Traffic Safety

Current status and way forward

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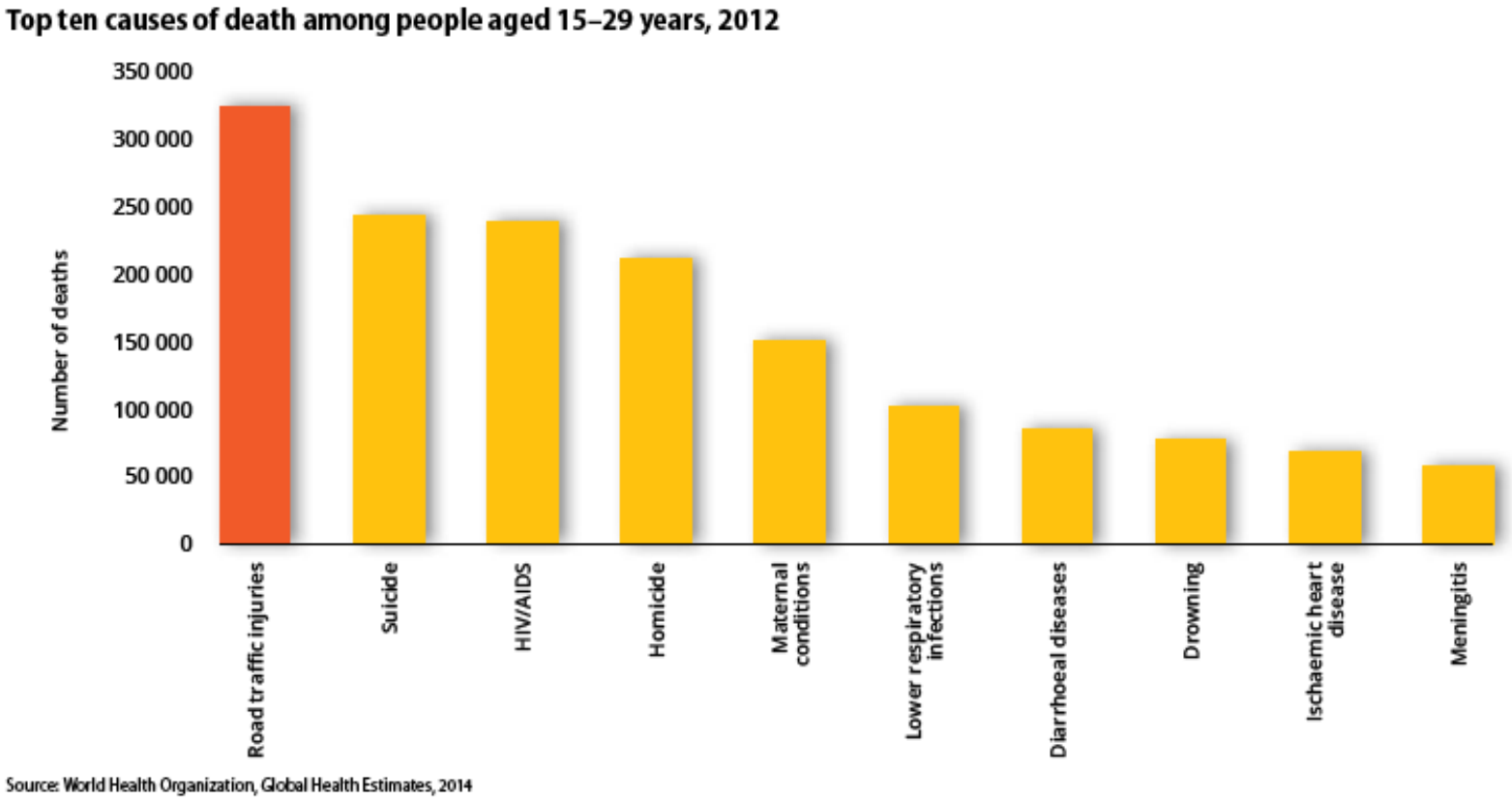
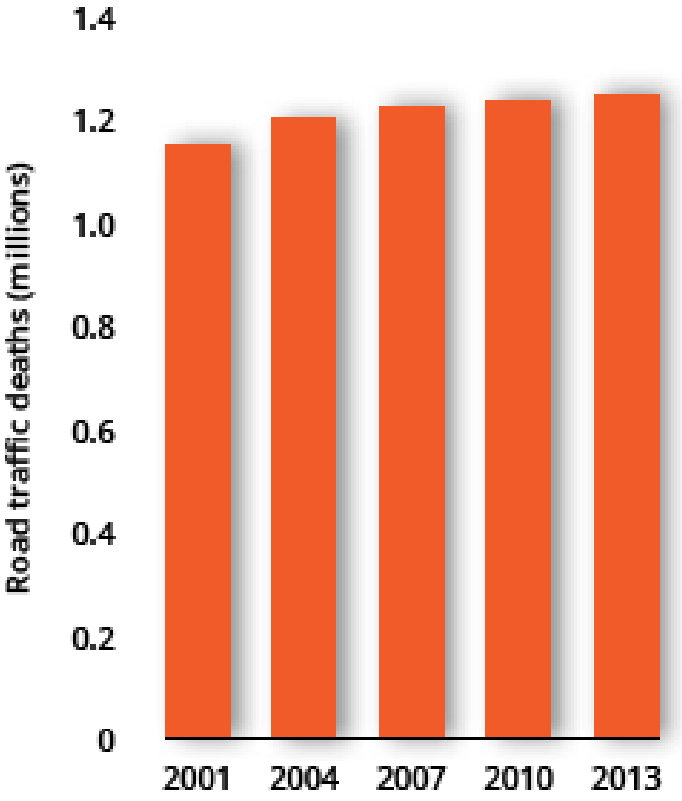
TRIPP

Global Status on road safety, WHO 2015

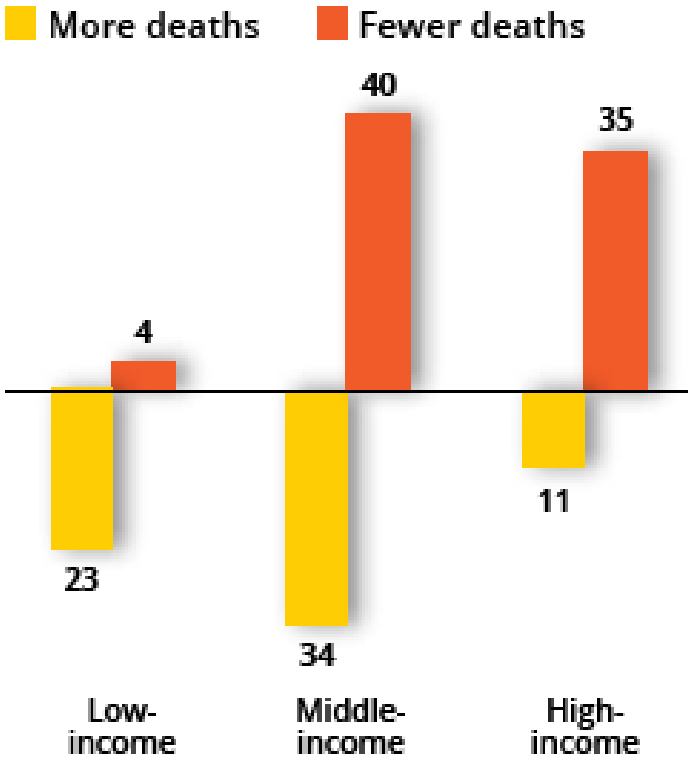


Global Status on road safety, WHO 2015

Number of road traffic deaths, worldwide



Countries showing changes in the number of road traffic deaths, 2010–2013, by income status[a]



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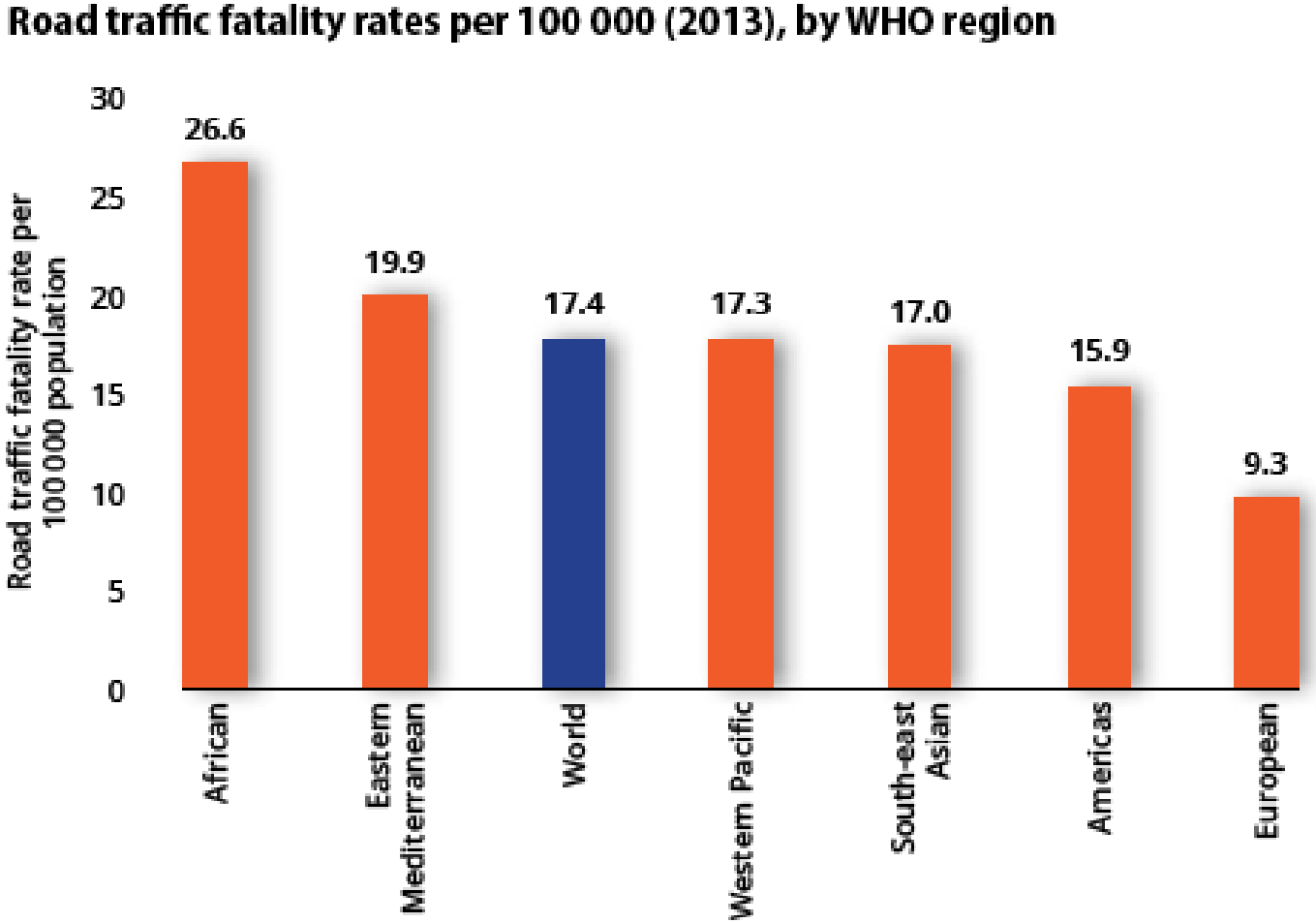
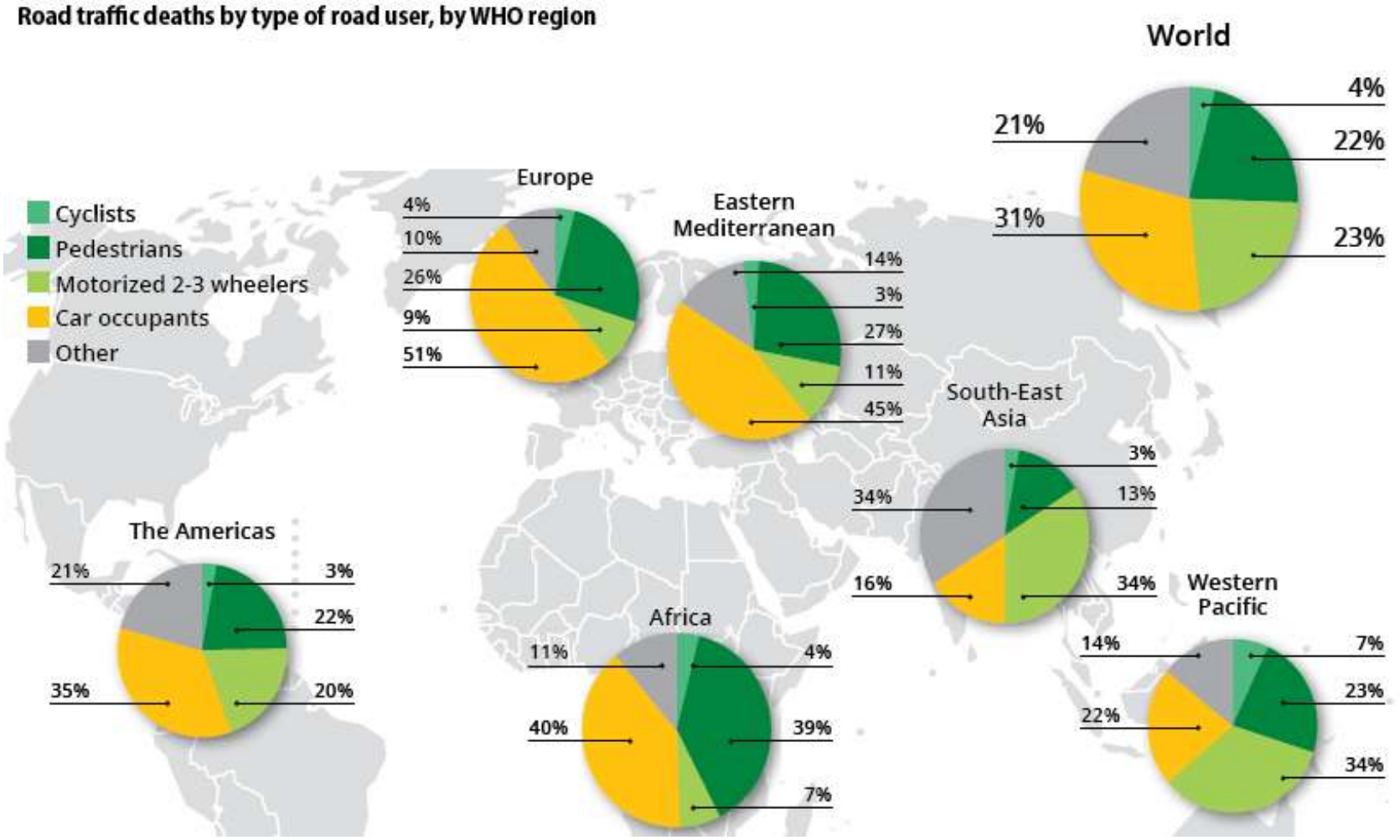
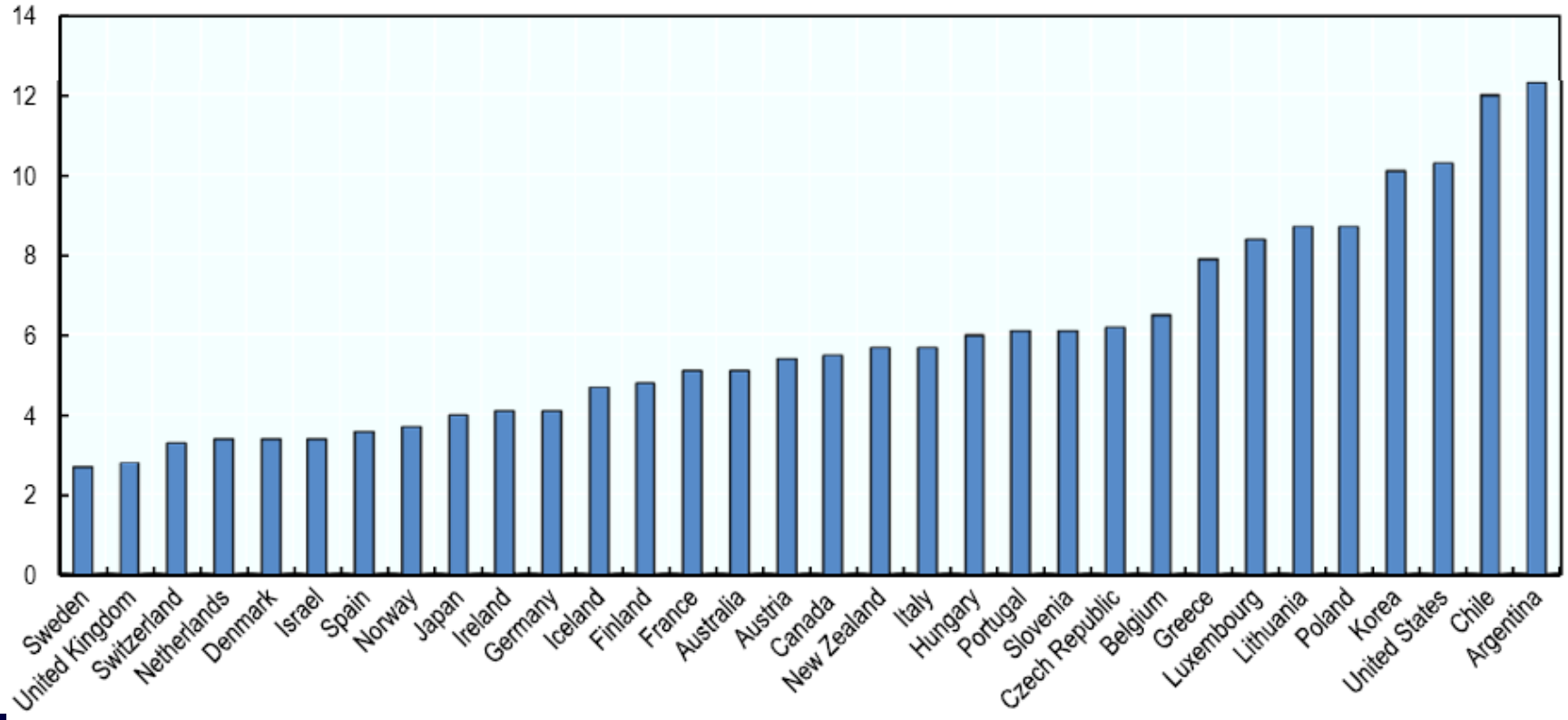


Road traffic death rates in low and middle income countries are more than double of high income countries

RT Deaths by type of road users by WHO regions



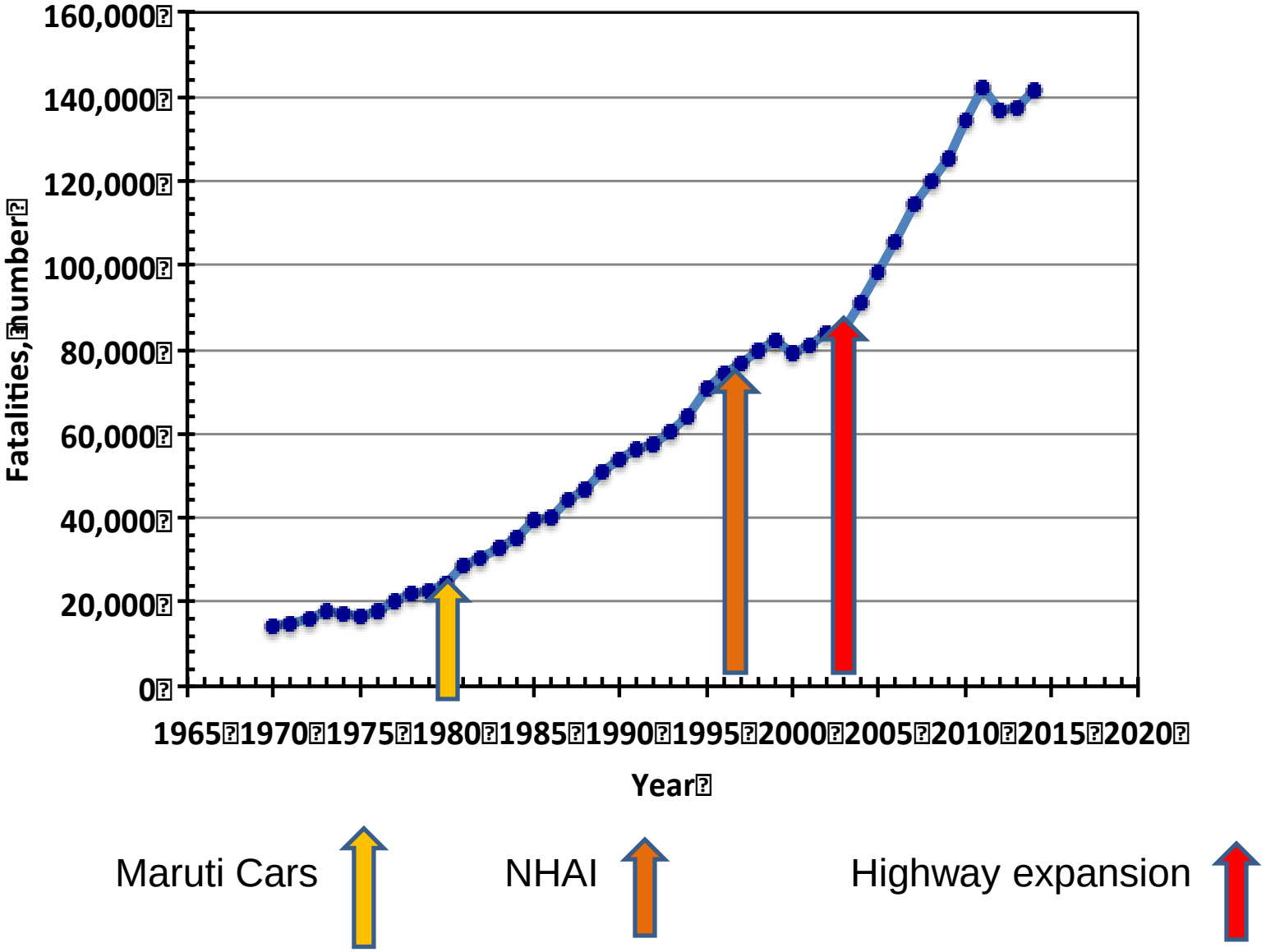
Road Traffic fatalities per 100000 habitants, 2013 EU



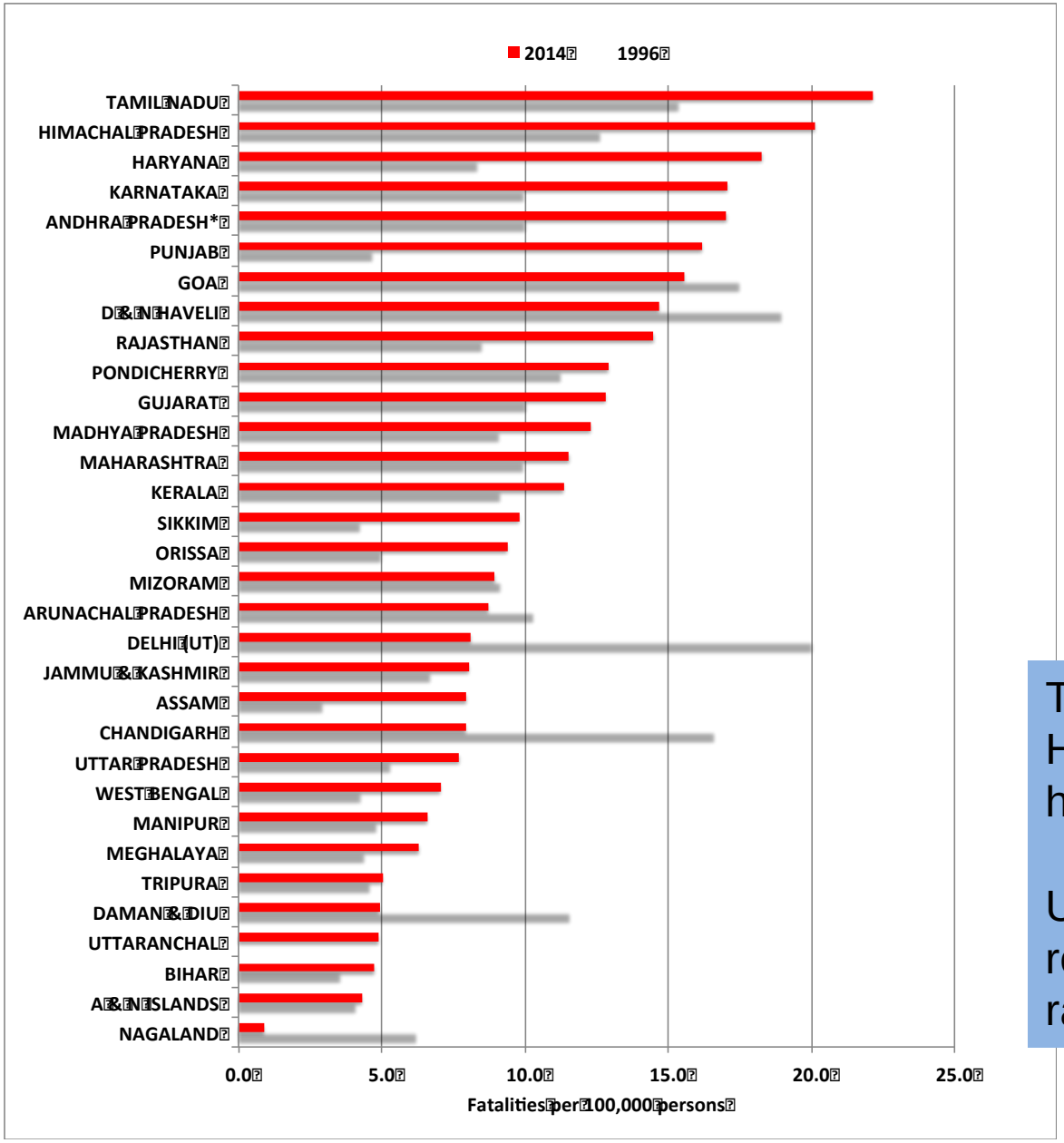
Since 2000, the rate has been reduced by about 50% in nearly half the countries. The greatest improvements were in Spain (-75%) and Portugal (-70%), while Denmark, France, Ireland, Slovenia, Sweden and Switzerland all had reductions of 60-63%

Road traffic deaths in India 1970 - 2014

(Source: NCRB, 2015).



Fatalities per100 thousand population



TN, HP, HY, K, AP high rates

UTs have reduced rates

Modal share of road traffic fatalities in four rural highway locations in India.

Analysis of police FIRs

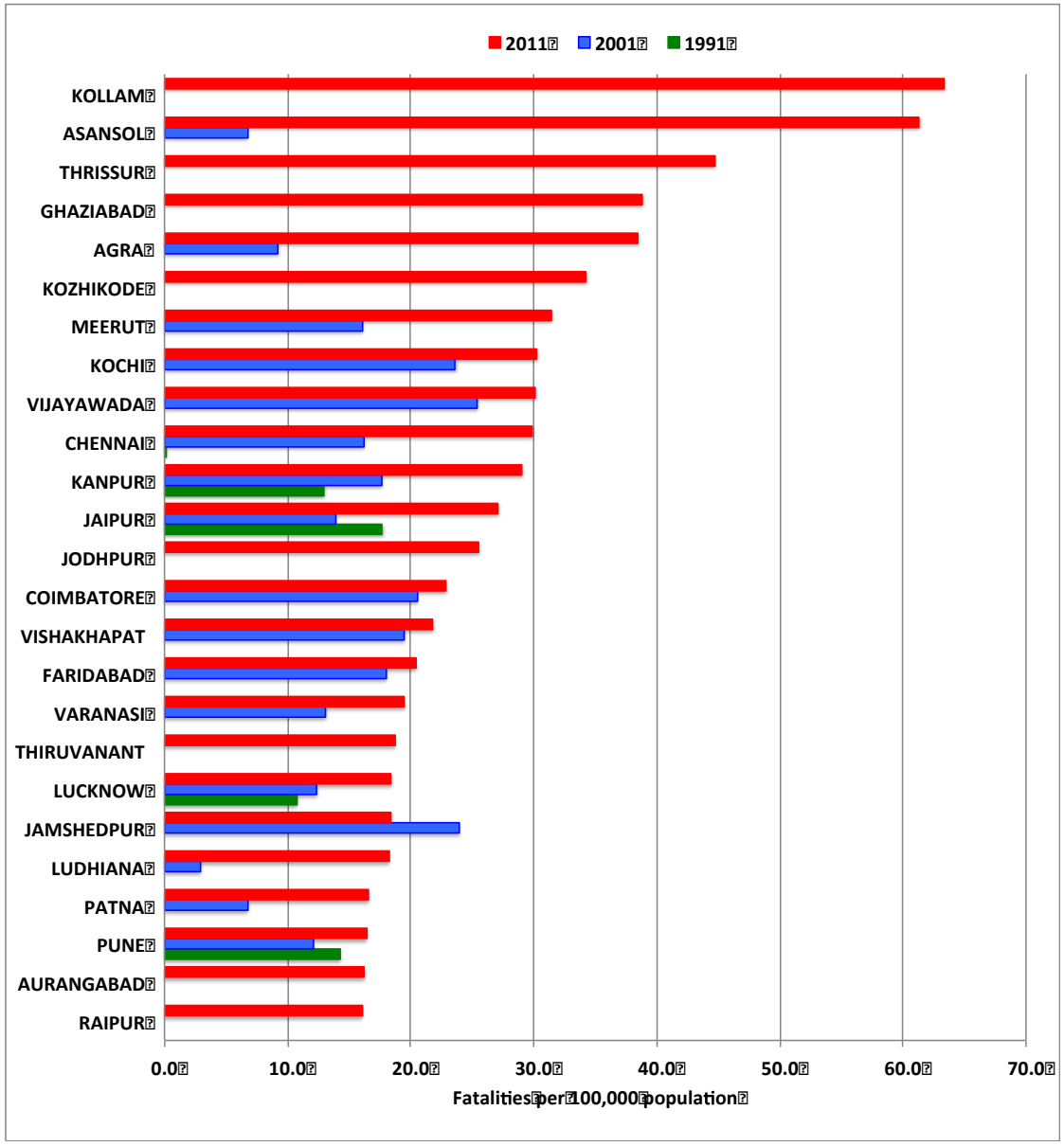
Location	Fatalities by type of road user, percent						
	Pedestrian	Bicycle	Motorised two-wheeler	Car	Bus	Truck	Unknown & other
Highways (1998)[1]	32	11	24	15	3	14	1
2lane NH8 (2010-2014)[2]	20	2	42	14	9	13	1
4lane NH24 (2010-2014)[2]	27	5	44	8	7	4	4
6lane NH1 (2010=2014)[2]	34	3	10	6	5	41	1

Notes: (1) Data from locations on 34 national and state highways in India (Tiwari, G. et al., 2000). (2) Tiwari, G., 2015

Proportion of impacting vehicle type in fatal crashes on selected highway locations

Location	Vehicles involved, percent						
	Truck	Bus	Car	TSR	MTW	Others	Total
Highways (1998)[1]	65	16	15	1	3	-	100
2lane NH8 (2010-2014)[2]	47	5	17	1	5	25	100
4lane NH24 (2010-2014)[2]	54	8	9	4	3	22	100
6lane NH1 (2010=2014)[2]	72	3	12	1	2	10	100

Notes: (1) Data from locations on 34 national and State highways in India (Tiwari, G. et al., 2000). (2) Tiwari, G., 2015



2-4 times increase in 2 decades

Annual RTI deaths per 100,000 population in million plus cities 1991-2011

RTC fatalities by road user type in selected cities:

Analysis of police records

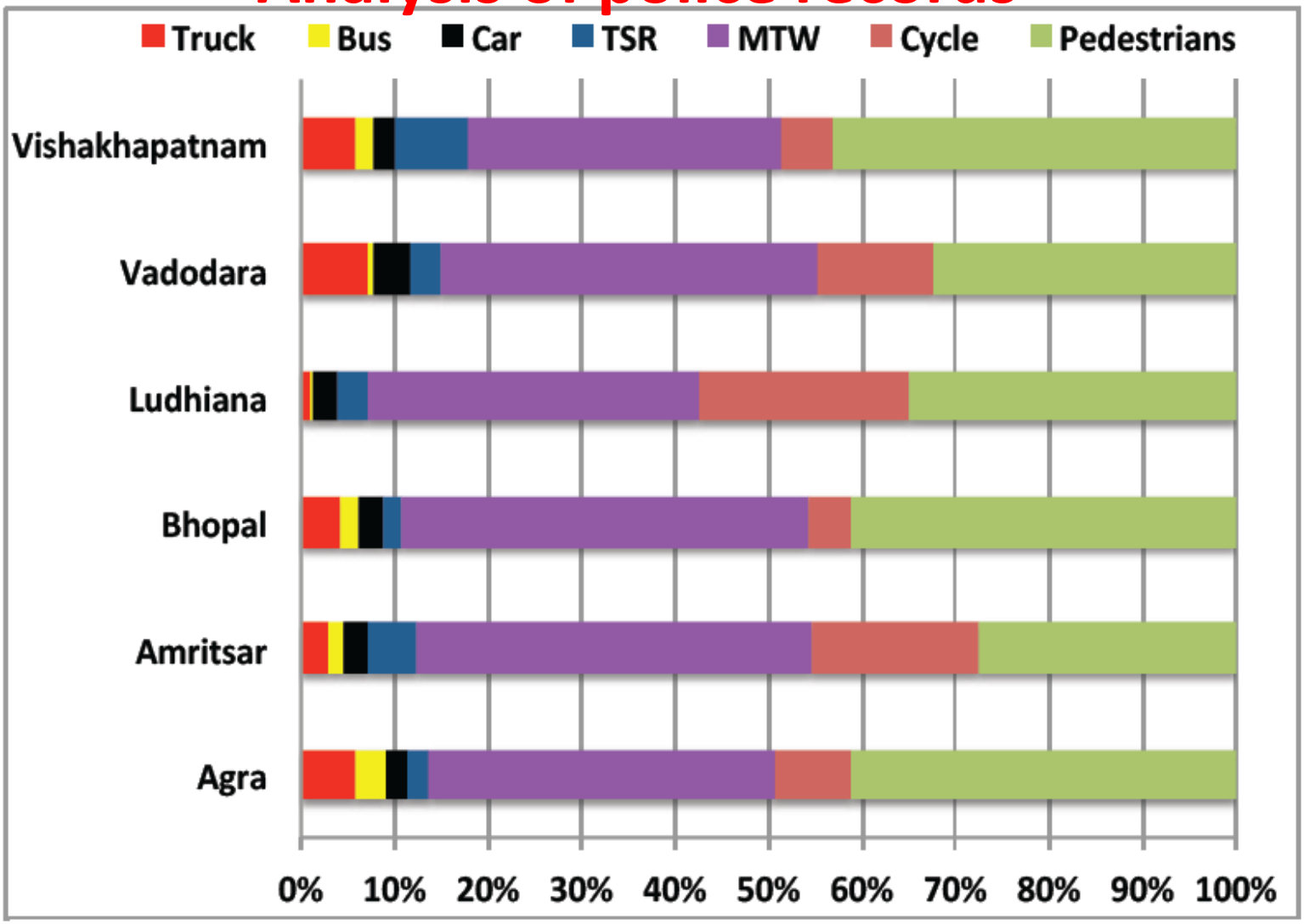
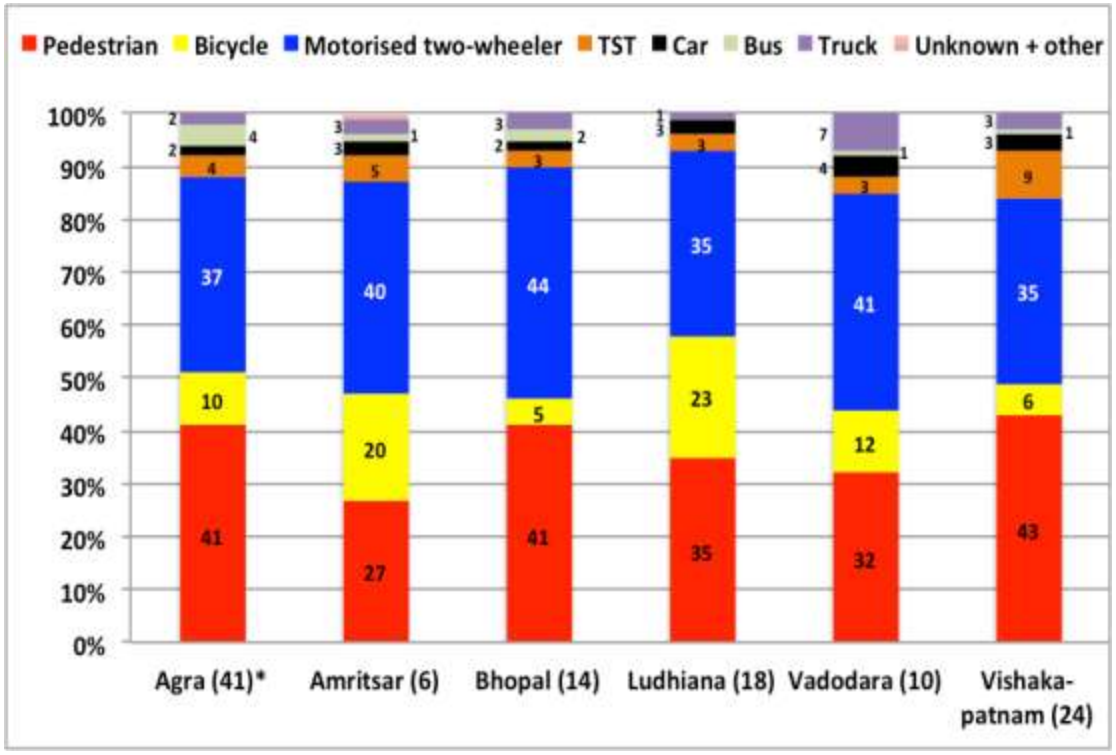


Figure 11. Proportion of RTI fatalities by road user type in six study cities (MTW - Motorised two-wheelers, TSR - Three-wheeled scooter rickshas).

Proportion of road traffic fatalities by road user type (vehicle occupants, bicyclists and pedestrians) in 6 Indian cities (IITD study)



City	Per cent pedestrian fatalities
Agra	0
Amritsar	0
Bhopal	<1
Delhi	5
Ludhiana	3
Mumbai	10
Vadodara	6
Vishakhapatnam	17

Proportion of pedestrian fatalities according to NCRB (2015)

Traffic Safety History

Time periods and their characteristic road safety paradigms, adapted from OECD (1997).

	1900–1920	1920–1950	1950–1970	1960–1985	1985/1990–Now
Crash	Chance phenomenon, bad luck	Road devils, accident prone drivers	Road user or vehicle or road	Multi-causal approach	Result of integral road system
Research	What	Who	How: the cause	How: which causes, technical improvements	Multi-dimensional, economic analysis
Measures	On an ad hoc basis	Educate, punish	Choice from the three E's	Technical solutions for vehicle & road	Adapt road system to road user

Road Safety Policy Models

Intuitive model

(penalties, education,driver training,licensing)

Vehicle centric model

(vehicle standards for occupants, road standards vehicles),

Human Centric model

(road design, city planning for Limitations of the road users)

Vision Zero: A new approach to road safety for Sweden

Vision Zero first emerged in Sweden when Claes Tingvall, the then director of road safety at the Swedish Road Administration, proposed Sweden should have the same approach to traffic safety as it did to workplace safety.

Backed by the Minister for Transport, Vision Zero was passed in 1997 as an Act of Parliament calling for an end to deaths and serious injuries on Swedish roads.

In Sweden at the time, seven people per 100,000 were killed on the road; in 2015, fewer than three people are killed per 100,000.

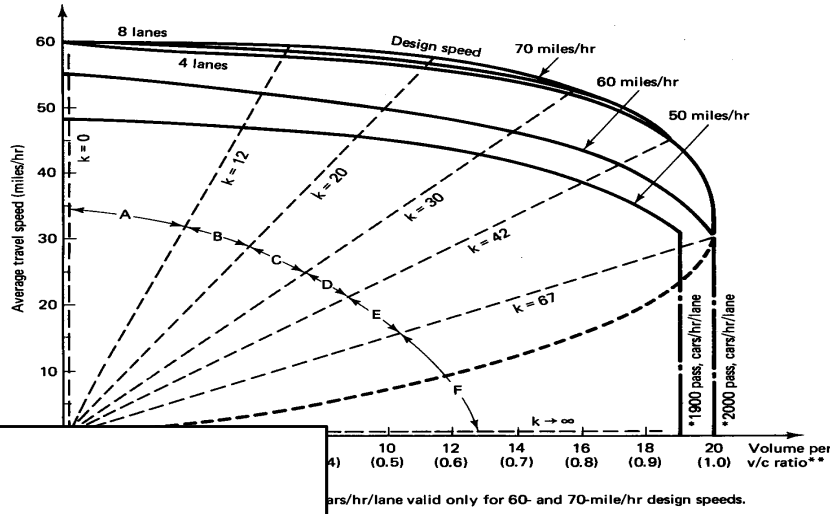
Vision Zero: A new approach to road safety for Sweden

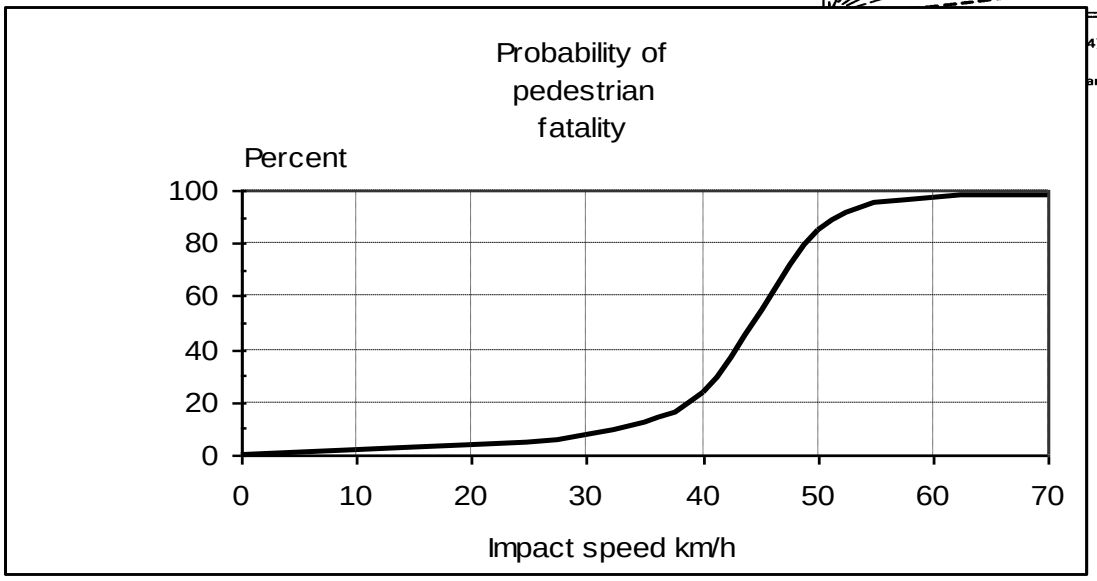
But in Vision Zero, the accident is not the major problem. The problem is that people get killed or seriously injured.

"The reason that people get serious injuries is mainly because people have a certain threshold where we can tolerate external violence… and we know quite well now how much violence we can tolerate."

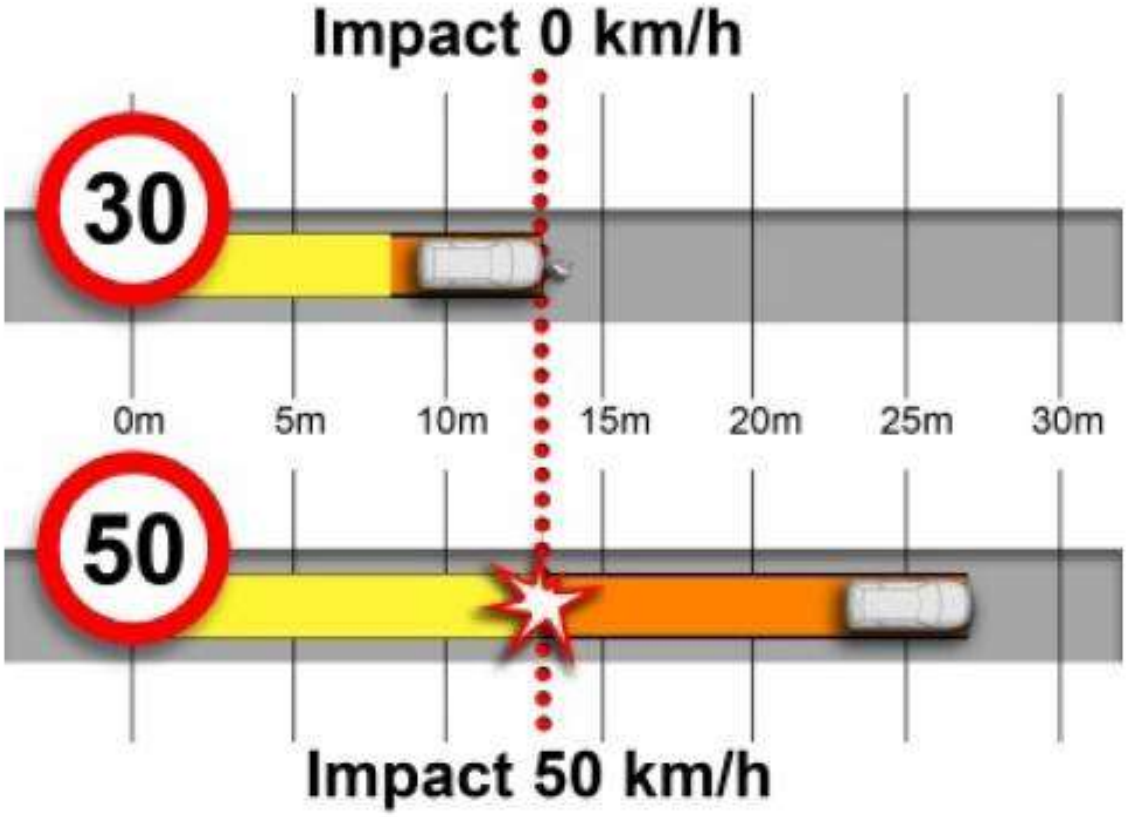
Conflict between safety and mobility

- Higher level of service implies higher speeds-i.e. higher probability of fatality





Stopping distances at different travel speeds



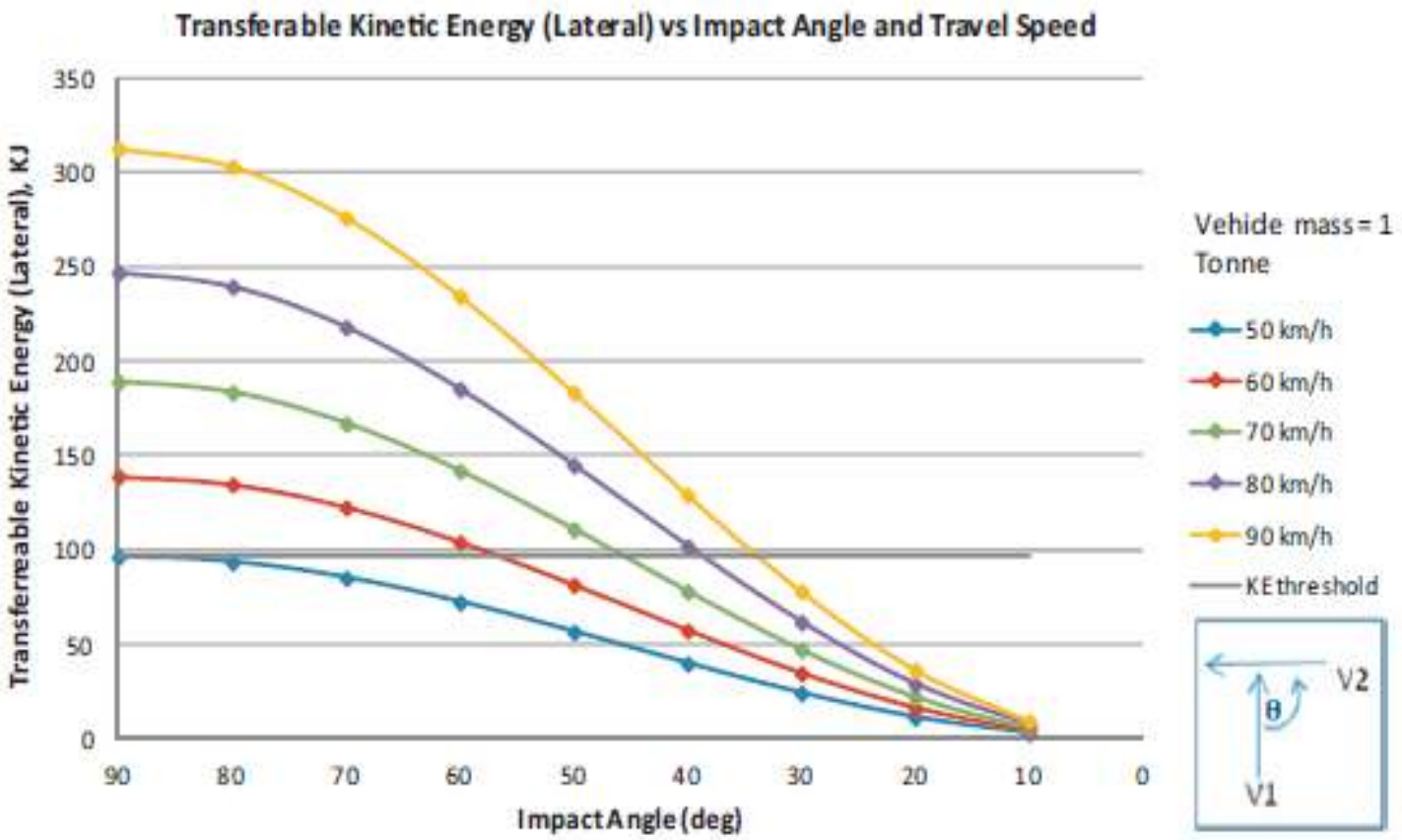
Distance covered during reaction time (1 second)

Braking distance

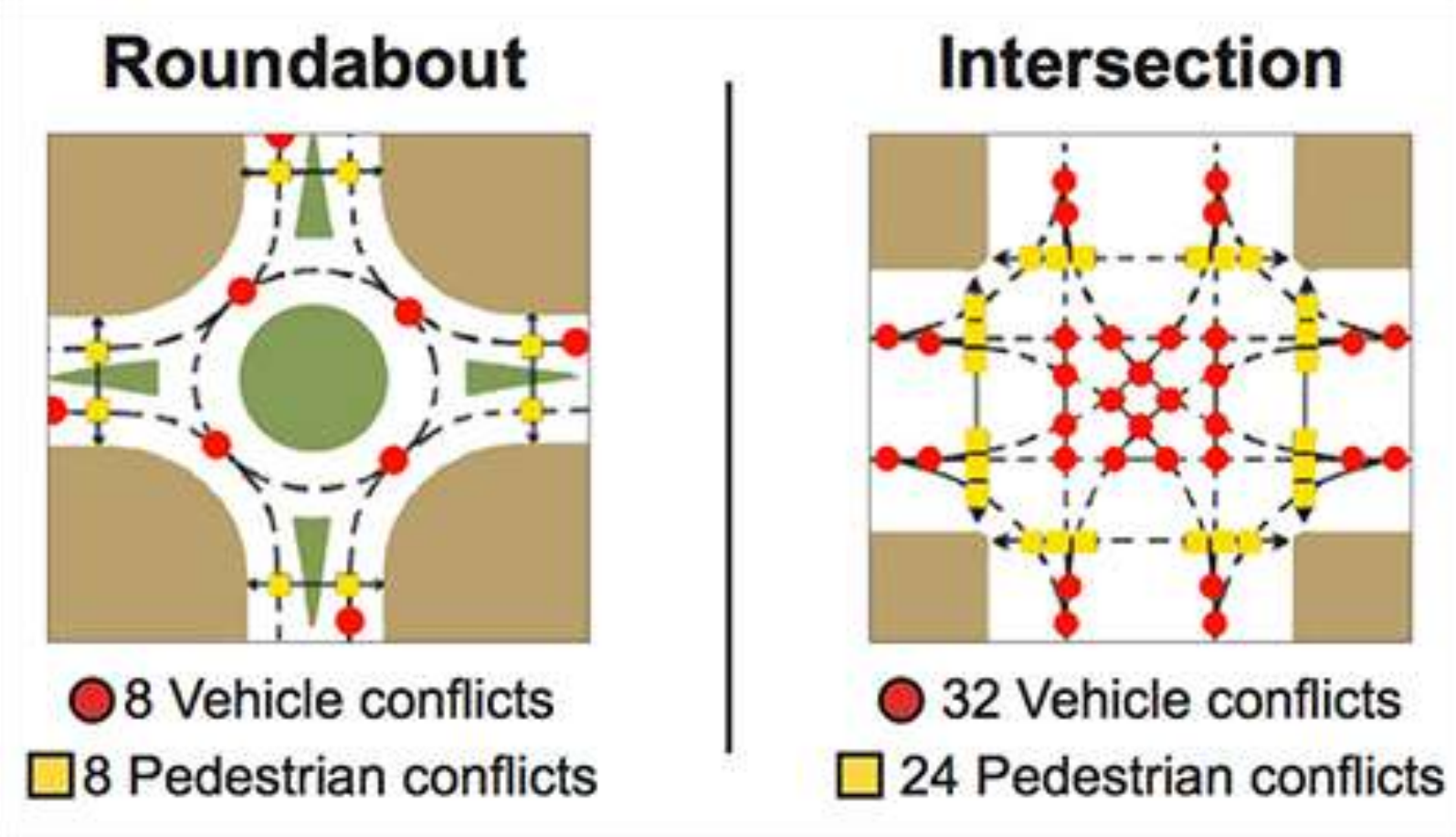
Intersection Design

- Intersection control conflicting and merging traffic.
- Three main types – signalized , unsignalized and roundabouts.
- Grade separated facilities are not desirable within urban limits and accessibility due to their adverse impact on accidents, pollution etc.
- Grade separated facilities divide urban landscape into separate zones, making pedestrians and cyclists extremely vulnerable.

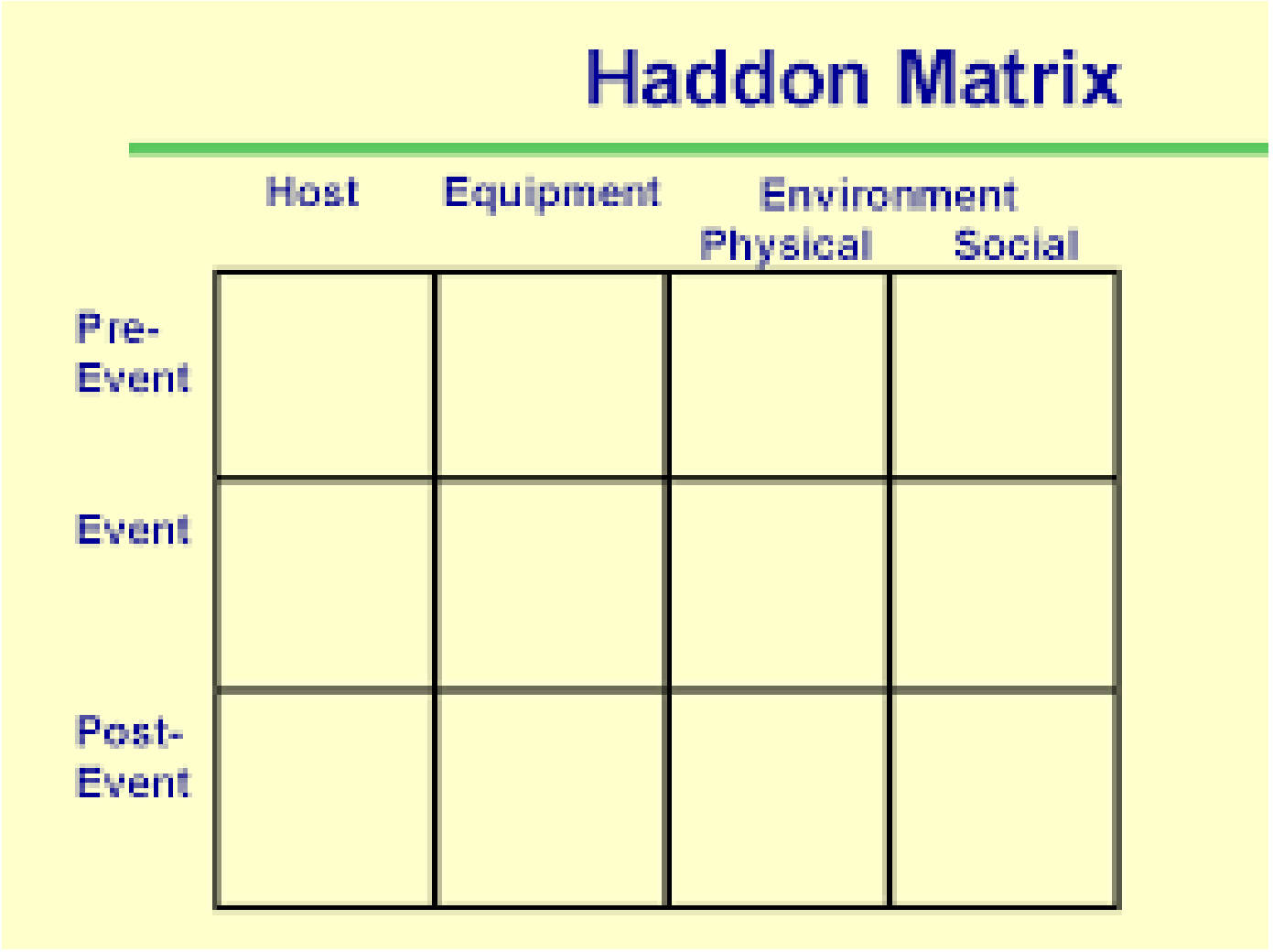
Impact angle, Kinetic energy and travel speed



Roundabout safety



Public health Approach to Traffic Safety

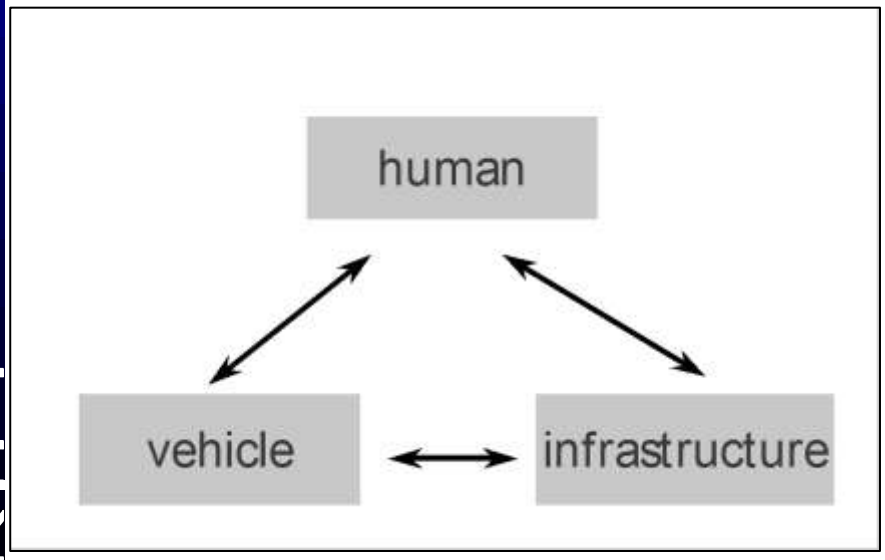


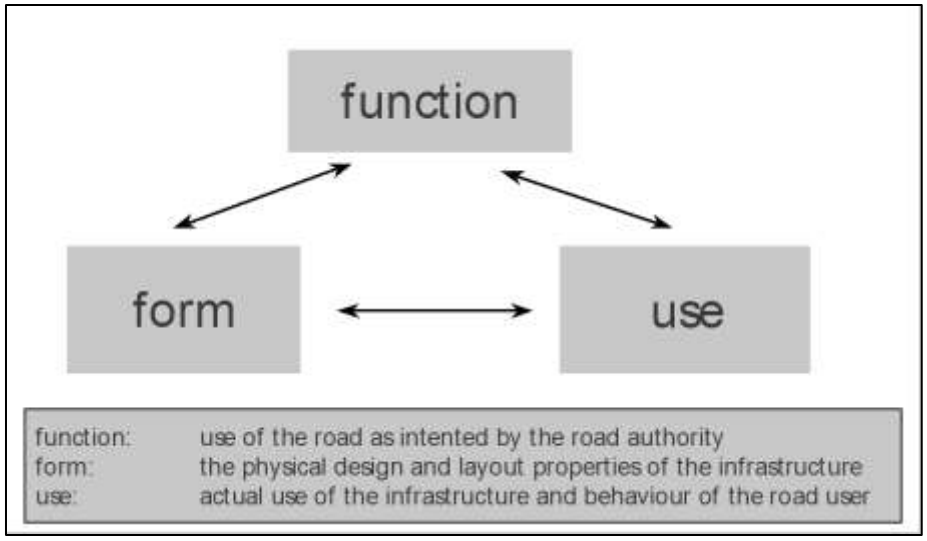
Sustainable Safe traffic system

a road environment with an infrastructure adapted to the limitations of the road user;

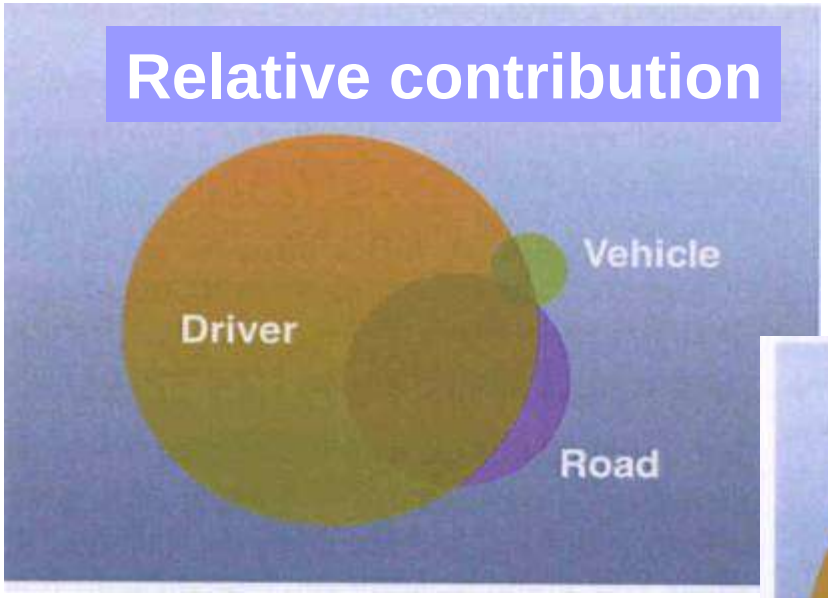
vehicles equipped with technology to simplify the driving task and provided with features that protect vulnerable and other road users; and

road users that are well informed and adequately educated.



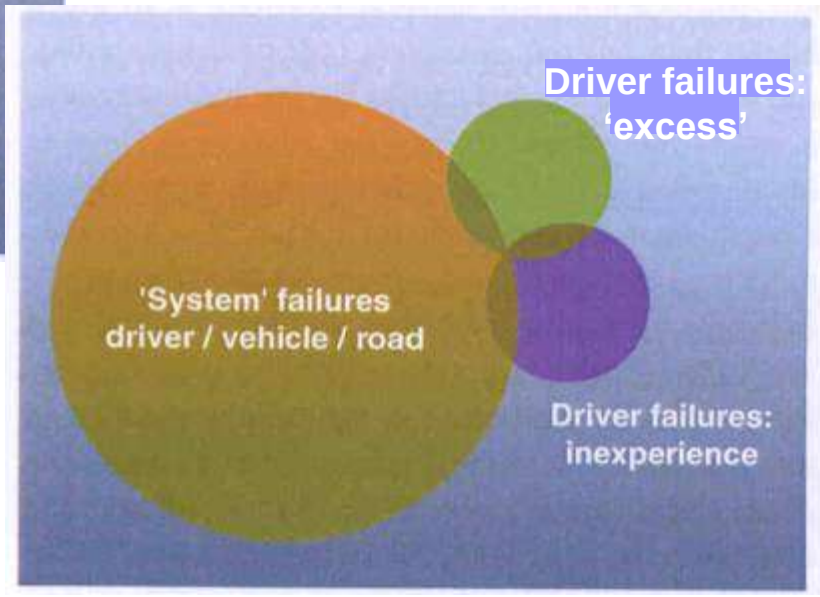


Discussion on a paradigm shift



MoRTH continues emphasis on driver's fault ~ 78%

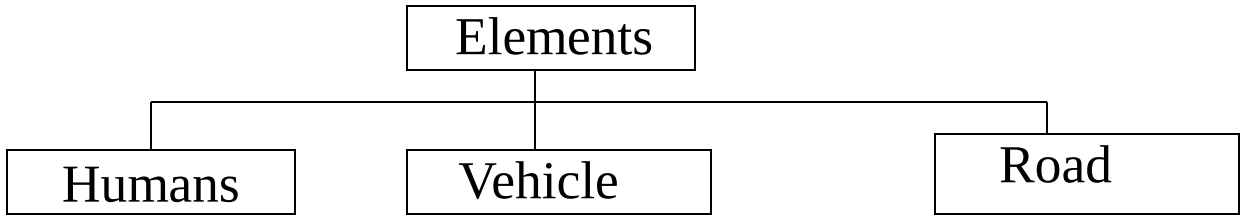
Based on police reports



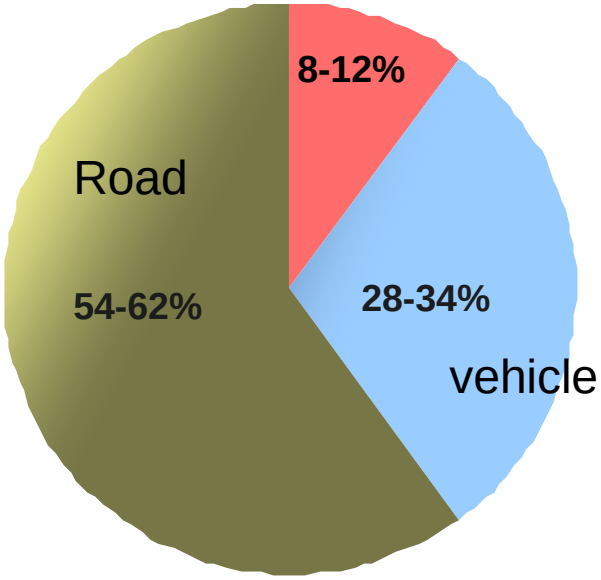
System approach:

RTC Elements & % age Contribution

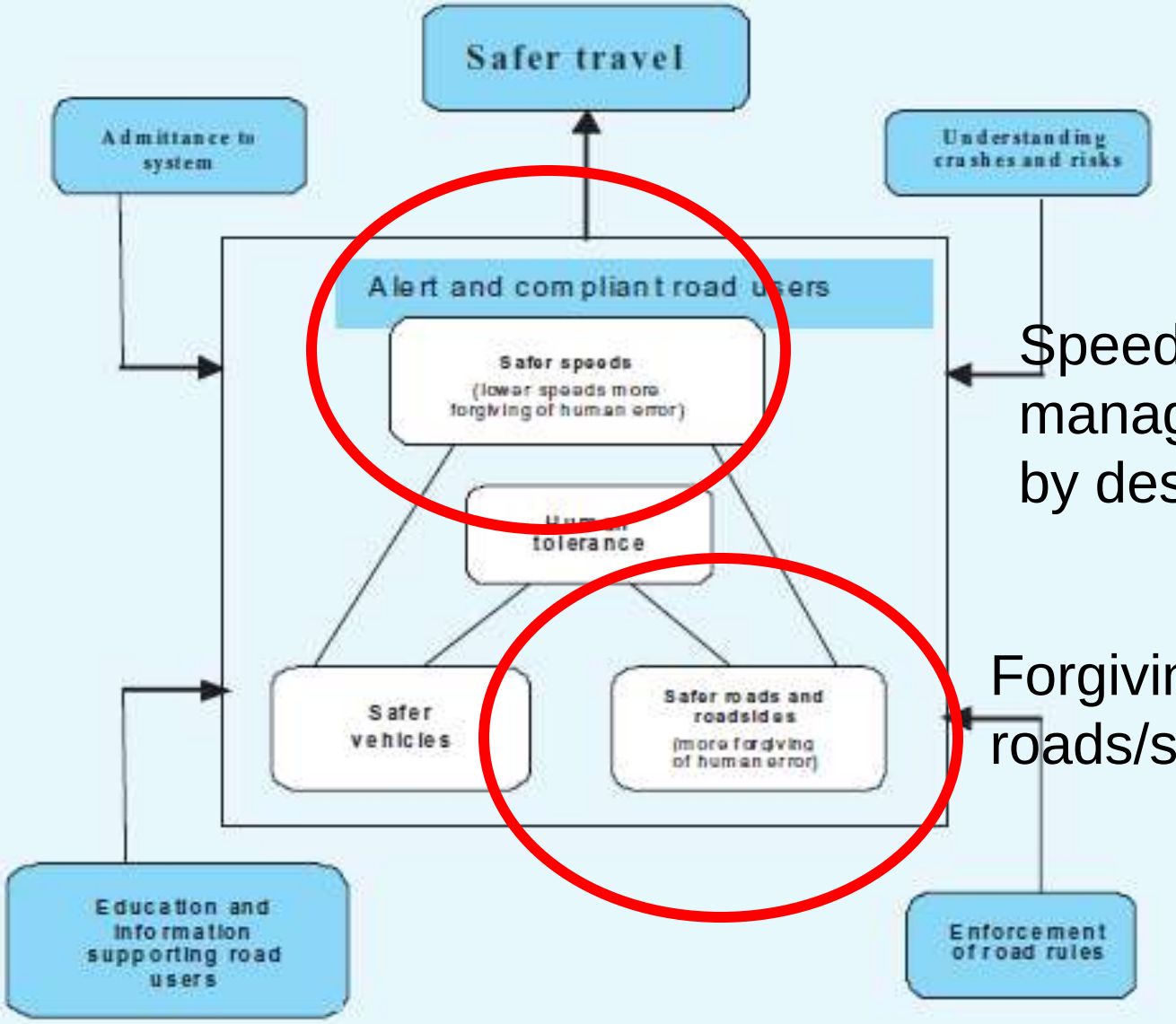
Basic elements of road accidents are;



%Age Contribution in Road Accidents by these Elements



SAFE SYSTEM APPROACH



Rumble strips laid thicker than the specified 15-25mm (according to IRC 39 –1986)

Design faults on newly constructed highways

Poorly Planned & Maintained Bus stand

raised median,

mixing of slow and fast traffic

Parked Vehicles in Bus Lay Bye

Wrong median-raised and fencing

Safe highways- median, audible markers, crash barrier

Shoulder rumble strips

14% reduction in all ROR crashes after the installation of shoulder rumble strips

Shoulder Rumble Strips

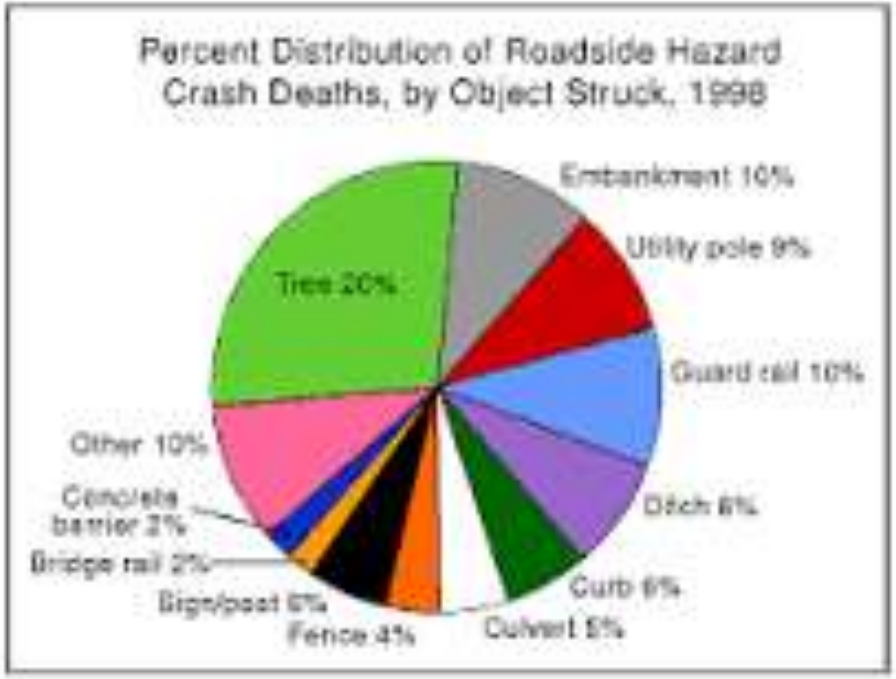
Problem: Roadway departures account for more than half of all roadway fatalities.

Roadway departure fatalities, which include run-off-the road (ROR) and head-on fatalities, are a serious problem in the United States. In 2003, there were 25,562 roadway departure fatalities, accounting for 55 percent of all roadway fatalities in the United States. That same year, more than 16,700 people died in ROR crashes (39 percent of all roadway fatalities). In 2008, 304 persons were killed in noninterstate roadway departure crashes in New York State.

Safe Highway (Japan)

Roadside Hazards

About a third of motor vehicle deaths involve vehicles leaving the roadway and hitting fixed objects such as trees or utility poles alongside the road. Almost all such crashes involve only 1 vehicle. **Roadside hazard**crashes occur in both urban and rural areas but are mostly a problem on rural roads.



Common methods for treating roadside safety Issues(European guidelines)

BEFORE

AFTER

1

Remove the obstacle

2

Redesign the obstacle

3

Relocate away

Common methods for treating roadside safety Issues(European guidelines)

4

Reduce
impact severity

5

Shield
the obstacle

6

Delineate
the obstacle

Rural Highway Development Issues

Guidelines for highway development generally follow international specifications and are not tailored to the country specific situations

- Presence of tractors, bicycles and other NMVs
- High density living pattern along the highways
- Bicycles and pedestrians not being conspicuous at night
- Truck drivers evolving peculiar behavior patterns to communicate with each other and other road users
- Road users avoiding traveling long distances to find gaps, and traveling in the wrong direction instead.

WORK ZONE ISSUES: Non-standard signs and barricades

Work Zone Crashes: Research Review

- Deaths and injuries at work zones are caused by a variety of factors (Lindly et al. 2002)
  - **speeding traffic**
  - inadequate visibility of signs
  - poor road surface condition
  - inadequate traffic control
  - improper management of material

Speed control by design

Way forward

- Traffic calming in urban areas and on rural highways passing through villages- **revise current standards**
- Separate bicycle lanes on arterial roads and service lanes along highways-**revise current standards**
- Mandatory road safety audit and implementation of VRU standards
- Enforcement of speed control **by design**

Suggested Priorities

- ***National Data Base and Statistical Analysis Systems.***
- **Establish safety departments within operating agencies. Monitoring and evaluation of ongoing projects)**
- **Fund multidisciplinary safety research centres at academic institutions. Trained professionals, Crash modification factors, revision of standards**