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Designing Safe Streets for All Users

Responses to the challenges posed by growing motorcycle use

Eduardo Pompeo

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ADB GRRSO Dialogue on
Motorcycle Safety

Manila, Oct 12, 2022

[@GlobalStreets](https://twitter.com/GlobalStreets)

www.globaldesigningcities.org

GDCI Global Designing Cities Initiative

An aerial view of a city grid with a blue grid overlay. Three rectangular areas in the top row are highlighted in a darker blue, showing parks with green spaces and tree patterns. The rest of the grid shows dense urban buildings and streets.

STREETS

The background is a grid of aerial photographs of a city. Most cells show dense urban development with buildings and streets. A central 3x3 grid of cells is highlighted in a darker blue, showing a large green park area with a network of paths and trees. A diagonal blue line runs from the top-left towards the bottom-right, passing through the grid.

STREETS

are the platform to...

Move



Istanbul, Turkey

Dine



Paris, France

Play



Fortaleza, Brazil

Learn to Ride



Bogot , Colombia

Spaces to relax



New Delhi, India

To spend time with old friends



Madrid, Spain

....or meet new ones



Portland, USA

The background is a grid of aerial photographs of a city. Most cells show dense urban development with buildings and streets. A central 3x3 grid of cells is highlighted in a darker blue and shows a large green park area with a network of paths and trees. A diagonal blue line runs through the grid from the top-left to the bottom-right.

STREETS

serve many functions...



Mobility and Access
Environmental Sustainability
Economic Sustainability
Livability and Quality of Life
Public Health and Safety

The image is a grid of 20 aerial photographs of city blocks, arranged in 4 rows and 5 columns. The central 3x3 area (rows 2-4, columns 3-5) is highlighted with a semi-transparent blue overlay. This highlighted area shows a park with green lawns, trees, and a network of paths. The surrounding 17 blocks show dense urban development with various building styles, streets, and some green spaces.

**Largest network of
continuous public space**



**we must make better, more efficient
use of this valuable space**







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天安门 4.1 km

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(-) तीव्र गुड़िका
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2ª e 6ª 05-09h
17-21h
Sábado 10-14h
VIA
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BOCA CITY
METROPOLITANA

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MARCA FERRARI
R. 171-1402
marcainformatica.com.br

MEC
61-0941

A lot can be done for the safety of motorcyclists

- **Universal helmet use**
- **Safer motorcycles**
- **Strategic enforcement**
- **Better training for motorcyclists**
- **Improved crash response**
- **Better crash data management**
- **...**

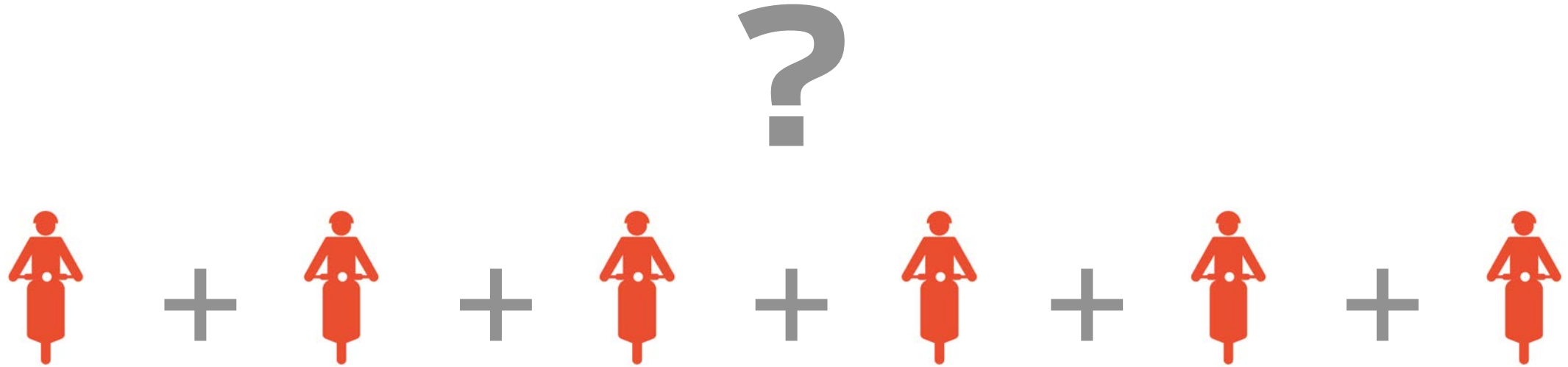
When it comes to street design, we should acknowledge that the street is a single space where multiple users interact...



We can we avoid repeating mistakes from the past...



...of considering only one user in isolation...



...to asking how do we make our cities safe for all people!





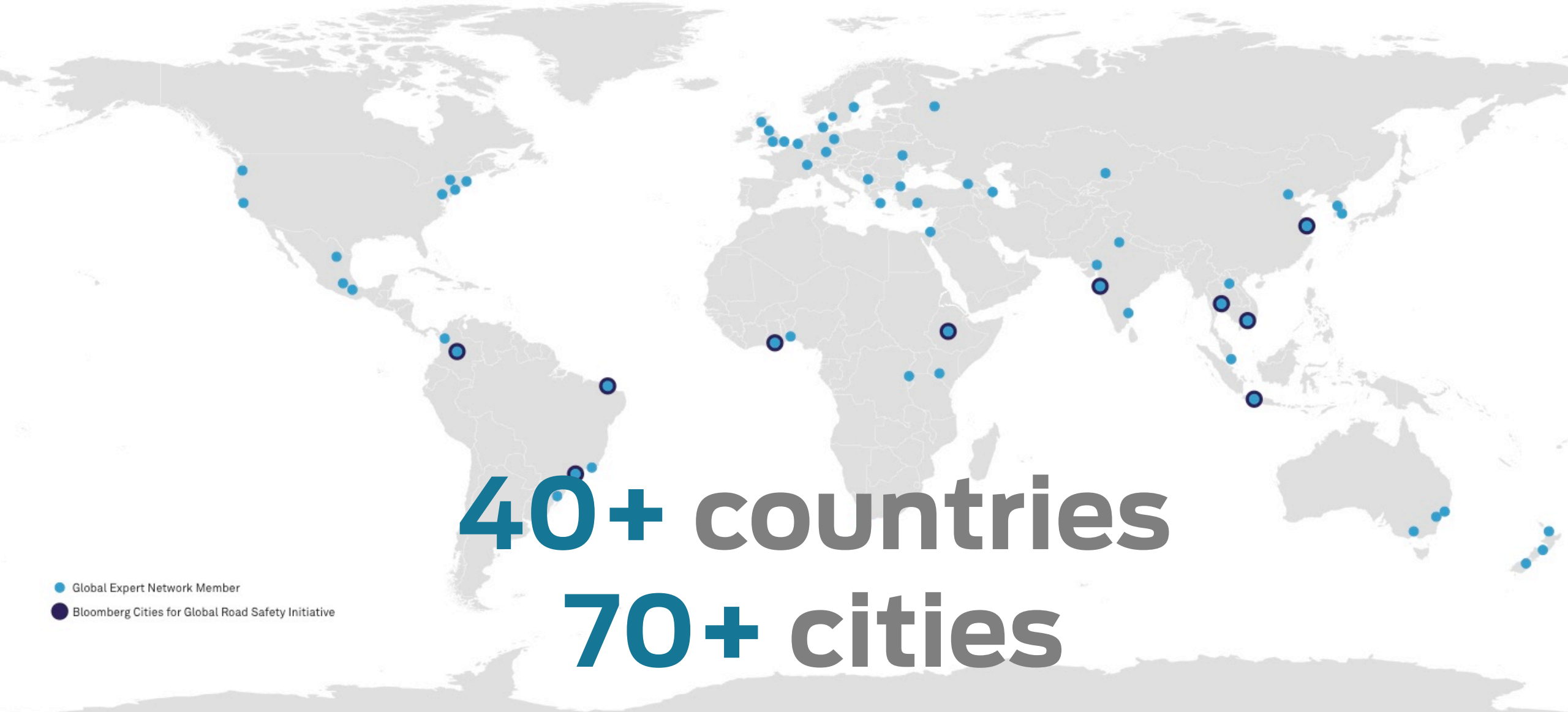
Global Designing Cities Initiative



**Bloomberg
Philanthropies**

INITIATIVE FOR GLOBAL ROAD SAFETY

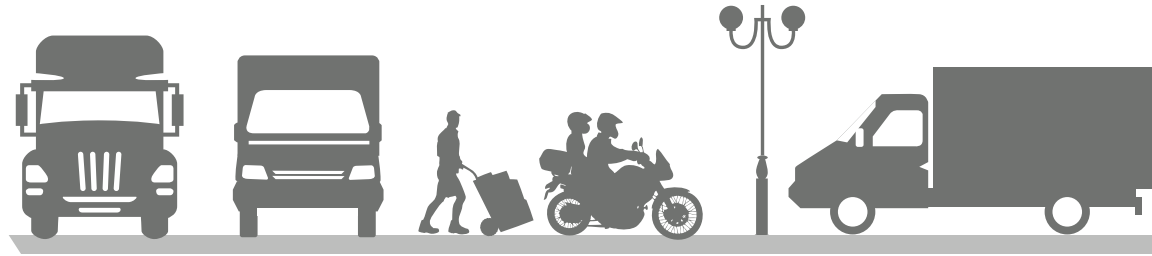
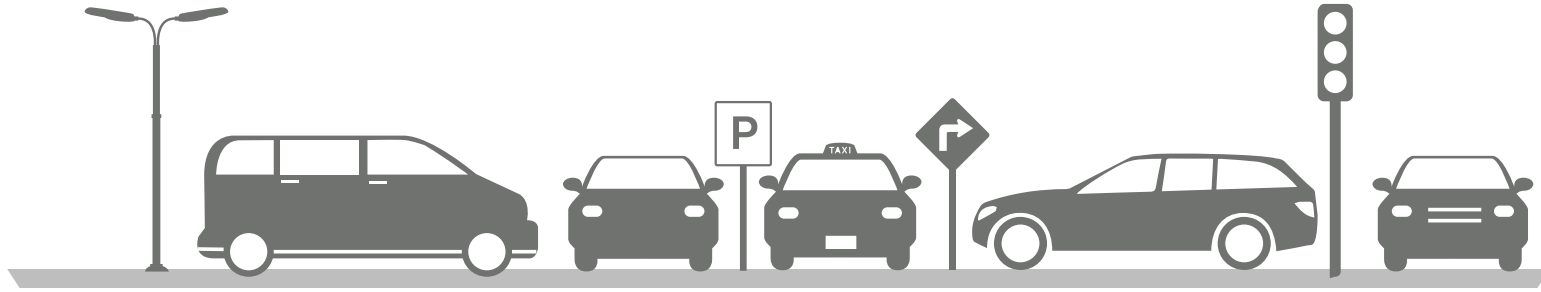
Global Expert Contributing Network

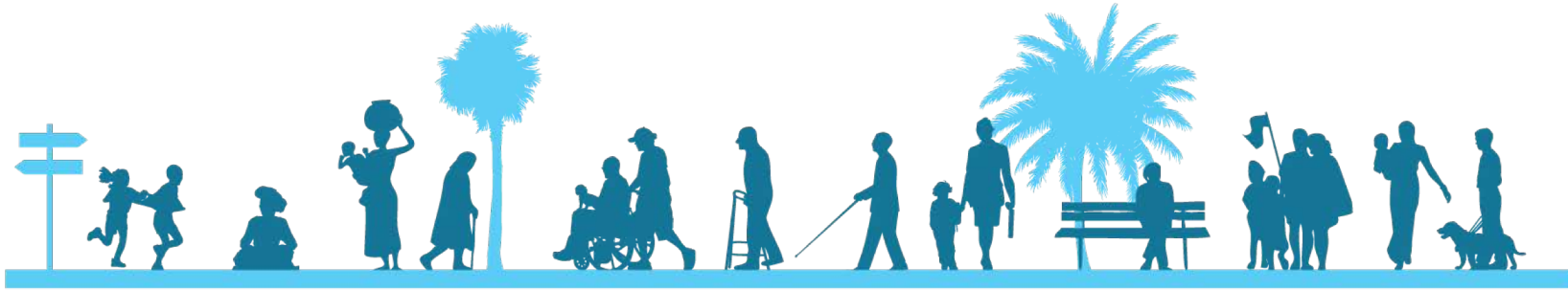


40+ countries

70+ cities

- Global Expert Network Member
- Bloomberg Cities for Global Road Safety Initiative





What is Possible?



People: Design for All Street Users



-  Pedestrians
-  Cyclists
-  Transit Riders
-  Motorists
-  Freight Operators and Service Providers
-  People Doing Business

**We do not have all the
answers...**

**We do not have all the
answers...**

**...but together we can
dialogue to formulate the
right questions 😊**

Motorcyclists are highly vulnerable



Motorcyclists



Car occupants

Motorcyclists are 38x more likely to be killed
than car drivers in London

Motorcyclists are a unique vulnerable road user



Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists



Pedestrians

User Protection

Low

Low

Low

Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists



Pedestrians

User Protection	Low	Low	Low
Max Speed		~20km/h	~6km/h
User Mass		Low	Low

Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists

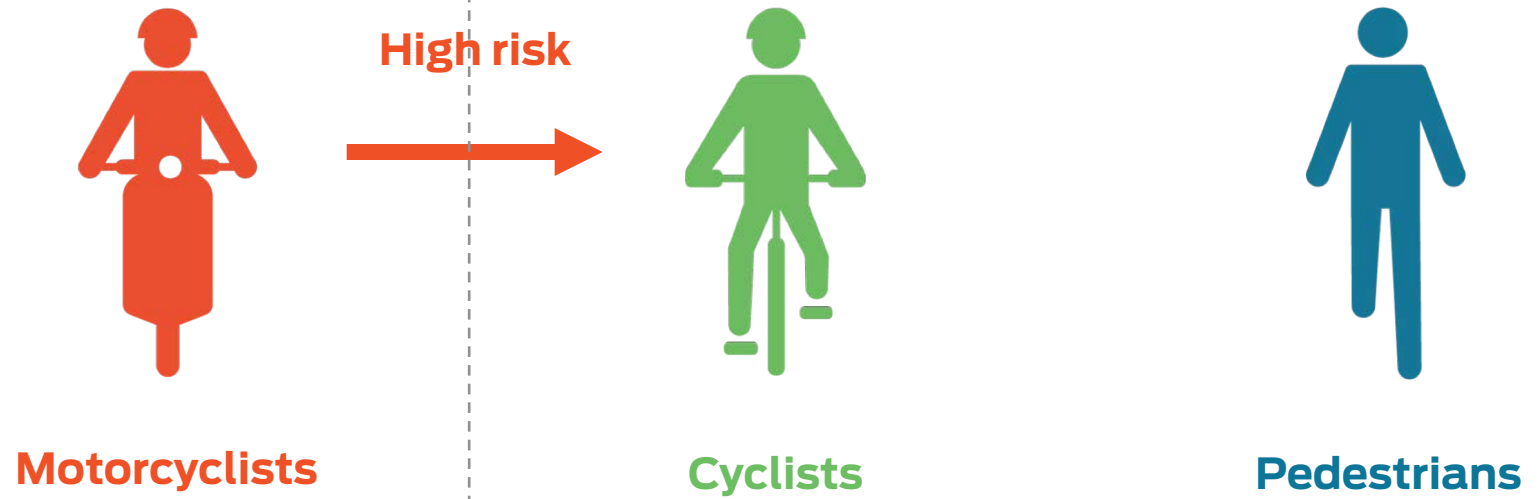


Pedestrians

Minimal risk
→
(low mass and speed differential)

User Protection	Low	Low	Low
Max Speed		~20km/h	~6km/h
User Mass		Low	Low

They also pose risks to other vulnerable users



User Protection	Low	Low	Low
Max Speed	~100km/h +	~20km/h	~6km/h
User Mass	Medium	Low	Low

They also pose risks to other vulnerable users



Motorcyclists

High risk



In Bogota, motorcycles are the **LEADING cause of death for pedestrians**
(cause 33% of ped deaths, 2020)



Pedestrians

Victim/Vehicle	Light vehicle	Motorcycle	Heavy vehicle	Passenger vehicle	Pedestrians	Bicycle	Single-vehicle crash	Missing vehicle	Total
Motorcyclist	25	8	37	33	4	3	43	0	153
Pedestrian	21	44	13	28	0	2	0	22	130
Cyclist	9	6	21	18	1	0	13	0	68
4-wheeler occu.	2	1	5	2	0	0	16	0	26
Total	57	59	76	81	5	5	72	22	377

Source: City of Bogotá / Vital Strategies

They also pose risks to other vulnerable users



Motorcyclists

Motorcycles caused or participated in 27% of all road traffic fatalities in the city, despite mode share of only 5.5%

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Source: City of Bogotá / Vital Strategies

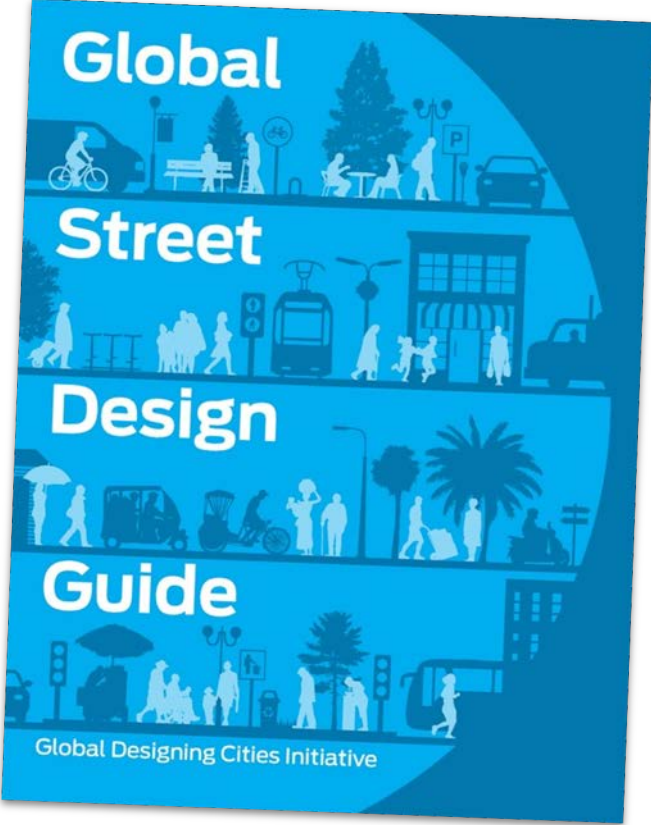
They also pose risks to other vulnerable users



Motorcyclists

At high speeds,
**motorcycling is
inherently unsafe
in urban areas**

What does the rapid growth and danger posed by motorcycles mean for the physical design of streets?



Is the implementation of Dedicated Motorcycle Facilities the right design response in cities?



Dedicated motorcycle lane



Advanced stop bar for motorcycles

(a)

Are motorcycling facilities proven to make our streets safer for all users?

(b)

How can we redesign streets to promote safe and sustainable mobility?

(c)

Focus on speeds to make streets safe for all users

(a)

Are motorcycling facilities proven to make our streets safer for all users?

In motorways, there are positive trends



In cities, there are mixed results



Precedent: pilot implementation of dedicated motorcycle lanes in São Paulo, Brazil

In cities, there are mixed results

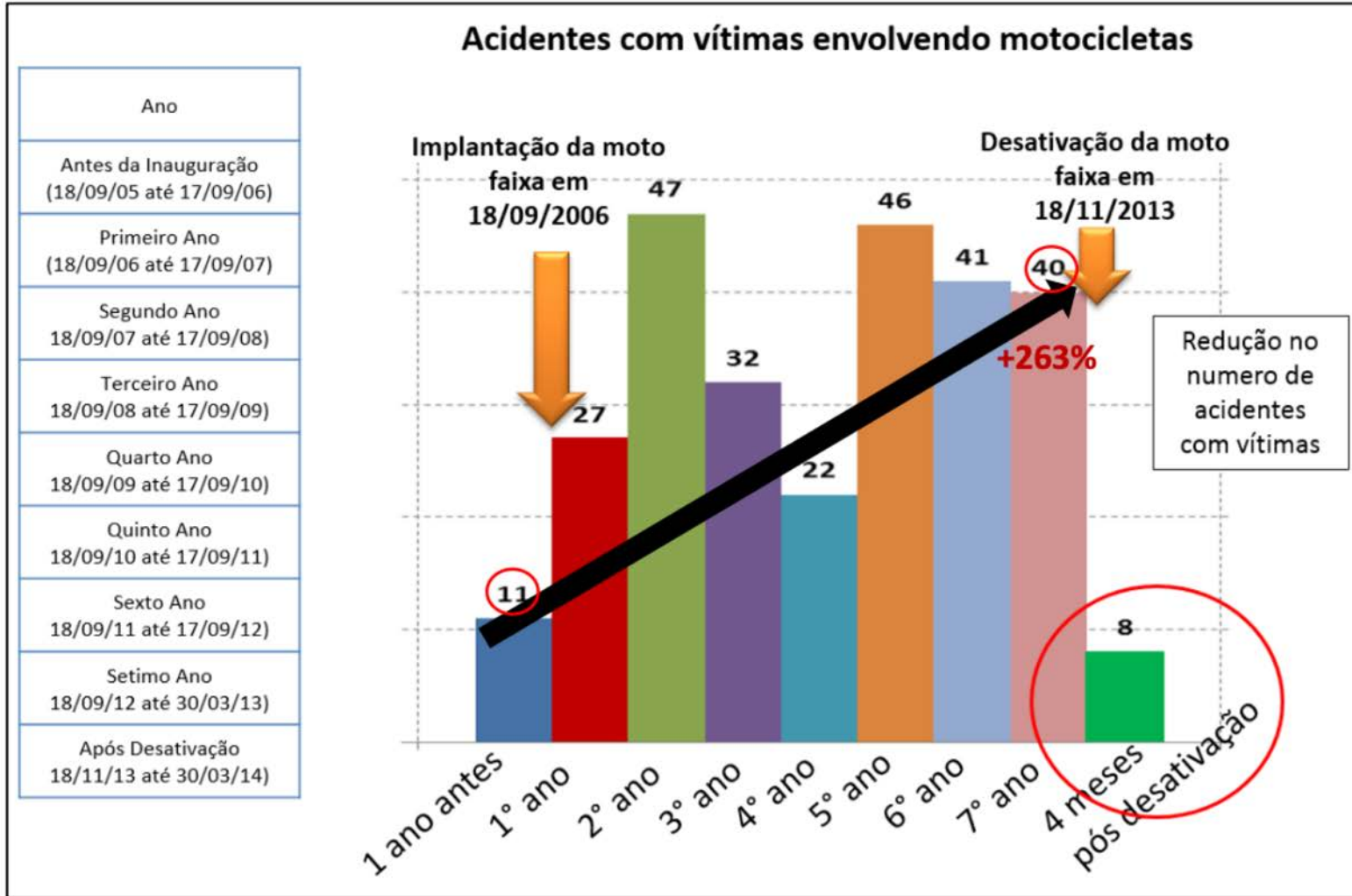


Gráfico 8 – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET

In cities, there are mixed results

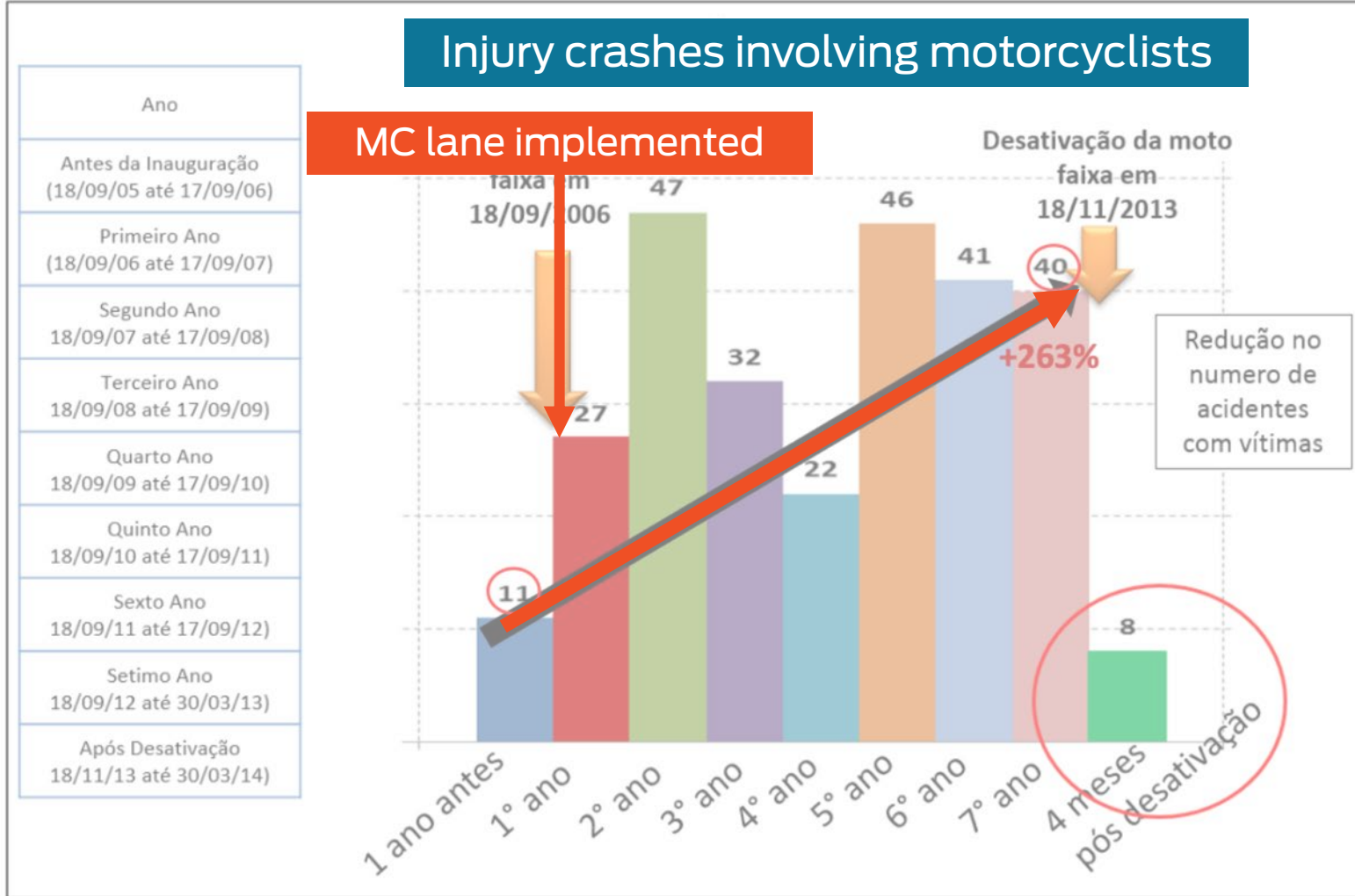


Gráfico 8 – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET

In cities, there are mixed results

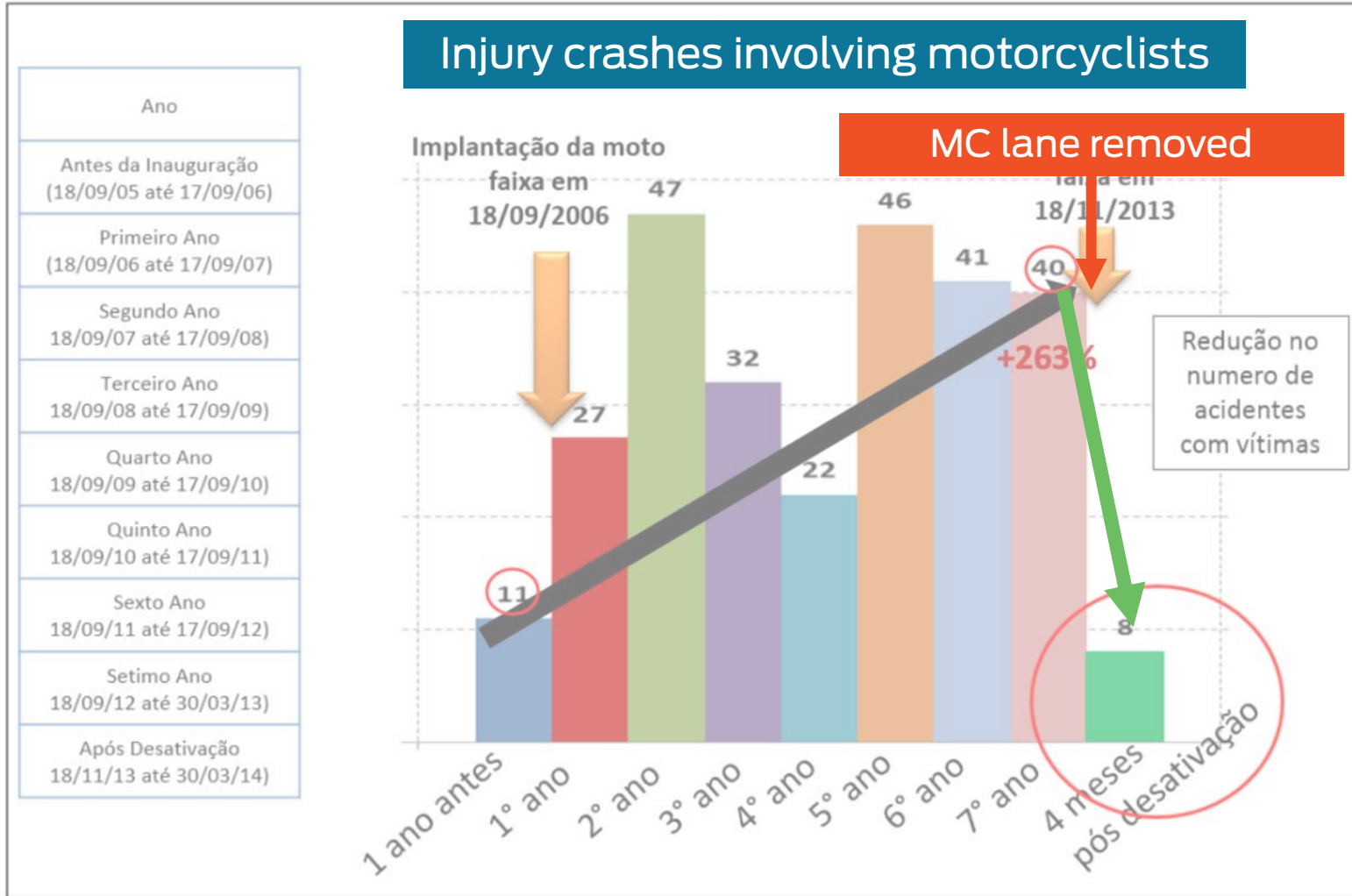
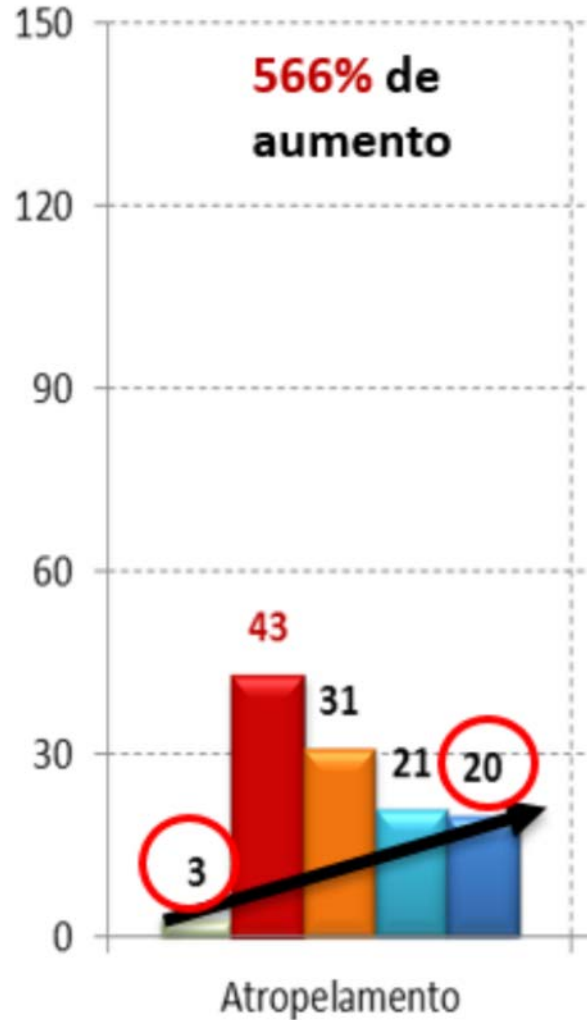


Gráfico 8 – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET

In cities, there are mixed results



On another corridor with the same typology, there was a **566% increase in motorcycle-pedestrian crashes**

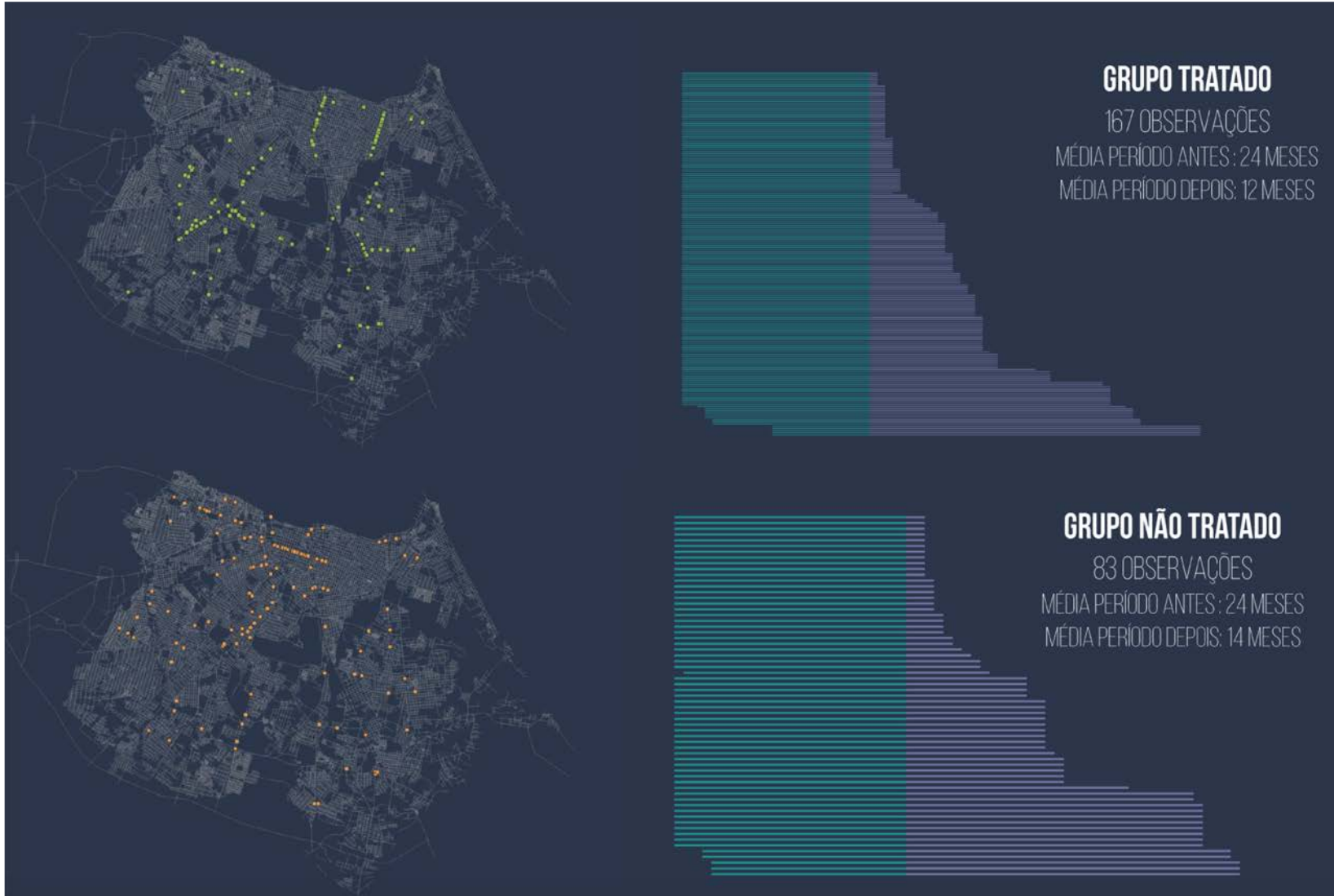
Gráfico 13 – Dados de acidentes Av. Liberdade/ Av. Vergueiro/ Av. Noé Azevedo “antes” x “depois” – SAT CET

Dedicated Motorcycle Facilities

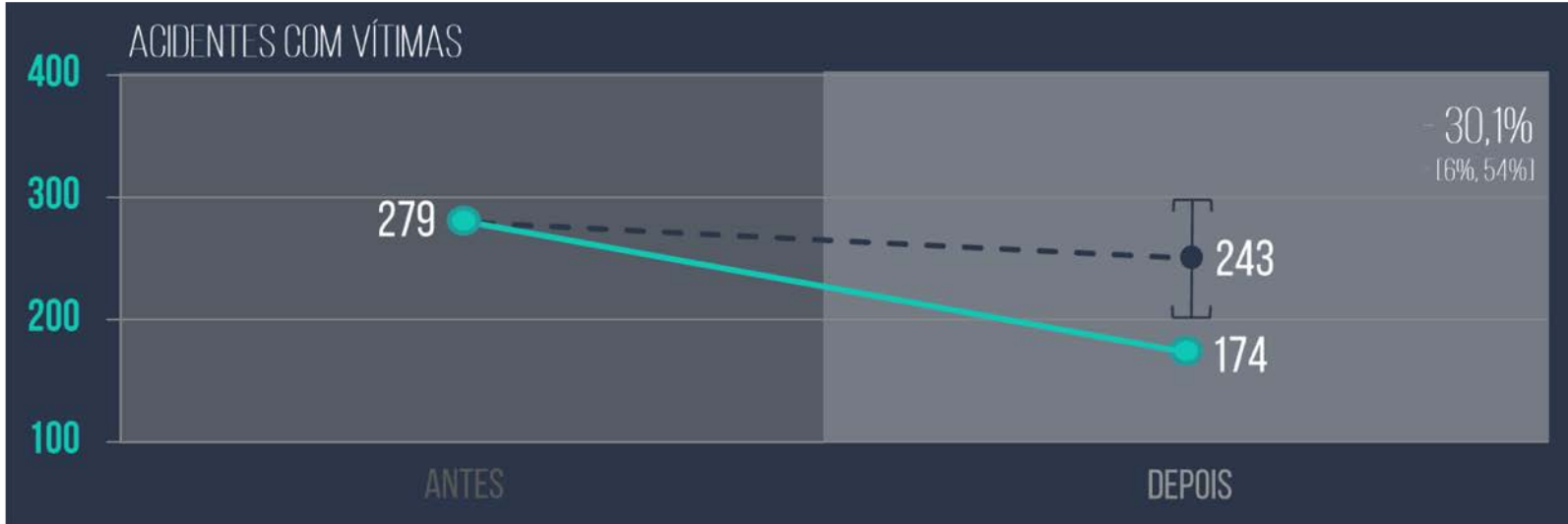
Advanced Stop Bars



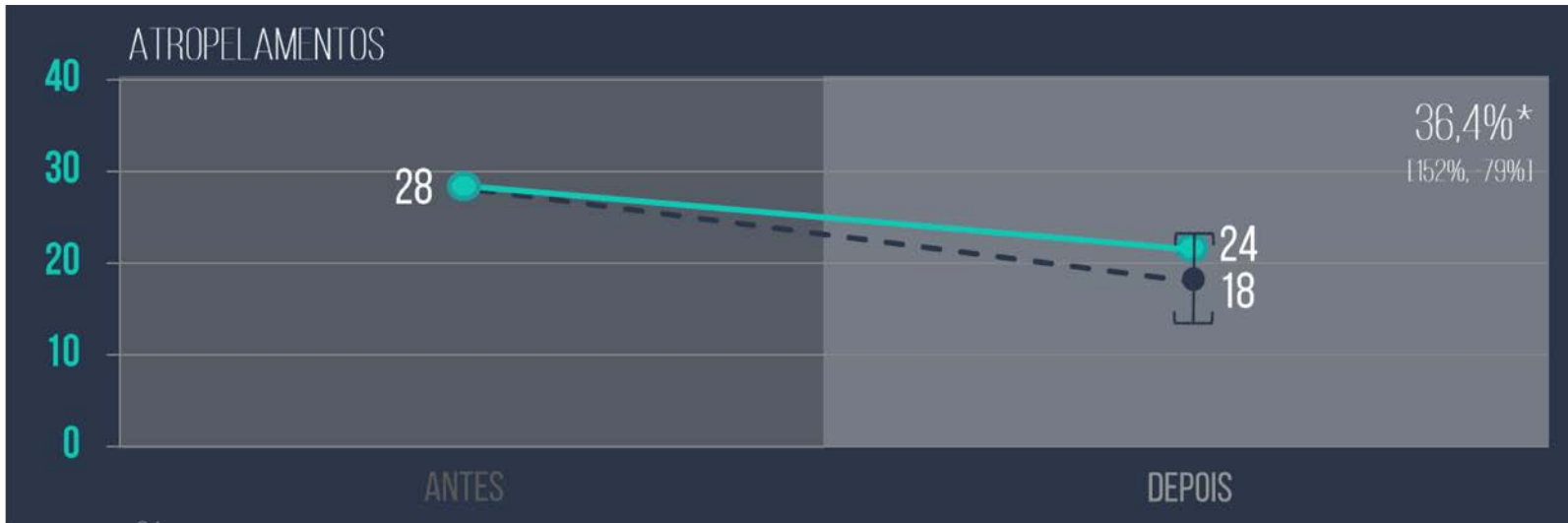
Advanced Stop Bars



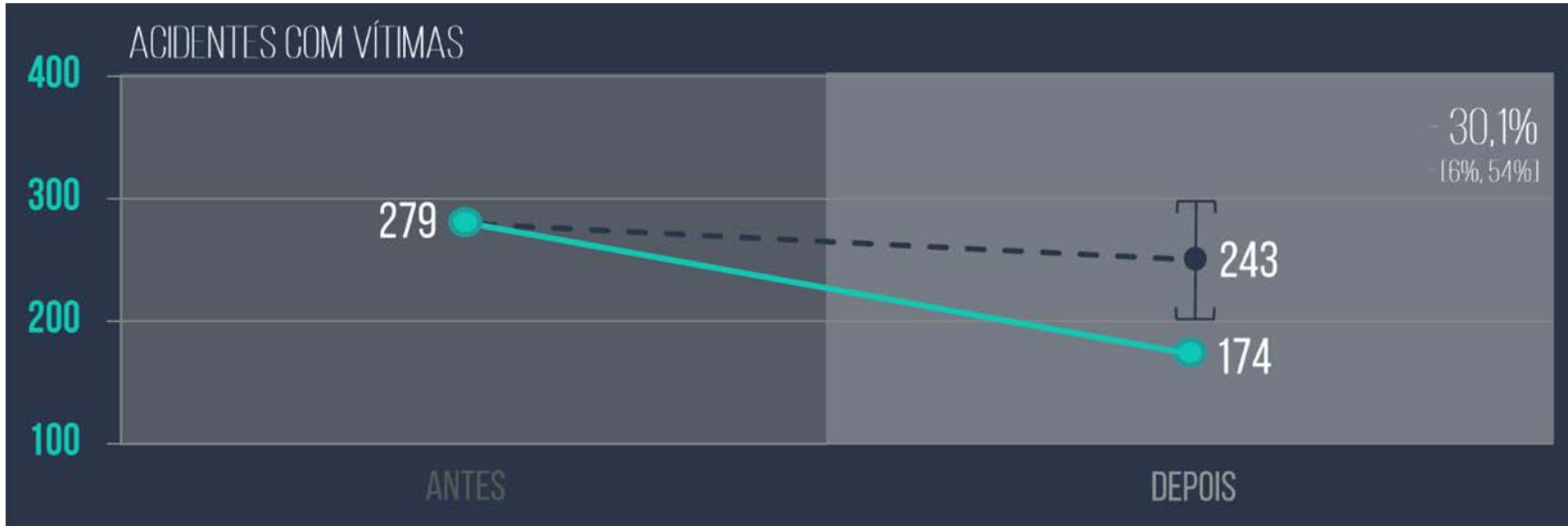
Advanced Stop Bars



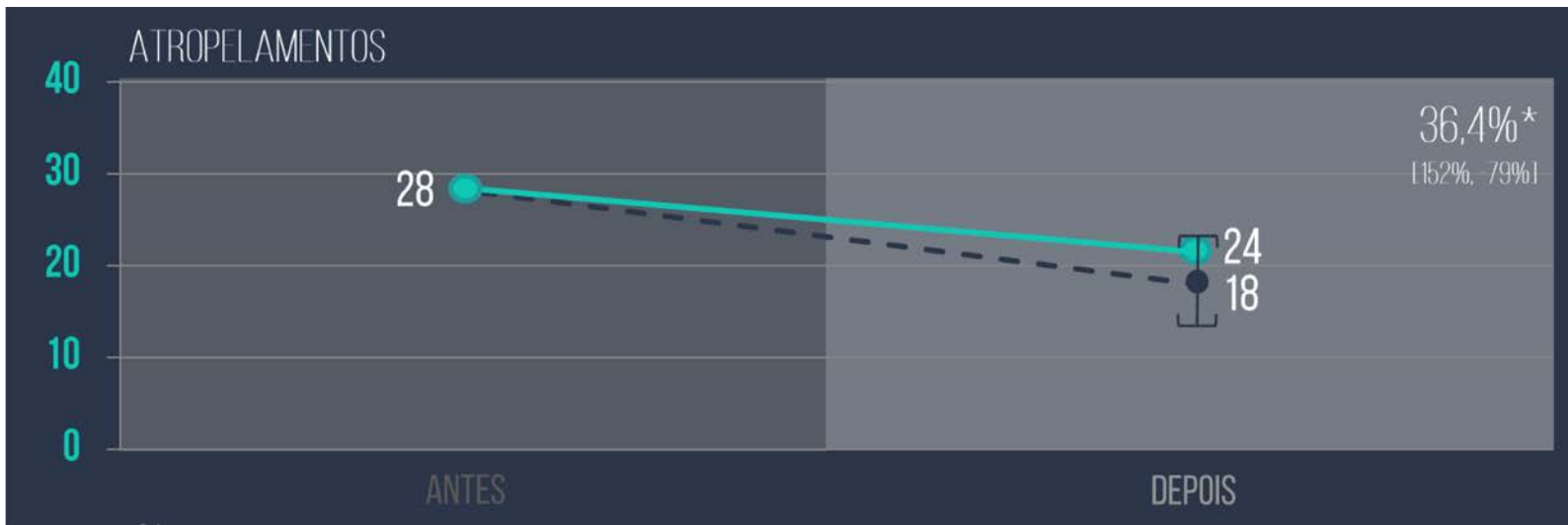
-30.1% injury crashes



Advanced Stop Bars



-30.1% injury crashes



+36.4% pedestrian crashes

Multiple contexts and typologies



To evaluate their impact we should understand:

- The context
- The typology
- Safety of all users
- Why does it work or doesn't?



Filtering traffic

Travel Lane Widths



Can wider lanes
make it safer for
MCs to filter
through traffic?

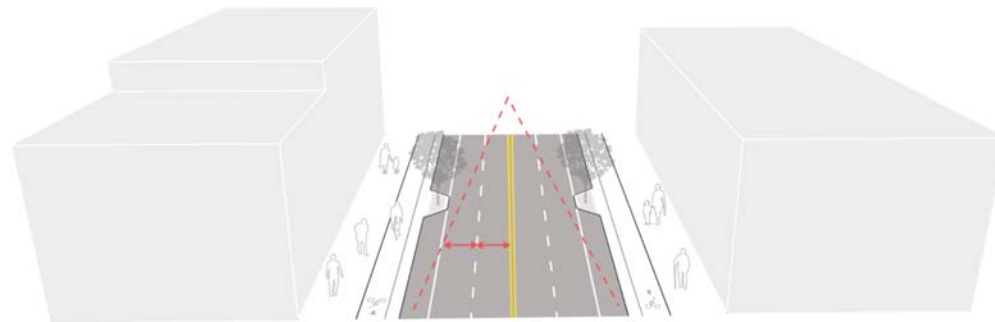
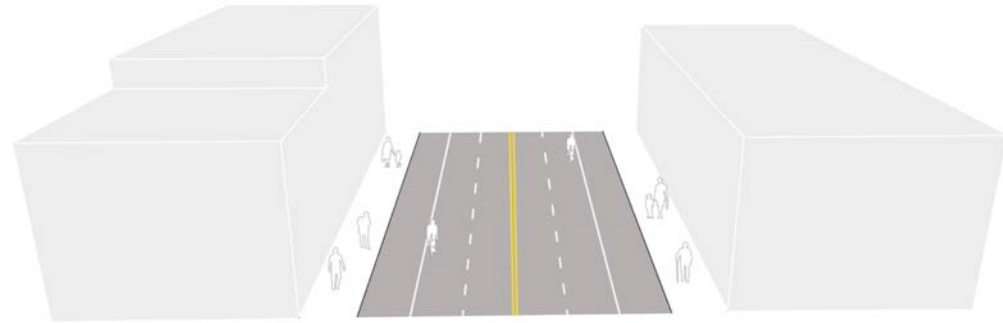
Travel Lane Widths



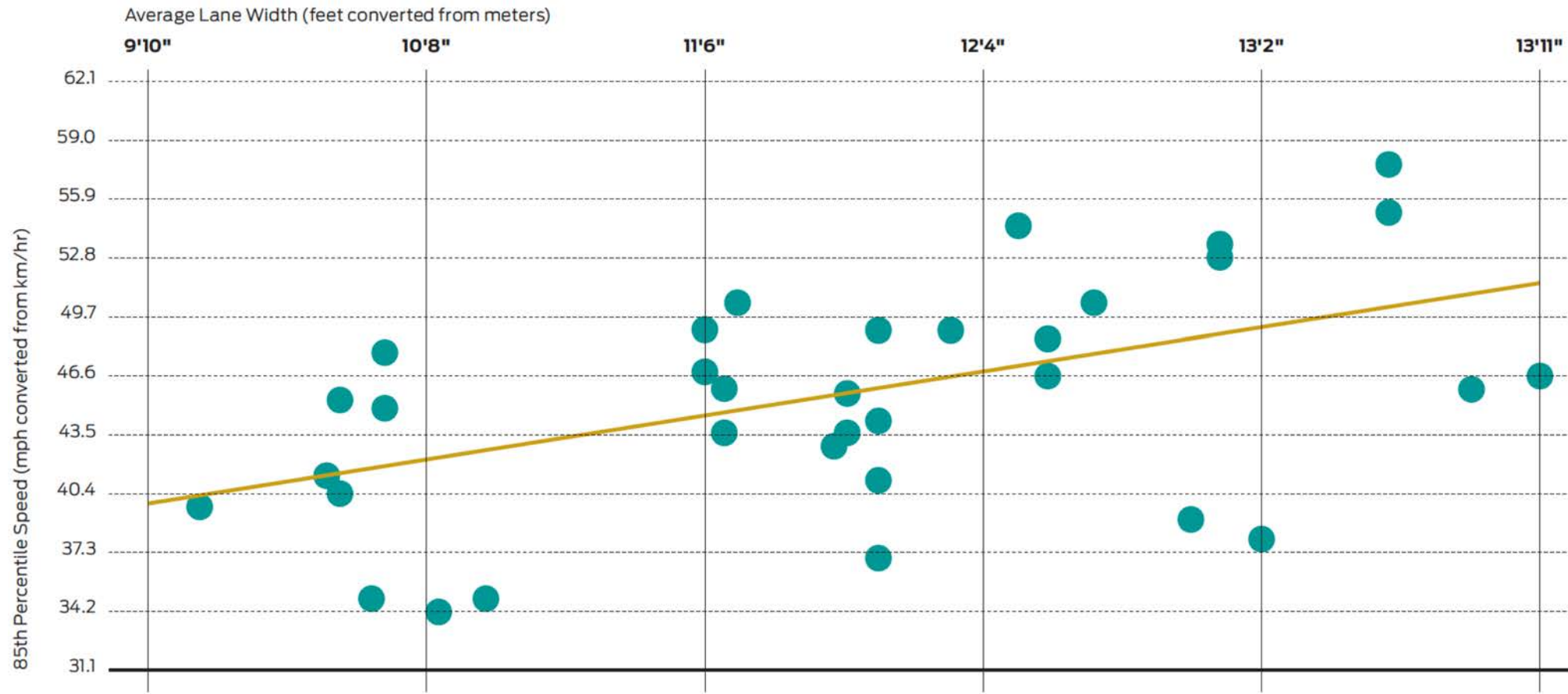
Can narrower travel lanes limit speeding opportunities?

Street Design Strategies

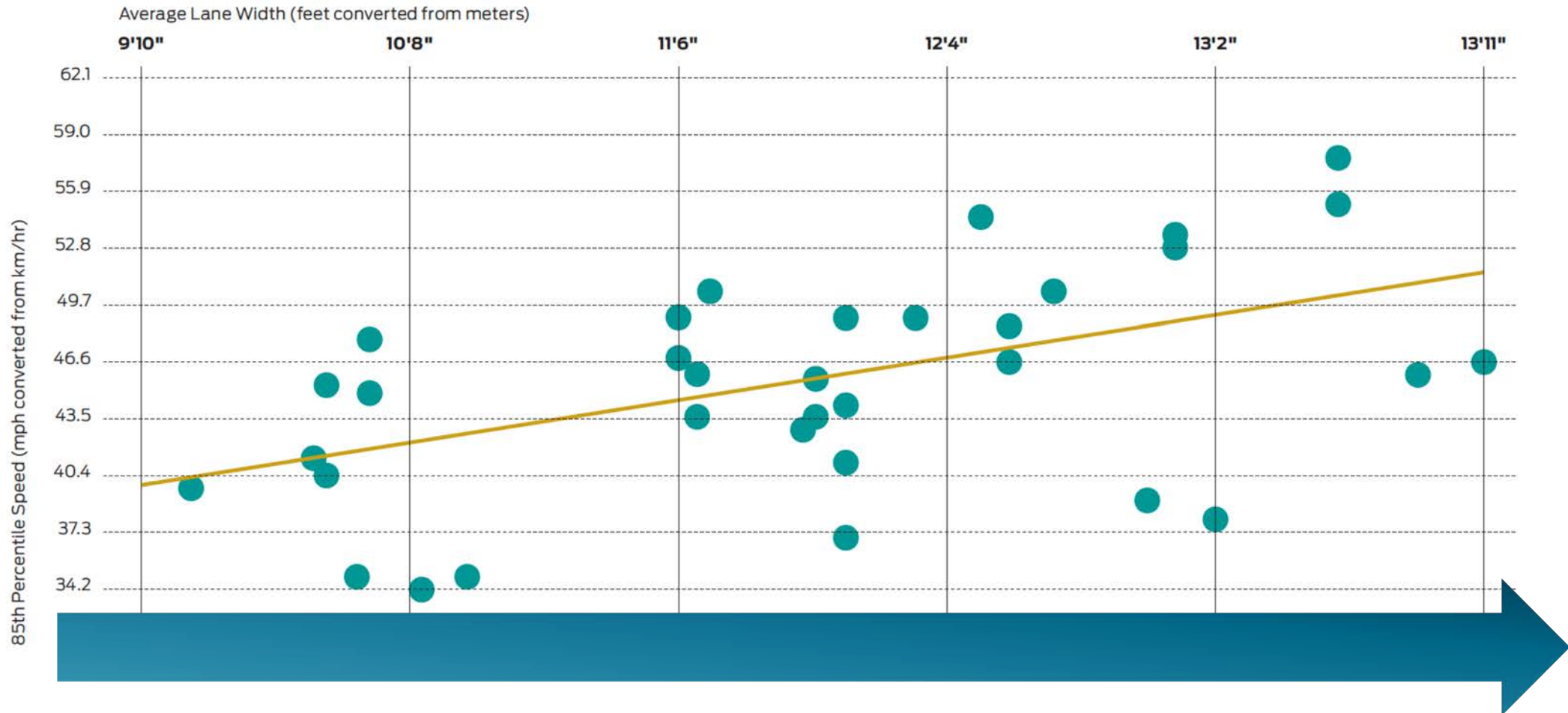
Narrow travel lanes



Wider travel lanes are correlated with higher vehicle speeds.

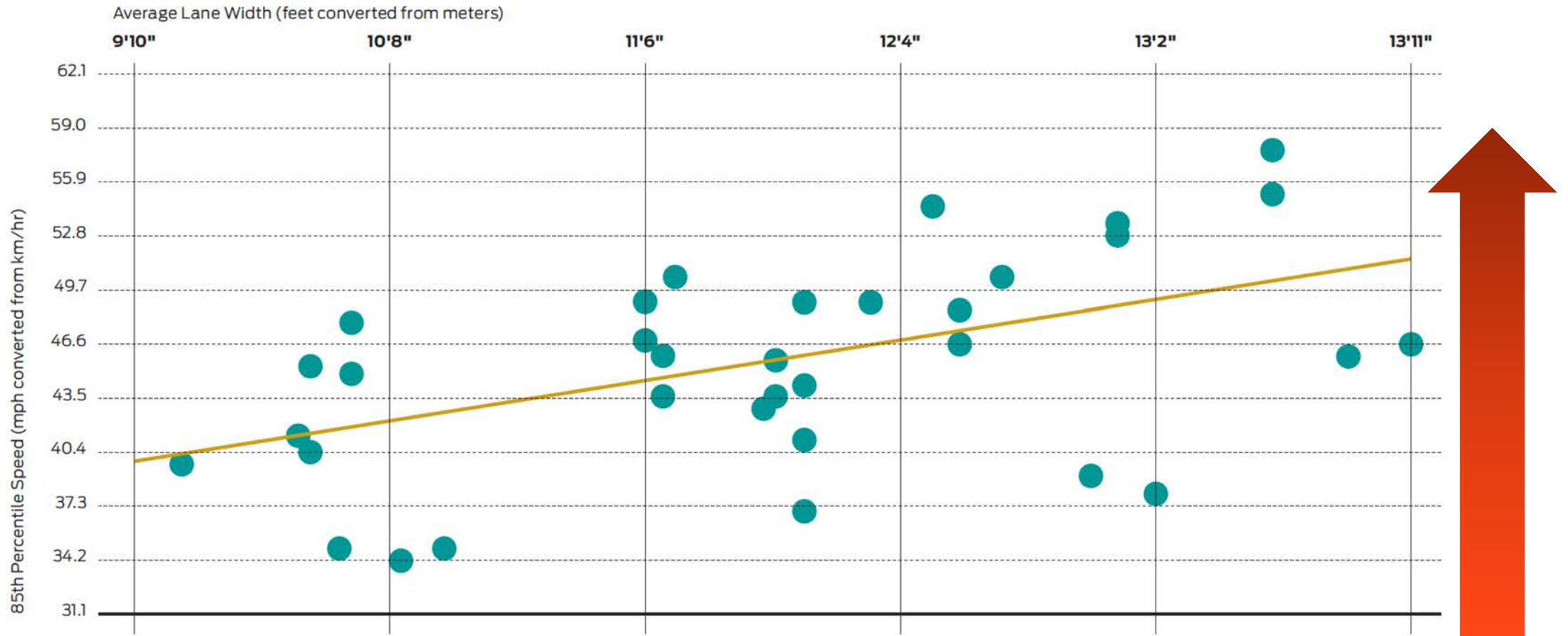


Wider travel lanes are correlated with higher vehicle speeds.



Wider lanes

Wider travel lanes are correlated with higher vehicle speeds.



Wider lanes = Higher Speeds

Research questions:

What is the impact of lane width on motorcyclists speeds and safety?

How does it impact safety **for all street users?**

(b)

The street space is finite.

What should we prioritize to promote safe and sustainable mobility?

Promote a shift to sustainable modes

Reallocate street space



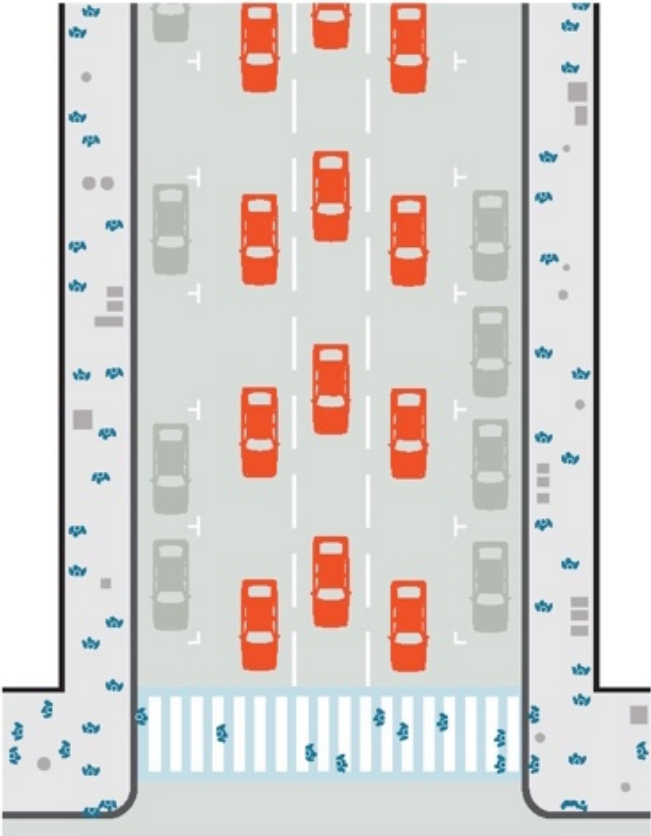
Promote a shift to sustainable modes

To make safe alternatives convenient and attractive



Multimodal streets are more efficient

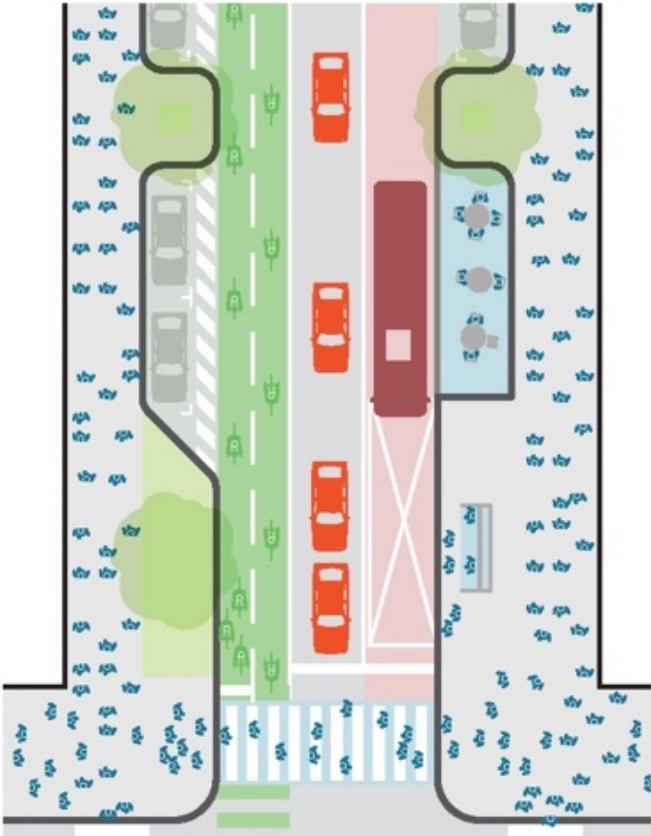
Car-Oriented Street



Total capacity:

12,300
people/ h

Multimodal Street



Total capacity:

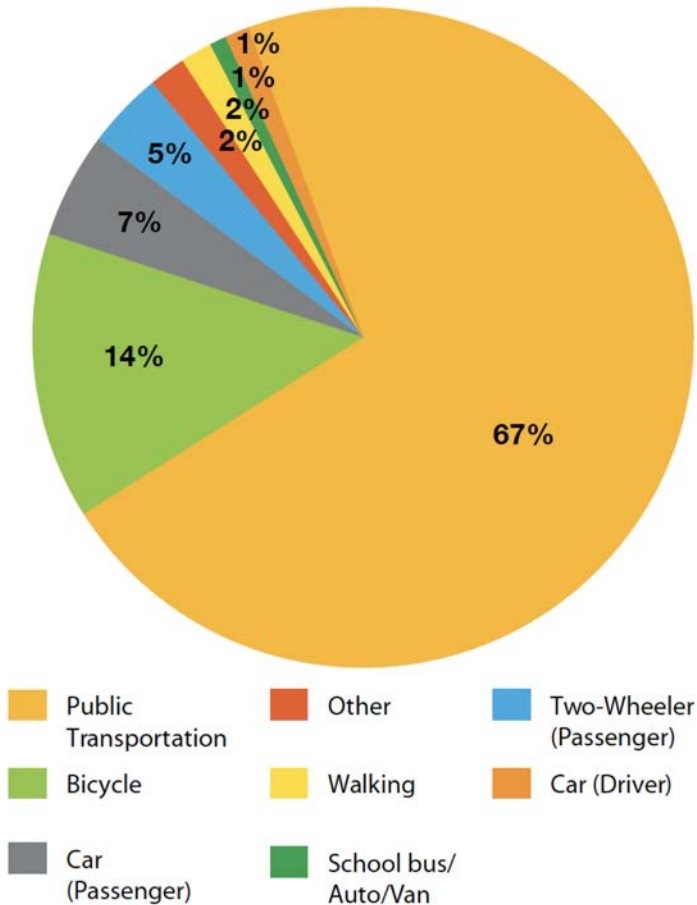
30,100
people/ h

x 2.4
people

How can we reverse the trend of transit riders shifting to motorcycles?

Prevent a shift from sustainable modes...

Figure 9. Transport Modes Used Prior to Two-wheelers by Pune Survey Respondents



Motorcyclists in Pune, India:

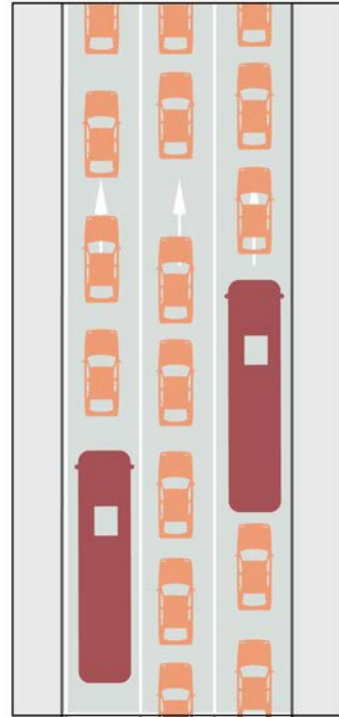
67% of formerly used public transit
14% formerly used bicycle

Source: Pune survey, 2012

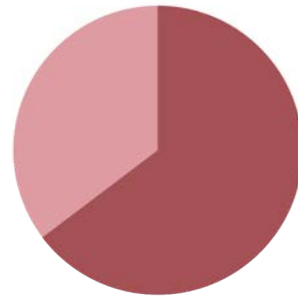
Source: Embarq India, 2014

Save travel time with dedicated transit facilities

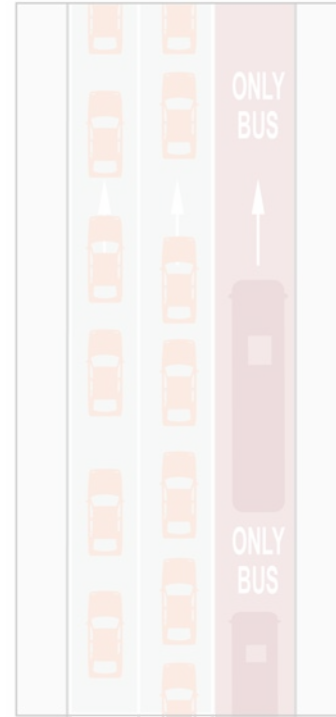
Transit stuck in congestion



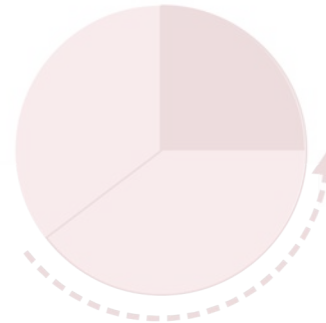
**1000-2800
people/ hour**



Transit given dedicated space

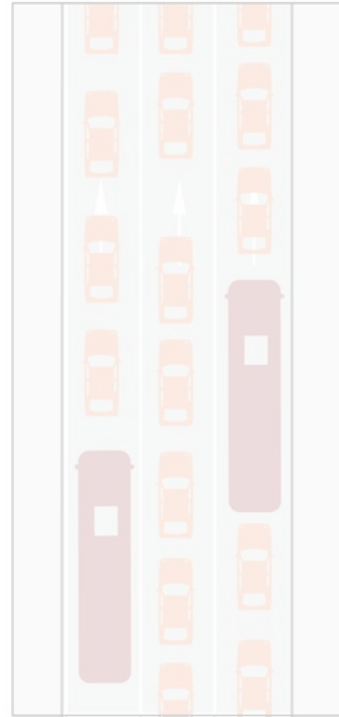


**4000-8000
people/ hour**

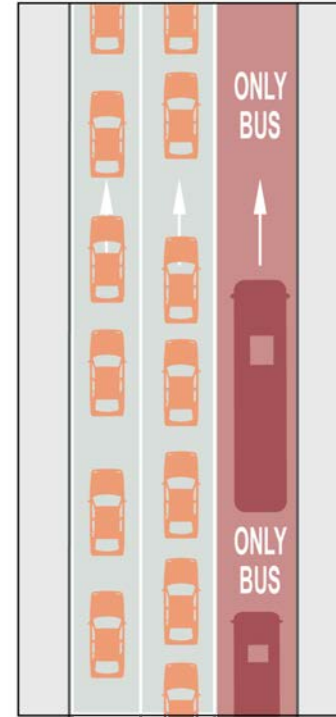
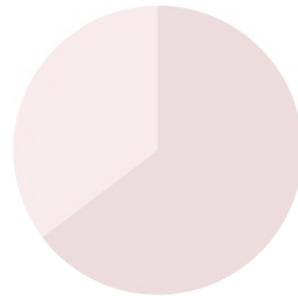


Save travel time with dedicated transit facilities

Transit stuck in congestion



1000-2800 people/ hour



Transit given dedicated space

4000-8000 people/ hour



Roll out the red carpet

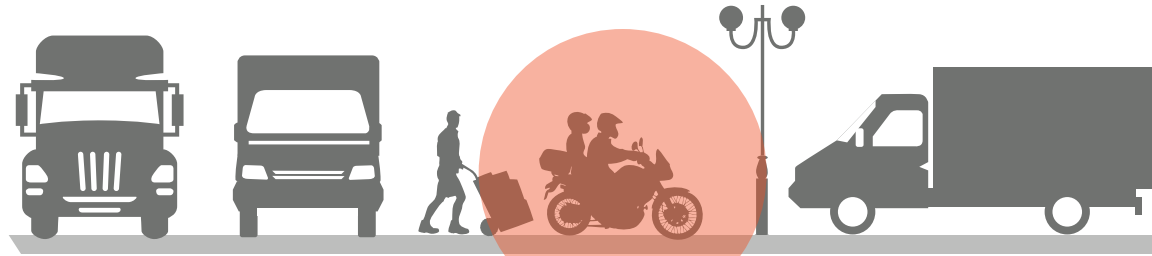
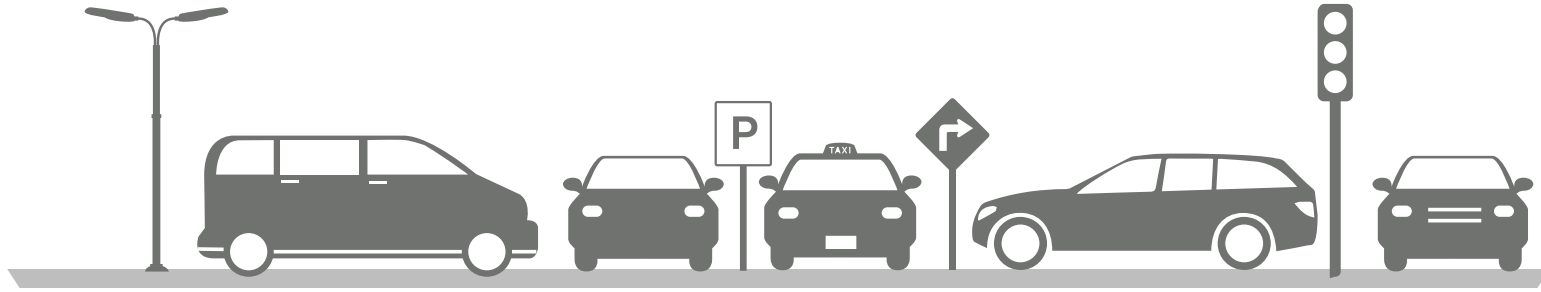


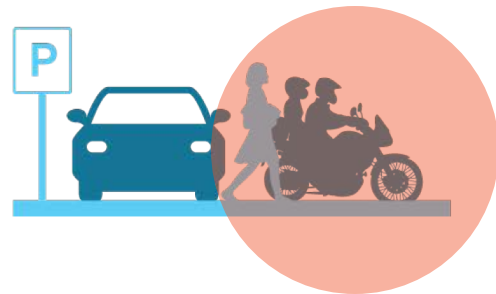
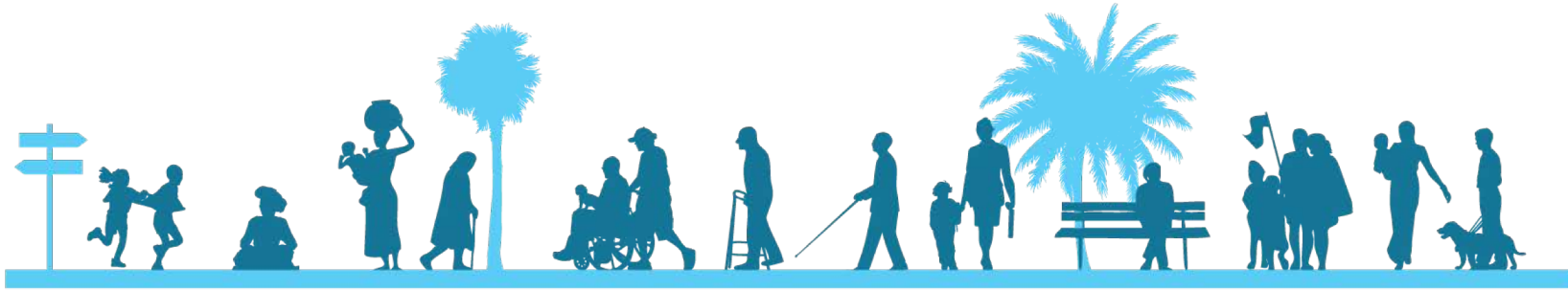
Different types of transit facilities



Nantes, France

Why should we not treat cycle and motorcycle facilities equally?

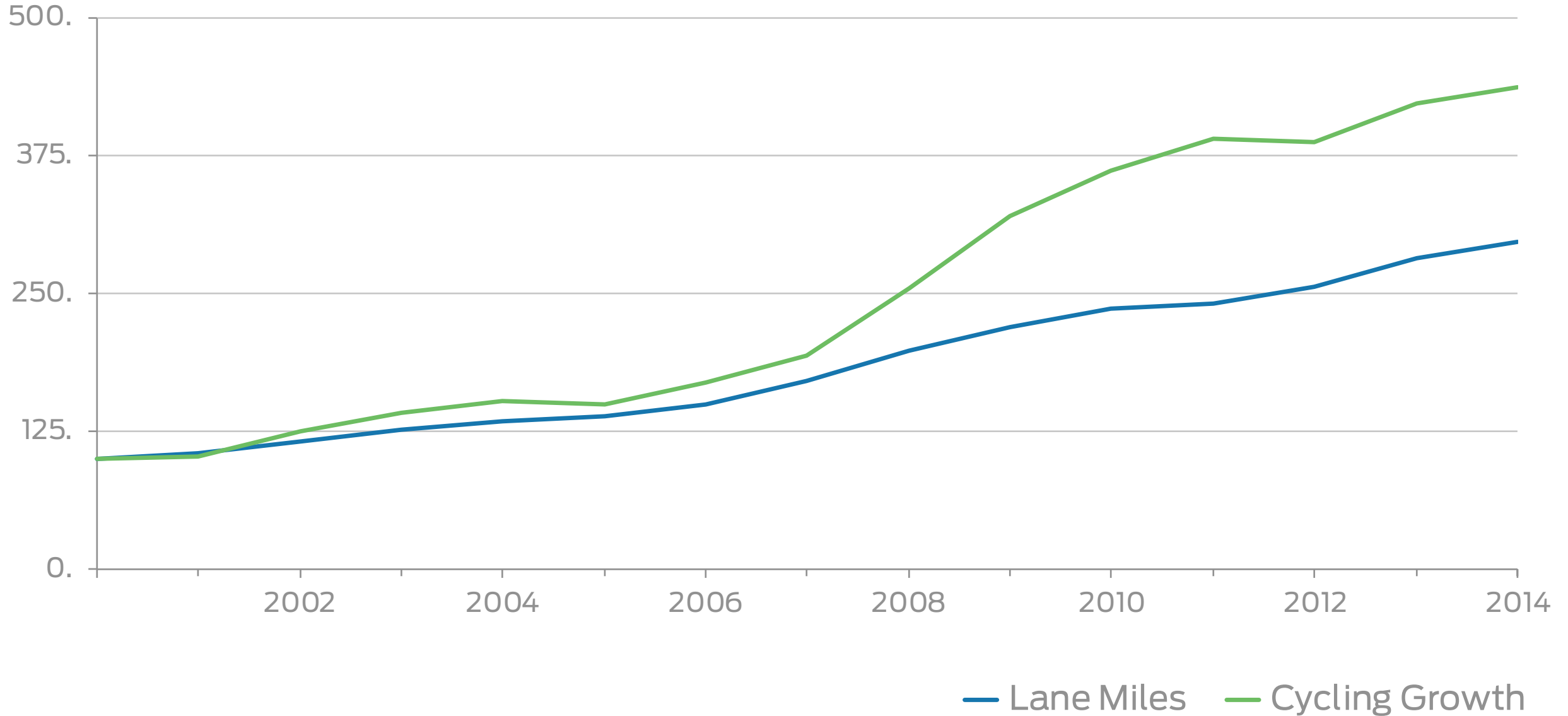




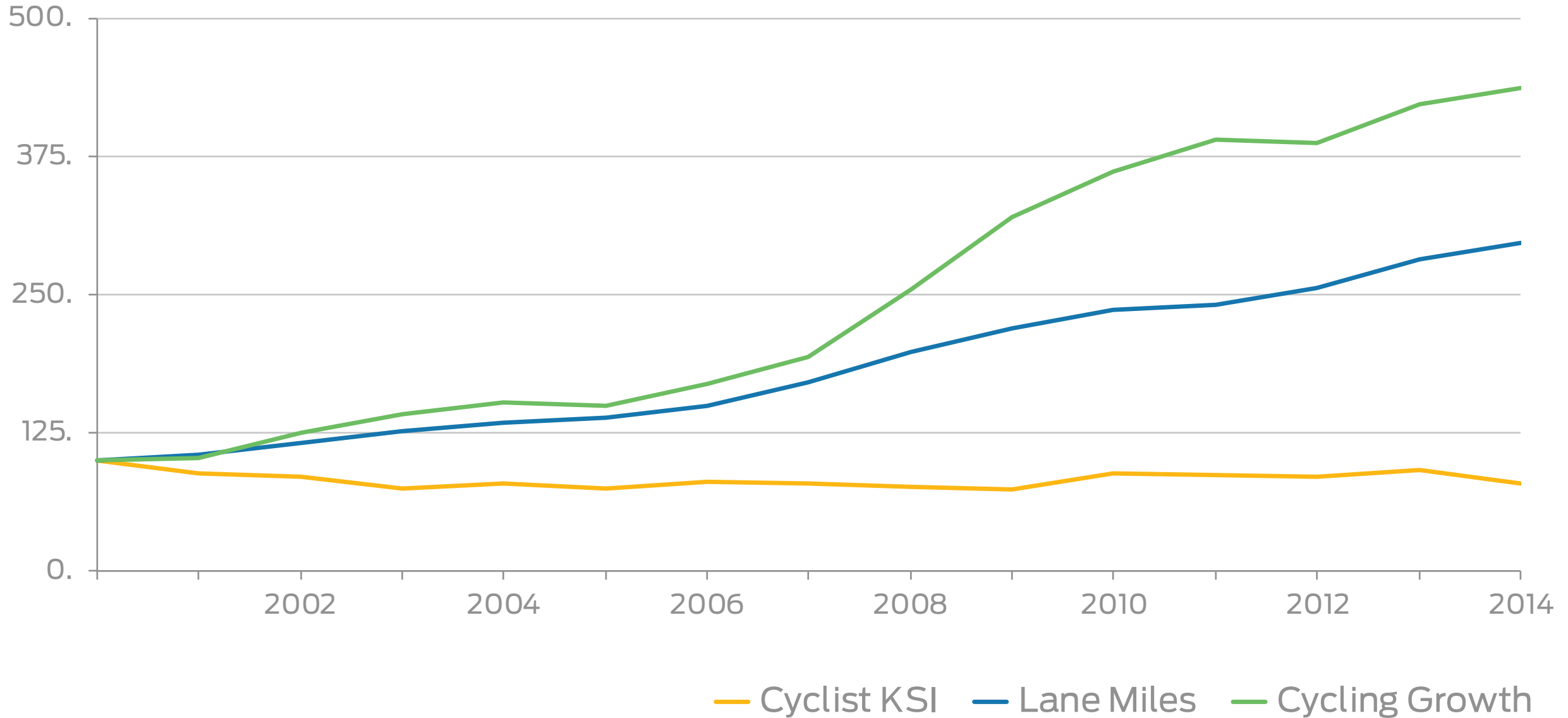
Designing for all ages and abilities



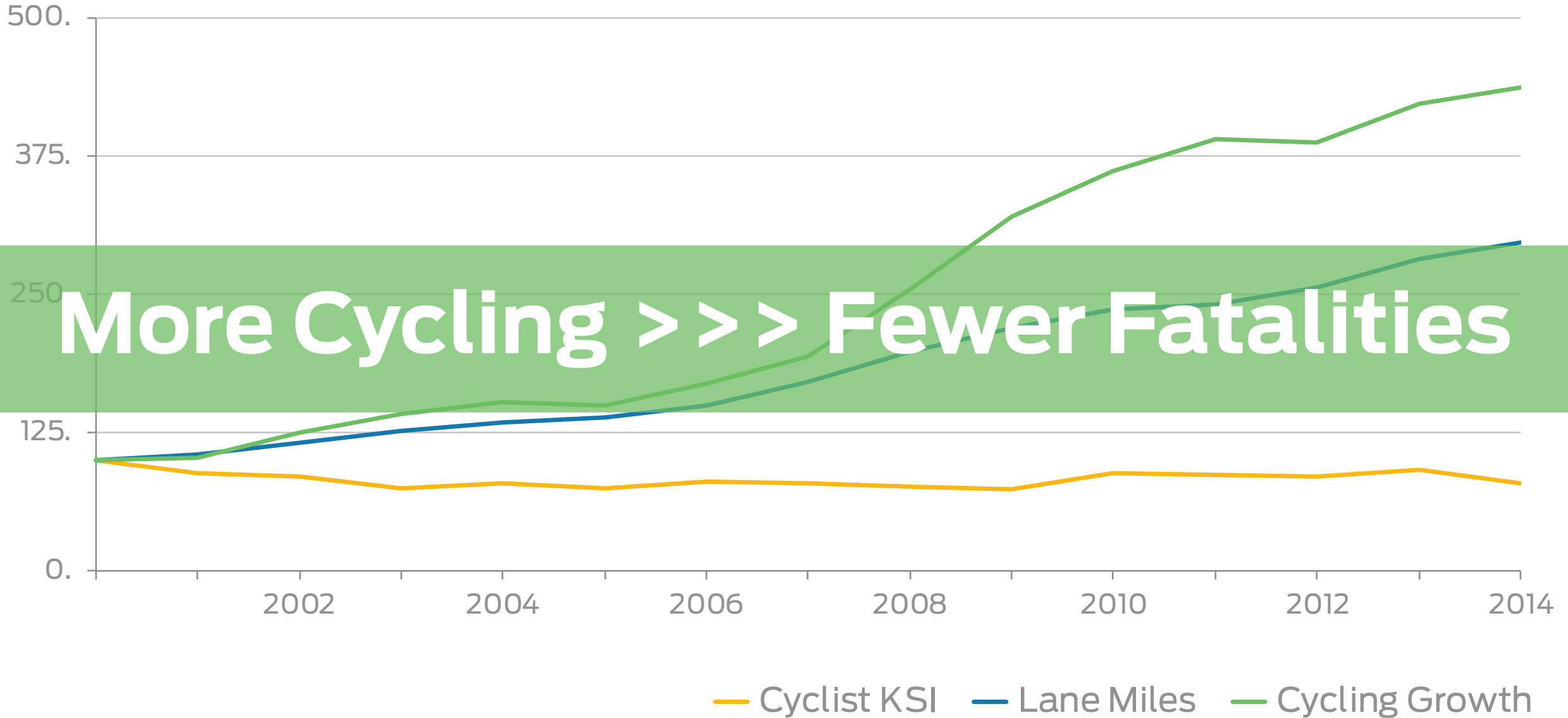
More Lanes = More Cyclists



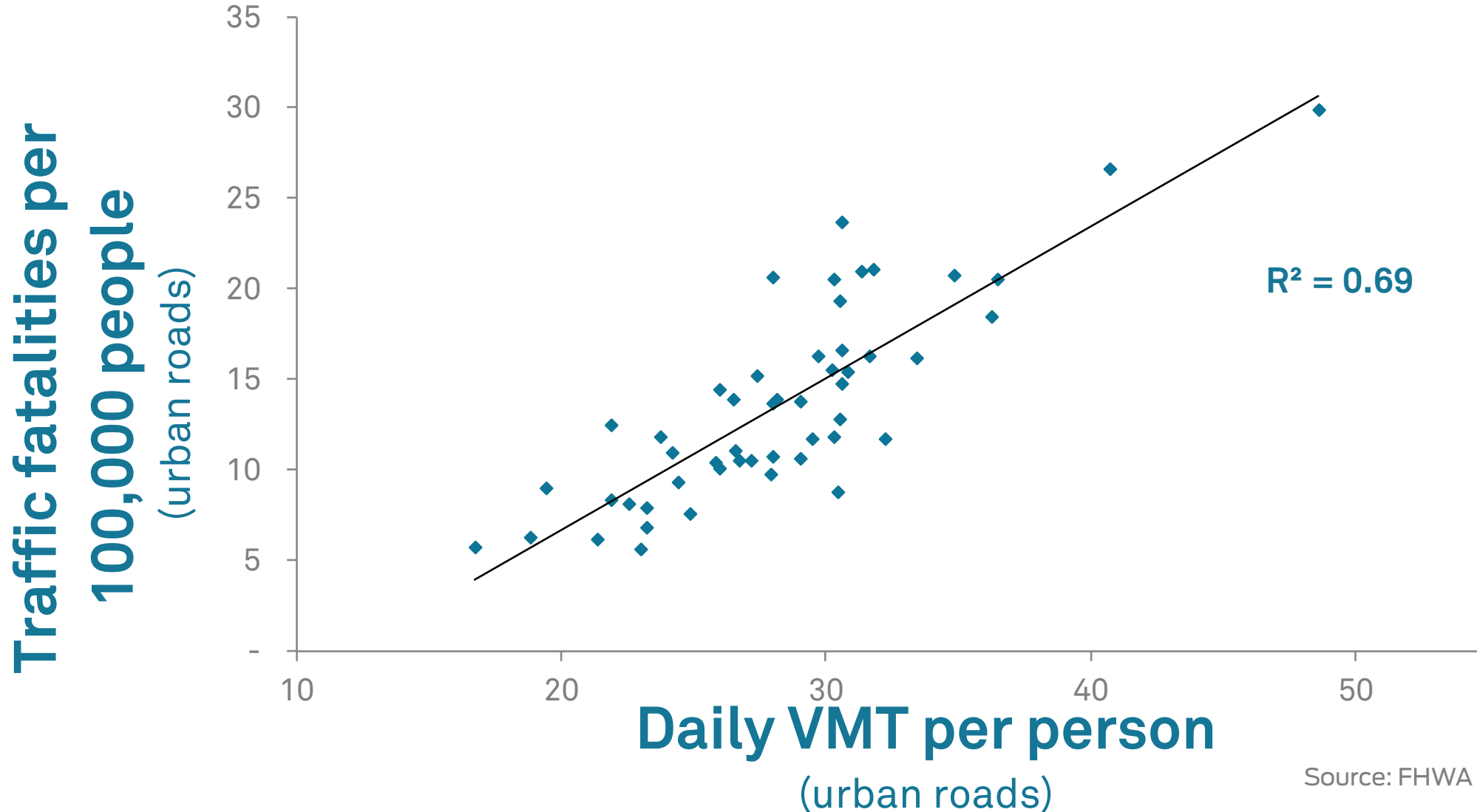
More Lanes + More Cyclists = Reduced Risk (For All Users)



More Lanes + More Cyclists = Reduced Risk (For All Users)



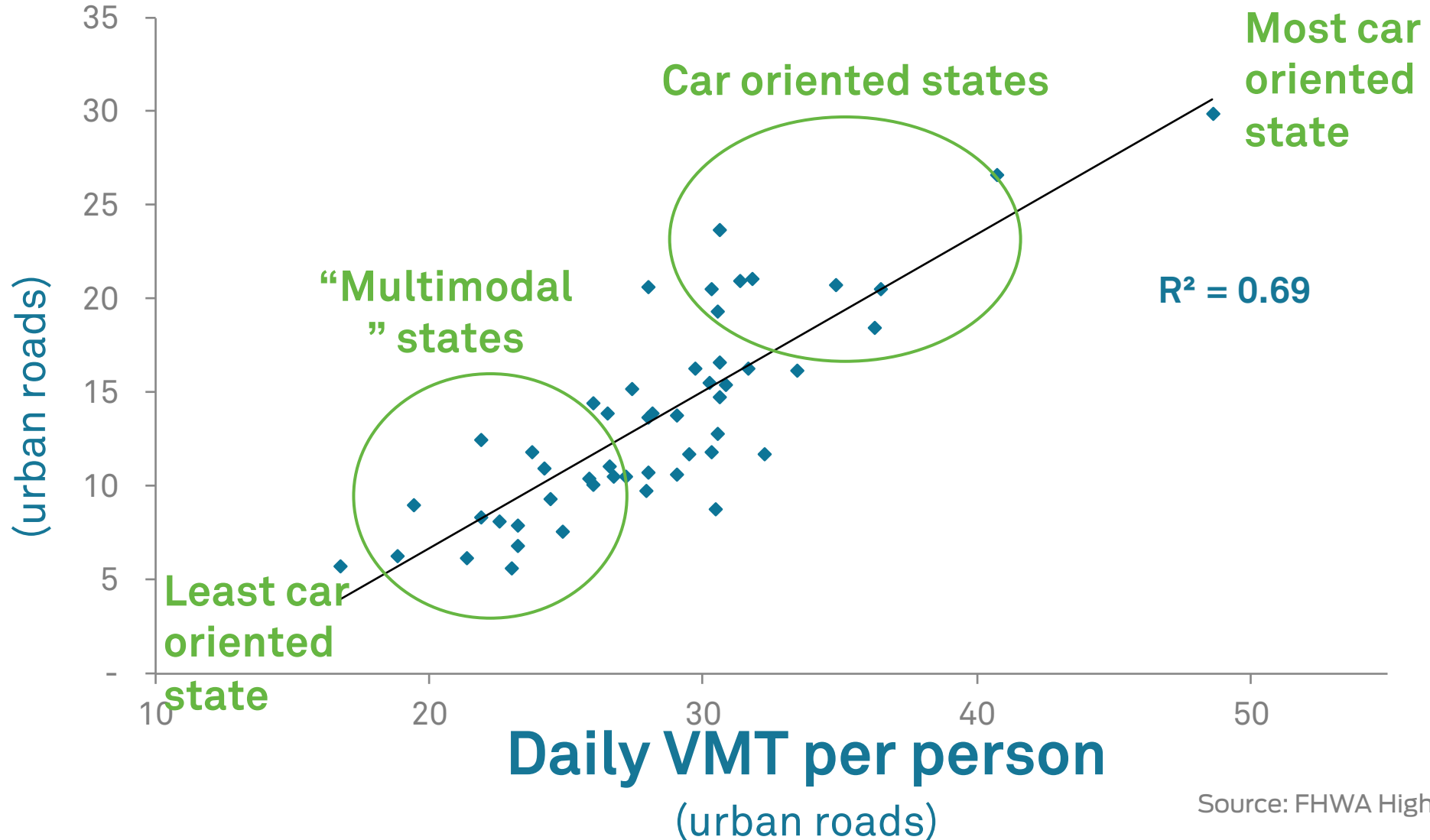
More Personal Driving is Associated with More Traffic Fatalities



Source: FHWA Highway Statistics, 2008

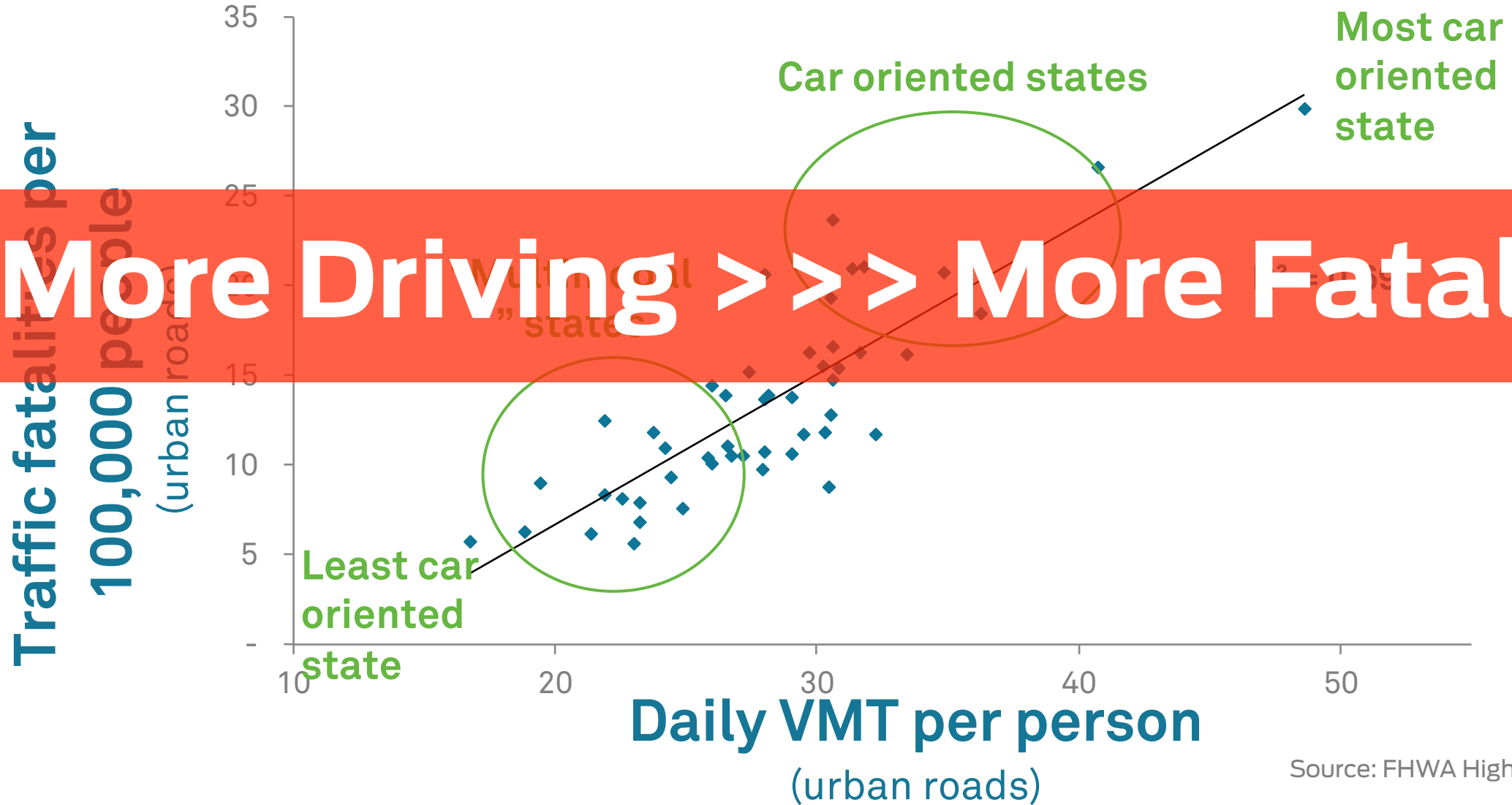
More Personal Driving is Associated with More Traffic Fatalities

Traffic fatalities per 100,000 people



More Personal Driving is Associated with More Traffic Fatalities

More Driving >>> More Fatalities



Research question:

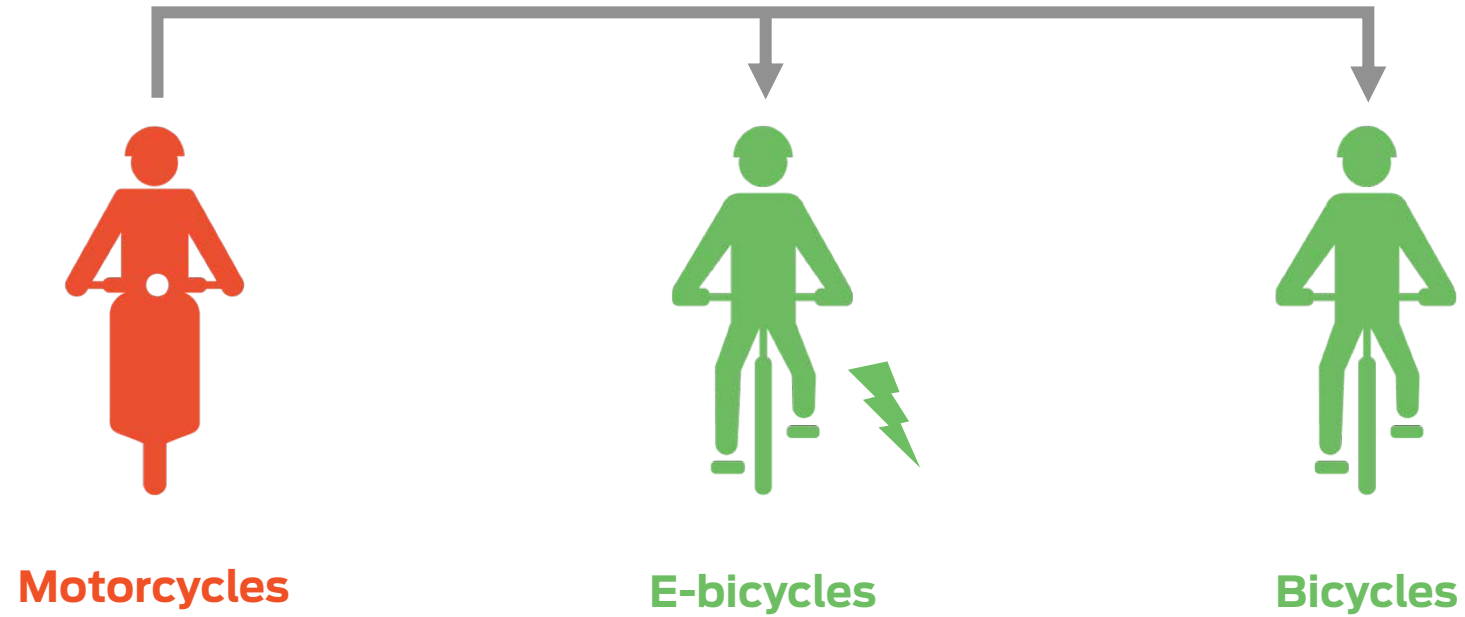
**Does dedicated infrastructure
induce demand for motorcycling?**

Research question:

**Are higher percentages of
motorcycle use/higher VKT also
correlated with higher fatality rates?**

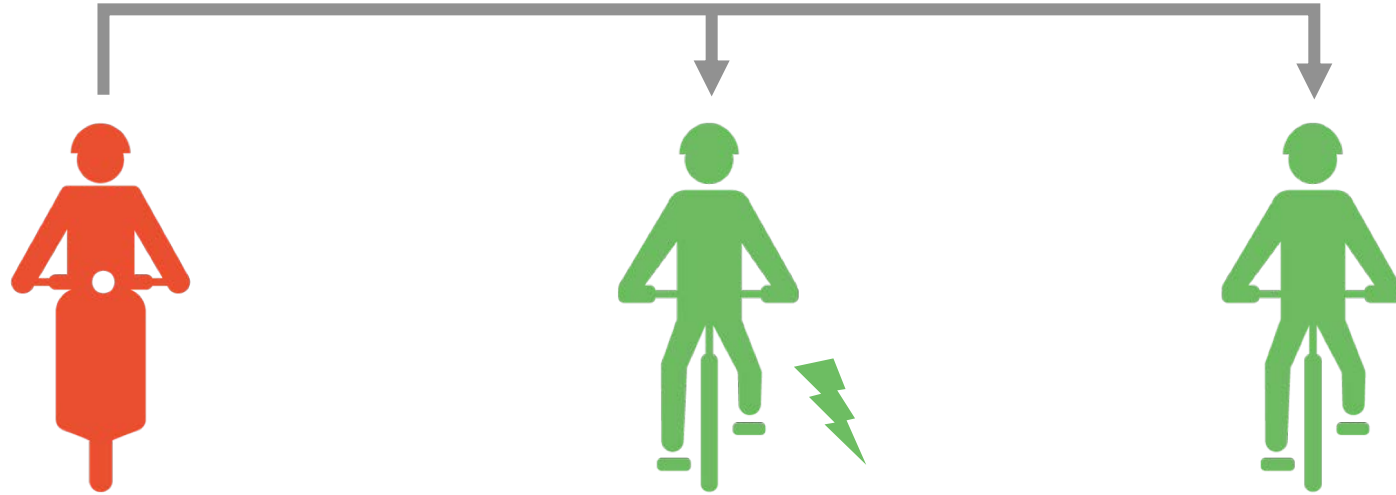
**How can we capture the
benefits of motorcycles but
avoid the negative impacts?**

Can governments support a shift towards bikes and e-bikes?



Max Speed	~100km/h +	~25km/h ?	~20km/h
User Mass	Medium	Low ?	Low

Can governments support a shift towards bikes and e-bikes?



Motorcycles

E-bicycles

Bicycles

Max Speed	~100km/h +	~25km/h ?	~20km/h
User Mass	Medium	Low ?	Low

Needs careful definition and regulation

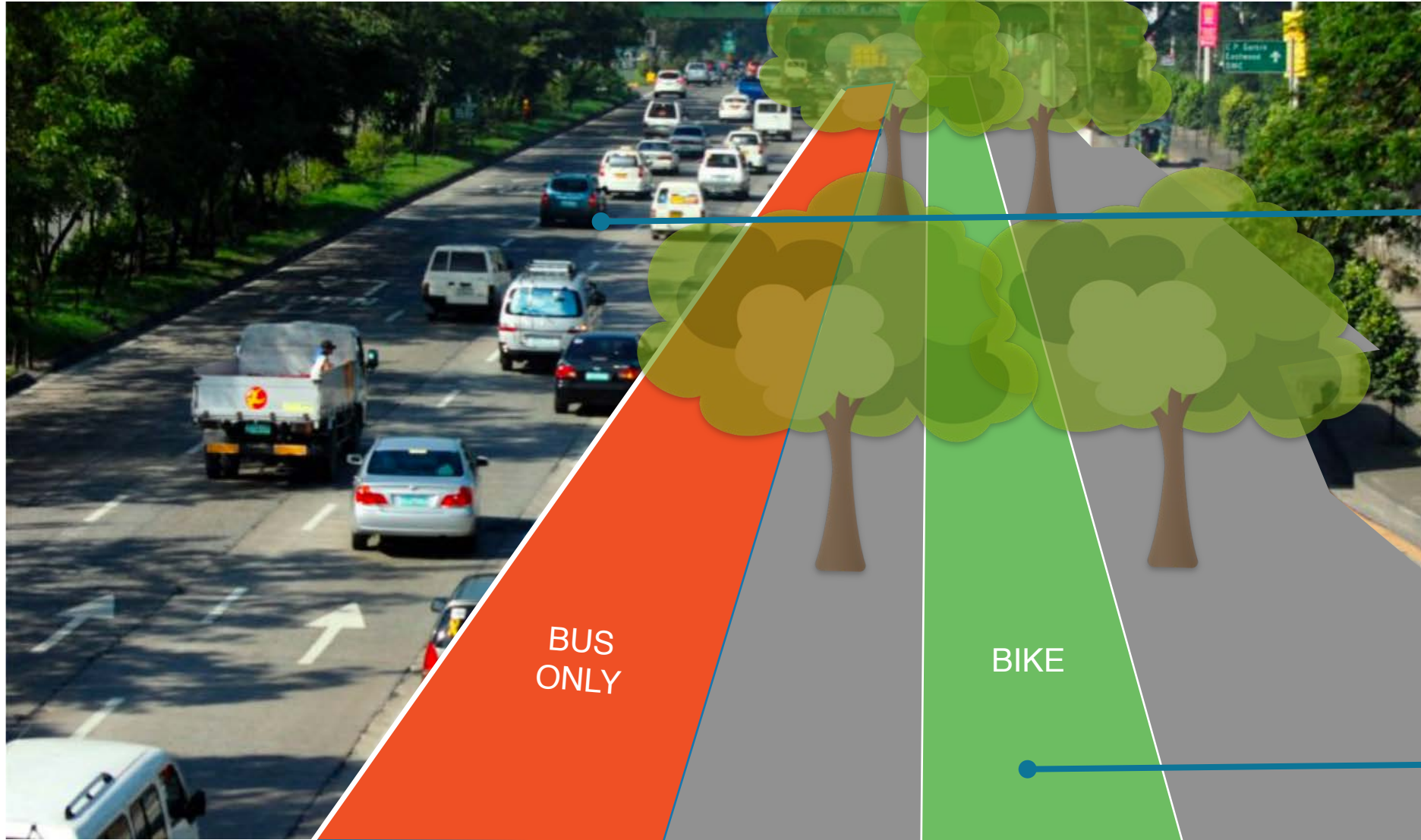
What will they look like?



Can infrastructure design catalyze such shift?



Can infrastructure design catalyze such shift?



Motorcyclists in mixed traffic + Speed limit reduction + Roadbed width reduction

Cycles and E-Cycles

(c)

Act now - Focus on speeds to make streets safe for all users

We know that
Speed kills!



And that lowering it
saves lives!

30

First 10 corridors – 2018/2019

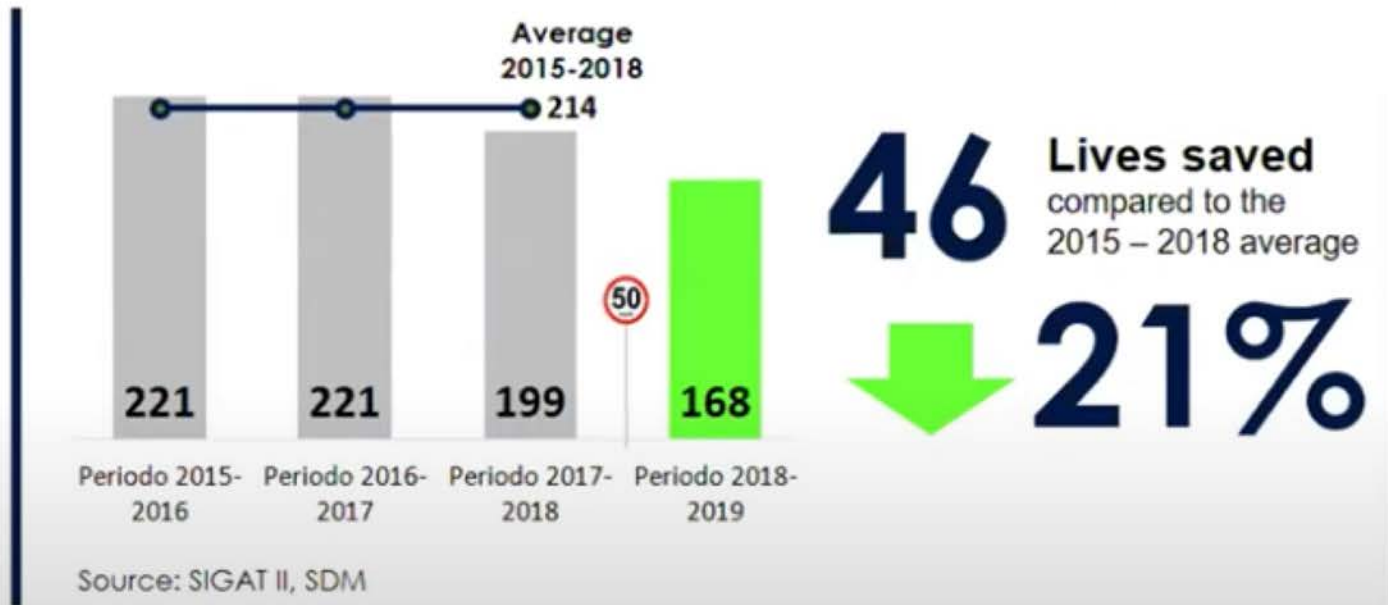


160 Km intervened

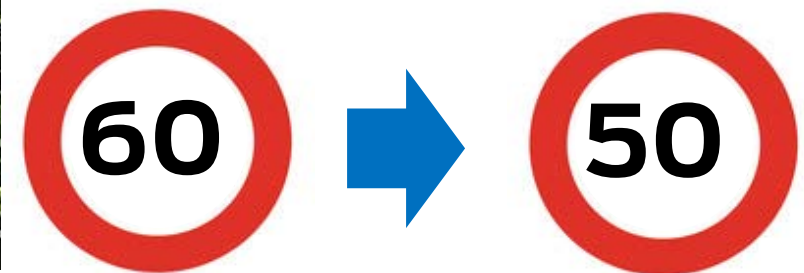
29% of the road network

+210 deaths each year

35%-40% of the deaths



Fortaleza, Av. Leste-Oeste

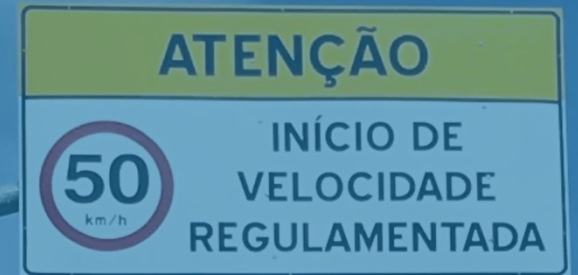


Fortaleza, Av. Leste-Oeste

Redesign + Enforcement

42% reduction in crashes with injuries

83% reduction in crashes involving pedestrians



Can design help reduce speeds?



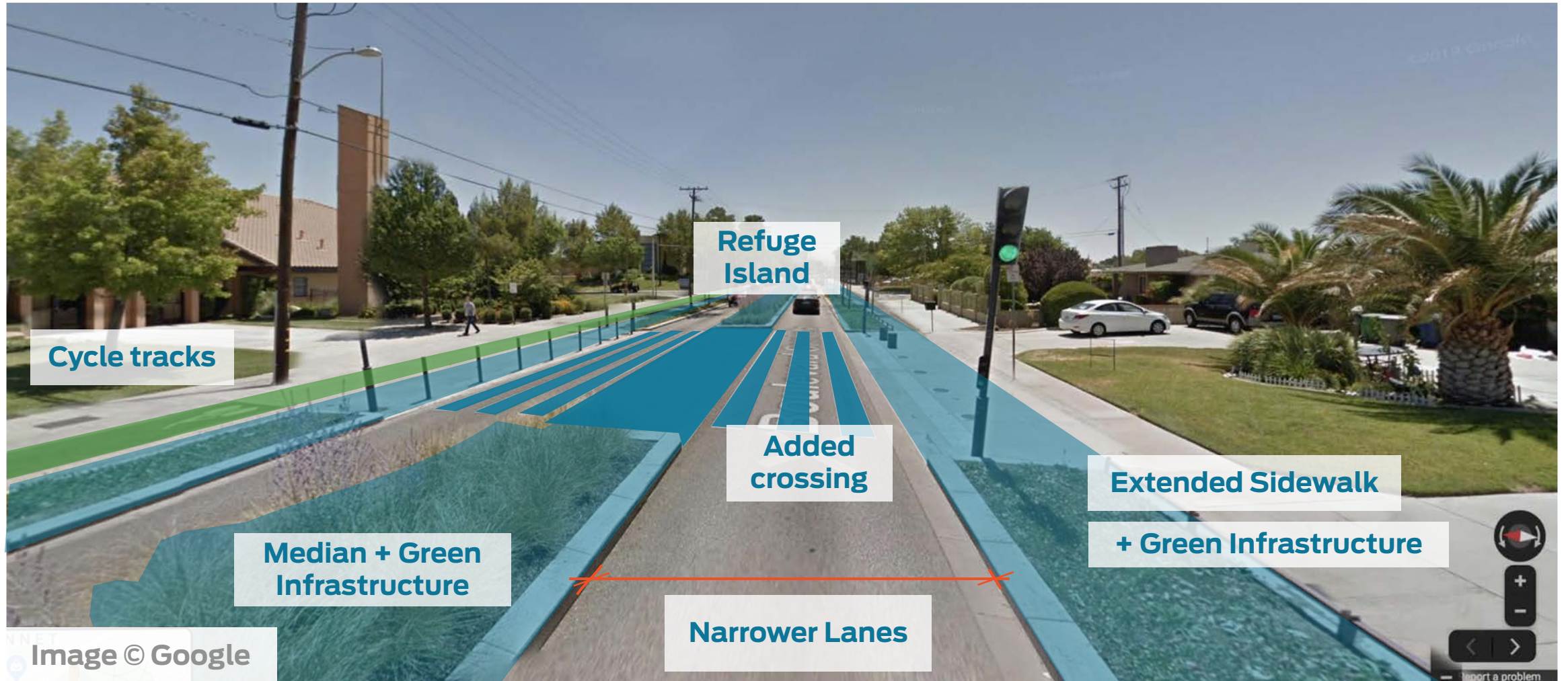
Image © Google

Google

Yes, the way streets are designed impact how they are used!

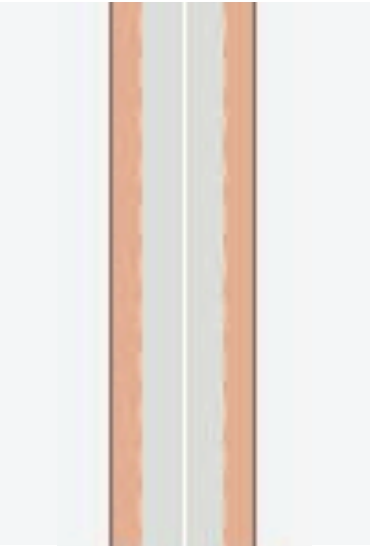


Yes, the way streets are designed impact how they are used!

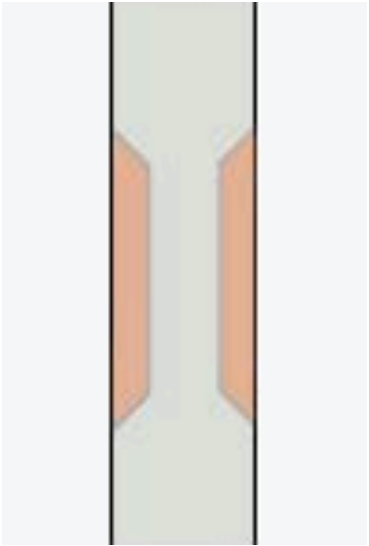


Geometric Design

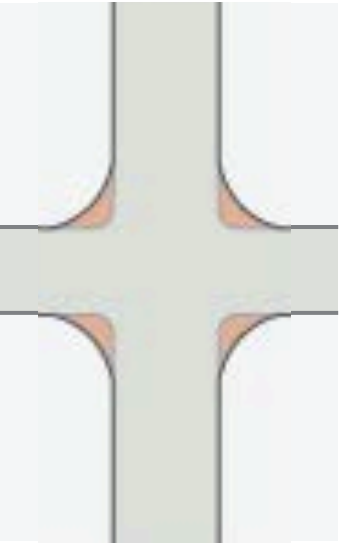
(Vertical + Horizontal Deflection, Compact Intersections, Narrower Lanes etc.)



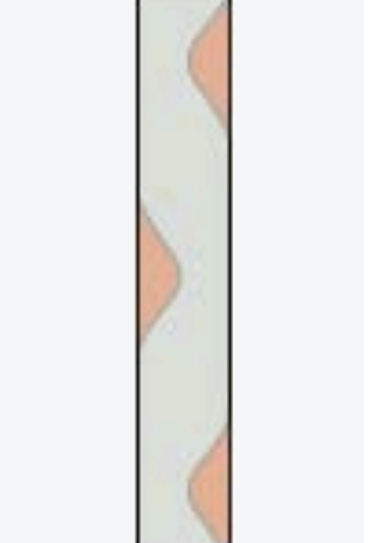
Lane Narrowing



Pinchpoints



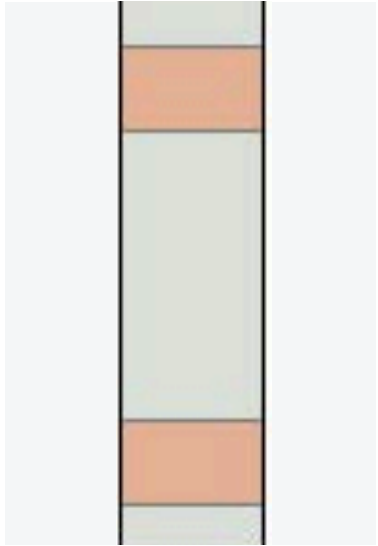
Corner Radii



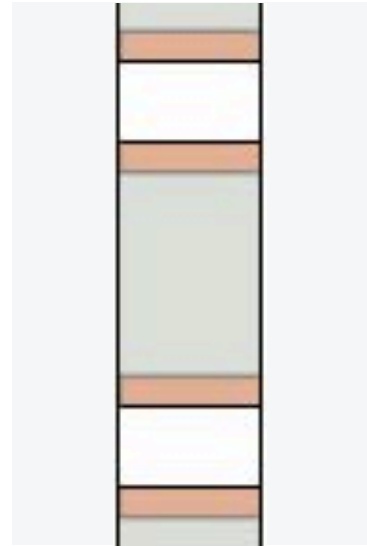
Chicanes and Lane Shifts

Geometric Design

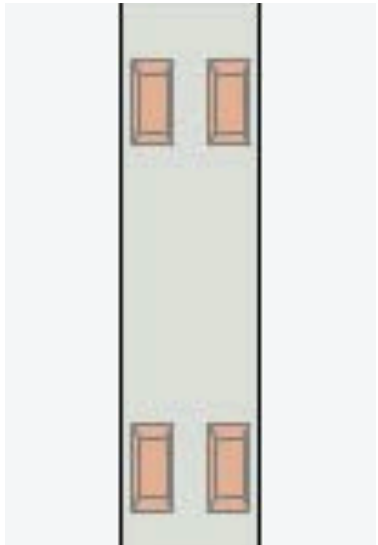
(Vertical + Horizontal Deflection, Compact Intersections, Narrower Lanes etc.)



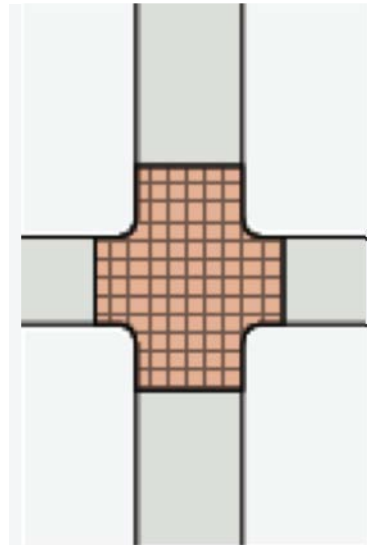
Speed Humps



Speed Tables



Speed Cushions



Pavement Material and Appearance

Traffic calming area

Albert Sabin Children Hospital - Fortaleza, Brazil



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3. Shift to safer modes

Street space is finite – use it wisely to promote a shift from motorcycling to safe and sustainable mobility



Kabataş ↓

GIFT-CD/DVD-BOOK

SILVERADO
PER JEWELLERY

CHANGE OFFICE

TURKISH DELIGHT BAKLAVA SPICE BAZAR

Çıkış/Exit
Girilmez
No entry

705







portmans

General Pants Co.

General Pants Co.

havaia
General Pants Co.





...UITO
NÃO É MAIS
FORTE QUE UM
PAÍS INTEIRO.

SOLTO

POWERFUL







**reimagine,
reinvent, and
redesign safer,
more
sustainable
streets!**



Thank you!

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ADB GRRSO Dialogue on
Motorcycle Safety

Manila, Oct 12, 2022

@GlobalStreets
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