4th IRF Regional Conference on "Accident Prevention: Road Safety Measures"
23-24 October 2009 at IHC, New Delhi

The Elements of the Road Safety Management System and Infrastructure Safety Management

Said Dahdah
GRSF

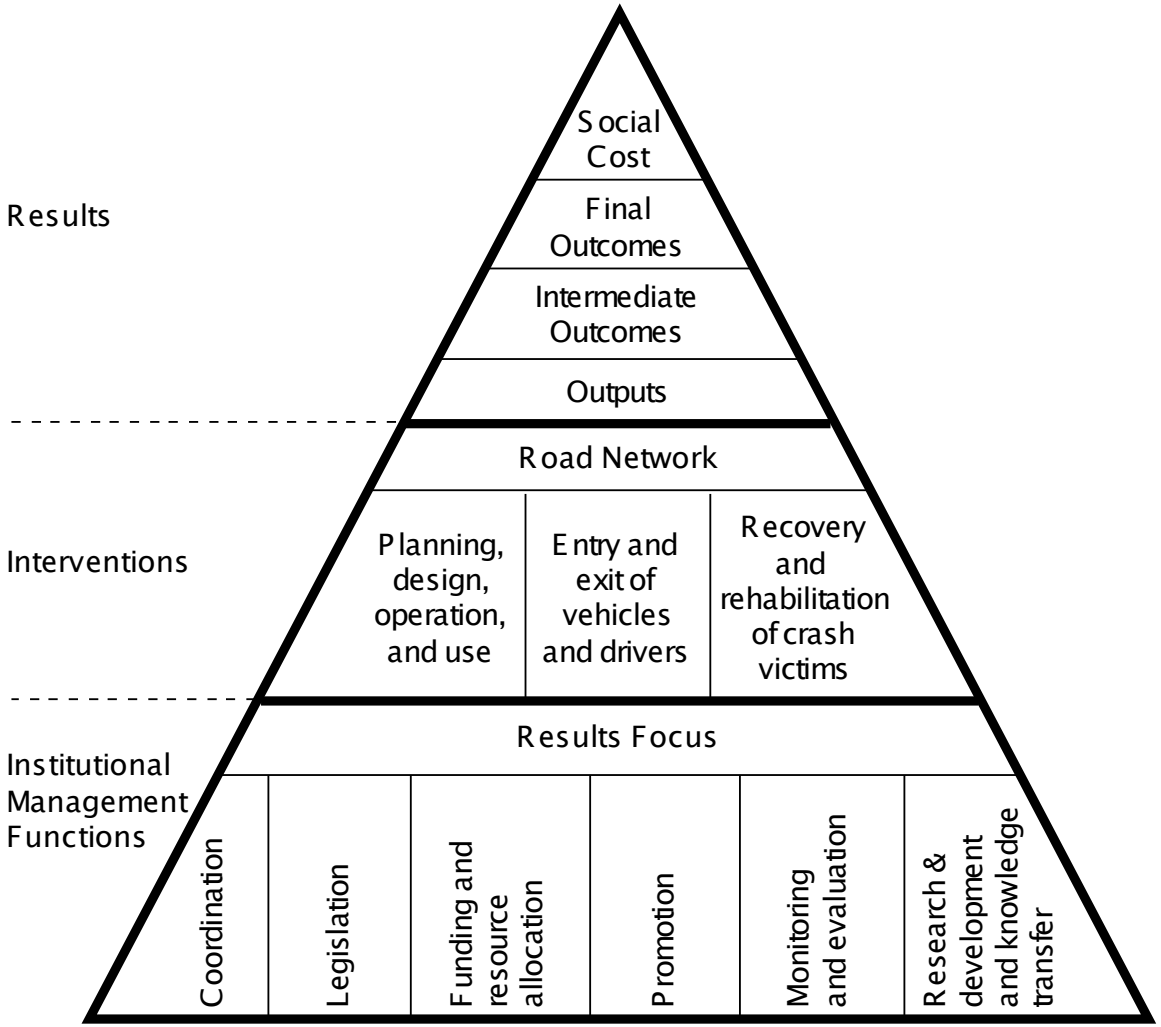
WORLD BANK GLOBAL ROAD SAFETY FACILITY

Overview

Road safety is *produced*, just like any other goods and services. This production process can be viewed as a *management system*.

There are three distinctive levels in the management system: (1) *institutional management functions*, which produce (2) *interventions*, which in turn produce (3) *results*. Much of the common discussion concerning road safety improvements centers on (2) alone.

Figure 1: Road Safety Management System



Source: References [ ], [ ], and [ ].

System characteristics

The safety management system as defined has a number of useful characteristics:

- *it places an emphasis on the production of safety*
- *it is neutral to country structures and cultures*
- *it accommodates evolutionary development*
- *it works within any given land-use/transportation system*
- *it takes the road network as its frame of reference and locates the deaths and injuries that are avoidable*

Management functions

Seven vital institutional management functions can be identified:

- *Results focus*
- *Coordination*
- *Legislation*
- *Funding and resource allocation*
- *Promotion*
- *Monitoring and evaluation*
- *Research and knowledge transfer*

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Results focus

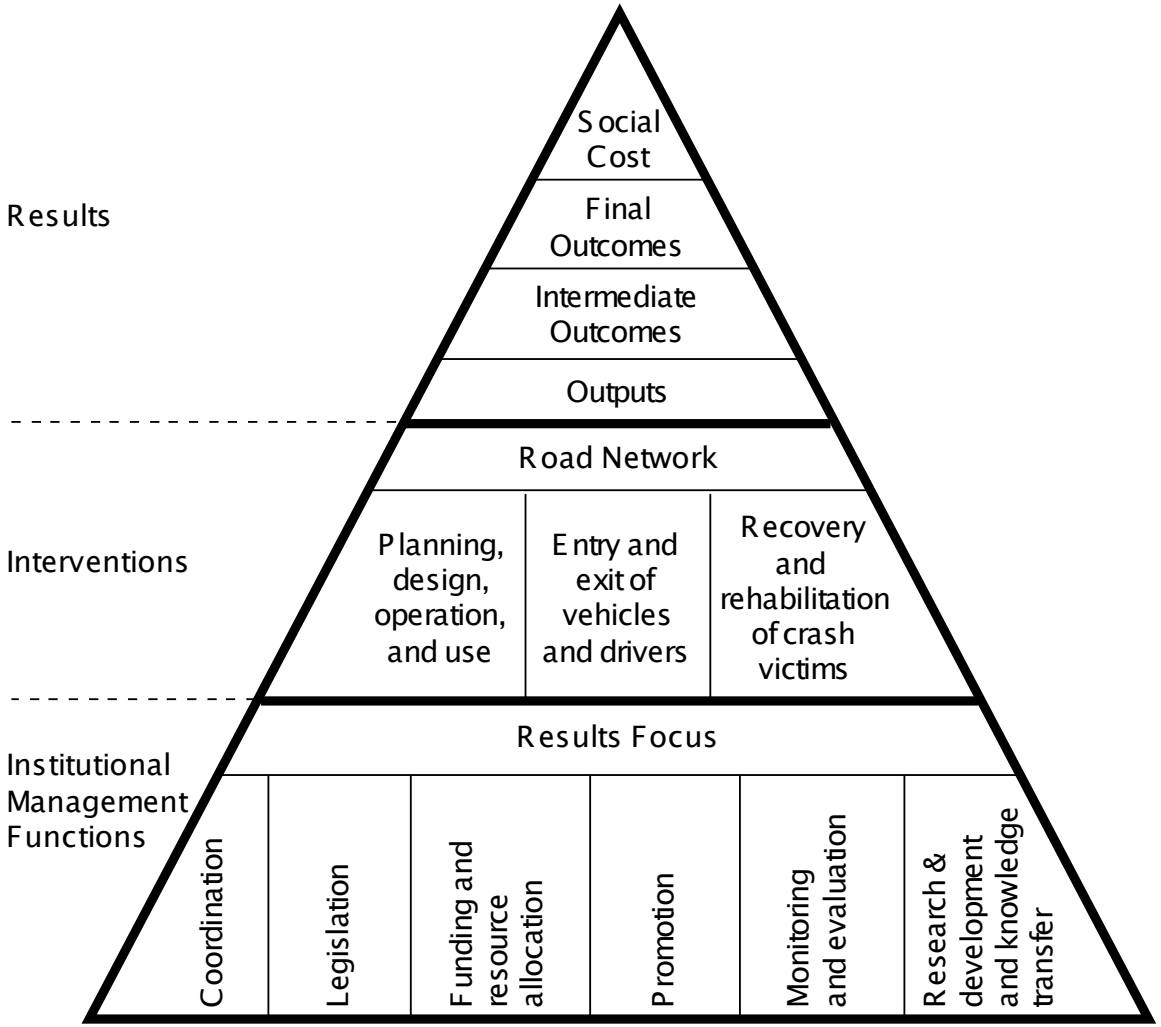
What has been termed ‘results focus’ is the primary, overarching institutional management function.

This addresses the issue of leadership, strategy and ‘ownership’. What are you trying to achieve? How are you going to get there? Who is accountable for this?

The other six functions contribute to the achievement of the desired results. How do you coordinate this? Legislate [illegible]? And so on.

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Figure 1: Road Safety Management System



Source: References [ ], [ ], and [ ].

Evolution of results focus

1950s the road user.

1960 – 70s systemic interventions – the 'Haddon matrix'.

1980 – 90s targeted national plans.

90s onwards *Safe System* goal.

Lead agency role

As the focus on results has evolved there has been sharpened focus on agency accountability.

The *World Report on Road Traffic Injury Prevention* highlighted the crucial importance of the lead agency role in directing the national effort across all the institutional management functions. Lead agency forms follow these functions, but there is no preferred structural model for a successful lead agency.

Interventions

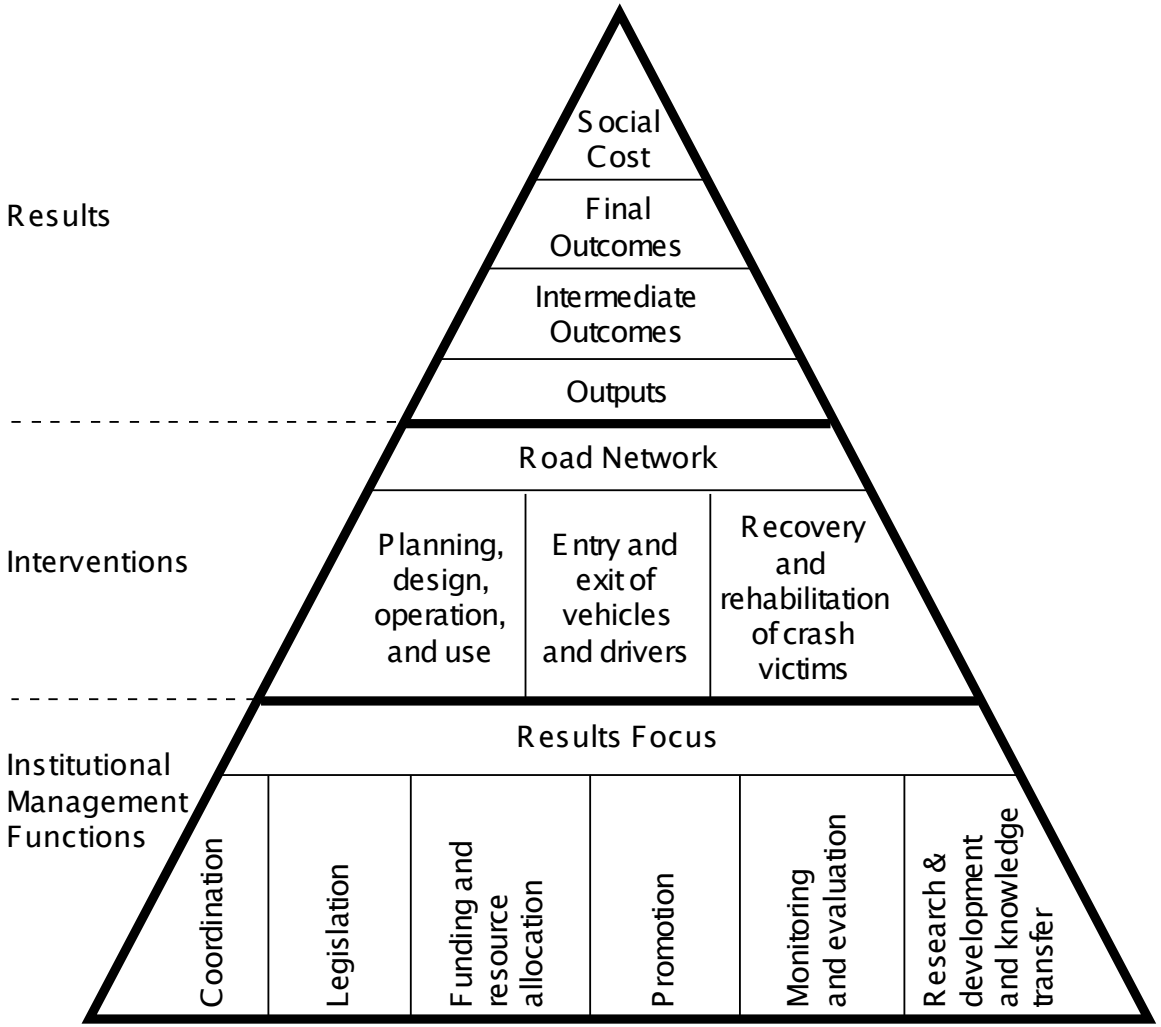
Interventions address:

- *The design and operation of the road network*
- *The entry and exit of vehicles and road users to the road network*
- *The recovery of road crash victims from the road network and their rehabilitation*

They set standards and rules for these activities, and also concern compliance with them, using education, enforcement and incentives.

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Figure 1: Road Safety Management System



Source: References [ ], [ ], and [ ].

The design and operation of the road network

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Making roads more forgiving

With the shift to a *Safe System* goal for network management there has been a growing emphasis on the protective features of road infrastructure. Injury prevention is taking priority over crash reduction.

Road operators are becoming more accountable for the safety performance of their networks and safety rating measures are being developed to objectively rank infrastructure in terms of its protective features.

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Rethinking enforcement goals

With the emergence of targeted safety programs the approach to traffic safety enforcement shifted from an offender 'apprehension' model to a 'general deterrence' model where all road users are targeted.

Enforcement is focused on injury prevention and promoted this way. Reduced speeds, less drink driving and increased wearing of safety belts and helmets all contribute to reduced deaths and injuries.

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Traffic safety enforcement

Aims at controlling road user behaviour by preventative, persuasive and punitive measures to achieve the safe and efficient movement of traffic.

Consists of legislation to govern the safe use of the traffic system, and related road user penalties; traffic policing to ensure compliance; and intensive social marketing to support policing programs targeting key safety behaviours.

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Deterrence

Safety enforcement outcomes depend upon:

(1)the perceived risk of detection;

(2)the severity of the punishment; and

(3)the immediacy of the punishment.

Drivers are deterred from offending to the extent that they think they will be caught, and then severely and swiftly punished.

Deterrence (cont'd)

Enforcement begins with observation. The aim is not so much to catch offenders but to deter them.

Observation is of course costly. It would for instance be prohibitively expensive to observe all road traffic all the time. What is needed is to make drivers think that they are being observed, or might be being observed, even when they are not.

Deterrence (cont'd)

Offenders who are caught and punished may change their behaviour as a result of the experience. Where this occurs, it is known as *'specific deterrence'*.

But many others also change their behaviour, not because of the punishment experience, but because of the threat of it. This is known as *'general deterrence'.*

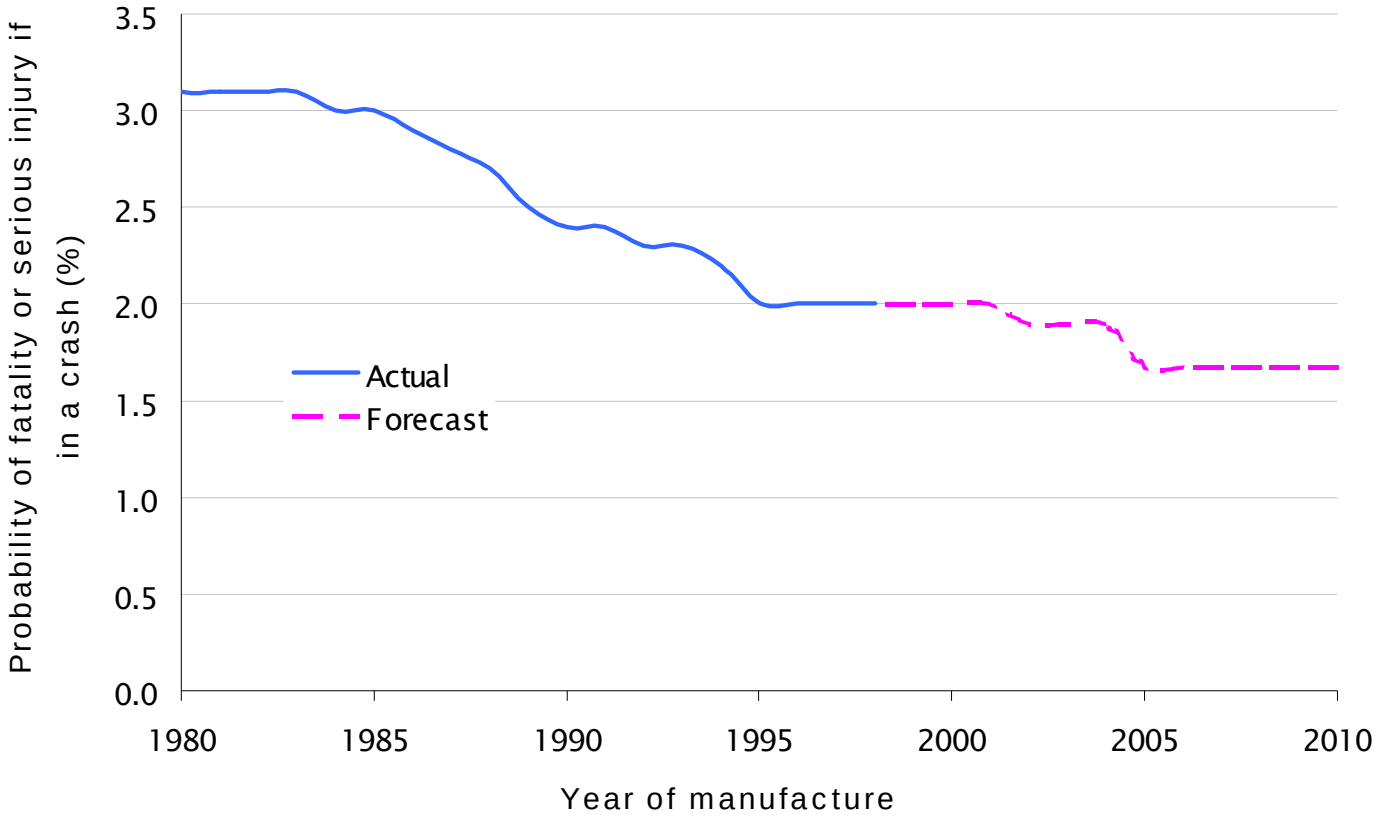
The entry and exit of vehicles and road users to the road network

Vehicle safety benefits

The rate of take-up of improved vehicle safety standards depends on how fast the market is growing and how quickly existing owners replace their older vehicles.

It also depends on the age profile and market share of used vehicle imports, which can in low and middle-income countries make up a large share of the vehicles supplied to the market.

Vehicle crashworthiness



WORLD BANK GLOBAL ROAD SAFETY FACILITY

Driver licensing

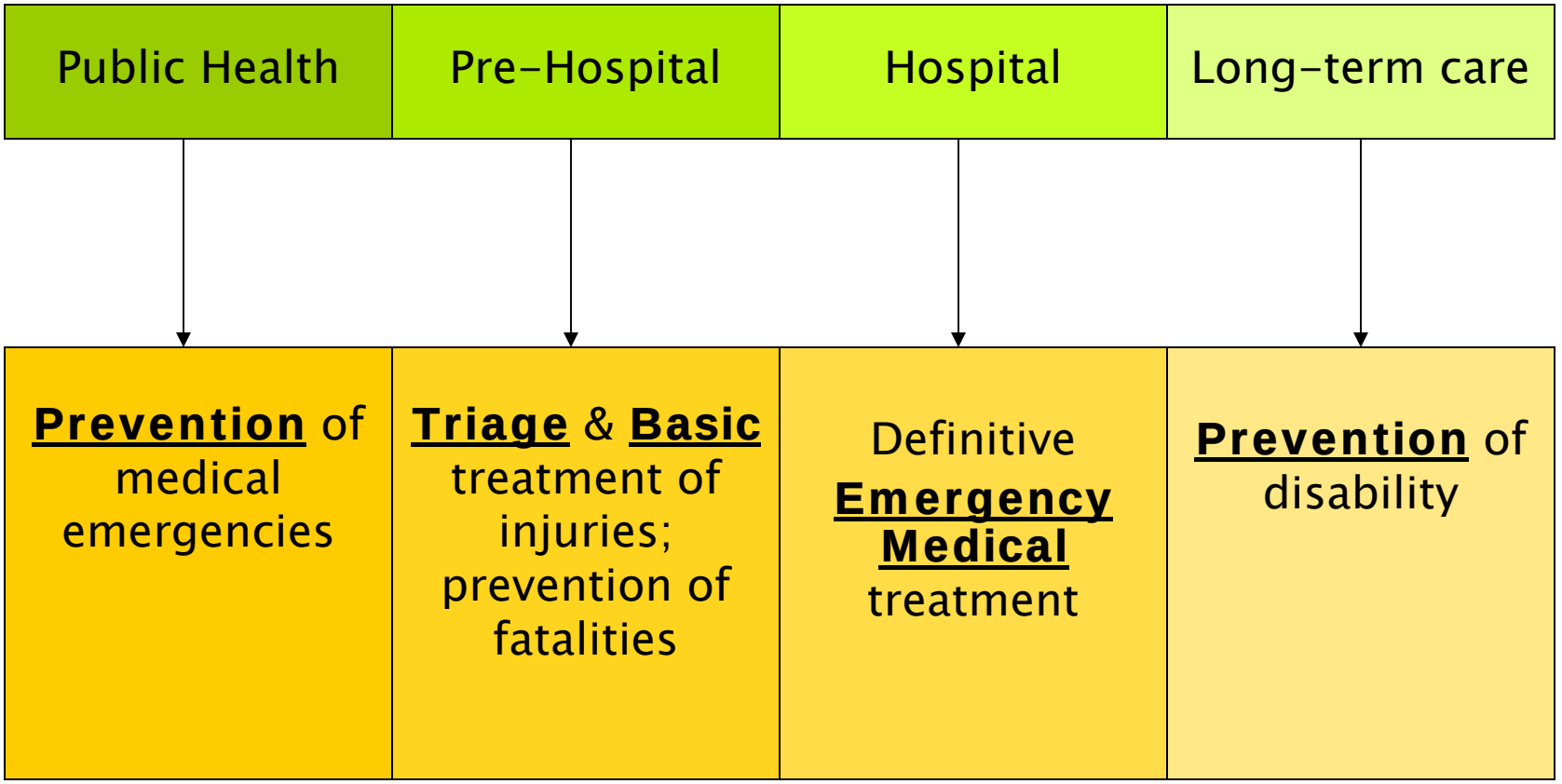
Novice drivers of all ages lack both driving skills and experience in recognizing potential dangers. In the case of newly-licensed young drivers their immaturity and limited driving experience result in disproportionately high rates of crashes.

Graduated driving licensing systems address the risks faced by new drivers and have proved to be effective in reducing their deaths and injuries.

The recovery of road crash victims from the road network and their rehabilitation

WORLD BANK GLOBAL ROAD SAFETY FACILITY

Health Systems



Source: Nhan T. Tran, Johns Hopkins University, School of Public Health

Post-crash care

Effective post-crash care is characterized by:

- *efficient emergency notification;*
- *fast transport of qualified medical personnel;*
- *correct diagnosis at the scene;*
- *stabilization of the patient;*
- *prompt transport to point of treatment;*
- *quality emergency room & trauma care; and*
- *extensive rehabilitation services.*

Service priorities

Post-crash care improvement must address the chain of interventions which include bystanders at the scene of the crash, emergency rescue, access to emergency care, trauma care and rehabilitation.

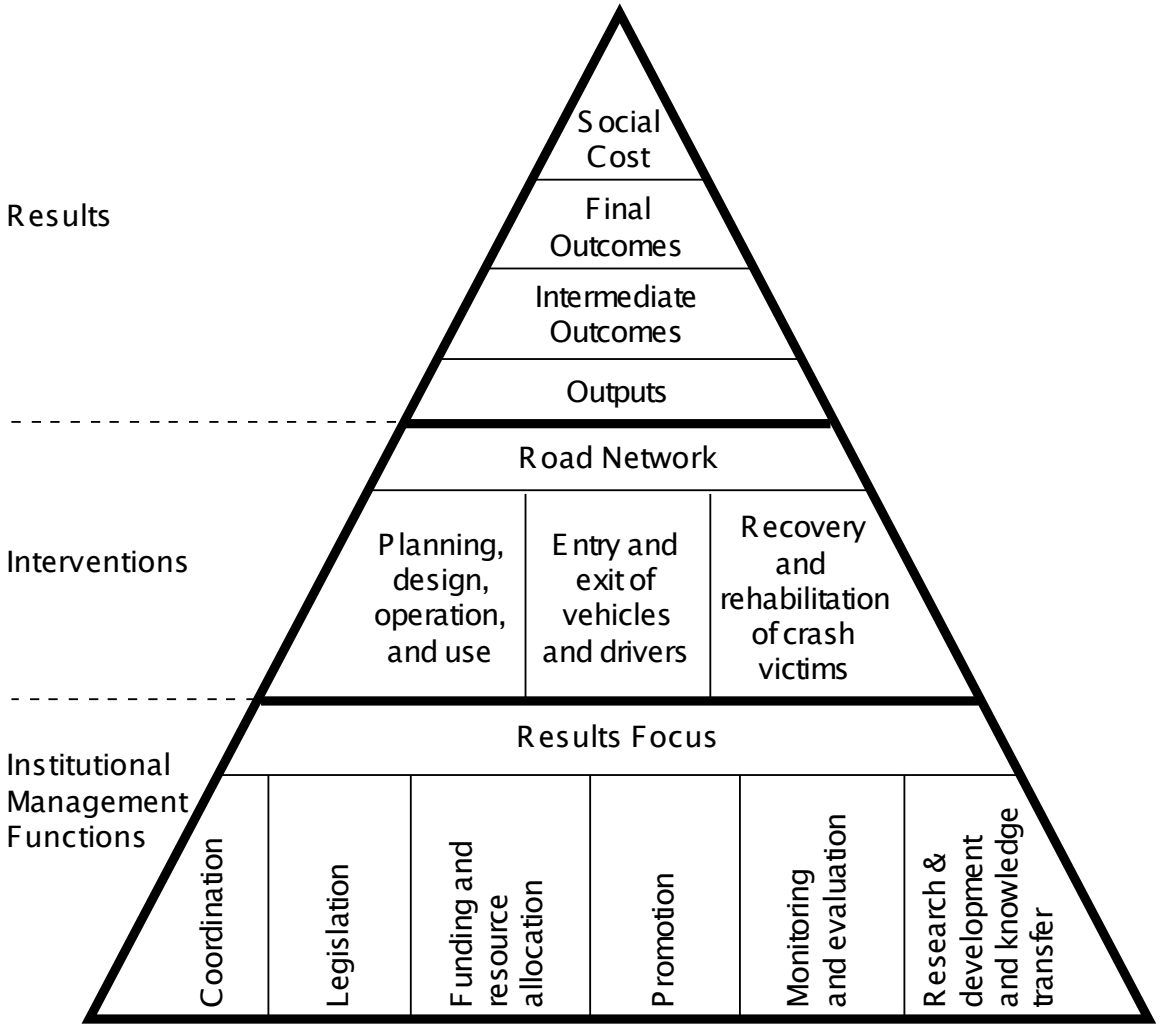
In low and middle-income countries attention to pre-hospital care is important, especially in terms of training for first-responders, improving access to the emergency medical system, and coordinating emergency rescue services.

Service priorities (cont'd)

Basic improvements in the hospital setting are also important, in terms of human resources and trauma-related equipment, some of which is not expensive.

Rehabilitation services are an essential component of comprehensive post-hospital care. Third-party motor vehicle insurance schemes provide an important mechanism to fund essential services
and reduce poverty impacts

Figure 1: Road Safety Management System



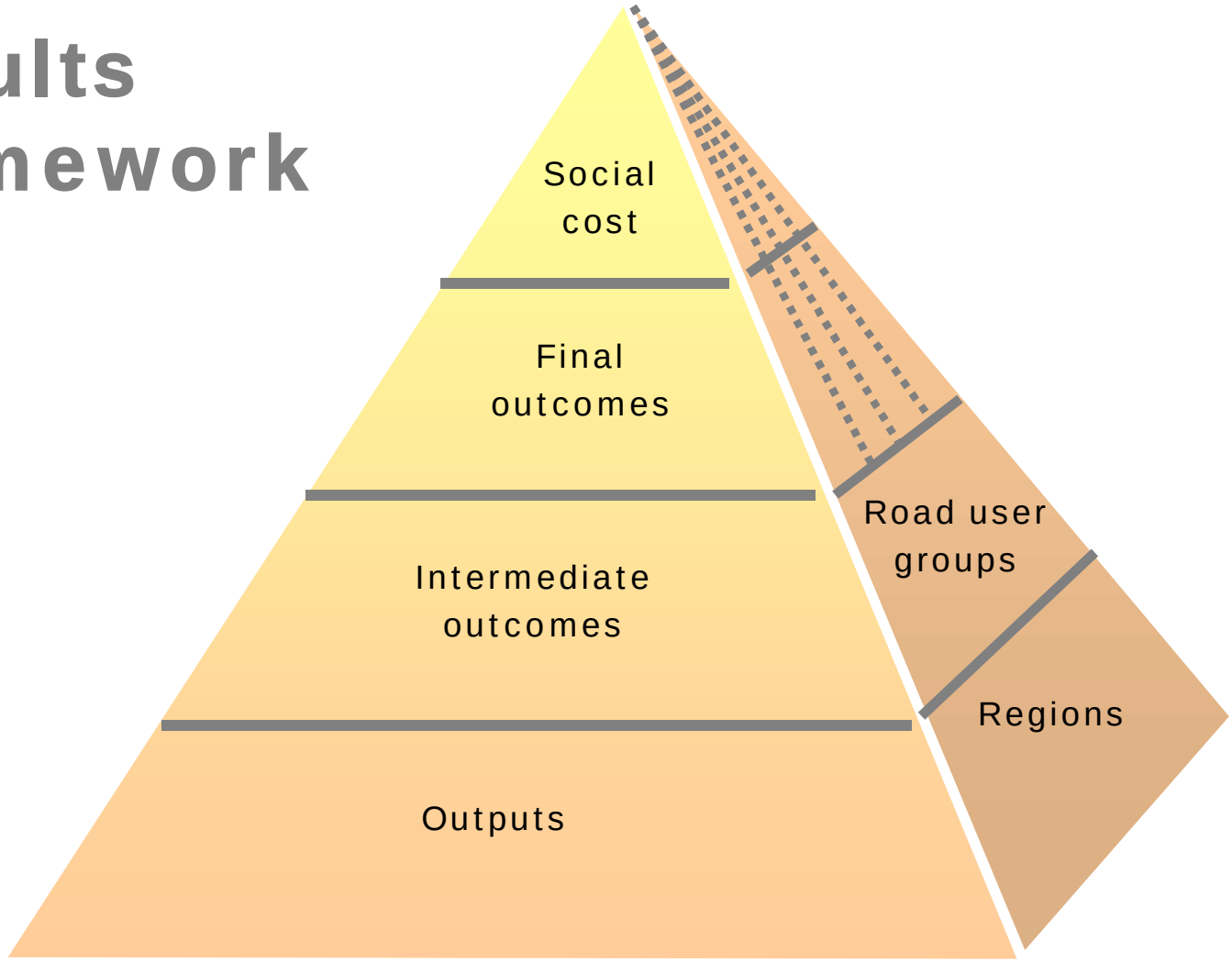
Source: References [ ], [ ], and [ ].

Results

Results can be expressed in terms of final outcomes, intermediate outcomes, or outputs.

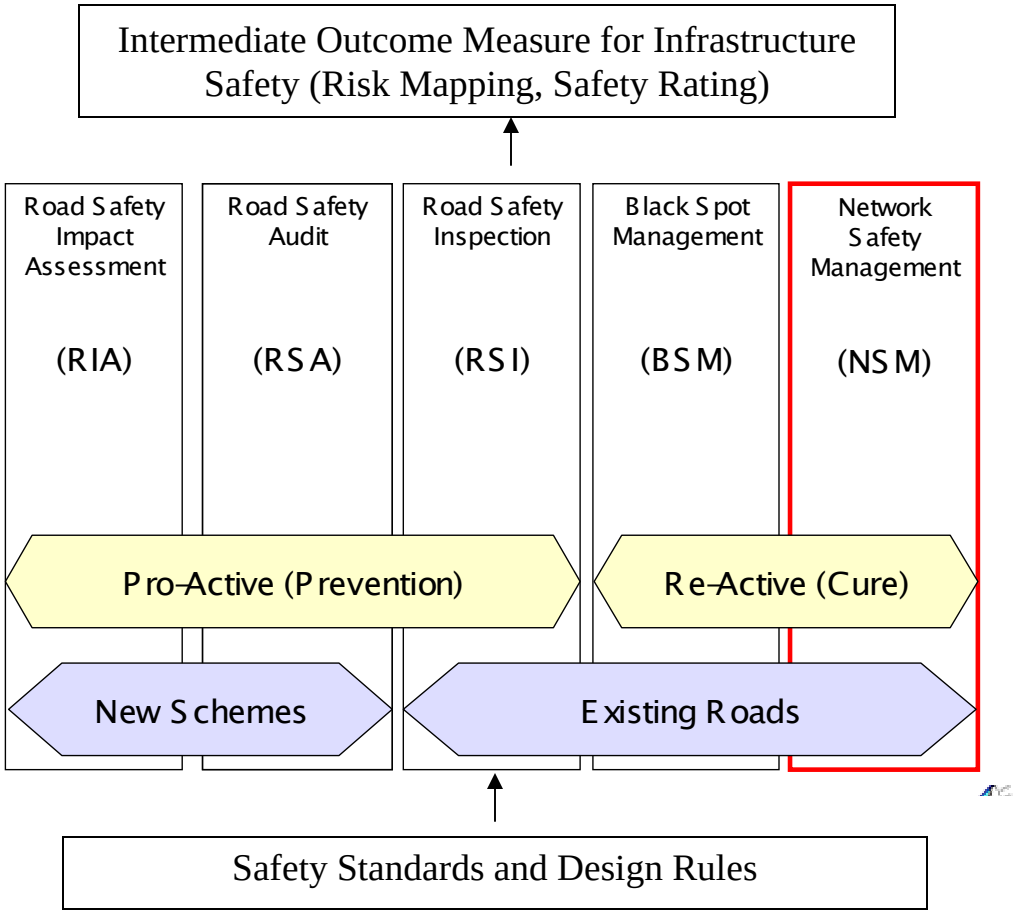
Final outcomes consist of social costs, fatalities and injuries. Intermediate outcomes consist of reduced speeds, higher wearing rates, improved road and vehicle standards, etc. Outputs consist of deliverables such as hours of police patrol, volume of infringement notices, length of road treated, etc.

Results Framework



Source: *Road Safety Strategy 2010, National Road Safety Committee, Wellington, New Zealand, October 2000*

Quality Assurance of the Safety of Infrastructure



Limitations of traditional approaches in identifying Black Spots

Groups according to the expected number of accidents						
Count	**0.2**	**0.5**	**1**	**3**	**4**	**Total**
0	532	61	37	5	1	636
1	106	30	37	15	4	192
2	11	8	18	22	7	66
3	1	1	6	22	10	40
4	0	0	2	17	10	29
5			0	10	8	18
6				5	5	10
7				2	3	5
8				2	1	3
9					1	1
Total	650	100	100	100	50	1000

38 False Positives BS

28 Correct Positives BS

66 Identified BS

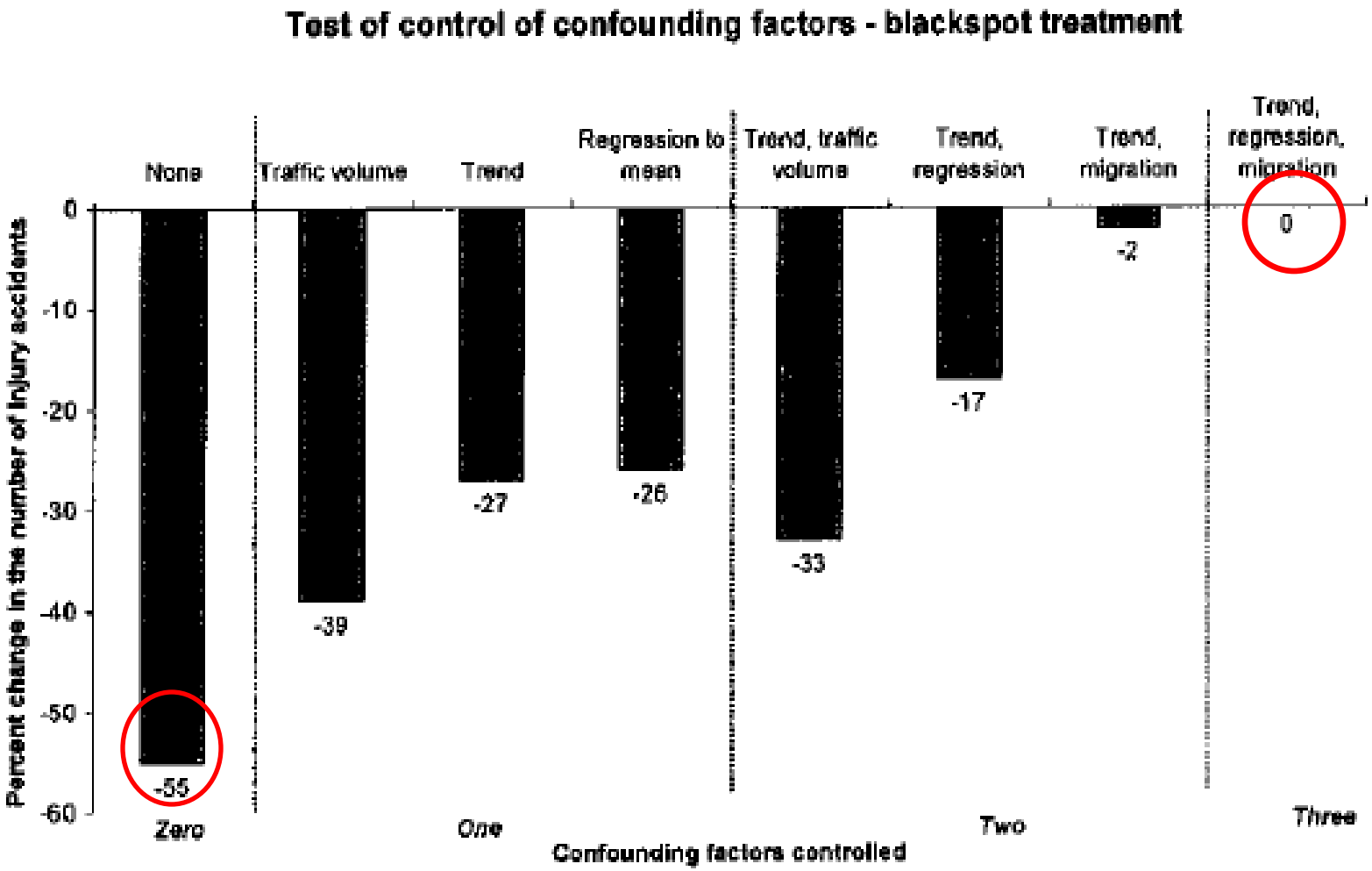
Theoretical Definition of a Black Spot

A road accident black spot is any location that:

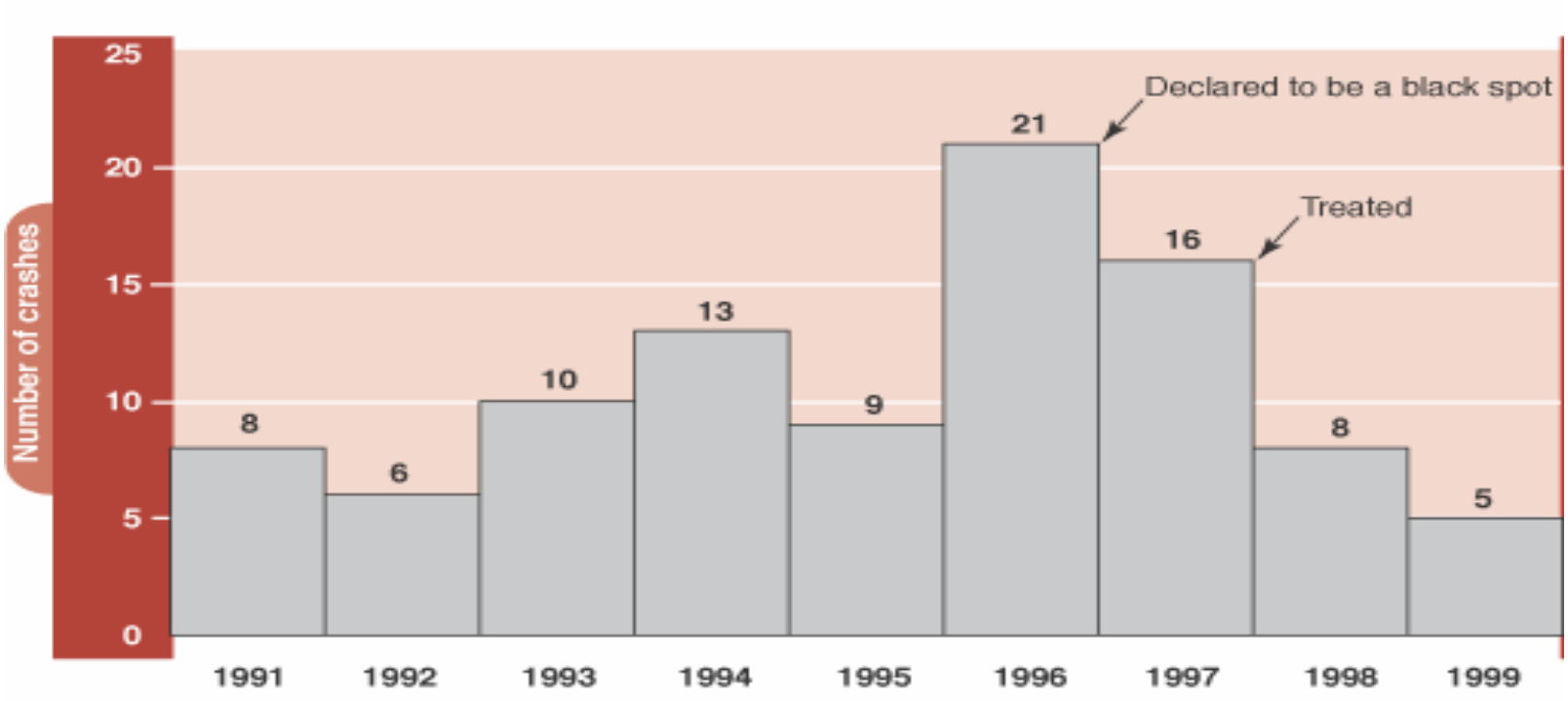
1. Has a higher expected number of accidents,
2. Than other similar locations,
3. As a result of local risk factors

Hence, The Empirical Bayes (EB) method should be used

Evaluation of the effectiveness of black spot treatment



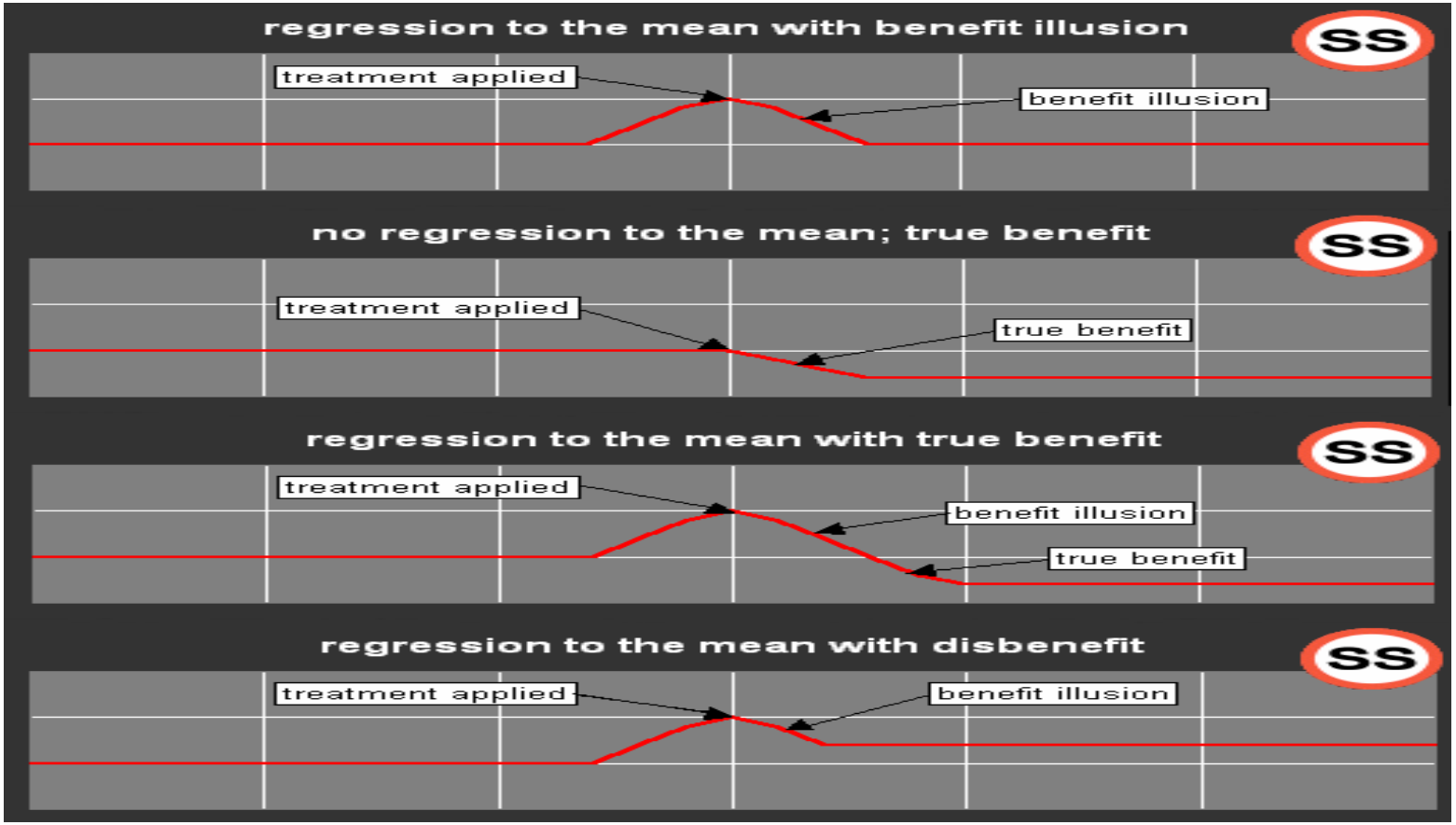
Regression-to-mean



Source Victorian Government

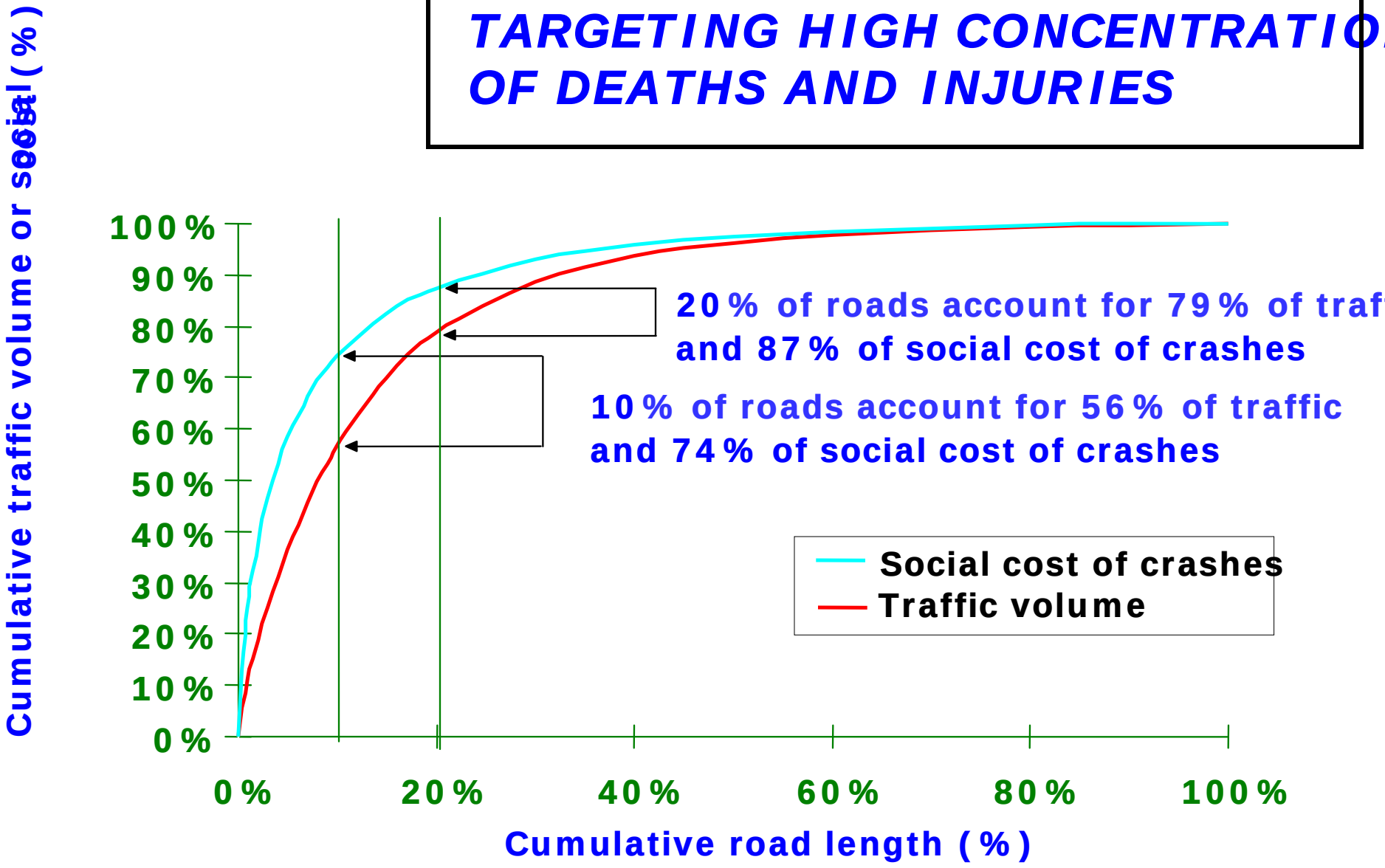
WORLD BANK GLOBAL ROAD SAFETY FACILITY

Regression-to-mean



WORLD BANK GLOBAL ROAD SAFETY FACILITY

TARGETING HIGH CONCENTRATION OF DEATHS AND INJURIES



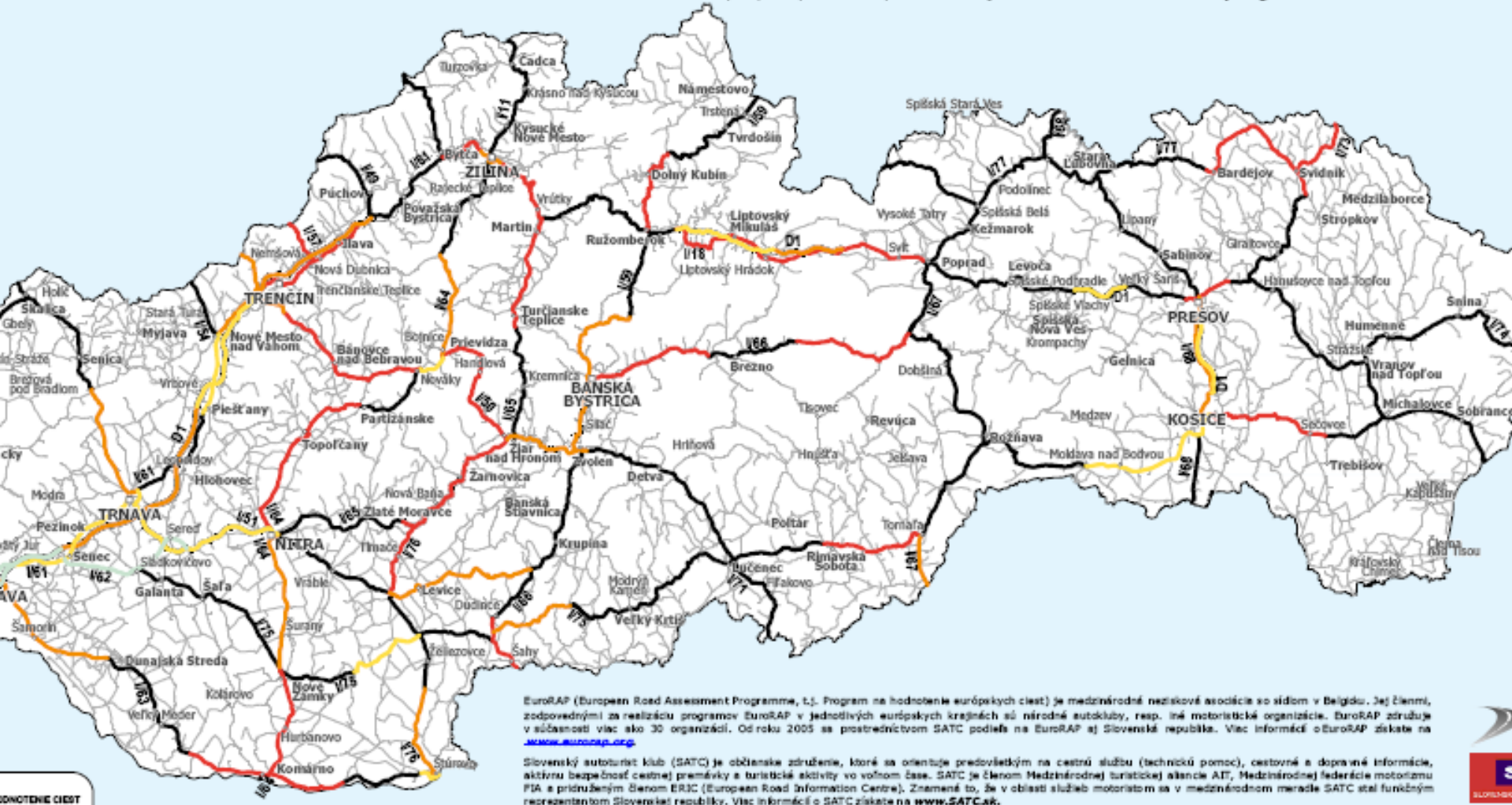
EuroRAP
EUROPEAN ROAD ASSESSMENT PROGRAMME

eň rizikovosti vybraných ciest ovensku

Táto mapa zobrazuje štatistické riziko nehôd so smrteľnými a vážnymi zraneniami na vybranej sieti ciest Slovenska v rokoch 20
je pre každý úsek hodnotenej siete vypočítané porovnaním frekvencie výskytu nehôd so smrteľnými a vážnymi zraneniami s inte
Napríklad riziko úseku, ktorým za deň prejde 10.000 vozidiel a na ktorom sa stalo 20 nehôd so smrteľnými a vážnymi zranenia
vyššie, než je riziko úseku s rovnakým počtom nehôd, ktorým prejde 100.000 vozidiel.

Na niektorých cestách boli v poslednom období vykonané úpravy s cieľom zvýšiť ich bezpečnosť, ale v čase prieskumu bo
so smrteľnými a vážnymi zraneniami na úsekoch ciest znázornených čiernou farbou desaťkrát vyššie, ako na najbezpečn
(znázornených zelenou farbou).

Viac informácií o štatistických postupoch tohto prieskumu nájdete na stránke **www.eurorap.org**.



EuroRAP (European Road Assessment Programme, t.j. Program na hodnotenie európskych ciest) je medzinárodné neziskové asociácie so sídlom v Belgicku. Jej členmi, zodpovednými za realizáciu programov EuroRAP v jednotlivých európskych krajinách sú národné autokluby, resp. iné motoristické organizácie. EuroRAP združuje v súčasnosti viac ako 30 organizácií. Od roku 2005 sa prostredníctvom SATC podieľa na EuroRAP aj Slovenská republika. Viac informácií o EuroRAP získate na www.eurorap.org.

Slovenský autoturist klub (SATC) je občianske združenie, ktoré sa orientuje predovšetkým na cestnú službu (technickú pomoc), cestovné a dopravné informácie, aktívnu bezpečnosť cestnej premávky a turistické aktivity vo voľnom čase. SATC je členom Medzinárodnej turistickej aliancie AIT, Medzinárodnej federácie motorizmu FIA a pridruženým členom ERIC (European Road Information Centre). Znamená to, že v oblasti služieb motoristom sa v medzinárodnom meradle SATC stal funkčným reprezentantom Slovenskej republiky. Viac informácií o SATC získate na **www.SATC.sk.**

Geomatika SK, s.r.o. je spoločnosť zameraná na zber, spracovanie a poskytovanie priestorových údajov (content provider). Jej produkty sa opierajú o aktivity v oblasti vedy a výskumu v oblasti GIS a inteligentných dopravných systémov (IDS). Patrí sem predovšetkým spolupráca na projektoch „Tvorba vzorovej databázy pre potreby pasívnych navigačných systémov" (riešený na základe MDPT SR č. 101/1997), "Inteligentné dopravné systémy" (riešený na základe uznesenie Vlády SR 912/2002) a medzinárodný projekt CONNECT. Viac informácií o Geomatike získate na **www.geomatika.sk.**

Pri tvorbe tejto mapy boli použité vybrané údaje o dopravných nehodách poskytnuté Policajným zborom SR a údaje z celoštátneho sčítania dopravy v roku 2005 SSC.

Pri tvorbe tejto mapy boli na základe Rámcovej zmluvy o spolupráci medzi Slovenským autoturist klubom a spoločnosťou Geomatika SK, s.r.o. využité mapové údaje spoločnosti Geomatika SK, s.r.o.

Recommendations

- Road Safety Councils/Committees are not effective
- Need to establish lead agency that deliver the 7 institutional functions needed
- Don't recommend Blacksopt treatment programs because lack of reliable data, lack of capacity , overall low infrastructure quality
- Recommend Pro-Active approaches in infrastructure safety