



2021 North Shore Transportation Survey

Final report
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Prepared for: City of North Vancouver,
District of North Vancouver, and
District of West Vancouver

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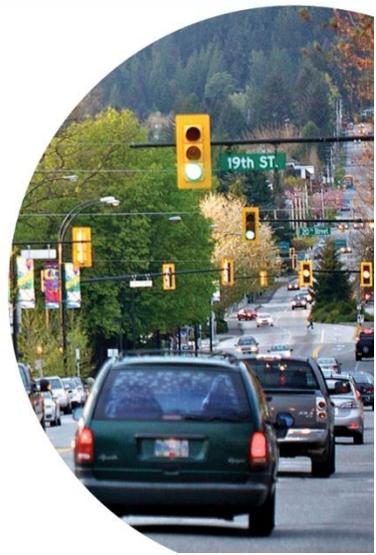
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This project would not be possible without the contributions of over 2,131 residents of the Tsleil-Waututh Nation, Squamish Nation, City of North Vancouver, District of North Vancouver, and District of West Vancouver who completed the survey. We thank all those who responded to this survey, via phone interview or online, and told us about their daily travel and transportation habits. Their participation in the 2021 North Shore Transportation Survey has contributed to transportation planning data that will be useful for years to come.

Executive Summary

The North Shore Transportation Survey (NSTS) is a biennial survey of residents of the North Shore that tracks key transportation metrics associated with residents' travel patterns. The survey is an initiative of the City of North Vancouver (CNV), District of North Vancouver (DNV), and District of West Vancouver (DWW).

The fall 2021 North Shore Transportation Survey (NSTS) is the second survey of its kind, providing the first opportunity to see longitudinal trends in transportation. It comes at a time of great change in travel patterns when the COVID-19 pandemic resulted in a significant shift to working from home and a significant reduction in transit, and when municipalities and other jurisdictions have been more actively investing in sustainable transportation modes. The NSTS tracks trip rates, mode shares, vehicle kilometres travelled, and other key metrics that will help policy makers, programmers and researchers assess the impact of transportation initiatives and plan for future investments.

The survey results suggest that residents of the North Shore made 66,000 fewer daily trips in 2021 than in 2019, despite an estimated 4% increase in population during that time frame, as illustrated in Figure E1. The average resident made 3.13 trips per day in 2021 compared to 3.66 in 2019. This 15% decrease is attributable to the impact of the COVID-19 pandemic on residents' commuting patterns and other activities, notably an increase in work-from-home arrangements and virtual schooling as well as a reduction in social interactions and trips for personal business (such as banking, medical appointments, vehicle repair, etc.).

E1. Daily Trip Volumes and Person Trip Rates – 2019 vs 2021

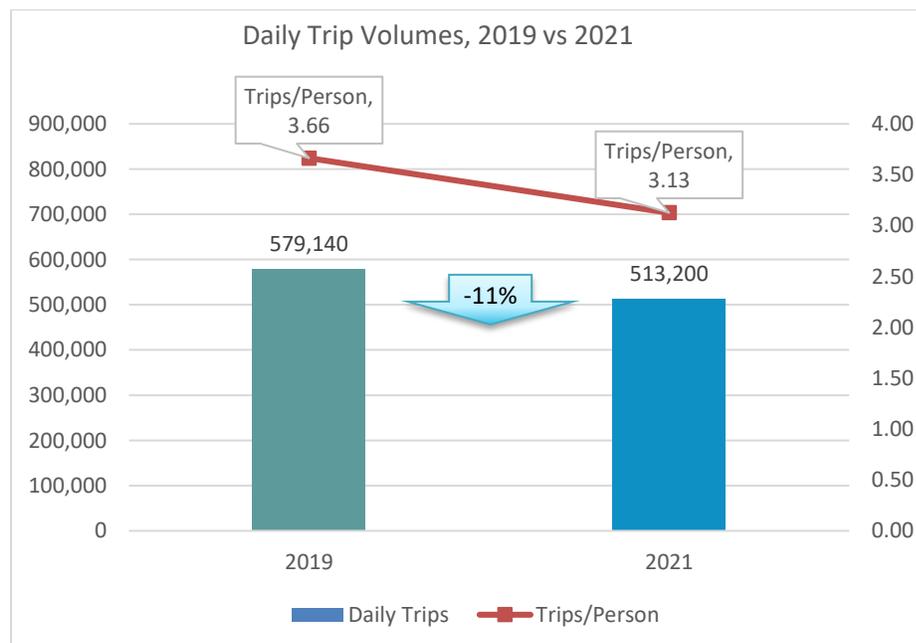
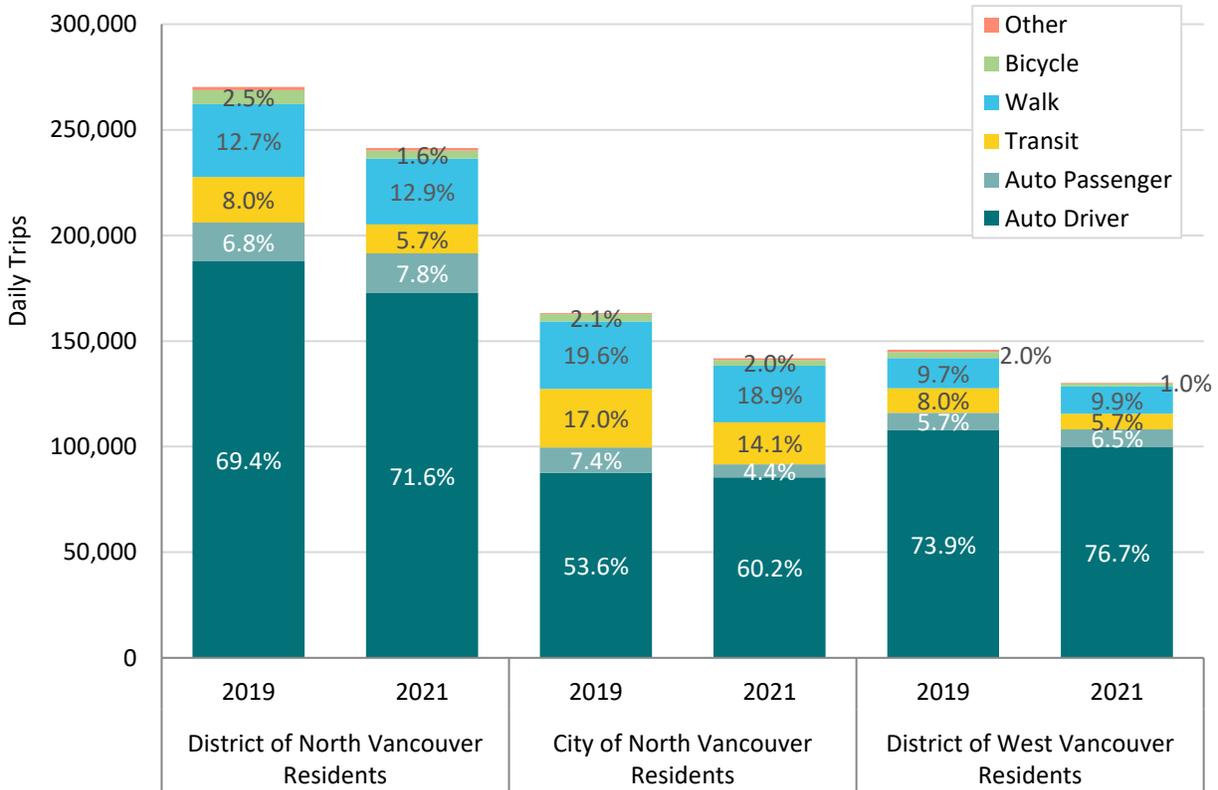


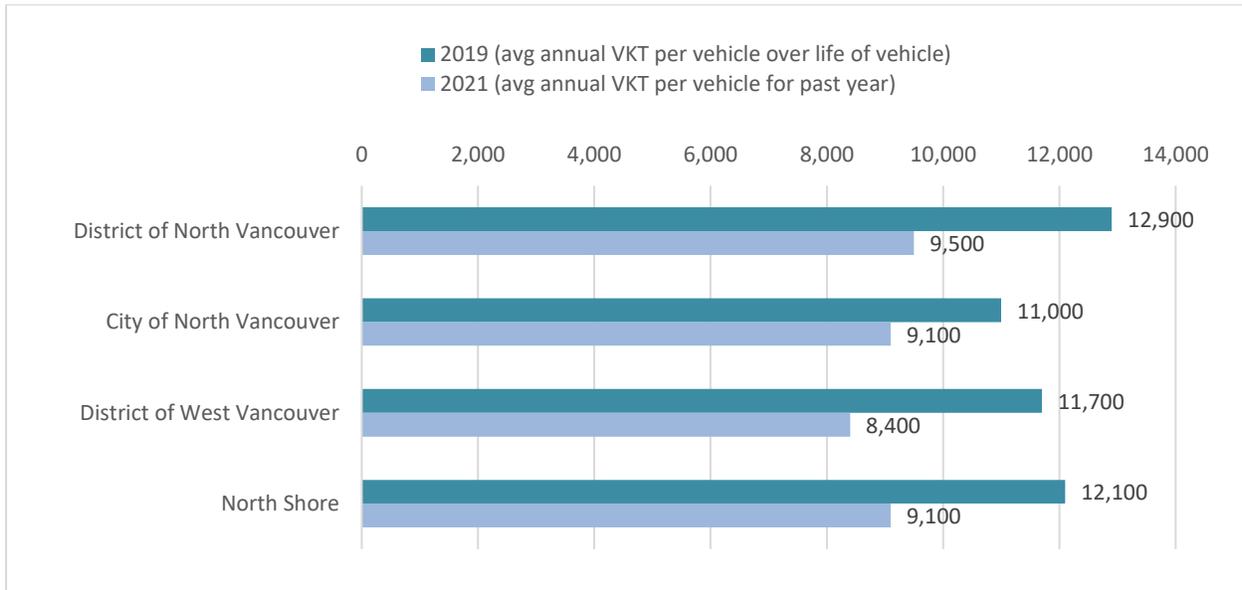
Figure E2 presents the mode shares in 2021 by municipality compared to the mode shares in 2019. For all municipalities, the proportion of auto and walking trips increased while the proportion of transit trips decreased. Combining all sustainable modes (transit, walk, and bike), CNV has the highest sustainable modes share, at 35%, while DNV has 20% and DWV has 17%. The three municipalities saw similar drops (ranging from 22% to 25%) in the volumes of trips via sustainable modes, amounting to 3-4 percentage point drops in sustainable mode shares compared to 2019.

E2. Total Trips by Mode and Mode Share - by Municipality, 2019 vs 2021



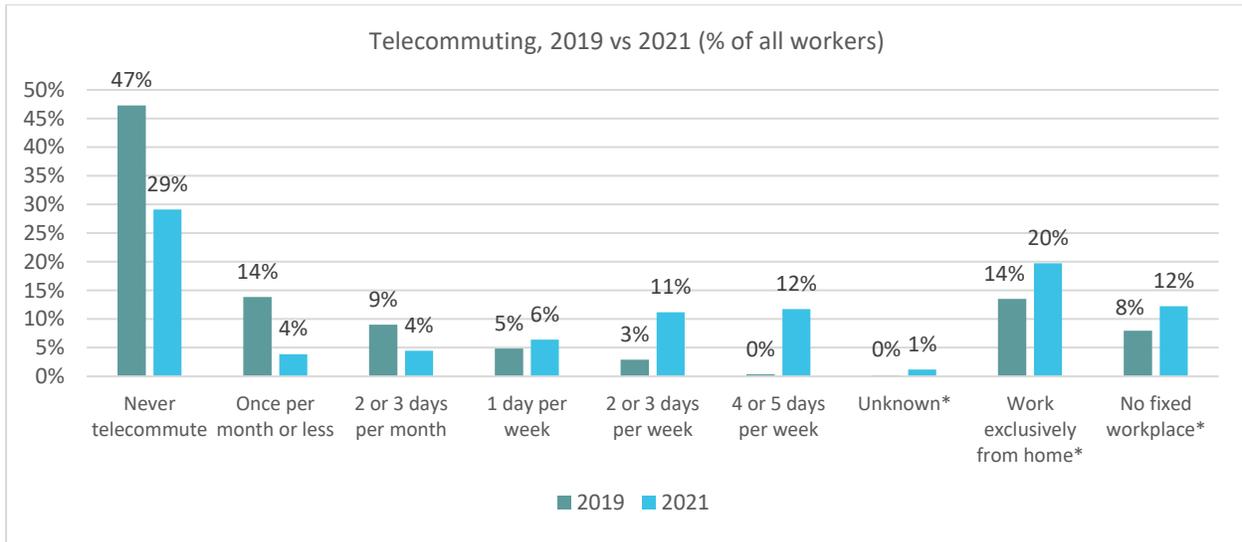
Overall, the survey results suggest that the average VKT per household vehicle is approximately 9,100 km per year, down from 12,100 km per year. This is a significant (25%) decrease over 2019, showing the continued depressed vehicle travel related to the COVID-19 pandemic. Similar patterns can be observed by municipality, as shown in Figure E3. Of note, it appears that DWV residents incur the lowest annual VKT, at 8,400 km, compared with 9,100 km for CNV, and 9,500 km for DNV.

E3. Average Annual VKT, by Municipality, 2019 and 2021 (Past Year Odometer Difference)



Behind the shifts in travel are two factors: continued work from home as a precautionary measure during the current stage of the COVID-19 pandemic, and what may prove to be a more permanent shift in work arrangements, including increases in hybrid work arrangements, in which workers may commute a few days per week and work remotely the other days. Figure E4 shows the frequency of telecommuting for survey participants who work. Just under one-third never telecommute, a decrease from nearly one-half in 2019. In 2021, 20% of participants reported working exclusively from home, which is an increase from 14% in 2019, and 12% reported working from no fixed workplace which is an increase from 8% in 2019. It will be interesting to see how this pattern changes over time as COVID-19 becomes endemic and some workers return to work at their usual workplace while others continue to work from home.

E4. Frequency of Telecommuting



The North Shore communities have been actively working on investments and programming for active transportation, including the construction of bike lanes, the addition of an e-bike-share program and a pilot project to allow e-scooters on local streets and paved multi-use pathways in CNV and DNV. Table E5 provides data that shows access to bicycles and micromobility devices by municipality. Residents of the North Shore own an estimated 117,900 bicycles, of which 10,600 are e-bikes. This is more than double the estimated number of e-bikes in 2019, at 4,100 e-bikes. Interestingly, the one community that isn’t participating in the micromobility pilot, DWV, has the highest estimated proportion of households with at least one micromobility device at 4%.

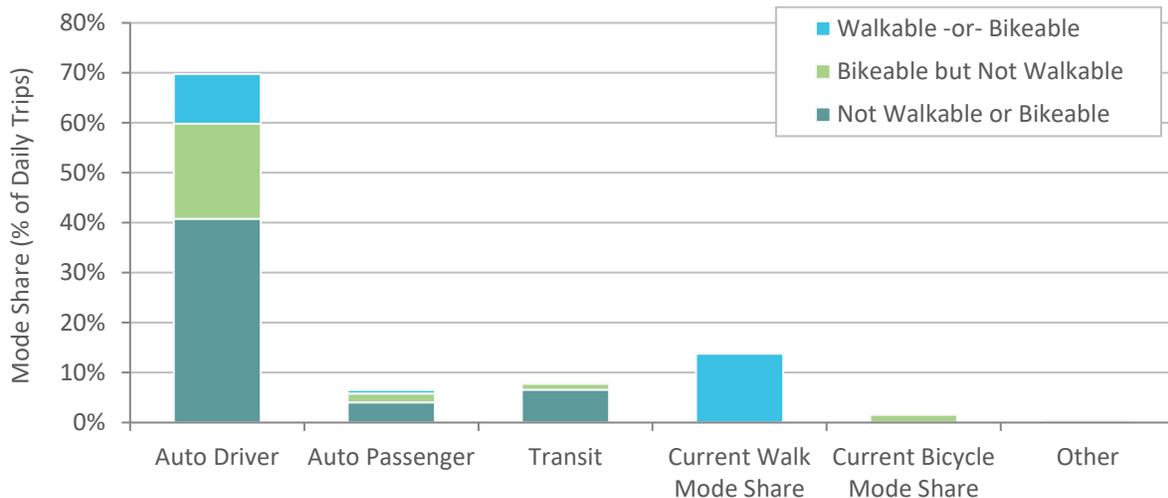
E5. Bicycles and Micromobility Device Access

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Estimated total adult bicycles (including e-bikes)	117,900	60,100	30,800	27,000
% of households with at least one adult bicycle	58%	66%	52%	54%
Average adult bicycles per household	1.47	1.80	1.10	1.41
% of adult bicycles that are e-bikes	9%	8%	10%	11%
Estimated total micromobility devices	3,600	1,300	1,300	1,100
% of households with at least one micromobility device	3%	2%	3%	4%
Average micromobility devices per household	0.05	0.04	0.05	0.06

The surveyed trips were examined to determine the extent to which trips that were made using a motorized mode could have feasibly utilized an active mode instead (i.e., walking or cycling) based on trip distance. The distance threshold for a “bikeable” trip was set at 4.6 km and at 1.6 km for a “walkable” trip. About 40% of auto driver trips (19% of total daily trips by all modes) are bikeable, while

14% are walkable (10% of all daily trips by all modes). As shown in Figure E6, this suggests that 19% of all trips were within what is considered an appropriate cycling distance for potential mode-shifting from auto driver to cycling, an additional 10% could be potentially shifted from auto driver to walking.

E6. Percentage of Walkable and Bikeable Trips from Current Mode Share – North Shore



Factors that influence mode share include trip purpose, access to transportation modes and sustainable infrastructure, topography, population density and dwelling type, income, immigration status, proximity to employment and amenities and more. This report provides travel data to support analysis to understand these factors. The zones with the highest population density and greatest proximity to employment have among the highest sustainable mode shares. Other mode share results are as follows:

- Trip purpose has a significant variation in mode share with other trips (43%), work trips (36%), and school trips (81%) having the highest sustainable transportation mode shares.
- When looking at patterns of travel by age, we see a pattern of increasing auto driver reliance to the age of 35 where it remains relatively constant until 75+ years of age. Younger age groups have higher transit and walking mode share whereas the older age groups have an increase in walking and auto passenger mode share. Survey participants between 35 and 64 have the highest auto driver mode shares, at between 75% to 77% of their daily trips while the 15 to 24 age group has the lowest percentage with 31% of their daily trips.
- Vehicle use increases with income, auto driver trips represent between 50% and 57% of trips for the lowest-income households (residents with annual household income of less than \$30K, and those of between \$30K and \$50K) and increases to three-quarters of all trips for the highest (74% mode share for those with incomes greater than \$200k per year).
- The survey results suggest that recent immigrants (those who settled in Canada within the last five years) are more likely to be reliant on transit, with a 28% transit mode share. Residents who were born in Canada or who immigrated more than 15 years ago had the lowest transit mode shares, at 8% and 6% respectively.

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Commonly Used Acronyms

NSTS	North Shore Transportation Survey
CNV	City of North Vancouver
DNV	District of North Vancouver
DWV	District of West Vancouver
INSTPP	Integrated North Shore Transportation Planning Project
CBD	Central Business District (e.g., Vancouver CBD)
CSD	Census Subdivision
MVRD	Metro Vancouver Regional District
FVRD	Fraser Valley Regional District
VKT	Vehicle Kilometres Travelled
EV	Electric Vehicle
TDM	Transportation Demand Management
HBW	Home-based work (trips directly from home to work or directly from work to home)

1 Introduction

1.1 Project Overview

1.1.1 Background and Objectives

The North Shore Transportation Survey (NSTS) is a biennial survey of residents of the North Shore that tracks key transportation metrics associated with residents' travel patterns. The survey is an initiative of the City of North Vancouver (CNV), District of North Vancouver (DNV), and District of West Vancouver (DWV). Survey participants are randomly sampled from across the three municipalities and First Nations communities on the North Shore.

In 2018, the Integrated North Shore Transportation Planning Project (INSTPP) report identified a number of key access and mobility challenges. Identified challenges include:

- land use is largely car oriented;
- transit and alternative modes of travel are often not competitive with travel by car;
- measures are lacking to manage road use;
- road use exceeds capacity at peak times and pinch points;
- the road network has gaps that reduce choice and increase congestion.

Building on the work of INSTPP, the North Shore Connects partnership was formed by the municipal and First Nations governments of the North Shore (Squamish and Tsleil-Waututh Nations) to work with other levels of government and stakeholders to address these identified challenges and plan, secure funding for, and implement projects that improve transportation on, to and from the North Shore.

The NSTS is intended to track trip rates, mode shares, vehicle kilometres travelled, and other key metrics that will help the municipalities assess the impact of transportation initiatives and plan future transportation investments. The baseline survey was conducted in the fall of 2019 with 1,901 residents of the North Shore. A shorter interim survey was conducted in the fall of 2020 with 1,081 returning participants. The interim survey kept participants engaged with the survey program and collected information on transportation issues of interest, including the impact of the COVID-19 pandemic on the travel of the panel of previous participants. The focus of this report, the 2021 NSTS, conducted with 2,131 residents, is the second full-length survey and will allow for comparisons against the 2019 baseline survey. It was conducted with a sample of previous and newly recruited participants.

1.1.2 COVID-19 Context

The survey responses have been impacted by the ongoing COVID-19 global pandemic. The pandemic has impacted people's travel habits and usual behaviour, as many people were limiting outings, working from home, and making different decisions regarding transportation modes, such as avoiding public transit.

The short interim survey conducted in 2020 was administered during the second wave of COVID-19. During the survey administration period, daily case counts were high, peaking at upwards of 800 new

cases per day¹, widespread vaccination had not yet begun, daily hospitalizations and deaths were high, and various restrictions were implemented (such as limits on social gatherings, travel restrictions, and compulsory public mask mandates). The 2020 survey was conducted with only repeat survey participants, i.e. it did not add new recruits to supplement the representativeness of the survey sample. Nevertheless, the results revealed a number of dramatic changes in work arrangements, commuting patterns, reduced daily trips, and reduced use of transit and cycling during this wave of the pandemic, in part due to concern about travel on transit and in part due to work-from-home arrangements.

Data collection for the 2021 survey began just over 1.5 years after the pandemic was declared. At this time, COVID-19 cases in the region were on the decline following a peak in early October 2021. With the general decline in cases, some residents may have started to return to more typical travel patterns, however, many of those who had started working from home had not yet returned to commuting, and risk of infection was still a concern. At the start of the data collection period, daily COVID-19 cases in B.C. were at about 700 new cases per day (compared to daily case peaks upwards of 950 per day during previous COVID-19 waves), declining to about 350 daily, with cases just beginning to rise again at the end of the data collection period with the advent of the COVID-19 Omicron variant.² The 2021 survey refreshed the survey panel with new recruits to the survey program and provides a basis for comparison against the 2019 baseline that reveals ongoing impacts of the pandemic on trip-making behaviours.

1.1.3 Design and Administration of the 2021 North Shore Transportation Survey

The 2021 NSTS was conducted between late October and early December 2021 with residents of the North Shore. The survey was a voluntary 24-hour recall travel survey that captured residents' household characteristics, demographics, and trips undertaken by the survey participant on the most recent previous weekday. The questionnaire included attitudinal questions and reporting of usual transportation-related habits. The survey was open to residents 15 years of age or older. The survey questionnaire is included in **Appendix A** of this report.

Survey participants could complete the survey online or over the telephone. An address-based sampling approach was used to randomly select households across the North Shore to participate. In order to set survey targets that would ensure a geographically representative sample, the North Shore was organized into 26 sampling districts based on Statistics Canada Aggregated Dissemination Area geographies. Selected households were invited to participate via an invitation letter (included in **Appendix B** of this report). Households with a corresponding phone number were also contacted by phone. A small number of supplementary surveys (to obtain a better representation of younger demographics) were also collected by way of asking participants to invite other members of their household under the age of 40 years old to participate, with 13 such surveys obtained. Over 90% of the surveys were completed between October 26 and November 30, 2021, with the survey kept open until December 18, 2021, to target sampling districts with low response rates. In comparison, for the baseline

¹ COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (<https://github.com/CSSEGISandData/COVID-19>, last accessed April 28, 2022).

² COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (<https://github.com/CSSEGISandData/COVID-19>, last accessed April 28, 2022).

survey, 90% of the surveys were conducted between October 22 and November 21, and the survey was kept open until December 13, 2019. While the survey dates align relatively well, it may be possible that the slightly later shift in data collection dates in 2021 could have had a modest impact on the incidence of active mode use. The 2021 survey experienced an interruption during which data collection was paused from November 14-17, 2021 due to a severe storm that brought significant levels of rainfall through the area; enough to impact people's travel decisions. It may be noted that the weather was somewhat rainier and colder on average compared to seasonal norms even outside the pause in data collection, which could also have affected the incidence of active mode use.

The 2021 NSTS gathered information from 2,131 North Shore residents after data validation, trip logic checks, and rejection of surveys with data issues. Of the 1,025 survey panel members who in 2020 agreed to be contacted again, two-thirds (689 or 67%) provided a valid survey again in 2021. A total of 1,442 new participants were recruited to complete the survey, the majority of which were recruited by address-based sampling, with 13 recruited via the spin-off sampling approach that asked participants with other household members under the age of 40 to invite them to participate. Out of the total participants, 1,914 agreed to be contacted again for future surveys.

The survey data set was weighted to compensate for non-response bias and expanded to represent the target population, using the 2021 Census population and dwelling counts projected forward to 2022. Weighting controls for household-level information included dwelling counts, dwelling type, and household size for eight geographic data expansion zones. Weighting controls for person- and trip-level information included population counts by dwelling type and population counts by age and gender for the same data expansion zones. At the time data weighting was undertaken, only total population and dwelling counts were available from the 2021 Census, i.e. detailed Census Profile information was not yet available. Therefore, the household- and person-level weighting controls used distributions from 2016 Census Profile data scaled to the 2021 Census dwelling and population counts.

When weighted and expanded, the survey data represents approximately 164,100 residents from 80,400 private households in the study area, for a sampling rate of 2.7% of households or 1.3% of population 15+ years of age living in private residences³. The survey captured 6,477 trips made by survey participants on a prior weekday, which provides a snapshot of 24-hour travel patterns of residents of the study area over the course of a typical fall weekday. The weighted and expanded trip records represent an estimated total of 513,200 trips made each day by residents 15+ years of age.

1.1.4 Analysis of the Survey Results and Comparison to Previous Survey Cycles

As part of the baseline survey in 2019, a review of the North Shore geography was undertaken to organize the survey area into sub-municipal geographies that would be suitable for sub-municipal analysis. Similar to the multi-agency approach of INSTPP, the North Shore's transportation network, population densities, and land uses were examined with a holistic view that "transportation knows no borders", rather than strictly adhering to municipal city limits. This approach enables useful analysis of travel patterns at the regional level and across jurisdictions. The survey results are analysed for three

³ Excludes approximately 1.5% of the population living in collective residences (senior's care homes, university residences, group homes, prisons, barracks, etc.) or who are experiencing homelessness.

municipal areas and eight sub-municipal zones. First Nations lands on the North Shore are included within the geographies used for analysis but are not analysed separately due to small sample sizes. The survey geographies are outlined in [Section 2](#) of this report.

It should be noted that while a short survey was conducted in 2020 as part of this research program, the 2020 survey only included a limited number of questions on travel patterns and was conducted with a smaller survey sample composed of only previous 2019 NSTS participants. Furthermore, as the 2020 survey did not recruit new participants, it may not have provided a fully representative sample of the population. Thus, while the 2020 results illuminated the kinds of impacts of the panel, they do not provide an appropriate basis for longitudinal comparisons against the full 2019 or 2021 results. Longitudinal comparisons (i.e., comparisons over time) in this report are made only between 2019 and 2021.

Overall, the 2021 survey results are subject to a margin of sampling error of $\pm 3.1\%$ at a 95% confidence level, taking into account the effects of data weighting.⁴ Survey results for sub-populations are subject to higher margins of sampling error. The results for the 620 surveys completed with CNV residents are subject to a sampling error of $\pm 5.8\%$, the 1,021 surveys with DNV residents are subject to a sampling error of $\pm 4.5\%$, and the 490 surveys for DWV residents are subject to a sampling error of $\pm 6.4\%$ (at a 95% confidence level, and taking into account the effects of data weighting).

1.2 Report Organization

The remainder of this report is organized into the following sections:

- Section 2: Survey Geography
- Section 3: Participant Characteristics
- Section 4: Daily Trip Characteristics
- Section 5: Travel Patterns
- Section 6: Topical Issues
- Section 7: Lessons Learned and Recommendations

⁴ 19 times out of 20, for a given survey question, the survey response percentage should be somewhere within the margin of error of the survey results. The margin of error has been corrected to take into account the increase in error associated with data weighting to correct for over-/under-sampling and/or non-response bias. The formula

for margin of error is $E = \pm z \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} \times \sqrt{\frac{N-n}{N-1}} \times \sqrt{deff}$ where N is the size of the sample universe, n is

the size of the survey sample, p is the proportion being assessed (in this case $p=0.50$ to obtain the maximum sample error), $z=1.96$, the z-score associated with a 95% confidence level, and $deff$ is the design effect associated with the weighting of the sample (with $deff$ computed as the sample size times the sum of the squares of the weights divided by the square of the sum of the weights).

1.3 Interpreting the Survey Results

Readers should keep the following in mind when interpreting the survey results presented in this report:

- The survey results are based on a 1.3% sample of the population of the North Shore. **All figures should be understood to be estimates.**
- **The survey results represent the population 15 years of age and older who live in private residences.** This excludes approximately 15% of the population who are aged 0-14 years and approximately 1.5% of the population living in collective residences (seniors' care homes, university residences, group homes, prisons, barracks, etc.) or who are experiencing homelessness.
- **It may be too early to establish trends in travel and mobility behaviour and patterns from only two years of the full survey, particularly in the context of the evolving impacts of the COVID-19 pandemic.**
- **Caution should be exercised when making comparisons with TransLink's Metro Vancouver Regional Trip Diary,** which is usually undertaken every five years and was last completed in 2017.
 - The TransLink trip diary is conducted with a new cross-section of the population in each survey cycle. The NSTS is designed as a panel survey, albeit with regular refreshment of the sample with new recruits.
 - The TransLink trip diary is conducted as a complete household travel survey, for which demographics and trips are collected for all members of the household. The NSTS focuses on a single household member over the age of 15 (sampled from within the household to obtain a representative sample) and does not include the trips and mode choices of younger children.
 - The NSTS is intended to illuminate differences in travel patterns at a sub-municipal level and the data are weighted at a sub-municipal level, whereas the TransLink trip diary data are weighted for analysis at the municipal level. There may be other differences in sampling, survey design, and data weighting methodologies that may affect comparisons between the two surveys.
- **Expanded household, person, and trip counts presented in this report have been rounded to the closest 100 or the closest 10,** but the actual margin of error is usually considerably greater than units of 10.
- **Figures presented for individual categories may not always sum to exactly the reported total across those categories due to rounding.**
- Survey response proportions have either been rounded to the nearest percent or one-tenth of a percent. **Individual percentages may not always add to exactly 100% or 100.0% due to rounding.**

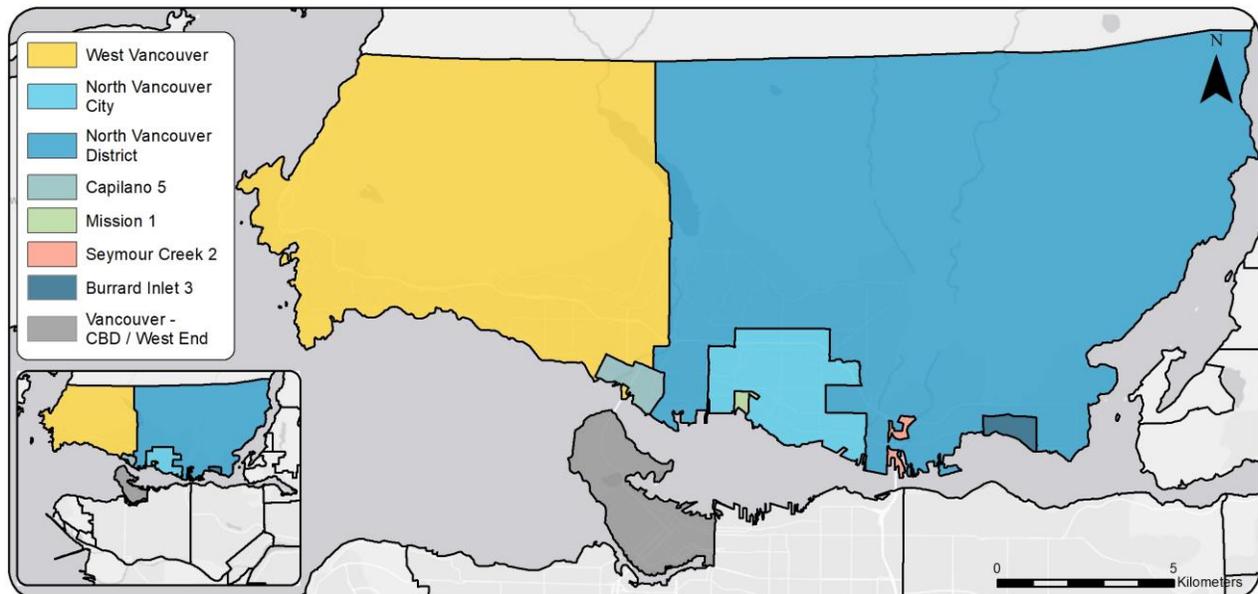
2 Survey Geography

2.1 Survey Scope

The 2021 NSTS study area comprises the entire North Shore, including Tsleil-Waututh Nation (Burrard Inlet 3 Census Subdivision), Squamish Nation within the North Shore area (Mission 1, Seymour Creek 2, and Capilano 5 Census Subdivision), CNV, DNV and DWV. The study area is presented in **Figure 1** below. The Vancouver downtown CBD/West End, which is outside the study area, is highlighted on the map for reference, as this is a common external destination for North Shore residents.

For the purposes of defining trips external to the study area, a wider geographical ‘travel area’ was developed that includes the rest of the Metro Vancouver Regional District and the Fraser Valley Regional District. Locations captured by the survey within this travel area were geocoded to regional, municipal, or sub-municipal areas as appropriate for analysis of work locations and trip destinations outside the North Shore.

Figure 1. Map of Study Area



2.2 Survey Geographies and Population Counts

The North Shore includes a number of different municipalities and First Nations, as noted above. For the purpose of analysis by municipal area, First Nations lands have been combined with the municipality they border or are situated within the boundaries as outlined in [Table 1](#) below.

Table 1. Municipal Areas with 2021 Projections of 2016 Census Counts

Municipal Area for Analysis	Census Subdivisions in Municipal Area	Land area (sq km)	Total private dwellings	Total Population	Private Households Occupied by Usual Residents	Population 15+ Years of Age in Private Dwellings	2021 NSTS Survey Completions
1. District of North Vancouver (DNV)	District of North Vancouver	160.8	34,285	88,168	32,700	72,033	1,002
	Burrard Inlet 3	1.1	1,151	2,373	1,136	2,079	19
	Seymour Creek 2	0.5	32	105	30	90	0
2. City of North Vancouver (CNV)	City of North Vancouver	11.9	29,265	58,120	27,293	49,630	620
	Mission 1	0.3	191	570	172	470	0
3. District of West Vancouver (DWV)	District of West Vancouver	87.3	19,483	44,122	17,690	37,251	464
	Capilano 5	1.7	1,460	2,899	1,334	2,532	26
North Shore	Total	263.4	85,868	196,357	80,355	164,085	2,131

Source: Statistics Canada 2021 Census population and dwelling counts, with estimates of population in private households and pop 1%+ in private households from 2016 Census data

As mentioned in [Section 1.1.4](#), a set of eight geographies, or “sub-municipal zones”, was developed for use in data weighting and analysis at a more disaggregate level than municipality. The zones were developed looking at the North Shore as a whole, to group together similar residential and commercial areas, and in consideration of the road and transit networks available to residents, even if the boundaries of like areas sometimes bridge municipal boundaries. The map on the next page ([Figure 2](#)) illustrates the boundaries of the eight zones that were developed. The colouring of the map depicts population densities for Statistics Canada Dissemination Areas, one of the smallest levels at which data from the national Census are released. The eight zones and their populations are listed in [Table 2](#).

Figure 2. Map of Zones with Population Density by Dissemination Area (Population per Hectare)

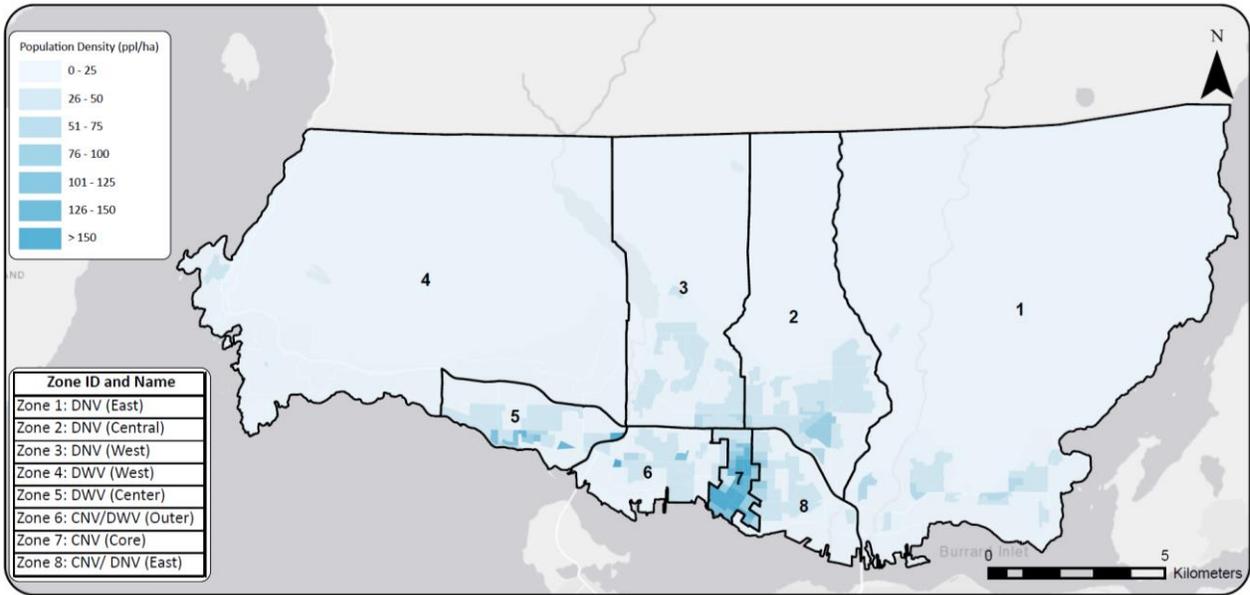


Table 2. Zones with 2021 Projections of 2016 Census Counts

	Land area (sq km)	Total private dwellings	Total Population	Private Households Occupied by Usual Residents	Population 15+ Years of Age in Private Dwellings	2021 NSTS Survey Completions
Zone 1: DNV (East)*	101.9	10,722	27,623	10,495	22,716	323
Zone 2: DNV (Central)	28.1	11,425	30,874	11,086	24,985	363
Zone 3: DNV (West)	27.6	9,164	24,463	8,679	19,943	263
Zone 4: DWV (West)	79.9	9,513	23,705	8,614	20,074	243
Zone 5: DWV (Center)†	7.5	11,491	23,448	10,669	19,848	244
Zone 6: CNV / DWV (Outer)‡	8.1	7,040	16,751	6,585	13,673	156
Zone 7: CNV (Core)	2.7	18,622	31,954	17,278	28,352	355
Zone 8: CNV / DNV (East)^	7.6	7,890	17,539	6,949	14,494	184
North Shore Total	263.4	85,868	196,357	80,355	164,085	2,131

* Zone 1 also includes Burrard Inlet 3 (Tsleil-Waututh Nation) and part of Seymour Creek 2 (Squamish Nation);

† Zone 5 also includes part of Capilano 5 (Squamish Nation);

‡ Zone 6 also includes Mission 1 and part of Capilano 5 (Squamish Nation);

^ Zone 8 also includes part of Seymour Creek 2 (Squamish Nation)

3 Participant Characteristics

This section describes the characteristics of North Shore residents and their households, as captured by the survey, including age, gender, household, lifestyle/level of physical activity, occupation, bicycle and vehicle access characteristics. The purpose of capturing these characteristics is to better understand travellers' needs, challenges, and patterns. The results are based on the survey sample with selected information from the 2016 census (scaled to reflect 2021 population counts, where possible).

3.1 Age and Gender Distribution

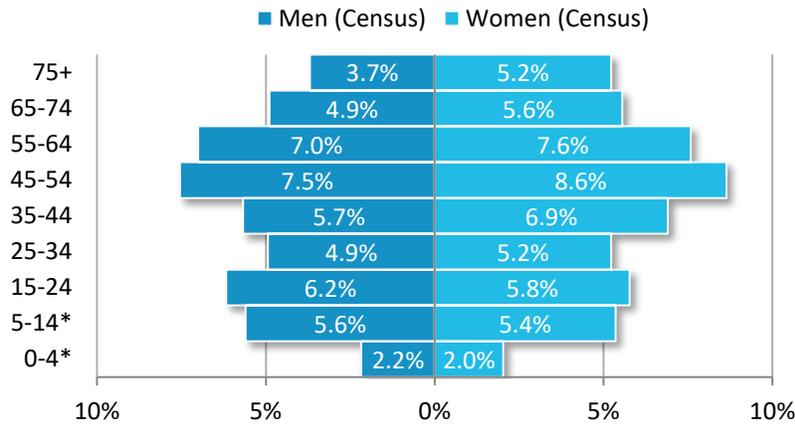
Table 3 provides a comparison of the Census distributions against the weighted and expanded survey data, using the total population of all ages as the base for percentages for comparability. The survey data somewhat under-represent residents 15-24 years of age (due to small sample sizes for this age range and limits placed on extreme weights), and slightly overrepresent age ranges above this. Overall, however, it appears that the weighted survey frame is a good match in terms of the actual population of the studied region.

Table 3. North Shore Census Population Distribution vs. Survey Age Distributions

	2016 Census		Survey	
	Men	Women	Men	Women
0-4	2.2%	2.0%	Not surveyed	Not surveyed
5-14	5.6%	5.4%	Not surveyed	Not surveyed
15-24	6.2%	5.8%	4.5%	4.2%
25-34	4.9%	5.2%	5.2%	5.3%
35-44	5.7%	6.9%	5.9%	7.2%
45-54	7.5%	8.6%	7.9%	9.1%
55-64	7.0%	7.6%	7.3%	7.9%
65-74	4.9%	5.6%	5.1%	5.9%
75+	3.7%	5.2%	3.7%	4.7%

As the survey data underrepresent those ages 15-24 years old, Census data have been used to illustrate actual distributions. The distribution of population by age based on 2016 Census data (**Figure 3**) shows a larger population between 45 and 64 years of age, with notably less population 25 to 44 years. This may have implications for travel patterns and provision of services as the population ages. It may be noted that the 2021 Census data on age distributions were not available at the time the survey data were weighted and analysed.

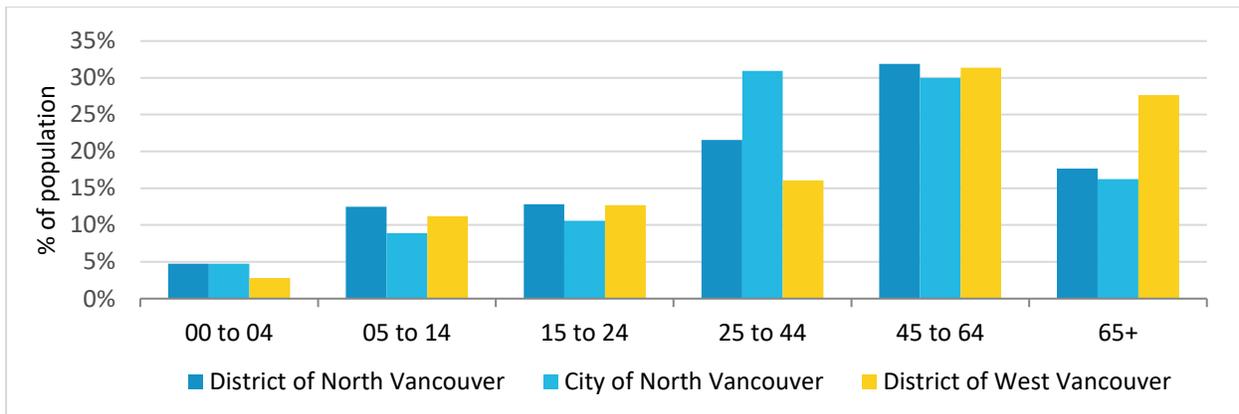
Figure 3. North Shore Population Distribution by Age/Gender (2016 Census)



Source: 2016 Census age distributions.

Figure 4 shows the age distribution per municipality based on the Census data. DWV generally has the highest percentage of 65+ age group (28%) while the CNV has the highest percentage of the 25 to 44 age group (31%). The other age groups are generally similar across the municipalities.

Figure 4. Age Distribution by Municipality (2016 Census)



Source: 2016 Census.

3.2 Household Characteristics

3.2.1 Dwelling Type

Figure 5 shows the distributions of dwellings by type for each of the municipalities. Approximately 50% of private dwellings occupied by usual residents in DNV and DWV are single-detached houses while only 12% of CNV dwellings are single-detached houses. Nearly 40% of CNV dwellings are apartment or condominium buildings with less than five storeys. Figure 6 maps these distributions by sub-municipal zone. The weighted survey data very closely match the Census distributions, so comparisons with the Census have not been presented.

Figure 5. Dwelling Type by Municipality (% of Private Dwellings Occupied by Usual Residents; Survey Data) ⁵

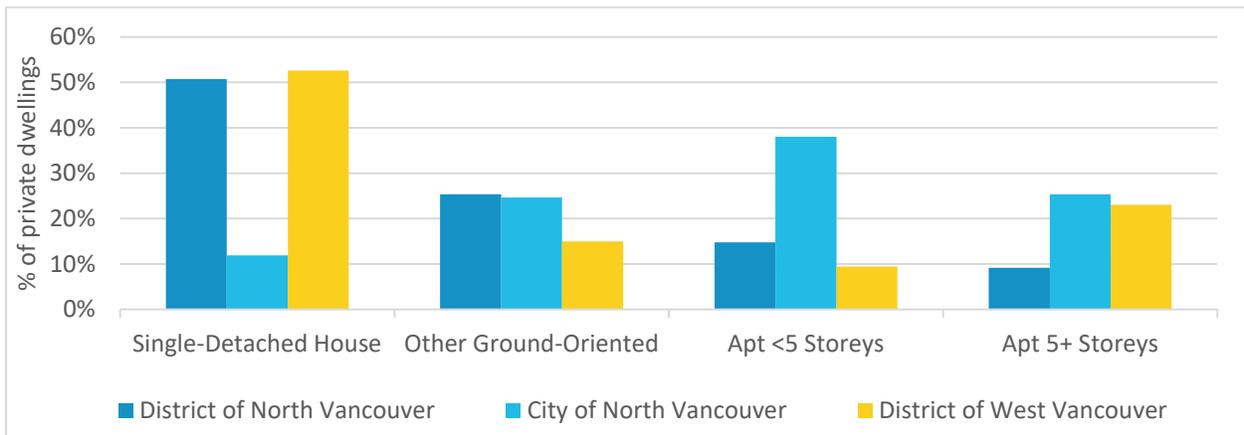
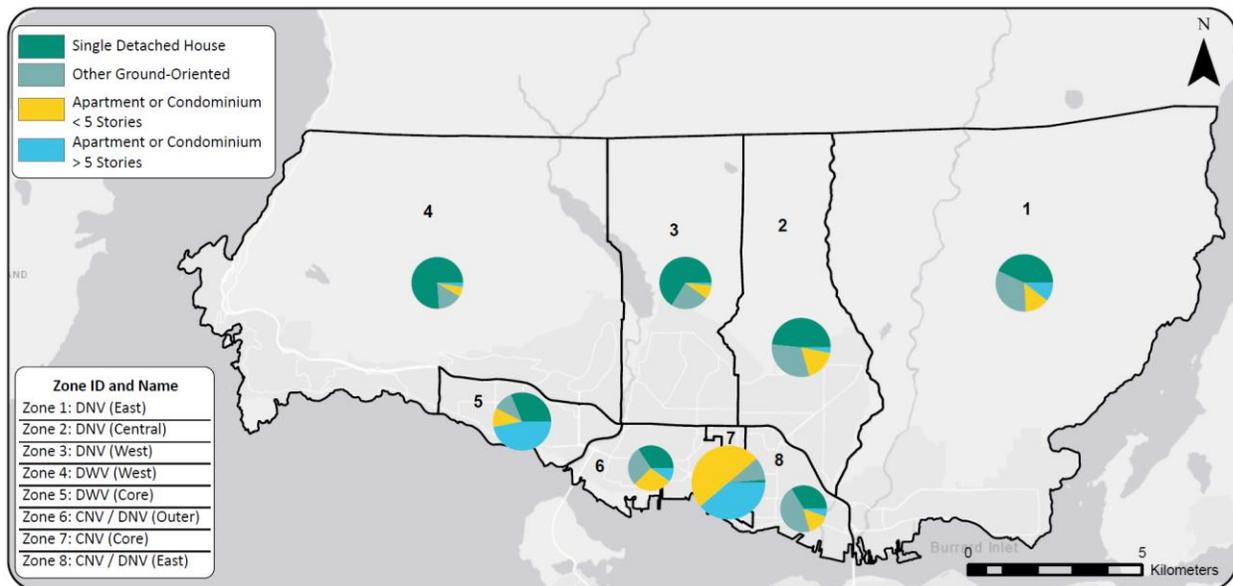


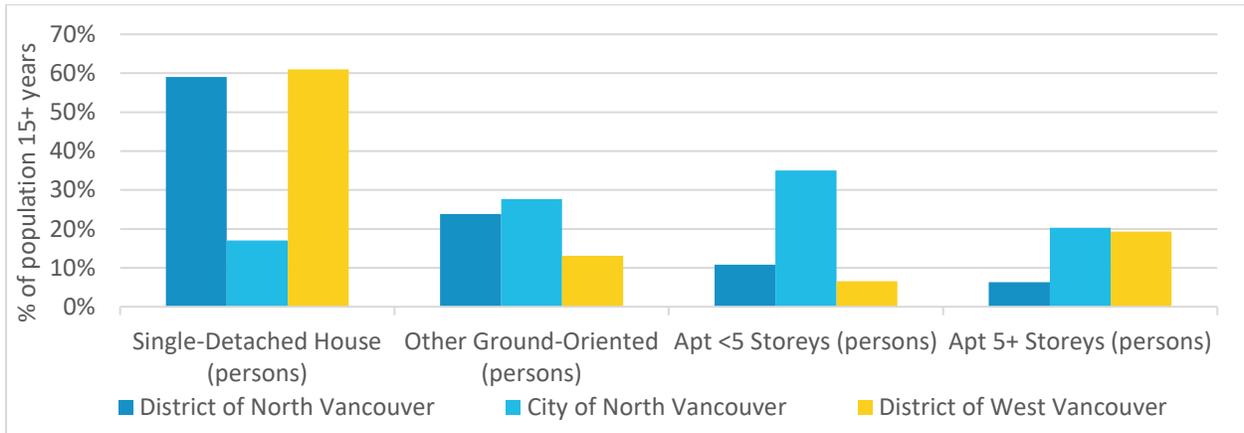
Figure 6. Map of Dwelling Type by Zone (% of Private Dwellings Occupied by Usual Residents; Survey Data)



⁵ Other ground-oriented = rowhouse, townhouse, semi-detached, secondary suite in a house, mobile home or other dwelling type.

Figure 7 provides a different perspective, illustrating the distribution of the survey target population by dwelling type. Approximately 60% of residents aged 15 years and older in DNV and DWV live in single-detached houses (59% DNV, 61% DWV) while 17% of CNV residents live in single-detached houses. More than one-third (35%) of CNV residents 15 years and older live in apartment or condominium buildings with less than five storeys.

Figure 7. Survey Population by Dwelling Type by Municipality (% of Population 15+ Years of Age)



3.2.2 Household Size

Figure 8 shows the distribution of household size by municipality. Within CNV, single-person households represent the largest percentage of households (38%). Two-person households represent the highest percentage in DNV (31%) and DWV (33%). The distribution of three-person households is generally similar across municipalities (14-19%). Four-person and five-person households are less common in CNV (11% and 4%) compared to DNV (20% and 9%) and DWV (16% and 7%). The weighted survey data closely match the Census distributions.

Figure 8. Household Size by Municipality (Survey Data)

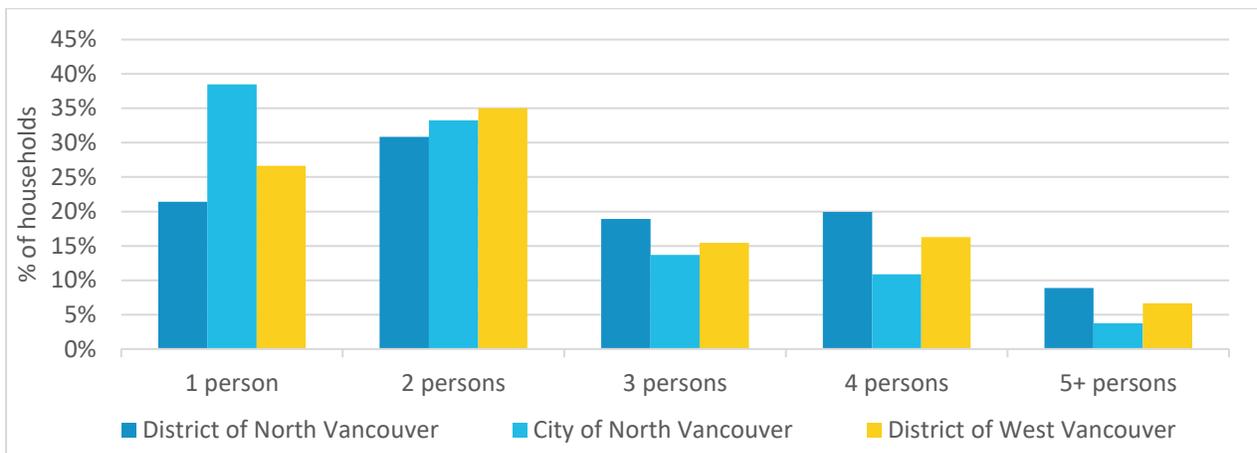


Table 4 presents average household size by dwelling type. As might be expected, households in single-detached houses and other ground-oriented dwelling types (town house, row house, semi-detached, etc.) are larger, at 3.02 persons and 2.76 persons respectively, than apartment dwellers, at 1.70 for apartments with fewer than five stories and 1.63 for those with five or more stories.

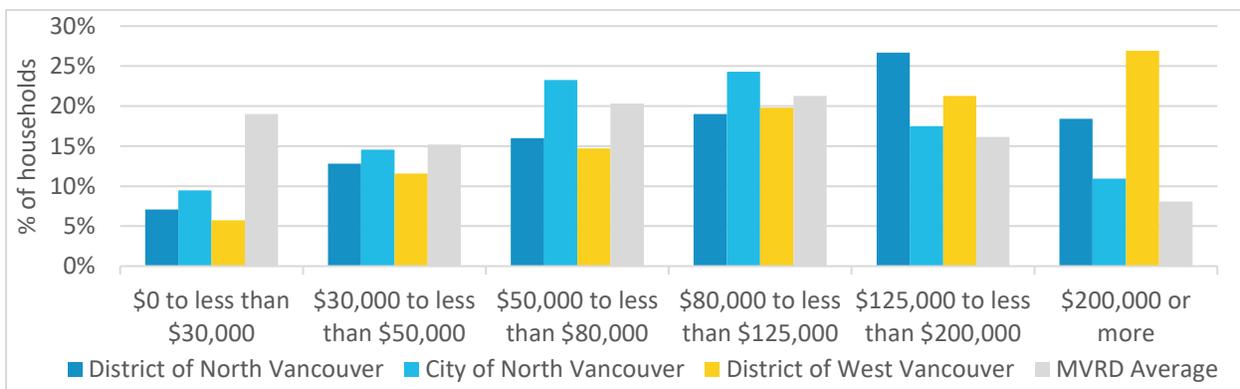
Table 4. Average Household Size by Dwelling Type by Municipality

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Single-Detached House	3.02	3.07	2.93	2.98
Other Ground Oriented	2.76	2.93	2.74	2.31
Apartment <5 stories	1.70	1.75	1.66	1.78
Apartment 5+ stories	1.63	1.50	1.71	1.61
Total	2.43	2.69	2.09	2.45

3.2.3 Household Income

Figure 9 shows the household income distribution by municipality from the 2021 survey results and a comparison to the Metro Vancouver Regional District (MVRD) results that are from 2016 Census distributions as 2021 Census data on income has not yet been released. Compared to the MVRD, the North Shore municipalities have a higher proportion of households with household incomes above \$125,000 and more than three times the proportion of households with incomes of \$200,000 or more. The North Shore municipalities have substantially fewer households with incomes under \$30,000 compared to the MVRD. In CNV, the most common household income bracket is \$80,000 to \$125,000 (24% of households). In DNV, just over one-quarter of households (27%) are in the \$125,000 to \$200,000 bracket, with an additional 18% with household incomes of \$200,000 or more. DWV has the largest proportions in high-income brackets, with 21% in \$125,000 to \$200,000 range and 27% in \$200,000 and higher (nearly 50% of households with incomes higher than \$125,000). It may be noted that comparison of the survey data against the 2016 Census distributions suggests that the weighted survey sample may under-represent households with annual incomes of less than \$30,000, and somewhat over-represent households with annual incomes of over \$80,000, even accounting for the fact that the Census data are six years out of date. The 2021 Census income data have not yet been released.

Figure 9. Household Income Distribution by Municipality (Survey Data, except MVRD, which is from 2016 Census) ⁶



⁶ Household income distributions exclude 11% of survey participants who declined to answer this question.

3.3 Lifestyle

Figure 10 shows survey participants' self-assessment of their level of physical activity by municipality. Between 60% and 64% of participants self-rate their activity level as moderately active or very active, with DNV highest at 64%, DWV at 63%, and CNV the lowest at 60%. One-third (33%) of CNV participants reported light physical activity.

Figure 10. Level of Physical Activity⁷ by Municipality, 2021

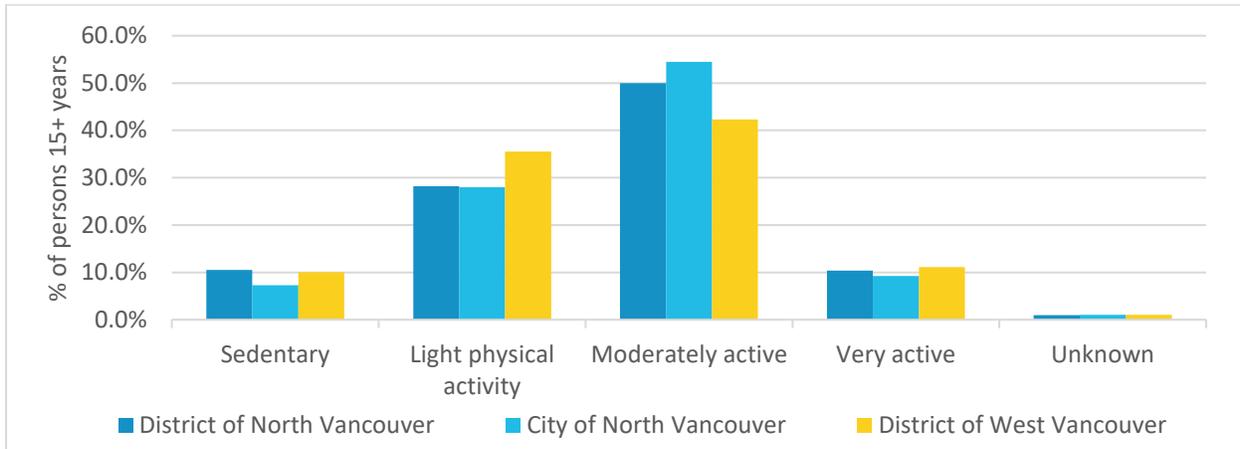


Figure 11 shows the change in self-assessed activity level between 2019 and 2021. Overall, when 2021 results are compared to 2019, a slight increase in sedentary lifestyles (to 9% in 2021 compared to 7% in 2019) and a decrease in very active lifestyles (to 10% in 2021 compared to 14% in 2019) is observed. As shown in **Table 7**, the change in self-assessed activity level differed across municipalities. CNV saw a shift towards moderate activity from both very active and light physical activity, while DWV saw the greatest increase in light physical activity (resulting from a decrease in both moderately and very active).

⁷ Activity levels were defined as follows: Sedentary- desk job, little or no exercise; Light physical activity- on your feet some of the day, light exercise once or twice per week; Moderately active- on your feet most of the day, moderate exercise 3 to 7 times per week; Very active- walking most of the day, hard exercise almost every day.

Figure 11. Level of Physical Activity, 2019 to 2021

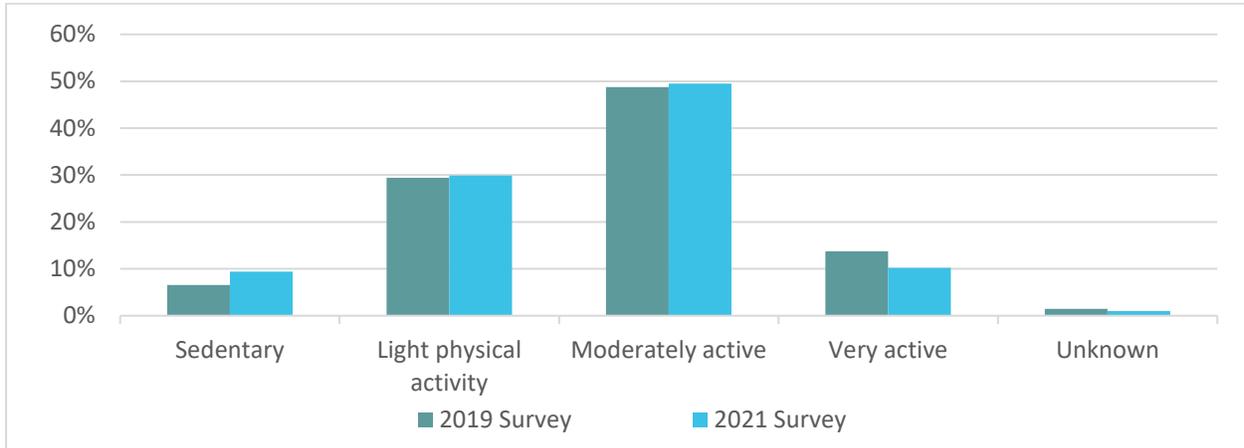


Table 5. Level of Physical Activity by Municipality, 2019 to 2021

	DNV			CNV			DWV		
	2019	2021	%-pt change*	2019	2021	%-pt change	2019	2021	%-pt change
Sedentary	5%	10%	5%	7%	7%	1%	9%	10%	1%
Light physical activity	29%	28%	-1%	33%	28%	-5%	26%	36%	10%
Moderately active	51%	50%	-1%	45%	54%	10%	50%	42%	-8%
Very active	14%	10%	-3%	15%	9%	-5%	13%	11%	-2%
Unknown	1%	1%	0%	1%	1%	0%	2%	1%	-1%

* % pt change = change in percentage points between 2019 and 2021.

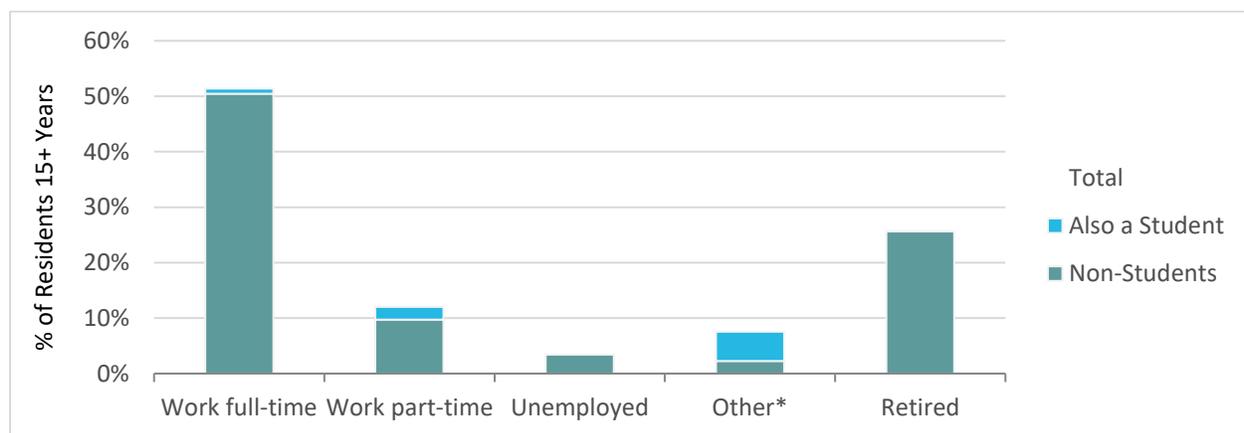
3.4 Occupational Characteristics

This section describes the survey participants' occupational characteristics, including employment and/or student status, employment type, and employer support programs related to travel demand management. The survey results are based on the population sample of age 15 years or more. Note: in most statistical analyses, 15 years old is considered the age of eligibility for participation in the labour force.⁸

3.4.1 Occupational Status

Figure 12 and **Figure 13** show employment status and student status aggregated for the North Shore. The survey results suggest that approximately one-half (51%) of residents over the age of 15 work full-time and 12% work part-time, for a total of 63% of residents over the age of 15 being employed. Approximately one-quarter (26%) of labour-force eligible residents are retired. While statistics on retirement rates are not available in Census data, it may be noted that 23% of the North Shore population over the age of 15 was of retirement age at time of the 2016 Census (i.e., 65 years or older), which, compared to the Metro Vancouver average of 20%, suggests that the North Shore likely has more retirees than the rest of Metro Vancouver. Unemployed survey participants represent 3% of the labour-force eligible population and 8% are students. Of note, unemployment is greater amongst youth: survey participants aged 15-24 comprise only about 10% of the labour-force eligible population but 30% of those who reported being unemployed. Of those who are students, one-quarter (25%) are high school students, half (50%) are in full-time Post-Secondary Education (PSE) or other studies (adult basic education, etc.), and 25% are in part-time PSE or other studies. Of those who are students, approximately 70% are in the 15-24 bracket and 30% are older. Also of note, 11% of those who are students reported attending school online, compared to only 3% in 2019 (pre-COVID), despite the re-opening of in-person learning in Fall 2021. There is overlap between students and workers: approximately 3% of the population 15+ years works full-time or part-time while attending school.

Figure 12. Employment Status⁹



⁸ In B.C., children aged 14-15 can participate in light work with consent of a guardian, however, Statistics Canada treats age 15 years as the age of eligibility for participation in the labour force, for which labour data are collected.

⁹ *'Other' includes students who are not employed, homemakers, those on disability, and other statuses.

Figure 13. Student Status

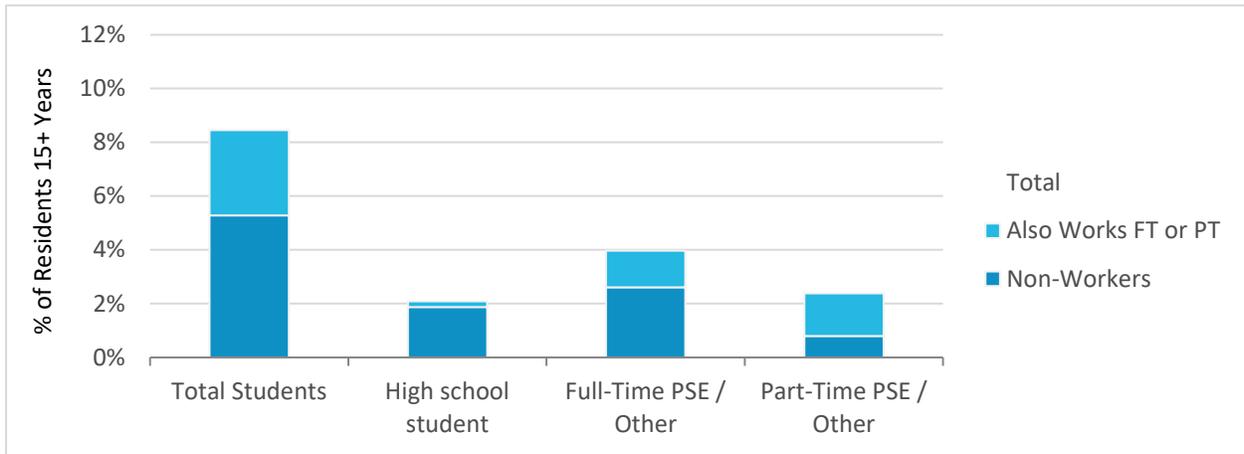
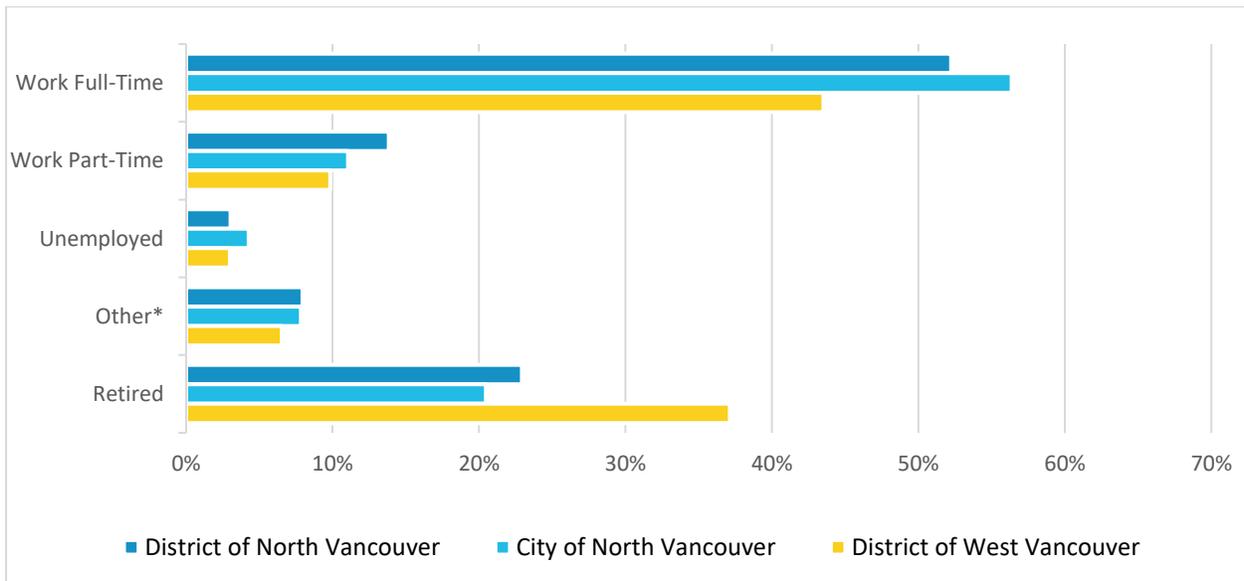


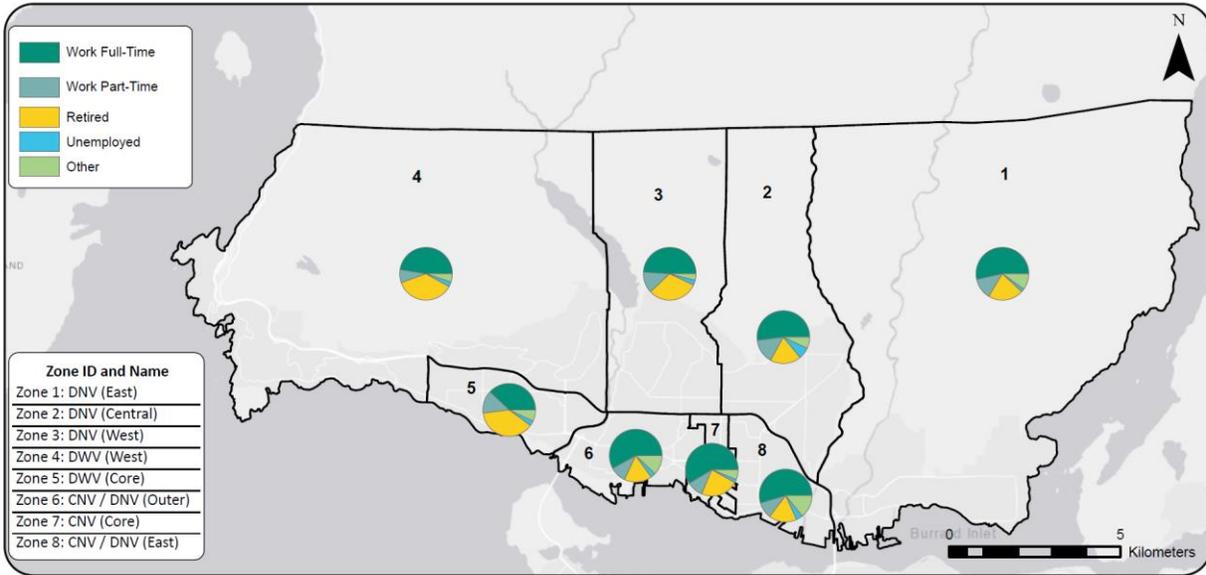
Figure 14 shows employment status by municipality, while Figure 15 shows this by zone. Just over one-half of CNV residents and DNV residents over the age of 15 work full time (56% and 52%, respectively). DWV has the highest proportion who are retired, at 37%. Full-time workers living in DWV represent around 44% of the population 15+. The CNV has the highest proportion of participants who classify themselves as “unemployed” at 4%, which may be correlated to the higher proportion of younger people in this municipality. When considered by zone, Zone 5 has a notably smaller percentage of labour-force eligible residents who work full time, at 38%, compared to most other zones at around half (ranging from 47% to 54% full-time workers), except for Zones 6 and 7, which both have 58% full-time workers.

Figure 14. Employment Status by Municipality ¹⁰



¹⁰ *‘Other’ includes students who are not employed, homemakers, those on disability, and other statuses.

Figure 15. Map of Employment Status by Zone



3.4.2 Employment Characteristics

Figure 16 shows occupation type by municipality. DWV has relatively higher percentages of these occupation types:

- Business Finance and Admin Occupations (20%)
- Management occupations (19%)
- Education Law & Social, Community & Government Services (15%)

CNV has relatively higher percentages of these occupation types:

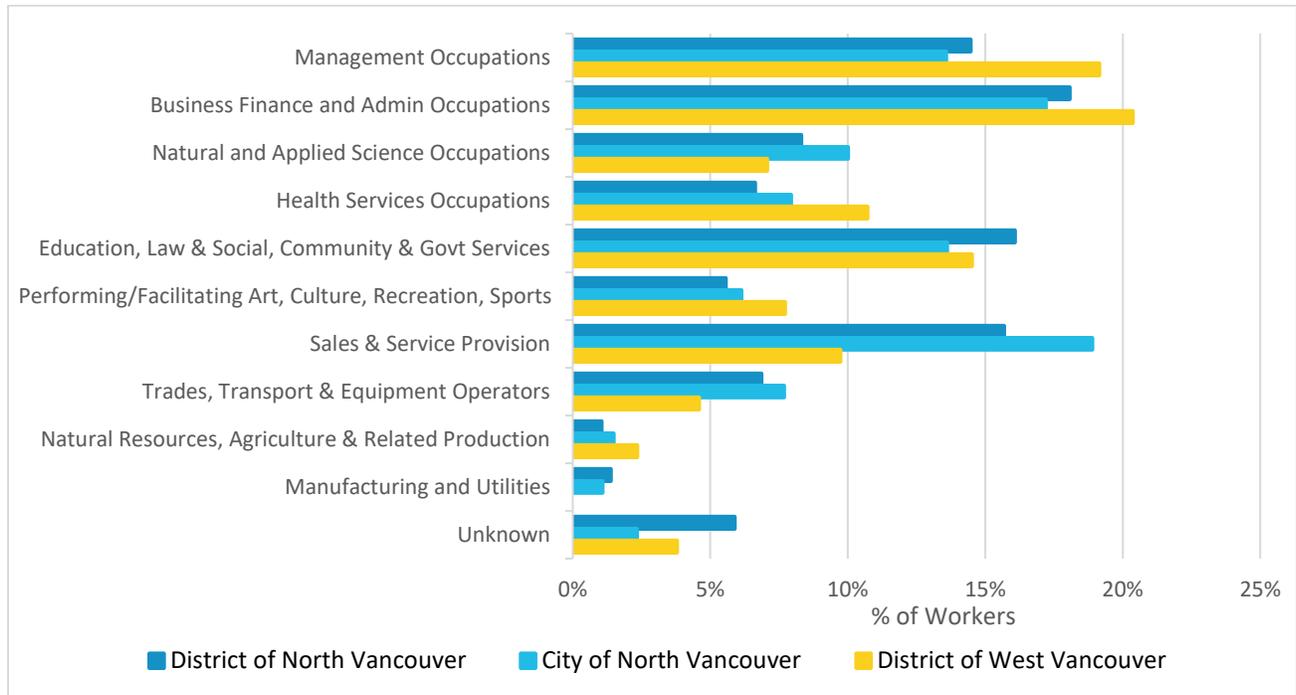
- Sales & Service Provision (19%)
- Business Finance and Admin Occupations (17%)
- Management occupations (14%)
- Education, Law & Social, Community & Government Services (14%)

DNV has relatively higher percentages of the following occupation type:

- Business Finance and Admin Occupations (18%)
- Education, Law & Social, Community & Government Services (16%)
- Sales & Service Provision (16%)
- Management occupations (14%)

It may be noted that a comparison of the survey results against the 2016 Census suggests that the survey sample may somewhat under-represent Sales & Service occupations in all municipalities, although they are generally representative of most other occupational categories.

Figure 16. Occupation Type by Worker's Place of Residence



3.4.3 Employer Support for Travel Demand Management Programs

Figure 17 and Figure 18 present the proportion of workers living on the North Shore whose employer supports travel demand management (TDM) programs. These programs range from providing electric vehicle (EV) charging infrastructure to having a company carpool/car share program to employer-subsidized transit passes. Figure 17 presents this information from the perspective of the participant's home location and Figure 18 presents this information from the perspective of the participant's work location.

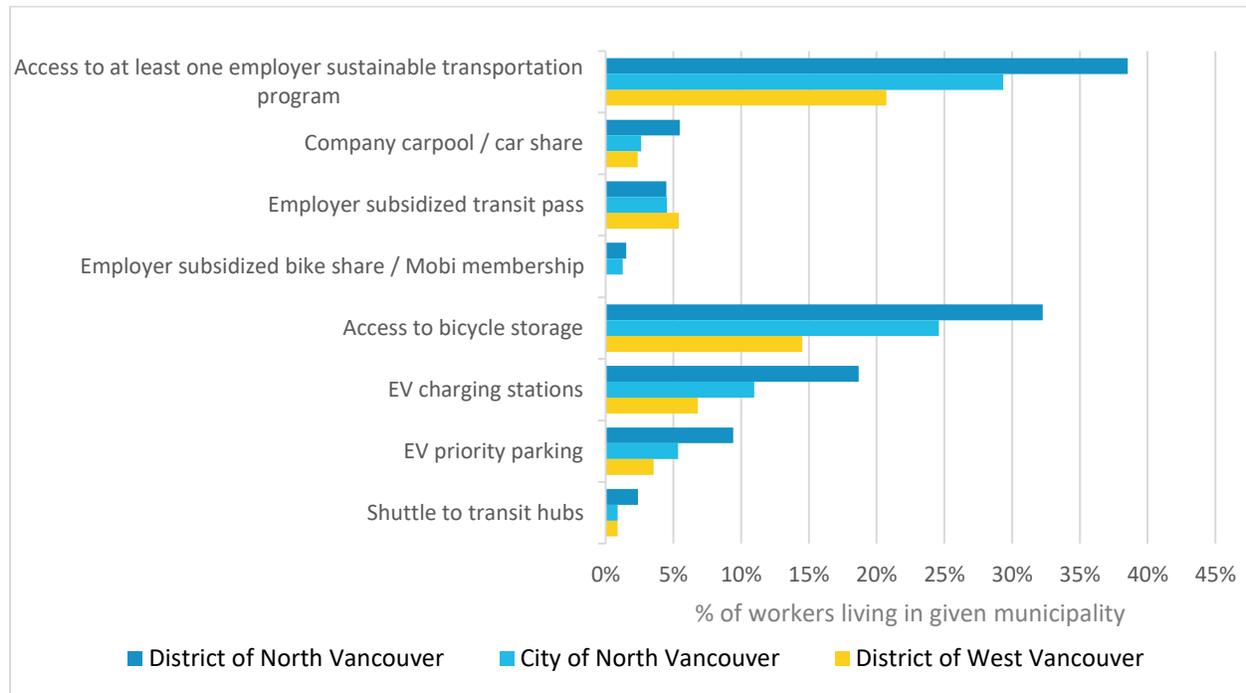
Overall, 32% of workers who live on the North Shore have access to at least one employer-supported transportation program of any kind. Access to bicycle storage and/or EV charging stations were the most frequently reported programs. In nearly all cases, residents of DNV are more likely than residents of CNV or DWV to have access to any employer-supported TDM programs.

In 2019, survey participants were asked about four employer-supported transportation programs and in 2021 participants were asked about six different types of programs (highlighted in the figure below) because of the topics identified by participants in 2019.¹¹ Compared to 2019, across municipalities, there was a decrease in the proportion of participants reporting access to employer-subsidized bike share (around 2% in 2019 compared to 1% in 2021), company carpool or car share (6% in 2019 compared to 4% in 2021), and employer-subsidized transit passes (6% in 2019 and 5% in 2021). It is possible that

¹¹ It should be noted that the overall percentage of participants reporting access to at least one transportation program in 2021 is not comparable to the overall percentage from 2019. In 2019, the survey did not ask respondents whether they had access to bike storage or EV supports, although a few survey participants volunteered this information. The addition of these categories in the 2021 survey has impacted the overall percentage, resulting in a much higher estimate than that observed in 2019.

these decreases are due to more people working from home in 2021 compared to 2019. It is also possible that the decrease in support for car share programs reflects a decrease in the number of such companies operating in the area. Since 2019, two car share services have ceased operations in the North Shore area. Participants were more likely to report access to employer-provided shuttles to transit hubs in 2021 compared to 2019 (2% in 2021 compared to less than 1% in 2019). Some caution may be exercised in interpreting these comparisons, as the percentage-point differences are small, and some portion of the variance between survey cycles may be the result of random sampling new recruits to replenish the survey panel.

Figure 17. Employer Support of Transportation Programs by Municipality (Based on Place of Residence)



From the perspective of workers’ places of work (where their jobs are located) as presented in Figure 18, North Shore residents whose employers are located outside of the North Shore (who represent just under one-half of workers residing on the North Shore) are much more likely to have employers who support sustainable transportation. Overall, 47% of external jobs have employers who support at least one of these programs. This percentage is slightly lower for jobs in CNV (9%) compared to DNV (11%) and DWV (10%)

As noted above, a slight decrease in the proportion of participants reporting access to company carpool, employer subsidized transit passes, and employer subsidized bike share membership has been observed between 2019 and 2021. One notable exception to this pattern is that residents who work in DWV were substantially more likely to report having access to employer subsidized transit passes in 2021 (9% of survey participants from this municipality) compared to 2019 (2%), although some caution should be exercised in interpreting this result due the modest survey sample size of workers with jobs located in DWV (n=109).

Table 6 on the following page examines employer support of transportation programs from the perspective of survey participants’ type of occupation. Survey participants in natural and applied science occupations, management, and health occupations have the most access to programs encouraging sustainable transportation, with between 40% and 45% having access to at least one such program. On the other end of the spectrum, employees in sales and service occupations have almost no access to such programs, with bicycle storage reported by only 4% of workers in these occupations and less than 0.5% reporting any other employer sponsored supports.

Figure 18. Employer Support of Transportation Programs by Municipality (Based on Place of Work for Residents of the North Shore)

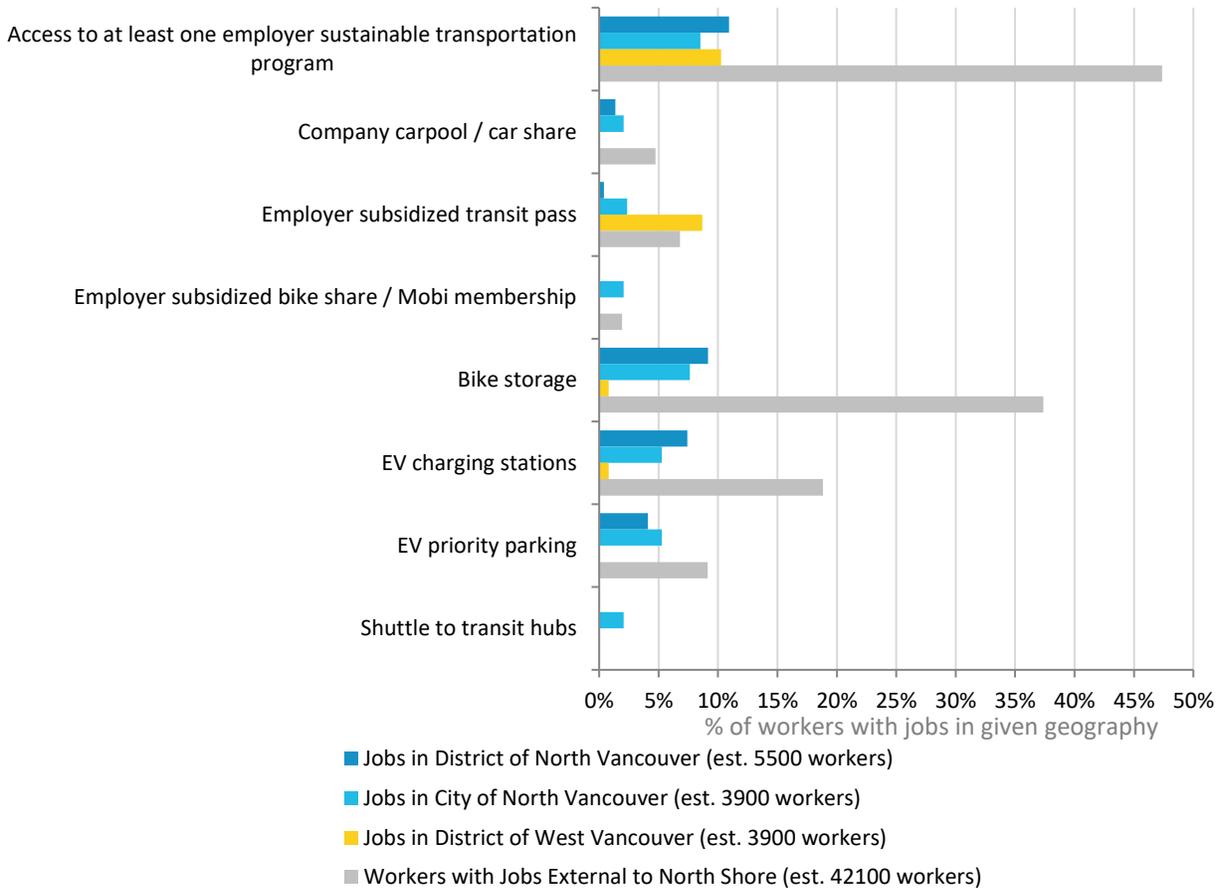


Table 6. Employer Support of Transportation Programs by Occupation Type

	Natural & Applied Science Occupations	Management Occupations	Health Occupations	Business, Finance, & Admin	Education, Law, Social, Community & Govt Services	Sales and Service Provision	All Other / Unknown*
Sample size (n)	117	196	105	262	194	94	182
Access to at least one employer sustainable transportation program	45%	43%	40%	34%	33%	4%	26%
Company carpool / car share	2%	6%	3%	5%	6%	0%	2%
Employer subsidized transit pass	10%	2%	8%	7%	5%	0%	3%
Employer subsidized bike share / Mobi membership	2%	2%	0%	3%	0%	0%	0%
Bike storage	44%	35%	35%	25%	31%	4%	17%
EV charging stations	15%	19%	17%	18%	14%	0%	11%
EV priority parking	4%	7%	9%	12%	10%	0%	4%
Shuttle to transit hubs	2%	1%	3%	1%	2%	0%	3%
Other	1%	0%	0%	1%	0%	0%	0%

All Other / Unknown includes: Natural Resources, Agriculture, and Related Production; Manufacturing and Utilities; Trades, Transport & Equipment Operators; Performing and Facilitating Art, Culture & Recreation; and Unknown.

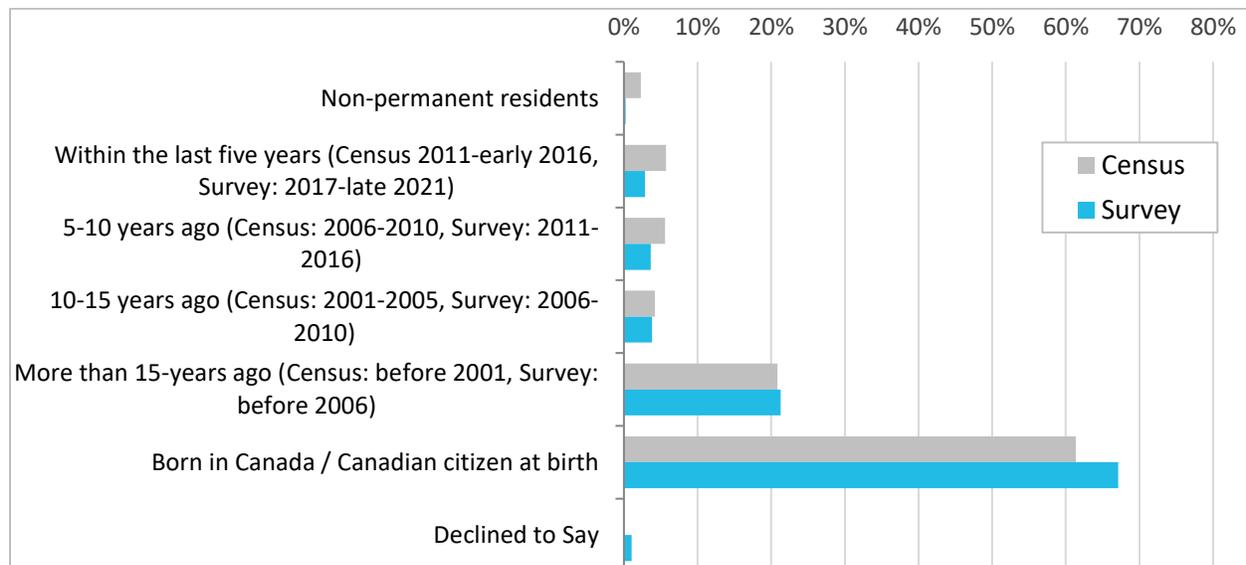
3.5 Year of Immigration and Racial Identity

The 2021 survey included additional demographic questions for use in exploring equity and diversity issues. Highlighted below are the key survey findings as related to immigration status and racial identity. Such information was collected to better understand possible differences in transportation choices across the different equity groups.

3.5.1 Year of Immigration

As highlighted in **Figure 19**, over two-thirds (67%) of survey participants identified themselves as “non-immigrants” (i.e., born in Canada). Of the approximately one-third of respondents who indicated that they had immigrated to Canada, the majority would be considered “long term” residents as they have resided in Canada for more than 10 years. Overall, it does appear, however, that coverage of immigrants in the survey generally reflects the actual distribution based on census data, although representation of “new immigrants” (i.e., those that arrived in Canada in the last ten years) is slightly below that of the estimated population based on census data. This could reflect survey non-response related to language ability, lower levels of engagement in surveys generally, and/or higher mobility with respect to place of residence and thus decreased likelihood of being retained in the panel of previous participants. It may be noted that survey sample sizes for recent immigrants are relatively modest (n=33 within the last five years, or n=79 within the last ten years), thus, while the analysis of transportation indicators by immigration status may yield significant results that illuminate the topic, the magnitude of observed differences may not be precise.

Figure 19. Year of Immigration, 2021 Survey Data Compared with 2016 Census

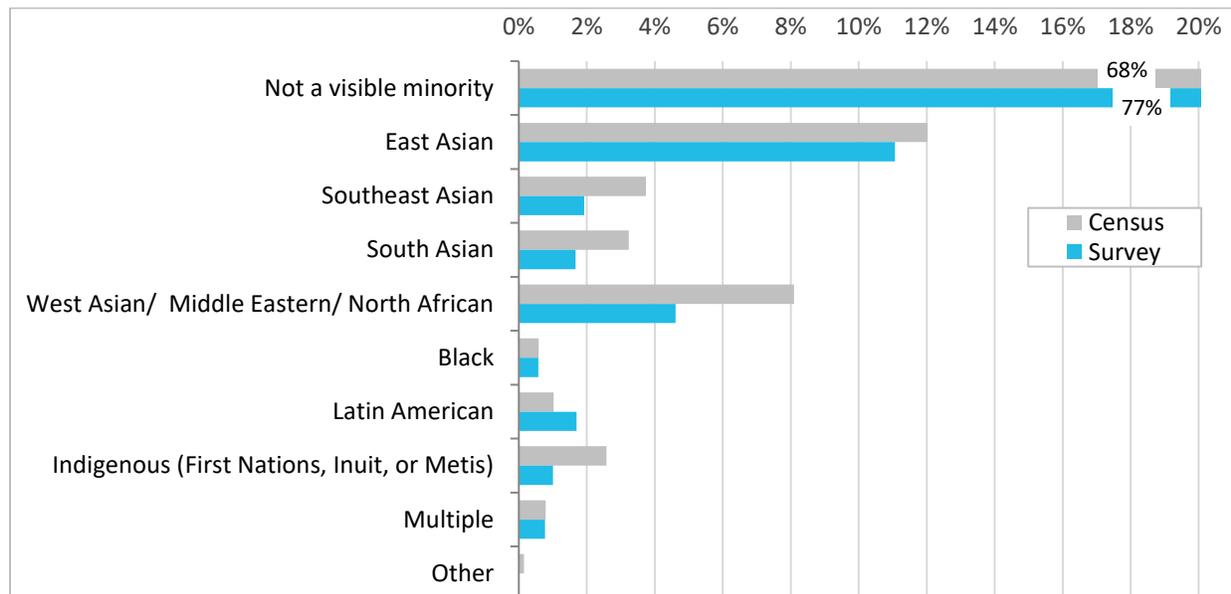


3.5.2 Racial Identity

As with immigration status, additional data was collected in the 2021 survey to identify respondents on the basis of racial identity. While race is a social construct with no biological or scientific basis, racial identity (or perceived racial identity) has real and important impacts on equity as race is often used to establish and justify systemic/societal systems of power, privilege, and oppression. Collecting this information from survey participants will allow for some equity-based analysis to be conducted. Based on Census population group categories, non-white respondents may be referred to as visible minorities.¹²

As shown in **Figure 20**, while the survey results provide a generally good representation of visible minorities, there is not a perfect alignment between the survey data and the estimated actual proportions based on the most recent (2016) census data. Overall, visible minority groups are slightly underrepresented in the 2021 survey data, the only exception to that being respondents from Latin America, who are slightly overrepresented. It should be noted that sample sizes for some categories are quite small (ranging from 6 to 33 survey participants). It is beyond the scope of this report to undertake multivariate analysis (e.g., taking into account age, income, immigration status, and other demographic variables) to determine what other factors contribute to observed differences in statistics such as mode shares.

Figure 20. Year of Immigration, 2021 Survey Question on Racial Identity Compared with 2016 Census Visible Minority Group¹³



¹² The Census definition states that visible minority refers to whether a person belongs to a visible minority group as defined by the Employment Equity Act and, if so, the visible minority group to which the person belongs. The Employment Equity Act defines visible minorities as 'persons, other than Indigenous peoples, who are non-Caucasian in race or non-white in colour. (<https://www12.statcan.gc.ca/census-recensement/2016/ref/guides/006/98-500-x2016006-eng.cfm>). For purposes of the NSTS, Indigenous people are reported separately from “not a visible minority” both in the survey results and in presentation of the Census data. Categories of West Asian and Middle Eastern/North African have been combined.

¹³ Note: This figure excludes 5% of survey participants who declined to provide an answer.

3.6 Bicycle and Micromobility Device Access

3.6.1 Bicycle Availability

Table 7 and **Figure 21** show the number of bicycles per household for the North Shore overall and by municipality. As shown in **Table 7**, residents of the North Shore own an estimated 117,900 bicycles, of which 10,600 are e-bikes. This is more than double the number of e-bikes in 2019, at 4,100 e-bikes.

DNV has the highest number of adult bicycles per household at 1.80 bikes per household (bike/hh), while CNV and DWV have averages of 1.10 and 1.41 bikes/hh respectively. While residents of DNV have the highest number of adult bicycles and e-bikes, a lower proportion of them are e-bikes (8% vs 10% for CNV and 11% for DWV).

Figure 22 illustrates access to bicycles by sub-municipal zone. Residents of Zone 5 and Zone 7, both of which have higher urban density, have less access to adult bicycles than their counterparts in other areas, which may reflect challenges related to a lack of bicycle storage.

Overall, 65% of the North Shore population aged 15 years and older has access to an adult bicycle. This is a slight increase over what was observed in 2019 when 64% of the North Shore population aged 15 years or older had access to an adult bicycle. However, e-bike ownership is on the rise. There was a notable increase in the proportion of residents aged 15 and over with access to e-bikes: in 2019 only 4% of North Shore residents had access to an e-bike but in 2021, 9% of residents have access to an e-bike.

Table 7. Bicycles and Bicycle Access

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Estimated total adult bicycles (including e-bikes)	117,900	60,100	30,800	27,000
% of households with at least one adult bicycle	58%	66%	52%	54%
Average adult bicycles per household	1.47	1.80	1.10	1.41
Estimated number of e-bikes	10,600	4,600	3,000	3,000
% of adult bicycles that are e-bikes	9%	8%	10%	11%
% of pop 15+ with access to an adult bicycle	65%	72%	61%	58%

Figure 21. Average Number of Standard Bicycles and E-Bicycles per Household by Municipality

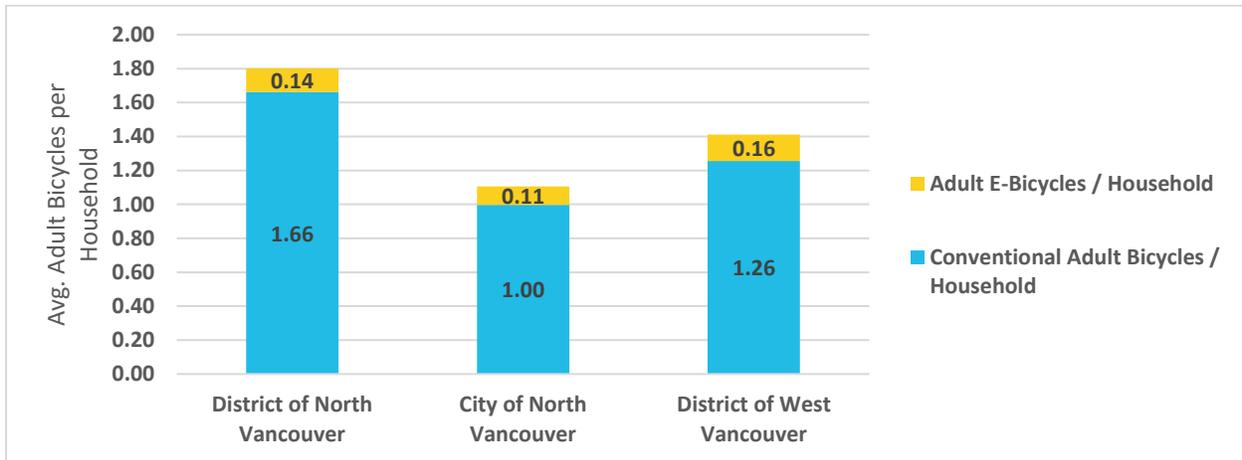
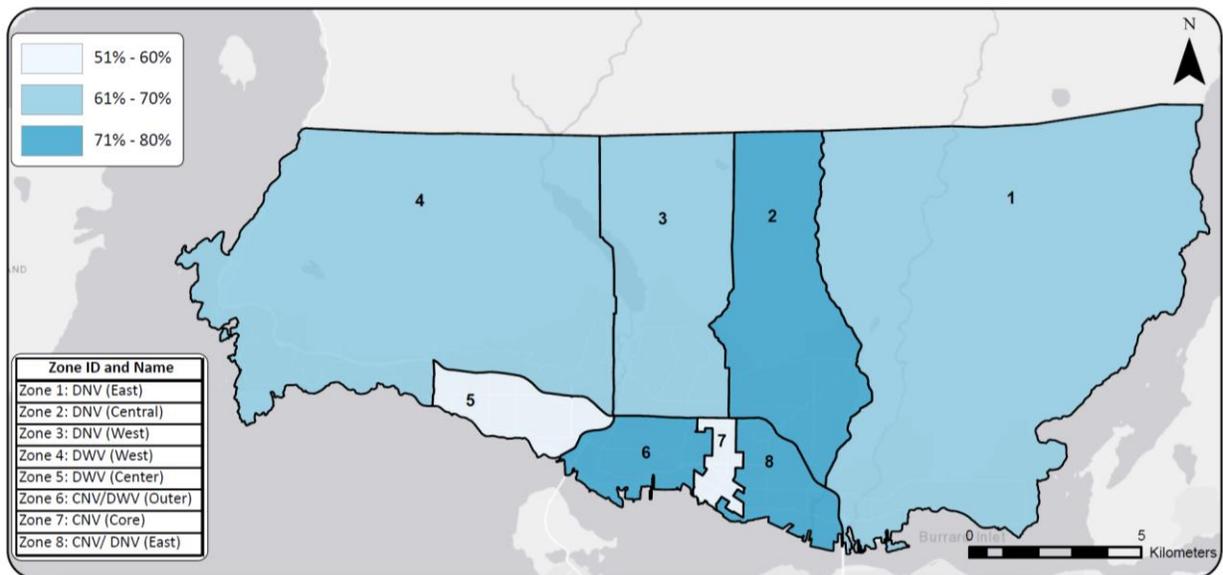


Figure 22. Map of Bicycle Availability by Zone (% of Residents 15+ with Access to an Adult Bicycle)



3.6.2 Bike Share Membership

Bike share membership is on the rise on the North Shore. In 2019, the only services available were located outside the North Shore (e.g., Mobi, in Vancouver), and only 0.5% of residents surveyed were members of such a service. With the advent of the new Lime e-bike share service launched in 2021, just over 5% of 2021 survey participants indicated membership in a bike share service. As shown in [Table 8](#), bike share membership is most common in CNV (9%) compared to DNV (5%) and DWV (1%). It is interesting to recall that Zone 7 in CNV had the lowest bicycle availability, which may be due to the limitations of storing bicycles in higher density dwellings. The Lime e-bike share may be more popular in CNV due to the lack of bicycle availability in higher density dwellings.

Table 8. Bike Share Membership (Overall and by Municipality)

% Population with Bike Share Membership	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
None	94.6%	94.8%	90.9%	98.6%
Member of at least one bike share service	5.4%	5.1%	9.0%	1.3%
Lime e-bike share	5.1%	5.1%	8.0%	1.4%
Mobi bike share	0.5%	0.2%	1.3%	0.2%
Other	0.0%	0.1%	0.0%	0.0%

3.6.3 Micromobility Device Availability

Micromobility devices include any non-motorized device with wheels that are not a bicycle. They are not defined as a vehicle in the B.C. Motor Vehicle Act and therefore not legally allowed on the streets, except through bylaw. In early 2022, CNV and DNV adopted an e-scooter bylaw to allow legal use of them on their streets through the Micromobility Pilot, and intermunicipal collaboration supported by the BC Ministry of Transportation and Infrastructure. The new regulations are in force only in the two municipalities. Micromobility devices are not currently allowed on the streets of DWV.

As shown in [Table 9](#), approximately 3% of households across the North Shore have access to at least one micromobility device, for an average of 0.05 micromobility devices per household or an estimated 3,600 in total. Residents of DWV (4%) are slightly more likely than residents of other regions to own micromobility devices (3% in CNV and 2% in DNV).

It should be noted that micromobility devices are relatively uncommon. Depending on the random sample of the population surveyed, the expanded survey estimates of the number of such devices may over- or under-represent the actual number on the North Shore. The results presented here should be interpreted with caution.

Table 9. Micromobility Devices and Micromobility Device Access

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Estimated total micromobility devices	3,600	1,300	1,300	1,100
% of households with at least one micromobility device	3%	2%	3%	4%
Average micromobility devices per household	0.05	0.04	0.05	0.06

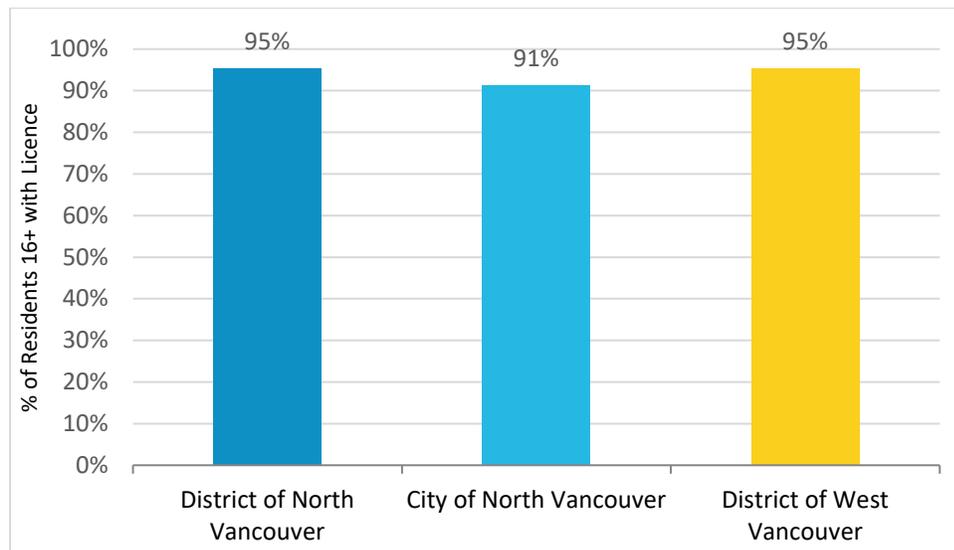
3.7 Private Vehicle Access

This section describes survey participants' access to private vehicles, including the percentage of licensed drivers, private vehicle availability, vehicle types, and parking availability.

3.7.1 Licensed Drivers

Figure 23 illustrates the proportion of the population aged 16 years or older who have a driver's license, out of those who are eligible to have one. DNV and DWV have the highest proportion, at 95%, while CNV has a slightly lower proportion at 91%.

Figure 23. Licensed Drivers by Municipality (of Population 16+)



3.7.2 Private Vehicle Availability

Table 10 shows the percentage of survey participants (over the age of 15) who have access to at least one vehicle. The survey results suggest that, overall, 94% of residents have access to a private vehicle. This percentage is highest for DNV (98%) and lowest for CNV (90%).

The survey results suggest that North Shore residents have an estimated total of 130,200 vehicles compared to the 2019 survey estimate of 125,530 (a 3.7% increase). However, the average number of vehicles per household of 1.62 compares similarly to the 1.65 in 2019, a negligible drop, suggesting that the growth in vehicles is due to the growth in households between 2019 and 2021 (5.3% growth in dwellings occupied by usual residents, using the dwelling estimates used in the 2019 and 2021 surveys).¹⁴

¹⁴ Note: The dwelling estimates used in 2019 to expand household-level data to represent all households were based on 2016 Census counts of dwellings occupied by usual residents scaled to 2019 using BC Stats forecasted population growth rates from 2016 to 2019. The dwelling estimates used in the 2021 survey are based on 2021 Census counts of dwellings occupied by usual

It may be noted that, as the survey sample somewhat under-represents lower-income households (household income below \$30,000 per annum) despite adjustments to the data weighting by dwelling type and household size, there is a chance that the survey data may somewhat over-represent the number of household vehicles. ICBC data show that as of December 31, 2020 (one year previous to the current survey), there were almost 113,700 insured vehicles of relevant vehicle types (passenger, motorcycle, motorhome, or commercial) registered to individuals in the North Shore municipalities, with 99,800 of these registered for personal use and the about 13,900 for business/other use. In addition, there were also almost 10,400 vehicles of relevant vehicle types registered by 'external organizations', of which almost 1,400 were registered for personal use.¹⁵ It is difficult to estimate how many of the vehicles registered by persons for business use are kept at home or used as household vehicles or how many of the vehicles registered by external organizations for personal use may also be kept at home or used for personal use. It may also be noted that there may be residents of the North Shore who have vehicles for which insurance is registered in another municipality (e.g., those with more than one residence). Nevertheless, the ICBC figures do suggest that, even accounting for growth in the number of vehicles from 2020 to 2021 and use or storage of business vehicles at home, the expanded survey estimates may somewhat over-represent household vehicles, possibly by as much as 10%.

Table 10. Private Vehicle Availability by Municipality

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Estimated household vehicles	130,200	60,400	36,700	33,200
Average household size	2.43	2.69	2.09	2.45
Average vehicles per household*	1.62	1.81	1.32	1.74
Average vehicles per person 16+	0.80	0.82	0.72	0.84
% pop 15+ with access to at least one vehicle	94%	98%	90%	94%

*based on total households in area, including those without vehicles.

residents. The 2019 intercensal estimates may differ from the actual number of dwellings in 2019. No attempt has been made to verify the accuracy or recalibrate the 2019 dwelling estimates or the 2019 survey estimates.

¹⁵ <https://www.icbc.com/about-icbc/newsroom/Pages/Statistics.aspx>,

<https://public.tableau.com/app/profile/icbc/viz/VehiclePopulationIntroPage/VehiclePopulationData>

Figure 24 maps the proportion of the population over the age of 15 who live in a household with at least one vehicle. In zones with higher urban density, somewhat fewer residents have access to a vehicle, although the proportions are still large majorities (84% in zone 7 being the lowest).

Figure 24. Map of Private Vehicle Availability by Zone (% of Residents 15+ with Access to a Vehicle)

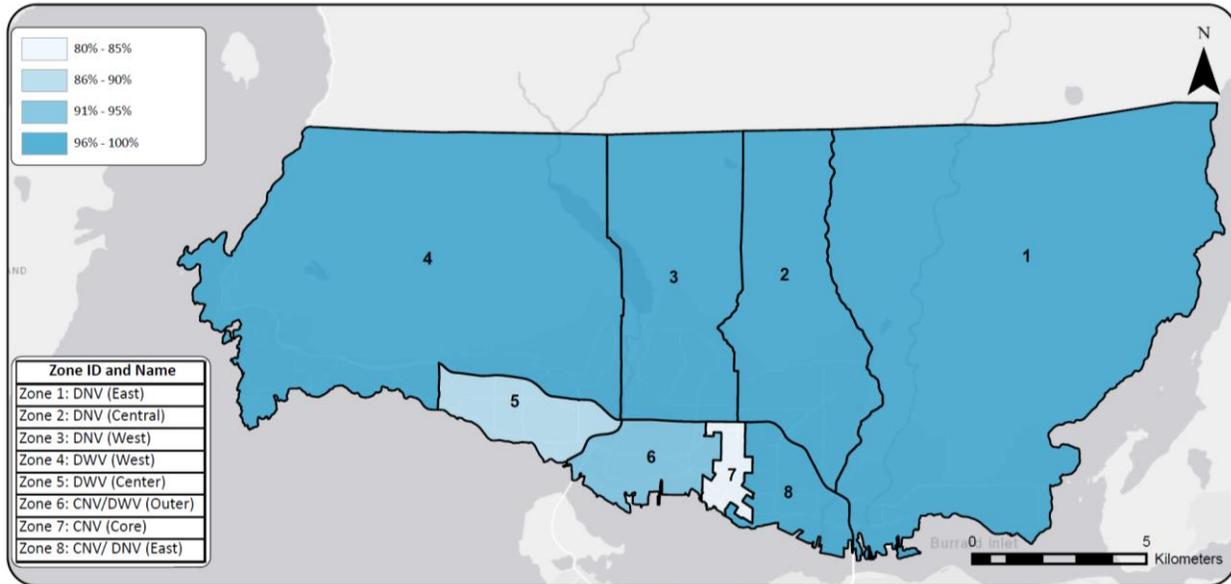


Figure 25 shows the proportion of households with access to at least one vehicle by household type. Residents living in houses (99%) and other ground-oriented housing (96%) are more likely than those living in apartment or condominium buildings (83-86%) to have access to a vehicle.

Figure 25. Private Vehicle Availability by Dwelling Type ¹⁶

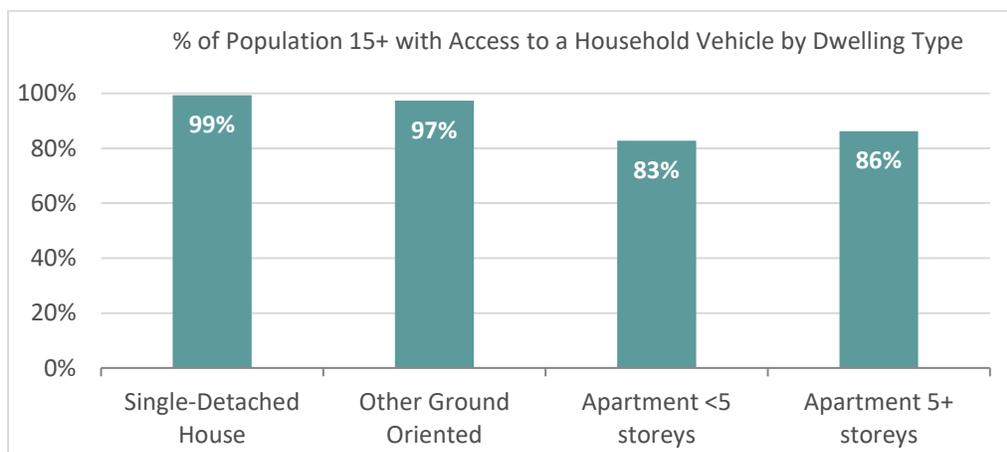


Figure 26 shows the proportion of households with access to at least one vehicle by age. Residents aged

¹⁶ Other ground-oriented = rowhouse, townhouse, semi-detached, secondary suite in a house, mobile home or other dwelling type.

25 to 34 years old and 85 to 97 years old are least likely to have access to a vehicle.

Figure 26. Private Vehicle Availability by Age Range ¹⁷

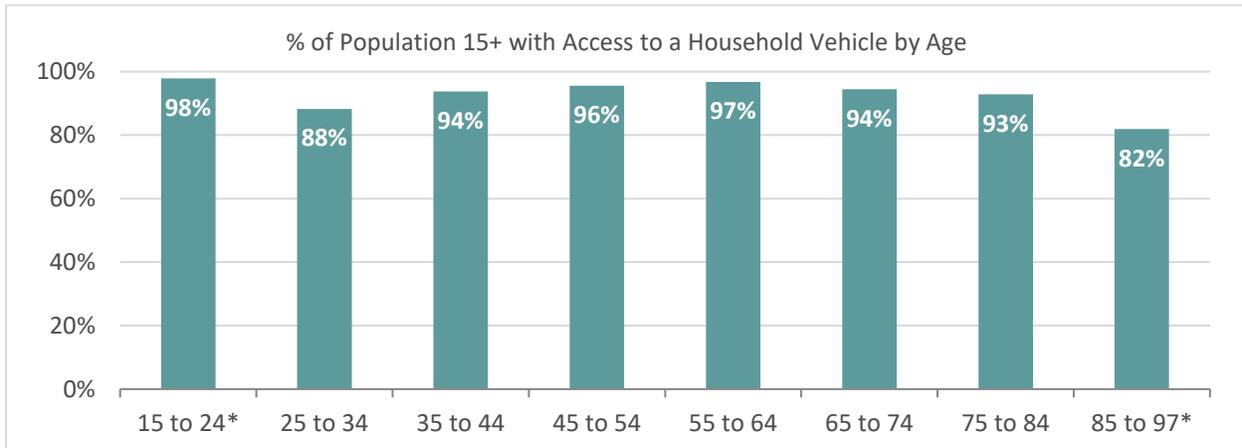


Table 11 below presents the average number of vehicles per household by type of dwelling, overall and by municipality. As indicated, households in single-detached houses average 2.15 vehicles, those in other ground-oriented dwellings average 1.66, and those in apartments have the fewest vehicles, averaging 1.07 and 1.11 for apartments with fewer than five stories and more than five stories, respectively.

Table 11. Average Number of Private Vehicles per Household by Dwelling Type

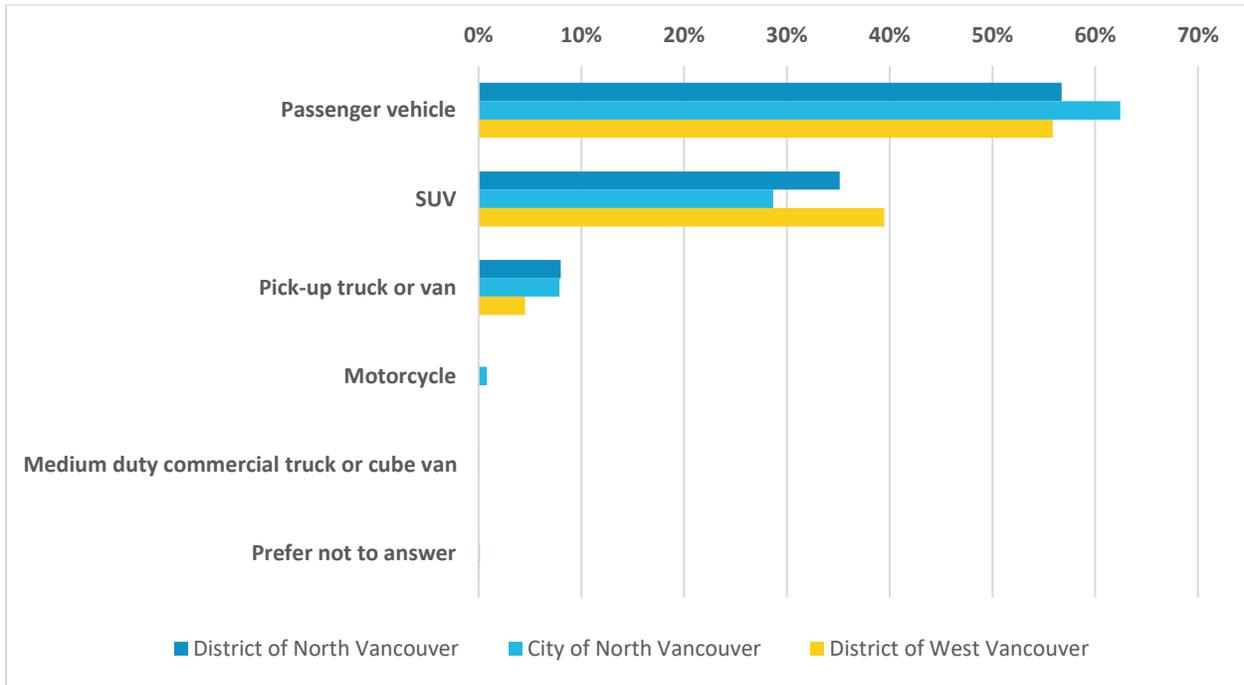
Dwelling Type	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Single-Detached House	2.15	2.16	2.15	2.14
Other Ground Oriented	1.66	1.71	1.59	1.70
Apartment <5 stories	1.07	1.12	1.06	1.05
Apartment 5+ stories	1.11	1.20	1.05	1.13
Total	1.62	1.81	1.32	1.74

¹⁷ Results for ages 15-24 should be interpreted with caution due to small sample size (n=52).

3.7.3 Vehicle Types

Figure 27 shows that passenger vehicles are the dominant type of vehicle throughout the North Shore, with 62% of CNV residents, 57% of DNV residents, and 56% of DWV residents reporting passenger vehicles. DNV and DWV residents were more likely to own SUVs compared to CNV residents, while residents of CNV and DNV were more likely to own pick-up trucks or vans compared to DWV.

Figure 27. Vehicle Types by Municipality (Usual Vehicle Driven)



3.7.4 Vehicle Fuel Type

Figure 28 and Table 12 show the fuel type for vehicles that survey participants regularly drive on the North Shore and by municipality. Conventional gasoline vehicles are the majority (82% DWV, 84% DNV, and 85%, CNV). Diesel vehicles are slightly more common among DWV residents (4%) than DNV and CNV residents (2% each). Electric vehicle ownership is on the rise. In 2019, 8% of North Shore residents owned hybrids or electric vehicles; in 2021, that percentage has increased to 13%. The most notable increase in hybrid or EV ownership was seen in DWV where an increase of 9 percentage points was observed. DWV is also the region with the highest overall hybrid or EV ownership at 16%, compared to 12% in CNV and 10% in DNV. The rise in ownership of hybrid and EV vehicles likely reflects provincial programs that incentivize the purchase of such vehicles, including improvements to EV infrastructure; like access to charging stations; concurrent with rising gas prices and shifts in EVs desirability for vehicle purchasers.

Electric vehicle ownership is on the rise. In 2019, 8% of North Shore residents owned hybrids or electric vehicles; in 2021, that percentage has increased to 13%. The most notable increase in hybrid or EV ownership was seen in DWV where an increase of 9 percentage points was observed. DWV is also the region with the highest overall hybrid or EV ownership at 16%, compared to 12% in CNV and 10% in DNV. The rise in ownership of hybrid and EV vehicles likely reflects provincial programs that incentivize the purchase of such vehicles, including improvements to EV infrastructure; like access to charging stations; concurrent with rising gas prices and shifts in EVs desirability for vehicle purchasers.

Figure 28. Vehicle Fuel Types by Municipality (Usual Vehicle Driven)

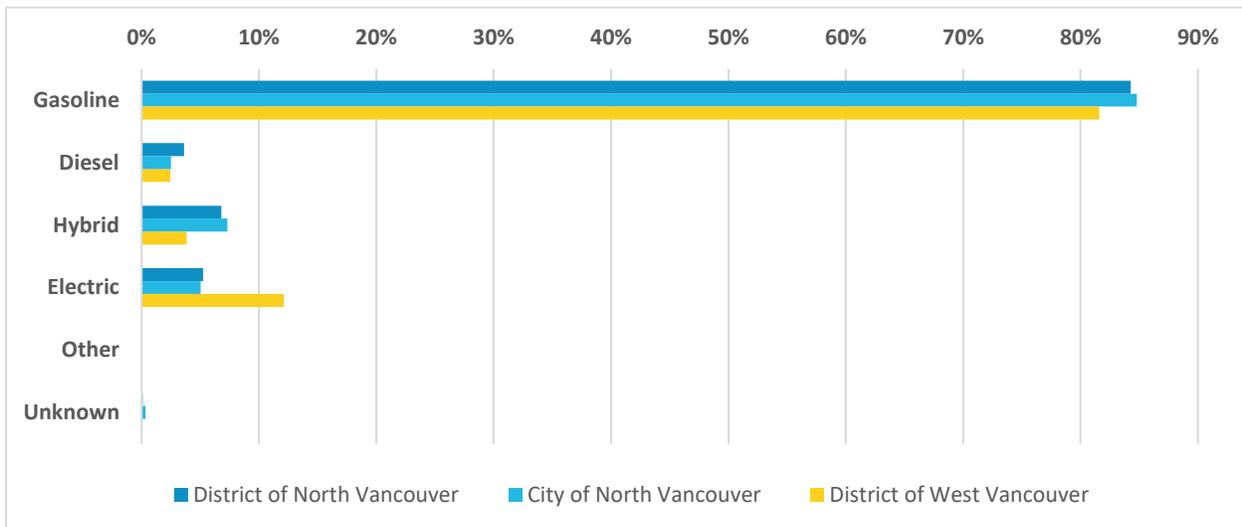


Table 12. Increase in Hybrid and Electric Vehicles, 2019 to 2021

	North Shore		DNV		CNV		DWV	
	2019	2021	2019	2021	2019	2021	2019	2021
Hybrid	4%	6%	5%	7%	5%	7%	4%	4%
Electric	4%	7%	5%	5%	3%	5%	3%	12%
Subtotal Hybrid + Electric	8%	13%	10%	12%	7%	12%	7%	16%
%-pt increase		+5%		+2%		+5%		+9%

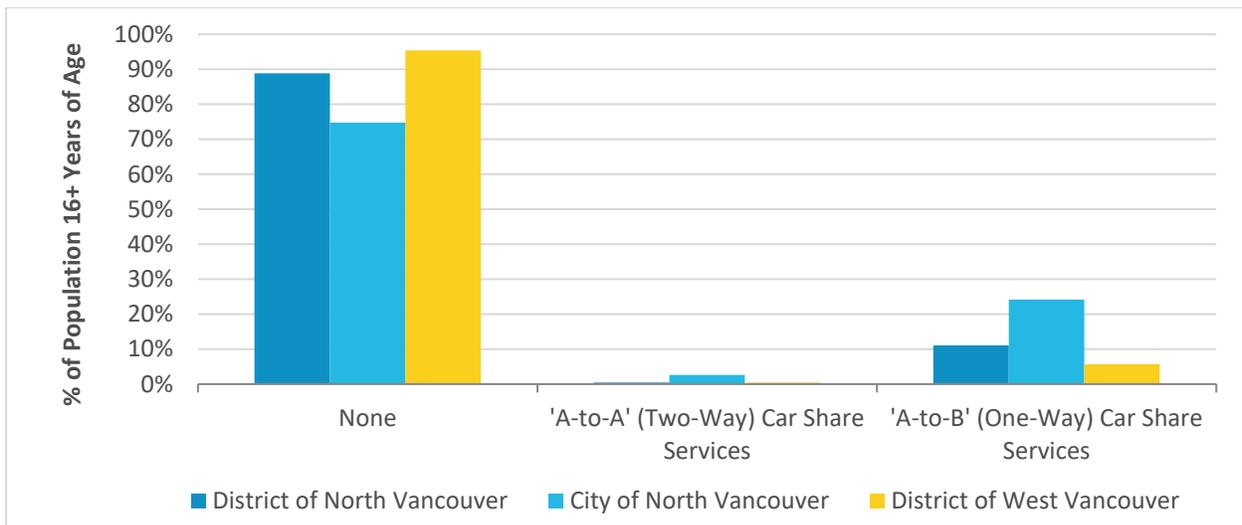
3.7.5 Car Share Membership

Figure 29 shows the percentage of survey participants over the age of 15 who had car share memberships (at the time of the survey in Fall 2021) by municipality. Currently, the available ‘A-to-A’ service is Evo, which is primarily available in CNV, with availability in small portions of DNV and DWV. Currently, the available ‘A-to-B’ service is Modo, which is largely only available in CNV, plus a single car available in Lynn Valley in DNV. Both services are also available in large portions of the City of Vancouver, with Modo having pockets of coverage in other Metro Vancouver municipalities. It may be noted that both A-to-A and A-to-B car share services generally become more viable and thus more available as neighbourhoods increase in population density and/or employment density.

CNV had the highest percentage of car share memberships while DWV had the lowest. Overall, the percentage of residents with at least one car share membership has dropped in all municipalities, from 17%, 28%, and 10% respectively in DNV, CNV, and DWV in 2019, to 11%, 25%, and 5% respectively in 2021. This is likely due to a few factors, including the pandemic (i.e., more people working from home and limiting outings) and may be related to the loss of two car share companies in the region (Car2Go and ZipCar).

Examination of the survey responses on modes of transportation used on their reported travel day, about 0.3% of automobile trips made by survey participants were via car share automobiles.

Figure 29. Membership in Car Share Services by Municipality



4 Daily Trip Characteristics

This section provides a snapshot of daily (24-hour) travel patterns from the trips reported by survey participants. The section includes trip demand, purpose, mode share, and distribution

4.1 Trip Demand

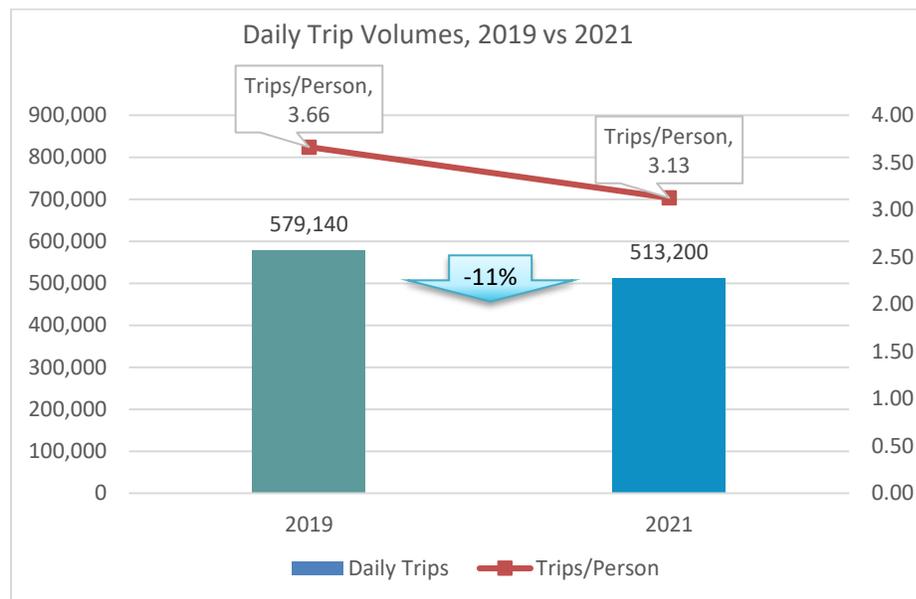
This section provides trip demand characteristics which include daily trips, trip volumes by time of the day, and annual vehicle kilometres travelled (VKT).

4.1.1 Daily Trips

For this survey, a trip was defined as a journey from one place (origin) to another (destination) with a single purpose that may involve more than one mode of travel. Travel to work with a stop at a coffee shop is two separate trips: one with a purpose of restaurant/dining, another with a purpose of work.

The survey results suggest that residents of the North Shore made 66,000 fewer daily trips in 2021 than in 2019, despite an estimated 4% increase in population during that time frame¹⁸. This is illustrated in **Figure 30** and detailed in **Table 13**. The average resident made 3.13 trips per day in 2021 compared to 3.66 in 2019. This 15% decrease is attributable to the continued impact of the COVID-19 pandemic on residents' commuting patterns and other activities, notably an increase in work-from-home arrangements and virtual schooling, as well as a reduction in social interactions and trips for personal business (such as banking, medical appointments, vehicle repair, etc.). Changes in residents' volumes of trips for different purposes are detailed in **Section 4.2** of this report.

Figure 30. Daily Trip Volumes and Person Trip Rates – 2019 vs 2021



¹⁸ In 2019 the total population of the North Shore was based on BC Statistics Agency estimates. In 2021, population estimates were based on 2021 Census data.

Table 13. Daily Trips and Person Trip Rates, 2019 to 2021

	2019	2021	Difference	% Change
North Shore Population (age 15+) ¹⁹	158,100	164,200	6,100	+4%
Trips	579,100	513,200	-65,900	-11%
Trip Rate (trips/person)	3.66	3.12	-0.54	-15%

Examining the survey estimates by municipality reveals that daily trip rates experienced a drop for residents of all municipalities, with the most significant drop being for CNV residents, with a 19% reduction in daily trips (**Table 14** and **Figure 31**). This stands to reason given CNV's high rate of employment (56%) and the impact of COVID on increasing work from home. This increase was offset by a significant increase in population for this municipality in 2021 (+8% for the over the age 15+ population relative to the estimate at the time of the 2019 survey)²⁰, for a net decrease in total trips of 13%. DNV and DWV saw more modest decreases in daily trip rates, and net decreases in volume of 11%.

Table 14. Daily Trips and Person Trip Rates by Municipality, 2019 to 2021

	DNV			CNV			DWV		
	2019	2021	% Change	2019	2021	% Change	2019	2021	% Change
North Shore Population (age 15+) ¹⁹	72,400	73,400	+1%	47,100	50,800	+8%	38,600	40,000	+4%
Trips	270,300	241,300	-11%	163,100	141,800	-13%	145,800	130,100	-11%
Trip Rate (trips per person)	3.73	3.29	-12%	3.46	2.79	-19%	3.78	3.25	-14%

¹⁹ Source: 2019 population estimate: 2016 Census counts by age group projected to 2019; 2020 population estimate: 2021 Census counts, using 2016 age distributions for the proportion 15 years of age and older.

²⁰ It may be noted that the 2019 population estimate may not be entirely reliable as they were based on BC Stats population growth estimates for years in between the Census applied to 2016 Census counts, thus caution should be exercised when considering the growth in population as represented by the expanded survey results.

Figure 31. Estimated Total Daily Trips and Trip Rates by Municipality (Population Aged 15+) – 2019 vs 2021

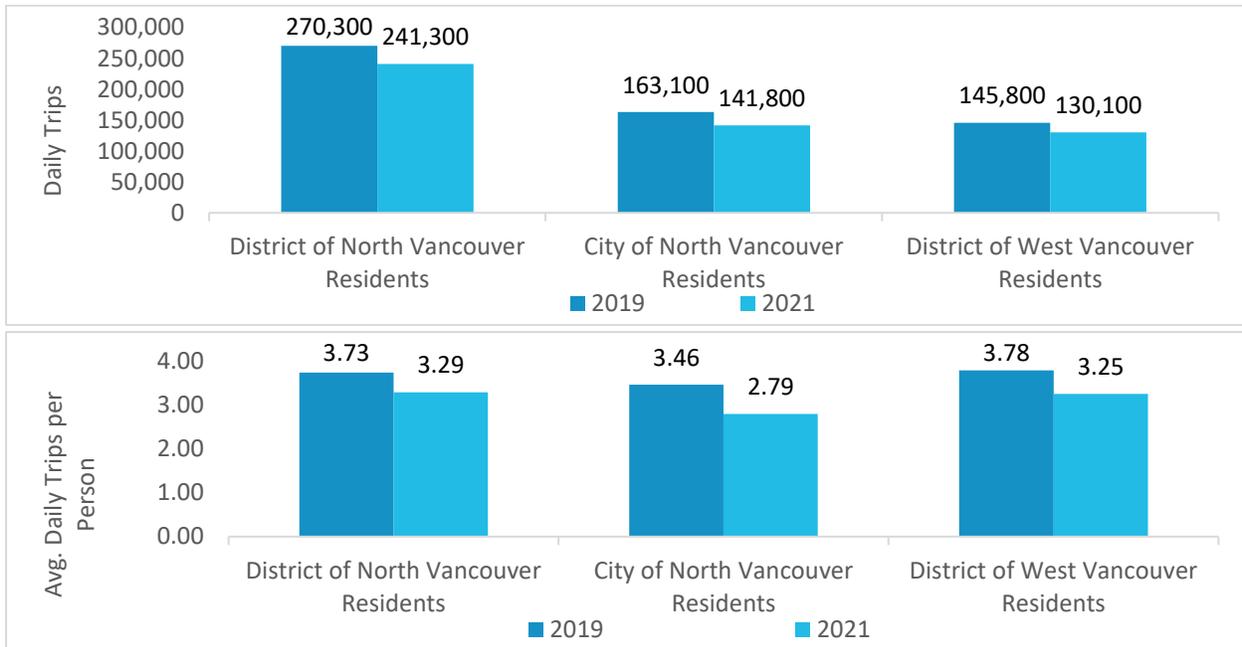


Figure 32, presents the average daily trip rates for residents of each zone. Daily trip rates are highest for residents of Zone 3 (DNV west), at 3.53, and lowest for residents of Zones 7 and 8 (CNV/DNV east) at 2.84 and 2.62, respectively. Lower trip rates in Zones 7 and 8 are not explained by the high employment in the zones. Workers actually have slightly higher daily trip rates on average than non-workers (3.22 vs. 2.95 respectively). This holds true in all zones. In Zone 8, which has the lowest daily trip rate, workers have an average trip rate of 2.87, below the worker average, and non-workers have an average daily trip rate of 2.13, well below the non-worker average. The lower trip rates may be associated with other factors such as age, access to vehicles, and lifestyle. Of note, Zone 8 has the lowest average age of all the zones and proportionately fewer trips reported for shopping and personal business.

Figure 32. Map of Average Daily Trips by Municipality of Residence

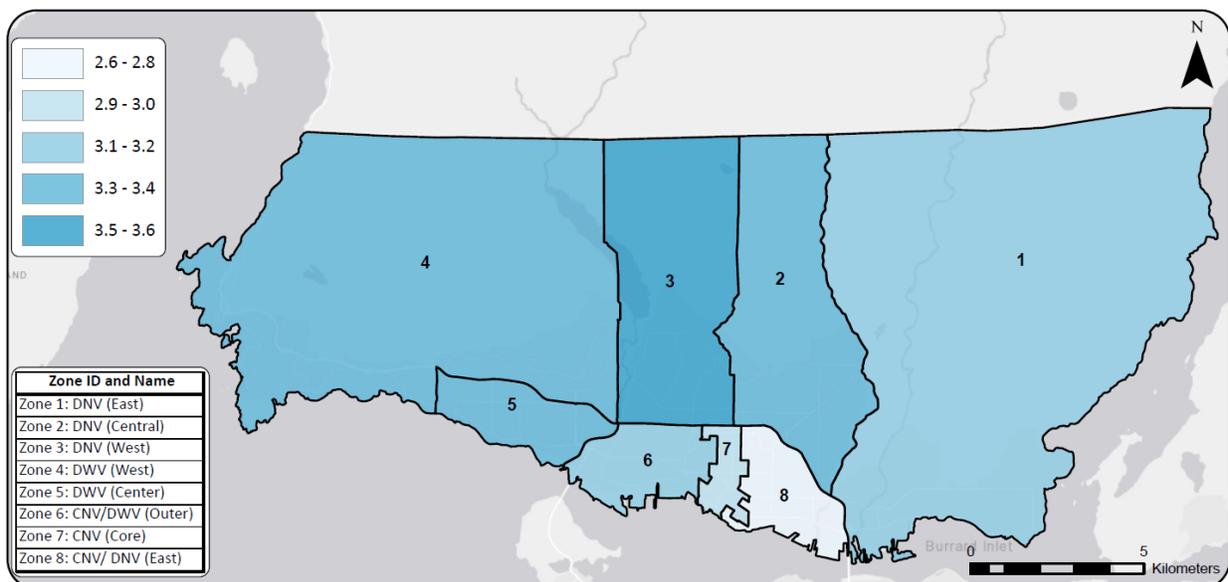


Figure 33 shows the average daily trip rates by age and gender for the North Shore. The results suggest that women and men 40 to 49 years old have the highest average daily trip rates for their genders, at 4.33 and 3.54 trips per day, respectively. Women generally have higher daily trips rates than men across all age groups except for those older than 80 and those between 30 and 39 years old (although the latter result should be interpreted with caution due to a small sample size for men in this age group).

Figure 33. Trip Rates by Age Group and Gender – North Shore ²¹

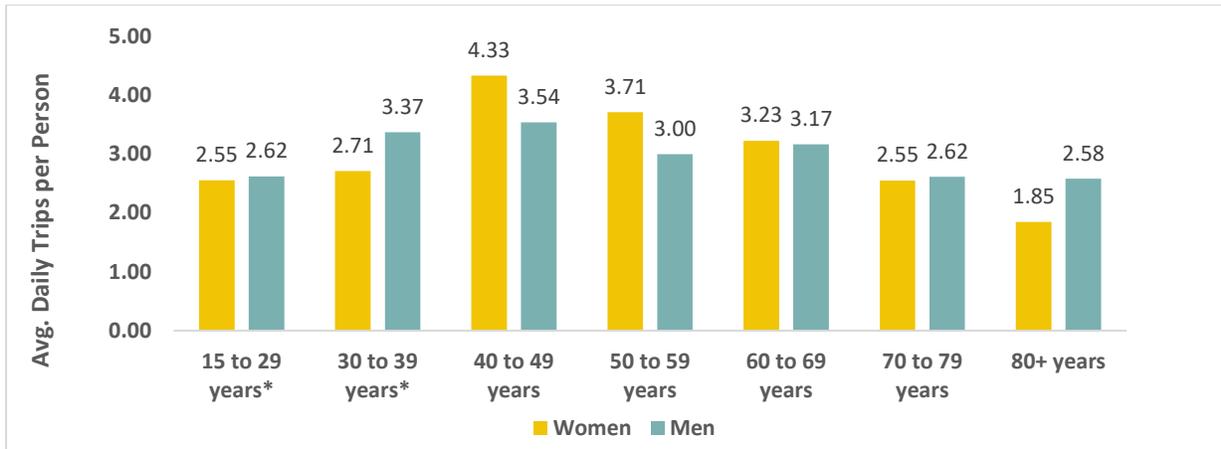
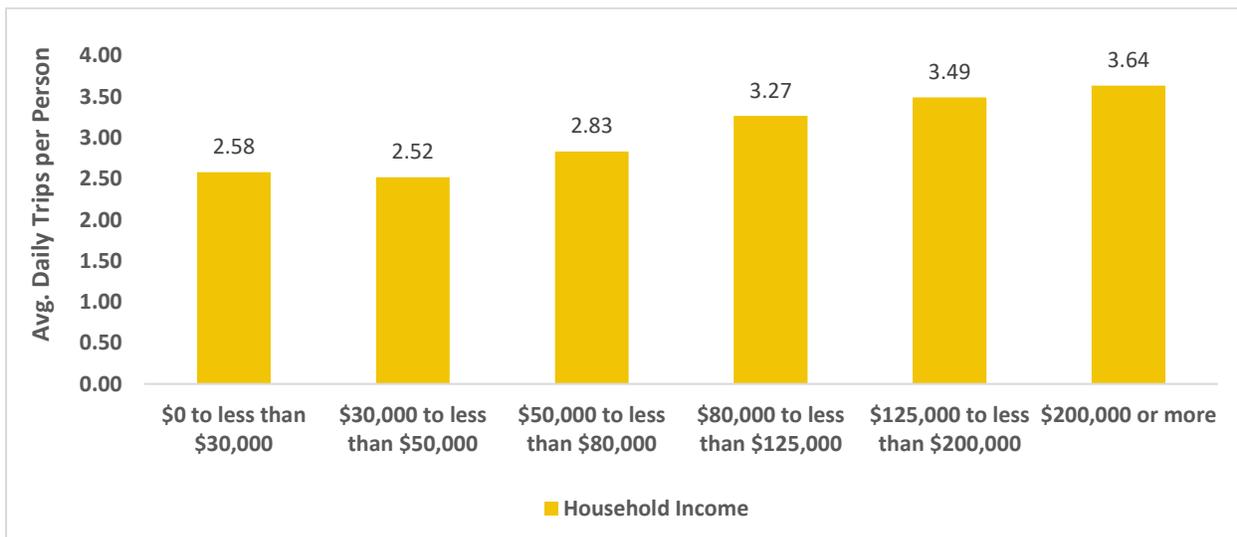


Figure 34 illustrates the relationship between annual household income and the average daily trip rate. As indicated, those with lower annual incomes tend to have lower trip rates (2.53 to 2.58 trips per day for incomes below \$50,000 per year), while there is a clear trend with increasing trip rates as household income rises above this.

Figure 34. Trip Rates by Household Income – North Shore ²²



²¹ Interpret results for both genders 15-29 years and men 30-39 years with caution due to smaller sample size (n<100). Ages have been grouped into ranges based on similarity of trip rates. Non-binary participants are not displayed due to small n.

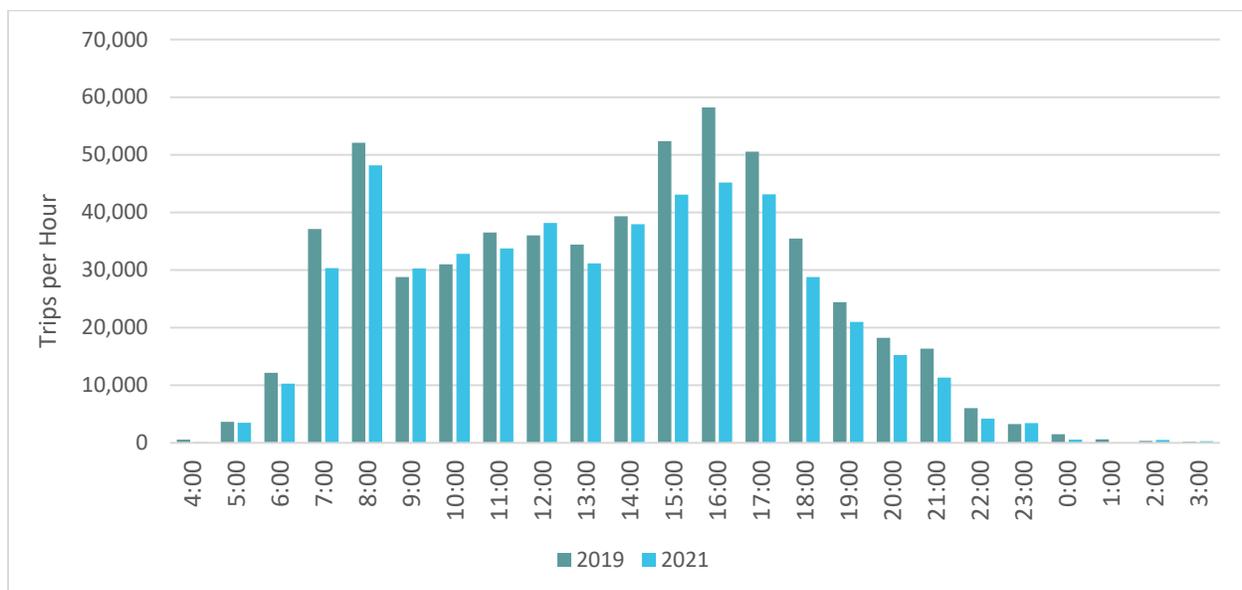
²² Interpret results for less than \$30,000 annual income with caution due to smaller sample size (n=97).

4.1.2 Trip Volumes by Time of Day

Figure 35 shows the percentage of North Shore residents' weekday trip volumes²³ by the time of the trip departure for both 2019 and 2021 survey cycles, yielding the following observations:

- The highest trip demand in the morning period occurs from 8:00 AM to 9:00 AM with 48,200 trips in that hour (although down significantly from 52,000 in 2019).
- The highest trip demand in the afternoon period occurs from 4:00 PM to 5:00 PM with 45,500 in that hour (down from 58,200 trips in 2019). Similarly high volumes may also be observed in the adjacent hours from 3:00 PM to 4:00PM and 5:00 PM to 6:00 PM.
- Comparing the 2019 and 2021 distributions, the overall pattern shows notable reductions in trip volumes in the morning between 6:00 AM and 9:00 AM, and again between 3:00 PM and 7:00 PM, which include traditionally common commuting times.

Figure 35. Number of Trips by Hour of Day – North Shore, 2019 vs. 2021



²³ It may be noted that this includes some trips that may not be to, from, or within the North Shore. The survey results include a small proportion of trips that take place entirely externally, i.e., with neither the trip origin nor the trip destination on the North Shore. Overall, 5% of residents' trips are entirely external.

4.1.3 Vehicle Kilometers Travelled (VKT)

Survey participants were asked to confirm information about the vehicle that they usually drive (vehicle type, fuel type, make and model year) and to report the odometer reading for that vehicle. Odometer readings for previous survey participants who drove the same vehicle as in 2020 were used to calculate the average annual VKT, discarding particularly high or low outliers. Given that, by design, the 2020 short survey was conducted with previous panelists and did not recruit any new panelists, and there was attrition in the survey sample between 2020 and 2021, the sample of respondents who had provided valid odometer readings that could be used to calculate VKT was relatively modest (n=434). The resulting VKT estimates have been compared against those developed from the 2019 and 2020 surveys in [Table 15](#) and [Figure 36](#). It should be noted that as 2019 was the baseline year of this survey, the 2019 VKT estimates were based on the average VKT across the lifetime of the vehicle (based on the odometer reading at the time of the survey and year of manufacture).

In interpreting the results, it is important to consider the context: the 2019 results are prior to the COVID-19 pandemic; the 2020 results reflect about five months of regular travel followed in normal pre-pandemic conditions followed by about seven months of travel after COVID-19 restrictions were first imposed; and the 2021 results reflect a full year of COVID-19 conditions with varying degrees of restrictions and returns to work throughout the period.

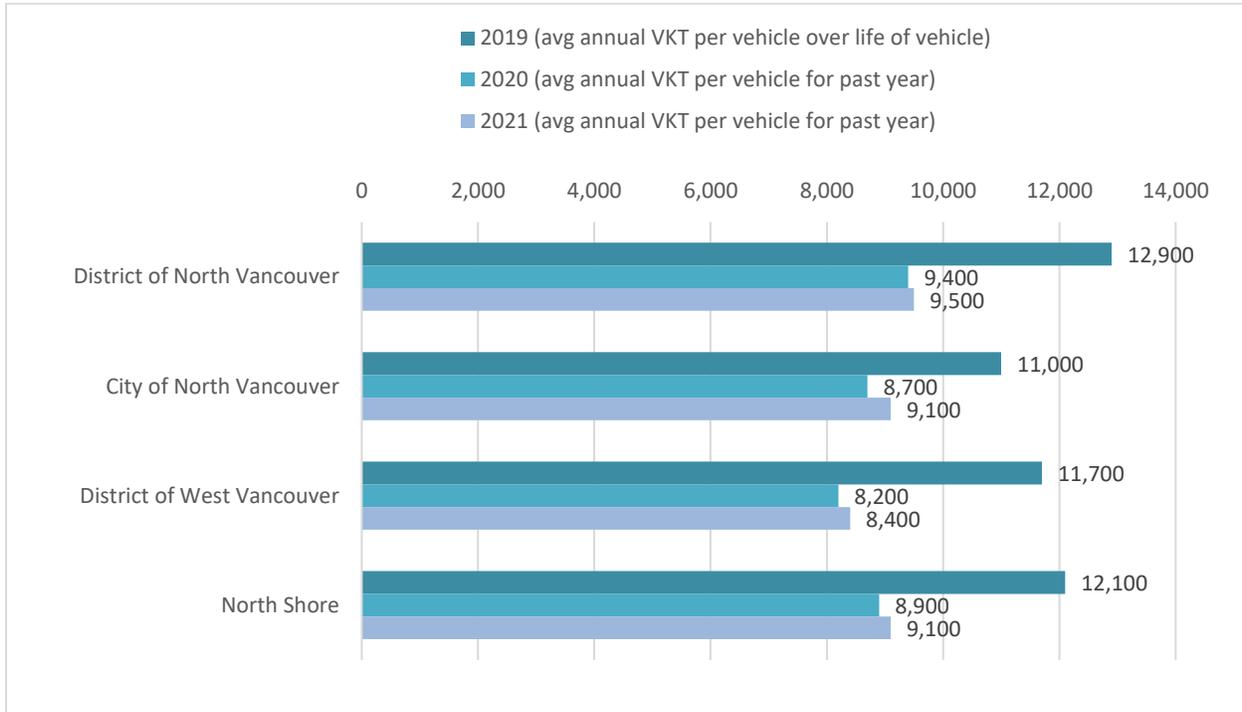
Overall, the survey results suggest that the average VKT per vehicle for North Shore residents is approximately 9,100 km. This is a slight (2%) increase over 2020, showing the continued depressed vehicle travel following the sharp drop between 2019 and 2020 (-36%). Similar patterns can be observed by municipality. Of note, it appears that DWV residents incur the lowest annual VKT, at 8,400, compared with 9,100 for CNV, and 9,500 for DNV.

Table 15. Vehicle Kilometer Travelled Survey Results, 2019, 2020, and 2021

	District of North Vancouver	City of North Vancouver	District of West Vancouver	North Shore
Estimated private vehicles in households				
2019	58,360	34,150	33,020	125,530
2020	58,900	34,300	34,600	127,700
2021	60,400	36,700	33,200	130,200
Estimated average annual VKT per household vehicle				
2019 (avg annual VKT per vehicle over life of vehicle)	12,900	11,000	11,700	12,100
2020 (avg annual VKT per vehicle for past year)	9,400	8,700	8,200	8,900
2021 (avg annual VKT per vehicle for past year)	9,500	9,100	8,400	9,100
Estimated total annual VKT incurred for private vehicles*				
2019	751,181,000	375,470,000	386,456,000	1,513,107,000
2020	554,267,000	298,016,000	282,744,000	1,136,597,000
2021	573,104,000	333,414,000	280,381,000	1,182,541,000

*Total annual VKT rounded to the nearest 1,000. All figures are estimates scaled to take into account non-responses.

Figure 36. Average Annual VKT, by Municipality, 2019, 2020, and 2021 (Past Year Odometer Difference) ²⁴



²⁴ As 2019 was the baseline survey, there were no previous years' odometer readings to compare against, and the VKT estimates are based on the average kilometers per year based on the lifetime of the vehicle since manufacture. n=1,404 in 2019, n=393 in 2020, n=434 in 2021

4.2 Trip Purpose

For this survey, a trip was defined as a journey from one place (origin) to another (destination) with a single purpose that may involve more than one mode of travel. Travel to work with a stop at a coffee shop is two separate trips: one with a purpose of restaurant/dining, another with a purpose of work. Travel to work which involved driving to a park & ride location then taking transit the rest of the way is considered a single trip with a primary mode of transit and a transit access mode of driving. It may also be noted that the survey allowed participants to enter trips for exercise or leisure that return to the trip origin without stopping at a destination along the way. This includes trips for taking a dog for a walk around the block, going for a jog or bicycle ride for exercise only (not to get somewhere), or going for a scenic drive (without stopping at a destination).²⁵

Figure 37 shows the distribution of trip purposes for weekday trips made by residents of the North Shore in both 2019 and 2021. Trip volumes are presented as a bar chart for a side-by-side comparison of years in **Figure 38** but without the return home trips, while **Table 16** details the results presented in these charts.

The results show interesting patterns in how the COVID-19 pandemic has impacted human activity and travel. Significant decreases in daily trips can be observed for the following purposes:

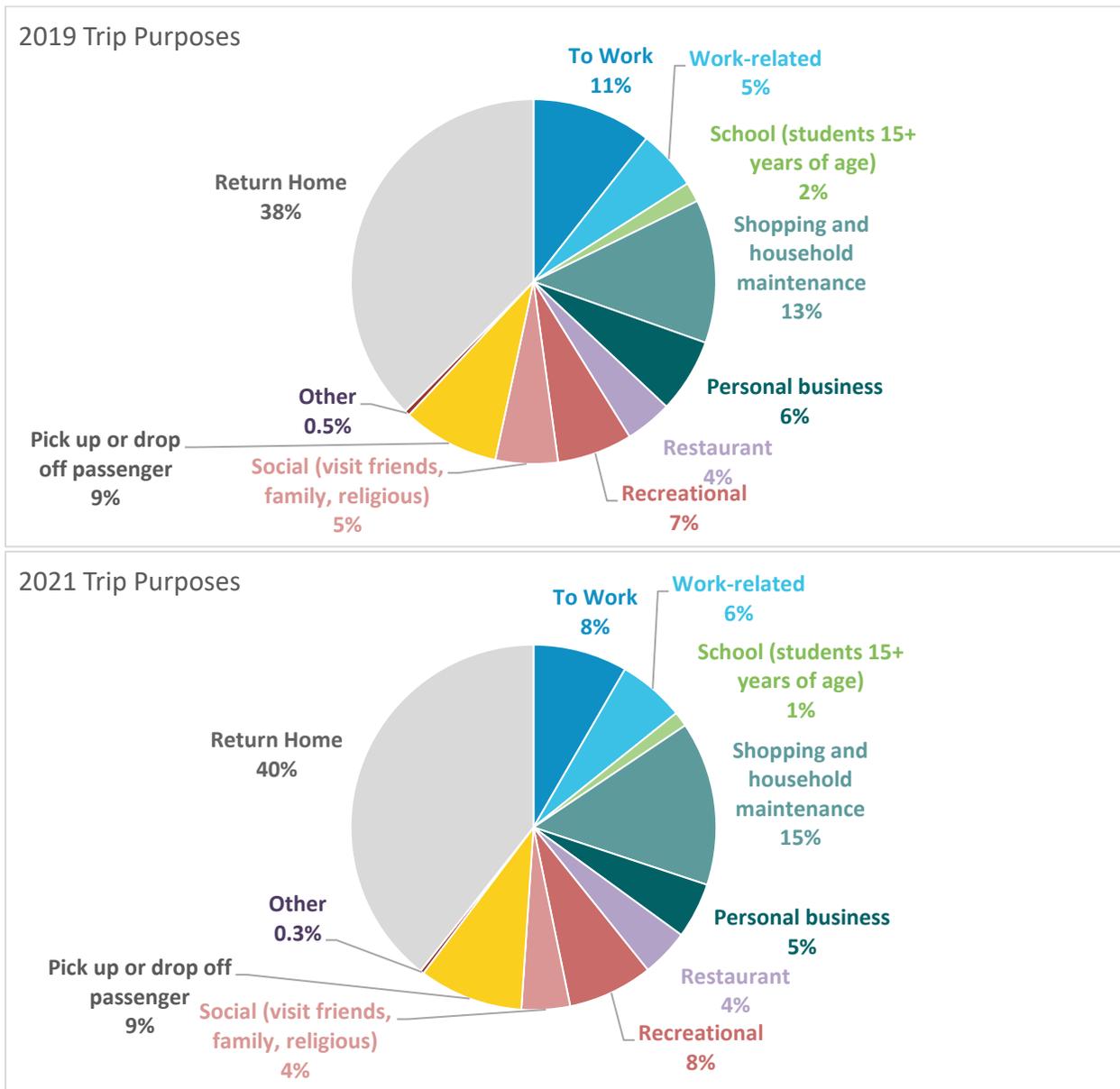
- Usual trips to work and work-related trips represent around 14% of total daily trips, down from 16% of total daily trips in 2019. This is a modest decrease proportionate to total trips, however, the total volume of trips to one's usual workplace dropped by 18,700 (from 61,500 to 42,800), a 30% decrease in such trips, while the number of trips for work-related purposes (errands or meetings) remain stable.
- Trips for personal business (such as banking, medical appointments, vehicle repair, or personal care) represent 6% of all trips. The number of such trips is one third reduced from 2019 volumes.
- Trips for social purposes represent 4% of all trips. The number of such trips is also close to one-third reduced from 2019 volumes.

Other kinds of trips were notable for having similar volumes to 2019, even if their proportions of the total might have shifted slightly:

- Shopping trips represent 15% of trips. The daily number of shopping trips is undiminished from 2019 levels, at 74,500 in 2021, while shopping's share of total trips is up (from 13% in 2019).
- Recreational trips represent 7% of all trips. The daily number of such trips is undiminished from 2019 levels.
- Close to one in ten trips is to drive someone somewhere or to pick someone up ('serve passenger' trips, 9%), such as driving children to or from school or dropping someone off for an appointment. This is proportionally unchanged from 2019, and down slightly from 2019 volumes.

²⁵ Such trips represent approximately 2.5% of all trips, with most being recorded as having recreational or social purposes.

Figure 37. Weekday Daily Trip Purposes - % of Trips, 2019 vs 2021 ²⁶



Individual percentages have been rounded and may not add to 100%

²⁶ Trip purposes are assigned based on the purpose of the trip at the trip destination, without consideration of the trip origin. Trips that return home from activities outside the home are characterized as 'return home' trips. I.e., trips returning home are not categorized according to the most recent activity outside the home or the original reason for leaving home.

Figure 38. Weekday Daily Trip Purposes 2019 vs 2021

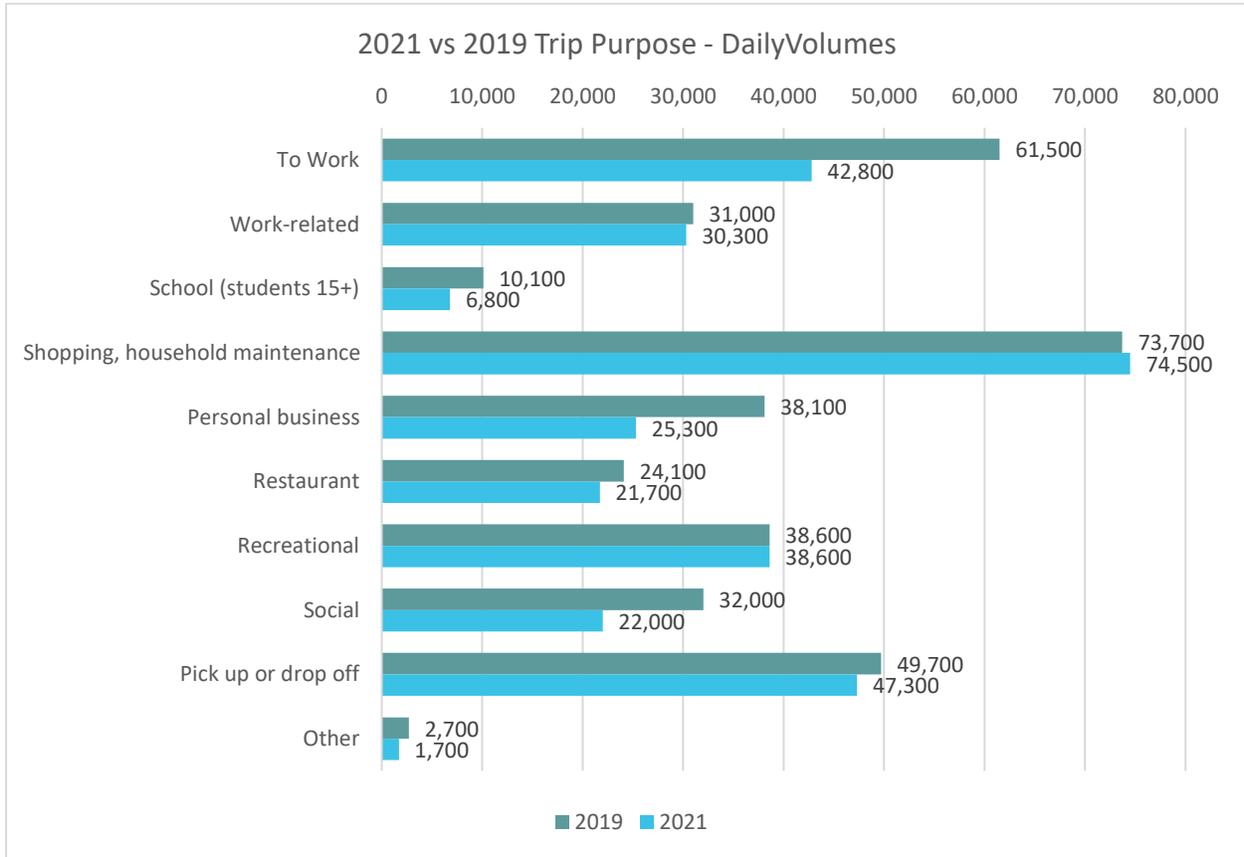


Table 16 shows the daily trip purpose by municipality for 2019 and 2020. Notably, DWV has a lower proportion of trips to work (5%) and higher proportion of trips for shopping, household maintenance (17%), social visits (5%), and pick up or drop off of passengers (11%) compared to DNV or CNV. This finding is not unexpected given the large proportion of retired residents in DWV compared to CNV and DNV.

Table 16. Trip Purpose by Municipality

	DNV		CNV		DWV		North Shore	
	2019	2021	2019	2021	2019	2021	2019	2021
Total Trips	270,300	241,300	163,100	141,800	145,800	130,100	579,100	513,200
Trip Purposes								
To work (usual workplace)	10.9%	9.2%	13.2%	9.9%	7.1%	5.1%	10.6%	8.3%
Work-related	6.1%	6.2%	4.9%	6.4%	4.5%	4.9%	5.4%	5.9%
School (students 15+ years of age)	2.0%	1.8%	2.0%	1.1%	1.0%	0.7%	1.8%	1.3%
Shopping, household maintenance	12.8%	13.7%	10.7%	13.9%	14.8%	16.7%	12.7%	14.5%
Personal business	6.8%	4.9%	5.1%	4.8%	7.8%	5.0%	6.6%	4.9%
Restaurant	3.6%	4.4%	5.0%	4.6%	4.3%	3.6%	4.2%	4.2%
Recreational	6.3%	6.8%	6.8%	8.2%	7.2%	8.2%	6.7%	7.5%
Social (visit friends, family, religious)	5.0%	3.8%	6.0%	4.1%	6.0%	5.3%	5.5%	4.3%
Pick up or drop off passenger	8.8%	9.6%	6.2%	6.6%	10.8%	11.3%	8.6%	9.2%
Other	0.4%	0.2%	0.4%	0.3%	0.6%	0.6%	0.5%	0.3%
Return Home	37.3%	39.4%	39.6%	40.1%	35.9%	38.6%	37.6%	39.4%
	change in volume	%-pt change						
Change, 2019 to 2021								
Trip Purposes								
To work (usual workplace)	-7,300	-1.7%	-7,500	-3.3%	-3,800	-2.1%	-18,600	-2.3%
Work-related	-1,500	0.1%	1,100	1.5%	-300	0.3%	-700	0.5%
School (students 15+ years of age)	-1,000	-0.2%	-1,800	-0.9%	-600	-0.4%	-3,300	-0.4%
Shopping, household maintenance	-1,500	0.9%	2,200	3.2%	200	1.9%	900	1.8%
Personal business	-6,500	-1.9%	-1,400	-0.3%	-4,800	-2.8%	-12,800	-1.6%
Restaurant	900	0.8%	-1,600	-0.4%	-1,600	-0.7%	-2,300	0.1%
Recreational	-700	0.5%	400	1.3%	300	1.1%	0	0.9%
Social (visit friends, family, religious)	-4,300	-1.2%	-4,000	-1.9%	-1,800	-0.7%	-10,100	-1.3%
Pick up or drop off passenger	-600	0.8%	-700	0.4%	-1,100	0.5%	-2,400	0.6%
Other	-600	-0.2%	-200	-0.1%	-100	0.0%	-1,000	-0.1%
Return Home	-5,900	2.1%	-7,700	0.5%	-2,100	2.7%	-15,500	1.8%

Individual percentages have been rounded and may not add to 100%

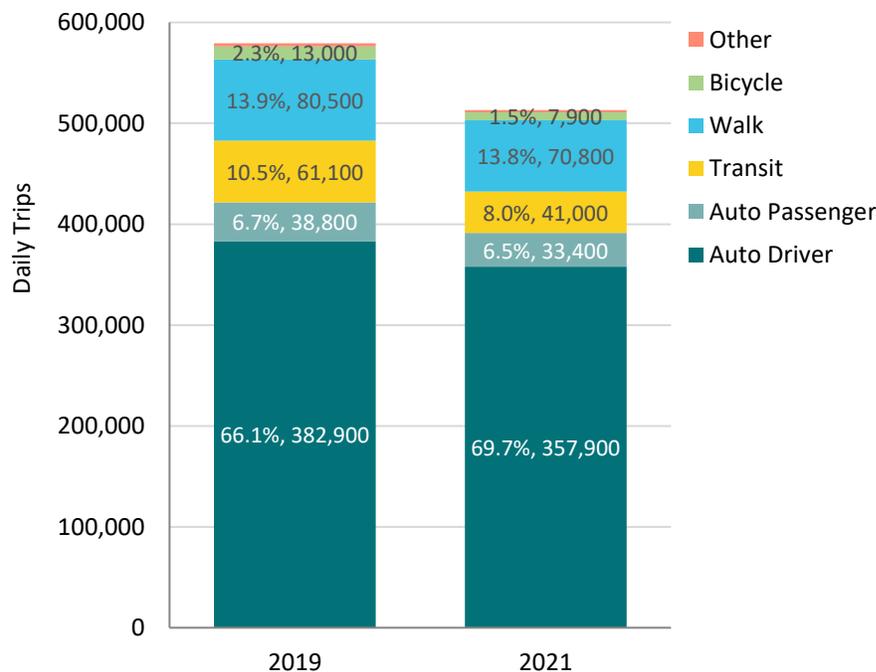
4.3 Trip Mode Share

4.3.1 Mode Shares

Figure 39 presents the mode shares of the 513,200 trips made by North Shore residents in 2021, compared to the mode shares of the 579,100 trips residents made in 2019. As with other analyses presented here, the impacts of COVID-19 on travel patterns are evident in the survey results.

- Automobile mode shares (combined driver and passenger trips) increased from 73% to 77% in 2021. However, given the overall decrease in total trips, this does not represent a shift towards non-sustainable mode use, and the actual number of automobile trips has dropped by 30,400 daily trips.
- Transit mode shares are dropped from 11% to 8% of all trips, with a one-third reduction in volume (20,100 fewer transit trips).
- Walk mode shares remain stable at 14%, while cycling had a drop from a 2.3% to a 1.5% mode share. The number of trips via these active modes dropped by 9,700 and 5,100 respectively, representing a 12% reduction in the volume of walking trips and a significant 39% reduction in volume for cycling trips.
- Other modes (0.04% of trips in 2021) include taxi, ride-hail (Uber, Lyft, etc.), motorcycle, low-speed motor vehicle (moped, limited-speed motorcycle, scooter-style e-bike), HandyDart, minibus, and intercity modes (such as airplane, rail, or coach bus).

Figure 39. Total Trips by Mode and Mode Share - North Shore, 2019 vs 2021



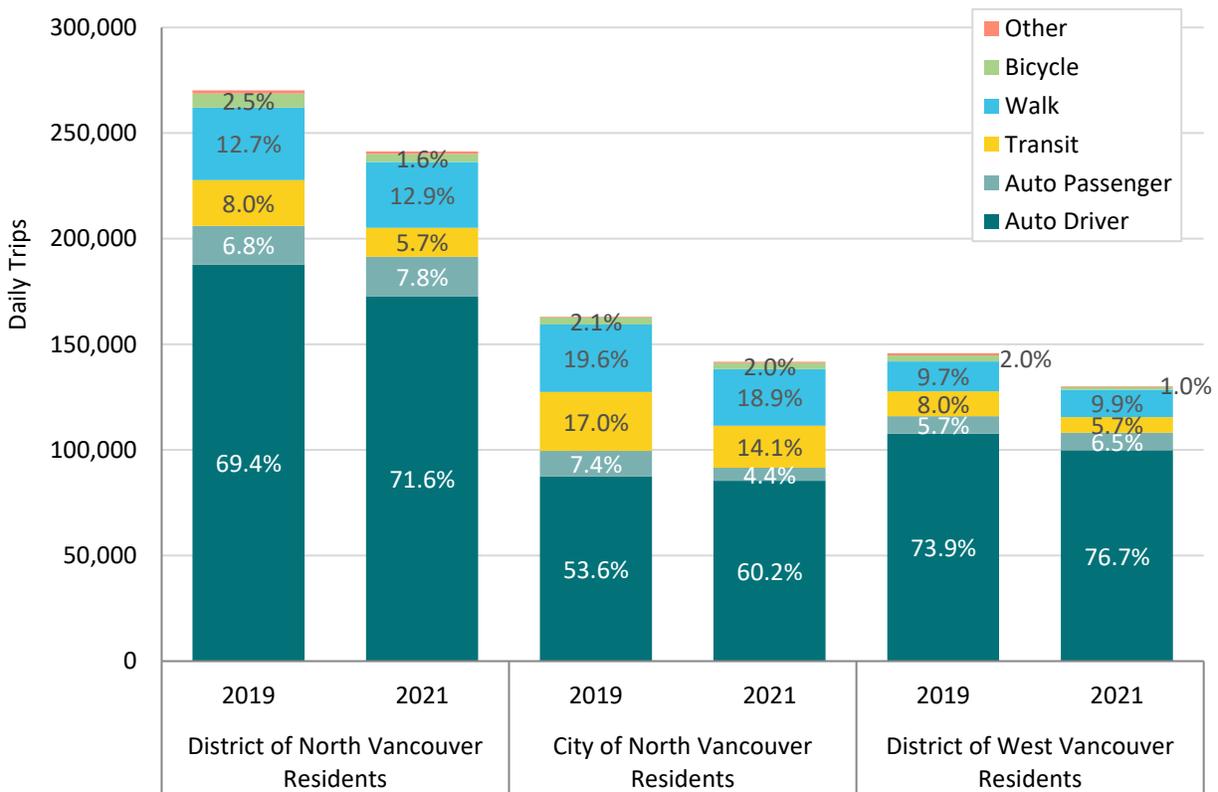
Individual percentages have been rounded and may not add to 100%
 Percentages for Other are <0.5% and are not displayed.

2019 and 2021 mode shares are presented by municipality in **Figure 40** below and **Table 17** on the following page. Examining the 2021 survey results:

- DWV residents have the highest auto driver mode share, at 77% of all trips, with CNV residents having a notably lower auto driver mode share than the other municipalities at 60%.
- Auto passenger trips represent 8% of trips in DNV, but only 4% in CNV.
- Transit mode shares are higher amongst CNV residents, at 14%, while DNV and DWV both have a 6% transit mode share.
- CNV has notably higher walk mode shares, at 19%, while this share is 13% for DNV and 10% for DWV.

Combining all sustainable modes (transit, walk, and bike), CNV has the highest sustainable modes share, at 35%, while DNV has 20% and DWV 17%. The three municipalities saw similar drops (ranging from 22% to 25%) in the volumes of trips via sustainable modes, amounting to 3-4 percentage point drops in sustainable mode shares compared to 2019. These shifts in mode shares and in volumes of trips are associated with the ongoing impacts of COVID-19 on work commutes and other areas of human activity. As we adapt to COVID-19 becoming endemic, we may see further shifts in mode shares and volumes as more people begin to feel comfortable taking transit again, more workers return to commuting, and as other human activity patterns continue to evolve.

Figure 40. Total Trips by Mode and Mode Share - by Municipality, 2019 vs 2021



Individual percentages have been rounded and may not add to 100%. Percentages for Other are <0.5% and are not displayed.

Table 17. Daily Trip Volumes by Mode by Municipality ²⁷

Daily Trips by Mode	North Shore		District of North Vancouver Residents		City of North Vancouver Residents		West Vancouver Residents	
	2019	2021	2019	2021	2019	2021	2019	2021
Auto Driver	382,900	357,900	187,700	172,700	87,500	85,400	107,700	99,800
Auto Passenger	38,800	33,400	18,400	18,800	12,100	6,200	8,300	8,400
Transit	61,100	41,000	21,600	13,700	27,800	19,900	11,700	7,400
Walk	80,500	70,800	34,400	31,200	31,900	26,800	14,200	12,900
Bicycle	13,000	7,900	6,700	3,700	3,500	2,800	2,900	1,400
Other*	2,900	2,200	1,500	1,200	400	700	1,000	300
Total Daily Trips	579,100	513,200	270,300	241,300	163,100	141,800	145,800	130,100
Mode Shares	2019	2021	2019	2021	2019	2021	2019	2021
Auto Driver	66.1%	69.7%	69.4%	71.6%	53.6%	60.2%	73.9%	76.7%
Auto Passenger	6.7%	6.5%	6.8%	7.8%	7.4%	4.4%	5.7%	6.5%
Transit	10.5%	8.0%	8.0%	5.7%	17.0%	14.1%	8.0%	5.7%
Walk	13.9%	13.8%	12.7%	12.9%	19.6%	18.9%	9.7%	9.9%
Bicycle	2.3%	1.5%	2.5%	1.6%	2.1%	2.0%	2.0%	1.0%
Other*	0.5%	0.4%	0.5%	0.5%	0.2%	0.5%	0.7%	0.2%
Sustainable Mode Share (Transit + Walk + Bike)	26.7%	23.3%	23.2%	20.1%	38.7%	34.9%	19.7%	16.6%
Active Share (Walk + Bike)	16.1%	15.3%	15.2%	14.5%	21.7%	20.9%	11.7%	10.9%

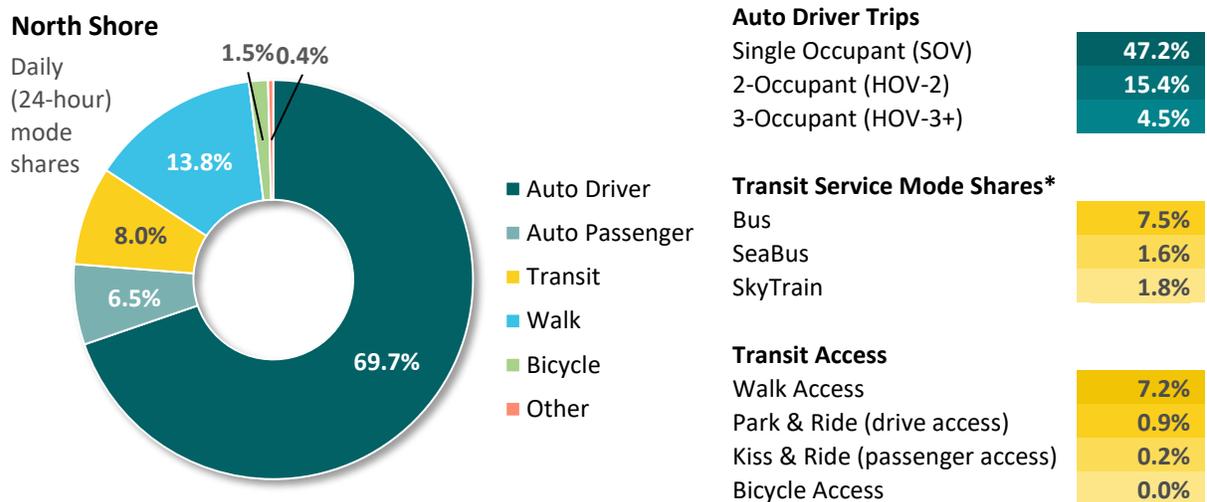
²⁷ * Other modes include taxi, ride-hail (Uber, Lyft, etc.), motorcycle, low-speed motor vehicle (moped, limited-speed motorcycle, scooter-style e-bike), HandyDart, minibus, and intercity modes (such as airplane, rail, or coach bus).

4.3.2 Detailed Mode Shares including Vehicle Occupancy, Transit Services Used, and Transit Access Modes

Figure 41 shows the weekday mode share for North Shore residents, breaking out auto driver mode shares by vehicle occupancy and transit mode shares by service and by transit access mode. Readers are reminded that these mode shares are based on all daily trips made by North Shore residents, including trips external to the North Shore.

- High Occupancy Vehicle (HOV) auto driver trips represent around 20% of all trips while Single Occupancy Vehicle (SOV) trips represent around 47%.
- Bus trips represent around 7.5% of all trips while the SeaBus and SkyTrain represent 1.6% and 1.8%, respectively (with there being some overlap between uses of services, e.g., a trip involving both SeaBus and SkyTrain).
- Access to transit is primarily via walking. Of all daily trips, just over 7% are transit trips accessed by walking to and from transit, with about 1% being auto-access transit trips whether as a vehicle driver or passenger (Park & Ride or Kiss & Ride trips).²⁸

Figure 41. Weekday Mode Shares – North Shore



* Sum of Bus + SeaBus + SkyTrain may add to greater than total Transit mode share as more than one transit service may be used in a single trip. North Shore residents' trips outside the North Shore are counted in the totals, including trips made via SkyTrain.

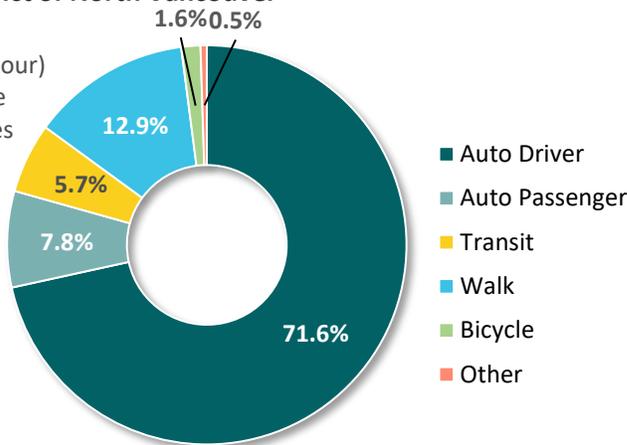
Figure 42 shows the detailed mode shares for residents of each municipality.

²⁸ "Transit access mode" refers to the primary mode used to get to and/or from the transit stop. Park & Ride (drive-access) transit trips are those for which the survey participant either drove to their first transit boarding location or drove from their last transit stop to their destination. Kiss & Ride (passenger-access) transit trips are those for which the participant was either driven to their first transit boarding location or driven from their last stop (without driving at either end), while bicycle-access is where the participant cycled to and/or from transit (without the driving or being a passenger at either end). Walk-access transit trips are those for which the survey participant walked at both ends of the trip.

Figure 42. Weekday Mode Shares by Municipality

District of North Vancouver

Daily (24-hour) mode shares



Auto Driver Trips

Single Occupant (SOV)	48.2%
2-Occupant (HOV-2)	16.6%
3-Occupant (HOV-3+)	4.5%

Transit Service Mode Shares*

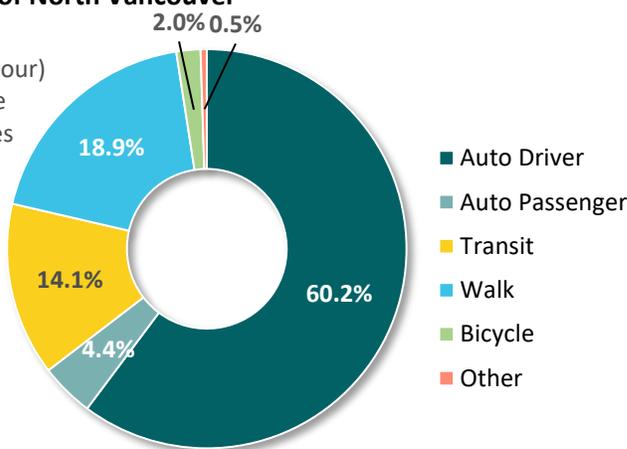
Bus	5.8%
SeaBus	0.2%
SkyTrain	0.7%

Transit Access

Walk Access	5.2%
Park & Ride (drive access)	0.6%
Kiss & Ride (passenger access)	0.0%
Bicycle Access	0.0%

City of North Vancouver

Daily (24-hour) mode shares



Auto Driver Trips

Single Occupant (SOV)	43.3%
2-Occupant (HOV-2)	11.6%
3-Occupant (HOV-3+)	3.1%

Transit Service Mode Shares*

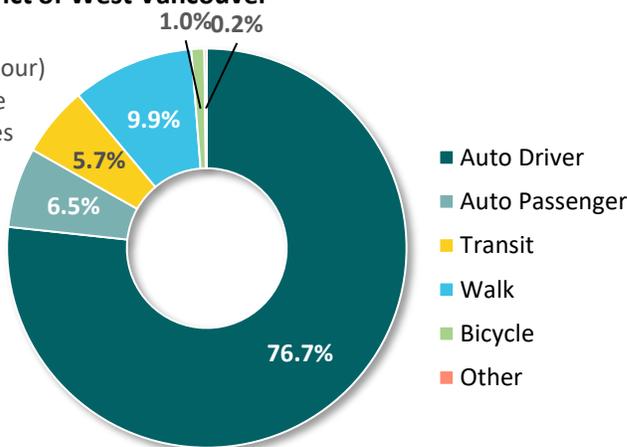
Bus	12.6%
SeaBus	4.7%
SkyTrain	3.7%

Transit Access

Walk Access	13.3%
Park & Ride (drive access)	0.8%
Kiss & Ride (passenger access)	0.6%
Bicycle Access	0.1%

District of West Vancouver

Daily (24-hour) mode shares



Auto Driver Trips

Single Occupant (SOV)	49.5%
2-Occupant (HOV-2)	17.5%
3-Occupant (HOV-3+)	6.0%

Transit Service Mode Shares*

Bus	5.1%
SeaBus	0.6%
SkyTrain	1.6%

Transit Access

Walk Access	4.4%
Park & Ride (drive access)	1.3%
Kiss & Ride (passenger access)	0.1%
Bicycle Access	0.0%

*Sum of Bus + SeaBus + SkyTrain may add to greater than total Transit mode share as more than one transit service may be used in a single trip. North Shore residents' trips outside the North Shore are counted in the totals, including trips made via SkyTrain.

4.3.3 Mode Share by Zone

North Shore residents' weekday mode shares are presented by zone of residence in **Table 18**. Auto driver mode shares are highest for residents of Zones 1, 3, and 4 (75%, 73% and 86% respectively). Auto driver mode shares lowest for Zones 6 and 7 (66% and 54% respectively), which comprise most of CNV and a small part of DWV. Zones 6 and 7 also have the highest sustainable and active mode shares, with 17% and 16% transit mode shares, respectively, and 22% and 15% walk mode shares, respectively, although only a 1% cycling mode share. Cycling was highest for survey participants from Zone 8 (3%).

The total sustainable mode share that combines Transit + Walk + Bike is particularly notable. Zone 7 stands out with a 40% sustainable mode share, meeting a target that is commonly strived for by other communities. While the following observations are anecdotal, Zone 7 has many of the features of a 15-minute community including amenities, high-density residential, proximity to sustainable transportation modes and proximity to employment. In contrast, Zone 4 has the lowest sustainable mode share with 7%, reflective of the land use characteristics, lack of density and distance from core services and high-frequency transit.

Table 18. Mode Shares by Zone

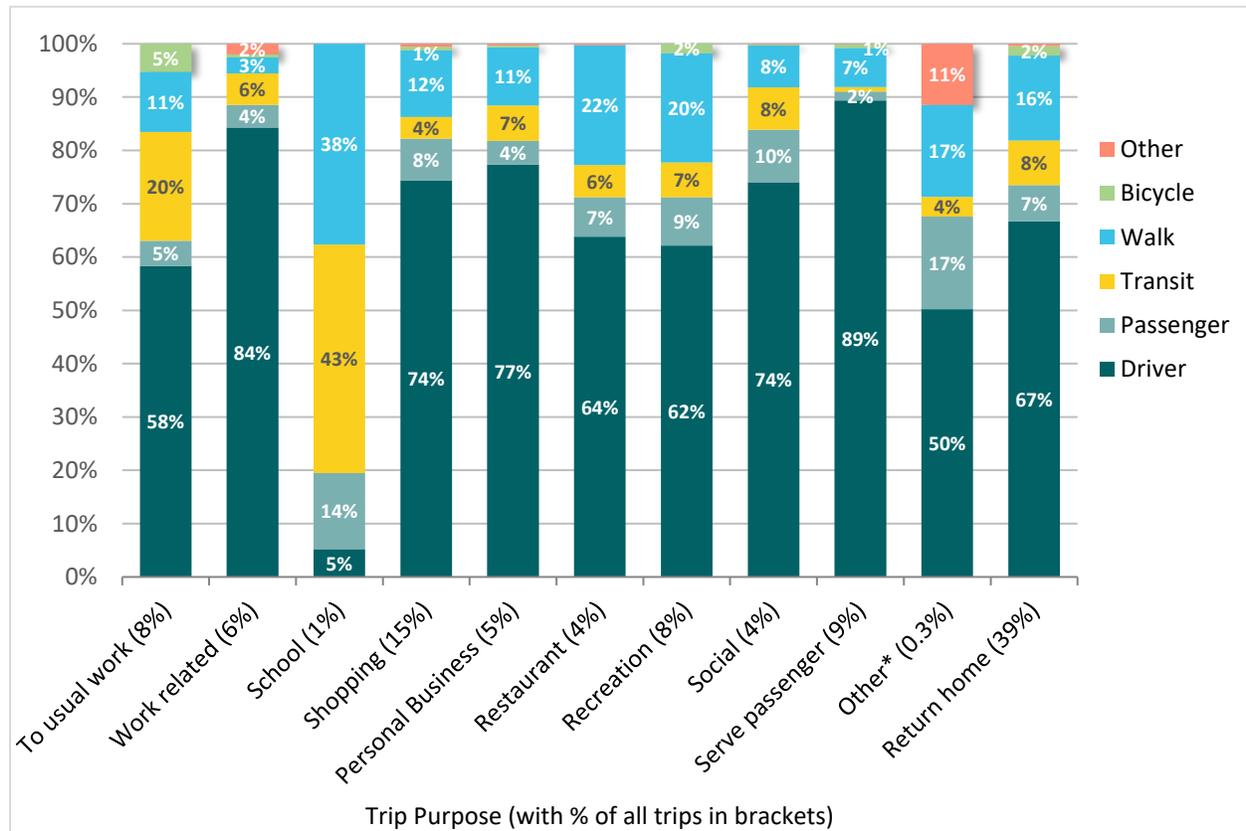
Mode Shares by Place of Residence	North Shore	Zone 1 DNV East	Zone 2 DNV Central	Zone 3 DNV West	Zone 4 DWV West	Zone 5 DWV Center	Zone 6 CNV /DWV	Zone 7 CNV Core	Zone 8 CNV /DNV E
Auto Driver	69.7%	74.7%	67.1%	73.1%	85.8%	68.5%	65.3%	54.5%	70.9%
Auto Passenger	6.5%	9.2%	6.8%	7.6%	7.1%	5.2%	3.2%	5.3%	6.3%
Transit	8.0%	4.0%	9.6%	3.5%	1.0%	9.1%	16.7%	16.2%	3.8%
Walk	13.8%	9.7%	14.1%	15.0%	4.8%	15.3%	12.8%	22.4%	14.7%
Bicycle	1.5%	2.3%	2.2%	0.5%	1.1%	1.0%	1.3%	1.3%	3.0%
Other	0.4%	0.1%	0.3%	0.3%	0.1%	0.9%	0.7%	0.3%	1.2%
Subtotals									
Sustainable (Transit + Walk + Bike)	23.3%	16.0%	25.9%	18.9%	7.0%	25.3%	30.8%	39.9%	21.6%
Active (Walk + Bike)	15.3%	12.0%	16.3%	15.4%	6.0%	16.3%	14.1%	23.7%	17.8%

4.3.4 Mode Share by Trip Purpose

Figure 43 illustrates how mode shares vary by trip purpose.

- The highest auto driver mode shares are for serve-passenger (drop off or pick up) trips (89%), work-related (84%). Personal business, shopping, and social are at 77%, 74%, and 74%.
- Passenger mode shares are highest for trips to attend school (made by the post-secondary students and high school students over the age of 15²⁹) (14%) and other purposes (17%).
- Transit shares are highest for school and work commutes (43% and 20% respectively).
- Walk mode shares are highest for school, restaurant, and recreation trips (38%, 22%, and 20% respectively).
- Cycling mode shares are highest for work commutes (5%) and recreation (2%), with shopping, serve passenger, and work-related all at 1%, and all other purposes below 0.5%.

Figure 43. Mode Share by Trip Purpose - the North Shore ³⁰



²⁹ When interpreting mode shares for trips to school, readers are reminded that the survey only included residents 15 years of age and older. I.e., the survey did not include students under the age of 15, whose mode shares would differ from those presented here for post-secondary students and high school students 15+ years of age.

³⁰ Interpret results for purposes marked with an asterisk (*) with caution due to small sample sizes (n<30 trips). Mode shares of 1% or less are included in the chart, but values are not displayed. Work-related, shopping and serve passenger have a 1% bicycle share, while shopping has a 1% Other. All other modes for which percentages are not displayed in the chart have less than 0.5% share.

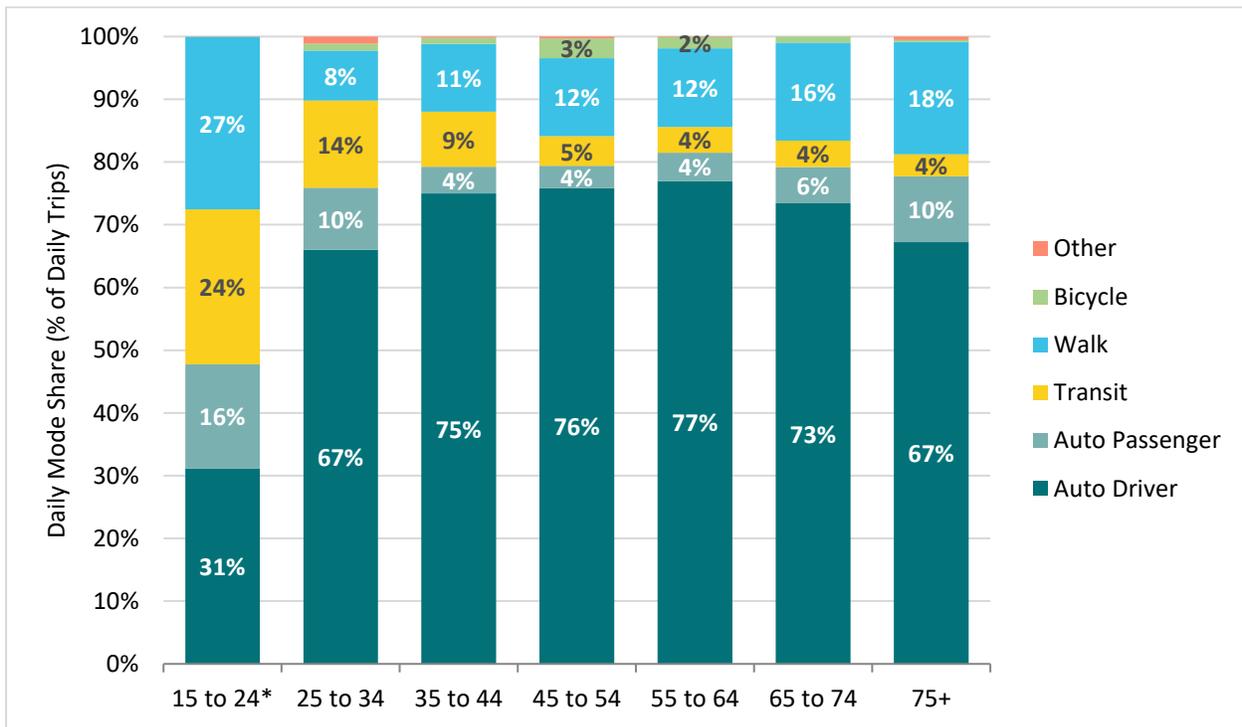
4.3.5 Mode Share by Age Group

Figure 44 shows mode shares by age group.

- Survey participants between 35 and 64 have the highest auto driver mode shares, at between 75% to 77% of their daily trips while the 15 to 24 age group has the lowest percentage with 31% of their daily trips.
- The 15 to 24 age group has the highest percentage of auto passenger trips with 16% of daily trips, while residents between 35 to 64 have 4% passenger mode shares.
- Participants in the 15 to 24 age group have the highest percentage of transit trips, at 24% of their daily trips, while those in age groups older than 45 have only 4%-5% transit mode shares.
- Participants in the 15 to 24, 65 to 74, and 75+ age groups have the highest percentages of walking trips, with 27%, 16% and 18%, respectively.

Results for the 15-24 age group should be interpreted with caution due to small sample size.

Figure 44. Mode Share by Age Range – North Shore ³¹



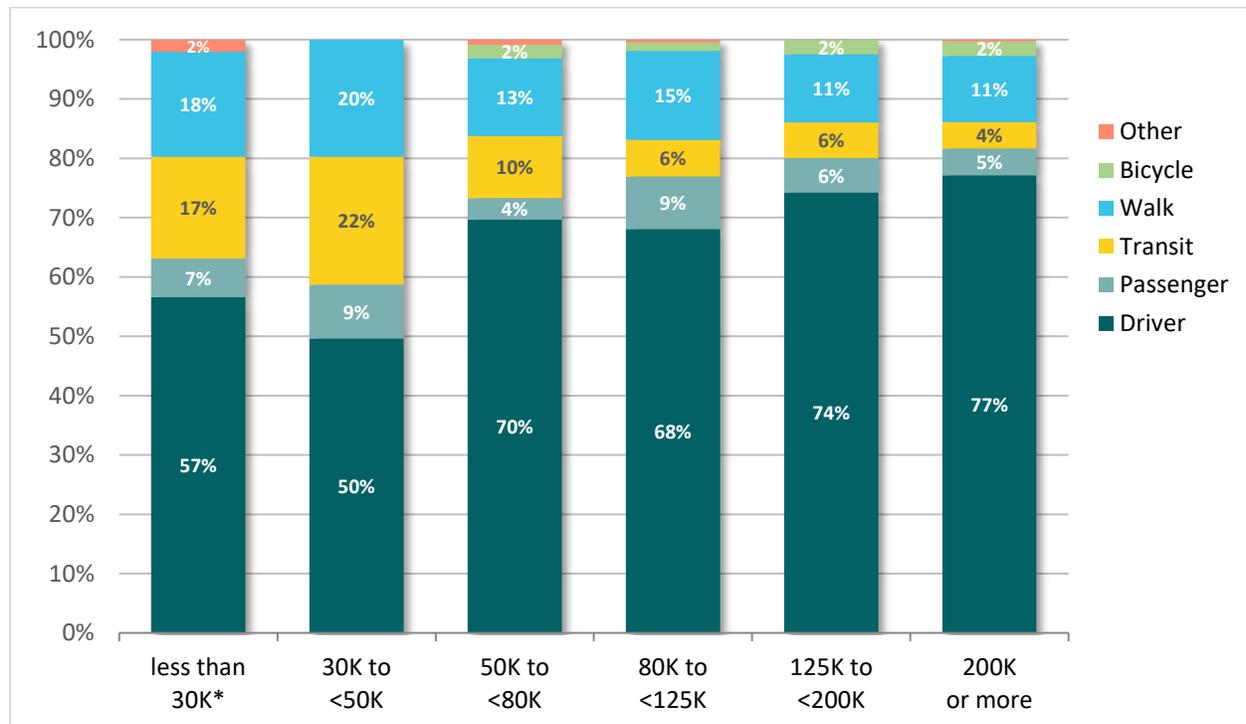
³¹ Age groups with an asterisk “*” have modest samples size (n<150 trips) and should be interpreted with caution. Mode shares of 1% or less are included in the chart, but values are not displayed. Bicycling has a 1% mode share for age ranges of 25-34, 35-44, and 65-74, and less than 0.5% for 15-24 and 75+. Other modes (low speed motor vehicle, taxi, ride-hail, ferry, airplane, etc.) have shares of less than 0.5% for all age ranges except 25-34 (1%) and 75+(1%).

4.3.6 Mode Share by Income

Figure 45 shows mode shares by household income.

- Vehicle use increases with income, with auto driver trips representing between 50% and 57% of trips for the lowest-income households (residents with annual household income of less than \$30K, and those of between \$30K and \$50K) and increasing to three-quarters of all trips for the highest (74% mode share for those with incomes greater than \$200k per year).
- Use of public transit is highest amongst lower-income households. 17% of trips made by those in the lowest-income (less than \$30k per year) households are via transit and 22% for those with incomes of \$30k to \$50k. This drops as income increases, from 10% for those in households with \$50k to \$80k, and only 4% for those with incomes of \$200k or more.
- Almost one in five trips made by residents of the lowest-income households are via walking, at 18% to 20% for residents with less than \$30K income and between \$30K to \$50K respectively, dropping 11% for residents of households in the income brackets greater than \$125K.
- The results show negligible bicycle mode shares for lower income households below \$50K. Higher income brackets show 2% mode shares except for \$80-125K, at 1%.

Figure 45. Weekday Mode Share by Household Income – North Shore ³²

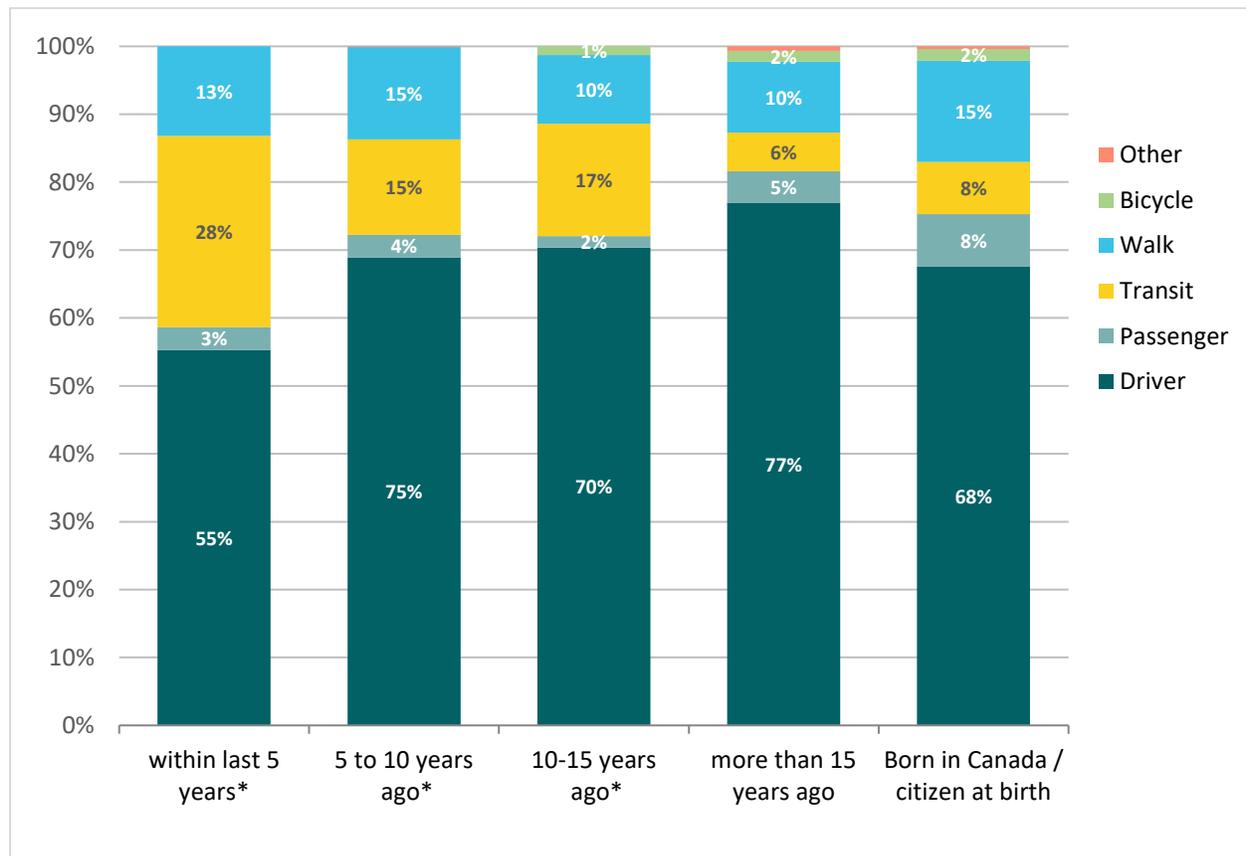


³² Income groups with an asterisk “*” have smaller samples size and should be interpreted with caution. Mode shares of 1% or less are included in the chart, but values are not displayed. Bicycling has a 1% mode share for ‘80K to <125K’. Other modes (low speed motor vehicle, ride-hail, taxi, ferry, airplane, etc.) has a 1% mode share for ‘50K to <80K’ and for ‘80K<125K’. All other mode shares for which percentages are not listed have less than a 0.5% share.

4.3.7 Mode Share by Immigration Status/Year

The survey results suggest that recent immigrants (those who settled in Canada within the last five years) are more likely to be reliant on transit, with a 28% transit mode share (Figure 46). Residents who were born in Canada or who immigrated more than 15 years ago had the lowest transit mode shares, at 8% and 6% respectively. Interestingly, immigrants who settled in Canada more than 15 years ago appear to have the highest auto driver mode shares. The results for the more recent immigrants, that is the three groups who all immigrated within the last 15 years, should be interpreted with caution due to the relatively small samples, nevertheless, the data does suggest decreased transit use and increased auto driving as immigrants become more established. Also of note, while cycling mode shares were low for all groups, they were non-existent for immigrants within the last ten years who participated in the survey.

Figure 46. Weekday Mode Share by Immigration Status – North Shore ³³

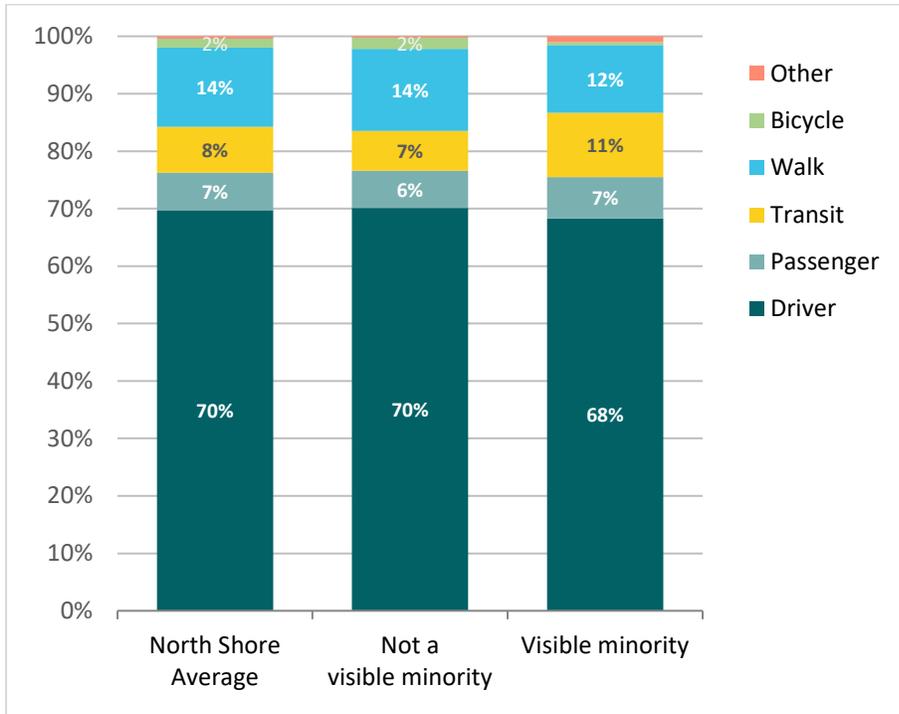


³³ Groups with an asterisk "*" have smaller samples size (n<150 trips) and should be interpreted with caution. Non-permanent residents and participants who declined to say whether or when they immigrated are suppressed. Mode shares of 1% or less are included in the chart, but values are not displayed. Bicycling has a 1% mode share for participants who immigrated within the last five years. Other (low speed motor vehicle, ride-hail, taxi, ferry, airplane, etc.) has a 1% mode share for those who immigrated more than 15 years ago. All other mode shares for which percentages are not listed have less than a 0.5% share.

4.3.8 Mode Share for Visible Minority Populations

The survey results suggest that people who self-identified in a visible minority population group are more likely to use transit, with an 11% mode share, compared to 7% for non-minorities (Figure 47). Auto reliance is roughly equivalent for both minorities and non-minorities alike (with driver and passenger shares summing to 75% and 76% respectively). Also of note, while the average cycling mode share is low in this survey cycle (2%), it is only 0.5% for visible minorities. Survey sample sizes for individual racial identity groups were too small to allow for a more detailed analysis by specific population group.

Figure 47. Mode Shares for Visible Minorities – North Shore ³⁴



³⁴ Results for participants who declined to answer on the racial identity question are excluded. Mode shares of 1% or less are included in the chart, but values are not displayed. Other (low speed motor vehicle, ride-hail, taxi, ferry, airplane, etc.) has a 1% mode share for participants whose answers suggest that they belong to a visible minority population group.

4.4 Trip Distributions

This section describes the trip distributions for trips reported by survey participants, including the trip origin and destinations and internal capture of trips.

4.4.1 Trip Origins and Destinations

Table 19 shows the origin-destination (O-D) flows by the sub-municipal Zone. The O-D matrix is generally balanced between the O-D zones.

Of the estimated 513,100 total daily trips made by North Shore residents 15+ years of age:

- 73% (375,500 trips) are made entirely within the North Shore;
- More than one fifth (22%, or 113,200 daily trips) are between the North Shore and places external to the North Shore (about equally split between those leaving and returning to the North Shore); while
- 5% are made entirely outside the North Shore (29,900 trips with both the origin and destination being external).³⁵

Zone 5 (DWV central) and Zone 7 (CNV core) are the most popular destination zones, respectively attracting 42,800 and 42,400 daily trips from other zones each day (with equivalent numbers of trips outbound from these zones). These two zones have the highest amount of commercial land uses on the North Shore including a regional shopping centre and regional athletic fields in Zone 5 and a central business district and recreation district in Zone 7.

Looking at flows to destinations external to the North Shore, the City of Vancouver downtown peninsula (CBD/West End) attracts 17,800 trips from the North Shore each day, the rest of Vancouver/University Endowment Lands (UEL) attracts 20,700, and Burnaby 7,600 (with equivalent numbers of trips returning home to the North Shore from all of these external locations). Other destinations south of the North Shore combined attract another 3,300 daily trips, while about 1,200 daily trips are destined to locations north of the North Shore or other external locations outside the MVRD and the Fraser Valley Regional District (FVRD).

All told, trips from the North Shore to destinations south of the North Shore accounted for 54,900 daily trips, down 19% from the 67,700 estimate in the 2019 survey results. This compares to an 8% reduction in trips within the North Shore. Assuming that many trips to MVRD are for work purposes, this is likely a reflection of the ongoing reduced commuting volumes associated with the COVID-19 pandemic. Despite the survey period falling between peaks of the waves of COVID-19 infections, more workers were still working from home.

³⁵ For example, if a North Shore resident who works in Vancouver walks from work in downtown Vancouver to a downtown Vancouver cafe for lunch, then from the cafe back to work, the trips to and from the cafe would be considered entirely external to the North Shore. Such external trips are counted in the daily trip totals for the survey participant. If a survey participant travelled to a faraway place outside the Lower Mainland travel area, such as Toronto, then made trips while in Toronto, the trips within Toronto would not be included in the survey dataset.

The highest flows between individual zones are from Zone 5 (DWV central) to Zone 4 (DWV west) with around 16,100 daily trips. For most zones, trips within that zone account for the majority of trips. This is discussed more in Section 4.4.2

Table 19. Origin-Destination Flows by Zone (Daily Trips Made by Residents of the North Shore)

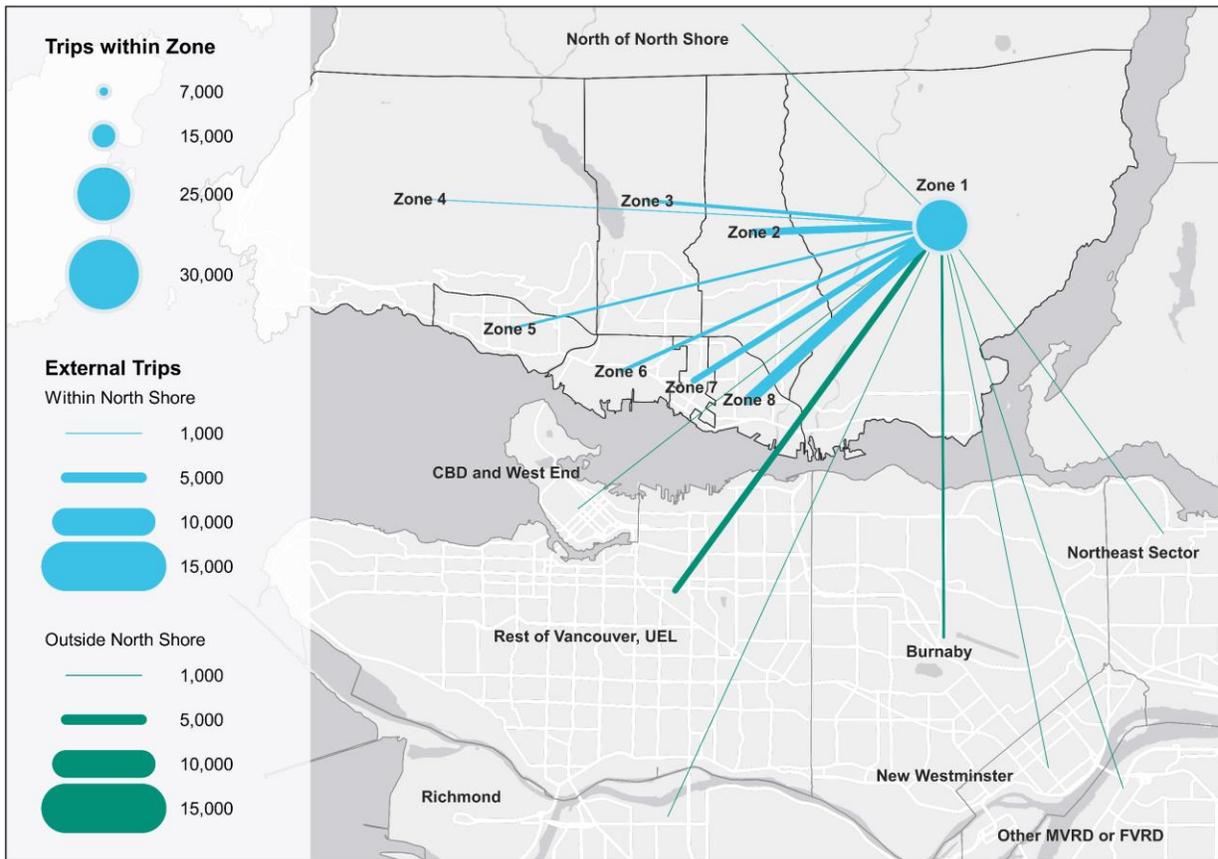
Destination Origin/Destination	Destinations on the North Shore								External Destinations								Total Daily Trips	
	Zone 1 DNV East	Zone 2 DNV Central	Zone 3 DNV West	Zone 4 DWV West	Zone 5 DWV Center	Zone 6 CNV /DWV	Zone 7 CNV Core	Zone 8 CNV /DNV E	Van CBD / West End	Rest of Van	Rich- mond	Burn- aby	New West	NE Sector	Other MVRD/ FVRD	North of North Shore		Other External
Zone 1 DNV (East)	24,400	4,000	2,400	1000	2,000	2,500	3,600	5,500	700	3,500	200	2,000	-	100	700	500	-	53,400
Zone 2 DNV (Central)	3,200	17,900	3,000	900	2,000	2,800	6,900	4,800	2,800	1,300	700	3,000	200	400	800	-	-	50,600
Zone 3 DNV (West)	2,600	2,900	20,100	2,800	6,400	4,200	3,900	2,600	1,900	2,600	400	800	-	100	200	-	-	51,500
Zone 4 DWV (West)	1,100	700	2,200	15,300	14,600	2,000	1,300	1,300	2,500	2,000	700	900	100	300	200	400	-	45,500
Zone 5 DWV (Center)	1,100	1,700	6,600	16,100	30,500	4,400	4,100	2,400	3,100	1,900	200	500	200	-	300	-	500	73,800
Zone 6 CNV/DWV (Outer)	2,700	2,900	5,400	1,800	5,100	17,000	6,700	2,700	2,400	2,500	300	1500	-	-	500	-	-	51,600
Zone 7 CNV (Core)	3,800	6,200	3,300	1,600	4,600	8,100	26,700	6,000	3,600	2,100	800	900	200	900	700	200	-	69,300
Zone 8 CNV/DNV (East)	5,400	4,700	3,000	700	1600	3,200	6,400	7,800	800	1,500	100	900	-	100	400	100	-	36,900
Van CBD/West End	1,000	3,000	1,600	1,800	3,100	2,000	3,100	600	3,000	1,400	100	600	-	-	100	-	-	21,400
Rest of Vancouver/UEL	3,600	1,800	2,500	2,100	1,600	1,700	2,600	1,400	1,000	5,000	-	1300	100	-	200	-	-	25,100
Richmond	100	700	100	600	400	700	600	300	100	300	600	200	-	-	-	-	-	4,800
Burnaby	2,200	2,800	700	700	800	1800	1,300	1,200	100	800	100	4,900	-	600	300	-	-	18,400
New Westminister	100	100	-	-	100	200	200	-	-	-	-	100	100	-	-	-	-	1,000
Northeast Sector	400	400	-	100	-	400	500	200	300	-	-	100	-	200	-	-	-	2,600
Other MVRD/FVRD	700	500	200	100	200	300	900	300	-	100	400	400	100	-	1,200	-	-	5,400
North of North Shore	500	-	-	100	-	-	200	-	-	100	-	-	-	-	-	200	100	1100
Other External	-	100	-	100	100	-	100	500	-	-	100	-	-	-	-	-	100	1100
Total Daily Trips	52,900	50,500	51,300	45,900	73,300	51,400	69,100	37,500	22,300	25,100	4,600	18,200	900	2,700	5,500	1400	700	513,200

Blue shading is used to highlight greater trip volumes, with the intensity of the colour increasing with volume. Grey shading indicates trips entirely within the given zone (both origin and destination).

4.4.2 Trip Desire Line Maps

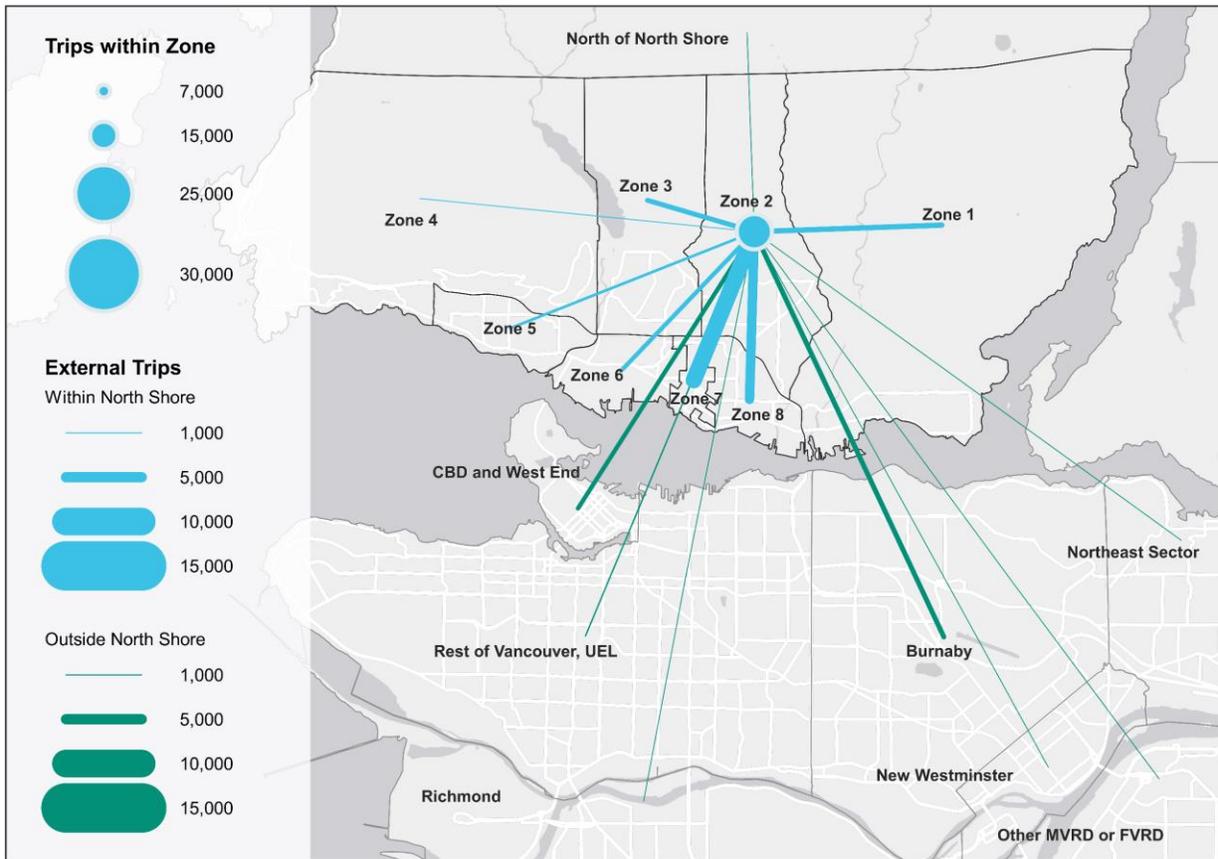
The following maps graphically represented the volumes of trips made by residents of each zone, both within the given zone and from the given zone to other zones on the North Shore and elsewhere in Metro Vancouver. Below each map, volumes to destinations internal and external to the North Shore are noted in a table.

Figure 48. Destinations of Daily (24-Hour) Trips from Zone 1



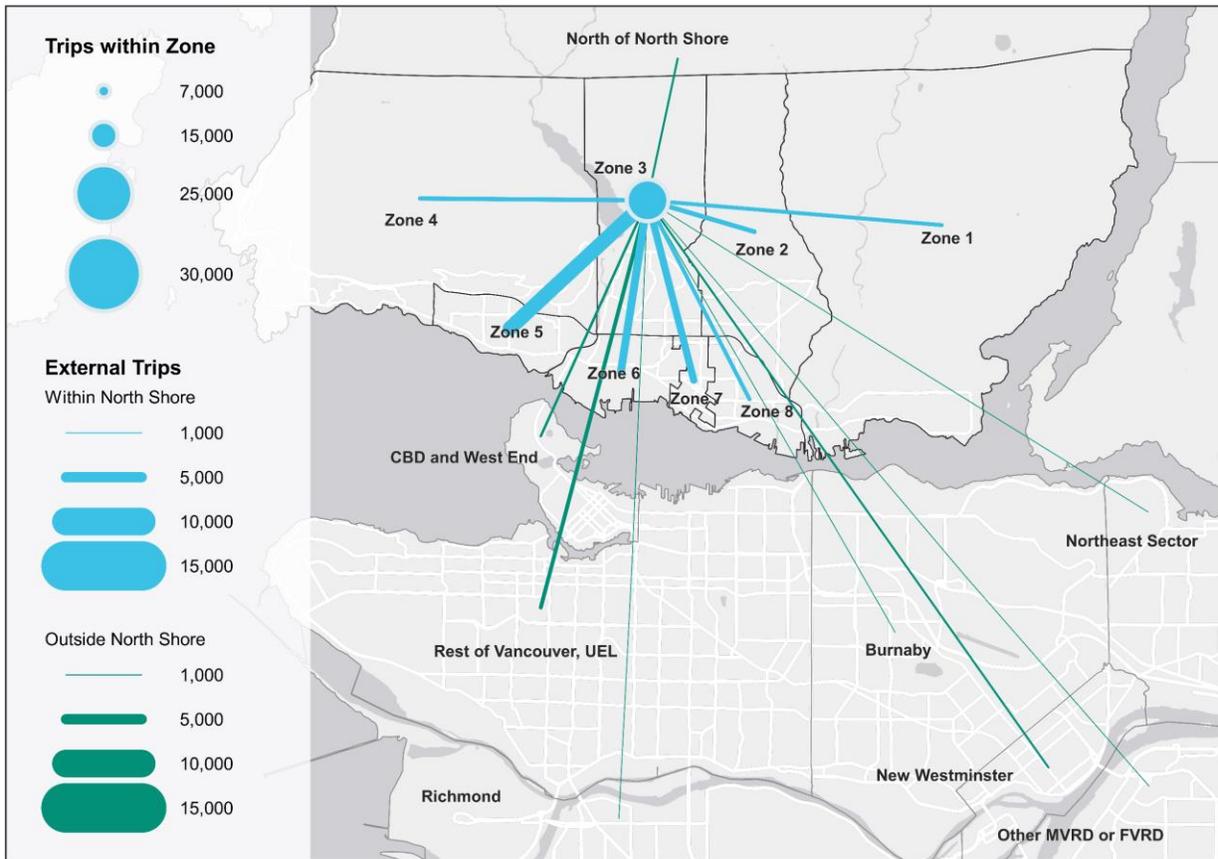
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
24,400	4,000	2,400	1,000	2,000	2,500	3,600	5,500
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
700	3,500	200	2,000	0	100	700	500

Figure 49. Destinations of Daily (24-Hour) Trips from Zone 2



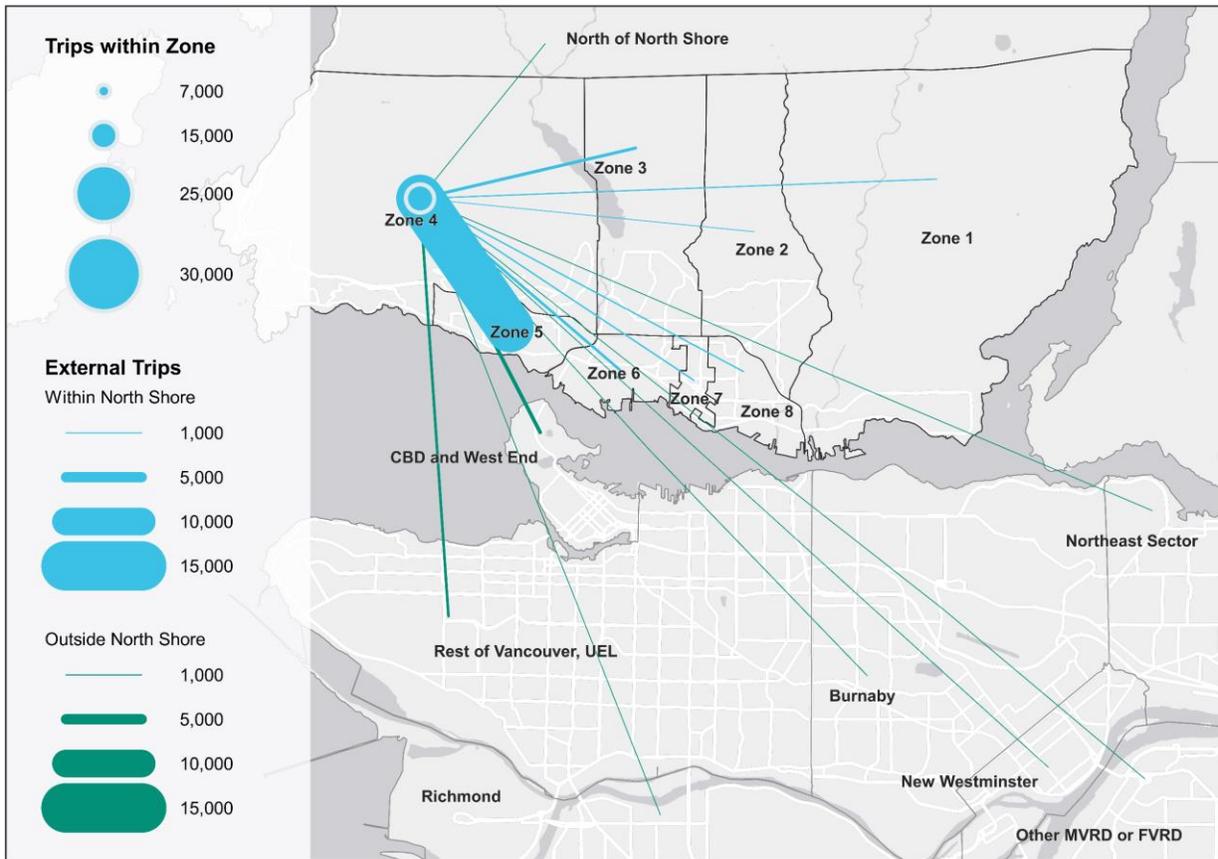
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
3,200	17,900	3,000	900	2,000	2,800	6,900	4,800
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
2,800	1,300	700	3,000	200	400	800	0

Figure 50. Destinations of Daily (24-Hour) Trips from Zone 3



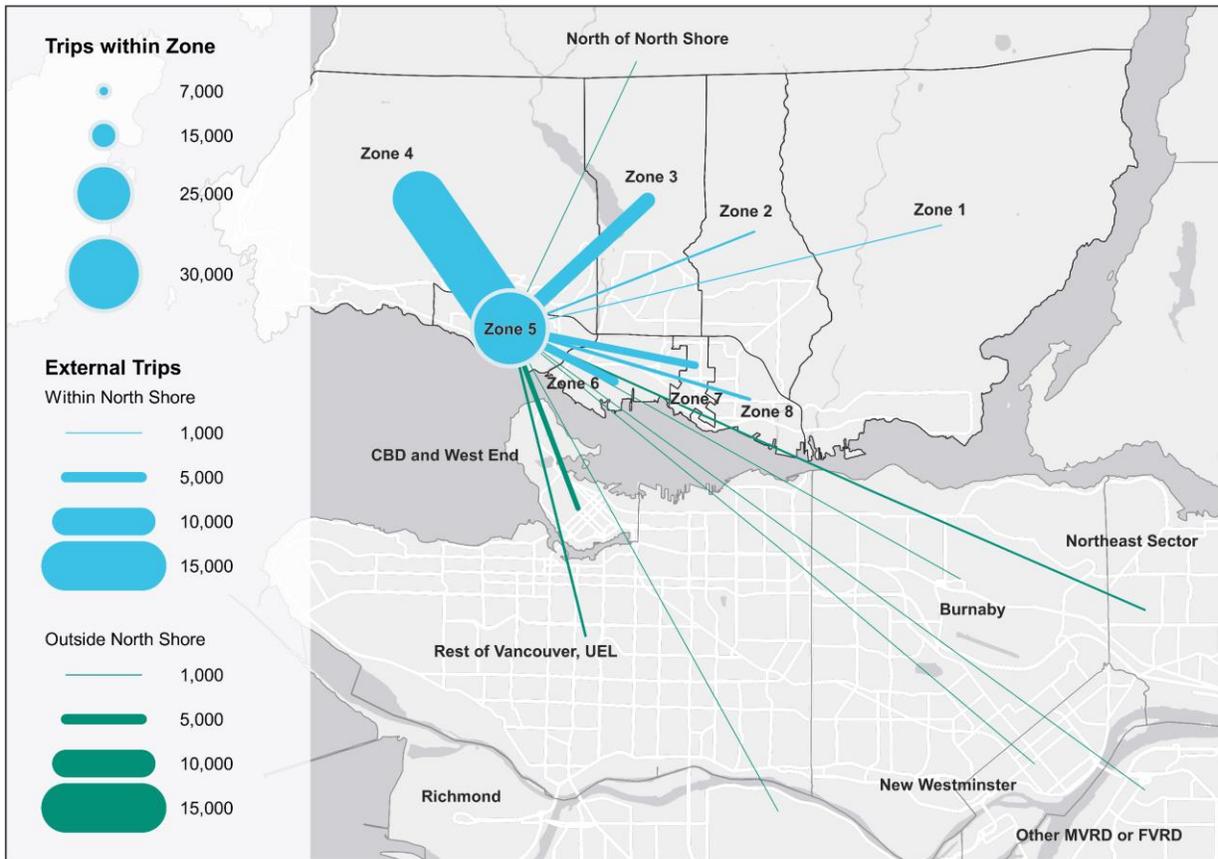
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
2,600	2,900	20,100	2,800	6,400	4,200	3,900	2,600
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
1,900	2,600	400	800	0	100	200	0

Figure 51. Destinations of Daily (24-Hour) Trips from Zone 4



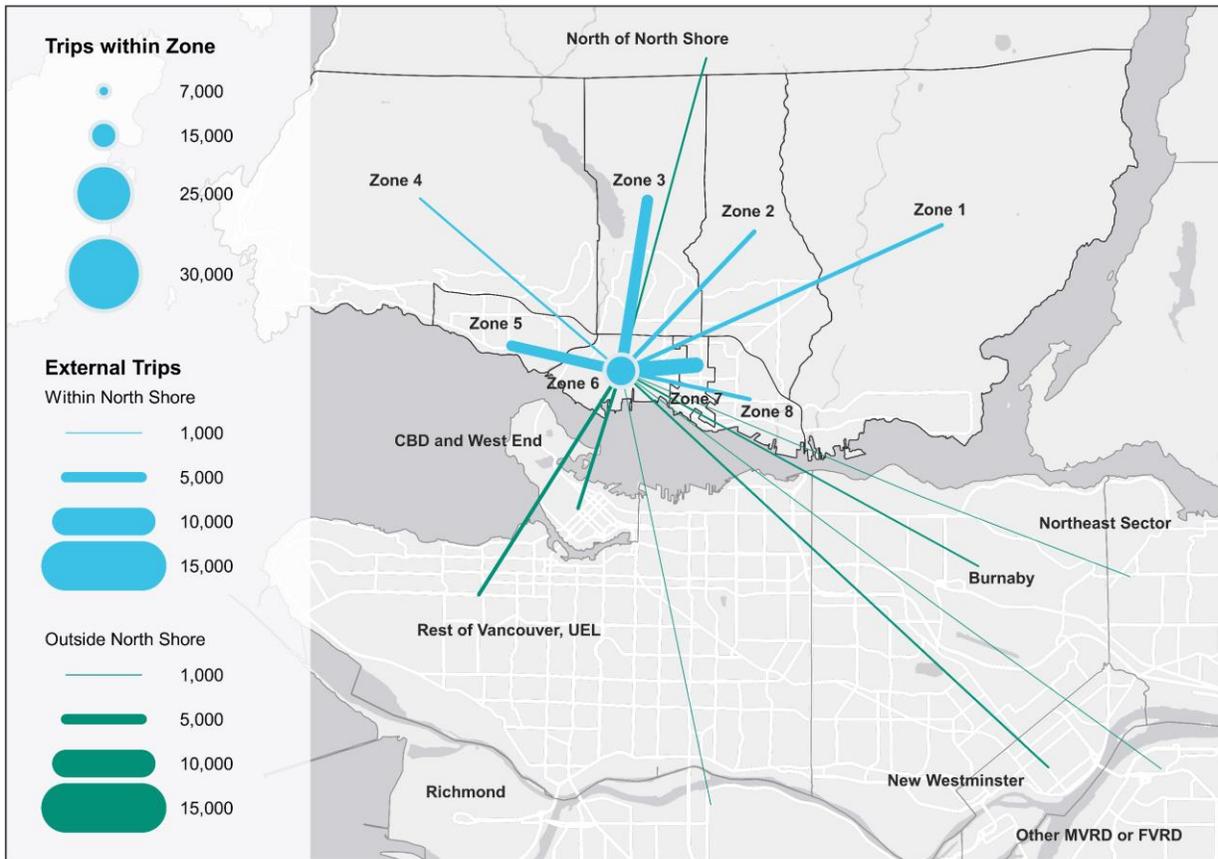
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
1,100	700	2,200	15,300	14,600	2,000	1,300	1,300
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
2,500	2,000	700	900	100	300	200	400

Figure 52. Destinations of Daily (24-Hour) Trips from Zone 5



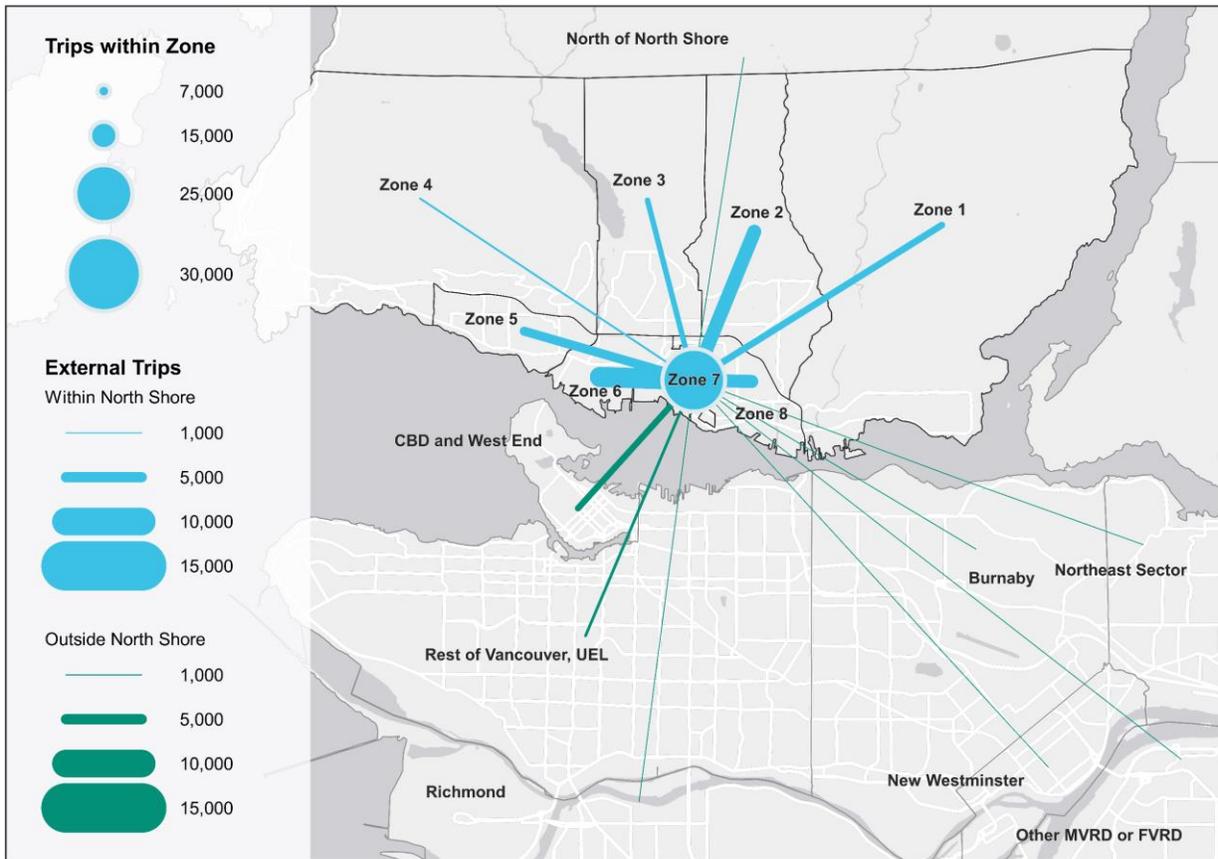
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
1,100	1,700	6,600	16,100	30,500	4,400	4,100	2,400
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
3,100	1,900	200	500	200	0	300	0

Figure 53. Destinations of Daily (24-Hour) Trips from Zone 6



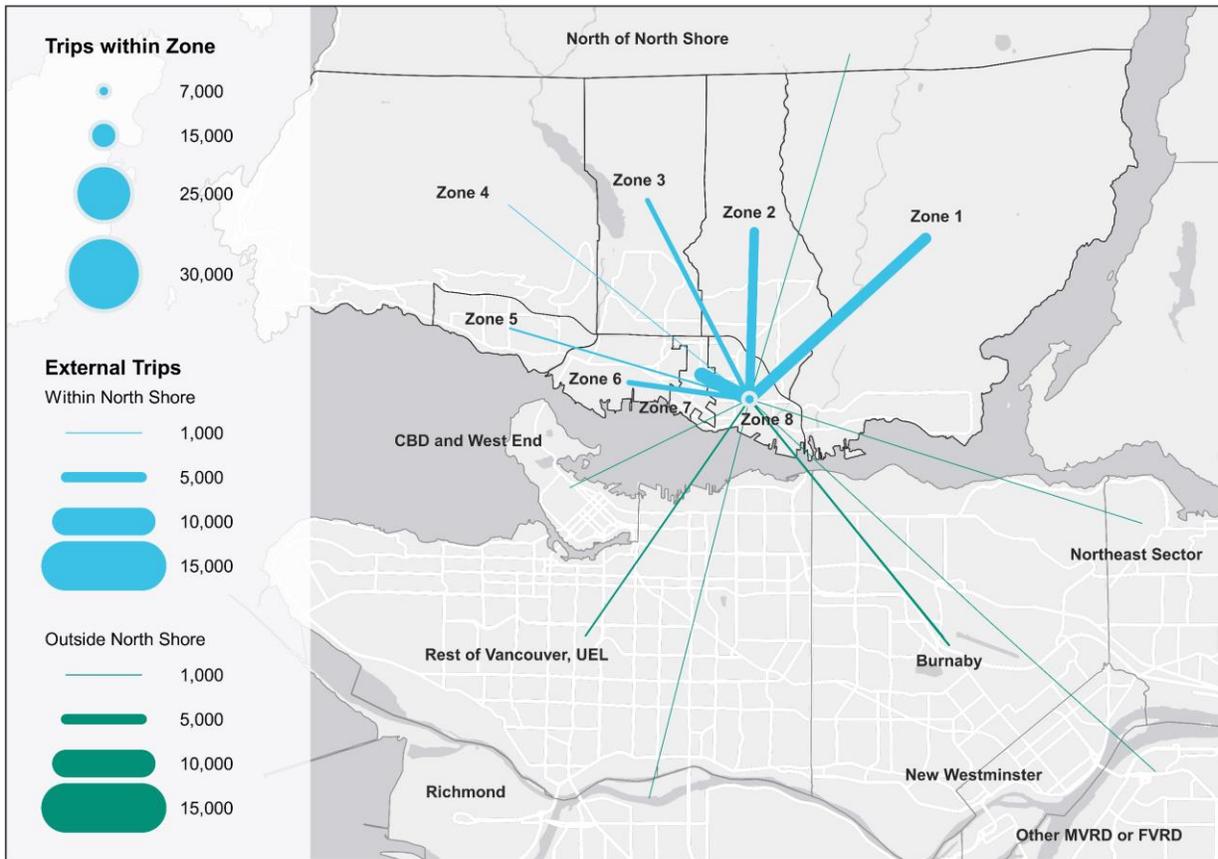
Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
2,700	2,900	5,400	1,800	5,100	17,000	6,700	2,700
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
2,400	2,500	300	1,500	0	0	500	0

Figure 54. Destinations of Daily (24-Hour) Trips from Zone 7



Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
3,800	6,200	3,300	1,600	4,600	8,100	26,700	6,000
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
3,600	2,100	800	900	200	900	700	200

Figure 55. Destinations of Daily (24-Hour) Trips from Zone 8



Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
5,400	4,700	3,000	700	1,600	3,200	6,400	7,800
Vancouver CBD / West End	Rest of Vancouver	Richmond	Burnaby	New Westminster	Northeast Sector	Other MVRD or FVRD	North of North Shore
800	1,500	100	900	0	100	400	100

4.4.1 Crossings of Burrard Inlet

Table 20 shows the crossing use by the destination for flows originating from the North Shore. Each day, residents of the North Shore make almost 54,900 southbound trips that cross Burrard Inlet to get to destinations in the rest of the Metro Vancouver Region (with an equivalent number of northbound return trips back to the North Shore).

- Lions Gate Bridge carried almost 64% of traffic destined to Vancouver CBD/West End, 37% of the traffic to the rest of Vancouver/UEL and 52% of the traffic to Richmond.
- Ironworkers Memorial Second Narrow Bridge carried 94% or more of traffic destined to Burnaby, New Westminister, Northeast Sector, and FVRD.
- The SeaBus carried 10% of traffic destined outside the North Shore (mainly Vancouver CBD, Rest of Vancouver, Richmond, and Burnaby). SeaBus usage is highest for trips destined to the Vancouver CBD/West End (19% of trips to this area) and Richmond (23%).

The survey results suggest that the volume of trips by residents to destinations south of the North Shore is down by about 19% compared to 2019, with a greater drop in trips via the Lions Gate Bridge than via other crossings. Note: some of the variance on crossing choice for destinations with smaller volumes of trips may be the result of small sample sizes rather than an actual shift in travel patterns.

Table 20. Crossing Use for Southbound Origin-Destination flows between North Shore and Rest of Metro Vancouver Region ³⁶

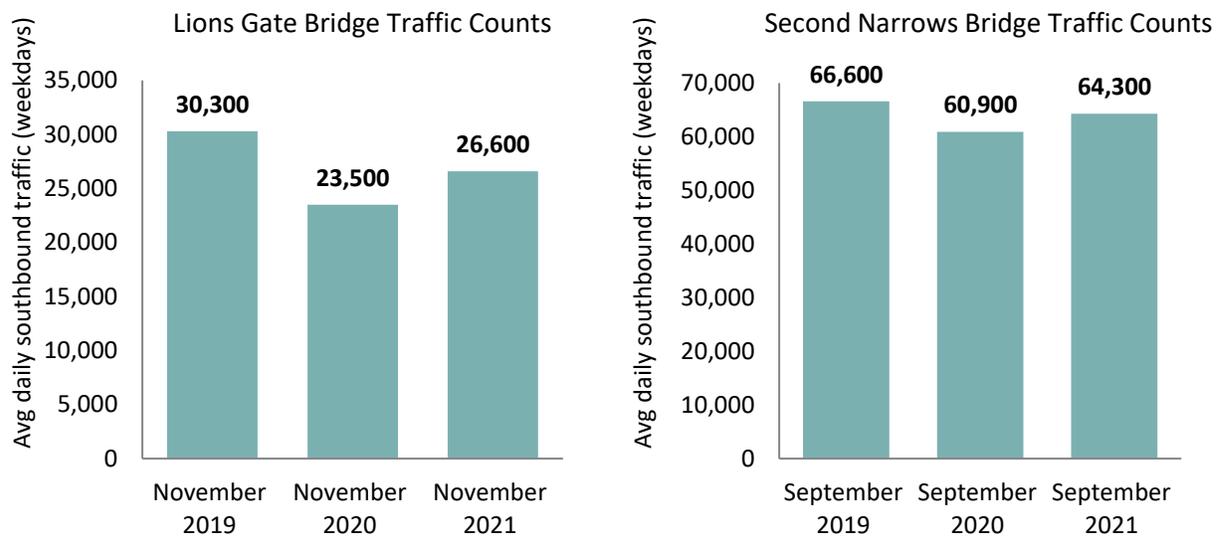
Destination	Survey Year	Estimated Daily Trips	% of Daily Trips made by North Shore residents via Each Crossing (row %)		
			Lions Gate Bridge	Ironworkers Memorial Second Narrows Crossing	SeaBus
Vancouver CBD/West End	2019	29,960	66%	14%	20%
	2021	17,760	64%	17%	19%
Rest of Vancouver, UEL	2019	20,650	51%	43%	6%
	2021	17,360	39%	56%	5%
Richmond	2019	2,290	40%	44%	16%
	2021	3,330	52%	24%	23%
Burnaby	2019	10,590	1%	96%	4%
	2021	10,550	3%	94%	4%
New Westminister	2019	1,600	0%	100%	0%
	2021	520	0%	100%	0%
Northeast Sector	2019	2,200	0%	100%	0%
	2021	1,650	0%	100%	0%
Other Metro Van./FVRD	2019	3,500	7%	92%	0%
	2021	3,730	2%	98%	0%
Total Trip Destinations South of the North Shore	2019	67,790	44%	46%	11%
	2021	54,900	38%	52%	10%

³⁶ Excludes 'Other' crossing methods such as via airplane or private boat. Percentages calculated excluding trips for which crossing used is unknown.

The charts in **Figure 56** below show volumes in total southbound traffic counts across both the Lions Gate and Second Narrows bridges from 2019 to 2021 for all vehicles, including those driven by non-residents of the North Shore and including vehicles on commercial trips. The results show that southbound traffic counts on both bridges dropped considerably in 2020 with some recovery in 2021. In 2021, traffic counts on the Lions Gate Bridge were 13% below 2019 levels, while the traffic counts on the Second Narrows Bridge were only 3% below 2019 levels.

Caution should be exercised when comparing the traffic count information to the survey data on crossings, as the crossing flows reported on in the survey data include all modes of travel, including auto driver, auto passenger, public transit, and other modes, whereas the traffic count data include only vehicle counts.

Figure 56. Bridge Traffic 2019 – 2021³⁷

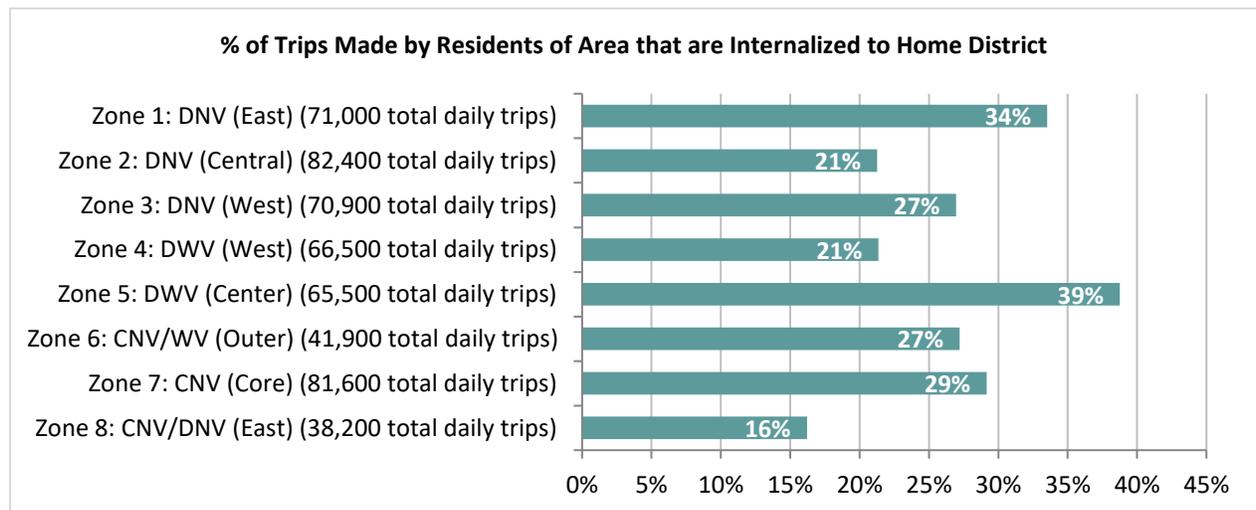
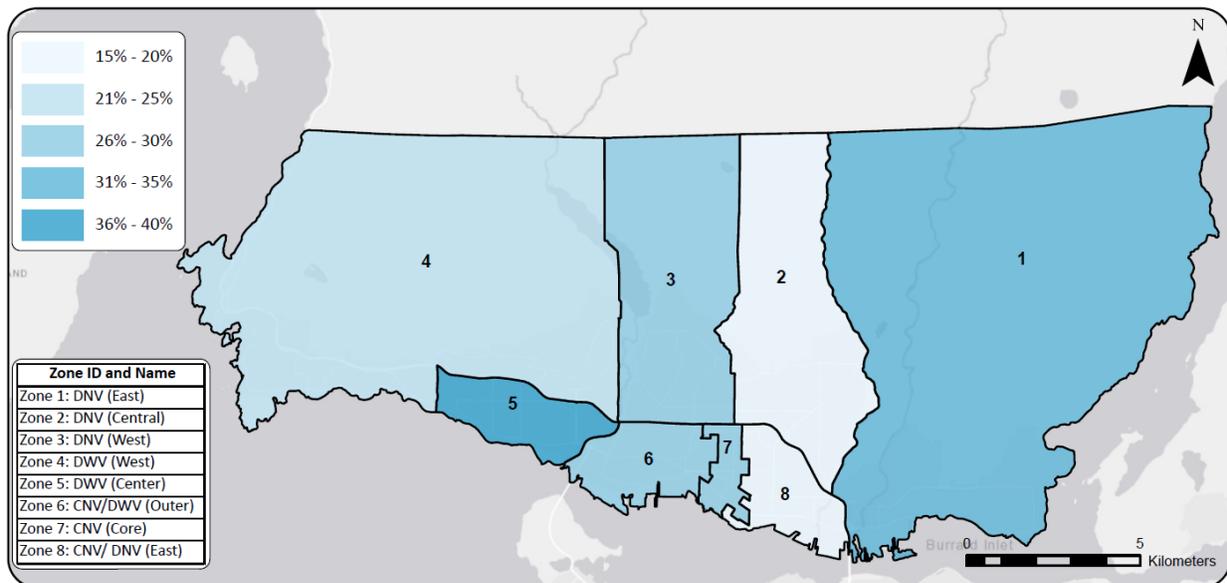


³⁷ Source: Ministry of Transportation and Infrastructure's Traffic Data Program (<https://www.th.gov.bc.ca/trafficdata/>, last accessed June 2022). November counts are used for Lions Gate Bridge to correspond with the timeframe of the survey. As November 2021 counts by day of week were not available for Second Narrows Bridge, September counts were used for all years.

4.4.2 Trip Internal Capture

Figure 57 shows the trip internal capture, or ‘internalization’ of trips, for each of the sub-municipal zones, or the proportion of trips made by residents of the zone that remain within the zone. This provides an indication of the extent to which shopping, services, work, and other trip purposes are met locally. Zone 5 DWV (Center) captures around 39% of trips made by its residents which is the highest percentage of all zones, with the wide range of amenities within the zone and the high proportion of retired people (about 40% of residents over the age of 15 in this zone are retired) likely being factors. Zone 8 CNV/DNV (East) captures 16% trip internalization which is the least among all zones. The fact that Zone 7 CNV (Core) has only 29% internalization despite its urban density is likely the result of the large number of Zone 7 residents commuting to work locations south of the North Shore (even despite the increase in work from home during the COVID-19 pandemic and reduction in southbound trips).

Figure 57. Map of Internalization of Trips made by Residents of Each Zone

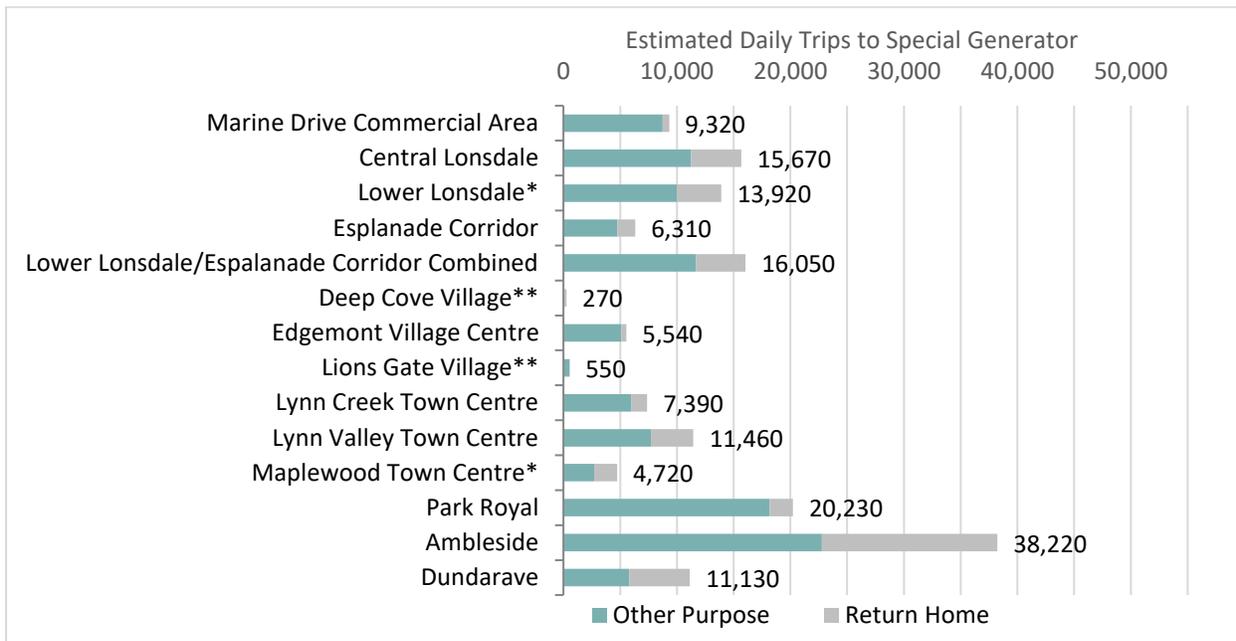


4.4.3 Special Generators

Figure 58 shows the survey estimates of the number of daily trips made by North Shore residents to selected ‘special generators’, popular North Shore destinations that attract trips made by residents, (including trips made within the boundaries of these generators). Some of the areas of interest to the municipalities are largely commercial areas or town centres, while others are entire neighbourhoods with a mix of both residential and commercial/institutional land uses (e.g., Ambleside and Dundarave). The graph shows return home trips in a different colour than trips for other purposes outside the home in order to distinguish the volumes of trips for purposes or activities that attract travellers to each generator (other than residents of the area simply returning home). The mix of return home trips are different for each generator depending on how many residential dwellings there are within the geographic boundaries provided for each generator. Readers are reminded that the survey results are not exact counts but are survey estimates based on trip destinations reported by a 1.3% sample of the population aged 15+ years.

The trips to the special generator areas account for 27% of North Shore residents’ daily trip destinations including external destinations outside the North Shore, or 33% of residents’ North Shore destinations (excluding external destinations). Looking at just purposes outside the home (i.e., excluding return home trips), trips to the special generators represent 32% of North Shore residents’ destinations outside the home or 44% of their destinations on the North Shore.

Figure 58. Daily Trips Made by North Shore Residents to Special Generator Destinations ³⁸



³⁸ The Lower Lonsdale and Esplanade Corridor areas overlap. Results have been presented separately as well as combined. The majority of the Esplanade Corridor destinations are within the Lower Lonsdale boundaries as well. * Interpret special generators marked with an asterisk (*) with caution due to small sample sizes (n=40 to 60 trip records with destinations within the boundaries of the special generator). ** Interpret special generators marked with two asterisks (**) with extreme caution due to smaller sample sizes (n<20 trip records with destinations within the boundaries of the special generator)

4.5 Trip Distance and Duration

Trip distances and durations for each trip captured in the survey data have been estimated for the most efficient route available based on the trip origin, destination, mode of travel, and time of day of travel. As shown in **Figure 59**, auto drivers have the longest trip distance for home-based work trips, averaging 12.7 km, while transit users have the longest trip distance for all trips, averaging 11.3 km. The shortest trips are made by those who walk, averaging 0.9 km for work trips and 1.0 km for all trips. Interestingly, the average distance of transit work trips (12.1 km) is similar to the average distance of auto driver work trips (12.7 km).

Comparison to the results from 2019 revealed some differences in the average work commute distances by mode. The average trip distance for auto driver work trips decreased from 14.1 km in 2019 to 12.7 km in 2021, while the average across all auto driver trips has remained the same. Conversely, the average length of auto passenger work trips increased from 8.6 km to 9.8 km, as did the average transit work trip, from 11.7 km to 12.1 km, walk work trips remained the same at 0.9 km, while the average bicycle work trip decreased from 10.3 km to 9.5 km (although this result should be interpreted with caution due to the small sample of bicycle work trips). Shifts in average length of these trips could be related to an increase in work from home, particularly the decrease in average length of auto driver trips.

Figure 59. Average trip Distance for Home-based Work Trips and All Trips – North Shore³⁹

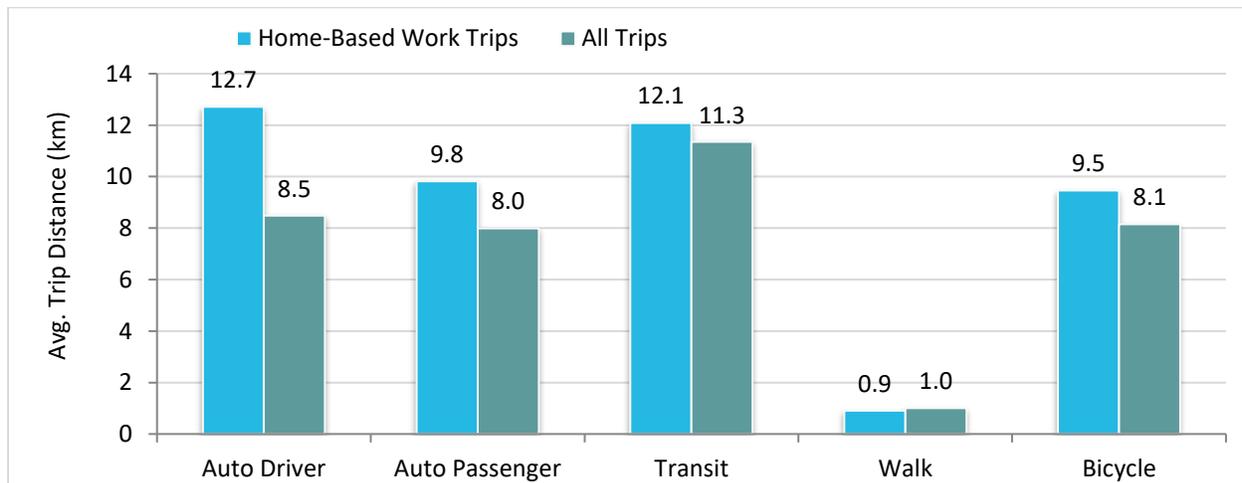


Table 21 shows the daily person-km trips on weekdays across modes. Auto driver trips account for 79% of the daily person-km travelled and auto passenger accounts for an additional 7%. Transit trips account for 11% of total person-km travelled.

³⁹ Other modes are excluded due to small sample size

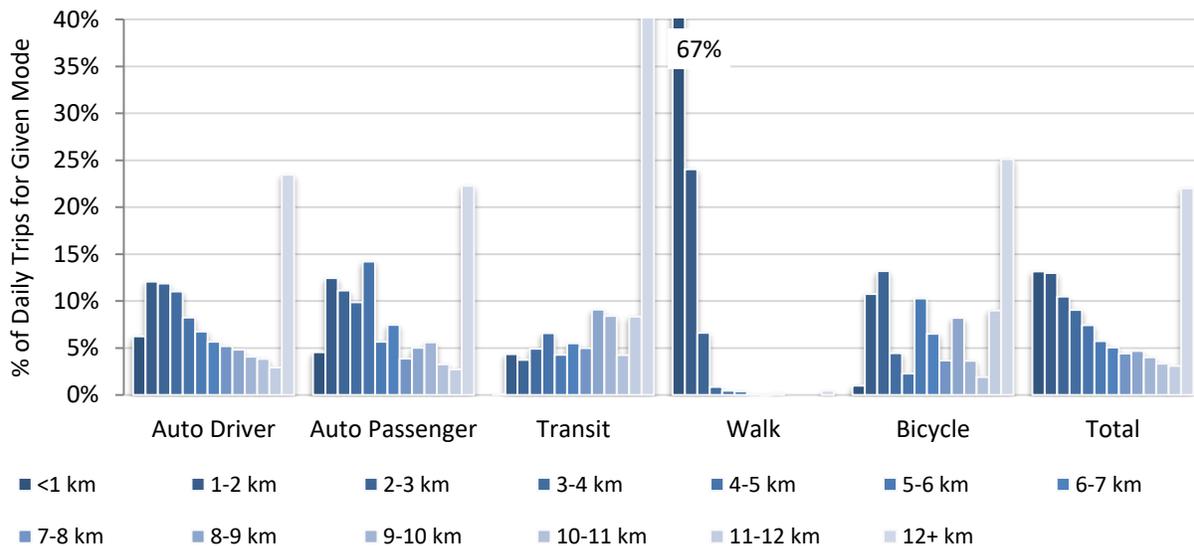
Compared to 2019, person-km travelled has decreased for all modes, with the largest decrease being observed for bicycle trips (-36%), followed by transit (-15%), and auto passenger or walking trips (-12% each). These changes may be due to an increase in the number of people working from home and therefore not commuting to and from work on a regular basis. Of note, the distances travelled via auto driver trips did not drop as much as other modes (only a 5% reduction). There may be a number of factors at play in the preceding observations, including the possibility that some of the jobs that are easiest to commute to via transit and other sustainable modes (e.g., office jobs in central business districts that are well serviced by transit, cycling, and pedestrian infrastructure) may also be the kinds of jobs that are easiest to do from home.

Table 21. Total Daily Person-KM on Weekdays ⁴⁰

Total Daily Person-Km (Weekdays)						
	Auto Driver	Auto Passenger	Transit	Walk	Bicycle	Other*
2019	3,198,400	300,000	616,100	53,600	95,700	6,200
2021	3,025,200	262,800	524,400	60,000	60,800	n/a
% Change	-5%	-12%	-15%	12%	-36%	n/a

Figure 60 illustrates the distribution of trip distances by mode of travel. Unsurprisingly, the majority of walking trips are short with 91% of such trips being within 2km and 67% of these trips being less than 1km. Approximately 50% of auto trips, either as driver or passenger trips, were 5km or shorter. Also notable is the 25% of bicycle trips greater than 12km.

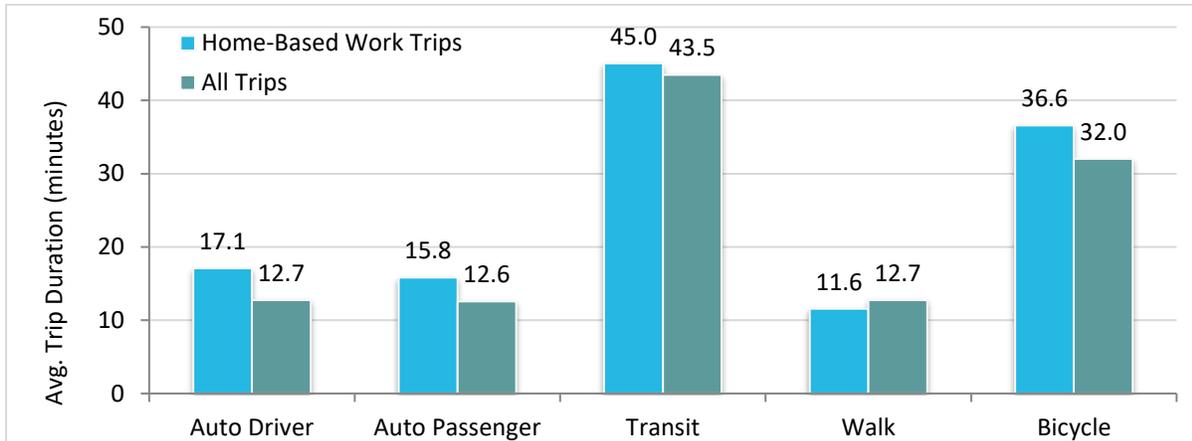
Figure 60. Trip Distance Distributions by Mode



⁴⁰ *Other modes are excluded from the 2021 results due to small sample size*

Figure 61 shows the average trip duration by mode for residents of the North Shore. Transit home-based work trips have the longest duration at 45.0 minutes, followed by bicycle trips at 36.6 minutes. Walking trips have the shortest duration at 11.6 minutes for home-based work trips and 12.7 minutes for all trips. This suggests that people who are currently choosing to travel via transit or bicycle may be willing to experience longer travel times. Shorter travel times relative to the distance travelled may be an important reason for many residents' choice of automobile as their usual mode of travel for both commuting and non-commuting purposes and may present a barrier in trying to convince people to shift to more sustainable modes.

Figure 61. Average Trip Duration by Mode



5 Travel Patterns

This section discusses overall travel patterns, habits, preferences, and attitudes for the “usual” travel behaviour. This is differentiated from the snapshot of actual travel on a specified day. It includes usual commute travel patterns, usual non-commute mode, and travel patterns related to walking, cycling, and transit.

5.1 Work Commute Patterns

The commute travel patterns explored in this section include North Shore residents’ reported usual mode of travel for work commutes, the work destinations they commute to, frequency of telecommuting, and their satisfaction with their work commutes.

5.1.1 Workers and Workplaces

Figure 62 and **Table 22** provide a basis for understanding the survey results on commuting patterns that will follow. It also illuminates the ongoing impact of COVID-19 in spite of a high percentage of the working-age population having received vaccinations by Fall 2021 and increased returns to work.

- The weighted and expanded survey data suggest that in 2019 there were 96,700 workers on the North Shore and a total of 104,000 in 2021, an 8% increase that may be in part due to the natural increase in population (estimated at +4%), and in part due to higher rates of employment reported by survey participants.
- Overall, in 2021, an estimated 70,900 workers reported having a usual workplace outside the home they would normally commute to absent the pandemic, with 64,200 of these commuting to work at least some of the time and 6,700 currently not travelling to their usual workplace at all. The workers who reported having a usual workplace outside the home represent 68% of all workers, down from 79% in 2019.
- The proportion of workers reporting no fixed workplace (e.g., professional drivers, trades contractors, and others whose worksite may change regularly) has increased from 8% to 12% (from 7,700 workers to 12,800).
- The proportion of workers reporting they work exclusively from home has also increased from 14% to 20% (from 13,100 to 20,500).

It is unclear whether the increases in exclusively working from home or reporting no fixed workplace may be permanent or a product of how survey participants and their employers are managing current circumstances or even a by-product of how survey participants may have interpreted the questionnaire in relation to their current situation. There may be some survey participants who actually have a usual workplace who consider, for the time being at least, they work exclusively from home or who consider that they have no fixed workplace because they sometimes telecommute from locations outside their home. The extent to which the shifts may persist as COVID-19 becomes endemic will be interesting to track in the next cycle of this survey.

Figure 62. Work Arrangements, 2019 vs 2021

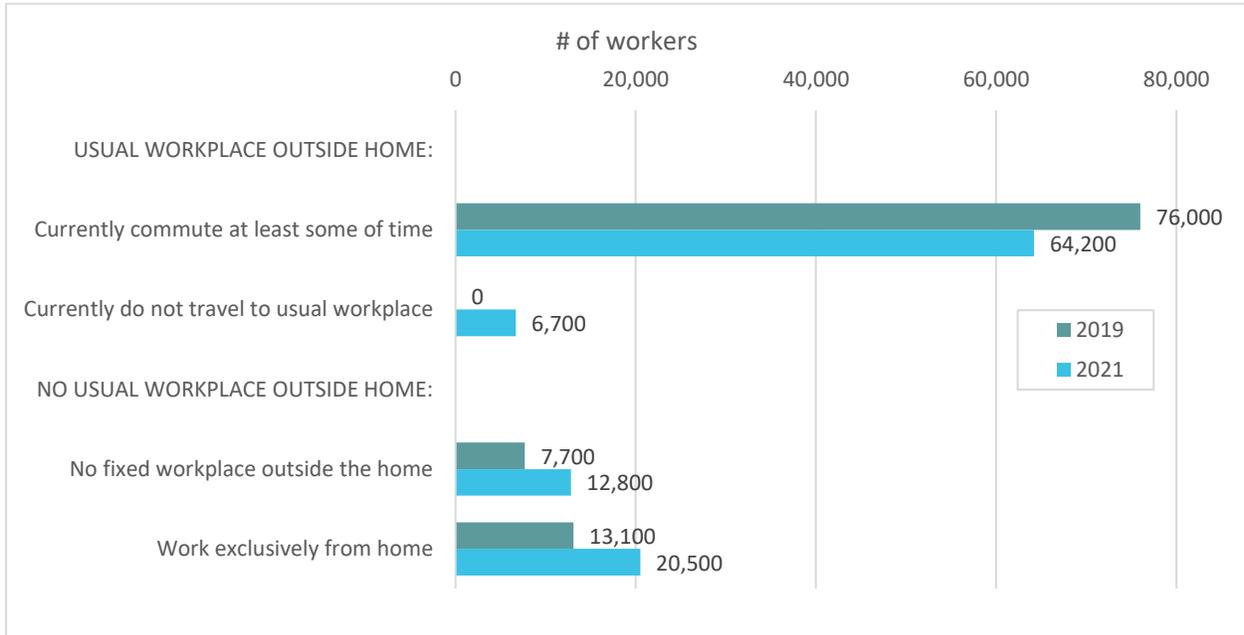


Table 22. Work Arrangements and Daily Commutes by Municipality, 2019 vs 2021

	North Shore		DNV		CNV		DWV	
	2019	2021	2019	2021	2019	2021	2019	2021
USUAL WORKPLACE OUTSIDE HOME:								
Currently commute at least some of time	76,000	64,200	37,300	31,000	25,900	21,300	12,700	11,800
Currently do not travel to work at all	n/a	6,700	n/a	3,600	n/a	2,100	n/a	1,000
NO USUAL WORKPLACE OUTSIDE HOME:								
No fixed workplace outside the home	7,700	12,800	2,900	5,100	3,300	3,800	1,600	3,800
Work exclusively from home	13,100	20,500	6,000	8,800	3,000	7,000	4,200	4,800

5.1.2 Telecommuting

Behind the shifts presented in the preceding section are two factors: continued work from home as a precautionary measure during the current stage of the COVID-19 pandemic, and what may prove to be a more permanent shift in work arrangements, including increases in hybrid work arrangements, in which workers may commute two or three days per week and work from home the other days. The survey questionnaire asked workers with a usual workplace how frequently they telecommute now and what their expectations are for the future. Workers who already work exclusively from home and those with no fixed workplace are included in the denominator for percentages to provide a more complete picture of all workers.

Figure 63 shows the frequency of telecommuting for survey participants who work. Just under one-third never telecommute; a decrease from nearly one-half in 2019. In 2021, 20% of participants reported working exclusively from home, which is an increase from 14% in 2019, and 12% reported working from no fixed workplace which is an increase from 8% in 2019. It will be interesting to see how this pattern changes over time as COVID-19 becomes endemic and some workers return to work at their usual workplace while others continue to work from home.

Figure 63. Frequency of Telecommuting

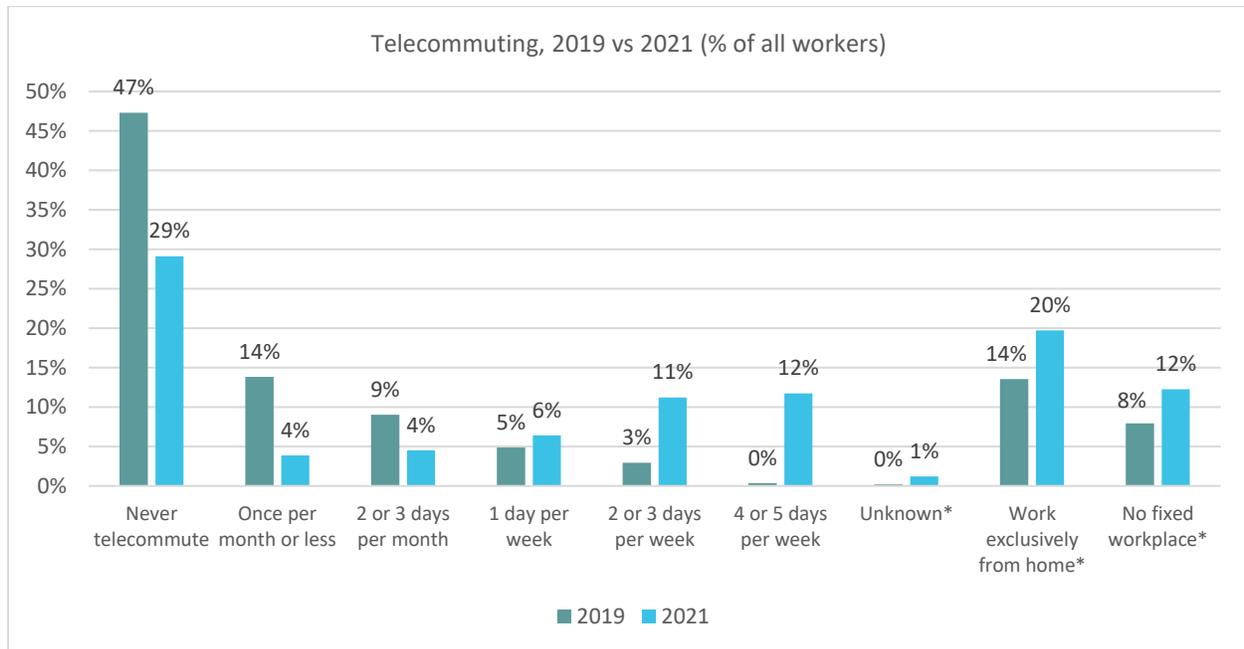


Table 23 shows the frequency of telecommuting for survey participants who have a usual workplace outside of their home by municipality. Overall, the DWV saw the largest decrease in the proportion of survey participants reporting that they never telecommute (-25%) compared to CNV (-20%) and DNC (-14%). DWV also has the largest proportion of residents who work exclusively from home or regularly telecommute at least two days per week.

Table 23. Frequency of Telecommuting by Municipality, 2019 vs 2021

	North Shore		DNV		CNV		DWV	
	2019	2021	2019	2021	2019	2021	2019	2021
Total Workers	96,700	104,100	46,100	48,500	32,200	34,200	18,500	21,400
Never telecommute	47%	29%	47%	33%	51%	31%	42%	17%
Once per month or less	14%	4%	15%	5%	15%	2%	10%	3%
2 or 3 days per month	9%	4%	9%	3%	8%	7%	11%	3%
1 day per week	5%	6%	7%	7%	3%	5%	2%	8%
2 or 3 days per week	3%	11%	2%	10%	4%	10%	4%	16%
4 or 5 days per week	0%	12%	1%	11%	0%	13%	0%	10%
Unknown*	0%	1%	0%	1%	0%	0%	0%	2%
Work exclusively from home*	14%	20%	13%	18%	9%	20%	23%	22%
No fixed workplace*	8%	12%	6%	11%	10%	11%	9%	18%
Subtotal Regular Telecommuters								
% who have a usual workplace outside the home and telecommute at least 2 days per week	3%	23%	3%	21%	4%	23%	4%	26%
%-point change, 2019 to 2021		+20%		+19%		+19%		+22%
Subtotal Regularly Work from Home								
% who either telecommute at least 2 days per week or who do not have a usual workplace outside the home and work from home exclusively	17%	43%	15%	40%	13%	43%	27%	48%
%-point change, 2019 to 2021		+26%		+24%		+30%		+22%

To assess how telecommuting habits may change over the next year, survey participants were asked whether they expected to be telecommuting more, less, or the same in one year's time. The survey results suggest that telecommuting patterns were still evolving during Fall 2021, and we have not yet transitioned to a stable new 'steady state'. As employers and workers continue to adapt to the risks of COVID-19, the work and travel patterns depicted in the survey results can be expected to continue to transition. As shown in [Figure 64](#) (on the next page), 29% expect to be telecommuting the same amount, 20% expect to be telecommuting less frequently, and only 3% expect to be telecommuting more frequently with another 1% expecting to start telecommuting in the next year. [Table 24](#) illustrates that this pattern is the same for all municipalities. Notably, residents of DWV (46%) were more likely to expect their telecommuting frequency to be the same a year from now compared to residents of CNV (27%) and DNV (23%). These findings are interesting and highlight that the COVID-19 pandemic will likely have long-term impacts on telecommuting habits, even after becoming endemic, particularly the 29% who plan on telecommuting the same as now.

Figure 64. Expectation for Telecommuting Frequency a Year from Now (% of Workers with Usual Workplace Outside Home)

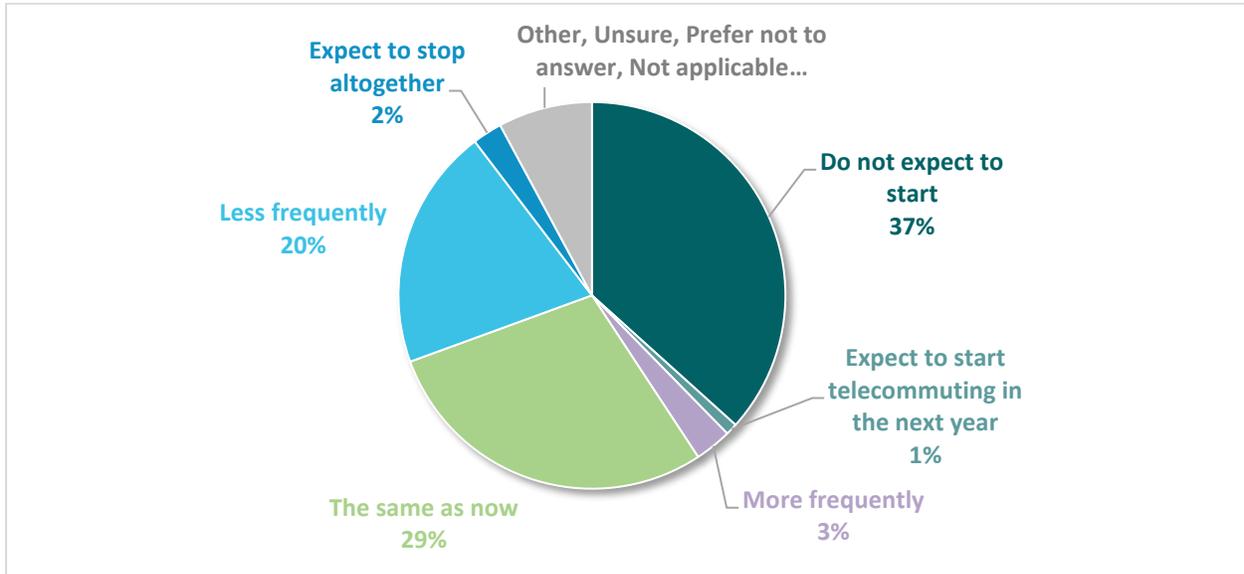


Table 24. Expectation for Telecommuting Frequency a Year from Now (% of Workers with Usual Workplace Outside Home) – by Municipality

	North Shore	DNV	CNV	DWV
Do not expect to start	37%	39%	40%	25%
Expect to start telecommuting in the next year	1%	2%	0%	0%
More frequently	3%	3%	2%	3%
The same as now	29%	23%	27%	46%
Less frequently	20%	21%	20%	18%
Expect to stop altogether	2%	3%	3%	0%
Other, Unsure, Prefer not to answer, Not applicable	8%	8%	8%	7%

5.1.3 Usual Work Commute Mode

Figure 65 and **Figure 66** on the following page show the usual and secondary modes of travel for commute purposes from the 2019 and 2021 surveys. By looking at secondary mode, we can see what mode people may have the most potential to shift to. That is, these people have access to the mode (e.g., own a car, own a bicycle, live near transit, etc.), and either sometimes use the mode or can envision using it in a pinch when their usual mode is unavailable. Secondary modes do not sum to 100% as some workers stated that they did not use a secondary mode of transportation for work trips. The proportion of workers who indicated a secondary mode for commuting went from 81% in 2019 down to 61% in 2021.

It is important to note that the proportions depicted do not represent the mode shares of actual work commutes on an average day. Not all commuters travel to work on a given weekday, and not all use their usual mode. These results represent the usual mode choices for those who “Currently commute at least some of time” whether they commuted that day or not (i.e., excluding those who have a usual workplace but who do not currently commute and those with no fixed workplace location). On any given day, some of these workers may not be scheduled to work, may take days off, or may have a hybrid work schedule in which they travel to the office two or three days per week and work from home the other days, and includes others who do travel to work and may use a secondary mode. Readers are referred to [Section 5.1.4](#) for actual daily work travel patterns.

The following observations can be made:

- Overall, driving has increased its share of usual commute modes, from 62% in 2019 to 67% in 2021. Readers are reminded that because many workers are not currently commuting to work, the actual number of vehicle trips for work purposes has decreased.
- Just under one-fifth (19%) of commuters currently cite transit as their usual mode of travel to work, down from 23% in 2019. While this is a drop from 2019, it is not the nadir: the results from the short interim survey conducted in Fall 2020 suggested that at that time fewer than one in ten workers was taking transit for work.⁴¹ Thus the 2021 result suggests a partial rebound in transit use for those who are still commuting.
- Active modes were also cited less as usual commute modes, with cycling being the usual mode for 5% of commuters (compared to 7% in 2019) and walking for 4% of commuters (compared to 6% in 2019). It may be possible that workers who would normally use these modes may be more likely to work from home.

The results show a shift from transit to auto driver not only in primary mode but also in secondary mode of travel. This speaks to the rigidity in mode choice during the COVID-19 pandemic and suggests that trust in transit as a safe and convenient option has not yet fully recovered for all residents: in 2019, 32% of participants listed transit as their secondary mode of travel to work; this drops to only 23% in 2021.

⁴¹ The 2020 survey results are not included in time series results in this report as the 2020 survey was undertaken with a smaller survey sample composed of only participants in the 2019 survey and may be subject to different biases.

Interestingly, fewer participants also reported auto passenger as a secondary mode (10%) compared to 2019 (16%). Cycling and walking and other modes (taxi, ride-hail, etc.) had similar proportions of commuters citing them as secondary modes in both 2019 and 2021 (the same percentage or within 1% difference).

Figure 65. Usual Mode of Travel to Commute – North Shore, 2019 ⁴²

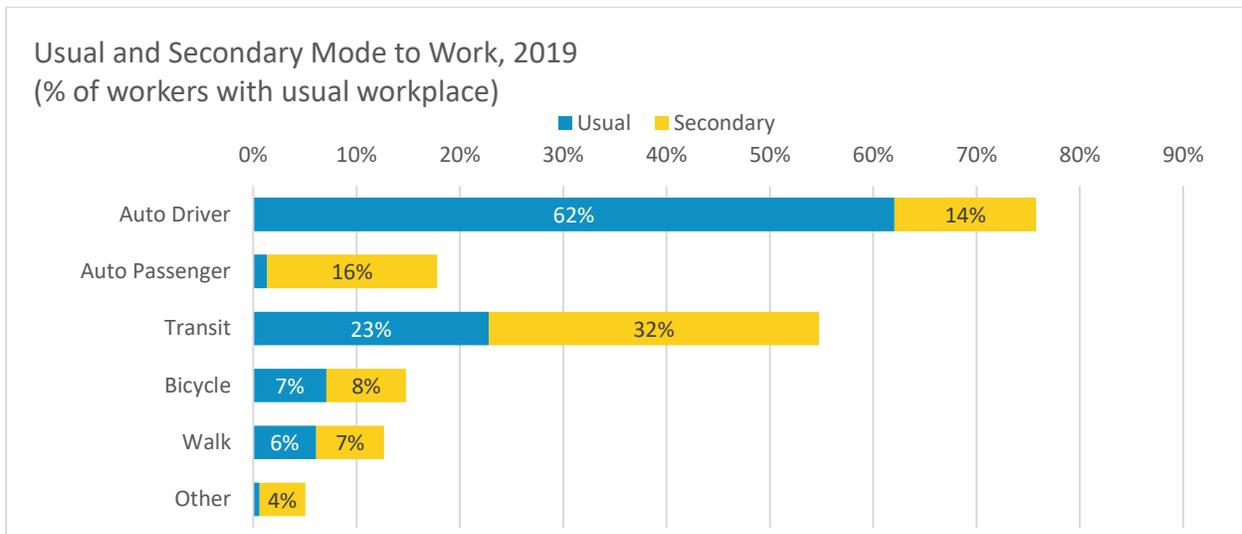
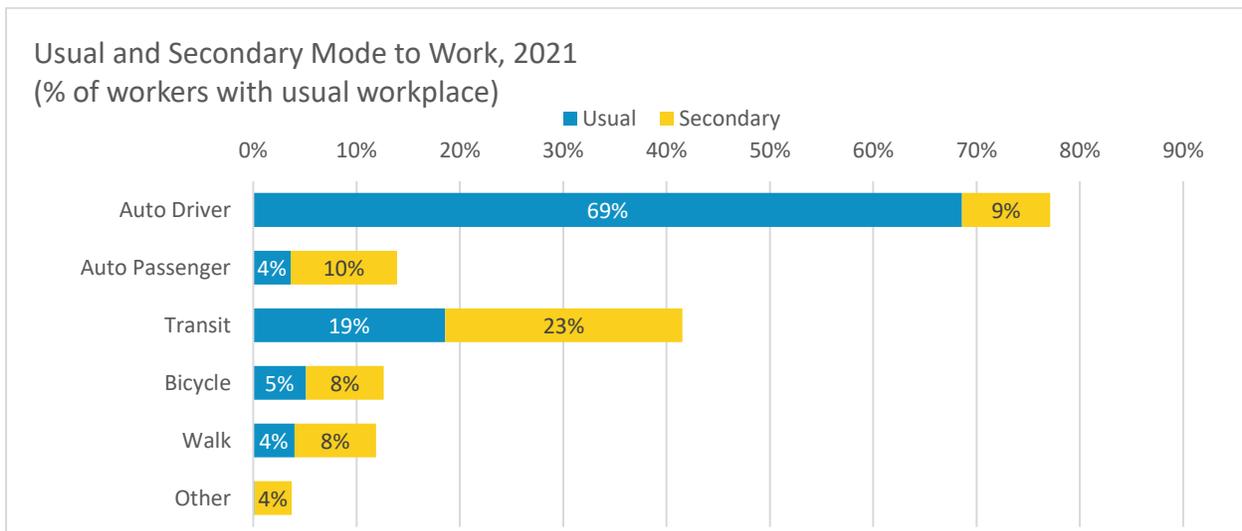


Figure 66. Usual Mode of Travel to Commute – North Shore, 2021 ⁴³



⁴² Bars for usual mode (blue) add to 100% (although %s shown may not add to exactly 100% due to rounding). Bars for secondary mode (yellow) add to 81%, as, in 2019, 19% did not have a secondary mode of travel (whether by choice or not having another option). Small percentages not displayed in the chart: Auto passenger, usual mode, 1%; Other, usual mode, 1%.

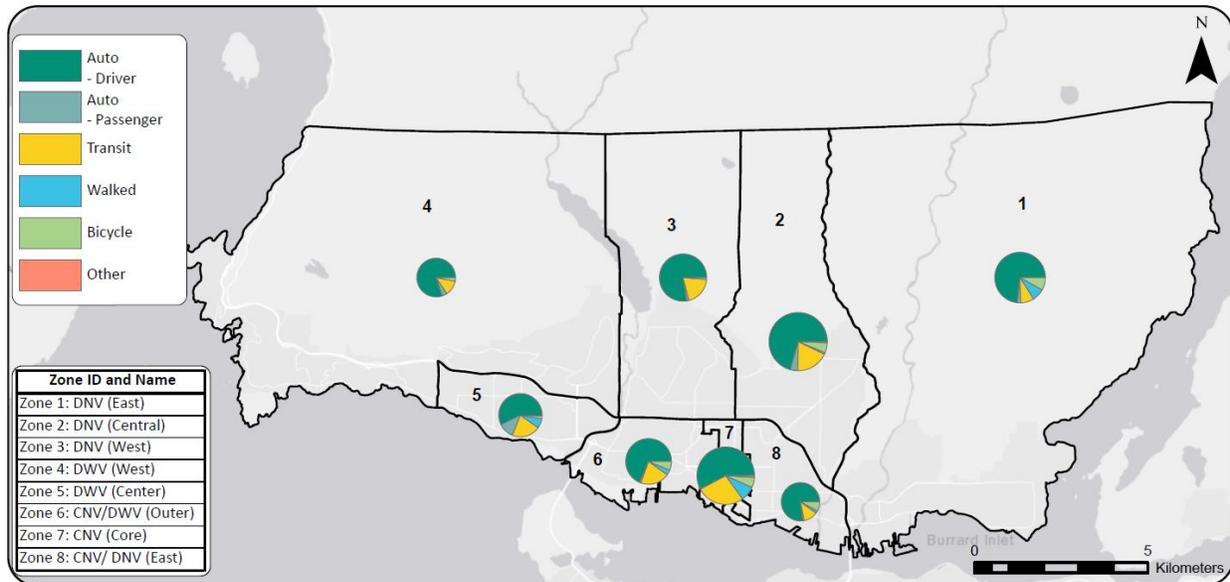
⁴³ Bars for usual mode (blue) add to 100% (although %s shown may not add to exactly 100% due to rounding). Bars for secondary mode (yellow) add to 61%, as, in 2021, 39% did not have a secondary mode of travel (whether by choice or not having another option). Small percentages not displayed in the chart: Other, usual mode, <0.5%. Excludes workers with a usual workplace outside the home who say that they currently are not travelling to work at all.

Table 25 below presents the above survey results by municipality. All municipalities show the same trend of a drop in the estimated number of workers regularly commuting. Amongst those that commute, there was an increase in the proportion of workers who commute as drivers and a decrease in transit, cycle, and walk proportions. Interestingly, for CNV, transit as a secondary mode choice is still strong, dropping only modestly from 37% to 33%. **Figure 67** further below presents a view of commuters’ mode choices by zone, with this information detailed in **Table 26**.

Table 25. Usual Mode of Travel for Work Commute by Municipality, 2019, 2021 ⁴⁴

	DNV				CNV				DWV			
	2019		2021		2019		2021		2019		2021	
Commuters*	37,300		31,000		25,900		21,300		12,700		11,800	
	Usual	2nd										
Auto Driver	68%	9%	71%	9%	53%	20%	64%	7%	63%	13%	70%	10%
Auto Passenger	2%	24%	5%	12%	1%	8%	1%	6%	1%	11%	5%	13%
Transit	17%	27%	16%	19%	31%	37%	24%	33%	23%	37%	17%	15%
Bicycle	9%	11%	5%	8%	4%	4%	6%	10%	8%	5%	4%	2%
Walk	4%	7%	3%	5%	9%	7%	6%	12%	4%	4%	5%	8%
Other	0%	4%	0%	2%	1%	2%	0%	5%	0%	10%	0%	5%
Never use a secondary mode	-	18%	-	44%	-	21%	-	28%	-	19%	-	47%

Figure 67. Map of Usual Mode of Travel for Work Commute by Zone of Residence



⁴⁴ *Commuters = workers with usual workplace outside the home who currently commute. Excludes workers with a usual workplace outside the home who say that they currently are not travelling to work at all. Percentages of usual modes may not add to exactly 100% due to rounding. Percentages for secondary mode add to less than 100% as not all survey participants use a secondary mode.

Table 26. Usual Mode of Travel for Work Commute Zone of Residence

	Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
Auto Driver	70%	70%	75%	80%	57%	68%	58%	77%
Auto Passenger	6%	4%	2%	4%	12%	1%	0%	1%
Transit	8%	18%	22%	13%	22%	21%	27%	12%
Bicycle	8%	6%	1%	3%	2%	6%	6%	8%
Walk	8%	1%	0%	0%	7%	4%	8%	2%
Other	0%	1%	0%	0%	0%	0%	0%	0%

5.1.4 Travel to Work Daily Mode Shares

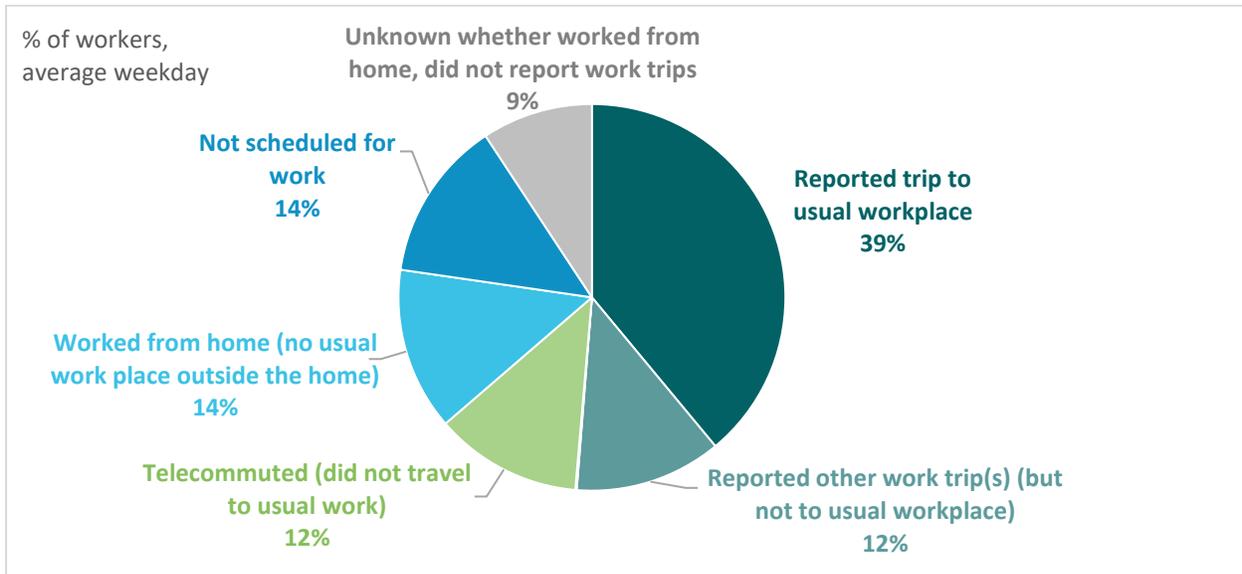
Work arrangements, telecommuting patterns, usual mode choice, work schedules, and daily circumstances all contribute the daily volumes of **actual** work trips on a given day. **Figure 68** provides a picture of workers' activity on an average fall weekday. **Table 27** breaks these results out by workplace type. This analysis combines daily trips reported (specifically, the first work trip)⁴⁵, information on work arrangements, and answers to validation questions built into the survey. Some caution should be exercised when interpreting the results, as 9% of survey participants did not make work-related trips but did not have a clear indication in the data as to whether they worked from home.

The survey results suggest the following:

- Combining categories, at least three quarters (77%) of workers work on any given day.
- At least one half (51%) either travel to their usual workplace (39%) or travelled for work-related purposes (12%) (e.g., business meeting, work errand, arriving at a worksite, starting the workday as a driver, etc.).
- At least one-quarter (26%) work from home, with 12% being workers with a usual workplace who are working from home instead of travelling to work, and 14% being either those who work exclusively from home or those with no fixed workplace who worked from home on the given day.

⁴⁵ Each worker's trip data were scanned to identify the first trip to usual work or, barring this, first work-related trip. The primary mode of the first trip was also identified. If the trip to work did not originate from home, preceding trips were scanned up to the trip leaving home to identify the most appropriate reported mode to use as the work commute mode. E.g., if someone reported three trips, first walking to a post office, then taking transit to a coffee shop, then walking from the coffee shop to work, the primary work commute mode was identified as transit (as the mode most likely to travel the longest distance in the overall multi-trip commute tour).

Figure 68. Daily Work Travel and Telecommute Pattern



As shown in Table 27, the survey results suggest that about four-fifths (79%) of workers with a usual workplace worked on their travel day, with almost one-fifth (18%) working from home the entire workday and the other three-fifths (61%) travelling either to work or for work-related purposes. In future survey cycles, it will be interesting to track the extent to which usual commuters’ work from home patterns change.

Table 27. Daily Work Travel and Telecommute Pattern by Workplace Type

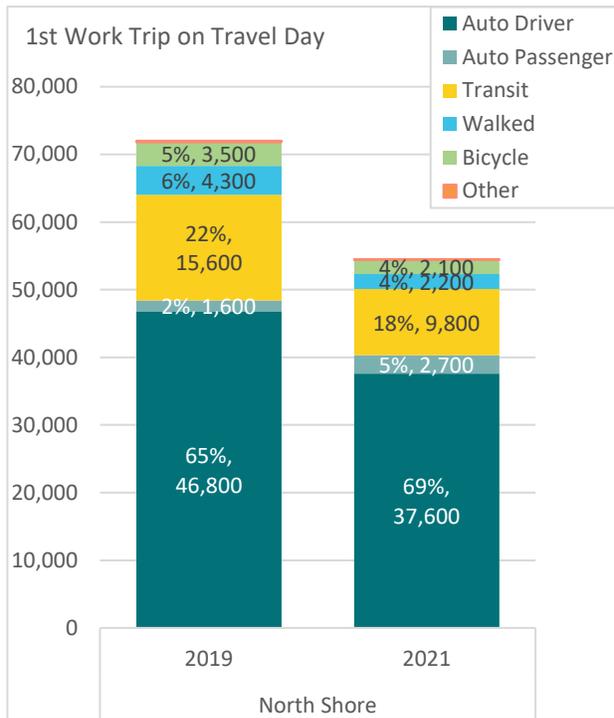
	Works exclusively from home	No fixed workplace address	Usual workplace outside the home	Total workers
Workers	20,500	12,800	70,800	104,100
Reported trip to usual workplace	-	-	57%	39%
Reported other work trip(s) (but not to usual workplace)	15%	53%	4%	12%
Away on business / working on the road	0%	1%	0%	0%
Telecommuted (did not travel to usual workplace)	-	-	18%	12%
Worked from home (no usual workplace)	57%	19%	n/a	14%
Not scheduled for work	12%	16%	13%	13%
Unknown whether worked from home, did not report work trips	16%	10%	7%	9%
Subtotal known to have worked (either reported work trip(s) or reported working from home/telecommuting)*	72%	73%	79%	77%
Subtotal reported at least one trip to usual workplace or for other work-related purpose	15%	53%	61%	51%
Subtotal known to have worked from home*	57%	19%	18%	26%

*interpret with caution due to the 9% of workers for whom it is unknown whether they worked despite not making work trips.

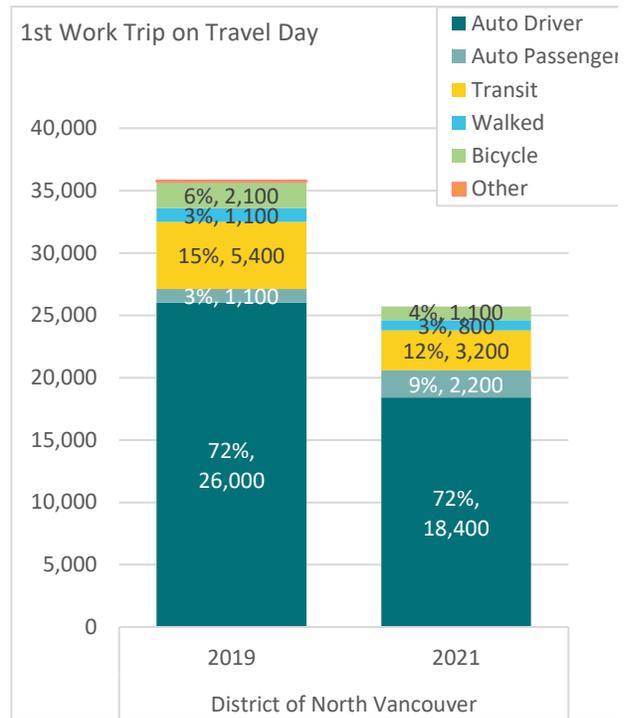
Figure 69 on the following page provides another view of the mode shares for travel to work which takes into account both the number of commuters and the proportions. Figures are presented for the North Shore overall and by individual municipality. As illustrated, the total number of workers travelling to work or for work purposes was lower in 2021 than in 2019. In total, one-quarter fewer workers made at least one work trip, a drop from 71,800 to 54,600 workers travelling to or for work. This is the net impact of the trends in work arrangements and telecommuting discussed in preceding sections of this report. As indicated, the auto driver mode share for trips to work has gone up (from 65% to 69%) even as the number of trips by this mode have dropped. The transit mode share for trips to work has increased also, even as fewer workers are travelling to work via transit. Active modes saw drops in both mode share and number of trips to work. By municipality, even though similar proportions of DNV and DWV commuters report driving as their usual mode, at 72% in both 2021 and 2019, and a larger proportion of CNV commuters reporting driving (64% in 2021 vs. 51% in 2019), the actual number of driving trips has dropped in all municipalities. The drop in auto driver trips in the CNV is marginal (an estimated decrease of only about 500 trips); The decrease in total trips to work occurs in the transit and walk trips. The results underscore the reality that given the profound impacts of COVID-19, mode share as a transportation indicator must be considered in the context of the corresponding trip volumes as well.

Figure 69. Daily Work Mode Shares ⁴⁶

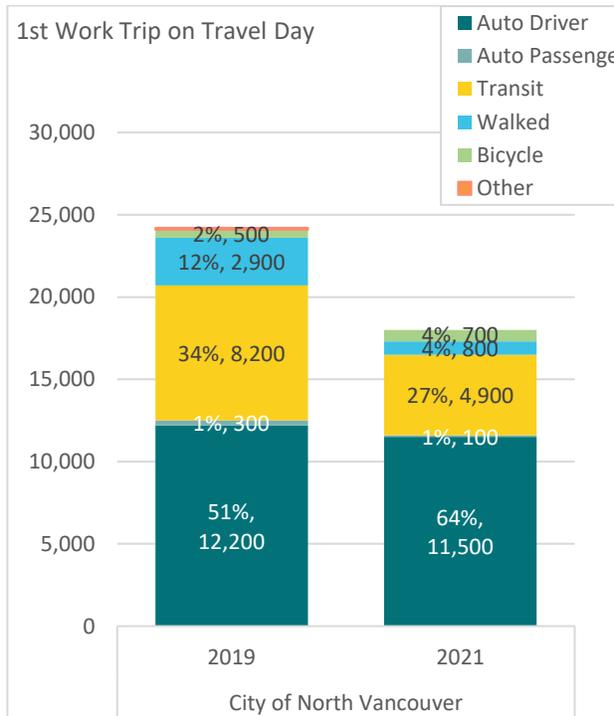
North Shore



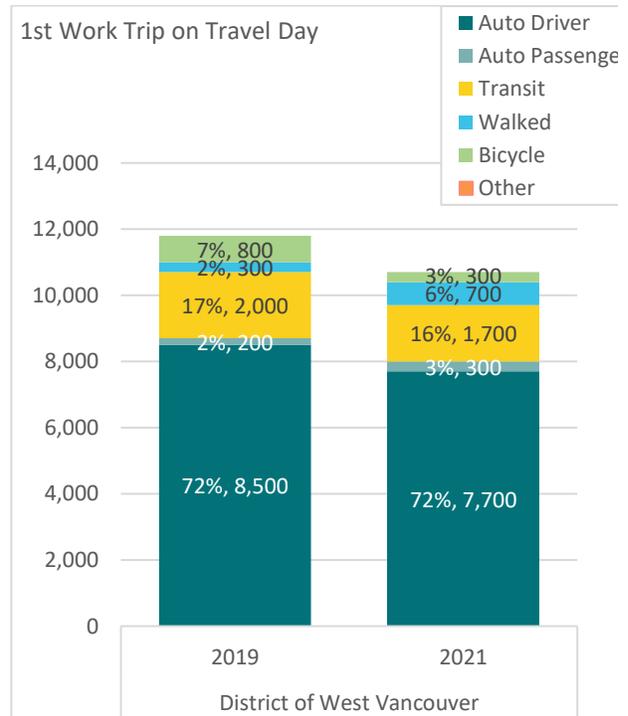
District of North Vancouver



City of North Vancouver



District of West Vancouver



⁴⁶ Percentages not displayed: North Shore: 2019 Other <0.5%, ~200 trips; 2021 Other <0.5%, ~100 trips; 2019 DNV, CNV: both have Other <0.5%, ~100 trips.

5.1.5 Work Locations

Figure 70 shows the distribution of usual place of work locations for the workers living in the North Shore who participated in the survey, who also work outside their homes and have a usual place of work. Most (60%) work at jobs located in the North Shore, with the largest proportions working in zone 7 CNV (Core; 12%) and Zone 1 DNV (East; 9%). Around 40% work in municipalities external to the North Shore with the largest sharing working in Vancouver CBD / West End (19%) or the rest of Vancouver (10%).

Table 28 shows the zone-to-zone work commute flows. The greatest volumes, excluding those who work from home, are for Zone 3 DNV West to the Vancouver CBD/West End (an estimated 3,490 commuters) and from Zone 5 DWV (Centre) to the Vancouver CBD/West End (3,130). Zones 2, 4, 6, and 7 also have more than 2,000 commuters travelling to the Vancouver CBD/West End for work. Zones 1, 5, and 7 have substantial internalized work trips with around 1,300 to 2,000 commuters living and working within each of these zones. Also of note is the large number of workers who work from home in all but zone 6 or who have no fixed workplace in all but zones 3 and 6. Table 29 aggregates these commute flows by home municipality to zone of work destination.

It should be noted that sample sizes for certain zones may be small, so the distributions should be taken as indicative of the overall pattern rather than exact.

Figure 70. Distribution of Usual Place of Work Locations - North Shore Residents

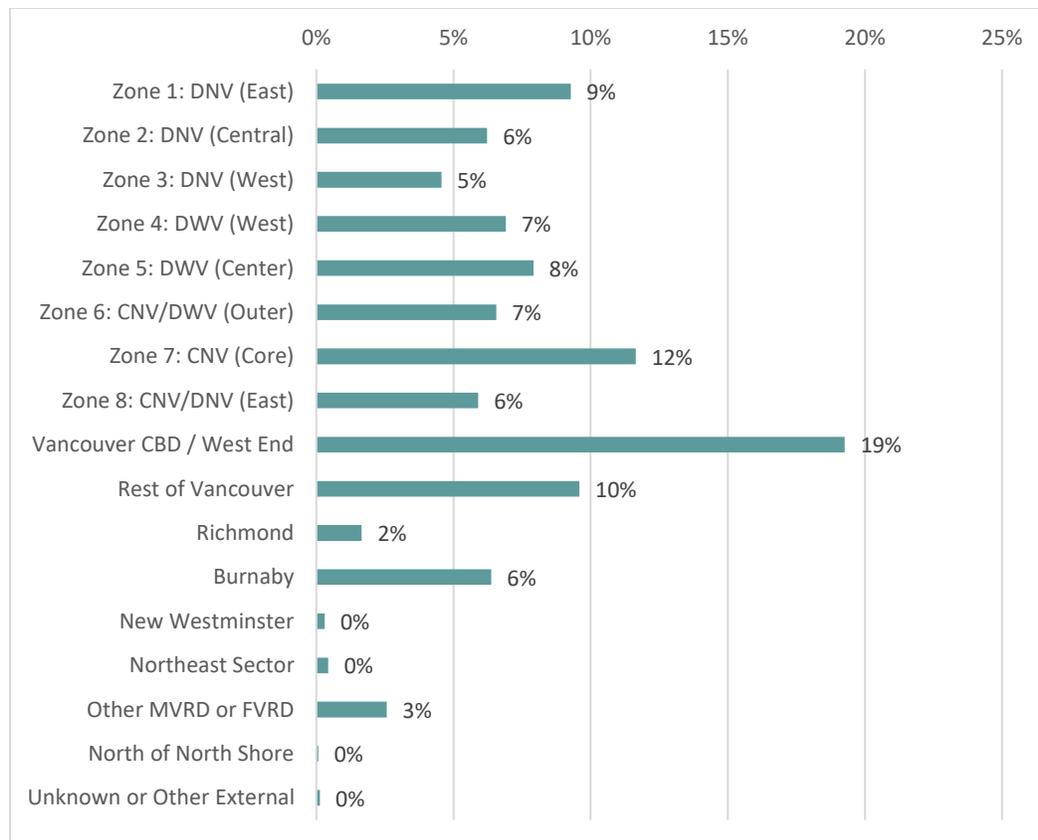


Table 28. Home-Commute Location Matrix, Zone-to-Zone

Workplace Location:	Work from Home	No Fixed Workplace	Internal to North Shore								External								Total	
			Zone 1 DNV East	Zone 2 DNV Central	Zone 3 DNV West	Zone 4 DWV West	Zone 5 DWV Center	Zone 6 CNV /DWV	Zone 7 CNV Core	Zone 8 CNV /DNV E	Van CBD / West End	Rest of Van /UEL	Richmond	Burnaby	New West	NE Sector	Other MVRD/ FVRD	North of North Shore		Other External
Home																				
Zone 1 DNV (East)	3,230	1,450	2,050	390	360	230	20	720	610	480	1,580	1,930	60	1,470	20	30	580		0	15,210
Zone 2 DNV (Central)	2,390	2,050	840	450	510	260	650	1,010	300	750	2,940	1,330	810	1,660	80	210	340	70	90	16,740
Zone 3 DNV (West)	2,580	740	490	410	220	70	590	600	800	100	3,490	1,830		290			130		220	12,560
Zone 4 DWV (West)	2,650	2,610		20	20	90	460	190	460		2,940	1,000	150	220	150	20	120		0	11,100
Zone 5 DWV (Center)	2,430	1,280	330		20	110	1,470	30	210	70	3,130	800		470			170		0	10,520
Zone 6 CNV/DWV (Outer)	780	520	190	340		380	470	1,280	190	30	2,240	1,230	330	880			450		0	9,310
Zone 7 CNV (Core)	4,400	2,590	1,070	370	180	400	910	860	1,640	690	2,850	1,350	300	1,050	50	100	810		0	19,620
Zone 8 CNV/DNV (East)	2,180	1,550	120	160	130	510	170	890	1,040	330	970	580	70	630		80	60		0	9,470
Total	20,640	12,790	5,090	2,140	1,440	2,050	4,740	5,580	5,250	2,450	20,140	10,050	1,720	6,670	300	440	2,660	70	310	104,530

Blue shading is used to highlight greater numbers, with the intensity of the colour increasing with increasing numbers.

Table 29. Home-Commute Location Matrix, Municipality-to-Zone

Workplace Location:	Work from Home	No Fixed Workplace	Internal to North Shore								External								Total	
			Zone 1 DNV East	Zone 2 DNV Central	Zone 3 DNV West	Zone 4 DWV West	Zone 5 DWV Center	Zone 6 CNV /DWV	Zone 7 CNV Core	Zone 8 CNV /DNV E	Van CBD / West End	Rest of Van /UEL	Richmond	Burnaby	New West	NE Sector	Other MVRD/ FVRD	North of North Shore		Other External
Home																				
DNV	8,820	5,130	3,020	1,610	930	940	1,830	2,550	1,980	1,260	8,500	5,450	870	4,030	100	320	940	70	620	48,970
CNV	7,030	3,860	1,640	510	470	910	980	2,640	2,490	1,120	6,190	2,630	370	2,000	50	100	1,430		0	34,420
DWV	4,790	3,800	430	20	40	200	1,930	390	780	70	5,450	1,970	480	640	150	20	290		0	21,450
Total	20,640	12,790	5,090	2,140	1,440	2,050	4,740	5,580	5,250	2,450	20,140	10,050	1,720	6,670	300	440	2,660	70	620	104,840

Blue shading is used to highlight greater numbers, with the intensity of the colour increasing with increasing numbers.

5.1.6 Commute Distances

Zone-to-zone work Commute distances are broken out for jobs located on the North Shore and jobs south of the North Shore. Average commute distance for jobs located north of the North Shore have not been presented separately due to the very small survey sample of workers with jobs located north of the North Shore. Straight line distances are presented as a common basis for comparison because actual distance travelled will vary depending on mode choice and, for travel to work south of the North Shore, crossing used.

Table 30 shows the average straight-line commute distance between home and place of work for survey participants by municipality.⁴⁷ Residents of CNV have the shortest average commute distance (at 7.1 km) compared to DNV (8.6 km) and DWV (10.1 km). The average commute distance compares to the 2016 Census estimate of the Canadian median straight-line distance to work of 7.7 km, with the median for all of Metro Vancouver being 7.4 km.⁴⁸ Residents who work and live on the North Shore have an average commute distance of 3.3 km to 5.1 km. Residents who live in the North Shore and work south of the North Shore have a longer average commute, ranging from 10.0 km to 12.2 km.

Table 30. Average Straight-Line Commute Distances (km) by Municipality

Municipality	Sample Size	Workers	Average Straight-Line Distance from Home to Work (km)			
			For Total Workers	For Workers with Workplace on North Shore	For Workers with Workplace South of North Shore	For Workers with Usual Workplace Elsewhere
District of North Vancouver	387	34,490	8.6	4.8	11.1	30.8
City of North Vancouver	234	23,530	7.1	3.3	10.0	60.3
District of West Vancouver	136	12,860	10.1	5.1	12.2	n/a

Figure 71, on the next page, shows the average straight-line commute distance by sub-municipal zone. Residents who live in the North Shore and work south of the North Shore have longer average commute distances than those who live and work in the North Shore. Residents of Zone 4 West Vancouver (West) have the longest average commute distance of 14.6 km for people who work south of the North Shore and 8.8 km for those who work within the North Shore.

⁴⁷ This metric is only presented for survey participants who work outside their homes and have a usual place of work.

⁴⁸ Tetyana Yaropud, Jason Gilmore and Sébastien LaRoche-Côté. *Results from the 2016 Census: Long commutes to work by car*, 2019. (<https://www150.statcan.gc.ca/n1/pub/75-006-x/2019001/article/00002-eng.htm>, last accessed June 2022).

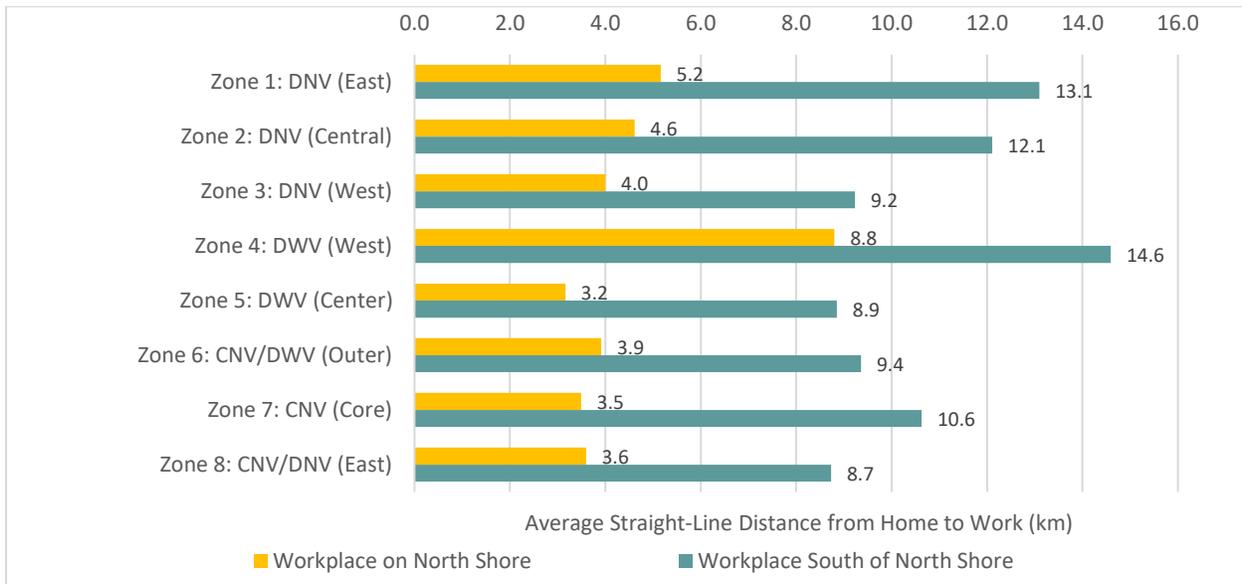
Figure 71. Average Straight-Line Commute Distances Based on Place of Work


Table 31 presents the differences between 2019 and 2021 work commute differences for all geographies for work locations on the North Shore and those south of the North Shore. The general patterns in 2019 and 2021 are very similar, however, they do show increases in the straight-line distance for both workplaces on and south of the North Shore (+0.3km for both), although there is considerable variation by zone. Possible factors may include job changes, changes in residence (e.g., regular telecommuters moving to live further away from work), or changes in work arrangements (e.g., some workers shifting to working exclusively from home). Some of the variation between cycles may also be the result of random sampling. Comparisons for geographies with smaller samples of workers in both survey cycles should be interpreted with caution.

Table 31. Average Straight-Line Commute Distances (km) by Municipality, 2019 vs 2021

Geography	Sample Size	Average Straight-Line Distance from Home to Usual Work (km)					
		For Workers with Workplace on North Shore			For Workers with Workplace South of North Shore		
		2019	2021	Difference	2019	2021	Difference
North Shore Average	757-760	4.0	4.3	+0.3	10.7	11.0	+0.3
District of North Vancouver	385-387	4.4	4.8	+0.4	11.4	11.1	-0.3
City of North Vancouver	234-257	2.6	3.3	+0.8	9.1	10.0	+0.9
District of West Vancouver	118-136	5.6	5.1	-0.5	12.2	12.2	0.0
Zone 1: DNV (East)	128-129	5.3	5.2	-0.1	11.1	13.1	+2.0
Zone 2: DNV (Central)	132-135	4.7	4.6	-0.1	12.5	12.1	-0.4
Zone 3: DNV (West)	88-98	3.3	4.0	+0.7	12.5	9.2	-3.3
Zone 4: DWV (West)	53-64	8.5	8.8	+0.3	16.7	14.6	-2.1
Zone 5: DWV (Center)	68-72	2.9	3.2	+0.3	10.1	8.9	-1.2
Zone 6: CNV/DWV (Outer)	70-71	2.7	3.9	+1.3	7.6	9.4	+1.7
Zone 7: CNV (Core)	137-150	2.4	3.5	+1.1	8.5	10.6	+2.1
Zone 8: CNV/DNV (East)	56-66	3.2	3.6	+0.4	7.4	8.7	+1.3



5.1.7 Satisfaction with Usual Commute Mode

As shown in **Figure 72**, 57% of survey participants are satisfied with their usual commute mode and this is consistent across municipalities. Overall, the level of satisfaction with usual commute mode remains unchanged from 2019. **Figure 73** shows that satisfaction with usual commute mode varies by mode, with those who walk (84%) or cycle (68%) most likely to be satisfied with the usual commute mode. Transit users (48%) were least likely to be satisfied with their usual commute mode and were more likely to be neutral (neither satisfied nor dissatisfied). Those most likely to be dissatisfied with their commute mode were auto drivers (24%) and auto passengers (30%).

Figure 72. Satisfaction with Commute by Municipality of Residence

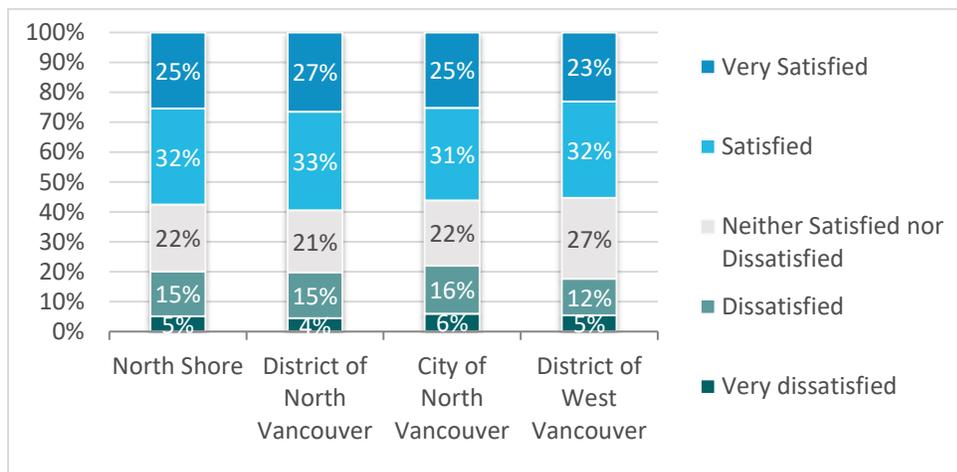
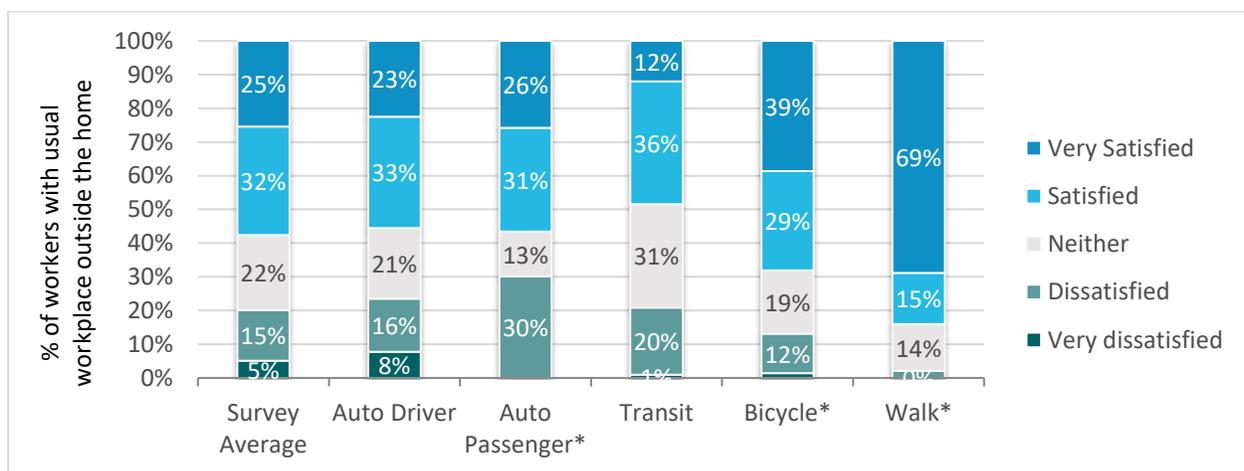


Figure 73. Satisfaction with Commute by Usual Commute Mode ⁴⁹

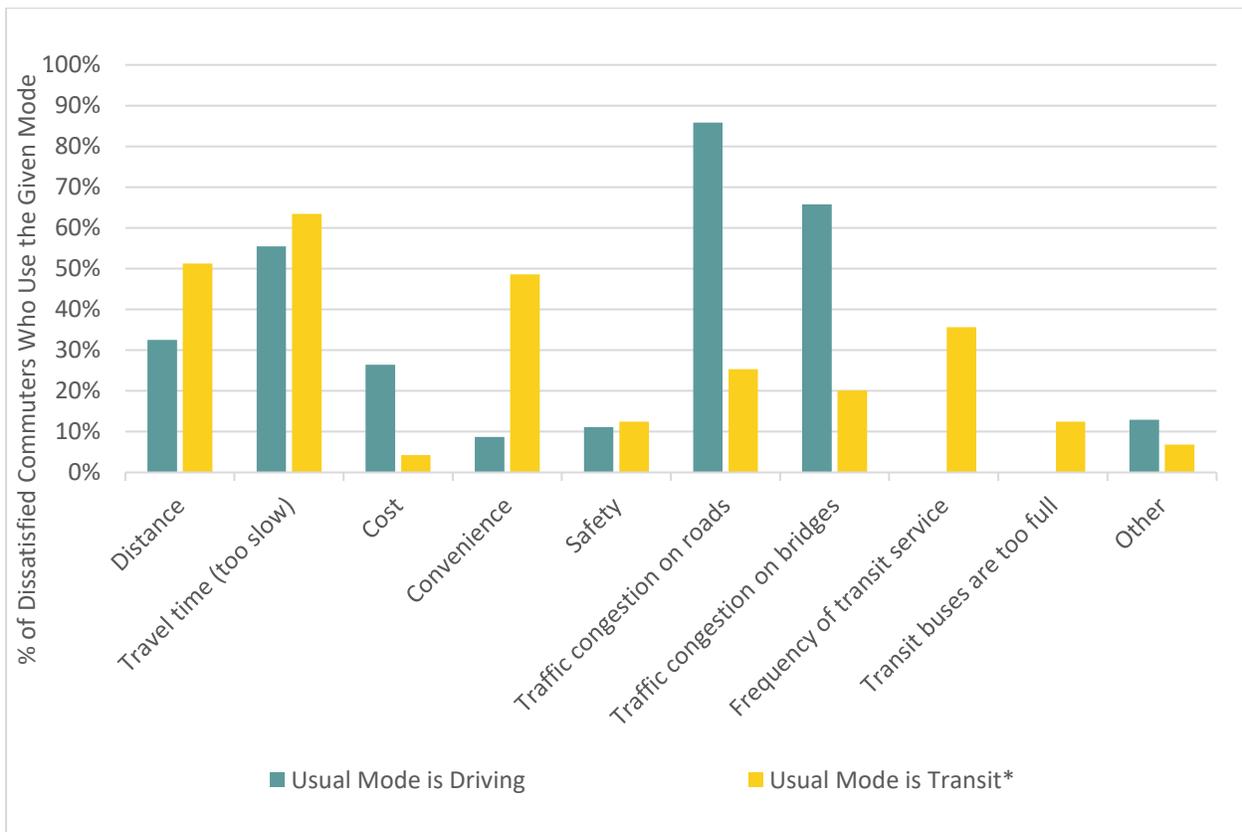


⁴⁹ Interpret modes marked with an asterisk (*) with caution due to smaller sample sizes (n=18 auto passenger commuters, n=35 bicycle commuters, and n=30 walk commuters).



Those dissatisfied with their commute were allowed to select multiple reasons for their dissatisfaction. Survey results are presented for dissatisfied auto drivers and transit users. Results have not been presented for dissatisfied commuters who use other modes due to small samples sizes. As shown in [Figure 74](#), participants who reported their usual commute mode as transit were most often dissatisfied because of the travel time, perceived inconvenience, or the distance of their commute. Participants who reported their usual commute mode as driving were most likely to be dissatisfied because of traffic congestions on roads, traffic congestion on bridges, or the travel time. Interestingly, almost as many drivers as transit users indicated travel time as a source of their dissatisfaction, even though the average time to travel the same distance via transit is considerably longer than via automobile (as presented in [Section 4.5](#)), although auto trips using certain routes and bridge infrastructure during peak travel times may be subject to slower traffic or congestion-related delays.

Figure 74. Reasons for Dissatisfaction with Commute

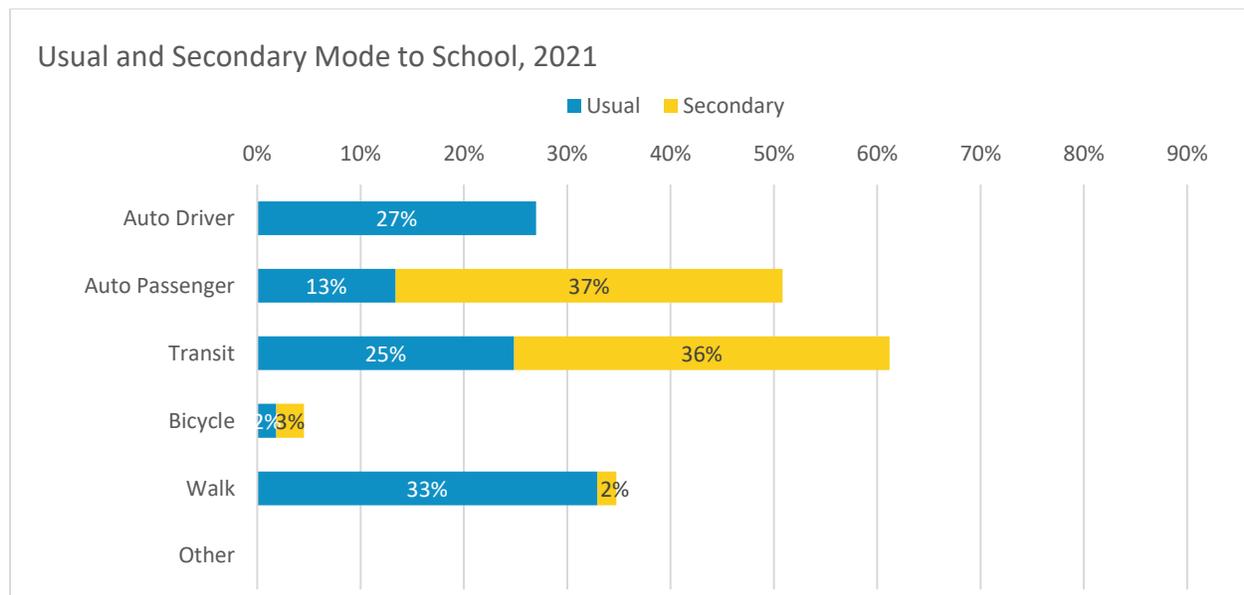


5.2 School Commute Patterns

Given the small samples of participants who were students in 2019 (n=54) or in 2021 (n=44), the survey results for students are not presented in as much detail as was provided for work commuter patterns. The findings that follow may not necessarily be generalizable to the entire population of secondary and post-secondary students 15+ years of age who live on the North Shore.

As shown in [Figure 75](#), survey participants who were students most often reported walking (33%) or driving (27%) as their usual commute mode. Transit (36%) and auto passenger (37%) were the most commonly reported secondary commute modes among students. Of note, in 2019, one-half of students surveyed cited Transit as their usual mode of travel to school but this has dropped to one-quarter in 2021. It is possible that some individuals are still avoiding public transit due to perceived pandemic-related risks. It is also possible that some students, similar to workers, are attending classes remotely and no longer travelling to school on a regular basis. Given the small sample sizes these changes will need to be monitored over time to see whether they are indicative of a true shift in student's usual commute mode.

Figure 75. Usual and Secondary Mode to School, 2021 (% of Students 15+ Years of Age) – Caution: small sample size

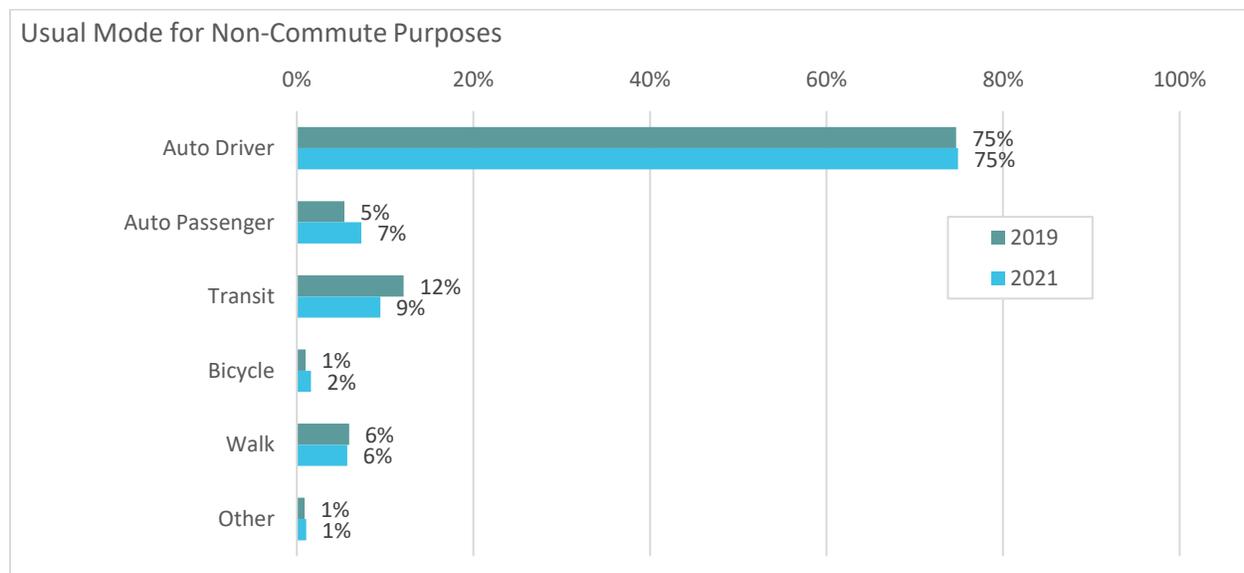


5.3 Usual Non-Commute Mode

This section describes the usual non-commute trips which include trip purposes of shopping, meeting friends and family, recreation and other discretionary trip purposes.

Figure 76 shows usual and secondary mode share for non-commute trips for the North Shore. Overall, auto driver accounts for 75% of all non-commute trips. Transit accounts for 9% of all non-commute trips, auto passenger accounts for 7%, and walking accounts for 6%, while biking and other modes account for only 2% and 1% respectively. These findings are largely unchanged from 2019, though a slight decrease in transit trips (-4%) was observed.

Figure 76. Usual and Secondary Mode Share for Non-Commute Trips (% of Population 15+ Years)



As shown in **Figure 77** (on the next page), walking and transit are the most common secondary modes for non-commute trips.

Figure 77. Usual and Secondary Mode Share for Non-Commute Trips

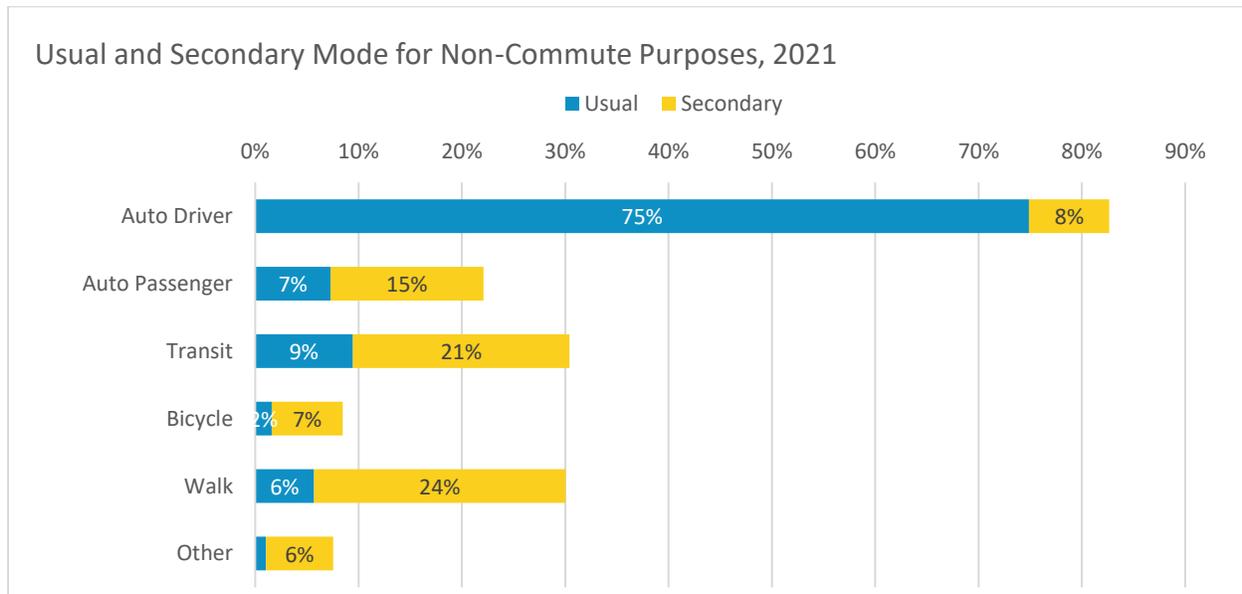


Table 32 provides an overview of usual mode share for non-commute trips by municipality and Figure 78 and Table 33 provide an overview of usual mode share for non-commute trips by zone.

While auto driver remains the most common usual non-commute mode by municipality, residents of CNV are less likely to report auto driver as their usual non-commute mode and more likely to report transit or walking as their usual non-commute mode compared to residents of DNV or DWV (see Table 32).

Table 32. Usual Non-Commute Mode by Municipality

	North Shore		DNV		CNV		DWV	
	2019	2021	2019	2021	2019	2021	2019	2021
Auto Driver	75%	75%	79%	78%	66%	68%	77%	78%
Auto Passenger	5%	7%	5%	8%	5%	5%	7%	8%
Transit	12%	9%	10%	8%	17%	13%	11%	8%
Bicycle	1%	2%	1%	2%	1%	2%	1%	1%
Walk	6%	6%	4%	4%	10%	10%	4%	4%
Other	1%	1%	1%	1%	1%	2%	0%	1%

As shown in Figure 78, it is notable that residents of Zone 4 DWV (West) almost exclusively reported auto-driver (92.4%) or auto passenger (6.6%) as their usual non-commute mode whereas residents of Zones 6 and 7 the least auto driver (60.7% for Zone 6 and 63.1% for Zone 7) or auto passenger (7.2% for Zone 6 and 5.7% for Zone 7) as their usual non-commute mode.

Figure 78. Map of Usual Mode for Non-Commute Trips by Zone

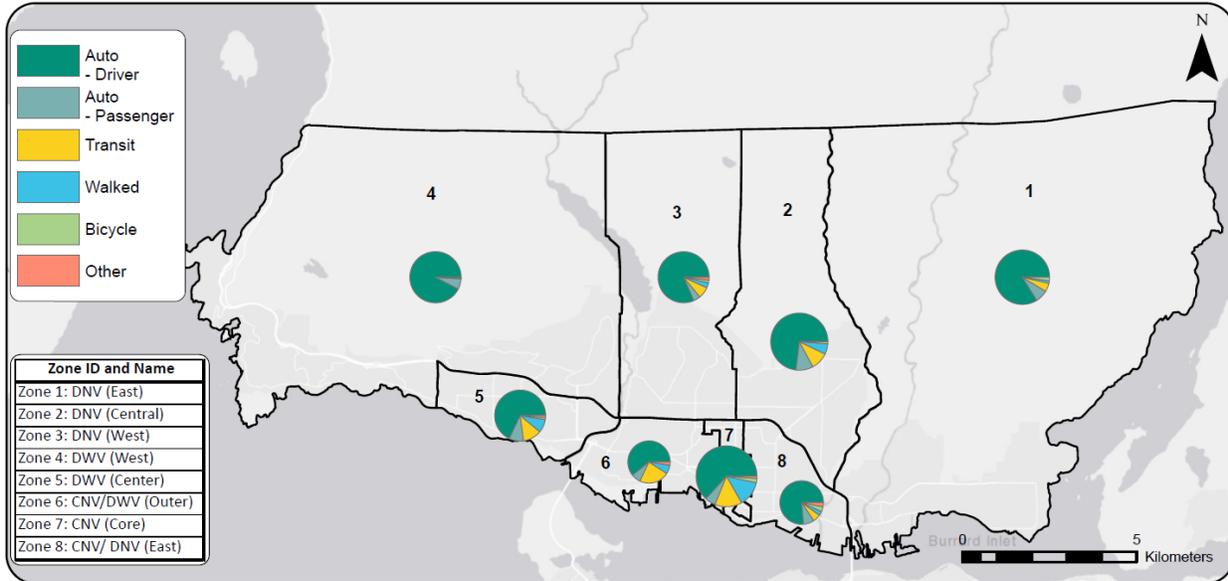


Table 33. Usual Mode for Non-Commute Trips by Zone

	Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/W V (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DN V (East)
Auto Driver	84%	73%	82%	92%	68%	61%	63%	76%
Auto Passenger	8%	10%	4%	7%	9%	7%	6%	8%
Transit	5%	10%	6%	0%	12%	23%	15%	6%
Bicycle	2%	1%	2%	1%	1%	0%	2%	4%
Walk	2%	6%	3%	0%	8%	7%	13%	3%
Other	0%	0%	2%	0%	1%	2%	1%	3%

5.4 Walking

This section provides the overall walking travel patterns within the North Shore.

5.4.1 Walking Frequency

As shown in **Figure 79**, 78% of survey participants walk or roll at least 2-4 times per week with 30% reporting that they walk or roll every day. Small proportions of participants reported that they never walk/roll for more than 15 minutes (3%) or that they are physically unable to walk/roll for 15 minutes (2%). **Table 34** shows the frequency at which survey participants walk for more than 15 minutes by municipality. There are no notable differences in walking frequency by municipality.

Figure 79. Walking Frequency

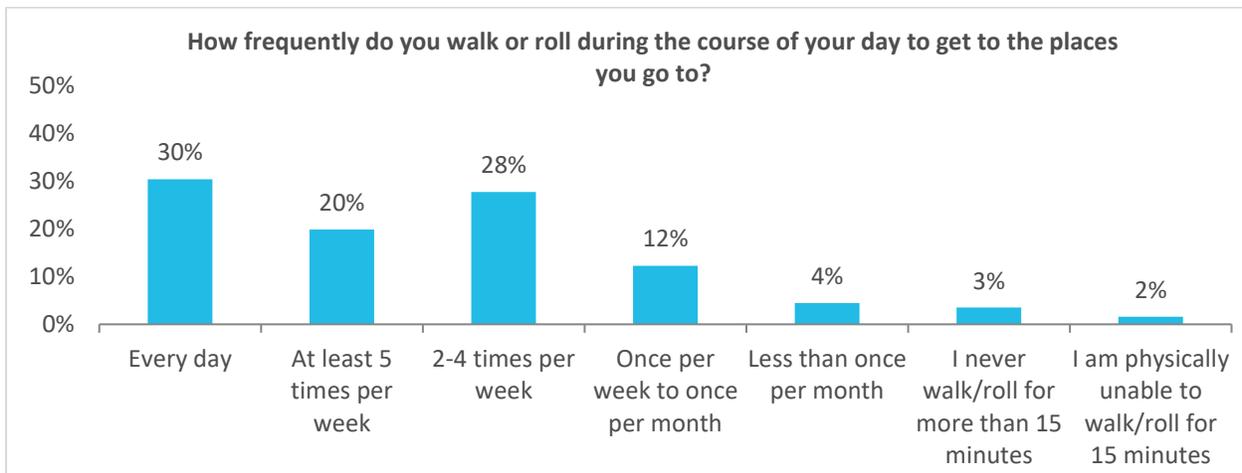


Table 34. Walking Frequency by Municipality

	North Shore	DNV	CNV	DWV
Every day	30%	30%	36%	25%
At least 5 times per week	20%	20%	19%	21%
2-4 times per week	28%	28%	27%	28%
Once per week to once per month	12%	13%	11%	12%
Less than once per month	4%	5%	3%	5%
I never walk/roll for more than 15 minutes	3%	3%	1%	8%
I am physically unable to walk/roll for 15 minutes	2%	2%	2%	2%

Excludes non-responses.

5.4.2 Walking for Commutes to Work or School

Figure 80 and Figure 81 show the percentage of the population over the age of 15 who commute to school or work by walking. Zone 5 DWV (Centre) has the highest percentage of walk commute mode at 17%, followed by Zone 8 CNV/DNV (East; 14%) and Zone 1 DNV (East; 10%). No survey participants from Zone 4 DWV (West) reported walking as their usual commute mode to work or school. Given the small number of survey participants who reported walking as a usual commute mode and the impact of the pandemic on commute trips, these survey results should be interpreted with caution.

Figure 80. Map of Percentage of Population 15+ Who Walk for Usual Commute to Work or School – by Zone

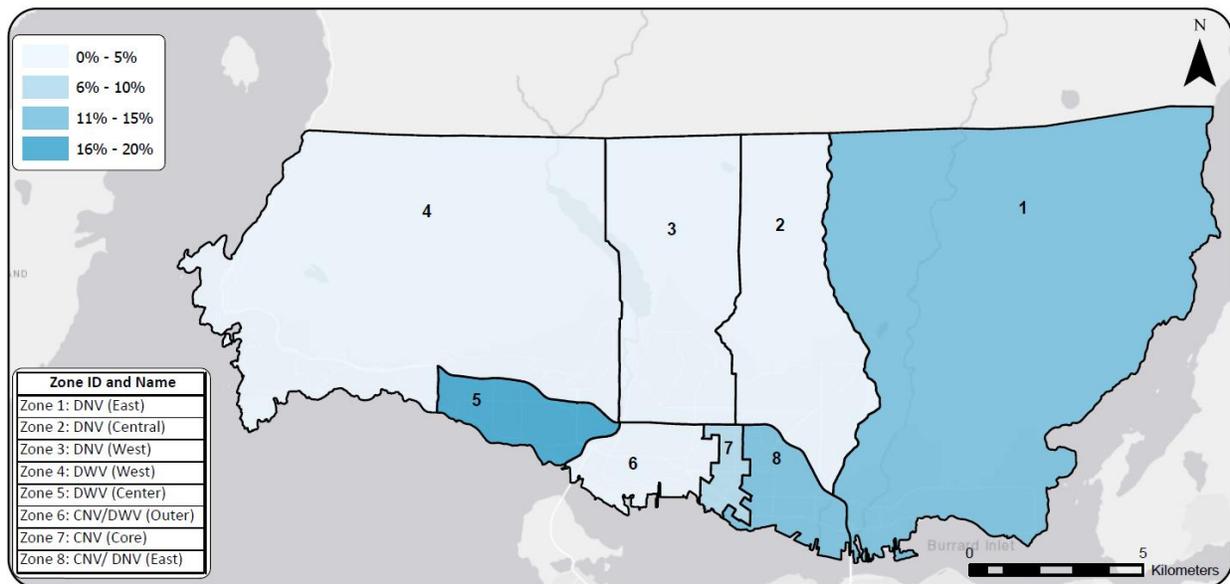
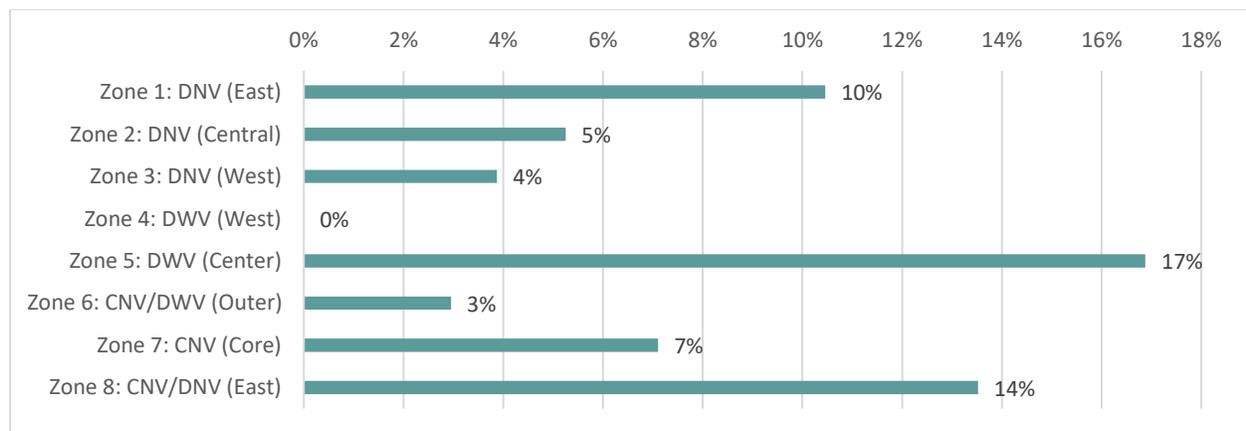


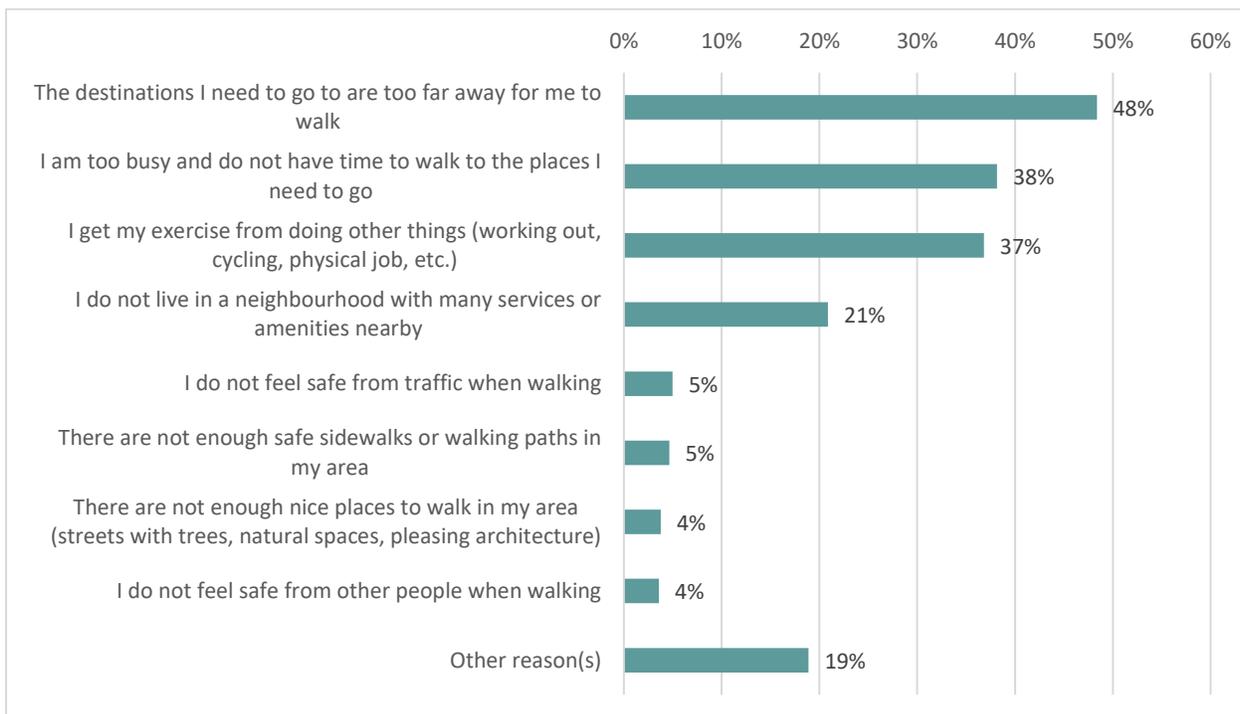
Figure 81. Map of Percentage of Population 15+ Who Walk for Usual Commute to Work or School – by Zone



5.4.3 Reasons for Not Walking More

Survey participants who reported walking less than five times per week were asked why they do not walk more often. **Figure 82** shows that nearly one-half of those who walk less than five times per week reported that the destinations they need to go to are too far away to walk. Participants were also likely to report that they were too busy and do not have time to walk to the place they need to go (38%) and/or that they get their exercise from doing other things, like working out, cycling, or having a physically demanding job (37%).

Figure 82. Participant Reported Reasons for Not Walking More Often (asked of those who walk less than 5 times per week)



As shown in **Table 35**, residents of CNV (3%) were substantially less likely than residents of DNV (20%) or DWV (41%) to report that the reason they do not walk more often is because they do not live in an area with many services or amenities nearby. Residents of CNV (7%) were also more likely than residents of DNV (2%) or DWV (3%) to report that they do not walk more often because they do not feel safe from other people when walking.

Residents of DWV (55%) were more likely than those in CNV (41%) or DNV (49%) to report that the destinations they needed to go to were too far away to walk. DWV residents (7%) were also more likely to report that they do not walk more often because there are not enough safe sidewalks or pathways in their area, compared to residents of DNV (4%) and CNV (3%).

Table 35. Participant Reported Reasons for Not Walking More Often (asked of those who walk less than 5 times per week) by Municipality

	North Shore	DNV	CNV	DWV
The destinations I need to go to are too far away for me to walk	48%	49%	41%	55%
I am too busy and do not have time to walk to the places I need to go	38%	41%	36%	36%
I get my exercise from doing other things (working out, cycling, physical job, etc.)	37%	38%	40%	31%
I do not live in a neighbourhood with many services or amenities nearby	21%	20%	3%	41%
I do not feel safe from traffic when walking	5%	5%	4%	6%
There are not enough safe sidewalks or walking paths in my area	5%	4%	3%	7%
There are not enough nice places to walk in my area (streets with trees, natural spaces, pleasing architecture)	4%	4%	4%	3%
I do not feel safe from other people when walking	4%	2%	7%	3%
Other reason(s)	19%	19%	21%	17%

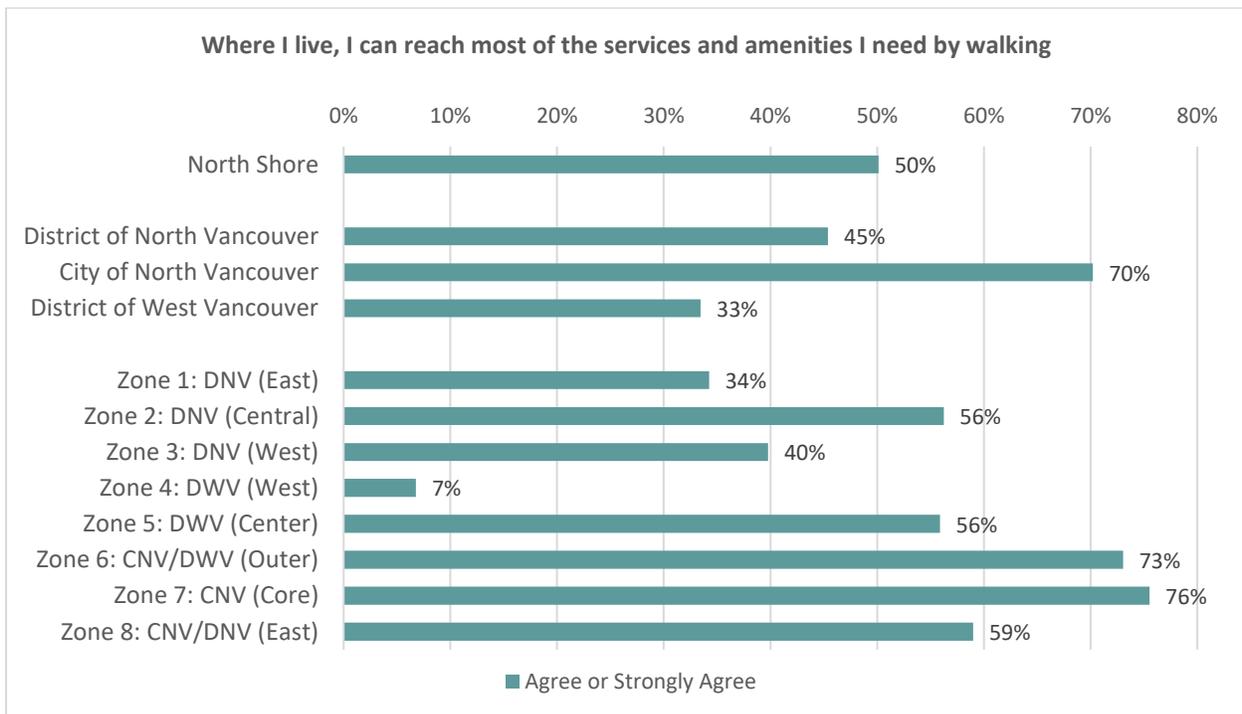
Note: Excludes answers of prefer not to answer. Percentages add to greater than 100% due to multiple responses. Examples of other reasons specified include the weather, health or physical limitations, 'too lazy', the amount I walk is sufficient



5.4.4 Walkable Neighbourhoods

Overall, 50% of survey participants from the North Shore perceived their neighbourhood to be “walkable”, that is, they agreed that they could reach most of the services and amenities they need by walking (Figure 83). Resident of CNV (70%) were more likely than those living in DNV (45%) or DWV (33%) to report that their neighbourhood was walkable. Notably, residents of Zone 4 DWV (West) were considerably less likely than those in all other zones to feel that their neighbourhood was walkable; only 7% of survey participants agreed that they could reach most of the services and amenities they needed in this zone. As reported in Section 5.4.2, no residents of Zone 4 reported walking as their usual commute mode and this finding aligns with the low proportion of survey participants who agreed that their neighbourhood is walkable. Residents of Zone 6 CNV/DWV (Outer) and Zone 7 CNV (Core) were mostly likely to agree that their area was walkable (73% and 76% respectively).

Figure 83. Perceptions of Walkable Neighbourhoods



5.5 Cycling

5.5.1 Cycling Frequency

Figure 84 shows the frequency with which survey participants cycle. One-half (50%) of survey participants reported ever riding a bicycle, with 22% of residents cycling less than once per month, 16% cycling between one time per week and one time per month, and 13% cycling two or more times per week, in fair weather. Unsurprisingly, North Shore residents are much less likely to cycle during rainy or cold weather, with 22% reporting that they ever ride a bicycle in rainy or cold weather. Overall, one-half of residents never ride a bicycle (46%) or are physically unable to do so (4%). Compared to 2019, these results are quite similar (as captured in **Table 36**).

Figure 84. Percentage of Population 15+ Who Ride a Bicycle in Fair Weather vs. Rainy/Cold Weather

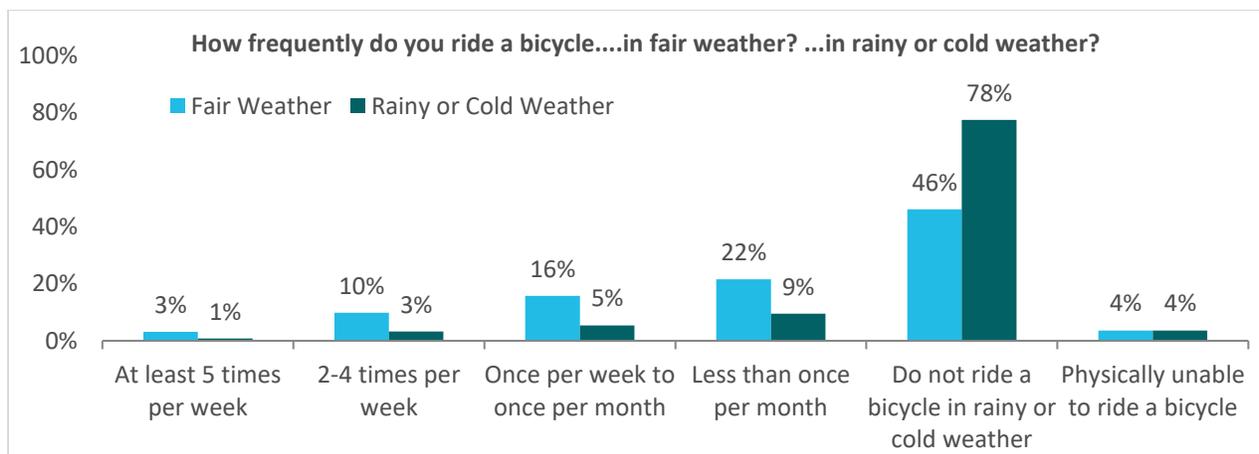


Table 36. Cycling Frequency in Fair Weather vs. Rainy/Cold Weather, 2019 vs. 2021

	Fair Weather			Rainy or Cold Weather		
	2019	2021	%-pt change	2019	2021	%-pt change
At least 5 times per week	5%	3%	-2%	3%	1%	-2%
2-4 times per week	8%	10%	+2%	3%	3%	0%
Once per week to once per month	13%	16%	+3%	5%	5%	0%
Less than once per month	22%	22%	0%	8%	9%	+1%
Do not ride a bicycle	47%	46%	-1%	77%	78%	+1%
Physically unable to ride a bicycle	5%	4%	-1%	5%	4%	-1%

Table 37 shows the percentage of the population 15+ years of age who cycle two or more times per week by municipality. Residents of CNV (15%) and DNV (14%) are more likely than residents of DWV (8%) to cycle twice per week in fair weather. The pattern is the same for those who cycle in rainy or cold weather, though only very small percentages (5% or less) of survey participants reported cycling in rainy or cold weather more than two times per week. It may be that residents of DWV have to travel further

to access services and amenities, making them less likely to cycle, compared to residents of CNV or DNV, as residents of DWV were also less likely to consider their area to be walkable.

Table 37. Cycling Frequency in Fair Weather vs. Rainy/Cold Weather by Municipality

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
At least twice per week in fair weather (# of cyclists 15+ yrs)	21,200	10,100	7,800	3,300
At least twice per week in fair weather (% of persons 15+ yrs)	13%	14%	15%	8%
At least twice per week in rainy weather (# of cyclists 15+ yrs)	6,600	3,300	2,700	600
At least twice per week in rainy weather (% of persons 15+ yrs)	4%	4%	5%	2%

5.5.2 Cycling for Commutes

Figure 85 and Figure 86 show the percentage of the population over the age of 15 who cycle for their usual commute to work or school, by zone. Overall, 4% of North Shore residents commute to work or school by cycling. Zone 5 DWV (Centre) has the lowest percentage of cycle commute mode at 2%, followed by Zone 3 DNV (West) and Zone 4 DWV (West) at 3% each. About 5% of residents from other zones (1, 2, 6, 7, 8) cycle as their usual commute mode to work or school. Given the small number of survey participants who reported walking as a usual commute mode and the impact of the pandemic on commute trips, these survey results should be interpreted with caution.

Figure 85. Map of Percentage of Population 15+ Who Cycle for Usual Commute to Work or School – by Zone

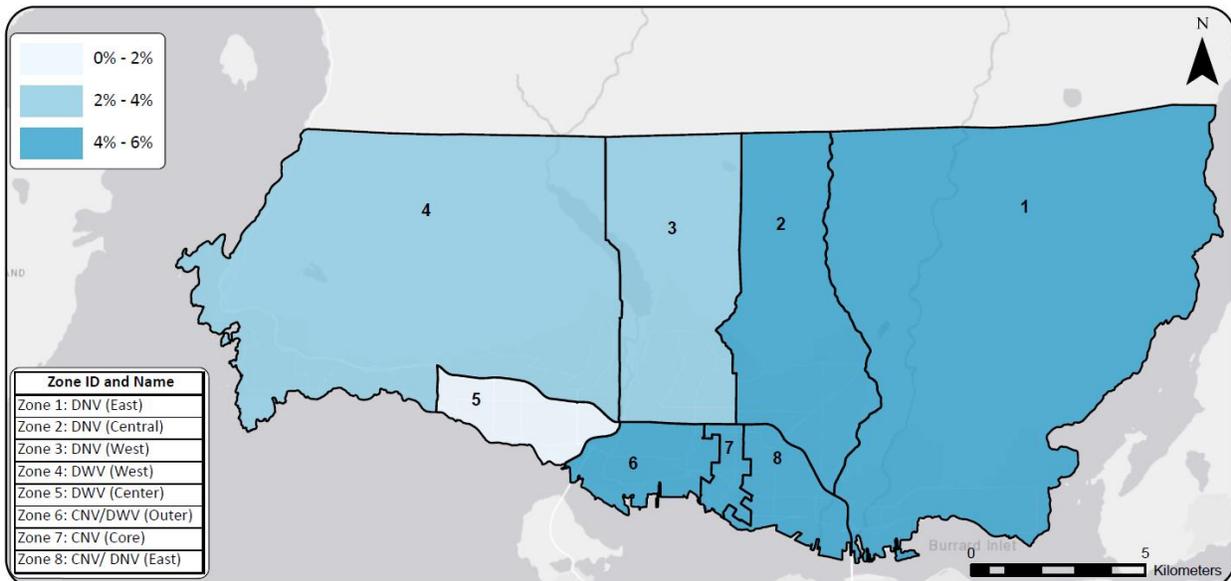
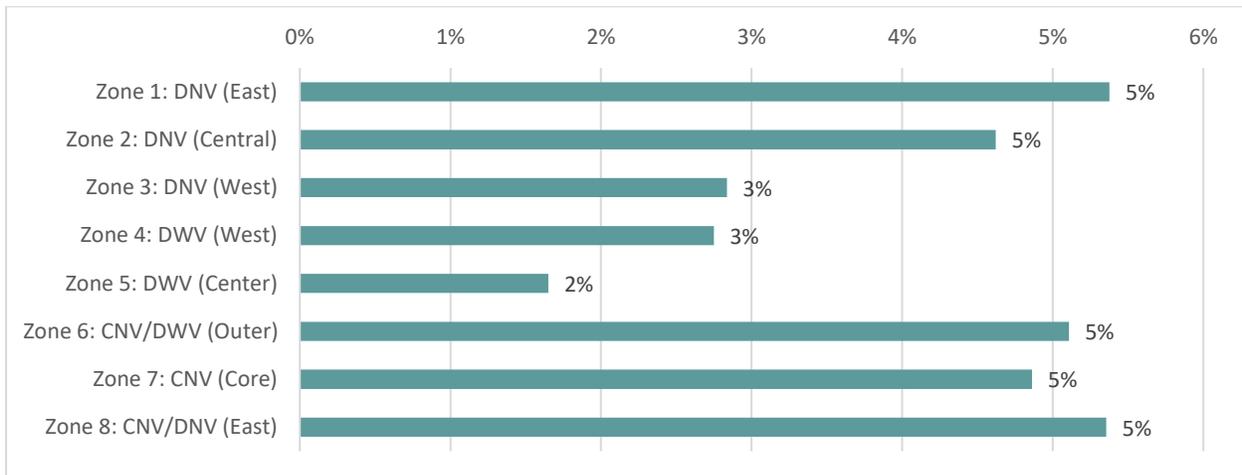




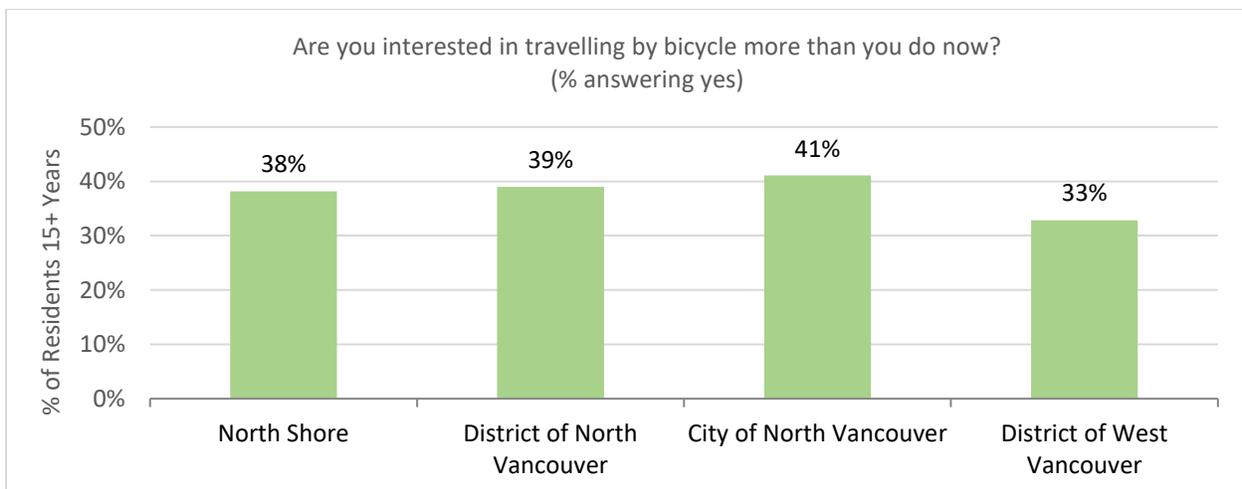
Figure 86. Percentage of Population 15+ Who Cycle for Usual Commute to Work or School – by Zone



5.5.3 Interest in Cycling More

Survey participants were asked if they are interested in cycling more than they currently do. As shown in Figure 87, 38% of North Shore residents ages 15+ are interested in cycling more. Residents of CNV (41%) and DNV (39%) were more likely than residents of DWV (33%) to indicate that they were interested in cycling more often. Compared to 2019, there are no notable differences. It may be noted that those who cycle frequently already and those who have no reason or opportunity to increase their cycling further would answer no to this question.

Figure 87. Survey Participant Interest in Cycling More – by Municipality





5.5.4 Barriers to Cycling

Survey participants who do not cycle as often in rainy or cold weather, compared to fair weather, were asked to select the reason(s) why. As shown in **Figure 88** the majority of cyclists (72%) cycle less often in cold and rainy weather because they do not like getting cold or wet. Approximately one-half of these participants did not feel safe from other traffic in poor weather. **Table 38** presents the reasons for not cycling more often in cold and rainy weather by municipality. There are no notable differences by municipality.

Figure 88. Barriers to Cycling in Rainy or Cold Weather as Much as in Fair Weather ⁵⁰

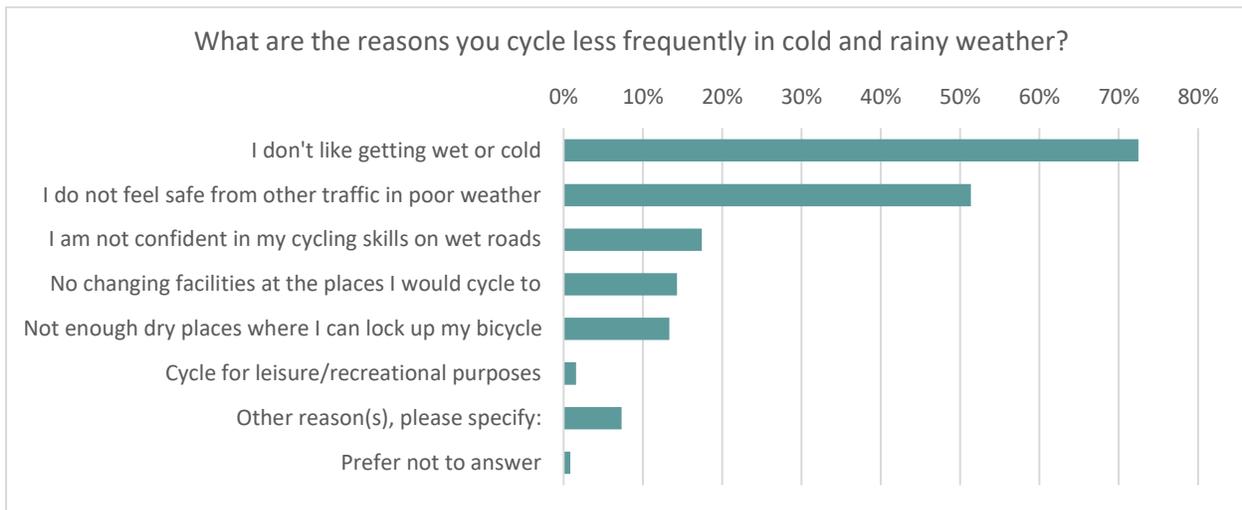


Table 38. Participant Reported Reasons for Not Cycling More Often in Cold and Rainy Weather by Municipality ⁵⁰

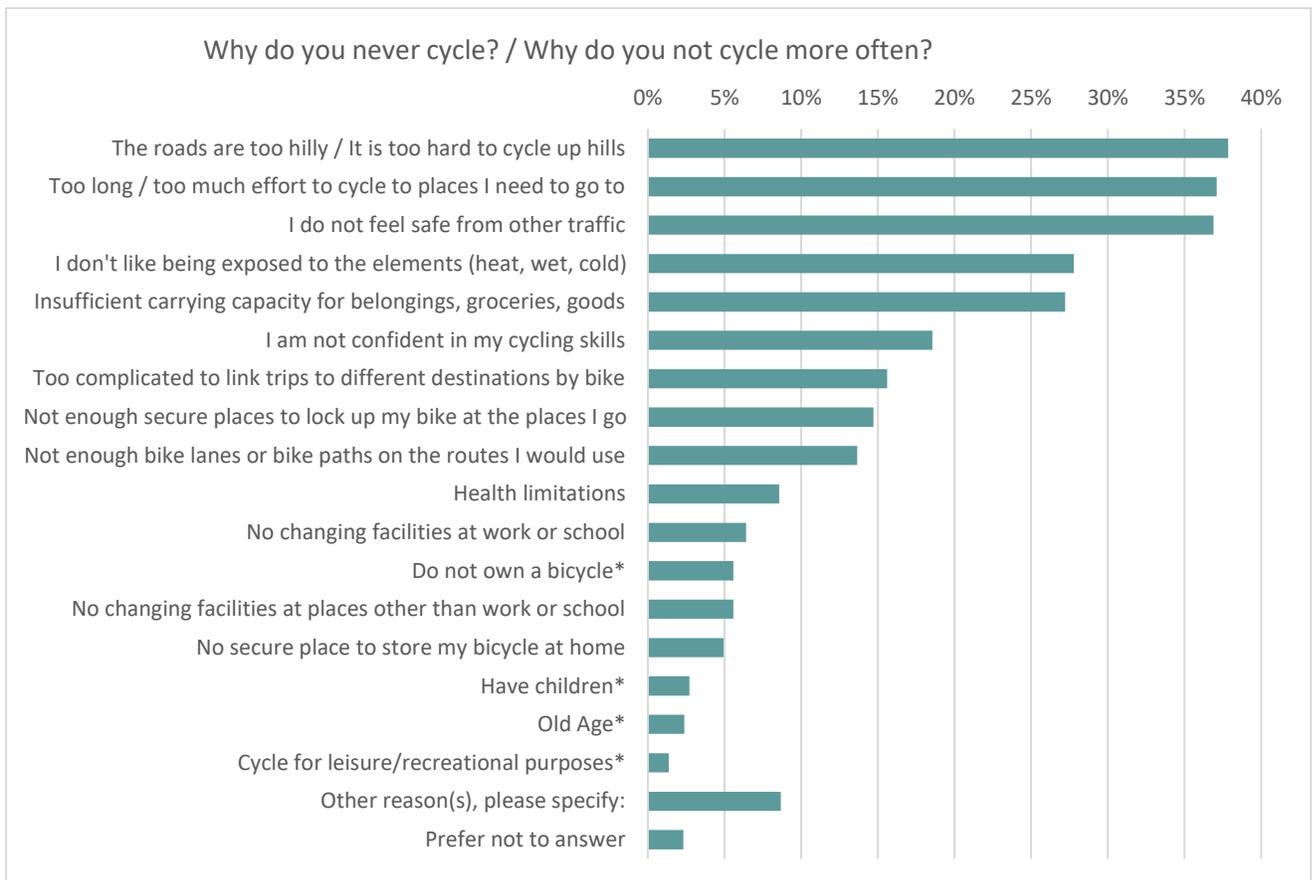
What are the reasons you cycle less frequently in cold and rainy weather?	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
I don't like getting wet or cold	72%	70%	76%	72%
I do not feel safe from other traffic in poor weather	51%	48%	53%	57%
I am not confident in my cycling skills on wet roads	17%	17%	19%	16%
No changing facilities at the places I would cycle to	14%	15%	12%	16%
Not enough dry places where I can lock up my bicycle	13%	12%	16%	14%
Cycle only for leisure/recreational purposes	2%	2%	1%	2%
Other reason(s), please specify:	7%	8%	7%	6%
Prefer not to answer	1%	1%	1%	0%

⁵⁰ Asked of survey participants who reported cycling in cold and rainy weather less frequently than they cycle in fair weather.



Survey participants who cycle once per week or less were also asked to indicate their reasons for not cycling more often, and those who never cycle were asked why they never cycle. The most common reasons for not cycling more often were because the roads are too hilly (38%), it takes too long or is too much effort to cycle (37%), and/or because participants did not feel safe from other traffic (37%). Other barriers to cycling are illustrated in **Figure 89**. As shown in **Table 39**, these reasons are similar across municipalities. Residents of DWV are more likely than residents of CNV or DNV to report that they do not cycle more often because the roads are too hilly and/or because it takes too long to cycle to the places they need to go.

Figure 89. Barriers to Cycling ⁵¹



⁵¹ Asked of those who cycle once per week or less frequently and those who never cycle. Themes marked with an asterisk (*) were common themes in “other, specify” responses for which new codes were added.

Table 39. Participant Reported Reasons for Not Cycling by Municipality⁵²

Why do you never cycle? / Why do you not cycle more often?	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
The roads are too hilly / It is too hard to cycle up hills	38%	38%	31%	46%
It takes too long or is too much effort to cycle to the places I need to go to	37%	37%	29%	47%
I do not feel safe from other traffic	37%	37%	35%	39%
I don't like being exposed to the elements (heat, wet, cold)	28%	29%	27%	28%
Insufficient carrying capacity for my belongings, groceries, or goods	27%	29%	23%	30%
I am not confident in my cycling skills	19%	21%	17%	15%
It's too complicated to link all my trips to different destinations by bicycle	16%	16%	12%	18%
Not enough secure places to lock up my bicycle at the places I would cycle to	15%	16%	15%	13%
There aren't enough bike lanes or bike paths on the routes I would travel	14%	12%	11%	20%
Health limitations	9%	9%	9%	8%
No changing facilities at work or school	6%	8%	6%	5%
Do not own a bicycle*	6%	5%	8%	3%
No changing facilities at places other than work or school	6%	7%	3%	6%
No secure place to store my bicycle at home	5%	5%	7%	2%
Have children*	3%	4%	1%	2%
Old Age*	2%	1%	2%	5%
Cycle for leisure/recreational purposes*	1%	2%	2%	0%
Other reason(s), please specify:	9%	10%	8%	7%
Prefer not to answer	2%	2%	4%	1%

⁵² Asked of those who cycle once per week or less frequently and those who never cycle. Themes marked with an asterisk (*) were common themes in "other, specify" responses for which new codes were added.

5.6 Transit

As shown in [Figure 90](#) and [Table 40](#), 75% of North Shore residents use transit, which is a decrease from 81% in 2019. Overall, between 2019 and 2021 there has been a decrease in the percentage of North Shore residents who regularly use transit, once per month or more and an increase in residents who use transit infrequently (i.e., less than once per month) or not at all. The change from 2019 (50%) to 2021 (32%) appears to be driven primarily by residents of DNV and DWV where a larger increase in the percentage of residents never using transit is observed compared to CNV. For both DNV and DWV the percentage of residents who never use transit increased by 12 percentage points but for CNV it increased by only 4 percentage points.

Figure 90. Transit Use in the Past Month, 2019 vs 2021⁵³

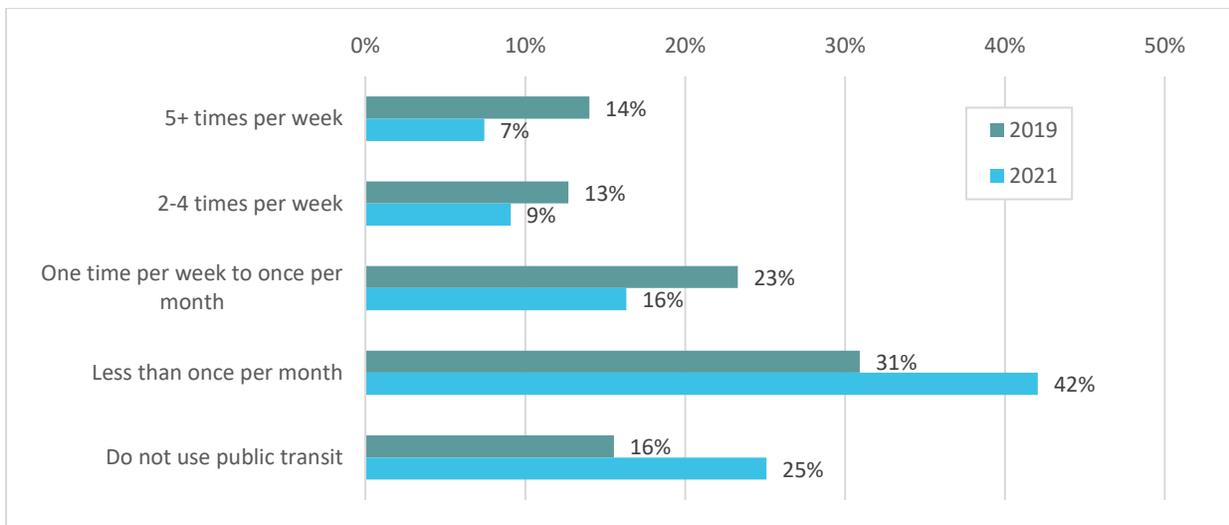


Table 40. Frequency of Transit Use by Municipality, 2019 vs 2021⁵³

	North Shore			DNV			CNV			DWV		
	2019	2021	%-pt chng	2019	2021	%-pt chng	2019	2021	%-pt chng	2019	2021	%-pt chng
5+ times/week	14%	7%	-7%	13%	6%	-7%	20%	11%	-9%	9%	5%	-4%
2-4 times/ week	13%	9%	-4%	10%	7%	-3%	15%	13%	-2%	16%	8%	-8%
One time per week to once per month	23%	16%	-7%	24%	16%	-8%	25%	19%	-6%	21%	14%	-7%
Less than once per month	31%	42%	+11%	37%	43%	+6%	23%	42%	+19%	29%	40%	+11%
Do not use public transit	16%	25%	+9%	16%	28%	+12%	11%	15%	+4%	21%	33%	+12%

⁵³ Percentages may add to less than 100% due to rounding.

Figure 91 shows the frequency of transit use by zone. Zone 4 DWV (West) has the highest percentage of residents who do not use transit, at 49%, followed by Zone 1 DNV (East) at 32%. Zone 6 CNV/DWV (outer) has the highest percentage of regular transit users (i.e., they use transit two or more times per week) at 30%, followed by Zone 7 CNV (Core) at 24%). The percentages are listed for reference in Table 41.

Figure 91. Map of Frequency of Transit Use by Zone

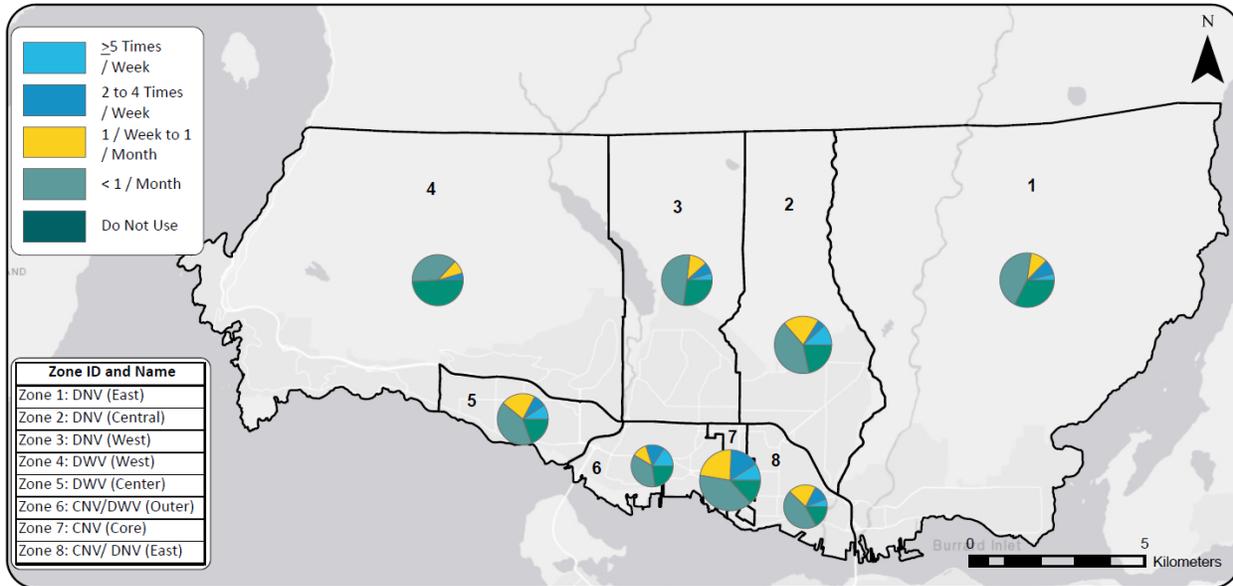


Table 41. Frequency of Transit Use by Zone

	Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/WV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
5+ times per week	4%	12%	5%	0%	9%	16%	9%	6%
2-4 times per week	9%	4%	7%	4%	8%	14%	15%	12%
One time per week to once per month	10%	20%	11%	9%	22%	11%	23%	20%
Less than once per month	45%	42%	50%	38%	41%	36%	39%	45%
Do not use public transit	32%	22%	27%	49%	19%	23%	13%	17%

5.7 Walkability and Bikeability of Motorized Trips

The surveyed trips were examined to determine the extent to which trips that were made using a motorized mode could have feasibly utilized an active mode instead (i.e., walking or cycling). The distance threshold for a “bikeable” trip was set at 4.6 km (actual distance travelled on available bike routes), based on the finding that 90% of reported cycling trips had an estimated actual cycling distance within this threshold. The distance threshold for a “walkable” trip was set at 1.6 km (actual distance travelled), based on 90% of reported walking trips having an estimated actual distance on existing sidewalks and pathways within this threshold. For trips taken using motorized modes, the trip origin, destination, and time of day were processed to determine the estimated actual cycling and walking distances via the most efficient available cycling and pedestrian routes. If the cycling or walking distance was found to be within the appropriate threshold, the trip was deemed bikeable or walkable for the purposes of this analysis.

About 40% of auto driver trips (19% of total daily trips by all modes) are bikeable, while 14% are walkable (10% of all daily trips by all modes). As shown in [Figure 92](#), overall, this suggests that 19% of all trips were within what is considered an appropriate cycling distance for potential mode-shifting from auto driver to cycling, and an additional 10% could be potentially shifted from auto driver to walking.

Of auto passenger trips, 38% are considered bikeable and 10% are considered walkable. Smaller percentages of transit trips were considered bikeable (17%) or walkable (2%). This likely reflects the fact that transit trips were, on average, longer than trips taken by auto passengers. Overall, this suggests that when all modes are considered 3% of total daily trips are considered bikeable and show potential for mode shift from auto passenger or transit user to cycling, and 1% show potential for mode shift to walking. Though there is potential for some mode-shifting away from auto passenger and transit, the impact on overall mode shares would be quite minimal.

Figure 92. Percentage of Walkable and Bikeable Trips from Current Mode Share – North Shore

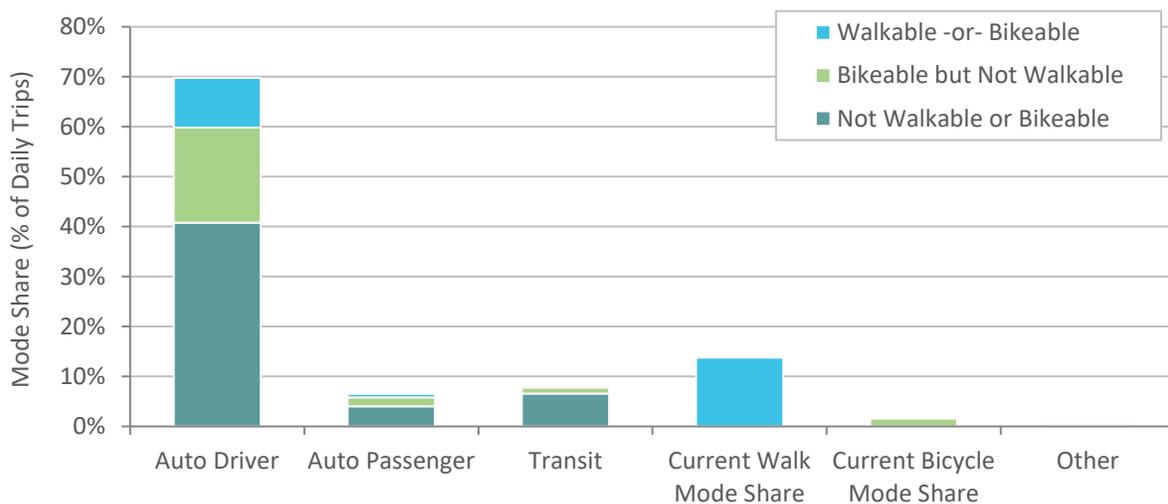


Table 42 and **Table 43** provide a breakdown of bikeable and walkable auto driver trips by municipality of residence and zone of residence. Potential for mode shifting across municipalities is similar; approximately 30% of all daily trips are auto driver trips that could shift to cycling (representing 42% of all auto driver trips) and 10% could shift to walking (representing 14% of all auto driver trips). When examined by zone, Zone 5 DWV (Centre) shows the most potential for mode shifting from auto driver to cycling, at a 34% share of all trips. Zone 6 CNV/DWV (Outer) shows the most potential for mode shifting from auto driver to walking (a 14% share of all trips).

Table 42. Mode Shift Potential by Municipality of Residence (Daily Trips)

	North Shore	District of North Vancouver	City of North Vancouver	District of West Vancouver
Auto Driver Trips	357,900	172,700	85,400	99,800
Auto Driver Mode Share	70%	72%	60%	77%
Bikeable Trips	148,700	68,500	42,400	37,800
% of Auto Driver Trips	42%	40%	50%	38%
Mode shift potential	29%	28%	30%	29%
Walkable Trips	51,000	24,100	14,600	12,300
% of Auto Driver Trips	14%	14%	17%	12%
Mode shift potential	10%	10%	10%	9%

Table 43. Mode Shift Potential by Zone of Residence (Daily Trips)

	Zone 1: DNV (East)	Zone 2: DNV (Central)	Zone 3: DNV (West)	Zone 4: DWV (West)	Zone 5: DWV (Center)	Zone 6: CNV/DWV (Outer)	Zone 7: CNV (Core)	Zone 8: CNV/DNV (East)
Auto Driver Trips	52,900	54,000	51,500	56,900	44,500	27,100	44,000	26,900
Auto Driver Mode Share	75%	67%	73%	86%	69%	65%	55%	71%
Bikeable Trips	19,200	24,200	19,200	15,800	22,300	13,600	22,300	12,100
% of Auto Driver Trips	36%	45%	37%	28%	50%	50%	51%	45%
Mode shift potential	27%	30%	27%	24%	34%	33%	28%	32%
Walkable Trips	8,500	6,900	6,700	5,200	7,200	5,700	8,400	2,600
% of Auto Driver Trips	16%	13%	13%	9%	16%	21%	19%	10%
Mode shift potential	12%	9%	9%	8%	11%	14%	10%	7%

It should be noted that this analysis does not take into account real or perceived barriers that may influence the practicability of cycling or walking along a route of a given trip. These may include considerations involving the physical infrastructure in place to support active modes, the physical ability for an individual to make a trip using an active mode, and whether the trip involves the transport of larger cargo that would not be practical to transport on foot or a standard bicycle. Barriers to cycling



more are discussed in [Section 5.5.4](#) and reasons for not walking more are discussed in [Section 5.4.3](#). Furthermore, trips may have been a part of a broader trip chain with longer travel times or distances that necessitated the use of a vehicle, which also factors into the choice of mode for non-home-based trips. Therefore, the number and proportion of walkable and bikeable trips should be considered an upper limit for the potential to shift these types of trips to active modes.

6 Topical Issues

This section will highlight the survey topics of particular interest in the current survey cycle. The survey results for some topical questions will have been reported in earlier sections of the report, others will be featured in the report sections that follow.

6.1 Summary of Topical Issues

Certain survey questions were included in the 2021 NSTS in order to provide a better understanding of transportation-related issues of current interest or to inform upcoming policy planning. These questions are not part of the core data requirements for trend tracking and may not be asked again in the next survey cycles. Some of these questions were of specific topical interest in the 2021 survey cycle only. Other questions may pertain to perceptions, attitudes or travel patterns that may be slow to change. Such questions could alternate full survey cycles (ask every 4 years) or be revisited much later (for example, every 10 years), unless there is a distinct policy need to ask them sooner.

Topical questions in the 2021 NSTS that do not necessarily need to be asked about in the next survey cycle are as follows:

- Expected changes to telecommuting frequency in the coming year ([Section 5.1.2](#)).
- Barriers to walking ([Section 5.4.3](#))
- Walkable neighbourhoods ([Section 5.4.4](#))
- Barriers to cycling ([Section 5.5.4](#))
- Source of information for construction-related travel delays, presented below.

6.2 Source of Information for Construction-Related Travel Delays

As noted in [Section 5.1.7](#), residents of the North Shore were most often dissatisfied with their usual commute mode because of the travel time (i.e., it took too long to get to the places they needed to go) and perceived inconvenience. Among auto drivers, 86% were dissatisfied with their usual commute mode because of congestion or traffic on roads and 66% were dissatisfied because of traffic or congestion on bridges. Recognizing that traffic congestion may be a growing concern for travellers, particularly auto drivers, survey respondents were asked where they get their information on construction-related delays and how they would like to get this information (i.e., their preferred source).

As shown in [Figure 93](#), residents of the North Shore are most likely to get this information from local radio stations (46%) or social media (30%). Residents preferred source of information on construction-related delays is local radio (38%), social media alerts (35%), or text message (34%) which is not currently an option.

[Table 44](#) provides a breakdown by municipality. Residents of CNV (39%) are less likely to get information about construction-related delays from local radio, compared to residents of DNV (50%) and DWV (47%)



and were less likely to indicate local radio as their preferred source of information. Residents of CNV (13%) were more likely than residents of DNV (9%) and DWV (5%) to get their information from “other” sources. Other sources mentioned by respondents included newspapers, Drive BC, Waze app, Alertable app, Apple Maps, “the internet”, car GPS systems, traffic cams, building strata notices, and word of mouth.

Figure 93. Survey Participants’ Reported and Preferred Source of Information on Construction-Related Delays ⁵⁴

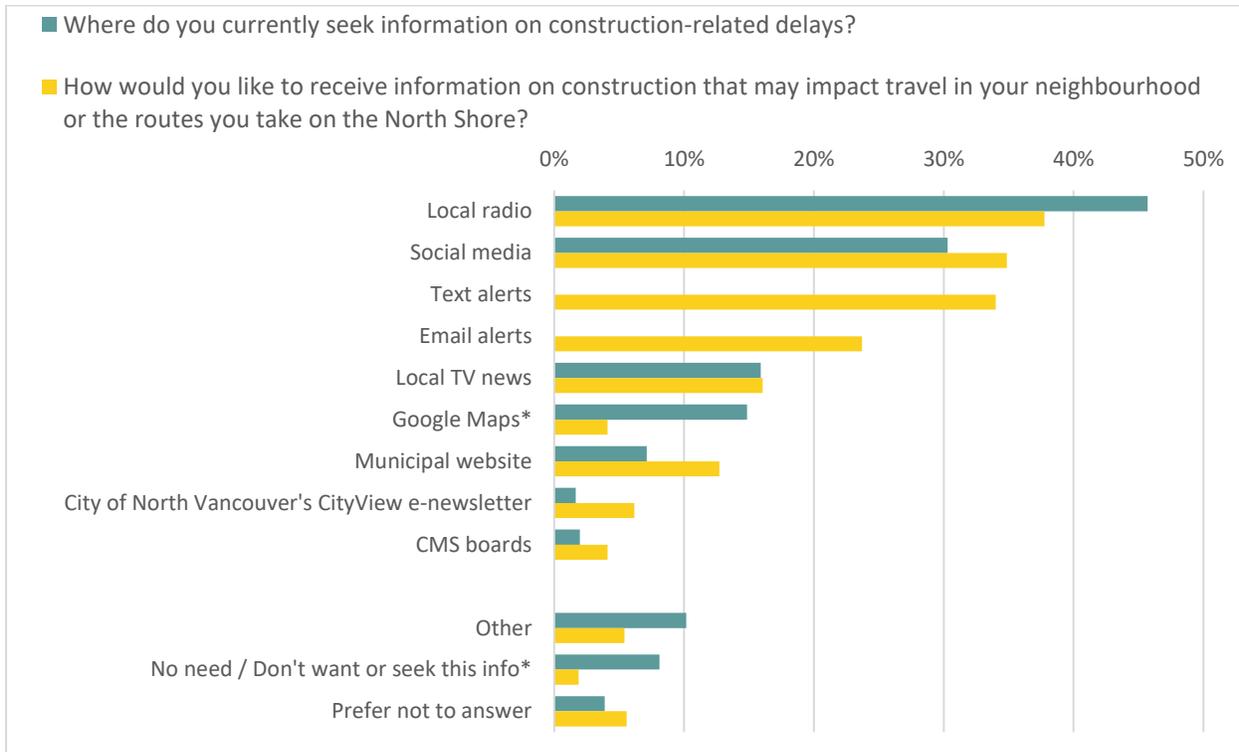


Table 44. Reported and Preferred Source of Information on Construction-Related Delays – by Municipality ⁵⁴

	North Shore		DNV		CNV		DWV	
	Use	Would like	Use	Would like	Use	Would like	Use	Would like
Local radio	46%	38%	50%	40%	39%	33%	47%	39%
Social media	30%	35%	30%	33%	30%	35%	31%	38%
Text alerts	n/a	34%	n/a	34%	n/a	31%	n/a	38%
Email alerts	n/a	24%	n/a	22%	n/a	26%	n/a	24%
Local TV news	16%	16%	17%	14%	16%	16%	15%	19%
Google Maps*	15%	4%	16%	5%	14%	3%	15%	4%
Municipal website	7%	13%	8%	12%	7%	14%	5%	12%
CNV's CityView e-newsletter	2%	6%	1%	5%	3%	10%	2%	3%

⁵⁴ n/a = text alerts and email alerts were not asked about for the question on current use, as they are not currently offered. Percentages add to greater than 100% due to multiple responses. Asterisk (*) = Common write-in answer from "other, please specify" given its own code. As the category was not presented to respondents, actual incidence may be higher.

	North Shore		DNV		CNV		DWV	
	Use	Would like	Use	Would like	Use	Would like	Use	Would like
Changeable Message Sign (CMS) boards	2%	4%	2%	5%	2%	3%	2%	4%
Other	10%	5%	9%	5%	13%	5%	8%	8%
No need / Don't want or seek this info*	8%	2%	8%	2%	10%	2%	7%	2%
Prefer not to answer	4%	6%	3%	5%	5%	7%	4%	5%

7 Lessons Learned and Recommendations

When the North Shore Transportation Survey was launched in 2019, the baseline survey provided an opportunity to explore transportation demand indicators, residents' travel patterns, and residents' perceptions on topics of interest for transportation planning (such as comfort cycling in different cycling environments and interest in e-bike share services). The shorter interim survey in 2020 provided a unique opportunity to better understand the impacts of the COVID-19 pandemic on selected travel behaviours, even though the 2020 results are not reported on here due to differences in sample composition. The 2021 survey was the first full survey cycle since the baseline survey. The 2021 survey has allowed for robust tracking of changes in key transportation measures, such as mode shares and trip volumes, and in residents' transportation behaviours and choices, such as the rise in e-bikes and EVs. It has also revealed the ongoing impacts of COVID-19 on travel habits such as transit usage, telecommuting, and commuting patterns. The survey program as a whole provides a rich dataset that can be mined for further analysis and used in tracking the North Shore's progress towards a more sustainable transportation future.

Outlined below are some of the lessons learned from this research and recommendations for the next survey cycle.

- Data collection period.** We recommend starting and concluding the survey earlier in the next survey cycle. The 2019 NSTS survey data collection started October 22 and concluded December 13 (with delays in data collection experienced due to holding off on final invitation letters due to the transit strike). The 2021 NSTS data collection started October 26 and concluded December 18 (with some disruption in data collection due to severe weather events). We recommend starting the next full survey cycle earlier in the fall, with most surveys completed prior to November 10, so as to obtain more surveys in weather conditions that are reasonable for walking and cycling (daytime temperature highs above 10°C and lows above 5°C) and to reduce the likelihood of future extreme weather events, which may be more likely later in the fall. The difference in time frames from an earlier start may have a slight effect on the comparability of the two surveys with respect to mode shares (with a possibility of higher active mode shares in better weather), which would be a necessary caveat to the results.
- Maintain core survey design.** As the NSTS is a tracking study, we recommend maintaining the core questionnaire to maximize comparability from cycle to cycle, particularly for questions related to key transportation metrics such as trip rates and mode shares. Specific questions to add, revise or drop should be considered carefully with respect to the impact of any changes on improving results and on comparability.
- Topical questions.** The survey provides a unique opportunity to conduct research with residents on questions of topical interest that may be useful to current transportation planning considerations. New topics of interest can be explored in future survey cycles.

- Panel sample design.** The survey is conducted as a panel survey with a regular addition of new recruits, meaning that participants in previous surveys are invited to participate in future cycles as long as they are willing. To compensate for attrition in the panel (due to those who do not agree to participate in future cycles, who move away from the North Shore, or who cannot be contacted in the next cycle), new participants should be recruited from the general population. This approach has certain advantages, including cost efficiency and the unchanging core panel of participants reducing cycle-to-cycle variation due to random sampling. However, over time the core panel may develop some bias in terms of its representativeness of the population (e.g., may favour more established residents who rarely move). This was proven in the exploration of the data for repeat participants as part of the 2020 interim survey (with repeat participants found to have higher daily trip rates in the baseline survey, even after controlling for age, gender, and dwelling type via data weighting). The panel composition should be monitored over time, and decisions made as appropriate to balance the size of the existing panel against the recruitment of a new cross-section in each survey cycle and/or to retire older panellists after a certain number of years of participation.
- Representation of young people.** Both the 2019 and 2021 surveys somewhat under-represented younger residents, particularly those between the ages of 15 and 24, who are generally less likely to participate in surveys. We recommend continuing to undertake address-based sampling to include coverage of all residents living in private dwellings, including cell-phone-only households. We also recommend continuing to offer spin-off sampling to ask participants in households with other household members under the age of 40 to recruit another household member to participate. It may also be possible to undertake other measures to encourage young people to participate.
- Streamlining of the Questionnaire and Reporting.** The survey questionnaire is relatively long, and the dataset provides a rich dataset with much information. In order to reduce the burden on survey respondents, we recommend a review of the questionnaire and the survey results to identify the questions and transportation indicators of greatest use to the municipalities. If aspects of analysis are not being used by the municipalities, they may be candidates for dropping, in favour of providing more focused results on the most important measures. Some analyses may not need to be reported in every survey cycle. For example, reasons for dissatisfaction with commutes will change gradually over time and may not warrant reporting on in every full survey cycle (opening up room to explore other topics in greater depth). Conversely, other indicators, such as those associated with sustainable mode targets, will be important to track in each full cycle to measure incremental change.
- Tracking VKT.** The sample sizes of survey panel members who provided odometer readings in the previous survey cycle for the same vehicle are modest in number, particularly when broken out by municipality. Therefore, it will be important to minimize attrition in the panel and ensure participants provide accurate odometer readings and vehicle information. In addition, as the number of electric vehicles continues to grow, it should be possible to have sufficient sample



sizes of such vehicles to estimate VKT more accurately for these vehicles vs. those fueled by gas, as they have different impacts on the greenhouse gas (GHG) emissions. Given the rise in interest in estimating GHG and planning for climate action, consideration may need to be given to whether the sample sizes for VKT estimates are robust enough for the purposes to which the estimates may be put. In particular, the strategy of conducting a short interim survey with only previous participants (with no new recruits), while cost-effective, is subject to attrition without replacement with new recruits, resulting in a very modest sample size of recruits with previous odometer readings in the next cycle. Also, consideration may need to be given as to whether improvements can be made in the estimation methodologies, particularly the estimates of household vehicles by which to expand the survey results.

- **Tracking COVID 19 Impacts.** The survey results have revealed significant shifts in trip making for work commutes and other purposes and the pandemic's impacts on work arrangements and telecommuting. It will likely be useful to continue to track changes in these measures, to help transportation planners understand evolving transportation demand as we begin to settle into a new steady-state (with COVID-19 transitioning to be endemic rather than a pandemic).