Web appendix: Interrupted time series segmented regression analysis

The following is an explanation of the method of Wagner et al,[28] applied to our particular analysis. Segmented regression analysis is a method of estimating changes in levels and trends in an outcome (deaths, in our case) associated with an intervention (the legislation in the third quarter of 1998 to reduce pack size of paracetamol). The time series regression equation for this model is

$$\hat{Y}_t = \beta_0 + \beta_1 \text{ x } time_t + \beta_2 \text{ x } intervention_t + \beta_3 \text{ x } time\_after\_intervention_t + e_t \quad (1)$$

Y_t is the outcome (mean number deaths per quarter); *time* indicates the number of quarters from the start of the series (1..68); *intervention* is a dummy variable taking the values 0 in the pre-intervention segment and 1 in the post-intervention segment; *time_after_intervention* is 0 in the pre-intervention segment and counts the quarters in the post-intervention segment at time t (1..45). The coefficient β_0 estimates the base level of the outcome (number of deaths) at the beginning of the series; β_1 estimates the base trend, i.e. the change in outcome per quarter in the pre-intervention segment; β_2 estimates the change in level of deaths in the post-intervention segment; β_3 estimates the change in trend in deaths in the post-intervention segment; e_t estimates the error.

Absolute effect of the intervention

The model was used to estimate the absolute effect of the intervention in two ways, both of which we used.

(a) First, we calculated the difference between the estimated outcome at a certain time after the intervention and the outcome at that time if the intervention had not taken place. For example, to estimate the effect of the intervention at the midpoint of the post-intervention period (when *time* = 46 and *time_after_intervention* = 23), we have

$$\hat{Y}_{46\ (without\ intervention)} = \beta_0 + \beta_1 \text{ x } 46 \quad (2)$$

$$\hat{Y}_{46\ (with\ ntervention)} = \beta_0 + \beta_1 \text{ x } 46 + \beta_2 + \beta_3 \text{ x } 23 \quad (3)$$

thus, the absolute effect of the intervention is

$$\hat{Y}_{46\ (with\ ntervention)} - \hat{Y}_{46\ (without\ ntervention} = \beta_2 + \beta_3 \text{ x } 23 \quad (4)$$

Coefficients and errors from full models including all terms in equation (1) are given in the Appendix table. Non-significant terms were included as there may be correlation between slope and level terms which should be accounted for.