

Laplace regression: a novel method for modeling survival data

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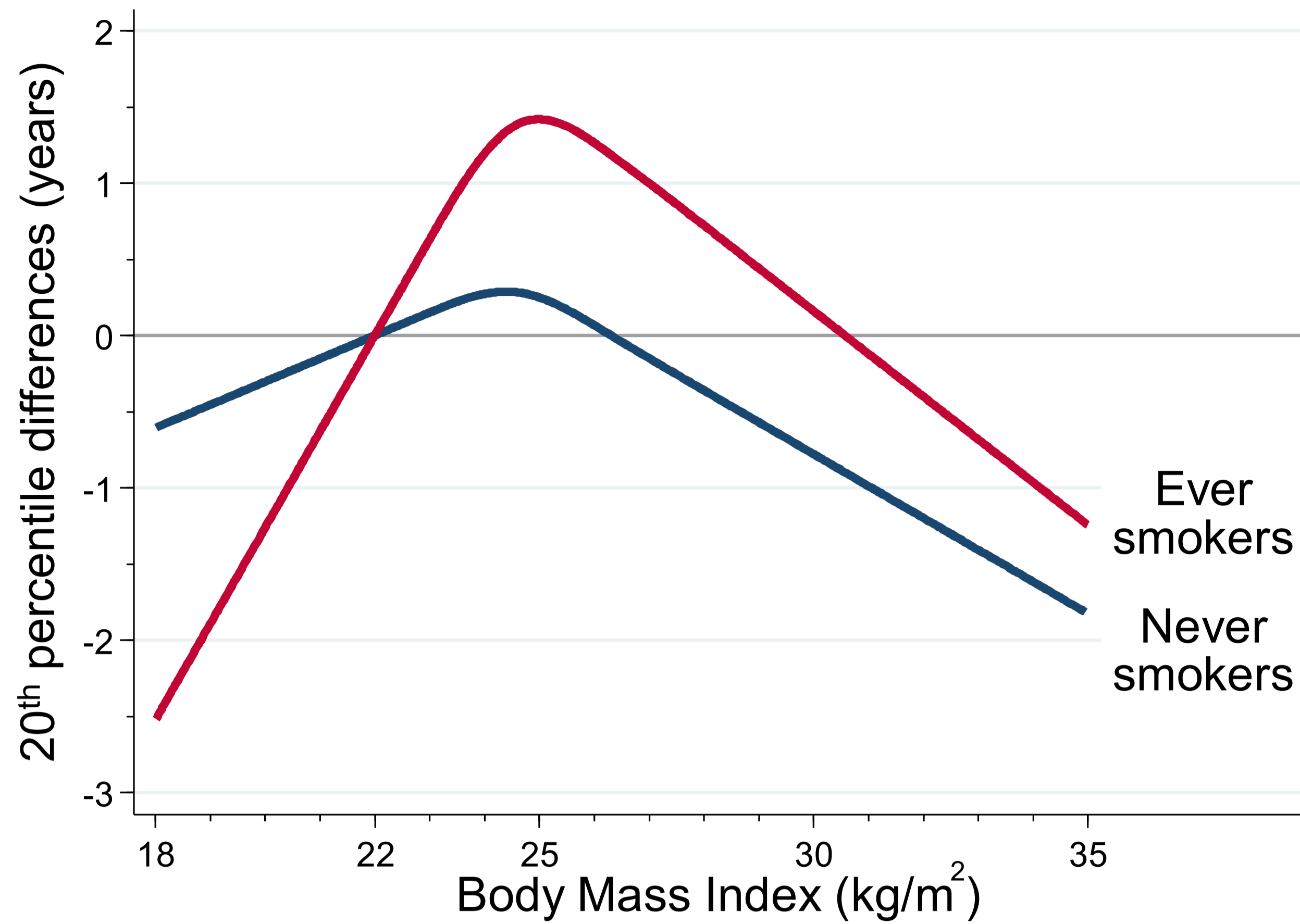


Figure 1. Age-adjusted differences in the 20th percentile of time to death (years) among ever smokers (red) and never smokers (blue) according to Body Mass Index (reference: 22 kg/m²).

Results and Conclusions

- Body Mass Index (BMI) had a strong nonlinear relation with the time by which 20% of the men in the cohort had died. BMI extremes were associated with shorter survival times.
- Among overweight and obese men (BMI ≥ 25 kg/m²), every 1 unit increment in BMI was associated with about 3 months (95% CI: 2.4 to 3.6) shorter survival time for both ever and never smokers.
- Laplace regression can be used to estimate percentiles of a possibly censored time-to-event variable conditionally on exposure and confounding variables. It may offer useful insight to the analysis of survival data.

Introduction

Cohort studies are conducted to prospectively assess the association between an exposure and the risk of an event. Findings from those studies are often summarized in terms of relative risks.

We illustrate an alternative way of analyzing prospective studies. This approach focuses on the estimation of percentiles of a possibly censored time-to-event variable, conditionally on exposure and confounding variables. We utilize Laplace regression.

Subjects and Methods

To show the potentials of this approach and its simple interpretation, we examined the relationship between Body Mass Index (BMI) and time to death from any cause ($n=7,396$) in a population-based cohort of Swedish men aged 45-79 years old at baseline ($n=42,978$).

We used Laplace regression to model the relationship between BMI (continuous, kg/m²) and the 5th, 10th, 15th and 20th percentile of survival time (years). We adjusted the model for age at baseline (45-55, 55-65 or 65-79 years old) and smoking status (ever or never smokers). We also included an interaction term between BMI and smoking status.



Figure 2. Estimated percentiles (5th, 10th, 15th and 20th) of survival time (years) for men of age between 55 and 65 years, according to Body Mass Index (kg/m²) and smoking status: ever (A) or never smoker (B).



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