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Response to 'Evaluation of New Zealand's bicycle helmet law' article

In a recently published *NZMJ* article, Clarke claims the New Zealand (NZ) mandatory bicycle helmet law (MHL) halved the amount of cycling usage and contributed to 53 premature deaths per year.[1] However, no statistical analyses such as hypothesis testing or computing confidence intervals are performed in reaching the above conclusion.

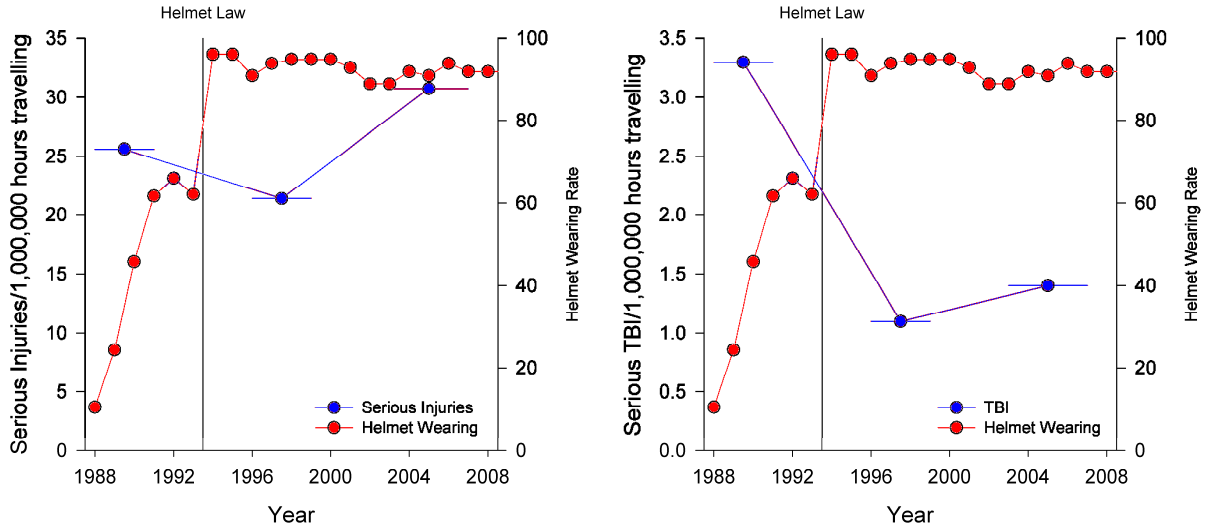
Olivier,[2] in a commentary regarding Clarke's study, also noted the author failed to meet any of the Bradford-Hill minimal criteria to provide minimal evidence of a causal relationship between NZ MHL and 53 premature deaths each year. This letter critically evaluates the study's methods and choice of data used to support the author's conclusions.

A major weakness in this study is the lack of cycling exposure data in a 6-year window around the helmet law. Hours travelled by bicycle was taken from Land Transport Safety Authority surveys collected for the periods 1989–1990, 1997–1998 and 2003–2006 and the Ongoing New Zealand Household Survey for the period 2006–2009. As a result, injury rates relative to the amount of cycling are only estimable during those years. Since the NZ MHL went into effect on 1 January 1994, this study sheds no light on the cycling environment in a 6-year window around the MHL.

Helmet laws are enacted to increase helmet-wearing in an attempt to mitigate bicycle-related head injuries and do not offer injury protection to other body parts. The author, however, did not analyse head injury separately and instead combined all cycling-related injuries. In fact, there was a 67% decline in serious traumatic brain injury (TBI) comparing data for the years nearest the helmet law (1988–1991 vs. 1996–1999).[6] Further, when contrasted with increases in helmet-wearing, there is a decline in both serious injuries overall (Abbreviated Injury Score, AIS≥3) and serious TBI alone.

While there is an increase in serious cycling injury comparing 1996–1999 and 2003–2007 periods, there is only a slight increase in TBI. During this period, estimates of helmet-wearing in NZ have remained steady indicating any changes in the injury trends are unlikely to be related to changes in helmet-wearing and, therefore, the helmet law.

Figure 1. Cycling-related injuries and traumatic brain injury (TBI) per million hours travelling and estimated helmet-wearing rates in New Zealand (Source: Tin Tin et al[6]; New Zealand Ministry of Health)



For injury assessment, Clarke argues the NZ MHL is associated with an increased injury risk of 20% by comparing overall injury (per million hours cycling) in the periods 1988–1991 and 2003–2007. However, when available pre-law injury data is compared to a period that is more relevant to MHL, i.e., 1996–1999, there is a substantial decline in cyclist injuries overall (-17%) and serious injuries (-53%). These declines are relative to cycling exposure and the time period corresponds to an increase in helmet-wearing as shown in Figure 1.

Further, Clarke notes overall cycling injuries more than doubled compared with pedestrians from 1988–1991 to 2003–2007. However, the author fails to mention the ratio of cyclist to pedestrian serious injuries dropped 28% (4.9 to 3.52) 2 years after MHL.

To analyse the effect of a policy intervention, it is important to effectively estimate the trend before and after the intervention in order to assess whether or not any observed increase/decrease around the time of the intervention is part of a longer upward/downward trend. Hence, it is important to account for the background trend and the estimation of trends cannot be achieved by simply comparing two points in time on either side of the law, as was done in Clarke' study. In fact, previous studies have noted a decline in ridership back to 1986 for commuters,[5] which began long before the helmet law in 1994 and before the substantial increase in helmet-wearing that began in 1990.[3] This downward trend is not in any form captured in the author's analysis.

Tin Tin et al[6] list several reasons apart from the helmet law for declines in cycling rates and increases in cycling injuries. These include the lack of cycling focus in the New Zealand road safety agenda, an increase in children being driven to school due to parental concerns of safety and an already existing pre-law decline in cycling rates.

Clarke, however, does not address these possible confounding factors and attributes all declines in cycling rates and safety to the helmet law.

In conclusion, due to weakness in the analysis and choice of data—particularly the 6-year absence of cycling exposure data around the time the helmet law was introduced, the original conclusion that the MHL halved the amount of cycling usage and contributed to 53 deaths each year is highly questionable, if not misleading.

In fact, when data nearest the helmet law, and therefore most relevant, is coupled with helmet use surveys, there is a population-level benefit to helmet-wearing on lowering head injuries.

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