Biostatistics 140.623
Third Term, 2017-2018

Laboratory Exercise 4
Answer Key

This exercise concerns time to death for a random subset of infants born in the Nepal Nutrition Intervention Program, Sarlahi (NNIPS-II).

The following are the results for a Cox proportional hazards model describing the hazard of death as a function of key predictors including gestational age.

The **Model** uses:

gestational age (*ga_cat*) (1 - gestational age <36 weeks; 2 - 36-37 weeks; 3 - 38-39 weeks; 4 - 40-41 weeks; 5 - 42+ weeks),

parity (*par_cat*) (0 - no prior live births; 1 – 1 prior birth; 2 2 -4 prior live births; 3 – 5 –8 prior live births; 4 - 8+ prior live births),

indicator of treatment group (*alloc*: 1– beta carotene; 2 - placebo; 3 – vitamin A),

indicator of maternal night blindness (*nblind* 0 – not night blind; 1 = night blind)

gender (*male* = 1 - male; 0 - female; 9 -missing).

```
.stcox i.ga_cat i.par_cat i.male i.nblind i.treat
i.ga_cat          _Iga_cat_1-5        (naturally coded; _Iga_cat_1 omitted)
i.par_cat         _Ipar_cat_0-4       (naturally coded; _Ipar_cat_0 omitted)
i.male            _Imale_0-9          (naturally coded; _Imale_0 omitted)
i.nblind          _Inblind_0-1        (naturally coded; _Inblind_0 omitted)
i.treat           _Itreat_1-3         (naturally coded; _Itreat_1 omitted)

         failure _d:  cens == 1
   analysis time _t:  stime

Iteration 0:   log likelihood = -5331.5528
Iteration 1:   log likelihood = -5240.9443
Iteration 2:   log likelihood = -5234.4384
Iteration 3:   log likelihood = -5234.4341
Iteration 4:   log likelihood = -5234.4341
Refining estimates:
Iteration 0:   log likelihood = -5234.4341

Cox regression -- Breslow method for ties

No. of subjects =         9537                     Number of obs   =      9537
No. of failures =          586
Time at risk    =      1524439
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                                                  LR chi2(13)     =    194.24
Log likelihood  =   -5234.4341                    Prob > chi2     =    0.0000

------------------------------------------------------------------------------
          _t |
          _d | Haz. Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  _Iga_cat_2 |    .410208   .0535474    -6.83   0.000     .3176074    .5298068
  _Iga_cat_3 |   .3223936   .0494353    -7.38   0.000     .2387066      .43542
  _Iga_cat_4 |   .3232159   .0378524    -9.64   0.000     .2569253    .4066104
  _Iga_cat_5 |   .3459858   .0412471    -8.90   0.000     .2738932    .4370541
 _Ipar_cat_1 |   .5421811   .0716511    -4.63   0.000     .4184612    .7024794
 _Ipar_cat_2 |   .6384453   .0650712    -4.40   0.000     .5228392    .7796134
 _Ipar_cat_3 |   .7866432   .1011147    -1.87   0.062     .6114555    1.012024
 _Ipar_cat_4 |   1.177897   .3278896     0.59   0.556     .6825894    2.032615
    _Imale_1 |   1.008748   .0836131     0.11   0.916     .8574887     1.18669
    _Imale_9 |   1.421911   1.014747     0.49   0.622     .3510845    5.758811
  _Inblind_1 |   1.424597   .1778734     2.83   0.005     1.115352    1.819583
   _Itreat_2 |   .9563635   .0986431    -0.43   0.665      .781316    1.170629
   _Itreat_3 |    .958336   .0964619    -0.42   0.672     .7867551    1.167336
------------------------------------------------------------------------------
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1. Write out the model. What do you conclude about the relationship between the hazard of death and the various risk factors of interest?

The model is:

log h(t: X) = log h_0(t) +β1X1+β2X2+ ……+βpXp

After adjustment for the other variables, the hazard of death does not appear to be influenced by gender or treatment. The hazard of death was 1.4 times higher in infants of night-blind mothers as compared to non-night-blind mothers, after adjusting for the other covariates. Both gestational age and parity were associated with the risk of death. The risk of death decreased with increasing gestational age. As compared to firstborn infants, the risk of death was decreased with increasing parity until category 4 (9+ births); the hazard of death was increased in infants with mothers having 9 or more children as compared to that of firstborn infants.

2. What does Stata give you if you specify nohr as an option after the stcox command?

This option provides the Cox regression coefficients (the log relative hazard or log hazard ratio).

3. What is the difference in the log hazard of death for a male infant whose mother has had 9 prior births and a female infant whose mother has had no prior births?

[b_8(male) + $b_9$par_cat4]) – [b_8(0) +b_9(0)] = 0.173

[(log1.178)(1) + log1.009(1)]) – [(log1.178)(0)+ log1.009(0)] = 0.173

4. What is the relative hazard (hazard ratio) of death for a male infant whose mother has had 9 prior births and a female infant whose mother has had no prior births?

$e^{0.173}$ = 1.19 = HR

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