Assessing Impacts of Rising Fuel Prices on Rural Native Americans

Jon Mielke
Jeremy Mattson
David Ripplinger

Small Urban & Rural Transit Center
Upper Great Plains Transportation Institute
North Dakota State University
Fargo, North Dakota

November 2008

Acknowledgement

This research was sponsored by the Federal Transit Administration, United States Department of Transportation, and conducted by the Small Urban & Rural Transit Center within the Upper Great Plains Transportation Institute at North Dakota State University. Contributing authors were Jon Mielke, Jeremy Mattson, and David Ripplinger.

Peer review assistance was provided by Dennis Trusty, director of the Northern Plains Tribal Technical Assistance Program, and Pam Ternes, director of Standing Rock Public Transportation, Ft. Yates, North Dakota. Additional assistance was provided by the staff of the Oil Price Information Service.

The guidance of Jill Hough of the Small Urban & Rural Transit Center and Henry Nejako, FTA Project Manager for the project, are also acknowledged.

Disclaimer

The contents presented in this report are the sole responsibility of the Small Urban & Rural Transit Center, the Upper Great Plains Transportation Institute, and the authors.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Rising fuel prices have a greater relative impact on rural residents, based on the premise that rural incomes are lower than urban incomes and that rural residents travel more miles via personal vehicle each year than city dwellers. Given the fact that many Indian reservations are extremely rural and have some of the lowest income levels in the nation, it seems logical to assume that Native Americans in rural areas may be among the most impacted by rising fuel prices. This paper tests this hypothesis.

The New York Times reported on June 9, 2008, that rural residents are impacted more by rising gasoline prices than their urban counterparts. The reasons for the differential are lower rural income levels and longer commute distances. The article noted that while urban dwellers may spend 4% or less of their income on gasoline, some rural residents reportedly spend over 13% of their income on motor fuel (Krauss 2008).

A primary source of the New York Times report was a "Pain At The Pump" study conducted by the Oil Price Information Service (OPIS), a fuel analysis firm based in Gaithersburg, Maryland. OPIS collects weekly fuel price data that is used and disseminated by the American Automobile Association (AAA). OPIS used state-level per capita vehicle miles traveled data compiled by the Bureau of Transportation Statistics, 2004 county-level household income data available from the U.S. Census Bureau, and local fuel prices to determine what percentage of household incomes are spent on motor fuel (Atkins 2008).

This study will review comparable, updated, and more specific data for rural counties that are comprised of at least 25% Native Americans. These counties will be compared with national averages, the states that the highly Native counties are located in, and select urban areas of the country. This comparison will also include some of the highly impacted counties identified in the OPIS report.

2. MEDIAN HOUSEHOLD INCOME

Household income, as defined by the U.S. Census Bureau, is the pre-tax sum of money income received in the calendar year by all household members 15 years of age and older. Sources of income include wages and salaries, interest, dividends, rental income, Social Security income, welfare payments, retirement benefits, and disability pensions.

Decennial census reports provide median household income figures for geographical areas such as states, counties, cities, and Indian reservations. The 2000 census reported median household income figures based on 1999 income.

The Census Bureau also provides updated household income estimates during the 10-year period between decennial reports. These updates are available at state and county levels but are not provided for Indian reservations.

Since 2000 census household income data are nearly 10 years old, this report will utilize 2005 Census Bureau estimates. As indicated above, these estimates are not available for Indian reservations. This report will, therefore, focus on counties in the lower 48 states where at least 25% of the population is Native American. These counties, as identified via U.S. Census Bureau data, are listed in Table 2.1 and presented pictorially in Figure 2.1. Table 2.1 also indicates how much of the land in each county is located on a reservation.

Table 2.1 Rural Counties With 25% or More Native Population

Reservation or Tribe	State	County	Population (2006 Est.)	% Native Population	% Reservation Land
Blackfeet	MT	Glacier	13,578	61.4%	71%
Cherokee	OK	Adair	22,317	41.6%	100%
Cherokee	NC	Swain	13,445	26.3%	7%
Cherokee & U. Keetoowah	OK	Cherokee	44,910	31.5%	100%
Cheyenne River	SD	Dewey	6,112	72.7%	100%
	SD	Ziebach	2,706	71.3%	100%
Crow	MT	Big Horn	13,035	60.6%	70%
Crow Creek	SD	Buffalo	2,109	80.8%	52%
Fort Belknap	MT	Blaine	6,615	47.5%	18%
Fort Peck	MT	Roosevelt	10,496	58.9%	74%
Lake Traverse	SD	Roberts	10,024	31.1%	80%
Lower Brule	SD	Lyman	3,929	36.9%	20%
Menominee	WI	Menominee	4,597	81.9%	100%
Navajo & Zuni	NM	Cibola	27,481	41.0%	23%
Navajo Nation	UT	San Juan	14,265	53.9%	24%
Northern Cheyenne	MT	Rosebud	9,261	34.2%	7%
Omaha	NE	Thurston	7,273	50.5%	100%
Pine Ridge	SD	Bennett	3,543	54.2%	0%
	SD	Jackson	2,900	51.2%	57%
	SD	Shannon	13,824	86.8%	100%
Rosebud	SD	Mellette	2,099	54.3%	0%
		Todd	10,088	81.0%	100%
Spirit Lake	ND	Benson	6,997	50.9%	30%
Standing Rock	ND	Sioux	4,282	80.0%	100%
Standing Rock	SD	Corson	4,288	64.0%	100%
Three Affiliated	ND	Mountrail	6,442	31.2%	21%
Turtle Mountain	ND	Rolette	13,903	70.8%	8%
White Earth	MN	Mahnomen	5,072	29.9%	100%
Yankton	SD	Charles Mix	9,224	31.1%	59%

Source: U.S. Census Bureau

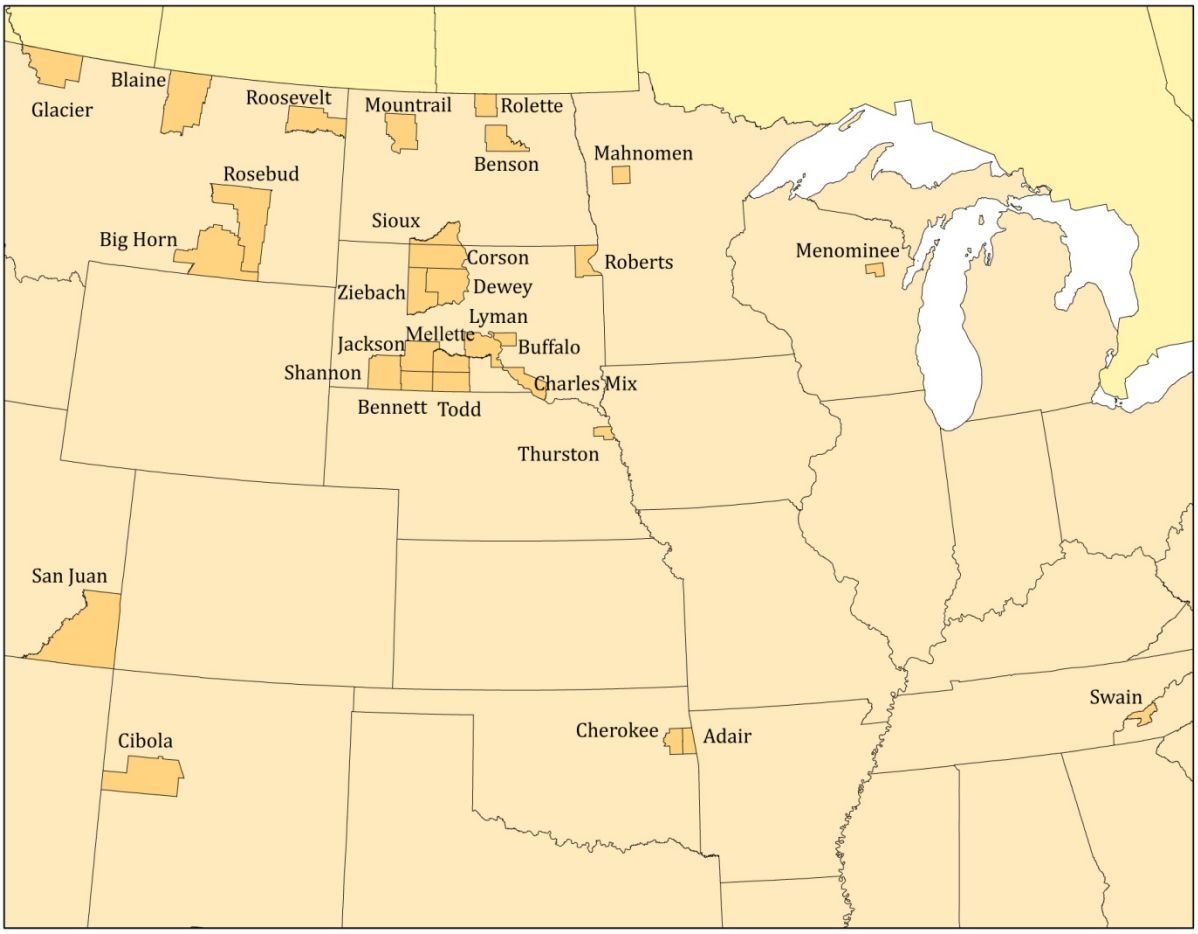

Figure 2.1 Rural Counties With 25% or More Native Population
Source: U.S. Census Bureau

It should be noted that there are another six counties that have comparable concentrations of Native populations. These counties do, however, have larger metropolitan centers and over 50,000 residents. They are, therefore, more urban in nature and outside the scope of this study. These counties and their Native populations are identified in Table 2.2 and again on the map in Figure 2.2.

Table 2.2 Urban Counties With 25% or More Native Population

Reservation or Tribe	**State**	**County**	**Population (2006 Est.)**	**% Native**
Hopi, Havasupai, & Navajo	AZ	Coconino	124,953	28.8%
Lumbee	NC	Robeson	129,021	37.5%
Navajo & Apache	AZ	Apache	71,118	74.1%
Navajo & Hopi	AZ	Navajo	111,399	46.4%
Navajo & Ute Mountain	NM	San Juan	126,473	38.2%
Navajo & Zuni	NM	McKinley	71,875	74.5%

Source: U.S. Census Bureau

Even though the counties listed in Table 2.2 are considered urban for the purposes of this study, Figure 2.2 illustrates that several are geographically quite large. While these counties have sizeable populations, several also have large rural areas. As will be discussed in later sections, the relatively non-homogeneous nature of these counties may cause their county median household income and per household vehicle miles traveled estimates to be atypical of the rural population of each county. These counties are not, therefore, included in the comparison group with the nation's rural counties with significant Native populations.

Figure 2.2 Urban Counties With 25% or More Native Population
Source: U.S. Census Bureau

Based on 2005 Census Bureau estimates, the highly Native counties identified in Table 2.1 have median household incomes that are considerably below national and regional levels. As Table 2.3 and Figure 2.3 indicate, the 2005 national median household income was $46,242. The average of the median household incomes in the 29 Indian Country counties listed in Table 2.3 was $30,087, 35% below the national average and 31% below the multi-state average. This finding is consistent with 2000 census data which indicated that 25% of all households on Indian reservations in the lower 48 states had incomes below the poverty level, compared to 12% in the nation as a whole.

Table 2.3 Median Household Incomes

City / State/ Reservation	State	County	2005 Median Household Income
Major Metro Areas			
Boston	MA	Suffolk	$43,155
Chicago	IL	Cook	$48,919
Dallas	TX	Dallas	$42,791
Denver	CO	Jefferson	$60,996
Kansas City	MO	Jackson	$43,284
Los Angeles	CA	Los Angeles	$48,166
Miami	FL	Miami-Dade	$37,142
Minneapolis	MN	Hennepin	$56,004
New York City	NY	Bronx	$29,331
Phoenix	AZ	Maricopa	$48,752
Seattle	WA	King	$58,351
Washington	DC	Dist. of Col.	$48,078
Major Metro Average			$47,330
Reservation States			
Minnesota	MN	Statewide	$52,048
Montana	MT	Statewide	$38,503
Nebraska	NE	Statewide	$43,675
New Mexico	NM	Statewide	$37,603
North Carolina	NC	Statewide	$40,781
North Dakota	ND	Statewide	$40,818
Oklahoma	OK	Statewide	$37,020
South Dakota	SD	Statewide	$40,096
Wisconsin	WI	Statewide	$47,141
Utah	UT	Statewide	$48,155
Multi-State Average			$43,724
National Average	US	Country-wide	$46,242
Reservation or Tribe			
Blackfeet	MT	Glacier	$30,285
Cherokee	OK	Adair	$28,594
Cherokee	NC	Swain	$33,485
Cherokee & U. Keetoowah	OK	Cherokee	$29,761
Cheyenne River	SD	Dewey	$29,716
	SD	Ziebach	$21,213
Crow	MT	Big Horn	$30,680

City / State/ Reservation	State	County	2005 Median Household Income
Crow Creek	SD	Buffalo	$16,868
Fort Belknap	MT	Blaine	$28,486
Fort Peck	MT	Roosevelt	$27,419
Lake Traverse	SD	Roberts	$32,008
Lower Brule	SD	Lyman	$30,750
Menominee	WI	Menominee	$30,839
Navajo & Zuni	NM	Cibola	$31,670
Navajo Nation	UT	San Juan	$29,852
Northern Cheyenne	MT	Rosebud	$41,185
Omaha	NE	Thurston	$31,836
Pine Ridge	SD	Bennett	$30,823
	SD	Jackson	$25,445
	SD	Shannon	$25,487
Rosebud	SD	Mellette	$28,439
	SD	Todd	$22,341
Spirit Lake	ND	Benson	$29,721
Standing Rock	ND	Sioux	$25,720
Standing Rock	SD	Corson	$23,436
Three Affiliated	ND	Mountrail	$34,541
Turtle Mountain	ND	Rolette	$29,748
White Earth	MN	Mahnomen	$31,903
Yankton	SD	Charles Mix	$29,778
Reservation Average			$30,087
OPIS Counties			
Wilcox	AL	Wilcox	$19,407
Jefferson	MS	Jefferson	$21,203
Holmes	MS	Holmes	$20,916
Wilkinson	MS	Wilkinson	$21,904
Clay	KY	Clay	$19,728
OPIS County Average			$20,448

Source: U.S Census Bureau 2005

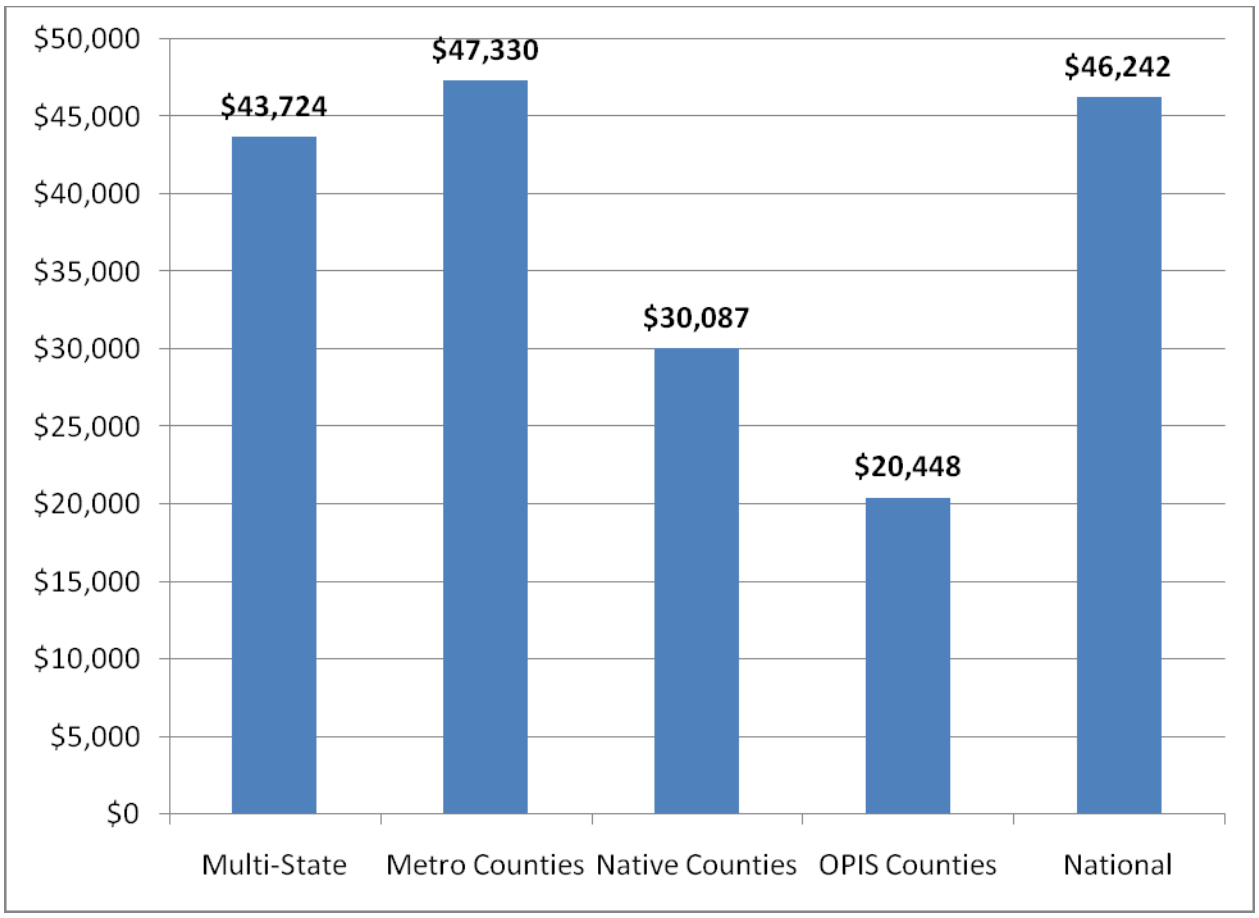

Figure 2.3 Median Household Incomes for Comparison Groups

Table 2.3 and Figure 2.3 also include median income data for five counties that were identified in the "Pain At The Pump" OPIS report as being the most highly impacted by rising fuel prices. As indicated, these counties have median household incomes that are considerably lower than the Indian Country counties reviewed in this study. The median household income figures for these counties have been updated from the OPIS report to reflect 2005 estimates and to make them consistent with other presentations in this study.

Rising fuel prices have a relatively greater impact on low-income households if those households travel the same or a greater number of miles per year than their higher-income counterparts and pay comparable prices for fuel. The following section compares household vehicle miles traveled and annual expenditures for fuel for the subject counties in Indian Country relative to those in the multi-state region as well as select metropolitan areas, OPIS comparison counties, and the national average. This information will ultimately contribute to the process of determining the relative impacts of rising fuel prices on various households.

3. ANNUAL FUEL EXPENDITURES

A household's annual expenditures for motor fuel are a function of miles traveled, vehicle miles per gallon, and fuel prices. The following paragraphs quantify these expenditures for each of the geographic areas identified earlier.

Theoretically, there are several ways that a household's annual expenditures for fuel may be determined. The most straightforward method would obviously be an information collection mechanism that surveys households on the subject. Unfortunately, it does not appear that this type information is readily available with the specificity required by this study.

One existing source of related information is the National Household Travel Survey (NHTS) conducted by the Department of Transportation's Federal Highway Administration (FHWA). Another source is the U.S. Department of Energy's Energy Information Administration (EIA). The NHTS claims to be the nation's official inventory of daily travel. The most recent NHTS was conducted in 2001 and consisted of a sample of almost 70,000 U.S. households. A new survey is being conducted in 2008, but it has not yet been completed. This survey, however, is conducted at a national, rather than local, level.

The EIA published a report in 2005 entitled *Household Vehicles Energy Use: Latest Data & Trend.* That report used data from the 2001 NHTS and calculated per household fuel consumption and related annual expenditures for fuel. These data are presented for urban vs. rural areas and for various multi-state regions of the country (Energy Information Administration 2005). While this report does not present data for individual states, counties, or Indian reservations, it does indicate that rural households with a motor vehicle consumed an average of 1,469 gallons of fuel annually, compared to 1,054 gallons for their urban counterparts.

The rural nature of the subject counties in Indian Country is exemplified by the population and population density data presented in Table 3.1. As this table indicates, the 29 Indian Country counties have an average population density of 5.0 persons per square mile. The multi-state comparison group has a population density of 38.7 persons per square mile while the national average is 79.6. The 12 metropolitan areas listed in Table 3.1 have an average population density of 1,435.9 per square mile and the five OPIS comparison counties have 23.3 residents per square mile. The "rural" OPIS counties have population densities that are 4.6 times higher than the subject Indian Country counties. By all accounts, the Indian Country counties listed in Table 3.1 are extremely rural.

Table 3.1 Population Densities

City / State/ Reservation	State	County	Population (2006 Est.)	Land Area (Sq. miles)	Persons/ Sq. Mile
Major Metro Areas					
Boston	MA	Suffolk	687,610	59	11,754.0
Chicago	IL	Cook	5,288,655	946	5,592.3
Dallas	TX	Dallas	2,345,815	880	2,666.9
Denver	CO	Jefferson	526,994	772	682.5
Kansas City	MO	Jackson	664,078	605	1,098.0
Los Angeles	CA	Los Angeles	9,948,081	4,061	2,449.7
Miami	FL	Miami-Dade	2,402,208	1,946	1,234.4
Minneapolis	MN	Hennepin	1,122,093	557	2,016.0
New York City	NY	Bronx	1,361,473	42	32,416.0
Phoenix	AZ	Maricopa	3,768,123	9,203	409.4
Seattle	WA	King	1,826,732	2,126	859.2
Washington	DC	Dist. of Col.	581,530	61	9,471.2
Major Metro Average			30,523,392	21,257	1,435.9
Reservation States					
Minnesota	MN	Statewide	5,167,101	79,610	64.9
Montana	MT	Statewide	944,632	145,552	6.5
Nebraska	NE	Statewide	1,768,331	76,872	23.0
New Mexico	NM	Statewide	1,954,599	121,355	16.1
North Carolina	NC	Statewide	8,856,505	48,711	181.8
North Dakota	ND	Statewide	635,867	68,976	9.2
Oklahoma	OK	Statewide	3,579,212	68,667	52.1
South Dakota	SD	Statewide	781,919	75,885	10.3
Wisconsin	WI	Statewide	5,556,506	54,310	102.3
Utah	UT	Statewide	2,550,063	82,144	31.0
Multi-State Average			37,961,053	935,716	38.7
United States	US	Country-wide	299,398,484	3,537,438	79.6
Reservation or Tribe					
Blackfeet	MT	Glacier	13,578	2,995	4.5
Cherokee	OK	Adair	22,317	576	38.7
Cherokee	NC	Swain	13,445	528	25.5
Cherokee & U. Keetoowah	OK	Cherokee	44,910	751	59.8
Cheyenne River	SD	Dewey	6,112	2,303	2.7
	SD	Ziebach	2,706	1,962	1.4
Crow	MT	Big Horn	13,035	4,995	2.6

City / State/ Reservation	State	County	Population (2006 Est.)	Land Area (Sq. miles)	Persons/ Sq. Mile
Crow Creek	SD	Buffalo	2,109	471	4.5
Fort Belknap	MT	Blaine	6,615	4,226	1.6
Fort Peck	MT	Roosevelt	10,496	2,356	4.5
Lake Traverse	SD	Roberts	10,024	1,101	9.1
Lower Brule	SD	Lyman	3,929	1,640	2.4
Menominee	WI	Menominee	4,597	358	12.8
Navajo & Zuni	NM	Cibola	27,481	4,539	6.1
Navajo Nation	UT	San Juan	14,265	7,820	1.8
Northern Cheyenne	MT	Rosebud	9,261	5,012	1.8
Omaha	NE	Thurston	7,273	394	18.5
Pine Ridge	SD	Bennett	3,543	1,185	3.0
	SD	Jackson	2,900	1,869	1.6
	SD	Shannon	13,824	2,094	6.6
Rosebud	SD	Mellette	2,099	1,306	1.6
	SD	Todd	10,088	1,388	7.3
Spirit Lake	ND	Benson	6,997	1,381	5.1
Standing Rock	ND	Sioux	4,282	1,094	3.9
Standing Rock	SD	Corson	4,288	2,473	1.7
Three Affiliated	ND	Mountrail	6,442	1,824	3.5
Turtle Mountain	ND	Rolette	13,903	902	15.4
White Earth	MN	Mahnomen	5,072	556	9.1
Yankton	SD	Charles Mix	9,224	1,098	8.4
Reservation Average			294,815	59,197	5.0
OPIS Counties					
Wilcox	AL	Wilcox	12,911	889	14.5
Jefferson	MS	Jefferson	9,194	519	17.7
Holmes	MS	Holmes	20,866	756	27.6
Wilkinson	MS	Wilkinson	10,239	677	15.1
Clay	KY	Clay	24,052	471	51.1
OPIS County Average			77,262	3,312	23.3

Source: U.S. Census Bureau

The rural nature of many Indian reservations is also exemplified by the distances that area residents must travel for major medical services, shopping, etc. Table 3.2 lists each of the subject Indian Country counties and the distance from the geographic center of each county to the nearest regional shopping and medical center. As this table illustrates, one-way trips typically range from 70 to 200 miles or more.

Table 3.2 Travel Distances to Major Regional Centers

Reservation	State	County	Regional Center	Distance
Blackfeet	MT	Glacier	Great Falls, MT	136 mi.
Cherokee	OK	Adair	Tulsa, OK	105 mi.
Cherokee	NC	Swain	Knoxville, TN	93 mi.
Cherokee & U. Keetoowah	OK	Cherokee	Tulsa, OK	71 mi.
Cheyenne River	SD	Dewey	Bismarck, ND	194 mi.
	SD	Ziebach	Rapid City, SD	157 mi.
Crow	MT	Big Horn	Billings, MT	71 mi.
Crow Creek	SD	Buffalo	Sioux Falls, SD	157 mi.
Fort Belknap	MT	Blaine	Great Falls, MT	171 mi.
Fort Peck	MT	Roosevelt	Bismarck, ND	289 mi.
Lake Traverse	SD	Roberts	Fargo, ND	100 mi.
Lower Brule	SD	Lyman	Sioux Falls, SD	167 mi.
Menominee	WI	Menominee	Green Bay, WI	57 mi.
Navajo & Zuni	NM	Cibola	Albuquerque, NM	103 mi.
Navajo Nation	UT	San Juan	Grand Junction, CO	220 mi.
Northern Cheyenne	MT	Rosebud	Billings, MT	99 mi.
Omaha	NE	Thurston	Sioux City, IA	34 mi.
Pine Ridge	SD	Bennett		
	SD	Jackson	Rapid City, SD	107 mi.
Rosebud	SD	Shannon	Rapid City, SD	75 mi.
	SD	Mellette	Rapid City, SD	157 mi.
	SD	Shannon	Rapid City, SD	75 mi.
Spirit Lake	ND	Todd	Rapid City, SD	196 mi.
Standing Rock	ND	Benson	Grand Forks, ND	105 mi.
Standing Rock	SD	Sioux	Bismarck, ND	73 mi.
Three Affiliated	ND	Corson	Bismarck, ND	116 mi.
Turtle Mountain	ND	Mountrail	Minot, ND	66 mi.
White Earth	MN	Rolette	Minot, ND	110 mi.
Yankton	SD	Mahnomen	Fargo, ND	79 mi.
		Charles Mix	Sioux Falls, SD	145 mi.

Source: Google Maps

The extremely rural nature of some of these counties is also exemplified by the fact that two of the Indian Country counties in South Dakota (Shannon and Todd) do not have county seats. Related administrative functions for those counties are handled in the county seats of neighboring counties.

The 2001 EIA data referenced earlier reflects an average fuel price of approximately $1.32 per gallon. Based on the EIA urban vs. rural consumption estimates, rural households were paying approximately $529 more per year for fuel in 2001 than their urban counterparts. With 2008 fuel prices sometimes approaching or exceeding $4 per gallon, urban households would be spending an average of $4,216 per year on fuel while rural household expenditures may average $5,876. This represents a difference of $1,660 or nearly 40%.

Given the relatively outdated underlying data in the EIA report and the fact that it is not specific down to the geographic levels required by this study, attempts were made to identify information that would permit the calculation of current household fuel expenditures at a more local level. The OPIS report cited earlier utilized statewide averages published by the Federal Highway Administration (FHWA). The FHWA's Office of Highway Policy Information published a *Highway Statistics 2005* handbook which contains total per capita vehicle miles traveled (VMT) data for each state. OPIS used these data and current fuel prices to determine estimated annual fuel expenditures.

Related calculations assumed an average fuel efficiency of 18 miles per gallon. Its fuel cost information was derived based on local credit card purchases by fleet vehicles throughout the nation during the week of June 28, 2008 (Atkins 2008). The per capita VMT reported by the FHWA includes VMT from trucking; to include this in an estimation of household travel would be misleading. Fortunately, the FHWA also estimates the percentage of miles traveled that is accounted for by trucking. Per capita VMT may, therefore, be calculated by subtracting trucking. These data show significant variations in per capita VMT among states. For example, the District of Columbia has the lowest per capita VMT in the country (6,342). On the other end of the spectrum, Wyoming has an annual per capita VMT of 14,049.

Table 3.3 identifies the 10 states in the continental United States with the lowest and the highest per capita VMTs. As this table indicates, rural states tend to have significantly higher per capita VMTs than their urban counterparts.

Table 3.3 Per Capita Vehicle Miles Traveled

State	Annual Per Capita Vehicle Miles Traveled
Low VMT States	
District of Columbia	6,342
New York	6,729
Nevada	6,975
Rhode Island	7,393
California	7,409
Illinois	7,570
New Jersey	7,778
Pennsylvania	7,812
Washington	8,022
Massachusetts	8,272
National Average	**9,236**
High VMT States	
North Carolina	10,551
Tennessee	10,591
Montana	10,664
Indiana	11,211
Georgia	11,211
Vermont	11,332
Oklahoma	11,474
Alabama	11,790
Mississippi	12,593
Wyoming	14,049

Source: Federal Highway Administration 2005

As indicated earlier, the annual vehicle miles traveled estimates presented in Table 3.3 are on a per capita basis. To calculate household VMTs, it would be necessary to multiply each household's per capita estimate by the number of residents per household. Using this methodology and the 2000 national census estimate of 2.59 persons per household, the average American household accrues approximately 23,900 vehicles miles annually.

It should also be noted that Table 3.3 VMT figures are statewide averages. As is the case with urban vs. rural states, it is assumed that household VMT in rural areas of each state would be higher than the state average and, conversely, that each state's urban VMT would be lower than the state average. This occurrence would cause the use of these VMT estimates to understate the differences in the impacts of higher fuel prices on rural vs. urban households in each state.

To overcome this deficiency, this study utilized a transferability methodology and census tract data to generate county-level VMT estimates for each of the counties and states being analyzed. Researchers at the Oak Ridge National Laboratory have devised a transferability methodology for using survey results from the NHTS to make estimates for household VMT and other travel variables for regional or local

levels (Hu et al. 2007). The transfer method was originally applied to the 1996 NHTS survey (then called the Nationwide Personal Transportation Survey). Researchers found that travel estimates generated using this approach were second best only to those estimated with data from locale-specific household surveys (Hu et al. 2007, Reuscher et al. 2002). The methodology is explained in detail by Hu et al. (2007). The method works by classifying each census tract in the country into either a rural, suburban, or urban category. These tracts are then further classified by income level. Estimates for each census tract are then made based on survey results from households that are in similarly classified tracts. For example, the household travel characteristics of a census tract classified as rural and low income would be estimated based on survey data collected from households in census tracts that are also classified as rural and low income.

When this method was applied to the 2001 survey data, the researchers found that it did not perform as well and corrective revisions were made. Each tract was subsequently classified into one of the following geo-economic cluster combinations: mega-urban, urban, suburban, rural, and extreme poverty. Within each of these clusters, regression analysis was conducted to estimate travel characteristics as a function of a number of variables. Household size, vehicle count, and household buying power (which is a function of both income and cost of living) were found to significantly influence propensity to travel.

Researchers then used this regression-based approach to estimate travel variables for each census tract in the country. The estimates are, therefore, based primarily on geography, household buying power, car ownership, and size of household. Travel is expected to increase when household buying power increases, when household size increases, and when vehicle ownership increases. Travel also increases in more rural areas. When the researchers assessed the performance of their VMT estimates against survey results for specific locations, they found a mean absolute deviation of 9.75%. The results from this approach are not perfect, but they tend to be better than those from anything other than a location-specific survey.

Since location-specific transportation surveys have not been conducted for Indian reservations, the NHTS transfer estimates were the best available estimates of county-level household travel. These data were obtained from the NHTS Transferability Online Analysis Tool.[1] By distinguishing between urban and rural areas, these VMT estimates represent a significant improvement over the statewide averages used in the OPIS study.

Using this methodology, Table 3.4 presents a listing of the 10 highest and lowest VMT counties in the United States. As this table indicates, Shannon County, South Dakota, has the highest annual household VMT (30,762) while Bronx County, New York, has the lowest (4,409).

[1] Data were obtained for travel characteristics and the number of households by household size and car ownership for individual census tracts. To obtain the average VMT for each census tract, a weighted average was calculated by weighting the VMT of each household type by the number of such households that exist in the county. County-wide and state-wide estimates were then calculated by taking a weighted average of the census tracts, with each tract being weighted by its number of households.

Estimated annual household VMT estimates for each of this study's subject counties are presented in Table 3.5. A corresponding graphic presentation for related comparison groups is presented in Figure 3.1. Table 3.5 fuel usage estimates are calculated using a 20-mile-per-gallon (mpg) vehicle efficiency. While the U.S. Department of Transportation 2008 National Transportation Statistics passenger car efficiency estimates of 22.4 mpg (FHWA 2008), this estimate of overall vehicle efficiency understates average consumption since it is based on passenger car consumption and not the less efficient use of pickups and sports utility vehicles, an occurrence that is common in rural areas. The previously cited EIA report reflected urban consumption at 20.5 mpg and rural consumption at 19.5 mpg. OPIS bases its findings on an estimated 18 mpg (Atkins 2005). An estimated 20 mpg is, therefore, considered reasonable.

Table 3.5 also presents OPIS fuel price estimates for the week of June 28, 2008, and corresponding per household expenditures for fuel. The prices for fuel in Indian counties ranged from $3.76 to nearly $4.04 per gallon and averaged $3.86. The average for the multi-state region was also $3.86 while the national average price of fuel for the week was $3.89.

Table 3.4 Highest and Lowest VMT Counties in United States

	Annual Household VMT
Highest VMT Counties	
Shannon, SD	30,762
Morgan, UT	30,001
Powhatan, VA	29,884
Glasscock, TX	29,445
Loving, TX	29,224
New Kent, VA	29,182
Pike, GA	29,092
Elbert, CO	28,700
Williamson, TN	28,685
Greene, VA	28,625
Lowest VMT Counties	
Philadelphia, PA	9,742
Baltimore city, MD	9,562
San Francisco, CA	9,058
Queens, NY	8,689
Suffolk, MA	8,271
District of Columbia	7,970
Owsley, KY	7,855
Hudson, NJ	7,431
Kings, NY	4,681
Bronx, NY	4,049

Table 3.5 VMT and Household Fuel Expenditure Estimates

City / State/ Reservation	State	County	Est. Annual VMT/ Household	Est. Annual Household Fuel Use (gal.)	Local Fuel Cost / Gallon*** (Wk of 6/28/08)	Est. Per Household Fuel Cost / Yr.
Major Metro Areas						
Boston	MA	Suffolk	8,271	414	$3.896	$1,611
Chicago	IL	Cook	13,959	698	$4.216	$2,943
Dallas	TX	Dallas	18,336	917	$3.793	$3,477
Denver	CO	Jefferson	20,241	1,012	$3.828	$3,874
Kansas City	MO	Jackson	17,079	854	$3.727	$3,183
Los Angeles	CA	Los Angeles	14,821	741	$4.037	$2,992
Miami	FL	Miami-Dade	14,524	726	$3.986	$2,895
Minneapolis	MN	Hennepin	17,008	850	$3.827	$3,254
New York City	NY	Bronx	4,049	202	$3.828	$775
Phoenix	AZ	Maricopa	18,502	925	$3.742	$3,462
Seattle	WA	King	17,209	860	$4.028	$3,466
Washington	DC	Dist. of Col.	7,970	399	$3.991	$1,590
Major Metro Average			**14,914**	**746**	**$3.908**	**$2,914**
Reservation States						
Minnesota	MN	Statewide	19,726	986	$3.823	$3,771
Montana	MT	Statewide	20,516	1,026	$3.804	$3,902
Nebraska	NE	Statewide	20,430	1,022	$3.879	$3,962
New Mexico	NM	Statewide	19,130	957	$3.898	$3,728
North Carolina	NC	Statewide	21,597	1,080	$3.893	$4,204
North Dakota	ND	Statewide	20,316	1,016	$3.868	$3,929
Oklahoma	OK	Statewide	20,230	1,012	$3.810	$3,854
South Dakota	SD	Statewide	21,037	1,052	$3.882	$4,083
Wisconsin	WI	Statewide	19,388	969	$3.953	$3,832
Utah	UT	Statewide	21,087	1,054	$3.883	$4,094
Multi-State Average			**20,399**	**1,020**	**$3.857**	**$3,934**
National Average	**US**	**Country-wide**	**18,638**	**932**	**$3.889**	**$3,624**
Reservation or Tribe						
Blackfeet	MT	Glacier	20,187	1,009	$3.812	$3,848
Cherokee	OK	Adair	23,984	1,199	$3.762	$4,511
Cherokee	NC	Swain	24,889	1,244	$3.982	$4,955
Cherokee & U. Keetoowah	OK	Cherokee	22,103	1,105	$3.818	$4,219
Cheyenne River	SD	Dewey	23,416	1,171	$3.849	$4,506
	SD	Ziebach	24,905	1,245	$3.849	$4,793

City / State/ Reservation	State	County	Est. Annual VMT/ Household	Est. Annual Household Fuel Use (gal.)	Local Fuel Cost / Gallon*** (Wk of 6/28/08)	Est. Per Household Fuel Cost / Yr.
Crow	MT	Big Horn	22,525	1,126	$3.767	$4,243
Crow Creek	SD	Buffalo	25,757	1,288	$3.873	$4,988
Fort Belknap	MT	Blaine	22,339	1,117	$3.760	$4,200
Fort Peck	MT	Roosevelt	20,026	1,001	$3.852	$3,857
Lake Traverse	SD	Roberts	23,726	1,186	$3.937	$4,670
Lower Brule	SD	Lyman	26,299	1,315	$3.896	$5,123
Menominee	WI	Menomine e	23,680	1,184	$4.014	$4,753
Navajo & Zuni	NM	Cibola	21,662	1,083	$3.845	$4,165
Navajo Nation	UT	San Juan	18,872	944	$4.039	$3,811
Northern Cheyenne	MT	Rosebud	23,025	1,151	$3.767	$4,337
Omaha	NE	Thurston	24,000	1,200	$3.779	$4,535
Pine Ridge	SD	Bennett	23,572	1,179	$3.902	$4,599
	SD	Jackson	27,599	1,380	$3.906	$5,390
	SD	Shannon	30,762	1,538	$3.786	$5,823
Rosebud	SD	Mellette	23,990	1,200	$3.919	$4,701
	SD	Todd	26,947	1,347	$3.774	$5,085
Spirit Lake	ND	Benson	23,590	1,180	$3.879	$4,575
Standing Rock	ND	Sioux	26,309	1,315	$3.799	$4,997
Standing Rock	SD	Corson	24,741	1,237	$3.849	$4,761
Three Affiliated	ND	Mountrail	23,762	1,188	$3.948	$4,691
Turtle Mountain	ND	Rolette	23,374	1,169	$3.912	$4,572
White Earth	MN	Mahnomen	22,607	1,130	$3.772	$4,264
Yankton	SD	Charles Mix	23,161	1,158	$3.910	$4,528
Reservation Average			**23,105**	**1,155**	**$3.861**	**$4,460**
OPIS Counties						
Wilcox	AL	Wilcox	18,518	926	$3.730	$3,454
Jefferson	MS	Jefferson	22,745	1,137	$3.669	$4,173
Holmes	MS	Holmes	13,767	688	$3.606	$2,482
Wilkinson	MS	Wilkinson	23,233	1,162	$3.712	$4,312
Clay	KY	Clay	15,968	798	$3.690	$2,946
OPIS County Average			**17,584**	**879**	**$3.681**	**$3,236**

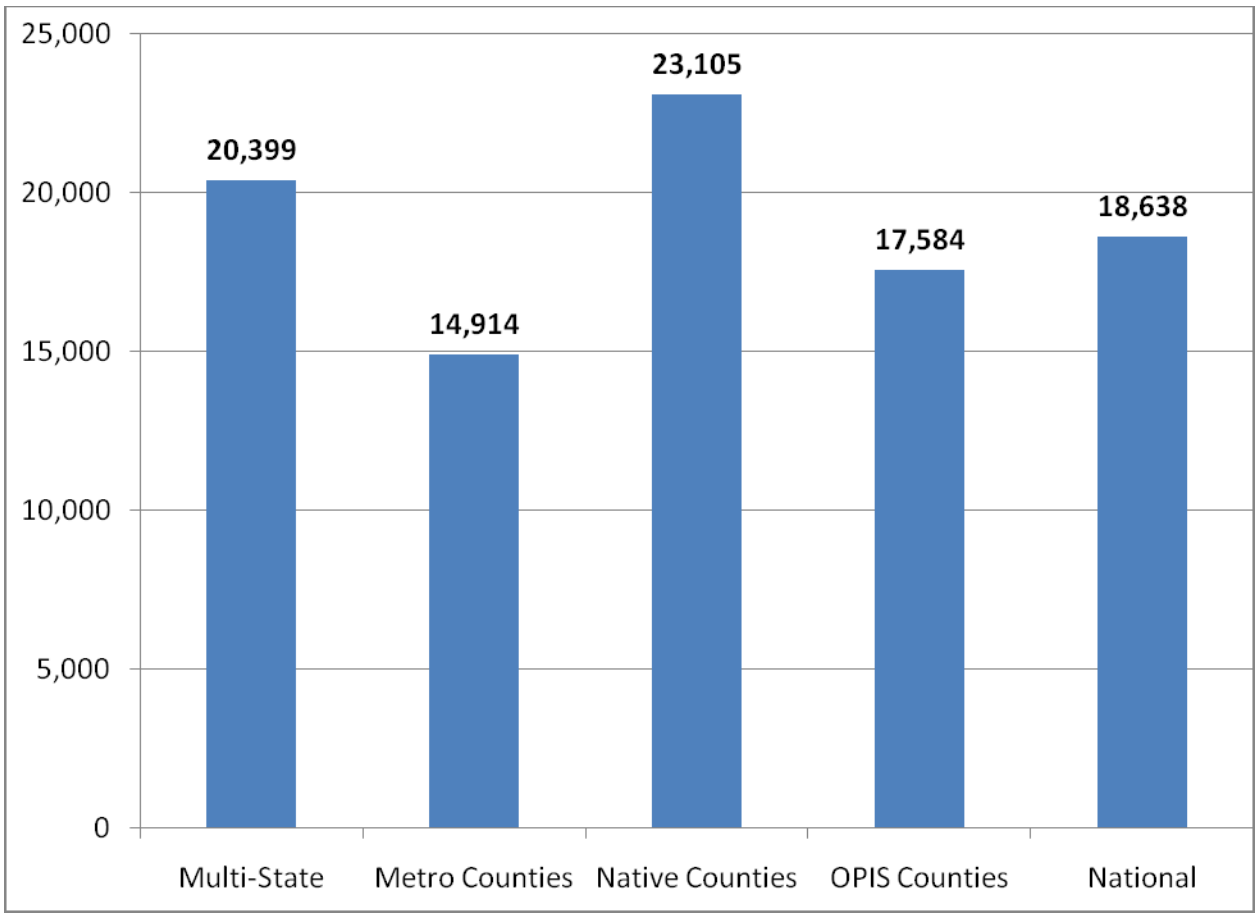

Figure 3.1 Household VMT Estimates for Comparison Groups

Using the VMT estimates presented in Table 3.5, Figure 3.2 illustrates fuel consumption averages for each of the comparison groups. As discussed earlier, these estimates are based on projected vehicle efficiencies of 20 miles per gallon.

It should be noted that the per household fuel consumption estimates presented in Table 3.5 are considerably lower than the estimates from the EIA report discussed earlier. While Table 3.5 shows a metro average consumption of 746 gallons, the EIA urban estimate was 1,054 gallons. Similarly, Table 3.5 shows an average consumption rate of 1,155 gallons per household in Indian Country counties compared to an EIA rural average estimate of 1,469 gallons. Both sets of estimates are based on the FHWA's 2001 NHTS. Some of these differences may be the result of narrower areas covered in this report, but the main difference is that the estimates in the EIA report are averages for households with vehicles, while this study does not exclude households with no vehicles.

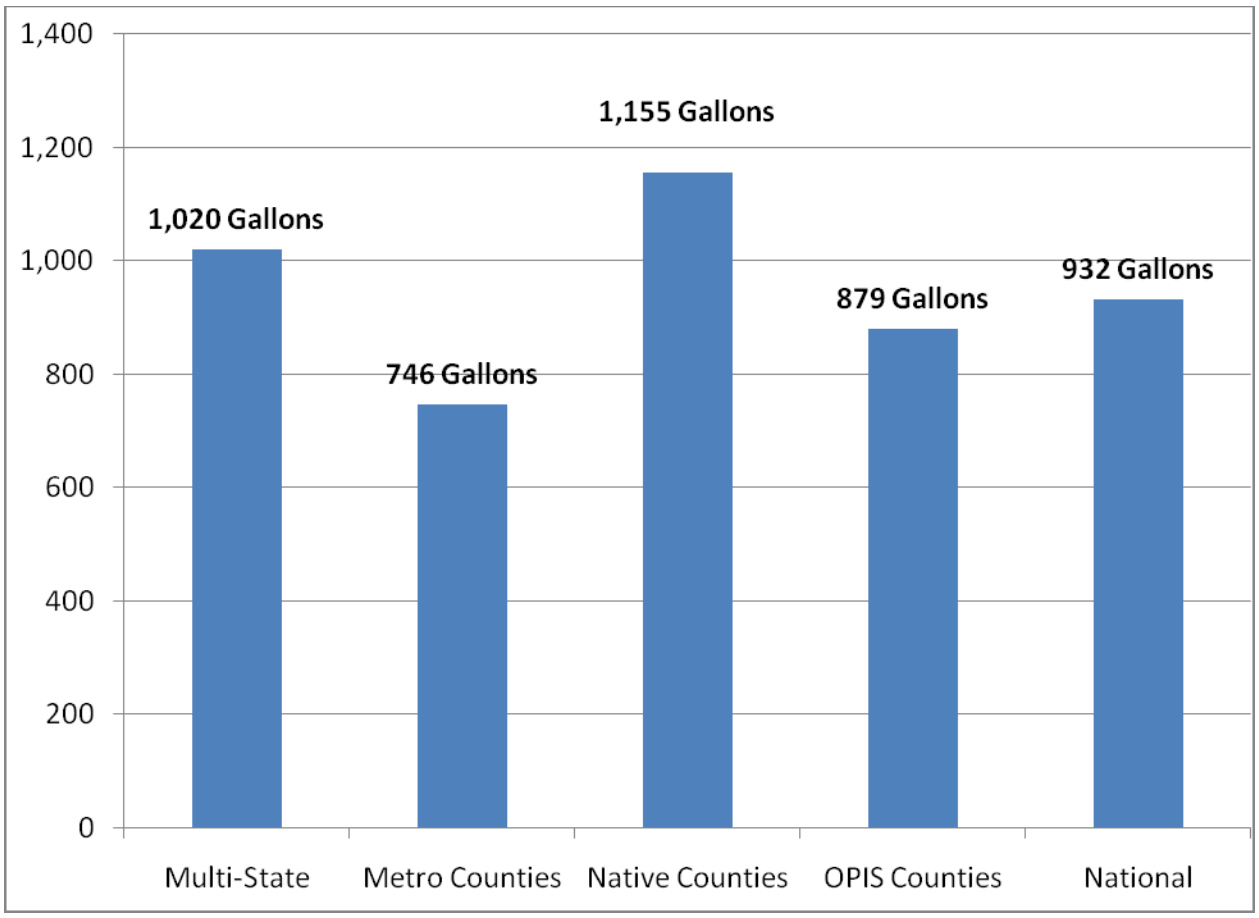

Figure 3.2 Household Fuel Consumption Estimates for Comparison Groups

As Table 3.5 indicates, estimated annual household fuel expenditures vary considerably among various metropolitan areas, ranging from a low of $775 in New York City's Bronx County to a high of $3,874 in Denver's Jefferson County. The average for the 12 metropolitan areas listed is $2,914. In contrast, the estimated annual expenditures for fuel in the 29 Indian Country counties listed in Table 3.5 average $4,460 and range from $3,811 in San Juan County (Navajo Nation), Utah, to $5,823 in Shannon County (Pine Ridge Reservation), South Dakota. In each of these and subsequent comparisons, related averages were derived after giving consideration to the varying number of households in each county.

As illustrated in Figure 3.3, the average household fuel consumption for the 10 comparison states is $3,934. The average for the five OPIS comparison counties was $3,236, 27% below the Indian Country county average. The higher VMT for the Indian Country counties is expected given the extreme rural nature of these counties and also because income in these counties, which affects VMT, is not as low as that of the five OPIS comparison counties.

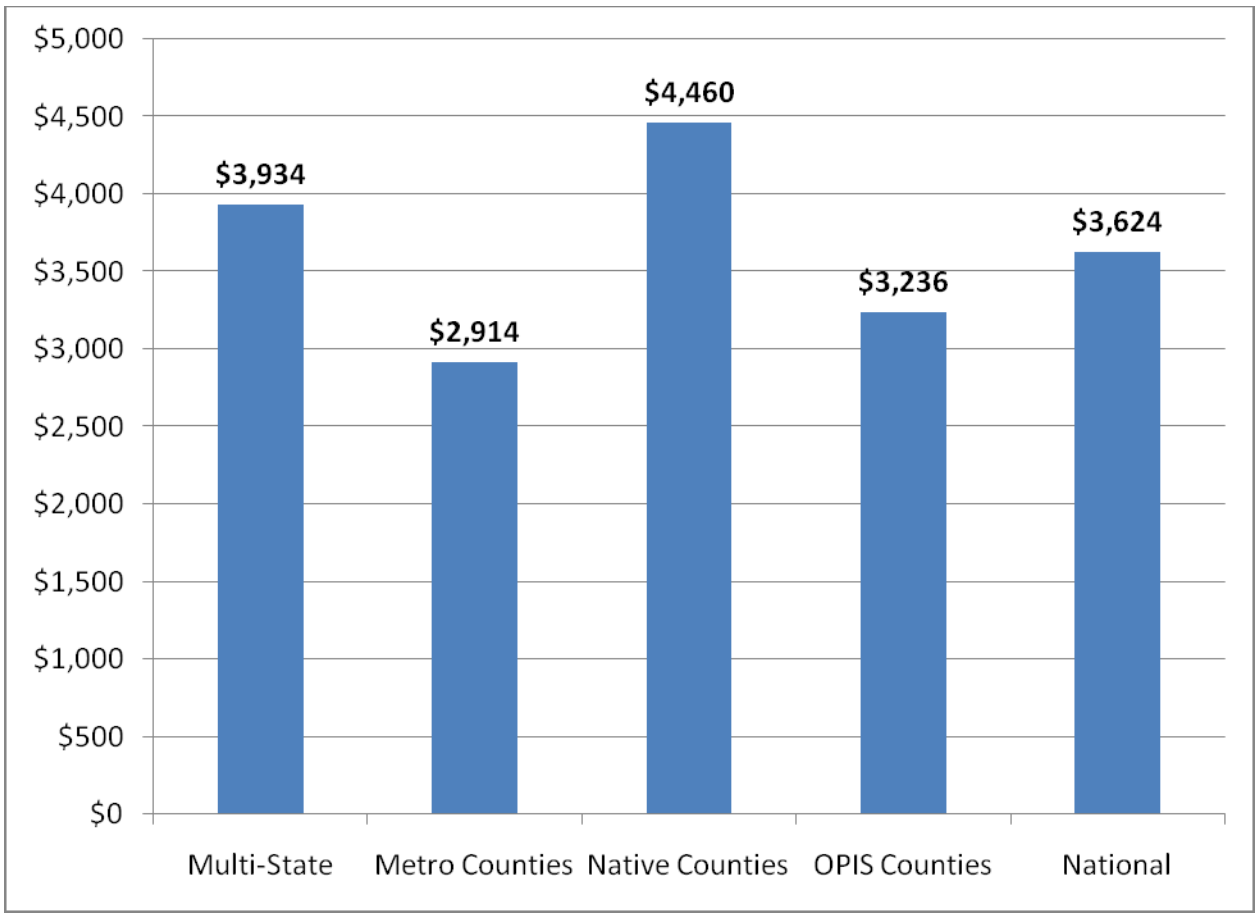

Figure 3.3 Household Fuel Expenditure Estimates for Comparison Groups

Per household fuel consumption and related annual expenditures are obviously going to vary depending on fuel prices and the efficiency of the vehicles being driven. Table 3.6 identifies how annual fuel-related expenditures vary with subject population groups depending on vehicle efficiencies and fuel prices, while keeping average VMT constant. As expected, Table 3.6 indicates that annual expenditures consistently increase more for rural areas as fuel prices increase. The ability to utilize more fuel-efficient vehicles creates obvious benefits. Unfortunately, the ability to make these changes may be more limited based on rural residents' needs for more heavy-duty vehicles and their lower income levels.

Table 3.6 Annual Fuel Costs Under Various Prices and Fuel Economy Levels

	Miles per gallon				
Gasoline price	**18**	**20**	**22**	**24**	**26**
($/gallon)	(dollars per year)				
Native Counties					
2.50	3,209	2,888	2,626	2,407	2,222
3.00	3,851	3,466	3,151	2,888	2,666
3.50	4,493	4,043	3,676	3,369	3,110
4.00	5,134	4,621	4,201	3,851	3,555
4.50	5,776	5,199	4,726	4,332	3,999
Multi-State Average					
2.50	2,833	2,550	2,318	2,125	1,961
3.00	3,400	3,060	2,782	2,550	2,354
3.50	3,966	3,570	3,245	2,975	2,746
4.00	4,533	4,080	3,709	3,400	3,138
4.50	5,100	4,590	4,173	3,825	3,531
Major Metro Counties					
2.50	2,071	1,864	1,695	1,554	1,434
3.00	2,486	2,237	2,034	1,864	1,721
3.50	2,900	2,610	2,373	2,175	2,008
4.00	3,314	2,983	2,712	2,486	2,294
4.50	3,729	3,356	3,051	2,796	2,581
National Average					
2.50	2,589	2,330	2,118	1,941	1,792
3.00	3,106	2,796	2,542	2,330	2,151
3.50	3,624	3,262	2,965	2,718	2,509
4.00	4,142	3,728	3,389	3,106	2,867
4.50	4,660	4,194	3,812	3,495	3,226

Utilizing Table 3.5 annual household fuel cost estimates and the median household income data presented earlier, it is possible to compute household fuel costs as a percentage of annual household income. These calculations are the topic of the following section of this report.

4. PERCENTAGE OF INCOME SPENT ON FUEL

Rising fuel prices impact everyone, but the greatest dollar impact is on individuals and households who consume the most fuel. As the preceding sections of this report indicate, these households are typically located in rural areas of the country, including many Indian reservations. Similarly, as summarized earlier in Table 2.3, there are drastic differences in median household income in rural vs. urban areas of the country, with household income levels being typically higher in urban areas.

Table 4.1 combines the income findings presented in Table 2.3 and the fuel expenditure data presented in Table 3.5 to identify the percentage of annual household income that is spent on motor fuel. As Table 4.1 illustrates, rural households typically spend a significantly higher portion of their income on fuel than their urban counterparts.

For comparison purposes, Table 10 also includes counties that were identified in the OPIS "Pain At The Pump" report as paying the highest percentages of household income on fuel. Data on those counties was recalculated to reflect the methodologies used in this report, namely more current household income and vehicle efficiency data and more specific VMT estimates. As this comparison indicates, seven of the Indian Country counties studied show higher percentage spending on fuel than all five of the most-impacted counties identified in the OPIS report. These seven counties are identified in bold italic print.

Table 4.1 Percentage of Income Spent on Fuel

City / State/ Reservation	State	County	2005 Median Household Income	Est. Per Household Fuel Cost/Yr.	Income Spent on Fuel
Major Metro Area					
Boston	MA	Suffolk	$43,155	$1,611	3.7%
Chicago	IL	Cook	$48,919	$2,943	6.0%
Dallas	TX	Dallas	$42,791	$3,477	8.1%
Denver	CO	Jefferson	$60,996	$3,874	6.4%
Kansas City	MO	Jackson	$43,284	$3,183	7.4%
Los Angeles	CA	Los Angeles	$48,166	$2,992	6.2%
Miami	FL	Miami-Dade	$37,142	$2,895	7.8%
Minneapolis	MN	Hennepin	$56,004	$23,254	5.8%
New York City	NY	Bronx	$29,331	$775	2.6%
Phoenix	AZ	Maricopa	$48,752	$3,462	7.1%
Seattle	WA	King	$58,351	$3,466	5.9%
Washington	DC	Dist. of Col.	$48,078	$1,590	3.3%
Major Metro Average			**$47,330**	**$2,914**	**6.2%**

Reservation States					
Minnesota	MN	Statewide	$52,048	$3,771	7.2%
Montana	MT	Statewide	$38,503	$3,902	10.1%
Nebraska	NE	Statewide	$43,765	$3,945	9.0%
New Mexico	NM	Statewide	$37,603	$3,728	9.9%
North Carolina	NC	Statewide	$40,781	$4,204	10.3%
North Dakota	ND	Statewide	$40,818	$3,929	9.6%
Oklahoma	OK	Statewide	$37,020	$3,854	10.4%
South Dakota	SD	Statewide	$40,096	$4,083	10.2%
Wisconsin	WI	Statewide	$47,171	$3,832	8.1%
Utah	UT	Statewide	$48,155	$4,094	8.5%
Multi-State Average			**$43,724**	**$3,933**	**9.0%**
National Average	**US**	**Country-wide**	**$46,242**	**$3,624**	**7.8%**
Reservation or Tribe					
Blackfeet	MT	Glacier	$30,285	$3,848	12.7%
Cherokee	OK	Adair	$28,594	$4,511	15.8%
Cherokee	NC	Swain	$33,485	$4,955	14.8%
Cher. & U. Keetoowah	OK	Cherokee	$29,761	$4,219	14.2%
Cheyenne River	SD	Dewey	$29,716	$4,506	15.2%
	SD	***Ziebach***	***$21,213***	***$4,793***	***22.6%***
Crow	MT	Big Horn	$30,680	$4,243	13.8%
Crow Creek	***SD***	***Buffalo***	***$16,868***	***$4,988***	***29.6%***
Fort Belknap	MT	Blaine	$28,486	$4,200	14.7%
Fort Peck	MT	Roosevelt	$27,419	$3,857	14.1%
Lake Traverse	SD	Roberts	$32,008	$4,670	14.6%
Lower Brule	SD	Lyman	$30,750	$5,123	16.7%
Menominee	WI	Menominee	$30,839	$4,753	15.4%
Navajo & Zuni	NM	Cibola	$31,670	$4,165	13.1%
Navajo Nation	UT	San Juan	$29,852	$3,811	12.8%
Northern Cheyenne	MT	Rosebud	$41,185	$4,337	10.5%
Omaha	NE	Thurston	$31,836	$4,535	14.2%
Pine Ridge	SD	Bennett	$30,823	$4,599	14.9%
	SD	***Jackson***	***$25,445***	***$5,390***	***21.2%***
	SD	***Shannon***	***$25,487***	***$5,823***	***22.8%***
Rosebud	SD	Mellette	$28,439	$4,701	16.5%
	SD	***Todd***	***$22,341***	***$5,085***	***22.8%***
Spirit Lake	ND	Benson	$29,721	$$4,575	15.4%
Standing Rock	***ND***	***Sioux***	***$25,720***	***$4,997***	***19.4%***
Standing Rock	***SD***	***Corson***	***$23,436***	***$4,761***	***20.3%***

Three Affiliated	ND	Mountrail	$34,541	$4,691	13.6%
Turtle Mountain	ND	Rolette	$29,748	$4,572	15.4%
White Earth	MN	Mahnomen	$31,903	$4,264	13.4%
Yankton	SD	Charles Mix	$29,778	$4,528	15.2%
Reservation Average			**$30,087**	**$4,460**	**14.8%**
OPIS Counties					
Wilcox	AL	Wilcox	$19,407	$3,084	15.9%
Jefferson	MS	Jefferson	$21,203	$3,726	17.6%
Holmes	MS	Holmes	$20,916	$2,216	10.6%
Wilkinson	MS	Wilkinson	$21,904	$3,850	17.6%
Clay	KY	Clay	$19,728	$2,630	13.3%
OPIS County Average			**$20,448**	**$3,236**	**15.8%**

Figure 4.1 illustrates the percentage of household income that is spent on fuel for each of the comparison groups represented in Table 10. As both Table 4.1 and Figure 4.1 indicate, households in the studied Indian Country counties spend a considerably greater percentage of their income on fuel than their metro counterparts (14.8% vs. 6.2%). Their fuel expenditures also drastically exceed the multi-state and national average (14.8% vs. 9.0% and 14.8% vs. 7.8%, respectively). This finding is consistent with prior work concerning transportation equity and the determination that low-income residents of automobile-dependent communities tend to spend much more of their income on transportation than residents of communities with more diverse, multi-modal transport systems (Litman, 2007).

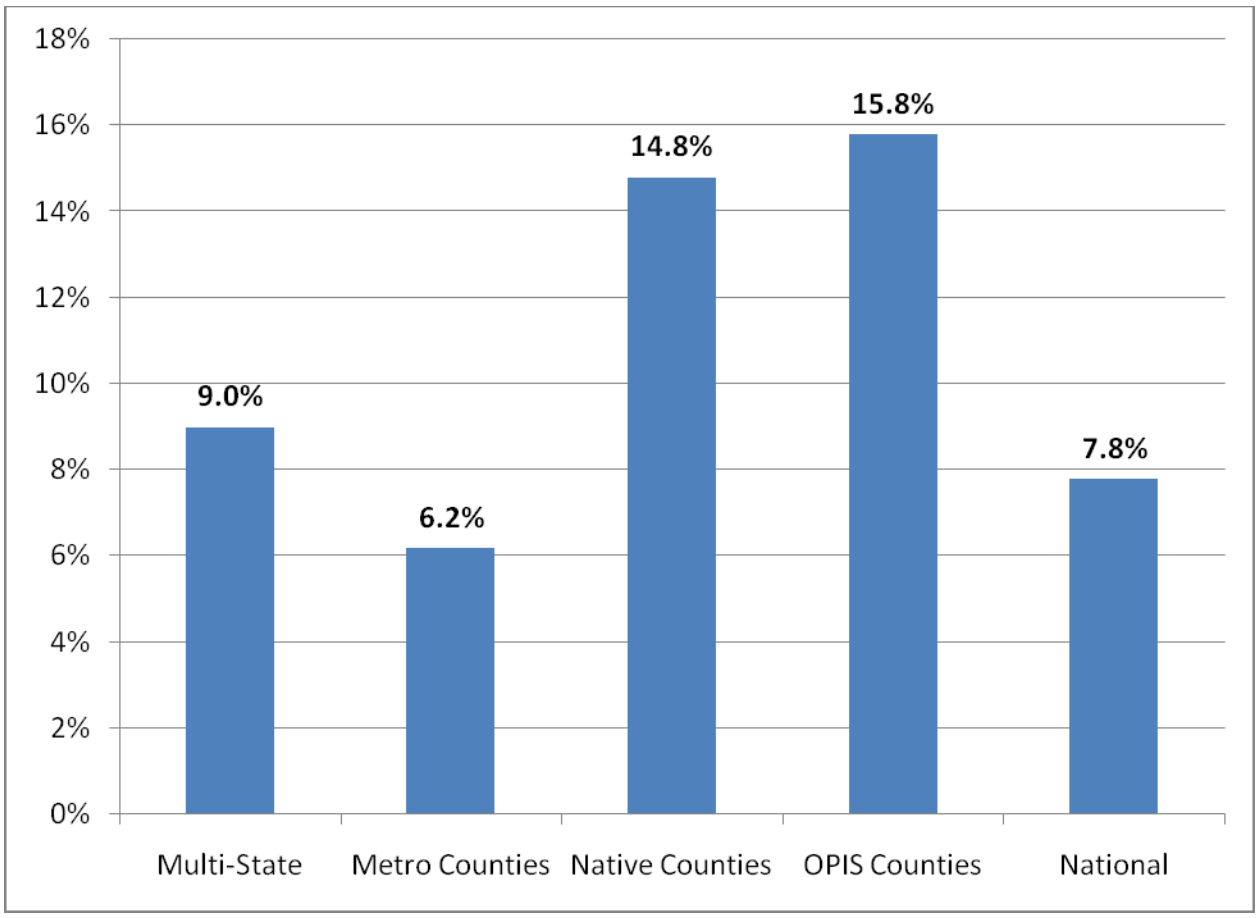

Figure 4.1 Percentage of Income Spent on Fuel by Comparison Groups

It should be noted that the expenditure percentages presented for the OPIS comparison counties in Table 4.1 are significantly higher than the OPIS percentages referred to in the Introduction. For example, the OPIS "Pain At The Pump" report suggested that residents in some of the hardest hit counties were paying approximately 13% of their household income for fuel while Table 4.1indicates that this number is closer to 17.6%. While there are several differences in methodology that account for this discrepancy (updated income projections, differing mpg estimates, county vs. statewide VMT estimates, etc.), the biggest difference results from the fact that OPIS did not adjust FHWA per capita VMT estimates to reflect the number of residents per household. This calculation is necessary in order to estimate household VMT and then to use that estimate to calculate household fuel expenditures and percentage spending on fuel.

The Native county percentage presented in Figure 4.1 represents an average of the 29 Indian Country counties analyzed in this study. Figure 4.2 compares the five hardest hit Native counties with the five hardest hit counties identified by OPIS. As this figure illustrates, the impact of rising fuel prices is significantly greater on the identified Native counties than on their OPIS counterparts (22.9% versus 15.8%).

Percentage household spending on fuel is naturally going to deviate depending on miles traveled, fuel prices, and vehicle efficiency. Table 4.2 presents a comparison of how percentage spending on fuel changes under various price and fuel efficiency levels (while holding average VMT and income constant). As expected, percentage spending increases as fuel prices increase and as vehicle efficiency drops. In all instances, reservation counties spend a considerably greater percentage of their household income on fuel than their regional and metro counterparts.

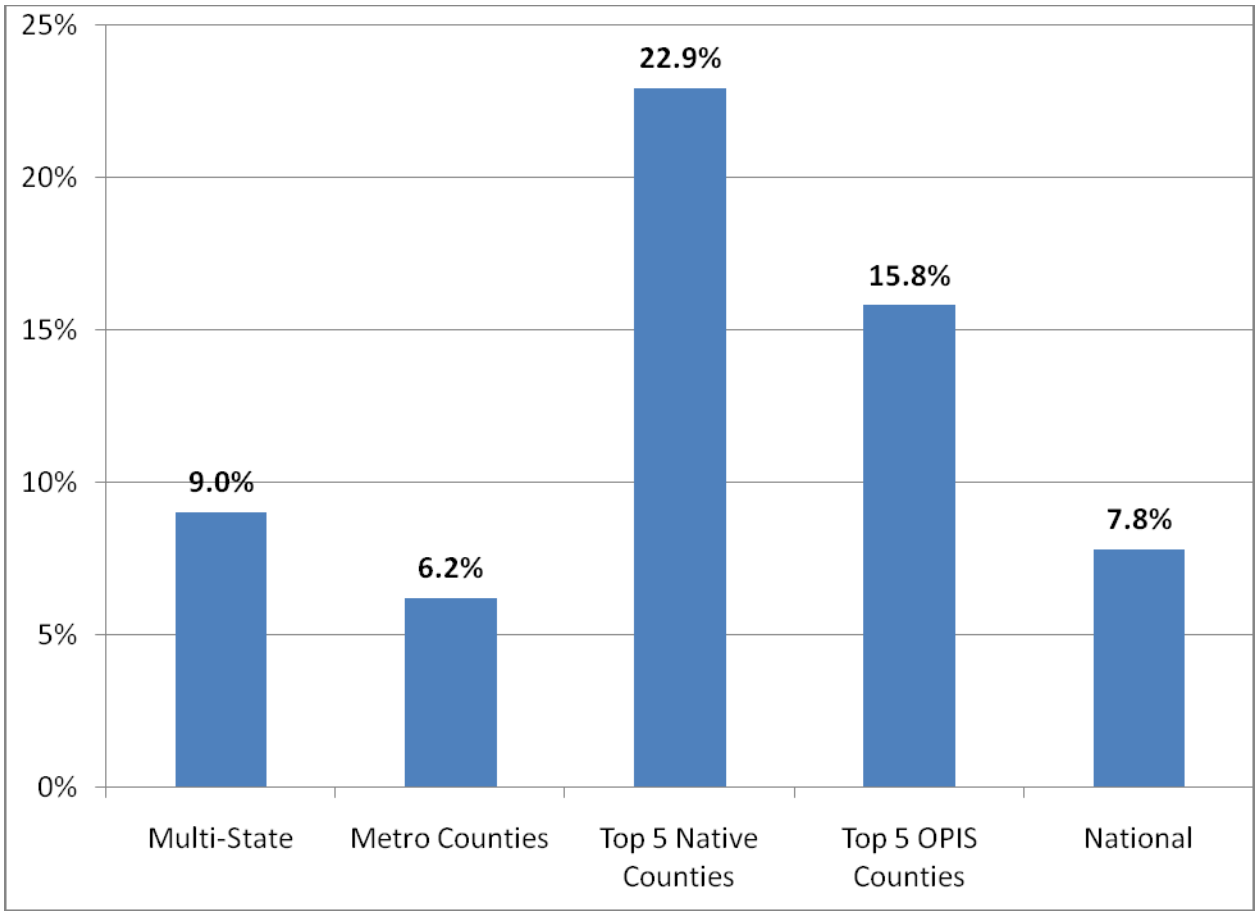

Figure 4.2 Percentage of Income Spent on Fuel by Hardest Hit Native counties

Table 4.2 Average Percentage of Household Income Spent on Fuel Under Various Price and Fuel Economy Levels

	Miles per gallon				
Gasoline price	**18**	**20**	**22**	**24**	**26**
($/gallon)	(percent of income)				
Native Counties					
2.50	10.7	9.6	8.7	8.0	7.4
3.00	12.8	11.5	10.5	9.6	8.9
3.50	14.9	13.4	12.2	11.2	10.3
4.00	17.1	15.4	14.0	12.8	11.8
4.50	19.2	17.3	15.7	14.4	13.3
Multi-State Average					
2.50	6.5	5.8	5.3	4.9	4.5
3.00	7.8	7.0	6.4	5.8	5.4
3.50	9.1	8.2	7.4	6.8	6.3
4.00	10.4	9.3	8.5	7.8	7.2
4.50	11.7	10.5	9.5	8.7	8.1
Major Metro Counties					
2.50	4.4	3.9	3.6	3.3	3.0
3.00	5.3	4.7	4.3	3.9	3.6
3.50	6.1	5.5	5.0	4.6	4.2
4.00	7.0	6.3	5.7	5.3	4.8
4.50	7.9	7.1	6.4	5.9	5.5
National Average					
2.50	5.6	5.0	4.6	4.2	3.9
3.00	6.7	6.0	5.5	5.0	4.7
3.50	7.8	7.1	6.4	5.9	5.4
4.00	9.0	8.1	7.3	6.7	6.2
4.50	10.1	9.1	8.2	7.6	7.0

5. SUMMARY

This study represents an attempt to identify the relative impact that rising fuel prices have on rural Native Americans. It focuses on 29 counties in the lower 48 states that have populations that are at least 25% Native American and compares related data with national averages, 10 corresponding states, 12 major metropolitan areas, and five "hard hit" counties that were identified by the Oil Price Information Service. The lack of current, readily available data concerning median household income and per household fuel consumption makes it difficult to identify the relative impacts of rising fuel prices on all Indian tribes and reservations. The Indian Country counties identified in this study are not the only highly impacted tribes or reservations. These counties were studied simply because required data is available only for counties and not for individual tribes or reservations. When this data becomes available following the 2010 census, it is anticipated that further study will reveal that other rural tribes and reservations are impacted in a manner similar to that portrayed by this study's findings.

Despite the limited availability of related data, it does appear that many rural Native American counties are among the hardest hit by rising fuel prices. These impacts result because of the travel distances that are consistent with rural life, relatively low household income levels, and the lack of transportation alternatives. As a result, these households spend up to 29.6% of their income on fuel, compared to metro area averages as low as 2.6% in some parts of the country.

In addition to having to spend a significantly greater percentage of their household income on fuel, it should also be noted that rural residents may, in many cases, have fewer transportation options than their urban counterparts. While urban dwellers may have access to other modal choices, including taxis, fixed route and paratransit bus services, and commuter trains, rural residents may have no other choice but private automobiles.

Transit usage has risen dramatically with rising fuel prices and many service providers have responded with increased service offerings. Rural areas, including Indian reservations, should not be overlooked regarding the need for new and expanded services to offset the negative impact of rising fuel prices. ". . . disadvantaged people may benefit from policies that help them drive, but they can benefit even more overall from policies and programs that increase total travel options" (Litman, 2007).

REFERENCES

Atkins, Phil. 2008. *Telephone Interview*. Oil Price Information Service, Gaithersburg, Maryland, July 24.

Bureau of Transportation Statistics. 2008. *National Transportation Statistics*. U.S. Department of Transportation, Washington, D.C. http://www.fhwa.dot.gov/policy/ohim/hs05/htm/ps1.htm accessed August 2008.

Energy Information Administration. 2005. *Household Vehicles Energy Use: Latest Data & Trends*. U.S. Department of Energy. Washington, D.C. http://www.eia.doe.gov/emeu/rtecs/nhts_survey/2001/tablefiles/0464(2005).pdf accessed July 2008.

Federal Highway Administration. 2005. *Highway Statistics 2005*. U.S. Department of Transportation, Washington, D.C. http://www.fhwa.dot.gov/policy/ohim/hs05/htm/ps1.htm accessed July 2008.

Hu, Patricia S., Timothy Reuscher, Richard L. Schmoyer, and Shih-Miao Chin. "Transferring 2001 National Household Travel Survey." ORNL/TM-2007/013 Prepared by Oak Ridge National Laboratory for the U.S. Department of Energy. Prepared for the Federal Highway Administration, U.S. Department of Transportation. May 2, 2007.

Krauss, Clifford. 2008. *Rural U.S. Takes Worst Hit as Gas Tops $4 Average.* New York Times, New York City, New York, June 9.

Litman, Todd. "Evaluating Transport Equity." Victoria Transport Policy Institute. Victoria, British Columbia, Canada. July 19, 2007.

NHTS Transferability Home. http://nhts-gis.ornl.gov/transferability/ accessed August 2008.

Oil Price Information Service. 2008. *Pain At The Pump*. Gaithersburg, Maryland, July.

Reuscher, Timothy, Richard L. Schmoyer, Jr., and Patricia S. Hu. "Transferability of Nationwide Personal Transportation Survey Data to Regional and Local Scales." *Transportation Research Record* 1817 (2002): 25-32.

U.S. Census Bureau. 2005. *State & County QuickFacts*. Washington, D.C. http://quickfacts.census.gov/qfd/states/38000.html accessed July 2008.