TRAVEL BEHAVIOR IMPACTS OF THE PANDEMIC AND CONDUCTING HOUSEHOLD TRAVEL SURVEYS IN THE POST-COVID ERA

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Southeast Florida FSUTMS Users Group
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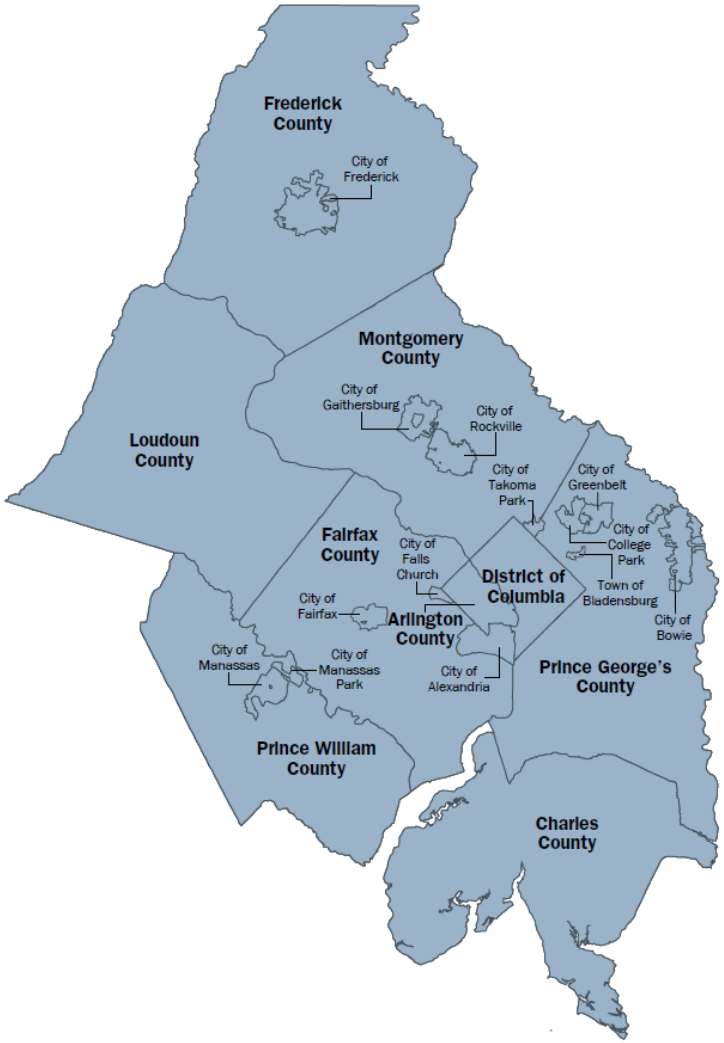
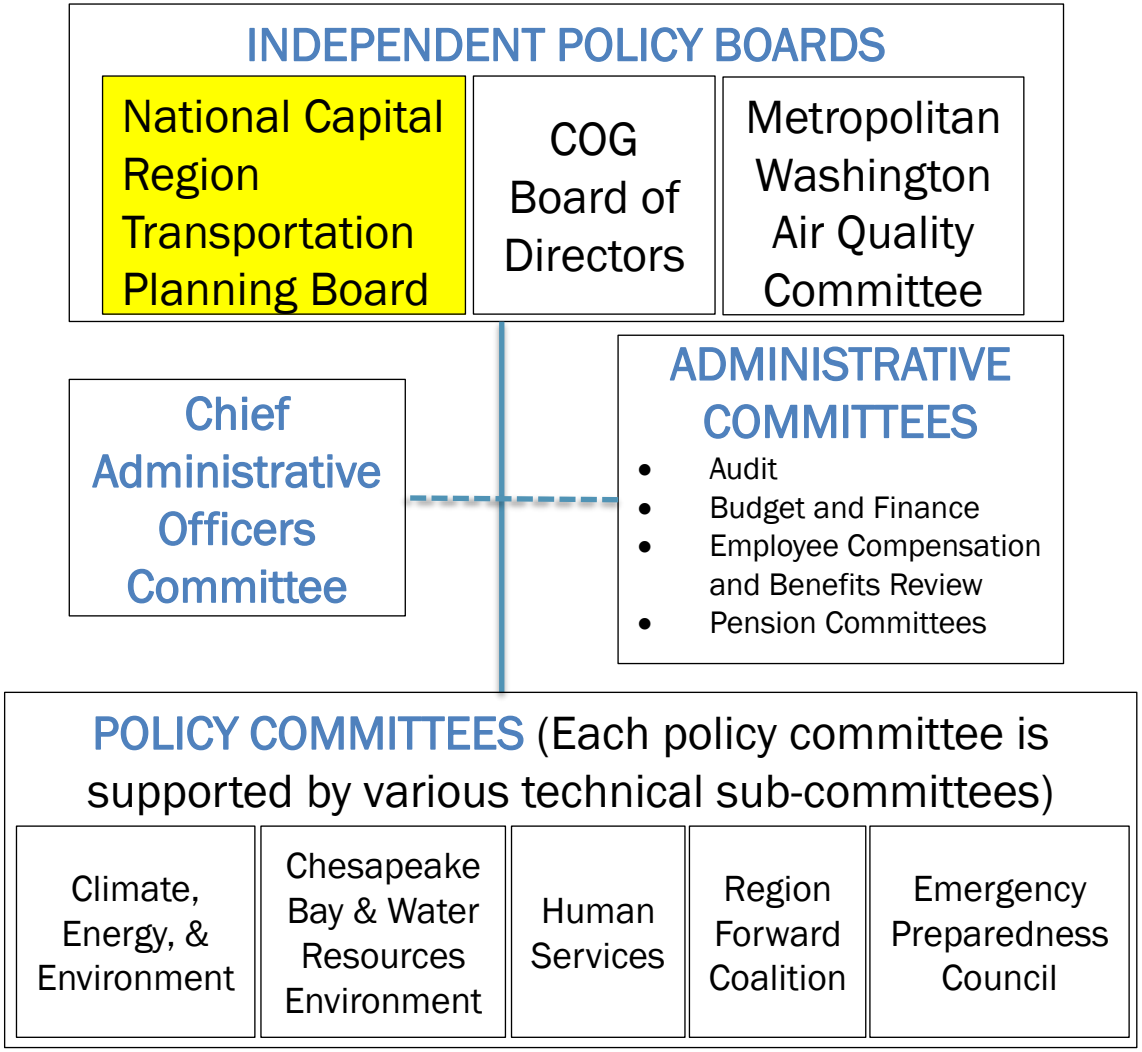
National Capital Region
Transportation Planning Board

About COG

- Metropolitan Washington Council of Governments (COG) is an independent, nonprofit association of local governments
- Brings area leaders together to address major regional issues in the District of Columbia, suburban Maryland and Northern Virginia
- Membership comprises 300 elected officials from 22 local governments, the Maryland and Virginia state legislatures, and U.S. Congress

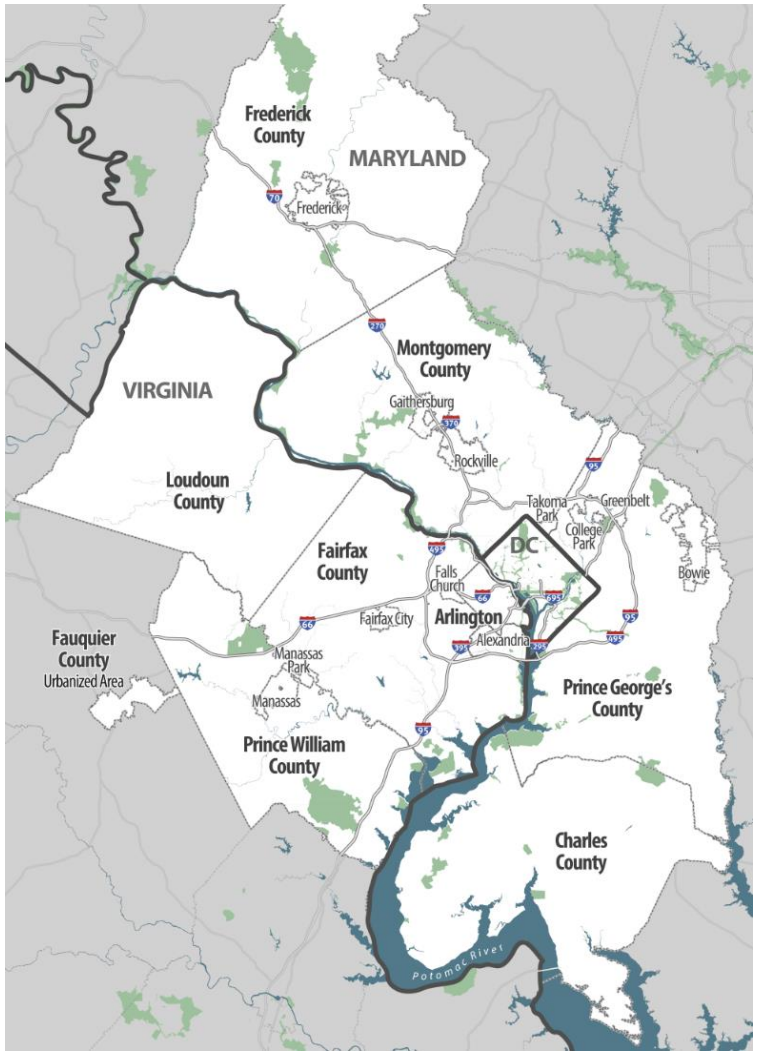


COG Structure

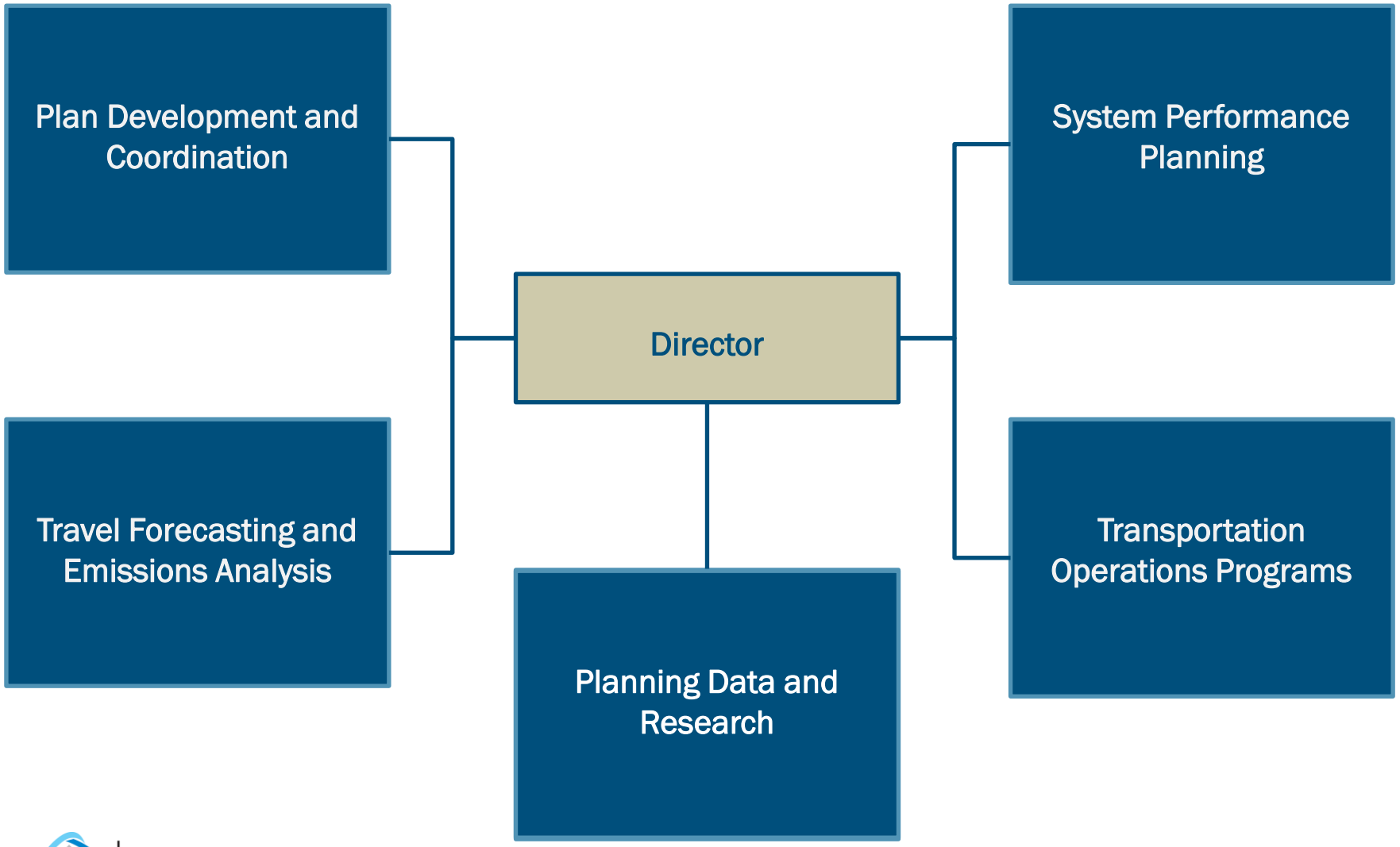


About TPB

- National Capital Region Transportation Planning Board (TPB) is the federally-designated Metropolitan Planning Organization (MPO) for the region
- Plays an important role as the regional forum for transportation planning
- Prepares plans and programs that the federal government must approve for federal-aid transportation funds to flow to metropolitan Washington



Department of Transportation Planning



Planning Data and Research Team

Planning Data Resources

- Geographic Information System
- Regional Transportation Data Clearinghouse

Continuous Airport Systems Planning

- Geographic Information System
- Regional Transportation Data Clearinghouse

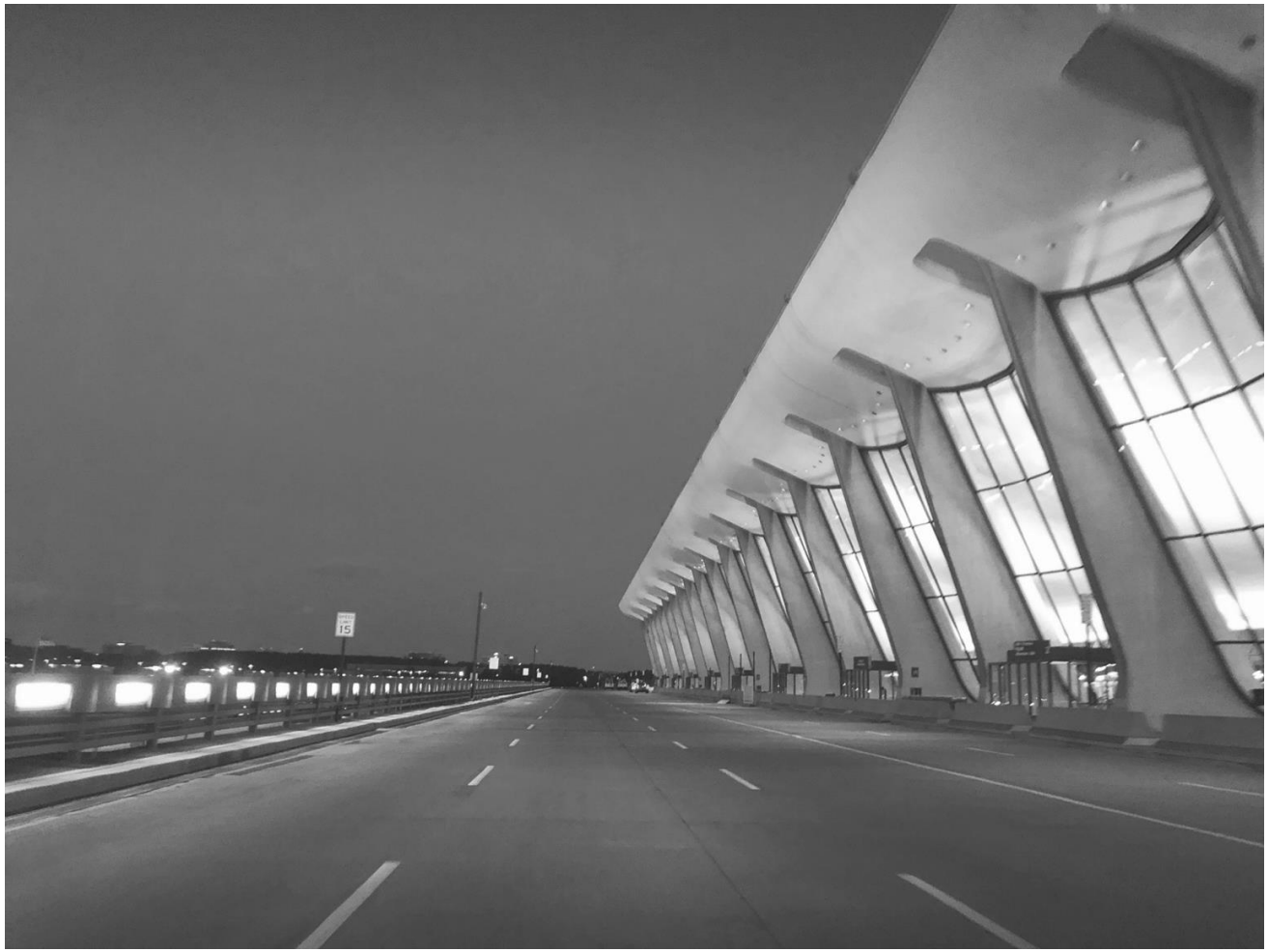
Planning Research and Assistance

- Travel Trends Analysis
- Land Use & Transportation Planning Coordination
- Scenario Planning
- Regional Travel Surveys Travel Monitoring
- Technical Assistance Projects

My Role and Selected Projects at COG/TPB

- My role and selected projects as Principal Statistical Survey Analyst at COG/TPB:
  - Provide subject matter expertise and technical oversight on the development of COG/TPB surveys
  - Oversaw the 2017/2018 Regional Travel Survey, the largest household travel survey conducted in the DC region which collected travel behavior data from over 16,000 households
  - Perform survey method and design research to inform best practices and to ensure COG/TPB surveys are state of the practice
  - Currently leading the development of the sampling plan and survey methodology for the 2023 Regional Air Passenger Survey

Transportation Surveys Focused on Travel Behavior Impacts of the Pandemic



Overview of the Project

The purpose of this project was to examine how pandemic travel trends were being captured by travel surveys conducted by MPOs, universities and federal/state governments.

A literature review focusing on travel surveys measuring the impacts of COVID-19 on transportation and travel behavior in U.S. states and metro areas.

- A reference list/matrix of surveys focused on COVID-19 and collect relevant resources
- A summary of the types of COVID-19 surveys
- For five surveys representing best practices in survey design and methodology, a summary of overall findings from COVID-19 surveys

Literature Scan

The initial task of the project was conducting a literature scan of COVID-19 transportation surveys:

- Copies of survey instruments/questionnaires
- Research papers, memos, presentation slides, technical reports
- TRB 100th Annual Meeting (January 21-29, 2021)

Based on the review of these materials, a list of surveys were compiled in a matrix which included information on:

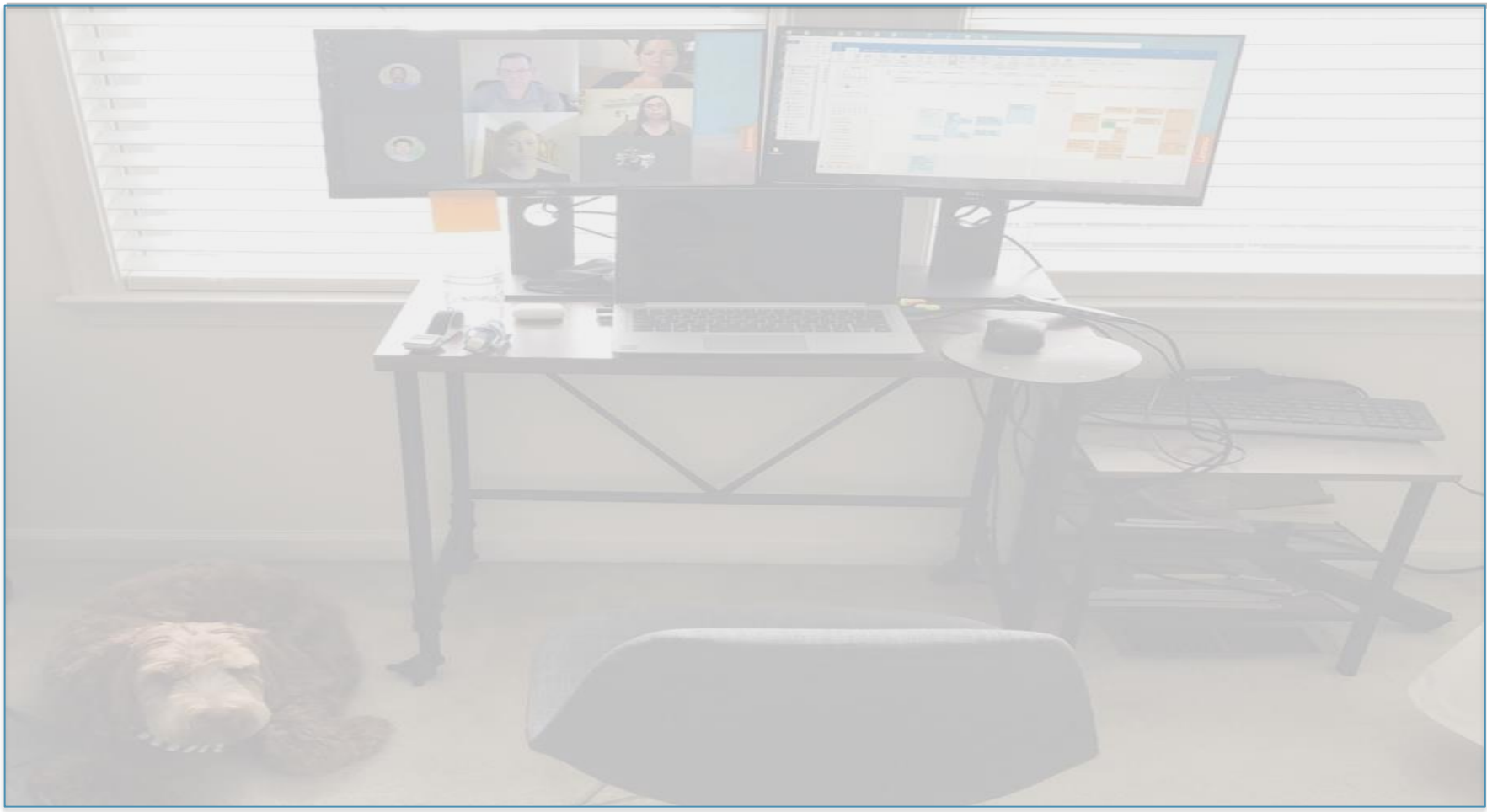
- Funding partners, survey design, survey region, field date, sample size, weighting approach, and data items covered

The list of surveys was vetted based on robustness of survey design, sampling methodology, and overall comprehensiveness

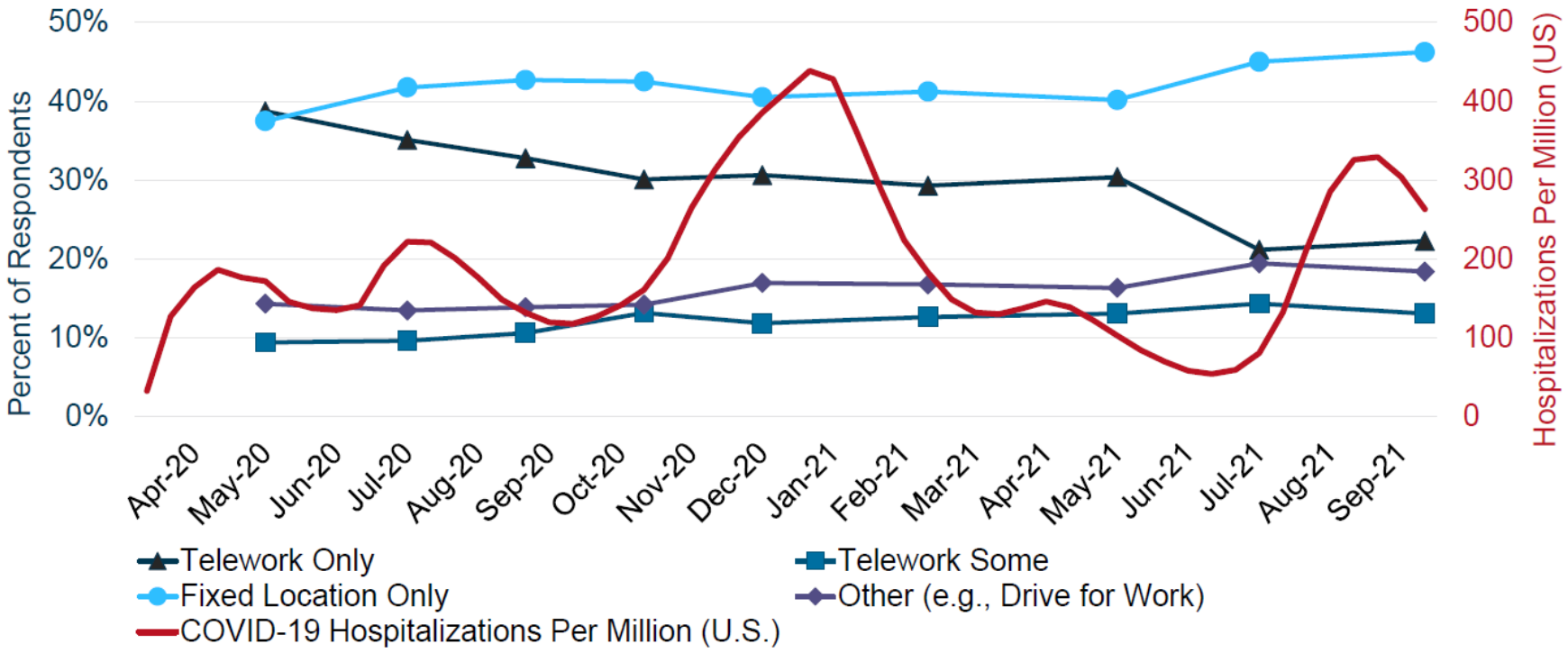
“Top 5” COVID-19 Transportation Surveys

Survey Name	Agency	Agency Type	Multiple Waves	National Geographic Coverage	Random Sampling Approach
COVID-19 Transportation Insights Panel	Resource Systems Group, Inc. (RSG)	Private consulting firm	✓	✓	✓
UC Davis COVID-19 Mobility Study	University of California Davis (UC Davis)	Academia	✓	✓	✓ Plus convenience sample add-on survey
COVID-19 and the Future Survey	Arizona State University-University of Illinois at Chicago (ASU-UIC)	Academia	✓	✓	✓
Travel Behavior Inventory COVID-19 Panel Survey	Metropolitan Council (Met Council)	MPO (Twin Cities region)	✓	Regional	✓
COG/TPB Voices of the Region Survey	Metropolitan Washington Council of Governments (COG)	MPO	Single	Regional	✓

Key Findings on Teleworking and Work from Home

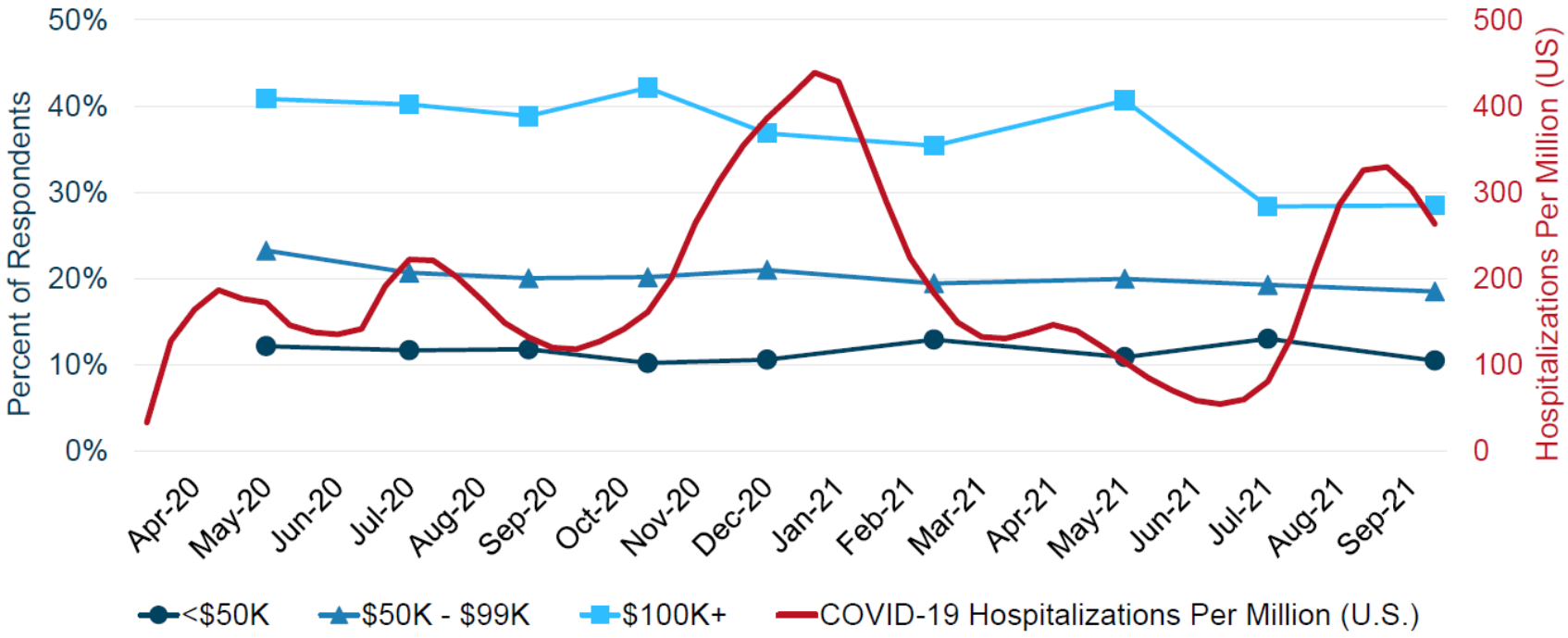


Teleworking Trends by Partial/Full Time Telework Status



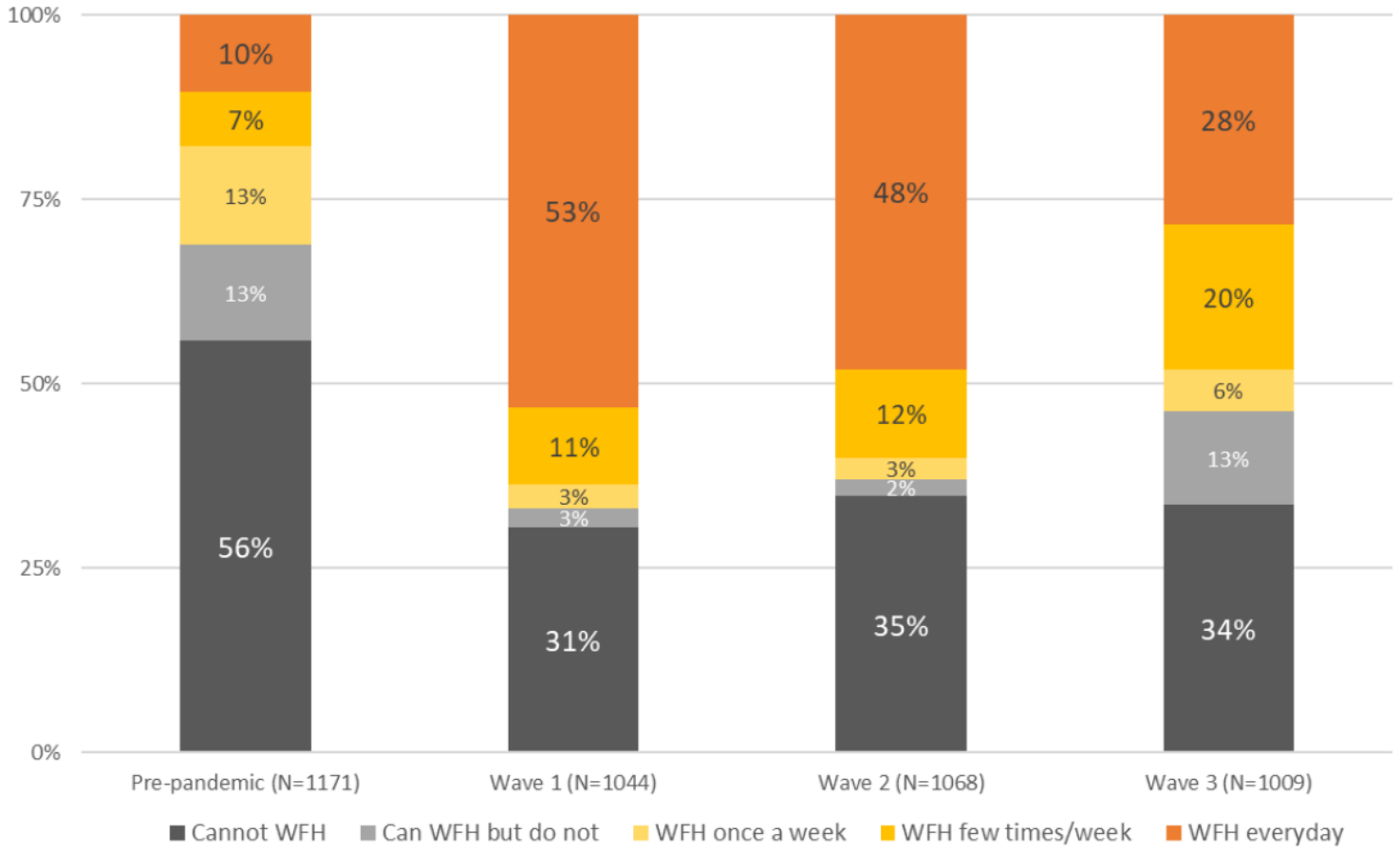
Source: Resource Systems Group (RSG)

Teleworking Trends by Income Group



Source: Resource Systems Group (RSG)

Evolution in Work from Home (Pre-Pandemic to Wave 3)



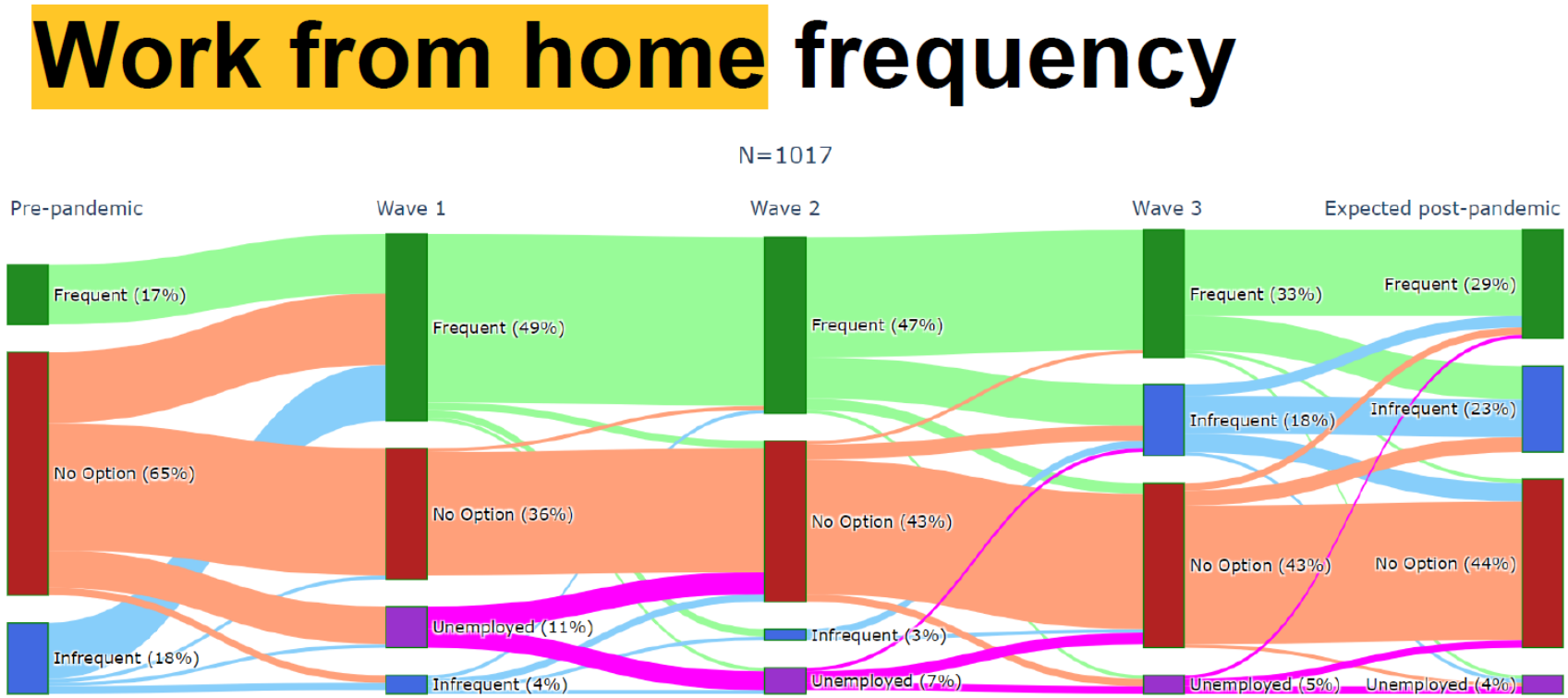
Wave 1: Apr to Oct 2020

Wave 2: Nov 2020 to May 2021

Wave 3: Oct to Nov 2021

Source: TOMNET Transportation Center (ASU-UIC)

Work from Home Frequency (Pre-Pandemic to Wave 3)



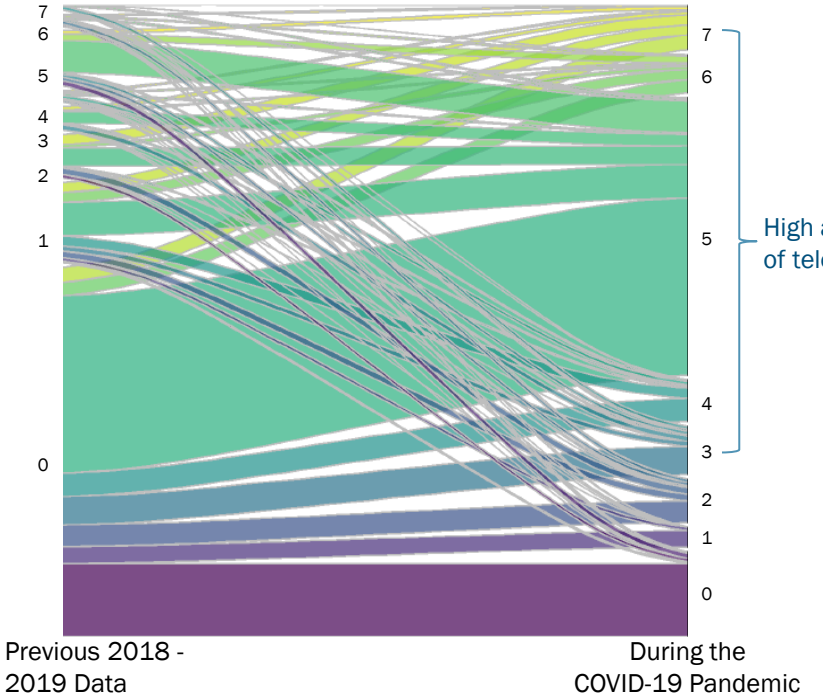
"Frequent" = twice/week or more

"Infrequent" = once/week or less

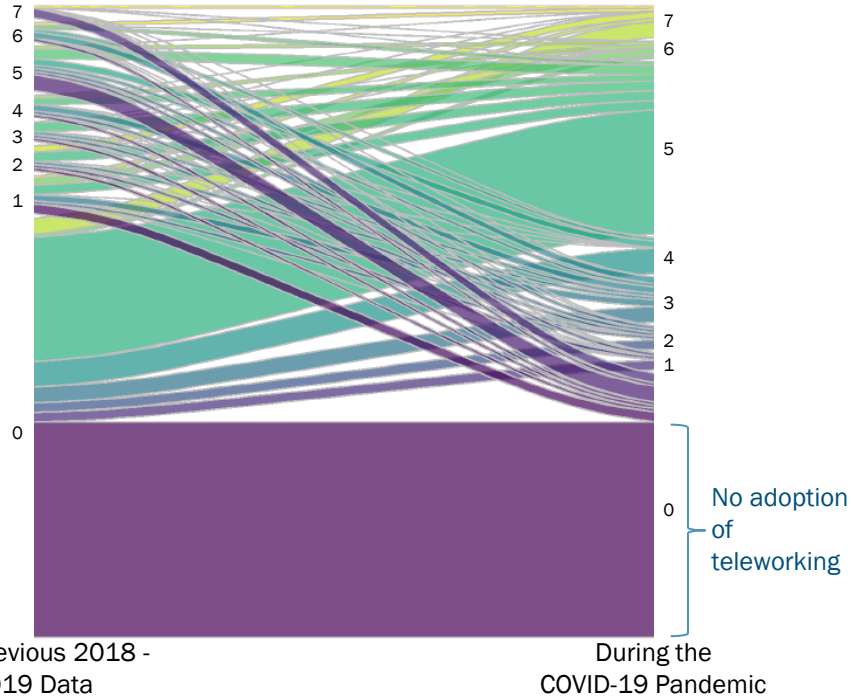
Source: TOMNET Transportation Center (ASU-UIC)

Days Working from Home by Income

Higher Income respondents
(HH Income ≥$75K)



Lower Income respondents
(HH Income<$75K)



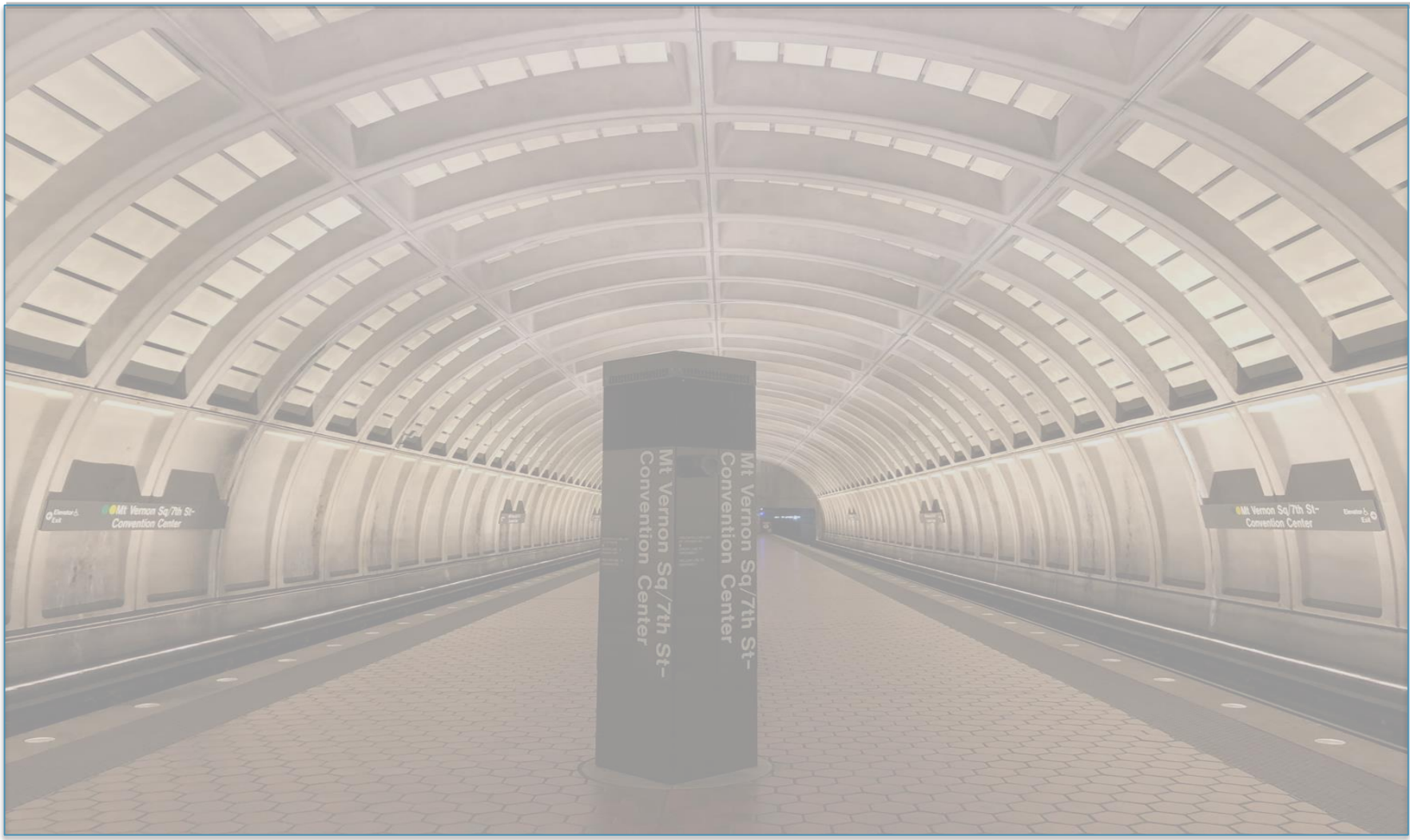
Notes:
1. Based on the longitudinal dataset of participants from the 2018 California Mobility Study and the 2019 "8 Cities" 3R Study (May to July 2020)
2. Numbers on Y-axis denote days teleworked per week.

Source: UC Davis Institute of Transportation Studies

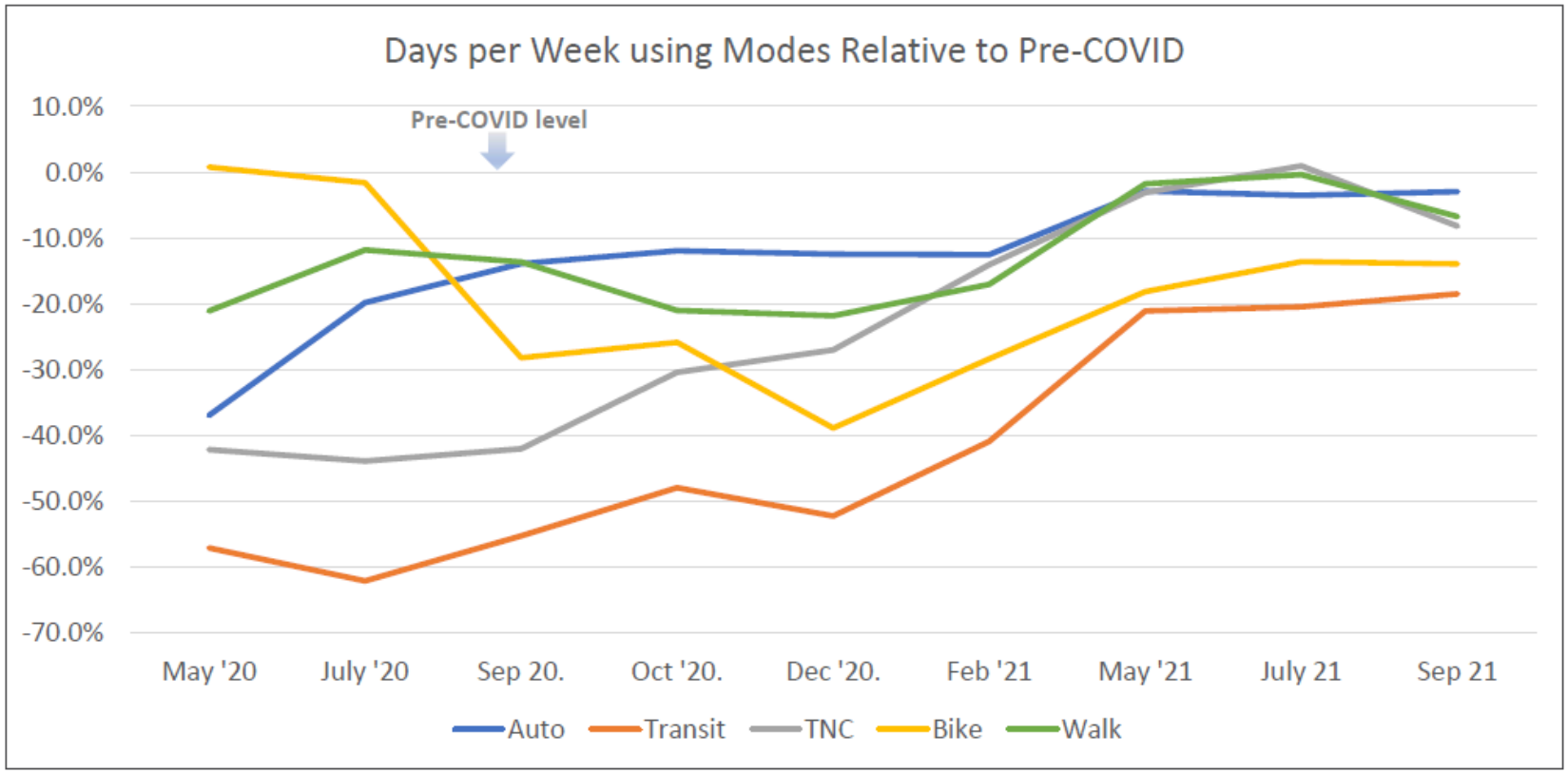
Summary of Teleworking Trends and Findings

- Teleworking rates were highest at the beginning of the pandemic and declined in mid-2021
- Full-time teleworking was highest in early/mid 2020 and declined into 2021, while part-time teleworking increased in 2021
- Teleworking will be more prevalent in a post-pandemic "new normal" period; most people with telework compatible jobs are expected to telework a few days a week
- The pandemic is likely to have long-term impacts on teleworking trends, as more employers are offering flexible or "hybrid" work schedules

Key Findings on Travel Mode

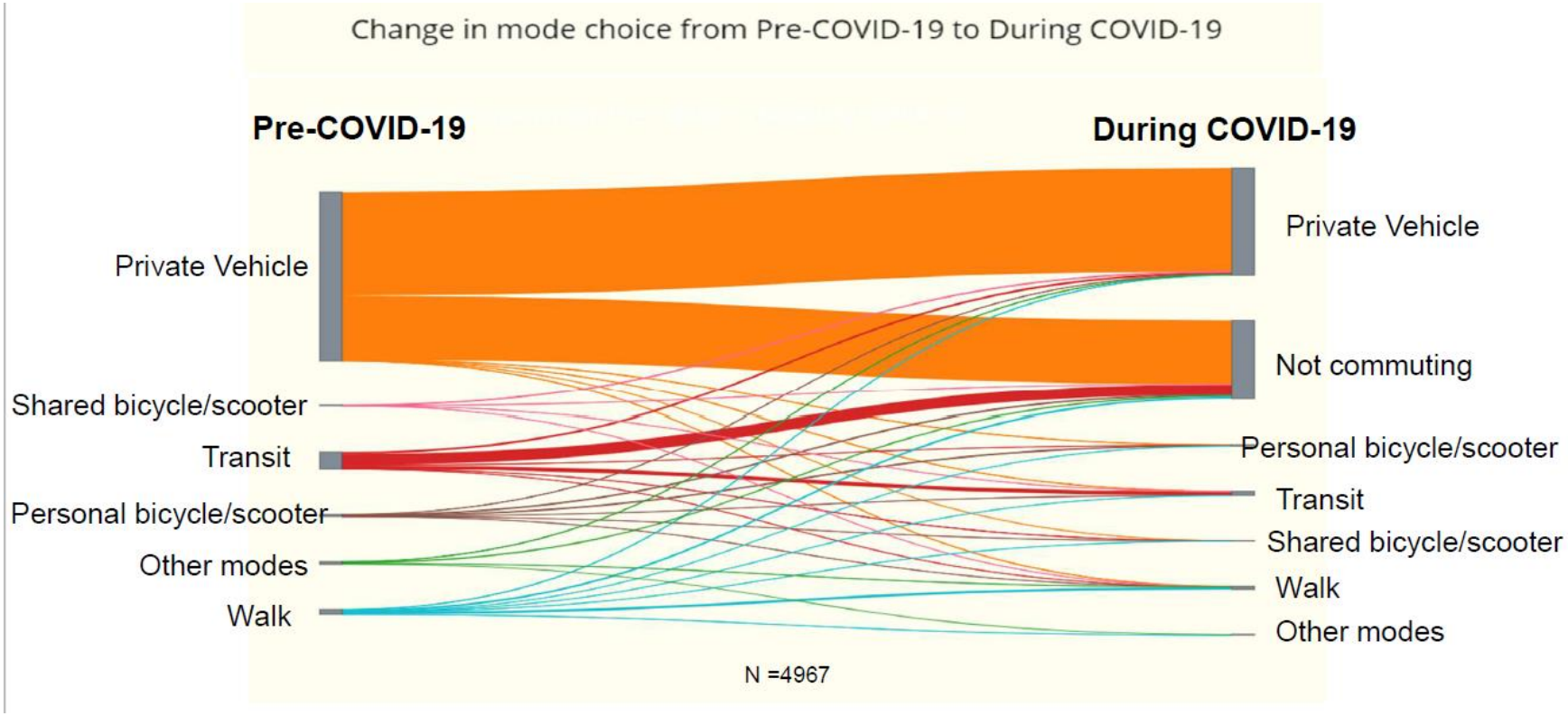


Days Per Week Using Travel Mode



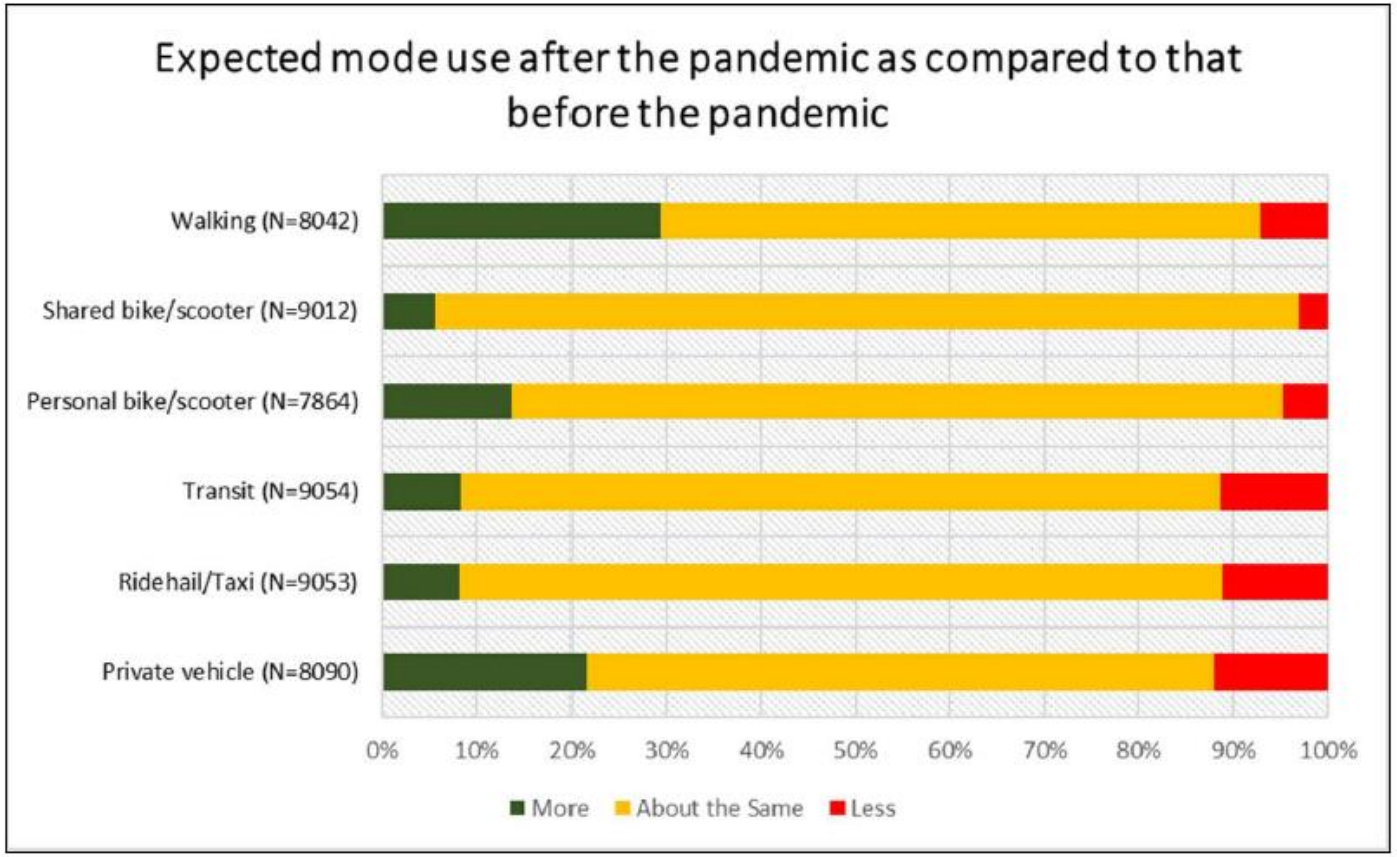
Source: Resource Systems Group (RSG)

Change in Mode Choice from Pre-COVID-19 During COVID-19



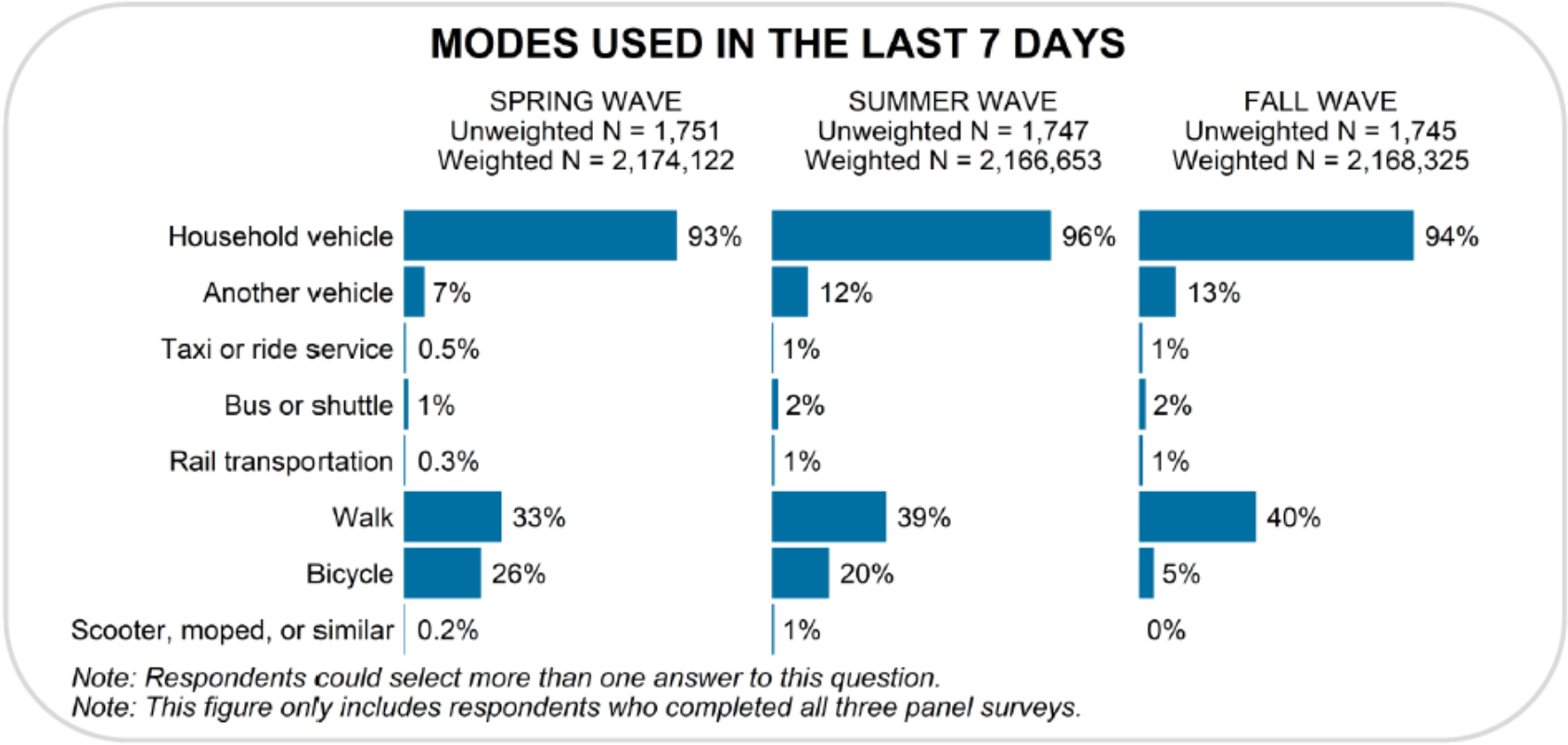
Note: Based on the first wave of respondents from April to October 2020.
Source: TOMNET Transportation Center (ASU-UIC)

Expected Mode Use After the Pandemic Compared with Pre-Pandemic



Note: Based on the first wave of respondents from April to October 2020.
Source: TOMNET Transportation Center (ASU-UIC)

Travel Mode Used in the Last 7 Days (Met Council Survey)



Source: Metropolitan Council (Twin Cities MPO)

Summary of Travel Mode Findings

- The start of the pandemic marked a sharp decline in trip overall, especially for public transit trips
- Auto travel by private vehicle has largely recovered to pre-pandemic levels
- Public transit usage is expected to remain below pre-pandemic levels in the foreseeable future
- The usage of shared modes such as taxi and ridehail will likely be lower in a post-pandemic period

How This Literature Review May Inform Future COG/TPB Surveys

- The pandemic had a significant impact on travel patterns which poses challenges in a post-pandemic period:
  - Rapid changes in travel patterns and behavior
  - Increasing costs and declining response rates
- Multiple waves and more frequent data collection
- Sampling methodology including mixed-methods and non-probability sampling approaches
- Consider panel frame surveys
- Attitudinal and stated preference questions

MPO Household Travel Survey State of the Practice

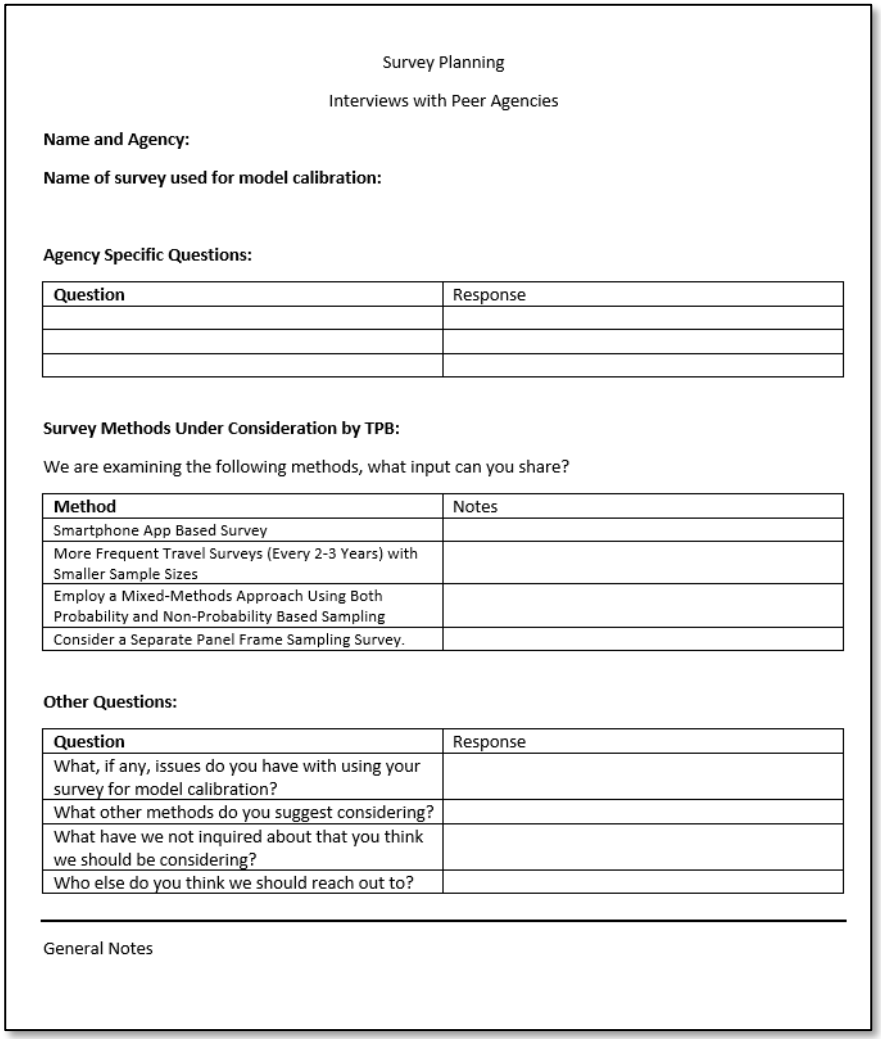
A crew from the Metropolitan Washington Council of Governments conducts a survey in the 1960s. (Metropolitan Washington Council of Governments)

Background

- TPB has conducted a regional household travel survey about once a decade since 1968
- During or after the last two surveys, new technologies emerged, and travel behavior shifted
- Members and stakeholders expect more information, sooner, and more frequently
- Household travel surveys are increasingly costly while response rates have been declining
- Household travel survey methods have been evolving

Approach

- Preliminary, internal memo outlining methods to consider for future household travel surveys
- August to October 2022, performed online research and conducted interviews to learn about recent survey efforts and methodologies employed by other metropolitan planning organizations (MPOs)
- Organized and moderated a panel discussion on Household Travel Surveys on November 30th through the Association of Metropolitan Planning Organization's (AMPO) Data Working Group



Survey Planning

Interviews with Peer Agencies

Name and Agency:

Name of survey used for model calibration:

Agency Specific Questions:

Question	Response

Survey Methods Under Consideration by TPB:

We are examining the following methods, what input can you share?

Method	Notes
Smartphone App Based Survey	
More Frequent Travel Surveys (Every 2-3 Years) with Smaller Sample Sizes	
Employ a Mixed-Methods Approach Using Both Probability and Non-Probability Based Sampling	
Consider a Separate Panel Frame Sampling Survey.	

Other Questions:

Question	Response
What, if any, issues do you have with using your survey for model calibration?	
What other methods do you suggest considering?	
What have we not inquired about that you think we should be considering?	
Who else do you think we should reach out to?	

General Notes

MPOs Interviewed and Recent HTS Efforts

Federally Designated MPO	Contact(s) Interviewed	Most Recent HTS	NextGen NHTS Add-On Samples Acquired
Atlanta Regional Commission (ARC)	Guy Rousseau	2011	Yes, acquired in 2022
Baltimore Metropolitan Council (BMC)	Todd Lang and Robert Berger	2018/19	No
Metropolitan Council, Twin Cities (Met Council)	Jonathan Ehrlich and Ashley Asmus	2019	No
North Central Texas COG (NCTCOG)	Arash Mirzaei and Kathy Yu	1996	Plan to acquire in 2024. Previously used NHTS in 2008/09 and a larger sample in 2016/17
Puget Sound Regional Council (PSRC)	Brian Lee	1999, 2006, 2014/5, 2017, 2019, 2021	No
San Diego Association of Governments (SANDAG)	Grace Miño	2019, 2023 (in progress)	No
Metropolitan Transportation Commission, San Francisco Bay Area (MTC)	Shimon Israel	2012/3, 2018/9 (partial), 2023	No

Findings – Agency Background

The MPOs interviewed can be divided into three groups:

1. Conducting or actively preparing for a more frequent and smaller sample size household travel survey
2. Participating in and purchasing add-on samples through the Federal Highway Administration (FHWA) Next Generation National Household Travel Survey (NextGen NHTS)
3. Planning to conduct a large-scale household travel survey once a decade

Group 1 - Conducting/preparing for more frequent, smaller scale survey

- Metropolitan Council, Twin Cities (Met Council)
  - Conducted HTS once a decade until 2013 when staff began asking if it was sufficient and decided it was not
  - In 2016/17, developed a continuous data collection program with three cross-sectional waves every other year from 2019 to 2023
  - Paused collection during the height of the pandemic and instead conducted a separate COVID-19 survey in 2020
- Puget Sound Regional Council (PSRC)
  - Conducted its last large-scale HTS in 2014. After the survey, a large light rail expansion plan was implemented, and the region was undergoing rapid growth.
  - Considered trade-offs of smaller sample size data collected more frequently versus larger sample size data that was a decade old and, in 2016, transitioned to conducting smaller surveys every other year

Cont., Group 1 - Conducting/preparing for more frequent, smaller scale survey

- San Diego Association of Governments (SANDAG)
  - Conducted its last large-scale HTS in 2016
  - Data quickly out of date with emergence of new modes such as ride-hail/transportation network companies (TNCs), electric scooters, and neighborhood electric vehicles in beach areas
  - Opted to move towards smaller scale and more frequent data collection in three cross-sectional waves (2021, 2023, and 2025)
- Metropolitan Transportation Commission, San Francisco Bay (MTC)
  - Coordinated with Caltrans for the 2012/13 California HTS
  - Observed travel behavior changing at a greater rate
  - Overseeing the transition of a once-a-decade travel diary survey to a biennial cross-sectional survey conducted every other spring, starting in 2023

Group 2 - Participating in the NextGen NHTS

- Atlanta Regional Commission (ARC)
  - Conducted its last large-scale HTS in 2011
  - In partnership with Georgia DOT, the agency is moving forward with the NextGen NHTS
  - Pooled fund effort, return on investment, and the latest travel survey methods and technologies cited as reasons
- North Central Texas Council of Governments (NCTCOG)
  - Conducted its last HTS in 1996 and since then used NHTS data for model development
  - Acquired NHTS data in 2008/09 and a larger sample in 2016/17
  - Plans to acquire NextGen NHTS add-on samples in 2024 or later to assure data reflects travel behavior in a post-pandemic era
- Both agencies consider the NextGen NHTS to be an easier to use, lower cost and higher value alternative that aligns with their state DOTs

Group 3 - Planning for Large-Scale Survey Once a Decade

- Baltimore Metropolitan Council (BMC) plans to conduct a large-scale survey once a decade
  - COG/TPB coordinated with BMC on the 2017/2018 Regional Travel Survey
  - Considered NextGen NHTS but do not intend to use it to replace a household travel survey
  - Plans to focus on modal surveys and on-board transit surveys and then conduct another HTS in five to seven years

Opinions on Survey Methods Under Consideration

	ARC	BMC	MET	NCTCOG	PSRC	SANDAG	MTC
Smartphone App-Based Survey	+	-	+	+/-	+	+	+
More Frequent Travel Surveys (Every 2-3 Years) with Smaller Sample Sizes	+	-	+	-	+	+	+
Mixed-Methods Approach Using Both Probability and Non-Probability Based Sampling	+	+/-	+	ND	+/-	+	+/-
A Separate Panel Frame Sampling Survey	+	+/-	+/-	ND	+/-	+	+/-
Attitudinal and Stated Preference Questions on the Survey	+/-	-	+/-	-	ND	+/-	-
Incentives	+	-	+	+	+	+	+

+ = Positive reception. Primarily positive comments.
+/- = Balanced reception. Negative and positive comments.
- = Negative reception. Negative and/or cautionary comments.
ND = Not determined or discussed

Smartphone App-Based Survey

- Most MPOs were in favor of the use of smartphone apps with passive data collection for household travel surveys
- Smartphone apps capture historically underreported trips from travel diaries and reduce respondent burden
- MTC recently conducted a demonstration of smartphone apps from several vendors
- Most MPOs cautioned against requiring participants to use a smartphone app and recommended other options such as internet and telephone to ensure accessibility to all groups
- Some agencies have softened the requirements to use smartphone app surveys in recent survey efforts (e.g., Met Council and PSRC)

Cont., Smartphone App-Based Survey

- Smartphone app-based surveys require some effort from respondents to report trip details
- App performance, accuracy of trips being captured, bias against populations without smartphones, and imputation for origin and destination noted as potential issues
- Privacy concerns particularly for children's travel; people under 18 are typically not asked to use these apps but child trips may be reported by an adult

More Frequent Travel Surveys with Smaller Sample Sizes

- Among the MPOs that were interviewed, about one-half conduct or are in the process of moving to frequent travel surveys (Met Council, PSRC, SANDAG, and MTC) for the following reasons:
  - Lower amount of funding needed each survey year / continuous request level
  - Capturing new modes and technologies such as TNCs and micromobility
  - Travel patterns and behavior have become more complex, particularly post-pandemic
  - Other surveys have adopted this approach such as the ACS and the NextGen NHTS

Mixed-Methods Approach Using Probability and Non-Probability Sampling

- Most of the MPOs that were interviewed shared an interest in exploring a mixed methods approach
- May expand the reach of surveys for underrepresented groups

Cont., Mixed-Methods Approach Using Probability and Non-Probability Sampling

- Various techniques mentioned by MPOs include:
  - Partnering with community-based organizations to obtain input and solicit responses
  - Interviews, focus groups, or snowball sampling in target areas
  - For transit on-board surveys, using apps to reach customers and matching it with APC data
  - Oversampling certain geographic areas with a high share of low income and minority groups
  - Social media recruitment

A Separate Panel Frame Sampling Survey

- Sampling method that replaces traditional probability-based sampling frames with online panels for survey design
- Online panels are compiled through intercept or targeted recruitments and have a large sample pool
- Curated panels may yield a higher response rate than the address-based sampling method
- One half of the households in the NextGen NHTS will be recruited using a panel frame sampling method
- MPOs interviewed noted that panel frame surveys can increase responses from hard-to-reach population groups by controlling sociodemographic characteristics
- PSRC noted concerns about weighting panel frame sample data and MTC noted this should not serve as a foundation of a survey

Attitudinal and Stated Preference Questions with a Travel Diary

- MPO staff stated that adding attitudinal or stated preference questions to a travel diary can dramatically increase respondent burden
- Those interviewed aimed to simplify surveys; adding these kinds of questions can make surveys more complex
- Historically, most household travel surveys have been revealed preference surveys, not stated preference surveys
- NCTCOG commented that attitudinal and stated preference responses may provide insights but are not critically important
- SANDAG limits these types of survey questions to smaller survey efforts with specific topics (e.g., border crossing, parking)
- Met Council noted that attitudinal/stated preference questions should be limited to minimize respondent burden

Incentives

- Nearly all MPOs found incentives to be essential to the success of surveys
- In some jurisdictions, federal funds cannot be used for survey incentives
- Various techniques and suggestions included:
  - Targeted/differential incentives such as higher incentives to lower income, large households, and transit dependent
  - Offering lower/limited enrollment incentives followed with incentives at completion
  - Raffle drawings which are less expensive than providing incentives to all participants

Other Comments and Suggestions

- Management, coordination and resources
  - Work closely with the team that runs the regional travel model
  - Consider staff capacity and balance with frequency of data collection
- Survey approach and design
  - Focus on hard-to-reach groups
  - Consider modifying sampling frame from household to person based
  - Explore mixed methods with qualitative research methods
- Consider quality control methods and data imputation techniques
- Evaluate other data sources and consider data aggregators, big data, and data fusion

Next Steps

- Share findings with TPB members and seek input
- Share findings with the MPOs that we interviewed
- Consolidate input from TPB staff and members and develop recommendations for a future TPB household travel survey

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