Commuting in America 2013

The National Report on Commuting Patterns and Trends

Brief 9. How Commuting Influences Travel

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

CTPP

JANUARY 2015

About the AASHTO Census Transportation Planning Products Program

Established by the American Association of State Highway and Transportation Officials (AASHTO) and the U.S. Department of Transportation (U.S. DOT), the AASHTO Census Transportation Planning Products Program (CTPP) compiles census data on demographic characteristics, home and work locations, and journey-to-work travel flows to assist with a variety of state, regional, and local transportation policy and planning efforts. CTPP also supports corridor and project studies, environmental analyses, and emergency operations management.

In 1990, 2000, and again in 2006, AASHTO partnered with all of the states on pooled-fund projects to support the development of special census products and data tabulations for transportation. These census transportation data packages have proved invaluable in understanding characteristics about where people live and work, their journey-to-work commuting patterns, and the modes they use for getting to work. In 2012, the CTPP was established as an ongoing technical service program of AASHTO.

CTPP provides a number of primary services:

- **Special Data Tabulation from the U.S. Census Bureau—**CTPP oversees the specification, purchase, and delivery of this special tabulation designed by and for transportation planners.
- **Outreach and Training—**The CTPP team provides training on data and data issues in many formats, from live briefings and presentations to hands-on, full-day courses. The team has also created a number of electronic sources of training, from e-learning to recorded webinars to downloadable presentations.
- **Technical Support—**CTPP provides limited direct technical support for solving data issues; the program also maintains a robust listserv where many issues are discussed, dissected, and resolved by the CTPP community.
- **Research—**CTPP staff and board members routinely generate problem statements to solicit research on data issues; additionally, CTPP has funded its own research efforts. Total research generated or funded by the current CTPP since 2006 is in excess of $1 million.

Staff

- Penelope Weinberger, CTPP Program Manager
- Matt Hardy, Program Director, Policy and Planning
- Jim Tymon, Chief Operating Officer/Director of Policy and Management

Project Team

- Steven E. Polzin, Co-Author, Center for Urban Transportation Research, University of South Florida
- Alan E. Pisarski, Co-Author, Consultant, Falls Church, Virginia
- Bruce Spear, Data Expert, Cambridge Systematics, Inc.
- Liang Long, Data Expert, Cambridge Systematics, Inc.
- Nancy McGuckin, Data Expert, Travel Behavior Analyst

Contact

Penelope Weinberger, e-mail: pweinberger@aashto.org, phone: 202-624-3556; or CTPPinfo@aashto.org

Pub Code: CA09-4 ISBN: 978-1-56051-579-1

Brief 9. How Commuting Influences Travel

This brief is the ninth in a series describing commuting in America. This body of work, sponsored by American Association of State Highway and Transportation Officials (AASHTO) and carried out in conjunction with a National Cooperative Highway Research Program (NCHRP) project that provided supporting data, builds on three prior *Commuting in America* documents that were issued over the past three decades. Unlike the prior reports that were single volumes, this effort consists of a series of briefs, each of which addresses a critical aspect of commuting in America. These briefs, taken together, comprise a comprehensive summary of American commuting. The briefs are disseminated through the AASHTO website (*traveltrends.transportation.org*). Accompanying data tables and an *Executive Summary* complete the body of information known as *Commuting in America 2013* (CIA 2013).

Brief 9 provides information on how the commute trip influences the overall pattern of travel. Part of the importance of commuting is that commuting travel influences the travel patterns of commuters for non-commute purposes. Additionally, the travel patterns of non-commuters are affected as they plan their travel in response to the times and locations of heavy travel by commuters.

Specifically, someone commuting to an employment location for work has an explicit temporal constraint on when they can carry out other travel imposed by their work time commitment. In addition, the geographic location—more specifically, the travel corridor between home and work—provides an opportunity for that traveler to carry out other activities in proximity to that corridor. For example, a trip to eat during work is geographically influenced by the work location. In addition, many errands carried out in conjunction with travel to and from work are carried out within the commute corridor. Simple things such as picking up a gallon of milk or dropping off dry-cleaning are activities whose breadth of location options enables choosing a location conveniently located with respect to commute travel patterns. The regular commute trip also increases the awareness of opportunities within the commute corridor that can influence the prospect of carrying out other activities in that geography. While commuting to work, a driver might notice a sale at a furniture store or a movie showing at a theater that might influence subsequent travel destinations based on awareness of opportunities within the corridor.

Commuting also influences the travel of non-commuters, as many individuals intentionally plan their trips to avoid competing with commuters on the roadway and transit system. It is common for individuals to avoid peak periods for discretionary trips and to select destinations that are not in areas known to be subject to congestion caused by commuters.

Some of the relationships noted above can be described with quantitative data, and others simply are acknowledged behaviors but are not necessarily quantitatively documented.

Trip Chaining

Tables 2-1 and 2-2 in Brief 2 documented the importance of commute travel in the realm of all household travel and roadway and transit system travel. Also in Brief 2, a series of figures added further detail (Figures 2-1–2-7). In 2009, commuting constituted 15.6 percent of person trips, 19.0 percent of person miles of travel, 18.8 percent of person travel time, and 27.8 percent of vehicle miles of travel. These numbers, significant in their own right, under-represent the true influence of commuting due to the impacts noted above and the overall impact of commuting on our transportation system as discussed in Brief 1.

Defining Trip Chaining

For purposes of defining trip chaining when analyzing National Household Travel Survey (NHTS) survey data, trips were defined as a "chain" if intervening activities consumed 30 minutes or less before resuming the trip to home or work. This under-represents the full extent to which work trips are sequenced into trip tours, where longer-duration subsequent or prior activities are part of a sequence of activities all carried out since leaving from or before returning to home. This might include, for example, working a six-hour shift at a job, then traveling to a movie before returning home.

One of the most obvious ways in which commuting influences travel is via trip chaining, the process whereby individuals link additional activities to their trip to or from work. By creating chains of activities linked by travel between those activities versus carrying out each activity as a distinct trip from home, travelers reduce overall travel requirements to carry out a given set of activities. Analysts have explored trip chaining in the context of commuting to and from work.

Figure 9-1 shows the extent of trip chaining for work commuting by gender. The data indicate that the extent of trip chaining has remained relatively stable since 1995. There was a slight decline in commute trip stops for other purposes for 2009, perhaps contrary to what might be expected as analysts commonly assume that tight recession period budgets and high fuel prices would motivate increased trip chaining to reduce travel.

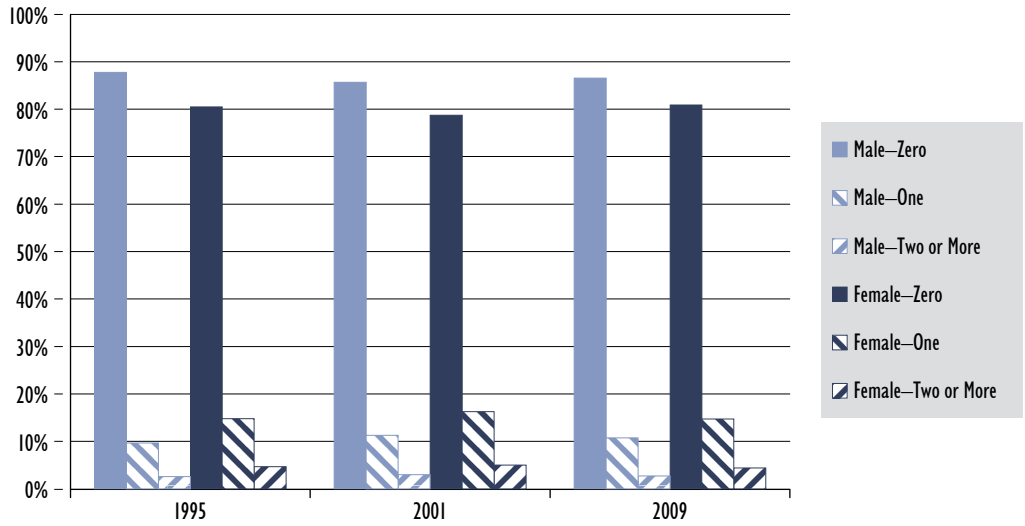

Figure 9-1. Transit Trip Chaining by Gender (Stops on Commute)

Source: NHTS data series, Trip Chaining file

For work commuting in 2009, 84 percent of workers went directly to or from work without a chained trip, 12.5 percent of workers stop once, and 3.5 percent stop more than once. This level of stopping is quite modest, indicating that schedule or other factors dampen the motivation to chain other activities with work trips. Often something as simple as a conveniently located coffee vendor accessible from the inbound travel lane is the motivation for a chained trip.

While trip chaining would seem an attractive opportunity to carry out activities, the vast majority of workers—84 percent—do not chain other activities with their trip to and from work on a given travel day.

Trip chaining varies modestly by gender. In 2009, more than 86 percent of males reported no stops on their trip to or from work versus approximately 81 percent of females. Similarly, females were more likely to have multiple stops on their commute trip. This is consistent with historical roles of females doing more household-/family-serving trips (646 per year for females versus 529 for males according to the 2009 NHTS) and shorter female commutes (9.72 miles for females versus 13.5 miles for males according to the 2009 NHTS).

Figure 9-2 shows the trend in trip chaining by trip purpose. For all three surveys referenced, family and personal business trips are the large majority of trip purposes for chained trips. The second most common trip purpose is shopping. Work-related, church or school, social/recreation, and other trip purposes are all modest shares, below 10 percent of chained trips.

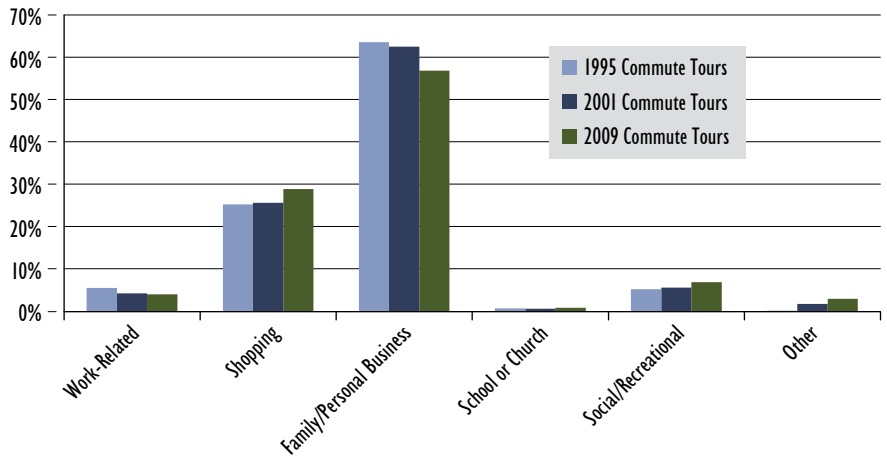

Figure 9-2. Trend in Trip Chaining by Trip Purpose

Source: NHTS data series, Trip Chaining file

Work travel also influences the timing and perhaps location of other activities that are sequenced with trips to and from work into trip tours. NHTS data indicates that 21.6 percent of trips to work do not originate at home and 41.0 percent of trips from work do not go directly home. The difference between these numbers and the data shown in Figure 9-1 represents tours of longer duration activities coordinated with work activities.

Figure 9-3 itemizes the sequence of travel to and from work. This includes both short stops that constitute trip chains (activity duration of 30 minutes or less) as well as longer-duration stops, referred to as trip tours.

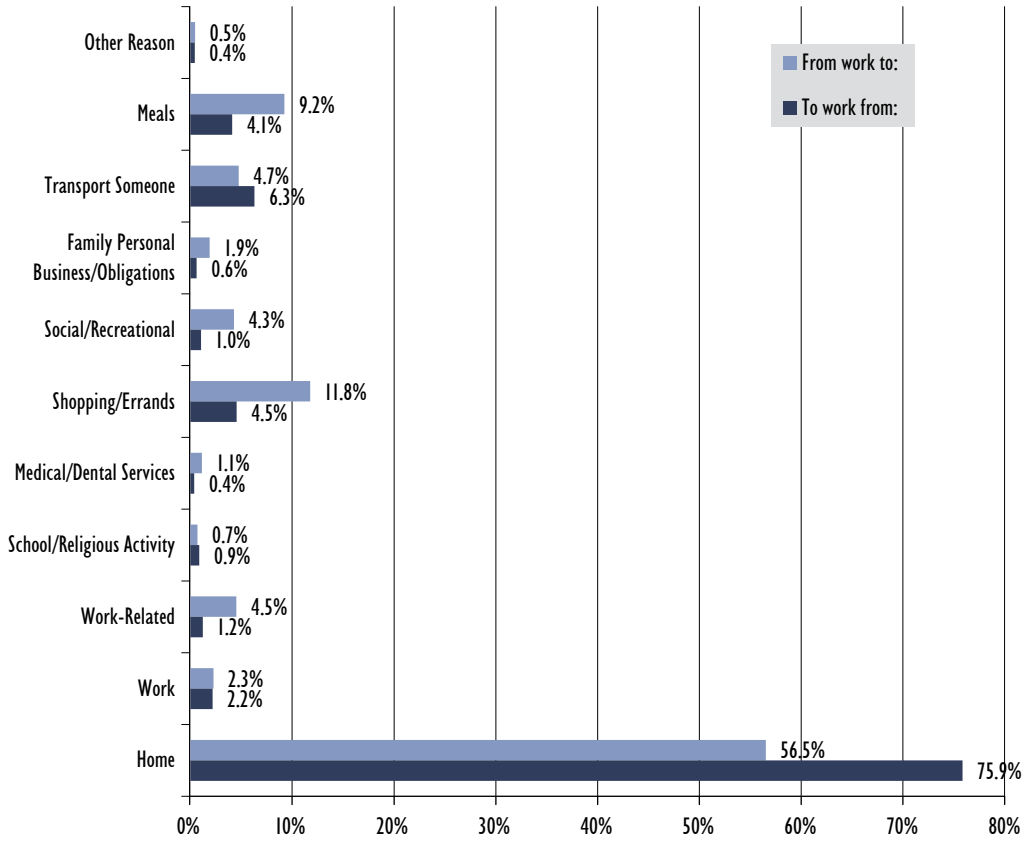

Figure 9-3. Activities Integrated in Work Trip Chains and Tours

Source: NHTS 2009.

Note: Totals do not sum to 100% because 2.5% of trips do not have information about prior/subsequent activity.

Activity-based models, with their inherent appreciation for the interrelationships between household travel decisions and activity decisions, have led to a growing interest in more fully understanding trip chaining and trip tour activities. With the greater availability of GPS-based location data on travel activities, analysts are beginning to evaluate the relationship between commuting and other activity geographic and temporal patterns. Ongoing research such as "An Integrated Model of Residential Location, Work Location, Vehicle Ownership, and Commute Tour Characteristics"[1] and "Exploring the Influence of Urban Form on Travel and Energy Consumption: A Tour-based or Trip-based Analysis?"[2] reflect the growing attention to further understanding trip chaining and trip tour behaviors in the context of commuting.

[1] Rajesh Paleti, Chandra R. Bhat, and Ram M. Pendyala, *92nd Annual Meeting of the Transportation Research Board*, 2013.

[2] Chao Liu and Frederick W. Ducca, *91st Annual Meeting of the Transportation Research Board*, 2012.

Aspects of trip chaining remain to be researched, such as how much circuity is added to the home-to-work trip to carry out trip-chaining or trip-tour activities. GPS provides a tool to provide the information to answer this question. Emerging GPS and cell phone tracking data, for example, can help validate actual trip chaining behavior relative to survey responses.

The Influence of Commuting on Other Trip Departure Times

In addition to influencing travel for other purposes via trip chaining, the work trip and time at work influence the ability of the traveler to accomplish activities during those occupied times and, hence, influence the overall temporal distribution of travel. Workers' travel for other purposes has to be coordinated with, or planned around, their commute travel. Figure 9-4 shows the temporal pattern of travel for workers on weekdays for the approximately 42 percent of the adult population (ages 16 and older) that is in the workforce and worked on the travel day that was surveyed. These workers may have worked various work schedules throughout the 24-hour day.

As Figure 9-4 indicates, workers carry out a significant amount of travel even on their workdays, with the total number of non-work trips exceeding the number of commute trips even on work days.

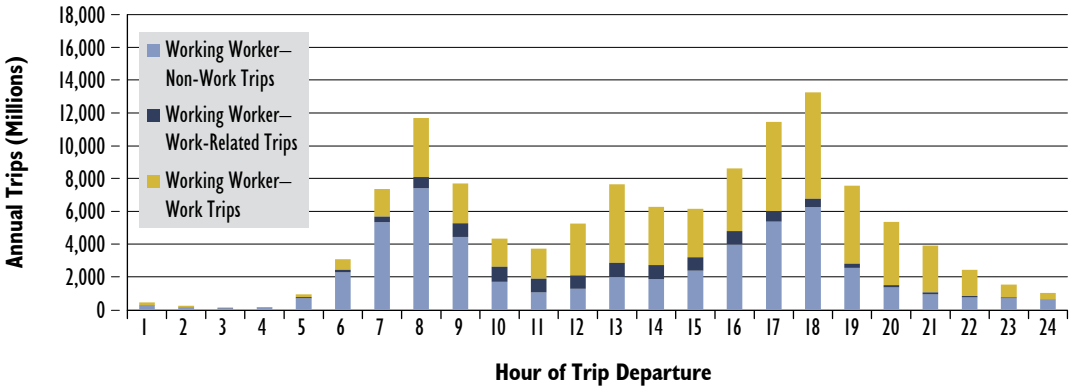

Figure 9-4. Temporal Pattern of Travel for Workers Who Worked on Survey Day

Source: 2009 NHTS

Figure 9-5 provides a measure of travel for workers who were not traveling to or from work on the travel survey weekday. These workers constitute approximately 27 percent of the adult population. Interestingly, the total number of non-work trips by workers who were not working was less than the number of non-work trips by persons who worked on the referenced survey weekday.

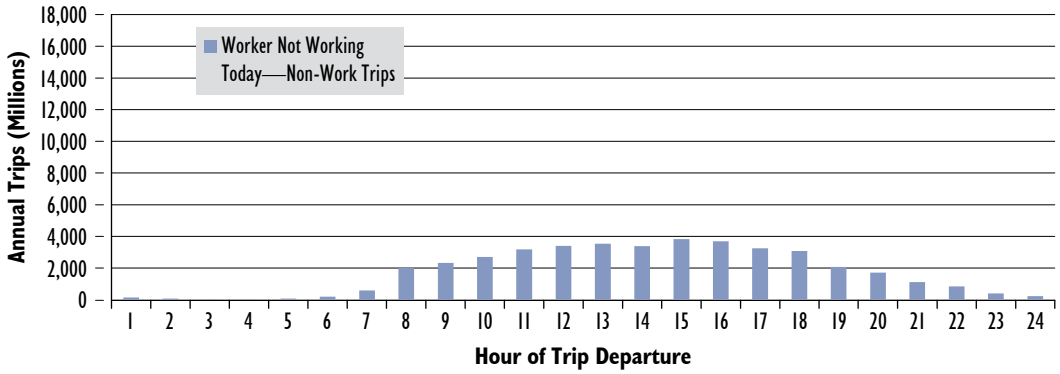

Figure 9-5. Temporal Pattern of Travel for Workers Not Working on Survey Day

Source: 2009 NHTS

Figure 9-6 presents the temporal distribution for weekday travel for adults who are not in the workforce. The estimated population in the category of adult non-workers is approximately 31 percent of the adult population. Also, a small number of work trips were reported for individuals who do not consider themselves workers.

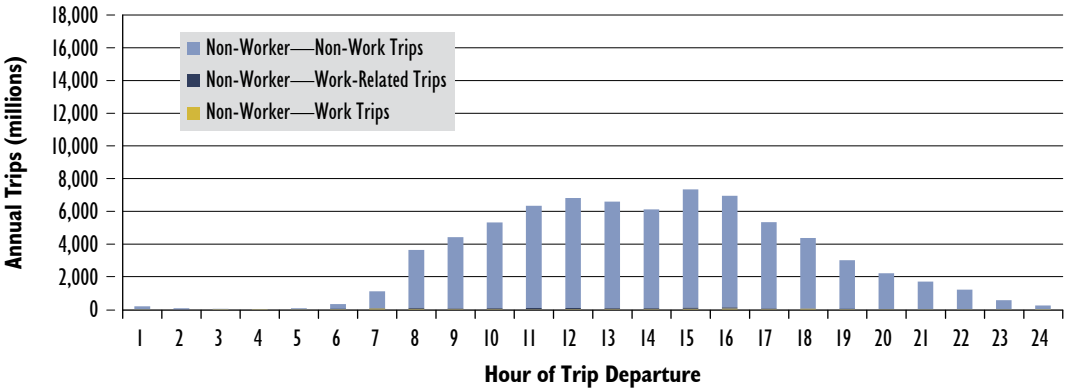

Figure 9-6. Temporal Pattern of Travel for Non-Workers

Source: 2009 NHTS
Note: A very small number of work trips and work-related trips were reported for non-workers but the numbers do not show up graphically.

Summary

As noted in Brief 2, households with commuters are economically active and, accordingly, have higher levels of travel than do households without commuters (see Figures 2-10 and 2-11). Participating in work increases travel, and workers, by virtue of having income, tend to be more active in other activities that require travel. In addition to creating a significant amount of travel, commuters often plan significant shares of their activities in conjunction with commuting. The trip from home to work is significant in influencing location decisions, as that high-frequency, fixed-destination trip is important to consider when making household location decisions. As a highly-traveled corridor, home-to-work travel can become a significant destination for other household activities due to both the opportunities to coordinate travel in conjunction with work and the awareness of other destinations in the corridor due to the frequent travel within the corridor.

While trip chaining would seem an attractive opportunity to carry out activities, the vast majority of workers—84 percent—do not chain other activities with their trip to and from work. However, approximately 22 percent of trips to work do not originate at home, and approximately 42 percent of trips from work do not go directly home.

Not surprisingly, workers have to make non-work trips outside of their commuting and work time commitments. In contrast, non-workers have no such constraint and show a tendency to carry out activities during normal work periods. The evening rush period is the time where workers return home and carry out other activities and non-workers are traveling to complete many of their days activities, resulting in particularly high demand for travel in the evening rush period.

Commuting in America 2013 Briefs Series

The *CIA 2013* series will include the briefs listed below as well as a *CIA 2013* Executive Summary and supporting data files, all available at the CIA 2013 website *traveltrends.transportation.org*. The website also includes a glossary of terms, documentation of data sources, and additional resources. The series of briefs included in *CIA 2013* are:

1. **Overview**—establishes institutional context, objectives, importance, data sources, and products to be produced.
2. **The Role of Commuting in Overall Travel**—presents national trend data on the relative role of commuting in overall person travel; explores commuting as a share of trips, miles of travel, and travel time at the national level.
3. **Population and Worker Trends**—provides very basic and key national demographic data.
4. **Population and Worker Dynamics**—focuses on the dynamics of the population and workforce, including data on migration, immigration, and differential rates of growth.
5. **The Nature and Pattern of Jobs**—defines employment and describes it in terms of its temporal, geographic, and other features.
6. **Job Dynamics**—looks at trends as they relate to jobs, including work at home, full-time versus part-time, job mobility, and changes in the nature and distribution of job types.
7. **Vehicle and Transit Availability**—reports on vehicle ownership and licensure levels and the availability of transit services. It also references factors influencing the availability of bike, walk, and carpool commute options.
8. **Consumer Spending on Transportation**—reports on various trends related to household spending on transportation.
9. **How Commuting Influences Travel**—explores how commuting travel influences overall travel trends temporally and geographically.
10. **Commuting Mode Choice**—provides a summary of mode choice for commuting (including work at home).
11. **Commuting Departure Time and Trip Time**—reports descriptive information on travel time and time left home, including national and selected additional data for metro area sizes.
12. **Auto Commuting**—addresses trends in privately-owned vehicle (POV) and shared-ride commuting.
13. **Transit Commuting**—addresses transit commuting.
14. **Bicycling and Walking Commuting**—addresses bicycling and walking as commuting modes.
15. **Commuting Flow Patterns**—addresses commuting flow patterns for metro area geographic classifications.
16. **The Evolving Role of Commuting**—synthesizes and interprets materials developed in the prior briefs to paint a picture of the current role of commuting in overall travel and evolving trends to watch going forward.

ES. CIA 2013 Executive Summary

**American Association of State
Highway and Transportation Officials**
444 North Capitol Street, N.W.; Suite 249
Washington, DC 20001

www.transportation.org
ctpp.transportation.org
traveltrends.transportation.org

Pub Code: CA09-4

ISBN: 978-1-56051-579-1