# First Birth Timing Discrete Time Event History Analysis Code for the ChitwanABM

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Follows analysis of Ghimire and Hoelter (2007), and Axinn and Ghimire (2010):

- Ghimire, D. J., and L. F. Hoelter. 2007. Land use and first birth timing in an agricultural setting. Population & Environment 28:289-320.
- Ghimire, D. J., and W. G. Axinn. 2010. Community context, land use, and first birth. Rural Sociology 75 (3):478-513.

Uses the `glmer` function from the R `glmer` package to conduct a multilevel discrete-time event history analysis of first birth timing using the monthly Chitwan Valley Family Study (CVFS) household registry data.

```
## Loading required package: Matrix
```

```
## Loading required package: lattice
```

```
## Attaching package: 'Matrix'
```

```
## The following object(s) are masked from 'package:base':
##
## det
```

```
## Attaching package: 'lme4'
```

```
## The following object(s) are masked from 'package:stats':
##
## AIC, BIC
```

```
## Loading required package: foreign
```

```
## Loading required package: survival
```

```
## Loading required package: splines
```

```
## Loading required package: MASS
```

```
## Loading required package: nnet
```

```
## Attaching package: 'epicalc'
```

```
## The following object(s) are masked from 'package:Matrix':
##
## expand
```

```
## The following object(s) are masked from 'package:lattice':
##
## dotplot
```

```
## Loading required package: R2WinBUGS
```

```
## Loading required package: coda
```

```
## Attaching package: 'coda'
```

```
## The following object(s) are masked from 'package:lme4':
##
## HPDinterval
```

```
## Loading required package: abind
```

```
## arm (Version 1.5-05, built: 2012-6-6)
```

```
## Working directory is
## /media/Zvoleff_Passport/Code/ChitwanABMStats/Event_History_Analysis
```

```
## Attaching package: 'arm'
```

```
## The following object(s) are masked from 'package:coda':
##
## traceplot
```

```
## Error: unable to open file: 'No such file or directory'
```

```
## Error: object 't1indiv' not found
```

```
## Error: object 'old_respID' not found
```

```
## Error: object 'old_respID' not found
```

```
## Error: object 'old_respID' not found
```

```
## Error: object 'NBHID' not found
```

```
## Error: object 't1indiv' not found
```

```
## Error: object 't1indiv' not found
```

```
## Error: object 'parents_char' not found
```

```
## Error: object 'parents_char' not found
```

```
## Error: object 'parents_char' not found
```

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```

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```

```
## Error: object 'parents_char' not found
```

```
## Error: object 'parents_char' not found
```

```
## Error: object 'parents_char' not found
```

```
## Error: object 't1indiv' not found
```

```
## Error: object 'parents_char' not found
```

```
## Warning: cannot open compressed file
## '/media/truecrypt1/Nepal/ICPSR_0538_Restricted/Recode/recoded_NBH_data.Rdata',
## probable reason 'No such file or directory'
```

```
## Error: cannot open the connection
```

```
## Error: object 'nbh_recode' not found
```

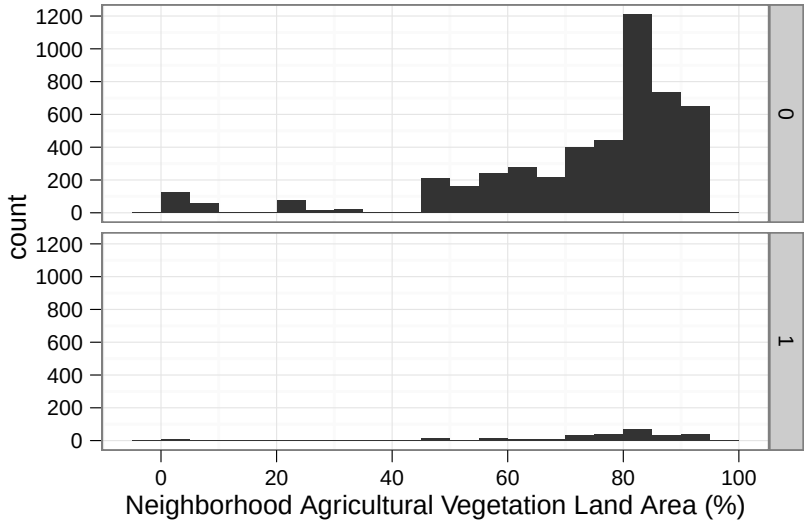
```
## Error: object 'nbh_recode' not found
```

```
## Error: object 'nbh_level_vars' not found
```

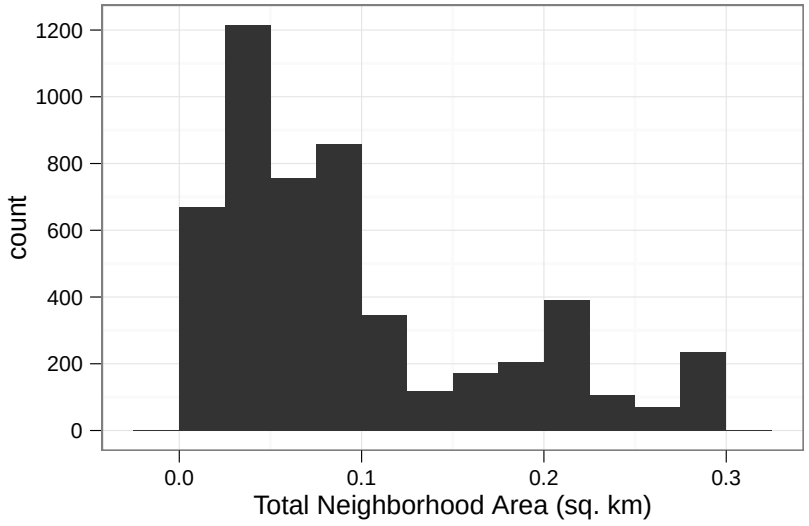
```
## Error: replacement has 0 rows, data has 5140
```

# Basic Statistics

Total number of person-month records: 5140, from 330 women. Now look at a table of how those records are distributed (0 being no first birth, 1 being first birth).




*Agricultural Vegetation Area*

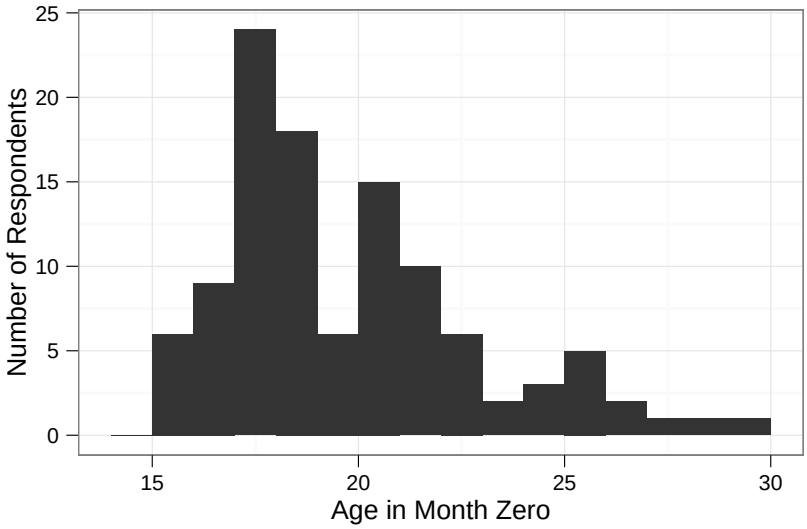



*Total Neighborhood Area*

```
##
##   male female   <NA>
##      0   5140      0
```

```
##
##    0    1 <NA>
## 4857  283    0
```

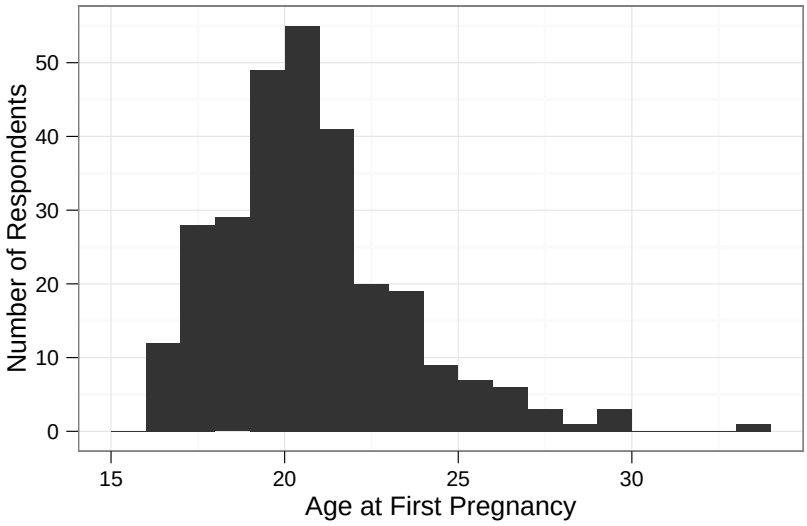
Make a quick plot of the age distribution of the sample in the first month:




*Age distribution of sample in initial month of data collection*

Do a plot of the age at first birth:

```
##
##   16   17   18   19   20   21   22   23   24   25   26   27   28   29   33
##   12   28   29   49   55   41   20   19    9    7    6    3    1    3    1
## <NA>
##    0
```




*plot of chunk age-at-first-preg*

```
##           ethnic
## first_preg UpHindu HillTibeto LowHindu Newar TeraiTibeto
##          0    2429       1102      325    96         905
##          1     158         38       20     9          58
```

```
##           schooling_yrs_cat
## first_preg [0,4) [4,7) [7,11) [11,99)
##          0   554   358    302    3285
##          1    48    43     35     155
```

```
##           marr_duration
## first_preg [42,999) [0,6) [6,12) [12,18) [18,24) [24,30) [30,36) [36,42)
##          0     2075   804    461     338     279     311     281     308
##          1       42    82     53      46      22      12      16      10
```

```
##           father_work
## first_preg    0    1
##          0 2100 2734
##          1  147  135
```

```
##           mother_work
## first_preg    0    1
##          0 3973  852
##          1  229   53
```

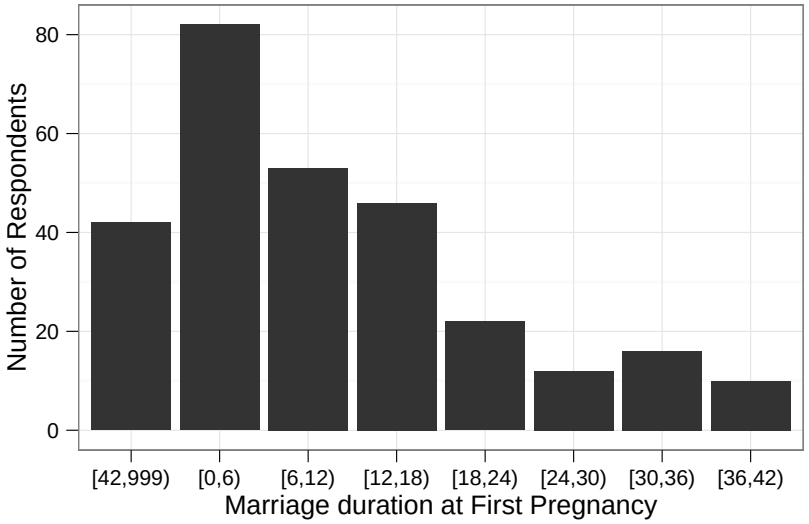
```
##           father_school
## first_preg    0    1
##          0 2789 2068
##          1  158  125
```

```
##           mother_school
## first_preg    0    1
##          0 4199  631
##          1  244   39
```

```
##           mother_num_children
## first_preg    1    2    3    4    5    6    7    8    9   10   11   12
##          0   69  187  456  892 1182  690  744  229  310   81   12    5
##          1    6   12   30   54   68   37   41   17    9    5    3    1
```

Do a plot of the marriage duration at first birth (using the categories established earlier):

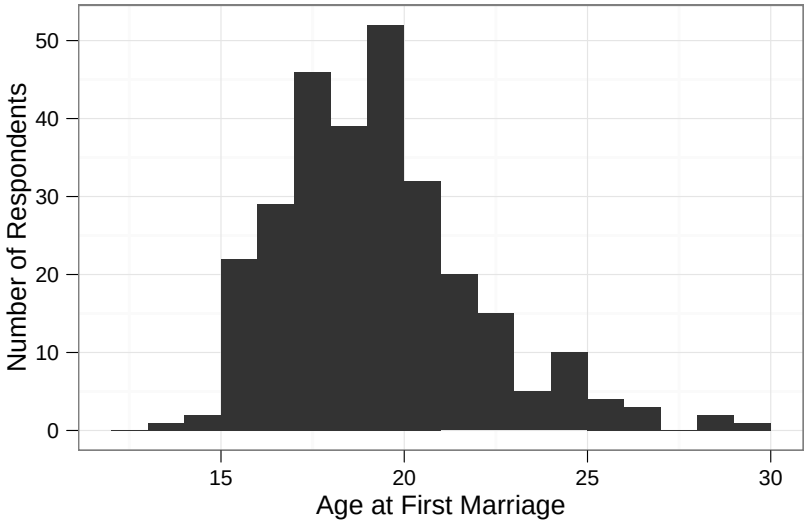
```
##
## [42,999)    [0,6)   [6,12)  [12,18)  [18,24)  [24,30)  [30,36)  [36,42)
##       42       82       53       46       22       12       16       10
##     <NA>
##        0
```




*plot of chunk marr-durration-at-first-preg*

And do a plot of the age at first marriage:

```
## age_at_first_marr
## 13 14 15 16 17 18 19 20 21 22 23 24 25 26 28 29
##  1  2 22 29 46 39 52 32 20 15  5 10  4  3  2  1
```




*plot of chunk age-at-first-marr*

# Discrete-time Event History Models

## Fixed effect model

```
##
## Call:
## glm(formula = model_formula, family = binomial, data = first_preg_long)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -0.707  -0.411  -0.273  -0.211   3.077
##
## Coefficients:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.57348    0.89855   -3.98  7.0e-05 ***
## percagveg_t1             -0.00321    0.00444   -0.72  0.46925
## elec_avail                0.25954    0.16057    1.62  0.10600
## avg_yrs_services_lt15    -0.00377    0.00813   -0.46  0.64238
## dist_nara                 0.00674    0.01164    0.58  0.56269
## total_t1                 -0.87946    1.08680   -0.81  0.41839
## ethnicHillTibeto         -0.62301    0.20437   -3.05  0.00230 **
## ethnicLowHindu            0.01594    0.26002    0.06  0.95112
## ethnicNewar              -0.49201    0.38129   -1.29  0.19692
## ethnicTeraiTibeto        -0.03382    0.17735   -0.19  0.84877
## schooling_yrs_cat[4,7)    0.48076    0.23820    2.02  0.04356 *
## schooling_yrs_cat[7,11)   0.84738    0.45897    1.85  0.06485 .
## schooling_yrs_cat[11,99)  1.29348    0.55805    2.32  0.02046 *
## mths_marr_pre_1997       -0.00612    0.00789   -0.78  0.43779
## marr_duration[0,6)        2.40521    0.60248    3.99  6.5e-05 ***
## marr_duration[6,12)       1.94223    0.45577    4.26  2.0e-05 ***
## marr_duration[12,18)      1.70154    0.28495    5.97  2.4e-09 ***
## marr_duration[18,24)      1.14735    0.30612    3.75  0.00018 ***
## marr_duration[24,30)      0.41861    0.35481    1.18  0.23807
## marr_duration[30,36)      0.82217    0.32088    2.56  0.01040 *
## marr_duration[36,42)      0.26223    0.36802    0.71  0.47613
## age_at_first_marr        -0.03210    0.02515   -1.28  0.20186
## father_work              -0.32690    0.14235   -2.30  0.02165 *
## mother_work              -0.08111    0.17771   -0.46  0.64809
## father_school            -0.14205    0.13311   -1.07  0.28589
## mother_school            -0.08626    0.19383   -0.45  0.65631
## mother_num_children      -0.02250    0.03443   -0.65  0.51337
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 2124.9  on 4719  degrees of freedom
## Residual deviance: 1976.4  on 4693  degrees of freedom
##   (420 observations deleted due to missingness)
## AIC: 2030
##
## Number of Fisher Scoring iterations: 6
##
```

```
##                                coef       OR
## (Intercept)               -3.573483  0.02806
## percagveg_t1              -0.003210  0.99680
## elec_avail                 0.259541  1.29634
## avg_yrs_services_lt15     -0.003773  0.99623
## dist_nara                  0.006737  1.00676
## total_t1                  -0.879457  0.41501
## ethnicHillTibeto          -0.623007  0.53633
## ethnicLowHindu             0.015941  1.01607
## ethnicNewar               -0.492006  0.61140
## ethnicTeraiTibeto         -0.033818  0.96675
## schooling_yrs_cat[4,7)     0.480757  1.61730
## schooling_yrs_cat[7,11)    0.847382  2.33353
## schooling_yrs_cat[11,99)   1.293478  3.64544
## mths_marr_pre_1997        -0.006124  0.99389
## marr_duration[0,6)         2.405213 11.08079
## marr_duration[6,12)        1.942226  6.97426
## marr_duration[12,18)       1.701540  5.48238
## marr_duration[18,24)       1.147354  3.14985
## marr_duration[24,30)       0.418611  1.51985
## marr_duration[30,36)       0.822167  2.27542
## marr_duration[36,42)       0.262230  1.29983
## age_at_first_marr         -0.032100  0.96841
## father_work               -0.326905  0.72115
## mother_work               -0.081111  0.92209
## father_school             -0.142048  0.86758
## mother_school             -0.086257  0.91736
## mother_num_children       -0.022503  0.97775
```

## Mixed-effects model - random intercept at neighborhood level

```
## Generalized linear mixed model fit by the Laplace approximation
## Formula: first_preg_2level_formula
##    Data: first_preg_long
##   AIC  BIC logLik deviance
##  2032 2213   -988     1976
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  originalNBH (Intercept) 0.00588  0.0767
## Number of obs: 4720, groups: originalNBH, 119
##
## Fixed effects:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.58118    0.90254   -3.97  7.3e-05 ***
## percagveg_t1             -0.00317    0.00447   -0.71  0.47890
## elec_avail                0.25987    0.16223    1.60  0.10918
## avg_yrs_services_lt15    -0.00382    0.00822   -0.46  0.64224
## dist_nara                 0.00660    0.01177    0.56  0.57520
## total_t1                 -0.89043    1.10039   -0.81  0.41840
## ethnicHillTibeto         -0.62288    0.20577   -3.03  0.00247 **
## ethnicLowHindu            0.01872    0.26137    0.07  0.94292
## ethnicNewar              -0.49205    0.38327   -1.28  0.19921
## ethnicTeraiTibeto        -0.03283    0.17887   -0.18  0.85438
## schooling_yrs_cat[4,7)    0.48290    0.23844    2.03  0.04285 *
## schooling_yrs_cat[7,11)   0.85253    0.45947    1.86  0.06353 .
## schooling_yrs_cat[11,99)  1.30112    0.55862    2.33  0.01985 *
## mths_marr_pre_1997       -0.00632    0.00792   -0.80  0.42479
## marr_duration[0,6)        2.40261    0.60329    3.98  6.8e-05 ***
## marr_duration[6,12)       1.94018    0.45649    4.25  2.1e-05 ***
## marr_duration[12,18)      1.69943    0.28542    5.95  2.6e-09 ***
## marr_duration[18,24)      1.14627    0.30654    3.74  0.00018 ***
## marr_duration[24,30)      0.41665    0.35528    1.17  0.24091
## marr_duration[30,36)      0.82046    0.32126    2.55  0.01065 *
## marr_duration[36,42)      0.26044    0.36848    0.71  0.47971
## age_at_first_marr        -0.03159    0.02529   -1.25  0.21152
## father_work              -0.32995    0.14298   -2.31  0.02102 *
## mother_work              -0.08213    0.17844   -0.46  0.64530
## father_school            -0.14170    0.13379   -1.06  0.28954
## mother_school            -0.08528    0.19488   -0.44  0.66167
## mother_num_children      -0.02278    0.03460   -0.66  0.51030
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) prcg_1 elc_vl a___15 dst_nr ttl_t1 ethnHT ethnLH ethncN
## percagvg_t1 -0.363
## elec_avail  -0.110  0.079
## avg_yrs__15 -0.215  0.301 -0.166
## dist_nara   -0.224  0.016  0.379  0.100
## total_t1     0.062 -0.468 -0.038  0.030 -0.194
## ethncHllTbt -0.065 -0.009  0.020 -0.095 -0.221  0.159
## ethnicLwHnd -0.019 -0.042  0.172 -0.125 -0.045  0.077  0.179
## ethnicNewar -0.042  0.113  0.002 -0.126 -0.099  0.081  0.150  0.091
## ethnicTrTbt -0.111 -0.066  0.116  0.055 -0.132  0.227  0.284  0.205  0.116
## schl__[4,7) -0.255 -0.016  0.006 -0.010 -0.003 -0.004 -0.014  0.011  0.005
```

```
## sch__[7,11) -0.427 -0.013  0.005  0.000 -0.001 -0.011 -0.012  0.017 -0.014
## sc__[11,99) -0.613 -0.015  0.000 -0.006 -0.001 -0.006 -0.024  0.004 -0.017
## mths___1997 -0.322  0.076 -0.028 -0.038  0.021 -0.047  0.063 -0.063  0.054
## mrr_dr[0,6) -0.646 -0.006 -0.018  0.005 -0.017  0.009  0.027 -0.029 -0.020
## mrr_d[6,12) -0.487 -0.001 -0.004  0.013 -0.017 -0.002  0.034 -0.050 -0.033
## mrr_[12,18) -0.231 -0.013 -0.006  0.019 -0.039  0.038  0.062 -0.016 -0.052
## mrr_[18,24) -0.219  0.020  0.014  0.023  0.011  0.013  0.010 -0.022  0.011
## mrr_[24,30) -0.181  0.039  0.016  0.019  0.004 -0.004  0.017 -0.032  0.013
## mrr_[30,36) -0.183  0.028  0.012  0.019 -0.003  0.004  0.013 -0.026  0.009
## mrr_[36,42) -0.154  0.023  0.007  0.013 -0.006 -0.009  0.027  0.005  0.009
## ag_t_frst_m -0.523  0.015 -0.057 -0.087  0.068  0.006  0.086  0.013  0.021
## father_work -0.141  0.005  0.031 -0.005  0.001  0.211 -0.055 -0.049  0.059
## mother_work -0.082  0.088  0.051  0.038  0.154  0.021  0.121 -0.011  0.087
## father_schl -0.084  0.043 -0.092 -0.038 -0.039 -0.047  0.069 -0.012  0.026
## mother_schl -0.077  0.157 -0.049 -0.012 -0.020 -0.030 -0.030  0.085  0.043
## mthr_nm_chl -0.080 -0.081  0.021 -0.012 -0.031 -0.010 -0.005  0.078 -0.036
##             ethnTT s__[4, s__[7, s__[11 m___19 m_[0,6 m_[6,1 m_[12, m_[18,
## percagvg_t1
## elec_avail
## avg_yrs__15
## dist_nara
## total_t1
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## schl__[4,7)  0.002
## sch__[7,11)  0.000  0.520
## sc__[11,99) -0.003  0.427  0.697
## mths___1997  0.081  0.000 -0.002 -0.003
## mrr_dr[0,6)  0.043  0.235  0.560  0.855  0.349
## mrr_d[6,12)  0.065  0.000 -0.001  0.521  0.461  0.756
## mrr_[12,18)  0.050 -0.001 -0.001 -0.001  0.574  0.374  0.493
## mrr_[18,24)  0.014 -0.001 -0.002 -0.002  0.423  0.298  0.394  0.560
## mrr_[24,30)  0.002 -0.002 -0.002 -0.002  0.305  0.234  0.310  0.446  0.381
## mrr_[30,36) -0.011 -0.001 -0.001 -0.001  0.302  0.247  0.327  0.473  0.405
## mrr_[36,42)  0.015  0.000  0.000 -0.001  0.195  0.189  0.250  0.368  0.320
## ag_t_frst_m  0.092  0.008  0.015  0.012  0.151 -0.024 -0.020 -0.022 -0.004
## father_work  0.057 -0.005 -0.017 -0.017  0.004  0.031  0.034  0.047  0.015
## mother_work -0.045 -0.025 -0.013 -0.012 -0.004 -0.044 -0.054 -0.042 -0.005
## father_schl  0.000 -0.009 -0.014  0.000  0.005 -0.016 -0.023 -0.015  0.009
## mother_schl  0.127  0.001 -0.003 -0.018  0.061 -0.023 -0.034 -0.041 -0.005
## mthr_nm_chl -0.070 -0.017 -0.009 -0.004 -0.092 -0.018 -0.016 -0.006  0.026
##             m_[24, m_[30, m_[36, ag_t__ fthr_w mthr_w fthr_s mthr_s
## percagvg_t1
## elec_avail
## avg_yrs__15
## dist_nara
## total_t1
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## schl__[4,7)
## sch__[7,11)
## sc__[11,99)
```

```
## mths___1997
## mrr_dr[0,6)
## mrr_d[6,12)
## mrr_[12,18)
## mrr_[18,24)
## mrr_[24,30)
## mrr_[30,36)  0.331
## mrr_[36,42)  0.264  0.285
## ag_t_frst_m  0.000  0.005  0.031
## father_work  0.020  0.023  0.012  0.072
## mother_work -0.001 -0.019 -0.008  0.033 -0.290
## father_schl  0.011  0.001 -0.001  0.011 -0.076  0.106
## mother_schl -0.005 -0.015 -0.014  0.060 -0.073 -0.006 -0.143
## mthr_nm_chl  0.020  0.011  0.005 -0.156  0.049 -0.050  0.155 -0.043
```

```
##                             coef      OR
## (Intercept)              -3.5812  0.0278
## percagveg_t1             -0.0032  0.9968
## elec_avail                0.2599  1.2968
## avg_yrs_services_lt15    -0.0038  0.9962
## dist_nara                 0.0066  1.0066
## total_t1                 -0.8904  0.4105
## ethnicHillTibeto         -0.6229  0.5364
## ethnicLowHindu            0.0187  1.0189
## ethnicNewar              -0.4920  0.6114
## ethnicTeraiTibeto        -0.0328  0.9677
## schooling_yrs_cat[4,7)    0.4829  1.6208
## schooling_yrs_cat[7,11)   0.8525  2.3456
## schooling_yrs_cat[11,99)  1.3011  3.6734
## mths_marr_pre_1997       -0.0063  0.9937
## marr_duration[0,6)        2.4026 11.0520
## marr_duration[6,12)       1.9402  6.9600
## marr_duration[12,18)      1.6994  5.4708
## marr_duration[18,24)      1.1463  3.1464
## marr_duration[24,30)      0.4166  1.5169
## marr_duration[30,36)      0.8205  2.2716
## marr_duration[36,42)      0.2604  1.2975
## age_at_first_marr        -0.0316  0.9689
## father_work              -0.3300  0.7190
## mother_work              -0.0821  0.9211
## father_school            -0.1417  0.8679
## mother_school            -0.0853  0.9183
## mother_num_children      -0.0228  0.9775
```

## Mixed-effects model - random intercepts at individual and neighborhood levels

```
## Generalized linear mixed model fit by the Laplace approximation
## Formula: first_preg_3level_formula
##    Data: first_preg_long
##   AIC  BIC logLik deviance
##  2034 2222   -988     1976
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  respid      (Intercept) 0.00000  0.0000
##  originalNBH (Intercept) 0.00588  0.0767
## Number of obs: 4720, groups: respid, 324; originalNBH, 119
##
## Fixed effects:
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.58117    0.90254   -3.97  7.3e-05 ***
## percagveg_t1             -0.00317    0.00447   -0.71  0.47887
## elec_avail                0.25987    0.16223    1.60  0.10919
## avg_yrs_services_lt15    -0.00382    0.00822   -0.46  0.64225
## dist_nara                 0.00660    0.01177    0.56  0.57526
## total_t1                 -0.89040    1.10039   -0.81  0.41842
## ethnicHillTibeto         -0.62287    0.20577   -3.03  0.00247 **
## ethnicLowHindu            0.01873    0.26137    0.07  0.94288
## ethnicNewar              -0.49205    0.38327   -1.28  0.19920
## ethnicTeraiTibeto        -0.03283    0.17887   -0.18  0.85438
## schooling_yrs_cat[4,7)    0.48289    0.23844    2.03  0.04285 *
## schooling_yrs_cat[7,11)   0.85255    0.45947    1.86  0.06353 .
## schooling_yrs_cat[11,99)  1.30113    0.55862    2.33  0.01985 *
## mths_marr_pre_1997       -0.00632    0.00792   -0.80  0.42478
## marr_duration[0,6)        2.40262    0.60329    3.98  6.8e-05 ***
## marr_duration[6,12)       1.94017    0.45649    4.25  2.1e-05 ***
## marr_duration[12,18)      1.69942    0.28542    5.95  2.6e-09 ***
## marr_duration[18,24)      1.14626    0.30654    3.74  0.00018 ***
## marr_duration[24,30)      0.41663    0.35528    1.17  0.24092
## marr_duration[30,36)      0.82046    0.32126    2.55  0.01065 *
## marr_duration[36,42)      0.26044    0.36848    0.71  0.47970
## age_at_first_marr        -0.03159    0.02529   -1.25  0.21153
## father_work              -0.32996    0.14298   -2.31  0.02102 *
## mother_work              -0.08213    0.17844   -0.46  0.64531
## father_school            -0.14170    0.13378   -1.06  0.28953
## mother_school            -0.08529    0.19488   -0.44  0.66164
## mother_num_children      -0.02278    0.03460   -0.66  0.51031
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) prcg_1 elc_vl a___15 dst_nr ttl_t1 ethnHT ethnLH ethncN
## percagvg_t1 -0.363
## elec_avail  -0.110  0.079
## avg_yrs__15 -0.215  0.301 -0.166
## dist_nara   -0.224  0.016  0.379  0.100
## total_t1     0.062 -0.468 -0.038  0.030 -0.194
## ethncHllTbt -0.065 -0.009  0.020 -0.095 -0.221  0.159
## ethnicLwHnd -0.019 -0.042  0.172 -0.125 -0.045  0.077  0.179
```

```
## ethnicNewar -0.042  0.113  0.002 -0.126 -0.099  0.081  0.150  0.091
## ethnicTrTbt -0.111 -0.066  0.115  0.055 -0.132  0.227  0.284  0.205  0.116
## schl__[4,7) -0.255 -0.016  0.006 -0.010 -0.003 -0.004 -0.014  0.011  0.005
## sch__[7,11) -0.427 -0.013  0.005  0.000 -0.001 -0.011 -0.012  0.017 -0.014
## sc__[11,99) -0.613 -0.015  0.000 -0.006 -0.001 -0.006 -0.024  0.004 -0.017
## mths___1997 -0.322  0.076 -0.028 -0.038  0.021 -0.047  0.063 -0.063  0.054
## mrr_dr[0,6) -0.646 -0.006 -0.018  0.005 -0.017  0.009  0.027 -0.029 -0.020
## mrr_d[6,12) -0.487 -0.001 -0.004  0.013 -0.017 -0.002  0.034 -0.050 -0.033
## mrr_[12,18) -0.231 -0.013 -0.006  0.019 -0.039  0.038  0.062 -0.016 -0.052
## mrr_[18,24) -0.219  0.020  0.014  0.023  0.011  0.013  0.010 -0.022  0.011
## mrr_[24,30) -0.181  0.039  0.016  0.019  0.004 -0.004  0.017 -0.032  0.013
## mrr_[30,36) -0.183  0.028  0.012  0.019 -0.003  0.004  0.013 -0.026  0.009
## mrr_[36,42) -0.154  0.023  0.007  0.013 -0.006 -0.009  0.027  0.005  0.009
## ag_t_frst_m -0.523  0.015 -0.057 -0.087  0.068  0.006  0.086  0.013  0.021
## father_work -0.141  0.005  0.031 -0.005  0.001  0.211 -0.055 -0.049  0.059
## mother_work -0.082  0.088  0.051  0.038  0.154  0.021  0.121 -0.011  0.087
## father_schl -0.084  0.043 -0.092 -0.038 -0.039 -0.047  0.069 -0.012  0.026
## mother_schl -0.077  0.157 -0.049 -0.012 -0.020 -0.030 -0.030  0.085  0.043
## mthr_nm_chl -0.080 -0.081  0.021 -0.012 -0.031 -0.010 -0.005  0.078 -0.036
##             ethnTT s__[4, s__[7, s__[11 m___19 m_[0,6 m_[6,1 m_[12, m_[18,
## percagvg_t1
## elec_avail
## avg_yrs__15
## dist_nara
## total_t1
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## schl__[4,7)  0.002
## sch__[7,11)  0.000  0.520
## sc__[11,99) -0.003  0.427  0.697
## mths___1997  0.081  0.000 -0.002 -0.003
## mrr_dr[0,6)  0.043  0.235  0.560  0.855  0.349
## mrr_d[6,12)  0.065  0.000 -0.001  0.521  0.461  0.756
## mrr_[12,18)  0.050 -0.001 -0.001 -0.001  0.574  0.374  0.493
## mrr_[18,24)  0.014 -0.001 -0.002 -0.002  0.423  0.298  0.394  0.560
## mrr_[24,30)  0.002 -0.002 -0.002 -0.002  0.305  0.234  0.310  0.446  0.381
## mrr_[30,36) -0.011 -0.001 -0.001 -0.001  0.302  0.247  0.327  0.473  0.405
## mrr_[36,42)  0.015  0.000  0.000 -0.001  0.195  0.189  0.250  0.368  0.320
## ag_t_frst_m  0.092  0.008  0.015  0.012  0.151 -0.024 -0.020 -0.022 -0.004
## father_work  0.057 -0.005 -0.017 -0.017  0.004  0.031  0.034  0.047  0.015
## mother_work -0.045 -0.025 -0.013 -0.012 -0.004 -0.044 -0.054 -0.042 -0.005
## father_schl  0.000 -0.009 -0.014  0.000  0.005 -0.016 -0.023 -0.015  0.009
## mother_schl  0.127  0.001 -0.003 -0.018  0.061 -0.023 -0.034 -0.041 -0.005
## mthr_nm_chl -0.070 -0.017 -0.009 -0.004 -0.092 -0.018 -0.016 -0.006  0.026
##             m_[24, m_[30, m_[36, ag_t__ fthr_w mthr_w fthr_s mthr_s
## percagvg_t1
## elec_avail
## avg_yrs__15
## dist_nara
## total_t1
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
```

```
## schl__[4,7)
## sch__[7,11)
## sc__[11,99)
## mths___1997
## mrr_dr[0,6)
## mrr_d[6,12)
## mrr_[12,18)
## mrr_[18,24)
## mrr_[24,30)
## mrr_[30,36)  0.331
## mrr_[36,42)  0.264  0.285
## ag_t_frst_m  0.000  0.005  0.031
## father_work  0.020  0.023  0.012  0.072
## mother_work -0.001 -0.019 -0.008  0.033 -0.290
## father_schl  0.011  0.001 -0.001  0.011 -0.076  0.106
## mother_schl -0.005 -0.015 -0.014  0.060 -0.073 -0.006 -0.143
## mthr_nm_chl  0.020  0.011  0.005 -0.156  0.049 -0.050  0.155 -0.043
```

```
##                              coef      OR
## (Intercept)              -3.5812  0.0278
## percagveg_t1             -0.0032  0.9968
## elec_avail                0.2599  1.2968
## avg_yrs_services_lt15    -0.0038  0.9962
## dist_nara                 0.0066  1.0066
## total_t1                 -0.8904  0.4105
## ethnicHillTibeto         -0.6229  0.5364
## ethnicLowHindu            0.0187  1.0189
## ethnicNewar              -0.4920  0.6114
## ethnicTeraiTibeto        -0.0328  0.9677
## schooling_yrs_cat[4,7)    0.4829  1.6208
## schooling_yrs_cat[7,11)   0.8525  2.3456
## schooling_yrs_cat[11,99)  1.3011  3.6734
## mths_marr_pre_1997       -0.0063  0.9937
## marr_duration[0,6)        2.4026 11.0520
## marr_duration[6,12)       1.9402  6.9599
## marr_duration[12,18)      1.6994  5.4708
## marr_duration[18,24)      1.1463  3.1464
## marr_duration[24,30)      0.4166  1.5168
## marr_duration[30,36)      0.8205  2.2715
## marr_duration[36,42)      0.2604  1.2975
## age_at_first_marr        -0.0316  0.9689
## father_work              -0.3300  0.7190
## mother_work              -0.0821  0.9212
## father_school            -0.1417  0.8679
## mother_school            -0.0853  0.9182
## mother_num_children      -0.0228  0.9775
```

# Conclusions

***Model overview***

| Model | AIC | Log Likelihood |
|---|---|---|
| Fixed | 2030.4038 | -988.2019 |

| | | |
|---|---|---|
| 2-level (random int. at NBH level) | 2032.3974 | -988.1987 |
| 3-level (random int. at resp and NBH level) | 2034.3975 | -988.1987 |