

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

```
## Warning in fit_tmb(input.thiele.loghump.oag.vec.RW, inner_verbose = FALSE, : convergence error: false c
```

```
##      user  system elapsed
##      9.52    0.30    9.86
## [1] "false convergence (8)"
```

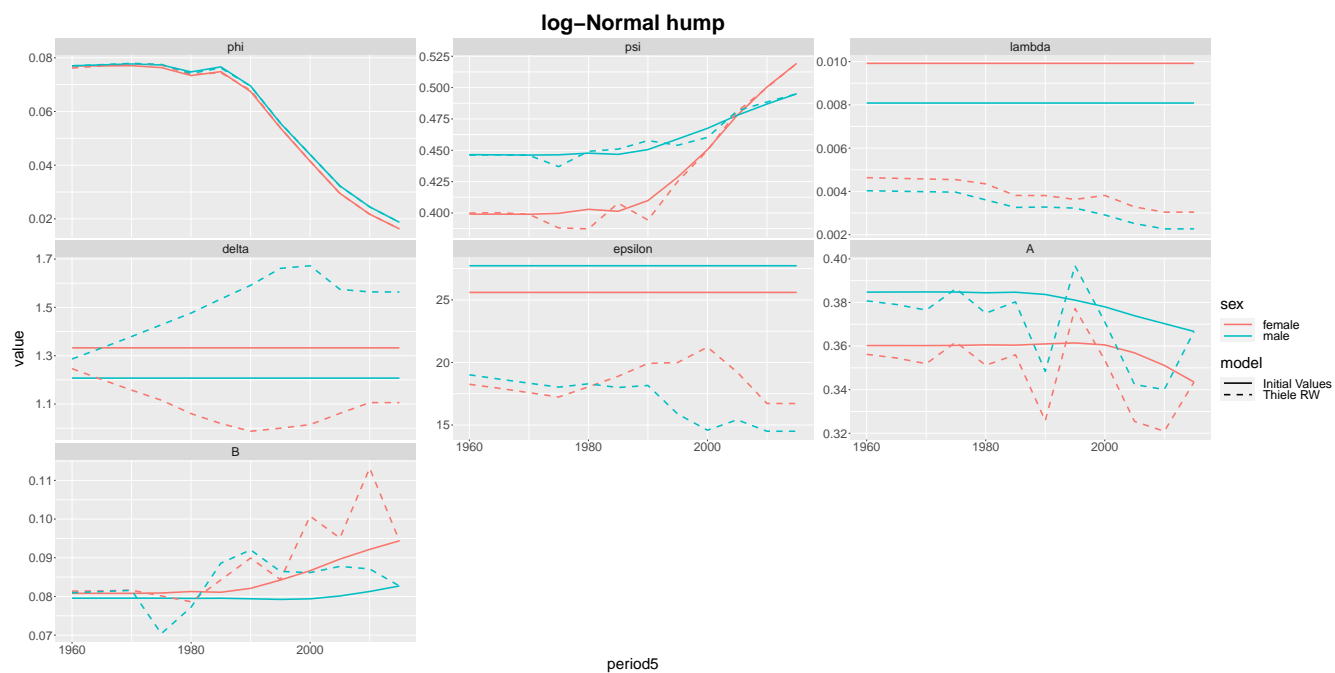


Figure 1: Estimated parameters



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



Figure 3: Estimated $_{5}q_0$

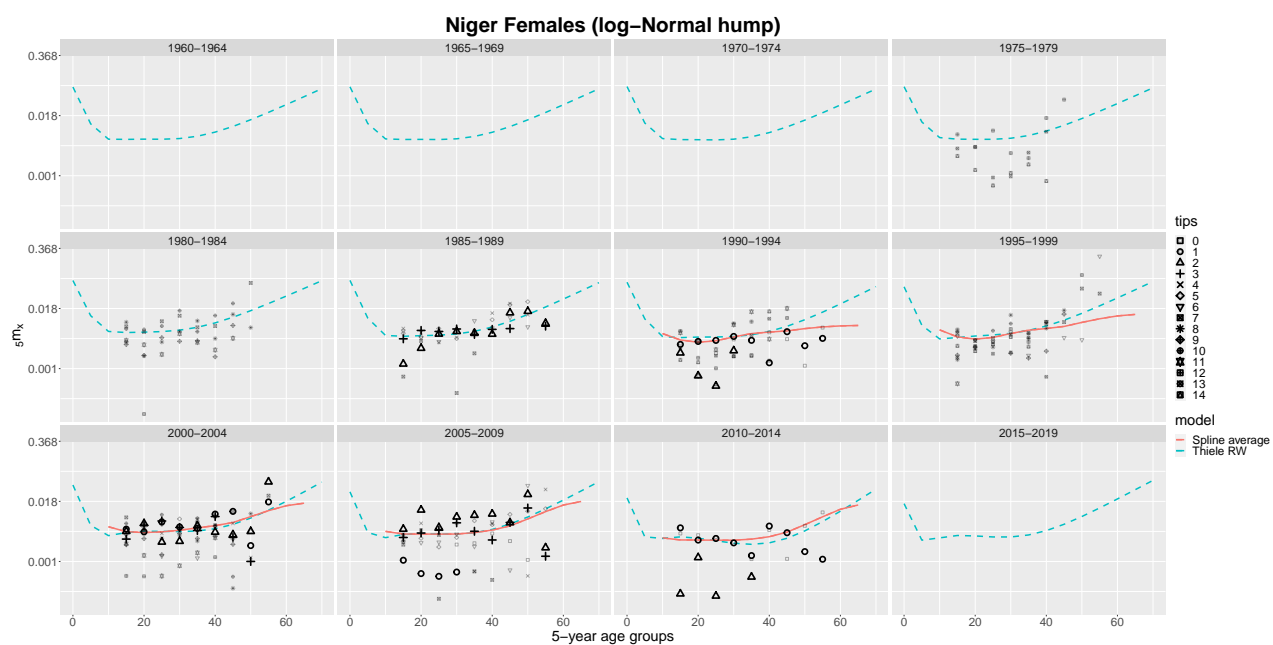


Figure 4: Mortality Schedules

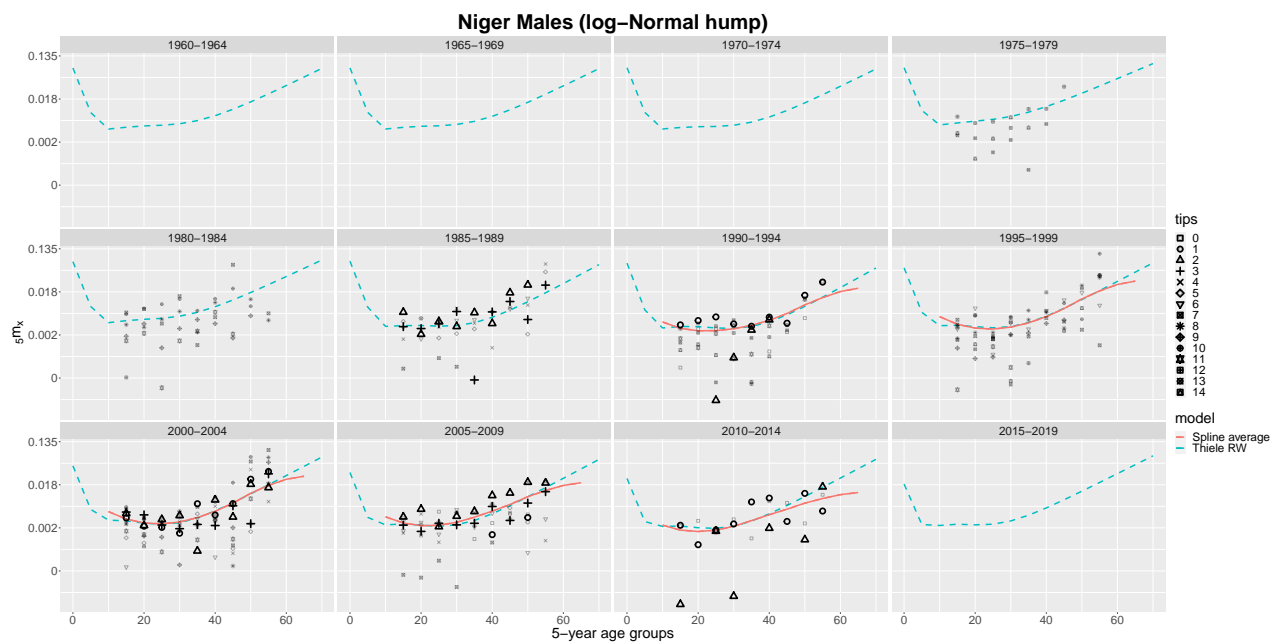


Figure 5: Mortality Schedules

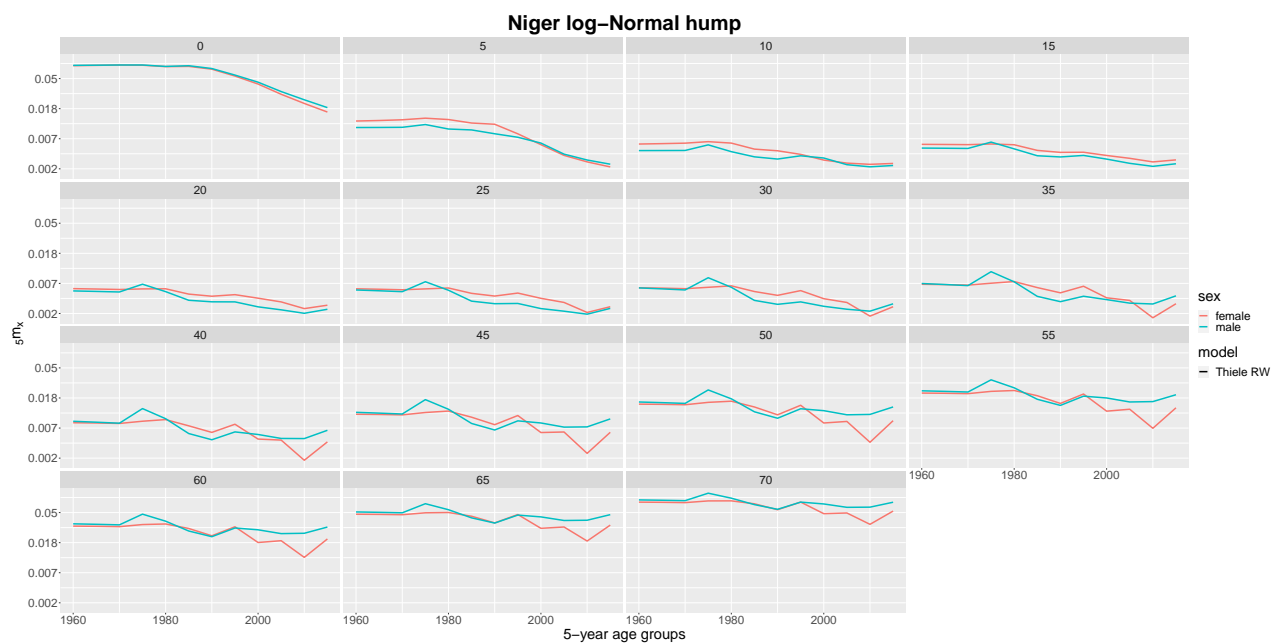


Figure 6: Mortality Schedules

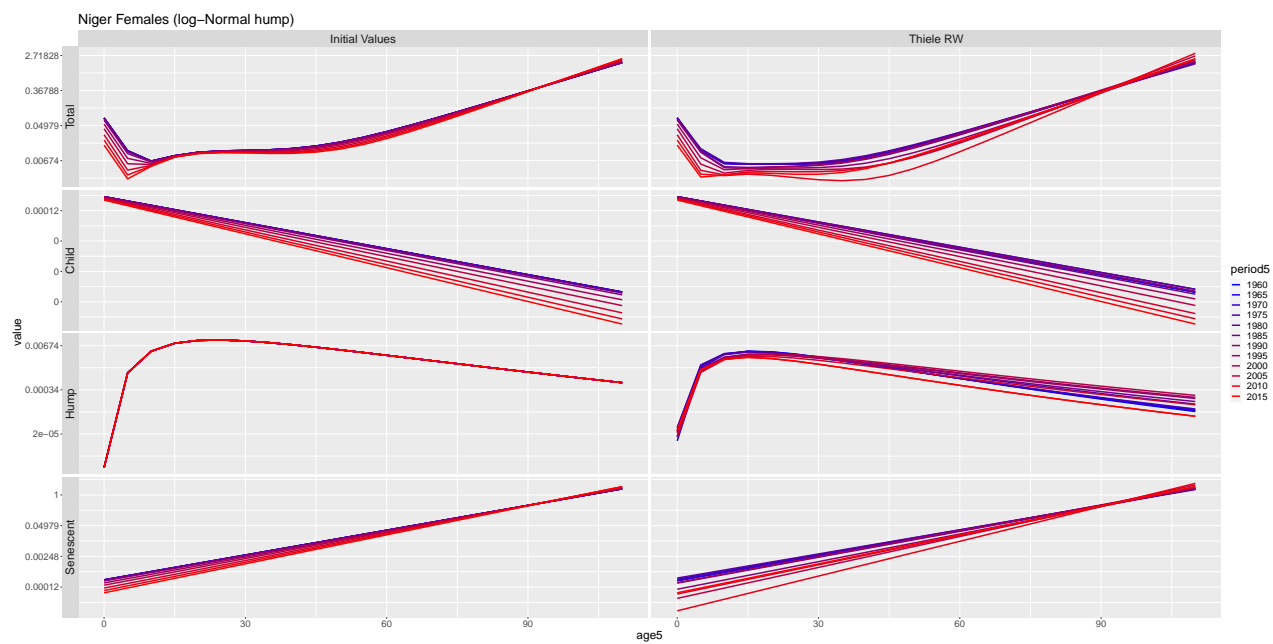


Figure 7: Thiele Decomposed

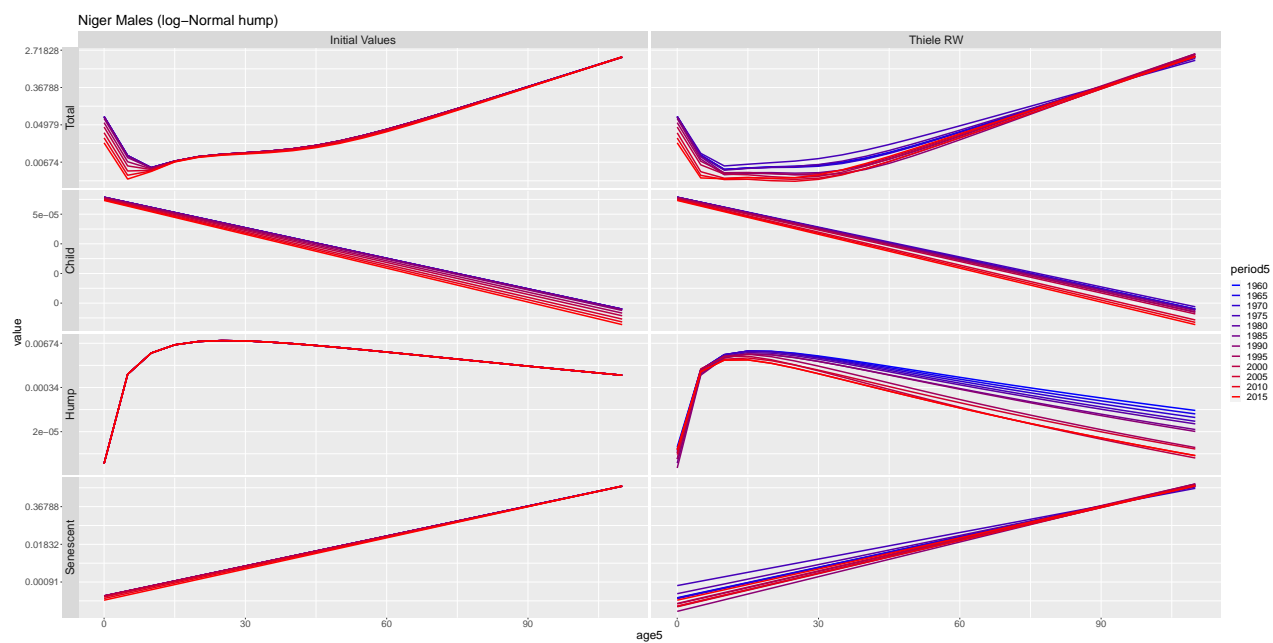


Figure 8: Thiele Decomposed

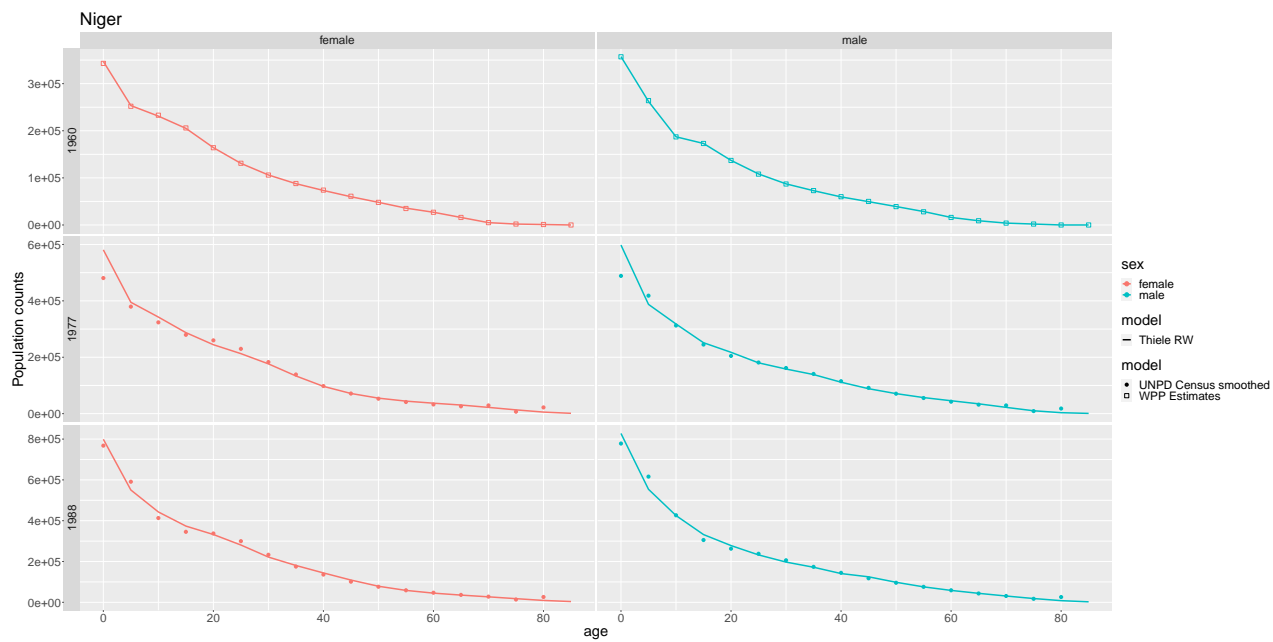


Figure 9: Population

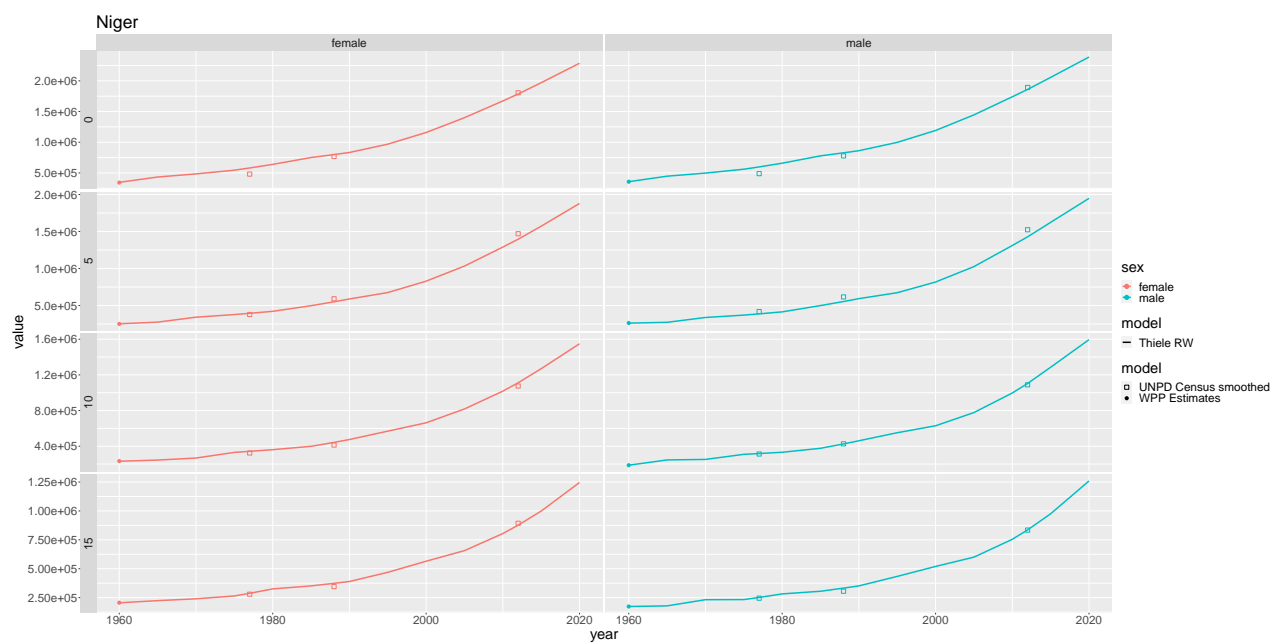


Figure 10: Population

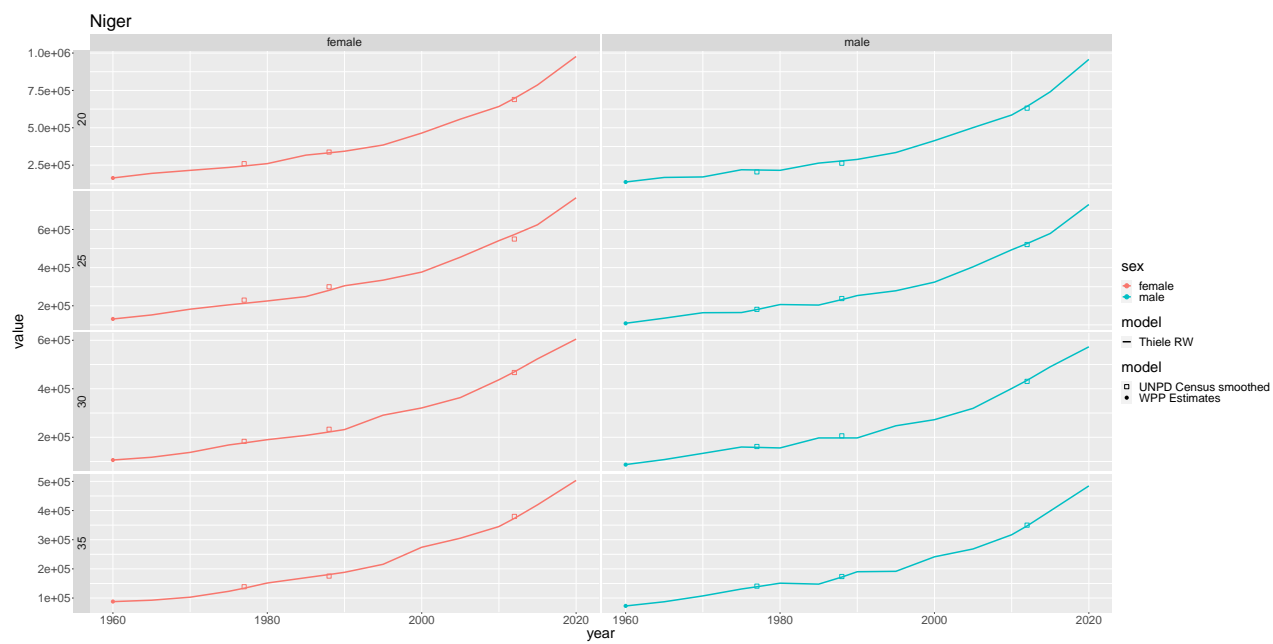


Figure 11: Population

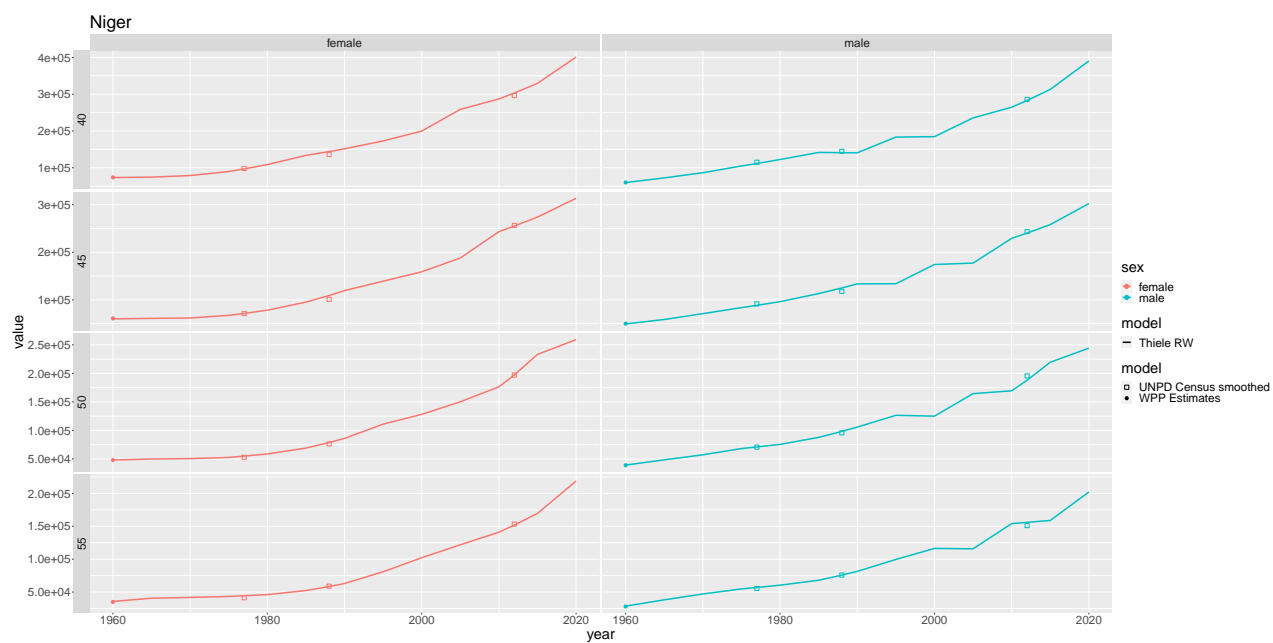


Figure 12: Population

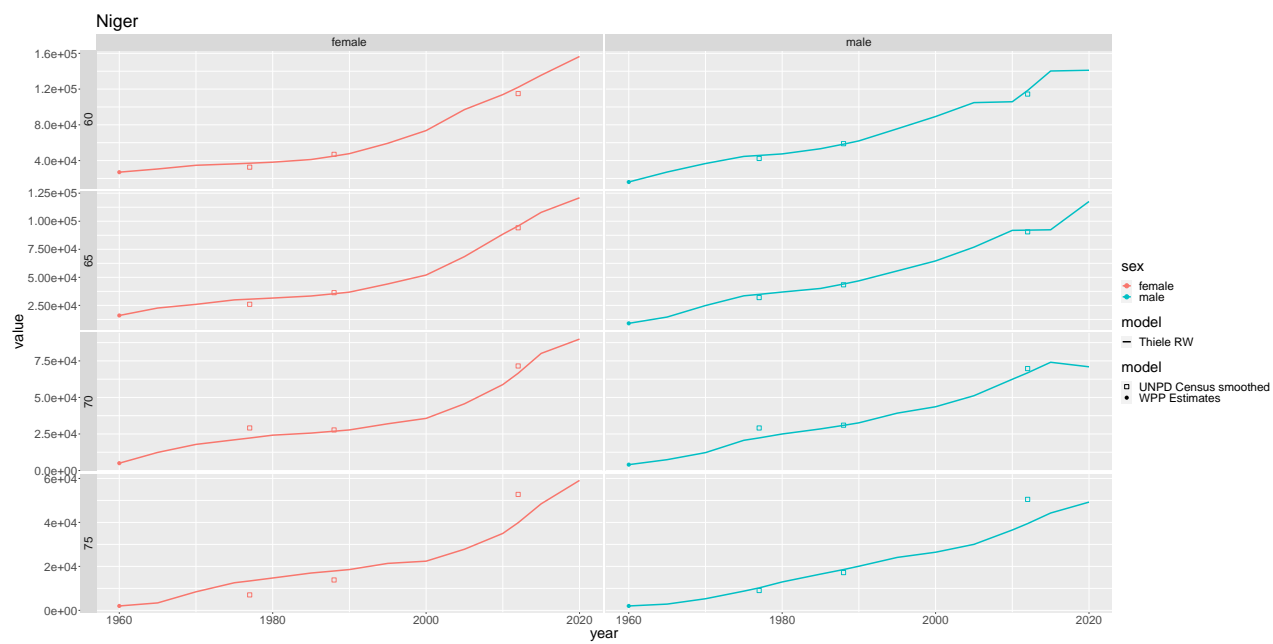


Figure 13: Population

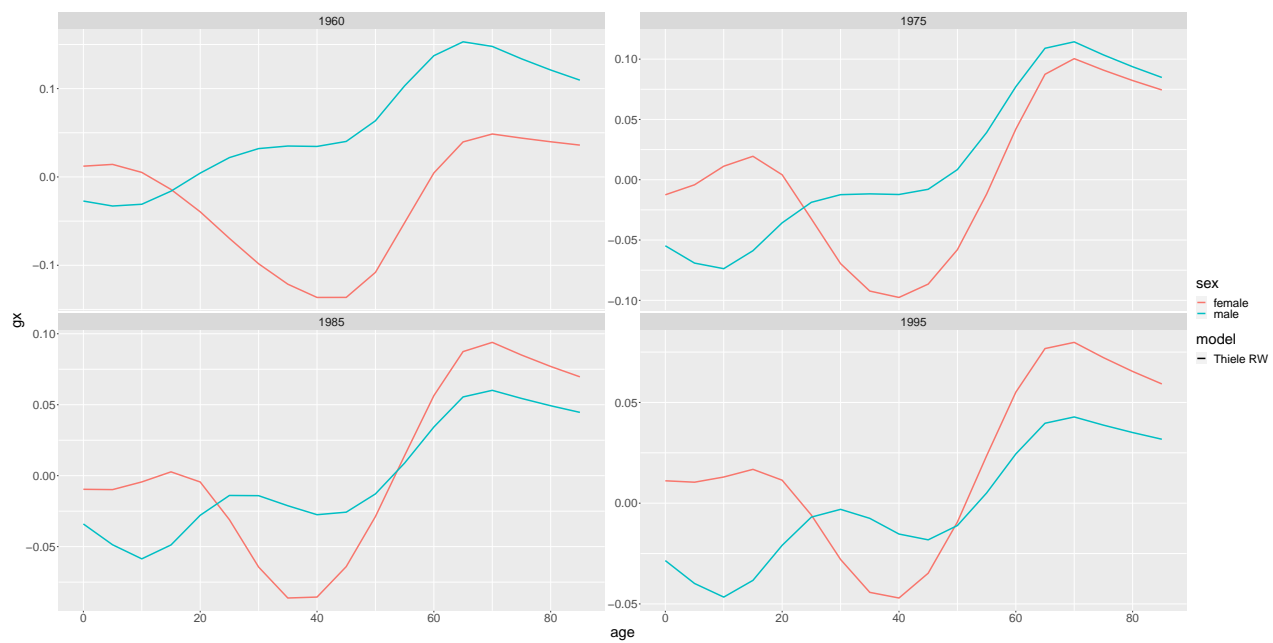


Figure 14: Migration



Figure 15: Migration

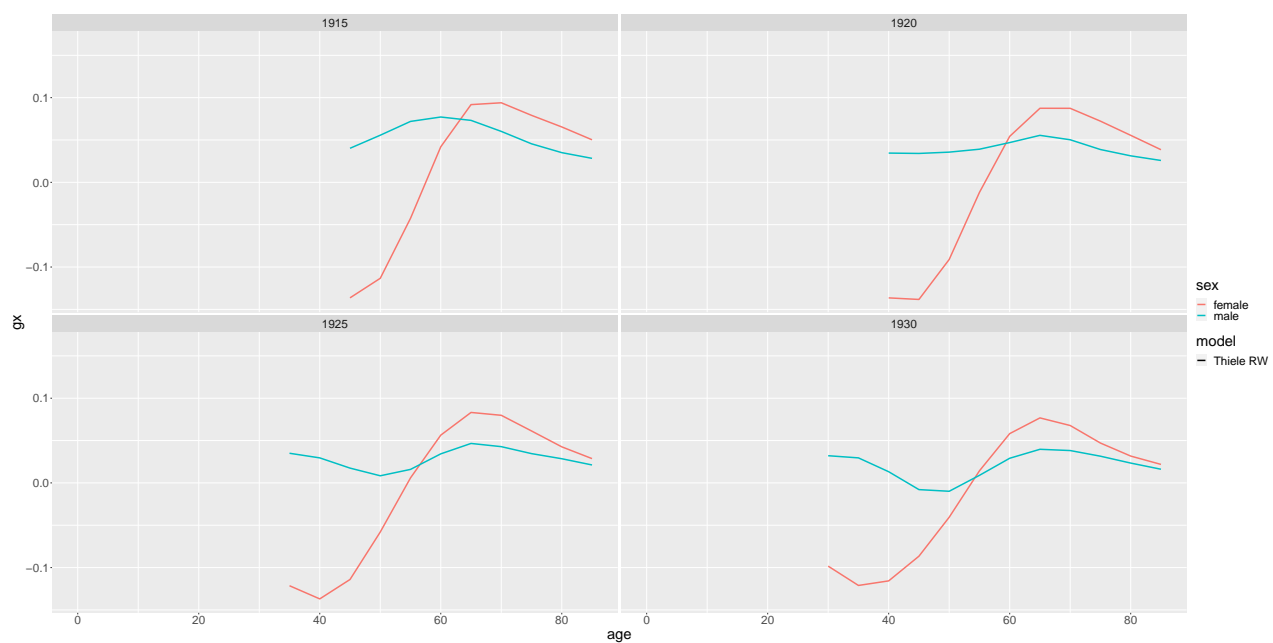


Figure 16: Migration

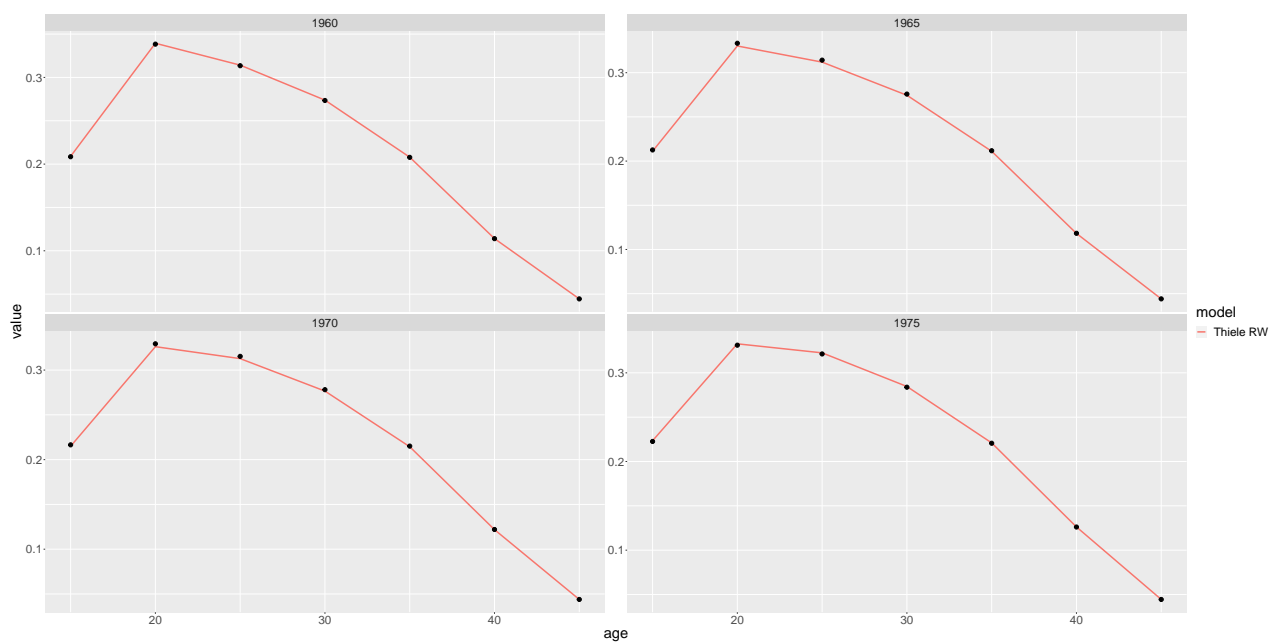


Figure 17: Fertility

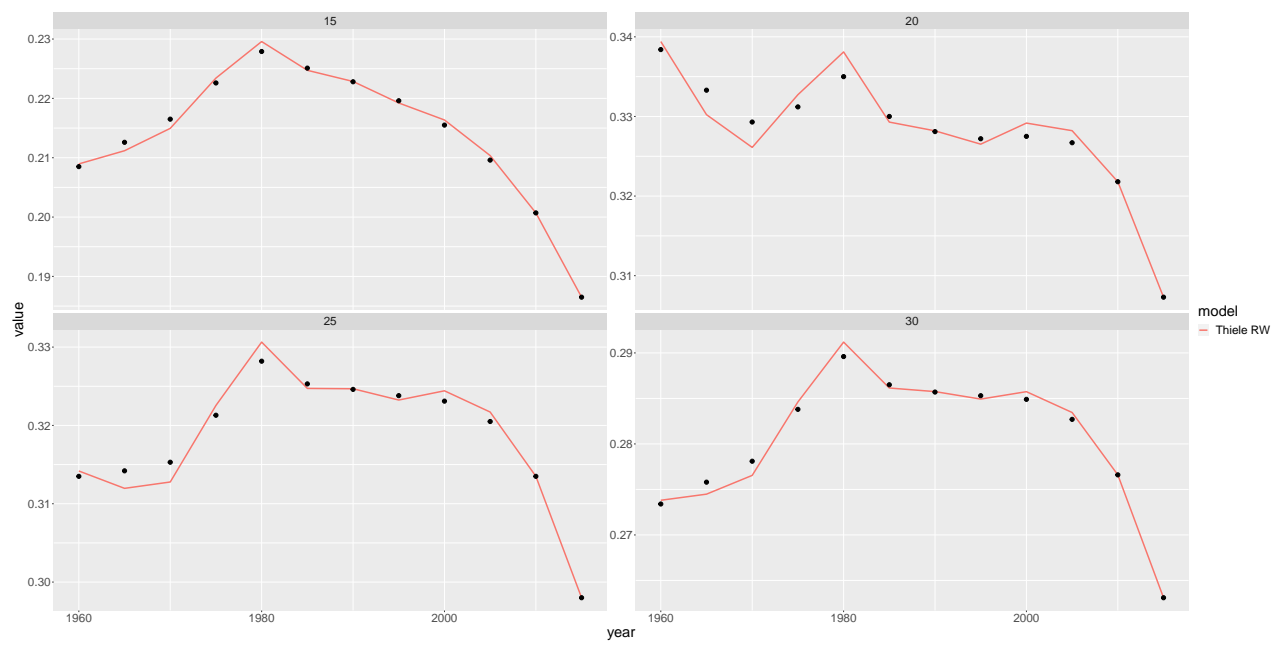


Figure 18: Fertility