

Springtides report

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

March 19, 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Not for citation or public dissemination.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 19 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 Oxygen 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.

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
Local Government Area	2016	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

Table 2: Point Coordinate Input Data

Service	Extent	Feature	Source
HSS	National	PNT	Springtides Replication Dataset

Spatial Attributes

The sources for the spatial attribute data that were used to generate this report are summarised in Table 3.

Table 3: Spatial Attribute Input Data

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

Abbreviations:

^a EPI_PARAMS: Epidemiology parameters

^b ERP_AXS: 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 4.

Table 4: 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.

Algorithm

The algorithm that produced the predictions in this report first generated 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. As these attribute data are reported at different levels of spatial resolution, the geometry representing 0800 Postal Area is divided into sub-units of varying sizes in order for the highest available resolution to be used for each attribute. 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 simplification, the assumed uniform distribution of counts at spatial resolutions greater than that for which reported data were available and the selection of data sources was not explored.

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.

01 July 2016 Resident Population Estimates

Table 5: Estimated 01 July 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%)
16	395	395	395
17	395	395	395
18	395	395	395
19	395	395	395
20	506	506	506
21	506	506	506
22	506	506	506
23	506	506	506
24	506	506	506
25	438	438	438

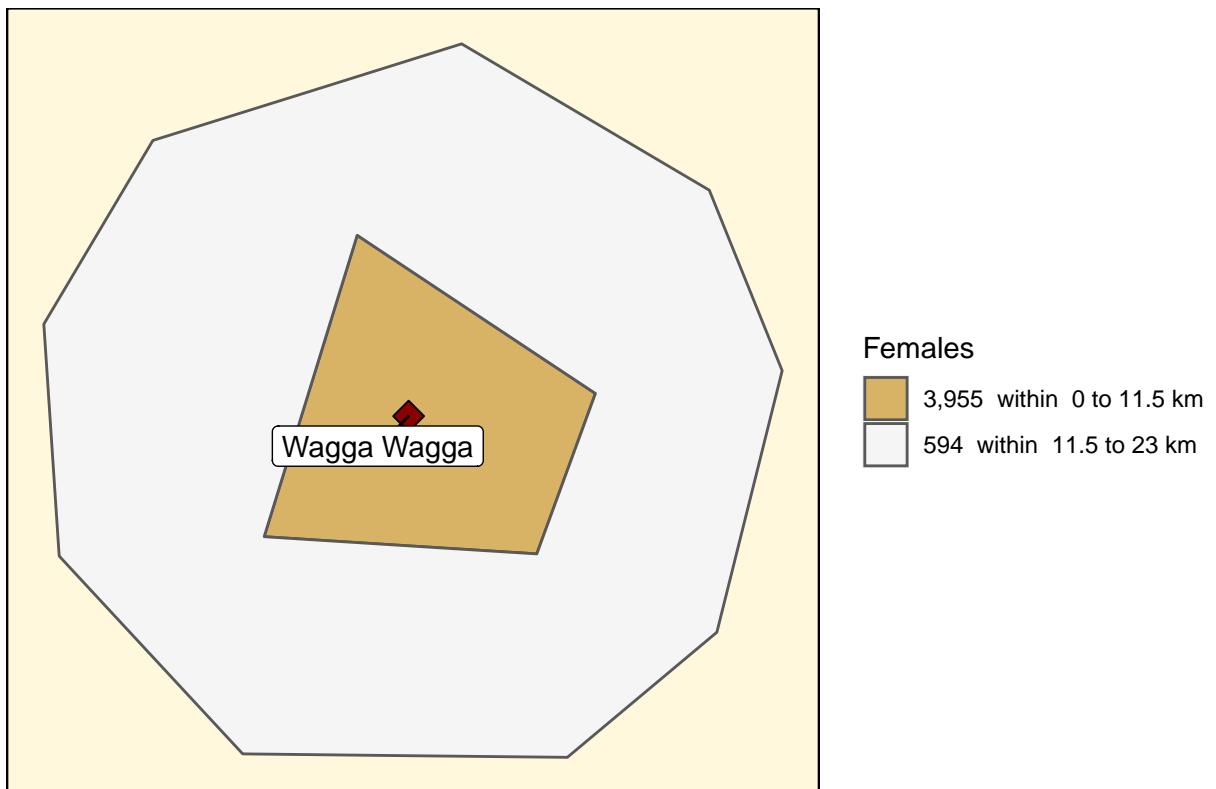


Figure 1: Estimated 01 July 2016 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Table 6: Estimated 01 July 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%)
16	421	421	421
17	421	421	421
18	421	421	421
19	421	421	421
20	465	465	465
21	465	465	465
22	465	465	465
23	465	465	465
24	465	465	465
25	427	427	427

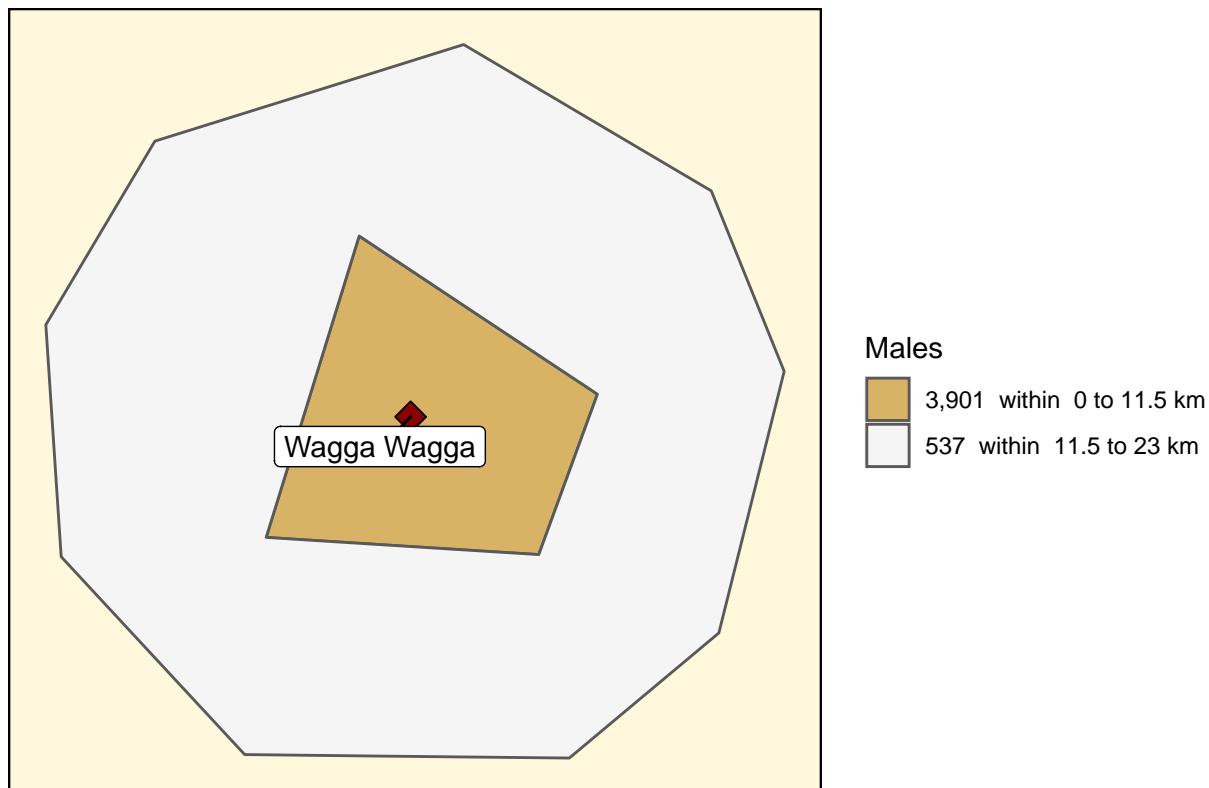


Figure 2: Estimated 01 July 2016 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Table 7: Estimated 01 July 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	16-25	4,547	4,547	4,547
Male	16-25	4,435	4,435	4,435
Persons	16-25	8,982	8,982	8,982

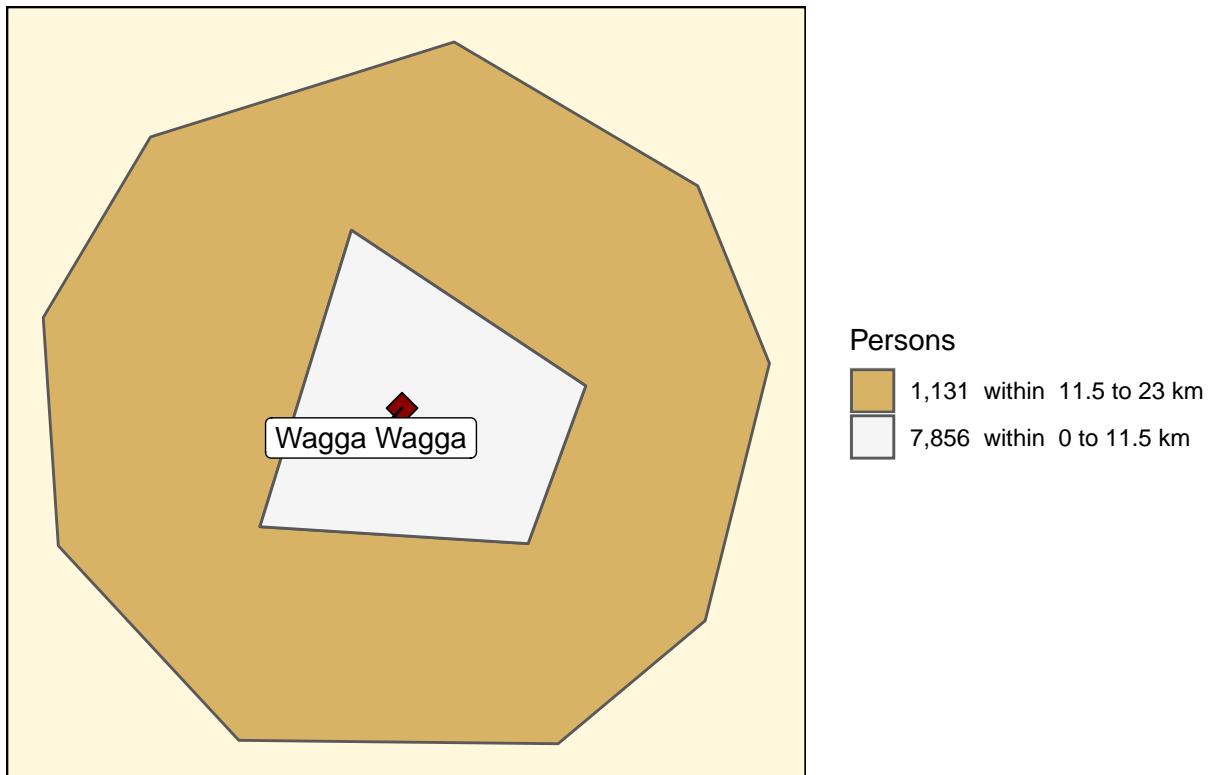


Figure 3: Estimated 01 July 2016 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

19 March 2020 Resident Population Predictions

Table 8: Predicted 19 March 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%)
16	401	399	403
17	401	399	403
18	401	399	403
19	401	399	403
20	510	505	514
21	510	505	514
22	510	505	514
23	510	505	514
24	510	505	514
25	440	434	442

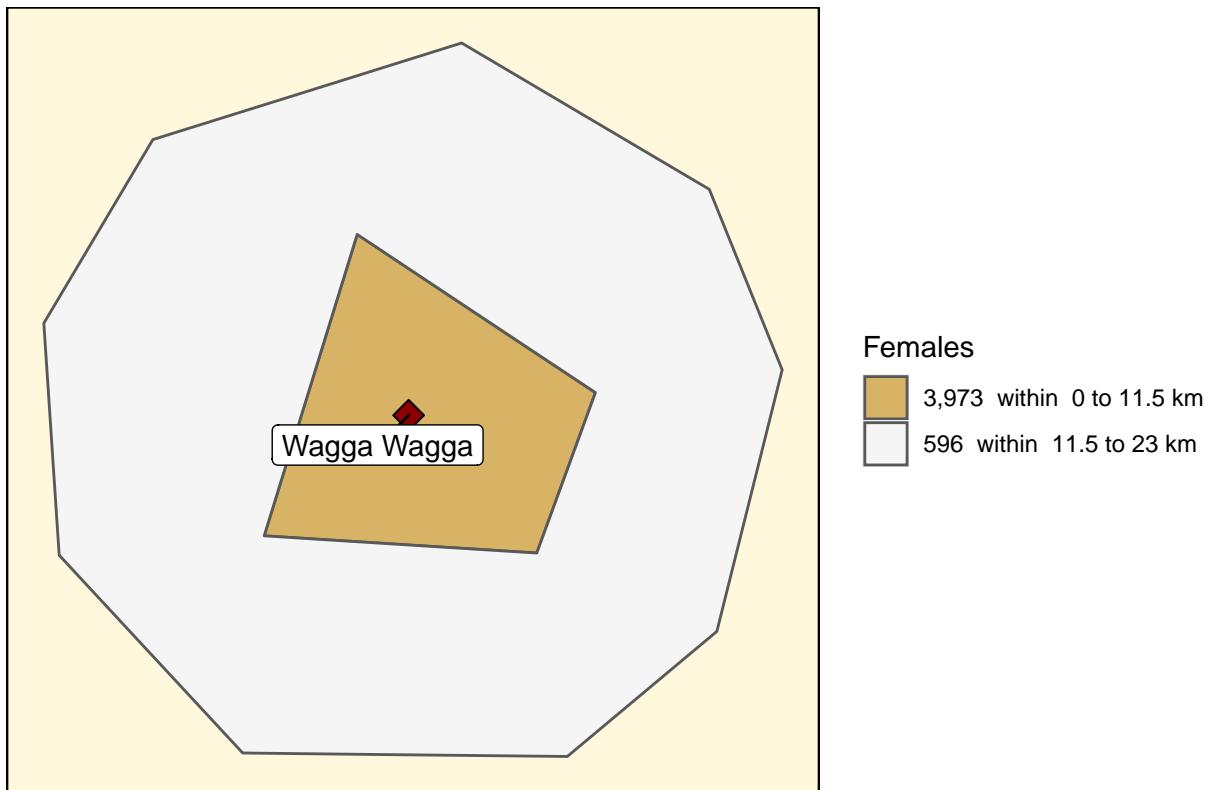


Figure 4: Predicted 19 March 2020 Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area

Table 9: Predicted 19 March 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%)
16	427	425	429
17	427	425	429
18	427	425	429
19	427	425	429
20	467	464	472
21	467	464	472
22	467	464	472
23	467	464	472
24	467	464	472
25	431	426	439

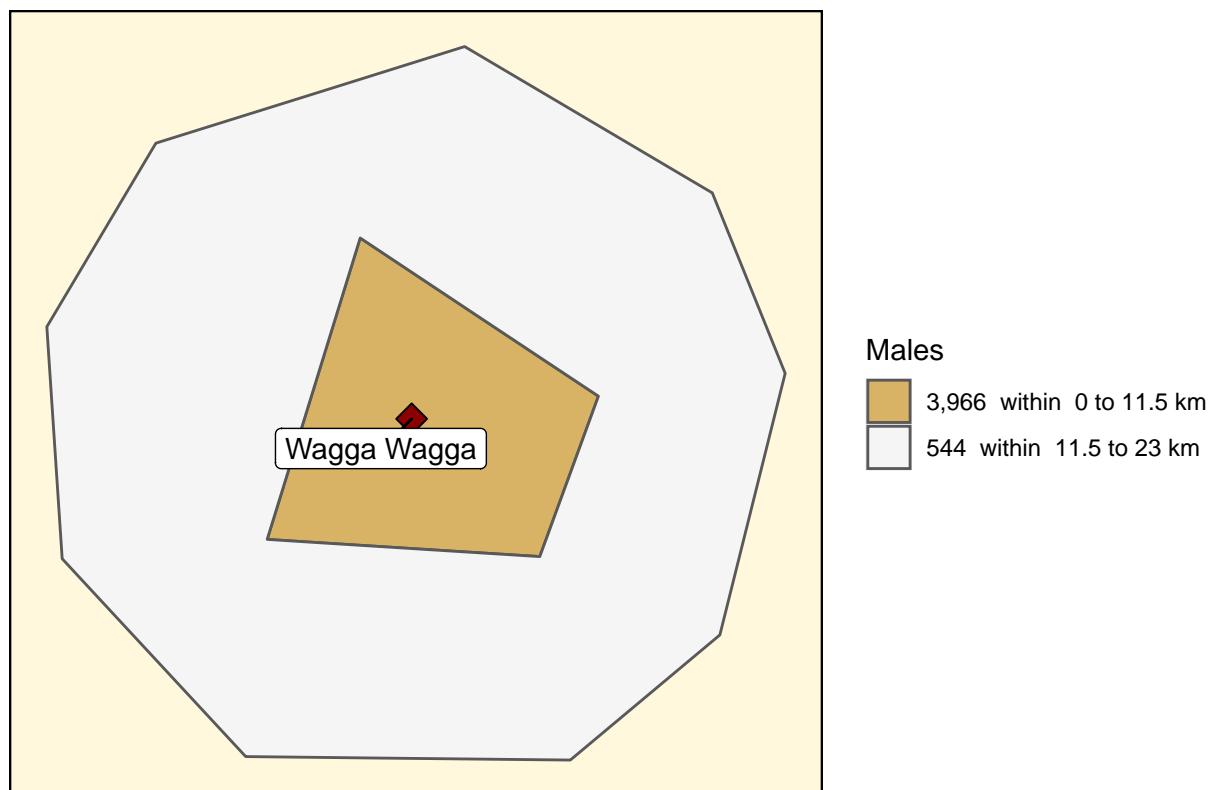


Figure 5: Predicted 19 March 2020 Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area

Table 10: Predicted 19 March 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	16-25	4,599	4,569	4,613
Male	16-25	4,476	4,458	4,505
Persons	16-25	9,079	9,036	9,089

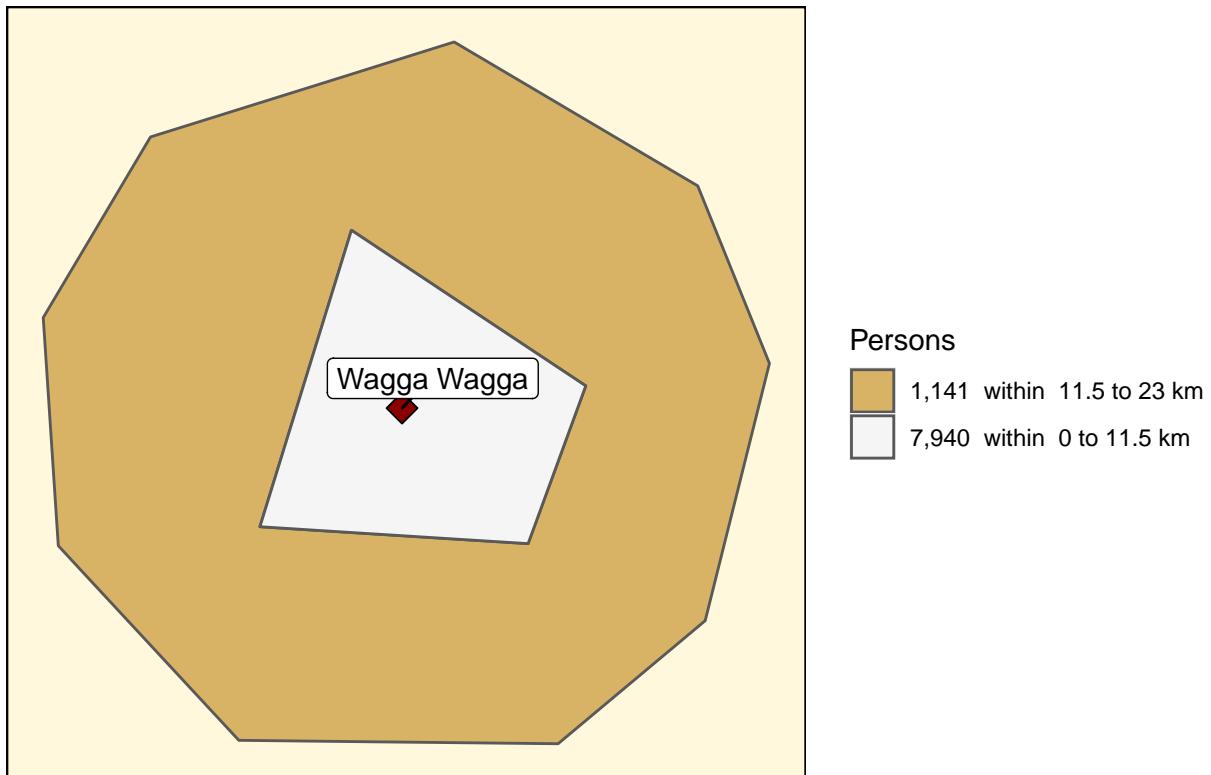


Figure 6: Predicted 19 March 2020 Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area

Predicted Change in Resident Population Between 01 July 2016 and 19 March 2020

Table 11: Predicted Change in Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
16	7	4	8
17	7	4	8
18	7	4	8
19	7	4	8
20	4	-1	8
21	4	-1	8
22	4	-1	8
23	4	-1	8
24	4	-1	8
25	2	-3	5

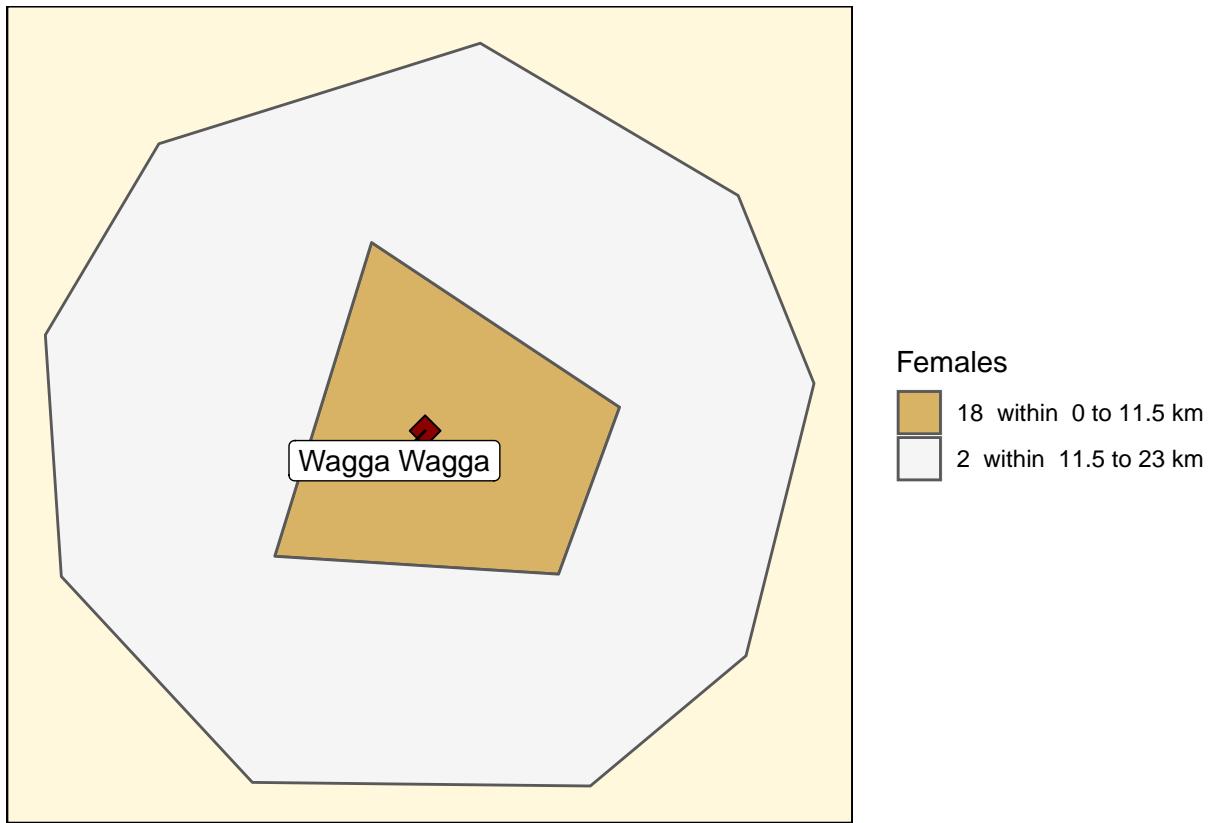


Figure 7: Predicted Change in Resident Population of Female 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Table 12: Predicted Change in Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
16	7	5	8
17	7	5	8
18	7	5	8
19	7	5	8
20	2	-1	7
21	2	-1	7
22	2	-1	7
23	2	-1	7
24	2	-1	7
25	4	-1	12

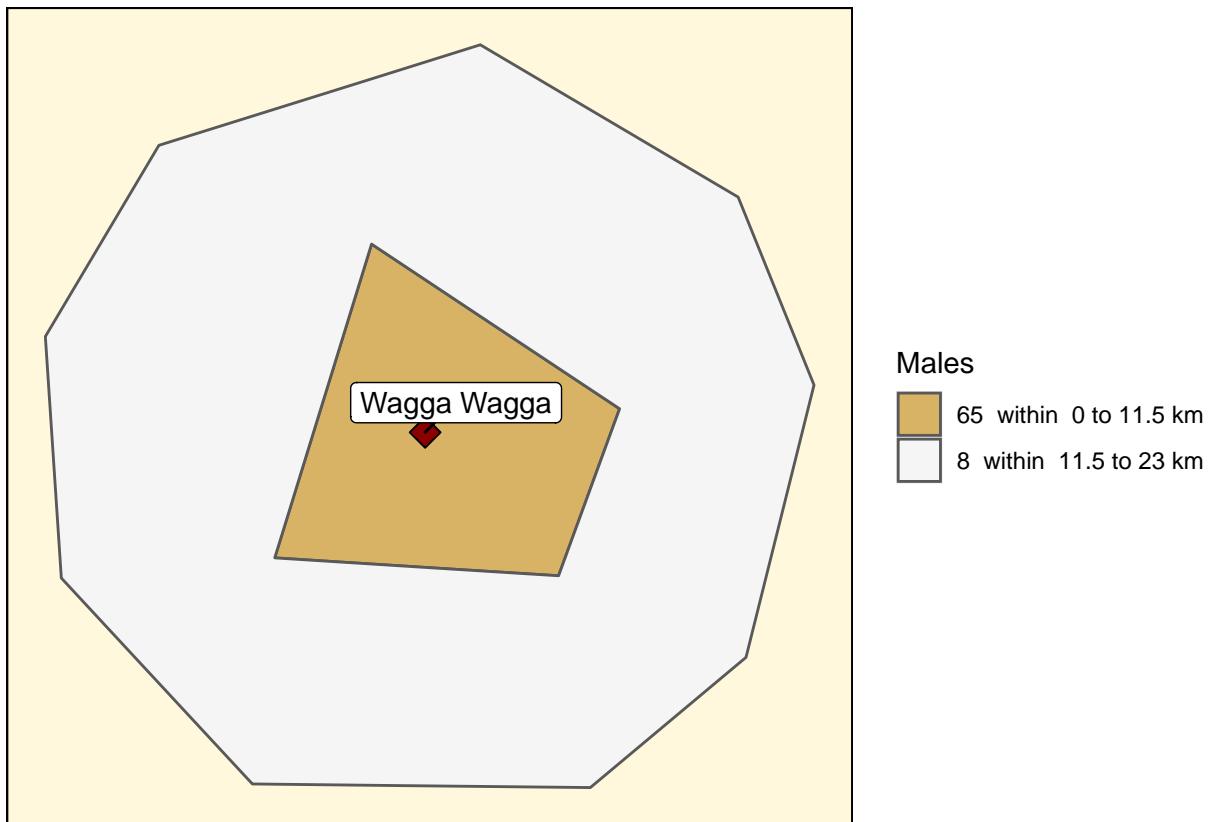


Figure 8: Predicted Change in Resident Population of Male 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Table 13: Predicted Change in Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	16-25	52	22	66
Male	16-25	41	23	70
Persons	16-25	97	54	106

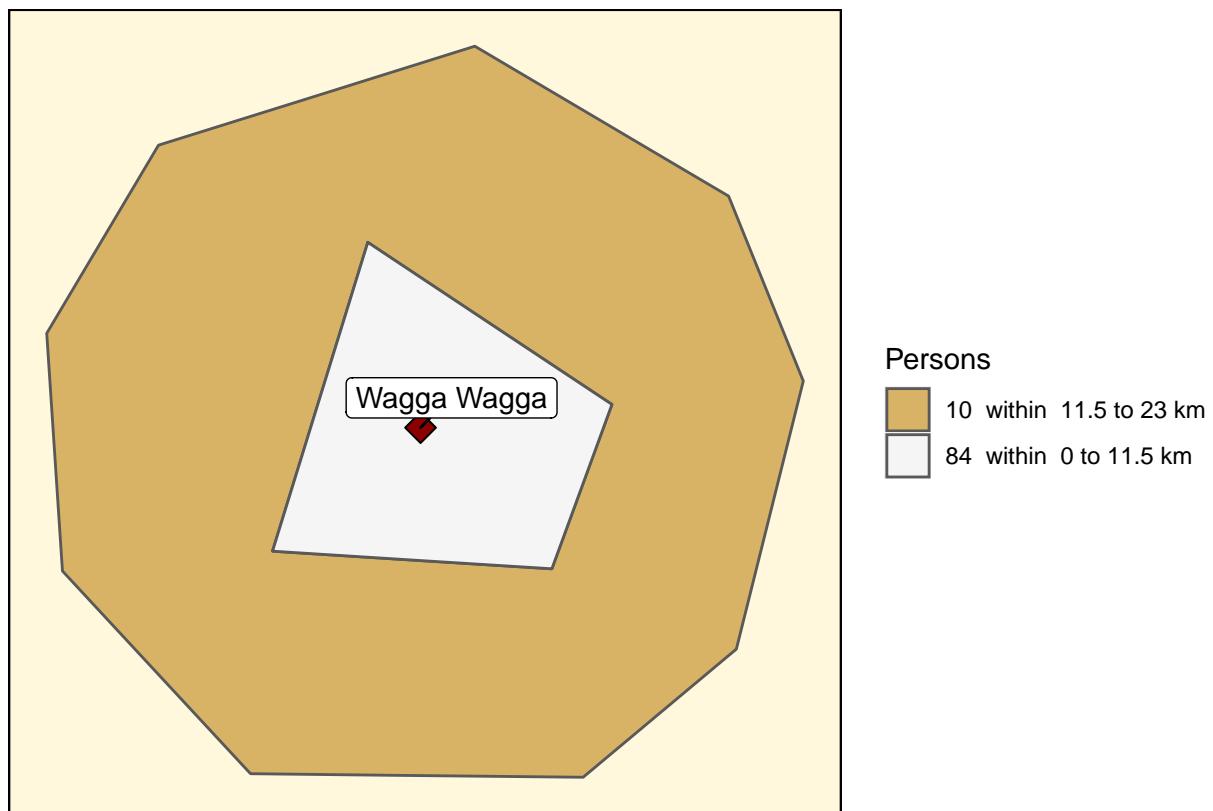


Figure 9: Predicted Change in Total Resident Population of 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

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.

01 July 2016 Annual Prevalence of Any Affective Disorder Predictions

Table 14: Predicted 01 July 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%)
16	31.4	28.4	39.5
17	34.0	29.0	41.0
18	33.2	27.1	41.0
19	33.6	24.1	38.4
20	42.2	35.5	50.5
21	41.2	31.7	51.2
22	40.5	28.8	49.0
23	36.3	29.2	48.0
24	43.0	33.4	51.9
25	37.9	32.2	40.5

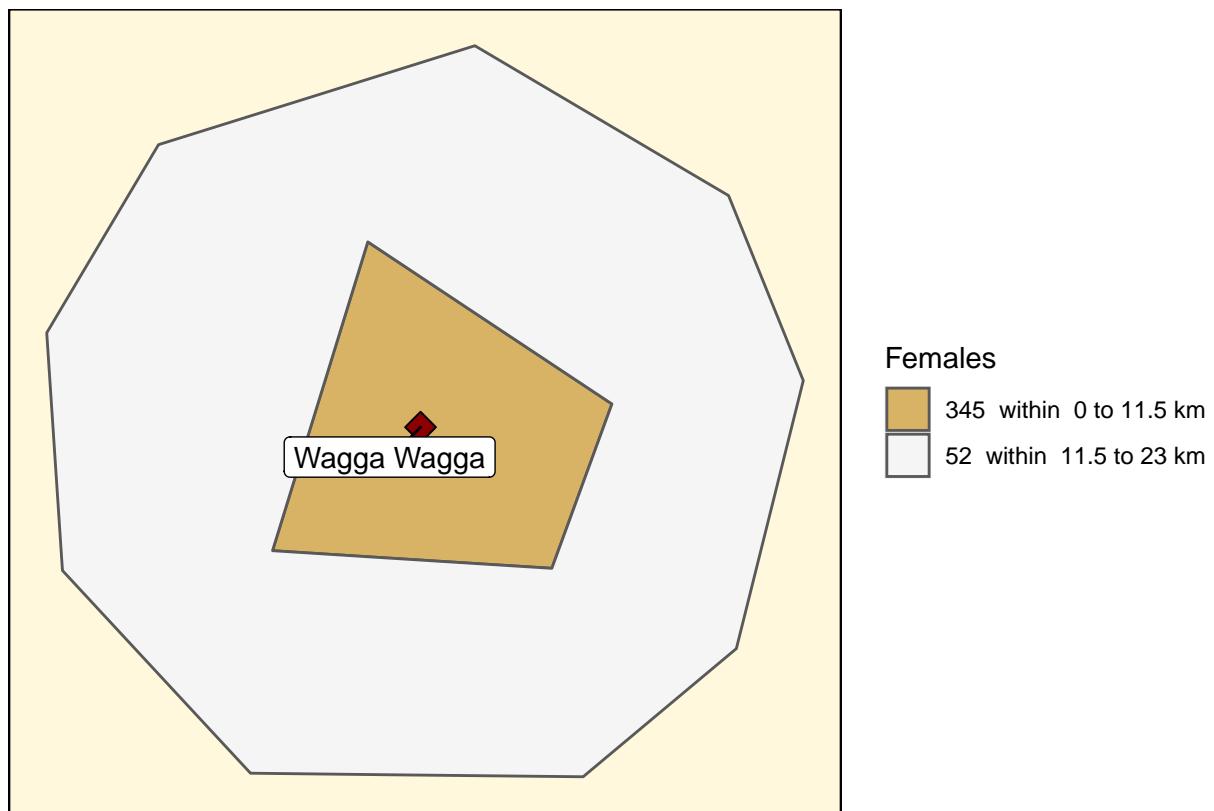


Figure 10: Predicted 01 July 2016 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Table 15: Predicted 01 July 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%)
16	21.1	17.4	25.6
17	16.6	12.4	21.3
18	16.5	10.0	21.7
19	20.0	12.8	23.5
20	17.3	11.5	23.5
21	20.7	15.6	23.5
22	19.9	15.6	27.0
23	22.5	12.8	25.1
24	21.9	12.6	27.7
25	36.5	25.8	47.3

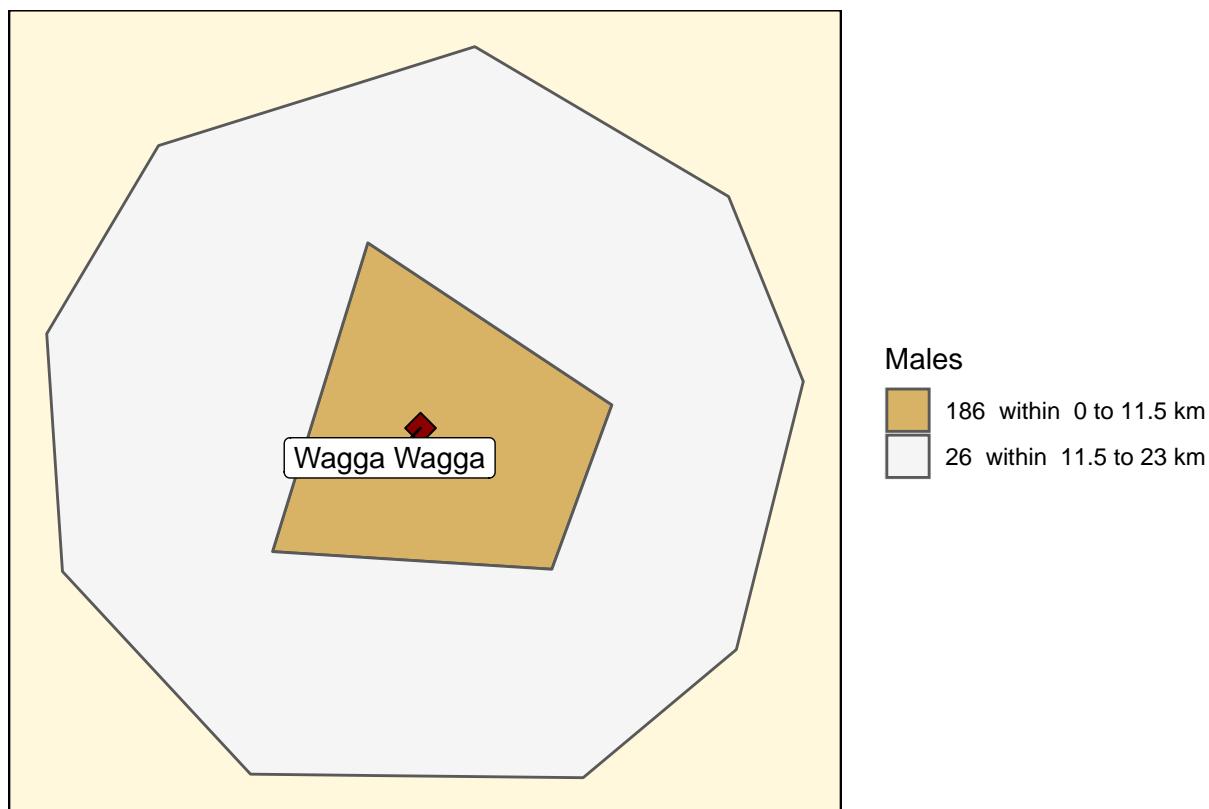


Figure 11: Predicted 01 July 2016 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Table 16: Predicted 01 July 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	16-25	373.5	343.4	397.7
Male	16-25	212.9	192.3	223.8
Persons	16-25	582.4	545.8	609.4

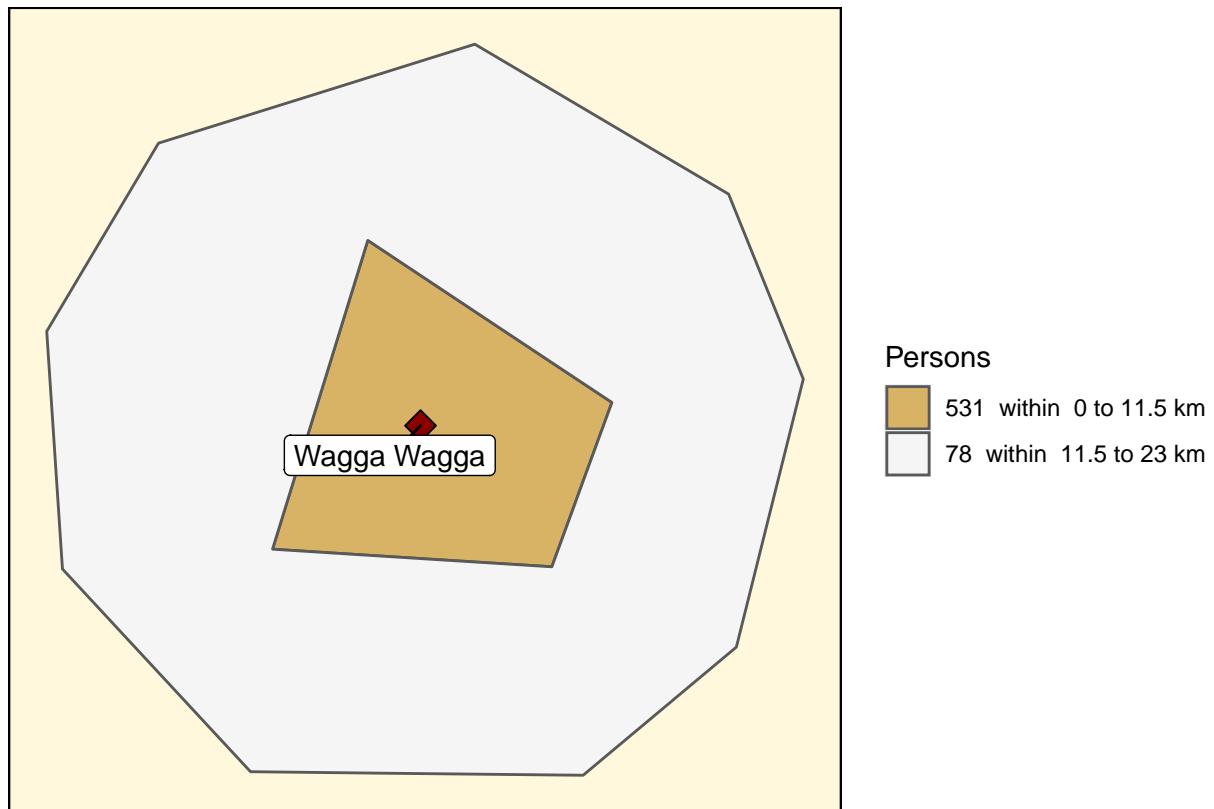


Figure 12: Predicted 01 July 2016 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

19 March 2020 Annual Prevalence of Any Affective Disorder Predictions

Table 17: Predicted 19 March 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%)
16	31.9	28.8	40.1
17	34.6	29.6	41.8
18	33.8	27.6	41.7
19	34.3	24.5	39.0
20	42.6	35.5	51.0
21	41.6	32.0	51.5
22	40.6	29.1	49.4
23	36.5	29.5	48.1
24	43.5	33.7	52.2
25	37.7	32.4	40.3

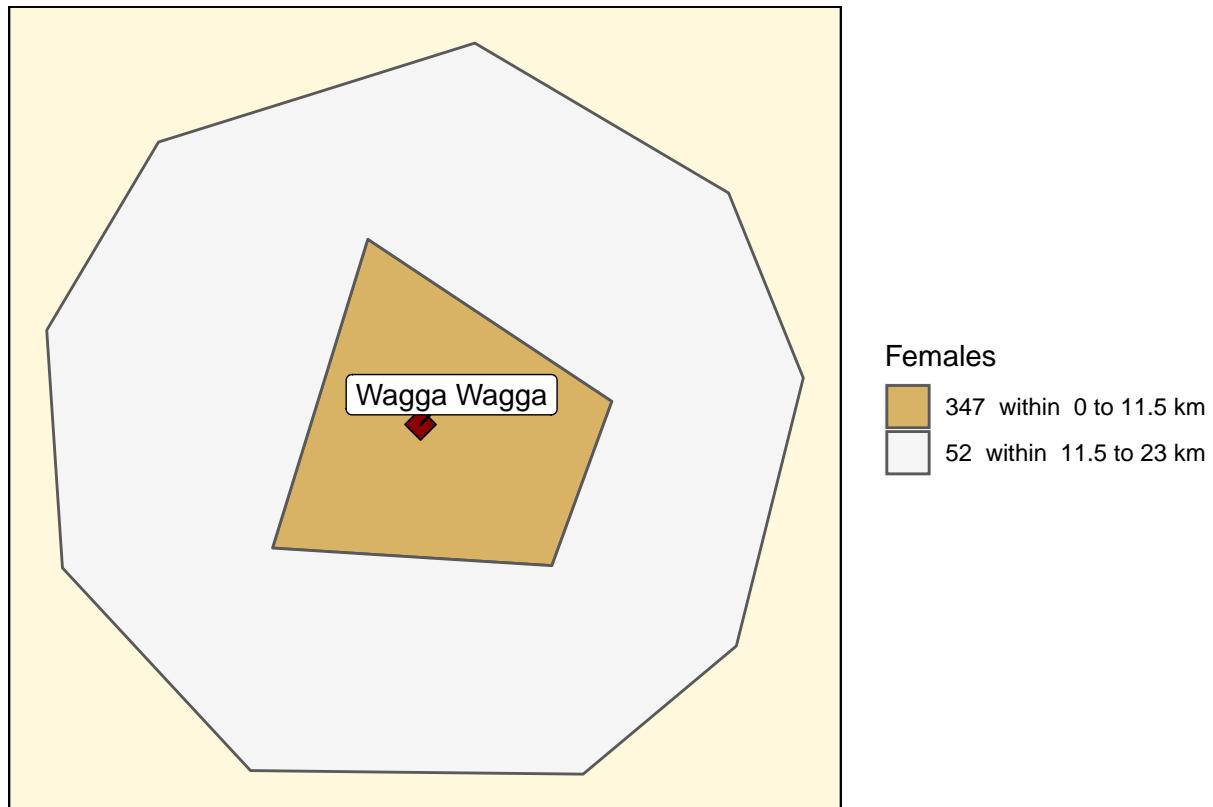


Figure 13: Predicted 19 March 2020 Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area

Table 18: Predicted 19 March 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%)
16	21.4	17.7	25.9
17	16.8	12.7	21.6
18	16.7	10.1	22.1
19	20.3	13.0	23.9
20	17.5	11.6	23.5
21	21.0	15.7	23.5
22	20.1	15.7	27.1
23	22.6	12.9	25.3
24	22.0	12.6	27.8
25	36.7	26.1	47.5

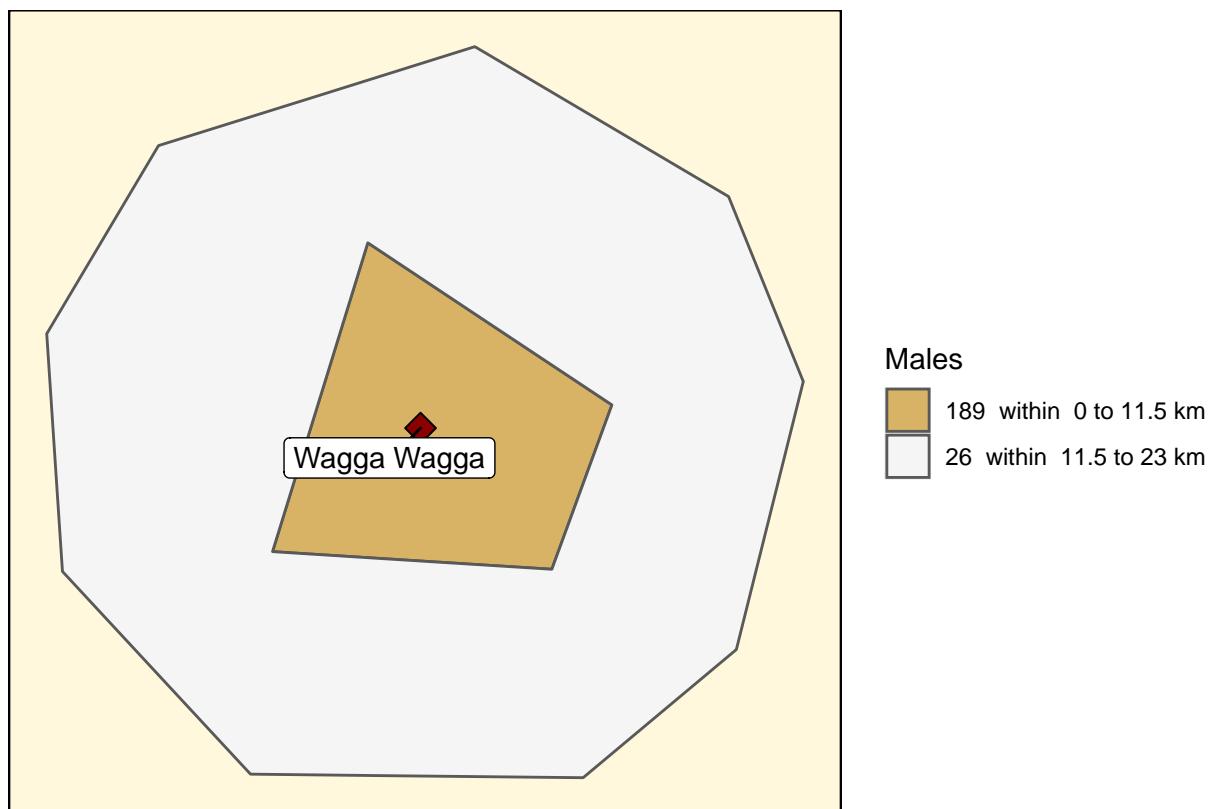


Figure 14: Predicted 19 March 2020 Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area

Table 19: Predicted 19 March 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	16-25	376.4	347.6	402.7
Male	16-25	215.0	193.7	226.4
Persons	16-25	587.9	551.5	615.6

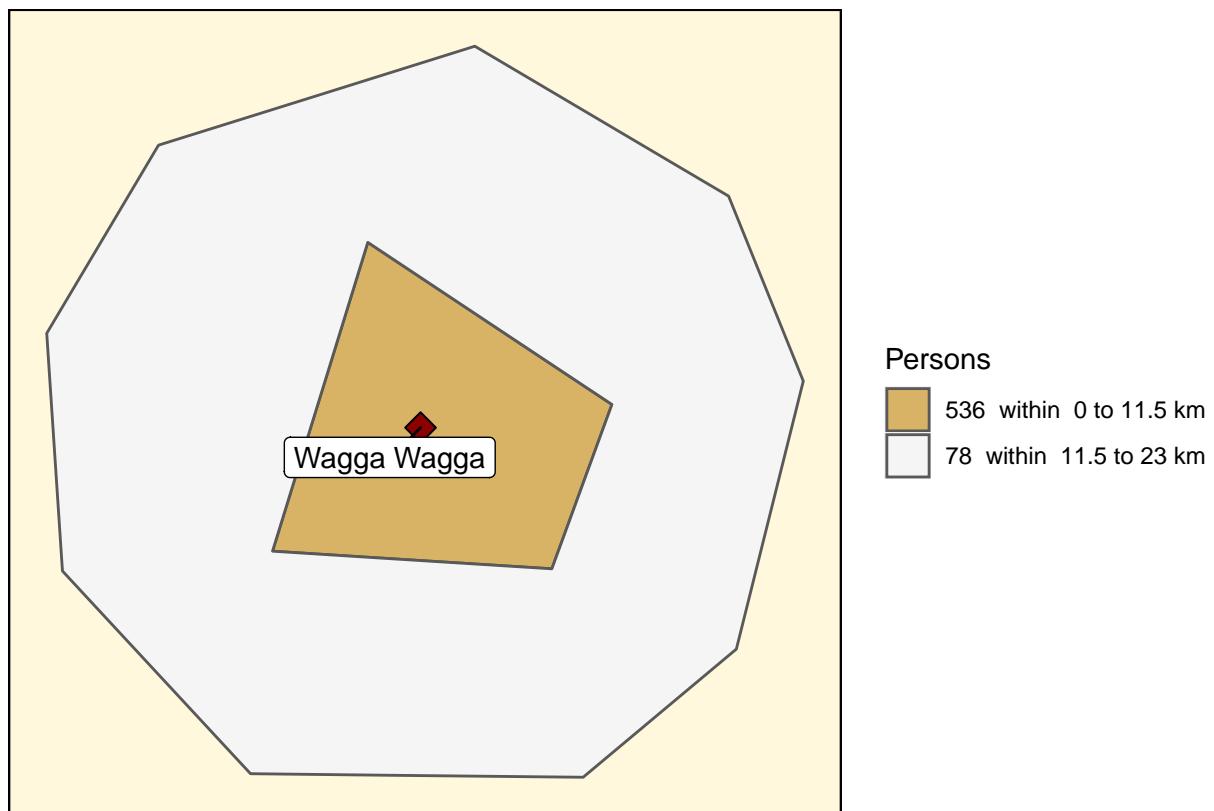


Figure 15: Predicted 19 March 2020 Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area

Predicted Change in Annual Prevalence of Any Affective Disorder Between 01 July 2016 and 19 March 2020

Table 20: Predicted Change in Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
16	0.5	0.4	0.8
17	0.6	0.3	0.8
18	0.6	0.4	0.8
19	0.6	0.4	0.7
20	0.4	-0.0	0.7
21	0.3	-0.1	0.5
22	0.3	-0.0	0.7
23	0.3	-0.0	0.6
24	0.4	-0.0	0.7
25	0.2	-0.3	0.4

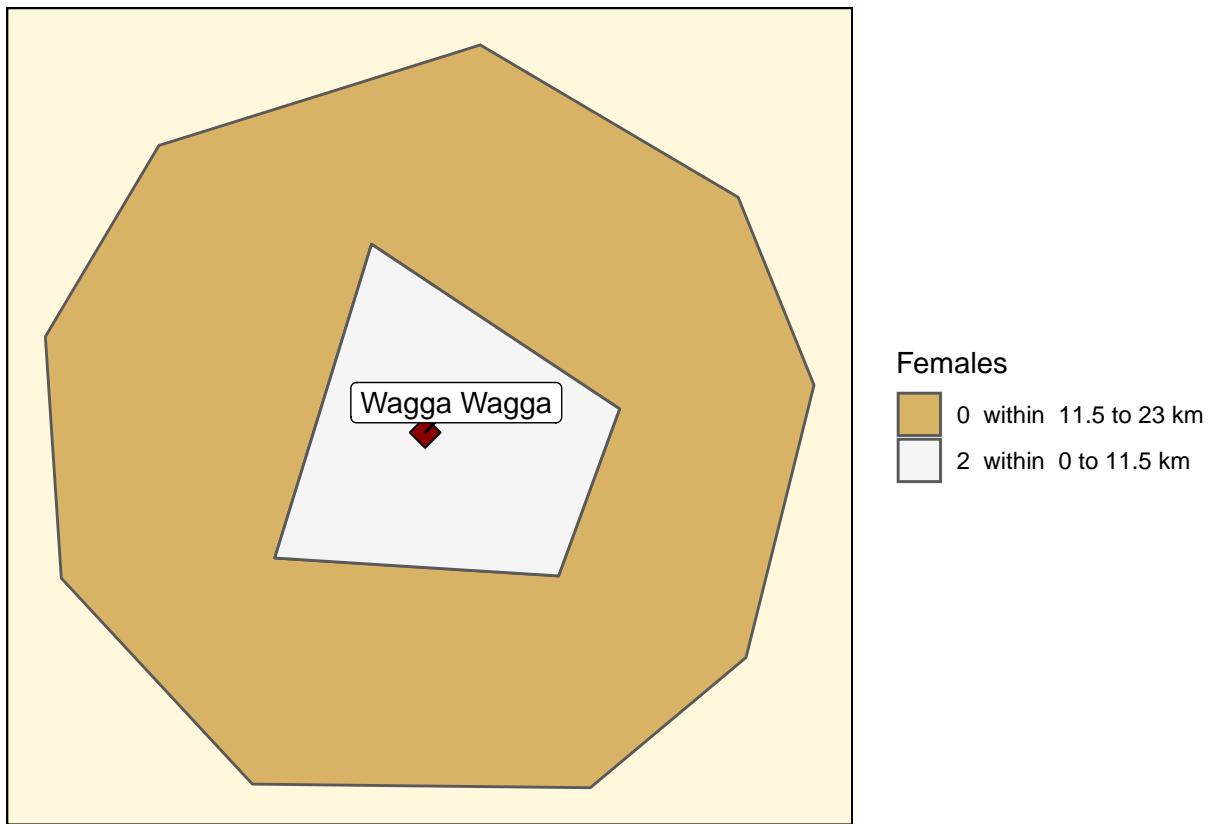


Figure 16: Predicted Change in Annual Prevalence of Any Affective Disorder in Female 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Table 21: Predicted Change in Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
16	0.3	0.2	0.4
17	0.2	0.2	0.3
18	0.2	0.1	0.4
19	0.3	0.2	0.4
20	0.1	-0.0	0.3
21	0.1	-0.1	0.3
22	0.1	-0.1	0.3
23	0.1	-0.1	0.4
24	0.1	-0.0	0.4
25	0.3	-0.0	1.0

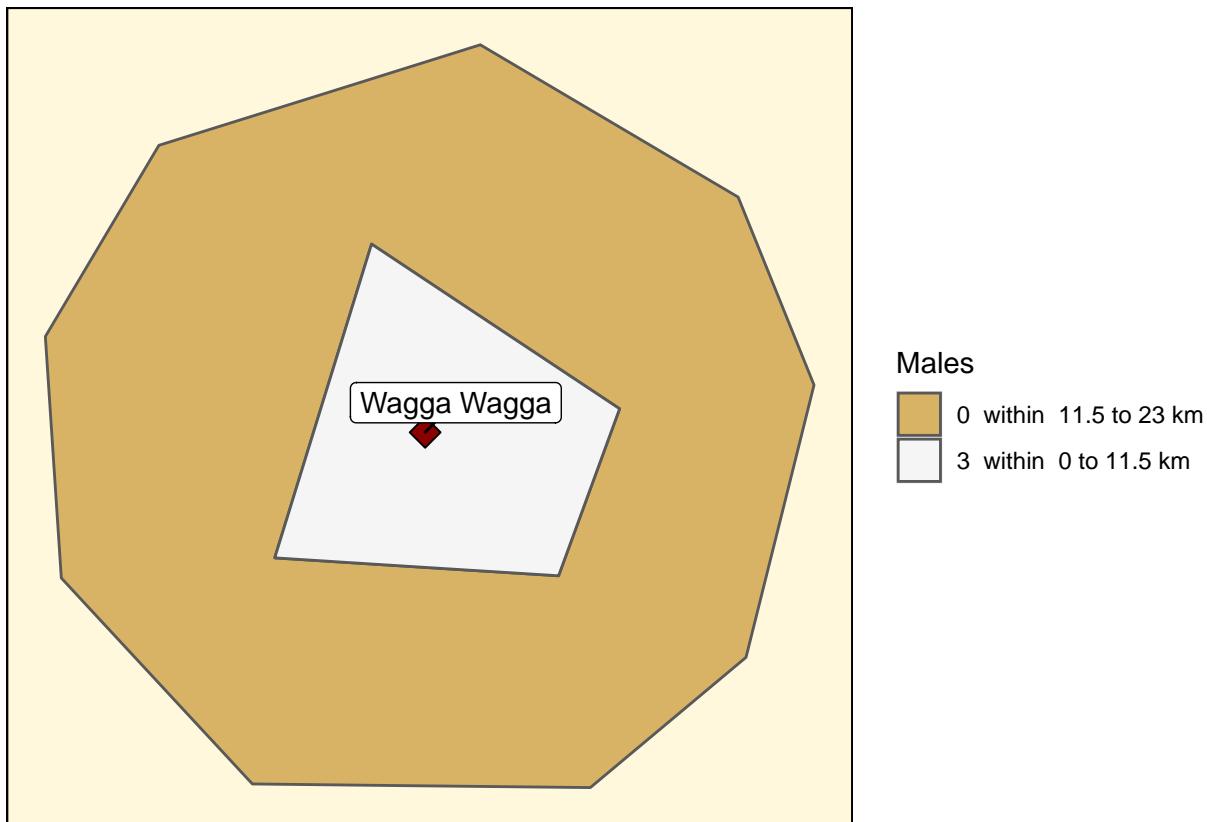


Figure 17: Predicted Change in Annual Prevalence of Any Affective Disorder in Male 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Table 22: Predicted Change in Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Sex	Age	Prediction	UI Low Bound (2.5%)	UI High Bound (97.5%)
Female	16-25	4.2	1.8	5.4
Male	16-25	1.7	1.1	3.5
Persons	16-25	6.3	3.6	7.3

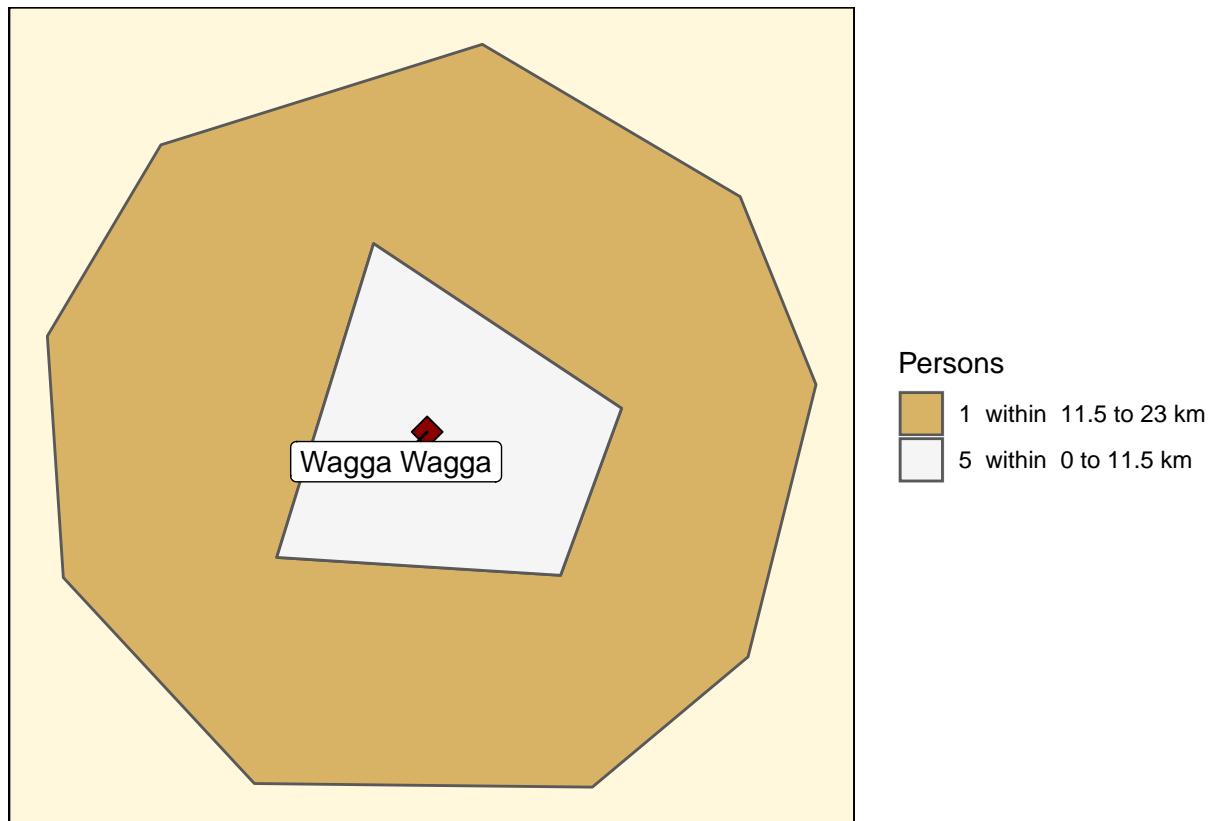


Figure 18: Predicted Change in Total Annual Prevalence of Any Affective Disorder in 16 to 25 Year Olds in 0800 Postal Area Between 01 July 2016 and 19 March 2020

Discussion

The results presented in this report are produced by an algorithm that synthesises Australian geometry and spatial attribute data. Strengths of this automated approach include the relevance of the input data to the Australian context and using data at the highest available spatial resolution. 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, 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. Thirdly, 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.

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