SubnationalCRVS Demo

Jeremy Roth

Contents

1 Set up

1.1 Load SubnationalCRVS package (includes example data)

```
#library(devtools)
#install_github("jroth-unfpa/SubnationalCRVS")
library(SubnationalCRVS)
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
```

1.2 Initialize a few things for the demo

```
knitr::opts_chunk$set(echo = TRUE)
library(dplyr)
library(knitr)
my_plots_dir <- "Plots/"
```

2 Conduct DDQA

2.1 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/")
```

2.1.1 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
```

2.1.2 View sex ratios in combined plot

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

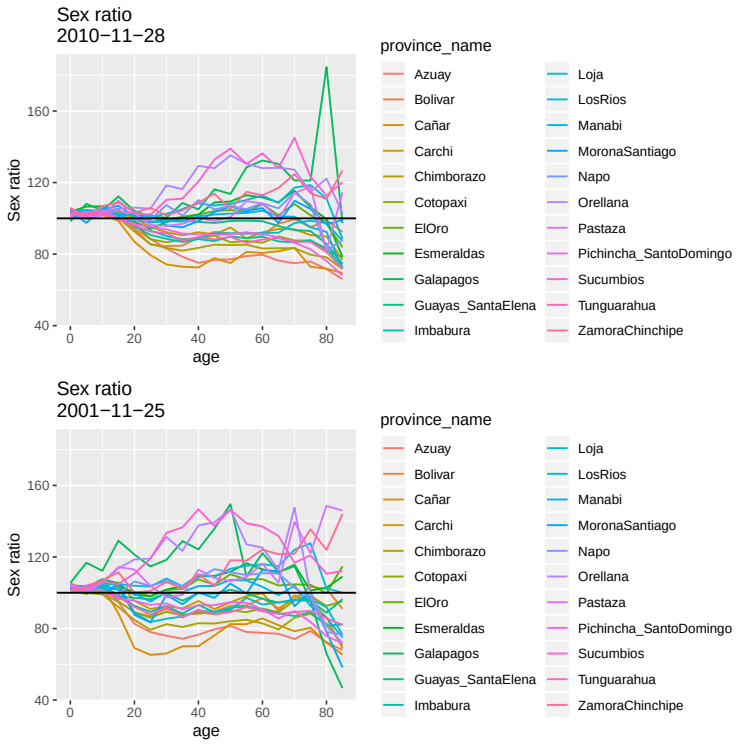

Figure 1: Sex ratios in Ecuador by province, combined plot

2.1.3 View sex ratios in disaggregated plots

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

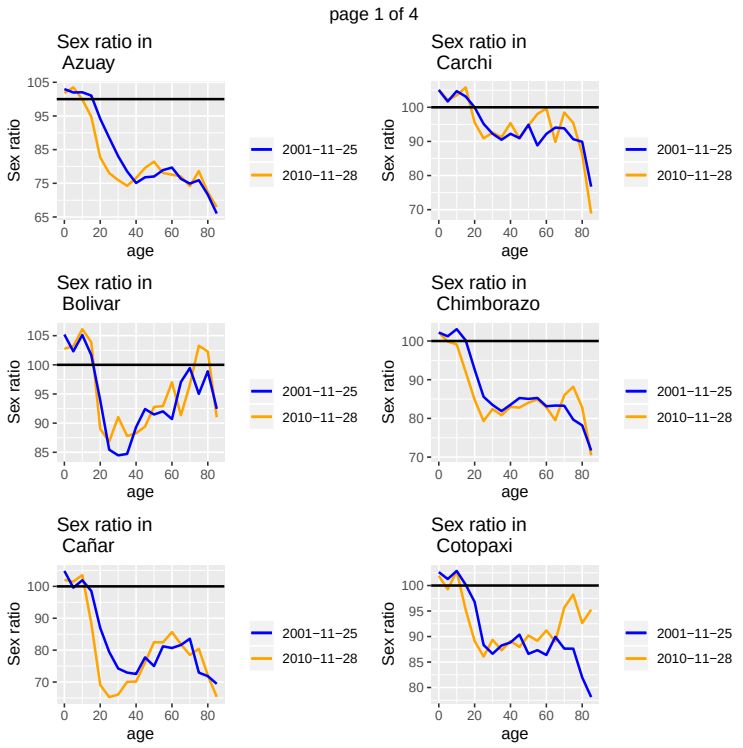

Figure 2: Sex ratios in Ecuador by province, disaggregated plots

2.2 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/")
```

2.2.1 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
```

2.2.2 View age ratios in combined plot

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

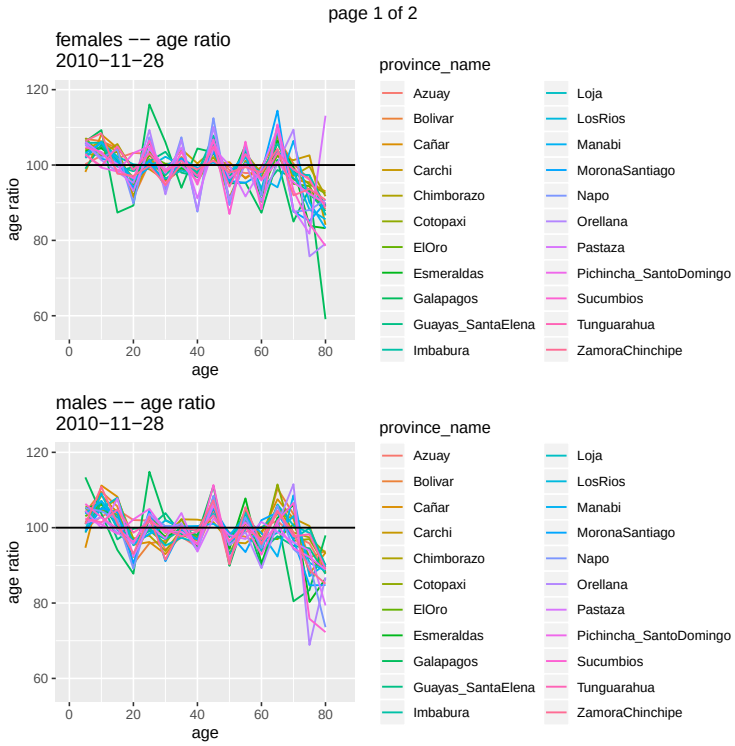

Figure 3: Age ratios in Ecuador by province, combined plot

2.2.3 View age ratios in disaggregated plots

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

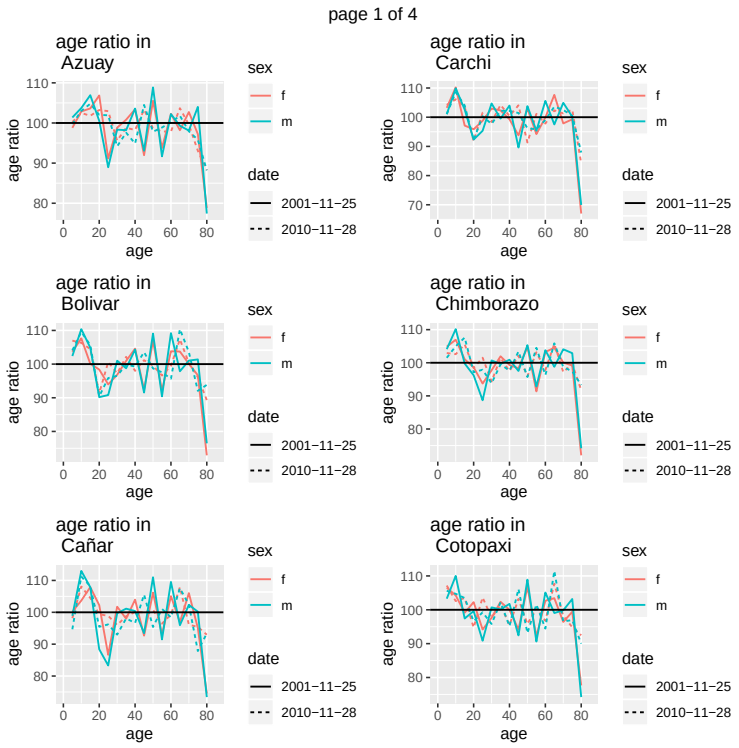

Figure 4: Age ratios in Ecuador by province, disaggregated plots

2.3 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/")
```

2.3.1 View potential age heaping in combined plot

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

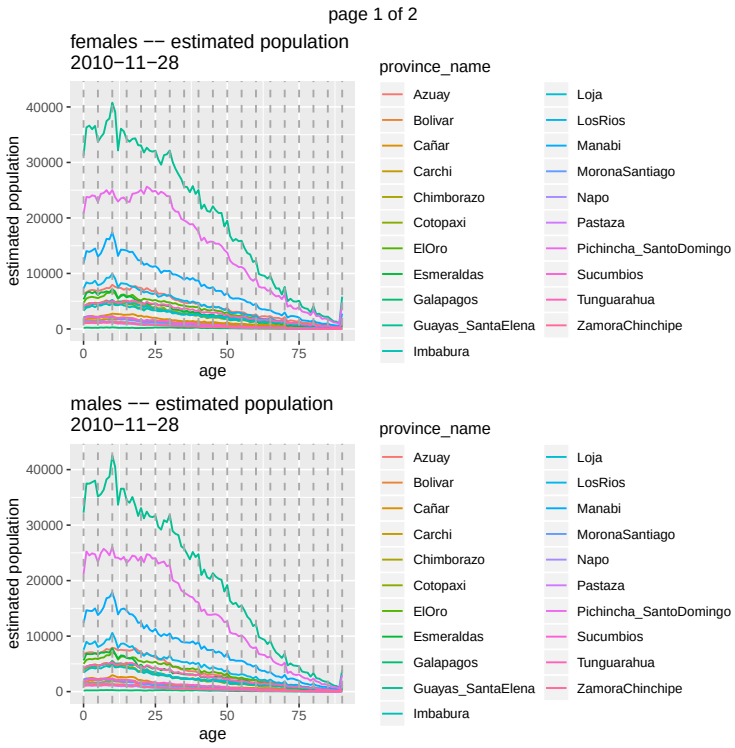

Figure 5: Population counts in Ecuador by single-year age, combined plot

2.3.2 View potential age heaping in disaggregated plots

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

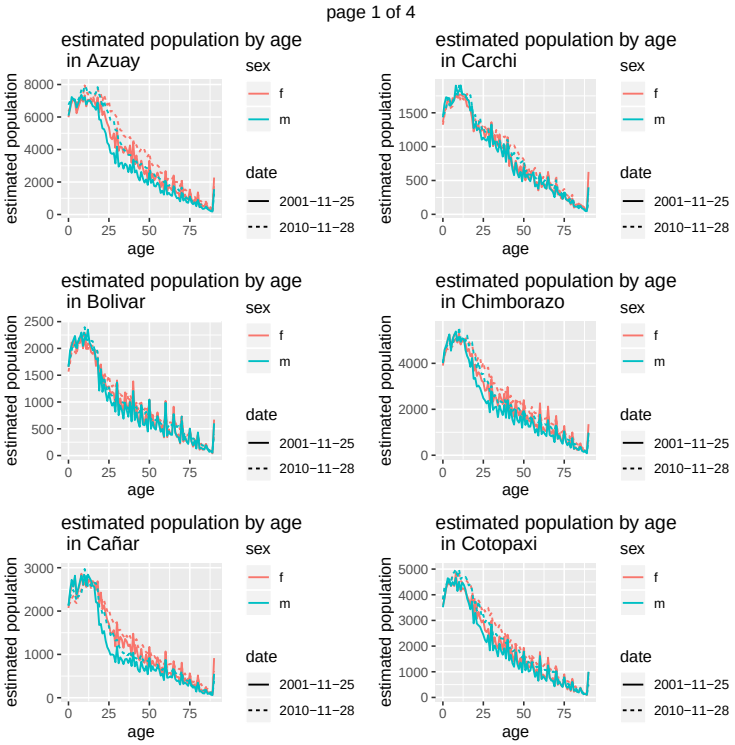

Figure 6: Population counts in Ecuador by single-year age, disaggregated plots

2.4 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/")
```

2.4.1 View age heaping indices in table

```
head(ageheaping)
```

```
##   province_name_short       date sex roughness sawtooth  Whipple    Myers
## 1                 Azu 2001-11-25   f 0.4147020 1.088489 1.175319 4.208178
## 2                 Bol 2001-11-25   f 0.9084333 1.088353 1.367128 7.385046
## 3                 Cañ 2001-11-25   f 0.6851925 1.114108 1.218101 4.890340
## 4                 Car 2001-11-25   f 0.3808346 1.006139 1.177630 3.749306
## 5                 Chi 2001-11-25   f 0.3446924 1.033020 1.249514 5.440711
```

```
## 6                Cot 2001-11-25   f 0.3409448 1.040521 1.274695 5.991138
##   Noumbissi
## 1  1.179950
## 2  1.348939
## 3  1.220498
## 4  1.153915
## 5  1.228173
## 6  1.246202
```

2.4.2 View age heaping indices in plots

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

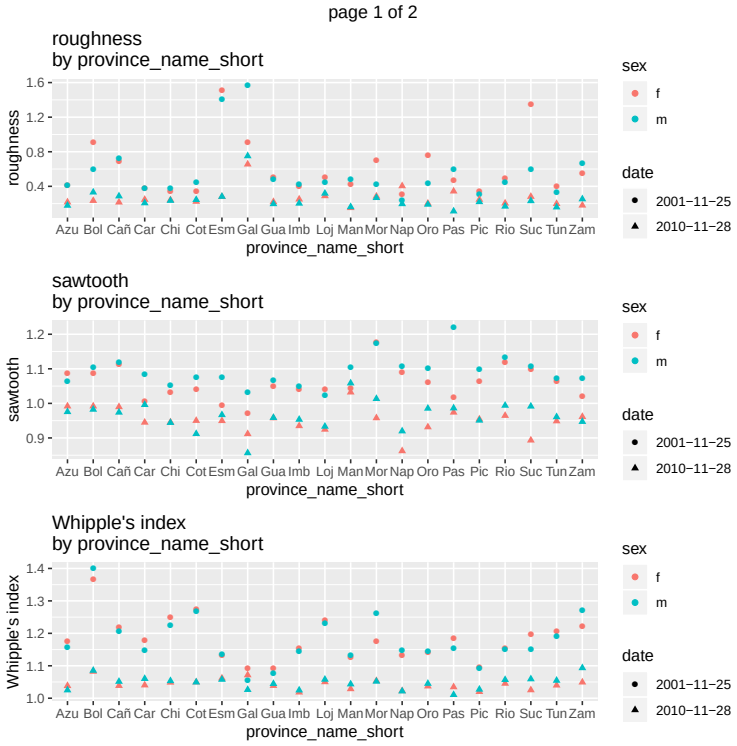

Figure 7: Age heaping indices in Ecuador by province

3 DDM estimation

3.1 Compute DDM estimates

```
ddm_results <- EstimateDDM(data=example_data_ecuador,
            name.disaggregations="province_name_short",
            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..."
```

3.2 Plot DDM estimates

```
PlotDDM(ddm_results=ddm_results,
        size.text.sensitivity=8,
        plots.dir="Plots/")
```

3.2.1 View DDM point estimates in table

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

```
##   cod     sex    ggbseg       ggb       seg lower_age_range upper_age_range
## 1 Azu Females 0.6690215 0.9869457 0.8062717              15              50
## 2 Azu   Males 0.7268026 1.0688804 0.9169165              15              50
## 3 Bol Females 0.7128565 0.9876368 0.7200723              20              60
## 4 Bol   Males 0.7427068 0.9553584 0.7963881              25              60
## 5 Cañ Females 0.6188313 0.9981219 0.5754533              20              55
## 6 Cañ   Males 0.7085910 0.9534686 0.7923367              15              50
```

3.2.2 View DDM point estimates in plot

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

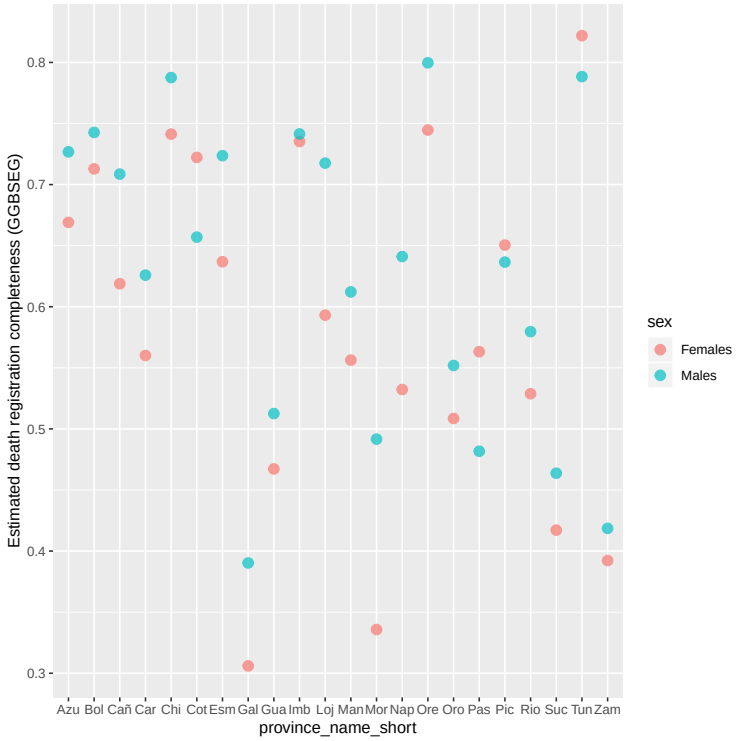

Figure 8: Point estimates of death registration completeness in Ecuador from 2001-2010, using the GGB-SEG method

3.2.3 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
## 1 Azu Females 0.6104842 0.9869457 0.8112473              15              50
## 2 Azu Females 0.6387823 0.8742469 0.8089535              15              55
## 3 Azu Females 0.6293945 0.8566154 0.8057450              20              55
## 4 Azu Females 0.6690215 0.8292898 0.8062717              15              60
## 5 Azu Females 0.6607905 0.8151276 0.8031217              20              60
## 6 Azu Females 0.6505367 0.7836742 0.8012668              25              60
```

3.2.4 View sensitivity of DDM point estimates in plot

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

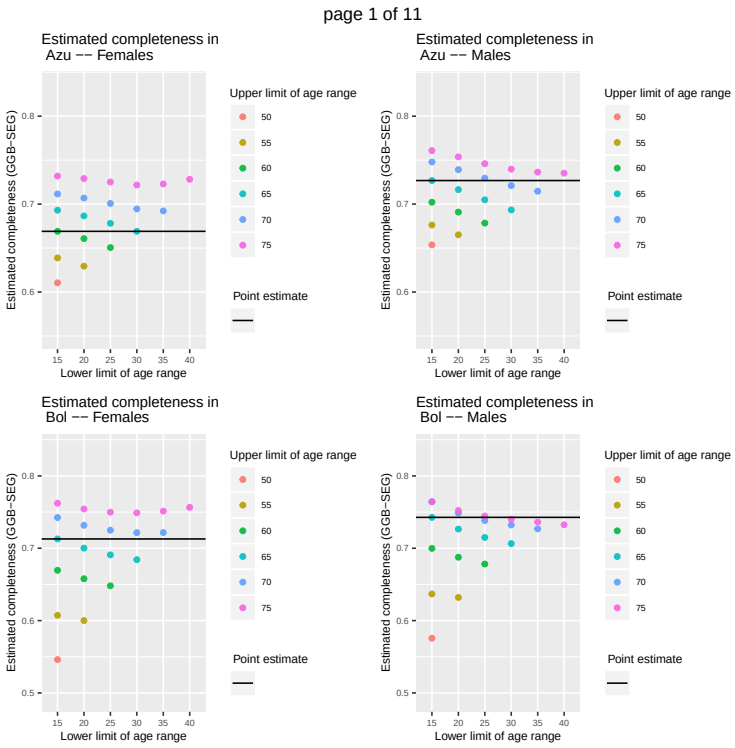

Figure 9: Sensitivity of point estimates of death registration completeness in Ecuador from 2001-2010 to choice of age-range parameter in the GGB-SEG method