Mapping Toronto's Digital Divide

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EXECUTIVE SUMMARY

The City of Toronto is home to some of Canada's fastest internet infrastructure. Yet there **continues to be a digital divide** in Toronto separating people who do or do not have access to the internet at home. This report provides a deeper examination of this divide, or rather series of divides, persisting in terms of internet speed, affordability and quality and household access to internet-enabled devices. Such divisions are not spread evenly across the population, with lower-income and older residents more likely to not have access, or to have slower internet.

To get an up-to-date and detailed understanding of internet and device access in Toronto amidst the COVID-19 pandemic, a multi-method online and phone survey of 2,500 Toronto residents was completed in November and December 2020. Additional data were also collected and analyzed from Statistics Canada, Toronto school boards, the Toronto Public Library and the federal government's Connecting Families initiative.

The key findings are:

- 98% of Toronto households have home internet access, but **38% of households report download speeds below the Canadian Radio-television and Telecommunications Commission (CRTC)'s national target** of 50 megabits per second (Mbps);
- **Half of Toronto's low-income households (52%) and of those aged 60 and older (48%) report download speeds below the national target** of 50 Mbps;
- 34% of Toronto households are **worried about paying their home internet bills** over the next few months, with rates of worry greatest among low-income, newcomer, single parent, Latin American, South Asian, Black and Southeast Asian residents.
- Of the 2% of Toronto households not connected to home internet, half are **not connected due to the cost**, and 61% say it is impacting their ability to **access critical services and information;**
- Those **aged 60 and older have lower rates of access** to home internet (95%) and are more likely to lack a device that can connect to the internet, compared to younger residents;
- Noteworthy parts of the City with lower rates of connectivity include the Humber Summit/Jane and Finch area, South Parkdale and the Moss Park/Regent Park/St. James Town area;
- 42% of those in Toronto without home internet access **use the public library** for access, compared to 16% overall;
- **Toronto households earning under $50,000 have less than one computer for each person** (average of 0.7 computers per person), lower than the national average of 1.0; and
- 15% of households with less than $20,000 income and 20% of those aged 60 and older do not have a smartphone.

These findings, particularly in the context of the digital shift during the pandemic, reinforce the need to continue scaling programs to close the remaining gaps in internet and device access. They also highlight notable gaps in internet quality and affordability along lines of income, age and race that urgently require greater policy and programmatic response.

INTRODUCTION

The digital divide in Canada is often described as an urban-rural divide. There are acute disparities in access to broadband internet in many parts of rural and remote Canada, and progress has been relatively slow in closing those gaps. In Toronto — Canada's largest city, with access to the nation's fastest internet service[1] — approximately 95% of residents had access to home internet service according to a 2018 Statistics Canada study, an overall access rate equivalent to other urban areas in Ontario, and significantly higher than the 90% access rate outside of metropolitan areas.[2]

However, this overall rate can mask critical dimensions of Toronto's digital divide — who is not connected and why, and whether the internet access of those who are connected is sufficient and accessible. The Canadian Radio-television and Telecommunication Commission (CRTC) declared the internet a basic service in 2016.[3] However, reliable, affordable, sufficiently fast connectivity, and the devices and literacy needed to use it, is still often plagued by disparities that often map onto other socioeconomic inequalities.

The digital divide is the gap that exists between individuals who have affordable internet access and the skills to use modern information and communication technology and those who do not.[4] While the "divide" usually describes a quantifiable gap, research on "digital inequality" or "digital disadvantages" has sought to capture the qualitative experience of the divide and the conditions that impact access beyond available internet infrastructure. Further insight into those who do and, more critically, those who do not have access to the internet is essential in providing an in-depth understanding of the digital divide. This work takes us into the lives of those who experience such disparities and the ways in which they are impacted.

According to the CRTC, 69% of households with an income less than $32,914 had a computer and internet access at home between 2013 and 2017, compared to 98.5% of higher-income households.[5] Almost half of households with an annual income of $30,000 or less did not have access to high-speed internet in 2018.[6] In addition, Canadian households with income under $32,914 spent 2.2% of their annual income on home internet services in 2017 – four times the proportion of the average Canadian household.[7] A survey of low-income Canadian households found that cost was the primary reason that households did not have a home internet connection.[8]

Research has also shown that older populations are more likely to not use the internet. A 2017 study found 74% of those aged 65 and older used home internet services, compared to 92% of those aged 50 to 64 and more than 97% of those under the age of 50.[9] Other research has indicated that 20% of Canadians aged 60 and older do not own a smartphone.[10]

More recent surveys have found that, since the start of the COVID-19 pandemic, online usage and

spending has increased — a rise that is correlated with retail sales figures. Thirty-four percent of Canadians reported spending more on their home and mobile internet; 44% reported that they had spent more money on online purchases of computers, laptops and tablets; 40% on smartphones; and 42% on online streaming. Screen time rates have also increased, with 41% reporting an increase in social media and messaging use (up to 57% for those age 15-34); and increased use of free and for-fee online streaming, online information and online education services.[11] In a late March 2020 survey, 77% of Canadian internet users said they spend at least 3-4 hours online everyday. About one in eight (15%) spent more than 8 hours per day online.[12] Only 13% reported going a week offline in the past 12 months, and 24% said that they had not gone more than 8 hours offline.[13]

Lack of broadband internet access is influenced by many factors, including access to and speed of internet service, cost of living and affordability of internet service, as well as access to (and performance of) devices. This report seeks to provide an updated and detailed analysis of internet access in the City of Toronto, providing a deeper understanding of those who are impacted by the digital divide.

DIGITAL ACCESS IN A PANDEMIC

This survey was conducted in late Fall 2020, as Toronto, like many other jurisdictions around the world, was experiencing varying levels of public service and business closures, or capacity and use limits as part of public health responses to the global pandemic. This included schools, public libraries, employment centres, community drop-in spaces, cafes and restaurants where internet and/or computers are available. At the same time, the need for internet and personal devices, such as computers, smartphones or tablets that enable access to the internet, has expanded as work, education, health care, services and social interactions in general have shifted remotely to reduce in-person interactions.

In late March, Statistics Canada estimated that approximately 4.7 million or 27% of working Canadians worked from home who did not previously do so.[14] As of October 2020, this rate was still 2.4 million or 13%.[15] Worker and employer surveys both suggest that remote work may remain in place for many months in some sectors and occupations. As of September 2020, the majority of post-secondary institutions were operating remote-only or in a hybrid model for select in-person labs and small classes.[16] K-12 learning in Ontario has included in-person, hybrid and full-remote versions, as provincial policy fluctuated, public health recommendations were released, and schools dealt with outbreaks. In Toronto, many adult learning programs, including high school diploma programs, have operated as hybrid programs, posing scheduling challenges to students who are also workers or parents, and without providing devices to students.[17] Many services, from reserving skating time at a municipal skating rink or booking a COVID-19 test to applying for the Canada Emergency Response Benefit, have shifted to online-first; and many social and commercial activities, from banking to buying groceries became, if not solely available online, then at least safer to do online.[18]

Home internet and internet-enabled devices make it possible for many families to isolate or quarantine; to reduce their contacts and risk of illness; and to remain connected to family, friends, work, school and services. Many organizations have responded with innovative solutions, including school boards distributing laptops and tablets,[19] settlement services distributing cell phones,[20] the City of Toronto and Toronto Public Library's "Wi-Fi on Wheels" park hotspot pilot program and the City of Toronto's Digital Canopy project providing free Wi-Fi to 25 large residential apartment buildings in low-income neighbourhoods. This study is in part meant to identify the gaps that remain in both internet and device access.[21,22] As Smythe, Wilbur, and Hunter write in a forthcoming article: "The societal lockdown imposed in Canada in March 2020 to stem the spread of COVID-19 severed key points of connection for low-income Canadians who rely upon schools, libraries, and even fast food chains for internet connectivity. This has had dire implications for timely access to vital information and resources."[23]

BACKGROUND ON THE DIGITAL DIVIDE

Internet access, once a rare opportunity, is today a core service that people from all walks of life rely on every day to perform everything from banking, working and learning, to receiving health care and government services. In Canada, year over year, home internet adoption has been steadily increasing, growing nationally from 76% in 2010 to 89% in 2018.[24]

Recognizing the importance of the internet, the United Nations has labelled it a human right.[25] The CRTC's 2021 goal is for 90% of Canadian homes and businesses to have access to maximum subscription speeds of at least 50 Mbps for downloads and 10 Mbps for uploads.[26] Despite this, many individuals and households lack access to sufficiently fast broadband internet. Those groups impacted and disadvantaged most by this digital divide include low-income, rural, remote and Indigenous residents and older adults. The global pandemic added new visibility to the divide, heightening awareness of the pre-existing socioeconomic and sociocultural inequities of our society.

SOME EXPLANATIONS FOR THE DIGITAL DIVIDE

Researchers have pointed to various reasons as to why certain populations are affected by the digital divide. These observations often coalesce around issues of access to digital infrastructure that enable internet connectivity as well as quality of service. In Canada, this is most notable in the context of the 'urban-rural' divide. It is well known, and a subject of much policy scrutiny, that many rural and remote communities in Canada lack the digital infrastructure to enable internet connectivity, disproportionately impacting Indigenous communities. Where they do have the infrastructure in place, the quality of service is often poor — well below the 50 Mbps levels of download speed that the CRTC recommends as adequate.[27] For example, Network BC estimates that only 25% of Indigenous communities in BC currently meet the 50 Mbps download speed target.[28]

Even with the digital infrastructure and high quality internet service in place, experts also point to issues with affordability impeding access to the internet. Hardware such as computers, laptops, tablets and routers needed to connect to the internet can also bring about unexpected expenses. Even when households or individuals own hardware, the rate of technology obsolescence and the cost of maintaining or replacing can diminish their ability to maintain continuous internet access.[29]

While issues of access, quality and affordability are important factors that help explain why certain populations do not have access to the internet, digital literacy skills, as well as the feelings of benefit, trust and security individuals receive from their engagement online, are also important factors that help explain the digital divide.[30]

The use of multiple types of internet-enabled devices by households allows for a more enriched and meaningful online experience. For instance, the breadth of online engagement is significantly higher for computer and tablet users. However, low-income households are disproportionately

more likely to use mobile phones as their primary or only access point to the internet. For those without access to home internet and who rely on their mobile phones for access instead, activities such as job searching or creating a resume become more challenging.[31]

Within the context of the pandemic, older populations are at increased risk of social isolation and loneliness. The internet affords the opportunity to dampen the social impact of physical distancing guidelines; but older adults, with generally lower than average incomes and technological skills, are largely excluded from the socially ameliorative impact of the internet.

RECENT INITIATIVES TO BRIDGE THE DIGITAL DIVIDE GAP

Several public and private initiatives have been launched in Canada in recent years, aimed at bridging the digital divide. The federal government launched the Connecting Families initiative, administered by Computers for Success Canada, providing $10/month internet access to over one million families eligible for the maximum Canada Child Benefit. Other federal programs, including the Digital Literacy Exchange, have support not-for-profit organizations in delivering basic digital literacy training needed to use the internet and internet enabled devices.[32]

Rogers introduced the Connected for Success program, providing $10/month internet access to households in community housing. TELUS's Internet for Good program provides $10/month internet access to people receiving disability benefits, youth aging out of the child welfare system and students in need in Alberta and British Columbia.

The Toronto District School Board and Toronto Catholic District School Board, like school boards across the country, provided students in need with internet-enabled devices and internet hot-spots during the school closures resulting from the pandemic.

The Toronto Public Library (TPL) continued its Wi-Fi Hotspot lending program, providing Wi-Fi hotspots with unlimited data for six months to 1,000 households, and launched a new Internet Connectivity Kits initiative to give a laptop and a Wi-Fi hotspot with two-years of unlimited data to those with most urgent need. Over 600 kits had been funded by external donations and grants by December 2020. Participating community agencies referred vulnerable households who could benefit from these programs to TPL. The Library also has for many years offered free computer training. Finally, the City of Toronto partnered with Cisco to launch Digital Canopy, a program that deployed free Wi-Fi hotspots in 25 residential buildings in low-income neighbourhoods.

Researchers in the US have noted that similar programs there have been under-utilized by some vulnerable groups for reasons including a lack of outreach, a fear of being stigmatized by service providers and inadequate internet speeds.[33]

Many major municipalities in Canada and the U.S. have internet access or infrastructure plans that were developed through community consultation and strong municipal support, including in San Francisco, Seattle and Vancouver. Cities like Ottawa have employed data analytics to identify the most vulnerable neighbourhoods for Wi-Fi hub installations.[34] New York City's plan on remediating the digital divide, in large part, involves expanding infrastructure by installing fibre optics in 'nearly every street intersection.'[35]

While this summary is not intended to be exhaustive, the various approaches highlighted here serve to illustrate the multifaceted nature of attempts to bridge the digital divide through access to the internet, devices and digital skills and literacy. They also recognize the interrelated issues of access, adoption, quality, engagement and governance that are necessary to produce meaningful digital inclusion and equity.

RESEARCH METHODOLOGY

This research study used a multi-method approach to explore the digital divide in the City of Toronto. Data were collected through anonymous voluntary surveys online and by phone, administered by Pollara Strategic Insights, to 2,500 Toronto residents aged 16 and older from November 25 to December 3, 2020. A probability sample of this size would yield results accurate to ± 2 percentage points, 19 times out of 20.

ONLINE SURVEY

In the first method, an online survey was conducted with a random sample of 2,000 Toronto residents who had opted-in to The Logit Group's research panel, which is recruited from a variety of online and offline channels, including telephone recruitment, in-person recruitment at public events, advertising and referrals. Response quotas were established to ensure sample representativeness using 2016 Census data by the six original City boroughs (Etobicoke: n=250; York: n=100; East York: n=80; North York: n=590; Old Toronto: n=550; and Scarborough: n=430), as well as by age and income range, plus or minus 2.5% from their 2016 Census proportion.

TELEPHONE SURVEY

In the second method, a telephone survey was conducted with a cluster sample of 500 Toronto residents using Interactive Voice Response, which enables respondents to use their phone keypads to input responses to automated questions. Respondents for the telephone survey had opted-in to a research panel built by Dynata, which is recruited through random digit dialling to both landlines and cell phones. Previous research indicated that low-income households and older adults were least likely to have internet access and to be underrepresented in online surveys. As such, the telephone survey sample targeted 34 of Toronto's 95 forward sortation areas (FSAs) that had the highest incidence of low-income households (measured by the percentage of the population in households below the Market Basket Measure poverty line and the Low-Income Measure After-Tax) and/or seniors (percentage of the population aged 65 and older) using the 2016 Census; see Appendix B for a breakdown of the sample.

The survey instrument was designed by the report authors, in consultation with the collaborators listed on page 2; six of the eight core questions were asked in the telephone survey to reduce length (see Appendix C for questionnaire).

The responses were weighted by income, based on the 2016 Census data to ensure that the sample matched Toronto's population. Fifteen FSAs with a small number of responses were combined with another FSA for reporting. Totals may not sum or add to 100 due to rounding.

We also compiled and reviewed data relevant to the digital divide in the City of Toronto from several other sources that we reference in our findings as follows:

- Data from Statistics Canada for the 2018 Canadian Internet Use Survey for the Toronto census metropolitan area (which contains most municipalities in the Greater Toronto Area); this survey also uses a sample methodology of 80% online and 20% telephone, which our own methodology matched to enable comparisons.

- National and Ontario data from a representative anonymous survey conducted online by Ryerson University's Cybersecure Policy Exchange with 2,000 Canadian residents aged 18 and older in May 2020.

- Data from Computers for Success Canada, which administers the federal government's Connecting Families initiative that provides $10/month internet access to qualified families who receive the maximum Canada Child Benefit. A heatmap was provided displaying qualified beneficiaries who responded "No, I do not" to the question "Do you have internet service already installed at this address now?" in 2018 and 2019 (see Appendix A).

- Data from the Toronto District School Board and Toronto Catholic District School Board of the postal codes for the 9,700 students (approx. 0.8% of total households in the City) who were provided with internet access during the initial school closures in March to June 2020 (see Appendix A).

- Data from the Toronto Public Library's Wi-Fi Lending program of postal codes for the 962 households (approx. 0.08% of total households in the City) that received a Wi-Fi hotspot through referrals from participating community agencies between May and October 2020 (see Appendix A).

FINDINGS

ACCESS TO HOME INTERNET IS INCREASING THOUGH DIGITAL DIVIDE REMAINS

The vast majority (98%) of Toronto households who responded to our survey currently have access to internet service installed at home, though those without report significant challenges explained further below. This figure is consistent with data from Statistics Canada's 2018 Canadian Internet Use Survey, which found that 95.9% of respondents in the Toronto census metropolitan area have access to internet service at home and continued growth in this rate over time.

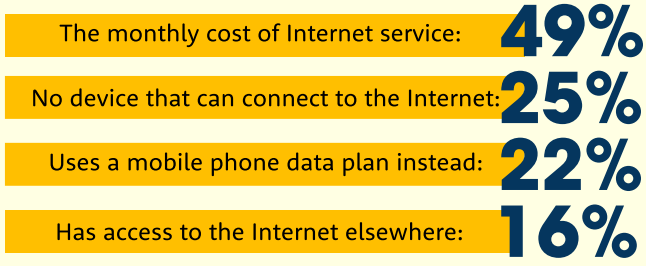
Although only 2% of respondents reported that they did not have access to internet at home (n=43), the survey findings still provide notable insights into the digital divide, or rather a series of divides, that persist in terms of internet speed, affordability and quality, the ability for people to access critical services, household access to internet-enabled devices, and the increasing use of mobile devices to connect to the internet as discussed below.

Cost is the Top Reason for Not Having Home Internet

The monthly cost of internet service is the most mentioned reason (49%) among Toronto households that do not have access to internet at home. Studies have shown Canada to be among the most expensive countries in the world for fixed broadband internet.[36]

According to one study, out of 62 countries surveyed, Canada ranks fifth most expensive for 100 Mbps of internet speed, costing on average $79 CAD per month. In contrast, Ukraine and Russia are among the cheapest for the same internet speed, costing $8 and $10 CAD per month, respectively.[37] Although there has been a downward trend in internet prices in Canada over the last five years, Canadians continue to pay at the "high end of costs" for internet speeds over 16 Mbps compared to other countries, with the notable exception of the U.S.[38]

Figure 1:
Reasons Why Respondents Have No Home Internet



(n=43)

Other top responses from respondents without home internet access include "not having a device to connect to the internet" (25%), followed by "use of a mobile phone data plan instead" (22%) and "access to the internet elsewhere" (16%). Phone ownership can be a cost-saving alternative for households to access the internet in comparison to incurring costs of an internet subscription in addition to owning the appropriate internet-enabled devices (e.g., computers, laptops, tablets).[39]

Lack of Home Internet Impacts Access to Critical Services

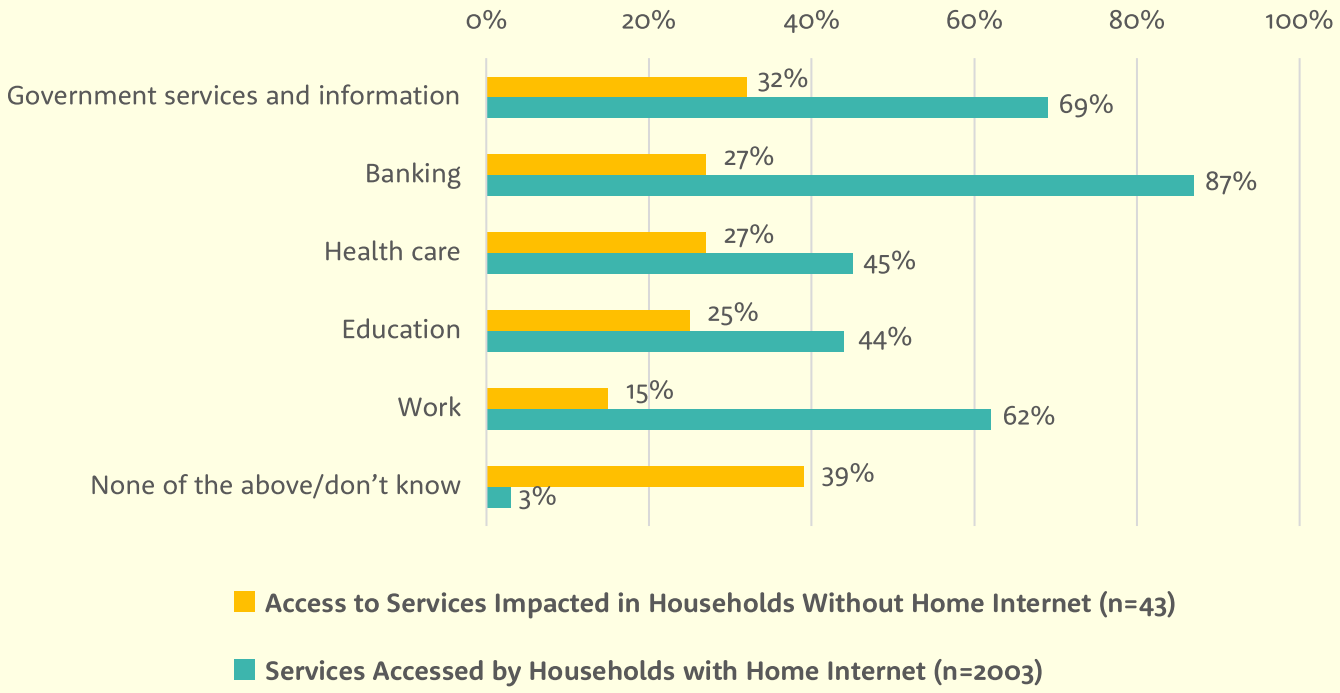
When asked if the lack of home internet access has impacted the household's ability to access critical services in the last six months, 61% said it has. The top mention was government services and information (32%), followed by banking (27%), health care (27%), education (25%) and work (15%). Many businesses and institutions have transitioned their operations to remote-only amidst the current global pandemic, further impacting access to such services by households without internet and making access even more critical for households. As of August 31, 2020, "nearly 33 percent of businesses across Canada reported that 90 percent or more of their employees were working remotely; nearly 43 percent of businesses reported 60 percent or more of their employees were working remotely."[40]

By way of comparison, the top services accessed in the last six months by households with home internet service are banking (87%) and government services or information (69%). This is followed by work (62%), which increases to 74% among those between ages 26 and 55.

Access to health care was selected by 45% of respondents with home internet. Of note, the proportion of Canadians who indicated accessing health care online in May 2020 was only 19%, suggesting a significant transformation in just a few months.[41]

Education was also accessed online at a significant rate (44%) among those with home internet, rising to 78% among those aged 16-26 and 71% among those with children under 18.

Figure 2:
Impact of Home Internet on Access to Critical Services



Income and Home Internet Access Divide

There is a significant correlation between lower household income and lower rates of home internet access. While 98% of respondents overall have home internet access, this figure drops to 94% among respondents who have a household income of less than $30,000. Among those with over $70,000 in household income, the proportion is 99.8%. Similarly, 96% of those who are not employed or unable to work have home internet access, compared to 99.2% of those who are employed. For households without home internet access and income under $30,000, 75% of these households cited the monthly cost as a barrier.

Age and Home Internet Access Divide

Likewise, there is a significant correlation between older age and lower rates of home internet access. Respondents up to age 44 reported 99.6% home internet access. Between the age of 45 and 59, the proportion of home internet access was only modestly lower at 98%. Above the age of 60, the proportion is 96% with the lowest proportion between the ages of 60 and 70 (95%). Among households without home internet, those aged 60 and older were more likely to indicate not having a device that can connect to the internet (30%) as a reason for not having home internet, compared to those under the age of 60 (14%).

Location and Home Internet Access Divide

Overall, 63% of those without home internet access live in apartment or condo buildings, compared to 44% overall. Those living in houses, townhouses or multi-unit houses had home internet access at a rate of 99.3%, compared to 97.6% of those in apartment or condo buildings. This is largely, however, a function of income — 58% of households with income under $30,000 live in apartment or condo buildings.

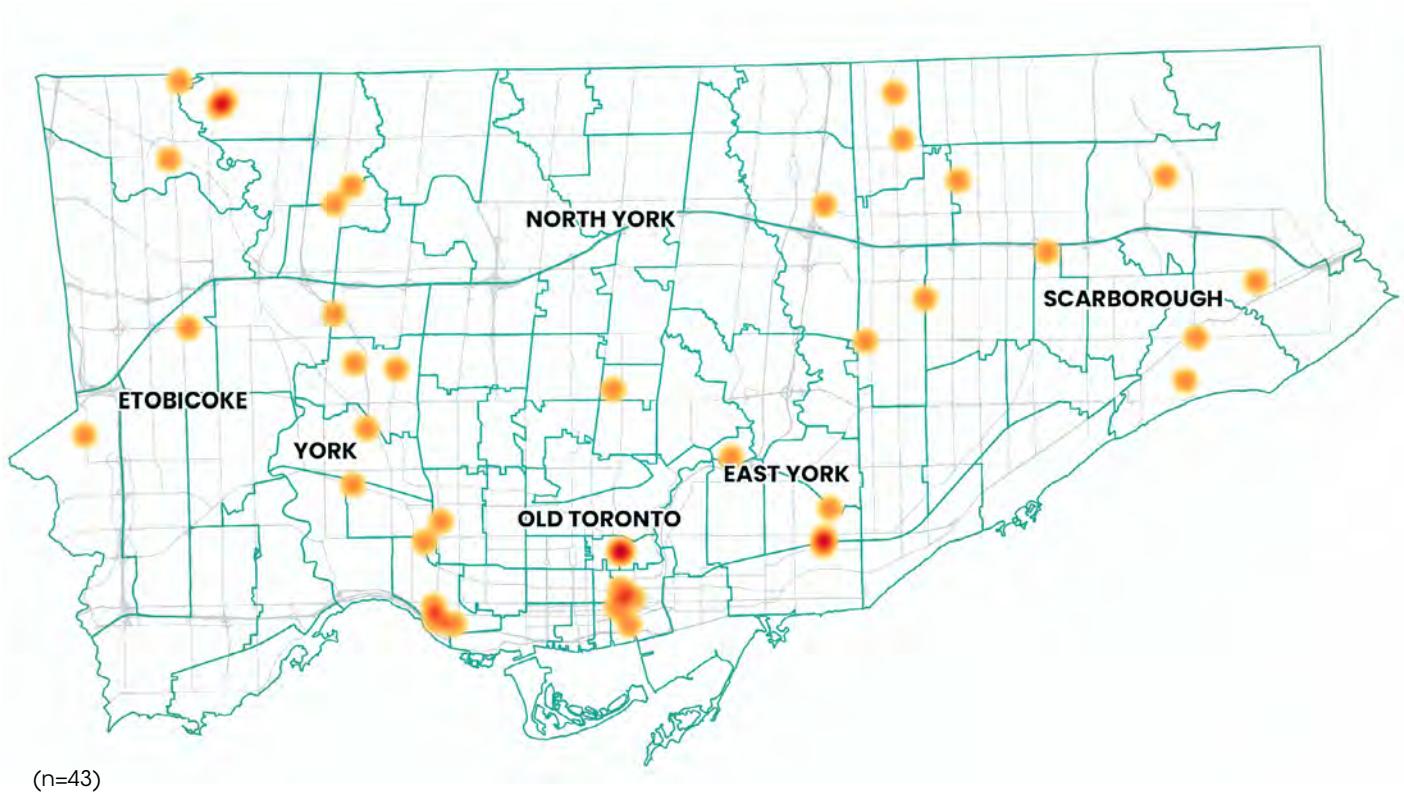
Figure 3 depicts the location of households within the City of Toronto without home internet access. Caution is recommended in extrapolating significance from any individual point given the small sample (n=43). However, there are patterns and particular areas that were of note.

In general, south Etobicoke, the west end of downtown and most of North York had remarkably high rates of home internet access. These areas are consistent with other data that we reviewed from the Toronto school boards and the Toronto Public Library, which similarly showed relatively high rates of internet access in these areas.

There are six areas of note with less than 96% rates of home internet access — each of which include designated Neighbourhood Improvement Areas and each of which also stood out in the other data sources reviewed, including from the Connecting Families initiative:

- Humber Summit/Jane and Finch (M9L/M3N/M3L)
- South Parkdale (M6K/M6R)
- East Downtown – Moss Park/Regent Park/St. James Town (M4X/M5A)
- Taylor-Massey (formerly Crescent Town, M4C)
- Thorncliffe Park (M4H)
- West Hill (M1E)

Figure 3:
Heatmap of Survey Respondents with No Home Internet Service



(n=43)

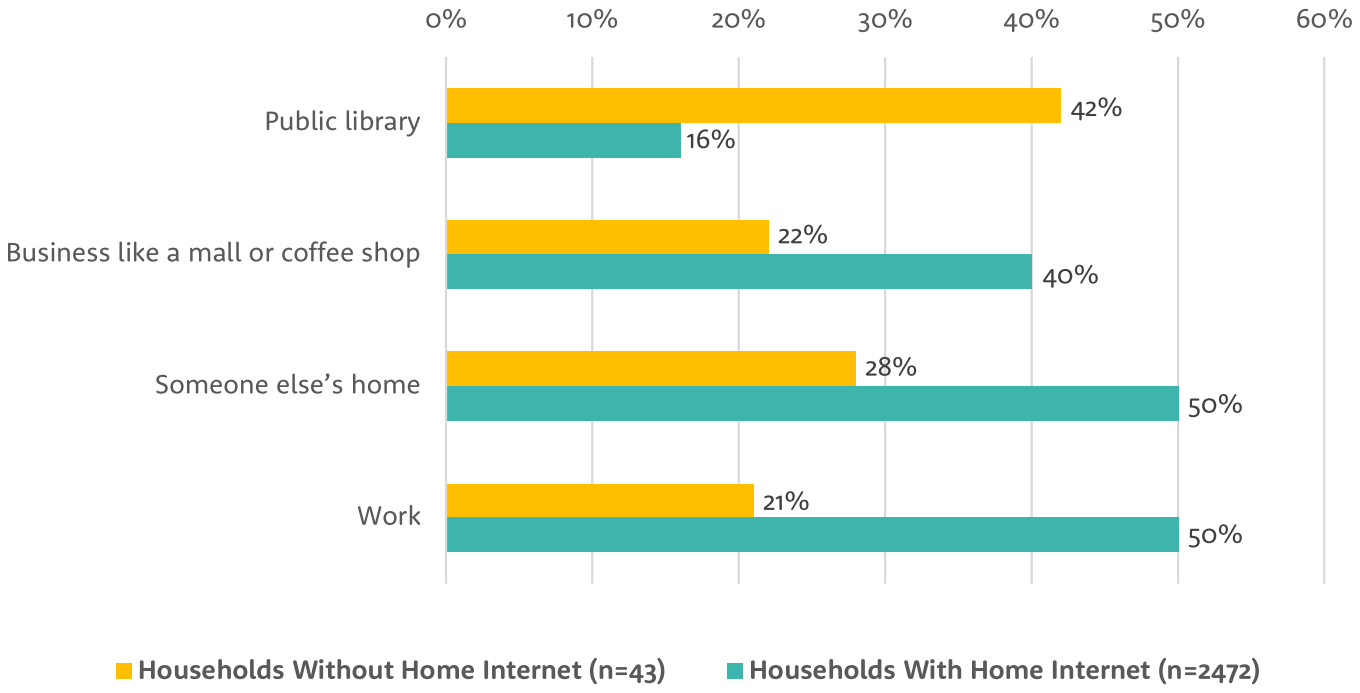
Those without home internet access were significantly more likely to have accessed the internet at a public library in the last year, but were less likely to have accessed the internet at their place of work, at someone else's home or at a business. Consistent with other research, public libraries serve as important facilities for vulnerable members of society, such as the homeless and low-income groups, to access the internet, providing free Wi-Fi for those who have their own device and computers, as well as computers, printers and other hardware and software. A 2016 survey of Ontario public library users found that 56% of those who used technology at the library would not otherwise have had access, rising to 68% for users 55 and older, and 63% for users identifying as low income. [42]

Businesses and institutions can employ various measures to restrict, prevent or deter the entry of those individuals who do not 'fit' the profile of a consumer, separating those they perceive to be legitimate customers from others who are deemed 'suspicious' (including for example 'loiterers'). [43, 44]

Such measures are unconducive to accessing the internet, which may help explain why only 22% of respondents without internet at home have accessed it in private commercial spaces. 21% of respondents without home internet also report accessing internet at work. The 79% of respondents without home internet who have not been accessing it at work may be partially explained by jobs that do not require the use of computers or full access to the internet. There is a correlation between lower-wage work and fewer tasks requiring computer use or digital skills. Lower-wage workers are disproportionately affected by a lack of digital literacy skills, and face challenges in upskilling to remain relevant in the labour market. [45]

There were no significant differences observed in home internet access by race/ethnicity, children in household, language spoken at home, length of residence in Canada, or single-parent households.

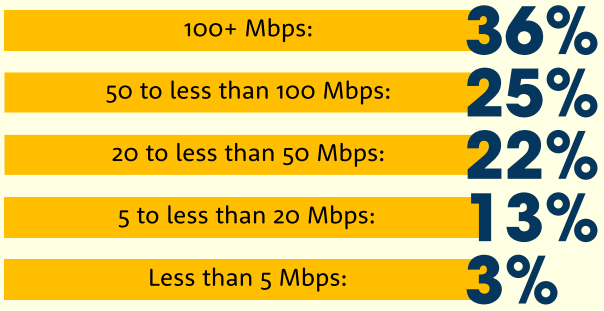
Figure 4:
Use of Internet Access Locations in Past Year



HOME INTERNET QUALITY

Just over 60% of Toronto households of reported their home internet download speed have speeds greater than 50 megabits per second (Mbps), while 36% report speeds 100 Mbps or greater.

Figure 5:
Reported Home Internet Download Speed



(n=1,849)

It is important to differentiate three ways to measure and understand internet download speed: 1) average speed experienced by an individual user; 2) maximum subscription speed of an internet connection shared by all that subscription's users; and 3) maximum subscription speed available in a given area.

The CRTC's 2021 goal is for 90% of Canadian homes and businesses to have access to maximum subscription speeds of at least 50 Mbps for downloads and 10 Mbps for uploads.[46] A download speed of 50 megabits per second enables individual users to comfortably stream high-definition video and download larger files, such as a music album or mobile application of 30 megabytes, in under 5 seconds.

The CRTC reported the average home internet subscription's maximum download speed in Canada in 2019 was 177 Mbps.[47]

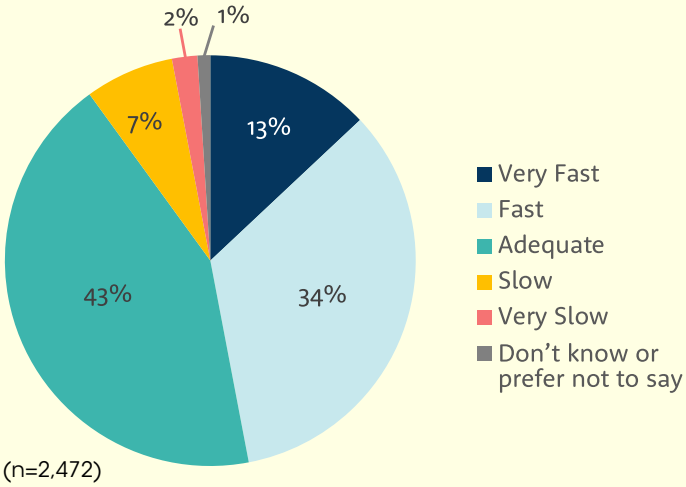
The global average download speed for broadband internet as of November 2020 according to one source was 91 Mbps;[48] while the Canadian Internet Registration Authority found the average Ontario download speed was 52 Mbps from April 2019 to March 2020.[49]

A majority of the 62 countries in one study offer 100 Mbps as the most frequent internet speed.[50] Such speeds allow for simultaneous and non-interruptive web browsing on multiple devices, including streaming services in 4K high resolution. While many countries around the world do not offer speeds lower than 100 Mbps, Canada continues to remain among the few internationally to continue to provide internet speeds less than 9 Mbps, alongside notably the US and UK.[51]

The inclusion of a link to an internet speed test in this online survey increased the rate of respondents providing their download speed to 75% — 49% of phone respondents indicated they did not know the maximum download speed of their home internet, compared to 80% of online respondents. This also increased the likelihood that respondents reported actual user speed at the time of response, rather than the maximum speed of their home internet subscription.

Nearly half (47%) of Toronto households report their home internet service is fast relative to their needs, and 43% report it is adequate relative to their needs. There is a moderate relationship (0.46 correlation coefficient) between reported download speed and assessment of adequacy relative to needs. Focusing on those with download speeds of less than 50 Mbps, 58% reported their internet speeds were adequate, 25% fast or very fast, and 17% slow or very slow.

Figure 6:
Assessment of Home Internet Adequacy Relative to Needs



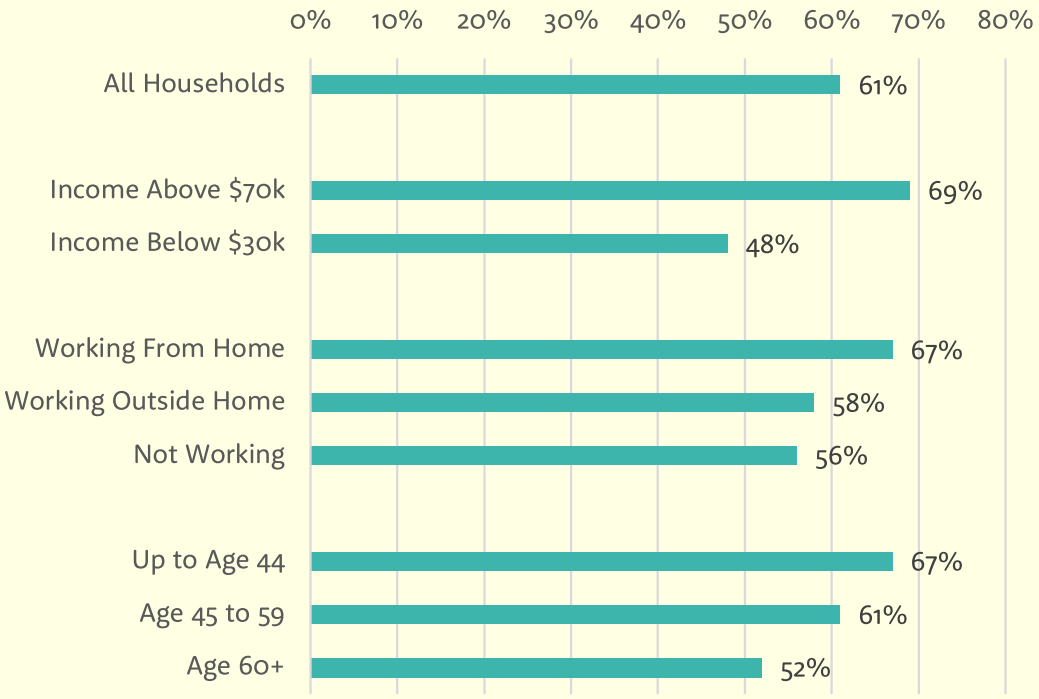
(n=2,472)

Higher Income, Higher Speeds

There is a significant correlation between lower household income and slower home internet access. About half (48%) of households with incomes less than $30,000 had internet download speeds greater than 50 Mbps, compared to 69% of households with incomes above $70,000. In a similar pattern, 17% of households with incomes less than $30,000 report slow internet relative to their needs, compared to just 6% of households with incomes over $70,000.

Single-person households also correlate with slower home internet. Two-thirds (67%) of households with more than one person had download speeds faster than 50 Mbps, compared to 53% of single-person households. This may be explained by an increase in income for households with more than one person, and greater demands on home internet, as there is a correlation between higher income and increased internet access. Just over half (56%) of those who are not employed or unable to work had download speeds greater than 50 Mbps, compared to 65% of those who are employed. Those currently working from home had modestly faster home internet speeds — 67% report download speeds greater than 50 Mbps, compared to 58% of those working at their place of employment. Statistics Canada analysis of telework potential found that workers in occupations with the lowest telework potential were more likely to be age 15-25, and have only a high school diploma or no diploma — characteristics often associated with low-income work, including in sectors such as accommodation and food services (6% telework capacity), where public health policies have mandated significant reductions in operations or closures during COVID-19.[52]

Figure 7:
Home Internet Speed Above 50 Mbps by Demographics



(n=1,849)

Older Age and Slower Home Internet Speed

There is also a significant correlation between older age and slower home internet. Two-thirds (67%) of those up to age 44 had download speeds greater than 50 Mbps, compared to 61% of those aged 45 to 59, and 52% of those aged 60 and older.

Slower Home Internet Speeds in Lower-Income Areas

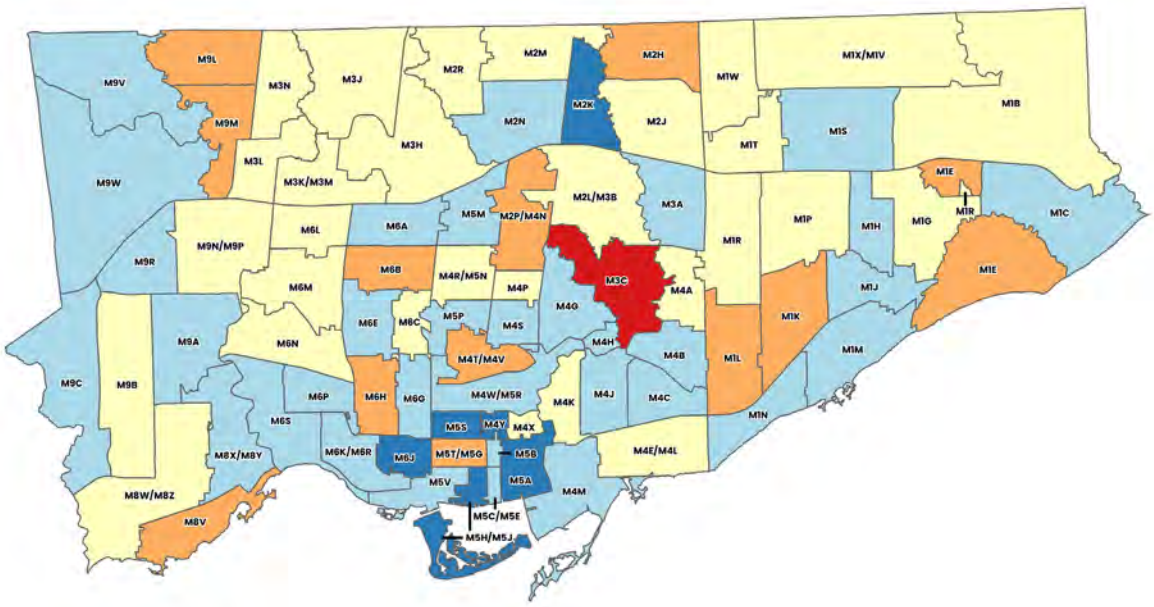
Figure 8 and 9 display the areas of the City with slower home internet speeds. 25% of people in the areas listed below, which have notable low rates of internet speeds, live in households below the poverty line, compared to the City-wide average of 22%:

- Flemingdon Park (M3C) at 67% below 50 Mbps
- Glen Park/Englemount-Lawrence (M6B) at 63% below 50 Mbps
- Golden Mile/Oakridge (M1L) at 61% below 50 Mbps
- Yonge-St. Clair (M4T/M4V) at 60% below 50 Mbps
- Humber Summit/Jane and Finch (M9L/M9M) at 59% below 50 Mbps
- Hillcrest Village (M2H) at 54% below 50 Mbps
- West Hill (M1E) at 52% below 50 Mbps

There were no significant differences observed in home internet speed by race/ethnicity, language spoken at home, length of residence in Canada, or single-parent households.

Figure 8:

Proportion of Respondents with Home Internet Download Speeds Over 50 Mbps



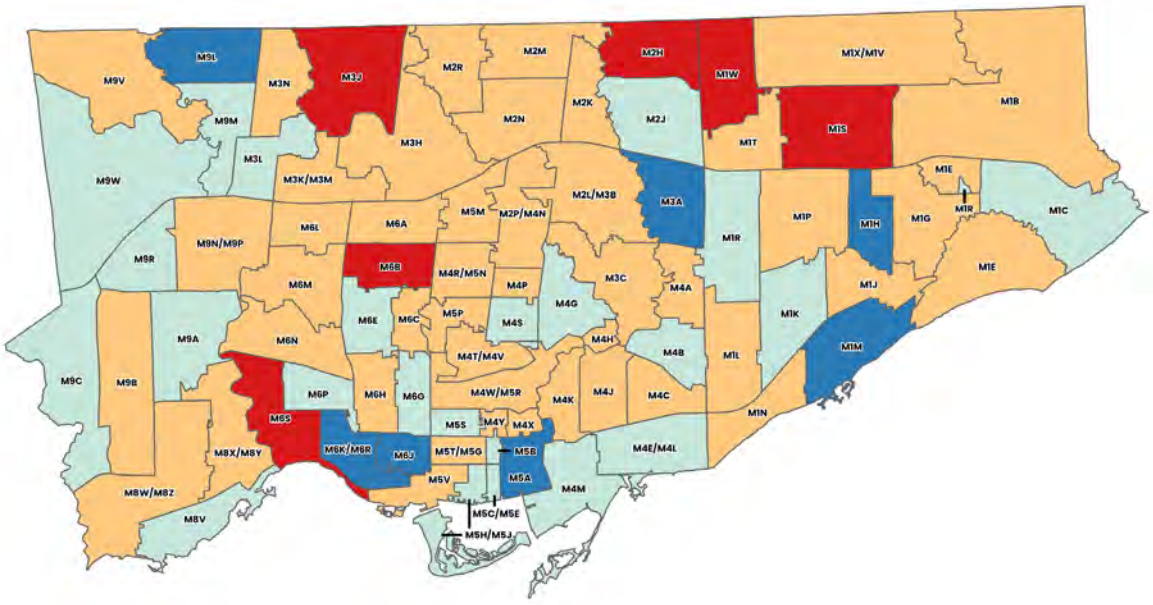
(n=1,849)

Percentage of respondents with over 50 Mbps download speed

33 35 50 65 80 90

Figure 9:

Proportion of Respondents with Fast or Very Fast Home Internet Service Relative to Needs



(n=2,472)

Percentage of respondents that said 'Fast' or 'Very Fast'

26 35 50 65 79

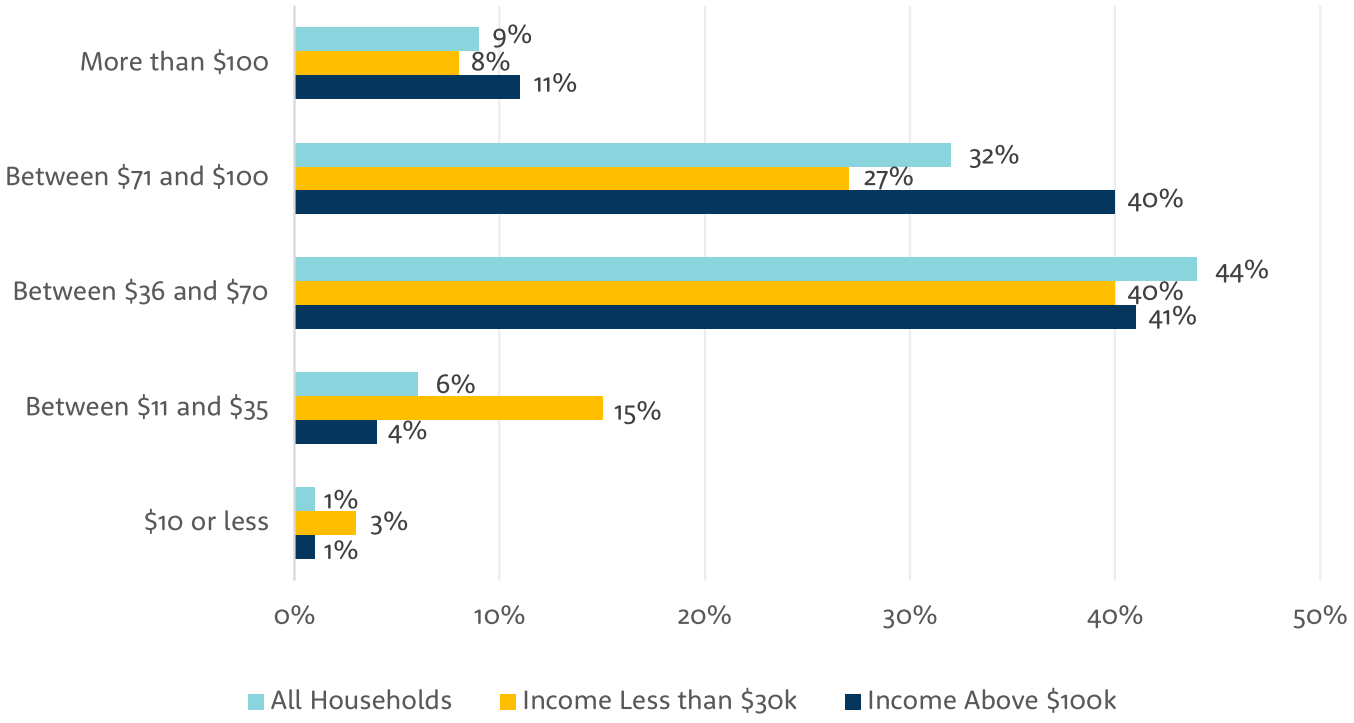
HOME INTERNET PRICES

Most Toronto households pay between $36 and $100 per month for home internet services.

There is a surprisingly weak relationship between reported monthly price and download speed (0.22 correlation coefficient); and no relationship (0.00 correlation coefficient) between reported monthly price and assessed adequacy of speed relative to needs. Households with incomes greater than $100,000 generally pay somewhat more per month ($72 average, compared to $68) and households with incomes less than $30,000 pay somewhat less ($61 average); for incomes between $30,000 and $100,000, there is a significant consistency in prices close to the overall average.

Two programs in the City provide $10/month home internet: 1) the Government of Canada's Connecting Families initiative, which is available to low-income families with children; and 2) Rogers' Connected for Success, which is available to households in community housing. Only 1% of all respondents, and 3% of those with income less than $30,000, indicated internet prices of $10 or less in this survey.

Figure 10:
Monthly Price of Home Internet Services Before Taxes



(n=2,472)

Household Worries about Ability to Pay Divided by Income and Race

When asked how much, if at all, they worry about being able to pay for their home internet bill over the next few months, one-third (34%) of households indicated they worry a lot or some. This is concentrated among lower-income households where a majority (51%) of households with incomes under $30,000 are worried. Those not employed or unable to work had a similar rate of worry (51%).

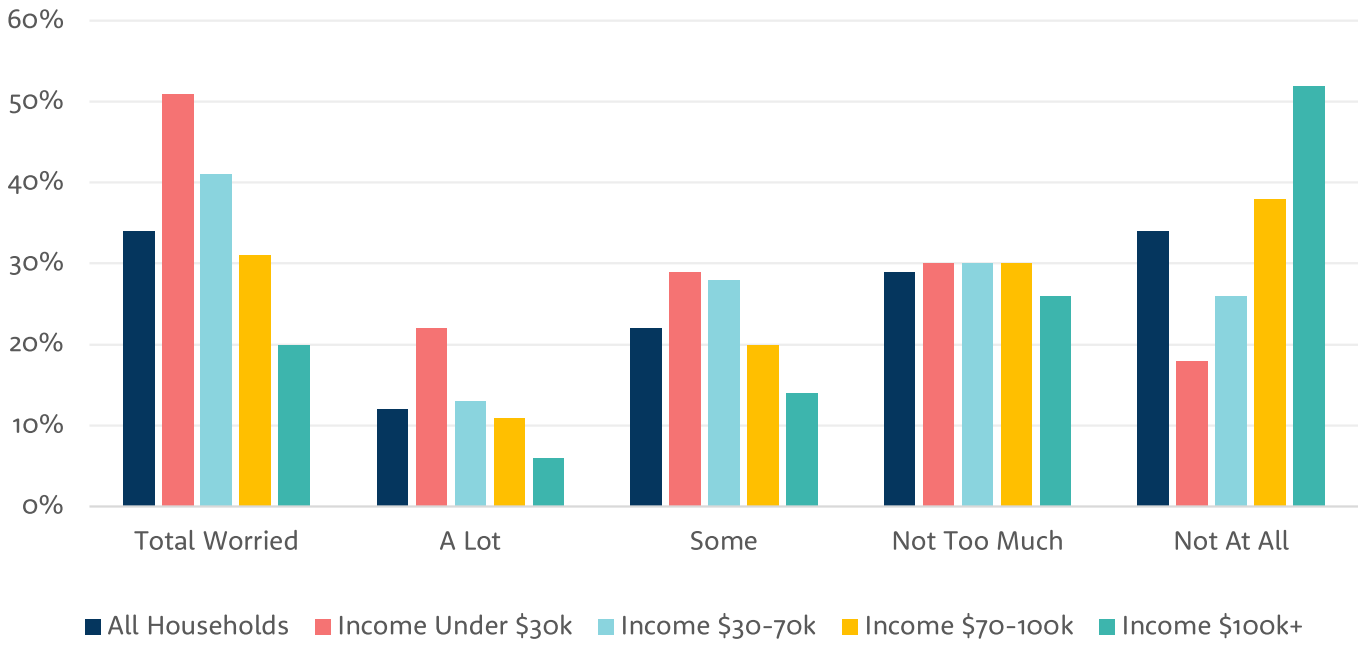
There are significant differences in worry about ability to pay by race/ethnicity. Latin American (53%), South Asian (46%), Black (42%) and Southeast Asian (40%) respondents were all significantly more likely to indicate they were worried; whereas White (29%) and East Asian (28%) respondents were less likely to be worried.

Those who have lived in Canada for less than 10 years (44%) were more likely to be worried than those who have lived here 10+ years (38%) and those born in Canada (31%). Those in single-parent households were also much more likely to be worried (62%).

By way of comparison, the proportion of respondents worried about paying for their home internet is the same as those worried about paying their cell phone bills (34% with 12% worried a lot and 22% worried some).

There were no significant differences observed in worry about ability to pay for home internet by age or language spoken at home.

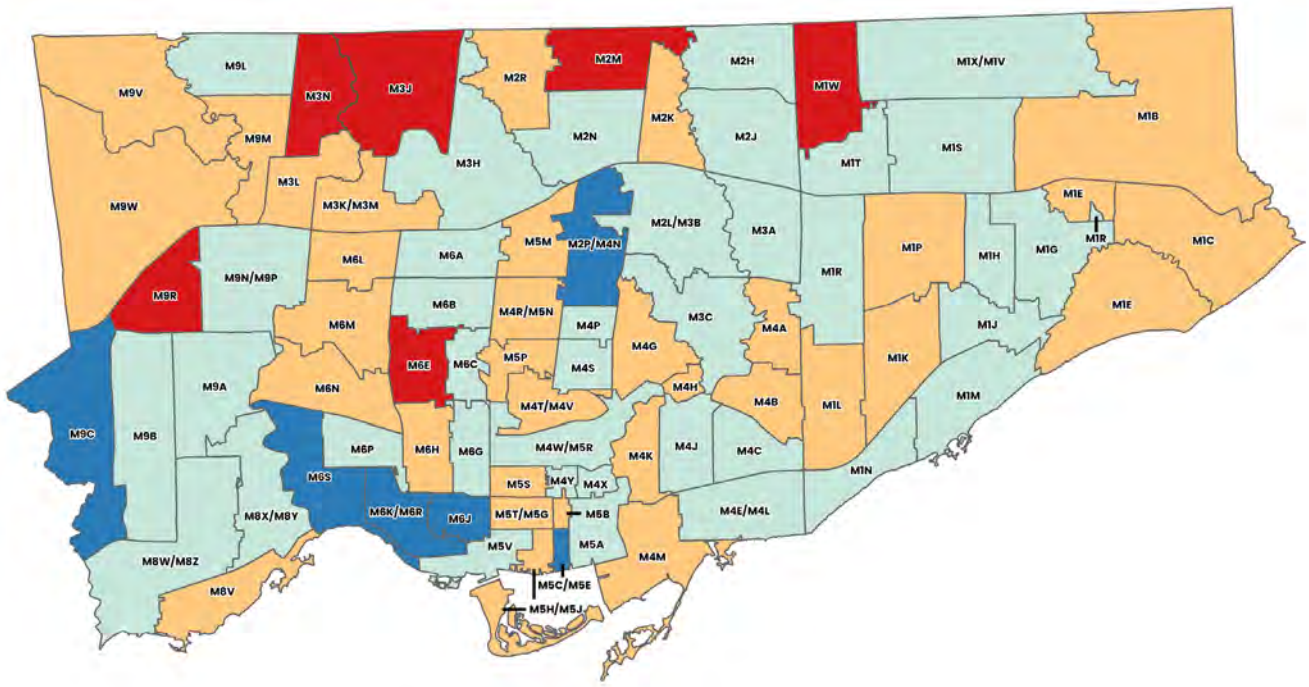
Figure 11:
Proportion Worried About Ability to Pay Home Internet Bill by Household Income



(n=2,472)

Figure 12:

Proportion of Respondents Worried About Ability to Pay Home Internet Bill



(n=2,472)

Percentage of respondents that said 'A lot' or 'Some'

4 20 35 50 65

DEVICES

Access to online services does not just require internet access — it also requires a device to connect with. Nearly all Toronto households (99.7%) have at least one device, either a computer, smartphone or tablet. Toronto households also have near universal access to desktop or laptop computers, though have on average less than one for each member of the household (0.8), compared to an average of 1.0 across Ontario and Canada in a May 2020 survey we administered with the same questions. Ninety-four percent of Toronto households have a smartphone, with nearly one (0.9) for each member of the household older than age 13.

It is worth noting here that Toronto District School Board and Toronto Catholic District School Board together reported delivering devices to approximately 65,000 families during the initial school closures of March to June 2020, or about 6% of all Toronto households, which undoubetly contributed to these rates of household access. These measures to facilitate remote learning in the context of the COVID-19 pandemic are likely to be temporary and will influence device access moving forward.

Device Ownership Divided by Income and Age

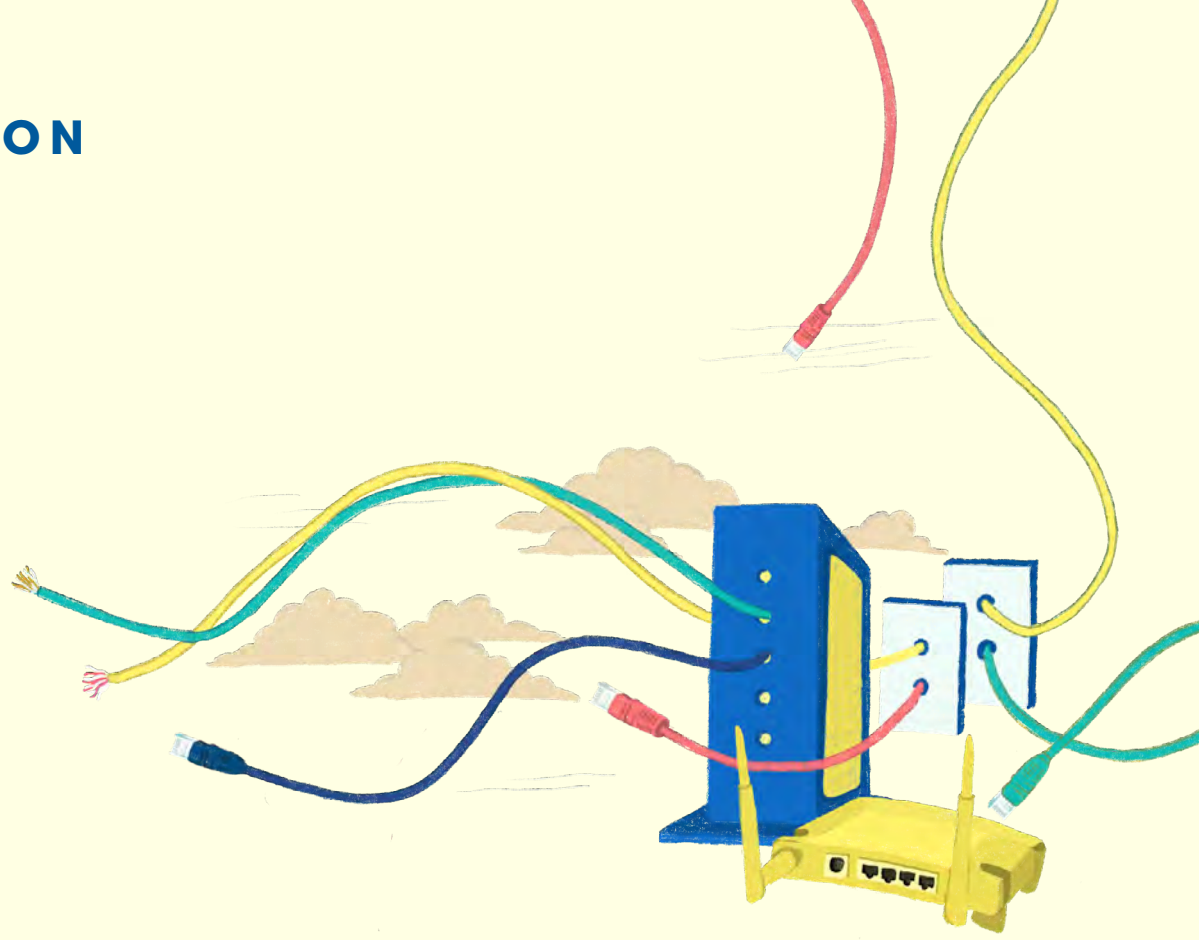
Overall, there are fewer devices per person among lower-income households. There are no computers among 7% of households with incomes less than $30,000, and among 7% of those not employed or unable to work. Among Toronto households with less than $50,000 in income, there is an average of 0.7 computers per person, compared to 0.9 of households with above $50,000 in income. Across Canada, the average is 1.0 for households above and below $50,000 of household income.

The relationship between household income and device access has been noted elsewhere including in a 2020 research study revealing that 26% of Canadian households with less than $20,000 in income and 20% of those aged 60 and older do not have access to a smartphone.[53] The rates of Toronto households are similar, with 15% of households with less than $20,000 in income and 20% of those aged 60 and older not having a smartphone.

Figure 13:
Household Access to Computers, Smartphones and Tablets

	Canada n= 2,000	Ontario n= 766	Toronto n= 2,515
% of households with computer	96%	98%	98%
# of computers per household	2.4	2.5	2.1
# of computers per person (all ages)	1.0	1.0	0.8
% of households with smartphone	91%	94%	94%
# of smartphones per household	1.8	1.9	2.1
# of smartphones per person 13+	0.9	0.9	0.9
% of households with tablet	73%	69%	69%
# of tablets per household	1.3	1.3	1.1
# of tablets per person (all ages)	0.5	0.5	0.4

CONCLUSION



This project highlights several striking gaps in connectivity, or a series of digital divides. While overall access to home internet is high and growing, four in ten residents in Toronto report download speeds below the national target of 50 Mbps and only one-third have speeds above 100 Mbps. Majorities of low-income households and those aged 60 and older have internet speeds below 50 Mbps — a significant gap from the national goal of 90% of households.

One-third of households are worried about paying their home internet bills, with low-income, newcomer, single parents and people of colour most likely to be worried.

Those who do not have home internet access mostly mention cost as the barrier, and over 60% say it is impacting their ability to access critical services and information.

Despite meaningful progress by public and private institutions to deploy internet and device access through the COVID-19 pandemic, there continue to be gaps by income and age in access to devices, and the gaps are greater in Toronto than elsewhere in the country.

These findings reinforce the need to continue scaling programs to close the remaining gaps in internet and device access. They also highlight significant gaps in internet quality and affordability along lines of income, age and race that urgently require greater policy and programmatic response.

ABOUT THE AUTHORS

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Nisa Malli lead's the Brookfield Institute for Innovation + Entrepreneurship's Innovative and Inclusive Economy workstream. She brings a social policy and social services lens to the institute, having worked on employment and training, poverty reduction, and other issues for the federal and municipal governments and the nonprofit sector. She was part of the team that started the Privy Council Office's Impact and Innovation Unit and was an advisor to the Deputy Ministers' Committee on Policy Innovation. Prior to joining the public service she managed a library-based digital literacy program for seniors, newcomers and job seekers. She holds an MA in Public and International Affairs from the University of Ottawa and a BFA from the University of Victoria.

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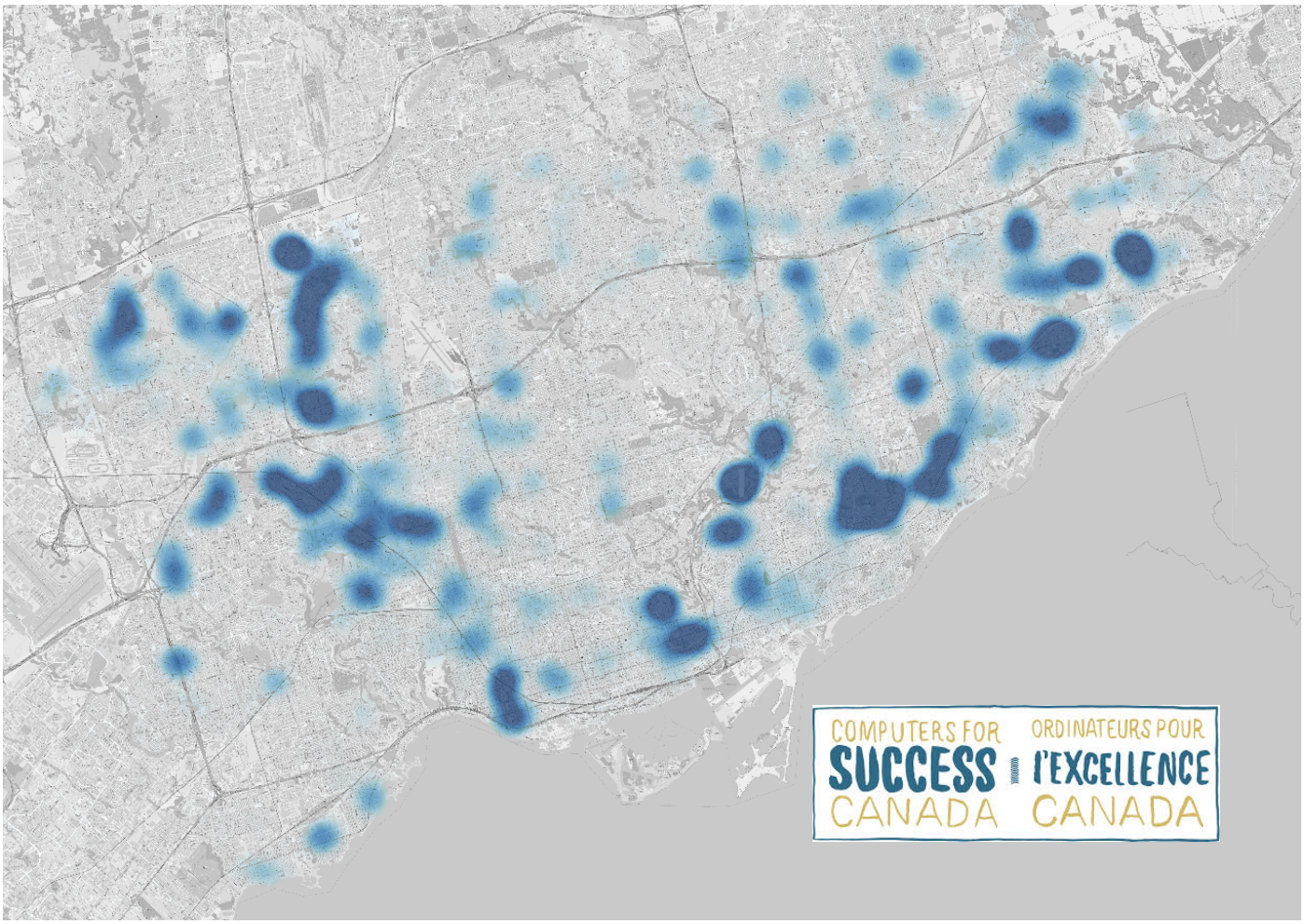
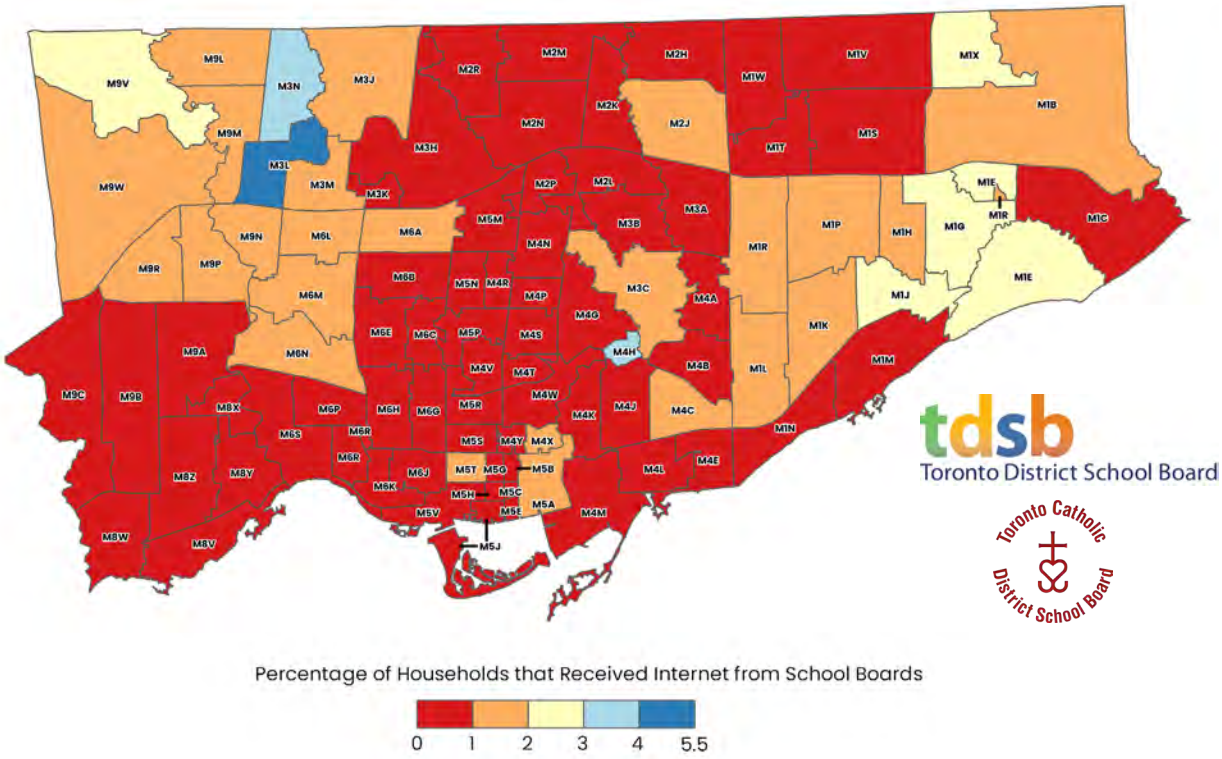
Selasi Dorkenoo is a geographer and data analyst skilled in cartography, GIS and data visualization. She utilizes spatial data through applied statistics and mapping in order to explore social inequities, accessibility, geodemography and health geography. She has contributed to retail and public health research teams, worked in analytics and marketing services, and provided consulting in the public sector. Selasi holds a Master of Spatial Analysis from Ryerson University.

APPENDIX A: MAPS OF DIGITAL DIVIDE FROM OTHER DATA SOURCES

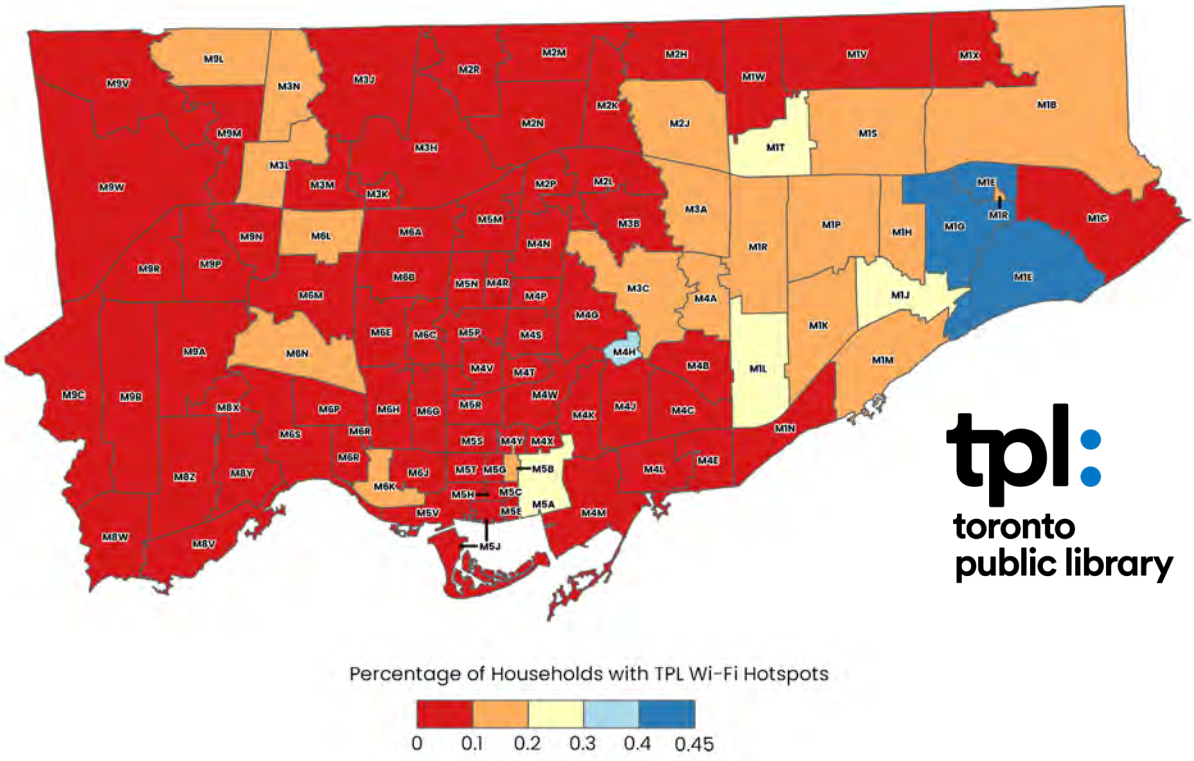
Heatmap of Families Qualified for the Government of Canada's Connecting Families initiative in 2018 and 2019 Who Reported Not Having Home Internet Service



Proportion of Total Households that Received Internet Access from Toronto English-Language School Boards from March to June 2020



Proportion of Total Households that Received Wi-Fi Hotspot from Toronto Public Library from May to October 2020



APPENDIX B: SURVEY SAMPLE

Sample by Forward Sortation Area and Proportion of Total Private Households in 2016 Census

FSA(s) online + phone	Weighted Survey Responses	% of Households	FSA(s) online only	Weighted Survey Responses	% of Households	FSA(s) online only	Weighted Survey Responses	% of Households
M1B	57	0.27%	M1C	29	0.25%	M6H	37	0.18%
M1E	63	0.36%	M1M	17	0.20%	M6J	17	0.11%
M1G	17	0.17%	M1N	28	0.29%	M6P	27	0.14%
M1H	18	0.19%	M1R	20	0.18%	M6S	22	0.14%
M1J	24	0.19%	M2H	26	0.28%	M8V	34	0.15%
M1K	41	0.22%	M2K	26	0.23%	M8W/M8Z	26	0.16%
M1L	54	0.42%	M2L/M3B	28	0.29%	M8X/M8Y	20	0.13%
M1P	42	0.25%	M2P/M4N	10	0.10%	M9A	27	0.17%
M1S	31	0.23%	M3H	39	0.26%	M9B	26	0.20%
M1T	37	0.28%	M3K/M3M	26	0.21%	M9C	32	0.21%
M1V/M1X	46	0.23%	M4B	18	0.23%	M9N/M9P	23	0.12%
M1W	61	0.36%	M4E/M4L	32	0.12%	M9R	20	0.16%
M2J	60	0.27%	M4G	11	0.13%	M9W	30	0.21%
M2M	36	0.28%	M4J	20	0.13%	**Total**	**2,515**	**0.23%**
M2N	101	0.28%	M4K	24	0.16%			
M2R	50	0.31%	M4M	23	0.20%			
M3A	51	0.37%	M4P	26	0.21%			
M3C	75	0.46%	M4R/M5N	12	0.09%			
M3J	24	0.24%	M4S	21	0.15%			
M3L	23	0.34%	M4T/M4V	23	0.15%			
M3N	36	0.25%	M4W/M5R	27	0.11%			
M4A	25	0.39%	M4Y	24	0.11%			
M4C	68	0.34%	M5B	14	0.17%			
M4H	17	0.26%	M5C/M5E	16	0.20%			
M4X	27	0.25%	M5H/M5J	20	0.17%			
M5A	60	0.25%	M5M	29	0.30%			
M5T/M5G	39	0.25%	M5P	18	0.18%			
M6K/M6R	42	0.13%	M5S	19	0.21%			
M6L	26	0.34%	M5V	33	0.09%			
M6M	56	0.33%	M6A	23	0.26%			
M6N	47	0.27%	M6B	22	0.19%			
M9L	9	0.22%	M6C	18	0.16%			
M9M	20	0.26%	M6E	18	0.11%			
M9V	44	0.25%	M6G	14	0.10%			

SAMPLE DEMOGRAPHICS

Age:
16-25: 13%
26-35: 20%
36-45: 14%
46-55: 16%
56-65: 17%
66-75: 14%
76+: 6%

Race/Ethnicity:
White: 57%
East Asian: 14%
South Asian: 8%
Black: 6%
Southeast Asian: 4%
Latin American: 2%
Indigenous: 1%
West Asian: 1%
Arab: 1%
Other: 4%
Don't know or prefer not to say: 3%

Household Income Before Taxes and Deductions in 2019:
Less than $30,000: 17%
$30,000 to less than $50,000: 14%
$50,000 to less than $70,000: 14%
$70,000 to less than $100,000: 15%
$100,000 or more: 27%
Don't know or prefer not to say: 13%

Gender:
Woman: 56%
Man: 43%
Non-binary/third gender: 1%
Prefer to self-describe/not to say: 1%

Length of Residence in Canada:
Born in Canada: 59%
Less than two years: 3%
Two to ten years: 7%
More than ten years: 31%
Don't know or prefer not to say: 1%

Housing:
House: 43%
Apartment or condo in building of 10 or more stories: 28%
Apartment or condo in building of less than 10 stories: 16%
Townhouse: 8%
Multi-unit house: 4%
Don't know or prefer not to say: 2%

Employment Status:
Employed full- or part-time and working from home: 40%
Employed full- or part-time and working at place of employment: 16%
Retired: 22%
Not employed or unable to work: 11%
Student: 7%
Other: 4%
Prefer not to say: 1%

Language Spoken Most Often at Home:
English: 88%
Other Language: 12%

APPENDIX C: SURVEY QUESTIONNAIRE

Screen 1. What is your postal code?
[Input or "No fixed address (e.g., shelter, experiencing homelessness, staying with others)"]

Screen 2. How old are you?
[Input]

Core Questions

C1: Do you currently have internet service installed at home?
a) Yes
b) No
c) Don't know or prefer not to say

[IF YES TO C1]

C2A: What is the monthly cost of your home internet service before taxes?
a) $10 or less
b) Between $10 and $35
c) Between $35 and $70
d) Between $70 and $100
e) More than $100
f) Don't know or prefer not to say

C3A: What is the maximum download speed of your home internet service? ***If you are at home now, you can use an internet speed test to check the current speed. [speed test provided in online survey only]***
a) Less than 5 megabits per second (Mbps)
b) 5 to less than 20 Mbps
c) 20 to less than 50 Mbps
d) 50 to less than 100 Mbps
e) 100 or more Mbps
f) Don't know or prefer not to say

C4A: How would you describe the speed of your home internet service relative to your needs?
a) Very slow
b) Slow
c) Adequate
d) Fast
e) Very fast
f) Don't know or prefer not to say

C5A: In the last six months, has your household used your home internet service to access any of the following? (Select all that apply) ***[options randomized]***
a) Work
b) Education
c) Government services or information
d) Banking
e) Don't know or prefer not to say

[IF NO TO C1]

C2B: Why do you not have internet service installed at home? (Select all that apply) ***[options randomized]***
a) The monthly cost of internet service
b) No home computer or other device that can connect to the internet
c) Use a mobile phone data plan instead
d) Have access to the internet elsewhere
e) Available internet service does not meet your needs
f) Lack of confidence, knowledge, skills or training
g) Security or privacy concerns
h) No need or no interest
i) No internet service available
j) Limitation of use due to a disability
k) Other - please specify
l) Don't know or prefer not to say

C3B: In the last six months, has the lack of home internet service impacted your household's ability to access: (Select all that apply) ***[options randomized]***
a) Work
b) Education
c) Health care [online survey only]
d) Government services or information
e) Banking
f) Don't know or prefer not to say

C6: In the last 12 months, where have you accessed the internet: (Select all that apply) ***[options randomized] [only a to d asked in telephone survey to those answered No to C1]***
a) At work
b) At a public library
c) At a business establishment (e.g., shopping mall, restaurant, coffee shop)
d) At someone else's home (e.g., friend, relative)
e) At school or an education institution
f) At another public location (e.g., medical centre, airport, community centre, subway)
g) Outside your home using your mobile phone data plan
h) None of the above
i) Don't know or prefer not to say

C7: How much, if at all, do you worry about being able to pay for each of the following over the next few months?

[IF YES TO C1] A) Home internet bill

[IF YES TO C2B-c or C6-a] B) Cell phone bill

a) A lot
b) Some
c) Not too much
d) Not at all
e) Don't know or prefer not to say

C8: How many of the following devices do you currently have in your household? *[online survey only]* [Input]
a) Smartphone
b) Laptop or desktop computer
c) Tablet (e.g., iPad)

Demographic Questions

D1: Including yourself, how many people live in your household between the following age ranges? [Input]
a) 18 years or older
b) Between 13 and 17 years old
c) Between 0 and 12 years old

D2: Do you self-identify as: (select more than one and/or specify, if applicable)
a) White
b) Indigenous, that is First Nations (Status/Non-Status), Métis or Inuit
c) East Asian (e.g., Chinese, Korean, Japanese, etc.)
d) South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
e) Southeast Asian (e.g., Filipino, Thai, Vietnamese, etc.)
f) Black
g) Latin American
h) West Asian (e.g., Iranian, Afghan, etc.)
i) Arab
j) Other - please specify
k) Don't know or prefer not to say

D3: What was your total household income, before taxes and deductions, in 2019?
a) No income
b) Less than $20,000
c) $20,000 to less than $30,000
d) $30,000 to less than $50,000
e) $50,000 to less than $70,000
f) $70,000 to less than $100,000
g) $100,000 to less than $150,000
h) $150,000 or more
i) Don't know or prefer not to say

D4: How long have you lived in Canada?
a) Born in Canada
b) Less than 2 years
c) 2 to 10 years
d) More than 10 years
e) Don't know/prefer not to say

D5: Which of the following best describes your current housing?
a) House (e.g., detached, semi-detached, bungalow)
b) Townhouse
c) Multi-unit or split-level house (including basement apartment)
d) Apartment or condominium in a building of less than 10 stories
e) Apartment or condominium in a building of 10 or more stories
f) Other - please specify
g) Don't know/prefer not to say

D6: What is your gender?
a) Woman
b) Man
c) Non-binary/third gender
d) Prefer to self describe:
e) Prefer not to say

D7: Which of the following best describes your current employment?
a) Employed full- or part-time and working from home
b) Employed full- or part-time and working at my place(s) of employment
c) Retired
d) Currently enrolled student
e) Unemployed or unable to work
f)Other
g) Prefer not to say

D8: What language do you speak most often at home? *[online survey only]*
a) English
b) A language other than English
c) Prefer not to say

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