



# CENTER *for* RURAL POLICY *and* DEVELOPMENT

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## *Effects of the Rising Cost of Gasoline on Rural Consumers in Minnesota*

### ***Summary of Findings***

The rise in the cost of gasoline last summer had every Minnesotan feeling its bite. The pain of this bite, however, is not the same for everyone. For those who have to drive longer distances, who drive heavier vehicles with lower fuel efficiency, or who have smaller overall household incomes, the rise in gasoline prices creates a particular burden. Worst off are those Minnesotans who fit within all three of these categories — and unfortunately, it is rural households that tend to be hit by this triple whammy. On average, rural Minnesotans have to travel longer distances to work and shop, drive heavier vehicles appropriate to more rugged road conditions, and receive considerably lower household incomes than their urban counterparts. This study looks at how each of these factors affects rural households throughout the state.

We found that rural households in Minnesota spend a surprisingly disproportionate amount of their budget on gasoline. In terms of raw dollars, rural households spend an average of over 20% more on gasoline than their urban counterparts, regardless of the price of gas. When considered as a percentage of total income, these rural households are spending nearly twice the percentage of their household budget on gasoline compared to urban households (5.8% vs. 3.2% at \$2.50 a gallon, 9.0% vs. 4.9% at \$3.82 a gallon).

Other costs of living, while lower in rural areas than in urban ones, are not low enough to counteract this added burden when gas prices climb. And because rural residents have few practical transportation alternatives, rural households end up bearing the full cost of gas price increases.

### ***Method***

We began our study by asking how fluctuating gasoline prices affect rural households. This question requires analysis on several levels. First, we needed to define “rural” and “urban” in a clear, understandable way. Counties were used as the geographical basis

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*The Center for Rural Policy and Development, based in St. Peter, Minn., is a private, not-for-profit policy research organization dedicated to benefiting Minnesota by providing its policy makers with an unbiased evaluation of issues from a rural perspective.*

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for analysis, ranked and combined into four groups based on Census measures of population density and proximity to urban centers. These groups are:

1. Counties within the Minneapolis/St. Paul Combined Statistical Area (CSA);
2. Counties within other Minnesota CSAs (defined as an area “containing substantial population nucleus, together with adjacent communities”)<sup>1</sup>;
3. Partially rural counties with some urban areas (defined as areas containing Census blocks with a population of at least 1,000 people per square mile, among other criteria);<sup>2</sup>
4. Completely rural counties, containing no areas of significant population concentration.<sup>3</sup>

Next, the average nominal gasoline costs were analyzed by county — that is, calculating the dollar amount an average household pays for gas in each county per month. This required determining, for each county, average household miles driven in a month, average mileage of the vehicles driven, the price of gasoline paid at the pump (including taxes), and median household income (see *Sources of Data* below to see how these factors were determined). The average amount of fuel used was derived by calculating the ratio of average miles traveled per month to the average mileage of vehicles in that county. From this we were able to calculate gasoline expenditures by multiplying the cost of fuel by gallons. Once these gasoline costs were calculated, we figured the percentage of median household income this cost of gasoline represented in each county. Finally, we created weighted averages of all these measures to produce an average for each of the four groups of counties described above.

## **Results**

The following table shows the weighted averages at three different price points for the four groups: 1) counties in the Minneapolis-St. Paul CSA, 2) counties in other regional CSAs, 3) rural counties with some urban areas, and 4) completely rural counties.

Table 1a, which represents the price of gas on July 23, 2008, shows that fuel costs are consistent across the county groupings, varying by only a penny. The other factors, however, show clear differences depending on how rural the groupings are. As the groupings of counties become more rural (moving

from left to right on the table), certain trends become clear: average miles driven rise while the measure of fuel efficiency falls, resulting in higher gasoline expenditures (since costs are a measure of miles divided by miles per gallon). These higher expenditures for gasoline in rural areas, however, are taken from much smaller pies: on average, households in the most rural counties have a total household income that is only two-thirds that of counties in the Minneapolis-St. Paul area.

The overall result is that the more rural the area, the greater the portion of the household budget going to pay for gasoline. The households in counties that are completely rural spent on average 9.0% of their budgets on gasoline compared to 4.9% spent in the Minneapolis and St. Paul area when the price of gasoline was near its peak. Tables 1b and 1c, however, demonstrate that even when the price of gasoline is lower, families in the most rural counties are still spending 20% more on fuel for their vehicles.

This result is particularly unfortunate because the demand for gasoline is considerably less elastic in rural areas, since there are fewer alternatives for transportation. Rural households simply cannot opt to take public transportation when gas prices rise: with few exceptions, they have to bear the full cost of the rise of fuel prices directly, and this forces them to reduce spending in other areas.

But where should they reduce spending? The bite out of rural household budgets is not offset by lower costs in other parts of their budgets. While housing costs are lower in rural areas, Table 2 (page 4) shows that when taken as a percentage of median income, amounts paid in rent actually take up about the same portion of rural household budgets for housing (in this case, a two-bedroom apartment) as for urban budgets: around 16%.

Moreover, there is no evidence that household costs for food, clothing and healthcare are any lower in rural areas than in the rest of Minnesota — and given the low median household incomes in rural areas, these costs, though nominally the same for rural and urban households alike, take up even more of the rural household budget. The higher costs for gasoline, then, disproportionately burden rural Minnesotans even further, at a time when they are struggling to make ends meet.

So even though it initially appears that cost of living in rural areas should be much lower than in

*Table 1a: Weighted average inputs and expenditures on gasoline at \$3.82 per gallon*

	Counties in:			
	Mpls/St. Paul CSA	Regional CSAs	Mostly rural	Completely rural
Fuel cost (per gallon, including tax)	\$3.82	\$3.82	\$3.83	\$3.82
Miles driven (per month)	1,591	1,705	1,803	1,864
Miles per gallon	22.16	22.07	21.88	21.56
Monthly gasoline expenditures	\$274	\$295	\$316	\$330
Median household income (per month)	\$5,557	\$4,218	\$3,889	\$3,700
Gas expenditures as percent of household budget	<b>4.9%</b>	<b>7.1%</b>	<b>8.2%</b>	<b>9.0%</b>

*Table 1b: Weighted average inputs and expenditures on gasoline at \$1.50 per gallon.*

	Counties in:			
	Mpls/St. Paul CSA	Regional CSAs	Mostly Rural	Completely Rural
Fuel cost (per gallon, including tax)	\$1.50	\$1.50	\$1.50	\$1.50
Miles driven (per month)	1,591	1,705	1,803	1,864
Miles per gallon	22.16	22.07	21.88	21.56
Monthly gasoline expenditures	\$108	\$116	\$124	\$130
Median household income (per month)	\$5,557	\$4,218	\$3,889	\$3,700
Gas expenditures as percent of household budget	<b>1.9%</b>	<b>2.7%</b>	<b>3.2%</b>	<b>3.5%</b>

*Table 1c: Weighted average inputs and expenditures on gasoline at \$2.00 per gallon.*

	Counties in:			
	Mpls/St. Paul CSA	Regional CSAs	Mostly Rural	Completely Rural
Fuel cost (per gallon, including tax)	\$2.00	\$2.00	\$2.00	\$2.00
Miles driven (per month)	1,591	1,705	1,803	1,864
Miles per gallon	22.16	22.07	21.88	21.56
Monthly gasoline expenditures	\$144	\$155	\$165	\$173
Median household income (per month)	\$5,557	\$4,218	\$3,889	\$3,700
Gas expenditures as percent of household budget	<b>2.6%</b>	<b>3.7%</b>	<b>4.2%</b>	<b>4.7%</b>

**Table 1d:** Weighted average inputs and expenditures on gasoline at \$3.00 per gallon.

	Counties in:			
	Mpls/St. Paul CSA	Regional CSAs	Mostly rural	Completely rural
Fuel cost (per gallon, including tax)	\$3.00	\$3.00	\$3.00	\$3.00
Miles driven (per month)	1,591	1,705	1,803	1,864
Miles per gallon	22.16	22.07	21.88	21.56
Monthly gasoline expenditures	\$215	\$232	\$247	\$259
Median household income (per month)	\$5,557	\$4,218	\$3,889	\$3,700
Gas expenditures as percent of household budget	3.9%	5.5%	6.4%	7.0%

**Table 2:** Weighted average rental costs for two-bedroom apartment.

	Counties			
	In Mpls/St. Paul CSA	Regional CSAs	Mostly Rural	Completely Rural
Rental cost of two-bedroom apartment	\$901	\$596	\$673	\$606
Median household income (per month)	\$5,561	\$4,218	\$3,889	\$3,700
Rental expenditures as percent of household budget	16.4%	16.0%	15.7%	16.2%

urban areas and that rural households should be able to afford to pay more for gasoline, this impression doesn't withstand closer scrutiny. Median household incomes in rural Minnesota are simply too low to support the additional, disproportionate burden of increased costs of gasoline.

### **Sources of data**

This study used several different inputs. For determining the average household miles driven, we used data from the U.S. Department of Transportation National Household Travel Survey (NHTS). The NHTS provides reports on various dimensions of personal travel based on actual vehicle miles traveled and trip duration for all personal travel. It is widely used for a number of purposes, ranging from modeling the impacts of gas tax changes to providing trip generation rates needed to calibrate travel demand models. We were able to obtain this data on a Census

tract level, using modeling provided by the NHTS Transferability Tool, a GIS-based tool to enable users to obtain valid estimates of average daily travel at local levels.<sup>4</sup> We then converted Census tract measures to county level measures using the Geographic Correspondence Engine from the Missouri Census Data Center.<sup>5</sup>

To calculate the average fuel economy (miles per gallon), we first determined the mix of cars, light trucks and motorcycles registered in each county using records from the Driver and Vehicle Services 2007 Registration Summaries from the Minnesota Department of Transportation.<sup>6</sup> We then took average miles per gallon for each type of vehicle as measured by the Federal Highway Administration in 2006<sup>7</sup> and applied it to each state's ratio of cars, light trucks and motorcycles, arriving at measures of fuel efficiency specific to each county.

For the price of gasoline, we used county level

price data from the Oil Price Information Service (OPIS).<sup>8</sup> OPIS captures station-specific retail gasoline and diesel prices for up to 120,000 service stations throughout the United States. OPIS obtains its price information through exclusive relationships with credit card companies, direct feeds and other methods, and provides daily reports of summary prices of gasoline. The price data in Table 1a represents average prices paid at the pump (including taxes) in each county in Minnesota as of July 23, 2008. Tables 1b and 1c were chosen as representative prices.

We obtained estimates of median household income for each county from the U.S. Census' Small Area Income and Poverty Estimates program.<sup>9</sup> Since these estimates were for 2005, we adjusted them to 2007 by indexing them to increases in the median wage from 2005 to 2007 for each Minnesota county,

using figures from the Minnesota Department of Employment and Economic Development's Quarterly Census of Employment and Wages (QCEW) program.<sup>10</sup> Finally, we adjusted the resulting amounts with the Consumer Price Index,<sup>11</sup> to bring the median household figures to mid 2008 dollars.

In order to compare gasoline consumption to spending on other basic needs, we drew on our experiences researching basic needs budgets for Minnesota counties.<sup>12</sup> For the specific data on rents, we used the Fiftieth Percentile Rent Estimates from the U.S. Department of Housing and Urban Development.<sup>13</sup> Finally, all weighting was done with population estimates by county for 2007 (the most recent available) from the Minnesota State Demographic Center.<sup>14</sup>

## Endnotes

<sup>1</sup> See Current Lists of Metropolitan and Micropolitan Statistical Areas and Definitions at <http://www.census.gov/population/www/estimates/aboutmetro.html>.

<sup>2</sup> See The Census 2000 Urban and Rural Classification, at [http://www.census.gov/geo/www/ua/ua\\_2k.html](http://www.census.gov/geo/www/ua/ua_2k.html).

<sup>3</sup> A listing of specific counties constituting these four groupings appears in Appendix A (next page).

<sup>4</sup> Information on and access to the NHTS data may be found at <http://nhts-gis.ornl.gov/transferability/>. For this measure we used data provided on the census tract level, which we combined up to the county level. Note that a report documenting the modeling algorithms used by the NHTS Transferability Tool is available at <http://nhts-gis.ornl.gov/transferability/TransferabilityReport.pdf>.

<sup>5</sup> This extremely useful geographic conversion tool is available at <http://mcdc2.missouri.edu/websas/geocorr2k.html>.

<sup>6</sup> Data on vehicle types was obtained from MN Department of Transportation Driver and Vehicle Services Registration Summaries from 2007 available at <http://www.dps.state.mn.us/dvs/MotorVehicle/Information/Vehicle%20frame.htm>. This data was converted to Federal vehicle categories, using Highway Measures of State Motor Vehicle Registrations from the U.S. Department of Transportation, Federal Highway at <http://www.fhwa.dot.gov/policy/ohim/hs06/htm/mv1.htm> and <http://www.fhwa.dot.gov/policy/ohim/hs06/htm/mv9.htm>

<sup>7</sup> Average mileage by vehicle type, from U.S. Department of Transportation, Federal Highway Administration, Highway Statistics, Table VM-1, ANNUAL VEHICLE DISTANCE TRAVELED IN MILES AND RELATED DATA – 2006 BY HIGHWAY CATEGORY AND VEHICLE TYPE. Data available at [http://www.fhwa.dot.gov/policy/ohim/hs06/roadway\\_extent.htm](http://www.fhwa.dot.gov/policy/ohim/hs06/roadway_extent.htm)

<sup>8</sup> OPIS data available for subscription at <http://www.opisnet.com/retail/index.asp>

<sup>9</sup> U.S. Census Small Area Income & Poverty Estimates are available at <http://www.census.gov/hhes/www/saie/index.html>

<sup>10</sup> QCEW data available at <http://www.deed.state.mn.us/lmi/tools/qcew/default.aspx>. For more information about this data set, see *About Quarterly Census Employment and Wages (QCEWES-202) Program* at <http://www.deed.state.mn.us/lmi/tools/qcew/about.htm>

<sup>11</sup> Consumer Price Index for All Urban Consumers (CPI-U), available at <http://www.bls.gov/CPI/>

<sup>12</sup> See the *Cost of Living in Minnesota Wage and Budget Calculator*, available at <http://www.jobsnowcoalition.org/>

<sup>13</sup> Data available at <http://www.huduser.org/datasets/50per.html>.

<sup>14</sup> Data from *Annual Estimates of County Population, Households and Persons per Household, 2000-2007*, published by the Minnesota State Demographic Center and the Metropolitan Council; release date July 28, 2008. Available at <http://www.demography.state.mn.us/estimates.html>.



*Appendix A: County groupings by population density and proximity to urban centers.*

In Mpls/St. Paul CSA	Counties		
	In Regional CSAs	Mostly Rural	Completely Rural
Anoka	Beltrami	Becker	Aitkin
Carver	Benton	Chippewa	Big Stone
Chisago	Blue Earth	Cottonwood	Cass
Dakota	Brown	Faribault	Clearwater
Hennepin	Carlton	Houston	Cook
Isanti	Clay	Hubbard	Fillmore
Ramsey	Crow Wing	Itasca	Grant
Scott	Dodge	Jackson	Kittson
Sherburne	Douglas	Kanabec	Lac qui Parle
Washington	Freeborn	Koochiching	Lake of the Woods
Wright	Goodhue	Lake	Lincoln
	Kandiyohi	Le Sueur	Mahnomen
	Lyon	Meeker	Marshall
	Martin	Mille Lacs	Murray
	McLeod	Morrison	Norman
	Mower	Pennington	Pope
	Nicollet	Pine	Red Lake
	Nobles	Pipestone	Renville
	Olmsted	Redwood	Sibley
	Otter Tail	Rock	Traverse
	Polk	Roseau	
	Rice	Stevens	
	St. Louis	Swift	
	Stearns	Todd	
	Steele	Wadena	
	Wabasha	Waseca	
	Wilkin	Watonwan	
	Winona	Yellow Medicine	