

Transportation Insecurity in the Motor City

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I. BACKGROUND

In 2015, the nation was captivated by the story of James Robertson, a 56-year-old Detroit resident, who, in addition to taking public transit, walked 21 miles a day, five days a week, for ten years to and from work in suburban Rochester Hills. The story, written by Bill Laitner and first published in the [Detroit Free Press](#), highlighted how the lack of a regional transit system combined with decades of disinvestment in public transit makes getting around the Detroit metropolitan area nearly impossible without a personal vehicle. It punctuated the high costs of car ownership in a city like Detroit. Despite making above minimum wage at his factory job, Mr. Robertson was unable to save enough to purchase a car nor was he able to afford the exceedingly high costs of car insurance in the city. The story also illuminated the everyday difficulties of those who experience transportation insecurity. For instance, long commute times: roundtrip, Mr. Robertson endured a roughly ten-hour commute daily. Then there is all the time spent waiting: every day, Mr. Robertson arrived at work nearly an hour and a half before his shift started because of the schedules of public transit (over the course of a week, that is roughly seven and a half hours spent waiting to start work after arriving early). And then there are the unsafe travel conditions to which one may be exposed: in the winter Mr. Robertson walked in sub-zero temperatures and in the summer, he suffered the heat. In the absence of sidewalks

or streetlights, sometimes he was forced to walk alongside cars in the street and in the dark. Commuting through neighborhoods he considered unsafe, Mr. Robertson was once mugged on his route home.

To capture the experiences of people like Mr. Robertson, researchers recently developed the [Transportation Security Index](#) (TSI). The TSI is the first validated measure of transportation insecurity, a condition in which a person is unable to regularly get from place to place in a safe or timely manner due to an absence of resources necessary for transportation. Such resources include money for gas or bus fare, friends who can provide rides, or being healthy enough to walk. Using this index, researchers have begun to better understand transportation insecurity, including everything from how many people – and who – experience it, to how it compromises individual well-being. For instance, Murphy et al. (2022) documented that in 2018 nearly one in four Americans experienced transportation insecurity. They also found that certain socio-demographic groups were more likely to experience transportation insecurity than others, especially those living below the poverty line. Further, researchers have shown that experiencing transportation insecurity is associated with poorer physical and mental health outcomes (McDonald-Lopez et al. 2023).

To date, most of this research has focused on understanding transportation insecurity at the national level. But there is likely wide variation in patterns of transportation insecurity by state, region, and city, with implications for policy.

In this paper we examine what transportation insecurity looks like in Detroit. We do so by considering the following questions:

- What is the prevalence of transportation insecurity in Detroit?
- What symptoms of transportation insecurity do Detroiters experience?
- Who experiences transportation insecurity in Detroit?
- How is transportation insecurity related to transportation access and mode use?
- How is transportation insecurity related to the costs associated with transportation?
- How satisfied are those experiencing transportation insecurity with their ability to get around?

Detroit is an interesting case in which to explore transportation insecurity for a few reasons. As its nickname “The Motor City” suggests, Detroit is intimately connected to the transportation industry. The history of car manufacturing and wealth born from the automobile industry have indelibly shaped the city physically, economically, and politically. Cars and car culture have long reigned supreme in Detroit. Indeed, not only was Detroit

the primary site of automobile manufacturing, but Detroit residents have been major consumers of car culture from an early time. Already by the late 1930s, there were 40% more cars per 100 residents in the Motor City compared to other large U.S. cities (Resnick 2017). And although Detroit was the first large American city to own and operate its own transit system (Gifford 2020), years of mismanagement, budget constraints, regional infighting, and political pressure have resulted in a bus system that runs infrequently, unreliably, and fails to connect to many neighborhoods in the city or function as part of a regional system (Rahman 2023). In summer 2024, nearly a third of the city’s buses were out of service due to needs for repair (Fayad 2024). The result is that due to its size, emphasis on car culture, and lack of investment in public transit modes, as Mr. Robertson’s experience illustrates, many in Detroit find the city difficult to navigate without a personal vehicle. And yet, as Mr. Robertson’s story also highlights, poor quality roads and high insurance costs can make car ownership and maintenance difficult (Edwards 2024; Cooney et al. 2019).

These points are born out in the research this white paper covers, which finds that more than a third of Detroiters experience transportation insecurity. Such rates are considerably higher than those reported nationally. We elaborate on this key finding in what follows, offering the first descriptive portrait of transportation insecurity at the local level.ⁱ We conclude by summarizing our findings and detailing ideas for future research.

II. DATA AND METHODS

The data for this study were collected as part of the Detroit Metro Area Communities Study (DMACS). DMACS is a panel survey of Detroit residents launched in 2016. Respondents are drawn from an address-based probability sample of all occupied Detroit households. New respondents have been recruited annually to account for panel attrition and bias. Data on transportation insecurity was collected as part of the Winter 2023 survey, collected between November 2, 2023 and December 19, 2023. That survey wave invited 3,065 study panelists to complete a self-administered online or interviewer-administered telephone survey. Of those invited, 2,296 Detroit residents completed the survey, an overall response rate of 76% (using AAPOR Response Rate 1).

The Winter 2023 DMACS wave included the 6-item Transportation Security Index (TSI-6), a validated scale designed to capture an individual’s experience with transportation

ⁱBut see the 2023 Baltimore Area Survey which included the Transportation Security Index. High level findings of transportation insecurity using that data have been documented in the report [“A Portrait of Baltimore: Results of the 2023 Baltimore Area Survey.”](#)

insecurity (Murphy et al. 2024). Modeled after the Food Security Index (Frongillo 1999), the TSI-6 asks respondents how often, in the past 30 days, they have experienced six unique symptoms of transportation insecurity previously observed in qualitative research. Symptoms of transportation insecurity include material concerns, like skipping trips and rescheduling appointments, as well as relational concerns, like worrying about inconveniencing ride givers or feeling bad because of transportation problems (see Table 1 for the for the full list of items included in the TSI-6).

Table 1. TSI-6 Questions and Response Options

Question Text	Response Options
In the past 30 days, how often did you have to reschedule an appointment because of a problem with transportation?	Often Sometimes Never
In the past 30 days, how often did you skip going somewhere because of a problem with transportation?	Often Sometimes Never
In the past 30 days, how often were you not able to leave the house when you wanted to because of a problem with transportation?	Often Sometimes Never
In the past 30 days, how often did you feel bad because you did not have the transportation you needed?	Often Sometimes Never
In the past 30 days, how often did you worry about inconveniencing your friends, family, or neighbors because you needed help with transportation?	Often Sometimes Never
In the past 30 days, how often did problems with transportation affect your relationships with others?	Often Sometimes Never

Per Murphy et al. (2024), to measure transportation insecurity using the TSI, each item in the index is scored on a three-point scale: never (0), sometimes (1), and often (2), creating a total possible sum score across the six items ranging from 0 to 12.ⁱⁱ Using these

ⁱⁱ We dropped any respondent who skipped one or more questions in the scale (n=31). One way of determining the quality of a scale measure is to examine the consistency of responses within the scale. We calculate the measure of survey scale item reliability (Chronbach's alpha) to be .93, suggesting high reliability/consistency of response among items.

sum scores, the TSI-6 is able to distinguish between three categories of transportation insecurity: “no insecurity” (sum scores = 0 or 1), “low insecurity” (sum scores = 2-5), and “high insecurity” (sum scores = 6-12).ⁱⁱⁱ

In this paper, we report findings in terms of both the three-category measure (no insecurity, low insecurity, high insecurity) and a binary measure that differentiates between those who experience no insecurity and those who experience any insecurity. Where appropriate, we report significant variation between groups based on two tailed t-tests.

In addition to the TSI, the Winter 2023 DMACS survey included questions on other aspects of mobility including household car ownership, typical mode use, and transportation cost burdens, which we explore in relation to transportation insecurity below. Every DMACS survey wave collects demographic information on respondents including their household size and household income as well as individual respondents’ race/ethnicity, age, gender, education and employment status. Respondent demographics are used to weight the results to ensure the survey sample is representative of the population of Detroit. Demographics of the unweighted sample are reported in Table A1 in the Appendix.

For this report, we pair data from DMACS with data on transportation infrastructure in Detroit, specifically with the location of Detroit Department of Transportation bus stops. The data on bus stops was gathered from the City of Detroit’s Open Data Portal.^{iv} To measure respondent proximity to bus stops, we use respondents’ geocoded address and calculate, using ArcGIS, the number of bus stops within specific distance buffers (e.g., a quarter mile, a half mile) as well as the estimated walking distance and walking time to the nearest bus stop.

ⁱⁱⁱTechnically, the 3 categories identified by the TSI-6 are “secure,” “marginal/low insecurity,” and “moderate/high insecurity” (see Murphy et al. 2024). For simplicity, in this report we use the terms “low insecurity” as shorthand for the “marginal/low insecurity” category and “high insecurity” for the “moderate/high insecurity” category.

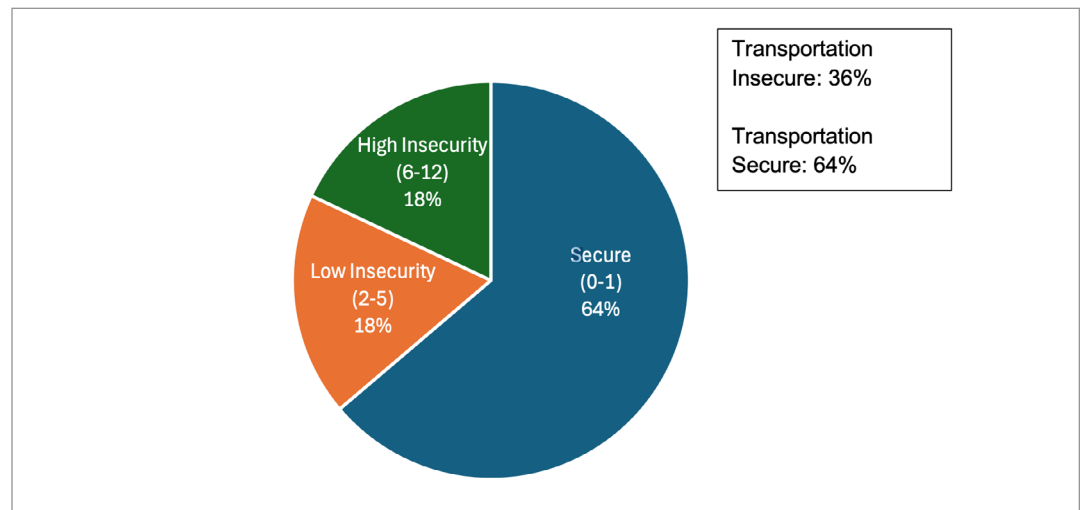
^{iv} Data on Detroit bus stop locations can be accessed at https://data.detroitmi.gov/datasets/1f8ef7745b59402d8566befafcbd6893_0/explore?location=42.367586%2C-83.122249%2C10.70. It should be noted that this data does not include SMART bus stops run by the local regional transit system or other forms of mass transportation in Detroit, including the People Mover or the Q Line streetcar system. Given the short distance to a bus stop for most respondents, data on transportation mode use, and our focus on local policy responses to transportation insecurity, focusing on the city-run bus system was deemed the most relevant transit system to evaluate.

III. RESULTS

A. What is the prevalence of transportation insecurity in Detroit?

As Figure 1 illustrates, in Detroit in 2023, more than a third (36%) of residents experienced transportation insecurity. Among those experiencing transportation insecurity, roughly half experienced low insecurity and half experienced high insecurity.

Figure 1. Prevalence of Transportation Insecurity in Detroit



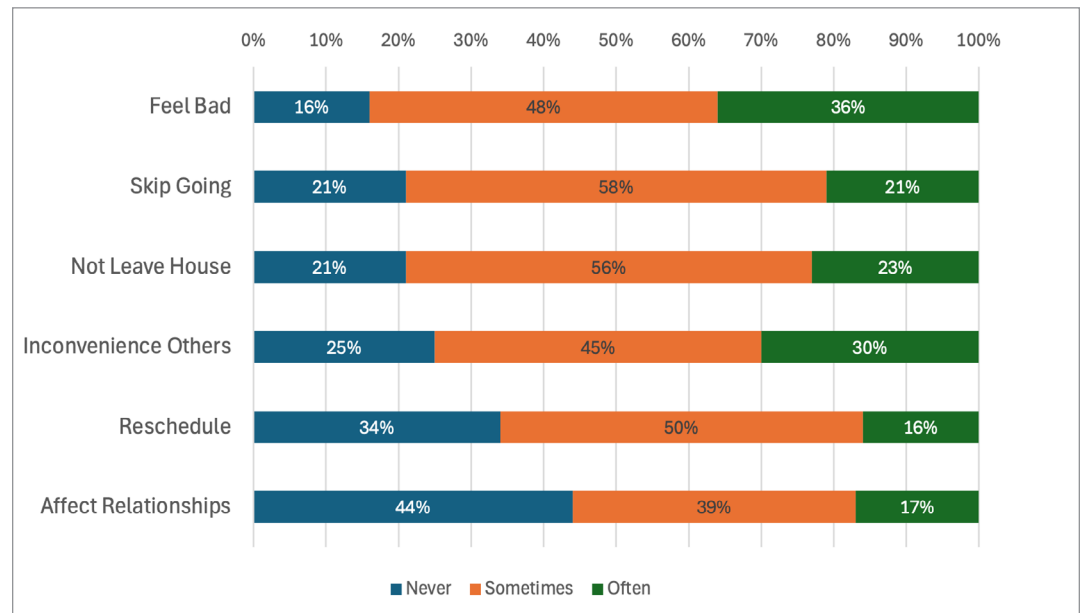
Notably, the estimated prevalence of transportation insecurity in Detroit is considerably higher than national estimates. Data collected from a national sample in 2022, using the TSI-6, found that 17% of adults in the United States experienced transportation insecurity (Murphy et al. 2024). This suggests that transportation insecurity in Detroit is roughly twice as high as transportation insecurity nationally, possibly reflecting the role that local socio-economic and infrastructure conditions play in shaping transportation insecurity in the city.

B. What symptoms of transportation insecurity do Detroiters experience?

While total sum scores can tell us the extent to which Detroiters experience transportation insecurity, understanding how Detroiters endorse each of the items in the index provides a more nuanced picture of what the experience of transportation insecurity looks like in the city. As Figure 2 shows, among residents experiencing transportation insecurity, the most common symptom of transportation insecurity experienced is feeling bad for not having the transportation one needs. Eighty-four percent of residents experiencing transportation insecurity report they sometimes or often felt bad in the

past 30 days due to transportation constraints. The least often endorsed symptom of transportation insecurity is feeling that problems with transportation had affected one’s relationships with others. Though it was the least commonly reported, we still find that over half (56%) of transportation insecure Detroiters report that problems with transportation affected their relationships sometimes or often in the last 30 days.

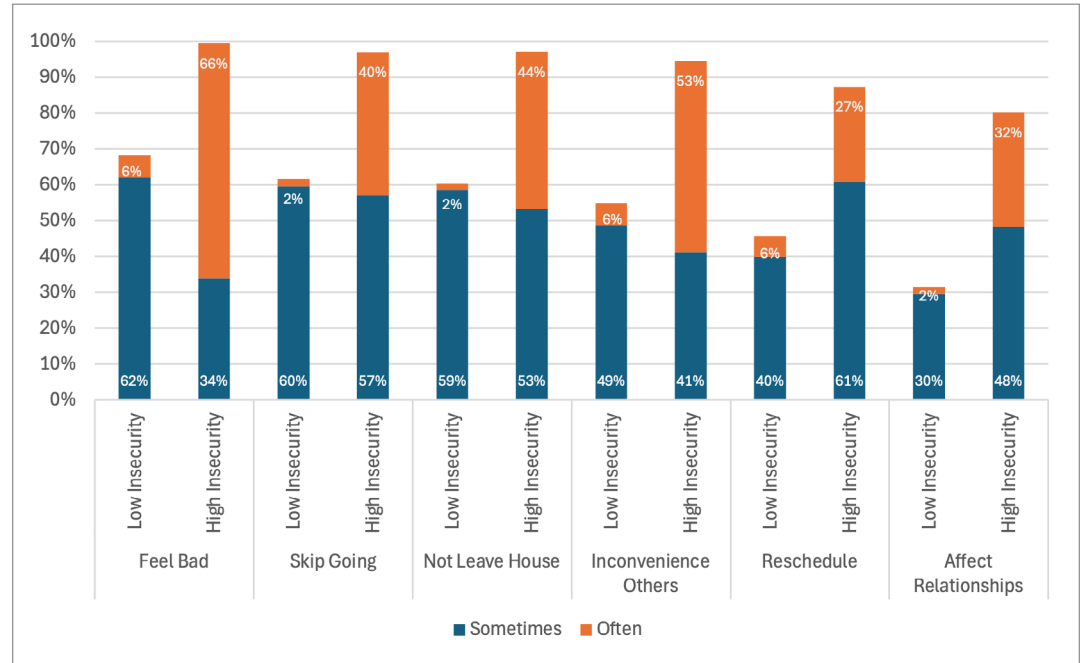
Figure 2. Transportation Insecure Detroiters’ Endorsement of Individual TSI-6 Items



How does the endorsement of symptoms of transportation insecurity differ by category of transportation insecurity? As Figure 3 shows, Detroiters experiencing high transportation insecurity are significantly more likely to report that they “sometimes” or “often” experience a given symptom of insecurity compared to those with low transportation insecurity. In fact, every Detroiters who experienced high transportation insecurity (100%) said that they had felt bad in the past 30 days because they lacked the transportation they needed. Residents experiencing high insecurity are especially likely to report “often” feeling bad about their transportation situation: two thirds (66%) report they felt bad “often” while a third (34%) say they felt bad “sometimes.” Those experiencing high transportation insecurity are also nearly unanimous in saying that, in the last 30 days, they “sometimes” or “often” skipped going somewhere (97%), had been unable to leave the house when they wanted to because of a problem with transportation (97%), or worried about inconveniencing others for rides (95%). Though feeling like transportation constraints affected relationships is the least frequently endorsed symptom of transportation insecurity, residents experiencing high transportation insecurity (80%) are more than twice as likely as residents experiencing low insecurity (32%) to report

transportation affected their relationships. Moreover, nearly a third (32%) of residents experiencing high insecurity said transportation problems “often” affected their relationships compared to just 2% of residents experiencing low insecurity.

Figure 3. Transportation Insecurity Symptoms Endorsed by Respondents Experiencing Low vs. High Transportation Insecurity



Given the construction of the TSI scale, it is unsurprising that the prevalence of each transportation insecurity symptom is lower among residents experiencing low insecurity. At most, 68% of Detroiters experiencing low insecurity report experiencing any given symptom of transportation insecurity, compared to the near ubiquity of symptom endorsement among residents experiencing high insecurity. At the same time, it is interesting to note that not only do residents experiencing low insecurity endorse fewer items, but they also are much less likely to say they “often” experience a given symptom. This means that it is not only the number of symptoms endorsed but also the severity of symptoms of insecurity that differentiates between those who experience low and high transportation insecurity.

C. Who experiences transportation insecurity in Detroit?

While the prevalence of transportation insecurity overall tells us how big of a problem transportation insecurity is in Detroit, it is important to know who experiences transportation insecurity and whether certain demographic groups are more vulnerable

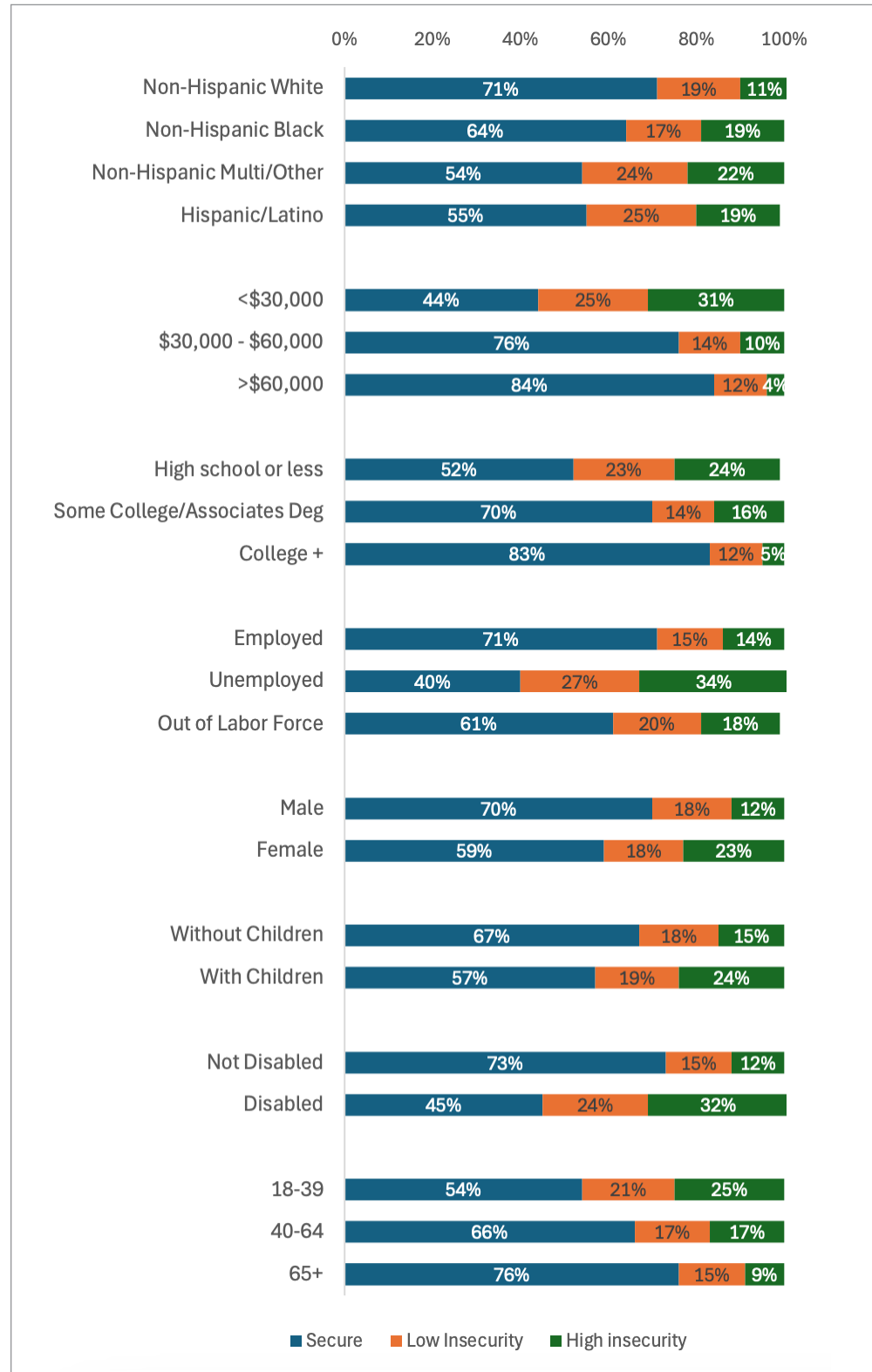
to experiencing this form of hardship. Towards that end, Figure 4 illustrates the variation in transportation insecurity among demographic groups of interest and highlights subpopulations of Detroiters more likely to experience this condition.

First, we examine variations between racial groups. Without controlling for other demographic variables, we find that though Non-Hispanic (hereafter NH) White residents are the least likely to experience transportation insecurity (30%), the difference between NH White Detroiters and NH Black Detroiters (36%) – the majority racial group in the city – is not significant. At the same time, we do find that NH Black residents are significantly more likely to experience high transportation insecurity (19%) compared to NH White residents (11%), suggesting that Black/White inequality manifests through variation in the severity of insecurity rather than in the experience of transportation insecurity generally. The prevalence or severity of transportation insecurity also does not vary significantly between NH Black residents and other minority populations – Latinos, NH Multi-Race or Other Race residents – approximately 45% of whom experience some level of transportation insecurity. However, Latinos, NH Multi-Race or Other Race residents are significantly more likely to experience insecurity, and especially high insecurity, compared to NH White Detroiters.

Factors associated with socioeconomic status are clearer predictors of transportation insecurity in Detroit. More than half (56%) of Detroit residents in households earning less than \$30,000 per year experience some level of transportation insecurity and nearly a third (31%) experience high transportation insecurity. This is significantly greater than the insecurity experienced by those living in higher earning households. Moderate income households – those earning between \$30,000 and \$60,000 – are also significantly more likely (24%) to experience transportation insecurity than households earning more than \$60,000 (16%). This difference is driven primarily by a greater prevalence of high insecurity among middle-earners (10%) compared to upper-earners (4%).

We observe a similar, graduated pattern of insecurity when considering educational attainment. Detroiters with a high school diploma or less are three times as likely (47%) as those with a college degree (17%) to experience transportation insecurity. Those with some college or an associate's degree are similarly twice as likely (30%) to experience transportation insecurity compared to college graduates. The significant differences between college graduates and others are especially pronounced when severity of insecurity is considered. Just 5% of college graduates experienced high transportation insecurity in the past 30 days compared to 16% of those with some college and 24% of those with a high school diploma or less.

Figure 4. Transportation Insecurity in Detroit by Demographic Group



Another socioeconomic indicator strongly associated with transportation insecurity is employment status. We find that employed Detroiters are significantly less likely to report transportation insecurity (29%) compared to residents who are unemployed (61%) or are out of the labor force because they are retired, disabled, in school, choose not to work, or otherwise have not worked or searched for jobs recently (38%). Unemployed Detroiters are especially likely (34%) to experience high transportation insecurity compared to employed Detroiters (14%) or those out of the labor force (18%). Taken together, the relationship between these socioeconomic factors – having a lower income, lower education level, or being unemployed – and transportation insecurity suggest the reinforcing nature of transportation insecurity, where economically disadvantaged individuals may have limited ability to regularly move from place to place in a safe or timely manner which further limits economic opportunity and the avenues available to overcome financial precarity (and perhaps even transportation insecurity).

In addition to these socioeconomic factors, we also explore variation by gender and household composition. We find that women are significantly more likely to experience transportation insecurity than men: 41% of women report experiencing transportation insecurity compared to 30% of men. This gender difference primarily reflects that women are nearly twice as likely to report high transportation insecurity (23%) compared to men (12%). Particular types of household composition also appear to be strongly associated with transportation insecurity in Detroit. Households with children are significantly more likely to experience transportation insecurity: 43% of households with children report some level of insecurity compared to a third (33%) of households without children. Again, this difference is driven by a greater prevalence of high transportation insecurity among households with children (24%) than those without children (15%).

Transportation insecurity is also significantly associated with having a disability.^v Fifty-six percent of Detroit residents who say they either need help with day-to-day activities – such as bathing, preparing meals, shopping, managing finances – or who self-identify as having a disability in relation to their employment status experience transportation insecurity, compared to 27% of residents who do not report having a disability. Detroiters who report having a disability are twice as likely (32%) to experience high insecurity compared to those without such limiting conditions (12%).

^v We measure disability status based on responses to two questions included on the DMACS survey. First, a respondent is classified as disabled if they report that the reason they are not working is because they “have health/medical limitations or are disabled.” Second, a respondent is classified as disabled if they select “I could use a little more help,” “I need a lot more help,” or “I get all the help I need” in response to the question “If for any reason you need help with day-to-day activities such as bathing, preparing meals, shopping, managing finances, etc., do you get the help you need?” These are unconventional measures of disability and may underrepresent the number of disabled residents who either need no help or whose disability is not a reason for being out of work.

Finally, we find that transportation insecurity is also most pronounced among younger Detroit adults – those 18-39 years old – 46% of whom report experiencing some transportation insecurity. In fact, transportation insecurity appears to decline with age. A third (34%) of Detroiters aged 40-64 report experiencing some level of transportation insecurity whereas a quarter of residents 65 and older are transportation insecure. While these results highlight how transportation insecurity varies by individual dimensions of respondent identity, they do not factor in the multiple identities of a given resident and how intersectionality might mean certain groups with multiple marginalized identities – for example parents with disabilities outside of the labor force – might face especially high levels of transportation insecurity. Table A2 in the Appendix includes results from statistical models that show how transportation insecurity is associated with demographic traits after controlling for other dimensions of identity. The results reinforce the strong relationship between socio-economic status, age, and disability on transportation insecurity, which endure even when controlling for other demographic variables.

D. How is transportation insecurity related to transportation access & mode use?

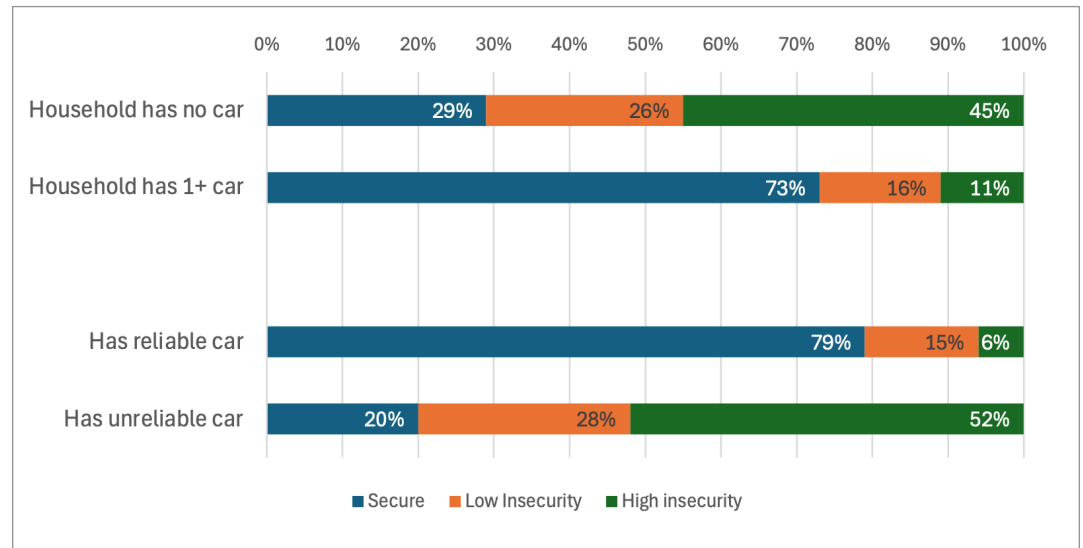
Now that we know the prevalence of transportation insecurity in Detroit and have a picture of what demographic groups are most vulnerable to experiencing this condition, another important question to consider is how transportation insecurity is related to what types of transportation people have access to and what kinds of modes they use. We begin this analysis by examining how transportation insecurity is related to access to a personal vehicle.

Access to a Personal Vehicle

Past research using national data has shown that car ownership is a key correlate of transportation insecurity, finding that non-car owners are twice as likely to experience transportation insecurity as car owners (Murphy et al. 2022). In Detroit, where 80% of households report owning at least one car, we find an even greater disparity in transportation insecurity between car owners and non-owners. Detroiters whose households do not own cars are nearly three times more likely to experience transportation insecurity (71%) compared to car owners (27%). Looking at this relationship by category we see that those without cars are 1.5 times as likely to experience low transportation insecurity (26%) compared to car owners (16%) and more than four times as likely to experience high transportation insecurity (45%) compared to car owners (11%).

While these data show that owning a car may generally protect residents against experiencing transportation insecurity, the fact that a quarter of car owners report some insecurity also indicates that car ownership alone cannot solve transportation insecurity. While there may be many reasons for this, one may have to do with the reliability of one’s car – or the ability to depend on it without concern it may break down because of age or inability to pay for maintenance. Indeed, as Figure 5 illustrates, we find that one in 10 car owners in Detroit (10%) report their vehicle is unreliable. Among those with unreliable vehicles, 80% are transportation insecure. Furthermore, half (52%) of car owners without a reliable vehicle experience high insecurity, compared to just 6% of car owners with reliable vehicles.

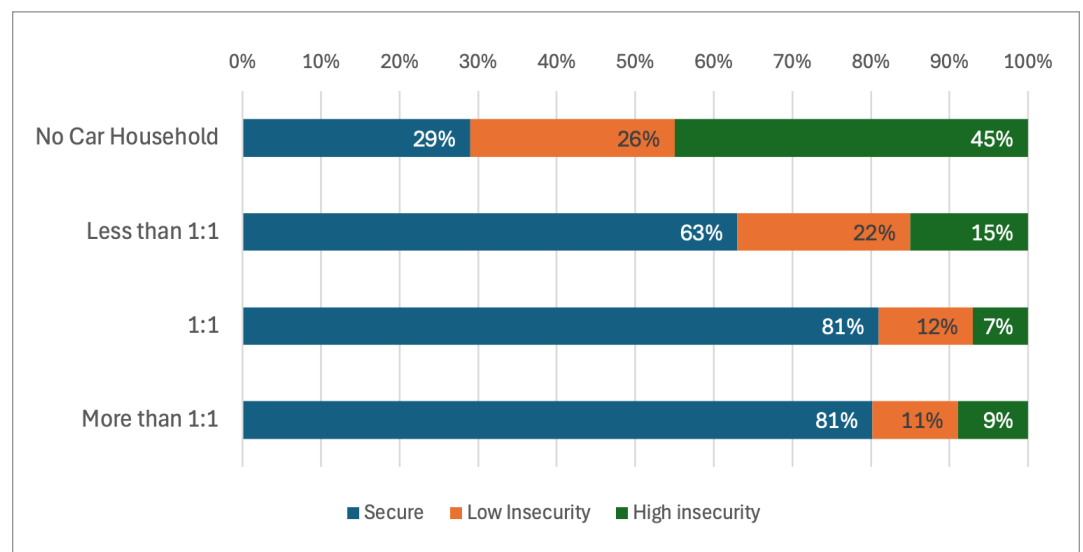
Figure 5. Car Ownership and Reliability by Transportation Insecurity Category



Another reason that car ownership may not protect individuals from experiencing transportation insecurity is that there may be multiple drivers within a household with transportation needs, but not sufficient vehicles in the household to meet those needs. Examining the car to household ratio among Detroiters we find that although 45% of Detroit households that own cars have one car per adult (a 1:1 car to adult ratio), in 42% of car-owning households there were more adults than cars, including 30% of households where there were one or fewer cars for every two adults (a 0:5:1 car to adult ratio). Moreover, we find that the ratio of cars to potential drivers within a household is a

significant predictor of transportation insecurity. As Figure 6 shows, while lacking a car altogether is associated with the highest prevalence of transportation insecurity, living in a household where there are fewer cars than adults makes one significantly more likely to experience transportation insecurity than living in a household where there is at least one car per adult. Indeed, 37% of Detroiters in households where adults outnumber cars were transportation insecure compared to 19% of residents where there were an equal number of cars and adults.

Figure 6. Car to Adult Ratio by Transportation Insecurity Category



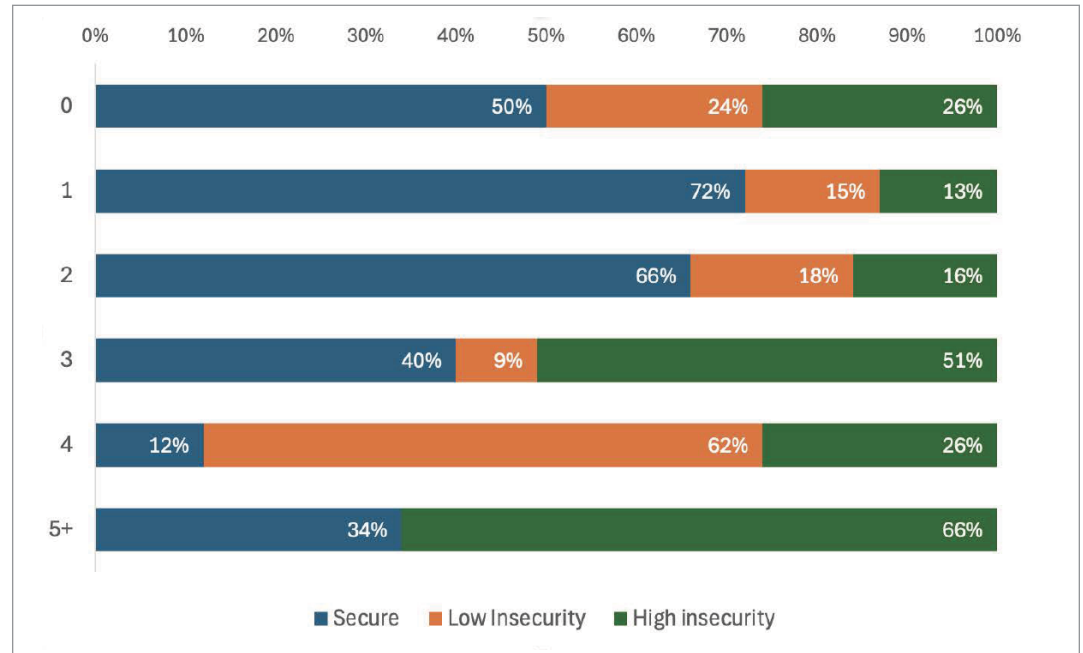
Looking at this relationship by category of transportation insecurity we see that Detroiters living with less than a 1:1 car to adult ratio were nearly twice as likely as those with at least one car per adult to experience low transportation insecurity (22% vs. 12%) and were similarly twice as likely as those with at least one car per adult to experience high transportation insecurity (15% vs. 7%). The major difference in transportation insecurity between those with below a 1:1 car to adult ratio and those with no car is the proportion that experience high transportation insecurity. Forty-five percent of those without cars experience high insecurity compared to 15% of those with less than a 1:1 car to adult ratio. However, these groups were roughly as likely to experience low insecurity.

Daily Transportation Modes

Of course, aside from a personal vehicle, there are many other modes of transportation people may use to get from place to place (for instance, public transit, ride hailing services, bicycling, etc.). And instead of relying on just one of these modes, people may meet their travel needs by piecing together multiple modes of transportation which may involve time and financial tradeoffs that have implications for transportation insecurity. How is transportation insecurity related to the number of different modes people use to get around to meet their daily travel needs?

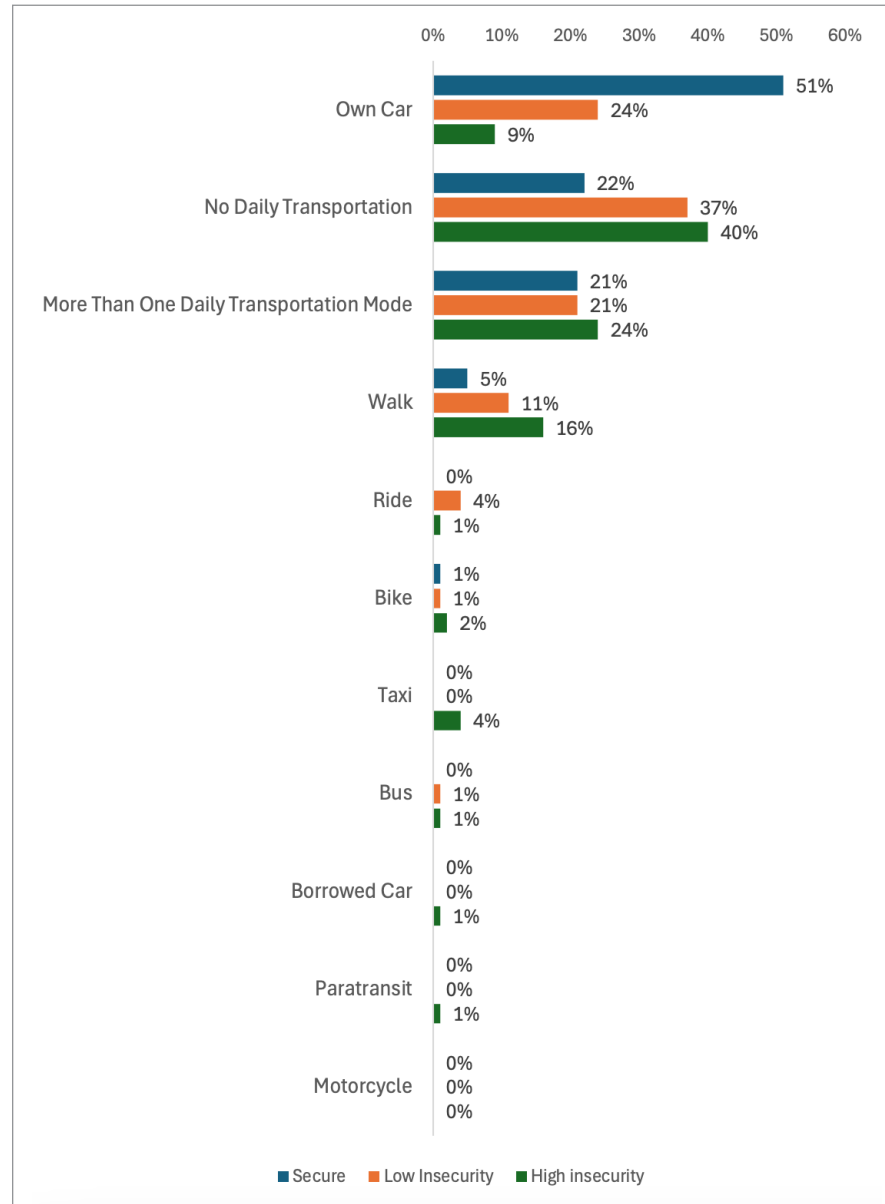
As Figure 7 shows, of the Detroiters who report relying on a single mode of transportation for their daily mobility, 28% experienced transportation insecurity while 72% experienced transportation security. Similarly, of Detroiters who report relying on two modes of transportation daily, 34% experienced transportation insecurity compared to 66% who experienced transportation security. This pattern changes for people who take three or more modes of transportation. That is, transportation insecurity increases significantly among residents who piece together their mobility by taking three or more modes of transportation daily. Interestingly, we also find that half (50%) of Detroiters who report they use no transportation modes daily experience transportation insecurity while the other half do not. This raises questions about whether this lack of travel reflects desired home boundness – including working from home – or if it reflects being confined to one’s home due to a lack of access to safe, reliable transportation options.

Figure 7. Number of Transportation Modes Taken Daily by Transportation Insecurity Category



While using more transportation modes may be associated with greater transportation insecurity, for those who rely primarily on a single daily transportation mode might some modes of transportation be more associated with transportation insecurity than others? Considering this question, we find that there is significant variation in the type of mode used between transportation insecure and transportation secure respondents. Perhaps unsurprisingly, in the Motor City, a personal vehicle (car, truck, or SUV) is the most common form of primary transportation. Among those experiencing transportation security, 51% reported that their primary mode of daily transportation was their own car. In contrast, those who experience low transportation insecurity are half as likely (24%) to say they primarily use their own car for daily transportation while just 9% of residents experiencing high insecurity similarly primarily rely on their car. Instead, one in six (16%) residents who experience high insecurity report that their primary way of getting from place to place every day is walking. By comparison, only 5% of transportation secure residents primarily get around on foot. Figure 8 also shows that residents experiencing transportation insecurity are significantly more likely to say they take no mode of transportation daily. Forty percent of people experiencing high insecurity and 37% of people experiencing low insecurity report that they take no mode of transportation daily compared to 22% of Detroiters experiencing transportation security.

Figure 8. Primary Mode of Daily Transportation by Transportation Insecurity Category



Proximity to Bus Transit

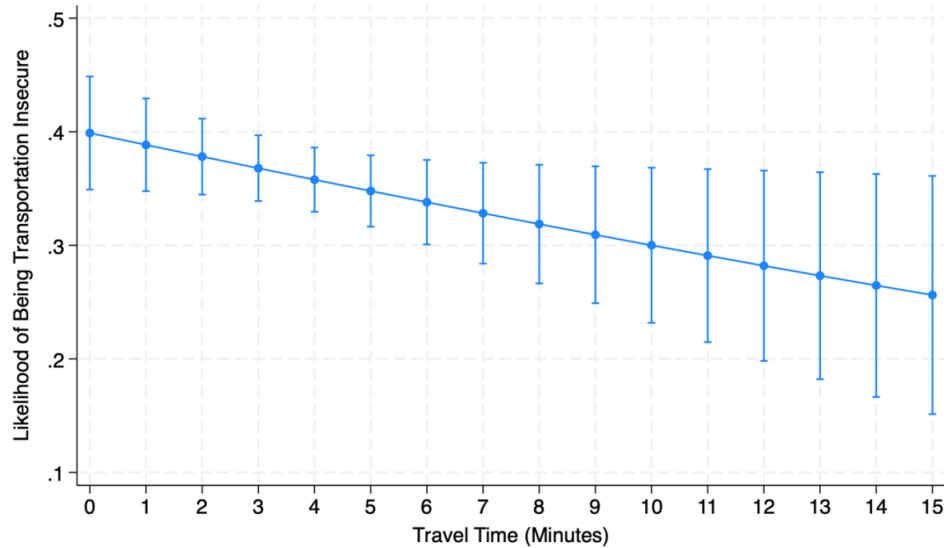
So far, the use of public transit has barely appeared in this report. In part, this is because, as Figure 8 illustrates, very few Detroiters (just 1%) said they primarily use the bus as their mode of daily transportation. This is true even among Detroiters who experience transportation insecurity, a demographic we might expect to be heavily reliant on public

transportation. In fact, very few Detroiters say they use public transit at all: 82% of residents report never using the bus as a means of transportation in the past 30 days. While there are likely many explanations for such low rates of ridership, given the well-documented finding that distance from transit stops is associated with decreased transit use (see, e.g., Durand et al. 2016), here we consider the role that proximity to bus routes might play. We find that the average DMACS respondent has seven bus stops within a quarter mile of their home and 28 stops within a half mile. When measuring the distance to the nearest bus stop, the average respondent lives a fifth of a mile (0.19 miles), or a four-minute walk, from their nearest bus stop. Residents who report using the bus are significantly more likely to live closer to a bus stop than those who never take the bus, but the difference is very small: residents who report riding the bus daily live, on average, a three-minute walk (or 0.15 miles) from the nearest bus stop while the average respondent who says they never use the bus lives a four-minute walk (or 0.19 miles) from the nearest bus stop.

While the number of bus stops within a quarter or half mile is not a significant predictor of transportation insecurity, proximity to the closest bus stop is. Regression models (illustrated in Figure 9) show that as one's distance to the nearest bus stop (in miles or minutes) increases, the likelihood of experiencing transportation insecurity goes down. This means that residents who live further away from a bus stop are less likely to experience transportation insecurity. This is counterintuitive if we believe that greater proximity to bus stops should ease transportation insecurity.

What might explain this finding? While we do not have the data to fully tease this out, there are several possible explanations. First, those further from bus stops may be more likely to own cars, which our analysis above finds is strongly associated with decreased transportation insecurity. Second, it is possible that this relationship is driven by factors associated with people's destinations (vs. the origin location of their travel). That is, while Detroiters may live proximate to transit, the transit available to them may not be adequate for taking them where they need or want to go and/or the closest transit stop to their destination may be prohibitively far. Additionally, it is possible that the types of neighborhoods served and not served by the bus and the ways in which other forms of advantage are patterned across space could explain this inverse relationship. Indeed, the significant negative effect of distance on insecurity disappears when we control for other respondent characteristics or for actual bus use. Regardless, the relationship between distance to the nearest bus stop and transportation insecurity does highlight that people experiencing transportation insecurity can – and do – live in neighborhoods where public transit is available and relatively proximate.

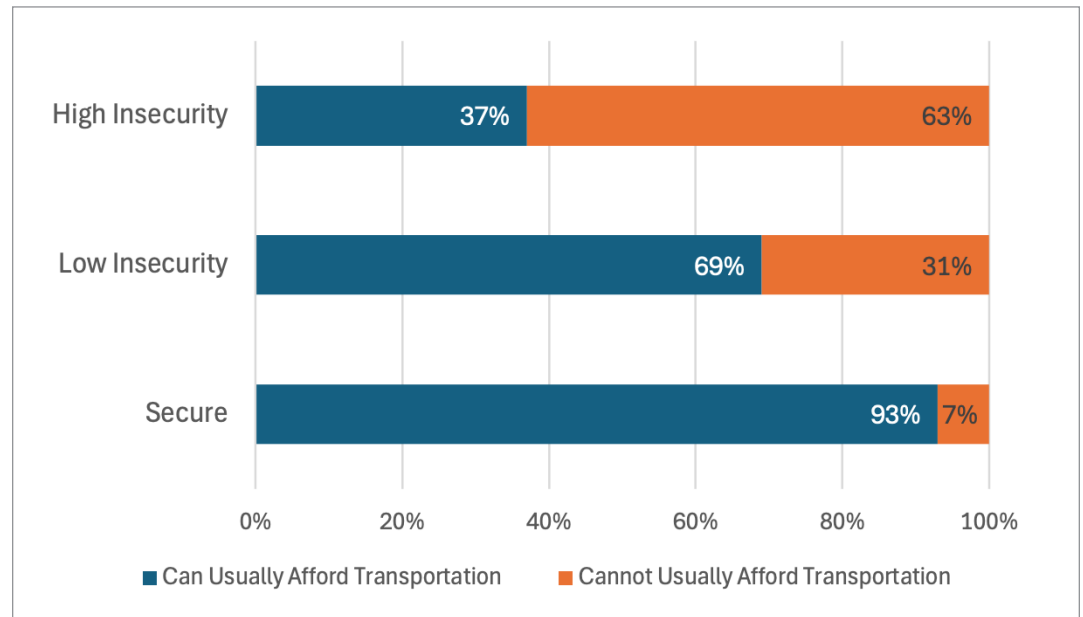
Figure 9. Relationship Between Minutes to Nearest Bus Stop and Transportation Insecurity



E. How is transportation insecurity related to the costs associated with transportation?

In the U.S., transportation ranks as the second biggest household spending category after housing (Bureau of Transportation Statistics 2022). How do the high costs of transportation shape transportation insecurity among Detroiters? Perhaps unsurprisingly, we find that those who experience greater transportation insecurity face significantly greater difficulty affording transportation-related costs. Nearly half (47%) of Detroiters experiencing transportation insecurity report that they cannot usually afford the transportation they need. In contrast, only 7% of those experiencing transportation security similarly say they struggle with affordability. Difficulty affording transportation increases significantly depending on the degree of transportation insecurity experienced. As Figure 10 illustrates, fully 63% of residents experiencing high transportation insecurity say they cannot usually afford the transportation they need, making them twice as likely as those experiencing low transportation insecurity (31%) and nine times as likely as those who are transportation secure (7%) to say they usually cannot afford transportation.

Figure 10. Ability to Afford Transportation by Transportation Insecurity Category

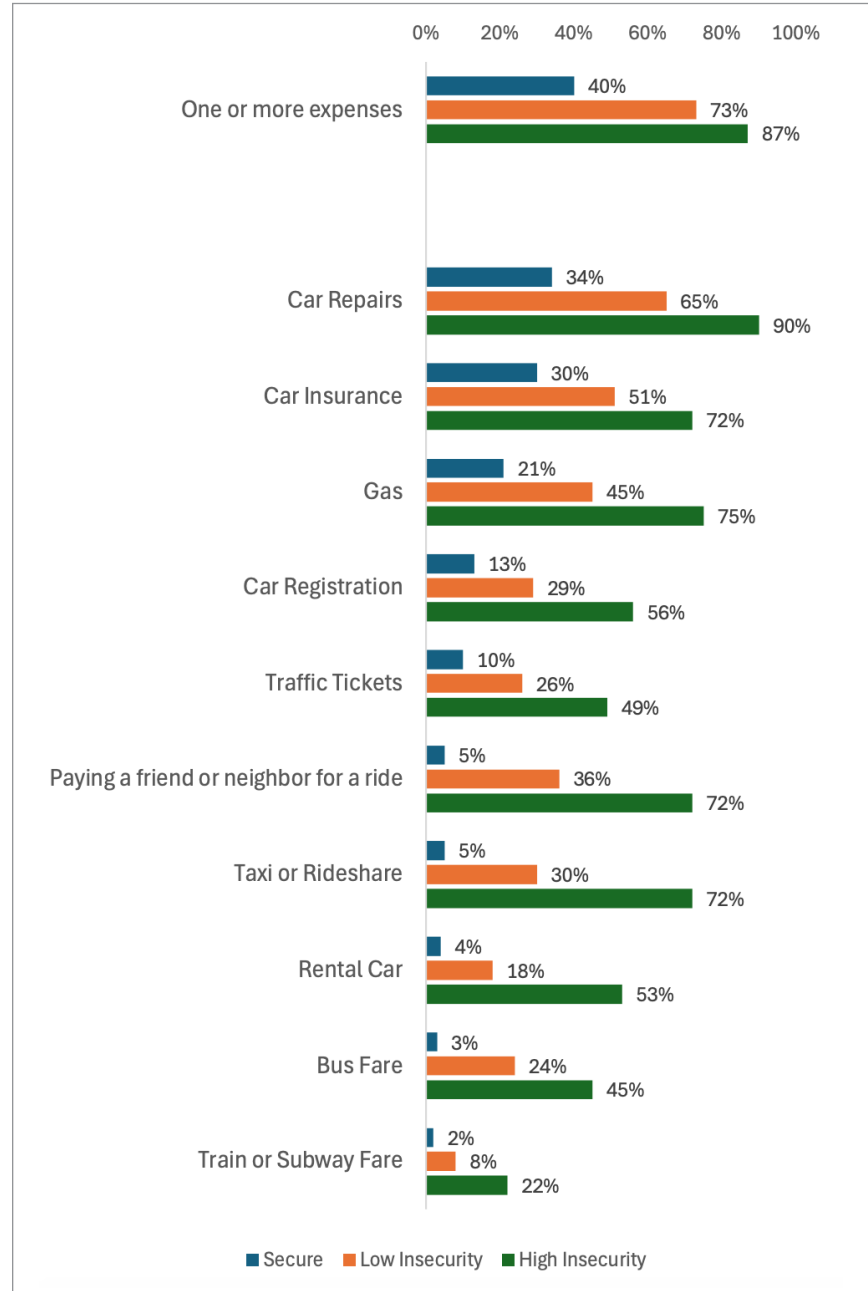


Beyond feeling more financially constrained when it comes to paying for the costs of transportation-related expenses, Detroiters experiencing transportation insecurity are also significantly more likely to report having recent difficulty paying for costs associated with transportation. When asked if they had difficulty paying for 10 expenses associated with transportation – including the cost of gas, bus fare, car repairs, or traffic tickets – in the past 30 days, 80% of Detroiters experiencing transportation insecurity reported they have had difficulty paying for one or more transportation expense, twice the proportion of transportation secure Detroiters (40%) who report similar affordability challenges. In fact, on average, residents experiencing transportation insecurity report they had trouble paying for 3 of the 10 transportation expenses in the past 30 days compared to secure residents who reported an average difficulty paying for just 1 of 10 transportation expenses.

Breaking down the difficulty of affording expenses by category, as shown in Figure 11, residents who experience high transportation insecurity are significantly more likely to report difficulty paying for at least one expense compared to low insecurity or secure residents. Specifically, 87% of high insecurity residents report they had trouble paying for at least one transportation expense in the past 30 days, compared to 73% of low insecurity residents and 40% of those who are transportation secure.

What specific transportation-related expenses do Detroiters struggle to afford the most? We find that the most common expenses Detroiters report having difficulty paying for are car repairs, followed by car insurance and gas. Residents experiencing transportation insecurity are twice as likely – a significant difference – to report having difficulty affording these transportation related expenses compared to their secure counterparts. While 44% of Detroit car owners say they have had trouble affording a recent car repair, 74% of car owners who experience transportation insecurity reported trouble paying for a car repair in the past 30 days compared to 34% of transportation secure residents. This variation is more pronounced when distinguishing between levels of transportation insecurity. Ninety percent of highly transportation insecure car owners have had difficulty paying for recent car repairs compared to 65% of low insecurity residents. We see a similar pattern with car insurance and gas. Roughly three quarters of car owning, high insecurity residents report recent trouble paying for car insurance (72%) or gas (75%). By comparison, 51% and 45% of residents experiencing low insecurity and 30% and 21% of transportation secure Detroiters similarly say they had recent trouble affording car insurance or gas, respectively.

Figure 11. Trouble Affording Common Transportation Expenses by Transportation Insecurity Category**



**Note: Data is reported based on expenses respondents self-identified as applicable to them. Respondents were asked: “In the past 30 days, have you had trouble paying for any of the following?” and could select “Yes,” “No,” or “Not applicable” for each expense type. Additionally, we only report difficulty paying for car-related expenses, like gas, among those who have a car in their household. However, it should be noted that those without a car may still be tasked with purchasing gas in exchange for rides. Analysis of car and non-car owners’ difficulty affording such expenses was substantively the same.

Of course, not all transportation expenses are equally relevant to those who are transportation secure and insecure. As noted above, those who experience transportation insecurity are significantly less likely to have a personal vehicle and thus rely on other modes of transit. However, we find that among those who experience transportation insecurity and who rely more heavily on the bus or on rides from others also report significantly greater difficulty affording these costs. Seventy-two percent of residents experiencing high transportation insecurity who say paying a friend, family member, or relative for a ride was a relevant recent expense said they had trouble affording it, compared to 36% of low insecurity residents and 5% of transportation secure residents. Similarly, 45% of residents experiencing high insecurity report struggling to afford bus fare compared to 24% of low insecurity residents and just 3% of transportation secure residents.

Together, these findings suggest that affordability – the ability to afford rides from friends, bus fare, car-related expenses, or all of the above – is a major driver of transportation insecurity in Detroit.

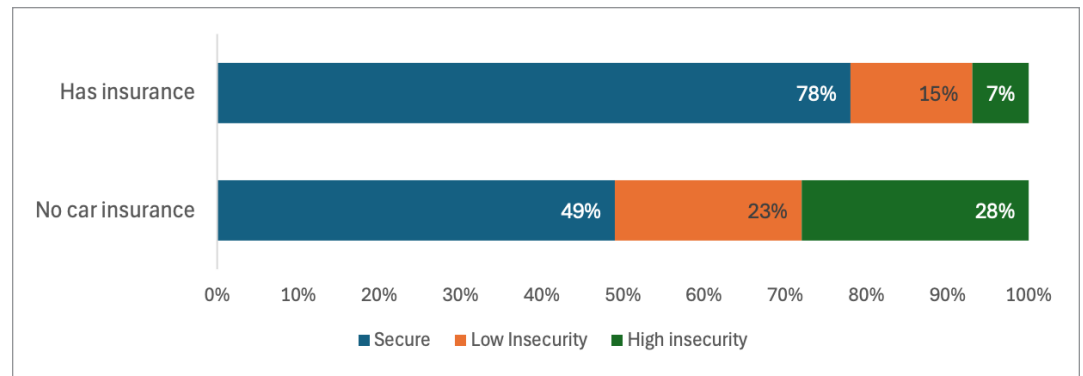
Car Insurance

Before moving on, it is important to dwell on the issue of the cost of car insurance for a moment. As noted in the introduction of this report, Michigan, and Detroit especially, is known to have costly car insurance (Cooney, Philips, Rivera 2019). Given such costs, it is perhaps no wonder that so many residents experiencing transportation insecurity report difficulty paying for car insurance. And given such difficulties affording car insurance among those experiencing insecurity, it thus perhaps not surprising that we find that car owning, transportation insecure Detroiters are more likely to forego car insurance than their transportation secure counterparts. Specifically, we find that residents with a car, but no car insurance are significantly more likely to experience transportation insecurity (51%) compared to those with car insurance (22%). As Figure 12 shows, uninsured car owners are especially likely to report high transportation insecurity: 28% of those with an uninsured car experience high insecurity compared to just 7% of car owners with insurance.

Such high rates of transportation insecure car owners in Detroit who do not have car insurance punctuates the precarity, both legal and financial, associated with the experience of transportation insecurity. To forego car insurance is risky: operating a

vehicle illegally in Michigan is considered a misdemeanor and may be punishable by a fine up to \$500, up to one year in jail, or both (Cooney, Philips, Rivera 2019). Yet, lacking adequate, affordable alternatives, drivers may feel they have no choice and see taking this risk as necessary if they are to get to the places they need to go with potential consequences for deepening their financial hardship and transportation insecurity.

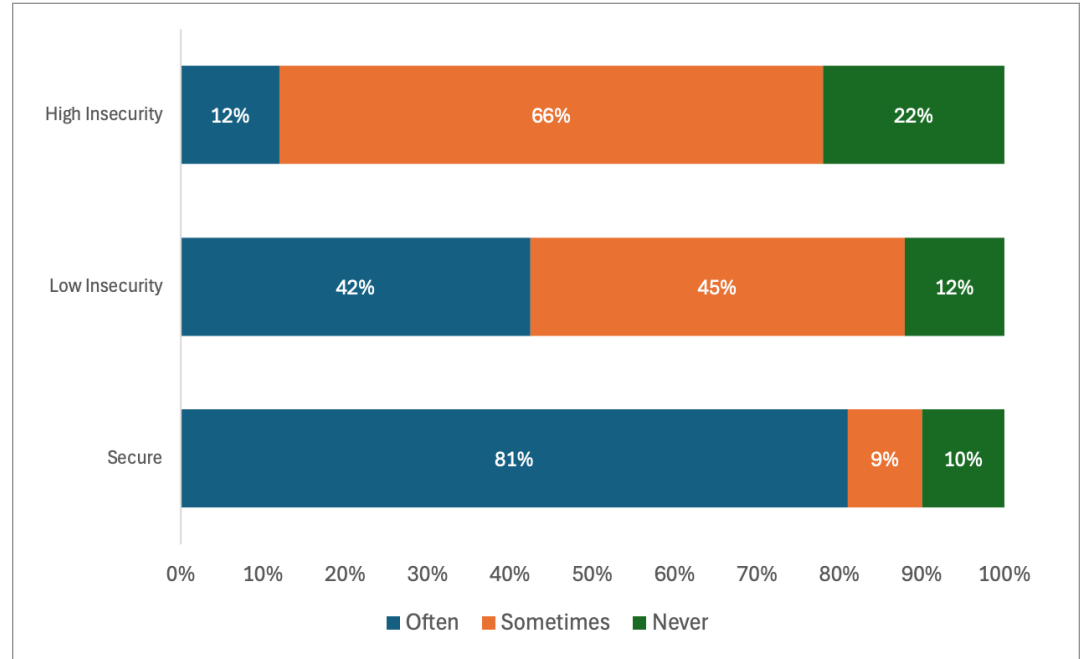
Figure 12. Insured vs Uninsured Car Owners by Transportation Insecurity Category



F. How satisfied are those experiencing transportation insecurity with their ability to get around?

To close our Results section, it is important to consider how satisfied Detroiters are with their ability to get to the places they need to go. Lack of satisfaction is an indicator of “unmet demand,” or demand for greater travel than one currently has available to them. Towards this end, it may come as little surprise that residents who experience the most transportation insecurity are the least satisfied with their ability to get around. As shown in Figure 13, few residents experiencing high transportation insecurity – just 12% – say they are “often” satisfied with their mobility. Those who experience the greatest insecurity are twice as likely (22%) as other Detroiters to say they are “never” satisfied with their ability to get around and two-thirds (66%) of residents experiencing high insecurity report only “sometimes” feeling satisfied with their mobility. By contrast, 81% of Detroiters who experience no transportation insecurity say they are “often” satisfied with their ability to get around and just 10% said they are “never” satisfied with their ability to get around. Residents experiencing low insecurity are half (42%) as likely as secure Detroiters to say they are “often” satisfied with their mobility, and about an equal proportion reported they are only “sometimes” satisfied (45%).

Figure 13. Detroiters’ Satisfaction with Their Ability to Get Around by Transportation Insecurity Category



IV. CONCLUSION

A. What have we learned about transportation insecurity in Detroit?

This report is the first deep dive into describing the landscape of transportation insecurity in Detroit. It is also among the first to provide a descriptive portrait of transportation insecurity at the local level. While the report details a number of patterns as it relates to transportation insecurity in the city, the following are some of our key, “big picture” findings:

- **Detroit is a city with a high rate of transportation insecurity.** With 36% of Detroiters experiencing transportation insecurity in 2023, this rate is nearly double that of transportation insecurity nationwide in the year 2022.
- **Disparities in who experiences transportation insecurity in Detroit largely parallel those observed at the national level.** In Detroit, and nationally, those with lower incomes, lower education rates, unemployment, children, and disabilities are more likely to experience transportation insecurity.

- **Racial differences in wealth and income in Detroit manifest through the severity of insecurity experienced, not its experience more generally.**

Interestingly, and not like the pattern observed nationwide, although White Detroiters are the racial group least likely to experience transportation insecurity, the difference between White and Black Detroiters – the majority racial group in the city – is not significant. However, Black residents are significantly more likely to experience high transportation insecurity compared to White residents.

- **Car ownership in Detroit can mitigate experiences with transportation insecurity, but not fully.** In Detroit, as in national data, we find that car ownership is strongly associated with transportation security. Residents experiencing transportation insecurity are less likely to own a car, often share a car with one or more other adults in their household, or have an unreliable car that makes it difficult to get from place to place.
- **The cost of bus fare and proximity to public transit stops does not seem to play a significant role in transportation insecurity in Detroit.** The vast majority (82%) of Detroiters report never using public transit as a means of transportation in the past 30 days. Moreover, only 1% of people experiencing high insecurity and 1% experiencing low insecurity report using the bus as their primary mode of daily transportation. The cost of bus fare does not seem sufficient to explain how little Detroiters rely on public transit: less than 50% of people experiencing high transportation insecurity report struggling to pay for bus fare while only 24% of people experiencing low insecurity do. Distance to public transit stops also does not seem to explain such little reliance: the average transportation insecure Detroiters lives within a three-minute walk of the nearest bus stop while the average transportation secure Detroiters lives within a four-minute walk. Moreover, we find that transportation insecurity is inversely related to bus proximity, meaning that as one's distance to the nearest bus stop (in miles or minutes) increases, the likelihood of experiencing transportation insecurity goes down.
- **A major driver of transportation insecurity in Detroit is difficulty paying for transportation-related expenses.** Nearly 80% of those experiencing transportation insecurity report having difficulty paying for at least one transportation-related expense. For car owners, the cost of repairs followed by car insurance and gas are the expenses transportation insecure people most struggle with. Among those without cars, paying friends and family for rides or using a taxi or rideshare rank among the expenses those experiencing insecurity most struggle with.

- **There is a sizeable share of transportation insecure car owners who do not have car insurance.** Car insurance in Detroit is very costly, especially compared to other cities. Seventy-two percent of car owners who experience high transportation insecurity and 52% experiencing low insecurity struggle to pay for car insurance. Such struggles are likely one reason why 51% of transportation insecure Detroiters who own cars report not having car insurance.
- **Detroit is a city with significant “unmet demand.”** Not only are rates of transportation insecurity high in the city, but almost 50% of residents who experience transportation insecurity report that they do not use any mode of transportation to get around daily. At the same time, residents who experience both high transportation insecurity and low transportation insecurity are much more likely than transportation-secure Detroiters to report either not being satisfied, or only sometimes being satisfied, with their ability to get around. Taken together, these findings suggest that there are a sizeable number of Detroiters who wish to travel more than their current situations allow.

B. Where do we go from here?

While our analysis has helped to shed light on important patterns of transportation insecurity in Detroit, it has also raised some key empirical questions in need of further investigation, highlighted opportunities for further data collection by government entities, and pointed to critical use cases of the Transportation Security Index for industry and nonprofit entities alike. In this regard, below, we outline how researchers, government, and industry can build off this work to better address transportation insecurity in their respective work.

Next Steps for Researchers

The findings emerging from this descriptive analysis raise some interesting questions about the causes and consequences of transportation insecurity that are worthy of further research. These include the following:

- **How does transportation insecurity impact children?** Our findings show that households with children are more likely to experience transportation insecurity than those without. What are the impacts to children of having a parent who is transportation insecure? How might parental transportation insecurity impact school attendance? School choice? Participation in afterschool activities? Exposure to safe neighborhoods? Educational attainment? Lifetime earnings?

- **Why do older adults experience less transportation insecurity than younger adults, despite perceptions otherwise?** As we find here, and see in nationwide data, older adults experience less transportation insecurity than younger adults. This finding is counterintuitive as research and common perceptions suggest that older adults struggle to get around. Future research should investigate what explains this pattern. To do so, researchers might try to tease apart whether older adults want to get out more and whether their mobility patterns are shaped by difficulty getting rides, fears for their physical safety, or something else. By adding the Transportation Security Index to surveys with a sufficient sample of older adults, researchers could also look into whether those experiencing transportation insecurity have difficulty paying for certain transportation-related expenses and better investigate the consequences of transportation insecurity for older adults' social, physical, and emotional wellbeing.
- **What is the relationship between transportation and individual-level cost burden?** These findings show that transportation insecure Detroiters struggle to meet the costs of paying for insurance, rides from family and friends, Uber fares, and more. More research is needed to understand how transportation costs relate to transportation insecurity. For instance, among those who are transportation insecure and transportation secure, how much of their household budget goes to transportation-related expenses? Are some people transportation secure but heavily cost burdened? That is, at what cost do they achieve transportation security? Are there different experiences with transportation cost burden by category of transportation insecurity?

Next Steps for Government

This report details what transportation insecurity looks like in one city: Detroit. In doing so it shows the importance of examining transportation insecurity at more fine-grained spatial scales and highlights the following opportunities for government at all levels to build upon this work:^{vi}

- **Establish a baseline of the prevalence of transportation insecurity in cities, counties, and states and track how the prevalence is changing over time.** In 2018 researchers established a baseline of transportation insecurity in the U.S.,

^{vi} Since the writing of this white paper, the Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine (2025) has issued a consensus study report that makes a number of recommendations pertaining to the study and measurement of transportation insecurity (citing the TSI used here, specifically) that would support many of the recommendations for next steps outlined here. This includes a recommendation to the Department of Transportation and Congress to “provide resources to states, local jurisdictions, regional planning organizations, and other recipients of federal surface transportation funds” to both “pilot test tools that directly measure transportation insecurity as it is experienced and related by people” and to “measure access, transportation insecurity, and environmental justice outcomes of their transportation investments and plans using the metrics and tools that were successfully piloted” (pgs. 143-144).

identifying that nearly one in four Americans experienced this condition (Murphy et al. 2022). Here, we have established a baseline of transportation insecurity in Detroit, identifying that 36% of Detroiters experience this condition. To better understand the prevalence of transportation insecurity at different geographic scales (i.e. to establish a baseline of transportation insecurity), states, metropolitan planning organizations, and cities could add the Transportation Security Index to their existing surveys or partner with local universities to add the index to surveys administered on campus (see, for example, the [Detroit Metropolitan Area Communities Study](#) used here or the [Baltimore Area Survey](#) run by Johns Hopkins University). For example, a [coalition](#) of King, Pierce, and Snohomish Counties in the state of Washington included the TSI on a regional mobility survey they recently fielded. In another example, the Minnesota Department of Transportation in 2024 included the Transportation Security Index in their biennial Omnibus Statewide Survey, becoming the first state DOT to include the TSI on an existing survey. In doing so, they created a baseline understanding of the prevalence of transportation insecurity in the state, finding that 26% of Minnesotans experienced transportation insecurity. In future years, MnDOT plans to continue to include the TSI on their surveys so as to track how transportation insecurity is changing in the state over time. If other government entities follow suit they could track how rates of transportation insecurity change over time and alongside things like changing demographics, investments in transportation infrastructure, or changing gas and insurance prices. Depending on survey design and sample sizes, such data could also be used to identify communities with concentrations of transportation insecurity that should be targeted for greater investment.

- **Assess transportation insecurity in rural and suburban areas.** Although this report focuses on transportation insecurity in Detroit, transportation insecurity is not a Detroit-specific problem nor a problem unique to urban areas. Indeed, researchers have [identified](#) that, nationwide, 22% of suburban residents and 13% of rural residents experience transportation insecurity. If the Transportation Security Index was included on state-wide surveys or those specific to suburban and rural counties, localities could conduct an in-depth exploration of transportation insecurity to better understand not only who experiences transportation insecurity but also what the main drivers of this condition are in these particular places.
- **Assess where and how public transit is falling short.** As these findings show, in Detroit, the cost of public transit and the proximity to a bus stop seems to explain little when it comes to transportation insecurity. This raises the question of whether these findings hold in other localities and also highlights the importance of understanding the experience of transportation insecurity among those who rely on

public transit, specifically. What about public transit in Detroit or elsewhere is not ameliorating people's transportation insecurity? What improvements could be made to public transit to more effectively move people from "transportation insecurity" to "transportation security"? Public transit agencies could use the Transportation Security Index in their ridership surveys to examine these kinds of questions. In separate surveys, they could also use the TSI to investigate more fully why those experiencing transportation insecurity do not rely on public transit more.

Next Steps for Industry & Nonprofits in the Mobility Space

There is exciting activity occurring among industry and nonprofit organizations that seeks to effectively address the transportation insecurity experienced among individuals and within communities. In this regard, the Transportation Security Index offers a useful tool to accomplish the following:

- **Evaluate whether individual transportation interventions are effectively moving people from "transportation insecurity" to "transportation security."** If administered at the beginning stages of an intervention implementation, over the course of the intervention, and after its termination, the Transportation Security Index can provide information on how effective an intervention has been in ameliorating transportation insecurity. Has it moved people from experiencing high insecurity to low insecurity? Has it moved people from experiencing low insecurity to having no security at all?
- **Screen people for participation in pilot deployments and other such mobility interventions.** For some deployments, industry and nonprofit organizations may want to target their intervention at those who are transportation insecure. In determining eligibility for participation, the TSI can be used as a screener to assess who is transportation insecure and thus eligible.
- **Demonstrate the value of our work to the communities we are working in.** Industry and nonprofits conduct their work in communities and seek collaboration and buy-in from local government, community organizations, and residents. The TSI can be used in community surveys to demonstrate to communities that local need for mobility interventions exists. If used to evaluate pilot projects and other kinds of interventions (e.g. mobility wallets, ride sharing vouchers, car sharing), the TSI can help industry and nonprofit organizations demonstrate the value of their work to the communities in which these pilots and interventions are deployed. If such evaluations were tied to other kinds of individual-level outcomes important to

the flourishing of people and communities (e.g. employment, arriving to work on time, health, voting), industry and nonprofit organizations could assess what kinds of returns on investment they, individuals, and communities are getting from the deployment of their respective programs.

C. How can Mcity help you in your own work addressing transportation insecurity?

Researchers at Mcity have been working with researchers, government agencies, industry, and nonprofit organizations, helping them administer the Transportation Security Index for their own purposes. We are here to help you do the same! We are especially well situated to partner on evaluation projects and can assist in thinking about research and deployment design, data collection, and data analysis. Please reach out if we can assist you: TransportationSecurityIndex@umich.edu.

V. APPENDIX

Table A1. Unweighted DMACS Winter 2023 Respondent Demographics

	N	%
Gender		
Male	637	28%
Female	1,659	72%
Age		
18-39	586	26%
40-64	1,070	47%
65+	640	28%
Household with Children		
Without Children	1,647	72%
With Children	640	28%
Race		
Non-Hispanic White	318	14%
Non-Hispanic Black	1,589	69%
Non-Hispanic Multi/Other	188	8%
Hispanic/Latino	201	9%
Education		
High school or less	714	31%
Some College/Associates Degree	888	39%
College +	694	30%
Income		
<\$30,000	1,244	54%
\$30,000 - \$60,000	502	22%
>\$60,000	550	24%
Employment		
Employed	1,119	54%
Unemployed	233	22%
Out of Labor Force	933	41%
Disability		
Not Disabled	1,507	66%
Disabled	776	34%
Total Sample	2,296	

Table A2 demonstrates that the significant between-group variations identified via bivariate analysis generally endure when included in a large, multivariate model that controls for variation in other variables. Assessing the results of linear probability models capturing the correlation between demographic groups and transportation insecurity in separate and combined models, we find that the significant effects of education, income, employment, age, and disability on transportation insecurity endure even when controlling for other demographic variables.

Table A2. Correlates of Transportation Insecurity.

		Bivariate LPM		Multivariate LPM	
Variable		Coef	SE	Coef	SE
Race					
	Non-Hispanic White				
	Non-Hispanic Black	0.061	0.042	-0.071	0.038
	Non-Hispanic Multi/Other	0.162*	0.069	0.032	0.06
	Hispanic/Latino	.153*	0.061	-0.024	0.061
Education					
	High school or less				
	Some College/Associates Deg	-.171**	0.031	-.075*	0.03
	College +	-.301***	0.033	-.108**	0.038
Income					
	<\$30,000				
	\$30,000 - \$60,000	-.317***	0.033	-.217***	0.035
	>\$60,000	-.398***	0.031	-.271***	0.04
Employment					
	Employed				
	Unemployed	.311***	0.05	.133**	0.048
	Out of Labor Force	.093**	0.03	-0.047	0.038
Gender					
	Not Female				
	Female	.106***	0.03	0.060*	0.028
Household w/ Children					
	Without Children				
	With Children	.099**	0.032	-0.027	0.031
Age					
	18-39				
	40-64	-.119**	0.034	-.129***	0.033
	65+	-.221***	0.036	-.197***	0.044
Disability					
	Not Disabled				
	Disabled	.281***	0.03	.239***	0.034
Constant					
				.586***	0.051

About Mcity

Mcity at the University of Michigan is leading the mobility transformation. Home to world-renowned researchers, a one-of-a-kind test facility, and on-road deployments, Mcity brings together industry, government, and academia from across disciplines to advance transportation safety, sustainability, equity, and accessibility for the benefit of society.

About the Detroit Metro Area Communities Study

The Detroit Metro Area Communities Study (DMACS) is a University of Michigan initiative designed to regularly survey a broad, representative group of Detroit residents about their communities, including their expectations, perceptions, priorities, and aspirations. Support for DMACS comes from the University of Michigan Gerald R. Ford School of Public Policy, Institute for Social Research and Poverty Solutions. DMACS is also supported by the Knight Foundation.

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