

# TRANSPORTATION NEEDS IN THE FUNDY REGION

A REPORT TO THE FUNDY REGIONAL  
SERVICE COMMISSION



**HOUSING, MOBILIZATION  
& ENGAGEMENT  
RESEARCH LAB**



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## Contributions

This study was designed and the data were collected by Dr. Julia Woodhall-Melnik, Graduate Assistants Maura Hickey and Sarah LeBlanc, and the students of the SOCI 4379 course at the University of New Brunswick. The report was prepared by Dr. Woodhall-Melnik with assistance from Sarah Durelle and Grace Roach. We extend our gratitude to all members of the HOME-RL team. This work was done in partnership with the Fundy Regional Service Commission.

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## Contact

For enquires about this report, please contact [homerl@unb.ca](mailto:homerl@unb.ca).

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# 1. EXECUTIVE SUMMARY

Transportation poses a unique challenge to planners and policymakers that work in diverse regions, like Fundy, that contain regional, semi-urban, suburban and urban areas. This report responds to a call by the Fundy Regional Service Commission for an overview of transportation use and needs in the Fundy Region.

The report begins with a review of current literature on regional transportation planning. The literature underscores the importance of multimodal and flexible systems of transportation for regions with rural, suburban, semi-urban and urban areas. Specific attention is brought to the first-last mile problem, wherein residents in low-density areas are challenged with meeting their own transportation needs for the start and/or end of their trips (Park et al., 2021). One suggestion to aid participants with this problem is to create comfortable, safe and accessible transfer points where residents can leave park their vehicles and access public transportation into the city core. These transfer points should have good outdoor furniture, sidewalks and good lighting for security. Another common solution to this problem is demand responsive transportation (Brovarone & Cotella, 2020; Mounce et al., 2020) and/or flexible public transportation services (Liu et al., 2021; Sayarshad & Gao, 2020). Saint John Transit has recently piloted these services with the use of mini e-busses.

The data presented in this report are from two sources: surveys conducted with the general public in the Fundy Region and open-ended responses from a brief survey with Key Informants who work with made-marginalized populations in the region. Prior to the creation of the surveys, students from the SOCI 4379 class at the University of New Brunswick in Saint John held two focus groups with individuals who have expert knowledge of transportation in the region. The discussions from the focus groups were analyzed and the findings were used to create a draft survey which was provided to the Fundy Regional Service Commission for feedback prior to data collection.

We acknowledge that this survey uses convenience sampling which increases the risk of selection bias. It is likely that individuals who happened to hear about the survey and felt strongly about regional transportation participated. However, we would also like to note the tremendous amount of public engagement with the survey that we received. We had originally hoped for roughly 400 responses and we were able to collect 832 valid responses from individuals who live in the region.

Saint John benefits from having existing public transportation services that can be built upon. Without these services, it is likely that greater barriers to transportation in the City of Saint John would exist. The responses in this survey indicate a desire for more public transportation and are for planning purposes. This report is not a criticism of current regional transportation, but presents avenues for future planning that can address any unmet needs that are natural occurrences in diverse regions.

## 1.1 - A Region Designed for Cars: Key Findings

Valid responses were collected from 832 participants in the Fundy Region and six Key Informants. Key findings include:

- Approximately half (51.80%) of participants live in Saint John and the remainder (49.20%) live in the surrounding areas
- The most prevalent primary mode of transportation is driving a personal vehicle (56.11%), followed by driving with another household member (23.94%)
- The Fundy Region is described by participants as accessible only if you own a vehicle
- 10.88% of respondents use public transportation as their primary mode of transportation. Most public transportation users do not have access to a vehicle or a driver's license
- 65.18% of participants never use public transportation. The most prevalent reasons for not using public transportation include it not being convenient, not available in participants' areas and it not working with participants' schedules
- 70.56% of participants would use public transportation if it was accessible, available in their areas, and had schedules that worked for them
- 38.96% of participants use some amount of active transportation. The most common reason given is to get exercise while going places. Those who do not use active transportation live too far from stores and work/school. Safety was a concern for participants, and many want access to safety features like well-maintained sidewalks and bike lanes
- The primary mode of transportation in the region is personal vehicle use
- 29.52% of participants find it challenging to get around the Fundy Region, 59.40% do not find it challenging and 11.08% are unsure. Ease of mobility in the region is attributed to personal vehicle use
- The most difficult to access location in the region is the Regional Hospital

This report uses a transportation justice framework to assess inequities in mobility. Transportation justice involves three key factors: 1) reducing barriers to transportation for made-marginalized populations; 2) reducing the burden of transportation (e.g. noise, pollution, etc.) for made-marginalized populations; and 3) engaging community in discussions and decisions on transportation. Equity is assessed by comparing rural, suburban, and semi-urban (referred to as a group as "regional") residents with those in the City of Saint John and comparing those with before tax household incomes of less than \$50,000/year (referred to as "low-income" with those who make \$50,000 a year or more. All of the findings of the equity analysis are statistically significant, meaning that the likelihood that they occurred by chance or in error is extremely low. Key findings include:

- Participants with household incomes below \$50,000 are disproportionately located in Saint John
- Regional residents have, on average, 0.23 more cars per person than those in who live in the city. Low-income households have, on average, 0.28 fewer cars per person than those who make \$50,000 a year and above



- All participants are assigned a difficulty score by summing the number of locations that they have difficulty accessing. 13 locations are assessed, and scores can range from 0-13. Saint John residents had a difficulty score of 2.61/13 and regional residents had a difficulty score of 1.71/13. Low-income residents have a difficulty score of 4.12/13, whereas individuals with incomes of \$50,000 and above had a difficulty score of 1.78/13. This indicates substantial mobility inequity for low-income individuals
- More Saint John residents (53.29%) access active transportation than those in regional areas (23.62%). More low-income residents (53.63%) use active transportation than higher income residents (37.47%)
- Saint John residents (75.18%) are more likely to use an improved public transportation system than regional residents (65.66%). Low-income residents (84.36%) are more likely to use an improved public transportation system than higher income residents (68.19%). This indicates that improvements to public transportation may be more important in lower-income neighbourhoods and in the city than in higher income or regional areas

This report indicates public willingness to engage with public transportation options and notes specific requests for improvement to active transportation infrastructure. It also indicates that many residents drive their own vehicles and are comfortable doing so. Although, the high cost of gas is discussed as a problem for some vehicle owners.

The Fundy Region faces challenges in ensuring transportation justice and equity of mobility in the region. Residents in the city face barriers and more socioeconomic disadvantage than those in the regional areas. However, additional analyses should be run to assess nuanced differences in the region. For example, Quispamsis, Rothesay and Grand Bay-Westfield have higher median incomes than Fundy-St. Martins and the Fundy Rural District. Further, the impact of area of residence on ease of access, along with income and other sociodemographic factors can be modelled to provide further guidance on which challenges most significantly contribute to mobility difficulties. Public engagement with these findings using a plain language knowledge transfer campaign may be beneficial to the public's understanding of the need for transportation equity and improvements in specific areas of the region.

Methods note: We note that two area amalgamations were made during the data analysis phase. Areas were determined by the first three digits of postal code and there is considerable overlap in postal codes between Rothesay and Quispamsis. We can say with certainty that participants live in Rothesay or Quispamsis, but there is too much overlap in postal codes to reliably separate Rothesay and Quispamsis. Participation from the Fundy Rural District was lower than in other areas and this was amalgamated with Fundy-St. Martin's to increase the number of participants and decrease the risk that any participants could be identified.



## 2. INTRODUCTION

Transportation is important to examine from a regional perspective. In regions that contain both regional and urban areas, city centres often provide regional access to services and employment. However, limited access to transportation can constrain population movement from regional areas to city centres, which limits access to resources housed in cities (Mirza & Hulko, 2022; Velaga et al., 2012). Through regional transportation planning, policymakers can account for the diverse needs of all residents, including those with low incomes and a lack of reliable personal transportation (Fletcher et al., 2010). In addition to addressing commuters' diverse needs, traffic congestion, and minimizing environmental degradation, a broader regional understanding of transportation provides policymakers with opportunities to generate diverse and comprehensive strategies that meet the needs of many residents (Liang et al., 2020). Further, transportation planning from a regional perspective allows for collaboration between diverse jurisdictions, which can facilitate collaborative initiatives and plans that aim to enhance mobility, foster economic growth, and improve accessibility across the region as whole (Boisjoly & El-Geneidy, 2017; Pokharel et al., 2023).

Regions that need to provide transportation options for both regional and urban areas experience unique challenges. This is largely related to the diverse needs of residents in areas with low-population densities that are more challenging to service using traditional forms of public transportation (e.g. subways, buses, light rail transportation, etc.; Nigro et al., 2019). Despite the challenges regional transportation planning presents, the ability of regions to service the diverse needs of individuals is critical to the social, health, and economic wellbeing of residents (Mirza & Hulko 2022). At present, the Fundy Region lacks a comprehensive understanding of the transportation needs of their residents who live in regional, semi-urban, suburban, and urban areas that span the region. The objective of this study is to better understand the transportation use, needs, and desires of individuals who live in the Fundy Region. In doing so, this report provides the Fundy Regional Service Commission with information that will benefit future transportation planning in the region and will identify gaps in information which they may explore further in the future.

## 2.1 - BACKGROUND

Transportation refers to any means used to move persons or goods from one location to another (Britannica, 2024). This is a very broad definition that provides little nuance on the diverse mechanisms used to move people around and between cities, towns, and regions. In the present study, we draw on Aman & Smith-Colin's (2020) more holistic definition of transportation to construct our own definition which meets the needs of our community partners. Hence, when we speak about transportation in our report, we refer to a system and its components that include various methods for moving individuals across diverse areas. This includes public transportation systems (e.g. buses, trains, subways), for-hire and ride sharing services (e.g. taxis, ride shares, private transportation services), driving private vehicles (e.g. cars, motorcycles), carpooling, and active transportation (e.g. walking, biking). Our definition also encompasses the transportation infrastructure (e.g. roads, bus stops, bike lanes) that contributes to and facilitates the use of transportation modalities (Aman & Smith-Colin, 2020).



## 2.2 - THE IMPORTANCE OF TRANSPORTATION FOR EQUITY, OPPORTUNITY & HEALTH

Equity considerations are central to regional transportation planning. Equal access to transportation ensures that all individuals have comparable mobility through the availability of accessible, affordable, and convenient transportation modalities (Karner et al., 2016), whereas equitable access to transportation ensures that barriers to mobility are lessened or removed for vulnerable populations (e.g. older adults, individuals with disabilities, regional residents, low-income populations, newcomers, etc.; Alhassan et al., 2023). Unequal and inequitable access to transportation can lead to transport disadvantage and transport poverty, which are detrimental to the wellbeing and socioeconomic inclusion of vulnerable populations (Ovideo, D. & Sabogal, O., 2020). Transport disadvantage occurs when individuals have poor access to transportation (Currie & Delbosc, 2010; Lucas, 2012), which often occurs alongside socioeconomic disadvantage. Transport disadvantage interacts with social exclusion and disadvantage to produce transport poverty (Lucas, 2012). Researchers debate the definition of transport poverty; however, we employ the definition offered by Lucas et al. (2016), as it considers mobility poverty, accessibility poverty, and transport affordability within its larger conceptualization of transportation poverty. Lucas et al. (2016: 356) note that transportation poverty exists when:

*“There is no transport option available that is suited to the individual’s physical condition and capabilities. The existing transport options do not reach destinations where the individual can fulfil his/her daily activity needs, in order to maintain a reasonable quality of life. The necessary weekly amount spent on transport leaves the household with a residual income below the official poverty line. The individual needs to spend an excessive amount of time travelling, leading to time poverty or social isolation. The prevailing travel conditions are dangerous, unsafe or unhealthy for the individual.”*

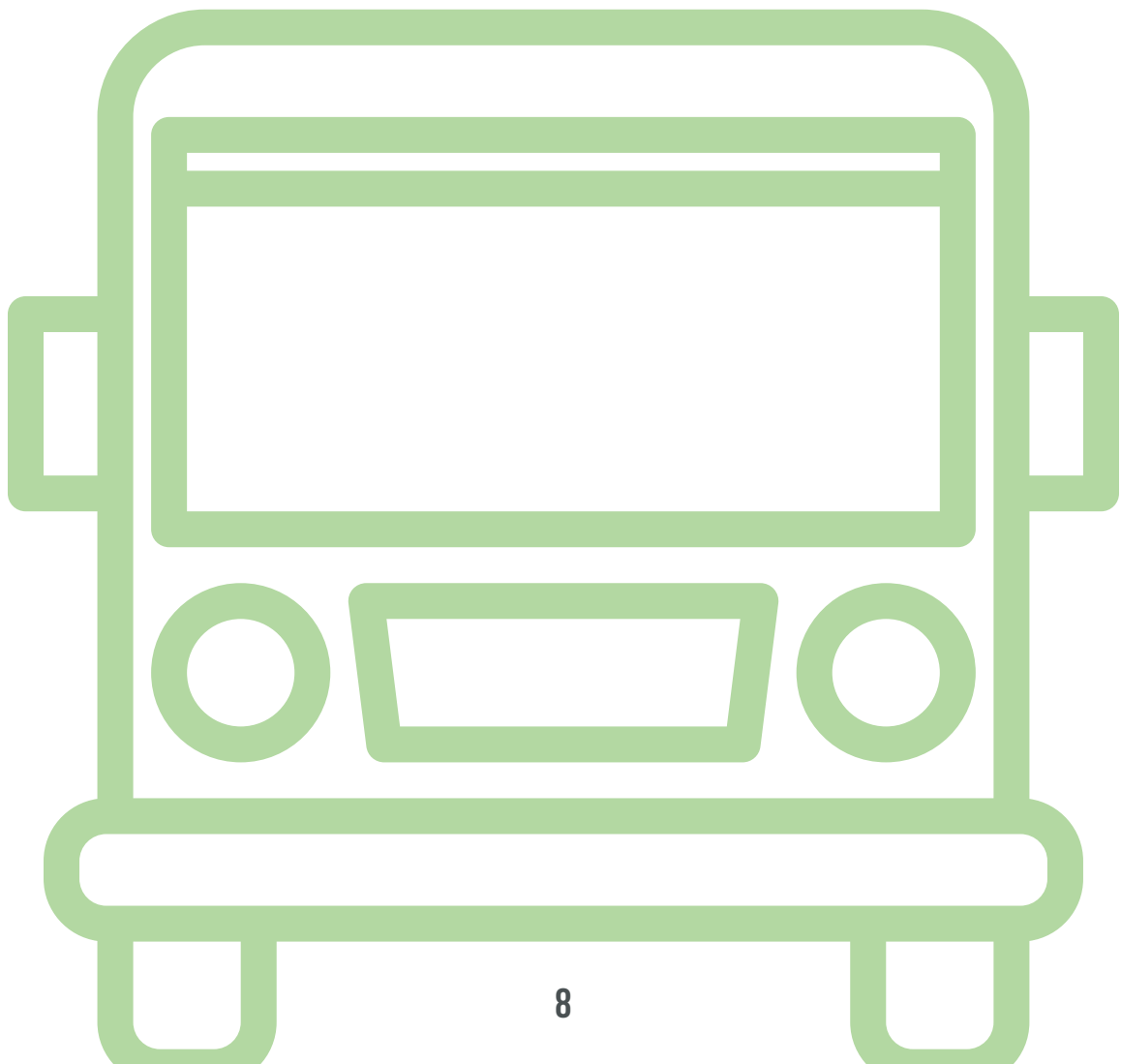
Using Lucas et al.’s (2016) definition, an individual or household is considered transportation poor when they meet any one or more of the criteria.

Public transportation systems facilitate mobility for members of a community, especially equity-denied and deserving groups. As Alhassan et al. (2023) demonstrate, members of made-marginalized groups, and especially those with intersecting or multiple vulnerabilities, are disproportionately impacted by poor transportation systems. They specifically investigate the health impacts of the closure of the Saskatchewan Transportation Company, and find that that seniors, low-income individuals, those living in regional or remote areas, people with disabilities, and Indigenous individuals all experience worse health outcomes and feelings of marginalization as a result of the closure. Aykanian (2022) further demonstrates how transportation inequity negatively impacts people experiencing homelessness, as their inability to access transportation limits their mobility and access to essential services. For individuals exiting homelessness, mobility may be necessary to find affordable housing and an absence of public transportation options can pose significant barriers to accessing affordable housing options.

Transportation justice refers to the need to equitably distribute both the benefits and burdens of transportation to best meet the needs and expectations of all community members (Aman & Smith-Colin, 2020; Karner et al., 2020). This involves transportation planning that intentionally removes mobility disparities for all groups and requires that the negative impacts of transportation (e.g. noise pollution, lack of access, decreased air quality) are not disproportionately experienced by populations who already face systemic inequities (Karner et al., 2020). Transportation justice considers various theories that are designed to account for externalities (e.g., environmental racism, lack or absence of service, risk while using transportation) associated with transportation systems, and promotes fairness, accessibility, safety, and environmental equity in transportation planning and policy development (Karner et al., 2020; Pereira et al., 2017).

Transportation is key to equitable participation in society, as the ability to effectively move from one place to another in an efficient, safe and barrier free manner facilitates access to essential services (e.g., health, financial, education, work) and provides connections to important social contacts (e.g., family, friends, social groups), which are fundamental for equity of opportunity and good quality of life (Golub & Martens, 2014; Pereira et al., 2017). Transportation that provides ease of access to key services for all community members is essential and ultimately leads to equality of opportunity.

Inclusive and participatory community decision-making processes are central to planning when using a transportation justice framework. Proponents of transportation justice argue that it is essential to ensure that individual autonomy and moral equity are maintained, as an integral part of transportation planning processes (Karner et al., 2020; Pereira et al., 2017). Karner et al. (2020) contend that this is best achieved through a deliberate process of community engagement, wherein the needs of community and those most affected by inequities in transportation are included and heard (Karner et al., 2020; Pereira et al., 2017). This principle frames this report and the results of the research activities presented herein. The methods for community engagement are discussed later in the report.



# 3. REGIONAL TRANSPORTATION: CHALLENGES & FACILITATORS IN THE LITERATURE

Providing effective regional transportation can be difficult for planners who support regions with multiple rural and semi-urban locales (Xu et al., 2022). This applies to the Fundy Region which is comprised of small towns, suburban communities, and the larger central city area of Saint John. Transportation development is particularly challenging in rural areas with low population density, wherein individuals are tasked with moving into larger city cores to meet their basic social, economic and health needs (Pateman, 2011). Planners who seek to provide equitable access to regional transportation encounter several barriers, which include rural geographic isolation, inadequate transportation infrastructure, funding limitations, and demographic challenges.

Geographic isolation presents a significant barrier to transportation for regional communities, as they are often located far from urban centers and essential services. Generally, rural residents are heavily dependent on cars due to limited access to public transportation options (Porru et al., 2020). When transportation is available, the Rural Health Information Hub (2012) notes that rural residents may view its use as inconvenient and inefficient. Nevertheless, the lack of transportation options in rural areas presents a significant disadvantage to rural residents without reliable access to personal vehicles (Aykanian, 2022). Further, longer trips into urban areas to access work and services can become quite expensive for rural residents. However, it is often extremely challenging to provide other options for residents, as public transportation routes may be underutilized in areas with low population density and high car ownership (Prus & Sikora, 2021). The economic resources for the development of additional transportation infrastructure and operations are typically lower in rural areas than urban centres (Prus & Sikora, 2021), which presents a barrier to the development of functional and equitable transportation systems. These factors contribute to the focused concentration of resources on the development and maintenance of road systems for car owners in regional areas (Porru et al., 2020).

A lack of adequate transportation from regional areas to city centres can pose significant barriers to residents' health and wellbeing. These challenges are not experienced evenly by all residents and are quite apparent for individuals who require regular access to medical care. For example, in their literature review on rural transportation and medical care, Wercholuk et al. (2022) find that transportation barriers can pose a significant threat to oncology patients in rural areas. Threats include delayed follow-up for care, lower access to specialized care, low rates of clinical trial enrollment, and variability in post-treatment care (Wercholuk et al., 2022). Virtual care and telehealth are recommended as sustainable strategies to provide better access to care for rural residents (Porru et al., 2020); however, these services cannot always replace standard in person care, require residents to have access to the internet and reliable devices, and often have lengthy wait times (Velaga et al., 2012).

Transportation is a challenge for many regions who serve rural, semi-rural, suburban, and urban populations. Literature on regional transportation highlights the significance of strategic investment, the identification of critical corridors, equity considerations, and the adoption of a multi-modal strategy to provide transportation in less populated areas (Cottrill et al., 2020). Investment in infrastructure is crucial for supporting varied modes of transportation. For example, Bruzzone et al. (2021) note the importance of updating infrastructure and comment on the need for dedicated bus lanes and protected bike paths to facilitate efficient and safer transportation.

Transportation infrastructure development is critical for addressing first-last mile transportation concerns, which Park et al. (2021) describe as the distance that people need to travel before and/or after using public transportation. Researchers argue that the first-last mile travel is the largest factor that determines individual uptake of public transportation and is vital for regional development and growth (Kåresdotte et al., 2022). Public transportation ridership experiences the first mile problem more often than the last mile problem and the first mile gap is most often filled through personal vehicle use (Park et al., 2021). To mitigate the impacts of the first mile problem, Park et al. (2021) find that good transfer experiences, which include safe and comfortable out-of-vehicle environments for public transportation riders who park personal vehicles and wait to transfer onto public transportation, are important (Park et al., 2021). Further, convenient and quick transfer times, and additional comfort features like good street furniture, bus shelters, protected bike lanes, good street lighting, seating, and access to well-maintained sidewalks facilitate longer-term public transportation ridership.

Flexible transportation options are also provided as solutions to the first-last mile problem. However, this requires significant infrastructure investment in order to develop the capacity to provide viable solutions for rural residents without reliable access to personal vehicles (Brovarone & Cotella, 2020). Demand-responsive transport (DRT) is noted as a flexible solution that can work for larger regions and rural areas (Brovarone & Cotella, 2020; Mounce et al., 2020). DRT emerged in Britain in the 1960s as a proposed solution to provide transportation to rural areas with lower demand for full public transportation systems (Ryley et al., 2014). Common types of DRT include dial-a-ride programs and community car deployment (Ryley et al., 2014). Research finds that DRT can be useful for rural communities when planners seek to address specific transportation needs (Brovarone & Cotella, 2020; Mounce et al., 2020). However, the true benefits of these services vary by population, location, and community needs and, at times, DRT systems fail. Enoch et al. (2006) argue that DRT fails when systems are not appropriately costed and when the needs of the community are not truly understood. They recommend that DRT services be integrated into communities slowly, using an incremental approach. The implementation of a DRT system should involve its evaluation to ensure that service is appropriate for the community in which it is deployed (for a comprehensive framework for the evaluation of DRT services, see Papanikolaou et al., 2017).

Flexible transportation services, which are similar to DRT services but more restrictive in terms of access points and times, are also deployed by some jurisdictions with varied transportation demands (Finn, 2012). Research on bus network design emerged as early as the 1960s, with the goal of minimizing costs and improving systems efficiency. Nourbajsh and Ouyang (2012) argue that fixed transportation routes with regular stops and schedules are desirable in cities with high population density; however, they are less ideal in low-demand areas with low population density. They note that flexible, rather than fixed, transportation services are perceived as desirable for less densely populated areas. Nourhajsh and Ouyang (2012) model the development of an optimal route bus tube system, wherein buses have fixed service areas, and the buses provide flexible service within these fixed areas (for more information, see: <https://doi.org/10.1016/j.trb.2011.07.014>). Although proposed program types vary, generally speaking, research indicates that well-designed flexible transportation systems can provide cost effective, safe, and convenient service from lower demand areas to transfer points or other locales within urban centres (Liu et al., 2021; Sayarshad & Gao, 2020).

To make significant improvements to connectivity and efficiency of regional transportation systems, regions should seek to measure public transportation ridership and transportation patterns to identify and improve critical routes for transport (Collins & Agarwal, 2015). Researchers propose that critical or optimal routes can be measured with analysis of current transportation ridership. For example, Porru et al. (2020) recommend the deployment of smart technologies to better understand transportation needs and find this approach suitable for both urban and rural areas. However, they note that planners must focus on the development of standardized metrics for determining optimal public transportation routes. Further, planners must engage across all levels of government to develop coordinated approaches to track mobility between rural and urban areas (Porru et al., 2020). Transportation improvements should consider current ridership patterns; however, they should also include improvements that will meet projected ridership needs in the future (Diab et al., 2020). Considering future needs when making infrastructure developments can save money in the long-term. These future needs must include projected population needs, alongside the current needs of residents. To increase transportation justice and limit transportation poverty, the opinions and perceptions of made-marginalized communities should be prioritized.





## 4. RESEARCH CONTEXT: THE FUNDY REGION

The Fundy Region, located in the province of New Brunswick, is comprised of six Local Governments and one Rural District: the City of Saint John, Grand Bay-Westfield, Quispamsis, Hampton, Rothesay, Fundy-St Martins, and the Fundy Rural District. The region currently has a population of 127,480. Saint John is the most populous jurisdiction in the region, with 69,875 residents, followed by Quispamsis, with a population of 18,780, and Rothesay, with a population of 11,975 (HDC, 2023). The other areas in the region are considerably smaller, with populations that range from 5,225 to 9,345 individuals (HDC, 2023).

The population density of the Fundy Region is 44.1 people per square kilometer. Perhaps surprisingly, Quispamsis (327.3 people per square kilometer) and Rothesay (343.8 people per square kilometer) have higher population densities than the City of Saint John itself (221.0 people per square kilometer). Fundy-St. Martins (8.0 people per square kilometer) and the Fundy Rural District (4.6 people per square kilometer) have the lowest population densities in the region (HDC, 2023).

The median age of the region is 44 years, which is younger than the provincial median age of 47 years but higher than the Canadian median age of 42 years (HDC, 2023). The jurisdiction with the lowest median age in the region is Quispamsis (43 years old) and the Fundy Rural District has the highest median age (49 years old; HDC, 2023). The Fundy Region is becoming more ethnically and racially diverse, with increased immigration from across and outside of Canada to the region (Hellstorm, 2020). The Human Development Council's (HDC, 2023) specialized analysis of regional data finds that the UK is the most common birthplace for immigrants to the Fundy Region, followed by Syria. English is the most common language spoken in the region. 96.7% of the population of Fundy's first language is English. Aside from the official languages of French and English, Arabic is the next most common language spoken in the Fundy Region (HDC, 2023).

The median after tax household income of the Fundy Region is \$65,500, which is higher than the provincial median of \$62,000, but much lower than the national median of \$73,000 (HDC, 2023). The City of Saint John has the lowest median income in the region (\$56,000), followed by Fundy-St. Martins (\$65,500) and the Fundy Rural District (\$67,500). Quispamsis (\$94,000), Rothesay (\$85,000), and Grand Bay-Westfield (\$84,000) boast the highest median after tax household incomes in the region. The HDC (2023) uses the LIM-AT to provide poverty rate estimates for the region. Regionally, 13.4% of residents live in poverty, with a disproportionately high poverty rate in the City of Saint John (17.8%), which is approximately 5% higher than the Fundy Rural District, which has the second highest poverty rate in the region (12.6%).

Approximately 31% of Fundy Region rents their housing. Saint John has a much higher percentage of renters (45.8%) than the other jurisdictions in the Fundy Region (6.3% to 19.3% renters). 27% of renters in Fundy Region spend more than 30% of their after tax income on housing. Most of these households live in Saint John; however, the highest percentage of households spending more than 30% of their income on housing is Rothesay (31.2%), followed by Quispamsis (28.8%), Grand Bay-Westfield (27.5%) and Saint John (27.1%). Rental housing is scarcer, but more affordable in other areas. For example, only 6.3% of households rent in the Fundy Rural District, but 0% of renter households spend more than 30% of their after tax income on housing (HDC, 2023).



## 4.1 - TRANSPORTATION IN THE FUNDY REGION

The transportation needs and experiences of individuals who live in Fundy Region are not well-researched. However, a recent study by Munoz Martinez et al. (2021) provides a good understanding of the impact of transportation access on individuals in Saint John. This sub-section provides a brief summary of their report, as it is used to inform the present research study and provides good context for understanding transportation from a justice-based standpoint. Their study focuses on the needs of individuals in Saint John who experience multiple barriers to economic and social inclusion (e.g. newcomers, individuals with disabilities and individuals who live in poverty), students and essential workers. Their study is unique as it explores the impacts of transportation on made-marginalized groups within the context of the Covid-19 pandemic. This period is characterized by an uptick in outdoor activity and the implementation of strict requirements on the number of individuals allowed on city buses at any given time (Munoz Martinez et al., 2021). They find that vulnerable populations in some of the city's poorest neighbourhoods rely on walking and public transportation for mobility. A notable exception was those who live on the east side of Saint John who feel underserved by public transportation and take taxis to and from services which are centralized in the North End and uptown areas. This is problematic as the individuals surveyed experience low-income and taxi services are quite expensive. They also find no use of para-bus services by the individuals with disabilities who were surveyed.

Munoz Martinez et al.'s (2021) study presents a variety of barriers to mobility and unmet needs within the City of Saint John. Barriers include the cost of transportation, low frequency and restrictive hours of bus service, a lack of bus stop infrastructure and printed information (e.g. benches, heat, shelters, signage), discrimination on transportation and poor sidewalk maintenance. Further, restricted access to public transportation due to a lack of availability on weekends, mornings and evenings and routes that do not serve suburban, semi-urban and rural areas of the region create additional barriers and increase reliance on taxi cabs for mobility (Munoz Martinez et al., 2021). Munoz Martinez et al.'s study, albeit rigorous in its mixed methods approach, focuses mainly on Saint John and does not broadly capture the perspectives of individuals living across the region. Additional research is needed to determine the transportation choices, preferences and needs of a larger sample that lives across the Fundy Region.

## 5. METHODS

This study was co-designed and conducted by students in SOCI 4379, Community-Based Health Research Seminar, which is an advanced placement Social Science class at the University of New Brunswick in Saint John. This course was designed with an experiential education component, which provides students with hands-on experience conducting community-engaged and partnered research. In Winter 2024, the course partnered with the Fundy Regional Service Commission's Transportation Branch to gain a better understanding of transportation use and needs in the Fundy Region. This research was reviewed and approved by the Research Ethics Board at the University of New Brunswick (REB# 2023-196).

In the first stage of the study, students conducted focus group sessions with key informants who were aware of key considerations and gaps in knowledge on transportation in the region. Two focus groups were conducted in late January of 2024 at the HOME-RL lab. Each focus group lasted for approximately one hour. Students from the SOCI 4379 class facilitated the focus groups and student scribes took notes on the points raised. The questions focused on what aspects of transportation should be addressed through a survey, who should be targeted for participation in the survey and how to best reach these individuals, and what factors intersect with transportation (e.g. food security, housing, etc.) in the region.

Results of the focus groups were analyzed and thematically coded to help inform the design of a survey on transportation which was delivered to the general public in Fundy Region. Dr. Woodhall-Melnik (JWM), along with graduate assistants, Maura Hickey (MH) and Sarah LeBlanc (SL), thematically coded the results and presented the codes to the students who were guided through the process of creating draft survey questions on the identified themes. These were edited by JWM and sent to the Fundy Regional Service Commission (FRSC) for their comments and changes. This was done to ensure that the survey met the needs of the FRSC. JWM also created a second survey with open-ended questions that was sent to key informants.



## 5.1 - SURVEY TO THE GENERAL PUBLIC

The main goals of this survey were to better understand current mobility in the Fundy Region and to gain an understanding of public needs to be incorporated in future regional transportation planning. The students from SOCI 4379 were divided into two groups and were guided by SL, MH, and JWM to administer the survey for approximately two weeks at the end of March 2024. One group focused on online recruitment. Students shared a link to the survey, housed in Interceptum, on social media pages that were created for the course, as well as on social media pages and groups that are frequented by the public in Fundy Region (e.g. various community news pages, social media pages of prominent community groups, city and town Facebook pages, etc.). Social media posts were also shared on HOME-RL's Facebook and X accounts. All posts were public and available to share, and students and investigators shared these links on their own social media pages if they were comfortable doing so. Email messages were also sent to post-secondary institutions in the Fundy Region, non-profits, community associations, and public sector agencies. Focus was placed on agencies that serve made-marginalized populations across the region to increase the participation of groups that are traditionally underrepresented in this type of research. Participants who self-administered the survey online were asked to provide electronic consent prior to participation.

A second group of students participated in in-person surveying. In person surveying was carried out at public locations and retail outlets across the Fundy Region, largely outside of the City of Saint John to increase regional participation. These areas were chosen because regional residents are more likely to drive and may self-screen out of the survey based on this; however, the goal was to include as many voices from the region as possible and we were interested in the use of all forms of transportation, not solely public transportation. The students approached individuals and requested their participation. If the participants agreed, they were verbally walked through the study information and consent forms. Written consent was obtained. The students administered the questions and wrote the answers on a paper version of the survey or asked them if they wanted to fill out a paper version themselves. The completed surveys were stored in a locked bag and brought back to HOME-RL where they were manually entered into Interceptum by SL, MH and the students. Physical copies of the survey were subsequently shredded.

If participants indicated that they did not have time to complete the survey, they were offered a business card with a QR code which linked to the online survey. This provided participants with the option of completing the survey themselves later. The groups were switched on the second week of surveying to ensure that all students had a chance to engage in in-person surveying. Lastly, two local radio stations that also run print articles covered information on the surveys in radio interviews and in text articles to further direct potential participants to the survey. This also provided a mechanism for engaging the broader community with the work that was being conducted. The survey remained active online until mid-April, 2024.

Individuals who participated in the survey were invited to provide their email addresses and contact numbers which were entered into a draw for six \$50 e-gift cards to a selection of retailers available online. The draw was conducted in April 2024 and gift cards were sent electronically to the winners. The completion of the draw was announced on HOME-RL's X and Facebook pages.



## 5.2 - KEY INFORMANT SURVEY

In addition to a survey for the general public, a open-ended survey was circulated to Key Informants. This survey was sent to 20 individuals who provided health, social, basic needs and economic assistance to individuals in the Fundy Region. Four individuals were identified as potential Key Informants by the Fundy Regional Service Commission and 15 individuals were contacts in the community that were known entities by HOME-RL. One individual reached out when they heard about the survey with a request to provide information on their clients' needs. The survey was conducted using MS Forms. This short survey asked Key Informants to provide information on the transportation use, needs, and barriers experienced by the populations with whom they worked. In total, six individuals completed the Key Informant survey.

## 5.3 - ANALYSIS

Once data collection was completed, all open-ended responses from the general survey and the Key Informant responses were entered into NVIVO for thematic coding. The thematic coding was conducted by Sarah Durelle (SD) and verified by JWM. The following themes were uncovered: barriers to access, which included inconvenient routes and schedules; issues with infrastructure, which included poor bus stop infrastructure and maintenance, and poorly maintained sidewalks; and barriers to active transportation, which included poor road conditions and a lack of bike lanes and walking paths. These themes, along with direct quotes that illustrate common sentiments expressed by participants and demonstrate information contained within each theme were incorporated throughout the findings section.

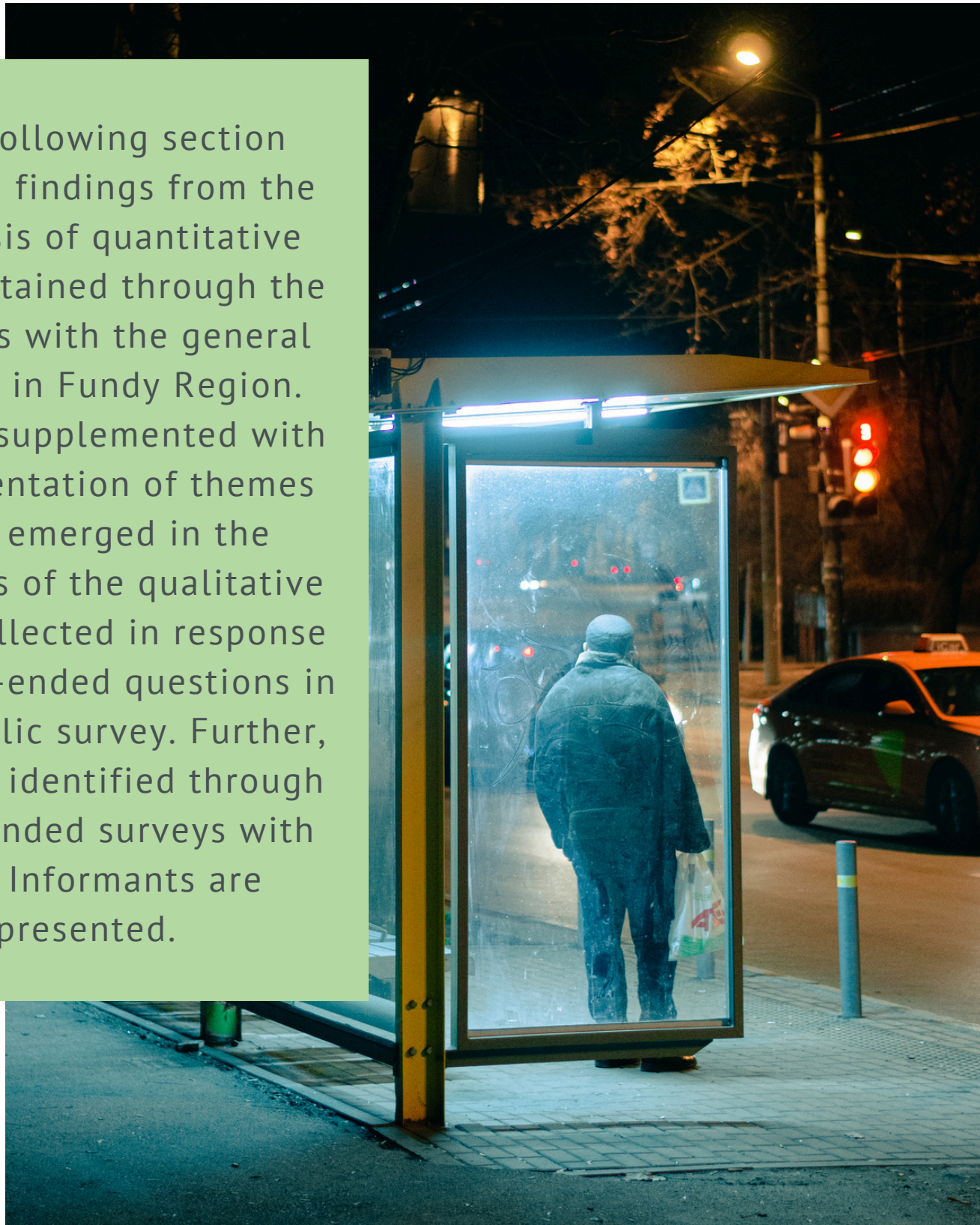
The quantitative data were downloaded from Interceptum into an MS Excel file which was used for coding. Numeric values were assigned to categorical data and files were cleaned to remove any blank responses and responses from outside of the Fundy Region. The data were coded by JWM. The coded data were transferred into Stata for analysis. Frequency counts and descriptive summaries were ran and were included in the findings section of this report. Additional analyses on transportation access and use for individuals with before tax household incomes of less than \$50,000 and individuals living outside of the City of Saint John limits were conducted to better understand differences in equitable access to transportation. Chi-square tests and two-sample t-tests were performed to assess whether between groups differences (e.g. low-income residents vs. others and City of Saint John residents vs. residents living outside of the City of Saint John) were statistically significant.





## 6. FINDINGS

The following section reports findings from the analysis of quantitative data obtained through the surveys with the general public in Fundy Region. This is supplemented with a presentation of themes that emerged in the analysis of the qualitative data collected in response to open-ended questions in the public survey. Further, themes identified through open-ended surveys with Key Informants are presented.



A total of 832 valid responses were collected from individuals who lived within the Fundy Region. The mean age of participants was 47.07 years, and the median age was 47. The age of participants ranged from 16 to 88 years. The majority of respondents identified as female (69.74%) rather than male (30.26%). Individuals who did not identify as female or male or chose to not identify their genders were scored as missing on the variable gender. These individuals comprised less than 2% of the sample. This was done as the small number of respondents in these categories presents a higher risk of participant identification and the number of respondents is not high enough to conduct further analyses.

Most participants lived in the Fundy Region for more than 10 years (36.28%) or for their whole lives (37.97%). A much smaller percentage of participants lived in the region for less than two years (8.22%), two to five years (8.59%), and between five and ten years (8.95%). This indicated that a large proportion of responses came from individuals who were experienced residents of the region; however, newer residents' responses were less prevalent. Regardless, the total number of individuals in each category were substantive enough to run analyses by time lived in the region. 82 individuals (9.86%) identified as newcomers to Canada and most participants did not identify as newcomers to Canada (n=750; 90.14%).

666 participants provided information about their before tax household incomes. Income was initially reported in categories with a \$25,000 range; however, these were combined into \$50,000 categories as they were deemed more useful for analysis. 181 (27.18%) of participants reported before tax household incomes of less than \$50,000. 229 (34.38%) of participants had incomes of between \$50,000 and \$99,999 per year. 136 (20.42%) of participants had incomes of between \$100,000 and \$149,999 and 120 (18.02%) of participants had before tax household incomes of \$150,000 per year or more.

Economic activity was reported for 828 participants. Just under half (45.53%) of participants worked full-time and 13.04% worked part-time, seasonal, contract, or multiple jobs (labelled as part-time or casual in Table A). 79 individuals (9.54%) reported being unemployed, disabled and not working, or staying home to care for a family member. 21.50% of the sample was retired. Some of these individuals worked causally or volunteered, but they noted in the qualitative response option that their primary economic status was retired. 10.39% or 86 individuals noted that they were students. Some of these individuals worked part or full-time in addition to being in school. 84 of the 86 students answered the question on whether they paid for parking at school. 37 (44.05%) of students paid for parking at school and 47 (55.95%) of students did not pay for parking at school. 552 individuals who worked responded to the question of whether they paid for parking at work. 129 (23.37%) did pay for parking and 423 (76.63%) did not pay for parking at work.

Participants were asked to report the number of people who lived in their household. They were asked to include themselves. 826 individuals answered the question on the number of adults aged 19 years or older. The number of adults per household ranged between zero and seven. The average number of adults per household was 2.15 and the median number of adults was 2 per household. 819 participants provided responses to the number of people under the age of 19 in their households. The average number of minors was 0.55 per household and the median number of minors was 0. The number of minors per household ranged from zero to four. Participants were asked about the number of vehicles owned in their households. 833 participants responded to this question. The average number of vehicles per household is 1.62 and the median number of cars was 2.00. The number of vehicles per household ranged from zero to eight.

The total number of individuals per household was calculated by adding the number of individuals over and under the age of 19 together for each participant. The mean number of individuals per household was 2.70 and the median number of individuals was 2.00. The number of individuals in total ranged from zero to nine. The mean and median number of vehicles per individual was calculated by dividing the number of vehicles by the total number of household members. The average number of cars per person was 0.67 and the median was 0.50. The number of vehicles per person ranged from zero to four.



# TABLE A: DESCRIPTION OF THE STUDY SAMPLE

<b>Variable (n)</b>	<b>Category</b>	<b>n</b>	<b>%</b>
<i>Gender (813)</i>	Female	567	69.74
	Male	246	30.26
<i>Time Lived in the Region (827)</i>	<2 years	68	8.22
	2 years to 5 years	71	8.59
	5 years to 10 years	74	8.95
	>10 years	300	36.28
	Entire Life	314	37.97
<i>Area of Residence (832)</i>	Saint John	431	51.80
	Rothsay/Quispamsis	122	14.66
	Hampton	124	14.90
	Grand Bay-Westfield	64	7.69
	Fundy Rural District/Fundy St. Martins	91	10.94
<i>Before Tax Income (666)</i>	<\$50,000	181	27.18
	\$50,000 to \$99,999	229	34.38
	\$100,000 to \$149,999	136	20.42
	\$150,000 +	120	18.02
<i>Newcomer Status (832)</i>	Yes	82	9.86
	No	750	90.14
<i>Economic Activity (828)</i>	Full-Time Work	377	45.53
	Part-time or Casual	108	13.04
	Unemployed/Disabled	79	9.54
	Retired	178	21.50
	Student	86	10.39
<i>Paid Parking at Work (552)</i>	Yes	129	23.37
	No	423	76.63
<i>Paid Parking at School (84)</i>	Yes	37	44.05
	No	47	55.95

<b>Variable (n)</b>	<b>Mean (Median)</b>	<b>SD</b>	<b>Range</b>
<i>Age (803)</i>	47.07 (47)	16.79	16-88
<i>Number of People &gt;19 in Household (826)</i>	2.15 (2.00)	0.89	0-7
<i>Number of People &lt;19 in Household (819)</i>	0.55 (0.00)	0.94	0-4
<i>Total Number of People in Household (815)</i>	2.70 (2.00)	1.31	0-9
<i>Number of Cars in the Household (831)</i>	1.62 (2.00)	1.03	0-8
<i>Average Number of Cars Per Person in the Household (811)</i>	0.67 (0.50)	.43	0-4



## 6.1 - CURRENT TRANSPORTATION

Participants were asked to indicate their primary mode of transportation. 880 participants responded to this question and the most prevalent mode of transportation was to drive alone (56.11%), followed by commuting with another household member (23.94%). Public transportation was the third most selected modality (10.88%), followed by biking or walking (6.65%). Very few participants used a cab or rideshare (0.85%) or carpoled with a non-household member (1.57%) as their primary mode of transportation (see Table B).

768 individuals provided at least one response to the question that asked about other modes of transportation accessed when their primary mode of transportation was unavailable (see Table B). Participants were asked to select all other modes of transportation used; therefore, the number of responses (1284) was greater than the number of participants. Participants were not asked to rank their preferences for secondary transportation. The most common other mode of transportation was walking or biking (34.27%), followed by driving with another household member (23.52%), driving alone (14.25%), carpooling with a non-household member (11.14%) and taking a cab or using a rideshare (10.98%). Public transportation was the least selected mode of alternative transportation (5.76%).

In addition to the survey's quantitative measurement of transportation access and use, participants were invited to provide responses to open-ended questions. The responses to these questions indicated that the region is very much viewed as a car-dependent locale, wherein residents experience ease of mobility if they have regular access to a reliable vehicle. For participants who noted that it was easy to get around the region, they often stated that this was because they "have a car." One participant stated the following:

*I have a car and everything is made for the car to get around. If I could choose another mode that didn't take so long to use then I would take another option, but until we change the way we think about city and regional design to move people and not cars no other options will be made available to me and others.*

These sentiments were common and not surprising, as some participants lived in areas where public transportation was not available and where active transportation was not viewed as a safe or realistic modality to access the city centre. One participant stated:

*Living outside a city core is important to me. I 100% understand and expect to be responsible for my own transportation.*

This study revealed that vehicle use was the primary mode of transportation and was the main contributor to mobility across the region.

All participants were asked to indicate how often they took a cab or rideshare. The vast majority (74.40%) indicated that they never use these services. Some individuals (20.41%) used these services occasionally (defined as one to four times per month) and few (5.19%) took a cab or rideshare once a week or more. Participants were also asked to indicate if they use active transportation (e.g. cycling, walking, scooting, etc.) as a form of transportation. 38.96% of participants indicated that they use active transportation; however, the frequency of use wasn't captured.



## TABLE B: MODES OF TRANSPORTATION & TRANSPORTATION USE BY TYPE

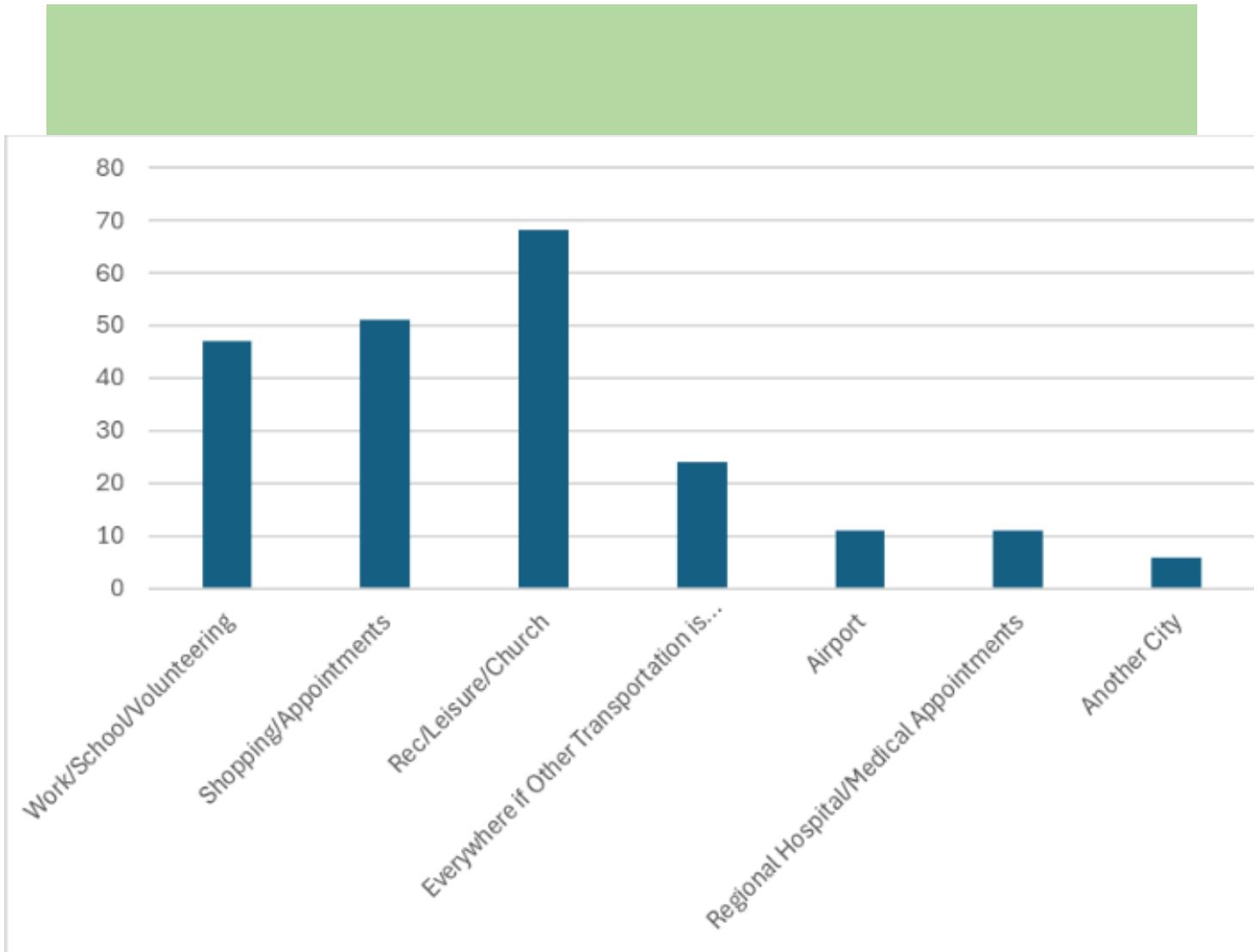
Variable (n)	Attributes	n	%
<i>Primary Mode of Transportation (880)</i>	Drive Alone	464	56.11
	Drive with Other Household Member	198	23.94
	Bike/Walk	55	6.65
	Cab/Rideshare App	7	0.85
	Carpool with Non-household Member	13	1.57
	Public Transit	90	10.88
	<i>Other Modes of Transportation (1284)</i>	Drive Alone	183
Drive with Other Household Member		302	23.52
Bike/Walk		440	34.27
Cab/Rideshare App		141	10.98
Carpool with Non-household Member		143	11.14
Public Transit		74	5.76
<i>Public Transit Use (830)</i>		Never	541
	Sometimes	167	20.12
	Often	55	6.63
	Primarily	67	8.07
<i>Active Transportation Use (824)</i>	Yes	321	38.96
	No	503	61.04
<i>Cab/Rideshare Use (828)</i>	Never	616	74.40
	1-4 times per month	169	20.41
	Weekly or More	43	5.19





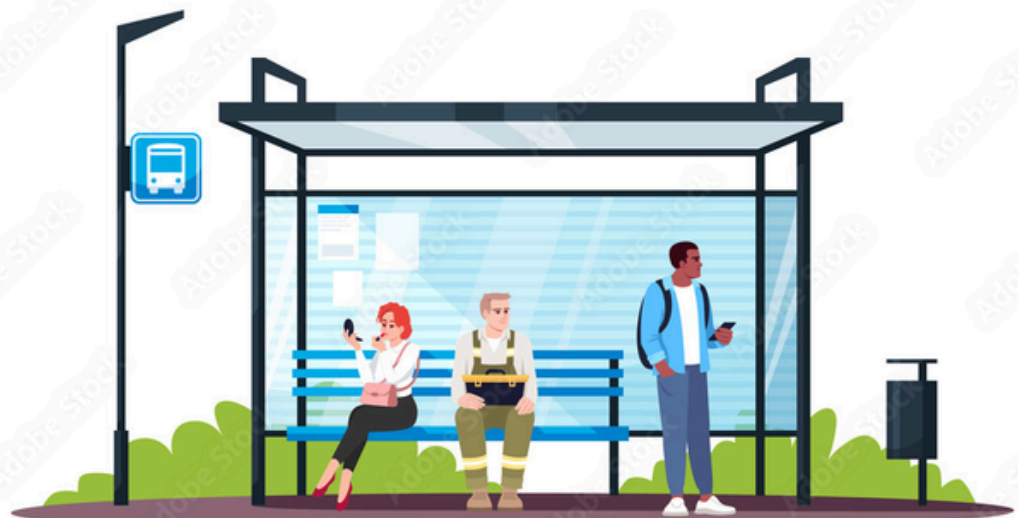
Participants who reported cab or rideshare use were asked to indicate where they took a cab or rideshare. Responses were open-ended and participants entered their own text to explain where they went. These responses were categorized into eight different categories (see Figure 1). 179 individuals responded to this question with 215 different locations. Of the 215 locations, 47 (21.86%) were work, school, or volunteering, 51 (23.72%) were shopping or non-medical appointments, 6 (2.79%) were to other cities, 11 (5.12%) were the airport, 11 (5.12%) were the Regional Hospital or other medical appointments, and 24 participants (11.12%) noted that they used cabs and rideshare services when they did not have access to a car or when they couldn't access public transportation. The most common use of cabs or rideshare services was to access recreation, leisure or church (31.63%; n=68). Under recreation and leisure, many participants noted that they used cabs or rideshare services when drinking to avoid driving.

# FIGURE 1: LOCATIONS ACCESSED BY CAB OR RIDESHARE



## 6.2 - ACCESSIBILITY OF KEY LOCATIONS

Participants were asked to respond to whether they found it difficult to get to key locations that are frequently accessed by most individuals. They chose between difficult, not difficult or not applicable. Not applicable was treated as a missing value in this analysis, hence, there is variation between location in the number of participants who responded for each location (see Table C). Between approximately one fifth and one quarter of participants had trouble accessing multiple locations such as second jobs (23.94%), school (24.39%), childcare centres and/or children's schools (22.01%), grocery stores (22.79%), other retail locations (24.52%), community services (23.57%), recreation (26.51%), government offices (25.87%), primary care providers (23.22%), and other medical offices (25.95%). Slightly fewer participants reported difficulty accessing their primary workplaces (17.05%) and their banks (19.12%). Slightly more participants had trouble accessing the Regional Hospital (27.09%). Interestingly, 395 participants answered not applicable or did not answer the question about ease of access to their primary care provider. This could indicate a low level of engagement with family physicians and nurse practitioners in the region.



# TABLE C: EASE OF ACCESS TO KEY LOCATIONS

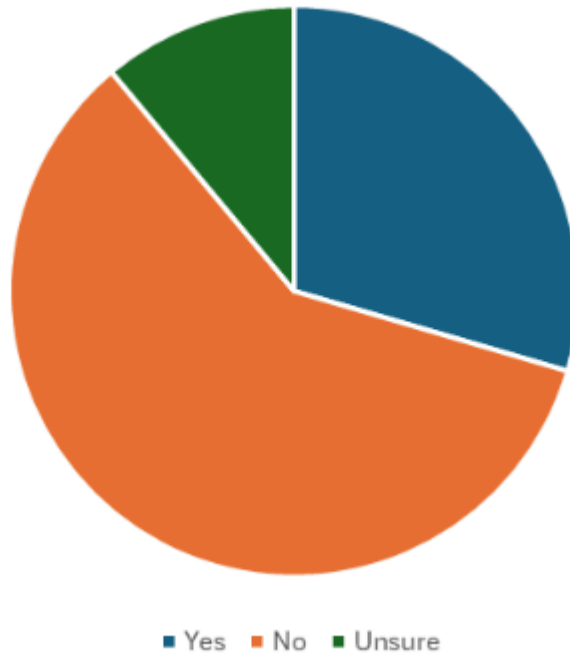
<b>Variable</b>	<b>Attribute</b>	<b>n</b>	<b>%</b>
<i>Work (546)</i>	Difficult	98	17.95
	Not Difficult	448	82.05
<i>Additional Work (188)</i>	Difficult	45	23.94
	Not Difficult	143	76.06
<i>School (82)</i>	Difficult	20	24.39
	Not Difficult	62	75.71
<i>Childcare/ Schools (209)</i>	Difficult	46	22.01
	Not Difficult	163	77.99
<i>Grocery Store (803)</i>	Difficult	183	22.79
	Not Difficult	620	77.21
<i>Other Retail (779)</i>	Difficult	191	24.52
	Not Difficult	588	75.48
<i>Recreation (713)</i>	Difficult	189	26.51
	Not Difficult	524	73.49
<i>Community Services (700)</i>	Difficult	165	23.57
	Not Difficult	535	76.43
<i>Government Offices (746)</i>	Difficult	193	25.87
	Not Difficult	553	74.13
<i>Primary Care Provider (491)</i>	Difficult	114	23.22
	Not Difficult	377	76.78
<i>Other Medical Offices (763)</i>	Difficult	198	25.95
	Not Difficult	565	74.05
<i>Regional Hospital (790)</i>	Difficult	214	27.09
	Not Difficult	576	72.91
<i>Bank (795)</i>	Difficult	152	19.12
	Not Difficult	643	80.88

## 6.3 - BARRIERS AND FACILITATORS TO TRANSPORTATION

Participants were asked if they found it difficult to get around the Fundy Region (see Figure 2). Of the 830 participants who responded, 245 (29.52%) said they found it difficult, 493 (59.40%) did not find it difficult, and 92 (11.08%) responded that they were unsure whether it was difficult to get around the Fundy Region.



## FIGURE 2: DIFFICULTY GETTING AROUND THE FUNDY REGION



Participants who used public transportation were asked to select all reasons for their use of public transportation from a pre-determined list. 122 participants responded with 223 reasons. Participants were also provided with space to enter other reasons if they were not captured in the pre-determined list. In total, there were 10 categories (see Table D). The top four reasons for public transportation use were not having access to a car (43.05%), not having a driver's license (34.08%), affordability (21.52%), and environmental reasons (20.63%). Of those who answered questions about why they used public transportation, 78.69% did not have access to a car and 62.29% did not have a driver's license. Approximately 40% of these respondents also noted public transportation use for affordability (39.34%) and because it is environmentally friendly (37.70%).

Participants who used active transportation were asked to select all reasons for their use of active transportation from a pre-determined list. 319 participants responded with 982 reasons (see Table D). Participants were also provided with space to enter other reasons if they were not captured in the predetermined list. In total, there were 10 categories. The most prevalent reason provided for active transportation use was that participants liked to get exercise (22.30%). Other frequently selected rationale included environmental reasons (15.58%), affordability (14.46%) and convenience (13.03%). Of those who answered questions about why they used active transportation, most (68.65%) selected that they used this form of transportation to get exercise. 47.96% of these participants used active transportation for environmental reasons. Others noted that they used active transportation because of convenience (40.12%) and affordability (44.51%).

# TABLE D: REASONS FOR USING PUBLIC TRANSPORTATION AND ACTIVE TRANSPORTATION

<b>Reasons for Public Transit Use (n=223)</b>	<b>n</b>	<b>%r*</b>	<b>%p**</b>
<i>I do not have access to a car</i>	96	43.05	78.69
<i>I do not have a driver's license</i>	76	34.08	62.29
<i>It's affordable</i>	48	21.52	39.34
<i>To avoid parking fees</i>	23	10.31	18.85
<i>Parking is too hard to find</i>	14	6.28	11.47
<i>It is convenient</i>	28	12.56	22.95
<i>I don't have to worry about driving</i>	28	12.56	22.95
<i>It is environmentally friendly</i>	46	20.63	37.70
<i>I can get things done on public transit</i>	21	9.42	17.21
<i>I have a disability or physical health condition that makes it hard to drive</i>	15	6.73	12.29
<b>Reasons for Active Transportation Use (n=982)</b>	<b>n</b>	<b>%r*</b>	<b>%p**</b>
<i>It is good for the environment</i>	153	15.58	47.96
<i>It is quick</i>	109	11.10	34.17
<i>It is convenient</i>	128	13.03	40.12
<i>I have good bike storage</i>	26	2.65	8.15
<i>I like to get exercise</i>	219	22.30	68.65
<i>It is affordable</i>	142	14.46	44.51
<i>I do not have a licence</i>	67	6.82	21.00
<i>I do not have a vehicle</i>	69	7.03	21.63
<i>It gives me independence</i>	59	6.01	18.49
<i>I have a lack of other options</i>	10	1.02	3.13

\*%r provides the responses as a percentage of the total number of reasons selected

\*\*%p provides the responses as a percentage of the total number of participants who responded

Participants who did not use public transportation or active transportation were also asked to select from as many pre-determined reasons for not using these forms of transportation as applied to them. They were provided with an open-ended text box to provide other reasons that were not listed in the original selected items. All the other answers were incorporated into the existing categories as there was substantial overlap. 647 participants identified 1,461 reasons for not using public transportation and 475 participants identified 1302 reasons for not using active transportation (see Table E).

Approximately half of participants stated that they did not use public transportation because it was not available in their area (50.12%) and that driving a personal vehicle was more convenient (54.25%). These accounted for 22.18% and 24.02% of reasons provided respectively. Scheduling (30.76% of participants) and length of travel (29.98%) were barriers to public transportation use for approximately one third of participants who did not use public transportation.

The second most common theme identified in the open-ended responses was the inconvenience of the schedule for public transportation in Saint John and surrounding towns that were connected by public transportation. Most respondents reported that service ended too early, did not run frequently enough, and that the hours on weekends and holidays were too short. Respondents living in Rothesay, and Quispamsis, reported that the Comex service was inadequate for transportation from these areas into the city centre, because they only ran twice a day. One participant stated:

*I would love to reduce to one car and supplement with public transport, but from Quispamsis, there are few options that are convenient and available on a decent schedule.*

In addition to limited schedules, participants were also concerned with the accuracy of bus schedules. One participant stated:

*I used to use public transport all the time, but since we moved back to this region, I haven't used it at all. I tried to use it once and actually found out that the schedule was inaccurate! [Someone I knew] was on the transportation commission at the time and we were able to address the inaccuracy and the schedule, but I feel like it's not even created for people to be able to use.*

Another common issue with transportation scheduling was the frequency of transfers and the length of time to travel short distances.



Commonly selected barriers to active transportation included the ease of using other forms of transportation (13.75% of reasons and 37.68% of respondents who do not use active transportation), the difficulty of transporting items when using active transportation (11.90% of reasons and 11.75% of participants), and the weather in the region (11.75% of reasons and 32.21% of participants). However, the most common reasons for not using active transportation were that stores (20.58% of reasons and 56.42% of participants) and workplaces/schools (17.28% of reasons and 47.37% of participants) were too far from where participants lived.

In their open-ended responses, participants elaborated on the lack of infrastructure for active transportation. Many respondents reported that they felt road conditions were not safe for walking or biking. One participant wrote:

*I've not felt safe biking the roads (sometimes even walking our dogs because not enough sidewalks) even to nearby places or for exercise. Too many steep hills/too far away from stores to pedal bikes [...]*

Participants noted that they do not feel safe using active transportation both within the city and regional areas. One participant stated:

*[The] only realistic option is by car. I would bike from KV to Uptown if there was a safe path to do so.*

The existing active transportation infrastructure was viewed as inadequate; especially sidewalks in the region, which participants described as poorly maintained in the winter, and during the warmer months when they were often cracked and in disrepair. Further, bike lanes were not viewed as being respected by drivers, nor were there bike paths connecting major services in the city that would allow individuals to use active transportation safely away from major roadways. One participant wrote:

*Bike infrastructure is basically non-existent aside from Harbour Passage and a few other places. Painted lines on the road is not infrastructure. I also personally know people that would ride bicycles if it were safe to do so. You're placing your life in the hands of drivers in certain places in Saint John if on a bicycle.*

The participants also noted that the region lacked pedestrian bridges. This is especially prominent in Saint John, where walking or cycling across the Harbour Bridge is prohibited, which creates limited access to the uptown core for those living on the lower west side of Saint John.

# TABLE E: REASONS FOR NOT USING PUBLIC TRANSPORTATION AND ACTIVE TRANSPORTATION

<b>Barriers to Public Transit Use (n=1461)</b>	<b>n</b>	<b>%r*</b>	<b>%p**</b>
<i>It is not available in my area</i>	324	22.18	50.12
<i>I do not like waiting for it</i>	81	5.54	12.52
<i>It doesn't work with my schedule</i>	199	13.62	30.76
<i>I find it hard to navigate</i>	99	6.78	15.30
<i>I feel uncomfortable or unsafe</i>	48	3.29	7.42
<i>I am worried about the spread of illness on transit</i>	41	2.81	6.34
<i>It takes too long to get anywhere</i>	194	13.28	29.98
<i>It costs too much</i>	57	3.90	8.81
<i>Driving a personal vehicle is more convenient</i>	351	24.02	54.25
<i>Driving a personal vehicle is more affordable</i>	45	3.08	6.95
<i>I have a physical health condition or disability that makes it hard to take transit</i>	22	1.51	3.40

<b>Barriers to Active Transportation Use (n=1302)</b>	<b>n</b>	<b>%r*</b>	<b>%p**</b>
<i>It is too time consuming</i>	102	7.83	22.10
<i>It is easier to take other forms of transportation</i>	179	13.75	37.68
<i>I do not have a good place to store a bike etc. at home</i>	41	3.15	8.63
<i>I do not have a good place to store a bike etc. at the places I go</i>	48	3.69	10.10
<i>I have physical limitations that prevent active transportation use</i>	74	5.68	15.58
<i>I have to pick up others (e.g. children, partner, etc.)</i>	77	5.38	16.21
<i>I live too far from school/work</i>	225	17.28	47.37
<i>I live too far from stores</i>	268	20.58	56.42
<i>I find it hard to transport items with me</i>	155	11.90	32.63
<i>The weather is too cold</i>	153	11.75	32.21



## 6.3.1 - UNDERSERVED AND UNSERVED AREAS

Rationale for participants' lack of use of public and active transportation was echoed in their responses to the open-ended questions. 235 responses were provided on concerns with public transportation. The most common theme within concerns with transportation was the existence of unserved and underserved areas in the Fundy Region. Many respondents reported that bus service did not exist in their areas or did not reach their areas. One participant stated:

*[T]here is no public transportation in my area. I have to take my car everywhere, and sometimes my significant other is using it. Also, even though we have no choice but to take our car to get everywhere we do not qualify for the carbon tax rebate [...] there is no alternative means of transportation in our area, so even if we wanted to use public transportation instead of our car we can't!*

This was echoed by residents in Quispamsis and Rothesay who had one daily bus to and from Saint John, which was limited to three main stops. These participants noted that this bus did not enhance mobility around their area directly, but rather acted as a shuttle service to and from Saint John. Other residents mentioned the lack of frequency in their areas, such as the south-central peninsula and west side of Saint John, which were only served by busses once an hour. Further, participants reported that it took over an hour via public transport to reach a destination that is a 12-minute drive by car.

Many residents living on the outskirts of the Fundy Region were unserved by public transportation. Many residents with access to public transportation found that the bus stops were inconveniently located in relation to their homes, workplaces, and places of leisure. One participant wrote the following in their open-ended response:

*If you bus, you're limited to one line that goes to the university, Uptown, and then East, and one line that heads from uptown to the West side, and many of the rest are super limited in times and where they go. It's impossible to get to Irving Nature Park via transportation, it's not hard to get around in central/east Saint John but to get anywhere else via transportation (including a big chunk of the west side and the north end) is far trickier.*

Another participant stated the following:

*Another issue is the many areas of the city with no bus coverage at all. When I first moved here I was anxious to explore the various beaches and major parks in the city, only to learn that apparently none of them are on bus routes.*

The participants' open-ended responses indicated that there were few options available for travel to other areas around the Fundy Region or the province, without owning a personal vehicle. This was reinforced by the quantitative data which indicated that driving a personal vehicle was the primary mode of transportation in the region. One participant stated:

*If you do not own a vehicle or your car breaks down, or for another reason you are unable to drive yourself, there are no options in my community.*

These residents reported that the lack of access to public transportation created difficulties with reaching necessities in the city core. They also noted the exuberant cost of gas and taxi fares and the limited availability of rideshares in these areas. Common areas of concern include Hampton, Darlings Island, Saint Martins, and Redhead. One participant stated:

*The cost of gas is so high. Along with the rising cost of everything else. Fundy St. Martins does not have taxi, bus service or train service. We are a very rural community.*

Residents living in Hampton also reflected on the closure of the Comex service and the barriers this has created to accessing necessary services in Saint John. In areas that were not served by public transportation, personal vehicles were described as the only mode of transportation. This was a concern for residents as vehicles were not always reliable or available and the increased costs of gas was viewed as a barrier to mobility for some participants.

The open-ended responses also indicated a lack of satisfaction with public transportation infrastructure. Many respondents in Saint John expressed that they felt the city was designed for motorists, not people. Bus stop infrastructure was a concern for many, because bus schedules were not clearly indicated at bus stops, nor were routes. Bus stops were not clearly marked, and many did not have a shelter.



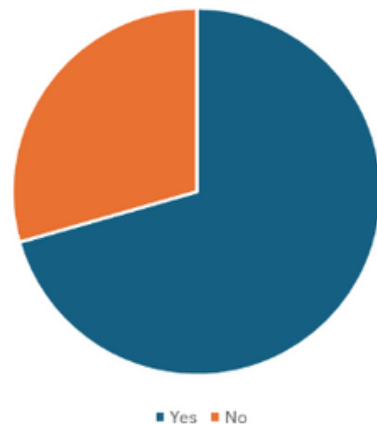
## 6.4 - POTENTIAL FOR USE

Participants were asked if they would use public transportation if it had times and locations that were convenient and accessible. 822 participants responded to this question. 580 individuals (70.56%) said that they would use public transportation if it was convenient and accessible and only 242 (29.44%) said that they would not use public transportation. See figure 3. The desire for options for forms of transportation that did not involve personal vehicle use was apparent in the participants' open-ended responses. For example, one participant wrote that transportation:

*Needs to be orientated to move people not cars around. It would be better to have a choice of how to get around the region and not be forced into car ownership when they would like to choose another way.*

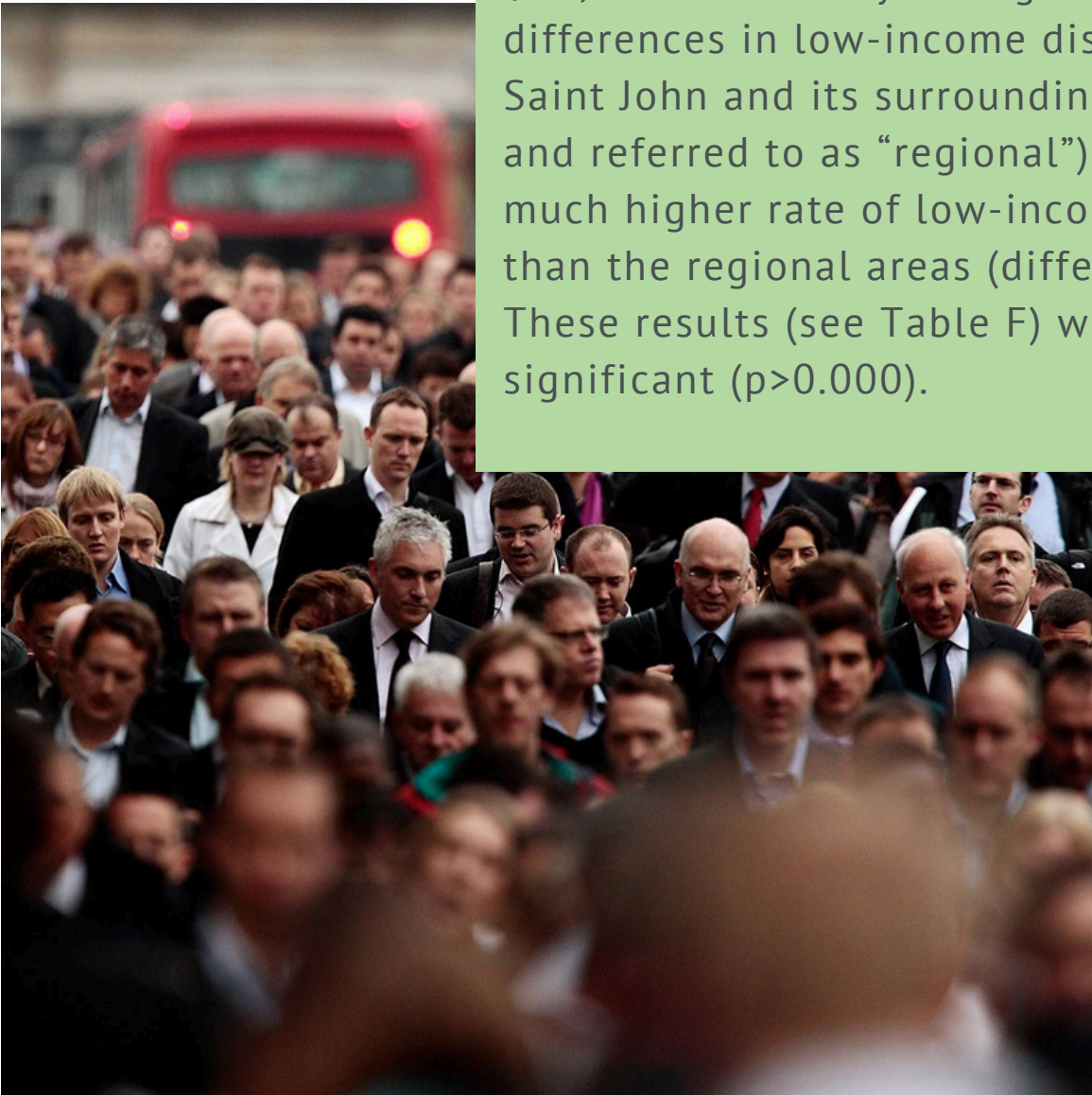
The data indicated that people would be open to using public transportation if it suited their needs, was accessible, safe, well-designed and more readily available.

### FIGURE 3: PUBLIC TRANSPORTATION USE IF IT WERE CONVENIENT AND ACCESSIBLE



## 7. ANALYSIS OF EQUITABLE ACCESS TO TRANSPORTATION

Tests of association were performed to determine whether two groups of interest in the Fundy Region, namely those who experience low-income and those who live in regional areas, experience mobility and transportation inequities. Low-income individuals were those with before tax household incomes of less than \$50,000. This analysis began with assessing differences in low-income distribution between Saint John and its surrounding areas (labelled and referred to as “regional”). Saint John had a much higher rate of low-income categorization than the regional areas (difference of 19.04%). These results (see Table F) were statistically significant ( $p > 0.000$ ).



## TABLE F: LOW INCOME STATUS BY AREA IN THE REGION

Income	Saint John n (%)	Region n (%)
<\$50,000	129 (35.93)	52 (16.89)
\$50,000+	229 (63.79)	256 (83.12)
Pearson chi2 = 30.68	P>0.000	

The average number of vehicles per person in a household was then compared by area. Saint John had an average of .23 cars less per person than those living in regional areas ( $p>0.000$ ). This was not surprising given the higher rate of low-income in Saint John and the availability of public transportation. Vehicles are expensive to purchase, fuel and maintain and open-ended responses indicated that they were perceived as fundamental to life in the region. One participant wrote:

*Saint John is a city built for those with cars. There are whole areas which aren't easily accessible without one, and visiting multiple areas within one day is a struggle, especially if you've purchased anything. The buses only cover certain areas of the city, and its inconvenient at best, especially if you work outside of the operating routes. If you live outside of the city, travel is completely impossible without a car.*

The analysis of average number of vehicles was then repeated by income group (see Table H). Lower income households had an average of .28 less vehicles per person than those in households who made \$50,000 or more per year ( $p>0.000$ ). This could be viewed as placing lower income individuals at a significant mobility disadvantage in a region that is perceived as being accessible through personal vehicle ownership.

## TABLE G: NUMBER OF VEHICLES PER PERSON IN A HOUSEHOLD BY AREA

Group	n	Mean	SD	95% C.I.
Saint John	420	.55	.43	.51-.60
Region	391	.78	.40	.75-.82
Difference =.23	P>0.000			

## TABLE H: NUMBER OF VEHICLES PER PERSON IN A HOUSEHOLD BY INCOME GROUP

Group	n	Mean	SD	95% C.I.
<50,000	177	.44	.44	.38-.51
\$50,000+	476	.73	.40	.69-.76
Difference =-.28	P>0.000			

The qualitative findings indicated that less access to vehicles in both Saint John and in lower income individuals had significant impacts on socioeconomic wellbeing. One participant stated:

*The lack of public transportation (particularly hours of operation) has prevented me from taking promotions at my job. My reliance on public transportation has cost me what would amount to a 25% raise at my place of employment.*

In this particular case, the participant noted that limited access to transportation and lack of access to a personal vehicle hindered their career

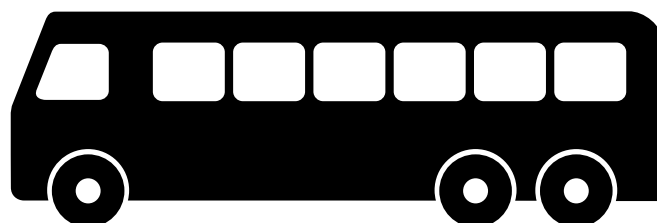


development and the ability to grow their income. Another participant stated:

*I am able to access my basic needs (work, school, grocery store), but I made that a primary consideration when I chose my apartment. I'm scared that if my rent goes up, I'll have to move to an area with less convenient public transportation. Also, I typically can do one (at most two) errands per day because of the time commitment of going to more than one place. Finally, as someone without a car, the public transportation options to public outdoor spaces are limited. This is a large problem for mental and physical health. I am an able-bodied person and I'm glad I can carry my heavy groceries or jump off the bus over the snowbank. I know many bus riders don't have that luxury.*

A total difficulty score was calculated for individuals using the 13 different variables that indicate whether a person had difficulty accessing key locations (e.g. work, school, etc.). This was done by assigning a value of zero to each of the no responses and a value of one to each of the yes responses. Not applicable was counted as missing as those individuals did not need to access the locations for which they answered not applicable. All 13 individual variables were summed to produce a value for each individual that ranged between zero and 13. The mean difficulty score of all participants was 2.16.

Participants in regional areas had less difficulty accessing key locations than those who lived in Saint John (difference of 0.90;  $p > 0.000$ ). See Table I. This indicates that transportation needs are better met in regional areas, which was likely due to the higher rates of vehicle ownership in regional areas. Participants in the low-income category had an average of 2.38 more key locations that were difficult to access than those in the higher income categories ( $p > 0.000$ ; see Table J). This is a stark inequity, likely related to inequitable access to vehicles.



## TABLE I: DIFFICULTY OF ACCESSING KEY LOCATIONS (SCORE) BY AREA

Group	n	Mean	SD	95% C.I.
Saint John	367	2.61	3.56	2.25-2.98
Region	362	1.71	3.27	1.37-2.04
Difference =.90	P>0.000			

## TABLE J: DIFFICULTY OF ACCESSING KEY LOCATIONS (SCORE) BY INCOME

Group	n	Mean	SD	95% C.I.
<\$50,000	181	4.16	3.89	3.89-4.73
\$50,000+	485	1.77	3.21	1.48-2.06
Difference =2.38	P>0.000			

Participants' desire to use public transportation if it was accessible, convenient and suited their schedules and needs was compared between Saint John and the regional areas (see Table K). Well over half of participants in each of the two areas stated that they would use public transportation if services were improved; however, the difference between the two areas was significant, with Saint John participants reporting more potential usage.

Participants' desire to use public transportation if improved was compared by income group. The results of this analysis were stark. Again, the rates of potential use were high in both groups; however, it was much higher (16.17%) in the group that made less than \$50,000 per year as a household.

## TABLE K: POTENTIAL USE OF PUBLIC TRANSPORTATION BY AREA

Would Use	Saint John n (%)	Region n (%)
Yes	318 (75.18)	262 (65.66)
No	105 (24.82)	137 (34.34)
Pearson chi2 = 8.9452	P=0.003	

## TABLE L: POTENTIAL USE OF PUBLIC TRANSPORTATION BY INCOME GROUP

Would Use	<\$50,000 n (%)	\$50,000+ n (%)
Yes	151 (84.36)	328 (68.19)
No	28 (15.62)	153 (31.81)
Pearson chi2 = 17.1296	P>0.000	

The final piece assessed for the equity analysis was the use of active transportation (see Tables M and N). Individuals in regional areas by far engaged in less active transportation than those in Saint John (difference of 29.67%;  $p>0.000$ ). Individuals in lower income households were more likely to engage in active transportation (difference of 15.82%;  $p>0.000$ ).



## TABLE M: USE OF ACTIVE TRANSPORTATION BY AREA

Uses Active Transportation	Saint John n (%)	Region n (%)
Yes	227 (53.29)	94 (23.62)
No	199 (46.71)	304 (76.38)
Pearson chi2 = 76.16	P>0.000	398

## TABLE N: USE OF ACTIVE TRANSPORTATION BY INCOME GROUP

Uses Active Transportation	<\$50,000 n (%)	\$50,000+ n (%)
Yes	96 (53.63)	181 (37.47)
No	83 (46.37)	302 (65.53)
Pearson chi2 = 14.01	P>0.000	



## 8. FINDINGS FROM KEY INFORMANT RESPONSES

The key informants worked for non-profit organizations or other public institutions and were on the front lines of serving made-marginalized populations, including people with physical illnesses, mental health illnesses or substance use disorders. This included individuals experiencing poverty, food insecurity, or housing insecurity, and homelessness. Their clientele spanned all ages and lived in regional and urban settings. When asked how their clients get to and from their services, the most frequent response was to get a ride from a friend or family member; bus and taxi were the second most frequent, followed by walking or other forms of active transportation.

Key informants echoed many of the same barriers stated by the survey respondents. The most common concern for their clients was the cost associated with transportation options, especially taxis and buses. One key informant noted:

*Cost of transportation is a big barrier for our clients. Bus passes are the cheapest and they are still \$70+/month. If they want to get their license, they need to be able to afford a car plus insurance and everything else that comes along with that which is becoming more and more difficult.*

Another common concern expressed by key informants, who were largely front-line workers, was the lack of scheduled buses and the inconvenient routes. One Key Informant wrote:

*Ensuring routes are connecting residential and commercial areas of the city – they need to take them to areas of pleasure/employment/activities/services and back home. For example, we have a lot of blended families and kids whose parents live in different areas of the city. If one parent lives Uptown but does not have a car, and the other parent lives West side and the child is going to school on the west side, the child is more likely going to be limited in their frequency of stay with their parent living Uptown due to lack of transportation to school (specifically in the mornings). This impacts the level of bonding and time spent between parent/child. Not everyone can afford a car, and you shouldn't need a car in a city our size.*

Many expressed the difficulty their clients had when trying to access services in relation to the location of their homes, which were not always located along bus routes. This limited access to family members, key services, leisure, housing and healthcare services. One key informant noted that Health Links, a service for people without primary care providers, was inaccessible for people outside of the city who were limited in their options for transportation.

## 8.1 - SUGGESTED IMPROVEMENTS

Survey participants were asked their opinions on what could be done to improve transportation in the Fundy Region. The most common responses were: expanded hours of operation and improved routes, extended access to unserved and regional areas, and train service connecting regional and urban areas. One participant wrote:

*As part of a broader strategy of personal transportation within the region, and to advance the hospitality and tourism industry of this region, I believe it would be an advantage to bring back a basic passenger train service that makes regular trips from Saint John to Moncton with stops at communities in between (Salisbury, Sussex, Norton, Hampton, Quispamsis/Rothesay).*

Other recommendations included lowered costs for public transportation, especially for seniors, youth, and those with low incomes, as well as the introduction of ride share services such as Uber or Lyft. One participant discussed the need for more ride share services:

*The taxis have a virtual monopoly and drive like maniacs because they don't have competition, keeping prices high. If you want to encourage people to patronize the city businesses, evolve into the 21st century and give them better, safer, more reliable options to get around. I regularly hear that people would go out to the Uptown to have a few drinks, but they refuse to take the cabs.*

Saint John recently introduced URide, an app-based service that connects riders to available drivers of personal vehicles. URide operates similarly to Uber and Lyft and may become a more popular option for people as it becomes more well-known.

Some of the participants acknowledged the challenge of providing regional transportation in a region where cars have been the primary mode of transportation for a long time:

*Would be great to have better bike paths and a better transit system. It's a chicken and egg thing – people rely on cars because they have to. And even when you offer transportation, its not popular. But provision of better active transport and public transportation options is a good investment in my opinion because we can't change habits unless the option exists.*

One participant described the potential benefits of multi-modal transportation in their open-ended responses and acknowledged the challenges of serving a diverse group of individuals in a dispersed region:

*Should have park and ride instead of attempting to please everyone. The current system, a couple of routes in the morning and at late afternoon, does nothing for those that are retired or otherwise unemployed. Small busses that would circulate through the KV area in the mornings and evenings to the park and rides should be looked at. During the day these buses could run routes through the KV to stores, appointments, recreation areas, etc.*

Key informants also echoed the responses of survey participants in terms of how transportation in the Fundy Region can be improved. Many expressed the need for affordability measures, such as lowered costs for seniors, youth and other individuals with fixed or limited incomes. They also suggested the implementation of subsidized programs for non-profits to provide bus passes to their clients. Key informants further reinforced the need for improved scheduling of buses as well as improved routes, and some form of public transportation to connect regional and urban areas.



## 9. DISCUSSION & FUTURE STEPS

This report focuses on the needs and transportation use of residents of the Fundy Region. Perhaps unsurprisingly, the main mode of transportation in the Fundy Region is personal vehicle use. These findings were anticipated, as the research team is in the Region and has a good understanding of transportation modalities from their own positions as residents and citizens. We do note that the region benefits from the existence of a public transportation provider--Saint John Transit. The services offered from this provider can be built on, which makes growing regional transportation options easier than in other areas without access to existing services.

Many people in the City of Saint John use active transportation to get exercise when they can. This is positive for personal health, wellbeing, traffic congestion, and the environment. However, barriers include living too far away from work, schools and stores, the weather in the region, and the difficulty of transporting items. Residents who do not use active transportation view it as time consuming and they note that it's easier to use other forms of transportation. However, residents note a desire for more well-developed active transportation infrastructure which would support the use of bicycles and walking in a safe way. Examples of this include well-cleared sidewalks that are in good repair and connect different areas of the city to one another and bike lanes with barriers to protect cyclists from vehicle traffic. The Region and City may also want to consider the implementation of bike share programs with discounted or free access for lower-income households to improve equity of mobility for lower-income people who are able to use active modalities of transportation. Physical activity as a mechanism for transportation is not used as much in the regional areas as residents often live too far from the places that they need to go.

The use of public transit in the region is quite low. This low use is due to inconvenient or infrequent scheduling, non-existent public transit infrastructure in regional areas and in some areas of the city, and the convenience of driving a personal vehicle. The most prevalent reasons for public transit use are lack of access to a vehicle and the absence of a driver's license. However, people who take transportation also note that they do so because it is affordable and environmentally friendly. In order to increase public transit use and decrease car reliance in the region, public transit needs to become more widely available and suit the scheduling needs of residents. However, campaigns for transit use may benefit from focusing on the reduced cost of transportation and the environmental impacts of reducing personal vehicle use.

Surprisingly, the majority of participants note that they would use public transit if it was available, convenient and met their needs. Population sprawl in the region makes it challenging to affordably service all areas of the region. The City of Saint John is following best practices in slowly introducing demand responsive public transit options through the use of smaller e-



buses. Further, the region's investment in dial-a-ride programs for regional residents who require access to healthcare also follows evidence-based practices noted in the background section of this report. The existence of a car culture is hard to counter. Residents need to be convinced to leave their vehicles in their driveways and choose to take public transportation. This requires a cultural shift that will likely not happen quickly.

The results, along with an understanding of population density in the region, indicate that Quispamsis and Rothesay may be good areas to target for additional public transportation infrastructure. This could involve the use of smaller busses that circulate these areas and connect residents to a connector location that offers more frequent service into the Saint John. This introduction may need to be done in a phased way that slowly introduces additional capacity in Rothesay and Quispamsis. Further, this may benefit from targeted advertising that stresses to residents that if these services are not used, they cannot be offered.

Unfortunately, the solution of adding additional transportation infrastructure in Rothesay and Quispamsis does little to address equity concerns in the region. Quispamsis and Rothesay have the highest median incomes in the region and residents have good access to vehicles. Further, the equity analysis indicates that individuals within the City of Saint John experience lower incomes, and that individuals in the lowest income group have more difficulty accessing key locations and have fewer vehicles to use for their own mobility. They currently experience challenges with a public transportation system that needs to be expanded to meet their transportation needs. Further, a higher proportion of low-income individuals report that they would use public transportation with improvements. Increasing transportation availability within the city may assist individuals in extending or changing their work hours, improve their housing options and allow for greater access to family members and recreation opportunities.

The equity analysis indicates that individuals who are lower-income, many of whom live in the city core, are in real need of enhanced public and active transportation options; however, it also indicates that individuals in regional areas are also limited in their access to public transportation. This creates burden for individuals in regional areas. Residents in these regional areas struggle with high gas prices and the cost of maintaining vehicles. They are also limited in their ability to use active means of transportation. In order to gain a better understanding of regional need, future work could remove higher income residents in regional areas from the analysis and rerun comparisons found in the equity analysis. This would provide a better understanding of the needs of lower-income regional residents who may disproportionately struggle with the costs of vehicle use and ownership. However, this survey, along with Statistics' Canada assessments of median income, finds higher concentrations of lower-income households in the City of Saint John than in the surrounding region. If closer analyses of specific areas in the region shows that regional residents in the lowest income group experience significant barriers to transportation, neighbourhood level analyses of median income could be used to locate regional areas that could be prioritized for pilot transportation projects.

Transportation in the Fundy Region suffers from two key challenges. First, can we build non-vehicular transportation infrastructure in areas that are currently very car dependent and hope that people use it. The results suggest that people may indeed use public transportation if it is added; however, the amount of infrastructure needed to provide convenient access is high and would require significant investment. To date, solutions that provide some access to public transportation, but not enough to make transportation use convenient, are partial solutions that ultimately fail due to limited uptake. Engagement in areas outside of the city core will need to carefully consider this, and if public transportation is extended into regional areas, trials of well-serviced public transportation will need to be prioritized in limited areas to assess use and future widespread feasibility. Extending public transportation may or may not be feasible and will require considerable research, planning and thought on behalf of city and regional staff and policymakers.

The second major problem faced in the Fundy Region is the transportation poverty experienced by those who live in households who make less than \$50,000 a year. These individuals are disproportionately located in the City of Saint John. They experience less mobility, which negatively impacts their ability to equally participate in many aspects of daily life. It also limits their occupational, familial, recreational and housing opportunities. These inequities must be addressed through a more fulsome extension of public transportation services which will produce additional costs. Decreased transportation poverty for individuals with low-to-moderate household incomes should be prioritized.

Ultimately, from a transportation justice perspective, the decision of whose needs to prioritize and which risks to take should be worked on by the Fundy Regional Service Commission in a way that facilitates conversations on the research findings in this report. The public should be made aware of the results of this study. Planners and policymakers must ask themselves difficult questions: As a region, do we prioritize lowered vehicle dependence in regional areas or focus on providing better public and active transportation in the city core, where limited access is causing transportation poverty? Are we able to do both? Next steps could include an additional analysis of regional income and accessibility to key locations, a separate look at the outcomes of this study in each area in the region, and public consultations on solutions. An accessible knowledge translation plan should be developed to disseminate the findings of this study in a meaningful way to participants and regional residents. This plan should prioritize increasing public capacity to have critical conversations about transportation and equity in the region. Additional data analyses can be conducted that model the relative risk of area in the region, income, primary mode of transportation, gender, and vehicle ownership on mobility. Further, average difficulty of access scores can be mapped using the first three digits of postal codes provided by participants in order to assess key areas that may require transportation improvements.

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