Problem Set 4

Applied Stats II

Due: April 12, 2024

Instructions

- Please show your work! You may lose points by simply writing in the answer. If the problem requires you to execute commands in `R`, please include the code you used to get your answers. Please also include the `.R` file that contains your code. If you are not sure if work needs to be shown for a particular problem, please ask.

- Your homework should be submitted electronically on GitHub in `.pdf` form.

- This problem set is due before 23:59 on Friday April 12, 2024. No late assignments will be accepted.

Question 1

We're interested in modeling the historical causes of child mortality. We have data from 26855 children born in Skellefteå, Sweden from 1850 to 1884. Using the "child" dataset in the `eha` library, fit a Cox Proportional Hazard model using mother's age and infant's gender as covariates. Present and interpret the output. article booktabs float

Covariate	Mean	Coef	Rel. Risk	S.E.	LR p
sex			0.002		
male	0.510	0	1 (reference)		
female	0.490	-0.082	0.921	0.027	
m.age	32.010	0.008	1.008	0.002	0.000
Events					
Total					
time at risk	5616				
Max. log. likelihood					
LR test statistic	-56503	22.52			
Degrees of freedom		2			
Overall p-value					1.28921e-05

Table 1: Results of the Cox Proportional Hazard model.

Infant's Gender by Sex

The Cox Proportional Hazard model reveals interesting insights regarding infant gender and its impact on child mortality. Being female compared to male is associated with a 9.2% lower risk of mortality. This finding suggests that female infants in the Skellefteå population during the specified period had a slightly better survival outlook than their male counterparts.

Mother's Age

The Hazard Risk of child mortality changes by a factor of approximately 1.008. This implies that older mothers may have a slightly higher risk of child mortality, although the effect size is quite small.

Likelihood Ratio Test

The overall p-value is 1.28921×10^{-5}, indicating that at least one of the covariates is significantly associated with child mortality. This suggests that the model, including both infant gender and mother's age, provides a better fit than a null model.