Joint Transportation Committee

Utility Study of a Statewide Household Travel Survey

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Executive Summary

State and local transportation policy decisions and investments have a critical impact on our state's economy and the wellbeing of our communities. There are many potential inputs to these decisions and investments, one of which is to collect data through a household travel survey (HTS). HTS data can inform answers to policymaker questions through one or both of the following:

1. **Informing development of a statewide travel demand model (TDM).** Statewide HTS data can serve as input to a TDM, which in turn provides estimates about travel patterns.
2. **Directly answering or informing policy questions.** HTS data can directly answer questions, serve as a starting point for further research, or inform decisions.

What is a Household Travel Survey?

An HTS offers in-depth household- and individual-level information about travel behaviors, vehicle characteristics, and demographic details. HTS often involve a travel diary, wherein respondents document the purpose, mode, and time of each trip an individual in a household takes. Participants typically self-report and submit their data via an online form, phone line, or smartphone app.

Since 1969, the Federal Highway Administration has conducted a nationwide HTS that provides a robust source of national longitudinal data. However, the sample size of Washingtonians is too small to offer statistically valid conclusions for certain population characteristics or geographies, and Washington does not have a statewide HTS. However, six Regional Transportation Planning Organizations and Metropolitan Planning Organizations (RTPOs/MPOs) conduct their own HTS. And, while 78% of the state's population resides in counties where RTPOs/MPOs conduct regional surveys, RTPOs/MPOs currently do not coordinate their HTS.

This study evaluates the potential utility of a statewide HTS and estimates implementation costs.

- **Potential utility:** A statewide HTS could inform several current and potential future transportation policy questions through either development of a TDM or direct use of HTS data. However, available travel data could also inform these questions, and an HTS may have limited flexibility to address future changes in research priorities, as HTS typically remain consistent over time to monitor trends.,
- **Costs:** Estimated costs of a statewide HTS are between $1.9 million – $8.8 million per biennium, depending on the approach to implementation, with mid-level estimates between $3.2 – $3.4 million. We conducted a preliminary examination of opportunities for the state to partner and expand on existing HTS, including consideration of potential cost-sharing arrangements. Potential cost-sharing would depend on the ultimate form of the statewide HTS and would be subject to contract details and negotiation. Absent further guidance on the desired outcome of an HTS, we were not able to provide a more detailed estimate of potential costs.

To determine whether to proceed with implementing a statewide HTS, the Legislature should evaluate two questions:

1. **What is the desired outcome(s) of additional travel data collection or analysis?** Does the Legislature want HTS data to develop a statewide TDM, to directly inform policymaker questions, or both?
2. **What is the best method to achieve the desired outcome(s)?** With a clear objective for additional travel data, the Legislature should determine the best method to meet that objective.

- **If the Legislature seeks to develop a statewide TDM,** then a statewide HTS is a necessary first step and the Legislature should engage WSDOT in discussions about need and scope.
- **If the Legislature seeks HTS data to directly inform transportation policy,** then it should compare the utility of HTS data with other existing transportation data, including costs.

Absent clear direction regarding the goal of an HTS, we could not meaningfully evaluate different agencies to perform ongoing analysis of statewide HTS data and other transportation research. Accordingly, this study does not include a recommendation for an agency to perform ongoing analysis of a statewide HTS and other transportation research.

Introduction

In 2023, the Washington State Legislature directed the Joint Transportation Committee (JTC) to conduct a study about the possibility of implementing a statewide household travel survey (HTS) (see ***Appendix A: Proviso***). The objectives of this study are as follows:

1. Describe the potential utility for a statewide HTS.
2. Develop options for implementation, including identifying a potential agency or agencies to access, process, and interpret HTS data or other data as necessary to inform policy.

Study Background

There is currently no statewide HTS in Washington state, though Washington is covered by the Federal Highway Administration's (FHWA) National Household Travel Survey (NHTS) and portions of the state are covered by regional surveys conducted by Regional Transportation Planning Authorities (RTPOs) and Metropolitan Planning Organizations (MPOs). While the NHTS covers the entirety of Washington, Washington's sample in the NHTS is too small to offer statistically valid conclusions at a granular level for certain population characteristics or geographies. And, while 78% of the state's population resides in counties where RTPOs/MPOs conduct regional surveys, RTPOs/MPOs currently do not coordinate their HTS so questions may differ between regions. The corollary is that there are rural areas of the state in which travel behavior is not understood as well as in more urban areas.

ABOUT HTS

HTS are typically administered by a government or quasi municipal corporation that contracts with a third-party contractor to conduct the sampling methodology, survey design, survey implementation, and data validation. The timeline to administer an HTS can take more than a year from planning to project close.

HTS offer in-depth household-level and individual-level information about travel behaviors, vehicle characteristics, and demographic details. HTS data also includes a travel diary component, where respondents document the purpose of each trip an individual in a household takes, their means of transportation, and their travel time. Participating households typically self-report and submit their data via an online form, phone line, or smartphone app.

A main value of an HTS is that it provides detailed data at both the household and individual levels. This is important because the characteristics of one's household impacts one's travel habits. For example, members of a higher-income household may take more discretionary trips for entertainment and recreation than lower-income households, and households with children make more trips to schools and activities than households without children. Further, vehicles are often shared across a household.

In general, HTS data serves two purposes:

Travel demand modeling. Transportation planners use information about travel patterns to model traffic volume and travel time and make projections based on anticipated population and network changes. TDMs also gauge the performance of the region's Long Range Transportation Plan and estimate air pollution caused by motor vehicles. A TDM can also offer insights into some policy and planning questions, described below.

Research and policy analysis. HTS data allow researchers to track changes in travel behaviors over time, examine relationships between demographics and travel patterns, and understand the implications of these patterns. Decision-makers can then use these findings to inform policymaking. See Exhibit 1 for the kinds of planning and policy questions that an HTS can and cannot answer.

Exhibit 1. Planning and Policy Questions that an HTS Can and Cannot Answer

HTS can help answer	Additional data is needed to fully answer
▪ How many car trips does the average resident make on a typical weekday? ▪ How does transit use vary by income? ▪ What are the peak travel hours, by trip purpose, throughout the day? ▪ How often do employed persons typically telecommute (vs. commuting to work)?	▪ Where do visitors go when they travel to the region? ▪ How many miles do ride-hail drivers (e.g., Uber, Lyft) travel without passengers in their vehicles? ▪ How many airplane trips does the average resident make each year? ▪ Where does freight travel around the region?

Source: PSRC, 2019.

Study Approach

This study was conducted from September 2023 through May 2024.

A small staff technical team with representation from the JTC, House Transportation Committee (HTC), and Senate Transportation Committee (STC) provided guidance and input to this study. See the textbox at right for staff technical team membership.

Staff Technical Team

HTC: Mark Matteson, Fiscal Coordinator

STC: Hayley Gamble, Budget Coordinator

JTC: Alyson Cummings, Senior Analyst

JTC: Paul Neal, Senior Counsel

Research topics included the following:

- **Evaluation of existing travel data collection in Washington**, including:
  - **Current HTS in Washington.** We reviewed existing HTS conducted in Washington, including the NHTS and regional HTS data that some RTPOs/MPOs collect. The purpose of this work was to evaluate the current extent of the state that is covered by existing HTS and whether a statewide HTS could offer efficiencies over multiple separate HTS efforts.
  - **Other travel studies and data collection.** We reviewed examples of other travel studies conducted by organizations such as the Washington Traffic Safety Commission (WTSC), Washington State Department of Transportation (WSDOT), the Department of Commerce (Commerce), and other regional planning entities in the state. The purpose of this work was to evaluate whether an HTS could have supported these studies or replaced the need for other data collection.
- **Interested party engagement.** We engaged representatives from several agencies and organizations that engage with travel data or studies. The purpose of this work was to understand how organizations currently engage with household travel data and whether and how a potential statewide HTS could offer benefits.
- **Evaluation of recent JTC studies.** We reviewed the objectives and methodologies of all JTC studies completed between January 2018 and October 2023. The purpose of this work was to understand

the proportion of studies for which HTS data could have wholly or partially replaced the need for other data collection.

- **Research and interviews regarding HTS in other jurisdictions.** We conducted desk research into other states that implement HTS and interviewed representatives from four states with a range of HTS models. The purpose of this work was to understand the mechanics, usefulness, and limitations of different HTS models with respect to their application to a statewide analysis in Washington.

Research Findings

Existing Travel Data Collection in Washington

Currently there is significant travel data collected in Washington, including existing HTS and other forms of data collection, collectively covering a broad range of topics. However, there are limited opportunities to combine findings across data sources, as described in the textbox at right.

HTS

Existing HTS within Washington include the FHWA's NextGen NHTS and regional HTS conducted by RTPOs and MPOs.

FHWA NextGen NHTS

The FHWA conducts a national HTS called the NextGen NHTS.[1] The Core Data Program is conducted every two years and sampled 7,893 households in 2022 using address-based sampling. The 2022 core survey includes 1,134 households from the Pacific Census Division (Alaska, California, Hawaii, Oregon, and Washington), which is the most granular level of data released. Based on Washington's share of the total US population, we estimate that the 2022 sample includes approximately 180 Washington households.[2] Data analysis based on NHTS data includes estimates on daily trips per person and average trip distance by trip purpose. See ***Appendix B: Historical NHTS Summary Statistics*** for more examples of metrics analyzed from historical NHTS data.

Combining Data Sources

In general, it is inappropriate to aggregate data across separate sources.* Survey analysis often applies weights to responses so that summary statistics are representative of the full population, and raw, unweighted source data that could be better matched to other datasets is rarely publicly available. Further, two surveys will often ask a similar question in two different ways, and the unit of analysis (e.g., household or individual) may differ between surveys.

While true consolidation of datasets is not always a viable option, survey analysis can draw on findings from separate datasets to provide more color to a narrative. For example: "According to the U.S. Census Bureau American Community Survey, 54% of workers in King County drive alone to work. The Seattle Commute Survey provides details about workers specifically in the City of Seattle. Among these workers, only 21% drive alone to work."

** There are exceptions. For example, data from one dataset may be supplemented with data from a second dataset, under certain circumstances, using a process called statistical matching.*

The FHWA NextGen NHTS offers a core survey Add-On program for states, local jurisdictions, and government agencies to purchase additional samples in a selected geographic area for a cost of approximately $260 to $275 per household.[3] The core survey Add-On program also enables the purchasing jurisdiction to add up to six additional questions to the survey within their geographic area. Currently, Washington does not participate in the core survey Add-On program.

[1] In January 2022, FHWA launched the NextGen NHTS to replace its traditional NHTS. The traditional NHTS was launched in 1969 and conducted every five to eight years. The NextGen NHTS surveys fewer households in a given survey year than did the traditional NHTS, which enables the FHWA to conduct this survey more frequently.

[2] This would amount to about 2.3% of the total sample size of 7,893 households in 2022, equivalent to Washington's share of the total US population and similar to Washington's share of the 2017 traditional NHTS sample (650 households out of 26,099 total households, or 2.5%).

[3] For the 2022 NextGen NHTS, Tennessee DOT purchased an add-on sample for 5,000 households, Virginia DOT for 11,000 households, and Oahu MPO for 2,500 households.

Regional HTS conducted by RTPOs/MPOs

We conducted an email survey of all 19 RTPOs/MPOs in Washington and 14 organizations participated. Of these 14, 6 reported that they conduct HTS (see right). These organizations primarily use HTS data for regional travel demand modeling and forecasting, and, in some cases, for public transit planning. See Exhibit 2 for a map showing the location and frequency of HTS conducted by RTPOs/MPOs.

RTPOs/MPOs that Conduct HTS

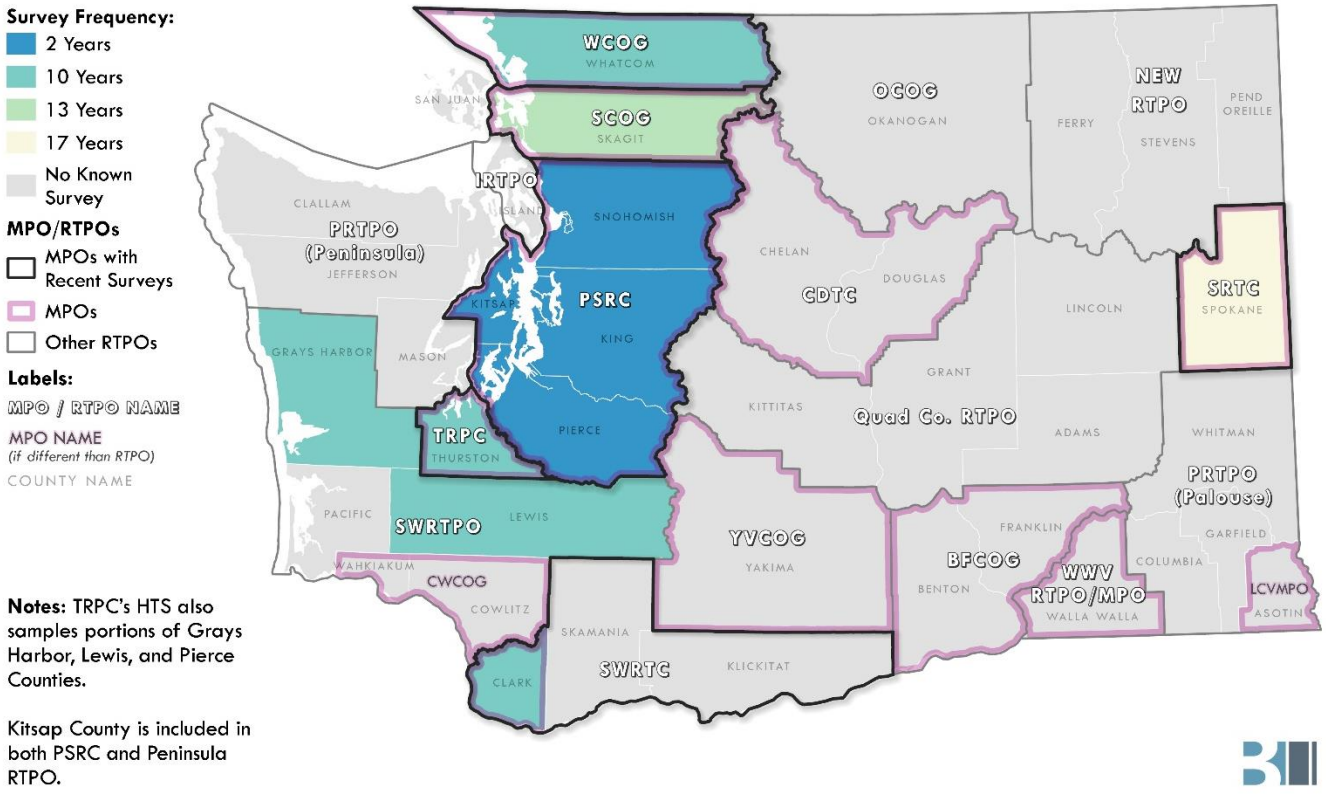
1. Puget Sound Regional Council (PSRC)
2. Skagit Council of Governments (SCOG)
3. Southwest Washington Regional Transportation Council (SW RTC)
4. Spokane Regional Transportation Council (SRTC)
5. Thurston Regional Planning Council (TRPC)
6. Whatcom County of Governments (WCOG)

Exhibit 3 shows an overview of the sample sizes and costs of these regional HTS. Implementation costs range from $200,000 to $870,000 depending on the sample size. This cost includes data collection and processing – that is, conducting the survey and cleaning and organizing the data into a usable dataset – but excludes data analysis. Additional costs for data analysis also range by organization, as many conduct analysis in-house. Those that could estimate the cost of analysis estimate between $49,000 and $80,000 beyond the cost of implementation.

Eight RTPOs/MPOs reported that they do not conduct HTS. These organizations reported cost constraints and staff capacity as primary barriers to conducting an HTS.

Through desk research, we found no evidence that the remaining five RTPOs/MPOs conduct HTS.

Exhibit 2. Location and Frequency of HTS Conducted by RTPOs/MPOs



Source: BERK, 2024.

Exhibit 3. Overview of the Sample Sizes and Costs of HTS Conducted by RTPOs/MPOs

RTPO/MPO	HTS Sample Size	Total Households in Area Surveyed	Percent of Households Sampled	Total Cost for Data Collection and Processing	Cost per Household
Puget Sound Regional Council (PSRC)	4,695 households (before data cleaning)	1,603,000	0.2%*	$870,000 (2023)	$185
Skagit Council of Governments (SCOG)	672 households; 1,343 persons	50,400	1.3%	$290,000 (2021)	$432
Southwest Washington Regional Transportation Council (SWRTC)	2,000 households expected in 2023	201,000	1.0%	$570,000 (2023)	$285
Spokane Regional Transportation Council (SRTC)	1,953 households; 3,879 persons	213,000	0.9%	$338,000 (2022)	$173
Thurston Regional Planning Council (TRPC)	2,121 households; 4,347 persons	116,000	1.8%	$390,000 (2022)	$184
Whatcom County of Governments (WCOG)	1,451 households; 3,000 persons	90,000	1.6%	$249,000 (2018)	$172

**Note: PSRC conducts surveys in a three-wave design, so that combined sampling rates over three years are about 0.6%.*

Source: BERK, 2024.

Non-HTS Travel Data

In addition to HTS data, there are many other sources of household travel behavior in Washington. Data sources include:

- **National data** such as the U.S. Census Bureau American Community Survey (ACS).
- **Travel surveys within Washington** such as the WTSC Washington Traffic Safety Survey.
- **Non-survey travel data collection within Washington** such as the Washington State Department of Licensing (DOL) Electric Vehicle Database.
- **Mobile device data collection** such as the U.S. Bureau of Transportation Statistics Daily Trips by Distance.

See ***Appendix C: Other Available Travel Data*** for descriptions of these and other examples of non-HTS travel data.

Interested Party Input: Potential Utility of a Statewide HTS

Feedback from Potential Users of HTS Data with a Statewide Focus

We interviewed several potentially interested parties, shown in Exhibit 4, to discuss their current use of household travel data and whether statewide HTS data would be useful to their organizations. See ***Appendix D: Interested Party Interview Questions*** for a list of the questions we used in interviews.

Across all our conversations, no interviewee reported that a statewide HTS would replace their organization's existing data collection. Instead, statewide HTS data could offer supplemental data. Most

interviewees expressed mild interest in statewide HTS data, with some expressing strong interest and others agnostic or unclear about the need for statewide HTS data.

The organizations with the greatest interest in a statewide HTS were the Governor's Office and the Washington State Transportation Commission (WSTC). Both suggested that robust statewide data could support policy decision-making, particularly for policies that affect overburdened communities.

WSDOT and the Office of Financial Management (OFM) requested additional clarity around the purpose of considering a statewide HTS. OFM described an impression that past conversations about a potential statewide HTS had led to consensus it was unnecessary. WSDOT was interested in the "problem statement" contributing to the interest in an HTS.

Commerce, DOL, and Municipal Research and Services Center declined to participate in an interview because their organizations do not engage with household travel data.

Exhibit 4. Potentially Interested Party Interviewees

Organization	Interviewee(s)	Interviewee Title
AWC	Brandy DeLange	Government Relations Advocate
Governor's Office	Debbie Driver	Senior Policy Advisor for Transportation
OFM	Erik Hansen	Senior Budget Advisor for Transportation
PSRC (see note)	Brian Lee	Program Manager of Data Solutions and Research
UW TRAC	Ryan Avery	Interim Director
WSAC	Axel Swanson	Managing Director, WA Association of County Engineers
	Paul Jewell	Senior Policy Director
WSDOT	Karena Houser	Director of Multimodal Planning & Development
	Natarajan Janarthanan	Manager of Travel, Data, Modeling, and Analysis
WSTC	Reema Griffith	Executive Director
	Carl See	Deputy Director
WTSC	Staci Hoff	Research Director

Notes: We interviewed PSRC to understand how their regional HTS could be expanded to the state and important considerations for implementing a successful HTS. Our interview questions with PSRC differed from those shown in the Appendix.

Source: BERK, 2024.

Other key takeaways include:

- **Potential benefits of a statewide HTS.** Some interviewees perceived that a statewide HTS could help the state develop complete, consistent state data – including about pedestrians, bicyclists, and transit; about overburdened communities; and about small areas – to inform policy decisions. Some interviewees suggested that a statewide HTS could help establish standard definitions and metrics statewide to support more consistency and accountability.
- **Potential policy topics that could benefit from statewide HTS data.** Interviewees noted that a statewide HTS could inform a range of policy topics, including vehicle miles traveled, a State energy

strategy, the transportation electrification strategy and electric vehicle infrastructure plans, the road usage charge evaluation, and other transportation and transit-oriented planning.

- **Potential challenges with a statewide HTS.** Some interviewees noted challenges with conducting an HTS, including that an HTS does not typically address emergent needs and there is bias involved in self-reported data. Others noted that it may be difficult to determine what the survey includes to maximize utility for the diverse interested parties that work with travel data in Washington. Another noted that an HTS could face ongoing funding issues and would need a legislative champion. Data trends are only apparent over time so ongoing funding would be essential.
- **Alternatives to statewide HTS data.** Interviewees described the other data sources that they currently use for travel data (see right), many of which are described in Appendix C: Other Available Travel Data.

Recommendations from interviewees

Interviewees suggested a range of recommendations should the Legislature choose to proceed with a statewide HTS:

- **Scoping.** Ensure a clear "problem statement" with questions to be answered. Consider other data (e.g., mobile device data; U.S. Census Bureau ACS) as an alternative to a statewide HTS. If an HTS is pursued, ensure plans for ongoing use of the data, rather than one-time use, to maximize value.
- **Implementation.** House the statewide HTS at a state agency that regularly uses travel data, as implementing via a third party may not be more efficient.
- **Funding and champions.** Identify one or more legislative champions to ensure adequate and consistent funding over time. Given that legislative terms are two years, it would be further important to house the HTS at a state agency (see above bullet) from which a legislative liaison could help ensure continued funding.
- **Analysis.** Pre-process HTS data to ensure usability by interested parties that may have limited capacity to engage with the data.

Other Data Sources Used by Interviewees

- **AASHTO CTPP** – American Association of State Highway and Transportation Officials Census Transportation Planning Products
- **Cambridge Mobile** – Telematics
- **MRSC** – Municipal Research and Services Center
- **NHTS** – National Household Travel Survey
- **OFM** – Office of Financial Management
- **PSRC** – Puget Sound Regional Council
- **Sound Transit** – rider and nonrider surveys
- **U.S. Census Bureau ACS** – including Journey to Work
- **WSDOT** – Washington Department of Transportation

Feedback from RTPOs/MPOs

In our email survey of RTPOs/MPOs, we asked each organization whether they would have an interest in statewide HTS data. All 14 participating organizations expressed interest. Of the six that currently conduct a regional HTS, some expressed interest in replacing their regional HTS with a statewide HTS if the statewide data could fulfill their organization's specific needs. Some said that statewide data would

supplement rather than replace their own survey because (a) statewide data may not have enough detail, and (b) statewide data may not be widely applicable to all MPO and RTPO TDMs.

HTS Outside Washington

Many states outside Washington employ variations of an HTS to achieve their goals around understanding travel behavior and conducting travel demand modeling.

We evaluated use of HTS outside Washington through two methods:

1. **Interviews and follow-on engagement with representatives from departments of transportation in three states:** Oregon, Tennessee, and Virginia. These states were identified in the study request for proposals based on preliminary research conducted by HTC staff. Oregon conducts an independent statewide survey and Tennessee and Virginia participate in the NHTS add-on program. All three states use HTS data for travel demand modeling. Through this research, we identified key considerations should the State of Washington choose to implement an HTS, which we incorporated into our analysis for Options for an HTS in Washington. See ***Appendix E: HTS in Other States*** for a full list of these considerations.
2. **Desk research into HTS in all states.** At the time of research, 18 states nationwide had currently or recently employed a statewide HTS, either through an independent HTS or participation in an NHTS add-on program. More information about HTS in other states can be found in Appendix E: HTS in Other States.

Potential Utility of an HTS in Washington

As described in the ***Introduction***, HTS data typically serves two functions: (1) developing TDMs, and (2) informing research and policy analysis.

Use 1: Travel Demand Modeling

The first potential use for Washington – travel demand modeling – is a relatively discrete and definable purpose. Currently, Washington does not have a statewide TDM, and the regional TDMs developed by RTPOs/MPOs differ and are informed by distinct regional HTS. To determine the potential utility of a statewide HTS for travel demand modeling, further research and engagement is needed:

- **Engagement with WSDOT.** Typically, states that develop and use a statewide TDM house this work at their department of transportation. In 2015, WSDOT requested ongoing funding to develop a statewide TDM, but this funding was not appropriated. Further research, engagement, and collaboration with WSDOT would be needed to determine whether development of a statewide TDM would be a desirable use of a potential statewide HTS.
- **Engagement with RTPOs/MPOs.** Further engagement of these organizations would be needed to understand the application of a single uniform statewide HTS to these different regional TDMs. As noted above, some RTPOs/MPOs would likely view a statewide HTS as a supplement to, rather than a replacement of, the HTS they currently conduct.

Use 2: Policy and Planning Research

The second potential use for Washington – policy and planning research – is a more open-ended purpose, with many potential use cases falling within this category. In general, conducting a statewide HTS could offer consistent statewide data about travel preferences with sociodemographic detail and the ability to track changes in travel patterns over time. Under this purpose, HTS data can also be considered a "public good," as the data is typically made available for agencies, organizations, and individuals to use as they see fit.

To evaluate the potential utility of an HTS in Washington for policy and planning research, we carried out three lines of analysis. We first considered how HTS data has recently been used for this purpose nationwide (see ***Recent Use of HTS Data for Policy Research Nationwide***), then analyzed hypothetical ways that HTS data could have been used for policy research in Washington had this data been available (see ***Recent Hypothetical Utility of HTS Data for Policy Research in Washington***). Both of these lines of analysis were backward-looking, and therefore offer insights into some potential future usefulness of HTS data but may not fully encompass future uses of this data. Because of this, we rounded out our analysis with a third line of analysis: a forward-looking evaluation of the potential ways HTS data could support policy and planning research in the future (see ***Future Potential Utility of HTS Data for Policy Research in Washington***).

Key takeaways from these three lines of analysis include:

- Nationally, there is significant usage of national HTS data for academic studies.

- Six out of 25 JTC studies (24%) conducted between 2018 and November 2023 could have benefitted from statewide HTS data, though all of these studies were successfully completed without this information.
- Some travel-related research conducted by entities other than the JTC over the past few years could have benefitted from statewide HTS data. However, statewide HTS data likely would not have fully replaced other data collection needs.
- While many potential future travel research topics could be informed by statewide HTS data, significant alternative data exists to inform these questions.

The following subsections describe these three lines of analysis in depth.

Recent Use of HTS Data for Policy Research Nationwide

Each year, the NHTS publishes a Compendium of Uses that lists all newly published scholarly research articles and reports that have used NHTS data as a source. See ***Appendix F: Uses of the NHTS*** for a summary of research and articles published between January and June 2023.

During the six-month period, the current Compendium referenced 214 research articles and reports, indicating broad applicability of the NHTS data. Some of these studies used NHTS data extensively–in some cases as their sole or primary dataset–such as a study on school bus ridership.[4] Others used NHTS findings to supplement other research, such as a study on air pollution exposures.[5]

It should be noted that the use of data for academic research is a different use case than using data to inform policy making during legislative session. Certainly, research informs legislative decisions, but academic research takes more time than is available when questions come up during legislative session.

The Compendium identifies 13 categories of policy research that NHTS data has recently supported:

1. **Bicycle and pedestrian,** such as the sociodemographic characteristics of people who travel by bike.
2. **Energy consumption,** such as strategies for the placement of electric vehicle charging stations.
3. **Environment,** such as the environmental impacts of shared mobility.
4. **Health,** such as travel for medical or dental care by race/ethnicity and rurality.
5. **Policy and mobility,** such as the possibility of shared micromobility to replace auto travel.
6. **Special population groups,** such as a demographic analysis of who takes school buses.
7. **Survey, data synthesis, and other applications,** such as simulations to analyze the impact of bike lanes on transportation mode choice.
8. **Traffic safety,** such as the impact of driver's age and gender, built environment, and road conditions on crash severity.

[4] Speroni, S. (2023). Who Takes the School Bus? The Roles of Location, Race, and Parents in Choosing Travel-to-School Mode in Georgia. *Transportation Research Record: Journal of the Transportation Research Board, 2677*(11). https://doi.org/10.1177/03611981231164388

[5] deSouza, P., Anenberg, S., Makarewicz, C., Shirgaokar, M., Duarte, F., Ratti, C., Durant, J., Kinney, P., & Niemeier, D. (2023). Quantifying Disparities in Air Pollution Exposures Across the United States Using Home and Work Addresses. *arXiv:2303.12559 [stat.AP]*. https://doi.org/10.48550/arXiv.2303.12559

9. **Transit planning,** such as urban transit infrastructure and inequality.
10. **Travel behavior,** such as the impact of ridesharing services on traffic congestion.
11. **Trend analysis and market segmentation,** such as the impact of telecommuting on daily travel.
12. **Emerging travel modes,** such as shared autonomous vehicle fleets.
13. **Passive Origin-Destination (OD) data product usage,** such as residency and worker status identification based on mobile device location data.

Recent Hypothetical Utility of HTS Data for Policy Research in Washington

Many agencies and organizations in Washington conduct travel research for policy purposes. To understand the hypothetical utility of HTS data in Washington, we examined studies conducted by the JTC and other entities over the past several years to understand if availability of statewide HTS data could have offered efficiencies or other benefits.

Hypothetical utility of HTS data for prior JTC Studies

The JTC completed 25 studies between 2018 and the time of analysis (November 2023). We identify that six of these studies could have potentially benefited from HTS data. While HTS data alone would not have been sufficient to fully address study objectives in any case, HTS data could have provided useful background information such as household demographics, travel patterns, and vehicle characteristics. See Exhibit 5 for the six studies for which HTS data could have been useful and the types of HTS data that could have supported these studies. See ***Appendix G: Recent JTC Studies*** for a detailed analysis of all 25 JTC studies.

Exhibit 5. Prior JTC Studies for which HTS Data Could Have Been Useful

Year	Study	Study Objective	Potentially Useful HTS Data
2023	Transportation Equity in Cities	Provide information, guidance, and recommendations on transportation equity that is helpful to all cities and towns.	Types of transportation used in overburdened communities as background information.
2023	Powered Micromobility Lending Libraries Study	Examine options for a state program to assist in establishing powered micromobility device lending libraries.	Information on needs and reasons for micromobility lending libraries.
2023	Encouraging High Consumption Fuel Users to Switch to Electric Vehicles	Understand factors affecting high consumption fuel users to switch to electric vehicles and evaluate potential policies to help encourage this transition.	Driver demographics and vehicle information.
2022	Nondrivers: Population, Demographics, and Analysis	Understand demographics of nondrivers and how existing infrastructure serves nondrivers throughout the state.	Nondriver demographics and the types of transportation modes nondrivers use.
2022	Vehicle Registration (Car Tabs) Payment Options Workgroup	Convene a workgroup to develop recommendations for payment options for vehicle fees or taxes.	Driver demographics, vehicle information, and number of vehicles per household.
2020	Feasibility of a Private Ferry Between Washington State and Vancouver B.C.	Evaluate feasibility of a private auto ferry service between Washington and British Columbia.	Driver demographics and vehicle info.

Source: BERK, 2024.

Hypothetical utility of HTS data for other studies and data collection

Several entities other than the JTC also conduct travel-related research in Washington. We analyzed a subset of this research to evaluate the extent to which HTS data could have benefitted these efforts. See Exhibit 6 for a summary of the travel studies we evaluated and the potential application of hypothetical statewide HTS data to these efforts. In many cases, statewide HTS data could have provided useful background information. In some cases, statewide HTS data could have supplemented but likely not fully replaced data collection efforts.

Exhibit 6. Evaluation of the Usefulness of Hypothetical Statewide HTS Data in Sample Recent Travel Studies

Recent Travel Study	Agency	Study Overview	Statewide HTS Data Utility?	Potential Alternative Data Sources
Washington State Plan for Electric Vehicle Infrastructure Deployment Survey	WSDOT	Develop a plan for statewide network of charging stations along state highways.	Yes – statewide HTS data could have provided information about electric vehicle (EV) adoption and usage.	EV adoption information is also available through DOL (see ***Examples of Non-Survey Travel Data Collection in Washington***).
Road Usage Charge Assessment	WSTC	Develop recommendations for road usage charges, an alternative to motor fuel taxes and vehicle fees.	Yes – statewide HTS data could have replaced the 2017 NHTS data that was used for this study, specifically characteristics of people traveling, household income, and their vehicles (WA sample was 650 households).	The study used existing NHTS data. Information was also gathered from the U.S. Census Bureau ACS; DOL registration data matched with VIN and Census tract; and FHWA Highway Statistics Series and Highway Performance Monitoring System data.
Transportation Electrification Study	EV Coordinating Council	Develop a plan to make EVs and EV infrastructure accessible and available.	Yes – statewide HTS could have provided information about EV travel patterns and usage.	Some information could be inferred through combining general travel patterns. EV adoption information is also available through DOL (see ***Examples of Non-Survey Travel Data Collection in Washington***).
Vehicle Miles Traveled Targets	WSDOT	Develop a process for establishing local vehicle miles traveled targets and options to achieve those targets.	No – The study developed an approach to setting vehicle miles travelled targets working with the 6 largest RTPOs/MPOs.	Data was gathered through WSDOT Highway Performance Monitoring System data; OFM population estimates; and research on what works to reduce VMT.

Source: BERK, 2024.

Future Potential Utility of HTS Data for Policy Research in Washington

An HTS is not always the only or best tool to answer a policy question. To evaluate the potential utility of HTS data for future policy research in Washington, we first developed a list of potential specific future travel research topics. We then evaluated each topic based on the utility of potential statewide HTS data to address that topic. We also evaluated whether each topic could be addressed through alternative data sources. Exhibit 7 provides examples of alternative data and a summary of our evaluation. See ***Appendix C: Other Available Travel Data*** for more information about potential alternative data sources. Where we have included regional data sources, these data cover a sizable proportion of

Washington's population, such as the PSRC HTS which surveys four counties covering approximately 56% of all households in Washington.[6]

Exhibit 7. Evaluation of Utility of HTS Data for Potential Future Travel Research Topics

Travel Research Topic	HTS Data Utility?	Examples of Alternative Data Available
Patterns and needs of pedestrians and bicyclists	Yes	▪ Mobile device data ▪ OFM Traffic Records Integration Program databases ▪ PSRC HTS and other studies ▪ Washington State Commute Trip Reduction Surveys ▪ WTSC Washington Traffic Safety Survey
Changes in commuting over time	Yes / partial – need to build up a dataset for trend analysis	▪ Mobile device data ▪ PSRC HTS ▪ U.S. Census Bureau ACS and Journey to Work section ▪ Washington State Commute Trip Reduction Surveys ▪ WSTC FROG Surveys ▪ WTSC Washington Traffic Safety Survey
Impacts of transportation fees/charges on overburdened communities	Yes, if an HTS includes questions focused on this topic	▪ King County Metro Rider and Non-Rider Survey ▪ U.S. Census Bureau ACS ▪ U.S. Department of Transportation Equitable Transportation Community Explorer ▪ WSTC Low-Income Toll Program Study (2021); Analysis of Relative Financial Impacts of Transportation Taxes by Household Income (2021). While these are not ongoing studies, this work could be leveraged for the next few years.
Reasons for using particular modes of transportation	Yes	▪ PSRC HTS and other studies ▪ Washington State Commute Trip Reduction Surveys ▪ WTSC Washington Traffic Safety Survey
Electric vehicle adoption	Yes	▪ DOL EV registrations databases ▪ National research studies and consumer reports
Electric vehicle usage (passenger and commercial vehicles)	Yes	▪ Replica data available through Commerce and PSRC HTS
Vehicle miles traveled for privately operated household vehicles	Yes, if an HTS includes questions focused on this topic	▪ FHWA Highway Performance Monitoring System Data ▪ WSDOT Annual Mileage and Travel Information
Travel behavior in rural areas	Yes	▪ U.S. Census Bureau ACS and Journey to Work section ▪ WTSC Washington Traffic Safety Survey

Source: BERK, 2024.

[6] The 2021 PSRC HTS covered King, Kitsap, Pierce, and Snohomish counties. According to the U.S. Census Bureau ACS, these counties had approximately 1,691,195 households in 2021, out of 3,022,255 total households in Washington state.

Determining a Path Forward

Options for an HTS in Washington

We identify three options for conducting a statewide HTS on a regular basis:

1. **Participation in the NHTS Core Add-On program.** The State could participate in the NHTS Core Add-On program to increase the sample size in the state.
2. **Independent statewide HTS.** The State could conduct its own HTS by developing a new survey, as Oregon did (see ***HTS Outside Washington***).
3. **PSRC expansion.** The State could expand an existing HTS to the full state. The most viable option for expansion would be the PSRC HTS, as this is a robust existing HTS that already represents a majority of the state's population. PSRC has expressed an openness to conversations about partnership with the State for this purpose, but more conversation would be needed.

These options would each differ in their content and level of flexibility, as described in the following subsections.

Content differences between the three HTS options

Based on our review of the 2022 NextGen NHTS Core Add-On survey for Virginia and the 2021 PSRC HTS (see ***Appendix H: Comparison of NextGen NHTS and PSRC Surveys***), a statewide HTS implemented through the NHTS Core Add-On and PSRC Expansion options would likely include many similar questions. The most recent versions of the NHTS and PSRC surveys both asked about household demographics, individual demographics, travel diaries on an assigned travel day, and travel patterns over the past 30 days. More specific topics had less overlap, such as discounted transit pass usage which appeared only on the NHTS or factors that contribute to the choice of current residence which appeared only on the PSRC survey. An independent survey could also be developed with many of the same questions as used in the NHTS or by PSRC, as desired.

Flexibility differences between the three HTS options

The independent survey is the most flexible option as it could be designed to meet the State's specific needs to the extent they are known. The PSRC Expansion would likely involve a redesign of the existing PSRC survey to account for surveying the full state instead of only the Puget Sound region and would still need to meet PSRC's needs. The NHTS Core Add-On would allow for up to six state-specific questions in addition to the base core survey questions.

Agency to Perform Ongoing Analysis of Statewide HTS Data

If the Legislature chooses to pursue a statewide HTS, it will need to determine an agency or organization to facilitate the process, maintain the data, and conduct analysis. That agency or organization would need additional resources to accommodate the additional effort required to conduct this work, and the appropriate agency would depend on the ultimate purpose of an HTS:

- **TDM.** If the Legislature seeks an HTS to develop a statewide TDM, WSDOT would be the most likely agency for this work, as states that develop a statewide TDM typically house this work at their department of transportation. The Legislature would need to engage WSDOT in a robust process to

determine the need for and use of such a model and to determine WSDOT's staff and resource needs for effective implementation.

- **Research for policy and planning.** If the Legislature seeks an HTS to inform policy and planning research without a TDM, several potential agencies could be appropriate, such as the JTC, the Washington State Institute for Public Policy, or the Washington State Transportation Center (TRAC). The Legislature would need to engage potential agencies in a robust process once it understands the scope of a statewide HTS to determine an agency's needs for effective implementation.

Cost Estimation

The estimated costs for implementing an HTS include costs for data collection and cleaning; data analysis; and project management and scoping. There may also be opportunities for cost-sharing with MPOs or RTPOs, though details about the extent of those opportunities would depend on guidance from the Legislature about the specific form of a statewide HTS.

The following sections describe each of these elements, with full biennial costs summarized in Exhibit 8. These cost estimates assume the State would conduct an HTS every two years, as both the NHTS Add-On program and PSRC conduct HTS with this frequency. The primary cost driver for survey efforts is the number of households surveyed, as shown in Exhibit 9. See ***Data collection and cleaning costs*** for more details on the low, medium, and high estimates.

Exhibit 8. Estimated Biennial Costs of Options for Additional Travel Data in Washington

Component	NHTS Core Add-On	Independent Survey	PSRC Expansion
Data collection and cleaning	**Low:** $1,350,000	**Low:** $1,250,000	**Low:** $1,350,000
	Medium: $2,700,000	**Medium:** $2,500,000	**Medium:** $2,700,000
	High: $8,100,000	**High:** $7,500,000	**High:** $8,100,000
Data analysis	$520,000	$520,000	$520,000
Project management and scoping	$20,000	$200,000	$200,000
Cost-sharing opportunities	(TBD)	(TBD)	(TBD)
Total	**Low: $1,890,000**	**Low: $1,970,000**	**Low: $2,070,000**
	Medium: $3,240,000	**Medium: $3,220,000**	**Medium: $3,420,000**
	High: $8,640,000	**High: $8,220,000**	**High: $8,820,000**

Note: See **Data collection and cleaning costs** *for more details on the low, medium, and high estimates.*

Sources: FHWA, 2023; Oregon State Department of Transportation, 2023; PSRC, 2023; BERK, 2024.

Data collection and cleaning costs

Data **collection** refers to recruiting and gathering information from households.

Data **cleaning** refers to preparing raw data collected from households for analysis. Based on PSRC's experience with their HTS, data received from the third-party organization implementing the survey data collection requires additional cleanup before the data is ready for analysis. Data cleaning may include standardizing data types or screening raw data for incomplete or missing data.

The cost to collect and clean data is estimated per household. PSRC reports that there is no significant difference in per-household costs for a larger or smaller sample of households, so we use a fixed per-household cost multiplied by the number of households in the sample to estimate total data collection and cleaning costs. Per-household costs are as follows:

- **NextGen NHTS Add-On:** $270 per household, based on Virginia's costs in 2022. We assume no additional data cleaning costs as Ipsos (the third-party market research organization for the 2022 NHTS) provides clean unweighted and weighted data files.
- **Independent statewide survey:** $250 per household, based on Oregon's average costs for data collection and cleaning.
- **PSRC survey expansion:** $270 per household, based on information provided by PSRC. This would include $250 per household for data collection and an additional $20 per household for data cleaning.

Total cost estimates for data collection and cleaning for each option are summarized in Exhibit 9. For each survey we offer three options for sample sizes.

Exhibit 9. Data Collection and Cleaning Costs for Statewide HTS Options

Estimate Band (Sample Size)	NHTS Add-On *$270 per household*	Independent Survey *$250 per household*	PSRC Expansion *$270 per household*
Low (5,000 households)	$1,350,000	$1,250,000	$1,350,000
Medium (10,000 households)	$2,700,000	$2,500,000	$2,700,000
High (30,000 households)	$8,100,000	$7,500,000	$8,100,000

Notes: We developed the sample size estimates using the following information:

- *Low: In a November 2022 conversation with Washington interested parties and legislative staff, PSRC estimated surveying 1,000 households in at least five geographical zones across the state.*
- *Medium: Virginia purchased an add-on sample of 11,000 households for the 2022 NextGen NHTS Add-On. Based on Census Bureau estimates, Washington's population and number of households are approximately 90% of those of Virginia.*
- *High: In an interview with Oregon Department of Transportation, staff targeted a sample size of 1% of households in the state. Washington has approximately 3 million households, according to the Census Bureau.*

Source: BERK, 2024.

Data analysis costs

All options assume that data analysis will require 2.0 FTE per year, estimated at a total annual cost of $130,000 per FTE, which assumes 30% for benefits. Based on PSRC's experience with their HTS program, data analysis staff would ideally include one manager plus supporting analysts. Based on Oregon's experience with statewide travel modeling and HTS analysis, data analysis staff would ideally have several years of training and experience, which could increase the base salary.

Project management and scoping costs

All options would require project management and scoping to evaluate survey needs. Project management and scoping are assumed to be biennial costs, not one-time costs. Though there may be some efficiencies from establishing a survey cycle every two years, efficiencies are not guaranteed due to factors that may change every two years such as survey needs, the pool of qualified third-party organizations who respond to request for proposals, and WSDOT staff turnover.

Project management costs are assumed by the entity that would facilitate procurement and implement the HTS. Examples of project management include preparing requests for proposals to contract with third-party organizations to design and implement the survey and negotiating contracts with contracted parties.

Scoping includes organizing meetings to decide on survey goals, survey questions, and survey design. Survey design may involve testing the survey questionnaire and methodologies to ensure a representative sample of households through recruitment, weighting, and stratification (i.e., determining subgroups within the sample by attributes such as household income). These costs are expected to be greatest for the Independent Survey and PSRC Expansion, as the NextGen NHTS Core Add-On is led by the FHWA.

The cost estimates for each option are as follows:

- **NextGen NHTS Core Add-On:** $20,000 for the process of deciding on six custom questions that Washington could include alongside the standard NHTS questions, estimated to be 10% of start-up costs for the Independent Survey (see below). This cost could vary widely depending on which entity

(e.g., WSDOT, another state organization, or a third-party consultant) were to lead the process, the number of interested parties involved, and their level of involvement. This estimate presumes that the FHWA would assume all other costs for overall project management (e.g., preparing requests for proposals and negotiating contracts) and statewide survey needs.

- **Independent Statewide Survey:** $200,000, based on Oregon's costs for project management and scoping in the 2023 cycle of their independent HTS.
- **PSRC Expansion:** $200,000 for project management and scoping required to survey the whole state instead of only the Puget Sound region. This cost is estimated to be the same as project management and scoping costs for the Independent Statewide Survey because both efforts would create a new survey building on existing efforts. This cost may also vary depending on the number of entities interested in purchasing additional samples in their region, as such collaborations increase the complexity and staff time on the project.

Cost-sharing opportunities

There may be some opportunity for cost-sharing arrangements with MPOs and RTPOs that currently conduct HTS, with opportunities falling into two scenarios:

- **If the state pursues a statewide HTS of any form.** Four of the 19 statewide MPOs and RTPOs we surveyed indicated interest in replacing or supplementing their HTS with a statewide survey. If the statewide HTS could fully substitute for existing MPO or RTPO HTS, it is possible that some MPOs and RTPOs could redirect funds from their independent HTS to support a statewide HTS. However, we believe the most likely outcome would be for these MPOs and RTPOs to fund any oversampling needed for their jurisdictions above the state's base sample. Additional MPO and RTPO contributions to the base cost of a statewide survey would likely be limited, primarily due to the staffing and budget constraints these organizations already face.
- **If the state pursues a statewide HTS in partnership with PSRC.** If the State pursues a formal partnership with PSRC to expand the existing PSRC HTS, there may be an opportunity for a cost-sharing arrangement with PSRC. Potential cost-sharing would depend on the ultimate form of the statewide HTS and would be subject to contract details and negotiation.

Next Steps

To determine the best path forward for Washington, Legislators have two key decisions to make.

1. **What is the desired outcome(s) of additional travel data collection or analysis?** As noted in Potential Utility of an HTS in Washington, HTS data could serve one or both of the following primary functions: (1) developing a statewide TDM, or (2) directly informing research for policy and planning.
2. **What is the best method to achieve the desired outcome(s)?** Once the Legislature has identified a clear objective for additional travel data collection or analysis, it should determine the preferred method of meeting that objective.
    - **If the Legislature seeks to develop a statewide TDM**, then a statewide HTS is a necessary first step and the Legislature should engage WSDOT in discussions about need and scope.

- **If the Legislature seeks HTS data to directly inform transportation research,** it should first review the examples of potential future travel research topics detailed in Future Potential Utility of HTS Data for Policy Research in Washington and Appendix F: Uses of the NHTS to identify if any topics are more relevant than others. Then it should compare the utility of HTS data with that of other existing transportation data, as described in Future Potential Utility of HTS Data for Policy Research in Washington and consider the overall estimated costs of conducting an HTS, as described in Options for an HTS in Washington.

Appendix A: Proviso

The following text is the proviso that appropriated funds for this study and provided guidance on the study structure.[7]

(1) $125,000 of the motor vehicle account—state appropriation and $125,000 of the multimodal transportation account—state appropriation are for the joint transportation committee to evaluate potential options and make recommendations for a statewide household travel survey and additional analytical capacity regarding transportation research.

(a) The recommendation on the statewide household travel survey must be based on how well a statewide survey investment would: Address policy questions related to household travel; address gaps between separate regional and local transportation models; and create a dataset to allow both for analysis and response to policymakers' questions relating to household travel and for transportation modeling and development. In evaluating potential survey options, the committee shall consider opportunities for the state to partner and expand on developed established household travel surveys, including surveys conducted at both the Puget Sound regional council and the federal highway administration. In its recommendation, the committee shall outline the process required for a statewide survey, including the costs and timing of each option.

(b) The committee shall recommend an agency or agencies to perform ongoing analysis of a statewide household travel survey and other transportation research. The committee shall consider the ability of an agency or agencies to meet shorter timeline policy needs, as well as longer timeline research projects. The recommendation must include the timing and costs associated with the development of such analytical capacity.

[7] Engrossed Substitute House Bill 1125, Section 204, 2023 Regular Session. See more at: https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/House%20Bills/1125-S.E.pdf (accessed October 11, 2023).

Appendix B: Historical NHTS Summary Statistics

The FHWA has published the following summary metrics of historical NHTS data supplemented with other household travel-related data from the FHWA, National Highway Traffic Safety Association, and U.S. Census Bureau American Community Survey. The FHWA has also published travel trends from the 2022 NHTS, which is available in a report form.

FHWA NHTS

TRAVEL PROFILE: UNITED STATES

2017 National Household Travel Survey

General Information

Demographics	2001	2009	2017
Total population	281,421,906	307,006,556	325,719,178
Total households	105,480,101	113,616,229	120,062,818
Total workers	128,279,228	138,591,804	152,802,672
Median age (years)	35.3	36.8	38.1
Median HH* income	$41,994	$50,221	$60,336

Source: U.S. Census Bureau, Decennial Census, and American Community Survey.
*Household

Daily Travel Indicators	2001	2009	2017
Daily trips per person:	4.09	3.79	3.37
Work/work-related	0.77	0.71	0.64
Shopping	0.88	0.79	0.62
Social	1.06	1.00	0.93
Family/personal	0.91	0.82	0.68
Other purposes	0.47	0.47	0.50

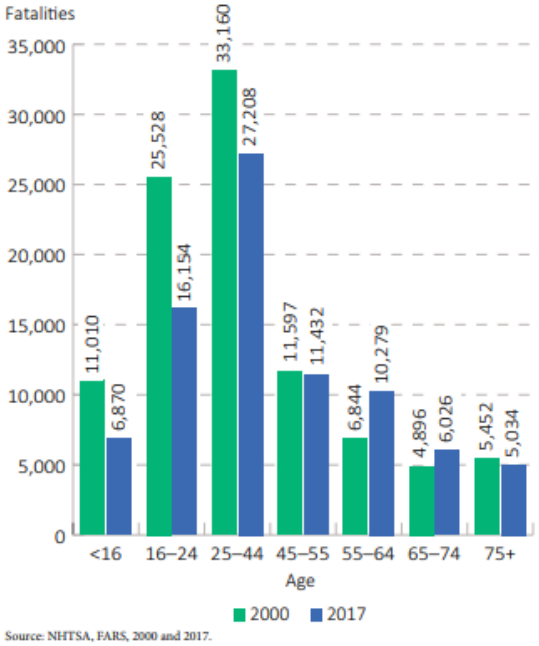
Source: NHTS 2001, 2009, and 2017.

Safety-Related Data

Safety-Related Travel	2001	2017
% walk trips after 6 pm	24	21
% households with motorbikes	4	5
% persons who biked last week	7	12
% persons who walked last week	65	73

Source: NHTS 2001 and 2017.

Fatalities By Age



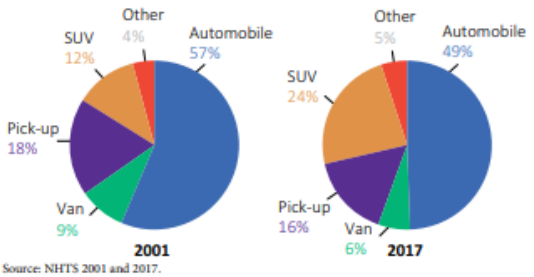
Source: NHTSA, FARS, 2000 and 2017.

Household Vehicle Fleet

Vehicle Ownership	2000	2017
Total number of vehicles	221,475,173	272,480,899
Vehicles per person	0.79	0.84
Vehicles per HH	2.10	2.27
Vehicles per worker	1.73	1.78
Average vehicle occupancy	1.63	1.67

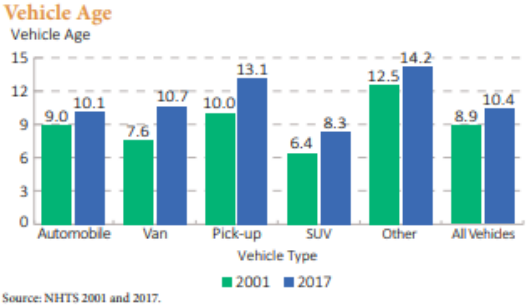
Source: Federal Highway Administration, Highway Statistics, State Motor Vehicle Registrations (Table MV-1) 2000 and 2017; Average vehicle occupancy per NHTS 2001 and 2017.

HH Vehicle Distribution



Source: NHTS 2001 and 2017.

Vehicle Age



Source: NHTS 2001 and 2017.

Travel Characteristics

General Travel Characteristics (in millions)

	2001	2009	2017
Total VMT (miles)	2,274,769	2,245,111	2,321,675
Total PMT (miles)	3,783,979	3,732,791	3,970,287
Total vehicle trips	233,030	233,849	220,430
Total person trips	384,485	392,023	371,152

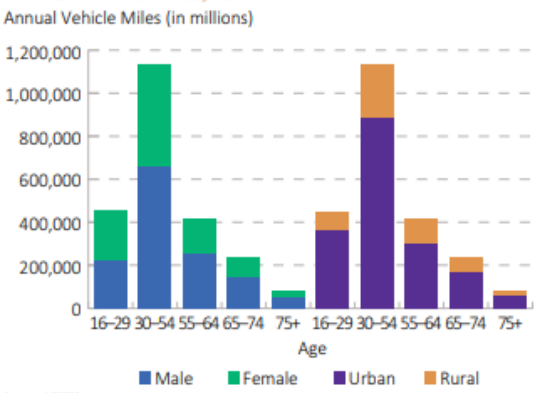
*Population is per 2000 Decennial Census, all other metrics from NHTS 2001, 2009, and 2017.

Travel Trips by Purpose

	Weekday	Weekend	Total
Home-based work	17%	6%	14%
Home-based shop	17%	27%	20%
Home-based social	10%	17%	12%
Home-based other	24%	19%	22%
Non-home-based	32%	31%	32%

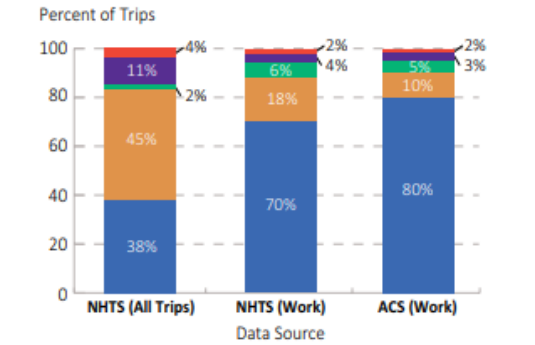
Source: NHTS 2017.

Annual Vehicle Miles, 2017



Source: NHTS 2017.

Means of Transportation, 2017



Source: NHTS 2017 and ACS 2017

Medical Trips by Age

	Urban	Rural	Total
<16	6%	8%	6%
16-29	12%	12%	12%
30-54	32%	28%	32%
55-64	19%	22%	20%
65-74	19%	17%	18%
75+	12%	13%	12%

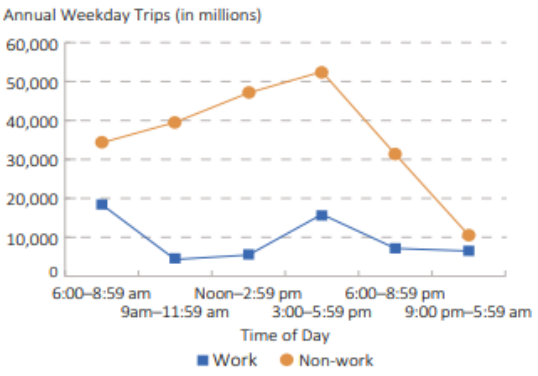
Source: NHTS 2017 (Urban/Rural designation reflects home location).

Average Trip Distance (Miles) by Purpose (2017)

	Weekday	Weekend	All Trips
Work/work-related	13	15	14
Shopping	8	8	8
Social/recreation	10	13	11
Family/personal business	7	10	8
Other purposes	17	25	19
All trips (all purposes)	11	13	12

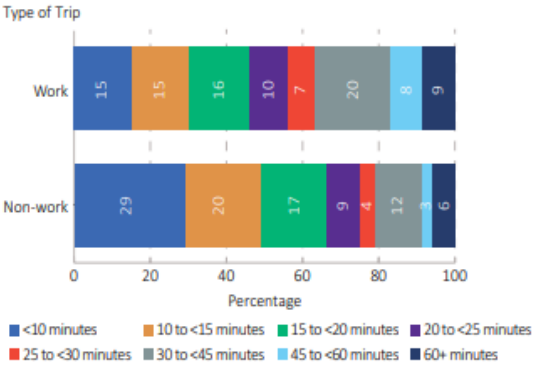
Source: NHTS 2017.

Weekday Trips by Time



Source: NHTS 2017.

Trip Length (minutes) for Work and Non-Work Trips



Source: NHTS 2017.

Source: FHWA, 2019.

Appendix C: Other Available Travel Data

This appendix provides examples of other available travel data but does not provide a comprehensive review of all available data.

All data varies in scope and methodology, and existing travel data is no exception. Effective use of data requires the user to understand the data's characteristics and how those characteristics may facilitate or limit the data's application for the desired purpose. The following bullets summarize some of the characteristics of data to consider when selecting the appropriate data for a desired purpose.

- **Purpose.** The purpose of the data source may be to build up a new dataset or to synthesize existing sources. For example, WTSC surveyed households across the state to learn about traffic safety patterns, while OFM put together traffic safety dashboards using data from WSDOT and DOL. In the case of independent surveys in Washington, we determined that an HTS could not replace or consolidate these independent surveys due to the purpose of each survey to understand travel behaviors towards of a specific group of people, such as employees or ferry riders.
- **Collection method.** Data may be collected actively or passively. A survey is an example of active data collection, where participants are recruited and asked to respond to a set of questions. Mobile device data is an example of passive data collection, where phone location data is collected from users who consent to privacy agreements.
- **Geographic reach.** Data may be available at the local, regional, statewide, or national level, typically depending on the reach of the organization collecting data. For example, the US Census Bureau is a federal agency that collects data across the country, while Commute Seattle is a local nonprofit partnership that focuses on data collection in the Seattle area.
- **Respondent universe.** The full universe of who data is collected from. The respondent universe may range from all residents in a given geography to only individuals with a certain characteristic or behavior, such as ferry riders.
- **Individual or household.** Data may be collected from individuals or households. For example, the King County Metro surveys individual bus riders and non-riders, while the FHWA NextGen NHTS Core Data Program requests for one adult to respond on behalf of the household for household-wide information such as vehicles, as well as for each person in the household for travel diaries.
- **Sampling and recruitment method.** The sampling method is the process of deciding who is invited to participate and the recruitment method is how participants are invited to respond. For example, the Ferry Riders Opinion Group (FROG) Survey is distributed via email to the FROG mailing list and offers the opportunity to contribute feedback as a member of the FROG community. On the other hand, the PSRC HTS uses a probability-based sampling approach to gather information from a representative sample for the area of interest and offers gift cards to increase response rates. In the latter, the approach allows the use of statistics to draw conclusions about behavior with respect to the population as a whole.
- **Sample size.** National data collection efforts may have smaller sample sizes for more granular geographies, while data collection via email recruitment may gather more responses. For example, the 2017 FHWA NHTS included 650 Washington households out of 26,099 households nationwide,

while the 2022 Commute Seattle collected 64,355 responses. In general, larger sample sizes with robust sampling methods are more reliable sources for analysis.

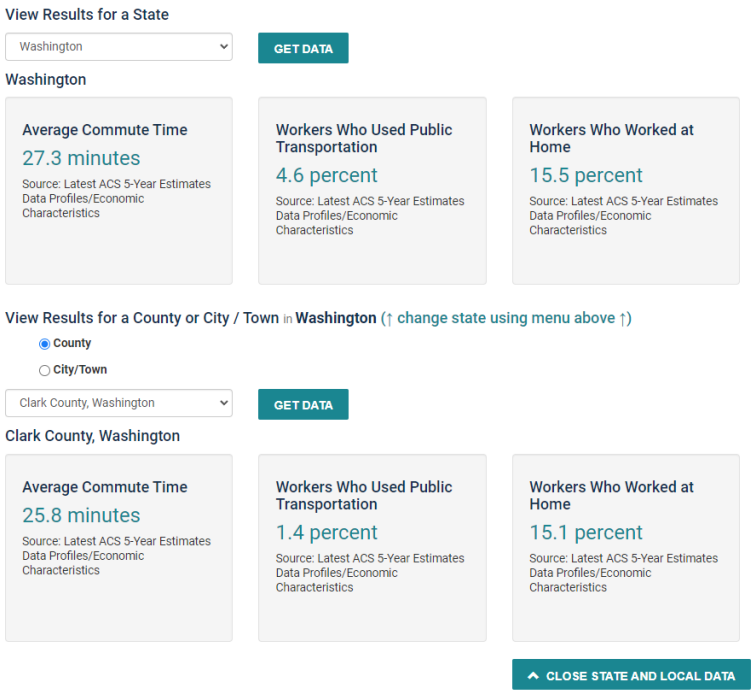
- **Frequency.** Some data is collected on an ongoing basis and other data is gathered periodically, depending on the purpose for data collection. For example, WSDOT traffic sensors installed on the road collect data continuously to provide real-time travel time estimates between locations. In contrast, many surveys are administered periodically, in part to identify trends across longer periods such as every two years, and in part due to the resource-intensive nature of planning, implementing, and processing survey data.

Examples of National Travel Data Collection Including Washington

U.S. Census Bureau American Community Survey

The Census Bureau samples approximately 3.5 million addresses each year through the American Community Survey (ACS). These data are collected continuously throughout the year to produce annual social, economic, housing, and demographic estimates. The Journey to Work section asks questions about where people work, how they get there, when they leave home, and how long it takes. These questions are used to create statistics about commuting or a person's journey to work. Available geographies include national, state, metropolitan, and micropolitan statistical areas, as well as county, city, and tribal areas. In the 2022 ACS, the Census Bureau conducted interviews with 43,575 Washington residents. Exhibit 10 shows an example of the Journey to Work statistics available for any county or city/town queried.

Exhibit 10. Example of U.S. Census Bureau ACS Journey to Work Statistics



Source: U.S. Census Bureau, 2024.

AASHTO Census Transportation Planning Products

The American Association of State Highway and Transportation Officials (AASHTO) is a nonprofit association of transportation departments across the U.S. representing all transportation modes. AASHTO organizes the Census Transportation Planning Products (CTPP) program, which is funded by state departments of transportation. The CTPP uses ACS data to summarize transportation-focused metrics including average number of vehicles per household, mode to work, and mean travel time by mode work. The CTPP also publishes transportation profiles at the state, county, and city levels.

U.S. Bureau of Labor Statistics American Time Use Survey

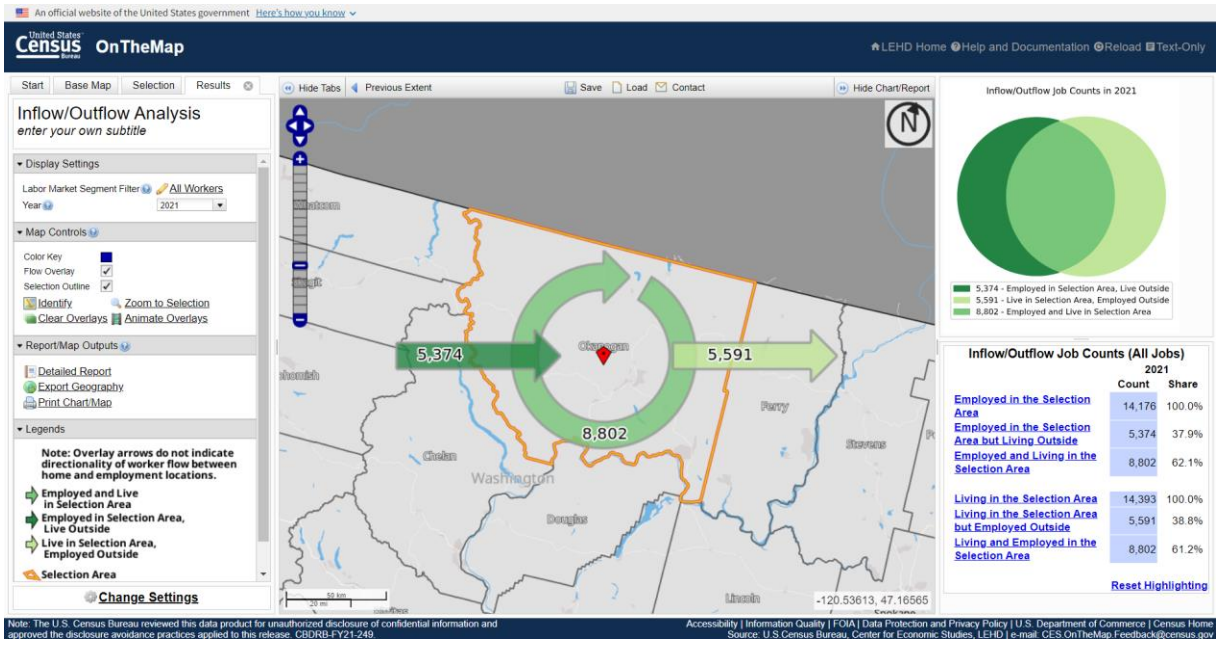
The Bureau of Labor Statistics (BLS) draws from the sample of households participating in the BLS Current Population Survey to collect information on how people spend their time. This includes a time-use diary, where respondents are asked how their time was used in the past day, including all active (e.g., working, eating) as well as quiet (e.g., thinking, relaxing) activities. For each activity, respondents are asked how long the activity took, who they were with, where they were, and what mode of transportation they used (if applicable).

BLS has conducted 237,000 phone interviews nationally from 2003 to 2022. The data is available in the form of granular summaries prepared by BLS (e.g., "Percent participating on an avg day – Travel related to organizational, civic, and religious activities, Parents with youngest household child 13-17 yrs, Women") or downloadable data intended for statistical software programs (e.g., SAS, Stata, SPSS).

Longitudinal Employment-Household Dynamics OD Employment Statistics

The Census Bureau also compiles data from administrative records to provide details about where workers are employed, where they live, and the relationships between the two. This information is visualized through the OnTheMap online tool. Available geographies include states, counties, cities, and ZIP codes. Exhibit 11 shows an example of the inflow-outflow data available for Okanagan County.

Exhibit 11. Example of Job Inflow and Outflow Data for Okanagan County, 2021



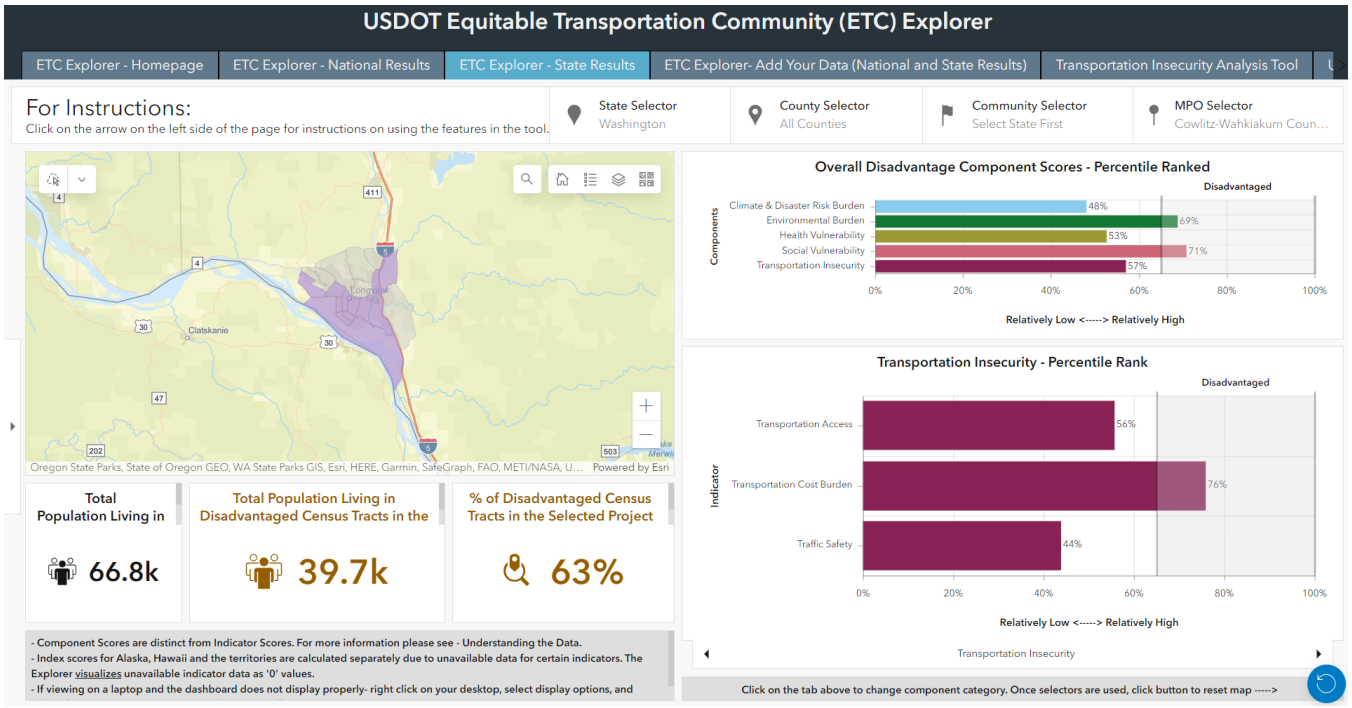
Source: U.S. Census Bureau OnTheMap, 2023.

U.S. Department of Transportation Equitable Transportation Community Explorer

The U.S. Department of Transportation (DOT) created the Equitable Transportation Community interactive web dashboard in response to Executive Order 14008. The dashboard visualizes climate and disaster risk burden, environmental burden, health vulnerability, social vulnerability, and transportation insecurity by estimating the percentage of disadvantaged Census Tracts in a selected geography (state, county, city, or MPO). Indicators for transportation insecurity are transportation access, transportation cost burden, and traffic safety. These indicators are assessed for each Census Tract using multiple data sources, including the U.S. Census Bureau, U.S. DOT, Environmental Protection Agency, and U.S. Bureau of Labor Statistics. Exhibit 12 shows an example of the transportation insecurity indicators for the Cowlitz-Wahkiakum Council of Governments MPO.

The dashboard also includes a Transportation Insecurity Analysis Tool which can be used to filter Census Tracts by variables such as estimated cost of transportation, estimated households without vehicles, and drive time and walk time to adult education centers, grocery stores, medical facilities, and parks.

Exhibit 12. Examples of Transportation Insecurity Indicators for Cowlitz-Wahkiakum Council of Governments



Source: U.S. Department of Transportation, 2023.

Examples of Travel Surveys in Washington

WTSC Washington Traffic Safety Survey

Since 2022, WTSC conducts an annual survey to understand traffic safety attitudes and driving behaviors. The survey uses probability-based address sampling to gather responses from households across Washington. In future surveys, WTSC also plans to use mobile data from Cambridge Analytics.

Washington State Commute Trip Reduction Surveys

In response to the state's Commute Trip Reduction Law (Chapter 468-63 WAC), WSDOT aggregates data from commute trip reduction surveys administered by worksites in urban growth areas with 100 or

more full-time employees. The dataset is at the Census Tract level and includes information on vehicle miles travelled per employee, daily greenhouse gas emissions per employee, and the share of employees by mode of transportation. WSDOT updates this dataset every two years.

Commute Seattle Survey

Commute Seattle is a nonprofit partnership of transportation and planning agencies in the city of Seattle. Every two years, Commute Seattle conducts a survey of employees at Seattle worksites, which includes worksites affected by the Commute Trip Reduction law. In 2022, the survey received 64,355 responses, including 55,965 responses from CTR-affected employees. Metrics collected include commute mode of transportation, non-commute mode of transportation, remote work patterns, and factors contributing to mode choice.

King County Metro Rider and Non-Rider Survey

King Conty Metro contracts with a third-party research organization to survey bus riders and non-riders on attitudes towards service and payment options. The survey uses probability-based address sampling and received 8,337 responses in 2021.

FROG Surveys

The Washington State Transportation Commission administers surveys to the online FROG community to learn about reactions and travel patterns of Washington State Ferries (WSF) riders. Surveys are distributed via email. The 2023 Winter WSF Performance Survey received 3,953 responses from riders who travelled between January and March 2023.

Examples of Non-Survey Travel Data Collection in Washington

DOL Electric Vehicle Databases

DOL maintains public databases of registered electric vehicles and electric vehicle title and registration activity. Though data fields are not always populated, available fields include vehicle model, how many miles the vehicle is capable of travelling solely on electric charge, and vehicle odometer reading at the time of title or registration activity. Personal identifiable information such as license plates and addresses are not public. These databases are updated every month.

OFM Traffic Records Integration Program

The Washington State Office of Financial Management compiles data from WSDOT, DOL, Washington State Patrol, the Administrative Office of the Courts, and the Washington State Department of Health to produce dashboards on road safety. The Traffic Records Integration Program dashboards include demographics for crash-related DUIs, drug-related crashes by drug class, and injury categories for crashes involving ignition interlock devices.

OSPI School Bus Ridership Data

The Washington State Office of Superintendent of Public Instruction uses data reported on a quarterly and annual basis to evaluate the efficiency of school transportation operations funding. Quarterly data reported by school districts include school bus rider morning and afternoon counts. Annual data reported by school districts includes school bus mileage reports, school transportation fuel reports, and homeless transportation reports.

WSDOT Road Devices

Monitors, sensors, and other installed devices collect real-time data on vehicle counts and speeds at sites of interest. This data is processed by staff at six WSDOT Traffic Management Centers (Exhibit 13). As an example, WSDOT uses data from these installed devices to monitor driving travel times for 93 urban locations and updates these estimates every five minutes.

While this data is objective and useful for applications such as traffic management, devices require maintenance and may go offline in certain weather conditions (e.g., snowstorm). In addition, this method collects data at the vehicle level. To extrapolate data to households would require referencing other data sources such as Department of Licensing registrations, which could introduce privacy concerns.

Exhibit 13. A WSDOT Traffic Management Center

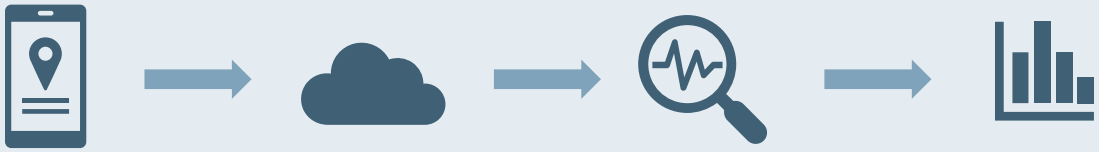
Source: WSDOT, 2023.

Examples of Mobile Device Data Collection and Uses

About Mobile Device Data Collection

Widespread use of smartphones – and the data that smartphones collect about users – offers an opportunity to understand the travel patterns of smartphone users. Mobile device data has been increasingly used by transportation planners due to large sample sizes that are ready for analysis. The graphic below shows an overview of how mobile device data is gathered and prepared for use.

Though mobile data collection allows for large samples across a geography, drawbacks include the cost of obtaining data, inferred rather than surveyed demographic information, and privacy concerns. However, the ability to use machine learning to infer modes of transportation and demographics may be more cost effective than survey outreach.



Mobile device applications collect mobile device location data collected with user consent

Mobile data supplier buys location data and strips personal identifying information

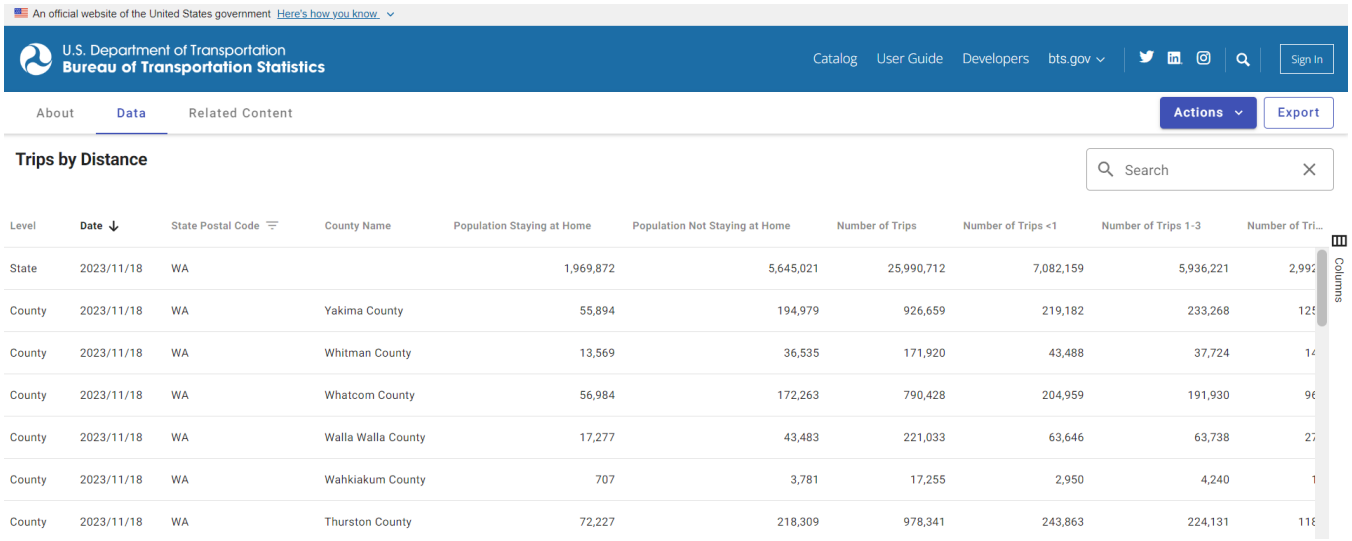
Analytics companies source from mobile data suppliers and integrate other data sources (e.g., speed limits) to infer about trip modes and purposes

Jurisdictions can purchase data samples for use in their transportation analyses.

U.S. Bureau of Transportation Statistics Daily Trips by Distance

The Bureau of Transportation Statistics contracts with the Maryland Transportation Institute and Center for Advanced Transportation Technology Laboratory at the University of Maryland to estimate daily trip counts from anonymized mobile device data. These estimates are available at the national, state, and county level. Metrics include population staying at home and population not staying at home – where home location is decided based on the device's most frequent nighttime location – as well as trip counts for numerous distance bands, such as less than one mile, 10-25 miles, and 250-500 miles. Trips include all modes of transportation. Exhibit 14 shows an example of the data for some counties in Washington.

Exhibit 14. Example of County-Level Data on Trips by Distance for Washington State Counties



Level	Date	State Postal Code	County Name	Population Staying at Home	Population Not Staying at Home	Number of Trips	Number of Trips <1	Number of Trips 1-3	Number of Tri...
State	2023/11/18	WA		1,969,872	5,645,021	25,990,712	7,082,159	5,936,221	2,992
County	2023/11/18	WA	Yakima County	55,894	194,979	926,659	219,182	233,268	125
County	2023/11/18	WA	Whitman County	13,569	36,535	171,920	43,488	37,724	14
County	2023/11/18	WA	Whatcom County	56,984	172,263	790,428	204,959	191,930	96
County	2023/11/18	WA	Walla Walla County	17,277	43,483	221,033	63,646	63,738	27
County	2023/11/18	WA	Wahkiakum County	707	3,781	17,255	2,950	4,240	1
County	2023/11/18	WA	Thurston County	72,227	218,309	978,341	243,863	224,131	118

Sources: U.S. Bureau of Transportation Statistics, 2023; Maryland Transportation Institute and Center for Advanced Transportation Technology Laboratory at the University of Maryland, 2023.

FHWA NextGen NHTS OD Data

In an effort affiliated with the NHTS, the FHWA collects OD data to summarize passenger trips and commercial truck trips. Passenger trip summaries are based on passively collected mobile device data and disaggregate trips by mode of transportation, purpose, and distance. Commercial truck trip summaries are based on in-vehicle GPS data and disaggregate trips by zones and distance. The FHWA also offers an OD Add-On program to purchase additional OD passenger data for a specified geography. The OD Add-On costs for Washington state are estimated to range from $115,000 to $200,000, depending on the requested geographic breakdown.[8]

StreetLight Database Subscription

StreetLight is a transportation data vendor that sources anonymized location data from GPS and mobile devices. With a subscription, users gain access to vehicle trip counts with details on origins, destinations, time, and inferences on mode of transportation, trip purpose, and demographics. Add-on subscription packages are also available to access data on additional modes such as walking, biking, and transit use.

StreetLight data may be used for travel demand modeling, which relies on inputs such as traffic counts between specific locations or between OD pairs. In 2020, researchers affiliated with the Virginia Transportation Research Council assessed the robustness of StreetLight data by comparing metrics such as annual average daily traffic counts and OD trip volumes to data collected by the Virginia Department of Transportation. StreetLight data was more likely to align with the state-collected data for multi-day periods and in zones with a higher estimated number of trips (e.g., above 800 vehicles per hour).[9] This

[8] Costing information for the NHTS OD Add-On program is sourced from a presentation by FHWA staff to the Washington State Transportation Commission on June 6, 2022.

[9] Yang, H., Cetin, M., & Ma, Q. (2020). Guidelines for Using StreetLight Data for Planning Tasks. *Virginia Transportation Research Council*, 20-R23. https://www.virginiadot.org/vtrc/main/online_reports/pdf/20-r23.pdf

suggests that StreetLight data would be more precise when analyzing travel patterns in urban areas over longer time frames.

StreetLight data may also be used for policy and planning research applications such as transportation planning for public lands or supporting community organizations to understand shared micromobility use in underrepresented communities.[10,11] While StreetLight data is applicable towards a variety of research topics, limitations include costly subscription packages and onboarding required to become familiar with software tools.[12]

Replica Data Products

Replica is a transportation data company that uses machine learning methods to transform data from multiple sources, such as location-based mobile data and in-vehicle GPS data, into a single source of "synthetic" data that models travel behavior on a typical day. Replica states that it never receives, uses, or outputs data with personally identifiable information.[13]

Replica offers a catalog of datasets that includes seasonal trip data by mode of transportation; demographics and employment data for the synthetic population; annual average daily traffic; weekly vehicle miles traveled; and weekly consumer spending by home and merchant location. In addition, Replica develops tools and applications to support customers with data analysis, such as the Standard Growth Scenarios tool that forecasts future travel patterns based 2035 population estimates.[14]

Replica's customers range from private companies (e.g., Waymo) to public agencies, including state and local government agencies in Washington state. For example, Replica data on EV trip trends was used in the EV Coordinating Council Transportation Electrification Strategy and the Commerce Publicly Available EV Site Mapping Tool. Replica also facilitates data validation analyses to evaluate the accuracy of its data, such as an analysis conducted by PSRC that found similar telecommuting rates by race/ethnicity and income when comparing the PSRC HTS and Replica data.[15]

Replica data products are accessed on a web-based platform. Pricing for Washington state would be approximately $1.2 million with access for one state department.[16]

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[10] Baird, T., Stinger, P., Cole, E., & Collins, R. (2022). Mobile Device Data for Parks and Public Lands Transportation Planning: A Framework for Evaluation and Applications. *Transportation Research Record: Journal of the Transportation Research Board, 2676*(8). https://doi.org/10.1177/03611981221083911

[11] Sanguinetti, A., Alston-Stepnitz, E., Ruhl, M., Dessouky, N., et al., & Broaddus, A. (2023). Equipping Active Travel Advocates with Digital Mobility Data and Tools: An Evaluation of a US Trial Program. *Active Travel Studies, 3*(1). https://doi.org/10.16997/ats.1198

[12] Regarding the cost of subscription packages, the City of Ames (Iowa) requested funding in 2021 to renew an annual $64,900 Streetlight subscription for base vehicle and traffic data in the Ames region and add an $40,766.67 annual upgrade for multi-modal (e.g., walk, bike, transit) data. Council Action Form available here: https://vault.amesnews.net/gov/city/CouncilPackets/2021/081021CouncilAgenda/20.pdf

[13] See Replica's documentation at https://documentation.replicahq.com/docs/approach-to-privacy.

[14] See other tools and applications at https://www.replicahq.com/applications.

[15] See other examples of data validation at https://www.replicahq.com/data-validations.

[16] Pricing for a State entity is $0.15 per resident in the state population for access for a single department. See more pricing options at https://www.replicahq.com/pricing.

Appendix D: Interested Party Interview Questions

1. How does your organization engage with household travel data?
2. What kinds of household travel data do you currently collect?
    a. What sources do you collect from?
    b. What are the costs of collecting this data?
    c. Are there any gaps in the data you collect?
3. In an ideal world, what other kinds of household travel data would you want to have?
    a. How would you use it?
    b. Why do you not currently collect this information?
4. How would statewide HTS data change your current investment or planning process for your area?
5. What factors should we consider in evaluating options for the State to implement a statewide HTS?
6. Would you be willing to help facilitate funding for a statewide HTS, either through your own resources or pass-through of federal funds?
7. Is there anything else you would like to share regarding your use of household travel data or the possibility of a statewide HTS?

Appendix E: HTS in Other States

Interviews and Engagement with Oregon, Tennessee, and Virginia

As a part of this study, BERK engaged representatives from Oregon, Tennessee, and Virginia, to learn about their use of an HTS and data. Exhibit 15 lists these representatives and their titles.

Exhibit 15. Contacts for HTS Outside Washington

Name	Title	Organization
Becky Knudson	Senior Transportation Economist	Oregon DOT
David Lee	Assistant Director, Long Range Planning Division	Tennessee DOT
Peng Xiao	Tavel and Accessibility Section Manager	Virginia DOT
Ying (Winnie) Xiang	System Data Analyst	

Source: BERK, 2024.

HTS Considerations Suggested by Other States

Engagement with representatives from Oregon, Tennessee, and Virginia yielded the following suggestions, should Washington choose to implement a statewide HTS:

- **An HTS should remain consistent over time** (i.e., use the same questions each cycle) to enable trend analysis.
- **HTS data is most useful when it can be input into a single travel demand modeling framework.** For example, MPOs in Oregon use a single TDM framework, and can therefore easily compare data. Washington's MPOs that develop TDMs do not currently use a single framework, and there may be high initial costs to implement this.
- **Staffing and capacity are key to implementing successful HTS systems.** For example, it is important to maintain staff capacity to perform data cleanup and analysis, to manage consultant work, and to oversee administrative tasks for the life of the project.
- **It is difficult to recruit participants for an HTS.** Oregon typically aims for about a 1% statewide participation rate and achieves this by conducting outreach to about 50% of households statewide. Outreach and customer service can be difficult to navigate in the process of collecting travel data, as it can be challenging to gain public trust.
- **Recent positive changes to the NHTS may minimize the relative benefits of conducting an independent HTS.** Oregon originally created its independent HTS because it needed different data than was available in previous versions of the NHTS. This may no longer be the case as the NHTS evolves and adapts to changing needs, including with implementation of NextGen NHTS.
- **The NHTS add-on program can provide advantages that an independent HTS may not.** This could include: flexibility; cost-effectiveness; data consistency over time; reduced administrative burden;

ease of data use; comprehensive support through customer service; and the ability to gather robust data using complex sampling techniques with relatively low staff inputs.

Desk Research into HTS in All States

In addition to speaking with representatives from Oregon, Tennessee, and Virginia, BERK conducted research about the HTS activities of all other states. The following states were found to gather statewide travel data, either through a statewide HTS model, or through the NHTS add-on program.

Exhibit 16. Household Travel Data in Other States

State	Independent Statewide HTS	NHTS Add-On Program (Previous two rounds, 2022 and 2017)*	Most Recent Data Year	Notes
Arizona		✓	2017	
California	✓	✓	2013	Participated in the 2017 NHTS add-on program, and has also conducted an independent, statewide survey.
Colorado	✓		2024	
Connecticut	✓		2017	
Georgia		✓	2017	
Maryland	✓	✓	2020	Participated in the 2017 NHTS add-on program, and has also conducted an independent, statewide survey.
Massachusetts	✓		2012	
Michigan	✓		2025	
New York		✓	2017	
North Carolina		✓	2017	
Ohio	✓		2024	HTS focuses on specific regions each year, using a rotation system.
Oregon	✓		2024	
South Carolina		✓	2017	
Tennessee		✓	2022	
Texas	✓	✓	2024	HTS focuses on regions with higher populations. Participated in the 2017 NHTS add-on program, and has also conducted an independent, statewide survey.
Utah	✓		2023	
Virginia		✓	2022	
Wisconsin		✓	2017	

**Note: States participating in the NHTS add-on program are only listed for the last two available years, 2022 and 2017. This table does not include participation in earlier NHTS add-on programs (1990 to 2009).*

Source: BERK, 2024.

Appendix F: Uses of the NHTS

Between January and June 2023, the NHTS identified 214 newly published scholarly research articles and reports that used NHTS data as a source. Exhibit 17 provides examples of the studies that used NHTS data, with a focus on studies that have some topical overlap with the kinds of transportation-related studies the JTC may have an interest in.

In some cases, the Legislature may be interested in simply applying the findings from these studies and other studies of national NHTS data to decision-making in Washington. In other cases, the Legislature may be interested in conducting similar studies within Washington.

Exhibit 17. Examples of Uses of the NHTS in Research Articles and Reports, January to June 2023

Category	Number of studies	Study examples
1. Bicycle and pedestrian	10	▪ Exploring the Socio-Demographic Characteristics of Bicycle Trip Makers ▪ Perceptions on Active Travel from Low-Income Households: Insights from the 2017 NHTS ▪ School Walk Zone: Identifying Environments That Foster Walking and Biking to School ▪ Development and Implementation of a GIS-Based Active Route Visualization Tool to Facilitate Equitable Planning for Walking and Cycling Routes in Small Communities
2. Energy consumption	60	▪ An Evs Charging Guiding Strategy for the Coupling System of Road Network and Distribution Network Based on the PT3 ▪ Optimal Scheduling of Battery-Swapping Station Loads for Capacity Enhancement of a Distribution System ▪ Comparing Regional Energy Consumption for Direct Drone and Truck Deliveries
3. Environment	13	▪ Quantifying Disparities in Air Pollution Exposures Across the United States Using Home and Work Addresses ▪ Environmental Impacts of Shared Mobility: Potential, Factors, and Assessments
4. Health	7	▪ Modeling Virus Transmission Risks in Commuting with Emerging Mobility Services: A Case Study of COVID-19 ▪ Travel for Medical or Dental Care by Race/Ethnicity and Rurality in the U.S.: Findings from the 2001, 2009 and 2017 National Household Surveys
5. Policy and mobility	18	▪ Understanding Mobility Change in Response to COVID-19: A Los Angeles Case Study ▪ Mobility Justice in Rural California: Examining Transportation Barriers and Adaptations in Carless Households

Category	Number of studies	Study examples
		▪ A Clustering-Based Approach to Quantifying Socio-Demographic Impacts on Urban Mobility Patterns ▪ Can Shared Micromobility Replace Auto Travel? Evidence from the U.S. Urbanized Areas Between 2012 and 2019 ▪ Planning for Electric Vehicles Coupled with Urban Mobility
6. Special population groups	17	▪ Who Takes the School Bus?: The Roles of Location, Race, and Parents in Choosing Travel-to-School Mode in Georgia ▪ Approaching Accessibility: Four Opportunities to Address the Needs of Disabled People in Transportation Planning in the United States ▪ Revisiting the Relationship Between Information and Communication Technologies and Travel Behavior: An Investigation of Older Americans ▪ Travel Burdens in Rural US Households
7. Survey, data synthesis, and other applications	30	▪ Exploring the Impact of Bike Lanes on Transportation Mode Choice: A Simulation-Based, Route-Level Impact Analysis ▪ Development of Guidance for a Vehicle Occupancy Rate Data Collection Program
8. Traffic safety	9	▪ Impact of Driver's Age and Gender, Built Environment, and Road Conditions on Crash Severity: A Logit Modeling Approach ▪ Overview of Walking Rates, Walking Safety, and Government Policies to Encourage More and Safer Walking in Europe and North America
9. Transit planning	6	▪ Evolution of Mode Use During the COVID-19 Pandemic in the United States: Implications for the Future of Transit ▪ Urban Transit Infrastructure and Inequality
10. Travel behavior	20	▪ Growth in Commuting Patterns and Their Impacts on Rural Workforce and Economic Development ▪ Understanding the Impact of Ridesharing Services on Traffic Congestion ▪ How the Design of Complete Streets Affects Mode Choice: Understanding the Behavioral Responses to the Level of Traffic Stress
11. Trend analysis and market segmentation	14	▪ The Future of Working Away from Work and Daily Travel: A Research Synthesis ▪ Public or Private? Optimal Organization for Incentive-Based Travel Demand Management
12. Emerging travel modes	2	▪ Curb Allocation and Pick-Up Drop-Off Aggregation for a Shared Autonomous Vehicle Fleet
13. Passive OD data product usage	8	▪ Residency and Worker Status Identification Based on Mobile Device Location Data ▪ Exploring the Effects of Population and Employment Characteristics on Truck Flows: An Analysis of NextGen NHTS OD Data

Sources: NHTS, 2023; BERK, 2023.

Appendix G: Recent JTC Studies

Exhibit 18 shows an analysis of whether statewide HTS data could have been used in all studies completed by the JTC between 2018 and the time of writing (November 2023).

Exhibit 18. Analysis of Potential Usefulness of HTS Data to JTC Studies from 2018 through 2023

Year	Study Name	Study objective	Study methodology	HTS Useful?	Rationale
2023	Transportation Equity in Cities	Provide information, guidance, and recommendations on transportation equity that is helpful to all cities and towns.	Staff workgroup; desk research on transportation policies, investments, tools, and methods used to assess transportation equity.	✓	HTS data could provide background info on the types of transportation used in overburdened communities.
2023	Powered Micromobility Lending Libraries Study	Examine options for a state program to assist in establishing powered micromobility device lending libraries.	Desk research of existing lending library program details; interviews; survey.	✓	HTS data could provide info on needs and reasons for micromobility lending libraries.
2023	Encouraging High Consumption Fuel Users to Switch to Electric Vehicles	Understand factors affecting high consumption fuel users to switch to electric vehicles and evaluate potential policies to help encourage this transition.	Data analysis; online survey.	✓	HTS data could provide driver demographics and vehicle info. Otherwise, surveying high consumption fuel users may be better suited as an ad hoc survey.
2023	Ultra High Speed Rail Review	Independent review of proposed ultra-high-speed rail system to connect Vancouver, BC, Seattle, and Portland.	Review of past studies; data analysis and modeling scenarios; assess implementation options.	✗	Market research or sampling is not needed for this study.
2022	Nondrivers: Population, Demographics, and Analysis	Understand demographics of nondrivers and how existing infrastructure serves nondrivers throughout the state.	Data analysis; survey; staff workgroup.	✓	HTS data could provide info on nondriver demographics and the types of infrastructure nondrivers use.
2022	Vehicle Registration (Car Tabs) Payment Options Workgroup	Convene a workgroup to develop recommendations for payment options for vehicle fees or taxes.	Workgroup; data analysis; survey; focus group.	✓	HTS data could provide driver demographics, vehicle info, and the number of vehicles per household. Otherwise, surveying about attitudes towards payment options for vehicle fees may be better suited as an ad hoc survey.
2022	Washington State Ferries Workforce Plan	Develop a workforce plan for the Washington State Ferries, which has been experiencing difficulty in staffing, increase in overtime costs, and canceled sailings.	Data analysis; interviews; focus groups; identifying implementation strategies.	✗	Market research or sampling is not needed for this study.
2022	Evaluation of Washington State Patrol's Cessna Aircraft Fleet	Evaluate options for modernizing Washington State Patrol's Cessna aircraft fleet.	Cost analysis; evaluating options for modernization.	✗	Market research or sampling is not needed for this study.

Year	Study Name	Study objective	Study methodology	HTS Useful?	Rationale
2022	Workgroup on Distribution of Federal Funds from the Infrastructure Investment and Jobs Act (IIJA)	Convene a workgroup to develop recommendations for distributing federal-aid highway formula program funding.	Workgroup; funding split decisions between state and local.	✗	Market research or sampling is not needed for this study.
2021	Hood River Bridge Bi-State Authority	Recommend options for a bi-state bridge authority to build and operate a bridge to replace the current span connecting Hood River, OR and White Salmon, WA.	Legal analysis; identify statutory vehicle to authorize bi-state bridge authority.	✗	Market research or sampling is not needed for this study.
2021	Broadband Infrastructure in Highway Rights-of-Way	Develop strategies for accessing state highway right of way to facilitate broadband access.	Data analysis; legal analysis.	✗	Market research or sampling is not needed for this study.
2021	Assessment of State Support for Short Line Rail Infrastructure	Assess effectiveness of state support for short-line rail infrastructure.	Consultation with agencies and interested groups; collect and analyze survey of short-line owners and operators.	✗	Survey geared towards short-line owners and operators, not households.
2021	Truck Parking Action Plan	Recommend options and strategies to address shortage of truck parking.	Engagement with interested parties; research on existing truck parking and needs; comparison to other states.	✗	Surveys would be geared towards commercial audience, such as truck drivers or parking lot owners.
2020	Feasibility of a Private Ferry Between Washington State and Vancouver B.C.	Evaluate feasibility of a private auto ferry service between Washington and British Columbia.	Analysis of economic impacts and ferry fares; legal analysis; engagement with interested parties.	✓	HTS data could provide driver demographics and vehicle info. Otherwise, could conduct an ad hoc survey on user perspectives on feasible service models.
2020	Statewide Transportation Needs Assessment	Assess statewide transportation needs, priorities, and funding mechanisms.	Engagement with interested parties; research on funding mechanisms.	✗	Cities, counties, and transportation planning organizations would be more appropriate survey audience than households if a survey had been conducted. Study worked with existing needs assessment already conducted by jurisdictions.
2020	Assessment of Rail Safety Governance	Recommend best practices for rail safety governance.	Desk research; engagement with rail interested parties.	✗	Market research or sampling is not needed for this study.
2020	Electrification of Public Vehicle Fleets	Inventory of public fleets in Washington state and analyze options and feasibility of electrification.	Engagement with interested parties; data analysis; desk research.	✗	Commercial stakeholders would be more appropriate survey audience than households.
2020	Vehicle Licensing Sub-Agents	Evaluate legislation, selection process, expenditures, oversight around vehicle subagents.	Data analysis; engagement with interested parties.	✗	Could have surveyed customer experiences with subagents, but this is not the focus of an HTS.

Year	Study Name	Study objective	Study methodology	HTS Useful?	Rationale
2020	Feasibility of East – West Intercity Passenger Rail	Evaluate feasibility of an east-west intercity passenger rail system with service to Auburn, Cle Elum, Yakima, Tri-Cities, Ellensburg, Toppenish, and Spokane.	Projections of ridership; literature review; advisory group; research of current infrastructure conditions and equipment needs.	✗	Surveys on this specific rail system may be better suited as an ad hoc survey.
2019	Capital Needs of Public Transit Systems	Evaluate capital needs of public transportation agencies and propose revenue sources.	Research on fleets, facilities, needs, funding for each agency.	✗	Public agency interested parties would be more appropriate survey audience than households.
2019	City Transportation Funding	Assess current state of city transportation funding, identify emerging issues, and recommend funding sources.	Engagement with interested parties; evaluate funding sources; research on current funding sources and gaps.	✗	City and transportation organization interested parties would be more appropriate survey audience than households.
2018	The Regulation of Taxi and For-Hire Services	Study the regulation of taxi and for-hire services regulated by state, local governments, and port districts.	Staff work group; individual and group interviews with dispatch companies, drivers, and medallion holders; desk research.	✗	Market research or sampling is not needed for this study.
2018	Assessment of Air Cargo Capacity	Evaluate the current and future capacity of the statewide air cargo system.	Desk research; advisory committee engagement; staff workgroup; panel of expert interested parties.	✗	Market research or sampling is not needed for this study.
2018	Commercial Driver's Licenses and Medical Certifications	Evaluate options for revising and administering state Commercial Drivers' License (CDL) medical certification standards.	Desk research; engagement of other states.	✗	Market research or sampling is not needed for this study.
2018	The Regulation of Transportation Network Companies	Conduct a review and analysis of state and local regulations that govern transportation network company (TNC) services.	Desk research; expert interviews; staff work group.	✗	Market research or sampling is not needed for this study.

Source: BERK, 2024.

Appendix H: Comparison of NextGen NHTS and PSRC Surveys

The following table compares the topics covered in the 2022 NHTS implemented in Virginia and the 2021 PSRC HTS.

Category	Question topic	2022 NHTS (VA)	2021 PSRC
Travel Diary: Per Day	Location at end of travel day	✓	✓
	Location at start of travel day	✓	✓
	Places traveled on travel date	✓	✓
	Whether made trips on travel date	✓	✓
	Reason for not making any trips on the travel date	✓	✓
	Paid for parking at any time during diary day	✓	
	Whether used toll bridge or road		✓
	Whether attended school on travel day		✓
	Reason for not attending school on travel day		✓
	If no travel on travel date, number of deliveries or services came to home		✓
	If no travel on travel date, amount telecommuted		✓
Travel Diary: Per Trip	Purpose of trip	✓	✓
	Main mode of transportation	✓	✓
	Vehicle used	✓	✓
	Time arrived	✓	✓
	Time departed	✓	✓
	Whether participant was driver or passenger	✓	✓
	Household members who traveled	✓	✓
	Number of non-household travel members	✓	✓
	Periodicity of parking payment	✓	
	Amount paid for parking	✓	
	Minutes walked from parking to destination	✓	
	No household members on trip	✓	
	Paid for parking	✓	
	Location of vehicle entry for carpool/vanpool (for trips using carpool/vanpool)		✓
	Change of vehicles (for trips using carpool/vanpool)		✓

Category	Question topic	2022 NHTS (VA)	2021 PSRC
	Whether toll paid		✓
	Taxi or rideshare fare (for trips using taxi or other hired service)		✓
	Travel mode to transit stop/station (for trips using public transportation)		✓
	Travel mode from transit stop/station (for trips using public transportation)		✓
Travel patterns over prior 30 days	Rode transit	✓	✓
	Rode a bike	✓	✓
	Went for a walk	✓	✓
	Used a rideshare	✓	✓
	Used a carshare		✓
	Used discounted transit pass	✓	
	Number of online purchase deliveries	✓	
	Times bike share used	✓	
	Times e-scooter used	✓	
	Times motorcycle used	✓	
	Times taxi service used	✓	
	Whether took fewer trips in past 30 days	✓	
	Reason for fewer trips	✓	
Paid parking and tolls	Cost of parking at home	✓	
	Whether respondent pays to park at home	✓	
	Toll amount to reduce commute to school or work	✓	
	Toll amount to reduce commute to shopping or entertainment	✓	
Overall household	Household income	✓	✓
	Total household members	✓	✓
	Number of vehicles in household	✓	✓
Individual demographics	Age	✓	✓
	Gender	✓	✓
	Highest level of education completed	✓	✓
	Race or ethnicity	✓	✓
	Whether has valid driver's license or permit	✓	✓
	Relationship to primary participant	✓	✓
	Condition or disability that makes travel difficult	✓	

Category	Question topic	2022 NHTS (VA)	2021 PSRC
Individual medical condition or disability	Impact of condition or disability on travel	✓	
	Length of time respondent has had condition	✓	
	Mobility/assistive devices used	✓	
Individual education	Whether currently enrolled as a student	✓	✓
	Type of school enrolled	✓	✓
	Location of school	✓	✓
	Usual transport to school	✓	
	Number of days traveled to school in prior week		✓
Individual employment	Hours worked	✓	✓
	Primary type of employment	✓	✓
	Location of primary workplace	✓	✓
	Whether employer offer subsidies for transit passes or other commuter benefits	✓	✓
	Primary activity for those who did not work for pay last week	✓	
	Whether drive for work	✓	
	Number of jobs		✓
	Type of industry		✓
Individual commute	Current work location type	✓	✓
	Days teleworked	✓	✓
	Method of commuting	✓	✓
	How often commuted to workplace in prior week		✓
	Length of time respondent has commuted to current workplace		✓
Vehicle	Make	✓	✓
	Model	✓	✓
	Year	✓	✓
	Fuel type	✓	✓
	Primary driver of vehicle	✓	✓
	When household purchased or obtained vehicle	✓	✓
	Disability plate or pass		✓
	Over past 30 days, how many days was vehicle used for business purposes?	✓	
	Over past 30 days, how many days was vehicle used for deliveries?	✓	
	Over past 30 days, how many days was vehicle used for other business?	✓	

Category	Question topic	2022 NHTS (VA)	2021 PSRC
	Over past 30 days, how many days was vehicle used for ridesharing?	✓	
	Vehicle used for other business purposes	✓	
	Vehicle used for business purposes	✓	
	Vehicle used for delivery service	✓	
	Vehicle used for ridesharing	✓	
	Vehicles owned less than 1 year - months owned	✓	
	Vehicle driven for work	✓	
	Miles put on vehicle in past year	✓	
	Self-reported annualized mile estimate	✓	
Housing	Location of home	✓	✓
	Renter or owner	✓	✓
	Type of home	✓	✓
	Length of time respondent has lived at current residence		✓
	Months of year at current residence		✓
	Factors that contributed to choice of current residence		✓
	Broadband internet at current residence		✓
	Previous address: location		✓
	Previous address: renter or owner		✓
	Previous address: type of home		✓
	Previous address: factors that contributed to decision to move		✓
Online purchasing	Number of times returned online purchase at Amazon drop-off center	✓	
	Number of times returned online purchase by direct to store	✓	
	Number of times returned online purchase by home pickup	✓	
	Number of times returned online purchase to post office/UPS/Fed Ex/ similar	✓	
COVID	Covid-related travel changes (to home delivery, public transit use, school travel, work travel) temporary or permanent	✓	
	COVID impact on online purchases for home delivery and how long change will last	✓	
	COVID impact on travel to a physical school/class location and how long change will last	✓	
	COVID impact on travel to a physical work location and how long change will last	✓	
	COVID impact on use of public transit and how long change will last	✓	
	Number of times per week order online for home delivery	✓	
	Number of times per week travel to school	✓	

Category	Question topic	2022 NHTS (VA)	2021 PSRC
	Number of times per week travel to work	✓	
	Number of times per week travel using public transit	✓	
	Frequency of telework before COVID		✓
	Frequency of commuting to office before COVID		✓
	Typical mode of commute before COVID		✓
	Typical work location before COVID		✓
	Primary type of employment before COVID		✓
	Impacts of COVID on employment		✓
	Household members living at current residence due to COVID		✓
Desired transportation investments	Desired transportation investments	✓	
	If the following bicycle improvements were in place, how often would each household member choose to take a bike for trips where bicycling is an option?		✓
Other	Whether anyone in household is part of a carshare program		✓