

The Handbook of Road Safety Measures

A source of knowledge about the effects of road safety measures

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A brief history of the book

- Published in Norwegian in 1982, 1989, 1997, 2012
- Ongoing revision since 2001 – revised parts of the book published electronically (in Norwegian) at the website of the Institute of Transport Economics
- Has expanded from 73 road safety measures in the first edition to 142 as of mid-2013
- Published in Finnish in 1993
- Published in Russian in 1997 and 2000
- Published in English in 2004 and 2009
- Published in Spanish in 2007 and 2014

Main questions the book answers

- Which road safety measures exist and can be used?
- Which road safety problems do these safety measures help solve?
- What are the effects of road safety measures on accidents or injuries?
- What are the effects of road safety measures on mobility and the environment?
- What are the costs of road safety measures?
- Which road safety measures give the greatest benefits for a given cost?

Three main parts of the book

1. Introduction
2. Road safety measures
3. Vocabulary and index

The introduction

1. Background and guide to readers
 - *Objective of the book; its structure; separating science and politics*
2. Literature survey and meta-analysis
 - *How studies were identified; basics of meta-analysis*
3. Factors contributing to road accidents
 - *Broad survey of risk factors and their contributions*
4. Basic concepts of road safety research
 - *Random and systematic variation; behavioural adaptation*
5. Assessing the quality of evaluation studies
 - *Introduction to study quality assessment*
6. The contribution of research to road safety policy making
 - *Cost-benefit analysis and other approaches to policy analysis*

Main groups of road safety measures

1. Road design and road equipment
2. Road maintenance
3. Traffic control
4. Vehicle design and protective devices
5. Vehicle and garage inspection
6. Driver training and regulation of professional drivers
7. Public education and information
8. Police enforcement and sanctions
9. Post-accident care
10. General-purpose policy instruments

Standard layout for chapters describing road safety measures

- Problem and objective
- Description of the measure
- Effect on accidents
- Effect on mobility
- Effect on the environment
- Costs
- Cost-benefit analysis

Effect on accidents

- This is the key section of each chapter
- In most cases the effect of a road safety measure is stated as the percentage change in the number of accidents or injured road users
- Uncertainty is stated as a 95% confidence interval
- A distinction is made between different versions of a measure and different levels of accident severity
- Most summary estimates of effect are based on meta-analysis
- Emphasis has been put on the methodologically best studies

Example: converting junctions to roundabouts

| Percentage change in the number of accidents | | | |
|--|--------------------------------|---------------|-------------------------|
| | Accident severity | Best estimate | 95% confidence interval |
| All roundabouts | All severities | -36 | (-43; -29) |
| All roundabouts | Fatal accidents | -66 | (-85; -24) |
| All roundabouts | Injury accidents | -46 | (-51; -40) |
| All roundabouts | Property damage only accidents | +10 | (-10; +35) |
| Previous yield junctions | All severities | -40 | (-47; -31) |
| Previous signalised junctions | All severities | -14 | (-27; +1) |
| X-junctions | All severities | -34 | (-42; -25) |
| T-junctions | All severities | -8 | (-28; +18) |
| Roundabouts in rural areas | All severities | -69 | (-79; -54) |
| Roundabouts in urban areas | All severities | -25 | (-34; -15) |

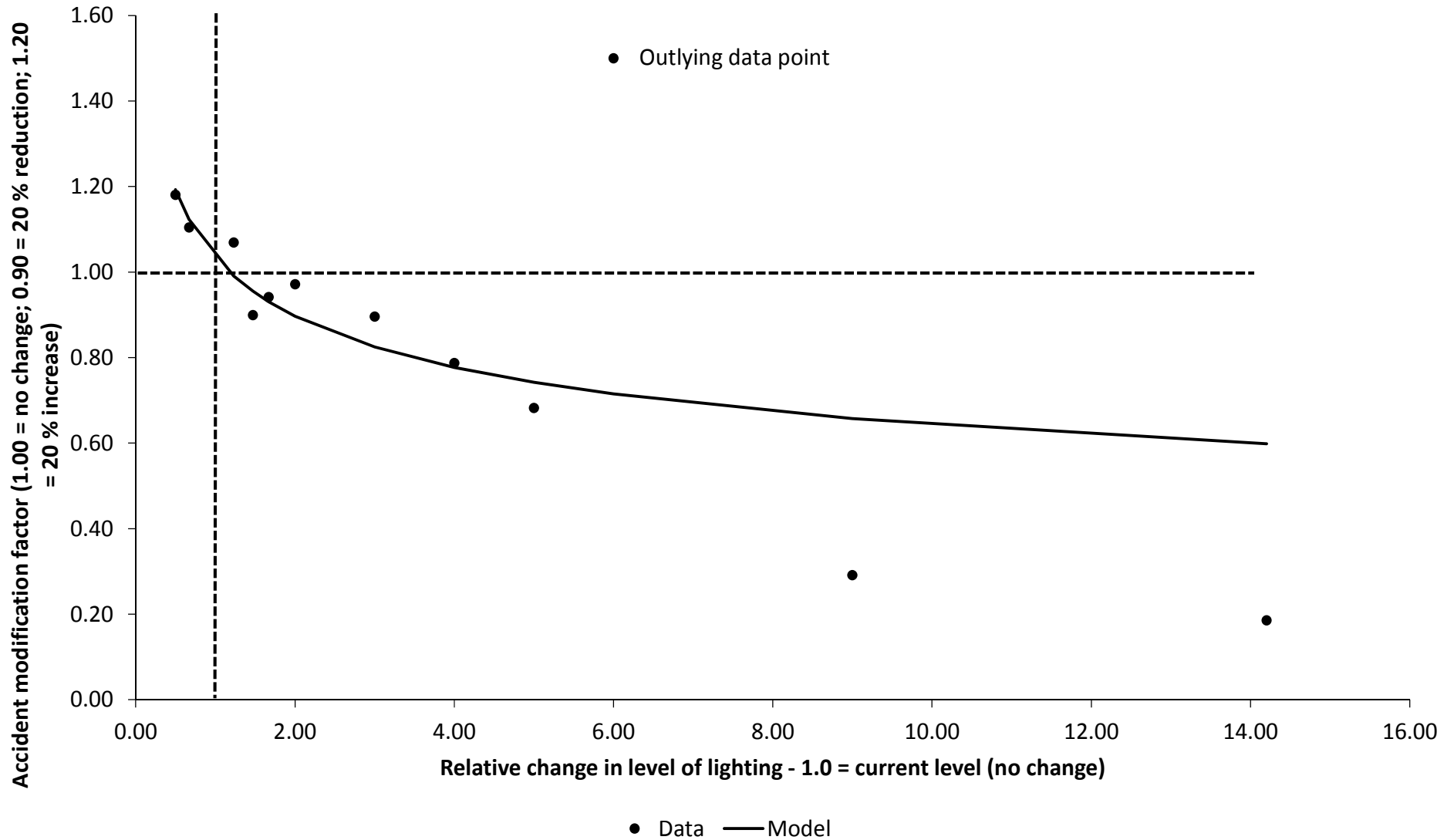
Effects of improved lighting

| | | Percentage change in number of accidents | |
|--|-------------------------|--|-------------------------|
| Accident severity | Accident types affected | Best estimate | 95% confidence interval |
| <i>Increasing the level of lighting by up to double the previous lighting level</i> | | | |
| Injury accidents | Accidents in darkness | -8 | (-20; +6) |
| Property-damage-only | Accidents in darkness | -1 | (-4; +3) |
| <i>Increasing the level of lighting by up to 2-5 times the previous level of lighting</i> | | | |
| Injury accidents | Accidents in darkness | -13 | (-17; -9) |
| Property-damage-only | Accidents in darkness | -9 | (-14; -4) |
| <i>Increasing the level of lighting by 5 times the previous level of lighting or more</i> | | | |
| Fatal accidents | Accidents in darkness | -50 | (-79; +15) |
| Injury accidents | Accidents in darkness | -32 | (-39; -25) |
| Property-damage-only | Accidents in darkness | -47 | (-62; -25) |

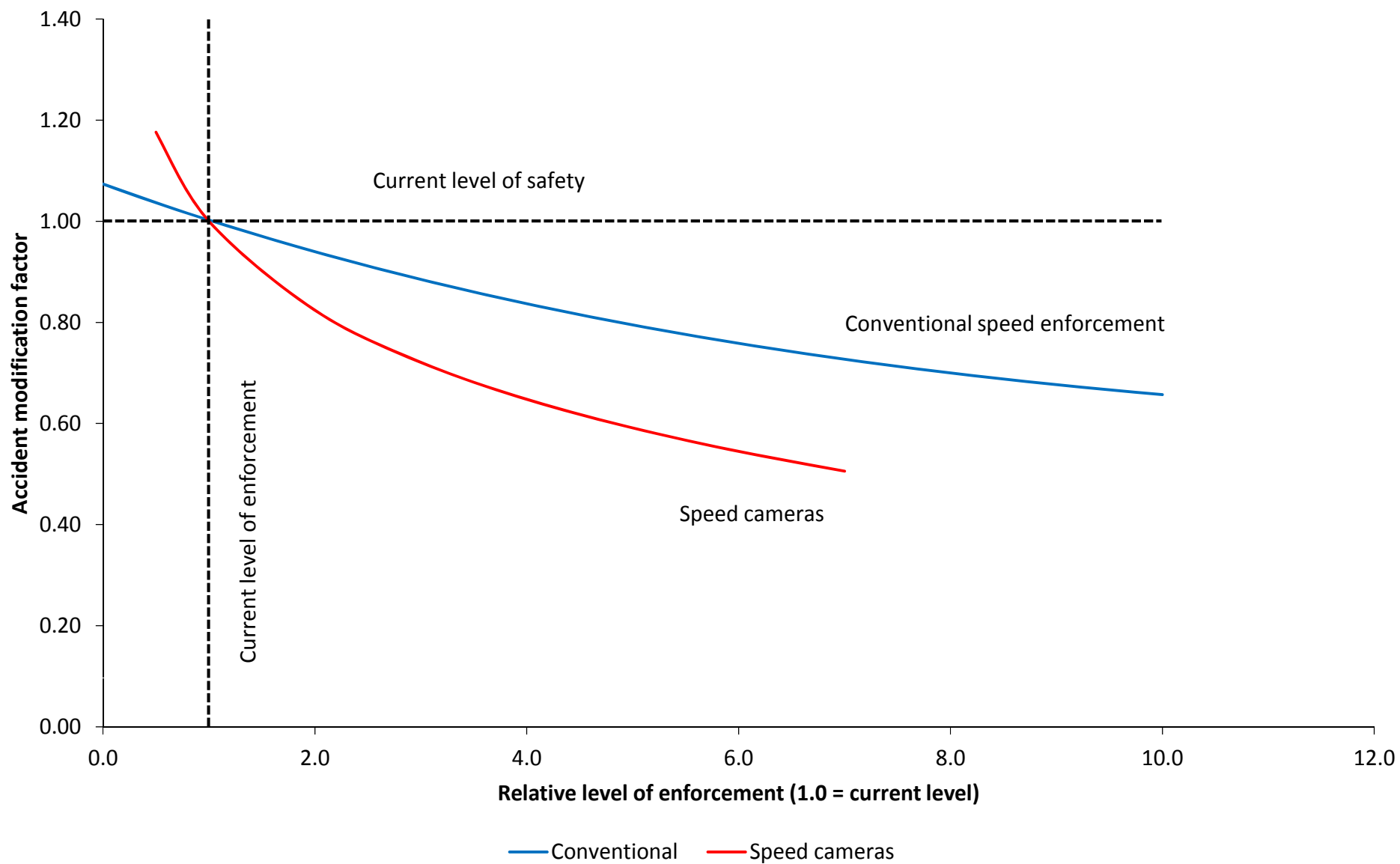
Developing the Handbook

- Increasing the level of detail in the presentation of effects on accidents or injuries
- Estimates of effect specified according to accident- or injury severity
- Presenting effects as accident modification functions
- Improving meta-analyses:
 - *Using meta-regression more often*
 - *Testing and adjusting for publication bias*
 - *Testing for moderator effects*
 - *Testing external validity*

Accident modification function (injury accidents) for changes in the level of road lighting



Accident modification functions for speed enforcement



The effects of road lighting are the same in all countries where they have been evaluated

