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Transportation Access to Health Care During the COVID-19 Pandemic: Trends and Implications for Significant Patient Populations and Health Care Needs

August 2020

UCLA Institute of Transportation Studies

Report No.: UC-ITS-2021-11 | DOI: 10.17610/T6RK5N

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UC-ITS-2021-11	N/A	N/A

4. Title and Subtitle	5. Report Date
Transportation Access to Health Care During the COVID-19 Pandemic: Trends and Implications for Significant Patient Populations and Health Care Needs	August 6, 2020
	6. Performing Organization Code UCLA-ITS

7. Author(s)	8. Performing Organization Report No.
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9. Performing Organization Name and Address	10. Work Unit No.
Institute of Transportation Studies, UCLA 3320 Public Affairs Building Los Angeles, CA 90095-1656	N/A
	11. Contract or Grant No. UC-ITS-2021-11

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
The University of California Institute of Transportation Studies www.ucits.org	Final Report (June 1 - July 31, 2020)
	14. Sponsoring Agency Code UC ITS

15. Supplementary Notes

DOI: 10.17610/T6RK5N

16. Abstract

Since March 2020, COVID-19 transportation system disruptions have altered how Americans access routine health care. This report examines current knowledge about disparities in transportation and access to health care for people with various health conditions and health care needs. We highlight evidence related to end-stage kidney disease, pregnancy, cancer, mental health and substance use, disabilities, multiple chronic conditions, and preventive care to discuss population-specific transportation needs and challenges, COVID-19 health risks, and impacts of transportation system disruption on health outcomes during the pandemic. The report concludes with policy recommendations for how leaders in transportation, public health, and health care can improve transportation access to care during the COVID-19 pandemic.

17. Key Words	18. Distribution Statement
NEMT, access to care, health care, literature review, vulnerable populations	No restrictions.

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	68	N/A

Form DOT F 1700.7 (8-72)

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Acknowledgments

This study was made possible through funding received by the University of California Institute of Transportation Studies from the State of California via the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The authors would like to thank the State of California for its support of university-based research, and especially for the funding received for this project.

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Table of Contents

Table of Contents

List of Tables

List of Figures

Executive Summary

Executive Summary

Delaying or forgoing health care can lead to devastating health outcomes. Since the onset of the Coronavirus disease 2019 (COVID-19) pandemic, American health care utilization has dramatically shifted, and many transportation systems have been disrupted.

In response to new and emerging health risks, social distancing recommendations, economic hardship, public transit service cuts, and health facility closures, Americans have changed how they access health care during the pandemic. According to the U.S. Census Household Pulse Survey, at least 40% of people have delayed health care because of COVID-19.[1]

Transportation challenges are a well-documented barrier to health care access. During the COVID-19 pandemic, these challenges have been amplified. Major transportation-related changes during the pandemic include concerns about the safety of relying on people outside one's household for rides, changes in public transportation service, and interruptions in reduced-cost shared-ride programs. Other consequences of COVID-19, such as job loss, residential moves, and changes in how and where health care is offered, have also impacted how people travel to health care. The pandemic's effects on transportation is likely to disproportionately impact people with certain health conditions and health care needs, with important implications for health equity.

In response to these evolving trends, this report synthesizes the current knowledge about transportation disparities in the setting of the COVID-19 public health emergency. To illustrate these concepts, we report data on transportation needs, COVID-19 impact, and health care and transportation interventions across seven specific categories of health care needs.

The seven categories of health care needs highlighted in this report are overrepresented among people with transportation challenges and/or have been shown to be amenable to transportation interventions. They include: (1) dialysis for end-stage kidney disease, (2) prenatal care, (3) cancer care, (4) mental health care and substance use treatment, (5) health care for people living with disabilities, (6) health care for people with multiple chronic conditions, and (7) preventive care.

Three key themes emerged from this review:

1. **Compounding Inequity**
   Structural inequality contributes to compounding socioeconomic and health burdens. The same disadvantaged groups (especially Black, Indigenous, and people/communities of color and low-income people) who face elevated risks for many health conditions are also more likely to experience the transportation barriers that prevent them from accessing care. In addition, these groups are most threatened by both the health and economic impacts of COVID-19. These intersecting disparities converge to continuously over-burden the same communities. Interventions that overcome transportation barriers to health care access can improve population health and health equity in the long term.

2. **Importance of Rides from Others: NEMT, Paratransit, and Informal Support Networks**
   Non-emergency medical transportation (NEMT) and paratransit are safe and feasible ways to transport people who are unable to drive themselves to health care, especially during the pandemic. The number of people eligible for NEMT via Medicaid is expected to increase during the pandemic as a result of widespread economic hardship and new transportation system disruptions. Efforts to increase the reach and service capacity of NEMT and paratransit programs may needed. Notably, in California and the four other states where Medicaid enrollment has not grown during the pandemic,[2] efforts to expand NEMT access must include efforts to increase Medicaid enrollment. While the tenuous transportation funding environment presents challenges, it is important to recognize that transportation interventions are cost-effective for society at large.[3] For medically vulnerable people who rely on rides from others, ensuring that these services remain viable and even grow is critical. Care must be taken to ensure that rides from friends and family can be offered safely or replaced by alternate modes during COVID-19.

3. **Risk/Benefit Trade-Offs**
   There are significant risks and benefits associated with all trips to health care during the COVID-19 pandemic. For individuals, the risk of contracting COVID-19 can be devastating, but missing health care can also lead to serious or life-threatening outcomes. For communities, more trips to care can lead to both health hazards (e.g. COVID-19 transmission and vehicle emissions) and benefits (e.g. economic support for critical transportation programs and community health centers). Health care is ahead of transportation agencies in developing risk/benefit tools to weigh the trade-offs between individual patient factors, community COVID-19-transmission factors, and health system factors. Transportation factors may merit greater attention in these tools.

Informed by these key themes, the final section of this report outlines policy implications and specific examples related to the following imperatives:

1. **Increase access to transportation services** through more screening, streamlined and expanded eligibility, novel funding mechanisms, and flexible and creative service delivery solutions.

2. **Ensure equitable priority-setting** by developing tools and frameworks to help individuals, transportation agencies, health systems, and policymakers weigh risks and benefits related to health and transportation.

3. **Advance systems change and cross-sector collaboration** to combat structural racism and jointly address cross-cutting social challenges.

These strategies can support the work of transportation planners, public health officials, and health system leaders working to improve equitable transportation access to health care during the COVID-19 pandemic and in future public health emergencies. By better understanding and providing for people and populations that are most in need, transportation barriers to accessing health care can be reduced for all.

Contents

Introduction

Nearly 6 million Americans delay or forgo health care each year because of transportation difficulties.[4] In early 2020, the Coronavirus disease 2019 (COVID-19) pandemic, a public health emergency caused by the SARS-CoV-2 virus, abruptly disrupted transportation systems and transportation patterns on a global scale, with far-reaching impacts on how we live, work, learn, and access important needs such as health care. By June 2020, over 40% of U.S. adults reported that they had delayed health care due to COVID-19.[1] Decreased use of health care can have serious and life-threatening health consequences. During the pandemic, a chilling drop in the number of people seeking emergency care for heart attacks—a serious but often treatable condition—may have contributed to increased rates of cardiac arrest and death.[5–7]

New and shifting transportation challenges related to COVID-19 have important implications for access to health care. Health systems and health insurers have responded to COVID-19 by deferring non-emergency medical procedures and replacing in-person appointments with video or telephone visits, which reduce patient travel burden and minimize physical contact between patients and health care providers. However, for people who still require in-person health care, COVID-19's effects on transportation may lead to significant disruptions in care, especially for people with certain health conditions and health care needs. Furthermore, this disruption may be particularly acute for the most medically and socioeconomically vulnerable populations, who already face the greatest burden of transportation disadvantage at baseline.[8]

The goal of this white paper is to examine the impact of the COVID-19 public health emergency on transportation to non-COVID-19-related health care. We highlight select populations that may be especially susceptible to transportation-related barriers to care during the pandemic in order to motivate responses tailored to the needs of these groups. We also analyze strategies to ensure that transportation does not become an even larger barrier to care during and after the pandemic. Lessons from the current pandemic may be relevant to future public health, safety, or climate disasters with similar disruptions to the transportation system. This work is intended to help policymakers, transportation leaders, health insurers, health care systems, and clinicians collaborate to ensure access to care during the COVID-19 pandemic and to advance equity in transportation and health care in the long term.

Report Overview and Scope

In Section I, we define access to care and review existing literature about transportation disparities. In Section II, we consider the ways in which COVID-19 has directly and indirectly altered transportation systems and travel behaviors. In Section III, we examine specific patient populations for whom accessing care may be particularly challenging due to the transportation impact of COVID-19. In Section IV, we identify research needs for advancing knowledge on this topic. Finally, in Section V, we summarize key themes and provide transportation policy recommendations to improve access to health care during the current pandemic and beyond. The findings in this report are not meant to be exhaustive, but rather exemplary of current needs and recommendations. Of note, precautions for safe transportation of patients with confirmed or suspected COVID-19 have been described elsewhere[9,10] and are outside the scope of this report.

I. Access to Care and Existing Transportation Disparities

Defining Access

In health care,[i] access refers to the availability of adequate health services and the ease and timeliness with which people can use those services.[11] In this context, access includes not just transportation but also health insurance coverage and engagement in the health care system. In transportation, access is defined by the relative ease of getting to opportunities.[12] Opportunities are broadly defined and encompass destinations such as jobs, essential services, school, or the grocery store.

Physical accessibility for people with disabilities as codified in the Americans with Disabilities Act of 1990 is an important component of access overall. However, this report focuses on the transportation field's broader concept of access to opportunities. Transportation access is a well-documented barrier to health care access.[4,13,14] Where people live, the transportation opportunities they have at their disposal, and whether they have health care nearby are all shaped by current and historical policy priorities and policy implementation.

Transportation Equity and Health Equity

Transportation challenges are shaped by structural factors that also influence the distribution of health risks, opportunities, and outcomes across populations. People who have the highest needs in transportation and whose needs are most often not met tend to be the same groups of people who are commonly underserved in their health care needs. Income, immigration status, gender, and physical ability, among others, are individual-level attributes through which political, economic, and social systems determine transportation and health care access.

Racism, for Black people especially, is also a structural factor that plays a major role in creating and perpetuating cumulative disadvantage that restricts access to transportation and contributes to worse health outcomes.[15] Structural racism intersects with all of the risk factors for transportation disparities that we describe in this report.

Existing Transportation Disparities

In order to consider overcoming transportation barriers to health care access, it is important to understand circumstances and social identities that are essential predictors of one's transportation experience. **Table 1** summarizes trends from research based on the National Health Interview Survey demonstrating how identity and geography shape travel patterns. **Table 2** summarizes important findings from other data sources. These identities intersect in various ways with the health care needs addressed in Section II.

[i] We use the term "health care" to refer to services that people receive to prevent and treat illness, including but not limited to medical care, dental care, vision care, nursing, pharmacy services, physical therapy and nutrition.

Table 1. United States Mobility Trends Observed from the National Household Travel Survey

Group	Mobility trends
Women[16–18]	• Greater complexity in travel patterns (trip chaining), especially among single-parent households with young children • Higher proportion of non-work trips and travel during mid-day periods • Lower bicycle use
Lower-income households[16,19–23]	• Lower number of trips/day • Higher public transit mode share and lower levels of car ownership • Under-represented in ride hailing trips • Higher amounts of walking for shopping trips • Highest carpool-to-work rates
Black Americans[20,24]	• Highest public-transit-to-work rates, highest levels of walking trips • Most underrepresented in ride-hailing trips • Higher rates of inter-household carpooling
Immigrants[ii, 25]	• Higher rates of household carpooling • Higher rates of transit use, followed by assimilation away from transit
People with disabilities[26–28]	• Fewer trips per day • Fewer trips by car (driver or passenger) than other non-disabled people • More likely to live in lower-income households • Higher use of public transit and paratransit • Greater need for high-quality pedestrian environment
Older adults[16,19,22]	• As age increases, declining number of trips per day • Higher levels of disability and concern for personal safety and security • Lower rates of driver licensing and driving
Rural populations[29]	• Higher rates of auto ownership, even among poor households • Rural transit use is extremely low but most common among Hispanic rural households

[ii] This includes authorized, temporary, and undocumented immigrants.

Table 2. Important Mobility Trends from Other Data Sources

Group	Mobility trends
Black Americans[30–32]	• Black people are more likely to fall victim to police violence while traveling • Black pedestrians are at greater risk of being hit by a car while walking • Car insurance premiums are higher in predominantly Black communities • Increase fear of experiencing racial discrimination while traveling
Women and transgender people[33–35]	• Women have more safety concerns about public transportation and travel at night • Transgender people are especially vulnerable to gender-based harassment on public transportation
People experiencing homelessness[36]	• More likely to use multiple modes of transportation on a given day • Most public transit-dependent population

II. Early Impact of COVID-19 on Transportation and Health Systems

This section evaluates key ways in which COVID-19 has impacted transportation and health systems as of mid-July 2020. The virus is still spreading throughout the U.S., and the pandemic's impact is changing day by day.

Job Loss and Insurance Coverage

As of May 2020, COVID-19 has caused the loss of around 25 million jobs, including 3 million in California alone.[37] Since the United States is heavily reliant on employer-based health insurance, many Americans who have lost their jobs due to the pandemic have been left without health insurance coverage. Government programs like Medicare and Medicaid have worked to connect people to coverage during the pandemic,[38] but many Americans remain uninsured. Additionally, COVID-19 has exacerbated and created new financial hardship for many people due to job loss, business closures, and housing affordability challenges,[37,39,40] making health care expenses increasingly burdensome during the pandemic.

Changes in Where People Live

Due to job loss, economic insecurity, and the transition to remote learning in most levels of education, COVID-19 is playing a major role in spurring residential moves. About 3% of Americans have moved because of the pandemic.[41] These moves have been most common among young adults (18-29), who are most affected by both job loss and the shutdown of on-campus housing. In some cases, residential moves might improve transportation opportunities, such as for a college student returning home to new access to a car. On the other hand, moves can create new difficulty with transportation to health care for people who move away from in-network health care providers and familiar transportation networks.

Changes in Transportation Services and Use

Transportation system changes due to COVID-19 are one of the main motivations of this paper. COVID-19 has dramatically shifted the structure of the economy, but it has also adversely affected ridership and revenue of transportation systems. While there is no consensus on how long the travel behavior changes observed during the pandemic will last, it is clear that COVID-19's damage to transportation system revenue will likely impact many aspects of transportation for years to come. The following sections outline changes to both transportation services and use, where data are available.

Personal Vehicles and Driving

Vehicle miles traveled in cars dropped precipitously in March 2020[42] and continued to decline until May 2020,[43] after which they rebounded almost to pre-COVID-19 levels as of July 2020.[44] Closures to Department of Motor Vehicles offices meant some people have experienced delays in obtaining drivers licenses. In California, in-person behind-the-wheel driver license tests were suspended from mid-March through late June 2020 and remain

closed to new applicants. Some car sharing services, like BlueLA, temporarily suspended service at the beginning of the pandemic but are mostly available as of July 2020.[45]

Private vehicles are also central to volunteer driver programs, like Ride and Go and Meals on Wheels, which help people get around and fulfill their basic needs. The pandemic's effect on these programs is unclear. Some programs have pivoted from transporting people to delivering meals or groceries.[46] However, given the reliance on retirees and older adults as volunteers,[47,48] pandemic has likely disrupted these programs by decreasing volunteer driver availability among this population at elevated risk for COVID-19. Similarly, as public health directives urge people to avoid close proximity to people outside their household, the mobility of people who rely on informal support networks for private vehicle rides is likely restricted, as well.[49]

Public Transit

In March, public transit[iii] ridership plummeted in cities around the U.S. as the stay-at-home orders took effect. Declines by as much as 70% were common, with bus ridership falling less than rail ridership.[50] Agencies began cutting service in response to lower levels of ridership and due to issues relating to transit workforce availability. For example, the Los Angeles County Metropolitan Transportation Authority (LA Metro) switched to a modified Sunday service schedule for all days of the week.[51] This change represented a 17-23% reduction in overall transit service for LA Metro. San Francisco cut service on 40% of bus lines in the city.[52] For people who continue to rely on public transit, service cuts mean longer wait times and, where service demand is high, health risks from being unable to physically distance.

Transit agencies are working to keep transportation systems as clean as possible for the safety of both the riders and the operators. Strategies like requiring face coverings (even offering them, in some cases), blocking off seats for greater spacing between passengers, not collecting fares, and boarding through the rear door of buses are being implemented.[53] Service cuts and the health risks associated with travel on public transit are falling disproportionately on poor people of color, who are overrepresented in transit ridership in most US cities. Transit operators and workers face greater occupational risk of contracting COVID-19. In Los Angeles, bus drivers are protesting for hazard pay after four dozen operators contracted the virus, and at least one died from it.[54]

The short-term crisis of public transit ridership threatens to be a longer-term fiscal crisis. LA Metro faces a 2-year budget shortfall of $1.8 billion, of which some $700 million may be offset with support from the federal CARES Act.[55] In San Francisco, the bus lines cut at the beginning of the pandemic could be permanently eliminated if a new source of revenue is not secured. Revenue from various federal recovery efforts, like the CARES Act, will help agencies in the near term. However, in the long run, there is a risk of a negatively-reinforcing cycle in public transit as reduced ridership leads to reduced revenue, which then requires more service cuts, which makes transit a less-appealing option, leading to further declines in ridership. Absent strong and timely public support, public transportation is at risk of becoming another casualty of the COVID-19 pandemic.[38]

[iii] We use "public transit" and "public transportation" interchangeably to refer to fixed-route, mass transit mobility options that are available to the public, such as buses, trains, and subways. Services such as paratransit, which are run and funded by government agencies but are available only on-demand or to restricted populations, are discussed separately.

Paratransit

Paratransit services address a variety of transportation needs, of which travel to health-related appointments is among the most common. Paratransit, which includes van services, on-demand buses, provider-based shuttles, and vehicles for hire, like taxis, is a mandated public service available to people whose physical or medical condition makes it hard to travel by other means.[56] Most commonly, paratransit services are run by local transit agencies.

Paratransit use declined by around 80% at the beginning of the pandemic; it has since recovered to as much as 50% of typical use in some places as of late July 2020. Because transit agencies are only obligated to provide paratransit service within three quarters of a mile of fixed-route public transit, there have been some concerns that paratransit service could decline with bus route cuts. There is no evidence of such cuts at this point in time.[49] Instead, one of the primary ways of COVID-19 has affected paratransit is through changes in eligibility determination processes. Traditionally, an in-person examination is required to determine eligibility and identify the particular type of paratransit service needed. Most transit agencies suspended in-person tests at the start of the pandemic, replacing them with various new methods such as telephone and video verification. Thus far, determining eligibility by phone seems to be an effective substitute for in-person verification.[49] Additionally, some paratransit providers have responded by reduced service use by adding food-delivery services.[57]

Transportation Network Companies

Ride sourcing or Transportation Network Companies (TNCs) like Lyft and Uber are transportation services pre-arranged through an online application that connects paying passengers to people driving their personal vehicles.[58] These services are distinct from taxi services; TNC rides cannot be hailed from the street as with taxis.

As with other forms of transportation, TNCs likely have faced declines in use during the COVID-19 pandemic, although the extent of such changes are not publicly known, given that data from these companies is confidential. Both Lyft and Uber have suspended their shared ride services since March 2020, potentially resulting in access challenges for residents of low-income neighborhoods, who rely on these shared ride services most often.[59] Regardless, every ride in a TNC vehicle is a shared ride between a passenger and driver. Lyft and Uber created new health and safety requirements including mandatory face coverings, guidelines on windows and air circulation, and stipulations that passengers do not ride in the front seat. It is not clear how effective these precautions are or the extent to which the public believes they are effective. As with public transit, the pandemic may result in major long-term changes for TNCs. Both Uber and Lyft have already made major layoffs—25% globally at Uber and 17% at Lyft.[60]

Non-emergency medical transportation (NEMT)

Federal law requires states to pay for non-emergency medical transportation (NEMT) to and from necessary health services for Medicaid[iv] enrollees who have unmet transportation needs.[63] NEMT rides can include either door-to-door service (ambulances, vans, and wheelchair vans) or curb-to-curb service (cars, taxis, buses).

[iv] Medicaid is a public health insurance program that covers low-income adults, children, pregnant women, older adults, and people with disabilities. Medicaid funding comes from federal and state governments, and each state administers its own Medicaid program. Over 64 million Americans were enrolled in Medicaid as of March 2020.[61] Medi-Cal is the name for California's Medicaid program. Medi-Cal covers 13 million (one in three) Californians.[62]

Arranging NEMT sometimes requires certification of need by a physician and/or a potentially lengthy prior authorization process.[64] In 2015, Medicaid provided 59 million NEMT rides to care for low-income Americans.[65] Although some Medicare managed care plans offer NEMT benefits, most traditional Medicare plans and commercial insurance plans do not offer NEMT benefits.[66]

Before the pandemic, TNCs were beginning to enter the NEMT industry.[4] Currently, Medicaid programs in 10 U.S. states have contracted with TNCs to provide NEMT, and a small number of Medicare managed care providers and some commercial insurers have begun to explore NEMT contracts, as well.[4]

With public transportation and multi-passenger paratransit suddenly less in favor because of COVID-19, the appeal of TNCs as NEMT providers has accelerated. Within the first few weeks of the public health emergency, several states, including Florida, Indiana, and South Carolina, rushed to remove regulatory barriers to make it easier for TNCs to provide NEMT.[67,68] Although the decreased volume of in-person visits during the pandemic has temporarily contributed to the declining use of NEMT,[69] there is reason to believe that NEMT demand could increase as the pandemic continues. As people lose their commercial insurance plans along with their jobs, many more people will enroll in Medicaid, making them eligible for NEMT benefits.[64,68]

Walking and Bicycling

Walking and bicycling appear to be on the rise during the pandemic, likely for more recreational than utilitarian purposes.[70–72] Bicycling and walking data are often collected in an ad hoc manner, so the exact magnitude of these changes is hard to pinpoint. A few California cities, like Long Beach, San Francisco, and Santa Monica, publish real-time data from their automated bicycle counters. Data from these counters shows moderate increases in bicycling volume in Santa Monica and Long Beach, with some particularly high-volume days.[73,74] In San Francisco, average monthly bike volumes for 2020 are significantly lower than for 2018 and 2019.[75]

Changes in Health Services

Health Care Facility Closures and the Rise in Telemedicine

COVID-19 has created economic challenges for health care practices that have had to adjust their services and availability as a result of the pandemic. Under the traditional fee-for-service model of health care, in which clinicians are paid by the number and complexity of services provided, reductions in patient volume during COVID-19 are expected to cost primary care clinics over $65,000 per physician, even accounting for recent federal subsidies.[76] A survey from late May 2020 found that nearly half of primary care clinics had to laid off or furloughed workers because of revenue shortfalls, while 1 in 7 primary care offices had temporarily closed.[77]

Primary care clinics are adapting. In a few cases, they have added food and medication delivery into their business models.[78] Many more health care facilities have focused on replacing in-person visits with telemedicine, in which clinicians care for patients via telephone or video calls.[78,79] This transition has been eased by temporary federal regulatory changes that made it easier for providers to be reimbursed for telemedicine visits during the pandemic.[80] With the help of telemedicine, clinic visit volumes have begun to recover since their nadir in late March and early April 2020, but they may have reached a below-baseline plateau.[77,81]

Notably, telemedicine has not been able to reach all patients. In particular, community health centers—which provide safety-net care for low-income and uninsured patients—have had more difficulty implementing

telemedicine.[82,83] Clinics may face prohibitive technology upgrade costs, while patients may experience barriers such as lack of broadband internet access (less of a concern if care is offered via telephone), language barriers, cognitive or physical limitations, or trust concerns.[83,84]

By May 2020, visit volume at community health centers was down by 43%, and nearly 2,000 community health center sites had temporarily closed.[85] For patients who rely on them, these clinic closures may mean longer travel distances to other sites and greater difficulty accessing health care. The changes have fallen most heavily on patients who are low-income people of color, who rely on these community health centers for their care.[86]

Mobile and home care delivery in the context of COVID-19

While a community-based alternatives to traditional health facility-based care existed before the pandemic, new transportation barriers related to COVID-19 have made these options more appealing for patients, especially those who cannot use telemedicine.[87,88] These programs range from mobile clinics and home visits, in which physicians and nurses deliver care in community locations or in the home, to community paramedicine, in which specialized paramedics provide non-emergency care in the home under remote physician supervision.[89,90] In addition to administering COVID-19 tests and caring for patients under isolation for COVID-19, these mobile providers have worked to increase capacity to provide routine care for patients who cannot easily travel to health care facilities.[87,91]

III. How COVID-19's Transportation Impact May Affect Access to Health Care

It is increasingly clear that COVID-19's far-reaching impact on transportation is affecting access to health care for many people. In this section, we illustrate this issue through the lens of specific health conditions and health care needs. Building on earlier work, we identified a sample of health care needs that are significant because (1) they are disproportionately required among people with transportation disadvantages and/or (2) transportation interventions can be cost effective or even cost-saving for addressing those needs.[14,92] While our broad search strategy for this section prioritized academic articles, we also incorporated relevant reports and news articles due to the rapidly evolving nature of the pandemic. We conclude this section by considering additional patient populations that may be particularly burdened by transportation changes during the COVID-19 pandemic.

Highlighted Health Care Needs

COVID-19 transportation system disruptions may have different implications for access to care for people with different types of health care needs. We examine the transportation implications of the pandemic using seven examples of health care needs: dialysis for end-stage kidney disease, prenatal care, cancer care, mental health and substance use treatment, care for people with disabilities, care for people with multiple chronic conditions, and preventive care.

Figure 1 compares the number of people affected by each of the health care needs highlighted in this section to the proportion of NEMT trips made to various types of health care, based on data from trips made in 32 states by one NEMT service provider in 2015.

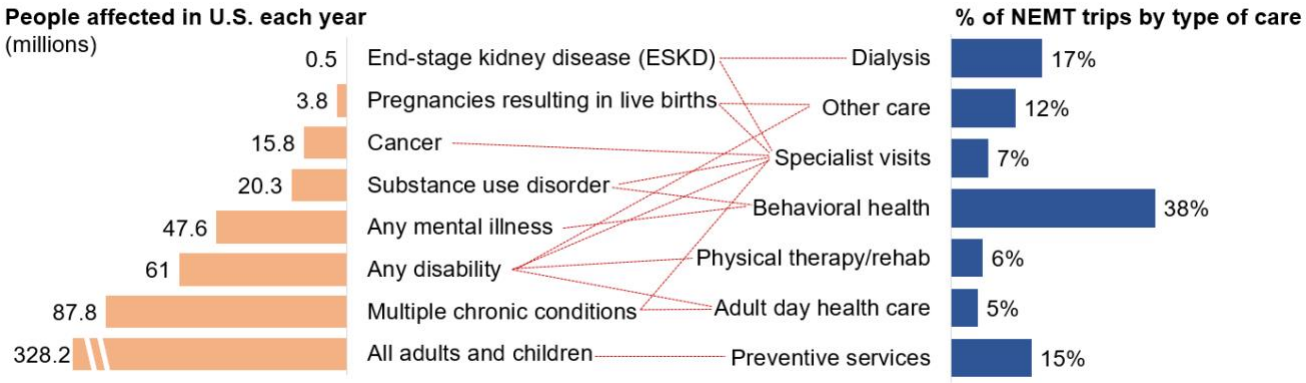

Figure 1. U.S. Prevalence of Selected Health Conditions and Non-Emergency Medical Transportation (NEMT) Trip Destinations. Note: Red lines depict common types of health care (at right) commonly required by people with certain health conditions (at left); the depicted condition/care relationships are neither exhaustive nor universal. Condition prevalence estimates are from various sources;[93–99] NEMT trip frequency obtained from data reported by the Kaiser Family Foundation[64] based on 59 million NEMT trips in 35 states provided by LogistiCare Solutions in 2015.

1) Dialysis for End-Stage Kidney Disease

Background

About 750,000 Americans live with end-stage kidney or renal disease (ESKD), an irreversible stage of kidney damage that must be treated dialysis or a kidney transplant.[100,101] Two thirds of people with ESKD (450,000 Americans) receive a type of dialysis called in-center hemodialysis.[93] These patients must travel three or four times a week to a dialysis facility to undergo a blood-filtration procedure that takes a few hours.[102,103] This adds up to over 300 one-way trips per year for a given individual with ESKD. The remaining patients either receive a kidney transplant, perform nightly peritoneal dialysis at home, or, uncommonly, perform home hemodialysis.[93,102] ESKD is significantly more prevalent among men, African Americans, and older adults.[101,104]

The U.S. spends over 3 billion dollars per year transportation to and from dialysis.[105] Close to half of ESKD patients rely on public forms of transportation (including paratransit) to get to dialysis, while about a quarter drive themselves and one fifth rely on rides from friends and family. Results from a 2017 survey that asked nephrology social workers how their patients traveled to dialysis are shown in **Figure 2**.[106]

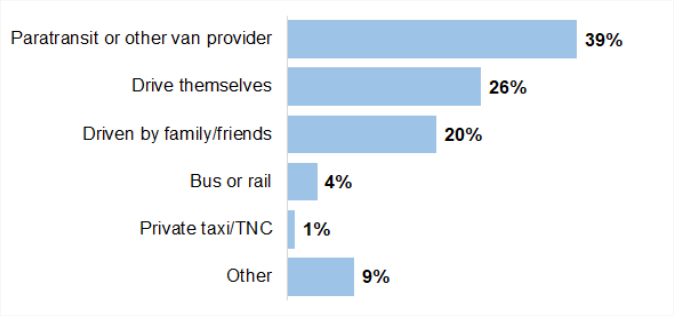

Figure 2. Modes of Travel to Dialysis Reported by Nephrology Social Workers (Adapted from National Academies of Sciences, Engineering, and Medicine[106])

On average, people with ESKD miss 2-10% of their scheduled dialysis sessions.[107,108] Missed dialysis is particularly common among patients who rely on public transportation.[109] These missed sessions can have life-threatening consequences, including increased risk of emergency department visits, hospitalization, and death due to electrolyte imbalances, fluid shifts, and cardiac arrhythmias.[107–109]

COVID-19 Transportation Context and Needs

ESKD causes immune dysfunction that puts these patients at an increased risk for COVID-19 morbidity.[110,111] The transportation burden of dialysis also increases these patients' risk of exposure to the virus. While public health officials have urged people minimize travel during the pandemic, most people with ESKD must continue to travel to dialysis facilities, where they spend several hours each visit in close proximity to other high-risk patients.[112] Some dialysis facilities and paratransit providers have clustered patients into smaller and more consistent groups to reduce infection risk, but these practices remain uncommon.[113]

The impact of COVID-19 on dialysis transportation networks has not yet been described. For the roughly 25% of patients who drive themselves, it is likely that COVID-19 had relatively little impact on transportation to dialysis. However, those who rely on others to drive them may be impacted by changes to the work or childcare schedules

of friends or family. These dialysis patients may also face an increased risk of infection from the driver and the driver's contacts if proper precautions are not maintained.[114] COVID-19 may have had less of an impact on people who rely on scheduled paratransit and NEMT to get to dialysis, although some transportation providers have been affected by driver shortages.[68] Dialysis patients who rely on fixed-route public transit, such as bus and rail services, may have struggled to travel to dialysis because of service reductions, especially early in the pandemic;[115] they may also be more reluctant to travel by public transit due to risk of exposure to the coronavirus.

Notably, although nearly 90% of ESKD patients on dialysis receive facility-based treatment, in-home dialysis treatments (predominantly peritoneal dialysis) are available.[103] In-home peritoneal dialysis is associated with greater patient satisfaction, improved quality of life, lower costs, lower rates of medical complications, and similar mortality risk.[102] Even before the pandemic, several federal initiatives were put in place with the goal of transitioning most ESKD patients to in-home dialysis by 2025.[116,117] The COVID-19 pandemic and the transportation challenges it has created have accelerated the urgency of meeting this goal.

2) Prenatal Care

Background

Prenatal care refers to medical services provided to women during pregnancy until delivery. In a given year, roughly 3.8 million U.S. pregnant women[94] attend a total of 22.5 million prenatal care visits.[118] U.S. obstetric guidelines recommend that most pregnant women travel to medical facilities for 14 or more prenatal care visits for counseling, vaccines, examinations, laboratory tests, and imaging studies.[119] Although the optimal number of prenatal visits is disputed, underuse of prenatal care is associated with increased risk of adverse outcomes such as preterm birth, low birthweight, neonatal death, and postpartum complications.[120,121] Additionally, because most women who become pregnant are relatively young and healthy, prenatal care is viewed as an important opportunity to screen young women for health risks and intervene to prevent future health problems.[122]

Despite a national campaign to improve access to prenatal care,[122] significant racial disparities persist, mirrored by disparities in COVID-19 outcomes. Black women are more than 3 times more likely than white women to die from complications related to both pregnancy[123] and COVID-19.[124] In 2018, only 68% of pregnant Black women and 72% of pregnant Latinx women in the U.S. received "early and adequate" prenatal care, compared to 81% of pregnant White women.[122]

Although there are no national data on modes of travel to prenatal care, lack of transportation is a well-documented barrier to prenatal care. Transportation barriers are especially common among low-income and minority mothers, and they remain a significant risk factor for missed prenatal care even after controlling for race/ethnicity, socioeconomic status, and childcare obligations.[125,126] Pregnant women with transportation barriers have cited excessive transportation costs and lack of rides from friends and family as primary challenges.[127] Additionally, physiologic changes during pregnancy can make physical activity more challenging,[128,129] thus limiting transportation options for women who would otherwise walk, bicycle, or use public transit. Extreme weather and the need to travel with young children may be added barriers to public transit use.[126]

A 2006 analysis estimated that by providing NEMT to women who would otherwise skip prenatal care due to transportation barriers, health insurers would save $367 per pregnancy by preventing pregnancy complications.[3] However, simply providing rides may not be sufficient if other social needs remain unmet. Medical providers tend to overestimate how much providing transportation alone can facilitate access to care.[130]

COVID-19 Transportation Context and Needs

Women seeking prenatal care during the COVID-19 pandemic may be impacted in several ways. First, although evidence is mixed, altered immune responses during pregnancy may put pregnant women at increased risk of severe complications, should they contract COVID-19.[131] Intrauterine transmission of COVID-19 from pregnant mother to child is disputed but may occur in rare cases.[132,133] Given these potential risks, pregnant women may be more reluctant to take trips outside their homes to access prenatal care, especially if they rely upon public transportation or rides from others outside their household. Second, compared to men, women of childbearing age have been impacted disproportionately by childcare obligations resulting from COVID-19 school closures,[134] further complicating transportation options for pregnant women, for whom travel with young children may be excessively taxing.[126] Third, many aspects of prenatal care, like pelvic examinations and ultrasounds, are not amenable to telemedicine.

Even before COVID-19, many clinicians had begun to question the recommended frequency of prenatal care visits.[135] With the COVID-19 pandemic, many obstetric practices have developed new prenatal care protocols that consolidate obligatory in-person services into as few as 5 total in-person visits for low-risk women. These restricted in-person visits are supplemented by telemedicine visits[84,136,137] (**Figure 3**). The pandemic has also accelerated the use of remote monitoring technology, such as home blood pressure monitors and home fetal heart rate monitors.[138–141] However, some of these devices may not be covered by health insurance.[141]

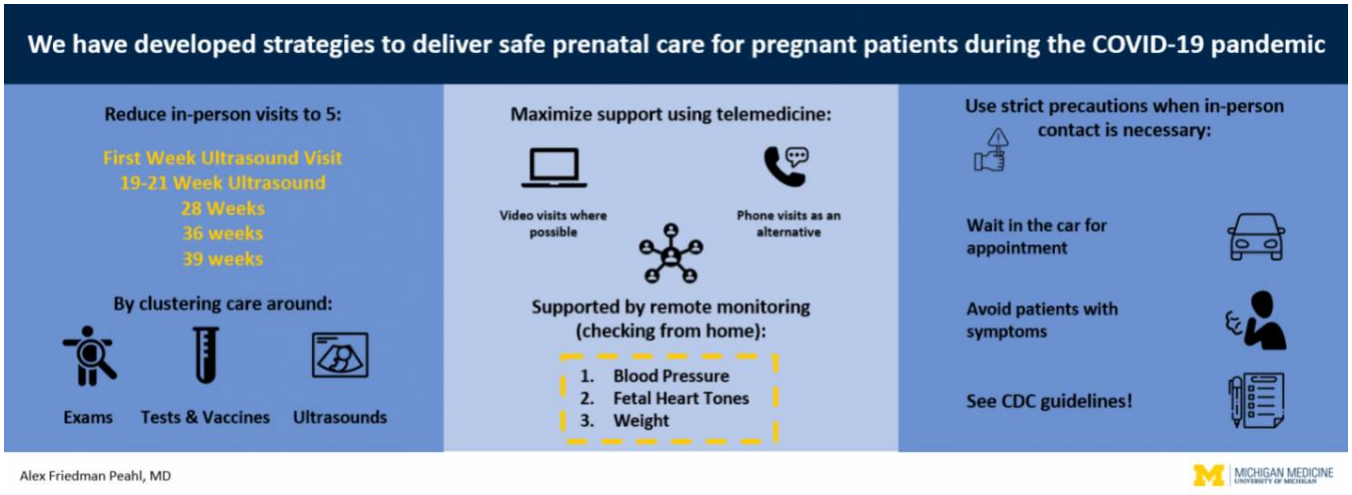

Figure 3: Example of a Novel Strategy for Prenatal Care during the COVID-19 Pandemic (Source: Peahl[142])

Rapidly adopted out of necessity,[143] these pandemic-induced changes to prenatal care delivery have the potential to improve access to prenatal care in the long-term. A growing number of studies have shown that virtual prenatal care is generally safe and well-received by patients and providers.[84,143–146] The American College of Obstetrics and Gynecology advocated for broader adoption of telemedicine for prenatal care[147] and in June 2020 issued a statement urging health insurers to make the temporary COVID-19 telemedicine policies permanent.[148] Whether these changes can reach the most vulnerable women remains to be seen, as women with the greatest transportation needs also struggle to access telemedicine and pay for remote monitoring devices.[141,149] Further research is needed to understand how changes to prenatal care delivery during COVID-19 are alleviating or widening socioeconomic disparities in pregnancy outcomes.

3) Cancer Care

Background

Each day, nearly 5,000 new cancers are diagnosed in the United States.[95] For many cancers, there are stark racial/ethnic disparities in incidence and outcomes.[150] Transportation barriers a prominent barrier to high-quality cancer care and a factor in these disparities.[151] The sheer frequency of trips to medical facilities required for diagnosis, monitoring, treatment and counseling can be a heavy burden for people ill with cancer.[152] Clinical trial participation, as is commonly recommended for people with advanced cancer, often requires even more trips for enrollment, tests, and treatments.[153,154] All of these trips are made more difficult, especially for those without social support, when cancer and the side effects of cancer treatment result in weakness and pain.[155–157] Increased travel burden has been linked to later cancer stage at diagnosis, worse prognosis, less guideline-concordant care, lower clinical trial participation, and increased psychological stress for both patients and caregivers.[158–162]

The transportation demands of cancer care have grown over the past few decades as oncology practice has largely shifted out of local community clinics and into a smaller number of regional, highly specialized, hospital-based clinics.[163,164] This shift to regionalized cancer care seems to have exacerbated travel disparities for patients seeking cancer care.[165] Although the majority of people say they would be willing to travel to access the highest-quality cancer care, people with lower income, non-White race/ethnicity, and older age are less likely to do so, in part because of transportation barriers such as traffic, needing a ride, and the cost of traveling and parking.[166,167]

Various transportation interventions had been studied to improve outcomes for patients with cancer. Examples include providing free or reduced-cost rides, bus passes, and assistance navigating existing NEMT programs or public transit systems.[168–171] An increasingly prominent intervention to help patients with cancer access health care is the “patient navigator” model, first introduced in the 1990s in recognition of the multiple, intersecting socioeconomic barriers to care faced by low-income women with breast cancer.[172] Patient navigator programs vary in scope but generally involve a professional or peer “navigator” who is trained to help patients address an array of non-medical barriers to care, including transportation. Navigators in these programs spend about 6-25% of their time arranging transportation.[173,174] These programs have helped people with cancer initiate treatment faster,[175–178] miss fewer days of treatment,[179] and enroll in clinical trials more readily.[168,180]

COVID-19 Transportation Context and Needs

For patients with cancer, who are often immunocompromised due to their disease and/or their treatment, any trip to health care—especially one not made alone by car—carries a potentially deadly risk of inadvertent COVID-19 exposure.[181–183] However, delaying cancer treatment to avoid coronavirus exposure can have serious consequences. While some cancer treatments, such as radiation therapy for low-grade lymphoma, may be safely delayed for a few months without significant risk of progression, others, such as surgery for ovarian cancer, cannot be delayed without high risk that the cancer will progress, making it harder, if not impossible, to treat.[154]

As clinicians and patients continue to weigh risks related to cancer and COVID-19, a number of clinical decision tools have emerged, offering guidance about when it might be safest to pursue cancer treatment, delay care, or modify standard treatment protocols (**Figure 4**).[154,184–187] Experts are still debating the best way to avoid bias in implementing these protocols, given that many include disease severity—which commonly varies with socioeconomic factors like race/ethnicity and income—as part of decision-making.[188]

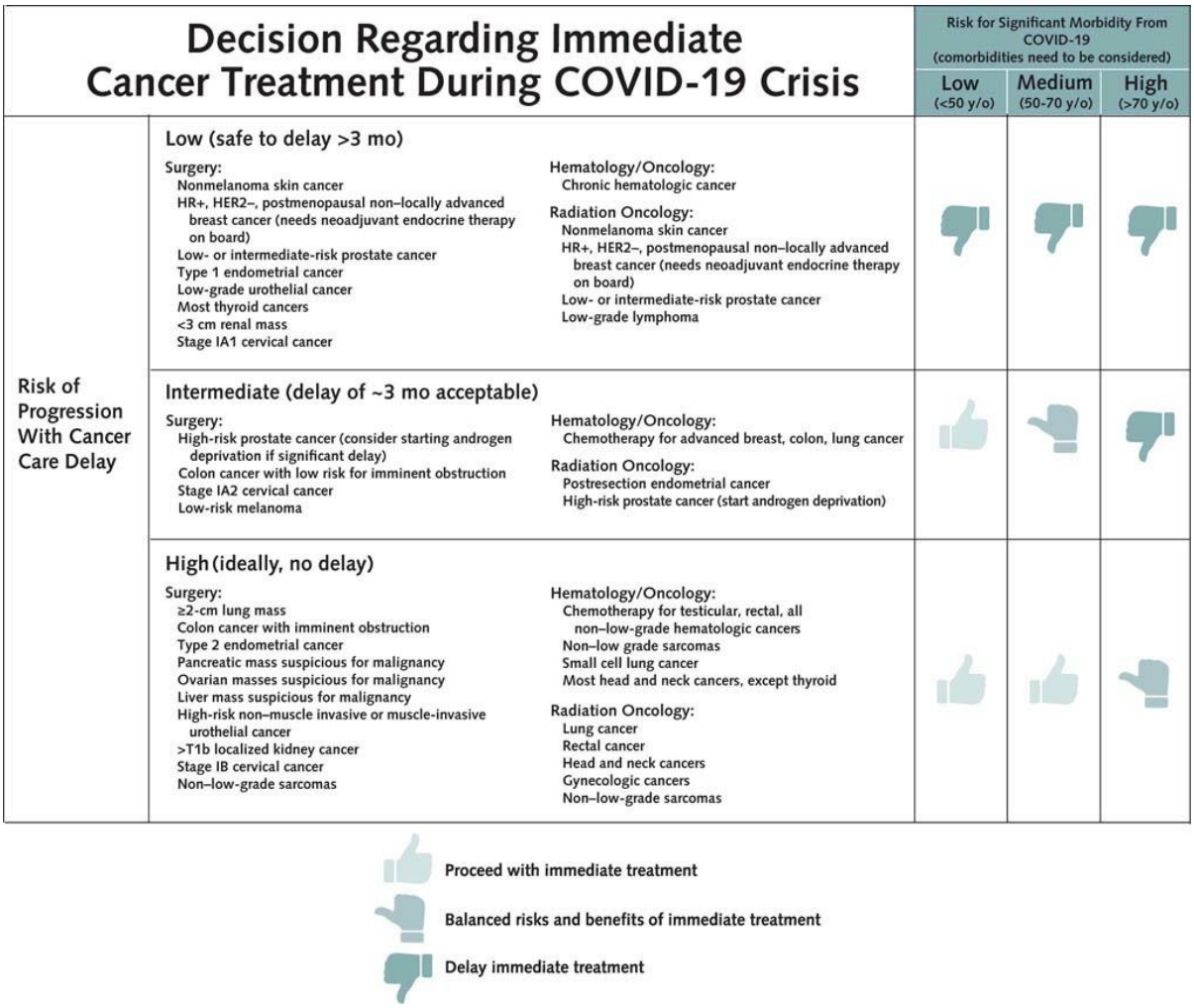

Figure 4: Example of a Risk-Benefit Decision Tool for Cancer Treatment during the COVID-19 Pandemic (Source: Kutikov[154])

Innovative models of cancer care may be able to help patients access cancer care even amid the COVID-19 pandemic. Recent innovations include:

- Replacing oncology consultation visits with telemedicine[188–190]
- Medication delivery services to reduce the need to travel to a clinic or pharmacy[190]
- Home-based intravenous chemotherapy infusions, supervised by visiting nurses, for certain patients[v,191]
- Expanded use of patient navigator programs to jointly address transportation and other social needs[192]
- Decentralization of clinical trials (reduced trips to regional specialty centers and greater reliance on local clinics to perform routine monitoring tests, supplemented by telemedicine and home delivery services)[193]
- Residential accommodations close to sites of care for people who require specialized care[155,194]

[v] Eligibility for home-based chemotherapy depends upon patient/caregiver willingness, type/stage of cancer, treatment regimen, comorbidities and functional limitations, home environment, and proximity to a hospital.[191]

4) Mental Health Care & Substance Use Disorder Treatment

Background

Based on 2018 data, 48 million American adults met criteria for any mental illness (AMI), meaning that they had a mental, behavioral, or emotional disorder in the past year that interfered with their daily activities.[96] Around 20 million met criteria for substance use disorder (SUD), because of alcohol or drug use that impaired their daily activities.[96] Many people with AMI and SUD have significant unmet care needs due to multifactorial barriers to care, including financial, social, and transportation challenges.[195]

While AMI and SUD prevalence does not differ by race/ethnicity, Black and Latinx patients who need treatment for AMI or SUD are less likely to receive it.[96] Males and lesbian, gay, bisexual, and transgender adults face higher prevalence and lower treatment rates compared to women and heterosexual and cisgender adults, respectively.[96] Rates of AMI and especially SUD are also higher among Medicaid enrollees than in the general population,[196] indicating that many of people with these conditions may have lower incomes and qualify for NEMT.

Although milder forms of mental illness can be treated by primary care physicians, severe mental illness and SUD often require treatment from specialized providers or facilities, which are often clustered in urban centers, necessitating prolonged travel for residents of suburban and rural areas.[197] Lack of reliable transportation is a common cause of failure to attend or complete AMI and SUD treatment.[198,199] Transportation barriers and associated treatment non-attendance is associated with worsening AMI, SUD relapse, overdose, and death including suicide.[66,199]

Patterns in how Americans travel to AMI and SUD treatment are complex. There is some evidence that people with AMI and SUD are more likely than the general population to rely on public transportation or rides from others to access ongoing treatment.[196] Lower transportation independence is thought to contribute to lower rates of AMI/SUD treatment and higher rates of treatment dropout.[199] Other studies suggest that people with anxiety and depression often prefer to drive personal vehicles, because public transportation can exacerbate their symptoms.[200] Meanwhile, severe AMI and SUD can interfere with the ability to drive safely and obtain or maintain a driver license.[201] For SUD in particular, access to treatment—which usually requires transportation—can reduce recidivism and help people keep their driver licenses after a driving under the influence offense.[202]

Several studies have demonstrated that comprehensive transportation programs can be effective at ameliorating transportation barriers to sustained AMI and SUD treatment.[203] One study found that 58% of Medicaid beneficiaries reported that they would not be able to attend their SUD treatment visits without access to NEMT.[204] Vouchers for public transit or taxis have also helped people overcome travel barriers to care for AMI and SUD.[203]

COVID-19 Transportation Context and Needs

Mounting evidence suggests that distress related to COVID-19 may have exacerbated existing AMI and SUD while provoking new cases and worsening racial/ethnic disparities in treatment.[205–207] The COVID-19 pandemic has also elucidated key differences between the AMI and SUD in the role of transportation in access to care.

Mental health services, including medication management and psychotherapy, have been provided safely and effectively via telemedicine for many years.[208] As a result, the transition to virtual mental health services during the pandemic has been relatively smooth,[208] with minimal reduction in mental health service volume[209] and

potential benefits for patients who would otherwise face transportation barriers. However, many of the most vulnerable patients may not have access to telemedicine.[207]

In contrast, SUD treatment is largely conducted in-person at specialized SUD treatment facilities. Federal regulations around medication regimens for opioid use disorder have required patients to travel to these facilities daily to pick up methadone doses and weekly or bimonthly for monitoring on buprenorphine.[204,210] Since the start of the pandemic, federal rule changes have made it easier for patients to take home up to a month's supply of methadone and to participate in buprenorphine counseling via telemedicine.[210] However, not all treatment facilities have implemented the relaxed guidelines, and some facilities temporarily closed or stopped accepting new patients.[208,210,211] To prevent relapse, overdose, and death during the pandemic, a multi-pronged approach may be needed to ensure that treatment facilities remain open, telemedicine and extended prescriptions are used when feasible, and transportation services are offered when needed.

A promising solution for both AMI and SUD may lie in increased use of mobile clinics and community paramedics to deliver care to patients with transportation difficulties, including those experiencing homelessness.[90,212,213]

5) Health Care for People Living with Disabilities

Background

More than 40 million Americans have some form of disability—hearing, vision, cognitive, physical/ambulatory or other—that limits their participation in daily activities in minor to major ways.[214] Disability is sometimes considered a secondary health condition when it results from another condition, such as multiple sclerosis. For 25.5 million Americans, disability makes it hard to travel outside the home.[26]

Disability rates differ by race/ethnicity, with the highest rates noted among Native Americans. Disability rates increase with age, and 47% of people over age 75 face some type of disability. By and large, people living with disabilities (PWD) experience greater socioeconomic disadvantage. Sixty-two percent of PWD are unemployed and, like other poor people, have lower access to health care in general. PWD often incur high costs for personal care aides, assistive technology, and transportation services.[215]

Regardless of age, PWD take fewer trips per day; 7 out of 10 PWD reduce their day-to-day travel because of their disabilities.[26] PWD commonly ask for rides from their informal support networks or use paratransit or reduced rate taxis.[26] Fifteen percent of people with travel-limiting disabilities, or 3.6 million Americans, do not leave their homes. These people face a different set of transportation challenges, as all of their needs must come to them.[26]

Across all of types of disabilities, PWD use health care more often and have more frequent emergency room visits than people without disabilities. PWD face longer travel times for similar trip distances to access health care, even after controlling for personal and modal characteristics (i.e. gender, race, poverty, bus, walking, etc.).[216] When trips take longer, PWD are left with less time for other needs, and their journeys are likely more exhausting, as well. This may contribute to why PWD are more likely to report delayed or unmet medical care needs.[217]

Transportation has been ranked as a top barrier to accessing health care among PWD in a variety of patient populations and research settings.[217,218] This barrier can create a spiral of increasing challenges, wherein PWD have unmet medical needs that lead to worsening functional status, thereby creating more demands and stress for them and their support networks. Improving transportation access for PWD can help break this cycle.

COVID-19 Transportation Context and Needs

A recent survey of over 2,000 PWD found that among the 47% who previously relied on a personal care aide for assistance, 23% had stopped receiving those services during the pandemic.[219] Meanwhile, over half of people who required regular health care reported disrupted access due to COVID-19.[219] The exact reasons for this disruption are not yet clear. In addition to loss of transportation assistance from personal care aides, it is possible that COVID-19's social distancing requirement has reduced rides from informal support networks. For PWD living in rural areas, broadband access issues are a barrier to using telemedicine to access care. Notably, in assessing public health responses to the pandemic, PWD have expressed concern that crisis triage protocols have not adequately prioritized their lives when determining how to allocate access to life-saving health care resources.[220]

Depending on the type of disability, facilitating paratransit enrollment for people who have lost access to other modes of transportation during the pandemic will be essential. For some PWD, volunteer driver programs could help overcome transportation barriers if clear safety precautions are observed. Additionally, NEMT and/or TNCs may be able to supplement volunteer driver programs if the economic, accessibility, and safety needs of PWD can be met. Historically, TNCs have struggled to meet demands and regulations for wheelchair-accessible vehicles, but recent study suggests that TNCs may be particularly promising for people with developmental disabilities.[221]

Public transit agencies are working to ensure that COVID-19 adaptation strategies can work for wheelchair users. For example, wheelchair users are exempted from rear-door boarding policies, and operators use a variety of methods to reduce COVID-19 risk for wheelchair users. This includes communicating with the passenger about needs for wheelchair securement assistance before boarding, asking passengers not to speak as the driver is securing the wheelchair, and providing extra supplies to clean surfaces and hands after securement.[222]

Overall, expanding access to paratransit by streamlining the eligibility application process, increasing the number of NEMT and TNC providers who can accommodate PWD, ensuring that PWD can access telemedicine, and exploring innovative models of home care delivery during the pandemic could help establish infrastructure to ensure improved long-term access to care for PWD.[223]

6) Health Care for People with Multiple Chronic Conditions

Background

Chronic conditions are the leading cause of death and disability in the United States. Chronic conditions refer to ailments that last one year or longer and that require ongoing medical treatment, limit activities of daily living, or both. Common examples include heart disease, cancer, chronic lung disease, chronic pain, stroke, Alzheimer's disease, diabetes, and kidney disease. Over 60% of American adults have at least one chronic condition, while 42% have two or more.[98] People who are older, Black or Hispanic, lower income, and less educated are more likely to have multiple chronic conditions.[98,224,225] This population overlaps significantly with PWD, as people with chronic conditions suffer from functional, physical, social, and cognitive limitations at rates three to six times greater than those without any chronic conditions.[226]

Most chronic conditions require regular travel to health care for ongoing treatment and monitoring.[227] As such, people with chronic conditions need reliable transportation to properly manage their conditions. Lack of transportation is one of the most common reasons for this population to delay or avoid routine care.[227,228] Delaying or avoiding care can result in exacerbation of chronic conditions, reduced quality of life, hospitalization, avoidable

surgeries and premature death.[226,227] Delayed or missed appointments also increase the likelihood that patients will utilize emergency services.[227] While people with chronic conditions are less likely to delay care compared to the general population, the consequences of delayed care are much more severe.[229]

Compared to the general population, people with multiple chronic conditions are more likely to report transportation barriers, less likely to own or use a private vehicle, and more likely to rely on public transit.[227,230] Higher rates of chronic disease are seen in rural areas, where people with multiple chronic conditions have longer travel times to access health care services.[230] In urban areas, people with chronic conditions are more likely to live in poor neighborhoods with fewer resources to support access to health care.[231] Social support is important for disease management and access to care for people with chronic conditions,[232,233] but the extent to which people with multiple chronic conditions rely on rides from friends and family to access care is not well understood.

COVID-19 Transportation Context and Needs

Given that people with chronic conditions have lower rates of car ownership and disproportionately rely on public transit, this population is also likely to have experienced additional transportation barriers due to COVID-19 related to public transit service reductions. As mentioned in previous sections, people who rely on rides from informal support networks may need to take extra precautions or seek other sources of transportation during the pandemic. Medicaid enrollees with chronic conditions can try to turn to NEMT, but additional resources, such as complex care managers, may be needed to overcome the challenge of coordinating complex care needs (e.g. disabilities plus multiple specialist providers in multiple locations) in this population.[68,234] For those who have access to the necessary technology, telemedicine is a promising modality for alleviating transportation difficulties caused by COVID-19.[234,235] Finally, increased specialist physician staffing within mobile clinics and community paramedicine programs, either in-person or via video conference, can help address the health care needs of people with chronic conditions who have both transportation and technology barriers.[87,212]

7) Preventive Care

Background

Preventive care encompasses a wide range of medical, dental, and vision care services including screenings, routine check-ins, and counseling to limit future health problems. Improved access to preventive care for all Americans was a major objective of the Affordable Care Act of 2010, which both expanded health insurance coverage and mandated that health insurers provide certain preventive medical services as an “essential health benefit” at no out-of-pocket cost to patients.[vi,238]

Transportation challenges are a risk factor for delays in receipt of numerous preventive services, including:

- Pap smears[239]
- Colonoscopies[240–242]
- Vaccines[243,244]

[vi] Notably, the ACA designated preventive dental and eye care as essential health benefits for children, but not for adults; in most cases, dental and vision benefits for adults remain optional and siloed from medical care.[236,237]

- General primary care[245]
- Dilated eye exams[246,247]
- Dental care[248]

Gaps in preventive care are especially common among the older, lower-income, and non-White populations known to be at increased risk for transportation challenges.[14]

COVID-19 Transportation Context and Needs

Preventive care use has slowed dramatically during the COVID-19 pandemic. In line with previous research showing that preventive services are first to go when patients have acute or chronic health concerns,[249,250] recent data suggests that preventive care is commonly being deferred due to the pandemic. Most people who have delayed care amid COVID-19 cite health care facility closures (82%) and safety concerns (53%) as the reason for missing care.[251] A June 2020 survey estimated that in the past 3 months, 37% of adults had delayed dental care and 30% had delayed routine medical examinations due to COVID-19.[251] Some clinics have temporarily suspended preventive services, focusing only on acute and chronic conditions.[252] By mid-April 2020, more than 3 million fewer vaccines had been administered to children compared to the same date in 2019.[253] The number of young children in Michigan who are up-to-date on vaccines dropped by a quarter from May 2019 to May 2020.[254]

The health consequences of missed or delayed preventive services vary. Cancer screenings in average-risk, asymptomatic people are unlikely to cause harm and thus reasonable to be deferred.[187,255] Meanwhile, delayed vaccines increase individual and community vulnerability to vaccine-preventable illnesses, which can lead to unnecessary morbidity and increased strain on hospital resources.[256,257] Both the CDC and the American Academy of Pediatrics have urged that adults and children continue to receive vaccines--and that children catch up on vaccines as soon as possible, if they are already behind—during the pandemic.[256,257] Notably, patients with serious health conditions and those without access to telemedicine are also considered higher priority for in-person preventive services.[255]

The Centers for Disease Control and Prevention (CDC) has issued a framework (**Figure 5**) to assist clinicians and patients in deciding which health care services should be delayed during the pandemic based on the likelihood of harm to patients and local COVID-19 transmission and control.[255] Transportation risk is not explicitly addressed in this framework but merits consideration in risk assessment.

Potential for patient harm	Examples	Substantial community transmission	Minimal to moderate community transmission	No to minimal community transmission
Highly likely Deferral of in-person care *highly likely* to result in patient harm	• Signs/symptoms of stroke or heart attack • Dental emergencies • Acute abdominal pain • Treatment for certain cancer diagnoses • Well-child visits for newborns	Provide care without delay; consider if feasible to shift care to facilities less heavily affected by COVID-19.	Provide care without delay; consider if your facility can provide the patient's care, rather than transferring them to a facility less affected by COVID-19.	Provide care without delay while resuming regular care practices.
Less likely Deferral of in-person care *may* result in patient harm	• Pediatric vaccinations • Change in symptoms for chronic conditions • Musculoskeletal injury • Certain planned surgical repairs • Physical or occupational therapy	If care cannot be delivered remotely, arrange for in-person care as soon as feasible with priority for at-risk* populations. Utilize telehealth if appropriate.	If care cannot be delivered remotely, work towards expanding in-person care to all patients in this category. Utilize telehealth if appropriate.	Resume regular care practices while continuing to utilize telehealth if appropriate.
Unlikely Deferral of in-person care unlikely to result in patient harm	• Routine primary or specialty care • Care for well-controlled chronic conditions • Routine screening for asymptomatic conditions • Most elective surgeries and procedures	If care cannot be delivered remotely, consider deferring until community transmission decreases. Utilize telehealth if appropriate.	If care cannot be delivered remotely, work towards expanding in-person care as needed with priority for at-risk* populations and those whose care, if continually deferred, would more likely result in patient harm. Utilize telehealth if appropriate.	Resume regular care practices while continuing to utilize telehealth if appropriate.

*Those with serious underlying health conditions, those most at-risk for complications from delayed care, and those without access to telehealth services.

Figure 5: CDC Framework for Health Care Systems Providing Non-COVID-19 Clinical Care During the COVID-19 Pandemic (Adapted from CDC[255])

Various health care delivery innovations have been explored as options to bring preventive care to patients with transportation barriers. Telemedicine's utility for preventive care is limited and only applicable to services such as depression screening that do not require in-person care. Mailed at-home cancer screening tests, such as fecal immunohistochemistry tests (commonly used to screen for colorectal cancer[258]) and HPV self-collection kits (an emerging tool to screen for cervical cancer, widely used in other countries but not yet in the U.S.[259,260]), are important options for patients unable or unwilling to travel for in-person screening during the pandemic.[261] Finally, some preventive services, such as vaccines, might be more easily accessible if they can be given at more convenient locations, such as pharmacies and supermarkets.[243] Ensuring vaccine access will be especially critical once a vaccine against SARS-Cov-2 becomes available.

Summary of Findings

Our findings are summarized in **Table 3**, which includes the key transportation challenges and consequences of unmet care for the groups discussed in this section, as well as specific transportation and health system adaptations intended to overcome these challenges during the COVID-19 pandemic.

Table 3. Health Care Needs, Unique Transportation Challenges, and COVID-19 Transportation Impact

Health Care Need	Population Affected in the U.S.	Transportation Needs & Challenges	Consequences of Unmet Medical Needs	COVID-19-Specific Transportation Challenges	COVID-19-Specific Transportation and Health System Adaptations
Dialysis for end-stage kidney disease (ESKD)	750,000 people have ESKD 450,000 receive in-center hemodialysis[93,101]	Travel to care at least 3x/week[103] Most patients do not drive themselves to dialysis[263]	Increased risk of emergency department visits, hospitalization, and death[107–109]	Reduced ability to rely on rides to appointments from people living outside of the home	Accelerated transition from in-facility to home-based dialysis treatment[116,262] Clustering patients for dialysis treatment and transportation to minimize shared infection risk[113]
Prenatal care	3.8 million pregnancies per year that result in live births[94]	14+ visits in 9 months[119] Physical limitations can make traveling difficult[128,129] Other children may need to accompany mother on trip[126]	Increased risk of preterm birth, low birth weight, neonatal death, and postpartum complications[120,121]	Potential reluctance to travel due to possibly increased risk for COVID-19-related complications[131,132] Greater childcare needs while schools and daycare facilities are closed[134]	In-person services consolidated into fewer visits[84,136,137] Increased use of telemedicine[143,145,146] Increased use of home monitoring devices [138]
Cancer care	15.8 million people currently living with cancer 40% of Americans will get cancer in their lifetime[95]	Frequent visits during active treatment (weekly and sometimes daily)[152–154] Physical limitations and pain can make travel difficult[155–157] Longer travel distances because of regionalized care[163,164,166,167]	Clinical consequences vary by type of cancer and treatment[154]	Increased risk of Covid-19 morbidity and mortality[181–183] People who rely on rides from others due to travel-limiting pain and frailty may face limited transportation options	Telemedicine is a feasible replacement for certain aspects of care[188–190] Home cancer treatment for eligible patients[190,191] Expanded use of patient navigator programs[192] Decentralized clinical trials[193] Local accommodations near treatment facilities[155,194]

Table 3 (Continued). Health Care Needs, Unique Transportation Challenges, and COVID-19 Transportation Impact

Health Care Need	Population Affected in the U.S.	Transportation Needs & Challenges	Consequences of Unmet Medical Needs	COVID-19-Specific Transportation Challenges	COVID-19-Specific Transportation and Health System Adaptations
Mental health care and substance use treatment	47.6 million people with any mental illness 20.3 million with substance use disorder[265]	Some programs require daily visits[211] Severe AMI or SUD may interfere with the ability to drive safely and maintain a driver license[201] Longer travel distances for rural patients due to urban concentration of treatment facilities[197]	Increased risk of substance use disorder relapse, overdose, suicide[66,199]	Some treatment facilities have closed or stopped accepting new patients, so some people may have to travel farther[208,211] COVID-19-induced fears may increase anxiety or other mental health conditions and increase difficulty traveling	Telemedicine can replace most ongoing mental health treatment[208] Federal rule changes allow some patients to receive extended supply of some substance use treatments, reducing trip frequency[204,210]
Health care for people with disabilities	61 million people with disabilities[97]	Frequent health care visits often required due to primary health conditions Physical activity limitations can make traveling difficult[26] Dispersed specialist needs may require longer travel distances	Potential worsening of underlying condition, resulting in strain on patients and caregivers	People who rely on rides from others may face restricted options Some PWD have stopped receiving help from personal care aides[219] Changes meant to promote physical distancing may impair access for PWD[57]	Temporary suspension of in-person eligibility appointments for paratransit; use of phone interviews and verifications with medical providers[264] Attention to accessibility concerns with any policy change, i.e. guidance to bus operators and passengers on physical distancing during wheelchair securement[57]

Table 3 (Continued). Health Care Needs, Unique Transportation Challenges, and COVID-19 Transportation Impact

Health Care Need	Population Affected in the U.S.	Transportation Needs & Challenges	Consequences of Unmet Medical Needs	COVID-19-Specific Transportation Challenges	COVID-19-Specific Transportation and Health System Adaptations
Health care for people with multiple chronic conditions	42% of adults or 88 million have 2+ chronic conditions 81% of people ages 65+ or 42 million have multiple chronic conditions[98]	Frequent care needs, often requiring trips as often as weekly or monthly[266] Lower levels of vehicle ownership, more likely to rely on public transit[227] More likely to live in rural areas and more likely to have weaker social support networks[234,267]	Increased risk of exacerbation of chronic conditions, reduced quality of life, use of emergency services, hospitalization, avoidable surgeries, and premature mortality[226,227]	Greater reliance on public transit may contribute to higher risk of exposure to the virus	Telemedicine can replace some routine care visits[235] NEMT can fill some of the gaps created by reduced public transit services in this disproportionately Medicaid-eligible population[68,234]
Preventive care	All adults and children (330 million Americans)	Certain screening tests and treatments require in-person care Transportation disparities among certain subgroups, as documented in Table 1.	Variable, depending on length of delay, type of preventive service, and patient characteristics	Facility closures and reduced preventive care service capacity may mean increased trip distances/travel time to care General safety concerns have driven marked declines in trips for preventive care[251]	CDC has provided a framework to help triage transportation interventions to improve access to the most time-sensitive preventive services during the pandemic[255]

Other Vulnerable Populations

In this section, we briefly highlight three additional groups of people whose transportation access to care may be particularly affected during the COVID-19 pandemic: rural populations, immigrants, and veterans.

Rural Populations

One-fifth of Americans live in rural areas. This group is more likely to travel farther for health care, less likely to live near to high-quality care facilities, and more likely to be served by under-resourced health facilities.[8,268] As a group they are also older, putting many at higher-risk for COVID-19 complications.[269] Compared to urban residents, rural Americans have less access to public transportation and rely more heavily on private vehicles.[8] As such, those without cars may depend on informal support networks, volunteer driver programs, or other rides to health care appointments,[227] creating potential problems if friends, family, or volunteer drivers are unable or unwilling to transport them due to the pandemic. Rural volunteer driver programs such as Green Raiteros, which emerged from a network of informal driver networks in Huron, California, can play an important role in providing transportation to health care but will need to adapt to social distancing recommendations.[270] The pandemic's boom in telemedicine use may be less likely to offload the transportation burden of rural residents seeking health care, given that 38% of rural residents nationally (and 56% in California) lack access to broadband internet (versus 10% of the general U.S. population).[271,272] Besides expanding access to broadband internet in the long term, policies that emphasize the use of telephone (rather than video) visits, reduce travel distances via mobile clinics, and meet transportation needs via NEMT and volunteer driver programs may help reduce the health care transportation burden for rural Americans in the immediate future.[267,272]

Immigrants

Immigrants face significant barriers to health care and transportation access, which both vary according to factors such as citizenship status, income, and language preference. Citizenship status complicates eligibility for public health insurance programs, leaving undocumented immigrants with fewer options when they need to seek care.[273] Meanwhile, only 15 states allow undocumented people to obtain a driver license.[274] Instead, many immigrants rely on public transportation and informal support networks for travel to meet their basic needs.[275,276] During the pandemic, reductions in public transit service, resulting in long waits and the potential for crowded buses, may compound the difficulties immigrant populations face when seeking health care. Risk of COVID-19 is also compounded in this group by virtue of where they live and work.[39,277–279]

Veterans

About 9 million Americans, mostly men, receive care through the Veterans Health Administration (VHA).[280] Over half of this population has a physical or mental disability that may limit travel options, while nearly 40% live in rural areas, obligating longer trips for care.[228,280] In recognition of these transportation challenges, pre-pandemic VHA benefits included a comprehensive NEMT program, various telemedicine programs, and opportunities for reimbursement for local, non-VHA care.[228,281,282] With the COVID-19 pandemic, the VHA has rapidly expanded its telemedicine capacity.[283] VHA NEMT has continued on a limited basis, but COVID-19 precautions have reduced transportation capacity and led to delayed and cancelled VHA van services in some cases.[284]

IV. Research Needs

Our analysis revealed a variety of areas in need of further study. We identified topics for further research related to both the general relationship between transportation and access to health care and the nuances of that relationship in the context of the COVID-19 pandemic.

General research needs on transportation access to health care

- Data on modes of travel for trips to health care for the general population and for subgroups of patients with specific health care needs
- National reporting on use of the Medicaid NEMT program, ideally linked to Medicaid claims data[65]
- Population-scale evaluation of disparities in travel needs, contextualized in an intersectional framework to illuminate the structural factors that need to be changed to improve transportation and health equity
- Updated population-scale cost-benefit analysis for the provision of transportation assistance for people seeking health care, accounting for emerging mobility options such as TNCs[14]

Transportation research needs in the context of COVID-19

- Collecting data on the extent to which transportation barriers during COVID-19 are contributing to the reasons people are delaying or forgoing health care, including more granular analysis of the types of care patients are skipping due to these new transportation barriers and the consequences of these changes for health system costs and patient outcomes
- Partnering with health care providers to assess how clients who are accessing health care during the pandemic are overcoming transportation barriers that they may be facing
- Policy analysis of the feasibility of continuing COVID-19-induced health system adaptations (e.g. improved access to telemedicine) to mitigate transportation barriers and costs long-term
- Analysis of the feasibility of bringing together transportation services provided by NEMT and paratransit providers to better coordinate transportation support for the most at-risk populations

Novel combinations of data from the fields of public health and transportation planning may help address some of the research questions listed above. Examples of population data sets from both health and transportation sources that may be useful in addressing these pending research questions are outlined in **Appendix A**.

As the ties between health and our social and built environments continue to be exposed, funding agencies have become increasingly motivated to support work focused on the social determinants of health. Grant opportunities at the intersection of population health and public policy, such as the Robert Wood Johnson Foundation's Building a Culture of Health program and the Federal Transit Administration's Access and Mobility Partnership Grants program, hold promise for advancing research on transportation and access to health care.

V. Conclusions and Next Steps

In this report, we reviewed the unique transportation needs and challenges faced by various patient groups in the context of transportation system changes during COVID-19. While the pandemic has certainly increased transportation barriers to health care access, we identified many ways in which people are working to creatively overcome these barriers, but there is more work to be done. We categorized our findings into three key themes, with important implications for policies to improve equity in transportation and health care access during the COVID-19 pandemic and beyond.

Key Themes

1. Compounding Inequity

Structural inequality contributes to compounding socioeconomic and health burdens. The same disadvantaged groups (especially Black, Indigenous, and people/communities of color and low-income people) who face elevated risks for many health conditions are also more likely to experience the transportation barriers that prevent them from accessing care. In addition, these groups are most threatened by both the health and economic impacts of COVID-19. These intersecting disparities converge to continuously over-burden the same communities. Interventions that overcome transportation barriers to health care access can improve population health and health equity in the long term.

2. Importance of Rides from Others: NEMT, Paratransit, and Informal Support Networks

Non-emergency medical transportation (NEMT) and paratransit are safe and feasible ways to transport people who are unable to drive themselves to health care, especially during the pandemic. The number of people eligible for NEMT via Medicaid is expected to increase during the pandemic as a result of widespread economic hardship and new transportation system disruptions. Efforts to increase the reach and service capacity of NEMT and paratransit programs may needed. Notably, in California and the four other states where Medicaid enrollment has not grown during the pandemic,[2] efforts to expand NEMT access must include efforts to increase Medicaid enrollment. While the tenuous transportation funding environment presents challenges, it is important to recognize that transportation interventions are cost-effective for society at large.[3] For medically vulnerable people who rely on rides from others, ensuring that these services remain viable and even grow is critical. Care must be taken to ensure that rides from friends and family can be offered safely or replaced by alternate modes during COVID-19.

3. Risk/Benefit Trade-Offs

There are significant risks and benefits associated with all trips to health care during the COVID-19 pandemic. For individuals, the risk of contracting COVID-19 can be devastating, but missing health care can also lead to serious or life-threatening outcomes. For communities, more trips to care can lead to both health hazards (e.g. COVID-19 transmission and vehicle emissions) and benefits (e.g. economic support for critical transportation programs and community health centers). Health care is ahead of transportation agencies in developing risk/benefit tools to weigh the trade-offs between individual patient factors, community COVID-19-transmission factors, and health system factors. Transportation factors may merit greater attention in these tools.

Policy Implications

The key themes in this report suggest various policy changes that may be needed to improve access to health care during and after the COVID-19 pandemic. Policymakers and public agencies in transportation, public health, and health systems may wish to consider the following strategies and principles related to increased access to transportation services, equitable priority-setting, and systems change and cross-sector collaboration.

1. Increase access to transportation services

- Agencies and organizations that provide health and social services should coordinate to increase screening for transportation barriers to care in order to better connect vulnerable populations to services.
    - *Example: Expanded use of patient navigator programs can help health systems evaluate a wide range of social needs and connect people with local resources.* [285,286]
    - *Example: Some health systems have proactively offered rides to patients via text messages and phone calls. Success of these services may hinge on targeting the most vulnerable patients.* [287,288]
- Transportation agencies should streamline eligibility checks and application processing to enroll more eligible individuals in paratransit and NEMT programs.
    - *Example: San Francisco MTA is using phone interviews to determine paratransit eligibility.* [289]
- Health insurers should consider expanding NEMT eligibility to cover vulnerable groups that are not Medicaid-eligible, such as California's large undocumented immigrant population.
- Transportation agencies should look outside of traditional funding sources to ensure the long-term viability of public transportation and paratransit in order to meet the transportation needs of the most economically and medically vulnerable patients during and after the pandemic.
    - *Example: The National Center for Mobility Management catalogs funding opportunities for transportation agencies, including health-related and COVID-19-specific grants* [290]
    - *Example: The Federal Transit Administration's Access and Mobility Partnership Grants program supports partnerships between transportation agencies and public health.* [291]
- Health care and transportation providers should strive for flexibility, creativity, and collaboration in funding and service provision in order to improve health care access during the pandemic.
    - *Example: Medicaid programs in Florida, Indiana, and South Carolina recently removed regulatory barriers to make it easier for TNCs to provide NEMT during the pandemic.* [67,68]
    - *Example: Health insurers and/or transit agencies can provide safety guidelines and reimbursement for rides provided by patients' informal support networks (**Figures 4** & **5**).*
    - *Example: The Call a Ride for Sausalito Seniors program, a volunteer driver program, has shifted from strictly providing rides to also delivering medications.* [46]

2. Ensure equitable priority-setting

- Health care systems should expand risk-benefit tools (**Figures 4 & 5** and **Appendix B**) to include considerations about both how people travel to care.

- Transportation agencies should consider how health care access in vulnerable communities may be impacted by service cuts and other programmatic responses to the pandemic. To advance equity in transportation and health, transit agencies should use risk-benefit tools ensure that they prioritize the needs of the most vulnerable groups.

    - *Example: LA Metro is building on its existing equity platform with a rapid equity assessment tool to evaluate programs proposed by through its COVID-19 recovery task force. The tool assesses who will benefit from these programs, who might be harmed, and how programs can prioritize the needs of the historically marginalized communities most impacted by COVID-19.*[292]

3. Advance systems change and cross-sector collaboration

- Transportation planners, public health practitioners, and policymakers should establish collaborations at the local, state, and federal level and share knowledge and align priorities as well as work within their spheres to combat systemic racism in health care and transportation access.

- Transportation leaders and policymakers should support non-transportation strategies to improve access to care for people with transportation barriers.

    - *Example: Transportation and health care can partner with grocery stores, pharmacies, libraries, and schools to bring mobile clinics and similar programs to people who need them.*

- Transportation leaders and policymakers should support efforts to address other social needs (e.g. childcare, housing instability, food insecurity) that often accompany and exacerbate transportation challenges and which are likely made more acute by COVID-19.

    - *Example: Focus on expanding economic relief and eviction protections during the pandemic.*

    - *Example: Insurers should help members enroll in other social services that help them manage their health, such as food assistance and discounted internet access programs.*[293]

Conclusion

California and the nation will be forced to address the aftermath of this pandemic for years to come, and delayed health care needs will eventually need to be addressed. This report highlights a variety of ways in which health care and transportation professionals have worked to overcome existing transportation disparities and those that have been exacerbated by the COVID-19 pandemic. Going forward, the solutions will need to be both big and small, incremental and systematic, targeted and universal. By better understanding and providing for people and populations that are most in need, transportation barriers to accessing health care can be reduced for all.

Appendices

Appendix A: Examples of Data Sources for Research on Transportation and Health Care Access

Data Source	Details	Transportation Measures	Health Care Access Measures
Health Data Sources			
National Health Interview Survey	National survey of about 35,000 households/year; cross-sectional. Geography below Census region is restricted.	Walking for transportation; proximity to bus stop; motor vehicle collisions	General health, chronic conditions, disability, health insurance, health care affordability
National Health and Nutrition Examination Survey	National survey, vital signs assessment, and laboratory tests from about 5,000 people (adults and children) per year; cross-sectional. Geography below national level is restricted.	Walking and bicycling for transportation and for leisure; recent rides in a car or motor vehicle; fear of traveling by public transit	General health, chronic conditions, disability, health insurance, health care affordability
Household Pulse Survey	Rapid-release household survey that will sample about 13.8 million households; each household is sampled 3 times over 12 weeks; data available at state level and for 15 large metropolitan statistical areas.	None; questions about housing insecurity and job loss may be relevant indirectly, or data can be linked to ecological data	Medical care delayed due to the COVID-19 pandemic
Behavioral Risk Factor Surveillance System	National survey of 400,000 adults/year; cross-sectional. Data available at the state level. Select questions available at metro area level.	Transportation as reason for delayed medical care	General health, chronic conditions, disability, delayed medical care, health insurance
Medical Expenditure Panel Survey	National, annual survey of about 15,000 families as well as medical providers and employers	None; questions about employment may be relevant indirectly, or data can be linked to ecological data	Chronic conditions, disability, health insurance, usual source of care, difficulty receiving care, health care utilization

Appendix A (Continued): Examples of Data Sources for Research on Transportation and Health Care Access

Data Source	Details	Transportation Measures	Health Care Access Measures
Well Being and Basic Needs Survey	National survey of about 7,500 non-elderly adults per year; cross-sectional	Access to public transportation; transportation barriers to employment; transportation barriers to accessing social services (variable by year)	General health, mental health, substance use, disability, health insurance
California Health Interview Survey	Population-based survey of about 23,000 California adults, adolescents, and children per year; cross-sectional	Walking for transportation and leisure; vehicle ownership	General health, chronic conditions, disability, health insurance, usual source of care, barriers to care
National EMS Information System (NEMSIS)	National database including emergency medical services (EMS) encounters from 47 states (including California) and 10,000 constituent EMS agencies	Mode of EMS arrival and transport as well as mechanism of injury details for traffic incidents; free text narrative may contain additional transportation details	Geospatial context such as distance to closest appropriate health facility; free text narrative may contain additional health details
California EMS Information System (CEMSIS)	Statewide database including 32 of California's 33 EMS regions (Los Angeles County not included)	Mode of EMS arrival and transport as well as mechanism of injury details for traffic incidents; free text narrative may contain additional transportation details	Geospatial context such as distance to closest appropriate health facility; free text narrative may contain additional health details
Los Angeles County EMS Agency, Data Management Division	County database that includes emergency and non-emergency encounters from 31 public safety EMS agencies and 77 private ambulance and ambulette providers	Mode of EMS arrival and transport as well as mechanism of injury details for traffic incidents; free text narrative may contain additional transportation details	Geospatial context such as distance to closest appropriate health facility; free text narrative may contain additional health details

Appendix A (Continued): Examples of Data Sources for Research on Transportation and Health Care Access

Data Source	Details	Transportation Measures	Health Care Access Measures
Transportation and General Data Sources			
National Household Travel Survey	Cross-sectional national sample on all trios and traveler/household characteristics; recent survey years include 2017, 2009, 2001.	Number of trips by mode, purpose, length, and household characteristics (i.e. vehicle availability)	Whether a person has a disability that makes it difficult to travel, trips to healthcare
American Time Use Survey	Nationally representative annual sample, based on interviews	Time spent traveling	Time spent on various healthcare related activities (personal health/fitness, medical care and services, health care for household members)
American Community Survey	Annual sample, available in 1 year and 5-year averages. Available at small geographic scales	Travel mode and duration for commute trips, household vehicles available	Health insurance coverage

Appendix B: Examples of Guidelines for Facilitating Safe Access to Care During the COVID-19 Pandemic

Organization/Guideline	URL
Centers for Disease Control and Prevention (CDC)	Framework for Healthcare Systems Providing Non-COVID-19 Clinical Care During the COVID-19 Pandemic
American Dental Association	Guidance for Dental Care During COVID-19
American Academy of Ophthalmology	Guidance for Care during the COVID-19 Pandemic
Centers for Medicare and Medicaid Services (CMS)	Recommendations Reopening Facilities to Provide Non-emergent Non-COVID-19 Healthcare
American Academy of Pediatrics	Guidance on Providing Pediatric Well-Care During COVID-19
American College of Obstetrics and Gynecologists	COVID-19 FAQs for Obstetrician-Gynecologists, Obstetrics

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