

Full Model: Test ChiSq DF Pr > Chisq
Likelihood Ratio 18.9131 8 0.0153

Variable	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
treat	1	-1.1984	0.3723	10.365	0.0013
age	1	-0.0654	0.0469	1.941	0.1635
sex	1	-0.4016	0.5987	0.450	0.5024
height	1	-0.0094	0.0161	0.342	0.5587
weight	1	0.0306	0.0247	1.540	0.2146
pattern	1	0.1899	0.4729	0.161	0.6880
cort	1	-1.5517	0.9335	2.763	0.0965
anti	1	0.6446	0.5255	1.505	0.2199

Reduced Model: Test ChiSq DF Pr > Chisq
Likelihood Ratio 12.2921 1 0.0005

Variable	DF	Estimate	Standard Error	Chi-Square	Pr > ChiSq
treat	1	-1.14022	0.34111	11.17	0.0008

1) Data from Collett (2003, p. 367) is from a study on chronic granulomatous disease. The response variable is *time* until infection. Predictors include *treatment* (0=placebo 1=interferon), *age*, *sex* (1=male 2=female), *height*, *weight*, *pattern* of inheritance (1=x-linked 2=autosomal recessive), *cort* (1=corticosteroids used at trial entry 2=not used), and *anti* (1=antibiotics used 0=not used). A stratified proportional hazards model has been fit with stratification on centre.

a) Test $\beta = 0$ for the full model.

$H_0: \beta = 0 \quad H_A: \beta \neq 0$
 $\chi^2(NIF) = 18.9131$
 $pval = 0.0153$

reject H_0 there is a SPH survival relationship between Y and the predictors *treat*, *anti*.

b) Test whether the reduced model is good.

H_0 reduced model is good
 H_A use the full model

$\chi^2(RIF) = 18.9131 - 12.2921 = 6.621 = \chi^2(NIF) - \chi^2(RIF)$
 $pval = P(\chi^2_7 > 6.621) > 0.25$

df	7	0.25
		9.04

fail to reject H_0 , the reduced model is good

	coef	exp(coef)	se(coef)	z	p	full model, n = 26
age	0.121	1.13	0.0484	2.500	0.012	
resid.ds	0.792	2.21	0.8078	0.980	0.330	a)
ecog.ps	0.087	1.09	0.6592	0.132	0.890	

Likelihood ratio test= 13.7 on 3 df, p=0.00333

(p1 for b)

	coef	exp(coef)	se(coef)	z	p	reduced model
age	0.137	1.15	0.0474	2.9	0.0038	

Likelihood ratio test= 12.7 on 1 df, p=0.000368

1) The *R* ovarian data gives survival times for patients with ovarian cancer. Predictors are *age* in years, *resid.ds* (residual disease present 1=no, 2=yes), and *ecog.ps* (ECOG performance status: 1 is better than 2). A stratified proportional hazards model is fit where the stratification variable *rx* is the treatment group.

a) Test whether $\beta_2 = 0$ for the full model.

$$H_0: \beta_2 = 0 \quad H_A: \beta_2 \neq 0$$

$$z_{02} = 0.980$$

$$p_{\text{val}} = 0.330$$

fail to reject H_0 resid.ps is not needed in the SPH model given age and ecog.ps are in the model

b) Find the ESP = $\hat{\beta}^T x$ for the reduced model if age = 40.

$$ESP = 0.137(40) = \boxed{5.48}$$

c) Find the ESP = $\hat{\beta}^T x$ for the full model if age = 40, resid.ds = 2, and ecog.ps = 2.

$$ESP = 0.121(40) + 0.792(2) + 0.087(2) = \boxed{6.598}$$