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Disparities in Access to Trauma Care in the United States: A Population-Based Analysis

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2. Acquisition of the data
3. Analysis and interpretation of the data
4. Drafting of the manuscript
5. Critical revision of the manuscript for important intellectual content
6. Statistical expertise
7. Obtained funding
8. Administrative, technical, or material support
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Abstract

Background—Injury is a major contributor to morbidity and mortality in the United States. Accordingly, expanding access to trauma care is a Healthy People priority. The extent to which disparities in access to trauma care exist in the US is unknown. Our objective was to describe geographic, demographic, and socioeconomic disparities in access to trauma care in the United States.

Methods—Cross-sectional study of the US population in 2010 using small units of geographic analysis and validated estimates of population access to a Level I or II trauma center within 60 minutes via ambulance or helicopter. We examined the association between geographic, demographic, and socioeconomic factors and trauma center access, with subgroup analyses of urban-rural disparities.

Results—Of the 309 million people in the US in 2010, 29.7 million lacked access to trauma care. Across the country, areas with higher income were significantly more likely to have access (OR 1.30, 95% CI 1.12–1.50), as were major cities (OR 2.13, 95% CI 1.25–3.62) and suburbs (OR 1.27, 95% CI 1.02–1.57). Areas with higher rates of uninsured (OR 0.09, 95% CI 0.07–0.11) and Medicaid or Medicare eligible patients (OR 0.69, 95% CI 0.59–0.82) were less likely to have access. Areas with higher proportions of blacks and non-whites were more likely to have access (OR 1.37, 95% CI 1.19–1.58), as were areas with higher proportions of Hispanics and foreign-born persons (OR 1.51, 95% CI 1.13–2.01). Overall, rurality was associated with significantly lower access to trauma care (OR 0.20, 95% CI 0.18–0.23).

Conclusion—While the majority of the United States has access to trauma care within an hour, almost 30 million US residents do not. Significant disparities in access were evident for vulnerable populations defined by insurance status, income, and rurality.

Keywords

health services geographic accessibility; healthcare disparities; trauma centers; health services research

INTRODUCTION

Each year, 29 million people are treated in United States (US) emergency departments for trauma. Of these injured people, 2.8 million are hospitalized, and more than 180,000 die. Trauma is the leading cause of death for individuals aged 1–44 years in the US.(1) Patients who sustain severe trauma are more likely to survive if they are treated in a trauma center,(2) and because injured patients rapidly decompensate in the absence of intervention, systems must be in place to assure rapid arrival at facilities equipped to optimally manage severe injury. As a result, trauma systems have been developed from a population perspective, and geographic access to trauma care is a Healthy People 2020 priority.(3–5)

Geographic variation in accessibility of trauma centers exists; in 2005 the almost 50 million US residents who lacked access to trauma care within an hour disproportionately lived in rural areas.(6) Some traditionally vulnerable populations (e.g., African Americans, foreign-born) have also been demonstrated to have less access to trauma care(7), and trauma center closures disproportionately affect communities with higher proportions of African Americans, the uninsured, and people living in poverty.(8–11)

Despite the trauma care system's commitment to population-based planning, little attention has been directed towards understanding what geographic and sociodemographic disparities may exist in access to trauma care. We sought to determine the existence and extent of disparities in access to trauma care in the United States.

METHODS

Data Sources

Trauma centers and air ambulances—Trauma center data were obtained from the 2010 Trauma Information Exchange Program (TIEP) of the American Trauma Society.(12) The TIEP inventory includes all Level I, II, and III trauma centers verified by either the American College of Surgeons or a designated state authority. We included only Level I and II trauma centers and we excluded all pediatric trauma centers in our analysis. Helipad locations (longitude and latitude) and flying speeds of helicopters based at each helipad were obtained from the 2009 Atlas and Database of Air Medical Services (ADAMS) of the Association of Air Medical Services.(13)

Geographic Data—Our primary geographic unit of analysis was the block group. In the nested geographies used by the US Census, a block group is a division of a Census tract comprising roughly 1,500 people that does not cross county or state boundaries. It is the smallest unit at which detailed demographic information is available. Population data, including block group centroid locations and demographic variables such as race, income, and gender, came from the 2010 Neilsen Claritas Demographic Estimations.(14)

We defined categories of urbanicity and rurality using the USDA's Modified Rural-Urban Continuum (MRUC) codes ((SDC) Supplemental Table 1). Rural block groups were defined as MRUC 8 or 9, while urban communities (major cities) were those with MRUC 0 or 1. Minor cities were defined as MRUC 2 and 3, and suburbs as MRUC 4–7.

Population demographic data—Demographic data were obtained from the 2005–2009 American Community Survey (ACS),(15) which is an ongoing survey of housing, economic, social, and racial characteristics conducted by the US Census Bureau that creates population estimates. The 2005–2009 ACS was the most recent five-year data set available that maintained the geographic boundaries consistent with our geographic units.

Data on hospital market characteristics and insurance status were available at the county level from the 2011–2012 Area Resource File (ARF).(16) The ARF is maintained by the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services and integrates information from multiple federal agencies. When primary data was only available at the county level, a per capita proportion was assigned to all block groups within that county.

Access Calculations—We defined access as the ability to reach a Level I or II trauma center within 60 minutes via ambulance or helicopter as has been done previously.(6, 17, 18) While we recognize that there is mixed empirical data to specifically support the notion of the so-called "golden hour" of trauma,(19, 20) (21–23) 60 minutes has been used in previous work on trauma system access(6, 7) and is the Healthy People 2020 benchmark to improve access to trauma care.(5)

Each of the 208,667 block groups in the United States (excluding Puerto Rico and Guam) was assigned a point in space within its geographic boundary that described the population-based center point of that block group (the block group centroid). The longitude-latitude coordinates of each of these centroids were used along with the coordinates for the nearest trauma center and helipad to calculate access time. Access calculations were made using a modified version of the Trauma Resource Allocation Model for Ambulances and Hospitals (TRAMAH).(24, 25) Time to the closest trauma center (by type) was determined using empirically derived fixed prehospital intervals (time from call to dispatch, time spent on scene, etc.) as well as calculated ambulance drive and fly times.(17) Driving time from the scene to the hospital was calculated from the block group centroid, using actual road networks and speed limits (ESRI ArcGIS Network Analyst model) and included a validated estimate of adjustment for the proximal leg of the journey (initial response of ambulance to patient) as has been done previously.(3) All calculations were done using C-sharp and ArcGIS.

Predictor Variables

Our primary objective was to explore disparities in access to trauma care, focusing on populations with barriers in accessing health care or recognized to have worse health outcomes.(26, 27) Drawing from previous work identifying an association between race, insurance status, and income with both trauma center closure and poor outcomes following trauma,(7–11) we used broad categories of race/ethnicity, age/gender, education, income, poverty, insurance, employment, and country of origin. In order to explore the influence of the overall local healthcare infrastructure of a community, we also examined variables related to healthcare resources and utilization. Finally, we examined the association between urbanicity/rurality and access to care.

Statistical Methods

We performed our analysis in three steps. We first performed descriptive analyses comparing demographic characteristics between geographies with and without access to trauma care and among subgroups within the broad categories of age, gender, race/ethnicity, education, socioeconomic status, and insurance status using data from a number of different sources as described above.

Second, we used data reduction techniques to convert the many available individual variables for important demographics of interest into a smaller number of representative variables. Doing so served to pool the range of rich information in our data and more efficiently classify each block group in a way that could be leveraged in subsequent analyses. Specifically, we used Cronbach's alpha to evaluate the internal consistency of each set of variables relating to each topic of interest ((SDC) Supplemental Table 2) and then used factor analysis to identify summary variables and calculate a z-score for each.(28)

Third, we used logistic regression to examine the association between the z-score predictor variables and access to trauma care. Initially we examined each variable by itself, using it first in its original continuous form and then as a categorical variable grouped into quintiles (using either the lowest or highest category as the reference) to examine whether the variable related to access to trauma care in a linear or a non-linear fashion. If the categorical form of the variable yielded a larger pseudo r-squared value, we used that form of the variable, and otherwise used the continuous form of the variable in subsequent adjusted analyses.(29, 30) We created an adjusted logistic regression model that assessed whether the predictor variables were associated with having access to trauma care in the United States overall. Finally, we stratified this model by rurality to investigate how the predictor variables related to trauma care access in major cities, in minor cities, in suburban areas, and in rural areas. Model fit was assessed using conventional diagnostics including variance inflation factors to identify multicollinearity and scatter plots of residuals to detect outliers.(31) We used Moran's I to test the residuals of each model for spatial autocorrelation. In instances when spatial autocorrelation was detected, we used a spatially lagged regression model that included a predictor variable that, for each block group, represented whether neighboring areas had access to trauma care as measured using an inverse distance weighted variable. The residuals from each of these models were then also tested using Moran's I in order to avoid the bias and imprecision associated with modeling geographic data.(32) Analyses were performed using Stata Version 12 (College Station, TX).

RESULTS

Our analysis included 208,667 block groups in the United States, describing a population of 309,038,974 people. Of those, 184,299 block groups (88.3% or 279.3 million Americans) had access to a Level I or II trauma center within an hour via ground or air ambulance transport while 24,368 (11.7% or 29.7 million Americans) did not. In unadjusted analysis, the population without prompt access to trauma care disproportionately had lower income, was more likely to live in poverty, and was more likely not to have health insurance (Table 1).

The results of the adjusted multivariate models of summary variables are reported in Table 2. A number of key characteristics were associated with access to trauma care for the United States as a whole and across the urban-rural continuum. Overall, areas with more uninsured and more Medicare and Medicaid eligible individuals were less likely to have access to trauma care within an hour (OR 0.09, 95% CI 0.07–0.11 and OR 0.69, 95% CI 0.59–0.82, respectively). In subgroup analysis, this relationship remained in minor cities (uninsured OR 0.01, 95% CI 0.01–0.02, Medicaid or Medicare eligible OR 0.18, 95% CI 0.15–0.21) and in suburbs (uninsured OR 0.04, 95% CI 0.02–0.07, Medicaid or Medicare eligible OR 0.34, 95% CI 0.26–0.59), as well as in rural areas with more uninsured individuals (OR 0.12, 95% CI 0.08–0.17). There was no association between these factors and access to trauma care in major cities, and the opposite relationship was observed in rural areas with high rates of Medicare and Medicaid eligible individuals (OR 1.89, 95% CI 1.42–2.44).

Increasing income was associated with increased odds of access in the country as a whole (OR 1.30, 95% CI 1.12–1.50), in major cities (OR 2.13, 95% CI 1.25–3.62), and in suburbs (OR 1.27, 95% CI 1.02–1.57), and showed a non-significant trend toward increased odds of access in minor cities (OR 1.15, 95% CI 0.90–1.47) and rural areas (OR 2.09, 95% CI 0.65–6.70). After having controlled for income, poverty, which emerged from the factor analysis as a construct that was distinct from income (defined in Supplemental Table 2) was associated with lower access to trauma care in major cities (OR 0.65, 95% CI 0.48–0.89) and a non-significant trend towards less access in the country as a whole (OR 0.91, 95% CI 0.79–1.04) and in suburbs (OR 0.89, 95% CI 0.89–1.06).

In the country as a whole, areas with higher rates of blacks and other non-whites, and areas with higher rates of Hispanic and foreign born individuals had greater access to trauma care (OR 1.37, 95% CI 1.19–1.58 and OR 1.51, 95% CI 1.13–2.01, respectively). Areas with higher proportions of blacks and non-whites also had greater access in minor cities (OR 1.68, 95% CI 1.06–2.69), suburbs (OR 1.28, 95% CI 1.06–1.53), and rural areas (OR 2.12, 95% CI 1.59–2.83) and showed a trend toward increased access in major cities. Areas with higher proportions of Hispanic and foreign born individuals, on the other hand, had increased access to trauma care in major cities (OR 2.66, 95% CI 1.53–4.60), but had decreased access in minor cities (OR 0.48, 95% CI 0.40–0.58). There was no association between areas with higher rates of Hispanics and foreign-born individuals and access to trauma care in suburbs and rural areas.

Rurality was associated with lower access to trauma care overall (OR 0.20, 95% CI 0.18–0.23), for minor cities (OR 0.75, 95% CI 0.64–0.87), and for rural areas (OR 0.02, 95% CI 0.01–0.04) (e.g. within rural areas, block groups with an MRUC of 9 had decreased odds of access compared to block groups with an MRUC of 8).

Various hospital market characteristics had mixed or non-significant effects on access. Increased healthcare utilization did not significantly affect access in the country as a whole or in major cities, decreased access in minor cities (OR 0.19, 95% CI0.15–0.26), and increased access in suburbs and rural areas (OR 1.55, 95% CI 1.01–2.39 and OR 1.83, 95% CI 1.61–2.07, respectively). Increased resources in terms of doctors and hospitals also had mixed effects across the various subgroups based on rurality (Table 2).

DISCUSSION

In this national study, we identify systematic, population-level associations between insurance status, economic factors, race/ethnicity, and rurality and rapid access to trauma care. Areas of the country with high rates of uninsurance, a greater number of Medicaid and Medicare eligible individuals, and more people living rurally had poor access to trauma care. These findings were observed for the United States as a whole and also within most of the subgroups that represent different levels of rurality. Economic factors were also associated with access to trauma care. Higher income was generally associated with increased access to care in the country as a whole and across subgroups, while poverty was associated with decreased access in major cities but had non-significant effects in the country as a whole and in other subgroups. Overall, areas with higher rates of black and non-whites as well as Hispanic and foreign born individuals had greater access to trauma care, though areas in minor cities with higher rates of Hispanic and foreign born individuals had less access.

Previous work on disparities in access to trauma care has demonstrated limited access to care for communities with a higher proportion of African-Americans and foreign-born persons living in urban areas,(7) and has shown that communities with higher proportions of poor, uninsured, and African-Americans were more likely to experience a decline in access between 2001 and 2007.(8) Our study expands on this previous work, and uses the data and methods employed by the federal government's Healthy People 2020 initiative. We provide a national exploration of the complex interactions between geography, demography, and socioeconomic status.

Areas with lower income, higher uninsurance rates, and higher rates of Medicaid and Medicare eligible individuals have less access to trauma care, suggesting that the payer mix plays a role in the development and designation of trauma centers. Previous work has described disparities in injury related outcomes among traditionally vulnerable populations, but the importance of the structural components of the emergency care system (e.g. access to trauma care) has not been emphasized. Our findings suggest that disparate access to trauma care is more associated with financial factors (lower income, higher uninsurance and higher rates of Medicaid and Medicare) than racial and ethnic minorities. Whether systematic disparities in trauma care access are associated with disparities in outcomes among vulnerable populations warrants investigation.

We observed differences in magnitude of effect and on occasion reversal of effect along the urban-rural continuum for a number of different variables. Our interpretation of this finding is that identifying hot spots in disparities for access to care requires a scalable method that allows for nuanced examination at the local level. With 38% of the United States population living in major cities (MRUC 0 and 1), it is likely that summary statistics and crude analyses obscure subtle differences, may hide existing disparities, or be incomplete by allowing large urban populations to drive overall findings.

Drivers of disparities are likely local, as evidenced by the fact that while areas with higher rates of Hispanic and foreign-born individuals had increased access overall (driven by major cities), similar populations in minor cities faced decreased odds of access. Similarly, the decreased access to trauma care faced by areas in major cities with higher proportions of people living in poverty identifies the urban poor as a specific population, defined by both geography and economics, that is particularly at risk for limited access. These two examples highlight the hazard of failing to capture local subtleties in access disparities and make it clear that certain especially vulnerable subpopulations may exist within traditionally disadvantaged groups. The importance of identifying specific populations with poor access to trauma care is further compounded by the known association between lack of trauma center access and increased mortality.(33) We believe that the scalable methods described here could bolster the Healthy People initiative in 2020, and beyond, to improve population access to trauma care by increasing transparency about disparities, empowering communities to examine the equity in their state systems, and developing incentives to increase access to trauma care for high-risk communities.

The study has a number of limitations. Our analysis used administrative data and thus has the inherent shortcomings of an analysis of this type. Key among these is the ability to fully capture the sociodemographic characteristics of a community, including some of the important variables we sought to explore. By deriving composite demographic and socioeconomic variables from multiple datasets, we believe that we were able to mitigate some of the uncertainty inherent in this type of analysis. The tradeoff associated with using composite variables is that we are unable to point to a single aspect of a community as the most important target to improve access and decrease disparities. Similarly, as this was an ecological analysis, it cannot speak directly to causation, and bias may exist in terms of drawing conclusions about individuals from aggregate data. However, larger healthcare systems decisions, including those about trauma care systems, are overwhelmingly made for populations and not on an individual-by-individual basis limiting concerns over ecologic bias. Also, the design, being cross-sectional, does not let us account for whether changes in community characteristics led to changes in access, or vice versa over time. It would be valuable for example to study whether hospital openings and closings, particularly in states that experienced new Level II for-profit expansions, served to possibly ameliorate or increase disparities in access. This question is worthy of separate study. Also, we defined access in terms of only Level I and II centers whereas some regional trauma systems rely on Level III and IV centers. Had we included study centers in our definition, we expect that the rural access disparity that we observed would have been attenuated to some extent. We chose to define our outcome as access to only Level I and II centers however given that these centers have been found to provide superior trauma care. Given the ultimate goal to decrease morbidity and mortality, we thought this definition would generate findings that can most responsibly describe the current state of disparities to access to high-caliber trauma care in the United States. Finally, while our results present a strong argument that systematic disparities in trauma center access exist and may affect vulnerable and economically disadvantaged populations in certain areas, demonstrating that this lack of access affects outcomes following injury is beyond the scope of this project.

CONCLUSION

As of 2010, 29.7 million Americans still lack access to a Level I or II trauma center within 60 minutes. Areas with higher rates of vulnerable groups including the uninsured, lower income populations, and rural populations overall are disproportionately affected. There is a complex interplay between socioeconomic, hospital market, and demographic characteristics that varies with rurality. Achieving the Healthy People 2020 goal of improving access to trauma care requires an understanding of the structural components of healthcare that may underlie disparities in health outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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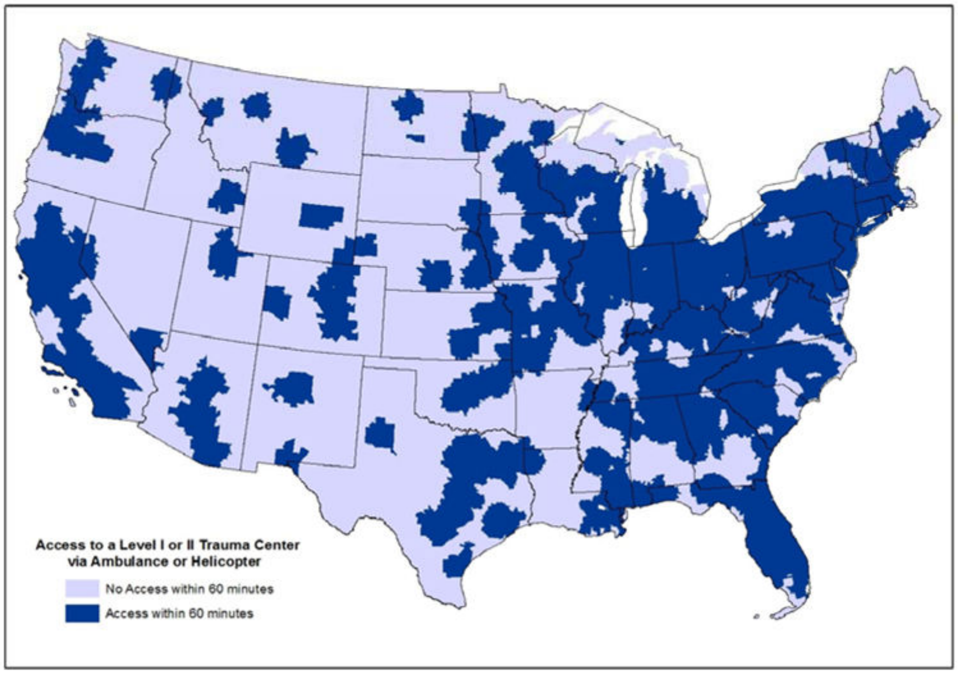

Figure 1.
Areas of the United States with Access to a Level I or II Trauma Center within 1 hour in 2010.

Table 1

Demographic Characteristics of Block Groups in the United States, Stratified by Trauma Center Access (unadjusted)

	All Block Groups in the USA		Block Groups with Access to a Level I or II Trauma Center*	Block Groups without Access to a Level I or II Trauma Center*
	Median	**Interquartile Range**	**Median**	**Median**
Income				
Per Capita Income[1]	$23,139	$17,551 – $31,060	$23,775	$19,972
Per Capita Income[2]	$23,208	$17,316 – $31,363	$23,876	$19,810
Median Household Income[2]	$48,125	$34,643 – $66,875	$49,909	$38,830
Median Family Income[2]	$57,404	$41,563 – $79,000	$59,375	$47,614
Poverty				
% Population Under 18 Living in Poverty[3]	15.2%	5.9% – 29.1%	14.3%	21.6%
% Population 18 to 64 Living in Poverty[3]	10.7%	5.8% – 18.2%	10.1%	14.6%
% Population 65 and Over Living in Poverty[3]	8.2%	3.8% – 14.8%	7.7%	11.4%
% Total Population Living in Poverty[3]	11.5%	6.1% – 19.6%	10.9%	15.4%
% of Households Receiving Public Assistance Income[2]	0.5%	0.0% – 3.6%	0.3%	1.0%
% of Families with Income Below the Poverty Level[2]	6.6%	0.0% – 16.5%	6.1%	10.3%
Insurance Status				
% Under 19 without Health Insurance[4]	7.1%	5.4 – 11.0%	6.8%	9.6%
% Under 65 without Health Insurance[4]	16.3%	12.7% – 20.2%	15.8%	19.9%
CMS Eligibles				
% Eligible for Medicare[4]	14.9%	12.3% – 17.5%	14.5%	17.8%
% Eligible for Medicaid[4]	19.0%	14.2% – 24.6%	18.6%	22.6%
Education – Dropouts				
% Population 25 or Over with Less than High School Degree[2]	13.0%	6.2% – 23.4%	12.5%	16.3%
% Population 25 or Over with Some College Education[2]	27.2%	20.3% – 34.0%	27.0%	28.2%
Education – Degrees				
% Population 25 or Over, High School Graduate[2]	30.8%	21.2% – 39.9%	30.1%	35.1%
% Population 25 or Over, Bachelors Degree[2]	13.5%	7.1% – 22.8%	14.2%	10.1%
% Population 25 or Over, Master's Degree[2]	4.5%	1.6% – 9.4%	4.8%	3.0%
% Population 25 or Over, Professional Degree[2]	0.3%	0.0% – 2.4%	0.5%	0.0%
% Population 25 or Over, Doctoral Degree[2]	0.0%	0.0% – 1.3%	0.0%	0.0%

	All Block Groups in the USA		Block Groups with Access to a Level I or II Trauma Center*	Block Groups without Access to a Level I or II Trauma Center*
	Median	Interquartile Range	Median	Median
Employment				
% in Labor Force who are Employed[1]	94.6%	90.8% – 97.1%	94.6%	94.5%
Race				
% Black[1]	2.7%	0.6% – 12.9%	3.0%	1.1%
% White[1]	84.0%	56.4% – 94.4%	83.4%	87.7%
% Non-White[1]	16.0%	5.6% – 43.6%	16.6%	12.3%
Ethnicity & Origin				
% Hispanic[1]	4.5%	1.6% – 15.4%	4.7%	2.9%
% Foreign-Born[1]	5.9%	2.0% – 15.4%	6.7%	2.2%
Healthcare Utilization				
Total Hospital Admissions per 1,000 Population[4]	118.9	83.0 – 166.2	119.1	98.0
Total Hospital Beds per 1,000 Population[4]	2.9	2.0 – 4.1	2.9	3.0
Total Hospital Inpatient Days Per 1,000 Population[4]	739.2	439.2 – 1054.0	754.7	503.4
Total Hospital ED Visits per 1,000 Population[4]	398.3	278.7 – 524.3	0.4	467.9
Healthcare Resources – Doctors				
Non-Federal MDs in General Surgery Devoted to Total Patient Care per 100,000 Population[4]	10.5	6.4 – 14.4	10.7	6.6
Non-Federal MDs in Emergency Medicine Devoted to Total Patient Care per 100,000 Population[4]	9.7	5.0 – 13.9	10.4	3.7
Healthcare Resources – Hospitals				
Total Number of Hospitals Per 10,000 population[4]	16.0	11.0 – 26.0	15.0	40.0
Per Capita Total Number of Critical Access Hospitals[4]	0.0	0.0 – 0.0	0.0	0.0
Per Capita STG Hospitals With ED[4]	8.1	5.9 – 15.0	7.8	24.0
			Of Block Groups with a given Rurality, Percentage that	
	Percentage of All Block Groups in the Country by Rurality		Have Access to Trauma Care**	Do not have Access to Trauma Care**
Rurality				
Major Cities[4]	50.3%		99.7%	0.3%
Minor Cities[4]	29.2%		89.1%	11.0%
Suburbs[4]	18.0%		61.6%	38.4%

	All Block Groups in the USA		Block Groups with Access to a Level I or II Trauma Center[*]	Block Groups without Access to a Level I or II Trauma Center[*]
	Median	**Interquartile Range**	**Median**	**Median**
Rural[4]	2.5%		43.2%	56.9%

[*] Within 60 minutes, driving or flying, crossing state boundaries

[**] Level I or II Trauma Center within 60 minutes, driving or flying, crossing state boundaries

[1] Neilsen/Claritas (block group level data)

[2] 2005 – 2009 ACS (block group level data)

[3] 2005 – 2009 ACS (census tract level data)

[4] 2011 – 2012 ARF (county level data)

Table 2

Adjusted Multivariate Logistic Regression – Access to a Level I or II TC within 60 minutes, Driving or Flying+

	USA			Major Cities			Minor Cities			Suburbs			Rural		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Income[1]	1.30***	1.12	1.50	2.13**	1.25	3.62	1.15	0.90	1.47	1.27*	1.02	1.57	2.09	0.65	6.70
Uninsured[1]	0.09***	0.07	0.11	0.22	0.01	44.05	0.01***	0.01	0.02	0.04***	0.02	0.07	0.12***	0.08	0.17
Medicaid/Medicare Eligibles[1]	0.69***	0.59	0.82	0.52	0.01	25.91	0.18***	0.15	0.21	0.34***	0.26	0.59	1.89***	1.42	2.44
Poverty[1]	0.91	0.79	1.04	0.65**	0.48	0.89	1.00	0.79	1.27	0.89	0.75	1.06	1.03	0.53	1.99
Education-Degrees[1]	1.11	0.94	1.31	1.32	0.62	2.79	1.58	1.00	2.49	0.94	0.79	1.13	0.68	0.345	1.30
Education-Dropouts[1]	0.97	0.91	1.02	0.86	0.70	1.07	1.66**	1.24	2.21	1.00	0.94	1.08	0.95	0.72	1.25
Black and Non-Whites[1]	1.37***	1.19	1.58	1.53	0.87	2.66	1.68*	1.06	2.69	1.28**	1.06	1.53	2.12***	1.59	2.83
Hispanic and Foreign Born[1]	1.51**	1.13	2.01	2.66**	1.53	4.60	0.48***	0.40	0.58	1.08	0.70	1.69	0.99	0.40	2.83
Healthcare Utilization[1]	0.92	0.75	1.13	5.64	0.01	3813.13	0.19***	0.15	0.26	1.55*	1.01	2.39	1.83***	1.61	2.07
Resources-Hospitals[1]	0.48***	0.41	0.55	1.02	0.00	119.99	2.51***	2.07	3.05	0.11***	0.06	2.39	0.34***	0.30	0.38
Resources-Doctors[1]	0.91	0.75	1.10	3.71	0.00	20953.16	1.04**	1.01	1.06	0.35**	0.13	0.95	1.71***	1.38	2.10
Percent Employed	1.02***	1.01	1.03	1.02	0.99	1.06	0.04***	0.02	0.07	1.01	1.00	1.02	1.07*	1.02	1.12
MRUC	0.20***	0.18	0.23	18.21	0.00	44563.22	0.75***	0.64	0.87	1.12***	1.08	1.19	0.02***	0.01	0.04

[1] Factored (composite) variable.

* p<0.05

** p<0.01

*** p<0.001

+ Results adjusted for spatial auto-correlation.