

CENTRAL CALIFORNIA TRAVEL STUDY – FINDINGS REPORT





Report Title:

Central California Travel Study – Findings Report

Report Prepared by:

RSG

Report Prepared for:

The Fresno Council of Governments, Kern Council of Governments, Kings County Association of Governments, Madera County Transportation Commission, Merced County Association of Governments, San Joaquin Council of Governments, Stanislaus Council of Governments, California Department of Transportation (CALTRANS), the Department of Housing and Community Development, and Tulare County Association of Governments.

For additional information regarding this report, or for questions about permissions or use of findings contained therein, please contact:

RSG (Headquarters)
55 Railroad Row
White River Junction, VT 05001
(802) 295-4999
www.rsginc.com



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LIST OF ABBREVIATIONS

ABS	Address-based sample
ACS	American Community Survey
BIPOC	Black, Indigenous, or Persons of Color
HH	Household
HTS	Household travel survey

EXECUTIVE SUMMARY

The Central California Travel Survey (CCTS) is a comprehensive household travel survey (HTS) that utilized a modern research approach to collect demographic and travel pattern information from residents living in the San Joaquin Valley region of California. This survey aims to obtain a detailed understanding of the travel behavior of households across the eight counties in central California.

The CCTS effort is led by the Fresno Council of Governments (FCOG) and is a collaboration between the eight metropolitan planning organizations (Valley MPOs) from Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties.

The highlights of this innovative approach include the following:

- **A two-part survey:**
 - Part one (the “recruit survey”) gathered data on the household’s demographic composition and typical travel behaviors.
 - Part two (the “travel diary”) gathered individual travel data during a specified travel period for all members of the household (HH).
- **Multiple modes of data collection:**
 - Households with smartphones were encouraged to complete their travel diaries using the rMove™ smartphone app for up to seven consecutive days.
 - Households without smartphones or households who were not willing to participate via rMove participated by completing their travel diary online (rMove for Web) or by calling into the survey call center. These households reported travel for one day (Tuesday, Wednesday, or Thursday).
- **An address-based sample (ABS) and mailed survey invitations:**
 - Most of the sample recruitment was accomplished through address-based sampling (ABS), a type of probability sampling, with a focus on reaching county-level targets in collaboration with the Valley MPOs. Supplemental sampling methods, primarily non-probability methods, were employed during all waves of data collection to improve survey representation.
 - Invited households received an initial letter packet with comprehensive details about the survey and then a follow-up postcard as a reminder.
- **A Supplemental (non-probability) sample:**
 - The supplemental sample included targeted outreach to hard-to-survey populations through transit rider email lists, local housing authorities, support from Nichols

Research, a market research firm based in California, and Ipsos' probability-based Knowledge Panel® (KP).

The CCTS collected a rich set of demographic and travel behavior data from 7,406 households across the eight-county study region. RSG collected data from 19,084 persons, representing 150,012 trips across 42,567 complete person-days.

Key survey findings include the following:

- The overall trip rate for the region was 4.0 person trips per day. Most of those trips (3.6) were made by car.
- The median distance for car trips is 2.5 miles and 3.2 miles for transit trips, while walking trips are much shorter at 0.4 miles, as expected. The median duration for car trips is 11 minutes, 26 minutes for transit trips, and 10 minutes for walking trips.
- The predominate trip mode is by car, representing 90% of all weighted trips. These trip modes vary little by income or county. However, those with household incomes under \$25,000 had the lowest share of car trips (83%) while those with incomes between \$100,000 and \$149,999 had the highest share of car trips (92%). Those with incomes under \$25,000 reported a higher share of walk trips (11%) and transit trips (2%) than those with higher incomes.
- Around one-third of all trip purposes are to home (31%), 11% of trips are for shopping and 7% for work. Within trip mode, walking and biking trips were more likely to be social and recreational trips or trips to change travel mode than driving trips.

A full summary of results is included in Section 8.0.

1.0 INTRODUCTION

1.1 SURVEY CONTEXT

The greater San Joaquin Valley is a diverse, agriculture-rich, eight-county region in the California Central Valley. As is the case for many agricultural-based regions, the region is large, mostly rural, demographically diverse, and contains a higher-rate of low-income households than other regions in California. Due to the demographic profile of the region, collecting representative household travel survey data is extremely difficult, requiring creativity and collaboration.

The primary goal of the Central California Travel Survey (CCTS) was to collect data from 6,850 complete households where households participate by completing either a seven-day diary using a smartphone travel survey app or a one day weekday travel diary online or through a call center interview. The survey planning process aimed to collect data from a representative sample of the population with a focus on groups historically underrepresented in surveys, such as low-income households, people of color, and people of Hispanic or Latinx descent (collectively referred to as hard-to-survey populations).

1.2 METHODOLOGY HIGHLIGHTS AND FINDINGS

This survey used a modern research approach to collect demographic and travel pattern information from residents throughout the San Joaquin Valley region of California.

The highlights of this innovative approach include the following:

- **A two-part survey:**
 - Part one (the “recruit survey”) gathered data on the household’s demographic composition and typical travel behaviors.
 - Part two (the “travel diary”) gathered individual travel data during a specified travel period for all members of the household (HH).
- **Multiple modes of data collection:**
 - Households with smartphones were encouraged to complete their travel diaries using the rMove smartphone app for up to seven consecutive days.
 - Households without smartphones or those who were not willing to participate through rMove completed their travel diary online (rMove for Web) or by calling into the survey call center. These households reported travel for one day (Tuesday, Wednesday, or Thursday).
- **ABS and mailed survey invitations:**
 - Most of the sample recruitment was accomplished through address-based sampling (ABS), a type of probability sampling, with a focus on reaching county-level targets in collaboration with the Valley MPOs. Supplemental sampling methods, primarily non-probability methods, were employed during all waves of data collection to improve survey representation.

- Invited households received an initial letter packet with comprehensive details about the survey and then a follow-up postcard as a reminder.
- **A supplemental (non-probability) sample frame:**
 - The supplemental sample included targeted outreach to hard-to-survey populations through transit rider email lists, local housing authorities, support from Nichols Research, a market research firm based in California, and Ipsos' probability-based Knowledge Panel® (KP).
- **Aligned questionnaires:**
 - The smartphone-based (rMove) and online-based (rMove for Web) questionnaires were aligned to ensure a single, consistent dataset at the end of the survey.
- **Advanced technologies and methods:**
 - The rMove app was the primary mode for travel data collection, which offered significant benefits for data quality and quantity (e.g., detailed trip paths, and lower degrees of underreporting).
 - The Bing Maps API helped capture and validate location and travel data.
 - The survey employed ACS data, along with RSG's market research experience and expertise, to develop the sampling plan and data weighting approaches.
- **Minimized respondent burden and increased engagement:**
 - The survey offered gift card incentives to households that completed the survey to improve the response rates (and thereby lower the overall mailing costs) and improve representativeness of the dataset. Depending on the sampling segment, incentives provided for participation were \$20-\$45 gift cards.
 - Survey respondents received customized reminders by email, telephone, or within the rMove smartphone app to encourage survey completion.
 - Survey respondents could also contact user support by telephone, email, or within the rMove smartphone app. Responses were generally provided within one business day.
 - The survey branding included an engaging logo and customized website to legitimize the survey and encourage responses.

These innovative approaches and RSG's experience both with the technologically advanced rMove app for mixed mode data collection and customized outreach and engagement methods led to a successful study. After rigorous QA/QC, weighting, and data validation, RSG provides a summary of results in this findings report.

2.0 STUDY SAMPLING

2.1 DATA COLLECTION SUMMARY

RSG targeted a goal of 6,850 completed households based on the San Joaquin Valley’s regional household population. This total represented slightly more than 0.5% of the total number of households in all eight counties to account for county-to-county variation. Data collection started in April 2022 and initial data collection continued through June 5, 2022.

For the fall 2022 survey sample, RSG recruited convenience sample by distributing generic participation codes to eleven regional housing agencies. These codes were intended for distribution to verified residents only, through cross-checked paper in rent notices or through closed email lists. The codes were not intended to be publicly available or accessible online. During fall data collection monitoring, data analysts noticed that survey respondents recruited using the Kern County (Housing 5) code were reporting home addresses in Fresno County. Further investigation concluded that these complete households were fraudulent. Unfortunately, most of these fraudulent completes were not identified prior to incentive distribution. Three-hundred fifty-five (355) completes were removed from the fall sample.

Due to lower than estimated survey response rates and fraudulent participants, survey data collection in 2022 fell short of the goal of 6,850 completed households. RSG has seen lower response rates in several household travel surveys, likely due to a combination of COVID, survey fatigue, the difficult political climate in the US, and increasing privacy concerns. Despite these challenges, complete surveys were collected from a total of 4,936 completed households collected in 2022.

RSG continued data collection in winter 2023 from January to March 2023. To encourage participation incentives were increased by \$10 for this 2023 data collection. Ultimately this led to a better-than-expected response and in the end exceeded the 6,850-household completion goal for the CCTS by 556 completes for a total of 7,406. Table 1 shows the total number of CCTS completes by method and year.

TABLE 1: TOTAL NUMBER OF CCTS COMPLETES BY METHOD AND YEAR

Sampling Method	2022 Complete Households	2023 Complete Households	CCTS Complete Households
Address-Based Sampling	4,565	2,335	6,900
Supplemental Sampling	371	135	506
Total	4,936	2,470	7,406

2.2 SAMPLING FRAME AND METHOD

The survey region is comprised of the eight-county area within central California. RSG used ABS to select households for participation for approximately 94% of the sample. ABS involves drawing a random sample of addresses from all residential addresses in that area. Using this method, all households within each defined area had an equal chance of selection for the sample. RSG purchased

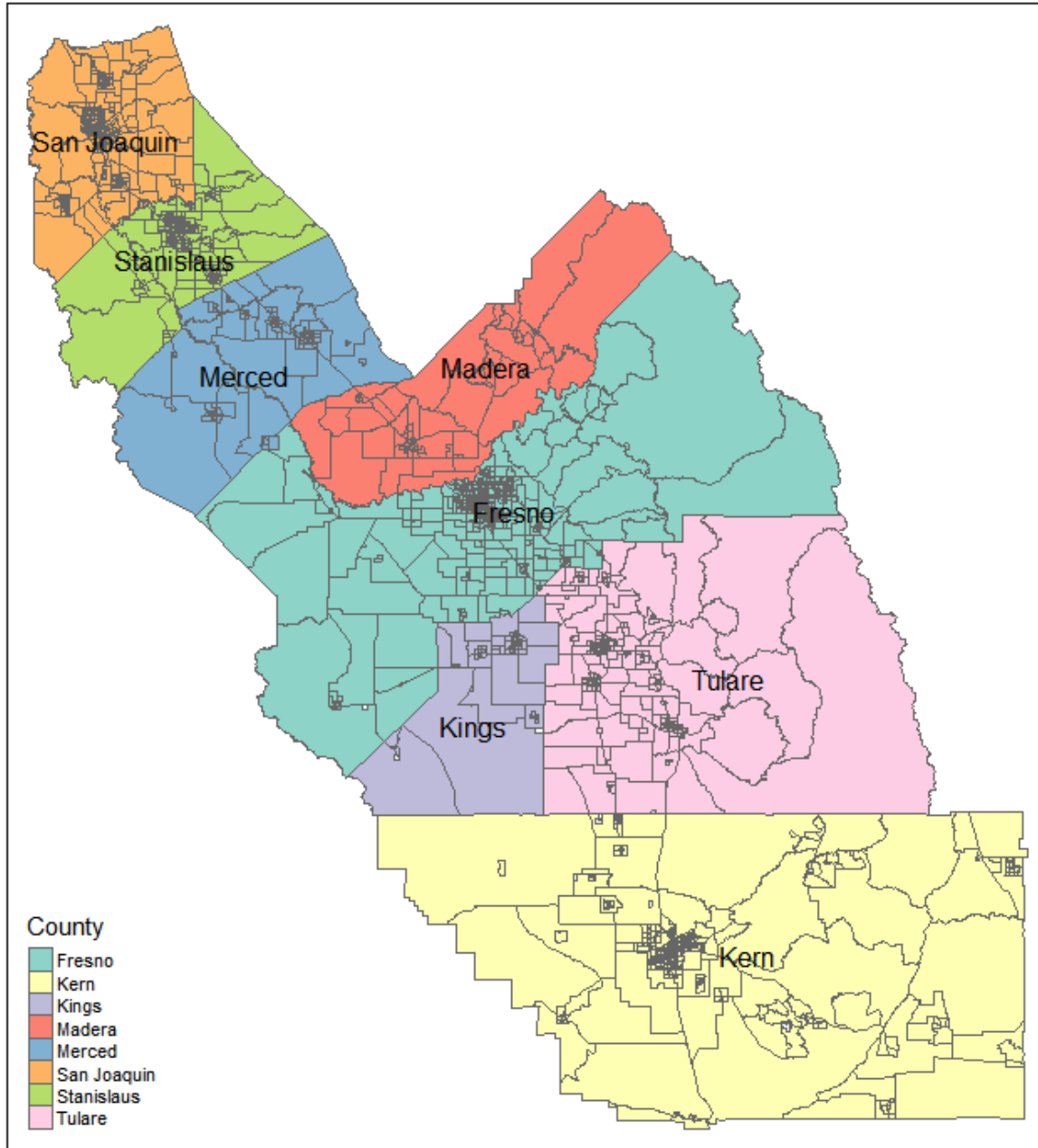
household mailing addresses from Marketing Systems Group (MSG), which maintains the Computer Delivery Sequence file from the U.S. Postal Service.

In addition to the ABS sampling, supplemental sample included targeted outreach to hard-to-survey populations through Nichols Research, transit rider email lists, housing agencies, and the Ipsos Knowledge Panel.

2.3 SAMPLE STRATIFICATION/SEGMENTATION

RSG geographically stratified the sample using Census Block Group data from the most recently available 2015-2019 American Community Survey 5-year estimates (ACS). The most detailed way to stratify the sample is to use Census Block Groups (BGs), which are the smallest geography for which most Census and ACS tables are publicly available. Each BG generally contains between 600 and 3,000 people. According to this ACS data, the region contains 2,310 BGs (Figure 1). Group Quarters are a relatively small segment of the population at 1.9% and were excluded from the sampling frame.

FIGURE 1: SURVEY REGION BY COUNTY AND BLOCK GROUP



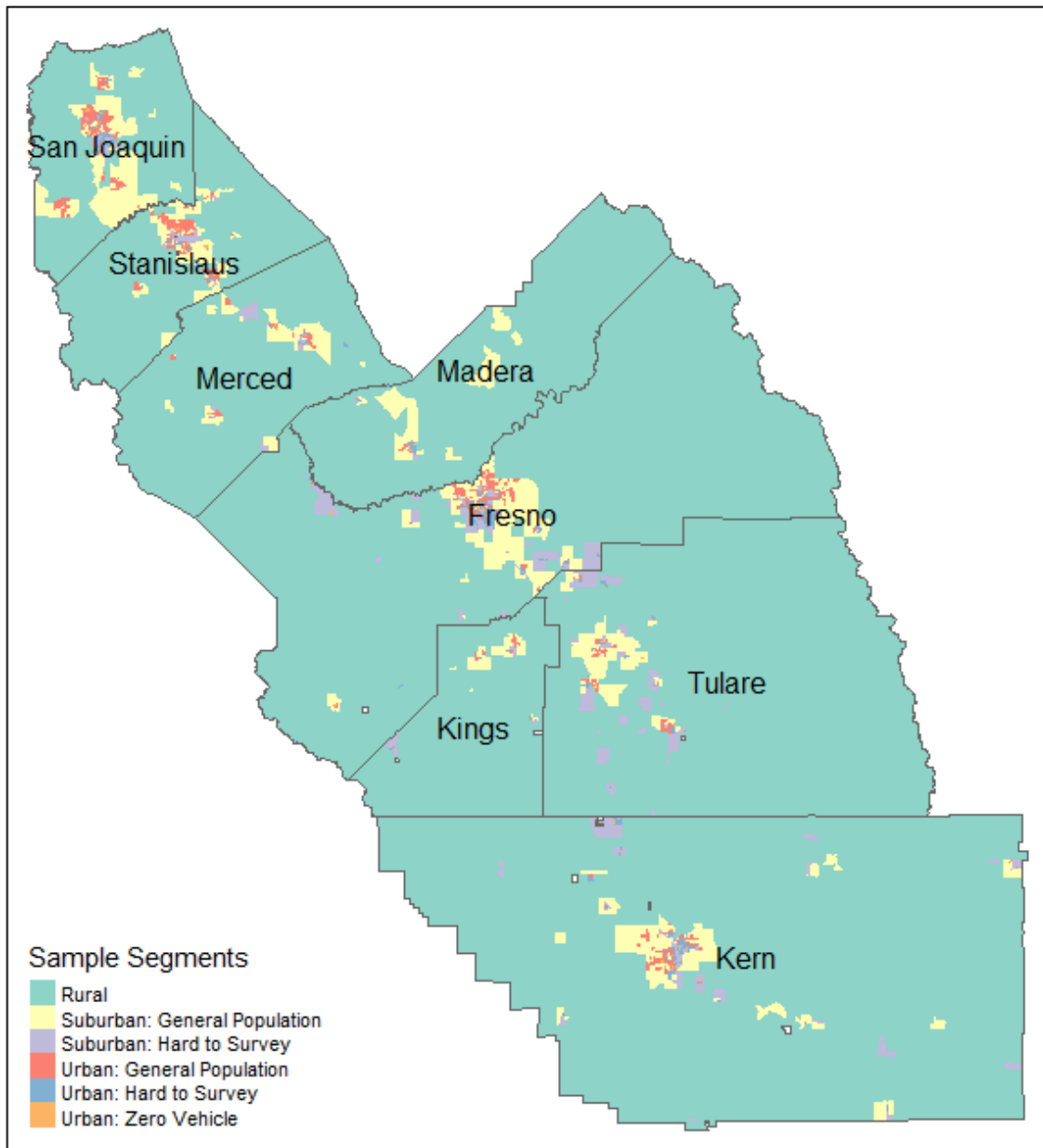
RSG used the following mutually exclusive sampling segments. These sample segments include compensatory oversampling for historically hard-to-survey populations include residents who are Hispanic, people of color (POC), residents of rural areas, or lower income. Targeted oversampling has been proposed for communities with a higher share of zero-vehicle households.

- 1) **Rural:** Comprised of the BGs in the Central California Valley that consist of a population density of less than 150 people per square mile.

- 2) **Suburban – General Population:** Comprised of the BGs in the Central California Valley that consist of a population density of more than 150 and less than 4,500 people per square mile, whose population is less than 90% Hispanic or POC, and less than 35% of households have an income under \$25,000.
- 3) **Suburban – Hard-to-Survey:** Comprised of the BGs in the Central California Valley that consist of a population density of more than 150 and less than 4,500 people per square mile, whose population is at least 90% Hispanic or POC, or 35% or more households have an income under \$25,000.
- 4) **Urban – General Population:** Comprised of the BGs in the Central California Valley that consist of a population density of more than 4,500 people per square mile, whose population is less than 90% Hispanic or POC, and less than 35% of households have an income under \$25,000.
- 5) **Urban – Hard-to-Survey:** Comprised of the BGs in the Central California Valley that consist of a population density of more than 4,500 people per square mile, whose population is at least 90% Hispanic or POC, or 35% or more households have an income under \$25,000.
- 6) **Urban – Zero Vehicle:** Comprised of the BGs in the Central California Valley that consist of a population density of more than 4,500 people per square mile and 5% or more households with zero vehicles.

Figure 2, provides a visual representation of the sample segments in the survey region.

FIGURE 2: SAMPLE SEGMENTS IN SURVEY REGION



2.4 SUPPLEMENTAL (NON-PROBABILITY) RECRUITMENT METHODS

In addition to ABS methods described above, RSG targeted 400 completes from supplemental sampling methods to improve recruitment of historically underrepresented hard-to-survey demographic groups. We completed the study with 506 completes through supplemental sampling.

Supplemental sampling methods, primarily non-probability methods, were employed during spring and fall data collection to improve survey representation. The following types of supplemental sampling were implemented in the CCTS.

- Non-probability sampling through transit agency support.
- Non-probability sampling through local housing authorities.
- Non-probability sample collected by Nichols Research; a market research firm based in California.
- Probability sampling through Ipsos' probability-based Knowledge Panel® (KP).

Due to the fraudulent participants in the fall of 2022, RSG used supplementing sampling for winter 2023 data collection in two forms. First, Nichols Research recruited hard-to-survey households to participate in the survey. Households recruited by Nichols Research were prescreened, with each being provided a unique password to access the survey (prior to 2FA). Second, RSG partnered with transit agencies and the City of Fresno to collect additional data by providing participants with unique participation codes.

Nichols Research

Results

This initiative resulted in 527 participants who completed the sign-up survey and 306 households that completed the full study by providing travel information for their assigned travel day(s).

Incentives

Nichols Research was compensated \$150- \$ 175 per completed household. Additionally, participants were offered the ability to choose to participate using the rMove app and receive \$35 per participating adult or to participate by either rMove for Web or through the call center and receive \$25 per participating household.

Transit Rider Recruitment

Results

After the initial fraudulent participants were removed from the study, this initiative resulted in 36 participants who completed the sign-up survey and 24 households that completed the full study by providing travel information for their assigned travel day(s).

Incentives

Supplemental transit participants were offered the ability to choose to participate using the rMove™ app (\$35/\$45 per participating adult) or to participate by either rMove for Web or through the call center (\$25/\$35 per participating household).

Housing Authorities

Results

After the initial fraudulent participants were removed from the study, this initiative resulted in 194 participants who completed the sign-up survey; and 113 households that completed the full study by providing travel information for their assigned travel day(s).

Incentives

Supplemental transit participants were offered the ability to choose to participate using the rMove™ app (\$35 per participating adult) or to participate by either rMove for Web or through the call center (\$25 per participating household).

City of Fresno

Results

This initiative resulted in 11 participants who completed the sign-up survey; and 8 households that completed the full study by providing travel information for their assigned travel day(s).

Incentives

City of Fresno participants were offered the ability to choose to participate using the rMove app (\$35 per participating adult) or to participate by either rMove for Web or through the call center (\$25 per participating household).

Ipsos Knowledge Panel

Results

RSG coordinated with Ipsos to recruit survey participants from their probability-based Knowledge Panel®¹ (KP). KP members were invited to participate in the survey via emailed invitations, with a target of 300 or more household completes via this supplemental sampling method. Sixty-two households completed the survey through this recruitment method. The Ipsos Knowledge Panel recruitment and completion rates were lower than estimated. Given the lower than anticipated participants, Ipsos recruitment efforts stopped on June 15th, 2022. To compensate for the shortfall, RSG partnered with Nichols Research to recruit additional hard-to-survey households.

¹ <https://www.ipsos.com/en-us/solutions/public-affairs/knowledgepanel>

Incentives

Incentives were provided to the panelists by IPSOS directly. Due to the nature of a panel recruitment, these incentives are determined and management based on IPSOS panel rewards program.

3.0 SURVEY DESIGN

3.1 OVERVIEW

The 2022/2023 study combined multiple data collection methods, including smartphone, online, and telephone. While 24% of households completed their travel diaries by smartphone, 76% of all trips were collected by smartphone due to the extended travel period from the smartphone app (up to 7 days) compared with the single-day online reporting. The survey design included two stages to recruit and collect data about households, their members, and their travel behaviors during the assigned travel period.

3.2 DATA COLLECTION METHODOLOGY AND PARTICIPATION METHODS

This study used an ABS approach with mailed recruitment materials supplemented with non-probability, supplemental sampling through transit riders, Nichols Research, and email lists from the City of Fresno. The mailed materials instructed households to download the app, visit the study website, or call a toll-free number to complete Part 1 (the demographic “recruit” survey). Households received instructions for Part 2 (the travel diary) shortly after completing Part 1.

Survey Fielding Period

Wave 1

Participants began the survey as soon as they received their invitations, which were mailed starting Thursday, April 19, 2022. The first travel week began on Monday, April 25, 2022, and the final travel week ended on June 5, 2022.

Wave 2

Wave 2 was supplemental housing agency recruitment only. Participants received emailed invitations beginning August 15, 2022. The first travel week began immediately, and the final travel week ended September 19, 2022.

Wave 3

Participants began the survey as soon as they received their invitations, which were mailed starting Tuesday, January 10, 2023. The first travel week began on Monday, January 16, 2023, and the final travel week ended on March 7, 2023.

Access Codes and Sign-up Survey

Each invited ABS household was provided with one unique password for the duration of the study. As a two-factor authentication measure, a second password was sent after participants started the recruitment process to verify each contact and continue the questionnaire online or in the rMove app. These mailings included English, Spanish, and Hmong content to communicate each of the available survey participation options to invited households. In the recruit survey, each household member was

identified with a unique nickname, initials, or name. Households completed the recruit questionnaire as soon as they received their initial invitation, providing data on the household's demographic composition, typical travel behaviors, and administrative information used to determine the household's method and schedule for completing their travel diaries. All households completed an identical recruit survey by downloading the app, going online, or calling the call center to complete the questions.

At the end of the online recruit survey, if all adults in the household owned smartphones, they received different text outlining the next steps than non-smartphone households; each household only saw the text relevant to them. When all adults in the household reported owning smartphones, they were offered the option to either download rMove and participate for a travel period of seven consecutive days for a higher incentive or participate for a 24-hour travel period and complete the study online or through the call center for a lower incentive. Households where not all adults owned smartphones were asked to complete a one day traditional travel diary online or over the telephone. If a person did the recruit survey directly on the app, as long as the other adults in their household had smartphones, they were directed to completed the travel diary using the app. If not all adults in the household had smartphones, they were re-directed to use the online or call center diary.

Travel Date Assignments

Participants were assigned their travel day using an assignment method consistent with RSG's standard HTS.

- rMove participants (up to seven travel days):
 - Household Size=1: Households with a single household member were assigned the next day following their sign-up survey as their first assigned travel day.
 - Household Size>1: Households with more than one member were assigned their first travel day three days following their sign-up survey. This is to allow time for all adults to download and install the rMove app.
- rMove for Web or Call Center participants (a single, weekday travel day):

All rMove for Web/Call Center participants were assigned a Tuesday, Wednesday, or Thursday 24-hour travel day. RSG's data collection platform balances a project's travel day assignments across the three weekday travel days, resulting in a final dataset that is reflective of regional, weekday travel. For example, a household that completes the sign-up survey on a Thursday, may be assigned the following Tuesday, Wednesday, or Thursday as their travel day to balance the number of households reporting travel on any individual weekday. There are multiple ways to ensure that the assigned travel periods are evenly divided across the weekdays of the month, with the simplest method being to ensure that the schedule of mailed invitations is aligned with the expected participant recruitment activity and the resulting travel diary periods. RSG's historical experience and results have successfully used this setup. We have done this in part to allow efficient automation of reminders and communications with participants, as well as ensuring that user support is readily available when participants first download and begin using rMove (e.g., not the weekend).

Proxy Reporting for Child Trips

Among rMove households, only adults related to the main respondent were required to use the app on their smartphones. One rMove adult in each household was designated to proxy report travel information for all children (under 18) in the household on a single travel day. If a child in an rMove household was reported as a travel party member on the designated reporter's trips, the trip was copied to the child's record. This adult was also asked to add trips to a child's roster if the child made an independent trip (e.g., riding the bus to school) or made a trip with someone outside of the household (e.g., getting a ride with a friend's parents).

Among online households, one adult was required to complete a full one-day travel diary for all children in the household. Like rMove, adult proxy reporters could copy children's trips from other adults and report new trips that the children made on their own.

3.3 REAL-TIME MONITORING

All collected data (passive and surveys) described above are encrypted and sent to a secure cloud server where they are stored for monitoring and processing.

RSG monitored the data for response and quality throughout the study. RSG continuously monitored the survey database and performed regular QA/QC during survey fielding. Response monitoring tools and procedures implemented during survey fielding included:

- Provision of a secure, real-time online dashboard that provided the Technical Advisory Committee (TAC) results such as response rates, progress toward sample targets, and comparison to ACS control data in real-time.
- RSG maintained a second, internal dashboard accessible by the RSG team allowing team members to view travel data and assist participants having difficulty completing the survey. This dashboard included the ability to view individual trips and metadata (e.g., smartphone type) to assist with troubleshooting.
- RSG provided information on data collection at recurring project progress meetings, including: survey response forecasts and effectiveness of oversampling efforts, updates on any issues encountered, actions to address those issues if warranted, and notes documenting these items and key decisions points.

3.4 SURVEY FRAUD

Survey fraud is not a new issue in survey research, but it has become increasingly sophisticated in recent years. Survey incentives both encourage invited persons to participate and increase the likelihood of survey fraud. Survey fraud in household travel surveys used to be limited to invited households falsifying data due to data privacy concerns or to complete surveys more quickly – but still be eligible for an incentive. An example would be a household reporting no travel on their assigned travel date, even if they did travel.

RSG's survey methodology is designed to mitigate fraud. The rMove™ survey platforms have built-in logic checks to encourage accurate data reporting, and quality control procedures implemented during

data collection and processing include additional safeguards to detect fraud. An example of these safeguards is the 2FA process, which protects personally identifiable information (PII) and mitigates fraud, since a unique password is emailed to a valid email address for survey access.

Unfortunately, some of the transit completes collected in spring and some of the housing authority completes collected in fall 2022 were fraudulent. It is common for supplemental sampling methods to include the use of generic codes (i.e., passwords) to allow agencies to easily invite their members to participate in the survey. RSG has used open links on social media, websites and through printed materials in several surveys over the past three years, to recruit hard-to-survey households. Prior to the CCTS, we had not been impacted by fraud with the above safeguards in place.

For the CCTS, the provision and distribution of generic codes resulted in fraudulent participation despite the use of 2FA. A sophisticated process was put into place by professional scammers. In May 2022 our RSG analysts noticed that suspicious email addresses were participating with the generic transit participation code. These initial suspicious email addresses contained variations on the same first name (e.g., “donisreal81”; “don834575”; “dondrake552”) and upon further review noted other suspicious email addresses following a similar pattern of nomenclature. Once detected, RSG implemented procedures to prevent new fraudulent participants by disabling some generic codes and conducting data analysis to identify fraudulent completes in the dataset. The professional scammers worked in a sophisticated manner, disguising their computer Internet Protocol (IP) and creating new Google, Yahoo and Hotmail email accounts to get around the 2FA, and access gift cards if distributed. This meant that each survey completed by a hacker was able to be completed to work around 2FA. It was discovered that the scammers were requesting digital gift card incentives be sent to the new email account, which could subsequently be redeemed online. In order to identify ‘real respondents’ from scammers, RSG emailed all transit participants to verify home addresses before mailing physical gift cards. This verification process enabled RSG to identify and remove 1,672 invalid completes from the spring sample prior to incentive distribution.

For the fall 2022 survey sample, RSG recruited convenience sample by distributing generic participation codes to eleven regional housing agencies. These codes were intended for distribution to verified residents only, through cross-checked paper in rent notices or through closed email lists. The codes were not intended to be publicly available or accessible online. During fall data collection monitoring, data analysts noticed that survey respondents recruited using the Kern County (Housing 5) code were reporting home addresses in Fresno County. Further investigation concluded that these complete households were fraudulent. Unfortunately, most of these fraudulent completes were not identified prior to incentive distribution. Three-hundred fifty-five (355) completes were removed from the fall sample, and RSG is covering the cost (not passing through incentive invoices to the FCOG) for these completes.

3.5 ADDITIONAL DATA PRIVACY AND FRAUD SAFEGUARDS

As a consulting firm delivering surveys for many different clients and survey participants in diverse geographies including California, Canada, and Europe, we take the safeguarding of Personal Identifiable Information (PII) and identity fraud seriously. Every RSG survey includes both our company

Privacy Policy (<https://rsginc.com/privacy-policy/>) and a project-specific Privacy Policy (e.g., <https://centralcatravelsurvey.com/privacy-policy/>) detailing data use and participant protections. This includes the capabilities provided by our Microsoft Azure database hosting, which is what RSG uses to store data in the cloud (<https://www.microsoft.com/en-us/trust-center>).

Microsoft Azure utilizes multi-layered security provided by Microsoft across physical datacenters, infrastructure, and operations in Azure. This includes state-of-the-art security delivered in Azure data centers globally. Azure relies on a cloud that is built with customized hardware, has security controls integrated into the hardware and firmware components, and added protections against threats such as DDoS. Azure benefits from a team of more than 3,500 global cybersecurity experts that work together to help safeguard data in our databases. RSG also provides an annual data security training for all staff.

In addition to these safeguards during data collection and hosting, once the data are collected, they go through a thorough data cleaning process, which includes:

1. **Investigating** IP addresses to identify whether more than one complete was submitted from the same IP addresses. These duplicates are not automatically discarded but flagged for further review. Occasionally, it is legitimate for more than one complete to have the same IP address, e.g., a household sharing an iPad or several respondents using a shared library or school computer.
2. **Deduplication** or “deduping” based on email addresses to see whether multiple completes are associated with the same email address.
3. **Cross-tabbing** results to check for outliers and illogical response patterns.
4. **Researching** the distribution of ZIP Code locations to ensure that they are reasonable given the study area.
5. **Evaluating** open-ended responses to ensure that they seem relevant to the survey.

The following steps were implemented to remove these fraudulent completes from the dataset. These steps erred on the side of removing more, rather than fewer complete households to minimize the chance that fraudulent households are included in the final dataset:

- **Removed Online Complete Households Requesting Digital Incentive Payments.** Knowing the transit links had been compromised, we removed any transit completes who used rMove for Web (online), chose a digital incentive and were unable to verify their home address. All the scammers identified followed this pattern.
- **Removed Out of Region Households.** Home addresses provided by each respondent were mapped to a county. If this county was outside of the study region (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties), they were removed from the dataset.
- **Removed Non-Residential Addresses.** A characteristic of the invalid responses was that many reported a business location (e.g., Fresno Airport) as their home address. All supplemental respondents who reported a business as their home address were removed from the dataset.

This identification process included a manual review of geocoded addresses on a map to identify if they were located in residential locations.

- **Removed Kern County (Housing 5) Completes with Home Addresses Outside Kern County.** Many respondents who used the Kern County household link were already removed for being out of region or for residing at a business. However, Housing 5 participants that reported a home location inside the study region, but outside of Kern County (where that housing authority was located) were also removed from the dataset.

Table 2 summarizes the disposition for households collected through supplemental sampling methodologies. The total number of valid completes from supplemental sampling was 506, exceeding the 400-household target as outlined in the original sample plan. Despite several challenges, the supplemental sampling effort was a success.

TABLE 2: DISPOSITION OF COMPLETE SURVEYS COLLECTED THROUGH NON-ADDRESS-BASED SAMPLING METHODOLOGIES

SUPPLEMENTAL GROUP	ORIGINAL COMPLETES	REMOVED IN SPRING COMPLETES	OUT OF REGION	REPORTED BUSINESS AS HOME ADDRESS	HOME ADDRESS OUTSIDE KERN COUNTY	VALID COMPLETES
Ipsos KP	61	0	0	6	0	55
Nichols Research	318	0	1	11	0	306
Transit Outreach	1,721	1,674	27	7	0	13
Housing 2- San Joaquin County	3	0	0	0	0	3
Housing 4- Kern County	3	0	0	0	3	0
Housing 5- Kern County	312	0	68	69	162	13
Housing 6- Fresno County	8	0	3	0	0	5
Housing 7- Coalition for Rural Housing (multi-county)	19	0	3	1	0	15
Housing 8 - Tulare County	49	0	1	1	0	47
Housing 9- Stanislaus County	1	0	1	0	0	0
Housing 11 – Kings County	31	0	0	1	0	30
StanRTA	7	0	0	0	0	7

FAX Transit	4	0	0	0	0	4
City of Fresno	8	0	0	0	0	8
Total	2,545	1,674	104	96	165	506

The rMove and online travel diary included numerous real-time validation and data quality features. Examples include the following:

- All locations provided by survey participants are geocoded and validated in real-time within our survey instruments (rMove and rMove for Web) including frequently visited locations such as home, work, and school as well as all trip origin and destination locations.
- Trip-level logic ensures consistency, such as ensuring that trip start and end times neither overlap nor have negative trip durations.
- Ability to enter address, business name, or place a marker on the map using Google Maps provides real-time geocoding of each location.
- For rMove for Web, household members can copy joint trip data to their roster to ensure data consistency across household members and reduce burden for larger households.
- Logic confirms that survey responses follow the survey questionnaire logic agreed upon.
- Household members who report that they did not make any trips on their assigned travel day skip the trip diary section of the online survey and are asked why they did not make any trips. The records of all persons reporting no trips are reviewed as part of the QA/QC process to determine whether the reasons provided (e.g., worked from home, sick, etc.) appear valid.

3.6 COMPLETION CRITERIA

Development of the study’s completion criteria was guided by industry best practices. Households were included in the data deliverable when they met the following conditions:

1. **The household completed the sign-up (recruitment) survey by answering all required questions.**
2. **All related household members completed at least one, concurrent 24-hour travel diary regardless of survey participation mode (smartphone, online, or call center).** For the purposes of household travel surveys, ‘related’ household members include spouses, unmarried partners, children, parents, siblings, and other relatives. Roommates/friends, household help, and other nonrelatives are not included in ‘related’ household members.

3.7 SURVEY INCENTIVES

The CCTS offered participants the following incentive options:

- Digital Amazon, Target, or Walmart gift card
- Physical Visa card
- Donation to the American Red Cross

- No incentive option.

Only households that had completed the survey were provided an incentive. To mitigate lower than estimated response rates after Wave 1 and 2, incentive offerings for all participation modes and for both hard-to-survey and regular households were increased in Wave 3 by \$10, as shown in Table 3.

TABLE 3: INCENTIVE BREAKDOWN BY PARTICIPATION MODE AND SAMPLE TYPE

ABS DATA COLLECTION MODE AND SAMPLE TYPE	WAVE 1 & 2	WAVE 3
rMove for Web Regular (per HH)	\$20	\$30
rMove for Web Hard-to-Survey (per HH)	\$30	\$40
rMove App Regular (per adult)	\$25	\$35
rMove App Hard-to-Survey (per adult)	\$35	\$45

The differential incentives approach offered incentives within the study invitation materials, and again at the end of the sign-up (recruitment) survey to maximize effectiveness and improve participation rates. The FCOG were not involved in processing or distribution incentives; RSG managed all logistics for incentives qualification, tracking, and distribution.

Opportunities and Constraints of Differential Incentives in Invitation Materials

When offering differential incentives within the invitation materials, households in hard-to-reach sample segments are offered a higher incentive than households in the other segments based on the Block Group of their home address. This higher incentive is offered with the initial invitation, resulting in an increase in recruitment rates. This method has been shown to be effective at increasing response rates but increases the overall recruitment cost and also results in paying higher incentives to some respondents who are not among the targeted population groups but happen to live in the targeted areas (e.g., non-BIPOC households or higher income households who live in low-income or high-BIPOC BGs).

Incentives After Sign-up/Recruitment

For households not already flagged for the differential incentive, above, the study additionally offered differential incentives at the end of the sign-up/recruitment survey if the household met the following condition:

- Reported household income less than \$25,000

Opportunities and Constraints of Differential Incentives After Recruitment. Compared to offering a higher incentive before recruitment, this method tends to have less effect on overall response rates because most households decline to participate at the recruitment stage. Consequently, this extra incentive only serves to reduce attrition rates among recruited households. On the other hand, this type of incentive costs less and can be targeted more efficiently toward hard-to-reach population groups. It is also applied across all BGs in the study area so has less geographic bias.

Red Cross Donation

The incentives methodology also included a 'Donate to the American Red Cross' option. 124 households chose this option and \$5,870 was donated to the American Red Cross.

No Incentive Option

The incentives methodology also included a 'Decline Incentive' option. Where RSG has offered this option in past studies, many participants have selected it. In this study, 72 of the 7,406 complete households chose the 'Decline Incentive' option.

Incentives Processing

As households completed the study, RSG identified which households eligible to receive an incentive (including those flagged for differential incentives) and processed those households for either physical or digital gift cards (at the households' individual preference) within one to two weeks of survey completion. Physical gift cards were issued as Visa gift cards. Electronic gift card options included Walmart, Target and Amazon e-card.

4.0 STUDY BRANDING, COMMUNICATION, AND ADMINISTRATION

4.1 STUDY BRANDING

RSG developed a custom project logo (Figure 3) and color palette to be used in public-facing materials for the CCTS. The goal of this project component is to have a set of engaging, professional materials to support the project’s credibility and response rates. The project logo and branding were used consistently throughout the survey’s invitation materials (i.e., envelope, letter, postcard), a public-facing website consistent with Section 508 guidelines for accessibility, and participant email templates. The intended effect of this coordination is to connect invitations, reminders, and other notices about the project.

FIGURE 3: CCTS STUDY LOGO AND BRANDING



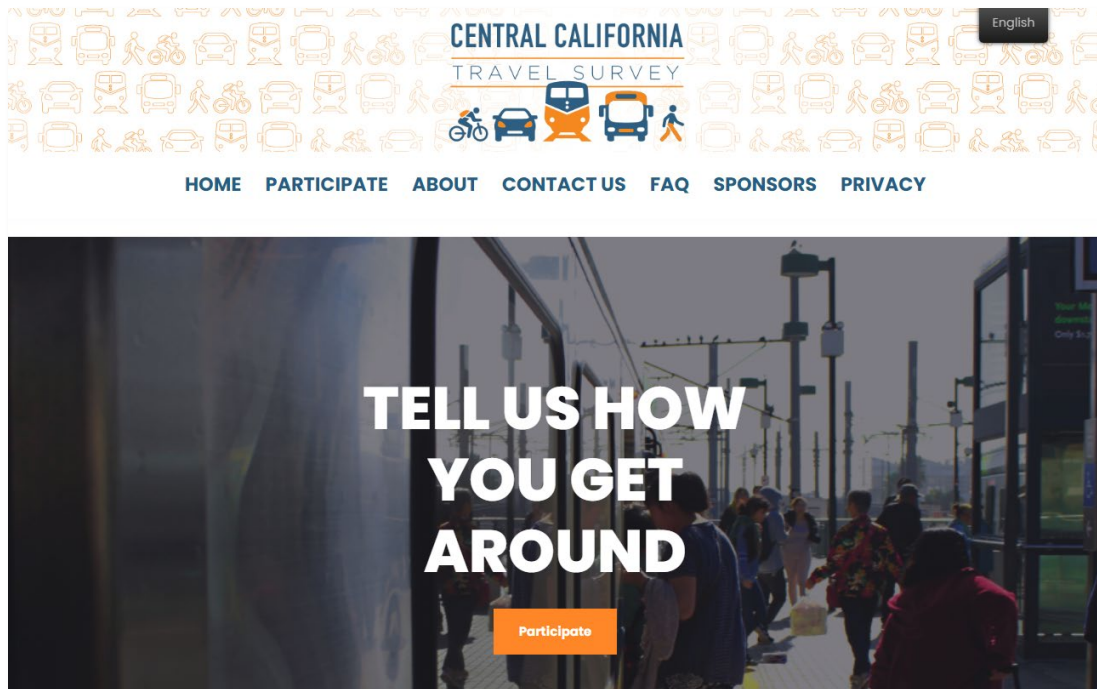
4.2 PUBLIC-FACING PROJECT WEBSITE

The public-facing project website served as both the entryway to the online survey instruments as well as a validating resource for participants with questions about the project (<https://centralcatravelssurvey.com>). RSG developed the website to describe the study and facilitate participation. This site was simple, intuitive, and easy to navigate on desktop computers and mobile devices. While the study was open to respondents, participants could access the survey by entering their access code on the website’s home page.

This website was available in both English, Spanish, and Hmong, and provided key project information including frequently asked questions, contact information, the project’s data privacy policy, and more. RSG coordinated with TAC on development of the website content.

Figure 4 shows a screenshot from the study website.

FIGURE 4: PROJECT WEBSITE HOME PAGE



4.3 STUDY INVITATION MATERIALS

Each invited household received two mailings:

- **Invitation Packet:** The cover letter explained the survey purpose and described the steps necessary to complete the study. The invitation packet also included a frequently asked questions sheet.
- **Reminder Invitation Postcard:** The reminder invitation postcard arrived at each household approximately 4 – 12 days after the invitation packet. These cards included the study phone number, website address, and participant login information.

The study invitation materials are provided within Appendix A, including: Invitation Letter, Invitation Envelope, and Reminder Invitation Postcard.

4.4 SUPPLEMENTAL TARGETED OUTREACH AND LESSONS LEARNED

The study produced valuable insights into the approach and efficacy of supplemental targeted outreach. The objectives of the supplemental outreach were numerous, including:

- Critical initiative to be inclusive, create greater visibility, and bring attention to the transportation needs of Central California’s residents.
- Represent people and families who are usually underrepresented in transportation research.
- Help transportation planners identify transportation needs and gaps.

- Conduct the study respectfully with cultural awareness of the needs of Central California's diverse population.

Supplemental Transit Rider Recruitment Lessons Learned

Despite the invalid completes, which likely resulted from social media outreach, the collaboration across Central California's transit agencies and willingness to support the survey effort during spring 2022 data collection was impressive, and the success of this recruitment is demonstrated by the 24 transit-riding households that participated through this supplemental approach. Recruitment of transit riders provides rare and desirable travel behavior information and a more demographically representative sample than recruitment through ABS alone.

Nichols Research Lessons Learned

Recruitment efforts concluded with 306 completed households resulting from this supplemental recruitment effort. The pre-screening method employed by Nichols Research was effective at identifying specific hard-to-survey populations and recruiting them to participate in the study.

Ipsos Knowledge Panel Lessons Learned

Successful recruitment of Knowledge Panel participants into a two-part household travel survey was limited by available panelists that resided in the study area and Ipsos' corporate policies surrounding informed consent. This recruitment method did not yield the anticipated number of completed surveys for the CCTS.

5.0 PARTICIPANT SUPPORT

This study utilized both inbound and outbound participant support. “Inbound” refers to communications that participants initiated, and “outbound” refers to communications that RSG initiated.

5.1 OUTBOUND PARTICIPANT SUPPORT

RSG used several types of outbound participant support (beyond the previously mentioned website and invitation materials) to aid study administration. The primary sources of outbound support were automated email reminders, reminder phone calls, and in-app reminders or notifications (rMove participants only).

Email Reminders and Phone Calls

RSG required all rMove participants to provide email addresses or sign-up through the call center. Online participants could provide both an email address (required for most households, unless participating through the call center) and an optional phone number. Any household that provided an email address received email reminders, while households that only provided a phone number were reminded by phone.

The study call center conducted all phone reminders. These reminders occurred on the following schedule:

- One day before each household’s travel date.
- One day after each household’s travel date.
- Three to five days after each household’s travel date (if the household had not yet completed the survey).

Reminder emails occurred on a similar schedule, although more frequently. RSG sent email reminders/notifications throughout the travel period to all households that provided an email address during Part 1 of the survey. Households received emails within an hour of completing Part 1, prior to the rMove travel periods (reminding participants to activate the app), the day before the travel period began, the day after each travel period ended, and 3–5 days after the end of the travel period if the household had not yet completed the survey.

In-App Reminders (rMove)

rMove participants also had in-app reminders to encourage them to complete all surveys during their travel periods. Participants received notifications as soon as a new survey was available—either several minutes after the end of a trip or the morning after a travel day. rMove participants reporting their children’s trips by proxy also received reminders to review and add to their children’s trip rosters.

5.2 INBOUND PARTICIPANT SUPPORT

In addition to all outbound participant support, RSG provided three primary means through which participants could contact survey administrators. All participants could call a toll-free number to reach

the survey call center or submit questions through the contact form on the website. rMove participants also had the option to submit feedback directly through the app.

5.3 LANGUAGE OPTIONS

The invitation materials, project [website](#), and survey instrument were all translated into English, Spanish, and Hmong. Respondents with limited English, Spanish, or Hmong proficiency could call the study call center to participate (or ask questions) in other languages. Those participants would be directed to leave a message on the project's toll-free hotline, and a translator would call the participant back in the appropriate language, and answer questions, or assist the participant in completing the study in real-time.

6.0 DATASET PREPARATION

Throughout the study, RSG implemented strict dataset preparation and quality control checks to ensure data was properly collected, stored, and analyzed. Before study fielding, survey instrument testing confirmed that study responses were recorded correctly. During data collection, survey instruments employed real-time validations and logic checks to ensure consistent coding and logical response combinations and to prevent skipped questions. After the data collection period ended, additional time was spent reviewing, cleaning, and processing the raw data to prepare the unweighted dataset for analysis (described further below). The full steps and details of data processing are provided in the separate, accompanying dataset guide.

Initial Data Review

Before reviewing the data for completion, RSG removed households from the dataset that met the following exclusion criteria:

1. Household reported a home location outside the eight counties within the study region. Most households dropped during initial review were excluded for this reason.
2. Household reported contact information that matches other households (indicating duplicates). In these cases, RSG kept the first “household” to report their travel diary and removed the subsequent records.

Completion and Exclusion Criteria

Following the initial data review, households were then further reviewed for survey completion. Households were considered complete if they met the following conditions:

1. The household completed the recruit survey by answering all required questions.
2. The household completed a travel diary for all participating household members on at least one concurrent weekday.

All online households had a single complete travel day. rMove households had at least one complete travel day (where all surveys are completed on the same day by all household adults) but may have up to seven completed travel days. Partially complete rMove travel days were included in the final dataset but flagged accordingly.

Additional notes about data cleaning are included in the study dataset guide (provided separately).

7.0 EXPANSION AND WEIGHTING

This section describes the analysis and methodology used to expand² the data collected in the 2022/2023 CCTS HTS to the 2019³ ACS Public Use Microdata Sample (PUMS)⁴ 1-year data. The weighting methodology applied adjusts for survey non-response, survey participation mode, and geographic bias due to oversampling and other factors. In addition, RSG adjusted trip rates between the participation methods offered for the survey: online, call center, or smartphone app.

The applied weighting process included four primary steps:

1. **Initial Expansion:** Calculating an “initial weight” based on the probability of selection in the sample design. This step essentially “reverses” the sample plan, providing higher initial weights to areas where less sampling occurred.
2. **Reweighting to account for non-response bias:** Performing an entropy maximization-based list balancing routine to match several key household and person dimensions to ensure the weighted data accurately represent the entire survey region (and reduce sampling biases). This routine is performed using the open-source application, PopulationSim⁵. To do this step, missing values for income, gender, and race/ethnicity were imputed for those who did not provide that information.
3. **Creating day-level weights to account for multi-day survey data:** Adjusting the day-level and trip-level data to account for smartphone respondents provided multi-day travel diaries, while online respondents provided a single-day travel diary (this is the “multi-day adjustment”). These relatively simple adjustments ensure that travel analyses accurately reflect the entire survey region for a “typical” weekday (Tues-Thu) and do not over-represent smartphone respondents with multiple travel days.
4. **Adjusting for non-response bias in day-pattern and trip rates:** Adjusting the trip-level weights by data collection method (smartphone vs. online vs. call center) to account for underreporting biases that RSG has detected in this survey and prior travel surveys. These adjustments help make the day and trip-level data more consistent and increase the accuracy of trip rates across survey participation methods.

The overall goal is to make the survey sample representative of the entire survey area across several key dimensions related to travel behavior.

² For the purposes of this report, the terms expansion, expansion factors, and weights are used interchangeably and are synonymous. They all represent the concept of an expansion weight.

³ 2019 ACS PUMS are used as the sample plan was developed using 2019 5-year ACS data and the associated Block Groups.

⁴ <https://www.census.gov/programs-surveys/acs/microdata/access/2019.html>

⁵ <https://activitysim.github.io/populationsim/>

The full weighting memo provided to the TAC contains a detailed description of the weighting process. The household and person targets used for weighting are summarized in Figure 5.

FIGURE 5: WEIGHTING TARGETS

Household-level:	Person-level:
<ul style="list-style-type: none"> • Total households • Household size • Number of household workers • Household income • Number of household vehicles • Presence of children 	<ul style="list-style-type: none"> • Total persons • Gender • Age • Worker status • University student status • Educational Attainment • Race • Ethnicity

The full weighting process is delineated in a separate weighting memo provided with the final dataset delivery.

7.1 NOTES FOR DATA USERS

Although HTS data provides opportunities for many types of analysis, data users should always consider the context when applying the data. The CCTS was designed to collect typical weekday data from residents in 8 central California counties. Therefore, the HTS dataset is not ideal for understanding weekend or visitor analysis (for example).

Data users should always use weighted data in any analysis intended to draw conclusions about the region (as opposed to survey takers). Note that only Tuesday, Wednesday, and Thursday were weighted in this study, so any weighted analyses do not represent travel on other days.




Finally, data users should ensure sufficient sample size (and acknowledge margins of error) in any analysis. The smaller the sample size, the larger the margin of error. Sample sizes and margins of error are a complicated topic, but a typical rule of thumb is to ensure at least 30 observations of a behavior to draw reasonable conclusions.

8.0 SURVEY RESULTS

8.1 RESULTS OVERVIEW

The CCTS collected a rich set of demographic and travel behavior data from a representative sample of 7,406 households across the eight-county study region. RSG collected data from 19,084 persons, representing 150,012 trips across 42,567 complete person-days from April 19, 2022 to March 7, 2023 (Table 4).

TABLE 4: RESULTS OVERVIEW

	Households Surveyed 7,406	Weighted Households 1,293,268
	Persons Surveyed 19,084	Weighted Persons 3,878,935
	Complete Person-Days 42,567	Weighted Person-Days 3,878,935

The results in this section are all based on the analysis of the final, weighted dataset. Unless otherwise noted, all analyses use weighted data. Weighted data means that the individual sample records have been assigned multipliers (weighting factors) so that, cumulatively, the variation in subgroup sample sizes is adjusted to align with the actual subgroup population sizes observed in the ACS data for the region. For an evaluation of how closely the *unweighted* dataset matched the ACS data for the region, please see the separate memo on the data weighting approach.

The results are shown in total and by county to provide the most useful view of the results for FCOG and the Valley MPOs.

8.2 SAMPLE PLAN EVALUATION

This section evaluates the performance of the sample plan. Overall, this study targeted 6,850 households with complete travel surveys and obtained 7,406 households, which is approximately 8% more households than expected. The original sample target of 6,850 was based on a target of 6,720 from the RFP which was 0.5% of the eight counties household totals and an additional 130 households to provide for county-to-county variation in data collection.

Table 5 shows the expected and actual response rates for the total ABS sample and the supplemental sample segments. The supplemental sample resulted in 506 completed household surveys (306 through Nichols Research, 36 through Transit Rider Recruitment, 194 through Housing Authorities, and 62 through Ipsos KnowledgePanel).

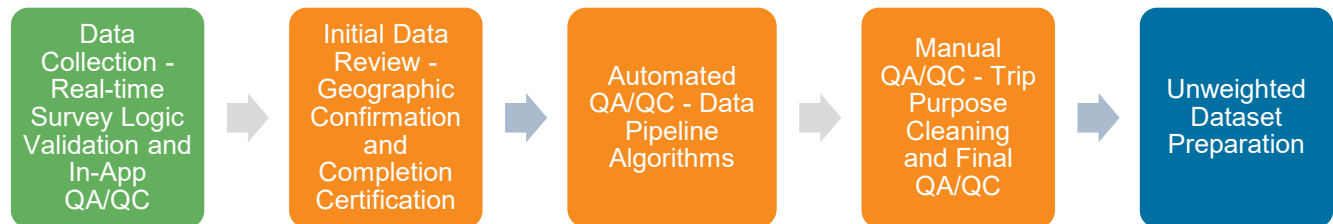
TABLE 5: EXPECTED AND ACTUAL RESPONSE BY ABS AND SUPPLEMENTAL SAMPLING SEGMENTS

Segment	Expected			Actual		
	Invitations	Response Rate	Complete Households	Invitations	Response Rate	Complete Households
ABS	395,000	1.67%	6,600	561,957	1.22%	6,900
Supplemental Sampling	-	-	400	-	-	506
TOTAL	-	-	7,000	-	-	7,406

8.3 DATA QUALITY CONTROL AND QUALITY ASSURANCE

RSG managed data processing and QA/QC closely throughout data collection. RSG utilizes a specific data processing and QA/QC workflow composed of three main parts as described below and schematized in Figure 6 for all HTS studies.

FIGURE 6: SCHEMATIC REPRESENTATION OF THE DATA PROCESSING WORKFLOW



In-App QA/QC

Data collected was validated in real-time through survey logic programmed into the survey instrument. This survey logic was rigorously tested by the project team using manual and automated testing tools. A detailed description of real-time in-app survey logic and data validation is outlined in Section 3.3.

Initial Data Review

The Initial Data Review step took place after data collection and the abovementioned real-time validation steps have already occurred. It is the first step in the Data Processing Workflow, conducted to identify and flag complete households and household members, and to create the working data tables. This data review is further detailed in Section 6.0.

Calculation of Geographic Variables

Census PUMA and Block Group shapefiles were downloaded via the R Tigris package and spatially joined to all reported coordinates including the reported home address, the sampled home address (if different), school and work locations (if applicable), and trip origin and destination locations. The

reported home Block Group may not always match the Block Group ascribed to the household's sample address (which is used to determine the sample segment) for a few reasons:

- Sample addresses are geocoded differently than survey addresses.
- Sample addresses sometimes are coded to a mailbox location rather than a home location.
- Home addresses in the survey are not always geocoded to a person's exact home (e.g., a cross street nearby).

Because a person's reported home address is considered more recent and typically more accurate than the sample address, the geographic variables are derived using this address. Households retain their initial sample segment assignment, as this is what determines their probability of being invited according to the information in the sample address file.

Automated QA/QC Data Pipeline Algorithms

Automated QA/QC was then performed using machine-learning algorithms that identify trips that require a manual review by our trained analysts. These machine-learning algorithms have been trained on a large set of data across various regions and trip types. RSG took additional steps to rigorously clean and review smartphone GPS data with the goal of providing a user-friendly dataset. RSG overlaid the smartphone trip path data collected onto maps to ensure the trip segments, paths, and times all appeared to be correct. RSG has developed proprietary machine-learning algorithms to assist in this process, helping to identify the trips most likely to require splitting into two trips (e.g., passenger drop-offs with a short stop period), merging with adjacent trips (e.g., trip split at long light in traffic), cleaning (e.g., spurious location jumps from urban canyon effect), or dropping from the dataset (e.g., spurious trips resulting from movement in a building). Analysts carefully reviewed the actions recommended by the algorithms to add a secondary level of quality control to the process. Additionally, the data processing pipeline included over 150 data quality checks that ensure that the delivered data is consistent and of high quality. When these checks failed, RSG analysts made a determination to either correct the data or to remove the data from the deliverable. A selection of automated consistency checks is provided in Table 6.

TABLE 6: AUTOMATED CONSISTENCY CHECKS

Table	Check
Household	<ul style="list-style-type: none"> Household IDs are unique Number of trips is not missing Household size is consistent between Household and Person tables Number of adults is not missing Number of adults is not 0 Number of adults is consistent between Household and Person tables Number of workers is not missing Number of workers is consistent between Household and Person tables Number of trips is consistent between Household and Trip tables Number of vehicles is consistent between Household and Vehicle tables No missing values for "home_in_region" No missing values for home PUMA No missing values for home Block Group BGs are in a single PUMA
Person	<ul style="list-style-type: none"> Person IDs are unique Number of trips is consistent between Person and Trip tables Number of complete days is consistent between Person and Day tables Children do not have a license Non-license holders do not drive a vehicle Children who are not students No missing values for work or school locations (if applicable) Work or school BGs are in a single PUMA
Day	<ul style="list-style-type: none"> Combination of person ID and day number are unique Number of trips is consistent between the Day vs Trip No incomplete surveys with complete timestamp No complete surveys missing complete timestamp
Vehicle	<ul style="list-style-type: none"> Vehicles IDs are unique
Location	<ul style="list-style-type: none"> Locations are unique Locations unique by trace_id and collect_time Departure and arrival times are in table Departure and arrival locations are in table

Table	Check
Trip	<ul style="list-style-type: none"> Trip IDs are unique Departure times values are on the travel_date Dwell times are not missing Dwell times are positive Dwell times are next departure time – arrival time Departure time is before arrival time Travel dates do not have multiple values for day of week Detailed purpose is consistent with purpose categories No missing values in imputed purpose Durations are positive Imputed durations are positive Durations equal arrival time – departure time Distances are positive Meter/mile conversions are approximately correct No missing values for origin or destination locations BGs are in a single PUMA Speed is calculated correctly Access trips should have a purpose of 'change_mode' Access trips should not have a mode of 'transit' Egress trips should have origin purpose of 'change_mode' Egress trips should not have a mode of 'transit' All transit trips should have access and egress trips Non transit trips should not have access and egress trips Copied trips for non-participants have same value as "parent" trip
Codebook	<ul style="list-style-type: none"> All variables are marked appropriately in codebook All variables in codebook are in dataset

Trip Purpose Cleaning

Trip purpose cleaning was applied to all rMove trips in person-days with at least 1 complete trip and no more than 10 incomplete trips. “Incomplete” trips are defined as those for which the respondent did not answer the trip-specific survey questions about purpose, mode, etc., for the given trip.

During trip purposes cleaning, the approach was to apply a logical sequence of “tests” or rules to trips for which the reported purpose was not consistent with the location type based on the smartphone trip trace data.

In general terms, the rules are designed to:

- Check the respondent’s reported destination purpose when it conflicts with the destination location type. The details of the rules depend on the trip purpose with different criteria used for change mode trips, escort trips, linked transit trips, trips with home destinations but other reported purposes, etc.
- Identify cases where respondents swapped the order of two or more trips when reporting their trip details.
- Identify cases where respondents may have omitted a trip and shifted remaining reported trip details by one trip when reporting the rest of their trips.
- Filling in missing data by sampling destination purposes from other trips made to the same locations, either by the same respondent or by other respondents.

Problematic trips were identified by comparing the destination purpose category to the destination location type. For example:

- For any destination purpose reported as “work” that is not at the primary work location, the destination purpose and purpose category were changed to “work-related.” This was the original intention of offering different purpose categories for work (at the usual workplace) versus work-related.
- Similarly, a new purpose category of “school-related” was added to apply to any destination purpose reported as “school” that was not at the primary school location.

These re-codings avoid some of the apparent mismatches between reported purposes and locations for work and school activities.

Iterations and Deliverable Review

Before delivery, this dataset was reviewed by the project team including by a data scientist, looking for any final dataset inconsistencies. This review included a comprehensive review of every data column in the dataset.

In addition, the research team, FCOG, and the TAC reviewed the data deliverables and discussed weighting procedures.

8.4 OVERALL TRIP RESULTS

This section describes the travel data collected during the survey using distributions and trip rates. Trip rates are calculated over weekdays only, consisting of Tuesday through Thursday. These metrics are segmented by important variables, such as household income, age, trip mode, and trip purpose.

Trip Analysis

Note that unweighted counts in this section (and all trip analysis sections below) include records only on Tuesday – Thursday, which are the days weighted for modeling and analysis (Table 7). Analyses by county are based on the participant’s county of residence.

TABLE 7: PERSON TRIPS ON COMPLETE WEEKDAYS (TUESDAY – THURSDAY) BY HOME COUNTY (WEIGHTED AND UNWEIGHTED)⁶

COUNTY	UNWEIGHTED COUNT	WEIGHTED COUNT
Fresno	16,121	3,537,447
Kern	18,187	3,415,856
Kings	3,197	557,999
Madera	4,178	563,874
Merced	5,780	1,020,892
San Joaquin	12,811	2,638,982
Stanislaus	9,051	1,879,518
Tulare	9,184	1,925,916
TOTAL	78,509	15,540,485

⁶ Tables 18-22 only include weighted trips with complete surveys

Trip Rates

The overall weekday trip rate by person is 4.0 across the study area and a trip rate of 12.0 by household. Trip rates are consistent across most counties, however, Tulare (4.3) and Kings (4.2) have the highest person trip rates (Table 8).

Trip rates also vary little by household income, ranging from 3.8 to 4.2 across all income categories (Table 9).

Most of the travel modes for these trips are by personal vehicle (3.6), followed by walk trips (0.26) (Table 10). The most trips by trip purposes are to home (1.23), followed by pick up or drop off (0.61) (Table 11).

TABLE 8: PERSON AND HOUSEHOLD TRIP RATES BY COUNTY (WEIGHTED)

COUNTY (n = 78,509)	TRIP RATE (PERSON)	TRIP RATE (HOUSEHOLD)
Fresno (n = 16,121)	3.9	11.4
Kern (n = 18,187)	4.4	12.7
Kings (n = 3,197)	4.2	12.7
Madera (n = 4,178)	3.9	12.5
Merced (n = 5,780)	4.0	12.8
San Joaquin (n = 12,811)	3.8	11.5
Stanislaus (n = 9,051)	3.8	10.8
Tulare (n = 9,184)	4.3	13.7
TOTAL	4.0	12.0

TABLE 9: PERSON TRIP RATE BY HOUSEHOLD INCOME BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Under \$25,000 (n = 14,498)	3.0	4.1	3.3	5.5	4.4	4.1	3.2	5.1	3.8
\$25,000 – 49,999 (n = 16,156)	3.8	4.2	4.2	4.8	3.9	3.8	3.1	4.1	3.9
\$50,000 – 74,999 (n = 13,168)	4.0	4.0	4.1	2.5	4.2	3.6	4.1	4.0	3.9
\$75,000 – 99,999 (n = 10,358)	4.1	4.9	4.9	3.3	4.9	4.3	4.4	4.1	4.4
\$100,000 – 199,999 (n = 16,166)	4.3	4.9	4.1	4.1	3.3	3.4	3.9	4.0	4.1
\$200,000 or more (n = 3,664)	4.3	4.4	I/S	I/S	I/S	4.5	2.8	I/S	4.2
Prefer not to answer (n = 4,499)	3.8	3.8	I/S	4.0	4.8	3.5	4.2	4.0	3.9
TOTAL	3.9	4.4	4.2	3.9	4.0	3.8	3.8	4.3	4.0

I/S indicated insufficient sample size for reporting weighted results in this cell. Sample sizes are reported in Appendix B. Samples sizes below 150 trips are considered insufficient because trips below 150 are reported by a handful of households (<30). Sample sizes above 150 trips but under 30 households reporting those trips is also marked as I/S.

TABLE 10: PERSON TRIP RATE BY TRAVEL MODE BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	0.241	0.263	0.303	0.174	0.272	0.322	0.282	0.228	0.265
Bicycle or e-bike	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	0.025
Taxi	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	<0.010
Smartphone-app ride hailing service	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	0.020
Vehicle	3.497	3.968	3.690	3.628	3.693	3.368	3.330	3.784	3.605
School bus	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	0.017
Shuttle	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	<0.010
Transit	0.021	0.022	I/S	I/S	I/S	I/S	I/S	I/S	0.028
Long-distance passenger mode	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	<0.010
Other mode	0.035	I/S	I/S	I/S	I/S	I/S	I/S	0.110	0.036
TOTAL	3.858	4.668	4.439	4.090	4.080	3.818	3.756	4.274	4.006

I/S indicated insufficient sample size for reporting weighted results in this cell. Sample sizes are reported in Appendix B. Samples sizes below 150 trips are considered insufficient because trips below 150 are reported by a handful of households (<30). Sample sizes above 150 trips but under 30 households reporting those trips is also marked as I/S.

TABLE 11: PERSON TRIP RATE BY TRIP PURPOSE BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Home	1.21	1.34	1.37	1.21	1.16	1.24	1.10	1.20	1.23
Work	0.30	0.29	0.27	0.27	0.25	0.29	0.29	0.29	0.29
Work-related	0.24	0.33	0.21	0.23	0.34	0.22	0.21	0.28	0.26
School	0.16	0.12	I/S	I/S	0.18	0.14	0.11	0.19	0.15
School -related	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	0.03
Pick up / Drop off	0.55	0.67	0.62	0.60	0.64	0.52	0.49	0.89	0.61
Shopping	0.44	0.50	0.32	0.47	0.56	0.41	0.42	0.47	0.45
Meal	0.30	0.32	0.30	0.27	0.21	0.27	0.31	0.28	0.29
Social / Recreation	0.24	0.30	0.27	0.20	0.18	0.26	0.30	0.25	0.26
Errand	0.17	0.22	0.34	0.21	0.18	0.19	0.26	0.19	0.21
Change mode	0.03	0.05	I/S	I/S	I/S	0.06	I/S	I/S	0.05
Overnight	0.14	0.14	I/S	0.23	0.16	0.11	0.12	0.11	0.13
Other purpose	0.06	0.04	I/S	I/S	I/S	0.07	0.07	0.08	0.06
TOTAL	3.86	4.35	4.17	3.86	4.04	3.80	3.76	4.28	4.01

I/S indicated insufficient sample size for reporting weighted results in this cell. Sample sizes are reported in Appendix B. Samples sizes below 150 trips are considered insufficient because trips below 150 are reported by a handful of households (<30). Sample sizes above 150 trips but under 30 households reporting those trips is also marked as I/S.

Trip Distances and Durations

This section shows trip distances and durations by mode and purpose categories. All tables are shown as medians to remove the effect of extreme outliers. Note that some trips do not have derived distances available if they occurred over water where there is no Google distance information available.

TABLE 12: MEDIAN TRIP DISTANCE AND DURATION BY TRAVEL MODE (WEIGHTED)

TRAVEL MODE	MEDIAN DISTANCE (miles)	MEDIAN DURATION (minutes)
Walk (n = 5,506)	0.4	10
Bicycle or e-bike (n = 598)	1.2	11
Taxi (n = 50)	3.2	20
Smartphone-app ride hailing service (n = 278)	2.4	11
Vehicle (n = 70,144)	2.5	11
School bus (n = 312)	2.8	30
Shuttle (n = 110)	8.9	30
Transit (n = 657)	3.2	26
Long-distance passenger mode (n = 67)	18.3	45
Other mode (n = 787)	3.1	18
TOTAL	2.3	11

TABLE 13: MEDIAN TRIP DISTANCE (MILES) BY TRAVEL MODE BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4
Bicycle or e-bike	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	1.2
Taxi	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	3.2
Smartphone-app ride hailing service	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	2.4
Vehicle	2.9	2.6	2.4	2.4	2.3	2.5	2.5	2.1	2.5
School bus	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	2.8
Shuttle	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	8.9
Transit	3.5	3.3	I/S	I/S	I/S	I/S	I/S	I/S	3.2
Long-distance passenger mode	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	18.3
Other mode	1.6	I/S	I/S	I/S	I/S	I/S	I/S	3.1	3.1
TOTAL	2.6	2.4	2.2	2.2	2.1	2.3	2.3	2.0	2.3

I/S indicated insufficient sample size for reporting weighted results in this cell. Sample sizes are reported in Appendix B. Samples sizes below 150 trips are considered insufficient because trips below 150 are reported by a handful of households (<30). Sample sizes above 150 trips but under 30 households reporting those trips is also marked as I/S.

TABLE 14: MEDIAN TRIP DURATION (MINUTES) BY TRAVEL MODE BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	11.0	9.0	7.0	7.0	10.0	10.0	11.0	9.0	10.0
Bicycle or e-bike	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	11.0
Taxi	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	20.0
Smartphone-app ride hailing service	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	11.0
Vehicle	12.0	11.0	10.0	12.0	10.0	12.0	11.0	10.0	11.0
School bus	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	30.0
Shuttle	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	30.0
Transit	40.0	23.0	I/S	I/S	I/S	I/S	I/S	I/S	26.0
Long-distance passenger mode	I/S	I/S	I/S	I/S	I/S	I/S	I/S	I/S	45.0
Other mode	40.0	I/S	I/S	I/S	I/S	I/S	I/S	13.0	18.0
TOTAL	12	11	10	12	11	12	11	10	11.0

I/S indicated insufficient sample size for reporting weighted results in this cell. Sample sizes are reported in Appendix B. Samples sizes below 150 trips are considered insufficient because trips below 150 are reported by a handful of households (<30). Sample sizes above 150 trips but under 30 households reporting those trips is also marked as I/S.

TABLE 15: DISTANCE DISTRIBUTION BY COUNTY (WEIGHTED)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509
0-2 miles	44%	44%	49%	47%	48%	46%	46%	51%	46%
2-5 miles	25%	29%	23%	19%	25%	26%	24%	23%	25%
5-10 miles	18%	16%	10%	12%	10%	12%	15%	12%	14%
10-20 miles	8%	6%	10%	10%	7%	7%	6%	7%	7%
20-50 miles	4%	4%	8%	10%	6%	6%	5%	6%	5%
50 or more miles	1%	2%	1%	2%	3%	3%	3%	2%	2%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%

Trip Modes

Table 16 shows the use of travel modes by county. Most study participants reported using personal household vehicles as their main mode of travel (90.0%), followed by walking (6.6%). Madera County reported the highest use of household vehicles as the travel mode (93.9%), while Tulare County reported the lowest use of personal vehicles for travel (88.4%). Tulare County additionally reported using more smartphone-app ride hailing services (2.1%) and other mode (2.6%) than other counties.

Comparing trip modes by income, use of personal vehicles is still reported as the most common mode (90.0%) (Table 17). Households with income less than \$25,000 report more walk trips (10.5%) of trips and more Smartphone-app ride hailing services (2.3%) than any other income group.

TABLE 16: TRAVEL MODE BY COUNTY (WEIGHTED %)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	16,121	18,189	3,197	4,178	5,780	12,811	9,051	9,184	78,511
Walk	6.2%	6.1%	7.3%	4.5%	6.7%	8.5%	7.5%	5.3%	6.6%
Bicycle or e-bike	1.1%	0.5%	0.1%	0.2%	0.2%	0.4%	1.2%	0.5%	0.6%
Taxi	0.0%	0.0%	0.1%	0.3%	0.0%	0.1%	0.1%	0.0%	0.1%
Smartphone-app ride hailing service	0.1%	0.4%	0.6%	0.0%	0.3%	0.5%	0.1%	2.1%	0.5%
Vehicle	90.6%	91.2%	88.5%	93.9%	91.4%	88.6%	88.6%	88.4%	90.0%
School bus	0.5%	0.7%	1.2%	0.8%	0.1%	0.2%	0.2%	0.1%	0.4%
Shuttle	0.0%	0.1%	0.3%	0.0%	0.0%	0.1%	0.2%	0.3%	0.1%
Transit	0.6%	0.5%	1.0%	0.1%	0.6%	0.7%	1.5%	0.6%	0.7%
Long-distance passenger mode (e.g., airplane)	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%
Other mode	0.9%	0.5%	0.9%	0.2%	0.6%	0.7%	0.7%	2.6%	0.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 17: TRAVEL MODE BY HOUSEHOLD INCOME (WEIGHTED %)

	HOUSEHOLD INCOME							
	Under \$25,000	\$25,000 – 49,999	\$50,000 – 74,999	\$74,999 – 99,999	\$100,000 – 199,999	\$200,000 or more	Prefer not to answer	TOTAL
<i>Unweighted sample (n)</i>	14,499	16,156	13,168	10,358	16,166	3,665	4,499	78,511
Walk	10.5%	4.4%	6.6%	6.7%	6.3%	6.4%	5.2%	6.6%
Bicycle or e-bike	0.6%	0.5%	1.1%	0.5%	0.6%	0.8%	0.4%	0.6%
Taxi	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
Smartphone-app ride hailing service	2.3%	0.2%	0.2%	0.2%	0.1%	0.0%	0.5%	0.5%
Vehicle	82.9%	91.8%	90.6%	90.3%	91.8%	90.7%	92.0%	90.0%
School bus	0.4%	0.9%	0.2%	0.1%	0.4%	1.0%	0.1%	0.4%
Shuttle	0.2%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%
Transit	1.6%	1.1%	0.5%	0.1%	0.3%	0.1%	1.0%	0.7%
Long-distance passenger mode	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%	0.1%
Other mode	1.4%	1.0%	0.4%	1.9%	0.4%	0.6%	0.6%	0.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Trip Purpose

The most frequently reported trip purpose is to the participant's home (30.6%), followed by pick-up/drop-off (15.3%) and shopping (11.3%). Tulare County reported the highest rate of pick-up/drop-off as the trip purpose (20.9%) in comparison to Stanislaus County's 13.0% (Table 18). Merced County reported the highest frequency of shopping trips at 13.8%. The lowest report of shopping as the trip purpose was in Kings County (7.9%) (Table 18).

Table 19 shows the purpose of trips by income. Those with a lower annual household income reported fewer trips to home and those with higher incomes reported more trips home. For example, households with income below \$25,000 reported less frequent trips returning home (26.0%) in comparison to those with a yearly income of \$200,000 or more (33.8%). Those in the <\$25,000 income group additionally reported lower rate of work (2.9%) trips compared to the \$200,000+ income group (10.3%). The <\$25,000 income group additionally has the lowest rate of work-related trips (3.2%). The highest report of work-related trips was by the \$50,000 – 74,999 income group (8.5%). The <\$25,000 income group additionally reported the highest frequency of pick-up/drop-off (18.0%) and shopping (15.8%) as the trip purpose in comparison to other income groups. The lowest frequency of shopping as the trip purpose was reported by the \$200,000+ group.

Trip purpose is compared by travel mode in Table 20. Vehicle trips are used more often for pick up and drop off (16%) or shopping (12.1%) than for work (7.2%). Smartphone app ride hailing service was most frequently used for pick-up/drop-off (39.0%). As expected walk and bike trips were most often used for social/recreation purposes (22.2% and 32% respectively) or to go home (28.1% and 40.6% respectively).

TABLE 18: TRIP PURPOSE BY COUNTY (WEIGHTED %)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	16,128	18,234	3,227	4,228	5,793	12,875	9,077	9,249	78,811
Home	31.2%	30.9%	32.6%	31.1%	28.6%	32.5%	29.3%	27.9%	30.6%
Work	7.7%	6.6%	6.4%	6.9%	6.3%	7.6%	7.6%	6.8%	7.1%
Work-related	6.1%	7.6%	5.2%	6.0%	8.4%	5.9%	5.5%	6.7%	6.5%
School	4.1%	2.8%	5.2%	2.9%	4.4%	3.7%	3.0%	4.4%	3.6%
School-related	0.6%	0.8%	0.5%	0.3%	2.3%	0.7%	0.5%	0.2%	0.7%
Pick up / Drop off	14.2%	15.5%	14.7%	15.4%	16.1%	13.6%	13.0%	20.9%	15.3%
Shopping	11.4%	11.6%	7.9%	12.1%	13.8%	10.7%	11.3%	10.9%	11.3%
Meal	7.8%	7.3%	7.4%	6.9%	5.3%	7.2%	8.2%	6.5%	7.3%
Social / Recreation	6.3%	6.9%	6.5%	5.3%	4.5%	6.7%	7.9%	6.0%	6.5%
Errand	4.5%	5.1%	8.1%	5.4%	4.3%	4.9%	6.9%	4.4%	5.1%
Change mode	0.8%	1.0%	2.1%	0.1%	0.8%	1.5%	2.1%	0.9%	1.2%
Overnight	3.6%	3.1%	2.1%	6.1%	3.9%	2.9%	3.1%	2.5%	3.2%
Other purpose	1.6%	0.9%	1.3%	1.5%	1.2%	2.0%	1.7%	1.9%	1.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 19: TRIP PURPOSE BY HOUSEHOLD INCOME (WEIGHTED %)

	HOUSEHOLD INCOME							TOTAL
	Under \$25,000	\$25,000 – 49,999	\$50,000 – 74,999	\$74,999 – 99,999	\$100,000 – 199,999	\$200,000 or more	Prefer not to answer	
<i>Unweighted sample (n)</i>	14,532	16,200	13,255	10,401	16,229	3,686	4,508	78,811
Home	26.0%	30.2%	30.8%	31.9%	31.6%	33.8%	32.9%	30.6%
Work	2.9%	6.8%	8.5%	6.3%	8.6%	10.3%	8.7%	7.1%
Work-related	3.2%	7.3%	8.5%	6.1%	8.0%	5.6%	3.8%	6.5%
School	3.7%	4.7%	3.4%	3.6%	3.1%	4.6%	2.5%	3.6%
School-related	1.5%	0.7%	0.5%	0.7%	0.5%	0.3%	0.3%	0.7%
Pick up / Drop off	18.0%	16.8%	14.4%	17.2%	13.6%	15.9%	7.8%	15.3%
Shopping	15.8%	12.3%	9.9%	10.0%	9.8%	7.3%	13.4%	11.3%
Meal	7.0%	7.1%	7.5%	7.0%	7.6%	5.8%	8.5%	7.3%
Social / Recreation	5.8%	4.4%	6.4%	7.2%	7.7%	8.0%	6.9%	6.5%
Errand	6.0%	4.0%	4.8%	4.9%	4.8%	4.6%	9.0%	5.1%
Change mode	2.4%	1.6%	1.2%	0.2%	0.6%	0.2%	1.8%	1.2%
Overnight	5.3%	2.9%	2.9%	3.0%	3.1%	2.4%	2.5%	3.2%
Other purpose	2.5%	1.2%	1.3%	1.8%	1.1%	1.1%	2.1%	1.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 20: TRIP PURPOSE BY TRAVEL MODE (WEIGHTED %)

	TRAVEL MODE										TOTAL
	Walk	Bicycle or e-bike	Taxi	Smartphone app ride hailing service	Vehicle	School bus	Shuttle	Transit	Long-distance passenger mode	Other mode	
<i>Unweighted sample (n)</i>	5,506	598	50	278	70,145	312	110	657	67	788	78,511
Home	28.1%	40.6%	30.1%	21.5%	31.1%	37.9%	14.1%	0.0%	25.4%	25.6%	30.6%
Work	6.5%	7.8%	0.3%	7.5%	7.2%	0.0%	20.3%	0.0%	20.8%	11.0%	7.1%
Work-related	6.7%	1.1%	5.5%	0.4%	6.5%	0.0%	33.0%	0.0%	6.1%	12.1%	6.5%
School	6.9%	2.4%	0.0%	6.6%	3.2%	53.3%	5.0%	0.0%	0.0%	3.1%	3.6%
School-related	3.2%	0.2%	0.0%	0.0%	0.5%	4.2%	1.0%	0.0%	0.0%	1.0%	0.7%
Pick up / Drop off	6.7%	1.3%	0.0%	39.0%	16.0%	1.5%	6.0%	0.0%	0.6%	18.3%	15.3%
Shopping	4.9%	4.1%	24.5%	6.2%	12.1%	0.0%	1.0%	0.0%	0.0%	6.2%	11.3%
Meal	4.7%	1.4%	11.9%	3.1%	7.6%	0.6%	0.2%	0.0%	0.5%	6.4%	7.3%
Social / Recreation	22.2%	32.0%	3.1%	5.7%	5.2%	0.1%	4.9%	0.0%	5.5%	6.4%	6.5%
Errand	2.9%	1.3%	1.7%	2.3%	5.4%	0.0%	7.5%	0.0%	0.6%	4.6%	5.1%
Change mode	3.7%	3.1%	1.7%	1.9%	0.2%	2.3%	0.3%	100.0%	31.8%	0.2%	1.2%
Overnight	2.7%	3.2%	21.2%	3.3%	3.3%	0.1%	4.6%	0.0%	5.7%	1.0%	3.2%
Other purpose	1.0%	1.5%	0.0%	2.6%	1.5%	0.1%	2.0%	0.0%	2.9%	4.1%	1.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

8.5 EMPLOYMENT RESULTS

More than half of participants age 16 and older were employed full-time or part-time (54.8%). A further third of participants were not employed and not looking for work (33.2%). Of participants 16 and older, 6.7% are unemployed and are looking for work. By County, the highest percentage of participants employed full-time was in San Joaquin County (46.5%), and the lowest percentage of participants employed full-time was in Tulare County (37.6%) (Table 21).

Commuting habits varied among employed adults in the study. Among employed adults, 61.2% in the study never telework, while 9.8% telework five days a week and 3.2% telework 6-7 days (Table 22). Employed adults in Merced County were most likely to telework five days a week (12.1%), while employed adults in Kings County were most likely to never telework (75.3%).

About two-thirds (64.6%) of employed adults go to one work location outside the home (Table 23). Employed adults in Madera County were most likely to work only from home or remotely (12.2%), while employed adults in Stanislaus County were least likely to work only from home or remotely (6.7%). For 14.1% of employed adults, work locations regularly varies and a further 3.1% of employed adults drive or travel for work. About ten percent of employed adults (9.9%) telework some days and travel to a work location some days, though only 1.9% of employed adults in Kings County telework some days and travel to a work location some days (Table 24). A small percentage of employed adults benefit from cash or incentives for carpooling, walking, or biking to work (0.6%) or free/discounted transit fare (0.8%). Commuters in the valley are more likely received subsidy for WFH, transit, carpooling instead of subsidy for rideshare, car share or bike share.

Table 25 describes Industry by county among employed adults. The most reported industries were Educational Services (14.0%) and Health Care and Social Assistance (14.1%).

TABLE 21: PERSON EMPLOYMENT STATUS BY COUNTY (WEIGHTED %, AGE 16+)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	3,298	3,409	583	738	1,141	2,586	1,774	1,685	15,214
Employed full-time (paid)	39.6%	40.6%	41.4%	39.4%	38.1%	46.5%	42.5%	37.6%	41.1%
Employed part-time (paid)	13.3%	14.1%	12.2%	11.7%	16.7%	12.3%	14.1%	14.6%	13.7%
Self-employed	2.5%	3.0%	3.2%	5.8%	4.5%	2.6%	1.9%	4.1%	3.0%
Not employed and not looking for work	34.1%	32.3%	33.1%	33.9%	31.2%	32.5%	34.2%	33.8%	33.2%
Not employed and looking for work	7.2%	7.7%	7.8%	7.9%	6.3%	4.9%	5.6%	7.6%	6.7%
Unpaid volunteer or intern	1.1%	0.7%	1.9%	1.1%	1.8%	0.4%	0.6%	1.1%	0.9%
Employed but not currently working	2.2%	1.5%	0.3%	0.2%	1.3%	0.7%	1.0%	1.2%	1.3%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 22: TELEWORK FREQUENCY BY COUNTY (WEIGHTED %, EMPLOYED ADULTS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,674	1,634	315	390	563	1,401	909	826	7,712
6-7 days a week	2.3%	3.9%	3.4%	2.9%	3.9%	4.0%	1.3%	4.0%	3.2%
5 days a week	11.8%	7.9%	6.1%	10.0%	12.1%	10.9%	6.8%	10.8%	9.8%
4 days a week	1.6%	2.2%	1.2%	8.5%	4.0%	3.6%	5.1%	2.6%	3.1%
2-3 days a week	10.1%	8.5%	2.7%	7.0%	9.6%	8.1%	10.5%	5.0%	8.5%
1 day a week	4.3%	3.2%	3.0%	3.6%	2.4%	3.2%	5.3%	7.2%	4.1%
1-3 days a month	3.2%	3.7%	1.1%	6.5%	2.0%	2.8%	3.1%	4.4%	3.3%
Less than monthly	6.8%	8.0%	7.2%	2.6%	7.3%	5.7%	6.2%	7.5%	6.7%
Never	60.0%	62.4%	75.3%	58.9%	58.7%	61.7%	61.7%	58.5%	61.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 23: JOB LOCATION TYPE BY COUNTY (WEIGHTED %, EMPLOYED ADULTS EXCLUDING “FURLOUGHED”)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,695	1,652	321	391	568	1,420	916	842	7,805
Go to one work location outside the home	65.0%	64.1%	81.1%	54.8%	63.2%	65.2%	64.6%	62.5%	64.6%
Work location regularly varies	12.4%	15.5%	7.2%	19.6%	10.2%	12.2%	15.4%	19.0%	14.1%
Work only from home or remotely	7.9%	7.6%	7.5%	12.2%	10.6%	9.6%	6.7%	8.2%	8.4%
Drive/travel for work	2.7%	3.5%	2.3%	1.2%	5.3%	2.9%	2.7%	3.6%	3.1%
Telework some days and travel to a work location some days	12.0%	9.2%	1.9%	12.2%	10.7%	10.1%	10.6%	6.7%	9.9%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 24: COMMUTE SUBSIDY USE BY COUNTY (WEIGHTED %, EMPLOYED ADULTS)⁷

	COUNTY								TOTAL
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	
<i>Unweighted sample (n)</i>	1,305	1,286	234	287	407	1,076	701	633	5,929
Free parking at work	91.5%	92.7%	94.6%	90.7%	84.0%	85.5%	89.9%	94.6%	90.4%
Discounted parking at work	0.8%	0.1%	0.1%	0.0%	0.7%	3.2%	1.3%	0.9%	1.1%
Free/discounted transit fare	0.4%	0.5%	0.1%	0.0%	0.1%	1.5%	2.1%	0.0%	0.8%
Free/discounted vanpool	0.5%	0.0%	0.8%	0.0%	0.0%	0.1%	0.3%	0.0%	0.2%
Cash or incentives for carpooling, walking, biking to work	0.9%	0.0%	3.1%	0.0%	3.1%	0.0%	0.1%	0.7%	0.6%
Free/discount smartphone-app ride service	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
Free/discounted carshare membership/use	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Free/discounted shuttle service	0.0%	0.2%	0.0%	0.0%	0.1%	1.2%	0.0%	0.0%	0.3%
Free/discounted bikeshare membership	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Free/discounted bicycle tune-up/maintenance	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Stipend for working at home	2.8%	0.7%	0.4%	2.5%	3.8%	3.5%	1.1%	1.8%	2.1%
None	5.4%	6.5%	2.9%	8.1%	8.3%	6.7%	6.2%	2.9%	5.9%

⁷ Participants could select more than one option, so totals exceed 100%.

TABLE 25: INDUSTRY BY COUNTY (WEIGHTED %, EMPLOYED ADULTS)⁸

	COUNTY								TOTAL
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	
<i>Unweighted sample (n)</i>	1,733	1,689	323	400	579	1,431	937	843	7,935
Agriculture, Forestry, Fishing and Hunting	4.3%	6.9%	6.3%	9.8%	9.5%	3.0%	4.4%	11.0%	6.0%
Utilities	1.1%	2.8%	0.1%	0.5%	1.9%	2.0%	4.6%	0.9%	2.1%
Construction	4.4%	3.4%	5.5%	4.2%	1.2%	4.0%	4.1%	2.6%	3.7%
Manufacturing	2.8%	2.4%	9.6%	2.0%	2.3%	3.4%	7.3%	3.7%	3.7%
Retail Trade	6.9%	6.4%	3.8%	11.7%	8.1%	9.6%	7.3%	7.4%	7.6%
Transportation and Warehousing	3.2%	5.5%	2.8%	2.9%	6.5%	12.2%	8.0%	6.2%	6.5%
Information	1.8%	1.4%	0.1%	4.1%	2.8%	4.1%	1.2%	0.5%	2.0%
Finance and Insurance	2.3%	1.7%	1.3%	6.7%	1.8%	1.8%	3.9%	3.3%	2.5%
Real Estate and Rental and Leasing	0.4%	0.6%	0.6%	1.0%	2.6%	1.0%	0.6%	0.8%	0.8%
Professional, Scientific, and Technical Services	5.1%	4.4%	2.8%	1.5%	4.0%	4.9%	5.0%	4.0%	4.5%
Educational Services	14.2%	17.0%	7.8%	15.0%	18.3%	15.0%	11.4%	8.9%	14.0%
Health Care and Social Assistance	19.0%	10.5%	11.1%	10.6%	14.2%	12.6%	12.8%	16.0%	14.1%

⁸ Participants could select more than one option, so totals exceed 100%.

COUNTY									
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Arts, Entertainment, and Recreation	1.4%	1.1%	2.3%	1.8%	2.0%	1.3%	2.4%	1.6%	1.5%
Accommodation and Food Services	4.3%	2.9%	19.2%	2.2%	9.1%	4.4%	3.7%	2.8%	4.5%
Other Services (except Public Administration)	2.1%	2.2%	0.7%	3.8%	1.6%	4.4%	2.9%	4.9%	2.9%
Public Administration, Government	9.9%	7.7%	12.1%	8.5%	2.2%	3.4%	5.8%	6.7%	6.9%
Other	16.9%	23.0%	13.9%	13.6%	12.0%	13.0%	14.5%	18.8%	16.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

8.6 TRAVEL DAY RESULTS

For persons without trips on their travel day, the main reason was that they stayed at home to hang around the house (55.7%) or they were not scheduled to work (13.9%) (Table 26).

On travel days, a third of households received packages at home (32.2%) and 5.9% received takeout (Table 27).

Among adults who telework, the majority telework 8-10 hours a day (42.0%) (Table 28). One-tenth of adults who telework do so for less than two hours a day (10.7%).

TABLE 26: REASONS FOR NO TRIPS ON TRAVEL DAY BY COUNTY (WEIGHTED %, PARTICIPANTS WITH ZERO TRIPS ON TRAVEL DAY)⁹

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,396	1,559	264	391	530	1,191	794	860	6,985
Not scheduled to work / took day off	12.1%	13.1%	13.1%	11.1%	14.1%	12.4%	19.0%	16.0%	13.9%
Worked at home for pay (e.g., telework)	6.3%	10.0%	5.3%	11.6%	5.9%	10.3%	10.4%	7.5%	8.5%
Hung around home	59.5%	49.8%	48.8%	63.5%	68.1%	53.9%	53.2%	53.7%	55.7%
Scheduled school closure (e.g., holiday)	0.4%	0.1%	0.3%	0.2%	2.1%	1.4%	0.7%	0.2%	0.6%
No available transportation (e.g., no car, bus)	3.6%	4.5%	0.3%	0.3%	0.4%	0.2%	0.6%	2.6%	2.2%
Sick or quarantining (self or others)	5.7%	6.5%	10.5%	11.7%	7.4%	7.4%	6.8%	16.8%	8.4%
Waited for visitor/delivery (e.g., plumber)	4.8%	2.0%	0.4%	0.7%	1.3%	4.3%	1.6%	1.1%	2.7%
Kids did online / remote / home school	5.6%	8.5%	14.3%	10.9%	10.6%	3.1%	4.5%	7.9%	6.7%
Weather conditions (e.g., snowstorm)	1.6%	1.5%	0.3%	3.1%	0.9%	1.6%	0.1%	0.1%	1.2%

⁹ Participants could select more than one option, so totals exceed 100%.

COUNTY									
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
May have made trips, but don't know when or where (age 0-17)	1.6%	1.5%	0.3%	3.1%	0.9%	1.6%	0.1%	0.1%	1.2%
Other reason	14.8%	15.8%	10.6%	11.0%	8.5%	15.1%	10.9%	12.0%	13.4%

TABLE 27: TRAVEL DAY DELIVERIES BY COUNTY (WEIGHTED %, ADULTS)¹⁰

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	5,180	5,645	1,035	1,317	1,831	4,454	3,206	2,918	25,586
Takeout/prepared food delivered to home	6.1%	6.8%	2.7%	2.3%	4.5%	4.7%	6.0%	8.3%	5.9%
Someone came to do work at home	3.9%	4.2%	1.0%	7.2%	1.9%	3.3%	4.4%	2.8%	3.7%
Groceries delivered to home	3.7%	3.4%	2.5%	1.8%	3.1%	2.0%	1.5%	2.9%	2.8%
Received packages at home	34.0%	25.7%	28.4%	39.0%	32.1%	32.5%	34.3%	37.6%	32.2%
Received personal packages at work	1.0%	0.2%	0.5%	0.2%	0.0%	0.4%	0.3%	0.6%	0.5%
Received packages at another location	3.0%	1.4%	2.0%	2.0%	1.3%	1.5%	4.0%	1.8%	2.2%
Other item delivered to home	0.8%	0.2%	0.1%	0.6%	0.5%	0.8%	0.3%	1.0%	0.6%
None	57.7%	64.9%	68.1%	54.4%	61.4%	60.2%	56.1%	55.0%	59.7%

¹⁰ Participants could select more than one option, so totals exceed 100%.

TABLE 28: TELEWORK TIME ON TRAVEL DAY BY COUNTY (WEIGHTED %, EMPLOYED ADULTS WHO TELEWORK)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,264	1,205	199	329	469	1,097	740	587	5,890
Less than 1 hour	2.4%	4.9%	0.6%	1.8%	1.7%	3.2%	5.5%	8.7%	4.0%
1 – 2 hours	6.8%	11.5%	10.4%	5.1%	5.7%	2.0%	5.0%	8.0%	6.7%
2 – 3 hours	10.4%	9.3%	2.1%	7.2%	10.2%	6.3%	8.9%	8.9%	8.7%
3 – 4 hours	4.2%	5.9%	5.6%	6.4%	5.7%	5.9%	3.4%	3.8%	4.9%
4 – 5 hours	6.5%	8.1%	4.7%	9.3%	3.0%	7.2%	10.2%	6.8%	7.2%
5 – 6 hours	6.2%	4.8%	3.5%	11.3%	5.0%	2.3%	6.2%	3.7%	4.9%
6 – 7 hours	4.5%	8.5%	16.2%	14.7%	8.1%	10.9%	4.9%	4.2%	7.5%
7 – 8 hours	6.1%	3.7%	4.6%	4.2%	5.5%	5.8%	9.4%	7.6%	6.0%
8 – 9 hours	35.1%	26.1%	35.2%	24.4%	37.4%	34.0%	33.0%	26.6%	31.7%
9 – 10 hours	11.3%	10.2%	3.0%	9.6%	7.9%	11.6%	8.1%	12.1%	10.3%
10 or more hours	6.5%	7.0%	14.1%	6.0%	9.6%	11.0%	5.4%	9.5%	8.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

8.7 HOUSING RESULTS

In the San Joaquin Valley, most households live in single-family detached homes (75.5%). San Joaquin County and Fresno County have notably more apartments with five or more units (Table 29).

For renters, there are two primary barriers to home ownership: not wanting to buy a home in the community (32.9%) and not having the financial resources for a monthly payment (31.9%) (Table 30).

About ten percent of community members have felt discrimination in housing (9.2%): 3.5% found repairs delayed or not made, 2.0% were not shown an apartment, 1.8% were asked to pay a higher security deposit, and 1.7% were asked to pay a higher rent, and 3% identified other discrimination (Table 31).

The best neighborhood attributes are being located near school, work, and shopping (42.9%), followed by scenery, environment, and atmosphere (18.5%) (Table 32). The top neighborhood attributes that community members view as unfavorable include neighbors (14.7%) and high cost of housing (12.8%) (Table 33).

TABLE 29: RESIDENCE TYPE BY COUNTY (WEIGHTED %)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,605	1,651	292	350	516	1,253	910	793	7,370
Single-family detached house	71.7%	73.4%	76.4%	90.0%	81.3%	76.1%	77.5%	76.0%	75.5%
Single-family house attached to one or more houses	2.1%	2.4%	3.3%	1.5%	1.7%	2.1%	2.5%	2.5%	2.3%
Building with 2-4 units	4.6%	4.9%	7.2%	0.1%	4.0%	4.5%	6.0%	8.2%	5.1%
Building with 5-49 apartments/condos	11.8%	8.0%	7.7%	4.8%	5.4%	11.3%	5.0%	4.3%	8.4%
Building with 50 or more apartments/condos	6.5%	6.3%	2.5%	2.5%	2.5%	2.4%	4.1%	1.0%	4.3%
Manufactured home/mobile home/trailer	0.8%	0.8%	1.7%	0.1%	0.7%	0.8%	1.6%	0.8%	0.9%
Other home	1.9%	2.9%	0.4%	0.5%	3.1%	2.4%	2.9%	5.7%	2.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 30: BARRIERS TO HOME OWNERSHIP BY COUNTY (WEIGHTED %, HOUSEHOLDS WHO DO NOT OWN THEIR HOME)¹¹

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	876	757	151	118	256	506	380	411	3,455
Not interested in buying home in community	33.9%	31.9%	42.3%	17.6%	27.8%	39.0%	27.6%	32.9%	32.9%
Cannot find home that suits quality standards	3.5%	5.5%	10.0%	4.4%	6.5%	1.5%	7.1%	2.7%	4.3%
Cannot find home that suits living needs	2.3%	3.2%	0.4%	0.7%	3.3%	0.3%	2.4%	0.2%	1.8%
Do not have financial resources for monthly mortgage payment	30.4%	32.4%	19.6%	45.5%	34.7%	32.4%	30.9%	33.6%	31.9%
Do not have financial resources for down payment	17.6%	17.0%	21.8%	27.9%	14.2%	17.5%	22.1%	23.0%	19.0%
Cannot find home within target price range	12.3%	10.0%	5.9%	3.9%	13.7%	9.3%	10.0%	7.6%	10.0%

¹¹ Participants could select more than one option, so totals exceed 100%.

TABLE 31: DISCRIMINATION EXPERIENCED IN HOUSING BY COUNTY (WEIGHTED %)¹²

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,801	1,896	336	413	602	1,456	1,045	931	8,480
None	91.1%	89.6%	94.8%	91.7%	95.3%	92.2%	89.3%	88.4%	90.8%
Not shown an apartment	1.8%	2.8%	1.3%	0.0%	0.5%	1.7%	3.4%	1.1%	2.0%
Asked to pay higher security deposit	1.8%	2.4%	2.1%	0.7%	0.3%	2.0%	1.5%	1.5%	1.8%
Asked to pay higher rent	1.3%	2.0%	1.4%	0.8%	1.1%	2.6%	0.5%	2.5%	1.7%
Repairs delayed or not made	4.5%	3.3%	4.2%	4.3%	1.6%	2.7%	2.3%	5.3%	3.5%
Provided different housing services or facilities	1.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.4%
Charged a deposit for my service/support animal	0.4%	1.0%	1.4%	0.0%	0.4%	0.0%	0.7%	1.3%	0.6%

¹² Participants could select more than one option, so totals exceed 100%.

COUNTY									
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Denied mortgage or charged a higher interest rate due to location or my protected class	0.9%	1.1%	0.1%	0.6%	0.6%	0.3%	0.8%	0.0%	0.7%
Disability-related income was not considered in mortgage application	0.4%	0.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.6%	0.3%
Other discrimination	4.0%	2.5%	0.2%	2.7%	2.8%	2.5%	2.8%	3.9%	3.0%

TABLE 32: BEST NEIGHBORHOOD ATTRIBUTE BY COUNTY (WEIGHTED %)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,801	1,896	336	413	602	1,456	1,045	931	8,480
Conveniently located near school, work, or shopping	42.9%	44.4%	48.5%	30.2%	41.7%	44.1%	46.5%	36.0%	42.9%
Public transportation options readily available	3.1%	1.7%	0.4%	0.9%	2.2%	1.9%	4.1%	3.2%	2.5%
Good mix of people	15.2%	9.8%	17.3%	11.3%	16.1%	11.0%	10.8%	13.1%	12.5%
Family-oriented, lots of children, child-friendly	8.8%	9.4%	10.9%	9.9%	11.2%	14.2%	8.0%	11.6%	10.3%
Scenery, environment, atmosphere	16.8%	18.2%	10.4%	41.0%	13.0%	16.2%	18.8%	25.0%	18.5%
Nothing / Not Applicable	13.2%	16.5%	12.4%	6.6%	15.9%	12.7%	11.8%	11.1%	13.3%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 33: WORST NEIGHBORHOOD ATTRIBUTE BY COUNTY (WEIGHTED %)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
<i>Unweighted sample (n)</i>	1,801	1,896	336	413	602	1,456	1,045	931	8,480
Neighbors (e.g., lack of community, noise, trespassing, disturbances, lack of upkeep)	14.6%	16.7%	8.0%	8.7%	10.5%	15.5%	17.6%	12.0%	14.7%
Scenery and atmosphere (e.g., lack of landscaping, graffiti, unkept roads/sidewalks)	4.1%	4.4%	3.2%	2.4%	5.7%	2.0%	3.3%	4.4%	3.7%
Environment issues and pollution (e.g., air pollution, odors, noise, dust, smoke)	7.4%	10.9%	11.2%	6.8%	8.2%	5.1%	5.6%	11.0%	8.1%
Overcrowding	1.1%	0.8%	2.2%	3.6%	0.6%	3.4%	3.3%	3.8%	2.1%
Not near school or work	4.7%	4.5%	4.0%	6.9%	4.3%	7.3%	5.3%	6.3%	5.4%
Not conveniently located (i.e., near public transportation, stores)	6.0%	6.9%	5.6%	17.4%	9.6%	6.8%	3.0%	4.9%	6.4%

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
High cost of housing	13.7%	8.8%	7.1%	8.7%	13.6%	16.3%	17.8%	9.9%	12.8%
Lack of adequate bike and pedestrian facilities	4.7%	1.9%	10.6%	8.2%	1.5%	2.7%	3.6%	3.2%	3.6%
Crime, lack of privacy or security	13.9%	11.4%	5.4%	2.7%	4.1%	9.9%	7.8%	8.2%	9.9%
Nothing / Not Applicable	29.8%	33.6%	42.5%	34.5%	41.9%	31.0%	32.6%	36.1%	33.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

9.0 CONCLUSION

The methods used in the CCTS provided higher-quality and more versatile data compared to traditional methods. The compensatory and targeted oversampling techniques resulted in a more representative sample than conventional random sampling would have allowed. Coherent, professional study branding and user-friendly survey tools (e.g., Bing Maps API) communicated expectations with participants and maximized the total participation rate. The high proportion of smartphone-collected data allowed for more precise trip rates and greater quantity of trip information captured across multiple days. Overall, the study applied innovative methods to capture higher-quality and higher-quantity data which will lead to greater analytical opportunities in the future.

APPENDIX A. INVITATION MATERIALS

CENTRAL CALIFORNIA
 TRAVEL SURVEY

2035 TULARE STREET, SUITE 201 | FRESNO, CALIFORNIA 93721

<First and last name/City name resident>
 <Street Address 1>
 <Street Address 2>
 <City, ID < #####>

<Letter Date>

We are inviting you to participate in the Central California Travel Survey. This survey is sponsored by the eight regional planning agencies in central California to collect vital information for transportation investments. By taking part, you'll help us understand how local roads, highways, public transportation, bike lanes, and sidewalks are used today, and how they can be improved to make travel better in the future.

We strongly value your participation in this survey. Your participation will help regional planners understand current transportation needs, so decision makers can effectively plan future transportation improvements. Your input will have a big impact because only a limited number of households have been invited to participate. After your household completes the survey we'll send you a gift card as thanks for participating.

Follow the instructions below to sign up today. Your voice can shape the future of your community.

Sincerely,

 Diane Nguyen
 Executive Director for the San Joaquin Council of Governments
 Chair of the San Joaquin Valley Regional Planning Agencies' Directors' Committee

<p>San Joaquin Council of Governments Diane Nguyen - Chair</p>	<p>Tulare County Association of Governments Ted Smalley - Vice Chair</p>	<p>Merced County Association of Governments Stacie Guzman</p>	<p>Madera County Transportation Commission Patricia Taylor</p>
<p>Stanislaus Council of Governments Rosa Park</p>	<p>Kern Council of Governments Ahron Hakim</p>	<p>Kings County Association of Governments Terri King</p>	<p>Fresno Council of Governments Tony Boren</p>

GET STARTED TODAY INVITATION ACCESS CODE: **XXXXXXXXXX**

OPTION 1

Download the smartphone app rMove™ and sign up

Tell us about your travel for 7 Days

Receive \$XX per adult after all adults complete the survey

OR

OPTION 2

Sign up at CentralCAtravelsurvey.com or call 1-833-777-1787

Tell us about your travel for 1 Day

Receive \$XX per household after completing the survey

You can participate in English, Spanish, and Hmong through the survey smartphone app, the online survey, or by calling toll-free.

ESPAÑOL – Le invitamos a completar una encuesta sobre viajes en California Central y alrededores. Al participar nos ayuda a mejorar las opciones de transporte en su comunidad. Una vez que haya completado la encuesta, le enviaremos una tarjeta de regalo como agradecimiento. Para inscribirse, visite CentralCAtravelsurvey.com o llame al 1-833-777-1787.

HMOOB – Peb thov kom nej teb ib co lus nug trog seb nej mus ub mus no li cas. Thaum koj koom tee ces koj peb tau peb kho trojkev thauj mus mus loe loe kom zoo dua hauv koj lub zej lub zos. Tom qab koj teb cov lus nug tas, peb yuav xa ib daig gift card tuaj ua koj tsaug. Yuav kom rau tau npe, mus rau ntawm CentralCAtravelsurvey.com lossis hu rau 1-833-777-1787.

Learn more at CentralCAtravelsurvey.com or by calling 1-833-777-1787

CENTRAL CALIFORNIA

2035 TULARE STREET, SUITE 201

TRAVEL SURVEY

FRESNO, CALIFORNIA 93721



FREQUENTLY ASKED QUESTIONS

ESPAÑOL – Para obtener más información sobre la encuesta y obtener respuestas a las preguntas más frecuentes, visite CentralCAtravelsurvey.com o llame al 1-833-777-1787.

HMOOB – Yog xaw paub ntiv txog daim ntawv ntsuam xyuas thiab tau trais cov lus teb rau cov lus nug nquag mus saib hauv CentralCAtravelsurvey.com lossis hurau 1-833-777-1787.

WHAT IS THIS SURVEY ALL ABOUT?

We want to learn how, when, where, and why people travel in and around central California. We're asking you to log your travel to help us understand regional transportation patterns. By participating you can help us plan for future transportation improvements in your community.

WHY SHOULD I PARTICIPATE?

Your participation ensures that households like yours are represented in our regional transportation plans. Your input has a big impact because only a limited number of households are invited to participate.

HOW IS MY PERSONAL PRIVACY PROTECTED?

We are committed to protecting the confidentiality, integrity, and security of your personal information. We take this responsibility seriously. We will not disclose or share personal information we collect from you except as required by law. Our Privacy Policy is intended to help you understand how we collect and safeguard your information. To read the survey's full privacy documentation, visit CentralCATravelSurvey.com.

WHAT IF I DON'T TRAVEL MUCH?

Any amount of travel (even if you don't make any trips) will help us improve regional transportation planning. Don't forget that short trips, such as walking the dog, count too.

WHAT IF THE TRIPS I MAKE AREN'T TYPICAL?

That's no problem - we still encourage you to participate. We'll also ask about your typical travel habits too.

HOW WAS I SELECTED TO PARTICIPATE?

Invited households were selected at random across central California.

I WAS INVITED TO USE THE SURVEY SMARTPHONE APP, RMOVE. HOW DOES IT WORK?

After you download rMove and sign up, rMove will log your trips for one week while you go about your daily life. Each day you'll be asked to complete a short daily survey about your travel habits as well as a trip survey about each trip you make.

WHAT DO I GET FOR PARTICIPATING?

You will receive a gift card once all members of your household have reported their travel and completed their surveys. If your household participates using the smartphone app, rMove, each participating adult will receive a gift card (e.g., a household with two adults receives two gift cards). Households that report their travel online or by calling in will receive a single gift card.

HOW MUCH TIME DOES IT TAKE TO PARTICIPATE?

It takes about 10 minutes to sign up for the survey. Once you sign up, we'll give you instructions for logging your travel and completing the survey. Households that log their travel for seven days in the smartphone app, rMove, will spend about 5-10 minutes each day reporting their travel. Households that log their travel online or over the phone will spend about 10 minutes per household member reporting their travel for one day.

WHO IS SPONSORING THIS SURVEY?

This survey is sponsored by the Fresno Council of Governments, Kern Council of Governments, Kings County Association of Governments, Madera County Transportation Commission, Merced County Association of Governments, San Joaquin Council of Governments, Stanislaus Council of Governments, Tulare County Association of Governments, the California Department of Transportation (Caltrans), and the Department of Housing and Community Development.



Learn more at CentralCAtravelsurvey.com or by calling 1-833-777-1787

CENTRAL CALIFORNIA
TRAVEL SURVEY



2035 TULARE STREET, SUITE 201
FRESNO, CALIFORNIA 93721

SPONSORED BY Fresno Council of Governments | Kern Council of Governments
Kings County Association of Governments | Madera County Transportation Commission
Merced County Association of Governments | San Joaquin Council of Governments
Stanislaus Council of Governments | Tulare County Association of Governments
California Department of Transportation (Caltrans) | Department of Housing and Community Development (HCD)

CENTRAL CALIFORNIA
TRAVEL SURVEY



TELL US HOW YOU
GET AROUND



RECEIVE A **\$20-35** GIFT CARD
AS A THANK YOU FOR YOUR TIME

ESPAÑOL – Complete nuestra encuesta y reciba una tarjeta de regalo como agradecimiento por su tiempo

HMOOB – Teb peb cov lus nug ces peb yuav xa ib daig gift card tuaj ua koj tsaug

CENTRAL CALIFORNIA
TRAVEL SURVEY



2035 TULARE STREET, SUITE 201
FRESNO, CALIFORNIA 93721

SIGN UP TODAY! COMPLETE A SURVEY ABOUT HOW YOU TRAVEL AND RECEIVE A \$20-35 GIFT CARD AS THANKS



GO ONLINE:

CentralCAtravelsurvey.com

OR



CALL TOLL-FREE:

1-888-215-8106

INVITATION ACCESS CODE:

XXXXXXXXXX

HMOOB – Pab peb kho txojkev thauj mus mus los los kom zoo dua hauv koj lub zej lub zos. Teb peb cov lus nug ces peb yuav xa ib daig gift card tuaj ua koj tsaug. Mus rau npe teb cov lus nug hauv is taws nej lossis hu tus xov tooj hu dawb.

ESPAÑOL – Ayúdenos a mejorar las opciones de transporte en su comunidad. Complete la encuesta y le enviaremos una tarjeta de regalo como agradecimiento. Para completar la encuesta, registre en línea o llame gratis.

<City name resident>
<Street Address 1>
<Street Address 2>
<City, MN <#####>

SPONSORED BY

Fresno Council of Governments | Kern Council of Governments | Kings County Association of Governments
Madera County Transportation Commission | Merced County Association of Governments
San Joaquin Council of Governments | Stanislaus Council of Governments | Tulare County Association of Governments
California Department of Transportation (Caltrans) | Department of Housing and Community Development (HCD)

APPENDIX B. SAMPLE SIZE TABLES

In this Appendix, we present the unweighted sample size for the three-way trip rate tables included in the analysis. This data will provide context for sufficient sample sizes to display trip rate data.

TABLE 34: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY HOUSEHOLD INCOME BY COUNTY (NUMBER OF TRIPS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Under \$25,000	3,401	4,150	594	602	1,014	1,544	1,369	1,824	14,498
\$25,000 – 49,999	3,587	4,122	646	804	1,401	2,186	1,549	1,861	16,156
\$50,000 – 74,999	2,530	2,842	511	708	1,126	1,939	1,560	1,952	13,168
\$75,000 – 99,999	2,211	2,180	463	655	803	1,733	1,055	1,258	10,358
\$100,000 – 199,999	2,944	3,315	588	912	994	3,329	2,370	1,714	16,166
\$200,000 or more	495	628	251	117	163	1,432	433	145	3,664
Prefer not to answer	953	950	144	380	279	648	715	430	4,499
TOTAL	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509

TABLE 35: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY HOUSEHOLD INCOME BY COUNTY (NUMBER OF HOUSEHOLDS)

	COUNTY								TOTAL
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	
Under \$25,000	446	477	82	64	135	197	182	221	1,804
\$25,000 – 49,999	386	389	55	66	111	220	179	178	1,584
\$50,000 – 74,999	222	232	43	57	84	193	145	126	1,102
\$75,000 – 99,999	181	160	32	50	60	157	98	87	825
\$100,000 – 199,999	233	247	46	69	76	293	191	113	1,268
\$200,000 or more	39	51	10	14	19	99	43	18	293
Prefer not to answer	111	102	24	34	31	100	75	53	530
TOTAL	1,618	1,658	292	354	516	1,259	913	796	7,406

TABLE 36: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY TRAVEL MODE BY COUNTY (NUMBER OF TRIPS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	1,152	1,207	212	208	431	1,160	621	515	5,506
Bicycle or e-bike	127	123	5	5	50	94	105	89	598
Taxi	5	9	8	7	1	15	3	2	50
Smartphone-app ride hailing service	44	85	3	1	9	51	15	70	278
Vehicle	14,366	16,318	2,876	3,891	5,190	11,212	8,093	8,198	70,144
School bus	59	109	19	21	14	23	19	48	312
Shuttle	18	19	12	1	13	13	16	18	110
Transit	171	150	42	10	37	102	93	52	657
Long-distance passenger mode	11	18	1	2	4	19	9	3	67
Other mode	168	149	19	32	31	122	77	189	787
TOTAL	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509

TABLE 37: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY TRAVEL MODE BY COUNTY (NUMBER OF HOUSEHOLDS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	317	310	57	68	107	273	163	141	1,436
Bicycle or e-bike	36	31	3	3	14	35	26	22	170
Taxi	3	5	2	4	1	5	2	2	24
Smartphone-app ride hailing service	21	33	1	1	6	15	7	11	95
Vehicle	1,380	1,382	251	309	447	447	790	682	5,688
School bus	29	47	9	10	6	14	10	21	146
Shuttle	8	9	3	1	6	6	8	6	47
Transit	72	56	11	7	16	35	31	24	252
Long-distance passenger mode	7	10	1	2	2	11	6	2	41
Other mode	57	60	7	9	21	45	29	32	260
TOTAL	1,618	1,658	292	354	516	1,259	913	796	7,406

TABLE 38: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY TRIP PURPOSE BY COUNTY (NUMBER OF TRIPS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Home	4,815	5,450	961	1,164	1,609	3,925	2,737	2,686	23,347
Work	1,230	1,193	249	319	396	1,011	644	584	5,626
Work-related	1,016	1,162	250	402	702	897	578	655	5,662
School	605	636	124	100	203	354	237	347	2,606
School -related	95	106	17	26	52	62	50	34	442
Pick up / Drop off	2,080	2,507	412	487	703	1,479	982	1,337	9,987
Shopping	2,049	2,412	310	480	703	1,562	1,142	1,110	9,768
Meal	1,252	1,365	249	333	388	1,025	775	755	6,142
Social / Recreation	1,012	1,156	193	258	306	892	645	584	5,046
Errand	867	1,022	219	336	273	713	610	528	4,568
Change mode	250	252	69	18	58	190	148	81	1,066
Overnight	549	628	95	169	282	458	307	305	2,793
Other purpose	301	298	49	86	105	243	196	178	1,456
TOTAL	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509

TABLE 39: UNWEIGHTED SAMPLE SIZE FOR TRIP RATE BY TRIP PURPOSE BY COUNTY (NUMBER OF HOUSEHOLDS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Home	1,365	1,367	244	293	433	1,060	777	664	6,203
Work	634	614	134	132	197	543	343	288	2,885
Work-related	302	297	61	72	108	243	177	166	1,426
School	322	323	69	63	101	219	140	183	1,420
School -related	37	41	9	10	12	23	20	17	169
Pick up / Drop off	570	551	107	112	164	395	267	298	2,464
Shopping	806	820	116	177	256	621	430	389	3,615
Meal	523	545	99	122	155	395	302	266	2,407
Social / Recreation	458	462	71	105	137	334	248	224	2,039
Errand	461	493	86	103	141	364	284	238	2,170
Change mode	95	85	16	12	24	58	39	37	366
Overnight	269	264	45	69	94	191	146	145	1,223
Other purpose	205	198	38	56	70	154	129	118	968
TOTAL	1,618	1,658	292	354	516	1,259	913	796	7,406

TABLE 40: UNWEIGHTED SAMPLE SIZE FOR TRIP DISTANCE (MILES) BY TRAVEL MODE BY COUNTY (NUMBER OF TRIPS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	1,152	1,207	212	208	431	1,160	621	515	5,506
Bicycle or e-bike	127	123	5	5	50	94	105	89	598
Taxi	5	9	8	7	1	15	3	2	50
Smartphone-app ride hailing service	44	85	3	1	9	51	15	70	278
Vehicle	14,366	16,318	2,876	3,891	5,190	11,212	8,093	8,198	70,144
School bus	59	109	19	21	14	23	19	48	312
Shuttle	18	19	12	1	13	13	16	18	110
Transit	171	150	42	10	37	102	93	52	657
Long-distance passenger mode	11	18	1	2	4	19	9	3	67
Other mode	168	149	19	32	31	122	77	189	787
TOTAL	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509

TABLE 41: UNWEIGHTED SAMPLE SIZE FOR TRIP DISTANCE (MILES) BY TRAVEL MODE BY COUNTY (NUMBER OF HOUSEHOLDS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	317	310	57	68	107	273	163	141	1,436
Bicycle or e-bike	36	31	3	3	14	35	26	22	170
Taxi	3	5	2	4	1	5	2	2	24
Smartphone-app ride hailing service	21	33	1	1	6	15	7	11	95
Vehicle	1,380	1,382	251	309	447	447	790	682	5,688
School bus	29	47	9	10	6	14	10	21	146
Shuttle	8	9	3	1	6	6	8	6	47
Transit	72	56	11	7	16	35	31	24	252
Long-distance passenger mode	7	10	1	2	2	11	6	2	41
Other mode	57	60	7	9	21	45	29	32	260
TOTAL	1,618	1,658	292	354	516	1,259	913	796	7,406

TABLE 42: UNWEIGHTED SAMPLE SIZE FOR TRIP DURATION (MINUTES) BY TRAVEL MODE BY COUNTY (NUMBER OF TRIPS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	1,152	1,207	212	208	431	1,160	621	515	5,506
Bicycle or e-bike	127	123	5	5	50	94	105	89	598
Taxi	5	9	8	7	1	15	3	2	50
Smartphone-app ride hailing service	44	85	3	1	9	51	15	70	278
Vehicle	14,366	16,318	2,876	3,891	5,190	11,212	8,093	8,198	70,144
School bus	59	109	19	21	14	23	19	48	312
Shuttle	18	19	12	1	13	13	16	18	110
Transit	171	150	42	10	37	102	93	52	657
Long-distance passenger mode	11	18	1	2	4	19	9	3	67
Other mode	168	149	19	32	31	122	77	189	787
TOTAL	16,121	18,187	3,197	4,178	5,780	12,811	9,051	9,184	78,509

TABLE 43: UNWEIGHTED SAMPLE SIZE FOR TRIP DURATION (MINUTES) BY TRAVEL MODE BY COUNTY (NUMBER OF HOUSEHOLDS)

	COUNTY								
	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	TOTAL
Walk	317	310	57	68	107	273	163	141	1,436
Bicycle or e-bike	36	31	3	3	14	35	26	22	170
Taxi	3	5	2	4	1	5	2	2	24
Smartphone-app ride hailing service	21	33	1	1	6	15	7	11	95
Vehicle	1,380	1,382	251	309	447	447	790	682	5,688
School bus	29	47	9	10	6	14	10	21	146
Shuttle	8	9	3	1	6	6	8	6	47
Transit	72	56	11	7	16	35	31	24	252
Long-distance passenger mode	7	10	1	2	2	11	6	2	41
Other mode	57	60	7	9	21	45	29	32	260
TOTAL	1,618	1,658	292	354	516	1,259	913	796	7,406