Cost-effectiveness of road safety measures

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Background and main problems

- An objective of further improving road safety is widely supported.
- Many cost-effective road safety measures have already been implemented.
- Major increases in funding for road safety measures cannot be expected.

To what extent can road safety be further improved by means of cost-effective road safety measures?
- A measure is cost effective if benefits are greater than costs.
Findings from road safety policy analyses

- Analyses of road safety policy have been made for:
  - Norway 1984
  - Norway 1999
  - Sweden 2000
  - Norway 2007

- All these analyses show that there is a great potential for improving road safety by means of cost-effective measures

- Current road safety policies do not fully employ all cost-effective road safety measures to the optimal extent
A maximally efficient use of road safety measures

- Each road safety measure is used optimally
- Optimal use is to apply a measure up to the point at which marginal benefits (i.e. the extra benefits contributed by a small increase in the use of a measure) equal marginal costs of using the measure
- Optimal use of road safety measures will maximise social benefits and yield the largest surplus of benefits over costs
- Benefits include all relevant impacts of measures on safety, mobility and environmental quality
Potential reduction of road accident fatalities by 1993 in Norway according to policy analysis in 1984

<table>
<thead>
<tr>
<th>Policy options</th>
<th>Number of fatalities</th>
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<tbody>
<tr>
<td>Baseline number of fatalities</td>
<td>379</td>
</tr>
<tr>
<td>Expected in 1993 without new measures</td>
<td>447</td>
</tr>
<tr>
<td>Expected in 1993 if current policy continues</td>
<td>390</td>
</tr>
<tr>
<td>Expected in 1993 if measures are used optimally</td>
<td>350</td>
</tr>
</tbody>
</table>
Potential reduction of road accident fatalities in Norway by 2012 according to policy analysis in 1999

Policy options

- Baseline number of fatalities: 300
- Expected in 2012 without new measures: 372
- Expected in 2012 if current policy continues: 338
- Expected in 2012 if measures are used optimally: 189
Potential reduction of road accident fatalities in Sweden by 2012 according to policy analysis in 2000

<table>
<thead>
<tr>
<th>Policy options</th>
<th>Number of fatalities</th>
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<tbody>
<tr>
<td>Baseline number of fatalities</td>
<td>554</td>
</tr>
<tr>
<td>Expected in 2012 without new measures</td>
<td>613</td>
</tr>
<tr>
<td>Expected in 2012 if current policy continues</td>
<td>528</td>
</tr>
<tr>
<td>Expected in 2012 if measures are used optimally</td>
<td>316</td>
</tr>
</tbody>
</table>
Potential reduction of road accident fatalities in Norway by 2020 according to policy analysis in 2007

Policy options

- Baseline number of fatalities: 250
- Expected in 2020 without new measures: 285
- Expected in 2020 if current policy continues: 190
- Expected in 2020 if measures are used optimally: 138
Some preliminary observations

- Road safety can be greatly improved by using road safety measures optimally.
- Current road safety policies do not use all road safety measures optimally.
- The potential for reducing the number of fatalities does not appear to have been reduced over time.
- Which are the road safety measures that can contribute the most to reducing fatalities and how realistic is it to apply these measures optimally?
The ten most effective measures (effects cannot be added)

Reduction of the number of fatalities (in Norway)

- ISA-systems on all cars: 43.5
- Electronic stability control: 34.5
- More drink-driving enforcement: 22.1
- Event data recorders: 14.5
- More 4 or 5-star EuroNCAP cars: 13.7
- Seat belt reminders: 11.7
- Road lighting: 10.9
- Alcohol ignition interlock for offenders: 7.5
- Speed enforcement (traditional methods): 7.2
- Impact attenuators on heavy vehicles: 6.9
Some challenges in using road safety measures cost-effectively

- Cost-effectiveness is not known for all road safety measures – introducing a new measure cannot be based entirely on cost-effectiveness

- There can be good reasons for not basing priorities strictly on cost-effectiveness
  - Reducing risk for pedestrians and cyclists
  - Reducing the total number of road accident fatalities

- Some of the more cost-effective measures require international agreement to be broadly used – in particular vehicle safety features
How to deal with new measures

- New measures should only be introduced if there are reasons to believe that they would improve road safety.

- Such reasons are:
  - The measure is known to favourably influence one or more risk factors that contribute to accidents or injuries.
  - The measure is unlikely to lead to behavioural adaptation.
  - New technology should perform more reliably than humans.

- Examples:
  - ISA: likely to be effective.
  - Fatigue monitoring: unreliable and likely to be compensated.
  - Intelligent cruise control: drivers are very reliable, technology may not be better.
Relationship between estimated fatality reduction (first order effect) and benefit-cost-ratio
Relationship between proportion of benefits for pedestrians and cyclists and benefit-cost-ratio

![Graph showing the relationship between proportion of benefits for pedestrians and cyclists and benefit-cost-ratio.](image-url)
International cooperation is needed

- An increasing proportion of the potential for improving road safety is attributable to vehicle safety features

- Some promising new safety features include:
  - ISA (intelligent speed adaptation)
  - Accident data recorder
  - Enhanced neck injury protection in rear impacts
  - Electronic stability control

- To make new safety features mandatory on all new cars, international agreement is needed, as the market for cars is global and safety standards should be the same in all countries
Expected number of road accident fatalities in Norway in 2020

- Mean annual number 2003-2006: 250
- Expected in 2020 if nothing is done: 285
- Expected in 2020 if road safety measures are used optimally: 138
- Expected in 2020 if Norwegian government acts optimally: 171
- Expected in 2020 if current policy is continued: 190
Theoretical and realistic reduction of fatalities by 2020 in Norway

- Expected in 2020 with no new measures: 285
- Expected if measures are used optimally: 138
- Realistic forecast for 2020: 200

Difference = 62

Beyond national control
Inefficient priorities (too little enforcement)
Inefficient selection of sites for treatment
Concluding remarks

- It is often argued that improving road safety is cost-effective – it gives good value for money.
- This is true: a cost-effective use of road safety measures can greatly improve road safety.
- Yet: road safety measures tend to be used inefficiently – and this is likely to continue.
- Overcoming the barriers to a cost-effective use of road safety measures is quite difficult – in fact almost inconceivable.
- Hence, road safety will continue to improve more slowly than is theoretically possible.