

SubnationalCRVS Demo

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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 sex age pop2 pop1   date1   date2 province_name
## 1      1    m  0 6750 6086 2001-11-25 2010-11-28      Azuay
## 2      1    m  1 6984 6555 2001-11-25 2010-11-28      Azuay
## 3      1    m  2 7090 7232 2001-11-25 2010-11-28      Azuay
## 4      1    m  3 7095 7101 2001-11-25 2010-11-28      Azuay
## 5      1    m  4 6961 7083 2001-11-25 2010-11-28      Azuay
## 6      1    m  5 6895 6583 2001-11-25 2010-11-28      Azuay
##   province_name_short
## 1                  Azu
## 2                  Azu
## 3                  Azu
## 4                  Azu
## 5                  Azu
## 6                  Azu
```

```
head(example_data_ecuador)
```

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

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"))
```

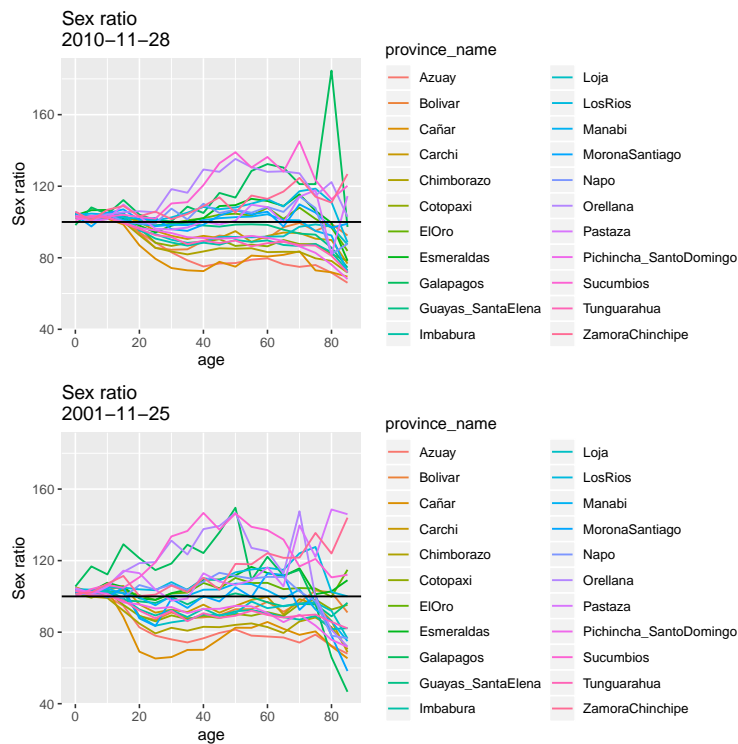


Figure 1: Sex ratios in Ecuador by province, combined plot

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"))
```

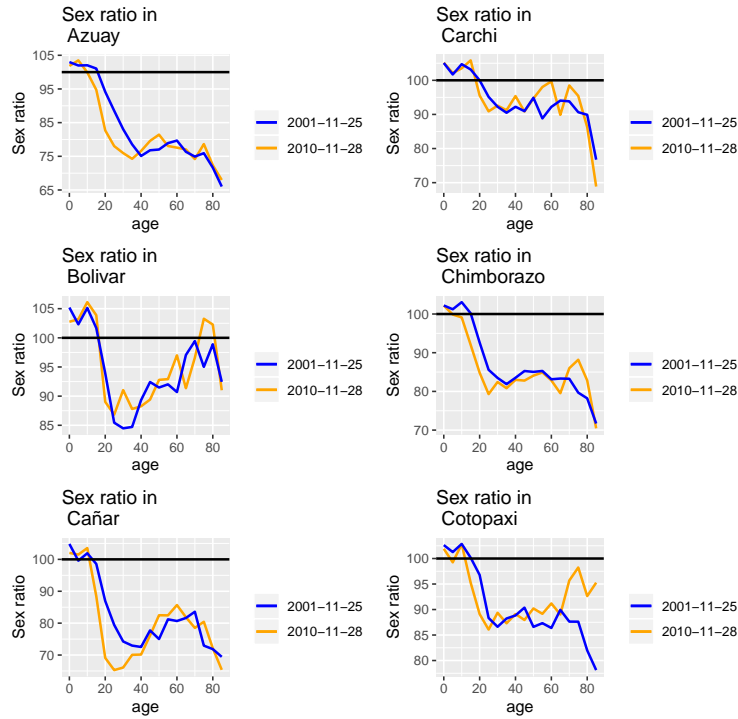


Figure 2: Sex ratios in Ecuador by province, disaggregated plots

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"))
```

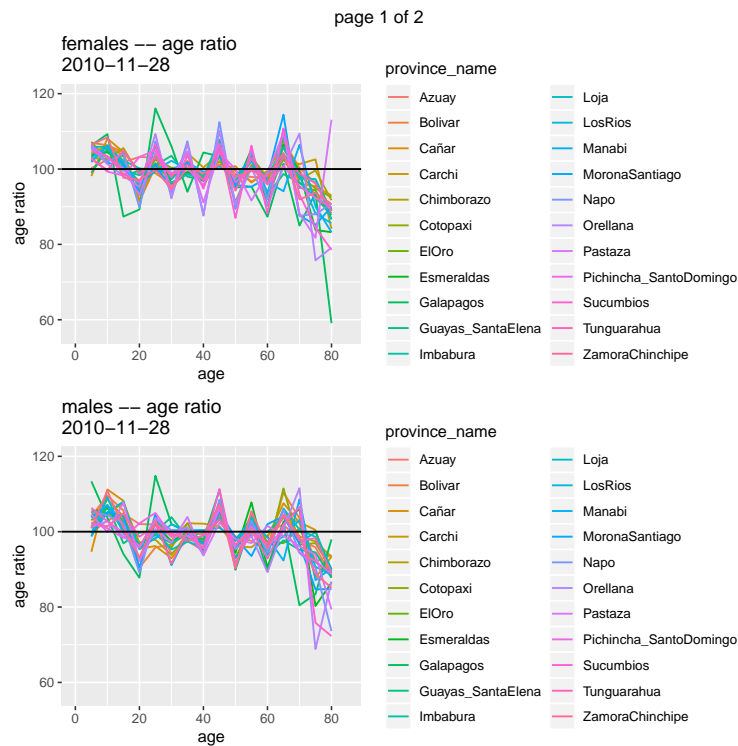


Figure 3: Age ratios in Ecuador by province, combined plot

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"))
```

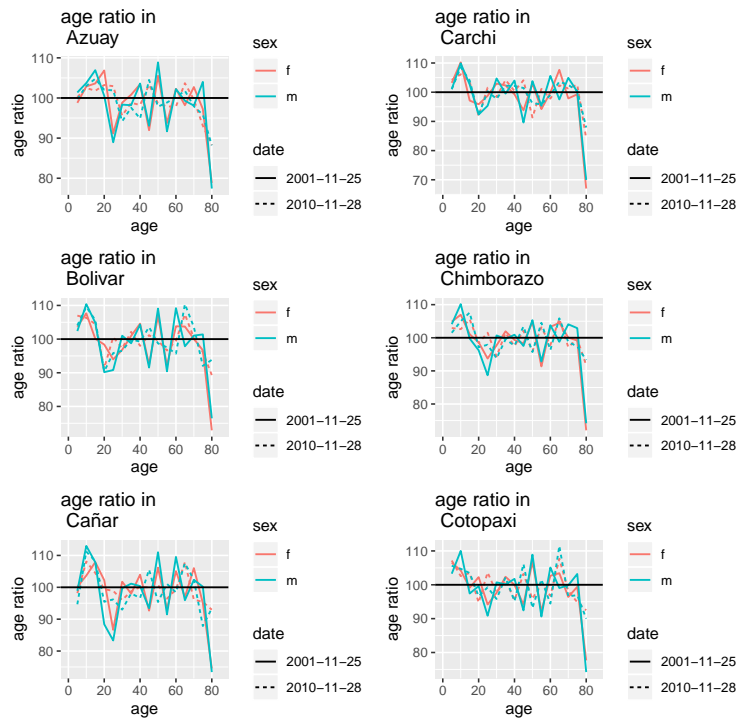


Figure 4: Age ratios in Ecuador by province, disaggregated plots

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"))
```

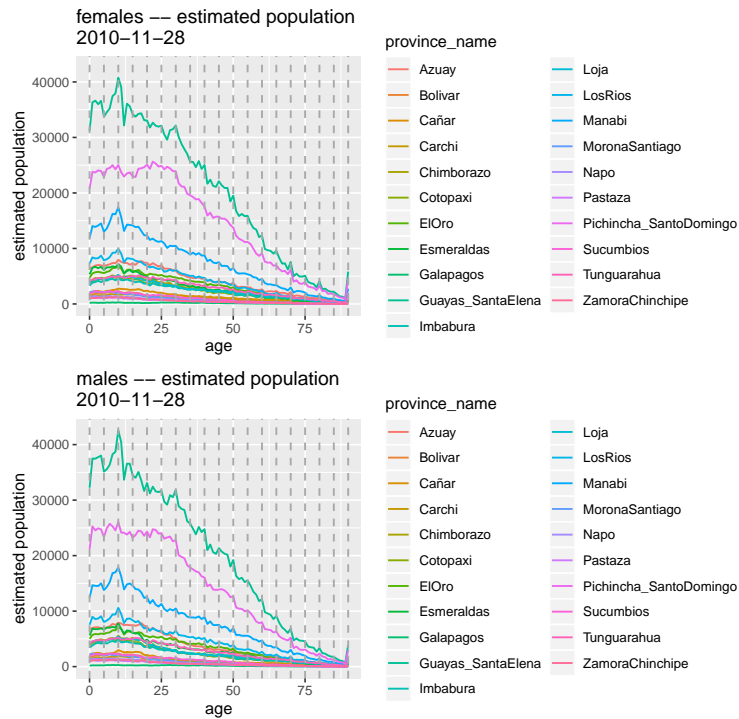


Figure 5: Population counts in Ecuador by single-year age, combined plot

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"))
```

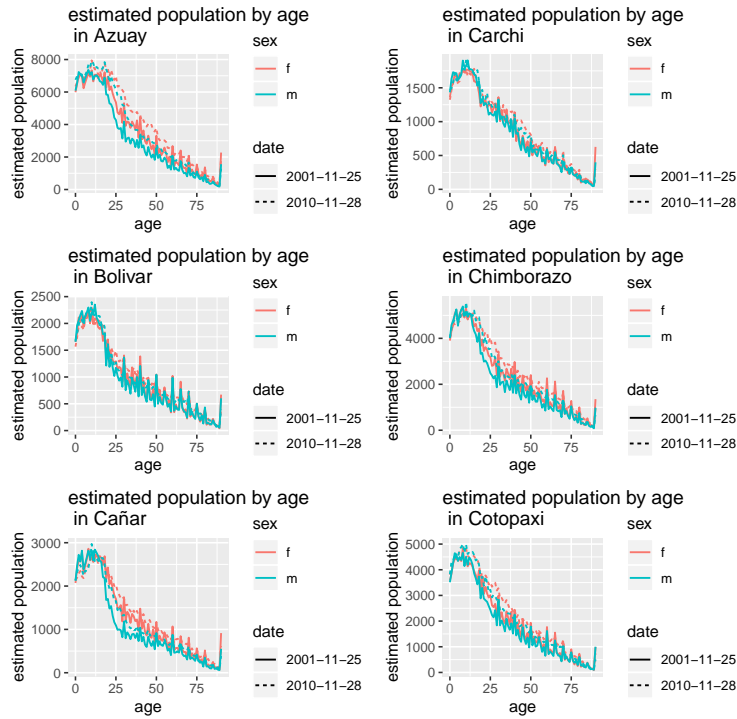


Figure 6: Population counts in Ecuador by single-year age, disaggregated plots

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	BoI	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
##   Numbissí
## 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"))
```

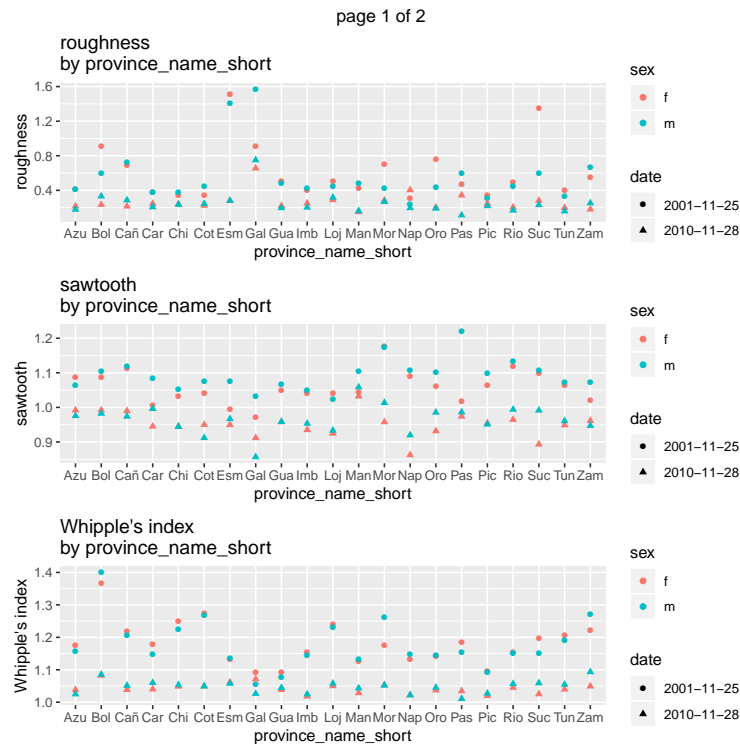


Figure 7: Age heaping indices in Ecuador by province

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"))

```

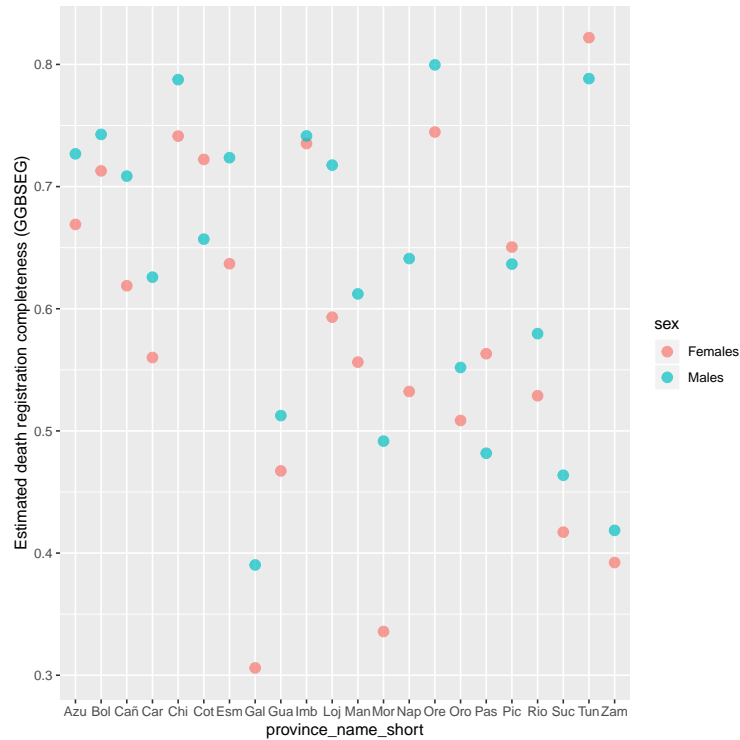


Figure 8: Point estimates of death registration completeness in Ecuador from 2001-2010, using the GGB-SEG method

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"))
```

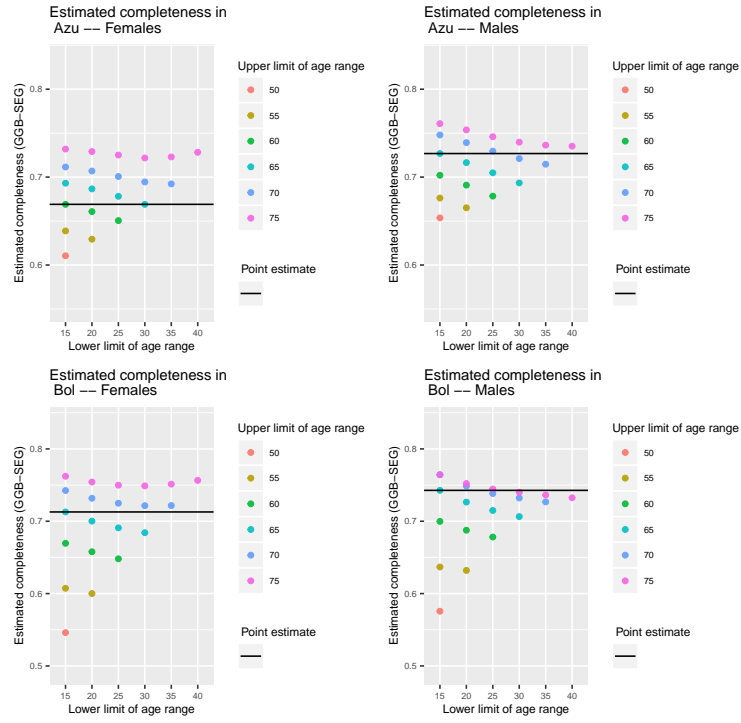


Figure 9: Sensitivity of point estimates of death registration completeness in Ecuador from 2001-2010 to choice of age-range parameter in the GGB-SEG method