Appendix 1. Rate ratio estimation from segmented regression analysis (adapted from Wagner et al.[(25)]).

To estimate the effect of legislation in an intervention province, the following segmented regression model was specified:

$$\log(Rate)_t = \beta_0 + \beta_1 time_t + \beta_2 intervention_t + \beta_3 time\ since\ intervention_t + e_t$$

Where, *Rate* is the number of head injury hospitalizations per cyclist injury hospitalization, *time* is a continuous variable starting at 1 indicating time in years at time *t* from the start of the observation period, *intervention* is an indicator for time *t* occurring before (intervention=0) or after (intervention=1) legislation, and *time since intervention* is coded as 0 before legislation and as a continuous variable starting at 1 post-legislation. The error term e_t is the random variation at time *t* not explained by the model.

β_0 estimates the baseline level of the rate at time zero, β_1 estimates the baseline trend in the rate before the intervention, β_2 estimates the change in level of the rate immediate after the intervention, and β_3 estimates the change in the trend in the rate after legislation, compared with the trend before legislation.

To express the effect of legislation, estimated post-intervention values of the rate were compared to values estimated at that same time, but based on baseline level and trend only. For example, in Alberta, where legislation was implemented in 2002 (year 9), the rate ratio (RR) was estimated one year after legislation (year 10) by specifying the following models:

$$\log(Rate)_{10(With\ Legislation)} = \beta_0 + \beta_1(10) + \beta_2(1) + \beta_3(2)$$

$$\log(Rate)_{10(Without\ Legislation)} = \beta_0 + \beta_1(10) + \beta_2(0) + \beta_3(0)$$

The difference between these two equations:

$$\log(Rate)_{10(With\ Legislation)} - \log(Rate)_{10(Without\ Legislation)} = \beta_2(1) + \beta_3(2)$$

can be expressed as a rate ratio at time *t*, which is estimated from the following model:

$$\frac{Rate_{10(With\ Legislation)}}{Rate_{10(Without\ Legislation)}} = \beta_2(1) + \beta_3(2)$$

A control and intervention group can be compared with respect to their post-intervention change in level and trend using the following equation:

$$\log(Rate)_t = \beta_0 + \beta_1(time)_t + \beta_2(intervention)_t + \beta_3(time\ since\ intervention)_t + \beta_4(group) + \beta_5(group * time)_t + \beta_6(group * intervention)_t + \beta_7(group * time\ since\ intervention)_t + e_t$$

Where, *group* indicates whether the rate was calculated in the control or intervention group. A difference between the groups in post-intervention change in level is determined by the statistical significance of β_6, whereas a difference between the groups in post-intervention change in trend is determined by the statistical significance of β_7.