DRAFT

Health Trends in Minnesota

INTRODUCTION & CONTEXT

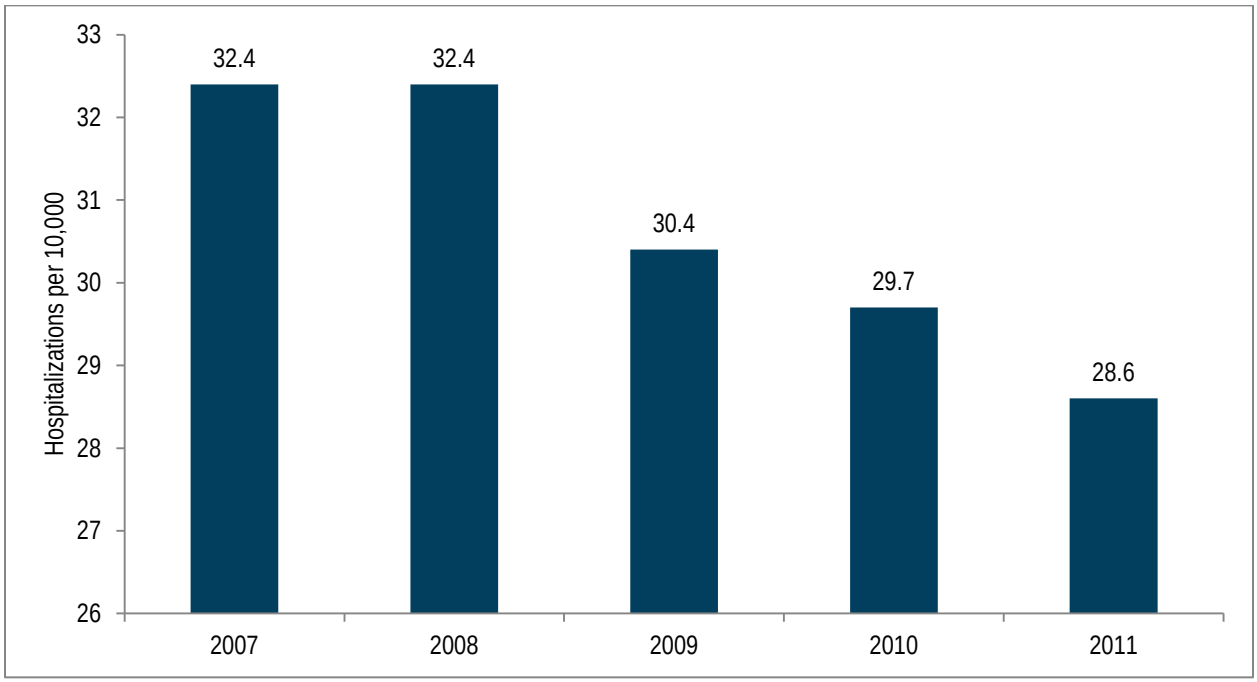
The impact of transportation choices on public health has become a topic of emerging importance in recent years. Transportation and health are linked through a wide variety of factors, including pollution from the transportation sector, changes to urban form due to transportation development, and physical activity rates. Investments in non-motorized transportation modes and public transit infrastructure have, in many cases, increased rates of physical activity in communities.[1] Increases in physical activity levels are one of the most straight-forward ways to improve public health outcomes, and would almost certainly mitigate some of the most pressing public health issues in Minnesota. Individuals who engage in at least 60 minutes of moderate physical activity each week show modest improvements in health outcomes, and those who reach 150 minutes reduce their risk of chronic diseases and other poor health outcomes.[2] Increasing physical activity levels in daily routines is an important goal considering that only ten percent of Americans reach this recommended level of activity.[3] A review of available data describing the current landscape of a variety of health outcomes related to the transportation system follows this introduction.

Health Statistics Related to Transportation in Minnesota

HEART DISEASE & OBESITY

Heart disease is the second-most common cause of death in Minnesota, behind only cancer.[4] Additionally, heart attacks occur more frequently in individuals who are overweight or obese.[5] As discussed previously, increases in physical activity through active transportation can help to reduce the risk of heart attacks and other forms of heart disease. Figure 1 shows the rate of hospitalizations due to heart attacks in Minnesota.

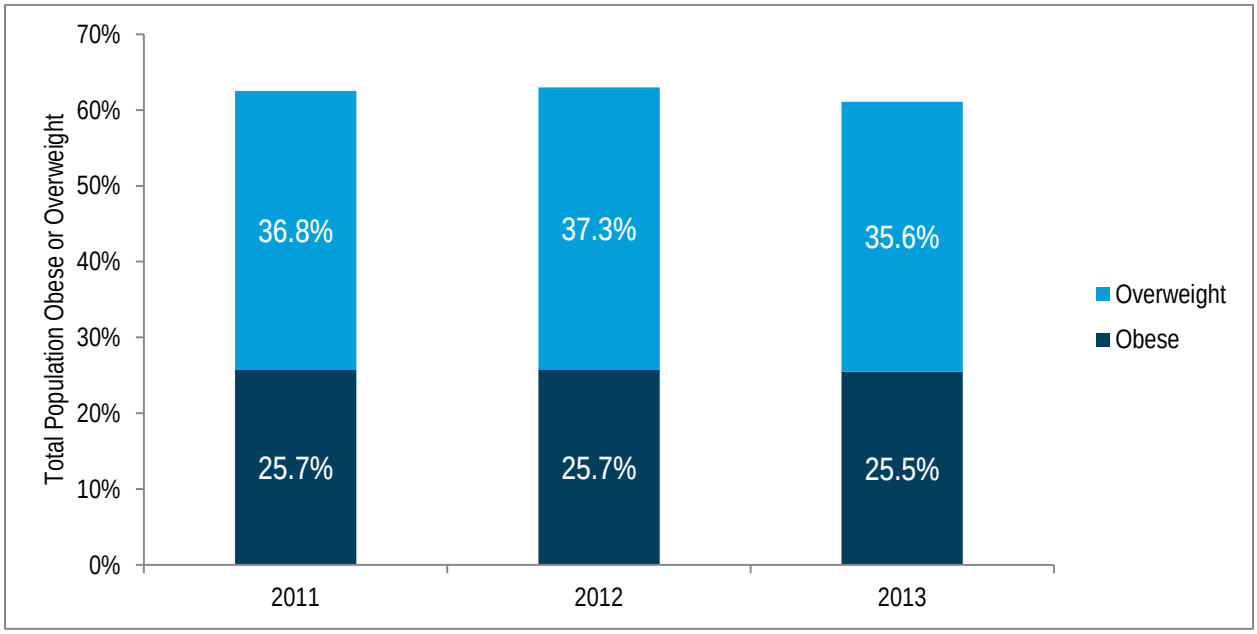
Figure 1: Heart attack hospitalization rates per 10,000 people[6]



[1] Reynault & Christopher, 2013
[2] Ibid.
[3] Sandt et. al., 2012
[4] Minnesota Department of Health, 2012
[5] American Heart Association, 2014
[6] MN Data Access Portal

Given the close link between heart disease and obesity, further examination of the data describing how many Minnesotans are overweight or obese is warranted. Fortunately, Minnesota is making progress towards reducing the prevalence of unhealthy weights. The Department of Health's methods for estimating how many Minnesotans are overweight or obese changed in 2010, limiting the length of time that trends can be analyzed. For comparison, 35.5 percent of US residents were overweight in 2013 while 28.3 percent of US residents were obese.[7] Figure 2 shows the percentage of Minnesotans who were overweight or obese from 2011 to 2013.

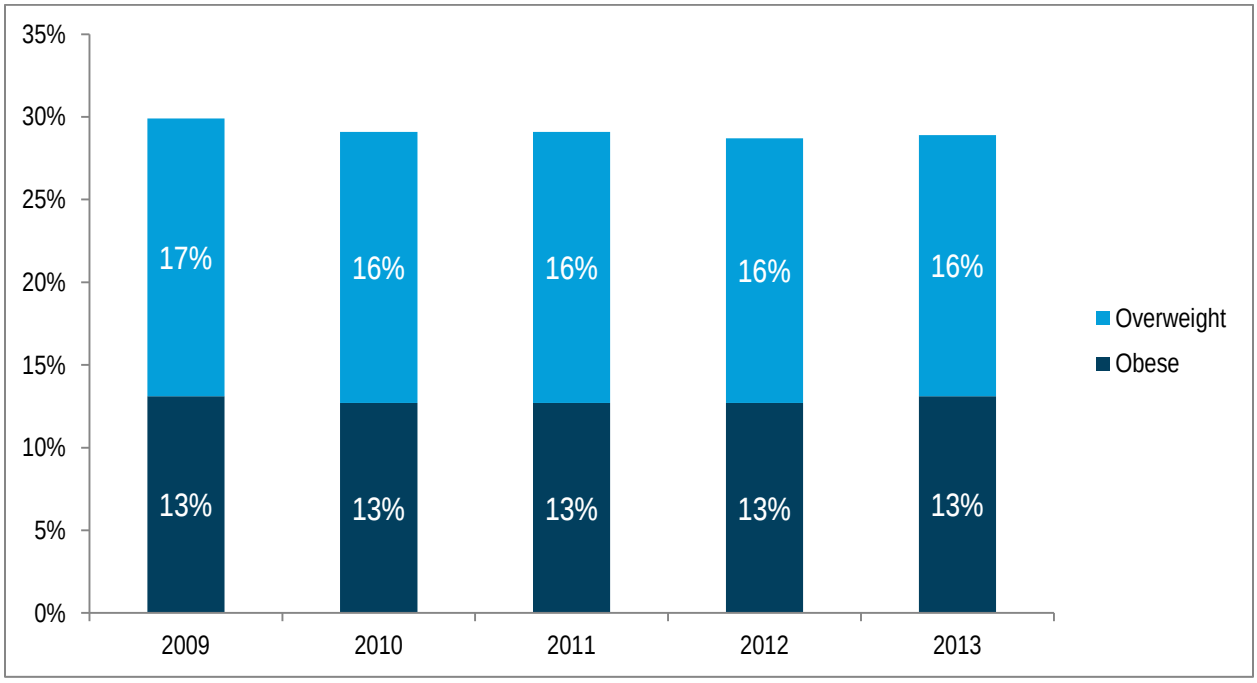
Figure 2: Percent of Minnesotans over 18 diagnosed as obese or overweight[8]



In contrast to the data that has been maintained for adults, data that can be compared over longer periods of time exists for childhood rates of unhealthy weights. As is shown in Figure 3, gains in reducing the rates of these outcomes have been more modest over the last 5 years than those made among Minnesota's adult population during the last three years.

[7] Centers for Disease Control and Prevention
[8] MN Data Access Portal

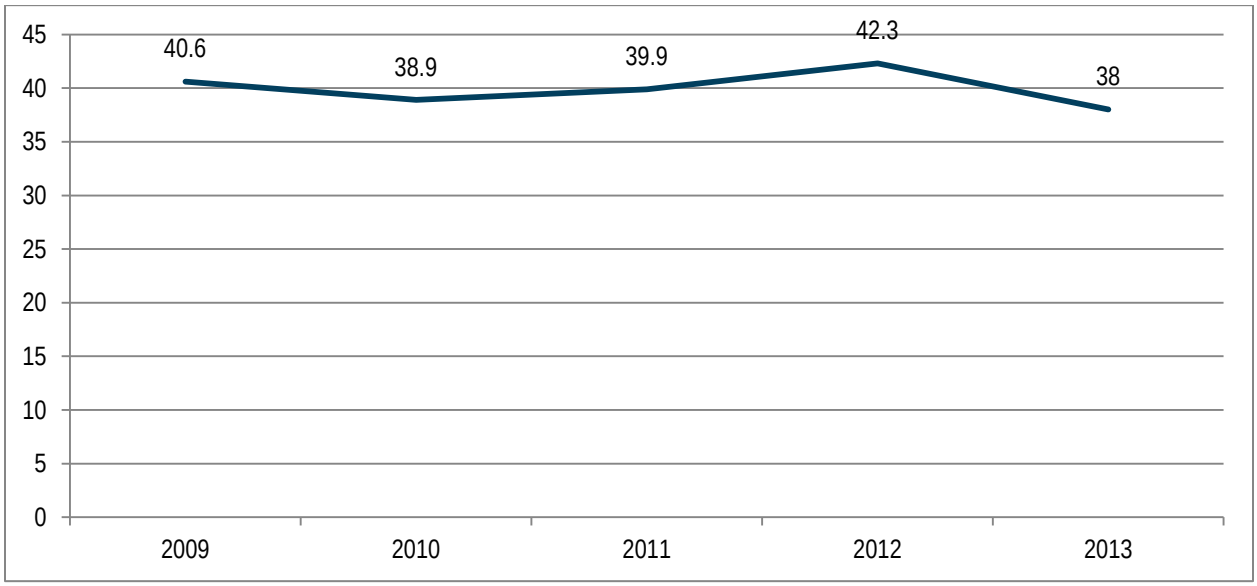
Figure 3: Percent of Minnesotans under 18 diagnosed as obese or overweight[9]



ASTHMA

While asthma is infrequently a direct cause of death, it can often result in hospitalization and health care expenditures, affecting overall health and local economies. Statewide health data shows that asthma hospitalization rates have remained relatively constant over the last five years. Figure 4 shows how hospitalization rates have changed since 2009.

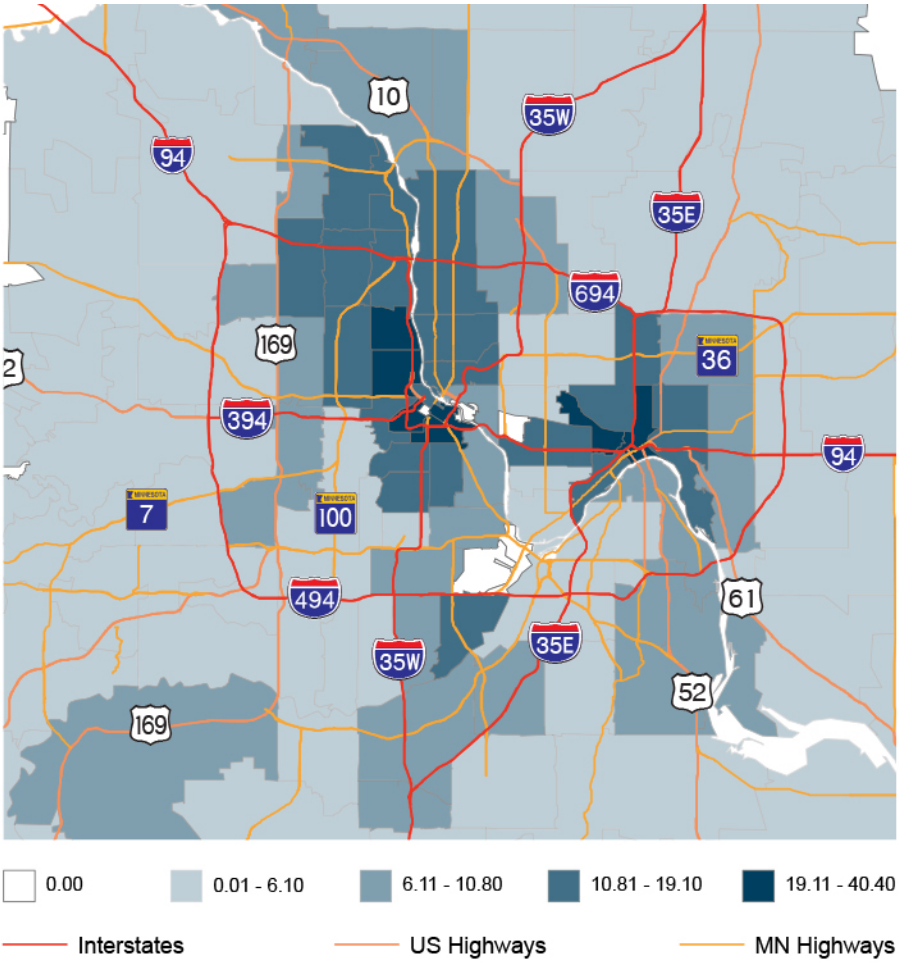
Figure 4: Hospitalization rates for asthma events per 10,000 people[10]



[9] MN Data Access Portal
[10] MN Data Access Portal

Asthma rates are higher in communities located near to major air pollutant generators, such as highways. Transportation choices have a significant impact on these rates – the more people that travel using single-occupancy vehicles, the more pollution is emitted from the transportation sector. Negative effects on air quality are measurable within 600 feet of major highways.[11] Given this knowledge, a closer examination of asthma rates and the locations of major highways in the Twin Cities metropolitan area show how individuals living next to major highways are much more likely to be hospitalized for asthma-related reasons (Figure 5).

Figure 5: Asthma hospitalization rates per 10,000 people



The increased prevalence of asthma hospitalizations around major highways in the Twin Cities metropolitan area shows the impact that higher levels of air pollution from transportation sources can have on communities. The highest rates of asthma hospitalizations follow the path of Interstate 94 through North Minneapolis, past Downtown Minneapolis, and through the heart of Saint Paul. Hospitalization rates may not be as high in suburban areas that surround highways because the impacts of roadway pollutants are typically limited to 600 feet in either direction from the roadway. In many suburban communities there are few residences within this distance of major highways. Changing the course of these impacts is difficult; however, strategies like reducing the number of trips taken by single-occupancy vehicles and subsequent reductions in emissions would improve air quality in immediately surrounding communities.

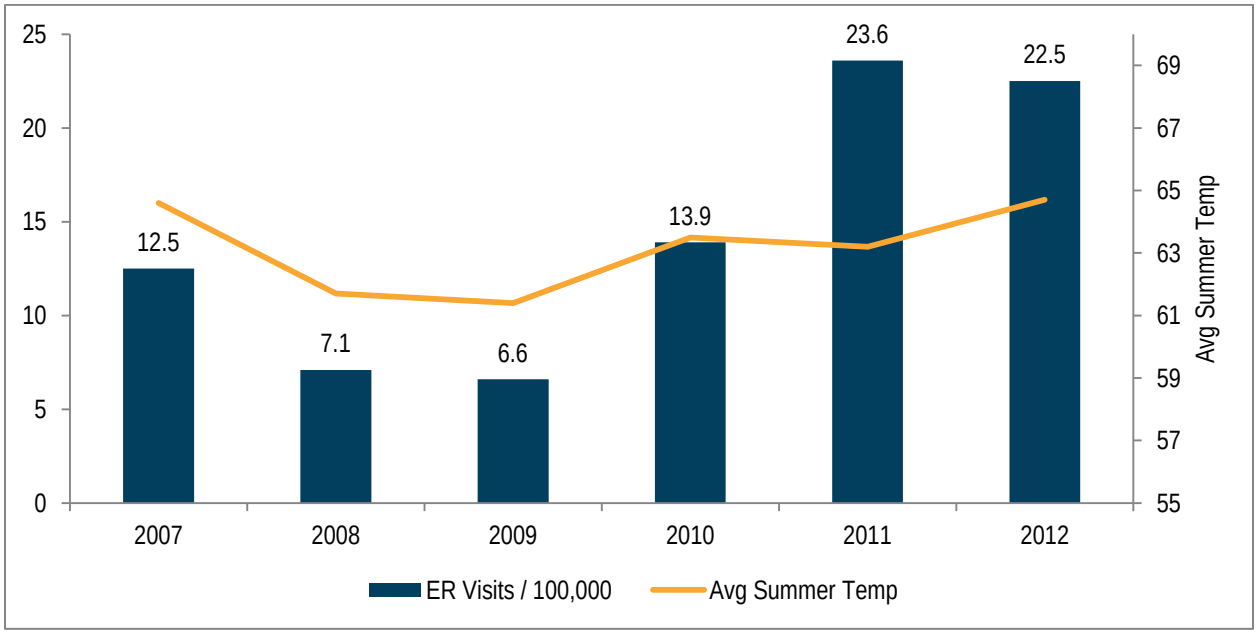
HEAT-RELATED ILLNESS

Heat-related illnesses are likely to become a greater concern as Minnesota's summers continue to become warmer due to the effects of climate change. Figure 6 shows a comparison of average summer temperature in Minnesota compared to the number of heat-related emergency room visits

[11] US EPA, 2015

per 100,000 people. Data tracked by the Minnesota Department of Health shows that even small increases in the average temperature over the course of a summer can result in more emergency visits to health providers.

Figure 6: Average summer temperature & heat-related emergency visits, 2007 – 2012[12]



In addition to climate change, other environmental factors like urban heat island effect may increase the incidence of heat-related health effects. Urban heat island effect occurs in areas with little vegetation and vast amounts of impermeable surfaces that trap and radiate energy from the sun as heat. As more and more of Minnesota's population moves to urban areas the effects of urban heat island should be monitored and mitigated when possible.[13]

Transportation Choices and Public Health

Engaging in active transportation has been linked to health benefits that extend beyond weight management. Women who walk or bike for 30 minutes each day have a reduced risk of developing breast cancer, while men who bike 30 minutes as part of their commutes have better mental health outcomes.[14] Reducing cancer risk is vitally important as all cancers combined are the most frequent cause of death in Minnesota.[15] Individuals do not need to walk or bike their entire commute to reap the benefits of increased physical activity. Those who commute via public transportation take on average 30 percent more steps and walk for an average of eight minutes more than those who commute by automobile.[16] Encouraging even small increases in the use of active transportation will help to augment other efforts to increase the amount of physical activity that individuals engage in.

Access to Health Care and Opportunities

Transportation and health care are also linked based on how easy it is for individuals to reach their healthcare providers. This can be especially challenging for individuals and families that do not own automobiles or do not live in an area that provides reliable alternatives to travel by car. In rural areas, individuals must often travel considerable distances to reach a medical center or clinic, while appointments with specialists often require

[12] MN Data Access Portal
[13] Urban & Rural Population Trends, MnDOT SMTP Trend Paper
[14] APHA, 2010
[15] Minnesota Department of Health, 2012
[16] APHA, 2012

even greater amounts of travel.[17] In both urban and rural areas, individuals are less likely to utilize health care services if they do not have regular access to their own automobile or a care provider who can provide rides.[18] This can be particularly challenging for families with limited resources who may already struggle to gain access to the healthcare system. As discussed in the paper on Minnesota's aging population, these concerns can significantly impact the ability of seniors around the state to reach medical facilities for care. Time and distance were found to be a barrier to reaching the care that individuals need.[19]

Impact of Transportation on Disease Spread

HUMAN POPULATIONS

The ease of travel throughout the world and the rise of air transportation have facilitated rapid travel over distances that may have seemed impossible only 100 years ago. These advances have increased the risk for human populations, despite the obvious benefits of improved interstate and international travel. For comparison, the influenza pandemic of 1918 took one year to spread from its beginnings in the United States or Europe to isolated islands in the Pacific, while the H1N1 (swine flu) virus spread worldwide within two months in 2009. The frequency and sheer number of connections made between different states and countries make containing the spread of infectious disease incredibly challenging. Difficulties in containing these types of outbreaks may be worsened with the emergence of drug-resistant diseases like TB that were once thought to be easily treated. These diseases, particularly those spread through the air, pose major potential problems based on Minnesota's interconnected transportation system. The Minnesota Department of Health's Emergency Preparedness, Response, and Recovery unit is responsible for planning how Minnesota can prepare for potential pandemic events.[20]

On a local level, the concerns to be planned for include transportation connections, disease research centers at the University of Minnesota and Mayo Clinic, and the potential for mutations that allow diseases to spread from livestock to humans. Both the University of Minnesota and May Clinic participate in the Great Lakes Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research, whose main laboratory is located in Illinois.[21] The University of Minnesota's CIDRAP (Center for Infectious Disease Research and Policy) works to prevent illness and death through epidemiologic research and translation of scientific information into practical applications and solutions.[22] Fortunately, significant progress in medical science and the emergence of computational modeling processes provide modern society with advanced tools to assist with efforts to suppress the rapid spread of disease through the transportation system.[23]

LIVESTOCK

Increased trade and traffic volumes of livestock moving through Minnesota, the United States, and the world have linked transportation with issues that have significant impacts on our food system and local economies. The recent outbreak of bird flu in Minnesota grounded the potential impacts of a disease outbreak in reality. According to a July 2015 analysis conducted by the University of Minnesota, lost turkey and egg production, wages, and benefits have cost the state's economy $647 million during the most recent bird flu outbreak.[24] To this point, scientists remain unsure of exactly how this round of bird flu spread across the state – though it is possible that transportation may have played a role somewhere along the way. Once on a farm, the flu virus is typically transported in barns by people or equipment.[25] Live animal transport remains a concern in terms of disease spread, both related to the spread of bird flu and other diseases. The distance that livestock travel on average during their lifetime has the potential to rapidly accelerate disease spread. As of 2007, livestock in the United States traveled 1,000 miles on average.[26]

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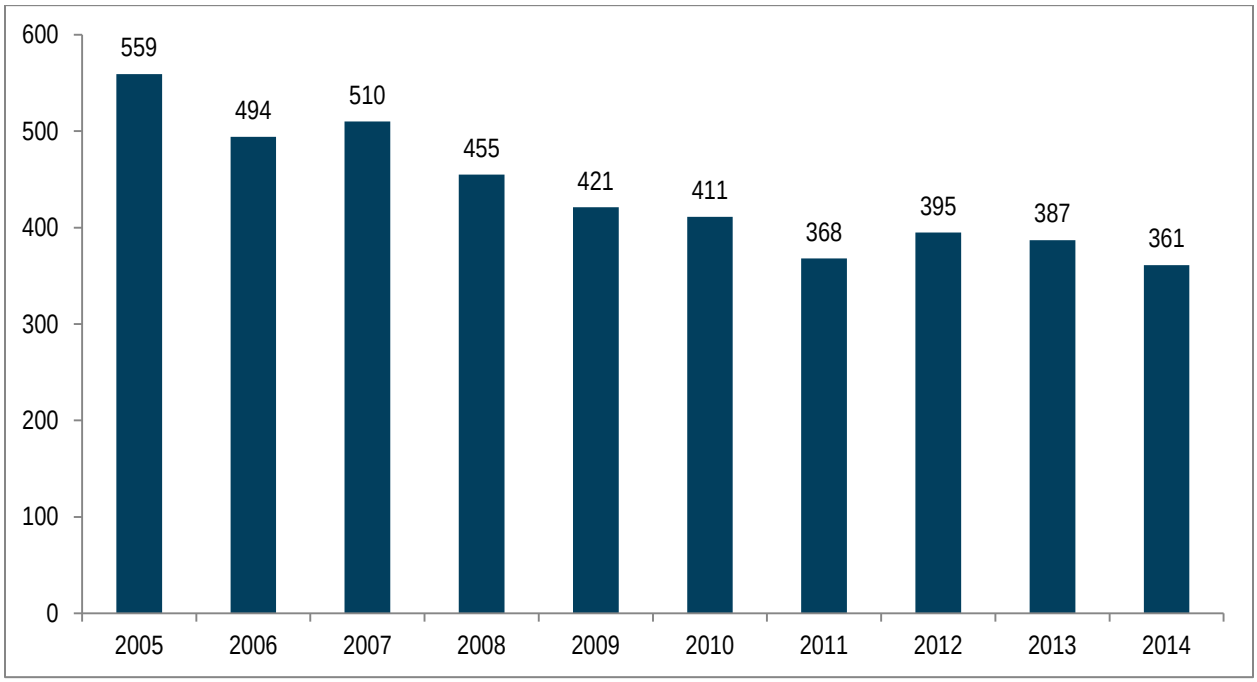
[17] Rural Assistance Center, 2015
[18] Syed, Gerber, & Sharp, 2013
[19] Ibid.
[20] Minnesota Department of Health
[21] Federation of American Scientists
[22] University of Minnesota, CIDRAP
[23] Colizza & Vespignani, 2010
[24] Hughlett, 2015
[25] Benson, 2015
[26] Greger, 2007

TRAFFIC FATALITIES & SAFETY

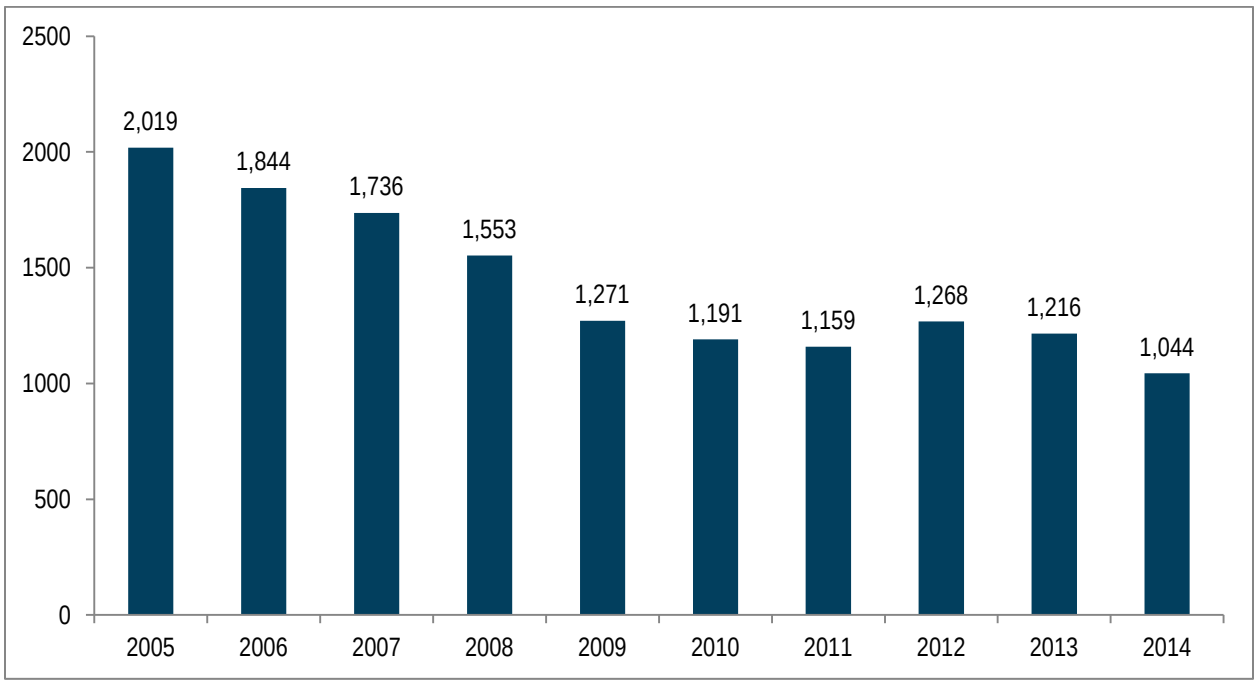
Broadly speaking both the number of fatalities and serious injuries that have occurred on all Minnesota roadways have fallen in the last 10 years.[27] Minnesota's Toward Zero Deaths (TZD) initiative, founded in 2003, has increased awareness of traffic fatalities and injuries and worked to improve safety for the traveling public. The TZD initiative has set targets for continuing to reduce fatalities (300) and serious injuries (850) on Minnesota's roads by 2020.[28] Younger drivers and males are over-represented in traffic crashes in Minnesota – young people made up 27 percent of traffic deaths and 39 percent of serious injuries.[29] Figures 7 and 8 show recent progress toward Minnesota's TZD goals.

Figure 7: Traffic fatalities on Minnesota's roads since 2005[30]



[27] MnDOT Annual Performance Report, 2014
[28] Ibid.
[29] 2014 Minnesota Crash Facts
[30] MN Department of Public Safety Crash Facts

Figure 8: Serious injuries resulting from crashes involving a motor vehicle on Minnesota's roads since 2005[31]



[31] MN Department of Public Safety Crash Facts