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How can cyclist injuries be included in health impact economic assessments?

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ABSTRACT

This paper discusses how injuries sustained while cycling can be included as a component of health impact economic assessment of increased cycling. To include injuries as a component of a health impact assessment, their expected frequency of occurrence and impacts on health must well known. In this respect, incomplete reporting of cyclist injuries in official accident statistics is an obstacle for good health impact assessment. It is convenient to represent injuries in terms of an expected loss of health per cyclist or kilometre cycled, which can be converted to monetary terms to make it comparable with the health benefits. It is suggested that stating health loss in terms of DALYs (Disability Adjusted Life Years) is suitable for this purpose. Examples are given of how to estimate the health loss associated with bicycle injuries. It is more difficult to model the probability of injury. Two approaches are compared. One approach relies on the relationship between distance cycled per year and risk of injury. The other approach is based on the concept of safety-in-numbers. The number of injuries is modelled as a function of the number of cyclists and motor vehicles. Results are found to be greatly influenced by the assumptions made about whether increased cycling occurs as a result of modal shift from motor vehicles or not.

1. Background and research problem

It is an objective of transport policy in many countries to encourage more physically active transport by means of walking or cycling. If motorised travel is replaced by walking or cycling, there may be benefits in terms of less traffic congestion, less pollution (including the contribution to global warming) and improved public health. However, it is difficult to estimate the expected effects of policy interventions designed to promote walking or cycling.

One of the problems encountered is that official accident statistics, which is usually the most easily accessible source of data about traffic injuries, tends to be very incomplete with respect to cyclist injuries. A recent study in Oslo, Norway (Elvik, 2017a) compared cyclist injuries recorded by the police in 2014 to injuries recorded as part of a research project carried out by the municipal emergency medical clinic (Oslo legevakt). The overall level of reporting in police statistics was found to be 7.5%. The reporting of slight injuries sustained in single bicycle crashes was particularly low: 0.4%. It is clear that relying on such an incomplete source of data can give highly misleading results concerning the impact of increased cycling on the number of cyclist injuries. Another challenge is how best to model the relationship between the amount of cycling (and walking) and the number of injuries. Many studies (see Elvik and Bjørnskau, 2017 for a review) suggest that the relationship is not linear and that the number of injuries does not increase in proportion to the amount of cycling, a phenomenon referred to as safety-in-numbers. The objective of this paper is to discuss how the risk of injury when cycling can be included in health impact assessments.

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Table 1
Overview of studies assessing the health impacts of increased walking or cycling.

Study	Scenario	Location(s)	Indicator of health impacts	Safety-in-numbers considered	Estimated impact on number of traffic injuries
Woodcock et al. (2009)	Increased walking and cycling; reduced use of cars and motorcycles	London (England) and Delhi (India)	DALYs	No	Increase in London; decrease in Delhi
Rabl and de Nazelle (2012)	Increased walking and cycling; cars use reduced correspondingly	Amsterdam and Paris for cyclist fatalities	Number of cyclist fatalities	No	Increase
Woodcock et al. (2013)	Increased walking and cycling; reduced use of cars	Towns in England and Wales, except London	DALYs	Yes, as well as changes in speed of cars	Reduction assuming safety-in-numbers; increase otherwise
Maizlish et al. (2013)	Increased walking and cycling; reduced use of cars	San Francisco Bay area	Fatalities, injuries and DALYs	Yes	Increase
Rojas-Rueda et al. (2013)	Increased cycling and use of public transport; reduced use of cars	Barcelona	Number of injuries, DALYs	No	Reduction in most scenarios
Woodcock et al. (2014)	Use of London bicycle sharing system	London	Number of injuries, DALYs	No	Increase
Schepers et al. (2015)	Increased cycling associated with provision of bike lanes	Hypothetical Dutch city (100,000 inhabitants)	Life days gained per person	No, input was effect of bike lane	Reduction
Rojas-Rueda et al. (2016)	Increased walking and cycling; reduced use of cars	Six European cities	Number of deaths; total and per inhabitant	Yes, in a sensitivity analysis	Increase in baseline analysis
Nilsson et al. (2017)	Increased cycling; reduced use of cars	Stockholm	Number of fatalities and injuries, DALYs	No	Increase
Maizlish et al. (2017)	Increased walking, cycling and use of public transport; reduced use of cars	California	Number of injuries, DALYs	Yes	Reduction in most scenarios