Springtides report

Report generated by the Orygen Springtides App
Input parameters selected by Anonymous user

March 17, 2020

Not for citation or public dissemination.

Introduction

Purpose

This report summarises a set of predictions about the annual prevalence of any affective disorder in young people aged between 16 and 25 for the 0800 Postal Area between 01 July 2016 And 17 March 2020. The document also describes some of the key features of the model used to generate these predictions, describes the level of uncertainty associated with the predictions and some of the strengths and limitations of the methods and data sources used in the predictive model.

About Springtides

This report has been automatically generated by the development version of the Springtides App. The Springtides App provides a web based user interface to a computer simulation model of youth mental health epidemiology. The Springtides app and simulation model was developed by Orygen in the statistical software R using the readyforwhatsnext open source modelling framework. The source code for both Springtides and readyforwhatsnext is due for public release as R packages later in 2020. Currently, access to these code libraries is by invitation only as testing is currently ongoing. As this report is generated by the development version of the Springtides App, readers of this report are encouraged to cross reference report findings with other data sources and to report any suspected errors to the Springtides development team.

Methods

Data sources

Currently, all input data used by the Springtides model are Australia specific. Most of the input data is freely available on the Internet and released under permissive licensing arrangements. Some input data were collated from reviews of relevant literature by the Springtides development team and collectively form part of the Springtides Replication Dataset. The replication dataset is currently stored in a private online data repository but is due for public release later in 2020.

Algorithm

The algorithm that produced the predictions in this report first retrieved the geometries that describe 0800 Postal Area. To speed processing times, these geometries have been simplified to reduce the density of points in each shape, using an algorithm that preserves topology. These geometries are next synthesised with spatial attribute data that include census counts, population projections, the mean prediction errors for previous official population projections and age and sex prevalence rates for Any Affective Disorder. These attribute data are reported at different levels of spatial resolution, so to allow the highest resolution data for each data type to be used 0800 Postal Area is divided into sub-units of varying sizes. Population counts and population projection data are used to predict the future resident population of 16 to 25 year olds by sex for each area sub-unit. These resident population predictions are then multiplied by age and sex based prevalence rates to produce the prevalence predictions, which are summed to produce a total prediction for 0800 Postal Area. To account for uncertainty in population projections and prevalence rate parameters, this process was repeated 10 times, each time drawing different values from the probability distributions of these parameters. The parameter uncertainty that is explored by this process relates to population growth rates and prevalence rates. Structural uncertainty relating to geometry simplifcation, the assumed uniform distribution of counts at spatial resolutions greater than that for which reported data were available and the selection of data sources were not explored.

Geometries

The geometry data include data on the boundaries of a range of Australian spatial units (Table 1). The boundary data source files are available for download direct from their publisher in the form of ESRI shape files.

Table 1: Boundary Input Data

Spatial Unit	Boundary Year	Extent	Source
Postal Area	2011	National	Australian Bureau of Statistics
State and Territory	2016	National	Australian Bureau of Statistics
Statistical Area 1	2016	National	Australian Bureau of Statistics
Statistical Area 2	2016	National	Australian Bureau of Statistics
Statistical Area 3	2016	National	Australian Bureau of Statistics

Spatial Attributes

The sources for the attribute data that were used to generate this report are summarised in Table 2.

Table 2: Spatial Attribute Input Data

Attribute	Spatial Unit	Boundary Year	Extent	Source
EPI_PARAMS	Australia	2016	National	Springtides Replication Dataset
ERP_ASX	Statistical Area 2	2016	NT	Australian Bureau of Statistics
ERP_TOT	Statistical Area 1	2016	National	Australian Bureau of Statistics
PPR	Statistical Area 3	2016	NT	State Government
PPR_MAPE	Australia	2016	National	Springtides Replication Dataset

Abbreviations:
[a] EPI_PARAMS: Epidemiology parameters
[b] ERP_ASX: Estimated Resident Population by Age and Sex
[c] ERP_TOT: Estimated Resident Population All Ages
[d] PPR: Population projections
[e] PPR_MAPE: Mean Absolute Prediction Error of ABS Population Projections

The values of the epidemiology parameters in the Springtides Replication Dataset along with details about the relevant evidence sources are summarised in Table 3.

Table 3: Input data for Annual Prevalence of Any Affective Disorder

Age range	Sex	Rate	UI Low Bound (2.5%)	UI High Bound (97.5%)	Source
16 to 24	Female	0.084	0.060	0.109	1
25 to 25	Female	0.084	0.069	0.100	1
16 to 24	Male	0.043	0.025	0.061	1
25 to 25	Male	0.077	0.053	0.102	1

Citations:
[1] Reavley NJ, Cvetkovski S, Jorm AF, Lubman DI. Help-seeking for substance use, anxiety and affective disorders among young people: results from the 2007 Australian National Survey of Mental Health and Wellbeing. ANZJP. 2010;44:7.

Results

Demographic Results

The predicted population of 16 to 25 year olds resident in 0800 Postal Area is summarised in the following nine tables and nine figures.

Table 4: Estimated 2016 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	74	74	74
21	74	74	74
22	74	74	74
23	74	74	74
24	74	74	74
25	131	131	131

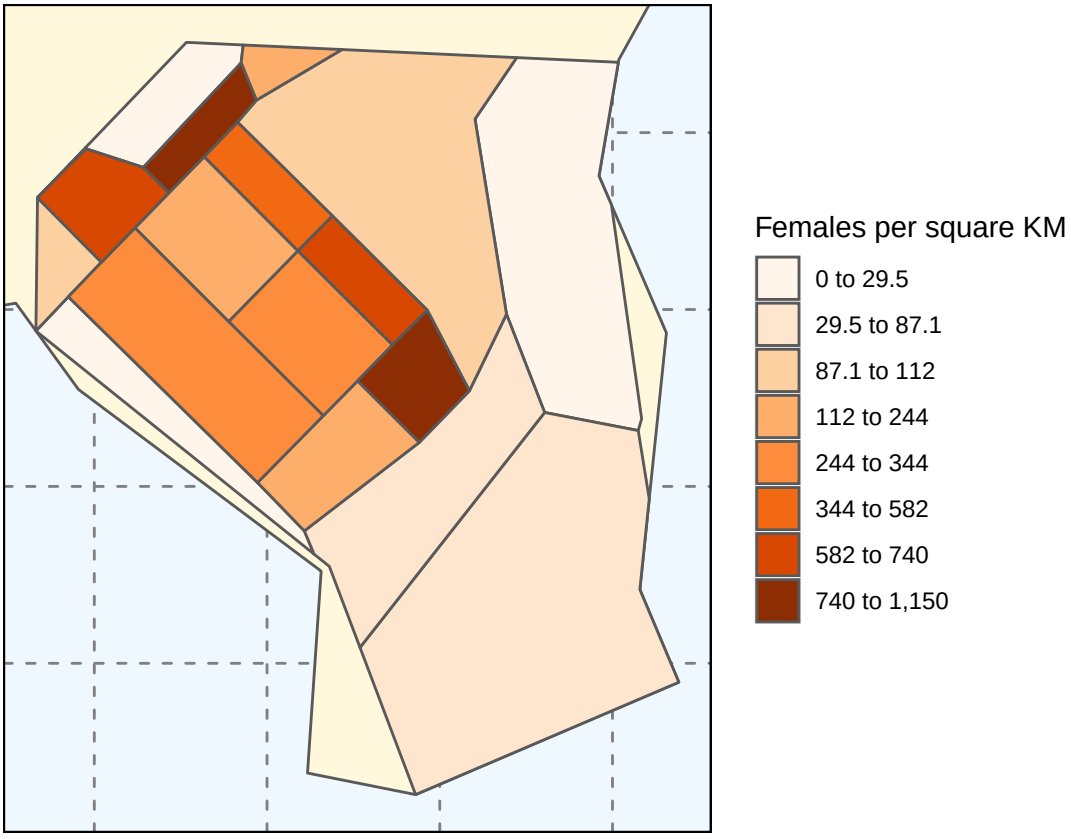

Figure 1: Estimated 2016 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Table 5: Estimated 2016 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	73	73	73
21	73	73	73
22	73	73	73
23	73	73	73
24	73	73	73
25	151	151	151

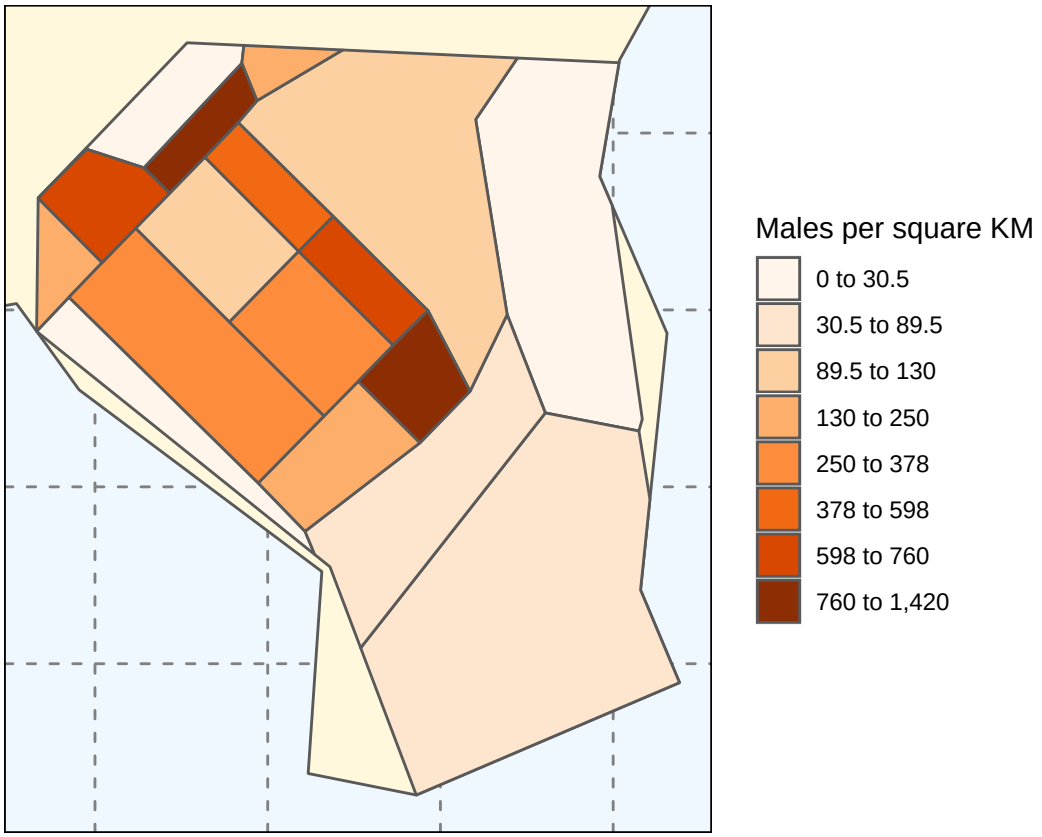

Figure 2: Estimated 2016 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Table 6: Estimated 2016 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

Sex	Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	500	500	500
Male	20-25	515	515	515
Persons	20-25	1,016	1,016	1,016

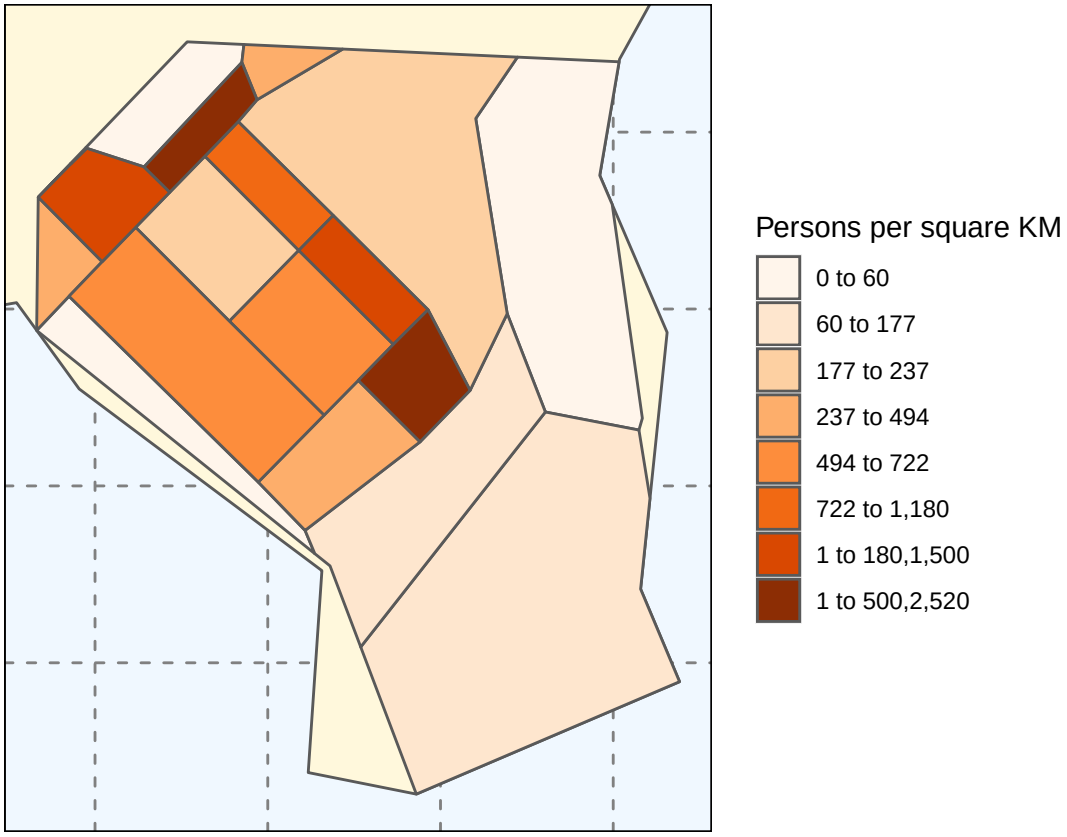

Figure 3: Estimated 2016 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

2020 Resident Population Predictions

Table 7: Predicted 2020 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	65	64	65
21	65	64	65
22	65	64	65
23	65	64	65
24	65	64	65
25	115	113	117

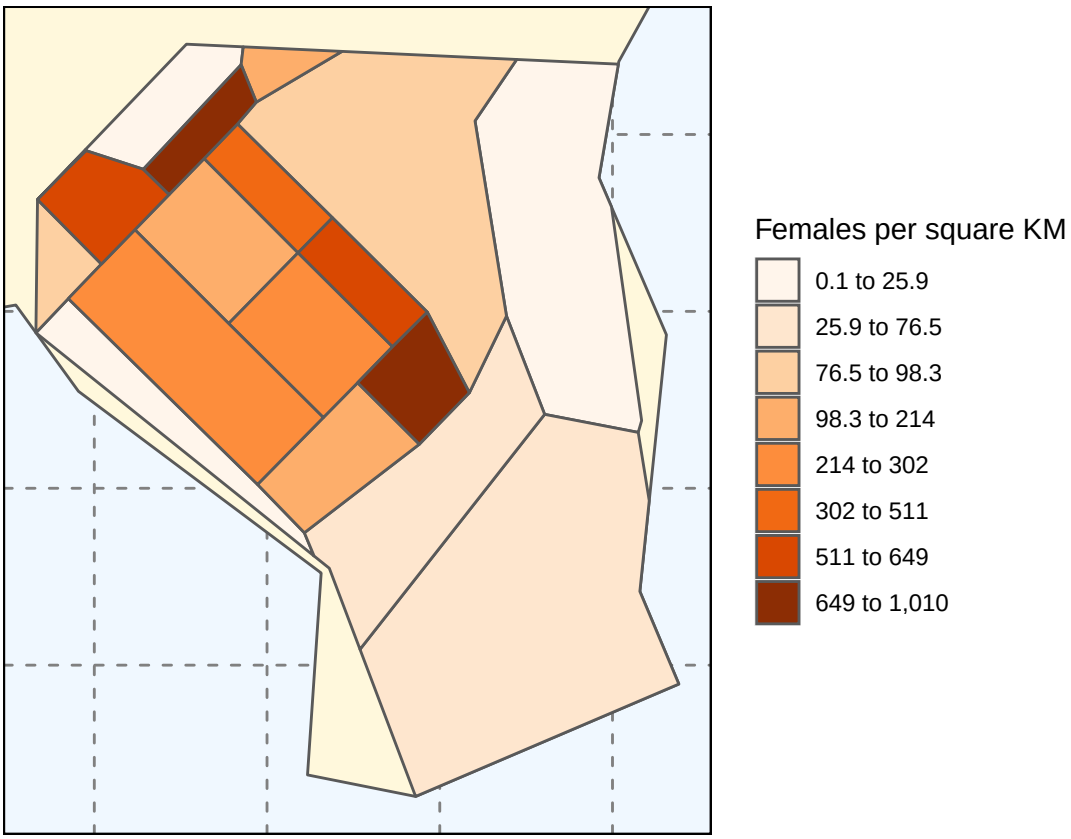

Figure 4: Predicted 2020 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Table 8: Predicted 2020 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	65	65	65
21	65	65	65
22	65	65	65
23	65	65	65
24	65	65	65
25	134	131	137

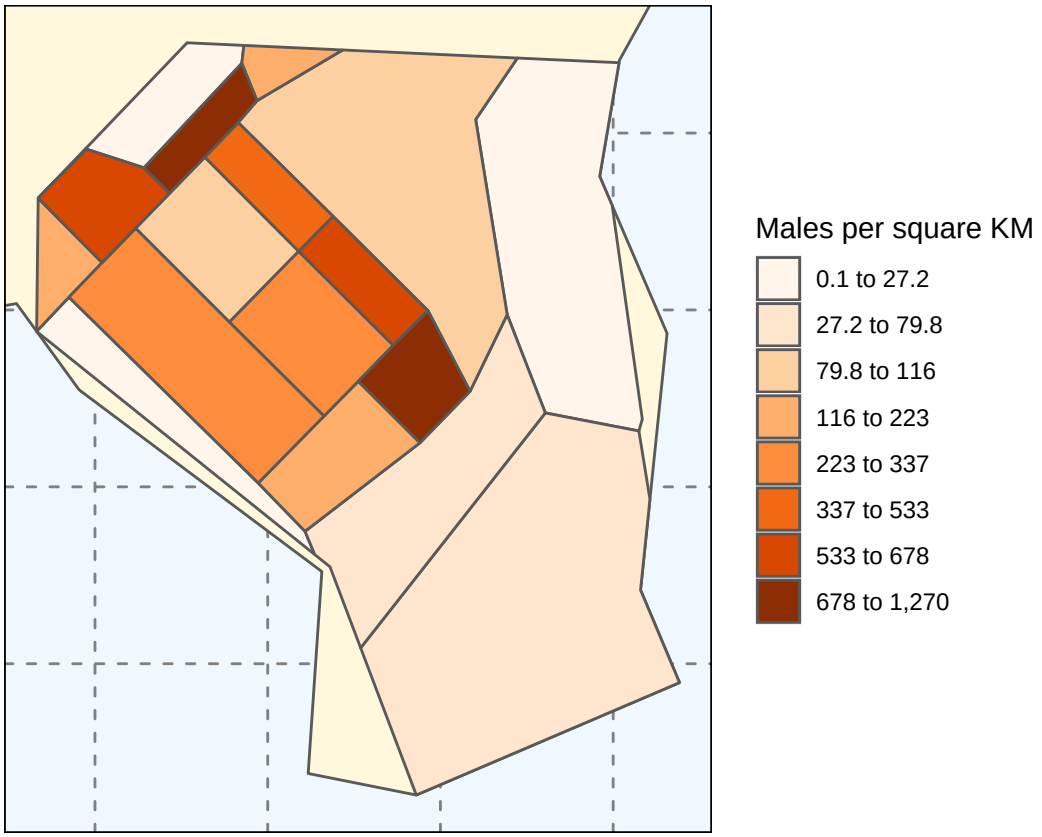

Figure 5: Predicted 2020 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Table 9: Predicted 2020 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	439	435	442
Male	20-25	460	454	463
Persons	20-25	899	889	904

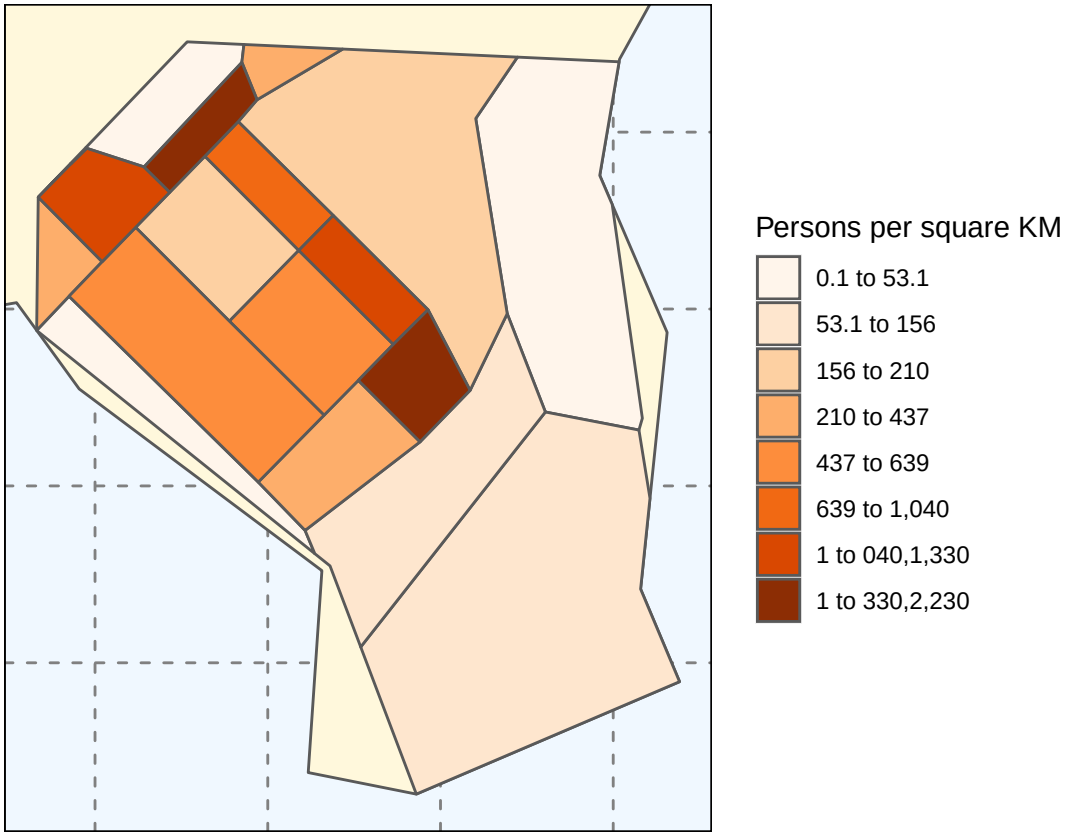

Figure 6: Predicted 2020 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

Predicted Change in Resident Population Between 2016 and 2020

Table 10: Predicted Change in Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	-9	-10	-9
21	-9	-10	-9
22	-9	-10	-9
23	-9	-10	-9
24	-9	-10	-9
25	-16	-18	-15

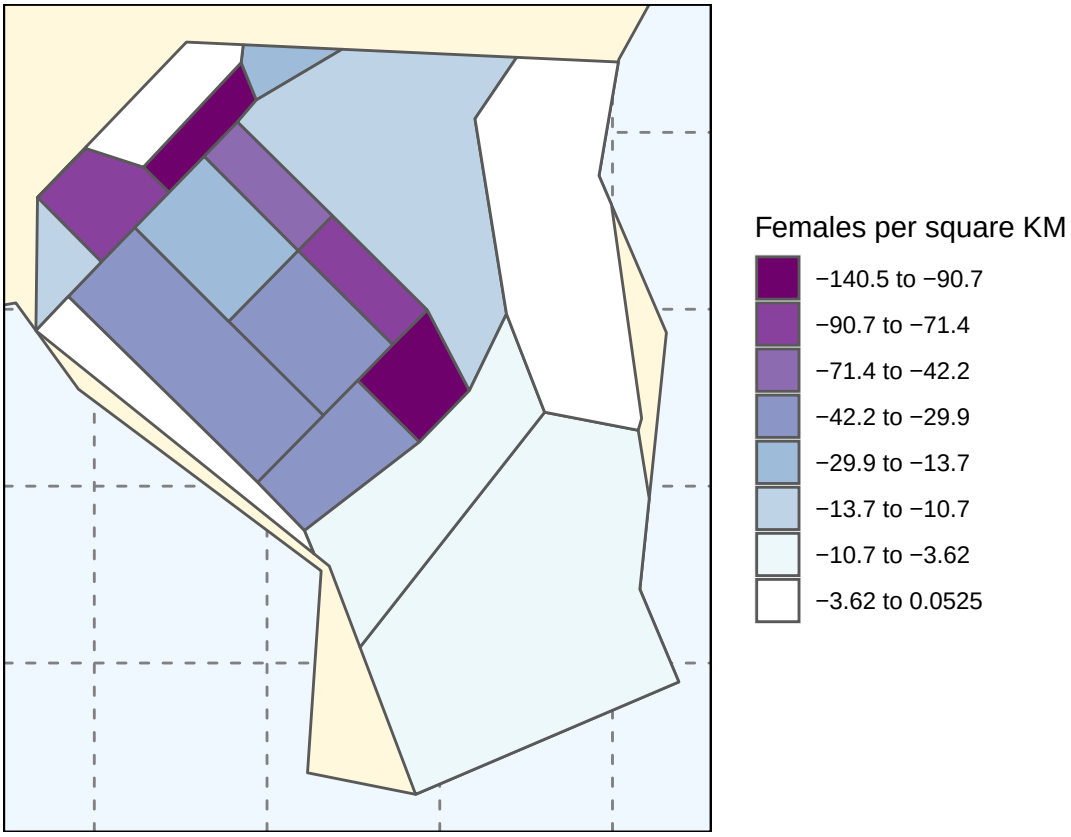

Figure 7: Predicted Change in Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Table 11: Predicted Change in Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	-8	-8	-8
21	-8	-8	-8
22	-8	-8	-8
23	-8	-8	-8
24	-8	-8	-8
25	-17	-20	-14

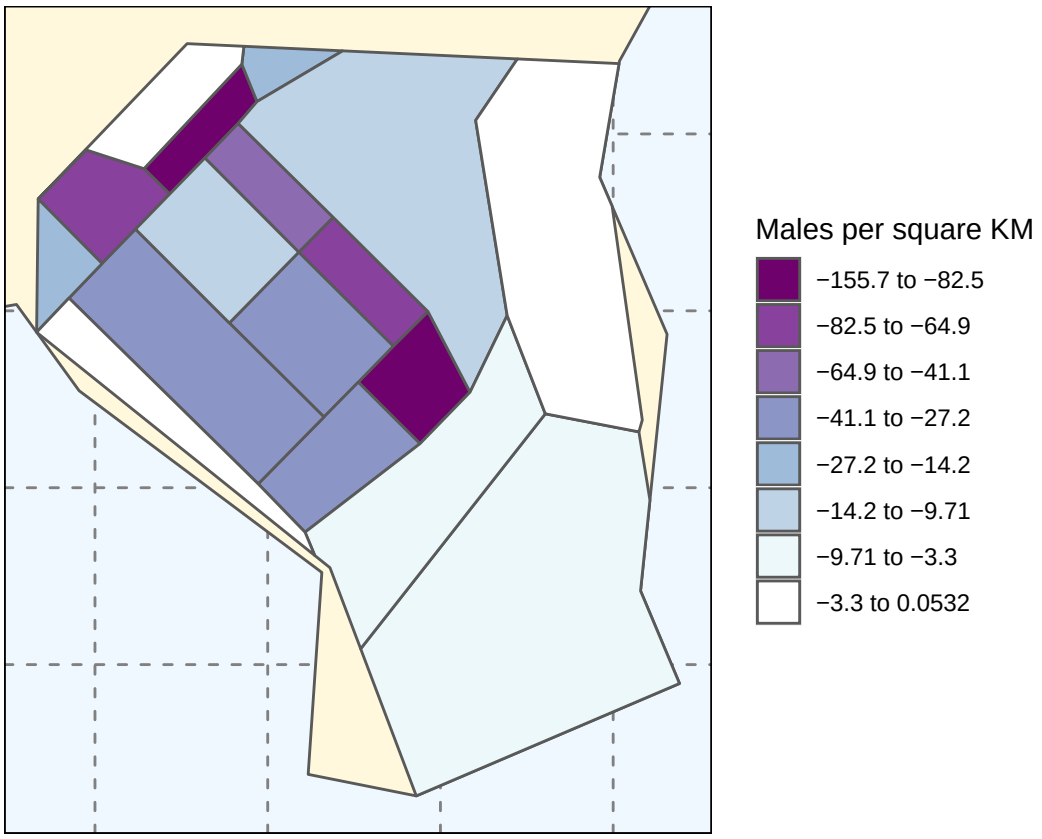

Figure 8: Predicted Change in Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Table 12: Predicted Change in Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	-62	-65	-59
Male	20-25	-56	-61	-52
Persons	20-25	-117	-126	-111

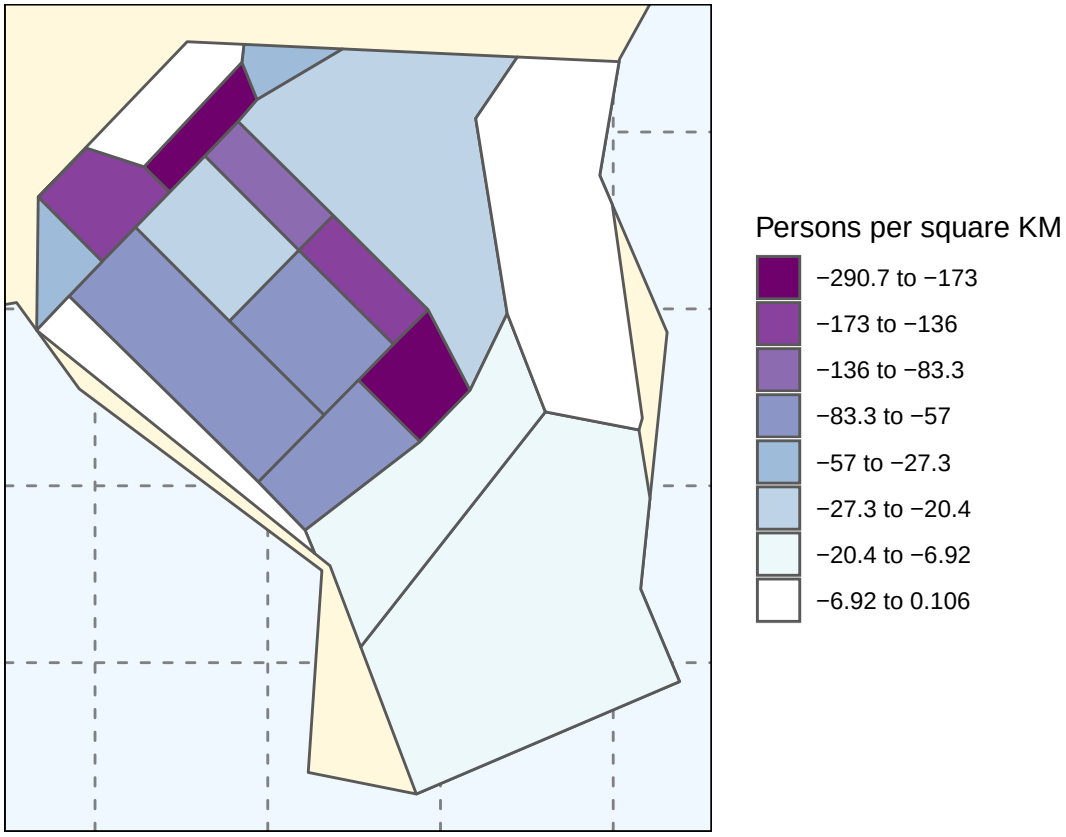

Figure 9: Predicted Change in Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Annual Prevalence of Any Affective Disorder Results

The predicted annual prevalence of any affective disorder amongst 16 to 25 year olds resident in 0800 Postal Area is summarised in the next nine tables and nine figures.

2016 Annual Prevalence of Any Affective Disorder Predictions

Table 13: Predicted 2016 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	6	5	8
21	6	5	7
22	6	6	7
23	6	5	8
24	6	6	7
25	11	9	12

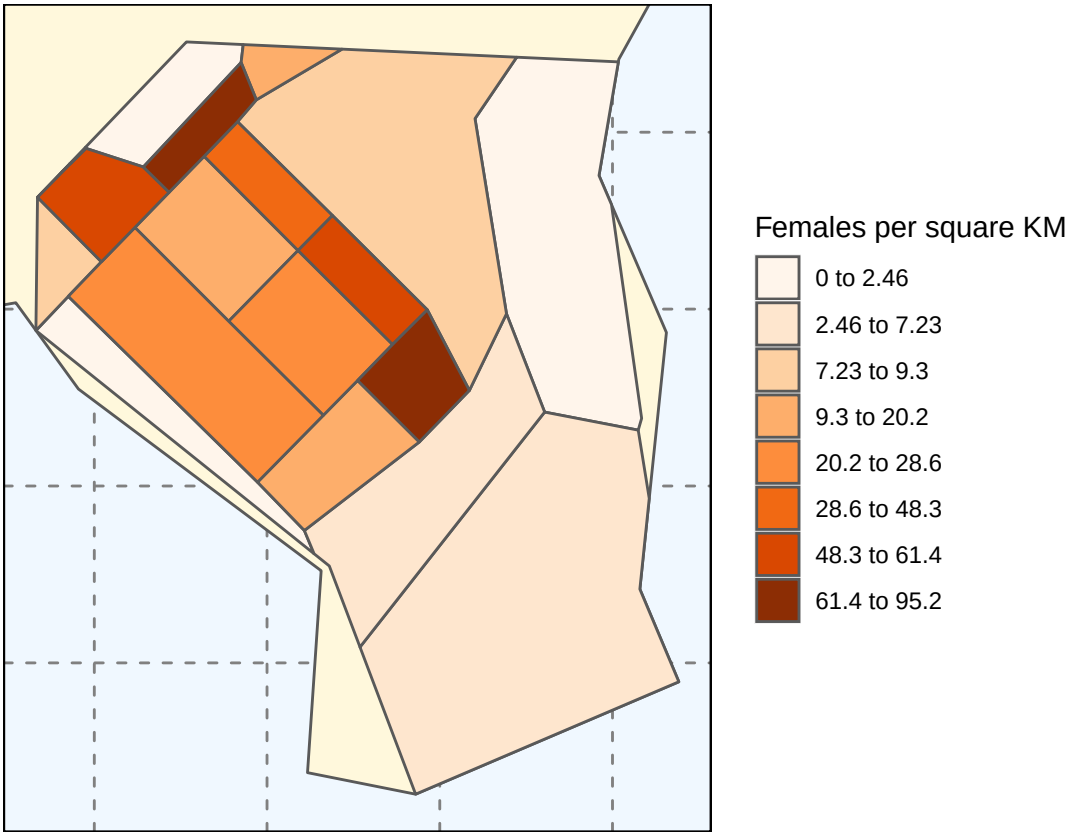

Figure 10: Predicted 2016 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Table 14: Predicted 2016 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	3	2	4
21	3	2	4
22	3	2	4
23	4	3	4
24	3	2	4
25	12	10	16

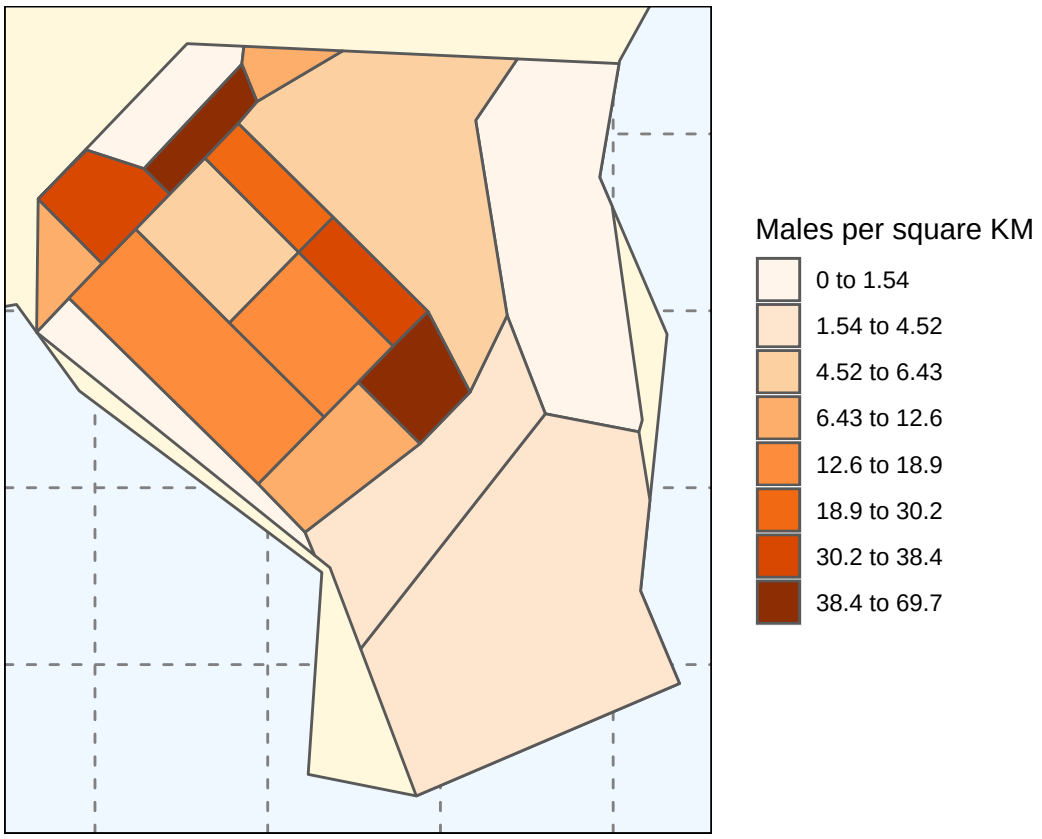

Figure 11: Predicted 2016 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Table 15: Predicted 2016 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

Sex	Age	Estimate	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	42	40	45
Male	20-25	28	26	31
Persons	20-25	71	68	73

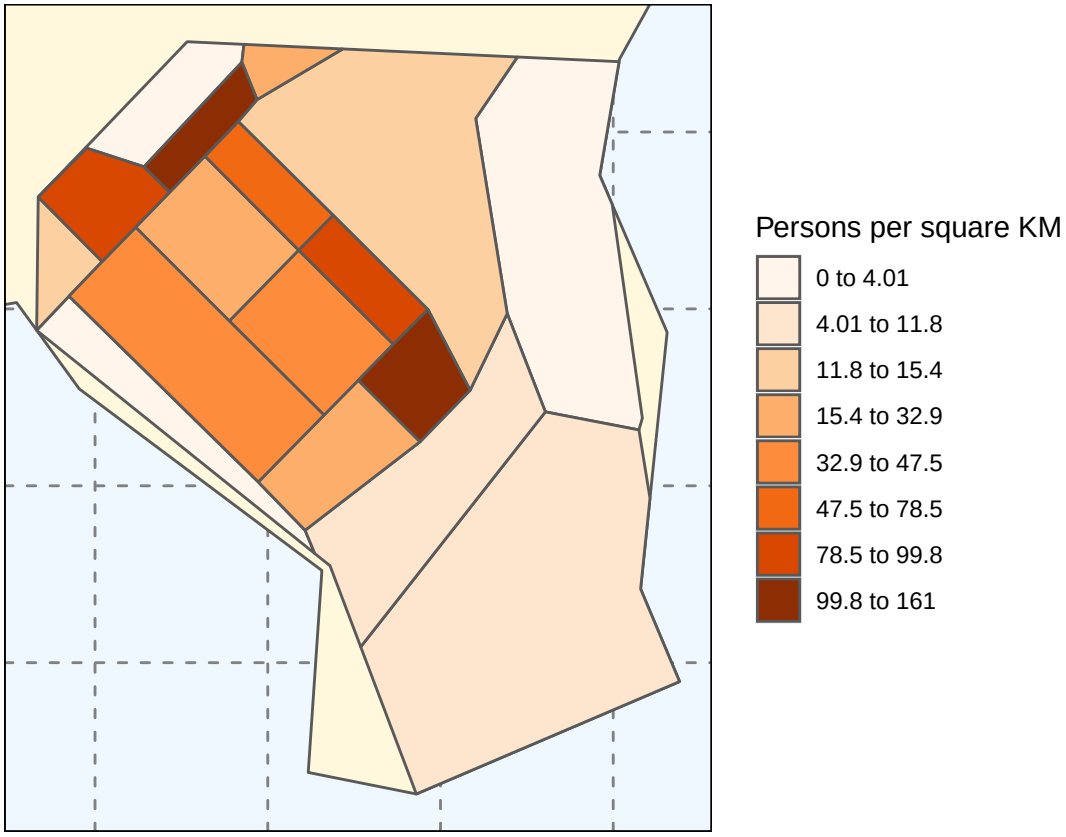

Figure 12: Predicted 2016 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

2020 Annual Prevalence of Any Affective Disorder Predictions

Table 16: Predicted 2020 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	5	5	7
21	5	4	6
22	6	5	6
23	5	4	7
24	5	5	6
25	10	8	11

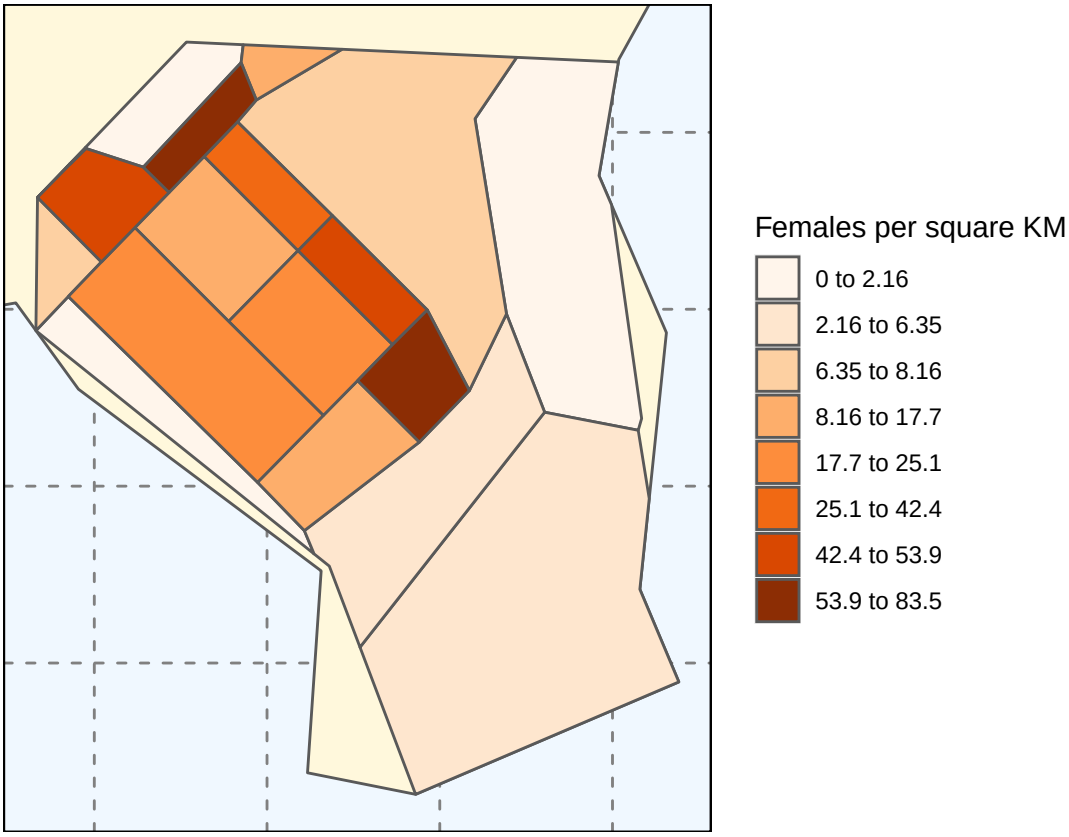

Figure 13: Predicted 2020 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Table 17: Predicted 2020 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	3	2	3
21	3	2	4
22	3	2	4
23	3	2	4
24	3	2	3
25	11	9	14

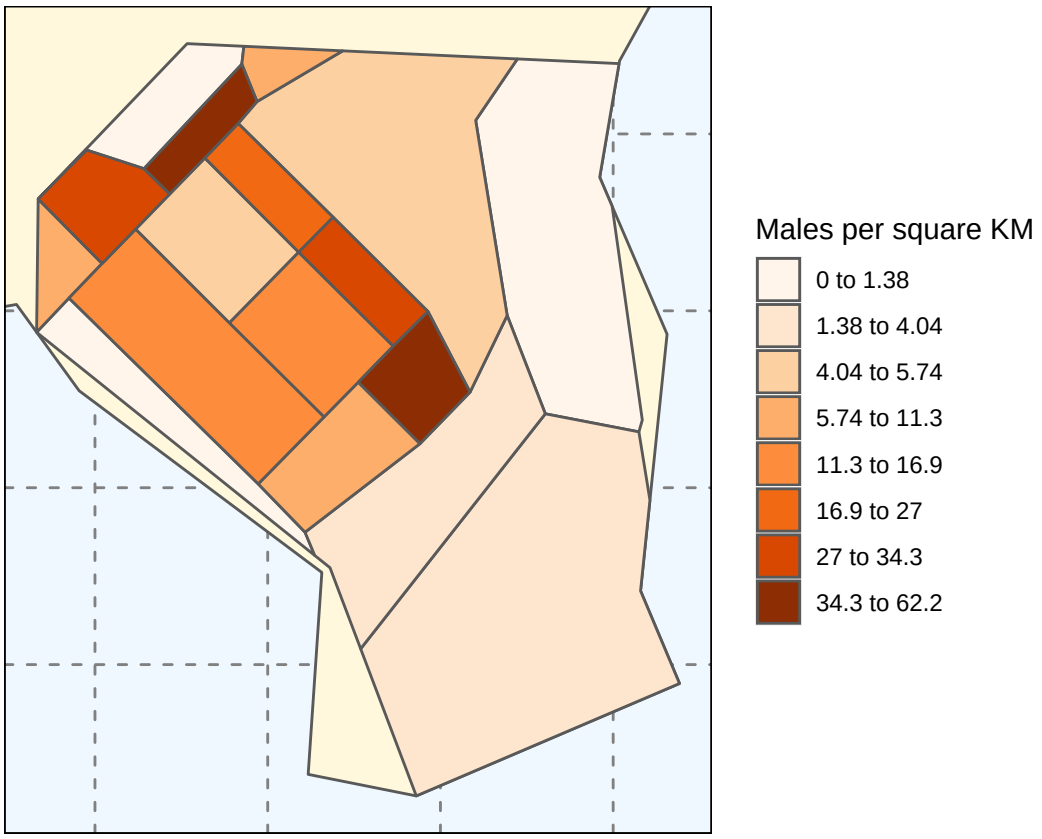

Figure 14: Predicted 2020 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Table 18: Predicted 2020 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	37	35	39
Male	20-25	25	23	28
Persons	20-25	62	60	65

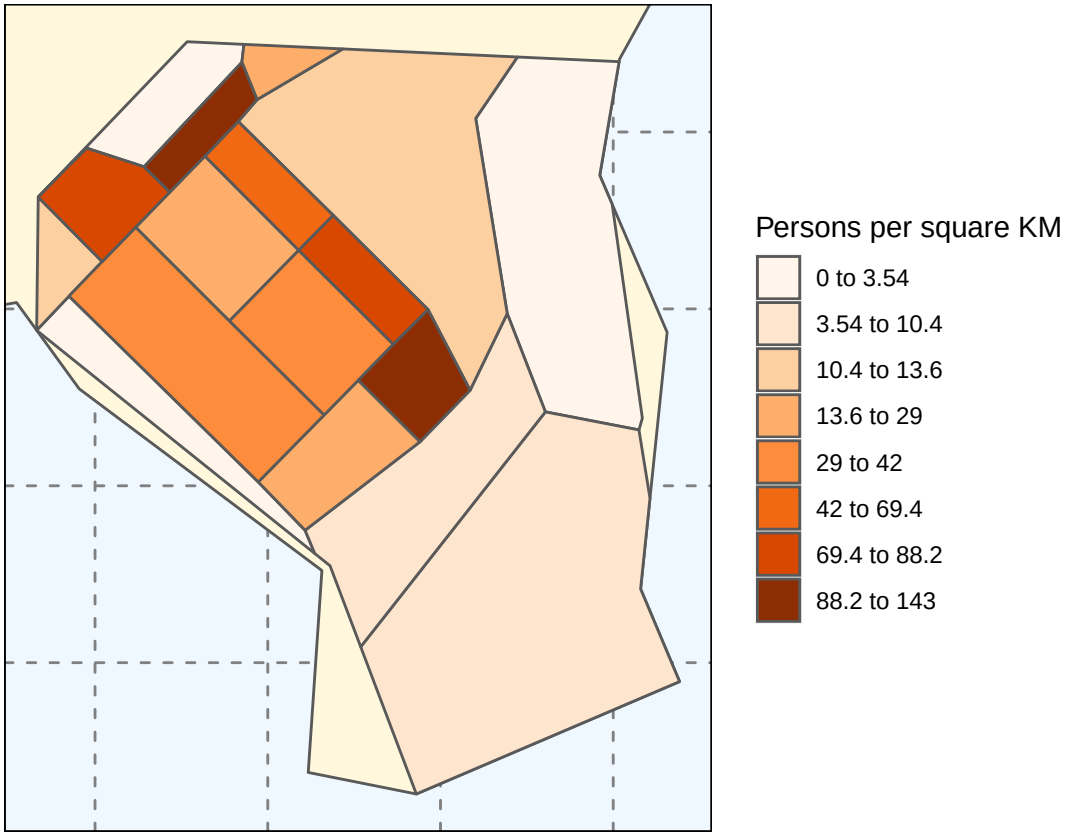

Figure 15: Predicted 2020 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

Predicted Change in Annual Prevalence of Any Affective Disorder Between 2016 and 2020

Table 19: Predicted Change in Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	-1	-1	-1
21	-1	-1	-1
22	-1	-1	-1
23	-1	-1	-1
24	-1	-1	-1
25	-1	-2	-1

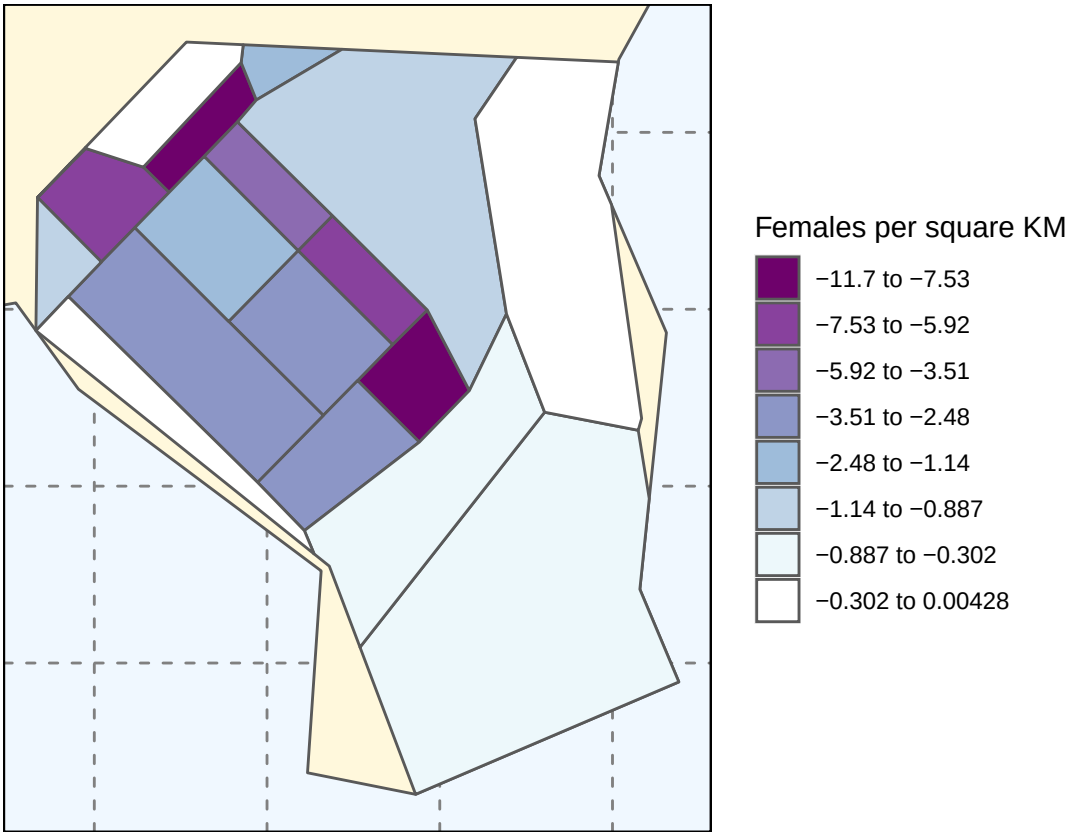

Figure 16: Predicted Change in Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Table 20: Predicted Change in Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
20	-0	-0	-0
21	-0	-0	-0
22	-0	-0	-0
23	-0	-0	-0
24	-0	-0	-0
25	-1	-2	-1

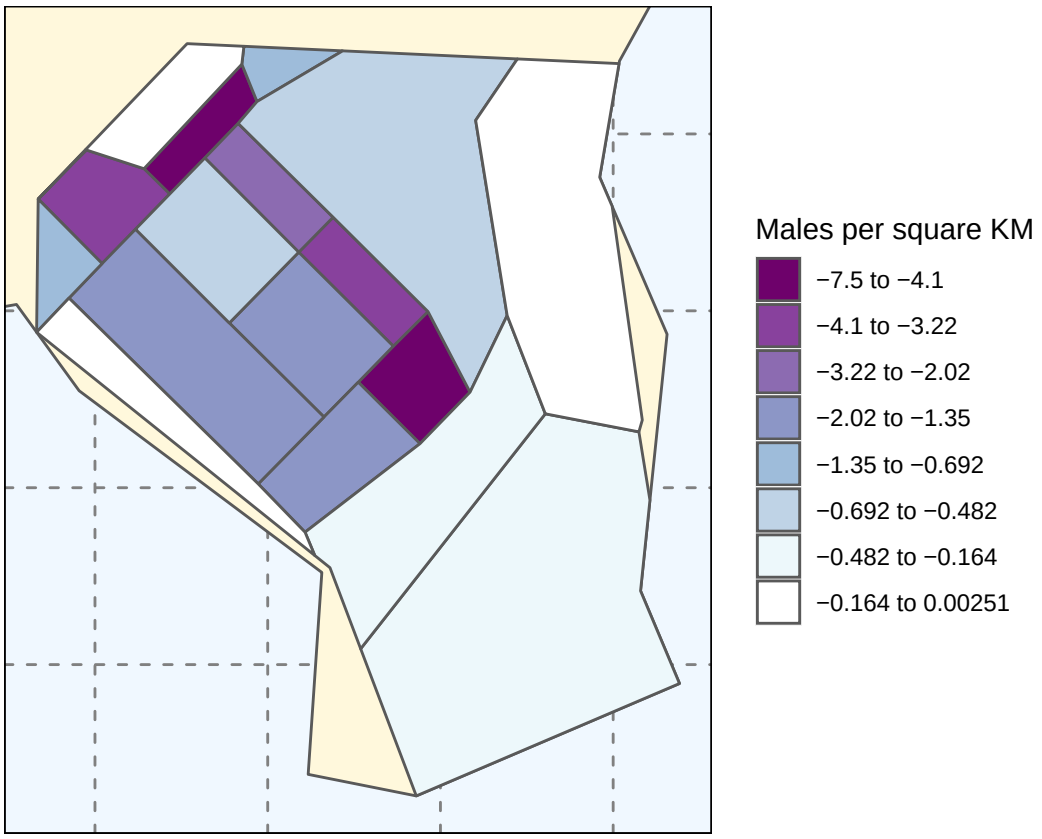

Figure 17: Predicted Change in Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Table 21: Predicted Change in Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	20-25	-5	-6	-5
Male	20-25	-3	-3	-3
Persons	20-25	-8	-9	-8

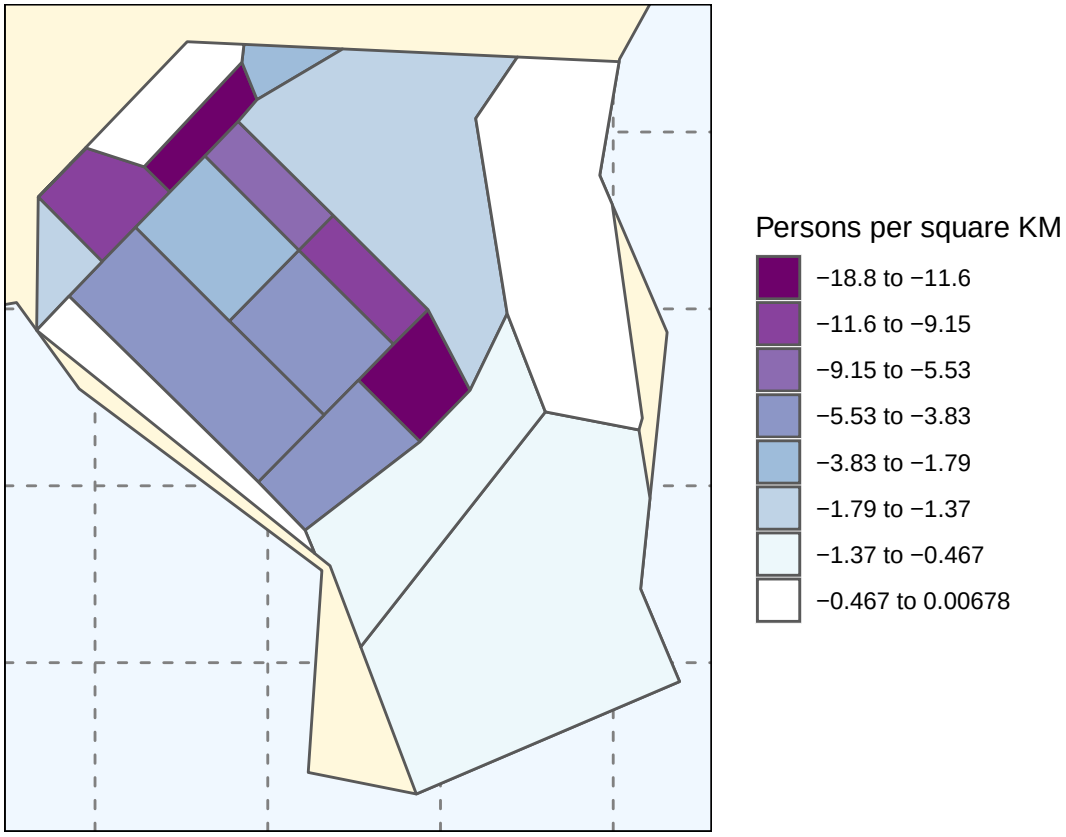

Figure 18: Predicted Change in Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area Between 2016 and 2020

Discussion

The results presented in this report are the result of the synthesis of Australian geometry and attribute data. Strengths of the approach implemented by the Springtides App in generating this report is the relevance of the input data to the Australian context and using the highest available resolution for each spatial attribute data type. However, there are also a number of limitations that users of this report should bear in mind when interpreting report results.

First and most importantly, this report is produced by a development version of the Springtides App, which means both the application and its underlying model are only partially verified and validated. An updated version of the Springtides App will be released once user testing, code and input data verification and validation checks have been completed. Secondly, epidemiology estimates are currently based on age and sex predictors only. Area attributes such as urbanicity and socioeconomic status will be added to the predictors in a forthcoming development version release. Thirdly, uncertainty is only partially explored and the true uncertainty of model outputs will be greater than that described in this report. Some model inputs currently only have deterministic values, structural uncertainty is not yet explored and to conserve computing resources we have restricted Springtides App users to running a maximum of 100 iterations of each simulation. We will be shortly addressing each of these constraints in a forthcoming development release as well as providing opportunities to explore structural uncertainty through selection of alternative evidence sources for a number of model parameters.

Contact

You can help improve the Springtides App by reporting any suspected errors or providing usability feedback to the Springtides development team. Email: matthew.hamilton@orygen.org.au