



GLOBAL  
ROAD SAFETY  
LEADERSHIP COURSE

# Road Traffic Injuries: The Neglected Health and Development Burden

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# Outline

- Brief introduction to unit
- Global burden of road traffic injuries
- Cost of road traffic injuries
- Interventions for road traffic injuries
- Policies for road traffic injuries
- Discussion



# Visualize the Problem!

## TECHNICAL FILMS SDN BHD

Client: Kementerian Pengangkutan Malaysia

Product: Motorcycle Safety Campaign

Title: Head Injury Protection "Helmet Test"

Duration : 30 sec

Language: English

Agency: Media House

Date: 24-10-2001





# Defining the Problem

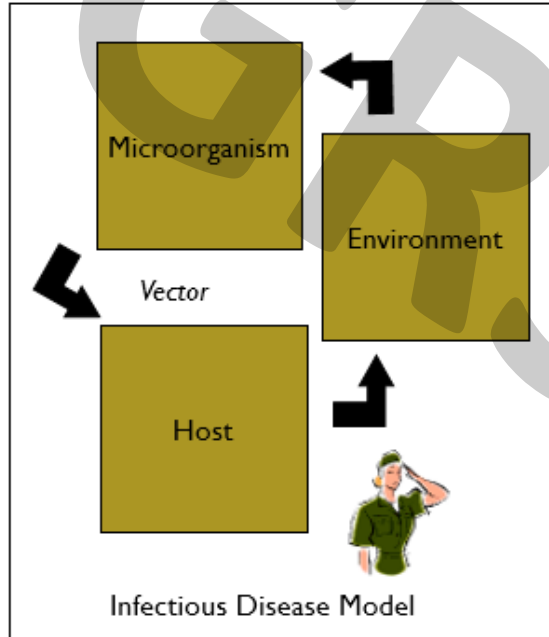


# Myths to “Injury Prevention”

- Individual behavior and **uncontrollable random events** cause most injuries
- Injury prevention policies and interventions **don't exist** (feasibility)
- Injury prevention policies and interventions **don't work** (ineffective)
- Injury prevention interventions are **too expensive** (inefficient)



# Injury Causation Model

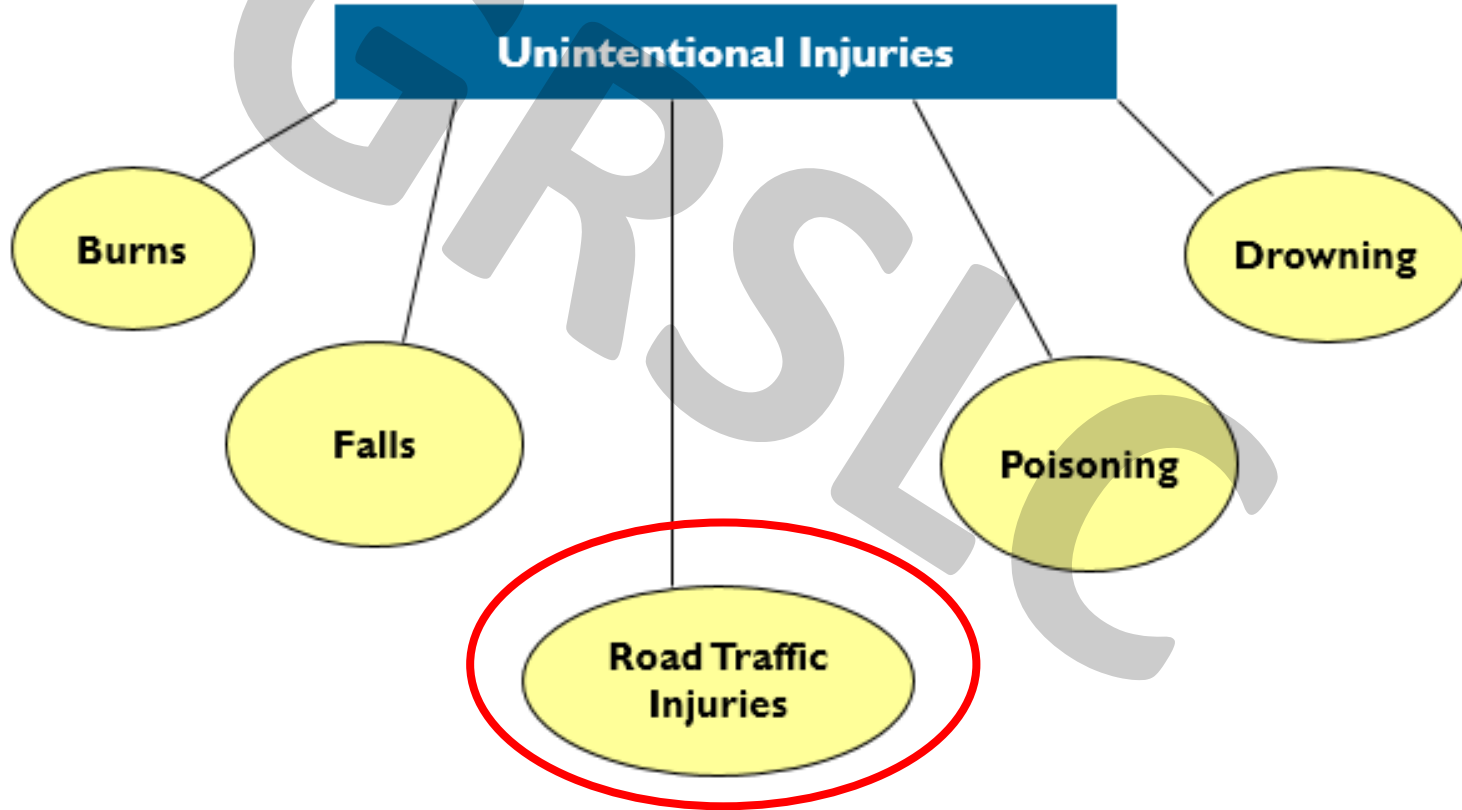


# Injuries

- **Body damage resulting from acute exposure to excess energy** (thermal, mechanical, electrical, chemical), **or ... from the absence of such essentials as heat or oxygen**

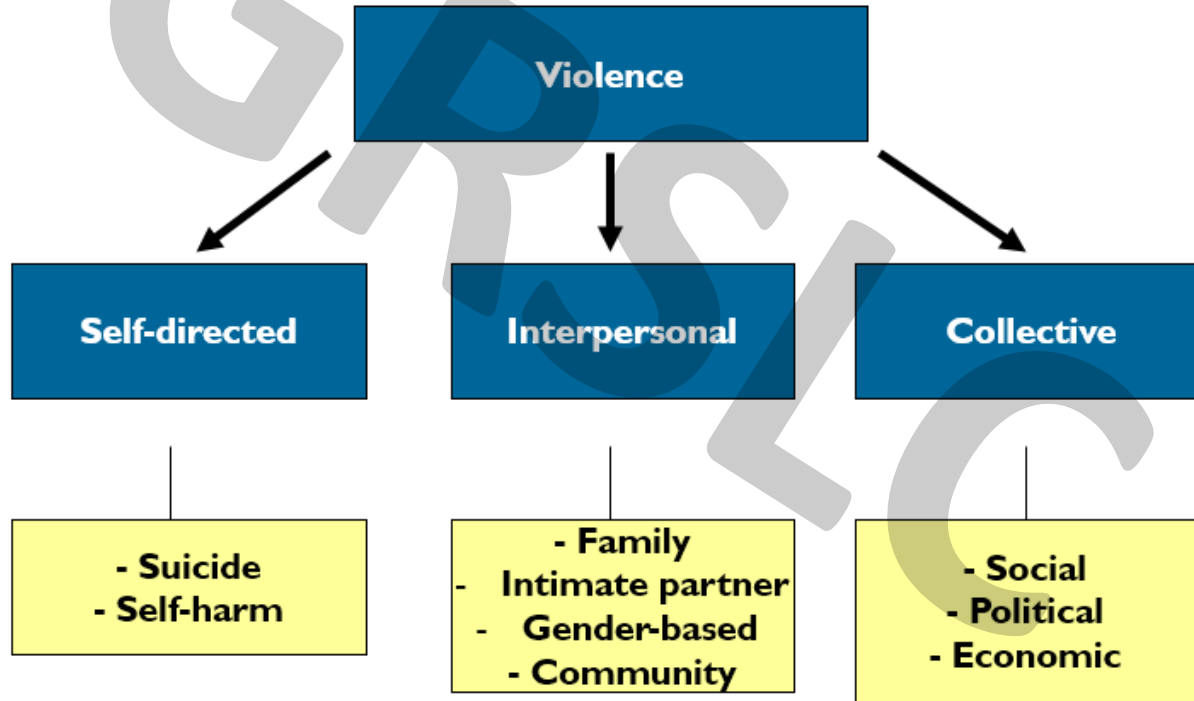


# Typology: Unintentional Injuries





# Typology: Intentional Injuries





# Assembling the Evidence



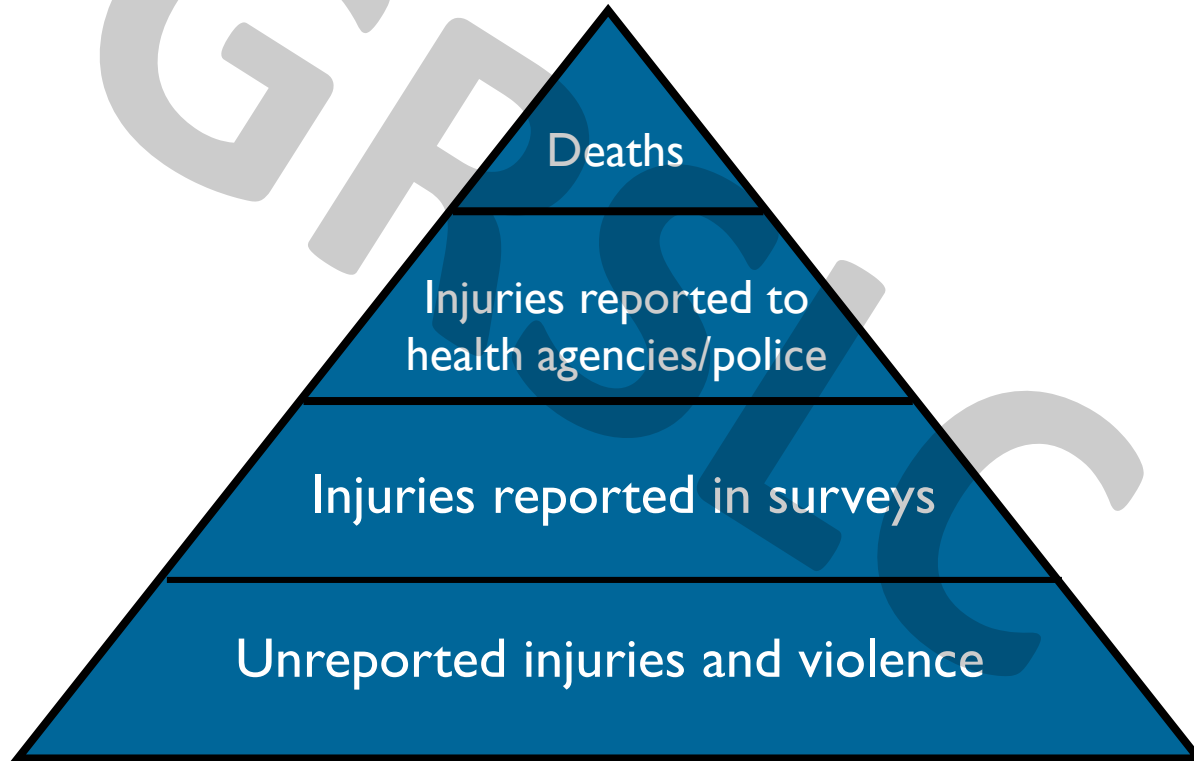
# Why are Road Traffic Injuries Relevant to Public Health?

## Individual and Societal Consequences:

- Mortality (counting deaths)
- Morbidity (non-fatal injuries)
  - ED visits
  - Hospitalizations
  - Outpatients visits
- Disability (short-& long-term sequelae)
- Economic and emotional cost(s) to society



# Counting Injuries: The Challenge



# Health Consequences of Injuries

**Health Consequences**



- **Physical**
- **Mental**
- **Behavioural**
- **Reproductive**



# Mortality

- Injuries are among the main causes of death for the U.S. population (top 5)
  - More than 136,053 deaths from unintentional injuries in 2014 – 1 person every 4 minutes
- Road traffic injuries one of the single greatest killer of Americans between the ages of 1-44 years
  - Responsible for 35,398 deaths annually



# Leading Causes of Death Worldwide, 2015

2015 Rank	Deaths (000s)	% Change '90
1. Ischaemic heart disease	8,916	49
2. Cerebrovascular disease	6,326	37
3. COPD	3,188	12
4. Lower respiratory infection	2,736	-19
5. Alzheimer disease	1,908	115
6. Lung cancer	1,722	68
7. Diabetes	1,518	127
<b>8. Road injuries</b>	<b>1,361</b>	<b>20</b>
9. Diarrheal diseases	1,312	-43
10. Chronic kidney disease	1,234	108

Source: Institute for Health Metrics and Evaluation (2016) GBD 2015. Available online at: <http://ihmeuw.org/4119>



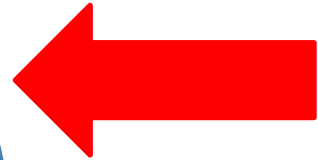
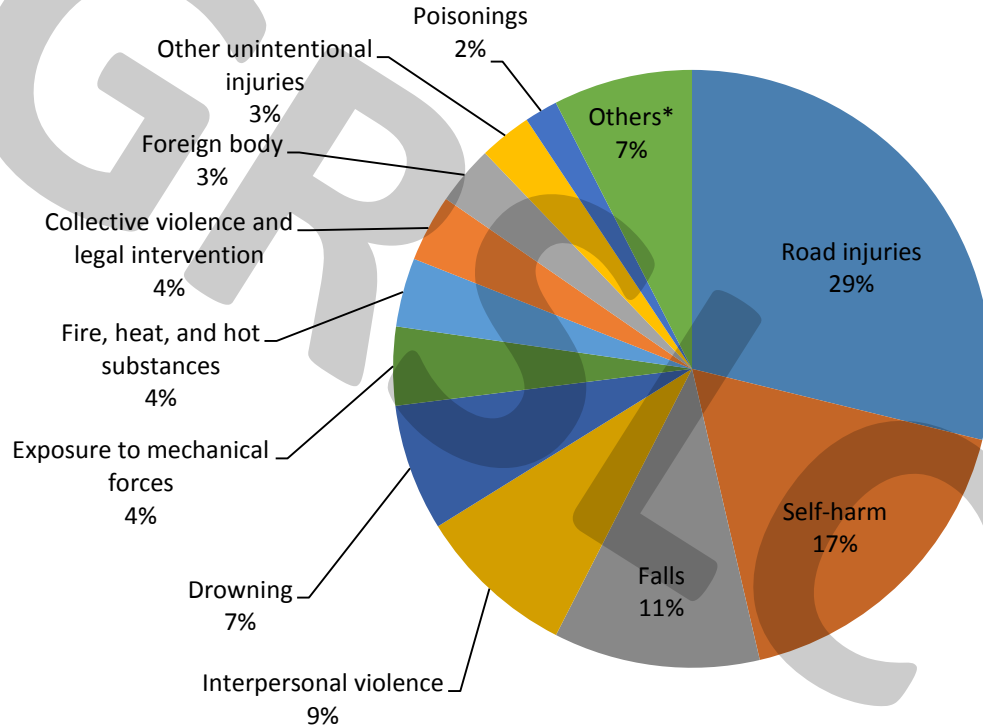
# Global Burden of Injuries

- According to the latest iteration of the Global Burden of Disease Study 2015, injuries were responsible for approximately **4.7 million deaths** worldwide in 2015
- Unintentional injuries accounted for 1.8 million deaths
  - Or ~39% of the burden of injury-related mortality
- Road traffic injuries accounted for 1.3 million deaths
  - Or ~29% of the burden of injury-related mortality





# Distribution of injury deaths by cause worldwide, 2015



\*Adverse medical Rx,  
Other transport  
injuries, Animal  
contact, Forces of  
nature and  
Environmental heat  
and cold exposure



# Burden of Disease (DALYs/100,000 pop)

## by global income level

	High-income	Upper-middle income	Low-middle-income	Low income
Comm. Dis. (including Maternal, Perinatal, & Nutritional)	1,470	3,614	14,560	31,912
Non-Communicable Diseases	21,730	20,512	19,467	16,898
Injuries	2,287	<b>3,277</b>	<b>3,630</b>	<b>4,850</b>





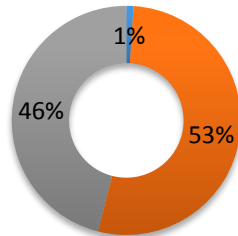
## Burden of RTIs



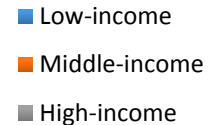
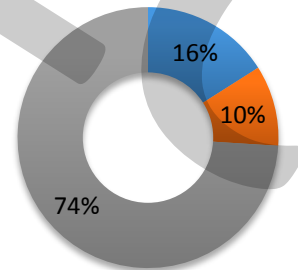
# RTIs in low-and middle-income countries

- Although low-and middle-income countries only possess **54%** of the world's registered vehicles, they suffer **ninety percent** of the world road traffic deaths
- Road traffic death rates are more than **twice** as high in LMICs than HICs

Registered motorized vehicles



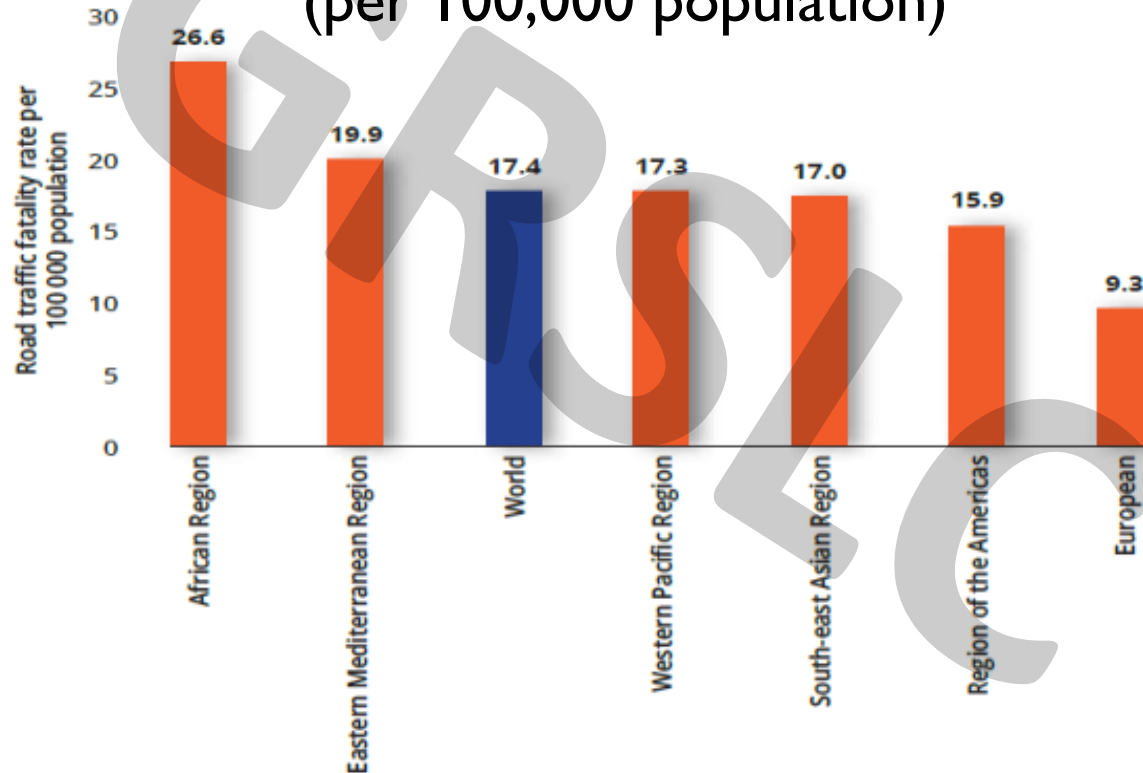
Road traffic deaths



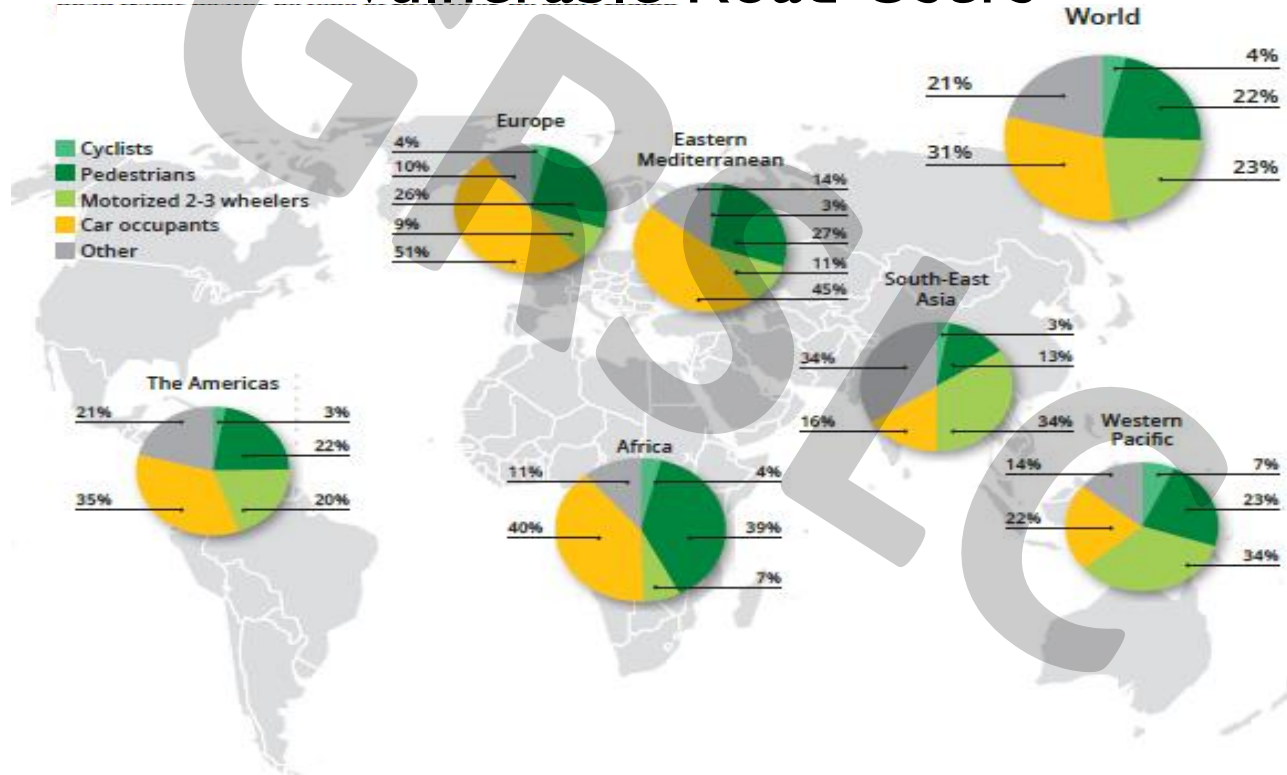


# Africa: Highest Road Traffic Death Rates

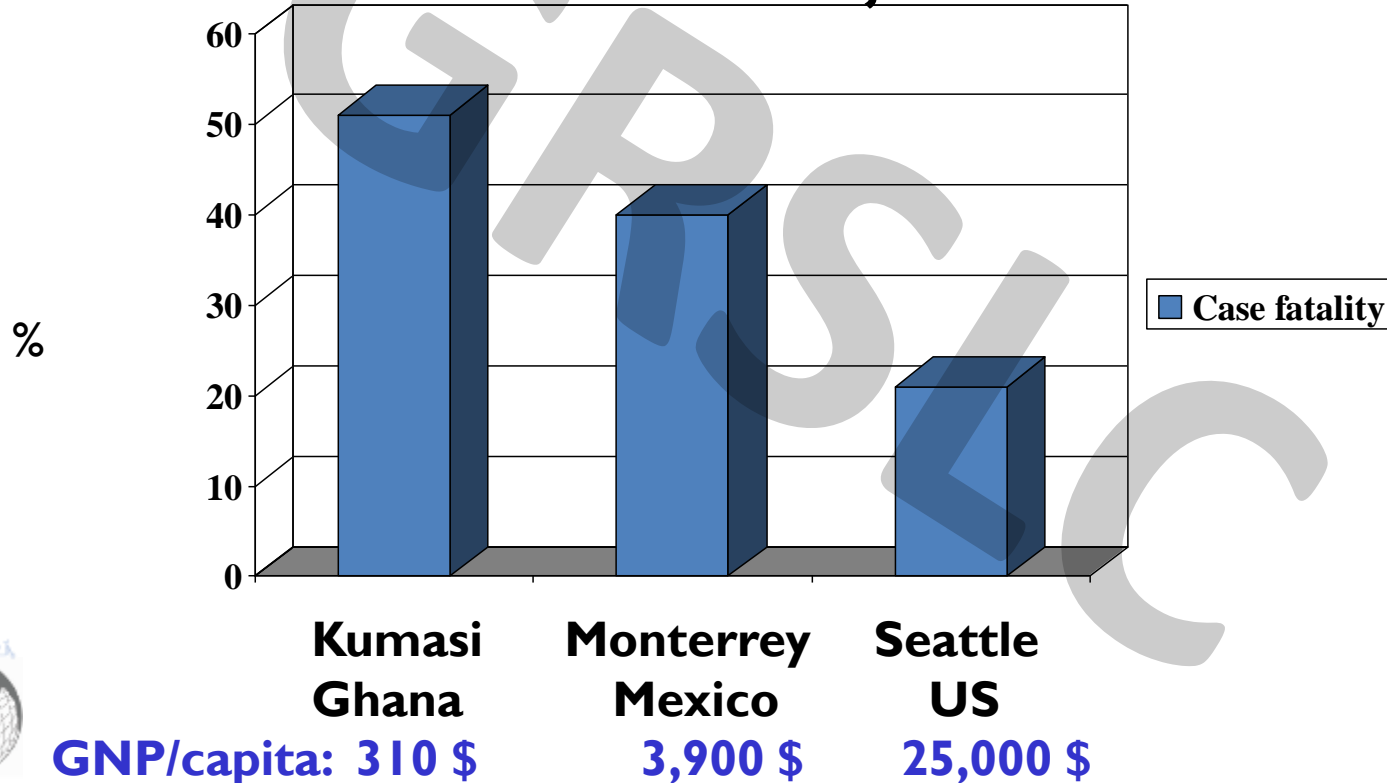
(per 100,000 population)



# Half of All Deaths: Vulnerable Road Users



# Pre-hospital Case Fatality: Serious Injuries







# More Evidence - Cost of Injuries



# Costs of Injuries

## Direct Costs

- Medical
- Mental health
- Emergency response services
- Law enforcement services
- Judicial services

## Indirect Costs

- Premature deaths
- Lost productivity
- Absenteeism
- Economic development
- Quality of life
- Other intangible losses



# Global Costs: RTIs

Region	Regional GNP 1997	As %	Estimated Annual Crash Costs GNP \$ Billions
Africa	370	1%	\$3.7
Asia	2,454	1%	\$24.5
Latin America/Caribbean	1,890	1%	\$18.9
Middle East	495	1.5%	\$7.4
Central/Eastern Europe	659	1.5%	\$9.9
<b>Subtotal</b>	<b>5,615</b>		<b>\$64.5</b>
Highly motorized countries	22,665	2%	\$453.3
<b>Total</b>			<b>\$517.8 billion</b>



# US Costs of Injury

	Medical Costs	Work Loss Costs	Total Costs
Fatal	\$2 Billion	\$187 Billion	\$189 Billion
Hospitalized	\$80 Billion	\$150 Billion	\$230 Billion
ED Treated and Released	\$66 Billion	\$100 Billion	\$166 Billion
<b>Total</b>	<b>\$148 Billion</b>	<b>\$437 Billion</b>	<b>\$585 Billion</b>



# What are the Alternatives?

**So injuries occur, *but ...***

**... what can we do about them?**

**... *what are the policy alternatives and their outcomes?***



# Haddon Matrix: Illustrative



## Person:

- alcohol use
- driving speeds
- protective equipment



## Vector:

- VEMs
- lights
- brakes



## Environment:

- street lighting
- paved roads
- road barriers



# Haddon Matrix: Illustrative [2]



## Pre-Crash

Intervention can prevent:

- death
- injury
- property damage



## Crash

Intervention can prevent:

- death
- injury



## Post-Crash

Intervention can reduce the chances of:

- death
- injury



# Haddon Matrix: Example

Time Frame	Host (Person)	Vector / Vehicle	Environment	
			Physical	Socio-economic
Pre-event	Avoiding alcohol	Visibility measures	Street lights	Social norms (drinking)
Event	Use of seatbelts	Airbags	Clear roads	Seatbelt laws
Post-event	Disability prevention	First aid	Response of EMS	Availability of EMS





# Cost-Effective Interventions Exist

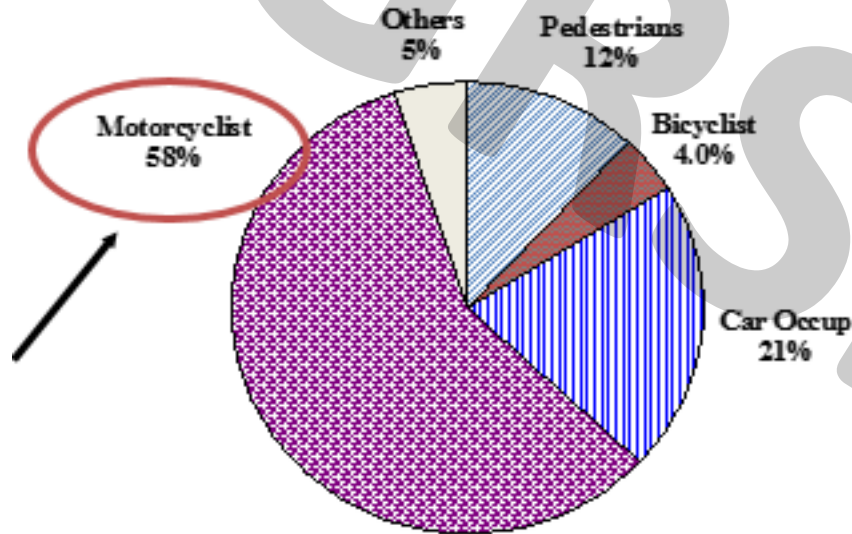
Intervention	Cost per Disability-Adjusted Life Year (DALY)
Improved enforcement (LMIC average)	\$5.25
Speed bumps at top 25%ile dangerous junctions (LMIC average)	\$8.89
Bicycle helmets (China)	\$107.00
Motorcycle helmets (Thailand)	\$467.00

*By comparison: interventions that cost less than \$500 per DALY averted are considered very cost-effective.*

(Bishai and Hyder, 2006)



# Road Traffic Fatalities: Example from Malaysia



**Increased risk for  
motorcyclists:**

**Smaller size-less  
conspicuous**

**Weaving through  
traffic**

**Less protection for  
driver/passenger**

SOURCE: ROYAL MALAYSIAPOLICE



# Interventions for Motorcycle Injuries: Malaysia did it!

- **Dedicated Motorcycle Lane on Highways**
  - 39% reduction in number of crashes
  - Costly and unavailable in rural roads
- **Motorcycle Helmets**
  - Prevent death (29%) and brain injury (67%)
  - Compliance still low
  - Young riders unprotected



# Criteria for Policy – Example Child Injuries

Intervention **cost benefit analysis** – many of the most effective interventions have great returns on investments

Expenditure of \$US each on:	Savings (\$US)
Smoke alarms	65
Child restraints	29
Bicycle helmets	29
Prevention counselling by pediatricians	10
Poison control centers	7
Home visitation to prevent child abuse	6



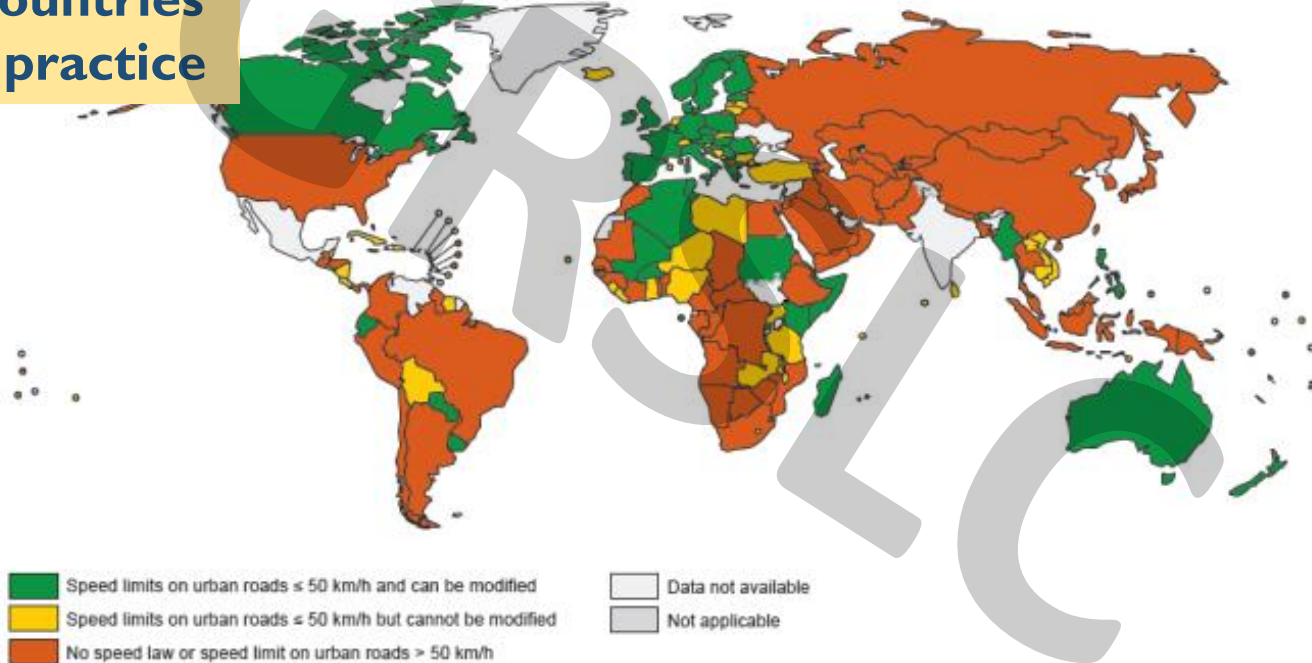


## Road Traffic Injury Prevention Policies – Trade-offs



# Comprehensive Urban Speed Laws

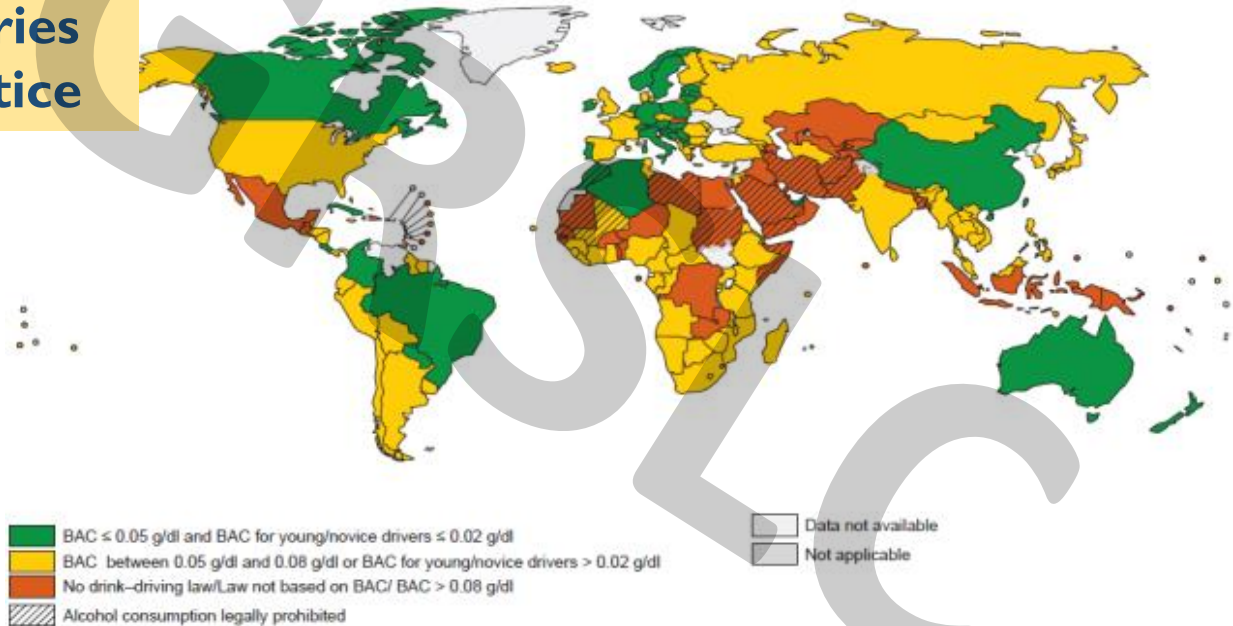
Only 47 countries with best practice



Comprehensive urban speed law = 50km/h & local authorities allowed to reduce limits

# Comprehensive Drink Driving Laws

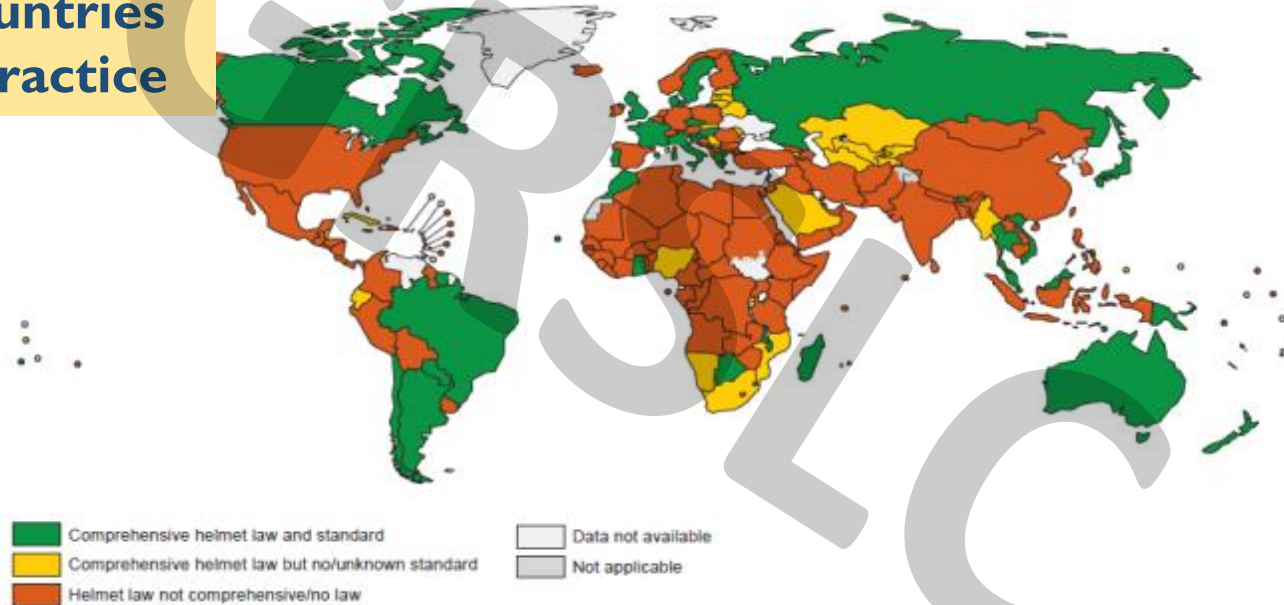
Only 34 countries with best practice



Comprehensive drink-driving law = Blood Alcohol Concentration (BAC) of 0.05 g/dl

# Comprehensive Motorcycle Helmet Laws

Only 44 countries with best practice

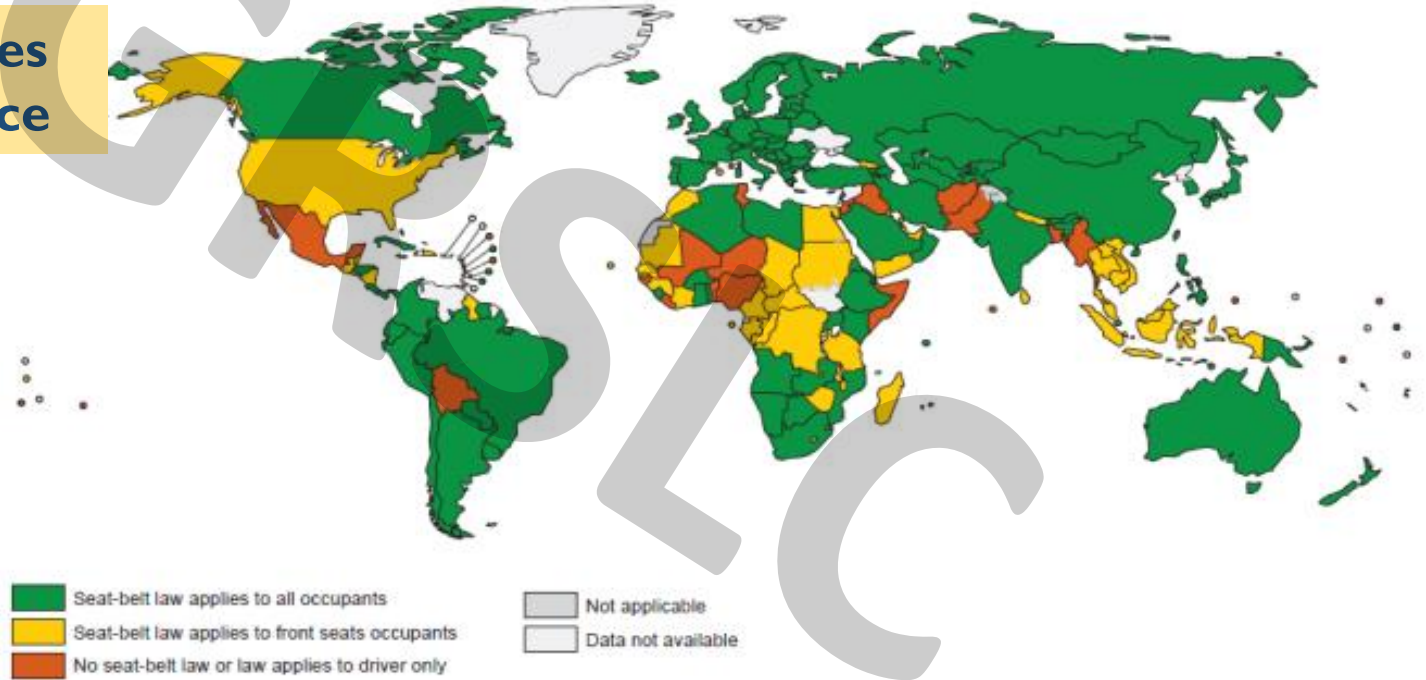


Comprehensive helmet law = All riders, all roads, all engine types + helmet standard



# Comprehensive Seatbelt Laws

Only 44 countries with best practice

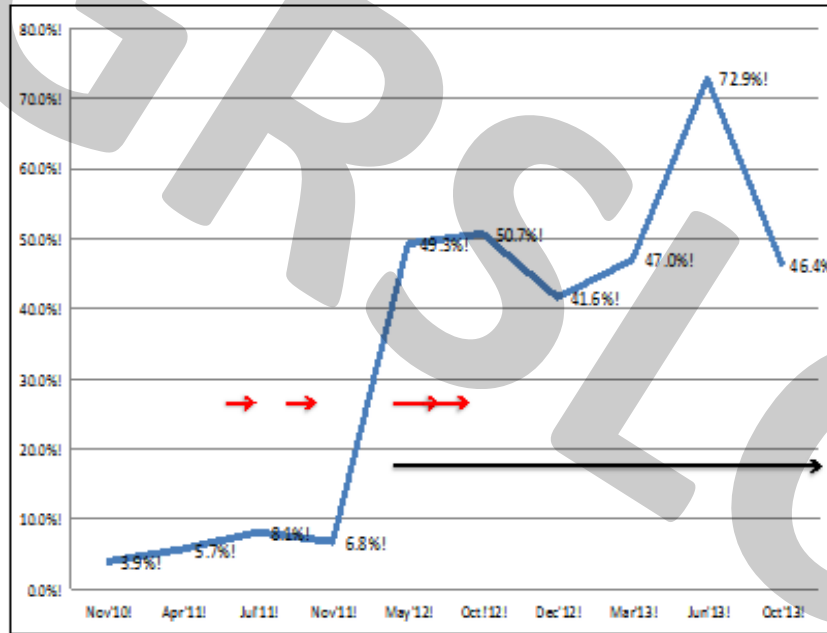


Comprehensive seat-belt law = Applies to all vehicle occupants



# Turkey Can do it!

## Seatbelt Observations, Afyon

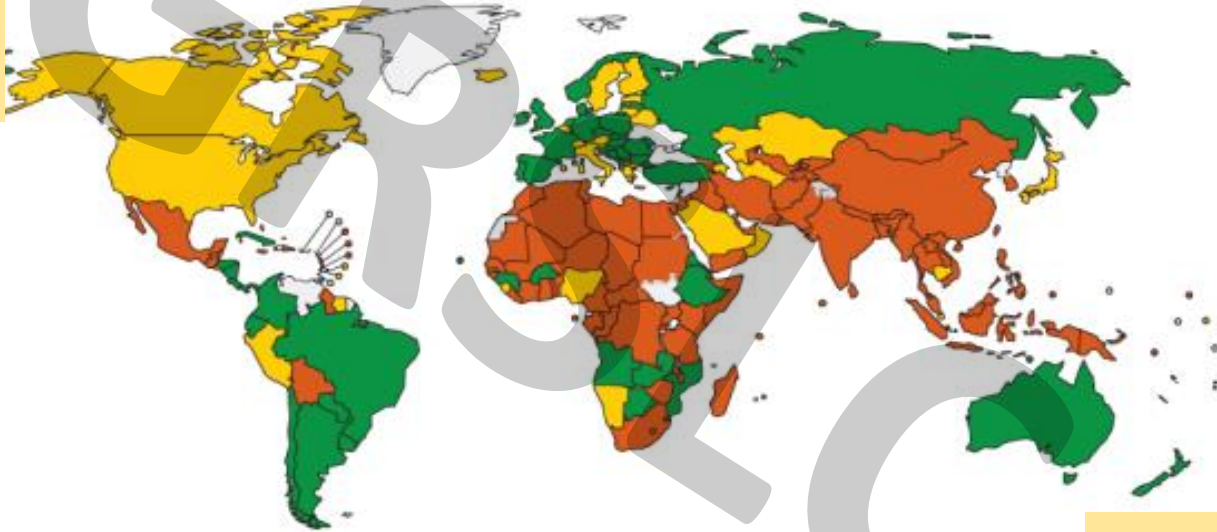





KEY  
Social marketing campaign →  
Enforcement →





# Child Restraint Laws: Half of All Countries

Only 53  
countries with  
best practice



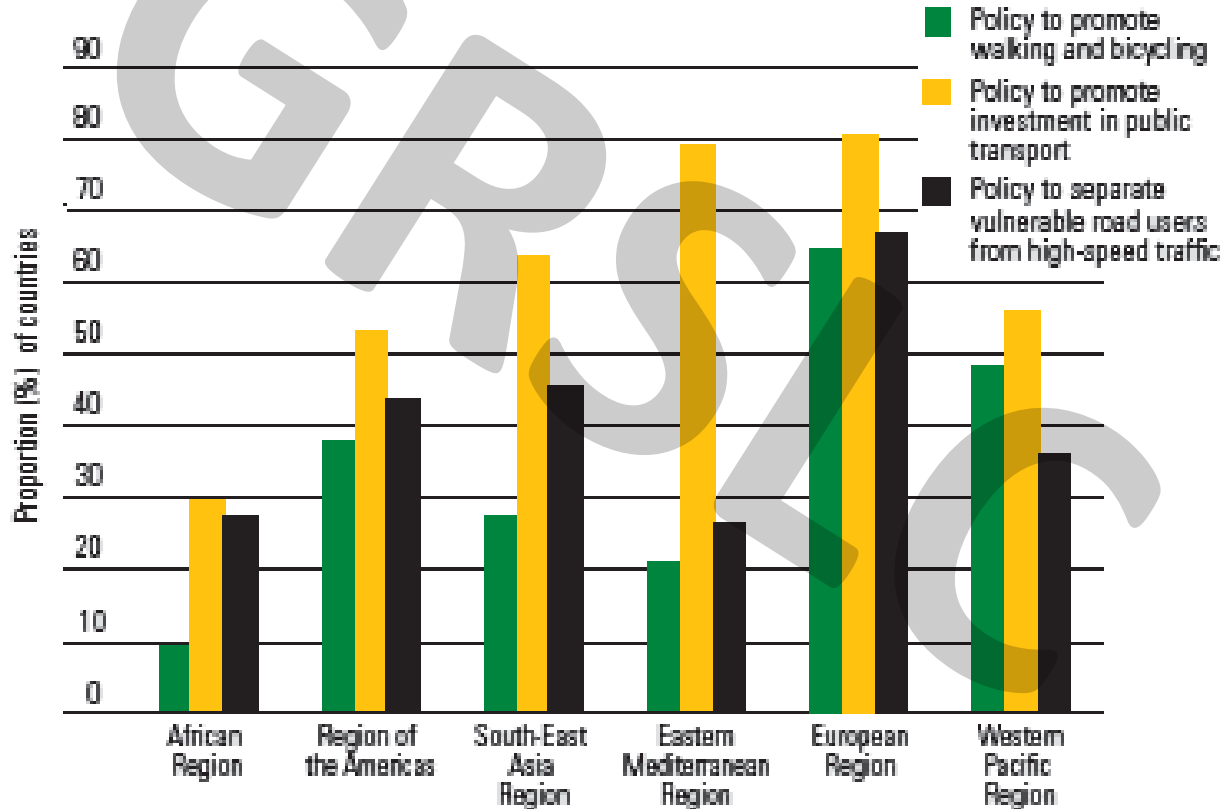
-  Law requires child restraints based on age/weight/height and restricts children from sitting in front seats
-  Law requires child restraints based on age/weight/height or child restraint law combined with restrictions on children sitting in front seats
-  No child restraint law/Child restraint law not based on age/weight/height and no restrictions on front seat

-  Data not available
-  Not applicable

+ Enforcement  
is poor



# Policies Promoting Walking and Cycling



**Exist in  
only 35%  
of  
countries**





# Reflections



# Global Policy Attention

- Global attention to the toll of injuries has been increasing, albeit slowly and condition-specific
- Good momentum for **road safety**
  - U.N. Global Decade of Action 2011-20
- Some traction at national level
  - Ministries of Health, Transport, Social Welfare, Justice, Education
- Plans for concerted movement on '**child road traffic injuries**'



# Road Injury Prevention and Control

- Preventable events cause most road injuries and trauma
- Interventions exist (feasibility)
- Interventions work (effective)
- Interventions are cost-effective (cost-efficient)



# And the Story of Change!

## TECHNICAL FILMS SDN BHD

Client: Kementerian Pengangkutan Malaysia

Product: Motorcycle Safety Campaign

Title: Child Safety On Bike

Duration : 30 sec

Language: English

Agency: Media House

Date: 24-10-2001





# Johns Hopkins International Injury Research Unit

World Health Organization  
Collaborating Center  
for Injuries, Violence and  
Accident Prevention



## Thank you!

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