Marriage Timing Discrete Time Event History Analysis Code for the ChitwanABM

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Follows analysis of Yabiku (2006):

> Yabiku, S. T. 2006. Land use and marriage timing in Nepal. Population & Environment 27 (5):445-461.

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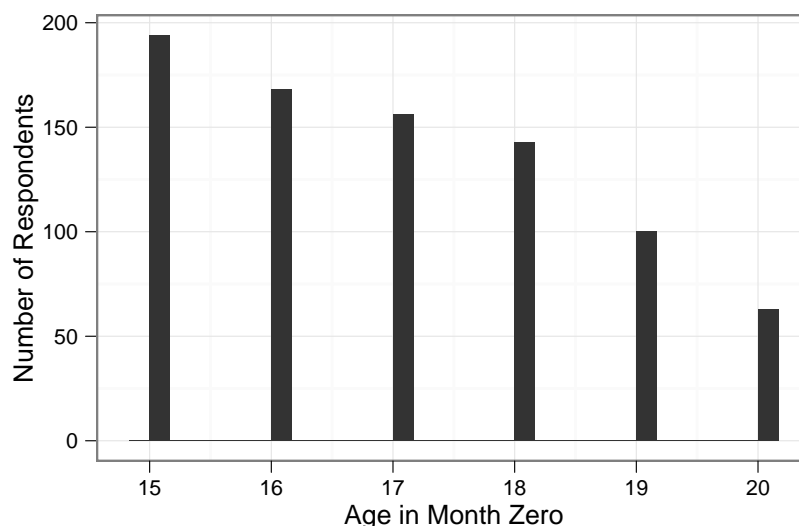
Basic Statistics

Total number of person-month records: 46000. Now look at a table of how those records are distributed (0 being unmarried, 1 being married).

```
##
##     0     1  <NA>
## 45513   487     0
```

Make a quick plot of the age distribution of the sample in the first month of data collection (when all are unmarried)

```
## stat_bin: binwidth defaulted to range/30. Use 'binwidth = x' to adjust
## this.
```


Age distribution of sample in initial month of data collection
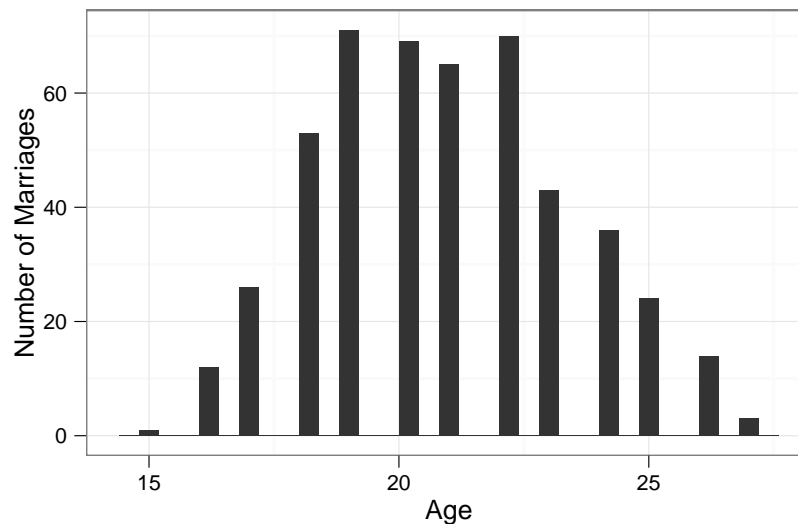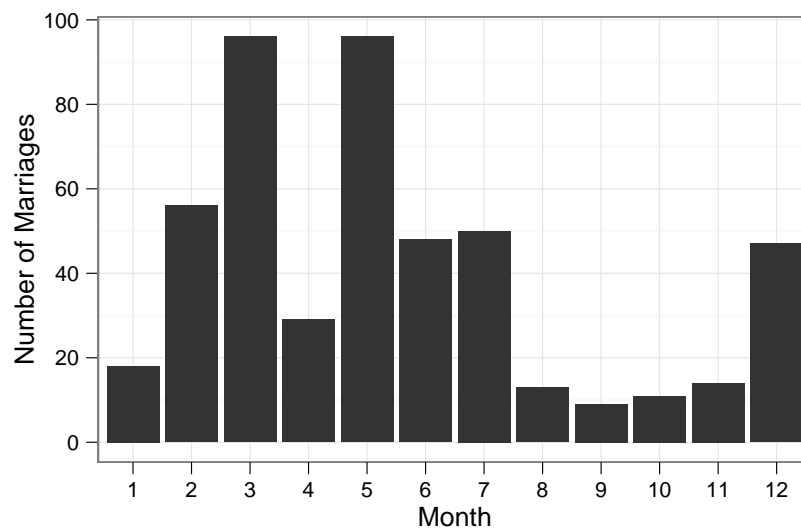
Also plot the age at marriage

```
## stat_bin: binwidth defaulted to range/30. Use 'binwidth = x' to adjust
## this.
```


Age at first marriage

```
##
## 15 16 17 18 19 20 21 22 23 24 25 26 27
##  1 12 26 53 71 69 65 70 43 36 24 14  3
```

Note that marriage is seasonal, so include a dummy variables for each month later on in the models:

plot of chunk marriages-month-hist

Check cross tabs of marit with the categorical predictors:

```
##                   marit_long$marit
## marit_long$age     0     1
##            15   580     1
##            16  2721    12
##            17  4421    26
##            18  5727    53
##            19  6422    71
##            20  6486    69
##            21  6051    65
##            22  5107    70
##            23  3652    43
##            24  2252    36
##            25  1261    24
##            26   615    14
##            27   194     3
##            28    24     0
```

```
##                   marit_long$ethnic
## marit_long$marit UpHindu HillTibeto LowHindu Newar TeraiTibeto
##                0    25182       5385     3498  4280        7168
##                1      264         63       37    35          88
```

```
##                   marit_long$gender
## marit_long$marit  male female
##                0 26394  19119
##                1   200    287
```

```
## , , gender = male
##
##     ethnic
## age  UpHindu HillTibeto LowHindu Newar TeraiTibeto
```

```
##     15      153         12        27      21            39
##     16      730        105       138      99           186
##     17     1204        303       267     144           359
##     18     1643        398       381     183           490
##     19     2002        445       374     206           542
##     20     2213        528       352     236           537
##     21     2127        513       303     264           533
##     22     1866        428       236     264           455
##     23     1299        378       186     215           330
##     24      844        240        93     141           205
##     25      464        145        33      82            87
##     26      236         69        24      43            42
##     27       66         18         6       9            18
##     28        9          3         0       0             3
##
## , , gender = female
##
##       ethnic
## age  UpHindu HillTibeto LowHindu Newar TeraiTibeto
##     15      168         45        23      27            66
##     16      762        203        99     129           282
##     17     1211        280       151     191           337
##     18     1583        277       159     231           435
##     19     1677        255       183     330           479
##     20     1494        252       132     354           457
##     21     1311        183       119     336           427
##     22     1012        140       104     308           364
##     23      638        107        66     220           256
##     24      380         69        42     126           148
##     25      226         34        31      94            89
##     26      101         15         6      39            54
##     27       24          3         0      23            30
##     28        3          0         0       0             6
##
```

Now make a quick plot of a histogram of log(percent agricultural vegetation + 1), for the first month:

```
## stat_bin: binwidth defaulted to range/30. Use 'binwidth = x' to adjust
## this.
```
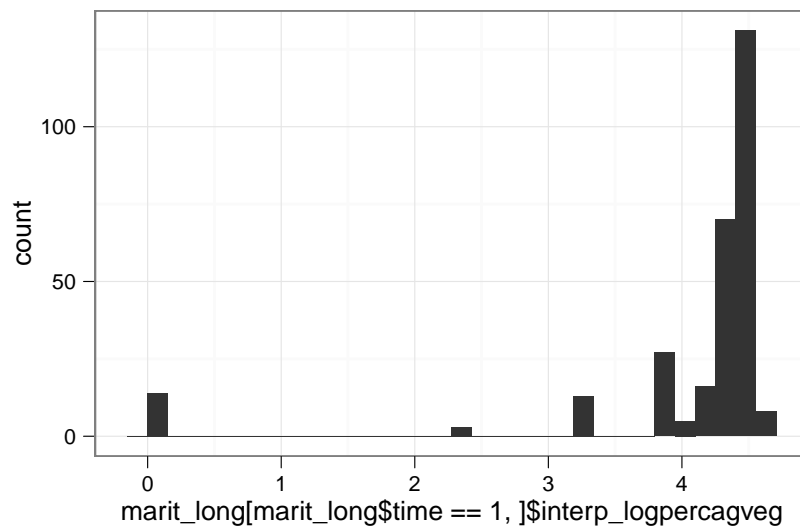
log(percent ag. veg. + 1) for month 1

Discrete-time Event History Models

Fixed effect model

Do two fixed effects models. First do a GLM with age in years, then a GLM with age in decades. Yabiku (2006) presents results with age in years, but the `glmer` optimization routine wouldn't converge unless age was rescaled to decades. So do a GLM with age in years for comparison with the Yabiku (2006) results, but use age in decades for the final model to be included in the ABM.

```
##
## Call:
## glm(formula = marit ~ ethnic + gender + age + I(age^2) + interp_logpercagveg +
##     SCHLFT_1996 + HLTHFT_1996 + BUSFT_1996 + MARFT_1996 + EMPFT_1996 +
##     schooling_yrs + in_school_1996 + month, family = binomial,
##     data = marit_long)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -0.584  -0.157  -0.106  -0.073   3.649
##
## Coefficients:
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)         -15.27145    4.68451   -3.26  0.00111 **
## ethnicHillTibeto     -0.00228    0.33441   -0.01  0.99455
## ethnicLowHindu       -0.33697    0.35418   -0.95  0.34140
## ethnicNewar          -0.32797    0.31648   -1.04  0.30006
## ethnicTeraiTibeto    -0.18721    0.23553   -0.79  0.42671
## genderfemale          0.81229    0.18002    4.51  6.4e-06 ***
## age                   0.61681    0.43798    1.41  0.15904
## I(age^2)             -0.00965    0.01039   -0.93  0.35315
## interp_logpercagveg   0.27794    0.13587    2.05  0.04079 *
## SCHLFT_1996           0.00416    0.01372    0.30  0.76182
## HLTHFT_1996          -0.00486    0.00466   -1.04  0.29681
## BUSFT_1996            0.01028    0.00800    1.28  0.19891
```

```
## MARFT_1996           -0.00280    0.00788   -0.36   0.72221
## EMPFT_1996            0.00502    0.00524    0.96   0.33748
## schooling_yrs        -0.02038    0.03537   -0.58   0.56442
## in_school_1996       -0.29969    0.18758   -1.60   0.11012
## month2                1.40636    0.49812    2.82   0.00475 **
## month3                2.04830    0.47726    4.29   1.8e-05 ***
## month4                0.31636    0.58790    0.54   0.59049
## month5                1.75675    0.48095    3.65   0.00026 ***
## month6                0.50765    0.55029    0.92   0.35626
## month7                0.99594    0.51509    1.93   0.05317 .
## month8               -0.56092    0.73191   -0.77   0.44345
## month9               -0.26929    0.67271   -0.40   0.68893
## month10              -0.04096    0.63448   -0.06   0.94853
## month11              -0.03004    0.63447   -0.05   0.96223
## month12               0.94768    0.52866    1.79   0.07303 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 1835.3  on 15876  degrees of freedom
## Residual deviance: 1657.5  on 15850  degrees of freedom
##   (30123 observations deleted due to missingness)
## AIC: 1712
##
## Number of Fisher Scoring iterations: 8
##
```

```
##                         coef     OR
## (Intercept)        -15.271453 0.0000
## ethnicHillTibeto    -0.002284 0.9977
## ethnicLowHindu      -0.336966 0.7139
## ethnicNewar         -0.327965 0.7204
## ethnicTeraiTibeto   -0.187206 0.8293
## genderfemale         0.812294 2.2531
## age                  0.616808 1.8530
## I(age^2)            -0.009647 0.9904
## interp_logpercagveg  0.277941 1.3204
## SCHLFT_1996          0.004157 1.0042
## HLTHFT_1996         -0.004865 0.9951
## BUSFT_1996           0.010280 1.0103
## MARFT_1996          -0.002802 0.9972
## EMPFT_1996           0.005024 1.0050
## schooling_yrs       -0.020383 0.9798
## in_school_1996      -0.299692 0.7410
## month2               1.406365 4.0811
## month3               2.048303 7.7547
## month4               0.316364 1.3721
## month5               1.756747 5.7936
## month6               0.507654 1.6614
## month7               0.995943 2.7073
## month8              -0.560923 0.5707
## month9              -0.269287 0.7639
## month10             -0.040958 0.9599
## month11             -0.030043 0.9704
```

```
## month12                 0.947684 2.5797
```

```
##
## Call:
## glm(formula = marit ~ ethnic + gender + agedecades + I(agedecades^2) +
##     interp_logpercagveg + SCHLFT_1996 + HLTHFT_1996 + BUSFT_1996 +
##     MARFT_1996 + EMPFT_1996 + schooling_yrs + in_school_1996 +
##     month, family = binomial, data = marit_long)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -0.584  -0.157  -0.106  -0.073   3.649
##
## Coefficients:
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)         -15.27145    4.68451   -3.26  0.00111 **
## ethnicHillTibeto     -0.00228    0.33441   -0.01  0.99455
## ethnicLowHindu       -0.33697    0.35418   -0.95  0.34140
## ethnicNewar          -0.32797    0.31648   -1.04  0.30006
## ethnicTeraiTibeto    -0.18721    0.23553   -0.79  0.42671
## genderfemale          0.81229    0.18002    4.51  6.4e-06 ***
## agedecades            6.16808    4.37978    1.41  0.15904
## I(agedecades^2)      -0.96467    1.03895   -0.93  0.35315
## interp_logpercagveg   0.27794    0.13587    2.05  0.04079 *
## SCHLFT_1996           0.00416    0.01372    0.30  0.76182
## HLTHFT_1996          -0.00486    0.00466   -1.04  0.29681
## BUSFT_1996            0.01028    0.00800    1.28  0.19891
## MARFT_1996           -0.00280    0.00788   -0.36  0.72221
## EMPFT_1996            0.00502    0.00524    0.96  0.33748
## schooling_yrs        -0.02038    0.03537   -0.58  0.56442
## in_school_1996       -0.29969    0.18758   -1.60  0.11012
## month2                1.40636    0.49812    2.82  0.00475 **
## month3                2.04830    0.47726    4.29  1.8e-05 ***
## month4                0.31636    0.58790    0.54  0.59049
## month5                1.75675    0.48095    3.65  0.00026 ***
## month6                0.50765    0.55029    0.92  0.35626
## month7                0.99594    0.51509    1.93  0.05317 .
## month8               -0.56092    0.73191   -0.77  0.44345
## month9               -0.26929    0.67271   -0.40  0.68893
## month10              -0.04096    0.63448   -0.06  0.94853
## month11              -0.03004    0.63447   -0.05  0.96223
## month12               0.94768    0.52866    1.79  0.07303 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1835.3  on 15876  degrees of freedom
## Residual deviance: 1657.5  on 15850  degrees of freedom
##   (30123 observations deleted due to missingness)
## AIC: 1712
##
## Number of Fisher Scoring iterations: 8
##
```

```
##                            coef       OR
## (Intercept)           -15.271453   0.0000
## ethnicHillTibeto       -0.002284   0.9977
## ethnicLowHindu         -0.336966   0.7139
## ethnicNewar            -0.327965   0.7204
## ethnicTeraiTibeto      -0.187206   0.8293
## genderfemale            0.812294   2.2531
## agedecades              6.168081 477.2695
## I(agedecades^2)        -0.964671   0.3811
## interp_logpercagveg     0.277941   1.3204
## SCHLFT_1996             0.004157   1.0042
## HLTHFT_1996            -0.004865   0.9951
## BUSFT_1996              0.010280   1.0103
## MARFT_1996             -0.002802   0.9972
## EMPFT_1996              0.005024   1.0050
## schooling_yrs          -0.020383   0.9798
## in_school_1996         -0.299692   0.7410
## month2                  1.406365   4.0811
## month3                  2.048303   7.7547
## month4                  0.316364   1.3721
## month5                  1.756747   5.7936
## month6                  0.507654   1.6614
## month7                  0.995943   2.7073
## month8                 -0.560923   0.5707
## month9                 -0.269287   0.7639
## month10                -0.040958   0.9599
## month11                -0.030043   0.9704
## month12                 0.947684   2.5797
```

Mixed-effects model - random intercept at neighborhood level

```
## Generalized linear mixed model fit by the Laplace approximation
## Formula: marit ~ ethnic + gender + agedecades + I(agedecades^2) + interp_logpercagveg +     interp_logpercagveg + SCHLFT_1996 + HLTHFT_1996 + BUSFT_1996 +    MARFT_1996 + EMPFT_1996 + schooling_yrs + in_school_1996 +     month + (1 | originalNBH)
##    Data: marit_long
##   AIC  BIC logLik deviance
##  1714 1928   -829    1658
## Random effects:
##  Groups      Name        Variance  Std.Dev.
##  originalNBH (Intercept) 2.23e-12 1.49e-06
## Number of obs: 15877, groups: originalNBH, 50
##
## Fixed effects:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)          -15.27160    4.68459   -3.26  0.00111 **
## ethnicHillTibeto      -0.00230    0.33442   -0.01  0.99452
## ethnicLowHindu        -0.33696    0.35418   -0.95  0.34141
## ethnicNewar           -0.32798    0.31648   -1.04  0.30005
## ethnicTeraiTibeto     -0.18721    0.23553   -0.79  0.42671
## genderfemale           0.81229    0.18003    4.51 6.4e-06 ***
## agedecades             6.16828    4.37985    1.41  0.15903
## I(agedecades^2)       -0.96472    1.03897   -0.93  0.35313
## interp_logpercagveg    0.27793    0.13587    2.05  0.04080 *
## SCHLFT_1996            0.00416    0.01372    0.30  0.76182
## HLTHFT_1996           -0.00486    0.00466   -1.04  0.29680
## BUSFT_1996             0.01028    0.00800    1.28  0.19891
## MARFT_1996            -0.00280    0.00788   -0.36  0.72218
## EMPFT_1996             0.00502    0.00524    0.96  0.33746
## schooling_yrs         -0.02038    0.03537   -0.58  0.56440
## in_school_1996        -0.29969    0.18759   -1.60  0.11013
## month2                 1.40636    0.49812    2.82  0.00475 **
## month3                 2.04830    0.47727    4.29 1.8e-05 ***
## month4                 0.31636    0.58790    0.54  0.59050
## month5                 1.75674    0.48095    3.65  0.00026 ***
## month6                 0.50764    0.55029    0.92  0.35628
## month7                 0.99593    0.51510    1.93  0.05318 .
## month8                -0.56091    0.73205   -0.77  0.44355
## month9                -0.26927    0.67273   -0.40  0.68896
## month10               -0.04093    0.63448   -0.06  0.94857
## month11               -0.03001    0.63447   -0.05  0.96227
## month12                0.94751    0.52867    1.79  0.07309 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) ethnHT ethnLH ethncN ethnTT gndrfm agdcds I(g^2) intrp_
## ethncHllTbt -0.085
## ethnicLwHnd -0.039  0.194
## ethnicNewar -0.077  0.296  0.144
## ethnicTrTbt -0.008  0.331  0.366  0.257
## genderfemal -0.077  0.129  0.118 -0.063  0.134
## agedecades  -0.982  0.038  0.017  0.038 -0.023  0.015
## I(agdcds^2)  0.973 -0.040 -0.023 -0.049  0.009 -0.009 -0.997
## intrp_lgprc -0.124  0.091  0.009  0.238  0.046  0.115 -0.003  0.004
## SCHLFT_1996 -0.047  0.103 -0.049 -0.021 -0.162  0.079  0.034 -0.041 -0.025
## HLTHFT_1996 -0.008  0.277 -0.038  0.271  0.221 -0.073  0.009 -0.014 -0.086
## BUSFT_1996  -0.027  0.044 -0.143  0.141 -0.326 -0.086  0.020 -0.014 -0.049
## MARFT_1996   0.029  0.053  0.202 -0.053  0.223  0.114 -0.031  0.033 -0.041
## EMPFT_1996  -0.020 -0.135  0.089 -0.061 -0.103  0.034  0.022 -0.019 -0.116
## scholng_yrs -0.122  0.267  0.278  0.121  0.414  0.384  0.066 -0.086  0.127
## in_sch_1996 -0.003 -0.024 -0.057 -0.149 -0.091 -0.057 -0.011  0.028 -0.013
## month2      -0.109  0.001 -0.001 -0.002 -0.002  0.001  0.021 -0.019  0.000
## month3      -0.115  0.000 -0.003 -0.004 -0.003  0.003  0.023 -0.021  0.001
## month4      -0.093  0.000 -0.001 -0.003 -0.002  0.003  0.019 -0.017  0.001
## month5      -0.107  0.002  0.003  0.007  0.008  0.001  0.020 -0.022  0.000
## month6      -0.094  0.002  0.002  0.006  0.007 -0.001  0.018 -0.021  0.000
## month7      -0.101  0.001  0.003  0.006  0.006  0.000  0.020 -0.022  0.001
## month8      -0.059 -0.001 -0.001  0.000  0.000 -0.002  0.001 -0.001 -0.001
## month9      -0.064 -0.001 -0.001  0.000  0.000 -0.002  0.001 -0.001 -0.001
## month10     -0.069 -0.001 -0.001  0.000  0.000 -0.003  0.001 -0.002 -0.001
## month11     -0.068  0.000 -0.001  0.000  0.000 -0.001  0.000 -0.001 -0.001
## month12     -0.081  0.001 -0.001  0.000 -0.001  0.001  0.000 -0.001  0.000
##             SCHLFT HLTHFT BUSFT_ MARFT_ EMPFT_ schln_ i__199 month2 month3
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## genderfemal
## agedecades
## I(agdcds^2)
## intrp_lgprc
## SCHLFT_1996
## HLTHFT_1996 -0.058
## BUSFT_1996  -0.102 -0.098
## MARFT_1996  -0.002 -0.144 -0.540
## EMPFT_1996  -0.117 -0.420  0.144 -0.175
## scholng_yrs  0.120  0.008 -0.020  0.009  0.075
## in_sch_1996 -0.014 -0.062  0.029  0.096 -0.094 -0.407
## month2      -0.003 -0.001  0.003 -0.001  0.002 -0.005  0.007
## month3      -0.005 -0.001  0.005 -0.003  0.003 -0.008  0.008  0.848
## month4      -0.003 -0.002  0.003 -0.001  0.001 -0.005  0.007  0.688  0.719
## month5       0.002  0.001  0.000 -0.003  0.000  0.010 -0.008  0.840  0.876
## month6       0.001  0.002 -0.001 -0.002  0.000  0.009 -0.008  0.734  0.766
## month7       0.001  0.002  0.000 -0.002  0.001  0.009 -0.009  0.784  0.818
## month8      -0.001  0.000 -0.001  0.000  0.000  0.000  0.002  0.552  0.576
## month9      -0.001  0.000 -0.001  0.000  0.000  0.000  0.002  0.601  0.627
## month10     -0.001  0.000 -0.001  0.000  0.000 -0.001  0.002  0.637  0.665
## month11      0.001  0.000  0.000  0.000  0.000  0.000  0.001  0.637  0.665
## month12      0.000  0.000  0.001  0.000  0.001  0.000  0.000  0.764  0.798
##             month4 month5 month6 month7 month8 month9 mnth10 mnth11
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## genderfemal
## agedecades
## I(agdcds^2)
## intrp_lgprc
## SCHLFT_1996
## HLTHFT_1996
## BUSFT_1996
## MARFT_1996
## EMPFT_1996
## scholng_yrs
## in_sch_1996
## month2
## month3
## month4
## month5       0.712
## month6       0.622  0.762
## month7       0.664  0.814  0.711
## month8       0.468  0.572  0.500  0.534
## month9       0.509  0.622  0.544  0.581  0.409
## month10      0.540  0.660  0.577  0.616  0.433  0.472
## month11      0.540  0.660  0.577  0.616  0.433  0.472  0.500
## month12      0.648  0.792  0.692  0.739  0.520  0.566  0.600  0.600
```

```
##                          coef       OR
## (Intercept)        -15.271596   0.0000
## ethnicHillTibeto    -0.002296   0.9977
## ethnicLowHindu      -0.336961   0.7139
## ethnicNewar         -0.327978   0.7204
## ethnicTeraiTibeto   -0.187211   0.8293
## genderfemale         0.812287   2.2531
## agedecades           6.168280 477.3643
## I(agedecades^2)     -0.964719   0.3811
## interp_logpercagveg  0.277931   1.3204
## SCHLFT_1996          0.004157   1.0042
## HLTHFT_1996         -0.004865   0.9951
## BUSFT_1996           0.010280   1.0103
## MARFT_1996          -0.002802   0.9972
## EMPFT_1996           0.005024   1.0050
```

```
## schooling_yrs          -0.020384   0.9798
## in_school_1996         -0.299689   0.7410
## month2                  1.406361   4.0811
## month3                  2.048301   7.7547
## month4                  0.316361   1.3721
## month5                  1.756743   5.7935
## month6                  0.507638   1.6614
## month7                  0.995932   2.7072
## month8                 -0.560910   0.5707
## month9                 -0.269270   0.7639
## month10                -0.040929   0.9599
## month11                -0.030014   0.9704
## month12                 0.947508   2.5793
```

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

```
## Generalized linear mixed model fit by the Laplace approximation
## Formula: marit ~ ethnic + gender + agedecades + I(agedecades^2) + interp_logpercagveg +    SCHLFT_1996 + HLTHFT_1996 + BUSFT_1996 + MARFT_1996 + EMPFT_1996 +    schooling_yrs + in_school_1996 + month + (1 | respid) + (1 |    originalNBH)
##    Data: marit_long
##   AIC  BIC logLik deviance
##  1709 1932  -826    1651
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  respid      (Intercept) 1.28e+00 1.13e+00
##  originalNBH (Intercept) 2.13e-11 4.62e-06
## Number of obs: 15877, groups: respid, 261; originalNBH, 50
##
## Fixed effects:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -19.65694    5.67239   -3.47  0.00053 ***
## ethnicHillTibeto    -0.15814    0.47960   -0.33  0.74160
## ethnicLowHindu      -0.60439    0.51576   -1.17  0.24126
## ethnicNewar         -0.70299    0.46443   -1.51  0.13011
## ethnicTeraiTibeto   -0.29561    0.33858   -0.87  0.38262
## genderfemale         1.17776    0.26136    4.51  6.6e-06 ***
## agedecades           8.35296    5.27419    1.58  0.11325
## I(agedecades^2)     -1.07137    1.25024   -0.86  0.39148
## interp_logpercagveg  0.37388    0.18965    1.97  0.04867 *
## SCHLFT_1996          0.01267    0.02030    0.62  0.53266
## HLTHFT_1996         -0.00728    0.00712   -1.02  0.30669
## BUSFT_1996           0.01423    0.01112    1.28  0.20058
## MARFT_1996          -0.00830    0.01132   -0.73  0.46331
## EMPFT_1996           0.00779    0.00783    1.00  0.31938
## schooling_yrs       -0.06696    0.05255   -1.27  0.20262
## in_school_1996      -0.31671    0.27602   -1.15  0.25120
## month2               1.41846    0.54529    2.60  0.00929 **
## month3               2.09907    0.52227    4.02  5.8e-05 ***
## month4               0.38395    0.64468    0.60  0.55147
## month5               1.68191    0.52652    3.19  0.00140 **
## month6               0.44694    0.60290    0.74  0.45850
## month7               0.95180    0.56399    1.69  0.09149 .
## month8              -0.59625    0.80170   -0.74  0.45704
## month9              -0.30096    0.73657   -0.41  0.68283
## month10             -0.06778    0.69453   -0.10  0.92225
## month11             -0.05055    0.69463   -0.07  0.94199
## month12              0.93862    0.57843    1.62  0.10465
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) ethnHT ethnLH ethncN ethnTT gndrfm agdcds I(g^2) intrp_
## ethncHllTbt  -0.104
## ethnicLwHnd  -0.051  0.199
## ethnicNewar  -0.084  0.296  0.156
## ethnicTrTbt  -0.026  0.323  0.362  0.264
## genderfemal  -0.126  0.103  0.107 -0.061  0.162
## agedecades   -0.977  0.054  0.022  0.030 -0.013  0.047
## I(agdcda^2)   0.967 -0.056 -0.028 -0.041  0.002 -0.036 -0.996
## intrp_lgprc  -0.144  0.076  0.011  0.283  0.035  0.126 -0.007  0.012
## SCHLFT_1996  -0.045  0.065 -0.078 -0.062 -0.199  0.110  0.025 -0.027 -0.031
## HLTHFT_1996  -0.022  0.292  0.001  0.264  0.234 -0.042  0.022 -0.025 -0.083
## BUSFT_1996   -0.056  0.036 -0.118  0.120 -0.300 -0.046  0.045 -0.038 -0.017
## MARFT_1996    0.064  0.042  0.179 -0.040  0.192  0.052 -0.057  0.056 -0.068
## EMPFT_1996   -0.024 -0.130  0.061 -0.057 -0.061  0.034  0.022 -0.018 -0.095
## scholing_yrs -0.118  0.227  0.260  0.113  0.337  0.342  0.044 -0.061  0.129
## in_sch_1996   0.002 -0.014 -0.015 -0.111 -0.015 -0.035 -0.012  0.023 -0.015
## month2       -0.099  0.003  0.001  0.000  0.000  0.001  0.019 -0.017  0.001
## month3       -0.105  0.001  0.000 -0.002 -0.001  0.003  0.012 -0.019  0.003
## month4       -0.086  0.002  0.000 -0.002 -0.001  0.005  0.018 -0.016  0.002
## month5       -0.098  0.003  0.006  0.009  0.010 -0.003  0.020 -0.024 -0.001
## month6       -0.087  0.003  0.003  0.007  0.007 -0.004  0.019 -0.022 -0.002
## month7       -0.094  0.002  0.004  0.007  0.006 -0.002  0.022 -0.025 -0.001
## month8       -0.054  0.000  0.000  0.001  0.000 -0.001  0.002 -0.003 -0.001
## month9       -0.059 -0.001  0.000  0.001  0.000 -0.002  0.002 -0.003 -0.001
## month10      -0.063  0.000  0.000  0.001  0.000 -0.002  0.002 -0.003 -0.001
## month11      -0.062  0.000 -0.001  0.000  0.000 -0.001  0.002 -0.002 -0.001
## month12      -0.074  0.001 -0.001  0.000  0.000  0.000  0.000 -0.001  0.000
##              SCHLFT HLTHFT BUSFT_ MARFT_ EMPFT_ schln_ i__199 month2 month3
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## genderfemal
## agedecades
## I(agdcda^2)
## intrp_lgprc
## SCHLFT_1996
## HLTHFT_1996  -0.074
## BUSFT_1996   -0.105 -0.154
## MARFT_1996   -0.034 -0.100 -0.518
## EMPFT_1996   -0.086 -0.460  0.130 -0.168
## scholng_yrs   0.124 -0.014  0.044 -0.059  0.121
## in_sch_1996  -0.056 -0.002 -0.026  0.095 -0.116 -0.406
## month2       -0.004  0.001  0.003  0.000  0.001 -0.004  0.008
## month3       -0.006  0.000  0.004 -0.002  0.001 -0.008  0.010  0.849
## month4       -0.002 -0.001  0.003 -0.001  0.000 -0.005  0.007  0.688  0.718
## month5       -0.002  0.002 -0.001 -0.001 -0.002  0.008 -0.004  0.840  0.877
## month6       -0.001  0.003  0.000 -0.001 -0.001  0.007 -0.005  0.734  0.766
## month7       -0.002  0.003  0.001 -0.002  0.000  0.008 -0.007  0.784  0.819
## month8       -0.002  0.000  0.000 -0.001  0.001  0.001  0.001  0.552  0.576
## month9       -0.001  0.000  0.000 -0.001  0.000  0.001  0.001  0.601  0.627
## month10      -0.001  0.000  0.000  0.000  0.000  0.001  0.001  0.637  0.665
## month11       0.000  0.000  0.000  0.000  0.000  0.001  0.001  0.637  0.665
## month12       0.000  0.000  0.001  0.000  0.001  0.001  0.000  0.765  0.799
##              month4 month5 month6 month7 month8 month9 mnth10 mnth11
## ethncHllTbt
## ethnicLwHnd
## ethnicNewar
## ethnicTrTbt
## genderfemal
## agedecades
## I(agdcda^2)
## intrp_lgprc
## SCHLFT_1996
## HLTHFT_1996
## BUSFT_1996
## MARFT_1996
## EMPFT_1996
## scholng_yrs
## in_sch_1996
## month2
## month3
## month4
## month5        0.711
## month6        0.621  0.762
## month7        0.663  0.815  0.712
## month8        0.467  0.572  0.500  0.534
## month9        0.508  0.623  0.544  0.581  0.409
## month10       0.539  0.660  0.577  0.617  0.434  0.472
## month11       0.539  0.660  0.577  0.616  0.434  0.472  0.500
## month12       0.647  0.793  0.692  0.740  0.521  0.567  0.601  0.601
```

```
##                        coef        OR
## (Intercept)       -19.656936    0.0000
## ethnicHillTibeto   -0.158143    0.8537
## ethnicLowHindu     -0.604393    0.5464
## ethnicNewar        -0.702994    0.4951
## ethnicTeraiTibeto  -0.295606    0.7441
## genderfemale        1.177760    3.2471
## agedecades          8.352963 4242.7314
## I(agedecades^2)    -1.071368    0.3425
## interp_logpercagveg 0.373876    1.4534
## SCHLFT_1996         0.012668    1.0127
## HLTHFT_1996        -0.007283    0.9927
```

```
## BUSFT_1996         0.014227    1.0143
## MARFT_1996        -0.008299    0.9917
## EMPFT_1996         0.007793    1.0078
## schooling_yrs     -0.066958    0.9352
## in_school_1996    -0.316712    0.7285
## month2             1.418458    4.1307
## month3             2.099071    8.1586
## month4             0.383946    1.4681
## month5             1.681909    5.3758
## month6             0.446940    1.5635
## month7             0.951803    2.5904
## month8            -0.596253    0.5509
## month9            -0.300961    0.7401
## month10           -0.067784    0.9345
## month11           -0.050552    0.9507
## month12            0.938615    2.5564
```

Conclusions

Model overview

Model	AIC	Log Likelihood
Fixed	1711.5021	-828.7511
2-level (random int. at NBH level)	1713.5021	-828.7511
3-level (random int. at resp and NBH level)	1709.2771	-825.6385