

Niger

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

## # A tibble: 18 x 4
##   aggr.age `1977` `1988` `2012`
## *   <dbl>   <dbl>   <dbl>   <dbl>
## 1     0 480868. 767944. 1804965
## 2     5 379474. 591098. 1470500
## 3    10 323758. 413151. 1075134
## 4    15 279586. 345464.  893434
## 5    20 259885. 337382.  689036
## 6    25 229768. 299763.  549851
## 7    30 182961. 233007.  467055
## 8    35 138789. 175234.  379821
## 9    40  97880. 135982.  296350
## 10   45  71277. 101152.  256364
## 11   50  52956.  76243.  196965
## 12   55  41285.  58936.  153305
## 13   60  32627.  46963.  114978
## 14   65  25976.  36347.   94167
## 15   70  29113.  27748.   71527
## 16   75   7027.  13818.   52730
## 17   80  22086.  26159.   34767
## 18   85     NA     NA   18941.
```

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

## # A tibble: 18 x 4
##   aggr.age `1977` `1988` `2012`
## *   <dbl>   <dbl>   <dbl>   <dbl>
## 1     0 488545. 778177. 1891826.
## 2     5 418323. 616100. 1524504.
## 3    10 312614. 426607. 1088679.
## 4    15 245025. 305321.  834345.
## 5    20 204773. 262859.  631280.
## 6    25 181324. 237907.  521141.
## 7    30 161887. 205936.  430506.
## 8    35 140820. 173789.  349963.
## 9    40 114989. 144546.  285869.
## 10   45  91540. 117817.  243368.
## 11   50  70724.  95765.  195591.
## 12   55  55425.  75808.  151019.
## 13   60  42384.  58913.  114428.
## 14   65  31976.  43365.   90566.
## 15   70  29092.  31006.   69752.
## 16   75   9029.  17178.   50476.
## 17   80  18057.  25771.   31506.
## 18   85     NA     NA   13999.
```

Thiele log-Normal Hump RW

```
##   user  system elapsed
## 21.50   0.38   22.01
```

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



Figure 1: Estimated parameters

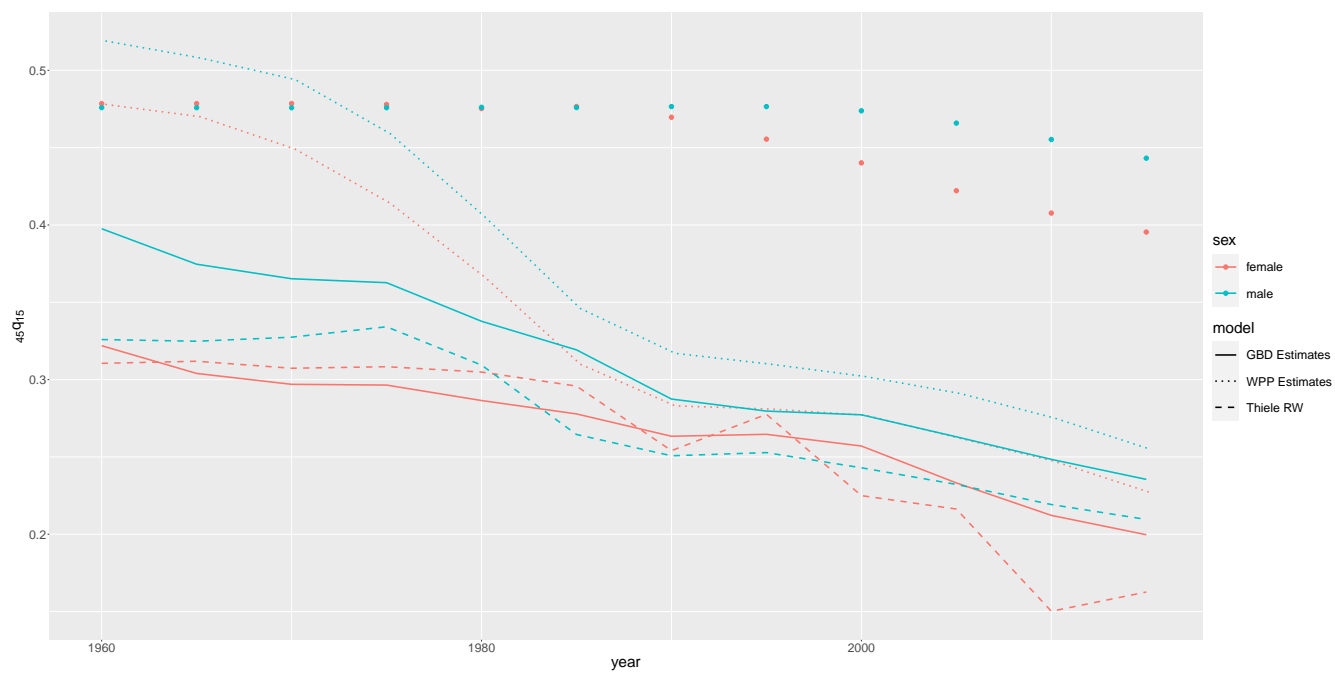


Figure 2: Estimated $_{45}q_{15}$

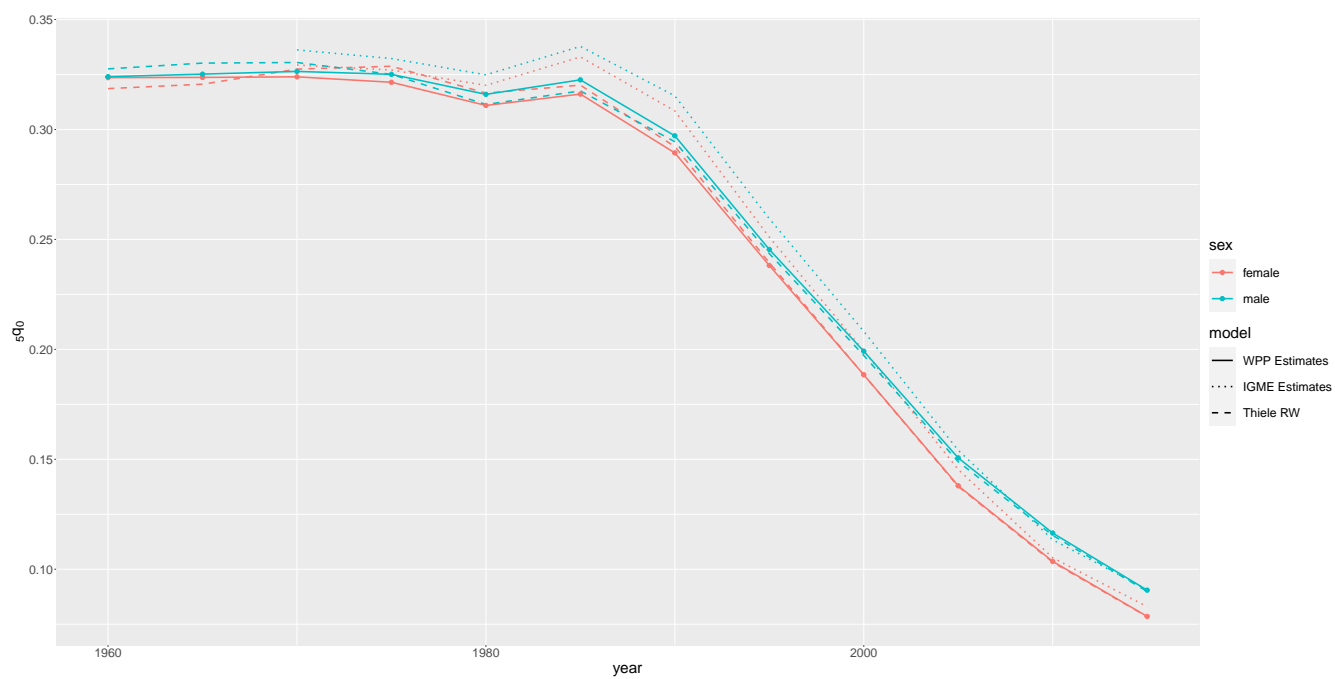


Figure 3: Estimated $_{5}q_0$

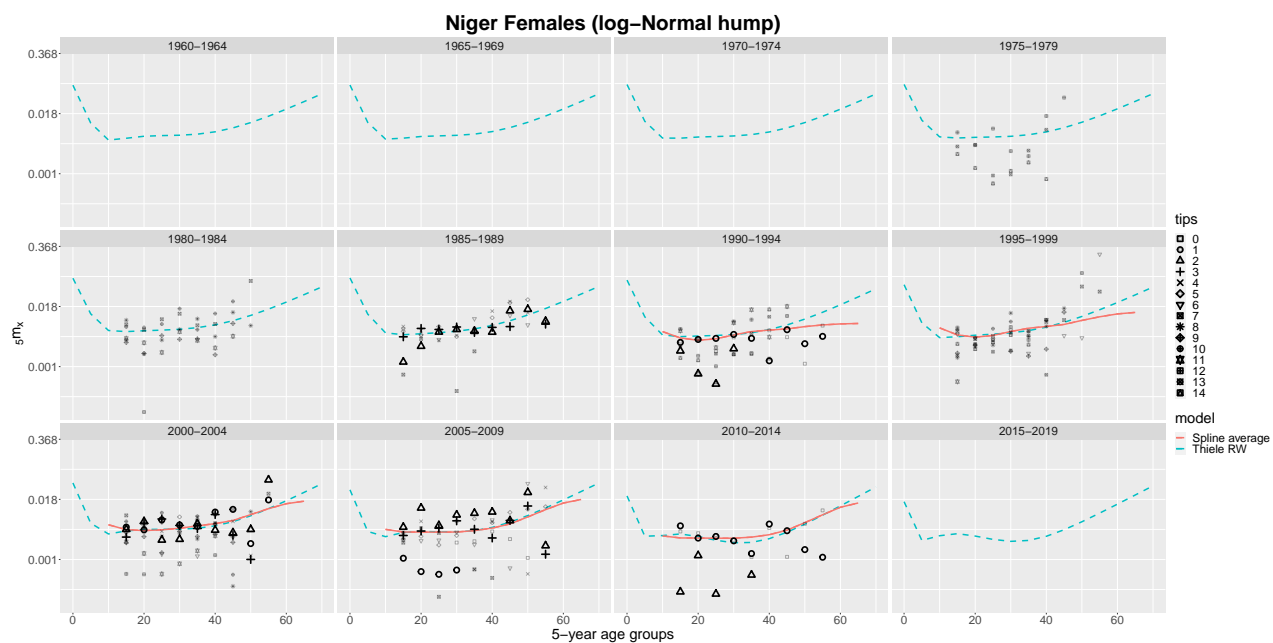


Figure 4: Mortality Schedules

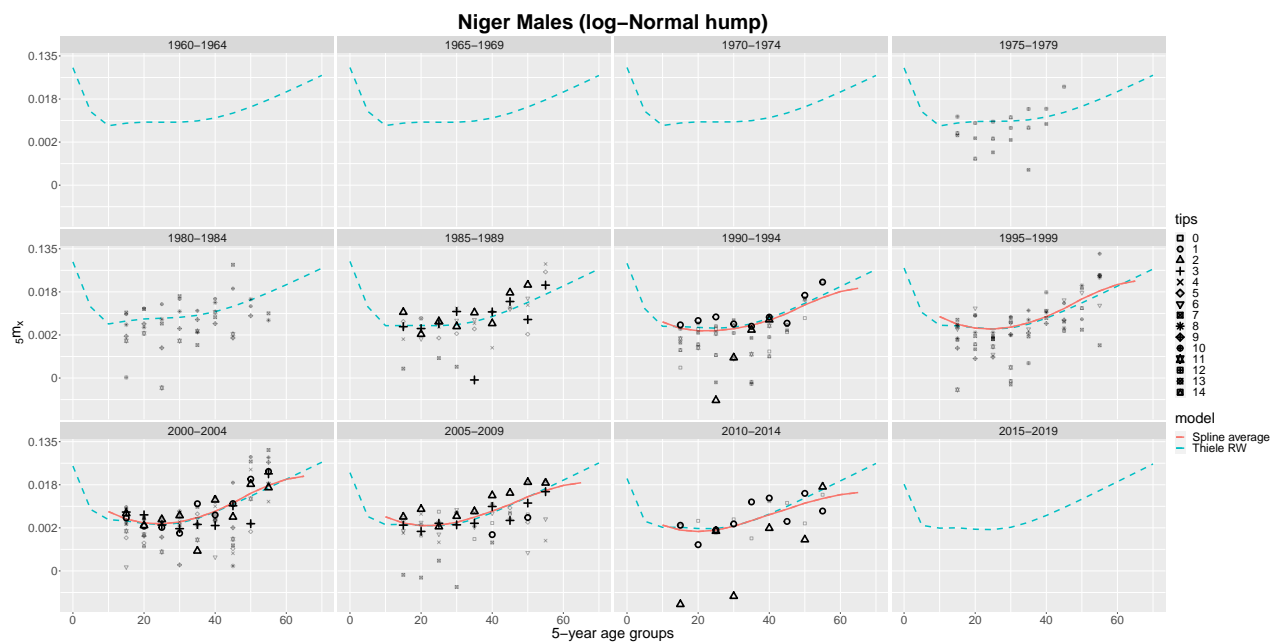


Figure 5: Mortality Schedules

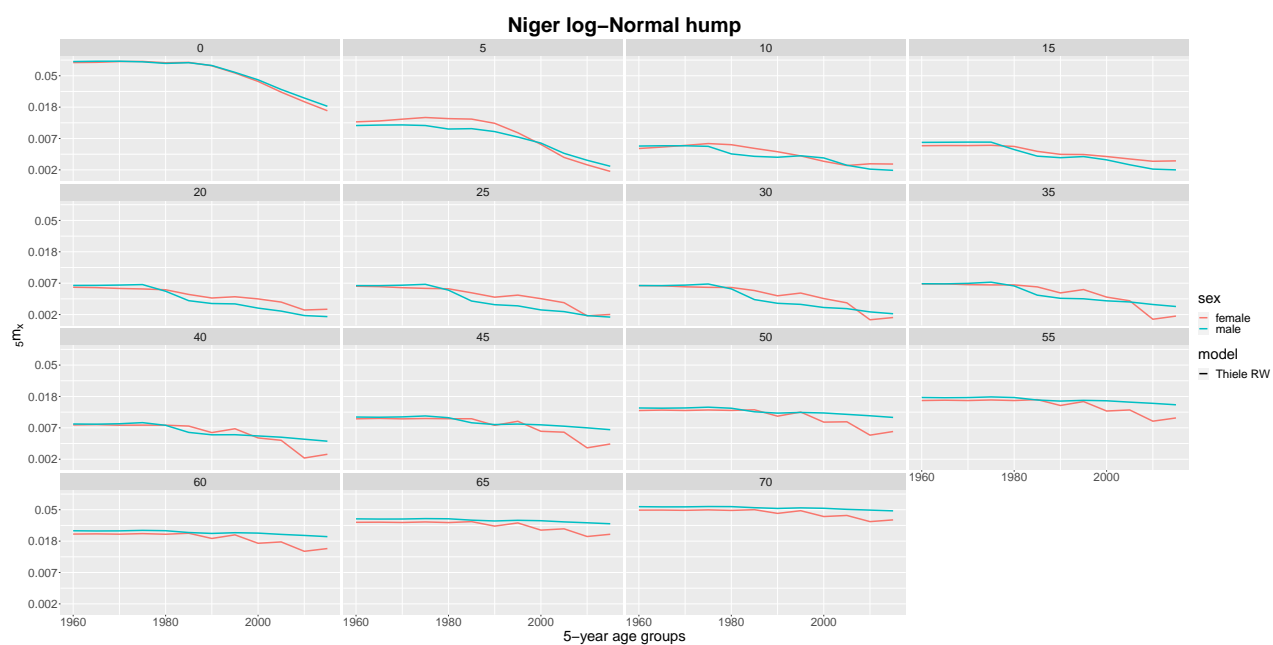


Figure 6: Mortality Schedules

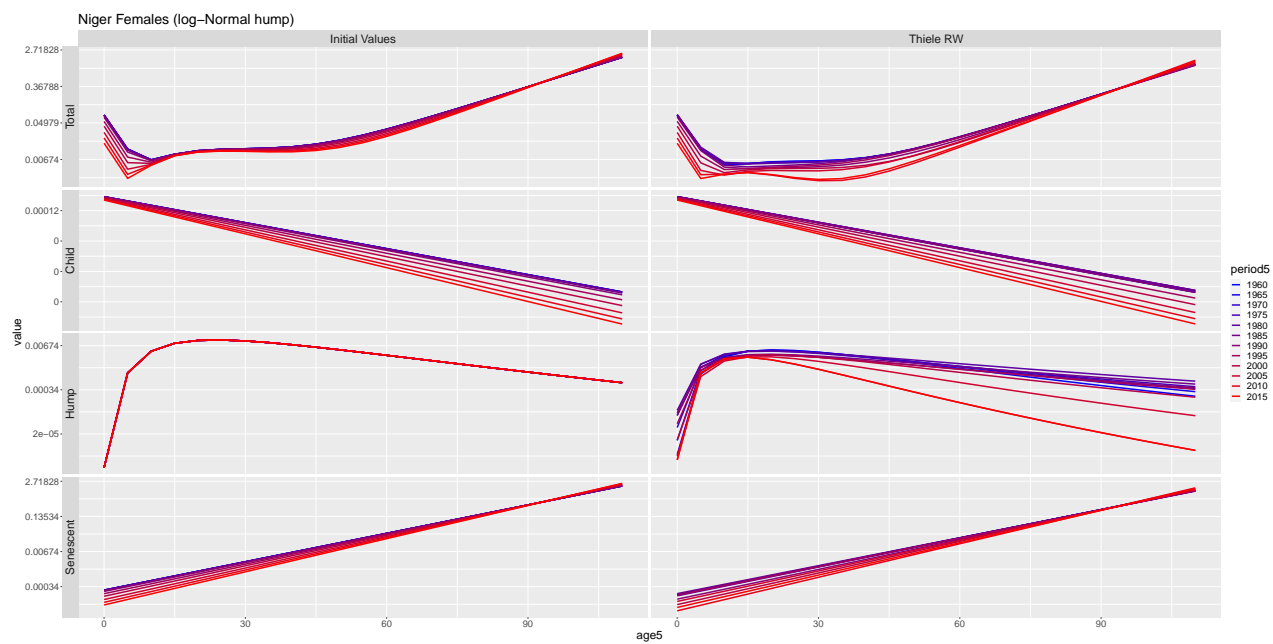


Figure 7: Thiele Decomposed

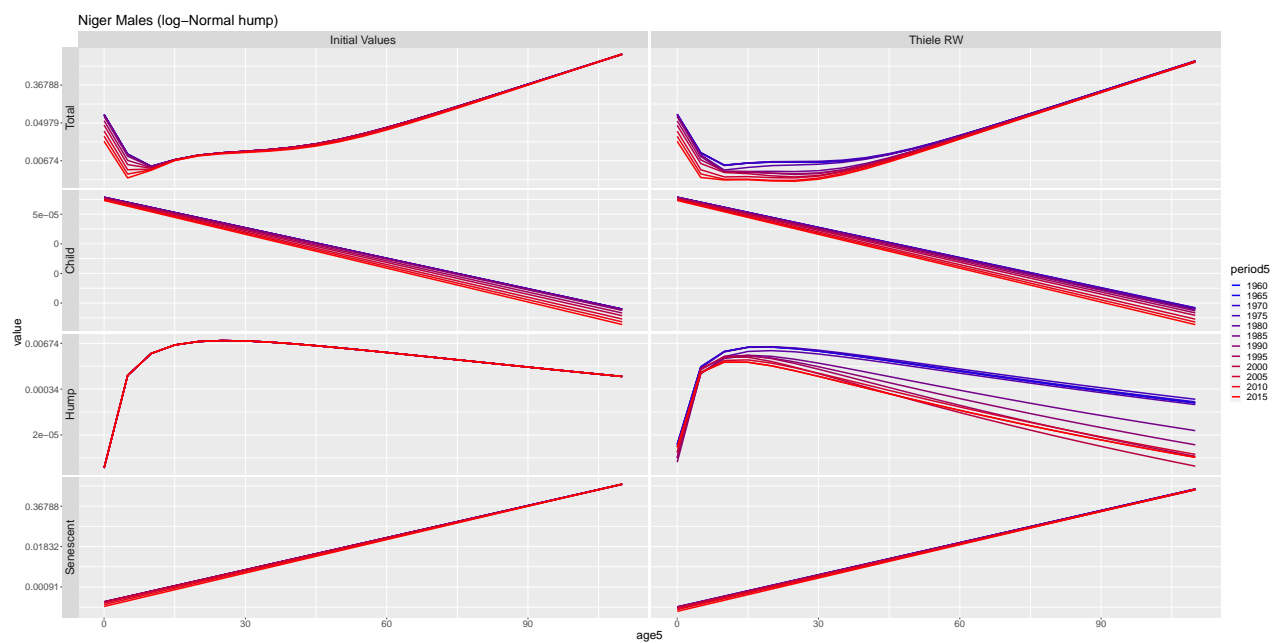


Figure 8: Thiele Decomposed

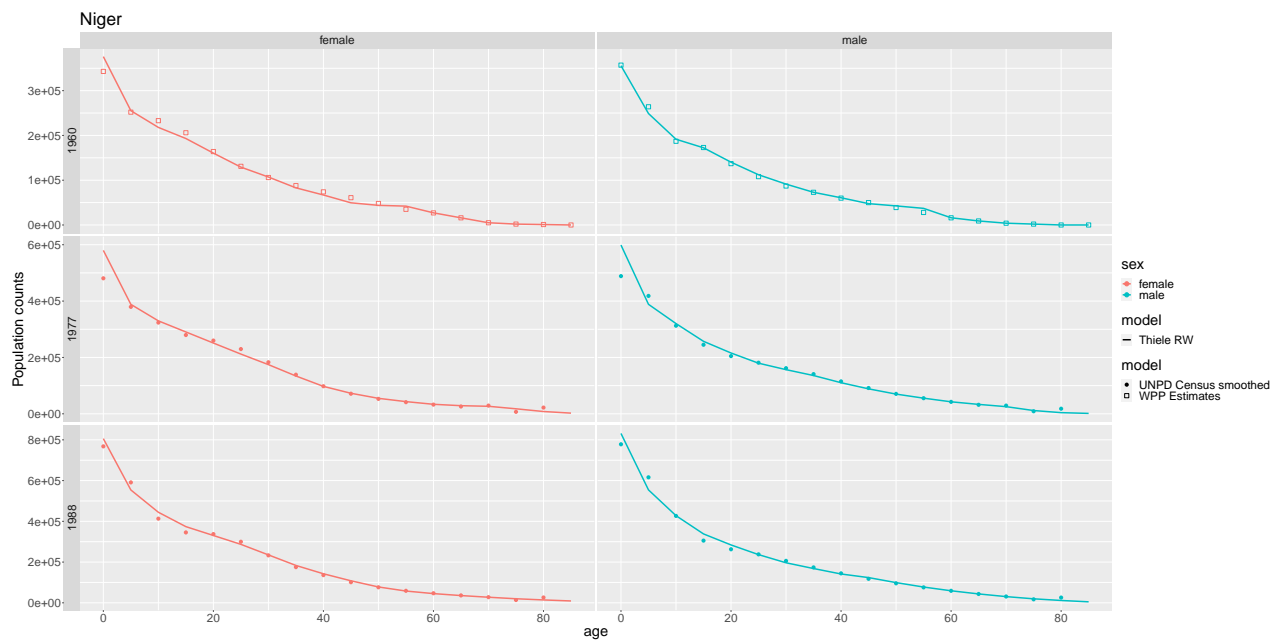


Figure 9: Population

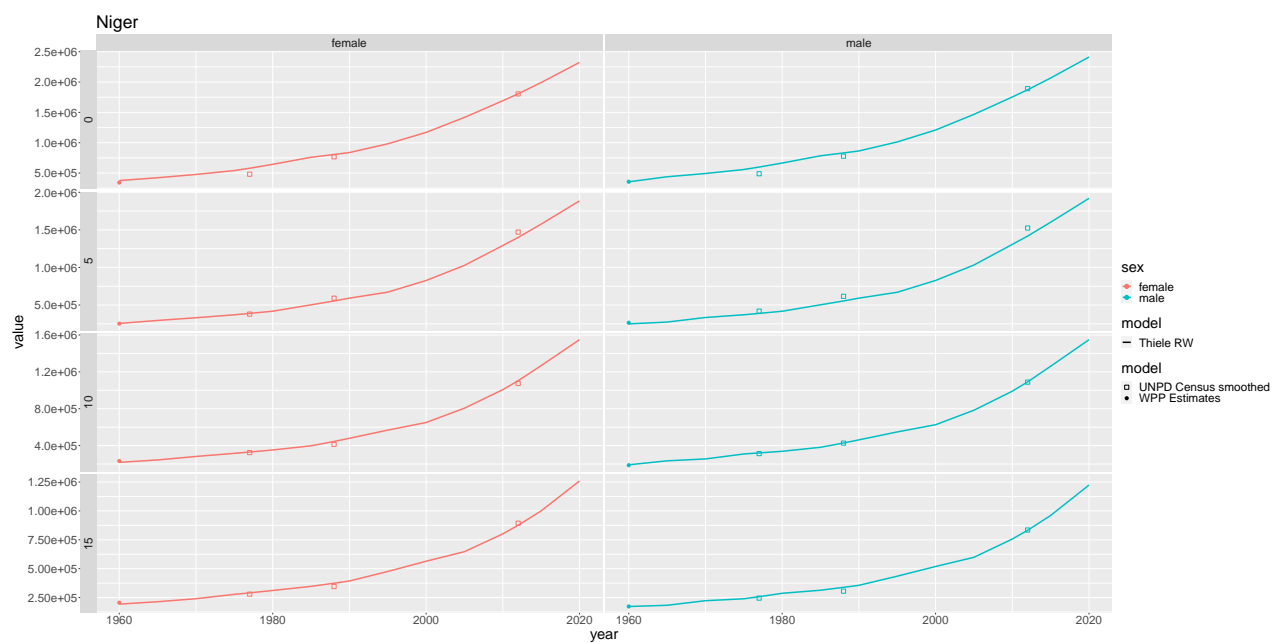


Figure 10: Population

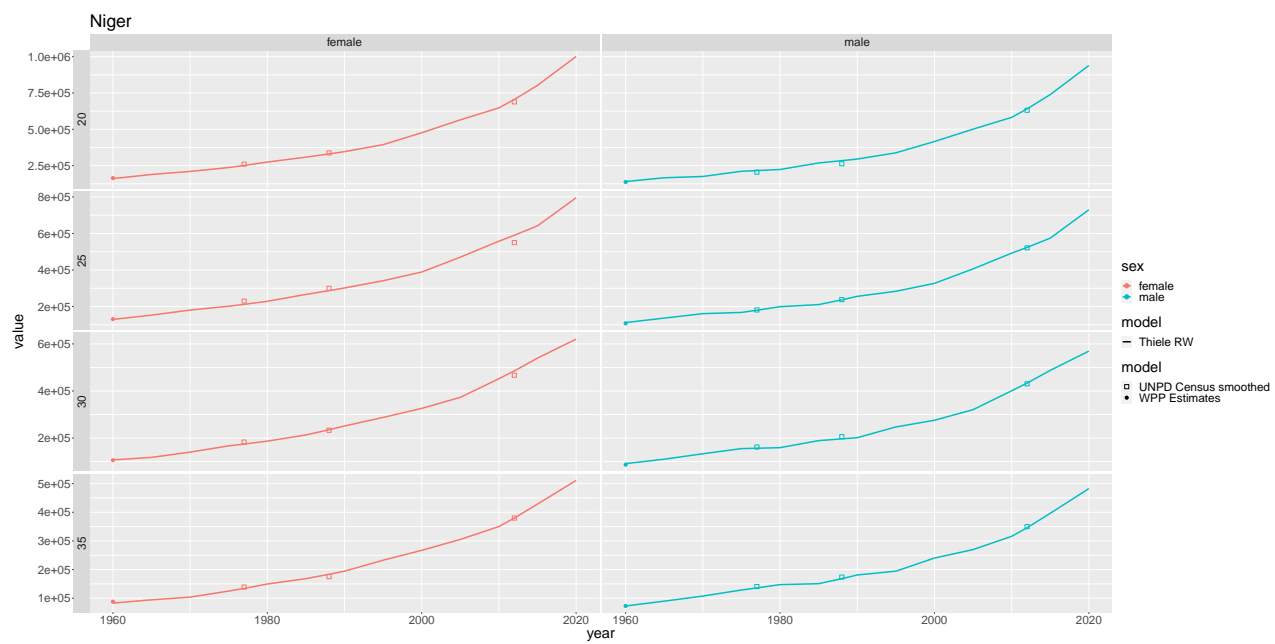


Figure 11: Population

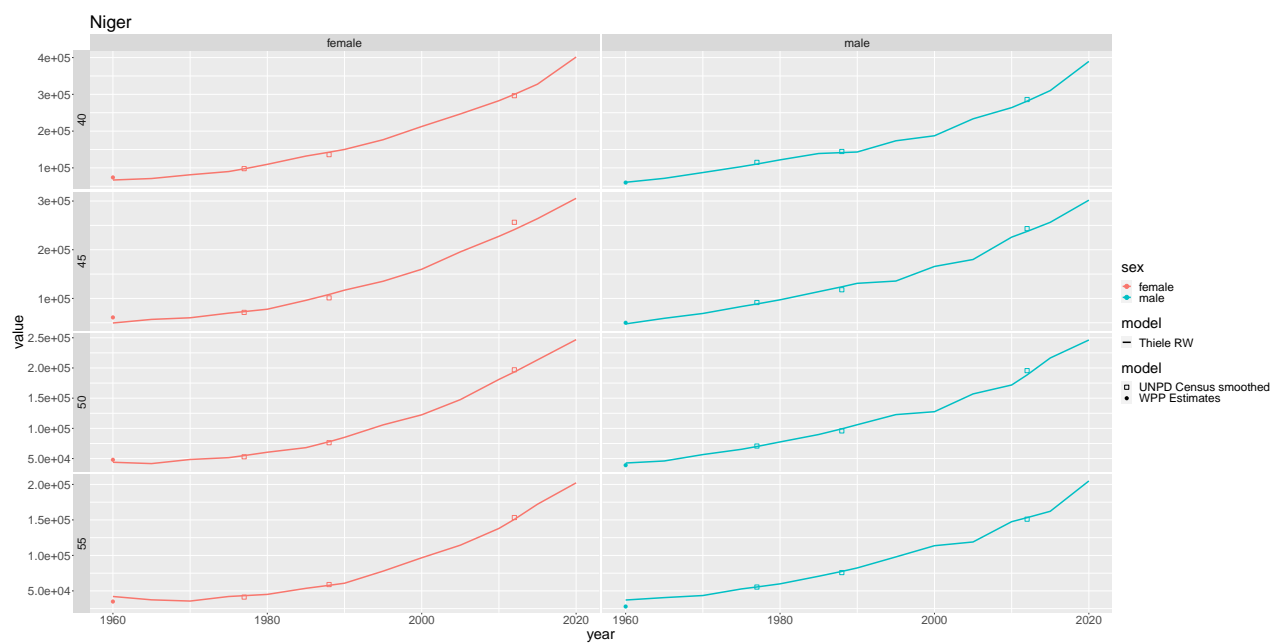


Figure 12: Population

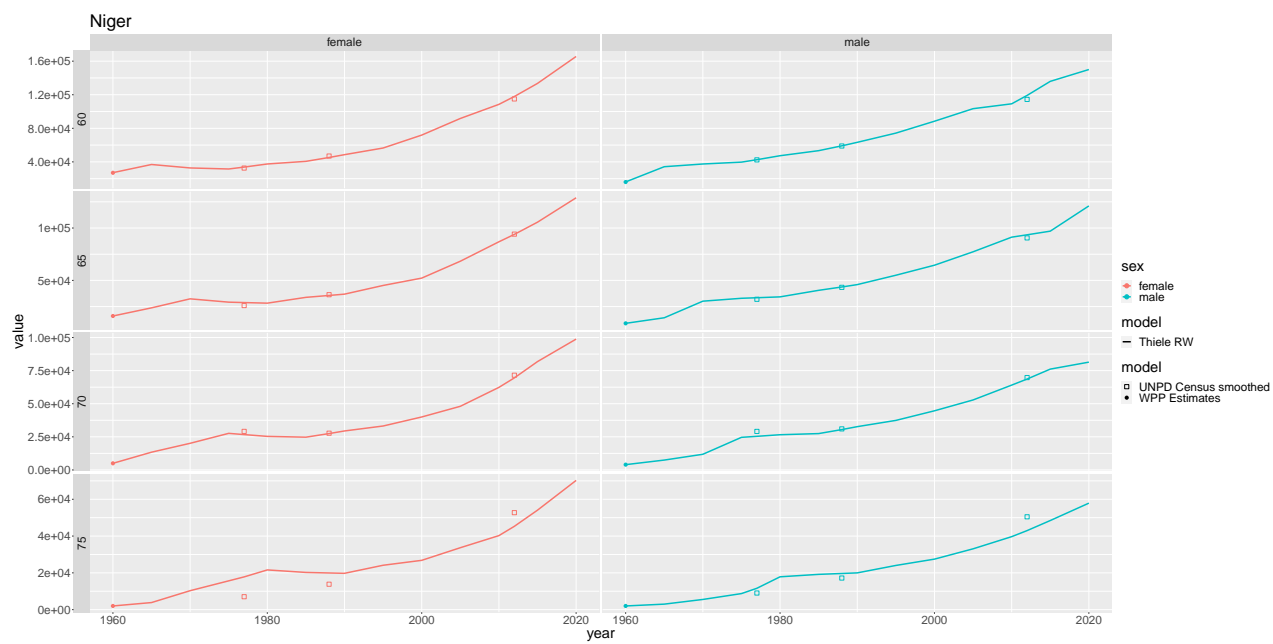


Figure 13: Population

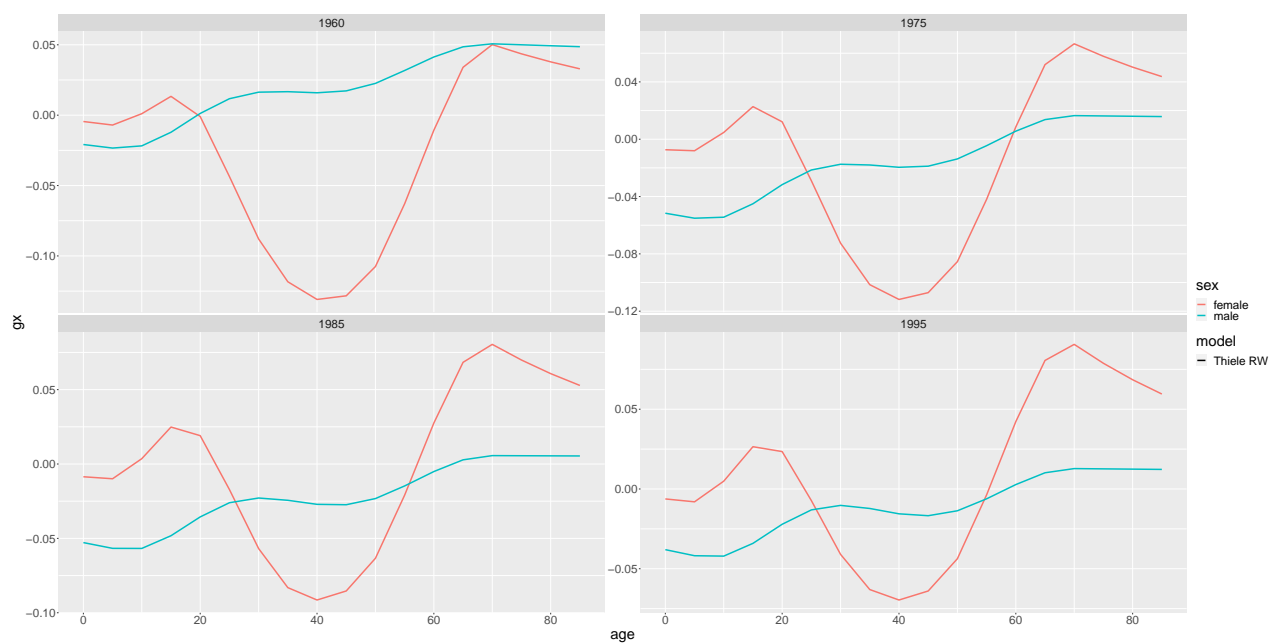


Figure 14: Migration

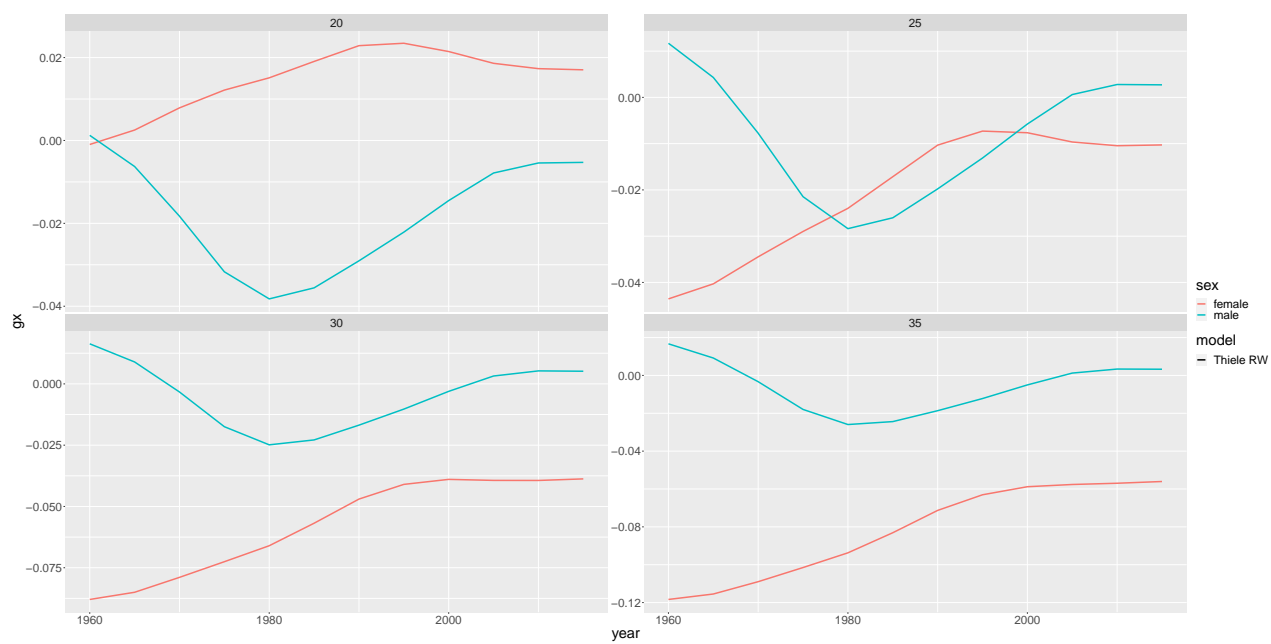


Figure 15: Migration

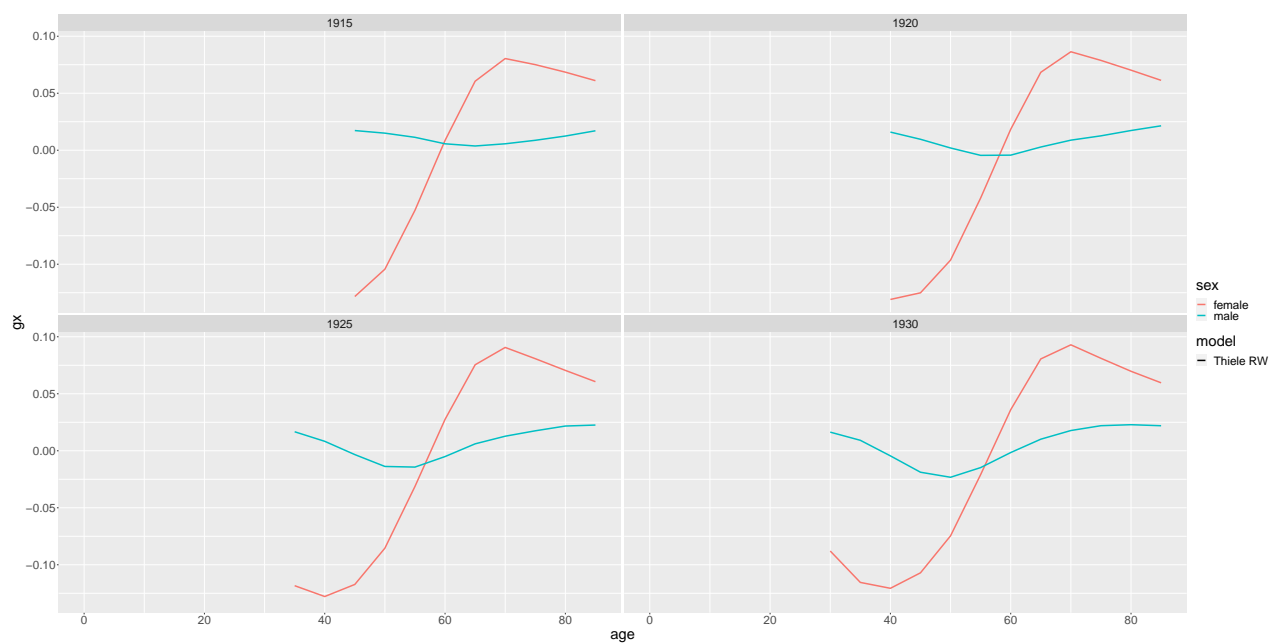


Figure 16: Migration

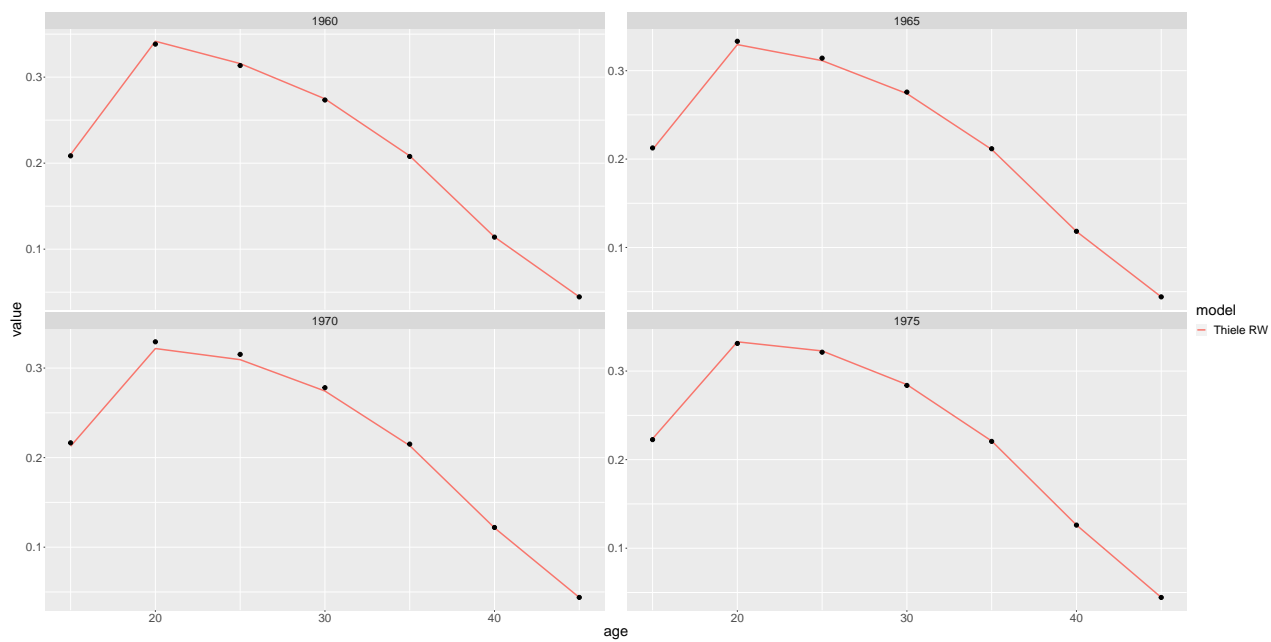


Figure 17: Fertility

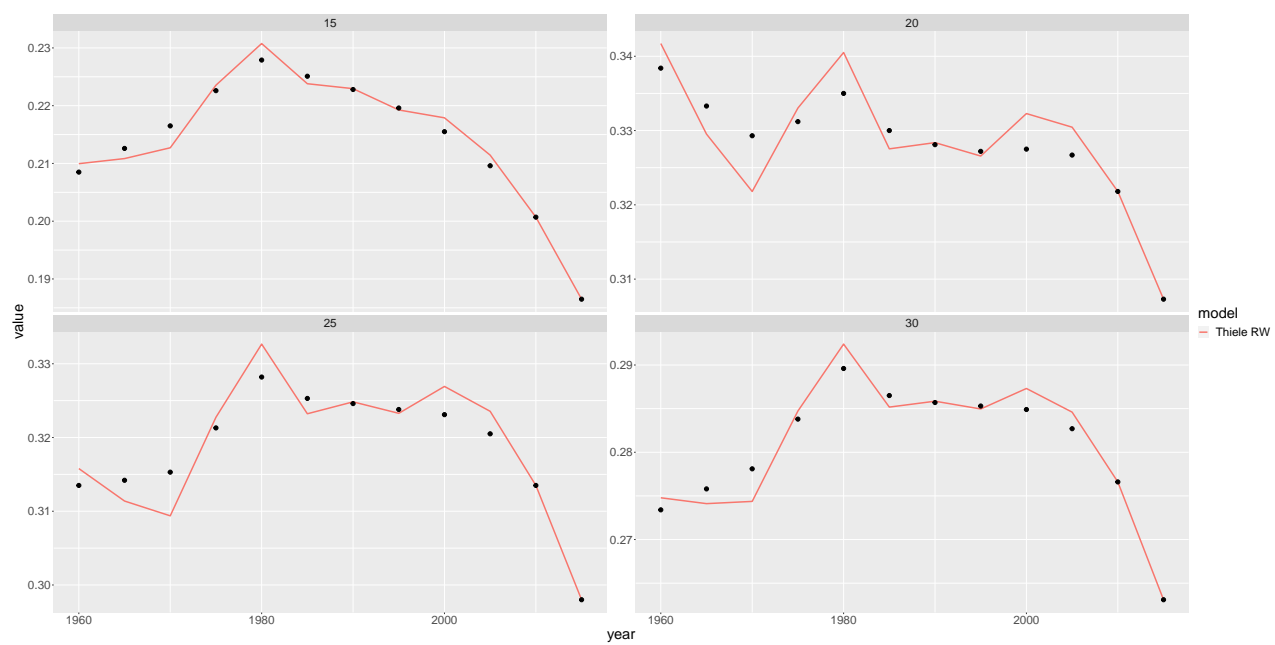


Figure 18: Fertility