



CHAPTER 2

Moving People

Highlights

- In 2013 total domestic person-miles of travel was about 4.7 trillion. Nearly four-fifths of person-miles was in cars or other personal vehicles, while domestic air travel accounted for 11 percent.
- In 2013 person-miles of travel on highways remained below the prerecession peak in 2007; annual data for 2014 are not yet available, but a monthly indicator of highway vehicle-miles of travel evidenced strong growth in 2014. Person-miles and vehicle-miles often rise in tandem.
- In 2014 new peaks were set for the number of commercial airline passengers (about 850 million) and revenue passenger miles (1.2 trillion). In contrast to previous years, U.S. air carrier's international revenue passenger miles exceeded domestic miles in both 2013 and 2014. In 2014, passengers are filling more seats per flight than a decade ago.
- International visitors to the United States rose from 60 million in 2010 to nearly 75 million in 2014, generating \$221 billion in export revenue—the highest in this century.
- Between 1990 and 2013, the number of people who drove alone to work increased by 25 million, while nearly 2 million fewer people carpooled to work.
- About 9 percent of households (about 9.8 million) had no vehicle in 2009. However, only 4 percent of households with a worker were without a vehicle, underscoring the critical role the personal vehicle plays in getting employees to and from work.
- About 14.8 percent of workers with no available vehicle walked to work, roughly four times the percentage for workers with one available vehicle. Similarly, 2.8 percent of those without a vehicle biked to their workplace, compared with 0.8 percent for workers with one available vehicle
- Transit use for the trip to work has slowly increased since reaching a low point in the mid 1990s. Transit now accounts for 5

percent of work trips, with higher levels in some metropolitan areas (the highest being New York City, San Francisco, CA, and Washington, DC).

- Walking and biking are important components of commuting to work in many cities. Regionally, walking to work is highest in Eastern cities. Over 10 percent of commuters in Boston, MA, Pittsburgh, PA, Washington, DC, and New York City walk to work. Biking to work is highest in the West and Midwest. Over 6 percent of commuters in Portland, OR, bike to work, as do over 5 percent of commuters in Madison, WI, and 4 percent in Minneapolis, MN.
- Working exclusively at home increased by about 82 percent from 1990 to 2013, growing from 3.4 million to 6.2 million.

The Nation's transportation system accommodates a large amount of local and long-distance travel to meet the demands of 319 million U.S. residents and 75 million foreign visitors.¹ In 2013 total domestic person-miles of travel (PMT) was about 4.7 trillion, nearly four-fifths of which was in cars or other personal vehicles, while domestic air travel accounted for 11 percent [USDOT BTS NTS, Table 1-40].² Transit, intercity rail, and bus services accounted for the remaining PMT. Walking and biking also accounted for a large number of local trips and travel miles.

The number of commercial air passengers and airline revenue passenger miles reached new highs in 2014, rebounding fully from sharp declines during and after the 2008 and 2009 economic recession. While 2014 highway PMT data had yet to be issued when this report was completed, highway PMT by personal vehicle in 2013 was still below the 2007 peak.

¹ On an individual basis, data from the National Household Travel Survey indicates that U.S. residents averaged slightly over 13,100 miles per capita in 2009 [USDOT FHWA NHTS 2011].

² PMT in 2-axle 6-tire single-unit trucks and in combination trucks have been excluded from this calculation.

Transit, intercity passenger rail, and intercity bus services continued to grow during and after the recession.

Recent Trends in Local Travel

As illustrated in table 2-1, personal travel is dominated by frequent, repetitive patterns, such as the daily commute to work and weekly shopping trips. Figure 2-1a shows the shares of person trips by trip purpose, and figure 2-1b shows the person-miles of travel for these purposes from the most recent National Household Travel Survey (NHTS) completed by the USDOT Federal Highway Administration in 2009. Social/recreational activities, family/personal errands and shopping combined accounted for nearly 70 percent of household PMT and 60 percent of household trips.

Work and work-related trips are typically longer than other types of local travel, making up about one-fourth of total mileage traveled but less than one-fifth of total trips. The shorter trips were typically for shopping, personal business, and social/recreation—each with greater shares of the number of trips but a lower share of PMT than the work commute (table 2-2).

TABLE 2-1 Average Annual PMT, Person Trips, and Trip Length by Trip Purpose: 2009 NHTS

Purpose	Total annual trips per household	Average trip length in miles per household	Person-miles traveled per household
Work	541	11.8	6,256
Work-related	106	20.0	2,078
Shopping	725	6.5	4,620
Family/personal errands	748	7.0	5,134
School/church	333	6.3	2,049
Social and recreational	952	10.7	9,989
Other	61	51.5	2,878
TOTAL	3,466	9.7	33,004

KEY: PMT = person-miles of travel; NHTS = National Household Travel Survey.

NOTES: Family/personal errands includes personal business, shopping, and medical/dental appointments.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey, *Summary of Travel Trends*, Table 5. Available at <http://nhts.ornl.gov/> as of June 2015.

Personal vehicles were used for 86 to 88 percent of journeys to work in the 1990 to 2013 period (table 2-3). However, driving alone continued to rise in share and numbers while carpooling declined. About 25 million more people drove alone to work in 2013 than in 1990, while the number of carpoolers fell by nearly two million, as shown in figure 2-2. Transit ridership increased by over one million. Walking dropped in both share and numbers nationwide from 1990 to 2013, while biking increased in both share and numbers nationwide.

The geography of commuting involves two opposing trends:

1. Workers and their places of work have grown farther apart over recent decades. Workers leaving their home county to work in another county more than quadrupled from 9 million to 38 million and almost doubled in share of all workers between 1960 and 2010.

2. An increasing number of workers are working at home. Part of the longer term growth in working at home had been masked in earlier decades by the number of people who worked on the farm where they also lived [AASHTO 2013].

In 2010, 13.4 million people worked from home at least one day per week, an increase of about 4.2 million people (35.4 percent) from 1997. Home-based workers include those who work exclusively at home as well as those who work at both home and at a job site. Advanced communication and information technologies have increased labor force mobility. Monday and Friday are the most likely days to telework, and Thursday is the least likely [USDOC CENSUS 2013a].

The NHTS survey data show that about one-fifth of trips involve trip-chaining in which people sandwich in daily errands and activities, such as dropping off and picking up children at school/day care or stopping at a fitness center,

FIGURE 2-1a Average Annual Trips per Household by Trip Purpose: 2009 NHTS

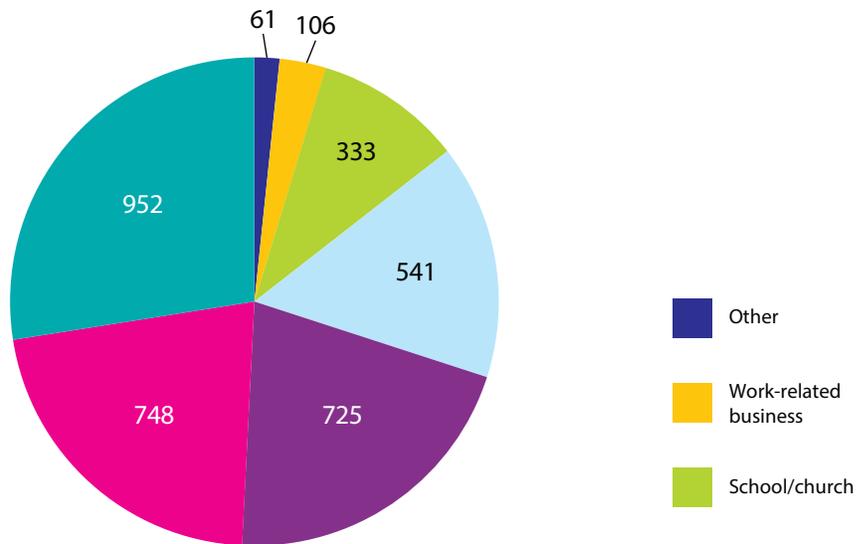
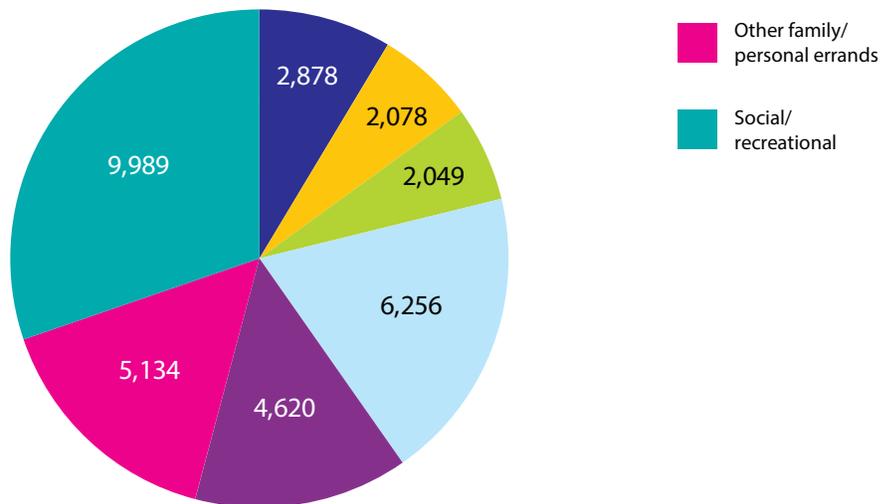


FIGURE 2-1b Average Annual PMT per Household by Trip Purpose: 2009 NHTS



KEY: PMT = person-miles of travel.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey, *Summary of Travel Trends*. Table 5. Available at <http://nhts.ornl.gov/> as of June 2015.

TABLE 2-2 Average Annual PMT, Person Trips and Trip Length by Trip Purpose: 1983, 1990, 1995 NPTS, 2001 NHTS and 2009 NHTS

	Average Person Trip (miles)				
	1983	1990	1995	2001	2009
All Purposes	8.7	9.5	9.1	10.0	9.7
To/From Work	8.5	10.7	11.6	12.1	11.8
Work Related Business	21.8	28.2	20.3	28.3	20.0
Shopping	5.4	5.4	6.1	7.0	6.5
Other Family/Personal Errands	7.3	8.6	7.6	7.8	7.0
School/Church	4.9	5.4	6.0	6.0	6.3
Social and Recreational	12.3	13.2	11.3	11.4	10.7
Other	8.2	10.3	22.8	43.1	51.5

NOTES: Average person trip length is calculated using only those records with trip mileage information present. Other *Family/Personal Errands* includes personal business and medical/dental.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey, *Summary of Travel Trends*, Table 5. Available at <http://nhts.ornl.gov/> as of November 2015.

TABLE 2-3 Commuting by Mode of Transportation: 1990, 2000, 2010, and 2013

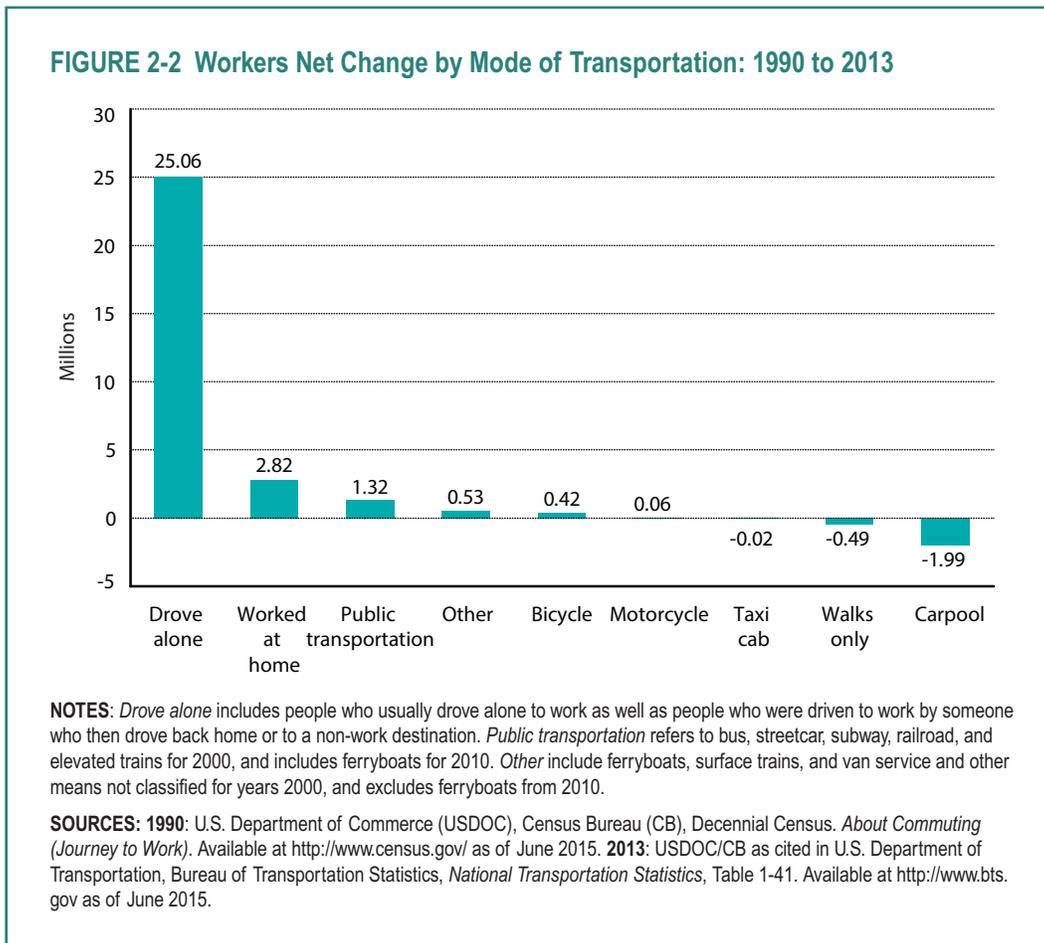
Thousands of workers

	1990		2000		2010		2013		Change, 1990 to 2013	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	115,070	100.0	128,279	100.0	136,941	100.0	142,962	100.0	27,892	24.2
Personal vehicle, total	99,593	86.5	112,736	87.9	118,124	86.3	122,664	85.8	23,071	23.2
Drives self	84,215	73.2	97,102	75.7	104,858	76.6	109,277	76.4	25,062	29.8
Carpool, total	15,378	13.4	15,634	12.2	13,266	9.7	13,387	9.4	-1,991	-12.9
2-person	NA	NA	NA	NA	10,294	7.5	10,266	7.2	NA	NA
3-person	NA	NA	NA	NA	1,733	1.3	1,824	1.3	NA	NA
4+ person	NA	NA	NA	NA	1,239	0.9	1,297	0.9	NA	NA
Public transportation	6,070	5.3	6,068	4.7	6,769	4.9	7,393	5.2	1,324	21.8
Taxicab	179	0.2	200	0.2	151	0.1	161	0.1	-18	-10.3
Bicycle	467	0.4	488	0.4	731	0.5	882	0.6	415	89.0
Motorcycle	237	0.2	142	0.1	267	0.2	296	0.2	58	24.6
Walks only	4,489	3.9	3,759	2.9	3,797	2.8	4,000	2.8	-488	-10.9
Other means	809	0.7	901	0.7	1,178	0.9	1,337	0.9	528	65.3
Works at home	3,406	3.0	4,184	3.3	5,924	4.3	6,229	4.4	2,823	82.9

KEY: NA = not available.

NOTES: Principal means of transportation to work refers to the mode of travel used to get from home to work most frequently. If more than one means of transportation was used each day, those surveyed were asked to specify the one used for the longest distance during the trip from home to work. Component values may not add to totals due to rounding.

SOURCES: 1990 and 2000: U.S. Department of Commerce (USDOC), Census Bureau (CB), Decennial Census. *About Commuting (Journey to Work)*. Available at www.census.gov as of June 2015. **2010 and 2013:** USDOC/CB, *American Community Survey 1-Year Estimates*, as cited in U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics*, table 1-41. Available at www.bts.gov, June 2015.



while on the way to and from work [USDOT FHWA NHTS 2011].

Figure 2-3 traces the number of trips per person per day made for major purposes as reported in the national travel surveys. The number of work trips has been stable, but the share has declined relative to other trips as travel for other trip purposes increased.

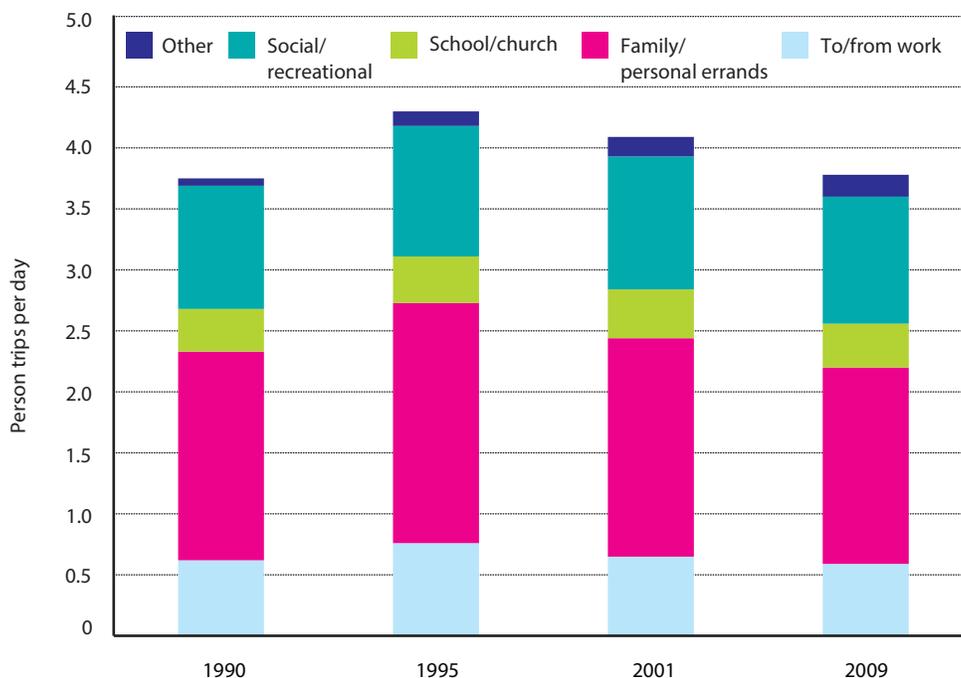
The number of trips varies throughout the week (figure 2-4). Friday accounts for the most trips, because of more social/recreational and family/personal/errand trips, and Sunday for the least. Reduced numbers of work trips and errands on Saturday and Sunday are partially

offset by shopping and social/recreational trips, as well as travel to religious services.

As shown in figure 2-5, the overwhelming majority of person trips for all purposes are taken in personal vehicles. Walking is used for a substantial number of errands and social/recreational trips. Family/personal errands and social/recreational activities accounted for more than two-thirds of trips, followed by trips to and from work, which accounted for 15.6 percent.

Supporting the high percentage of travel by personal vehicle, 9 out of 10 households have access to automobiles and other vehicles. The

FIGURE 2-3 Long-Term Trend in Trips per Day by Purpose: 1977, 1983, 1990, and 1995 NPTS, and 2001 and 2009 NHTS



NOTES: 1990 data have been adjusted to make them more comparable with later data in the series. 1995 "To or From Work" person trips and person miles are believed to be overstated (see Appendix 2 of the *1995 Summary of Travel Trends*). *Person trip* is a trip by one person in any mode of transportation. *Family/Personal Errands* includes personal business, shopping, and medical/dental appointments. *Other* includes trips for work-related business.

SOURCES: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey, *Summary of Travel Trends*, Table 11. Available at <http://nhts.ornl.gov/> as of June 2015.

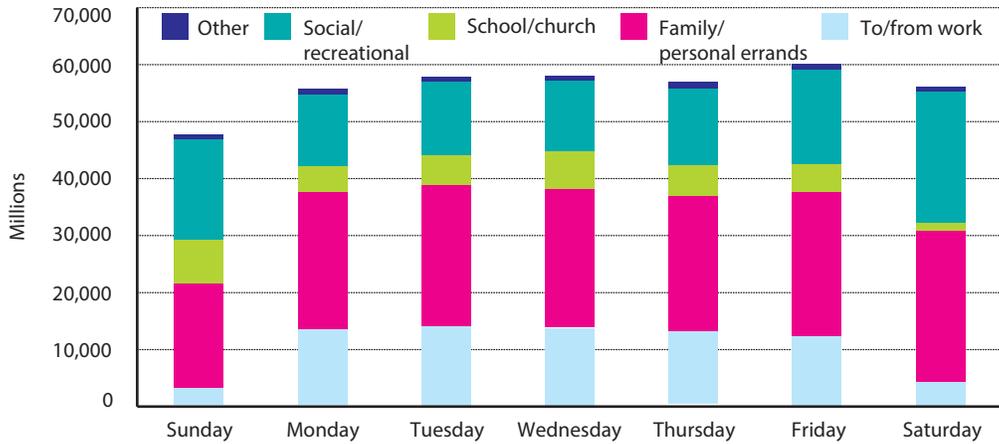
share of households without a vehicle declined from over 20 percent in 1960 to 8.7 percent in 2007. The most recent data indicate that roughly 10.7 million households, 9.2 percent of all households in 2012, did not have access to a vehicle [USDOC CENSUS 2012]. The number of households without vehicles has stayed about the same, at 10 to 11 million, despite a growing number of households over the past 40 years [AASHTO 2013].

Most households without access to vehicles do not have members in the labor force. Only 4 percent of households with workers have

no vehicles. Workers in these households mostly rely on transit, walking, or, to a lesser extent, carpooling to get to work. About 12 percent of households have more workers than vehicles. The other 88.4 percent are about evenly split (about 44 percent each) between households with more vehicles than workers and households where the number of vehicles equals the number of workers [AASHTO 2013].

National trends do not portray travel in individual metropolitan areas. For example, transit serves a higher share of work trips in

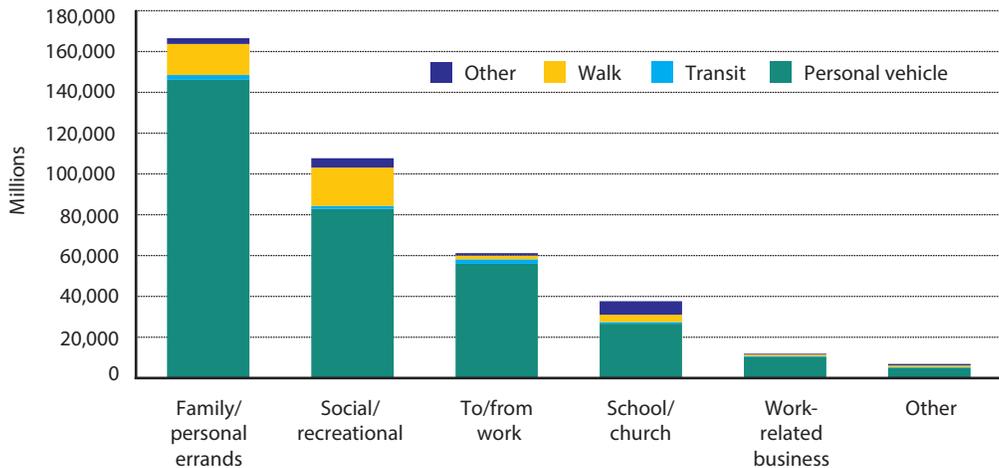
FIGURE 2-4 Annual Number of Person Trips by Purpose and Day of Week: 2009 NHTS



NOTES: *Person trip* is a trip by one person in any mode of transportation. *Family/Personal Errands* includes personal business, shopping, and medical/dental appointments. *To or From Work* includes work-related business trips.

SOURCES: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey (NHTS), *Online Analysis Tool*. Available at <http://nhts.ornl.gov> as of June 2015.

FIGURE 2-5 Annual Number of Person Trips by Mode and Purpose: 2009 NHTS



NOTES: *Person trip* is a trip by one person in any mode of transportation. *Family/Personal Errands* includes personal business, shopping, and medical/dental appointments.

SOURCES: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey (NHTS), *Online Analysis Tool*. Available at <http://nhts.ornl.gov> as of June 2015.

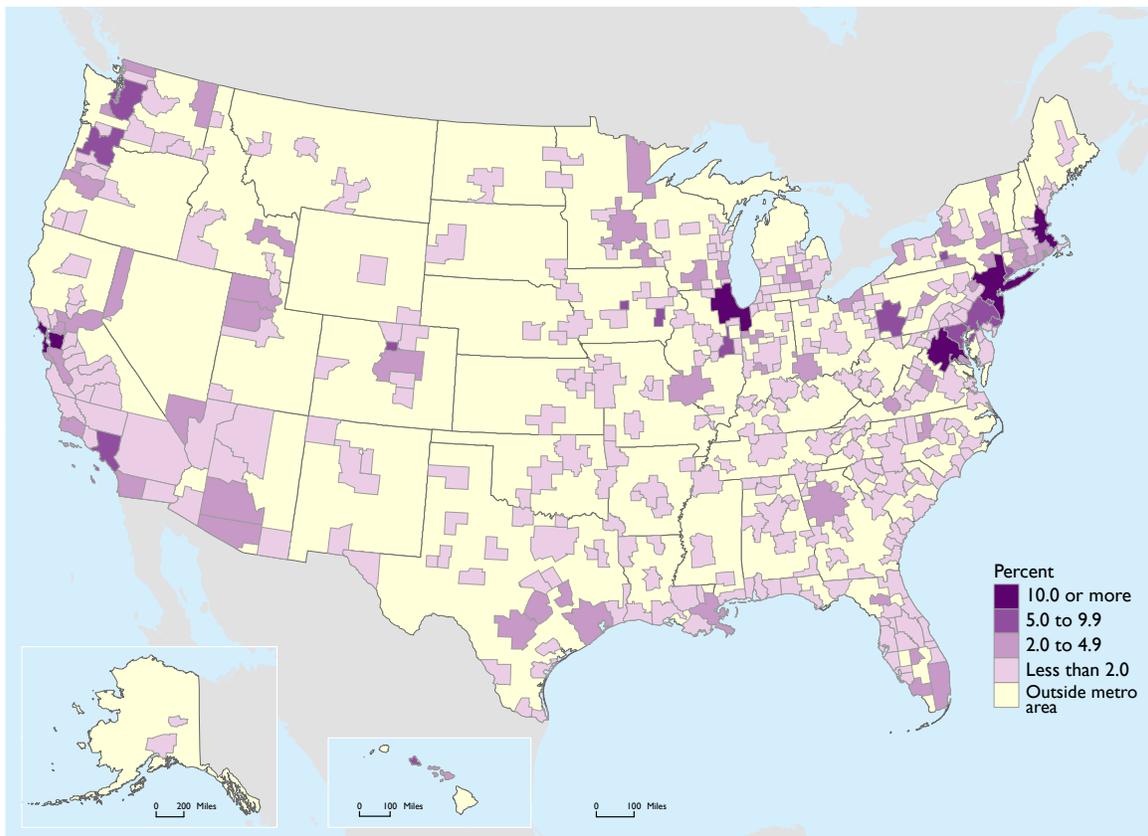
larger metropolitan areas: 11.0 percent in areas with a population over 5 million, 4.0 percent in areas between 2.5 and 5 million, and 2.2 percent in areas between 1 and 2.5 million (figure 2-6). At the highest extreme, 58.7 percent of workers living in the borough of Manhattan in New York City commute by transit and another 20 percent walk [USDOC CENSUS 2012].

Walking and Biking to Work

Nationally, only a small percentage of people walk or bike to work. However, these

nonmotorized modes of commuting are important in many cities of all sizes. According to recent Census data, 4.3 percent of workers in the principal cities of metropolitan areas walk to work and another 1.0 percent bike. Over 10 percent of commuters in several large cities (Boston, MA; Washington, DC; Pittsburgh, PA; and New York City) walk to work. Large cities with the highest percentage of commuters by bike are Portland, OR (6.1 percent); Madison, WI (5.1 percent); and Minneapolis, MN (4.1 percent). These cities have also invested in

FIGURE 2-6 Percentage Commuting by Public Transit: 2013 ACS



SOURCES: U.S. Department of Commerce, Census Bureau, *2009-2013 American Community Survey 5-Year Estimates*, available at <http://www.census.gov/acs> as of March 2015.

infrastructure to facilitate biking. Some small cities have higher rates of walking and biking, especially university towns.

Among regions, the Northeast has the highest rate of walking, while the West had the highest rate of biking. The South had the lowest rate of walking and bicycling to work for most city-size categories.

About 14.8 percent of workers with no available vehicle walked to work, roughly four times the percentage for workers with one available vehicle. Similarly, 2.8 percent of those without a vehicle biked to their workplace, compared with 0.8 percent for workers with one available vehicle [MCKENZIE 2014]. In many places the daily rhythms of local travel are affected by long-distance travel. Highway traffic between distant places contributes to local congestion on intercity highways. Traffic to and from airports also contributes to local congestion. Personal travel in recreational areas is dominated by seasonal variation (e.g., holidays, such as Memorial Day) as out-of-town visitors increase traffic counts along interstates that connect major cities and on local roads that lead to resort areas [DELDOT 2014].

Recent Trends in Long-Distance Travel

When defined as trips to a place over 50 miles away, long-distance travel is primarily served by personal vehicles or air carriers. There is no longer a comprehensive data source for long-distance travel. Although totals can be estimated from a variety of sources, the end result is incomplete—in terms of system usage for long-distance trips, trip purpose and length,

and traveler characteristics. The missing pieces include trips by personal vehicles, general aviation, and cruise ships. Vehicle-miles of travel on rural interstate highways are occasionally used as a surrogate for long-distance highway travel, but there is no methodology for separating local from long-distance travel within rural areas. Takeoffs and landings of general aviation aircraft are not a good indicator because many flights take off and land at the same airport rather than carry people to distant destinations. Numbers of passengers boarding and debarking from cruise ships in each port are measured, but passenger lists have not been compiled into trips since June 2012.

Long-distance travel includes approximately 74.8 million international visitors to the United States, as shown in figure 2-7a, in 2014, an increase of 15 million from 2010. Figure 2-7b shows the fluctuation in international visits since 2000, reflecting the impacts on international travel after the 2001 terrorist attacks and the influence of the global recession in the first half of 2009 [USDOC OTTI 2015]. U.S. and foreign airlines carried nearly 850 million passengers on domestic flights and international flights to and from the United States in 2014. Passenger enplanements were up by about 26 million from 2013, surpassing their previous peak in 2007. In 2014 domestic enplanements accounted for 78.0 percent of passengers, while international enplanements on U.S. and foreign airlines accounted for 22.0 percent [USDOT BTS OAI 2015]. U.S. airlines carried 55.0 percent of passengers traveling between the United States and international points. As shown in table 2-4, planes have become more crowded since

FIGURE 2-7a Foreign Visits by Main Markets: 2000–2014

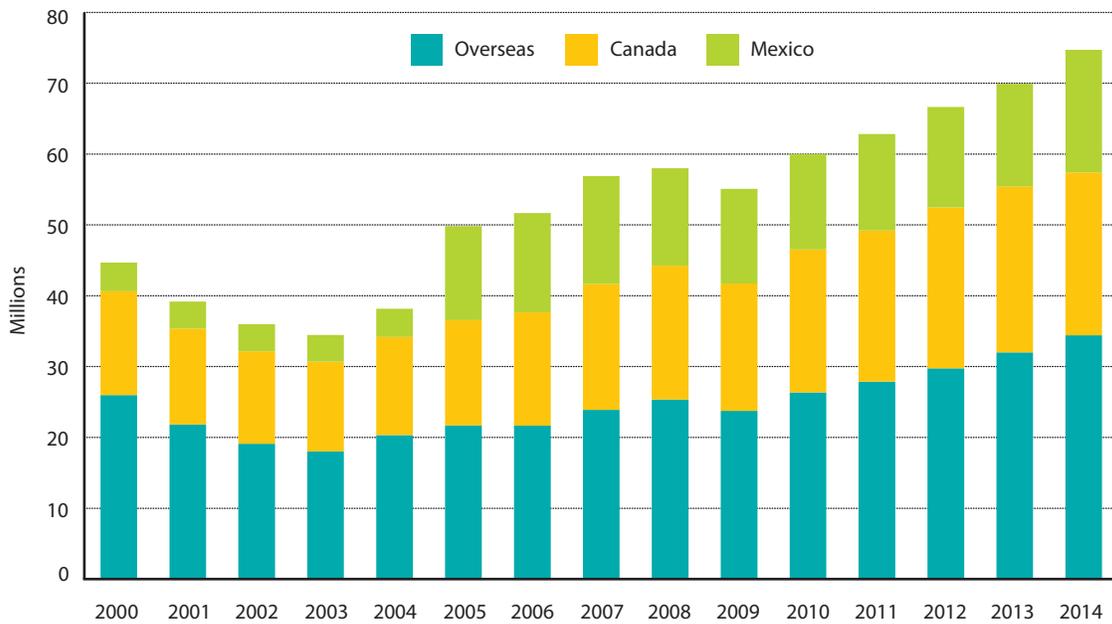
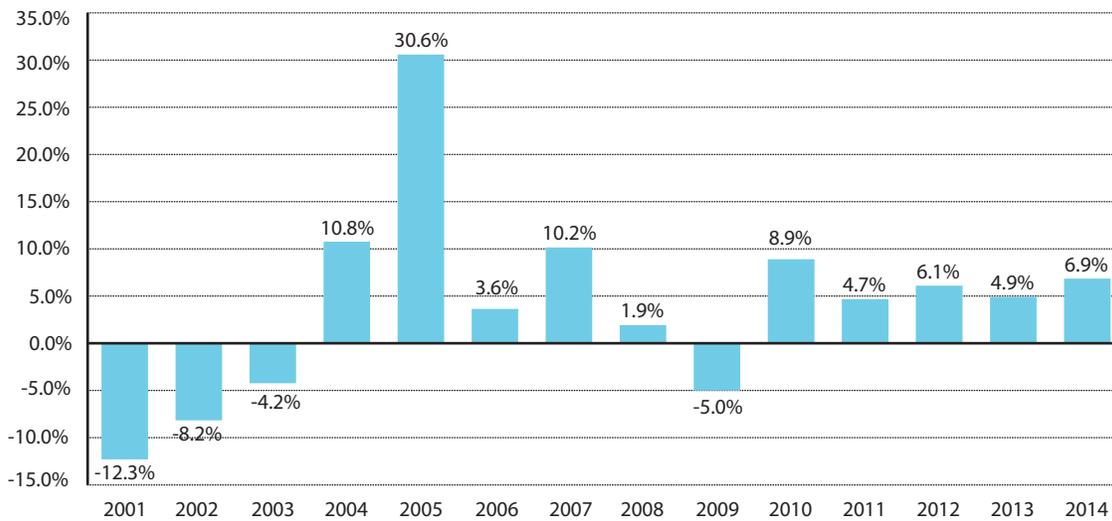


FIGURE 2-7b Percent Change from Previous Year in Total Foreign Visits: 2001–2014



SOURCES: U.S. Department of Commerce, Office of Travel and Tourism Industries, *U.S. Monthly Arrivals Trend Line: Overseas, Canada, Mexico & International*, available at www.travel.trade.gov as of March 2015.

2005 as measured by load factors. Domestic flights were, in general, more crowded than international flights.

The number of domestic and international flights (9.5 million in 2014) has been trending downward since the peak of over 11.3 million flights in 2005, but these flights are carrying more passengers and have a higher load factor than a decade ago. Domestic flights in 2014 accounted for 85.2 percent of total U.S. flights, while international flights of U.S. and foreign carriers accounted for 14.8 percent [USDOT BTS OAI 2015].

Between January 2003 and January 2015, U.S. airlines' total (domestic and international) passenger enplanements rose 18.1 percent. Enplanements of 64.4 million in January 2015 were the highest since the recession ended in June 2009 and the fourth highest of all-time. During this period, growth of international

enplanements (52.3 percent) outpaced domestic enplanements (14.3 percent). While domestic and total enplanements remain below prerecession levels, passengers are traveling longer distances. Passengers traveled 72.8 billion revenue passenger-miles in January 2015, the second highest of all-time, and 0.7 percent less than the all-time record set in the previous month (figure 2-8).

Long-distance railroad travel in the United States is primarily on Amtrak (also known as the National Rail Passenger Corp.). Amtrak ridership has been growing for many years, rising from 19.7 million annual person trips in its fiscal year 1997 to 30.9 million riders in 2014 [AMTRAK 2014]. On a second, smaller railroad, the Alaska Railroad, annual ridership peaked in 2007 at more than one-half million trips, but had not regained this level as of 2014. Customers traveling aboard railcars owned by cruise lines and pulled by the Alaska Railroad

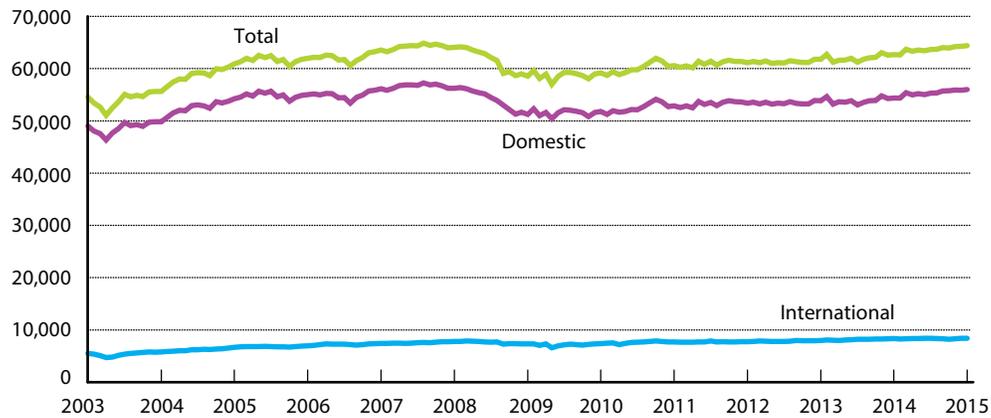
TABLE 2-4 Annual Airline (U.S. and Foreign Carriers) Passenger Enplanements: 2005–2014
Scheduled flights only

	Domestic enplanements (millions)	Domestic load factor (percent)	International enplanements (millions)	International load factor (percent)	Total domestic and international enplanements (millions)	Total domestic and international load factor (percent)
2005	657.3	77.2	143.6	78.7	800.8	77.8
2006	658.4	79.1	149.7	78.6	808.1	78.9
2007	679.2	79.9	156.3	79.1	835.4	79.5
2008	651.7	79.7	157.7	77.6	809.4	78.7
2009	618.1	81.1	149.7	78.3	767.8	79.7
2010	629.5	82.2	157.9	81.6	787.5	81.9
2011	638.2	82.9	163.9	80.3	802.1	81.6
2012	642.3	83.4	170.8	81.7	813.1	82.5
2013	645.7	83.5	179.3	82.1	825.0	82.8
2014	662.8	84.5	187.7	81.1	850.5	82.7

NOTE: International enplanements include U.S. and foreign carriers. Load factor is calculated by dividing demand, as measured by revenue passenger-miles (RPMs), by capacity, as measured in available seat-miles (ASMs).

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Airline Data and Statistics, Passengers*. Available at http://www.bts.gov/programs/airline_information/ as of July 2015.

FIGURE 2-8 U.S. Airline Passenger Enplanements: Jan 2003–Jan 2015



NOTE: Includes enplanements on scheduled services. International enplanements include only U.S. carriers.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *T-100 Market Data*. Available at www.transtats.bts.gov as of April 2015.

accounted for about half of the 2014 Alaska Railroad passengers [ARRC 2015].

Long-distance travel by motorcoach is summarized in table 2-5. In 2013 the motorcoach industry provided 605 million person trips in the United States and Canada, covering about 63 billion miles for an average trip length of about 104 miles. In 2013 the 19 large carriers, with more than 100 buses

each, accounted for less than 1 percent of operators, but provided 38.5 percent of person trips. Small carriers, with less than 10 buses each, accounted for 82.0 percent of operators, but provided only 21.9 percent of trips. The remaining carriers, with between 10 and 99 buses, provided 39.6 percent of person trips. Roughly half of all bus passengers are either students or senior citizens [ABA 2015]. About 48.4 percent of motorcoach mileage was in

TABLE 2-5 Motorcoach Carriers, Coaches, Trips, and Passenger Miles: 2010–2013

	2010	2011	2012	2013
Carriers	4,011	3,984	3,954	3,801
Coaches	40,709	40,141	39,607	36,903
Passenger trips (millions)	601	627	637	605
Passenger trips per coach	14,800	15,600	16,100	16,400
Passenger miles (billions)	69	76	76	63
Passenger miles per coach	1,703,200	1,897,400	1,912,500	1,710,000

NOTE: *The Motorcoach Census* measures the size and activity of the motorcoach industry in the U.S. and Canada.

SOURCE: American Bus Association, *Motorcoach Census*. Available at www.buses.org as of June 2015.

charter service; scheduled service accounted for another 33.9 percent. The remaining miles were for such services as commuting, packaged tours, and transport to and from airports.

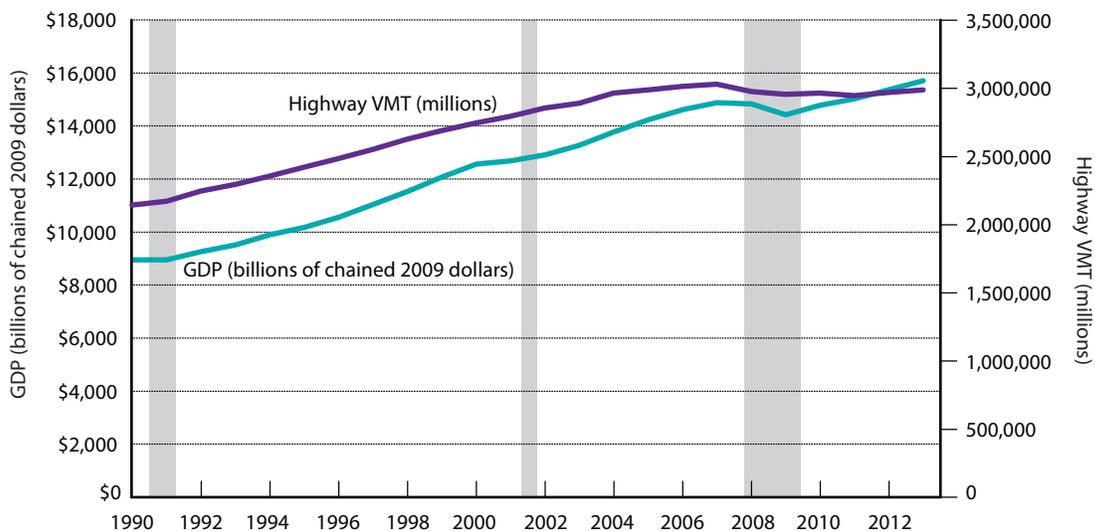
Forces of Change in Travel

After decades of growth, person-miles of travel (PMT) by the dominant mode of personal vehicles recovered slowly after 2008, but personal vehicles still account for about 80 percent of PMT. As described earlier, air travel declined during the recession, but has subsequently rebounded to reach new highs in 2014. The increases in travel by other modes (e.g., transit and intercity passenger rail) are far too small in numbers to offset the decline in highway PMT on total travel [USDOT BTS NTS 2015].

Economics and Recession

The 2008–2009 recession clearly impacted recent travel trends. Vehicle-miles traveled (VMT) peaked in 2007, just as the recession began, before dropping 1.8 percent in 2008, 0.7 percent in 2009, and 0.7 percent in 2011, followed by modest growth in 2010 and 2012. U.S. gross domestic product (GDP) grew at approximately 4 percent per year in the 1990s and about 3 percent per year in the early 2000s, but declined 0.3 percent in 2008 and 2.8 percent in 2009, before again growing each year from 2010 onwards through at least the end of 2014. Figure 2-9 shows the interrelationship between GDP and VMT. Annual series data are not yet available for 2013 and 2014, but monthly estimates indicate further VMT growth in these years as the

FIGURE 2-9 U.S. Gross Domestic Product (GDP) and Highway Vehicle-Miles Traveled (VMT): 1990–2013



NOTE: Shaded areas indicate economic recessions.

SOURCES: GDP: U.S. Department of Commerce, Bureau of Economic Analysis as cited U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS), *National Transportation Statistics*, Tables 1-35 and 3-10, available www.bts.gov as of June 2015. VMT: DOT, Federal Highway Administration as cited in DOT, BTS, *National Transportation Statistics*, Table 1-35. Available www.bts.gov as of June 2015.

economy continued to grow [USDOT FHWA 2015].

While the number of passengers on international flights to and from the United States returned to prerecession levels beginning in 2011, it was not until 2014 that enplanements on domestic flights finally exceeded their 2007 levels. Only urban transit and intercity rail passenger volumes grew during and after the recession (with the previously mentioned exception of the Alaska Railroad). The probable degree to which increases in gas prices may encourage people to take transit rather than drive is discussed

in box 2-A. As shown in figure 2-10, person-miles of travel increase with household income. With the last national personal travel survey completed in 2009, at the end of the recession, it remains to be seen what the next survey now underway will show about the trip-making propensities of the public.

Demographic and Geographic Shifts

Demographic factors are the driving force behind long term travel demand. Between 1990 and 2014, the U.S. population grew by 70 million people, reaching 319 million, placing additional travel demands on the transportation system [USDOC CENSUS

BOX 2-A Impact of Gas Prices on Transit Ridership

Transit ridership has increased dramatically over the past few years. Gas prices paid by drivers also increased dramatically until recently. The USDOT Office of the Assistant Secretary for Research and Technology (formerly known as RITA) and the California DOT cosponsored a study to examine the relationship between increases in gas prices and transit ridership in 10 U.S. urbanized areas (mostly densely populated urban cores).

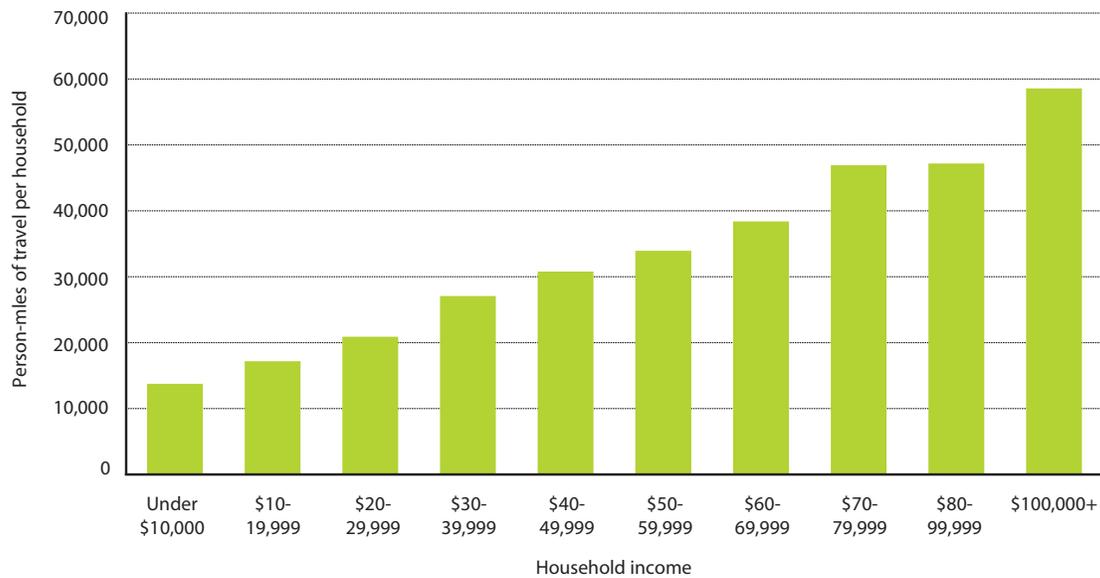
The study, *Net Effects of Gasoline Price Changes on Transit Ridership in U.S. Urban Areas*, released in December 2014, hypothesized what might happen with transit ridership if gasoline prices rose 10 percent between 2002 levels and 2011 in the 10 urbanized areas. It also examined transit ridership changes when gasoline prices reached a \$3 threshold and a \$4 per gallon threshold [ISEKI; ALI 2014].

The study examined bus, light rail, heavy rail, and commuter rail modes, as well as total transit system ridership. Effects varied by transit mode and other conditions. While only

the bus mode (and aggregate ridership) had strongly positive short-term effects when there was a 10 percent increase in gasoline prices, all modes showed ridership increases when the gas price increase was long-term during the 10-year study period. When gas prices were over \$3 per gallon, the study noted a “positive threshold boost effect” for commuter and heavy rails, resulting in a “substantially higher rate of ridership increase.” The rate of increase in bus ridership was 1.67 percent; the rate of increase for commuter rail was 2.05 percent, and the rate of increase for aggregate ridership rose 1.80 percent for the same level of gasoline price changes. When gasoline prices rose over \$4 a gallon, the rate of increase in ridership for heavy rail rose to 9.34 percent.

The study suggested that transit agencies could prepare for such “potential” increases in peak-period ridership from high gasoline prices through measures such as pricing strategies, general financing, capacity management, and operations planning of transit services.

FIGURE 2-10 Person-Miles of Travel per Household by Income Level: 2009 NHTS



SOURCES: U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey, Online Analysis Tool. Available at <http://nhts.ornl.gov/> as of June 2015.

2015]. All regions added population, but growth is not even across the country. More than 80 percent of the 1990 to 2010 population gain was in the South and West, continuing a decades-long trend [USDOC CENSUS 2001 and 2011]. Although two-thirds of the Nation’s counties and 85 percent of metropolitan counties gained population from 2000 to 2010, 175 metropolitan counties and 920 non-metropolitan counties lost a total of 2 million residents [AASHTO 2013]. These regional and metropolitan population changes affect transportation infrastructure needs and travel patterns.³

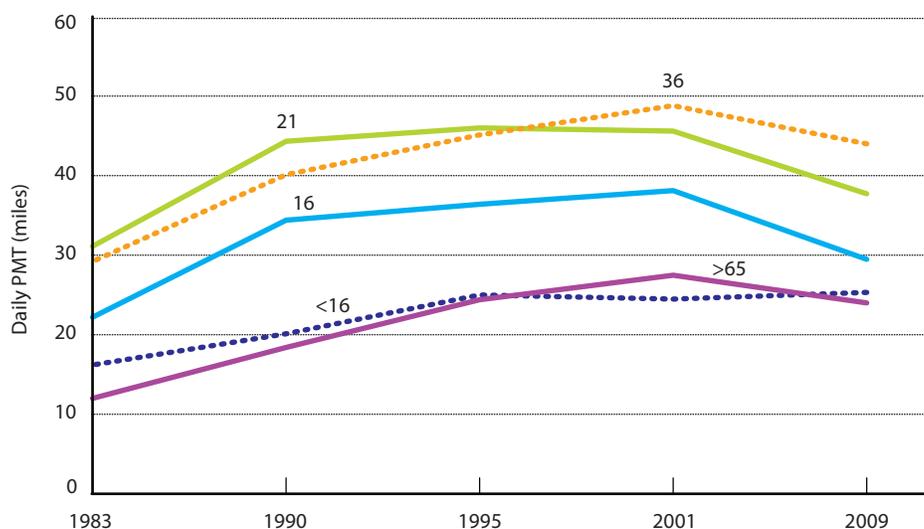
Demographic factors and the economy combine to affect travel demand through the

³ For a more detailed discussion of demographic trends and travel from 1950 forward, see *Transportation Statistics Annual Report: 2013*, pages 56 through 58.

growth of the labor force and the subsequent increase in journeys to work, and through growth in the income generated by the labor force, some of which becomes available for spending on discretionary travel. The number of workers increased by over 25 million, growing from about 119 million in 1990 to 146 million in 2014 [USDOL BLS 2015].

Figure 2-11 illustrates the effect of age on travel. Age is closely associated with the progression of the household life cycle (e.g., single person, married couple, households with small children and/or school age children, empty nesters, and retired individuals). Both the youngest (under 16 years of age) and the oldest (over 65 years of age) travel the least compared to other age groups. The other three age groups shown in the figure account for the majority of person-miles traveled (PMT),

FIGURE 2-11 Daily Person-miles of Travel (PMT) by Age Group: 1983, 1990, and 1995 NPTS, and 2001 and 2009 NHTS



NOTES: 1990 person trips were adjusted to account for survey collection method changes. Please see Appendix 2 of *2001 Summary of Travel Trends* for specifics.

SOURCES: U.S. Department of Transportation, Federal Highway Administration, National Household Travel Survey (multiple years), *2009 Summary of Travel Trends*, Table 14. Available at <http://nhts.ornl.gov/> as of June 2015.

particularly those between 26 and 65 years of age. This is a harbinger of future trends as older members of the labor force move toward the 65-year-age threshold, when many people move into retirement. Travel across all age groups (except those 16 years old and under) showed declines from 2001 to 2009. The youngest and oldest age cohorts seemed least affected by the December 2007 to June 2009 recession and its aftermath, while the working age groups were most affected, particularly the youngest segment [NBER 2013]. Whether this is cyclical or a fundamental change in travel behavior is not clear.

The baby boom generation, born between 1945 and 1965, has been the driving force for travel activity at the local and intercity level for many decades. Today, as the trailing edge of the baby

boom generation approaches retirement age, boomers are still affecting travel patterns. They are the first generation in which both women and men have been close to reaching the saturation point in terms of driver licenses and vehicle availability. Thus, retired baby boomers could be expected to be more mobile in their retirement years than previous generations, as indicated by an increase in PMT among those aged 65 and older [AASHTO 2013].

The millennial generation, born after 1980, is often described as having very different attitudes toward location and transportation than their baby boomer parents. Millennials are described as less dependent on the automobile and more likely to live in central cities [SAKARIA STEHFEST 2013]. National data do not corroborate this description; among

16-to-24 year old members of the U.S. labor force who migrated between suburbs and principal cities, 250,000 left the suburbs for cities and 450,000 left the cities for suburbs, for a net loss of approximately 200,000 from 2011 to 2012 [AASHTO 2013]. Young people are delaying the time when they acquire a driver's license and purchase their first new car, but the delay may have far more to do with the economy and availability of jobs for youth than with shifting preferences of the today's teenagers [AAA 2012]. Transportation as a share of spending is higher for people under the age of 35 than for any other age group [USDOL BLS 2012].

After decades of predictable growth, recent indicators of U.S. travel have become less clear. Many factors, such as the travel predilections of the aging baby boom generation, uncertainties about future levels of immigration, and the duration of continuing effects of the recent recession on travel, will enter into the equation. In order to understand possible changes in travel dynamics, good data about local, long-distance, and international travel will need to be collected on a regular basis. The central question for data development will be to distinguish what changes are cyclical phenomena, and therefore transient, from those that are structural and a fundamental part of a new era of travel behavior.

Time Spent Traveling

On weekdays in 2013, the average person spent 81.6 minutes per day traveling for a variety of activities. Examining only people who engaged in travel for work, the average

person spent 46.1 minutes per day traveling, the most time for all selected activities.

On weekends and holidays, people spent an average of 86.1 minutes per day engaged in various travel activities, 4.5 minutes more than on weekdays. Out of all selected activities, the average person spent the most time (45.6 minutes) traveling for activities related to socializing, relaxing, and leisure, about 11.0 minutes per day more than on weekdays. Travel related to eating and drinking on weekends and holidays accounted for 35.9 minutes—about 10 minutes more than on weekdays [USDOL BLS 2013].

People spent less time traveling in 2013 than 2003. On weekdays in 2013, people spent 5.2 fewer minutes traveling per day, a decrease of 6.0 percent from 2003. On weekends and holidays, people spent 4.3 fewer minutes traveling per day, a 4.7 percent decrease (figure 2-12).

Time spent traveling reached a low in 2008 in the midst of the last recession. Due to a post-recession increase in weekday travel time combined with a continued decline in weekend travel time, average weekday and weekend/holiday travel time were almost equal in 2011. On average, people traveled nearly 4.0 minutes more on weekends and holidays than on weekdays.

Challenges for Travel

An important component of accessibility is having access to transportation options, in particular for groups in society who have the most difficulty traveling. This section begins

FIGURE 2-12 Total Time Spent Traveling on Weekdays and Weekends: 2003–2013


NOTE: Activities are based on *American Time Use Survey Activity Lexicon* 2011 definitions. *Weekdays* exclude holidays. *Weekends and holidays* includes the following: New Year's Day, Easter, Memorial Day, the Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, *American Time Use Survey*. Available at www.bls.gov as of April 2015.

with a discussion of the degree of connectivity⁴ between public transportation modes, using data from the Bureau of Transportation Statistics' (BTS') Intermodal Passenger Connectivity Database. Other challenges discussed include access to transportation for people without a personal vehicle and transportation options for the elderly and for people with disabilities. The section concludes with health issues related to transportation.

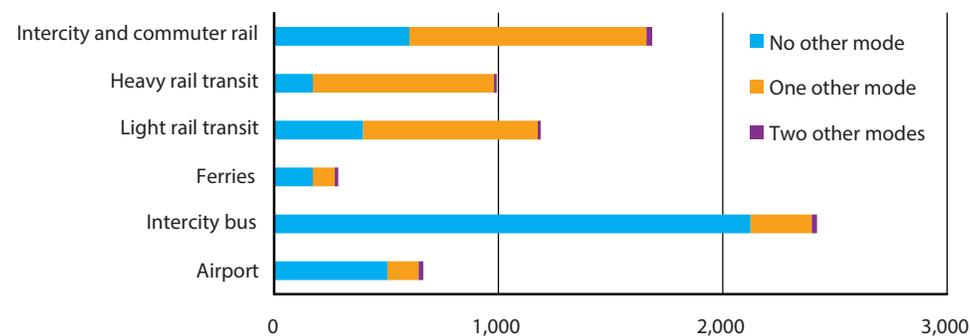
Passenger Access and Connectivity

People using public transportation (e.g., Amtrak, intercity bus, or commercial aviation) often need or wish to connect to another mode

⁴ Connectivity puts travelers in closer proximity to additional transportation alternatives that unconnected, parallel systems do not offer.

of transportation to reach their destinations. According to the 2009 National Household Travel Survey (NHTS), 99 percent of all transit trips used at least two transportation modes. Intermodal links between transportation modes (e.g., transit, intercity bus, or train station access at airports) give travelers more mobility options. The BTS Intermodal Passenger Connectivity Database inventories the connectivity of passenger transportation facilities (e.g., air, long-distance bus and ferry, and intercity rail service) and certain transit facilities (e.g., local ferry and heavy, light, and commuter rail). There are over 7,200 intercity passenger travel facilities (figure 2-13), of which 54.9 percent do not offer connections to other transportation modes, 43.5 percent connect to one other mode, and 1.5 percent

FIGURE 2-13 Intermodal Passenger Facilities by Mode: September 2013



Number of Connections by Facility Type

Number of facilities:	No other mode	One other mode	Two other modes	Grand total
Airport	506	138	22	666
Intercity bus	2,123	274	24	2,421
Ferries	173	98	16	287
Light rail transit	398	779	12	1,189
Heavy rail transit	173	808	11	992
Intercity and commuter rail	604	1,055	26	1,685
	3,977	3,152	111	7,240

NOTES: *Types of connections* include: Ferry (transit and intercity), Bus (intercity, transit, code share, and supplemental), Rail (intercity, light, heavy, and commuter), and Air. *Type of facilities* include: Ferry (transit and intercity, Intercity bus, Rail (intercity, light, heavy, and commuter), and Air.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, *Intermodal Passenger Connectivity Database* (as of 07/13/2013). Available at www.bts.gov as of June 2015.

connect to two other modes of transportation (e.g., bus, air, rail, or ferry) [USDOT BTS 2013].

Specifically, 83 percent of the heavy rail-stations (high-speed transit rail on an exclusive right-of-way) offered connections to other modes and are the most connected of all travel options, followed by light-rail transit (with 66.5 percent), and Amtrak/intercity and commuter rail (with 64.2 percent). About a quarter (24.0 percent) of airports with schedule passenger service connect with other transportation modes. Only 12.3 percent of

intercity bus facilities have connections to other modes [USDOT BTS 2013].

Access to Transportation for People Without a Vehicle

Many people without access to a personal vehicle, especially the poor, have difficulty reaching stores, services, and workplaces outside of their immediate neighborhoods. As previously discussed, roughly 9 percent of households (about 9.8 million) in 2009 did not have access to a personal vehicle. In the most densely populated parts of cities (10,000

plus people per square mile), 28.4 percent of households had no vehicle in 2009 [USDOT FHWA NHTS 2011].

People living below the poverty level are less likely to own, or have access to, a personal vehicle to get to work than the population as a whole. Across the Nation the percentage of people in poverty increased from 12.2 to 15.8 percent between 2000 and 2013 as the number of poverty stricken persons increased from 33.3 million to 48.8 million⁵ [USDOC CENSUS 2013b, 2014]. BTS analysis of the 2009 NHTS found that households with annual incomes less than \$25,000 were eight times more likely, on average, to be zero-vehicle households than households with annual incomes above that level [USDOT FHWA NHTS 2011]. Of workers below the poverty level, 63.6 percent drive to work compared to 76.4 percent of workers overall in 2012. Compared to commuters as a whole, people below the poverty level are more likely to take public transportation, walk, or use other transportation modes (compare figures 2-14a to 2-14b).

Transportation Access for Elderly and Disabled Passengers

Accessibility to transportation options also is a challenge for the elderly and those with physical or cognitive impairments. The American Association of Retired Persons Public Policy Institute estimated that 12 percent of all trips and 10 percent of all miles traveled in the United States in 2009 were

taken by persons age 65 and older [AARP 2011]. Transit use by people age 65 and older as a share of all the trips they had taken increased by 40 percent between 2001 and 2009, which represented more than 1 billion trips on public transportation in 2009 (a 55 percent increase from what was reported in 2001).

Over the last two decades, the Nation's transit fleet has made notable progress in making transit service accessible to those with disabilities. Through the installation of lifts and ramps or improvements in station infrastructure, people using wheelchairs or who have other travel disabilities now find it easier to access transit than in the recent past. In 2012 the percentage of accessible buses with 35 seats reached 99 percent, compared to about 94 percent in 2003 [USDOT FTA 2013]. Also during this period, accessible portions of the commuter rail fleet doubled to 85 percent, and accessibility on the light rail and heavy rail fleets reached 88 and 99 percent, respectively. The trolleybus fleet grew from 47 to 100 percent accessible. Demand-response transit fleets also have become more accessible, increasing from 84 to 89 percent.

Box 2-B examines the interactions between transportation and public health.

⁵ There is no statistically significant difference in the poverty rate between 2011 and 2013, while the poverty rate increased each year in the four years prior to 2011.

FIGURE 2-14a How Workers Below the Poverty Level Get To Work: 2012

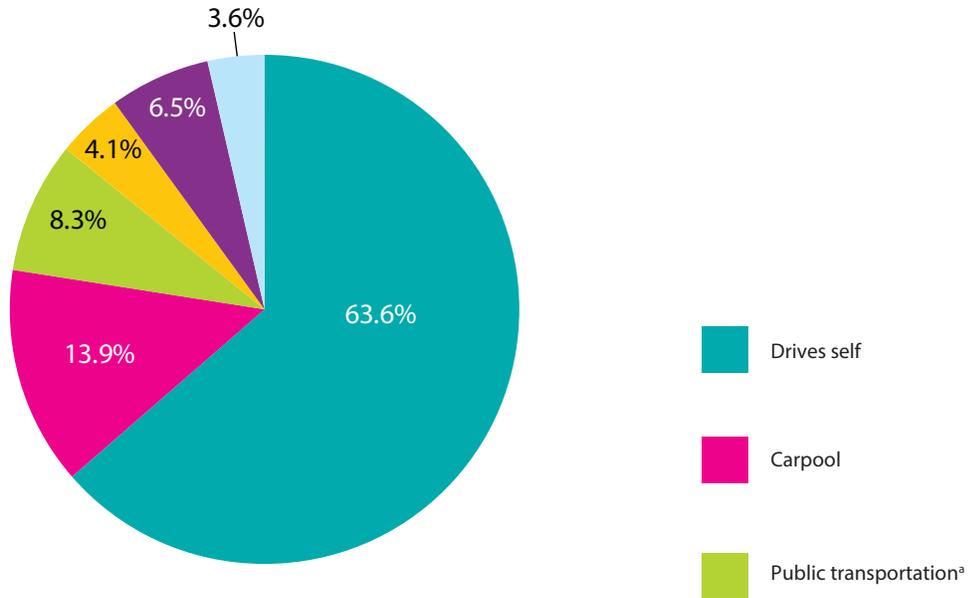
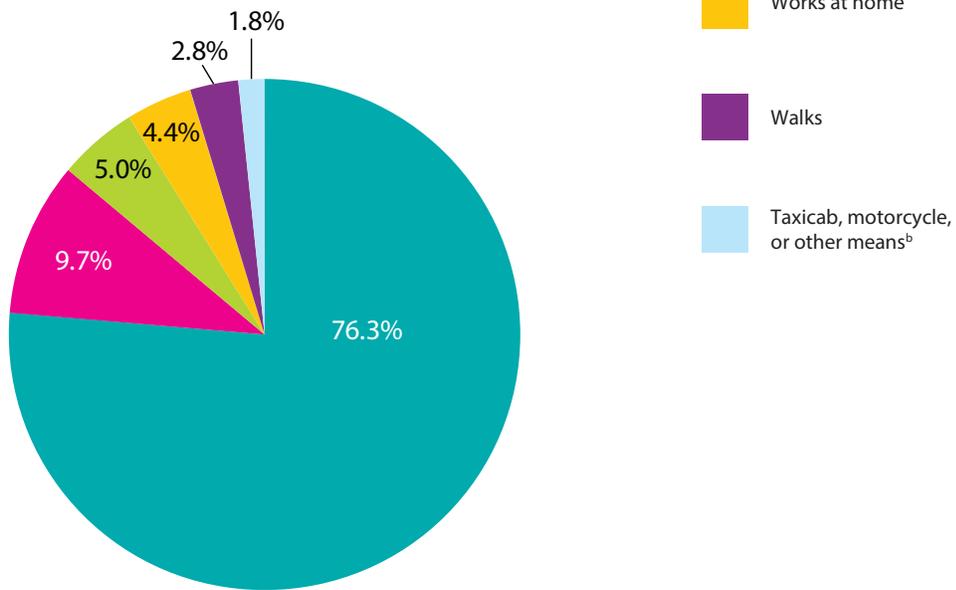


FIGURE 2-14b How Workers Get To Work: 2012



^a Public transportation category includes workers who used a bus or trolley bus, streetcar or trolley car, subway or elevated, railroad, or ferryboat. ^b Other means includes ferryboats, surface trains, and van service and other means not classified.

NOTES: Percents may not add to 100 due to rounding. For additional information, please refer to the *American Community Survey's 2012 Subject Definitions*, available at <http://www.census.gov/acs/>. Workers are civilians and members of the Armed Forces, 16 years and older, who were at work the previous week. Persons on vacation or not at work the prior week are not included.

SOURCES: *Below Poverty Level:* U.S. Department of Commerce, Census Bureau, 2012 American Community Survey, 1-year estimates, table B08122. Available at <http://www.census.gov/acs/www/index.html> as of June 2015. *Total:* U.S. Department of Commerce, Census Bureau, 2012 American Community Survey, 1-year estimates, table B08006. Available at <http://www.census.gov/acs/www/index.html> as of June 2015.

Box 2-B Health and Transportation

Transportation and public health interact in several ways, such as in the areas of public safety and exposure of the public to air pollution. In this regard, there has been improvement in some critical indicators of transportation's health impacts over the last several decades.

As is discussed in chapter 6, transportation fatalities and injuries have declined in recent decades, yet every day, on average, about 95 people die and 6,400 people are injured in transportation accidents—primarily on the highway. Air pollution from transportation also is an indicator of health effects, as is discussed in chapter 7. Here, too, there has been a reduction in transportation emissions over the last few decades, resulting in benefits to public health.

Perhaps the most dramatic change has been the virtual elimination of lead from gasoline. This phase out brought major public health benefits, particularly for children and populations living near major highways who were no longer exposed to unhealthy levels of lead from gasoline emitted into the air. Lead when inhaled or ingested from soil was shown to produce elevated lead levels in the blood, with multiple health effects such as lowering IQs for exposed children, and cardiovascular problems for adults [WORLD BANK 1998].

But air quality health impacts from transportation emissions from other air pollutants remain a concern. According to the US EPA, living, working or attending school near major roads has been associated with greater incidence or severity of such health effects as asthma, cardiovascular disease, reduced lung function, childhood leukemia, and premature death. Besides air pollution, noise exposure may also play a role in roadway-related health problems [USEPA].

The mode of transportation people use also impacts health. Americans increasingly have an obesity problem, in part because of diet and sedentary lifestyles, and in many cases lack of exercise. During the last half century, the time people spend each day walking and bicycling to workplaces or other places has declined, while the time spent sitting in vehicles has increased [AJPH 2011]. Census Bureau reports show that in 1960, 10.3 percent of people walked to work, compared to 2.8 percent in 2013. People also are less likely today than in the 1960s to use public transit, which generally involves walking to and from a bus stop or transit station.

The NHTS found that people averaged 1 hour a day in their vehicles as a passenger or a driver in 2009. This was less time than in 2001 but more time than in 1990 [USDOT FHWA 2011]. The amount of time spent in a vehicle varied by age group, from somewhat more than 40 minutes a day for children under the age of 18 (those less than 5 were not tallied) to over 70 minutes per day for those between 35 and 54 years of age. The 2009 NHTS survey found that walking accounted for 10 percent of daily trips—an increase from 8.6 percent in 2001.

The complex interactions between transportation and public health are increasingly recognized as an aspect of transportation planning. Several states and communities are explicitly addressing these connections in their statewide transportation plans. At the federal level, several USDOT agencies participate in a health in transportation working group. The working group also participates with other groups, such as the U.S. Department of Health and Human Services' Centers for Disease Control and the Transportation Research Board in sponsoring workshops and other activities designed to bring health issues to the fore in transportation planning.

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