SubnationalCRVS Demo

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Contents

1 Set up

```
#library(devtools)
#install_github("jroth-unfpa/SubnationalCRVS")
library(SubnationalCRVS)
library(dplyr)
my_plots_dir <- "Plots/"
dir.create(my_plots_dir)
knitr::opts_chunk$set(echo = TRUE)
```

2 View the first few rows of the data

```
head(ecuador_age_tabulation)
```

```
##   province_name province_name_short sex age pop1 pop2      date1      date2
## 1         Azuay                Azu   m   0 6086 6750 2001-11-25 2010-11-28
## 2         Azuay                Azu   m   1 6555 6984 2001-11-25 2010-11-28
```

```
## 3         Azuay                 Azu   m   2 7232 7090 2001-11-25 2010-11-28
## 4         Azuay                 Azu   m   3 7101 7095 2001-11-25 2010-11-28
## 5         Azuay                 Azu   m   4 7083 6961 2001-11-25 2010-11-28
## 6         Azuay                 Azu   m   5 6583 6895 2001-11-25 2010-11-28
```

```
head(example_data_ecuador)
```

```
##   province_name province_name_short sex age  pop1  pop2 deaths      date1
## 1         Azuay                 Azu   m   0 34101 34886    772 2001-11-25
## 2         Azuay                 Azu   m  10 34946 38125    223 2001-11-25
## 3         Azuay                 Azu   m  15 32387 37611    416 2001-11-25
## 4         Azuay                 Azu   m  20 25634 33665    480 2001-11-25
## 5         Azuay                 Azu   m  25 18606 28376    475 2001-11-25
## 6         Azuay                 Azu   m  30 16193 22026    456 2001-11-25
##        date2
## 1 2010-11-28
## 2 2010-11-28
## 3 2010-11-28
## 4 2010-11-28
## 5 2010-11-28
## 6 2010-11-28
```

3 Conduct DDQA

3.1 Sex ratio

```
s <- PlotSexRatios(data=example_data_ecuador,
                   name.disaggregations="province_name",
                   name.males="m",
                   name.females="f",
                   name.age="age",
                   name.sex="sex",
                   name.date1="date1",
                   name.date2="date2",
                   name.population.year1="pop1",
                   name.population.year2="pop2",
                   line.size.overall=0.6,
                   print.disaggregated=FALSE,
                   print.overall=FALSE,
                   plots.dir="Plots/")
```

3.1.1 View sex ratios in table

```
s %>% select(province_name, age, pop1, pop2, sex_ratio_1, sex_ratio_2) %>%
      head()
```

```
##   province_name age  pop1  pop2 sex_ratio_1 sex_ratio_2
## 1         Azuay   0 33491 33876   101.82138   102.98146
```

```
## 2         Azuay  10 34975 37366    99.91708   102.03126
## 3         Azuay  15 34181 37215    94.75147   101.06409
## 4         Azuay  20 31000 35753    82.69032    94.15993
## 5         Azuay  25 23844 32054    78.03221    88.52561
## 6         Azuay  30 21317 26520    75.96285    83.05430
```

3.1.2 View sex ratios in combined plot

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "sex_ratios_combined_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

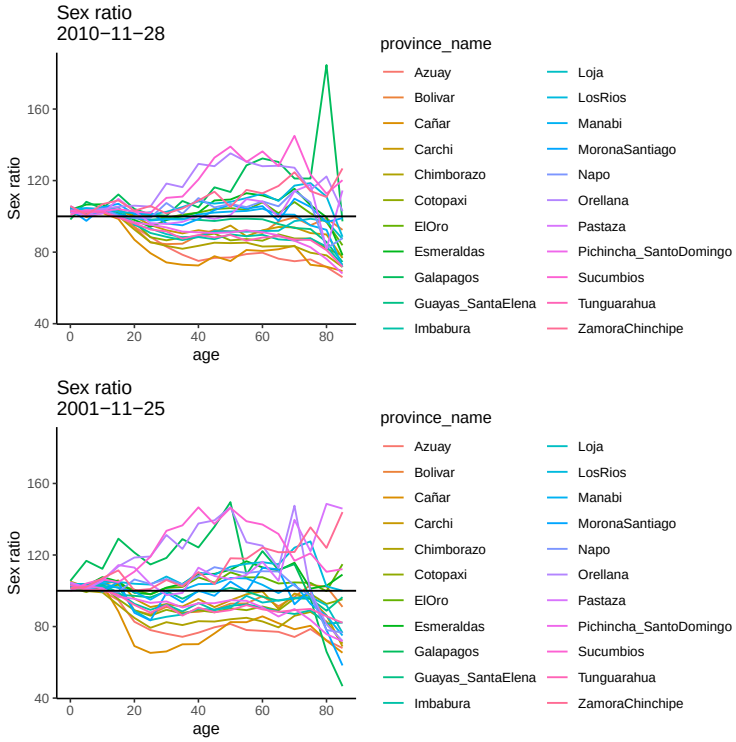

Figure 1: Sex ratios in Ecuador by province, combined plot

3.1.3 View sex ratios in disaggregated plots

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "sex_ratios_by_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

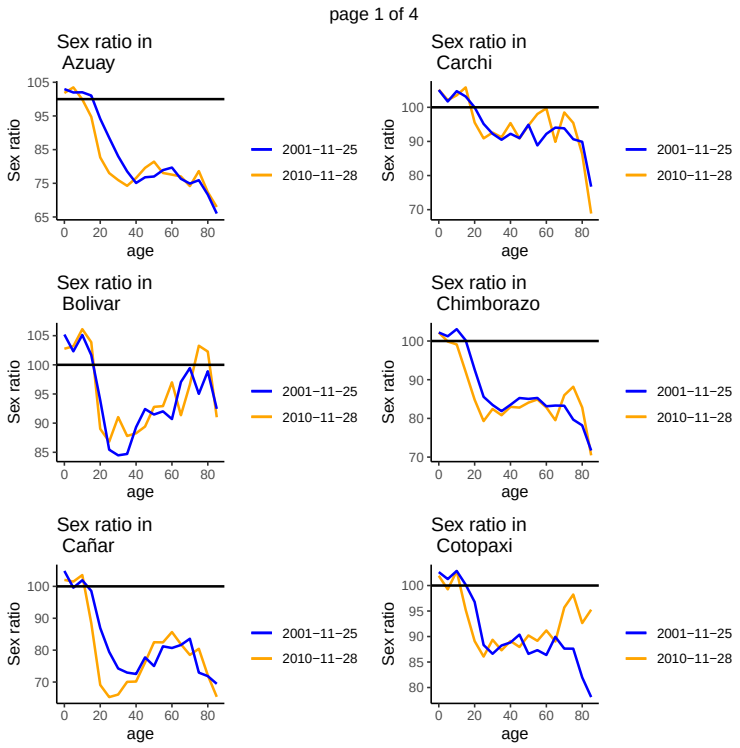

Figure 2: Sex ratios in Ecuador by province, disaggregated plots

3.2 Age ratios

```
a <- PlotAgeRatios(data=example_data_ecuador,
              name.disaggregations="province_name",
              name.males="m",
              name.females="f",
              name.age="age",
              name.sex="sex",
              name.date1="date1",
              name.date2="date2",
              name.population.year1="pop1",
              name.population.year2="pop2",
              line.size.overall=0.6,
              print.disaggregated=FALSE,
              print.overall=FALSE,
              plots.dir="Plots/")
```

3.2.1 View age ratios in table

```
a %>% select(province_name, age, pop1, pop2, age_ratio_1, age_ratio_2) %>%
      head()
```

```
##   province_name age  pop1  pop2 age_ratio_1 age_ratio_2
```

```
## 1         Azuay   0 33491 33876          NA          NA
## 2         Azuay   5 33817 35701    98.78480    100.2246
## 3         Azuay  10 34975 37366   102.87067    102.4905
## 4         Azuay  15 34181 37215   103.61804    101.7930
## 5         Azuay  20 31000 35753   106.85050    103.2294
## 6         Azuay  25 23844 32054    91.15202    102.9467
```

3.2.2 View age ratios in combined plot

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "age_ratios_combined_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

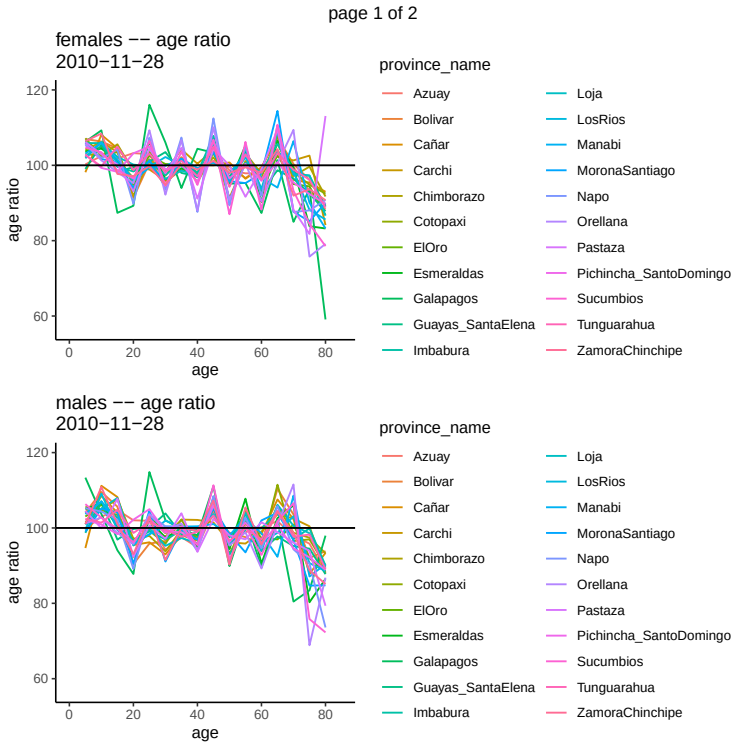

Figure 3: Age ratios in Ecuador by province, combined plot

3.2.3 View age ratios in disaggregated plots

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "age_ratios_by_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

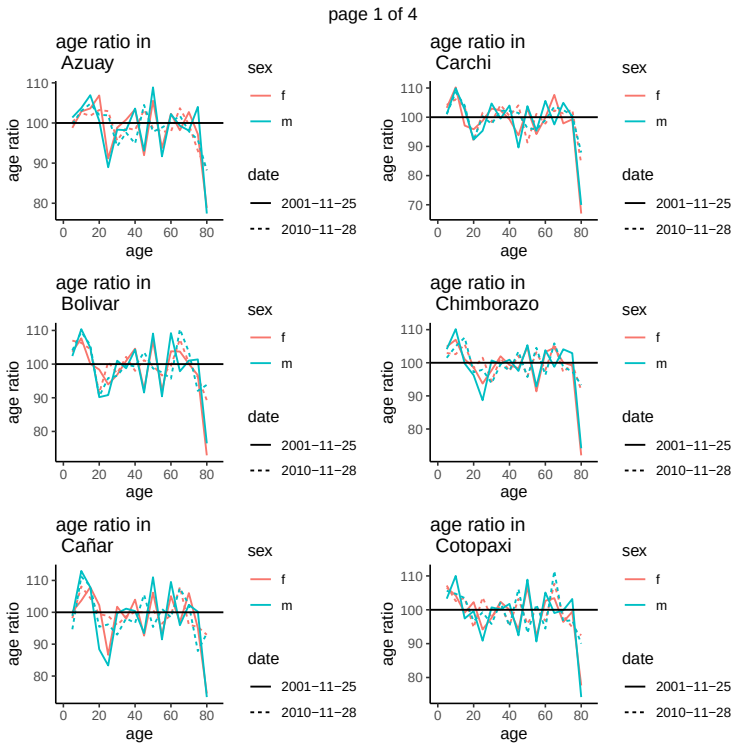

Figure 4: Age ratios in Ecuador by province, disaggregated plots

3.3 Potential age heaping

```
PlotPotentialAgeHeaping(data=ecuador_age_tabulation,
            name.disaggregations="province_name",
              name.males="m",
              name.females="f",
              name.age="age",
              name.sex="sex",
              name.date1="date1",
              name.date2="date2",
              name.population.year1="pop1",
              name.population.year2="pop2",
              print.disaggregated=FALSE,
              print.overall=FALSE,
              plots.dir="Plots/")
```

3.3.1 View potential age heaping in combined plot

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "potential_age_heaping_combined_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

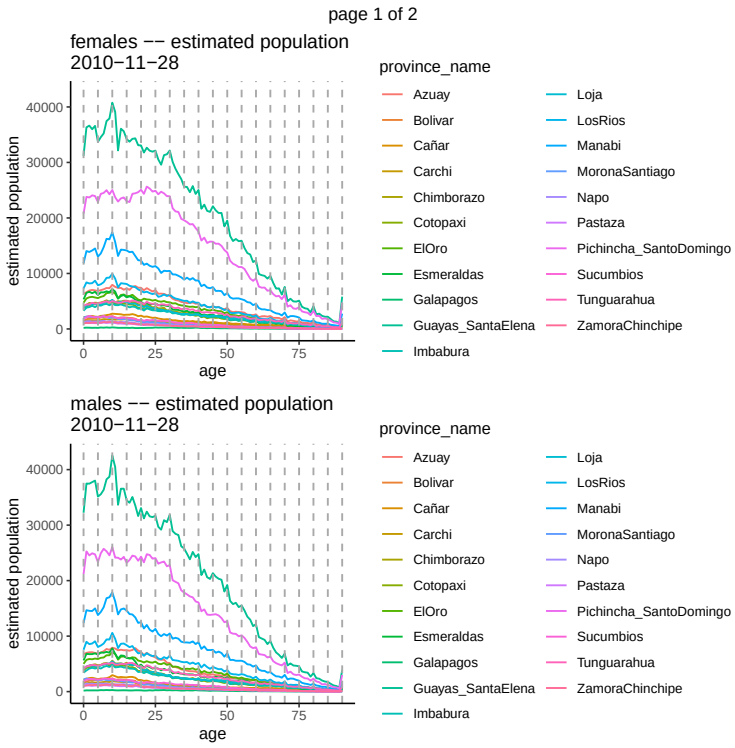

Figure 5: Population counts in Ecuador by single-year age, combined plot

3.3.2 View potential age heaping in disaggregated plots

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "potential_age_heaping_by_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

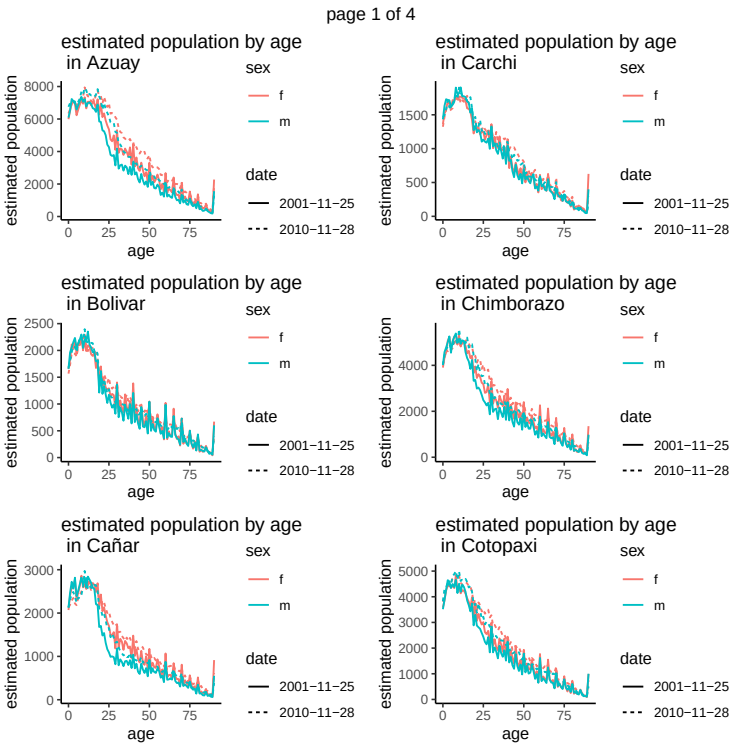

Figure 6: Population counts in Ecuador by single-year age, disaggregated plots

3.4 Age heaping indices

```
ageheaping <- PlotAgeHeapingScores(data=ecuador_age_tabulation,
                                   name.disaggregations="province_name_short",
                                   name.males="m",
                                   name.females="f",
                                   name.age="age",
                                   name.sex="sex",
                                   name.date1="date1",
                                   name.date2="date2",
                                   name.population.year1="pop1",
                                   name.population.year2="pop2",
                                   print.plots=FALSE,
                                   plots.dir="Plots/")
```

3.4.1 View age heaping indices in table

```
head(ageheaping)
```

```
##   province_name_short       date sex roughness Whipple Myers
## 1                Azu 2001-11-25   f      0.41    1.18  4.21
## 2                Bol 2001-11-25   f      0.91    1.37  7.39
## 3                Cañ 2001-11-25   f      0.69    1.22  4.89
```

```
## 4                Car 2001-11-25   f      0.38    1.18  3.75
## 5                Chi 2001-11-25   f      0.34    1.25  5.44
## 6                Cot 2001-11-25   f      0.34    1.27  5.99
```

3.4.2 View age heaping indices in plots

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "age_heaping_scores_combined_province_name_short_",
                                    Sys.Date(),
                                    ".pdf"))
```

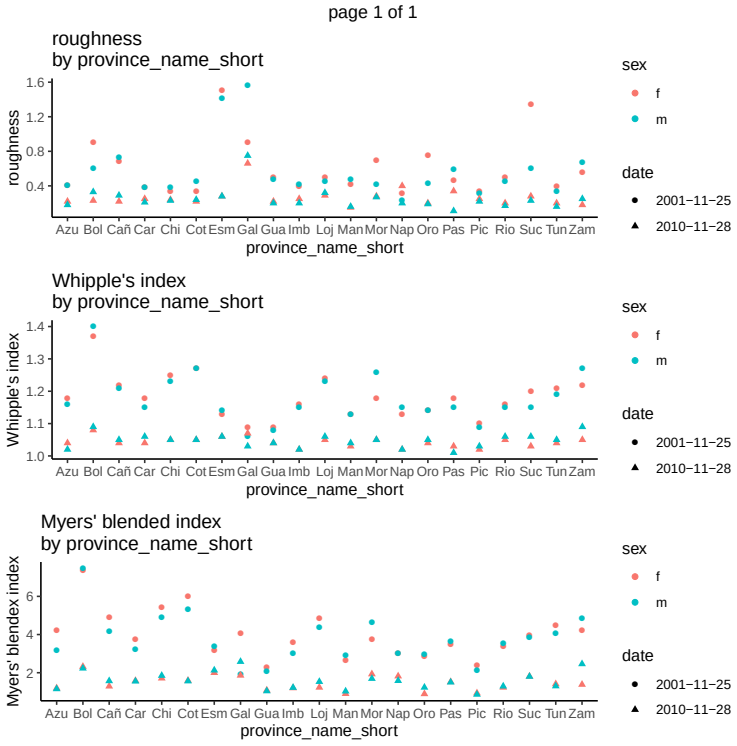

Figure 7: Age heaping indices in Ecuador by province

4 DDM estimation

4.1 Compute DDM estimates

```
ddm_results <- EstimateDDM(data=example_data_ecuador,
            name.disaggregations="province_name",
            name.age="age",
            name.sex="sex",
            name.males="m",
            name.females="f",
            name.date1="date1",
```

```
            name.date2="date2",
            name.population.year1="pop1",
            name.population.year2="pop2",
            name.deaths="deaths",
            deaths.summed=TRUE,
            min.age.in.search=15,
            max.age.in.search=75,
            min.number.of.ages=8)
```

```
## [1] "performing DDM estimation within each of 21 possible age ranges..."
```

4.1.1 View DDM point estimates in table

```
head(ddm_results$ddm_estimates)
```

```
##       cod     sex ggbseg   ggb   seg lower_age_range upper_age_range total_pop1
## 1   Azuay Females  0.669 0.987 0.806              15              50     599313
## 2   Azuay   Males  0.727 1.069 0.917              15              50     599313
## 3 Bolivar Females  0.713 0.988 0.720              20              60     170696
## 4 Bolivar   Males  0.743 0.955 0.796              25              60     170696
## 5   Cañar Females  0.619 0.998 0.575              20              55     206346
## 6   Cañar   Males  0.709 0.953 0.792              15              50     206346
##   total_pop2
## 1     710766
## 2     710766
## 3     183742
## 4     183742
## 5     224433
## 6     224433
```

4.1.2 View age-range sensitivity of DDM point estimates in table

```
head(ddm_results$sensitivity_ddm_estimates)
```

```
##     cod     sex ggbseg   ggb   seg lower_age_range upper_age_range total_pop1
## 1 Azuay Females  0.610 0.987 0.811              15              50     599313
## 2 Azuay Females  0.639 0.874 0.809              15              55     599313
## 3 Azuay Females  0.629 0.857 0.806              20              55     599313
## 4 Azuay Females  0.669 0.829 0.806              15              60     599313
## 5 Azuay Females  0.661 0.815 0.803              20              60     599313
## 6 Azuay Females  0.651 0.784 0.801              25              60     599313
##   total_pop2
## 1     710766
## 2     710766
## 3     710766
## 4     710766
## 5     710766
## 6     710766
```

4.2 Plot DDM estimates

```
PlotDDM(ddm_results=ddm_results,
        label.completeness="Estimated Completeness (%)",
        label.subnational.levels="Province",
        plots.dir="Plots/")
```

4.2.1 View DDM point estimates in plot

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "ddm_point_estimates_combined_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

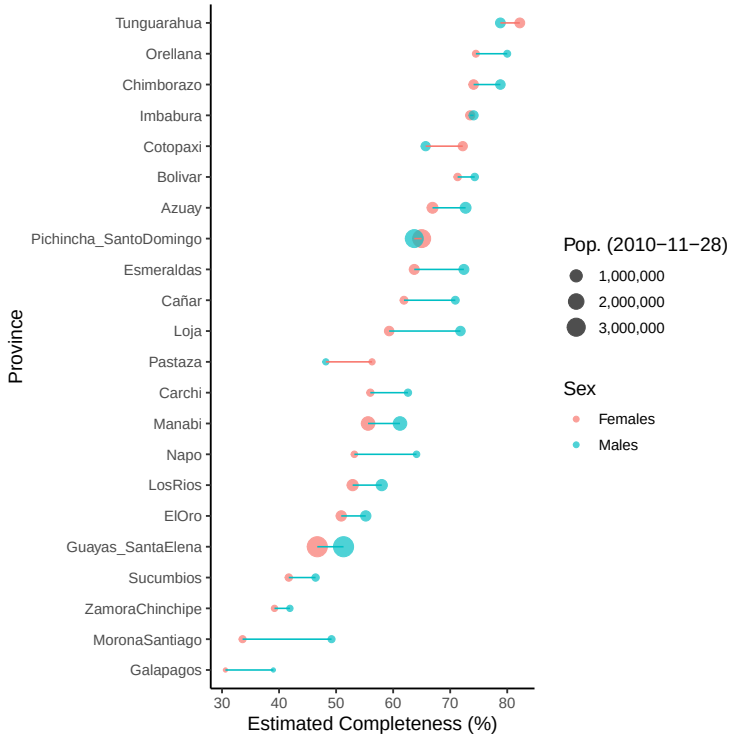

Figure 8: Point estimates of death registration completeness in Ecuador from 2001-2010, using the GGB-SEG method

4.2.2 View sensitivity of DDM point estimates in plot

```
knitr::include_graphics(path=paste0(my_plots_dir,
                                    "ddm_sensitivity_province_name_",
                                    Sys.Date(),
                                    ".pdf"))
```

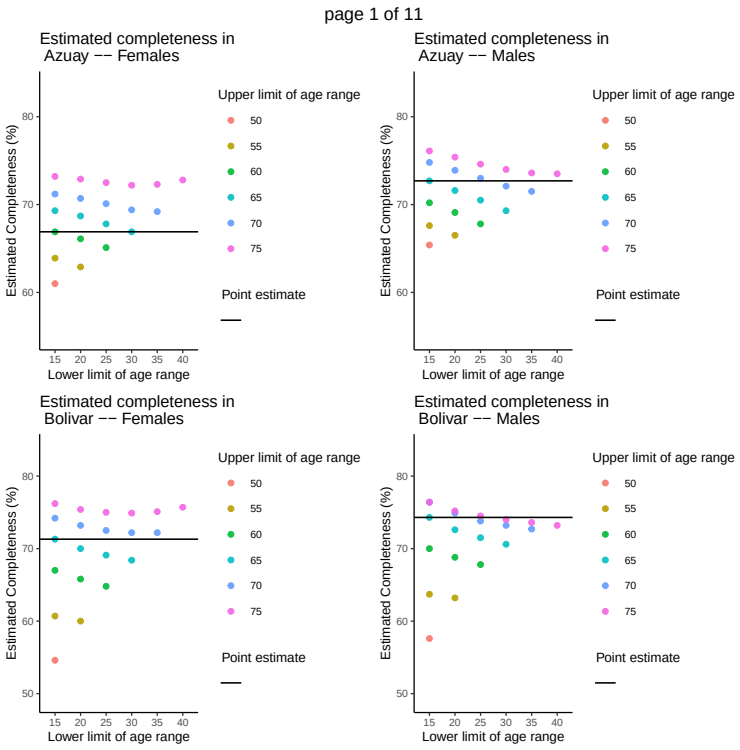

Figure 9: Sensitivity of point estimates of death registration completeness in Ecuador from 2001-2010 to choice of age-range parameter in the GGB-SEG method