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Metropolitan Council

2021-2022 TRAVEL BEHAVIOR INVENTORY SURVEY METHODOLOGY REPORT

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CONTENTS

1.0 INTRODUCTION 1
2.0 SURVEY DESIGN 2
2.1 SURVEY QUESTIONNAIRE 2
2.2 SURVEY INSTRUMENTS 3
RMOVE 4
RMOVE FOR WEB 4
3.0 SAMPLE DESIGN 5
3.1 ADDRESS-BASED SAMPLING 5
SAMPLING FRAME AND METHOD 5
SAMPLE PLAN DEVELOPMENT AND SEGMENTATION 6
3.2 SUPPLEMENTAL SAMPLING 10
RECRUITMENT THROUGH PUBLIC OUTREACH 10
RECRUITMENT THROUGH METRO TRANSIT'S TRANSIT ASSISTANCE PROGRAM 11
4.0 SURVEY IMPLEMENTATION 12
4.1 PARTICIPANT ENGAGEMENT 13
4.2 PUBLIC OUTREACH 14
4.3 PARTICIPANT SUPPORT 15
4.4 SURVEY MONITORING 16
SURVEY RESPONSE 16
4.5 PARTICIPANT INCENTIVES 16
DIFFERENTIAL INCENTIVE A/B TEST 18
5.0 DATA PROCESSING AND WEIGHTING 19

INITIAL DATA REVIEW 19
COMPLETION CRITERIA....19
DATA PROCESSING AND PREPARATION 19
WEIGHTING AND EXPANSION....19

6.0 LESSONS LEARNED AND FUTURE RECOMMENDATIONS 20

6.1 SURVEY DESIGN....20
SAMPLING STRATEGIES....20
PARTICIPATION MODE ASSIGNMENT 20
INVITATION ADDRESSEE....22
6.2 SURVEY IMPLEMENTATION....23
INCENTIVES 23

7.0 APPENDICES.... 24

7.1 INVITATION MATERIALS....24
7.2 SURVEY QUESTIONNAIRE....24
7.3 SUPPLEMENTAL OUTREACH DOCUMENTATION....24
7.4 DATA PRIVACY POLICY....24

LIST OF FIGURES

FIGURE 1: MAP OF TBI STUDY REGION BY SAMPLE SEGMENT.... 8
FIGURE 2: MAP OF TBI CORE COUNTIES BY SAMPLE SEGMENT.... 9
FIGURE 3: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – RACE 11
FIGURE 3: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – ETHNICITY 12
FIGURE 4: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – INCOME 12
FIGURE 5: REGIONAL MOBILITY SURVEY LOGO AND BRANDING.... 13
FIGURE 6: REAL-TIME DATA COLLECTION MONITORING DASHBOARD.... 16
FIGURE 7: SURVEY MODE PARTICIPATION BY RACE.... 21
FIGURE 8: SURVEY MODE PARTICIPATION BY INCOME.... 22

LIST OF TABLES

TABLE 1: SURVEY SCHEDULE BY TASK AND DELIVERABLE.... 1
TABLE 2: SURVEY PARTICIPATION BY LANGUAGE.... 2
TABLE 3: SURVEY PARTICIPATION MODE.... 4
TABLE 4: MAILING DATES.... 6
TABLE 5: SURVEY REGION HOUSEHOLDS AND PERSONS, BY SAMPLE SEGMENT.... 7
TABLE 6: RESPONSE RATES BY SAMPLE SEGMENT 10
TABLE 7: SUMMARY OF CBO SUPPORT AND/OR FEEDBACK PROVIDED FOR THE TBI.... 15
TABLE 8: SUMMARY OF PARTICIPANT INQUIRIES RECEIVED.... 15
TABLE 9: SUMMARY OF INCENTIVES DISTRIBUTION 18
TABLE 10: RESULTS OF A/B TEST OFFERING HARD-TO-SURVEY INCENTIVES IN INITIAL INVITATION LETTER 18
TABLE 11: RESULTS NAME MATCHING A/B TEST FOR ABS INVITATION IN MAIL GROUPS 1-6.... 22
TABLE 12: CONVERSION RATE BY DIARY PARTICIPATION MODE 23

1.0 INTRODUCTION

The Metropolitan Council's ("the Council's") 2021-2022 Travel Behavior Inventory (TBI) was a household travel survey (HTS) designed to collect demographic information, daily travel activities, and typical transportation patterns of people who live in the greater Twin Cities region. The 2021-2022 TBI was Wave 2 of 3 of the current multiyear TBI conducted every other calendar year. The travel information collected are vital for regional and local planning agencies to understand how regional changes due to shifting demographics and community development have impacted use of the transportation system. The data and reports collected from the survey will help the Council propose practical transportation investments, produce competitive federal grant applications, and prioritize the improvements that best fit regional needs.

The TBI was a mixed mode survey with the opportunity to participate via a smartphone-based travel survey app, an online survey, or a call center. This methodology followed current HTS best practices and resulted in a final dataset that can be used for model updates and transportation planning. Complete survey data was collected from 7,952 households in the region from June 22, 2021, through February 5, 2022. The project schedule is provided below in Table 1.

TABLE 1: SURVEY SCHEDULE BY TASK AND DELIVERABLE

TASKS AND DELIVERABLES	SCHEDULE
Task 1: Develop Survey Design and Methodology	**October 2020 – January 2021**
Subtask 1.1: Develop work plan and schedule *Deliverable: Draft and final work plan and schedule*	**October–December 2020**
Subtask 1.2: Develop Data Needs *Deliverable:*	**October 2020**
Subtask 1.3: QA/QC Plan *Deliverable: Draft and final QA/QC plan*	**November – December 2020**
Subtask 1.4: Sample Planning *Deliverable: Draft and final survey sampling plan*	**December 2020 – February 2021**
Subtask 1.5: Survey Design *Deliverable: Initial and finalized survey instrument*	**December 2020 – January 2021**
Subtask 1.6: Survey Management Plan *Deliverable: Draft and final survey management plan*	**October – December 2020**
Task 2: Conduct Survey	**June 2021 – February 2022**
Subtask 2.1: Survey Monitoring and QA/QC *Deliverable: Online real-time survey results dashboard*	**June 2021**
Subtask 2.2: Survey Administration *Deliverable: 7,500 complete household survey responses*	**June 2021 – February 2022**
Task 3: Data Processing and Weighting	**March–June 2022**
Subtask 3.1: Data Processing and QA/QC *Deliverable: Unweighted frequency tabulations of the dataset*	**March – May 2022**
Subtask 3.2: Data Weighting *Deliverable: Weighted dataset* *Deliverable: Weighted frequency tabulations of the dataset* *Deliverable: Dataset users' guide* *Deliverable: Dataset codebook*	**June – July 2022**

TASKS AND DELIVERABLES	SCHEDULE
Task 4: Prepare Documentation and Analysis *Deliverable: Survey summary presentation* *Deliverable: Survey appendices*	**June – July 2022**
Task 5: Community-Based Organizations Focus Groups *Deliverable: Focus group feedback and recommendations*	**December 2021 – February 2022**

2.0 SURVEY DESIGN

The following section outlines key elements of the survey design process, including development of the survey questionnaire and information about the survey instruments that were used for data collection.

2.1 SURVEY QUESTIONNAIRE

RSG used the 2018-2019 Wave 1 TBI questionnaire as the starting point for the TBI Wave 2 survey instrument design. This provided additional time for the project team to focus on assessing what new questions needed to be added or what questions could be dropped while also maintaining consistency between years. The final TBI questionnaire captured all essential HTS data needed for use in four-step, hybrid, and activity-based models as well as information on emerging behavioral changes of interest to agencies (e.g., electric vehicle adoption, teleworking frequency). Additionally, the questionnaire addressed the ongoing impacts of COVID-19 on participants' typical travel behavior. The survey instrument provided TBI respondents with the ability to report their current travel behavior easily and accurately while also providing valuable information on their pre-COVID-19 behavior and expected future behavior. The TBI survey questionnaire has been included as an appendix to this memo.

The survey questionnaire was translated from English into Hmong, Karen, Oromo, Somali, and Spanish for this survey effort and participants were able to complete the survey through all three participation modes in all six languages. The study website and participant reminder emails were also available in all six languages. However, most (99.5%) of respondents participated in English as shown in Table 2, which documents survey participation by language.

TABLE 2: SURVEY PARTICIPATION BY LANGUAGE

LANGUAGE	SIGNUP/RECRUIT SURVEY COMPLETION COUNT	TRAVEL DIARY COMPLETION COUNT
English	14,645	11,127
Hmong	1	0
Karen	0	0
Oromo	3	1

LANGUAGE	SIGNUP/RECRUIT SURVEY COMPLETION COUNT	TRAVEL DIARY COMPLETION COUNT
Somali	3	1
Spanish	86	49
Total	**14,738**	**11,178**

Note: Only one person in the household completes the signup survey, but multiple adult participants may complete the travel diary in the rMove app.

2.2 SURVEY INSTRUMENTS

Invited households could participate in the TBI by three participation methods including a smartphone app, an online survey, or through a call center. The same survey questionnaire was used across all participation modes to ensure data collection can be combined into a single dataset. This methodology is efficient, cost-effective, less burdensome on survey respondents, and yields a dataset with the same information collected for all participants regardless of participation mode.

Households that participated in the survey via smartphone provided travel data for seven days through RSG's smartphone-based travel survey app, rMove™, and the remaining share of participants provided their responses through rMove for Web™ which offered a one-day weekday survey that was self-administered online or completed via a call center interview. Travel data were collected for all household members, regardless of age, or participation method. Table 3 summarizes the count of households that participated in the survey and their participation method. In comparison to the 2018-2019 TBI the 2021-2022 TBI had a smaller share of smartphone diary participants due to a change in study design. Rather than assigning households where all adults owned smartphones to use the smartphone app for their diary, the 2021-2022 TBI gave these households the ability to choose their participation method. This "opt-in" approach was used to reduce attrition among households that did not want to participate via smartphone app and specifically to retain more hard-to-survey households in the sample. While the opt-in approach led to smaller number of smartphone diary participants, it helped the Wave 2 to obtain response rates similar to Wave 1 and to retain more hard-to-survey households in the sample.

TABLE 3: SURVEY PARTICIPATION MODE

SIGNUP SURVEY MODE	DIARY SURVEY MODE	HOUSEHOLD COUNT	PERCENT
Online or Call Center	Online or Call Center	4,465	56%
Online or Call Center	Smartphone	960	12%
Smartphone	Online or Call Center	200	3%
Smartphone	Smartphone	2,327	29%
Total		**7,952**	**100%**

rMove

During recruitment participants were asked whether all adults in their household owned smartphones. If all adults were smartphone owners, the household was provided the option to complete their travel diary through the rMove app and log their travel for seven days. Only adults (age 18+) were asked to download rMove. For households with children (ages 17 and under), one adult household member was asked to report any of their children's trips where an adult was not present (e.g., walked home from soccer practice with friends), for a single weekday, as well as provide summary-level data for that day (e.g., child went to school). Many children accompany adult household members on trips, and thus, that data is already reported by the adult participants during the assigned travel week (i.e., each trip survey asks which household members are on a given trip). This approach ensures a complete single travel day for all household members (including members under age 18) without overly burdening the reporting adult.

rMove for Web

RSG's proprietary survey technology, rMove for Web, served as the online equivalent to rMove. Participants who completed the one-day diary were assigned a Tuesday, Wednesday, or Thursday to report their travel. Call center interviewers used rMove for Web to collect responses over the telephone to ensure consistent real-time data validation and survey alignment regardless of participation mode. By using integrated survey platforms (rMove and rMove for Web), survey responses from all three participation modes (smartphone, online, call center) were processed through identical logic, validation, and real-time quality assurance checks. Survey responses were stored in a single database to ensure that data collected were consistent, regardless of participation mode.

3.0 SAMPLE DESIGN

Alongside the evolution of survey participation modes, HTS sampling methods have simultaneously evolved to address the decline in survey response rates observed nationally, and to increase participation from historically underrepresented groups. Additionally, sample planning for the Wave 2 TBI aimed to improve recruitment of demographic groups that were underrepresented in the 2018-2019 TBI. RSG recommended a combination of industry best practices and innovative sampling methods to increase the representativeness of the sample. Address-based sampling (ABS) was used as the primary sampling method while supplements to ABS were implemented as an additional means of outreach to hard-to-survey households.

3.1 ADDRESS-BASED SAMPLING

Sampling Frame and Method

The TBI study region comprises the seven-county Twin Cities metropolitan area, nine adjoining ring counties in Minnesota, and three bordering counties in Wisconsin. The sampling frame for this survey, as in years past, is the list of all households in the nineteen-county TBI study region excluding any households living in group quarters. RSG primarily used ABS to select households for participation. ABS involves drawing a random sample of addresses from all residential addresses in a defined geographic area. Using this method, all households within each defined area have an equal chance of selection for the sample. Once the sample plan was finalized, RSG purchased household mailing addresses from Marketing Systems Group (MSG), which maintains the Computer Delivery Sequence file from the U.S. Postal Service.

RSG geographically stratified the sample using Census Block Group data from the most recently available 2015-2019 American Community Survey 5-year estimates (ACS). This is the most detailed way to stratify the sample because Census Block Groups are the smallest geography for which most Census and ACS tables are publicly available. The 2015-2019 ACS data for the region reported a population of 1,445,382 households and 3,754,337 persons. Group Quarters are a relatively small segment of the population and were excluded from the sampling frame.

ABS Invitations were sent via first-class mail to each randomly selected address and batched into 22 mail groups. Table 4 provides the letter and reminder postcard schedule for each mail group.

TABLE 4: MAILING DATES

MAIL GROUP	LETTER MAIL DATE	POSTCARD REMINDER 1 MAIL DATE	POSTCARD REMINDER 2 MAIL DATE
1	6/17/2021	6/28/2021	7/6/2021
2	6/28/2021	7/6/2021	7/12/2021
3	7/5/2021	7/12/2021	7/19/2021
4	7/12/2021	7/19/2021	7/26/2021
5	7/19/2021	7/26/2021	8/2/2021
6	7/26/2021	8/2/2021	8/16/2021
7	8/9/2021	8/16/2021	8/23/2021
8	8/16/2021	8/23/2021	8/30/2021
9	9/27/2021	10/4/2021	10/11/2021
10	10/4/2021	10/11/2021	10/18/2021
11	10/11/2021	10/18/2021	10/25/2021
12	10/18/2021	10/25/2021	11/1/2021
13	10/25/2021	11/1/2021	11/8/2021
14	11/1/2021	11/8/2021	11/15/2021
15	11/8/2021	11/15/2021	11/22/2021
16	11/15/2021	11/22/2021	11/29/2021
17	11/22/2021	11/29/2021	12/6/2021
18	11/23/2021	11/30/2021	12/7/2022
19	11/29/2021	12/6/2021	12/13/2021
20	11/30/2021	12/7/2022	12/14/2021
21	1/3/2022	1/10/2021	1/17/2022
22	1/4/2021	1/11/2021	1/18/2022

Sample Plan Development and Segmentation

The project team used the following mutually exclusive and collectively exhaustive sample segments. These sample segments built on the sample segments from the 2018-2019 TBI which used the same geographic distinctions: Core-Urban, Core-Rural, and Ring. However, for Wave 2, RSG proposed a more targeted focus on sampling residents who are Hispanic and/or Black, Indigenous, and people of color (BIPOC). The criteria for each of the sample segments are defined below:

1) **Core-Urban Block Groups (BGs) – Group 1:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Urban in the Thrive MSP 2040 Community Designations and whose population is at least 80% Hispanic and/or BIPOC.
2) **Core-Urban BGs – Group 2:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Urban in the Thrive MSP 2040 Community Designations and whose population is 60%-80% Hispanic and/or BIPOC.

3) **Core-Urban BGs – Group 3:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Urban in the Thrive MSP 2040 Community Designations and whose population is 40%-60% Hispanic and/or BIPOC.

4) **Core-Urban BGs – Group 4:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Urban in the Thrive MSP 2040 Community Designations and whose population is 20%-40% Hispanic and/or BIPOC.

5) **Core-Urban BGS – Group 5:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Urban in the Thrive MSP 2040 Community Designations and whose population is less than 20% Hispanic and/or BIPOC.

6) **Core-Rural BGs:** Comprised of the BGs in the Twin Cities seven-county metropolitan area which are designated as Rural in the Thrive MSP 2040 Community Designations.

7) **Ring BGs:** Comprised of the BGs in the 12 ring counties surrounding the seven-county metropolitan area.

The resulting number of BGs, households, persons, and persons per household for each segment are listed in Table 5. The sample segments are shown in the TBI study region maps provided in Figure 1 and Figure 2. The observed response rates are shown in Table 6.

TABLE 5: SURVEY REGION HOUSEHOLDS AND PERSONS, BY SAMPLE SEGMENT[1]

SAMPLE SEGMENT	NUMBER OF BGS	TOTAL HOUSEHOLDS	TOTAL POPULATION	ADULTS PER HOUSEHOLD	ESTIMATED POC AND/OR HISPANIC SHARE OF POPULATION
Core-Urban BGs – Group 1	74	33,659	103,880	3.09	88%
Core-Urban BGs – Group 2	170	74,362	226,541	3.05	71%
Core-Urban BGs – Group 3	237	133,237	337,476	2.53	49%
Core-Urban BGs – Group 4	554	357,150	885,879	2.48	29%
Core-Urban BGs – Group 5	877	472,450	1,180,467	2.50	11%
Core-Rural BGs	173	116,565	330,904	2.84	8%
Ring BGs	407	257,959	689,190	2.67	8%
Core-Urban BGs – Group 1	74	33,659	103,880	3.09	88%
Total	**2,492**	**1,445,382**	**3,754,337**	**2.60**	**24%**

[1] Based on 2015-2019 ACS 5-year estimates.

FIGURE 1: MAP OF TBI STUDY REGION BY SAMPLE SEGMENT

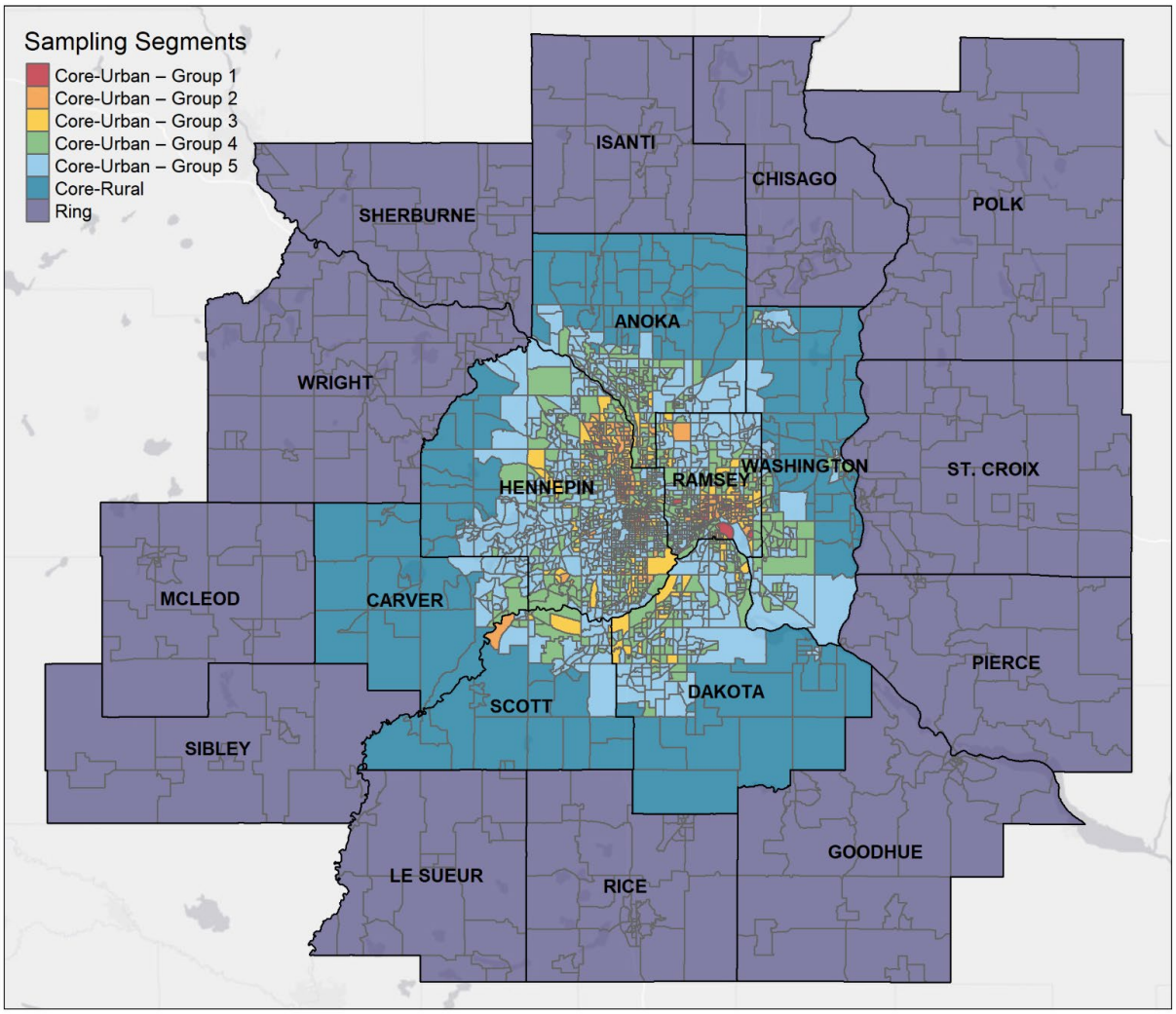


FIGURE 2: MAP OF TBI CORE COUNTIES BY SAMPLE SEGMENT

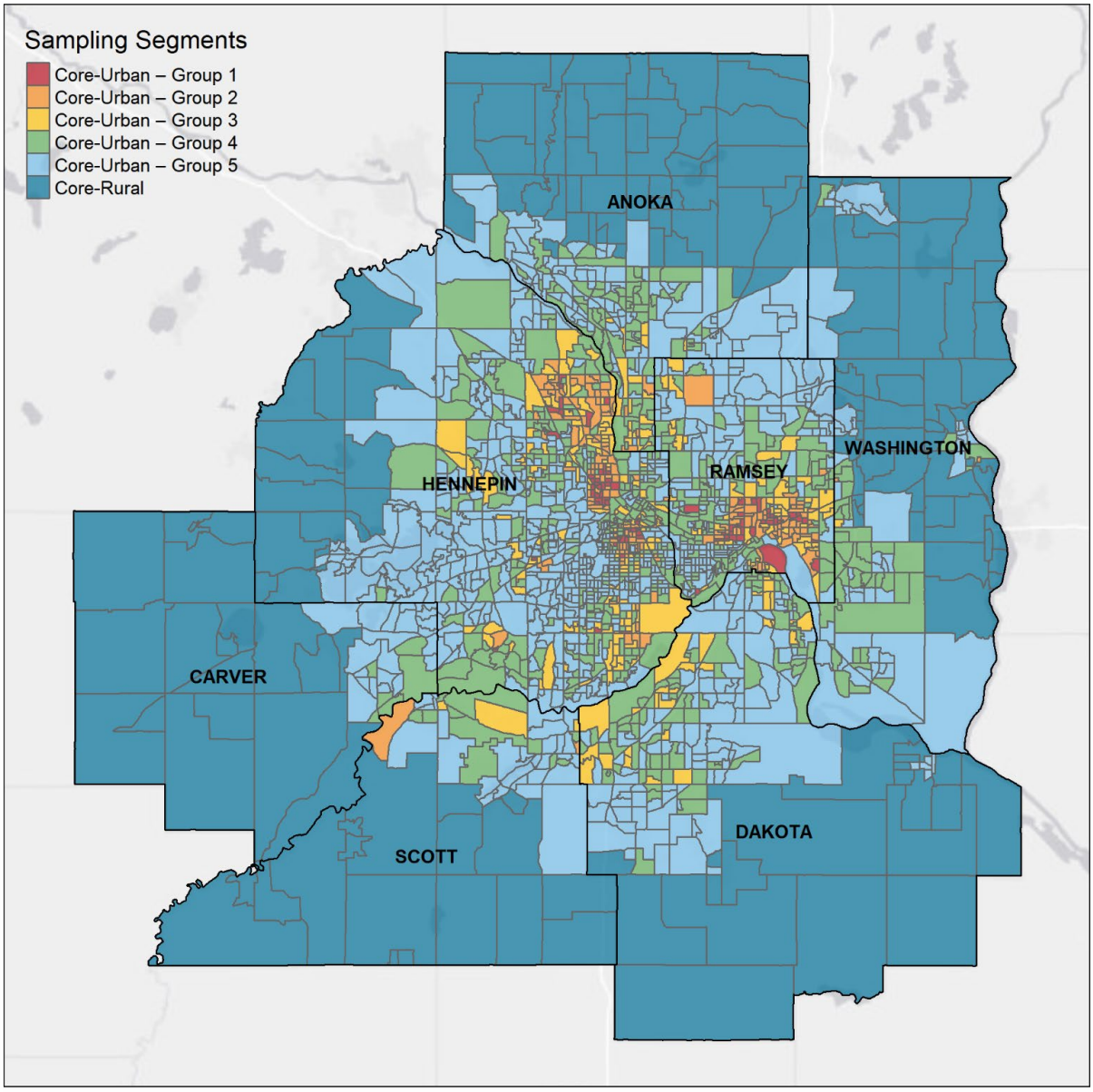


TABLE 6: RESPONSE RATES BY SAMPLE SEGMENT

SAMPLE SEGMENT	RESPONSE RATE
Core-Urban BGs – Group 1	1.6%
Core-Urban BGs – Group 2	2.5%
Core-Urban BGs – Group 3	2.6%
Core-Urban BGs – Group 4	3.2%
Core-Urban BGs – Group 5	3.1%
Core-Rural BGs	2.2%
Ring BGs	1.8%
Total	**2.5%**

3.2 SUPPLEMENTAL SAMPLING

Two supplemental recruitment efforts were implemented to improve response among hard-to-survey demographics that respond to mailed invitation materials at lower rates including 1) recruiting households through public outreach and community-based organizations and 2) recruiting households through Metro Transit's Transit Assistance Program (TAP) subscriber list. 772 households completed the survey as a result of these supplemental recruitment efforts.

Recruitment Through Public Outreach

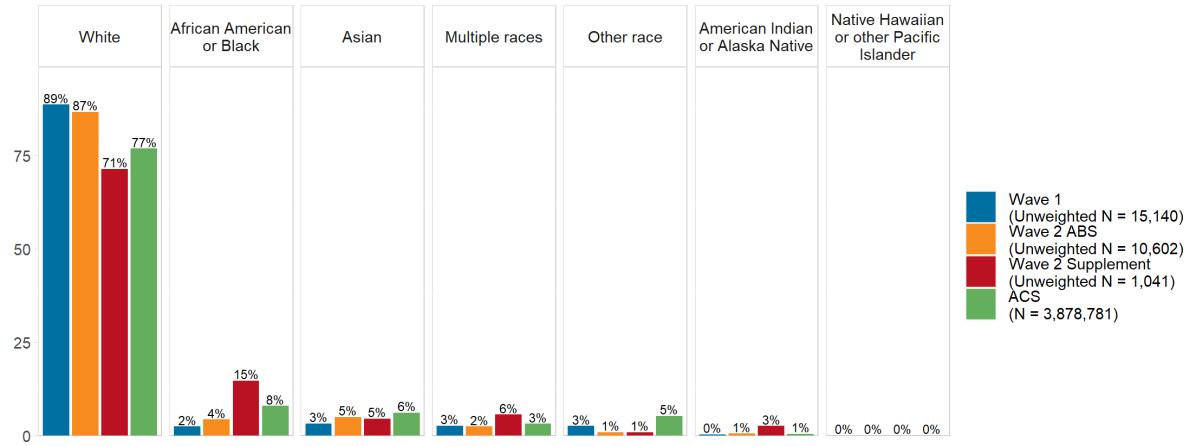
Supplemental sampling methods were implemented in the TBI with the intention of improving recruitment rates from demographic groups that are historically underrepresented or who respond at lower rates to mailed invitation efforts, particularly people with low-income, people of color, and people who are of Hispanic, Latino, or Spanish origin. Working closely together, NewPublica, RSG, and the Council coordinated an effort to invite members of community-based organizations (CBOs) to participate in the TBI, with a focus on CBOs that are primarily composed of historically underrepresented community members. CBO recruitment efforts were made in October 2021 through January 2022. NewPublica coordinated with organizations to determine the best means to invite community members to participate in the survey. 26 households completed the survey as a result of recruiting households through public outreach and CBOs. Overall, the effort to recruit through public outreach and CBOs was difficult as many CBOs throughout the region were short-staffed, already committed to other efforts, and overly burdened as a result of the impacts of COVID-19 (e.g., CBO participation in vaccination campaigns, CBO participation in health research studies). The consultant team does not recommend this as a supplemental recruitment strategy in future waves of the TBI, as it is a resource intensive recruitment strategy and did not achieve desired outcomes.

Section 4.5 Public Outreach provides further detail on the outreach efforts that were implemented.

Recruitment Through Metro Transit's Transit Assistance Program

After successfully recruiting members of Metro Transit's TAP program as part of the TBI COVID-19 panel survey, the project team decided to recruit members of the TAP to participate in the 2021-2022 TBI HTS. The COVID-19 panel survey results showed that the TAP list sample significantly improved sample representativeness in terms of low-income households and households with members who are People of Color or People of Hispanic, Latino, or Spanish descent. The 2021-2022 TBI results similarly show that the TAP list sample significantly improved sample representativeness as documented below in Figure 3, Figure 4, and Figure 5. Figure 3 shows that the TBI supplemental sample segment outperformed the Census Bureau's ACS in terms of representation by race. 11% of the unweighted ACS respondents are People of Color while 29% of the unweighted Wave 2 supplemental sample are People of Color[2]. Figure 4 shows that the Wave 2 TBI fell short on response from Hispanic residents. However, the TBI supplemental sample outperformed the Census Bureau's ACS in terms of representation by ethnicity. 3.5% of the unweighted ACS respondents are Hispanic, while 6% of the unweighted supplemental sample are Hispanic[3]. Figure 5 shows that the Wave 2 TBI obtained a more than representative sample of households with incomes less than $35,000 in both the ABS and supplemental sample methods. Overall, 746 households completed the survey as a result of recruiting households through Metro Transit's TAP subscriber list.

FIGURE 3: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – RACE



[2] For the study region, 30,950 out of the 34,713 PUMS records are 'White alone'. This is 89% of the unweighted PUMS data.
[3] For the study region, 33,496 out of the 34,713 PUMS records are 'Not Spanish/Hispanic/Latino'. This is 96.5% of the unweighted PUMS data.

FIGURE 4: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – ETHNICITY

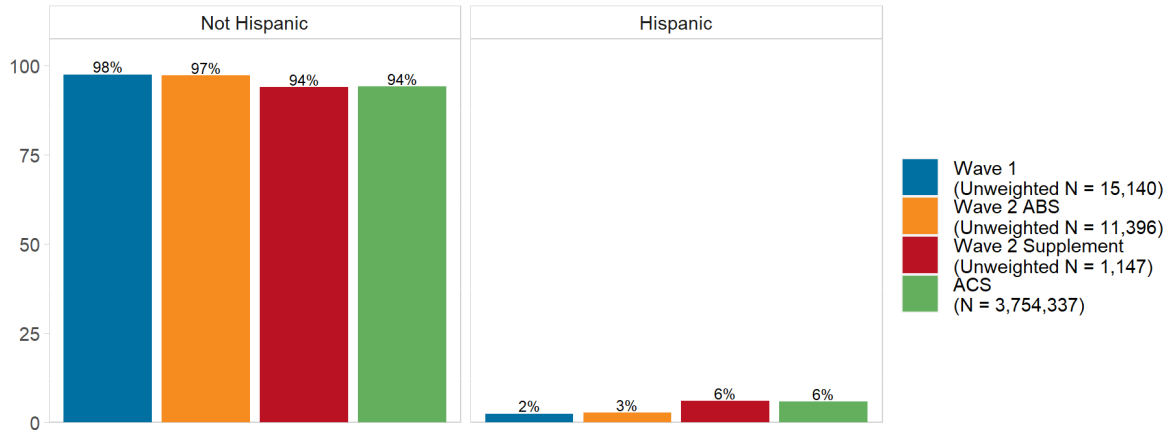
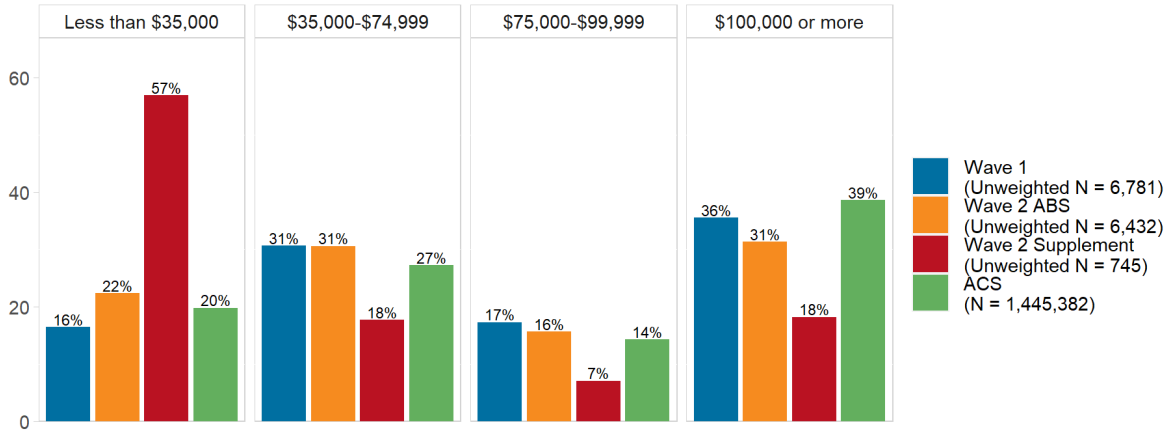


FIGURE 5: UNWEIGHTED TBI DATA COMPARE TO WEIGHTED ACS DATA – INCOME



4.0 SURVEY IMPLEMENTATION

The following section outlines key elements of survey implementation, including participant engagement, public outreach, participant support, survey monitoring, and participant incentive distribution. The 2021–2022 TBI collected data from June 22, 2021, to February 5, 2022. Households were recruited into the study via ABS and supplemental sampling through CBOs and through Metro Transit's TAP list. The study included two parts:

1. **Part one**, also called the "**recruit survey or signup survey**," collected information about household composition, demographics, and typical travel behavior.
2. **Part two**, also called the "**travel diary**," required participants to record their travel during an assigned travel period.

4.1 PARTICIPANT ENGAGEMENT

A custom survey logo and color palette were developed for the TBI and used in all public facing materials, including the survey invitation mailings, public website, participant email templates, and public outreach materials (see Figure 6). This set of engaging, professional materials connected all invitations, reminders, and other notices about the project to support the survey's credibility and response rate.

FIGURE 6: REGIONAL MOBILITY SURVEY LOGO AND BRANDING

The majority of completed households recruited via first-class mailed invitations. These mailing materials are provided as an appendix to this memo for documentation purposes. RSG mailed an invitation letter followed by two reminder postcards to maximize response rates. This approach was consistent with RSG's standard HTS mailing approach and other, similar survey efforts also conducted by RSG. Each invited household was provided a unique access code for the survey in their mailed invitation materials or in outreach recruitment materials/efforts. This access code was then used across all materials (print and online) and survey platforms (smartphone, online, call center) to streamline survey participation and reduce attrition. The mailings included English, Hmong, Karen, Oromo, Somali, and Spanish content to communicate each of the available survey participation options to all invited households.

RSG developed a public website (msptravelstudy.org) for the survey that was both the entryway to the online survey as well as a validating resource for participants with questions about the survey. This website provided information about the project, including frequently asked questions, contact information, and more. Screenshots of the survey website have been provided as an appendix to this memo.

4.2 PUBLIC OUTREACH

Public outreach was conducted to promote the TBI and recruit residents to participate as a supplement to ABS recruitment efforts and to receive feedback on the survey experience. Through conversations with the Council, the following audiences were identified as hard-to-survey populations of interest:

- Low-income populations
- People of color
- People of Hispanic, Latino, or Spanish origin

These demographic groups have been shown to have lower overall recruitment rates and conversion rates (the rate of recruits that go on to complete) in HTS. To improve opportunities for involvement particularly from populations of interest, increase access to information, and refine approaches as needed to encourage broad community participation, the consultant team recommended the following outreach approach:

- **Build community partnerships and survey awareness**: Lead efforts to build partnerships with CBOs. Communicate and connect with targeted demographics through outreach, with support from CBOs.
- **Refine recruitment strategies based on feedback**: Evaluate initial response to the TBI and refine outreach strategies based on feedback from CBOs and survey respondents particularly from populations of interest.

Targeted outreach began in September of 2021 with the development of a list of potential CBOs that could be partners in promoting the TBI and helping to recruit participants from targeted populations. The outreach team led by NewPublica, in partnership with the Council, identified potential CBOs, and categorized each organization by targeted demographics.

Each of the identified CBOs received an introductory email from NewPublica explaining the importance of the TBI, the Council's intent to bolster participation amongst traditionally underrepresented populations through feedback from CBO focus groups, as well as a request for CBO to support the Council's recruitment efforts. Over the next month, the outreach team followed up with phone calls and emails to gauge each CBO's willingness to support recruitment efforts, discuss opportunities to promote the TBI via email listservs or other communications channels, and ask for any additional recommendations CBOs may have for survey recruitment. Unfortunately, several organizations initially identified were ultimately unable to participate in recruitment efforts as they were short-staffed, already committed to other efforts, and overly burdened as a result of the impacts of COVID-19 (e.g., CBO participation in vaccination campaigns, CBO participation in health research studies). Table 7 below summarizes the organizations that NewPublica engaged with for outreach efforts and their participation level in the TBI effort.

TABLE 7: SUMMARY OF CBO SUPPORT AND/OR FEEDBACK PROVIDED FOR THE TBI

COMMUNITY-BASED ORGANIZATION	TBI SUPPORT AND/OR FEEDBACK PROVIDED
Hispanic Advocacy and Community Empowerment through Research (HACER)	Conducted a focus group/listening session and supported recruitment efforts
Northside Achievement Zone	Ultimately unable to support recruitment efforts or conduct a focus group due to resource constraints
Oromo and Somali Communities	Recruitment at community centers and completion of individual household feedback questionnaires
Hmong and Karen Communities	Recruitment at community centers and completion of individual household feedback questionnaires

The goal was to conduct four focus groups with CBOs to gather feedback from historically underrepresented populations on how to better reach their communities. Ultimately, a single focus group session was conducted with HACER and an individual household feedback questionnaire was used in lieu of focus groups to gather feedback from participants in the remaining communities. The focus group discussion guide, the individual household feedback questionnaire, as well as NewPublica's summary of the feedback they received are included as report appendices. The consultant team recommends revisiting the outreach strategy for Wave 3 to find alternative ways to better engage with historically underrepresented communities.

4.3 PARTICIPANT SUPPORT

Outbound communication about the TBI was initiated by mailed invitations or public outreach efforts and complemented by reminders via email, telephone, and/or within the smartphone app itself once a household completed the signup/recruitment survey. Reminder emails were thoughtfully scheduled throughout the survey period with the intent of maximizing response. Inbound communication (both calls and emails) from participants was typically related to incentives and/or requests for technical help (e.g., requesting an access code). A summary of participant inquiries received is documented below in Table 8. Regardless of the communication channel, project support staff aimed to respond to participant inquiries within one business day. RSG worked closely with our call center, WestGroup Research, on this project to streamline the participant experience.

TABLE 8: SUMMARY OF PARTICIPANT INQUIRIES RECEIVED

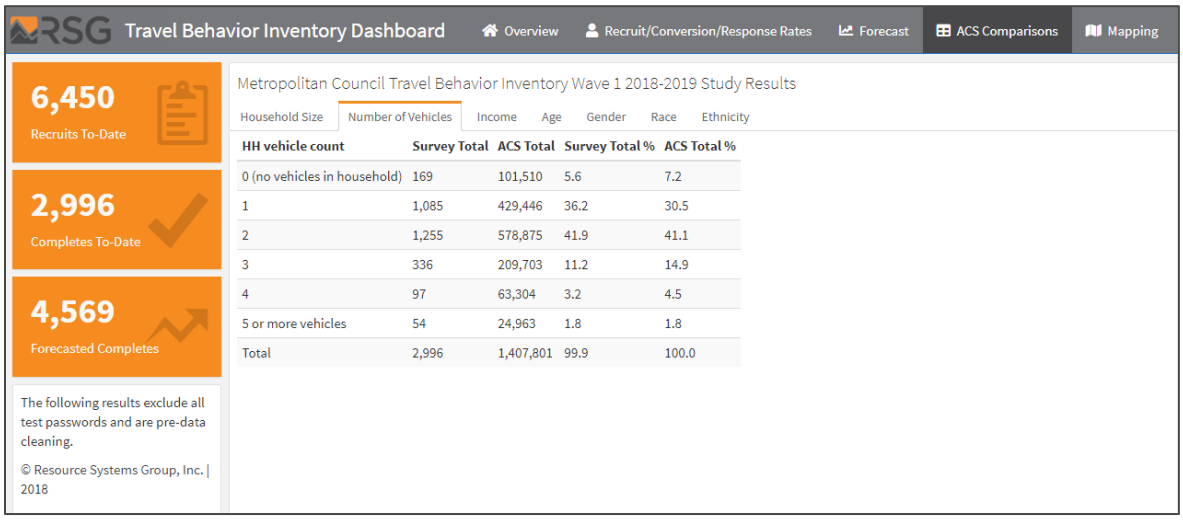
TYPE OF SUPPORT	COUNT	SHARE
Online participant inquiries	2,562	55%
Call center participant inquiries	2,063	45%
Total	**4,625**	**100%**

Includes inquiries from June 15, 2021 through March 30, 2022.

4.4 SURVEY MONITORING

During survey fielding, RSG continuously monitored the survey database and performed regular QA/QC. To provide the Council with full transparency and real-time access to survey response throughout data collection, RSG developed an online monitoring dashboard with real-time results, including response rates and a comparison of participants to ACS demographic data for the region (see Figure 7).

FIGURE 7: REAL-TIME DATA COLLECTION MONITORING DASHBOARD



HH vehicle count	Survey Total	ACS Total	Survey Total %	ACS Total %
0 (no vehicles in household)	169	101,510	5.6	7.2
1	1,085	429,446	36.2	30.5
2	1,255	578,875	41.9	41.1
3	336	209,703	11.2	14.9
4	97	63,304	3.2	4.5
5 or more vehicles	54	24,963	1.8	1.8
Total	2,996	1,407,801	99.9	100.0

Survey Response

During fielding, it became clear that response rates from specific demographics to the TBI were lower than initial projections and that the number of households choosing to use the rMove smartphone app was lower than expected. To address this, the consultant team implemented the following survey design changes to improve response to the TBI and obtain as many complete households as possible within the available data collection timeframe:

- Expanding and increasing the differential incentive offerings and criteria on 8/20/2021, these are detailed in Section 4.5 Participant Incentives.
- Refining outreach recruitment strategies and survey awareness efforts.
- Recruiting participants through the Metro Transit TAP subscriber list to leverage a low-cost approach to improve response among certified low-income populations who are known to be hard-to-survey.

These efforts bolstered survey response and the TBI surpassed its target of 7,500 completed households, with 7,182 households obtained through ABS and 772 households obtained through CBO partnerships and Metro Transit TAP subscriber list.

4.5 PARTICIPANT INCENTIVES

Participants who fully completed the survey were offered the following incentive options: a Visa gift card, a donation option to the local Twin Cities United Way, and a no-incentive option.

Incentives were distributed to participants within two to three weeks of the day they completed the survey. Differential incentive offerings were implemented based on survey participation mode (smartphone vs online/call center) and participant demographics. Differential incentive offerings based on participation mode were recommended because those participating via smartphone were asked to provide a full week of travel information rather than a single day. Differential incentive offerings based on participant demographics were also offered to improve survey representation from historically hard-to-survey groups. The criteria used to determine the type of incentive a household was offered is provided below:

A household qualified for the higher hard-to-survey incentive if it had any of these characteristics:

- Member 1 is Hispanic (offered at end of signup survey)
- Member 1 is a Person of Color (offered at end of signup survey)
- Household income is less than $35,000 (offered at end of signup survey)
- Household has four or more members (offered at end of signup survey) **– This was an additional characteristic added for sample order 3 starting 8/20/2021.**
- Household recruited using the public outreach access code or Metro TAP list code (offered in recruitment)
- Household recruited from sample segments 1 or 2 (offered in letter)

Incentive amounts:

- Online/call center standard offering was $10 per household.
- Online/call center hard-to-survey offering was $20 per household.
- Smartphone standard offering was $20 per adult participant. **– This was a $5 increase from sample orders 1 and 2 prior to 8/20/2021.**
- Smartphone hard-to-survey offering was $30 per adult participant **– This was a $10 increase from sample orders 1 and 2 fielding prior to 8/20/2021.**

A summary of incentives distribution is provided in Table 9.

TABLE 9: SUMMARY OF INCENTIVES DISTRIBUTION

INCENTIVE OFFERING	COUNT OF INCENTIVES ISSUED	SHARE OF INCENTIVES ISSUED
Virtual Visa gift card	8,327	88%
Physical Visa gift card	387	4%
Donation to Twin Cities United Way	768	8%
Total	9,482	100%

Differential Incentive A/B Test

An A/B test was conducted during the first six mailing groups to determine if offering a higher incentive amount in the invitation letter would increase recruit rates (and thus overall completion rates) for hard-to-reach households specifically households with Hispanic members and/or People of Color. In block groups whose population is at least 60% Hispanic and/or People of Color (sample segments 1 and 2), 50% of the invitation letters offered a higher incentive amount to determine if this would increase response from households with members who are Hispanic and/or People of Color. Overall, this offering was effective at increasing the number of hard-to-reach households in the sample from these block groups and it was implemented for the remainder of the mailing groups in the study.

TABLE 10: RESULTS OF A/B TEST OFFERING HARD-TO-SURVEY INCENTIVES IN INITIAL INVITATION LETTER

A/B Test Group	Completion Rate	% People of Color
Offered higher incentive in letter	2.7%	31%
Not offered higher incentive in letter	1.8%	27%

5.0 DATA PROCESSING AND WEIGHTING

The following section discusses the data processing and weighting methods that were implemented after data collection concluded.

Initial data review

RSG removed households from the dataset that met the following exclusion criteria:

- Households who report a home location outside the desired study region.
- Households who have not completed one concurrent travel day and are therefore considered incomplete.
- Households that have completed the survey more than once based on duplication rules involving home addresses and contact information.
- Households that experience significant technological challenges when completing the surveys via the rMove application. While rare, these households do have abnormal data and therefore are excluded from delivery.
- Households that requested their data be deleted due to privacy laws and regulations.

Completion Criteria

“Complete” households met the following conditions:

- The household completed the recruit survey in full.
- All household members completed a travel diary on a concurrent travel day.

Data Processing and Preparation

Most of the data collected was validated in real-time through survey logic. As a result, data preparation was primarily focused on coding variables and deriving new fields to facilitate analysis. The exception to this rule was the cleaning of smartphone GPS trip route data. RSG takes extra steps to rigorously clean and review our smartphone GPS data with the goal of providing a user-friendly dataset. RSG overlays the smartphone trip path data collected onto maps to ensure the trip segments, paths, and times all appear 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). Our analysts carefully review many of the actions recommended by our algorithms to add a secondary level of quality control to the process.

Weighting and Expansion

The methods used for weighting and expanding the 2021-2022 Wave 2 TBI data are documented in a separate weighting methodology memo. Please see the TBI Wave 2 Weighting Methodology Technical Memo for further detail.

6.0 LESSONS LEARNED AND FUTURE RECOMMENDATIONS

Based on the 2021-2022 Wave 2 TBI data collection effort, the consultant team has noted important lessons learned and future recommendations for the Council to consider for Wave 3 survey design and implementation. Five study design experiments were conducted in Wave 2 and the results of each are documented in the following section.

Wave 2 Study Design Experiments:

1. **Targeted address-based oversampling** to increase proportion of hard-to-survey households in the sample.
2. **Supplemental sampling efforts** to encourage hard-to-survey households to participate.
3. **Opt-in survey design** to provide respondents the opportunity to select their survey participation method and decrease attrition for hard-to-survey households.
4. **ABS invitation resident name matching** A/B test to determine if name matching results in a higher recruitment rate.
5. **Differential incentives** to increase completion rates for hard-to-survey population and increase representation in the sample.

6.1 SURVEY DESIGN

Sampling Strategies

Using Metro Transit's TAP list as a supplement to ABS recruitment was successful at increasing representation of low-income households and People of Color in the Wave 2 sample. In Wave 3, the consultant team recommends identifying new supplemental sampling methods to better reach hard-to-survey households and determine ways to avoid exhausting recruitment methods in a recurrent program. In particular, identifying email and text lists for hard-to-survey segments of the population will be most effective because these are trusted and known communication channels. For instance, recruiting members of subsidized housing programs may be a way to better reach low-income households in future waves since these communication channels are trusted sources and lead to better recruitment rates than mailed invitation materials for this population segment.

Participation Mode Assignment

One key recommendation to consider is whether households are asked to "opt-in" to the smartphone diary, or if they are "assigned" to participate in the diary using their smartphone, because some populations may be more or less comfortable participating using a smartphone app. In the 2021-2022 TBI survey, participants who completed the recruitment stage of the survey online received the options to "opt-in" to the smartphone diary, to complete their travel diary on the website, or to participate via the call center, based on participant preference. With this design, information on variable incentive offerings (with higher incentive offerings for those

that complete using the smartphone app) is provided to the participants alongside the option to "opt-in" to the smartphone diary or not, to still incentivize smartphone participation. This is different from the 2018-2019 TBI survey which assigned participants to use their smartphone if all members in the household were eligible to participate via smartphone.

Analysis of response rates and "opt-in" rates for smartphone app data collection has indicated that providing eligible households the choice to opt-in or opt-out of smartphone participation (and thus complete the survey online or through a call center), may result in additional participation from hard-to-survey households or households who may have otherwise chosen not to participate due to privacy or other concerns. Figure 8 and Figure 9 below document participation by race and income and show that certain segments of the population prefer certain participation methods over others. The trade-off is between cost, data quantity, and data quality. Assigning eligible households to participate using their smartphones results in a measurably higher share of smartphone participation than with opt-in but can result in fewer recruited households completing the survey (thus requiring more effort to secure the targeted sample size). The opt-in approach can increase overall survey conversion rates (the rate of households that signup and go on to fully complete the survey).

FIGURE 8: SURVEY MODE PARTICIPATION BY RACE

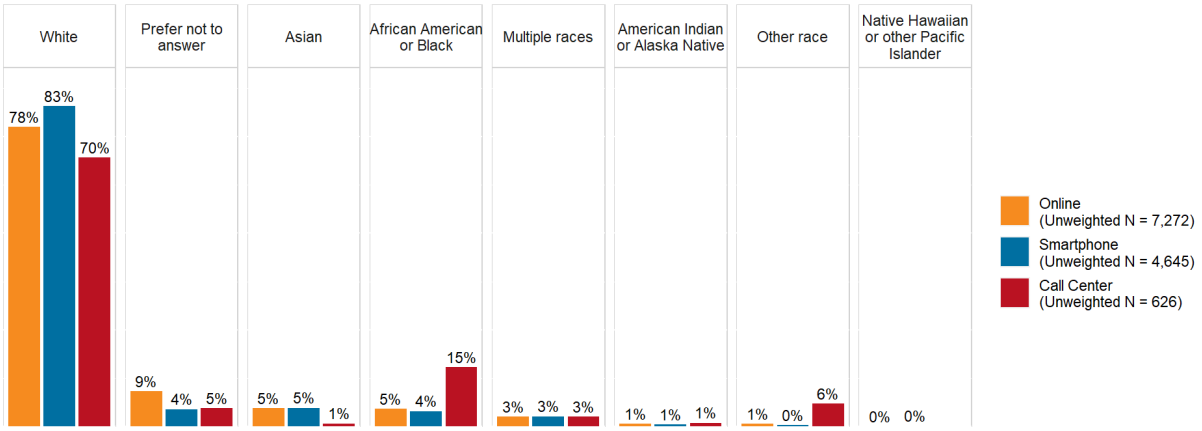
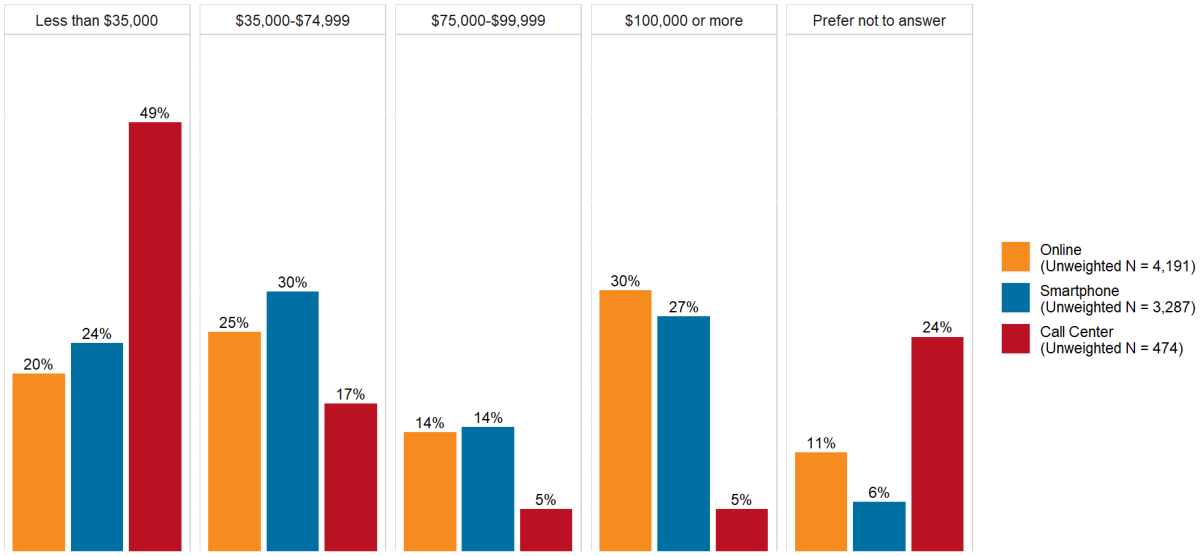


FIGURE 9: SURVEY MODE PARTICIPATION BY INCOME



Invitation Addressee

When purchasing the addresses for Wave 2, RSG had the option to purchase the resident's name and estimated income for the list of addresses. MSG states that they typically provide a name for 90% of addresses and an estimated income for about 85-90% of total addresses, although RSG has observed variation based on the region and study.

RSG conducted an A/B test during the first six mailing groups in all sample segments except core-urban sample segments 1 and 2 to evaluate the improvement in recruit rates due to addressing the invitations to the name match provided by MSG. RSG found that name matching had no significant effect on recruit and completion rates and recommended not purchasing name matching for subsequent mail orders (see Table 11). RSG did not purchase name matching from MSG for subsequent sample orders to save on sample purchasing costs. Instead of addressing letters and postcards with name matching from MSG, RSG used neighborhood-level data to address residents which was provided by the Council.

TABLE 11: RESULTS NAME MATCHING A/B TEST FOR ABS INVITATION IN MAIL GROUPS 1-6

TREATMENT	COMPLETED HOUSEHOLDS	NOT COMPLETED	COMPLETION RATE
Name was not used	1,204	38,373	3.04%
Used name if available	1,326	42,648	3.01%

6.2 SURVEY IMPLEMENTATION

Incentives

Offering household and person level incentives is the most effective means to increase survey response. Incentives reduce the overall survey costs, as incentive costs more than offset printing and mailing costs. Using differential incentive offerings based on participation mode and demographic data continues to support better representation in the overall sample. The project team continued offering differential incentives in Wave 2, as these proved effective in Wave 1 at increasing the conversion rate (and thus reducing attrition) for hard-to-survey households who typically dropout at higher rates. Overall, differential incentive offerings continue to be effective at increasing the conversion rate (thus decreasing attrition) for hard-to-reach households who face more barriers to complete the survey (see Table 12).

To further improve representation and overall response in future survey efforts, the consultant team recommends continuing to utilize differential incentive strategies in Wave 3 and determining if other segments should be included in the existing criteria.

TABLE 12: CONVERSION RATE BY DIARY PARTICIPATION MODE

DIARY PARTICIPATION MODE	CONVERSION RATE
Hard-to-survey household in sample orders 1-2	54%
Standard offering household in sample orders 1-2	55%
Hard-to-survey household in sample order 3	55%
Standard offering household in sample order 3	61%

7.0 APPENDICES

Appendices are provided as PDF's and delivered with the Wave 2 Methodology Report.

7.1 INVITATION MATERIALS

7.2 SURVEY QUESTIONNAIRE

7.3 SUPPLEMENTAL OUTREACH DOCUMENTATION

7.4 DATA PRIVACY POLICY

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