


Impacts of E-bike Ownership on Travel Behavior

Evidence from three Northern California rebate programs

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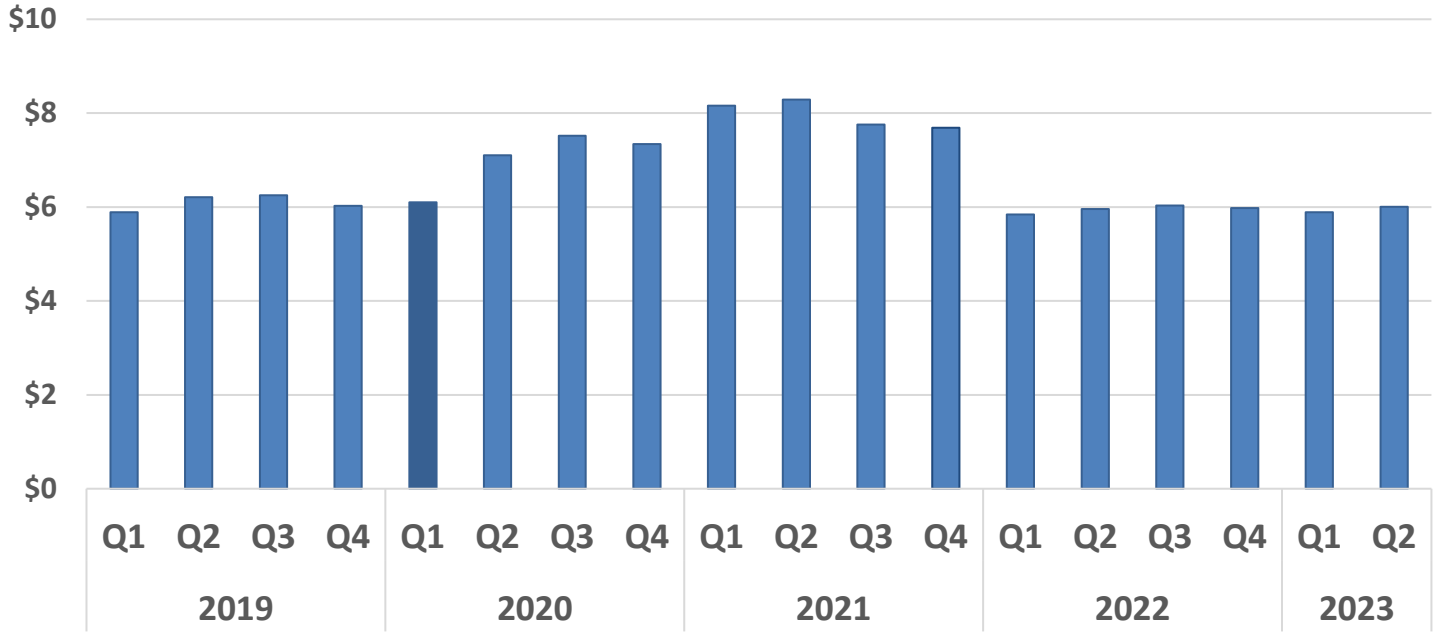
Growth in the United States bicycle market

Pandemic-Induced Bicycle Boom

*Real personal consumption expenditure on bicycles and accessories in the U.S.**



BEA
BUREAU OF ECONOMIC ANALYSIS
U.S. DEPARTMENT OF COMMERCE

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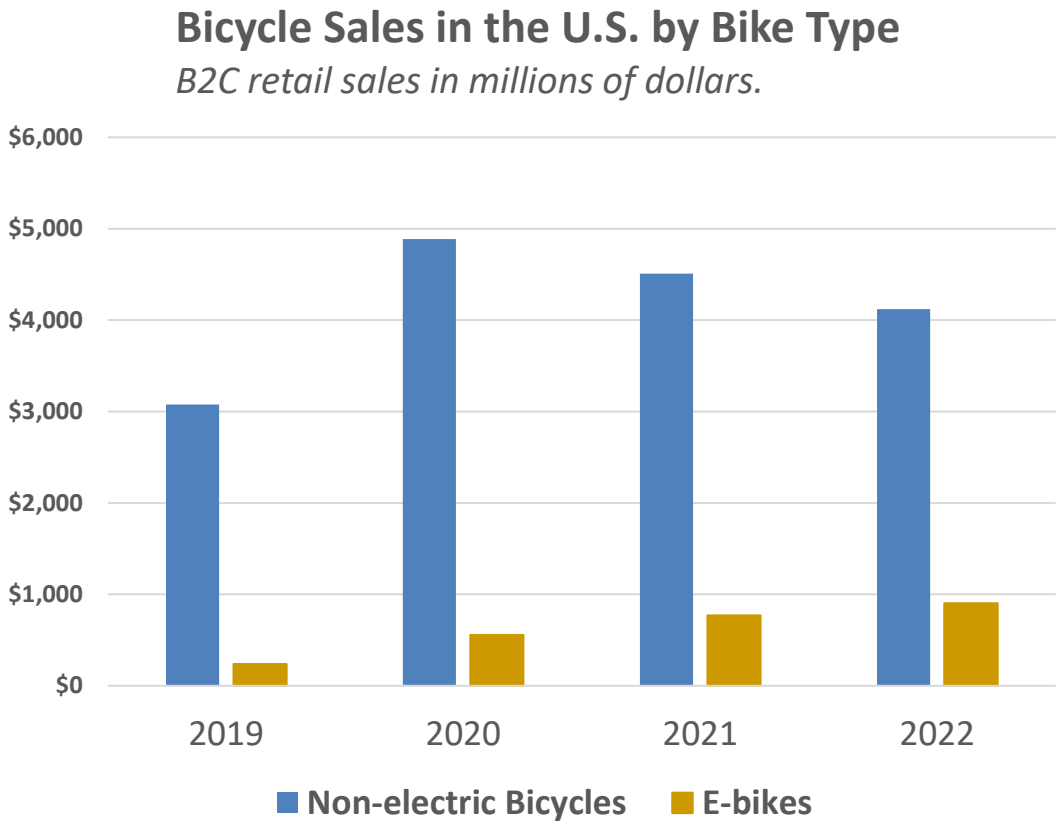
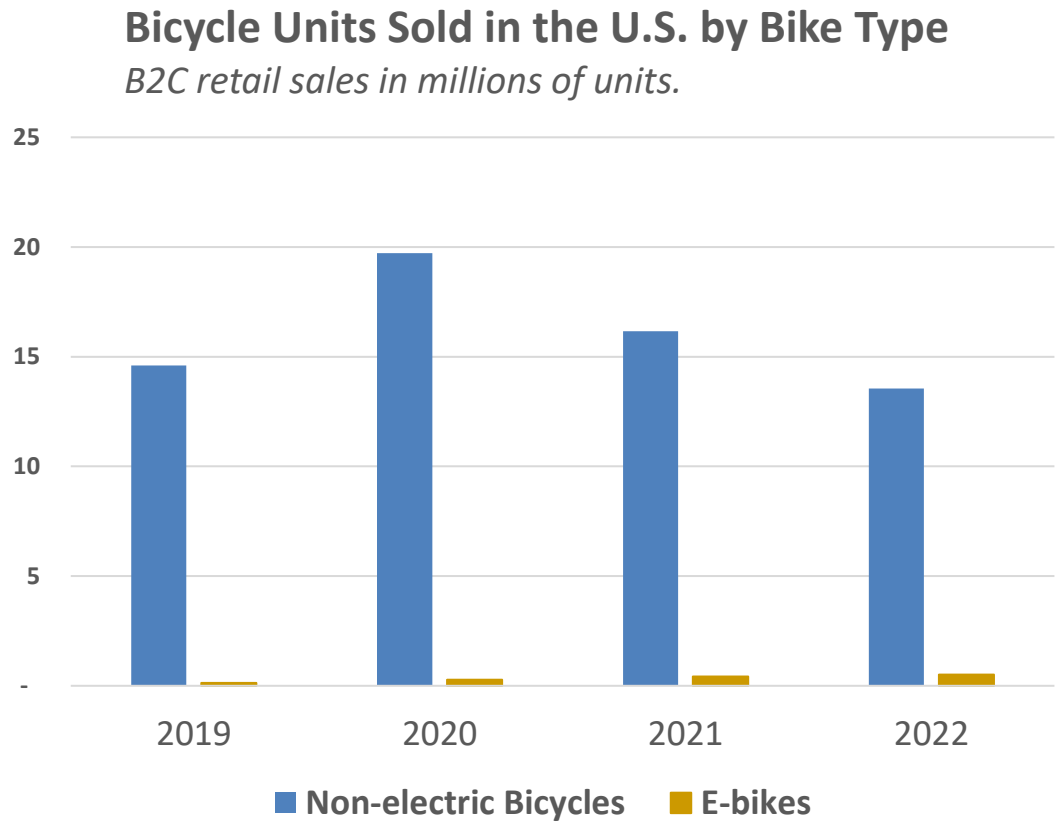
Growth in the U.S. bicycle market





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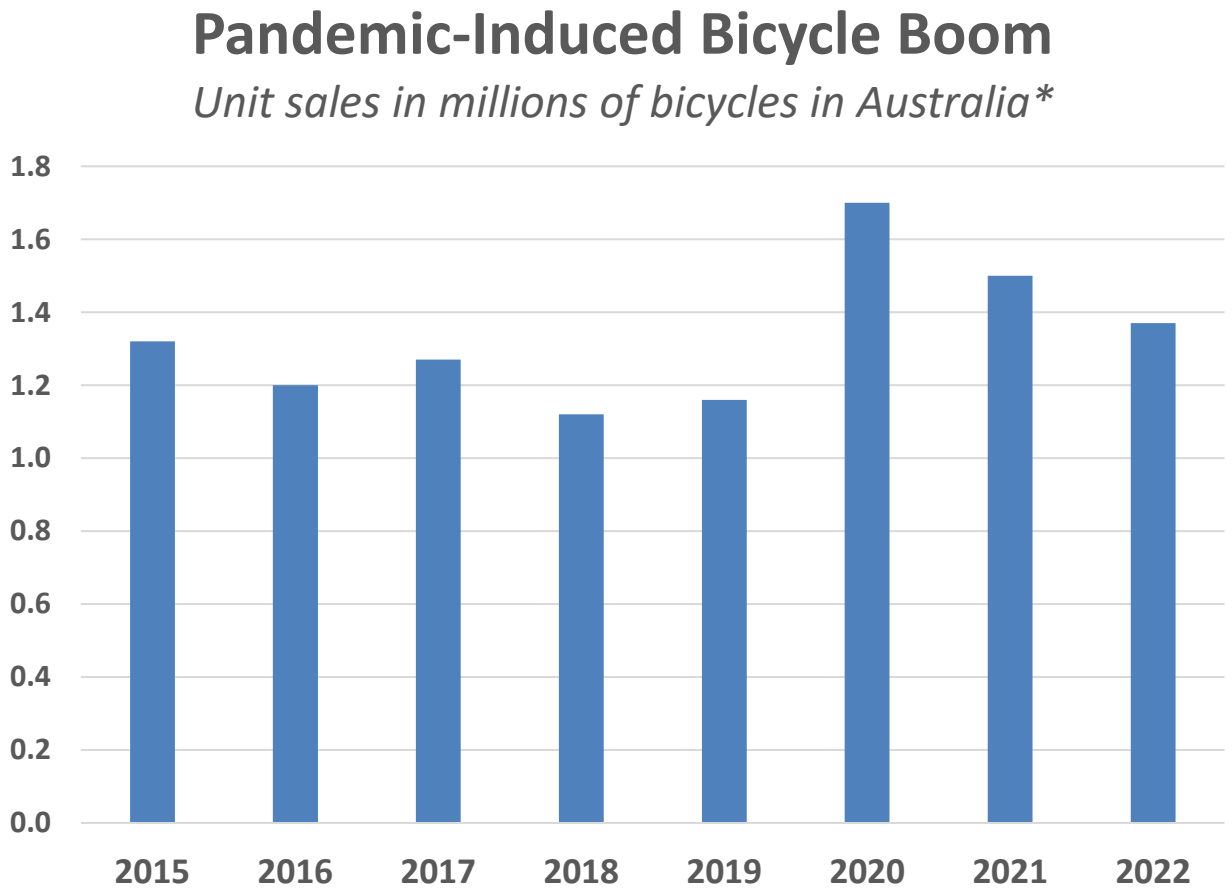
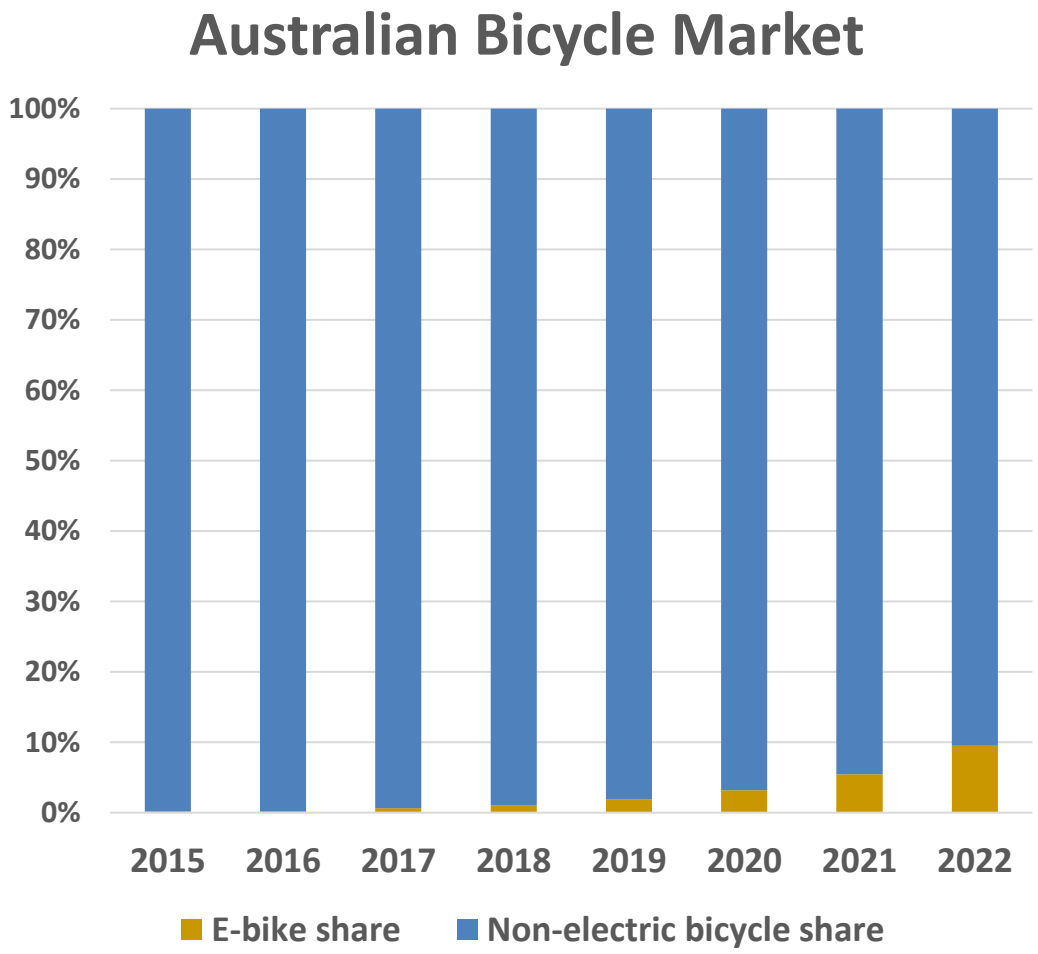
Personal communication Patrick Hogan, People for Bikes

Growth in the Australian bicycle market





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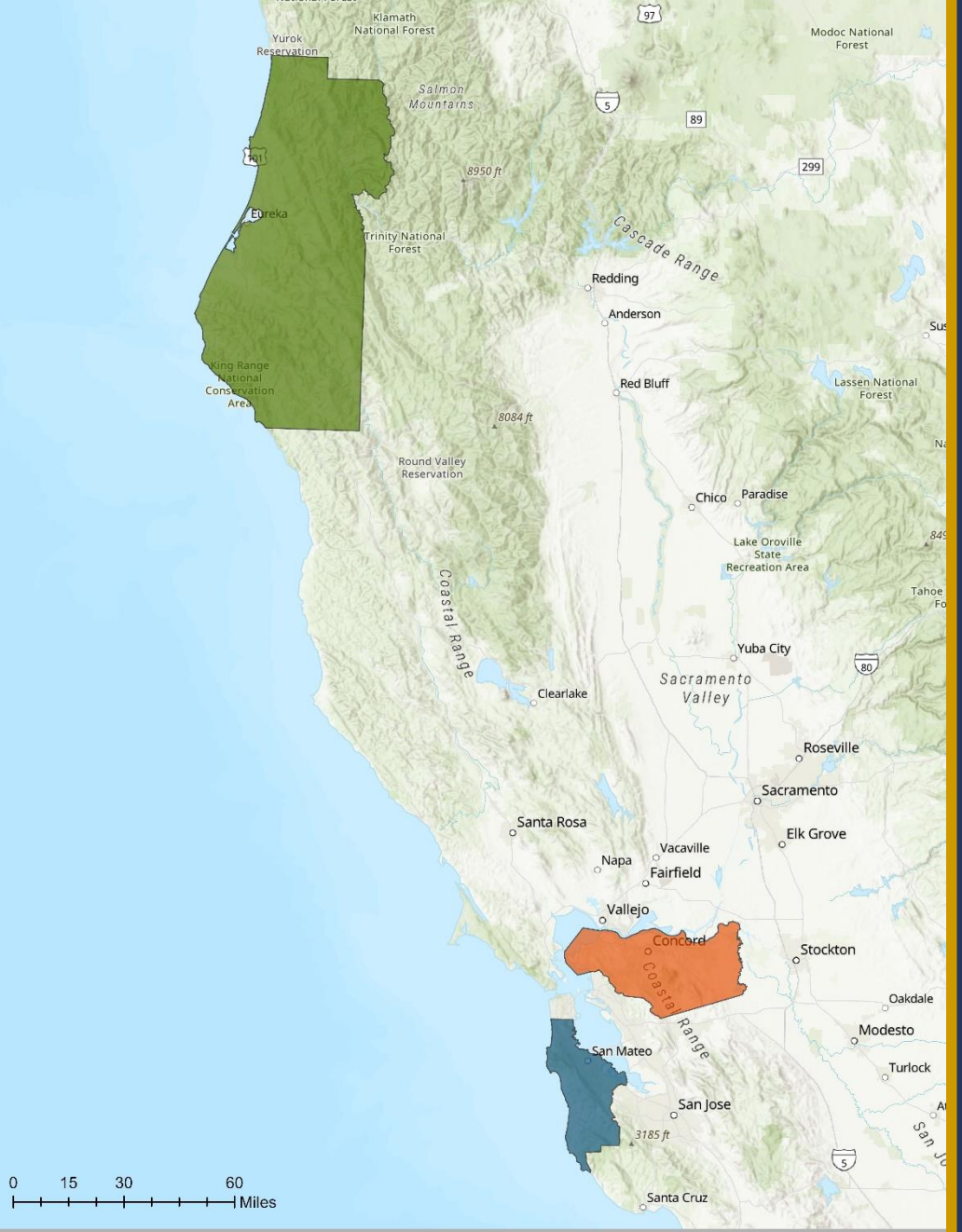
*numbers from Statistica Mobility Market Insights

Data Collection

- Participants in 3 rebate programs across Northern California completed a 1-2 month follow-up survey after receiving their e-bike.
- Our partner agencies distributed the online survey via Google Forms.
- Many participants also completed a 12-month follow-up survey.



Rebate Distribution

- Redwood Coast Energy Authority
- Peninsula Clean Energy
- Contra Costa County

Redwood Coast Energy Authority

April 200 to May 2020

41 respondents

Peninsula Clean Energy

May 2021 to September 2021

67 respondents

Contra Costa County

October 2020 to June 2022

509 respondents

Rebate Program Design:

Incentive & Outreach Strategy

Incentive Amount

Maximum Bike Price

Allowed E-bike types

Participant Eligibility

Differences between rebate program designs

	Redwood Coast Energy Authority	Peninsula Clean Energy	Contra Costa County
Incentive Strategy	After purchase rebate	Point-of-sale discount or after purchase rebate	After purchase rebate
Outreach Strategy	Website, press release, flyers, social media, etc.	Email distribution	Email distribution, newsletter, advertisements, social media
Incentive Amount	50% of the e-bike price, up to a $500 maximum	80% of the e-bike price up to $800 maximum	$150 or $300
Income qualifications	No income qualifications	Low-income status (400% FPL)	Low-income status for higher incentive

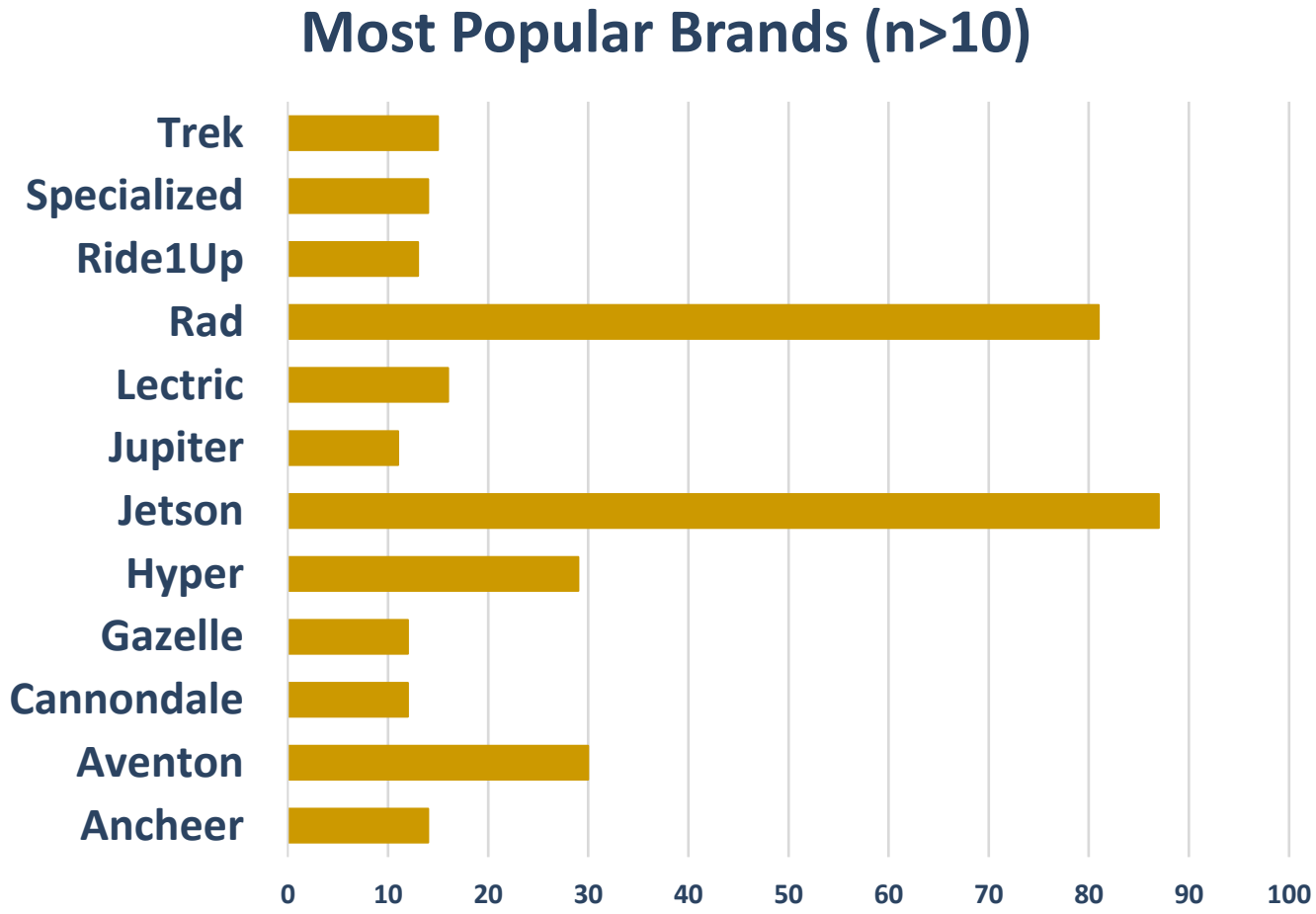
Details of respondents E-bikes

Avg Purchase Price

$1,553

Number of Unique Brands

80+



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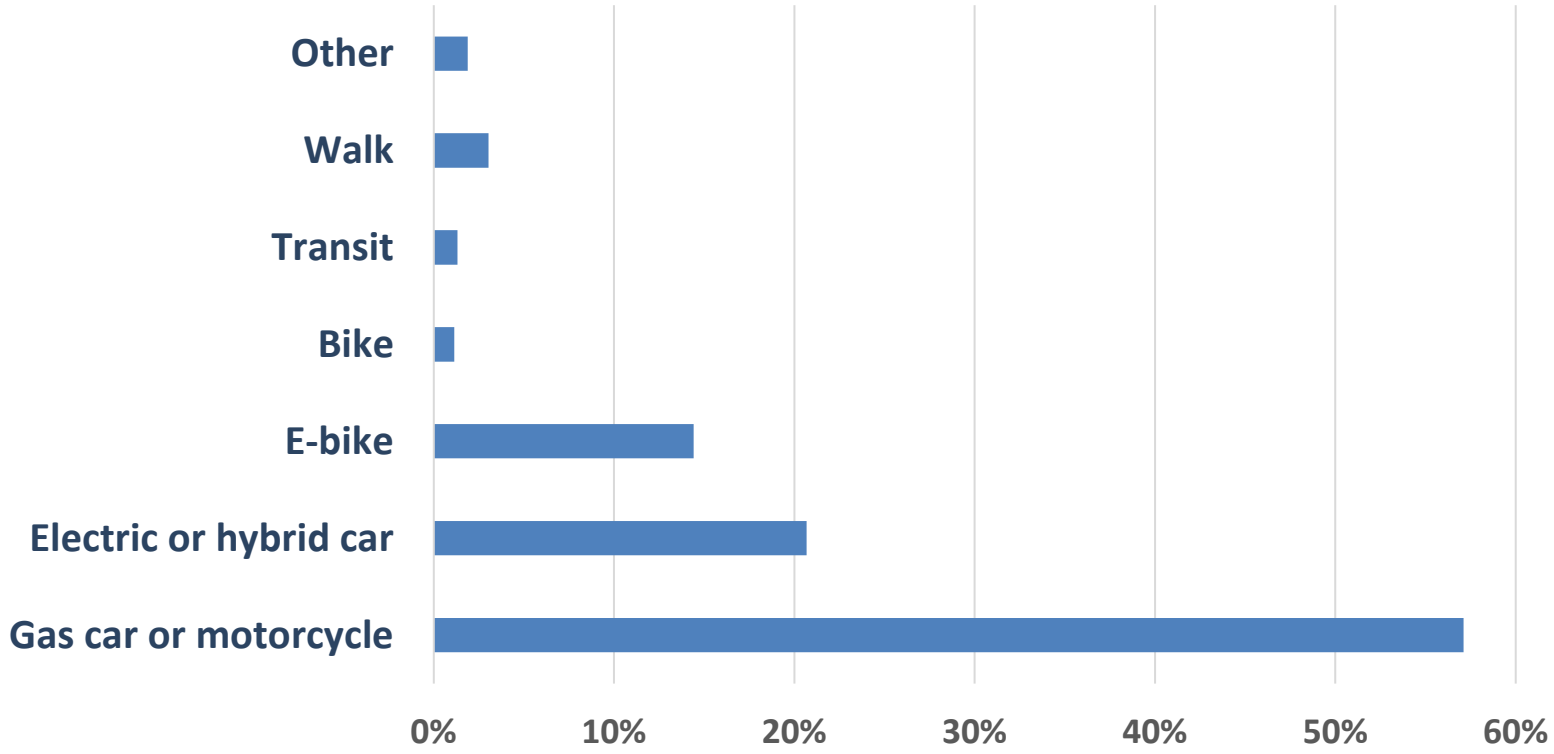
Primary Research Question

How does ownership of an e-bike impact individual travel behavior?

Primary Transportation Mode (1-2mo)



77.5%

Had access to a working bicycle

95%

Had access to a car

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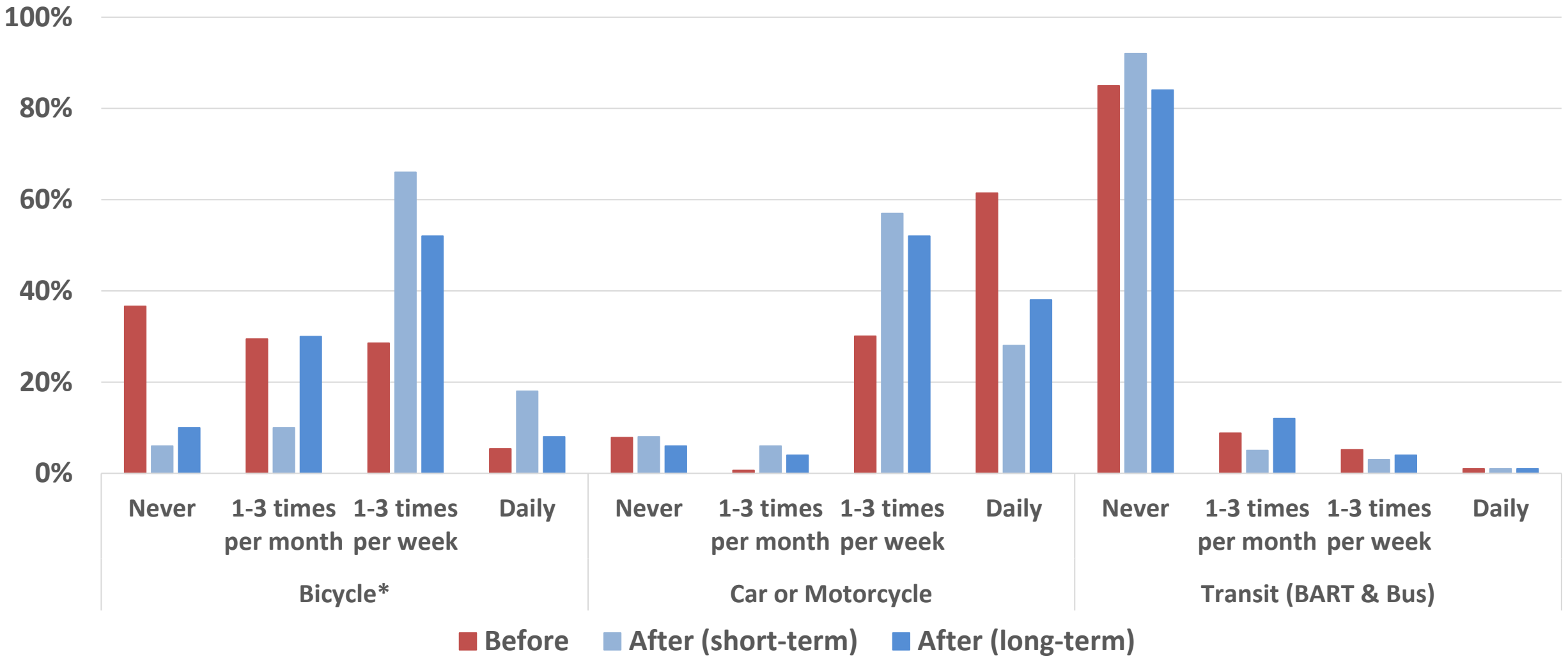
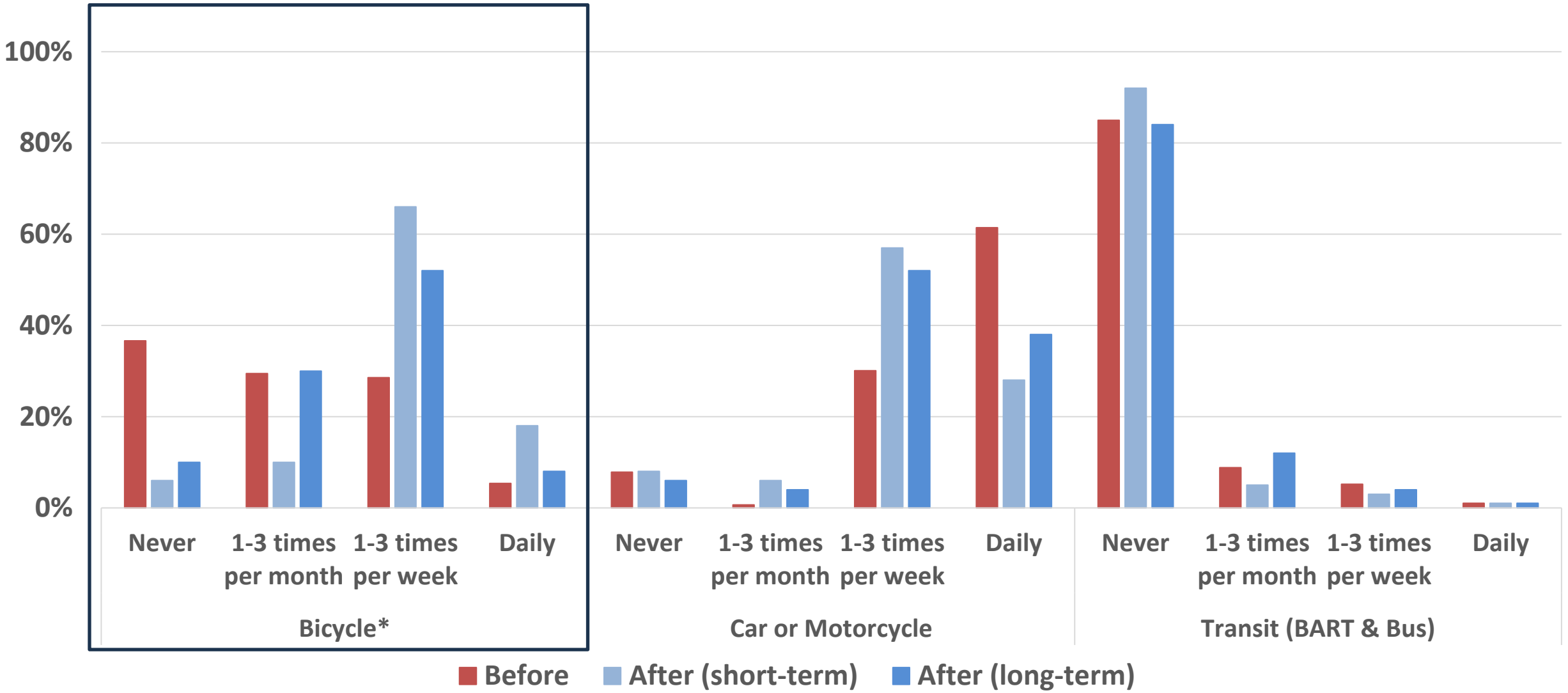
Frequency of Travel*



Frequency of Travel*



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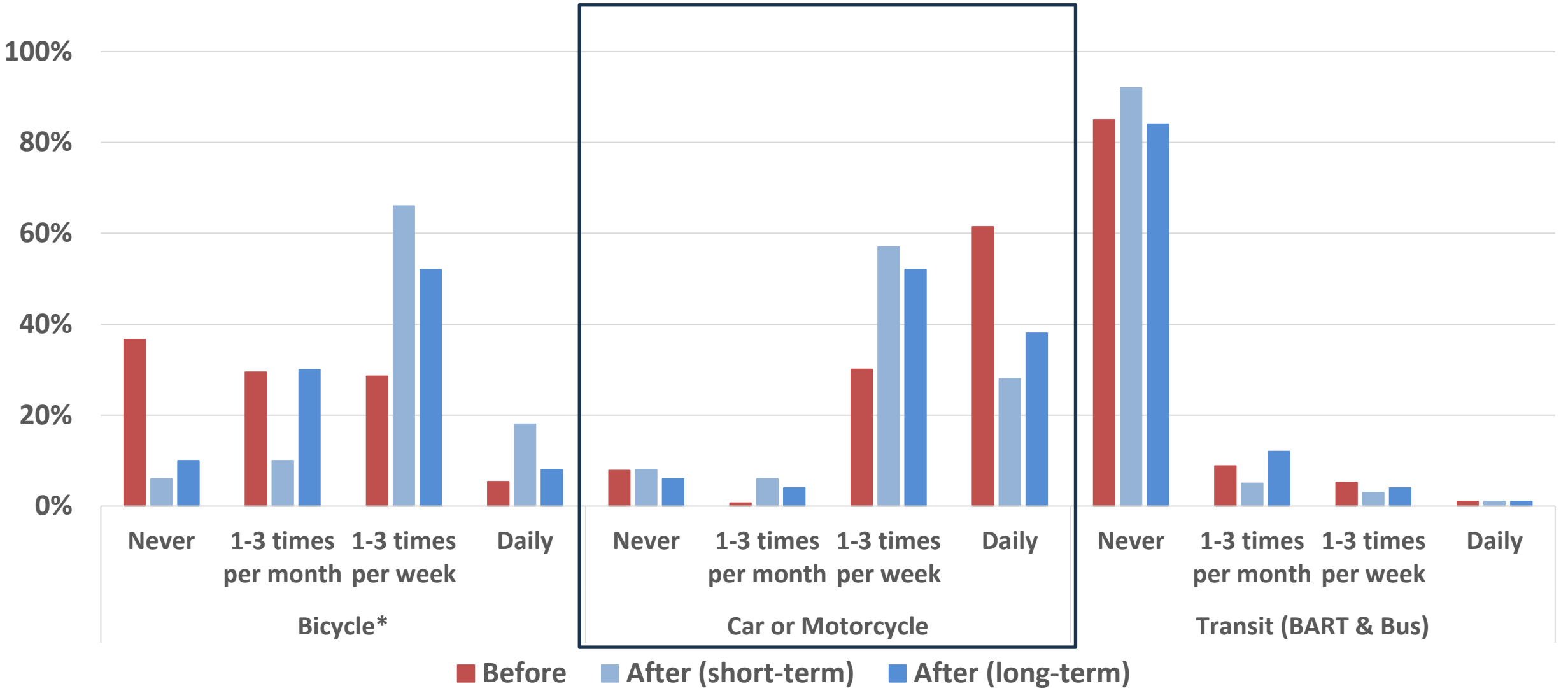

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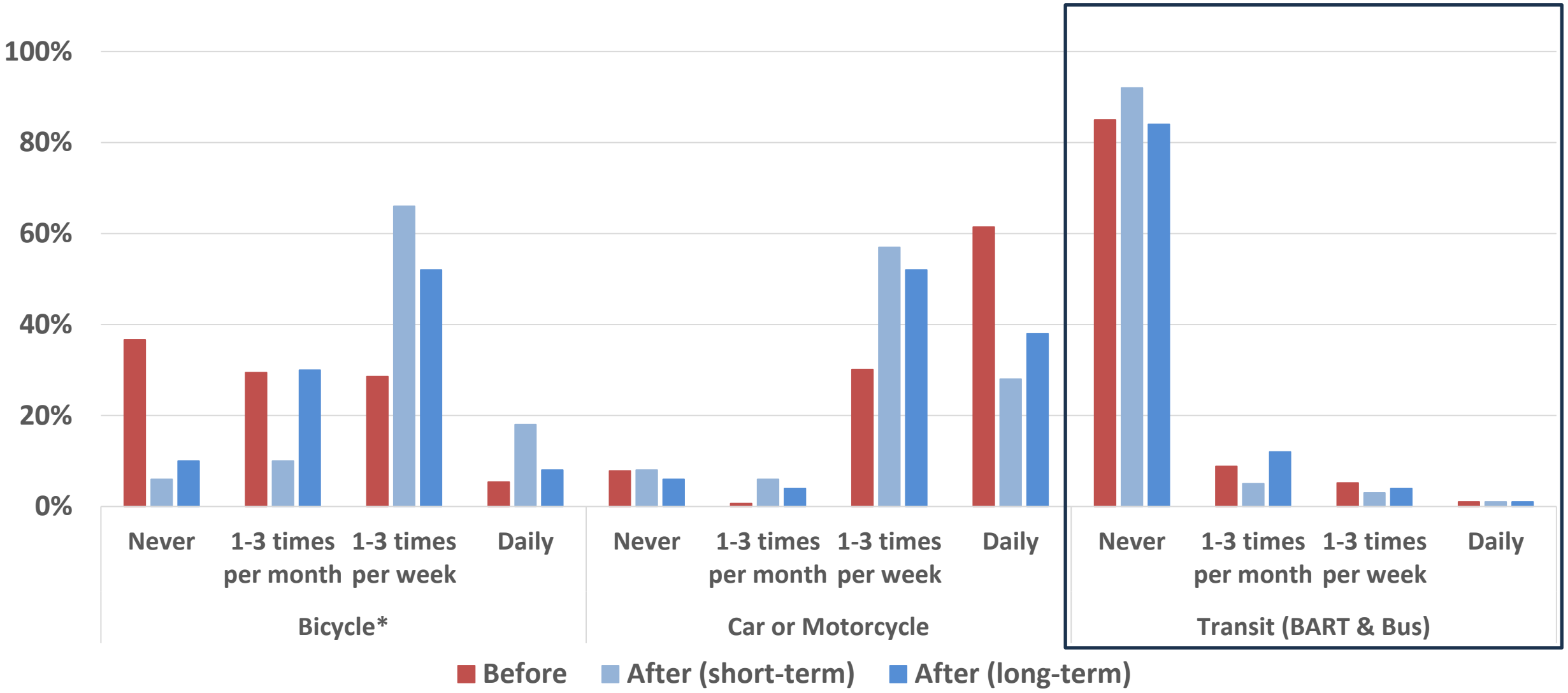
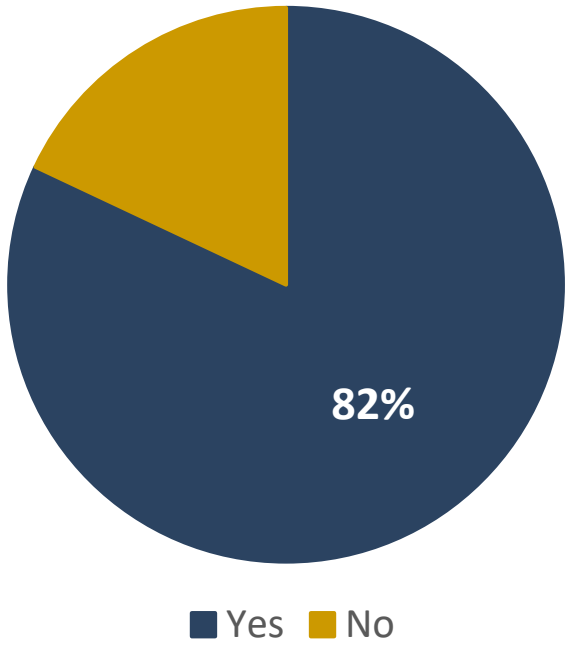
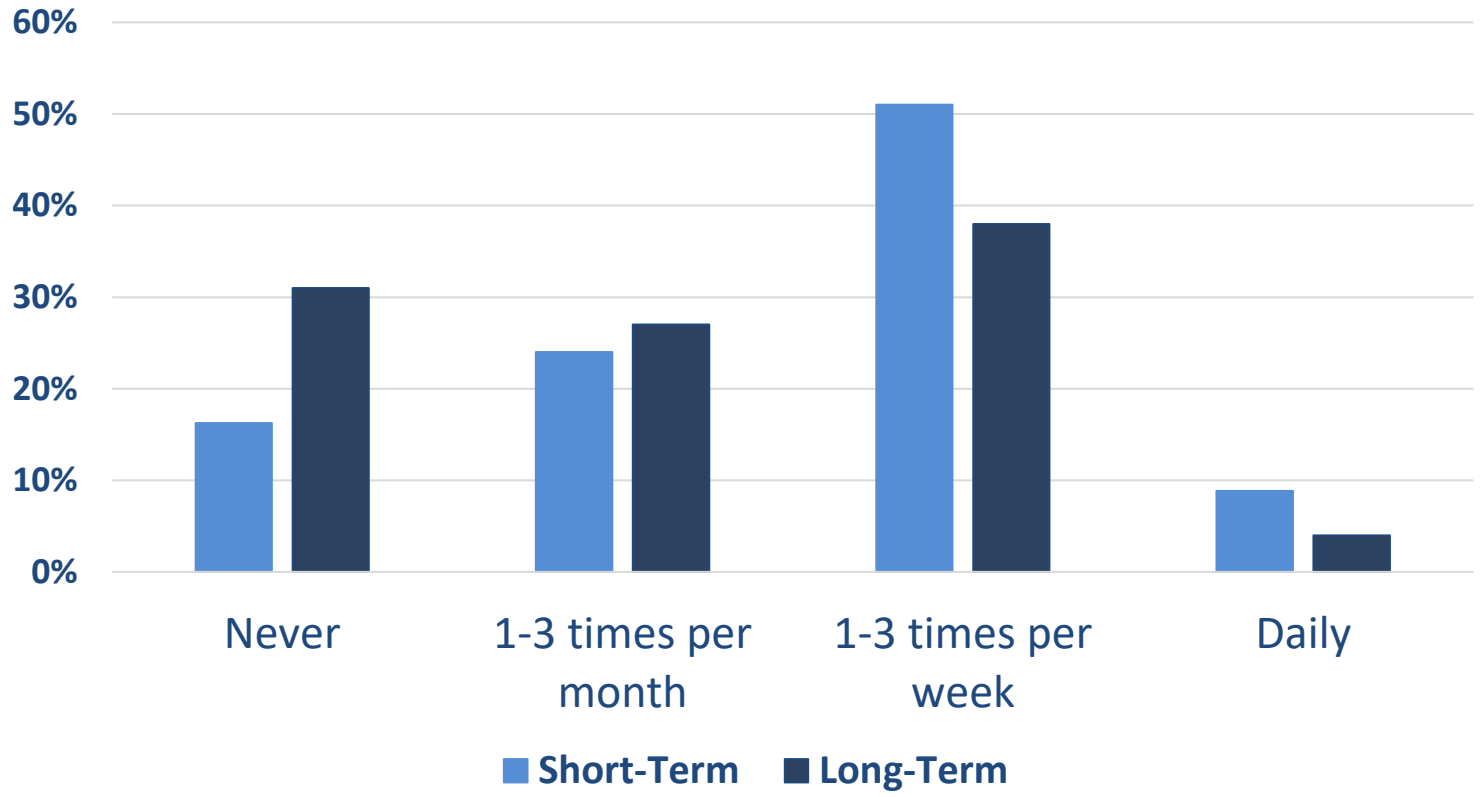


Replacing Car Trips with E-bike

Have you ever replaced a car trip with your e-bike?



Frequency of Replacing Car Trip with E-bike



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Short-term VMT and total CO2 equivalent emissions by time and jurisdiction – Method 1

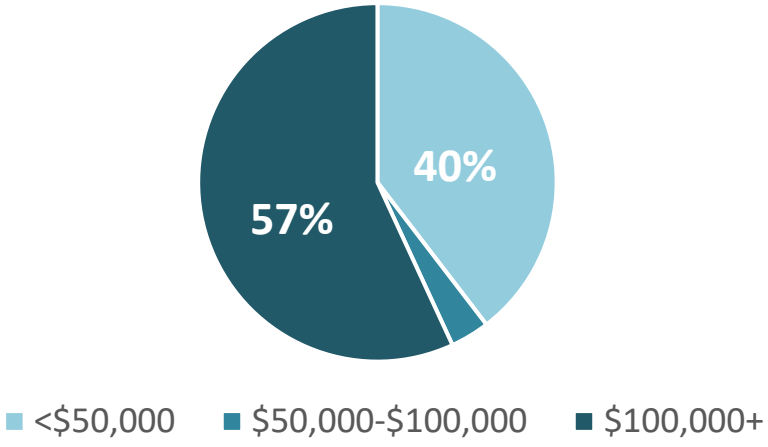
	Before	Short-Term	Car-Replacing E-bike Trips
Sum VMT (per Respondent)	175.01	103.59	82.03
PCE	171.90	107.03	87.70
CC	159.93	89.79	68.38
Total CO2e Emissions (metric tons)	0.084	0.052	**0.044**
PCE	0.135	0.085	0.074
CC	0.044	0.025	0.020

Short-term VMT and total CO2 equivalent emissions by time and jurisdiction – Method 2

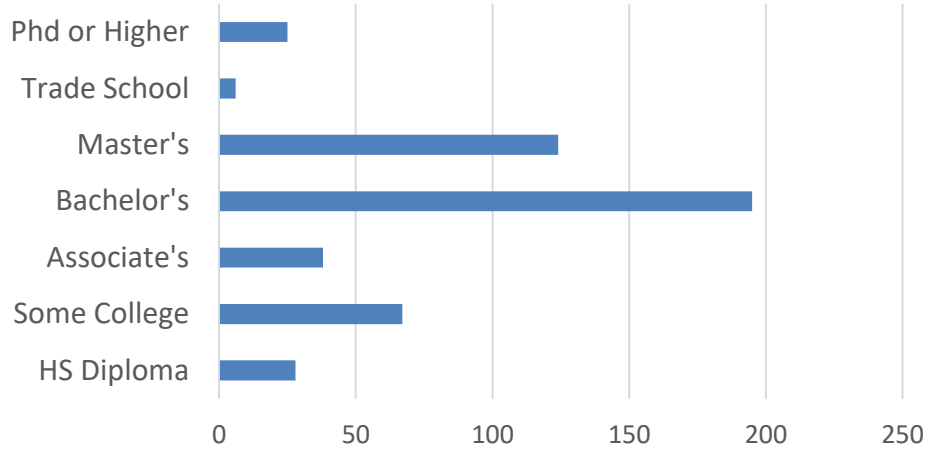
	Before	Short-Term	Car-Replacing E-bike Trips
Sum VMT (per Respondent)	133.13	82.68	45.41
PCE	-	-	-
CC	-	-	
Total CO2e Emissions (metric tons)	0.041	0.026	**0.012**
PCE	0.093	0.058	0.027
CC	0.035	0.021	0.010

…Who Participated?

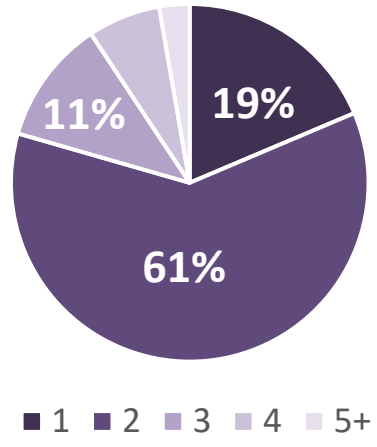
Household Income Category



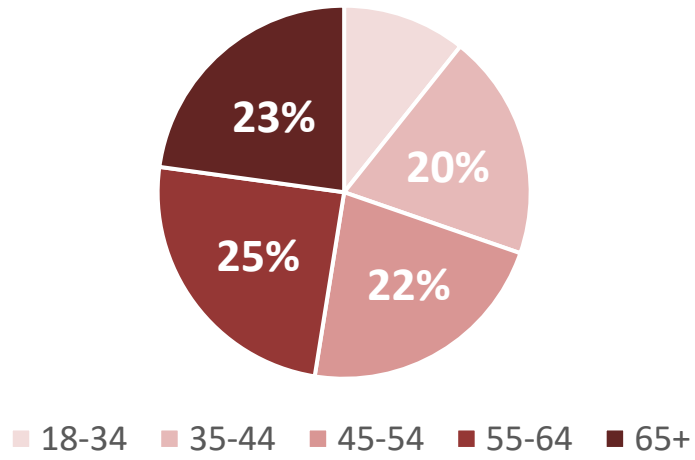
Highest Educational Achievement



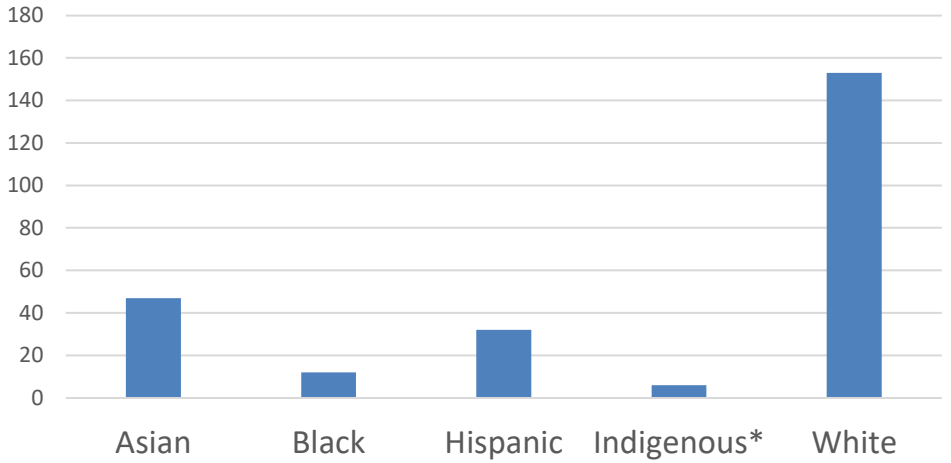
Household Size



Respondent Age Group

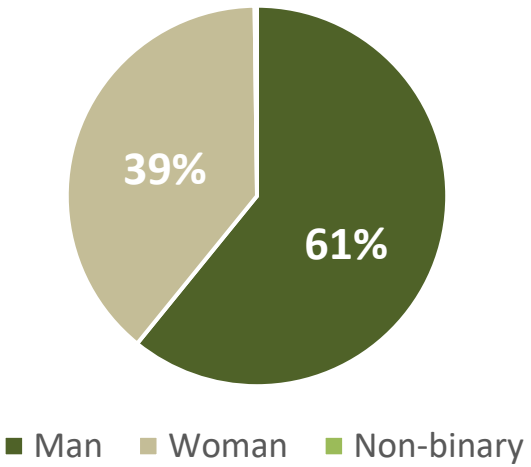


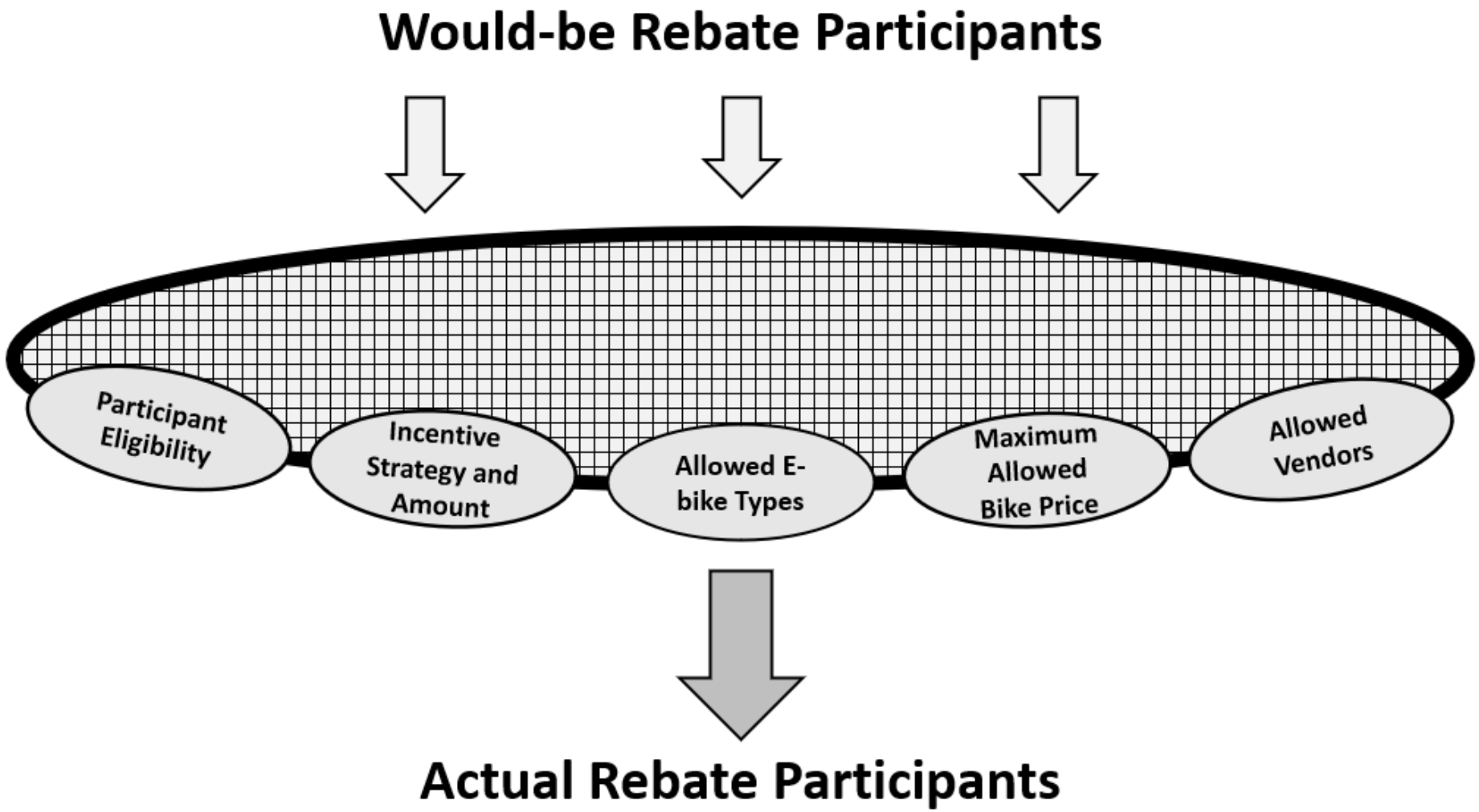
Reported Race/Ethnicity



*definition expanded to include Pacific Islander, Native Hawaiian, Native American

Reported Gender




Would-be Rebate Participants
Participant Eligibility
Incentive Strategy and Amount
Allowed E-bike Types
Maximum Allowed Bike Price
Allowed Vendors
Actual Rebate Participants

Program Design and Equity

To achieve equity outcomes in rebate distribution, programs should:

- Utilize income-qualifications,
- flat-rate incentives,
- And graded incentive levels

Creative solutions are needed to achieve other equity metrics. Utilizing the above strategies is not enough to achieve an equitable distribution of resources.

Let’s Summarize!

Key Findings

1. **E-bike rebate programs are successful at incentivizing participants to replace occasional car and/or motorcycle trips. This is associated with a reduction of 12-44 kilograms of CO2 equivalent emissions per person each month.**
2. Lower-income participants tend to replace more car trips.
3. E-bike ownership induces significant recreational travel.
4. Fear of vandalism and theft, a need for cargo space, weather, and a lack of quality bicycle infrastructure remain significant barriers.


Thank you!

Questions?

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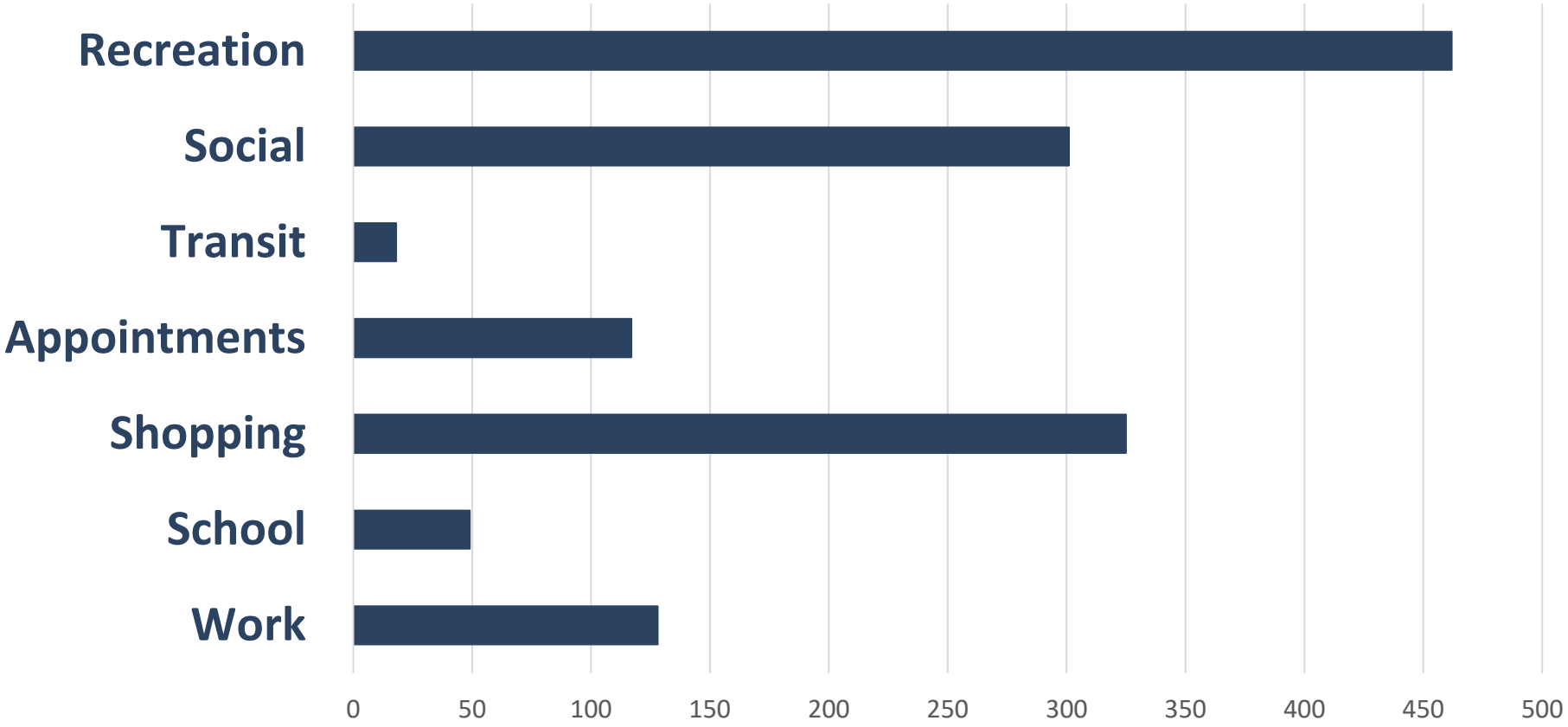
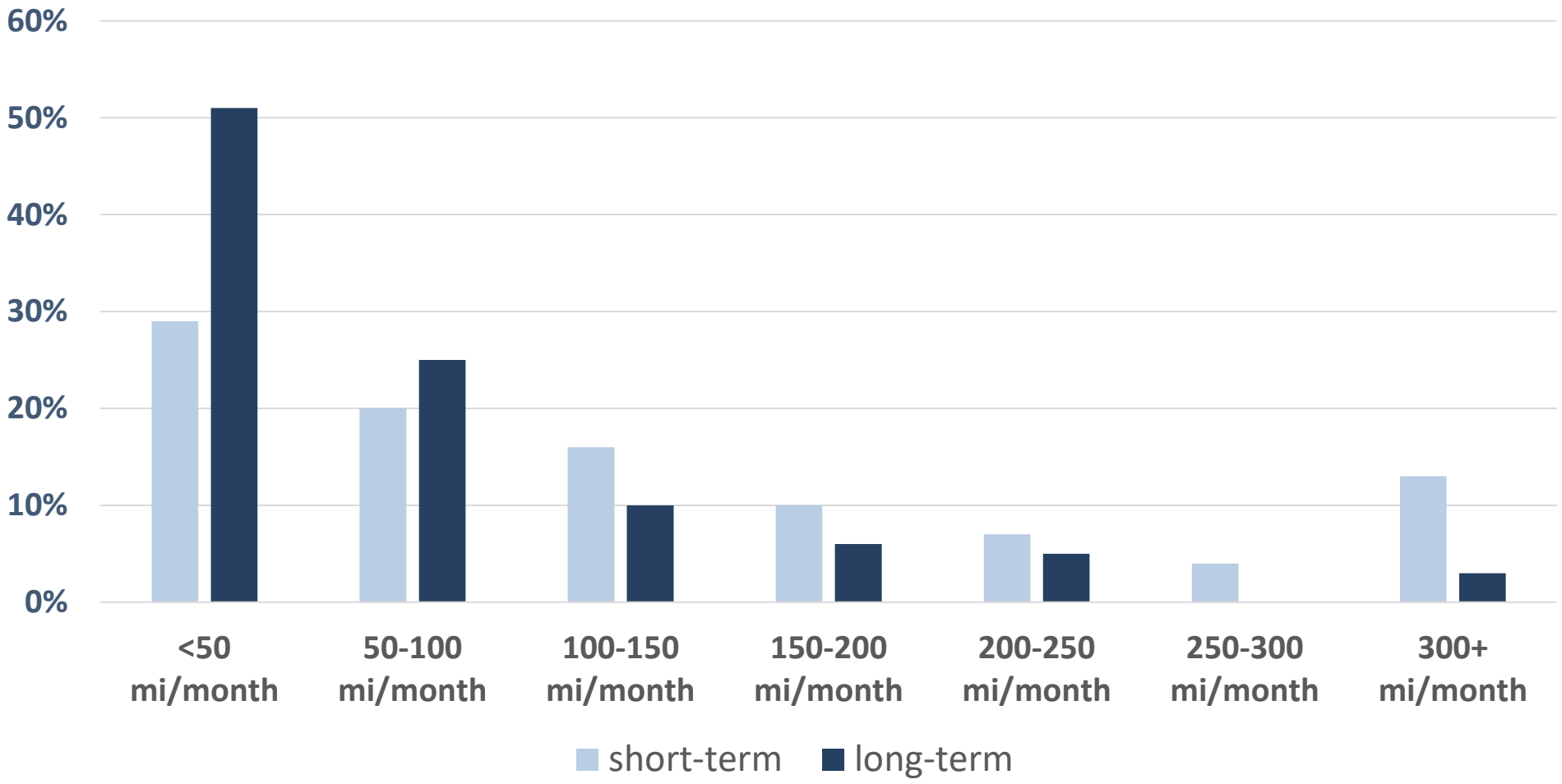
Extra Slides

Reported Destinations



Odometer Reading at 2mo…



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Program Parameters

Redwood Coast Energy Authority	Peninsula Clean Energy	Contra Costa County
After purchase rebate	Point-of-sale discount or after purchase rebate	After purchase rebate
50% of the e-bike price, up to a $500 maximum	80% of the e-bike price up to $800 maximum	$150 or $300
None	$1,800	$5,000
List of pre-approved e-bikes	All new class 1,2, and 3 e-bikes with motors of 750 watts or less	All new class 1, 2, and 3 e-bikes, e-bike conversion kits, e-mopeds (max speed < 30 mph) (with pedals)
Energy Customer Limit of one rebate per electric customer account	Low-income status (400% FPL) Resident of San Mateo County	Low-income status Resident of Contra Costa County and older than 18 One rebate per household

Types of E-bikes

	CLASS 1	CLASS 2	CLASS 3
Pedal Assist	✓	✓	✓
Throttle		✓	
Max Speed	20 mph	20 mph	28 mph

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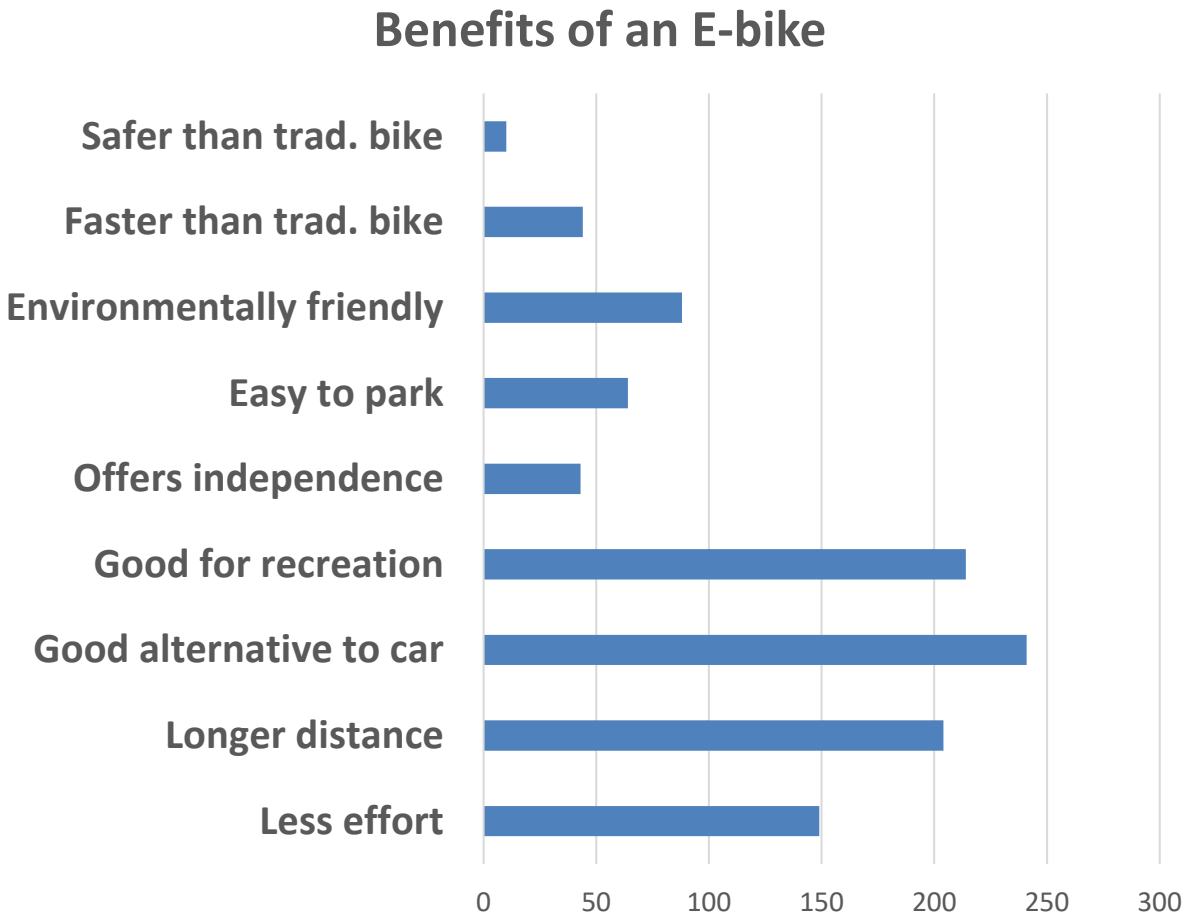
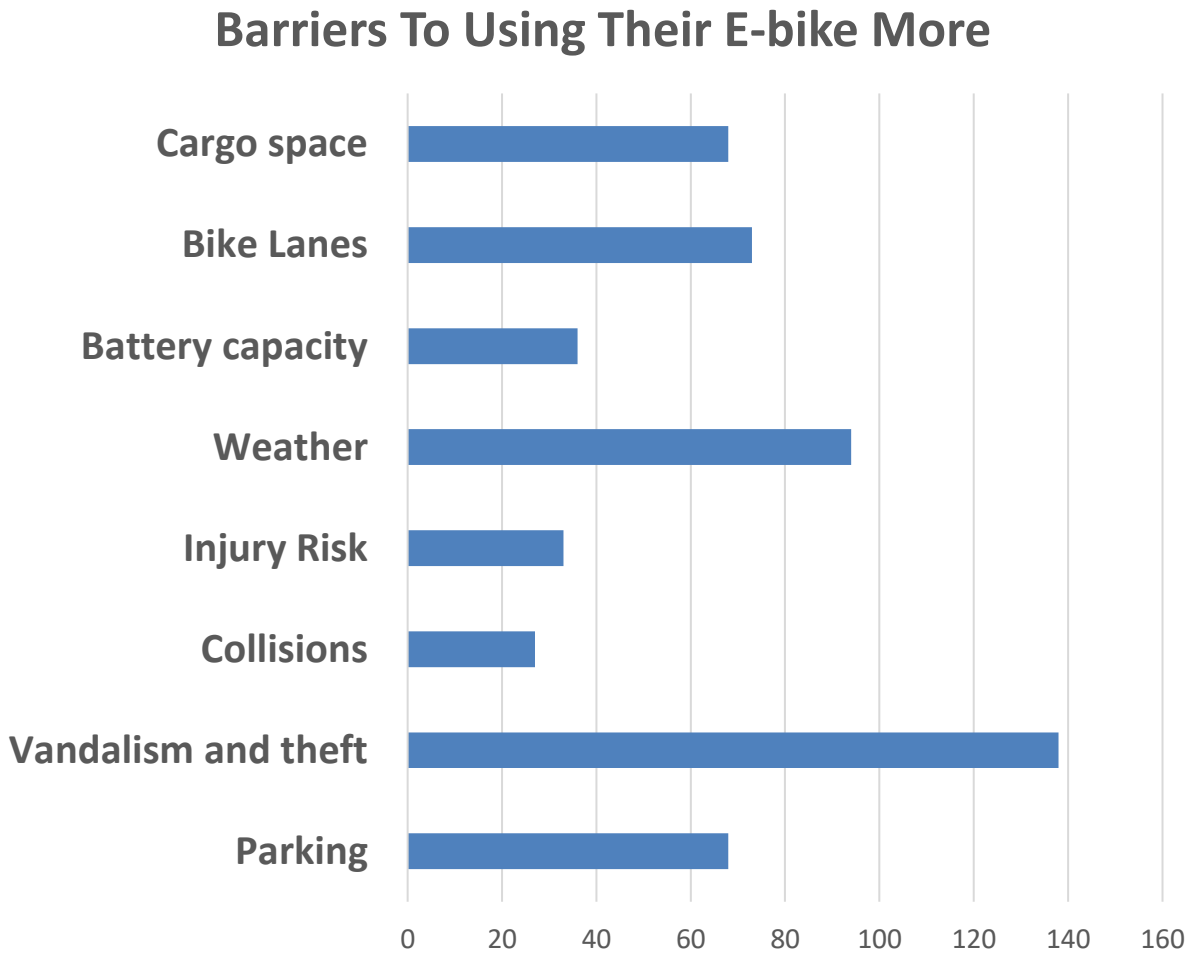
Benefits and Barriers





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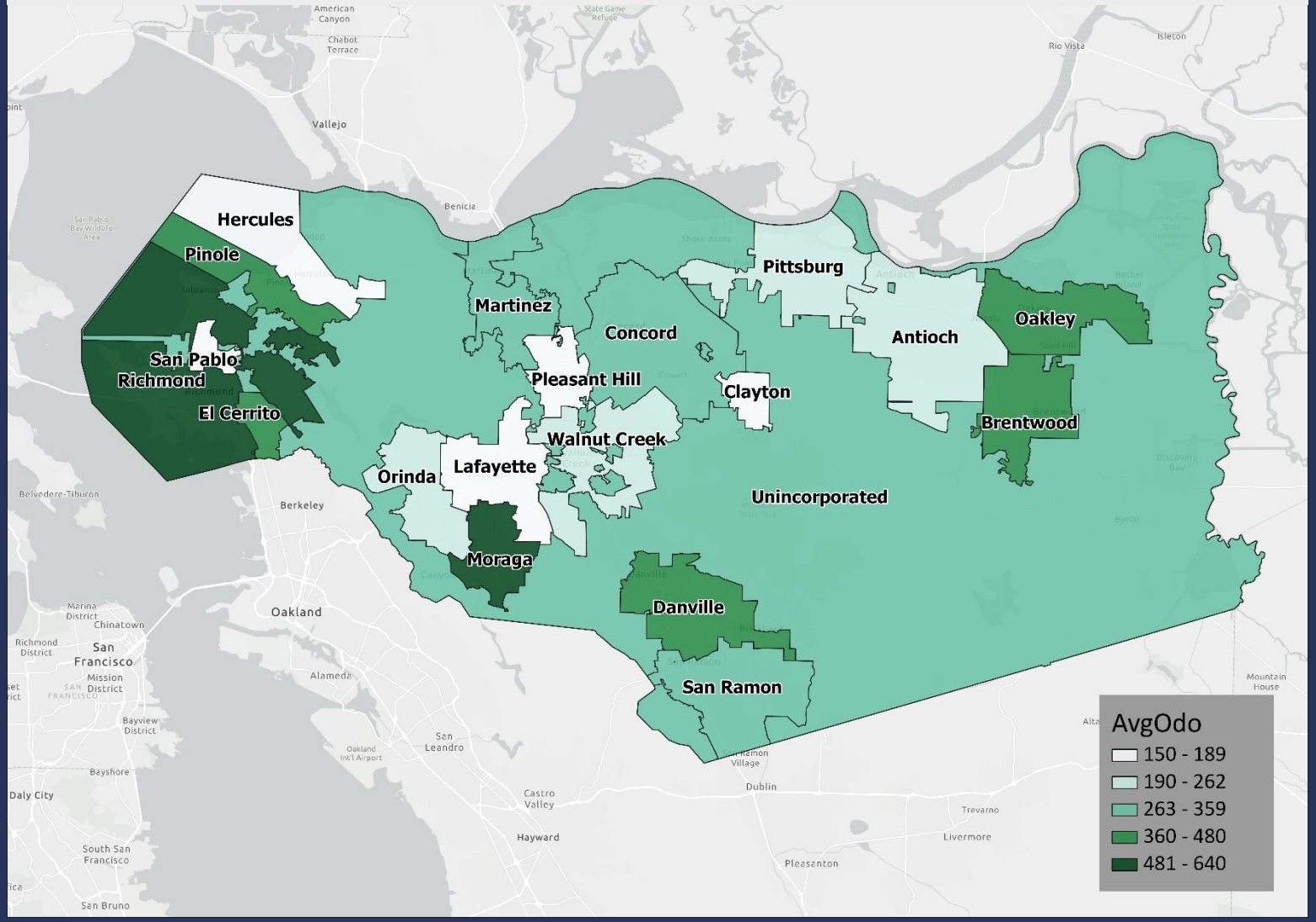
How did your e-bike make you feel?

Average Odometer Readings by City



Highest Avg Odometer:

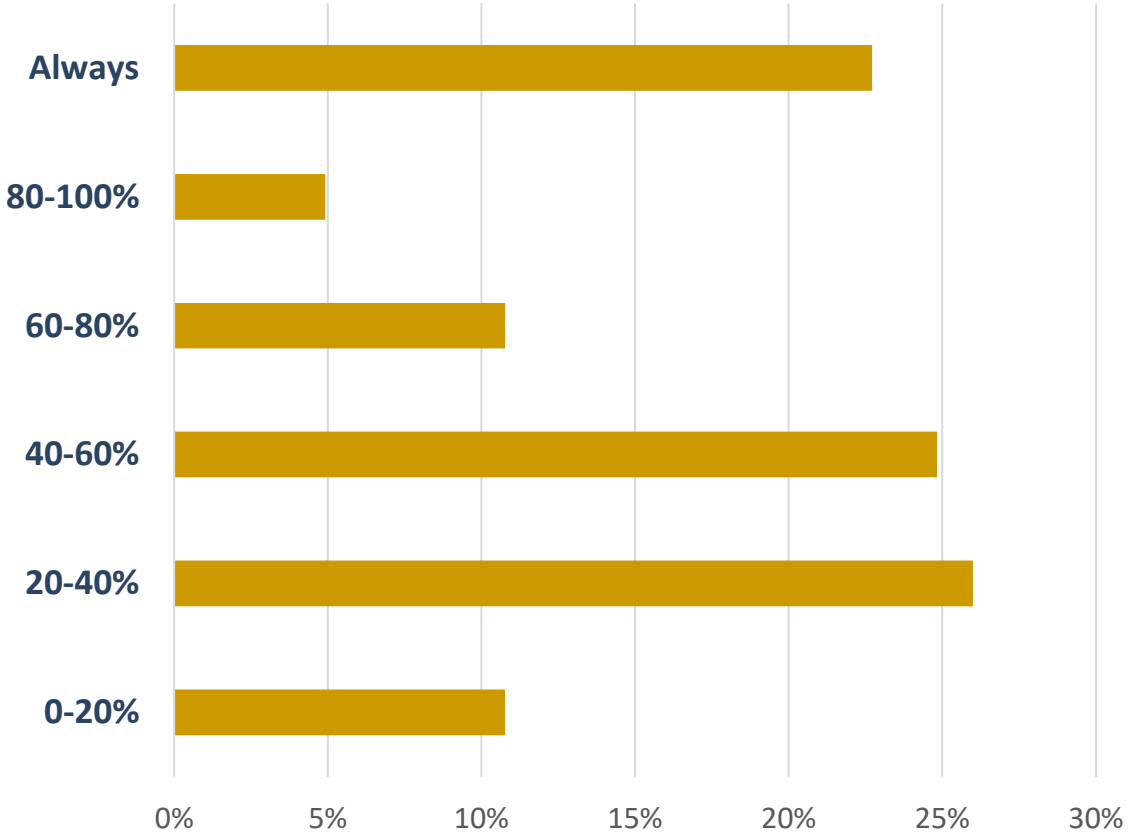
1. *Richmond – 640 mi*
2. *Moraga – 566 mi*
3. *Pinole – 480 mi*
4. *Brentwood – 468 mi*
5. *Danville – 420 mi*

Lowest Avg Odometer:

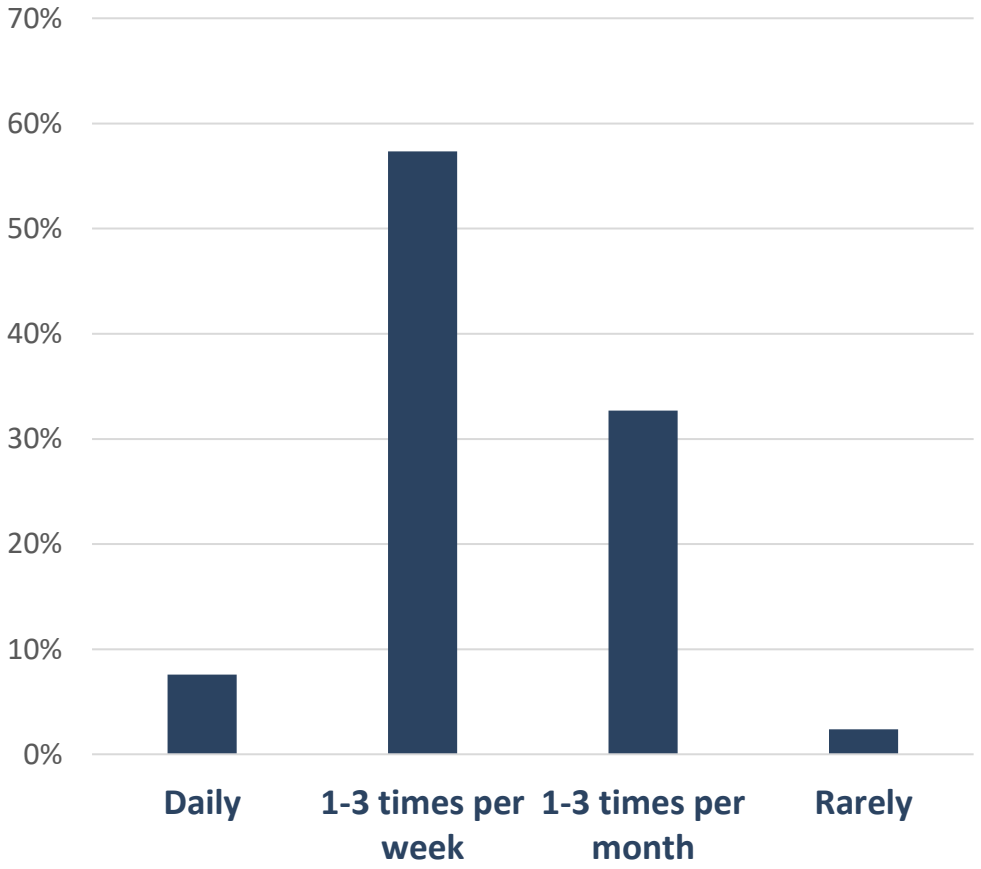
1. *Clayton – 150 mi*
2. *Lafayette – 150 mi*
3. *San Pablo – 153 mi*
4. *Hercules – 170 mi*
5. *Pleasant Hill – 189 mi*

Charging Behavior

What level is your battery when you typically recharge?



How frequently do you charge your e-bike?



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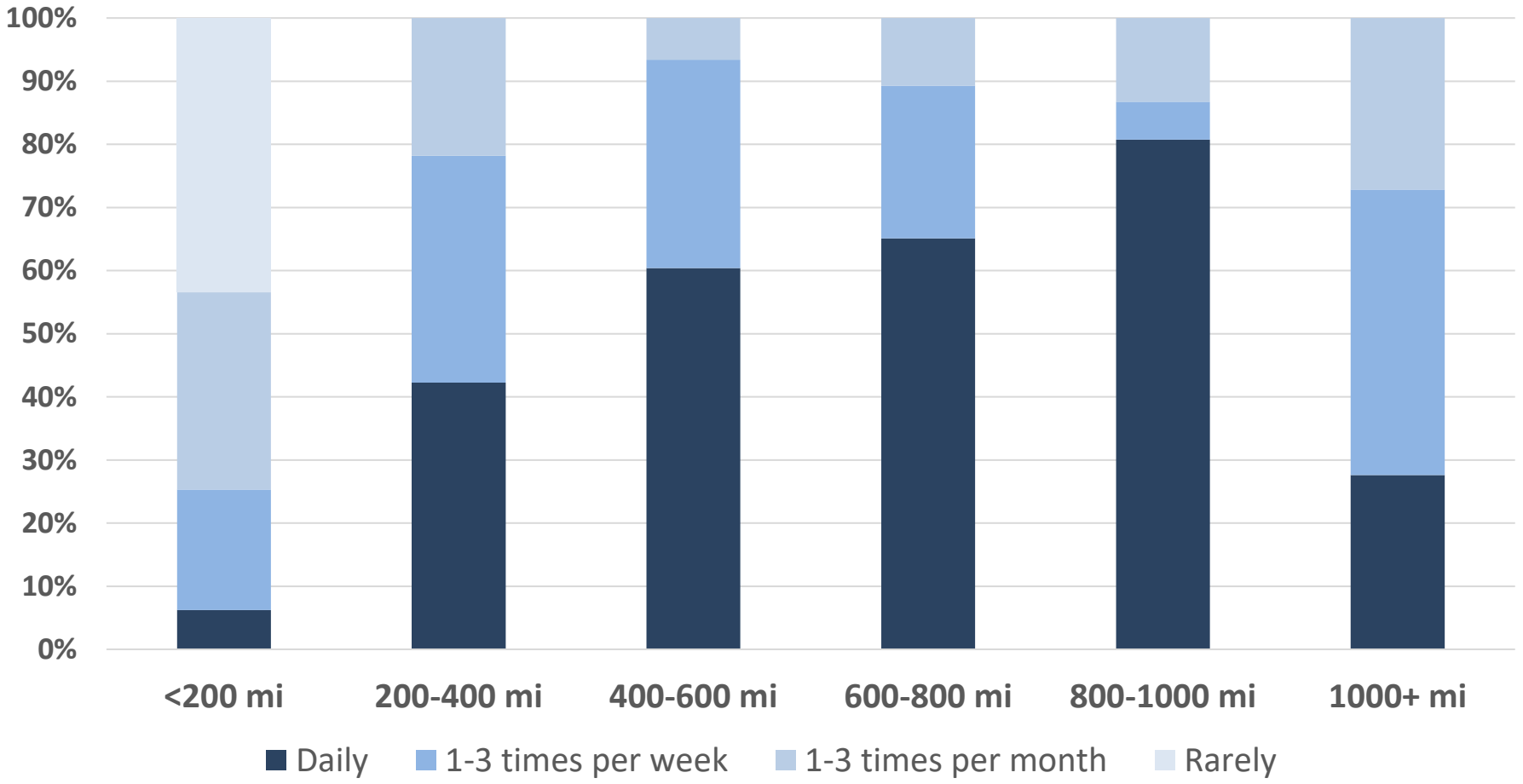
Odometer Reading and Charging Frequency



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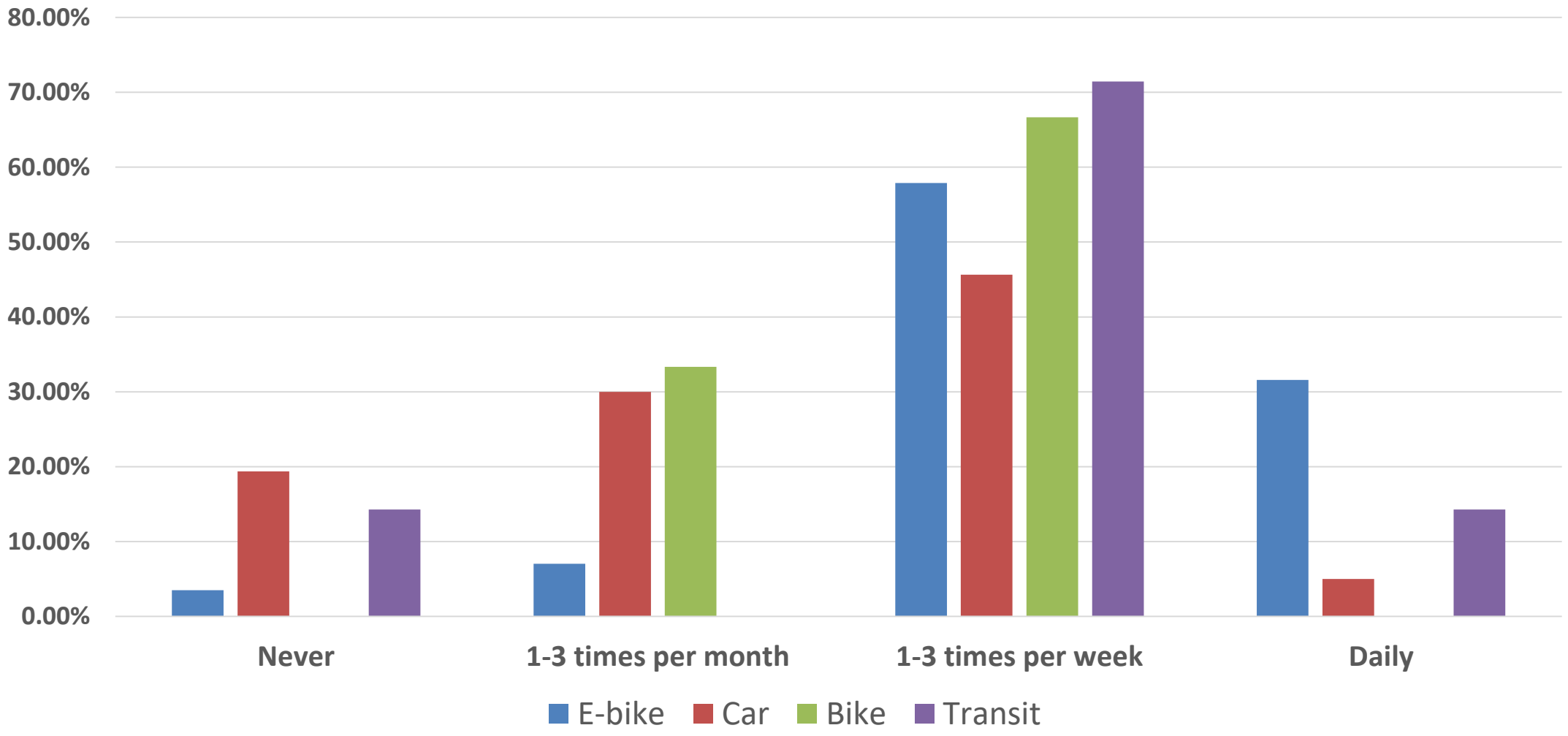
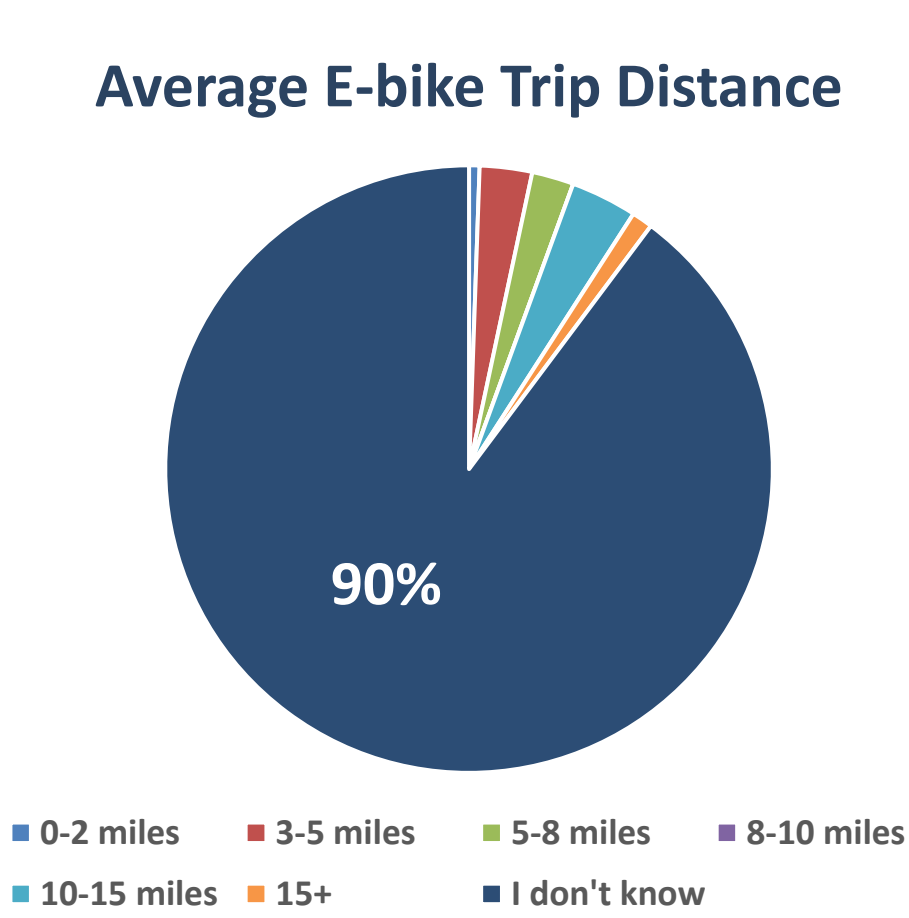
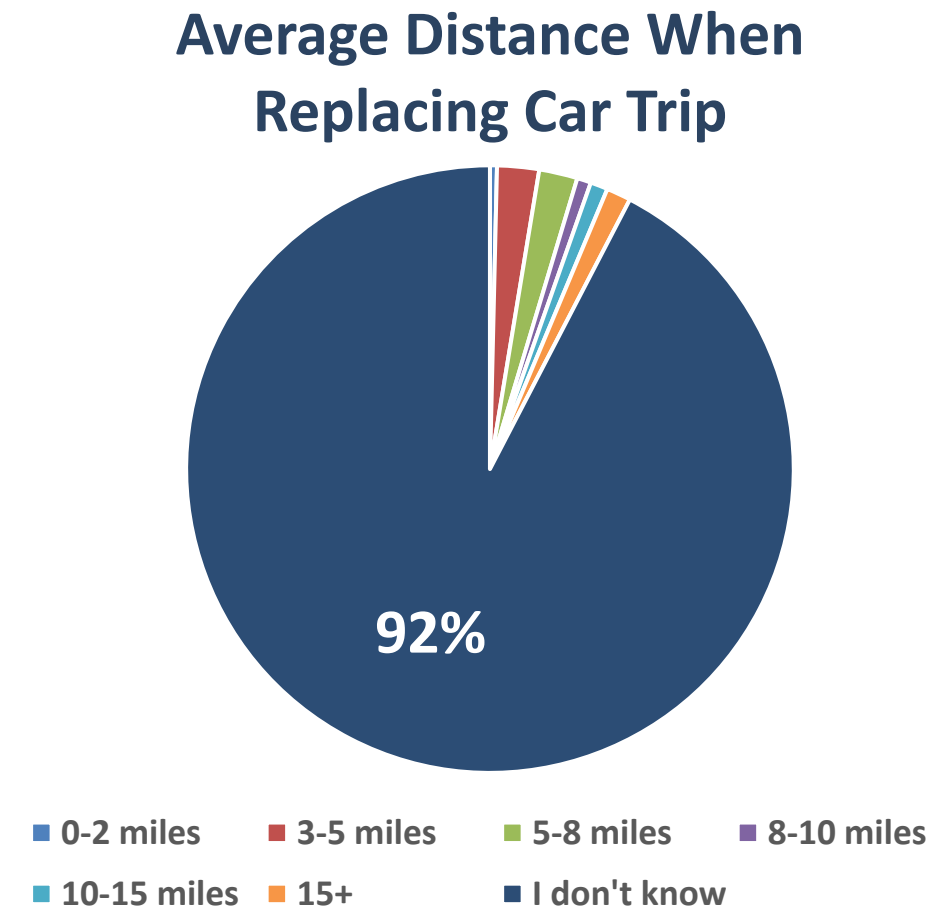
Frequency of Car Trip Replacement by Primary Mode*



Respondents don’t know their average travel distance





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