

Keeping science at the heart of road safety policy-making

European Transport Safety Lecture 2014

María Seguí Gómez

Barcelona, Spain, November 27, 2014

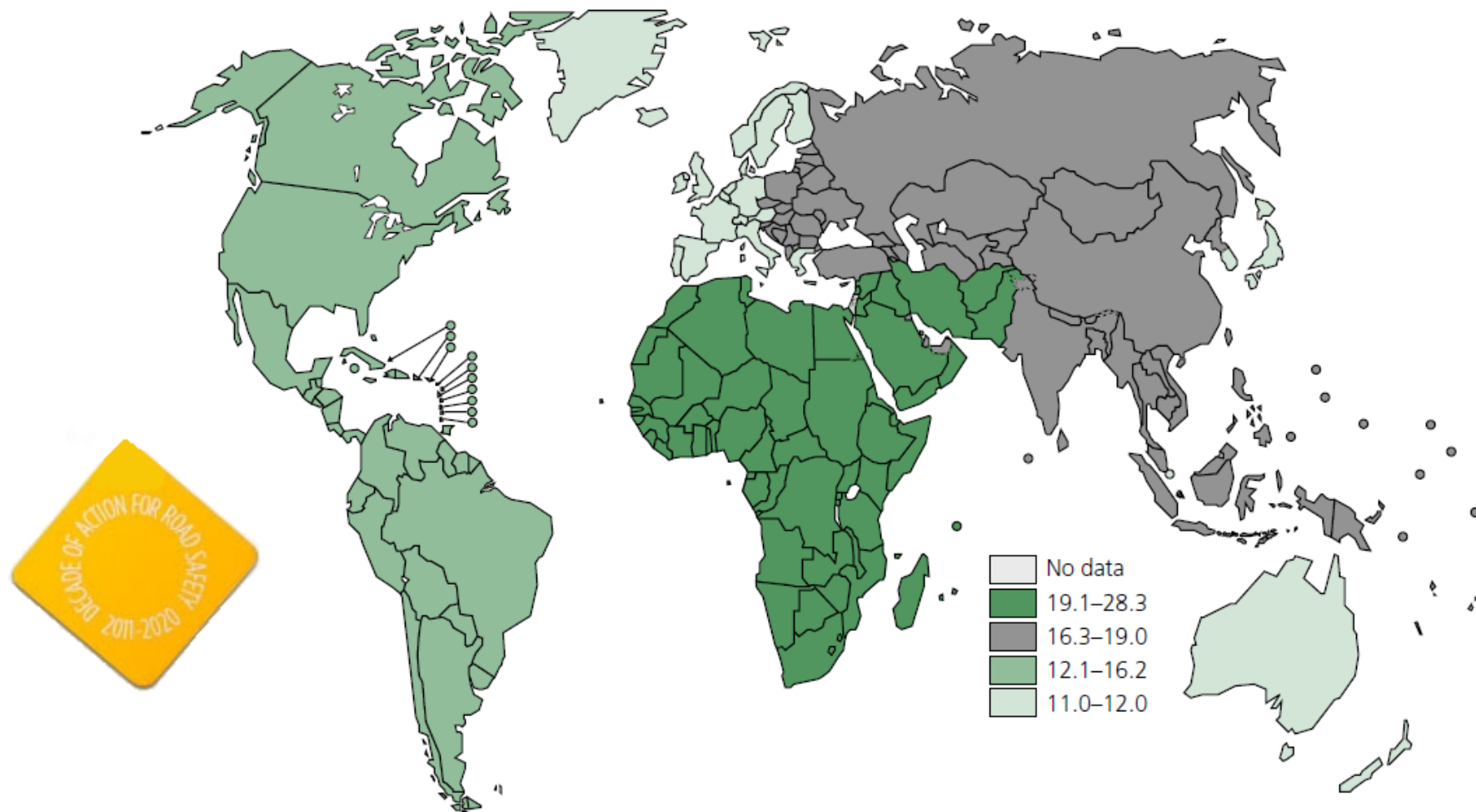


MINISTERIO
DEL INTERIOR

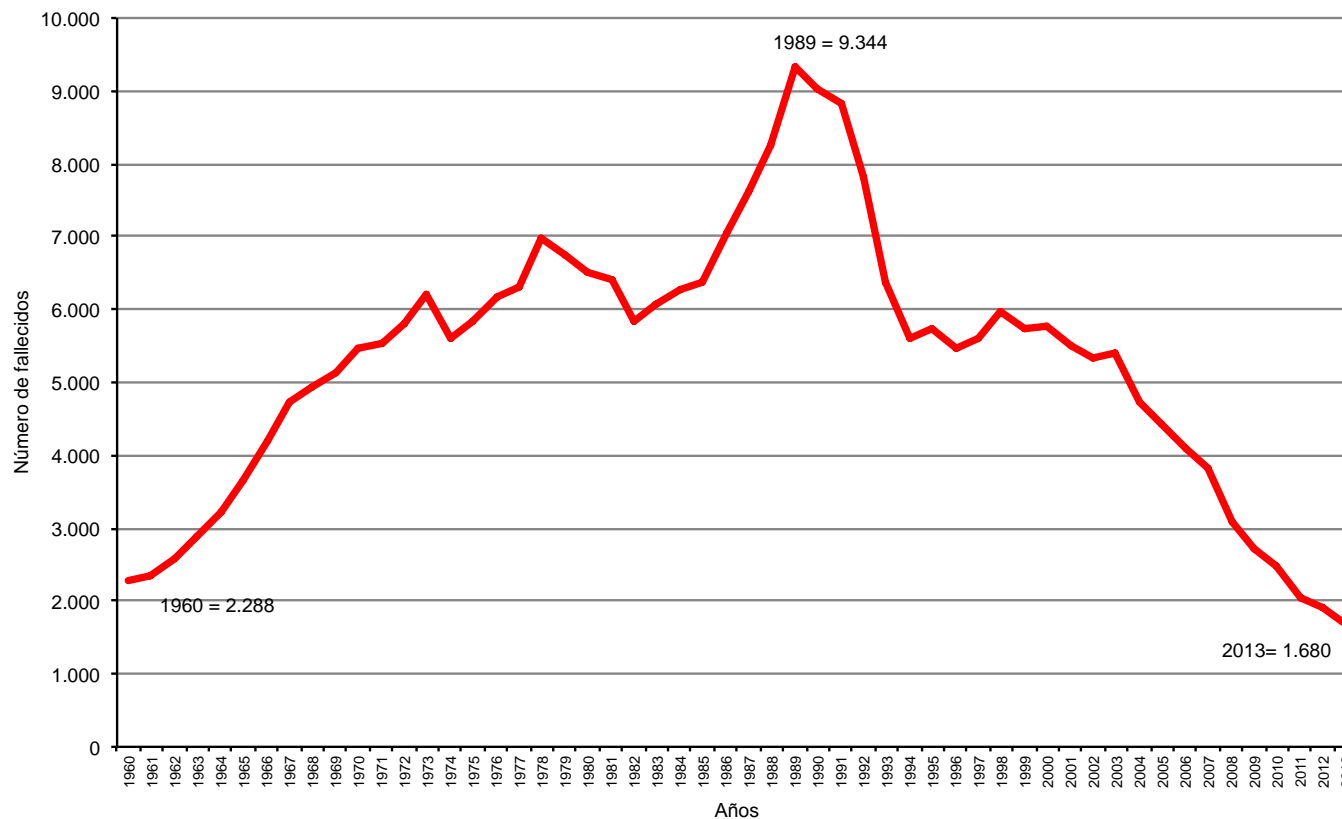


Declaration of a global pandemic 1.3 M/year (or 3500/day or 148/hour)

Road traffic injury mortality rates (per 100 000 population)















Mortality due to Road Traffic Accidents, Spain 1960-2013



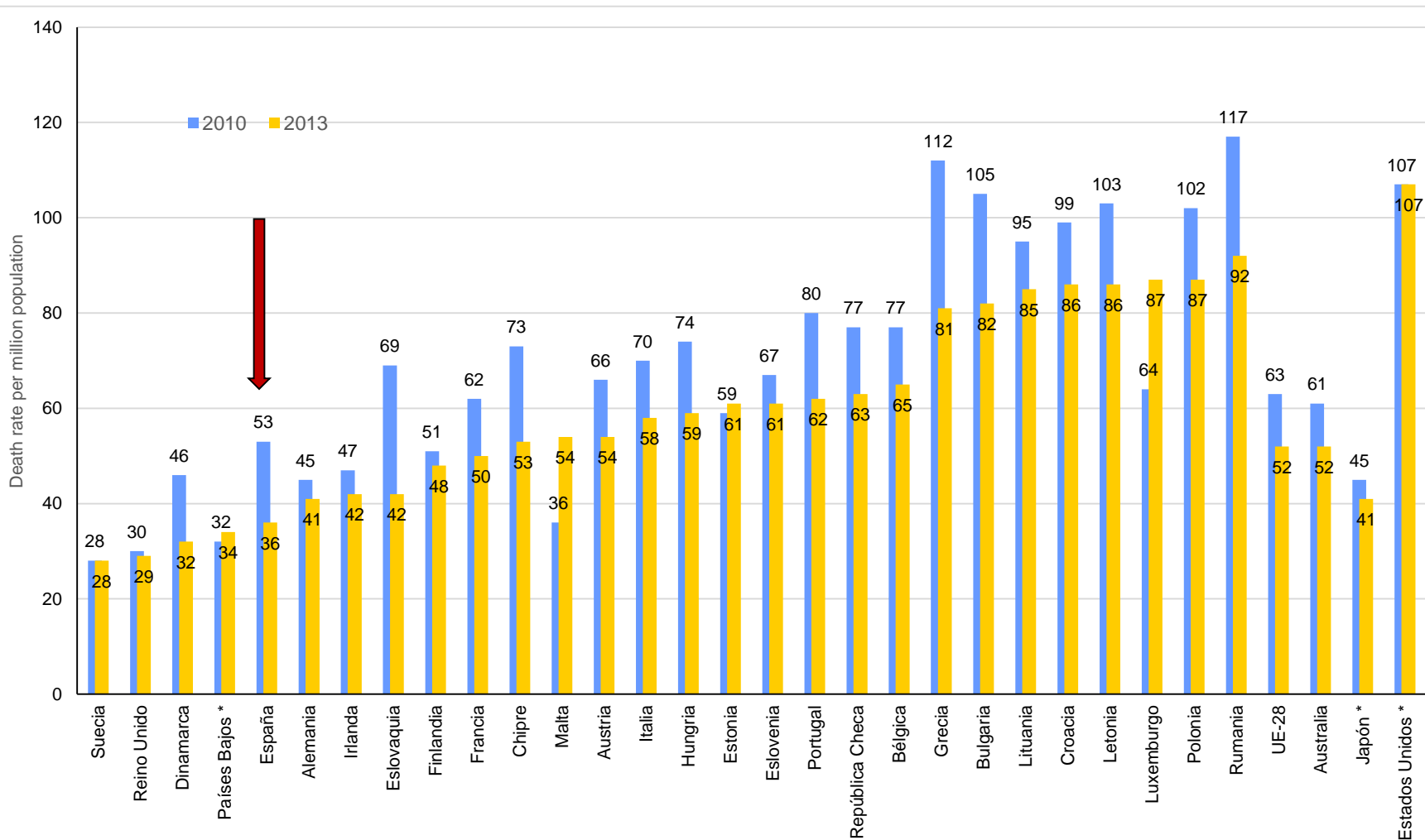
2013: 5  ; 5  ; 2  ; 1 N/A

Tabla 1. Indicadores de la Estrategia de Seguridad Vial 2011-2020.
Años 2009, 2012, 2013 y 2020

Indicadores				Cifra basal 2009	Cifra 2012	Cifra 2013	Cifra objetivo 2020
	1.	1.	Reduce mortality rate to 37 per million inhabitants	59	41	36	Inferior a 37
	2.	2.	Reduce 35% seriously injured	10.923	10.444	10.086	9.050
	3.	3.	Zero dead children without child restraint	12	9	4	0
	4.	4.	25% less drivers 18-24 y.o. dead or injured during weekends	730	406	345	548
	5.	5.	10% fewer dead drivers over 64 y.o.	203	202	182	183
	6.	6.	Reduce 30% pedestrian deaths	459	355	349	321
	7.	7.	1 million more cyclist without increase in death rate	1,2	1,6	1,5	1,2
	8.	8.	Zero tourism occupants dead in urban areas	101	71	72	0
	9.	9.	20% fewer deaths and serious injuries among motorcycles	4.473	2.760	2.811	2.778
	10.	10.	30% Fewer deaths in secondary roads departed lanes	520	369	285	364
	11.	11.	30% fewer in itinere deaths	170	100	100	119
	12.	12.	Decrease 1% BAC+ in preventive tests	3,7%	No disponible. Estudio periódico	4,1%	Inferior al 1%
	13.	1.	Reduce 50% light vehicles exceeding speed limits over 20km/h	6,2% (autop.) 3,5% (autov.) (conv. 90) (conv. 100)	8,0% (autop.) 4,3% (autov.) 14,0% (conv. 90) 10,8% (conv. 100)	No disponible. Estudio periódico	6,2% (autop.) 3,5% (autov.) 7,9% (conv. 90) 8,2% (conv. 100)

¹ Niños menores de 12 años.

Relative position of Spain as regards death rate per million population, 2010 and 2013



Sources: European Commission, CARE database and Eurostat; IRTAD.

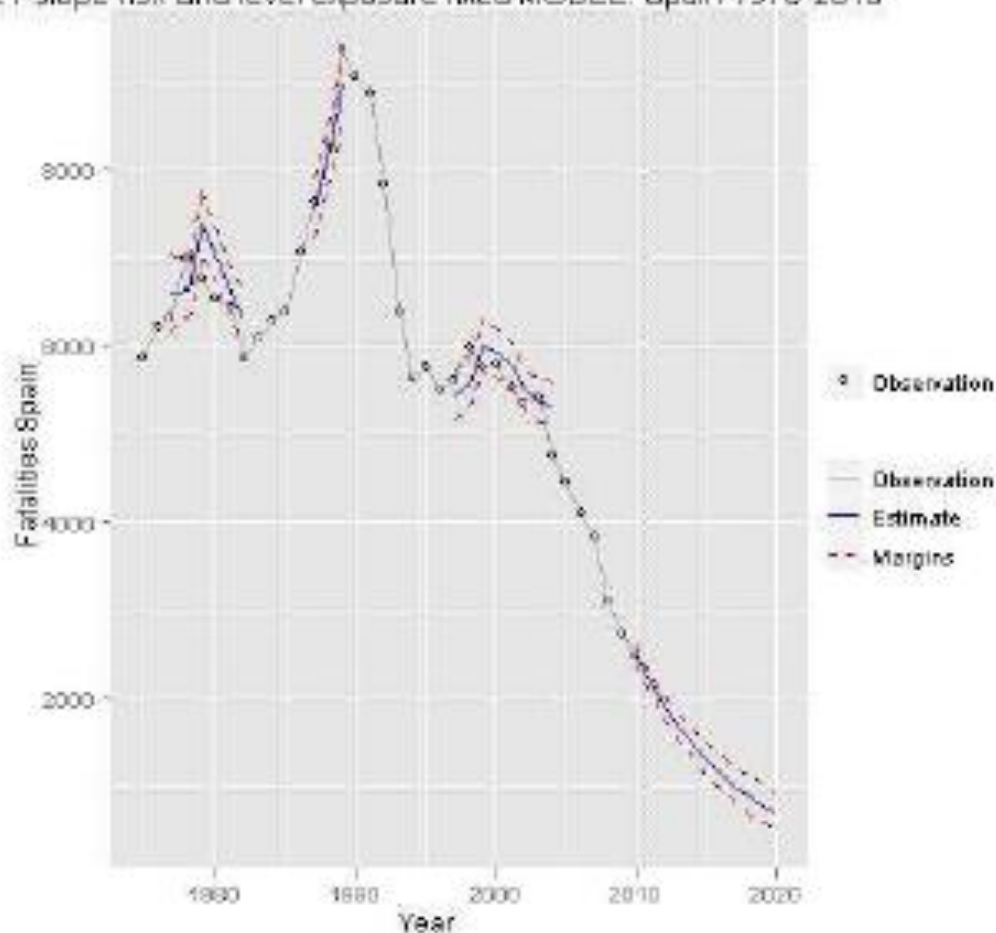
* Figures for 2012

Difficulties in the evidence-based decision-making process

1. Resistance to change: Let yourself be carried away vs. Taking decisions
2. Uncertainty over what to do: Eminence vs. Evidence
3. Lack of evidence
4. Quality and external validity of evidence
5. Capacity to adapt to a new intervention

Let yourself be carried away vs. Taking decisions

Forecast plots
RT slope risk and level exposure fixed MODEL. Spain 1975-2010

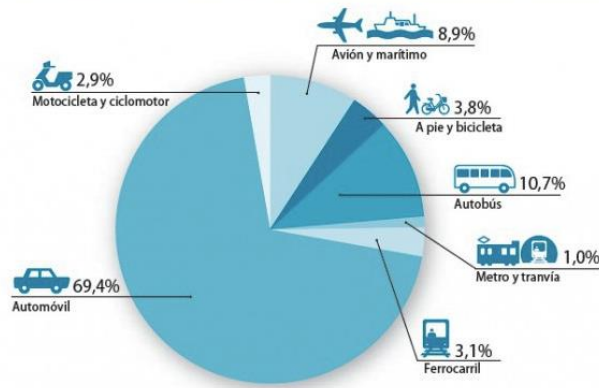


An example of prediction model:

- 1 factor
 - Exposure: Vehicle-kilometres
- “Business as usual”

What do we know about exposure?

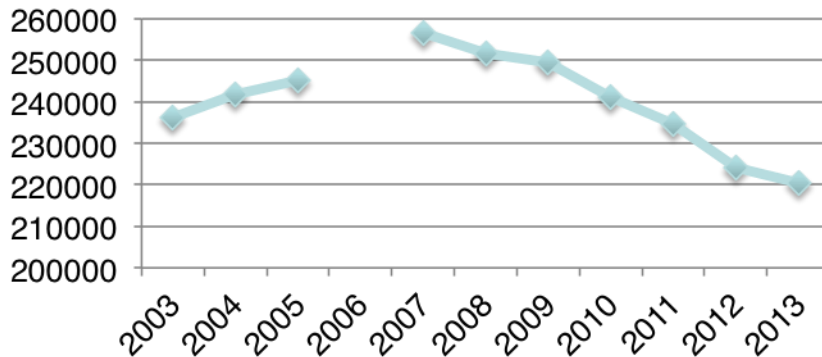
Figura 13. Distribución de los recorridos medios realizados diariamente por cada habitante en los diferentes medios de transporte en España (2007)



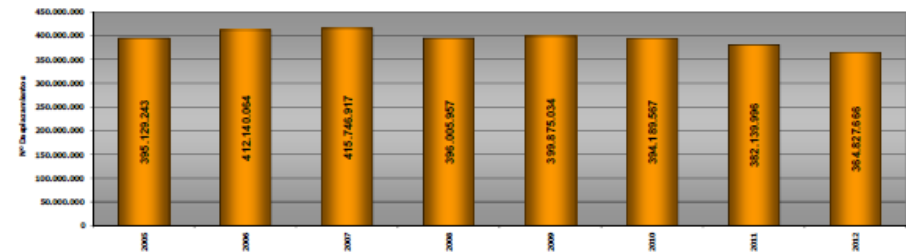
to

Trips (2007): 42,000 M

Veh-km interurban roads

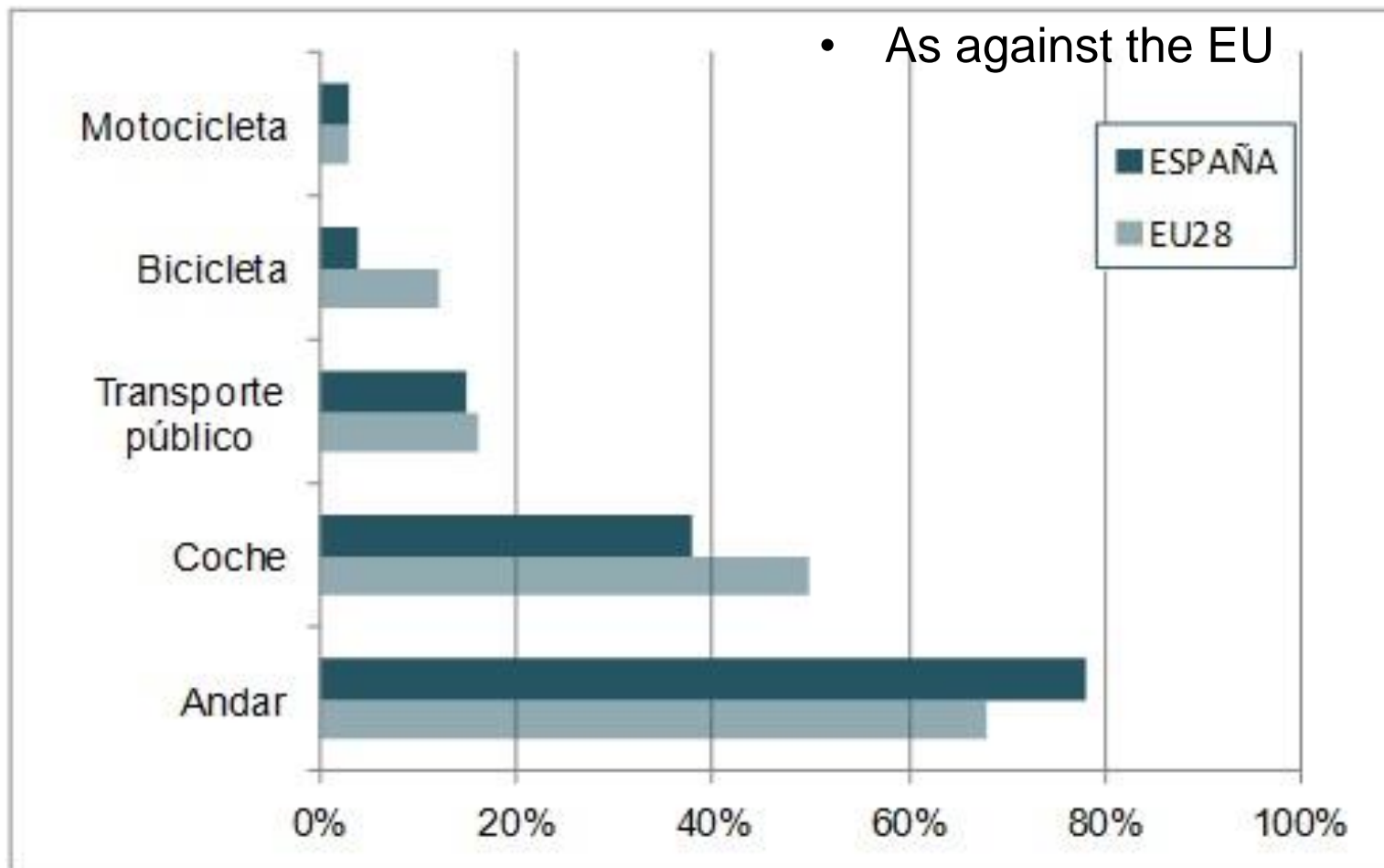


Number of long distance trips

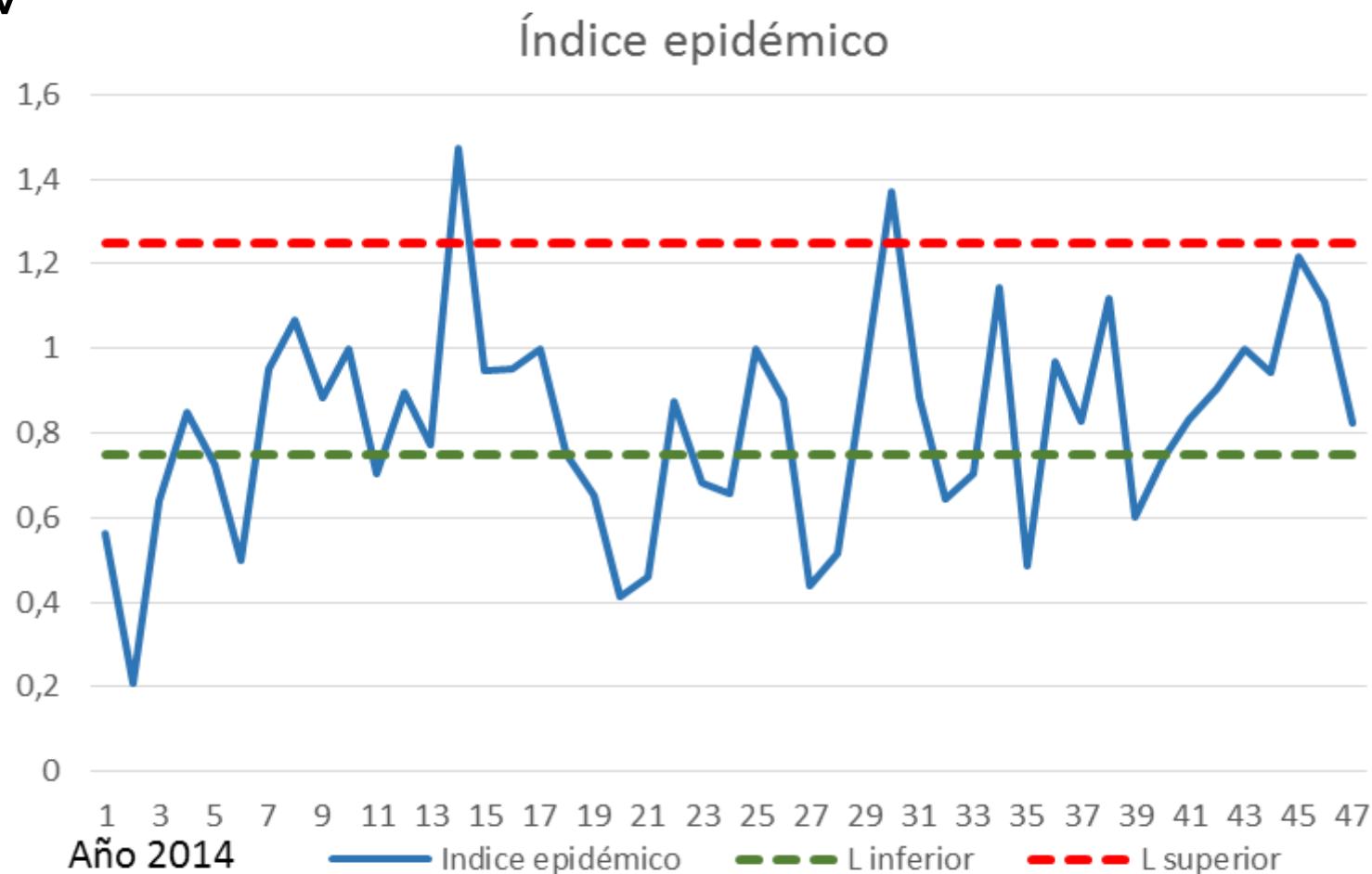


Source: DGT

In comparison with...

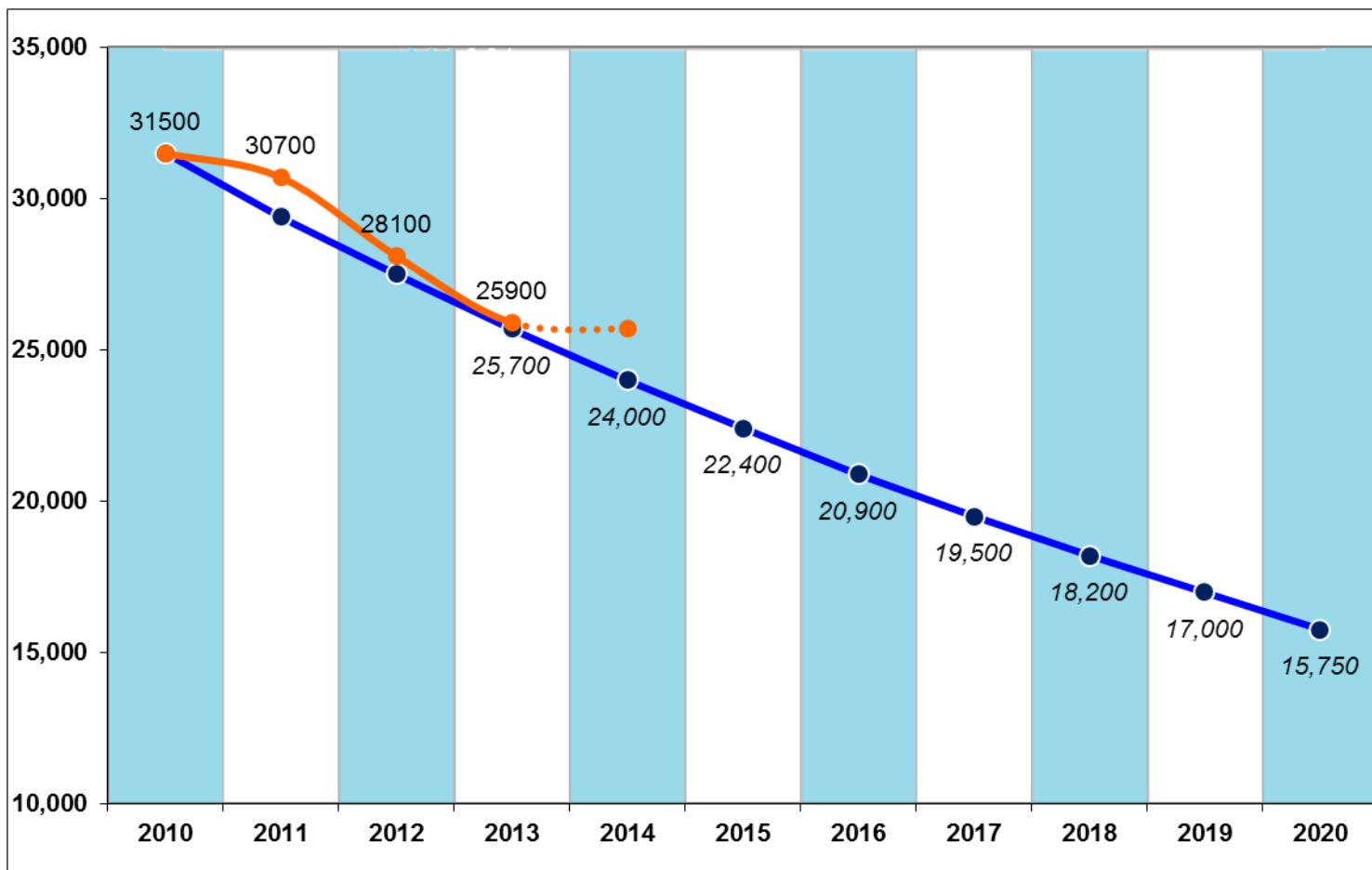


Siniestralidad provisional 2014 -1 ene -21 nov

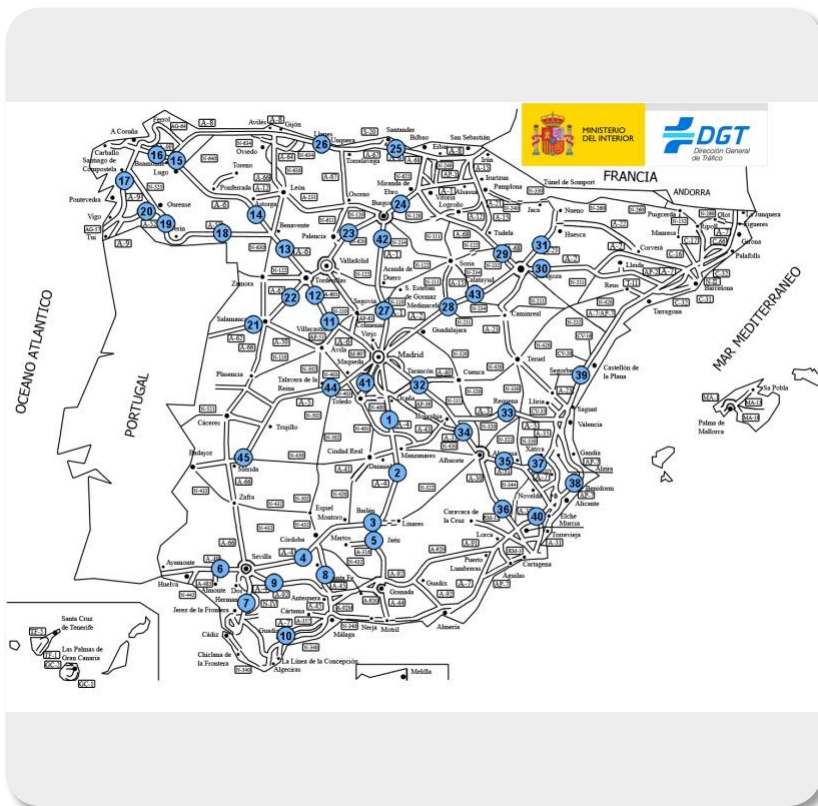


Nota: fallecidos en vías interurbanas a 24 horas, excepto Cataluña y el País Vasco.

Fatalities – evolution 2010-2014

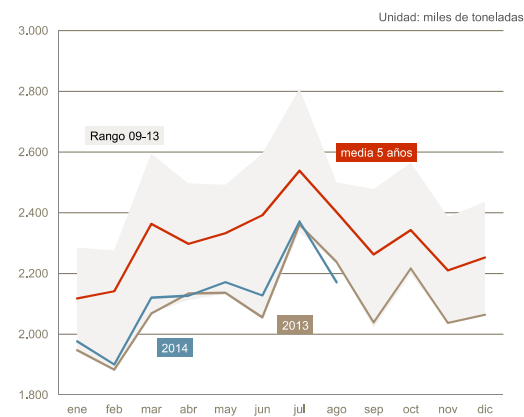


Immediate challenges I



DGT monitors 8000 out of 660000 km

Consumo mensual de combustibles de automoción

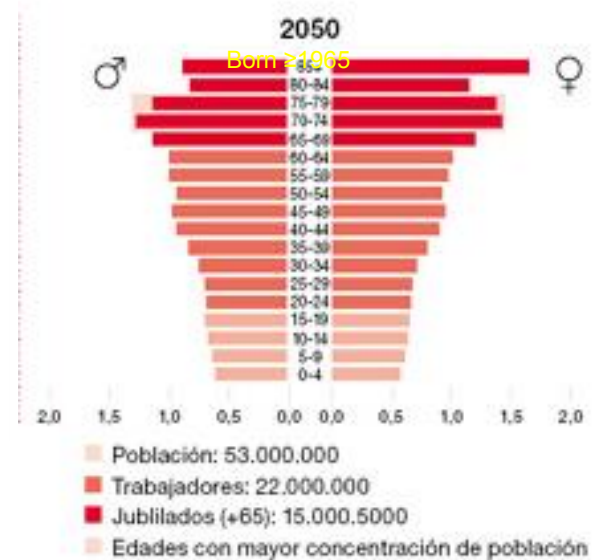
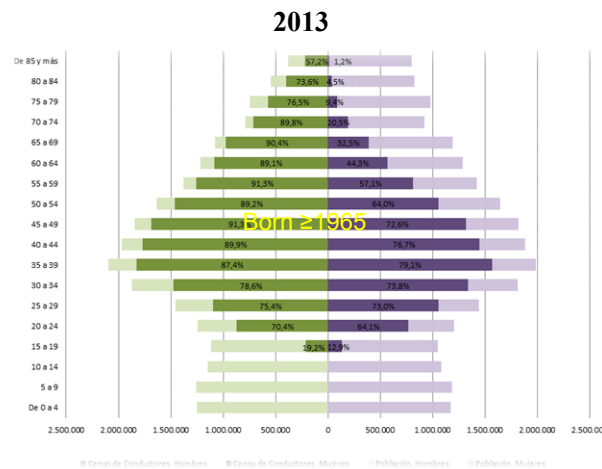
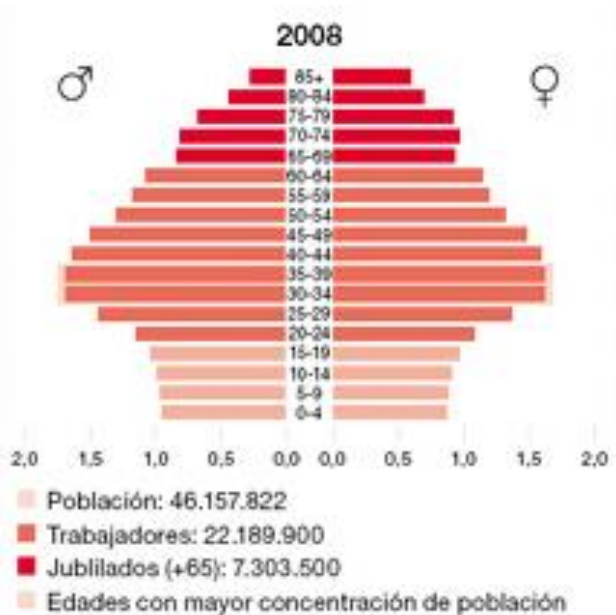


Fuente: Cores

TOTAL (Hasta 02 noviembre)	336.859.707	-1,25%	326.128.676	-3,19%	312.697.642	-4,12%	302.003.761	-3,42%	306.795.468	1,59%
TOTAL	394.189.567	-1,42%	382.139.996	-3,06%	364.827.666	-4,53%	354.219.623	-2,91%		

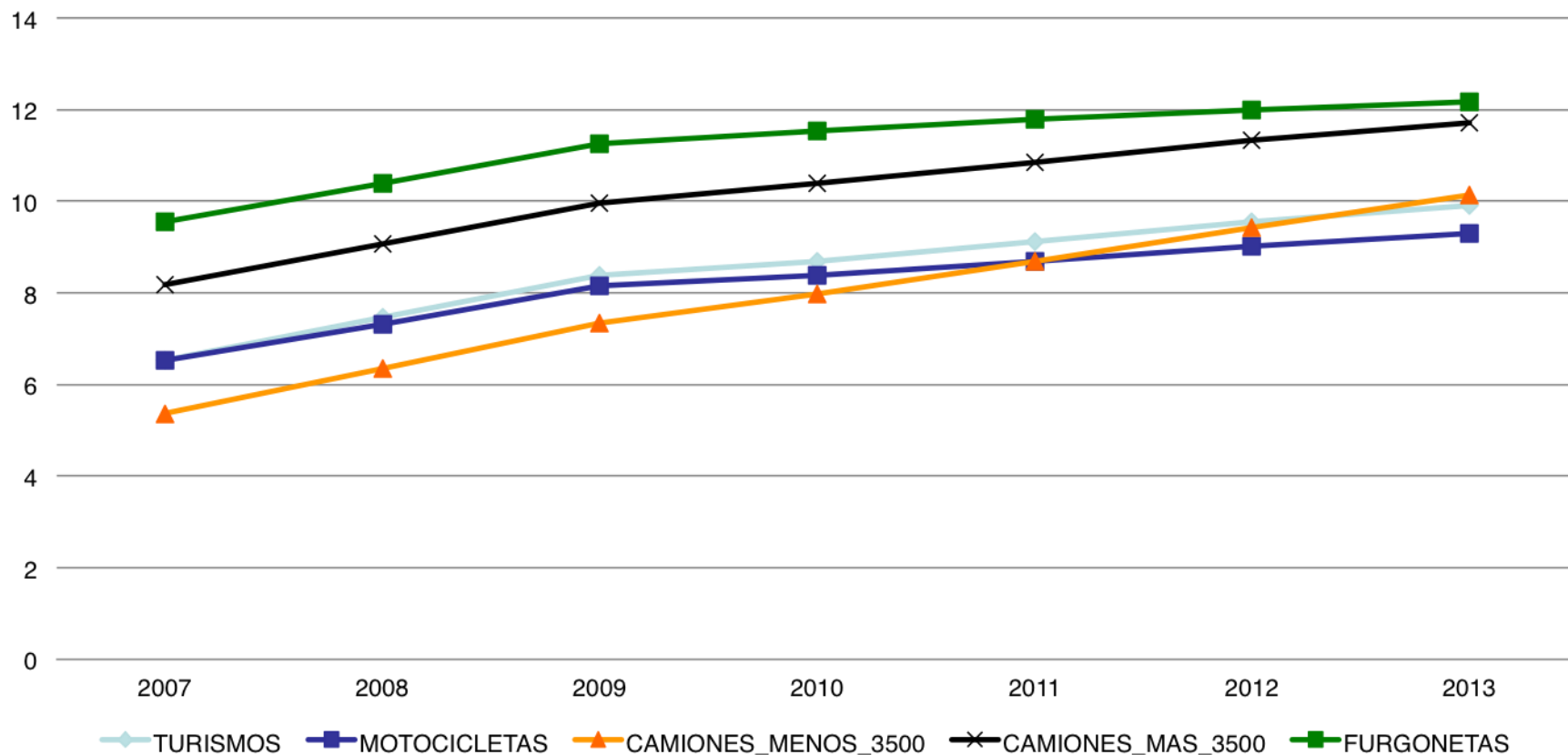
*El año 2012 es bisiesto por lo que el mes de febrero y el total incluyen un día más

Immediate challenges II. Population ageing



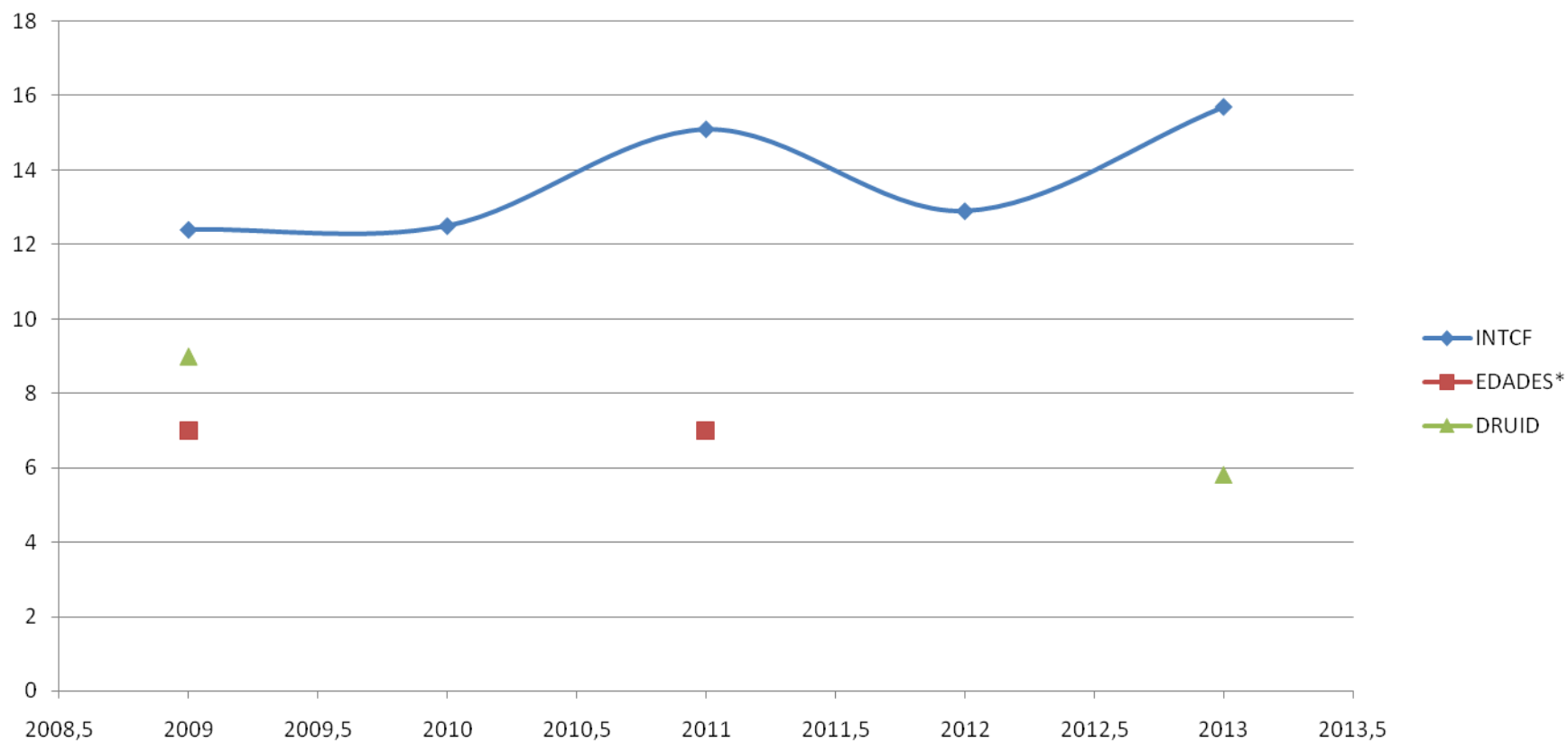
Mean age of vehicle fleet over the past years

Edad media según tipo vehículo (excluye >25 a)



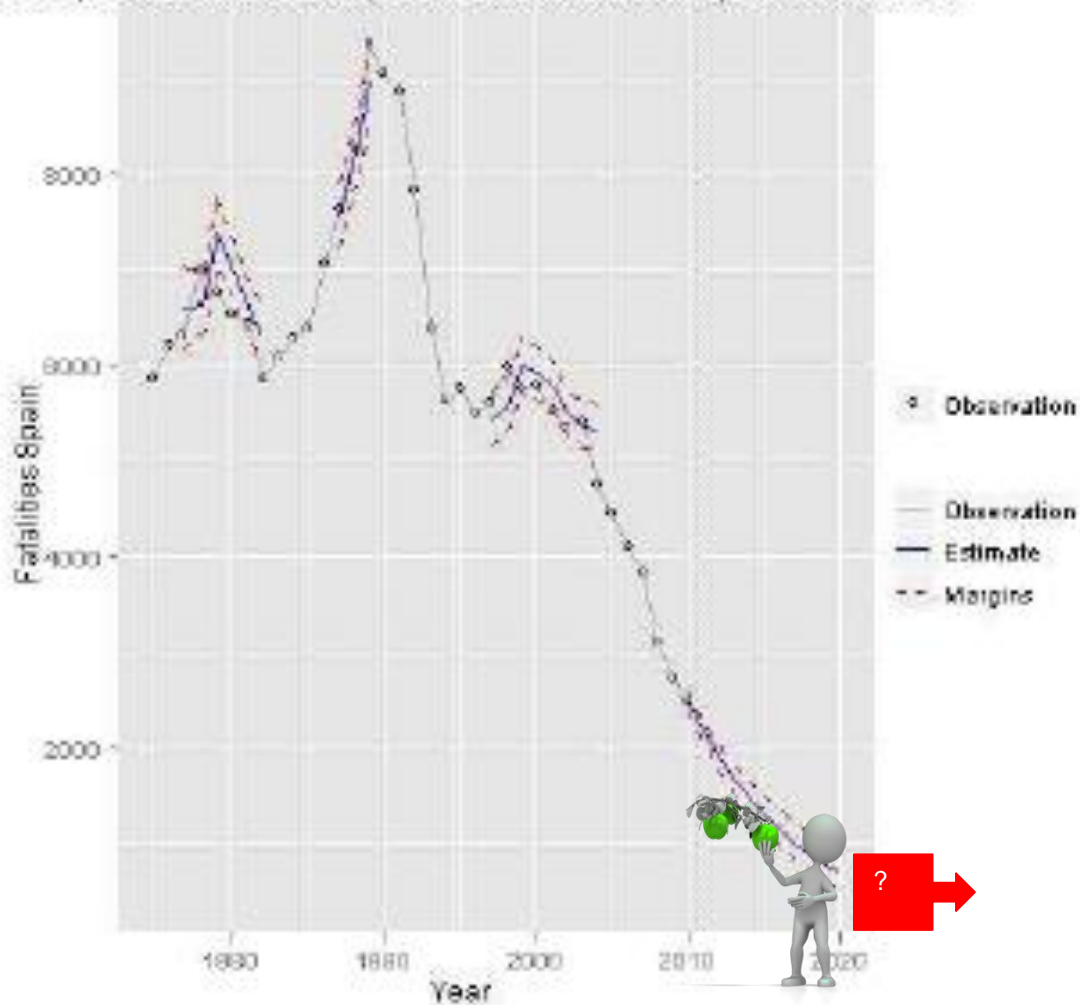
Other risks (e.g. DRUGS)

Evolution in the prevalence of illegal drugs (general population, randomly selected drivers, killed drivers).
Spain 2008-2013



Besides, if "we let ourselves be carried away" how do we get to 0?

RT slope risk and level exposure fixed MODEL. Spain 1975-2010



Source: DaCota country forecasts, 2008

Safe mobility and Government: Objectives Spain 2020-2050



0 Injured



0 Congestion



0 Pollution



0 Debt and + competitiveness

Difficulties in the evidence-based decision-making process

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Expert

OTRAN ASOCIACIONES DE VÍCTIMAS Y EXPERTOS

¿Se queda corta la sentencia de Ortega Cano?

Ha sido condenado a dos años y seis meses de cárcel por la muerte de Carlos Puma.

Ortega Cano entró en un vehículo contra el que conducía Carlos Puma, quien falleció. En el momento de la colisión, el conductor de la camioneta se encontraba en un estado de ebriedad. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?

MAI CHAGOLAS

"Sería penoso que no cumpliese la condena"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of Mai Chagas

FRANCISCO CANIS

"El indulto sería un error"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of Francisco Canis

AVILA RIVELLA RUIZ

"No debe salir tan barato matar"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of Avila Rivella Ruiz



EUGENIA DOMERCQ

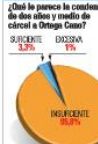
"La condena es casi un insulto"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of Eugenia Domercq

¿Qué le parece la condena de dos años y medio de cárcel a Ortega Cano?



JOSÉ PÉREZ TRIANA

"Una gran irresponsabilidad que merece reproche pero"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of José Pérez Triana

DIABOLINE VARGAS

"Los fiscales propusieron una responsabilidad proporcional"

Desde que algunas asociaciones de víctimas se empezaron a reunir en el momento de la colisión, se ha ido formando una conciencia de que el conductor de la camioneta que chocó con el coche de Carlos Puma, era un conductor ebrio. Este hecho se produjo el 11 de mayo de 2011. Casi tres años después se leparamos dos años y medio de cárcel. ¿Condena justa?



Portrait of Diaboline Vargas

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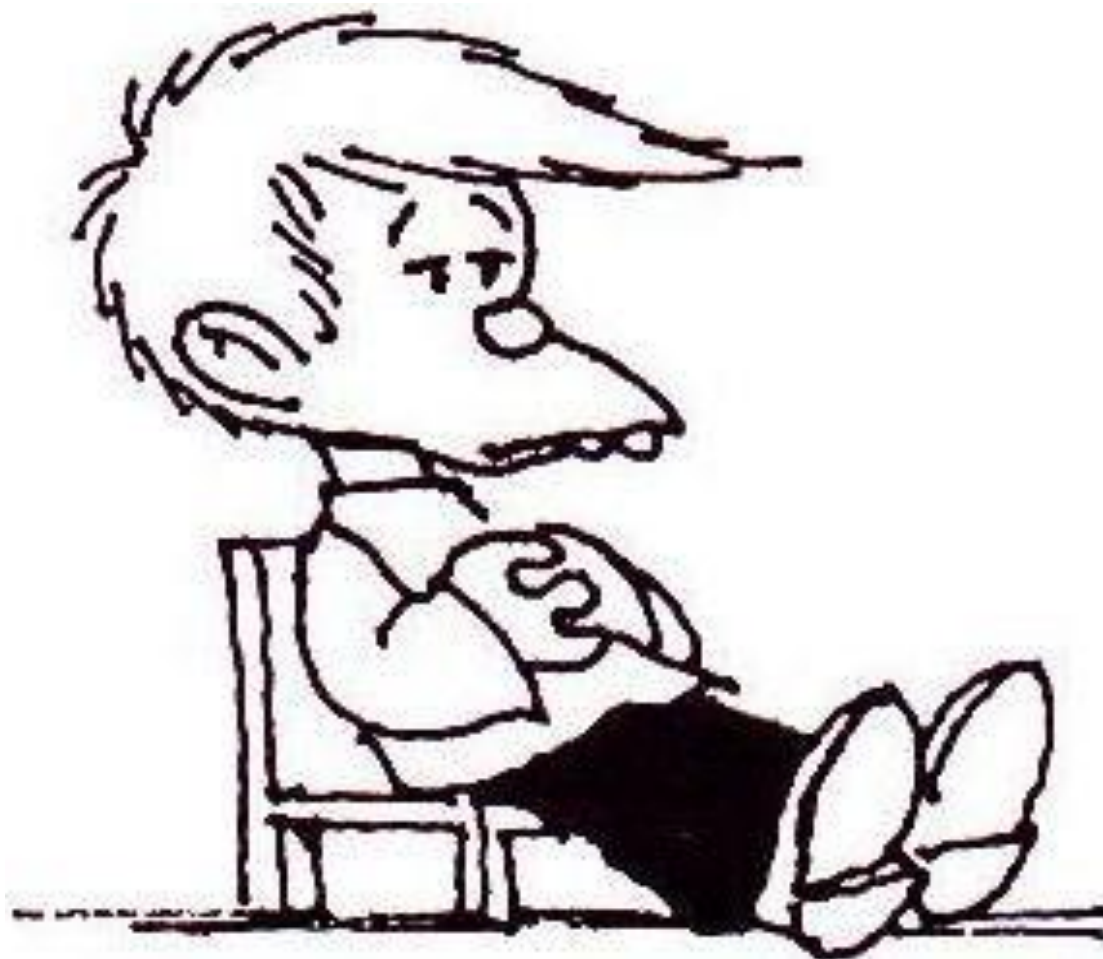
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Portrait of Diaboline Vargas

Haz clic en la esquina de la página para avanzar

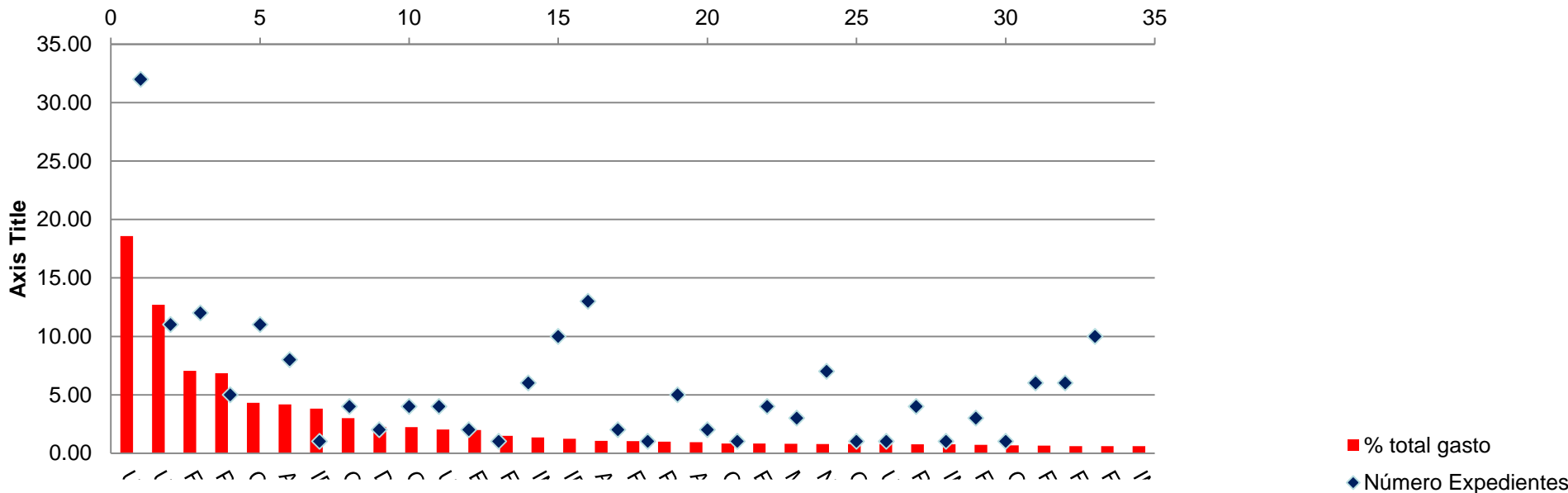
Ocultar

"When I grow up, I want to be an expert"

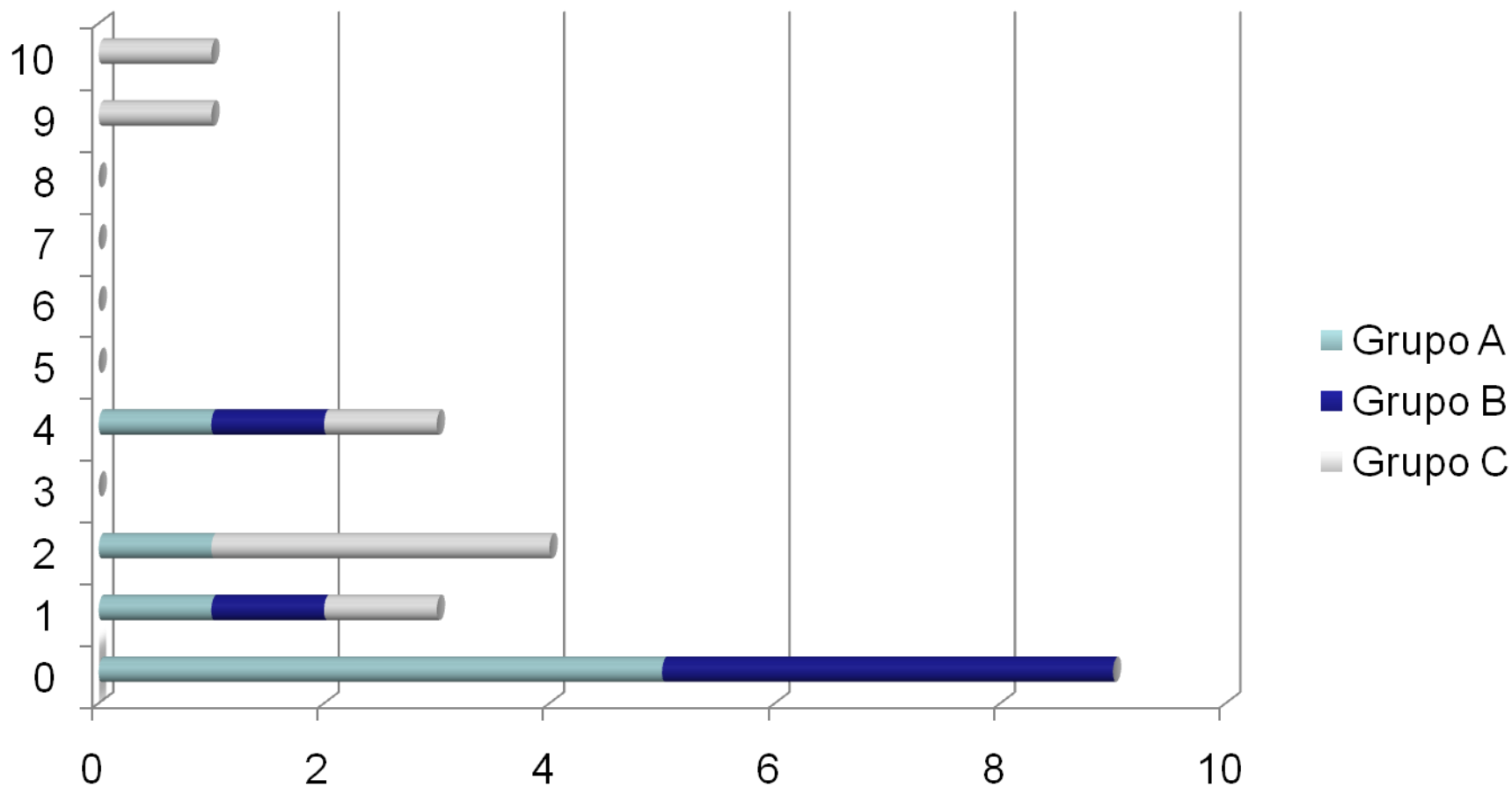


Experts?

**Distribution of research dossiers assigned to different entities.
DGT, 2002-2011**



h- index - 3 groups that have received more subsidies from DGT before 2013



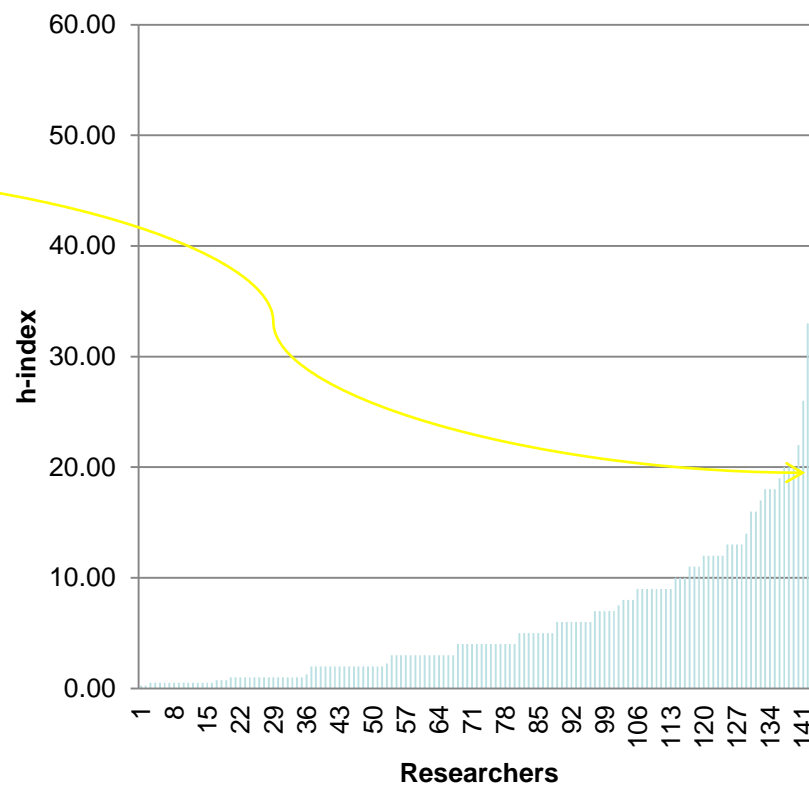
Eminence

- Self-reported vs. objective

Objective, for example, Rune Elvik



h-index for researchers
(RNI DGT, $h > 0$)



Much of what has been done so far:

- Has NOT been research
- Or has NOT been efficient
- And, in any case: little known and hardly collaborative (intra and extramural)

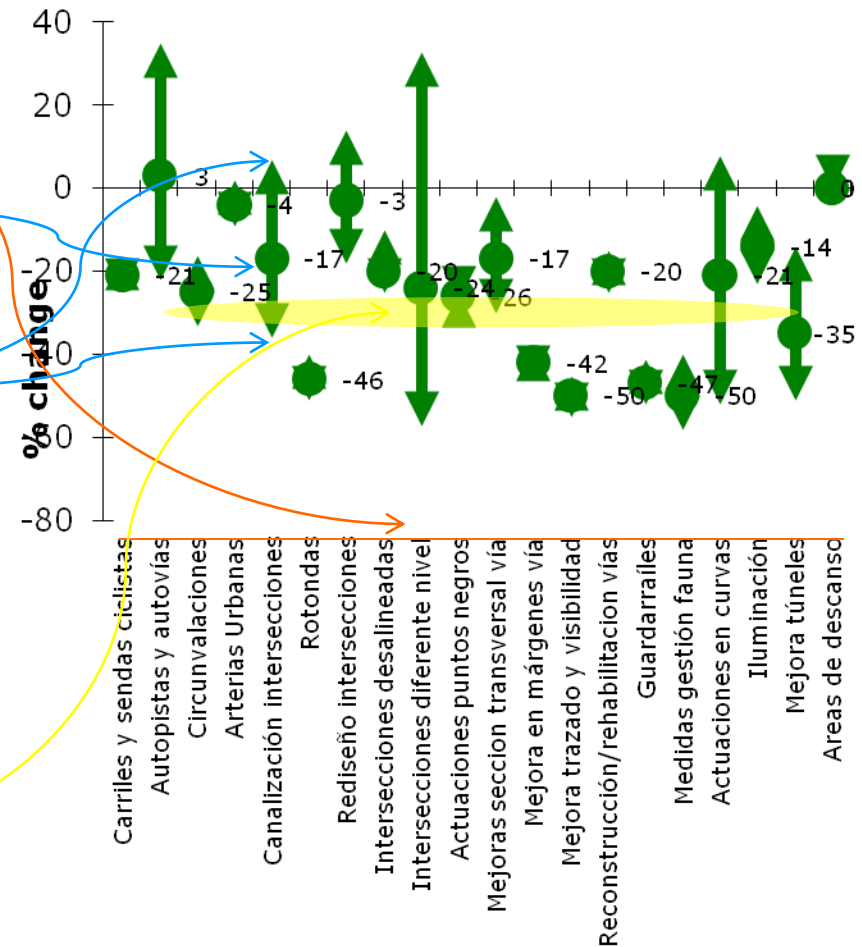
Difficulties in the evidence-based decision-making process

Guión

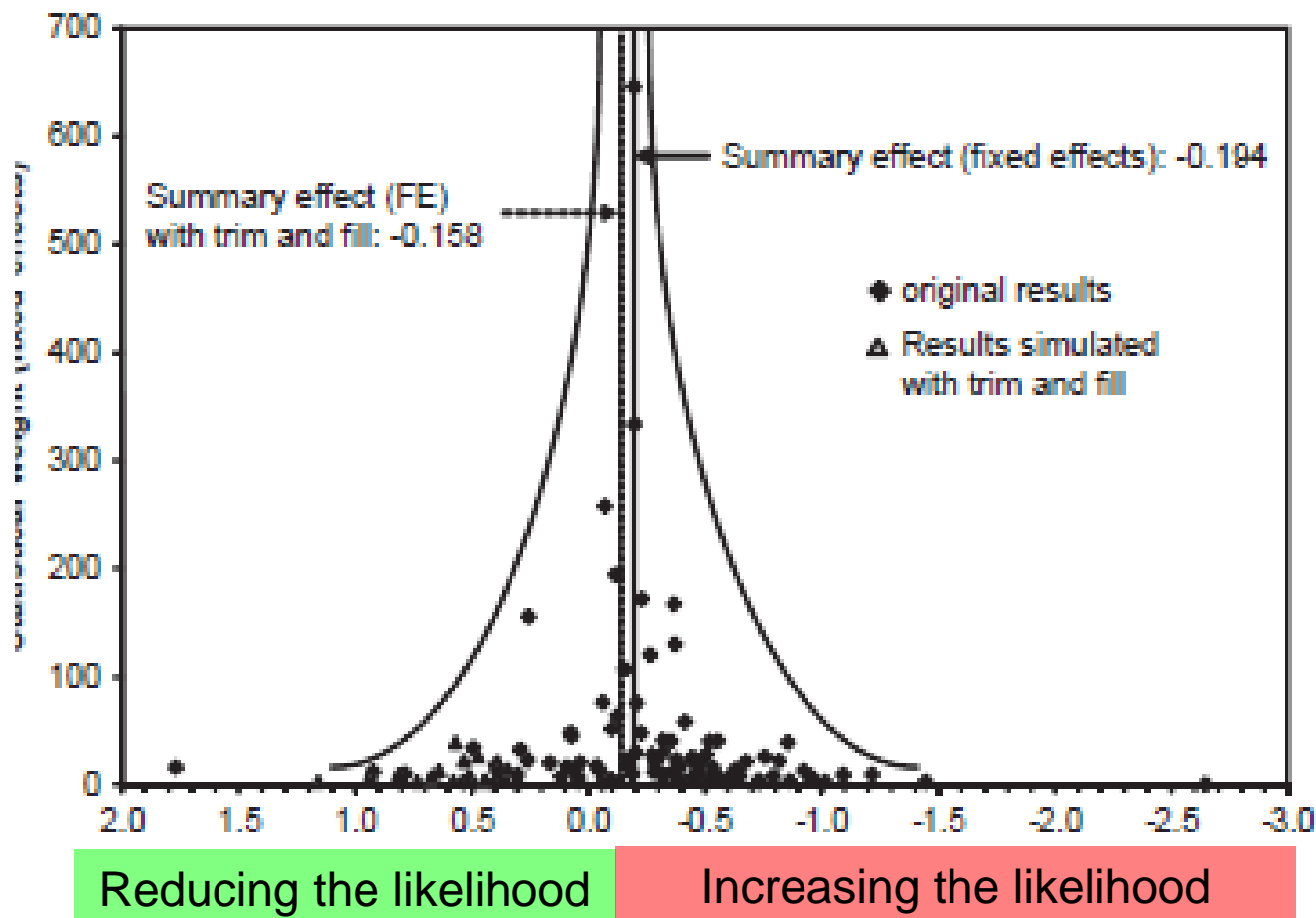
1. Resistance to change: Let yourself be carried away vs. **Taking decisions**
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However, incorporating evidence on effectiveness is a complex issue...

- Multiple interventions
- Various values
 - Central value (circle) = the most representative value in the group of assessed measures
 - Arrows around the circle = other values reported in other measures within the same action
 - Arrows crossing the zero value (0) mean that there are studies that tell us one thing and others that tell us the opposite
 - Blank spaces mean findings are very inconsistent
- The set of values, is it effective? is it very effective?



Example: Funnel plot showing the findings of studies assessing the impact of road lighting on accidents



Publication bias

Type of reporting bias	Definition
Publication bias	The <i>publication</i> or <i>non-publication</i> of research findings, depending on the nature and direction of the results
Time lag bias	The <i>rapid</i> or <i>delayed</i> publication of research findings, depending on the nature and direction of the results
Multiple (duplicate) publication bias	The <i>multiple</i> or <i>singular</i> publication of research findings, depending on the nature and direction of the results
Location bias	The publication of research findings in journals with different <i>ease of access</i> or <i>levels of indexing</i> in standard databases, depending on the nature and direction of results.
Citation bias	The <i>citation</i> or <i>non-citation</i> of research findings, depending on the nature and direction of the results
Language bias	The publication of research findings <i>in a particular language</i> , depending on the nature and direction of the results
Outcome reporting bias	The <i>selective reporting</i> of some outcomes but not others, depending on the nature and direction of the results

Table 10.1.a: Chapter 10 in Cochrane Handbook for Systematic Reviews of Interventions [2]. (c) The Cochrane Collaboration

Types of existing evidence

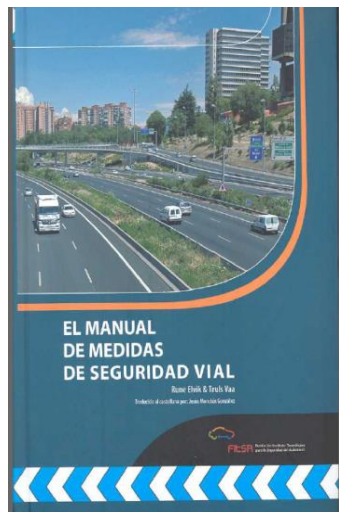
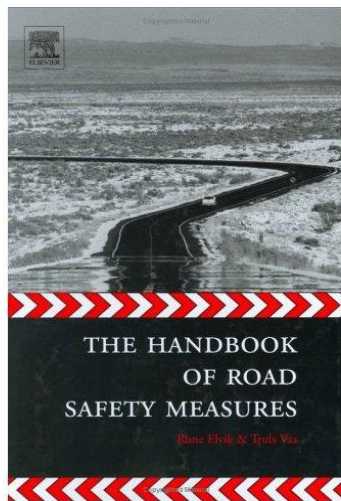


Difficulties in the evidence-based decision-making process

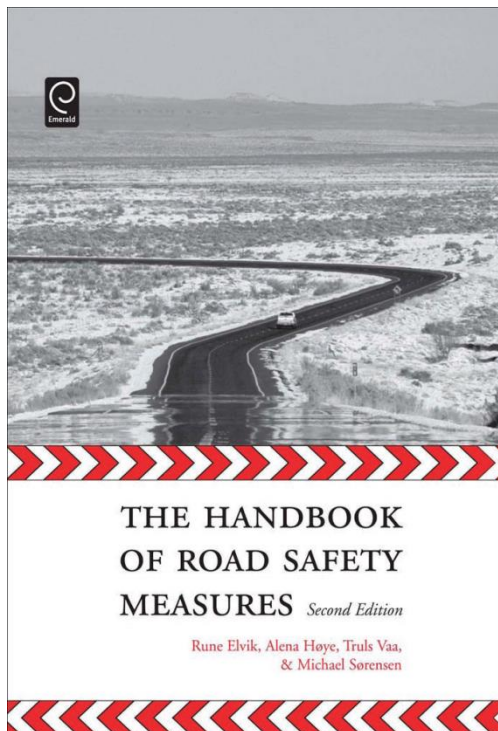
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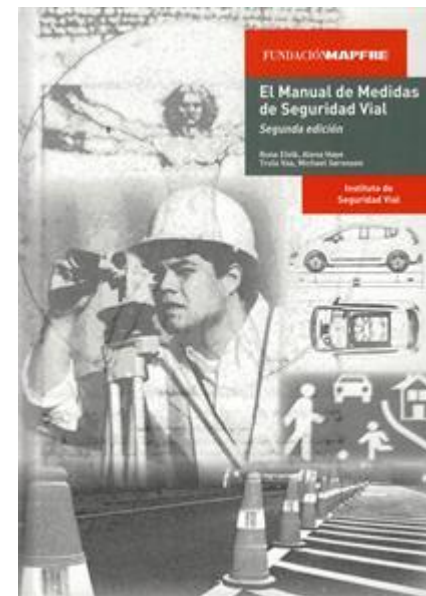
Reference(s)



1st edition



2nd edition

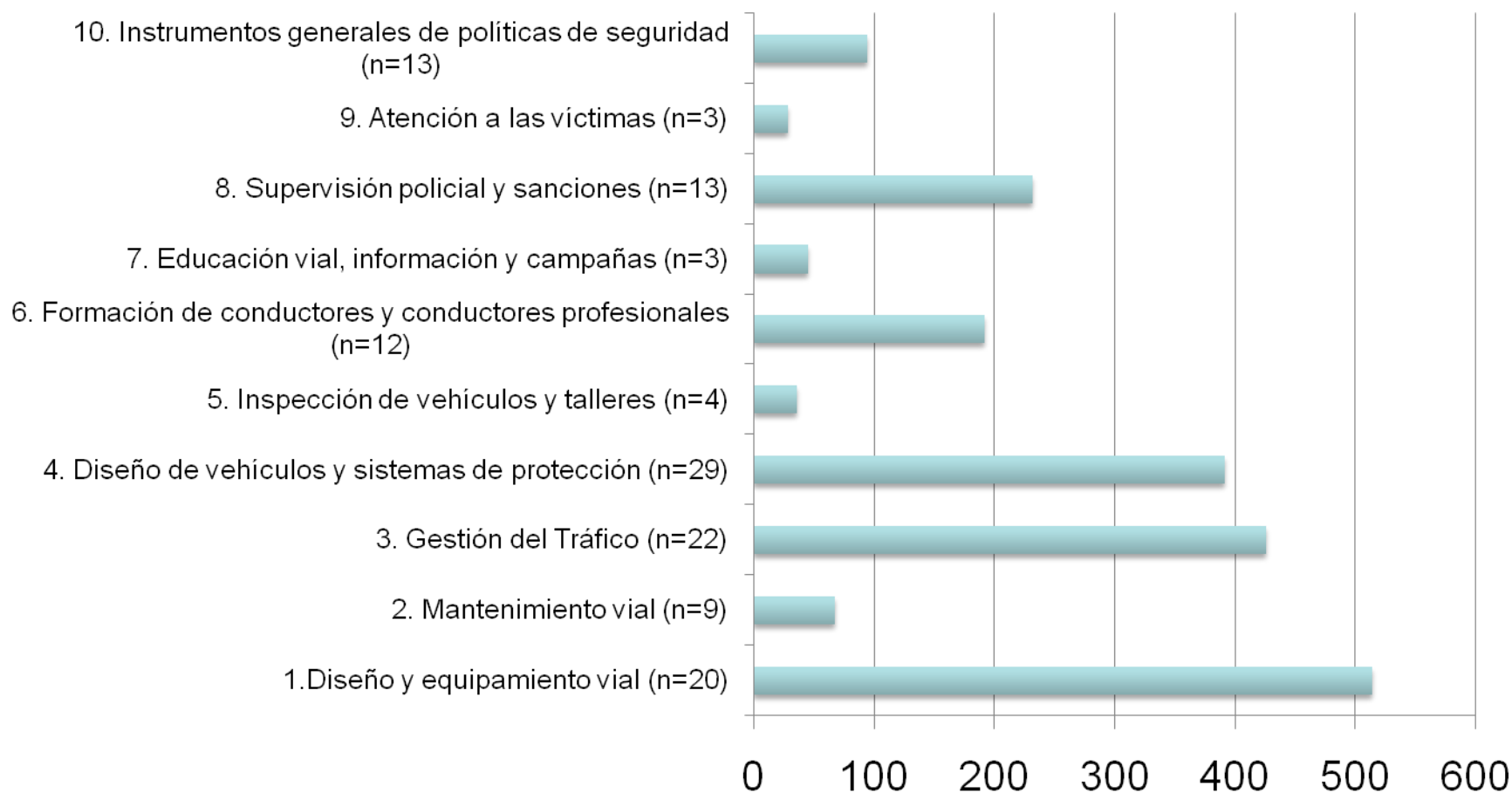


Where do we intervene? What do we assess?

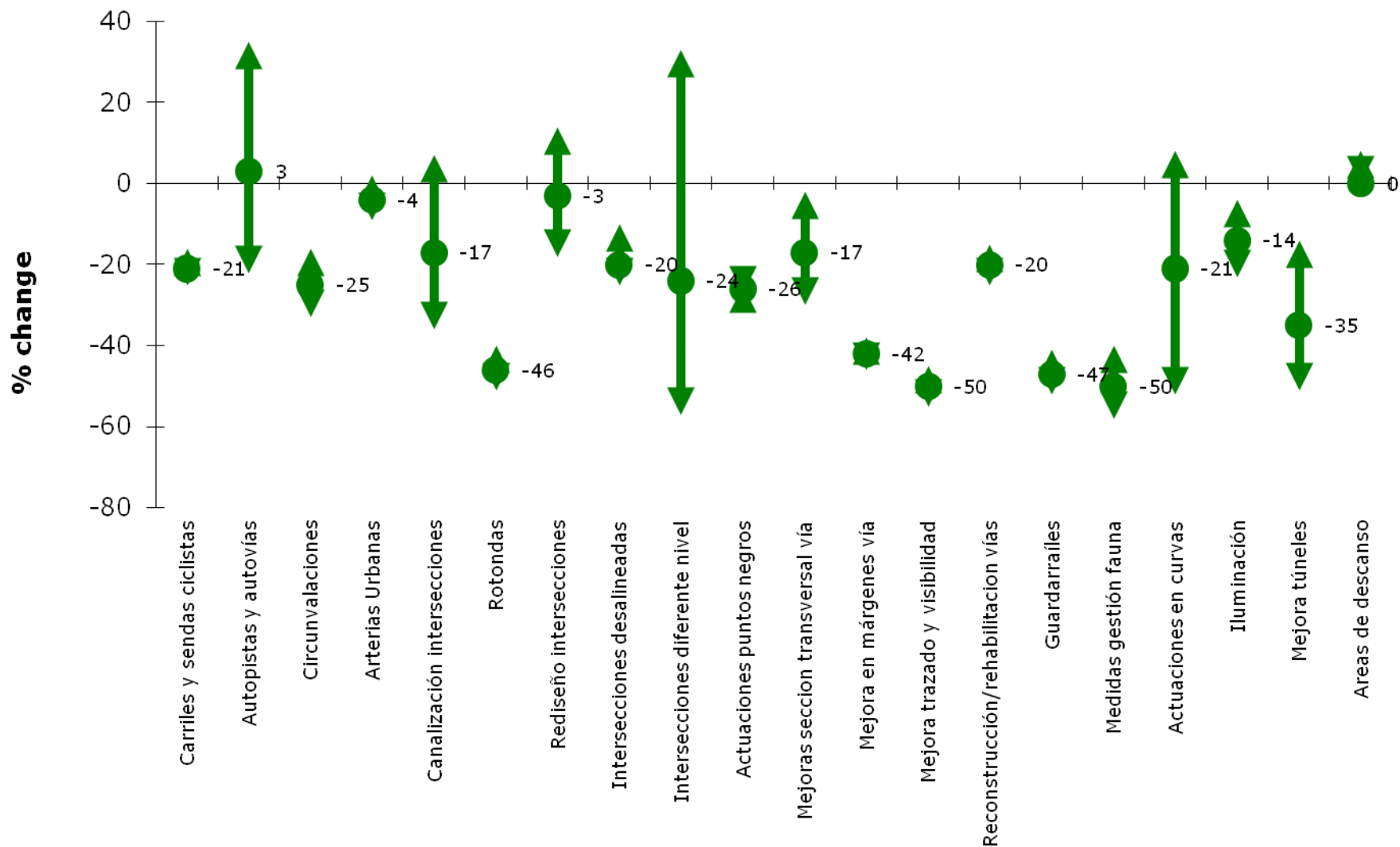
Haddon Matrix (2,025 studies on 128 interventions)			
	Person	Vehicle	Physical or Socio-economic environment
Pre-event	237	211	1,250
Event		311	69
Post-event		3	42

In which areas?

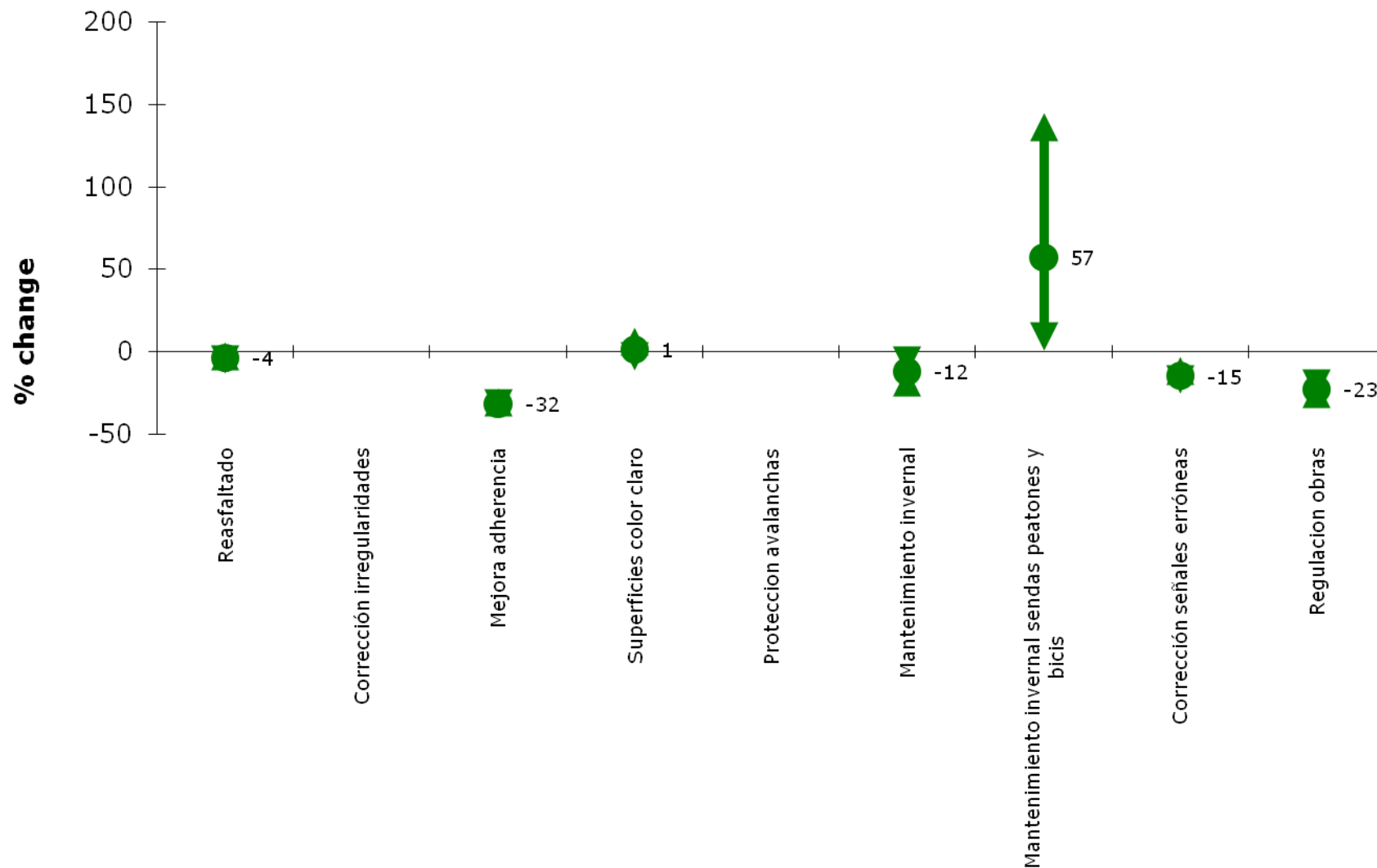
2,028 studies (reviewed) articles, 128 actions, 10 areas



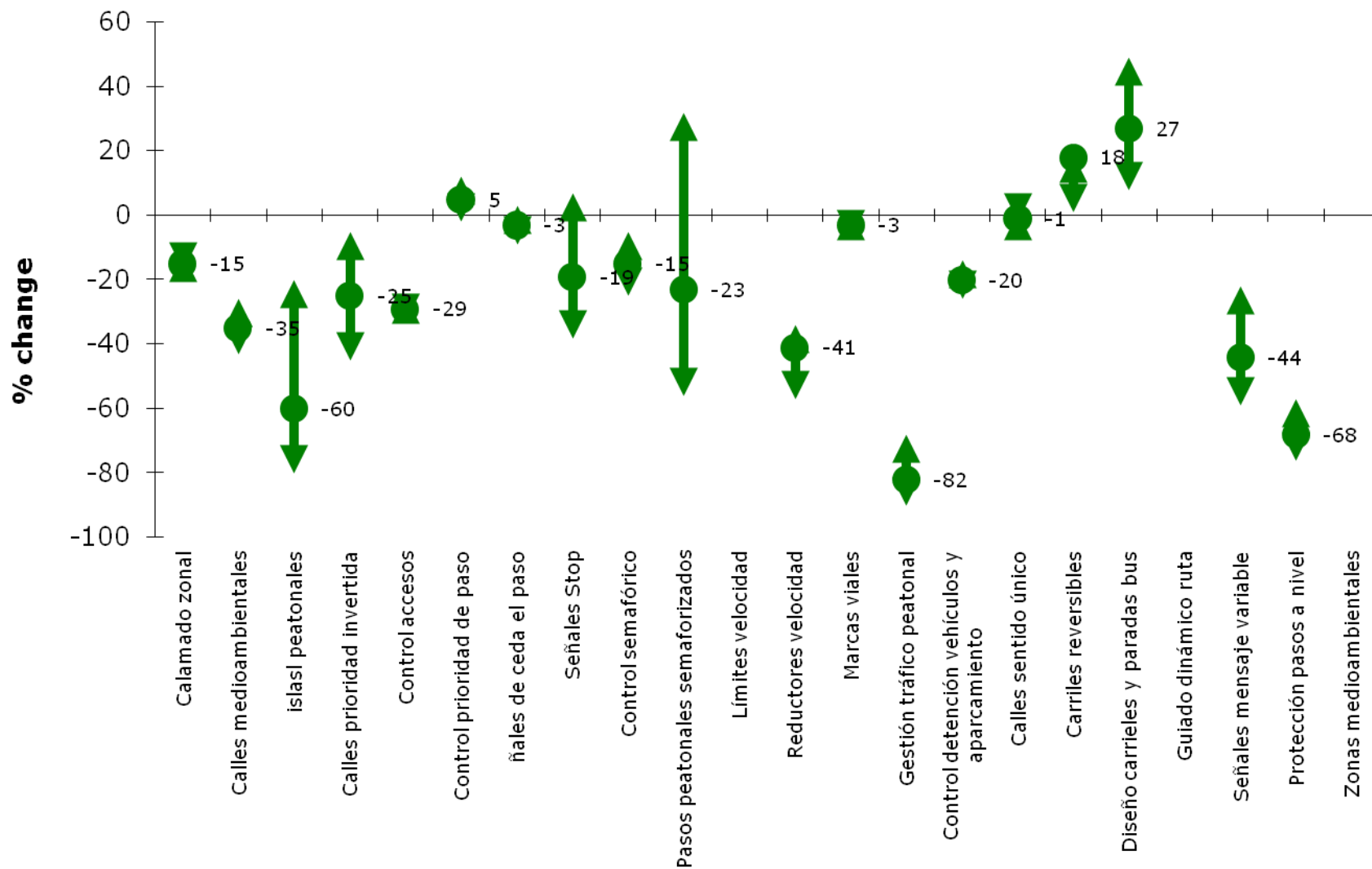
1. Road design and road equipment (n=20)



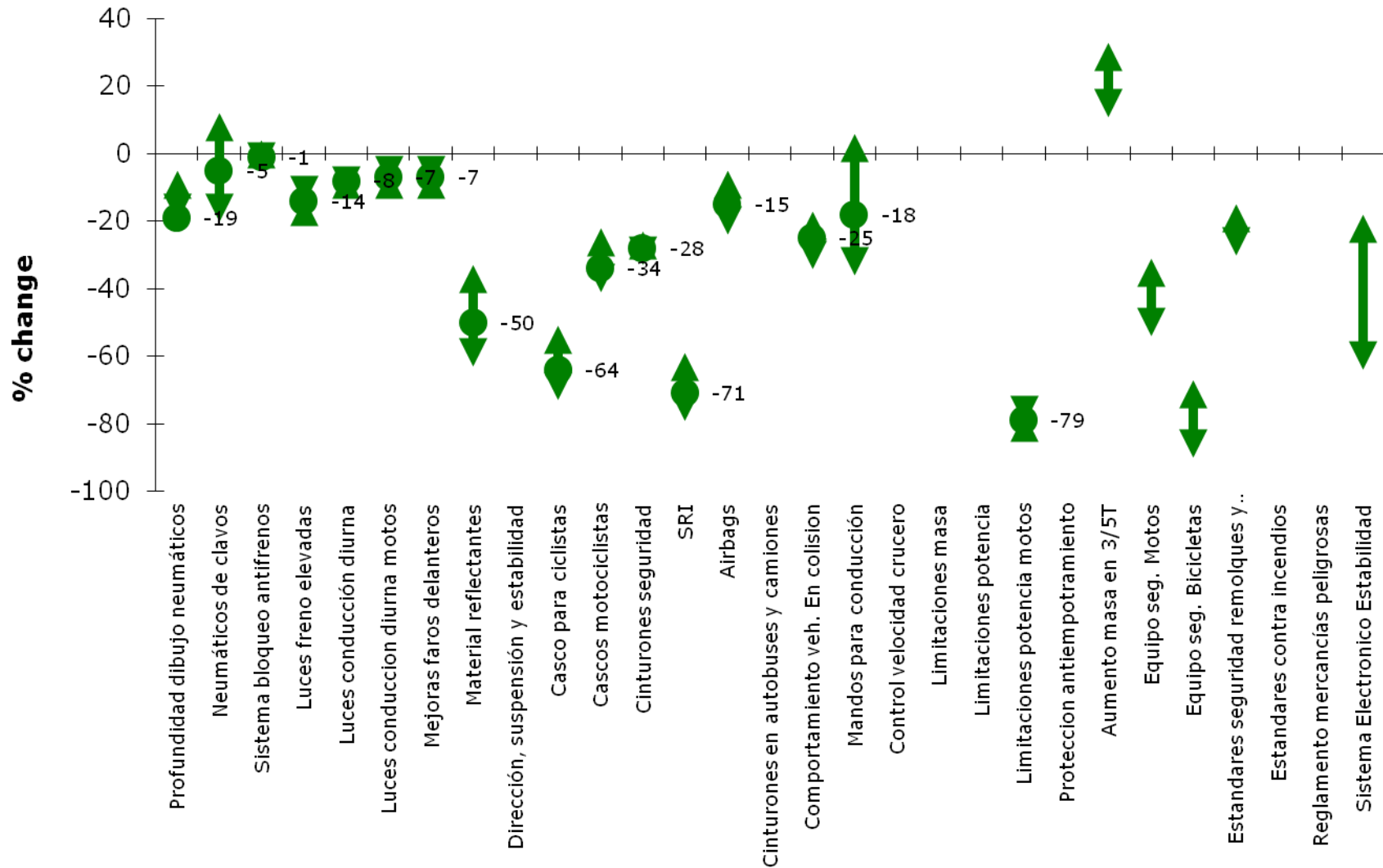
2. Road maintenance (n=9)



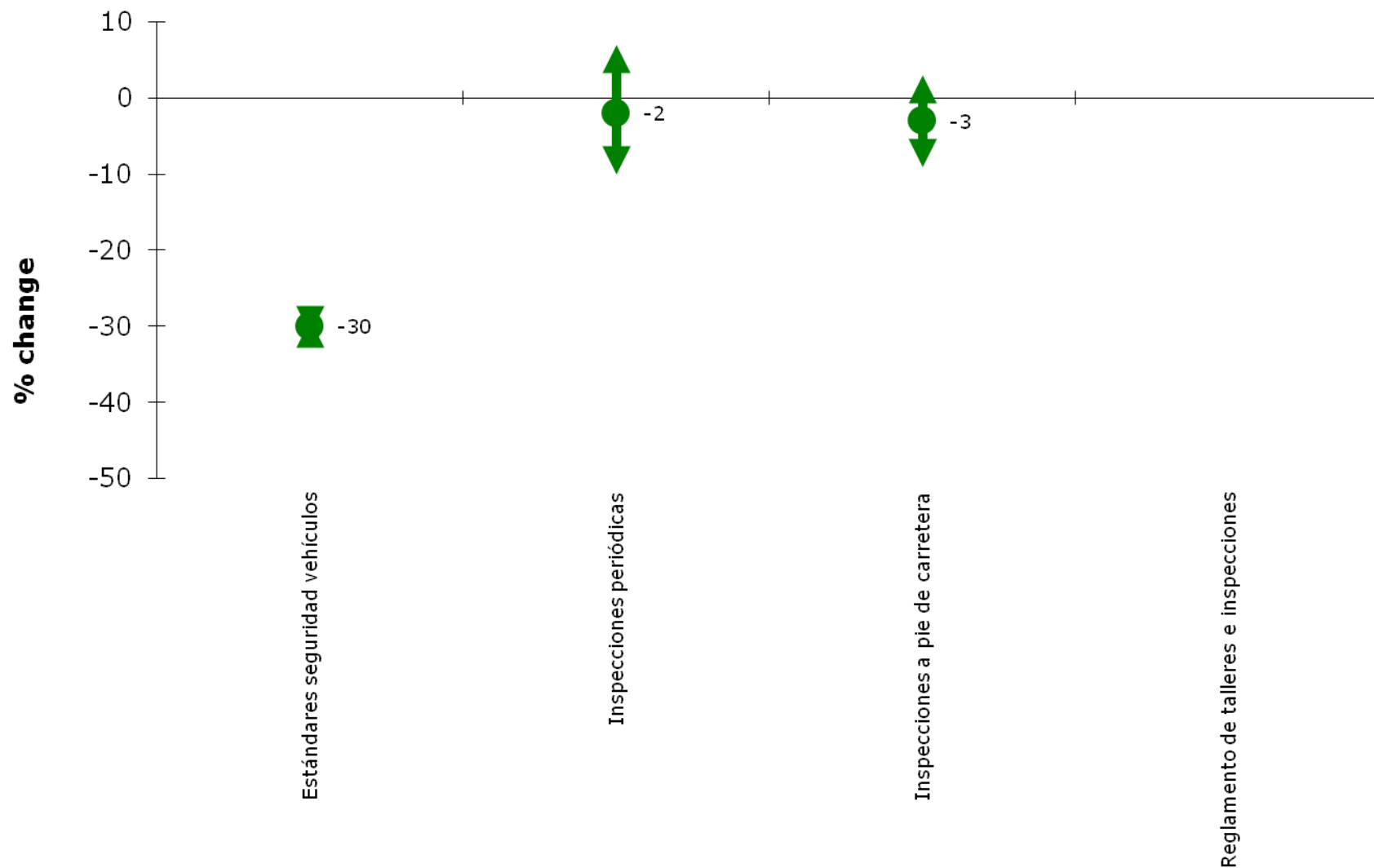
3. Traffic control (n=22)



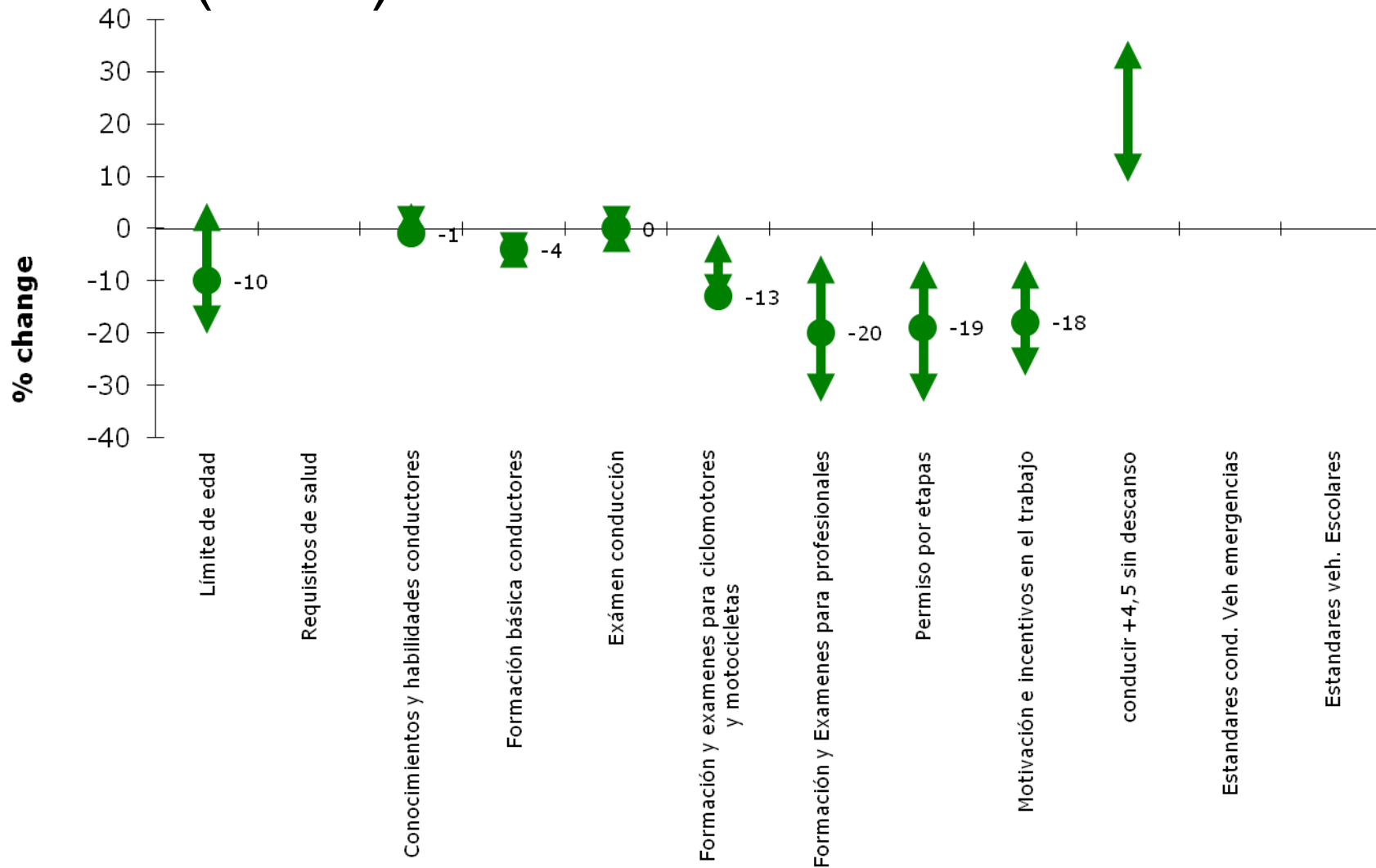
4. Vehicle design and protective devices (n=29)



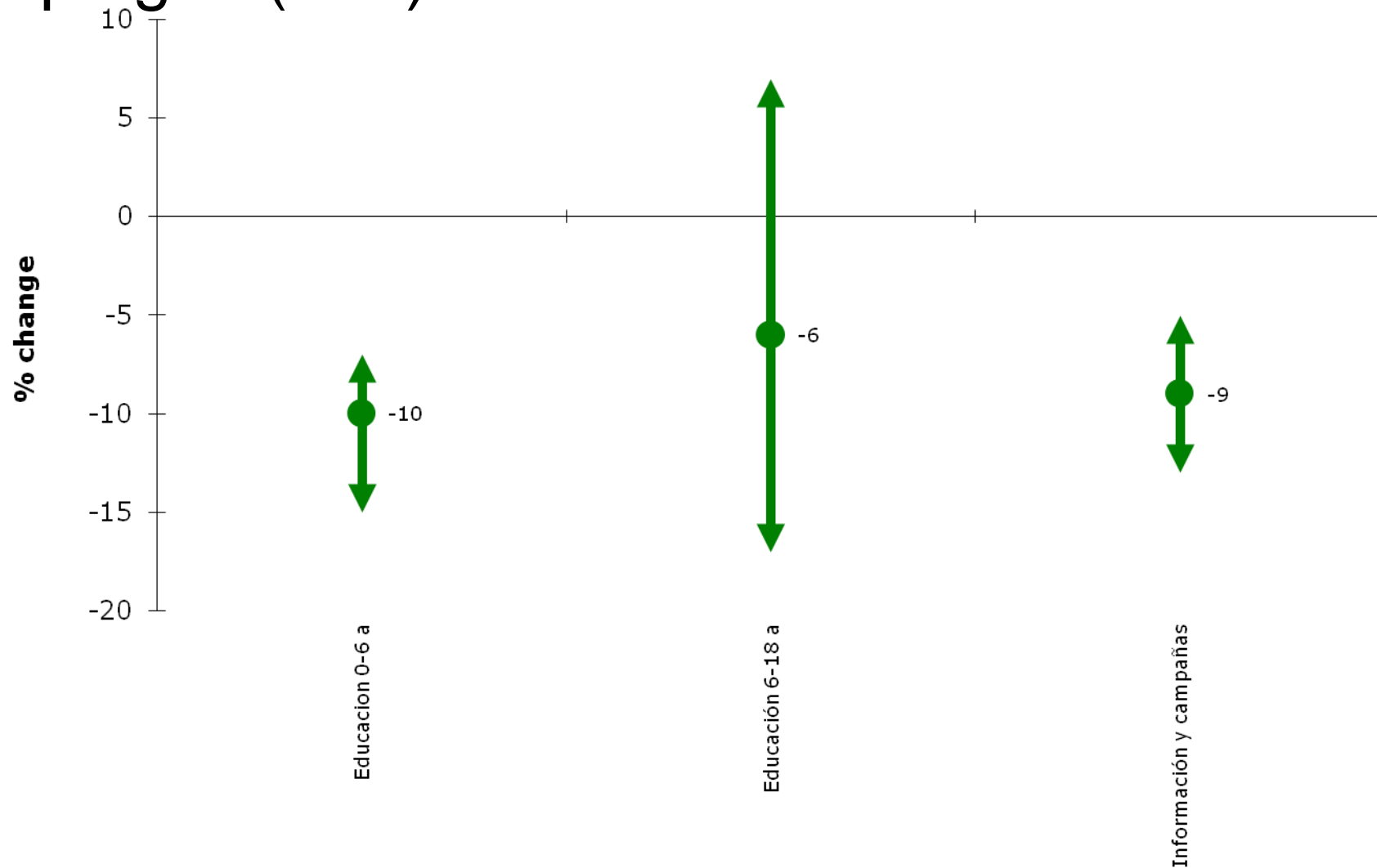
5. Vehicle and garage inspection (n=4)



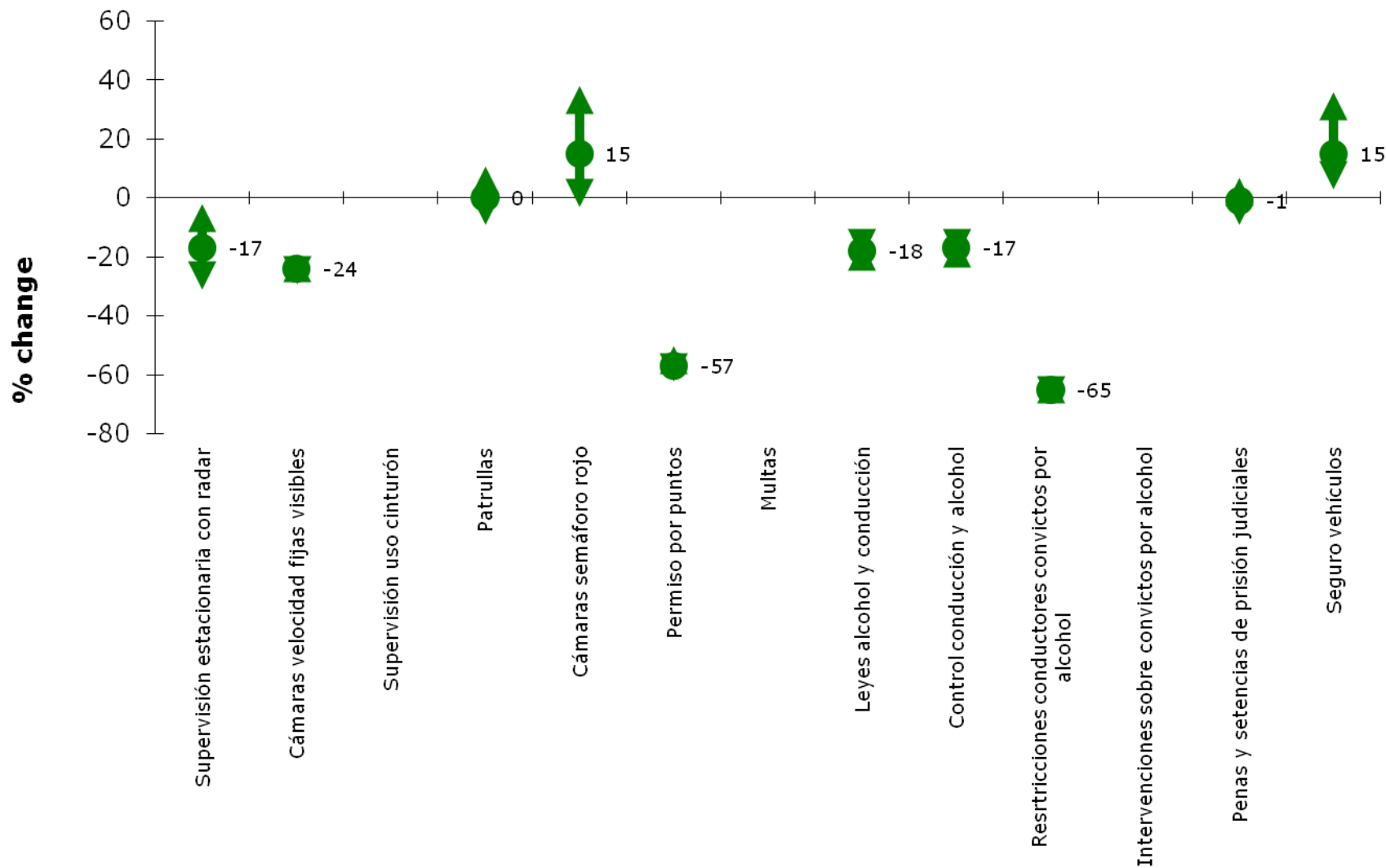
6. Driver training and regulation of professional drivers (n=12)



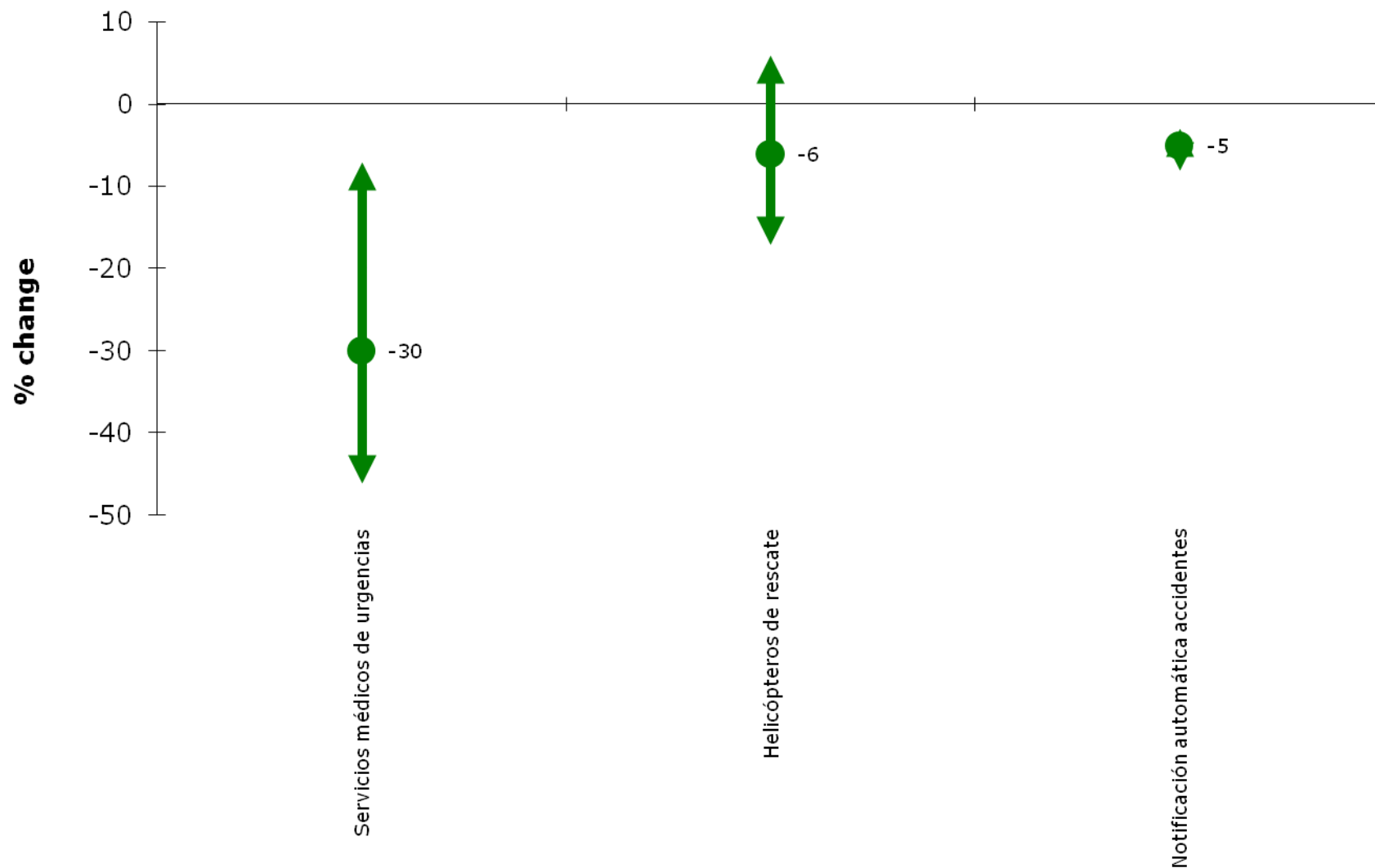
7. Road safety education, information and campaigns (n=3)



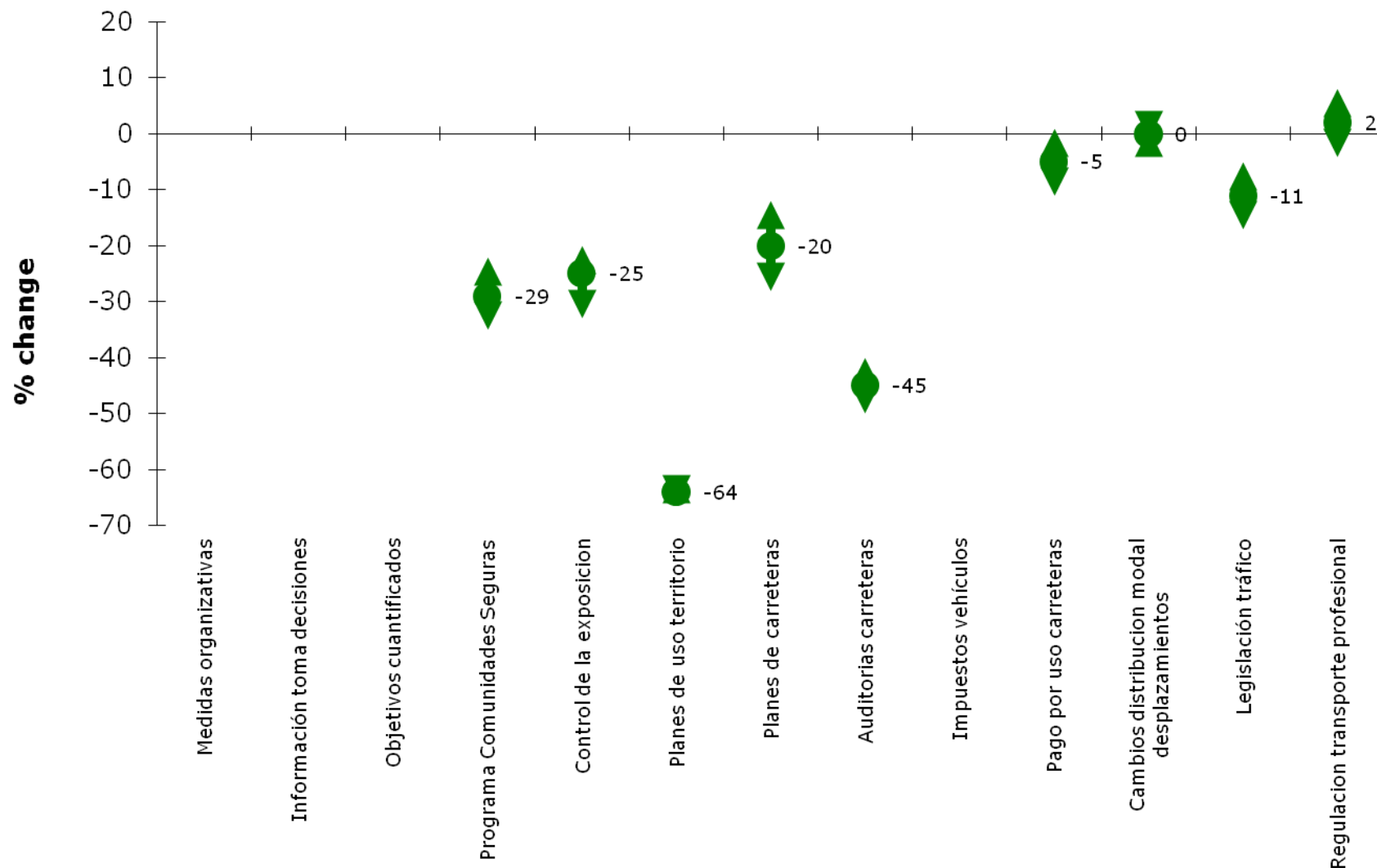
8. Police enforcement and sanctions (n=13)



9. Post-accident care (n=3)



10. General-purpose policy instruments (n=13)



In summary

	Actions	According to their effectiveness		
		Effective	NON effective	Non conclusive
1. Road design and road equipment	20	13	6	1
2. Road maintenance	9	5	2	2
3. Traffic control	22	12	7	3
4. Vehicle design and protective devices	29	18	3	8
5. Vehicle and garage inspection	4	1	2	1
6. Driver training and regulation of professional drivers	12	5	4	3
7. Road safety education, information and campaigns	3	2	1	0
8. Police enforcement and sanctions	13	6	4	3
9. Post-accident care	3	2	1	0
10. General instruments of road safety policies	13	6	3	4
Total	128	72	29	27

Difficulties in the evidence-based decision-making process

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Some people may say

- "I don't believe this data"
- "Outdated references" --- Update them for the 2009+ published work
- "No Spanish reference" -- Why don't we publish it?
- "Mine is different" - Document the differences in form and content
- "Works published are not prescriptive": For instance, Elvik (page 4) states "*This book is not a technical design handbook. It does not tell readers how to design a junction or how to build a car. **This book does not offer a prescription for road safety policy. It does not tell readers which road safety measures ought to be taken, nor does it instruct policymakers in how to set priorities for the provision of road safety.***"
 - And yet, are we going to ignore it?

Seeking out opportunities (Elvik, 2nd edition)

	Actions	Actions that have proved to be effective	DGT does	DGT could do
1. Road design and road equipment	20	12	3	0
2. Road maintenance	9	5	1	1
3. Traffic control	22	13	1	2
4. Vehicle design and protective devices	29	18	10	1
5. Vehicle and garage inspection	4	1	0	1
6. Driver training and regulation of professional drivers	12	5	2	1
7. Road safety education, information and campaigns	3	2	2	0
8. Police enforcement and sanctions	13	8	6	0
9. Post-accident care	3	2	1	1
10. General instruments of road safety policies	13	6	2	1
Total	128	72	28	9

Some examples (we do but they are not effective)

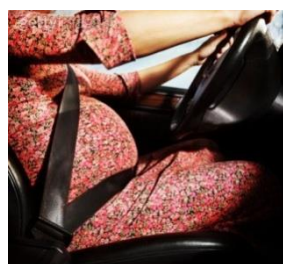
Class	Example of measure
1. Road design and road equipment:	nothing
2. Road maintenance	nothing
3. Traffic control	Traffic light controlled pedestrian crossings Road markings (speed bumps) Reversible lanes
4. Vehicle design and protective devices	nothing
5. Vehicle and garage inspection	nothing
6. Driver training and regulation	Minimum age in driving license (16-17) Theoretical driving tests
7. Road safety education and campaigns	Education for children aged 6-18
8. Police enforcement	Generic patrols Red traffic light cameras
9. Post-accident care	nothing
10. General-purpose instruments	nothing

Decisions affecting our present reality (Spain, 2013)



Population: 47,129,783
 Tourists: 60.6 M
 Public roads: > 660,000 km
 Journeys on high-capacity roads (ex C & BC): 365 M
 Journeys (2007): 42,000 M

Drivers: 24,4 Million
 New drivers: 387 thousand
 Licence renewals: 3 M M
 Vehicles: 32,6 million
 New veh.: 984 thousand
 Veh. de-registrations: 1,2 Million



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And what do we know about the effectiveness of those interventions?

Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness

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We gathered information on the cost-effectiveness of life-saving interventions in the United States from publicly available economic analyses. "Life-saving interventions" were defined as any behavioral and/or technological strategy that reduces the probability of premature death among a specified target population. We defined cost-effectiveness as the net resource costs of an intervention per year of life saved. To improve the comparability of cost-effectiveness ratios arrived at with diverse methods, we established fixed definitional goals and revised published estimates, when necessary and feasible, to meet these goals. The 587 interventions identified ranged from those that save more resources than they cost, to those costing more than 10 billion dollars per year of life saved. Overall, the median intervention costs \$42,000 per life-year saved. The median medical intervention costs \$19,000/life-year; injury reduction \$48,000/life-year; and toxin control \$2,800,000/life-year. Cost/life-year ratios and bibliographic references for more than 500 life-saving interventions are provided.

KEY WORDS: Cost-effectiveness; economic evaluation; life-saving; resource allocation.

Table I. Median of Cost/Life-Year Saved Estimates as a Function of Sector of Society and Type of Intervention

Sector of society	Type of intervention			
	Medicine	Fatal injury reduction	Toxin control	All
Health care	\$19,000 (n=310)	N/A ^a	N/A	\$19,000 (n=310)
Residential	N/A	\$36,000 (n=30)	N/A	\$36,000 (n=30)
Transportation	N/A	\$56,000 (n=87)	N/A	\$56,000 (n=87)
Occupational	N/A	\$68,000 (n=16)	\$1,400,000 (n=20)	\$350,000 (n=36)
Environmental	N/A	N/A	\$4,200,000 (n=124)	\$4,200,000 (n=124)
All	\$19,000 (n=310)	\$48,000 (n=133)	\$2,800,000 (n=144)	\$42,000 (n=587)

^a Not applicable by definition.

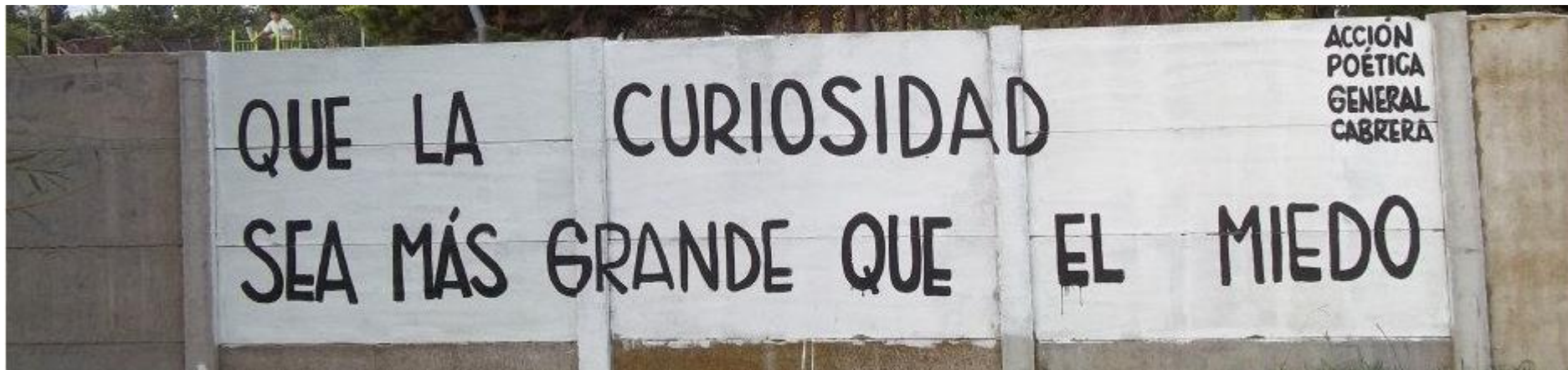
The contribution of research to road safety policy-making

		Research	Policy
Stage I	Describe current road safety problems and assess their relative importance in contributing to fatalities and injuries	✓	
Stage II	Develop road safety targets and decide on quantification of these as well as other policy objectives	✓	✓
Stage III	Survey potentially effective road safety measures and decide which measures still have a potential for improving safety	✓	
Stage IV	Describe the current road transport systems and establish a framework for analysis of alternative policy options		✓
Stage V	Develop alternative road safety policy options , showing the main directions for road safety policy		✓
Stage VI	Estimate the effects of each policy option on the number of killed or injured road users, as well as effects with respect to other policy objectives	✓	
Stage VII	Assess sources of uncertainty in estimated effects and discuss the treatment of uncertainty in road safety policy-making	✓	
Stage VIII	Determine considerations relevant to the choice of road safety policy and choose preferred policy	✓	✓
Stage IX	Implement preferred road safety policy and evaluate effects of that policy	✓	

Source: Elvik, 2009

DGT Research Plan and DGT funding





(Let curiosity be bigger than fear)



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