

Investigating the autism and ADHD prevalence in Chile through
Bayesian prevalence analysis and clinical record data linkage

Student 5526

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This dissertation is submitted for the degree of Master of Philosophy. The dissertation does not exceed the word limit for the respective Degree Committee. Word count: xxx TODO

1 Abstract

TODO

2 Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except where specifically indicated in the text.

USN: xxxxx July, 2022

TODO - is this section needed?

3 Introduction

TODO - copy in intro text

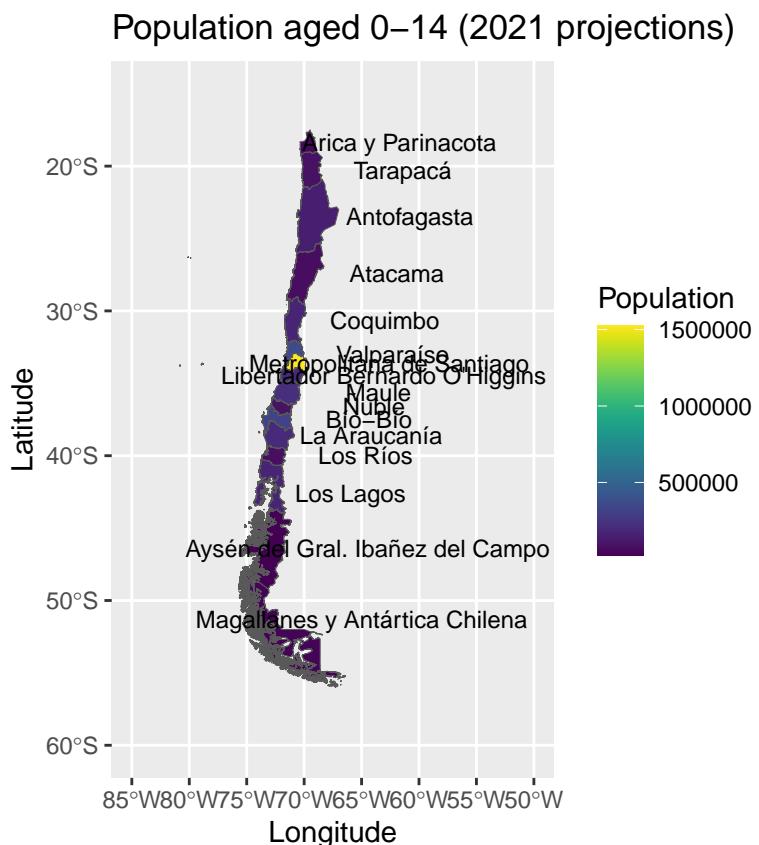


Figure 1: Population of 0-14 year olds in Chile in 2021 by region, from 2017 census projections.

4 Methods

TODO - copy in methods

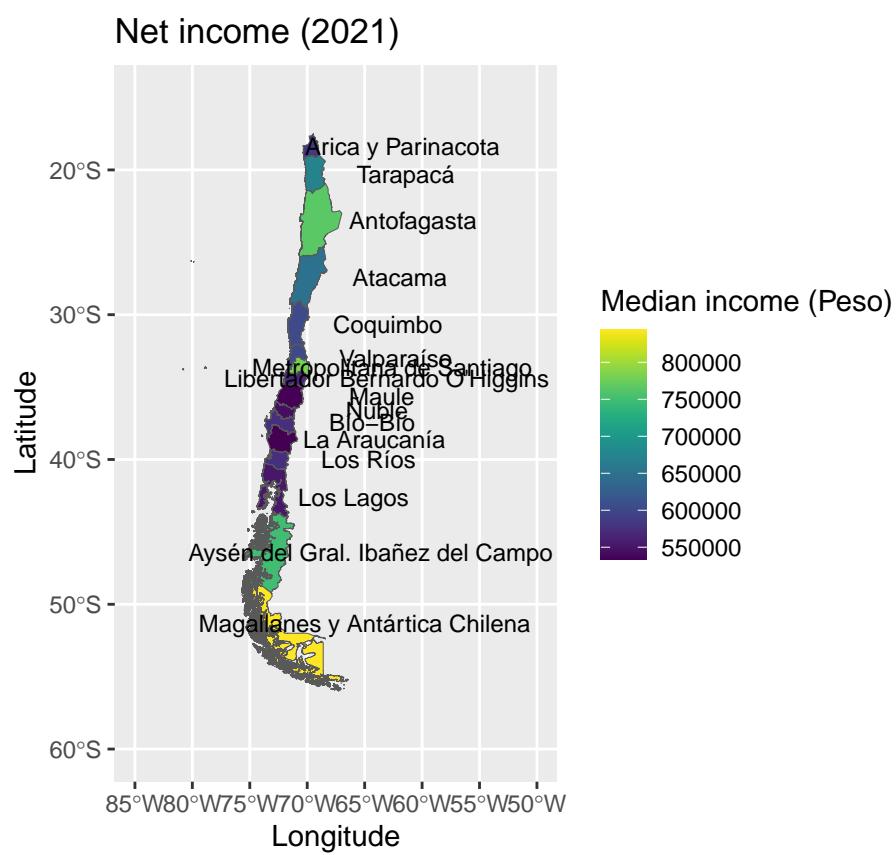


Figure 2: Net income from main job in Chile in 2021 by region, from the INE's Supplementary Income Survey.

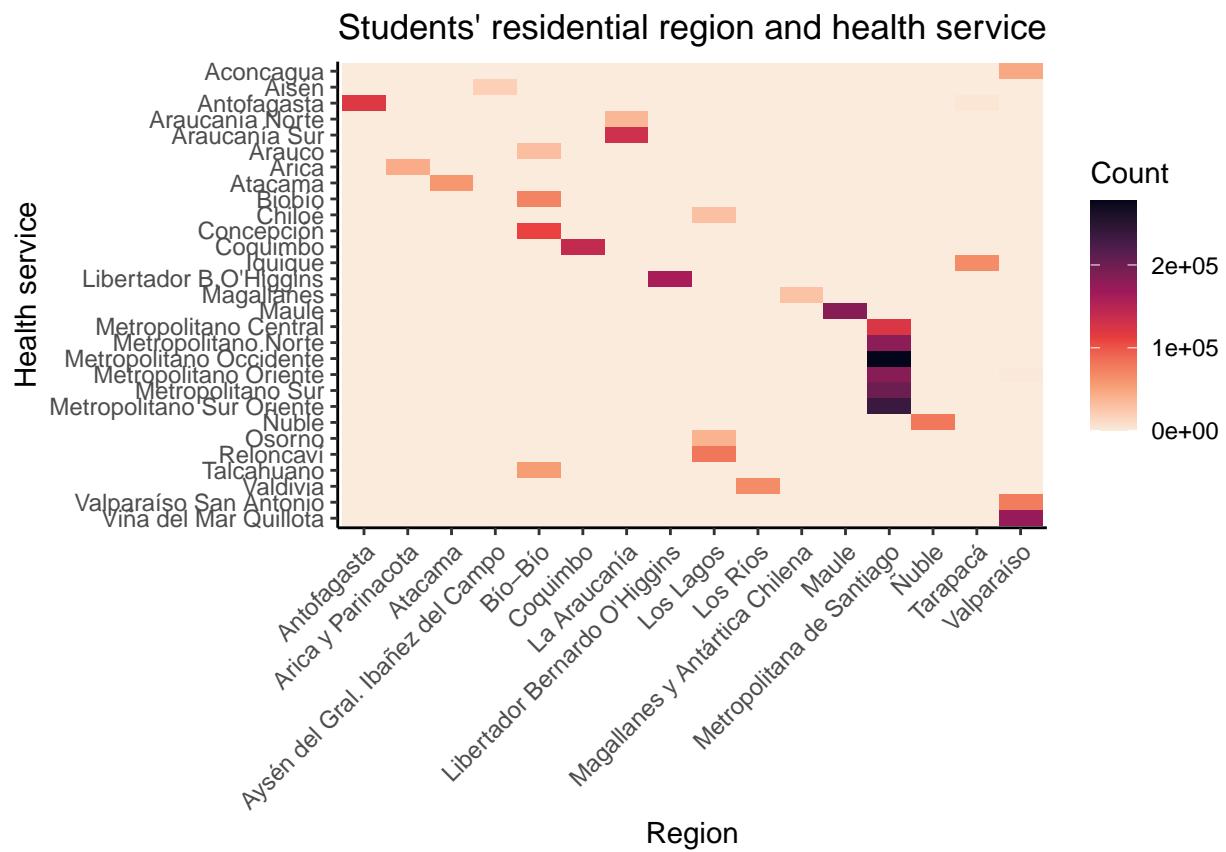


Figure 3: Residential communes aggregated to region level and the health services associated with the aggregated communes, with counts of the number of students resident in the communes in each health service's catchment area.

Communes in La Araucanía

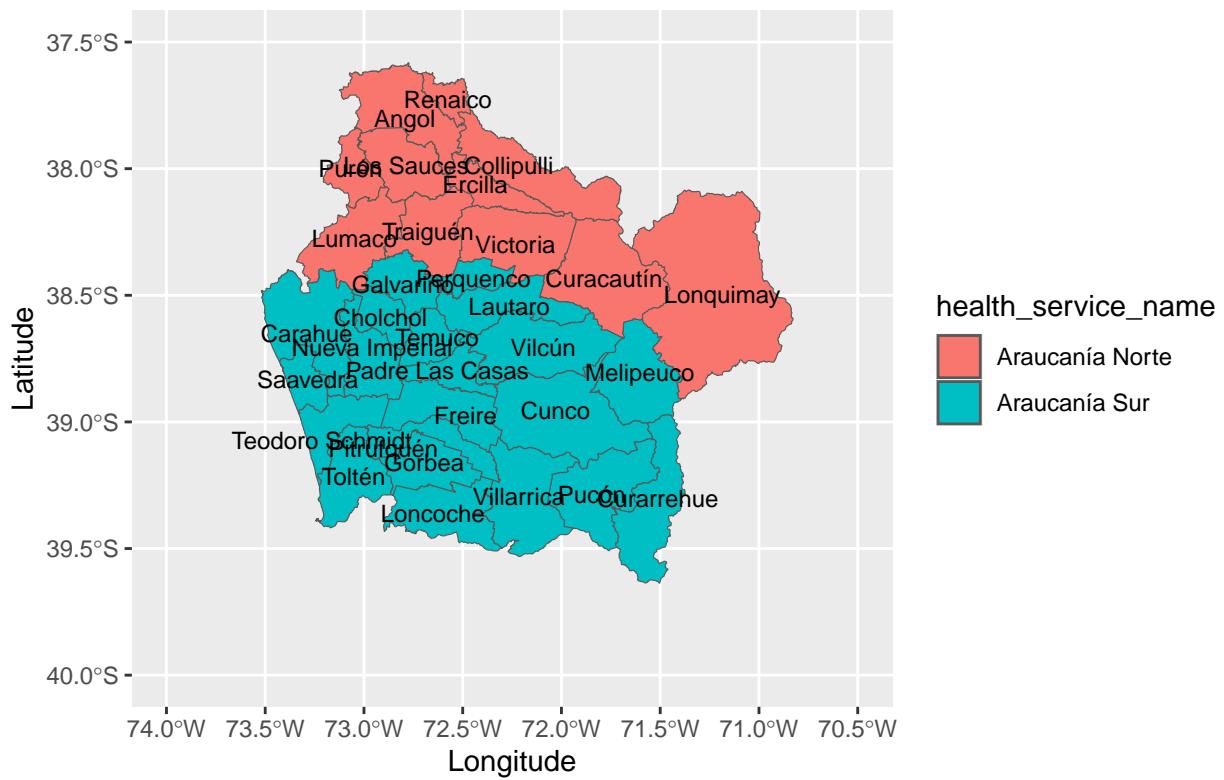


Figure 4: Communes in the Araucanía region, coloured red for the Araucanía Norte (north Araucanía) health services and blue for the Araucanía Sur (south Araucanía) health service.

5 Results

TODO - text explaining figures TODO - table formatting

5.1 School data

TODO - table summarising data content

In the school data, 4078 (0.13%) students were missing commune of residence. These missing values were imputed with their school's commune as most students are likely to go to school near their place of residence.

5.2 Clinical data

TODO - table summarising data content. Number of unique patients

5.3 Probabilistic data linkage

NB: there are 1688 unique ID's in patients and it's 1702 rows long because some people are represented in 2 communes.

5.3.1 Number matched

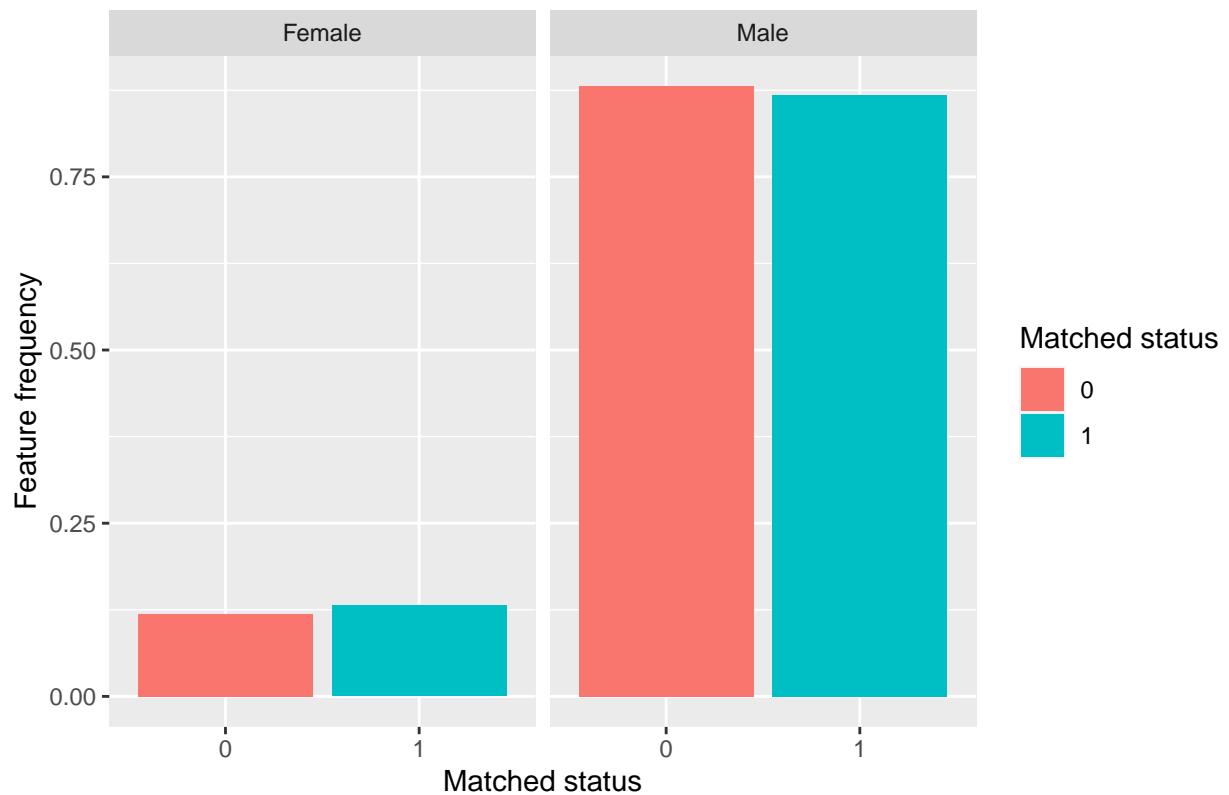
Using perfect match on sex, date of birth and commune of residence, 197 matches can be found between the school and patient records. 187 unique school records can be perfectly matched to clinical records. 193 patients can be linked to school records.

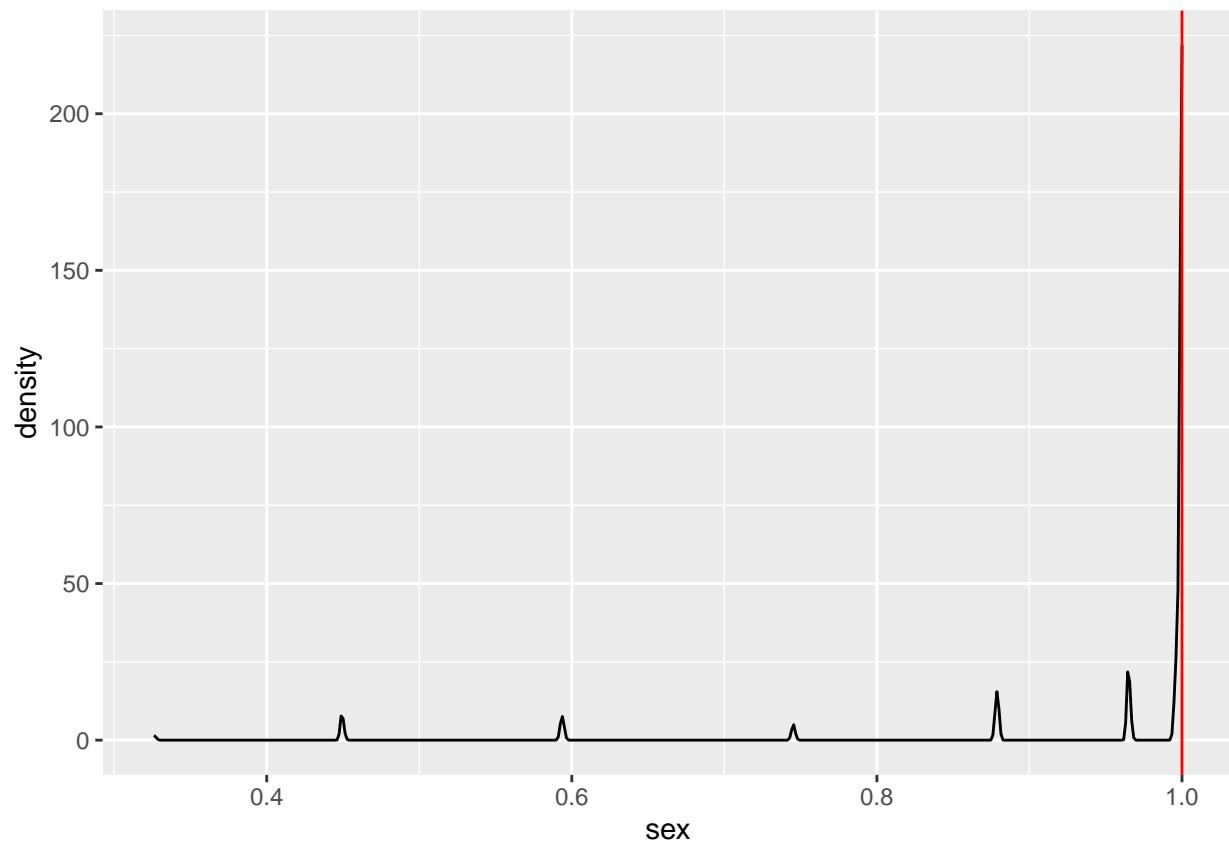
There are no patients that lived in different communes therefore were in the patient dataset twice that are matched to multiple school records.

5.3.2 Differences between un/matched

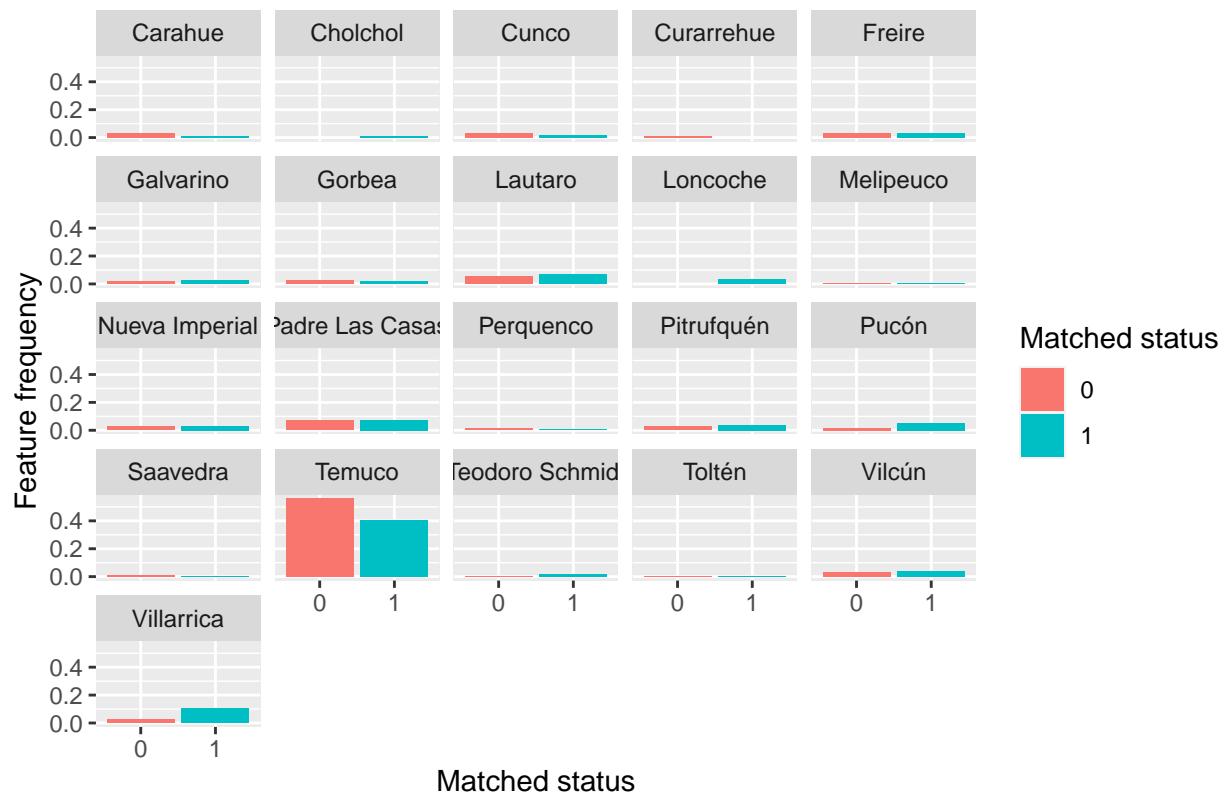
```
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: na.omit(school_yes$sex.school) and na.omit(school_no$sex.school)  
## D = 0.012308, p-value = 1  
## alternative hypothesis: two-sided  
  
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: as.numeric(na.omit(school_yes$ses_status.school)) and as.numeric(na.omit(school_no$ses_status.school))  
## D = 0.094886, p-value = 0.2286  
## alternative hypothesis: two-sided  
  
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: as.numeric(na.omit(school_yes$commune_code)) and as.numeric(na.omit(school_no$commune_code))  
## D = 0.20245, p-value = 9.174e-05  
## alternative hypothesis: two-sided
```

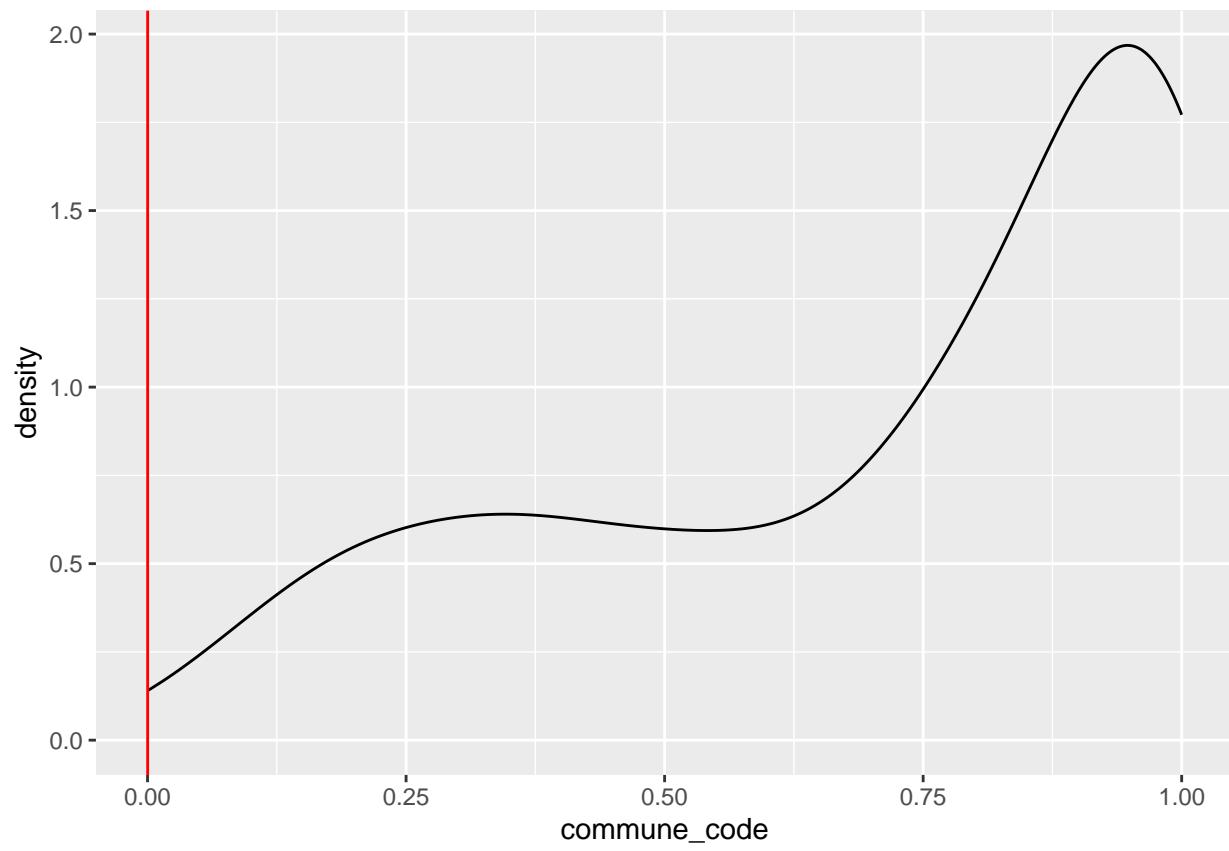
Matching of school record to clinical record by sex



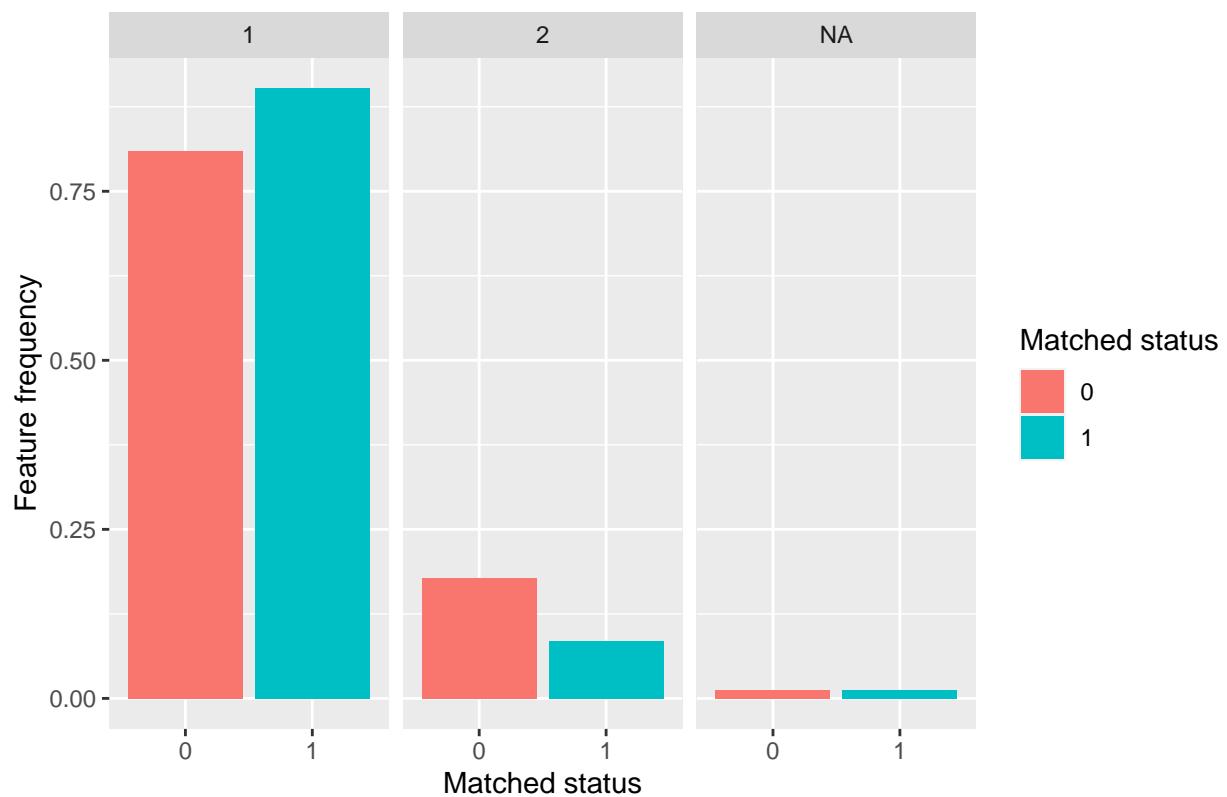


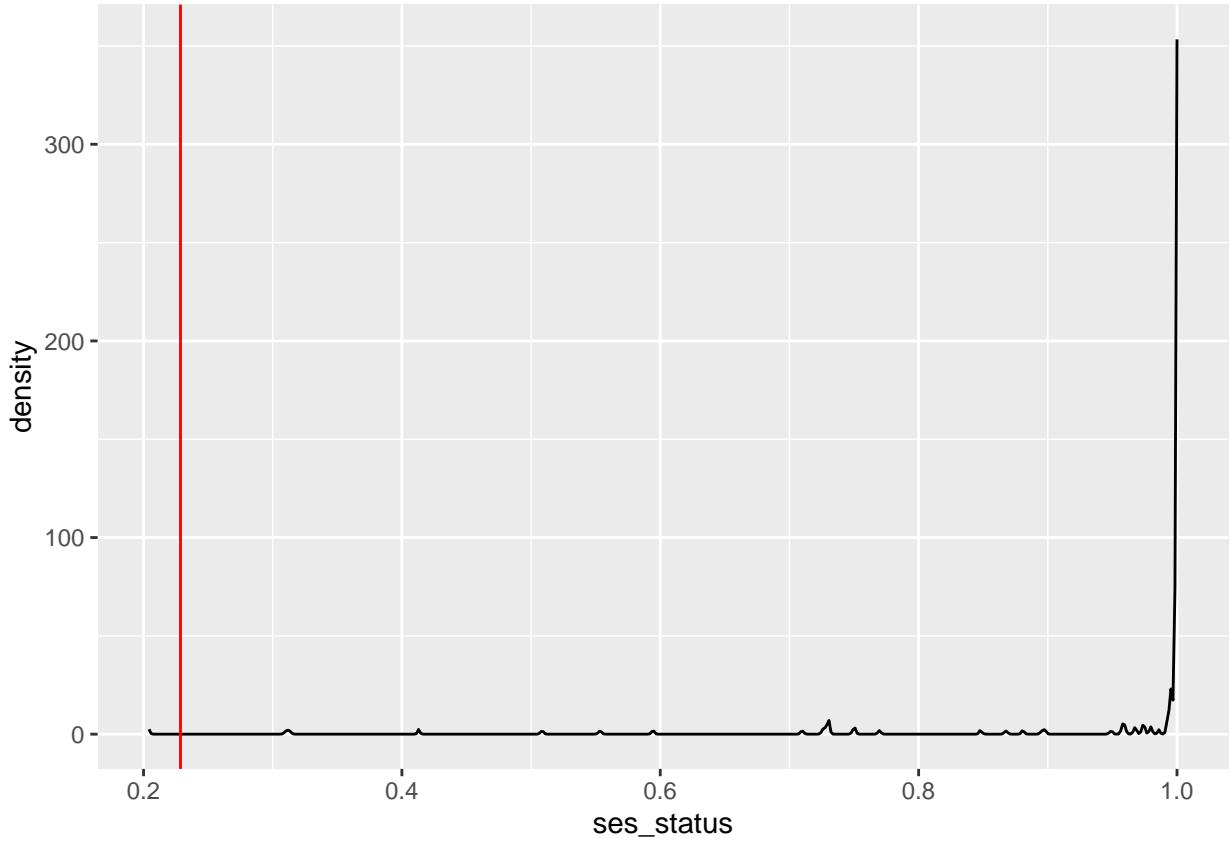
Matching of school record to clinical record by commune





Matching of school record to clinical record by SES status





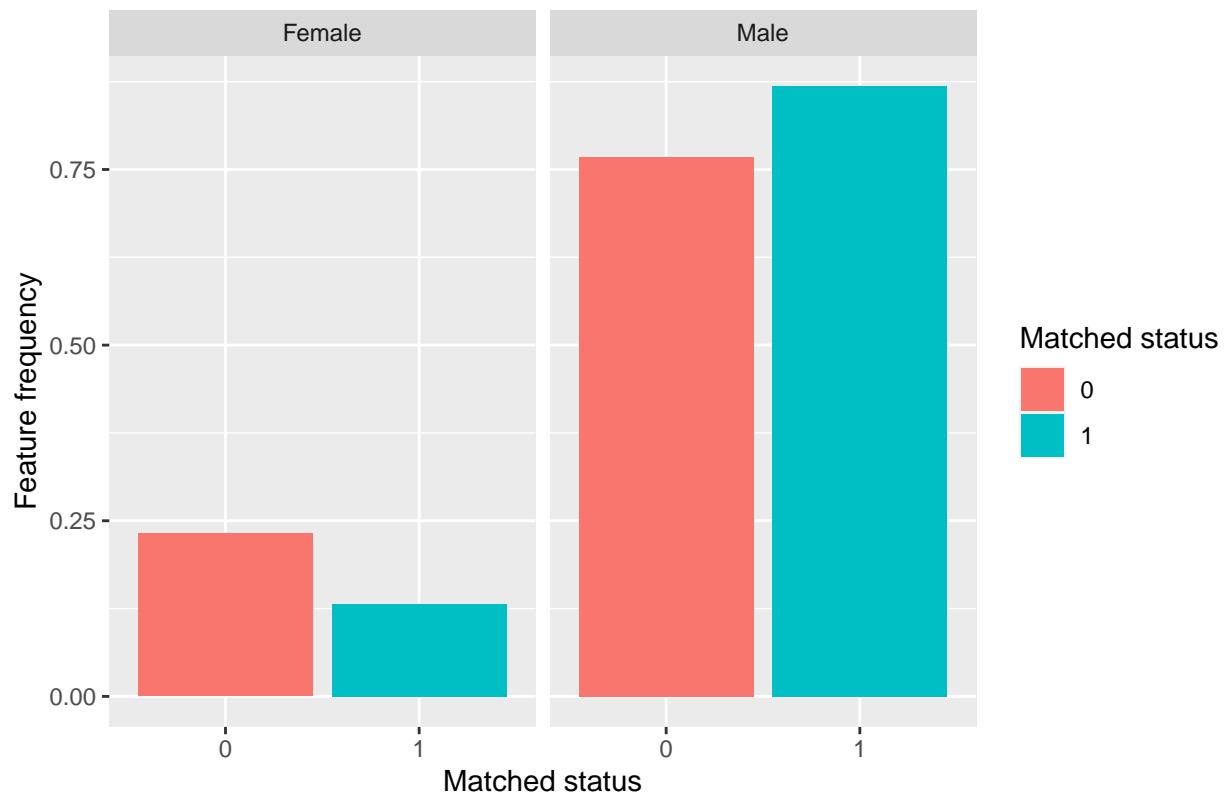
Bit easier to match SES status of 1 (probably more common)

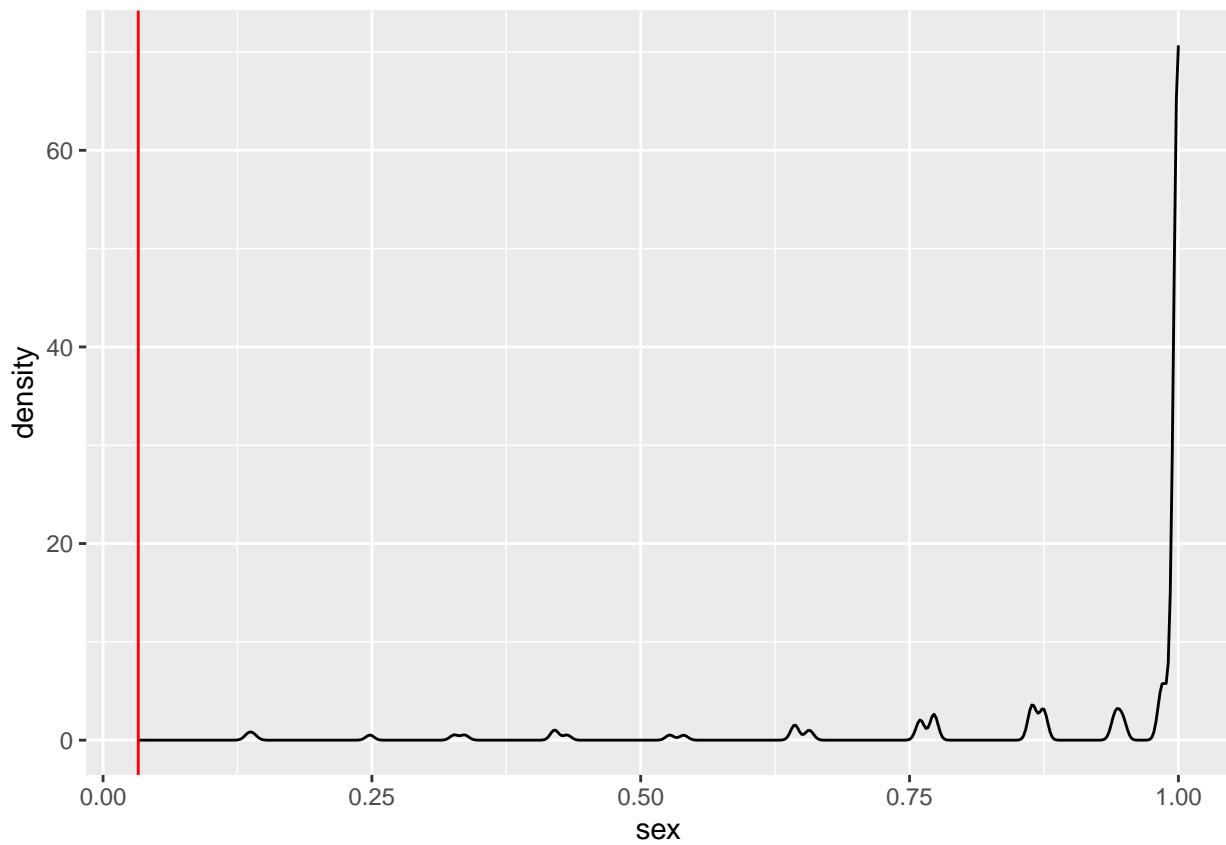
Our matched/non-matched are not different by sex (p-value in Kolmog is same as most of distribution of permuted pvals) but are different by commune and ses status. Cohen's D test isn't suitable to compare the matched and un-matched because the data don't have standard deviations.

??Add commune maps here with size of sample for school and clinical?? Also size of other features.

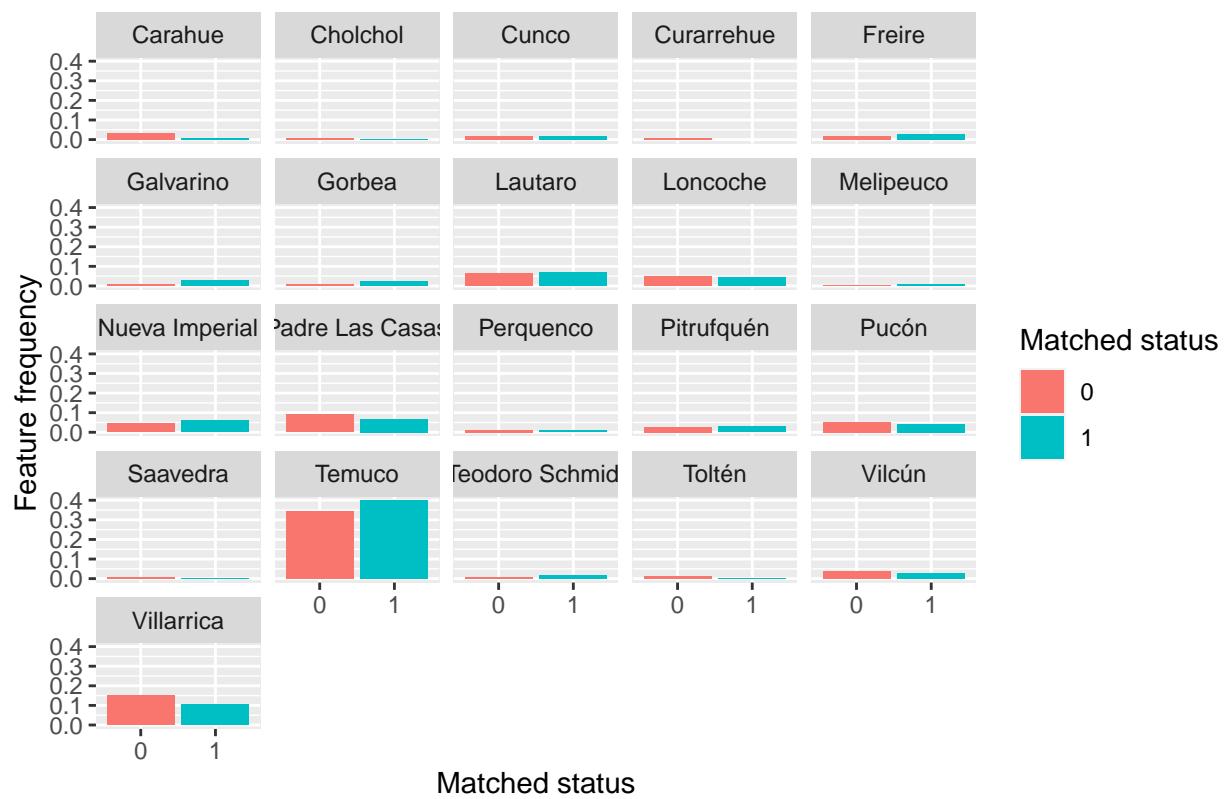
```
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: na.omit(patients_yes$sex.patient) and na.omit(patients_no$sex.patient)  
## D = 0.10057, p-value = 0.03276  
## alternative hypothesis: two-sided  
  
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: as.numeric(na.omit(patients_yes$ses_status.patient)) and as.numeric(na.omit(patients_no$ses_s  
## D = 0.067733, p-value = 0.3086  
## alternative hypothesis: two-sided  
  
##  
## Two-sample Kolmogorov-Smirnov test  
##  
## data: as.numeric(na.omit(patients_yes$commune_code)) and as.numeric(na.omit(patients_no$commune_code))  
## D = 0.084804, p-value = 0.1074  
## alternative hypothesis: two-sided
```

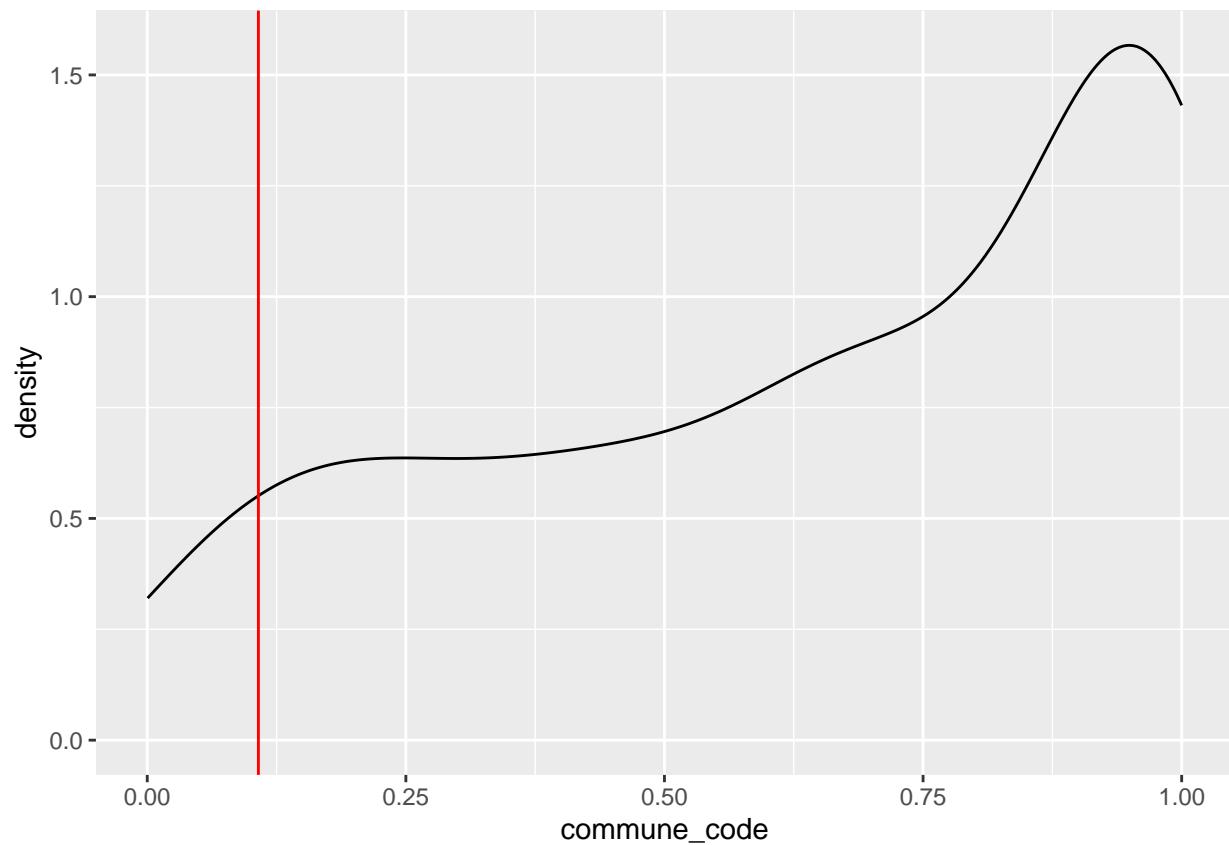
Matching of clinical record to school record by sex



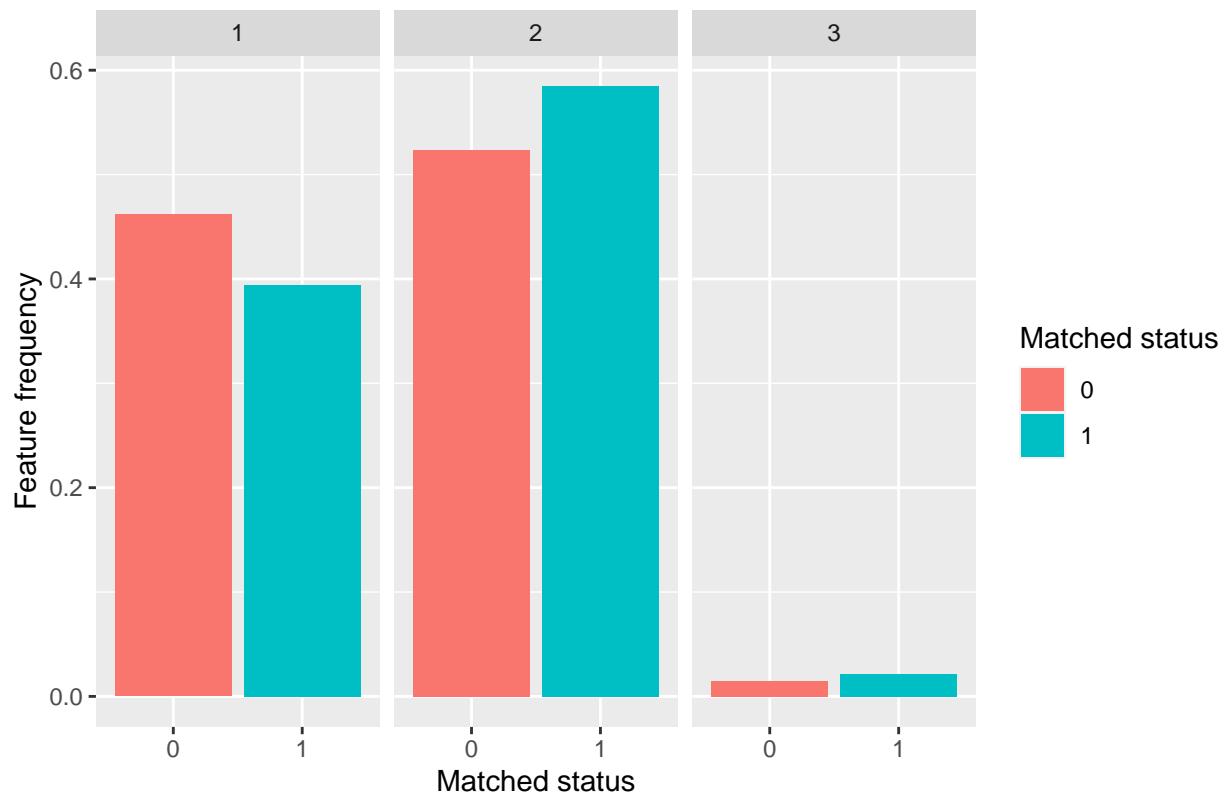


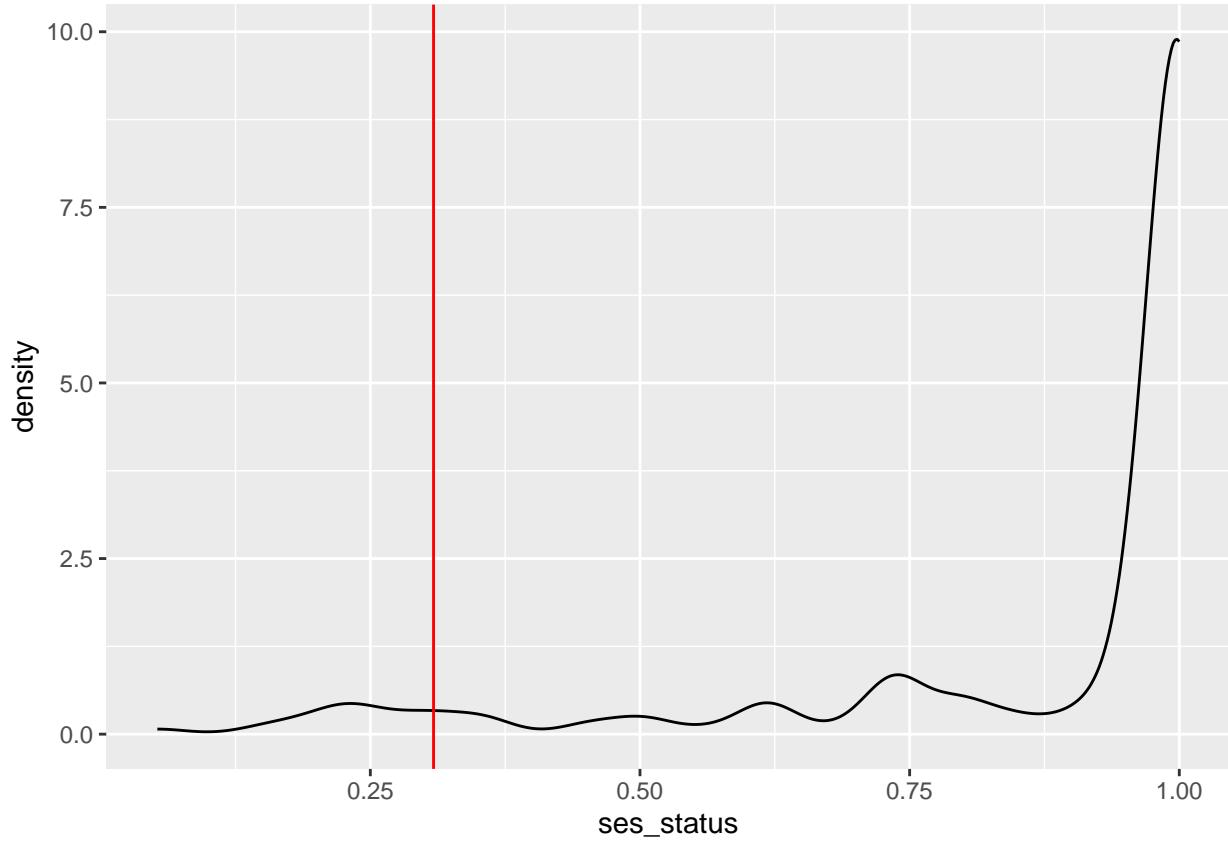
Matching of clinical record to school record by commune





Matching of clinical record to school record by SES status





TODO - comment on whether any of the matched patients had only intellectual disability and not autism.

5.3.3 Prev delta

5.4 Frequentist prevalence estimation

5.4.1 Autism and ADHD prevalence by sex

```
## # A tibble: 1 x 6
##   crude_ci_lower crude_rate crude_ci_upper adjusted_ci_lower adjusted_~1 adjus~2
##       <dbl>        <dbl>        <dbl>        <dbl>        <dbl>      <dbl>
## 1     0.00468     0.00476     0.00484     0.00457     0.00465  0.00473
## # ... with abbreviated variable names 1: adjusted_rate, 2: adjusted_ci_upper

## # A tibble: 1 x 6
##   crude_ci_lower crude_rate crude_ci_upper adjusted_ci_lower adjusted_~1 adjus~2
##       <dbl>        <dbl>        <dbl>        <dbl>        <dbl>      <dbl>
## 1     0.0150      0.0151      0.0153      0.0148      0.0150   0.0151
## # ... with abbreviated variable names 1: adjusted_rate, 2: adjusted_ci_upper

## # A tibble: 2 x 7
##   sex_desc crude_ci_lower crude_rate crude_ci_upper adjusted_c~1 adjus~2 adjus~3
##   <chr>        <dbl>        <dbl>        <dbl>        <dbl>      <dbl>      <dbl>
## 1 Male         0.00787     0.00801     0.00815     0.00773  0.00787  0.00801
## 2 Female       0.00127     0.00133     0.00139     0.00125  0.00131  0.00138
## # ... with abbreviated variable names 1: adjusted_ci_lower, 2: adjusted_rate,
## #   3: adjusted_ci_upper

## # A tibble: 2 x 7
```

```

##   sex_desc crude_ci_lower crude_rate crude_ci_upper adjusted_c~1 adjus~2 adjus~3
##   <chr>          <dbl>      <dbl>          <dbl>      <dbl>      <dbl>      <dbl>
## 1 Male           0.0196     0.0198       0.0201     0.0194     0.0197     0.0199
## 2 Female         0.00998    0.0101       0.0103     0.00997    0.0101     0.0103
## # ... with abbreviated variable names 1: adjusted_ci_lower, 2: adjusted_rate,
## #   3: adjusted_ci_upper

```

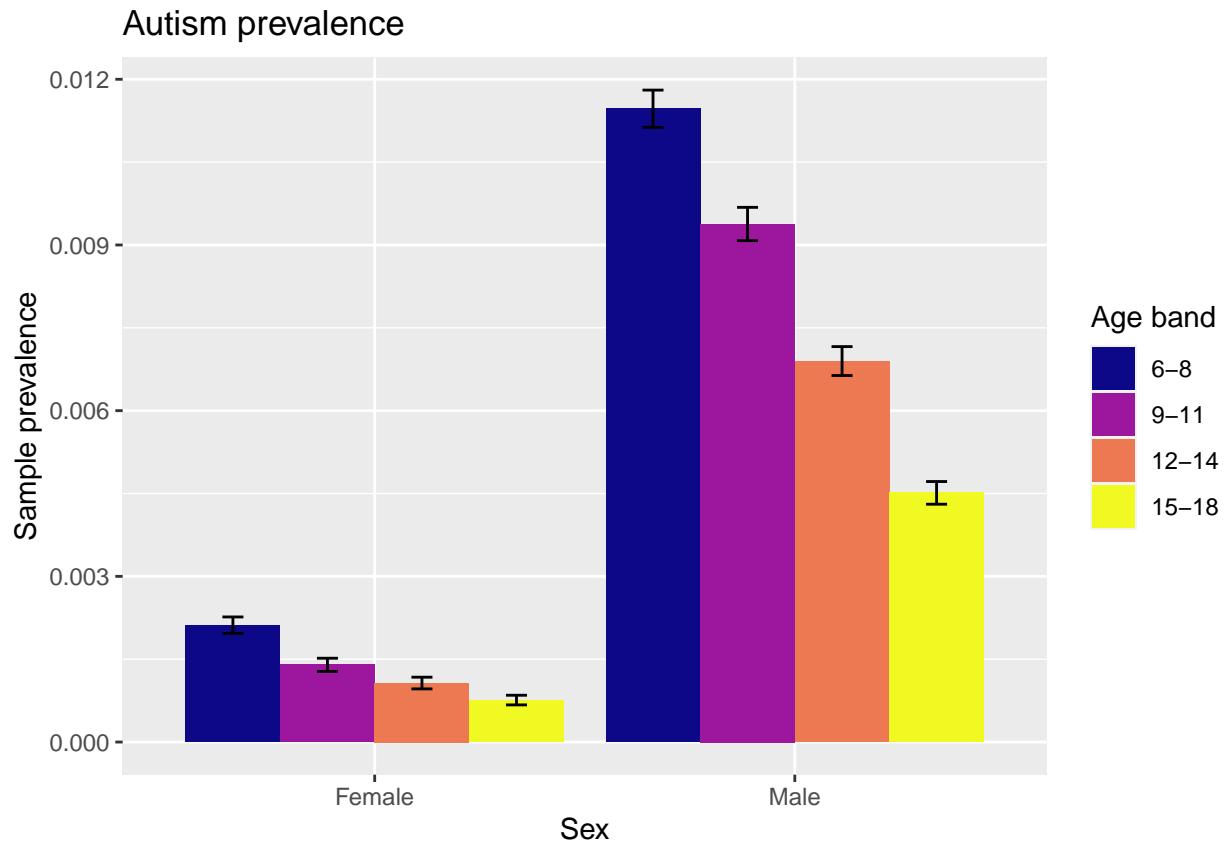


Figure 5: Sample prevalence of autism by age band and sex. Bars show 95% normal confidence intervals.

5.4.2 Autism and ADHD prevalence by health service

```

##               health_service_name crude_ci_lower crude_rate crude_ci_upper
## 1                  Aconcagua     0.00378    0.00438     0.00497
## 2                   Aisén        0.00629    0.00749     0.00869
## 3                 Antofagasta     0.00791    0.00842     0.00893
## 4            Araucanía Norte     0.00244    0.00300     0.00356
## 5            Araucanía Sur     0.00336    0.00369     0.00402
## 6                  Arauco        0.00637    0.00731     0.00826
## 7                  Arica         0.00540    0.00612     0.00684
## 8                  Atacama        0.00262    0.00306     0.00351
## 9                  Biobío        0.00383    0.00431     0.00479
## 10                 Chiloé        0.00375    0.00450     0.00524
## 11             Concepción        0.00732    0.00784     0.00837
## 12                 Coquimbo        0.00378    0.00412     0.00445
## 13  Libertador B.O'Higgins     0.00402    0.00434     0.00467
## 14                  Maule        0.00280    0.00305     0.00331

```

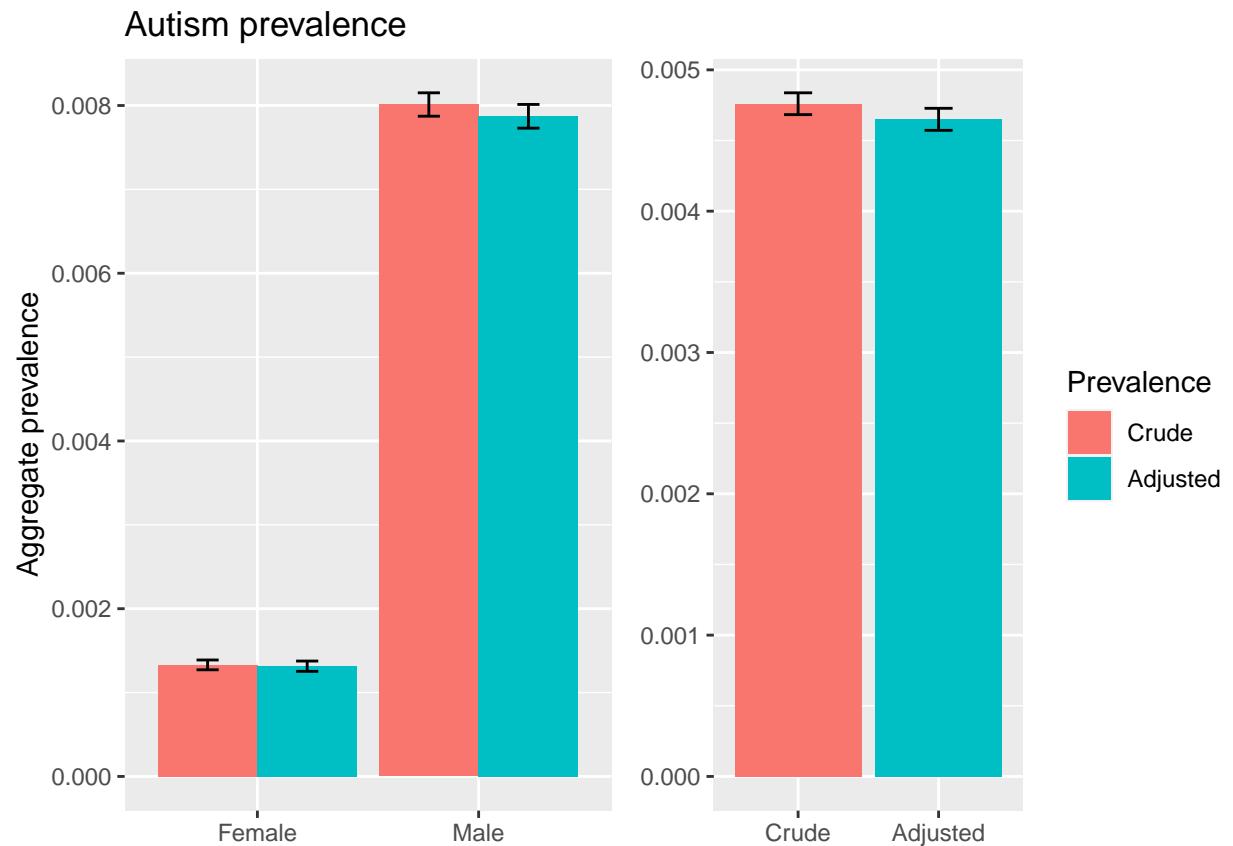


Figure 6: Crude and age- and sex-adjusted sample prevalences of autism, by sex and in aggregate. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

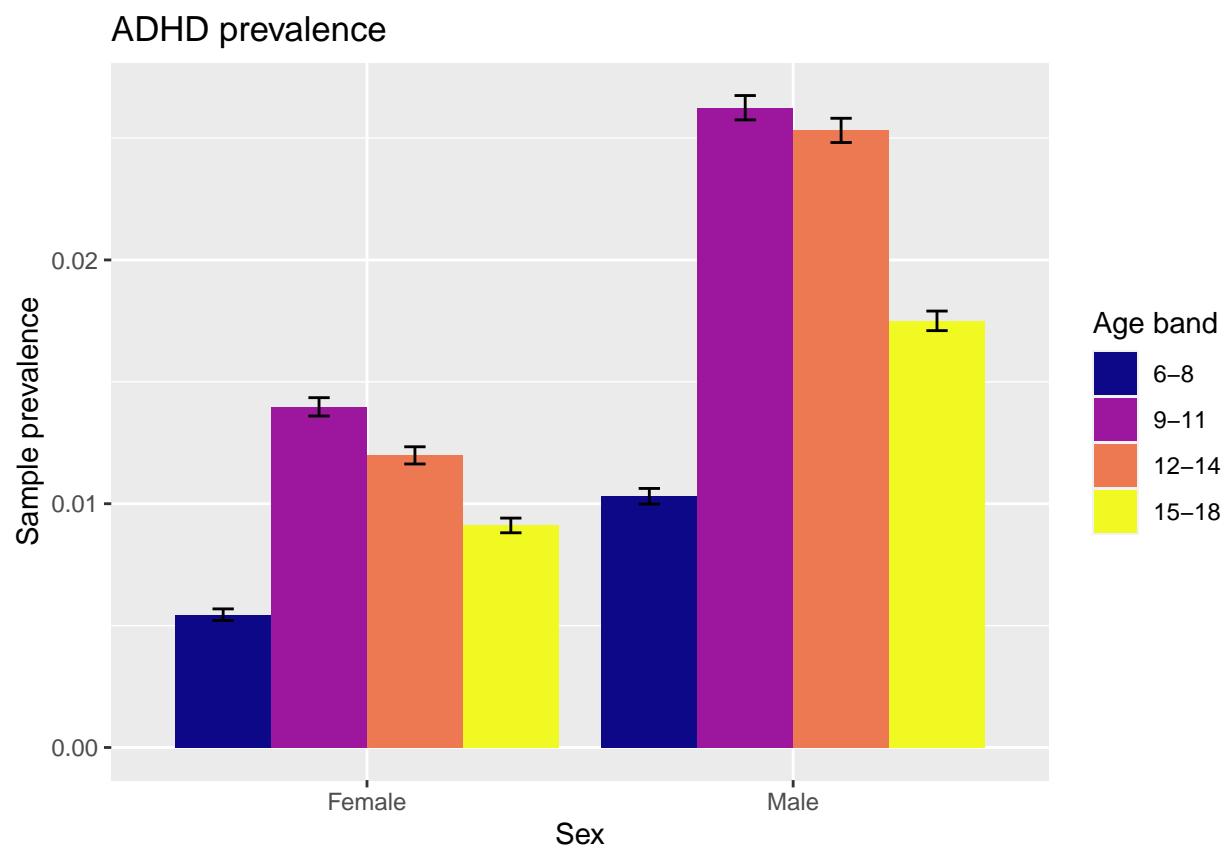


Figure 7: Sample prevalence of ADHD by age band and sex. Bars show 95% normal confidence intervals.

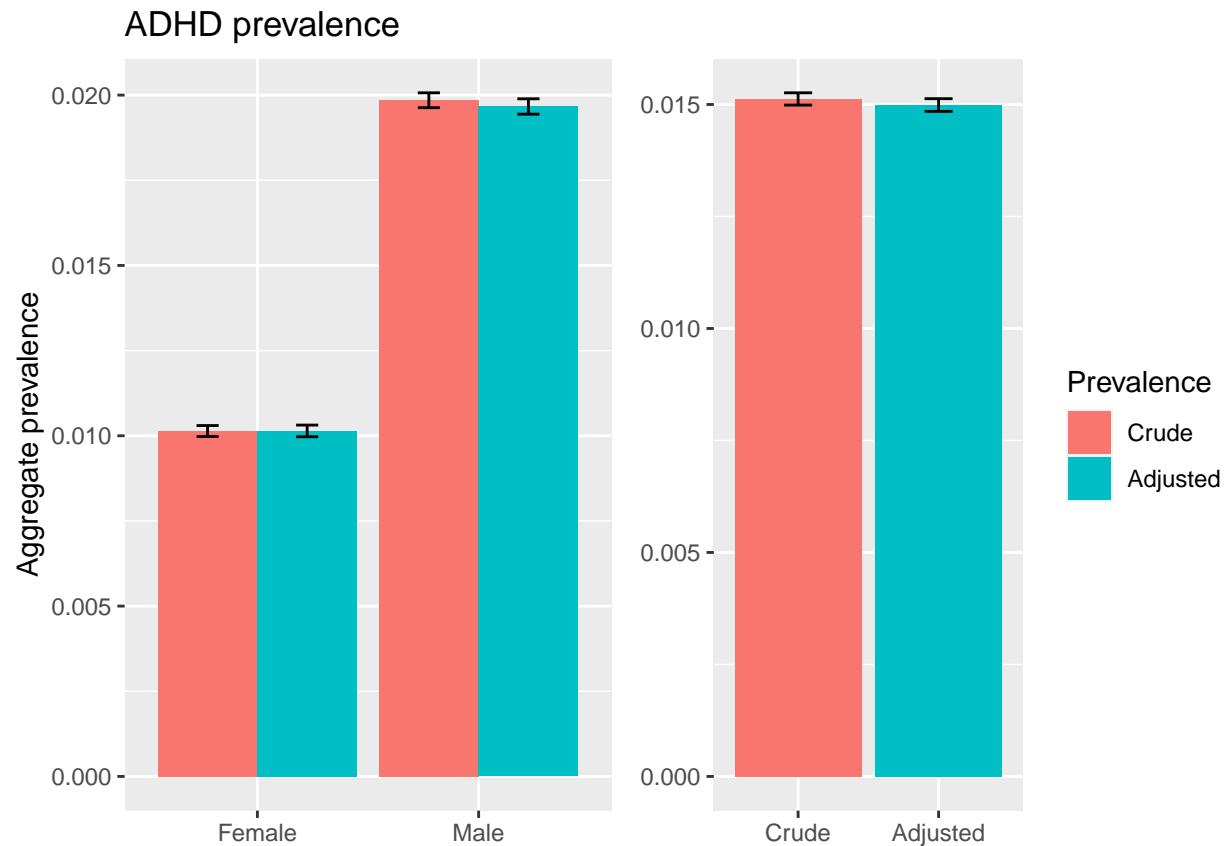


Figure 8: Crude and age- and sex-adjusted sample prevalences of ADHD, by sex and in aggregate. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```

## 15          Reloncaví      0.00379  0.00424  0.00469
## 16          Iquique       0.00381  0.00431  0.00481
## 17          Magallanes     0.00725  0.00831  0.00938
## 18  Metropolitano Central 0.00385  0.00421  0.00457
## 19  Metropolitano Norte   0.00269  0.00294  0.00318
## 20  Metropolitano Occidente 0.00336  0.00358  0.00381
## 21  Metropolitano Oriente   0.00279  0.00304  0.00329
## 22  Metropolitano Sur       0.00385  0.00413  0.00442
## 23 Metropolitano Sur Oriente 0.00342  0.00367  0.00391
## 24          Osorno        0.00380  0.00445  0.00510
## 25          Talcahuano    0.00763  0.00839  0.00916
## 26          Valdivia       0.00269  0.00311  0.00354
## 27  Valparaíso San Antonio 0.00635  0.00694  0.00752
## 28  Viña del Mar Quillota   0.00632  0.00670  0.00709
## 29          Ñuble         0.01238  0.01317  0.01396
## adjusted_ci_lower adjusted_rate adjusted_ci_upper
## 1      0.00369  0.00427  0.00499
## 2      0.00634  0.00752  0.00895
## 3      0.00774  0.00825  0.00881
## 4      0.00245  0.00300  0.00376
## 5      0.00338  0.00372  0.00410
## 6      0.00624  0.00715  0.00825
## 7      0.00539  0.00614  0.00704
## 8      0.00266  0.00312  0.00368
## 9      0.00373  0.00420  0.00475
## 10     0.00364  0.00433  0.00518
## 11     0.00718  0.00771  0.00828
## 12     0.00364  0.00396  0.00433
## 13     0.00393  0.00425  0.00460
## 14     0.00277  0.00303  0.00332
## 15     0.00373  0.00417  0.00467
## 16     0.00363  0.00410  0.00466
## 17     0.00724  0.00831  0.00958
## 18     0.00380  0.00416  0.00456
## 19     0.00262  0.00287  0.00314
## 20     0.00316  0.00338  0.00361
## 21     0.00274  0.00298  0.00325
## 22     0.00371  0.00398  0.00427
## 23     0.00339  0.00364  0.00390
## 24     0.00371  0.00433  0.00507
## 25     0.00739  0.00813  0.00898
## 26     0.00260  0.00300  0.00349
## 27     0.00625  0.00683  0.00749
## 28     0.00620  0.00658  0.00699
## 29     0.01208  0.01286  0.01371
## health_service_name crude_ci_lower crude_rate crude_ci_upper
## 1          Aconcagua    0.01950  0.02079  0.02209
## 2          Aisén        0.02027  0.02232  0.02438
## 3          Antofagasta  0.00958  0.01014  0.01071
## 4 Araucanía Norte    0.01217  0.01334  0.01452
## 5 Araucanía Sur      0.01358  0.01422  0.01485
## 6          Arauco       0.01501  0.01641  0.01782
## 7          Arica        0.01040  0.01139  0.01237

```

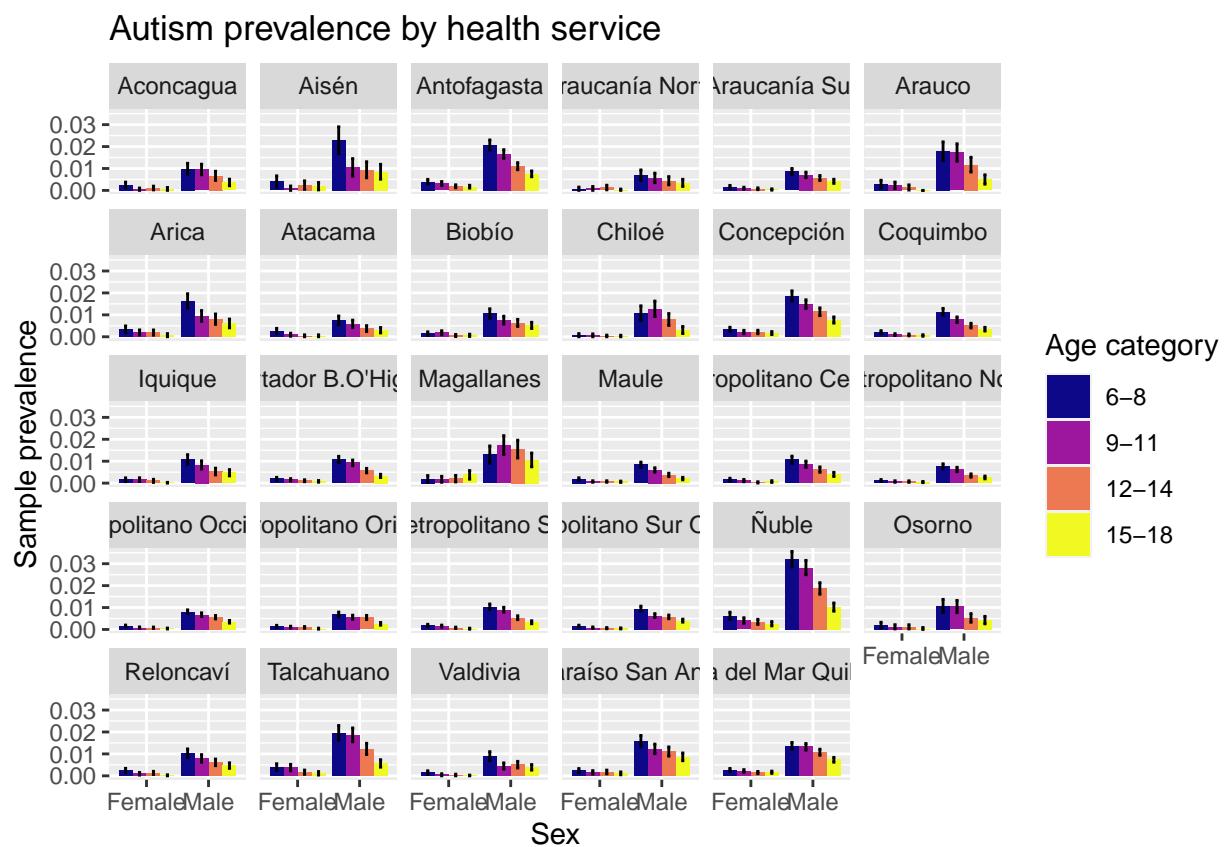


Figure 9: Sample prevalence of autism by health service, age band and sex. Bars show 95% normal confidence intervals.

Autism prevalence by health service



Figure 10: Crude and age- and sex-adjusted sample prevalences of autism by health service. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```

## 8          Atacama    0.00435  0.00492  0.00549
## 9          Biobío    0.02159  0.02269  0.02378
## 10         Chiloé     0.02771  0.02960  0.03149
## 11         Concepción 0.02842  0.02942  0.03043
## 12         Coquimbo   0.01907  0.01980  0.02053
## 13  Libertador B.O'Higgins 0.01662  0.01726  0.01789
## 14          Maule     0.01143  0.01193  0.01243
## 15         Reloncaví  0.00952  0.01022  0.01092
## 16          Iquique   0.01402  0.01494  0.01586
## 17         Magallanes  0.02870  0.03072  0.03274
## 18  Metropolitano Central 0.01457  0.01526  0.01594
## 19  Metropolitano Norte   0.01361  0.01416  0.01471
## 20  Metropolitano Occidente 0.01054  0.01093  0.01131
## 21  Metropolitano Oriente  0.01163  0.01213  0.01263
## 22  Metropolitano Sur     0.01372  0.01424  0.01476
## 23 Metropolitano Sur Oriente 0.01512  0.01562  0.01611
## 24          Osorno     0.00946  0.01046  0.01145
## 25          Talcahuano 0.02926  0.03071  0.03215
## 26          Valdivia   0.00998  0.01077  0.01156
## 27  Valparaíso San Antonio 0.01132  0.01209  0.01286
## 28          Viña del Mar Quillota 0.01123  0.01174  0.01224
## 29          Ñuble      0.02019  0.02120  0.02220
##   adjusted_ci_lower adjusted_rate adjusted_ci_upper
## 1      0.01913    0.02044    0.02187
## 2      0.01970    0.02171    0.02398
## 3      0.00938    0.00994    0.01056
## 4      0.01179    0.01294    0.01426
## 5      0.01320    0.01384    0.01452
## 6      0.01497    0.01642    0.01806
## 7      0.01022    0.01122    0.01237
## 8      0.00431    0.00488    0.00556
## 9      0.02146    0.02260    0.02382
## 10     0.02680    0.02867    0.03069
## 11     0.02889    0.02998    0.03112
## 12     0.01922    0.02000    0.02082
## 13     0.01626    0.01691    0.01759
## 14     0.01105    0.01154    0.01207
## 15     0.00923    0.00991    0.01065
## 16     0.01405    0.01502    0.01608
## 17     0.02853    0.03064    0.03294
## 18     0.01426    0.01495    0.01568
## 19     0.01361    0.01417    0.01476
## 20     0.01082    0.01123    0.01166
## 21     0.01146    0.01196    0.01248
## 22     0.01354    0.01407    0.01462
## 23     0.01481    0.01531    0.01583
## 24     0.00922    0.01020    0.01129
## 25     0.02872    0.03022    0.03182
## 26     0.00983    0.01062    0.01150
## 27     0.01129    0.01208    0.01294
## 28     0.01097    0.01147    0.01201
## 29     0.02001    0.02105    0.02217
## # A tibble: 21 x 7

```

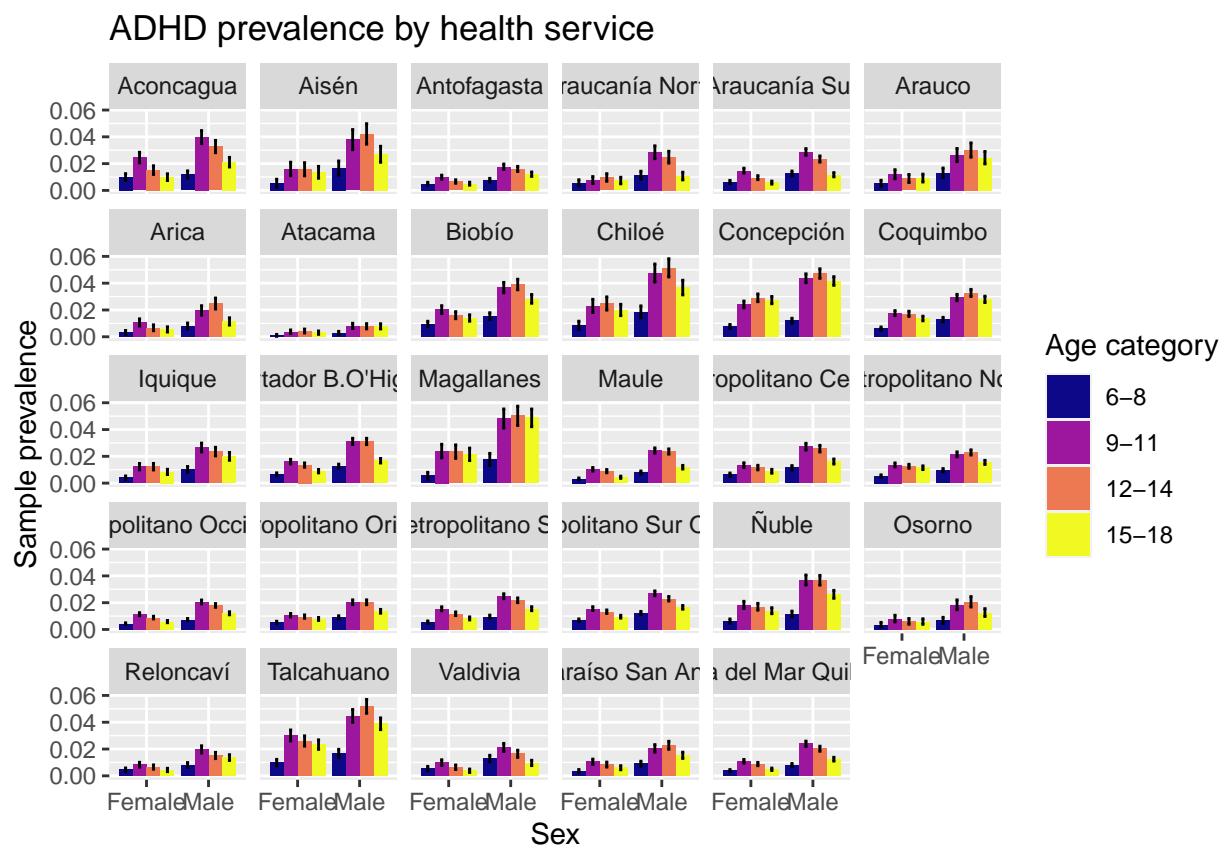


Figure 11: Sample prevalence of ADHD by health service, age band and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by health service



Figure 12: Crude and age- and sex-adjusted sample prevalences of ADHD by health service. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```

##   commune_name crude_ci_lower crude_rate crude_ci_upper adjus~1 adjus~2 adjus~3
##   <chr>          <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 Carahue        0.00116    0.00266    0.00416  0.00129  0.0025   0.00588
## 2 Cholchol        0          0.00138    0.00295  0.00026  0.00128  0.00816
## 3 Cunco          0.00229    0.0048     0.00732  0.00258  0.00472  0.0100
## 4 Curarrehue     0          0.00147    0.00351  0.00017  0.00142  0.00804
## 5 Freire          0.00195    0.00381    0.00567  0.0021   0.00369  0.00672
## 6 Galvarino       0.00196    0.00478    0.0076   0.0023   0.00463  0.0101
## 7 Gorbea          0.00235    0.0054     0.00844  0.00258  0.0052   0.0118
## 8 Lautaro         0.00255    0.00401    0.00546  0.00259  0.00387  0.00647
## 9 Loncoche        0.00062    0.00202    0.00341  0.0009   0.00295  0.00845
## 10 Melipeuco      0          0.00187    0.00445  0.00022  0.00183  0.0144
## # ... with 11 more rows, and abbreviated variable names 1: adjusted_ci_lower,
## #   2: adjusted_rate, 3: adjusted_ci_upper

```

Autism prevalence by commune in Araucanía Sur

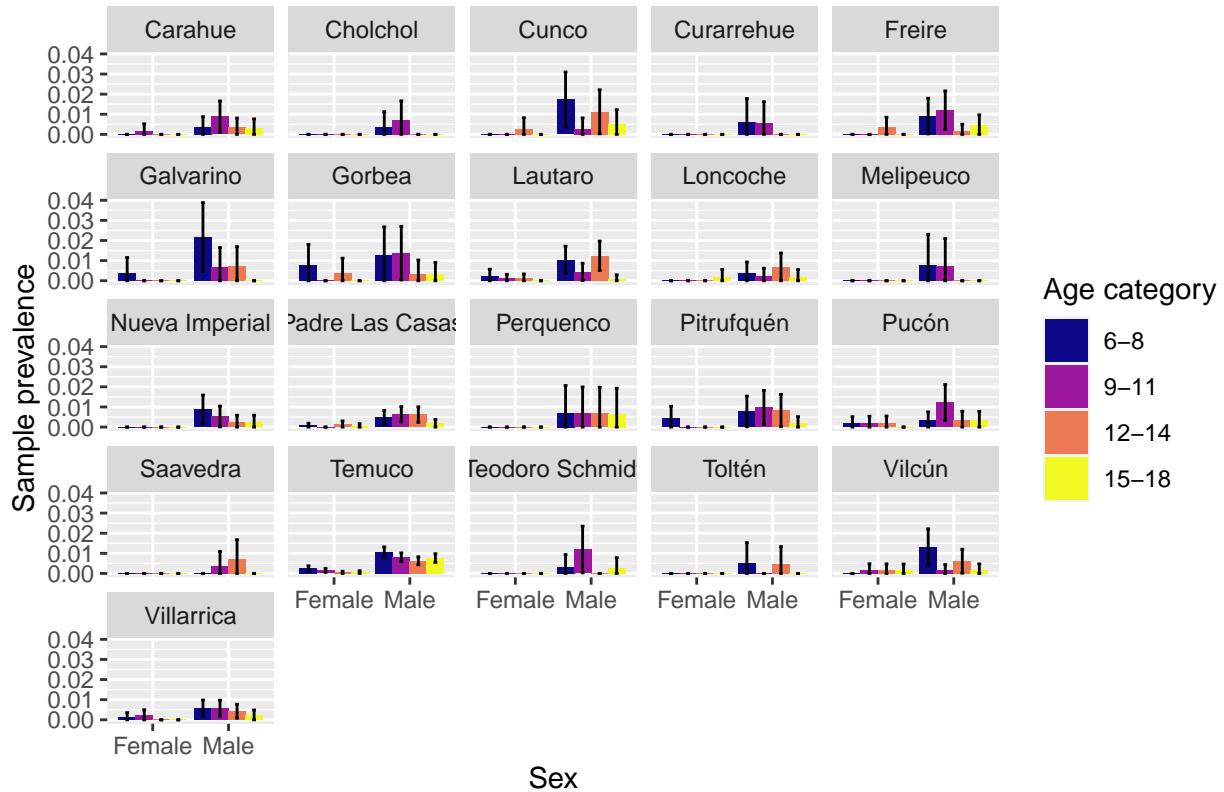


Figure 13: Sample prevalence of autism by commune in Araucanía Sur health service, age band and sex. Bars show 95% normal confidence intervals.

5.4.3 Autism and ADHD prevalence by socio-economic status

```

## # A tibble: 7 x 7
##   school_fee      crude_ci_lower crude_rate crude_ci_~1 adjus~2 adjus~3 adjus~4
##   <fct>          <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 Free            0.00556    0.00566    0.00576  0.00537  0.00547  0.00557
## 2 $1,000-$10,000 0.00221    0.00714    0.0121   0.00293  0.00686  0.0325
## 3 $10,001-$25,000 0.00154    0.002      0.00246  0.00157  0.00203  0.00269

```

Autism prevalence by commune in Araucanía Sur

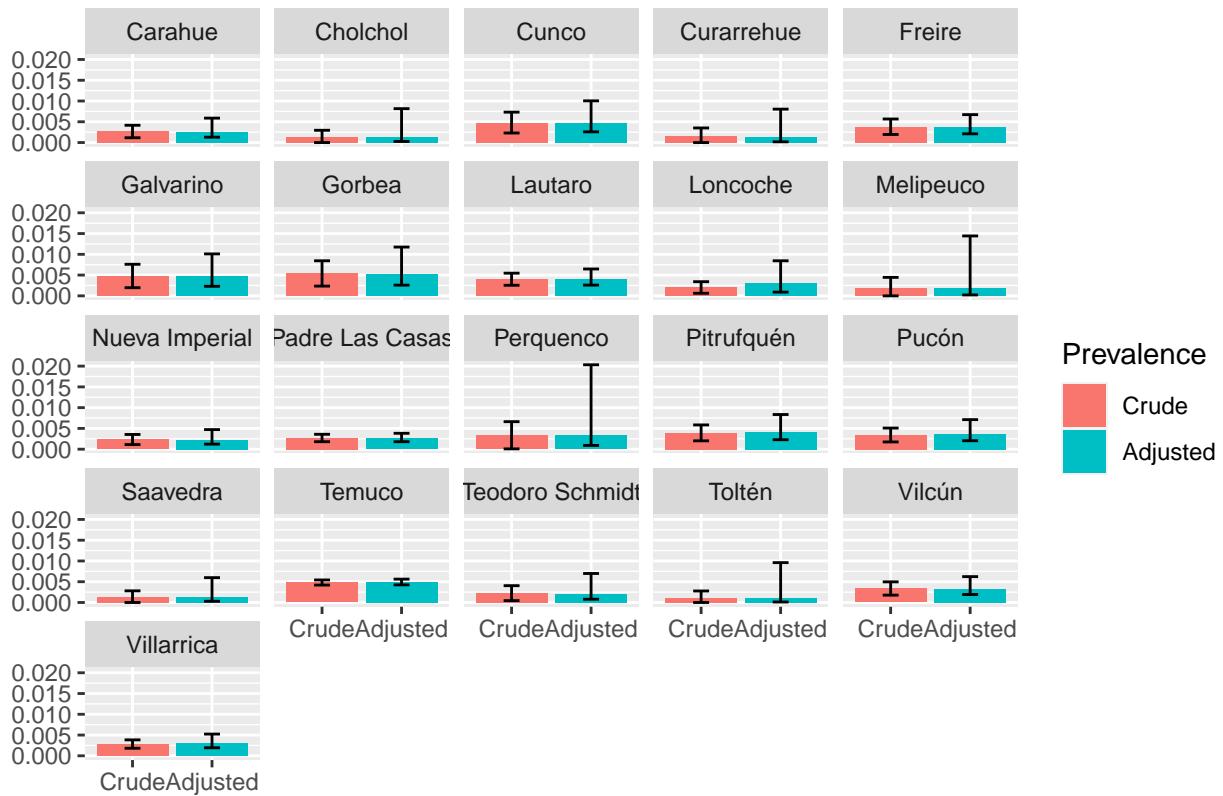


Figure 14: Crude and age- and sex-adjusted sample prevalences of autism by commune in Araucanía Sur health service. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```

## 4 $25,001-$50,000      0.0028      0.00303     0.00327 0.0029 0.00316 0.00345
## 5 $50,001-$100,000    0.00365     0.00388     0.00411 0.00373 0.00399 0.00427
## 6 $100,001+            0.00039     0.00047     0.00055 0.00039 0.00046 0.00056
## 7 No information       0.00442     0.00504     0.00566 0.00403 0.00458 0.00524
## # ... with abbreviated variable names 1: crude_ci_upper, 2: adjusted_ci_lower,
## #   3: adjusted_rate, 4: adjusted_ci_upper

```

Autism prevalence by SES status



Figure 15: Sample prevalence of autism by socio-economic (SES) status of student's family, age band and sex. Bars show 95% normal confidence intervals.

```

## # A tibble: 7 x 7
##   school_fee      crude_ci_lower crude_rate crude_ci_~1 adjus~2 adjus~3 adjus~4
##   <fct>          <dbl>        <dbl>        <dbl>      <dbl>      <dbl>      <dbl>
## 1 Free             0.0163       0.0165       0.0167     0.0160     0.0162     0.0164
## 2 $1,000-$10,000   0           0.00179      0.00426    0.00013    0.00108    0.0274
## 3 $10,001-$25,000  0.00953     0.0106       0.0116     0.0094     0.0105     0.0117
## 4 $25,001-$50,000  0.0154       0.0159       0.0165     0.0159     0.0165     0.0172
## 5 $50,001-$100,000 0.0184       0.0190       0.0195     0.0184     0.0190     0.0196
## 6 $100,001+         0.00208     0.00225      0.00242    0.00212    0.00231    0.00251
## 7 No information    0.0111       0.0121       0.0131     0.0113     0.0122     0.0133
## # ... with abbreviated variable names 1: crude_ci_upper, 2: adjusted_ci_lower,
## #   3: adjusted_rate, 4: adjusted_ci_upper

```

5.4.4 Autism and ADHD prevalence by ethnicity

```

## # A tibble: 3 x 7
##   ethnic_2_group      crude_ci_lower crude_~1 crude~2 adjus~3 adjus~4 adjus~5
##   <fct>          <dbl>        <dbl>        <dbl>      <dbl>      <dbl>      <dbl>
## 1 White              0.0163       0.0165       0.0167     0.0160     0.0162     0.0164
## 2 Black              0.0111       0.0121       0.0131     0.0113     0.0122     0.0133
## 3 Other              0.0184       0.0190       0.0195     0.0184     0.0190     0.0196

```

Autism prevalence by SES status

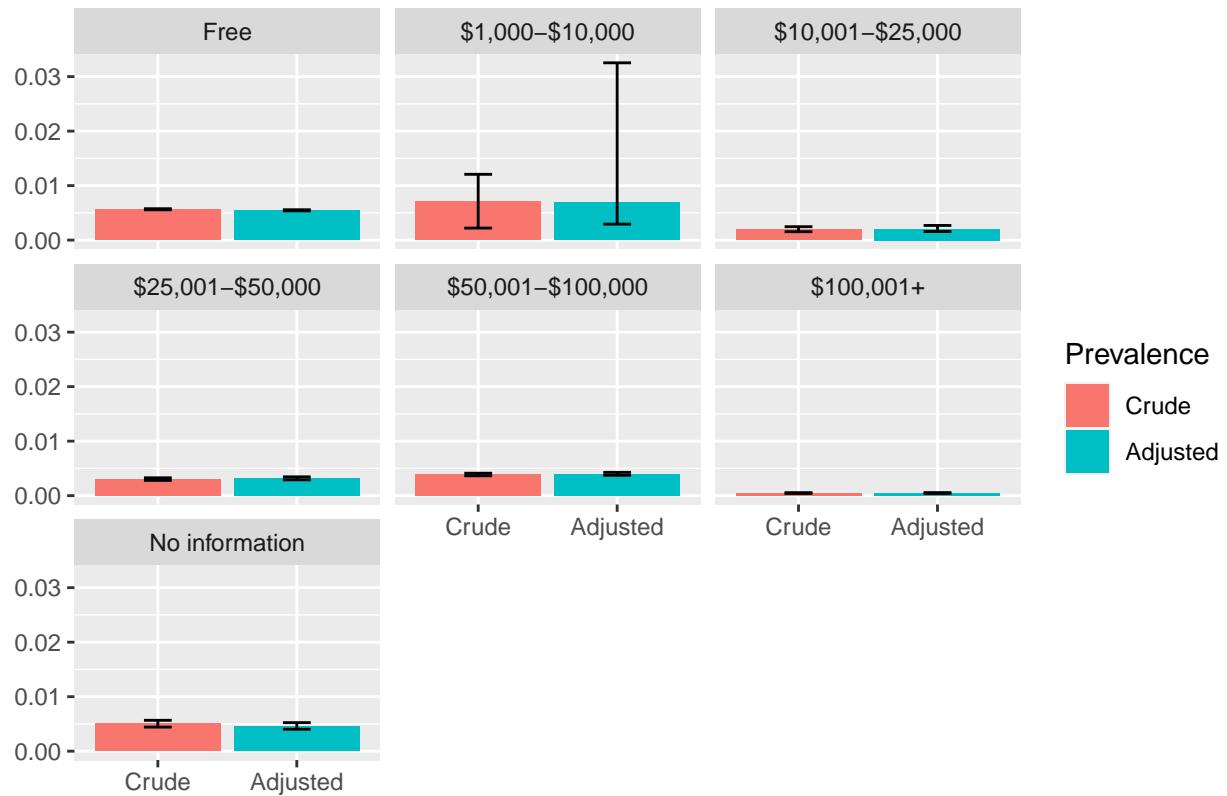


Figure 16: Crude and age- and sex-adjusted sample prevalences of autism by socio-economic (SES) status of student's family. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

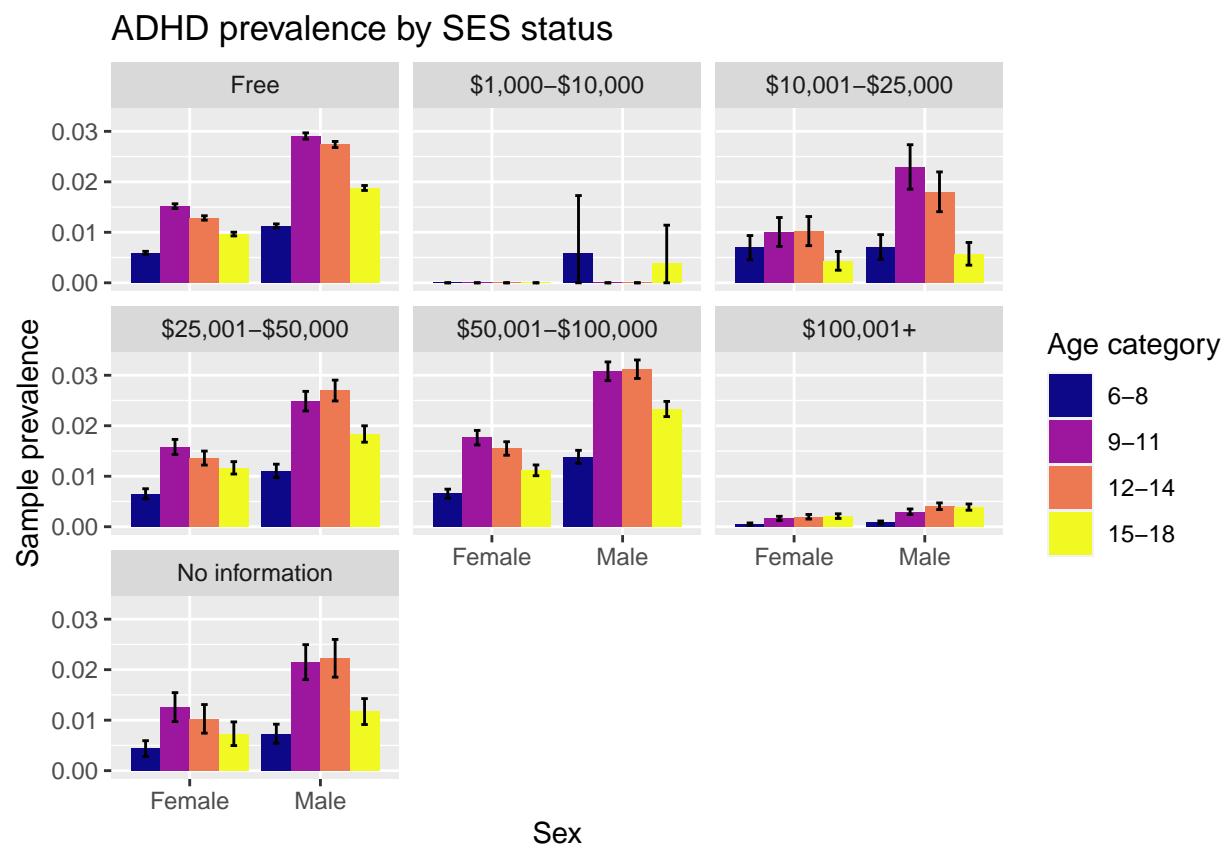


Figure 17: Sample prevalence of ADHD by socio-economic (SES) status of student's family, age band and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by SES status



Figure 18: Crude and age- and sex-adjusted sample prevalences of ADHD by socio-economic (SES) status of student's family. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```

##   <chr>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 Mapuche    0.00335  0.00363  0.00391  0.0032   0.00347  0.00376
## 2 No Indigenous group 0.00473  0.00481  0.00489  0.00463  0.00471  0.00479
## 3 Other Indigenous group 0.00538  0.00612  0.00686  0.00491  0.00565  0.00655
## # ... with abbreviated variable names 1: crude_rate, 2: crude_ci_upper,
## #   3: adjusted_ci_lower, 4: adjusted_rate, 5: adjusted_ci_upper

```

Autism prevalence by ethnicity

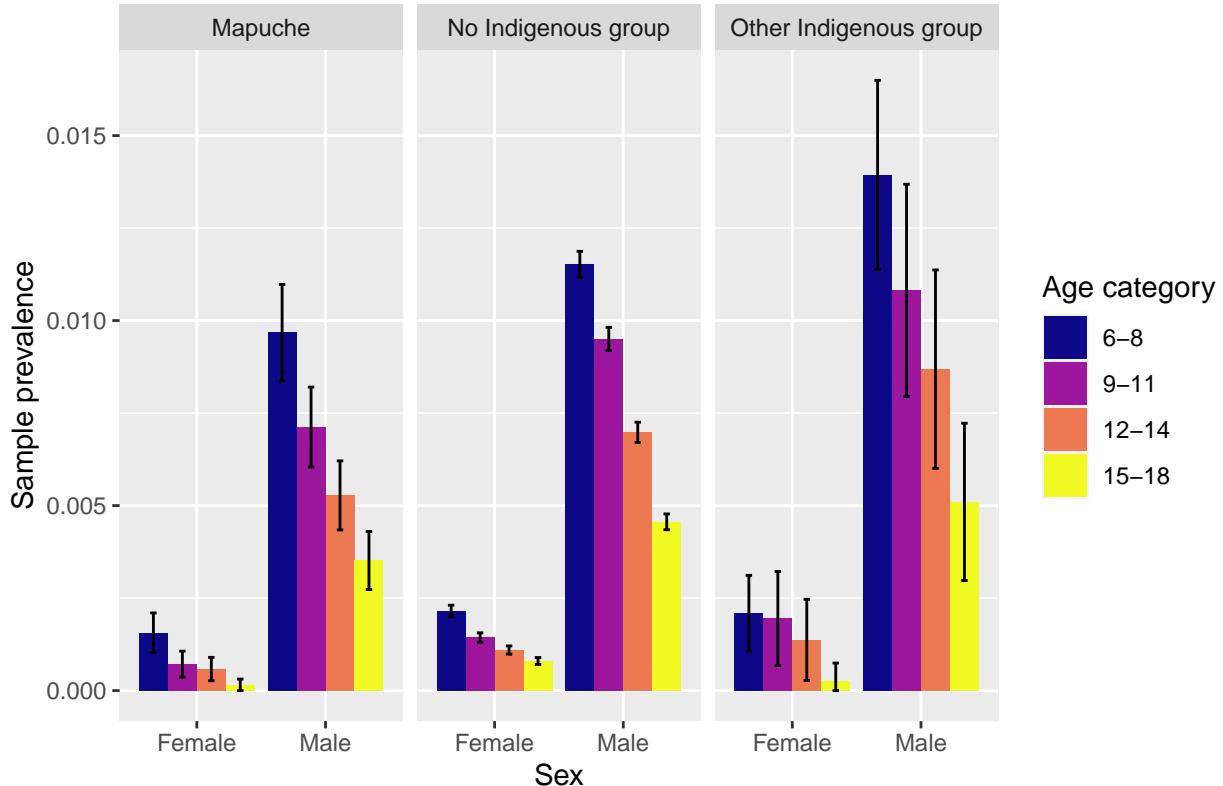


Figure 19: Sample prevalence of autism by ethnicity, age band and sex. Bars show 95% normal confidence intervals.

```

## # A tibble: 3 x 7
##   ethnic_2_group      crude_ci_lower crude_ci_upper adjus~1 adjus~2 adjus~3 adjus~4 adjus~5
##   <chr>                  <dbl>          <dbl>        <dbl>     <dbl>     <dbl>     <dbl>
## 1 Mapuche            0.0132         0.0138       0.0143    0.0128   0.0133   0.0139
## 2 No Indigenous group 0.0151         0.0153       0.0154    0.0150   0.0151   0.0153
## 3 Other Indigenous group 0.00914      0.0101       0.0110    0.0103   0.0115   0.0128
## # ... with abbreviated variable names 1: crude_rate, 2: crude_ci_upper,
## #   3: adjusted_ci_lower, 4: adjusted_rate, 5: adjusted_ci_upper

```

5.4.5 Autism and ADHD prevalence by rurality

```

## # A tibble: 2 x 7
##   school_rurality      crude_ci_lower crude_ci_upper adjus~1 adjus~2 adjus~3 adjus~4
##   <chr>                  <dbl>          <dbl>        <dbl>     <dbl>     <dbl>     <dbl>
## 1 Rural                0.00629        0.00662      0.00694  0.00541  0.00573  0.0061
## 2 Urban                0.00452        0.0046       0.00468  0.00447  0.00455  0.00463
## # ... with abbreviated variable names 1: crude_ci_upper, 2: adjusted_ci_lower,

```

Autism prevalence by ethnicity

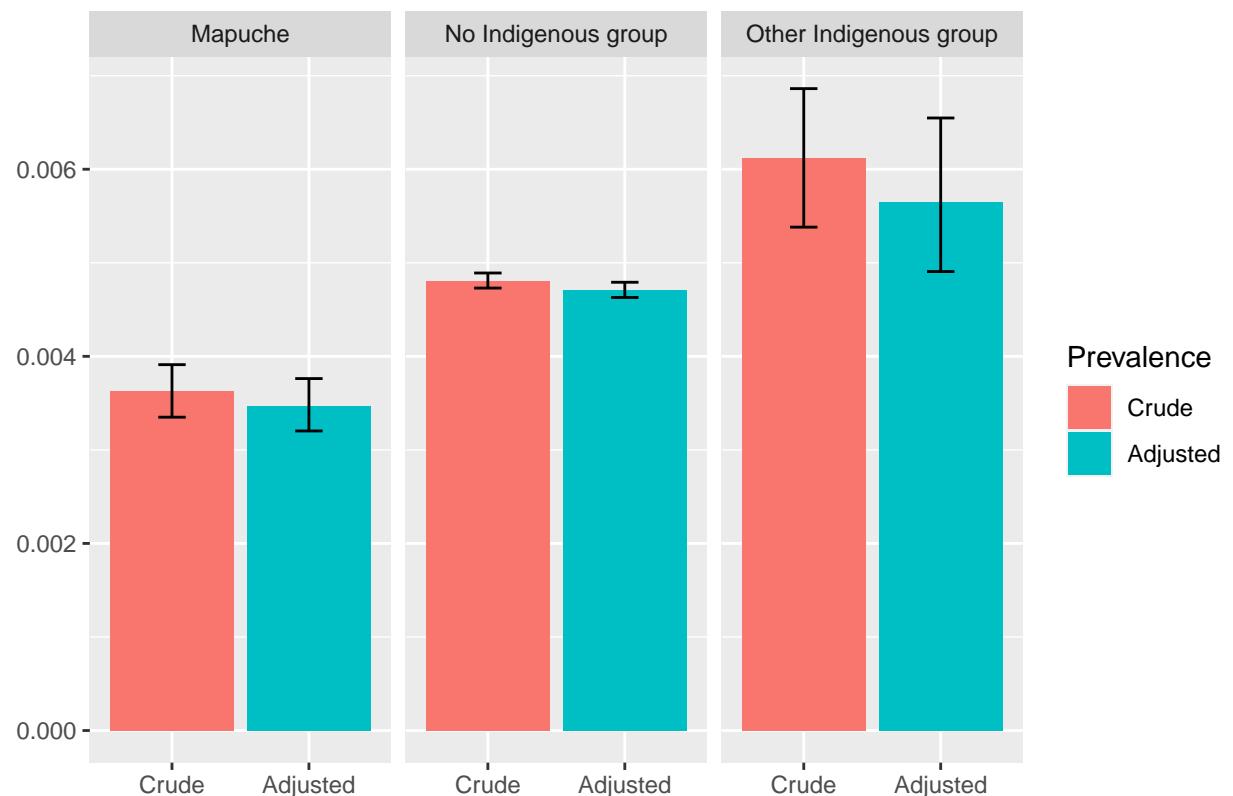


Figure 20: Crude and age- and sex-adjusted sample prevalences of autism by ethnicity. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

ADHD prevalence by ethnicity

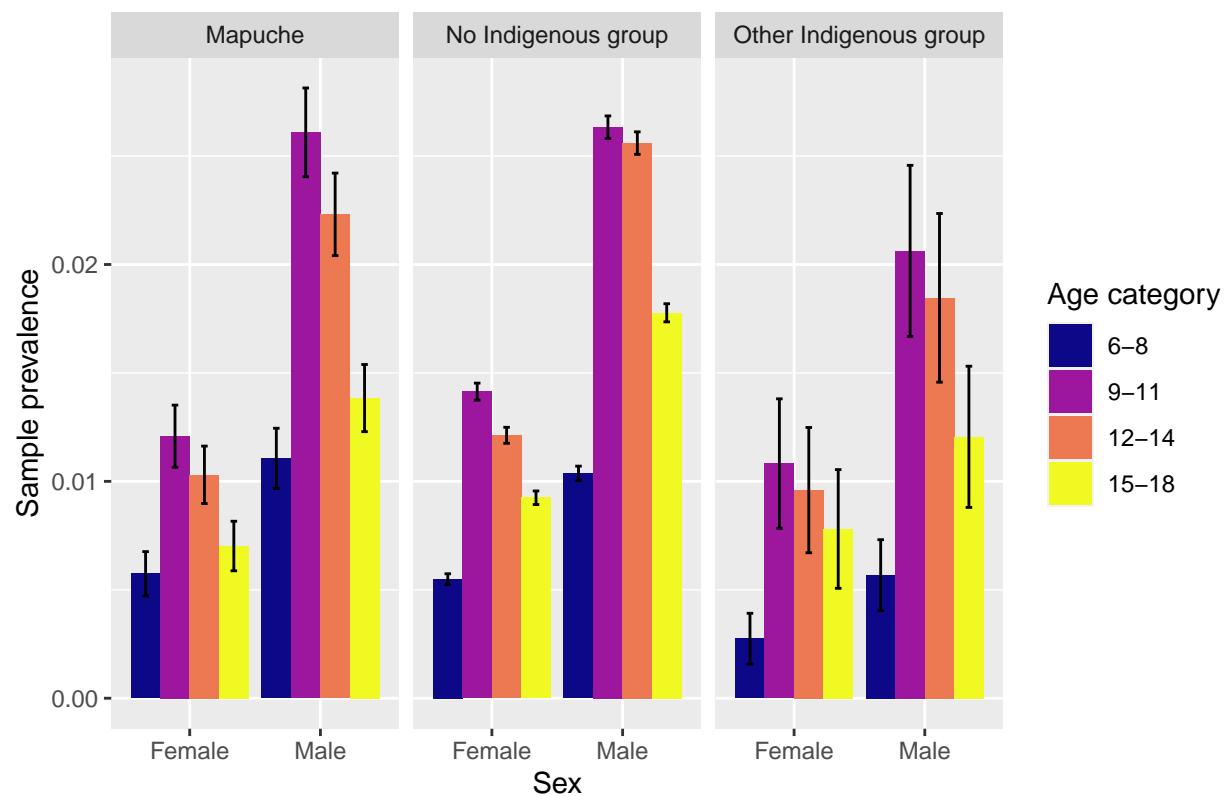


Figure 21: Sample prevalence of ADHD by ethnicity, age band and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by ethnicity

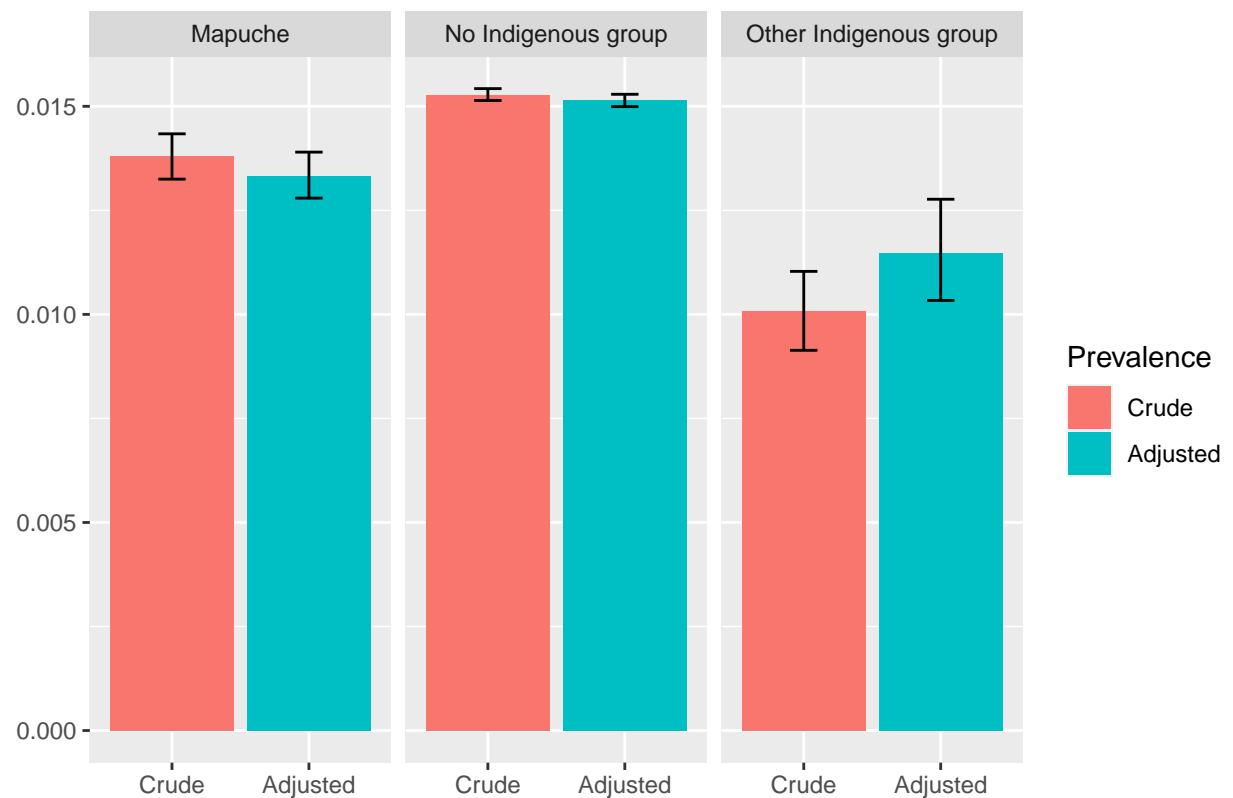


Figure 22: Crude and age- and sex-adjusted sample prevalences of ADHD by ethnicity. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

```
## # 3: adjusted_rate, 4: adjusted_ci_upper
```

Autism prevalence by school's rurality

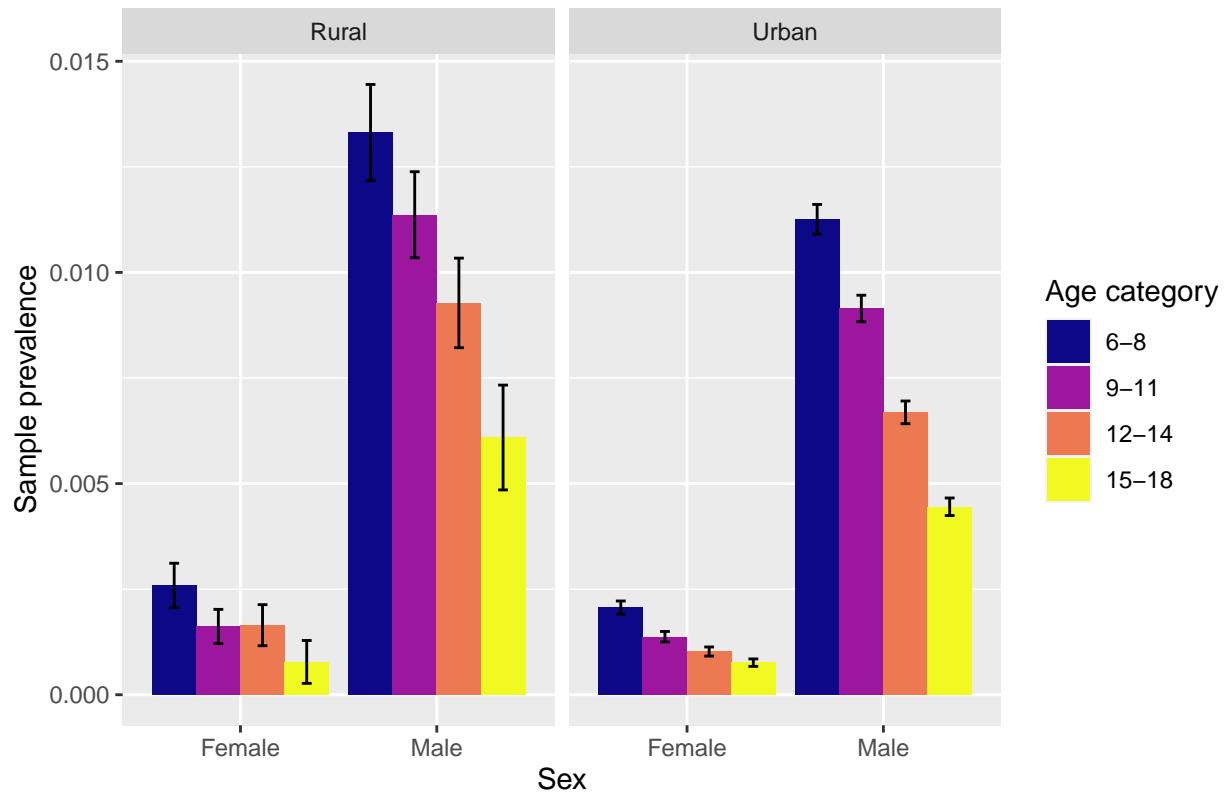


Figure 23: Sample prevalence of autism by school's rurality, age band and sex. Bars show 95% normal confidence intervals.

```
## # A tibble: 2 x 7
##   school_rurality crude_ci_lower crude_rate crude_ci_u~1 adjus~2 adjus~3 adjus~4
##   <chr>           <dbl>      <dbl>      <dbl>      <dbl>      <dbl>      <dbl>
## 1 Rural            0.0172     0.0177     0.0182     0.0161     0.0167     0.0174
## 2 Urban            0.0148     0.0149     0.0150     0.0147     0.0148     0.0150
## # ... with abbreviated variable names 1: crude_ci_upper, 2: adjusted_ci_lower,
## #   3: adjusted_rate, 4: adjusted_ci_upper
```

Autism prevalence by school's rurality

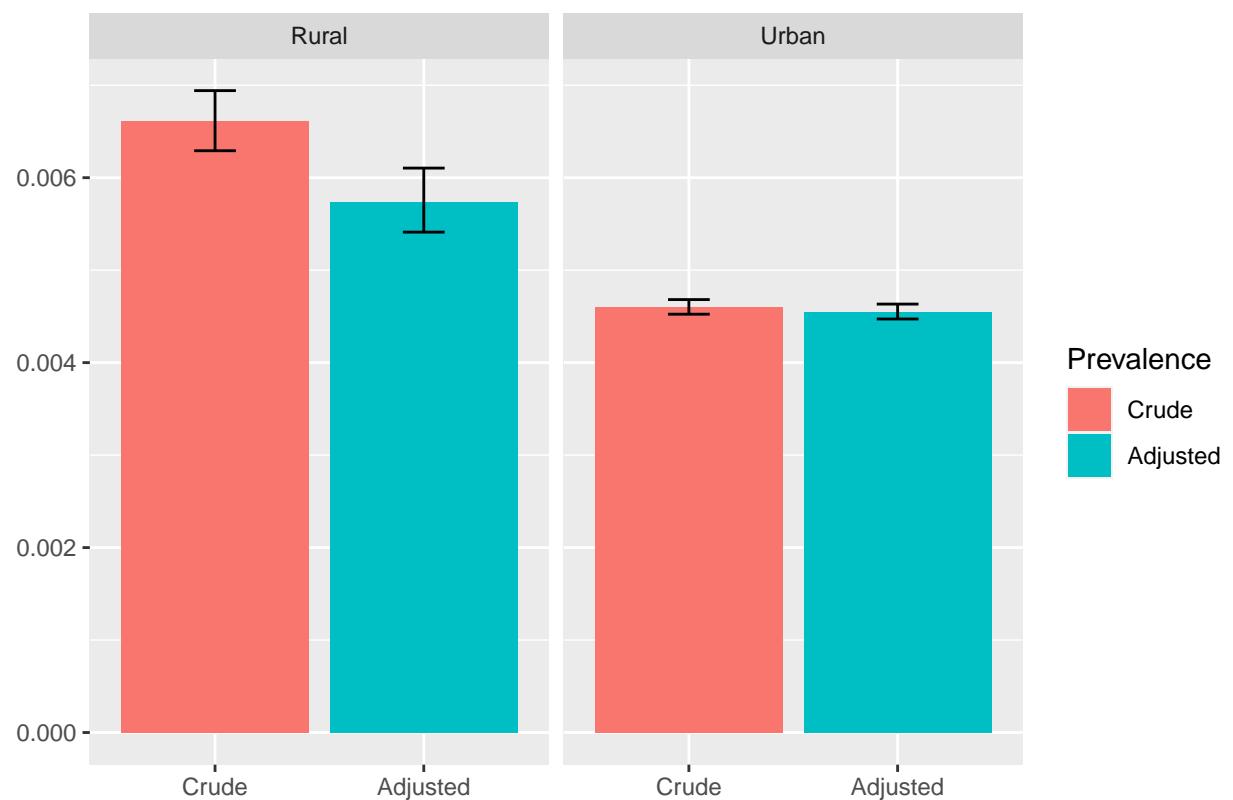


Figure 24: Crude and age- and sex-adjusted sample prevalences of autism by school's rurality. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

ADHD prevalence by school's rurality

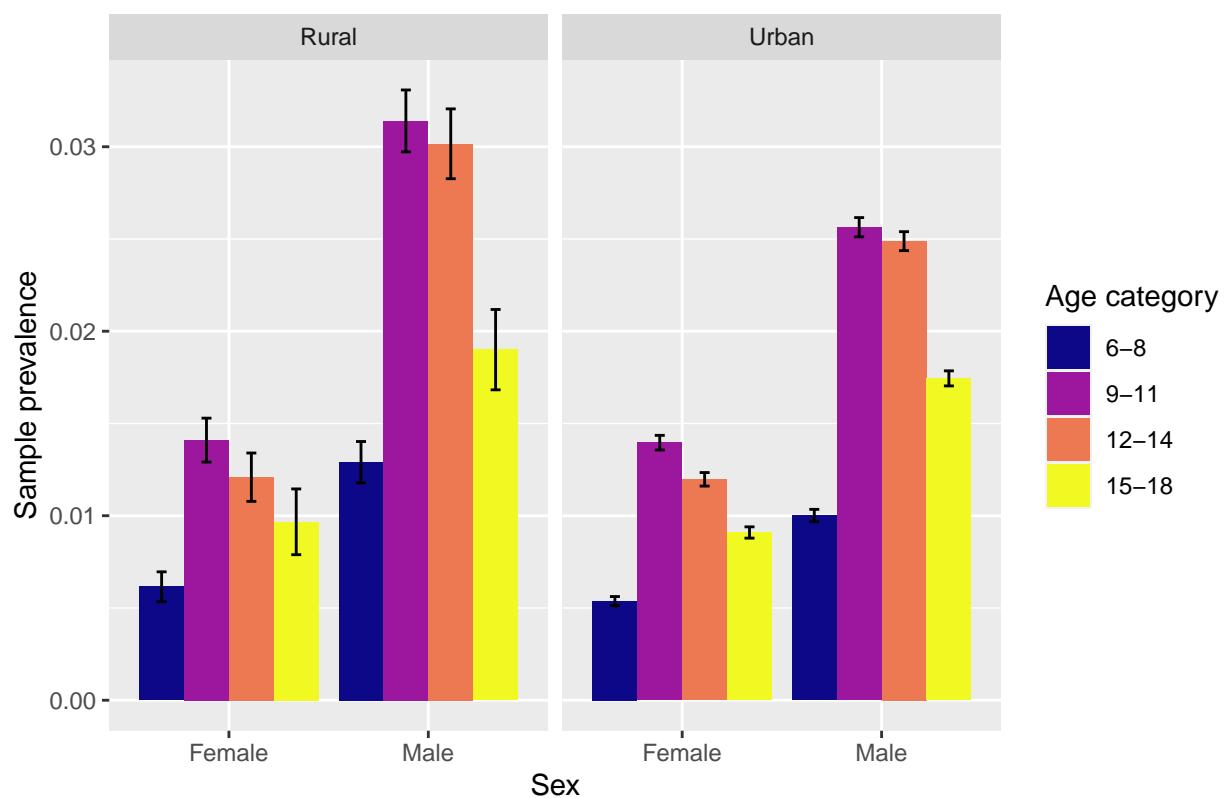


Figure 25: Sample prevalence of ADHD by school's rurality, age band and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by rurality

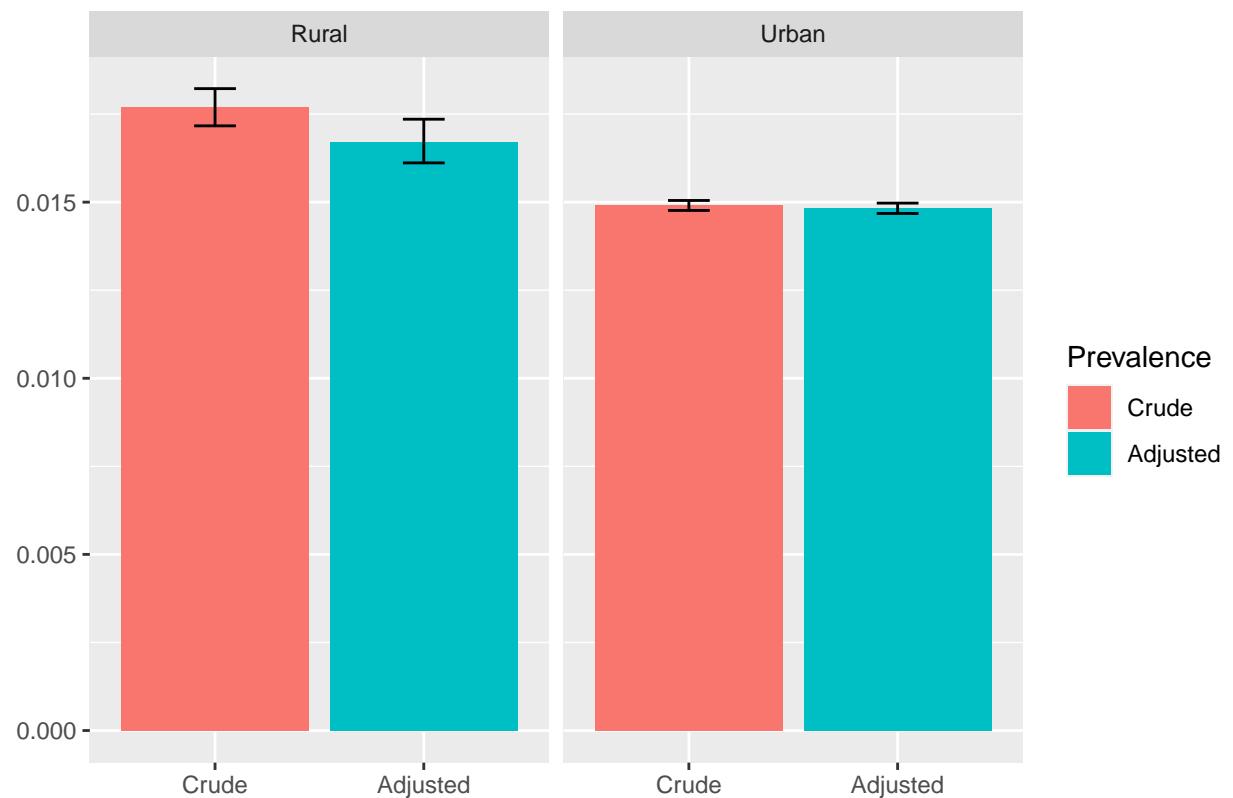


Figure 26: Crude and age- and sex-adjusted sample prevalences of ADHD by school's rurality. Bars for crude prevalence show 95% normal confidence intervals and bars for adjusted prevalence show 95% gamma confidence intervals.

Autism prevalence, prior mean = 0.00465, prior sd = 3.98e-05

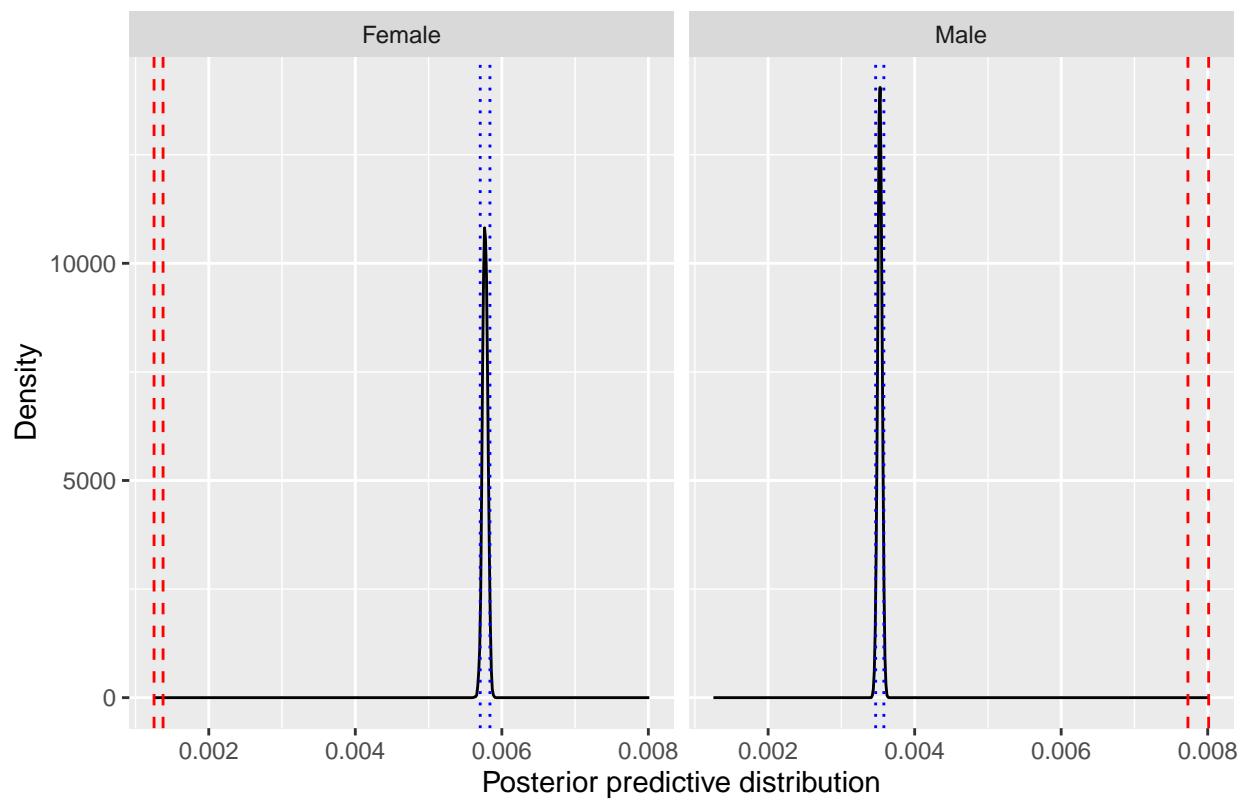


Figure 27: Posterior predictive distribution for autism with a random effect on sex, and with age- and sex-adjusted global prevalence prior.

ADHD prevalence, prior mean = 0.015, prior sd = 7.25e-05

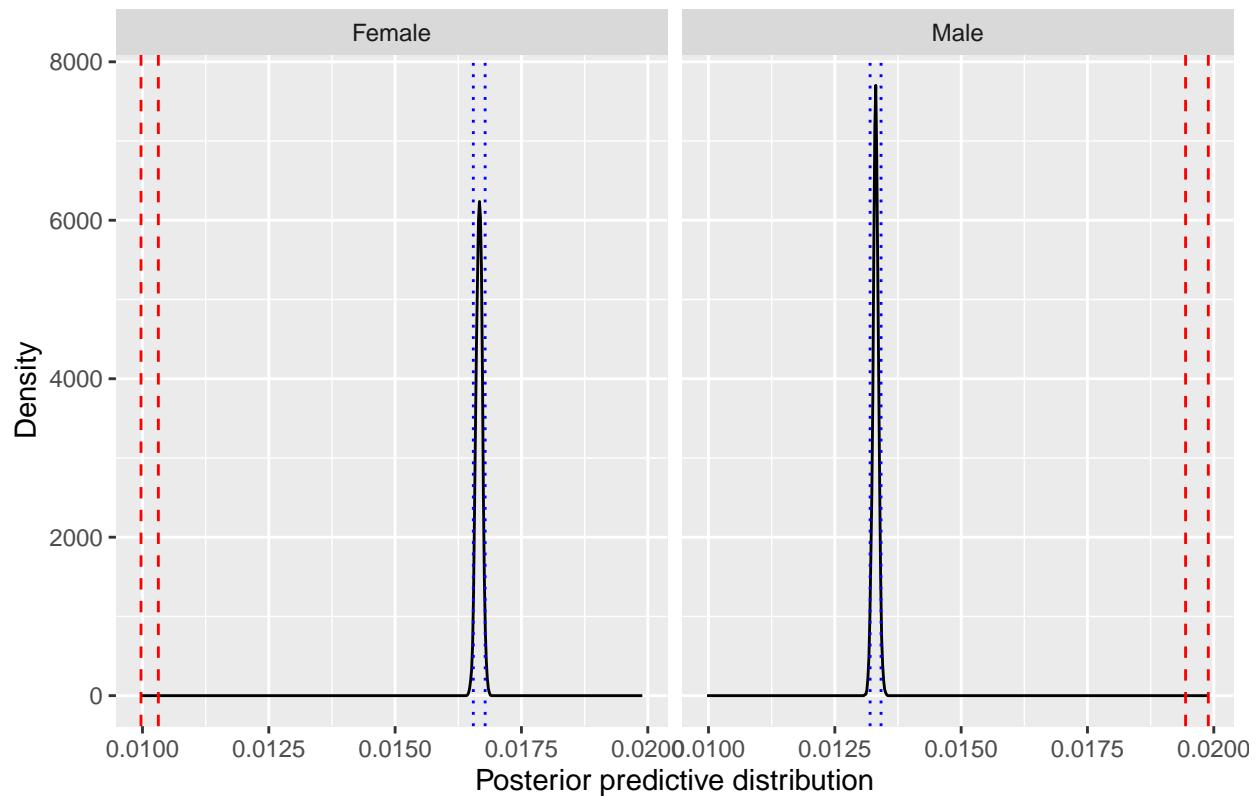


Figure 28: Posterior predictive distribution for ADHD with a random effect on sex, and with age- and sex-adjusted global prevalence prior.

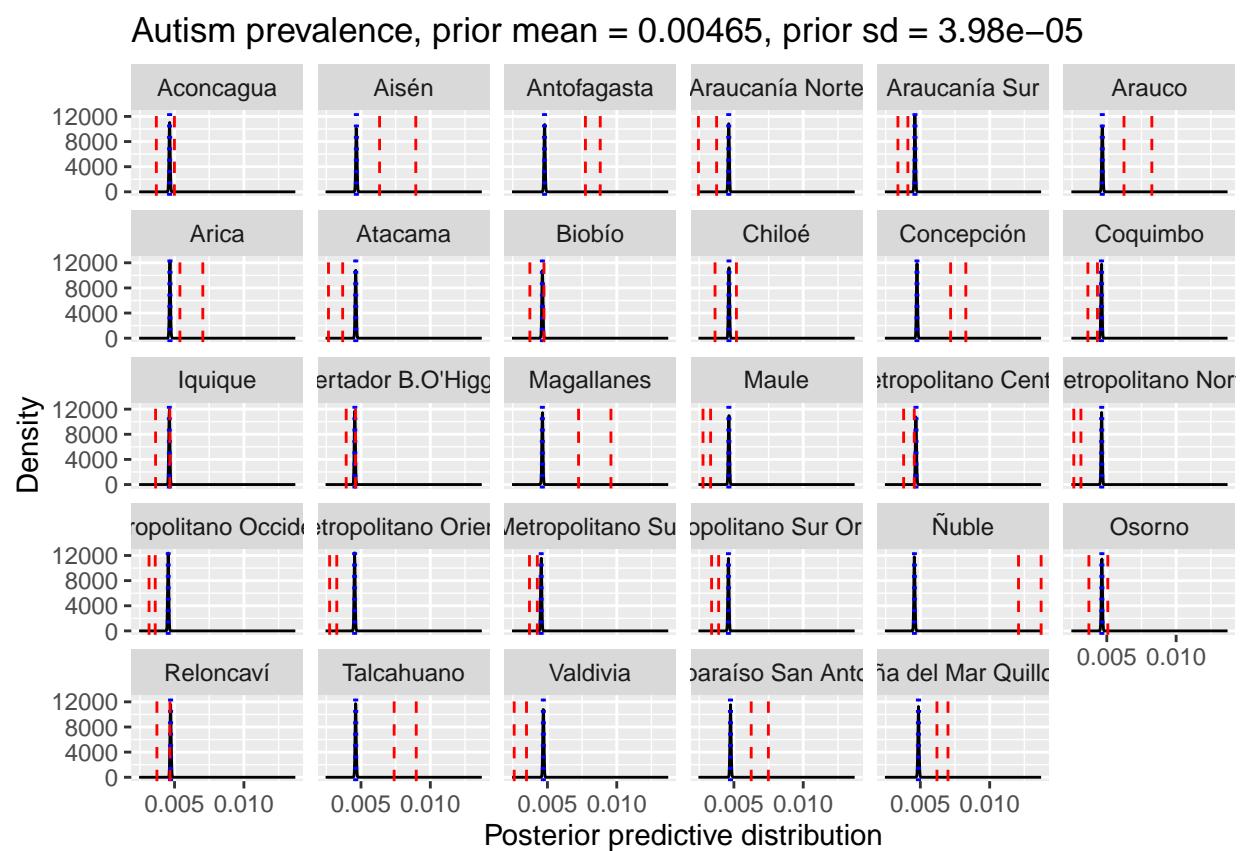


Figure 29: Posterior predictive distribution for autism with a random effect on student's health service, and with age- and sex-adjusted global prevalence prior.

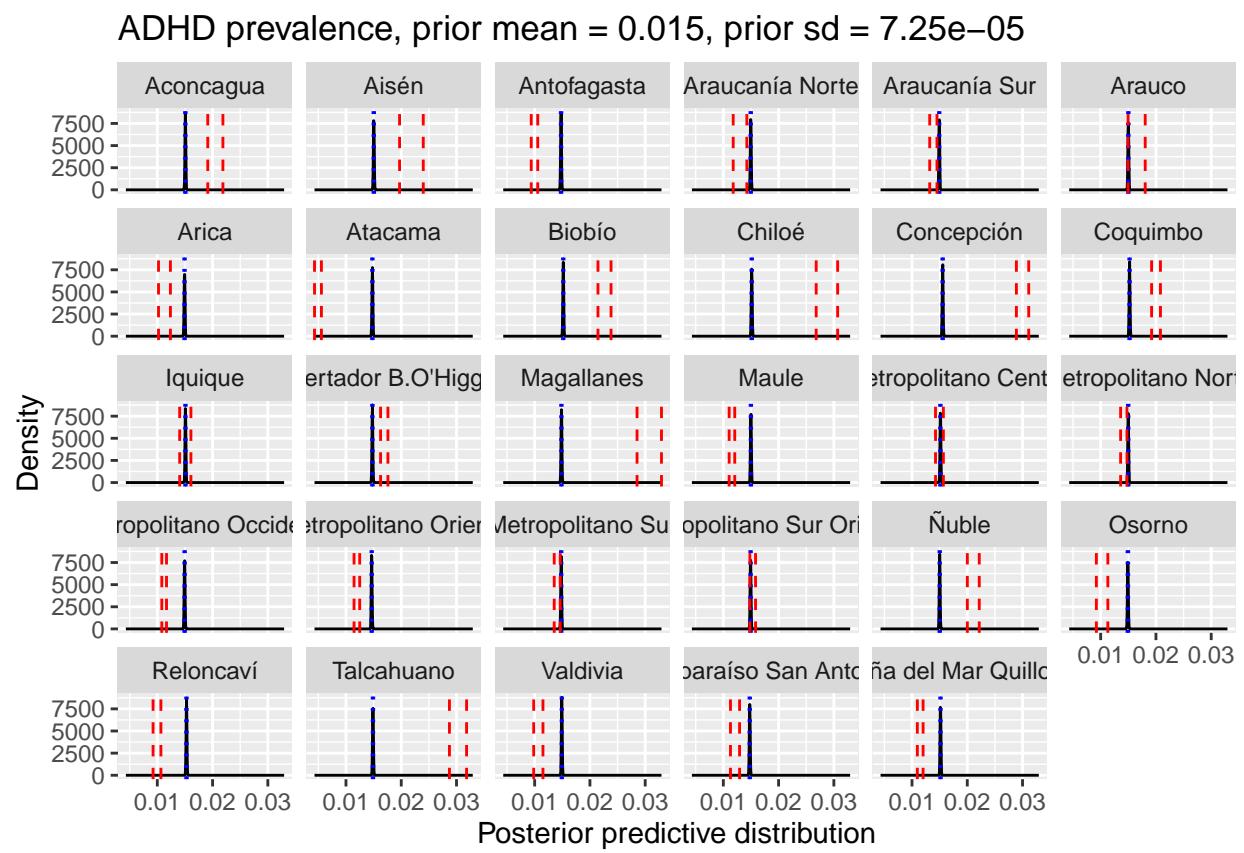


Figure 30: Posterior predictive distribution for ADHD with a random effect on health service, and with age- and sex-adjusted global prevalence prior.

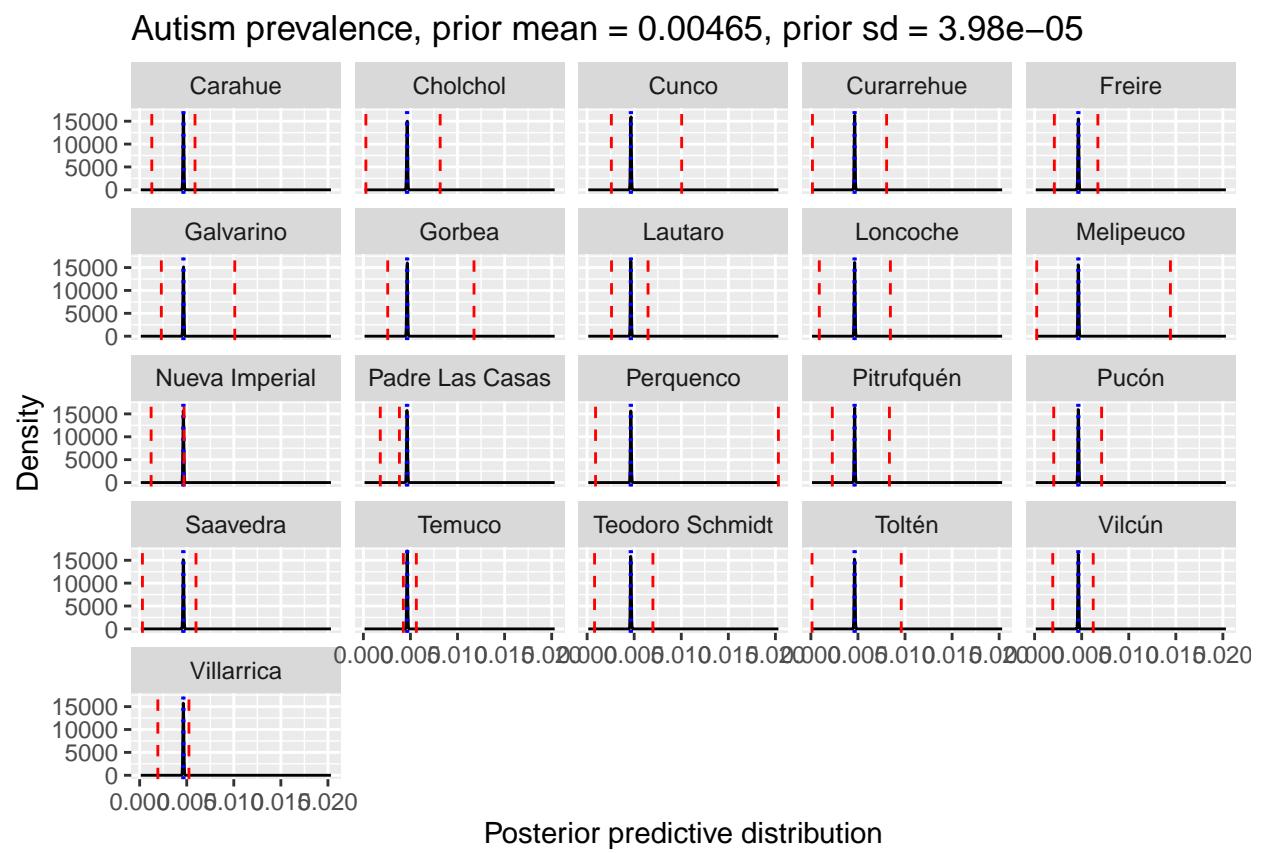


Figure 31: Posterior predictive distribution for autism with a random effect on commune within Araucanía Sur health service, and with age- and sex-adjusted global prevalence prior.

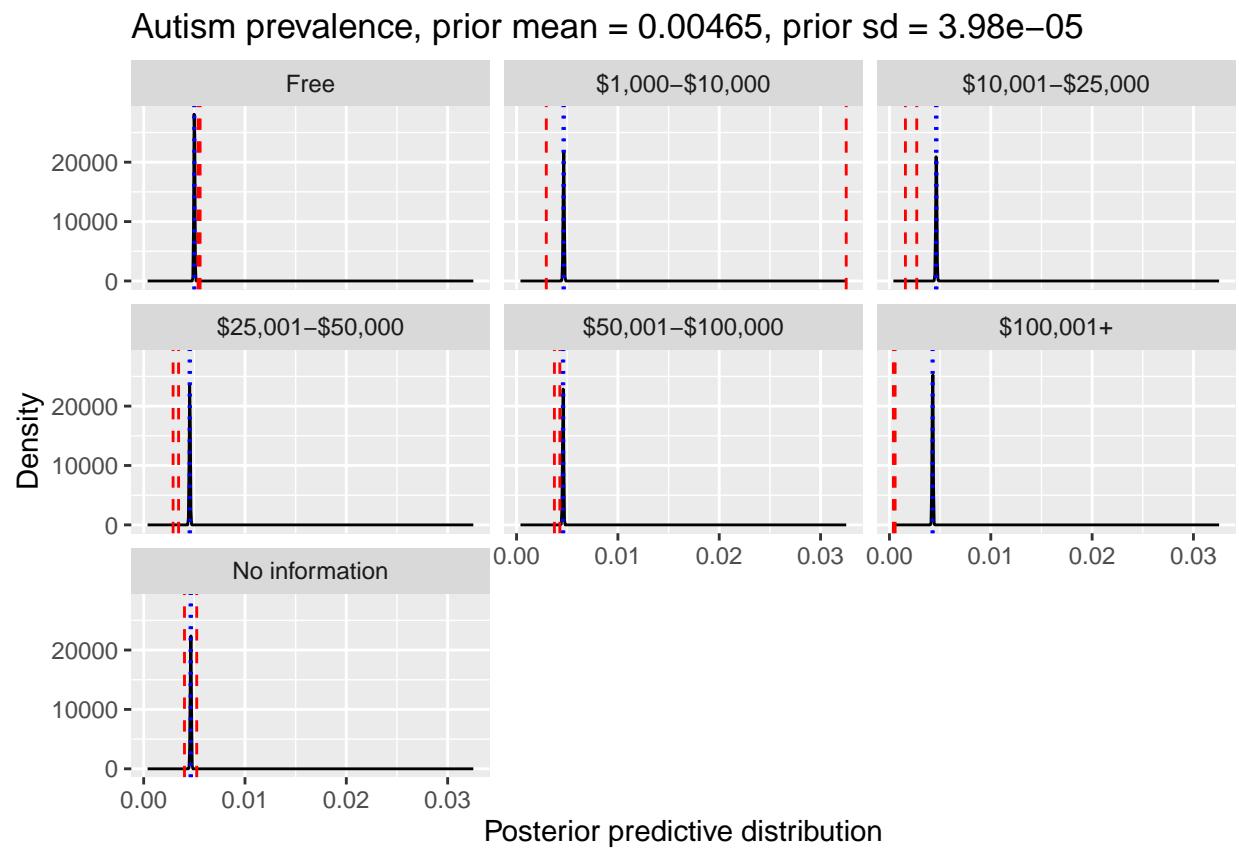


Figure 32: Posterior predictive distribution for autism with a random effect on socio-economic status of student's family, and with age- and sex-adjusted global prevalence prior.

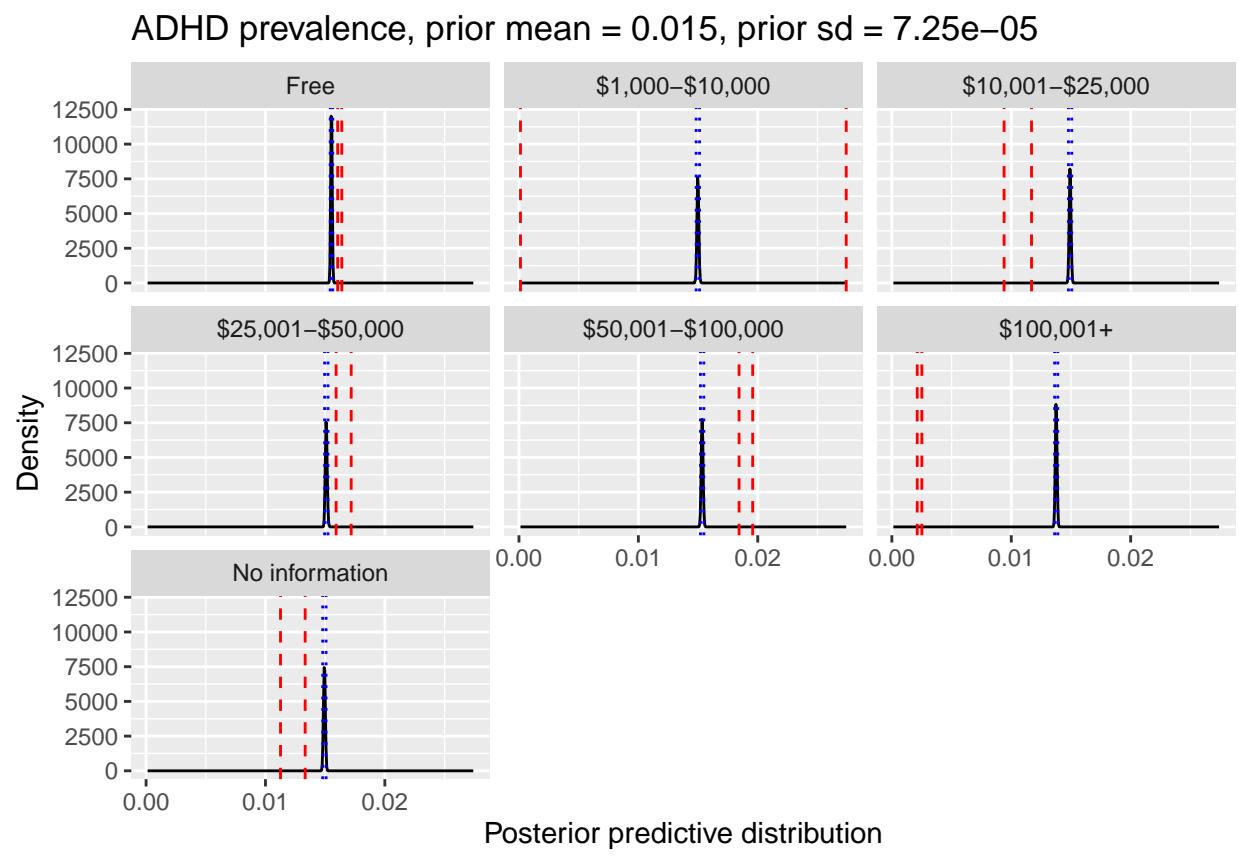


Figure 33: Posterior predictive distribution for ADHD with a random effect on socio-economic status of student's family, and with age- and sex-adjusted global prevalence prior.

Autism prevalence, prior mean = 0.00465, prior sd = 3.98e-05

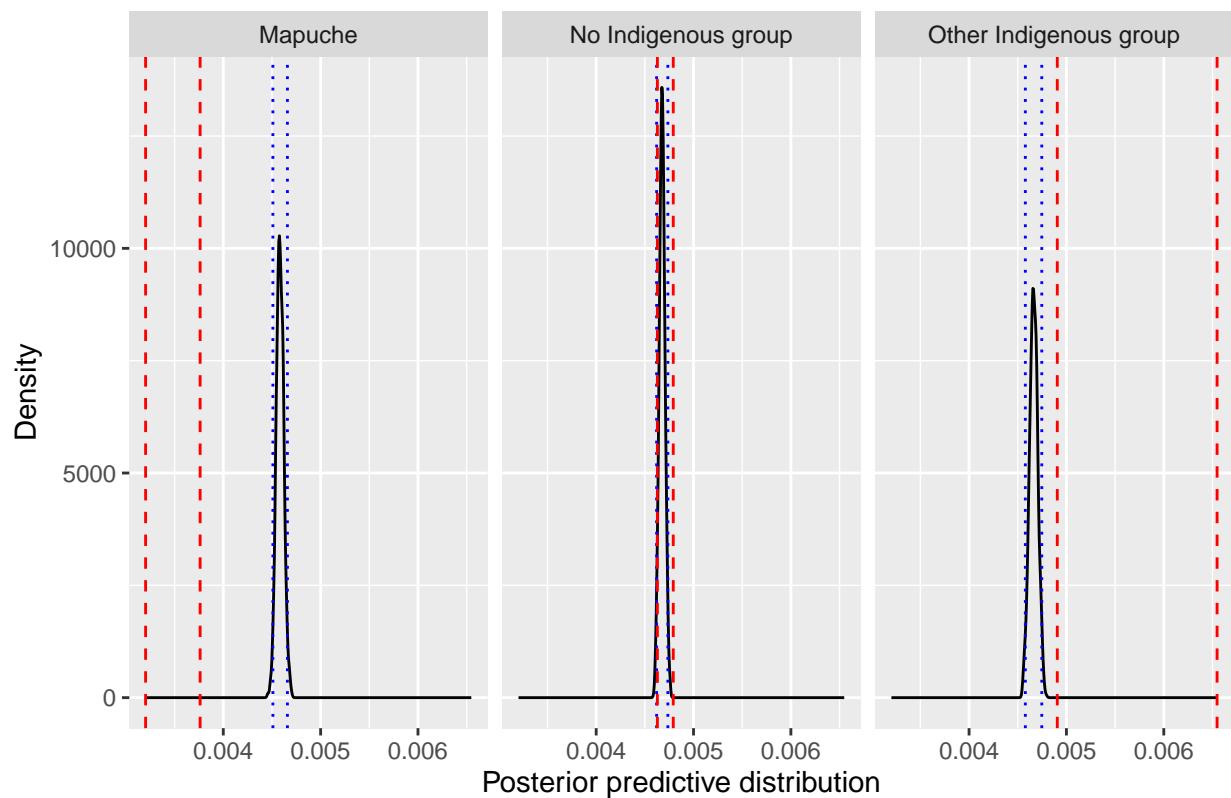


Figure 34: Posterior predictive distribution for autism with a random effect on ethnicity, and with age- and sex-adjusted global prevalence prior.

ADHD prevalence, prior mean = 0.015, prior sd = 7.25e-05

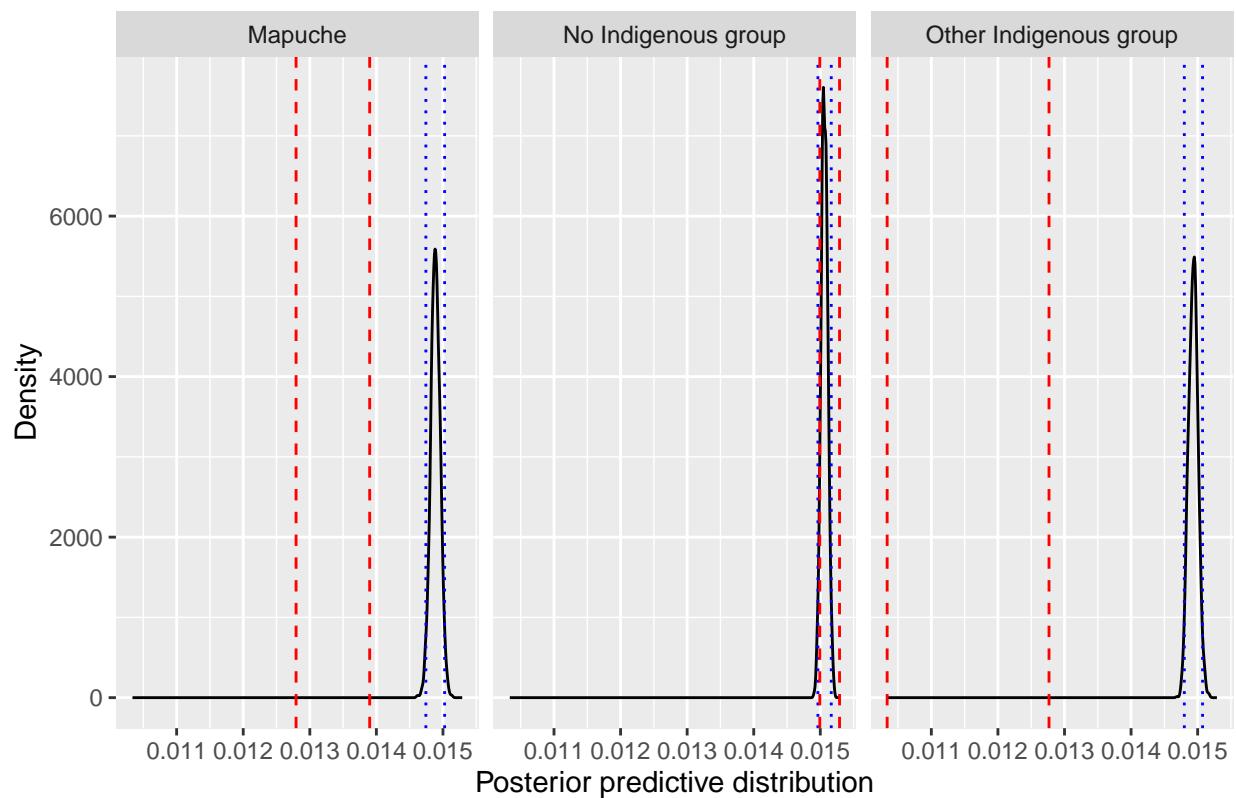


Figure 35: Posterior predictive distribution for ADHD with a random effect on ethnicity, and with age- and sex-adjusted global prevalence prior.

Autism prevalence, prior mean = 0.00465, prior sd = 3.98e-05

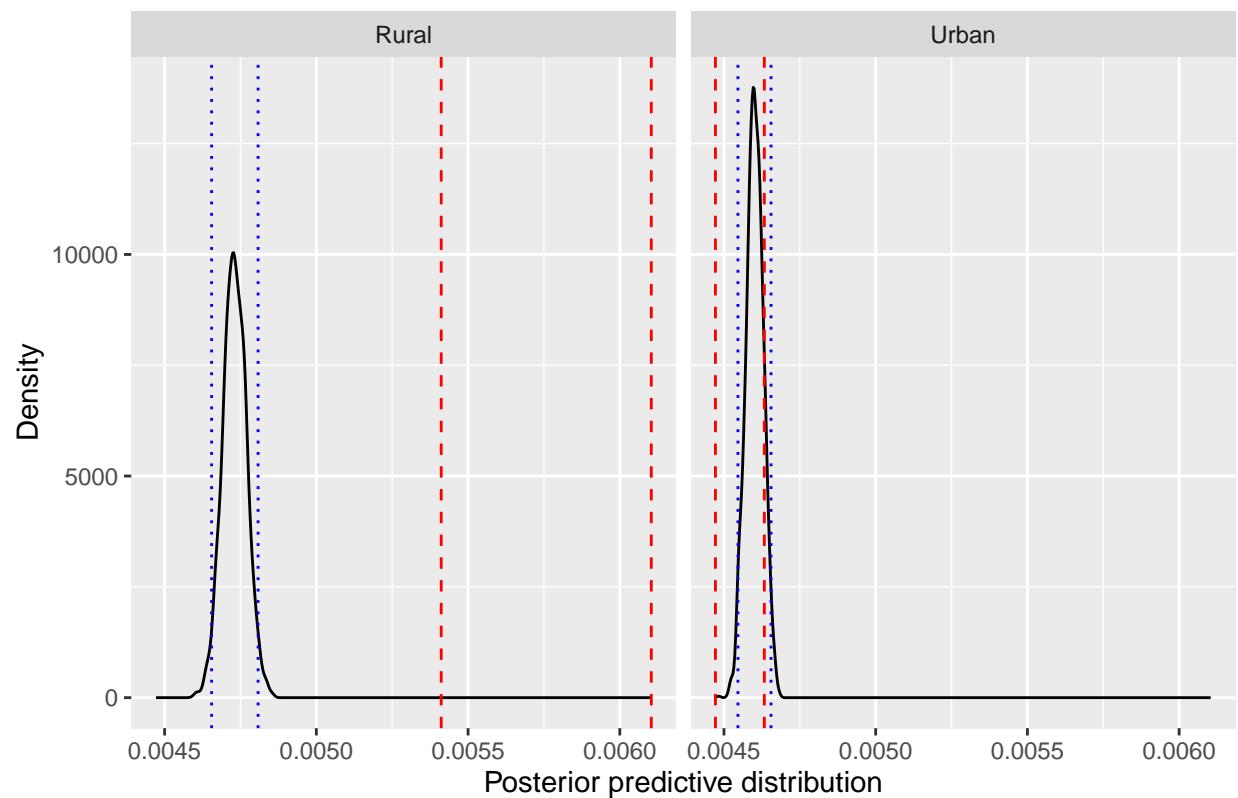


Figure 36: Posterior predictive distribution for autism with a random effect on school's rurality, and with age- and sex-adjusted global prevalence prior.

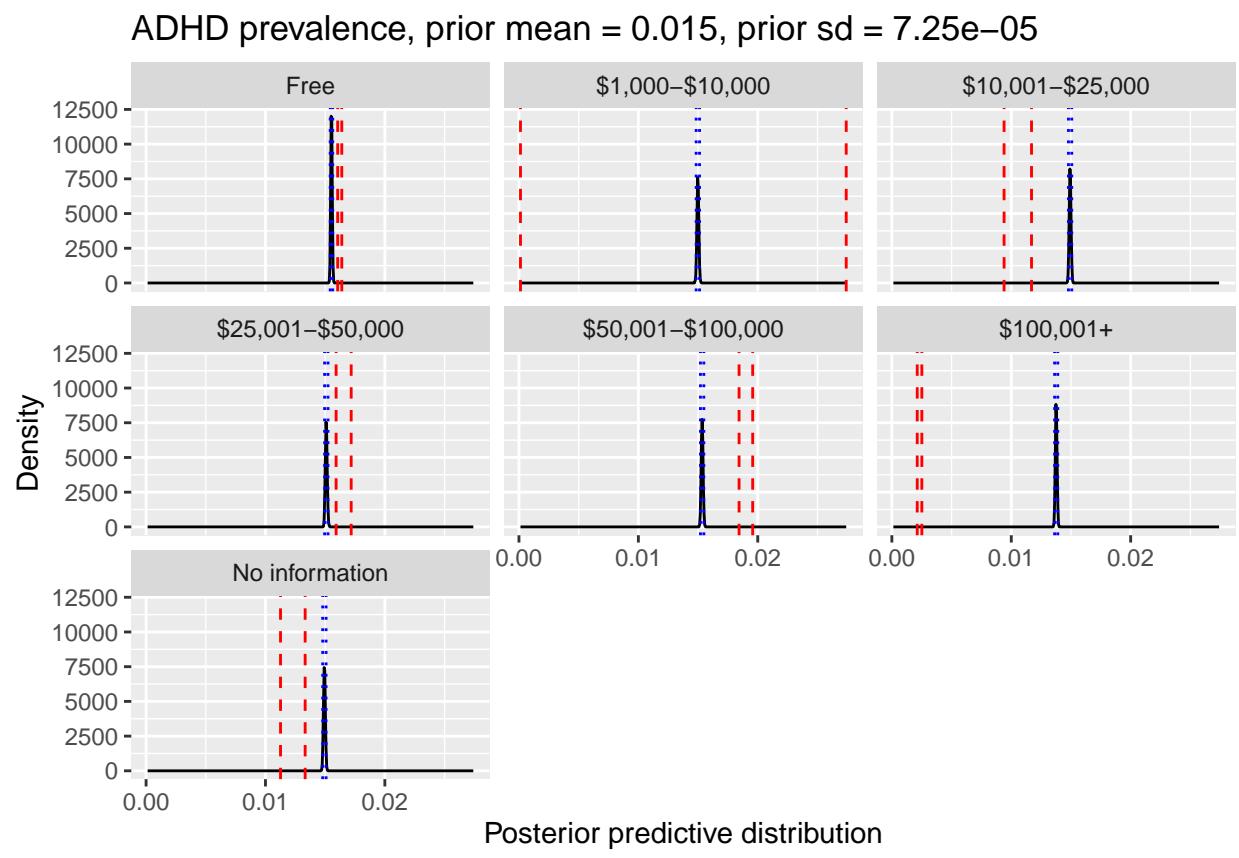


Figure 37: Posterior predictive distribution for ADHD with a random effect on school's rurality, and with age- and sex-adjusted global prevalence prior.

5.5 Bayesian prevalence estimation

5.5.1 Random effect on sex

5.5.2 Random effect on health service

5.5.3 Random effect on commune in Araucanía Sur health service

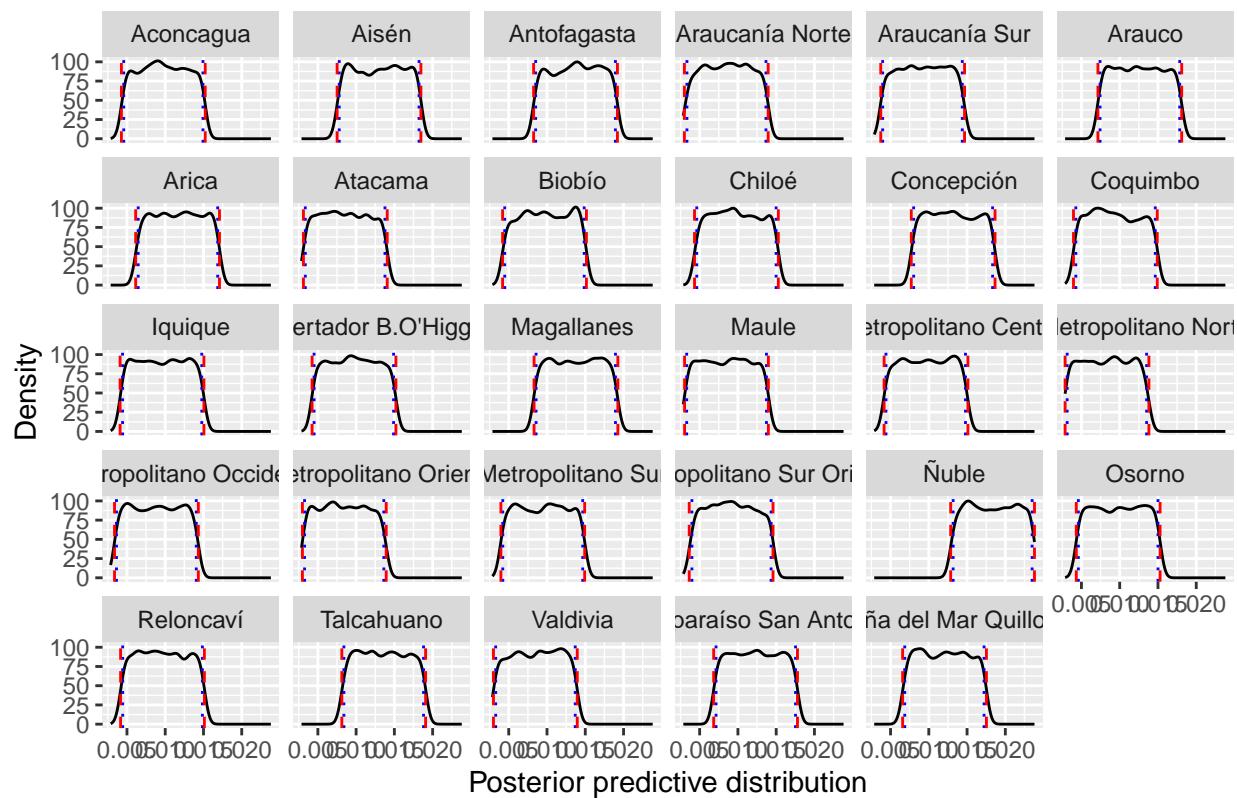
5.5.4 Random effect on socio-economic status

5.5.5 Random effect on ethnicity

5.5.6 Random effect on school's rurality

5.6 Bayesian prevalence projection

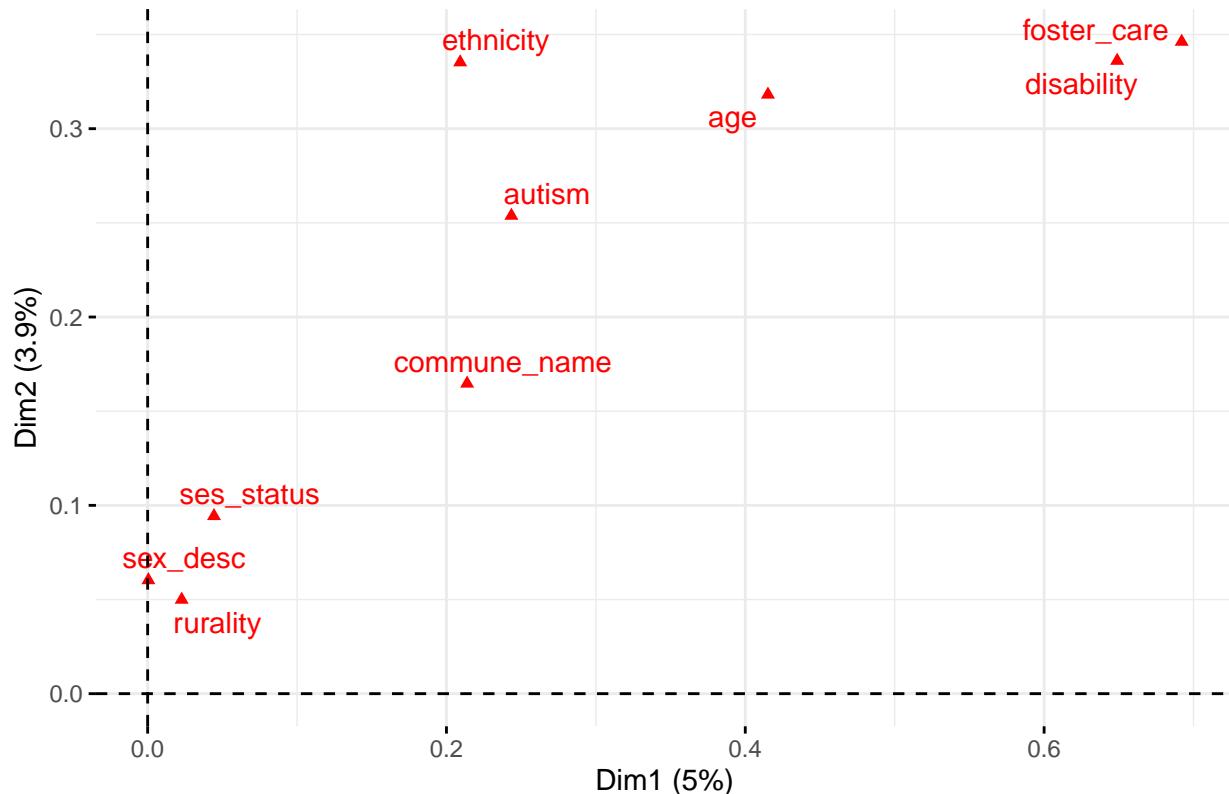
Region specific priors informed by clinical data from Araucanía Sur



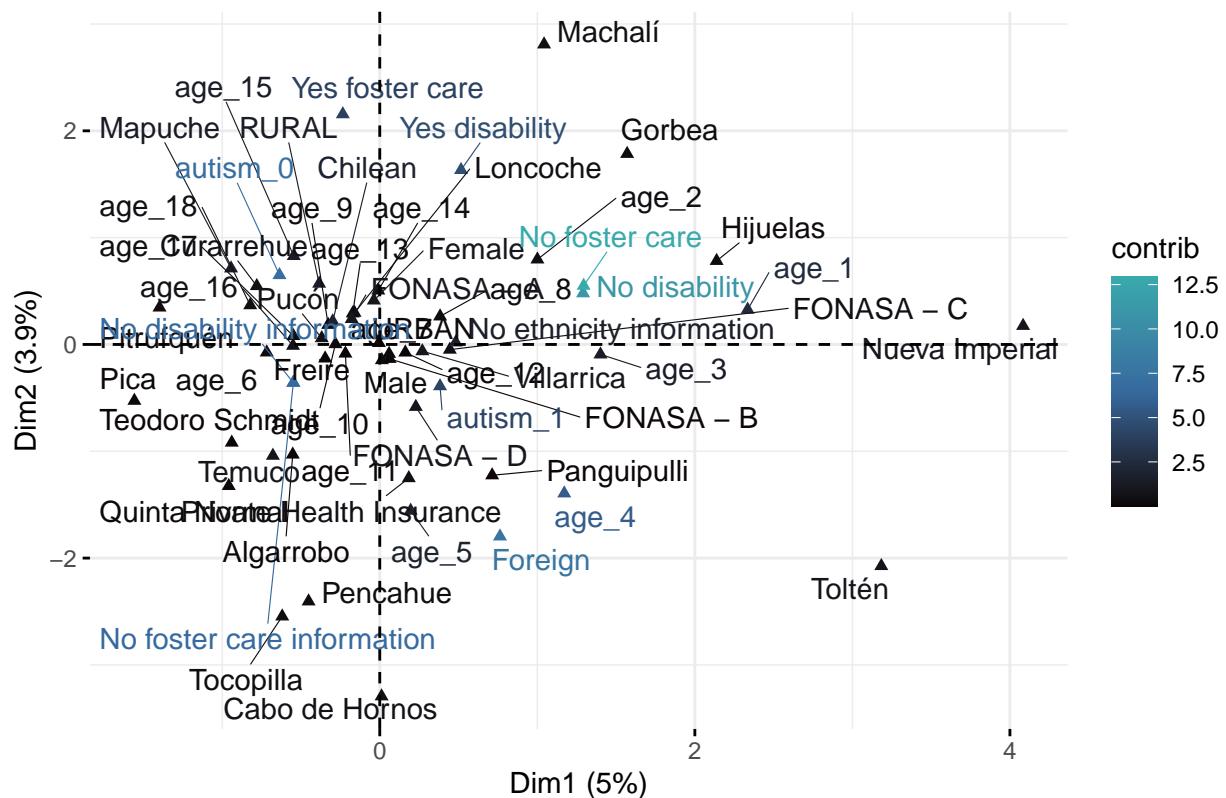
Red is the prior 95% CI (adjusted sample rate and it + prev_delta), blue is posterior 95% CrI

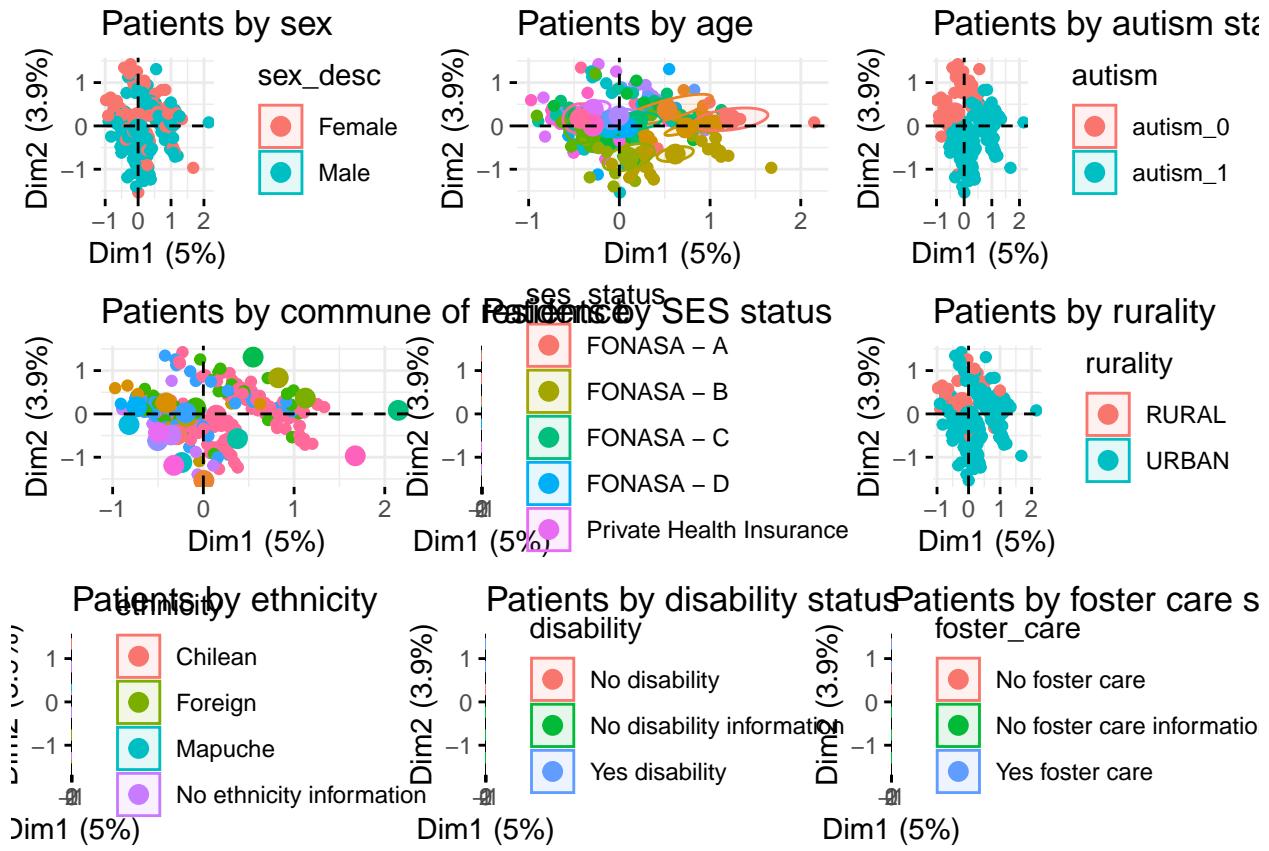
5.7 MCA

Variables – MCA

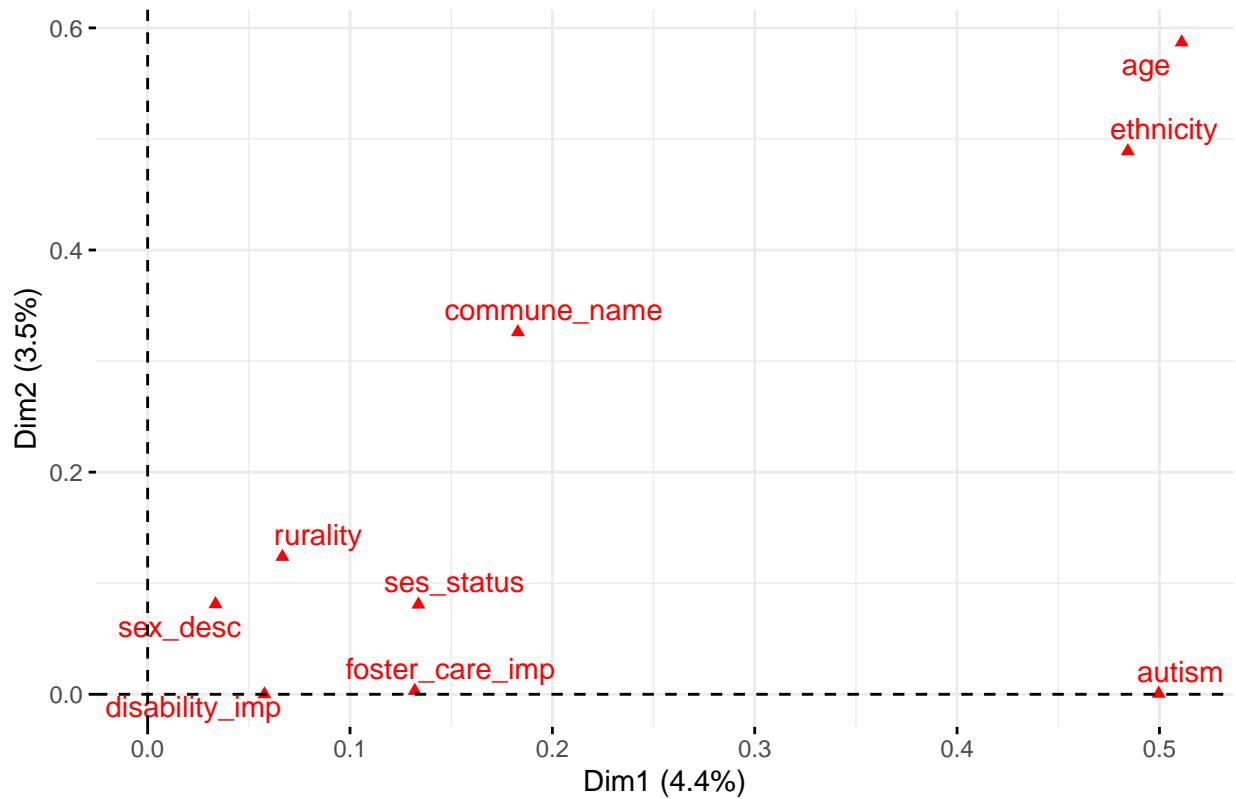


Variable categories – MCA

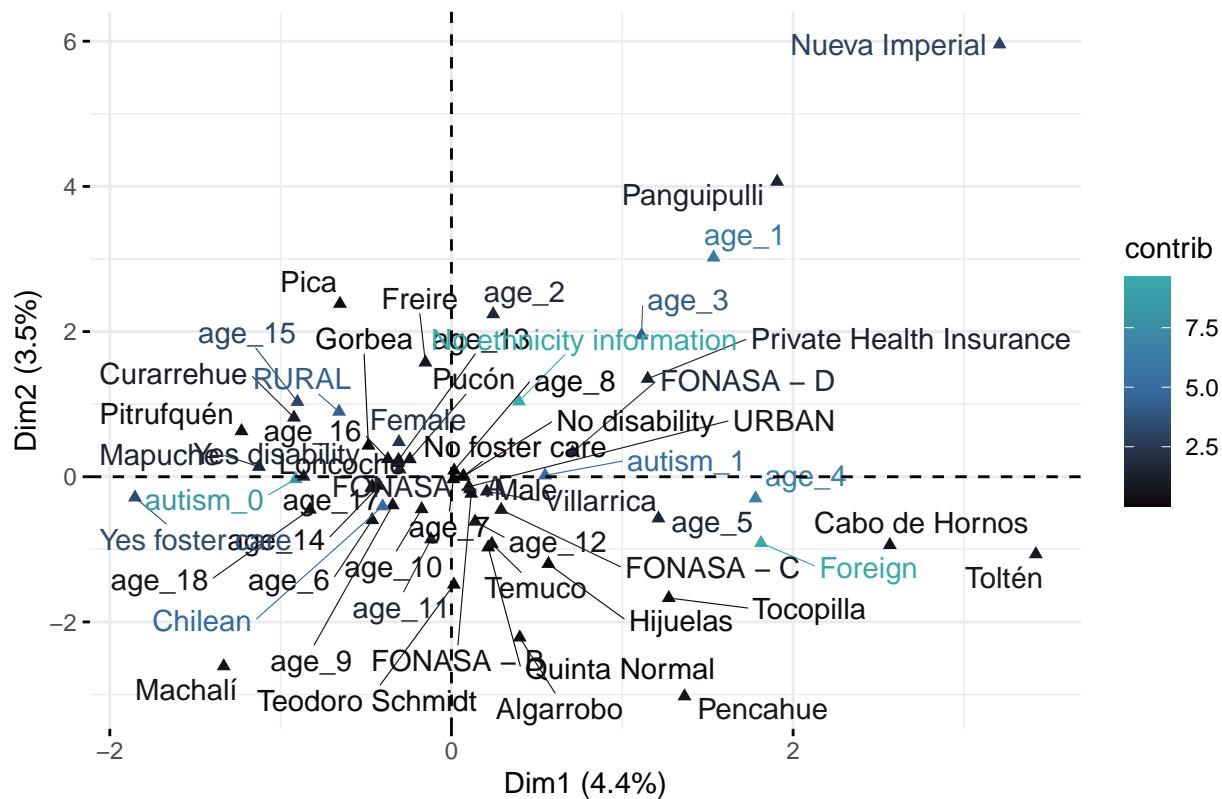


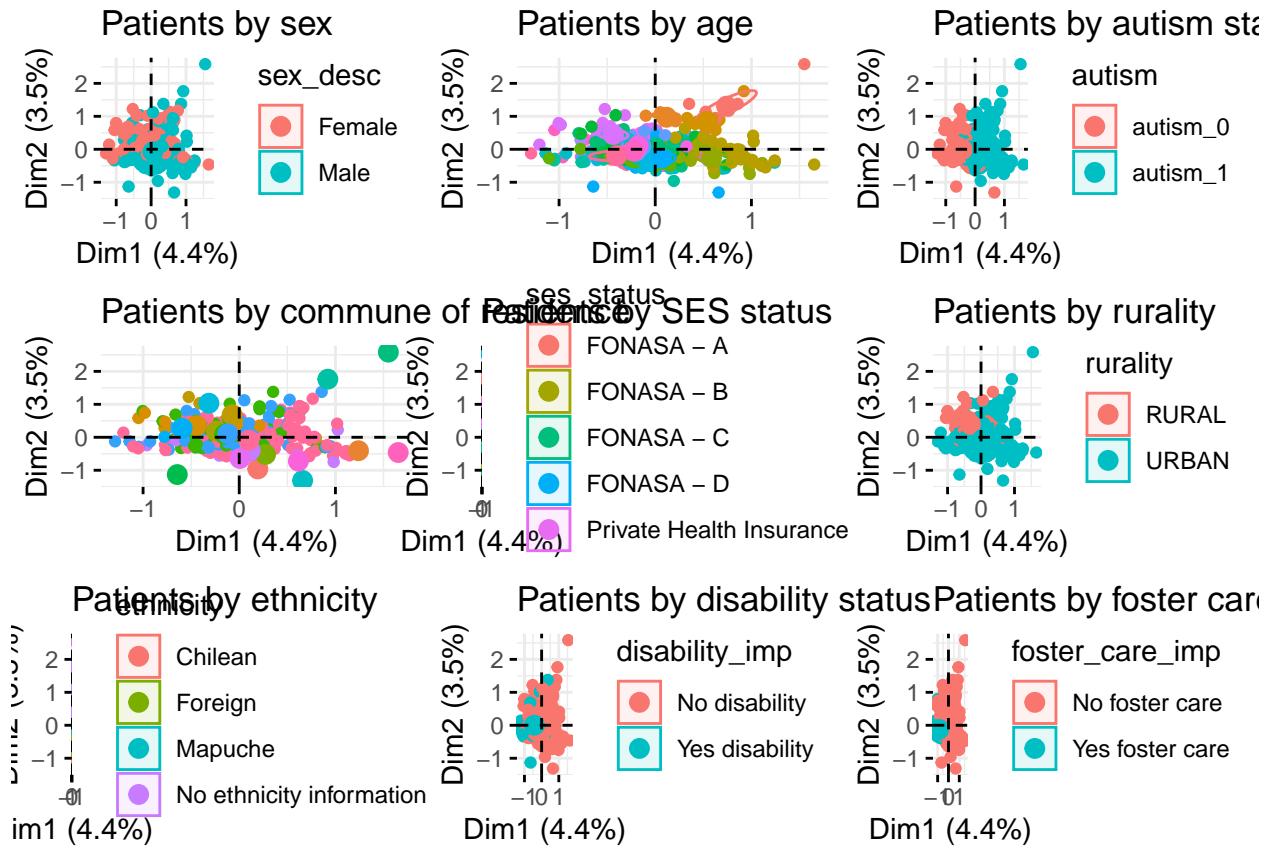


Variables – MCA



Variable categories – MCA





6 Supplementary materials

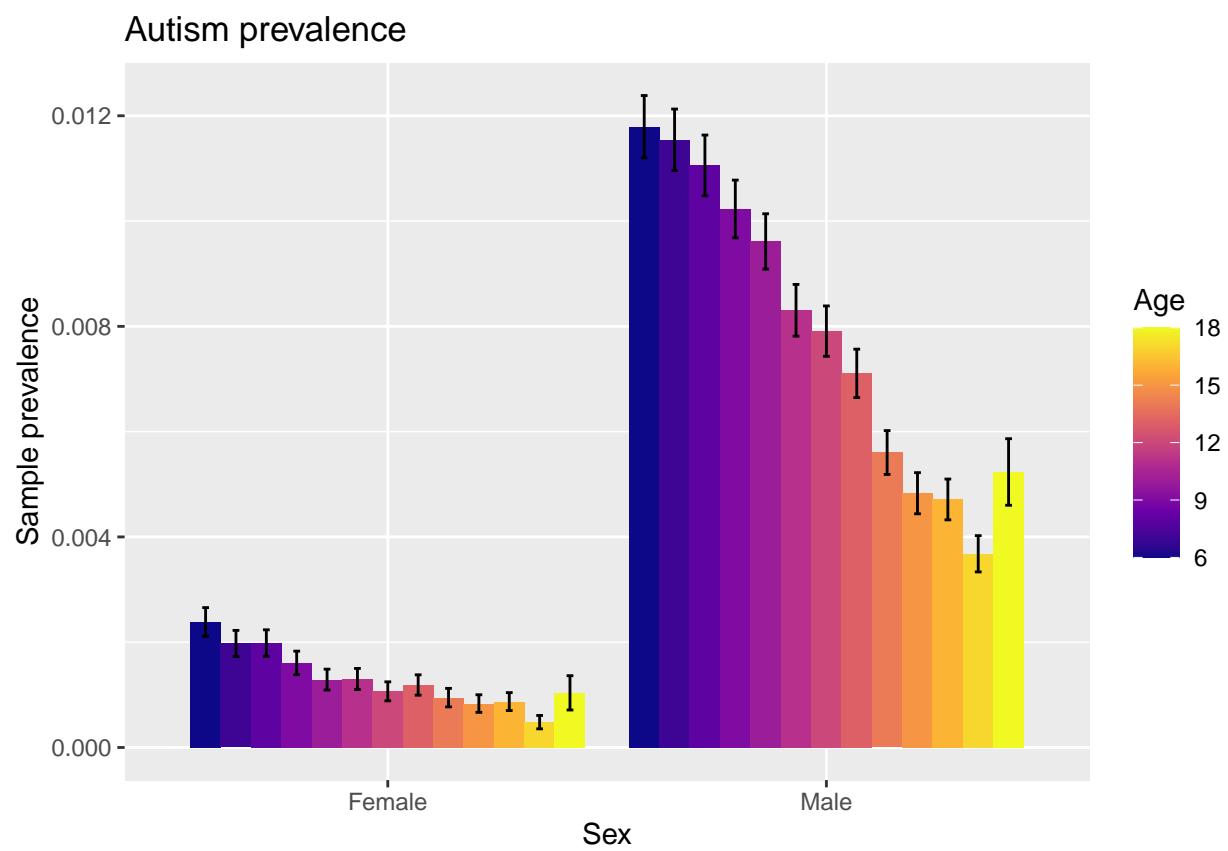


Figure 38: Sample prevalence of autism by age and sex. Bars show 95% normal confidence intervals.

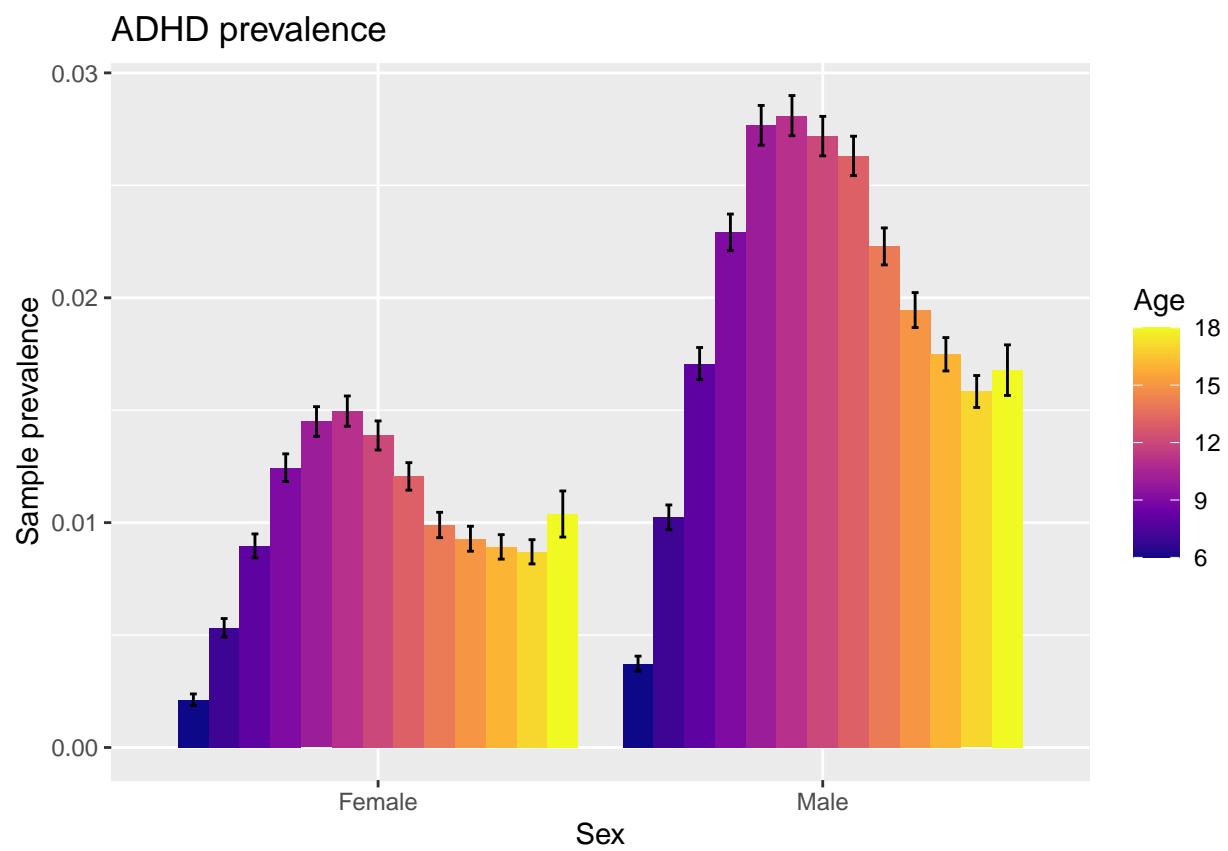


Figure 39: Sample prevalence of ADHD by age and sex. Bars show 95% normal confidence intervals.



Figure 40: Sample prevalence of autism by health service, age and sex. Bars show 95% normal confidence intervals.

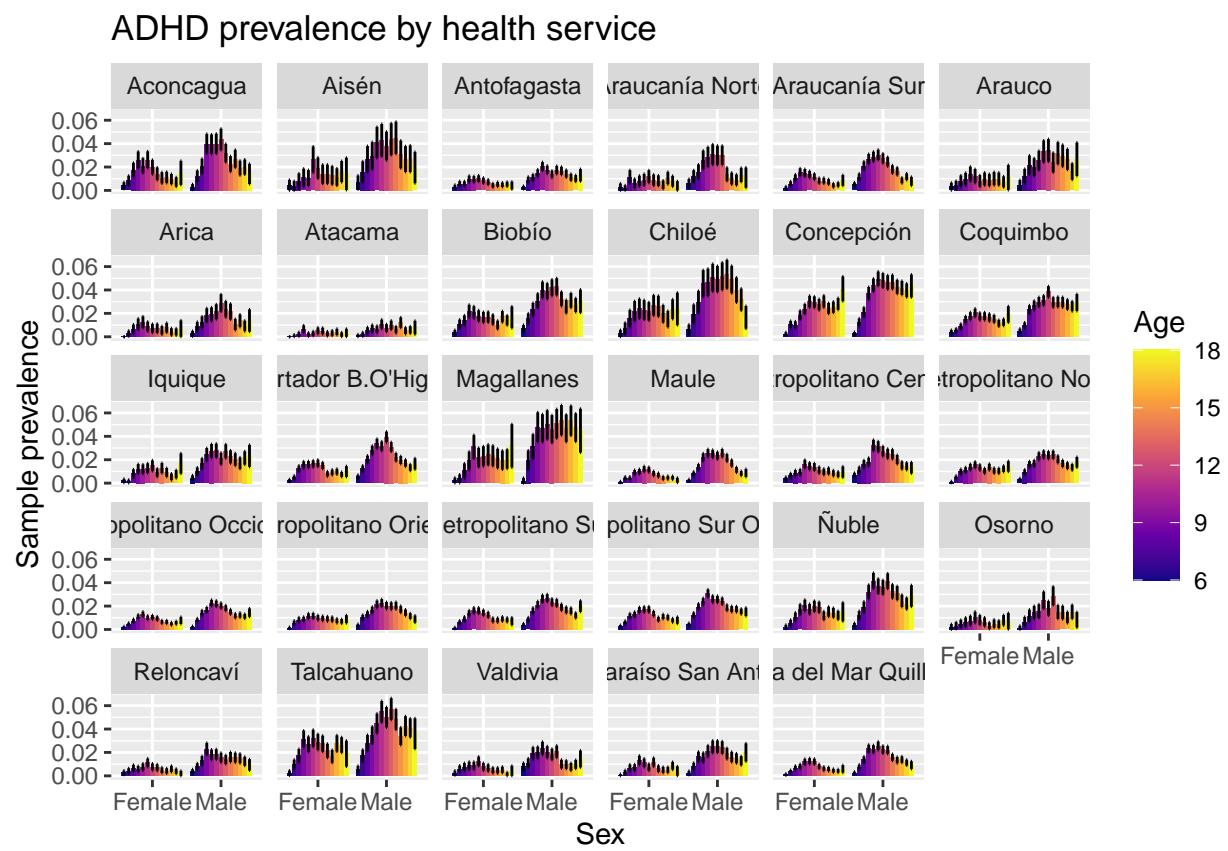


Figure 41: Sample prevalence of ADHD by health service, age and sex. Bars show 95% normal confidence intervals.

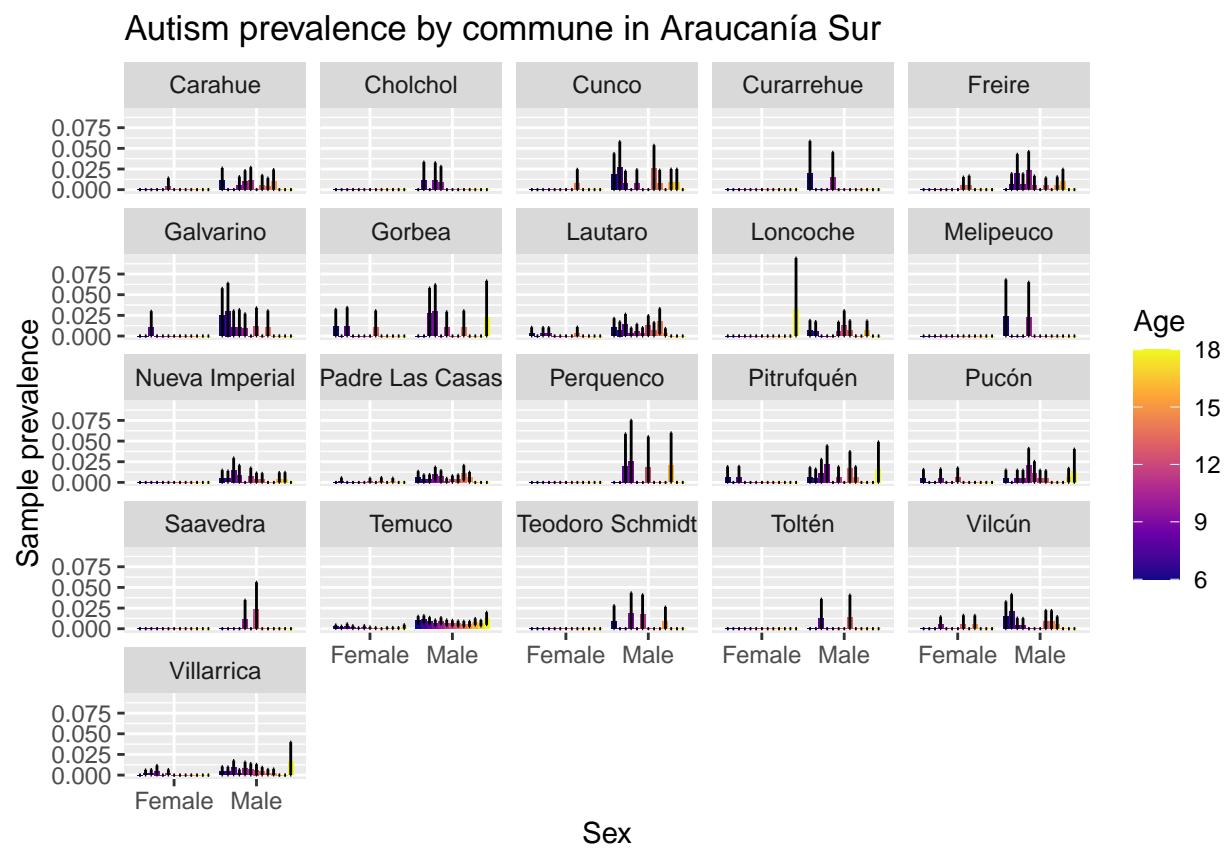


Figure 42: Sample prevalence of autism by commune in Araucanía Sur health service, age and sex. Bars show 95% normal confidence intervals.

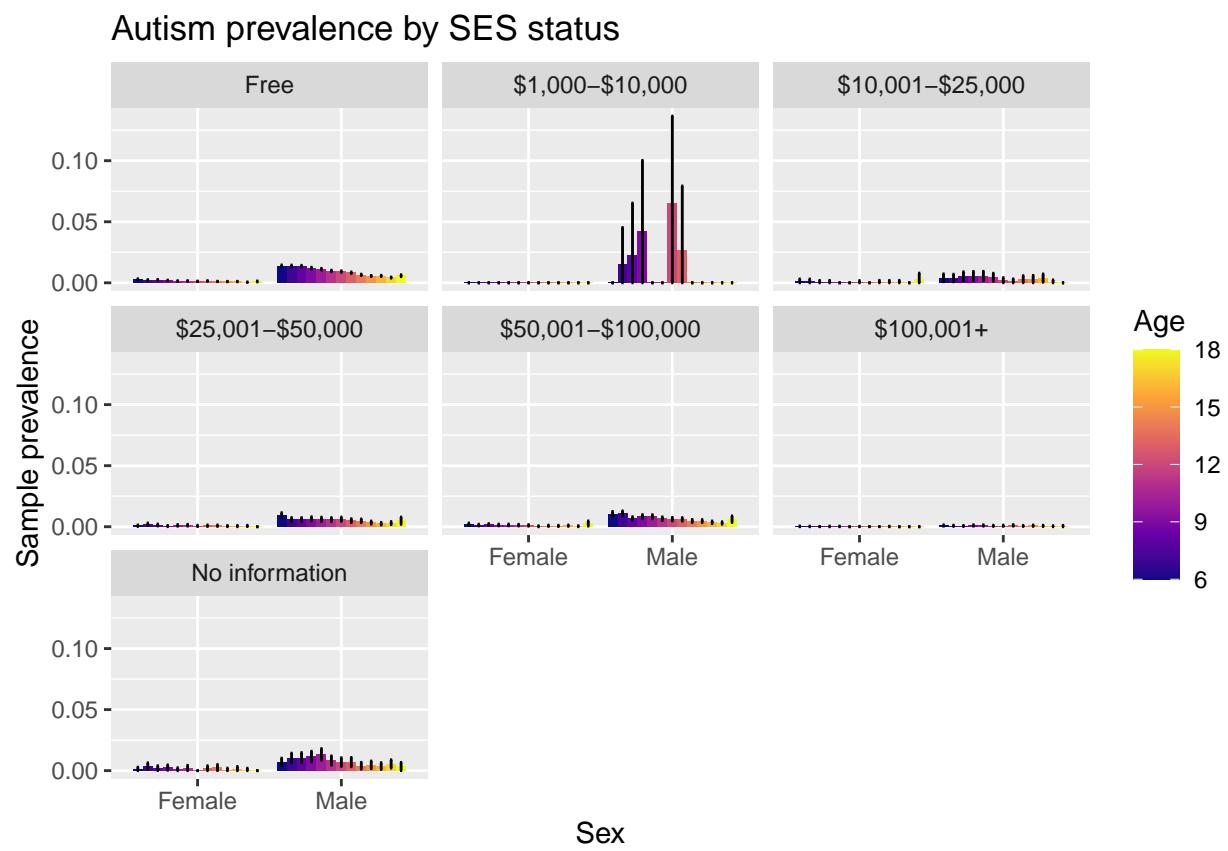


Figure 43: Sample prevalence of autism by socio-economic (SES) status of student's family, age and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by SES status

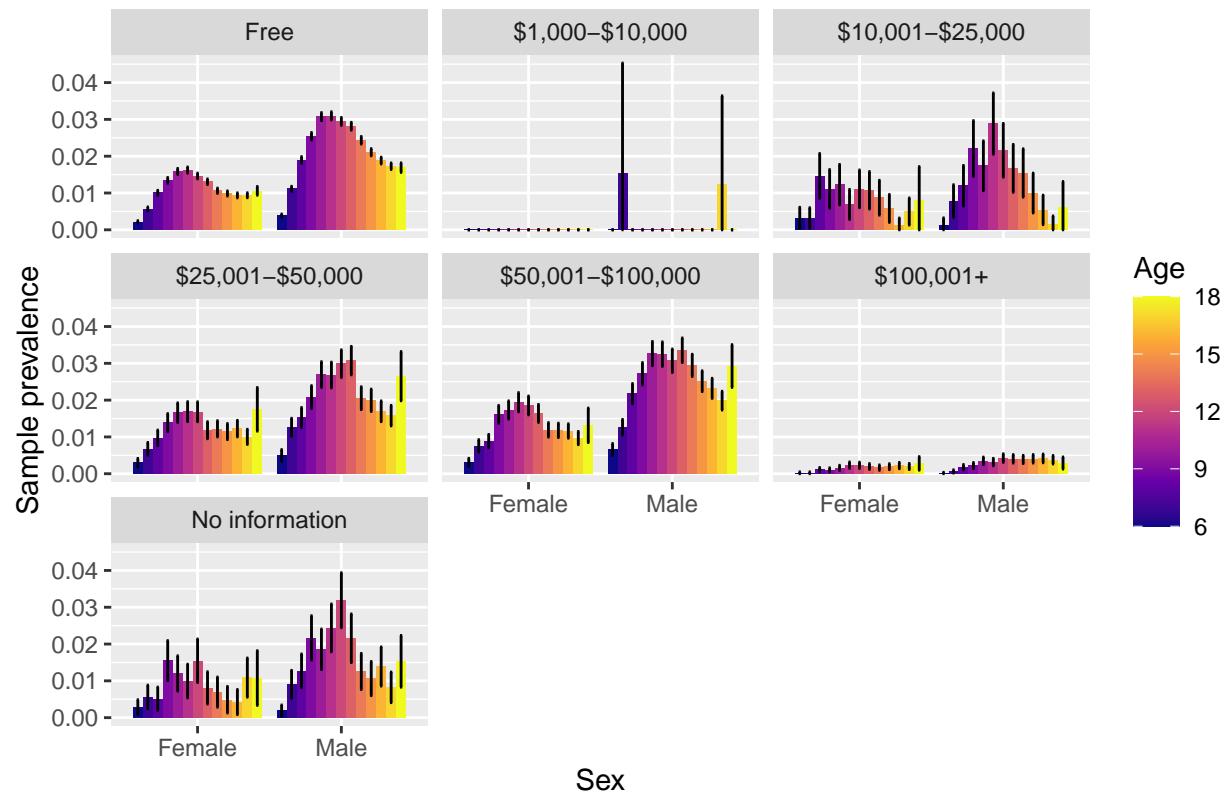


Figure 44: Sample prevalence of ADHD by socio-economic (SES) status of student's family, age and sex. Bars show 95% normal confidence intervals.

Autism prevalence by ethnicity

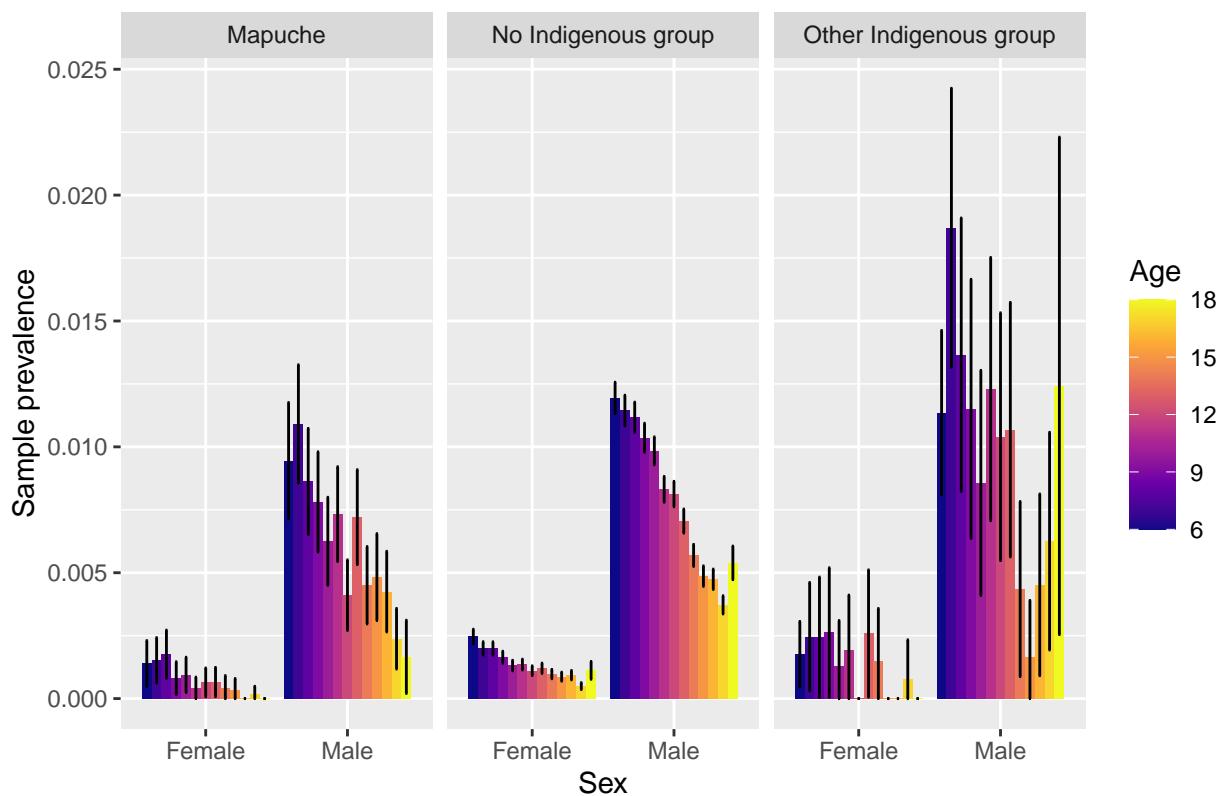


Figure 45: Sample prevalence of autism by ethnicity, age and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by ethnicity

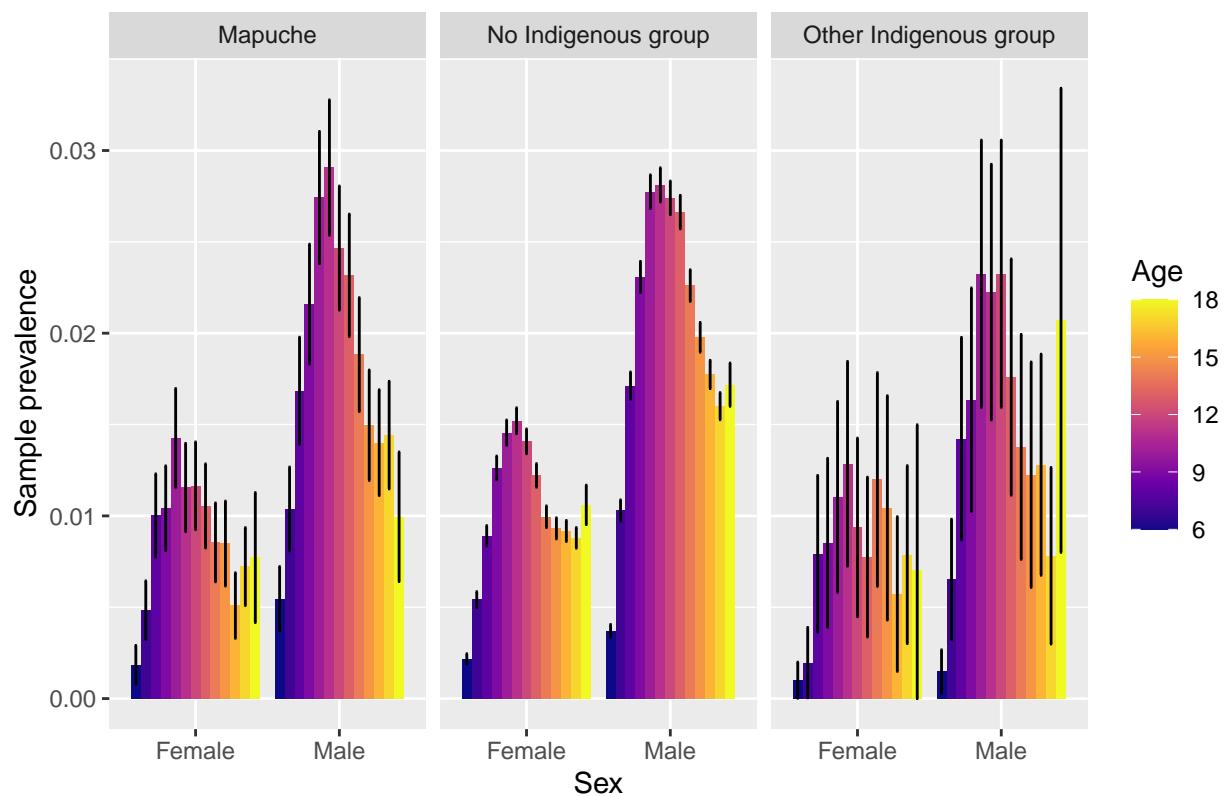


Figure 46: Sample prevalence of ADHD by ethnicity, age and sex. Bars show 95% normal confidence intervals.

Autism prevalence by school's rurality

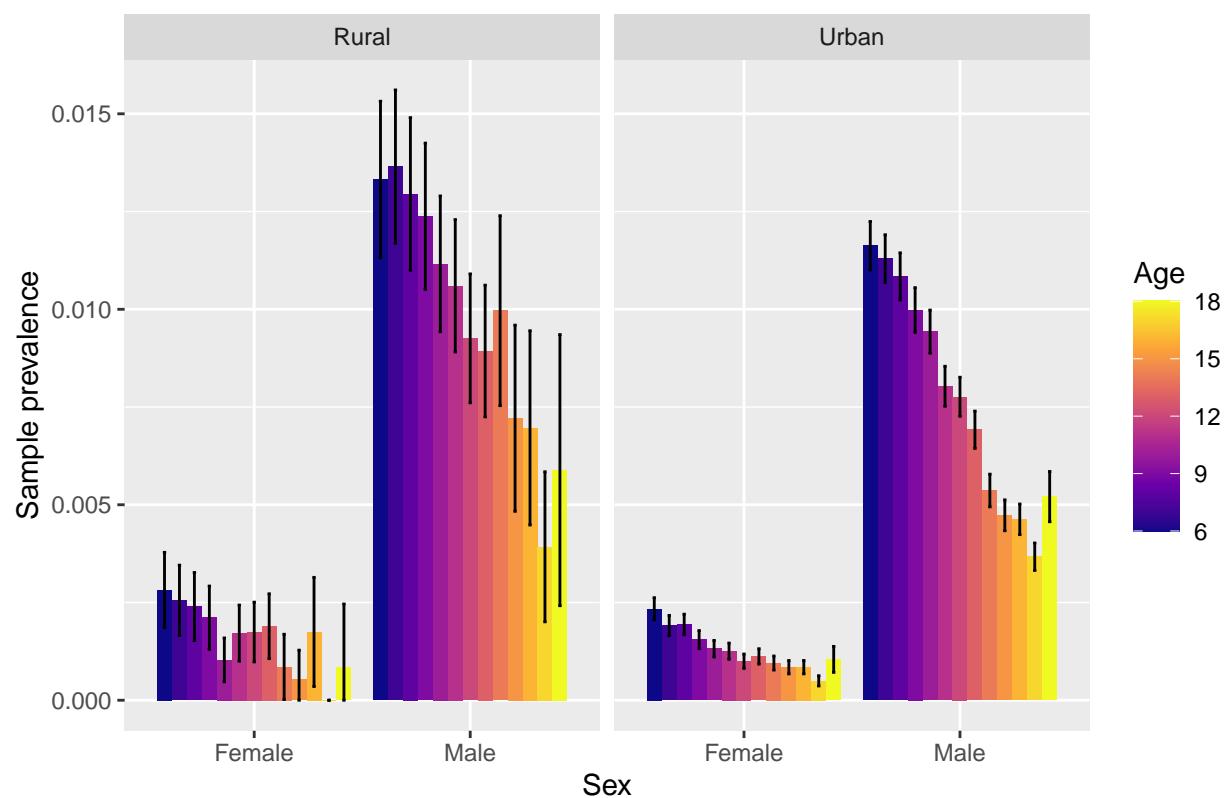


Figure 47: Sample prevalence of autism by school's rurality, age and sex. Bars show 95% normal confidence intervals.

ADHD prevalence by school's rurality

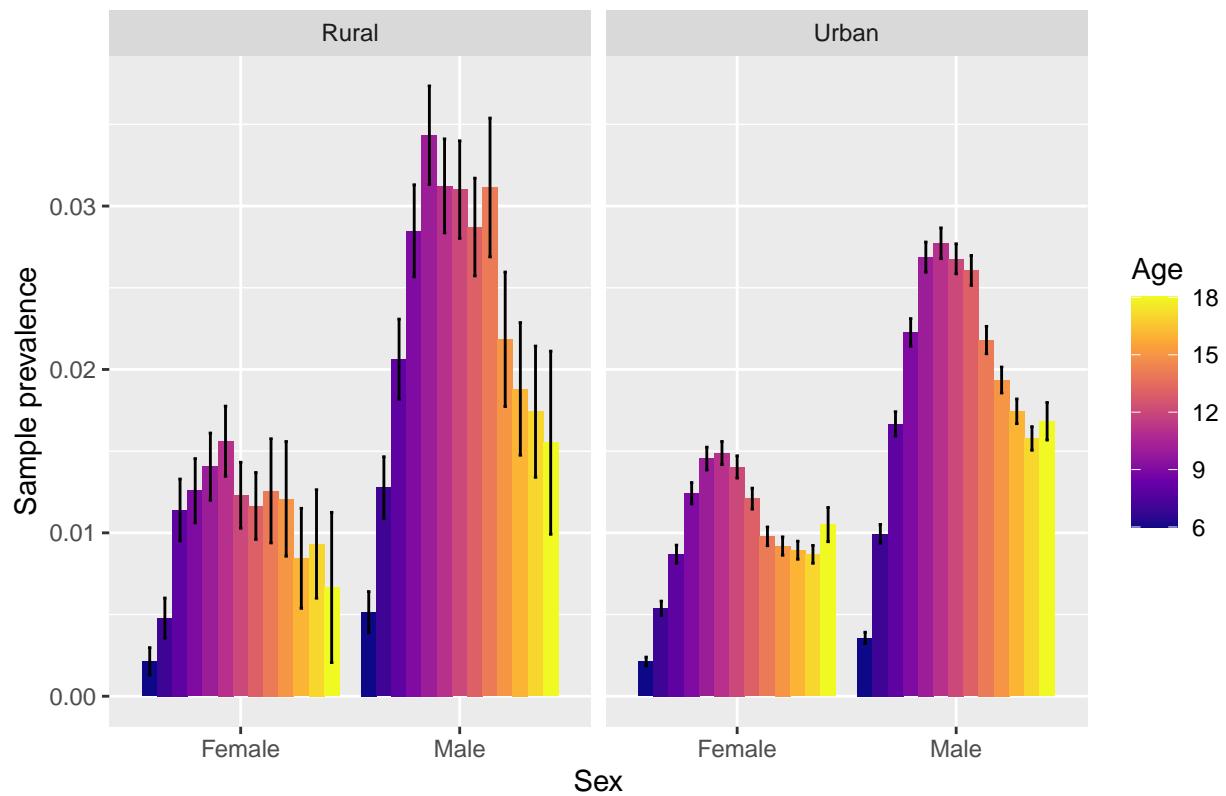


Figure 48: Sample prevalence of ADHD by school's rurality, age and sex. Bars show 95% normal confidence intervals.