Is sibling rivalry fatal?

The impact of sibling composition on child mortality in nineteenth-century Sart, Belgium

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Background

This study considers the impact of sibling composition on child mortality.

Previous research has found strong positive correlations between birth order and infant mortality. The explanation given for this is that higher-order children are often considered superfluous by their parents, are therefore neglected, and subject to greater risk of death than earlier-born siblings (see, for example, Shorter 1975; Scrimshaw 1978).

A second generation of studies (for example, Cohen 1975; Knodel and Hermelin 1984) demonstrate that the effect of birth order on mortality disappears or is significantly minimized if completed sibling size is controlled for. The relationship between birth order and mortality results from the correlation between birth order and sibling size, where sibling size is believed to mediate mortality through resource competition between siblings. Larger families mean more competition for limited resources which results in higher mortality.

The current study adds to this research by investigating the impact on child mortality of siblings present in the household. We use survival analysis with number of co-resident siblings classified by age and sex as time-varying covariates.

Hypotheses

Co-resident siblings of the same age group (0-4 years) compete for familial resources and care. Therefore the more siblings aged 0-4 years a child has, the more likely she is to die before turning five.

1. Number of co-resident siblings aged 0-4 years is positively associated with mortality risk under age 5 years.

Co-resident siblings aged 15 years and over increase the probability of survival through provision of resources (they may be working) and care.

2. Number of co-resident siblings aged 15 years and over is negatively associated with mortality risk under age 5 years.

Co-resident siblings aged 5-14 years have no effect on the chances of surviving since any competition for resources is balanced by provision of resources.

3. Number of co-resident siblings aged 5-14 is not associated with mortality risk under age 5 years.

Study population

In 1812 the Eastern Belgian commune of Sart introduced a population register. The whole population of the commune was recorded at the opening of the register. People were listed by order of household. Births, deaths, movement between households, migration and marriages were updated continuously through the period.

Our study population consists of all children born in Sart in the period 1812-1900, whose siblings were also all born in Sart, and whose mothers were unmarried at the time of their first appearance in the Sart population register.

Method

Using Cox proportional hazard models we explore the impact of time-varying and time-invariant covariates on survival up to fifth birthday. The model is clustered on mother’s ID. This adjusts the standard errors to allow for intra-familial correlation.

Discussion

In preliminary analysis, the co-resident sibling was considered decomposed by sex. However sex composition was not found to be important and the results presented here are for the mutually exclusive age groups without further classification by sex. Mortality level was not associated with presence of same-sex siblings.

Birth order was not an important predictor of child mortality and it was not included in the final model. The number of siblings in the household was highly correlated with number of siblings ever born and number of children surviving. These last two variables were dropped from the final model. They were shown to have no effect on child survival in univariate Cox models.

In the final Cox model covariates were included for number of co-resident siblings aged 0-4, 5-14, and 15+; number of previous deaths in the sibset was significantly correlated with child mortality. Children who had lost one sibling had a significantly higher mortality risk compared to children with no co-resident siblings aged 0-4.

Variables

Dependent: Death of child before fifth birthday

Independent: time-varying

Co-resident male siblings aged 0-4
Co-resident male siblings aged 5-14
Co-resident female siblings aged 0-4
Co-resident female siblings aged 5-14
Co-resident siblings aged 15 years and over

Independent: time invariant

Birth order
Mother’s age at birth
Father’s age at birth
Parent’s age at child’s birth
Child’s year of birth

Variables for survival analysis classified by age and sex

Variables

Table 1: Cox regression results, survival from birth to fifth birthday, for selected covariates, Sart, Belgium, 1812–1900, n = 2,122

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ref cat:</th>
<th>Hazard ratio</th>
<th>p-value</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of siblings aged 0-4</td>
<td>Ref cat: 0</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Co-resident male siblings aged 0-4</td>
<td>2</td>
<td>1.874</td>
<td>0.000</td>
<td>1.356 2.614</td>
</tr>
<tr>
<td>Co-resident female siblings aged 0-4</td>
<td>3</td>
<td>2.187</td>
<td>0.001</td>
<td>1.635 2.930</td>
</tr>
<tr>
<td>Co-resident siblings aged 5-14</td>
<td>4</td>
<td>2.811</td>
<td>0.000</td>
<td>2.292 3.481</td>
</tr>
<tr>
<td>Number of siblings aged 15+</td>
<td>5</td>
<td>0.991</td>
<td>0.000</td>
<td>0.988 0.995</td>
</tr>
</tbody>
</table>

Discussion

1. Number of co-resident siblings aged 0-4 is associated with an increased risk of child mortality compared to having one sibling.

2. Number of co-resident siblings aged 0-4 is associated with a doubled risk of child mortality compared to having none.

3. The number of co-resident siblings aged 5-14 and 15+ is not associated with mortality risk.

Conclusion

1. Having no co-resident siblings aged 0-4 is associated with an increased risk of child mortality compared to having one sibling.

This may be because of the high proportion of first births in this group.

2. Having three or more co-resident siblings aged 0-4 is associated with a doubled risk of child mortality compared to having none.

The number of previous deaths in the sibset was significantly correlated with child mortality. Children who had lost one sibling had a two-halves increased risk of dying compared to children who had never lost a sibling.

Boys had a 26% increased risk of child mortality compared to girls. Mother’s and father’s age at birth were not significantly associated with mortality. Child mortality declined over the nineteenth century in Sart at an average rate of 1% per year.

References


