Recommended Policies for the

21st Century Trends in US Mobility

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Executive Summary

Major shifts in the transportation sector have been observed through the beginning of the 21st century due to emerging technologies and changing travel behaviors. Concurrent technology revolutions affecting travel include vehicle automation, general connectivity, information systems, and alternative fuel technologies. For the first time the 2017 National Household Travel Survey (NHTS) included questions to capture impacts of emerging technologies on the transportation system to learn about users of such technologies and shifting travel behaviors resulting from technology adoption.

National Household Travel Survey

The National Household Travel Survey (NHTS) is conducted by the United States Department of Transportation (USDOT) and gathers travel related information about the United States population through survey-based methods. The survey data is released periodically to track travel behaviors through time and inform transportation planners and policymakers about the latest developing trends in transportation. The 2017 NHTS is the most recent version and documents socioeconomic attributes for all members (≥5 years of age) among 129,969 households. Survey data is documented at four levels: household, person, vehicle, and trip level which can be linked with unique identifiers at each level. New questions were added to the 2017 NHTS to capture that latest trends in transportation, such as ride-hailing and alternative fuel vehicles.

The widespread adoption of smart phones has enabled the emergence of ride-hailing companies, such as Uber and Lyft. Ride-hailing companies provide a service that matches passengers to drivers with personal vehicles using an online mobile application. Ride-hail providers are also called transportation network companies (TNC) and ride share companies. The use of information and communications technologies, algorithms, and data analytics allows ride-hailing companies to provide convenient and reliable transportation alternatives throughout many urban areas. To capture changing travel behaviors surrounding the introduction of new mobility services, the 2017 NHTS asks participants about their frequency of ride-hailing use in the previous month.

Vehicle fuel technologies continue to evolve and improve motivated by the desire to mitigate negative climate change and public health outcomes from vehicle emissions. The 2017 NHTS captures more detail regarding the fuel types of private vehicle purchases in the United States using additional questions. Alternative fuel vehicles (AFV) were added as a response to the fuel type question in addition to gasoline and diesel. Additionally, a follow-up question was asked to all AFV owners regarding the specific type of fuel (electric, hybrid, or plug-in hybrid).

The NHTS is a survey that focuses on personal ground travel within the United States. For this reason, air transportation and freight movement were not included in the analysis.

RESULTS AND FINDINGS

Analyzing the NHTS data resulted in some significant policy findings related to changing travel behaviors in the United States due to the disruptive technologies noted above. The following results highlight characteristics and policy recommendations identified within and among the travel behaviors of four highlighted traveler groups; ride-hailing users, transit users, alternative fuel vehicle owners, and active travelers.

REFERENCES

U.S. Department of Transportation, Federal Highway Administration, 2017 National Household Travel Survey. https://nhts.ornl.gov

U.S. Department of Transportation (2018), 2017 NHTS Data User Guide, Technical Report, Federal Highway Administration. http://nhts.ornl.gov/assets/2017UserGuide.pdf

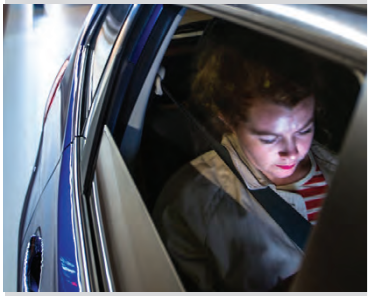
Transportation User Groups

For this policy analysis the researchers selected four major transportation user groups to explore and analyze travel behavior and underlying trends that might be affected by emerging technologies. In addition, the selected groups directly impact 21st century management challenges in the transportation field, like, safety, congestion and emissions mitigation, urbanization, and environmental sustainability. The four sections highlighted in this report are listed below with research questions:

- **Ride-hailing**—Who is using ride-hailing services? When and why are they using them? Which modes are being substituted? What policies can mitigate negative outcomes?
- **Public transit**—What is the current state of public transit in the United States? What travel behavior shifts surround public transit? What is the relationship between ride-hailing services and transit?
- **Alternative fuel vehicles**—What is the popularity of various types of alternative fuel vehicles? What are travel behaviors and annual miles traveled among various fuels? What are the socioeconomic and demographic characteristics of alternative fuel vehicles owners?
- **Active transit** (e.g. bicycling and walking)—What are trends in active transit? What are the socioeconomic and demographic characteristics of active commuters? How to facilitate/incentivize increased active commuter mode share?

Overall in the survey, the following observations stood out to the researchers. The general trend observed was that younger populations with higher incomes and educational attainment seemed to be early adopters of emerging mobility technologies, such as ride-hailing and alternative fuel vehicles. There seems to be an interesting relationship between transit and ride-hailing, in that ride-hailing users use public transit at increased rates. Public transportation continues to decline in the United States, while ride-hailing services have observed a large increase in annual trips during the previous eight years. Active transit commuter mode share has increased since 2009 for short trips. Low income commuters largely rely on walking while bike commuters are dominated by white males.

RIDE-HAILING



- Open, collaborative partnerships between local governments, transit providers, taxi companies, and ride-hailing companies
- Facilitate a complementary relationship between transit and ride-hailing services through first- and last- mile services and late-night programs when transit services become less frequent

PUBLIC TRANSIT

- Select appropriate incentives/ fees to promote most efficient modes of travel during peak congestion hours
- Explore partnerships with ride-hailing providers to improve urban mobility among vulnerable populations

ALTERNATIVE FUEL VEHICLES

- Explore alternative financial incentives to the federal tax credit, such as upfront cost savings, which might help improve AFV adoption rates among low-income households
- Outreach and infrastructure investment for alternative fuel vehicles in non-urban areas

ACTIVE TRANSPORTATION

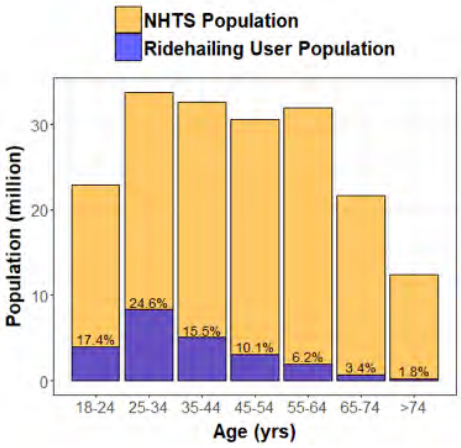
- Include emerging micro-mobility trends in latest surveys to adequately study and plan for changing travel behaviors
- Invest in active transportation infrastructure (bike lanes, separated lanes for micro-mobility, improved sidewalks) to improve safety, especially in low-income areas
- Partnerships between micro-mobility providers and local governments to ensure equal access and smooth rollout

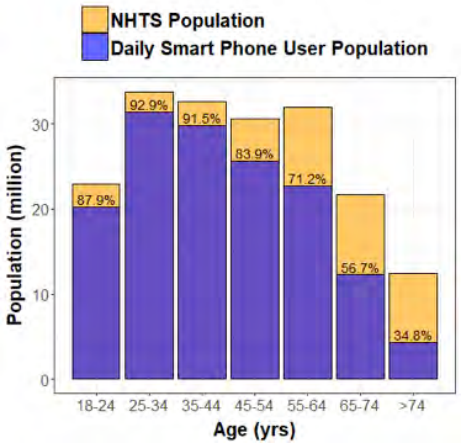
Ride-Hail Users

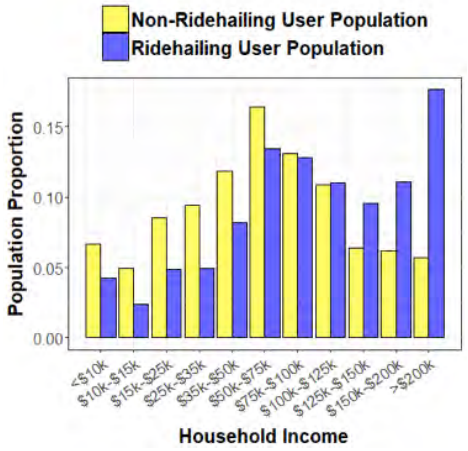
Findings and Characteristics of **Ride-hail Users**

RESULTS FROM THE NHTS

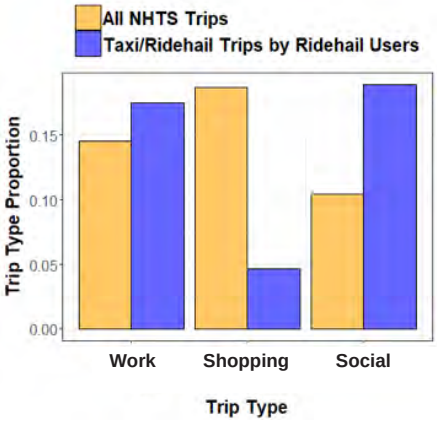
Considering respondents over the age of 18 (the minimum passenger age for Uber/Lyft without an accompanying adult), the proportion of the United States population who have used a ride-hailing service at least once in the previous month was 10%. Ride-hailing users tend to be younger, earn higher incomes, and are more likely to reside in urban areas with high population densities. Compared to the general population, white and Asian populations represented a larger proportion of the ride-hailing user population while African Americans represented a smaller proportion. While the distribution of smart phone and ride-hail users is similar, many smart phone owners don't use ride-hailing. The ride-hailing population tends to have higher incomes than transit users (see charts below.)

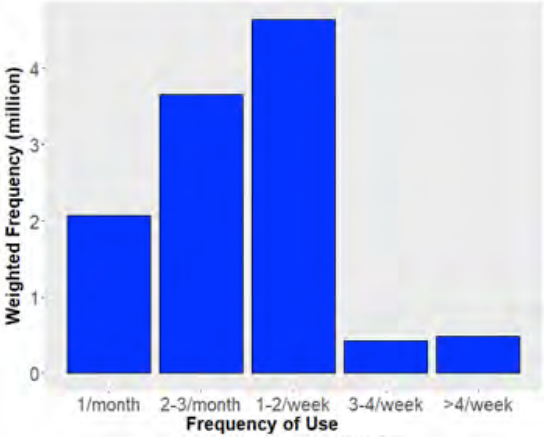




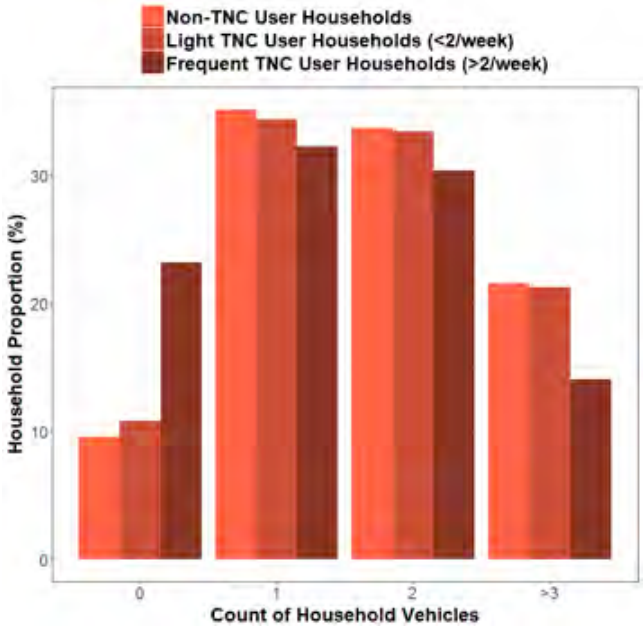


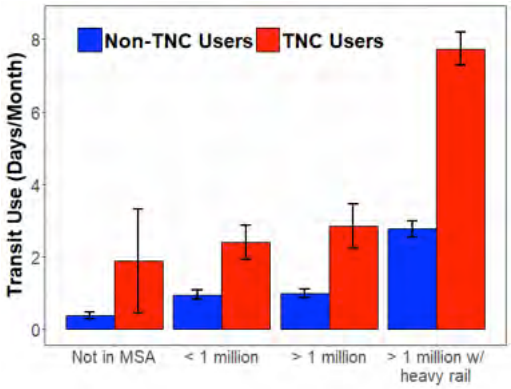
Of the ride-hailing users, 60% hailed a ride three times or less in the previous month, indicating that ride-hailing services are primarily used for special occasions. This is based on analysis of trip types among ride-hailing users from the NHTS trip level file. It is important to note that ride-hailing (Uber/Lyft) and taxis are combined and represent one mode of transportation in the NHTS data set. This fact makes it difficult to separate the two modes and make any strong conclusions regarding ride-hailing trip purpose. However, among ride-hailing users, approximately 19% of ride-hailing/taxi trips were social/recreational trips. The total proportion of social/recreational trips among all trips for the aggregate NHTS population was only 10%. Shopping and errands accounted for over 18% of total annual trips compared to less than 5% for ride-hailing/taxi trips among ridehail users. Overall, 17.5% of ride-hailing/taxi trips were work related among ride-hailing users. In many cases, work-related transportation can be reimbursed, which might alter some of the travel behavior conclusions mentioned in this analysis.





	NHTS	Ridehailing Frequency of Use			
	Population	1/month	2-3/month	1-2/week	>2/week
Percentage of Ridehail Users (%)		24	34	28	13
Average Age (yrs)	46	39	37	35	34
Percent White (%)	70.1	72.5	70.4	72.8	68.5
Median Income ($US)	$50k-$75k	$75k-$100k	$75k-$100k	$100k-$125k	$100k-$125
Median Education Level	Associate's	Bachelor's	Bachelor's	Bachelor's	Bachelor's
Average Monthly Public Transit Trips	1.9	3.1	4.4	6.9	9.6
Average Commute Time (min)	18.5	19.1	19.3	17.6	18.7
Average Household Cars	1.9	2.1	2	1.9	1.5





Ride-hailing users utilize transit at higher rates and own fewer vehicles compared to the aggregate United States population. In fact, the ride-hailing user population reported similar frequencies of use for both ride-hailing services and public transit during the previous month. Reported use of public transit for ride-hailing users living in large cities (>1 million) with access to heavy rail was almost three times greater when compared to similar sized cities without heavy rail. The average monthly frequency of ride-hailing use was also elevated when heavy rail was present.

POTENTIAL ISSUES

The interaction between ride-hailing and transit is complicated and varies from city to city. Additionally, concrete conclusions are hard to make because ride-hailing trip data is closely guarded by privately-held firms. However, the results indicate clear differences among ride-hail users and non-users in terms of transit use. Results indicate possible scenarios might be (i) respondents are pairing ride-hailing services with transit as a first-mile and/or last-mile solution (ii) transit riders are replacing transit trips with ride-hailing trips, or (iii) transit use doesn't change and other modes of transportation are being replaced by ride-hailing services. The inability to understand the role ride-hailing services play in urban mobility creates challenges in the transportation decision making process (i.e. investment, design, equity implications, etc.) for local governments and transportation planners.

Commuter rail provides a potentially convenient pairing with ride-hailing services due to fast travel speeds and limited stops. Ride-hailing services can provide first- and last-mile solutions for rail travelers because the total travel time is likely similar to that of the personal vehicle due to high commute speeds of heavy rail and their dedicated right of way. This pairing will also reduce parking costs incurred at transit stations. Socioeconomic status might also lead to increased use of both TNCs and commuter rail, as it was found that both commuter rail and ride-hail users tend to be from higher income households.

Extra travel by ride-hailing services to re-position vehicles or pick up passengers can also lead to roadway and curbside congestion.

POLICY RECOMMENDATIONS

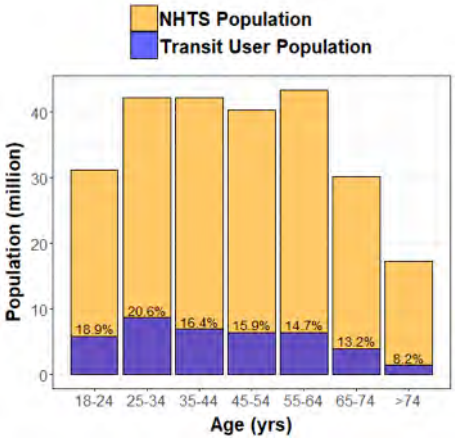
Ride-hailing services provide an alternative, flexible, and convenient mode of transportation in many urban areas. The first step to ensure equity and efficiency in urban transportation networks is to appropriately understand the roles ride-hailing services play within the urban system. An effective and open partnership between local governments, transit providers, taxi companies, and ride-hailing companies is extremely important to provide the highest level of service. This partnership would include data sharing and program design to provide first- and last-mile services to transit stations (bus, heavy rail, subway, etc.) and late-night services when transit services become less frequent. Service coverage can be increased to regions of low density through ride-hailing services. Equity considerations may be considered through voucher programs to ensure equal access to mobility services.

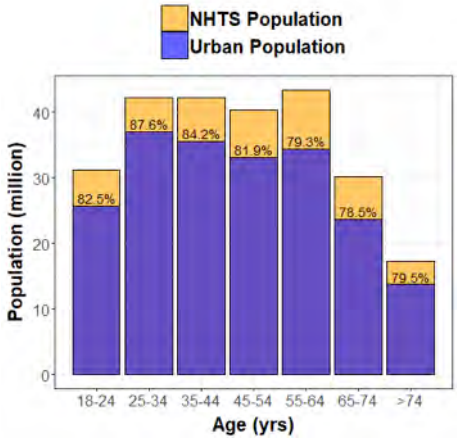
Public Transit Users

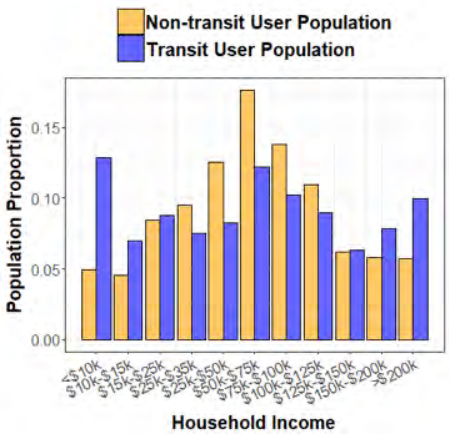
Findings and Characteristics of **Transit Users**

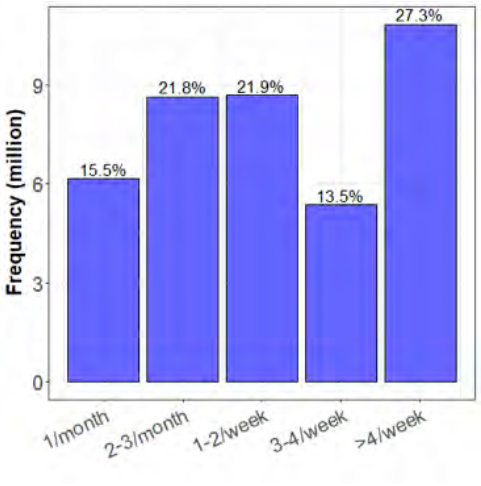
RESULTS FROM THE NHTS

The proportion of the United States population that reported transit use in the previous month was 16.1%. Transit riders are predominately young and reside in urban regions. Low- and high-income households represent large proportions of the transit user population. Low income users tend to use bus services while high income households often use rail. Minority groups rely on public transit more heavily than the white population. High frequency transit riders use ride-hailing services at increased rates and own fewer household vehicles. High frequency ride-hailing users earn higher incomes compared to transit users indicating that vehicle ownership is likely by choice. The overall proportion of people using transit for commuting has declined between 2009 and 2017. During this same period, the proportion of taxi/ride-hailing users (taxis and ride-hailing were considered one category in the NHTS) has increased dramatically, likely due to the emergence of ride-hailing companies, such as Uber and Lyft.









More than 60% of transit riders use transit services at least once per week and over 27% use public transit as a daily commute mode. Frequent transit commuters tend to be younger and less white than the general NHTS population. Average monthly ride-hailing trips increase with transit use while household vehicle ownership rates decrease. These observations are likely because existing transit network and built environment characteristics that facilitate frequent transit use are the same features that facilitate increased use of ride-hailing services (short travel distances, limited parking availability and high parking costs). However, in certain situations, these results might indicate either a complementary (ride-hailing as first- and last-mile solutions) or a substitutional (frequent transit users are shifting to ride-hailing services) relationship. These attributes of the built environment also disincentivize vehicle ownership by providing reliable alternative travel options while reducing individual costs from vehicle ownership. Frequent transit users have only 1 household vehicle compared to the NHTS average of 2.2 household vehicles. A further breakdown of transit users by mode yields that African Americans most often use bus services, while White and Asian populations use more subway and light rail services. Almost 80% of low-income households use buses compared to 22.4% for the highest earning households. The proportion of commuter rail, subway, and light rail all increase as household income increases.

The proportion of work commutes for both buses and commuter/heavy rail observed a slight decrease since 2009. Subway/light rail observed a large increase since 2009. However, subway services are dominated by New York

	NHTS	Transit Frequency of Use			
	Population	1-3/month	1-2/week	3-4/week	>4/week
Percentage of Transit Users (%)		37	22	14	27
Average Age (yrs)	47.2	45	44	44	42
Percent White (%)	73.1	66.1	60.2	56.1	53.4
Median Income ($US)	$50k-$75k	$50k-$75k	$50k-$75k	$50k-$75k	$50k-$75k
Median Education Level	Associate's	Bachelor's	Bachelor's	Associate's	Bachelor's
Average Monthly Rideshare Trips	0.4	0.9	1.6	1.9	2.2
Average Commute Time (min)	19.2	19.4	19.4	20.9	26.1
Average Household Cars	2.2	1.8	1.4	1.1	1
Zero Car Households (%)	7	14.9	27	34.8	42.2

	Status	Bus[1] (%)	Commuter Rail[2] (%)	Subway[3] (%)	Transit (%)	NHTS (%)	Difference (%)
Race	White	34.1 (±3.7)	19.0 (±3.2)	46.9 (±3.3)	58.2	73.6	-15.4
	Black	62.9 (±6.2)	7.2 (±4.1)	29.9 (±8.0)	20.5	12.5	+8.0
	Asian	34.9 (±7.6)	12.3 (±6.3)	48.3 (±5.5)	11.2	5.4	+5.8
	Other	57.0 (±13.9)	7.3 (±3.7)	35.6 (±11.7)	10.2	8.5	+1.7
Household Income	<$25k	79.0 (±7.8)	4.9 (±3.7)	16.1 (±6.9)	17.9	19.6	-1.7
	$25k-$50k	56.7 (±7.2)	4.8 (±2.8)	38.5 (±7.0)	14.9	21.1	-6.2
	$50k-$75k	46.0 (±8.0)	10.6 (±4.9)	43.4 (±7.0)	14.3	16.8	-2.5
	$75k-$100k	36.9 (±10.9)	10.8 (±6.3)	52.3 (±11.5)	12.5	13.2	-0.7
	$100k-$150k	22.8 (±6.5)	23.6 (±5.9)	53.5 (±5.3)	19.1	16.8	+2.3
	>$150k	22.4 (±8.0)	26.8 (±5.1)	50.8 (±10.4)	21.3	12.5	+8.8
Residence	Second City	68.2 (±7.9)	18.6 (±7.4)	13.2 (±4.7)	13.3	19.8	-6.5
	Rural	52.5 (±18.7)	16.9 (±10.6)	30.6 (±25.2)	0.5	18.2	-17.7
	Suburban	46.1 (±9.3)	35.7 (±9.8)	18.2 (±4.8)	17.1	22.8	-5.7
	Small Town	52.9 (±17.3)	32.8 (±18.5)	14.3 (±9.6)	4.2	19.3	-15.1
	Urban	36.1 (±4.1)	7.2 (±1.8)	56.7 (±4.2)	64.8	20	+44.8

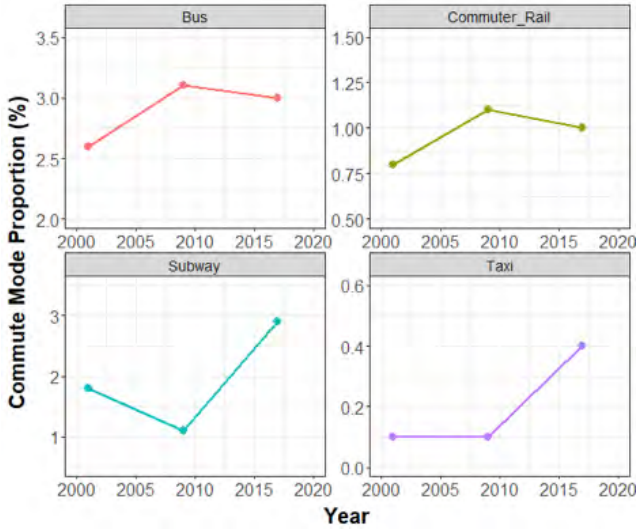
Note: The proportions are calculated for each characteristic of interest (race, household income, and living location). For example, the first row calculates the proportion of transit commuters for each transit mode for the white transit commuter population. "Transit" and "NHTS" correspond to the total transit and general NHTS population proportions for each race, household income, and living location. Values in parentheses represent the 95% confidence interval.

[1]Represents the proportion of transit commuters that most often use bus services

[2]Represents the proportion of transit commuters that most often use commuter rail

[3]Represents the proportion of transit commuters that most often use subway, light rail, or street cars

City, and the ridership was down in 2009 due to the financial crisis, thus making the longer-term increase much less pronounced. The 2017 NHTS grouped taxis with ride-hailing companies (Uber/Lyft) for the first time which resulted in a large increase in the proportion of commuters who reported taxis/ride-hailing as their most common commute mode. Since 1980, taxi commute mode share has been relatively constant between 0.1% and 0.2%. The large increase observed in 2017 to 0.4% is likely due to the rapid growth of ride-hailing services.



POTENTIAL ISSUES

Transit commuter mode share has declined while ride-hailing/taxi services observed a large increase since 2009. While uncertainty about the transit/ride-hailing interaction exists due to data limitations, general observations from the 2017 NHTS indicate that a substitutional relationship might exist due to contrasting trends. These observations are concerning because of the impact they might have on congestion. Transit modes (buses, commuter rail, etc.) are extremely space efficient compared to personal vehicles, including taxi and ride hailing vehicles. A substitutional effect between these two modes, especially during peak hours, can increase congestion significantly.

Low income households predominately rely on bus services compared to various forms of rail (heavy, elevated, street car, commuter, subway, light) that are most utilized by higher income households. Additionally, transit level of service metrics (walk time to/from transit station and wait time) improved for high income households since 2009 while the same metrics were worse for low income households. Transit agencies often face two competing objectives; 1) access and 2) ridership. As transit agencies invest and improve the transit network to boost ridership, it is important that access to transit for vulnerable populations is preserved.

POLICY RECOMMENDATIONS

While ride-hailing services improve urban mobility options for many residents, it is important to ensure that the sub-set of ride-hailing users are not affecting the greater network in a harmful manner. A combination of incentives and/or fees that nudge ride-hailing/taxi users to choose more efficient modes of travel, especially during times of congestion, is important to preserve network sustainability and equity.

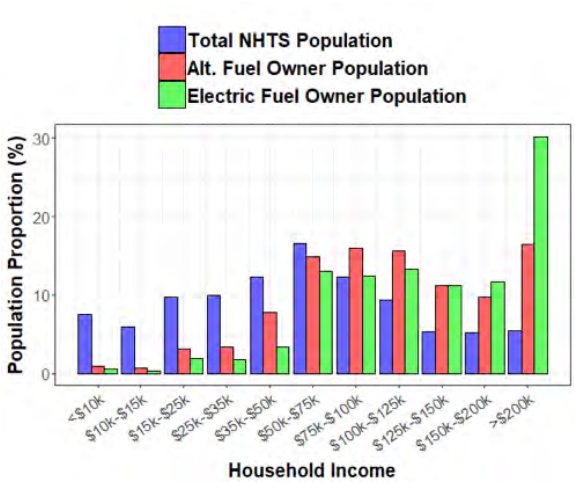
Emerging forms of mobility, such as ride-hailing companies, also have the potential to greatly improve access to jobs, health care and education for vulnerable populations. Pairing ride-hailing services with existing transit or providing mobility in an area without transit service can drastically improve the economic and health status among vulnerable populations. Partnerships between transit agencies and ride-hailing companies can improve mobility access, however, a voucher type policy might be required to ensure that ride-hailing services are affordable to low income populations. Additionally, a seamless payment system where individuals can pay for a multi-modal trip with one payment method that is accessible will also be important for the success of the program.

Alternative Fuel Vehicles

Findings and Characteristics of **Alternative Fuel Vehicle Owners**

RESULTS FROM THE NHTS

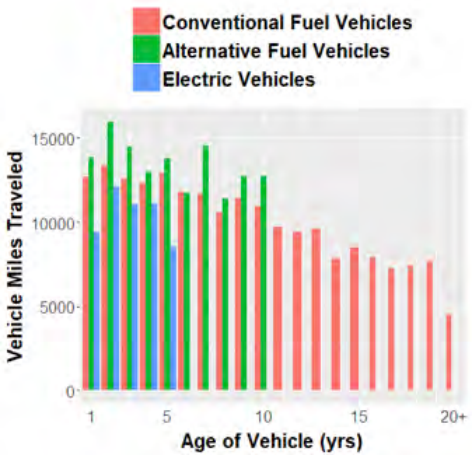
The proportion of the United States households that own at least one alternative fuel vehicle was 3.7%. AFVs are defined as all non-gasoline, non-diesel vehicles. Hybrid electric vehicles are considered alternative fuel vehicles in the 2017 NHTS, even though their primary fuel is gasoline. At a vehicle level, only 2.2% of the private vehicle fleet in the United States consist of AFVs. Of the AFVs, 80% were hybrid-electric vehicles that still rely on gasoline. Alternative fuel vehicle owners earn higher incomes and have higher levels of education compared to the general population. A large proportion of AFV households live in urban areas. More than 75% of AFV households own at least one conventional fuel vehicle (diesel or gasoline) in addition to their AFV.

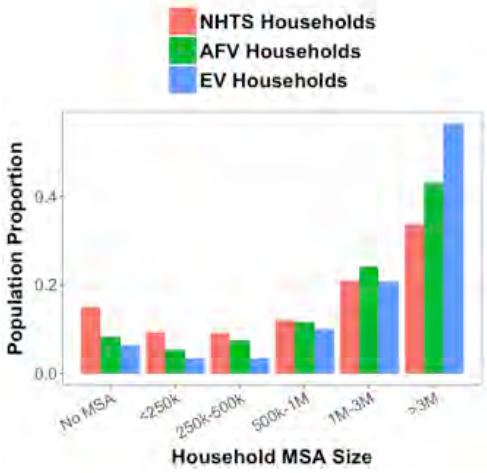


Further splitting alternative fuel vehicle fuel types by household, results indicate that more than 30% of electric vehicle (EV) households make more than $200k per year compared to just 16% and 5% of the AFV and overall NHTS households respectively. The initial costs of EV ownership remain high compared to similar-performing conventional fuel vehicles. Household EVs are often present in multi-car households to be used for specific trip types. Home ownership and the presence of a garage both influence the choice to purchase an EV because of charging outlet availability. These characteristics are all representative of higher income population.

Number of Cars in Household	Zero	One	Two	Three+	Total
Number of Households (millions)	10.5	39.6	39.1	28.8	118.2
Total NHTS Population	8.9%	33.5%	33.1%	24.4%	99.9%
Conventional Fuel Only Vehicle Owners	NA	97.8%	95.1%	94.3%	87.3%
Alternative Fuel Only Vehicle Owners	NA	2.2%	0.04%	0.04%	0.9%
Owns Both Alternative and Conventional Fuel Vehicles	NA	NA	4.5%	5.6%	2.9%

The highest annual miles traveled for AFVs were observed for hybrid and/or plug-in hybrid vehicles. Electric vehicles traveled the least number of annual miles. These observations are likely due to improved efficiency for hybrid-electric vehicles and range limitations for fully electric vehicles. Since alternative fueled vehicles are newer than the entire fleet, their mileage would be expected to be somewhat higher since vehicle miles traveled per vehicle drops with vehicle age. More than 60% of EV households and 52% of AFV households have a graduate degree compared to only 28% for the general United States population. Large proportions of AFV and EV households resided in large metropolitan areas. More than 40% of AFV owners live in MSAs with populations greater than 3 million. EV households average one additional vehicle per household compared to the NHTS population.





	All Households	Biodiesel	Plug-in Hybrid	Electric	Hybrid	Other
AFV Households (%)	NA	0.4	7.5	8.9	78.5	2.9
Average Age (yrs)	49.0	50.0	52.0	54.0	54.0	48.0
Percent White (%)	76.0	74.1	83.3	79.2	79.9	93.3
Median Income ($US)	$50k-$75k	$75k-$100k	$75k-$100k	$75k-$100k	$75k-$100k	$50k-$75k
Median Education Level	Associate's	Bachelor's	Bachelor's	Bachelor's	Bachelor's	Associate's
Urban/Rural Ratio (%)	82.0	88.0	90.0	90.0	88.0	52.0
Average Household Cars	2.0	3.0	2.6	2.9	2.4	3.1

POTENTIAL ISSUES

Results from the NHTS indicate that a large proportion of AFV households are wealthy and own multiple vehicles. The current incentive structure is to provide tax breaks to AFV owners. This policy framework doesn't seem to be improving AFV ownership among low income households. The push to increase AFV ownership is not only important from an emissions standpoint, but many other perks exist for AFV owners in selected states (e.g. preferred parking, permission to enter HOV lanes, etc.) that might further widen the gap between high- and low-income households.

The proportion of AFVs in the private vehicle fleet in the United States is currently 2.2%. The same private vehicle fleet is used to provide ride-hailing services, as all drivers must utilize their private vehicles. Ride-hailing popularity is increasing rapidly, and vehicle miles traveled is expected to increase due to dead-head miles between ride-hail trips and mode shift to ride-hailing. In the absence of policy intervention, it is likely that many metropolitan regions will observe large increases in congestion and emissions which can negatively affect public health and increase the likelihood of climate change related events.

POLICY RECOMMENDATIONS

To mitigate potentially harmful outcomes related to a slow transition away from conventional fuel vehicles towards cleaner alternatives might require policy interventions in addition to the existing tax break for households that purchase an alternative fuel vehicle. First, to deal with the high upfront costs associated with AFVs, a policy where cost savings are provided at the time of vehicle purchase for low income families might provide the needed financial assistance for such families to realistically consider AFVs. A second policy intervention pertains to the rapid adoption of ride-hailing services and their use of the private vehicle fleet. This issue is likely worked out in a partnership with local governments where a minimum proportion of the ride-hailing vehicle fleet must be an alternative fuel vehicle is agreed upon.

An alternative solution might be an incentive-based structure where local governments and ride-hailing companies provide financial incentives to drivers who utilize alternative fuel vehicles. This type of solution can both help improve AFV ownership among low-income individuals in addition to reducing emissions from ride-hailing vehicles.

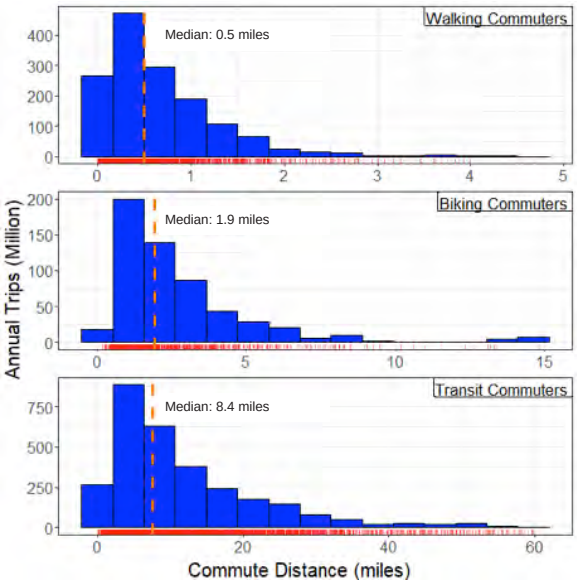
In addition to the above recommendations, an outreach effort to educate households in more rural locations about technology improvements to EV range will be important in the transition away from the internal combustion engine. Adequate investment into charging infrastructure in less population dense regions, and advertising those locations, will ensure equitable access and allow for a more sustainable transition, both from an environmental and equity point of view.

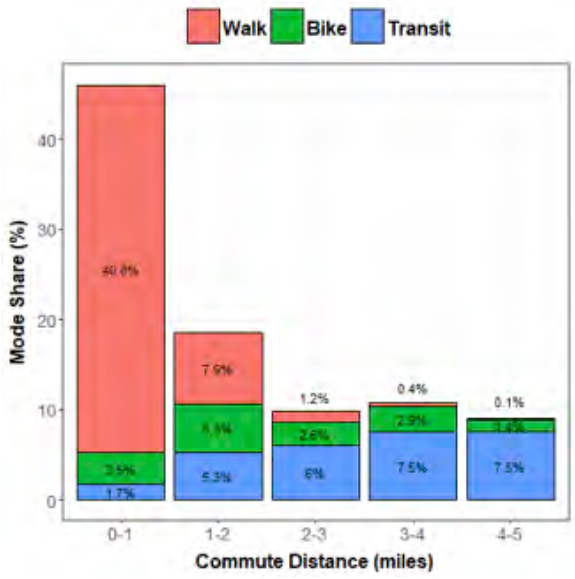
Active Transportation

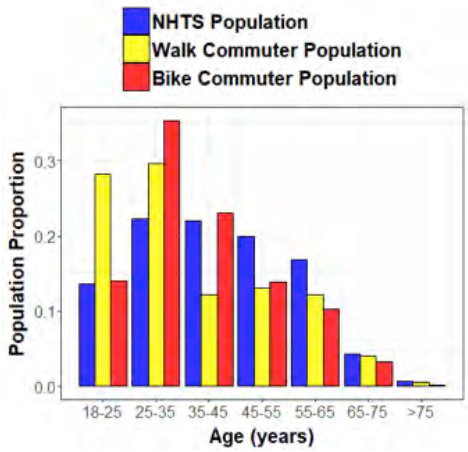
Findings and Characteristics of **Active Travelers**

RESULTS FROM THE NHTS

Currently, 82.3% of the United States population resides in urban areas. Of the urban population, approximately 54% commute to work regularly. The urban commuter population is used in this analysis to understand behaviors and characteristics of active commuters in the United States. Of the commuting population, 3.2% of people reported walking and 1.3% reported biking as their most frequent commute mode. From a trip level perspective, commute trips account for 15% of the total annual trips taken and 16.5% of the annual person miles traveled. The median travel length for walking commutes was 0.5 miles compared to 1.9 miles for bike commutes.







Walking commuters are the youngest with approximately 60% of walking commuters being under the age of 35. Bike commuters are also young compared to the NHTS population, however, approximately 60% of the bike population is represented by commuters between 25 and 45 years of age. A large proportion of walking commuters live in households making less than $25k annually which is likely due to the high costs of car ownership. Male bike commuters outnumber females by almost 3-to-1. The black population makes up approximately 13% of the NHTS general population, however, only 3.8% of the bike commuter population is black. Both the lowest and highest income households represent larger proportions of the bike commuter population compared to the general NHTS population. Over 40% of bike commuters have graduate degrees.

	Status	NHTS[1] (%)	Walking Commuter[2] (%)	Bike Commuter[2] (%)
Gender	Male	53.3	53.2 (-0.1)	72.7 (+19.4)
	Female	46.7	46.8 (+0.1)	27.3 (-19.4)
Race	White	71.3	72.2 (+0.9)	78.9 (+7.6)
	Black	12.8	11.5 (-1.3)	3.8 (-9.0)
	Asian	6.4	8.6 (+2.2)	7.8 (+1.4)
	American Indian	0.7	1.0 (+0.3)	0.2 (-0.5)
	Pacific Islander	0.3	0.1 (-0.2)	0.6 (+0.3)
	Multiple	3.4	2.9 (-0.5)	3.5 (+0.1)
	Other	5.1	3.6 (-1.5)	5.2 (+0.1)
Household Income	<$25k	12.6	27.2 (+14.6)	17.0 (+4.4)
	$25k-$50k	20.0	22.6 (+2.6)	18.4 (-1.6)
	$50k-$75k	17.2	12.4 (-4.8)	17.9 (+0.7)
	$75k-$100k	14.7	10.3 (-4.4)	10.7 (-4.0)
	$100k-$125k	12.5	9.9 (-2.6)	10.8 (-1.7)
	$125k-$150k	7.8	4.0 (-3.8)	5.6 (-2.2)
	>$150k	15.2	13.6 (-1.6)	19.5 (+4.3)
Education	< high school	3.2	6.6 (+3.4)	1.3 (-1.9)
	GED	18.0	18.8 (+0.8)	7.3 (-10.7)
	Some College/Associates	30.0	25.8 (-4.2)	26.3 (-3.7)
	Bachelor's	26.8	24.1 (-2.7)	24.6 (-2.2)
	Graduate Degree	22.0	24.7 (+2.7)	40.5 (+18.5)

1 NHTS refers to the National Household Travel Survey urban commuter population
2 Values in parentheses indicate deviation from the NHTS commuter population

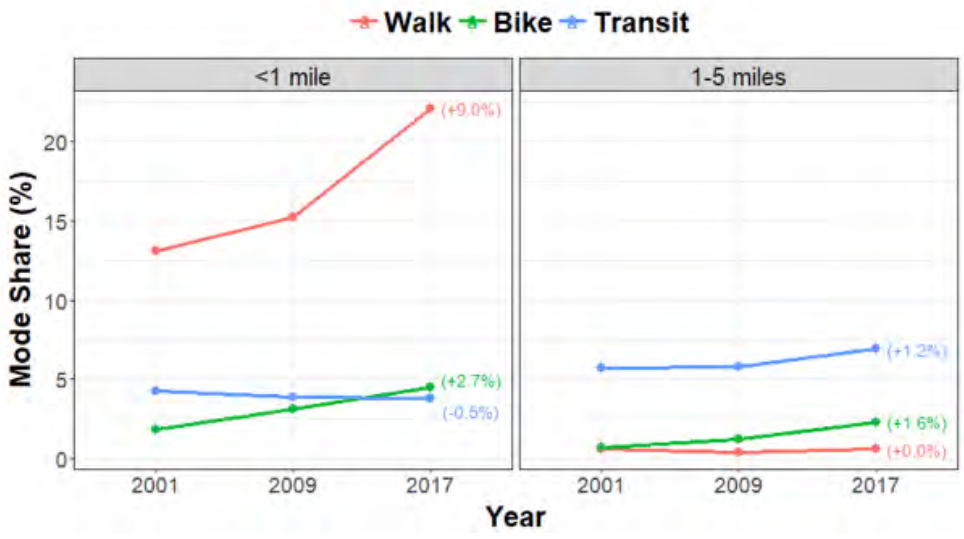
Both forms of active commuters (walking and biking) are most common in no children households. Additionally, almost 70% of active transportation commuters live in zero or one car households, which only represent 30% of the NHTS population.

	Status	NHTS[1] (%)	Walking Commuter[2] (%)	Bike Commuter[2] (%)
Occupation	Sales/Service	26.0	37.8 (+11.8)	24.9 (-1.1)
	Clerical/Administrative	10.4	7 (-3.4)	4.9 (-5.5)
	Labor[3]	13.0	7.2 (-5.8)	6.0 (-7.0)
	Professional/Managerial	50.5	48 (-2.5)	64.3 (+13.8)
Life Status	No Children	50.0	64.8 (+14.8)	68.0 (+18.0)
	Single Parent[4]	4.8	6 (+1.2)	1.9 (-2.9)
	2+ Parents[4]	45.2	29.2 (-16.0)	30.1 (-15.1)
Household Vehicles	0 Household Cars	4.7	28.2 (+23.5)	22.3 (+17.6)
	1 Household Car	24.5	38.0 (+13.5)	43.7 (+19.2)
	2+ Household Cars	70.8	33.7 (-37.1)	34.0 (-36.8)

1 NHTS refers to the National Household Travel Survey urban commuter population
2 Values in parentheses indicate deviation from the NHTS commuter population

Both forms of active commuters (walking and biking) are most common in no children households. Additionally, almost 70% of active transportation commuters live in zero or one car households, which only represent 30% of the NHTS population.

High income households are responsible for the steepest increases in active transportation commuter mode share. Walking times to and from transit stations and wait times have become worse for low income populations while high income populations have experienced improved transit travel and wait times.



POTENTIAL ISSUES

Active transportation modes (walking and biking) can provide numerous benefits to the individual traveler and the greater transportation network. From a traveler perspective, it is common to observe improved public health and well-being among active commuters. From an engineering point of view, the reduction in private vehicles on the roadway resulting from commuters opting to travel via foot or bicycle can help reduce congestion and emissions that negatively impact all nearby residents. As the global population continues to grow and move to urban areas, sustainable commute modes are more important than ever.

Results from the NHTS indicate that travel times to and from bus stations have become longer for low income households since 2009. Travel times from high income households decreased during the same time period. Equal access to reliable transit for all socioeconomic and demographic backgrounds is fundamental in ensuring economic stability within the community.

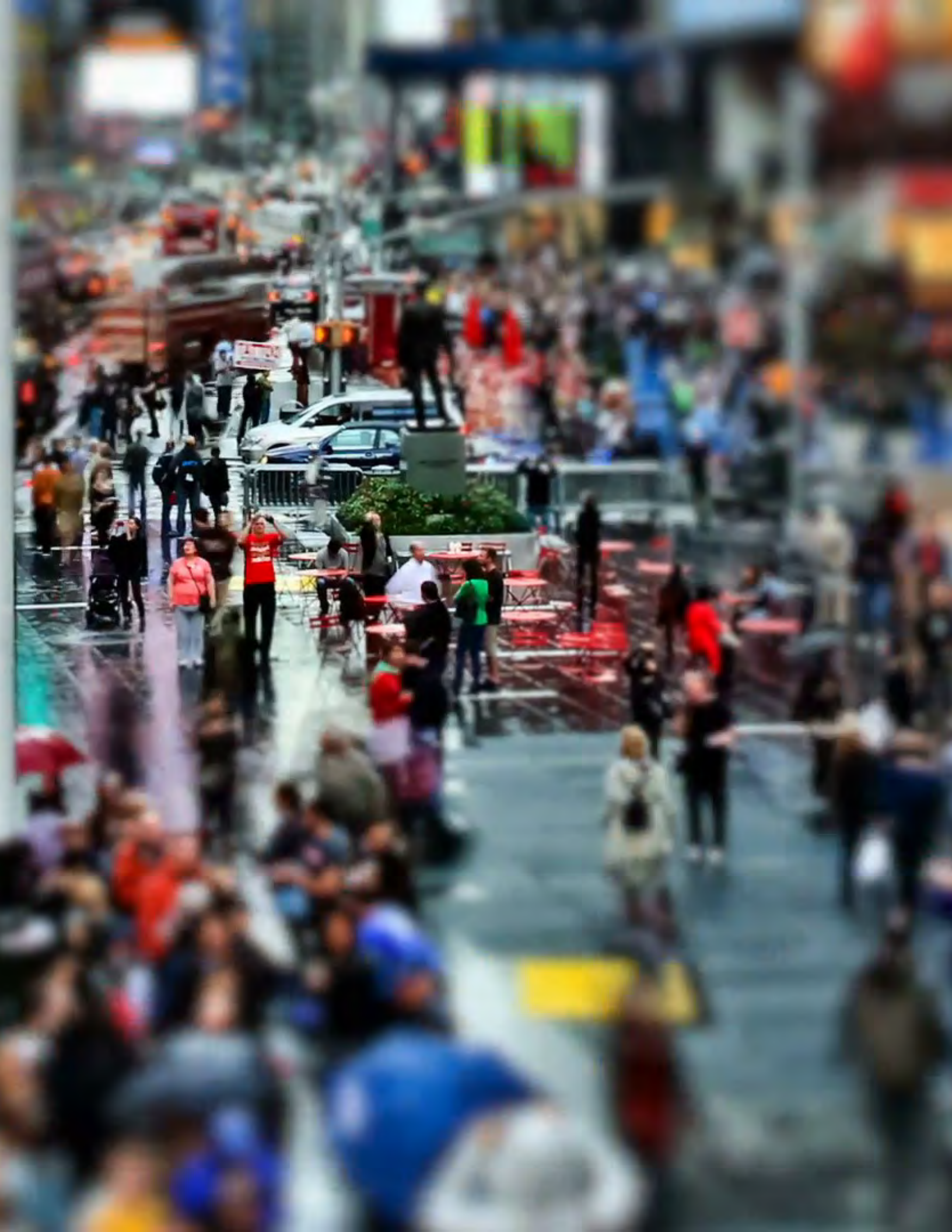
Lastly, new forms of urban mobility continue to be deployed across many United States metropolitan areas. Electric scooters, e-bikes, sit scooters, bike shares, and many more are being piloted without policies to ensure equal access. Additionally, new micro-mobility users and their greater interaction with the existing transportation network are poorly understood. How cities and governments prepare for the rapid deployment of new mobility options will dramatically influence the potential success or failure regarding their integration into the existing transportation system.

POLICY RECOMMENDATIONS

As new forms of mobility take shape, from bikeshares to electric scooters, policies to ensure access for low income and minority communities is extremely important in preserving reliable mobility access for all. Partnerships between private mobility providers and local governments can help ensure that equity considerations are met by strategic placement of new mobility systems. A policy and regulatory framework should also be sketched out before new mobility options are deployed to avoid potential negative outcomes that might stem from the absence of regulation. Education, safe infrastructure, and access to community bikeshares, scooters, etc. that can reduce travel time to and from transit stations can help improve commute travel time among vulnerable populations.

New infrastructure investment that improves safety for active commuters and micro-mobility users is extremely important due to current vehicle-centric infrastructure designs in many American cities. Bike lanes, active commute corridors, sidewalks, dedicated lanes for micro-mobility are all infrastructure designs that separate vehicular traffic from more vulnerable modes (walk, bike, micro-mobility) to help reduce collisions. Investment should also be distributed across all neighborhoods and socioeconomic classes to ensure transportation system equity.

As emerging technologies and new micro-mobility alternatives continue to be deployed and gain popularity, it is recommended that transportation planners and researchers continue to study user populations and behavioral changes for informed network design and investment. To do this, it is recommended that travel surveys (local, regional, or national) include new forms of mobility questions to analyze behavioral shifts and underlying trends to better inform future transportation planning and investment.



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Summer 2019