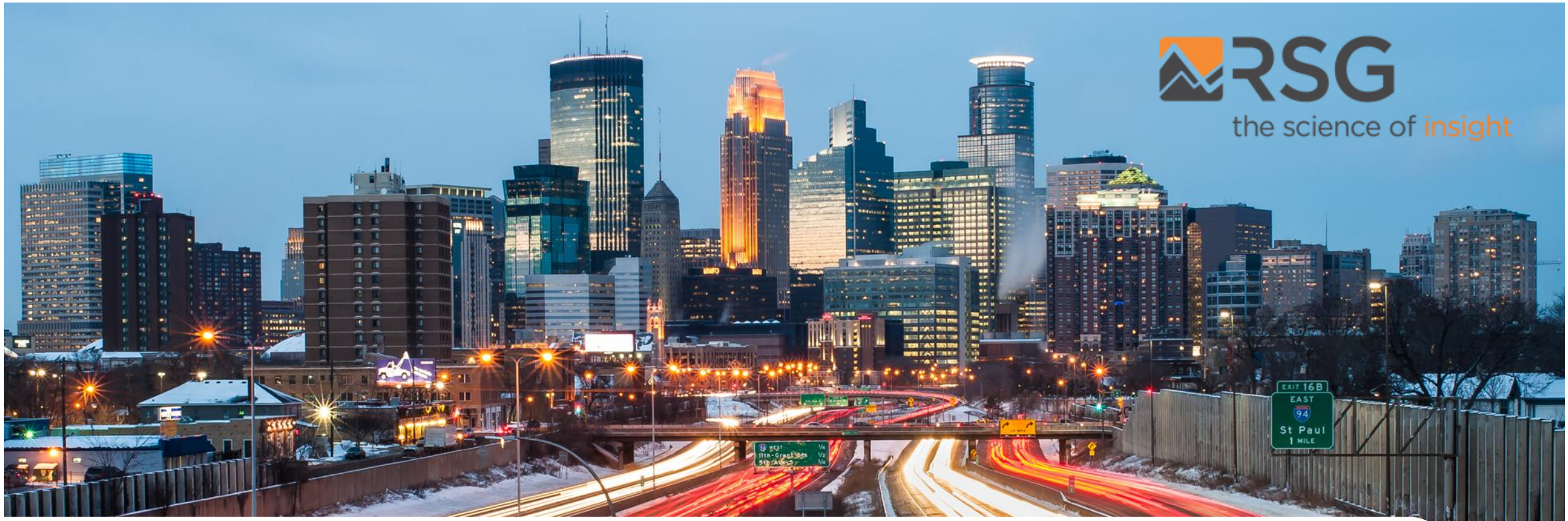

RSG
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METROPOLITAN COUNCIL

Travel Behavior Inventory

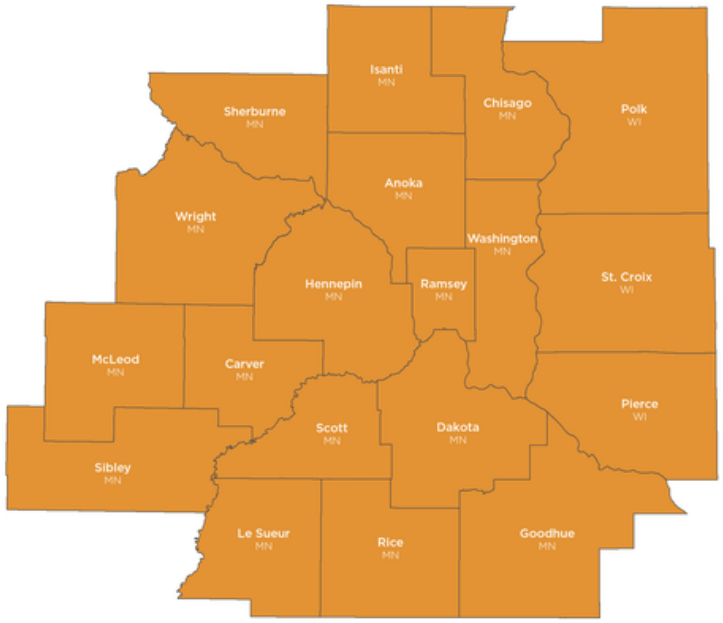
Data Collection Program

Wave 1 2018 – 2019 Results Analysis

July 10, 2020

Metropolitan Council
Travel Behavior Inventory (TBI) Household Survey

The TBI is a **household travel survey** of the greater Twin Cities region that has been conducted every 10 years since 1949.



Two significant changes in 2018:

1. **Recurrent** survey program every other year
2. Began using a **smartphone GPS application** as the primary means of data collection

Why transition to a biennial recurrent travel survey program?

Planners can keep pace with changes in the transportation industry and regional development (e.g., new modes, changing neighborhoods).

Recurrent programs **1) provide opportunity for rapid improvement cycles based on recent results** and **2) create cost efficiencies** as the program evolves incrementally year over year.

TBI recurrent program schedule – 12 months of data collection every other year

2018 Pilot
400 households

2018-2019
Wave 1
7,500 households

2020-2021
Wave 2
3,700 households

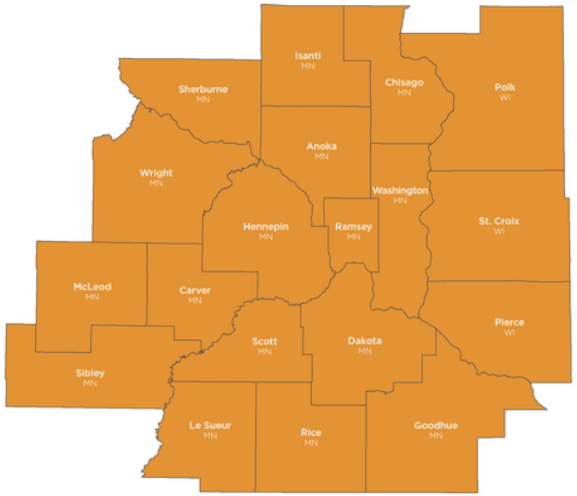
2022-2023
Wave 3
3,700 households

Wave 1 Survey Overview

7,837	13,431	84,582	351,177	6,830,105
HOUSEHOLDS	VEHICLES	TRAVEL DAYS	TRIPS	LOCATIONS

SUMMARY

- Survey fielded from **October 1, 2018 through September 30, 2019**.
- **Smartphone participants completed a 7-day travel diary**.
- **Online and call center participants completed a 1-day travel diary**.
- Same questionnaire was used for smartphone, online, and call center participants.
- Survey was available in English, Spanish, Karen, Oromo, Somali, and Hmong.

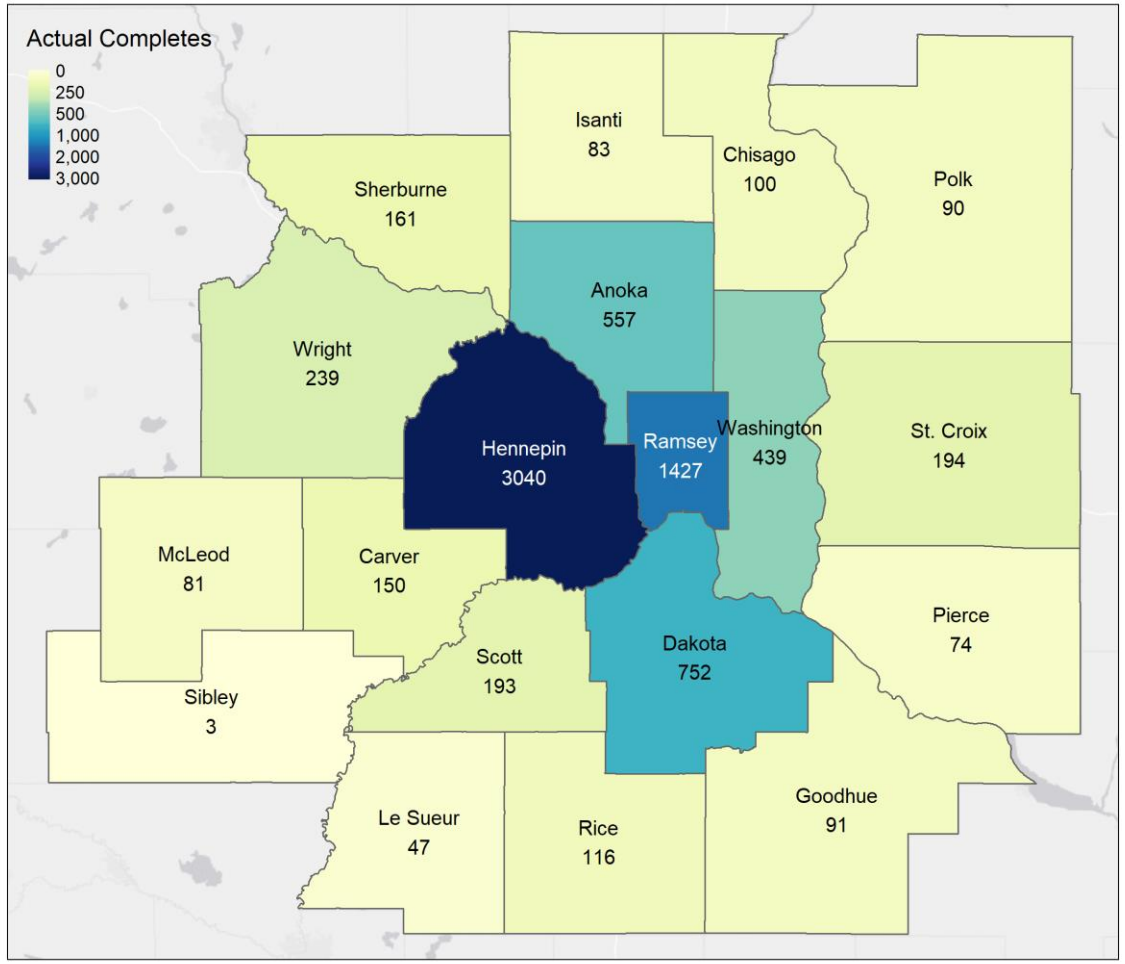


Survey Region

Target Completes = 7,500

Actual Completes = 7,837

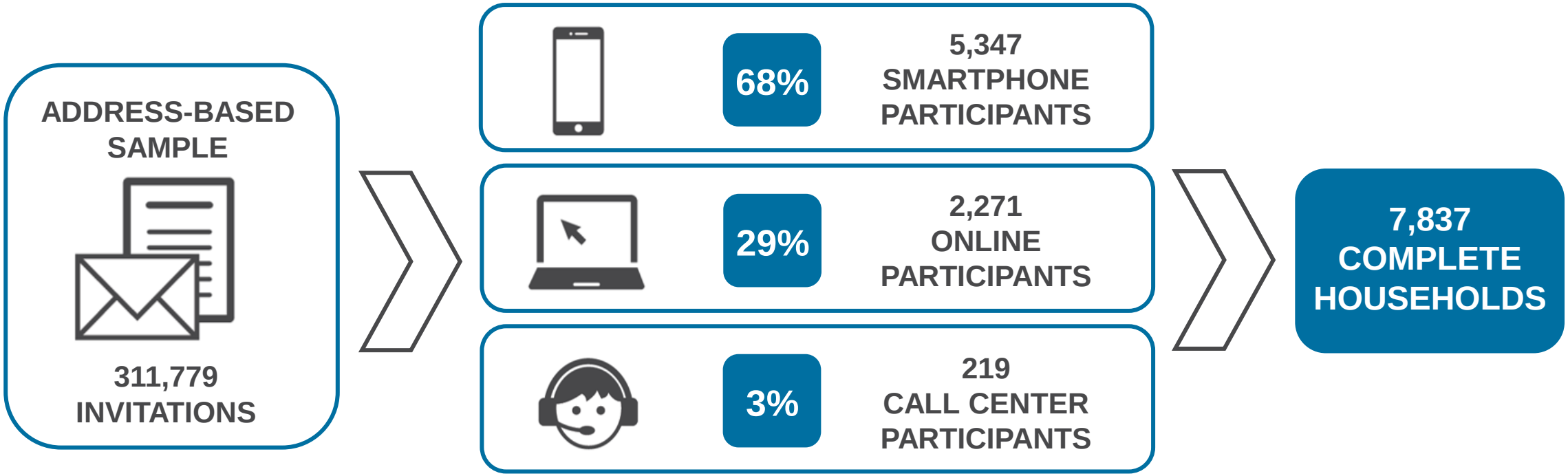
- The overall survey target was exceeded by 337 completes.
- Response rates varied by county and sample segment
- Compensatory oversampling was used to meet targets for hard-to-survey geographies



Methodology

Survey Design

2018-2019 TBI departed from previous iterations of the survey and **began using a smartphone GPS application** as the primary means of data collection.



Recruitment and Engagement

RECRUITMENT

Mailed Invitation Materials

- Address-based sampling was used by drawing a random sample of addresses from all residential addresses in the survey region.
- An invitation letter was sent to sample addresses followed by two reminder postcards.

ENGAGEMENT

Informational Website

- Participate in the survey
- Answers frequently asked questions

Call Center

- Participate in the survey
- Answer questions
- Reminder calls

Survey Email Address

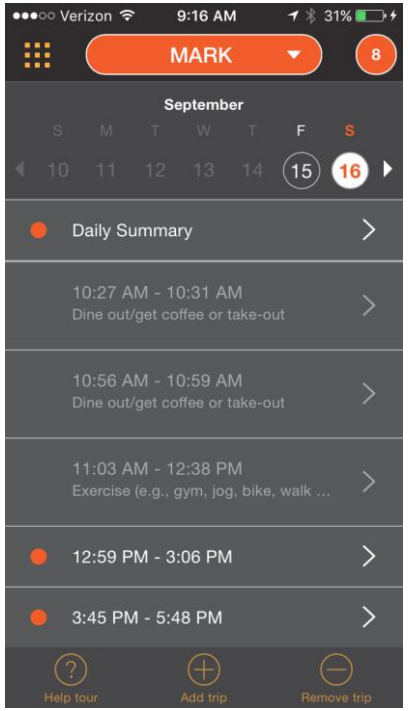
- Answer participant questions
- Send reminder emails

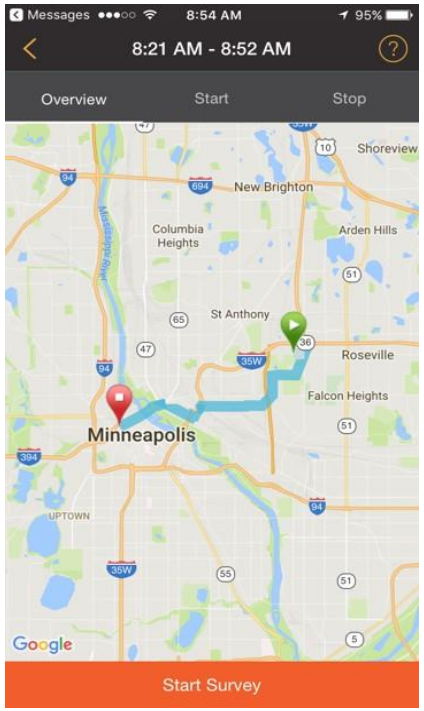
Smartphone App Participation

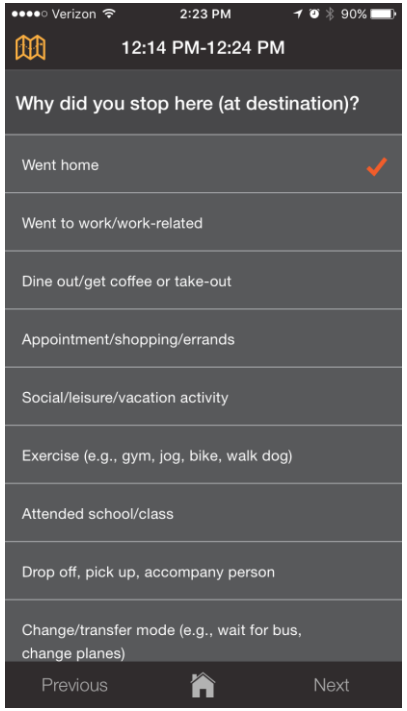
Passive/automatic collection of spatial data for <u>seven days</u> **AND** prompted in-app surveys

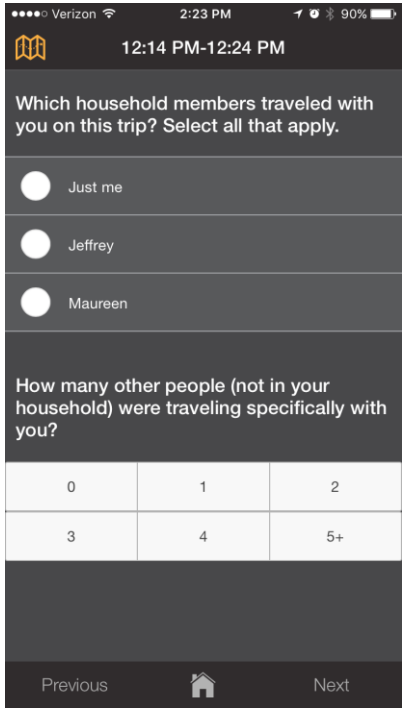
TRIP SURVEY

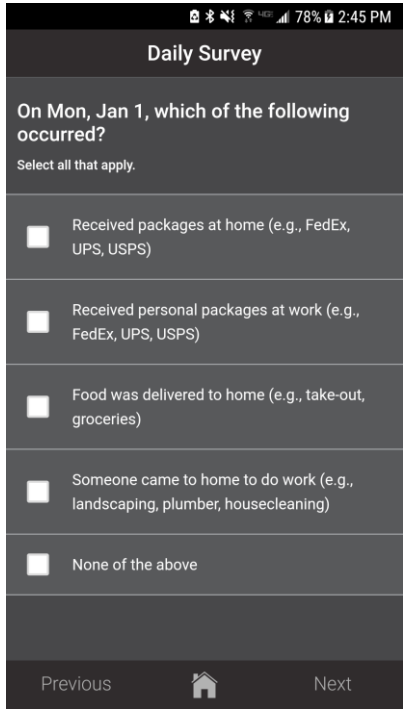
DAILY SURVEY







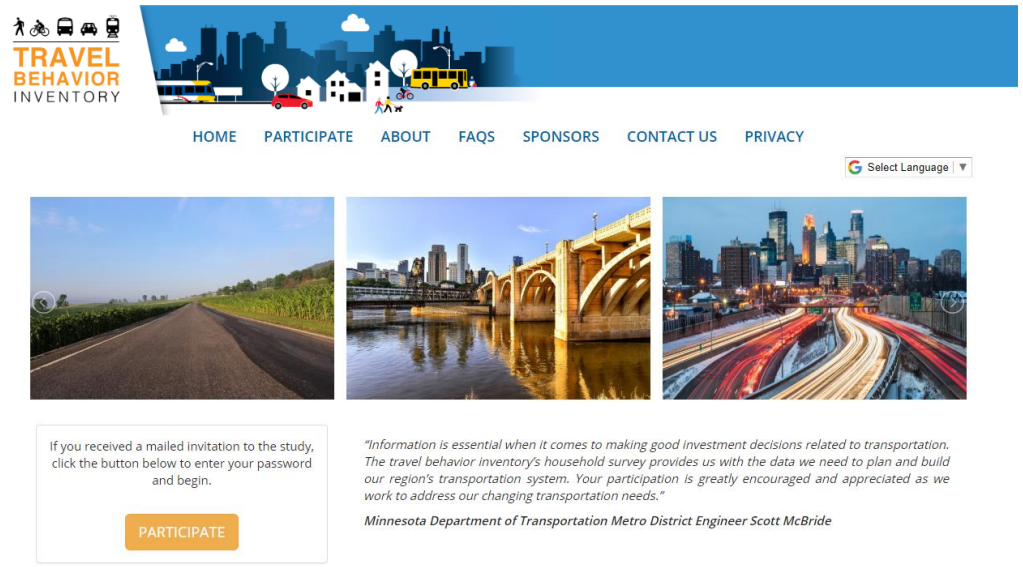


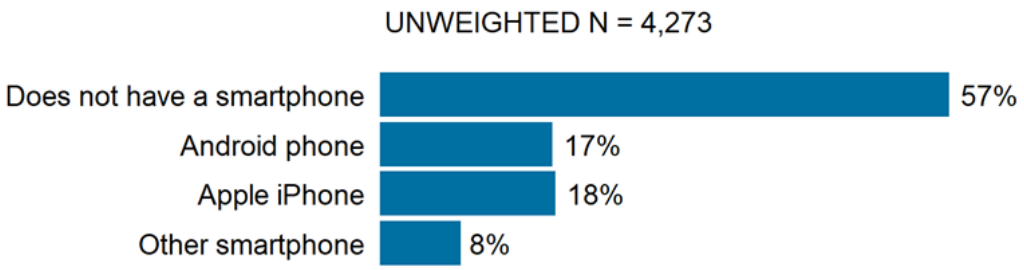


Online and Call Center Participation

Online survey participants entered the survey through the public website using the password received in their invitation mailings.

78% of call center participants and 55% of online participants do not own smartphones.

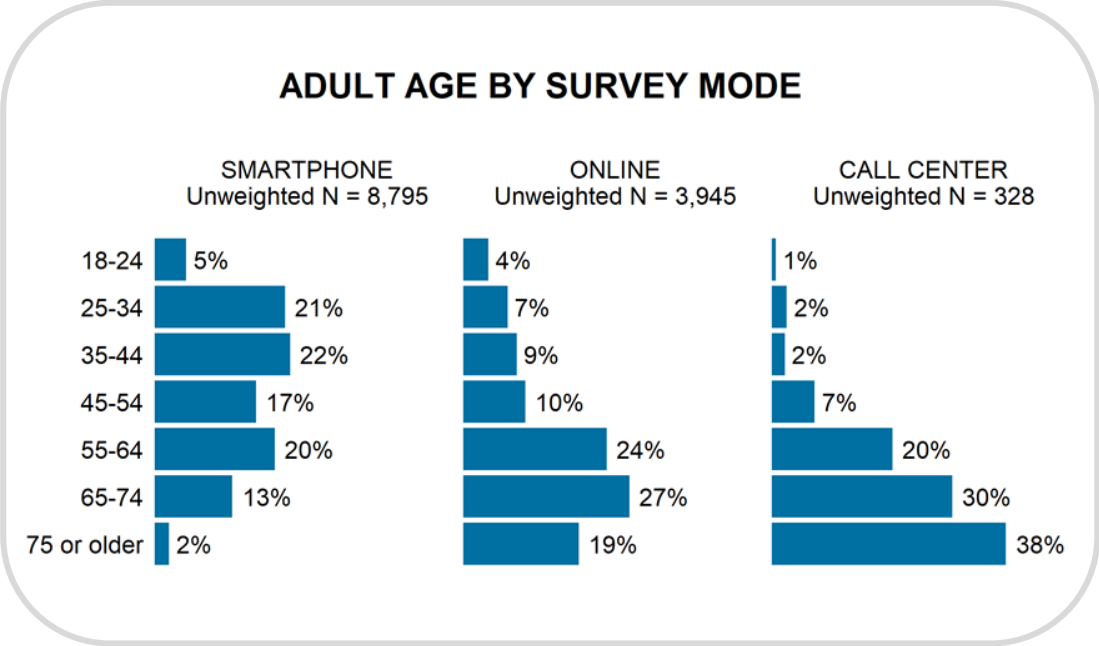


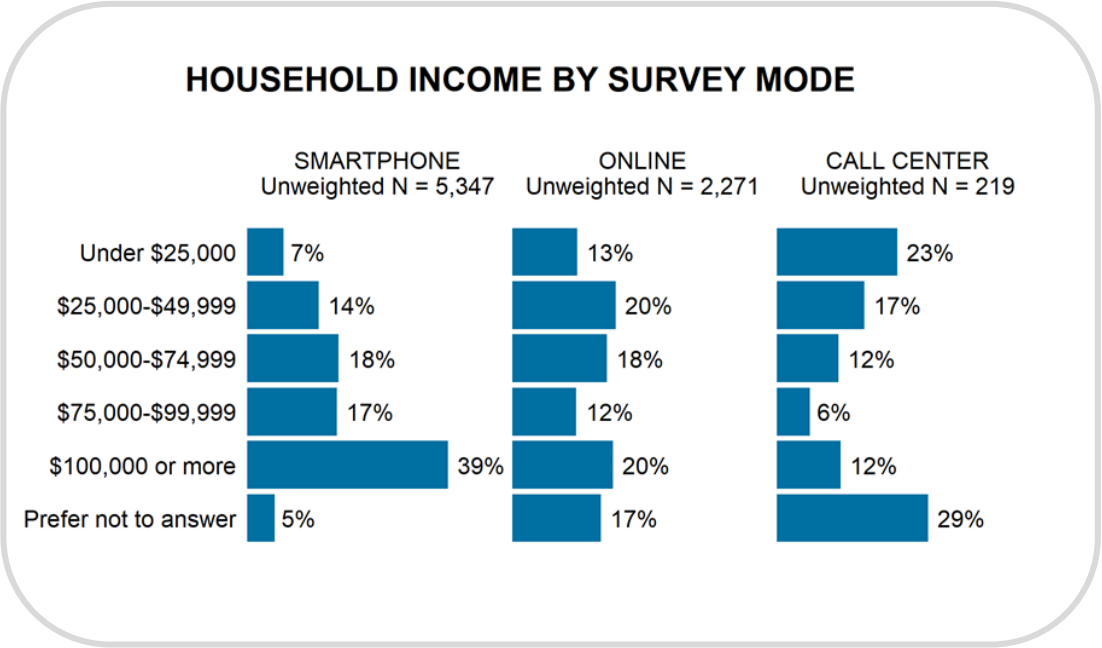


Survey Participation and Mode Profile

85% of smartphone participants are under age 65, while 68% of call center participants are age 65 and over.

Call center participants are more likely to decline reporting household income in comparison to smartphone and online participants.





Survey Overview

- Sample Profile
- Trip Diary
- Vehicle Use and Behavior
- Transit Use and Behavior
- Pedestrian and Micromobility Behavior
- New Mobility Services
- Attitudes Toward Autonomous Vehicles
- Equity Analysis

Please Note:

- *All figures are weighted to represent the population of the study region unless noted otherwise.*
- *Data at the trip and day levels are weighted to represent an average weekday.*

Sample Profile

Household and Person Demographics

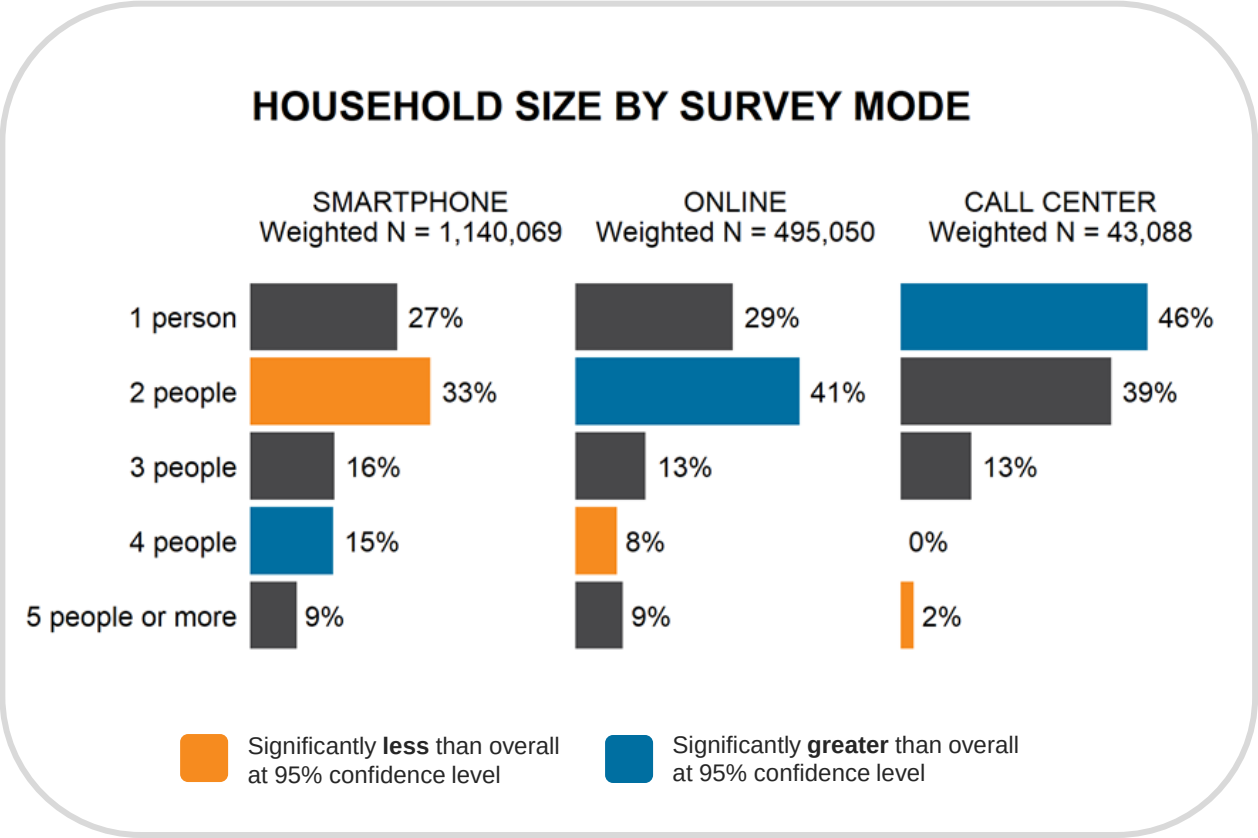
Sample Profile Overview

Demographic Breakdown.		Unweighted Sample	Weighted Sample	ACS 5-Year Average (2014-2018)
Age	Under 18	19%	25%	24%
	18 – 24	4%	6%	9%
	25 – 44	28%	28%	28%
	45 – 64	29%	27%	27%
	65 and older	21%	15%	13%
Gender	Female	53%	51%	50%
	Male	47%	49%	50%
Race	American Indian or Alaska Native	0%	0%	1%
	Asian	3%	6%	6%
	Black or African American	3%	7%	8%
	Native Hawaiian or other Pacific Islander	0%	0%	0%
	White	90%	82%	80%
	Two Races or More	3%	3%	3%
	Other	1%	2%	2%
Ethnicity	Not of Hispanic, Latino, or Spanish Origin	98%	94%	94%
	Hispanic, Latino, or Spanish Origin	2%	6%	6%
Income	Under $25,000	10%	13%	14%
	$25,000-$49,999	17%	19%	18%
	$50,000-$100,000	37%	31%	31%
	$100,000 or more	36%	36%	37%
Employment Status	Employed	66%	71%	72%
	Not employed	34%	29%	28%
Disability	No disability	96%	95%	90%
	Any disability	4%	5%	10%

Note: For variables where "Prefer not the answer" was an option, respondents who selected that answer have been excluded from these calculations.

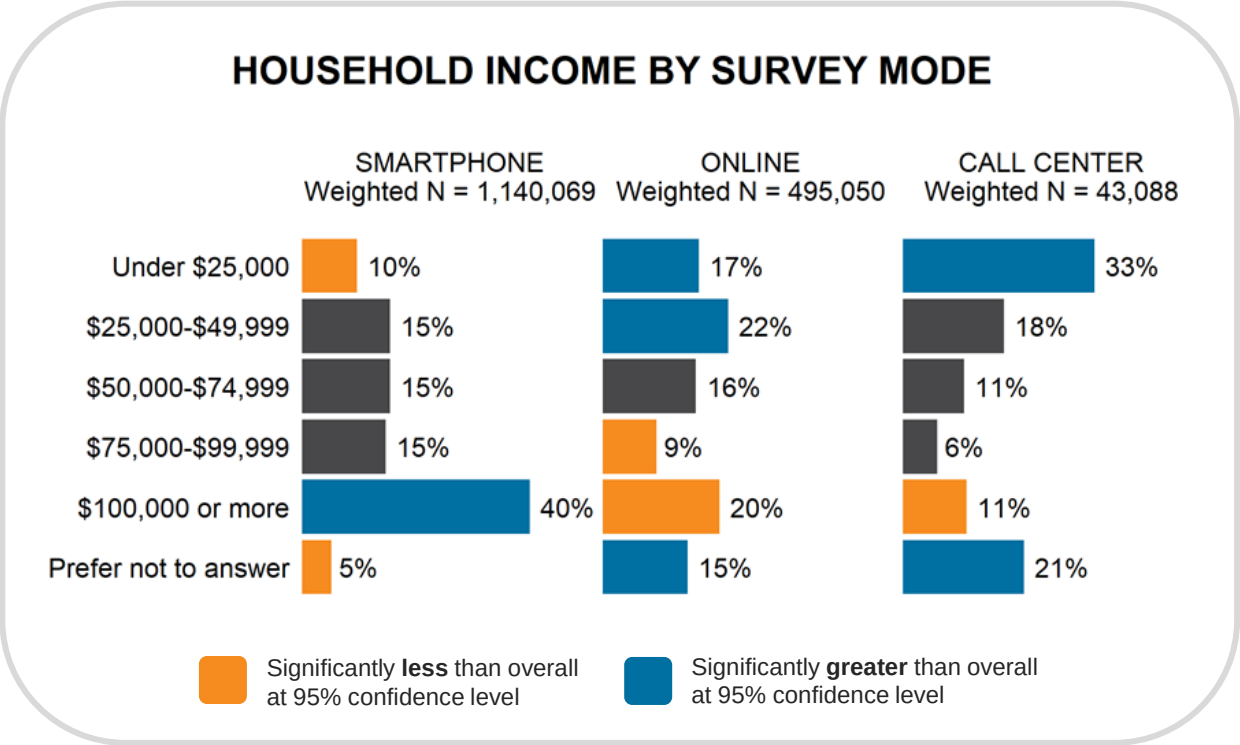
Household Size

40% of households participating by smartphone have 3 or more members, compared to 30% for households participating online and 15% for households participating via the call center.



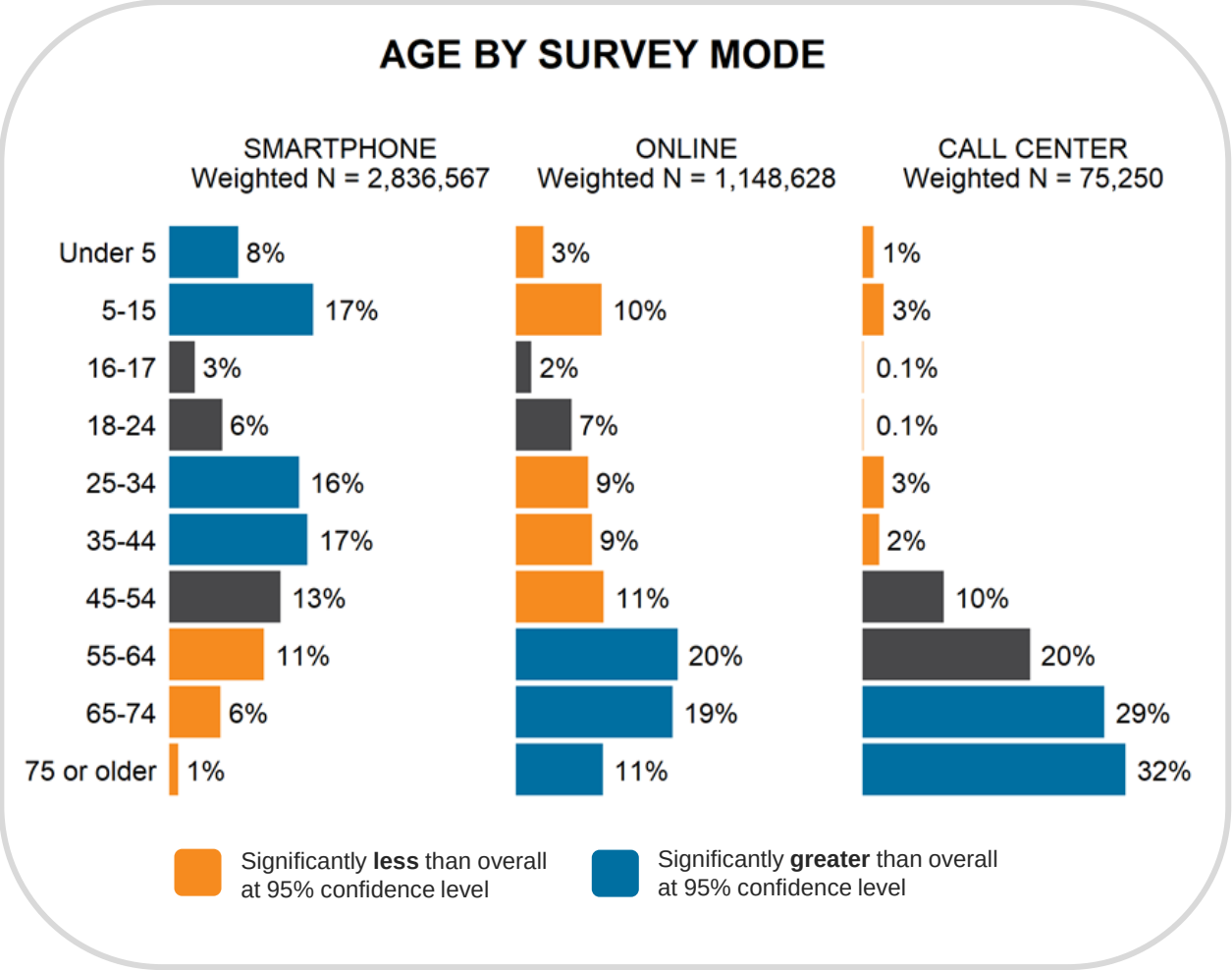
Household Income

Households participating through the call center have the largest share of low-income households and the largest share of households declining to report household income.

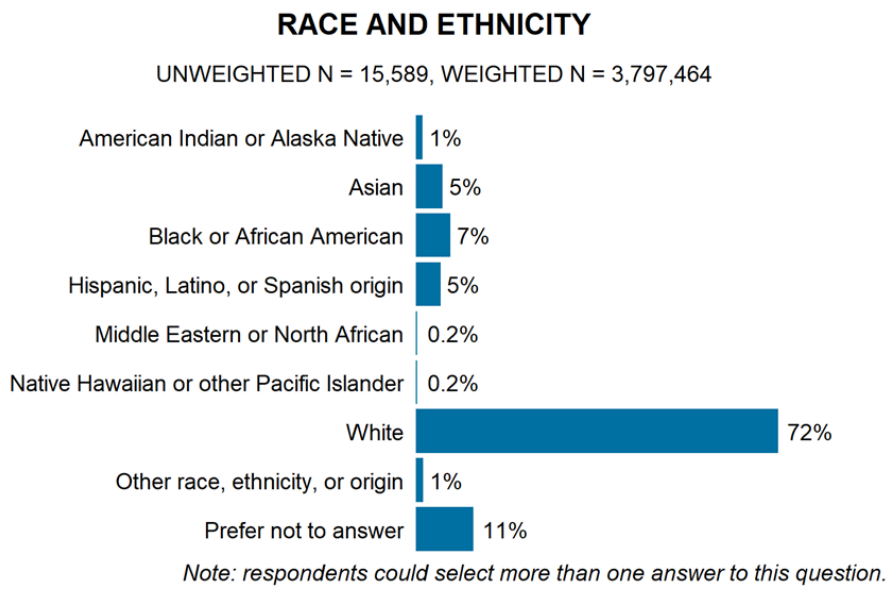


Age

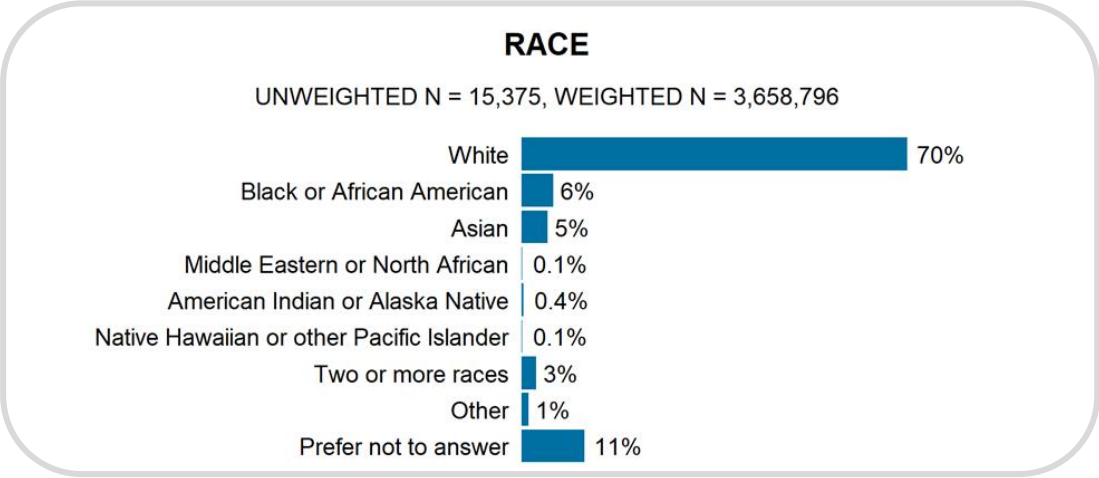
Residents who completed the TBI travel diary using a smartphone are younger than residents who completed the survey online or over the phone.

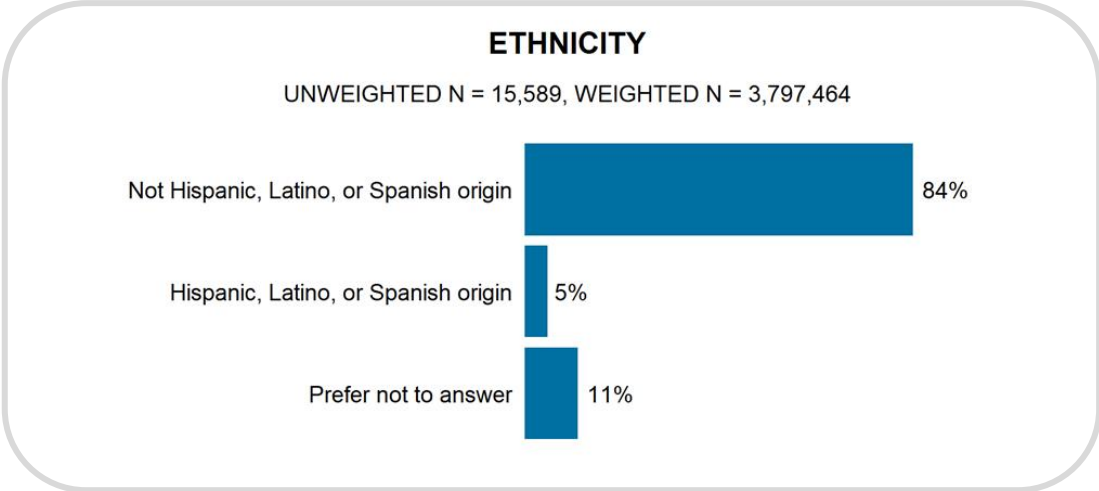


Race and Ethnicity



Race and ethnicity were asked as one select all that apply question. Responses have been aggregated in the figures to the right for ease of comparison to the census.



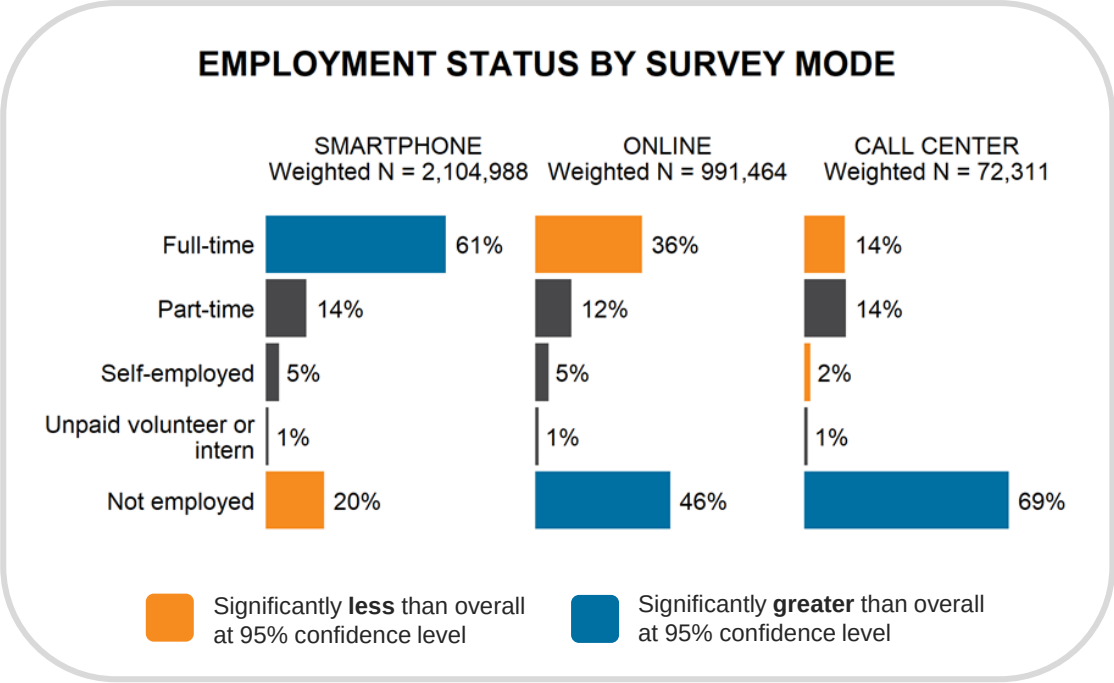


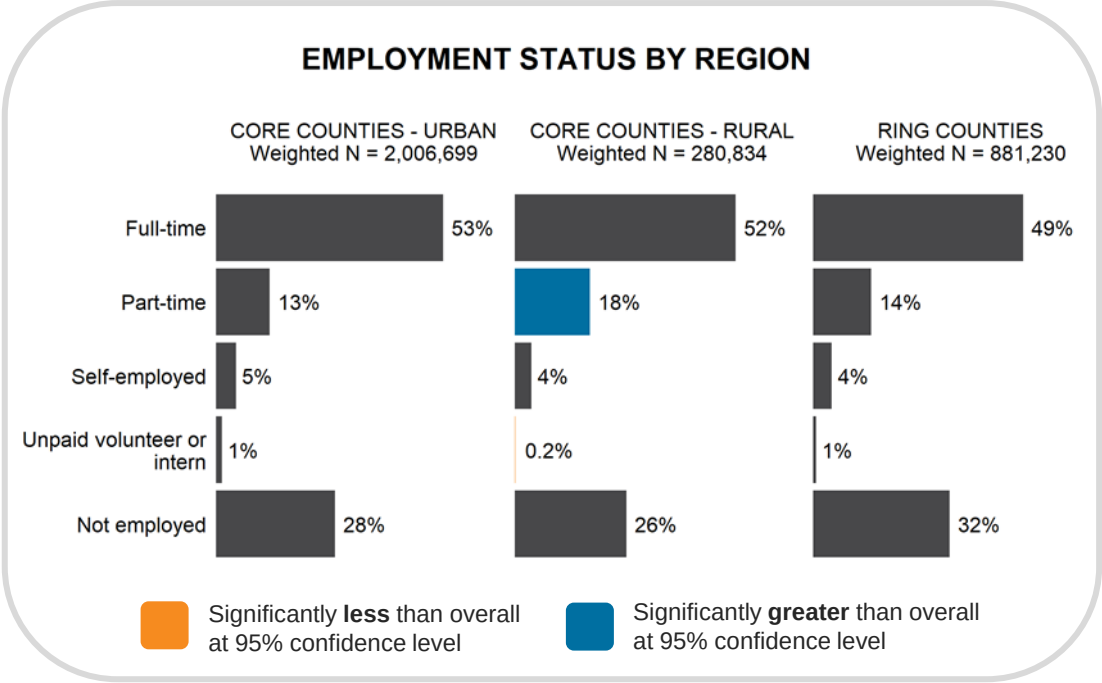
Note: Respondents who only selected "Hispanic, Latino, or Spanish Origin" in this question are excluded from the figure on the top right.

Employment Status

Smartphone participants have the highest employment rate, while call center participants have the lowest employment rate – which is reasonable given that most call center participants are age 65+.

Employment rates are consistent across study area regions.

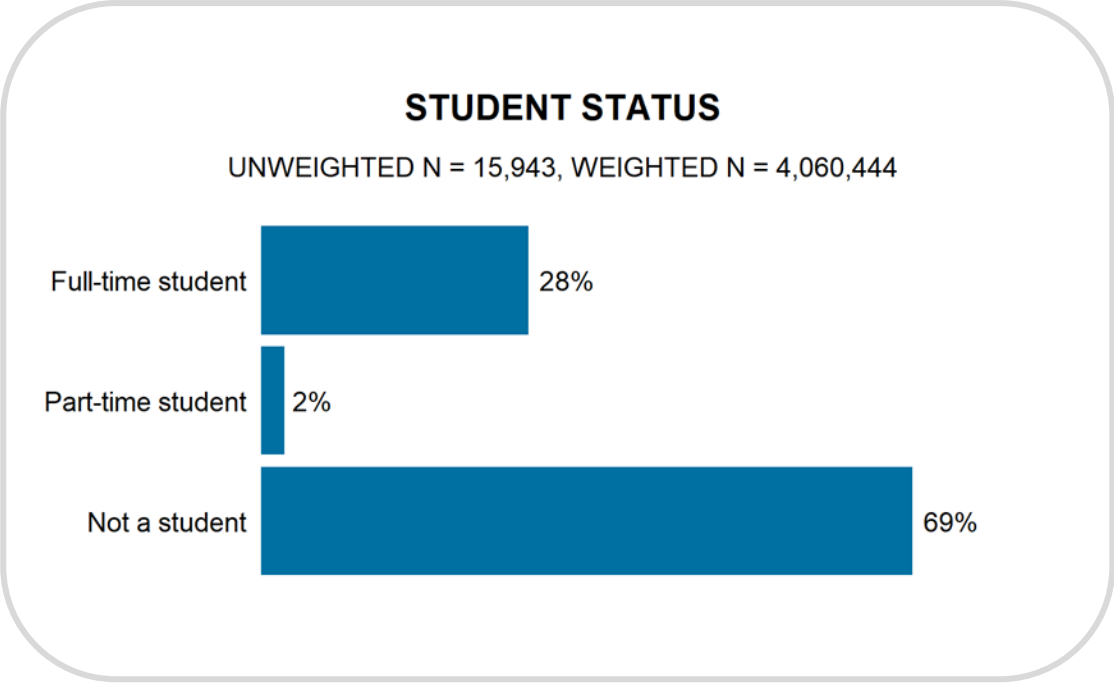


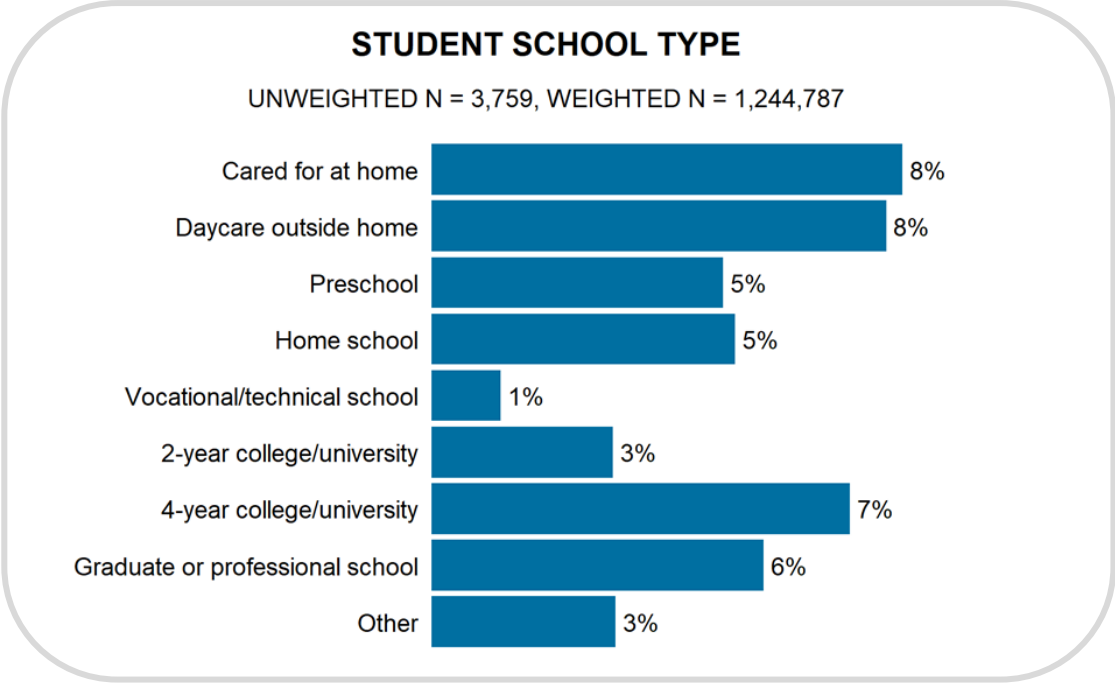


Student Status

8% of adults are students, 30% of residents are students.

16% of students are enrolled in a 2-year or 4-year college/university or graduate school.



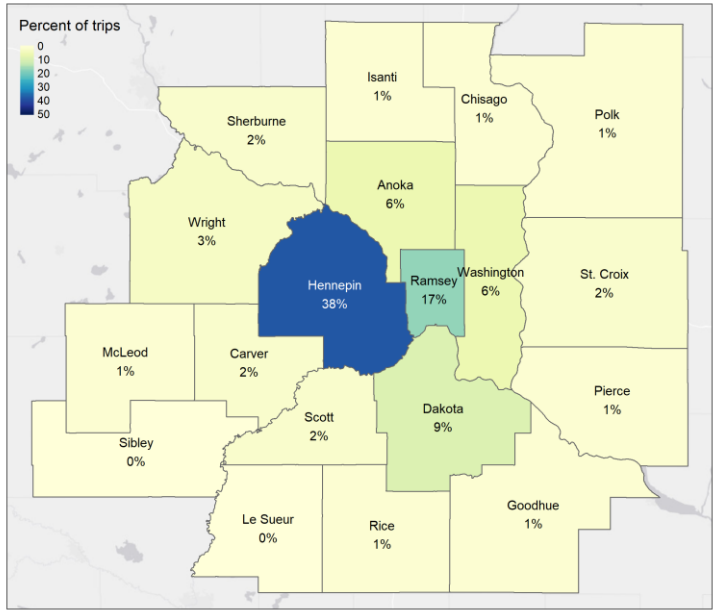


Trip Diary

Trip Destinations

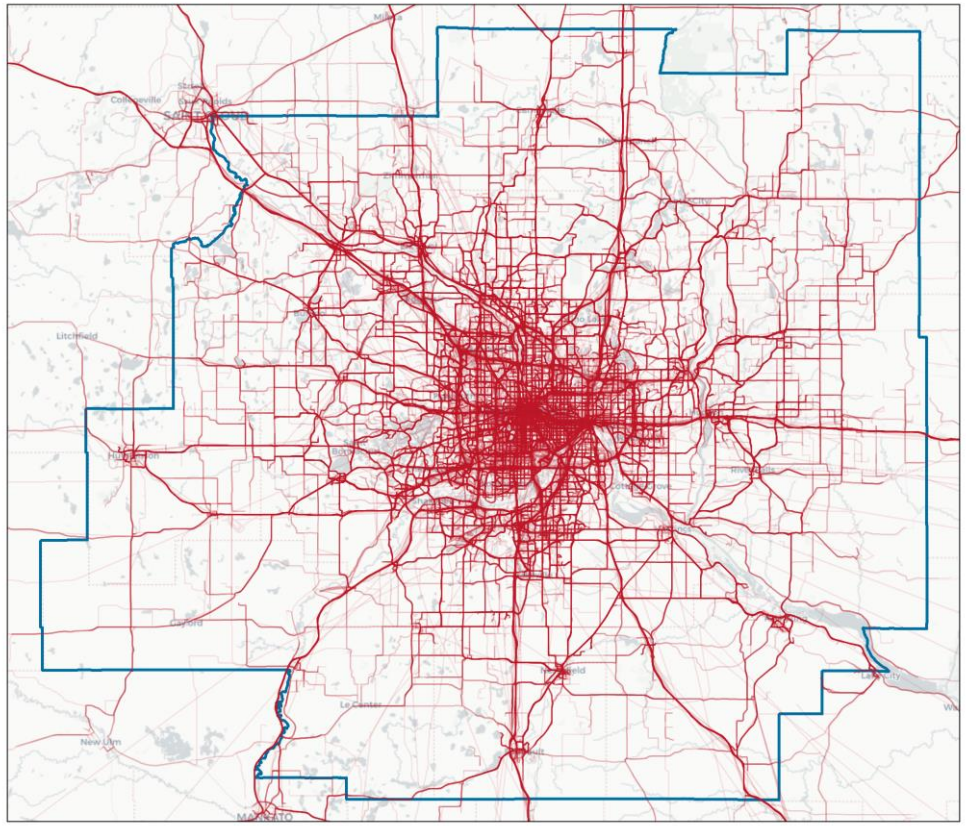
The largest share of trips (38%) are to Hennepin County followed by trips to Ramsey County at 17%.

SHARE OF TRIPS BY DESTINATION COUNTY



The remaining 6% of trips were made to destinations outside of the survey region

TRIP ROUTES



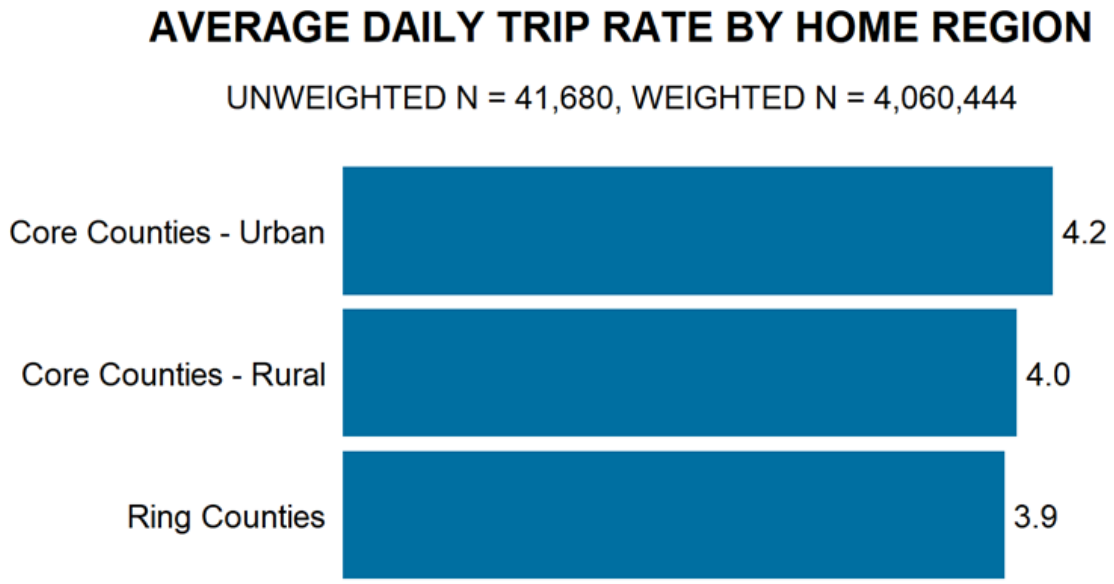
Trip origins and destinations were trimmed by 500 meters to protect respondents' privacy

Daily Trip Rate

REGIONAL AVERAGE WEEKDAY TRIP RATE

4.1

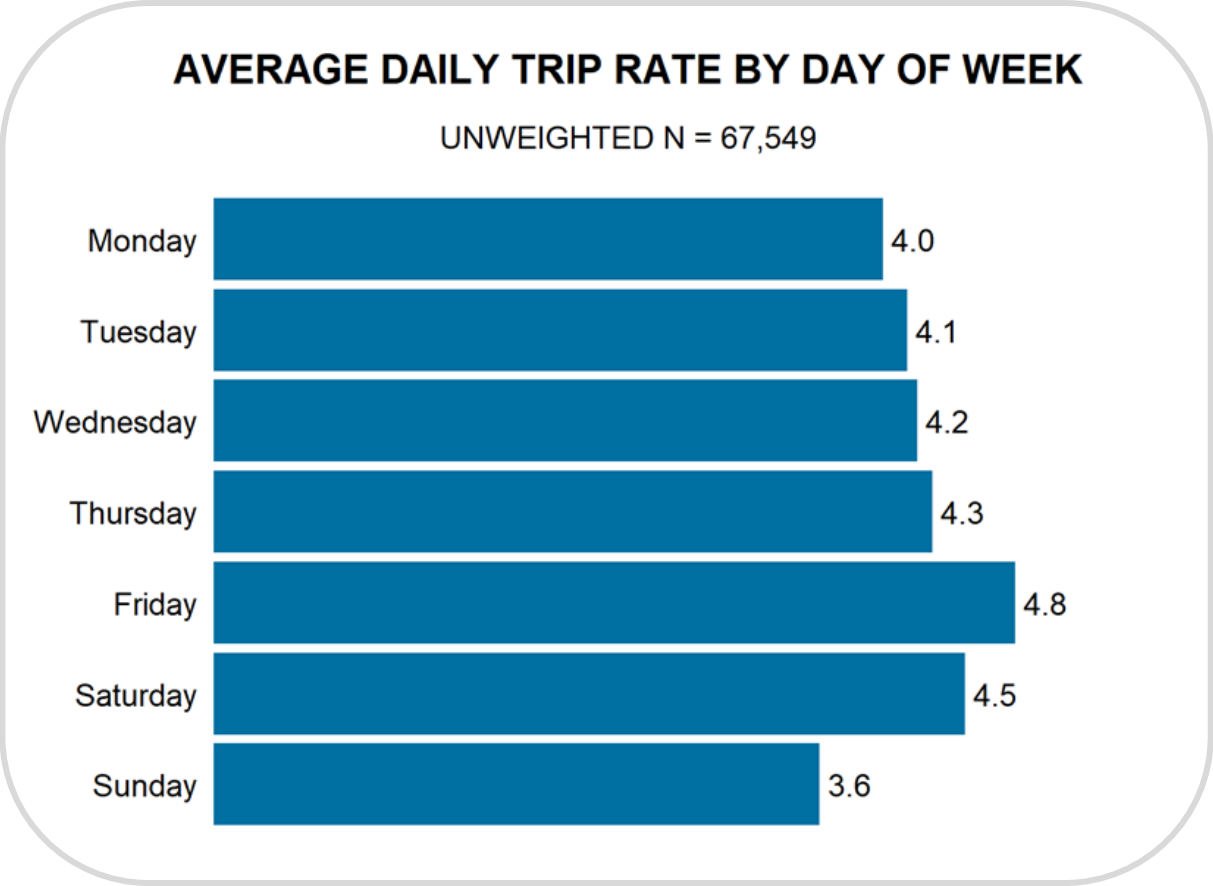
Residents of the Core Counties – Urban region have the highest average daily trip rate.



Daily Trip Rate by Day of Week

Friday has the highest average daily trip rate, while the fewest trips are made on Sunday.

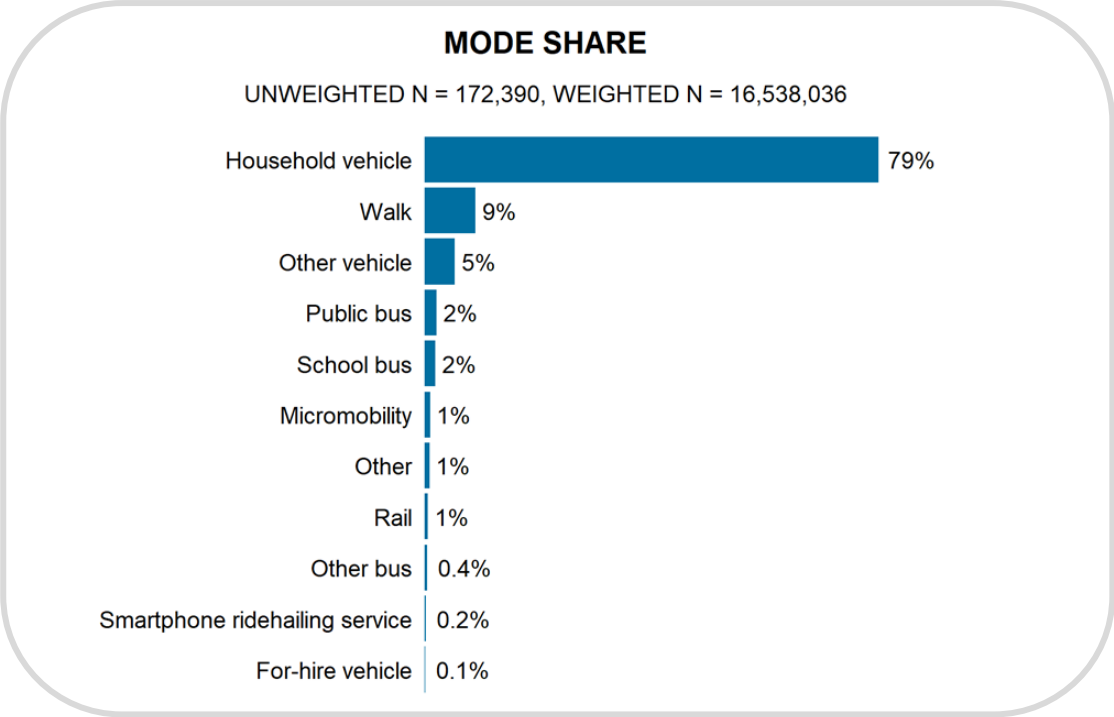
Note: These trip rates are unweighted.

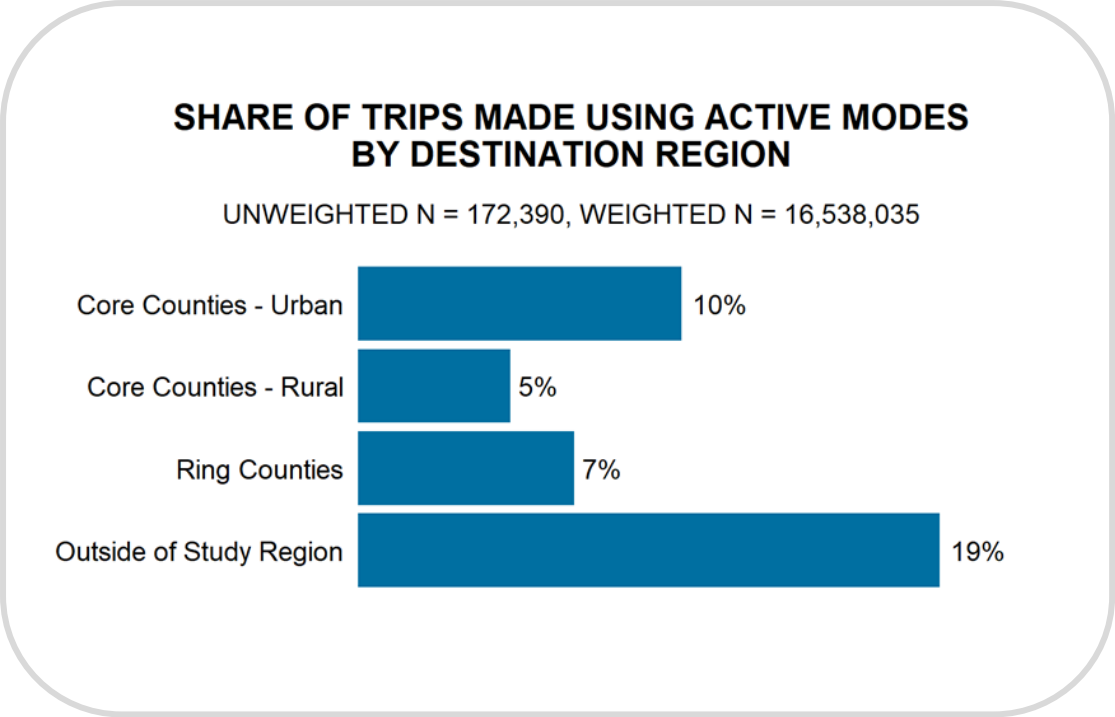


Mode Share

79% of trips are household vehicle trips, the highest of any mode.

Within the study area, the Core Counties – Urban region has the highest share of trips made using active modes (walk and micromobility trips).

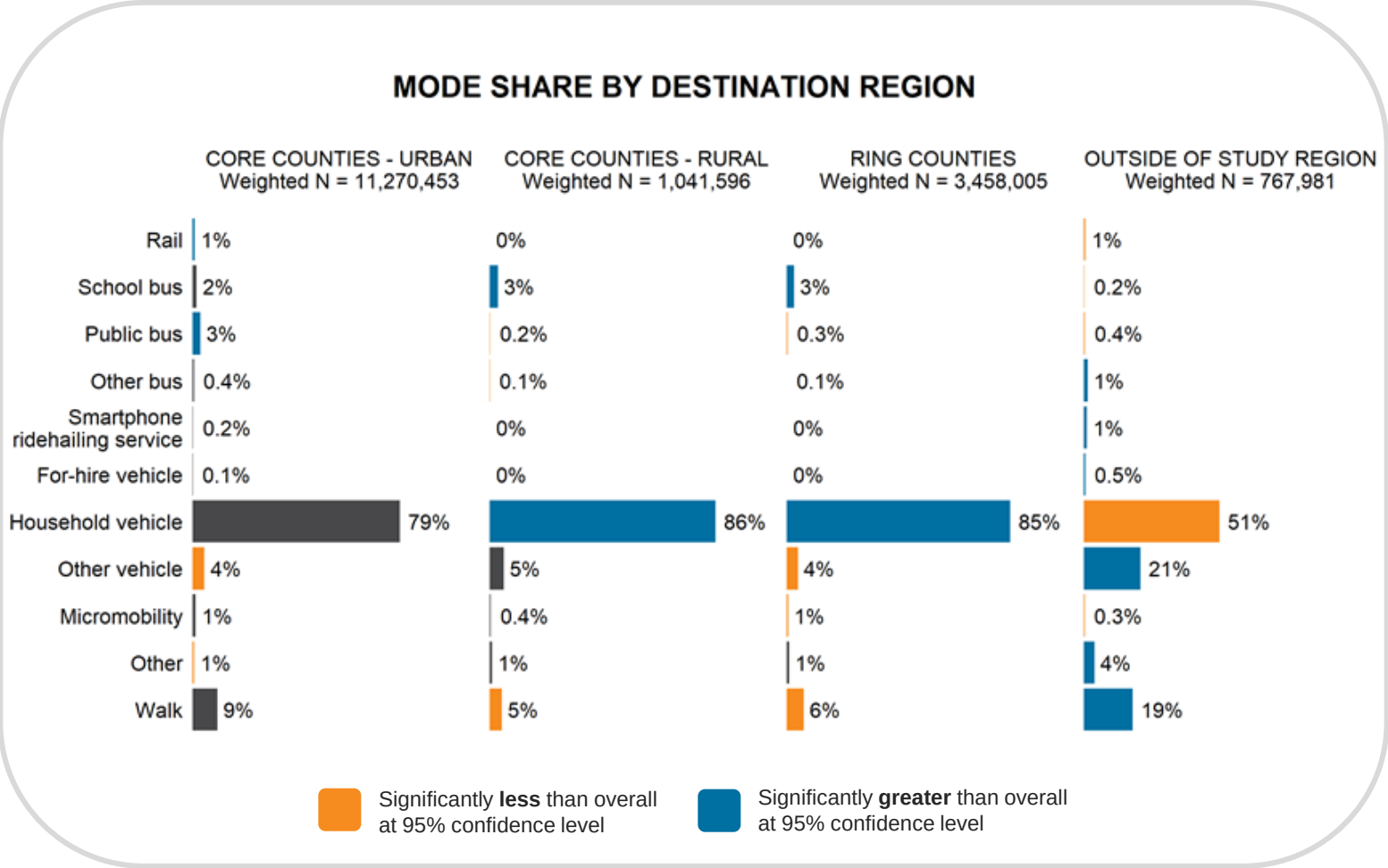




Mode Share by Destination Region

The Core Counties – Rural region has the highest share of household vehicle trips.

The Core Counties – Urban region has the highest share of public bus trips and walk trips within the study region.

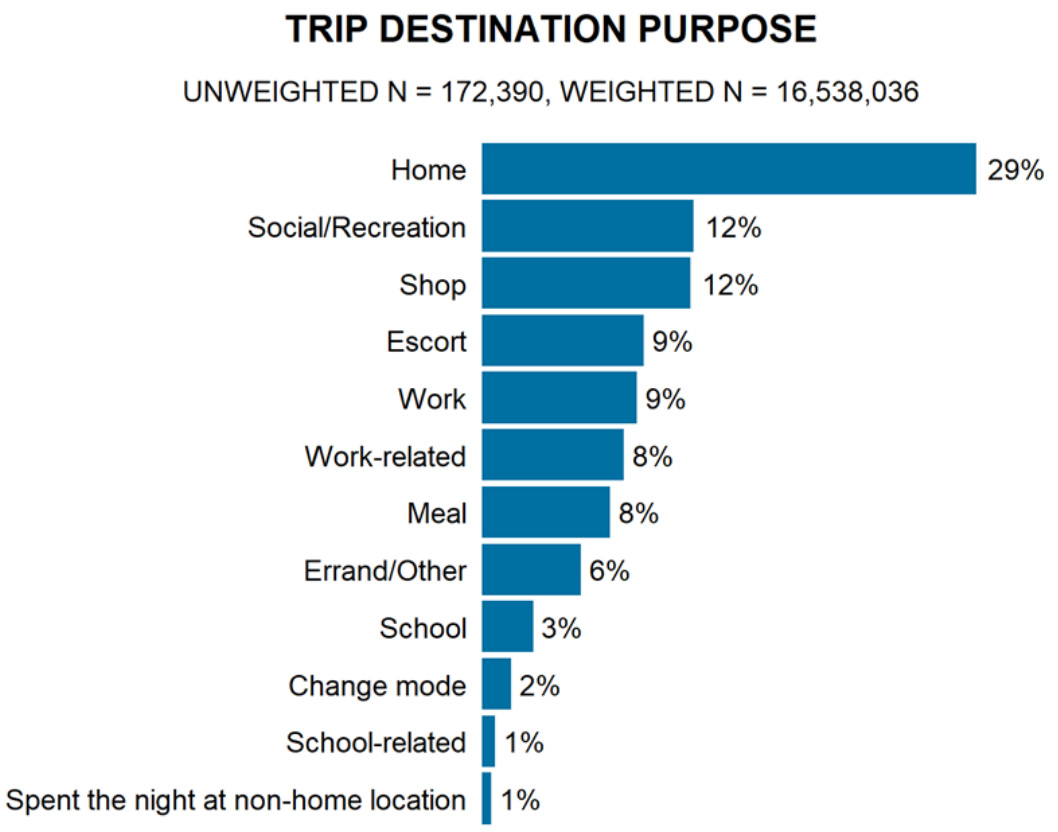


Trip Purpose

Most frequent trip purposes:

- 29% of trips are trips home.
- 17% of trips are to work or are work-related.

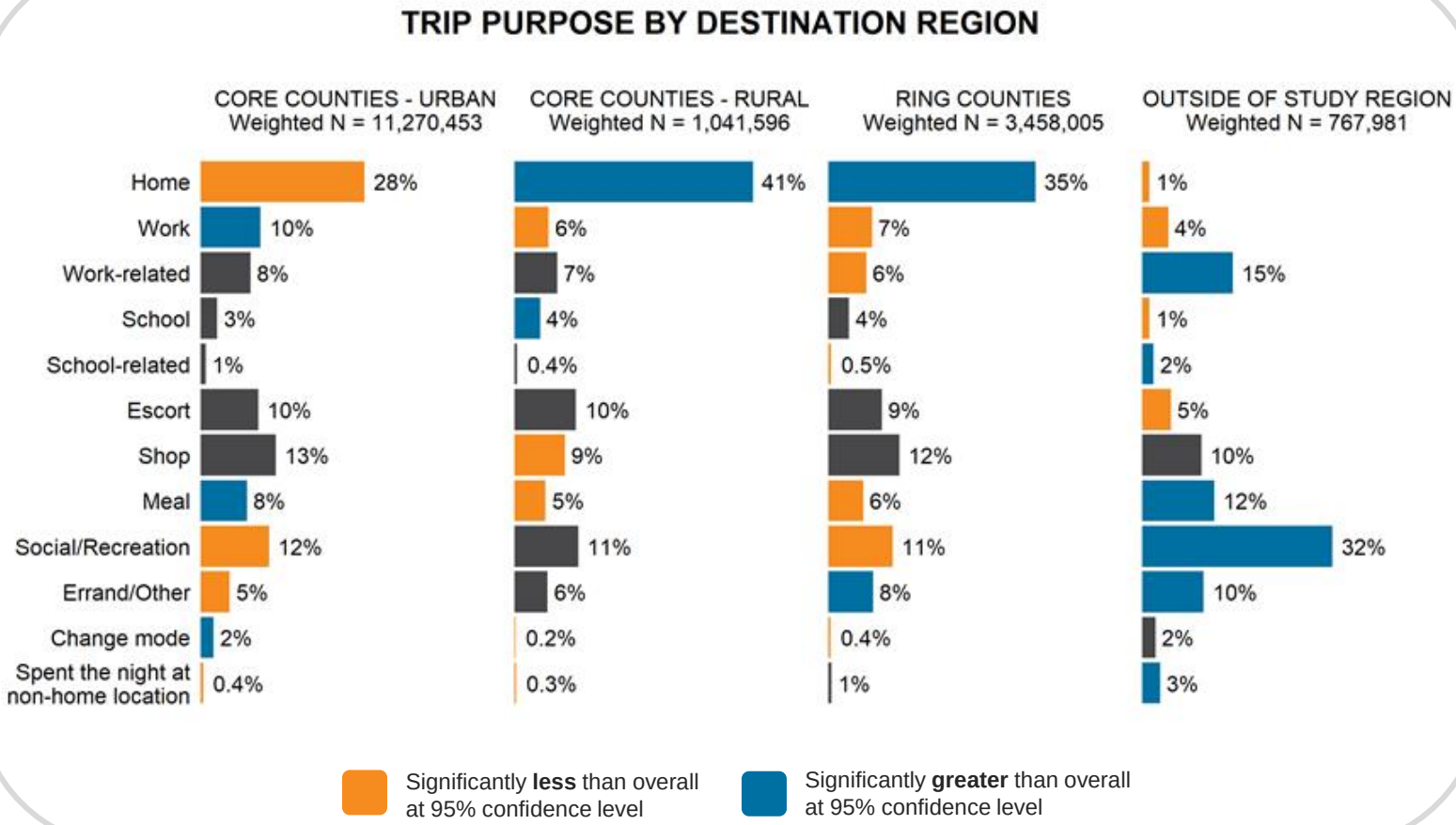
Note: Purpose refers to the "purpose for traveling to the trip destination."



Trip Purpose by Destination Region

The Core Counties – Rural and Ring Counties regions have a larger share of trips home compared to trips ending in the Core Counties – Urban.

The Core Counties – Urban region have a larger share of work commute and meal trips.

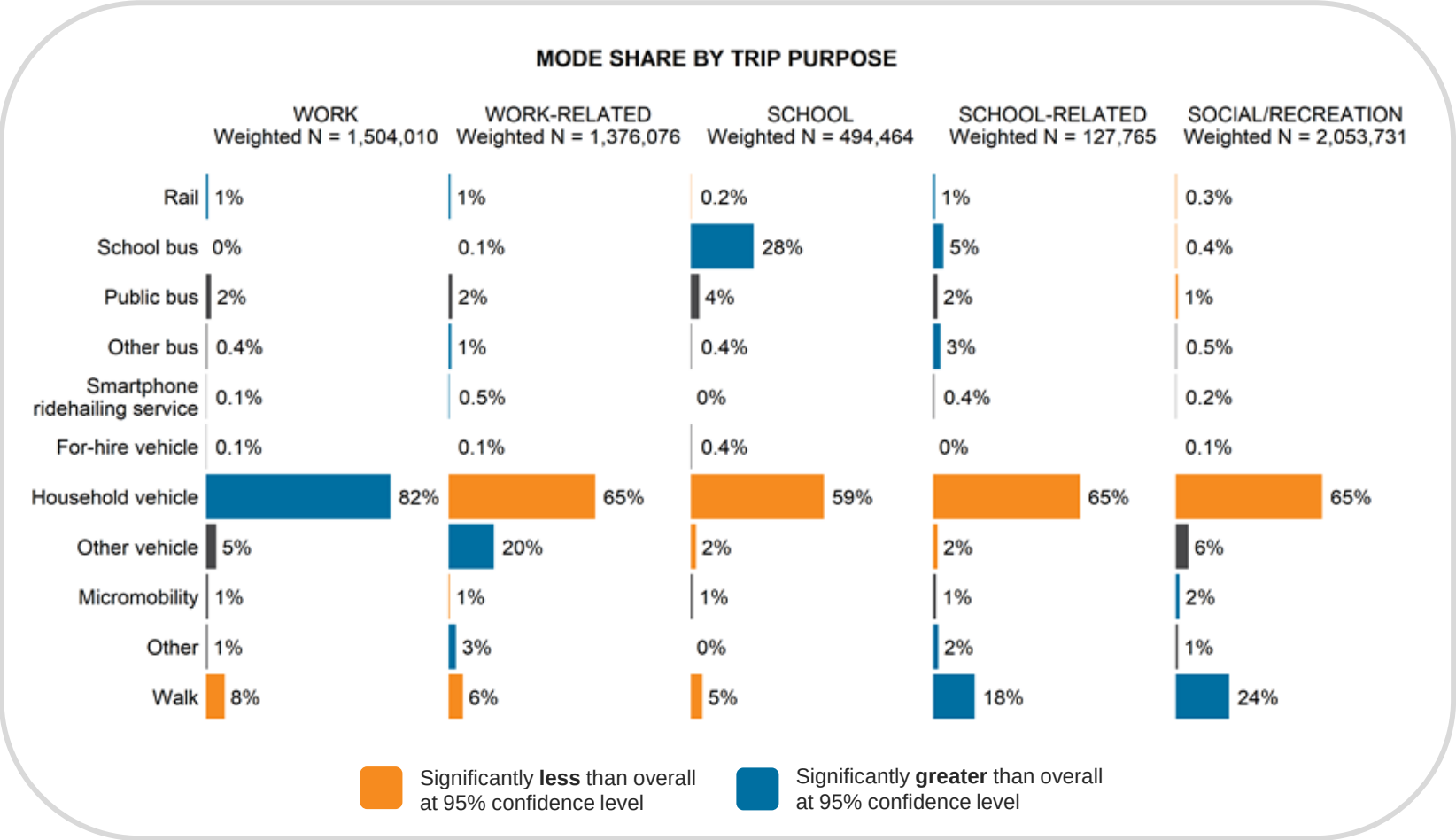


Trip Mode by Trip Purpose

Work commute trips are more likely to be made in a household vehicle.

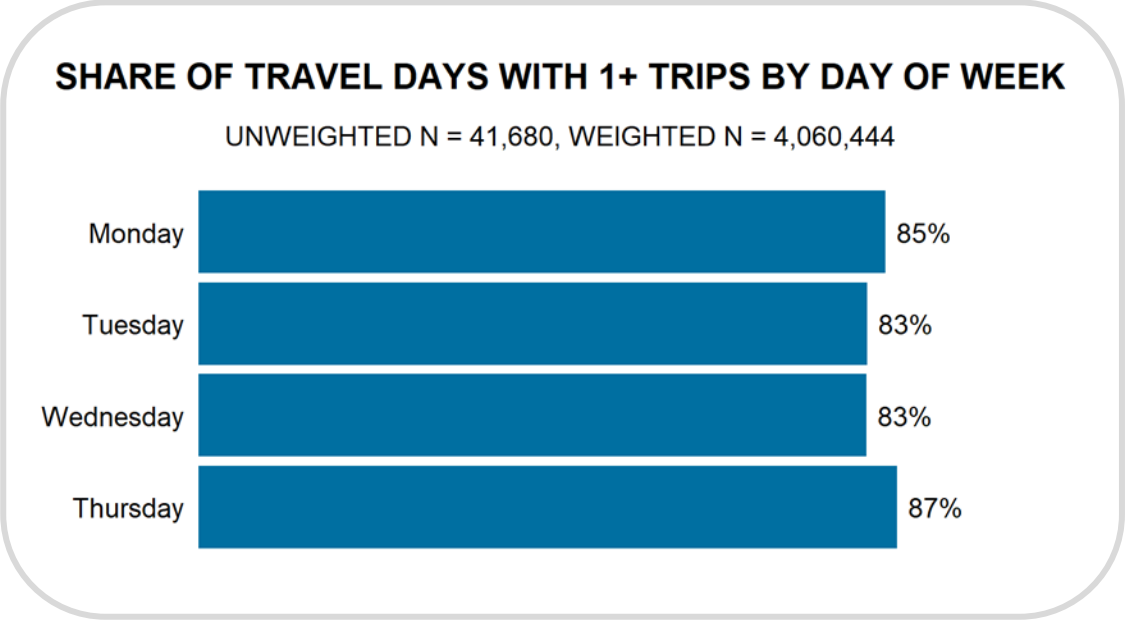
28% of school trips are made by school bus.

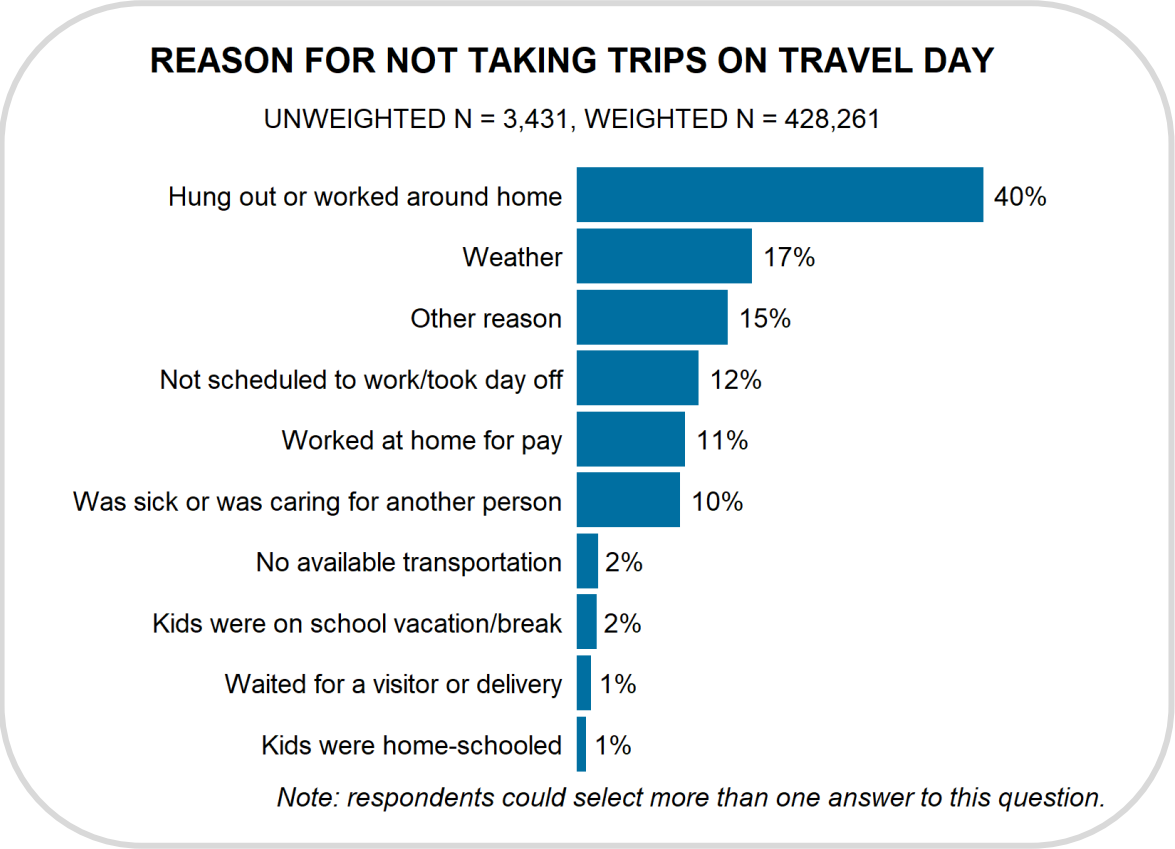
School-related and social/recreation trips have a larger share of walk trips.



No Travel Days

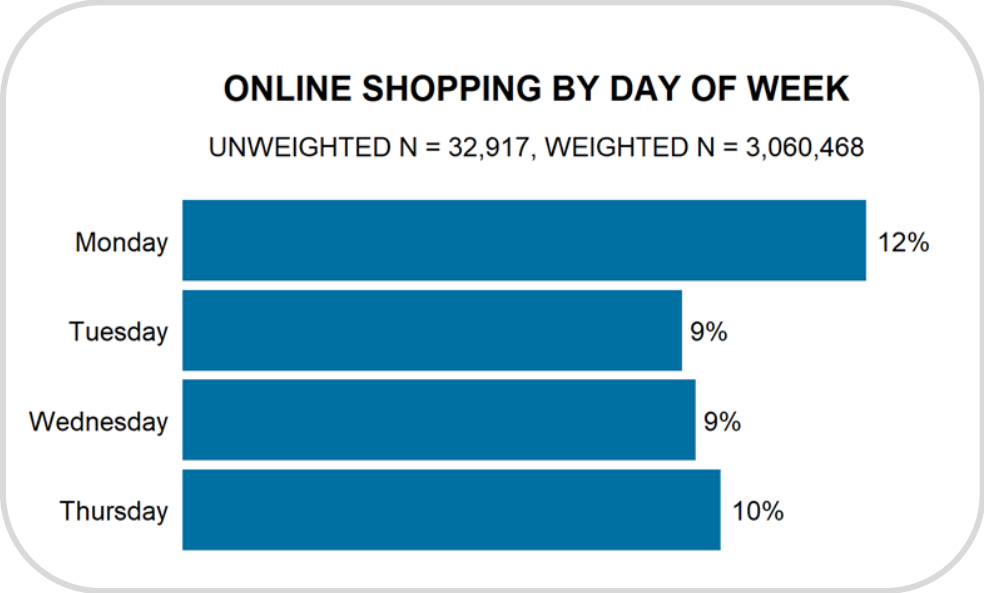
On an average weekday, 16% of residents do not make any trips.

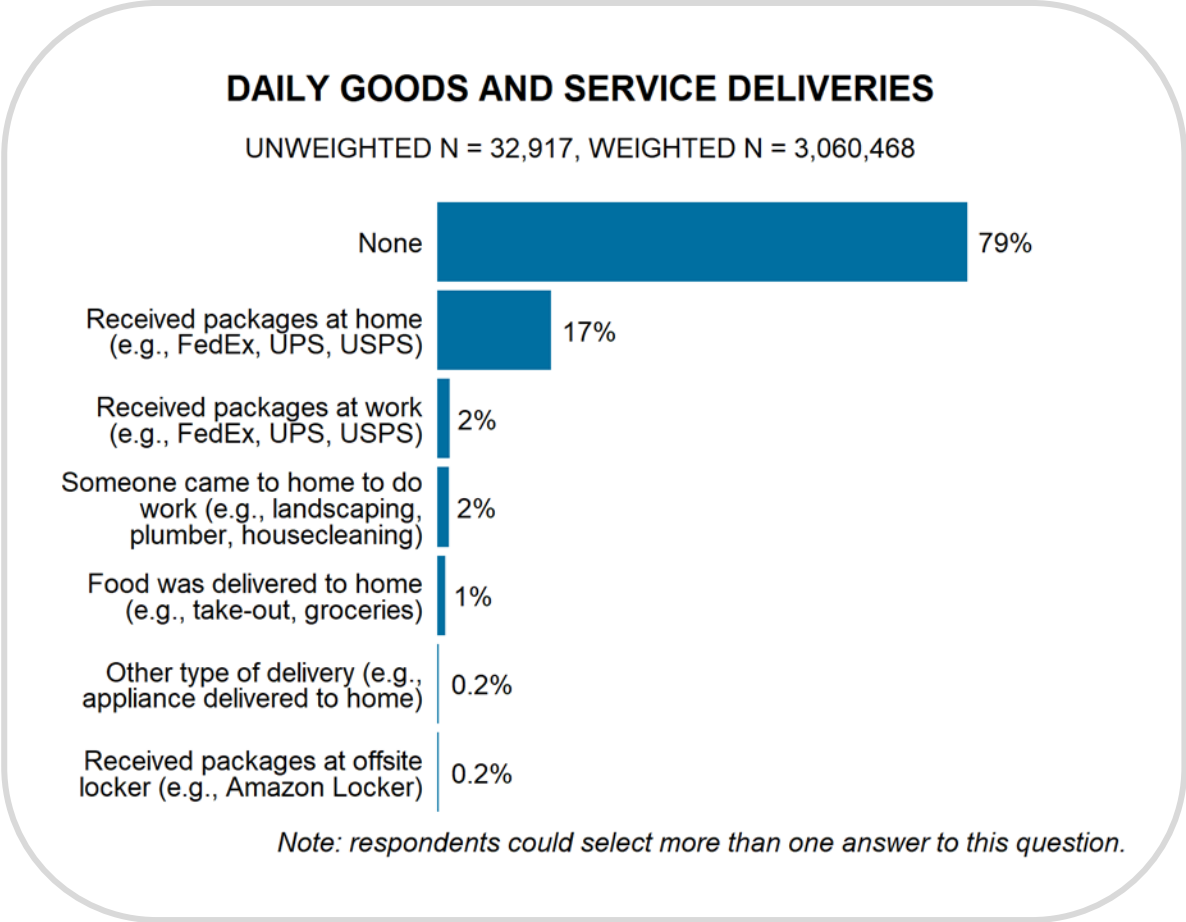




Freight Service Use

On an average weekday, 10% of residents shop online and 21% receive a good or service delivery.

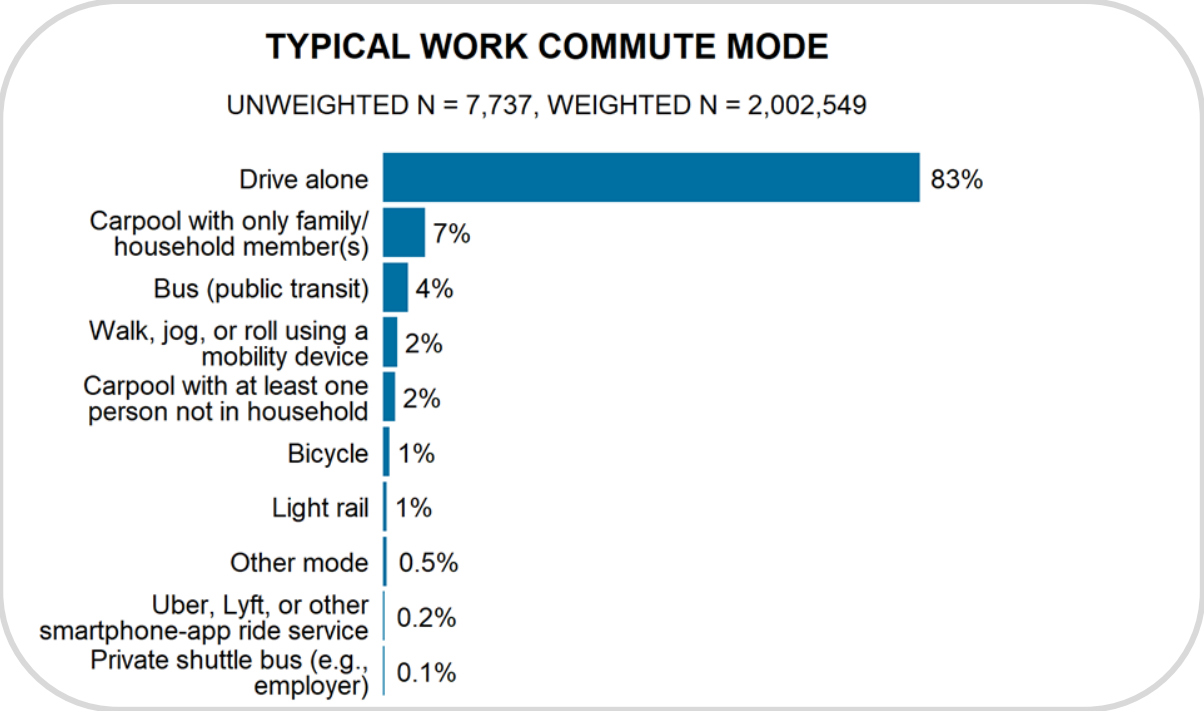


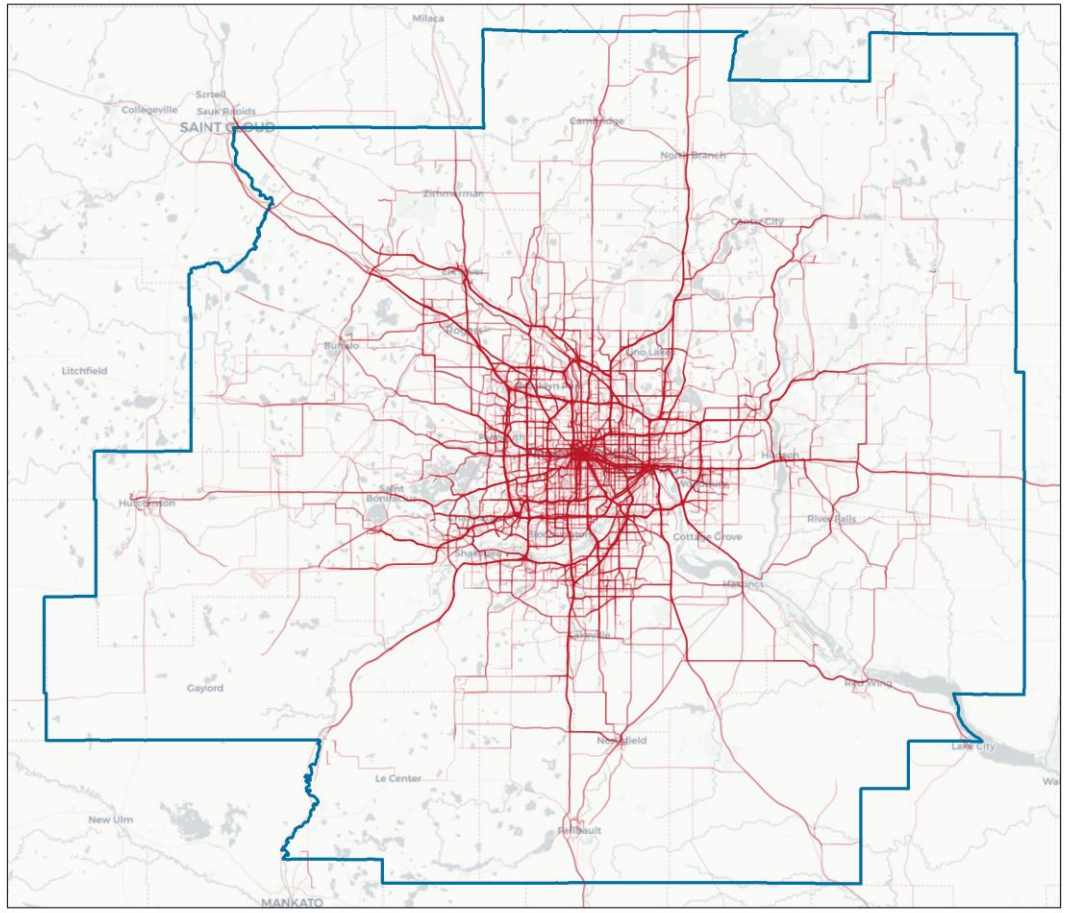


Work Commute Trips

83% of workers typically drive alone to work.

13% of workers change their work commute mode by season.



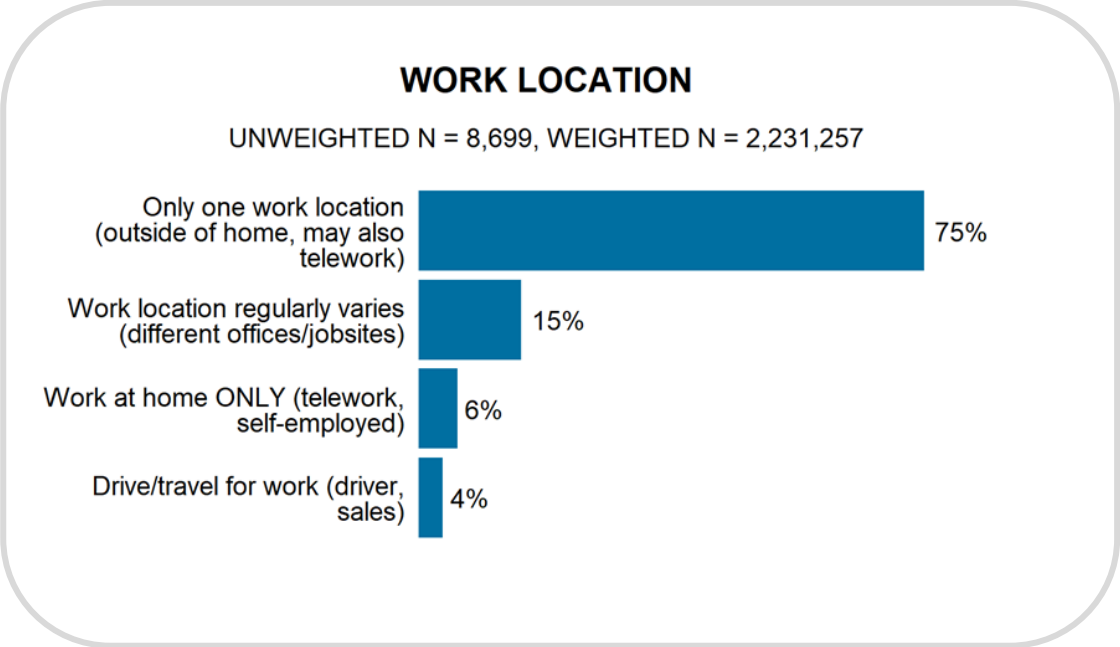


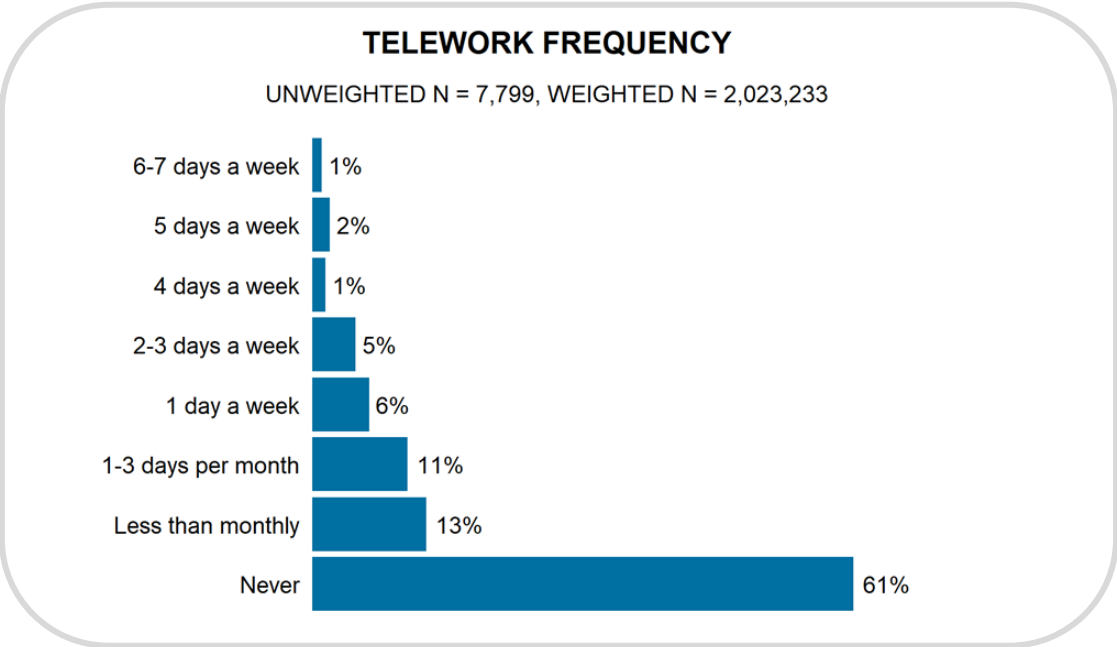
Trip origins and destinations were trimmed by 500 meters to protect respondents' privacy

Work Location

75% of workers have one work location.

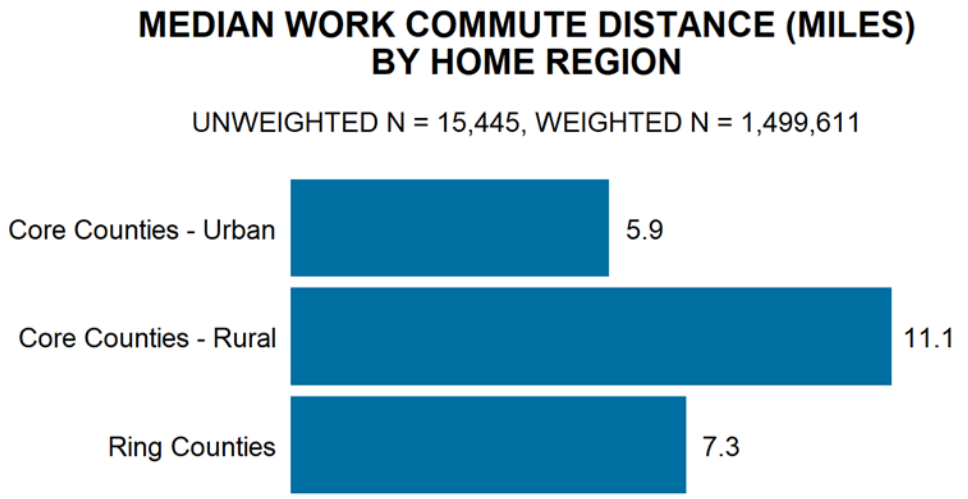
15% of workers with one work location or whose work location regularly varies telework at least 1 day a week.

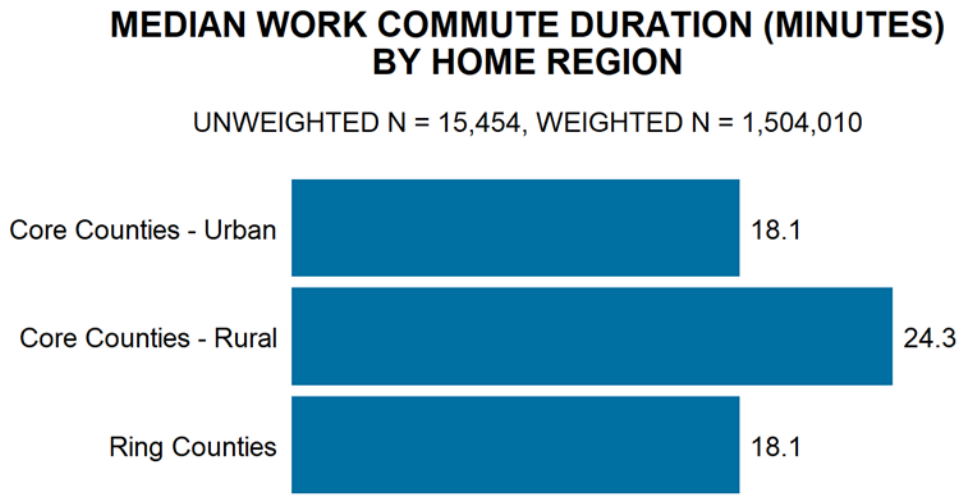




Work Commute Distance and Duration

Workers who reside in the Core Counties – Rural region have the longest median work commute trip distance and duration.

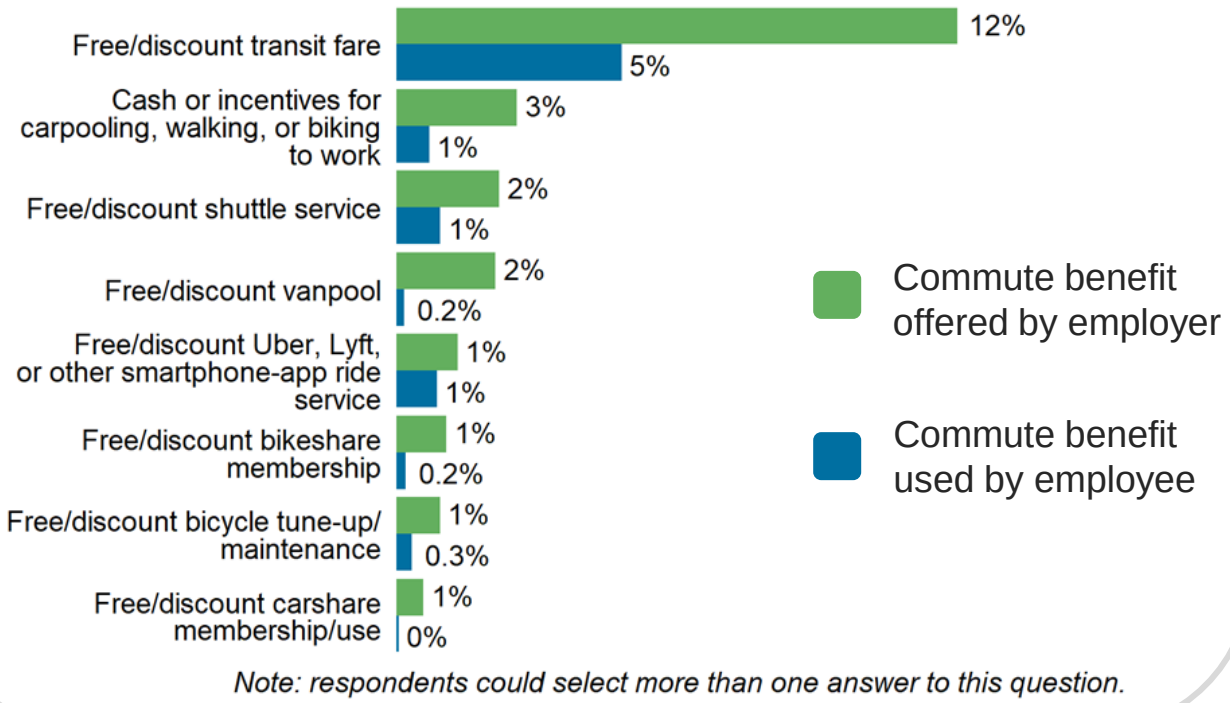




Employer Subsidized Services

12% of workers' employers offer free or discounted transit fare. Slightly less than half of those workers use that benefit.

The second most offered commuting benefit is cash or incentives for taking alternative modes of transportation to work.

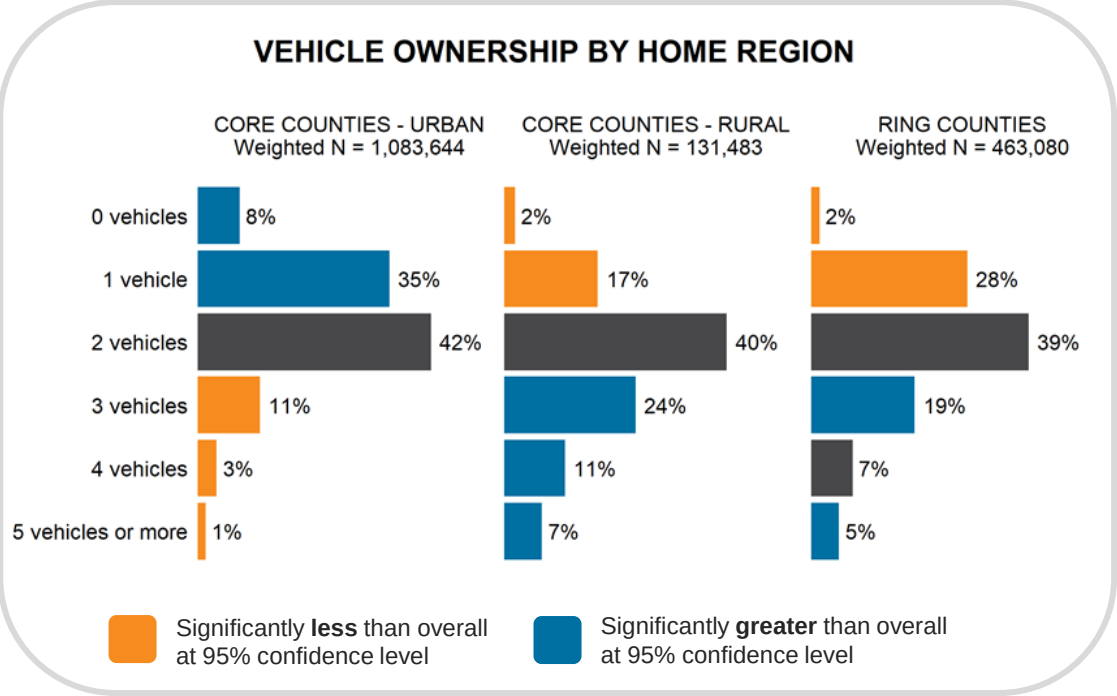


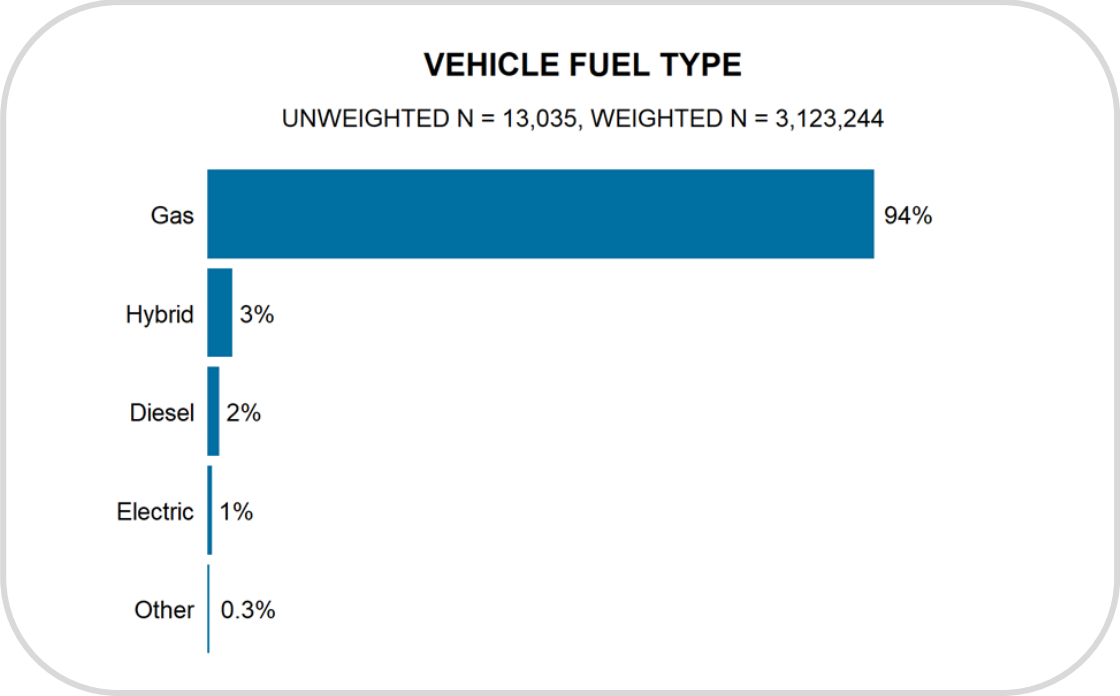
Vehicle Use and Behavior

Vehicle Ownership

Households in the Core Counties – Urban region are less likely to own 3 or more vehicles.

94% of vehicles are fueled by gas.

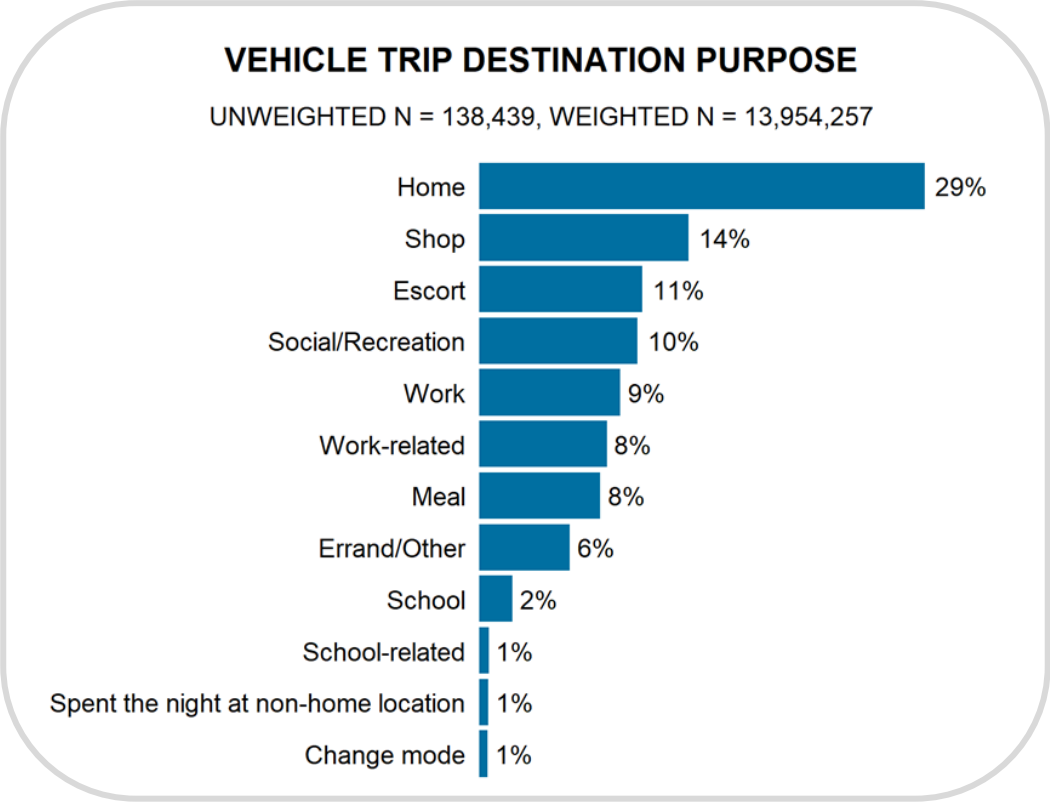


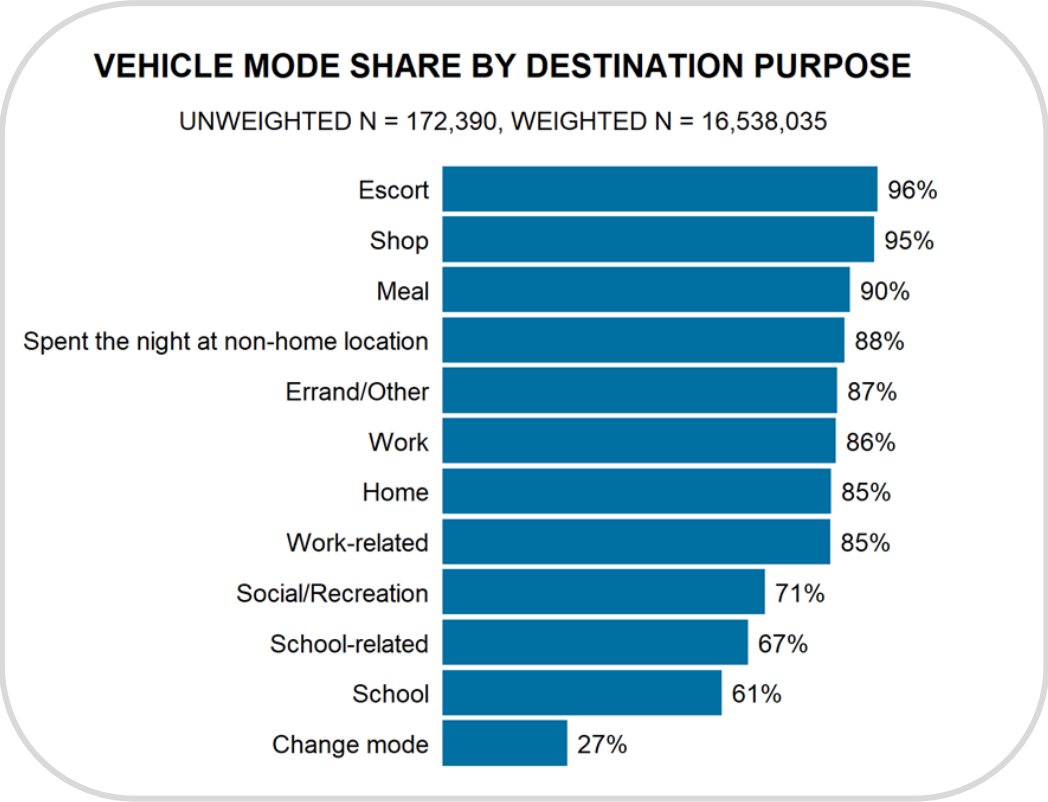


Vehicle Travel Behavior

The largest share of vehicle trips are made for the purpose of shopping or going home.

Escort and shopping trips are the most likely to be made in a vehicle.

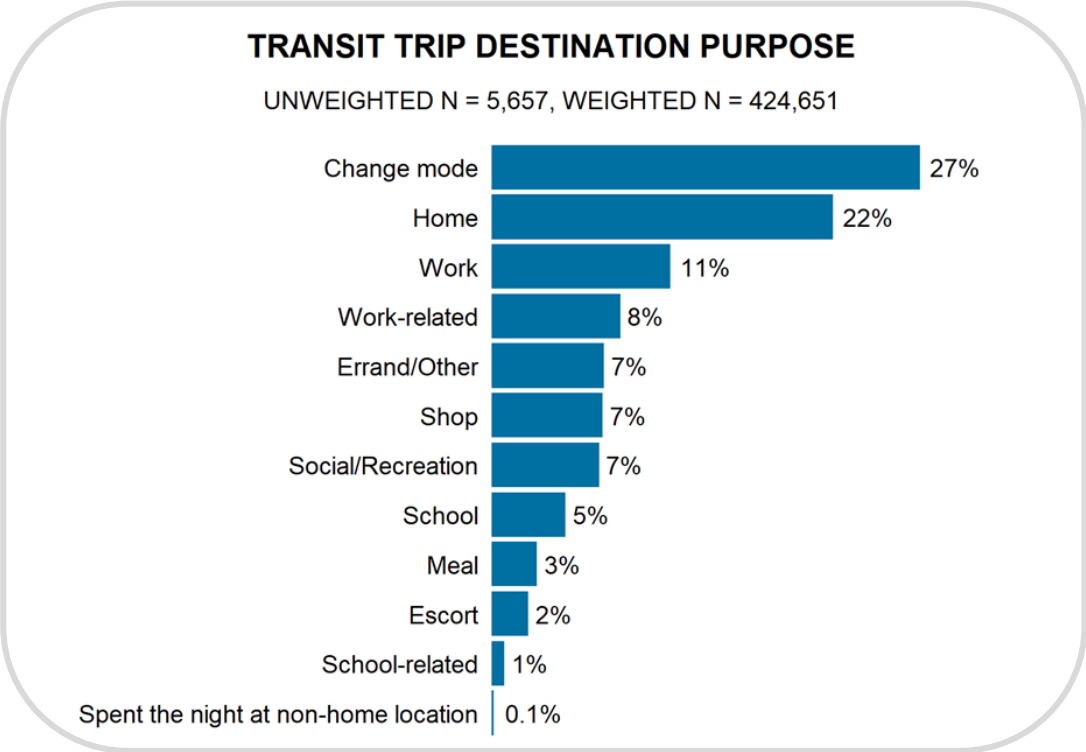


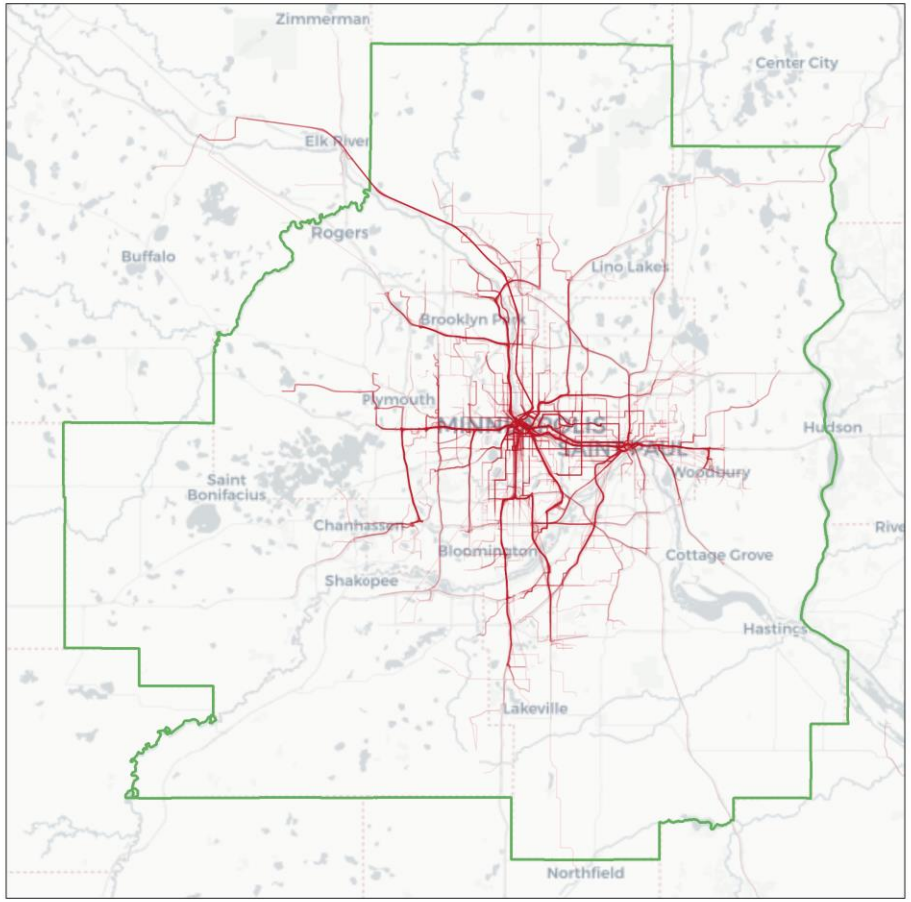


Transit Use and Behavior

Transit Trip Traces

Most public bus and rail trips are made for the purpose of changing modes, going home, or going to work.



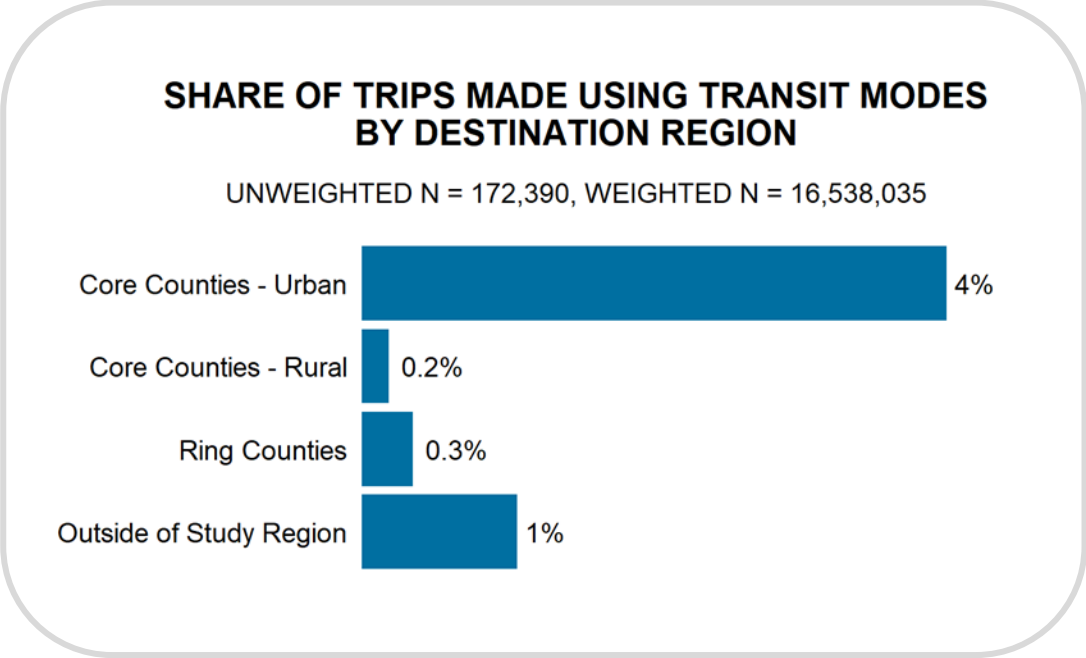


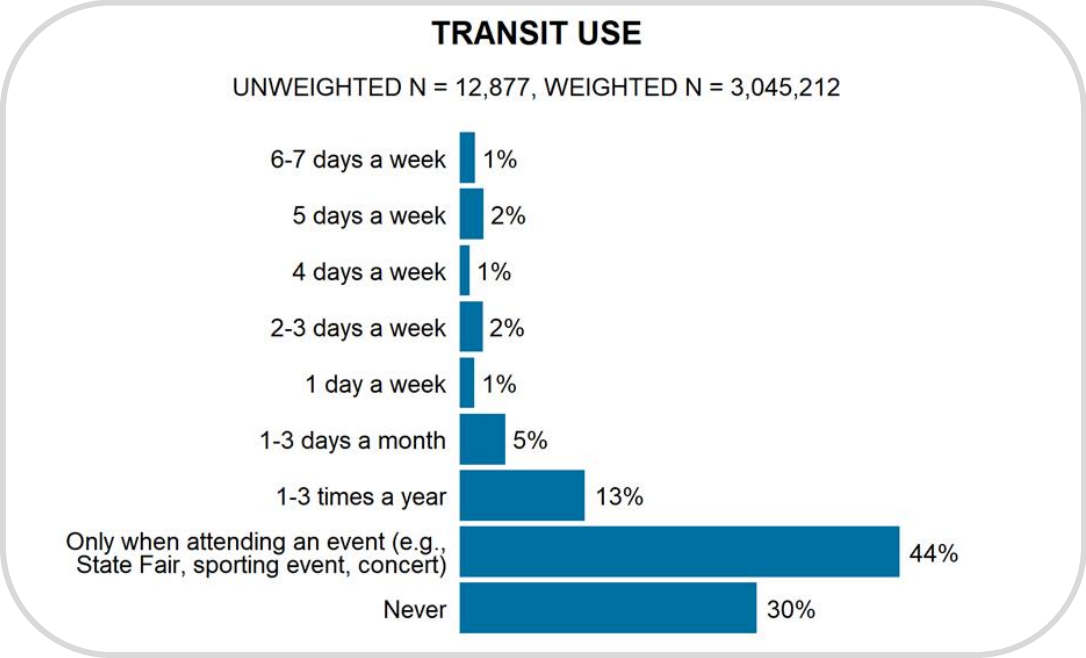
Trip origins and destinations were trimmed by 500 meters to protect respondents' privacy

Transit Mode Share and Use

4% of trips made with destinations in the Core Counties – Urban region are made using public bus or rail, the highest share of the three regions in the study area.

7% of residents use transit weekly and 44% only use transit when attending an event.

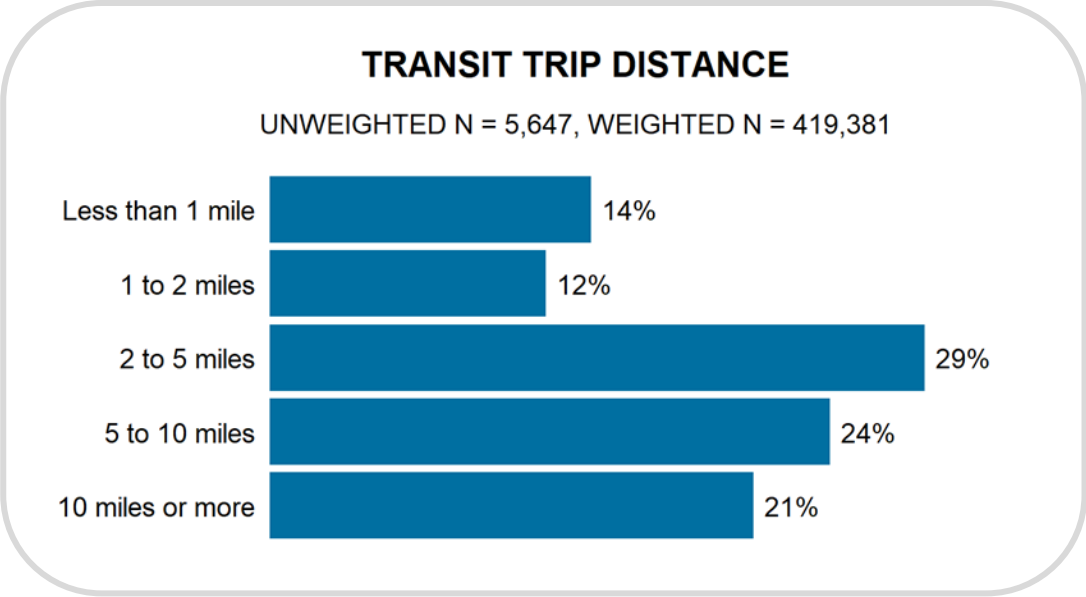


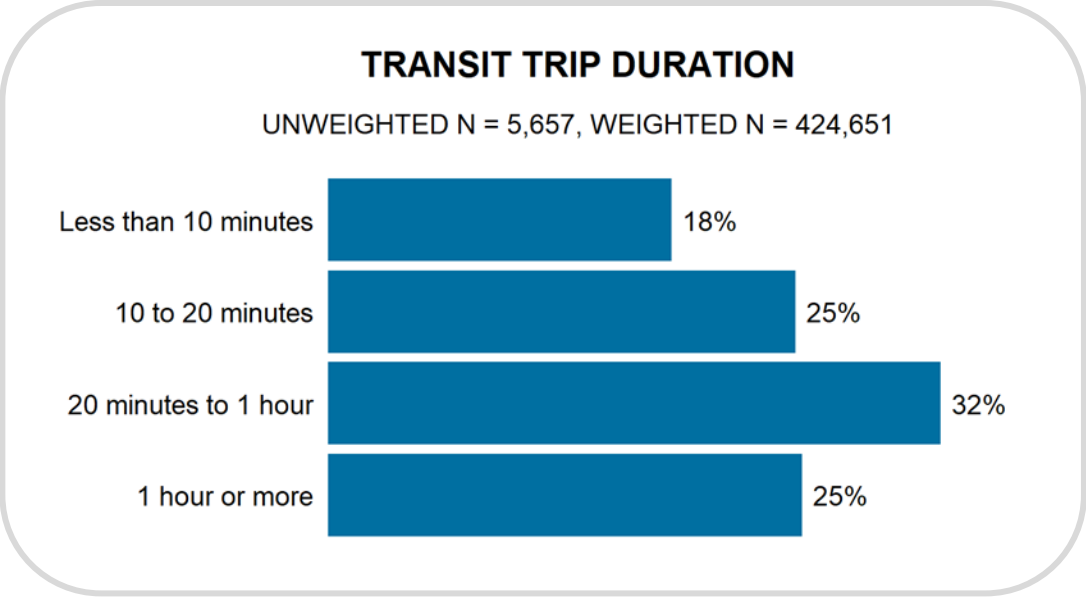


Transit Trip Distance and Duration

74% of transit trips are 2 or more miles long.

82% of transit trips were 10 minutes or longer in duration.

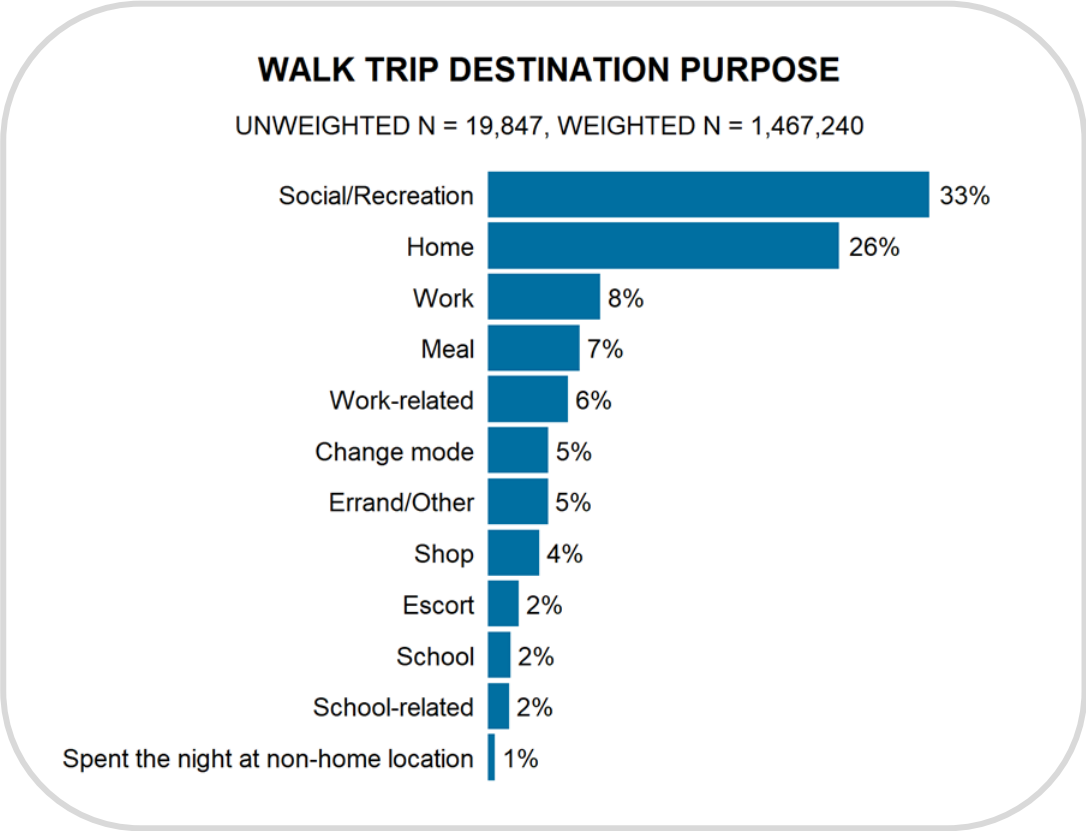


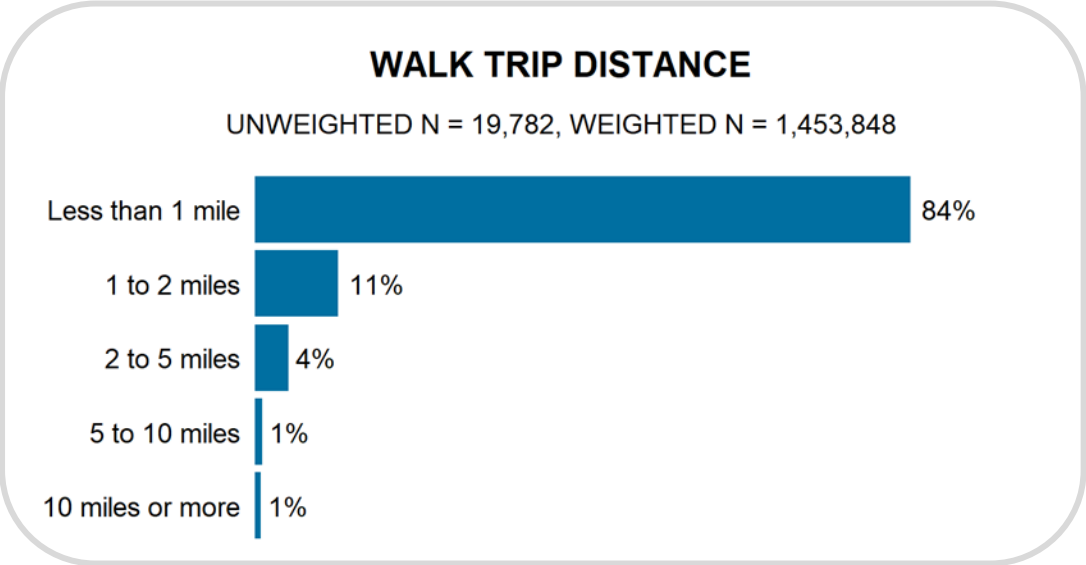


Pedestrian and Micromobility Behavior

Pedestrian Behavior

The majority of walk trips are made for the purpose of social and recreation or going home.



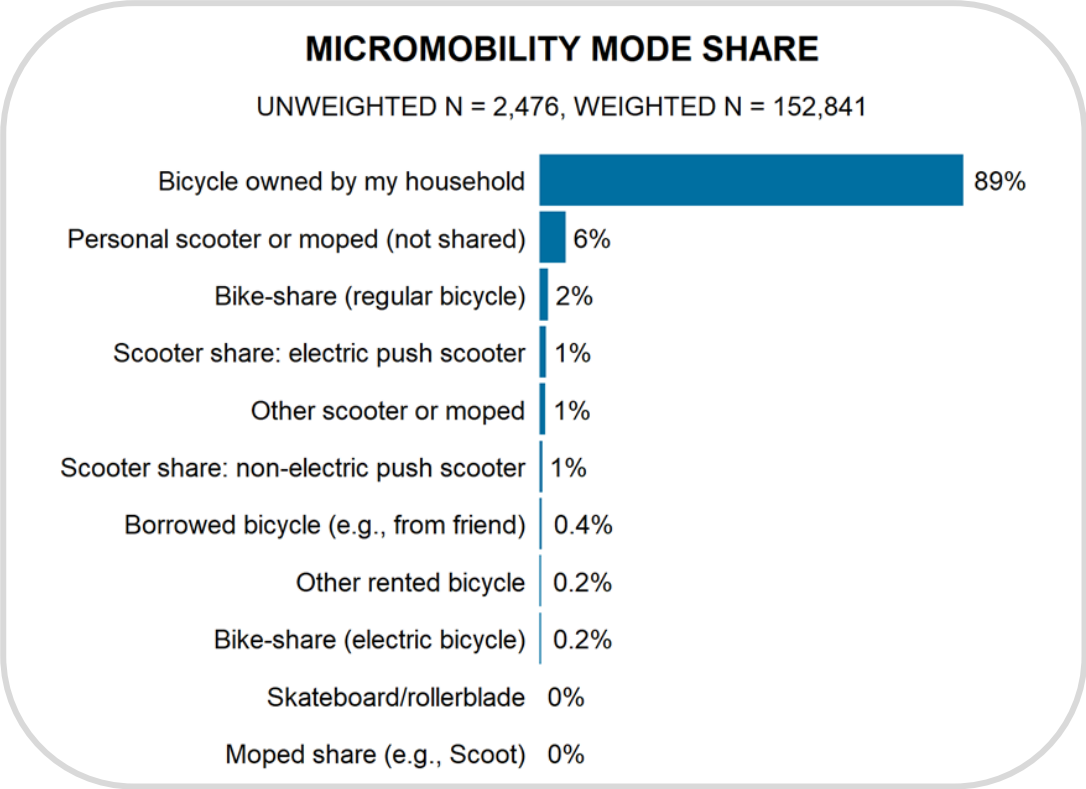


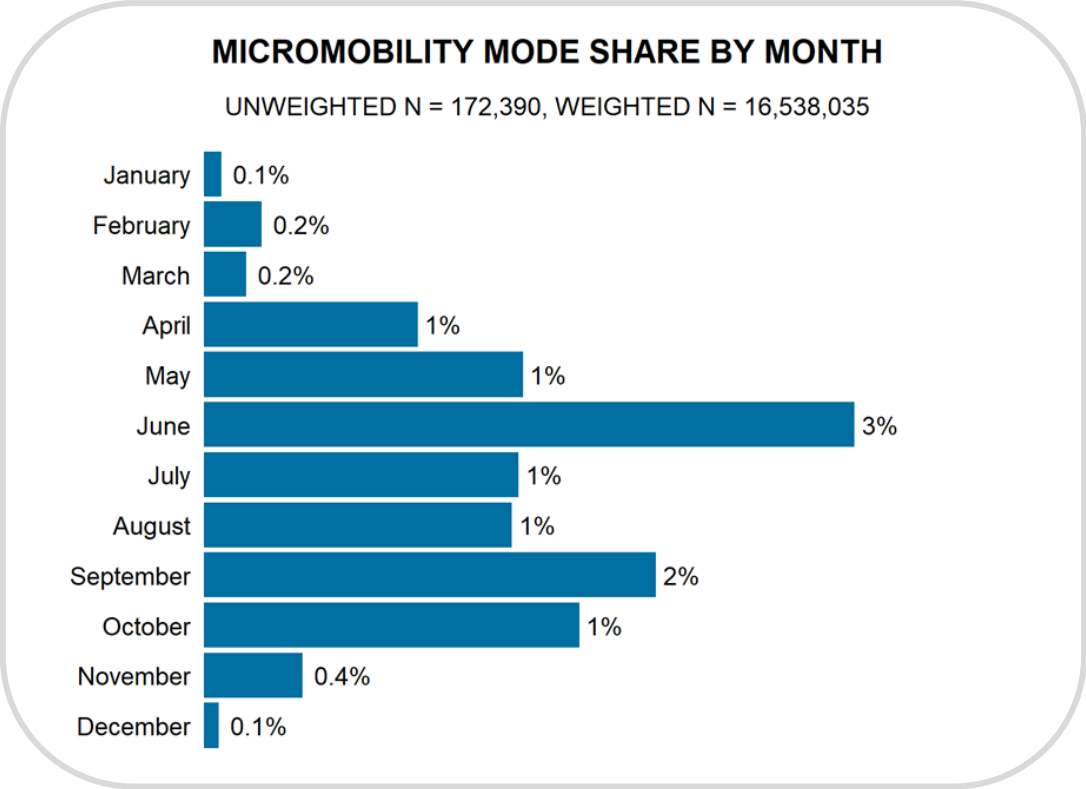
84% of walk trips are less than 1 mile. 75% are 20 minutes or less.

Micromobility Mode Use

89% of micromobility trips are made using a personal bicycle.

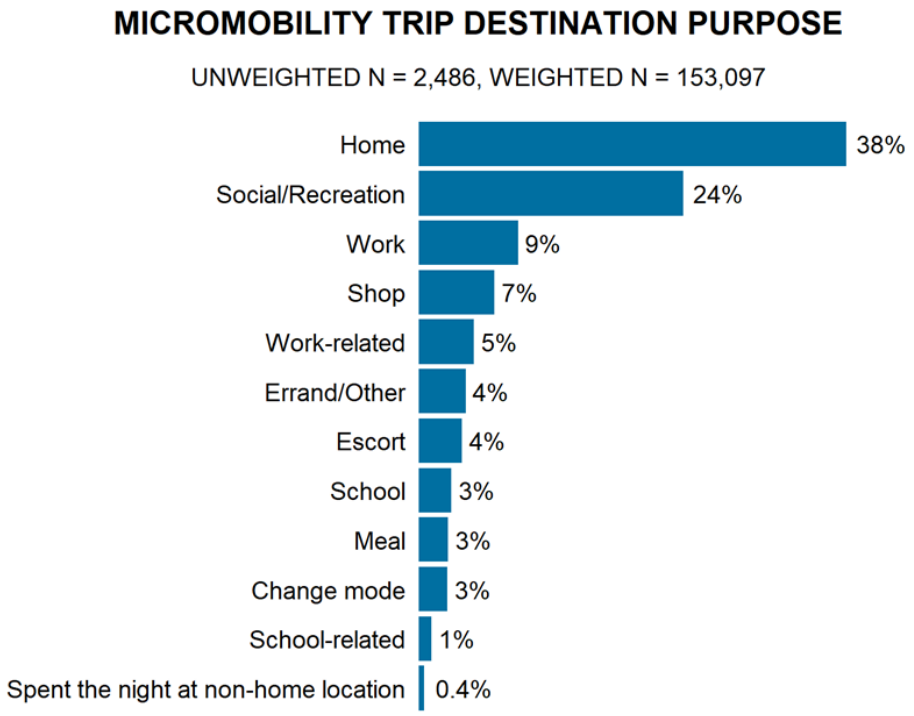
The share of micromobility trips changes seasonally, increasing in warmer months.

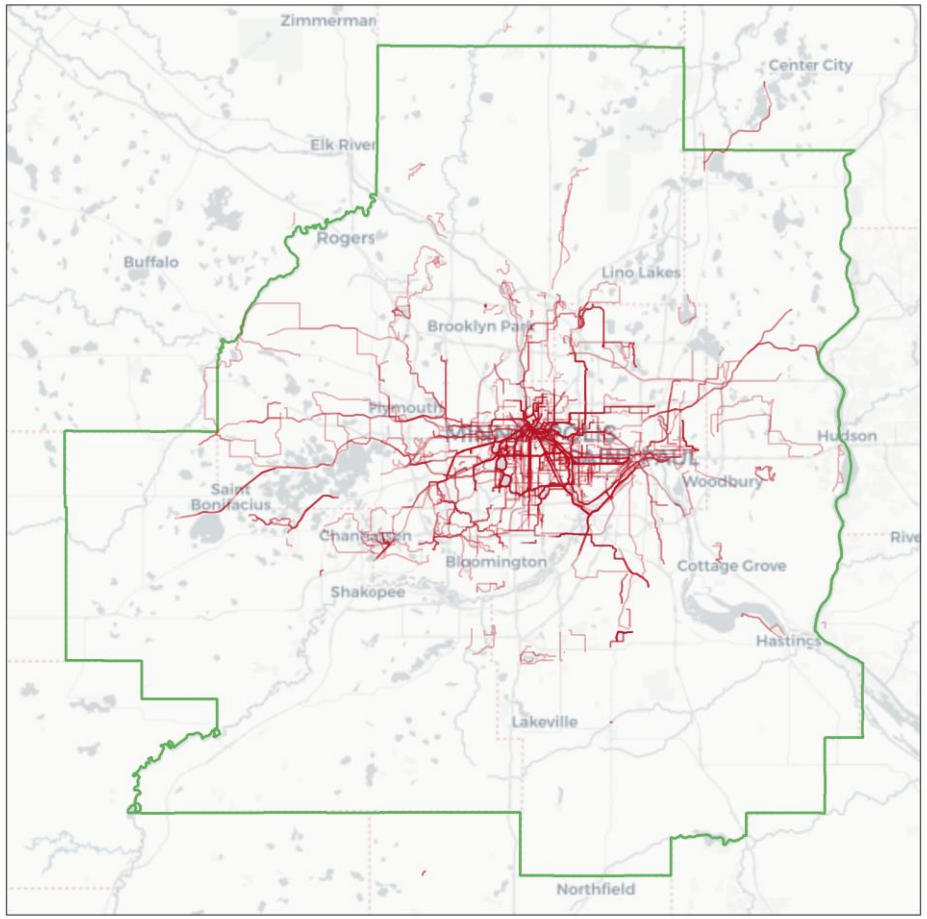




Micromobility Trips

The majority of micromobility trips are made for the purpose of going home or social and recreation.

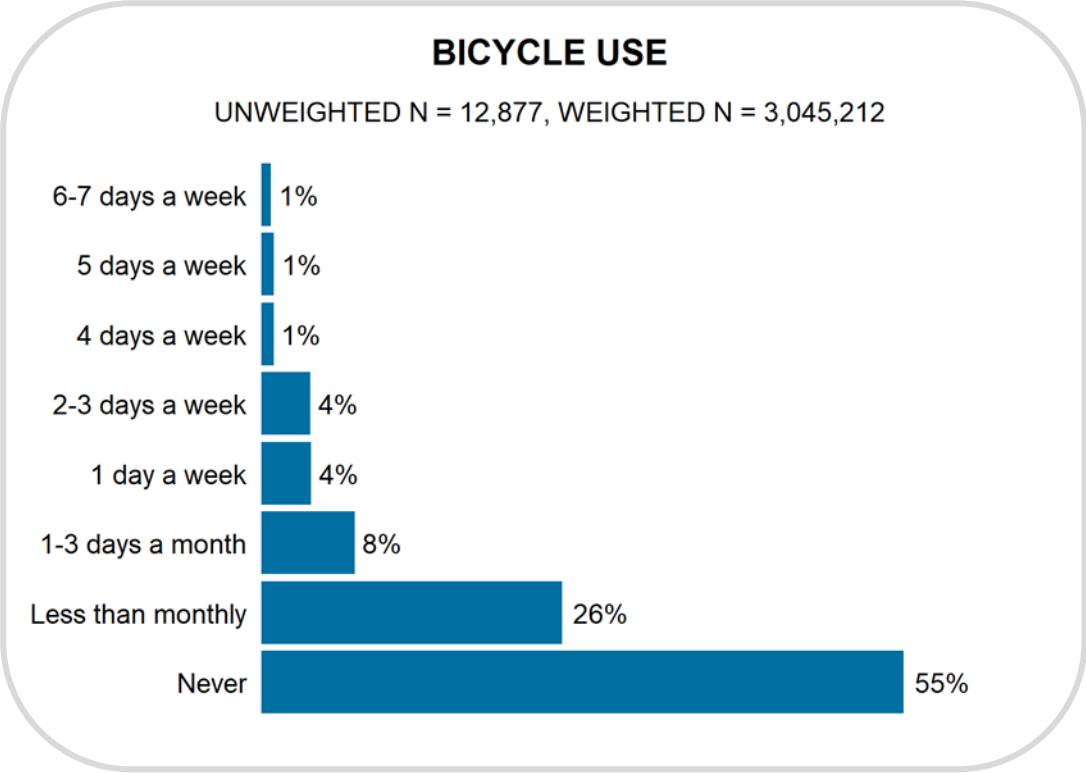


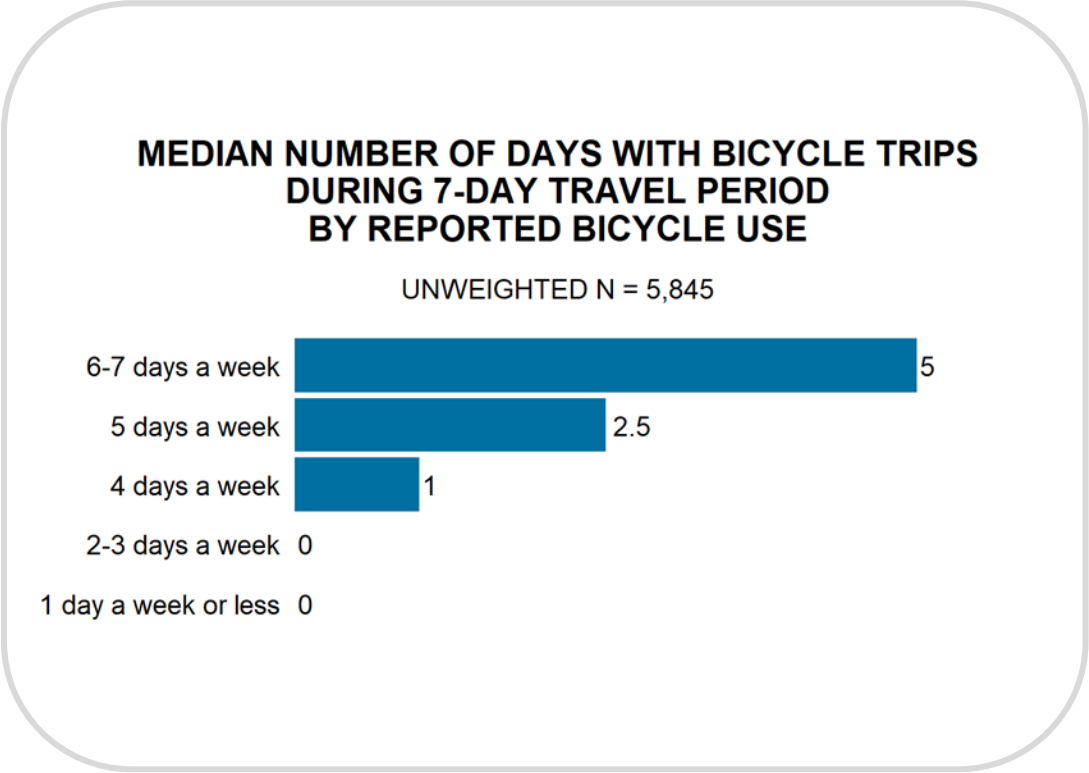


Trip origins and destinations were trimmed by 500 meters to protect respondents' privacy

Frequency of Bicycle Use

19% of residents use a bicycle at least monthly and 11% use a bicycle weekly.



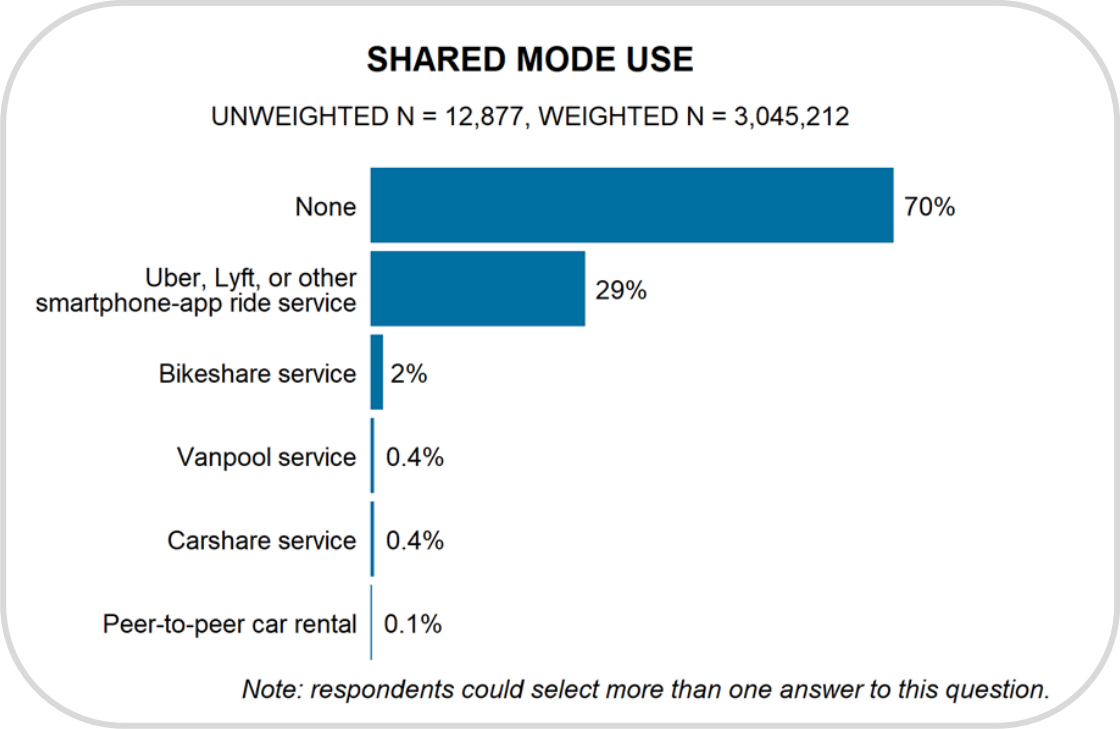


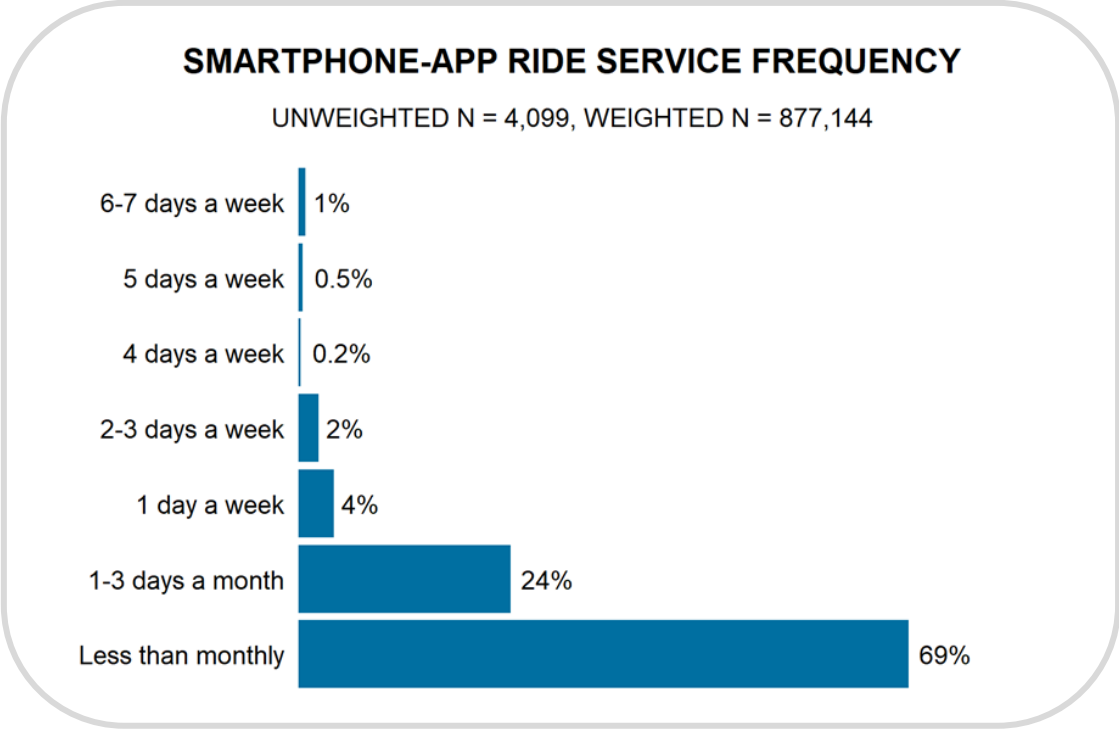
New Mobility Services

Shared Mode Use

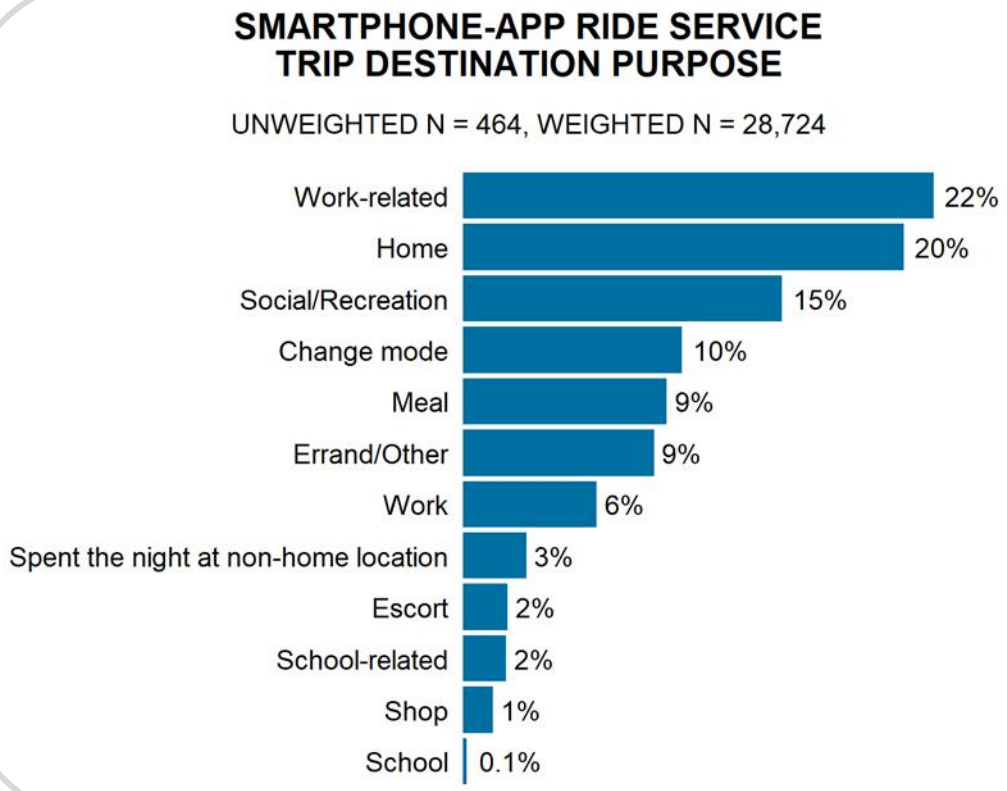
29% of residents have used a smartphone-app ride service. 1% of residents drive for Uber, Lyft, or another smartphone-app ride service.

69% of residents who use smartphone-app ride services use them less than monthly.

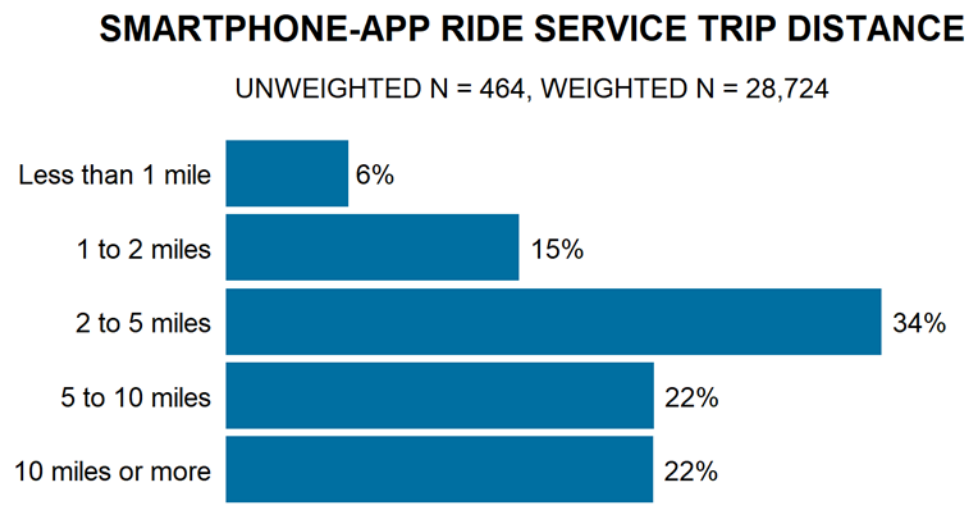




Smartphone-app Ride Service Trips



The largest share of smartphone-app ride service trips are made for a work-related purpose or to go home.

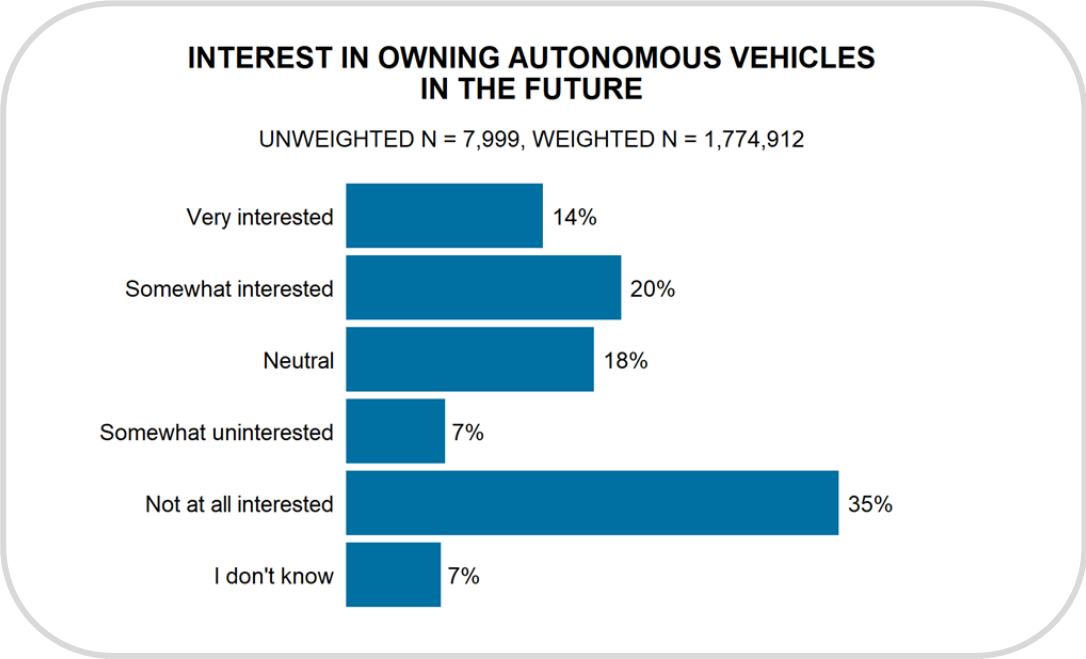


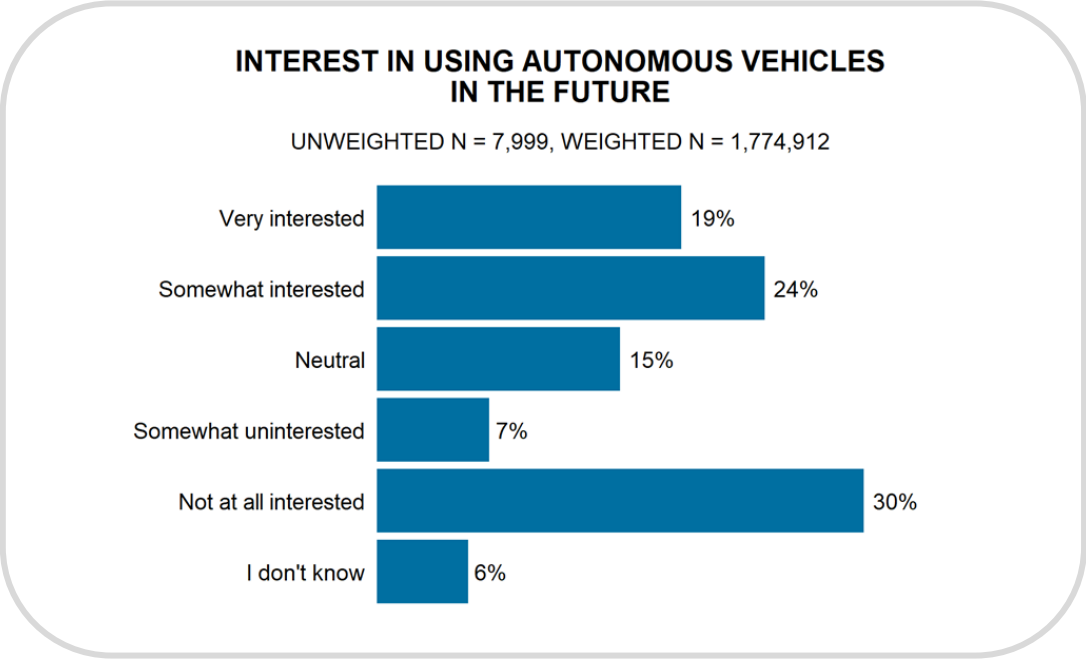
Attitudes toward Autonomous Vehicles

Interest in Using and Owning Autonomous Vehicles

34% of residents are interested in owning an autonomous vehicle in the future, while 35% are not at all interested.

43% of residents are interested in using an autonomous vehicle in the future.



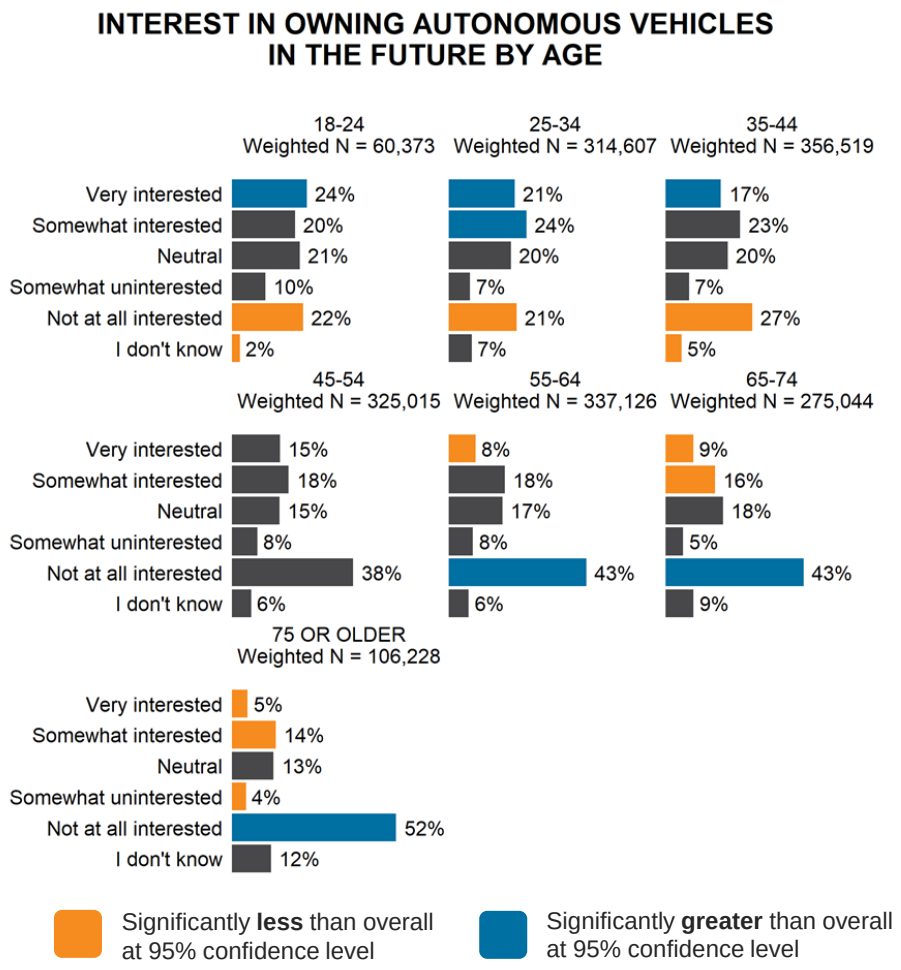


Interest by Demographics

Interest in autonomous vehicles was analyzed by several demographic variables.

Residents who are more interested in using or owning autonomous vehicles in the future include the following:

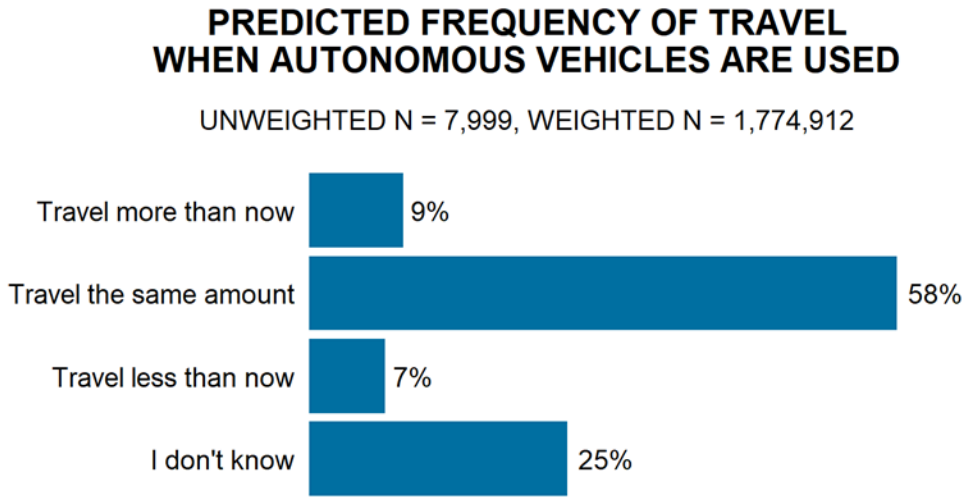
- Younger residents
- Residents with higher incomes
- Residents of the Core Counties – Urban region



Predicted Impacts of Autonomous Vehicles on Travel

The majority of residents predict that they will travel about the same amount as they do now when autonomous vehicles are used.

25% reported they do not know how they will travel in the future when AVs are used.



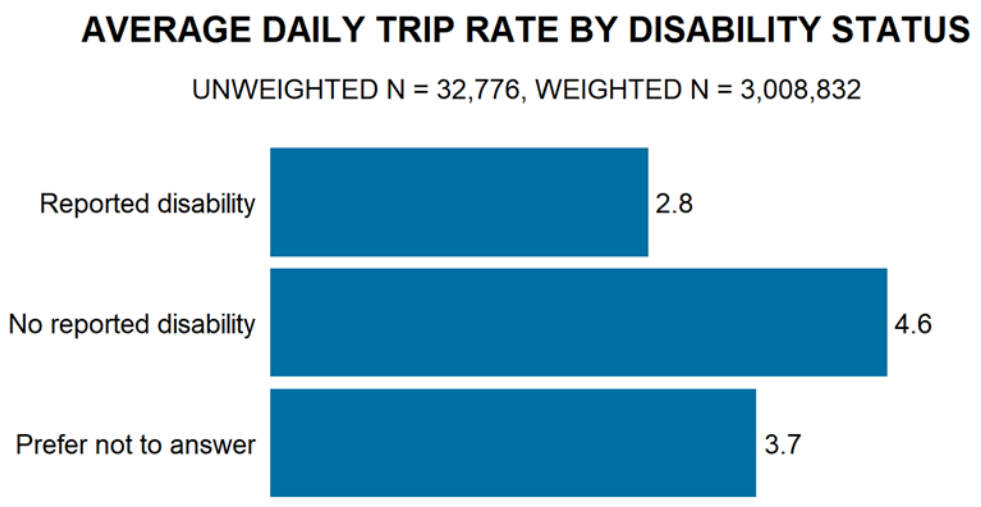
Equity Analysis

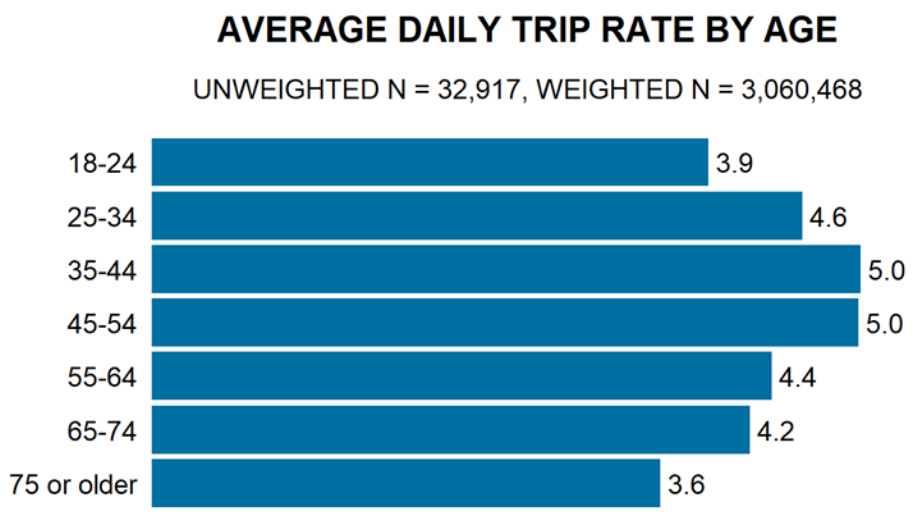
Trip Rates

Residents with a disability have lower average daily trip rates than residents without a disability.

Residents between the ages of 35 and 54 have the highest average daily trip rates.

There is no difference in trip rate by gender.

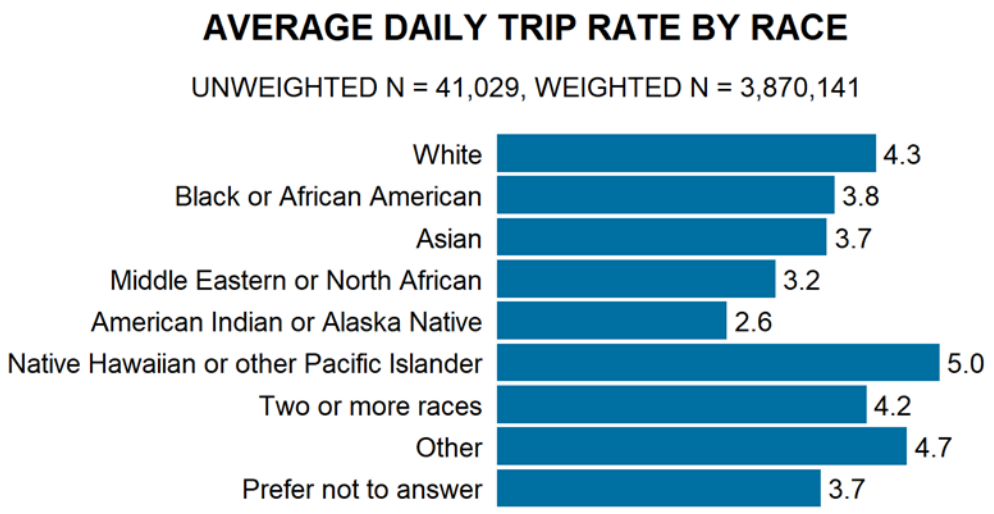


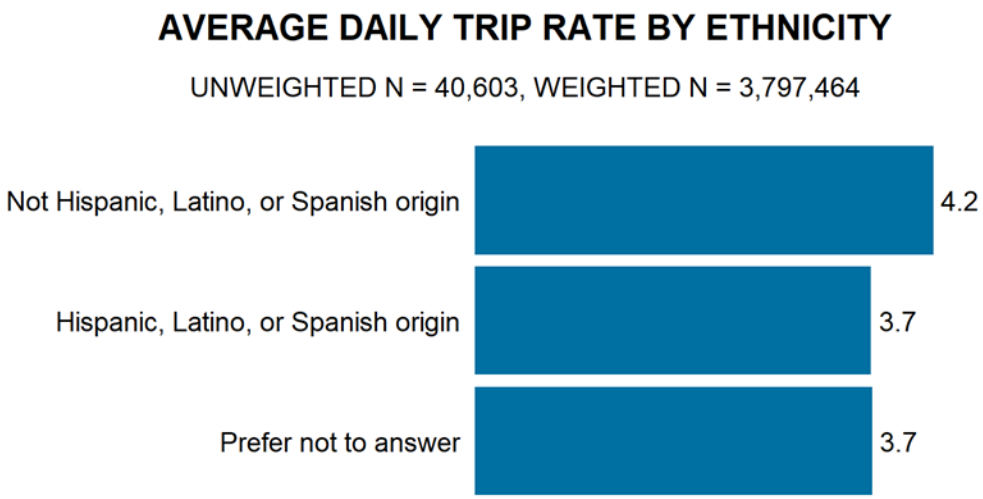


Trip Rates

Hispanic, Asian, and Black or African American residents have lower average daily trip rates.

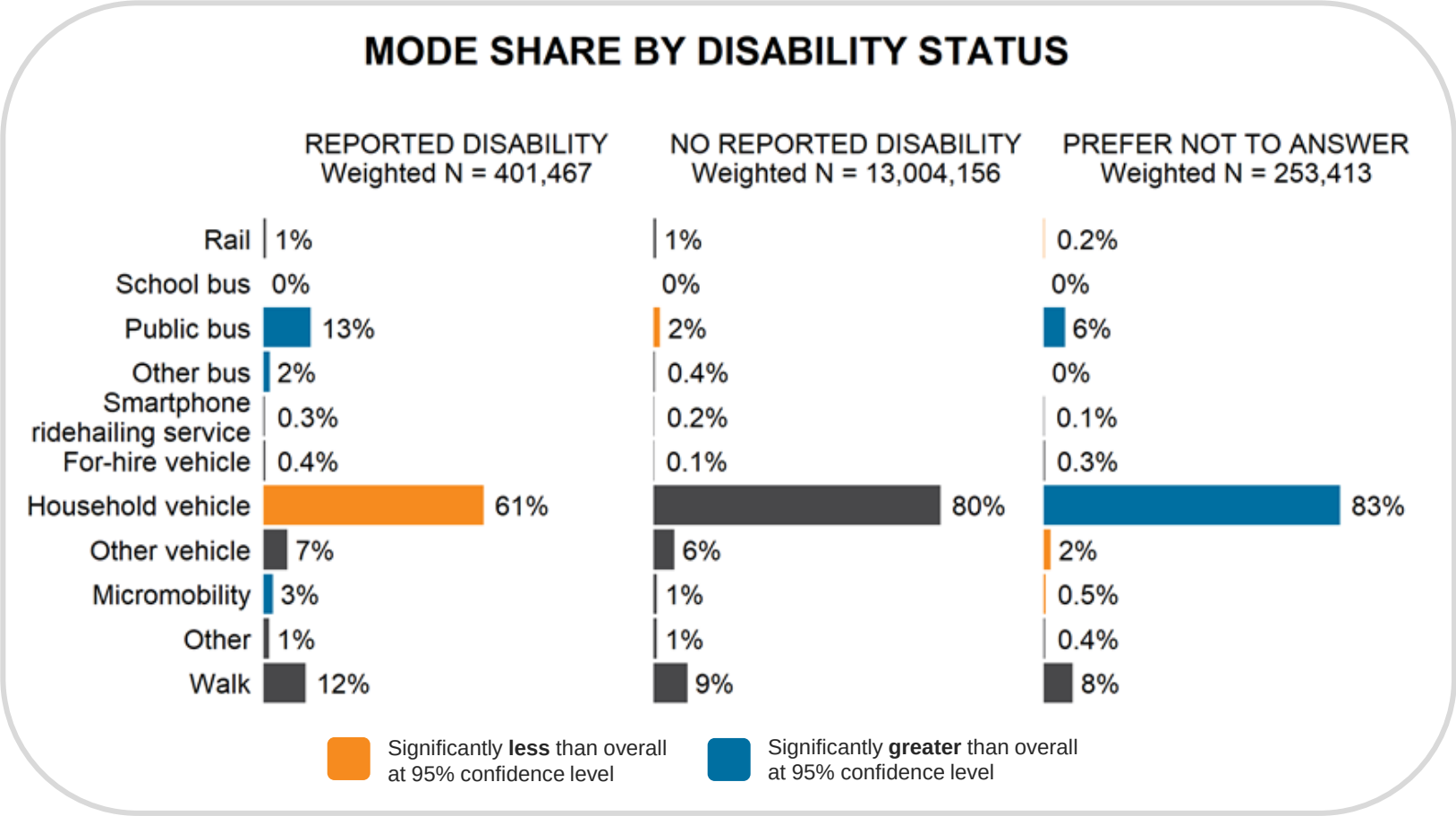
Note: the sample sizes for Native Hawaiian or Pacific Islander, Middle Eastern or North African, and American Indian or Alaska Native are small (28, 58, and 101, respectively), causing more variation in observed trip rates.





Mode Share by Disability Status

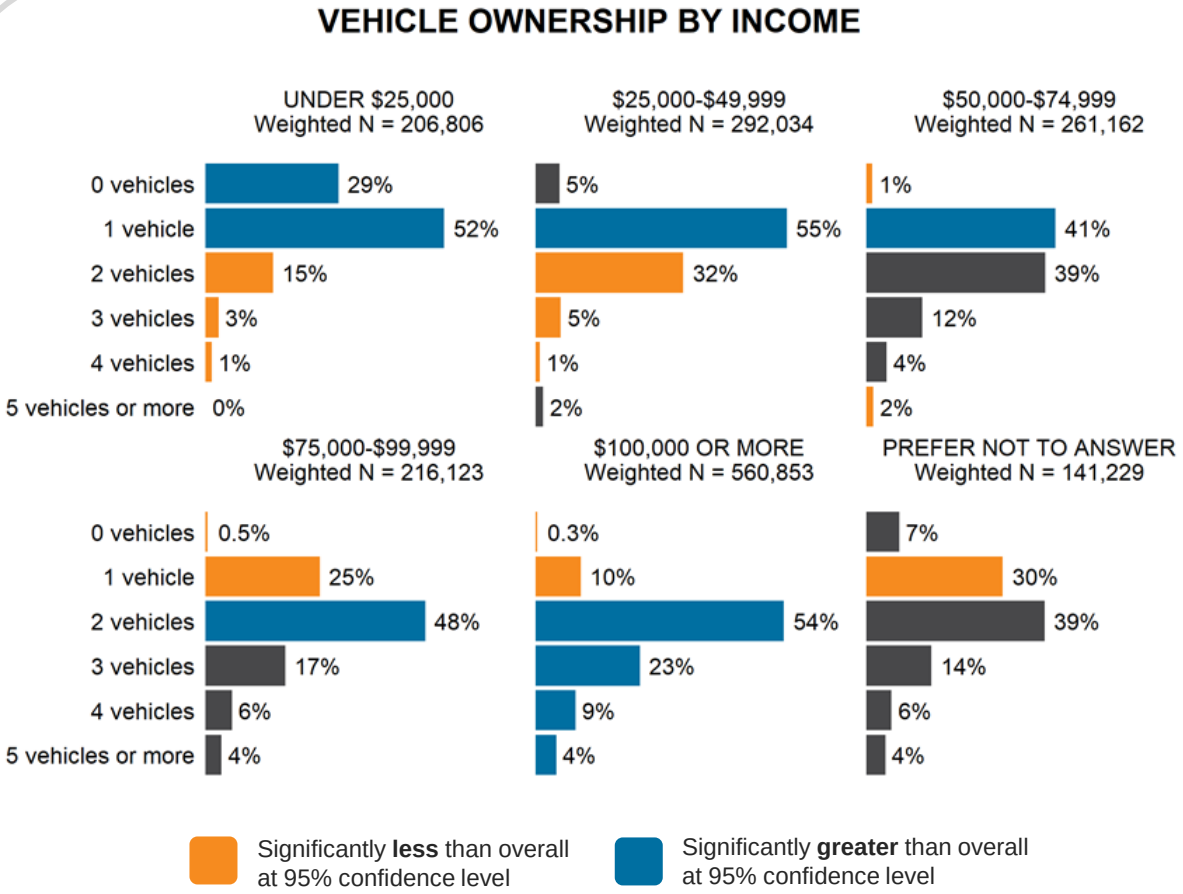
Residents who reported a disability are more likely to make trips using the public bus and less likely to make trips in a household vehicle.



Mode Use by Income

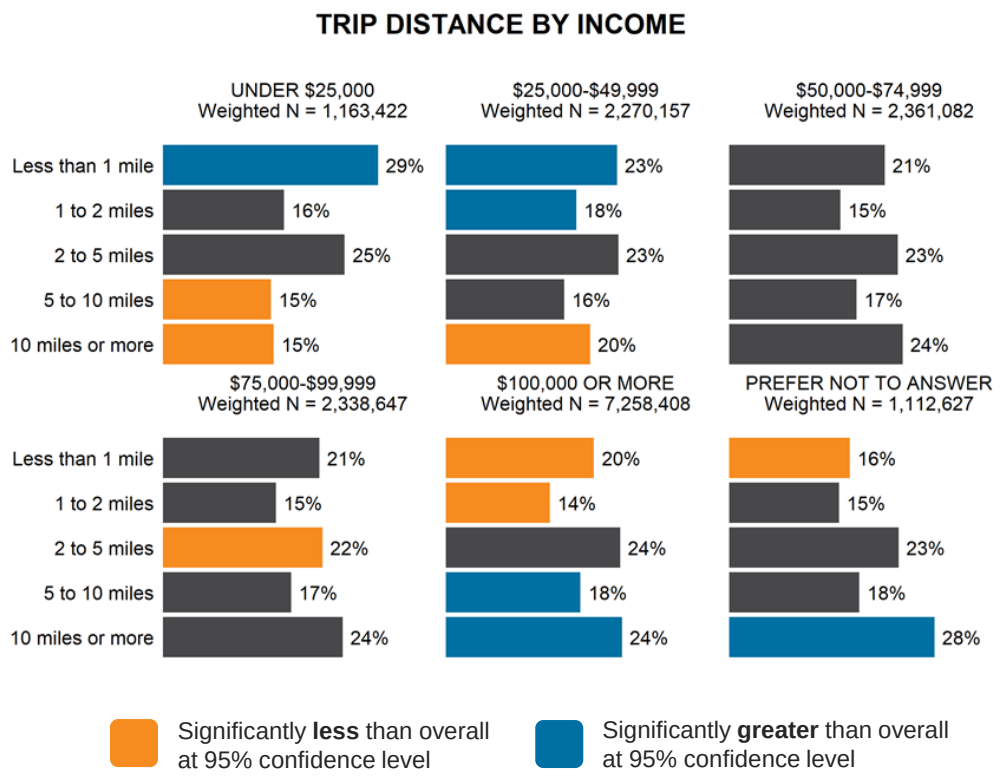
Households with incomes less than $25,000 are less likely to own a vehicle.

10% of trips made by residents in households in the lowest income category use the public bus service.



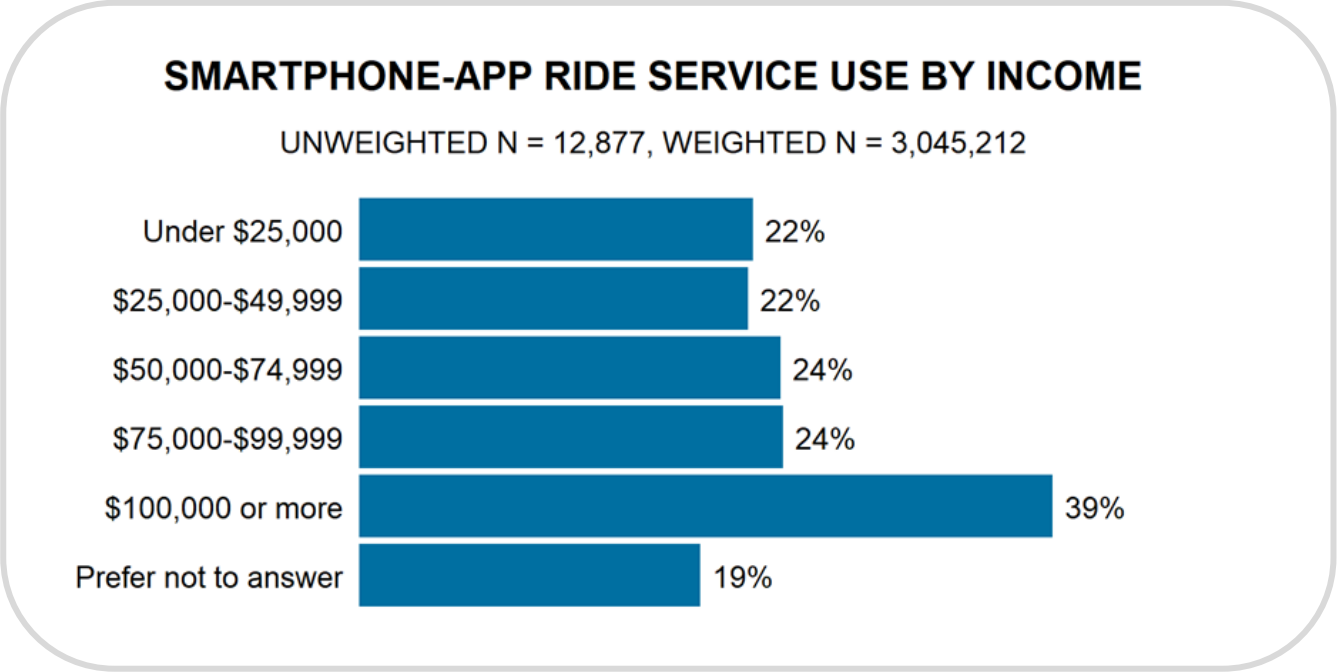
Trip Distance by Income

Residents in lower income households make a larger share shorter trips.



Smartphone-App Ride Service Use by Income

Residents in households with incomes over $100,000 are more likely to use smartphone-app ride services.



Lessons Learned & Next Steps

Wave 1 Lessons Learned

2 key areas to improve upon in Wave 2:

1. **Sample Representativeness** and continued focus on participation from hard-to-survey groups.
2. **Decreasing survey burden for reporting children's trips** to increase children's school trips rates.

Lessons Learned: Wave 1 Study Design Experiments

Differential Incentives

Increase completion rates for hard-to-survey populations

Targeted Oversampling

Increase proportion of hard-to-survey households in the sample

Door-to-door Outreach

Encourage hard-to-survey households to participate

Travel Date Reassignment

Provide a second chance for survey dropouts to complete

Opportunity to make informed decisions about future efforts and incorporate new methods with less risk.

Increasing Representation in the Survey Sample

3 key actions to improve representation:

1. **Oversampling** is critical to obtaining sufficient participation from hard-to-survey groups
2. **Outreach** to communicate the importance of the survey to residents to encourage participation
3. **Engagement/Reminders** once a hard-to-survey household engages with the study encourage them to fully complete the survey

1. Oversampling

Some variables are easier to efficiently oversample than others.

Overcoming known response biases in the sample:

- Zero-car households
- Low-income households
- Minority households
- Non-English speakers

Easier to oversample:
- Concentrated in certain census block groups

- People under 30
- Large households

Harder to oversample:
- Can sample students enrolled in higher education to address age bias
- Large HH response is often best handled through incentive structure

2. Outreach

Targeted outreach to populations of interest to improve participation.

- Stakeholder identification and engagement
- Print and electronic news publications
- Community newspapers
- Social media
- Television
- Radio
- Connecting with community organizations and leaders

3. Recruitment and Engagement

RECRUITMENT

Mailed Invitation Materials

- Address-based sampling was used by drawing a random sample of addresses from all residential addresses in the survey region.
- An invitation letter was sent to sample addresses followed by two reminder postcards.

ENGAGEMENT

Informational Website

- Participate in the survey
- Answers frequently asked questions

Call Center

- Participate in the survey
- Answer questions
- Reminder calls

Survey Email Address

- Answer participant questions
- Send reminder emails

Next Steps

Majority of decision making for Wave 2 in the next 4 months

PreTest Planning

- Identify primary data needs
- Survey design & methodology
- Sampling considerations
- Local/Unique circumstances

MARCH–APRIL 2018

PreTest & Planning for Wave 1

- PreTest - 400 completed HHs
- Validate methodology & sampling
- QA/QC testing
- Assess results & plan for Wave 1

MAY 2018 – SEPT 2018

Wave 1

- Outreach program
- Track ongoing performance
- **7,500 completed HHs**

OCT 2018 – OCT 2019

Data Processing & Reporting

- Final weighted data set
- Final report & documentation

NOV 2019 – APR 2020

Planning for Wave 2

- Assess Wave 1 results & plan for Wave 2
- Refresh methodology & sampling
- QA/QC testing

APR 2020 – SEPT 2020

Wave 2

- Outreach program
- Track ongoing performance
- **3,700 completed HHs**

OCT 2020 – OCT 2021

Data Processing & Reporting

- Final weighted data set
- Final report & documentation

NOV 2021 – MAR 2022

Wave 3

- Outreach program
- Track ongoing performance
- **3,700 completed HHs**

OCT 2022 – OCT 2023

Project Workflow

PLANNING

APR 2020 – SEPT 2020

Sample Plan Development

Survey Design & Testing

DATA COLLECTION

OCT 2020 – OCT 2021

Participant Recruitment & Engagement

Monitoring Survey Results

PROCESSING & REPORTING

NOV 2021 – MAR 2022

Data Processing & Cleaning

Weighting

Analysis

Wave 2 Planning Tasks
Next 4 Months

Before each wave of data collection review:

- Schedule of meetings and deliverables
- Detailed scope assumptions
- Evaluation of changes for the upcoming year
- Evaluation of risks for the upcoming year

Continue to leverage previous work, not all tasks from Wave 1 will apply equally to future waves.

Tasks Currently Underway

- Work plan refresh
- Coordinating data needs

Upcoming Tasks (May – July)

- Questionnaire development
- Sample planning
- Participant recruitment and engagement material refresh
- Outreach planning

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