# The Shape of the Troubles: Developing an Impulse-decay model for representing the effect of conflict-attributable excess deaths after 1972 in young adult males in Northern Ireland

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1. **Abstract.** [150-200 words]

This paper introduces a new model specification and procedure for estimating the effects of sectarian conflict on mortality rate structures for young adult males in Northern Ireland. This model specification assumes that additional mortality from the Troubles can be modelled by a function with two components: an impulse, meaning an initial jump in mortality that occurred in a given year, and a decay, meaning that conflict intensity continued to both persist and fall after the impulse. The model was developed after noticing a distinct mortality pattern in Northern Ireland’s all-cause mortality rates when compared visually against neighbouring populations, highlighting the importance of using appropriate visual methods for exploratory analysis of mortality structures and developing models accordingly. An innovative and related data visualisation approach, Lexis surface visualisations of model residuals, was used to further refine the model structure. As the model structure only requires all-cause mortality records to produce, it can be applied to estimating additional mortality likely attributable to sectarian conflict even in populations lacking more detailed records of causes of death, and can be used to estimate the human costs of conflict in lower and middle income countries.

1. 3-6 **keywords**.

All-cause mortality; Lexis surfaces; Northern Ireland; sectarianism; external mortality; methodology

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1. **Biographical note.**  [up to 100 words]

Jon Minton is a researcher based in the School of Social & Political Sciences at the University of Glasgow. His primary research interest is in the applications of complex data visualisation approaches to exploring and understanding patterns in population data.

1. **Geolocation information.**

Scotland, UK

1. **Supplemental online material.**

The code used to produce the analyses presented here are available at the following location: <https://github.com/JonMinton/Northern_Ireland_Troubles>

A pre-print of this article and additional material is available from the following location: <https://osf.io/3pj2f/files/>

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