Kenya

```
## [1] "Census Females"
```

```
## # A tibble: 86 x 7
##      age  `1962`  `1969`  `1989`  `1999`  `2009`  `2019`
##    <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1     0 114962. 180506  401598. 543989. 605394. 549078.
##  2     1 124197. 208046. 365428. 433581. 566581. 575921.
##  3     2 141646. 212504. 376228. 440024. 584414. 597634.
##  4     3 141163. 208169. 374954. 428539. 590820. 611884.
##  5     4 137277. 206301. 369718. 422904. 593132. 619616.
##  6     5 132355. 198945. 364496. 409859. 579842. 620166.
##  7     6 130667. 189674. 354931. 397985. 565593. 616144.
##  8     7 125741. 180390. 348116. 395986. 553310. 615971.
##  9     8 118982. 169485. 337418. 406667. 547863. 622445.
## 10     9 110984. 158670. 325087. 410989. 535936. 626357.
## # ... with 76 more rows
```

```
## [1] "Census Females 5-year"
```

```
## # A tibble: 18 x 2
##      age   `1979`
##    <dbl>    <dbl>
##  1     0 1423936.
##  2     5 1235895.
##  3    10 1046913.
##  4    15  872886.
##  5    20  701504.
##  6    25  546283.
##  7    30  423762.
##  8    35  334882.
##  9    40  274175.
## 10    45  227571.
## 11    50  184967.
## 12    55  142658.
## 13    60  109394.
## 14    65   84777.
## 15    70   62651.
## 16    75   86752.
## 17    80      NA
## 18    85      NA
```

```
## [1] "Census Males"
```

```
## # A tibble: 86 x 7
##      age  `1962`  `1969`  `1989`  `1999`  `2009`  `2019`
##    <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1     0 110490. 181280  407366. 559955. 617213. 548946.
##  2     1 119896. 209856. 370701. 444554. 579266. 580058.
##  3     2 137308. 214870. 380545. 449449. 596090. 601059.
##  4     3 136838. 211596. 380154. 438004. 604392. 617870.
##  5     4 134196. 210258. 374474. 432305. 607876. 626295.
##  6     5 130987. 203113. 368800. 419618. 595609. 627665.
```

```
##  7     6 130752. 194028. 358900. 407236. 580858. 623689.
##  8     7 127766. 185536. 352312. 403393. 566023. 621037.
##  9     8 123091. 175184. 340718. 414324. 561125. 628883.
## 10     9 117015. 165066. 327739. 416104. 548548. 632145.
## # ... with 76 more rows
```

```
## [1] "Census Males 5-year"
```

```
## # A tibble: 18 x 2
##      age   `1979`
##    <dbl>    <dbl>
##  1     0 1424953.
##  2     5 1244344.
##  3    10 1052936.
##  4    15  851898.
##  5    20  664211.
##  6    25  519992.
##  7    30  404695.
##  8    35  312473.
##  9    40  258557.
## 10    45  221009.
## 11    50  181751.
## 12    55  143338.
## 13    60  114261.
## 14    65   93665.
## 15    70   66506.
## 16    75   87947.
## 17    80      NA
## 18    85      NA
```

Thiele log-Normal Hump Spline

```
## [1] "relative convergence (4)"
```

```
##           log_tau2_logpop_f           log_tau2_logpop_f           log_tau2_logpop_m           log_tau2_
##                   6.1434516                   5.3221974                   6.3312374                   5
##               log_tau2_gx_m         log_lambda_gx_age_f         log_lambda_gx_age_m        log_lambda_g
##                   2.4143786                   6.5618297                   7.5505937                   1
##     log_lambda_gx_agetime_m               log_lambda_tp log_lambda_tp_0_inflated_sd           log_dispe
##                   6.9077831                   1.9371502                  -0.5327302                   0
##     log_marginal_prec_psi_f       log_marginal_prec_A_f       log_marginal_prec_B_f     log_marginal_pre
##                   6.8055316                   6.7779290                   6.4727744                   6
##       log_marginal_prec_B_m            log_lambda_phi_f            log_lambda_psi_f         log_lambda_
##                   3.4648709                   4.3071869                   4.3069198                   3
##               log_lambda_A_f              log_lambda_B_f            log_lambda_phi_m           log_lambd
##                   4.3058951                   4.3027693                   4.3072667                   4
##        log_lambda_epsilon_m              log_lambda_A_m              log_lambda_B_m    logit_lambda_slop
##                   4.7795159                   4.3098581                   4.5216562                   1
##    logit_lambda_slope_rho_m     logit_delta_slope_rho_m   logit_epsilon_slope_rho_m
##                   1.0940379                  -1.6150531                   1.3111550
```

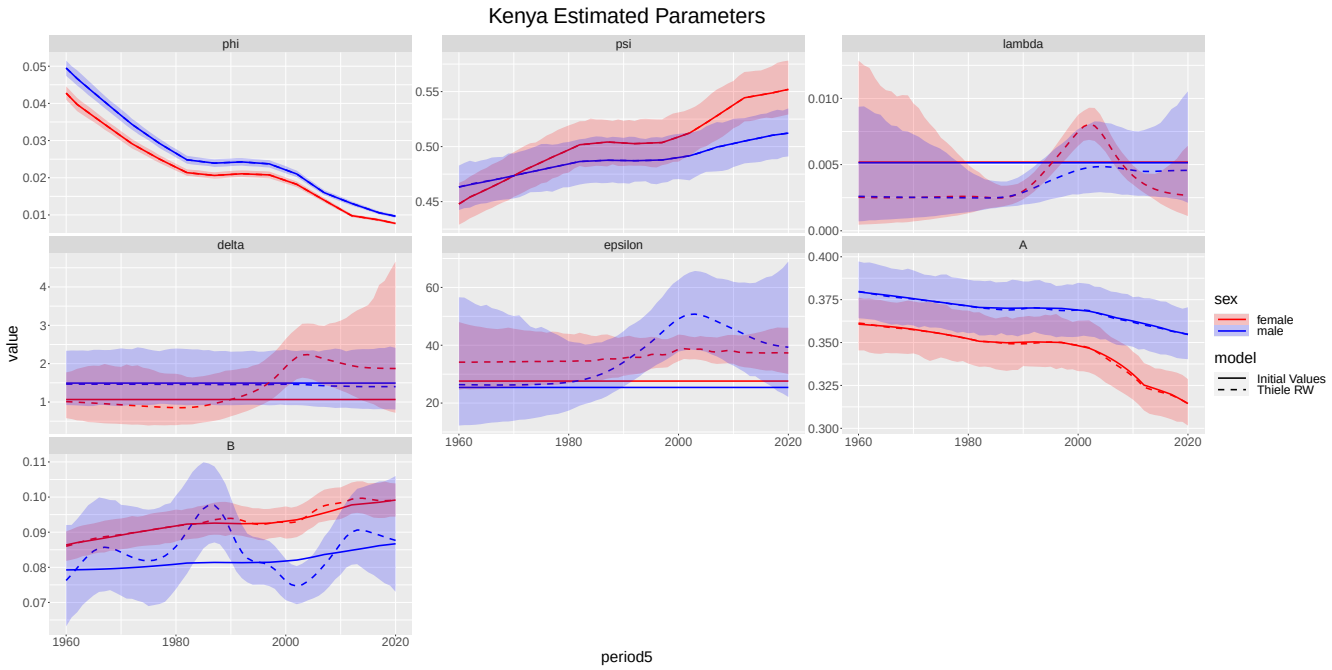

Figure 1: Estimated parameters

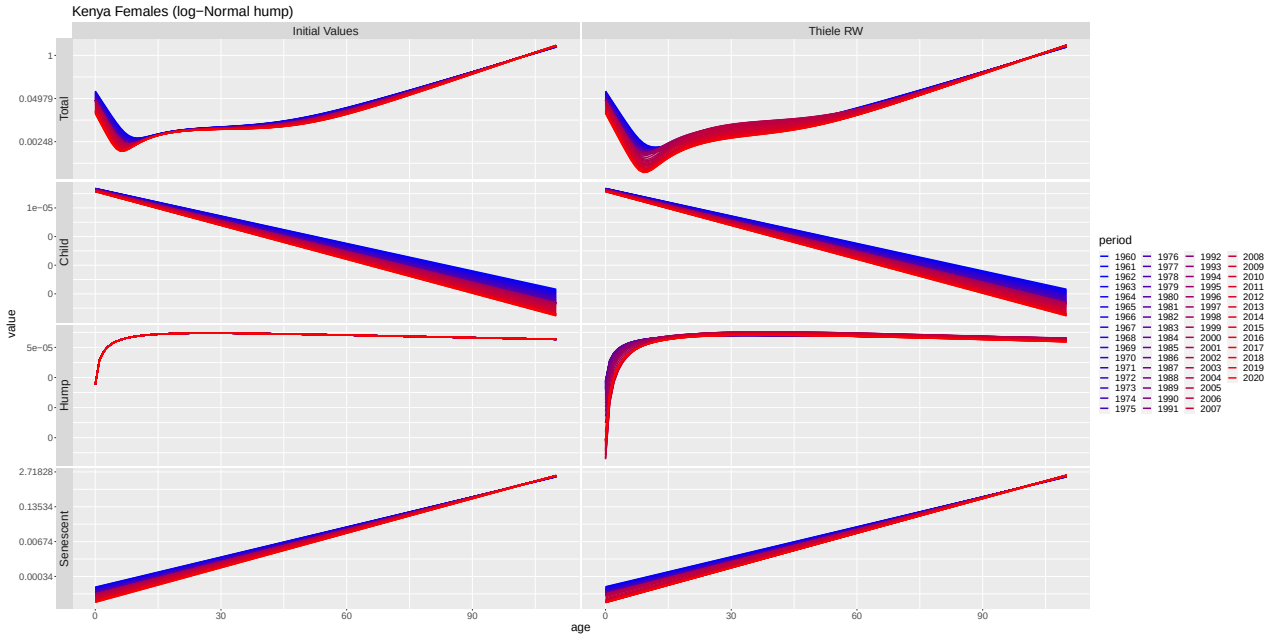

Figure 2: Thiele Decomposed

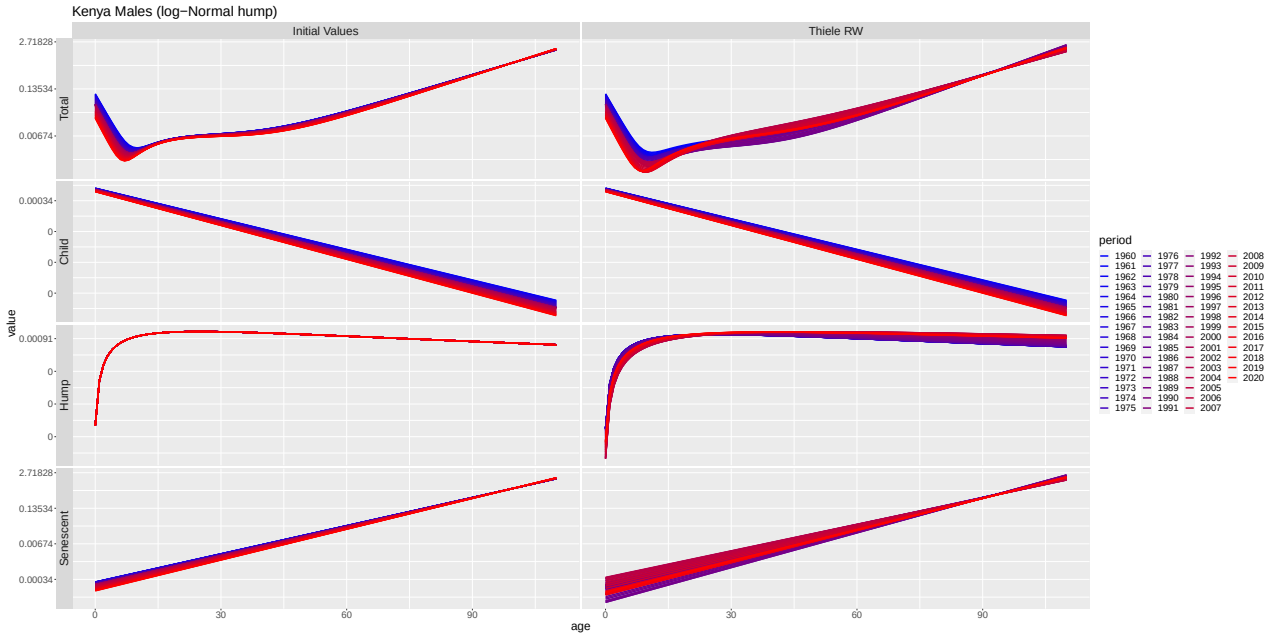

Figure 3: Thiele Decomposed

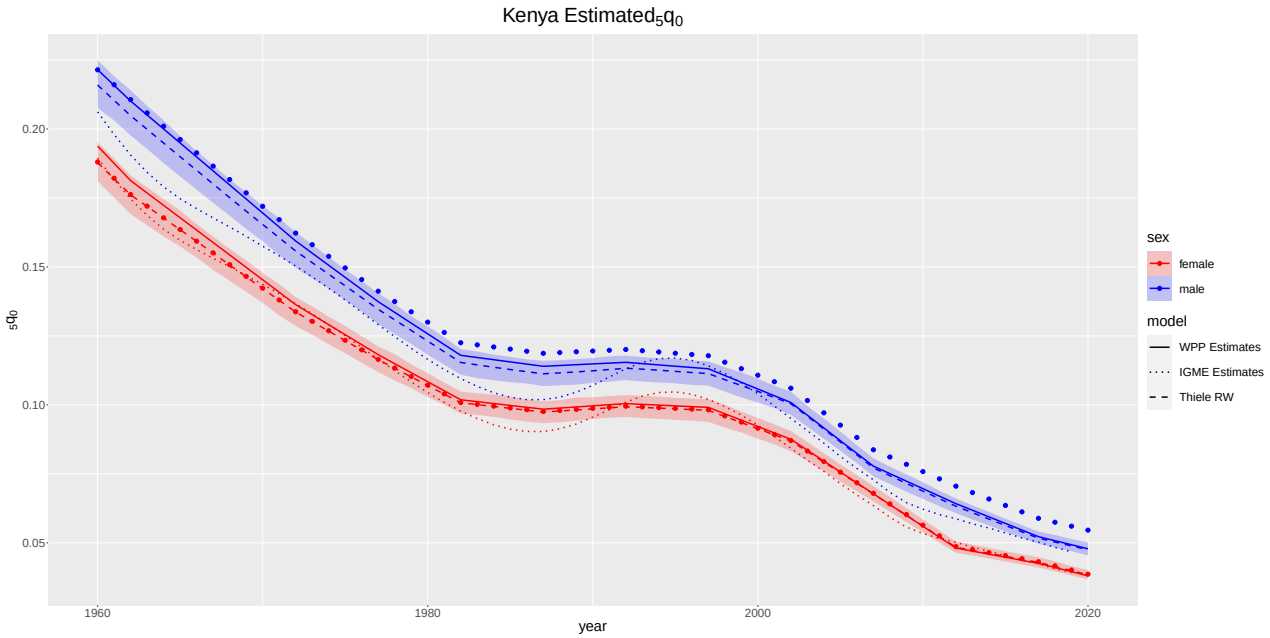

Figure 4: Estimated ${}_5q_0$

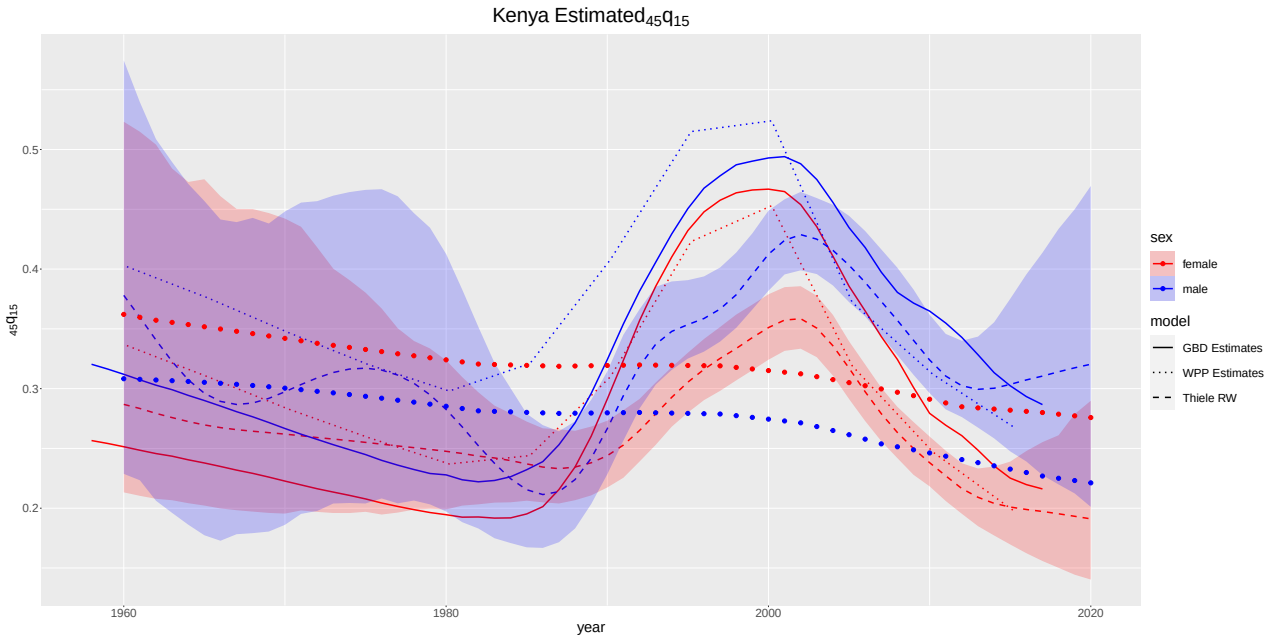

Figure 5: Estimated ${}_{45}q_{15}$

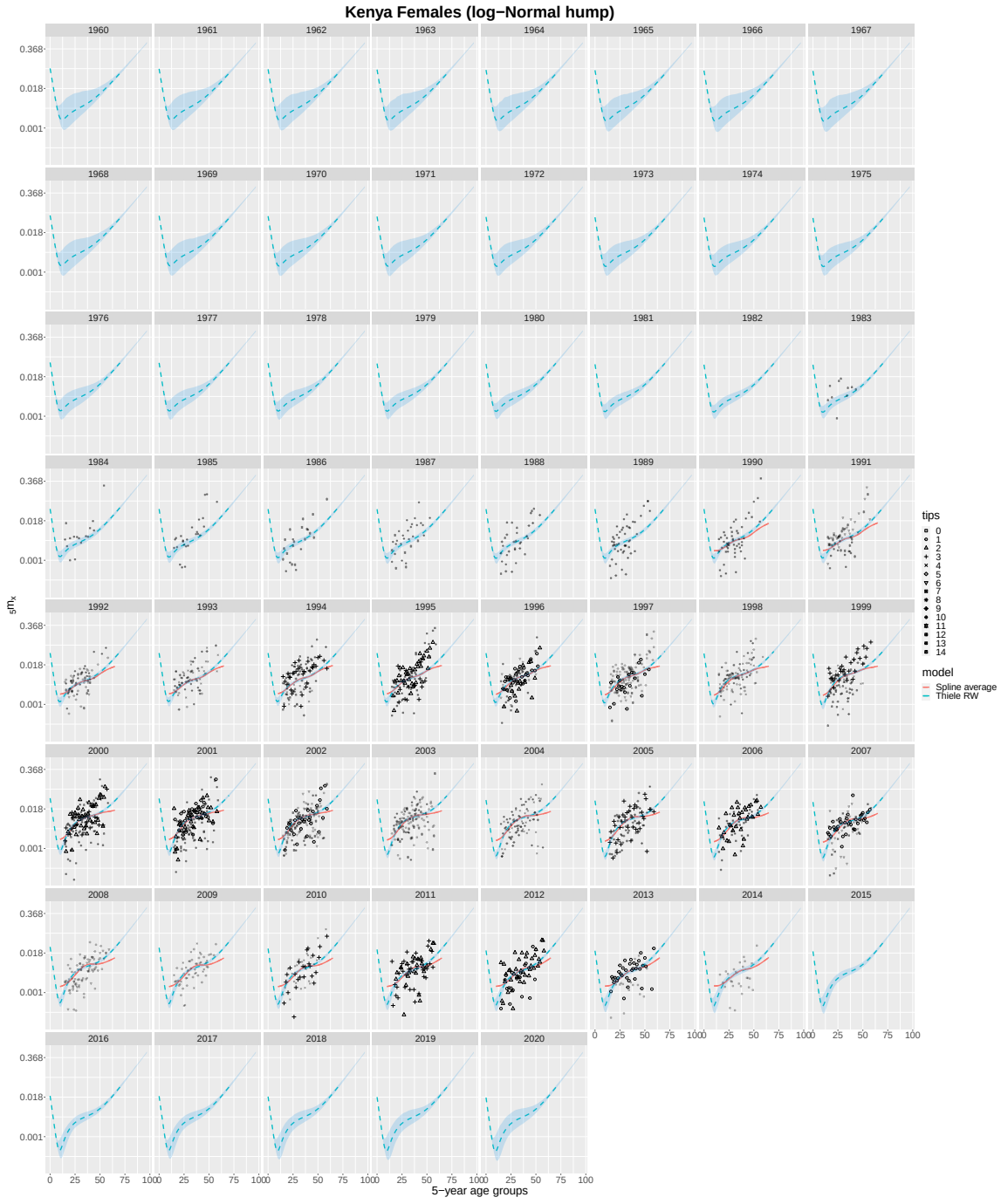

Figure 6: Mortality Schedules

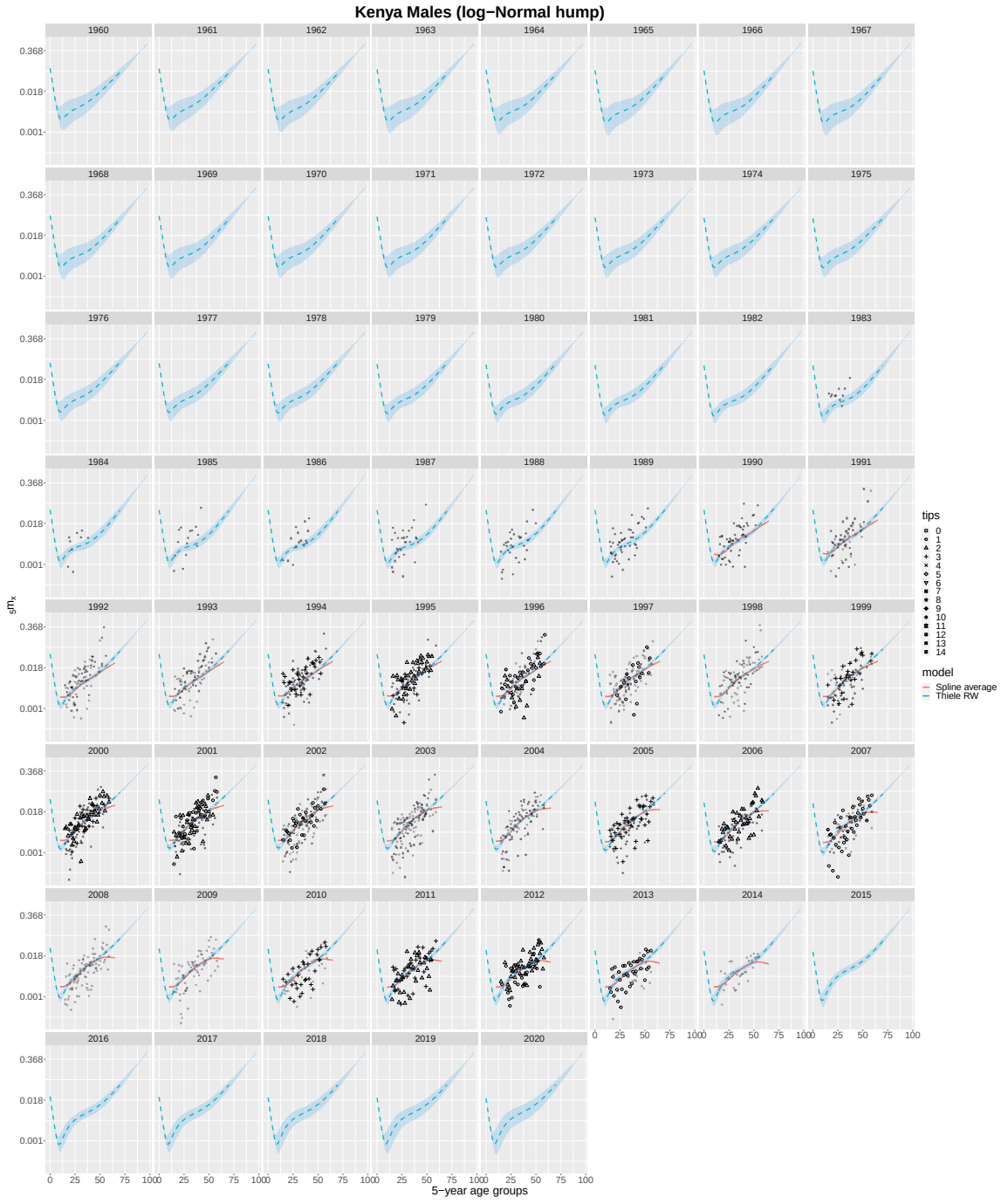

Figure 7: Mortality Schedules

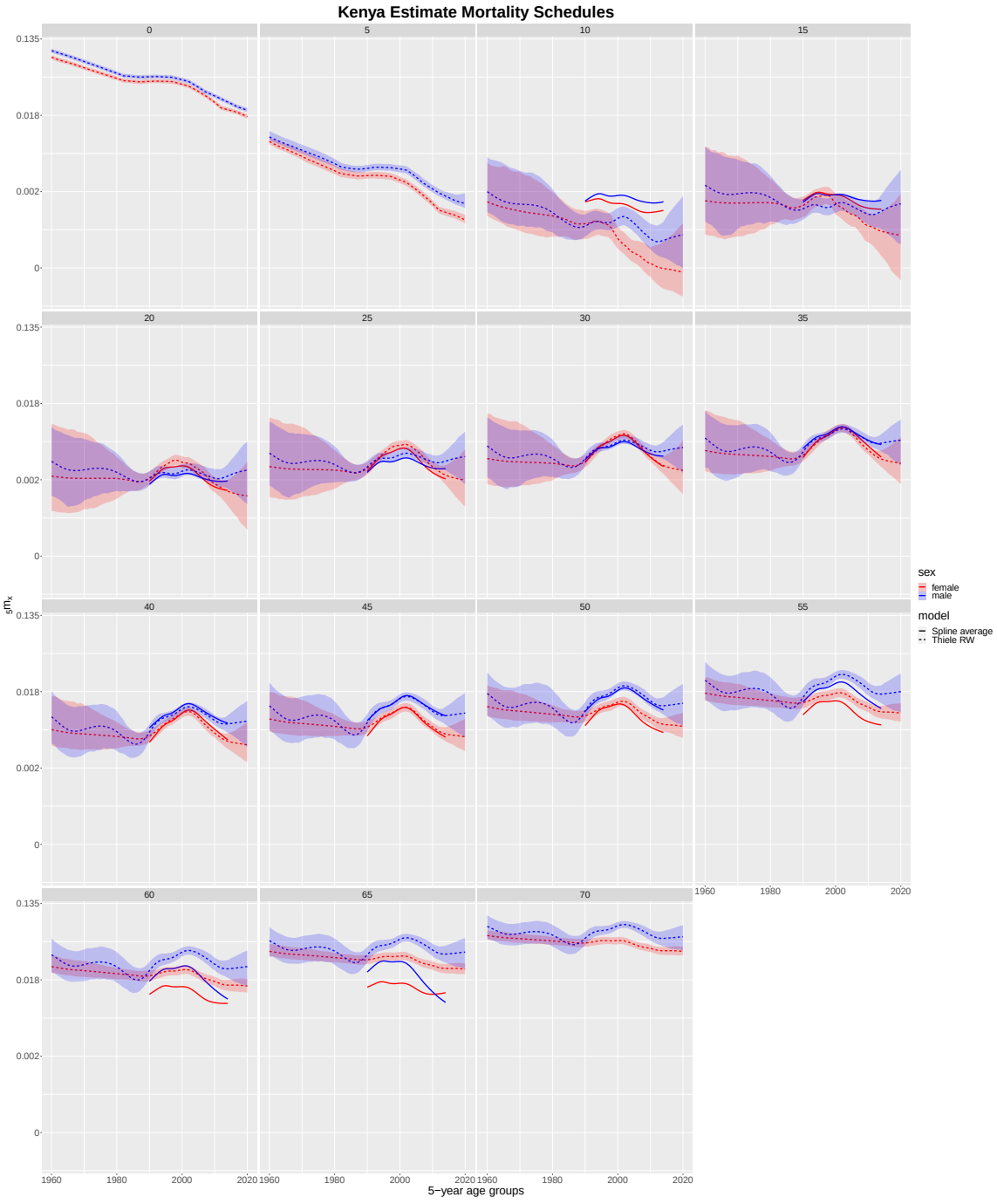

Figure 8: Mortality Schedules

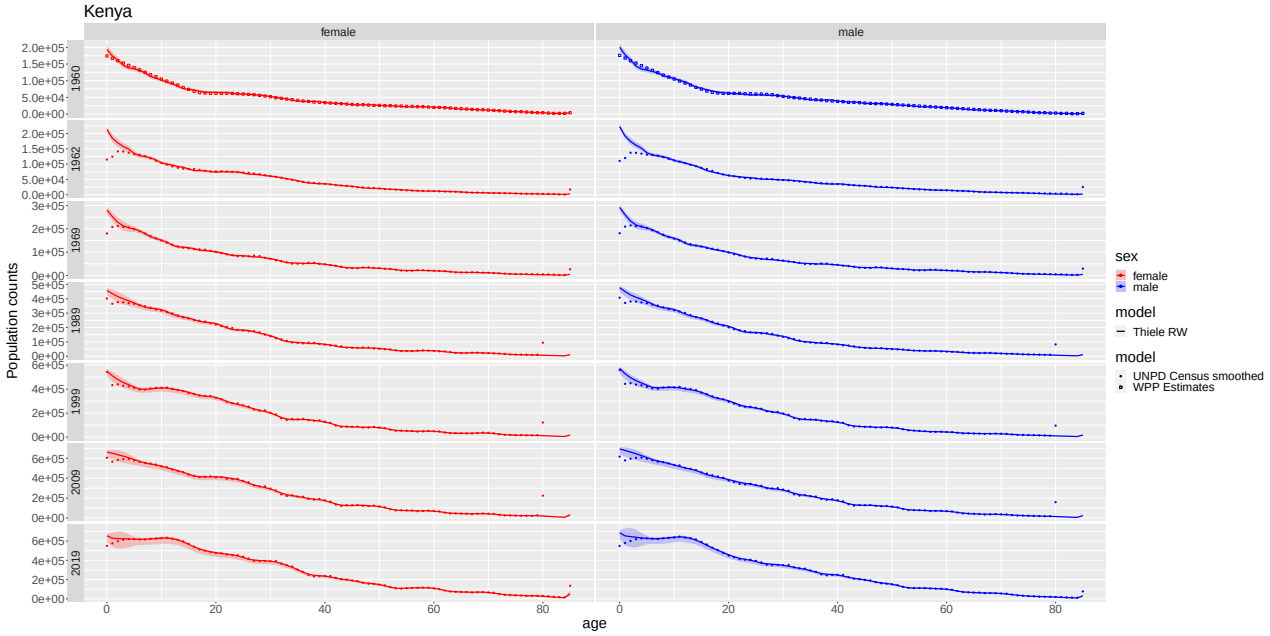

Figure 9: Population

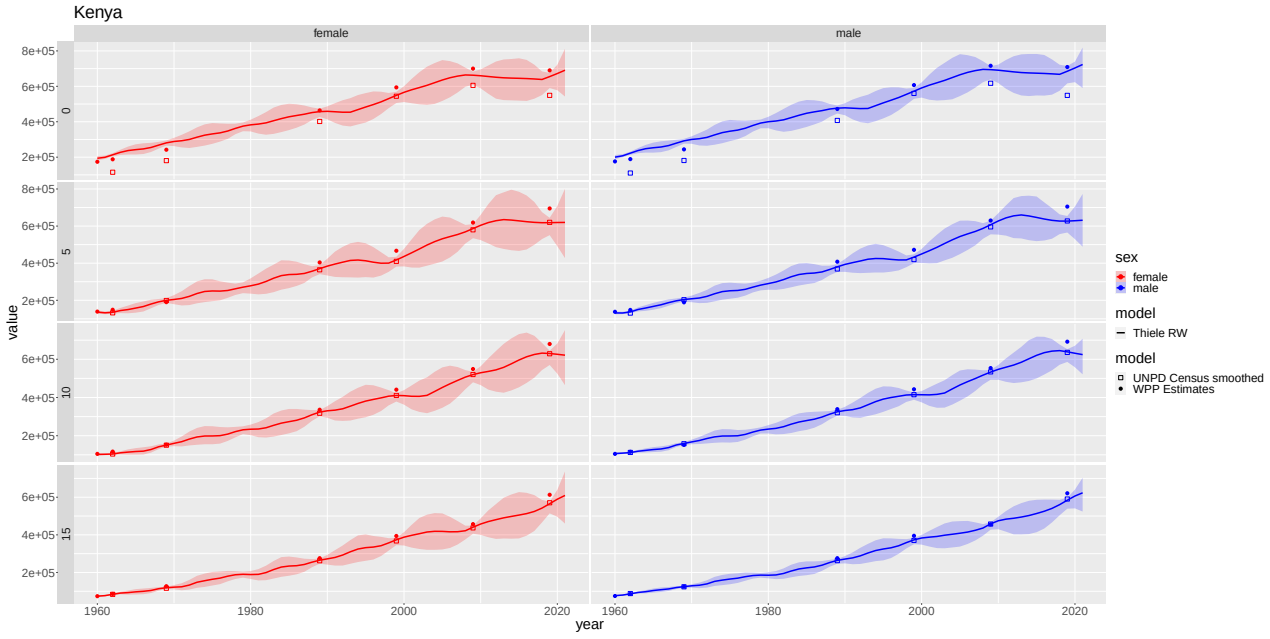

Figure 10: Population

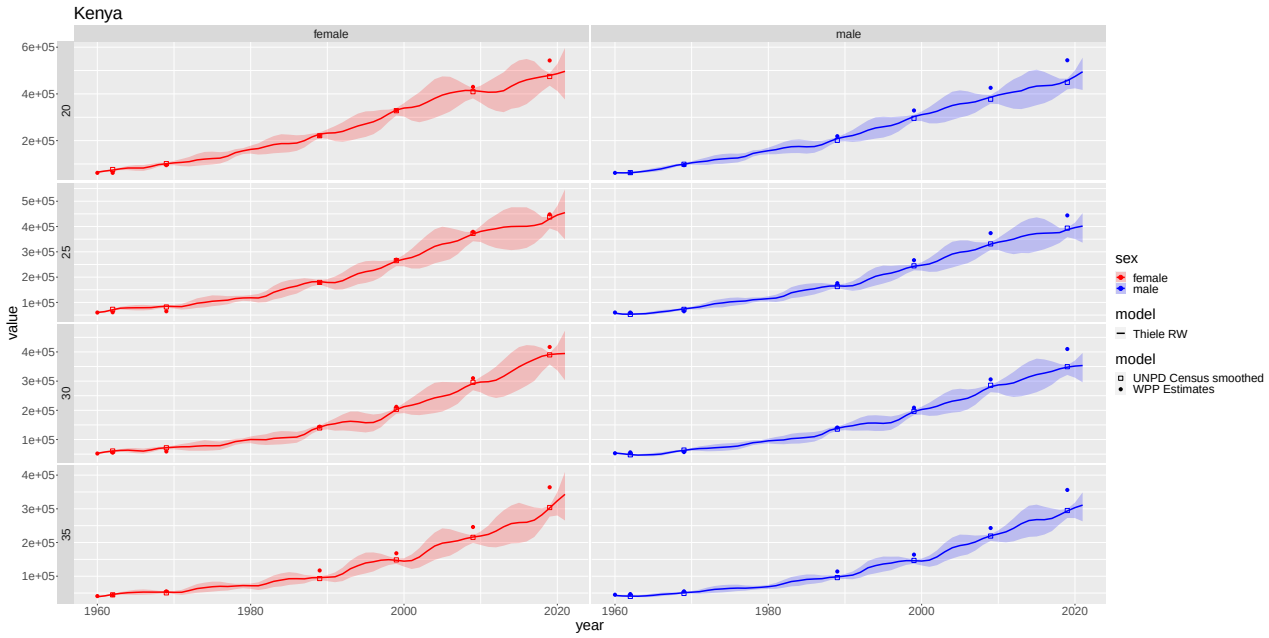

Figure 11: Population

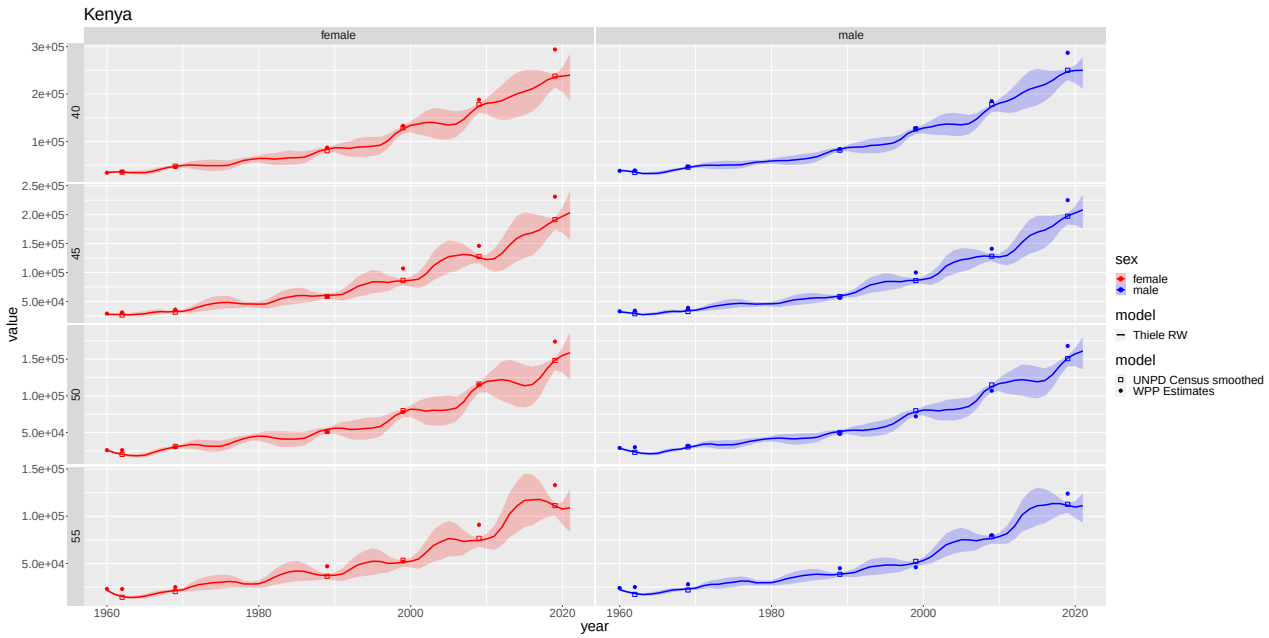

Figure 12: Population

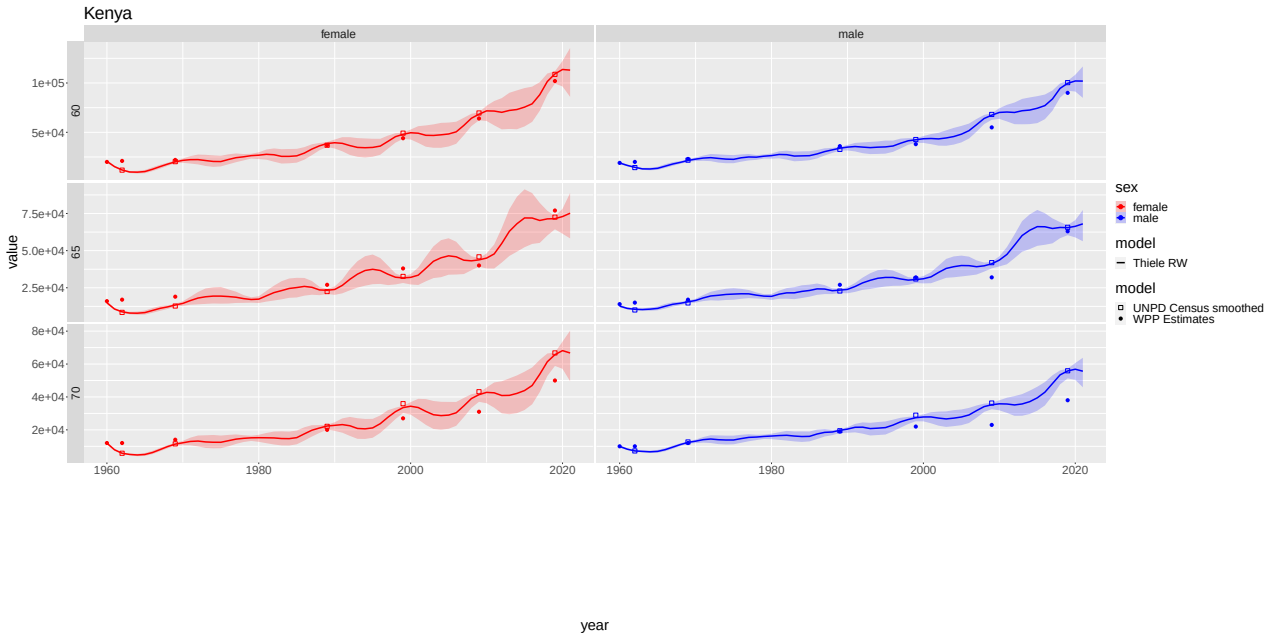

Figure 13: Population

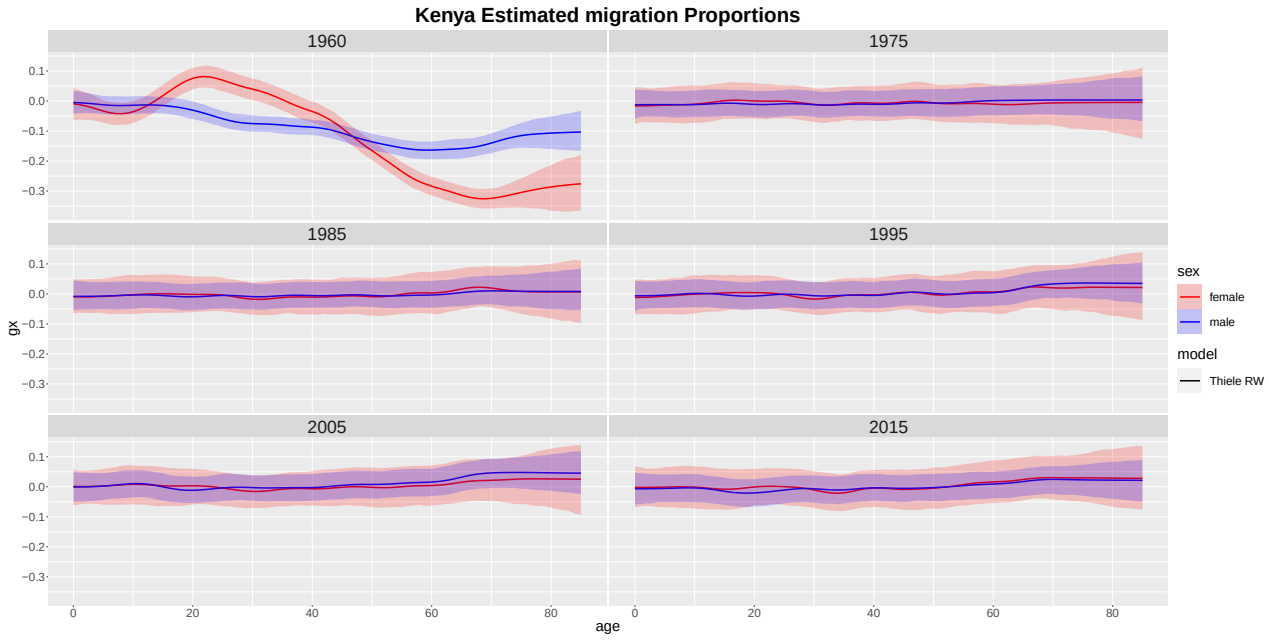

Figure 14: Migration

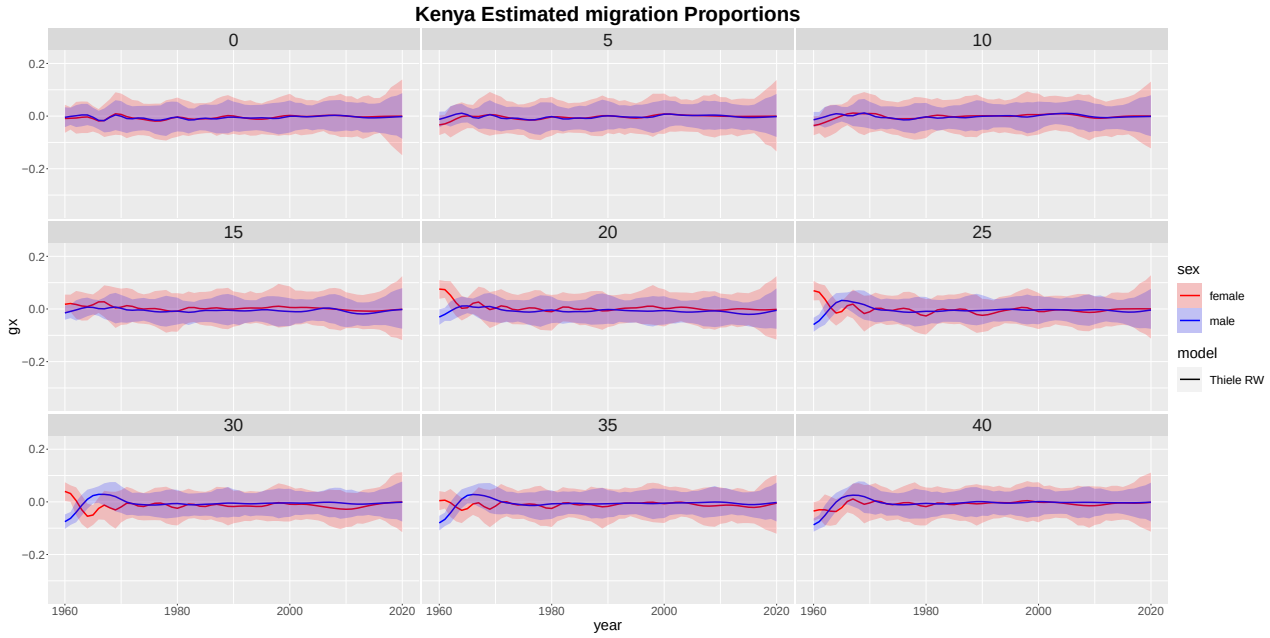

Figure 15: Migration

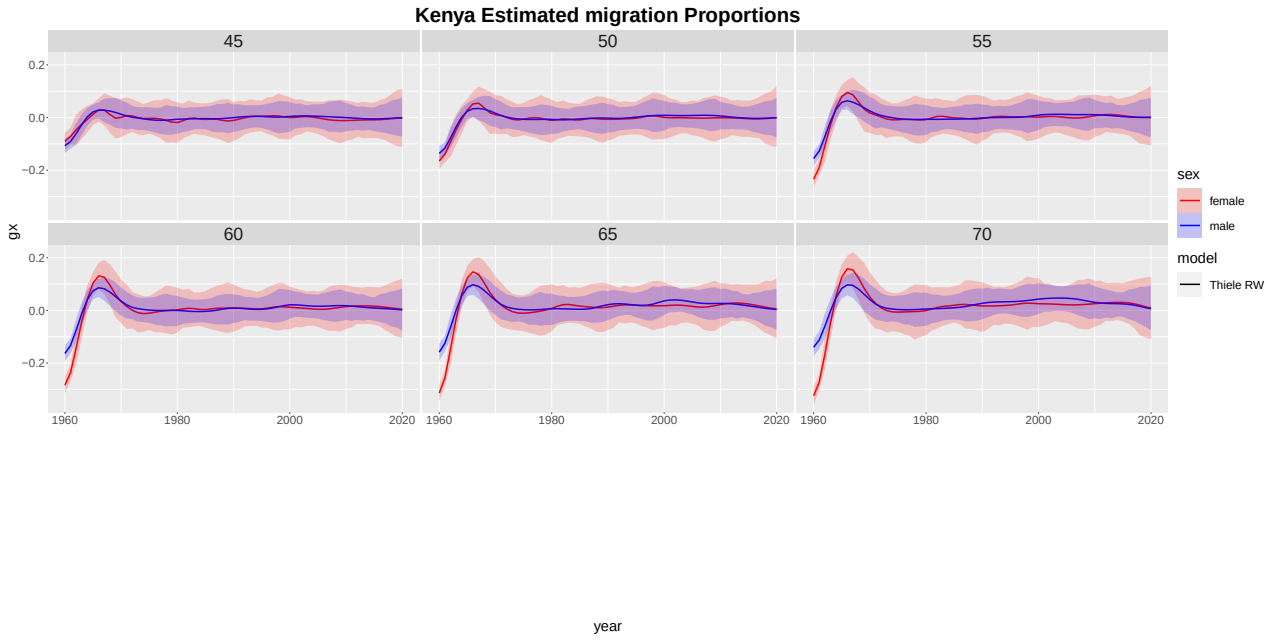

Figure 16: Migration

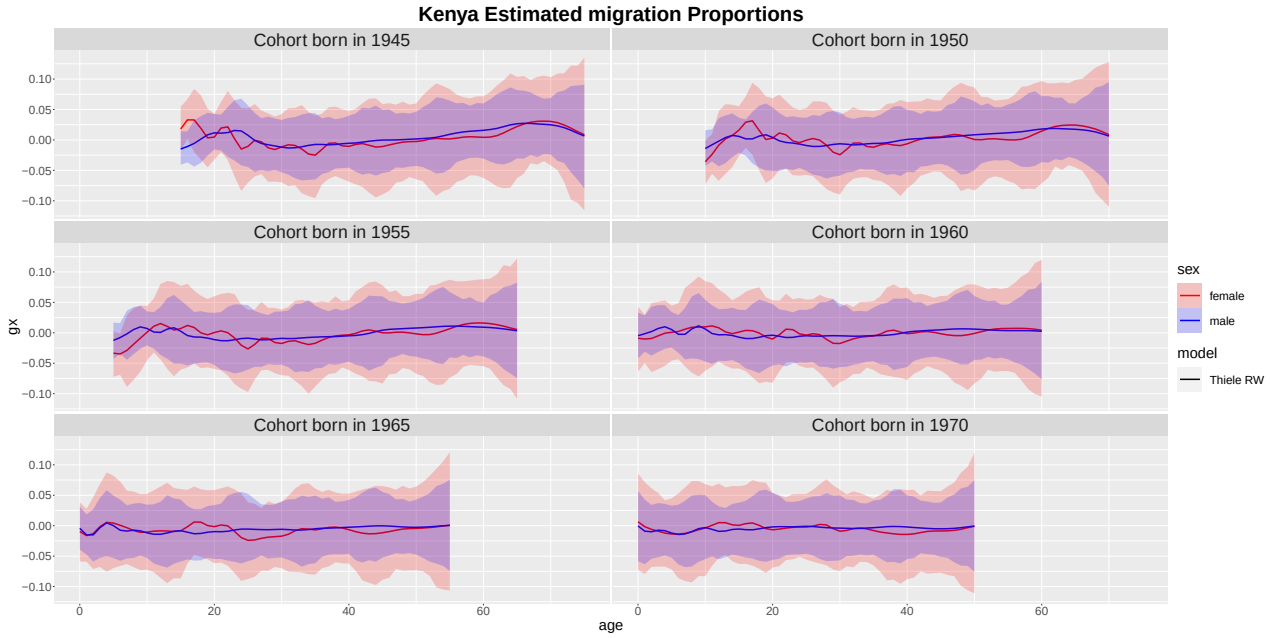

Figure 17: Migration

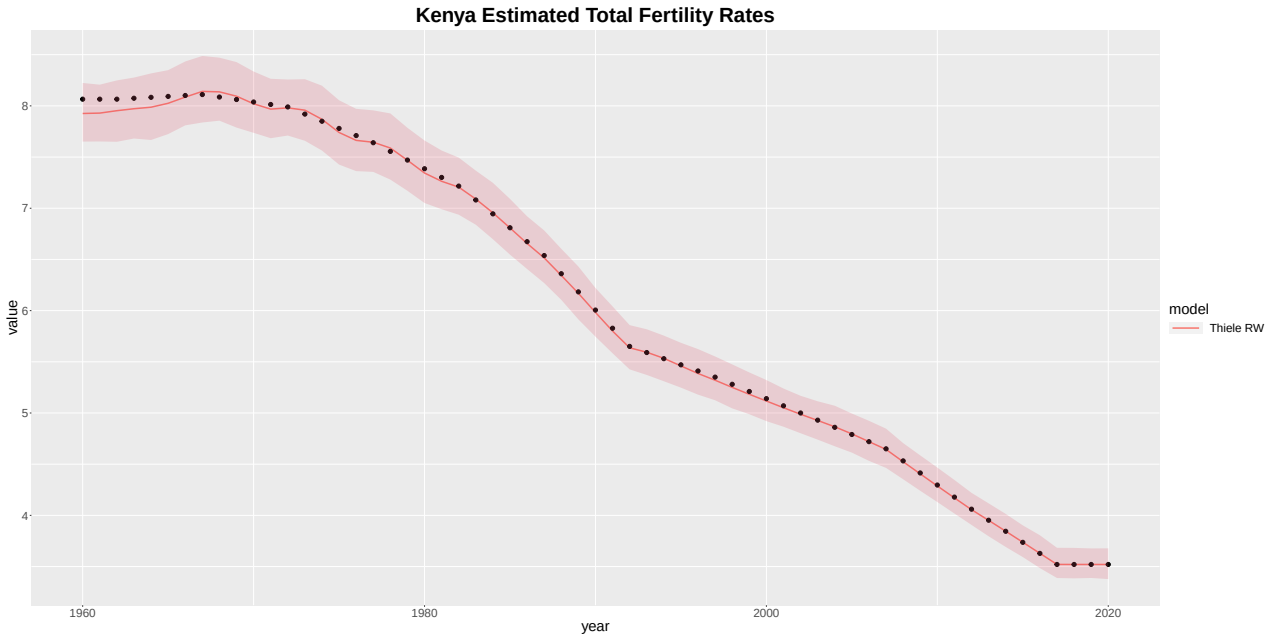

Figure 18: Total Fertility

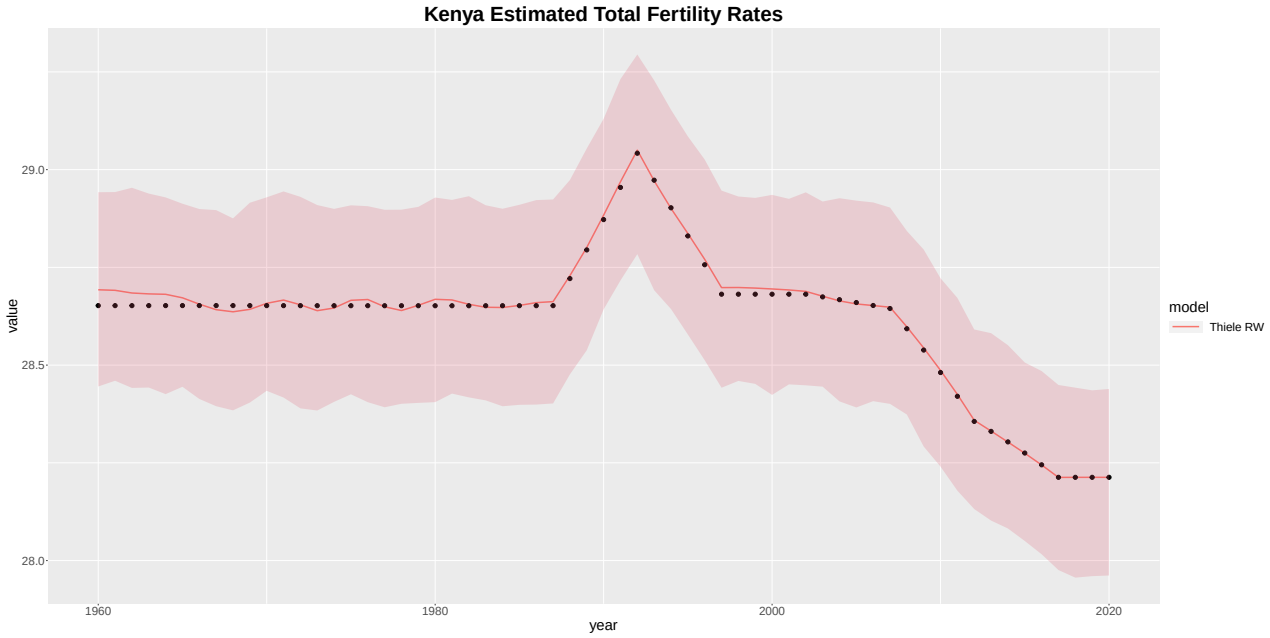

Figure 19: Mean age at births

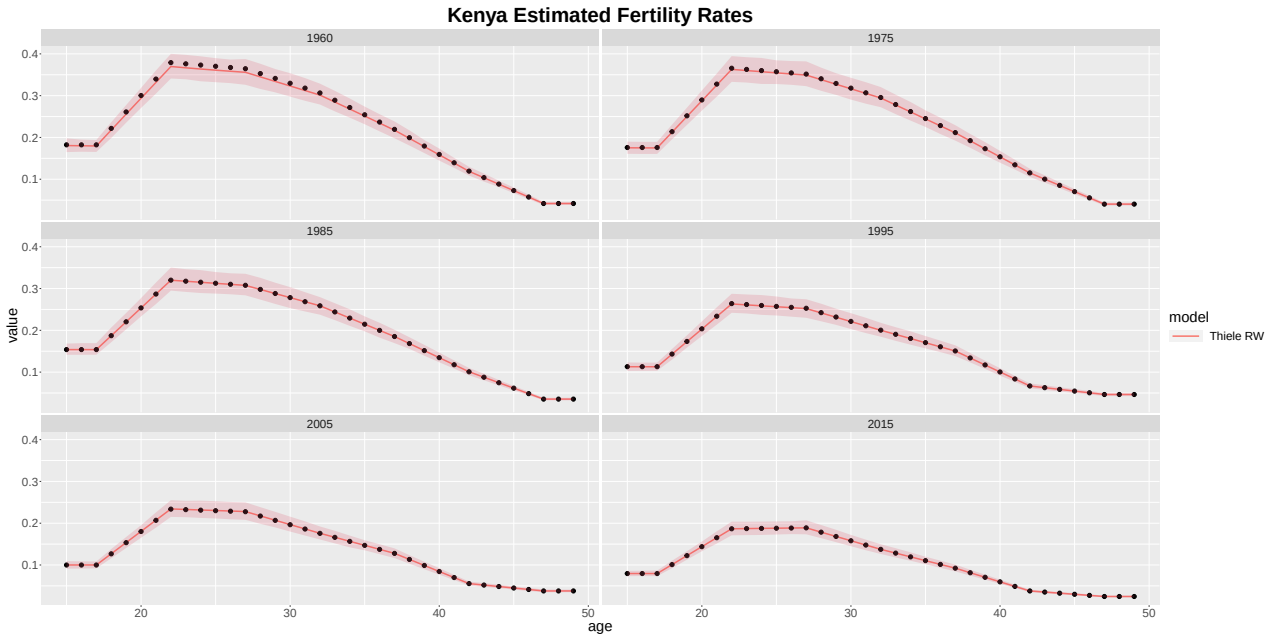

Figure 20: Fertility

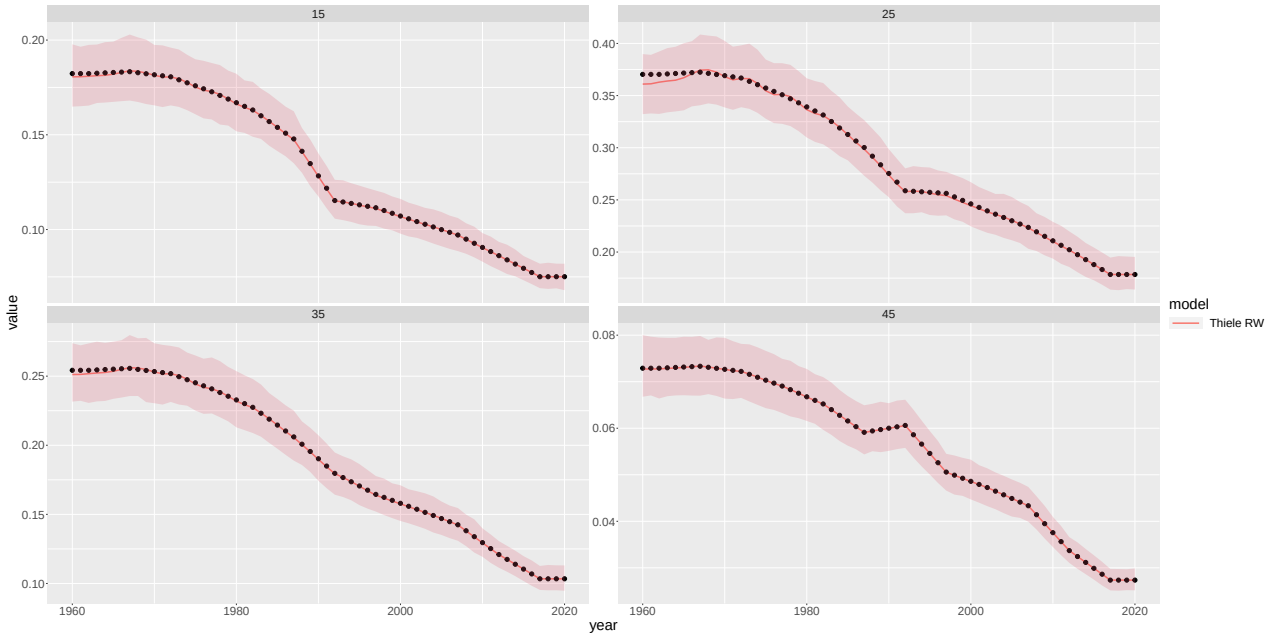

Figure 21: Fertility