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COVID and Public Transit in the Houston Region

www.airalliancehouston.org

Executive Summary

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Contents

Glossary of Terms

- **COVID 19** - an acute respiratory illness in humans caused by a coronavirus, capable of producing severe symptoms and in some cases death, especially in older people and those with underlying health conditions. Also referenced in this report as: Coronavirus and Coronavirus Disease 2019.
- **Vehicle Miles Traveled (VMT)** - measures the amount of travel for all vehicles in a geographic region over a given period of time. It is calculated as the sum of the number of miles traveled by each vehicle.
- **Respiratory Hazard Quotient** - The ratio of the potential exposure to a substance and the level at which no adverse effects are expected (calculated as the exposure divided by the appropriate chronic or acute value). learn more: www.epa.gov/national-air-toxics-assessment.
- **Social Vulnerability Index (SVI)** - The index combines fifteen indicators to help local officials identify communities that may need support before, during, or after disasters. The U.S. Centers for Disease Control created the index, learn more: www.atsdr.cdc.gov/placeandhealth/svi/index.html.
- **Transportation Equity Demand Index (TEDI)** - The index combines fifteen indicators to identify high-demand areas for equitable improvements for people walking, biking, and transit based on socio-demographic, propensity, and human/built environment characteristics. LINK Houston created the index and provides periodic updates, learn more: https://linkhouston.org/reports-briefings/equity-in-transit-2020/.
- **Quality Affordable Transportation Index (QATI)** - The index combines seven indicators to identify where walking, biking, and local transit are relatively good now. LINK Houston and Rice University: Kinder Institute for Urban Research created the index in 2020, learn more: https://linkhouston.org/reports-briefings/houston-housing-transportation-affordability-2020/.
- **Public Transportation (generally)** - all publicly provided transportation services, including infrastructure for people walking, rolling (i.e., people with disabilities), and biking for practical purposes to reach opportunities.
- **Transit** - services operated by the Metropolitan Transit Authority of Harris County (METRO), including local bus, bus rapid transit, light rail, and regional express park-and-ride bus.
- **Community Research Team (Team)** - the team of community leaders who developed research questions, identified and convened community members, and facilitated the focus groups in partnership with the grant funded organizations.

Executive Summary

Increasing access to and utilization of alternative modes of transportation is critical to reducing the public health impacts from exposure to harmful air pollution and decreasing greenhouse gases (GHGs) that are contributing to climate change.

Prior to the emergence of the coronavirus pandemic in Houston/Harris County, bus and transit ridership was improving steadily since 2014. However, since its emergence in March 2020, coronavirus has decreased bus and transit ridership about 40%, and Metropolitan Transit Authority of Harris County (METRO) officials predict that it may be years before ridership returns to pre-covid levels.

Historically, communities of color and people with lower-incomes have relied heavily on public transit for basic survival needs such as going to and from work and obtaining food and necessities. These same communities have suffered disproportionately from the impact of COVID-19 – in part because overrepresentation in "essential jobs" increases risk of contracting coronavirus and because unequal exposure to air pollution has contributed to underlying health conditions making them more susceptible to having worse coronavirus-related health outcomes. Despite overall decreases in public transit ridership throughout the region during the pandemic, the availability of public transit has remained a necessity for some Houston communities. This research aimed to better understand the impact of coronavirus on communities that rely on public transportation to inform the development of a post-coronavirus transportation policy agenda.

Focusing on three Houston communities hit hard by the pandemic, our team conducted four distinct activities to better understand how COVID affected residents' transportation use in our region: virtual focus groups with community members from each of the three focus areas; quantitative and qualitative data analysis of results from the focus groups and from various transportation, air quality, and social vulnerability data; a literature review; and a series of interviews with regional 'stakeholders' - elected officials, planners, and public policy professionals.

Key Findings

- There is a growing body of evidence that poor air quality contributes to complications from the COVID 19 virus, and that vulnerable groups already exposed to poor air quality were and are more likely to experience disproportionate impacts from the pandemic.
- 'Essential workers' in Houston/Harris County who continued working in critical industries and services throughout the height of the pandemic, continued relying on public transit as a primary mode of transportation.
- Residents hold a generally positive view of public transportation, and that many continued relying on public transportation throughout the pandemic. Conversely, many residents stopped using public transportation during the pandemic out of fear of exposure to the virus.

- Participants also noted that the pandemic has highlighted many areas of potential improvement for METRO's services.
- Many of the stakeholders expressed uncertainty about the future of mobility in the region. Lingering fear of the virus and discomfort with returning to 'normal' behavior and functioning may delay a return to pre-pandemic travel patterns.
- Each of the individuals we spoke to agreed that reliable, accessible public transportation is quintessential to millions in their cities; ensuring we maintain and even improve these services is a common goal in spite of the pandemic.

Policy Recommendations

- **Federal and state government must expand funding to support public transit** as an essential service for people and the broader economy; the additional funding should allow flexibility for application to both capital and operating expenses.
- **Local, regional, and state-level planning entities must reorient their planning priorities to address changes** in behavior brought about by the pandemic to meet current and future transportation demand, specifically for people walking, rolling, biking, and riding local transit to affordably reach opportunity.
- **METRO must restore services to pre-COVID levels**, continue to equitably implement service improvements in the METRONext plan, and partner with other public and private entities on a public information campaign to educate and reassure the public and riders.

Photo: Trong Nguyen / Shutterstock.com

Introduction

Overview of Project and Methodology

Through this project, we sought to answer three central questions:

1. How did coronavirus impact residents' access to and utilization of public transportation? If access was limited, how did this impact access to other basic needs such as getting to and from work/school; obtaining food; accessing health care?
2. How has coronavirus impacted residents' plans to use public transportation in the future?
3. Given that increasing access to alternative modes of transportation are key components needed to reduce air pollution and decrease GHG emissions, what policy proposals and/or funding investments should be prioritized?

Scope

Given the project timeline, our team decided to narrow our focus to three (3) distinct neighborhoods within the Houston region. The communities we chose were:

- **Kashmere Gardens-Greater Fifth Ward**
- **Greater Third Ward**
- **Sharpstown-Gulfton**

We made our selections based in part on targeted metrics to determine a community's socioeconomic stability, access to reliable transportation, and environmental vulnerability, pulling from indices such as the CDC's Social Vulnerability Index (SVI) and LINK Houston's Transportation Equity Demand Index (TEDI). Additionally, we chose these communities because one or more members of our research team had existing relationships with community leaders in these areas; leveraging long-standing relationships between our team and partnering communities ensured we were able to connect with residents to successfully complete the proposed project.

The following table compares the three focus communities to the City of Houston and Harris County based on the U.S. Census Bureau's American Community Survey 2015-2019 5-year Estimates.

The focus communities are more racially, ethnically, and socio-economically diverse than Houston or Harris County at-large. A greater proportion of residents rely on transit to reach employment. More information about the communities, the City of Houston, and Harris County is in section three.

	Sharpstown-Gulfton		Kashmere Gardens-Greater Fifth Ward		Greater Third Ward		Focus Communities		City of Houston		Harris County	
CHARACTERISTIC	Percent of Houston	Number	Percent of Houston	Number	Percent of Houston	Number	Percent of Houston	Number	Percent of County	Number	Percent of County	Number
Population	5.7%	126,175	1.2%	27,157	0.7%	15,942	7.6%	169,274	48%	2,224,278	100%	4,646,630
Working Population	5.6%	60,664	1.0%	10,334	0.6%	5,938	7.2%	76,936	49%	1,073,725	100%	2,208,486
Households	5.3%	43,332	1.2%	10,289	0.6%	4,746	7.1%	58,367	51%	824,710	100%	1,605,368
Land Area (Square miles)	2.0%	11	1.5%	9	0.5%	3	4.1%	23	33%	564	100%	1,706
INDICATOR	Percent Rate	Number	Percent Rate	Number	Percent Rate	Number	Percent Rate	Number	Percent Rate	Number	Percent Rate	Number
Households in Poverty	29%	12,480	34%	3,523	31%	1,472	30%	17,475	18%	145,954	14%	229,518
Single Parent Female Headed Households with Children Under Age 18	13%	5,479	11%	1,175	11%	542	12%	7,196	9%	74,082	9%	140,844
Households with 1-or-more Persons with a Disability	14%	5,950	38%	3,919	30%	1,402	19%	11,271	19%	158,152	20%	323,693
People of Color Population	91%	114,425	97%	26,215	82%	13,073	91%	153,713	75%	1,669,809	70%	3,271,725
Zero Vehicle Available Households	13%	5,708	19%	1,992	28%	1,350	16%	9,050	8%	68,897	6%	95,961
Workers Commuting by Transit	6.8%	4,104	6.0%	621	9.4%	560	6.9%	5,285	3.8%	40,552	2.5%	55,244
Population Density (people per squre mile)	x	11,171	x	3,145	x	5,344	x	7,388	x	3,943	x	2,723
Household Density (households per square mile)	x	3,836	x	1,192	x	1,591	x	2,547	x	1,462	x	941

Table 1

Methods

After identifying the communities of focus, six 'community leaders' were identified and invited to join the 'community research team.' Over the course of three meetings, the research team was briefed on the project and goals, co-developed and finalized discussion questions/prompts, and decided on logistical questions for virtual focus group facilitation. During these meetings, community leader team members were also trained on facilitating focus groups by Dr. Denae King (Texas Southern University).

Community leaders were tasked with recruiting ten (10) participants per community of focus and selecting dates for the focus group meetings. From the outset, all parties agreed focus groups would need to be conducted virtually to avoid any potential safety issues due to COVID. However, meeting virtually presents several challenges, particularly when it comes to ensuring access to community members who do not have reliable internet access or who are not familiar with virtual interfaces. Zoom was chosen because of its ease of use, its relative familiarity, and its alternative options for participation given several participants joined exclusively by phone. Participants were explicitly asked and expressed verbal informed consent at the beginning of each focus group session.

Translation services were also made available for each focus group , and some of the research team members even went as far as to organize a focus group exclusively for Spanish speakers. Two of the focus groups needed Spanish translation support. One focus group needed Swahili and Pashto translation support.

Research team members explained to participants that the goal of the project was to better understand the impact of coronavirus on communities that rely on public transportation to inform the development of a post-coronavirus transportation policy agenda. Participants were then asked a series of questions about their thoughts on and experiences with public transit before and during the pandemic, how their views may have changed over the course of the year, and public transportation's role in reducing air pollution.

Following the community focus groups, participants were given compensatory gift cards for their participation. Community leader team members were paid stipends over the course of their involvement, including planning meetings and focus group facilitation. Following the conclusion of the focus groups, the recordings were transcribed (and translated by the Alliance Language Network, if needed) and given to Dr. King to conduct qualitative data analysis for emerging theme content.

In addition to data analysis, our team conducted a broad literature review to provide further context on the connections between air quality, transit use, COVID and the impacts of lockdown. We drew from a number of sources, including, periodicals, news articles, and academic peer-reviewed studies.

In addition to the data collection and analysis, the community focus groups, and the literature review, our team conducted interviews with key stakeholders to provide additional context of how COVID impacted the region, and how our experience compared with other metro areas across the county. We conducted interviews with representatives from the following organizations and entities:

- Houston METRO
- Harris County
- City of Houston
- Rice University Kinder Institute for Urban Research
- Several Chicago- and New York City-based transportation advocacy groups

Literature Review

COVID-19, also known as the Coronavirus Disease 2019, spread rapidly around the world beginning in December 2019. To date, hundreds of millions of people have contracted COVID-19, and over 1.8 million people have died from the illness. COVID-19 is a virus that primarily attacks the respiratory system and causes severe acute respiratory syndrome (SARS), but the virus can also have devastating impacts throughout the entire body.[1]

In the United States, COVID impacted different regions at different times to varying degrees. It might be some time before we fully understand the myriad of variables that affected the spread and longevity of the virus, but little more than a year out from the first wave of shutdowns, some definite trends are clear. Health experts identified almost immediately that COVID 19 was devastating Black and brown communities at much higher rates than those of their white counterparts: by May 2020, twice as many Black Americans had died from complications related to COVID than other racial groups.[2] Throughout the pandemic, Black and Hispanic residents' share of total cases and COVID-related deaths have far outstripped their share of the total population. Studies suggest that people of color are at higher risk due to higher exposure and transmission.[3] In Texas, where nearly 50,000 people have died from COVID as of April 1, 2021 (although this number is almost assuredly an underestimate), the Hispanic population has borne 46% of COVID deaths despite only making up 39% of the population.[4][5]

There are a number of factors that explain the disproportionate impact on communities of color and working class neighborhoods. Almost immediately, health experts were able to identify that existing socioeconomic vulnerabilities were an indicator of higher risk of contracting COVID and experiencing complications. According to the CDC, "Inequities in the social determinants of health, such as poverty and healthcare access, affecting these groups are interrelated and influence a wide range of health and quality-of-life outcomes and risks."[6] Existing underlying chronic diseases, lack of access to quality healthcare, poverty, and racial discrimination are just a few of a multitude of factors that made COVID much more dangerous for people of color and working class neighborhoods.

Several new studies suggest significant links between air quality and COVID risk, as well. Air quality's impact on public health is already well documented: one third of deaths from stroke, lung cancer, and heart disease are due to air pollution; air toxics can cause or worsen diseases like asthma, chronic obstructive pulmonary disease (COPD), or pneumonia.[7] Additionally, it is well documented that poor air quality disproportionately impacts working class communities,[8] and that people of color are 1.5 times more likely to live in an area with heavy pollution.[9] According to a Harvard study, "exposure to even small amounts of air pollution over the long term can make someone 8% more likely to die from COVID-19."[10] Other studies have found that "both short-term and long-term exposure to air pollution especially PM2.5 and nitrogen dioxide (NO2) may contribute significantly to higher rates of COVID-19 infections and mortalities."[11]

Because of the rapid spread of COVID, many organizations, such as schools, government offices, businesses, non-profits, and more, shifted from traditional in-person interactions to remote styles of work in order to limit interpersonal contact. Despite the unprecedented number of people working fully or partially remotely, in order to satisfy basic material needs like food and health care, some workers must continue physically commuting to their in-person jobs. This subset of individuals has been deemed "essential workers," and they comprise the workforces of industries that necessitate in person work, such as hospitals, medical offices, restaurants, grocery stores, shops, manufacturing jobs, and more.[12] Transportation consequently remains an important subject during the COVID-19 pandemic, and essential workers disproportionately fill lower-paid positions within the service industry.[12] Non-essential workers and leisure travelers, however, have dramatically reduced their usage of public transit; some cities have seen drops in ridership of up to 80 or 90 percent, necessitating conversations about how to ensure transit services continue operating in the face of decimated income.[13] Low-cost and reliable public transit is therefore a vital resource in need of active support to ensure that people have a reliable way to reach the places they need.

In the Houston region, public transit plays an integral role in providing equitable access to communities. Prior to the onset of the pandemic, residents of the Houston region took over 285,000 trips each weekday on fixed-route transit; 67% of those trips were taken on buses. According to LINK Houston's 2018 Equity in Transit Report, "For many people in Houston, especially those who live in under-resourced communities, public transit is the only option to access employment, education, medical care, healthy food, and other opportunities. Lack of safe and affordable transportation options exacerbates barriers to such opportunities." This held particularly true in Black and brown communities, who made up "75% of Houston residents according to 2017 U.S. Census data and 78% of transit riders." LINK also found that in Houston, prior to the pandemic, "40% of local bus riders live in households with no vehicle."[14]

During the beginning months of the pandemic in the US, public transit quickly became an easy target for blame on potential spread of the virus because of the perceived and real close proximity to others in compact spaces. However, as TransitCenter and many others have argued, "Subsequent research into the prevalence of the virus and how it spreads disproved this hypothesis."[15] Analysis by Tri-State Transportation Campaign, for instance, found that within the New York region, "density and transit are poorly correlated to COVID outbreaks."[16] Science Magazine noted "Epidemiological investigations in other countries traced major spreading events overwhelmingly to venues like gyms, clubs, and restaurants, not transit."[17] While people using transit do spend time in enclosed spaces with others potentially carrying the virus, three factors contribute to limited spread: people spend less time on transit than at home or elsewhere, people talk less than they would in other enclosed spaces, and public transportation is often better ventilated than indoor spaces.

Photo: Sally / Unsplash

Public transit is not only a public service that can provide equitable access to communities, but also an integral tool in improving local air quality and reducing greenhouse gas (GHG) emissions. Pollution from mobile sources is quickly gaining ground as one of the leading factors in air quality and climate change. Levy, Buonocore, and von Stackelberg (2010) estimate that "in 2010 vehicle emissions in the U.S. contributed to 2200 premature deaths and more than $18 billion in public health expenditures."[18] In the US, the transportation sector accounted for 29% of GHG emissions in 2019; the City of Houston's Climate Action Plan found that in 2017, on-road mobile emissions accounted for 47% of the area's GHG emissions.[19] And, despite the unprecedented 'lockdowns' governments enacted in reaction to the spread of the virus, transportation persisted as a major GHG source:

> *Transportation-related emissions were still the United States' single biggest driver of climate change in 2020, despite historic drops in vehicle miles travelled and a relatively large drop in tailpipe smog compared to prior years. Planes, trains and automobiles (and presumably to a lesser extent, boats) accounted for an estimated 31 percent of total net emissions in 2020, and the transportation industry experienced the largest drop in total emissions of any sector — though not enough to dethrone it as the nation's top polluter.*[20]

Expansive, reliable, and accessible public transportation systems are considered an essential component to lowering greenhouse gas outputs and improving air quality because they provide sustainable alternatives to driving cars. Encouraging people to use public transportation instead of driving is a central component of many climate action strategies, including Houston's Climate Action Plan, which calls for a drastic reduction in VMT. A recent climate justice survey, conducted by the Coalition for Environment, Equity, and Resilience (CEER), of over 500 residents in northeast Harris County found that although 55% of respondents rely on passenger vehicles as their primary mode of transportation, the majority reported improving public transit as a viable strategy for fighting climate change, addressing air quality issues, and improving multimodal infrastructure. Moreover, 50% indicated that they would rely on public transportation in case of extreme weather or disasters. These survey results highlight the critical role of public transportation for communities of color.

Public transportation services suffered greatly throughout the pandemic. The international association for public transport (UITP) found that "Public transport is one of the most disrupted sectors of the COVID-19 pandemic with early estimates suggesting that the drop in ridership during lockdown periods has been as much as 80%–90% in major cities in China, Iran and the United States, and as much as

70% for some operators in the United Kingdom."[13] Houston was one of these cities - METRO estimates that it lost 85-90% of its ridership during the beginning months of the pandemic. As many have pointed out, most US transit agencies rely on a combination of farebox revenue and sales tax for funding; with the drop in ridership and the economic disruption caused by the pandemic, both of those revenue streams have dried up. By the summer of 2020, "[Houston] METRO's internal finance analysts expect[ed] revenues from the sales tax to drop by $102 million, about 13 percent of what the agency had budgeted for fiscal 2020."[21] For many agencies, this translates to service cuts. In New York City, "transit officials drafted plans to cut core subway and bus service by 40 percent" because of lost revenue. Washington, DC officials "proposed drastically cutting services for fiscal year 2022, including eliminating weekend DC Metrorail service, closing 19 DC Metrorail stations, and eliminating 2,400 jobs."[23] Public transportation service cuts will inevitably fall hardest on low income communities, who, as we've seen, rely on public transportation to a much greater degree.

Hopefully, this brief literature review has evinced our interest in this study: COVID has been as devastating as it has due in part to a high number of complementary factors that accelerated its spread and deadliness, such as poor air quality or lack of reliable access to healthcare. Conversely, the pandemic exacerbated a number of existing inequities in the US. Black and brown people have had much less job security, are more likely to work dangerous essential jobs, and continue to have a much higher risk of contracting and experiencing complications with COVID. Public transportation exists at a critical nexus between public health, social and economic stability (particularly for low-income and minority populations), and environmental sustainability. Reliable, accessible public transportation systems remain a cornerstone of long-term public health and environmental welfare, but our already struggling public transit agencies have been decimated by the pandemic, despite remaining as a lifeline for 'essential workers.' Our hope with this study was to gain a better understanding of these interwoven issues and provide policy recommendations moving forward.

Public transportation service cuts will inevitably fall hardest on low income communities, who, as we've seen, rely on public transportation to a much greater degree.

Findings

This section explores residents' and communities' experiences during the pandemic using both quantitative and qualitative data.

While the pandemic's impacts were felt everywhere, the reality is that pre-existing challenges exacerbated the impacts in some communities, and for some residents. Some communities experienced disproportionately high COVID-19 cases per capita and deaths per capita. The research team relied on data to identify potential focus communities for in-depth study, discussed strategies to engage communities, partnered with community leaders as members of the research team, and ultimately conducted focus groups.

Selecting Communities of Focus

The process to select the three focus areas of Houston - the combined Sharpstown and Gulfton Super Neighborhoods, the combined Kashmere Gardens and Greater Fifth Ward Super Neighborhoods, and Greater Third Ward Super Neighborhood - involved layering together several existing data points. The Potential Priority Communities Map in Figure 1 is the result of overlaying five (5) measures:

1. 2018 Total Respiratory Hazard Quotient by Census Tract, Environmental Protection Agency (EPA).
2. 2018 Social Vulnerability Index (SVI) by Census Tract, Centers for Disease Control (CDC).
3. 2020 Transportation Equity Demand Index (TEDI) by Census Block Group, LINK Houston.
4. COVID-19 Total Cases per Capita by ZIP Code (through September 14, 2020), Harris County.
5. COVID-19 Deaths per Capita by ZIP Code (through September 14, 2020), Harris County.

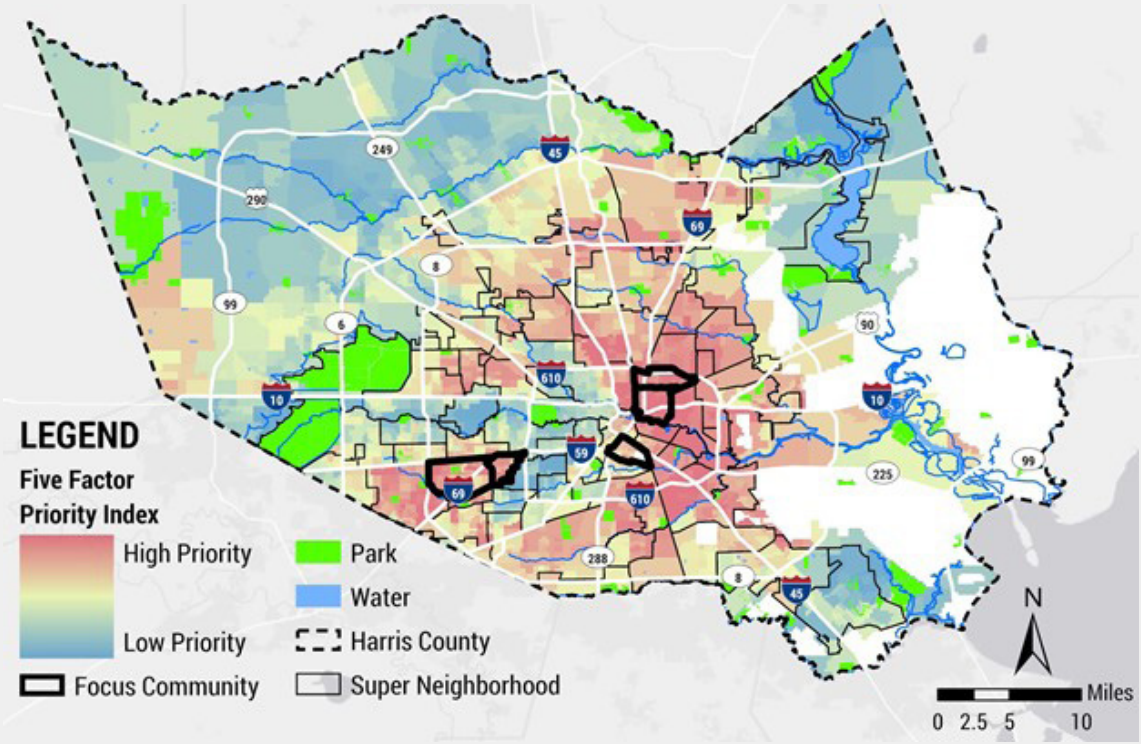


Figure 1

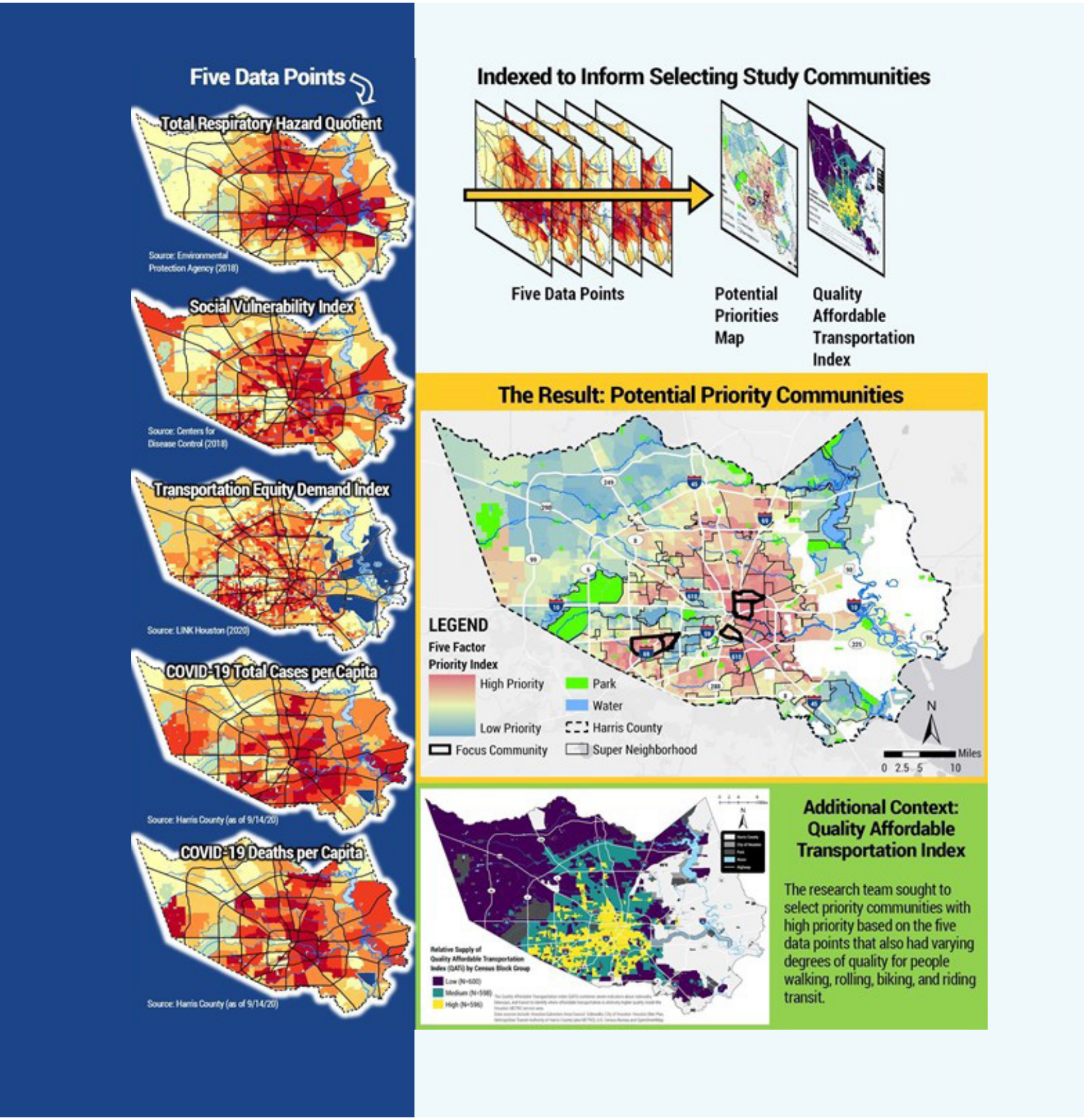

Five Data Points
Total Respiratory Hazard Quotient
Source: Environmental Protection Agency (2018)
Social Vulnerability Index
Source: Centers for Disease Control (2018)
Transportation Equity Demand Index
Source: LINK Houston (2020)
COVID-19 Total Cases per Capita
Source: Harris County (as of 9/14/20)
COVID-19 Deaths per Capita
Source: Harris County (as of 9/14/20)
Indexed to Inform Selecting Study Communities
Five Data Points
Potential Priorities Map
Quality Affordable Transportation Index
The Result: Potential Priority Communities
LEGEND
Five Factor Priority Index
High Priority
Low Priority
Focus Community
Park
Water
Harris County
Super Neighborhood
N
Miles
0 2.5 5 10
Additional Context: Quality Affordable Transportation Index
The research team sought to select priority communities with high priority based on the five data points that also had varying degrees of quality for people walking, rolling, biking, and riding transit.

Figure 2

Each of the five data points was combined in the Potential Priority Communities index based on an equal weighting. Two of the five data points are related to socio-economic demand - CDC Social Vulnerability Index and Transportation Equity Demand Index. The EPA's respiratory quotient identifies communities with inequitably poor air quality. The two COVID-19 data points identify where the pandemic has had outsized negative impacts on communities. The result enabled the research team to brainstorm potential focus communities based on information not only about COVID-19 but also recent health and socio-economic realities.

The study set out to explore residents' experiences and opinions about how COVID-19 changed individual use of public transportation. It was with that in mind the research team compared the Potential Priority Communities result to the Quality Affordable Transportation Index (QATI), developed by LINK Houston and Rice University: Kinder Institute for Urban Research in May 2020. The Quality Affordable Transportation Index combines seven indicators to identify where walking, biking, and transit are relatively accessible and reliable now. Communities with high priority for equity in transportation and also possessing relatively low quality affordable transportation were considered especially strong candidates for engagement.

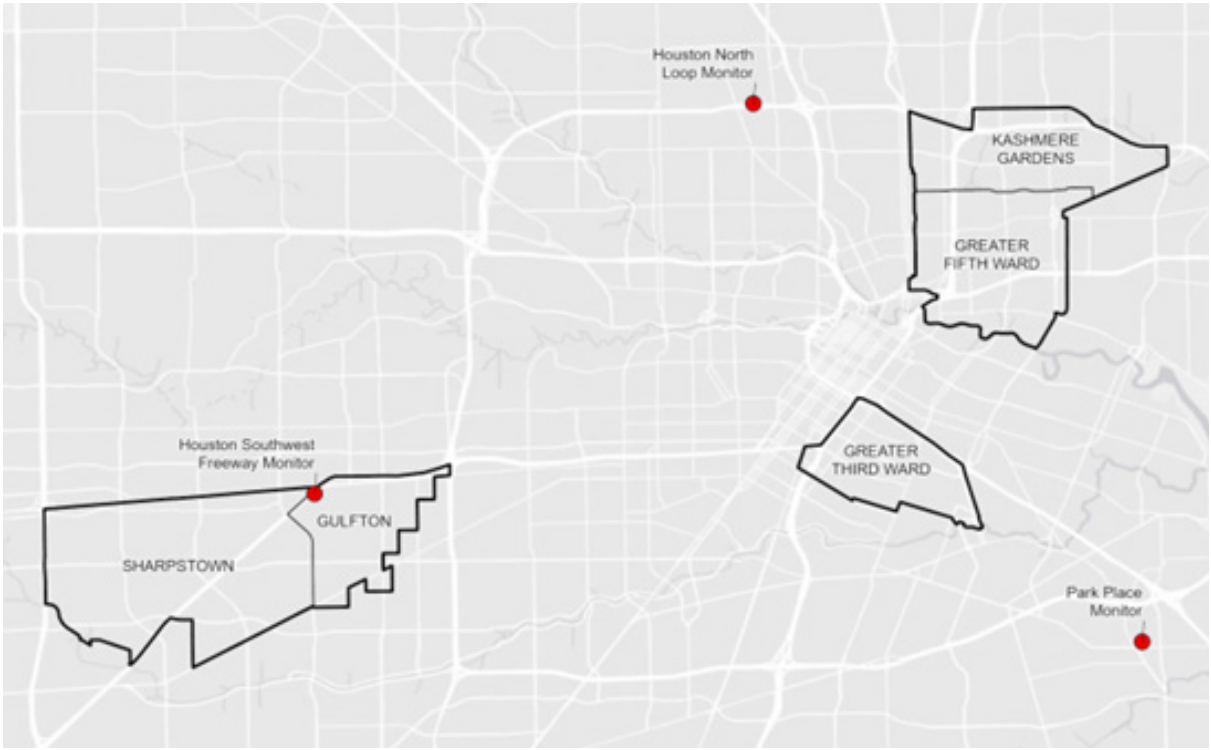


Figure 3

Park Place						
Measurement	April			October		
(ppb)	2019	2020	%Change	2019	2020	%Change
Avg. Daily Concentration	10.68	7.33	-31.3%	12.55	12.83	2.2%
Median Daily Concentration	6.90	6.90	0.0%	12.40	10.80	-12.9%
High Daily Concentration	29.50	13.90	-52.9%	28.50	30.10	5.6%

Southwest Freeway						
Measurement	April			October		
(ppb)	2019	2020	%Change	2019	2020	%Change
Avg. Daily Concentration	18.92	15.30	-19.2%	20.00	20.49	2.5%
Median Daily Concentration	12.90	12.30	-4.7%	19.70	20.30	3.0%
High Daily Concentration	56.30	36.00	-36.1%	36.90	47.20	27.9%

North Loop						
Measurement	April			October		
(ppb)	2019	2020	%Change	2019	2020	%Change
Avg. Daily Concentration	37.56	29.98	-20.2%	31.86	30.23	-5.1%
Median Daily Concentration	39.40	29.30	-25.6%	26.90	28.00	4.1%
High Daily Concentration	86.50	64.00	-26.0%	62.40	64.80	3.8%

Table 2

Air Quality Data

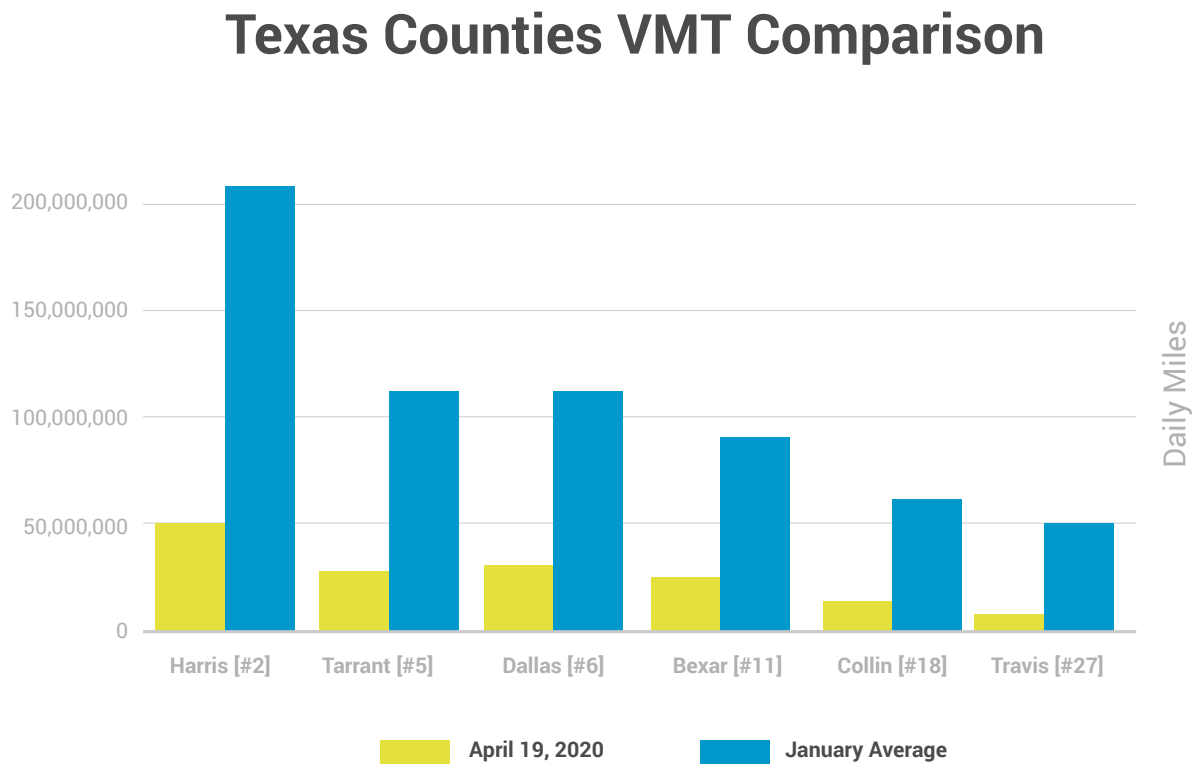
Figure 3 and Table 2 show nitrogen oxide (NOx) levels at the three air monitors nearest the focus communities.

While few conclusions can be drawn from the limited air quality data available, the patterns in NOx emissions during April 2020 and October 2020 show that the response to the pandemic had significant impacts on emission levels. In April, during the height of stay-at-home orders in Texas, NOx emissions dropped precipitously. As noted in the literature review section, the 'lockdown' measures' effect on air quality globally is not clear cut, and a myriad of variables affected air quality throughout the pandemic; however, as we see here, a drop in human activity drastically reduced some emissions in certain areas.

Transportation Data

In order to assess the impact of the pandemic on transportation in the Houston region, our team looked at a number of metrics to better understand traveling patterns in our region.

The table below shows the drastic decreases in vehicle miles traveled (VMT) in several Texas counties. Compared to the January average, Harris County saw a 79% drop in VMT levels in April of 2020 (numbers denote the county's ranking in VMT nationally).



When Houston METRO boarding data were analyzed for stops within the communities of focus, some interesting trends emerged: as expected, bus ridership fell off during April 2020, and, for the most part, had not returned to pre-pandemic levels by October. However, in the Gulfton/Sharpstown community, ridership actually increased in October, while all other focus areas and the METRO service area at-large continued to see below average ridership. This data point coincides with feedback we heard during our focus groups with residents of this community: many said they never stopped using public transportation during the pandemic.

As discussed in the literature review section, communities containing a large number of 'essential workers' continued to rely on public transportation for work and basic necessities; Sharpstown and Gulfton, two predominantly minority and low-income communities, fit squarely into this category.

While the data provides interesting context, it is by no means comprehensive. In the next section, we will discuss perspectives on public transportation prior to and during the pandemic from individuals in these communities.

		Gulfton/Sharpstown		Third Ward		Kashmere Gardens/Fifth Ward		All Study Areas		METRO Totals	
Indicator 2019 vs. 2020	**Month**	**Weekdays**	**Weekends**	**Weekdays**	**Weekends**	**Weekdays**	**Weekends**	**Weekdays**	**Weekends**	**Weekdays**	**Weekends**
Net change in average activity for the area	April	-10,558.33	-439.50	-1,356.17	-303.33	-11,728.67	-10,033.50	-23,643.17	-10,776.33	-282,979.07	-193,906.42
	October	+3673.83	+9710.17	-1,365.33	-288.83	-9,191.50	-8,406.00	-6,883.00	+1015.33	-245,068.65	-164,850.50
Average activity change per stop	April	-31.42	-1.31	-11.59	-2.59	-31.44	-26.90	-28.62	-13.05	-31.95	-21.89
	October	+10.93	+28.9	-11.67	-2.47	-24.64	-22.54	-8.33	+1.23	-27.79	-18.69

Focus Groups and Key Stakeholder Interviews

Research team members, including community leaders, convened community participants on Zoom to facilitate each focus group.

Each virtual focus group, led by 1-2 community leaders, included 5-10 community member participants. Two focus group sessions were held for Sharpstown-Gulfton and Greater Third Ward each, and one session was held for the Kashmere Gardens-Greater Fifth Ward community. A total of thirty (30) community members participated in the focus groups across the selected communities.

The questions used to prompt discussion during the focus groups were developed during previous meetings with the research team members. After approval of the focus group guide, community leaders practiced facilitating focus group discussions. Questions used in the discussions centered on community members' thoughts and experiences with transportation choices pre- and post-pandemic.

- What do you think of when you think about public transportation?
- What do you or people in your household use public transportation for?
- Did you decide to use or not use public transportation because of the pandemic?
- Did the pandemic change your ability to get to the places you needed to go to like, work/school, medical care, social services, church, shopping for food and other essential items?
- Are you planning on using public transportation in the future? Why or why not?
- What would make you more willing or comfortable with using public transportation?
- What are some good reasons people should use public transportation instead of driving cars?
- How does public transportation affect air quality?
- What changes in public transportation could reduce air pollution?

Each focus group discussion was recorded and later transcribed for data analysis. The transcripts were then used to examine emerging themes and content related to the project's central research questions across the three selected communities.

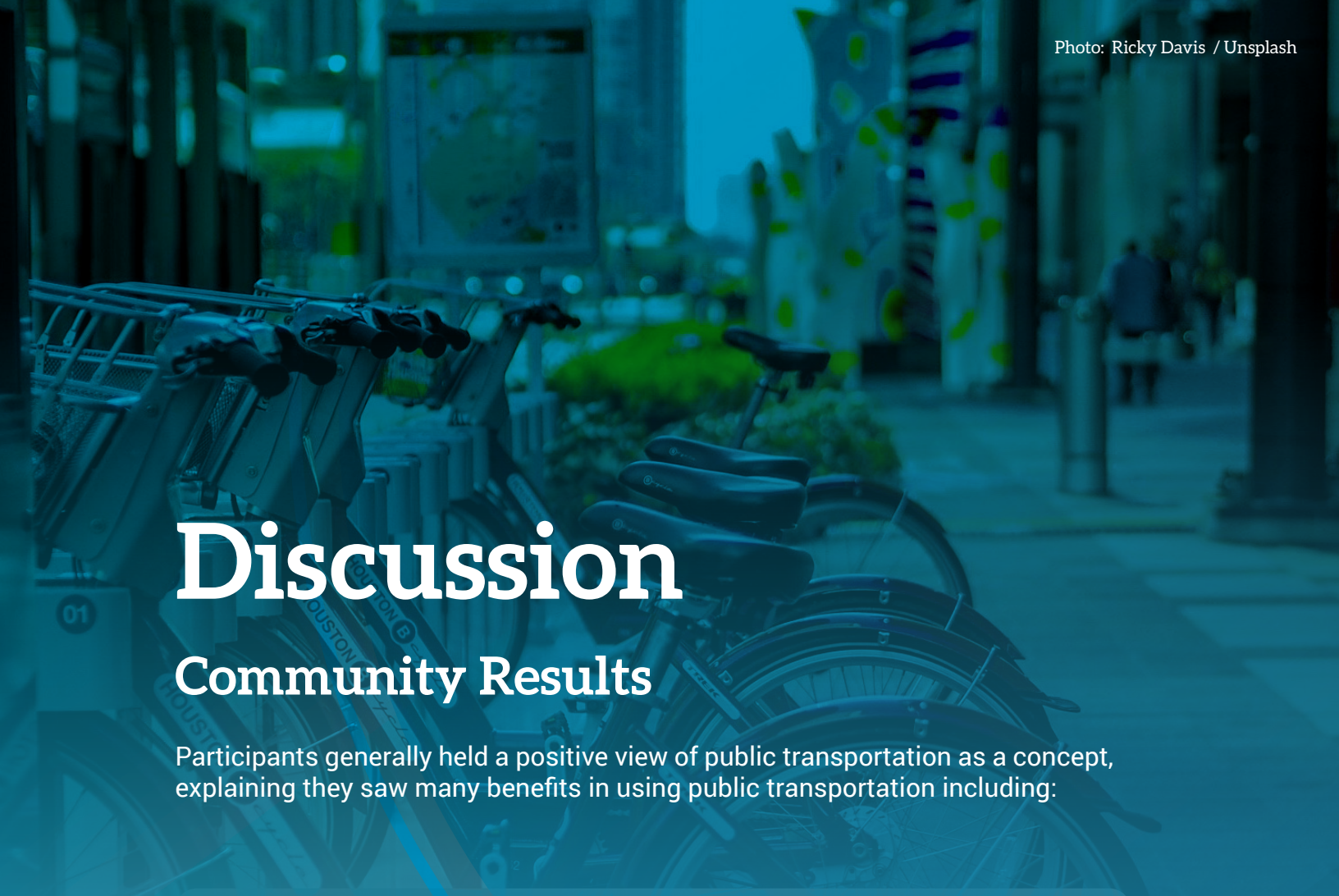


Photo: Ricky Davis / Unsplash

Discussion

Community Results

Participants generally held a positive view of public transportation as a concept, explaining they saw many benefits in using public transportation including:

- **Travel Options**
  - » METRO, bus, light rail/train, bicycles, taxi, park & ride, vanpool, carpool, pedestrian rides, walking, electric cars and Uber/lyft
  - » Lack of vehicle ownership
  - » Avoid Traffic/Congestion
- **Convenience**
  - » Affordable, Efficient, Reliable, Convenient, and a Necessity
- **Connectivity - With others and to opportunities**
- **Opportunities for Improvement**
  - » **Equitable Access** - bus routes and shelters, ADA compliance
  - » **Safety** - Crime/COVID precautions
  - » **Negative Perceptions** of oversight by government and room for improvement

When asked what public transportation was used for, participants responded with a wide variety of uses, from 'essential' trips such as grocery shopping, healthcare, and immigration services, and leisure/non-essential trips, like visiting parks or family.

> *"When I think about public transportation, I'm thinking like all the different various ways that we could get around."*

> *"But when it comes to transportation, I think about time and the ability to get where you need to go quickly ... and sometimes, public transportation does not offer that."*

Participants were asked specifically about whether or not they continued using public transportation during the pandemic, and their reasoning for their decisions. We received interesting variances in answers depending on the community; see below.

- **In Sharpstown**, nearly all of the participants discussed continued use of public transportation throughout the pandemic for essential trips such as commuting to work and accessing healthcare.
- **Most Kashmere Gardens-Greater Fifth Ward** participants explained that they stopped using public transportation due to COVID-related safety or cleanliness concerns. One participant mentioned that they had largely switched to using the rideshare service Uber.
- **Participants from Third Ward** gave answers similar to those from Fifth Ward: most who previously used public transportation prior to the pandemic stopped out of fear of COVID. Some specifically cited non-compliance of COVID precautions (masks, social distancing) from other riders; others cited lack of sanitary measures such as making hand sanitizer available on buses/trains. Other participants explained that they did not need to use public transportation anymore because they could work from home or that they had no reason to go out.

> *"We use buses for everything in my house, whatever it might be."*

Facilitators then asked participants if they were planning on using public transportation again in the future, under any circumstances.

- **In Sharpstown and Third Ward**, nearly all participants stated that they would use public transportation again in the future (if they weren't already still using public transportation). However, most agreed that they would like to see additional COVID precautions in place, such as masks, sanitizing stations, and enforced social distancing. Participants in these two communities also explained that improved service - increased reliability, comfort, accessibility, frequency, and greater range of service - would all encourage them to use public transportation more.
- **Interestingly**, most Fifth Ward participants claimed they were not planning on using public transportation in the future. One community member said they would, but also explained that better access was needed for bus and light rail.

> *"I think we have much room for improvement. They are trying but public transportation needs to be equitable for us, who may have a disability ... to be able to navigate timely and efficiently to and from".*

> *"I think if we continue to take precautions, both the passengers and the drivers, public transportation can still be used comfortably with masks, sanitizer, and by keeping the distance as much as possible."*

Facilitators shifted the conversation to discuss potential benefits of using public transportation. When asked, participants identified the following as potential benefits of using transit:

- **Improve air quality**
- **Avoid traffic and congestion**
- **Reduce air pollution**
- **Affordable/Saves Money**
- **Environmentally Friendly**
- **Meet people/socialize/attend events**
- **Reduce stress**

When asked explicitly about connections between public transportation use and air quality, participants responded that they believed using public transportation instead of passenger vehicles yielded definite air quality benefits and generally was a more environmentally sustainable option.

> *"One of the reasons people should use public transportation instead of driving is to help reduce asthma, climate change, and fatalities on the road."*

Finally, respondents were asked what changes to transportation could improve air quality. They gave the following responses:

- **Use electric/hybrid options for METRO or rapid transit**
- **Use carpool options**
- **Use Park & Ride**
- **Limit the number of cars on the highway**
- **Use alternative fuels options**
- **Move from buses to rail (trains)**
- **Provide rideshare options**
- **Reduce car/diesel emissions**
- **Enhance connectivity of public transportation options that connect to each other**

"Public transportation actually improves it (air quality) ... the advantage is that a public bus can carry 30 to 40 people. I think it's like 10 to 15 cars that wouldn't be polluting, so it decreases air quality problems."

"We need to go to more electric kinds of things ... electric cars, shared rides, and a transportation system that goes throughout the whole city and not just for certain people ... we're talking equity."

Findings from the focus groups suggest that community participants without access to a vehicle continued using public transportation for work purposes. Participants also reduced usage because of COVID fears and limited places to visit. Issues related to safety and equitable access were more enhanced with the pandemic. Participants voiced concerns related to COVID-19 precautions, such as, cleanliness, lack of access to hand sanitizer, masks, and social distancing enforcement on buses/rail. Additionally, concerns related to equitable access to efficient (timely) bus/rail routes and safe bus shelters were emphasized. People of color communities have historically shown a desire to utilize public transportation. Community participants in this project also voiced a willingness to use public transportation in some communities, in spite of COVID concerns. Therefore, education and solutions related to reducing barriers to public transportation use, such safety, efficiency and reliability should be provided for local decision makers and METRO.

Stakeholder interviews

1. **Council Member David Robinson**, City of Houston, At-Large 2
2. Houston METRO Executive Leadership Team
    a. **Tom Lambert**, President and CEO
    b. **Clint Harbert**, Vice President of System and Capital Planning
    c. **Tracy Jackson**, Media Manager
    d. **Tanya McWashington**, Vice President of Public Engagement
    e. **Kurt Lurhson**, Vice President of Bus Operations
    f. **Andy Skabowski**, Executive VP and COO
3. **David Fields**, Chief Transportation Planner, City of Houston
4. **Bryan Brown**, Senior Transportation Planner, Harris County
5. **Bill Fulton**, Executive Director, Rice Univerity's Kinder Institute for Urban Research
6. Chicago group:
    a. **Jacky Grimshaw**, Center for Neighborhood Technologies
    b. **Lynda Lopez**, Active Transportation Alliance
    c. **Olatunji Oboi Reed**, Equiticity
    d. **Roberto Requejo**, Elevated Chicago
    e. **Marly Schott**, Elevated Chicago
7. New York Group:
    a. **Betsy Plum**, Riders Alliance
    b. **Danny Pearlstein**, Riders Alliance
    c. **Philip Miatkowski**, Transportation Alternatives
    d. **Erwin Figueroa**, Transportation Alternatives
    e. **Chris Van Eyken**, TransitCenter
    f. **Colin Wright**, TransitCenter

In order to achieve a greater understanding of how the pandemic impacted our region, we interviewed a number of individuals and groups at a 'stakeholder' level, e.g. individuals leading or part of municipal governing bodies, transportation agencies, or research entities that focus on transportation or play a direct role in transportation systems in our region. Our goal was to gather perspectives from these leaders and policymakers to provide more context around the issues the region faced during the height of the pandemic and how they responded. Since the end product of this report is a series of policy recommendations, we were also hoping to catch a glimpse of how these policymakers plan to adapt to a post-pandemic reality.

Interviewees were asked a series of questions exploring their perspectives of the pandemic and its impacts from their roles as elected officials, agency heads, etc. Questions and answers are summarized below.

We began each interview by asking: **From your and your organization's perspective, how did the pandemic impact our region? Will these changes be permanent?** There were a few common themes in our stakeholders' answers to this question: huge dropoff in use of all modes of transportation, but with distinct outliers; the highlighting of existing social and economic inequities in our region; and uncertainty about the future of mobility in our region.

As nearly all of our interviewees pointed out, transportation use fell off during the opening months of the pandemic and hasn't returned to pre-pandemic levels yet. According to METRO CEO Tom Lambert and his team, they saw about half of their local bus and rail ridership disappear; Park and Ride ridership fell by 85-90%. VMT in

Photo: Trong Nguyen / Shutterstock.com

Harris County dropped by 75%.

However, as several interviewees clarified, this was not the case for all residents in our region. “There are at least two segments of the traveling population right now: those who have more autonomy in their travel decisions...and those who, for one reason or another, never stopped traveling,” said City of Houston Chief Transportation Planner David Fields. While there are a number of factors that potentially impacted Houstonians’ day-to-day transportation choices through the pandemic, we can say confidently that one’s job and economic status played heavily into these choices. As we saw in regions across the US, individuals considered ‘essential workers’ in the Houston region were more likely to rely on public transportation as their primary mode. When discussing this trend, Bill Fulton explained that office workers are better paid, more likely to be white, and have better job security. Workers who must work on site are lower paid, less likely to be white, and are more at risk to lose their job and contract COVID. So, while public transit ridership and passenger vehicle usage went down dramatically, transit remained a lifeline for essential workers.

Many of the stakeholders expressed uncertainty about the future of mobility in the region. Lingering fear of the virus and discomfort with returning to ‘normal’ behavior and functioning may delay a return to pre-pandemic travel patterns. Many employers have not returned to work, and some may institute remote work or hybrid models long-term. As of this writing, vehicle traffic has begun to return to pre-pandemic levels, but we cannot say for certain if this trend will continue or what kind of behavior changes adopted over the past year will become permanent. When asked how they might adapt to these changes, David Fields answered that local transportation planners have to shift their thinking on policy: “Every single person driving every single day...is no longer our starting point.”

Others, such as Robinson and Fulton, expressed some optimism about this being a moment to rethink regional mobility. Robinson highlighted his leadership role on the region’s executive transportation policy body, the H-GAC’s Transportation Policy Council (TPC), and noted that the TPC may be a potential avenue for implementing a shift in policy and investment. Referencing a 2019 effort to reconfigure the region’s project investment criteria to better support multimodal infrastructure like sidewalks and bike lanes, he explains that the region is in a prime position to move towards more sustainable, equitable transportation investments.

Fulton pointed out the new Biden administration, which campaigned on sustainable infrastructure investment, as a potential force for change. Biden and his allies

had already signaled a much more transit-friendly transportation agenda by the time we had conducted this interview in February 2020; some weeks later, the administration unveiled a multi-trillion dollar infrastructure package that would deliver on this agenda, at least in part. Fulton called greater investment in transit "a necessity in the long run."

Lambert expressed similar sentiments about the necessity of funding. Through 2020, METRO saw a drastic decrease in their sales tax receipts; Lambert explains, "sales tax is a significant amount of revenue that METRO brings in that supports not only our operations, but our efforts towards capital projects." METRO is unique among major US transit agencies in that its farebox revenues is not its chief source of financing. However, as is the case with many transit agencies across the country, METRO is scraping for resources and is looking towards non-traditional funding sources. "We're very interested in the opportunities to receive more state funding. The reality is transit has not received state funding in the State of Texas. You're hearing more and more people now talking about the opportunities to flex funding in the state," said Lambert. Many transportation advocates argued the state should have been funding public transit in Texas even before the pandemic; now, it may be even more crucial to maintain transit as a public service. Mr. Lambert concluded the interview by saying "We've come to realize that as communities have to adjust to critical things, transit has to adapt to serve communities." Policymakers must provide METRO with the resources necessary to make adaptations for the community.

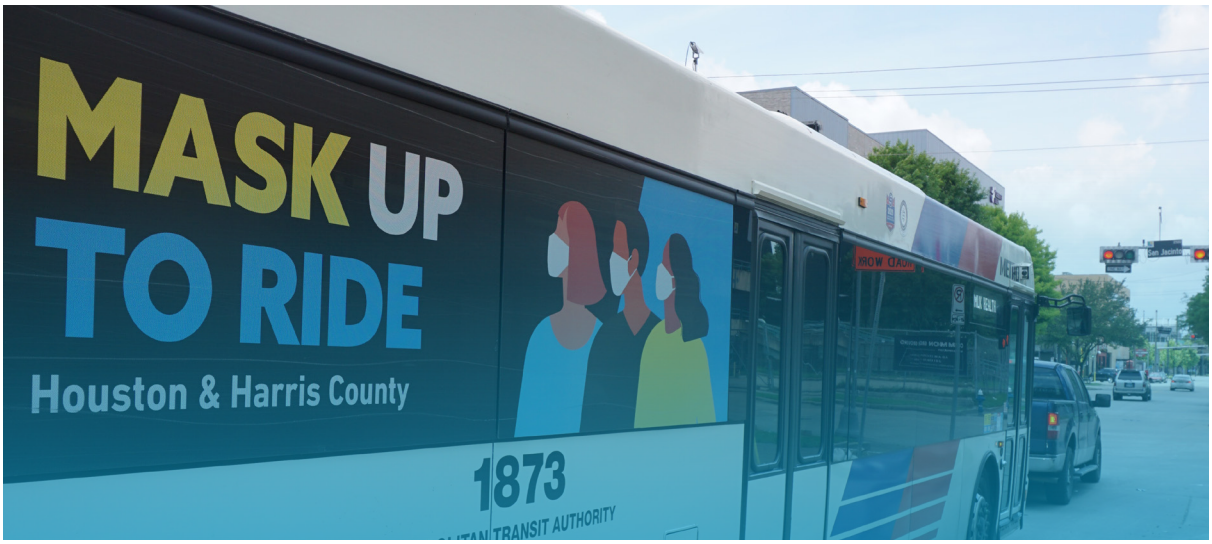
We asked a similar set of questions to two sets of transportation advocacy groups - one set from New York, one set from Chicago. Not surprisingly, these cities saw similar changes in travel patterns. When asked about the biggest impact of COVID on transportation in Chicago, Lynda Lopez of Active Transportation Alliance replied, "The ways it changed the workforce, and how the workforce moves in the city and the region. And who kept going to work, in person, versus working remotely. We definitely saw drastic ridership declines, especially on rail." This mirrors a similar observation of the workforce divide pointed out by Fulton in Houston. Olatunji Oboi

Reed, leader of Equiticity in Chicago, spoke to the "three way intersection" of challenges Chicagoans faced:

"So you have COVID, which, you know, Black and brown people bear the brunt of. Then you have this focus on essential workers in our region, who are all mostly Black and brown. Then you have those two things intersecting with income. In Chicago, the poor people are Black and brown. Because of that, financially not in a position to consider other modes of travel. And because of that, when they do stretch themselves financially for other modes of travel because they don't feel safe in transit, that has a much greater impact on their finances as opposed to wealthy people. So, for me, what it exposed was the dearth of options for people beyond transit."

Similar to what we observed in Houston, the brunt of the direct and indirect impacts of the pandemic fell on Black and brown communities.

The New York groups noted similar patterns, and perhaps have a deeper divide when it comes to transportation options available to its working class residents. As the pandemic set in, New York City saw a precipitous drop in subway ridership (although bus ridership was not as impacted). Betsy Plum, executive director of the Riders Alliance, explained that higher income residents are much more likely to own a car and have the option to commute and travel alone; conversely, roughly 5 million people in NYC proper do not have cars and depend on the subway and bus systems. Many New Yorkers were hit with the dilemma



of wanting to protect themselves from COVID but still relying on public transit.

The Chicago groups explained the specific difficulties their communities faced with transportation and healthcare during the pandemic. According to Jacky Grimshaw of Center for Neighborhood Technology (CNT), most COVID testing sites were car-oriented and as a result, much more difficult to access for residents using alternative modes. It took some time before local officials created more accessible testing sites. Houston faced almost the exact same issue: testing sites propped up in locations like NRG Stadium were nearly cut off from anyone traveling on foot.

Both the New York and Chicago groups expressed concern about the future of multimodal transportation in their respective cities for varying reasons. Both the MTA and the CTA rely more heavily on farebox revenue, which took a hit when ridership dropped off. Just as METRO CEO Tom Lambert mentioned during our interview, the two groups explained that the emergency funding packages passed by Congress helped some, but more consistent sources of funding are needed to maintain their services. Roberto Requejo of Elevated Chicago spoke to the specific need of ensuring affordable housing around existing transit networks. While Chicago already has an extensive transit network, ensuring affordable development around its transit is an issue, particularly now considering COVID's disproportionate economic impacts on working class communities.

Through these conversations with advocacy groups in Chicago and New York City, we are able to draw some similarities in the challenges faced by our respective cities during the pandemic. It seems almost universally true that working class neighborhoods and communities of color were hit hardest by COVID in a variety of ways, from higher case counts to greater economic insecurity. 'Essential workers,' who suffered increased risks being exposed to the virus in order to keep their jobs, came from these neighborhoods and often relied on transit. The question of how to secure the future of transit as a public service seemed universal, as well. Each of the individuals we spoke to agreed that reliable, accessible public transportation is quintessential to millions in their cities; ensuring we maintain and even improve these services is a common goal in spite of the pandemic.

Policy Recommendations

Federal and state government must expand funding to support public transit as an essential service for people and the broader economy; the additional funding should allow flexibility for application to both capital and operating expenses.

- Public transit is an essential service that many of the most vulnerable rely on for basic needs. The pandemic highlighted and deepened many of the stark socioeconomic and racial inequities, and further proved transit's indispensability as a public service.
- Reducing vehicle emissions is an essential step in improving air quality and curbing climate change-causing greenhouse gas emissions; mode switch to public transit is an urgent component of this effort. In 2014, Texas produced 175 million metric tons of CO2e, or carbon dioxide equivalent, from on-road and fuel-cycle emissions. This accounted for .49% of total global greenhouse gas emissions alone.[24]
- While increased public transit use is a primary strategy for reducing total mobile emissions, residents also expressed a desire to see 'greener' strategies within public transit. METRO should work towards replacing its fossil fuel fleet with electric buses.
- Currently, METRO receives no operational funding and no dedicated funding for capital improvements from the state of Texas. At the federal level, funding is heavily weighted towards road and highway improvements, although legislation introduced in March 2021 would shift these allocations. The State must first remove the barriers to providing funding to public transportation authorities in large urbanized areas, then reevaluate it's funding priorities.
- During the 87th Session of the Texas Legislature, two resolutions were filed to allow state transportation funds to be used on multimodal infrastructure projects: House Joint Resolution 109, and its companion Senate Joint Resolution 40. As of April 2021, HJR 109 had been heard in the House Transportation Committee; SJR 40 had not been scheduled for a hearing. The goal of these pieces of legislation - to change the constitutional language on state transportation funds that limits it to use on highways - is essential to improving the funding landscape for public transportation.
- Alternative or unorthodox sources of funding should be pursued at a community level to support priority community infrastructure projects immediately.

Local, regional, and state-level planning entities must reorient their planning priorities to address changes in behavior brought about by the pandemic to meet current and future transportation demand, most specifically for people walking, rolling, biking, and riding local transit to affordably reach opportunity.

- Transportation policy makers cannot treat transportation infrastructure as if it lives in a vacuum, and investments cannot be decided on isolated metrics without considering the greater context. Transportation infrastructure is more than just the means from Point A to Point B; it plays a large role in everything from our social and civic lives to our personal health and well-being. Policymakers must view our transportation systems holistically and prioritize investments accordingly. Transportation investments and land use planning should be restructured around long-term regional goals and values, such as eliminating traffic deaths or cutting mobile emissions by a certain amount, and should take into account a much broader set of project criteria. The regional MPO, the H-GAC, has a long range plan that purportedly follows this model - the Regional Transportation Plan (RTP). However, the current goals are not nearly comprehensive enough and do not adequately consider impacts on a number of factors like public health, environmental sustainability, and environmental justice. Council Member Robinson alluded to recent changes made to project scoring criteria, but these changes do not address the structural inadequacies of our regional planning.
- Infrastructure and land use planning must shift towards a more community-led model. Currently, most transportation projects in our region do not engage community members to discuss project needs, potential impacts, or design feedback until late in a project planning and execution cycle. This often results in poorly planned projects that do not adequately address the real needs of the community it's intended to serve, or is implemented in a way that is unnecessarily detrimental. Community-focused planning that incorporates input early on in the process may address these issues.
- The pandemic acted as an unique opportunity to observe different travelling conditions, and we must take these observations into consideration. For example: during the beginning months of the lockdown, VMT dropped off and cars could travel at free flow speeds, the stated goal of many transportation investments (See TTI's Urban Mobility Report). While cars were able to drive faster, deadly crashes skyrocketed, bringing into question whether or not Level of Service is an appropriate metric to base entire funding schools of thought around.
- Environmental sustainability goals and social equity goals of infrastructure projects should continue to be aligned with other complimentary transportation policy goals, such as Vision Zero. These distinct goals often have overlapping strategies; making the case of increased return on investment should be standard for policymakers.

METRO must restore services to pre-COVID levels, continue to equitably implement service improvements in the METRONext plan, and partner with other public and private entities on a public information campaign to educate and reassure the public and riders.

- Residents in each of the three study communities expressed a desire to see METRO expand its services to reach more areas and become more efficient and reliable. METRO stated that they are planning moving forward with METRONext despite temporary setbacks due to the pandemic. Ideally, as these projects roll out, residents will see services improve; however, METRO and its supporters should continue to seek out additional funding sources and improve services to ensure public transportation remains a viable option for all residents.
- Equity in distribution of bus routes, stops, future investments, etc.
- Residents in each community expressed concern over exposure to COVID on public transportation. Research suggests that using public transportation did not pose an extraordinary risk compared to other modes, but fear and wariness of the virus will likely linger within the public consciousness for some time. METRO should continue to actively seek out opportunities to educate the public on the risks associated with riding public transit. METRO might see more success with an education campaign if taken in partnership with other local entities who share an interest in ridership returning, such as the City of Houston and Harris County.

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