



MANAGING SPEED

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Speed Management Workshop Outline

Session 1: An introduction to the new CAREC RSE Manual
6- Speed Management, & evidence-based actions

Break out session : Best opportunities for improving speed management

Session 2: Countering the reluctance to manage speeds,
with evidence of successes and unexpected benefits

Break out session: Discussion of speed limits in CAREC countries



Session 1:

An introduction to the new CAREC RSE Manual 6 - Speed Management, & evidence-based actions

For the first 5 manuals: Go to the ADB website
Phil Jordan will introduce Manual 7 this afternoon.
This is Manual 6



The Speed Management Manual:

For practitioners, road designers/engineers, police, policy-makers, decision-makers, and legislator/politicians, at all levels of government.

- Explains and provides the evidence on what works in speed management for practitioners, and policy makers
- Provides the Psychology behind why some actions works and others do not
- Provides the evidence for the real economic as well as road safety benefits of stronger management of speed
- Encourages CAREC road authorities to devote more resources to Speed Management
- Considers common areas of resistance to stronger speed management, and how to address this



Structure of the Speed Management Manual

(Session 1)

Module I. Introduction to Road Safety in CAREC Countries and the Role of Speed

Module II. Road Design and Engineering

Module IV. Changing Road-user Behaviour

(Session 2)

Module III. Vehicle Technology

Module V. Modal Shift and City Planning

Module VI. Delivering improved Speed Management

Module VII. Evidence for the Role of Speed in Crashes: Dispelling the Myths & Misinformation



Module I. Introduction to Road Safety in CAREC Countries and the Role of Speed

- A. Purpose of This Manual
- B. Structure of this Manual
- C. Introduction: Global Road Safety & CAREC Road Safety
 - The CAREC Region is Distinctive, but Evidence from Other Countries Still Applies
- D. Safe System and Speed
 - Recommendations from Module I



First step: Speed is fundamental to road safety

I will cover evidence to show this later.

Want to start with how we can manage speeds

So, for now, just three facts from the manual:

- 1. Speed is a major contributor to both the occurrence of crashes and to severity.**
- 2. Each 1% reduction in speed will deliver a 4% reduction in deaths.**
- 3. Lower speeds generally IMPROVE the economy. Speeding-related crashes are on average costing CAREC countries over 2.3% of GDP each year. This is an avoidable economic drain.**
- 4. In CAREC countries, a 10 km/h reduction in average speeds in each of the most common speed limits would deliver a reduction in deaths by approximately 53%.
No other direct change can achieve such an impressive saving of lives (and injuries).**



Is the evidence from elsewhere applicable in CAREC Countries

The CAREC region is diverse & distinctive (even within countries)

- Huge to small countries; Fertile river valleys, extreme mountains, deserts, forests
- Extreme cold (with the two coldest capital cities on earth) to hot, dry to monsoon
- Many distinctive cultures, religions, languages, and political systems
- Across countries, motorcycles vary from a huge safety problem to a small contributor.

MOST evidence of what works still applies

- We have much more in common- especially on the effects of Speed:
 - Laws of Physics, human body vulnerability, we all make mistakes, we share psychology
- Speed has the same effects everywhere
 - More extreme in CAREC with higher risk roadsides & more vulnerable road users (pedestrians, motorcycles, bicycles) [CAREC average: 34% of deaths are pedestrians, good road safety countries average 16%]

Apply in CAREC: All the interventions (road and vehicle engineering, enforcement).

Many instances of evidence from CAREC prove this.

Do not apply in CAREC: Messages/Campaigns must be designed to culture and beliefs



The Evidence applies:

Many examples of evidence from CAREC and LMICs are provided in the Manual

TOTAL in Manual = 25 examples studies & evaluations from LMICs, including 10 from CAREC

CAREC and other LMIC examples

Raised pedestrian crossings

- ✓ Pakistan: Raised pedestrian crossings were shown to improve safety in Karachi.

Roundabouts

- ✓ Georgia: Converting stop sign controlled intersections to roundabouts resulted in dramatic savings: a 69% reduction in injury and fatal crashes

Pavement marking to narrow lanes

- ✓ In China, a variety of multi-coloured pavement markings (which can narrow lanes) have been shown to improve separation of vehicles (headways), to reduce travel speeds, and reduce crashes.

Speed has the same effects everywhere: BUT More extreme consequences in CAREC with higher risk roadsides & more vulnerable road users (pedestrians, motorcycles, bicycles)
[Examples photos - 4 CAREC countries]



Safe system is the key to success in HICs and LMICs

Unsafe System

Safe System



Safe system is the key to success in HICs and LMICs

Unsafe System



Safe System

Problem of crashes

System user



Problem of injury

System designer

Safe system is the key to success in HICs and LMICs

Unsafe System



Safe System



Problem of crashes



Problem of injury

System user



System designer

Module II. Road Design and Engineering

A. The Powerful Opportunities

Traffic Calming (Road engineering interventions)

B. Setting the right speed limit and operating speed

C. Prioritizing Road Design and Engineering Opportunities

- Recommendations for Road Design and Engineering



Safe system evolution

Examples from CAREC

Unsafe System



Safe System



Problem of crashes



Problem of injury

System user



System designer

Safe system evolution

Examples from CAREC

Unsafe System



Safe System



Problem of crashes



Problem of injury

System user



System designer

Safe system evolution

Examples from CAREC

Unsafe System

Lessons in

Safe System

Cost & the way people use the road



Problem of crashes

Problem of injury

System user

System designer

More Examples from CAREC [Note: Speed humps with a lower profile are effective in higher speed zones]



Setting the right speed limit and operating speed

**Common View: Road surface and designated purpose of the road
are key in setting speed limits
(A rural highway in Chad)**



What matters: Road classification or road usage?

Rural “highway” in Chad: Is 80+km/h right?



What matters: Road classification or road usage?

Actual road usage and roadside functions matter for road safety:
Examples from CAREC



Probably get the speed limit right by
considering the road surface, not its function

What matters: Road classification or road usage?

Actual road usage and roadside functions matter for road safety:

Examples from CAREC



Mountain highway or village meeting place?



What matters: Road classification or road usage?

Actual road usage and roadside functions matter for road safety:

Examples from CAREC



Mountain highway or village meeting place?



Highway or shopping centre/market?





Good practices exist in CAREC Countries, but are not used enough



Gateway treatment design example (for roads going into an urban area)

- Makes the change of speed highly visible and forces speed down at the start
- Proven to reduce speeding and reduce serious crashes



Module IV. Changing Road-user Behaviour

A. Enforcement and communications

- How to achieve Behaviour Change: the Psychology behind getting Enforcement to work
- Why is deterrence so effective for road safety?

B. Maximising the Benefits of Enforcement and the Power of General Deterrence

General and Specific Deterrence

The features which create better general and specific deterrence

C. What works in behaviour change

D. Prioritizing Behaviour Change Opportunities

- Recommendations for Behaviour Change



How to achieve Behaviour Change: Psychology

Road Safety is:

- **First – A road System problem**
 - Solved by Safe System
- **Second - Motivation problem**
 - Main behaviours in crash deaths in CAREC (country data)

SPEEDING, DRINK-DRIVING, DISTRACTION (???), FAIL TO GIVE WAY (probably due to speeding or fatigue or), SEATBELT NON-USE, MOTORCYCLE HELMET NON-USE

Example 1: **Drink-driving** - People know it's illegal; its not a skill to avoid driving after drinking.

Drink-driving is a choice- a motivation problem

Example 2: **Speeding** – people (almost always) know the speed limit; its not a skill to drive below 60 km/h in a 60 zone. Speeding is a choice- a motivation problem

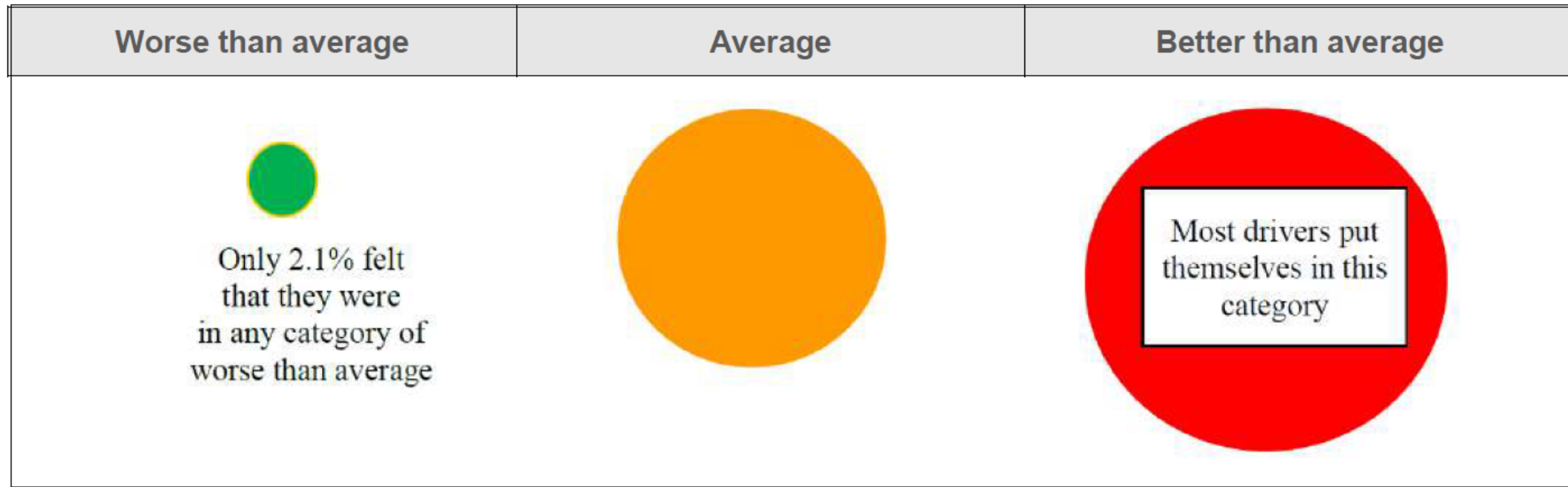
Same for using a phone while driving, same for putting on a helmet or a seatbelt



a. Misjudgment of risk (evidence)

Examples:

1. Personal experience
2. Optimism bias/ driver over-confidence

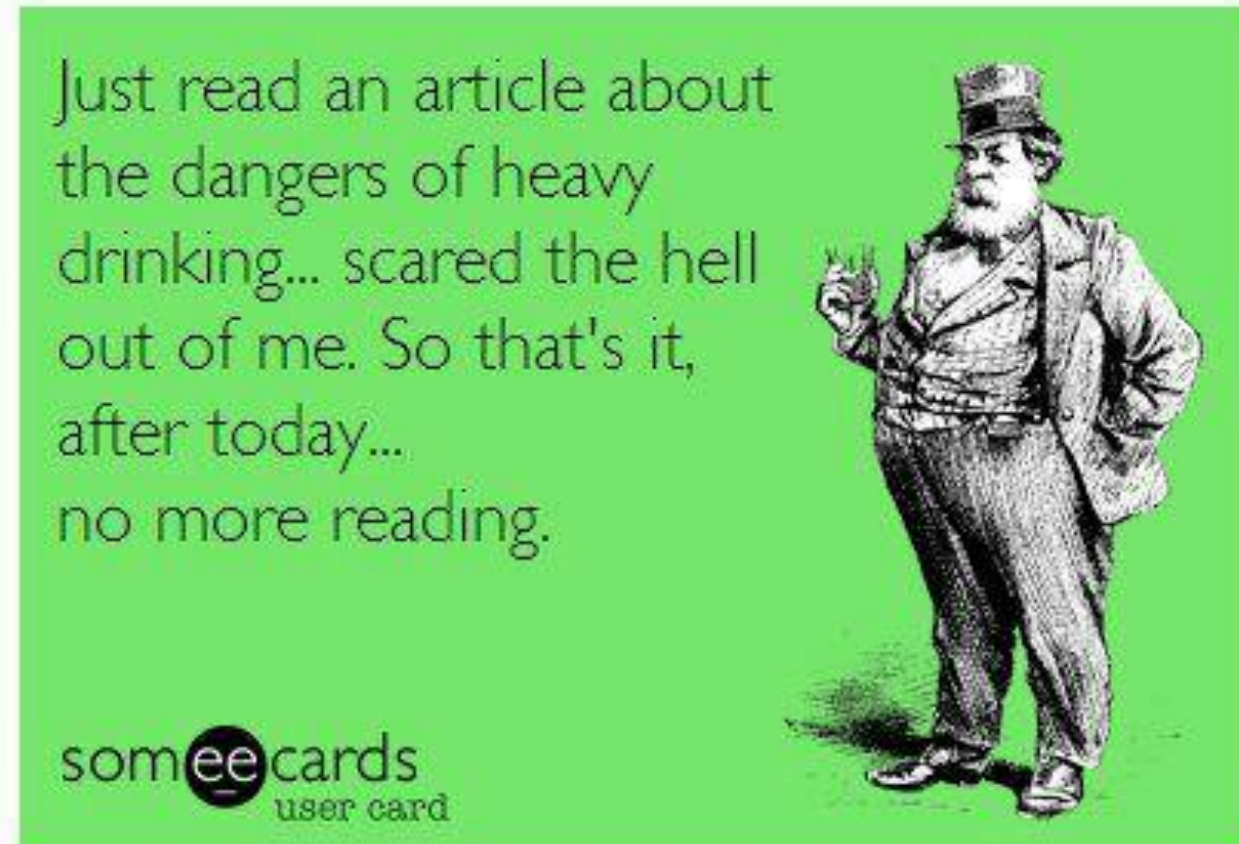


Source: Adapted from Job (1990)

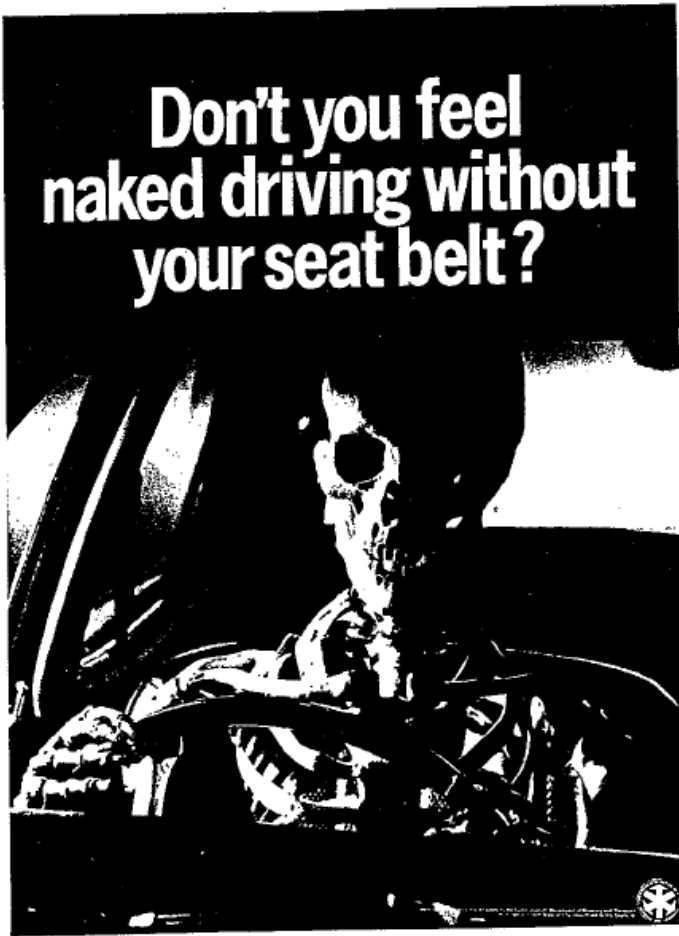
Education: Higher fear messages

- More denial
- More driver over-confidence
- Less listening to the message

Source: Job (1988)



EVIDENCE: High Fear Education/Campaigns versus Enforcement



“Click-clack front and back

Or a \$50 fine”

Speeding: Hundreds of studies show speed cameras save lives and injuries – including in CAREC (many are noted in the Manual)

**Many high fear campaigns:
Seatbelt wearing went to 25%**

**New law and one enforcement campaign:
Seatbelt wearing went to over 90%, now 99%**

Question: Why not just train better drivers instead of enforcement?

Answer: More car handling skill leads to more crashes

- **Evidence shows:**
 - more skills = more crashes
 - More skills training = more crashes
- Racing car drivers.....Have more crashes on public roads than average drivers

More skill



more confidence



more risk taking



more crashes

How to achieve Behaviour Change: Psychology

Factors to consider	Driver skills training	Education (what to do, crash risk)	Reward the right behaviour	Enforcement (and campaigns on enforcement)
Is it addressing a relevant factor?	Road safety is not a skill problem	Road safety is not a knowledge problem	Logic is sound: Consequences motivate	Logic is sound: consequences motivate
Is it practical?	-	-	Costs are too high to get impact of fines	Yes
Is the timing right?			Connection to behaviour is weak (long delay)	Strong to moderate
Does this connect to the right behaviours	-	-	No. Connects to not being caught	Yes (and with campaigns can increase general

Deterrence

(The threat of punishment to change behaviour)

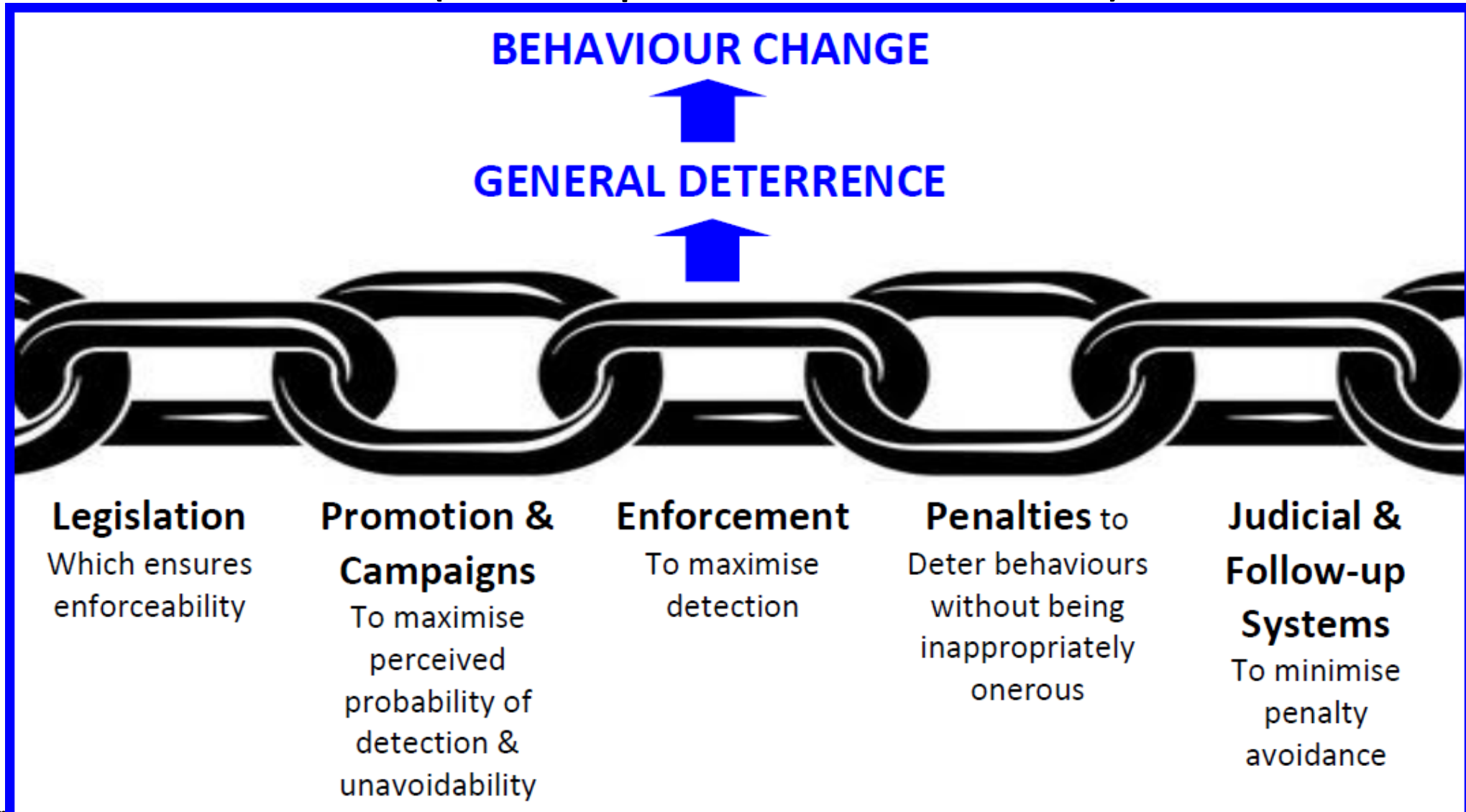
General deterrence: Deterring the general population with having to catch everyone (by getting people to believe they are likely to be caught if they speed, or)

Specific deterrence: Deterring individuals by catching them

**General deterrence is much more important for road safety
(It influence many more people)**

Chain of Processes Necessary for General Deterrence and Behaviour Change in Road Safety

(Developed for this Manual)

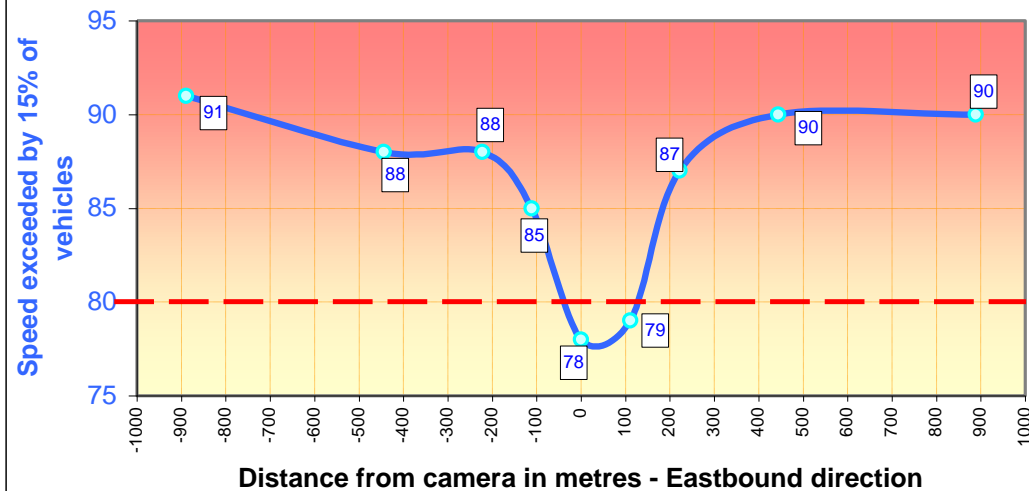


Some good Speed Enforcement practices in CAREC

- ✓ Fixed and mobile speed cameras



EXAMPLE OF SPEED PROFILE AROUND A FIXED SPEED CAMERA IN AN 80 KM/H ZONE



- ✓ Mix of signposted and covert (no signs) speed cameras, or no signs on any cameras
(Better than some HICs)

Questions & Discussion are most welcome



BREAK OUT SESSION 1: BEST OPPORTUNITIES FOR IMPROVING SPEED MANAGEMENT

15 minutes to discuss

Which are the best road engineering opportunities for CAREC?..for your country?

Which are the best behaviour change opportunities for CAREC?..for your country?

Brief report back soon after: appoint a spokes person or two. **Time will be limited.**



BRIEF REPORT BACK: FROM BREAKOUT 1

**BEST OPPORTUNITIES FOR IMPROVING
SPEED MANAGEMENT**

Session 2:

- 1. Vehicles**
- 2. Modal shift**
- 3. Delivering Speed Management**
- 4. Powerful evidence: Managing resistance to Speed management**



Module III. Vehicle Technology

- A. Challenges to be overcome to improve vehicle technology
- A different type of Assessment of Road Safety Value
- B. **Vehicle Technology (Vehicle interventions to help limit speeds)**
- C. Prioritizing Vehicle Technology Opportunities
- Recommendations for vehicle technology



Speed Governing

- Sets a maximum speed for a vehicle, and prevents the engine from pushing the vehicle past that speed
 - Used of trucks and buses
 - Requires enforcement (vehicle checking)
 - Good practice: If a speed limited vehicle is caught above its supposed maximum speed by speed enforcement (unless on a significant downhill slope) – large extra penalty and vehicle impoundment

Intelligent Speed Adaptation (ISA) or Limiting

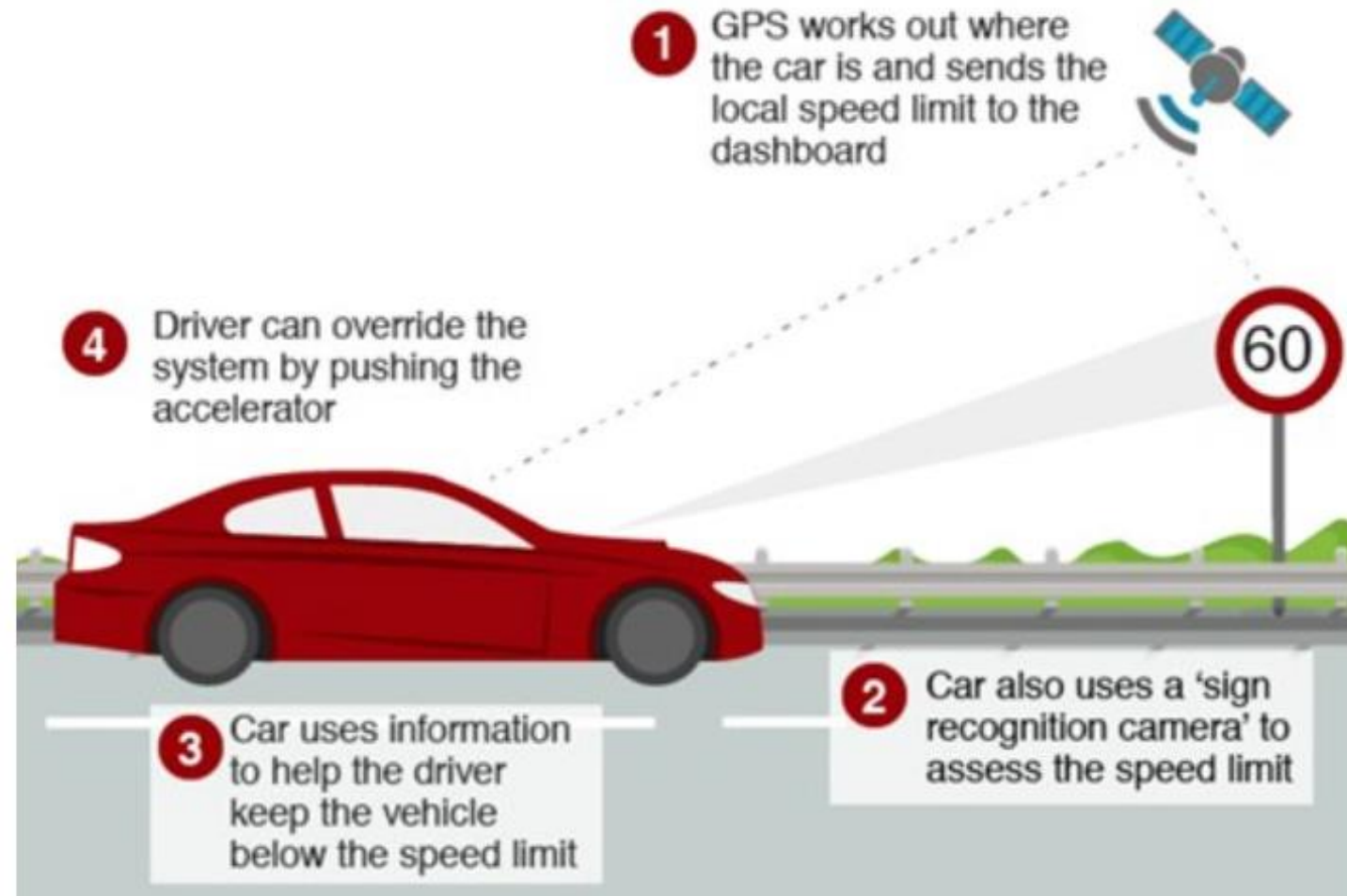
How does speed limiting work?

European Union:

Made ISA mandatory for new vehicles
= Increased opportunity for others to follow

Evidence- More forceful (intervening)
ISA works much better for road safety
than pure advisory.

(Requires speed zone mapping)



Safe system evolution

Examples from CAREC

Unsafe System

Safe System

**Rely on the driver to
select a safe speed**



**Use technology and
engineering to
ensure a safe speed**

Problem of crashes



Problem of injury

System user



System designer

Recommendations for vehicle technology

- Mandatory **Intervening** ISA which cannot be over-ridden by the driver:
 - **Evidence**- The strongest vehicle technology opportunity for speed management
 - Can be regulated for all new and imported vehicles with a reasonable start date.
- **Speed limiters** which limit vehicles (especially trucks, buses, and goods vans) to a maximum speed equal to or lower than the speed limit on rural roads (not highways)
 - Evidence- Good vehicle technology opportunity
- Vehicle industry advice on the start date was proven to be false in the EU's regulation of ISA, and so should be interpreted with concern for self-interest.
- Advisory ISA
 - Weaker opportunity, but still worthwhile.

Module V. Reducing Speed through Modal Shift and City Planning

- A. [Modal Shift](#)
- B. Urban (land use) planning
- C. Prioritizing Modal Shift and City Planning Opportunities
 - Recommendations for Modal Shift and City Planning



Modal Shift

Road diets

- Building/expanding/improving **effective alternative options to road transport**: metro, rail, water transport such as ferries, air, BRT systems, and safe active transport.
- Ensure alternative transport is highly cost competitive through: Shift costs through levies on private vehicle road use, subsidising mass transit.
- Ensure alternative transport systems is faster (and comfortable): Take available road space for alternative transport, give priority at intersections, lower road speed limits...



Examples in CAREC

Modal Shift in CAREC

Separate MC or BC lanes- Road diet as well as improved safety for cyclists and motorcycles)



Module VI. Delivering improved Speed Management

A. Selecting the best Speed Management Actions

- Selection processes

B. Managing and Delivering Implementation

- Persuade key decision makers, and required partners and stakeholders
- Identify potential risks and develop mitigation strategies
- Monitoring, Evaluation, and Continuous Improvement



Decision points to select the most effective actions for your country

Decision Process 1: Situational Assessment- What is the nature of the speeding problem in your country/state/municipality?

Decision Process 2: Which are the best (& best value) interventions?

Decision Process 3: Which are the best interventions for your country?

Decision Process 4: What can we feasibly achieve?

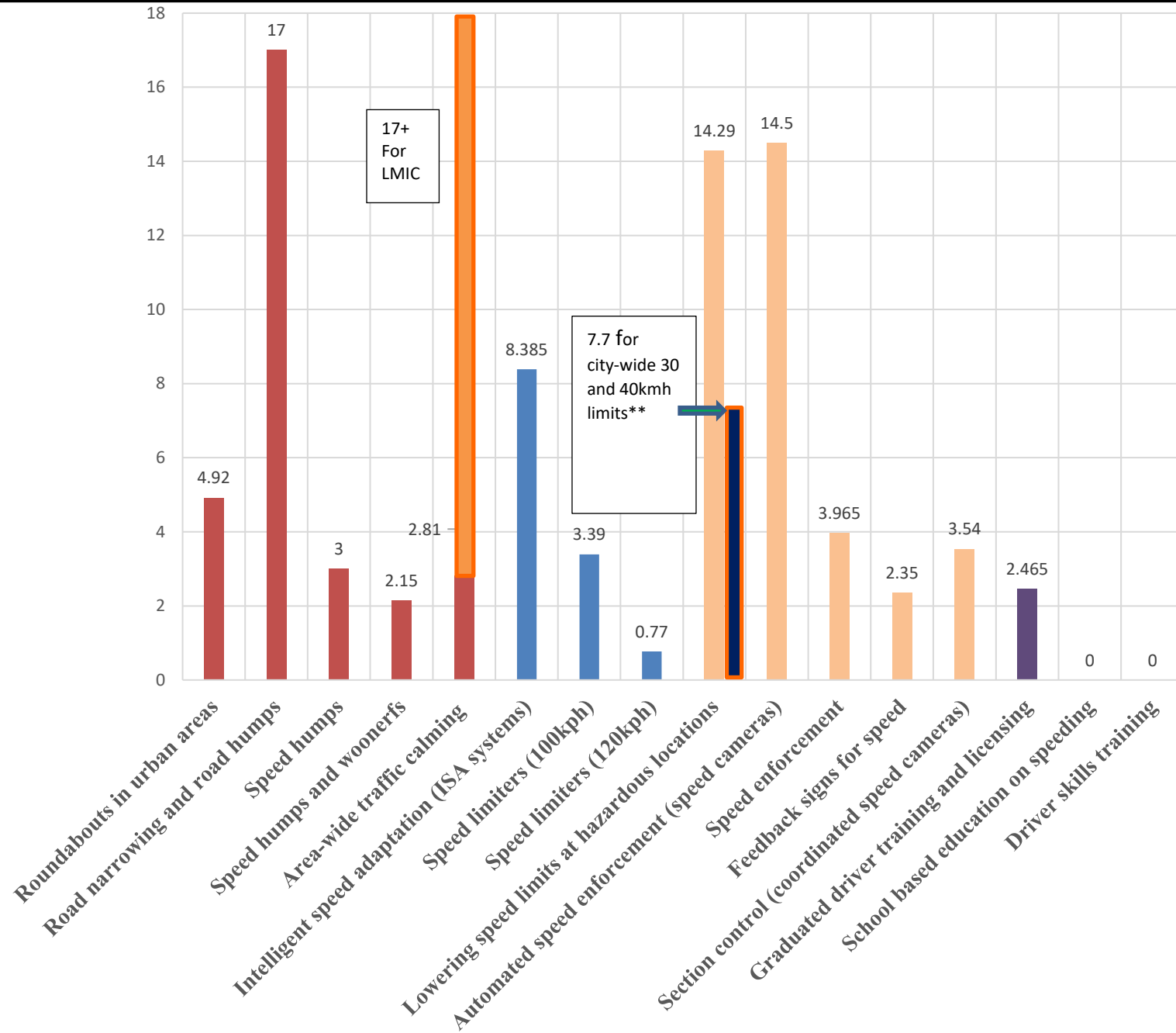
Decision process 5: Is funding available (including from different partners)?

(next few slides are a few relevant pieces of evidence)

Decision process 3: Which are the best interventions for your country?

Country	Urban Speed Limit (km/h)	Comparison with SS Speed of 30 km/h (km/h)	Calculated Decrease in Deaths, Urban*	Rural Speed Limit (km/h)	Comparison with SS Speed of 70 km/h (km/h)**	Calculated Decrease in Deaths, Rural*
Afghanistan	90	Too high by 60	17 times lower	90	Too high by 20	3 times lower
Azerbaijan	60	Too high by 30	6 times lower	90	Too high by 20	3 times lower
China	N/A	N/A	N/A	N/A	N/A	N/A
Georgia	60	Too high by 30	6 times lower	90	Too high by 20	3 times lower
Kazakhstan	60	Too high by 30	6 times lower	110	Too high by 40	6 times lower
Kyrgyz Republic	60	Too high by 30	6 times lower	90	Too high by 20	3 times lower
Mongolia	60	Too high by 30	6 times lower	80	Too high by 10	2 times lower
Pakistan	90	Too high by 60	17 times lower	110	Too high by 40	6 times lower
Tajikistan	60	Too high by 30	6 times lower	90	Too high by 20	3 times lower
Turkmenistan	60	Too high by 30	6 times lower	90	Too high by 20	3 times lower
Uzbekistan	70	Too high by 40	9 times lower	100	Too high by 30	4 times lower
Average for CAREC	67	Too high by 37		94	Too high by 24	
Average for good road safety countries	53	Too high by 23		90	Too high by 20	

Benefit-Cost Ratio



**Decision
Process 2:**
Which are the
best (& best
value)
interventions?

Assessment of the best interventions for managing speed in CAREC countries					
Intervention type	Impact	Sustain-ability	Best Value (benefit: cost ratio)	Safe System contribution	Overall Recommended Priority for CAREC
Road Engineering that forces speeds down (Speed humps, etc.)	High	High	Up to 17:1	Strong	Priority 1
Vehicle technology that forces speeds down (speed limiters, governing ISA)	High	High	Up to 8:1	Strong	Priority 2
Behaviour change via general deterrence (including enforcement and communications/messaging based on enforcement)	High	Weak (enforcem ent)	3:1 to 14:1	Weak	Priority 3
Road engineering that assists drivers to lower speeds (lower speed limits)	Moderate	High	Below engineering forces speeds down	Moderate	Priority 4 when used alone which still works
GLS with additional speed limits and higher penalties for speeding for novice drivers	Moderate	Moderate	Not known	Weak	Priority 5
Vehicle technology that assists drivers to lower speeds (Advisory ISA)	Moderate	Moderate	Much lower than speed governing	Moderate	Priority 6
Campaigns based on the risk of crashing	Weak	Weak	Low	Weak	Low priority (useful to support strong enforce...t)
Education or training of drivers	Bad	Weak	Zero	Zero	No Priority

Managing and Delivering Implementation

Persuading key decision-makers, required partners and stakeholders (to support and fund speed management actions)

In CAREC and everywhere this is a big issue, because speed management is generally misunderstood

- Map those we need for support and success
- Lobbying, preparing business cases, and preparing media speaking points for partners, decision makers, politicians, and various other stakeholders to support certain interventions. Road safety NGOs can also be especially important influencers.

The Speed Management Manual provides information and evidence to use

The Speed Management Manual presents the common mistakes on speed and shows how they are wrong (will cover some in the last Module)

Module VII. The Evidence for the Role of Speed in Crashes: Dispelling the Myths and Misinformation

A. The Contribution of Speed to crashes and their severity

B. The Contributions of Speed to Crash Trauma

C. Economic costs of Crash Deaths and Injuries

A Warning on crash data to estimate the role of speed and speeding

A Warning on what does not work

D. The Known Effects of Speed Apply in CAREC Countries

E. Dispelling the Myths and Misinformation on Speed

Recommendations from Module VII



Evidence for the Role of Speed in Crashes & its Uses

Purposes

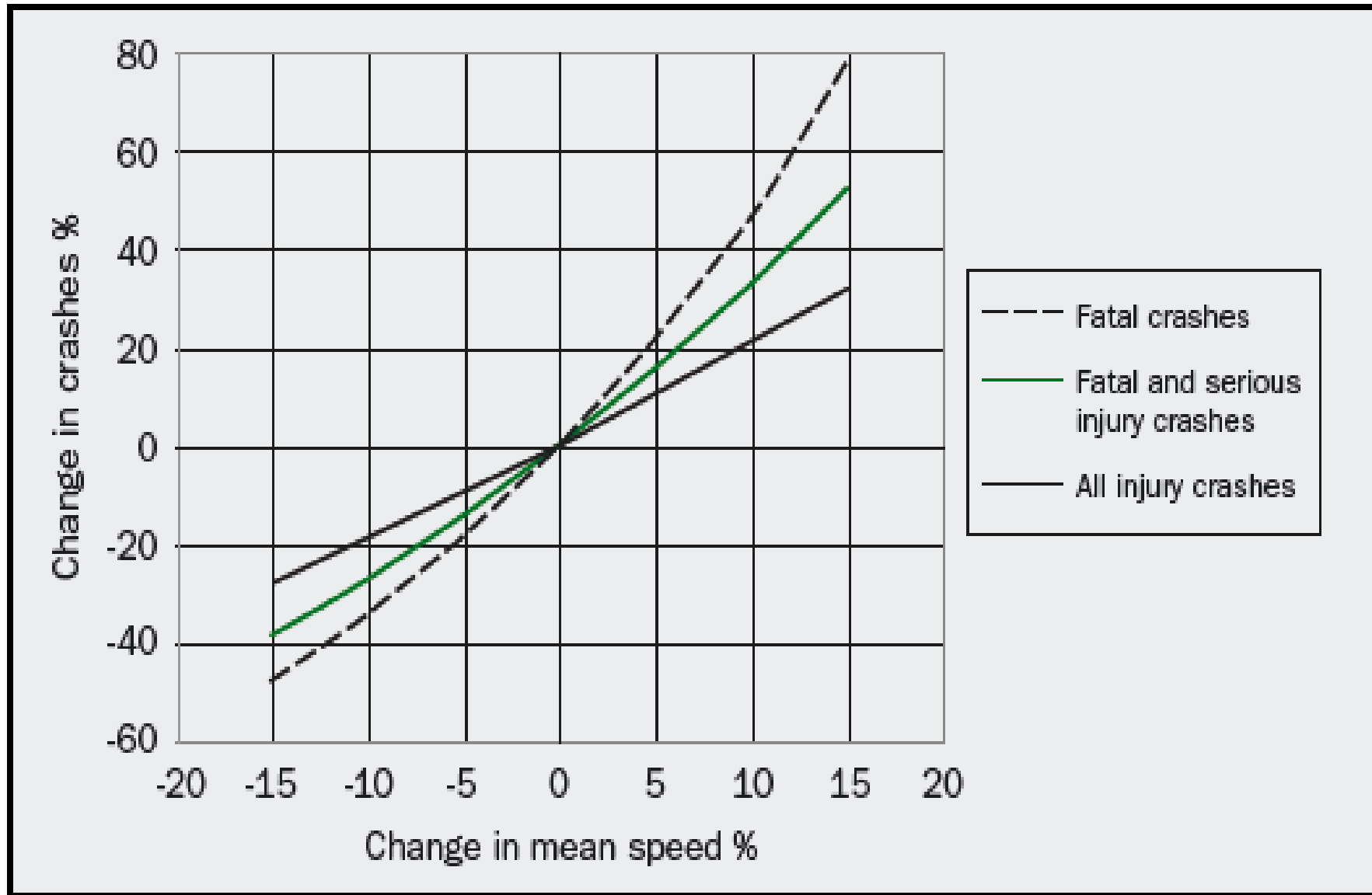
- ✓ To understand why speed management is critical
- ✓ For persuading those we need to support it (noting that local evaluations will help more)
- ✓ To dispel many mistaken beliefs on speed management

Types of Evidence

1. The effects of changes in travel speed on serious crash risk
2. Case-control studies of speed and serious crash risk
3. The effects of impact speed on the chances of surviving the crash
4. The scientific evidence for life and injury saving effects from many interventions which reduce speeds



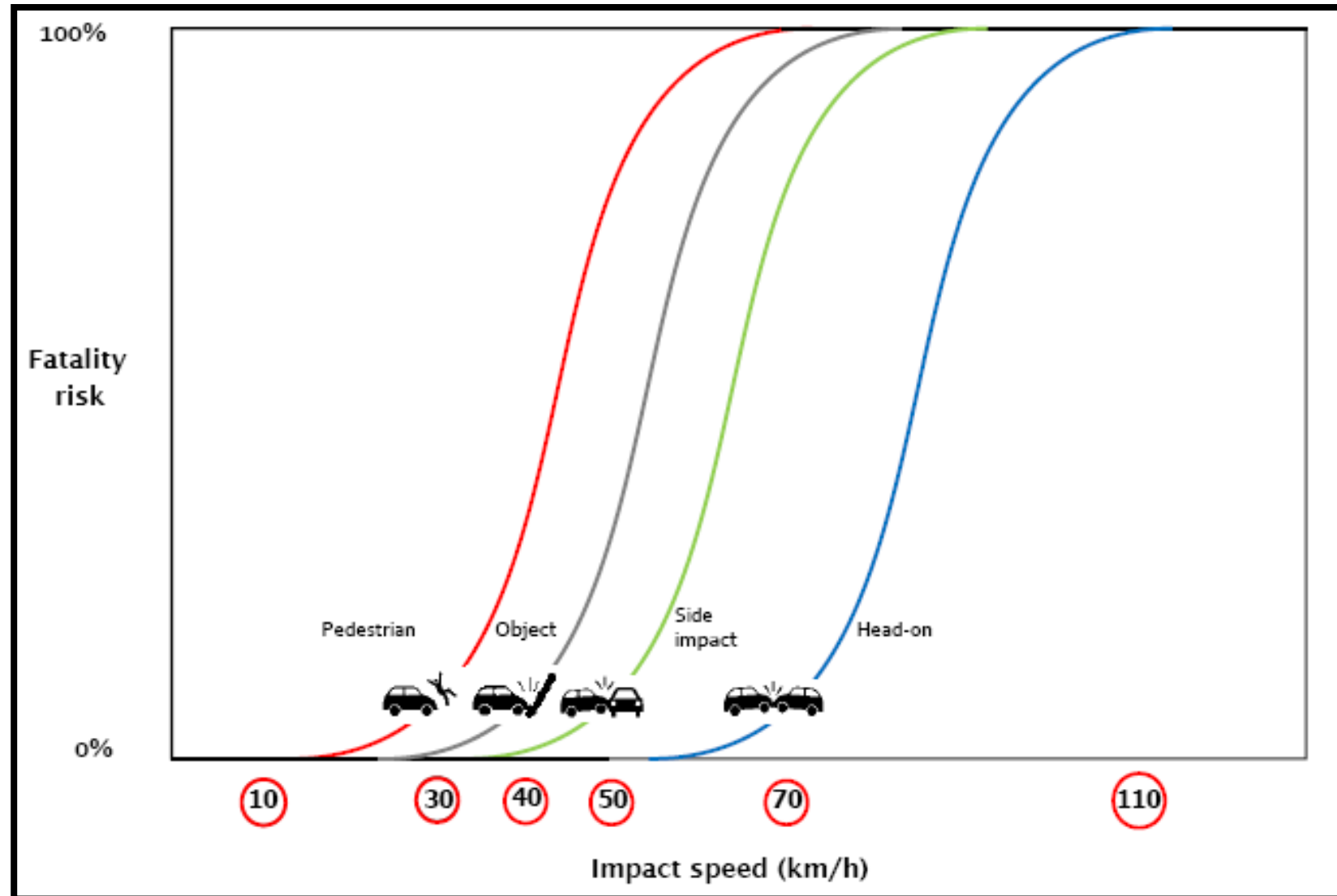
Effect of changes in travel speed (Source: Nilsson, 2004)



Small changes in speed have large impacts on road crash deaths and injuries: Each 1% decrease in speed results in approximately a 4% decrease in deaths and a 3% decrease in serious trauma (death or serious injury)

Risk of death by speed of impact for different crash types

(Source: GRSP- and originally Wramborg, 2005)



A. The Contribution of Speed to crashes and their severity

Misjudgment of the importance of differences in speed

Common MISTAKEN belief:

10kmh difference at the start = 10kmh difference at the of
stopping or in a crash
(so....not very important)

EVIDENCE

10kmh difference at the start (100kmh versus 110kmh)

Considering

judgement time

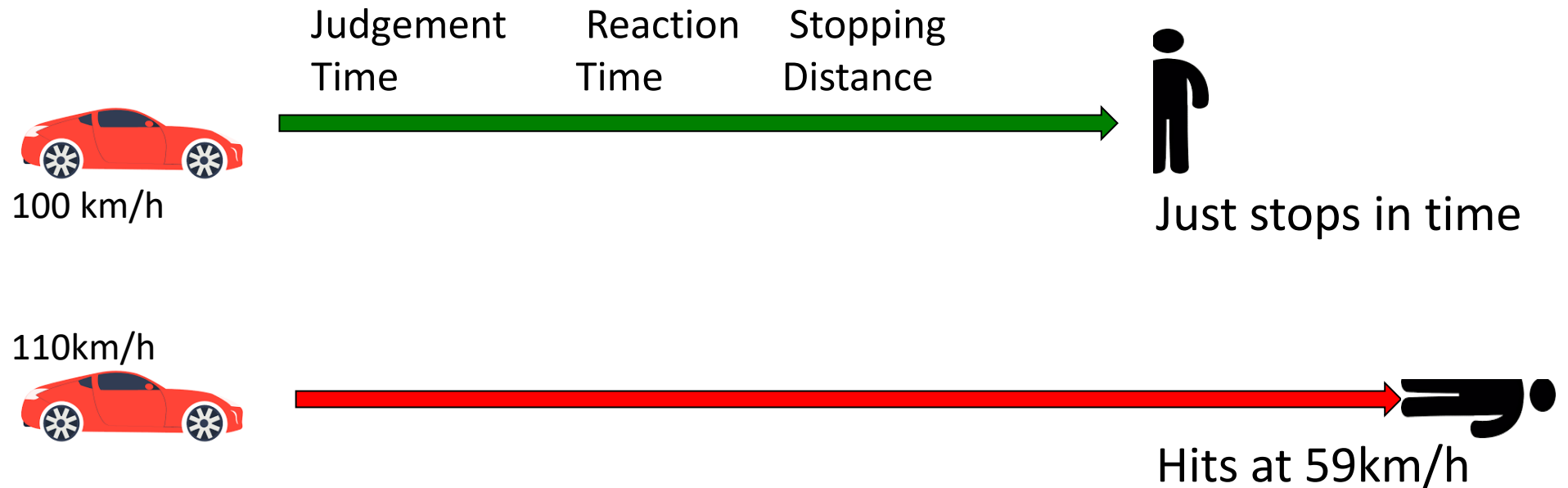
reaction time

braking deceleration

= ? kmh difference at the end

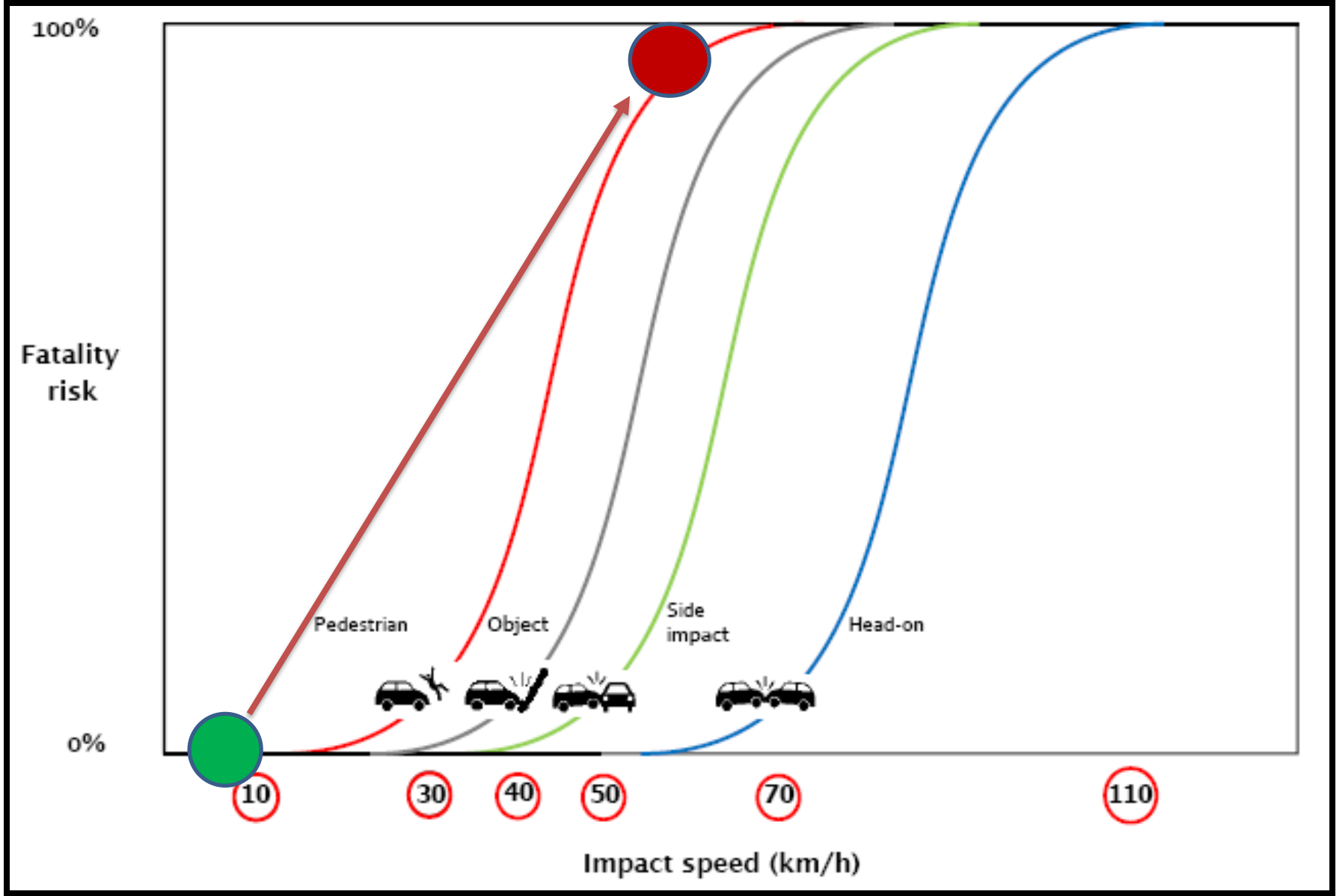
Reality of Physics

Small differences at start = **LARGE** difference at end



Difference caused by 10 km/h at the start = NO Crash to a FATAL crash

Risk of death by speed of impact changes for different crash types (Source: GRSP- and originally Wramborg, 2005)



MYTHS: WRONG BELIEFS ABOUT SPEED

We have been deliberately misled on the costs and benefits of speed

Myth 1: Higher speed is better for the economy

Myth 2:

Myth 3: Higher speed limits solve congestion

Myth 4:

Myth 5:

Myth 6:

Myth 7:

Myth 8:

Myth 9:

Myth 10: Mostly it is the extreme speeders who have serious crashes

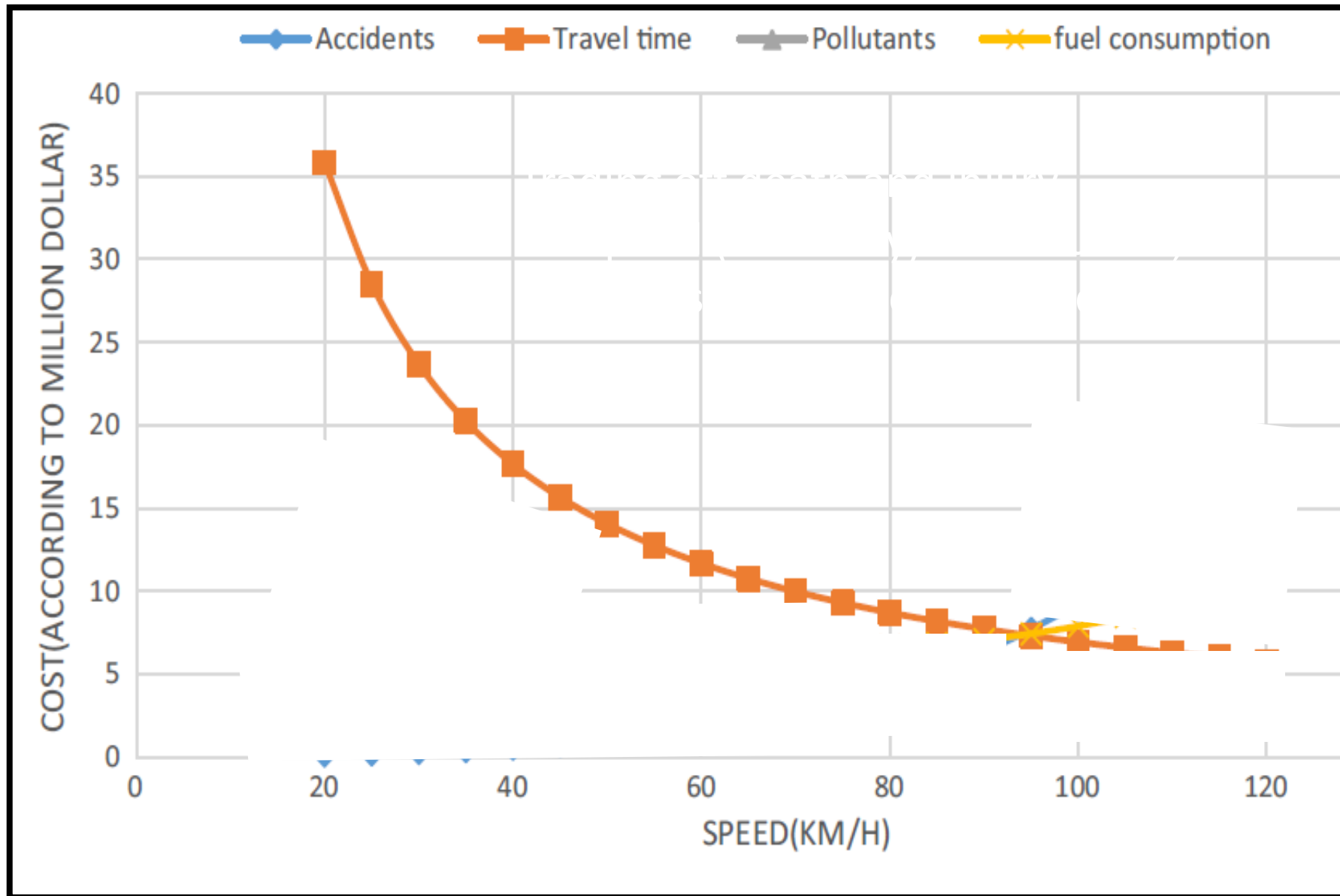
Myth 11:

Myth 12: Lower speed limits will create much slower journeys

Myth 13:

Myth 14:

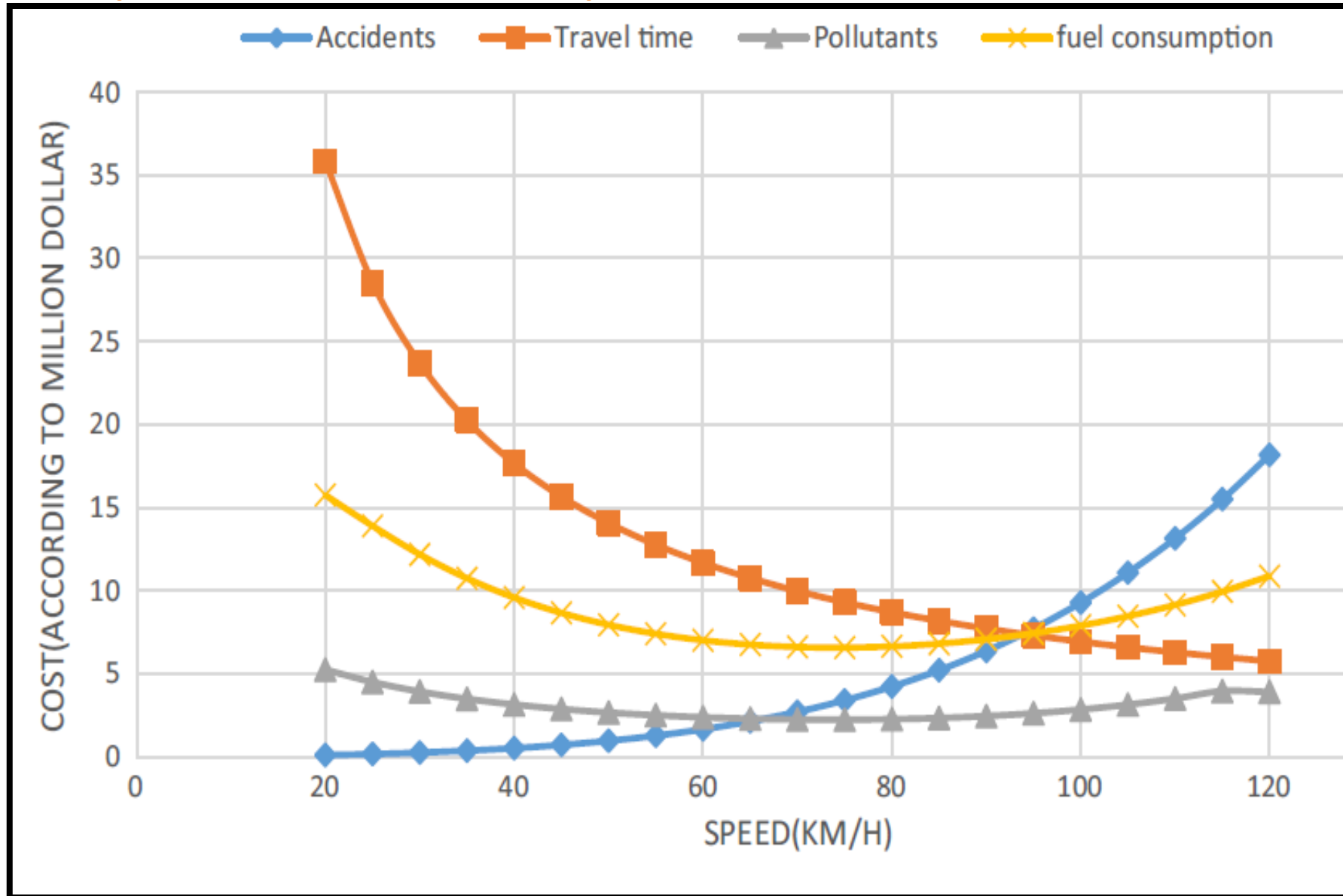
Myth 1: Higher speed is better for the economy (study from Iran, many others show similar results)



Myth 1: Higher speed is better for the economy (study from Iran, many others show similar results)

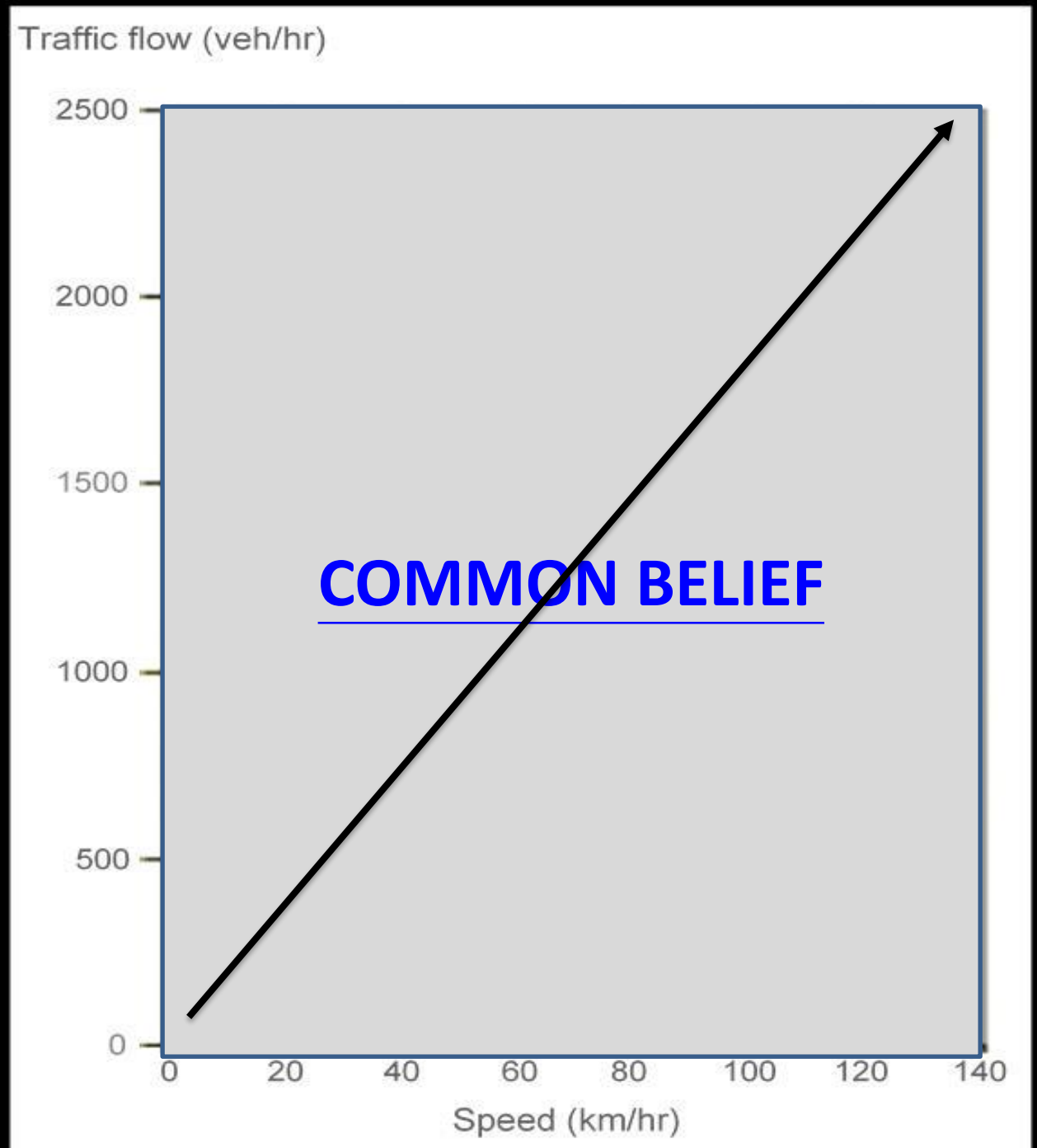
Economically
ideal speed
for a
Motorway is
76 km/h, not
the 100 or
110 km/h
typical
limits.

Ideal speeds
are much
lower for
urban roads.

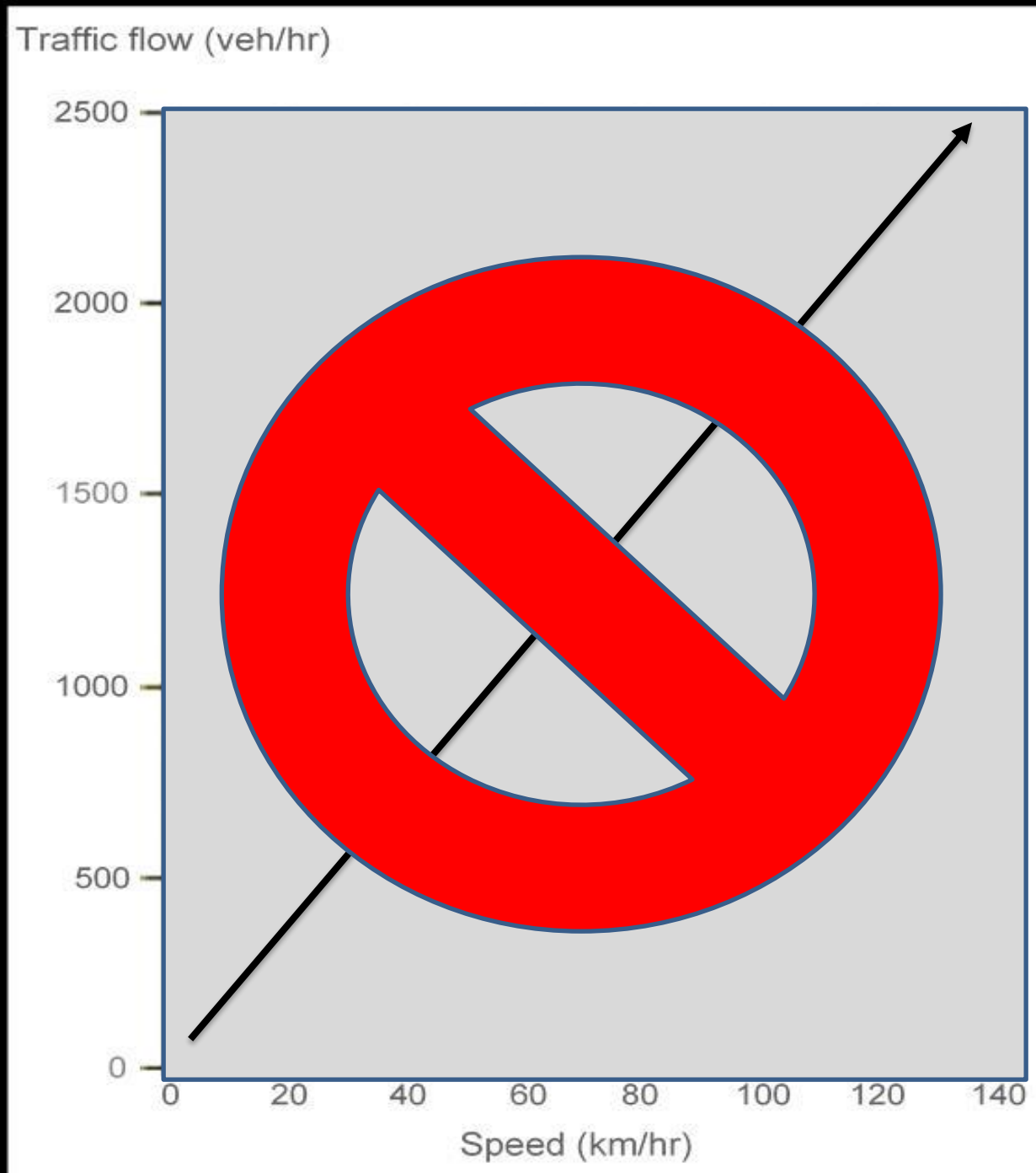


Myth 3: Higher speed limits solve congestion

The relationship between speed and traffic flow: Showing that decreasing speeds does not necessarily increase congestion, and can improve congestion

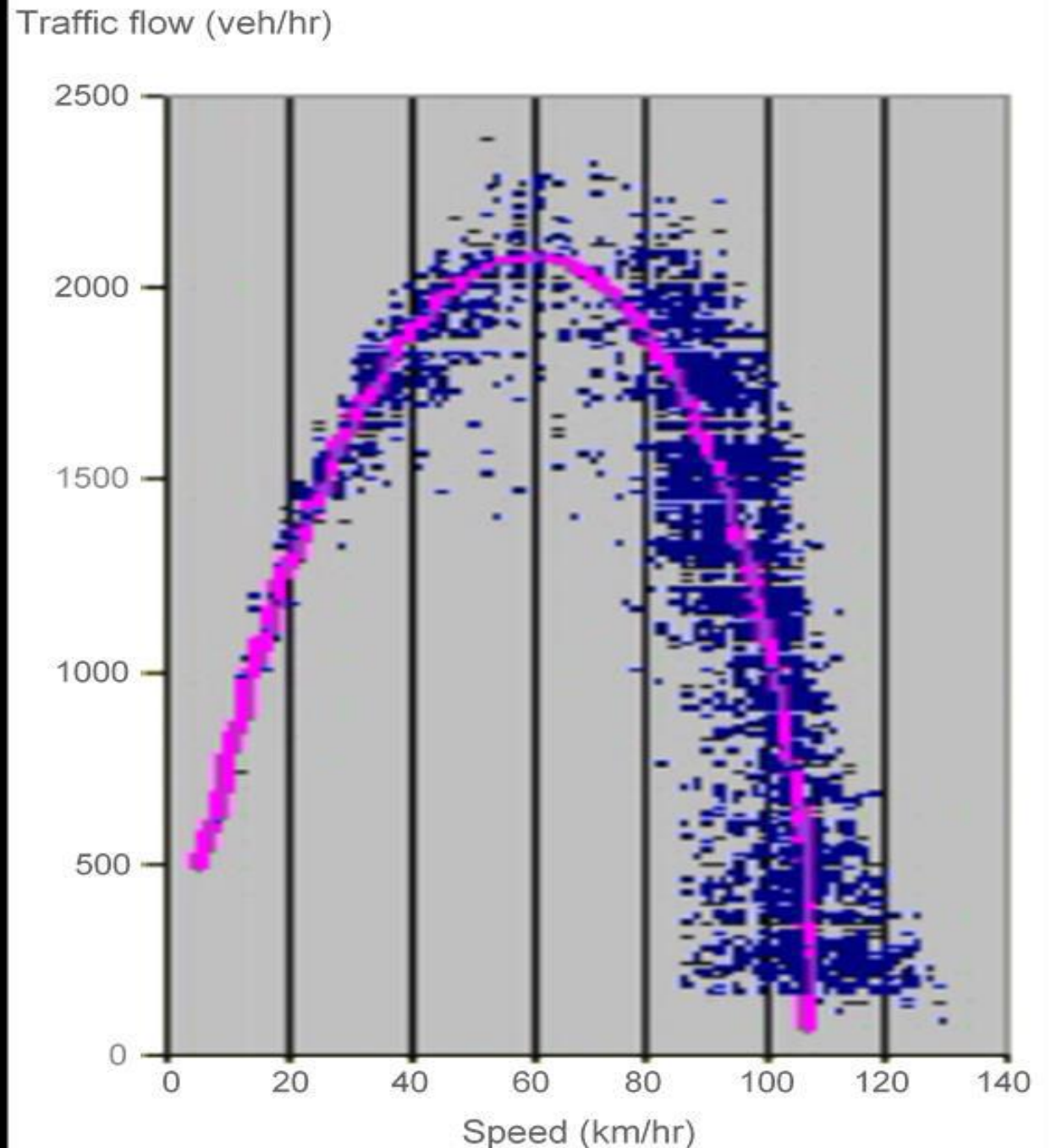


**The relationship between
speed and traffic flow:
Showing that decreasing
speeds does not
necessarily increase
congestion, and can
improve congestion**



EVIDENCE

The relationship between speed and traffic flow:
Showing that decreasing speeds does not necessarily increase congestion, and can improve congestion
(Source: Job & Mbugua, 2020)



Myth 10: Mostly it is the extreme speeders who have serious crashes

Population risk of speeding by speed limit – Kloeden's risk estimates

Speed band (over speed limit)	Speed limit							Total risk (casualty)	Total risk (fatal)
	50 km/h	60 km/h	70 km/h	80 km/h	90 km/h	100 km/h	110 km/h		
1-10 km/h	30%	38%	33%	45%	43%	52%	54%	38%	43%
11-20 km/h	35%	41%	40%	26%	26%	23%	26%	35%	31%
21-30 km/h	27%	17%	22%	14%	13%	11%	10%	20%	17%
31-45 km/h	6%	3%	5%	12%	12%	10%	8%	6%	8%
46 km/h +	1%	0%	1%	4%	5%	3%	3%	1%	2%
Casualty crashes % (2008)	33%	34%	9%	8%	1%	11%	3%		
Fatal crashes % (2008)	19%	18%	9%	14%	2%	32%	6%		

**Evidence:
Analysis
of risk for
each level
of
speeding**

Myth 12: Lower speed limits will create much slower journeys

- As above, some lower speed limits reduce congestion
- Simple calculation of the difference in time taken from distance and speed will over-estimate the real time difference because for some of the journey vehicles are slowed by other vehicles, curves, turns, intersections etc.

We significantly over-estimate the extra time taken

Questions & Discussion are most welcome

BREAK OUT SESSION 2: DISCUSSION OF SPEED LIMITS IN CAREC COUNTRIES

15 minutes to discuss

What speed limits do you see around?

Are these safe speeds for the circumstances?

Where are the best opportunities for improvement?

What arguments are most likely to work to lower these in your country?

Brief report back soon after:

appoint a spokes person or two. **Time is limited**



BRIEF REPORT BACK: FROM BREAKOUT 2

SPEED LIMITS



with appropriate permission.

BRIEF REPORT BACK: FROM BREAKOUT 2

DISCUSSION OF SPEED LIMITS IN CAREC COUNTRIES

Close and summary of the morning and key take-away dot points

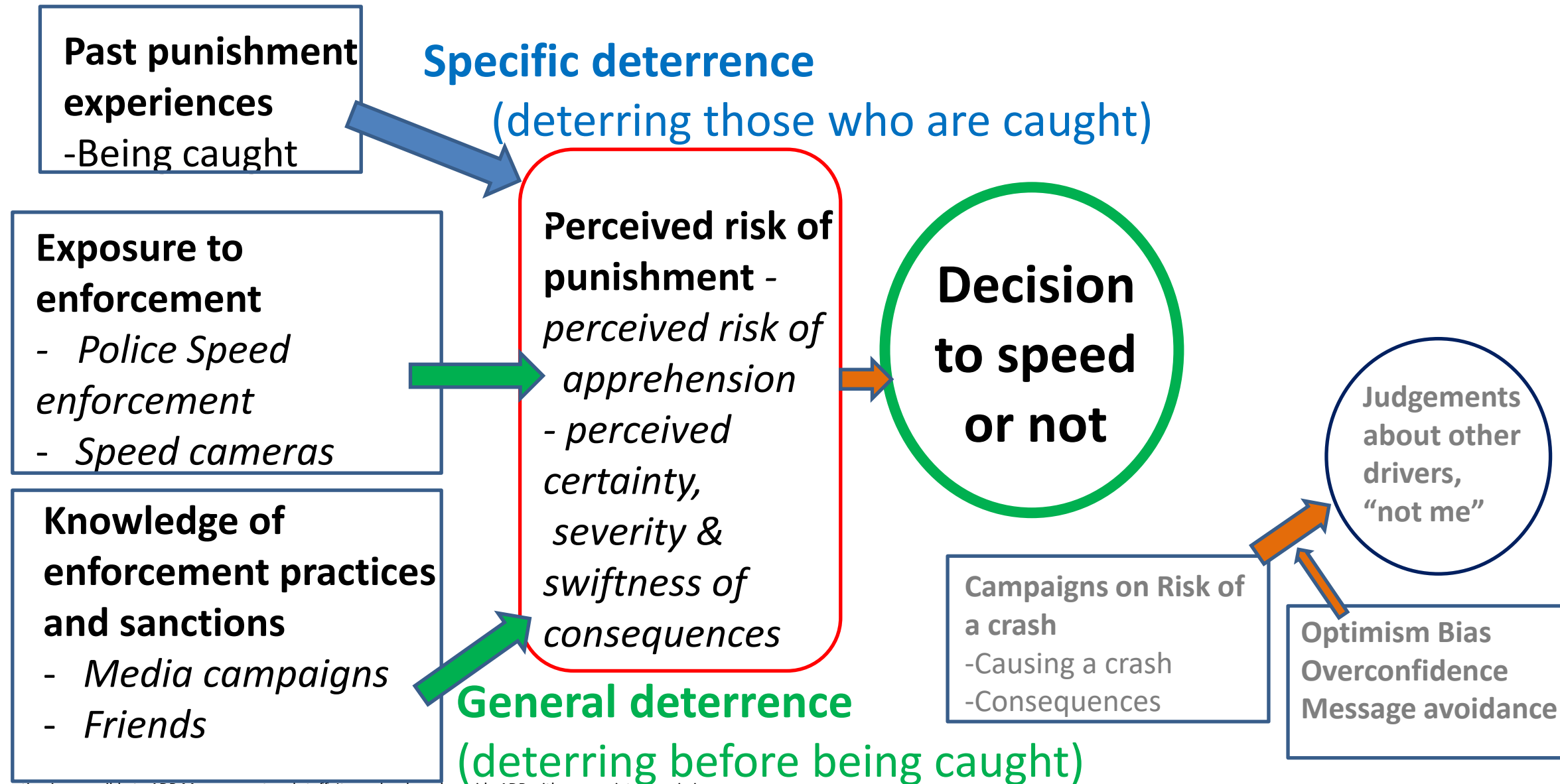
The **Speed Management Manual** shows that:

- Lowering speeds is a powerful way to reduce crash deaths and injuries, saving huge economic costs
- Lower travel speeds are generally better for the overall economy
- Better speed management is often resisted due to mistaken beliefs
- We must adopt actions which the evidence shows to be effective

The **Speed Management Manual** provides:

- Many proven highly cost-effective interventions for use in CAREC Countries, across roads, vehicles, and modal shift, not just behaviour change
- Guidance on processes for intervention selection & implementation

Classical deterrence theory model for driving



Roads and Campaigns: Too much reliance on telling people what to do

