



WORLD
RESOURCES
INSTITUTE

WRI ROSS CENTER FOR
SUSTAINABLE
CITIES

CITIES SAFER BY DESIGN

Real-world guide on designing safer streets and communities



CELAL TOLGA IMAMOGLU, ROAD SAFETY PROJECTS MANAGER EMBARQ INITIATIVE, WRI ROSS CENTER FOR SUSTAINABLE CITIES

GLOBAL TRENDS

The urban population will increase from **50% in 2007** to **70% in 2030** (UNICEF 2012).

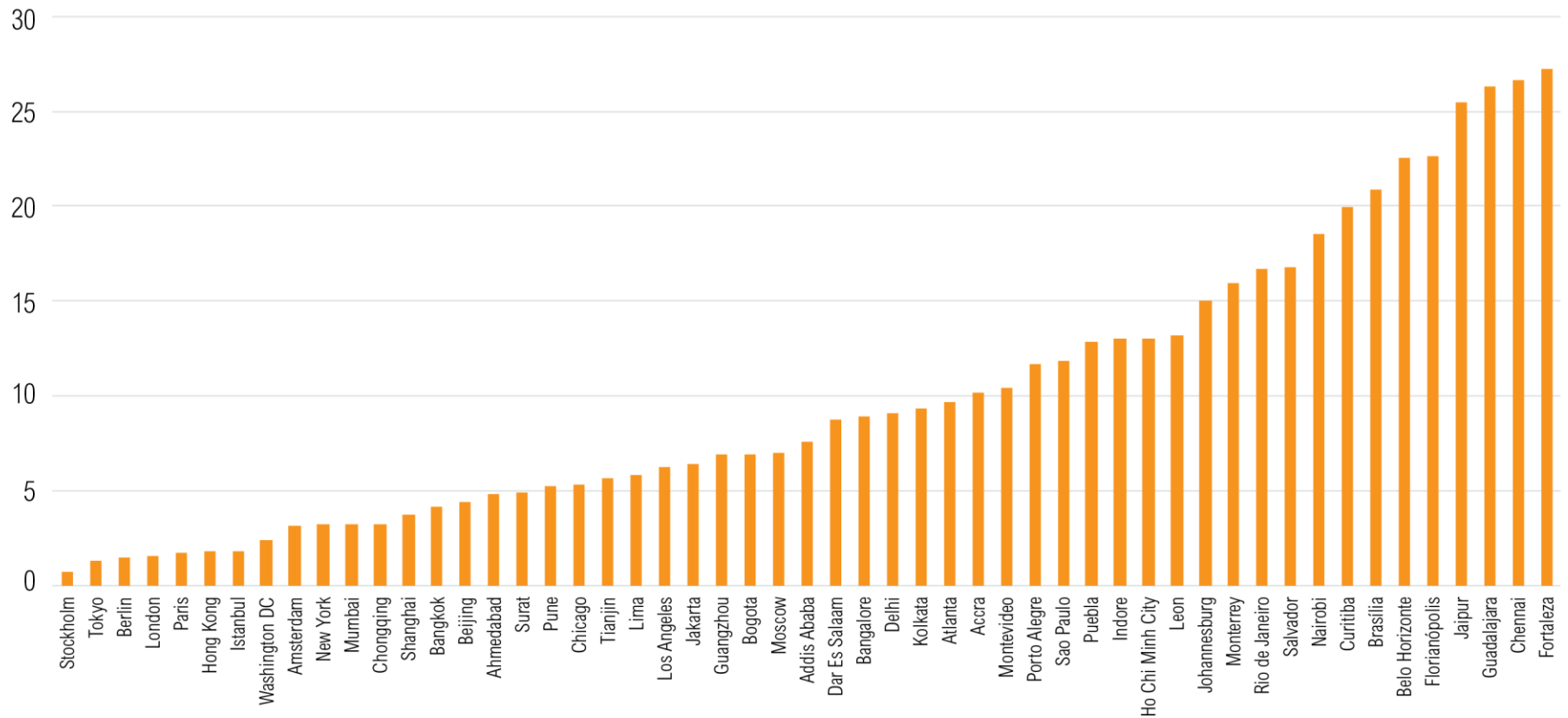
The number of cars will more than double by 2050, from **1 BILLION** today to **2.5 BILLION** in 2050.

NEARLY HALF of the world's traffic fatalities already occur in cities.

WHO IS TRAFFIC SAFETY ABOUT?

- Road crashes are the leading cause of death among young people **ages 15-29**, and the second leading cause of death worldwide among people **ages 5-14**.¹
- Older pedestrians and cyclists can account for up to **45 percent** of pedestrian fatalities and up to **70 percent** of cyclist fatalities.²
- People from lower socioeconomic backgrounds are more likely to be involved in traffic crashes, and often live in areas with low-quality infrastructure.³

REPORTED FATALITY RATES IN SELECTED CITIES (PER 100,000 POPULATION)

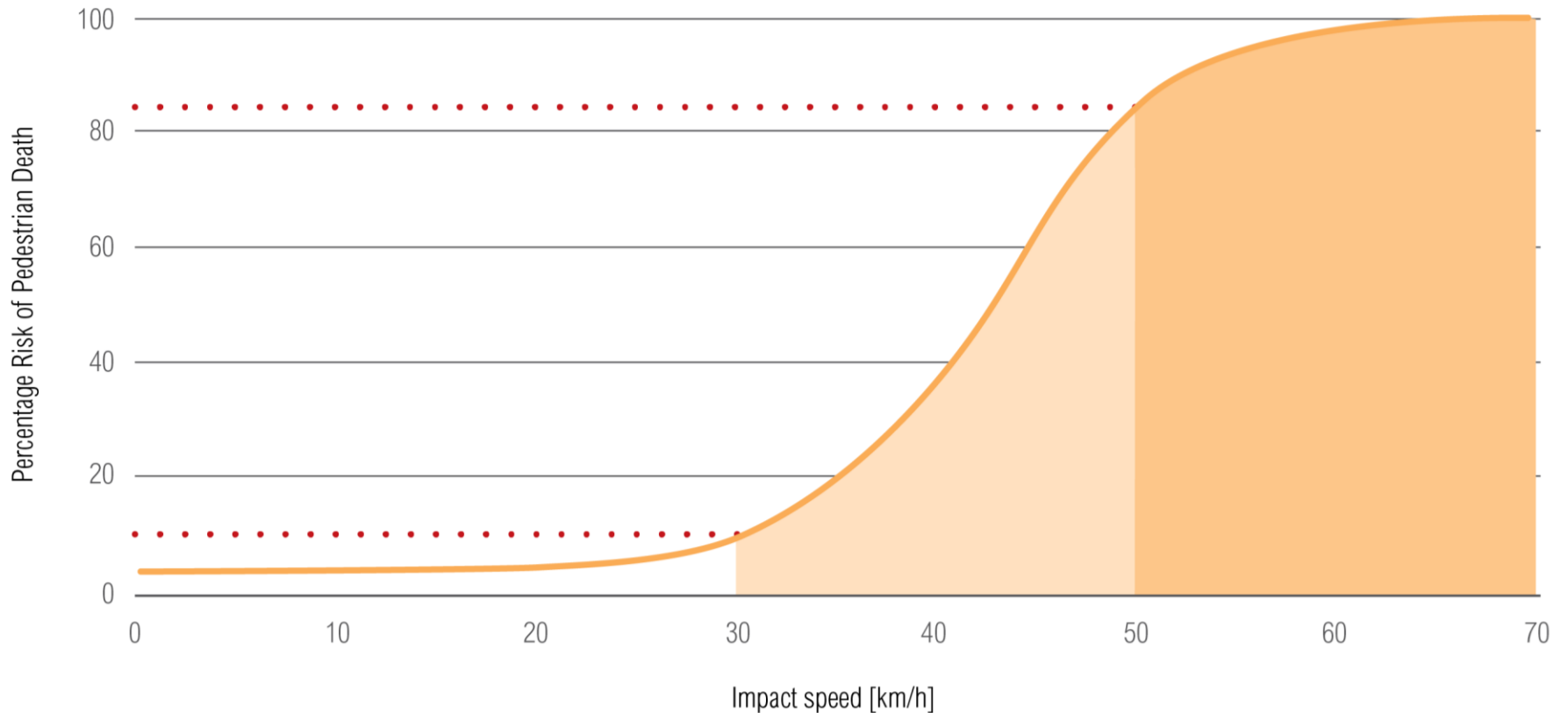


DEVELOPMENT PATH FOR TRAFFIC SAFETY



■ Reported Fatality Rate (Per 100,000 Population)

REDUCE EXPOSURE, DIMINISH RISK



Pedestrian Death Risks Declines at Lower Vehicle Speeds

DESIGN PRINCIPLES



Urban design that reduces the need for vehicle travel and fosters safer vehicle speeds



Traffic calming measures that reduce vehicle speeds or allow safer crossings



Arterial corridors that ensure safer conditions for all road users



A network of connected and specially designed bicycling



Safe pedestrian facilities and access to public spaces



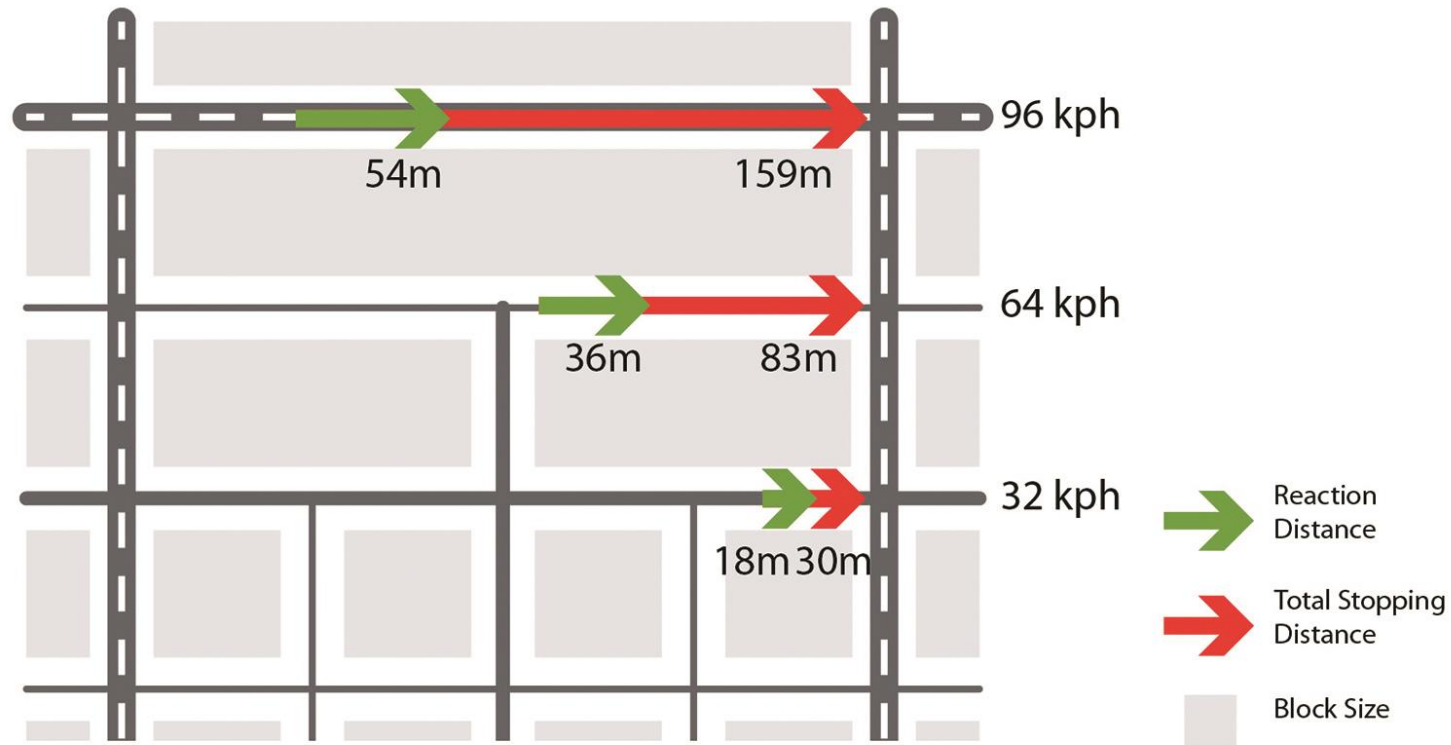
Safe access to mass transport corridors, stations, and stops

KEY URBAN DESIGN ELEMENTS

- Block size
- Street connectivity
- Street widths
- Access to destinations
- Population density



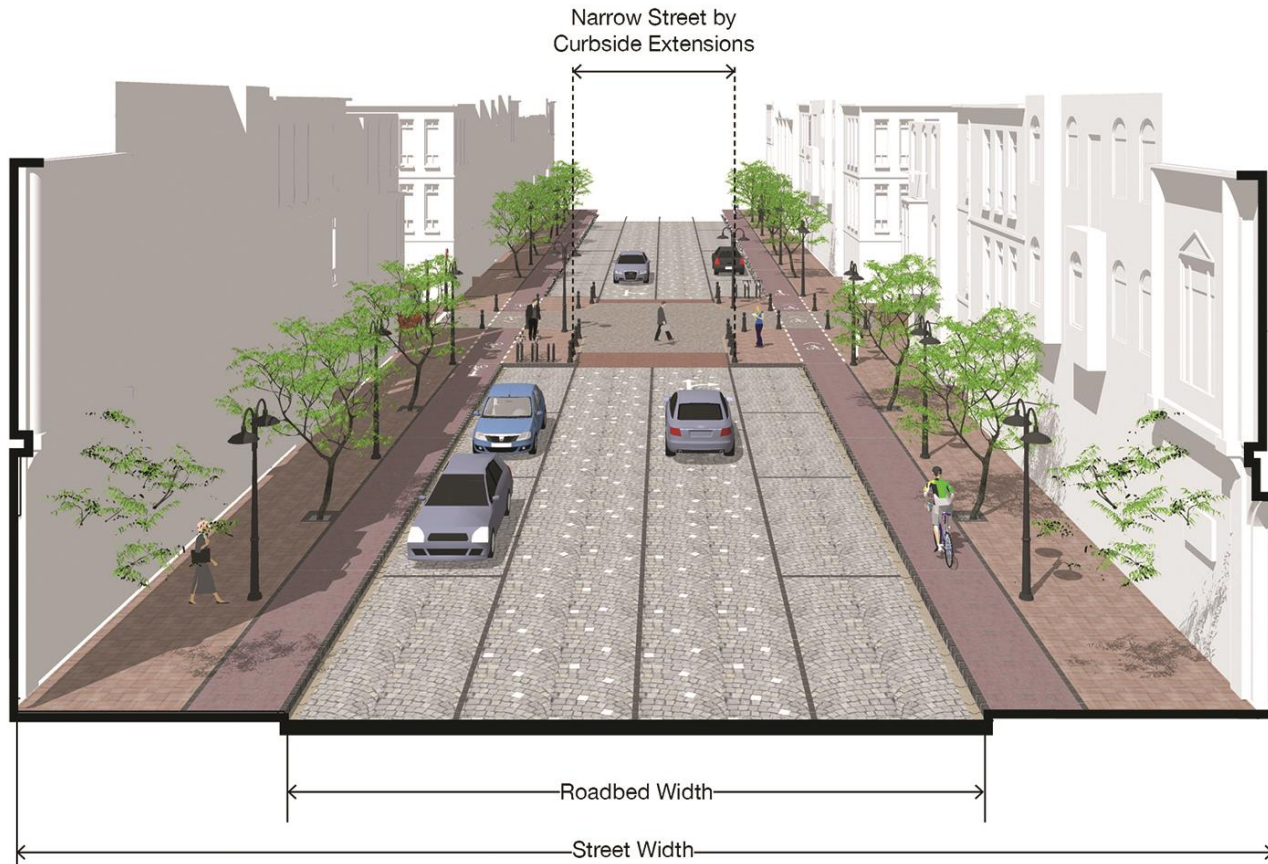
COMPACT & CONNECTED URBAN DESIGN



Assumes 2 seconds reaction time and vehicle deceleration rate of 3.4 m/s²

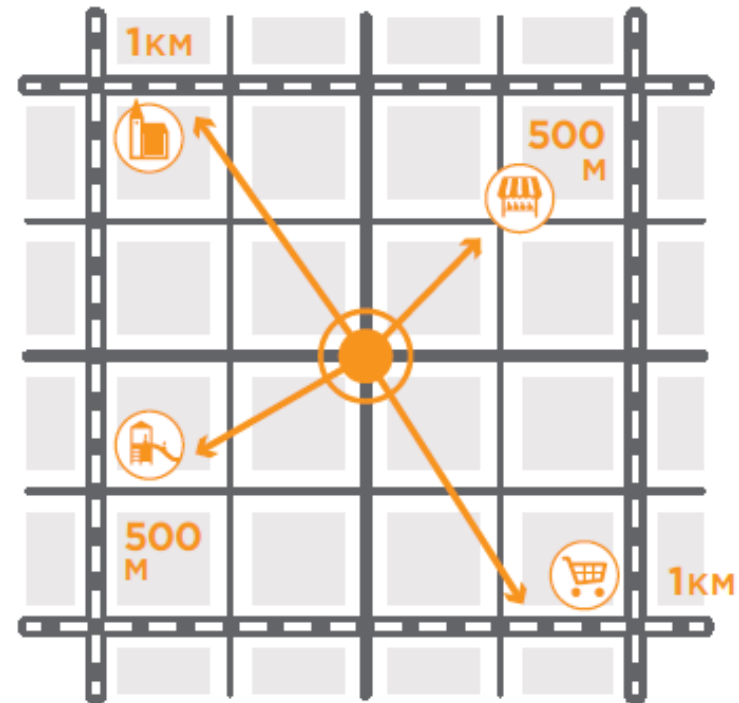
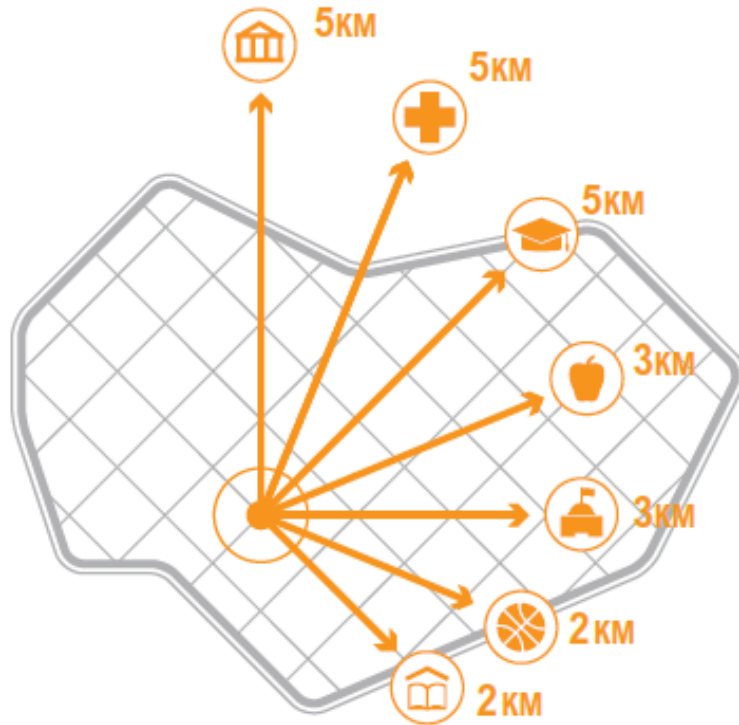
- Smaller block sizes and distance between signalized intersections can reduce speeds and improve safety.¹ Complement with fewer 4-armed junctions.

COMPACT & CONNECTED URBAN DESIGN



- Evidence from Mexico City shows that as the maximum pedestrian crossing distance at an intersection increases by 1 meter, pedestrian fatality risk increases 6%.¹

COMPACT & CONNECTED URBAN DESIGN

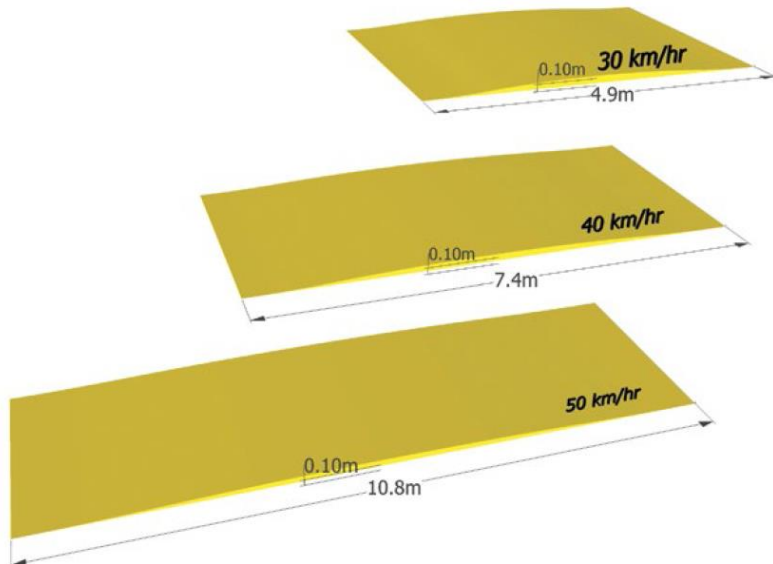


- Vehicle travel in cities is most strongly related to accessibility to destinations, meaning that efforts to increase access to jobs, retail and public space can decrease vehicle travel and improve overall safety.¹

TRAFFIC CALMING MEASURES

- Speed humps
- Speed cushions
- Chicanes
- Chokers
- Curb extensions
- Raised pedestrian crossings
- Traffic circles
- Roundabouts

SPEED HUMPS



- Speed humps are simple but effective ways to lower speeds. Newly installed humps have shown to reduce mean vehicle speeds from 36.4 to a designed speed of 24.4 km/hr. ¹

RAISED CROSSINGS



Bogota, Colombia

- **10 percent** reduction in speeds, slows vehicles turning and passing through intersections, and prioritizes pedestrian passing on even pavement. ¹

CURB EXTENSIONS



Joinville, Brazil

- Evidence from Latin American cities shows that the chance of a vehicle collision and pedestrian crash increases by **6 percent** for every additional 1 meter of pedestrian crossing distance. Curb extensions are simple ways to reduce crossing distance. ¹

ARTERIAL CORRIDORS AND JUNCTIONS

- Major arterial considerations
- Crossings
- Signalization
- Medians
- Median refuge islands
- Lane balance

CREATING COMPLETE STREETS



A major arterial street in Mexico City was recently transformed into a “Calle Completa,” with a protected cycle lane, dedicated BRT, new sidewalks and access to a central green median.

MEDIAN REFUGE ISLANDS



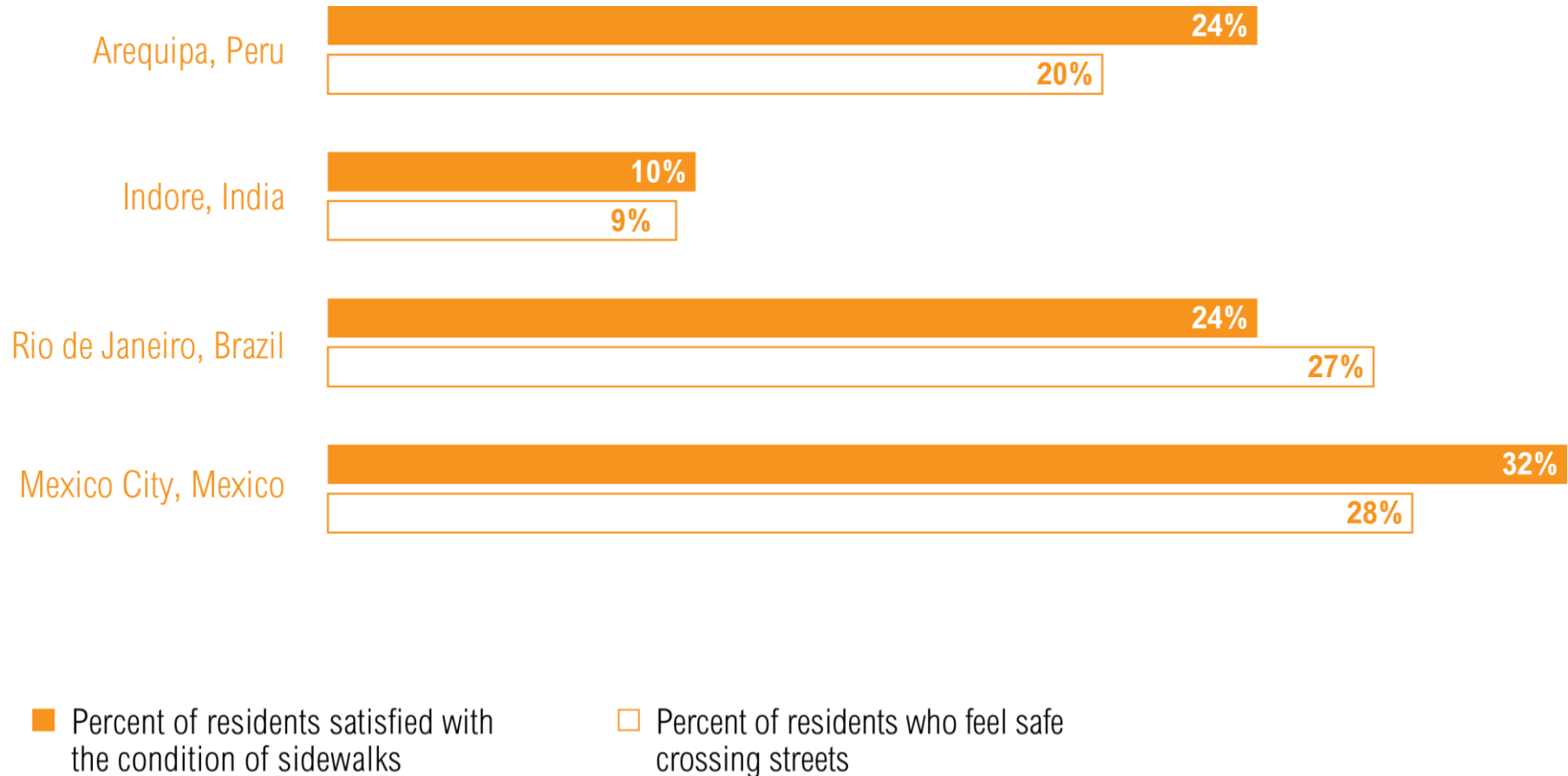
Small changes can help, too. Median refuge islands and medians can make crossing easier and lower speeds of passing traffic by providing protection in the middle of the road and narrowing the view of the road of drivers

PEDESTRIAN SPACES AND ACCESS TO PUBLIC SPACE

- Safer sidewalks
- Shared streets
- Pedestrian streets and zones
- Safe access to places to learn and play
- Open streets, or ciclovias
- Street plazas



SIDEWALK CONDITIONS AND STREET CROSSING SAFETY SATISFACTION IN FOUR CITIES



SAFE SIDEWALKS CASE



PEDESTRIANIZING STREETS



Izmir, Turkey

Pedestrianization can cut traffic crashes in half in and around these zones, and create great public spaces for people in high-volume areas. Measures should be taken at buffer areas to ensure safe entry.

STREET PLAZAS & PARKLETS



Mexico City



Sao Paulo, Brazil

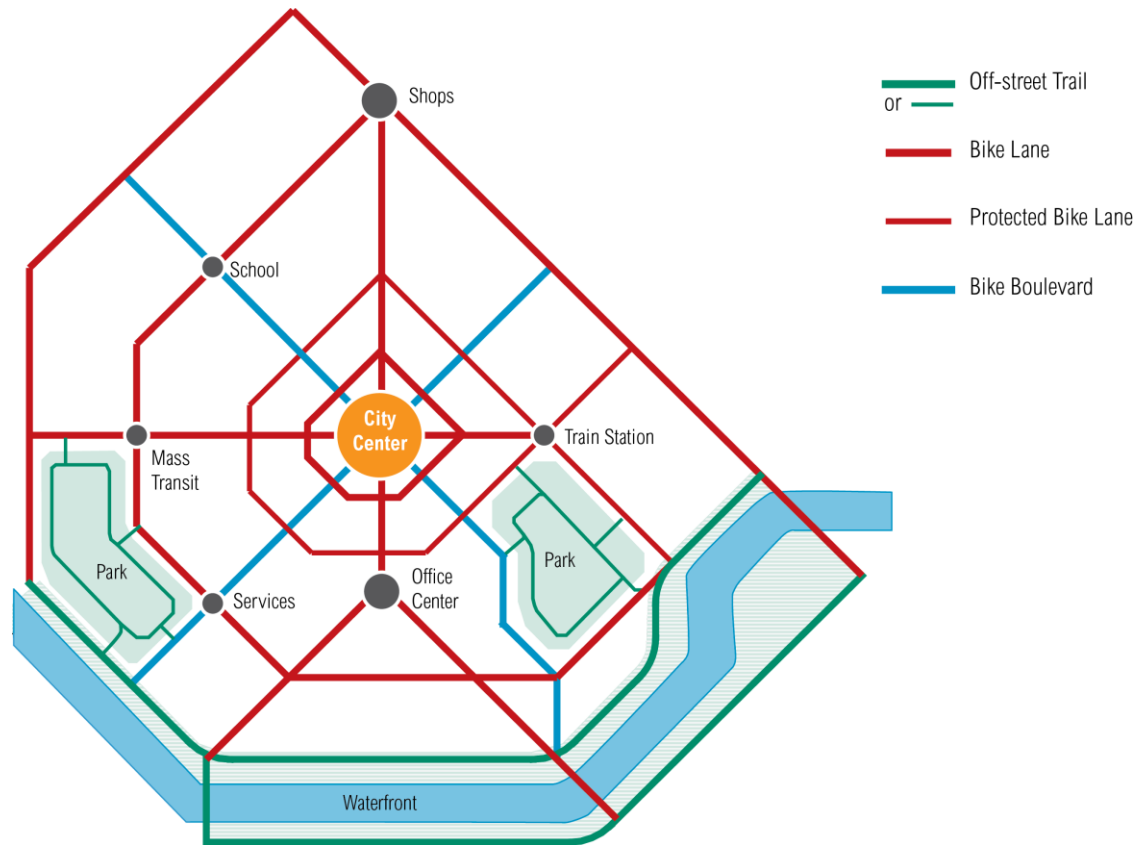
New York has shown a decrease of **16 percent** in speeding and a **26 percent** reduction in injury crashes along streets that contain pedestrian plazas.¹

BICYCLE INFRASTRUCTURE

- Bicycle networks
- Bike lanes and cycle tracks
- Off-street trails
- Shared bicycle street
- Bicycle safety at intersections
- Bike safety at bus stops
- Bicycle signals

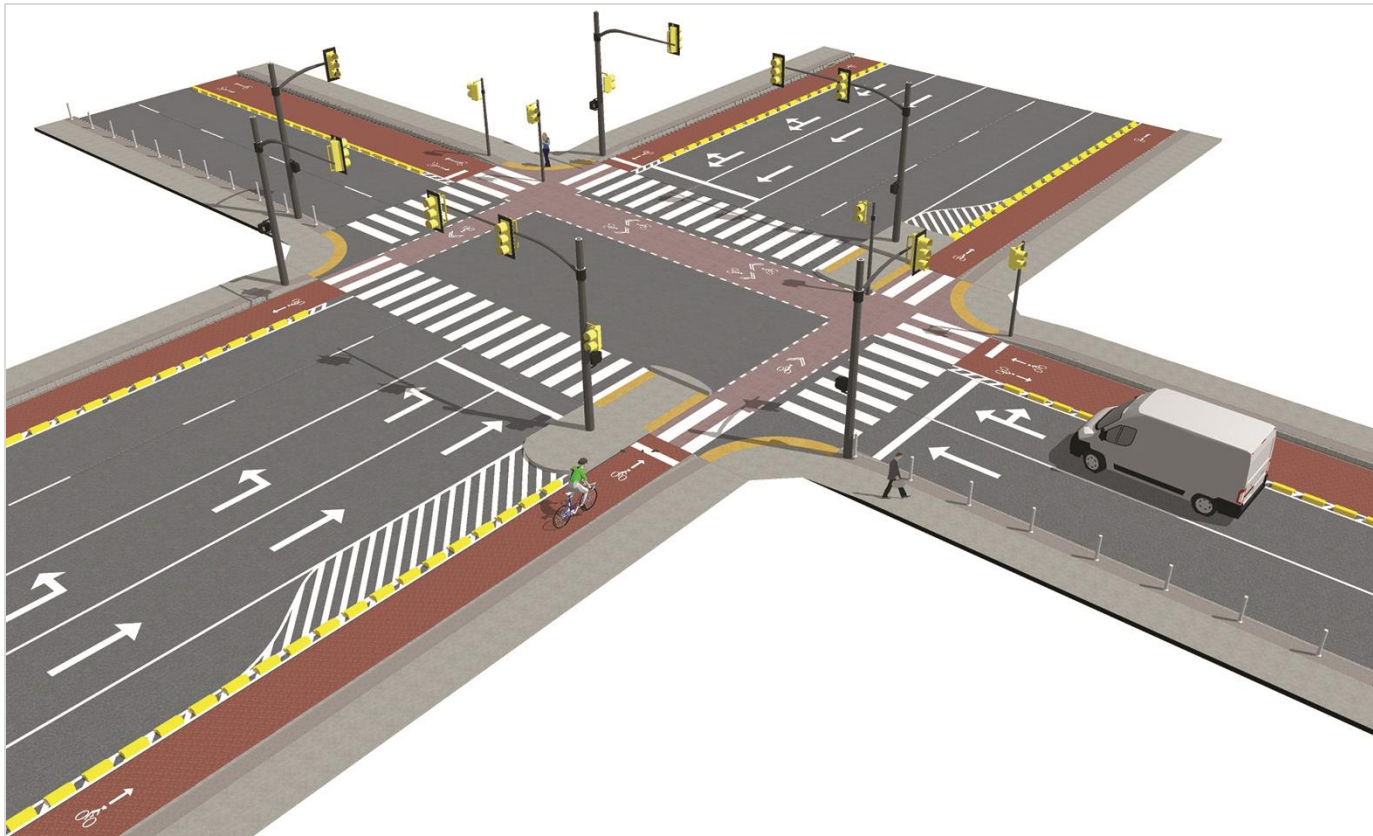


NETWORK FOR SAFETY IN NUMBERS



- Bogota, Colombia found that adding more than 100 km (62 miles) of bikeways helped reduce bicyclist deaths by **47.2 percent** between 2003 and 2013 , and increased bicycle use from just over **3 percent** of all daily trips to over **6 percent**.¹

PROTECT CYCLISTS ON BUSIER STREETS



Protected bicycle lanes on busy roads and help ensure cyclists feel safe and are not at great risk from distracted drivers.

PROTECTED CYCLE LANES



- Mexico City now has over 120 km of cycle lanes, including protected lanes, and places like Shanghai also are installing protected bicycle lanes. ¹

GETTING INTERSECTIONS RIGHT



Speed-reducing countermeasures (e.g. raised bicycle crossings) and design to increase cyclist-driver visibility can improve visual search patterns in favor of the cyclists coming from the right.

GREEN NETWORKS



Bogota, Colombia

Off-street bike paths have been found to be one of the safest bicycle routes, but providing bike and pedestrian tracks within them has been shown to provide better safety compared to mixed-user paths

SHARED BICYCLE STREETS – BIKE BLVDS



- Collision rates on well-designed bicycle boulevards have been shown to be two to eight times lower than those on parallel, adjacent arterial routes. ¹

SAFE ACCESS TO TRANSIT STATIONS AND STOPS

- Intersections
- Midblock pedestrian crossings
- BRT /Busway Stations
- Terminals and transfer stations
- Midblock bus stops



Ruta Norte
Por República de Venezuela

- Buenavista
- Delegación Cuauhtémoc
- Puente de Alvarado
- Museo de San Carlos
- Hidalgo
- Bellas Artes
- Teatro Blanquita
- República de Chile
- República de Argentina
- Teatro del Pueblo
- Mixcalco
- Ferrocarril de Cintura
- Morelos
- Archivo de la Nación
- San Lázaro
- Aeropuerto T1
- Aeropuerto T2



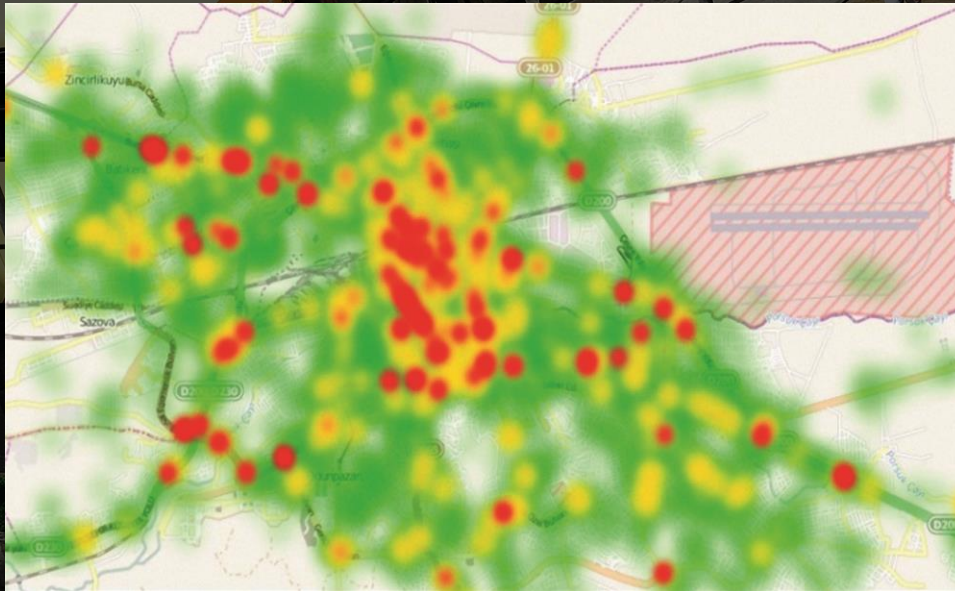
TRANSIT IS SAFE - MAKE ACCESS TO IT SAFE, TOO



Mass transit has a lot of people moving to and from it, so making this a safe connection is key. Often a corridor might be built or run without much consideration of this, so things like providing traffic calming, or raised pedestrian crossings to stations as seen here in Istanbul can help improve safety and access.

IMPROVING DATA AND ANALYSIS

- Data analysis and assessment tools for deploying these design principles



- Heat Map of Traffic Crashes in Eskisehir, Turkey ¹



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