



**Application of the Equity Rubric
for Purpose and Need to a Demonstration Corridor
in the Texas Megaregion**

Carol Abel Lewis, Ph.D.
Gwendolyn C. Goodwin, Ph.D.
Marcia Robin-Stout, M.S.
Graduate Student, Brandon Rogers

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16. Abstract State transportation agencies and Metropolitan Planning Organizations (MPOs) seek to improve access to employment, health care and other essential needs and services for vulnerable or at-risk populations. Purpose and need statements trigger the planning process for projects leading to increased mobility. The designation of purpose and need for rural and small urban communities is especially important as these locales often are considered less vigorously for public transportation than urban locations. Previous research for CM ² created an Equity Purpose and Need Rubric for use by transportation planners in megaregion settings. In addition to traditional poverty indicators, the rubric considers the percentage of income paid for transportation compared to the county mean. This research pays particular attention to communities in small urban and rural areas and applies the index to a corridor in the Texas Triangle megaregion.			
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Chapter 1. Background

State transportation agencies and Metropolitan Planning Organizations (MPOs) across the country apply variables seeking equity in transportation projects. The goal is to improve access to employment, health care and other essential needs and services for vulnerable or at-risk populations. Previous research in Cooperative Mobility for Competitive Megaregions (CM2) identified variables that are appropriate for developing Purpose and Need statements for transportation projects and created an Equity Purpose and Need Rubric for use by transportation planners in megaregion settings. In addition to traditional poverty indicators, the rubric considers the percentage of income paid for transportation compared to the county mean. This research pays particular attention to communities in small urban and rural areas.

The research focuses on the Texas Triangle that connects the state's largest cities of Houston, Dallas, Austin and San Antonio. The work will apply the Equity Purpose and Need Rubric to the Texas Megaregion US 290 Corridor that links the cities of Houston and Austin.

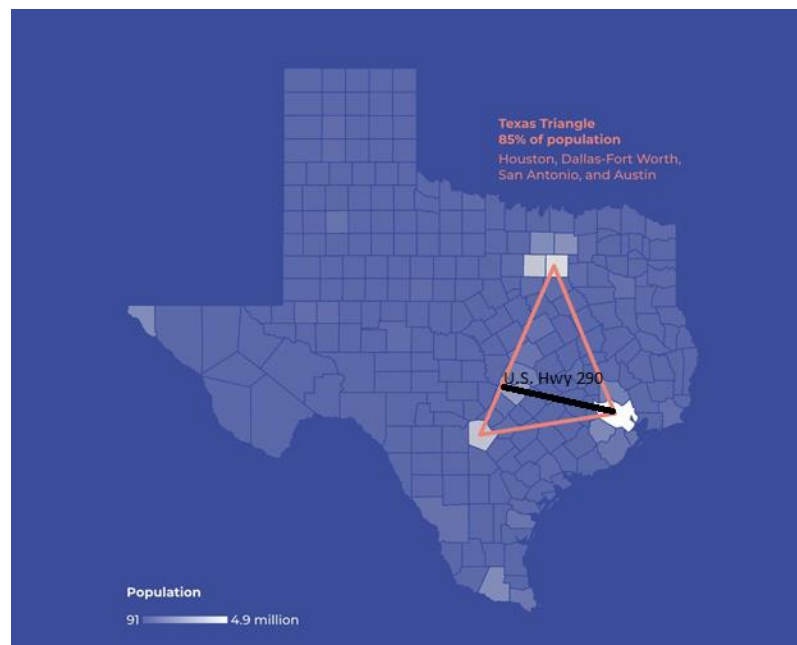


Figure 1. Texas Triangle

Previous work showed concentrations of vulnerable and environmental justice populations within the corridor. There are 6 interstice counties that comprise the corridor, one of those Fayette, has no vulnerable block groups according to the criteria applied. The counties along the corridor from west to east are Bastrop, Lee, Washington, Austin Waller (Figure 2).



Figure 2. US 290 Corridor Counties

MPO's conducting the planning are Houston-Galveston Area Council (HGAC) for Capital Area Metropolitan Planning Organization (CAMPO) for Bastrop on the west end and Waller at the east end. The MPO threshold of an urban center with population of 50,000 is not met for any of the counties in the interstice, so they are under the jurisdictions of Councils of Government (COGs). Washington County's transportation is a part of the Brazos Valley COG and Bastrop and Lee are in the Capital Area COG. The intensity of transportation planning is far less for resident in the COG jurisdictions than provided by the MPOs. The Texas Department of Transportation provides an overlay for rural public transit, but notes far more is needed, especially for rural areas. Their 2017 – 2021 report reads, "In rural areas, people from all over the region have a desire to access major employers that are potentially located miles from where they live"¹ This point is particularly applicable to low income and vulnerable populations. The ladder of opportunity for improving their lives is intertwined with accessibility to education and training which would make them more attractive to employers.

¹ Miller, Kristie. TxDOT Project 409256-106, Technical Memorandum, Statewide Perspectives from the 2017-2021 Regionally Coordinated Transportation Plans Review of 2017-2021 Public Transit-Human Services Transportation Plans ([TTI Regionally Coordinated Transportation Planning](#)), pg. 20.

Rural residents lag their urban counterparts in the capacity to move around without a vehicle. According to Brown and Stommes², 40% of rural residents do not have access to public transportation, which isolates them not only from employment opportunities, but also from government services designed to improve their life quality. These residents have inadequate opportunities to participate in activities that would enhance their economic, educational or social standing. Better public transportation would diminish the gap between their current accessibility and their needed accessibility. While not a focus of this research, social isolation for rural senior is a serious concern. Housing location decisions generally focus on affordability; access to employment matters, but may not be a priority when viewed in context of money available to pay for housing. Carlino and Mills³ in examining what matters in county development argue that in a good economy jobs follow people and in a bad economy people follows jobs; the point is that jobs and population are interdependent. In addition to employment, access to health care and healthy food options are critical. Our challenge is to describe the transportation gaps in three areas of need: Higher Education and Employment, Health and Food Deserts.

1.1 Access to Higher Education and Employment

As noted, good public transportation potentially translates into an opportunity for advanced education and employment for many people. For most Texans in rural areas, the only means of transportation is the private vehicle. For lower income residents, this means a larger share of the income must be spent on transportation, leaving even less money for other needs. For some people, there is a gap between educational background or skill set needed for jobs close to home.^{4,5} Therefore, traveling additional miles contributes to the regular transportation expenses. Previous research indicated population decrease for several of the case study

² Brown, Dennis M., and Eileen S. Stommes. 2004. Rural Governments Face Public Transportation Challenges and Opportunities, *Amber Waves*, Vol. 2, Issue 1, February. ([USDA Amber Waves](#))

³ Carlino Gerald and Edwin Mills (February 1987) The Determinants of County Growth. [Website](#)

⁴ Kasarda, John D. 1983. Entry-Level Jobs, Mobility, and Urban Minority Unemployment. *Urban Affairs Quarterly*, 19: 21-40.

⁵ Wachs, Martin and Brian D. Taylor. 1998. Can Transportation Strategies Help Meet the Welfare Challenge? *Journal of the American Planning Association*, 64, 1: 15-19.

corridor communities⁶. According to Chi, there is a notable link between transportation and population growth.^{7,8,9} Transportation accessibility is important to the population and is necessary for economic growth and development. While population change is dependent on many factors including national economic outlook (growth or loss), environmental variables, the demographic structure of the area, and employment, transit or public transportation is able to help bridge and support many of these variables.

1.2 Health Impacts

Work by Karner and London indicates that solid planning and improving regional transportation helps rural residents to be more integrated and opens opportunities¹⁰. Good transportation connections result in better physical health, enhanced environmental quality, and renewed economic health. Some research suggests that a person changing mode choice from driving to public transportation can significantly improve health by increasing walk access¹¹. Other research confirms that rural areas have more barriers than urban and small cities, especially related to a limitation of resources, having more options, and professionals with better training opportunities. Because the health care provider is operating in a smaller environment with a smaller practice, the barriers are exacerbated¹².

⁶ Lewis, C. Goodwin, G and al. (April 2019) Creating a Framework to Determine Purpose and Need for Increased Travel Options in the Megaregion for Vulnerable Non-urban Communities. [Equity Framework](#)

⁷ Chi, G., Voss, P. R., & Deller, S. C. (2006). (PDF) Rethinking Highway Effects on Population Change. Retrieved June 30, 2019, from

⁸ Chi, G. (2009, May). Can knowledge improve population forecasts at subcounty levels? Retrieved June 30, 2019, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2831277/>

⁹ Chi, G. (2010, January 19). The Impacts of Highway Expansion on Population Change: An Integrated Spatial Approach - Chi - 2010 - Rural Sociology - Wiley Online Library. Retrieved June 30, 2019, from <https://onlinelibrary.wiley.com/doi/10.1111/j.1549-0831.2009.00003>.

¹⁰ Karner, Alex and Jonathan London (2014). Rural Communities and Transportation Equity in California's San Joaquin Valley Transportation Research Board. Washington, D.C.

¹¹ Carpenter, Rochelle and Heather Zacarro (2018). Building Healthy and Prosperous Communities. Transportation for America & American Public Health Association.

¹² Christiane Brems, Mark E. Johnson, Teddy D. Warner & Laura Weiss Roberts (2006) Barriers to healthcare as reported by rural and urban interprofessional providers, Journal of Interprofessional Care, 20:2, 105-118, DOI: [10.1080/13561820600622208](https://doi.org/10.1080/13561820600622208)

1.3 Food Deserts

A critical component of well-living is access to healthy food options. Numerous studies highlight the discrepancy in distance and availability to healthy dietary choices for low income residents. Further, deserts have been thoroughly studied in their connection to obesity and related health outcomes. There are many definitions of Food Deserts; according to the Farlex Dictionary of Idioms, a food desert is defined as “a location that lack options for nutritious food, often associated with urban areas with stores that mostly offer non-perishable food.”¹³ The United States Department of Agriculture (USDA) specifies a food desert as “a part of the country void of fresh fruit, vegetables, and other healthful whole foods, usually found in impoverished areas.”¹⁴ Similarly, the Center of Disease Control (CDC) labels a food desert as “an area that lack access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet.”¹⁵ Reasonable access to healthy food is as difficult for rural low-income residents as it is for urban residents. Work done by the Rural Sociological Society defined rural food desert as when all resident are more than 10 miles from a supermarket supercenter¹⁶. Public transit linkages could help forge the gap in some way. While cold or frozen foods would not be suitable for transit traveling, supplies of fresh fruit and vegetables could be managed by transit. When looking at transit trip purpose for low income people and those with disabilities, Jansuwan, Christiansen and Chin¹⁷ found that low income people travel more for groceries, shopping, school, and education, whereas people with disabilities take more transit trips for leisure. Researchers warn as young people relocate from the rural communities, shrinking populations put pressure on volume - market driven merchants to remain in the rural areas.

¹³ [Dictionary Food Desert](#)

¹⁴ [Food and Agriculture Organization Website](#)

¹⁵ [Changing Food Deserts into Oases](#)

¹⁶ Morten, Lois Wright and Tony Blanchard (2007) Starved for Access: Life in Rural America's Food Deserts. Rural Realities, Vol 1, Iss 4. <http://www.ruralsociology.org>

¹⁷ Jansuwan, Sarawut, Keith M. Christensen; and Anthony Chen

Assessing the Transportation Needs of Low-Mobility Individuals: Case Study of a Small Case Study of a Small Urban Community in Utah; Journal of Urban Planning and Development Vol. 139, Issue 2 (June 2013)

Chapter 2. The Corridor

The US 290 corridor provides the link to many jobs and educational opportunities in the Texas north central area, however a major drawback in the 6 counties of the study is reliable consistent transportation. Since that does not exist in the study area, some residents move into the concentrated city areas where they can depend on vehicles for a shorter more affordable distance. Public transit is a remedy to connecting the rural with urban areas as it would offer dependable alternatives and act as a linkage between all the central areas. Workers of the service, retail, restaurants and accommodation industries are often low-income workers who most feel the cost of individual commuting by private vehicle.

Bastrop, Lee, Austin, Fayette, Washington and Waller are the perfect example of being proximate, but inadequately connected by public transportation. Nestled between Houston, with its renowned Texas Medical Center and Austin, the Texas state capital, these counties are at a commutable distance to benefit from the economic development and the breadth of educational institutions in the corridor. No fewer than twelve post-secondary, undergraduate or graduate institution are within the US290 corridor. This is a perfect example where public transportation could provide a link between the communities and employment, educational, cultural, health and shopping opportunities. Secondly, residents could take advantage of lower rural and small town housing prices. The US 290 corridor residents could maintain the residential lifestyle while enjoying the economic benefits of developed cities. Only Bastrop County, next to Austin's Travis County has public transportation.

2.1 Vulnerable Communities in the US 290 Corridor

This research identified vulnerable block groups using the mean 15.9% poverty rate for the state of Texas applied to the counties of Bastrop, Lee, Austin, Fayette, Washington, Waller, and Fayette. The 34 Block groups with a higher rate were classified as vulnerable (Table 1).

Table 1
34 Block Group Poverty Level Means

County	Percent Poverty
Austin	19
Bastrop	24
Lee	22
Waller	31
Washington	26
Texas	15.9

The vulnerable block group designation signified examination for percentages of female head of household, minority population, poverty population, non-English speakers and senior population greater than the county mean for each variable. Access to education, employment and health care is essential to improving the life opportunities for these residents.

2.1.1 Education

Observations regarding the employment and education sectors for residents along US 290 provide a perspective of the available opportunities for residents. The 2017 Census data show that all counties reflect the Texas average for high school education with 82% of residents graduating¹⁸. Table 2 shows a comparison of the 290 corridor attainment.

2.1.2 Employment

The team analyzed the 76 block groups that are within 5 miles each side of the US290 centerline for their economic industries. All six counties have a mix of industries with the majority as agricultural, mining, oil and gas, accommodations, healthcare and retail. Texas is known as a primary producer of oil and oil products and that industry influence appears in the corridor. The Texas monthly oil and gas production for February 2019 reflected output of 113.5M barrels of oil¹⁹ with the study area along the 290 corridor responsible for about 12.6% of the state totals.

2.1.3 Food Deserts

¹⁸ Pensacola News Journal. (n.d.). 2017 American Community Survey 5-Year Estimates. Retrieved June 29, 2019, from <https://data.pnj.com/american-community-survey/washington-county-texas/population/total-population/yty/05000US48477/>

¹⁹ RRC of Texas. (n.d.). Texas Monthly Oil & Gas Production. Retrieved June 29, 2019, from <https://www.rrc.state.tx.us/oil-gas/research-and-statistics/production-data/texas-monthly-oil-gas-production/>

One method to track the number of food deserts in the United States is the Food Access Research State Atlas created by the USDA²⁰. This atlas maps food access indicators for census tracts using ½-mile and 1-mile boundaries to the closest supermarket for urban areas, 10-mile and 20-mile boundaries to the closest supermarket for rural areas, and vehicle availability for all tracts. Along the U.S. Highway 290 Corridor between Houston, TX and Austin, TX, the results are mixed. The greatest gaps are in Bastrop with 5 to 8 tracts of low income people removed from beneficial food options. Austin, Bastrop, Lee, Waller, and Washington have tracts that are considered food deserts given residents low accessibility and the distance (Table 3). Bastrop shows the highest vulnerability with 5 tracts at the 10 and 20 mile distances.

Table 2
US 290 Corridor Educational Attainment Profile

Location	Population(sample)	HS	Percentage	College D.	Percentage	Associate	Percentage	Bachelors	Percentage	Masters	Percentage	Doctorate	Percentage
TEXAS (for Comparison)	17,454,431	14448527	82.80%	6218904	25.10%	1206509	6.10%	3288777	18.80%	1255615	7.20%	191047	1.60%
Austin County	19993	16392	82.20%	6076	30.50%	1633	8.20%	3075	15.40%	1028	5.20%	144	1%
Bastrop County	53159	42923	80.70%	14297	26.90%	3521	6.60%	7527	14.20%	2192	4.10%	545	1%
Fayette County	17974	14911	83%	4584	25.50%	1339	7.40%	2412	13.40%	590	3.30%	105	0.08%
Lee County	11512	9519	82.70%	2784	0.2	753	6.50%	1414	12.30%	493	4.30%	46	0.07%
Waller County	26108	20450	78.30%	6619	25.40%	1598	6.10%	3477	13.30%	1189	4.60%	187	0.60%
Washington County	23225	19639	84.60%	7362	31.70%	1808	7.80%	3876	16.70%	1198	5.20%	261	0.09%

Source: Values from the US Census, American Community Survey, 2017

Table 3
Food Dessert Tracts by Low Income and Low Access

County	No. of Tracts with Low Income and Low Access at 1 and 10 miles	No. of Tracts with Low Income and Low Access at .5 and 10 miles	No. of Tracts with Low Income and Low Access at 1 and 20 miles
Austin	0	0	0
Bastrop	5	5	2
Lee	1	1	1
Waller	1	1	1
Washington	0	0	0

Of the 76 block groups that are within 5 miles of the US 290 centerline, 34 are vulnerable (Figure 3). Also shown are proximate colleges and universities, medical facilities

²⁰ United States Department of Agriculture (USDA). Economic Research Service <https://www.ers.usda.gov/data-Food-Access-Research-Atlas>. [Food Access Map](#)

and grocery stores with fresh fruits and vegetables. Improved access to these facilities, as well as employment opportunities would begin to address the unmet travel needs in the corridor.

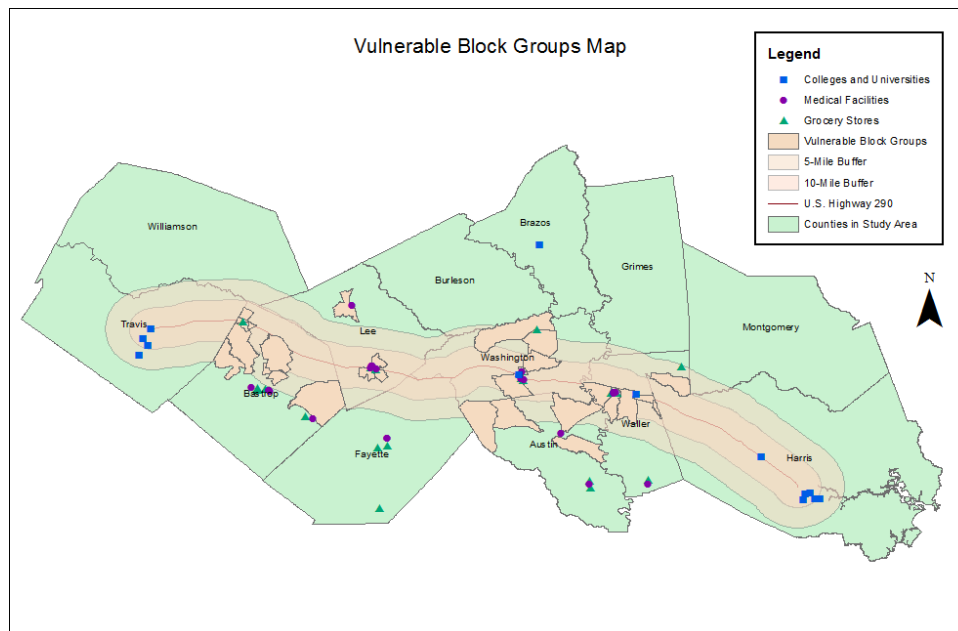


Figure 3. 290 Corridor Vulnerable Block Groups and Colleges & Universities, Medical Facilities or Grocery Stores.

2.1.4 Percent of Income Spent on Transportation

The majority of transportation environmental justice or vulnerability measures focus on sociodemographic variables. These are clearly an indication of people at risk of being marginalized for a variety of social conditions. Alone, however, they do not link directly to the shortcomings associated with transportation. This research considers the percent of income spent on transportation as compared to others in the same community. Specifically, the percent of income spent on transportation by households in each county with more than 2 persons is compared to the state of Texas mean of 11 percent (Table 4). Bastrop County's residents spend the same percentage on transportation as the Texas state mean. All other interstice county residents exceed the state mean on their transportation expenses with three of them spending 15 and 16 percent on transportation. These values are indexed per the state mean in the table for later use in the template. While Bastrop County residents are aligned with the state's means, Washington County residents show the greatest difference from the state's means.

Table 4. Percent of Income Spent on Transportation Index

County	State % Income for Trans	County % Income for Trans	% of Income for Index Value
Austin	11	12	1.2
Bastrop	11	11	1.0
Lee	11	15	1.4
Waller	11	15	1.4
Washington	11	16	1.5

2.1.5 Vulnerable Block Groups Index

The corridor's 76 block groups were categorized by percentages of female head of household, non-English speakers, minorities, seniors and households with no automobile available. Block groups received the vulnerable designation by a poverty percentage greater than the Texas mean of 15.9 percent. The categories of seniors and households with no automobiles proved not to contribute to vulnerability in this corridor. Many seniors exhibited higher than average incomes and there were very few households without a vehicle. The female head of household variable was the same as the county means. Percent minority and percent non-English speaking carried forward for the Vulnerable Block Group (VBG) Index.

The 34 vulnerable block group means are categorized by county and reflected next to the county mean (Table 5). Each variable is indexed and a mean index value is calculated. All counties' VBG index values range from 1.0 to 1.65 showing varying levels of difference from the county as a whole. Austin County's is lowest at 1.1 to the highest levels of vulnerability for Washington County at 1.65.

Table 5. US 290 Corridor EJ Vulnerable Block Group Index

County	% County Non-English Mean	% VBG Non-English Mean	VBG Non-English Index Value	% County Mean Minority	% VBG Mean Minority	VBG Mean Minority Index Value	VBG Index Value
Austin	17	19	1.1	26	29	1.1	1.10
Bastrop	47	57	1.2	69	77	1.1	1.15
Lee	20	26	1.3	37	48	1.3	1.30
Waller	24	32	1.3	54	66	1.2	1.25
Washington	11	20	1.8	32	47	1.5	1.65

Table 6 combines the VBG index and the percent of income spent on transportation index. All values exceed 1 and when viewed in tandem support consideration for need based corridor public transportation projects in the US 290 corridor. The scores show variance for the vulnerable block groups from the means of their counties and allows comparison of the counties' household incomes to the state's.

Table 6. Composite Index Value

County	VBG Index Value	% of Income for Transportation Index	Composite Index
Austin	1.10	1.2	1.15
Bastrop	1.15	1.1	1.25
Lee	1.30	1.4	1.35
Waller	1.25	1.4	1.33
Washington	1.65	1.5	1.58

2.2 Case Study Counties

The study team focused on the two counties that included the two most vulnerable block groups per the variables ethnicity, poverty rate, English speaking and female head of household for a detailed review (Figure 4 and Figure 5). In 2017, Bastrop Block Group 4, census tract 9502 had a percentage poverty population of 43.67% and Washington Block Group 1, Census Tract 1705 had a poverty population of 42.24%. Washington County and Bastrop County reflect industry bases similar to the other corridor counties.

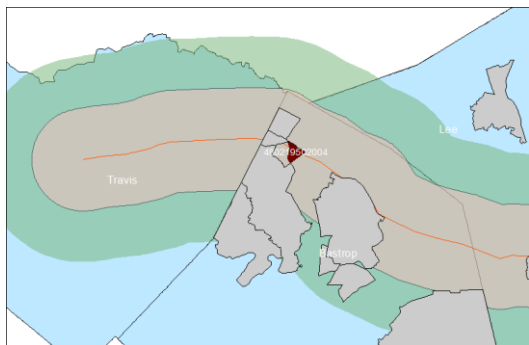


Figure 4. Bastrop County Block Group (Shown in Burgundy)

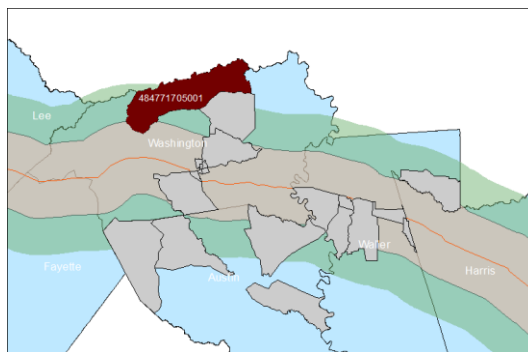


Figure 5. Washington County Block Group

2.2.1 Washington County

The jobs for Washington County are agriculture, mining, oil and gas, utilities, construction, manufacturing, retail and healthcare. For the month of February 2019, Washington County's operators produced over 2 million barrels of oil and over 8 million cubic feet of natural gas²¹. Agricultural revenue from almost 2700 farms, totaling 368,823 acres contributed \$43.5M in revenue from crop sales and life stock. The city center for Washington County's largest urban area grew and experienced a surge in new businesses and industries. Brenham had a 2017 population of 28,205 and a 3.5% rate of unemployment. In the shadow of this vibrancy and when looking at the most vulnerable block group in the county, a much different perspective is observed. In this block group, 1Census Tract 1705, the population decreased by 33.2% from 2012 and had an unemployment rate of 13.6 percent²². The unemployment rate is four times that of the State of Texas.

2.2.2 Bastrop County

Bastrop has several economic industries that include agricultural, construction, wholesale, retail, education, arts, forestry, hunting, mining and accommodations. According to the Texas permits based on the January 2019 production records, Bastrop County has over 20 top producing operators with 1500 plus active wells and recorded oil product. A recent Census

²¹ Washington County, TX Permits, Production, Wells & Operators. (n.d.). Retrieved June 30, 2019, from <http://www.drillingedge.com/texas/washington-county>

²² Pensacola News Journal. (2018, December 06). 2017 American Community Survey 5-Year Estimates. Retrieved March 03, 2019, from <https://data.pnj.com/american-community-survey/washington-county-texas/population/total-population/yty/05000US48477/>

of Agriculture profile shows Bastrop with approximately 2083 farms, totaling about 387,586 acres of farmland, grossing \$35M in crop and livestock sales.

The county's high school education rate is at 80.7% and the College degree is at 26.9% very close to the Texas average that holds for high school graduates at 82% and a College degree holder rate of 35.6%²³. According to the Texas Education Scorecard the economically disadvantaged for this county is at 67.4% compared to the Texas average of 58.7%²⁴. In the population count for the at-risk block group 4 Census Tract 9502 in Bastrop County, the US census records a population decrease of 28.2%²⁵.

In addition to being highly disadvantaged economically and experiencing high unemployment rates, Bastrop and Waller Counties showed a lower percentage of high school graduates than the state mean. Workers who are not highly educated often occupy positions in the service, retail, restaurants and accommodation industries for whom commuting cost is particularly impactful on their budgets.

²³ Economic Overview: Bastrop County, Texas (2016, October). 19Retrieved February 15, 2019, from <https://www.co.bastrop.tx.us/upload/page/0104/docs/EconomicOverviewBastropCountyTexas.pdf>

²⁴ Bastrop County Education Scorecard. (n.d.). Retrieved June 29, 2019, from <http://www.texaseducationscorecard.org/county/bastrop>

²⁵ Pensacola News Journal. (n.d.). 2017 American Community Survey 5-Year Estimates. Retrieved June 29, 2019, from <https://data.pnj.com/american-community-survey/bastrop-county-texas/population/total-population/ty/05000US48021/>

Chapter 3. Summary: Addressing the Gap

The US290 corridor provides the link to many jobs in Texas' central area, however a major drawback in the 6 counties of the study is reliable consistent public transportation. Since that does not exist in the study area, residents must purchase a vehicle leading to further tightening of already stretched budgets. Public transportation operates only in Bastrop County, leaving all other counties' residents to travel by personal vehicle to access jobs, education, health care or healthy food options. The research showed substantial gaps between the vulnerable residents and the location of health services, post high school educational opportunities and many jobs.

The percent of income spent on transportation is higher for all the counties than the Texas mean. The transportation cost burden considered along with the vulnerability of the 34 block groups reflects the extent to which each county's at-risk residents vary from the average Texan or other residents in their own county. Public transportation is a remedy to this situation as it would offer dependable alternatives and act as a connector between all the central areas.

As noted, the public entities expected to recognize and address the gap between need and available transit service are the MPOs and COGs. The most extensive public transportation planning is done by the MPOs of which Bastrop is in Capital Area Metropolitan Planning Organization and Waller is in the Houston Galveston Area Council. That leaves the other three interstice counties with no focused public transportation advocate. Current processes for including new transit projects in MPO jurisdictions rely on local agencies to submit projects to the MPOs. The process for the COGs is difficult as local implementing agencies are non-existent in the interstices. Marcantonio and Kramer argue that a new framework is needed to address social equity and should begin with the question of the most important unmet needs of the underserved communities²⁶. This work showed extensive unmet need and identified the 34 vulnerable block groups. People living there clearly need better access to employment, education, health care and healthier food options.

²⁶ Marcantonio, Richard A. and Kramer, Alex (Winter 2016). *A Community-Based Framework*. Progressive Planning. No. 296.

This work provides a numeric foundation for advocacy. The first step in taking a community of need into the planning process is documenting purpose and need. Thereafter, alternatives can be developed and a preferred best option identified. At that point the option can be placed in a queue for consideration by a state DOT or other entity to pursue. Ideas such as paratransit, structured carpooling or in the future rural automated vehicles enable discussion of more affordable multi-modal choices for rural residents. This research pays particular attention to communities in small urban and rural areas and applies the index to a corridor in the Texas Triangle megaregion.

References

- Bastrop County Education Scorecard. (n.d.). Retrieved June 29, 2019, from [Texas Education Scorecard](#).
- Brown, Dennis M., and Eileen S. Stommes. 2004. Rural Governments Face Public Transportation Challenges and Opportunities, *Amber Waves*, Vol. 2, Issue 1, February. ([Amber Waves Finding](#)).
- Brown, D. L., Fuguitt, G. V., Heaton, T. B., & Waseem, S. (1997). Continuities in Size of Place Preferences in the United ... Retrieved June 30, 2019, from [Continuities in Size of Place Preferences in the United States, 1972-19921](#)
- Carlino Gerald and Edwin Mills (February 1987) The Determinants of County Growth. [THE DETERMINANTS OF COUNTY GROWTH](#)
- Carpenter, Rochelle and Heather Zacarro (2018). Building Healthy and Prosperous Communities. Transportation for America & American Public Health Association.
- Chi, G., Voss, P. R., & Deller, S. C. (2006). (PDF) Rethinking Highway Effects on Population Change. Retrieved June 30, 2019, from https://www.researchgate.net/publication/257779230_Rethinking_Highway_Effects_on_Population_Change.
- Chi, G. (2010, January 19). The Impacts of Highway Expansion on Population Change: An Integrated Spatial Approach - Chi - 2010 - Rural Sociology - Wiley Online Library. Retrieved June 30, 2019, from [The Impacts of Highway Expansion on Population Change](#)
- Christiane Brems, Mark E. Johnson, Teddy D. Warner & Laura Weiss Roberts (2006) Barriers to healthcare as reported by rural and urban interprofessional providers, *Journal of Interprofessional Care*, 20:2, 105-118, DOI: [10.1080/13561820600622208](#).
- Economic Overview: Bastrop County, Texas (2016, October). 19 Retrieved February 15, 2019, from [Economic Overview Texas](#)
- Jansuwan, Sarawut, Keith M. Christensen; and Anthony Chen. Assessing the Transportation Needs of Low-Mobility Individuals: Case Study of a Small Case Study of a Small Urban Community in Utah; *Journal of Urban Planning and Development* Vol. 139, Issue 2 (June 2013).
- Karner, Alex and Jonathan London (2014). Rural Communities and Transportation Equity in California's San Joaquin Valley Transportation Research Board. Washington, D.C.
- Kasarda, John D. 1983. Entry-Level Jobs, Mobility, and Urban Minority Unemployment. *Urban Affairs Quarterly*, 19: 21-40.

- Lewis, C. Goodwin, G and al. (April 2019) **Creating a Framework to Determine Purpose and Need for Increased Travel Options in the Megaregion for Vulnerable Non-urban Communities.** [CAL Equity Framework](#)
- Marcantonio, Richard A. and Kramer, Alex (Winter 2016). *A Community-Based Framework*. Progressive Planning. No. 296.
- Miller, Kristie. TxDOT Project 409256-106, Technical Memorandum, Statewide Perspectives from the 2017-2021 Regionally Coordinated Transportation Plans Review of 2017-2021 Public Transit-Human Services Transportation Plans ([TTI Regionally Coordinated Transportation Planning](#)), pg. 20.
- Morten, Lois Wright and Tony Blanchard (2007) Starved for Access: Life in Rural America's Food Deserts. Rural Realities, Vol 1, Iss 4. [Rural Sociology Society](#).
- NASS-USDA. (2012). 2012 Census of Agriculture- Bastrop County Profile. Retrieved June 30, 2019, from [2012 County Agriculture Census](#).
- Pensacola News Journal. (n.d.). 2017 American Community Survey 5-Year Estimates. Retrieved June 29, 2019, from <https://data.pnj.com/american-community-survey/washington-county-texas/population/total-population/ty/05000US48477/>.
- Pensacola News Journal. (n.d.). 2017 American Community Survey 5-Year Estimates. Retrieved June 29, 2019, from [ACS: United States: Population Change: Total](#).
- RRC of Texas. (n.d.). Texas Monthly Oil & Gas Production. Retrieved June 29, 2019, from [Texas Monthly Oil & Gas Production](#).
- United States Department of Agriculture (USDA). Economic Research Service [Food Access Research Atlas](#)
- Wachs, Martin and Brian D. Taylor. 1998. Can Transportation Strategies Help Meet the Welfare Challenge? Journal of the American Planning Association, 64, 1: 15-19.
- Washington County, TX Permits, Production, Wells & Operators. (n.d.). Retrieved June 30, 2019, from <http://www.drillingedge.com/texas/washington-county>.