**Results**

<table>
<thead>
<tr>
<th>Parameters estimates for parametric proportional hazard model across all model specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant baseline models</td>
</tr>
<tr>
<td>Baseline hazard</td>
</tr>
<tr>
<td>Gompertz slope (b)</td>
</tr>
<tr>
<td>Covariate</td>
</tr>
<tr>
<td>Gender effect (β₁)</td>
</tr>
<tr>
<td>AIC ranking</td>
</tr>
</tbody>
</table>

- **Motivation**
  - A recent article in *Science* by Barbi et al. (2018) states having provided evidence for the existence of a plateau of human mortality, using Italian data on deaths at ages 105 and above (1).
  - We apply the method used by Barbi et al. to French data and test whether it lends additional evidence for a human mortality plateau.

- **Data**
  - Validated individual data on deaths at ages 105 and above in France, from nominative transcripts of French population register (2).
  - Extinct birth cohorts: 1883-1901
  - Number of observations: 3,789 individuals

- **Methods**
  - Fit parametric proportional hazard model with fixed covariates
    - For individual lifetime $t_i$:
      - Gompertz hazard baseline model: $h(t_i) = a^{b} e^{b(t_i-C_i)+bM_i}$
      - Constant hazard baseline model: $h(t_i) = a^{b} e^{b(t_i-C_i)+bM_i}$
    - $a$: Level of hazard at initial age
    - $b$: Gompertz slope (assumed null in constant baseline model)
    - $C_i$: Birth cohort minus baseline value of 1891
    - $β₀$: Birth cohort effect
    - $β₁$: Gender effect
    - $M_i$: Gender (0 for female, 1 for male)

- **Test Gompertz vs. constant hazard models for all model specifications using likelihood ratio test ($H_0: b = 0$ vs. $H_1: b ≠ 0$)**

- **Results**
  - According to AIC, model with Gompertz hazard baseline and gender effect is the optimal model.
  - Risk of death continues to increase above age 105, and the male hazard is 1.168 times greater than that of females.
  - Estimated hazards from our optimal model are in line with observed mortality trends at younger old ages.

- **Discussion**
  - Evidences for the existence of a plateau of human mortality, using Italian data from Bardi et al. (1) and French data from this study.

- **Conclusions**
  - Male mortality disadvantage persists to very old age.

SELECTED REFERENCES