Applied Stats II - Problem Set 4

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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.

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

The model results are shown in Table 1, and the LRT 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 mothers' 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.

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

Table 1:

	Dependent variable:
	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)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 2:

Statistic	N	Mean	St. Dev.	Min	Max
Df	2	1.000	0.000	1	1
AIC	3	113,017.100	5.528	113,011.000	113,021.800
LRT	2	11.130	2.355	9.465	12.795
Pr(>Chi)	2	0.001	0.001	0.0003	0.002

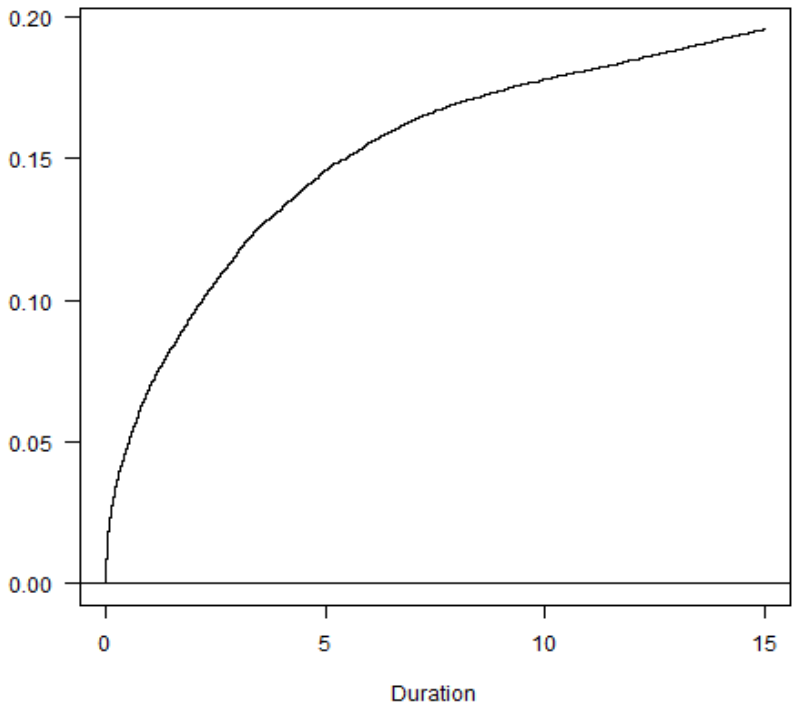

Figure 1: Cox Proportional-Hazard

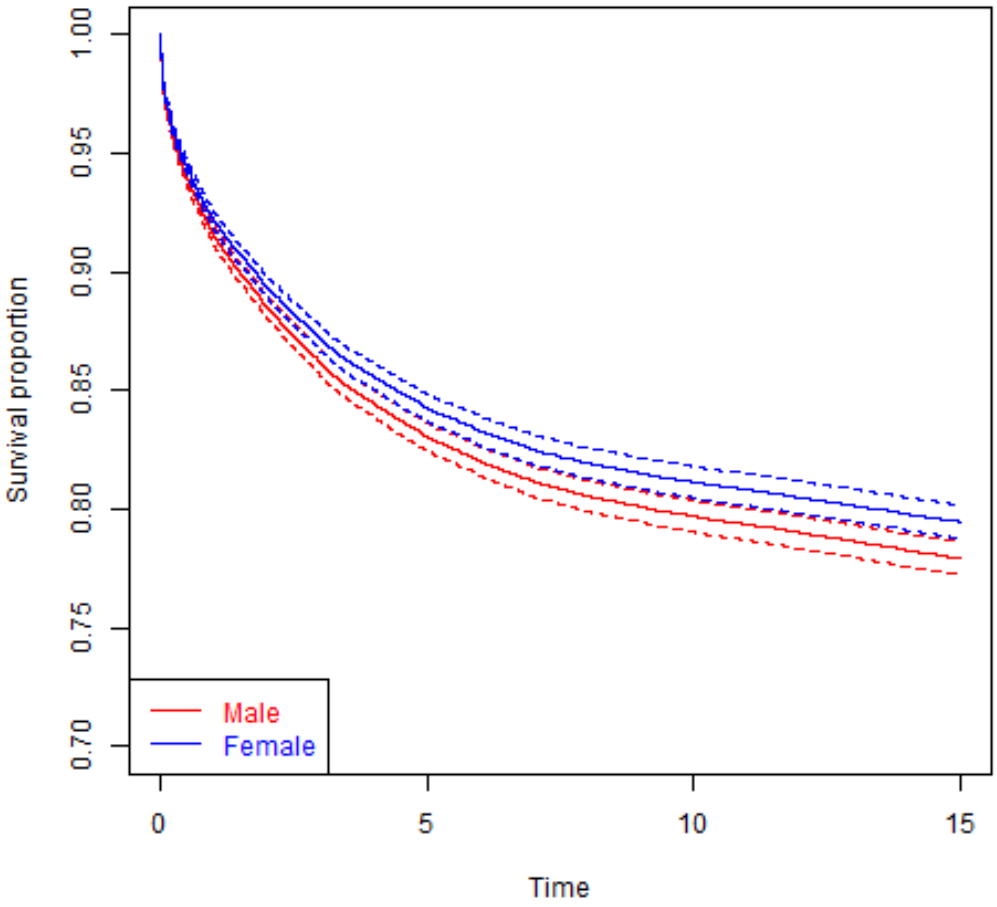

Figure 2: survival proportions - m.age = 32