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Taking the TTC during COVID-19

A VOICE FOR TRANSIT A Voice for Transit

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Table of Contents

01 Acknowledgements

We would like to express our deepest gratitude to our mentors at the Ryerson Leadership Lab: Sam Andrey and Camara Chambers. Next, we would like to thank Karim Bardeesy for co-founding the Ryerson Leadership Lab. Thank you to Howard Tam for providing his professional urban planning advice. Thanks also to TTCRiders and Steve Munro for sharing their TTC budget analyses online.

Lastly, thank you to our six interview participants - and those who responded to our call. Our report would not exist without you. Finally, thank you to our readers, families, and followers.

Who we are

Founded in March 2019, A Voice for Transit is led by Ryerson University students and alumni. We take an evidence-based approach to addressing delays, overcrowding and transit inequity on Toronto's transit systems like the GO and TTC. We have participated in TTC consultations and deputed at the TTC and the City of Toronto. We received seed funding from the Ryerson Leadership Lab, an action-oriented think tank at Ryerson University committed to developing new leaders and solutions to today's most pressing civic challenges.

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Credit: Jean-François Obregón Murillo

02 Executive Summary

Toronto Public Health COVID-19 data indicates that 73% of locally reported cases were racialized peoples and 67% of Torontonians hospitalized from the virus identified as coming from a racialized group. This suggests that Black, Indigenous and People of Colour (BIPOC) individuals in Toronto have been more exposed to COVID-19 infections.

Early in the pandemic, it became evident that essential workers were bearing the brunt of overcrowding conditions on the TTC. The key question of our research is: What does transit in Toronto look like during and after COVID-19? Questions about what public transit looked like during and after the pandemic will be explored in this report. Thus, understanding and highlighting the transit riding experiences of essential workers are this report's key focuses. We identify essential workers as individuals employed in retail, janitorial and cleaning, industrial and manufacturing or healthcare settings. We defined regular TTC riders as individuals who took more than three round trips per week.

Ridership in 2021 was impacted by the pandemic resulting in a 72% drop in June 2021 compared with pre-COVID-19 figures. The pandemic has seen a growing concern from riders about station and vehicle cleanliness, crowding and masks. An uncertain part of the data are the bus overcrowding metrics that shifted for network optimization as crowding definitions have gone upwards to allow for higher passenger loads.

Our team interviewed essential workers to hear about their transit experiences during the pandemic. Using digital channels, we received responses from 72 postal codes across Toronto. We then screened the respondents against our criteria: that they were essential workers and regular transit riders during the pandemic. Six individuals met our research criteria.

In our interviews, “Experience”, “Cleanliness”, and “Overcrowding” were the top three themes and they were respectively mentioned 18, 20 and 24 times. Regarding “Experience”, participants noted the emptiness in the system and the separations felt between customers and employees. We mostly heard riders complain about a lack of enforcement of passenger limits on vehicles, but praise when it did occur. Several riders had problems with the lack of enforcement of physical distance as well as unmasked passengers and vehicles with sub-par disinfection.

We then analyzed TTC budget items related to COVID-19 incremental expenses and ventilation upgrades. We see expenses like the $25.8 million dedicated to vehicle disinfection and $5.8 million for facility disinfection as important for retaining riders and attracting new ones. We see prioritizing capital investments

for HVAC upgrades on the subway as long overdue. The TTC's issues are similar to those of transit systems globally with overcrowding, drops in transit ridership as well as hygiene and disinfection concerns. Below are our recommendations:

- **Continue prioritizing cleanliness:** This makes riders more comfortable regarding the spread of COVID-19. It can also help to reduce infections related to other illnesses. Cleanliness was a top issue for interviewees, who were supportive of disinfection actions.

- **Prioritize subway system ventilation upgrades:** The TTC's 15-Year Capital Investment Plan and 2019-2028 Capital Budget included $32 million for upgraded subway/bus platform air ventilation. We recommend prioritizing this investment immediately, especially given that COVID-19 is a respiratory illness.

- **Apply COVID-19-related crowding and on-time bus performance practices:** We recommend that the TTC trial models optimizing trade-offs between passenger and operational costs while accounting for reduced vehicle capacity and revenue losses. The TTC can decide to have busses skip certain stations or stops when they become overcrowded utilizing real-time data on passenger loads at the station or vehicle levels.

- **Maintaining public subsidies:** The agency has long been dependent on fares to recoup costs and fund its operating budget. The silver lining to the Safe Restart Agreement is that it allows us to see how the system can function with a federal subsidy. This funding arrangement should be considered on a permanent basis. However, the system should still be incentivized to run efficiently.

- **Improving enforcement of public health measures:** We heard multiple participants express frustration at times when masks were not worn by passengers or employees and such actions not being penalized. We ask that TTC management works with employees' unions on actions to address vehicle crowding and masking.

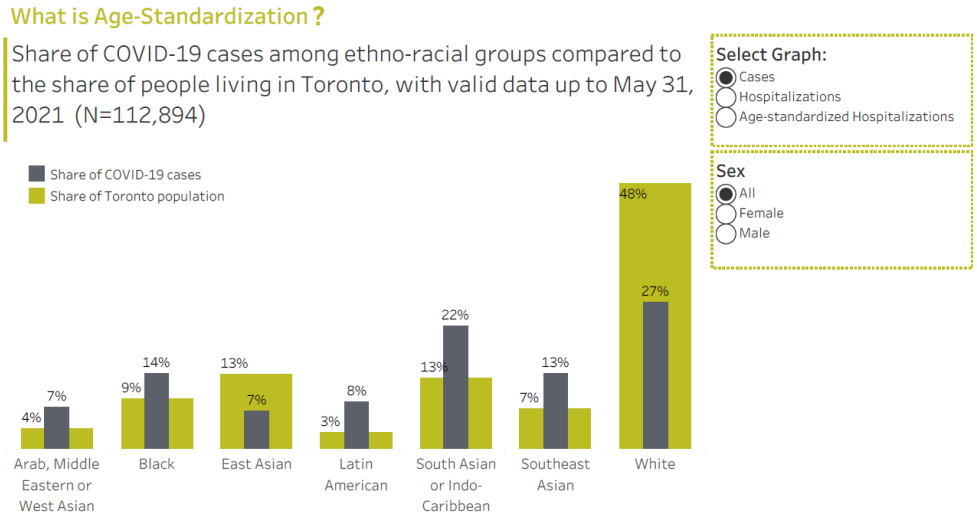
- **Using bond proceeds to fund disinfection capital expenses:** The City can issue debt for capital projects, but is prohibited from borrowing for operating expenses under the The City of Toronto Act. Given the drop in fare revenues, investments in capital equipment can be made using proceeds from City of Toronto bonds. We propose that the TTC request being able to dedicate general use of proceeds for this. These amounts should be a part of the agency's 2022 capital budget.

03 Introduction

Since spring 2020, Ontario has faced a significant amount of fear and paranoia while coping with COVID-19. In the beginning, Ontarians along with the government were unclear about the severity of the disease. The numbers of infections across the province climbed above 3,000 around September of 2020. (1) The total confirmed and probable cases as of August 26, 2021 is 173,637 with the majority (39%) of patients being around the working age of 20-39 infected within their community or workplace. (2)

According to City of Toronto COVID-19 data **(Figure 1)**, 73% of locally reported cases were racialized peoples and 67% of Torontonians hospitalized from the virus identified as coming from a racialized group compared to 52% of Torontonians identifying as racialized in 2016. (3)(4) This suggests that Black, Indigenous and People of Colour (BIPOC) individuals in Toronto have been more exposed to COVID-19 infections. Anecdotally, we have observed high usage of public transit by BIPOC individuals during the pandemic.

Figure 1 - Ethno-Racial COVID-19 Data in Toronto



Source: Toronto Public Health

1 Wilson, C. (2021, June 24). Ontario reports fewer than 300 new COVID-19 cases today, active caseload drops below 3,000. Retrieved July 23, 2021, from CP24: https://www.cp24.com/news/ontario-reports-fewer-than-300-new-covid-19-cases-today-active-caseload-drops-below-3-000-1.5483797
2 City of Toronto. (2021, August 27). COVID-19: Case Counts . Retrieved August 27, 2021, from https://www.toronto.ca/home/covid-19/covid-19-latest-city-of-toronto-news/covid-19-pandemic-data/covid-19-weekday-status-of-cases-data/
3 City of Toronto. (2019). *Population Demographics.* Toronto: City of Toronto. https://www.toronto.ca/wp-content/uploads/2019/11/99b4-TOHealthCheck_2019Chapter1.pdf
4 City of Toronto. (2021, May 31). *COVID 19: Ethno-Racial Identity & Income*. Retrieved July 23, 2021, from https://www.toronto.ca/home/covid-19/covid-19-latest-city-of-toronto-news/covid-19-pandemic-data/covid-19-ethno-racial-group-income-infection-data/

03 Introduction

Since hygiene, cleanliness, health, safety and the detriments of COVID-19 are at the focal point of every citizens' minds, this report will illustrate a lot of the pandemic commuting concerns from a civilian perspective. The COVID-19 pandemic demonstrates that societies function on the basis of a social contract, where the TTC plays a crucial role in helping facilitate social mobility. (5) The key question of our research is: What does transit in Toronto look like during and after COVID-19? Questions about what public transit looked like during, as well as after the pandemic will be explored in this report. This report will explore the impacts experienced by public transit riders during and after the pandemic. This report will also use secondary data and primary research collected from interviews to explore how health and safety on Toronto public transit conditions were managed during the pandemic. In order for a healthy city-wide safe restart, TTC will need to address their financial deficit as well as how to maintain funding towards transit hygiene and disinfection during and after the pandemic.

5 Stein, R. A., & Ometa, O. (2020, January 9). When public health crises collide: Social disparities and COVID-19. International journal of clinical practice (Esher), Volume 74, Issue9, . e13524. https://doi-org.ezproxy.lib.ryerson.ca/10.1111/ijcp.13524

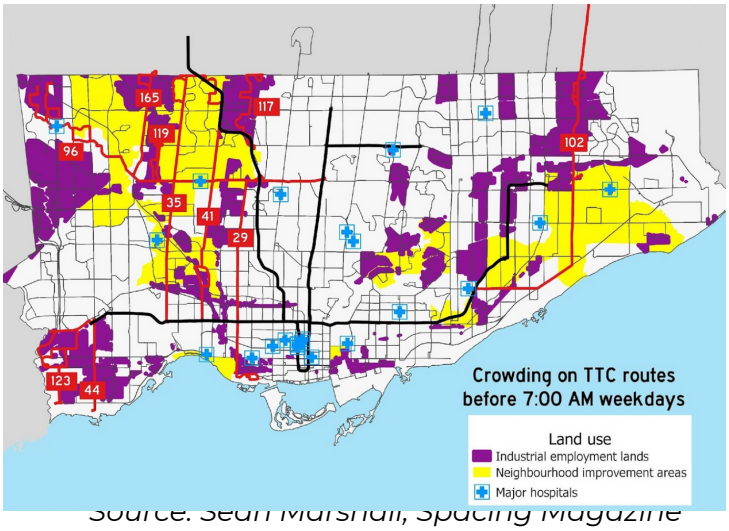
04 Background

Disproportionate Impacts of the Pandemic on TTC Bus Routes

As of May 2021, the TTC experienced a 72% drop in ridership compared with pre-COVID-19 rates (before March 2020). (6)(7) Several TTC express bus and streetcar routes have been either rerouted or discontinued due to reductions in demand as a result of several stay-at-home orders from February 2020 until July 2021. (8) Nevertheless, bus routes in Toronto's suburban boroughs have seen lesser drops in ridership throughout the pandemic.

These impacts were visible early on. It was reported by Spacing in May 2020 that 10 major bus routes in the city's suburban neighborhoods and industrial areas were experiencing atypical rush hour overcrowding and delays for certain essential workers who rely on public transit. (9) **(Figure 2)** The 10 bus routes in the map below are the 29 Dufferin, 35 Jane, 41 Keele, 44 Kipling South, 96 Wilson, 102 Markham Road, 117 Alness-Chesswood, 119 Torbarrie, 123 Sherway, and 165 Weston Rd North. These bus routes coincide with areas heavily populated by visible minorities and essential workers who rely specifically on the TTC bus services to bring them to their workplaces, for instance. To their credit, after noting the overcrowding on these routes, the TTC responded by improving service frequency after this article's publication. (10) Since transit overcrowding during the pandemic became a concern as a result of public health guidance on physical distancing, we became interested in commuters' health and safety on transit during the pandemic.

Figure 2: Crowding on TTC bus routes before 7 a.m. (March 2020)



Source: Sean Marshall, Spacing Magazine

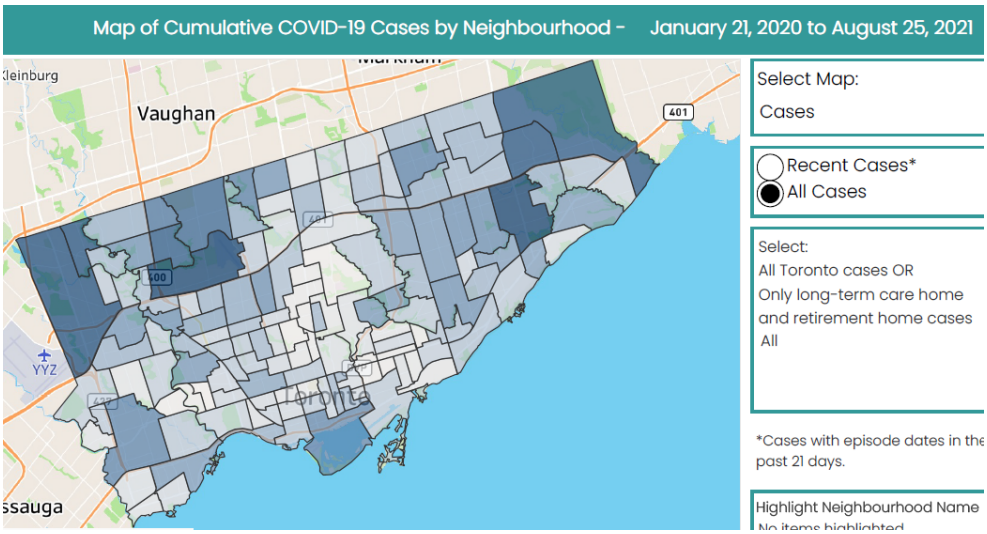
6 TTC Chief Executive Officer . (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf
7 TTC. (2020, May 13). TTC's Response to COVID-19. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/May_13/Reports/4_%20TTCs_Response_to_COVID_19_Staff_Presentation.pdf
8 Marshall, S. (2020, April 1). MARSHALL: Mapping TTC crowding during a pandemic. Retrieved July 23, 2021, from Spacing Toronto : http://spacing.ca/toronto/2020/04/01/marhsall-mapping-ttc-crowding-during-a-pandemic/
9 Ibid.
10 TTC. (2020, May 13). TTC's Response to COVID-19. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/May_13/Reports/4_%20TTCs_Response_to_COVID_19_Staff_Presentation.pdf

04 Background

Our Definition of Essential Workers

Understanding and highlighting the transit riding experiences of essential workers are key focuses of this report. We identify essential workers as those who are employed in retail, janitorial and cleaning, industrial and manufacturing or healthcare settings. Broadly, we applied the definition to include jobs that require individuals to be physically present. We defined regular TTC riders as individuals who took more than three round trips per week.

Figure 3: Infections by neighbourhood from January 21, 2020 to August 25, 2021



Source: Toronto Public Health (11)

The Toronto demographic profile shows that the most heavily impacted communities across the city are isolated from rapid transit and the city core's resources. Corresponding to the **Figure 3** map, the same TTC riders who reside in these hotspots have experienced rush hour overcrowding and delays during the peak of the pandemic in order to travel to essential jobs. A look at several census tracts in the city's northwest reveals that there are higher rates of Black, Indigenous and People of Colour (BIPOC) communities than the Toronto Census Metropolitan Area rates. This data from two studies was not to say that BIPOC people are more susceptible to infectious diseases like COVID-19, but to point out that exogenous vulnerabilities exist to make certain populations more at risk. (12) In other words, geography and urban planning has played a role in the social disparity for BIPOC health vulnerabilities.

11 Tableau Public. (2021, August 27). Map of Recent COVID-19 Rates by Neighbourhood. (OpenStreetMap, Producer) Retrieved August 27, 2021, from COVID-19 - Neighbourhood Map : https://public.tableau.com/app/profile/tphseu/viz/COVID-19-PublicFacingMap/MapDashboard

12 Stein, R. A., & Ometa, O. (2020, January 9). When public health crises collide: Social disparities and COVID-19. International journal of clinical practice (Esher), Volume 74, Issue9, . e13524.https://doi-org.ezproxy.lib.ryerson.ca/10.1111/ijcp.13524

04 Background

Ridership

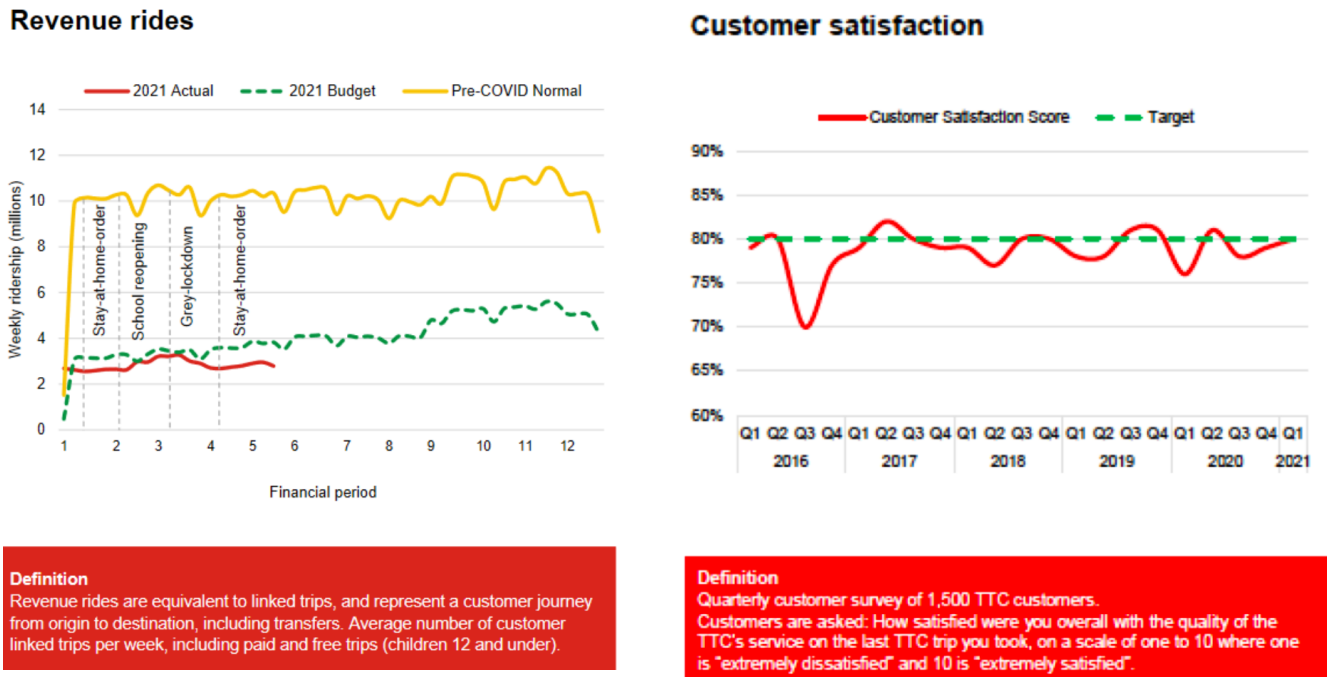
Since hygiene, cleanliness, health, safety and the detriments of COVID-19 are at the focal point of every citizens' minds, this report will illustrate a lot of the pandemic commuting concerns from a civilian perspective. The COVID-19 pandemic demonstrates that societies function on the basis of a social contract, where the TTC plays a crucial role in helping facilitate social mobility. The key question of our research is: What does transit in Toronto look like during and after COVID-19?

According to the TTC's June 2021 Chief Executive Officer Report, 2021 ridership has been heavily impacted by the pandemic, seeing a 72% drop from pre-COVID-19, and hence impacting the TTC's 2021 budget. The TTC's "Pre-COVID Normal" rate of ridership maintained a steady rate of about 10 million riders per revenue period. **(Figure 4)** However, between May 2-29, 2021), ridership totaled 2.86 million per week, representing a 3.7% increase from the previous period (April 4-May 1, 2021), which may indicate that riders were comfortable enough to return to the system. However, May 2-29, 2021 ridership represented 27% of pre-COVID ridership. (13) **(Figure 4)** That being said, the first phase of TTC's recovery campaign is tentatively scheduled for the summer of 2021 and was to be focused on safety measures, "including cleaning and sanitizing, mandatory masks, hand sanitizer, enhanced service on busy routes and improved station management to support customer comfort and awareness of safe travel on transit." According to the customer satisfaction section of the June 2021 TTC CEO's Report: "cleanliness continues to be a top driver of satisfaction." **(Figure 4)**

13 TTC. (2021). Chief Executive Officer's Report- June 2021 2055.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/June_16/Reports/1_Chief_Executive_Officer_Report_June_2021.pdf, p.10

04 Background

Figure 4: TTC Revenue Rides and Customer Satisfaction (June 2021)



Definition
Revenue rides are equivalent to linked trips, and represent a customer journey from origin to destination, including transfers. Average number of customer linked trips per week, including paid and free trips (children 12 and under).

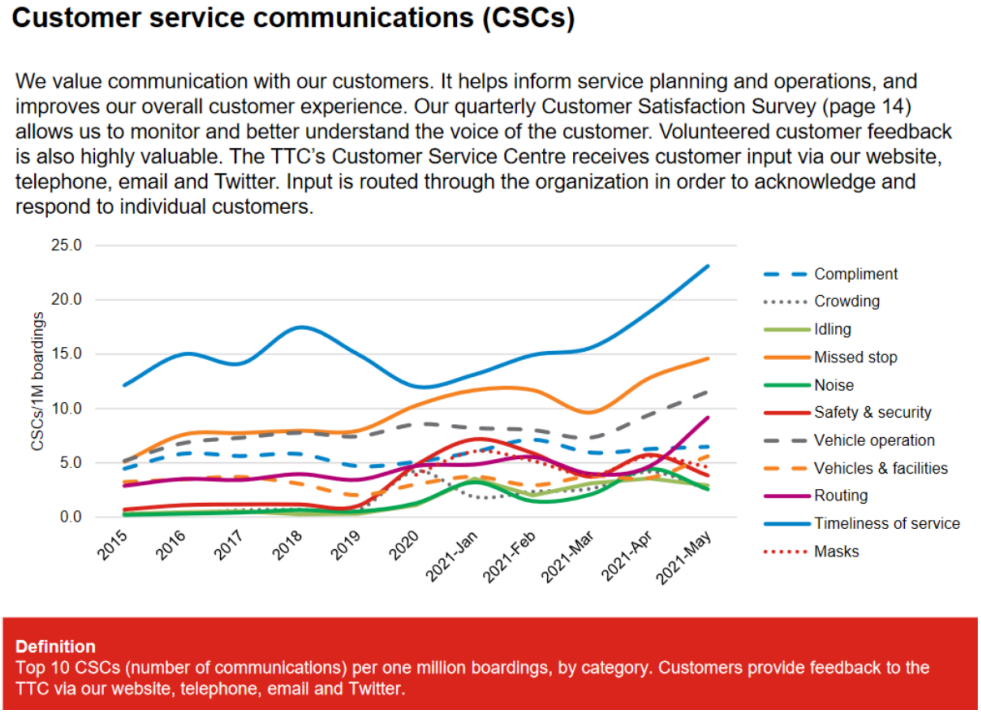
Definition
Quarterly customer survey of 1,500 TTC customers.
Customers are asked: How satisfied were you overall with the quality of the TTC's service on the last TTC trip you took, on a scale of one to 10 where one is "extremely dissatisfied" and 10 is "extremely satisfied".

Source: TTC (14) (15)

According to the Customer Service Communication section of the TTC CEO's Report in July 2021, the TTC's service and customer satisfaction was reported to be 80% in quarter one of 2021. Thus, the TTC reached its 80% benchmark through volunteered customer feedback. (16) The metrics used to measure customer satisfaction were factors that identify the efficacy of the commute: wait time, trip duration, comfort of ride, crowding, etc. across all modes of TTC vehicles. In April 2021, total ridership on the TTC dropped 30% due to the Ontario-wide shift to a stay-at-home order. Bus ridership dropped from an average of 1.4 million commuters a week in January 2021 to roughly 600,000 in May 2021. (17) The pandemic has seen a growing concern from riders about station and vehicle cleanliness, crowding and masks. (18) However, the categories of Safety & Security, Crowding and Masks in **Figure 5** are seeing steady declines. It can be observed that the Crowding dotted line in **Figure 5** spiked at 4 million in 2020 and remained consistently between 2 and 4 million throughout 2021. However, it is worth noting that Vehicles & facilities are rising and are at an all-time high as of May 2021. We are using this category as a proxy for concerns about hygiene and cleanliness.

14 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, p. 9
15 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, p.13
16 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, p.14
17 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, p.29
18 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, p.14

Figure 5 - Customer Feedback (May 2021)



Source: TTC (19)

Crowding

An uncertain part of the data are the bus overcrowding metrics that shifted for network optimization. From "level one" of the crowding standards (15 people per bus) in 2020, the TTC shifted to "level two" (25 people per bus) by June 2021. (20) Increasing maximum vehicle crowding capacity to 35 riders per bus was originally planned for the year-end of 2021, conditionally if COVID rates improve. (21) According to TTCRiders, which is primarily union-funded, this is a huge problem because the TTC's current plan shifts overcrowding metrics by lowering standards instead of adding more frequent bus services as restrictions loosen. (22) In examining the 2022 Annual Service Plan (ASP) - Network Optimization chart **(Figure 6)** are the decisions made by the TTC when performing their data analyses. Transit Demand Percentage as outlined takes the net average ridership compared to pre-pandemic levels as their key performance indicator. However, averaging the overcrowding metrics across the system hides specific lines and routes' overcrowding in their reporting. While system-wide demand may be

19 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf, pp.14-15
20 TTC 2021 Stakeholder Consultation Meeting, June 24, 2021
21 TTC Interim Chief Financial Officer. (2020). 2021 TTC and Wheel-Trans Operating Budgets 2050.1. Toronto: TTC. http://ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/Dec_21/Reports/1_2021_TTC_and_WheelTrans_Operating_Budgets.pdf, p. 9
22 TTCriders, & info@ttcriders.ca. (2021, January 19). What the 2021 City Budget means for transit riders. Retrieved July 23, 2021, from https://www.ttcriders.ca/what-the-2021-city-budget-means-for-transit-riders/#:~:text=The%20provincial%20and%20federal%20governments,and%20%2459%20million%20in%202023.

classified by TTC metrics as “Level 2,” there are individual routes that vary between “Level 3” and “Normal” overcrowding, both of which are not adequately addressed in regards to public health recommendations. Measures tend to be reactive with little action being taken on busy routes. Bus drivers are rarely limiting passengers and do not mention physical distancing.

Furthermore, when comparing pre-pandemic ridership to present day and year-to-date weekly ridership, the benchmark that the TTC chose to use was a week in March of 2020. While this may have been the last week of regular ridership prior to lockdown restrictions coming into effect, this does not accurately reflect ridership. A better metric to display would have been a year-to-date average of weekly ridership or a direct week-to-week comparison. When asked why neither of these methods were chosen, the TTC commented that they had performed the same analyses and chose not to display them claiming their choice was “sufficient for comparison.” (23)

Figure 6 - Network Optimization Chart

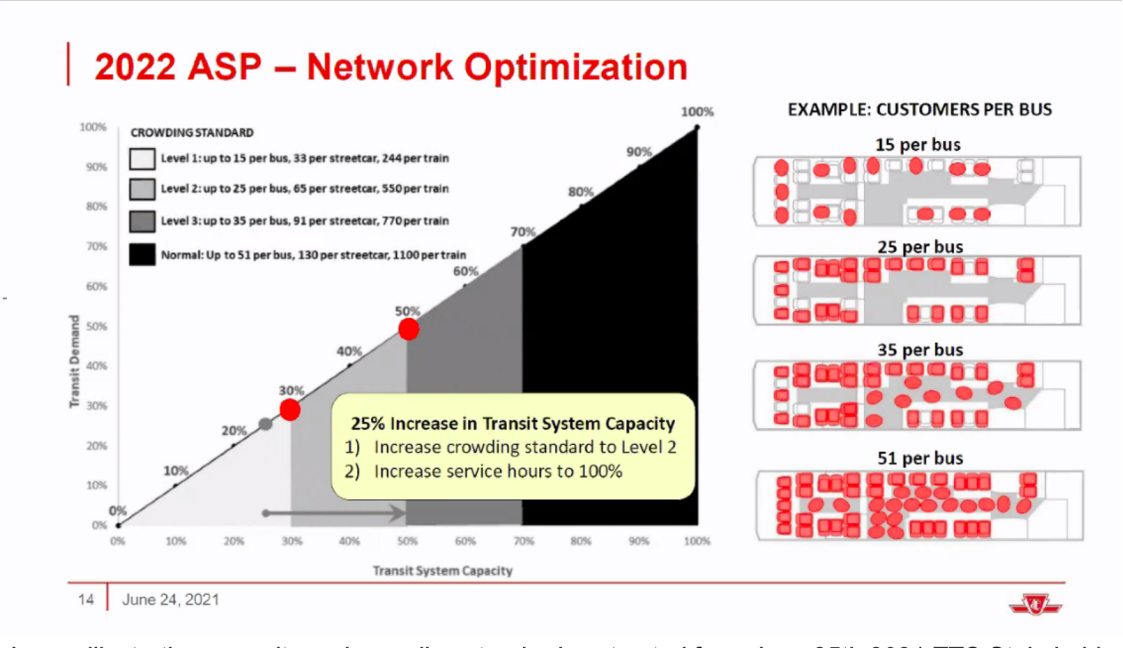


Image illustrating capacity and crowding standards extracted from June 25th 2021 TTC Stakeholder Consultation Meeting (Source: TTC) (24)

23 TTC 2021 Stakeholder Consultation Meeting, June 24, 2021
24 TTCriders, & info@ttcriders.ca. (2021, January 19). What the 2021 City Budget means for transit riders. Retrieved July 23, 2021, from https://www.ttcriders.ca/what-the-2021-city-budget-means-for-transit-riders/#:~:text=The%20provincial%20and%20federal%20governments,and%20%2459%20million%20in%202023.

05 Methodology

During the pandemic, our team interviewed essential workers who rely on the TTC to hear how their transit experiences during the pandemic. Our primary objective was to inquire about questions like: “Who does overcrowding affect the most?”, “Which neighborhoods are these people travelling from to work?”, “Which demographic is being impacted the most?”, and “How has commute journeys changed, and what has the TTC done to address it?”.

Our team also asked respondents for age group, race/ethnicity, gender, industry of work, along with major intersections close to participants’ jobs and residences. This information was collected to contextualize their transit experiences, which may be representative of others using the system. We attempted to obtain a sample of participants that would be representative of transit riders during the pandemic. Thus, we sent out ads to recruit interview participants on different social media platforms, like Facebook, Instagram, Twitter, and Reddit. We also sent emails to our newsletter subscribers, and several Toronto-based university and college administrations forwarded our recruitment email to their interested students. We reached mostly Ryerson University and University of Toronto students as well as some who may have been referred by those individuals. Most importantly, our team had to ensure that applicants who identified as essential workers living in suburban Toronto were accurately self-identifying to avoid skewing our quantitative and qualitative collection.

Research Design

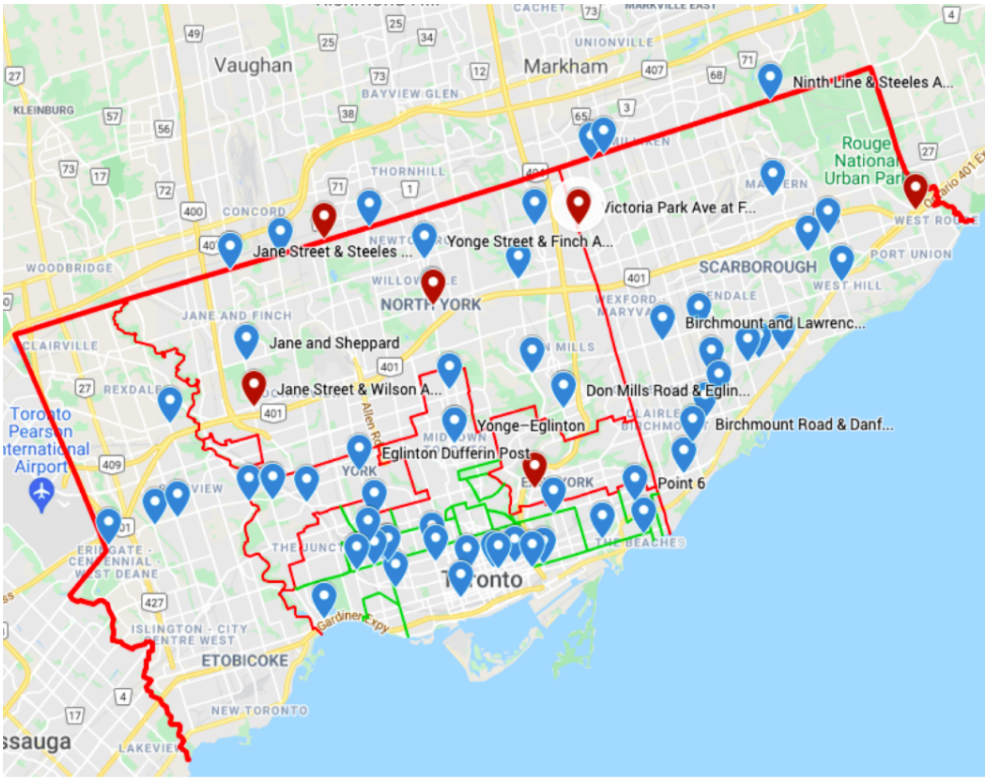
To reach the widest array of essential service workers, we collected prospective interviewee data in the screening process, including residents located close to major transit lines. A total of 72 residential postal codes were reached. As part of the research design, we screened all 72 prospects to fit our demographic criteria, principally that they were essential workers and regular transit riders during the pandemic. Six individuals met our research criteria. We asked interviewees for their commute routes, whether they live in multi-generational households, occupations, and closest major intersection to which they resided. Hence, in the map our team created in **Figure 7**, the red markers represent the interview participants who were interviewed and whose remarks we coded. Next item of research design was the coding process after the six prospects’ interviews had been transcribed, translated, recorded, and facilitated. The process of qualitative research coding is necessary to make feedback, free-text responses, and open-ended statements from participants into quantifiable data. A total of 23 themed questions were scripted and asked to our six participants, adding up to about 20-30 minutes of raw data to be collected from each interview. Within the process of coding, 10 major themes were preliminarily selected to be monitored, while other unsolicited unique themes that may arise as raw data are encouraged to be coded separately.

05 Methodology

Since this study was focused on answering questions regarding COVID-19 impacts on transit riders, our 10 major themes focused on: “Multi-Generational (Households)”, “Overcrowding”, “COVID-19 Impacts”, “Accessibility”, “Delays”, “Experiences”, “Mental Health”, and “Cleanliness”.

These keywords and others in our secondary research are based on academic and grey literature. The former was focused on articles addressing COVID-19, public transportation, and ridership. Our grey literature was focused on transportation budgets and ridership. It consisted of TTC reports, City of Toronto budgets, Government of Ontario budgets, and media articles.

Figure 7: Map of Interview Candidates and Interviewees



Map created by Sherwin Lau on June 28 2021 on ‘Google My Maps’ from survey data collected during spring of 2021. The red points are the individuals we have interviewed. The blue points represent respondents who matched our criteria, but did not follow-up for interviews.

06 Literature Review

Transit is facing immediate threats from the pandemic due to increased work-at-home activities leading to abrupt funding shortfalls. “The TTC anticipates revenue shortfalls of $153 million in 2022, and $59 million in 2023.” (25) Analyses early on in the pandemic suggested that 40% of Canadian jobs could be performed entirely from home, and that high earners were disproportionately represented among the workers employed in these jobs. (26)

Transportation frontline workers are exposed to infection risks from COVID-19 and have faced occupational hazards. (27) A leaked letter from Amalgamated Transit Union (ATU) 1505 to Winnipeg Mayor Brian Bowman had a transit driver describing a situation where a coughing passenger boarded the bus and said that he had COVID. The driver expressed concern for himself and his family after being exposed to the man. (28)

Reconciling government orders to maintain physical distancing to reduce COVID-19 infections is consequential for transportation services internationally. In this context, managing crowding with costs and service is an added challenge. According to Gkiotsalitis and Cats, the International Association of Public Transport considers the maintenance of high levels of service despite travel demand reductions to ensure safe distancing, particularly for high-risk user groups, as one of the main challenges associated with resuming public transport operations. (29) An analysis of surface and air samples for a trolley bus in Italy concluded that the measures taken in terms of sanitation, ventilation and interpersonal precautions are effective. (30) A study on physical distancing and COVID-19 states that under high occupancy indoors, transmission rates remain low as long as the environment is well-ventilated, people wear face coverings and remain silent when contact time is short. (31) However, if contact time is prolonged and if the indoor environment is not well-ventilated, the transmission rates increase to medium. **Figure 8** provides a graphical illustration of COVID-19 transmission risk in indoor places. The implications for the TTC is to prioritize ventilation upgrades in indoor environments and on routes where passenger loads are high for long periods of time.

25 TTCriders, & info@ttcriders.ca. (2021, January 19). What the 2021 City Budget means for transit riders. Retrieved July 23, 2021, from https://www.ttcriders.ca/what-the-2021-city-budget-means-for-transit-riders/
26 Koebel, K., & Pohler, D. (2020). Labor Markets in Crisis: The Double Liability of Low-Wage Work During COVID-19. https://doi-org.ezproxy.lib.ryerson.ca/10.1111/irel.12269
27 Spurr, B. (2020, Mar. 19) Toronto Star. “TTC workers now allowed face masks: Potential for job action by employees cited as reason for change.” https://www.thestar.com/news/gta/2020/03/18/ttc-lifts-ban-on-worker-face-masks-allows-all-door-boarding-on-buses-to-enhance-social-distancing.html
28 Snell, J. (2021, Jan. 12) Winnipeg Sun. “Transit union pushes for vaccinations for drivers after troubling incident on bus with potential COVID-positive passenger.” https://winnipegsun.com/news/news-news/transit-union-pushes-for-vaccinations-for-drivers-after-troubling-incident-on-bus-with-potential-covid-positive-passenger
29 Konstantinos Gkiotsalitis & Oded Cats (2021) Public transport planning adaption under the COVID-19 pandemic crisis: literature review of research needs and directions,DOI: 10.1080/01441647.2020.1857886
30 Ibid.
31 Jones et al, 2020. https://www.bmj.com/content/370/bmj.m3223

Figure 8: SARS-CoV-2 transmission from asymptomatic people in different settings

Fig 3 | Risk of SARS-CoV-2 transmission from asymptomatic people in different settings and for different occupation times, venting, and crowding levels (ignoring variation in susceptibility and viral shedding rates). Face covering refers to those for the general population and not high grade respirators. The grades are indicative of qualitative relative risk and do not represent a quantitative measure. Other factors not presented in these tables may also need to be taken into account when considering transmission risk, including viral load of an infected person and people's susceptibility to infection. Coughing or sneezing, even if these are due to irritation or allergies while asymptomatic, would exacerbate risk of exposure across an indoor space, regardless of ventilation

Source: Jones et al., 2020

TTC officials may consider implementing service variations that serve only a subset of stops through using short-turns or express routes, for instance. These measures would satisfy organizational priorities on avoiding delays, reducing crowding risks while mitigating disruptions for passengers. Gkiotsalits and Cats developed a model optimizing trade-offs between passenger and operational costs while accounting for reduced vehicle capacity and revenue losses. Their model was used in Washington, D.C.'s metro system and showed that 2-metre distancing resulted in 6.5% average vehicle occupancy rate and 43% unaccommodated passengers during the rush hour. (32) Another idea to address crowding is "subway by appointment" where a booking system is used to reserve 30-minute slots to enter stations, which was tried in Beijing. (33) TTC busses can skip certain stations or stops when they become overcrowded utilizing real-time data on passenger loads at the station or vehicle levels, helping to ensure service regularity and reducing delay risks. (34) The TTC can trial these ideas

32 Konstantinos Gkiotsalitis & Oded Cats (2021) Public transport planning adaption under the COVID-19 pandemic crisis: literature review of research needs and directions,DOI: 10.1080/01441647.2020.1857886
33 Ibid.
34 Ibid.

while the pandemic is stabilizing in case they need to be used if and when infections worsen. Crowding is considered one of the “Hot topics” in the TTC CEO’s Report for July 2021. The agency tracks crowding on its vehicles, defining crowding standards as 50% occupancy as 25 customers and 70% as 35 customers with both metrics being onboard a 40-foot bus. The TTC states that it does weekly occupancy analysis to assign “Run-as Directed Service”. It also mentions making frequent service changes by moving service from low-demand routes to high-demand ones.

The TTC could provide specific examples to the public of when these service changes occur. This would help to build trust as the agency plans for increased demand and ridership in September 2021. The TTC also tracks delays through its “On-Time Performance” (OTP) metric for all modes of service. In the TTC CEO’s Report for July 2021, construction was cited as a major factor for streetcar service not meeting OTP targets. Regarding bus service, the TTC has not met its OTP metrics for 2021, but is surpassing 2020 performance for certain months this year. (35) Its top 15 busiest routes had a 83.3% OTP, which is below the 2021 target. However, the causes for below-target OTP are not documented publicly, which would help to improve performance on the busiest routes. Again, reviewing literature like Gkiotsalits and Cats for ways to avoid delays would benefit the TTC’s service and have benefits for the public. We would like to focus on busses for a moment since they have been heavily relied upon during the pandemic. “Anecdotal evidence suggests that some low earners worked more during the pandemic (e.g., Blackwell 2020) given that many of their jobs were deemed essential (e.g., grocery store clerks, personal support workers),” according to Koebel and Poehler. (36) We expect ridership, particularly for busses, to increase as the province potentially re-opens the economy further and schools resume after Labour Day 2021.

35 TTC. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Repirt_July_2021.pdf, p. 19

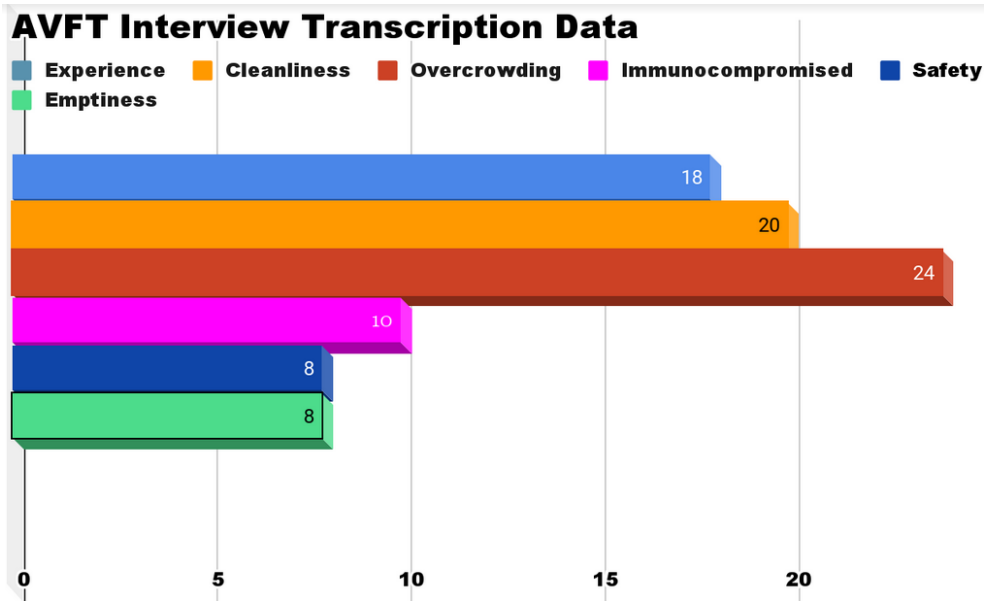
36 Koebel, K., & Pohler, D. (2020).

Credit: Ozora Amin

Regarding our finalized quantitative data, “Experience” was mentioned 18 times, “Cleanliness” was mentioned 20 times, and “Overcrowding” was mentioned 24 times. These were the top three themes that were mentioned the most throughout all six interview transcriptions and is important to state how the AVFT team defined each. As part of “unique themes” collected, “immunocompromised” was mentioned at least 10 times, while “Safety” and “Emptiness” were each mentioned eight times between the interview data. **(Figure 9)** Since the goal of this interview was to hear about the TTC rider experiences from essential workers, we wanted to record all the details that might indicate a pattern. As a result, we found that some riders on specific routes experienced less than ideal circumstances during a global health crisis.

“Experience” is referred to as the general expectations that each rider has before each commute, whether they feel safe as they are exposed to run-ins and other observations. This is important to our findings because tolerance levels of safety, healthiness, cleanliness, or crowdedness are subjective to different individuals, but observed details and highlighted experiences. Whereas cleanliness and crowdedness can be indicators of contrasting conditions of the different transit routes, modes, locations and hours that essential service workers encounter positive or negative experiences.

Figure 9 - Ethno-Racial COVID-19 Data in Toronto



Sources: Sherwin Lau, A Voice for Transit

07 Findings (What We Heard)

Theme 1: Experience

Data collected under the theme "Experience" from interview transcripts revealed imagery of transit conditions from anecdotal moments throughout the COVID-19 pandemic. Participants who commute from North York stated that they felt unsafe walking alone in completely empty subway trains and stations. They used the term "eerie" to describe the atmosphere of stations and buses, as homeless and substance users replaced the normal hoards of daily commuters on Sunday morning commutes. Additionally, a grievance was brought up by the same participant that shuttle buses during subway closures can be chaotic in the morning--especially early Sunday mornings after a night shift. It was also mentioned that since the pandemic, late night shuttle buses have been overcrowded with other essential workers and homeless people not following health/safety protocols. Hence, this anecdotal experience of a late night blue-night shuttle buses shows essential workers' support for running Line 1 trains a few hours earlier on Sundays to avoid general discomfort. There are contrasting views of the relationship between passengers and TTC workers that emerged in a couple of interviewees' comments. A woman who works in hospitality and lives in Leslieville noted the physical disconnect caused by the plexiglass separations on board streetcars and busses. This has been accentuated by COVID-19's increased public health restrictions. She also noted the in-

> **"When you fly in an airplane you've got the pilot, the cockpit, and the steel door. But he [the pilot] still generally says hello to you either when you get on or get off. They're [TTC operators] the ones driving you. I don't know. There's a relationship there that has been there for a really long time and it's not like they want to have conversations with these people. But, there's a nicety about it - a connection - that is totally changed."**
> ***- Participant***

creased presence of TTC enforcement officers on her streetcar line during the pandemic.

Others felt a sense of solidarity with the TTC employees and what they are going through during the pandemic. A woman who works in film and television and lives in North York was sympathetic about their daily challenges on the job. Describing one situation, she said: “I worry about the safety of the drivers, too. Because they really don't have much, I mean they have a shield, but it only goes down a certain length. I also saw a guy make the bus driver shake his hand, but he wasn't wearing his mask. The bus driver didn't know what to do.”

Theme 2: Safety

When interviewing another participant, who was asked to rank their level of safety from 1 - 5 (5 best and 1- as the worst), they ranked their experience with a four. Their main concern was the TTC’s overcrowding and COVID-19 safety protocols that lack adequate public health responses, like when it is visible that other commuters are not wearing masks on busses. A five (best) was never responded to by any participants. Another participant who works in cleaning and maintenance was asked to rank their level of safety, they answered with 2 out of 5. The emphasis on hygiene in the interviewees' comments below (see quote) suggests that the current TTC’s COVID-19 response is lacking elements of enforcement that could help to make riders feel safer.

Theme 3: Overcrowding & Delays

During the pandemic, we learned from national and international medical experts that close proximities are especially dangerous during trying times because of the spread of aerosols. According to Harvard Health Publishing (2021), “Aerosols are emit-

“In terms of security. I feel safe. In terms of health. No. I don’t feel safe. I would give it a 1 or a 2. Because we don’t have a culture of measuring social distancing. There are people who board without masks and drivers that do not place conditions. So, I give it (health) a 2.”
- Participant

ted by a person infected with coronavirus — even one with no symptoms — when they talk, breathe, cough, or sneeze. Another person can breathe in these aerosols and become infected with the virus. Aerosolized coronavirus can remain in the air for up to three hours. A mask can help prevent that spread." When asked "What things need improvement from the TTC?", we found a strong pattern of the overcrowding theme recurring from our interviewees. One participant answered that they felt like not many changes have been implemented, especially the lack of enforcement of public health measures. Multiple participants who took TTC daily have brought up that they have not seen a bus or streetcar driver decline service or prevent anyone not wearing a mask from entering.

"I mean I take the bus and the streetcar every single day and not once have I heard you know whoever like...I guess the bus driver or you know anybody else who's on their kind of like, call people out for not wearing a mask or you know like stopping people from getting on the bus if it's overcrowded like it's resuming as if it was like a regular day."

- Participant

A cause for the overcrowding crisis that a participant brought up was the availability of vehicles. A concern from a participant was the amount of people who are allowed on to the bus vehicle regardless of public health guidance on physical distancing. This problem correlates directly with the TTC's network optimization roll out that tampers with the metrics of what "overcrowded" means to the commission. Hence, an interviewee had voiced their suggestion: "(...) and then a whole new crowd gets onto the bus, so I'm capping how many people I think would be quite (beneficial)." Another participant said that the detriment of crowded vehicles is the mental health and anxiety of essential commuters: "even without the pandemic I have stories of being super anxious,

37 Steven A. Adelman, M., et. al. (2021, August 2). Coronavirus Resource Center. Retrieved August 5, 2021, from Harvard Health Publishing: https://www.health.harvard.edu/diseases-and-conditions/coronavirus-resource-center

and you know, really crowded. [...] yeah, it gets claustrophobic, it gets overwhelming especially when you have thoughts of like you know the dangers of the pandemic whispering in your ear being like: 'oh this shouldn't be like this, you know.'"

An early education administrator from the Kingston-Galloway area stated that some bus routes have always been crowded in that Scarborough neighborhood. They stated: "Occasionally, in a month, then I experience one delay. (...)I primarily rely on the bus. I only have to take two stops on the train, not the train-- the subway." For far-reaching neighborhoods that have been isolated from Lines 1 and 2, busses have been the primary mode of transportation. However, since the pandemic, trains on Line 2 as well as certain bus services have temporarily stopped due to scarce ridership, causing an abundant amount of commuters to get on shuttle buses during rush hours in the far ends of Scarborough. This has become a problem during COVID-19 for essential workers because overcrowded shuttle buses in isolated neighborhoods during rush hours can feel very stressful, even a bit dangerous. According to one participant: "Shuttle buses are another horrible story because you're trying to get where you're trying to go and like you, the shuttle buses are more crowded than the regular busses you know." We have noticed a pattern in riders' comments describing overcrowding and delays. These include that the same TTC route vehicles are often clumped in a row causing a cascade of passenger-overcrowding in the clumped buses, extremely slow moving vehicles moving behind them, and also delaying the next buses. A participant brought a solution to our attention that "they simply need to put out more buses - buses that I'm well aware to see have been sitting in a depot, but they don't." COVID-19 has taken a toll on mental health and taking transit has also pushed essential workers to choose between being squished into an overcrowded vehicle or to exhaustingly wait for the next vehicles which could be delayed.

"It's always frustrating and always has been, when you see, you know, three cars in a row that aren't spread out. But it's equally as frustrating, especially like when for example, like the patios we're in the road, so then it was only like one lane, and, and, and there, there is a streetcar on that lane. And it was only going 20 kilometers an hour, and nobody could get around it."

- Participant

07 Findings (What We Heard)

Theme 4: Cleanliness

Overcrowding and cleanliness are important issues to address for the TTC, especially as part of the post-pandemic recovery. As mentioned above, many interviewed TTC commuters have problems with the lack of enforcement of physical distance, but also because they feel unsafe around non-masked passengers and vehicles where disinfection could be improved. Participants have complained that busses are not properly sanitized on a daily basis on specific routes. Said by our interview participant who lives at Kingston and Morningside, "[..] they're (TTC) not cleaning these buses. I don't believe in them at all." "Like try to leave garbage on a seat on a Monday and check for it on the Saturday of the same week and it would still be there. [...]" And when asked what changes they have seen the TTC implement since COVID-19, they said: "Besides masks, no visible changes in cleanliness or crowd control."

A film and television worker has seen improvements on the TTC with hand sanitizing stations at subway stations near where they live in North York. Some passengers might feel like hygiene and cleanliness are their own responsibility. A participant stated: " I guess I rely on myself more than I'm afraid of other people. And then from like a COVID perspective. Similarly, like, I'm usually double mask, like I've got like a cloth one that fits close to my face and then I've usually got like the disposable blue one over it. [...] the surfaces aren't really where you catch things from but I've got like hand sanitizer. Of course I wash my hands as soon as I get to a place where I can wash my hands."

Plexiglass has been put up to protect vehicle conductors from COVID-19. However, we heard complaints about added stress that arises when conductors do not come out from their protective shield. That being said, more focus on daily cleaning of all vehicles would bring the level of anecdotal confidence back up. As an interviewee from Wychwood stated: "I think it would be quite beneficial to have some kind of person in charge of health and safety who's able to sanitize the bus more often, because I'll get onto the bus at like 7:30 in the morning but you know the floors are filthy and like you know...the seats have like a spilled drink on it and it doesn't feel like that extra time and care is going into sanitizing or cleaning." This underscores riders placing importance on cleanliness and expecting a certain standard to be maintained. When asking one cleaning and maintenance worker to rate the sanitary level of their commuted TTC vehicles, they answered with: "I would say a 3. [average] Yes. The truth. Because I can't say: 'Yes, constantly.' Because they are not impeccable. It is not that the company [TTC] does not demand it. We are the users. We litter. We leave masks lying around. We take the signs off the seats." Hence, this section is to point out that cleanliness and hygiene have been serious concerns from riders. It may be inevitable that passenger litter and cleanliness will continue to be a concern on transit. However, a takeaway for the TTC may be to maintain daily cleaning standards beyond the pandemic.

07 Findings (What We Heard)

Theme 5: COVID-19 Impacts

We defined this theme as COVID-19 impacts on service and as felt by riders. These impacts would have been unlikely to occur without the pandemic. Our interviewees noted that the biggest changes they saw were capacity restrictions on busses and mandatory masking. They broadly supported these measures. However, a fatigue has set in as one participant noted: “In 2020, people would limit buses to 10 people before they waited for the next bus. People have become exhausted so the bus is always crowded now.” There are also visible changes that may go beyond the pandemic, specifically physical distancing stickers on subway platforms. “Well, there's stickers all over the platform - like to stay away from each other, distancing stickers,” said a Leslieville participant working in the food and beverage industry.

There were concerns about what the service would look like post-pandemic or as the pandemic stabilizes. This manifests itself as fear of the TTC not increasing service to account for the vaccinated people who will lead to more riders after Labour Day. An interviewee said: “I guess my concern is simply vaccines are going out. More people who are working from home will maybe start to work in person again...Our buses will be more crowded, again, like more crowded than they already are, which is unbelievable.”

There were also questions raised with fundamental implications for the TTC. “I mean I've been thinking about buying a car. This whole pandemic really put things into perspective. So, I'm looking for a car, so I don't have to take the subway,” said a participant. “To me, it feels like there's just a lot of people still avoiding it [TTC] all together. This is also a sociological thing but like, those are probably the people who could afford to avoid it,” according to someone else. The key question for the TTC is: What can it do to retain and/or attract customers back to the service?

Credit: Jean-François Obregón Murillo

08 Budget Analysis

According to prominent Toronto transit advocate Steve Munro, "COVID has blown such a hole in our (TTC) finances that projections made a year ago bear no relation to the year as it evolved." TTC ridership dropped from 81% to 17% from the first to second quarters of 2020 as a result of the pandemic. This section of the report will briefly explore the TTC's budgetary pressures and highlight areas that should be prioritized based on our interviewees' comments.

COVID-19 Impacts

Despite the drop in ridership, fare revenues remain the TTC's main source of income for its operational budget. Total revenues for 2020 were $1.344 billion with $1.24 billion (92%) coming from fares and the rest, $98.4 million (8%), being generated from other sources like advertising. In order for the TTC to continue its ongoing operations, a balance of $789.8 million was needed--a minimum of $796.4 million just to address COVID-19 financial impacts, as seen in **Figure 10**. (38) Meanwhile, certain costs increased like COVID-19 incremental expenses of $53.6 million for conventional services. (39)

Figure 10 - COVID-19 Incremental Expenses on the TTC

COVID-19 Incremental Expenses ($Millions)	
TTC Conventional & Wheel-Trans	**2021**
COVID-19 Incremental Expenses	
Safety & Other Required Measures:	
Vehicle disinfecting	25.8
Personal Protective Equipment	5.9
Vehicle Ventiliation Filters	1.4
Facility Disinfecting, Decals and Other	5.8
Hand Sanitizer for Customers	2.4
Employee Screening Costs	5.5
Managing Resourcing:	
Overtime & Reg Labour (Critical response activities)	1.4
Recertification Training Delayed due to COVID	1.3
SBA & Absence Impact	6.2
Total COVID-19 Incremental Expenses	**55.5**

Source: Toronto Public Health

38 TTC Interim Chief Financial Officer . (2020). *2021 TTC and Wheel- Trans Operating Budgets 2050.1.* Toronto: TTC. pp5

39 TTC Interim Chief Financial Officer . (2020). 2021 TTC and Wheel- Trans Operating Budgets 2050.1. Toronto: TTC. pp38

08 Budget Analysis

According to TTCriders, the TTC anticipates revenue shortfalls of $153 million in 2022, and $59 million in 2023. (40) COVID-19's impacts on the TTC's revenue model may have riders paying higher fares going forward unless the provincial and federal governments step in. The Safe Restart Agreement is helping address this gap currently. (41) As we look past the pandemic, a portion of this federal aid could become a permanent part of the TTC's revenue model given the service is essential for the country's economic capital.

Cleanliness

Certain interviewees expressed that hygiene and cleanliness on the system continues to be an area of concern during the pandemic. **Figure 10** was published in December of 2020 and shows that $25.8 million was dedicated to vehicle disinfection, another $5.8 million for facility disinfection and $2.4 million was earmarked for customer hand sanitizing stations. (42) According to an internal audit done on the week of July 9, 2021, the TTC is continuing efforts of "Making hand sanitizer available in every station at bus bays and on every streetcar and Wheel-Trans vehicle". They are also "Continuing enhanced cleaning and disinfection of all public places, stations and vehicles with a focus on touch and grab points." (43)

In 2010, the TTC commissioner received complaints about the unclean state of all conventional vehicles. Hence, the vehicle cleaning audit report indicated that the budget of implementing an independent vehicle cleaning program is in the range of 75k-100k CAD in the 2010 budget. (44) The TTC began contracting its bus servicing and cleaning duties in 2012 for $60.4 million in a 5 year contract, and a new 6 year contract was signed in 2017 for an additional $91.5 million. (45)

According to a 1995 research journal published by the Transit Cooperative Research Program, "the word "clean" is arbitrary and subject to personal interpretations." (46) Of the 52 transit agencies that were part of the US study, 44% defined clean with just external cleaning of buses and 65% have specified written standards for interior clean-

40 TTCriders, & info@ttcriders.ca. (2021, January 19). *What the 2021 City Budget means for transit riders*. Retrieved July 23, 2021, from https://www.ttcriders.ca/what-the-2021-city-budget-means-for-transit-riders/

41 TTC. (2021). *Chief Executive Officer's Report- July 2021 2056.1.* Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf

42 TTC Interim Chief Financial Officer . (2020). 2021 TTC and Wheel- Trans Operating Budgets 2050.1. Toronto: TTC. pp 10

43 TTC. (2021, July 23). Latest news on COVID-19. Retrieved July 23, 2021, from https://www.ttc.ca/COVID-19/Latest_News.jsp

44 Toronto Transit Commission , & Giambrone, A. (2010.). *Report NO. "VEHICLE CLEANING".* Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2010/Sept_30_2010/Reports/Vehicle_Cleaning.pdf 1-6

45 Toronto Transit Commission , & Giambrone, A. (2010.). Report NO. "VEHICLE CLEANING". Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2010/Sept_30_2010/Reports/Vehicle_Cleaning.pdf 1-6

46 Schiavone, J. J. (1995). Transit Bus Service Line and Cleaning Functions: Synthesis of Transit Practice 12. Cooperative Research Program(TCRP), 1-57.

ing. (47) We have been unable to find the TTC's definition for this word. Publicly disclosing this may help to alleviate riders' concerns and help to recover lost ridership due to the pandemic.

Ventilation

It is important for the TTC to improve Heating, Ventilation and Air Conditioning (HVAC) systems to mitigate COVID-19 risks, particularly as ridership is expected to increase in September 2021. In May 2017, then-TTC Commissioner Joe Mihevc moved a motion recommending that the agency evaluate exposures to fine particulate matter (AKA air quality) in the subway system and implement mitigation strategies. (48) The board requested a joint report from TTC and Toronto Public Health (TPH) staff on how to undertake a joint study on subway air quality. (49) The report had nine recommendations, including several measures for the TTC to implement mitigation measures to improve air quality on the subway system. These recommendations included: implementing measures to mitigate fine particulate matter air pollution (PM2.5) through state of good repair, for instance; identifying mitigation measures on Line 2, such as reviewing ventilation systems; and requesting TTC staff to report back on opportunities for air quality improvements on the subway system. (50) The TTC board adopted the pertinent recommendations at its January 2020 board meeting. (51) However, a report at the same meeting stated that certain recommendations would be "as part of mid and long term planning of relevant capital programs." (52) At its December 2020 board meeting, the TTC board adopted the staff recommended 15-Year Capital Investment Plan and 2019-2028 Capital Budget, which included $32 million for upgraded subway/bus platform air ventilation. (53) (54) It is unclear how much of a priority this is for the agency and whether funding has been committed for this or not.

Given the airborne transmission of COVID-19, opportunities exist for the TTC to mitigate this risk by investing in improved HVAC systems. We are concerned about the amount of time it has taken for the issue of subway air quality to be studied and to be prioritized by the TTC since it was initially tabled in May 2017. The TPH study looked at short and potential long-term impacts of fine particulate air pollution (PM2.5) on the subway, which have been linked to cardiovascular and respiratory risks. (55) Those

47 https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Committee_meetings/Audit_Risk_Management/2019/Sep_19/Reports/4_ARC_Operating_Contract_Reviews.pdf pp 5
48 TTC. (2017, May 18). Notice of Motion: Air Quality Decision . Retrieved July 23, 2021, from TTC.ca: https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2017/May_18/Reports/19_Notice_of_Motion_Air_Quality.pdf
49 Ibid.
50 Toronto Medical Officer of Health . (2019). Subway Health Impacts Study HL13.8. Toronto: City of Toronto. https://www.toronto.ca/legdocs/mmis/2020/hl/bgrd/backgroundfile-141357.pdf
51 TTC. (2020). Subway Air Quality - Toronto Public Health Study HL13.8a. Toronto: TTC Board. https://www.toronto.ca/legdocs/mmis/2020/cc/bgrd/backgroundfile-145376.pdf
52 Ibid
53,54 TTC Chief Financial Officer . (2019). TTC 15-Year Capital Investment Plan & 2019-2028 Capital Budget & Plan . Toronto: TTC Board. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/January_24/Reports/10_TTC_15_Year_CIP_2019_2028_Capital_Budget.pdf
55 Toronto Medical Officer of Health . (2019). Subway Health Impacts Study HL13.8. Toronto: City of Toronto. https://www.toronto.ca/legdocs/mmis/2020/hl/bgrd/backgroundfile-141357.pdf

with cardiovascular and respiratory illnesses are particularly sensitive to PM2.5. (56) While masking is important for mitigating risks, COVID-19 adds urgency for the TTC to prioritize upgrading HVAC systems on the subway. This capital cost should be prioritized on wishlists for the federal government.

Separately, it is worth noting that the TTC spent $700,000 upgrading bus filters as a response to COVID-19. The agency's board approved the procurement of mobile climate control parts for a three-year term at its June 2021 meeting. The TTC budgeted $2.95 million between 2021-2024 for upgraded bus air filters as part of its COVID-19 response. This effort is commendable given the amount of essential workers, who travel long distances by bus.

56 Ibid.
57 Interim Chief Financial Officer . (2021). Procurement Authorization - Supply of Mobile Climate Control Parts 2055.6. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/June_16/Reports/6_Purchase%20Authorization%20-%20Supply%20of%20Mobile%20Climate%20Control%20.pdf
58 Ibid.
59 Ibid.

09 Conclusion/Recommendations

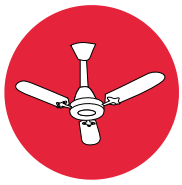
The TTC's issues during the pandemic are not unique to the agency as transit systems globally wrestle with overcrowding, drops in transit ridership as well as hygiene and disinfection concerns. The agency has worked to pivot its processes to address these issues, however the health crisis exposes the weaknesses of the TTC's business model with its reliance on farebox revenues, which have declined due to significant decreases in ridership. Nevertheless, the pandemic presents an opportunity for the agency to be less reactive and more proactive in re-thinking its business model, hygiene and disinfection protocols, as well as managing delays and overcrowding. These issues are not only important for the system's current ridership, but will be vital for winning back riders who have not returned since the pandemic's initial phases.

Our interviewees expressed concerns about overcrowding, hygiene and disinfection, safety and their relationship with employees. We undertook this project out of concern for the essential workers who rode the system regularly and we sought to gain unfiltered insights. Our meticulous screening process ensured that our participants were representative of ridership. It is important that the TTC take these concerns to heart and use the insights as a basis to justify improvements. Below are recommendations that were informed by our interviewees' comments.

09 Conclusion/Recommendations

Continue prioritizing cleanliness

According to the July 2021 TTC CEO's report, cleanliness is the top driver of customer satisfaction. This is a visible way for the agency to demonstrate to riders that it is prioritizing public health. This not only makes riders more comfortable regarding the spread of COVID-19, but it also can help reduce infections related to other illnesses. Our interviewees commented on cleanliness and were generally supportive of the actions taken by the agency. Prioritizing this issue will arguably contribute to keeping and attracting customers. Thus, we recommend that the TTC continue investing in regular cleaning and disinfection of its vehicles and system.



Prioritize subway system ventilation upgrades

Considering that the first TTC board motion about subway air quality was tabled in May 2017, it is high time that ventilation upgrades be made. We have cited scientific literature that highlights the role of the airborne transmission associated with COVID-19. Making these upgrades will reduce the risks associated with other cardiovascular and respiratory illnesses. The TTC adopted Toronto Public Health recommendations to improve air quality in 2020. The TTC's 15-Year Capital Investment Plan and 2019-2028 Capital Budget included $32 million for upgraded subway/bus platform air ventilation. However, it is unclear how this commitment will be funded. We recommend prioritizing this investment immediately given that COVID-19 is a respiratory illness, and that funds are identified for these upgrades in the 2021 budget.

Apply COVID-19-related crowding and on-time bus performance practices

We recommend that the TTC trial models optimizing trade-offs between passenger and operational costs while accounting for reduced vehicle capacity and revenue losses. The TTC can decide to have busses skip certain stations or stops when they become overcrowded utilizing real-time data on passenger loads at the station or vehicle levels. These ideas are based on academic literature and would help to ensure service regularity and reduce delay risks. These ideas can be trialed now by the TTC that the pandemic is stabilizing in case they need to be deployed if and when infections worsen.

09 Conclusion/Recommendations

Maintaining public subsidies

The Safe Restart Agreement has allowed the TTC to continue to operate with regular service frequency despite reductions in ridership and fare revenues. The agency has long been dependent on fares to recoup costs and fund its operating budget. The silver lining to the Safe Restart Agreement is that we see how the system can function with a federal subsidy. This funding should become permanent. However, the amount may be lower than what is being provided now assuming there is an increase in ridership in the coming months. In a pre-COVID-19 year like 2020 the TTC had a funding gap of $789 million, which was covered by the municipal government. This increased to $1.586 billion in 2021. The specifics of a permanent federal subsidy should be arranged to incentivize the agency to run efficiently. The TTC should not become solely reliant on a permanent subsidy since a change of government can lead to cutbacks. However, a federal subsidy should be considered as the TTC gradually recovers its pre-COVID-19 ridership.

Improving enforcement of public health measures

We heard multiple participants express frustration at times when masks were not worn by passengers or employees and such actions not being penalized. However, we have also seen instances of bus drivers asking riders to wear their face masks, which have been encouraging. We also heard complaints about passenger crowding on vehicles not being limited. We ask that TTC management works with employees' unions on actions to address vehicle crowding as well as masking for passengers and employees.

Using bond proceeds to fund disinfection and ventilation upgrade capital expenses

The City can issue debt for capital projects, but is prohibited from borrowing for operating expenses under the The City of Toronto Act. Given the drop in fare revenues, investments in capital equipment related to disinfection can be made using proceeds from City of Toronto bonds. We propose that the TTC request being able to dedicate general use of proceeds for this. These amounts should be a part of the agency's 2022 capital budget.

10 References

City of Toronto. (2020). Budget 2020. Toronto. https://www.toronto.ca/wp-content/uploads/2020/08/8de8-2020-city-of-toronto-budget-public-book.pdf

City of Toronto. (2021). Budget 2021. Toronto. https://www.toronto.ca/ext/digital_comm/pdfs/finance/2021-budget-public-book.pdf

City of Toronto. (2018). Green Debenture Framework. Toronto. https://www.toronto.ca/wp-content/uploads/2018/04/8e22-COT-Green-Debenture-Framework.pdf

City of Toronto. (2019). Population Demographics. Toronto: City of Toronto. https://www.toronto.ca/wp-content/uploads/2019/11/99b4-TOHealthCheck_2019Chapter1.pdf

City of Toronto. (2021, May 31). COVID 19: Ethno-Racial Identity & Income. Retrieved July 23, 2021, from:https://www.toronto.ca/home/covid-19/covid-19-latest-city-of-toronto-news/covid-19-pandemic-data/covid-19-ethno-racial-group-income-infection-data/

City of Toronto. (2021, July 27). COVID-19: Case Counts . Retrieved August 1, 2021, from https://www.toronto.ca/home/covid-19/covid-19-latest-city-of-toronto-news/covid-19-pandemic-data/covid-19-weekday-status-of-cases-data/

CPTDB Wiki. (2021, June 24). Toronto Transit Commission. Retrieved July 23, 2021, from: https://cptdb.ca/wiki/index.php/Toronto_Transit_Commission

Gkiotsalitis, K., & Cats, O. (2021). Public transport planning adaption under the COVID-19 pandemic crisis: Literature review of research needs and directions. Transport Reviews, 41(3), 374–392. https://doi.org/10.1080/01441647.2020.1857886

IEA. (2020, May 27). Changes in transport behaviour during the Covid-19 crisis. https://www.iea.org/articles/changes-in-transport-behaviour-during-the-covid-19-crisis

Jones, Nicholas R; Qureshi, Zeshan U; Temple, Robert J; Larwood, Jessica P J; Greenhalgh, Trisha; et al. (Aug 25, 2020). Two metres or one: what is the evidence for physical distancing in covid-19? BMJ; London Vol. 370, DOI:10.1136/bmj.m3223

Koebel, K., & Pohler, D. (2020). Labor Markets in Crisis: The Double Liability of Low-Wage Work During COVID-19. Industrial Relations: A Journal of Economy and Society, 59(4), 503–531. https://doi.org/10.1111/irel.12269

Konstantinos Gkiotsalitis & Oded Cats (2021) Public transport planning adaption under the COVID-19 pandemic crisis: literature review of research needs and directions, Transport Reviews, 41:3, 374-392, DOI: 10.1080/01441647.2020.1857886

Lucs, I. (2021). Demand for bikes is rising in Toronto amid COVID-19 but supply is scarce, cycling shops warn Social Sharing. Toronto: CBC News. https://www.cbc.ca/news/canada/toronto/cycling-toronto-supply-scarce-1.5947953

Marshall, S. (2020, April 1). MARSHALL: Mapping TTC crowding during a pandemic. Retrieved July 23, 2021, from Spacing Toronto : http://spacing.ca/toronto/2020/04/01/marhsall-mapping-ttc-crowding-during-a-pandemic/

10 References

Mihevc, J., & De Baeremaeker, G. (2017, May 18). Air quality in the TTC Subway System. Retrieved July 23, 2021, from https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2017/May_18/Reports/19_Notice_of_Motion_Air_Quality.pdf

Munro, S. (2020, December 20). TTC Operating Budget 2021. Retrieved July 23, 2021, from Steve Munro: Transit & Politics: https://stevemunro.ca/2020/12/20/ttc-operating-budget-2021/

Planning Act (Section 42) Reserve Funds Statement, 2016-2019. (n.d.). 3.
Ranger, M. (2021, March 11). Timeline: A year of pandemic life in Toronto. Retrieved July 23, 2021, from https://toronto.citynews.ca/2021/03/11/timeline-a-year-of-pandemic-life/

Schiavone, J. J. (1995). Transit Bus Service Line and Cleaning Functions: Synthesis of Transit Practice 12. Cooperative Research Program(TCRP), Washington, DC. 1-57. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Committee_meetings/Audit_Risk_Management/2019/Sep_19/Reports/4_ARC_Operating_Contract_Reviews.pdf

Seoni, R. (2020, July 7). COVID-19: A Neighbourhood View for the City of Toronto. Retrieved July 23, 2021, from Environics Analytics : https://environicsanalytics.com/en-ca/resources/blogs/ea-blog/2020/07/07/covid-19-a-neighbourhood-view-for-the-city-of-toronto

Spurr, B. (2020, Mar 19). TTC workers now allowed face masks: Potential for job action by employees cited as reason for change. *Toronto Star* http://ezproxy.lib.ryerson.ca/login?url=https://www-proquest-com.ezproxy.lib.ryerson.ca/newspapers/ttc-workers-now-allowed-face-masks/docview/2378734710/se-2?accountid=13631

Spurr, B. (2021, May 6). *Working from home deals a huge blow to ridership — now and possibly in the future, TTC warns*. Retrieved July 23, 2021, from https://www.thestar.com/news/gta/2021/05/06/working-from-home-deals-a-huge-blow-to-ridership-now-and-possibly-in-the-future-ttc-warns.html

Stein, R. A., & Ometa, O. (2020, January 9). When public health crises collide: Social disparities and COVID-19. *International journal of clinical practice (Esher), Volume 74, Issue9,* https://doi-org.ezproxy.lib.ryerson.ca/10.1111/ijcp.13524

Steven A. Adelman, M., Ashwini Bapat, M., Nicole Baumer, M. M., Suzanne Bertisch, M. M., Joseph R. Betancourt, M. M., Barry R. Bloom, P., . . . Anna R. Wolfson, M. (2021, August 2). *Coronavirus Resource Center*. Retrieved August 5, 2021, from Harvard Health Publishing : https://www.health.harvard.edu/diseases-and-conditions/coronavirus-resource-center

Tableau Public . (2021, July 21). Map of Recent COVID-19 Rates by Neighbourhood. (OpenStreetMap, Producer) Retrieved July 23, 2021, from COVID-19 - Neighbourhood Map : https://public.tableau.com/app/profile/tphseu/viz/COVID-19-PublicFacingMap/MapDashboard

TTC & Giambrone, A. (2010.). Report NO. “VEHICLE CLEANING”. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2010/Sept_30_2010/Reports/Vehicle_Cleaning.pdf

Toronto Medical Officer of Health . (2019). Subway Health Impacts Study HL13.8. Toronto: City of Toronto. https://www.toronto.ca/legdocs/mmis/2020/hl/bgrd/backgroundfile-141357.pdf

10 References

TTC. (2017, May 18). *Notice of Motion: Air Quality Decision* . Retrieved July 23, 2021, from TTC.ca: https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2017/May_18/Reports/Decisions/19_Notice_of_Motion_Air_Quality_Decision.pdf

TTC. (2017, October 16). *Supply of Subway Parts – Procurement Authorization*. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2017/October_16/Reports/18_Supply_of_Subway_Parts_Procurement_Authorization.pdf

TTC. (2019, July 10). *Subway Air Quality - Final Report*. http://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2019/July_10/Reports/7_Subway_Air_Quality_Final_Report_updated.pdf

TTC. (2019). Articulated Buses: Low-floor diesel buses. Retrieved July 23, 2021, from ttc.ca: https://www.ttc.ca/About_the_TTC/Projects/New_Vehicles/Articulated_Buses/index.jsp

TTC. (2019). Audit, Risk and Compliance: Operating Contract Reviews. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Committee_meetings/Audit_Risk_Management/2019/Sep_19/Reports/4_ARC_Operating_Contract_Reviews.pdf

TTC. (2020, January 27). Supply of Safety Products. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/January_27/Reports/Decisions/9_Subway_Air_Quality_Toronto_Public_Health_Study_Decision.pdf

TTC. (2020, January 27). Subway Air Quality – Toronto Public Health Study HL13.8a. Toronto: TTC Board. https://www.toronto.ca/legdocs/mmis/2020/cc/bgrd/backgroundfile-145376.pdf

TTC. (2020, May 13). TTC's Response to COVID-19. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/May_13/Reports/4_%20TTCs_Response_to_COVID_19_Staff_Presentation.pdf

TTC. (2020, December 20). TTC 15-Year Capital Investment Plan & 2021 – 2030 Capital Budget & Plan. http://ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/Dec_21/Reports/2_TTC_15_Year_CIP_and_2021_2030_Capital_Budget_and_Plan.pdf

TTC. (2020, December 20). 2021 TTC and Wheel-Trans Operating Budgets. http://ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/Dec_21/Reports/1_2021_TTC_and_WheelTrans_Operating_Budgets.pdf

TTC Interim Chief Financial Officer & Shaikh, R. (2021). Procurement Authorization - Supply of Mobile Climate Control Parts 2055.6. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/June_16/Reports/6_Purchase%20Authorization%20-%20Supply%20of%20Mobile%20Climate%20Control%20.pdf

TTC. (2021, July 23). Latest news on COVID-19. Retrieved July 23, 2021, from https://www.ttc.ca/COVID-19/Latest_News.jsp

TTC Board. (2020). TTC 15-Year Capital Investment Plan & 2021 - 2030 Capital Budget & Plan. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/Dec_21/Reports/Decisions/2050_2_TTC_15_Year_Capital_Investment_Plan_and_2021_to_2030_.pdf

10 References

TTC Board. (2020). TTC's Response to COVID-19. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/May_13/Reports/4_%20TTCs_Response_to_COVID_19_Staff_Presentation.pdf

TTC Chief Executive Officer. (2021). Chief Executive Officer's Report- June 2021 2055.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/June_16/Reports/1_Chief_Executive_Officer_Report_June_2021.pdf

TTC Chief Executive Officer. (2021). Chief Executive Officer's Report- July 2021 2056.1. Toronto: TTC. https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2021/July_7/Reports/1_Chief_Executive_Officer_Report_July_2021.pdf

TTC Chief Financial Officer. (2019). 2020 TTC and Wheel-Trans Operating Budgets. Toronto: TTC. Retrieved from TTC.

TTC Chief Financial Officer. (2019). TTC 15-Year Capital Investment Plan & 2019-2028 Capital Budget & Plan . Toronto: TTC Board.

TTC Interim Chief Financial Officer. (2020). 2021 TTC and Wheel- Trans Operating Budgets 2050.1. Toronto: TTC.

TTC, & Wheel Trans . (2021). Eligibility categories. Retrieved July 23, 2021, from https://www.ttc.ca/WheelTrans/Eligibility_Wheel-Trans/index.jsp

TTCriders, & info@ttcriders.ca. (2021, January 19). What the 2021 City Budget means for transit riders. Retrieved July 23, 2021, from https://www.ttcriders.ca/what-the-2021-city-budget-means-for-transit-riders/

TTC 2021 Stakeholder Consultation Meeting, June 24, 2021

Wilson, C. (2021, June 24). Ontario reports fewer than 300 new COVID-19 cases today, active caseload drops below 3,000. Retrieved July 23, 2021, from CP24: https://www.cp24.com/news/ontario-reports-fewer-than-300-new-covid-19-cases-today-active-caseload-drops-below-3-000-1.5483797