

Applied Stats II - Problem Set 4

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Due: April 16, 2023

Code in PS4_ImeldaFinn.R

Question 1

We're interested in modeling the historical causes of child mortality. We have data from 26574 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.

```
1 child_surv <- with(child, Surv(enter, exit, event))
2 child_cph <- coxph(child_surv ~ m.age + sex, data = child)
3 child_drop1 <- drop1(child_cph, test = "Chisq")
```

The model results are shown in Table 1, and the likelihood ratio test results in Table 2. Base case for sex is male, mean age for mother is 32.

There is a 0.082 decrease in the expected log of the hazard for female babies compared to male, holding mother's age constant. For a unit increase of mother's age, there is a 0.008 increase in the expected log of the hazard, holding sex constant.¹

The hazard ratio of female babies is 0.92 that of male babies, i.e. female babies are less likely to die (92 female babies die for every 100 male babies; female deaths are 8% lower, etc.), holding mother's age constant.

¹The interaction term for $m.age \times sex$ is 0.001, and is not significant, $p - value = 0.7445$

Table 1:

	<i>Dependent variable:</i>
	child_surv
m.age	0.008*** (0.002)
sexfemale	-0.082*** (0.027)
Observations	26,574
R ²	0.001
Max. Possible R ²	0.986
Log Likelihood	-56,503.480
Wald Test	22.520*** (df = 2)
LR Test	22.518*** (df = 2)
Score (Logrank) Test	22.530*** (df = 2)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Table 2:

	Df	AIC	LRT	Pr(>Chi)
<none>		113,011.000		
m.age	1	113,021.800	12.795	0.0003
sex	1	113,018.400	9.465	0.002

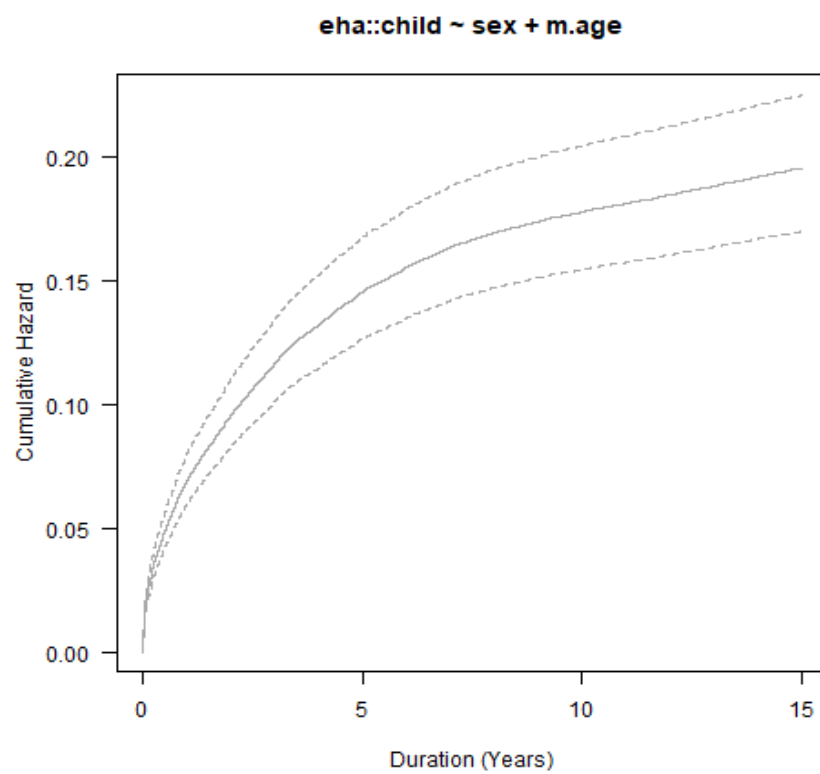


Figure 1: Cox Proportional-Hazard

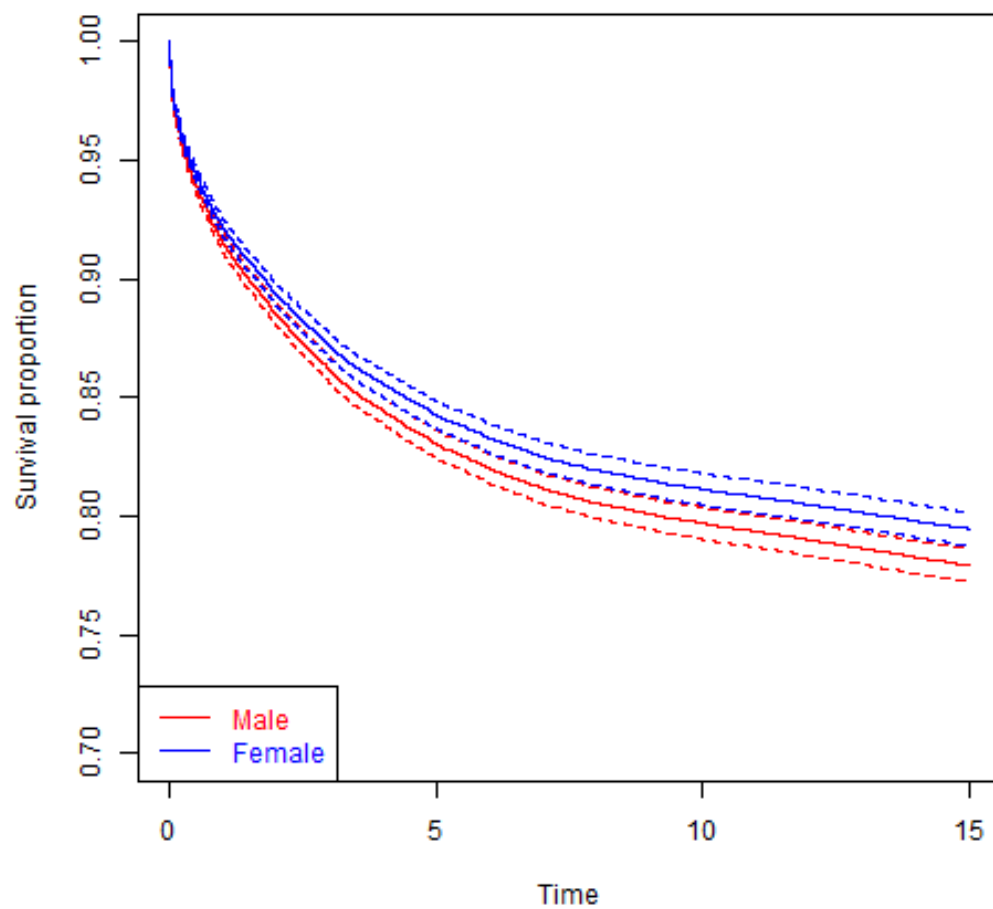


Figure 2: survival proportions - m.age = 32