



Street Lighting and Road Safety

There are a number of benefits to street lighting. It can be used to promote security in urban areas and to increase the quality of life by artificially extending the hours in which it is light so that activity can take place. Street lighting also improves safety for drivers, riders, and pedestrians.

Driving outside of daylight hours is more dangerous – only a quarter of all travel by car drivers is between the hours of 7pm and 8am, yet this period accounts for 40% of fatal and serious injuries to the same group¹. Pedestrians and vulnerable road users suffer from decreased visibility in the dark too. For these reason, ways of reducing the risk to all road users during the hours of darkness must be found.

A study for the Department for Transport² found that road safety was perceived as a key benefit for street lighting improvement. In the study, 73% of respondents agreed that ‘better street lighting would improve the safety of children’, and 63.8% agreed that ‘improved street lighting would lead to less accidents on the roads’.

As well as the public perception that better lighting improves safety, research that compares the quality of road lighting to accident reduction, found that it improves safety.

The most comprehensive study of street lighting to date was carried out by the Cochrane Collaboration³ which performed a systematic review of the literature and found 17 studies on the introduction of street lighting. The author’s conclusion from analysing the studies was “*street lighting can prevent road traffic crashes, injuries and fatalities. However, further well designed studies are needed to determine the effectiveness of street lighting in middle and low-income countries.*”

Individual studies

- A literature review⁴ of studies relating the presence of lighting to accident reduction concluded that “*On urban main roads, with mainly a traffic function, a reduction in accidents involving injuries of approximately 30% can be expected at night following an improvement in the lighting from very bad to good*”

¹ Night-time accidents, a scoping study; Report to the AA Trust; H. Ward et al, UCL http://eprints.ucl.ac.uk/archive/00001978/01/2005_44.pdf
² The value of improved street lighting in rural areas; Ken Willis et al, Centre for Research in Environmental Appraisal & Management, University of Newcastle upon Tyne, October 2003
³ Beyer FR, Ker K. Street lighting for preventing road traffic injuries. Cochrane Database of Systematic Reviews 2009, Issue 1. Art. No.: CD004728. DOI: 10.1002/14651858.CD004728.pub2 <http://www.cochrane.org/reviews/en/ab004728.html>
⁴ The relationship between the level of public lighting and traffic safety; a supplementary literature study, D.A.Schreuder. R-88-10. Leidschendam, SWOV, 1988

- A Japanese report⁵ that looked at the reduction in accidents at junctions, following the provision of lighting, found that there was a 43% reduction in night-time accidents. It also found that the effectiveness of lighting in preventing accidents depended on its illuminance, and that the brighter the lighting, the better it is at preventing accidents. However it did not define an upper limit to brightness beyond which further brightening would have no, or a negative, effect.
- A report by SWOV⁶ found that a 'relatively large proportion' of night-time accidents occur on unlit road sections. It also found that *'there are modest indications that the average injury severity and the proportion of accidents at bends is somewhat greater on unlit road sections'*.
- A report conducted by the University of Manchester Institute of Science and Technology⁷ found that low illumination is a major contributory factor in the night-time fatality rate.
- A more recent follow up study⁸ by some of the same authors using the same methodology reached the same conclusion and presented up to date figures showing the effect that lighting has on the likelihood of fatal injury.
 - On motorways, 2.6% of accidents are fatal where street lighting is present, compared to 4.3% of accidents where it is not.
 - On built up roads, 1.3% of fatal accidents are fatal where street lighting are present, compared to 1.9% of accidents where it is not.
 - Similarly, on non-built up roads 3.1% of accidents are fatal in lit conditions, rising to 4.9% in areas without street lights.

Both studies cited an increase in thinking and stopping distances in non-optimal night-time conditions as the reason why the rate increases. They concluded that on average the presence of street lighting reduces the severity of injuries by a factor of 3.

This reduction in accidents is seen despite the danger that drivers have been found to adapt their behaviour and adopt more risky behaviours at night where there is lighting. Examples of more risky behaviour are increased speed and reduced concentration⁹.

⁵ Research on the interrelation between illuminance at intersections and the reduction in traffic accidents; H Oya et al; The Lighting Journal, Vol 68 pp 14-21

⁶ Street lighting and road safety on motorways; A.A. Vis D-94-18, SWOV 1994

⁷ Road traffic accidents: the impact of lighting; I Murrey et al, The Lighting Journal, Vol 63 pp 42-46

⁸ Road traffic casualties: understanding the night-time death toll; S Planis et al, Injury Prevention Vol 12 Issue 2 pp125-128

⁹ Risk compensation - the case of road lighting; T Assum et al, Accident Analysis and Prevention, Vol 31, pp 545-553



Road Safety..... **Information**

This raises the concern about the relationship between the safety that a driver perceives and the actual level of safety, and how drivers behave in both conditions. If a driver perceives a better level of safety due to lighting, and therefore behaves in a more dangerous manner when their vision is not noticeably improved, could this lead to a greater increase in risk than simply reducing the luminance would suggest?

Conclusion

The presence of lighting not only reduces the risk of traffic accidents, but also their severity. Surveys have shown that the public are in favour of street lighting as a way of improving road safety and that, if anything, it needs to be improved in some areas.

There are economic and environmental reasons why some organisations may wish to reduce the amount of lighting. However there are safety reasons why lighting needs to be available.

In some locations, a reduction in lighting quality may not increase the risk of an accident. However, there is the danger that an unconsidered removal or reduction in quality could actually increase accidents and their severity.

Therefore, when considering removal or dimming of lights, location based traffic and accident evidence should be assessed. Accident rates should be monitored to ensure that sacrificing the quality of lighting does not unduly increase the risk. Increases in risk may ultimately lead to lives being lost.