

Zambia

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

## # A tibble: 86 x 6
##   age `1969` `1980` `1990` `2000` `2010`
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1     0 84889. 102576. 127337. 170387 220491
## 2     1 80819. 100263. 118568. 158438. 224143
## 3     2 77882. 103185. 119426. 164148. 226622.
## 4     3 75232. 104440. 119078. 165804. 221995.
## 5     4 73199. 104852. 118691. 165026. 215854.
## 6     5 71159. 104750. 117301. 160537. 210007.
## 7     6 68103. 103010. 115491. 153605. 207187.
## 8     7 64885. 100287. 113991. 147259 201344.
## 9     8 61647. 96378. 113300. 143607. 195715.
## 10    9 57518. 91975. 111701. 140017. 189090.
## # ... with 76 more rows

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

## # A tibble: 18 x 1
##   age
##   <dbl>
## 1     0
## 2     5
## 3    10
## 4    15
## 5    20
## 6    25
## 7    30
## 8    35
## 9    40
## 10   45
## 11   50
## 12   55
## 13   60
## 14   65
## 15   70
## 16   75
## 17   80
## 18   85

## [1] "Census Males"

## # A tibble: 86 x 6
##   age `1969` `1980` `1990` `2000` `2010`
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1     0 85555. 100973. 125548. 168841 220221
## 2     1 78711. 99404. 117337. 158084. 222980.
## 3     2 75013. 102451. 117859. 163155. 224408.
## 4     3 71853. 104159. 117375. 165029 220488.
## 5     4 70006. 104682. 116907. 164310. 214419
## 6     5 68559. 104553. 115530. 160073. 208240.
```

```
## 7      6 66359. 102749. 113548. 153289. 205290.
## 8      7 64120. 100126. 111633. 146481. 199336.
## 9      8 61976.  95881. 111123. 142884. 193666.
## 10     9 58705.  91264. 110131. 139348. 186816.
## # ... with 76 more rows
```

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

```
## # A tibble: 18 x 1
```

```
##       age
##   <dbl>
```

```
## 1      0
## 2      5
## 3     10
## 4     15
## 5     20
## 6     25
## 7     30
## 8     35
## 9     40
## 10    45
## 11    50
## 12    55
## 13    60
## 14    65
## 15    70
## 16    75
## 17    80
## 18    85
```

Thiele log-Normal Hump Spline

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

| | | | | | | |
|----|-------------------|------------------|--------------------|-----------------|----------------|-----|
| ## | log_tau2_logpop | log_tau2_logpop | log_tau2_logpop | log_tau2_logpop | log_lambda_fx | log |
| ## | 3.61399198 | 6.40167884 | 3.92400452 | 6.18273971 | 6.34611778 | 9 |
| ## | log_lambda_tp | tp_slope | tp_params_5 | tp_params_10 | log_lambda_phi | log |
| ## | 3.82179718 | -0.02259293 | 0.11035284 | 0.69280163 | 11.29207092 | 1 |
| ## | log_lambda_lambda | log_lambda_delta | log_lambda_epsilon | | | |
| ## | 2.46418754 | 4.23714363 | 5.41236631 | | | |

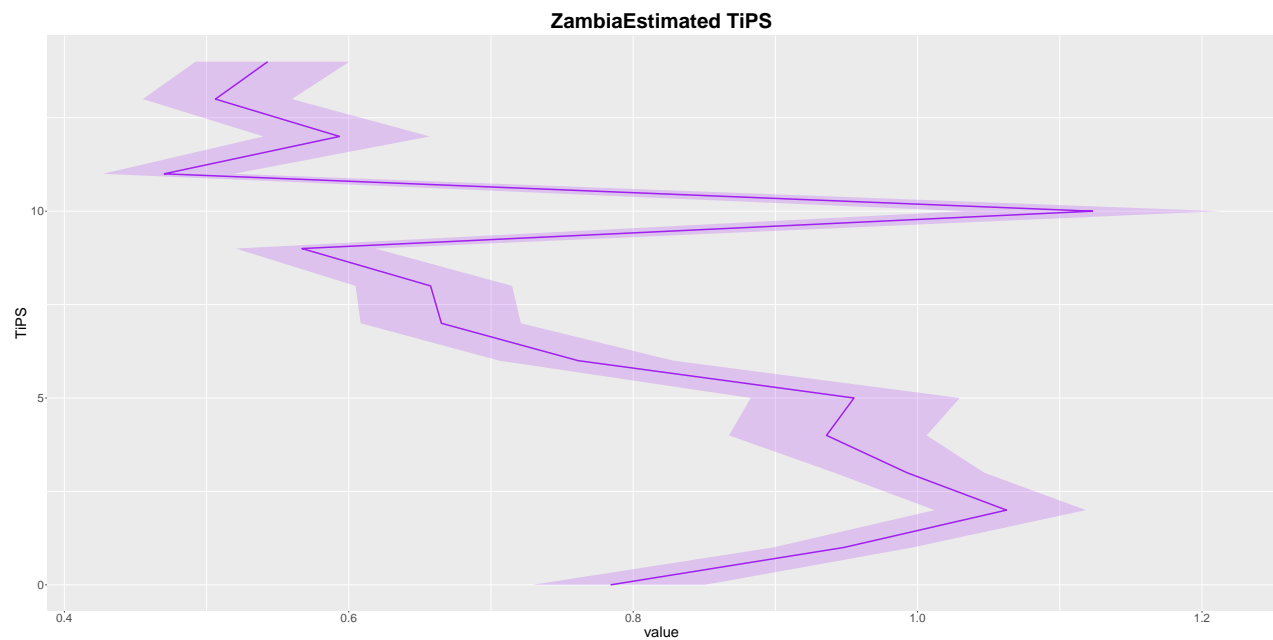


Figure 1: Estimated TiPS

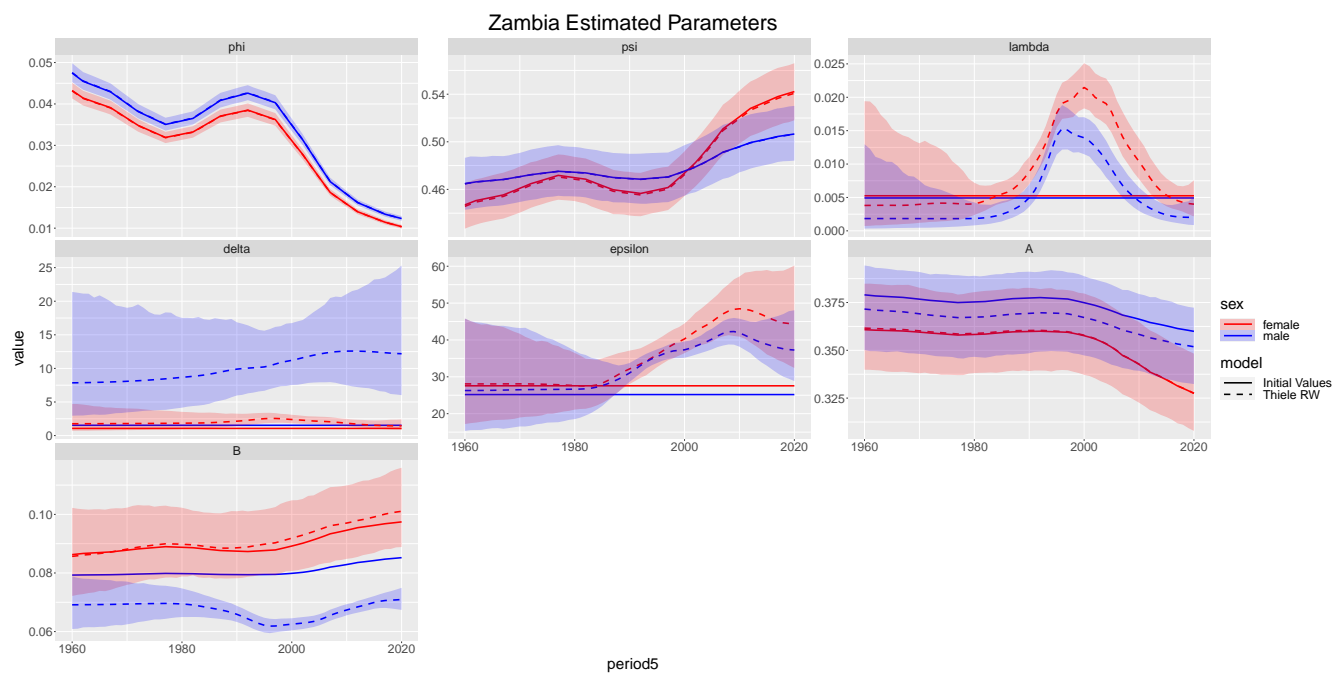


Figure 2: Estimated parameters

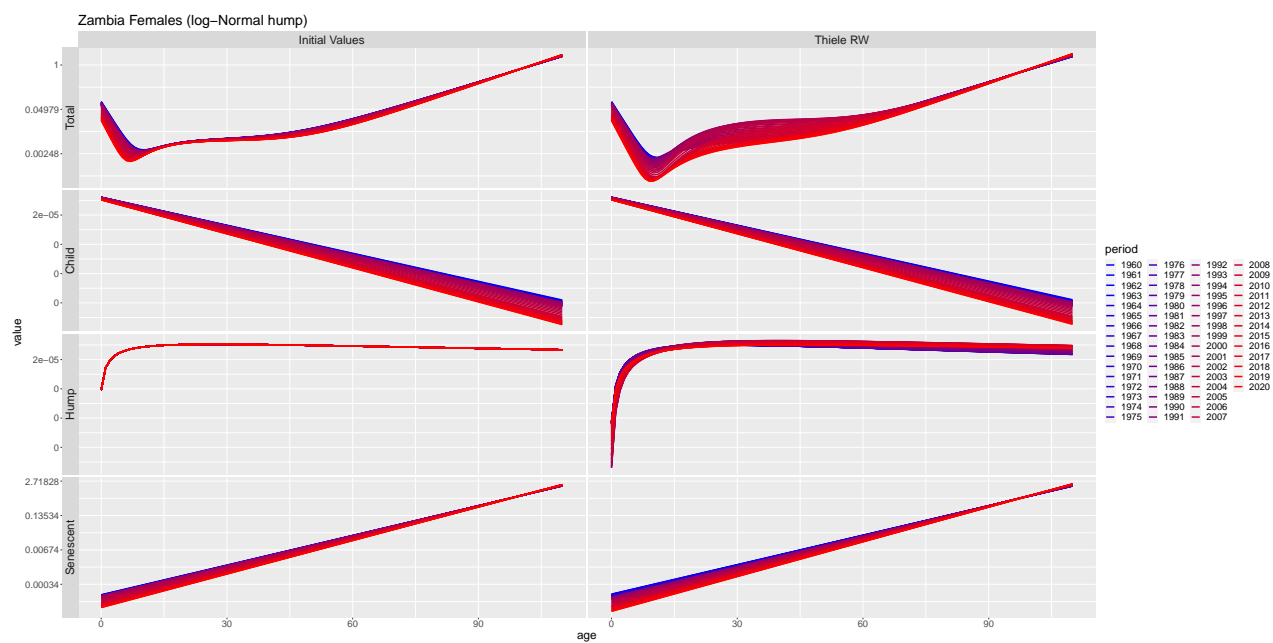


Figure 3: Thiele Decomposed

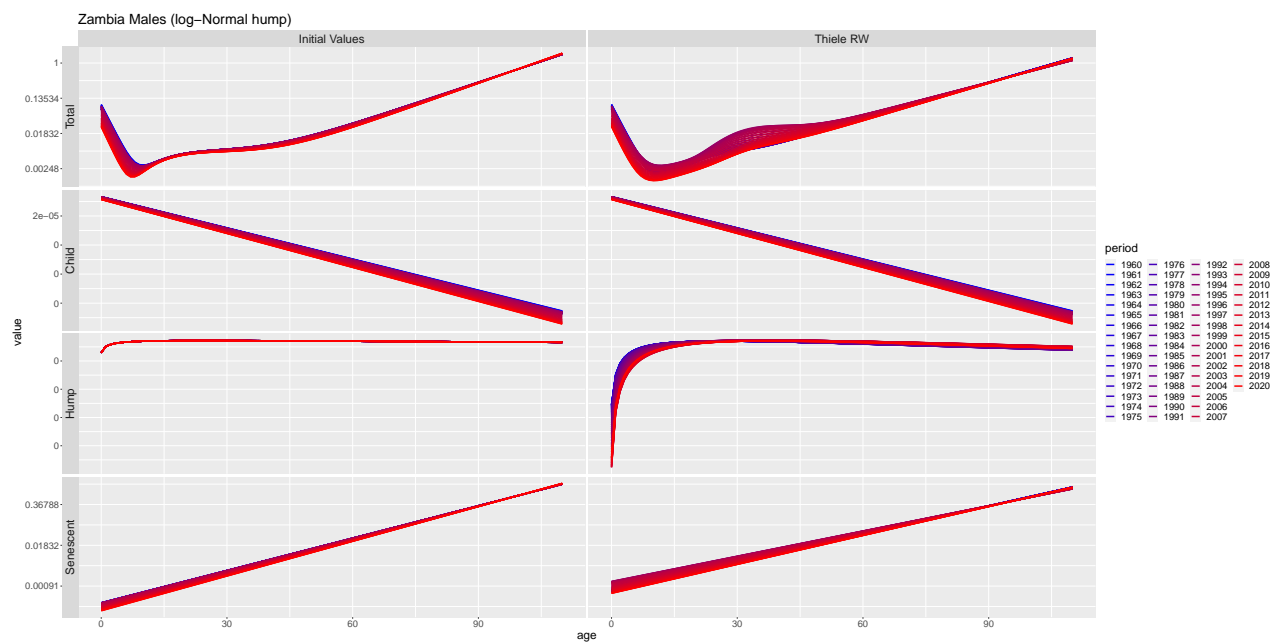


Figure 4: Thiele Decomposed

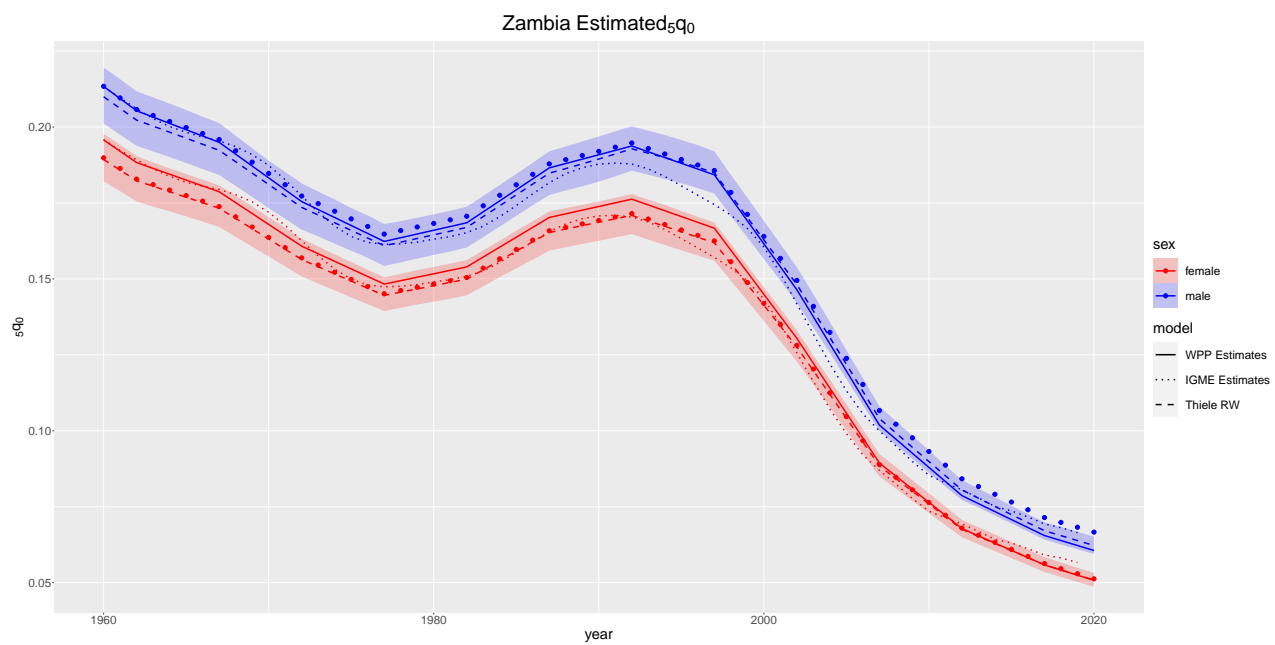


Figure 5: Estimated ${}_5q_0$

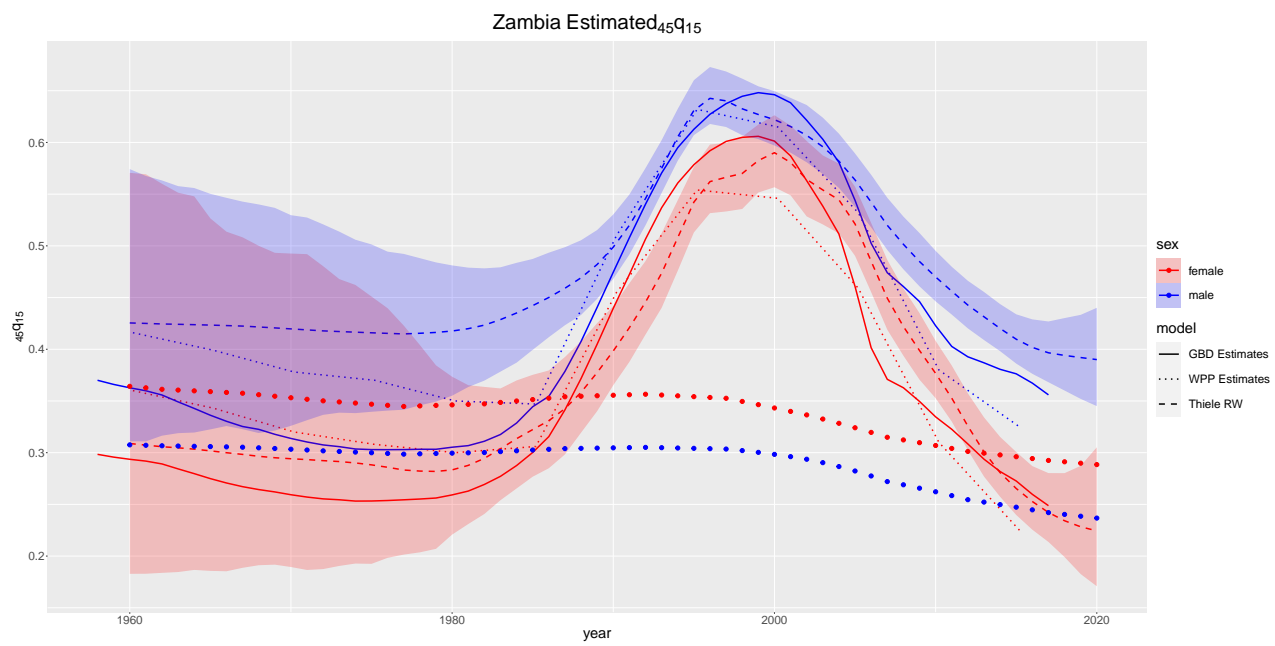


Figure 6: Estimated ${}_{45}q_{15}$

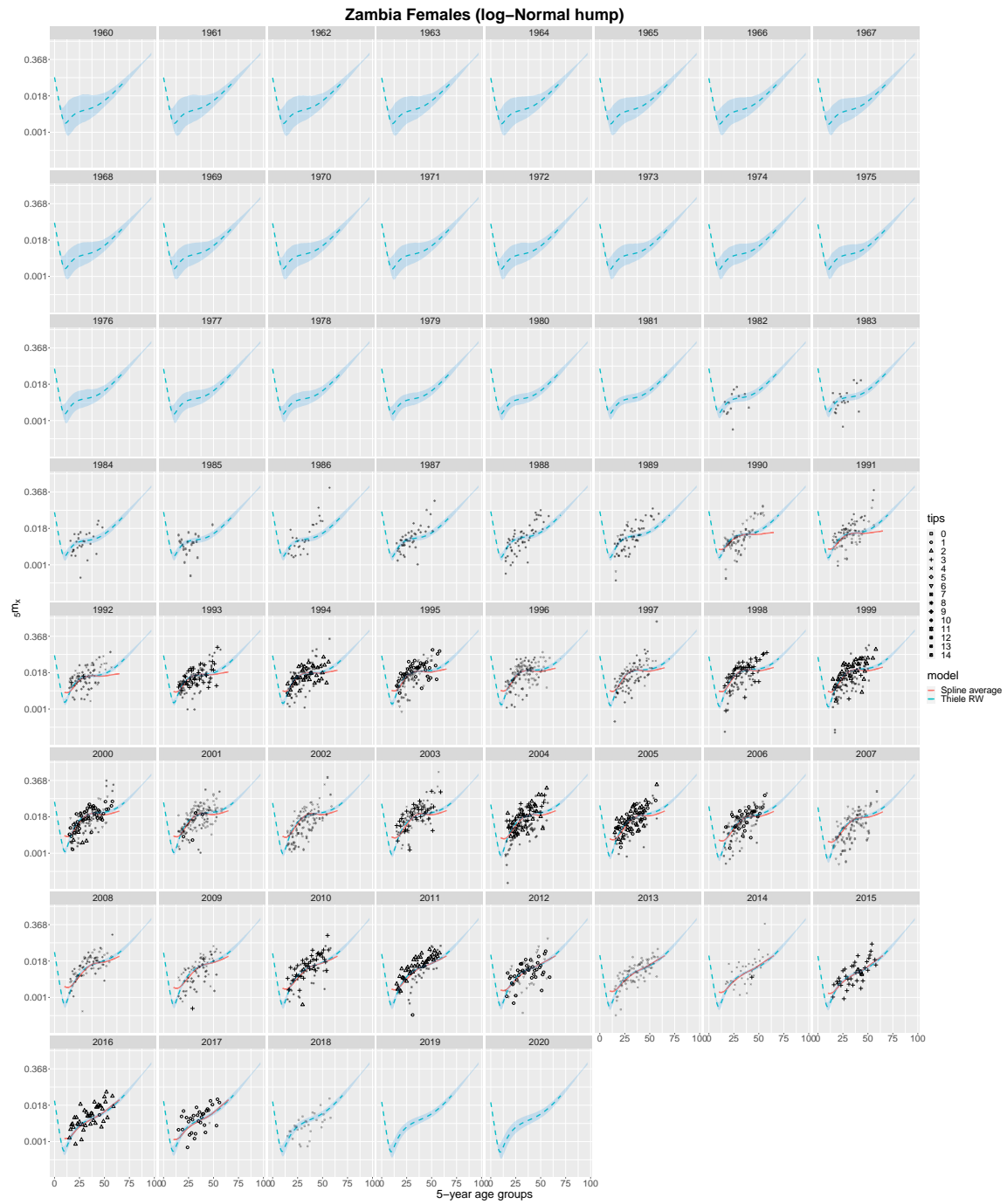


Figure 7: Mortality Schedules

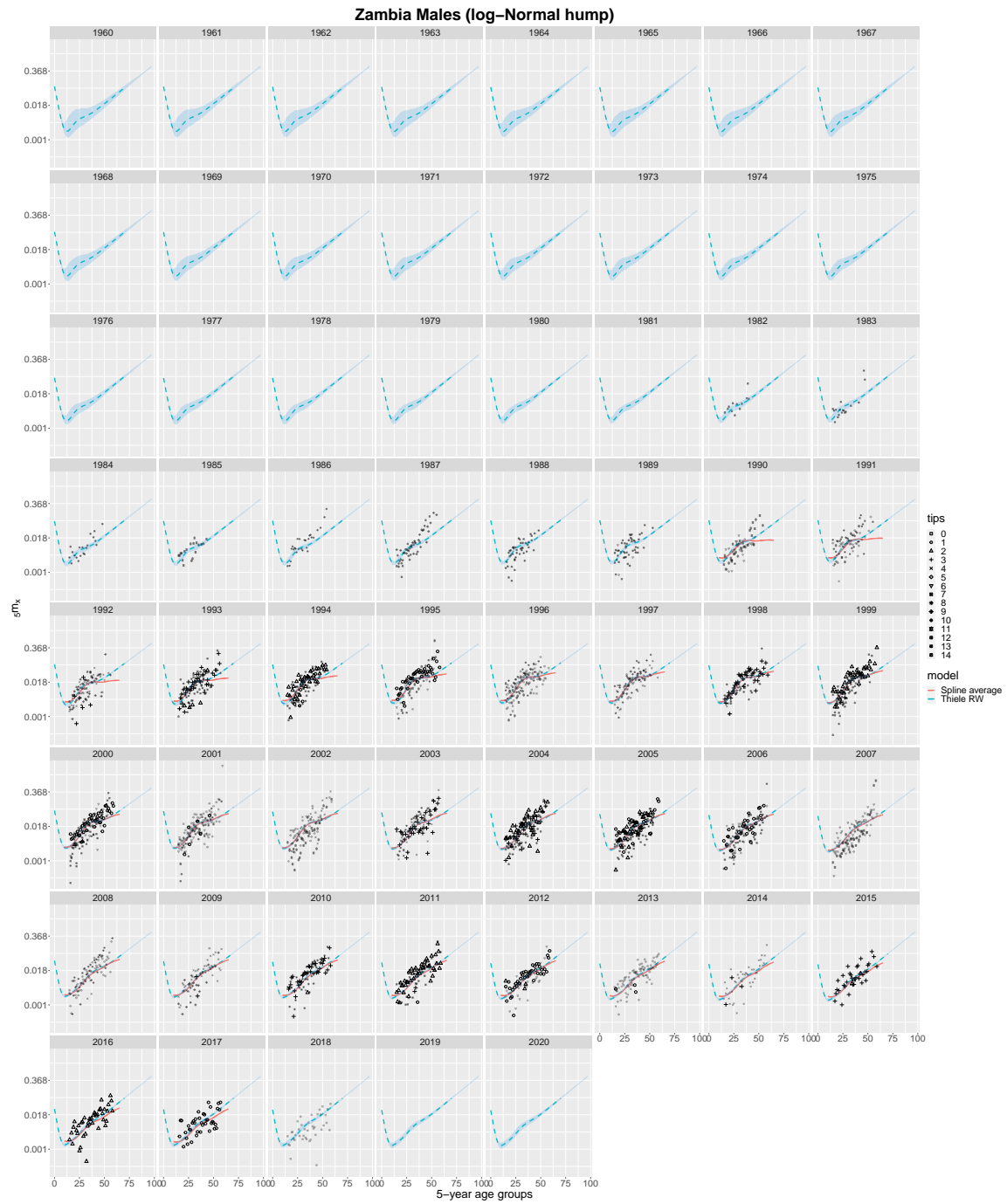


Figure 8: Mortality Schedules

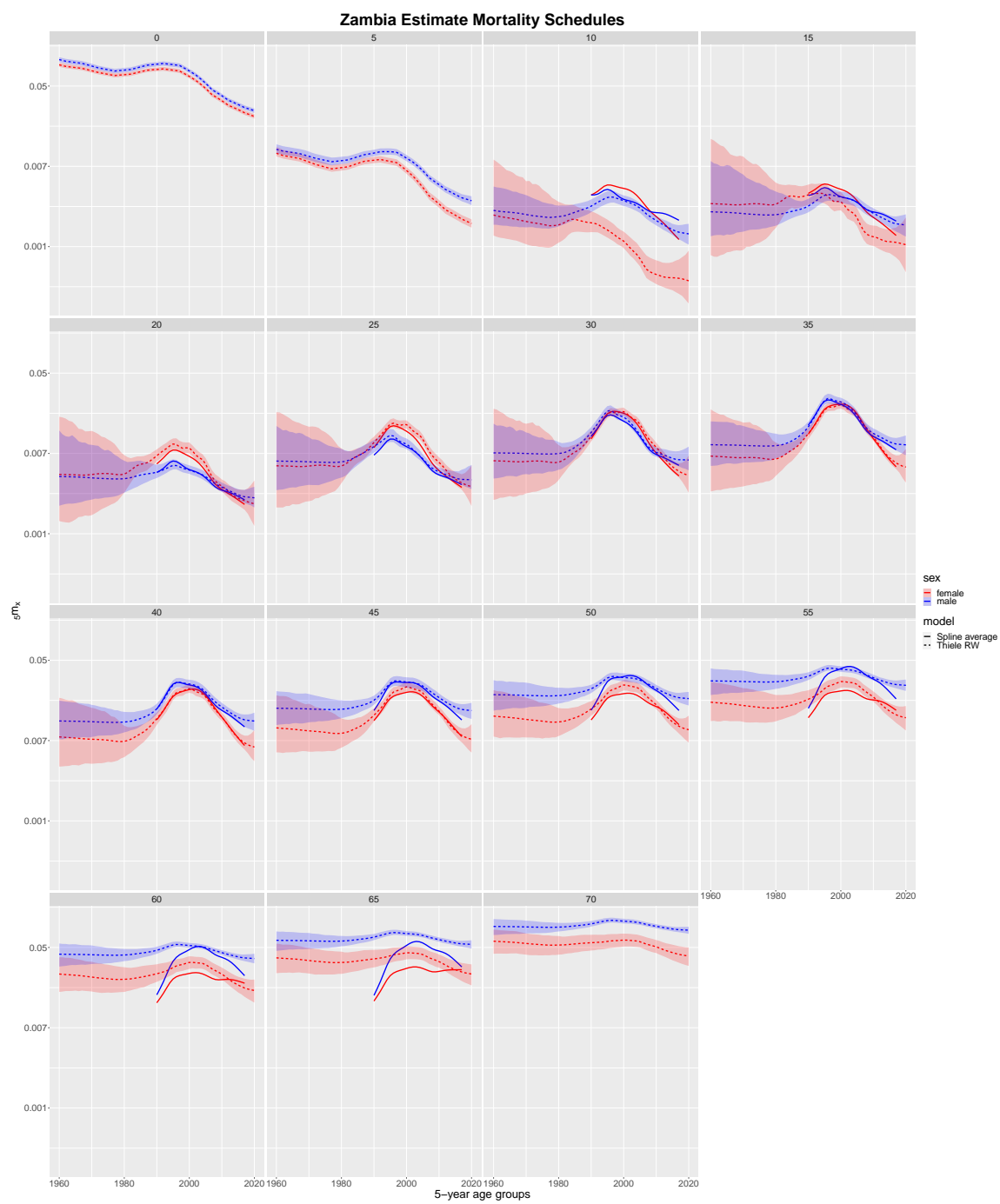


Figure 9: Mortality Schedules

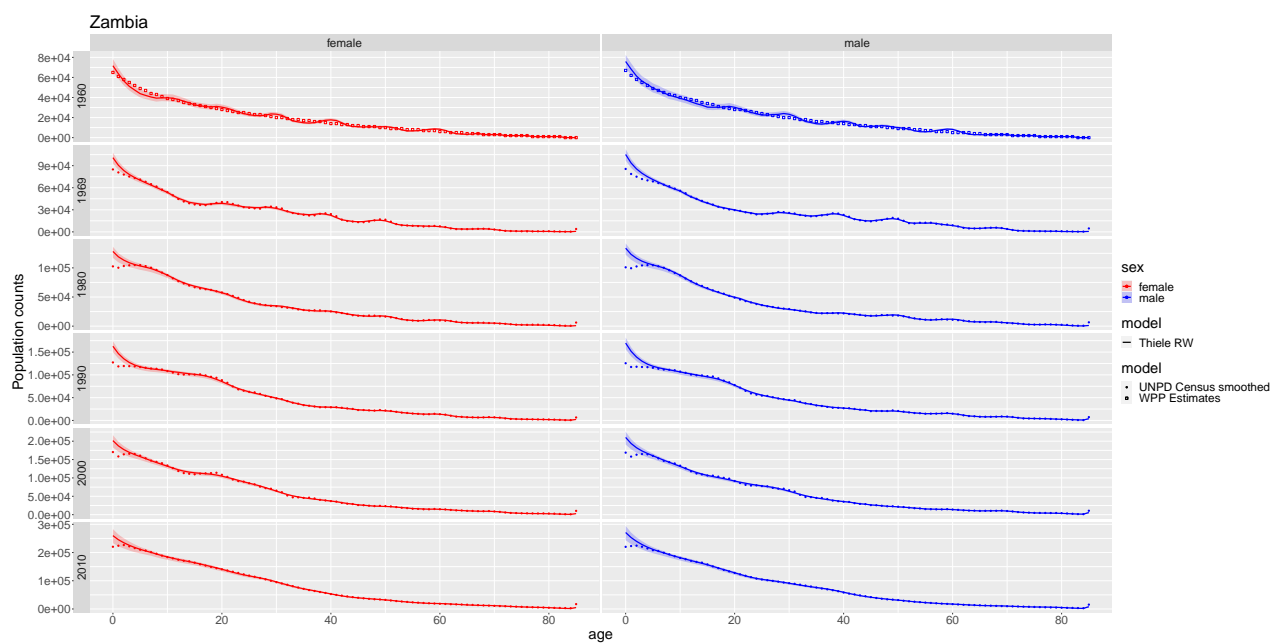


Figure 10: Population

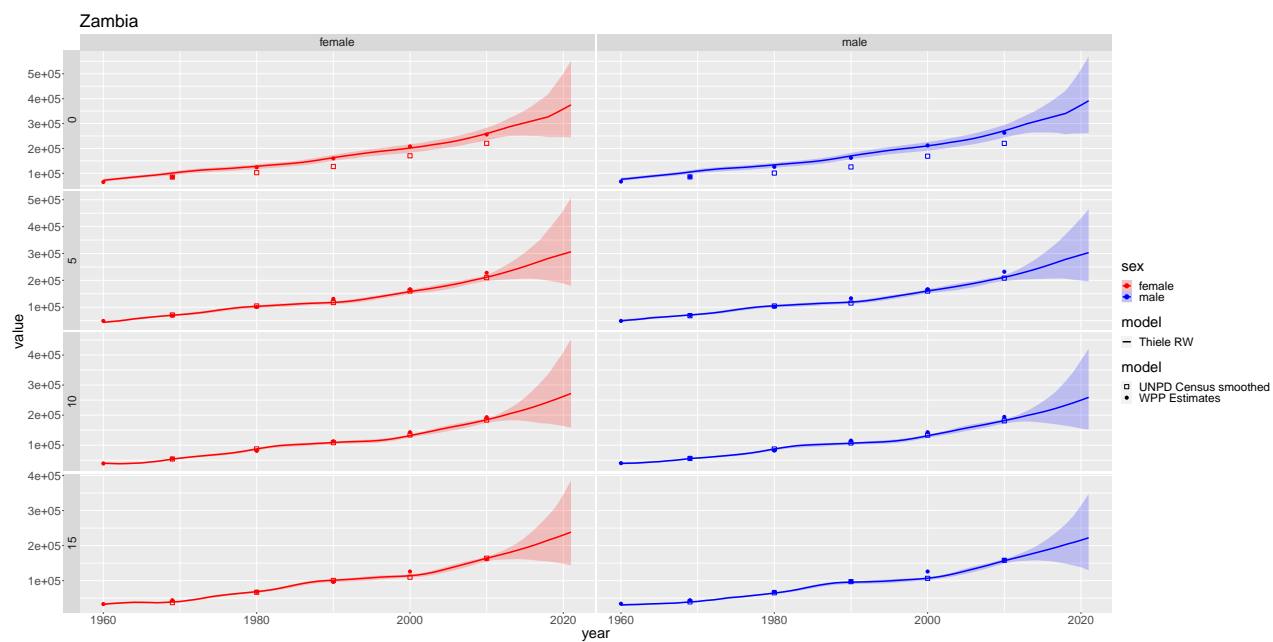


Figure 11: Population

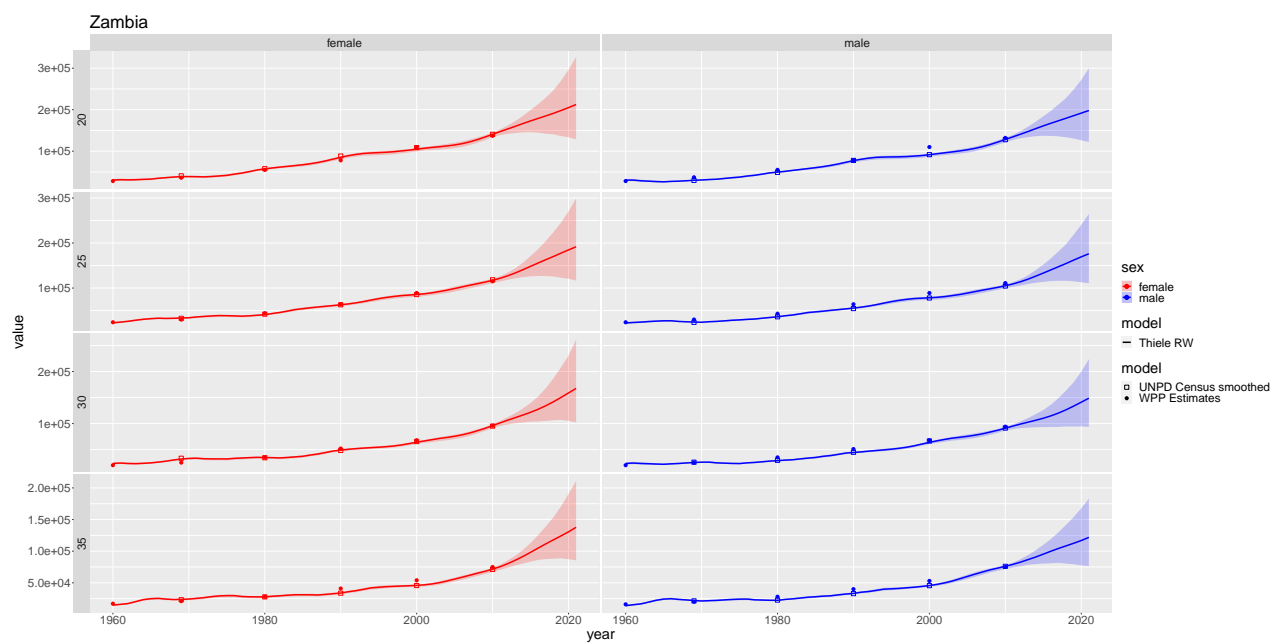


Figure 12: Population

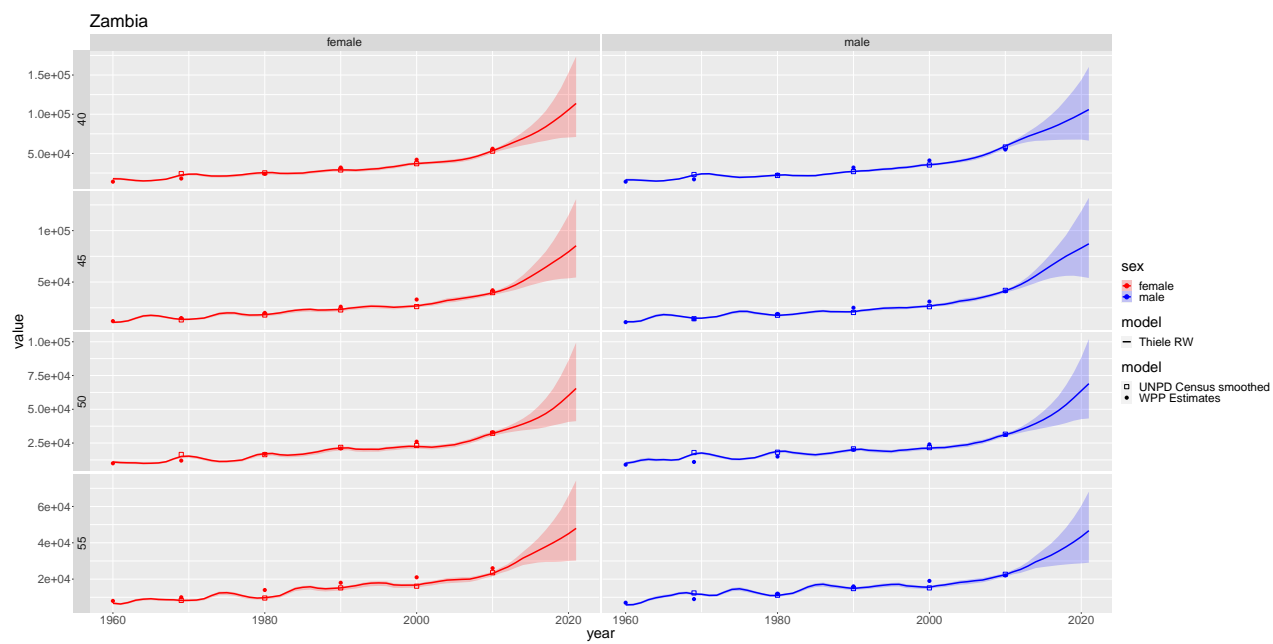


Figure 13: Population

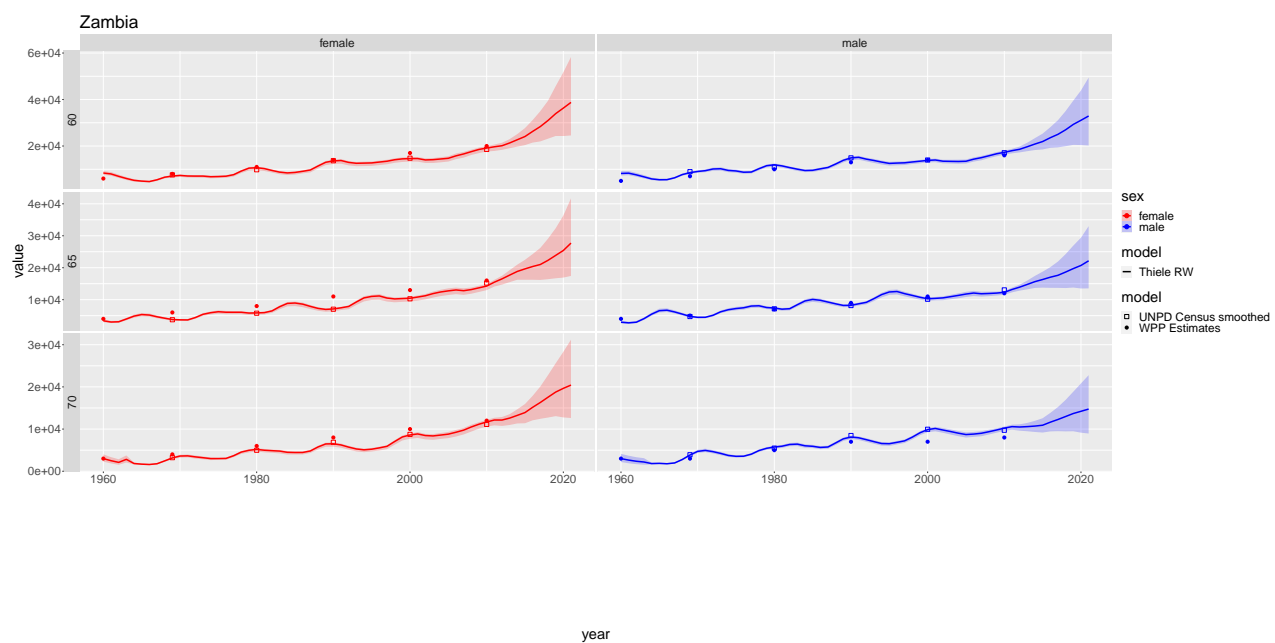


Figure 14: Population

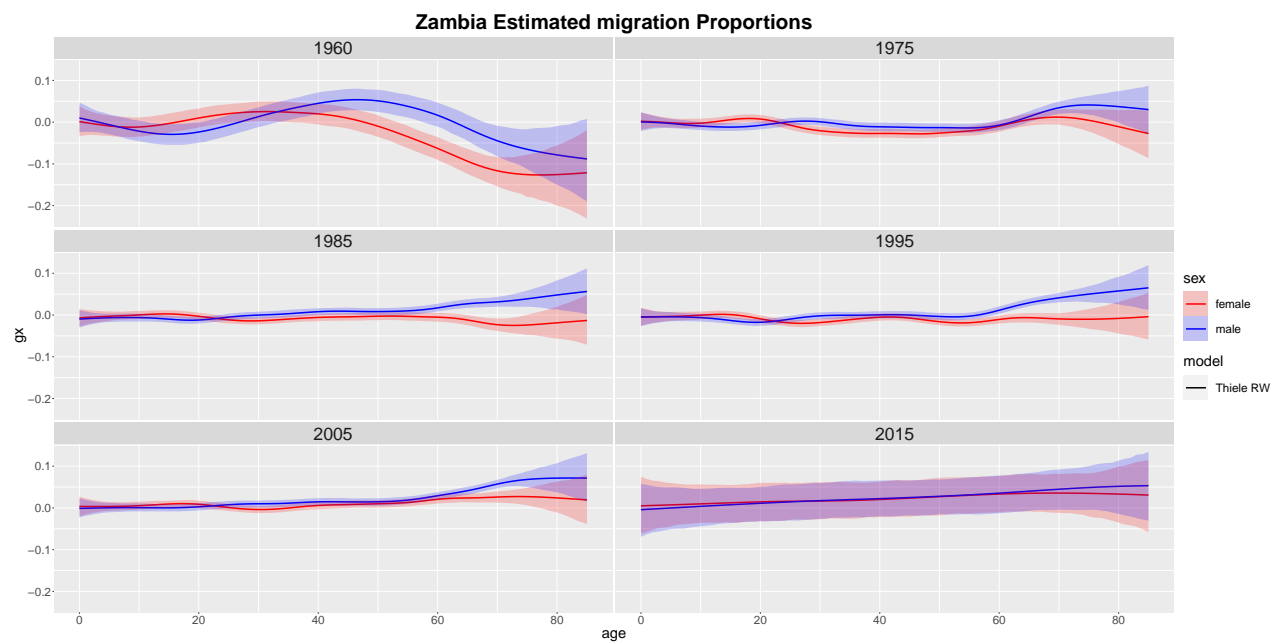


Figure 15: Migration

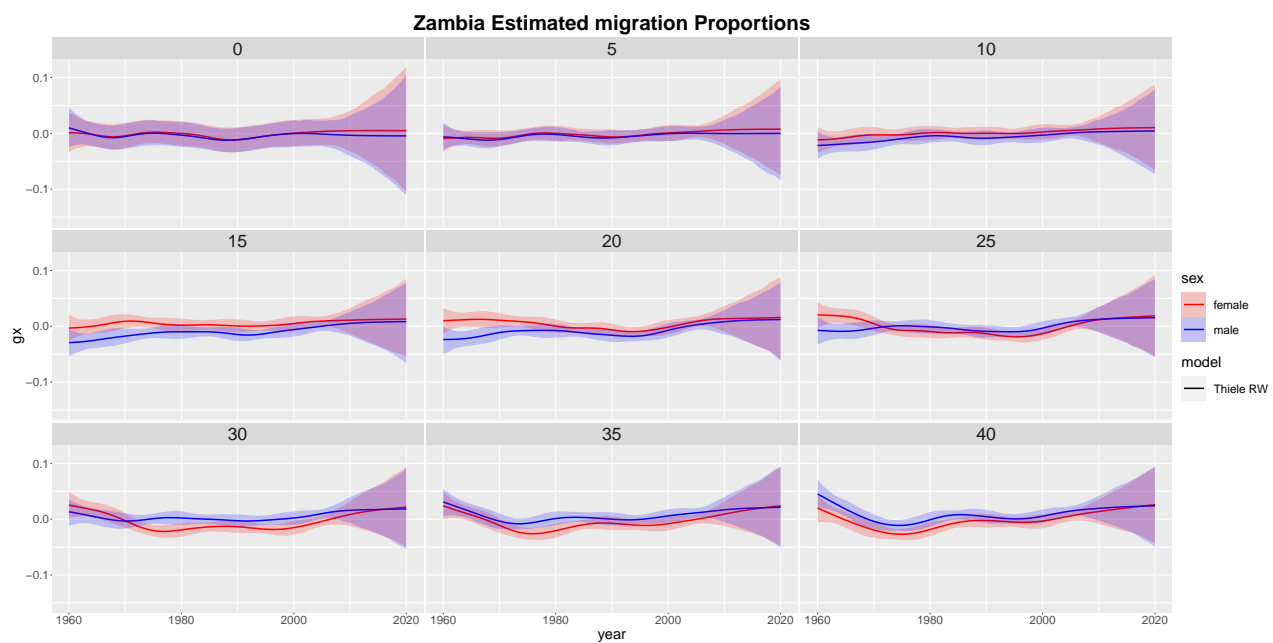


Figure 16: Migration

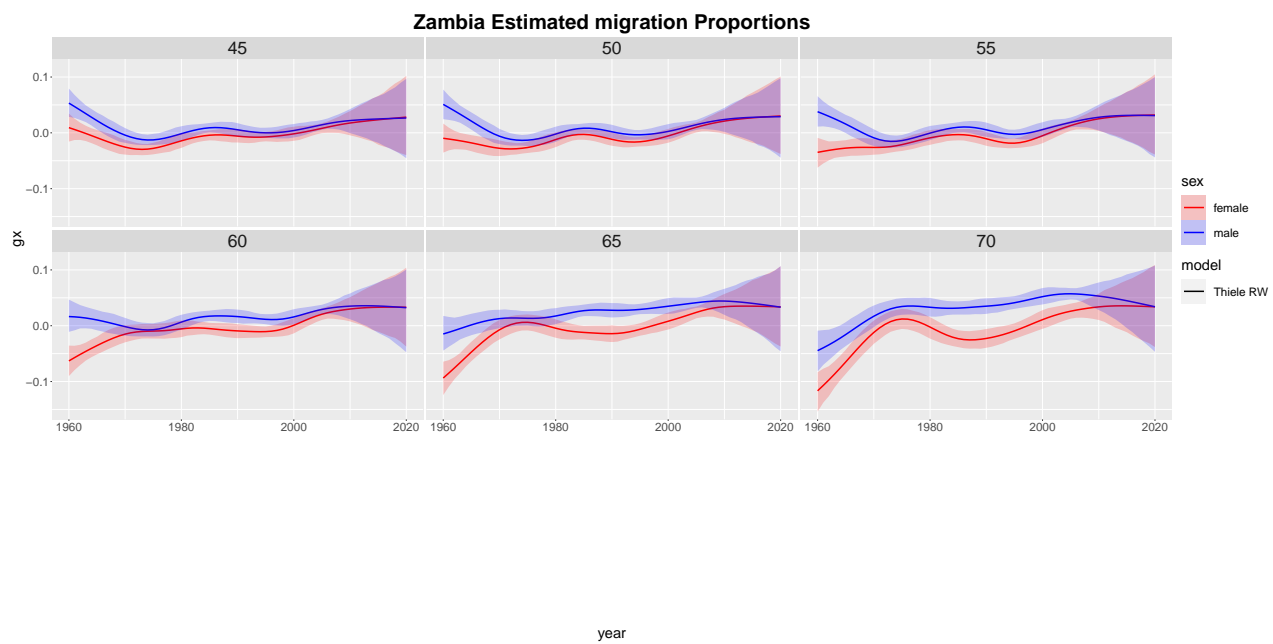


Figure 17: Migration

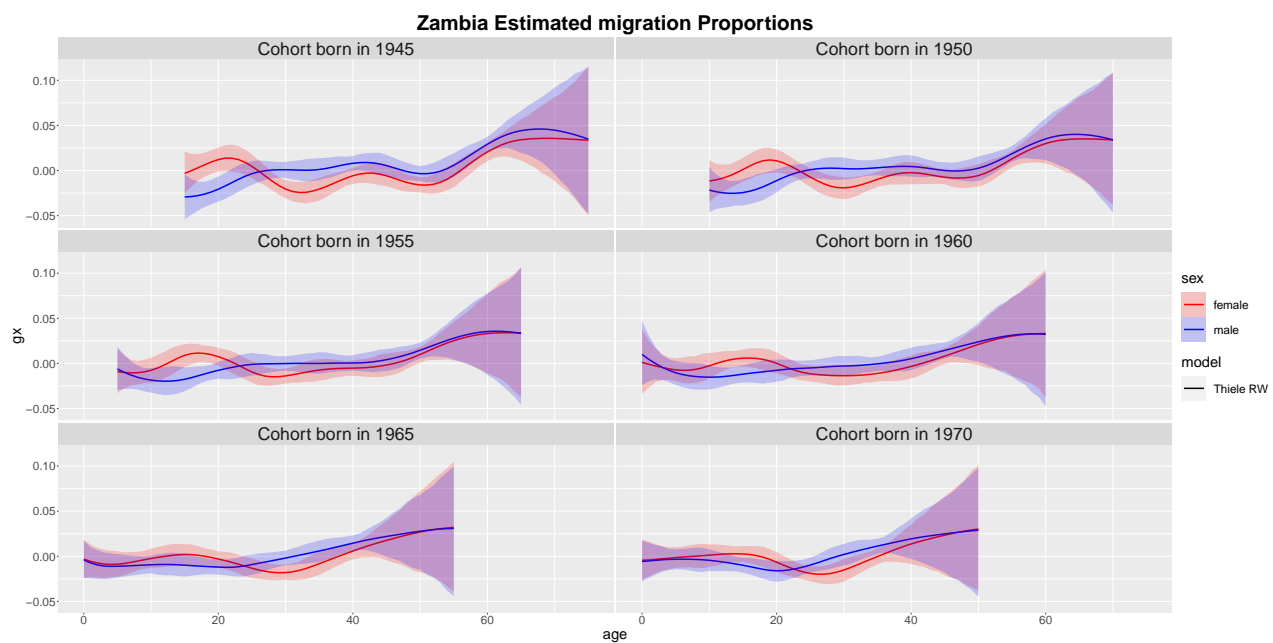


Figure 18: Migration

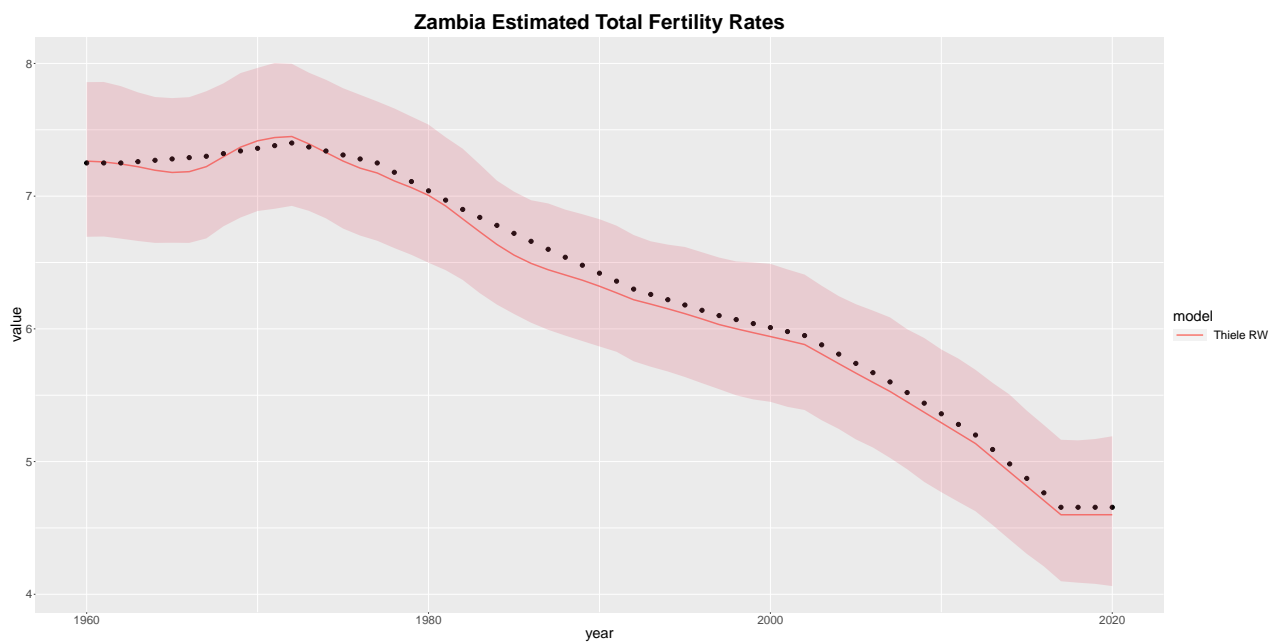


Figure 19: Total Fertility

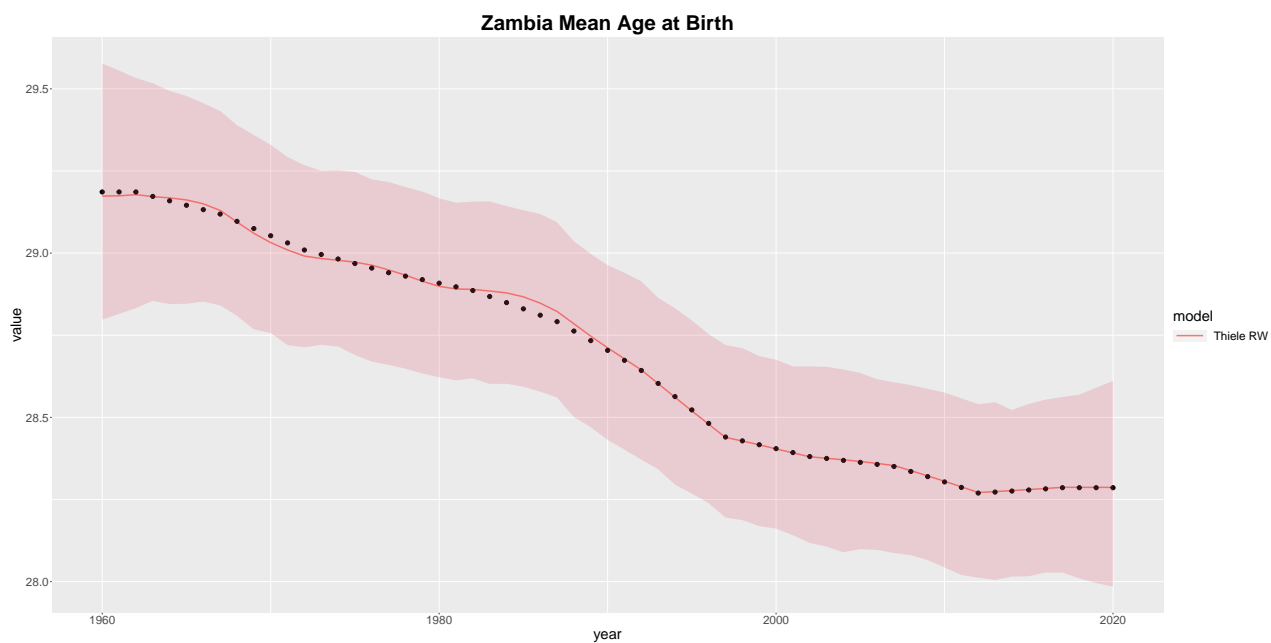


Figure 20: Mean age at births

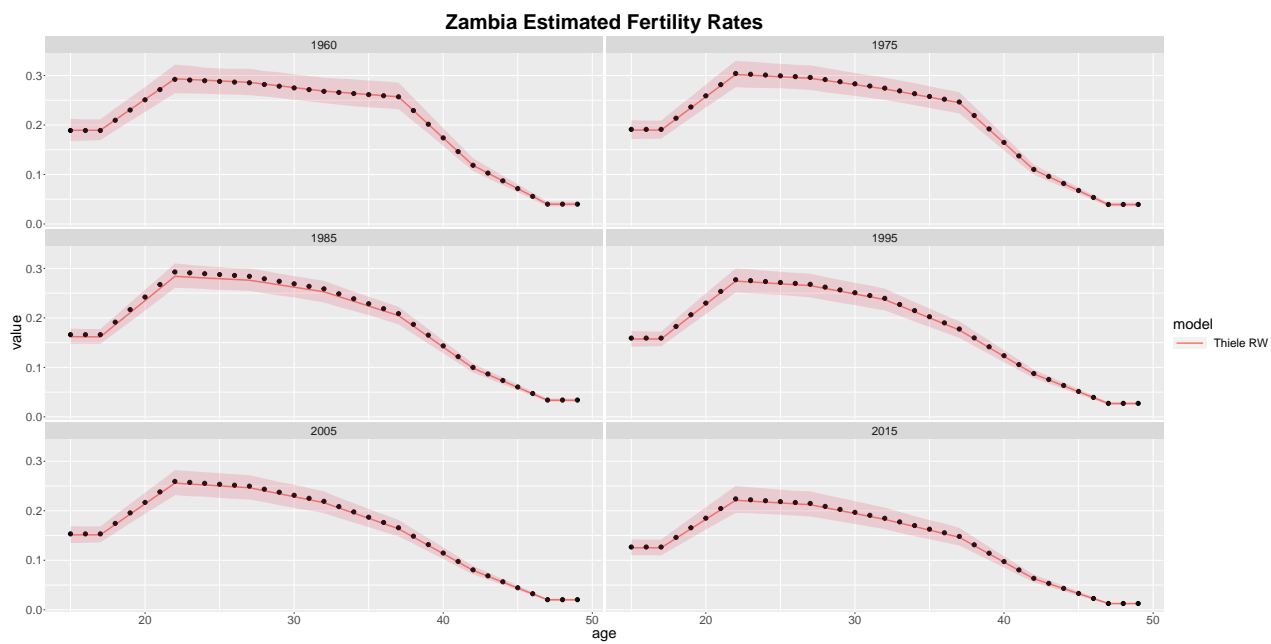


Figure 21: Fertility



Figure 22: Fertility