

# Transportation *Inequity*

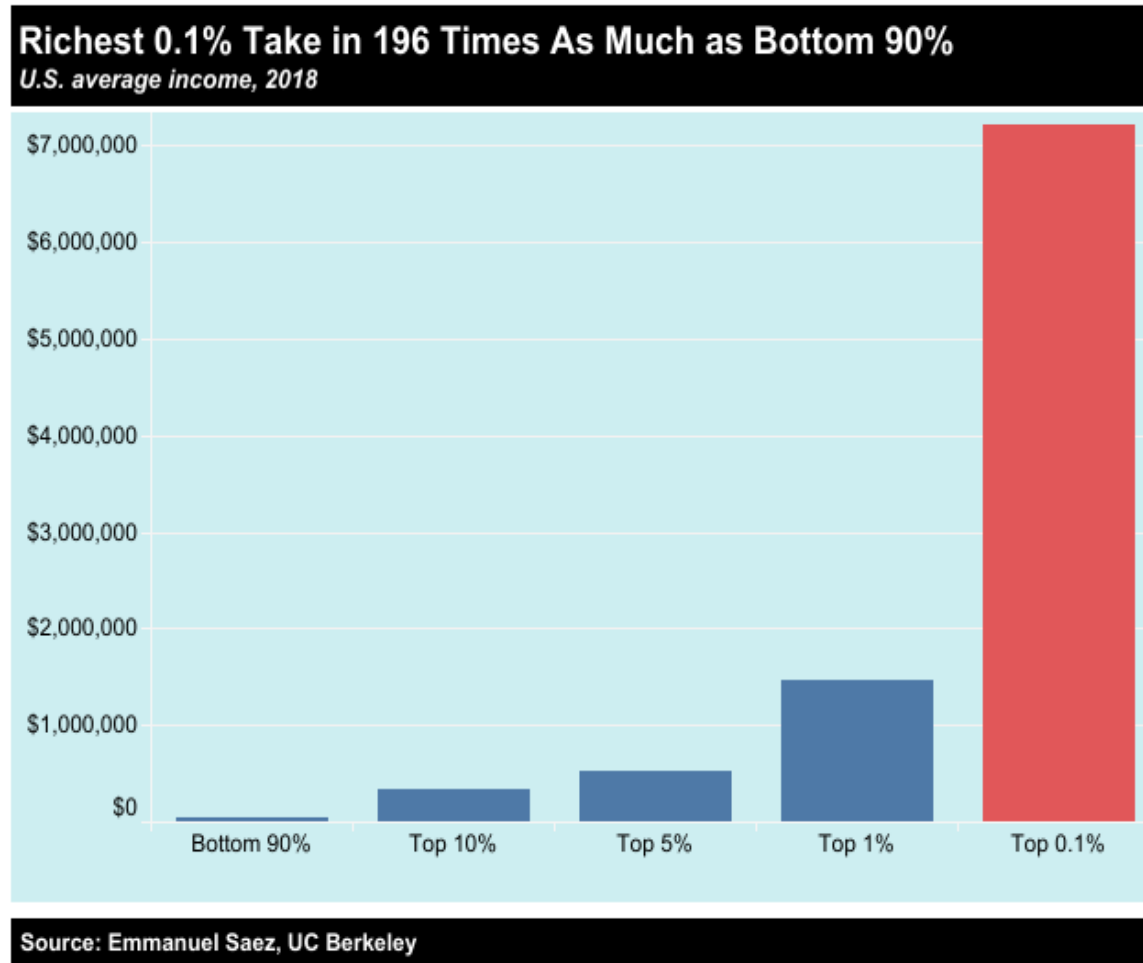
Dr. Tierra Bills | Assistant Professor | CEE | Wayne State University

TRB Executive Committee Planning Session

July 19, 2021



# Income inequality continues to grow more extreme!



Reference: <https://inequality.org/facts/income-inequality/>

Reference: [Hanauer and Rolf](#), (2020, September 14). The Top 1% of Americans Have Taken \$50 Trillion From the Bottom 90% - And That's Made the U.S. Less Secure. Time Magazine



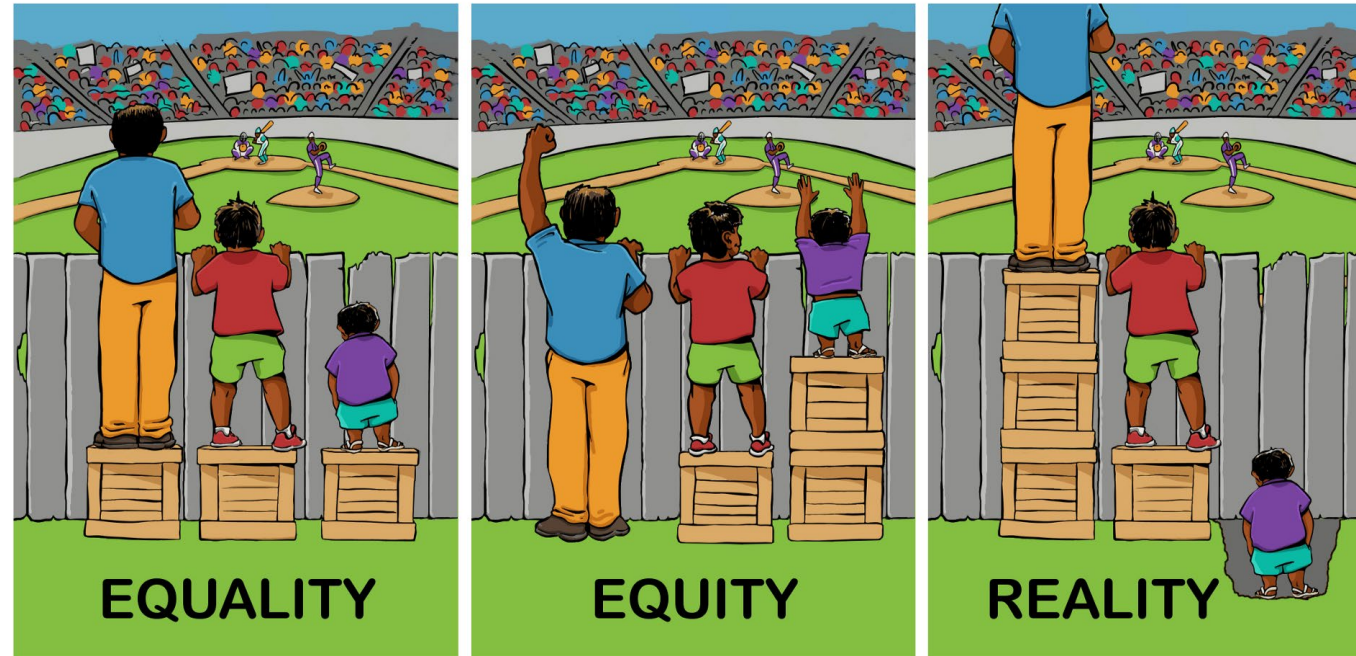
# Income inequality continues to grow more extreme!

- Inequality jeopardizes National economic stability and resilience<sup>1</sup>
- Inequality constrains economic growth<sup>2</sup>
- This makes the goal of transportation equity even more critical.

1. [Hanauer and Rolf](#), (2020, September 14). The Top 1% of Americans Have Taken \$50 Trillion From the Bottom 90% - And That's Made the U.S. Less Secure. Time Magazine
2. Bivens, J. (2017, December 12). Inequality is slowing U.S. economic growth. Economic Policy Institute. Accessed at: [epi.org/136654](http://epi.org/136654)



# What is Equity?



Mallon, H. (2021, February 3) Equity or Equality? Why it matters. Medium Accessed from: <https://medium.com/collective-power/equity-or-equality-why-it-matters-f0593f5d47c>





# Transportation Injustice and Inequality

## Black Bottom and Paradise Valley, Detroit, 1959 to 1961:



*Image: An aerial view of Hastings Street looking north from Mack and St. Antoine in 1959, Detroit Historical Society. Accessed 4/1/21*

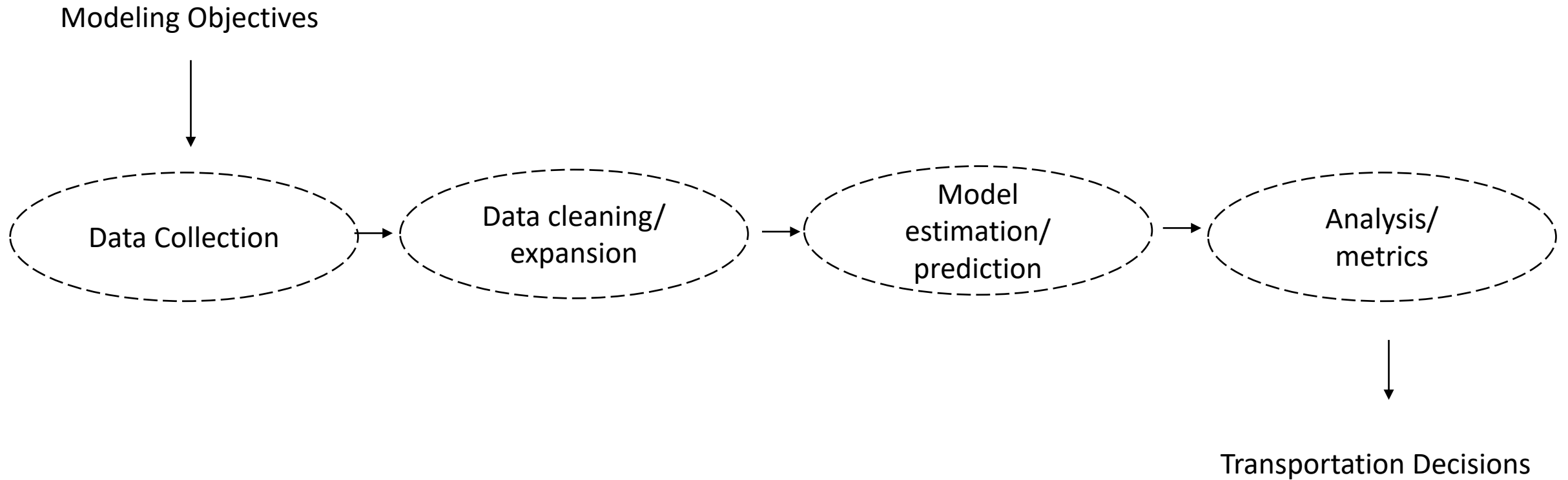


*Image: An aerial view of Chrysler Freeway, looking north from Mack and St. Antoine in 1961, Detroit Historical Society. Accessed 4/1/21*

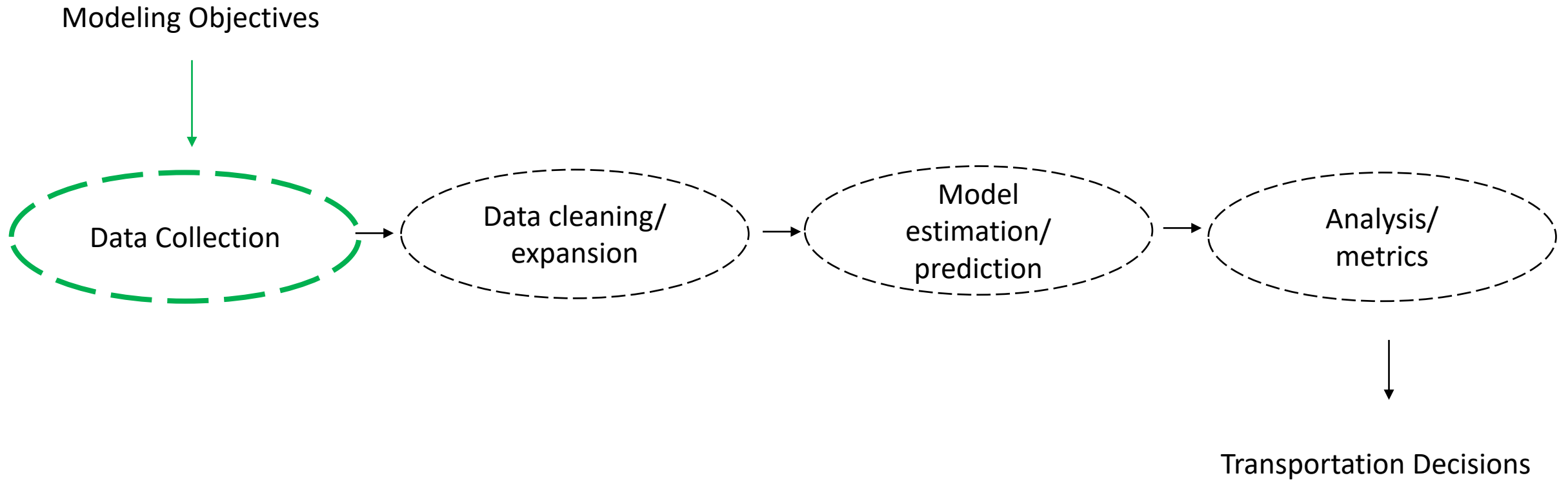
Read more at <https://riseupdetroit.org>



# Bias, Representativeness, and Equity in Transportation Decision-Making



# Bias, Representativeness, and Equity in Transportation Decision-Making



# Data Collection Lessons (Benton Harbor Travel Needs Survey 2017 - 2019)



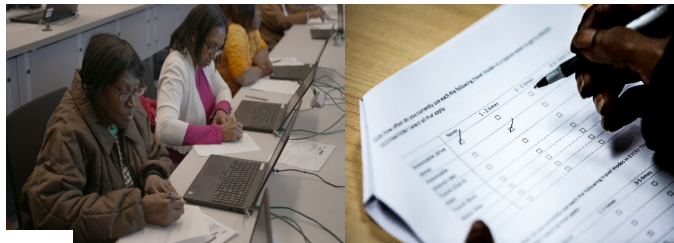
Benton Harbor



Outreach partners



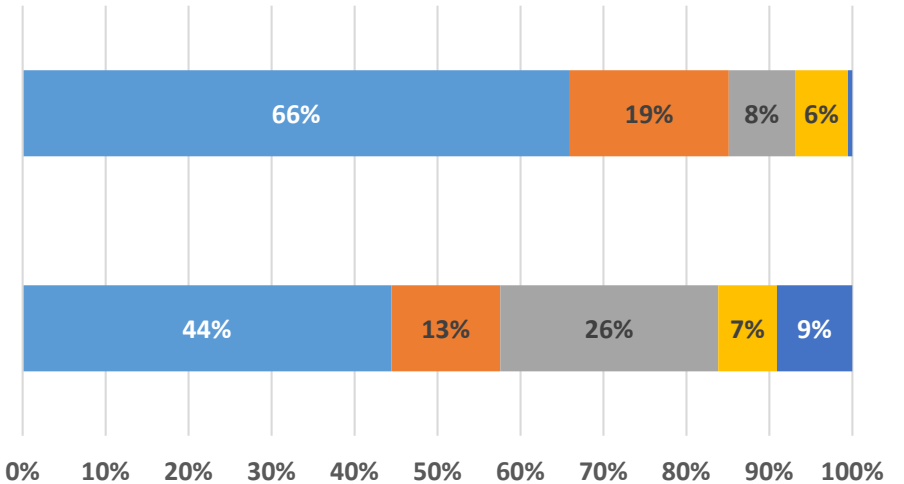
Survey Modes



Community Workshops

## Mode Share Comparison

MDOT Survey - Low income (2010)



■ Drive Alone ■ Shared Ride/ Carpool ■ Transit ■ Walk ■ Missing

### Overall Results:

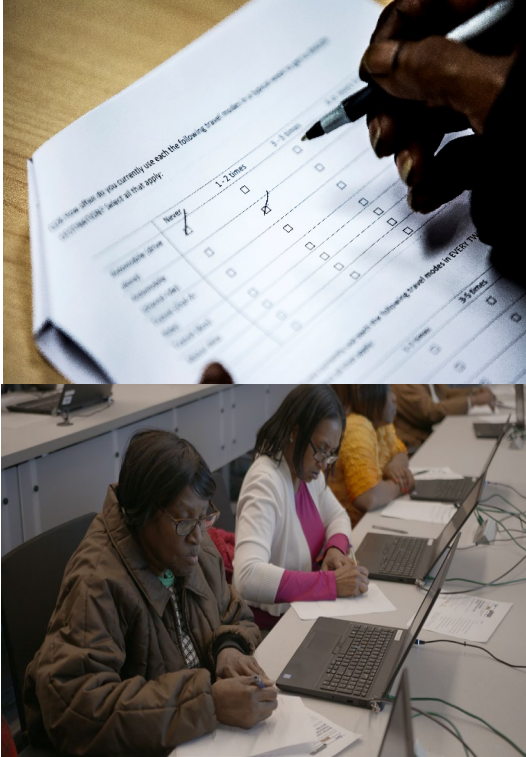
So far: **131** (144) from **5** workshops.

**Demographics:** Black (86%), Women (70%), Elderly (52%), Unemployed (56%)





# Data Collection Lessons (Benton Harbor Travel Needs Survey 2017 - 2019)

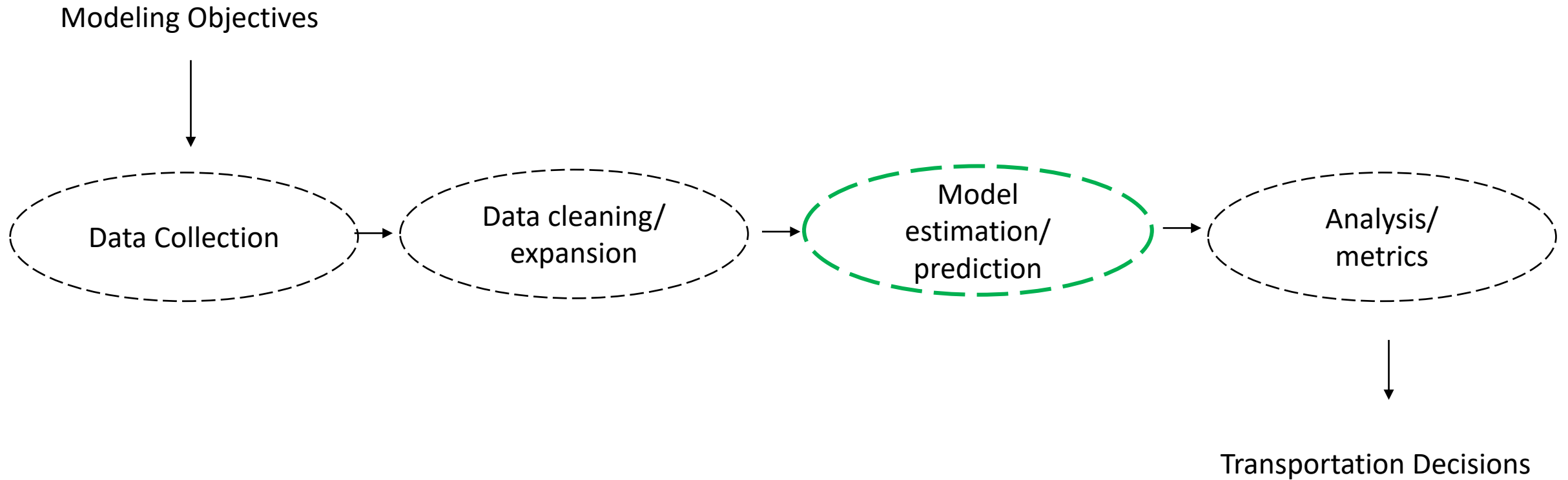


## Lessons Learned:

- Real-time updates to survey design (In-person interviews)
- Explanations for non-response more complex than expected
- The digital divide is real
- Work to engage community advocates



# Bias, Representativeness, and Equity in Transportation Decision-Making



# How can biases affect modeling and decision making?

$$DestUtility = -0.6 * distance + 0.99 * MC_{logsum} + 0.99 * \log(jobs)$$

Vanessa



10 Miles



*DestUtility @ 100%*

Downtown  
(100 Jobs)



10 Miles



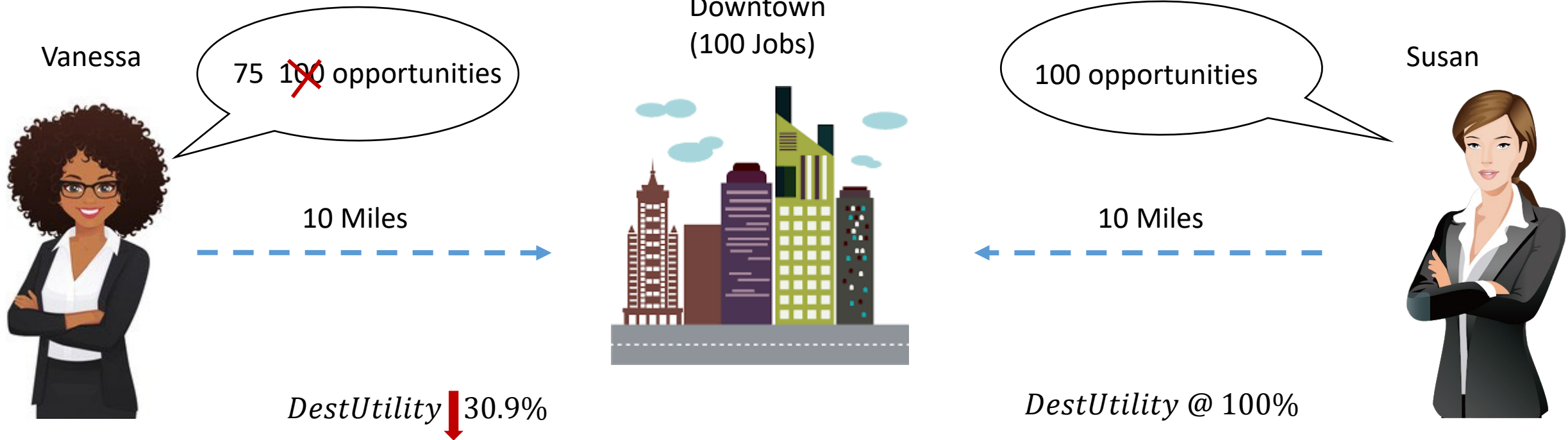
*DestUtility @ 100%*

Susan



# How can biases affect modeling and decision making?

$$DestUtility = -0.6 * distance + 0.99 * MC_{logsum} + 0.99 * \log(jobs)$$



# How can biases affect modeling and decision making?

$$DestUtility = -0.6 * distance + 0.99 * MC_{logsum} + 0.99 * \log(jobs)$$

Pam

75 ~~100~~ opportunities

~~10~~ miles 8 miles

Downtown  
(100 Jobs)



100 opportunities

10 Miles

Lydia



Employment  
Discrimination

→ DestUtility ↓ 30.9%

Underrepresentation

→ DestUtility ↑ 20.0%

DestUtility @ 100%

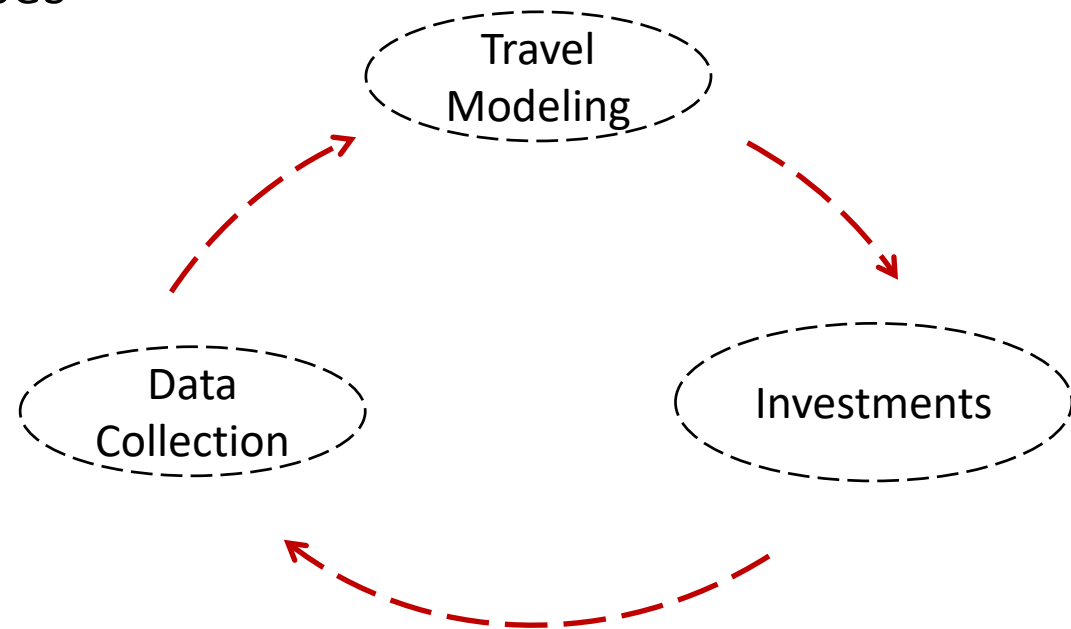




# Summary

- Our current state of extreme income inequality makes transportation equity more critical
- There is a long history of transportation inequity in the US and inequities persist in today's transportation decision making
  - Inequities tied to the representativeness of transportation data and the ability of travel models to capture biases

Inequity fuels a negative feedback mechanism in Transportation decision-making



Thank you!

Contact: [tbills@wayne.edu](mailto:tbills@wayne.edu)

**WSU PhD Students:**

- Eronmonsele Esekhaigbe
- Oluwanifemi Adegbulugbe
- Vahid Bahrami

**Umich Graduate Research Assistants:**

- Tian Tian
- Christopher Leflore

*Research Funding  
Sponsors*



*National Science Foundation*



*Ford Motor Company*

