Namibia

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

## # A tibble: 86 x 4
##      age `1991` `2001` `2011`
##    <dbl>  <dbl>  <dbl>  <dbl>
## 1      0 24851. 23909. 32157
## 2      1 21976. 23883. 28690.
## 3      2 21726. 24603. 28220
## 4      3 21259. 25041. 27500.
## 5      4 21247. 25458. 27077
## 6      5 20771. 25430. 26048.
## 7      6 20065. 25264. 24803.
## 8      7 19362. 25259. 23924.
## 9      8 18677. 25248. 23376.
## 10     9 18357. 25517. 23940.
## # ... 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 4
##      age `1991` `2001` `2011`
##    <dbl>  <dbl>  <dbl>  <dbl>
## 1      0 24861. 23791. 31976
## 2      1 21883. 24016. 28452.
## 3      2 21600. 24629. 28036.
## 4      3 21144. 24966. 27342.
## 5      4 21149. 25281. 26940.
## 6      5 20679. 25177. 25925.
```

```
##  7      6 19965. 24978. 24627.
##  8      7 19163. 24795. 23618.
##  9      8 18386. 24574. 23047
## 10      9 17972. 24684. 23621.
## # ... 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_f            log_tau2_logpop_f            log_tau2_logpop_m            log_tau2_
##                  6.3829771                   4.0874370                   6.4407388                   4
##              log_tau2_gx_m            log_lambda_gx_age_f         log_lambda_gx_age_m            log_lambda_g
##                  3.3314182                   7.9250254                   7.9281401                   8
##      log_lambda_gx_agetime_m              log_lambda_tp  log_lambda_tp_0_inflated_sd            log_disp
##                  6.9077295                   3.5952190                   0.3108012                   0
##      log_marginal_prec_psi_f         log_marginal_prec_A_f        log_marginal_prec_B_f       log_marginal_pr
##                  6.8083651                   6.8115760                   6.9031887                   6
##        log_marginal_prec_B_m              log_lambda_phi_f            log_lambda_psi_f            log_lambda_
##                  6.8899819                   4.3085493                   4.3078141                   2
##              log_lambda_A_f               log_lambda_B_f            log_lambda_phi_m               log_lamb
##                  4.3081173                   4.3234658                   4.3093179                   4
##         log_lambda_epsilon_m               log_lambda_A_m              log_lambda_B_m        logit_lambda_slo
##                  4.3331699                   4.3079672                   4.3203147                   1
##     logit_lambda_slope_rho_m        logit_delta_slope_rho_m    logit_epsilon_slope_rho_m
##                 -1.4938205                   0.5781258                   0.4385576
```
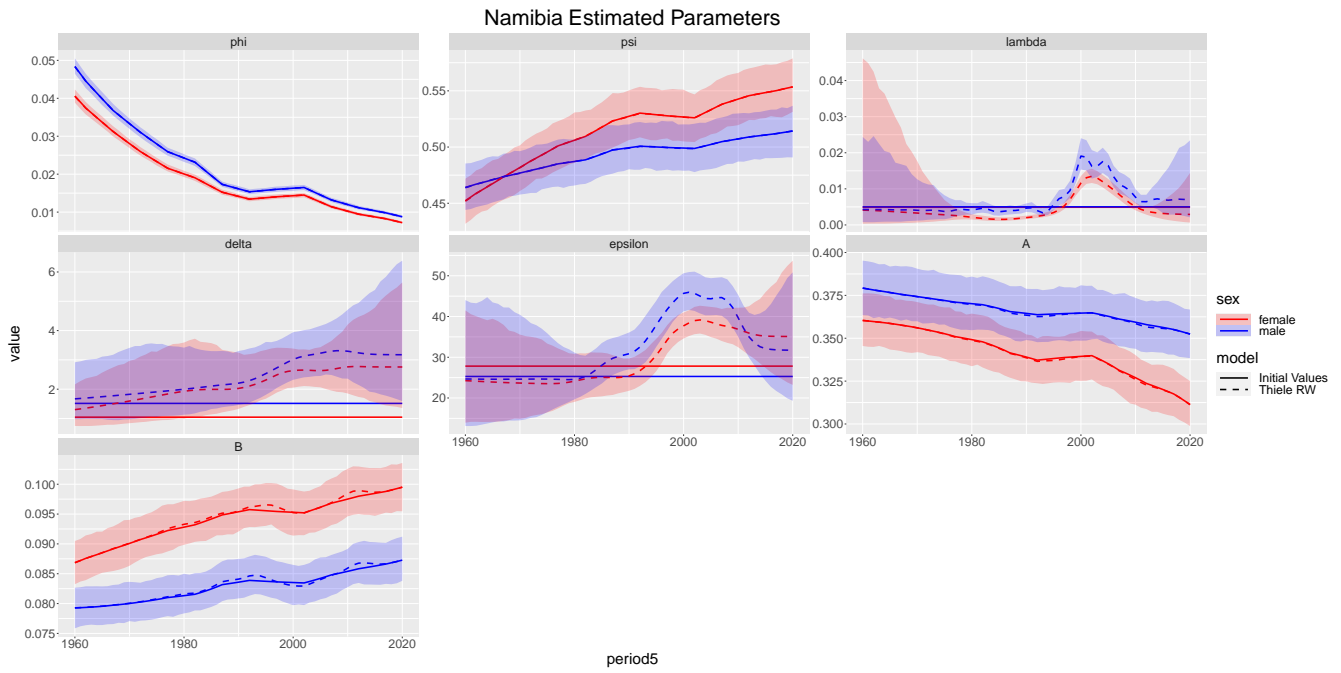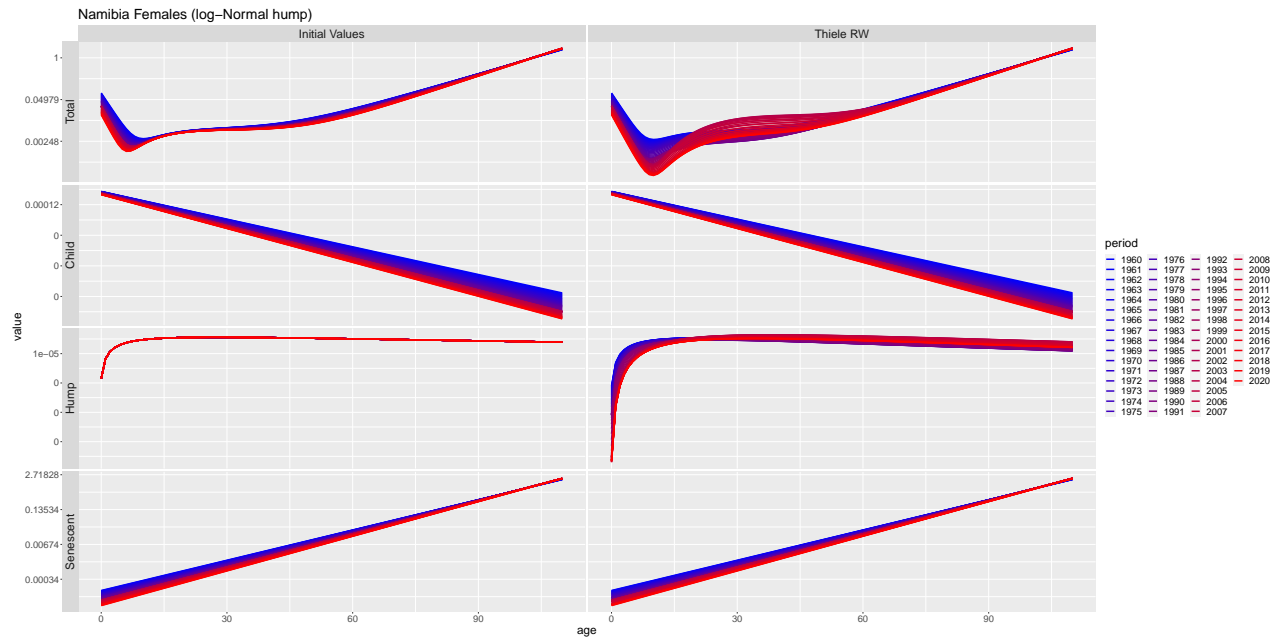
2

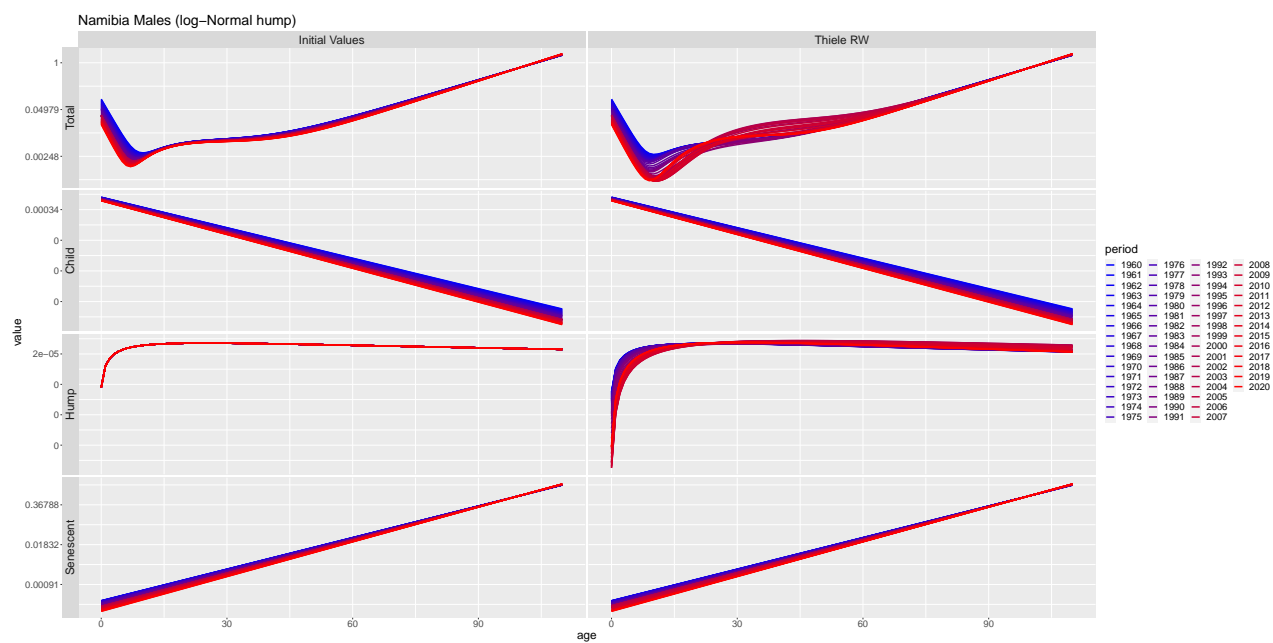Figure 1: Estimated parameters

Figure 2: Thiele Decomposed
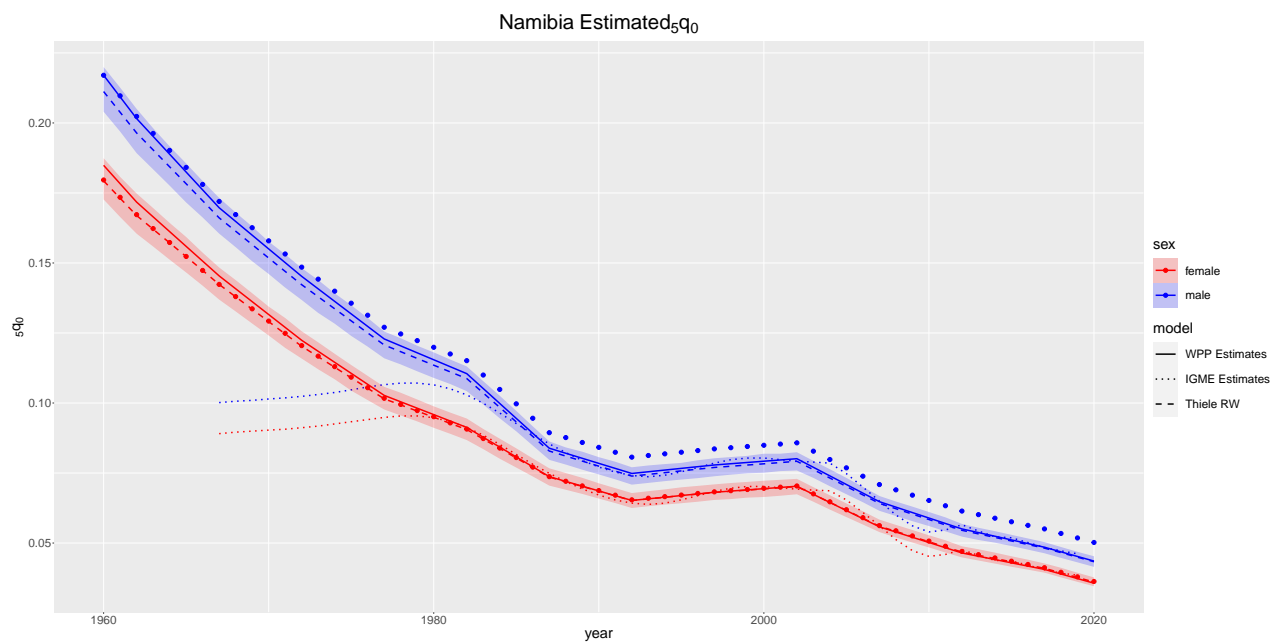
Figure 3: Thiele Decomposed
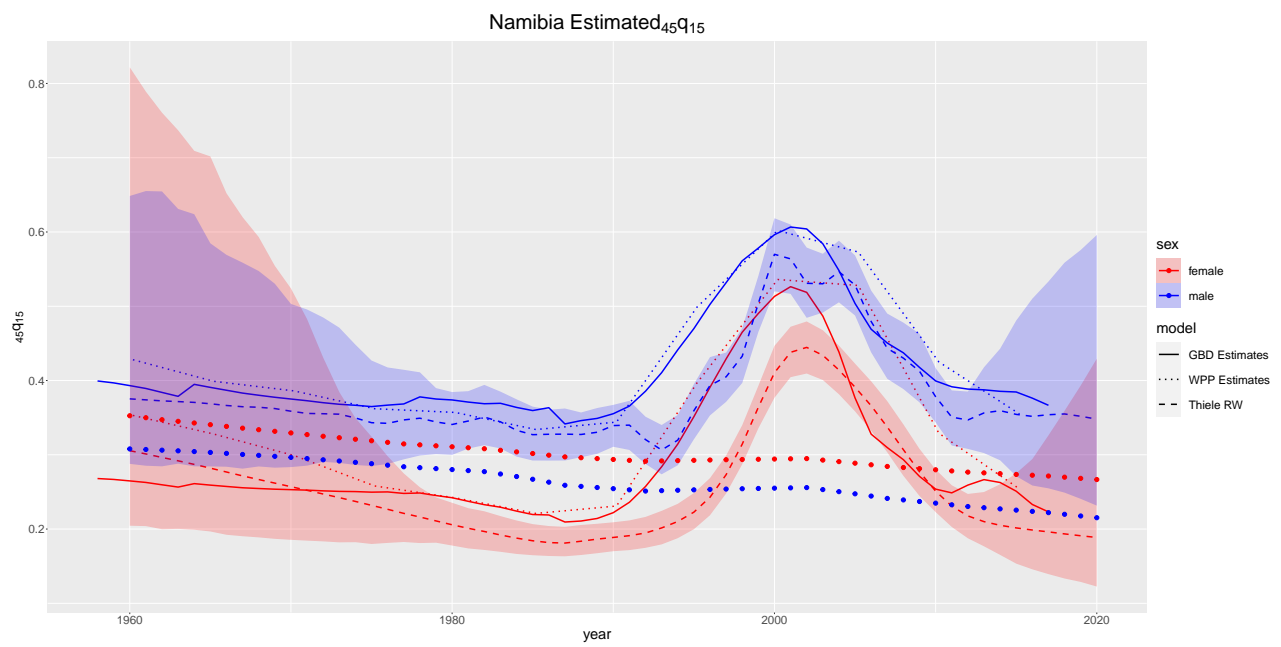

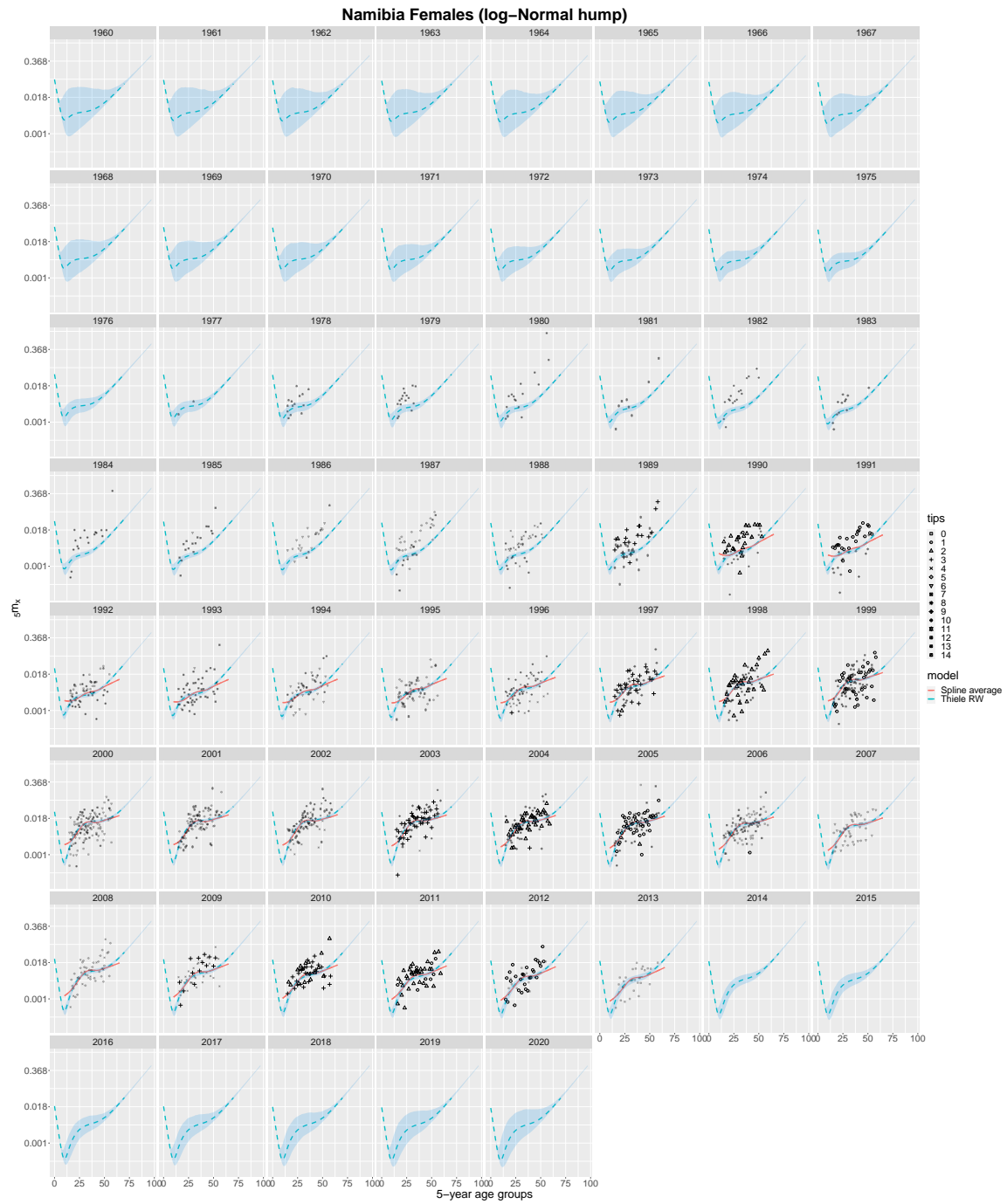Figure 4: Estimated $_5q_0$

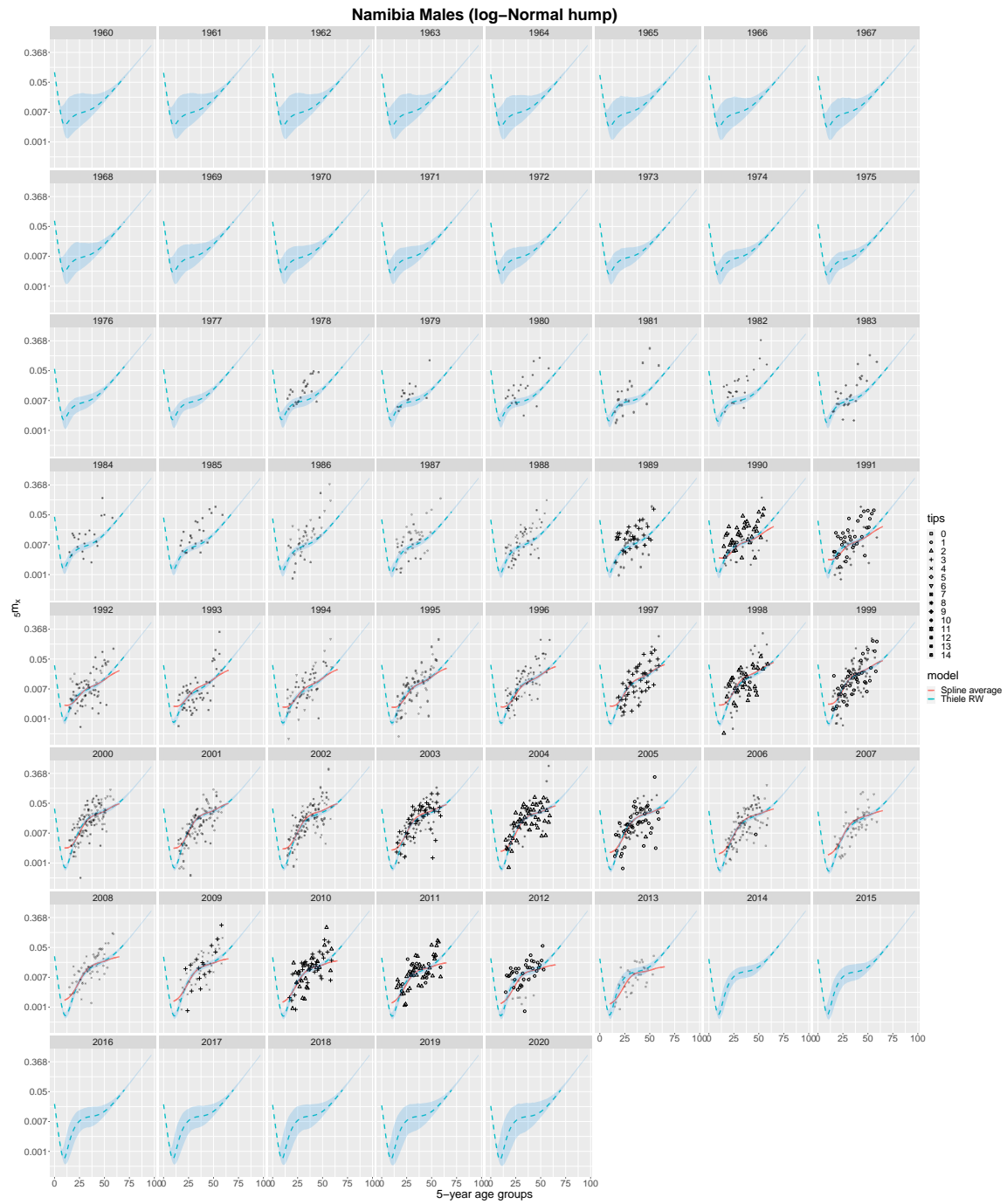Figure 5: Estimated $_{45}q_{15}$

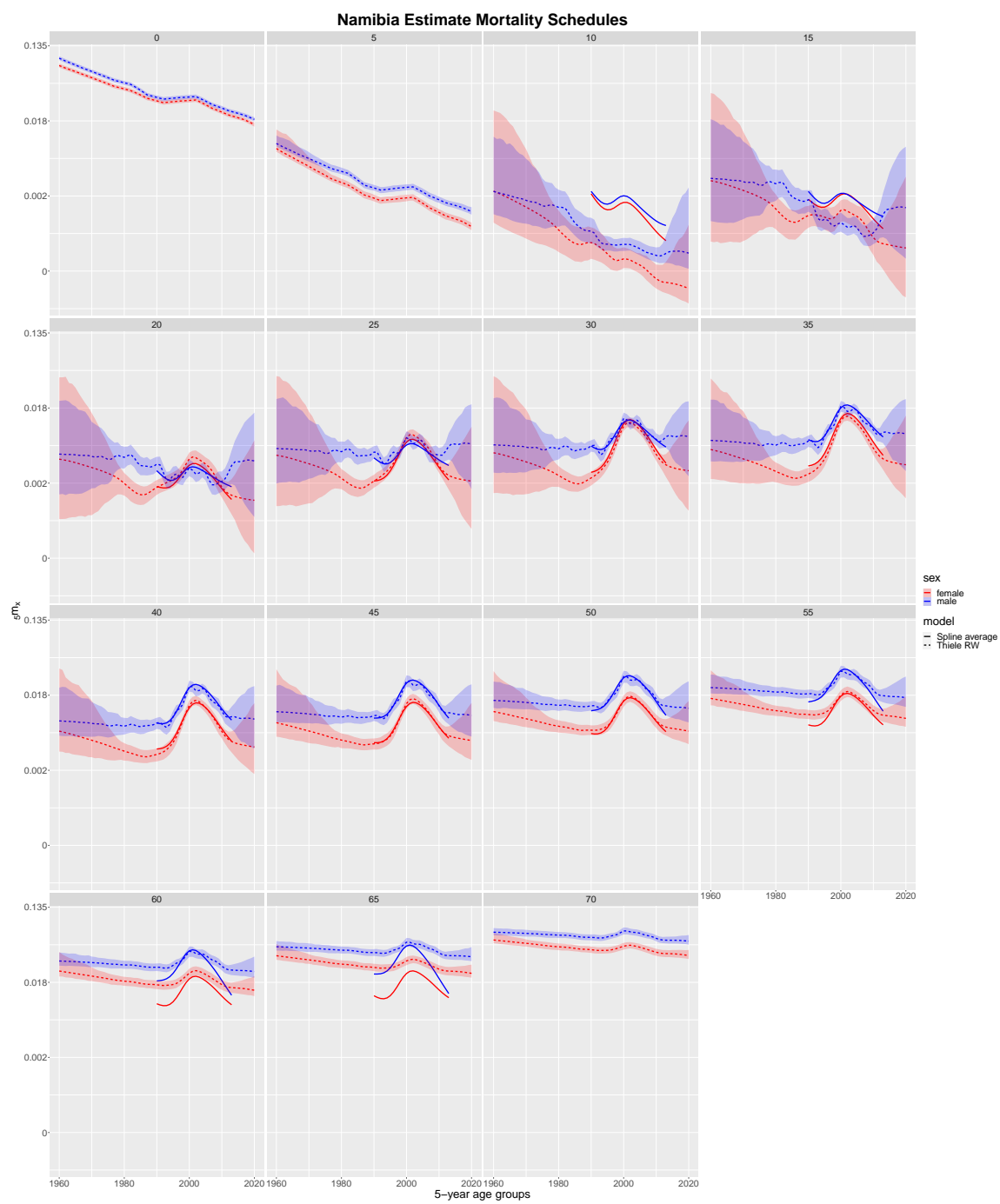Figure 6: Mortality Schedules

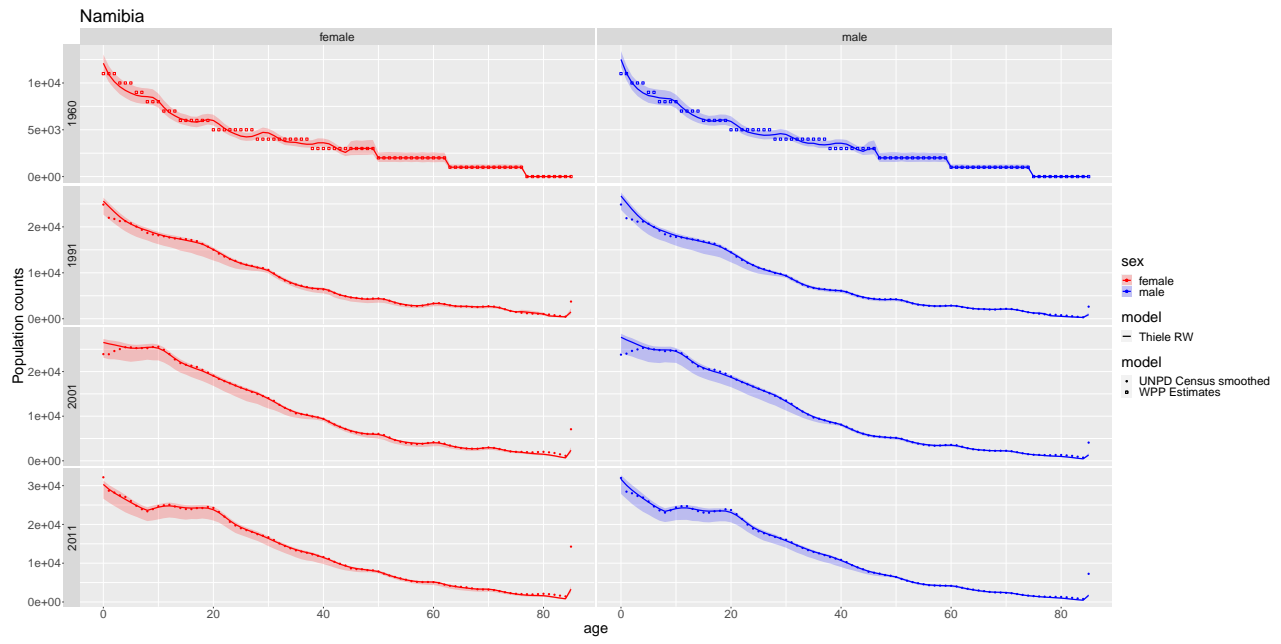Figure 7: Mortality Schedules

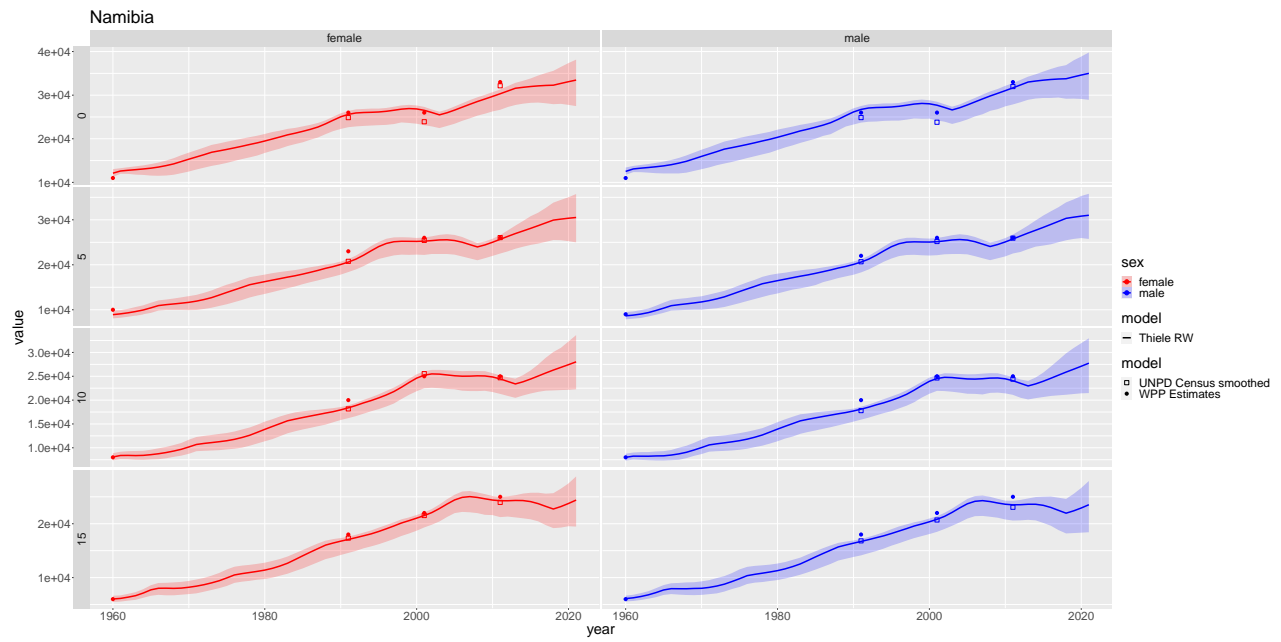Figure 8: Mortality Schedules

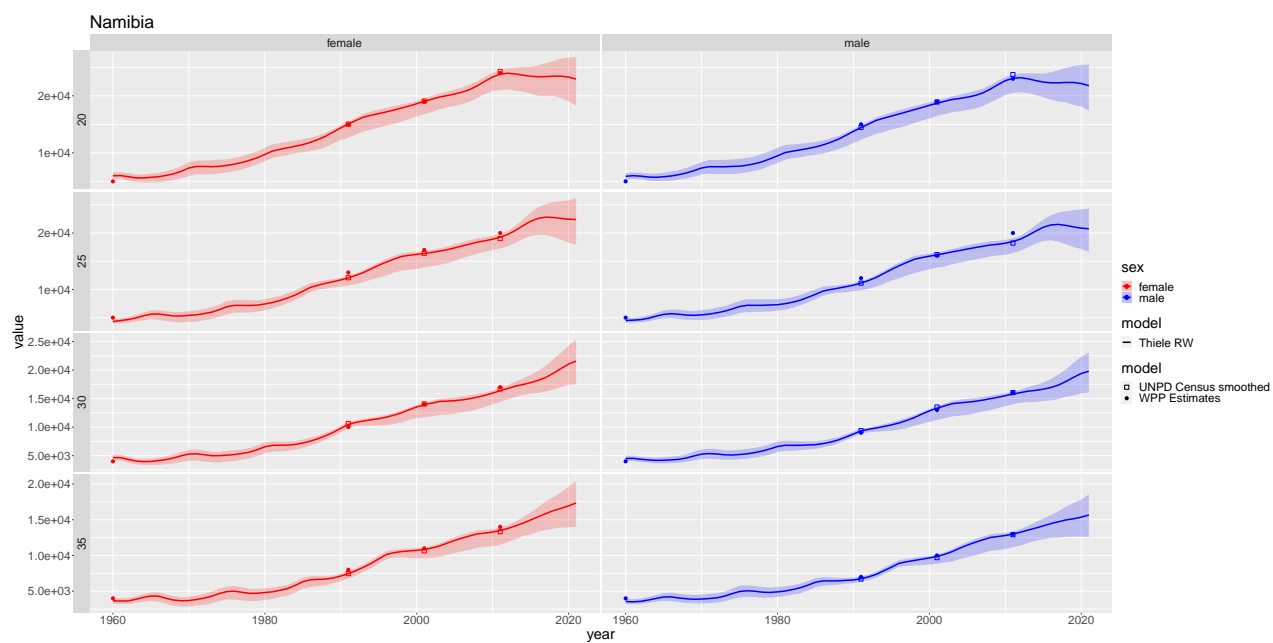Figure 9: Population

Figure 10: Population
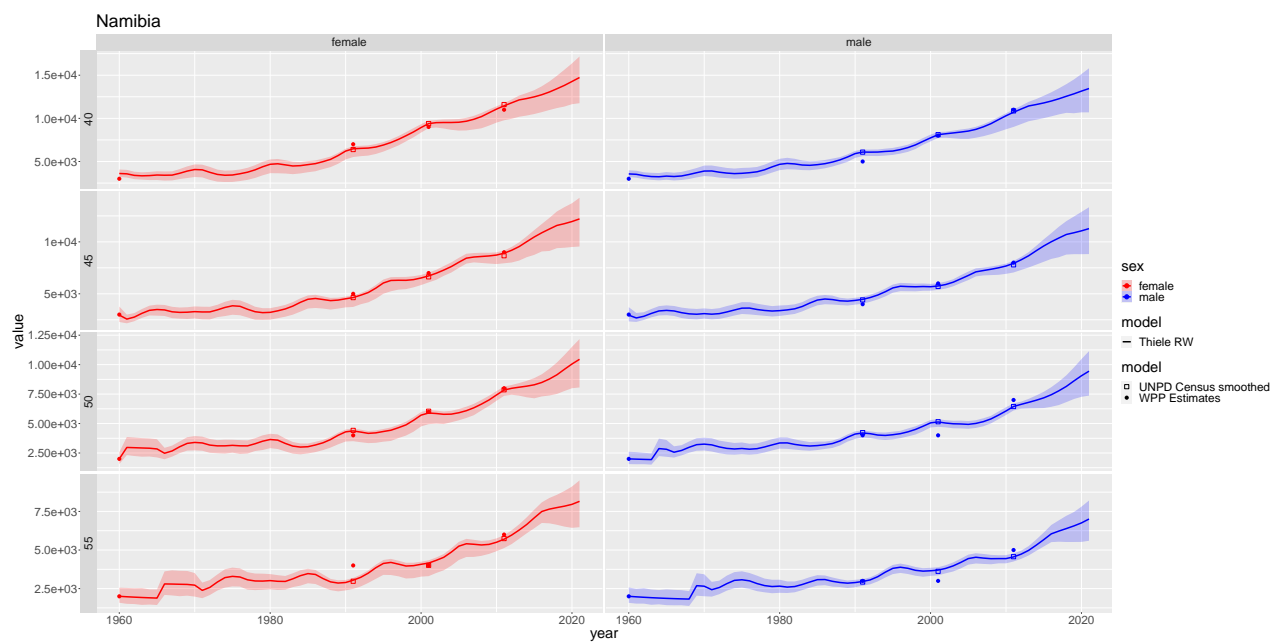
9

Figure 11: Population
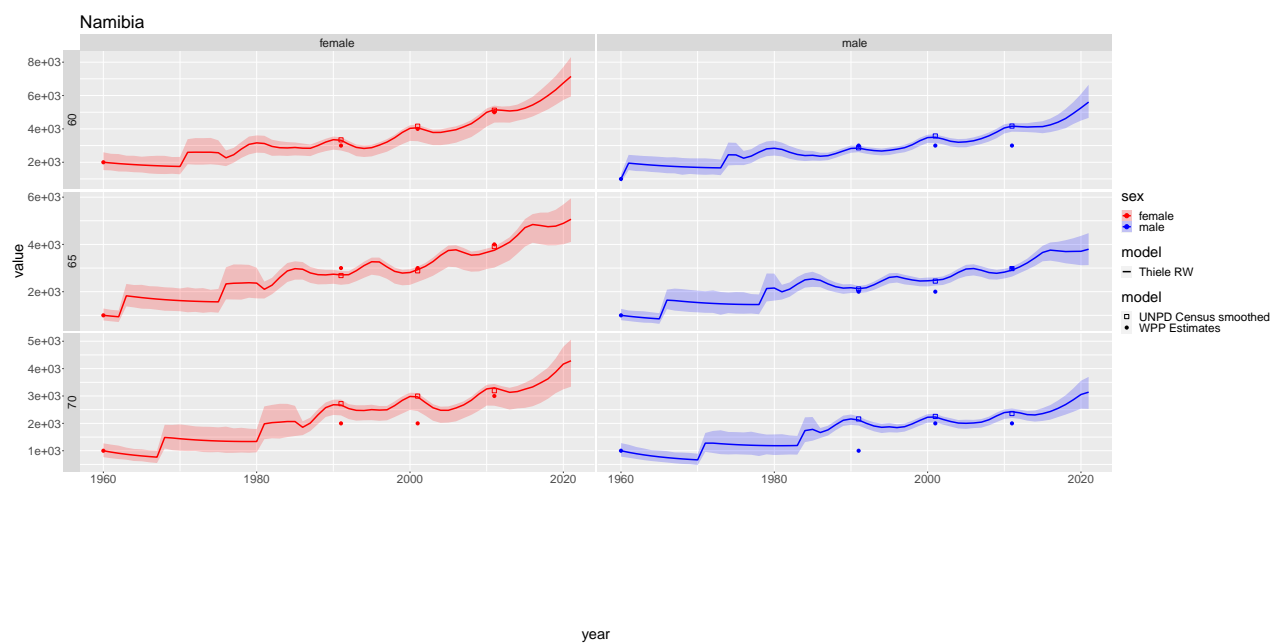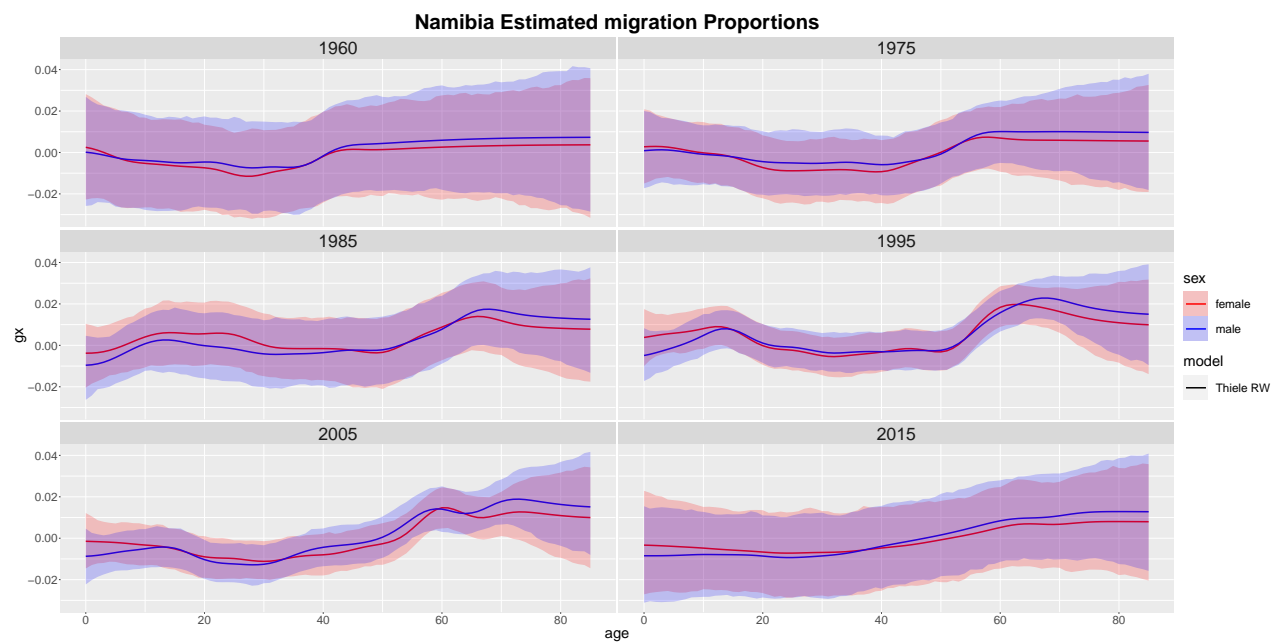

Figure 12: Population
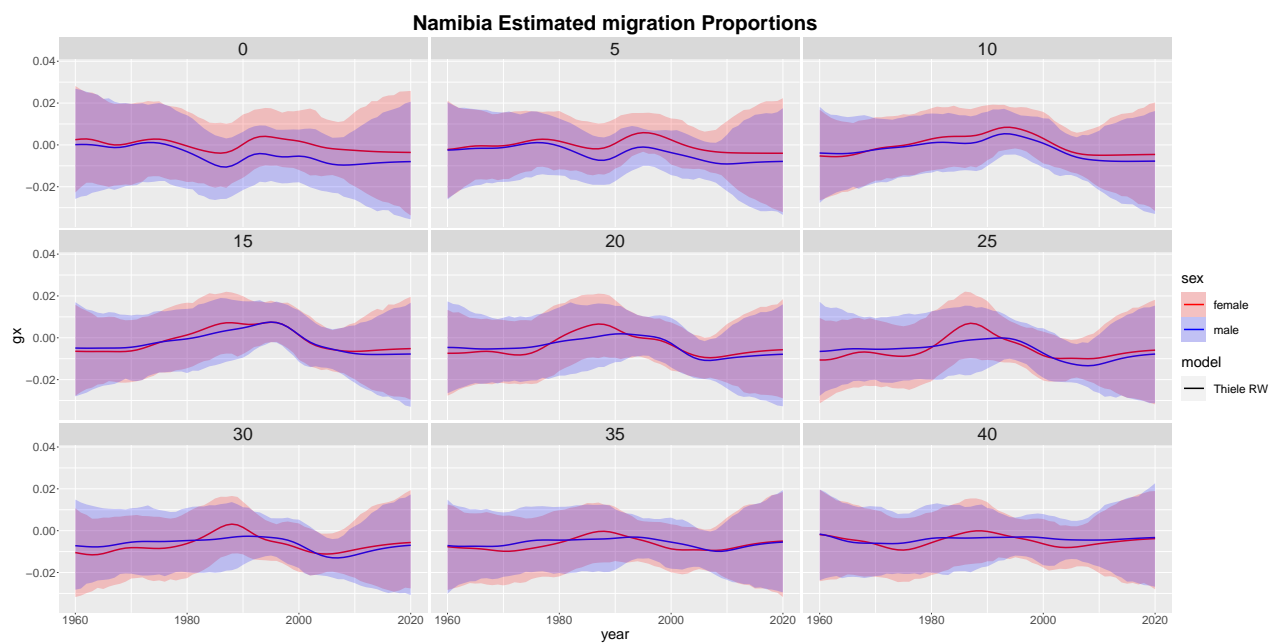
Figure 13: Population
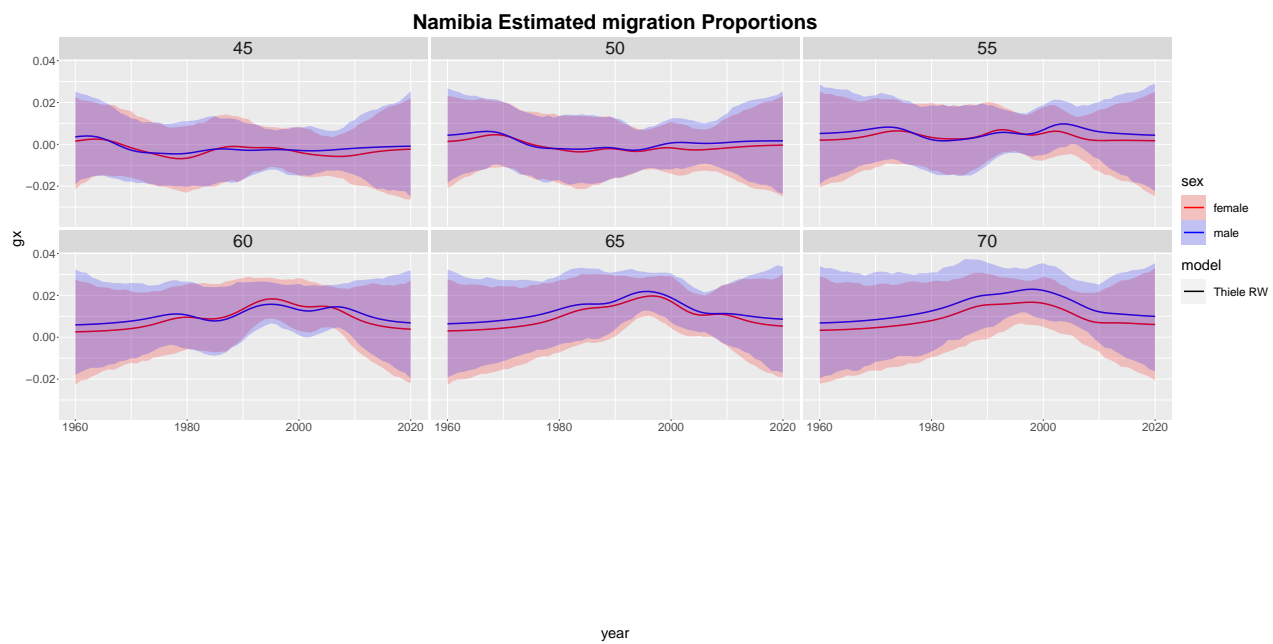

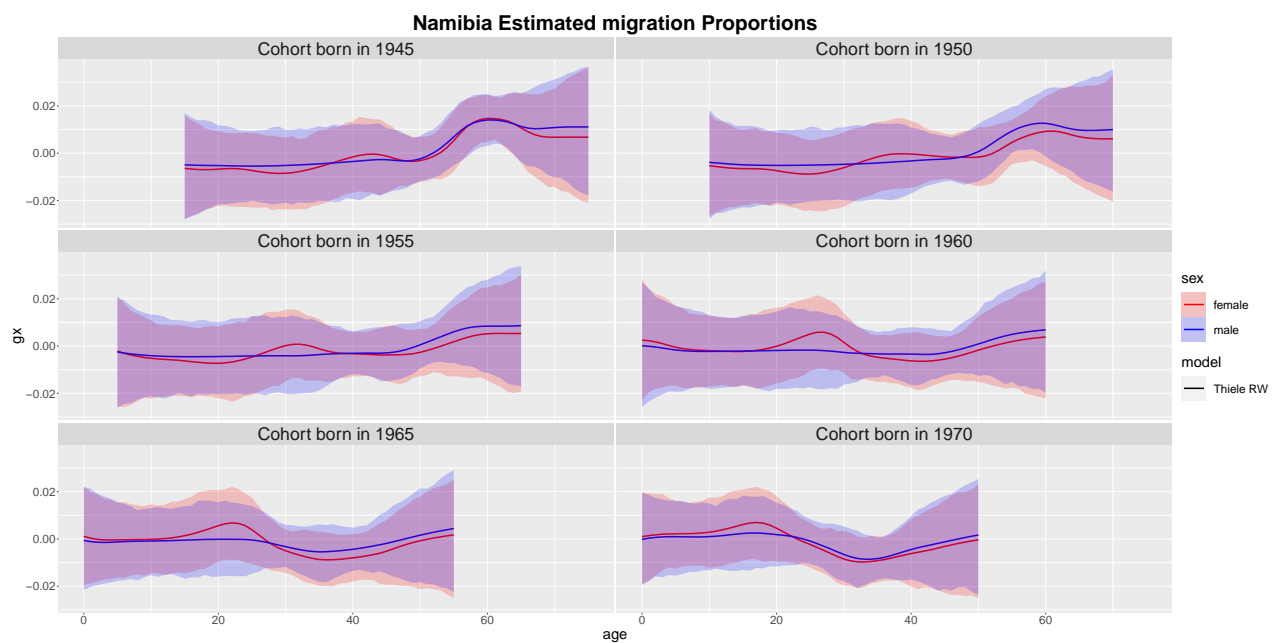Figure 14: Migration

Figure 15: Migration
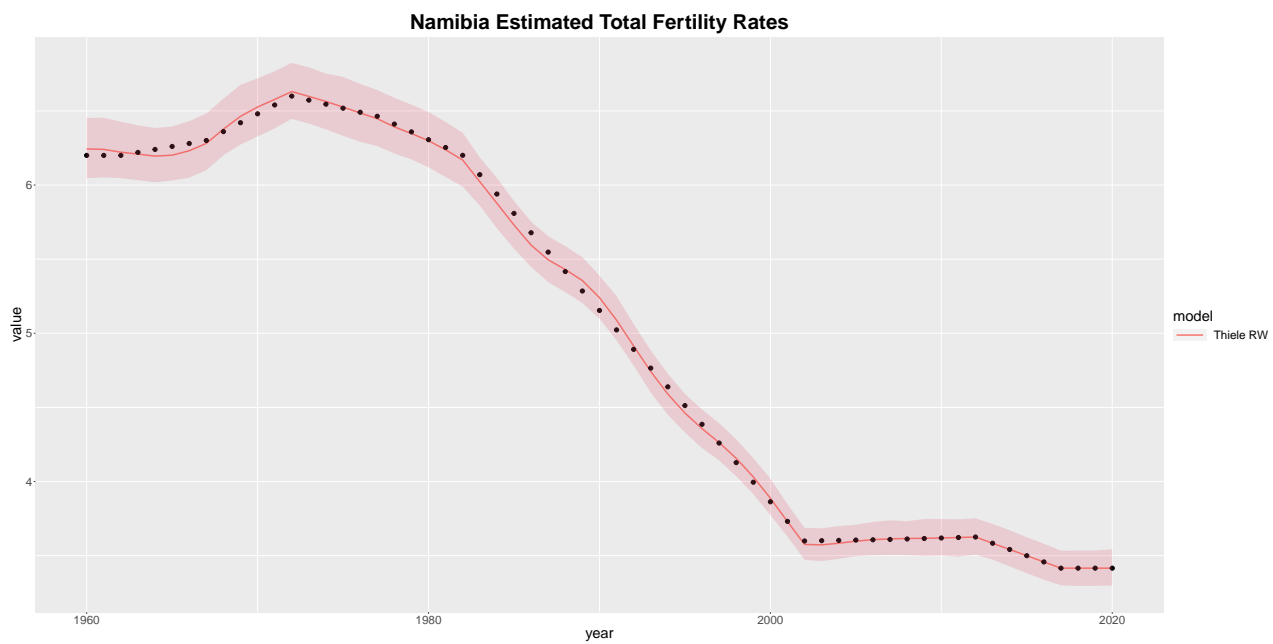

Figure 16: Migration
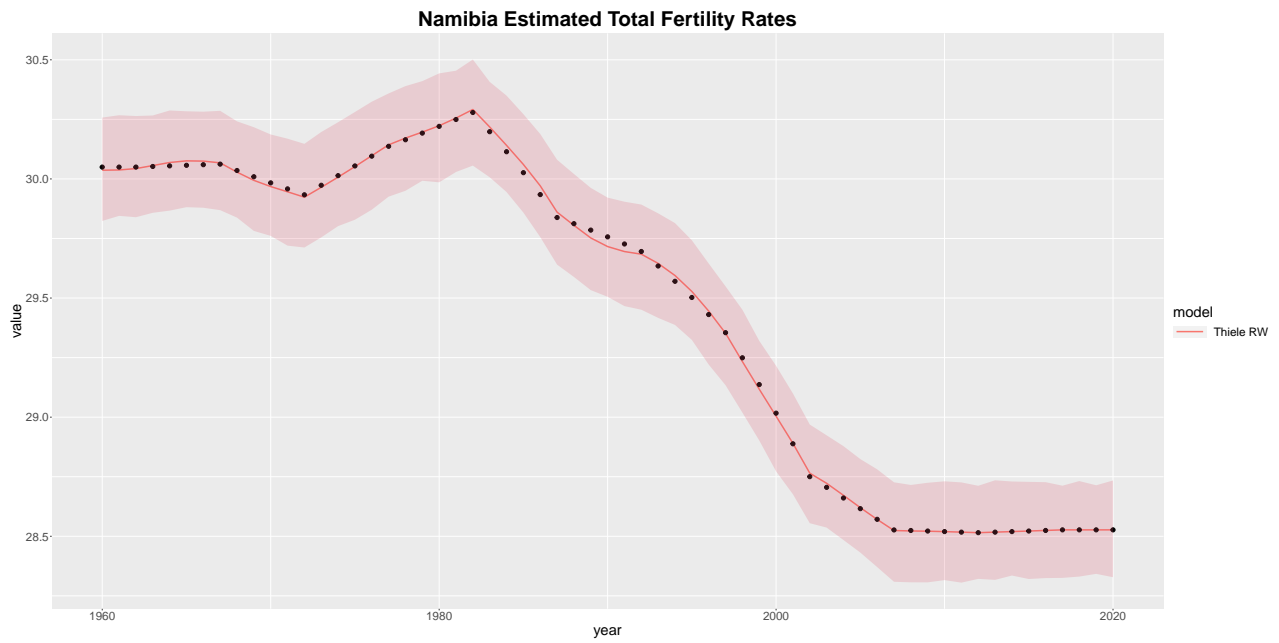
Figure 17: Migration

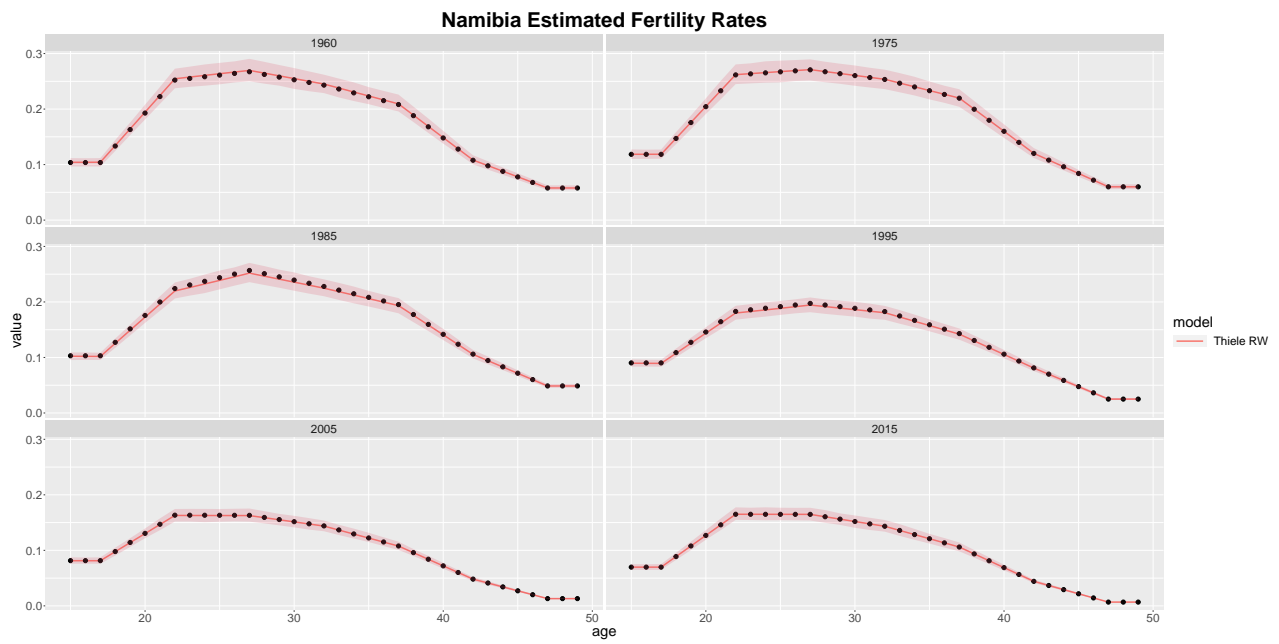Figure 18: Total Fertility

Figure 19: Mean age at births
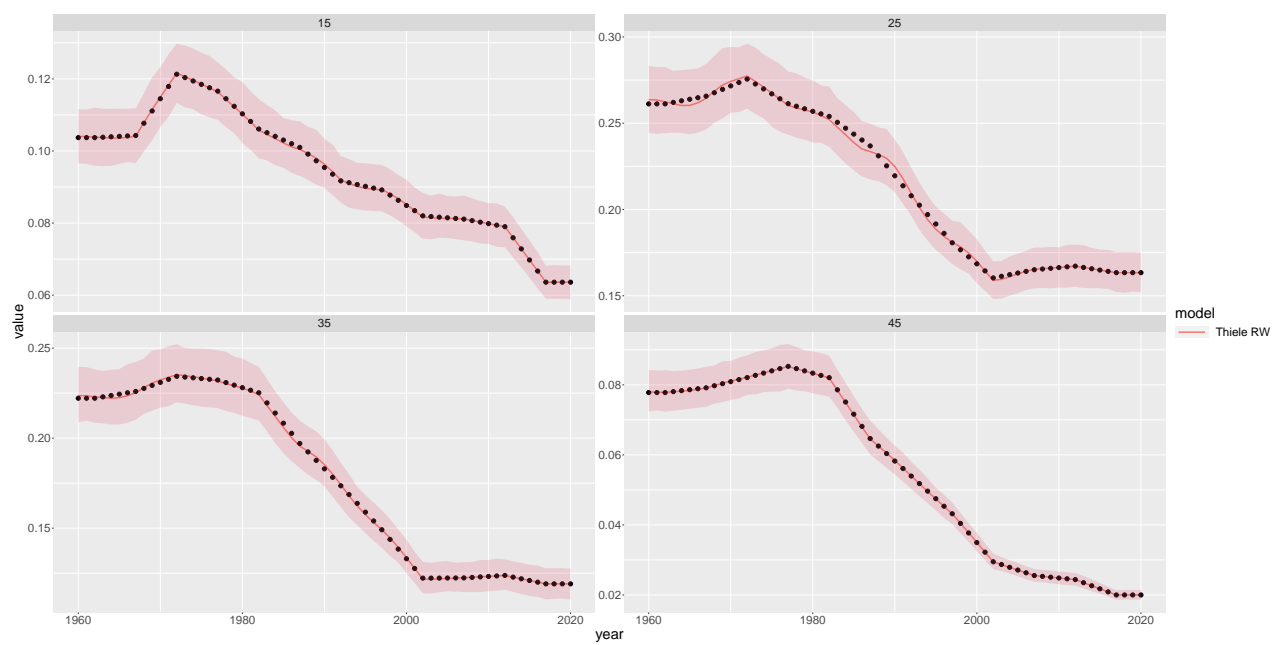

Figure 20: Fertility

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Figure 21: Fertility