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The Road Safety Problem - an overview





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WHERE ARE WE NOW?

- In 2000: 1.15 million deaths
- In 2016: 1.35 million deaths
- Rate of deaths/100,000 population stabilized

Source: WHO Global Status Report, 2018

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ROAD TRAFFIC INJURIES: **THE FACTS**



#RoadSafety



source: WHO Global status report on road safety 2018
www.who.int/violence_injury_prevention/road_safety_status/2018/en/

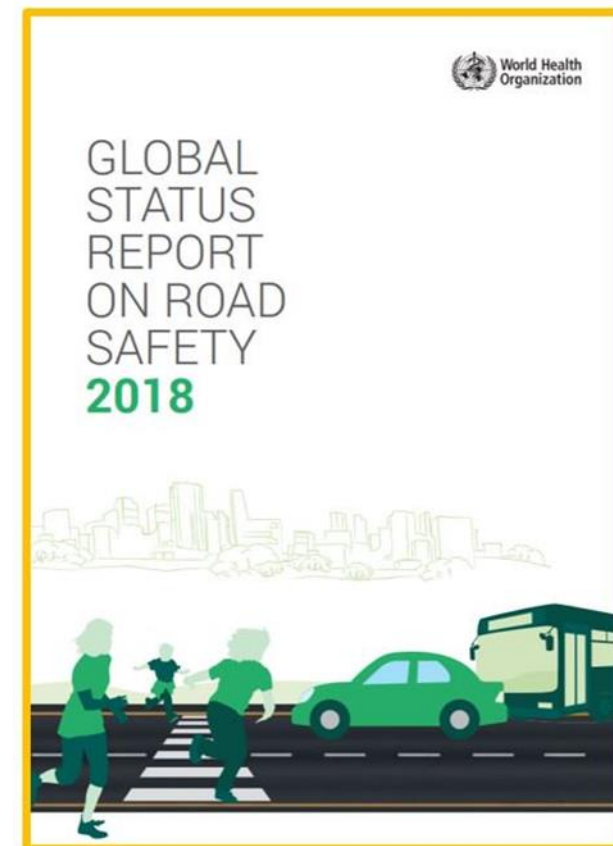


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WHERE ARE WE NOW?

Road traffic injuries
are the **8th** leading cause
of death 

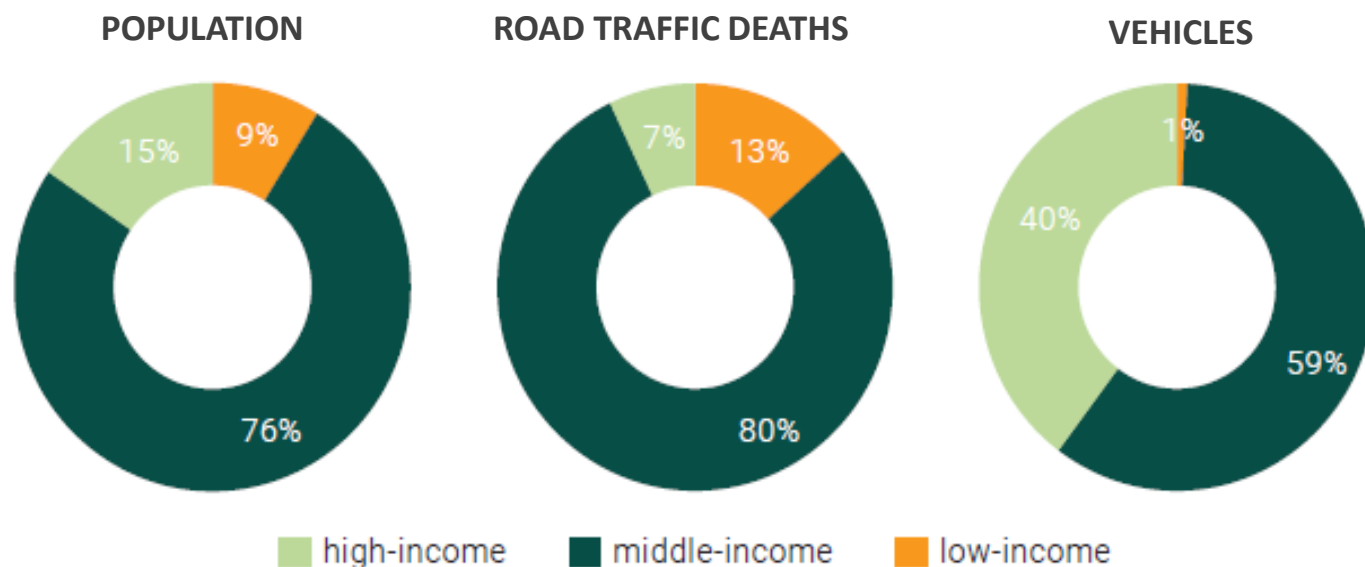
- More people now die from road traffic injuries than from
 - HIV/AIDS
 - tuberculosis and
 - diarrhoeal diseases.
- Annually, 50 million people suffer life-changing injuries from road crashes





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DISPARITY



*income levels are based on 2017 World Bank classifications

Disproportionately distributed by income level, region, and road user type.

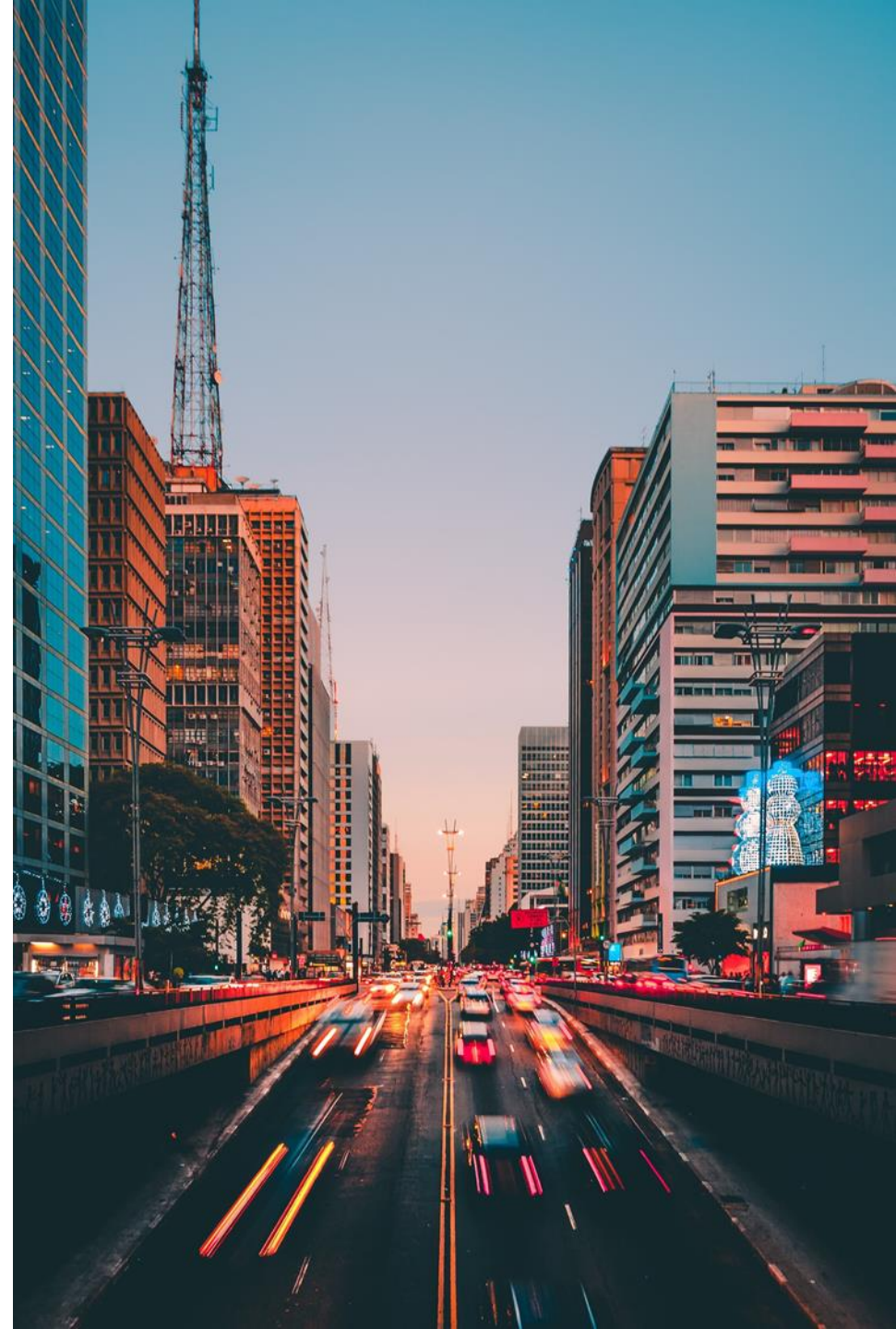
Low- and middle-income countries (LMICs) have

- 60% of the world vehicles
- 93% of road traffic deaths



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Safe System Approach





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SAFE SYSTEM APPROACH

Aims to ensure road users are
never subjected to impact energy levels
that cause fatal or serious injuries



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SAFE SYSTEM APPROACH

provides an alternative way of thinking about how to reduce road trauma,
instead of blaming the road user for a crash

highlights that the road transport system should be designed so that when
people make mistakes, the outcome is not a serious or fatal injury.

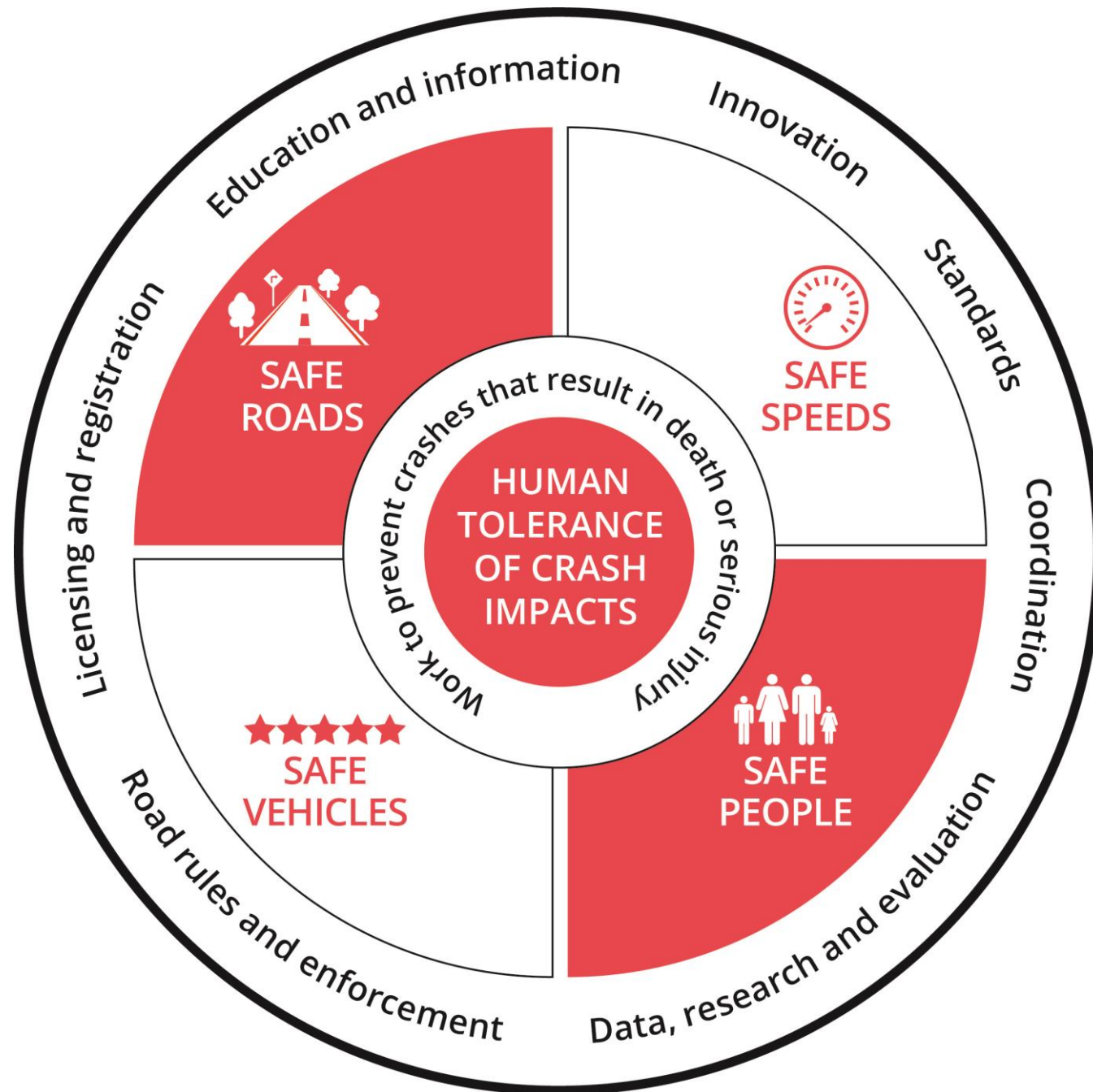


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THE SAFE SYSTEM APPROACH

Enforcement contributes
significantly to the 'safe
system' approach (directly &
indirectly)

**It's contribution to all parts
is often undervalued and
misunderstood.**





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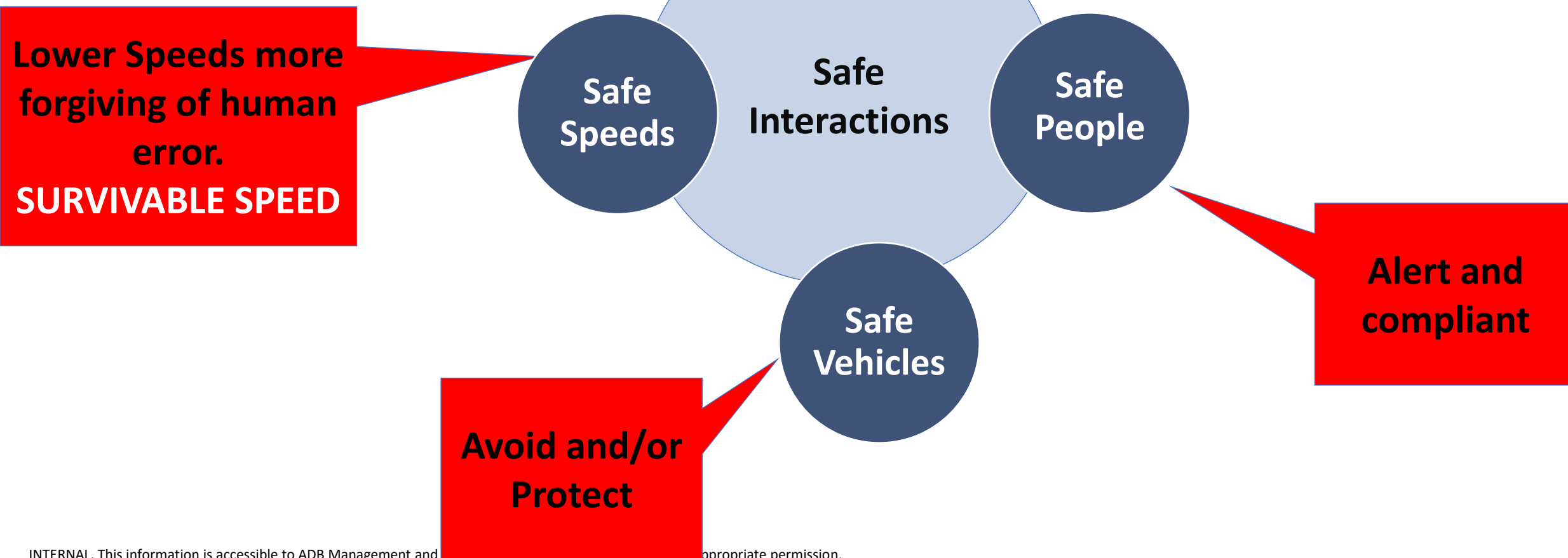
THE SAFE SYSTEM APPROACH

- Police and enforcement agencies **MUST** work together with key partners to prepare, conduct and evaluate activities.
- The main partners for the police are local road authorities, the judiciary, publicity organisations and researchers
- Local road authorities and researchers **MUST** also assist the police and enforcement agencies in analysing the local road safety problem to determine priorities.



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4 ELEMENTS





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WE HAVE TO CHANGE OUR WAY OF THINKING

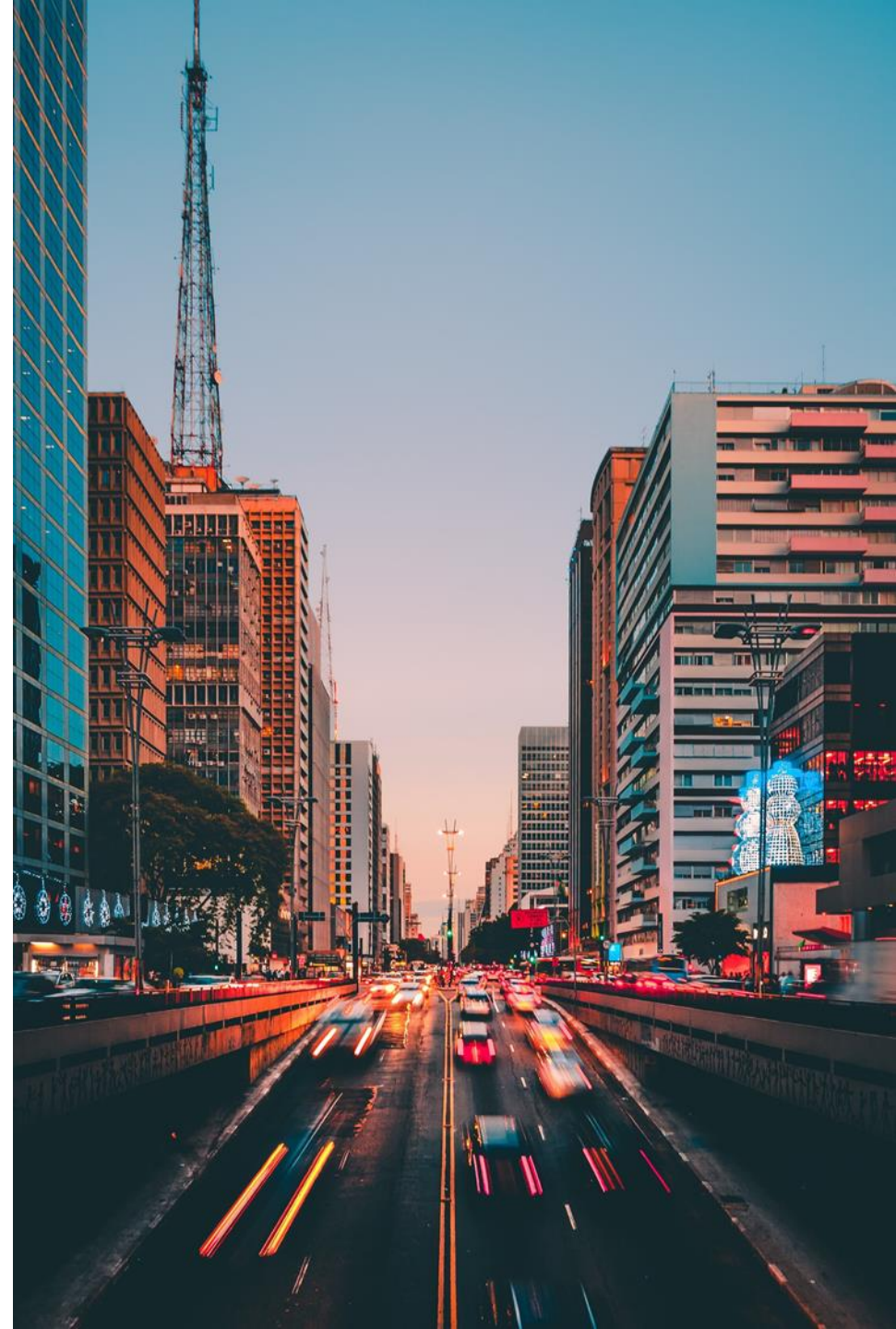
	Traditional Thinking	Safe System Thinking
What is the problem?	Crashes	Fatalities and serious injuries
What causes the problem?	Human Factors	People make mistakes, people are fragile
Who is ultimately responsible?	Road users	System designers
What is the major planning approach?	Incremental approach to reduce the problem	Systematic approach to build a safe road system
What is the appropriate goal?	Optimum number of fatalities & serious injuries	Zero fatalities & serious injuries



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CRASH CAUSES

PRIMARY CAUSATIVE FACTORS





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FIRST HORSELESS CARRIAGE FATALITY – UK (1896)

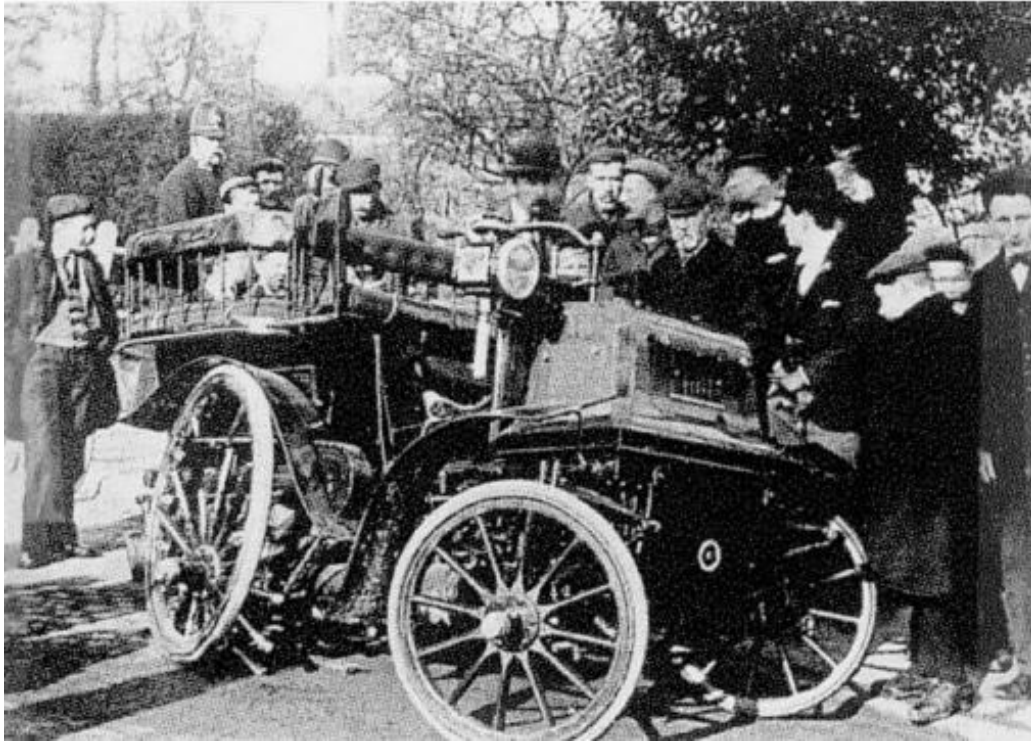


photo: Early Benz patent Motorwagen

- The first recorded fatal automobile crash occurred in Middlesex, England in 1896
- The two occupants were killed in a Motorwagen traveling at around 20km/h
- The back wheel shed its rim and the two occupants were ejected
- The Coroner found that the wheel was not made from “Good English Oak”

The Coroner claimed *“this must never be allowed to happen again”*

When have people started racing cars?

Right after the second car was manufactured



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CAUSATIVE FACTOR - SPEEDING

- ❑ Why Speeding is of primary concern – understanding the risk factor.
- ❑ Speed Management
- ❑ Enforcing Speed Limits





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Why speeding is a problem.... (1)

Speeding is a major problem for road safety because it contributes to both:

- the incidence of crashes,
- the severity of crashes.

Speeding occurs in crashes involving high-risk groups such as young drivers, motorcyclists, very often drivers without a driving license





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Why speeding is a problem.... (2)

A range of driving functions are adversely influenced by increasing speed, including:

- Perception and reaction time and distance
- braking distance
- probability of exceeding the critical speed of a curve
- loss of friction between tyres and the road
- loss of stability when turning and braking
- less time to notice and react to potential hazards
- other road users may misjudge the speed





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Why speeding is a problem.... (3)

Speed generates kinetic energy

The transfer of kinetic energy in a crash is responsible for injury

- when we move, collisions become possible
- higher speeds mean disproportionately higher kinetic energy
- our modern-day challenge – successfully managing sources of kinetic energy

$$\text{Kinetic Energy} = \frac{m \times v^2}{2}$$

M = mass of the body

V = the velocity with which the body is moving

a human head weighs 6% of all human body so it weighs on average 5 kilograms;

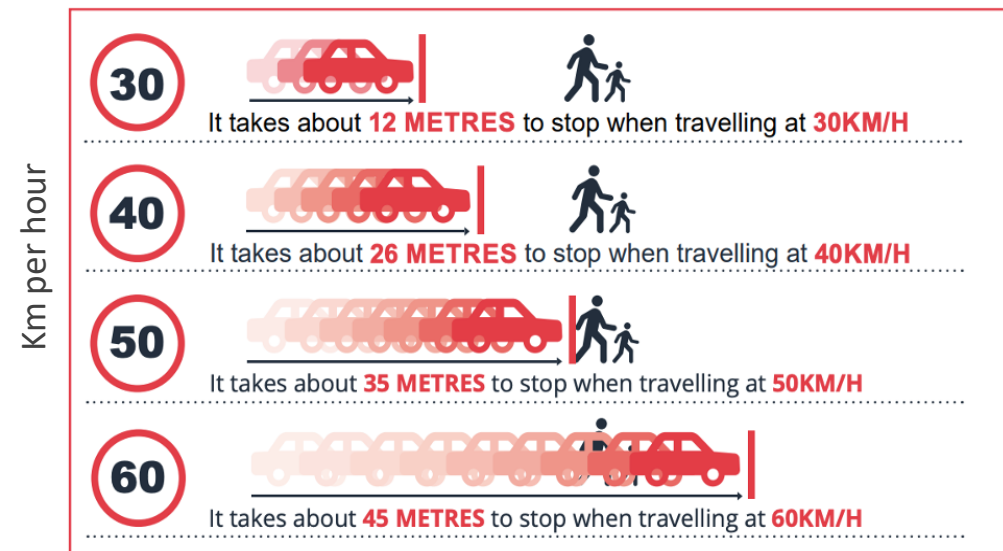
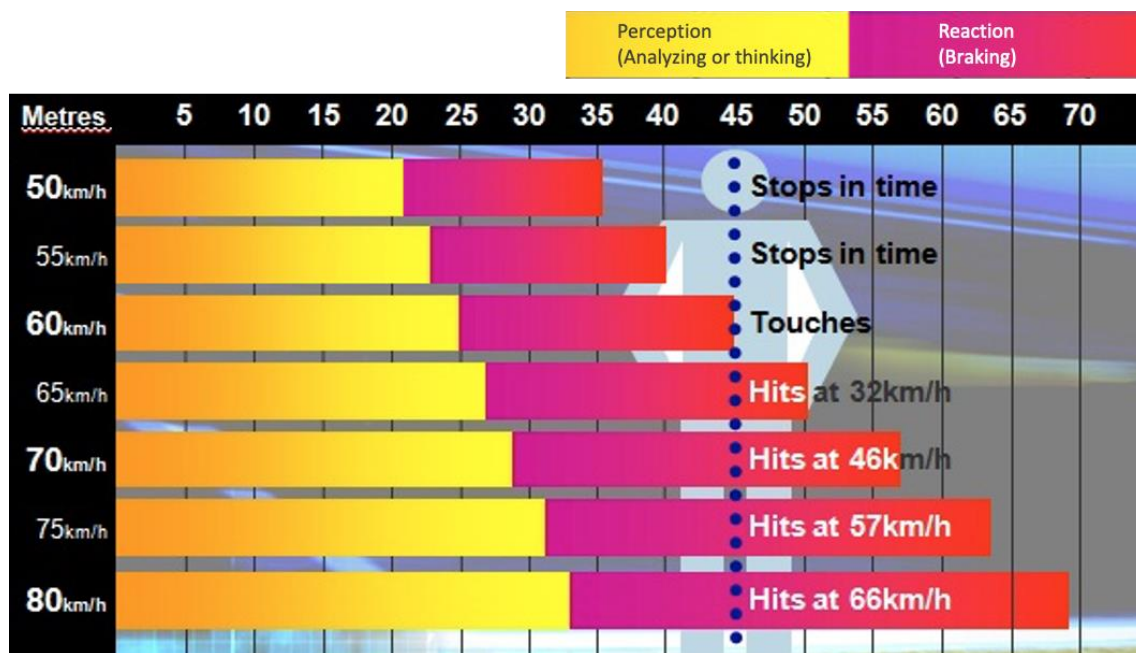
if the car hits the object with a speed of 50 kph the head weighs 385 kilograms!



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Braking & Stopping Distance

Relationship between travel speed, stopping distance and crash impact



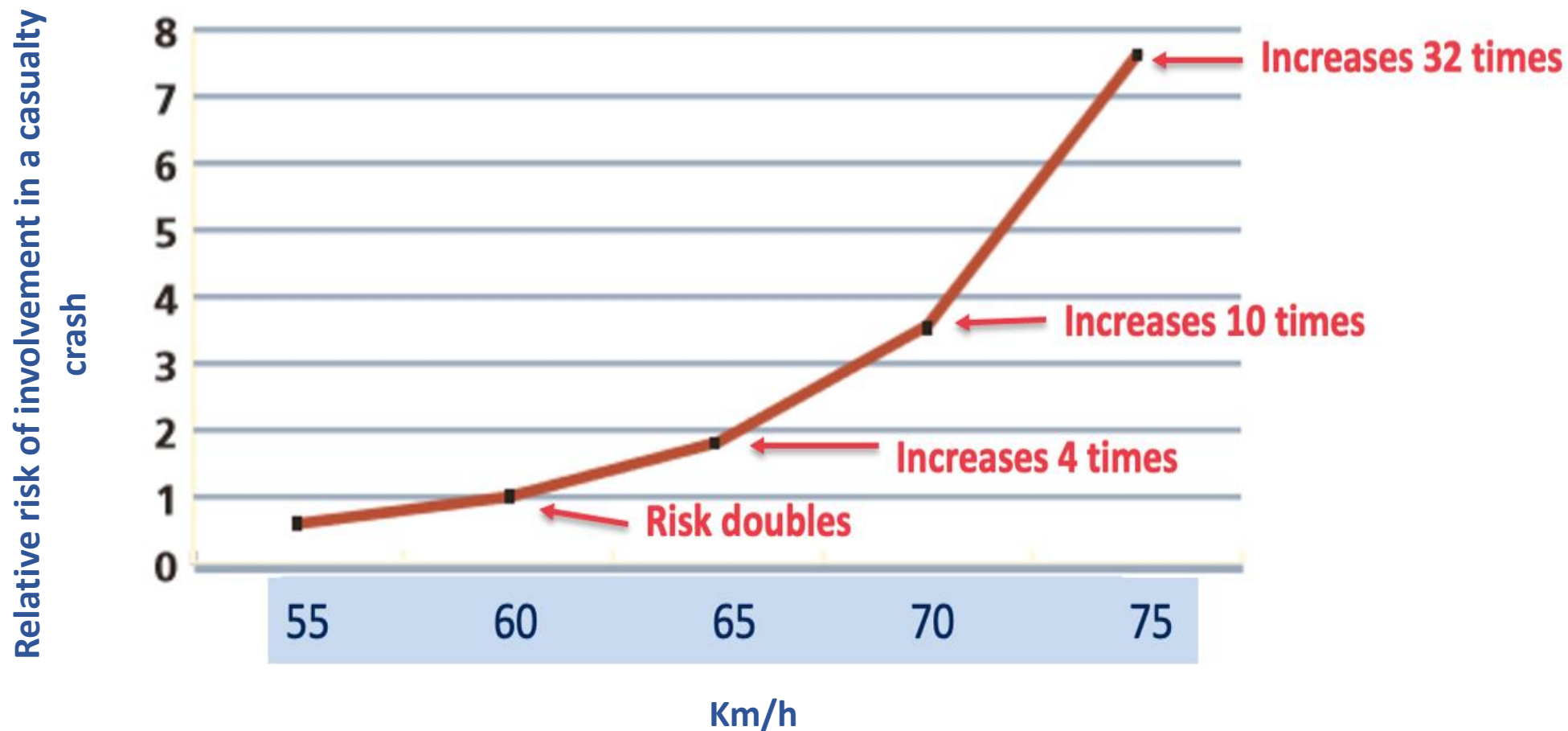
<https://research.qut.edu.au/carsrq/>



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Speed and Crash Risk Relationship

Crash risk by travel speed in a 60km/h zone





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Speed Management – focus on speed reduction



A 5% cut in average
speed can result in a

30% ↓

reduction in the number of
fatal crashes

- Urban speed limits should be **50 km/h or less**, with the ability to reduce this to **30 km/h** or less where there are high concentrations of pedestrians, such as around schools, markets or residential areas.
- Speed limits according to need take account of the type of road, roadside conditions and the volume and type of road users.

Source: Save LIVES – A road safety technical package, WHO, Geneva Switzerland, 2017.

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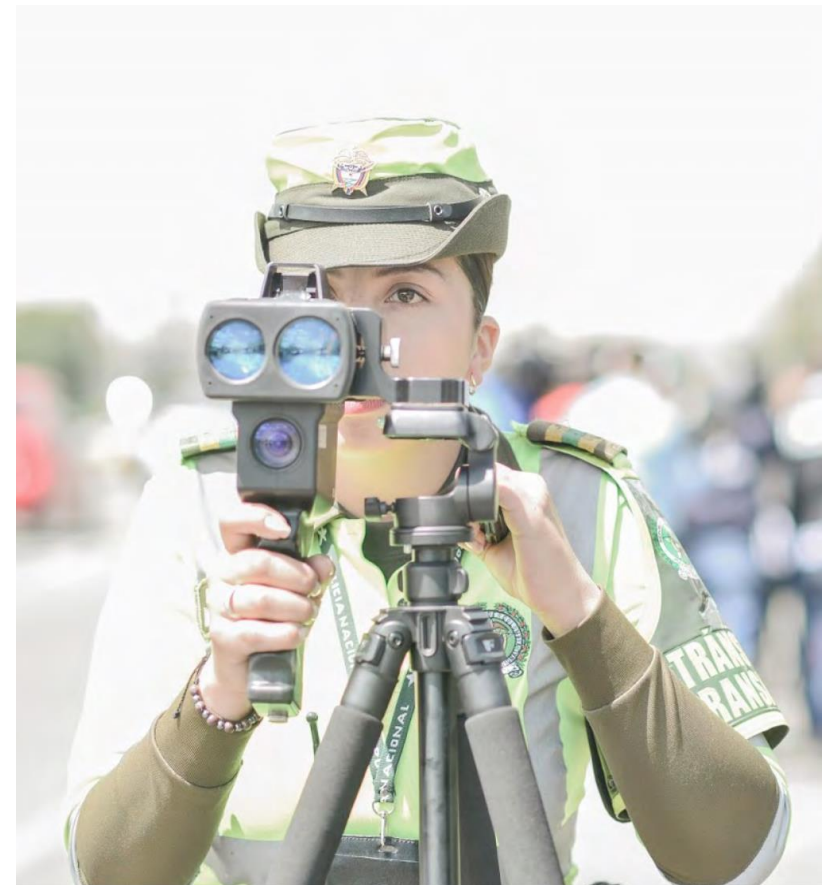


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Speed Reduction

Globally, speeding is the number one problem!

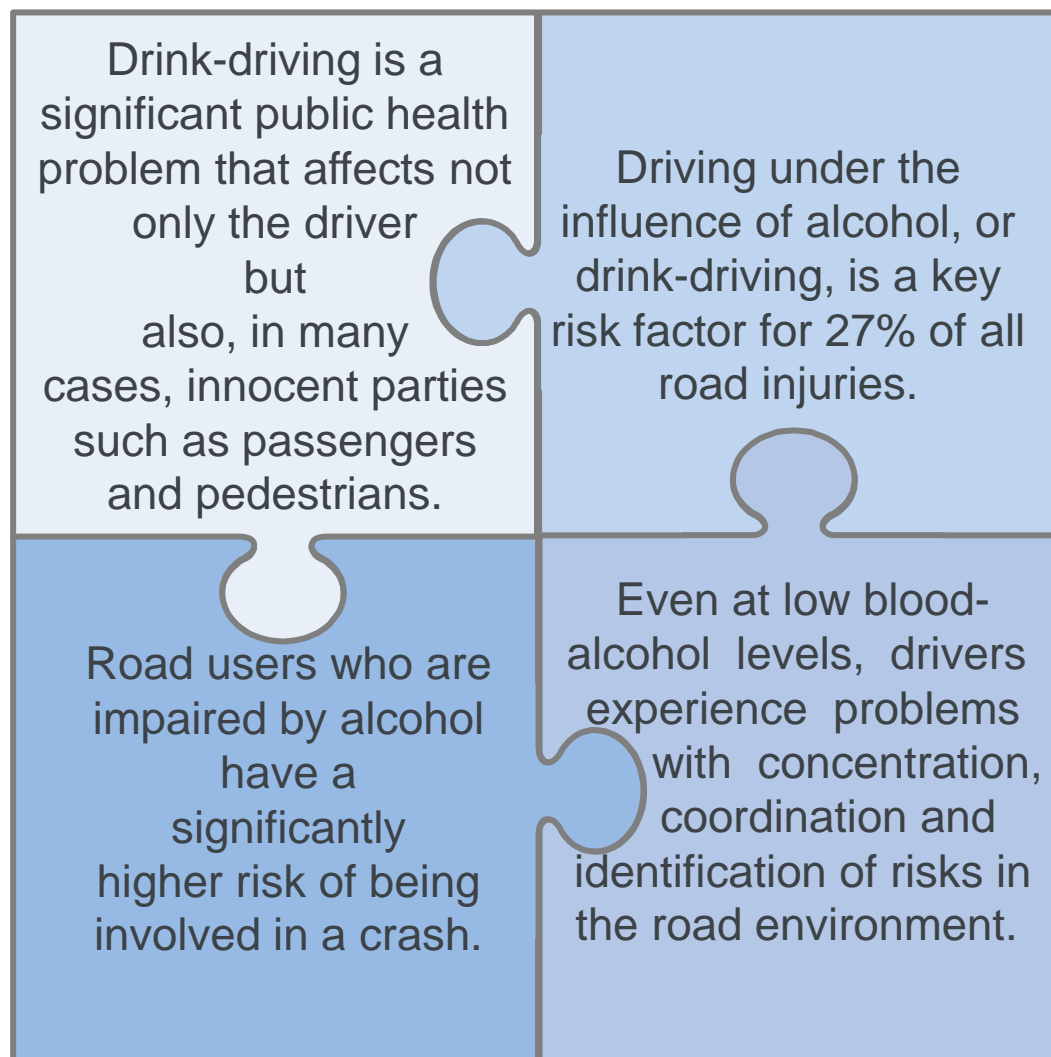
- Increase the perception of enforcement around speeding;
- Target high risk drivers and dangerous / careless / rash driving;
- Dosage intensity - how often, how much is required to change behaviour?





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CAUSATIVE FACTOR – DRINK DRIVING



Source: <https://www.who.int/initiatives/SAFER/drink-driving>



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The influence of alcohol on driving

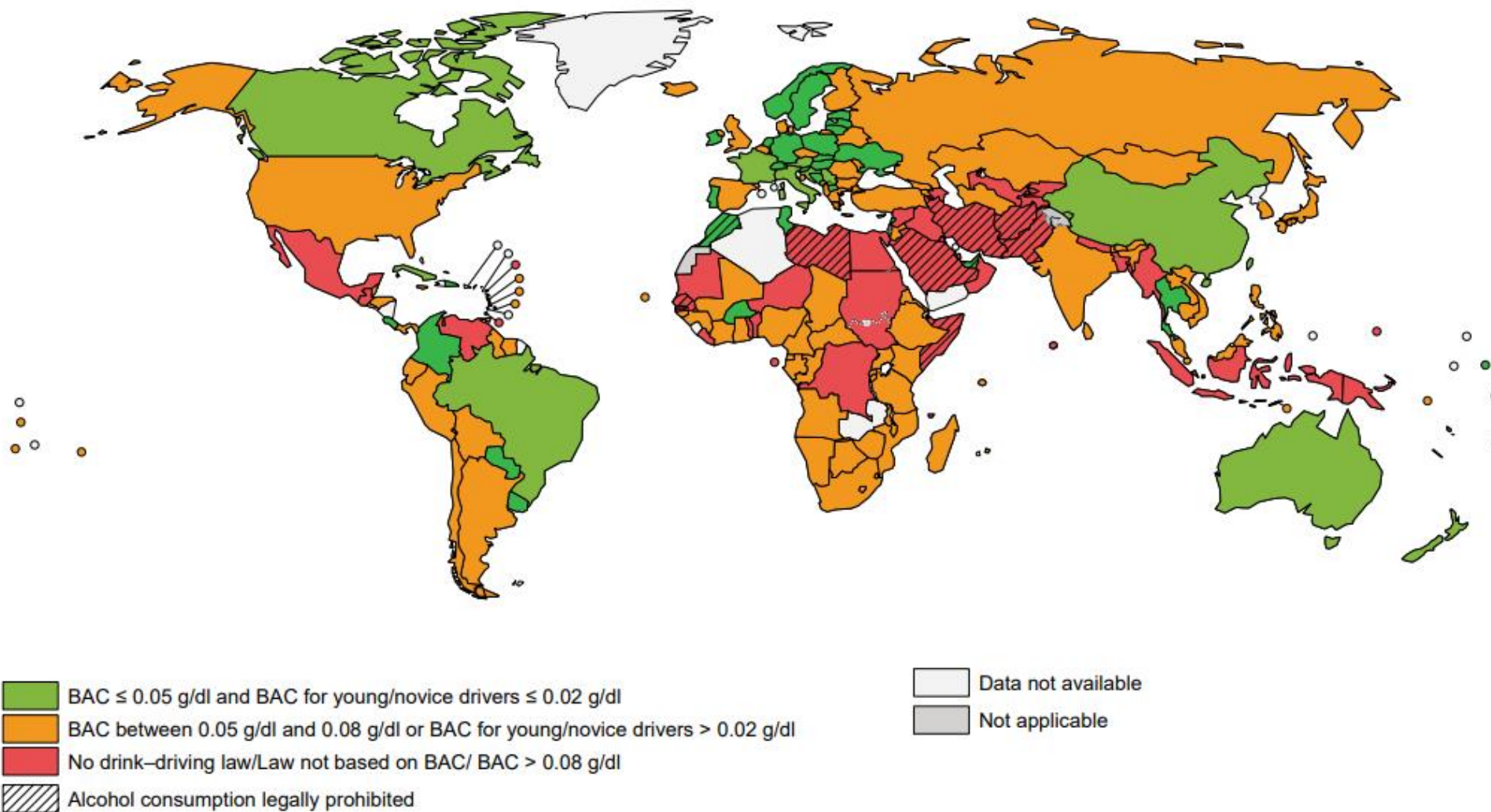
- Drinking and driving increases the risk of being involved in a crash, even at moderate levels of blood alcohol concentration (BAC)
- Crash risk increases dramatically at high levels of BAC
- Alcohol produces physical psychological effects which impair driving performance and decision-making





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Drink Driving laws by country in 2017



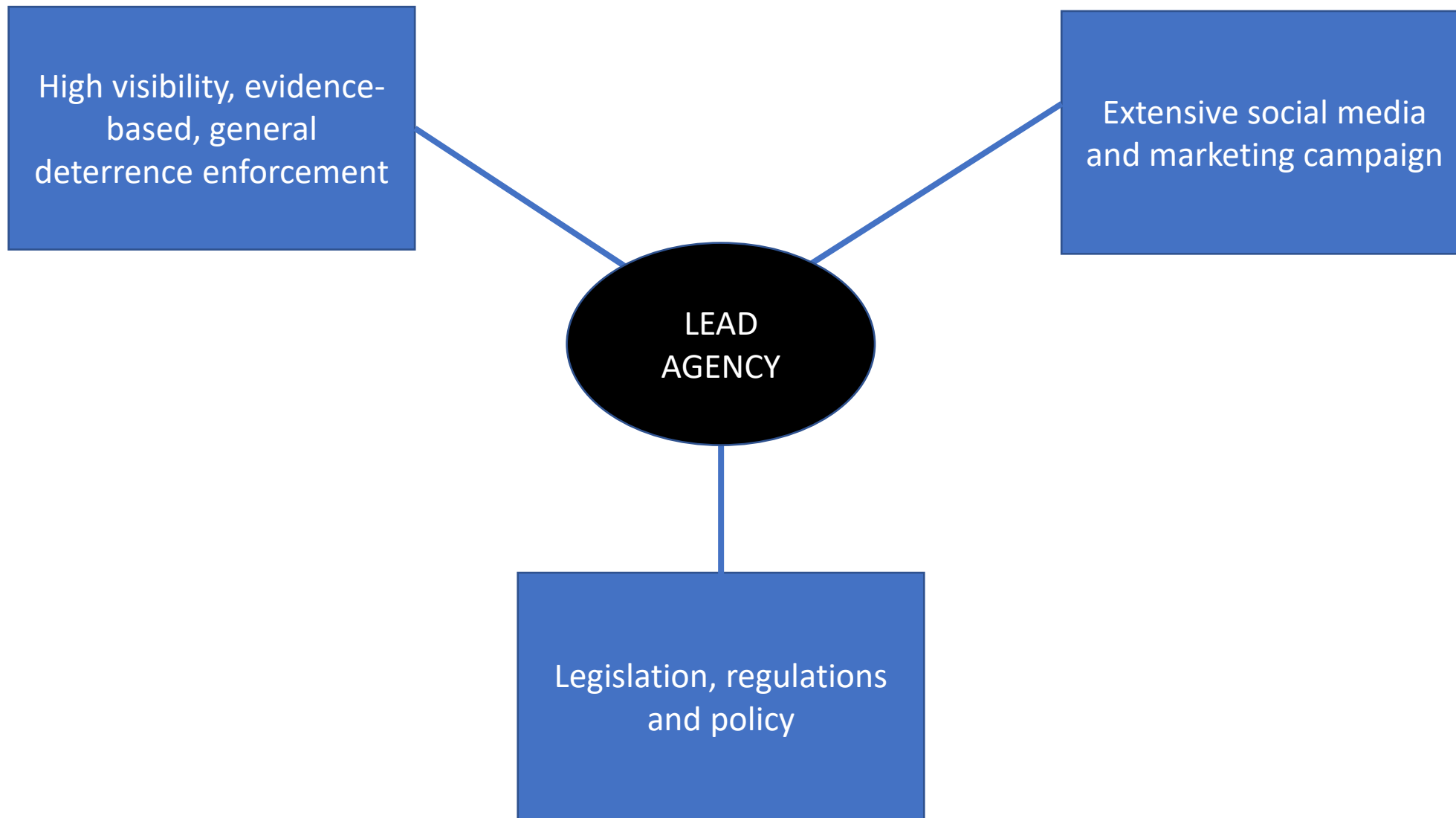
Source: Global Status Report on Road Safety 2018, WHO, Geneva, Switzerland, 2018

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Global Drink Driving Enforcement Practice

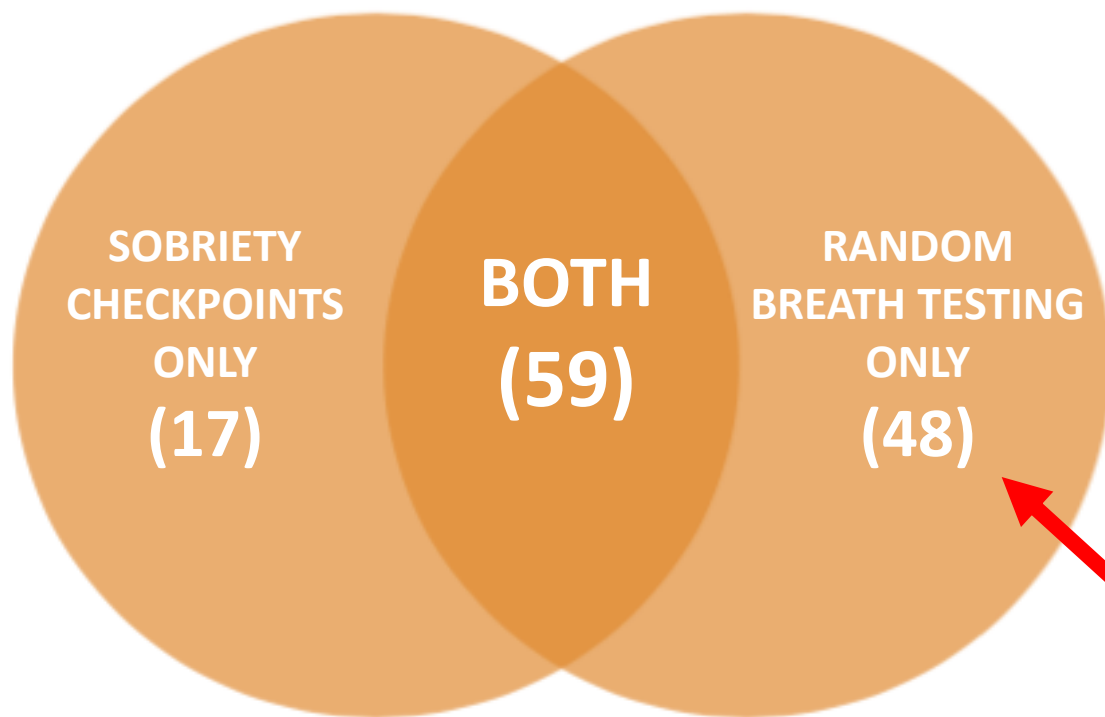




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Global Drink Driving Enforcement Practice

Methods of enforcing the maximum legal BAC, by number of countries (165)



National drink-driving law	Yes ^b
BAC limit – general population	–
BAC limit – young or novice drivers	–
Random breath testing carried out	Yes
Testing carried out in case of fatal crash	All drivers tested
Enforcement	0 1 2 3 4 5 6 7 8 9 10
% road traffic deaths involving alcohol	–

More than half of all countries undertake year round random breath testing

< 50%



Source: Global Status Report On Road Safety 2015, WHO, Geneva, Switzerland, 2015

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Source: Global Status Report on Road Safety 2018, WHO, Geneva, Switzerland, 2018



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REAL PURPOSE OF RANDOM BREATH TESTING



**“To create a perception amongst the driving public
that if they drink then drive,
their apprehension is inevitable.”**

**Not just focused on catching people, it’s about
deterrence.**



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DRINK DRIVING ENFORCEMENT

Strictly enforcing a drink driving law can reduce the number of road deaths by:



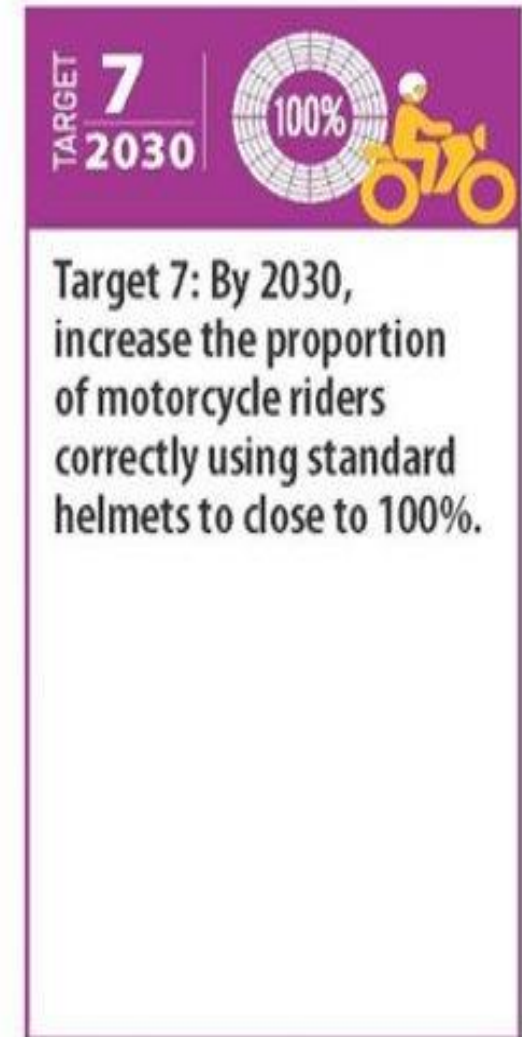


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CAUSATIVE FACTOR – HELMET WEARING

Motorcyclists

- ❖ Estimated 200M+ registered motorcycles worldwide
- ❖ Majority are in low to middle income countries
- ❖ Motorcyclists (and their passengers):
 - fall into vulnerable road user' group
 - account for 28% of all road deaths worldwide
 - 43% road deaths across SE Asia
- ❖ Approx. 73% of all reported motorcycle rider deaths occur in LMIC's





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Helmet Wearing

- Per kms travelled, motorcyclists have a **35 x greater risk of dying** than car drivers & 16 x greater risk of being injured
- If you are involved in a crash as a motorcyclist, you are twice as likely to die than being injured
- 75% of motorcycle crashes involve a collision with another vehicle
- Crash helmets decrease the likelihood of death by up to 40%
- Wearing a helmet decreases the risk and severity of injuries by about 70%



40% Reduction to risk of death



70% Reduction to risk of severe injury

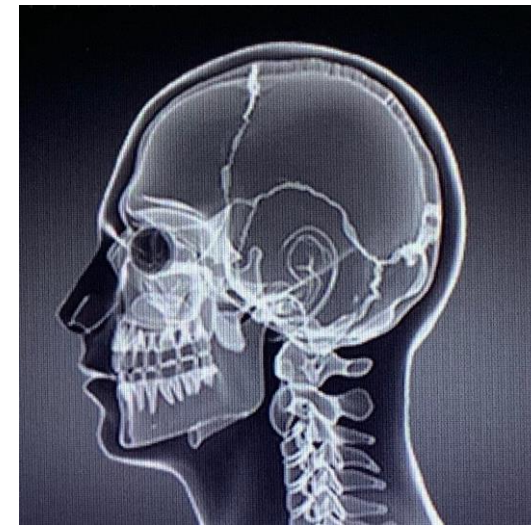




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Brain Injury Occurrence

- Two principal mechanisms of injury during a motorcycle crash:
 - ✓ direct contact
 - ✓ rapid acceleration / deceleration
- This can cause two injury types:
 - ✓ **OPEN**: fractured skull – penetration by some external object or bone fragments entering the brain tissue
 - ✓ **CLOSED**: If the rider's head hits an object, such as the ground, the head's forward motion is stopped, but the brain, having its own mass, continues to move forward until it strikes the inside of the skull. It then rebounds, striking the opposite side of the skull.
- Any can result in injuries that range from minor to fatal





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Helmet Legislation

‘Good’ helmet legislation mandates that helmets must be *worn by all riders*, be *properly fastened* and *meet a required standard*.

Of the 195 recognized countries worldwide:

- 167 have helmet legislation
- 93 countries have legislation that requires helmets meet a standard
- but only 49 have ‘good legislation’ that aligns with best practice standards





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Helmet Types

Tropical



Half Head



Open Face



Full Face



Helmet quality varies widely and counterfeit, poor quality helmets are not uncommon.

Over 30% of motor cyclist head impacts occur to the facial area!



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What You Can Do

Share this knowledge with your colleagues

- Enhance understanding across police of helmet wearing benefits

Community awareness

- Generate discussion amongst your community and media of benefits of helmets
- Advocate for 'good legislation'

Model Behaviour

- Ensure that you wear a helmet and be a role model in your community “***Be the change you want to see***”

Enforcement activity

- Conduct road safety operations to encourage compliance.

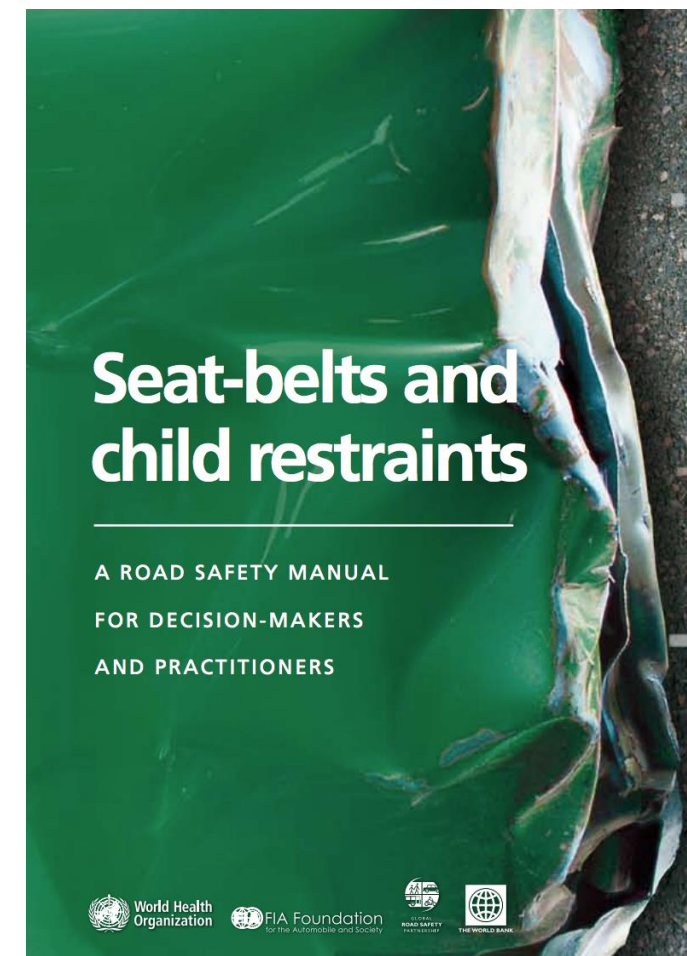


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CAUSATIVE FACTOR – SEATBELTS AND CHILD RESTRAINTS

International Experience of Seatbelt Use

- Many countries have introduced seat-belt laws, leading to hundreds of thousands of lives saved worldwide.
- Seat-belt use continues to be the most important form of occupant restraint & measures to increase their use - by means of legislation, awareness, and enforcement are central to improving the safety of vehicle occupants.





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What do seat belt use and child restraint systems have in common?

Isaac Newton's First Law of Motion

"An object at rest will remain at rest, and an object in motion will remain in motion (at a constant velocity) unless acted upon by an external force."





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Injury Risk Reduction

Wearing a seatbelt reduces the risk of fatal injury by:

Up to
50%

for front seat
occupants



Up to
25%

for rear seat
occupants





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Consequences (1)

1st impact

Vehicle hitting another object

2nd impact

Unbelted occupant and vehicle interior

3rd impact

Internal organs hit chest wall or skeletal structure



*Not buckling up can result in being totally **ejected from the vehicle** in a crash, which is almost always deadly.*



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Consequences (2)

Child restraint system

50 KM/H

1. The crash consequences of unrestrained children **at 50km/h** were equivalent to those associated with **a 10-metre fall**;
2. An **eight-year-old child weighing 30kg** will be thrown forward with **a force 25 times** its body weight; and,
3. **Without a child safety seat a crash at just 15 km/h can be fatal.**

8100 CHILDREN DIED ON EU ROADS
IN THE LAST TEN YEARS



HALF OF CHILD DEATHS ARE CAR
OCCUPANTS



ONE THIRD ARE PEDESTRIANS



13% ARE CYCLISTS



ONE IN EVERY 13 CHILD
DEATHS IS THE RESULT OF A
ROAD COLLISION

**TECHNOLOGIES
THAT CAN
IMPROVE ROAD
SAFETY FOR
CHILDREN**



INTELLIGENT
SPEED
ASSISTANCE



AUTOMATED
EMERGENCY
BRAKING
(with pedestrian and
cyclist detection)



CORRECTLY FITTED
AND APPROPRIATE
CHILD RESTRAINT
SYSTEMS



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Injury Risk Reduction

Child restraint seats reduce the likelihood of a fatal crash by

Approx.
70%
among infants



Between
54%-80%
among young children

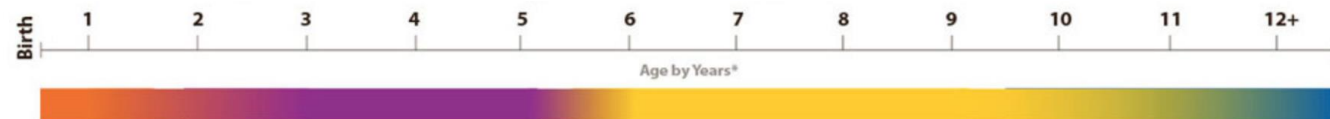




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Important Considerations

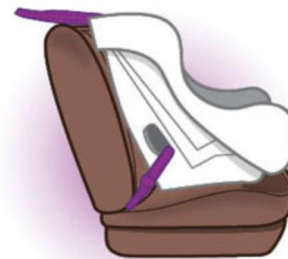
- Weight & height – not age
- Baby restraint facing the rear
- Facing forward or backwards
- Position in vehicle



REAR-FACING CAR SEAT

Birth up to Age 2*

Buckle children in a rear facing seat until age 2 or when they reach the upper height or weight limit of the seat



FORWARD-FACING CAR SEAT

Age 2 up to age 5*

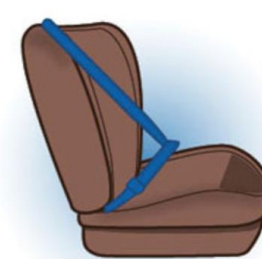
When children outgrow their rear-facing seat, they should be buckled in a forward-facing car seat until at least 5 or when they reach the upper height or weight limit of that seat



BOOSTER SEAT

Age 5 up until seat belt fits properly*

Once children outgrow their forward-facing seat, they should be buckled in booster seat until seatbelt fits properly.



SEAT BELT

Once seatbelt fits properly without a booster seat

Children no longer need to use a booster seat once seatbelt fits them properly. Seatbelt fits properly when the lap belt lays across the upper thighs (not Stomach) and the shoulder belt lays across the chest (not neck)



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Important Considerations CRS

- ✓ Preparing the public – growing public awareness
- ✓ Pre-introduction surveys of attitudes and use
- ✓ Preparing an enforcement strategy
- ✓ Monitoring and evaluation infrastructure
- ✓ CRS fitting assistance infrastructure
- ✓ A plan for existing CRS





WHY ENFORCEMENT IS IMPORTANT



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CHALLENGES IN MODIFYING BEHAVIOUR ⁽¹⁾

A wide range of factors impact on the behaviour of road users including:

- Psychological and physiological conditions
- Social influences
- Past experiences including habits formed over time
- Situational factors including the behaviour of other road users
- Current state and immediate goals





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CHALLENGES IN MODIFYING BEHAVIOUR ⁽²⁾

People drive as they live

- Many studies have confirmed a strong association between on-road behaviour and general behaviour
- Risky on-road behaviours often cluster together

Road users are resistant to change

- Recidivist/repeat drink driving and speeding offenders are over-represented in offences and crashes
- Without sustained high levels of enforcement, the deterrent effect of campaigns can be short-lived





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Why is enforcement necessary?

- **Limited public understanding of the link between their behaviours and their:**
 - risk of being in a crash
 - severity of outcome if involved in a crash
- **People are not good at assessing risk**
 - Illusion of control (I'm a good driver, I can control vehicle)
 - Familiarity with local roads (I am only going a short distance)
- **Experience shows us that enforcement can change behaviour which can then change attitudes and levels of moral acceptance**
- **Strong track record of changing behaviour and attitudes using enforcement + education when they are used together**





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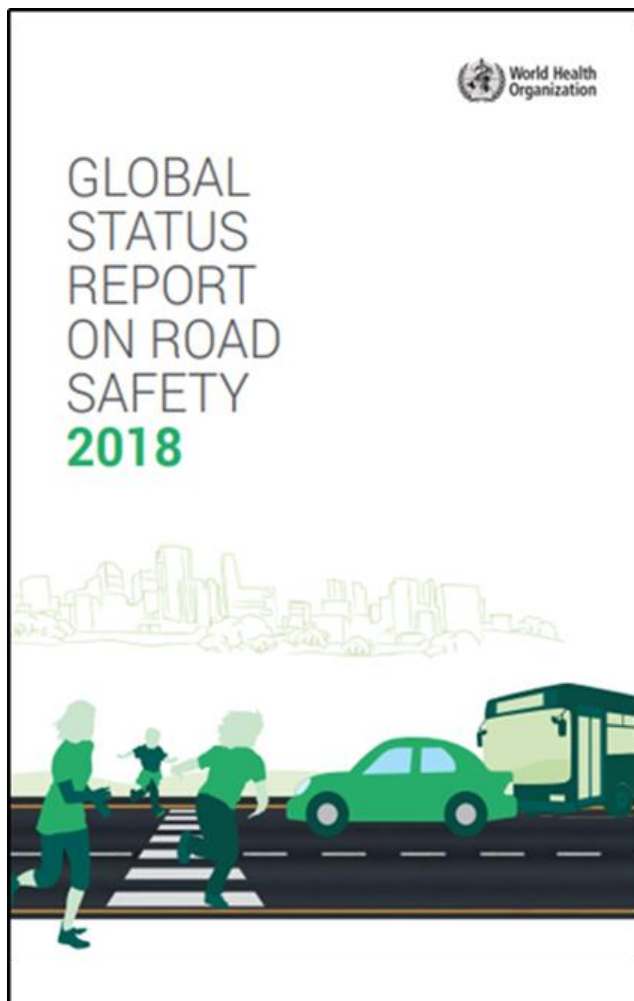
Why is enforcement necessary?

Road safety agencies around the world rely heavily on traffic law enforcement to modify road user behavior.

The most positive changes to road user behaviour occur when road safety legislation is supported by strong and sustained enforcement, and public awareness.

Before enforcement can take place there needs to be good policies in place that are enforceable.

While there has been progress towards improving road safety legislation and in making vehicles safer, the report shows that the pace of change is too slow.





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Why is enforcement necessary?



'It appears from research that enforcement is an important and effective way of preventing and reducing accidents, deaths and injuries'.

EUROPEAN COMMISSION RECOMMENDATION
of 6 April 2004
on enforcement in the field of road safety





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Why is enforcement necessary?

- **Consequences for violating any traffic rules should be clear in laws and regulations, and may include financial penalties, demerit points and license suspension.**
- In many countries - notably where a legislation has not previously been accompanied by enforcement, **highly visible levels of enforcement may be needed to persuade the public that breaking the law** may well result in a swift penalty.
- A number of police forces around the world **have adopted enforcement methods based upon an “anywhere, anytime” approach to deter all speeding.**

Source: Managing Speed, World Health Organisation, 2017





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ENFORCEMENT FOCUS

‘Anybody’



‘Anywhere’



‘Anytime’





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RESIDUAL EFFECT OF ENFORCEMENT

Police visibility

- Behaviour often changes in the presence of enforcement, particularly if the perceived probability of getting caught is high.
- Consequently, probability is a key factor in the strategy of enforcement authorities.
- Changes in the behaviour of one road user influences the behaviour of others.





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What do we want to achieve by enforcement?

- Reduce road related trauma
- Deter people from breaking the law
- Promote voluntary compliance with traffic laws.

Detering people involves changing perceptions about:

- Likelihood of being caught
- Penalties if caught





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What do we want to achieve by enforcement?

The subjective risk of being caught and hence the effectiveness of police enforcement, is larger if police enforcement is:

- accompanied by publicity,
- unpredictable and difficult to avoid,
- a mixture of highly visible and less visible activities,
- primarily focused on times and locations with high violation (maximum feedback to potential offenders),
- continued over a longer period of time,





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HIGH VALUE ENFORCEMENT – SUMMARY

- Adequate infringement & penalty system with solid judicial support
- Involves strong partnerships between police and other road safety stakeholders
- Enabled by sufficient ongoing funding and adequate human and technological resource allocation
- Established clear and unambiguous strategies supported by appropriate enforcement plans and targets (KPIs)
- Crash analysis required to confirm crash causes, locations and times





DETERRENCE THEORY



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DETERRENCE THEORY

- Influence a potential traffic offender through ‘fear’ of detection and the consequences to avoid offending.
- Targets ALL road users
- Has the potential to **influence ALL** road users



Source: MUARC Research Report, 270 Sept. 2006

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DETERRENCE

What is deterrence?

- The action of discouraging an action or event through instilling doubt or fear of the consequences.
- In a policing context, that fear of apprehension stops or 'deters' people from committing offences.
- Think about driving along a roadway...Is it the fear of injury should you crash that makes you slow down and drive at or under the speed limit, OR, is it the fear of the Police officer with the RADAR around the next corner?
- Be honest – the fear of the speeding ticket is the greater reason for compliance – That is deterrence!



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DETERRENCE

What are the two types of deterrence?

- General deterrence
 - impact of the threat of legal punishment on the public at large,
 - results from the public's perception that traffic laws are enforced and that there is a risk of detection and punishment when traffic laws are violated
- Specific deterrence
 - impact of the actual legal punishment on those who are apprehended,
 - results from the actual experience of detection, prosecution, and punishment of offenders



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DETERRENCE PRINCIPLES

How does deterrence work?

There are four key components to deterrence

1. Perceived risk of detection
2. Perceived certainty of punishment
3. Severity of punishment
4. Immediacy of punishment

The higher the perceived risk of detection, the less likely a road user is to commit an offence.



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DETERRENCE PRINCIPLES

How do we achieve deterrence?

There are four key elements to deterrence

1. A mix of Highly Visible and Less Visible Police Activity

(As many drivers as possible should see highly visible testing).

2. Rigorous enforcement

(No one avoids testing, regardless of occupation or status. All are treated the same).

3. Sustained and unpredictable enforcement

(Enforcement targets the correct times, is sustained throughout each year and location is unpredictable).

4. Well publicised

(Publicity & media support greatly enhances impact).



**WE'RE
EVERYWHERE.**

**IF YOU DRINK AND DRIVE
YOU DESERVE TO GET CAUGHT.**



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DETERRENCE PRINCIPLES

Highly visible enforcement

To create the fear of detection, police activity must support that perception. Highly visible policing operations (such as alcohol, speed and seatbelt checkpoints) should be carried out.

Police must be seen to act on offences. This means stopping violators whenever an offence is observed by police. This action 'tells' public observers that if you commit an offence, you will be stopped by police.



Less visible enforcement

Introducing covert enforcement is a valuable contributor to general deterrence - the use of unmarked patrol cars increases compliance.





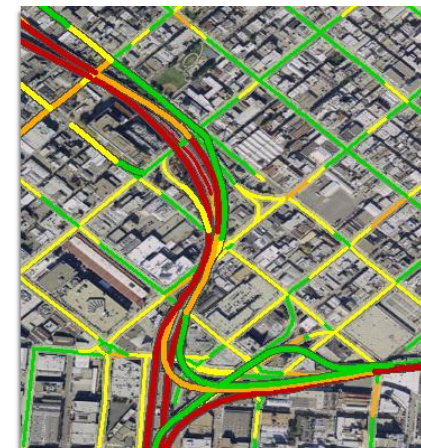
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DETERRENCE PRINCIPLES

Rigorous enforcement

Enforcement must be stern and consistent – Issuing of notices is critical to building deterrence. Warnings soften the impact of the enforcement apprehension and may give the impression that the offence isn't that serious.

All officers must take the same approach – a uniform response builds deterrence across the entire road network, not just in certain areas.





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DETERRENCE PRINCIPLES

Sustained and unpredictable

Enforcement activity must be ongoing – not just a week here or there. While the principle target of enforcement action may change due to seasonal risk, enforcement activity must be ongoing all year.

Checkpoint based enforcement should occur at many different locations at different times of the day and week. Unpredictability keeps road users guessing – they do not know where a checkpoint will be so change their driving just in case they come across one.

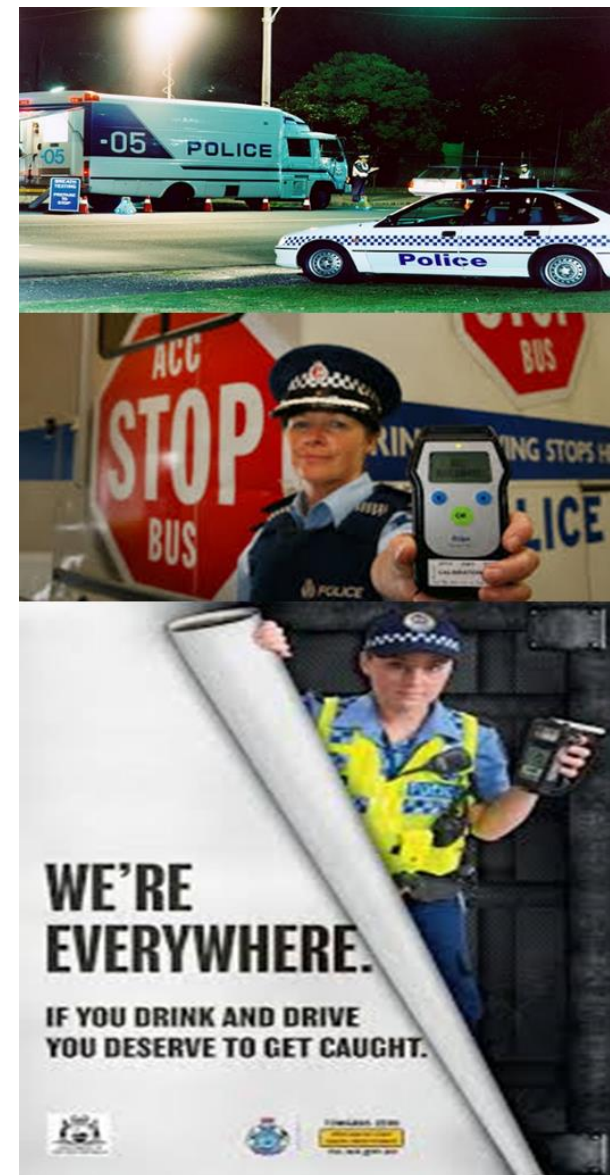




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DETERRENCE PRINCIPLES

- If law enforcement is conducted at a specific site for 7 days and then moved to another site, the residual impact will last for some time thereafter.
- It can be assumed that the residual impact will linger on for another 14 days after enforcement had been relocated to another site.
- Before the residual impact has decreased in its totality, the officers are re-deployed to the first site again.
- This rotation implies that the visible impact of the agency is trebled.





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DETERRENCE PRINCIPLES

Communication

Tell the public what you are doing.

Media (television, print and social media) play a significant role in supporting deterrence.

Having media sharing the enforcement message supports deterrence. It places greater tension on motorists to comply with traffic law if they are told that Police are concentrating on traffic enforcement.





LEVELS OF TOLERANCE

Application of a tolerance (Speeding)

- The “Implied Speed Limit”
- If a driver receives a ticket at 61 km/h for travelling above the 50km/h limit but not at 55km/h, then they are more likely to think that 55 km/h is still a safe speed even though the speed limit is 50 km/h.
- Enforcement is more effective and speed limits more credible if tolerance levels are low.
- In general, a high tolerance level sends the wrong message to road users.



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LEVELS OF TOLERANCE

Application of a tolerance (Speeding)

- Tolerance levels are not legislated but generally form part of a country's prosecutorial or police instructions.
- "Setting higher tolerance levels above speed limits gives a misleading signal to the drivers and makes the speed limit less credible." (OECD, 2006)
- The OECD recommends that tolerance levels should be set at the absolute minimum taking into account possible inaccuracies in measurement.



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ENFORCEMENT USING DETERRENCE

Detering people from doing the wrong thing on the road relies on them fearing they will be caught and fearing the consequences.

Perceived risk of apprehension - *Do I think I will be caught?*

Threat of sanctions

- Perceived Certainty of Punishment - *Will I receive the penalty if caught?*
- Perceived Severity of Punishment - *Are the penalties harsh?*
- Perceived Swiftness of Punishment - *Will I be punished in a timely way?*





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QUESTIONS?

Thank
You





THE END

GLOBAL ROAD SAFETY PARTNERSHIP SECRETARIAT



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