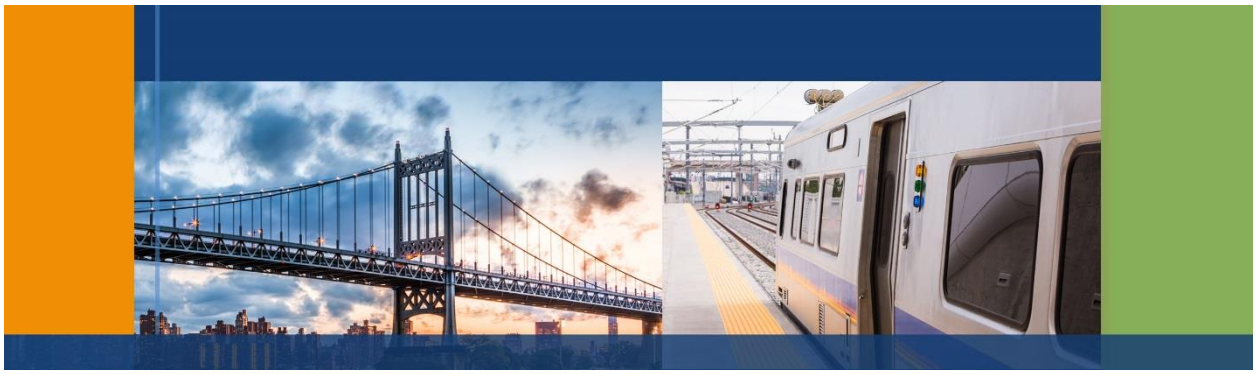


CHAPTER 3: Travel Behavior

Travel Behavior and the National Household Travel Survey

Household travel behavior depends heavily on the population's demographic distribution and geographic location. These factors historically have significant impacts on the size and distribution of travel demand. The growth of megaregions, changes in marriage and birth rates, and baby boomers entering retirement prompt population shifts that also significantly influence the way people travel. Many of these household characteristics can be found in the National Household Travel Survey (NHTS) data, the primary source of national-level information on travel behavior.

KEY TAKEAWAYS

- Baby boomers are working later in life, and driving more miles than did their cohorts of the past.
- Increased internet use is leading to higher reliance on trip-saving web services as well as growing demand for transportation alternatives such as ridehail, bikeshare, and carshare.
- Although privately owned vehicle (POV) alternatives have risen since 2009, vehicle ownership is still a strong indicator of household mobility with annual household trips increasing with the number of household vehicles.
- One in five American adults are now "smartphone-only" internet users, using their phones to browse the internet without broadband access at home.

The latest 2017 NHTS also captures information on household technology use. Access to the internet represents a fundamental shift in how Americans connect with one another, gather information, and conduct their day-to-day lives. Advancements in information communication technologies, global positioning systems (GPS), sensors, and automation have significantly influenced personal travel patterns. The adoption of new technologies has opened the doors to a growing list of advanced mobility options for many Americans, including teleworking, online shopping, and alternative transportation services.

A growing number of employers and professions offer remote work options, allowing eligible workers to avoid commute trips. The widespread use of online shopping allows households to cut down weekend errands and even grocery shopping. Ridehail, bikeshare, and carshare are all examples of mobility options that did not see significant market penetration as recently as 10 years ago. Myriad apps based on mobility-enabling technologies are now available that can help users perform day-to-day tasks, and are changing travel behavior. A trip that might have been taken in the traveler's personal vehicle now might occur via a variety of transportation alternatives.

Workers continue to drive the demand for vehicle travel. With more baby boomers working past traditional retirement age, the safety of older drivers is a growing concern. Biking and walking have also become more popular modes of travel over the years.

This chapter focuses on issues pertaining to personal travel; freight transportation is addressed separately in Part III of this report. The discussion covers only a subset of the wide array of data available through the 2017 NHTS. Future editions of this report will cover other topics of interest.

National Household Travel Survey

The NHTS, previously called the Nationwide Personal Transportation Survey, is a fundamental intermodal data collection effort conducted periodically and led by the Federal Highway Administration (FHWA) since 1969. The 2017 NHTS is the eighth and most recent survey in this series. The survey documents the demographic characteristics of households and people—and information about household vehicles—for all 129,969 sampled households, collected from April 2016 to April 2017. Unlike previous iterations, the 2017 survey captures additional information on public health, ridehail, carshare, transportation apps, and technology use. The most recent iterations of the survey also

capture data on web use, telework, and online shopping, allowing for trend analysis over the last two decades. The 2017 NHTS offers a nationally representative understanding of the adoption of advanced mobility solutions enabled by internet and mobile technologies.

The NHTS collects travel data from a representative sample of U.S. households to characterize personal travel patterns. Details of travel by all modes for all purposes of each household member are collected for a single assigned travel day. In this way, NHTS traces both the movement of household members and the use of each household vehicle on a randomly selected day. The data provide national and State-level estimates of trips and miles by travel mode, trip purpose, time of day, gender and age of traveler, and a wide range of attributes. The NHTS sets itself apart from the American Community Survey by collecting information on all travel purposes as opposed to focusing on only the journey to work. The data presented in this section are from the NHTS data series, unless otherwise noted.

Changes in NHTS Data Collection Methodology

Prior to 1990, NHTS data were collected in face-to-face interviews sampled from respondents to the Census Bureau's Current Population Survey. From 1990 to 2009, NHTS data were collected using a random-digit dial sample of telephone households in the United States. In 2017, address-based sampling was employed due to the decline of households with landline telephones. Most households submitted their responses via the web, although a self-selected group did opt to respond via telephone. Both the 2009 and 2001 surveys were conducted during economic downturns, whereas the 2017 survey, conducted in 2016–2017, occurred during a period of economic growth and a presidential election cycle. All of these factors can affect a household's willingness to participate, the quality of responses, and overall data results.

The 2017 methodology changes are described in the 2017 NHTS Release Notes: (https://nhts.ornl.gov/documentation). Additional information on the NHTS is available at http://nhts.ornl.gov.

Advanced Mobility Solutions

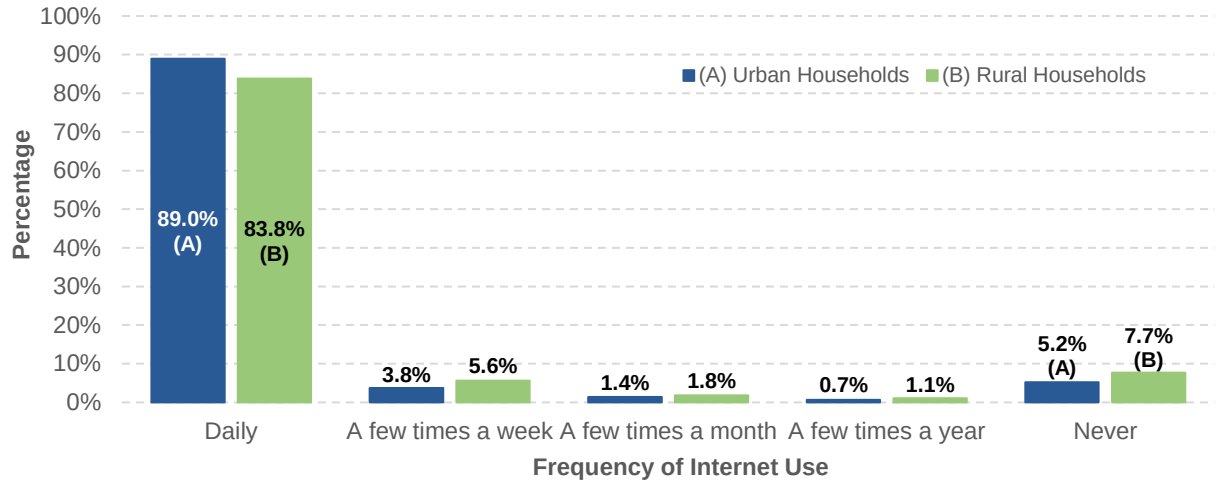
One unique feature of the 2017 NHTS is that it includes questions about advanced mobility technologies that are internet- or mobile phone-based. These trends can be linked to other household characteristics to better describe how mobility patterns are changing. The last decade has seen remarkable changes in internet use, online shopping, and telework.

Internet Use

Access to mobile phones and the internet plays a significant role in enabling these new technologies and often determines the breadth of mobility options available to a household. In some parts of the country, travelers now have the option to avoid enough trips to make car ownership optional. Basic errands such as depositing checks, mailing letters at the post office, purchasing international calling cards, listening to the latest music album, or even watching the latest movie release can all now be accomplished online. Online services, while potentially increasing freight delivery trips, can reduce consumer trips and personal errands, resulting in fewer household road miles traveled, less gasoline consumed, and reduced air pollution. Roughly 90 percent of Americans use the internet today, with 26 percent of American adults reporting that they are online almost constantly according to a 2018 Pew Research Center survey.[14] The 2017 NHTS confirms that more than 80 percent of households use the internet on a daily basis and over 90 percent use it at least a few times a month (see *Exhibit 3-1*).

[14] Pew Research Center. 2018. Internet/Broadband Fact Sheet. http://www.pewinternet.org/fact-sheet/internet-broadband/.

Exhibit 3-1 ■ Household Internet Use, 2017

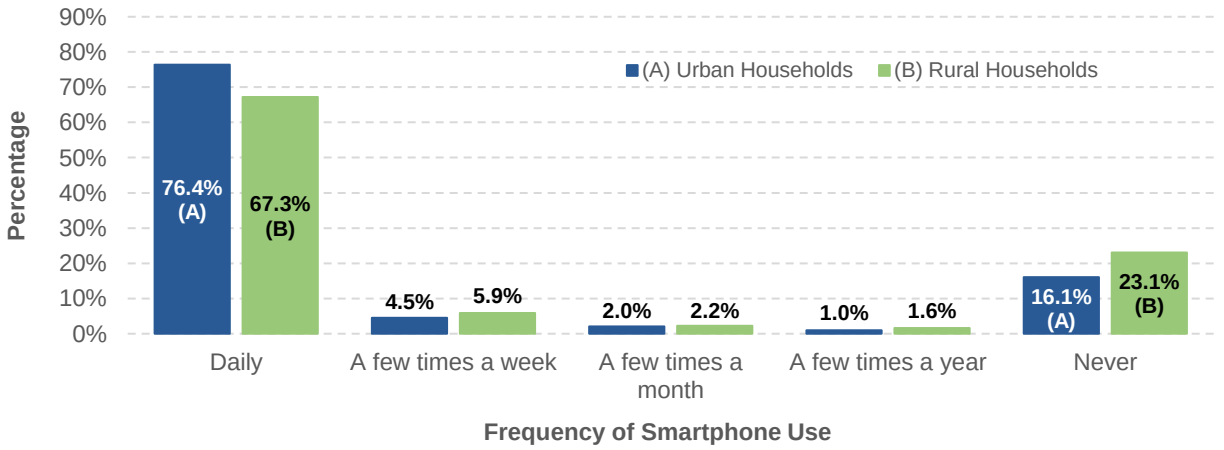


Source: National Household Travel Survey.

Today, about two-thirds of American households have broadband internet access in their homes.[1] Adoption gaps are typically based on factors such as age, income, education, and community type. Older adults and rural residents are less likely to have broadband service at home. Access to the internet is more widespread in urban areas, where 92 percent of residents use the internet at least a few times a week. The proportion of frequent internet use among rural residents is slightly lower at 89 percent. For some demographic groups—such as young adults and college graduates—internet use is nearly ubiquitous.

In early 2000, about half of U.S. adults were already on the Web; today, about nine out of 10 use the internet. Wireless connection is one of the main drivers of widespread internet access across the Nation, particularly in urban areas. The 2017 NHTS found that accessing the internet with a smartphone is more prevalent in urban areas: 81 percent of urban and 73 percent of rural households use the internet via smartphone at least a few times a week (see *Exhibit 3-2*). The share of rural households that have never used a smartphone to access the internet is 7 percentage points higher than that of their urban counterparts. Furthermore, the Pew Research Center found that one in five American adults are now "smartphone-only" internet users, using their phones to browse the internet without broadband access at home. This practice is especially common among younger adults, nonwhites, and lower-income Americans.

Exhibit 3-2 ■ Frequency of Smartphone Use to Access the Internet, 2017



Source: National Household Travel Survey.

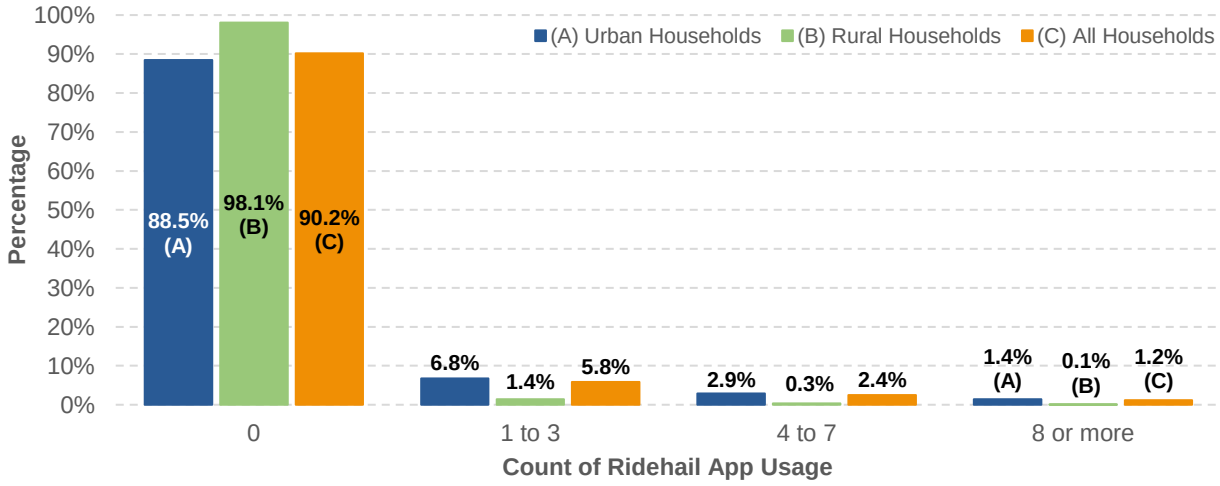
Ridehail and Carshare Use

Ridehailing services like Uber and Lyft are often viewed as alternatives to traditional taxi service, whereas carsharing services like Zipcar and Car2Go are used instead of traditional car rentals. Both of these services rely on the internet to inform customers of real-time vehicle availability.

Although the 2017 NHTS data show that over 80 percent of U.S. households have used their smartphones to access the internet, 91 percent of Americans at or above 16 years old indicated they had not hailed a ride with a ridehail smartphone app in the last 30 days (see *Exhibit 3-3*). The divide was more pronounced in rural areas, where less than 2 percent of respondents had used a ridehail app in the last 30 days, compared with the 11.5 percent of urban residents who had used a ridehail app at least once in the previous 30 days. Ridehail has enabled some users to avoid vehicle ownership altogether, especially in areas with multiple mobility options that support ridehail. Many ridehail companies do not provide service in rural communities due to the lower profit margins. Only a small portion (1.2 percent) of the population are frequent users of ridehail apps (eight or more times a month), and are largely concentrated in urban areas where their popularity among users has seen tremendous growth. Ridehail trips often include late-night trips, weekend trips, and even act as ambulance substitutes for trips to the emergency room. In the NHTS, ridehail trips were catalogued as taxi trips. Taxis' share of overall trips jumped from 0.2 percent in 2009 to 0.5 percent in 2017—an increase of 150 percent.

Carsharing, which also uses mobile app technology to indicate vehicle availability, is virtually negligible in both urban and rural households according to the 2017 NHTS. About 99.8 percent of rural Americans at or above 16 years old had not used a carshare vehicle in the last 30 days. Participation in carsharing was more common in densely populated urban areas, where about 0.7 percent of residents had made at least one carshare trip in the previous month. Although carsharing has not gained significant popularity in the United States, its users can often avoid private car ownership and use sharing services coupled with other transportation alternatives to fulfill their transportation needs.

Exhibit 3-3 ■ Ridehail App Usage in the Last 30 Days, 2017



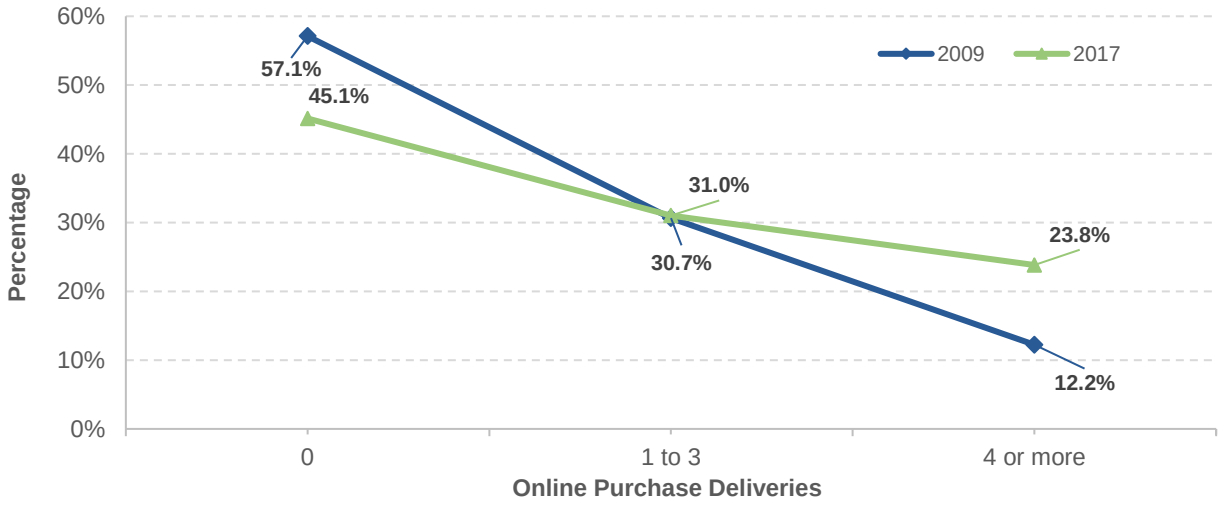
Source: National Household Travel Survey.

Online Shopping

Technology also has the potential to reduce the frequency of household shopping trips, with a growing number of households receiving deliveries from online transactions. 2017 NHTS data show a 2.5 percent and 1.5 percent drop in the distribution of shopping trips and personal errands, respectively, from 2009. This may not necessarily reduce total vehicle miles traveled (VMT) as freight VMT has grown in recent years to meet the needs of American consumers. More than 50

percent of Americans at or above age 16 have had at least one online purchase delivered in the last 30 days according to the 2017 NHTS, a 12 percent increase from 2009 (see *Exhibit 3-4*). The share of households with frequent deliveries has increased considerably, as shoppers making four or more monthly online purchases for delivery almost doubled from 12.2 percent in 2009 to 23.8 percent nationally in 2017. This is complemented by the share of households with zero online purchases, which dropped by 12.0 percentage points over this period.

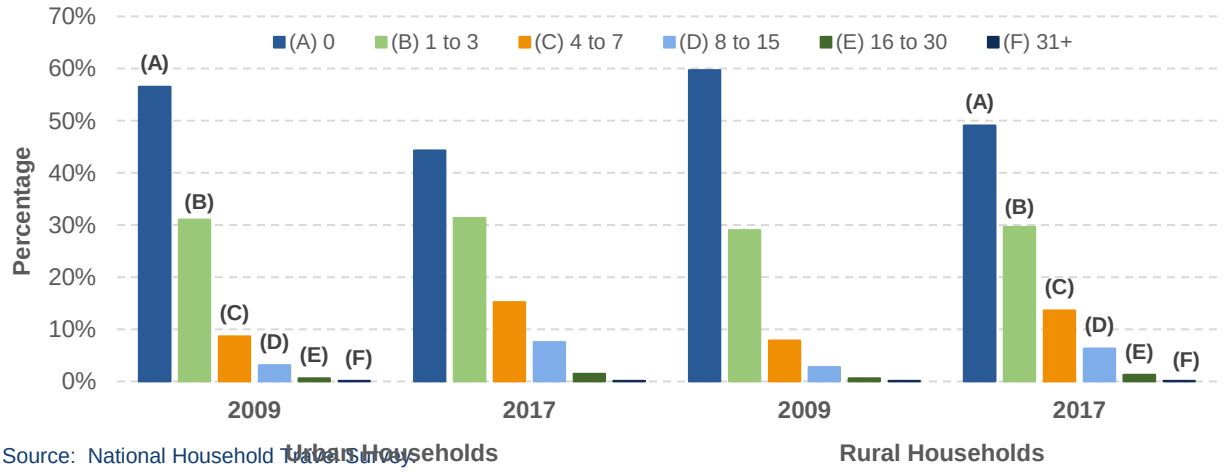
Exhibit 3-4 ■ Frequency of Online Purchase Deliveries in the Last Month, 2009 vs. 2017



Source: National Household Travel Survey.

Just under 60 percent (59.7 percent) of rural households did not receive deliveries of online purchases in 2009; this share decreased to 49.0 percent in 2017. Urban residents saw a slightly larger jump in the delivery of online purchases relative to their rural counterparts from 2009 to 2017: the share of urban households that received no deliveries was 56.5 percent in 2009 and 44.3 percent in 2017. The number of heavy users of online shopping has grown in both rural and urban areas. About 3.8 percent of urban households received more than eight deliveries in 2009, rising to 9.2 percent in 2017. This jump was slightly more pronounced in rural areas, where households relying heavily on online purchases increased from 3.4 percent in 2009 to 7.7 percent in 2017. With access to physical retail stores more limited and farther away in rural areas, online shopping can provide more retail options to rural residents (see *Exhibit 3-5*).

Exhibit 3-5 ■ Online Shopping, Monthly, 2009 vs. 2017



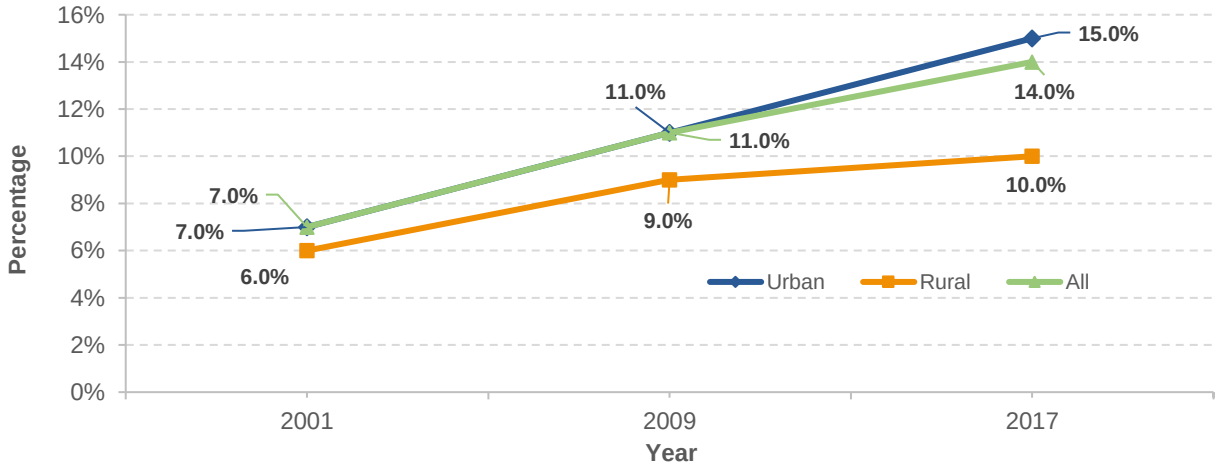
Source: National Household Travel Survey.

Telework

Technology has also enabled telework for some U.S. workers, especially those in careers that do not require a physical presence at all times. In the NHTS, respondents who do not "typically work from home" are asked if they have the option of working from home or an alternate workplace. Although not all who work from home require internet connectivity, many use the Web to check email; advancements in technology have enabled more telework functionality through improved connectivity and security. The share of telework-eligible workers increased from 11 percent in 2001 to 14 percent in 2014 (see *Exhibit 3-6*). The majority of the labor force still does not have the option to telework—especially in rural areas where 90 percent of workers are ineligible, compared with their urban counterparts at 85 percent.

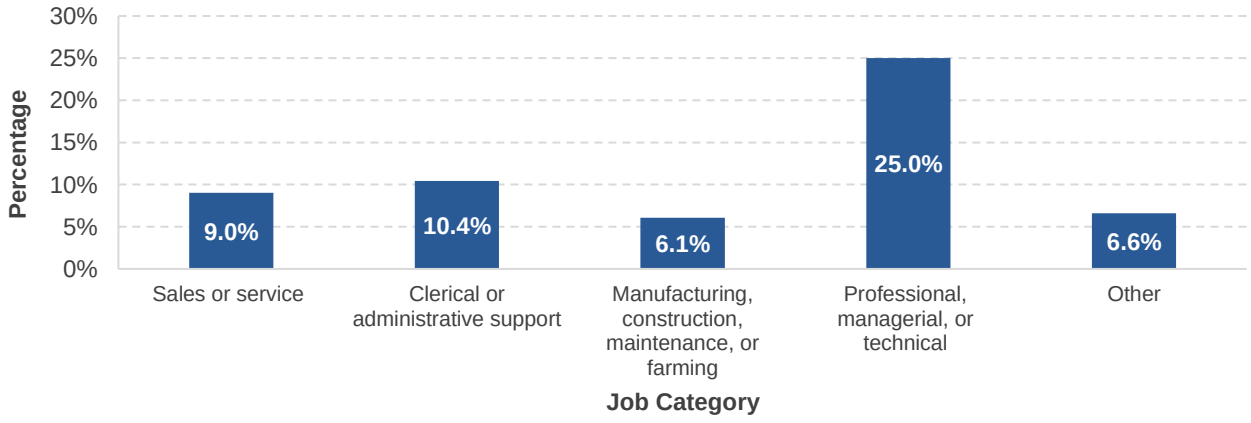
Although most workers do need to travel to their workplace, those in professional, managerial, or technical fields are more than twice as likely to have the option to telework compared with other occupations (see *Exhibit 3-7*). The uptick in telework and the use of advanced information technology has led travel behavior researchers to project that the average number of household trips will decrease, with fewer required commute trips to the office and more video conferencing options supplanting in-person meetings. Increased telework can contribute to reduced peak-hour congestion but may lead to additional discretionary trips or personal errands on non-commuting days/times.

Exhibit 3-6 ■ Telework-eligible U.S. Workers, 2001–2017



Source: National Household Travel Survey.

Exhibit 3-7 ■ Telework Eligibility by Job Category, 2017



Source: National Household Travel Survey.

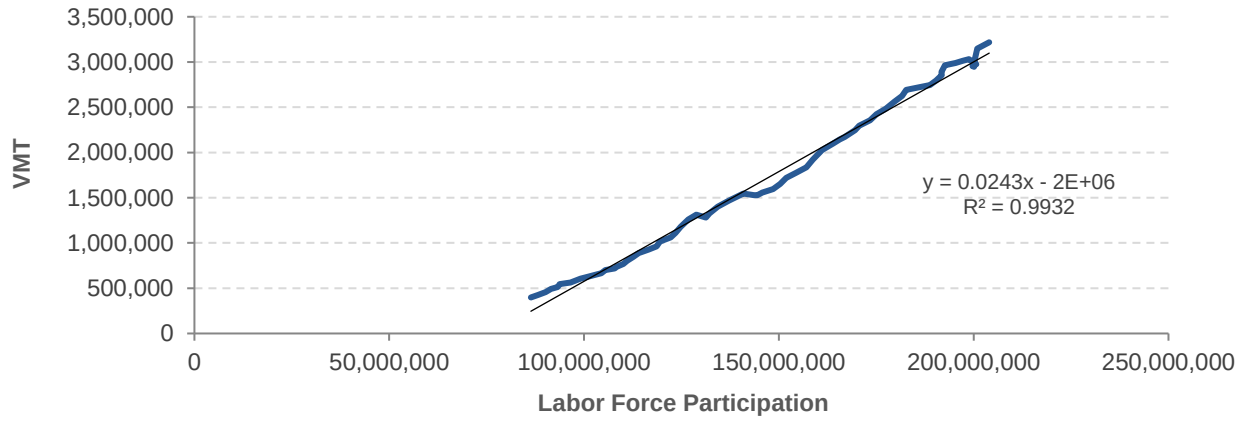
Travel Patterns Associated with Household Characteristics

Work status and household characteristics such as life cycle, age, and gender composition can strongly influence travel patterns.

Work Status

VMT has consistently shown a strong relationship with labor force participation over time. *Exhibit 3-8* shows the Bureau of Labor Statistics' (BLS) Labor Force Participation Population correlation with VMT from 1948 through 2016. Highway travel closely reflects economic conditions as movements of people and goods increase during booming periods. Even through recessions and employment level lows, VMT has remained strongly tied to the activity of the labor force.

Exhibit 3-8 ■ Labor Force Participation Population vs. Vehicle Miles Traveled, 1948–2016

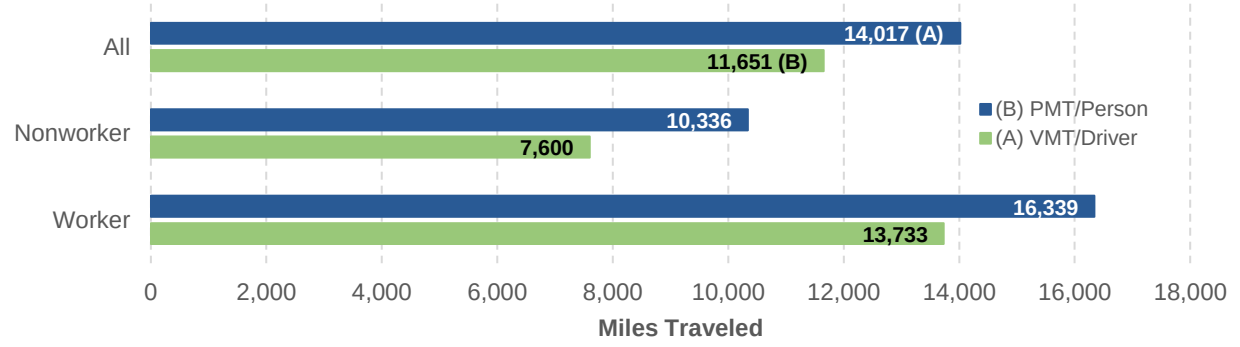


Source: FHWA Highway Statistics, Bureau of Labor Statistics

Travel by Workers vs. Nonworkers

With regular commuting habits and higher incomes, workers tend to have more consistent travel demands, as well as more financial resources, to purchase vehicles and take discretionary trips than do nonworkers. Workers travel more, regardless of whether it is in a vehicle, with almost 60 percent more person miles traveled than nonworkers in 2017 (see *Exhibit 3-9*). NHTS 2017 data show that an average worker drove 13,733 miles annually, almost double the miles driven by an average nonworker at 7,600 miles.

Exhibit 3-9 ■ Annual Miles, Worker vs. Nonworker, 2017



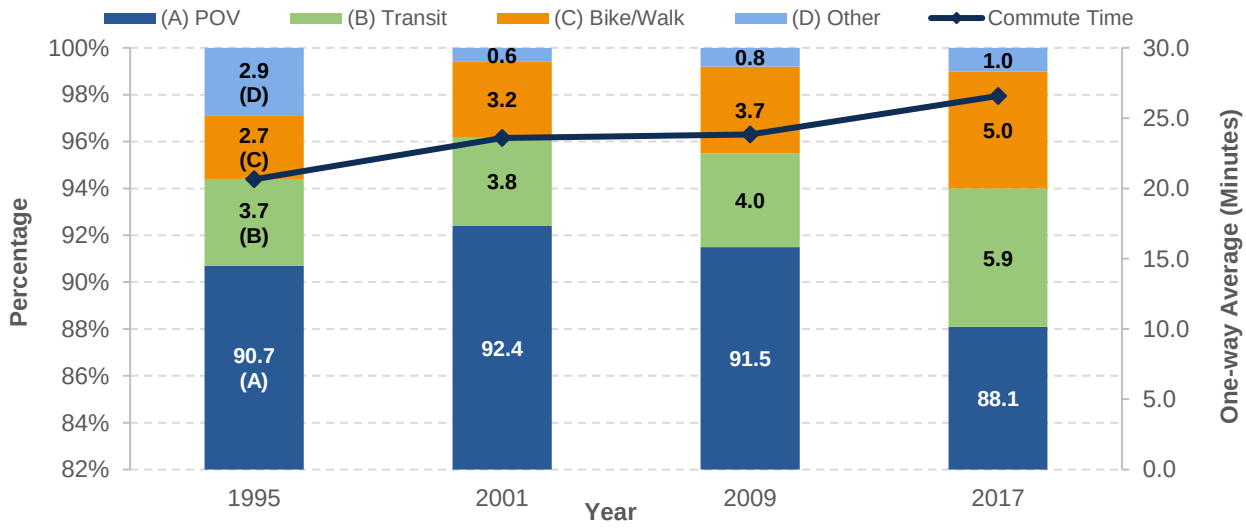
Note: PMT is person miles traveled; VMT is vehicle miles traveled.

Source: National Household Travel Survey.

Commuting Trips

Not only do workers take more daily trips, their time spent commuting has grown over time. *Exhibit 3-10* shows that the average commute in 2017 took 26.6 minutes (one way), compared with 23.9 minutes in 2009, for an average worker who traveled to and from work five days a week. Since 1995, the average commute time has risen by about 29 percent. This translates to an extra 27 minutes per week of commuting time in 2017.

Exhibit 3-10 ■ National Household Travel Survey Commute Trips, 2017



Note: POV is privately owned vehicle.

Source: National Household Travel Survey.

NHTS data on commute trips over time have also shown a small overall decline in the share of POV use though POV still represents the vast majority of commute mode share. From 2009 to 2017, the percentage of commute trips in POVs declined from 91.5 percent to 88.1 percent. Over this same period, the percentage of commute trips using transit rose slightly from 4.0 percent to 5.9 percent; the combined bicycling and walking share rose from 3.7 percent to 5.0 percent.

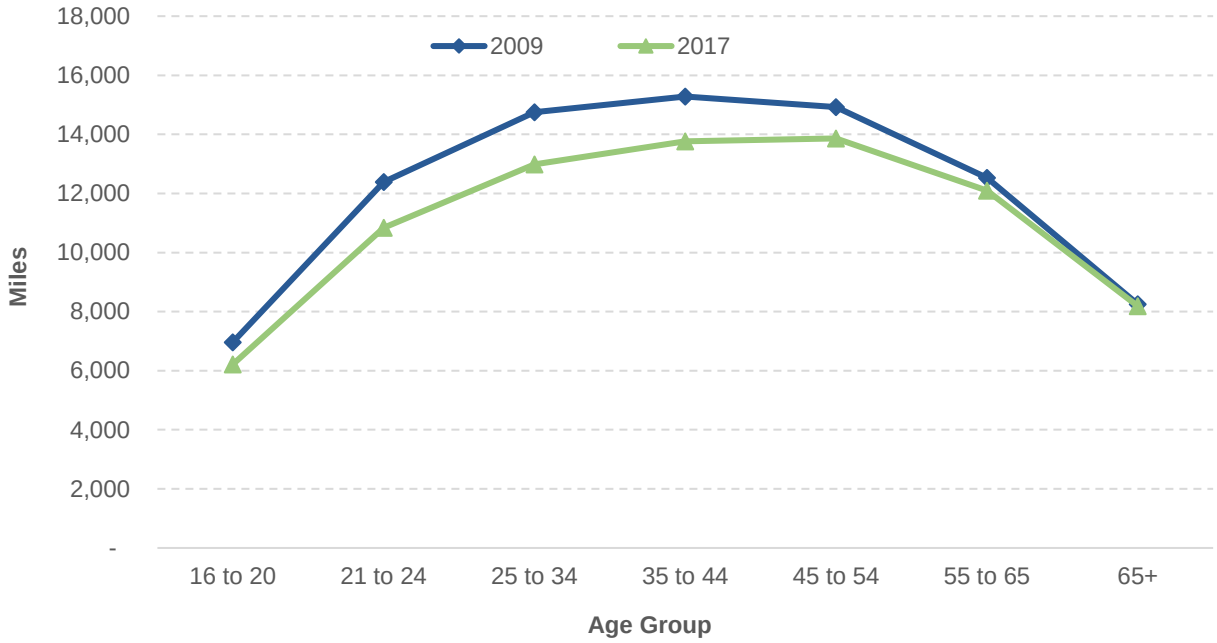
Baby Boomers

Baby boomers are the demographic cohort generally defined as people born from 1946 to 1964. In 2009, this cohort ranged in age from 45 to 63 years old; in 2017, they ranged from 53 to 71 years old.

For baby boomers aged 65 and over, the number of trips per week reported in NHTS showed little change over time, from 22.5 in 2009 to 22.3 in 2017. Older people were the only age group, however, to report an increase in time spent driving: 19 more minutes per week in 2017 compared with the estimate in 2009.

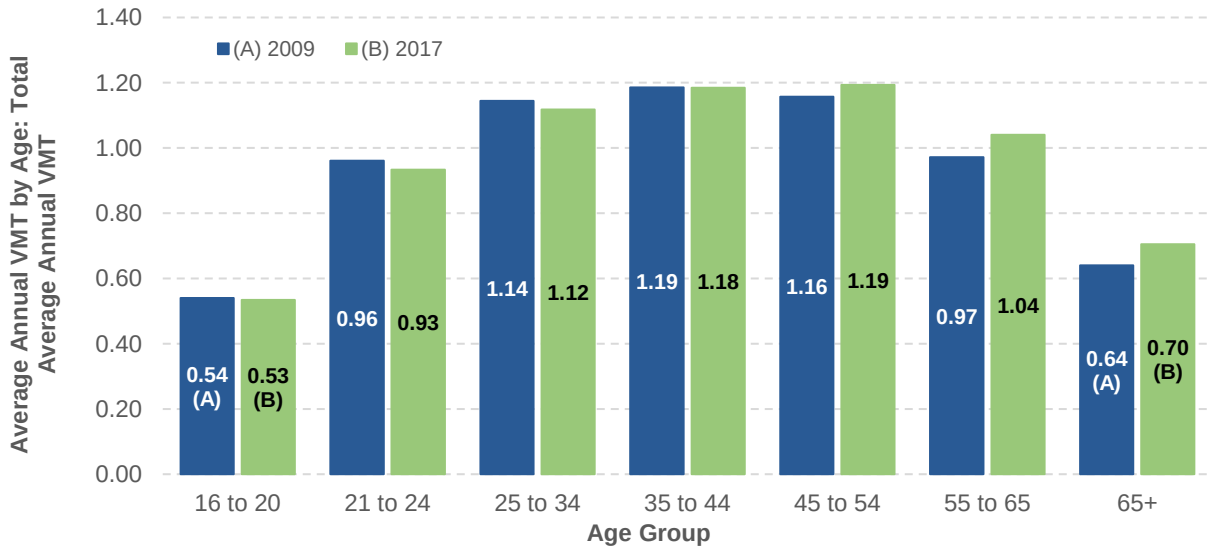
Exhibit 3-11 shows that average annual VMT reported in NHTS by age group. The reported number of miles driven declined between 2009 and 2017 for all age groups; the largest percentage decline was for drivers in the 21 to 24 age group, with progressively smaller declines for each older age group. As shown in *Exhibit 3-12*, those in the 55- to 65-year-old age group drove 4 percent more miles annually than the average U.S. driver in 2017, while in 2009 55- to 65-year-old drivers drove 3 percent fewer miles annually than the average U.S. driver that year. Drivers aged 65+ drove 30 percent fewer miles annually than the average U.S. driver in 2017, while in 2009 those aged 65+ drove 36 percent fewer miles than the average U.S. driver.

Exhibit 3-11 ■ Average Annual VMT by Age Group, 2009 vs. 2017



Note: VMT is vehicle miles traveled.
Source: National Household Travel Survey.

Exhibit 3-12 ■ Average Annual VMT by Age Indexed to Total Average Annual VMT, 2009 vs. 2017

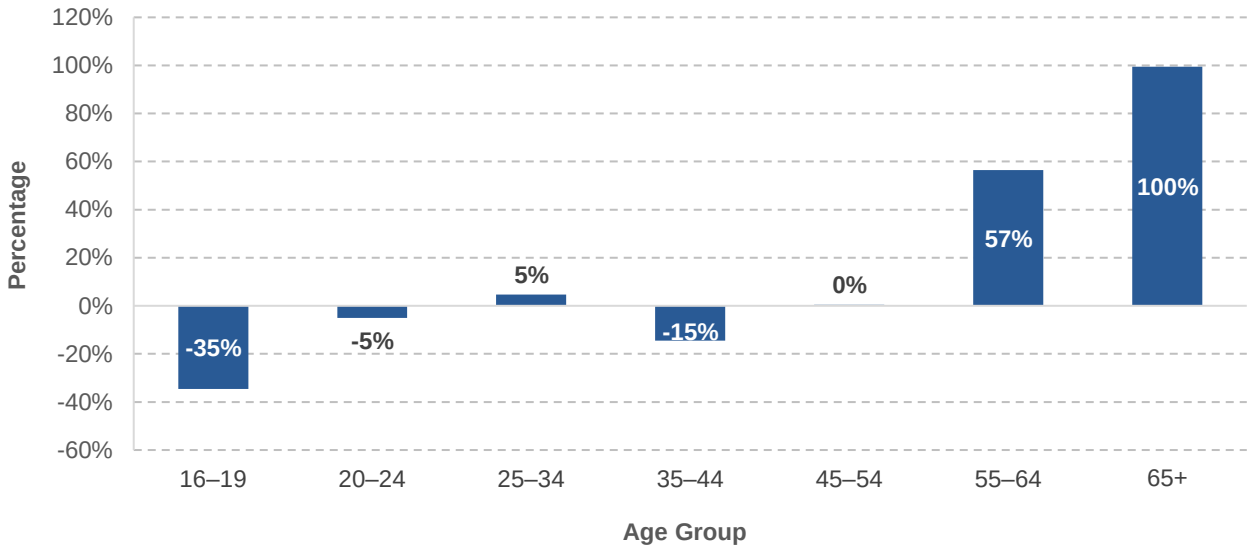


Note: VMT is vehicle miles traveled.
Source: National Household Travel Survey.

As boomers grow older, they are postponing retirement and staying in the workforce longer. From 2002 to 2016, the BLS shows that there was a 100 percent increase in workers over the age of 65 and a 57 percent increase in total employed. Meanwhile those aged 16 to 19 have seen a 35 percent decrease in total employed. Baby boomers are working longer into their traditional retirement years, and they are driving more miles than did their cohorts of the past. This higher

demand for driving among age 55+ workers contributes to the growing safety concerns for U.S. road users (see *Exhibit 3-13*)

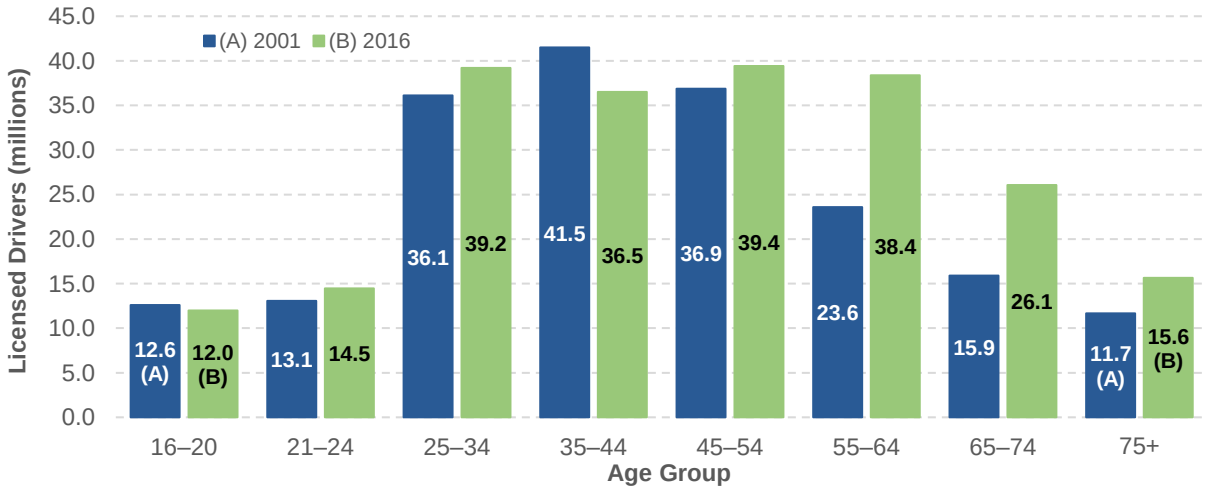
Exhibit 3-13 ■ Change in Employment Numbers, 2002–2016



Source: Bureau of Labor Statistics.

Drivers of the past acquired their licenses at an earlier age. With more States implementing graduated licensing programs, a boom in alternate mobility options, and the large portion of baby boomers entering the 65+ age bracket en masse, a higher percentage of older drivers are on the road compared with previous years. *Exhibit 3-14* shows the composition of licensed drivers by age group. Between 2001 and 2016, the numbers of licensed drivers in younger age groups (below 54 years old) declined or increased modestly. In contrast, the number of licensed drivers aged 55 years or older surged by more than one-third. This is particularly the case for licensed drivers between 55 and 74 years old, whose numbers rose by more than 60 percent. It is possible that the adoption of advanced technology and new mobility options is more prevalent in younger drivers than among aging drivers, but these transportation alternatives could prove quite beneficial to those who choose, or are required, to give up their licenses later in life.

Exhibit 3-14 ■ Licensed Drivers by Age Group, 2001 vs. 2016



Source: FHWA, Office of Highway Policy Information, Highway Statistics (https://www.fhwa.dot.gov/policyinformation/quickfinddata/qfdrivers.cfm).

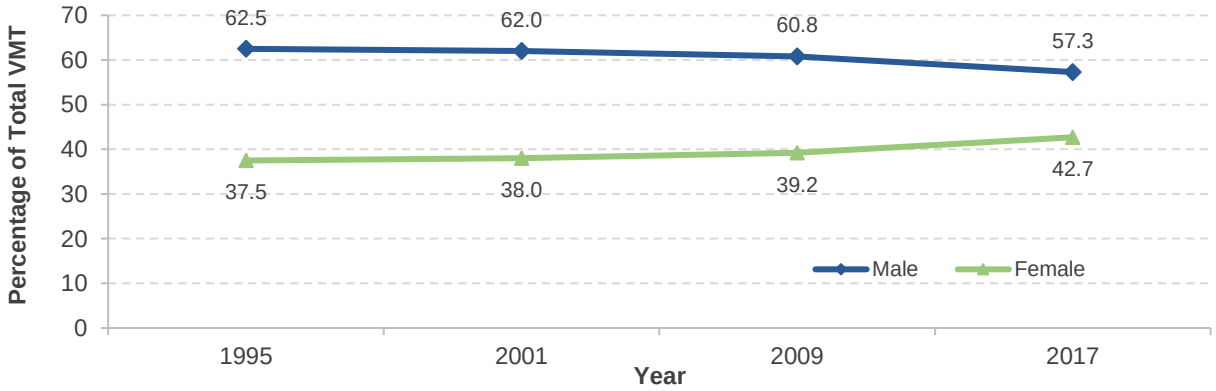
Travel by Gender

Traditionally, the number of male licensed drivers in the United States exceeded the number of female licensed drivers. This gap declined over time, and by 2005 the relationship was reversed: there were more female than male licensed drivers in the United States. The number of female licensed drivers has remained higher ever since.

Women are also closing the VMT gap. Although men drive more average annual miles than do their female counterparts across all age groups, the NHTS data show an increasing trend in VMT among women: they represented 39 percent of driver VMT in 2009, rising to 43 percent in 2017 (see *Exhibit 3-15*).

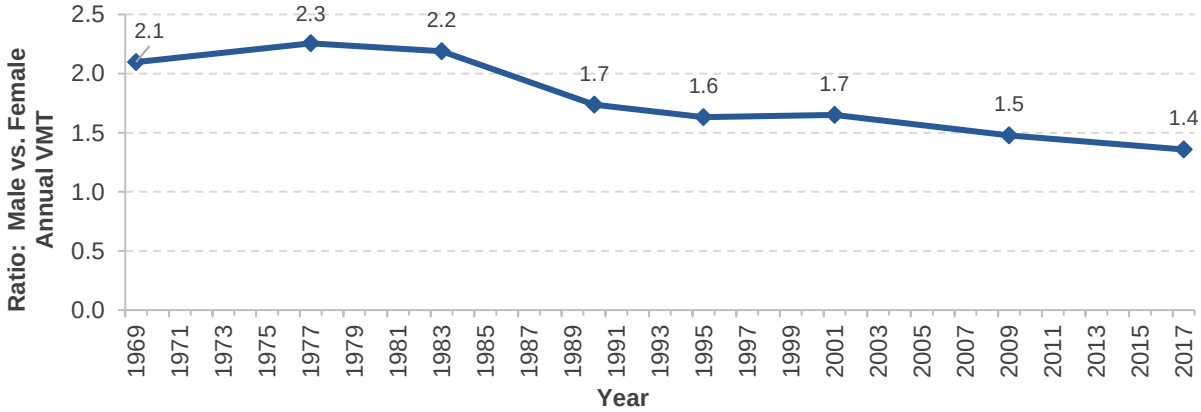
In 1969, men drove twice as many annual vehicle miles as women drove on average. *Exhibit 3-16* shows how the male-to-female ratio has grown closer to parity over time, with the average annual VMT of men dropping from 110 percent to 36 percent more than women from 1969 to 2017.

Exhibit 3-15 ■ Share of VMT by Gender, 1995–2017



Note: VMT is vehicle miles traveled.
Source: National Household Travel Survey.

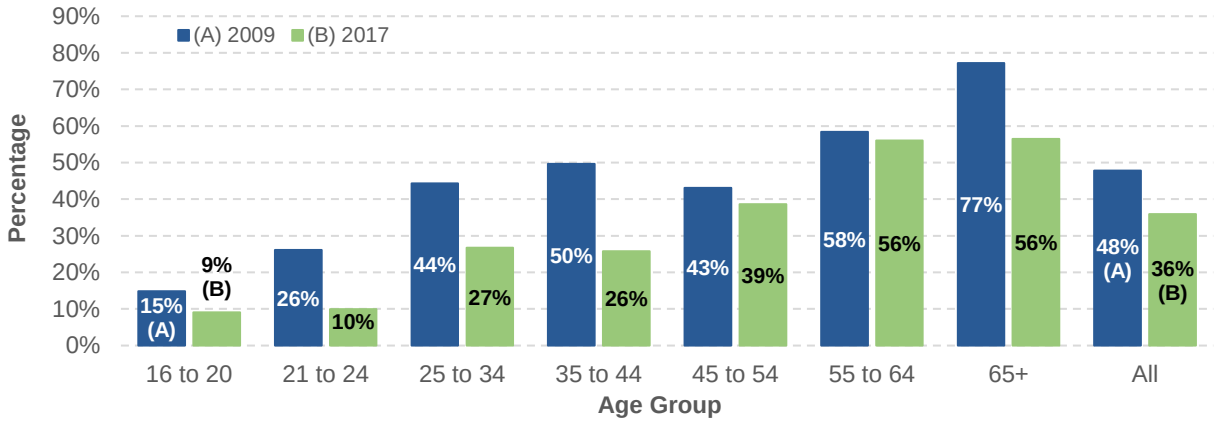
Exhibit 3-16 ■ Male vs. Female NHTS Average Annual VMT per Driver, 1969–2017



Note: NHTS is National Highway Travel Survey; VMT is vehicle miles traveled.
Source: National Household Travel Survey.

Women over 65 are also driving more and closing the VMT gap, with the male-to-female annual VMT ratio approaching parity across all age groups from 2009 to 2017 in *Exhibit 3-17*. Although men 65+ drove 56 percent more annual average miles than did their female counterparts in 2017, women have closed the gap by 21 percent from 2009 when men 65+ drove 77 percent more annual average miles than did women 65+ (77 percent vs. 56 percent).

Exhibit 3-17 ■ Percentage Difference Between Male Average Annual VMT and Female Average Annual VMT by Age Group, 2009 vs. 2017



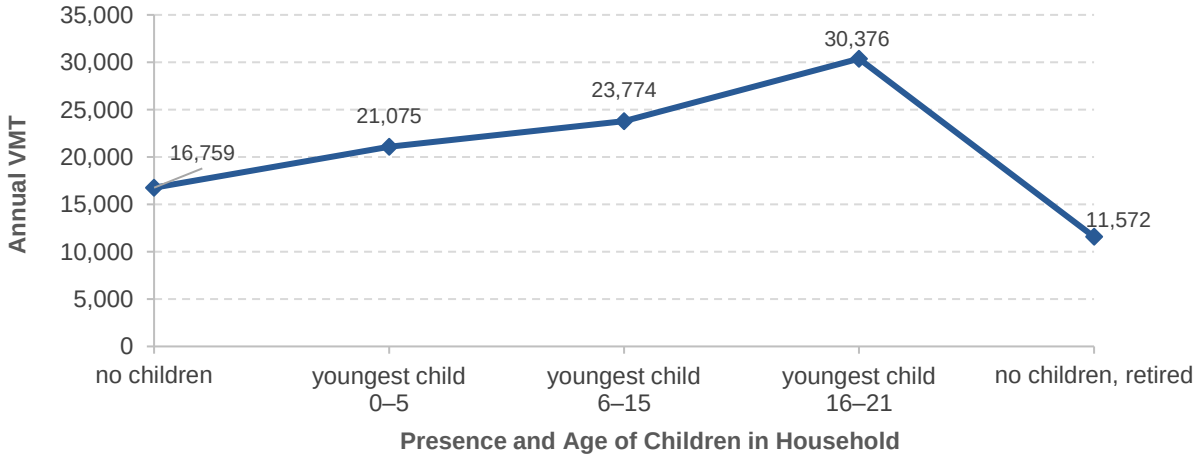
Note: VMT is vehicle miles traveled.

Source: National Household Travel Surveys.

Young Families

Exhibit 3-18 shows that households with children have a higher average annual household VMT whereas retirees and households with no children have the lowest household VMT. Household minors create many additional drop-off and pick-up trips with school and extracurricular activities, adding more miles to the household log that likely already contains regular work trips.

Exhibit 3-18 ■ NHTS Average Household Annual VMT, 2017



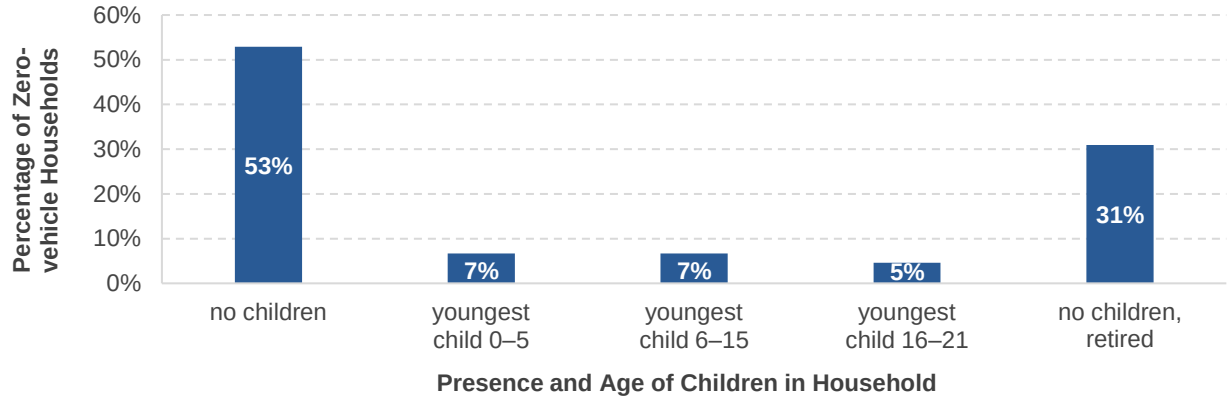
Note: NHTS is National Highway Travel Survey; VMT is vehicle miles traveled.

Source: National Household Travel Survey.

Children also prompt the "call" for vehicle ownership. As shown in *Exhibit 3-19*, households without children are much more likely to be zero-vehicle households. More than 80 percent of households without a car have no children present.

According to the Centers for Disease Control and Prevention, U.S. women are waiting longer to have their first child. In 1970, the mean age of a first-time mother was 24.6 years compared with 28 years in 2016. This growing delay in parenthood may also result in pushing back the need for vehicle purchases and higher VMT levels for older age groups.

Exhibit 3-19 ■ Zero-vehicle Households by Life Cycle, 2017



Source: National Household Travel Survey.

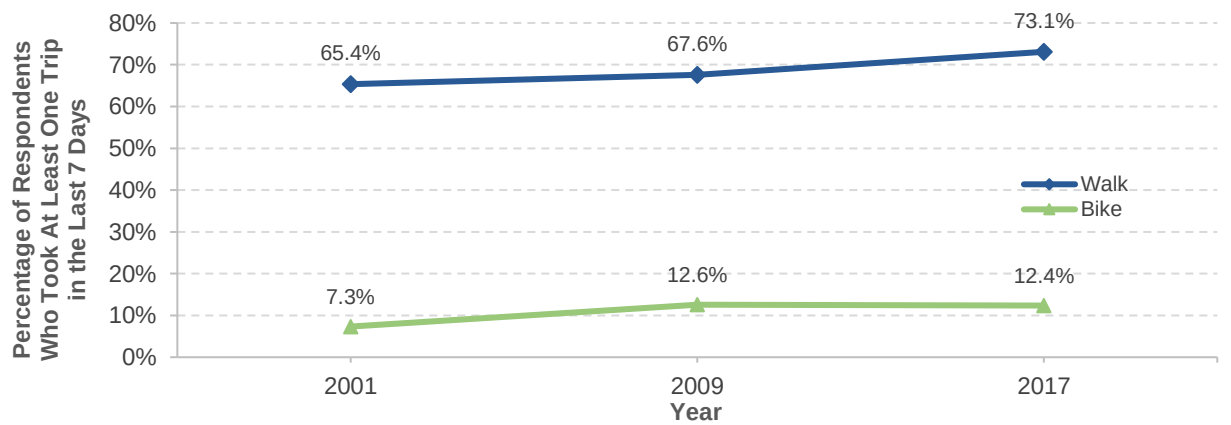
Travel Behavior Characteristics

As the U.S. population continues to grow, urban areas are seeing a disproportionate amount of the growth, with agglomeration effects drawing more jobs and skills to areas with larger population densities. As urban areas expand into their surrounding lands, commuting patterns change and corridors leading to employment centers continue to grow. These major cities have unique needs and hold a significant concentration of economic activity. This evolving distribution of housing and employment leads to unique vehicle ownership patterns and travel behavior trends.

Nonmotorized Trips

The NHTS is the only data source that captures bicycle and pedestrian activity at the national level. Since 2001, the NHTS has asked respondents about their cycling and walking frequency in the last week. The number of people who bike or walk at least once a week increased considerably from 2001 to 2017. Urban areas have seen significant growth in infrastructure to support active transportation, including sidewalks, bike lanes, and bikeshare programs. And although most Americans continue to rely on vehicles as their primary mode of transportation, 21 of the country's 50 most-populated cities saw a significant drop in driving over the last decade. When respondents were asked how many walking or bicycling trips they had taken in the past seven days, the data showed a 7.7 percentage point increase (from 65.4 percent in 2001 to 73.1 percent in 2017) in individuals who took at least one walking trip and a 5.1 percentage point increase in individuals who took at least one biking trip (see *Exhibit 3-20*).

Exhibit 3-20 ■ Bicyclist and Pedestrian Activity, 2001–2017

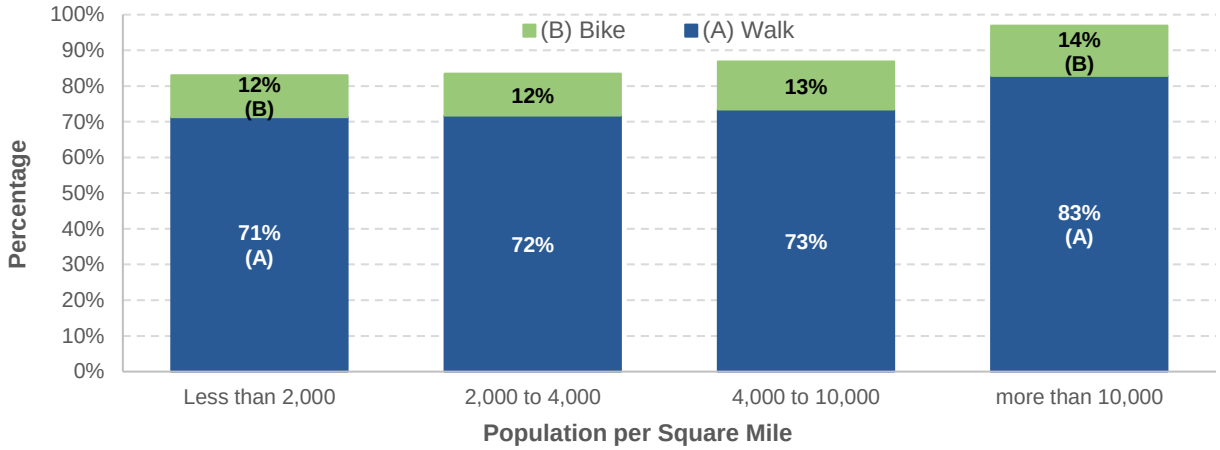


Source: National Household Travel Survey.

Both biking and walking trips were more prevalent in higher population density areas in the 2017 survey, likely due to the more inviting infrastructure, transit connectivity, and the shorter distances between origins and destinations in urban areas (see *Exhibit 3-21*). The likelihood of residents taking biking trips is 2 percent greater in regions with a population density greater than 10,000, compared with those areas with fewer than 2,000 people per square mile, where the likelihood of walking trips is 12 percent greater.

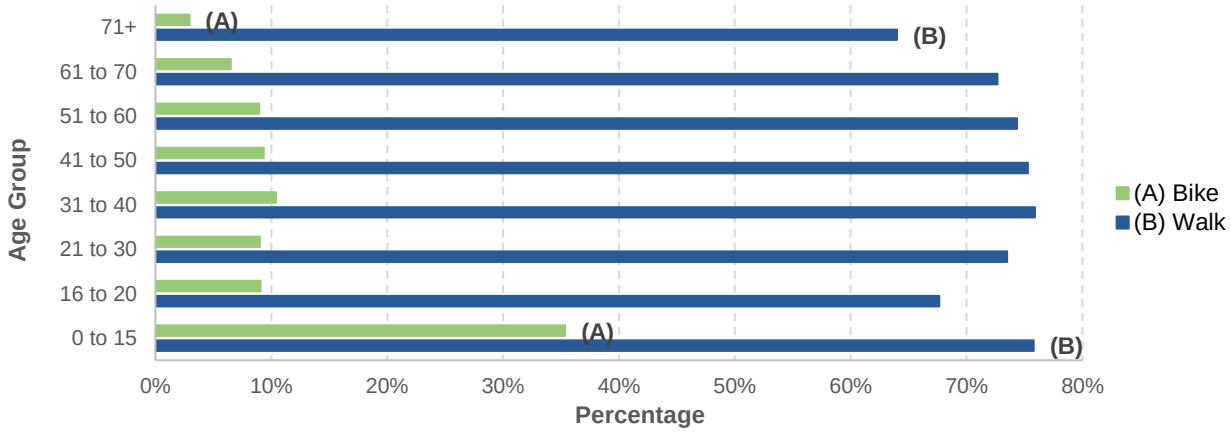
Walking trips are also much more common than biking trips across all age groups. Biking trips taper off considerably once a person reaches driving age, with bicycle use peaking with those 0 to 15 years old (35 percent). A continued decline occurs after age 40. Walking trips, however, remain relatively popular over the years with the lowest popularity in age groups 16 to 20 (68 percent) and 71 and over (64 percent) (see *Exhibit 3-22*).

Exhibit 3-21 ■ Respondents Who Took a Walk or Bike Trip in the Last Week, by Population Density, 2017



Source: National Household Travel Survey.

Exhibit 3-22 ■ Respondents Who Took a Bike or Walk Trip in the Last Week, by Age Group, 2017



Source: National Household Travel Survey.

Vehicle Ownership

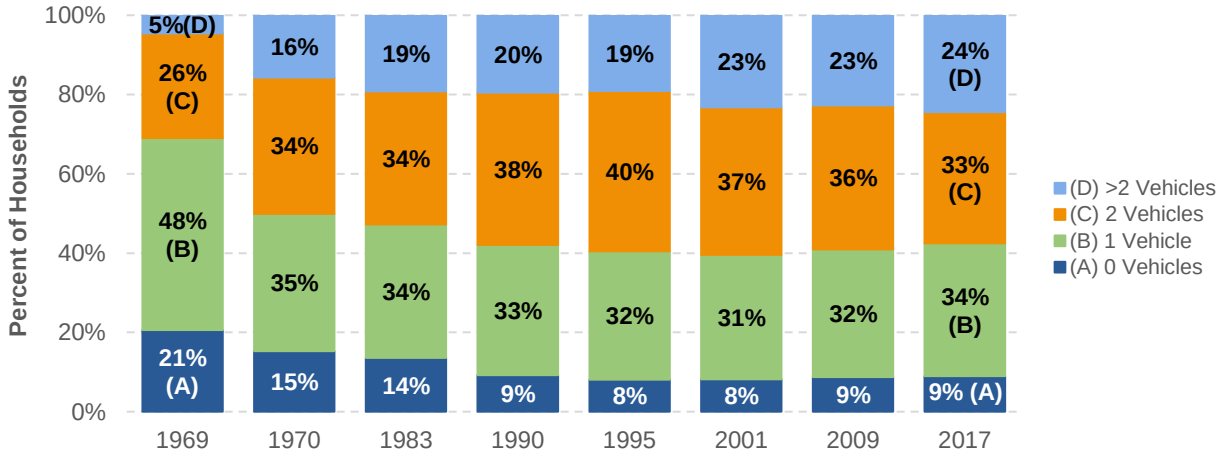
Household needs often dictate vehicle ownership patterns, and vehicle ownership is often a major indicator of household mobility. The composition of U.S. household vehicles has evolved over time (see *Exhibit 3-23*), which reflects the growing dependency of households on POVs to fulfill

transportation needs. With a growing number of transportation alternatives, however, some households now have the option to live car-free and use a combination of transit, ridehail, carshare, and nonmotorized modes. Despite these options, as the number of household vehicles decreases, the number of household person trips also decreases.

Pickup trucks and sport utility vehicles (SUVs) may offer significant utility, vans are helpful for moving large numbers of people, and sedans offer efficiency and fuel economy. Climate, gas prices, regional culture, family size, household hobbies, and income all can play a role in whether and what kind of vehicle is used by a household. *Exhibit 3-24* shows that SUV and motorcycle ownership has increased over the last 20 years, while automobile, van, and pickup truck ownership have declined.

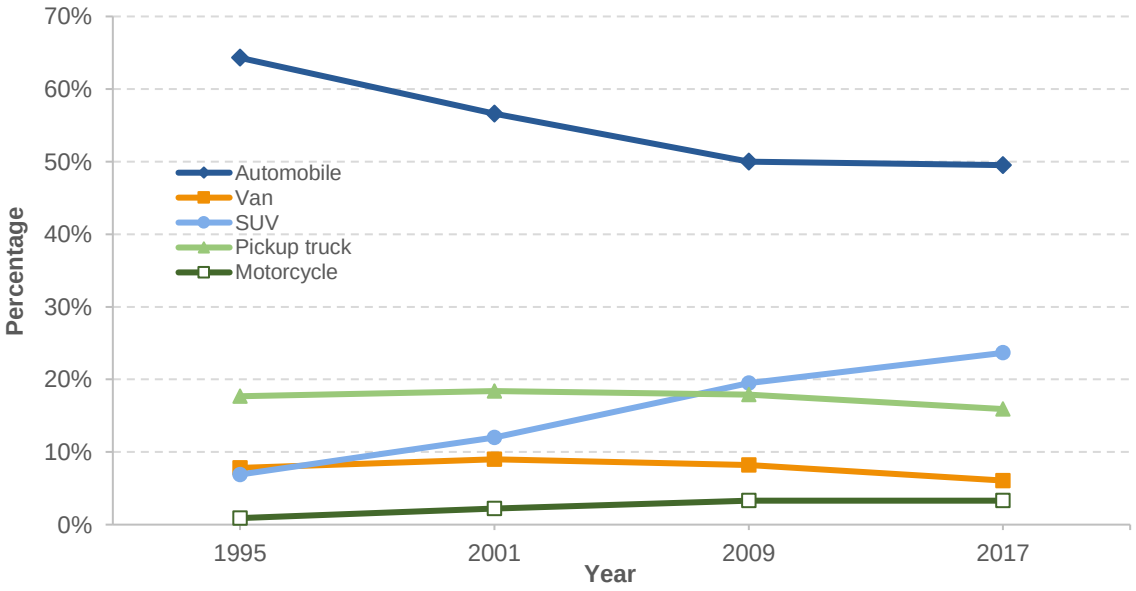
The number and type of vehicles in U.S. households vary by region. Pickup trucks and motorcycles are more prevalent in rural areas (28.7 percent vs. 12.1 percent and 4.3 percent vs. 3.0 percent, respectively), while automobiles and SUVs are more common in urban areas (53.5 percent vs. 36.2 percent and 24.1 percent vs. 22.1 percent, respectively) (see *Exhibit 3-25*).

Exhibit 3-23 ■ Share of U.S. Households by Vehicle Count, 1969–2017



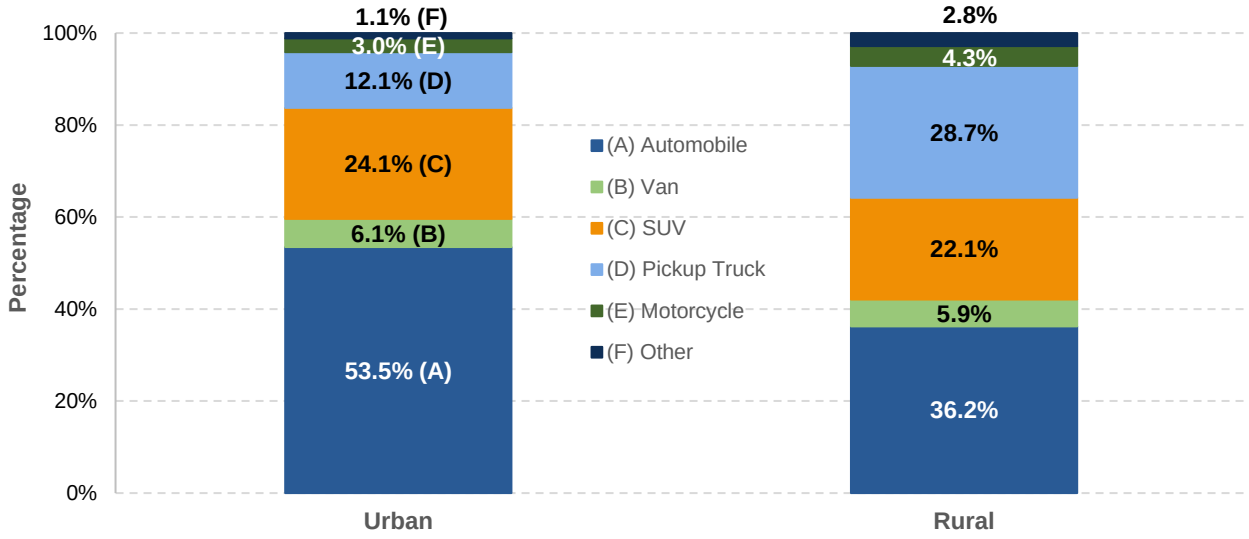
Source: National Household Travel Survey.

Exhibit 3-24 ■ Vehicle Ownership Trends by Vehicle Type, 1995–2017



Source: National Household Travel Survey.

Exhibit 3-25 ■ Vehicle Types, Rural vs. Urban, 2017

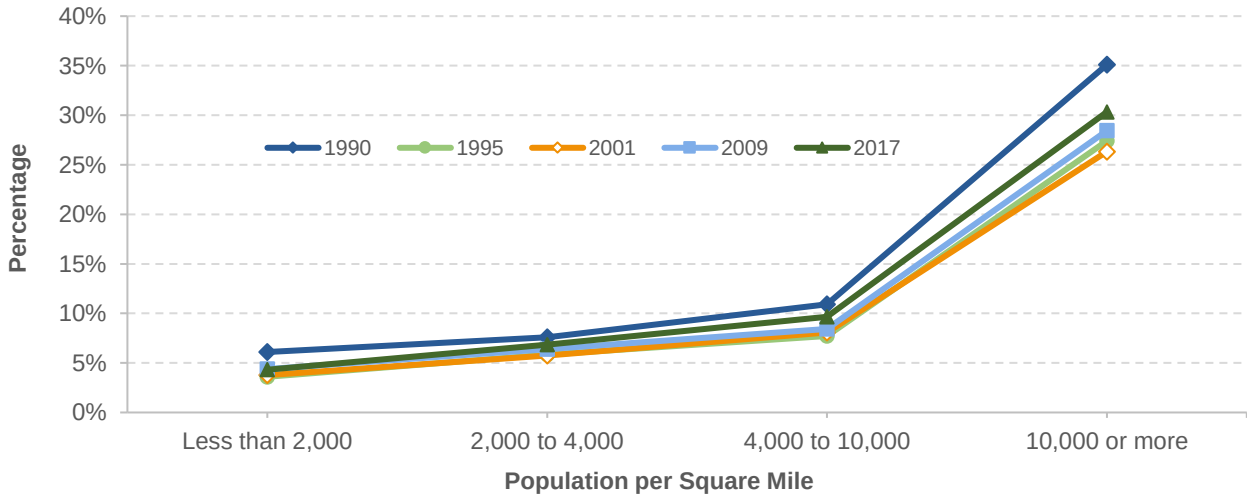


Source: National Household Travel Survey.

Urbanicity

Not only does the distribution of vehicle type change by "urbanicity," but so does the number of household vehicles. Urbanicity is characterized by the Census Bureau based on factors such as population, density, and land use. As population density increases, the percentage of households with more vehicles tends to decrease. This trend has held true for the last five iterations of the NHTS (see *Exhibit 3-26*). The percentage of households without vehicles increases with population density, and then rises sharply in areas with more than 10,000 people per square mile, likely due to higher density non-residential activity and the availability and practicality of more transportation alternatives including walking, biking, and public transit.

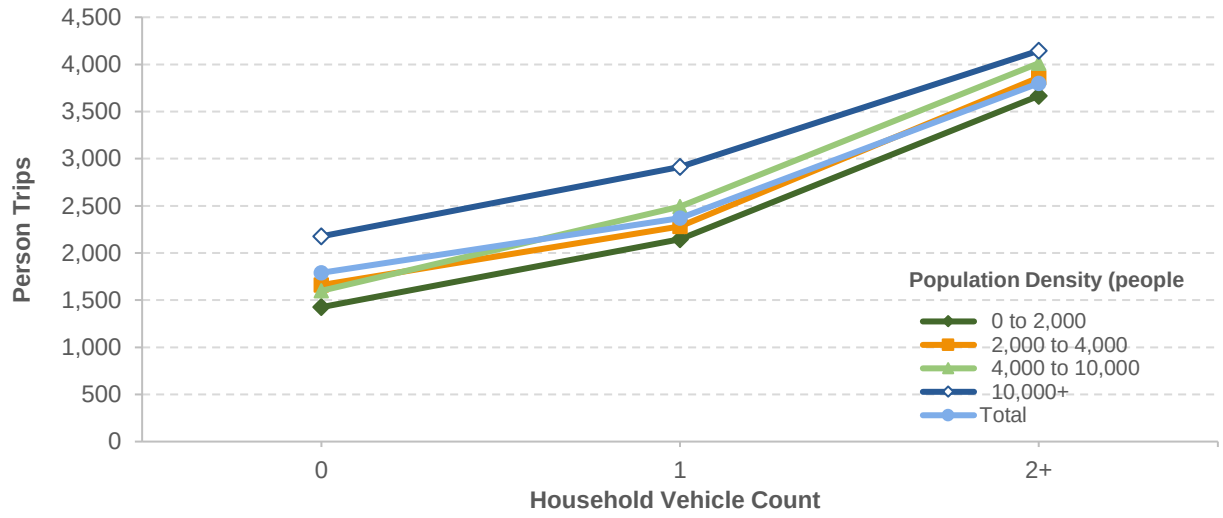
Exhibit 3-26 ■ Households Without a Vehicle, by Population Density, 1990–2017



Source: National Household Travel Survey.

Households living in areas with a population density greater than 10,000 people per square mile consistently have higher household person trips across all vehicle ownership levels, also likely due to the larger variety of mobility options and the close proximity of destinations (see *Exhibit 3-27*).

Exhibit 3-27 ■ Annual Person Trips per Household, 2017



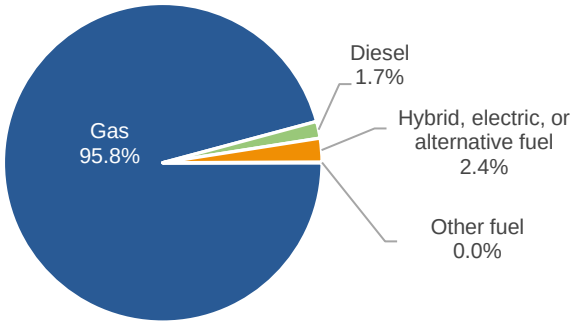
Source: National Household Travel Survey.

Advanced Vehicle Technology Penetration

Despite the post-recession rise in new vehicle sales, vehicle owners are still keeping their vehicles longer. The median age of the household vehicle fleet has been growing over the last 40 years. The average U.S. vehicle is almost 4 years older than in 1977, with rural households holding their vehicles longer than urban households. This pattern of vehicle ownership leads to a slow turnover of the U.S. vehicle fleet and delays in penetration of safety and fuel-efficient technologies.

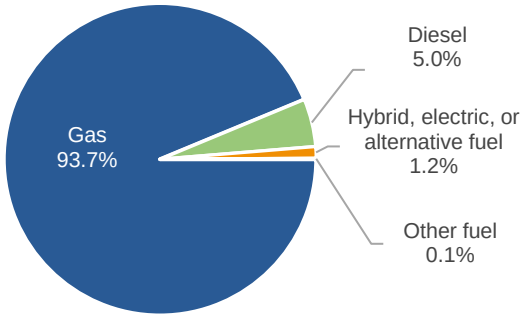
Petroleum-based products remained the predominant energy source for vehicles. About 2.4 percent of the total vehicle fleet in urban households use hybrid, electric, or alternative fuels in 2017, while 95.3 and 2.4 percent used gas and diesel, respectively (see *Exhibit 3-28*). Rural households reported even lower ownership rates of electric vehicles and higher ownership rates of diesel-run vehicles (see *Exhibit 3-29*).

Exhibit 3-28 ■ Urban Household Vehicle Fuel Type, 2017



Source: National Household Travel Survey.

Exhibit 3-29 ■ Rural Household Vehicle Fuel Type, 2017



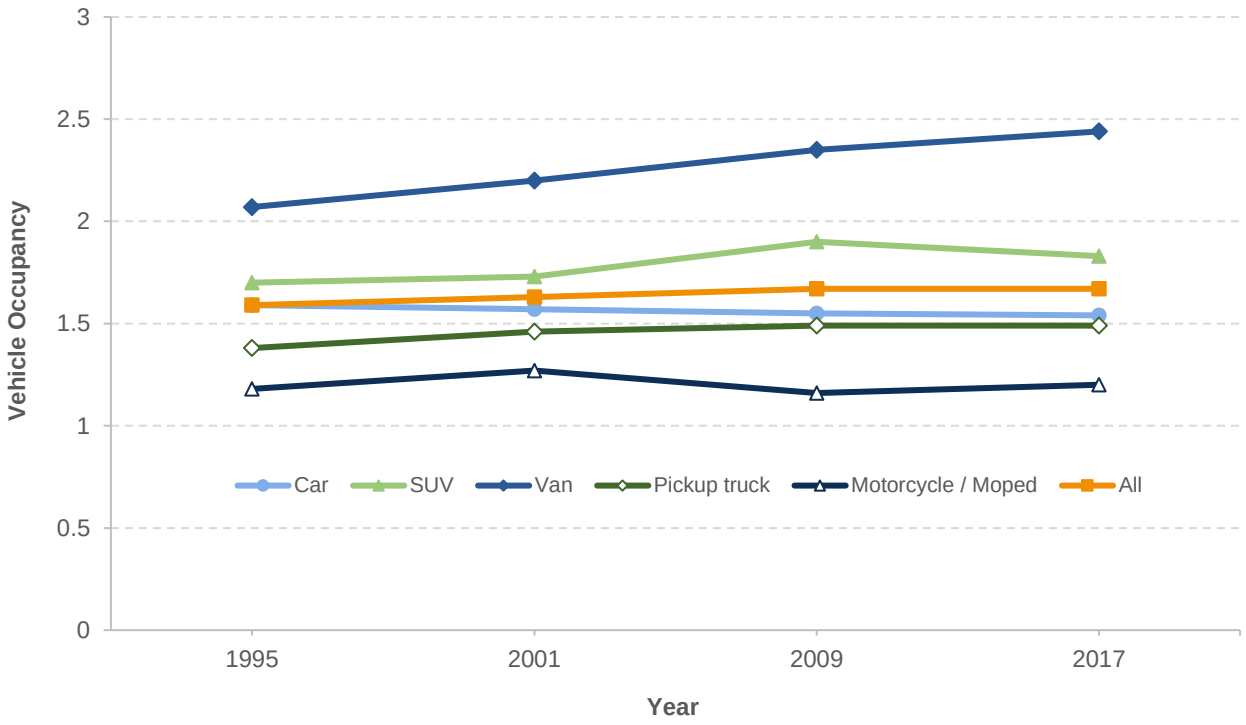
Source: National Household Travel Survey.

Vehicle Occupancy

According to 2017 NHTS data, the total mileage-weighted average vehicle occupancy is 1.67 (see *Exhibit 3-30*). This varies by mode with vans at the top at 2.44 and motorcycles and pickup trucks at the bottom with 1.20 and 1.49, respectively. The 18 percent increase (from 2.07 to 2.44) in the average vehicle occupancy of vans likely reflects their increasing use as family cars and people movers, and the overall 5 percent increase from 1995 to 2017 in average vehicle occupancy (AVO) reflects how slow driving culture changes in the United States.

Examined by trip purpose, work trips are most likely to be single-occupant trips with AVO slightly above 1, whereas social/recreational trips are most likely to have the highest number of passengers (see *Exhibit 3-31*). As with past years, 2017 NHTS mileage-weighted AVOs decreased compared with their 1977 levels for all trip purposes. Within the past decade, AVO showed a decline only for trips related to social/recreational purposes. All other trip-purpose AVOs either remained the same or increased. This may be due to young adults acquiring licenses later in life, increased high-occupancy vehicle/high occupancy toll (HOV/HOT) lanes, or reduced single-occupancy vehicle trips due to online shopping/telework/technology-enabled trip alternatives.

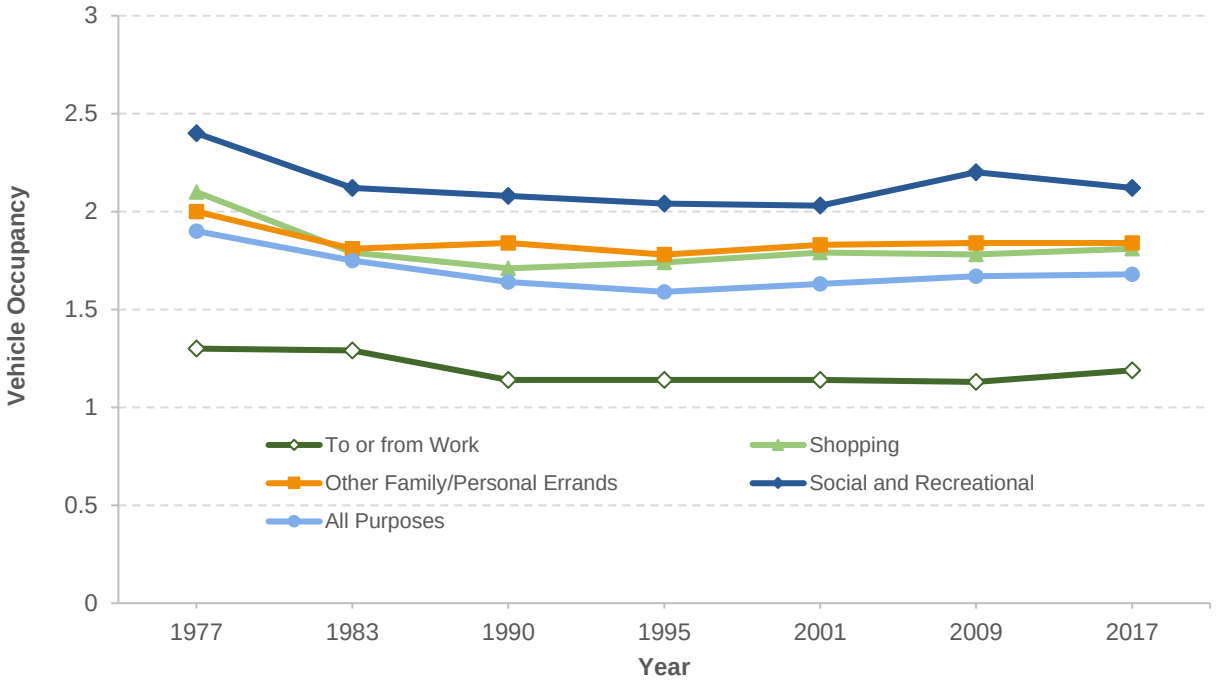
Exhibit 3-30 ■ NPTS/NHTS Vehicle Occupancy by Vehicle Type, 1995–2017



Mileage-weighted Average Vehicle Occupancy				
Vehicle type	**1995**	**2001**	**2009**	**2017**
Car	1.59	1.57	1.55	1.54
SUV	1.70	1.73	1.90	1.83
Van	2.07	2.20	2.35	2.44
Pickup Truck	1.38	1.46	1.49	1.49
Motorcycle/Moped	1.18	1.27	1.16	1.20
All	1.59	1.63	1.67	1.67

Source: National Household Travel Survey.

Exhibit 3-31 ■ NPTS/NHTS Average Vehicle Occupancy by Trip Purpose, 1977–2017



Mileage-weighted Average Vehicle Occupancy							
Trip Purpose	**1977**	**1983**	**1990**	**1995**	**2001**	**2009**	**2017**
To or from Work	1.30	1.29	1.14	1.14	1.14	1.13	1.19
Shopping	2.10	1.79	1.71	1.74	1.79	1.78	1.81
Other Family/ Personal Errands	2.00	1.81	1.84	1.78	1.83	1.84	1.84
Social and Recreational	2.40	2.12	2.08	2.04	2.03	2.20	2.12
All Purposes	1.90	1.75	1.64	1.59	1.63	1.67	1.68

Source: National Household Travel Survey.