Public Transit as an Indicator

Connecting Geotemporal Ridership Data with Disease Spread and Policy

Jonathan Scheff, M.Ed, M.S.
data scientist @ Transit app
Mapping Science Committee, NASEM, June 2020

Outline

1. Transit app data overview
2. User survey capabilities
3. Location data: locations, trips, interactions
4. Public transit as a COVID-19 indicator

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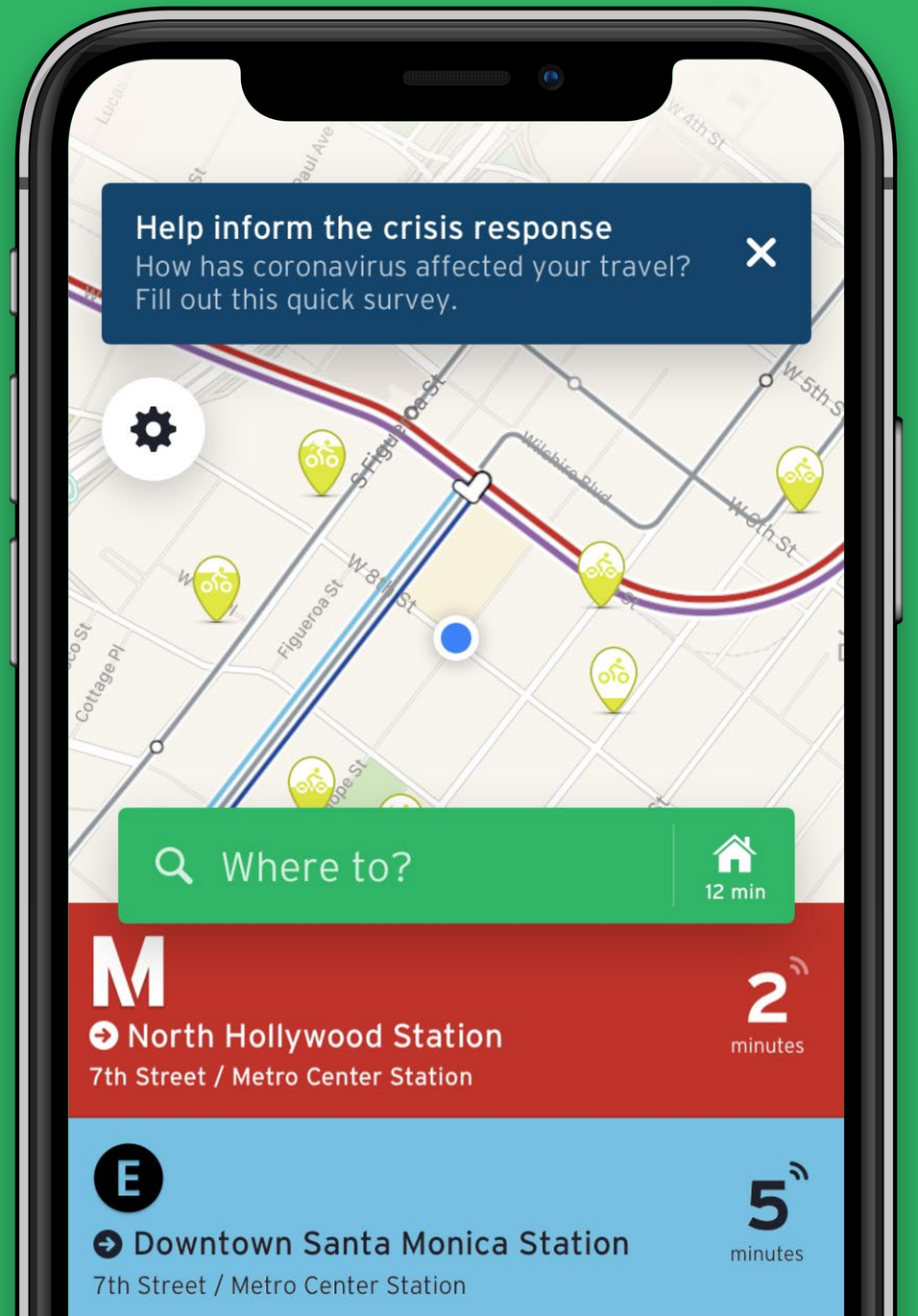
Transit app data:

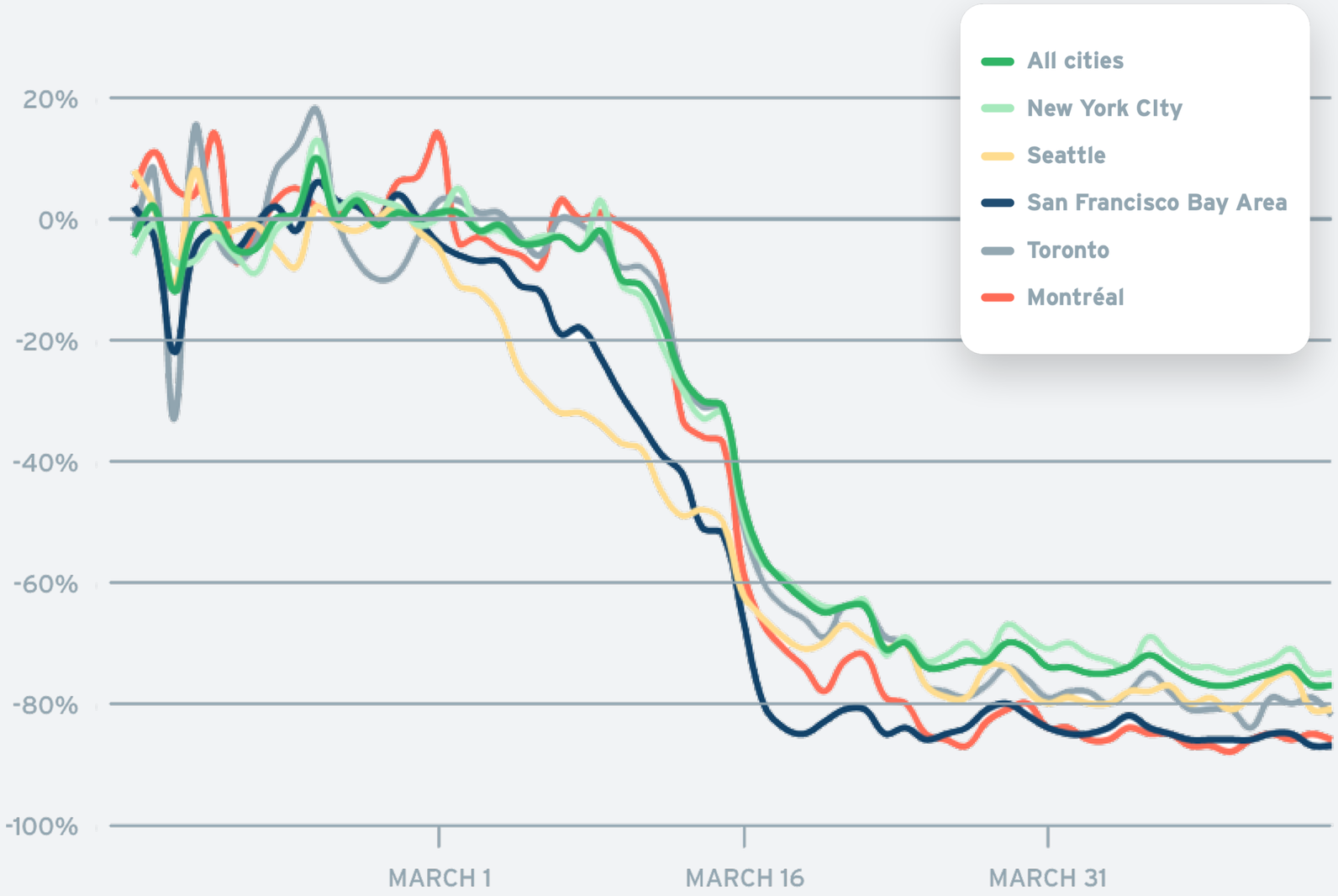
Session locations

Trips planned

Interactions with routes

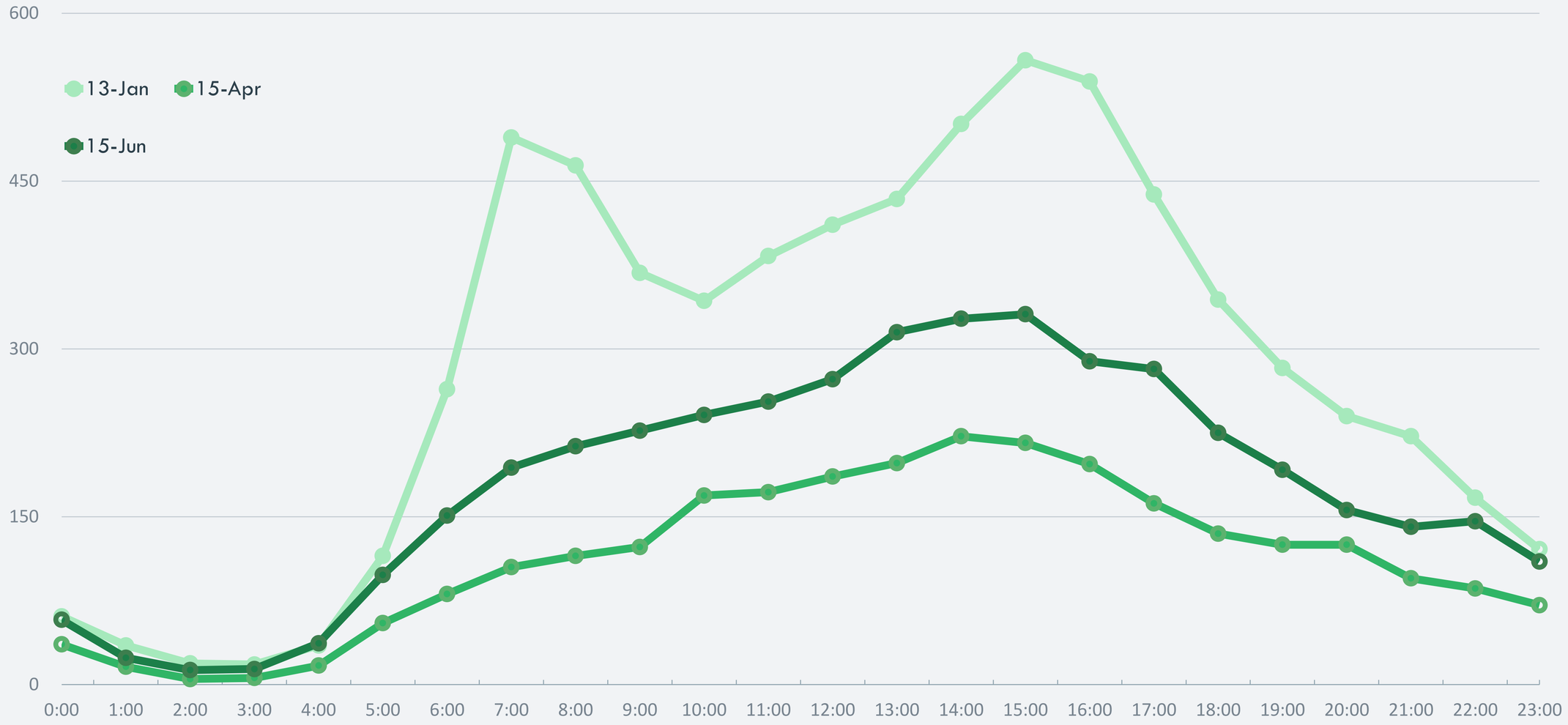
Preferences (accessibility, modes, etc.)





SOURCE: TRANSIT APP USAGE FEB. 15 TO APR. 14, 2020

Dayton, OH Hourly Activity



SOURCE: TRANSIT APP USAGE APR. 2020

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15,000

RESPONDENTS
IN THE US US

10,000

RESPONDENTS
IN CANADA CA

Survey topics include

Transit usage

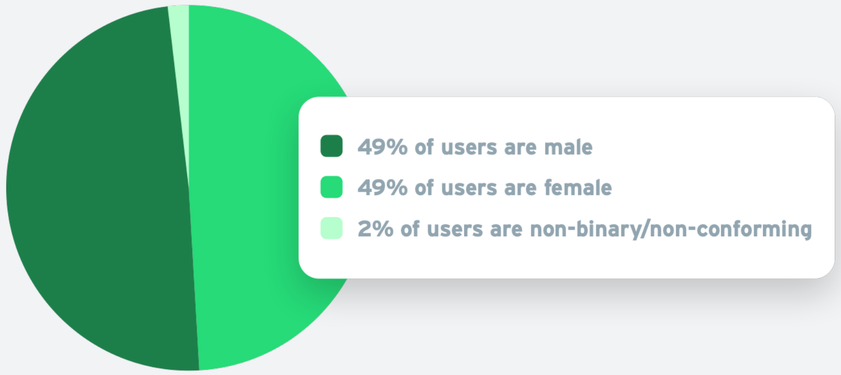
Employment

Awareness
of service changes

Demographics

Canada
United States
Sitka
Ketchikan
Fort St. John
BRITISH COLUMBIA
Terrace
Kitimat
Quesnel
ALBERTA
Fort McMurray
Meadow Lake
SASKATCHEWAN
Flin Flon
MANITOBA
Melfort
Red Deer
Medicine Hat
Weyburn
Winkler
Dryden
ONTARIO
Churchill
Inukjuak
Umiujaq
Kuujjuaq
Kangiqsualujjuaq
Nain
Hopedale
Happy Valley-Goose Bay
N.L.
QUÉBEC
Lebel-sur-Quévillon
Temiskaming Shores
Houghton
WASH.
Havre
Great Falls
Missoula
Helena
MONTANA
Billings
Minot
N.D.
Bismarck
Fargo
MINN
S.D.
Box Elder
Sioux Falls
Sioux City
IDAHO
Boise
Cody
Jackson
WYO.
Casper
ORE.
Medford
NEV.
UTAH
Cheyenne
Fort Collins
NEBR.
Lincoln
IOWA
Cedar Rapids
WIS.
MICH.
Fort Wayne
ILL.
OHIO
PA.
Harrisburg
Syracuse
N.Y.
N.H.
MAINE
N.B.
Fredericton
P.E.I.
Charlottetown
N.S.
COLO.
Pueblo
KANS.
Wichita
MO.
Springfield
St. George
Grand Canyon
Santa Fe
Albuquerque
N.M.
Amarillo
Lubbock
ARIZ.
Fort Smith
ARK.
Knoxville
Huntsville
W.VA.
VA.
Jacksonville
Wilmington
Augusta
Macon
GA.
ALA.
MISS.
Shreveport
TEXAS
Waco
LA.
Mobile
Dothan
FLA.
Port St. Lucie
Marsh Harbour
Bermuda
Bahamas
Las Cruces
Ciudad Juárez
Ensenada
San Felipe
B.C.
Heroica Caborca
SON.
CHIH.
Ciudad Obregon
COA.
Laredo
Corpus Christi
Matamoros
Torreón
Saltillo
Culiacán
DUR.
B.C.S.

Gender in Pittsburgh



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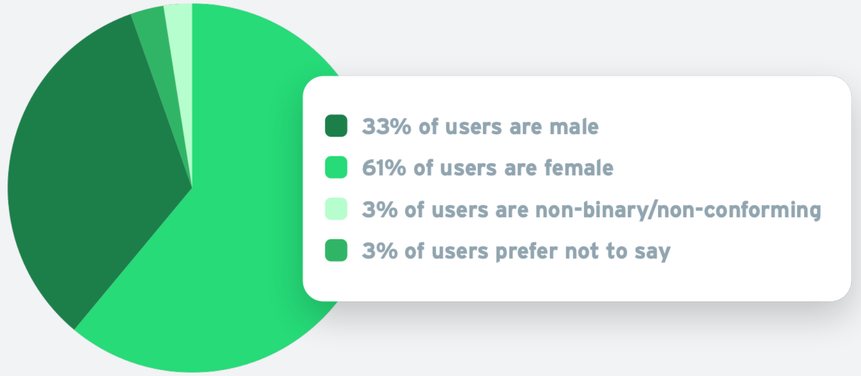
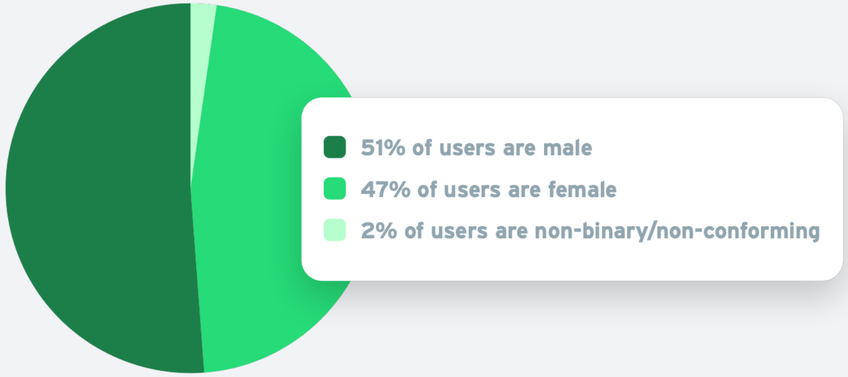


COVID-19 SURVEY

Gender in Las Vegas



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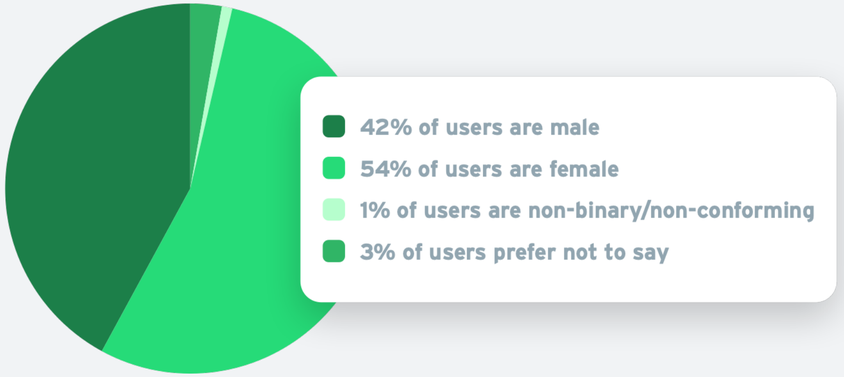
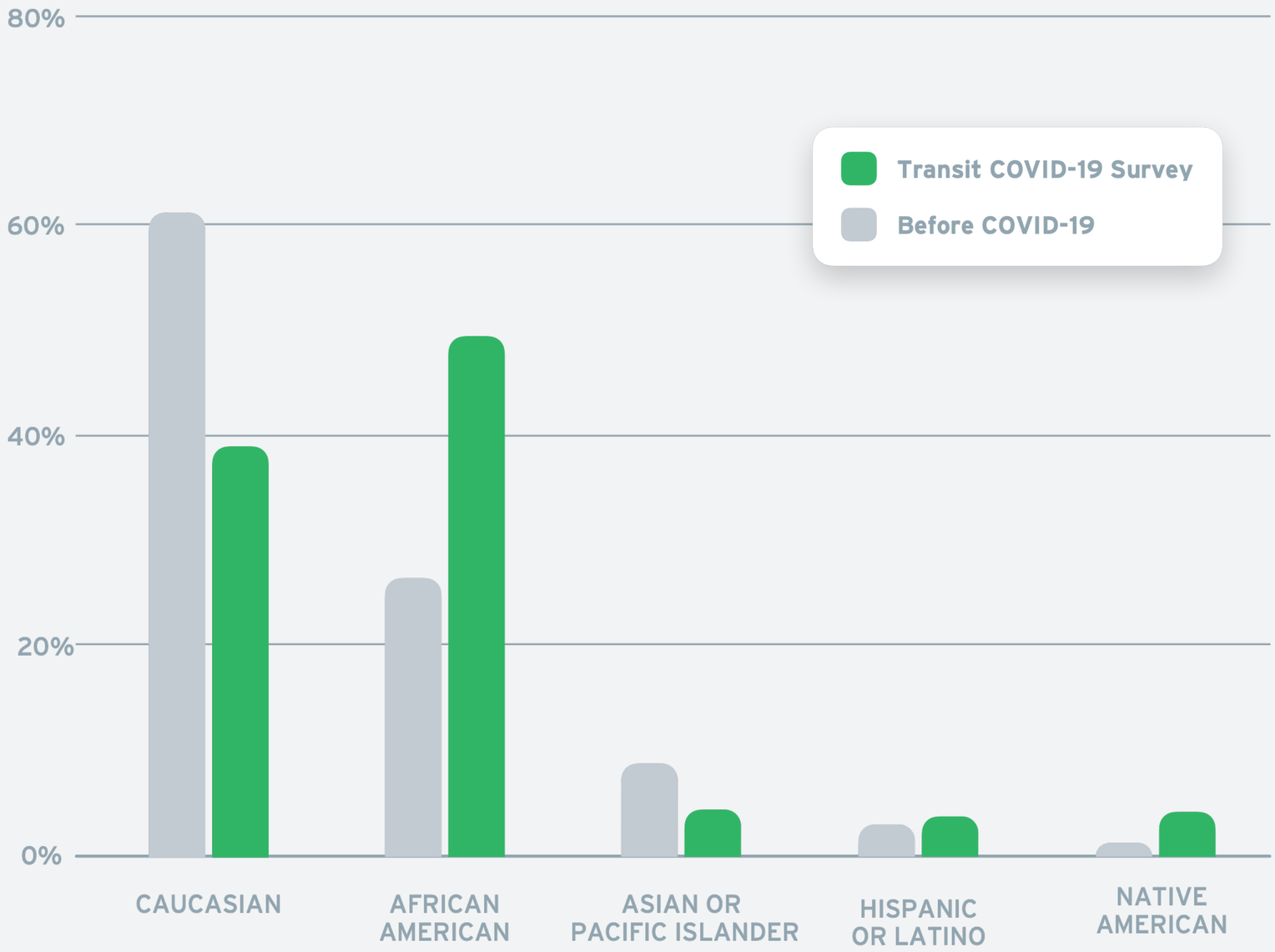


COVID-19 SURVEY

SOURCE: TRANSIT APP SURVEY SEP. 2019, DEC. 2019, APR. 2020

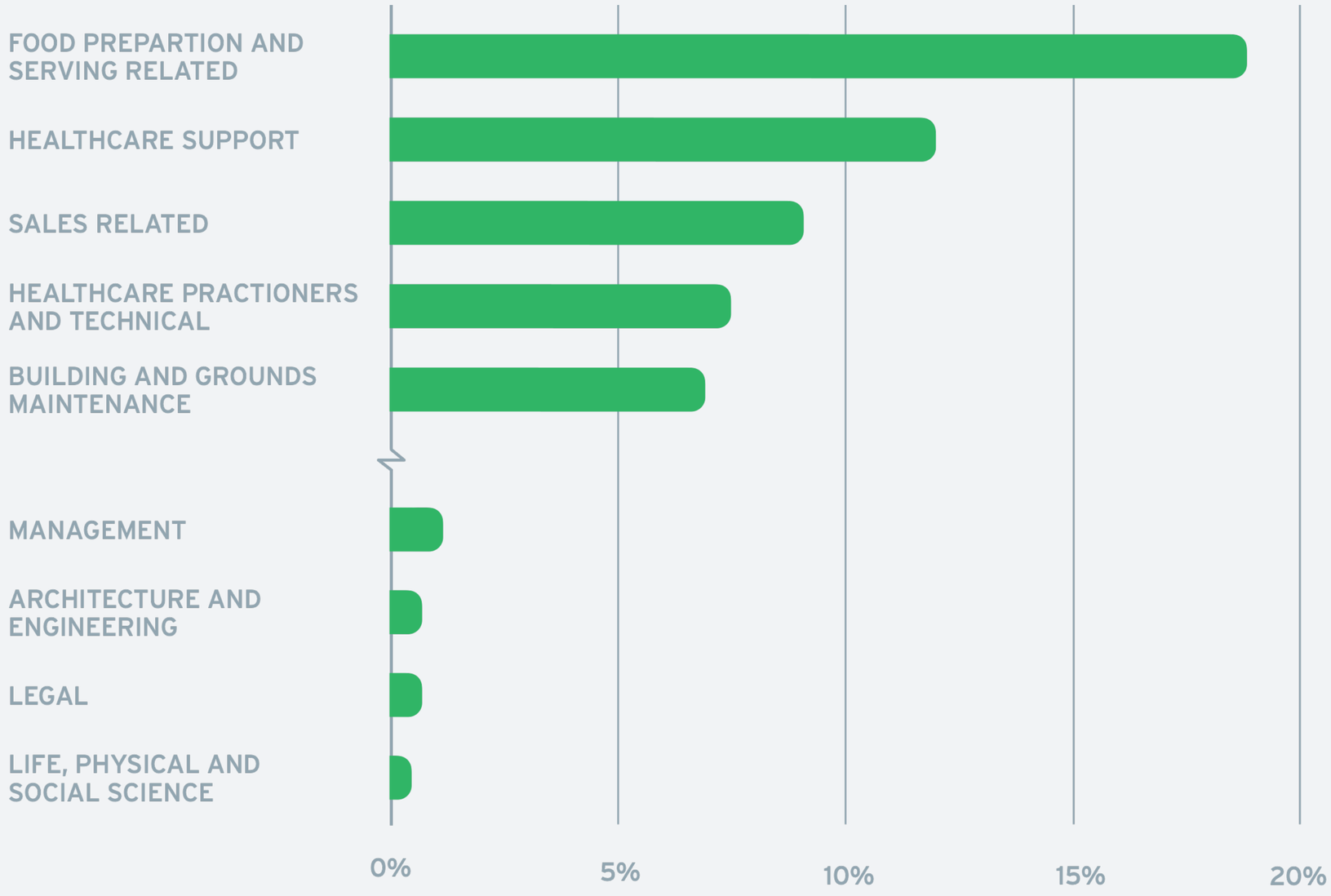
Pittsburgh: Race disparities at the city level



SOURCE: TRANSIT APP SURVEY APR. 2020, SEP. 2019

Employment

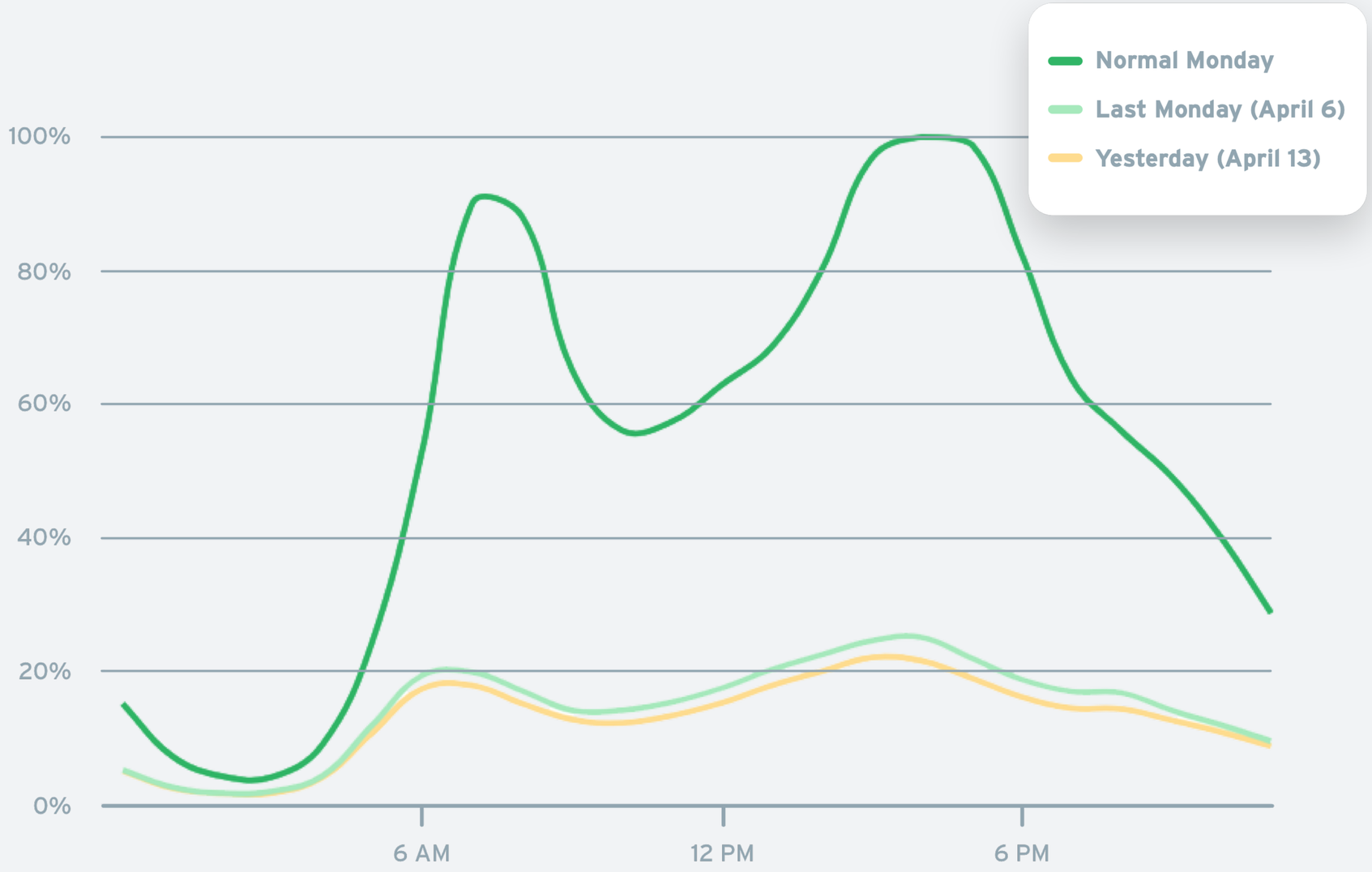
Proportion commuting to work by industry



SOURCE: TRANSIT APP SURVEY APR. 2020

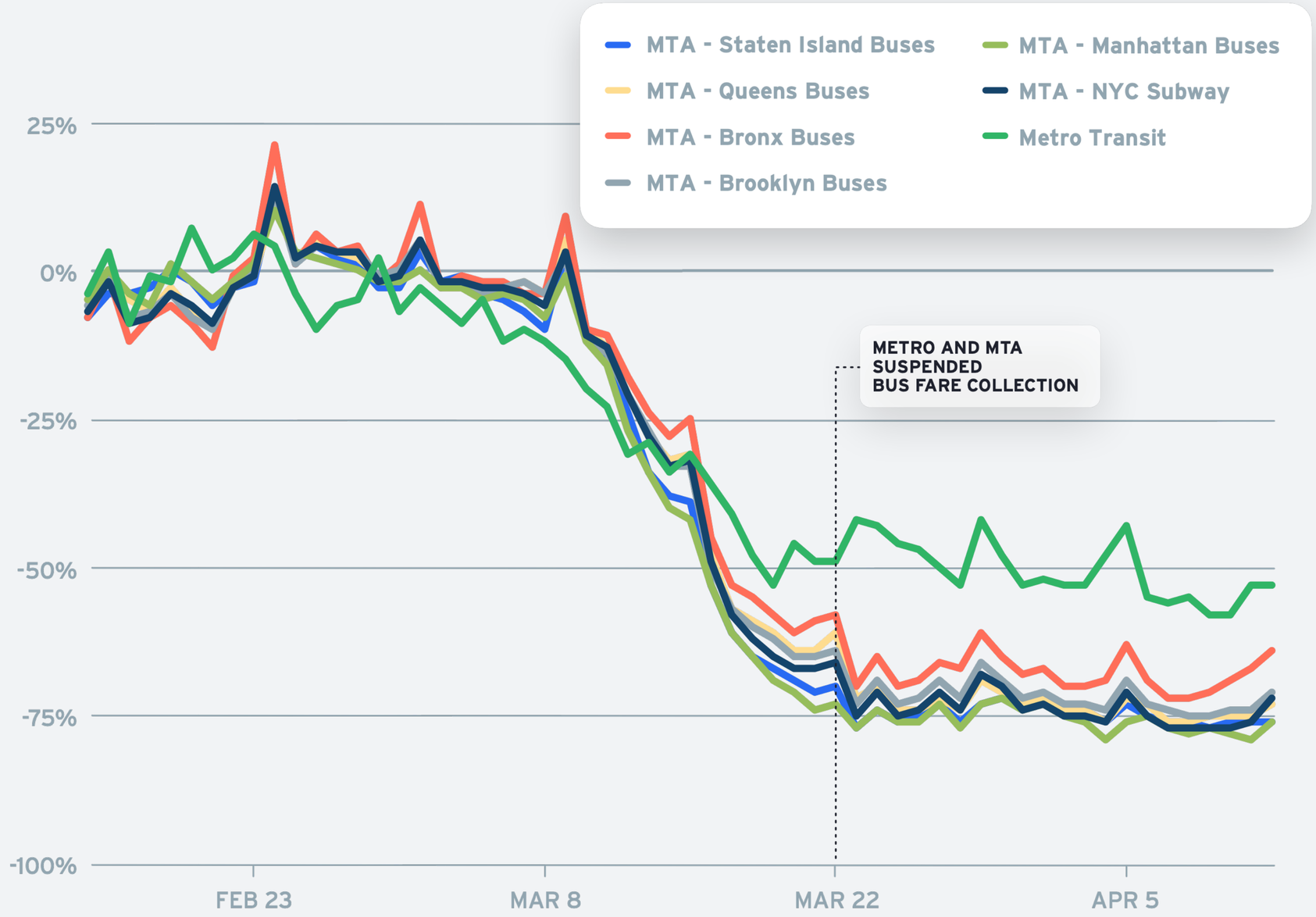
Rush hours shifted (AM) and spread out (PM)

- AM
  34% leave earlier
  9% leave later
- PM
  21% return earlier
  32% return later
- Current commuters have occupations that tend to have early, fixed start times



SOURCE: TRANSIT APP USAGE & TRANSIT APP SURVEY APR. 2020

Does eliminating fare collection induce demand for the bus?



SOURCE: TRANSIT APP USAGE, FEB. - APR. 2020

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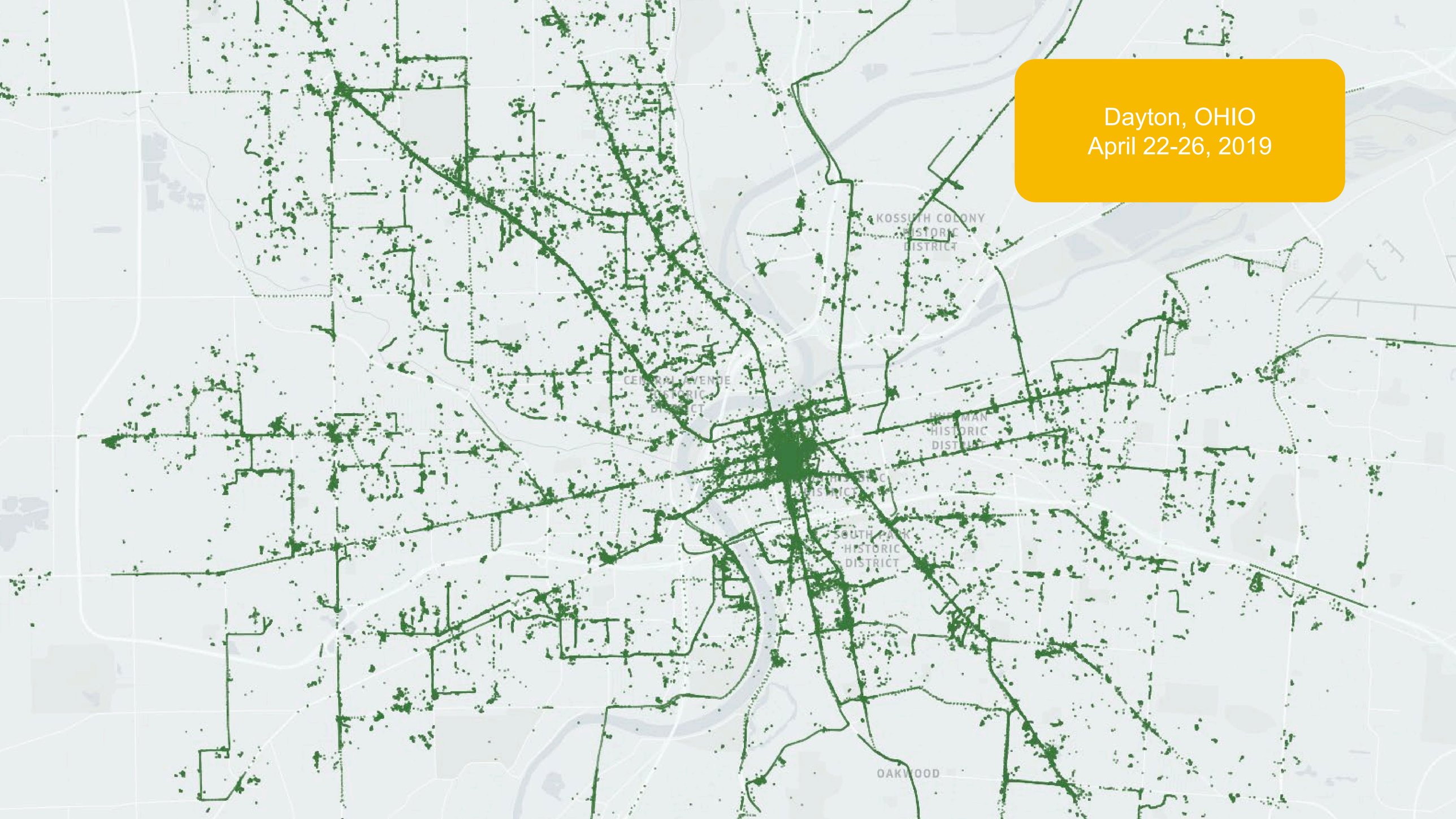
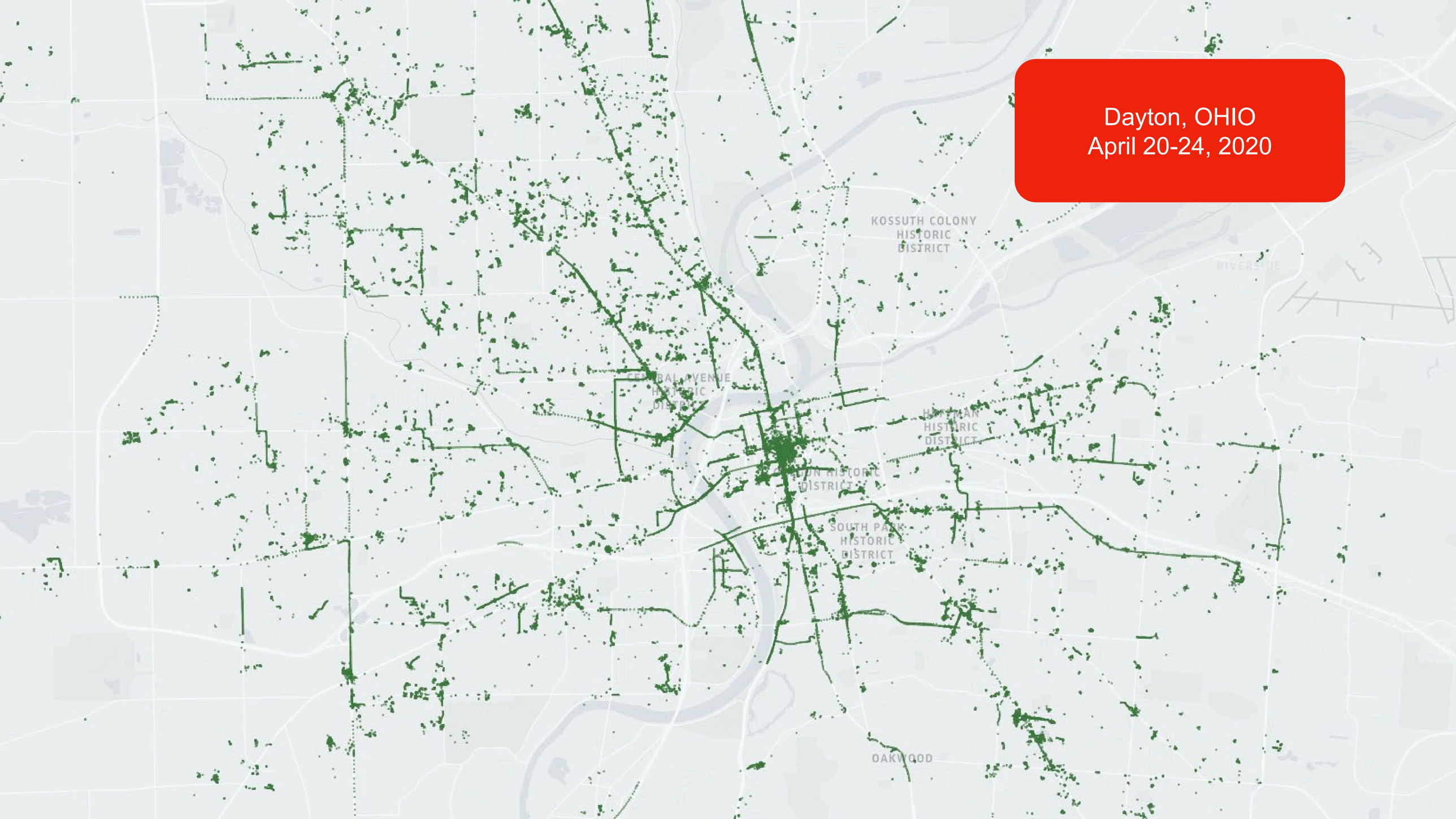
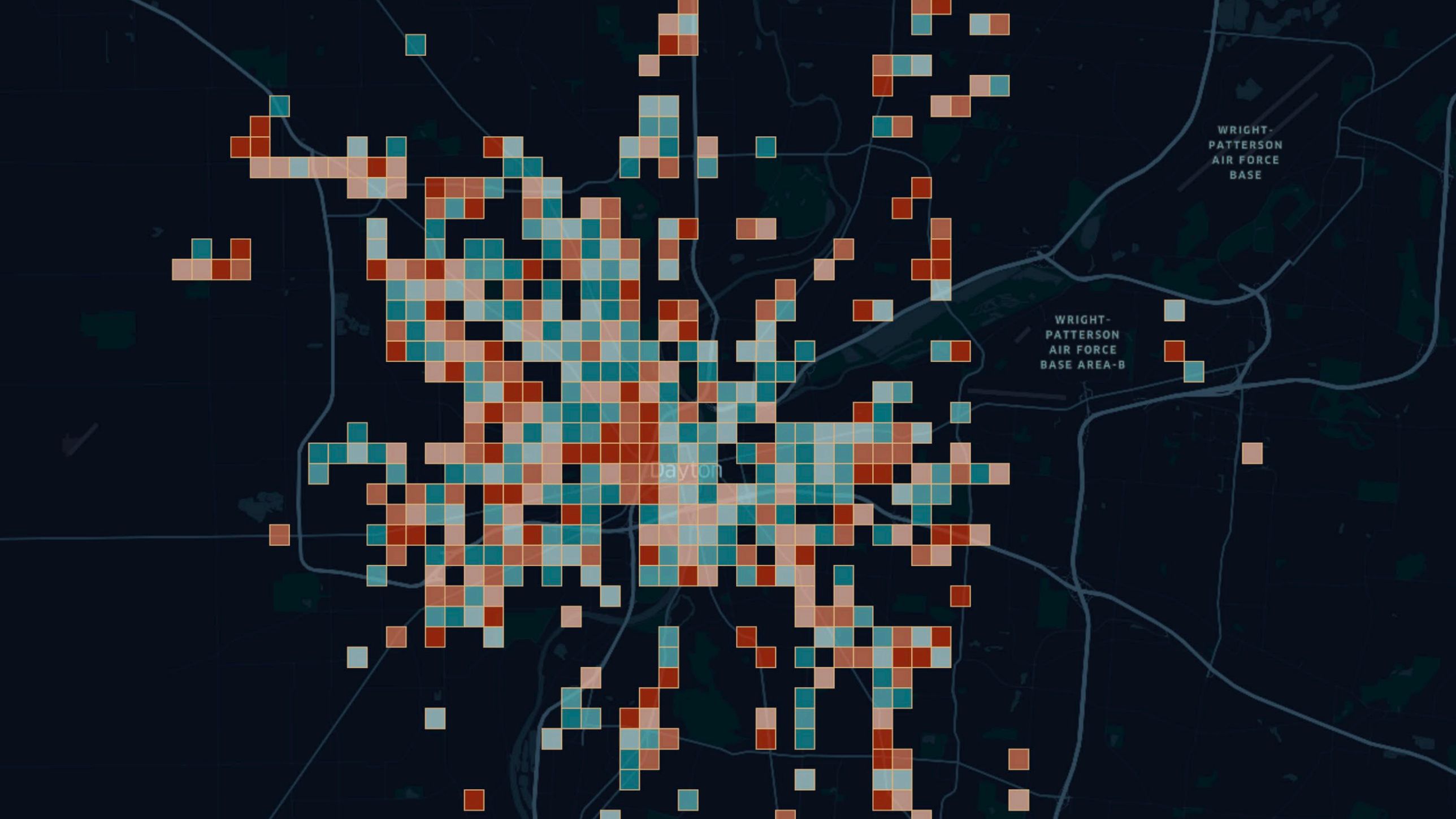
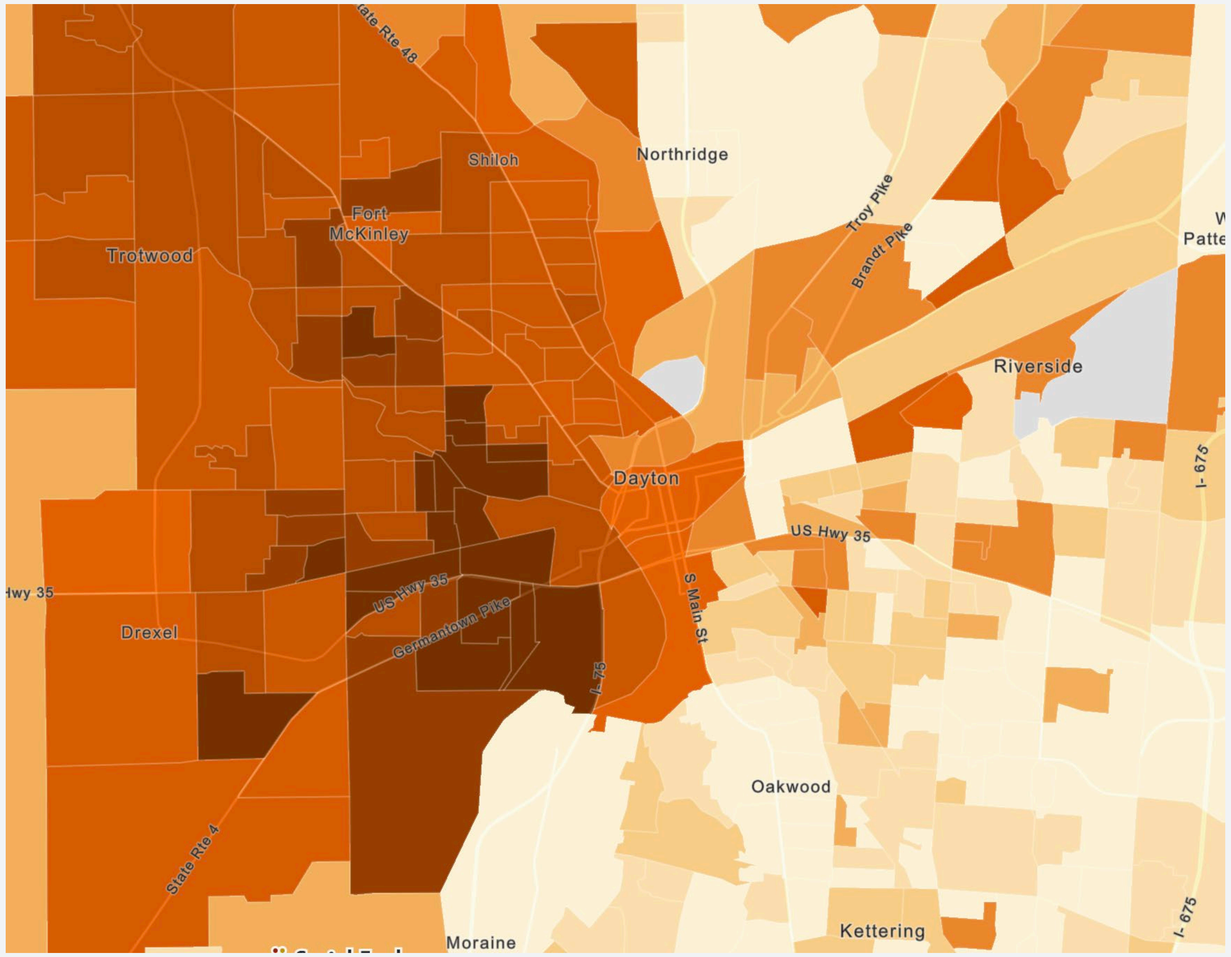
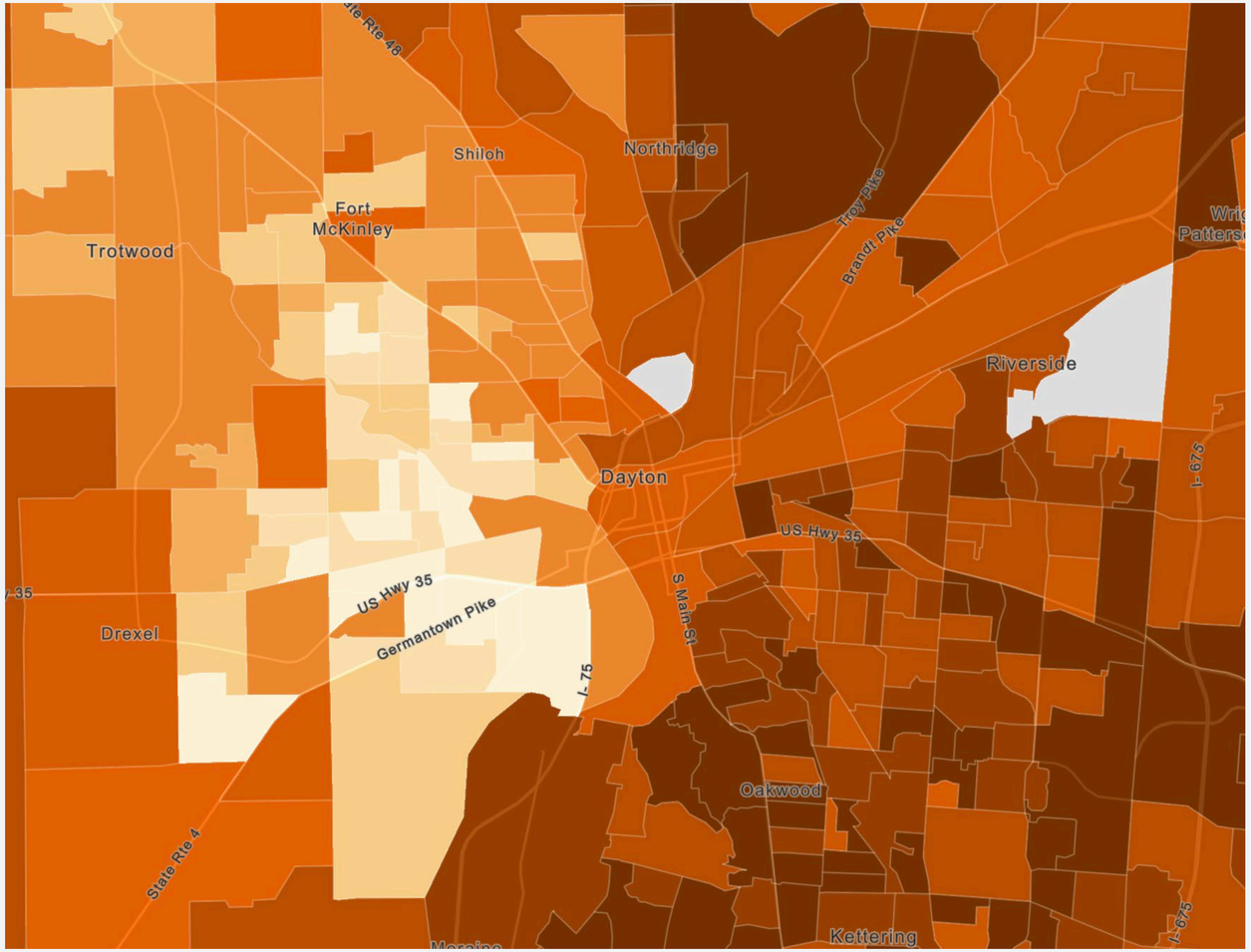

Dayton, OHIO
April 22-26, 2019
KOSSUTH COLONY
HISTORIC
DISTRICT
HISTORIC
DISTRICT
OAKWOOD


Dayton, OHIO
April 20-24, 2020
KOSSUTH COLONY
HISTORIC
DISTRICT
RIVERSIDE
SOUTH PARK
HISTORIC
DISTRICT
OAKWOOD


WRIGHT-
PATTERSON
AIR FORCE
BASE
WRIGHT-
PATTERSON
AIR FORCE
BASE AREA-B
Dayton





SOURCE: ACS 2018 (5-YEAR ESTIMATES) VIA SOCIAL EXPLORER

Geography & demographics

* People who identify as female took longer trips on average in Dayton, OH (not significant)

* People who identify as white also took longer trips (significant)

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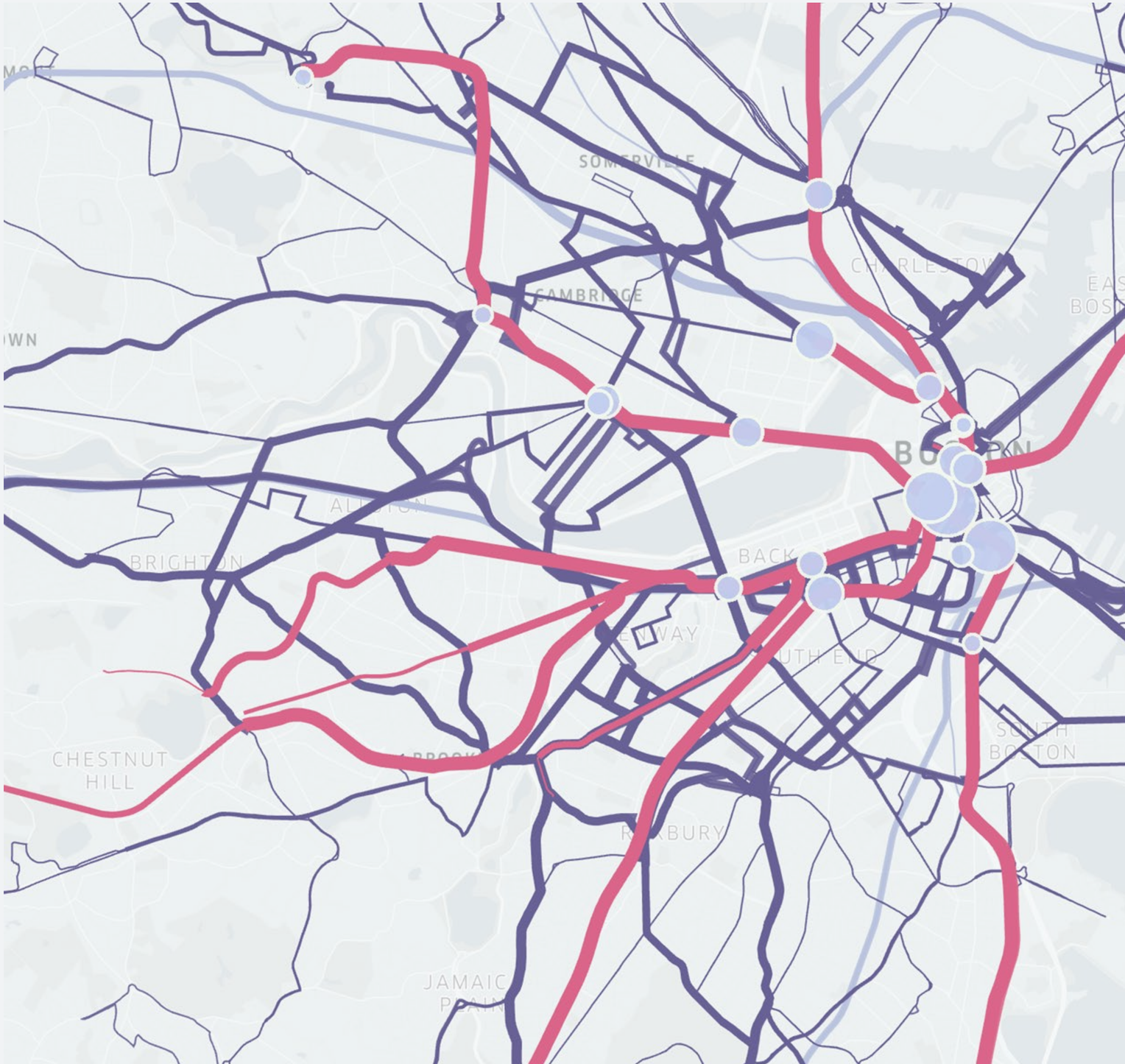
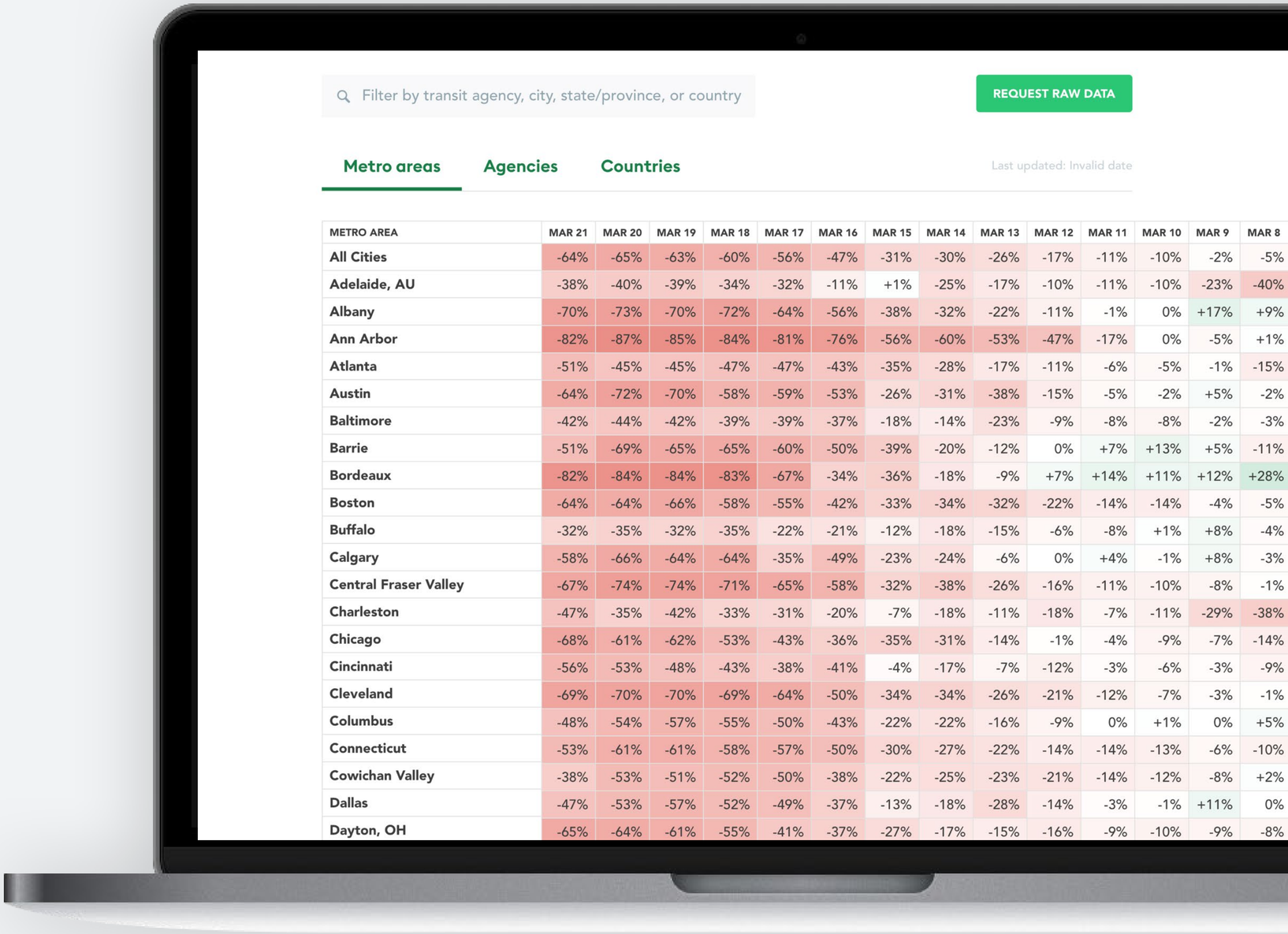
Indicators

- Overall demand: social-distancing, active workforce volume, economic activity
- Geotemporal distributions: discrepancies, equity, resource allocation, response to policy



Thank you



METRO AREA	MAR 21	MAR 20	MAR 19	MAR 18	MAR 17	MAR 16	MAR 15	MAR 14	MAR 13	MAR 12	MAR 11	MAR 10	MAR 9	MAR 8
All Cities	-64%	-65%	-63%	-60%	-56%	-47%	-31%	-30%	-26%	-17%	-11%	-10%	-2%	-5%
Adelaide, AU	-38%	-40%	-39%	-34%	-32%	-11%	+1%	-25%	-17%	-10%	-11%	-10%	-23%	-40%
Albany	-70%	-73%	-70%	-72%	-64%	-56%	-38%	-32%	-22%	-11%	-1%	0%	+17%	+9%
Ann Arbor	-82%	-87%	-85%	-84%	-81%	-76%	-56%	-60%	-53%	-47%	-17%	0%	-5%	+1%
Atlanta	-51%	-45%	-45%	-47%	-47%	-43%	-35%	-28%	-17%	-11%	-6%	-5%	-1%	-15%
Austin	-64%	-72%	-70%	-58%	-59%	-53%	-26%	-31%	-38%	-15%	-5%	-2%	+5%	-2%
Baltimore	-42%	-44%	-42%	-39%	-39%	-37%	-18%	-14%	-23%	-9%	-8%	-8%	-2%	-3%
Barrie	-51%	-69%	-65%	-65%	-60%	-50%	-39%	-20%	-12%	0%	+7%	+13%	+5%	-11%
Bordeaux	-82%	-84%	-84%	-83%	-67%	-34%	-36%	-18%	-9%	+7%	+14%	+11%	+12%	+28%
Boston	-64%	-64%	-66%	-58%	-55%	-42%	-33%	-34%	-32%	-22%	-14%	-14%	-4%	-5%
Buffalo	-32%	-35%	-32%	-35%	-22%	-21%	-12%	-18%	-15%	-6%	-8%	+1%	+8%	-4%
Calgary	-58%	-66%	-64%	-64%	-35%	-49%	-23%	-24%	-6%	0%	+4%	-1%	+8%	-3%
Central Fraser Valley	-67%	-74%	-74%	-71%	-65%	-58%	-32%	-38%	-26%	-16%	-11%	-10%	-8%	-1%
Charleston	-47%	-35%	-42%	-33%	-31%	-20%	-7%	-18%	-11%	-18%	-7%	-11%	-29%	-38%
Chicago	-68%	-61%	-62%	-53%	-43%	-36%	-35%	-31%	-14%	-1%	-4%	-9%	-7%	-14%
Cincinnati	-56%	-53%	-48%	-43%	-38%	-41%	-4%	-17%	-7%	-12%	-3%	-6%	-3%	-9%
Cleveland	-69%	-70%	-70%	-69%	-64%	-50%	-34%	-34%	-26%	-21%	-12%	-7%	-3%	-1%
Columbus	-48%	-54%	-57%	-55%	-50%	-43%	-22%	-22%	-16%	-9%	0%	+1%	0%	+5%
Connecticut	-53%	-61%	-61%	-58%	-57%	-50%	-30%	-27%	-22%	-14%	-14%	-13%	-6%	-10%
Cowichan Valley	-38%	-53%	-51%	-52%	-50%	-38%	-22%	-25%	-23%	-21%	-14%	-12%	-8%	+2%
Dallas	-47%	-53%	-57%	-52%	-49%	-37%	-13%	-18%	-28%	-14%	-3%	-1%	+11%	0%
Dayton, OH	-65%	-64%	-61%	-55%	-41%	-37%	-27%	-17%	-15%	-16%	-9%	-10%	-9%	-8%