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## > INTERNATIONAL JOURNAL FOR EQUITY IN HEALTH
## > SPECIAL ISSUE: "A panorama for health inequalities in Brazil: National Health Survey, 2013"
## > TITLE: "Educational inequalities in hypertension: complex patterns in intersections with gender and race in
Brazil"
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Brazil.

## > LIBRARY

library(foreign) # read.dta
library(survey)  # load survey package (analyzes complex design surveys)

## > SET WORKING DIRECTORY

setwd( "C:/Users/Ronaldo Alves/Documents/dadosPNS_30062016" )

## > OPEN DATABASE

dados = read.dta ("2013_PNS_data.dta")
dados = dados [complete.cases (dados$w00407), ] # exclude 800 NA-blood pressure

#######################################

## > CREATE VARIABLES

#######################################

# > AGE

dados$age_cat2 <- factor( 1 + findInterval( as.numeric( dados$c008 ) ,
                  c( 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80 ) ) ,
                  labels = c( "18-24", "25-29", "30-34", "35-39", "40-44",
                              "45-49", "50-54", "55-59", "60-64", "65-69",
                              "70-74", "75-79", "80 or older" ) )
```

```
# > RACE

dados$raca2 <- as.factor(ifelse(dados$c009=="1", "Branca",
                          ifelse(dados$c009=="2", "Preta",
                          ifelse(dados$c009=="3", "Outra",
                          ifelse(dados$c009=="4", "Parda",
                          ifelse(dados$c009=="5", "Outra",
                          ifelse(dados$c009=="9", "Outra", NA)))))))


# > EDUCATION ATTAINMENT

dados$educ_i <- factor(ifelse(dados$educ=="Supc", 1,
                        ifelse(dados$educ=="MedcSupi", 2,
                        ifelse(dados$educ=="FundcMedi", 3,
                        ifelse(dados$educ=="SinstFundi", 4, NA)))))


# > NUMERIC SCORE BY GENDER (calculos no final do script)
# > Exposure (education)

dados$escore_gi <- as.numeric(
                    ifelse(dados$educ=="Supc" & dados$c006=="masculino", 0.0570,
                    ifelse(dados$educ=="MedcSupi" & dados$c006=="masculino", 0.2753,
                    ifelse(dados$educ=="FundcMedi" & dados$c006=="masculino", 0.5190,
                    ifelse(dados$educ=="SinstFundi" & dados$c006=="masculino", 0.8008,
                    ifelse(dados$educ=="Supc" & dados$c006=="feminino", 0.0694,
                    ifelse(dados$educ=="MedcSupi" & dados$c006=="feminino", 0.3041,
                    ifelse(dados$educ=="FundcMedi" & dados$c006=="feminino", 0.5423,
                    ifelse(dados$educ=="SinstFundi" & dados$c006=="feminino", 0.8077,
                           NA)))))))))

# > NUMERIC SCORE BY GENDER AND RACE (calculos no final do script)
# > Exposure (education)

dados$escore_ri <- as.numeric(
  ifelse(dados$educ=="Supc" & dados$c006=="masculino" & dados$c009=="1", 0.0844,
```

```
  ifelse(dados$educ=="MedcSupi" & dados$c006=="masculino"& dados$c009=="1", 0.3423,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="masculino"& dados$c009=="1", 0.5924,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="masculino"& dados$c009=="1", 0.8345,
  ifelse(dados$educ=="Supc" & dados$c006=="feminino" & dados$c009=="1", 0.0980,
  ifelse(dados$educ=="MedcSupi" & dados$c006=="feminino"& dados$c009=="1", 0.3703,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="feminino"& dados$c009=="1", 0.6099,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="feminino"& dados$c009=="1", 0.8376,
  ifelse(dados$educ=="Supc" & dados$c006=="masculino" & dados$c009=="2", 0.0266,
  ifelse(dados$educ=="MedcSupi" & dados$c006=="masculino"& dados$c009=="2", 0.1955,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="masculino"& dados$c009=="2", 0.4389,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="masculino"& dados$c009=="2", 0.7700,
  ifelse(dados$educ=="Supc" & dados$c006=="feminino" & dados$c009=="2", 0.0405,
  ifelse(dados$educ=="MedcSupi" & dados$c006=="feminino"& dados$c009=="2", 0.2353,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="feminino"& dados$c009=="2", 0.4711,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="feminino"& dados$c009=="2", 0.7763,
  ifelse(dados$educ=="Supc" & dados$c006=="masculino" & dados$c009=="4", 0.0323,
  ifelse(dados$educ=="MedcSupi" & dados$c006=="masculino"& dados$c009=="4", 0.2154,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="masculino"& dados$c009=="4", 0.4523,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="masculino"& dados$c009=="4", 0.7692,
  ifelse(dados$educ=="Supc" & dados$c006=="feminino" & dados$c009=="4", 0.0422,
  ifelse(dados$educ=="MedcSupi" & dados$c006=="feminino"& dados$c009=="4", 0.2411,
  ifelse(dados$educ=="FundcMedi" & dados$c006=="feminino"& dados$c009=="4", 0.4777,
  ifelse(dados$educ=="SinstFundi" & dados$c006=="feminino"& dados$c009=="4", 0.7788,
  NA)))))))))))))))))))))))))))))))


########################################

## >> SPECIFY A COMPLEX SURVEY DESIGN

########################################

banco = svydesign(id = ~upa_pns, strata = ~v0024, data = dados, weights = ~v00291_x, nest = TRUE)


########################################
```

```
## > OUTCOME: HYPERTENSION (has1)

########################################

banco = transform (banco, has1 = as.numeric(
                   w00407 >= 140 | w00408 >= 90 | q006 == "1"))


########################################
########################################

## > RESULTS

########################################

## > TABLE 1

########################################

# > tamanho populacional

table(dados$c006)
masculino  feminino
    25920     33482

table(dados$age_cat2)
18-24       25-29       30-34       35-39       40-44       45-49       50-54       55-59       60-64       65-69
 7542        6280        7242        6761        5945        5425        4814        4216        3465        2773
70-74       75-79 80 or older
 2052        1389        1498

table(dados$raca2)
Branca  Parda  Preta Outra
 23828  29066   5568   940

table(dados$educ)
```

```
SinstFundi  FundcMedi   MedcSupi       Supc
     23882       9061      18807       7652

##

round(svymean(~c006, banco), 3)
               mean     SE
c006masculino 0.476 0.0038
c006feminino  0.524 0.0038

round(confint(svymean(~c006, banco)), 3)
              2.5 % 97.5 %
c006masculino 0.468  0.483
c006feminino  0.517  0.532

##

round(svymean(~age_cat2, banco), 3)
                     mean     SE
age_cat218-24       0.157 0.0030
age_cat225-29       0.100 0.0021
age_cat230-34       0.113 0.0023
age_cat235-39       0.102 0.0021
age_cat240-44       0.091 0.0019
age_cat245-49       0.091 0.0021
age_cat250-54       0.086 0.0021
age_cat255-59       0.078 0.0020
age_cat260-64       0.058 0.0017
age_cat265-69       0.045 0.0014
age_cat270-74       0.033 0.0013
age_cat275-79       0.021 0.0010
age_cat280 or older 0.025 0.0011

round(confint(svymean(~age_cat2, banco)), 3)
                    2.5 % 97.5 %
age_cat218-24       0.152  0.163
age_cat225-29       0.096  0.104
```

```
age_cat230-34       0.109  0.118
age_cat235-39       0.097  0.106
age_cat240-44       0.087  0.095
age_cat245-49       0.087  0.095
age_cat250-54       0.081  0.090
age_cat255-59       0.074  0.082
age_cat260-64       0.055  0.061
age_cat265-69       0.042  0.047
age_cat270-74       0.031  0.036
age_cat275-79       0.019  0.023
age_cat280 or older 0.023  0.027

##

round(svymean(~raca2, banco), 3)
             mean     SE
raca2Branca 0.475 0.0041
raca2Parda  0.419 0.0040
raca2Preta  0.092 0.0024
raca2Outra  0.014 0.0008

round(confint(svymean(~raca2, banco)), 3)
            2.5 % 97.5 %
raca2Branca 0.466  0.483
raca2Parda  0.412  0.427
raca2Preta  0.088  0.097
raca2Outra  0.012  0.015

##

round(svymean(~educ, banco), 3)
                mean     SE
educSinstFundi 0.391 0.0044
educFundcMedi  0.155 0.0028
educMedcSupi   0.327 0.0036
educSupc       0.127 0.0037
```

```
round(confint(svymean(~educ, banco)), 3)
               2.5 % 97.5 %
educSinstFundi 0.383  0.400
educFundcMedi  0.150  0.161
educMedcSupi   0.320  0.334
educSupc       0.120  0.134

##

# > prevalência não ajustada

round(svymean(~has1, banco), 3)
      mean     SE
has1 0.323 0.0038

round(confint(svymean(~has1, banco)), 3)
     2.5 % 97.5 %
has1 0.316  0.331

svyby(~has1, ~c006, banco, svymean, vartype = c("ci"))
               c006      has1      ci_l      ci_u
masculino masculino 0.3301978 0.3194658 0.3409298
feminino   feminino 0.3167385 0.3076321 0.3258449

svyby(~has1, ~age_cat2, banco, svymean, vartype = c("ci"))
               age_cat2       has1       ci_l      ci_u
18-24             18-24 0.06371088 0.05259366 0.0748281
25-29             25-29 0.11072741 0.09646085 0.1249940
30-34             30-34 0.16483395 0.14895204 0.1807159
35-39             35-39 0.21412189 0.19750553 0.2307383
40-44             40-44 0.29128180 0.27126054 0.3113031
45-49             45-49 0.36970782 0.34763661 0.3917790
50-54             50-54 0.45870414 0.43327248 0.4841358
55-59             55-59 0.53647892 0.50972554 0.5632323
60-64             60-64 0.58793089 0.55884830 0.6170135
65-69             65-69 0.65408821 0.62571800 0.6824584
70-74             70-74 0.70459177 0.67049112 0.7386924
```

```
75-79             75-79 0.73057314 0.69046710 0.7706792
80 or older 80 or older 0.72250902 0.68728789 0.7577301

svyby(~has1, ~raca2, banco, svymean, vartype = c("ci"))
             mean     SE
raca2Branca 0.475 0.0041
raca2Parda  0.419 0.0040
raca2Preta  0.092 0.0024
raca2Outra  0.014 0.0008

svyby(~has1, ~educ, banco, svymean, vartype = c("ci"))
            2.5 % 97.5 %
raca2Branca 0.466  0.483
raca2Parda  0.412  0.427
raca2Preta  0.088  0.097
raca2Outra  0.012  0.015

########################################
########################################

## > RESULTS

########################################

## > TABLE 2

########################################

# > tamanho populacional

svyby(~educ_i, ~c006, banco, svymean)
               c006   educ_i1   educ_i2   educ_i3   educ_i4  se.educ_i1  se.educ_i2  se.educ_i3  se.educ_i4
masculino masculino 0.1140733 0.3223560 0.1651937 0.3983771 0.004219019 0.005336475 0.004239768 0.006168423
feminino   feminino 0.1388534 0.3305116 0.1459514 0.3846836 0.004490480 0.004832034 0.003474000 0.005243407

svyby(~educ_i, ~raca2+c006, banco, svymean)
```

```
                   raca2      c006    educ_i1   educ_i2   educ_i3   educ_i4  se.educ_i1  se.educ_i2  se.educ_i3
se.educ_i4
Branca.masculino Branca masculino 0.16883746 0.3469587 0.1531411 0.3310628 0.007651125 0.007877939 0.006313989
0.008574141
Parda.masculino   Parda masculino 0.06463000 0.3015907 0.1720974 0.4616819 0.003743075 0.007840854 0.006269333
0.008703390
Preta.masculino   Preta masculino 0.05321320 0.2846225 0.2021691 0.4599953 0.007497133 0.015235041 0.017242419
0.018483347
Outra.masculino   Outra masculino 0.20663214 0.3915764 0.1066682 0.2951233 0.036034114 0.041553000 0.020486346
0.040756374
Branca.feminino  Branca  feminino 0.19606931 0.3485568 0.1305736 0.3248003 0.007841718 0.007503394 0.005031049
0.007214713
Parda.feminino    Parda  feminino 0.08443106 0.3133667 0.1597387 0.4424636 0.004057086 0.006692360 0.005543003
0.007412645
Preta.feminino    Preta  feminino 0.08106312 0.3084674 0.1631584 0.4473111 0.009968359 0.014697678 0.011682607
0.015901848
Outra.feminino    Outra  feminino 0.15614269 0.3588308 0.1538909 0.3311356 0.037169646 0.038351985 0.024985162
0.034688571

# > prevalência não ajustada

svyby(~has1, ~educ+c006, banco, svymean, vartype = c("ci"))
                          educ      c006      has1      ci_l      ci_u
SinstFundi.masculino SinstFundi masculino 0.4224854 0.4056538 0.4393171
FundcMedi.masculino   FundcMedi masculino 0.2599643 0.2354190 0.2845095
MedcSupi.masculino     MedcSupi masculino 0.2497665 0.2312191 0.2683138
Supc.masculino             Supc masculino 0.3368985 0.3067139 0.3670832
SinstFundi.feminino  SinstFundi  feminino 0.4773745 0.4619162 0.4928328
FundcMedi.feminino    FundcMedi  feminino 0.2612993 0.2405615 0.2820371
MedcSupi.feminino      MedcSupi  feminino 0.1983100 0.1843563 0.2122637
Supc.feminino              Supc  feminino 0.2118753 0.1902307 0.2335199

svyby(~has1, ~raca2+c006, banco, svymean, vartype = c("ci"))
                   raca2      c006      has1      ci_l      ci_u
Branca.masculino Branca masculino 0.3494349 0.3331991 0.3656707
Parda.masculino   Parda masculino 0.3014667 0.2860614 0.3168720
Preta.masculino   Preta masculino 0.3623524 0.3270742 0.3976307
```

```
Outra.masculino   Outra masculino 0.3586041 0.2716319 0.4455764
Branca.feminino  Branca  feminino 0.3204782 0.3069088 0.3340476
Parda.feminino    Parda  feminino 0.3031373 0.2903253 0.3159493
Preta.feminino    Preta  feminino 0.3673313 0.3403703 0.3942924
Outra.feminino    Outra  feminino 0.2580205 0.1934170 0.3226240

svyby(~has1, ~educ+c006+raca2, banco, svymean, vartype = c("ci"))
                                  educ      c006  raca2      has1       ci_l      ci_u
SinstFundi.masculino.Branca SinstFundi masculino Branca 0.4770721 0.45024426 0.5039000
FundcMedi.masculino.Branca   FundcMedi masculino Branca 0.2603459 0.22392117 0.2967706
MedcSupi.masculino.Branca     MedcSupi masculino Branca 0.2693958 0.24218262 0.2966089
Supc.masculino.Branca             Supc masculino Branca 0.3444449 0.30580046 0.3830894

SinstFundi.feminino.Branca  SinstFundi  feminino Branca 0.5119508 0.48598045 0.5379211
FundcMedi.feminino.Branca    FundcMedi  feminino Branca 0.2869712 0.25228887 0.3216536
MedcSupi.feminino.Branca      MedcSupi  feminino Branca 0.2133480 0.19227082 0.2344252
Supc.feminino.Branca              Supc  feminino Branca 0.2160546 0.18868249 0.2434266

SinstFundi.masculino.Parda  SinstFundi masculino  Parda 0.3741946 0.35123827 0.3971509
FundcMedi.masculino.Parda    FundcMedi masculino  Parda 0.2420199 0.20869276 0.2753471
MedcSupi.masculino.Parda      MedcSupi masculino  Parda 0.2252385 0.19898185 0.2514952
Supc.masculino.Parda              Supc masculino  Parda 0.2959460 0.24467628 0.3472157

SinstFundi.feminino.Parda   SinstFundi  feminino  Parda 0.4436675 0.42287143 0.4644637
FundcMedi.feminino.Parda     FundcMedi  feminino  Parda 0.2351987 0.20642823 0.2639691
MedcSupi.feminino.Parda       MedcSupi  feminino  Parda 0.1733933 0.15510940 0.1916773
Supc.feminino.Parda               Supc  feminino  Parda 0.1767659 0.14077512 0.2127567

SinstFundi.masculino.Preta  SinstFundi masculino  Preta 0.4472259 0.39578304 0.4986688
FundcMedi.masculino.Preta    FundcMedi masculino  Preta 0.3331238 0.23461244 0.4316352
MedcSupi.masculino.Preta      MedcSupi masculino  Preta 0.2619552 0.20843524 0.3154751
Supc.masculino.Preta              Supc masculino  Preta 0.2767161 0.13754668 0.4158855

SinstFundi.feminino.Preta   SinstFundi  feminino  Preta 0.4957223 0.45333575 0.5381089
FundcMedi.feminino.Preta     FundcMedi  feminino  Preta 0.2854936 0.22224633 0.3487410
MedcSupi.feminino.Preta       MedcSupi  feminino  Preta 0.2322410 0.17974991 0.2847321
Supc.feminino.Preta               Supc  feminino  Preta 0.3376352 0.21922384 0.4560466
```

```
SinstFundi.masculino.Outra  SinstFundi masculino  Outra 0.4339829 0.26103054 0.6069353
FundcMedi.masculino.Outra    FundcMedi masculino  Outra 0.2111174 0.05082905 0.3714057
MedcSupi.masculino.Outra      MedcSupi masculino  Outra 0.1781475 0.07071511 0.2855798
Supc.masculino.Outra              Supc masculino  Outra 0.6690529 0.50742480 0.8306809
SinstFundi.feminino.Outra   SinstFundi  feminino  Outra 0.4736028 0.35647996 0.5907256
FundcMedi.feminino.Outra     FundcMedi  feminino  Outra 0.1493421 0.05713388 0.2415503
MedcSupi.feminino.Outra       MedcSupi  feminino  Outra 0.1476121 0.08049070 0.2147336
Supc.feminino.Outra               Supc  feminino  Outra 0.1616700 0.02427832 0.2990616

#######################################

## > TABLE 2

#######################################
#######################################

# > AGE-ADJUSTED PREVALENCES

#######################################

## FUNCTION ("predictive marginal means")

# - Referências
# https://www.r-bloggers.com/statistically-significant-trends-with-multiple-years-of-complex-survey-data/
# https://gist.github.com/tslumley/2e74cd0ac12a671d2724
# https://rdrr.io/rforge/survey/man/svypredmeans.html
# http://www.asdfree.com/2015/11/statistically-significant-trends-with.html

#######################################

svypredmeans<-function(adjustmodel, groupfactor){

  design<-eval(bquote(update(adjustmodel$survey.design, .groupfactor=.(groupfactor[[2]]))))
  groups<-unique(model.frame(design)$.groupfactor)
  groups<-groups[!is.na(groups)]
  model<-update(adjustmodel, .~.+.groupfactor,design=design)
```

```
  w<-weights(design,"sampling")

  fits<-matrix(nrow=NROW(design),ncol=length(groups))
  dg_deta<-matrix(nrow=length(coef(model)),ncol=length(groups))
  for(i in 1:length(groups)){
    mf<-model.frame(design)
    mf$.groupfactor<-groups[i]
    mu<-predict(model,newdata=mf,type="response",se.fit=FALSE)
    eta<-predict(model,newdata=mf,type="link",se.fit=FALSE)
    fits[,i]<-coef(mu)

    mm<-model.matrix(terms(model),mf)
    dg_deta[,i]<-t(colSums(w*model$family$mu.eta(eta)*mm))/sum(w)
  }
  colnames(fits)<-as.character(groups)
  cond<-svymean(fits,design)
  addvar<-t(dg_deta)%*%vcov(model)%*%dg_deta
  vv<-addvar+attr(cond,"var")
  attr(vv,"parts")<-list(addvar,attr(cond,"var"))
  attr(cond,"var")<-vv
  cond
}

#######################################

## MARGINAL MODELLING (total PNS population = STANDARD)

marginals <-
  svyglm(
    formula = I( has1 == 1 ) ~ age_cat2,
    design = banco ,
    family = quasibinomial (link = "logit")
  )
round(exp(cbind(coef(marginals), confint(marginals))), 2)
                         2.5 % 97.5 %
(Intercept)          0.07  0.06   0.08
age_cat225-29        1.83  1.44   2.33
```

```
age_cat230-34        2.90  2.36   3.57
age_cat235-39        4.00  3.24   4.95
age_cat240-44        6.04  4.93   7.41
age_cat245-49        8.62  7.03  10.57
age_cat250-54       12.45 10.16  15.27
age_cat255-59       17.01 13.70  21.12
age_cat260-64       20.97 16.80  26.18
age_cat265-69       27.79 22.32  34.59
age_cat270-74       35.05 27.23  45.12
age_cat275-79       39.85 30.35  52.32
age_cat280 or older 38.26 29.60  49.46

# > GENDER

x <- svypredmeans(marginals, ~factor(c006))
round(x * 100, 1)
          mean     SE
masculino 34.0 0.0053
feminino  30.8 0.0044

round(confint(x) * 100, 1)
          2.5 % 97.5 %
masculino    33   35.0
feminino     30   31.7

# > RACA

x1 <- svypredmeans(marginals, ~factor(raca2))
round(x1 * 100, 1)
       mean     SE
Branca 31.6 0.0050
Parda  32.4 0.0051
Preta  35.7 0.0101
Outra  29.8 0.0226

round(confint(x1) * 100, 1)
       2.5 % 97.5 %
```

```
Branca  30.7   32.6
Parda   31.4   33.4
Preta   33.7   37.7
Outra   25.4   34.3

# > GENDER * RACE

y <- svypredmeans(marginals, ~interaction(c006, raca2))
round(y * 100, 1)
                  mean     SE
masculino.Branca 34.0 0.0075
masculino.Parda  33.2 0.0075
masculino.Preta  37.0 0.0162
masculino.Outra  37.0 0.0350
feminino.Branca  29.5 0.0060
feminino.Parda   31.8 0.0061
feminino.Preta   34.5 0.0123
feminino.Outra   25.0 0.0266

round(confint(y) * 100, 1)
                  2.5 % 97.5 %
masculino.Branca  32.6   35.5
masculino.Parda   31.7   34.7
masculino.Preta   33.9   40.2
masculino.Outra   30.1   43.8
feminino.Branca   28.4   30.7
feminino.Parda    30.6   32.9
feminino.Preta    32.1   37.0
feminino.Outra    19.8   30.2

# > GENDER * EDUCATION

y1 <- svypredmeans(marginals, ~interaction(c006, educ))
round(y1 * 100, 1)
                     mean     SE
masculino.SinstFundi 33.9 0.0074
masculino.FundcMedi  33.5 0.0134
```

```
masculino.MedcSupi   34.7 0.0102
masculino.Supc       33.2 0.0124
feminino.SinstFundi  35.3 0.0065
feminino.FundcMedi   31.5 0.0107
feminino.MedcSupi    27.3 0.0078
feminino.Supc        22.9 0.0107

round(confint(y1) * 100, 1)
                     2.5 % 97.5 %
masculino.SinstFundi  32.5   35.4
masculino.FundcMedi   30.9   36.1
masculino.MedcSupi    32.7   36.7
masculino.Supc        30.8   35.6
feminino.SinstFundi   34.0   36.6
feminino.FundcMedi    29.4   33.6
feminino.MedcSupi     25.8   28.9
feminino.Supc         20.8   25.0

# > GENDER * RACE * EDUCATION

z <- svypredmeans(marginals, ~interaction(c006, raca2, educ))
round(z * 100, 1)
                            mean     SE
masculino.Branca.SinstFundi 35.3 0.0113
masculino.Branca.FundcMedi  31.1 0.0194
masculino.Branca.MedcSupi   35.1 0.0151
masculino.Branca.Supc       32.1 0.0154

masculino.Parda.SinstFundi  31.9 0.0101
masculino.Parda.FundcMedi   35.0 0.0187
masculino.Parda.MedcSupi    34.0 0.0149
masculino.Parda.Supc        34.6 0.0226

masculino.Preta.SinstFundi  37.6 0.0221
masculino.Preta.FundcMedi   37.7 0.0483
masculino.Preta.MedcSupi    36.0 0.0270
masculino.Preta.Supc        33.5 0.0743
```

```
masculino.Outra.SinstFundi  35.7 0.0518
masculino.Outra.FundcMedi   27.2 0.0920
masculino.Outra.MedcSupi    29.4 0.0743
masculino.Outra.Supc        54.9 0.0747

feminino.Branca.SinstFundi  35.3 0.0100
feminino.Branca.FundcMedi   30.5 0.0167
feminino.Branca.MedcSupi    26.7 0.0108
feminino.Branca.Supc        22.4 0.0132

feminino.Parda.SinstFundi   35.3 0.0090
feminino.Parda.FundcMedi    31.9 0.0158
feminino.Parda.MedcSupi     27.4 0.0113
feminino.Parda.Supc         21.9 0.0204

feminino.Preta.SinstFundi   35.6 0.0173
feminino.Preta.FundcMedi    36.1 0.0309
feminino.Preta.MedcSupi     32.6 0.0266
feminino.Preta.Supc         32.8 0.0417

feminino.Outra.SinstFundi   34.3 0.0510
feminino.Outra.FundcMedi    21.7 0.0475
feminino.Outra.MedcSupi     17.9 0.0365
feminino.Outra.Supc         18.6 0.0659

round(confint(z) * 100, 1)
                            2.5 % 97.5 %
masculino.Branca.SinstFundi  33.1   37.5
masculino.Branca.FundcMedi   27.3   34.9
masculino.Branca.MedcSupi    32.1   38.0
masculino.Branca.Supc        29.1   35.1

masculino.Parda.SinstFundi   30.0   33.9
masculino.Parda.FundcMedi    31.4   38.7
masculino.Parda.MedcSupi     31.1   37.0
masculino.Parda.Supc         30.2   39.1
```

```
masculino.Preta.SinstFundi   33.2   41.9
masculino.Preta.FundcMedi    28.3   47.2
masculino.Preta.MedcSupi     30.7   41.3
masculino.Preta.Supc         18.9   48.0

masculino.Outra.SinstFundi   25.5   45.8
masculino.Outra.FundcMedi     9.2   45.3
masculino.Outra.MedcSupi     14.8   43.9
masculino.Outra.Supc         40.3   69.6

feminino.Branca.SinstFundi   33.3   37.2
feminino.Branca.FundcMedi    27.2   33.7
feminino.Branca.MedcSupi     24.6   28.8
feminino.Branca.Supc         19.9   25.0

feminino.Parda.SinstFundi    33.5   37.1
feminino.Parda.FundcMedi     28.8   35.0
feminino.Parda.MedcSupi      25.2   29.6
feminino.Parda.Supc          17.9   25.9

feminino.Preta.SinstFundi    32.2   39.0
feminino.Preta.FundcMedi     30.0   42.1
feminino.Preta.MedcSupi      27.4   37.8
feminino.Preta.Supc          24.6   41.0

feminino.Outra.SinstFundi    24.3   44.3
feminino.Outra.FundcMedi     12.4   31.0
feminino.Outra.MedcSupi      10.8   25.1
feminino.Outra.Supc           5.7   31.5


########################################

## > TABLE 2

########################################
```

```
#######################################

# > ODDS RATIOS (OR)

#######################################

# > OR - gender

logitmodel0_m <- svyglm (has1 ~ educ_i, design = subset(banco, c006=="masculino"), family = quasibinomial(link =
"logit"))
logitmodel1_m <- svyglm (has1 ~ educ_i + as.numeric(c008), design = subset(banco, c006=="masculino"), family =
quasibinomial(link = "logit"))
round(exp(cbind(coef(logitmodel0_m), confint(logitmodel0_m))),1)
                2.5 % 97.5 %
(Intercept) 0.5   0.4    0.6
educ_i2     0.7   0.6    0.8
educ_i3     0.7   0.6    0.8
educ_i4     1.4   1.2    1.7

round(exp(cbind(coef(logitmodel1_m), confint(logitmodel1_m))),1)
                    2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
educ_i2          1.0   0.8    1.2
educ_i3          1.0   0.8    1.2
educ_i4          1.1   0.9    1.2
as.numeric(c008) 1.1   1.1    1.1

logitmodel0_f <- svyglm (has1 ~ educ_i, design = subset(banco, c006 =="feminino"), family = quasibinomial(link =
"logit"))
logitmodel1_f <- svyglm (has1 ~ educ_i + as.numeric(c008), design = subset(banco, c006 == "feminino"), family =
quasibinomial(link = "logit"))
round(exp(cbind(coef(logitmodel0_f), confint(logitmodel0_f))), 1)
                2.5 % 97.5 %
(Intercept) 0.3   0.2    0.3
educ_i2     0.9   0.8    1.1
educ_i3     1.3   1.1    1.6
educ_i4     3.4   2.9    3.9
```

```
round(exp(cbind(coef(logitmodel1_f), confint(logitmodel1_f))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
educ_i2          1.3   1.1    1.6
educ_i3          1.7   1.4    2.1
educ_i4          2.0   1.7    2.3
as.numeric(c008) 1.1   1.1    1.1

# > OR - gender * race

# white men

logitmodel2_mb0 <- svyglm (has1 ~ educ_i, design = subset(banco, c006=="masculino" & raca2=="Branca"),
family=quasibinomial(link = "logit")) #white men
logitmodel2_mb <- svyglm (has1 ~ educ_i + as.numeric(c008), design = subset(banco, c006=="masculino" &
raca2=="Branca"), family=quasibinomial(link = "logit")) #white men
round(exp(cbind(coef(logitmodel2_mb0), confint(logitmodel2_mb0))), 1)
                2.5 % 97.5 %
(Intercept) 0.5   0.4    0.6
educ_i2     0.7   0.6    0.9
educ_i3     0.7   0.5    0.9
educ_i4     1.7   1.4    2.1

round(exp(cbind(coef(logitmodel2_mb), confint(logitmodel2_mb))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
educ_i2          1.1   0.9    1.3
educ_i3          0.9   0.7    1.2
educ_i4          1.2   1.0    1.5
as.numeric(c008) 1.1   1.1    1.1

# brown men

logitmodel2_mpa0 <- svyglm (has1 ~ educ_i, design=subset(banco, c006=="masculino" & raca2=="Parda"),
family=quasibinomial(link = "logit")) #brown men
```

```
logitmodel2_mpa <- svyglm (has1 ~ educ_i + as.numeric(c008), design=subset(banco, c006=="masculino" &
raca2=="Parda"), family=quasibinomial(link = "logit")) #brown men
round(exp(cbind(coef(logitmodel2_mpa0), confint(logitmodel2_mpa0))), 1)
                2.5 % 97.5 %
(Intercept) 0.4   0.3    0.5
educ_i2     0.7   0.5    0.9
educ_i3     0.8   0.6    1.0
educ_i4     1.4   1.1    1.9

round(exp(cbind(coef(logitmodel2_mpa), confint(logitmodel2_mpa))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
educ_i2          0.9   0.7    1.2
educ_i3          1.0   0.7    1.3
educ_i4          0.9   0.7    1.2
as.numeric(c008) 1.1   1.1    1.1

# black men

logitmodel2_mpe0 <- svyglm (has1 ~ educ_i, design=subset(banco, c006=="masculino" & raca2=="Preta"),
family=quasibinomial(link = "logit")) #black men
logitmodel2_mpe <- svyglm (has1 ~ educ_i + as.numeric(c008), design=subset(banco, c006=="masculino" &
raca2=="Preta"), family=quasibinomial(link = "logit")) #black men
round(exp(cbind(coef(logitmodel2_mpe0), confint(logitmodel2_mpe0))), 1)
                2.5 % 97.5 %
(Intercept) 0.4   0.2    0.8
educ_i2     0.9   0.4    2.0
educ_i3     1.3   0.6    3.0
educ_i4     2.1   1.0    4.4

round(exp(cbind(coef(logitmodel2_mpe), confint(logitmodel2_mpe))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
educ_i2          1.1   0.5    2.5
educ_i3          1.3   0.5    3.1
educ_i4          1.3   0.6    2.9
as.numeric(c008) 1.1   1.0    1.1
```

```
# white women

logitmodel2_fb0 <- svyglm (has1 ~ educ_i, design=subset(banco, c006=="feminino" & raca2=="Branca"),
family=quasibinomial(link = "logit")) #white women
logitmodel2_fb <- svyglm (has1 ~ educ_i + as.numeric(c008), design=subset(banco, c006=="feminino" &
raca2=="Branca"), family=quasibinomial(link = "logit")) #white women
round(exp(cbind(coef(logitmodel2_fb0), confint(logitmodel2_fb0))), 1)
                2.5 % 97.5 %
(Intercept) 0.3   0.2    0.3
educ_i2     1.0   0.8    1.2
educ_i3     1.5   1.2    1.8
educ_i4     3.8   3.2    4.6

round(exp(cbind(coef(logitmodel2_fb), confint(logitmodel2_fb))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
educ_i2          1.3   1.1    1.7
educ_i3          1.7   1.3    2.2
educ_i4          2.0   1.6    2.5
as.numeric(c008) 1.1   1.1    1.1

# brown women

logitmodel2_fpa0 <- svyglm (has1 ~ educ_i, design=subset(banco, c006=="feminino" & raca2=="Parda"),
family=quasibinomial(link = "logit")) #brown women
logitmodel2_fpa <- svyglm (has1 ~ educ_i + as.numeric(c008), design=subset(banco, c006=="feminino" &
raca2=="Parda"), family=quasibinomial(link = "logit")) #brown women
round(exp(cbind(coef(logitmodel2_fpa0), confint(logitmodel2_fpa0))), 1)
                2.5 % 97.5 %
(Intercept) 0.2   0.2    0.3
educ_i2     1.0   0.7    1.3
educ_i3     1.4   1.1    1.9
educ_i4     3.7   2.9    4.8

round(exp(cbind(coef(logitmodel2_fpa), confint(logitmodel2_fpa))), 1)
                     2.5 % 97.5 %
```

```
(Intercept)      0.0   0.0    0.0
educ_i2          1.4   1.0    2.0
educ_i3          1.9   1.3    2.6
educ_i4          2.1   1.6    2.8
as.numeric(c008) 1.1   1.1    1.1

#black women

logitmodel2_fpe0 <- svyglm (has1 ~ educ_i, design=subset(banco, c006 =="feminino" & raca2=="Preta"),
family=quasibinomial(link = "logit")) #black women
logitmodel2_fpe <- svyglm (has1 ~ educ_i + as.numeric(c008), design = subset(banco, c006 =="feminino" &
raca2=="Preta"), family=quasibinomial(link = "logit")) #black women
round(exp(cbind(coef(logitmodel2_fpe0), confint(logitmodel2_fpe0))), 1)
                2.5 % 97.5 %
(Intercept) 0.5   0.3    0.9
educ_i2     0.6   0.3    1.1
educ_i3     0.8   0.4    1.5
educ_i4     1.9   1.1    3.4

round(exp(cbind(coef(logitmodel2_fpe), confint(logitmodel2_fpe))), 1)
                    2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
educ_i2          1.0   0.6    1.7
educ_i3          1.2   0.7    2.2
educ_i4          1.0   0.6    1.7
as.numeric(c008) 1.1   1.1    1.1

########################################

## > TABLE 2

########################################
########################################

# > RELATIVE INDEX OF INEQUALITY (RII) - gender

########################################
```

```
rii_m0 <- svyglm(has1 ~ escore_gi, design = subset(banco, c006 == "masculino"), family=quasibinomial(link =
"logit"))
rii_m <- svyglm(has1 ~ escore_gi + as.numeric(c008), design = subset(banco, c006 == "masculino"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_m0), confint(rii_m0))),1)
                2.5 % 97.5 %
(Intercept) 0.3   0.3    0.3
escore_gi   2.7   2.3    3.3

round(exp(cbind(coef(rii_m), confint(rii_m))),1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
escore_gi        1.1   0.9    1.3
as.numeric(c008) 1.1   1.1    1.1

rii_f0 <- svyglm(has1 ~ escore_gi, design=subset(banco, c006 == "feminino"), family=quasibinomial(link = "logit"))
rii_f <- svyglm(has1 ~ escore_gi + as.numeric(c008), design = subset(banco, c006 == "feminino"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_f0), confint(rii_f0))), 1)
                2.5 % 97.5 %
(Intercept) 0.2   0.1    0.2
escore_gi   8.4   7.0   10.0

round(exp(cbind(coef(rii_f), confint(rii_f))), 1)
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
escore_gi        2.4   2.0    2.8
as.numeric(c008) 1.1   1.1    1.1

#######################################
#######################################

# > SLOPE INDEX OF INEQUALITY (SII) - gender

#######################################
```

```
sii_m0 <- svyglm(has1 ~ escore_gi, design = subset(banco, c006 == "masculino"), family=quasi(link = "identity"))
sii_m <- svyglm(has1 ~ escore_gi + as.numeric(c008), design = subset(banco, c006=="masculino"), family=quasi(link =
"identity"))
#summary(sii_m0)
#summary(sii_m)
round(coef(sii_m0)*100, 1)
(Intercept)   escore_gi
       22.1        21.8

round(confint(sii_m0)*100, 1)
            2.5 % 97.5 %
(Intercept)  19.9   24.3
escore_gi    17.9   25.8

round(coef(sii_m)*100, 1)
     (Intercept)        escore_gi as.numeric(c008)
           -16.5              2.2              1.1

round(confint(sii_m)*100, 1)
                2.5 % 97.5 %
(Intercept)      -19.1  -13.8
escore_gi         -1.3    5.7
as.numeric(c008)   1.1    1.2

sii_f0 <- svyglm(has1 ~ escore_gi, design = subset(banco, c006 == "feminino"), family = quasi(link = "identity"))
sii_f <- svyglm(has1 ~ escore_gi + as.numeric(c008), design = subset(banco, c006 == "feminino"), family = quasi(link
= "identity"))
#summary(sii_f0)
#summary(sii_f)
round(coef(sii_f0)*100, 1)
(Intercept)   escore_gi
       10.0        43.4

round(confint(sii_f0)*100, 1)
            2.5 % 97.5 %
(Intercept)   8.2   11.7
escore_gi    40.2   46.7
```

```
round(coef(sii_f)*100, 1)
     (Intercept)        escore_gi as.numeric(c008)
           -31.4             16.3              1.3

round(confint(sii_f)*100, 1)
                 2.5 % 97.5 %
(Intercept)      -33.2  -29.6
escore_gi         13.3   19.3
as.numeric(c008)   1.2    1.3

########################################
########################################

# > RELATIVE INDEX OF INEQUALITY (RII) - gender*race

########################################

# white men

rii_mb0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2 == "Branca"),
family=quasibinomial(link = "logit"))
rii_mb <- svyglm(has1 ~ escore_ri + as.numeric(c008), design = subset(banco, c006 == "masculino" & raca2 ==
"Branca"), family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_mb0), confint(rii_mb0))),1) #white men (unadjusted)
                2.5 % 97.5 %
(Intercept) 0.3   0.3    0.4
escore_ri   2.8   2.1    3.7

round(exp(cbind(coef(rii_mb), confint(rii_mb))),1) #white men
                    2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
escore_ri        1.2   0.9    1.6
as.numeric(c008) 1.1   1.1    1.1

# brown men
```

```
rii_mpa0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2=="Parda"),
family=quasibinomial(link = "logit"))
rii_mpa <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="masculino" & raca2=="Parda"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_mpa0), confint(rii_mpa0))), 1) #brown men (unadjusted)
                2.5 % 97.5 %
(Intercept) 0.2   0.2    0.3
escore_ri   3.0   2.3    3.9

round(exp(cbind(coef(rii_mpa), confint(rii_mpa))), 1) #brown men
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
escore_ri        0.9   0.7    1.3
as.numeric(c008) 1.1   1.1    1.1

# black men

rii_mpe0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2=="Preta"),
family=quasibinomial(link = "logit"))
rii_mpe <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="masculino" & raca2=="Preta"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_mpe0), confint(rii_mpe0))), 1) #black men (unadjusted)
                2.5 % 97.5 %
(Intercept) 0.3   0.2    0.4
escore_ri   3.8   2.2    6.7

round(exp(cbind(coef(rii_mpe), confint(rii_mpe))), 1) #black men
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.1
escore_ri        1.4   0.7    2.5
as.numeric(c008) 1.1   1.0    1.1

# white women

rii_fb0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Branca"),
family=quasibinomial(link = "logit"))
```

```
rii_fb <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Branca"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_fb0), confint(rii_fb0))), 1) #white women (unadjusted)
                2.5 % 97.5 %
(Intercept) 0.2   0.1    0.2
escore_ri   8.4   6.5   11.0

round(exp(cbind(coef(rii_fb), confint(rii_fb))), 1) #white women
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
escore_ri        2.5   2.0    3.3
as.numeric(c008) 1.1   1.1    1.1

# brown women

rii_fpa0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Parda"),
family=quasibinomial(link = "logit"))
rii_fpa <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Parda"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_fpa0), confint(rii_fpa0))), 1) #brown women (unadjusted)
                2.5 % 97.5 %
(Intercept)  0.1   0.1    0.1
escore_ri   10.0   7.8   12.8

round(exp(cbind(coef(rii_fpa), confint(rii_fpa))), 1) #brown women
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
escore_ri        2.3   1.8    2.9
as.numeric(c008) 1.1   1.1    1.1

# black women

rii_fpe0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Preta"),
family=quasibinomial(link = "logit"))
rii_fpe <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Preta"),
family=quasibinomial(link = "logit"))
round(exp(cbind(coef(rii_fpe0), confint(rii_fpe0))), 1) #black women (unadjusted)
```

```
                2.5 % 97.5 %
(Intercept) 0.2   0.2    0.3
escore_ri   5.7   3.1   10.4

round(exp(cbind(coef(rii_fpe), confint(rii_fpe))), 1) #black women
                     2.5 % 97.5 %
(Intercept)      0.0   0.0    0.0
escore_ri        1.0   0.6    1.8
as.numeric(c008) 1.1   1.1    1.1

########################################
########################################

# > SLOPE INDEX OF INEQUALITY (SII) - gender*race

########################################

# white men

sii_mb0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2=="Branca"), family=quasi(link =
"identity"))
sii_mb <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="masculino" & raca2=="Branca"),
family=quasi(link = "identity"))
#summary(sii_mb0)
#summary(sii_mb)
round(coef(sii_mb0) * 100, 1)
(Intercept)   escore_ri
       23.4        23.1

round(confint(sii_mb0) * 100, 1)
            2.5 % 97.5 %
(Intercept)  20.0   26.8
escore_ri    17.3   28.9

round(coef(sii_mb) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -17.4              4.7              1.1
```

```
round(confint(sii_mb) * 100, 1)
                 2.5 % 97.5 %
(Intercept)      -21.5  -13.2
escore_ri         -0.4    9.8
as.numeric(c008)   1.1    1.2

# brown men

sii_mpa0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2=="Parda"), family=quasi(link =
"identity"))
sii_mpa <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="masculino" & raca2=="Parda"),
family=quasi(link = "identity"))
#summary(sii_mpa0)
#summary(sii_mpa)
round(coef(sii_mpa0) * 100, 1)
(Intercept)   escore_ri
       18.9        22.4

round(confint(sii_mpa0) * 100, 1)
            2.5 % 97.5 %
(Intercept)    16   21.9
escore_ri      17   27.8

round(coef(sii_mpa) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -14.8             -0.3              1.1

round(confint(sii_mpa) * 100, 1)
                 2.5 % 97.5 %
(Intercept)      -18.6  -11.0
escore_ri         -5.3    4.7
as.numeric(c008)   1.0    1.2

# black men
```

```
sii_mpe0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="masculino" & raca2=="Preta"), family=quasi(link =
"identity"))
sii_mpe <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="masculino" & raca2=="Preta"),
family=quasi(link = "identity"))
#summary(sii_mpe0)
#summary(sii_mpe)
round(coef(sii_mpe0) * 100, 1)
(Intercept)   escore_ri
       21.2        30.0

round(confint(sii_mpe0) * 100, 1)
            2.5 % 97.5 %
(Intercept)  14.5   28.0
escore_ri    17.8   42.2

round(coef(sii_mpe) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -17.9              6.8              1.2

round(confint(sii_mpe) * 100, 1)
                 2.5 % 97.5 %
(Intercept)        -26   -9.8
escore_ri           -5   18.6
as.numeric(c008)     1    1.4

# white women

sii_fb0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Branca"), family=quasi(link =
"identity"))
sii_fb <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Branca"),
family=quasi(link = "identity"))
#summary(sii_fb0)
#summary(sii_fb)
round(coef(sii_fb0) * 100, 1)
(Intercept)   escore_ri
       10.0        44.1
```

```
round(confint(sii_fb0) * 100, 1)
            2.5 % 97.5 %
(Intercept)   7.3   12.7
escore_ri    39.2   49.0

round(coef(sii_fb) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -32.4             18.1              1.2

round(confint(sii_fb) * 100, 1)
                 2.5 % 97.5 %
(Intercept)      -35.0  -29.8
escore_ri         13.5   22.8
as.numeric(c008)   1.2    1.3

# brown women

sii_fpa0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Parda"), family=quasi(link =
"identity"))
sii_fpa <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Parda"),
family=quasi(link = "identity"))
#summary(sii_fpa0)
#summary(sii_fpa)
round(coef(sii_fpa0) * 100, 1)
(Intercept)   escore_ri
        7.8        45.1

round(confint(sii_fpa0) * 100, 1)
            2.5 % 97.5 %
(Intercept)   5.5   10.0
escore_ri    40.6   49.6

round(coef(sii_fpa) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -30.9             14.5              1.3

round(confint(sii_fpa) * 100, 1)
```

```
                 2.5 % 97.5 %
(Intercept)      -33.8  -28.1
escore_ri         10.2   18.8
as.numeric(c008)   1.2    1.4

# black women

sii_fpe0 <- svyglm(has1 ~ escore_ri, design=subset(banco, c006=="feminino" & raca2=="Preta"), family=quasi(link =
"identity"))
sii_fpe <- svyglm(has1 ~ escore_ri + as.numeric(c008), design=subset(banco, c006=="feminino" & raca2=="Preta"),
family=quasi(link = "identity"))
#summary(sii_fpe0)
#summary(sii_fpe)
round(coef(sii_fpe0) * 100, 1)
(Intercept)   escore_ri
       17.3        38.9

round(confint(sii_fpe0) * 100, 1)
            2.5 % 97.5 %
(Intercept)  10.3   24.3
escore_ri    26.6   51.2

round(coef(sii_fpe) * 100, 1)
     (Intercept)        escore_ri as.numeric(c008)
           -25.5              1.5              1.4

round(confint(sii_fpe) * 100, 1)
                 2.5 % 97.5 %
(Intercept)      -31.3  -19.6
escore_ri         -9.2   12.2
as.numeric(c008)   1.2    1.5

########################################
########################################

# >> GRAPH (Figures 1)
```

```
#######################################
#######################################

plot.new()
layout(matrix(c(1,2,3,4), 2, 2, byrow = TRUE), respect=F)

# > All Men

#svyby(~educ_i, ~c006, banco, svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(33.2, 34.7, 33.5, 33.9), # age-adjusted % hypertension
        c(0.1140733, 0.3223560, 0.1651937, 0.3983771), #prop educ_i
        space=0, ylim=c(0,80), col=c("White"), border="black",axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x1 <- c(0.0570, 0.2753, 0.5190, 0.8008) #score_m
y1 <- c(33.2, 34.7, 33.5, 33.9) #prevalence
points(x1, y1)
segments(0.0570,0,0.0570,33.2,lty=2)
segments(0.2753,0,0.2753,34.7,lty=2)
segments(0.5190,0,0.5190,33.5,lty=2)
segments(0.8008,0,0.8008,33.9,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main = NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-3.26051, 0.07710), lty=1, col="black") #summary(rii_m)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 34.0% (95%CI 33.0 to 35.0)")
text(0.69,-2.5,labels="SII = 2.2% (95%CI -1.3 to 5.7)")
text(0.7,-2.8,labels="RII = 1.1 (95%CI 0.9 to 1.3)")
mtext("1a) All men", side = 3, adj=0, font.main = 1, line = 1, outer = F)

# > White Men
```

```
#svyby(~educ_i, ~c006, subset(banco, raca2 == "Branca"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(32.1, 35.1, 31.1, 35.3), # age-adjusted % hypertension
        c(0.1688375, 0.3469587, 0.1531411, 0.3310628), #prop educ_i
        space=0, ylim=c(0,80), col="White", border="black",axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x2 <- c(0.0844, 0.3423, 0.5924, 0.8345) #score_mb
y2 <- c(32.1, 35.1, 31.1, 35.3) #prevalence
points(x2, y2)
segments(0.0844,0,0.0844,32.1,lty=2)
segments(0.3423,0,0.3423,35.1,lty=2)
segments(0.5924,0,0.5924,31.1,lty=2)
segments(0.8345,0,0.8345,35.3,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-3.277084, 0.191566), lty=4, col="black") #summary(rii_mb)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 34.0% (95%CI 32.6 to 35.5)")
text(0.69,-2.5,labels="SII = 4.7% (95%CI -0.4 to 9.8)")
text(0.7,-2.8,labels="RII = 1.2 (95%CI 0.9 to 1.6)")
mtext("1b) White men", side = 3, adj=0, font.main = 1, line = 1, outer = F)

# > Brown Men

#svyby(~educ_i, ~c006, subset(banco, raca2 == "Parda"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(34.6, 34.0, 35.0, 31.9), # age-adjusted % hypertension
        c(0.06463000, 0.3015907, 0.1720974, 0.4616819), #prop educ_i
        space=0, ylim=c(0,80), col="White", border="black",axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
```

```
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x3 <- c(0.0323, 0.2154, 0.4523, 0.7692) #score_mpa
y3 <- c(34.6, 34.0, 35.0, 31.9) #prevalence
points(x3, y3)
segments(0.0323,0,0.0323,34.6,lty=2)
segments(0.2154,0,0.2154,34.0,lty=2)
segments(0.4523,0,0.4523,35.0,lty=2)
segments(0.7692,0,0.7692,31.9,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-3.221295,-0.055054), lty=4, col="black") #summary(rii_mpa)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 33.2% (95%CI 31.7 to 34.7)")
text(0.7,-2.5,labels="SII = -0.3% (95%CI -5.3 to 4.7)")
text(0.7,-2.8,labels="RII = 0.9 (95%CI 0.7 to 1.3)")
mtext("1c) Brown men", side = 3, adj=0, font.main = 1, line = 1, outer = F)

# > Black Men

#svyby(~educ_i, ~c006, subset(banco, raca2 == "Preta"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(33.5, 36.0, 37.7, 37.6), # age-adjusted % hypertension
        c(0.05321320, 0.2846225, 0.2021691, 0.4599953), #prop educ_i
        space=0, ylim=c(0,80), col="White", border="black",axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x4 <- c(0.0266, 0.1955, 0.4389, 0.7700) #score_mpe
y4 <- c(33.5, 36.0, 37.7, 37.6) #prevalence
points(x4, y4)
segments(0.0266,0,0.0266,33.5,lty=2)
segments(0.1955,0,0.1955,36.0,lty=2)
segments(0.4389,0,0.4389,37.7,lty=2)
```

```
segments(0.7700,0,0.7700,37.6,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-3.256882, 0.303018), lty=4, col="black") #summary(rii_mpe)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 37.0% (95%CI 33.9 to 40.2)")
text(0.7,-2.5,labels="SII = 6.8% (95%CI -5.0 to 18.6)")
text(0.7,-2.8,labels="RII = 1.4 (95%CI 0.7 to 2.5)")
mtext("1d) Black men", side = 3, adj=0, font.main = 1, line = 1, outer = F)


########################################
########################################

# >> GRAPH (Figures 2)

########################################
########################################

# > All Women

plot.new()

layout(matrix(c(1,2,3,4), 2, 2, byrow = TRUE),respect=F)

#svyby(~educ_i, ~c006, banco, svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(22.9, 27.3, 31.5, 35.3),
        c(0.1388534, 0.3305116, 0.1459514, 0.3846836), #freq relativa educ_i
        space=0, ylim=c(0,80), col="White", border="black", axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x5 <- c(0.0694, 0.3041, 0.5423, 0.8077) #score_f
```

```
y5 <- c(22.9, 27.3, 31.5, 35.3) #prevalence
points(x5, y5)
segments(0.0694,0,0.0694,22.9,lty=2)
segments(0.3041,0,0.3041,27.3,lty=2)
segments(0.5423,0,0.5423,31.5,lty=2)
segments(0.8077,0,0.8077,35.3,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-4.431761,0.865499), lty=1, col="black") #summary(rii_f)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"), outer=F)
text(0.62,-2.2,labels="Prevalence = 30.8% (95%CI 30.0 to 31.7)")
text(0.7,-2.5,labels="SII = 16.3% (95%CI 13.3 to 19.3)")
text(0.7,-2.8,labels="RII = 2.4 (95%CI 2.0 to 2.8)")
mtext("2a) All women", side = 3, adj=0, font.main = 1, line = 1, outer = F)

# > White Women

#svyby(~educ_i, ~c006, subset(banco, raca2 == "Branca"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(22.7, 26.8, 30.5, 35.3),
        c(0.1960693, 0.3485568, 0.1305736, 0.3248003), #freq relativa educ_i
        space=0, ylim=c(0,80), col="White", border="black", axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x6 <- c(0.0980, 0.3703, 0.6099, 0.8376) #score_fb
y6 <- c(22.7, 26.8, 30.5, 35.3) #prevalence
points(x6, y6)
segments(0.0980,0,0.0980,22.7,lty=2)
segments(0.3703,0,0.3703,26.8,lty=2)
segments(0.6099,0,0.6099,30.5,lty=2)
segments(0.8376,0,0.8376,35.3,lty=2)

par(new=T)
```

```
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-4.502200, 0.932470), lty=4, col="black") #summary(rii_fb)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 29.5% (95%CI 28.4 to 30.7)")
text(0.7,-2.5,labels="SII = 18.1% (95%CI 13.5 to 22.8)")
text(0.7,-2.8,labels="RII = 2.5 (95%CI 2.0 to 3.3)")
mtext("2b) White women", side = 3, adj=0, font.main = 1, line = 1, outer = F)

# > Brown Women

#svyby(~educ_i, ~c006, subset(banco, raca2 == "Parda"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(21.9, 27.4, 31.9, 35.3),
        c(0.08443106, 0.3133667, 0.1597387, 0.4424636), #freq relativa educ_i
        space=0, ylim=c(0,80), col="White", border="black", axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x7 <- c(0.0422, 0.2411, 0.4777, 0.7788) #score_fpa
y7 <- c(21.9, 27.4, 31.9, 35.3) #prevalence
points(x7, y7)
segments(0.0422,0,0.0422,21.9,lty=2)
segments(0.2411,0,0.2411,27.4,lty=2)
segments(0.4777,0,0.4777,31.9,lty=2)
segments(0.7788,0,0.7788,35.3,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-4.445430, 0.820453), lty=4, col="black") #summary(rii_fpa)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 31.8% (95%CI 30.6 to 32.9)")
text(0.7,-2.5,labels="SII = 14.5% (95%CI 10.2 to 18.8)")
text(0.7,-2.8,labels="RII = 2.3 (95%CI 1.8 to 2.9)")
mtext("2c) Brown women", side = 3, adj=0, font.main = 1, line = 1, outer = F)
```

```
# > Black Women

#svyby(~educ_i, ~c006, subset(banco, raca2 == "Parda"), svymean)

par(mar = c(5, 4, 4, 8) + 0.3)
barplot(c(32.8, 32.6, 36.1, 35.6),
        c(0.08443106, 0.3133667, 0.1597387, 0.4424636), #freq relativa educ_i
        space=0, ylim=c(0,80), col="White", border="black", axes = F, xlab="numeric score",
        sub="cumulative relative frequency of the educational subgroups")
axis(4)
mtext("Prevalence", side = 4, line = 2.5, cex = 0.9)

x8 <- c(0.0405, 0.2353, 0.4711, 0.7763) #score_fpe
y8 <- c(32.8, 32.6, 36.1, 35.6) #prevalence
points(x8, y8)
segments(0.0405,0,0.0405,32.8,lty=2)
segments(0.2353,0,0.2353,32.6,lty=2)
segments(0.4711,0,0.4711,36.1,lty=2)
segments(0.7763,0,0.7763,35.6,lty=2)

par(new=T)
plot(c(0,0), c(-2,-6), type="n", xlab="", xlim=c(0,1), main=NULL, ylab="log (RII)", xaxt="n", frame.plot=F)
abline(coef=c(-3.929183, 0.004430), lty=4, col="black") #summary(rii_fpe)
axis(1, at=c(0,1), labels=c("0 (Highest Education)","1 (Lowest Education)"))
text(0.62,-2.2,labels="Prevalence = 34.5% (95%CI 32.1 to 37.0)")
text(0.7,-2.5,labels="SII = 1.5% (95%CI -9.2 to 12.2)")
text(0.7,-2.8,labels="RII = 1.0 (95%CI 0.6 to 1.8)")
mtext("2d) Black women", side = 3, adj=0, font.main = 1, line = 1, outer = F)


########################################
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## > CÁLCULO DO ESCORE NUMÉRICO

########################################
```

```
# > NUMERIC SCORE - variável independente do RII/SII
# > Exposure (education)

########################################
########################################

# > EDUCATION * GENDER

score0 <- data.frame(svyby(~c006, ~educ_i, banco, svytotal))
score0
  educ_i c006masculino c006feminino se.c006masculino se.c006feminino
1      1       7861526     10542973         295671.7        355970.9
2      2      22215636     25095357         446153.7        433033.7
3      3      11384565     11081921         317099.8        289255.5
4      4      27454742     29208570         516278.3        480781.4

score1m <- (score0[1,2]/2)/sum(score0[,2])
score2m <- (score0[1,2] + (score0[2,2]/2))/sum(score0[,2])
score3m <- (score0[1,2] + score0[2,2] + (score0[3,2]/2))/sum(score0[,2])
score4m <- (score0[1,2] + score0[2,2] + score0[3,2] + (score0[4,2]/2))/sum(score0[,2])
score_m <- round(c(score1m, score2m, score3m, score4m), 4)
score_m
[1] 0.0570 0.2753 0.5190 0.8008

score1f <- (score0[1,3]/2)/sum(score0[,3])
score2f <- (score0[1,3] + (score0[2,3]/2))/sum(score0[,3])
score3f <- (score0[1,3] + score0[2,3] + (score0[3,3]/2))/sum(score0[,3])
score4f <- (score0[1,3] + score0[2,3] + score0[3,3] + (score0[4,3]/2))/sum(score0[,3])
score_f <- round(c(score1f, score2f, score3f, score4f), 4)
score_f
[1] 0.0694 0.3041 0.5423 0.8077

# > EDUCATION * GENDER * RACE

score1 <- data.frame(svyby(~c006, ~educ_i, subset(banco, raca=="Branca"), svytotal))
score1
  educ_i c006masculino c006feminino se.c006masculino se.c006feminino
```

```
1      1       5445897      7154326         263137.2        318878.5
2      2      11191244     12718407         332369.1        336696.3
3      3       4939606      4764469         218117.6        187212.4
4      4      10678519     11851559         318648.2        296808.2

score1mb <- (score1[1,2]/2)/sum(score1[,2])
score2mb <- (score1[1,2] + (score1[2,2]/2))/sum(score1[,2])
score3mb <- (score1[1,2] + score1[2,2] + (score1[3,2]/2))/sum(score1[,2])
score4mb <- (score1[1,2] + score1[2,2] + score1[3,2] + (score1[4,2]/2))/sum(score1[,2])
score_mb <- round(c(score1mb, score2mb, score3mb, score4mb), 4)
score_mb
[1] 0.0844 0.3423 0.5924 0.8345

score1fb <- (score1[1,3]/2)/sum(score1[,3])
score2fb <- (score1[1,3] + (score1[2,3]/2))/sum(score1[,3])
score3fb <- (score1[1,3] + score1[2,3] + (score1[3,3]/2))/sum(score1[,3])
score4fb <- (score1[1,3] + score1[2,3] + score1[3,3] + (score1[4,3]/2))/sum(score1[,3])
score_fb <- round(c(score1fb, score2fb, score3fb, score4fb), 4)
score_fb
[1] 0.0980 0.3703 0.6099 0.8376

score2 <- data.frame(svyby(~c006, ~educ_i, subset(banco, raca=="Preta"), svytotal))
score2
  educ_i c006masculino c006feminino se.c006masculino se.c006feminino
1      1      336626.3     570533.7         48209.66        73387.76
2      2     1800519.8    2171036.8        109361.70       132355.48
3      3     1278920.1    1148331.6        127456.73        85813.41
4      4     2909927.1    3148238.7        148850.96       164103.31

score1mpe <- (score2[1,2]/2)/sum(score2[,2])
score2mpe <- (score2[1,2] + (score2[2,2]/2))/sum(score2[,2])
score3mpe <- (score2[1,2] + score2[2,2] + (score2[3,2]/2))/sum(score2[,2])
score4mpe <- (score2[1,2] + score2[2,2] + score2[3,2] + (score2[4,2]/2))/sum(score2[,2])
score_mpe <- round(c(score1mpe, score2mpe, score3mpe, score4mpe), 4)
score_mpe
[1] 0.0266 0.1955 0.4389 0.7700
```

```
score1fpe <- (score2[1,3]/2)/sum(score2[,3])
score2fpe <- (score2[1,3] + (score2[2,3]/2))/sum(score2[,3])
score3fpe <- (score2[1,3] + score2[2,3] + (score2[3,3]/2))/sum(score2[,3])
score4fpe <- (score2[1,3] + score2[2,3] + score2[3,3] + (score2[4,3]/2))/sum(score2[,3])
score_fpe <- round(c(score1fpe, score2fpe, score3fpe, score4fpe), 4)
score_fpe
[1] 0.0405 0.2353 0.4711 0.7763

score4 <- data.frame(svyby(~c006, ~educ_i, subset(banco, raca=="Parda"), svytotal))
score4
  educ_i c006masculino c006feminino se.c006masculino se.c006feminino
1      1       1906659      2638731         111008.0        132264.6
2      2       8897274      9793676         268473.5        247953.2
3      3       5077071      4992326         202698.8        195673.0
4      4      13620146     13828353         339520.0        325660.0

score1mpa <- (score4[1,2]/2)/sum(score4[,2])
score2mpa <- (score4[1,2] + (score4[2,2]/2))/sum(score4[,2])
score3mpa <- (score4[1,2] + score4[2,2] + (score4[3,2]/2))/sum(score4[,2])
score4mpa <- (score4[1,2] + score4[2,2] + score4[3,2] + (score4[4,2]/2))/sum(score4[,2])
score_mpa <- round(c(score1mpa, score2mpa, score3mpa, score4mpa), 4)
score_mpa
[1] 0.0323 0.2154 0.4523 0.7692

score1fpa <- (score4[1,3]/2)/sum(score4[,3])
score2fpa <- (score4[1,3] + (score4[2,3]/2))/sum(score4[,3])
score3fpa <- (score4[1,3] + score4[2,3] + (score4[3,3]/2))/sum(score4[,3])
score4fpa <- (score4[1,3] + score4[2,3] + score4[3,3] + (score4[4,3]/2))/sum(score4[,3])
score_fpa <- round(c(score1fpa, score2fpa, score3fpa, score4fpa), 4)
score_fpa
[1] 0.0422 0.2411 0.4777 0.7788

########################################
########################################

rm(list = ls() )
q()
```