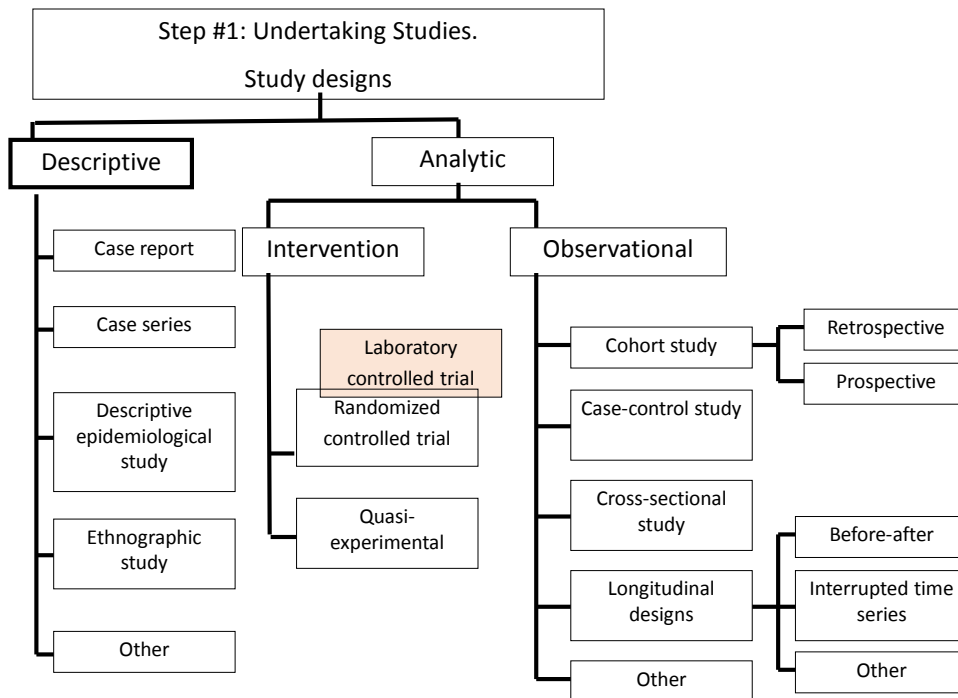


MV program evaluation

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Quiz: How do you proof safety belts work?



What is the objective of these studies

		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N= A+B+C+D

- Simplifying, ideally $D=0$, $B=0$, A much larger than C
- But in real world..... Most times “necessary and sufficient”, so it is all about proportions

An example

		Seat belt used		
		Yes	No	
Dead in crash	Yes	15	35	50
	No	30	20	50
		45	55	100

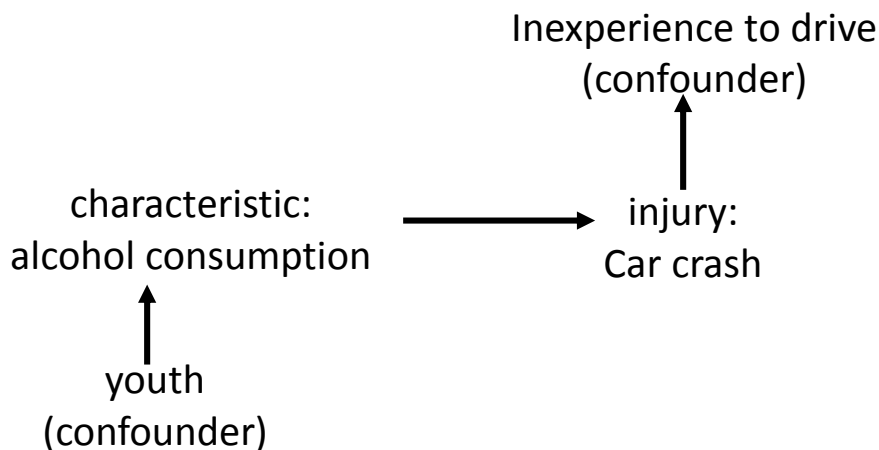
- $(15/45)/(35/55)=0.3/0.6=0,5$
- Are these 100 “the” 100? A convenient sample? A random sample?
 - Maybe it is not 0,5 but +/- something
- Depending on the order we filled in the “table”, the resulting value will be an ODDS RATIO (OR) or a RELATIVE RISK (RR) estimate. Also, if “representativity” in at stake, we can calculate %95CI

Danger #1: Bias

- Non-random error that results in an untrue estimate of an exposure’s effect on the risk of injury
- May occur in the design, conduct or analysis stage of a study
- Various types & sources of bias
 - e.g. selection bias

Danger #2: Confounding

Confounding in a hypothetical study of alcohol consumption as a risk factor for drowning



Danger #3: Precision

		Wearing a flowered dress used		
		Yes	No	
Dead in crash	Yes	20	20	40
	No	30	30	60
		50	50	100

- $(20/50)/(20/50)=0.4/0.4=1$
 - 1=NO EFFECT
- But what if 0.9? Or 1.2? How close to 1 is 1?
 - 95% CIs

Step #2: Integrating studies

- Review papers: a collection of papers and we describe their methods and findings highlighting commonalities and differences
- Systematic reviews: same as above but we impose stricter criteria both in gathering of studies as well as in methods (e.g., Cochrane reviews)
- Meta-analysis: same as above but homogeneity of studies is such that we can conduct new study integrating data from others

Where to look for effectiveness information?

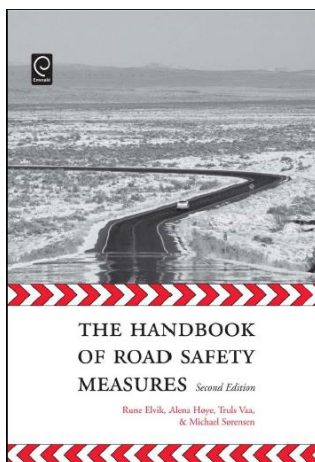
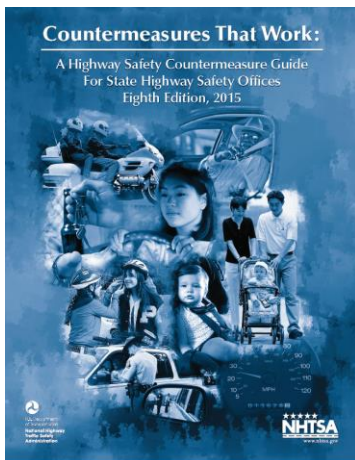


Table O.0.1: Overview of the number of studies, number of results and statistical weights for studies of the effects of general purpose policy instruments on traffic safety.

Measure	Number of studies	Number of results	Statistical weights
O.1 Organisational measures	7	7	0
O.2 Information for decision makers	11	11	0
O.3 Quantified road safety targets and targeted road safety programmes	1	35	71,716
O.4 Safe community programmes	7	20	28,119
O.5 Exposure control	11	76	700,800
O.6 Urban and regional planning	12	50	1,680
O.7 Road plans and road construction	10	16	0
O.8 Road safety audits	4	4	0
O.9 Motor vehicle taxation	3	24	0
O.10 Road pricing	9	9	0
O.11 Changes in the modal split of travel	7	66	85,183
O.12 Road traffic legislation	1	9	8,711
O.13 Regulating commercial transport	6	18	186,468
O.14 Provision of medical services	31	70	813



- Alcohol- and Drug-Impaired Driving;
- Seat Belts and Child Restraints;
- Speeding and Speed Management;
- Distracted and Drowsy Driving;
- Motorcycle Safety;
- Young Drivers;
- Older Drivers;
- Pedestrians; and
- Bicycles.

Effectiveness:

- ★★★★★ - Demonstrated to be effective by several high-quality evaluations with consistent results
- ★★★★ - Demonstrated to be effective in certain situations
- ★★★ - Likely to be effective based on balance of evidence from high-quality evaluations or other sources
- ★★ - Effectiveness still undetermined; different methods of implementing this countermeasure produce different results
- ★ - Limited or no high-quality evaluation evidence

Table O.12.1: Potential for reducing the numbers killed and injured in traffic in Norway assuming 100 per cent respect for road traffic legislation. Source: Elvik 1997B

Main group of regulations	Percentage decrease in number (95% confidence interval)	
	Injured	Killed
Speed limits	-9 (±5)	-15 (±8)
Use of safety equipment	-5 (±3)	-14 (±8)
Drink driving regulations	-3 (±2)	-10 (±7)
Other behaviour regulations in traffic	-8 (±6)	-7 (±5)
Technical requirements for vehicles	-1 (±1)	-1 (±1)
Driver requirements	-1 (±1)	-1 (±1)
Total potential	-27 (±18)	-48 (±30)

Then, prioritizing interventions....

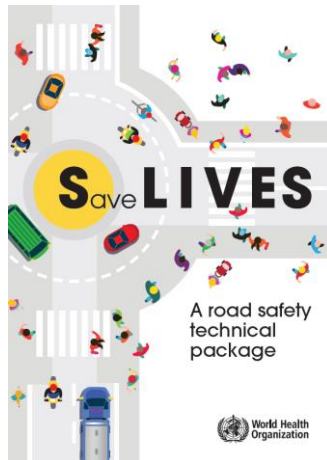








Table 2.1
Save LIVES: six components and 22 interventions

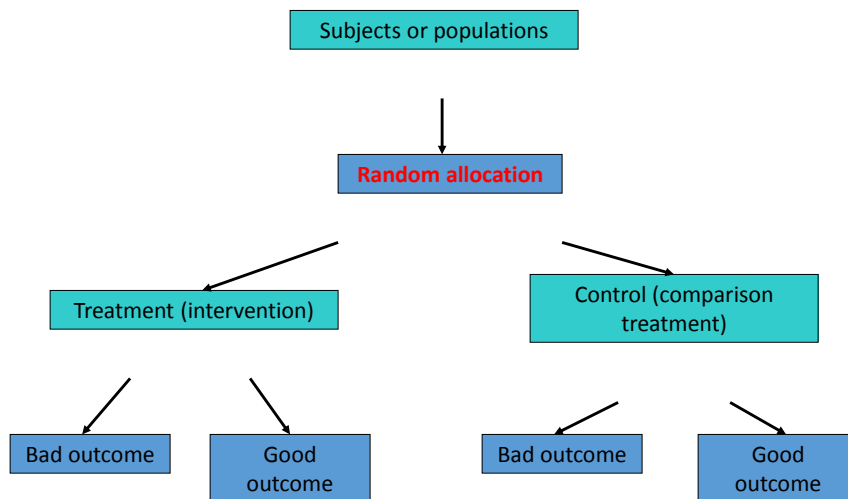
Acronym	Component	Interventions
	Speed management	<ul style="list-style-type: none"> Establish and enforce speed limit laws nationwide, locally and in cities Build or modify roads which calm traffic, e.g. roundabouts, road narrowing, speed bumps, chicanes and rumble strips Require car makers to install new technologies, such as intelligent speed adaptation, to help drivers keep to speed limits Create an agency to spearhead road safety
	Leadership on road safety	<ul style="list-style-type: none"> Develop and fund a road safety strategy Evaluate the impact of road safety strategies Monitor road safety by strengthening data systems Raise awareness and public support through education and campaigns Provide safe infrastructure for all road users including sidewalks, safe crossings, railways, overpasses and underpasses Pull in pace bicycles and motorcycle lanes Make the sides of roads safer by using clear zones, collapsible structures or barriers
	Infrastructure design and improvement	<ul style="list-style-type: none"> Design safer intersections Separate access roads from through roads Prioritize people by putting in place vehicle-free zones Restrict traffic and speed in residential, commercial and school zones Provide better, safer routes for public transport
	Vehicle safety standards	<ul style="list-style-type: none"> Establish and enforce motor vehicle safety standard regulations related to: <ul style="list-style-type: none"> • seat belts • electronic stability control • seat-belt anchorage • pedestrian protection, and • frontal impact • ISOFIX child restraint points • side impact Establish and enforce regulations on motorcycle anti-lock braking and daytime running lights
	Enforcement of traffic laws	<ul style="list-style-type: none"> Establish and enforce laws of national, local and city levels on: <ul style="list-style-type: none"> • drinking and driving • seat belts; and • motorcycle helmets
	Survival after a crash	<ul style="list-style-type: none"> Develop organized and integrated prehospital and facility-based emergency care systems Train those who respond to crashes in basic emergency care Promote community first responder training

So, back to study designs

Things to consider

- (Define outcome and exposure)
- Who/what and how is selected: (internal and external validity issues –bias and randomness)
- Who assigns exposure: (experimental vs. Epidemiological - confounding)
- What is the timing of things: from case to exposure or from exposure to case. From now onwards or from the past till present

(Randomized controlled) trials

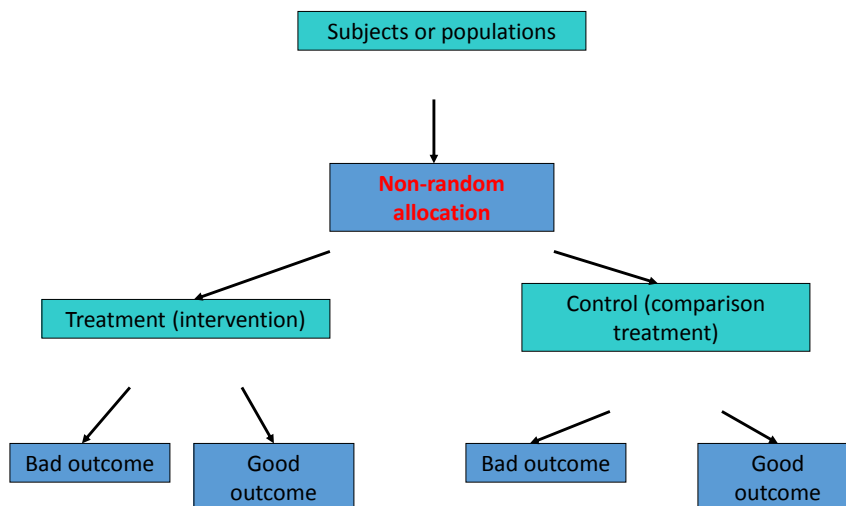


What is the objective of these studies

		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N= A+B+C+D

- Researcher:
 - Select total N (healthy) and characteristics
 - Selects exposure
- Sequence: Nothing->exposure->outcome
- Measure RR, possibly (if randomness is accounted for) 95%CI

Quasi-experimental studies

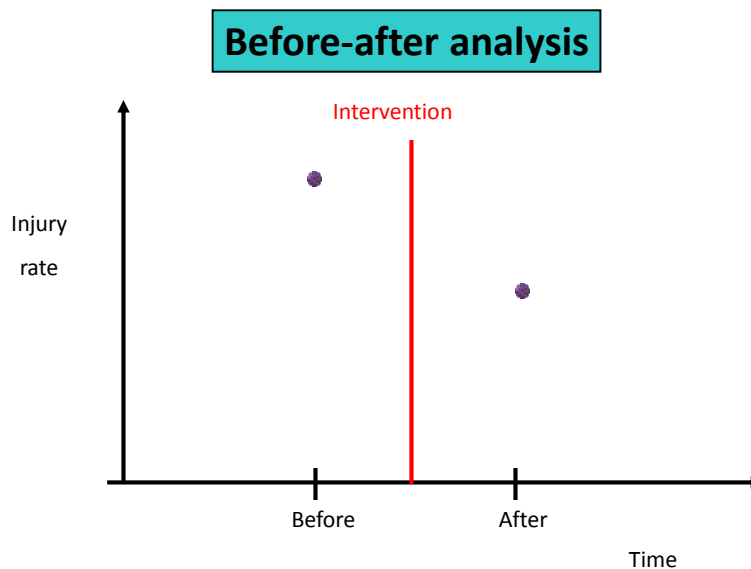


What is the objective of these studies

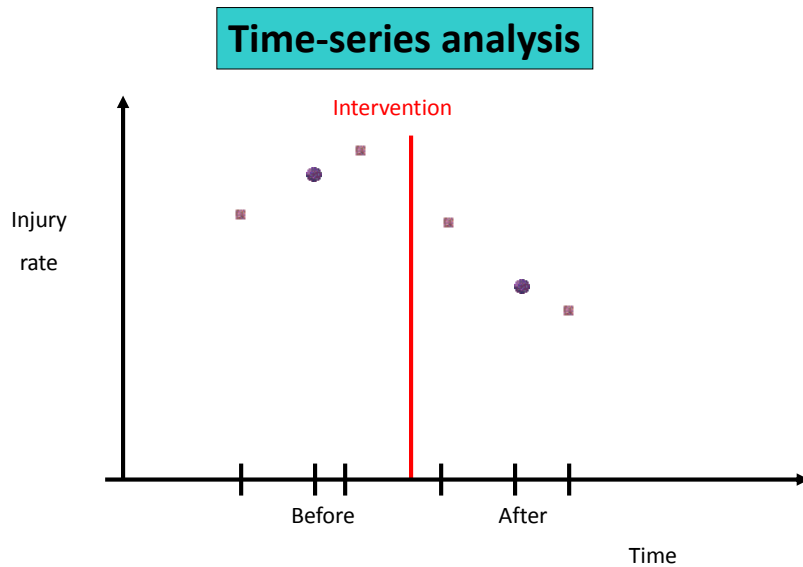
		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N=A+B+C+D

- Researcher:
 - Select total N (healthy) and characteristics
- Somebody else selects exposure
- Sequence: Nothing->exposure->outcome
- Measure RR (weaker), possibly (if randomness is accounted for) 95%CI

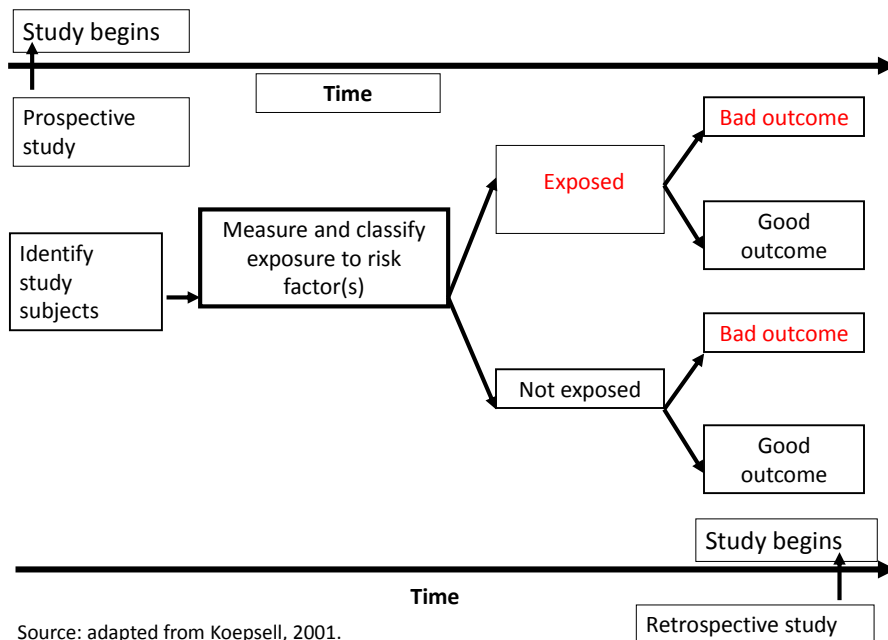
Longitudinal studies



Longitudinal studies



Cohort studies



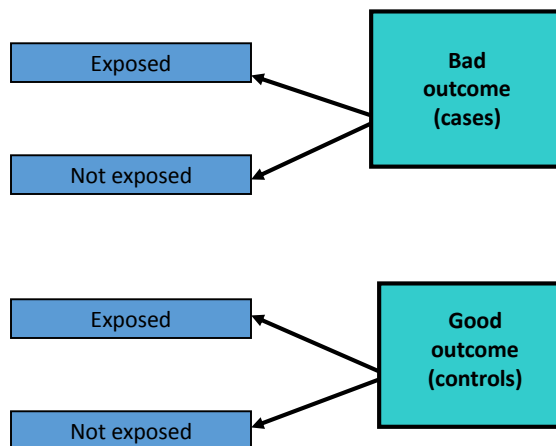
Source: adapted from Koepsell, 2001.

What is the objective of these studies

		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N= A+B+C+D

- Researcher:
 - Select total N (healthy) and characteristics
- Subjects elect exposure
- Sequence: Nothing->exposure->outcome
- Measure RR (weaker), possibly (if randomness is accounted for) 95%CI

Case-control studies



Source: adapted from Koepsell, 2001.

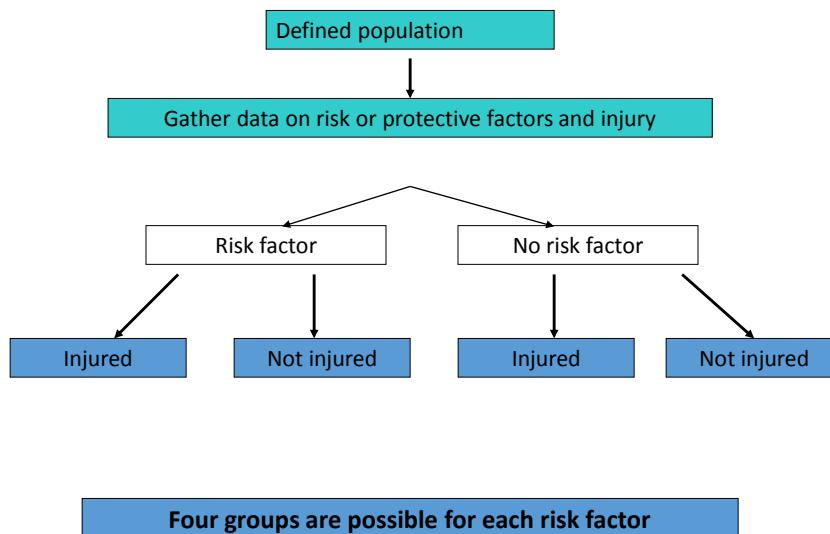
What is the objective of these studies

		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N= A+B+C+D

- Researcher:
 - Select A+B sick and C+B health
- Subjects Selected exposure
- Sequence: Injury->exposure
- Measure OR, possibly (if randomness is accounted for) 95%CI

Remember the 1943 BMJ by Lawrence of Arabia's physician?

Cross-sectional studies

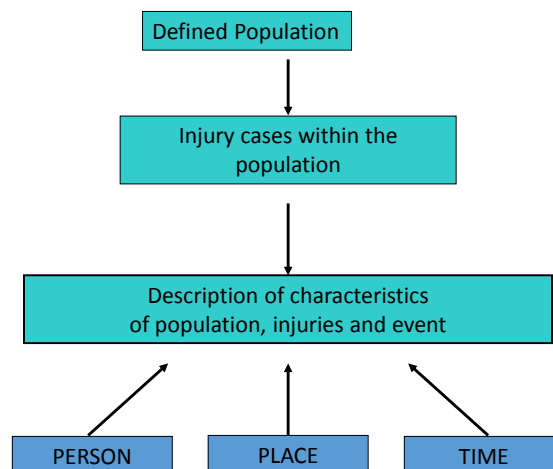


What is the objective of these studies

		Exposure		
		Yes	No	
Outcome	Yes	A	B	A+B
	No	C	D	C+D
		A+C	B+D	N= A+B+C+D

- Researcher:
 - Selects N
- Others selected exposure
- No Sequence: all measured at once
- Measure OR (VERY WEAK), possibly (if randomness is accounted for) 95%CI

Descriptive epidemiological studies



Choosing a research design

Questions to ask:

- Description or hypothesis testing?
- Can researcher determine exposure?
- How much time do I have for the study?
- What other resources do I have?

Summary

Purpose:

- response to problems
- identification of best practice
- evaluation of effectiveness and cost-effectiveness

Process:

- identify research question (review literature)
- choose appropriate study design:
dependant on type of question asked

Descriptive:

- define magnitude
- identify risk factors

Analytic:

- test hypotheses
- establish relationships



Seat Belts: Get the Facts

The Problem Risk Factors Effectiveness Prevention Additional Resources

What is the impact of seat belt use?

- Seat belts reduce serious crash-related injuries and deaths by about half.^{1,2}
- Seat belts saved almost 14,000 lives in 2015.³
- Air bags provide added protection but are not a substitute for seat belts. Air bags plus seat belts provide the greatest protection for adults.^{1,3}

1.1 State Primary Enforcement Seat Belt Use Laws

Effectiveness: ★★★★★	Cost: \$	Use: Medium	Time: Short
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	Low in place	On urban roads < 40 mph	Operator has the power to reduce reduced speed limits				
Drink-driving	National drink-driving law in place	Drink-driving law is based on BAC or equivalent BAC	BAC limit for general population < 0.05 g/dl	BAC limit for passenger vehicle drivers < 0.02 g/dl			
Motorcycle helmets	National motorcycle helmet law in place	Law applies to motorcycle drivers and adult passengers	Low applies to all road types	Low applies to all engine types	Low requires helmet to be properly fastened	Low requires helmet to meet a national or international standard	
Seat-belts	National seat-belt law in place	Law applies to drivers and front seat passengers	Low applies to rear seat passengers				
Child restraints	National child restraint law in place	Law is based on age-weight-height or a certain combination of these factors	Low restricts children under height or a certain age combination of these factors				

Note: *Based on global context; **Based on local context. Source: Based upon reference (8)

Pillar 1	Pillar 2	Pillar 3	Pillar 4	Pillar 5
Road safety management	Safer roads and mobility	Safer vehicles	Safer road users	Post-crash response