parkinson's australia

Ecosystem of Parkinson's in Australia Project

prepared by Professor George D. Mellick
for Parkinson's Australia, January 2024

Part 3: Modelling geographic distributions & future

Parkinson's Australia is registered as a Public Benevolent Institution with the Australian Charities and Not-for-Profits Commission ABN 46 011 714 078

Executive Summary

As the national advocate for the Australian Parkinson's community, Parkinson's Australia prioritises the need to work with our stakeholders to raise national awareness of Parkinson's, educate and empower the community about Parkinson's and ultimately create better outcomes for all those impacted by Parkinson's in Australia. To achieve these goals there is a need to the best possible evidence base to support our advocacy.

The Board of Parkinson's Australia commissioned the Ecosystem of Parkinson's in Australia Project with the aim to gather the best available information about the current impact of Parkinson's in Australia, to identify critical gaps in the available evidence base and to recommend, where needed, potential new directions of investigation that might enable this information to be collected and disseminated.

The project is multifaceted and ongoing. It is intended that various parts of the project would be released as individual report documents addressing specific issues. Ultimately Parkinson's Australia hopes that the Ecosystem Project will promote better community awareness, advocacy and connection, and reduce the burden of Parkinson's in Australia.

G.Mellick@griffith.edu.au
Griffith Institute
for Drug Discovery
Nathan, QLD 4111

Parkinson's Facts

Parkinson's is the second-most common neurological condition in the world, but remains one of the least understood.

UP TO
150,000
AUSSIES HAVE PARKINSON'S

ONE AUSSIE DIAGNOSED EVERY
27 MIN

52% are male

48% are female

Cost to economy >$10 billion p/a

MORE THAN
1 Million
AUSSIES ARE IMPACTED

UP TO
19,500
NEW CASES EVERY YEAR

OVER
13,400
ARE OF WORKING AGE

Part Three
Table of Contents

1 — Part three summary

2 — Introduction

3 — Methods

4 — Results

5 — Methods

6 — Results

7 — Acknowledgements

8 — References

9 — Appendices

1. Part three summary

This paper presents estimates of the incidence and prevalence of Parkinson's across Australia for 2020 using age and sex stratified population data available from the Australian Bureau of Statistics and the best possible summary incidence and prevalence data from international meta-analyses. The analyses reveal that across Australia there were an estimated 11,924 who developed PD in 2020. Considering the confidence intervals of this estimation, there may have been up to 19,520 new cases in 2020. Males made up 66% of the new cases and 33% female. There is a new case diagnosed every 27 minutes in Australia.

Similarly, estimates revealed that there were 75,753 people living with Parkinson's in Australia in 2020; within the confidence of this estimate, prevalence may be as high as 151,604.

An estimated 2.0% of the Australian population aged 55 years and older live with Parkinson's. This estimate is 3.2% of the population aged 65 years and older; with 9% of all cases are of working age (<64 years old).

In terms of absolute numbers, 78% of all cases live on Australia's eastern seaboard (New South Wales, Victoria and Queensland). When data are normalised by population size, South Australia has the highest estimated prevalence (362 per 100,000) and the Northern Territory the lowest (144 per 100,000). Tasmania returned the highest normalised incidence rates (58 per 100,000) with Northern Territory again the lowest (23 per 100,000).

Incidence and prevalence figures vary significantly across different regions of Australia – influenced substantially by the different population structures of these areas. Estimates of 2020 incidence ranged from 27 per 100,000 in Western Australia's Outback (North) to 85 per 100,000 in NSW's Mid North Coast, while prevalence ranged from 103 per 100,000 in Western Australia's Outback (North) to 544 per 100,000 in NSW's Mid North Coast.

Up to 40% of those with Parkinson's in Australia live outside major capital cities.

Across Australia the absolute incidence will more than double in the 30 years between 2020 and 2050 (117% increase) while the number of people living with Parkinson's will more than triple over this time (215% increase). Normalised to population size the projected increases remain substantial with incidence per 100,000 people increasing by 36% and prevalence per 100,000 by 35%.

While the number of people living with Parkinson's will increase substantially in all jurisdictions, the absolute increases will be greatest in Victoria (146% increase in prevalence). In terms of prevalence increases per 100,000, New South Wales returns the most modest increase (29%), while South Australia will experience the greatest increase in normalised prevalence (59%).

This is the first attempt to produce figures on incidence and prevalence across different Australian jurisdictions and regions. It demonstrates the critical role population structure plays in measurements of incidence and prevalence and the variability in data resulting from not appropriately considering demographic differences. This analysis forms a baseline for future studies, provides guidance to authorities interested in resource distribution and may enable focused selection of suitable target regions for specific research purposes.

2. Introduction

Background

There is limited data on the incidence and prevalence of Parkinson's disease (PD) in Australia. Part 2 of the Ecosystem of PD in Australia provided the results of an extensive literature review and summarised all previously published studies from Australia, concluding that there were no primary estimations of incidence and only seven peer-reviewed studies that reported on Australian prevalence figures. These studies varied greatly in terms of their methodologies and their point estimates of prevalence. The average of these studies provided a crude estimated prevalence of 496 per 100,000 (or 128,960 Australians living with PD in 2022 based on a population of 26 million). This was only slightly higher than the figure of 121,200 which could be estimated from the meta-analysed summary data published in the extensive systematic review of Pringsheim and colleagues (Pringsheim et al., 2014). Neither of these crude estimates takes population structure into consideration.

Why is it important to consider population structure in estimates of incidence and prevalence

The literature review undertaken in Part 2 of the Ecosystem report highlighted the complexities in measuring the incidence and prevalence of PD. It concluded that the most important factors influencing the estimation of incidence and prevalence, in the published literature, are population structure (especially age and sex distributions), the differences in diagnostic criteria and case-ascertainment methods for PD. High quality studies demonstrate that the incidence of PD increases with age and is slightly higher in males compared to females (Hirsch et al., 2016). These factors also influence prevalence; however, for prevalence, life expectancy and differential survival also play a role. None of the previously published Australian studies take population structure into consideration. Moreover, many of the potential variations in incidence and prevalence reported in the literature, which are sometimes speculatively attributed to possible differences in genetic factors, environmental exposures or cultural determinants, can be largely explained away once the differences in the age and sex distributions of the population are take into consideration (Pringsheim et al., 2014).

Modelling incidence and prevalence in a population of known structure

Previous meta-analyses of high-quality international studies provide data that can be used to model incidence and prevalence in a population given information about the age and sex distribution of that population. In a 2007 publication by the Australian Institute for Health and Welfare (AIHW), entitled "The burden of disease and injury in Australia 2003", Begg and colleagues used such an approach to make initial estimates of PD incidence and prevalence for 2003 (Begg et al., 2007). This was discussed in the first Parkinson's Australia – commissioned Living with Parkinson's Report, released in 2007 and the subsequent update reports (Access Economics, 2007; Deloitte Access Economics, 2011, 2015).

However, these initial modelling efforts looked at the Australian population as a whole, did not consider different geographical locations and used data from an old meta-analysis (de Rijk et al., 1997) that has now been superseded by more up-to-date meta-analysed age and sex stratified data (Pringsheim et al., 2014).

Geographical differences in incidence and prevalence across Australia

Understanding PD incidence and prevalence across different geographical regions of Australia is critical for better health-care planning and resource utilisation. This information may also be beneficial to address potential risk factors and assess the impacts of interventions; however, for this to be of benefit, initial baseline figures that take population structure into consideration are required.

Statistical Areas and Australian Bureau of Statistics (ABS)

In Australia, the ABS uses what is known as The Australian Statistical Geography Standard (ASGS) to classify different areas across the country according to their geo-location (Australian Bureau of Statistics., 2024). This enables every household and business (and thus every individual) to be associated with a specific geographical reference.

Statistical Areas (SAs) are a hierarchy of such classifications with each subsequent SA classification representing a grouping of locations ranging from the neighbourhood level of a few streets (SA1) through to suburb or town (SA2 and SA3) and larger regional locations (SA4).

Previous attempts to examine geographical distributions

As mentioned in Part 2 of the Ecosystem of Parkinson's report, two previously published Australian studies hinted at potential geographical differences in prevalence. Peters and colleagues reported an 60% increase in estimated prevalence in Regional and Remote areas of Queensland relative to Metropolitan areas (Peters et al., 2006). The Victorian study of Ayton and colleagues suggested an increased prevalence in areas of that state with increased production of pulse crops (Ayton et al., 2019).

However, both studies were methodologically limited and neither adequately considered population structure in the estimates (Fealy et al., 2023). To provide consistent data with which to test ideas about true geographic variations in the numbers of cases, initial modelling estimates of incidence and prevalence are required. This current document describes the first attempt to provide such estimates from across Australia using demographic data from the Australian Bureau of Statistics and the meta-analysed age and sex stratified incidence (Hirsch et al., 2016) and prevalence (Pringsheim et al., 2014) data from previously published international systematic reviews.

Statistical Area Classifications and Australian Bureau of Statistics (ABS)

In Australia, the ABS uses what is known as The Australian Statistical Geography Standard (ASGS) to classify different areas across the country according to their geo-location (Australian Bureau of Statistics, 2024). This enables every household and business (and thus every individual) to be associated with a specific geographical reference. Statistical Areas (SAs) are a hierarchy of such classifications with each subsequent SA classification representing a grouping of locations ranging from the neighbourhood level of a few streets (SA1) through to suburb or town (SA2 and SA3) and larger regional locations (SA4).

For example, the geographical reference location for the Nathan Campus of Griffith University, Brisbane, can be classified according to Table 1 from a larger general location (SA4 code 304 Brisbane South) through to the very specific (SA1 code 30304107008 which encompasses the campus precinct). Such geocoding allows for a consistent approach to linking information, such as that obtained in national censuses, back to specific locations.

The locations and boundaries of the specific SAs can be identified via the ABS website through their ABS Maps feature (https://maps.abs.gov.au/index.html). Interestingly, the ABS provides age and sex stratified population data at the various SA levels which can be used to look at known information from historical censuses as well as future population projections (Australian Bureau of Statistics, 2024). This enables modelling to be performed, in terms of incidence and prevalence of PD, using standardised data for the meta-analysed age and sex stratified figures.

Table 1. ABS Statistical Area Classifications for the Nathan Campus of Griffith University

Statistical Area Classification	Statistical Area Code	Description
SA4	303	Brisbane South
SA3	30304	Nathan
SA2	303041070	Salisbury
SA1	30304107008	[campus precinct]

Commonwealth electoral divisions

The Commonwealth of Australia has a federal parliament House of Representatives made up of members elected by constituents of 170 Commonwealth Electoral Divisions covering the whole of Australia. Similar to the Statistical Areas mentioned above, the ABS (Australian Bureau of Statistics, 2024) and the Australian Electoral Commission (Australian Electoral Commission, 2022) provide population data for each Electoral Division. Thus, incidence and prevalence figures for PD can also be modelled at the level of Australian Commonwealth Electoral Divisions.

3. Methods

Calculating incidence

The meta-analysed incidence data, stratified by age and sex as presented in the paper of Hirsch and colleagues (Hirsch et al., 2016) was used together with the population data for Australia available to model absolute numbers within each strata using the methods of Begg and colleagues (Begg et al., 2007). The population incidence was calculated by summing the various strata for Australia, each State and each SA4 region throughout Australia. Data per 100,000 of the specific population was also calculated from the absolute numbers and a knowledge of the total population size.

Calculating prevalence

Prevalence figures were modelled in a similar way to incidence, by using the stratified data presented by age and sex from the most comprehensive meta-analysis of prevalence studies available (Pringsheim et al., 2014). Again, data can be presented either as absolute numbers by age and sex or as prevalence data per 100,000 of the respective populations.

All initial data are presented for the Australian 2020 population figures together with projections out to 2050 based on the population projections of the ABS by age, sex for Australia and for each State (Australian Bureau of Statistics, 2022).

Regional incidence and prevalence

The data at a SA4 category level was also calculated, as above, for every SA4 throughout Australia. The figures are for the year 2020.

Australian Electoral Divisions

The 2021 incidence and prevalence were also calculated for each Australian Commonwealth Electoral Division using the demographic data available from the Australian Electoral Commission, which provides information of elector counts by age and gender for each division across Australia (Australian Bureau of Statistics, 2024).

4. Results

Australian incidence

The calculated incidence numbers for Parkinson's across Australia for 2020 are presented in Table 2 and Figure 1 (next page). The modelling suggests that 11,924 people developed PD during 2020. This corresponds to 47 per 100,000 Australians. This is similar to the estimate for 2022 presented in Part 2 of the Ecosystem project 10,660 (or 41 per 100,000) which was a crude estimate based on the overall data from the Hirsch meta-analysis (Hirsch et al., 2016). The modelling estimates have confidence intervals which range from a lower estimate of 7,153 to an upper estimate of 19,520 new cases per year. Taking this upper estimate, we can claim that there may be one new case of Parkinson's in Australia every 27 minutes. These estimates also suggest that of these incident cases 66% were male and 34% female.

Table 2. Australian incidence by state/territory and confidence intervals by sex.

State/Territory	Males/Females (95% CI)
Australian Capital Territory	105 (64 - 168) / 58 (34 - 99)
New South Wales	2,605 (1,589-4,168) / 1,369 (794-2,341)
Northern Territory	38 (64 - 61) / 19 (11 - 32)
Queensland	1,551 (946 - 2,482) / 911 (470 - 1,387)
South Australia	641 (391 - 1,026) / 343 (199 - 587)
Tasmania	203 (124 - 325) / 109 (63 - 186)
Victoria	2,007 (1,224 - 3,211) / 908 (527 - 1,553)
Western Australia	757 (462 - 1,211) / 400 (232 - 684)

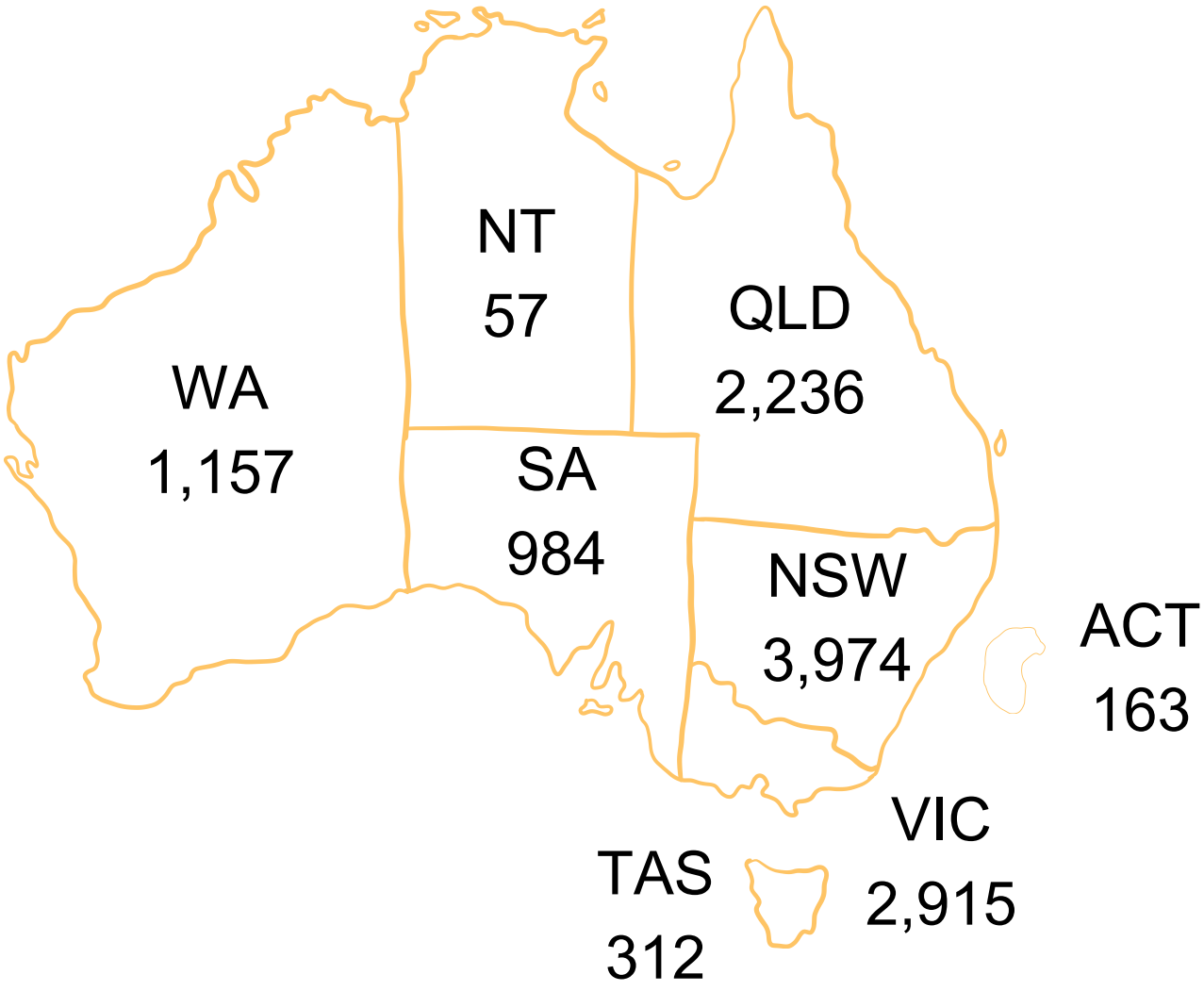


Figure 1. Incidence of Parkinson's in Australia in 2020

Incidence = 11,924 (95% CI 7,153 to 19,520)

Analysis conducted by Prof George Mellick, Griffith University – March 2022

Map Data Sources:
"Elector Count by Division, Age Groups and Gender for all States/Territories - as at 31 December 2021" Retrieved from the Australian Electoral Commission – Division Profiles https://www.aec.gov.au/profiles - 21 March 2022

Incidence by jurisdiction

As expected, the predicted numbers correspond to the population size of each jurisdiction, with 33% of incident cases in 2020 coming from New South Wales, 24% from Victoria and around 20% from Queensland.

The State-based population normalised incidence figures are presented in Table 3. This shows that estimates of normalised incidence range from 23 per 100,000 in the Northern Territory up to 56 per 100,000 for South Australia and 58 per 100,000 for Tasmania. This clearly shows the impact of population structure on incidence figures.

Table 3. Incidence per 100,000 people for each Australian jurisdiction normalised to population size.

State/Territory	Incidence per 100,000
Australian Capital Territory	38
New South Wales	49
Northern Territory	23
Queensland	48
South Australia	56
Tasmania	58
Victoria	45
Western Australia	44

Australian prevalence

Prevalence estimates for 2020 are shown in Table 4 below and Figure 3 (next page). Here it is estimated that 75,753 people were living with Parkinson's in Australia during this year. This corresponds to 299 per 100,000 of the population. This estimate is lower than the crude estimates of 496 per 100,000 and 315 per 100,000 given in Part 2 of this Ecosystem project. However, there are broad confidence intervals of these estimates which range from 38,218 to 151,604 individuals (or 128 to 702 per 100,000 of the total population). Given the upper level of confidence in this estimate it is justified (for advocacy purposes) to state that up to 150,000 people may be living with Parkinson's in Australia. Based on a population of 26 million Australians this equates to 1 in 173 people across the country. Of these it is estimated that 52% are male and 48% are female.

Table 4. Australian prevalence by state/territory and confidence intervals by sex.

State/Territory	Males/Females (95% CI)
Australian Capital Territory	105 (64 - 168) / 58 (34 - 99)
New South Wales	2,605 (1,589-4,168) / 1,369 (794-2,341)
Northern Territory	38 (64 - 61) / 19 (11 - 32)
Queensland	1,551 (946 - 2,482) / 911 (470 - 1,387)
South Australia	641 (391 - 1,026) / 343 (199 - 587)
Tasmania	203 (124 - 325) / 109 (63 - 186)
Victoria	2,007 (1,224 - 3,211) / 908 (527 - 1,553)
Western Australia	757 (462 - 1,211) / 400 (232 - 684)

Prevalence by jurisdiction

In 2020, over one third (34%) of Parkinson's cases resided in NSW, with 24% in Victoria, 20% in Queensland and the remainder in the other jurisdictions. When normalised to the population size of the various jurisdictions, prevalence per 100,000 individuals was highest in Tasmania (377 per 100,000) and South Australia (362 per 100,000) and below half this value in the Northern Territory (144 per 100,000) Table 5 and Figure 2.

Across Australia it is estimated that up to 13,408 people living with Parkinson's are under the age of 65 (or 9% of all prevalent cases). We consider these people to be of working age.

Overall, in Australia, we estimate that 2.0% of the population, aged 55 years or older, live with Parkinson's. For the population aged 65 years or older, this estimate is 3.2%.

Table 5. Prevalence per 100,000 people for each Australian jurisdiction normalised to population size.

State/Territory	Prevalence per 100,000
Australian Capital Territory	246
New South Wales	315
Northern Territory	144
Queensland	296
South Australia	362
Tasmania	377
Victoria	276
Western Australia	282

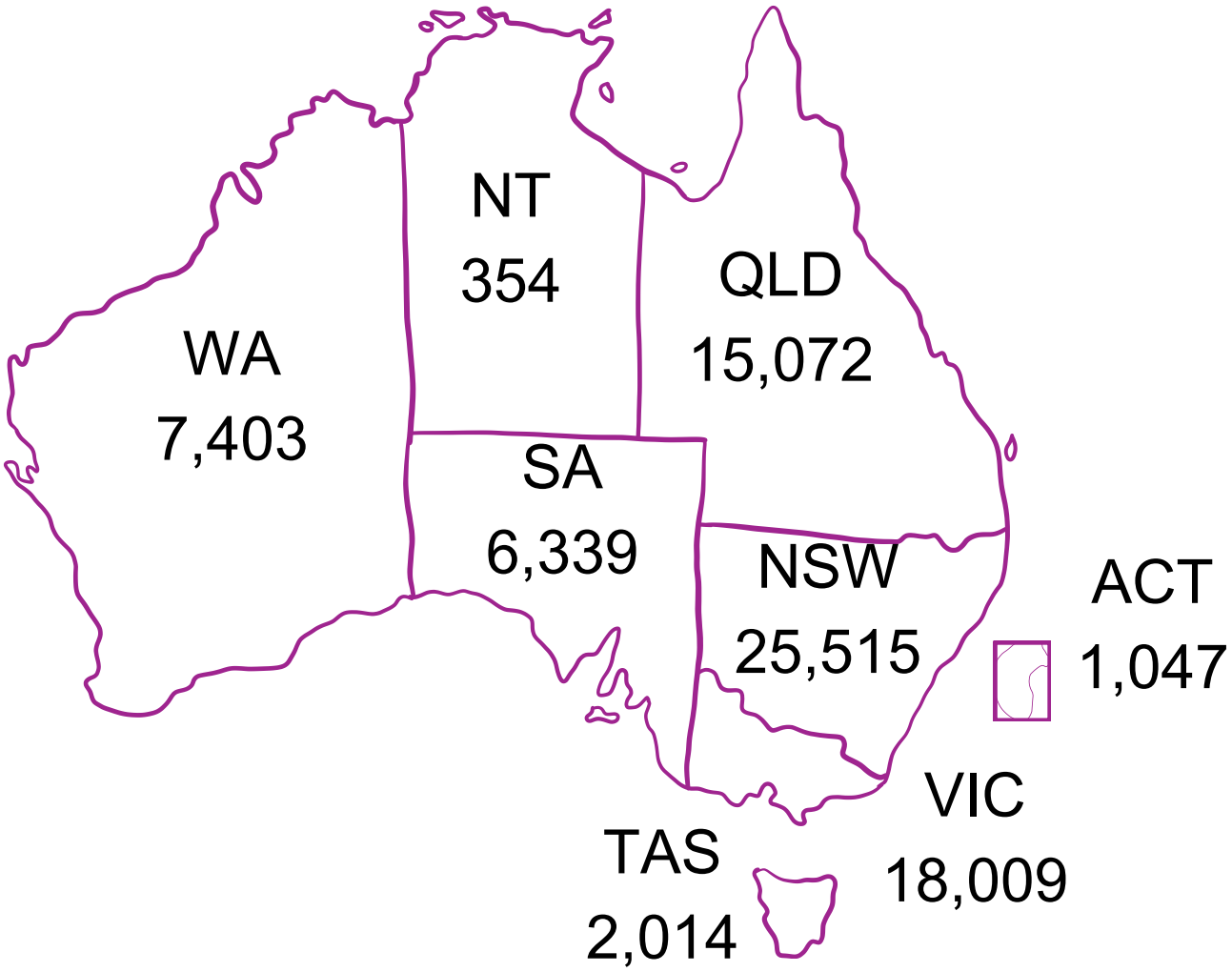


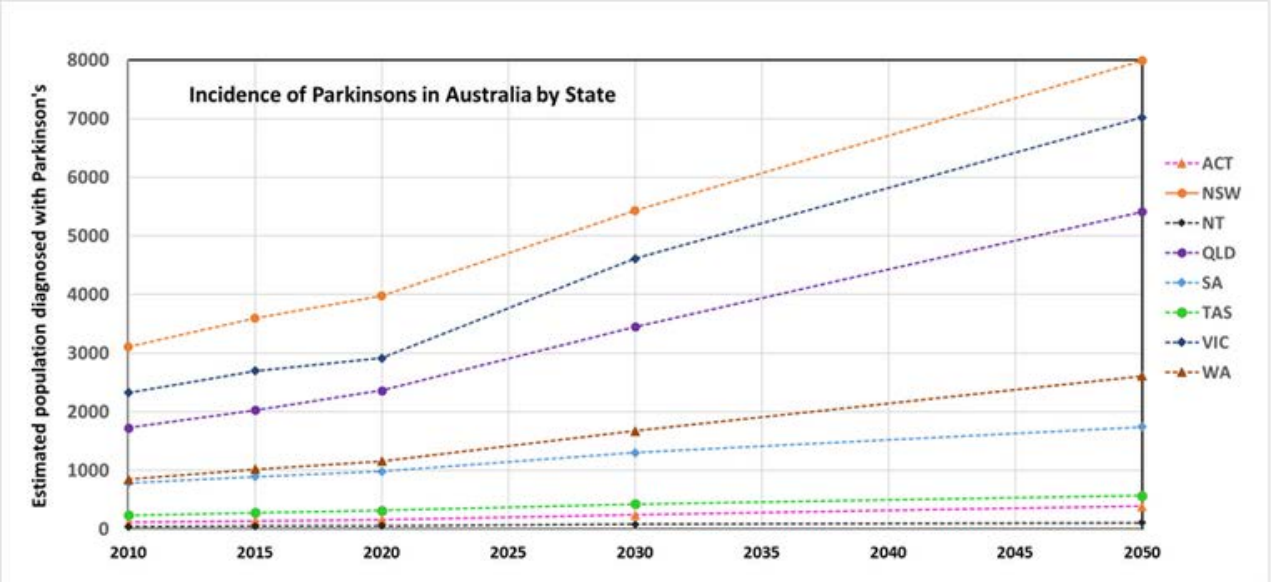
Figure 2. Prevalence of Parkinson's in Australia in 2020

Prevalence = 75,753 (95% CI 38,218 to 151,604)

Map Data Sources:
"Elector Count by Division, Age Groups and Gender for all States/Territories - as at 31 December 2021" Retrieved from the Australian Electoral Commission – Division Profiles https://www.aec.gov.au/profiles - 21 March 2022

Projected changes in incidence and prevalence

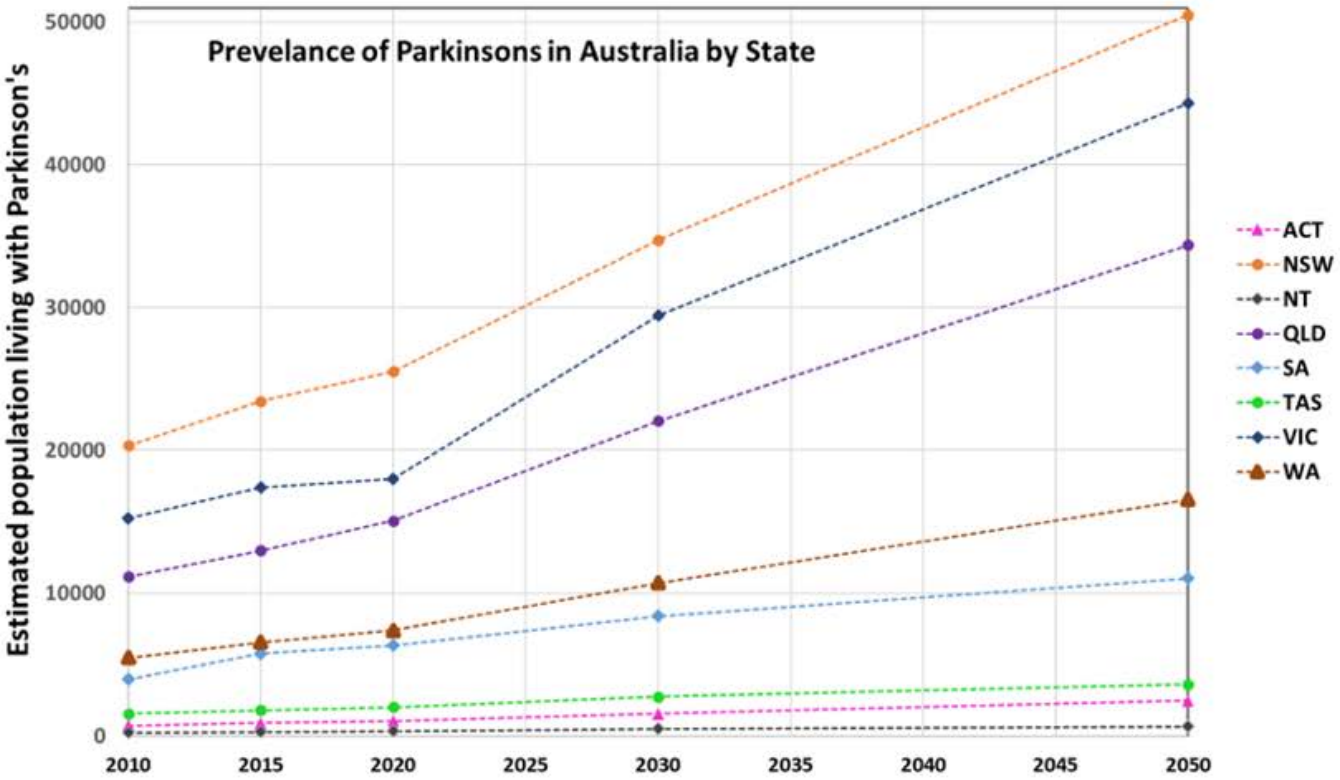
The projected changes in incidence and prevalence of Parkinson's over 30 years (i.e. 2020 to 2050) for each state or territory in Australia, based on ABS estimates of population demographics, are shown in Figs 3 and 4.



Year	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
2010	113	3,104	39	1,724	790	238	2,326	846	9,180
2015	141	3,599	50	2,013	892	280	2,698	1,019	10,710
2020	163	3,974	57	2,362	984	315	2,915	1,157	11,927
2030	240	5,426	80	3,452	1,302	428	4,613	1,672	17,213
2050	390	7,983	110	5,412	1,743	569	7,018	2,614	25,839

Year	Absolute numbers (95% CI)	Number per 100,000 (95% CI)
2020	11,924 (7,153 - 19,520)	47 (29 - 75)
2030	17,213 (10,500 - 27,541)	56 (34 - 89)
2050	25,839 (15,762 - 41,342)	64 (39 - 102)

Figure 3. Projected incidence by state and year



Year	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
2010	729	20,319	238	11,138	3,969	1,553	15,213	5,473	58,632
2015	905	23,429	303	12,995	5,784	1,793	17,424	6,551	69,184
2020	1,047	25,515	353	15,072	6,339	2,013	18,009	7,403	75,751
2030	1,552	34,728	496	22,063	8,383	2,741	29,467	10,708	110,138
2050	2,480	50,488	675	34,344	11,035	3,613	44,306	16,553	163,494

Year	Absolute numbers (95% CI)	Number per 100,000 (95% CI)
2020	75,753 (28,218 - 151,604)	299 (128 - 702)
2030	110,138 (47,359 - 258,824)	358 (154 - 840)
2050	163,494 (70,302 - 384,211)	403 (173 - 946)

Figure 4. Projected prevalence by state and year

Rise in incidence

The absolute incidence numbers are expected to more than double during this time (117% increase). The normalised incidence per 100,000 of the population will also rise considerably (36% increase, Table 6 & Figure 3).

Rise in prevalence

Similarly, there will be a marked increase in the number of Australians living with PD over the next 30 years, with absolute numbers increasing by 215% between 2020 and 2050 and prevalence per 100,000 of the population rising by 35% over the same time (Table 6 & Figure 4).

Table 6. Percentage changes in incidence and prevalence of Parkinson's by Australian jurisdiction between 2020 and 2050.

State/ Territory	Absolute incidence numbers	Incidence per 100,000	Absolute prevalence numbers	Prevalence per 100,000
ACT	139%	36%	137%	35%
NSW	101%	31%	98%	29%
NT	93%	43%	91%	42%
QLD	129%	37%	128%	36%
SA	77%	62%	74%	42%
TAS	81%	43%	79%	42%
VIC	141%	35%	146%	38%
WA	126%	46%	124%	44%

The increase in absolute numbers of people developing PD per year (2020-2050) is predicted to be greatest in Victoria (141%) and lowest in South Australia (77%), although the increase in normalised incidence per 100,000 of the population is greatest in South Australia (62% increase) and lowest in NSW with a 31% increase. It is notable that there is a broad spread of predicated changes in these figures across jurisdictions.

The predicted prevalence increase also varies considerably across the Australian States. Increases in the absolute numbers of people living with Parkinson's are expected to rise between 74% in South Australia and 146% in Victoria, while the prevalence per 100,000 of the population will increase between 29% in NSW and 59% in South Australia.

Incidence of Parkinson's by region (SA4 Statistical Areas)

Tables 7 to 14 provide a breakdown of the calculated number of incident cases and the population normalised incidence per 100,000 people living in each of the 88 SA4 regions across Australia for the year 2020. In terms of absolute numbers, there was a wide range in the distribution of new cases in 2020 across different SA4 regions. These ranged from a low of 17 new cases in the Western Australian outback (SA4 region 510) to a maximum of 360 new cases in Melbourne – South East (SA4 region 212). When normalised for the differences in the population size of these regions, the normalised incidence in 2020 ranged from 27 per 100,000 in Western Australia's Outback (North) (SA4 region 510) to 85 per 100,000 in SA4 region 108 (NSW Mid North Coast).

The average incidence per 100,000 people across all 88 SA4 regions in Australia was 53 per 100,000 (with a standard deviation of 14 per 100,000).

The top 3 SA4 regions by absolute numbers of new cases in 2020 were Melbourne South East followed by Queensland's Gold Coast (SA4 region 309) with 334 new cases and South Australia's Adelaide North (SA4 region 402) with 319 new cases. The bottom three regions were Western Australia outback (North), Northern Territory Outback (SA 4 region 702) with 21 new cases and Tasmania's South East (SA4 region 603) with 28 new cases.

Interestingly, normalisation of the incidence figures (per 100,000 of the population in each region) revealed a different list of regions presenting with the top three incidence figures: NSW Mid North Coast (SA4 region 108), South Australia's South East (SA4 region 407) and South Australia's Barossa – Yorke- Mid North (SA4 region 405) with 85 per 100,00, 82 per 100,000 and 80 per 100,000, respectively.

Prevalence of Parkinson's by region (SA4 Statistical Areas)

The list of prevalent cases and the prevalence figures normalised per 100,000 of the population across all Australian SA4 regions are presented in Table 15 to 22. The regions with the highest number of people living with Parkinson's in 2020 were Melbourne - South East (2,302 cases) followed by Gold Coast (2,135 cases) and Adelaide -North (1,909 cases). The regions with the fewest cases were Western Australia - Outback (North) (102 cases), Northern Territory outback (130 cases) and Tasmania South East (169 cases). When normalised for population size, the regions with the highest normalised prevalence (per 100,000 people) were New South Wales Mid North Coast (544 per 100,000), New South Wales Southern Highlands and Shoalhaven (501 per 100,000) and South Australia – South East (406 per 100,000). The spread of normalised prevalence figures was significant, with the bottom three regions being Western Australia Outback (North) (103 per 100,000), Northern Territory Outback (131 per 100,000) and Northern Territory Darwin (166 per 100,000).

Across all 88 SA4 regions the average normalised prevalence was calculated to be 336 per 100,000 with a standard deviation of 89 per 100,000.

Table 7. 2020 New South Wales' incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
101	Capital Region	147	63
102	Central Coast	220	64
103	Central West	128	60
104	Coffs Harbour - Grafton	103	72
105	Far West and Orange	67	58
106	Hunter Valley exc Newcastle	153	54
107	Illawarra	173	54
108	Mid North Coast	192	85
109	Murray	81	66
110	New England and North West	112	60
111	Newcastle and Lake Macquarie	215	56
112	Richmond - Tweed	180	71
113	Riverina	91	56
114	Southern Highlands and Shoalhaven	125	79
115	Sydney - Baulkham Hills and Hawkesbury	113	44
116	Sydney - Blacktown	122	32
117	Sydney - City and Inner South	116	31
118	Sydney - Eastern Suburbs	133	45
119	Sydney - Inner South West	296	47
120	Sydney - Inner West	143	44
121	Sydney - North Sydney and Hornsby	224	51
122	Sydney - Northern Beaches	145	53
123	Sydney - Outer South West	105	36
124	Sydney - Outer West and Blue Mountains	138	42
125	Sydney - Parramatta	194	38
126	Sydney - Ryde	98	47
127	Sydney - South West	176	38
128	Sydney - Sutherland	124	53

Table 8. 2020 Victorian incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
201	Ballarat	SA4 Code	57
202	Bendigo	217	58
203	Geelong	216	54
204	Hume	202	65
205	Latrobe - Gippsland	201	68
206	Melbourne - Inner	215	34
207	Melbourne - Inner East	204	56
208	Melbourne - Inner South	203	52
209	Melbourne - North East	210	43
210	Melbourne - North West	205	41
211	Melbourne - Outer East	214	50
212	Melbourne - South East	207	41
213	Melbourne - West	208	33
214	Mornington Peninsula	209	64
215	North West	206	67
216	Shepparton	211	65
217	Warrnambool and South West	213	65

Table 9. 2020 Queensland incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
301	Brisbane East	132	54
302	Brisbane - North	107	47
303	Brisbane - South	148	39
304	Brisbane West	84	44
305	Brisbane Inner city	93	31
306	Cairns	129	49
307	Darling Downs	79	61
308	Central Queensland	107	46
309	Gold Coast	334	50
310	Ipswich	150	38
311	Logan Beaudesert	145	40
312	Mackay Isaac Whitsunday	76	42
313	Moreton Bay North	163	61
314	Moreton Bay South	81	36
315	Queensland Outback	29	36
316	Sunshine Coast	260	64
317	Toowoomba	85	53
318	Townsville	108	44
319	Wide Bay	230	75

Table 10. 2020 South Australian incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
401	Adelaide - Central & Hills	219	71
402	Adelaide - North	319	71
403	Adelaide - South	275	73
404	Adelaide - West	166	68
405	Barossa - Yorke - Mid North	92	80
406	South Australia - Outback	63	75
407	South Australia - South East	159	82

Table 11. 2020 Western Australian incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
501	Bunbury	102	55
502	Mandurah	75	71
503	Perth - Inner	89	48
504	Perth - North East	113	41
505	Perth - North West	255	44
506	Perth - South East	221	42
507	Perth - South West	200	45
509	Western Australia - Wheat Belt	89	65
510	Western Australia - Outback (North)	17	17
511	Western Australia - Outback (South)	50	43

Table 12. 2020 Tasmanian incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
601	Hobart	131	55
602	Launceston and North East	92	62
603	South East	28	70
604	West and North West	74	65

Table 13. 2020 Northern Territory incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
701	Darwin	40	27
702	Northern Territory - Outback	21	21

Table 14. 2020 Australian Capital Territory incidence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Incident cases in 2020	Incidence per 100,000
801	Australian Capital Territory	172	40

Table 15. 2020 New South Wales' prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
101	Capital Region	933	401
102	Central Coast	1423	411
103	Central West	816	382
104	Coffs Harbour - Grafton	654	459
105	Far West and Orange	431	370
106	Hunter Valley exc Newcastle	976	342
107	Illawarra	1120	352
108	Mid North Coast	1223	544
109	Murray	515	422
110	New England and North West	724	389
111	Newcastle and Lake Macquarie	1392	364
112	Richmond - Tweed	1152	451
113	Riverina	585	361
114	Southern Highlands and Shoalhaven	795	501
115	Sydney - Baulkham Hills and Hawkesbury	721	280
116	Sydney - Blacktown	779	202
117	Sydney - City and Inner South	735	197
118	Sydney - Eastern Suburbs	859	290
119	Sydney - Inner South West	1892	300
120	Sydney - Inner West	920	282
121	Sydney - North Sydney and Hornsby	1443	326
122	Sydney - Northern Beaches	939	343
123	Sydney - Outer South West	671	228
124	Sydney - Outer West and Blue Mountains	892	269
125	Sydney - Parramatta	1238	244
126	Sydney - Ryde	634	306
127	Sydney - South West	1121	242
128	Sydney - Sutherland	803	346

Table 16. 2020 Victorian prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
201	Ballarat	625	368
202	Bendigo	614	372
203	Geelong	1116	351
204	Hume	743	411
205	Latrobe - Gippsland	1250	429
206	Melbourne - Inner	1568	220
207	Melbourne - Inner East	1457	364
208	Melbourne - Inner South	1509	335
209	Melbourne - North East	1558	275
210	Melbourne - North West	1138	265
211	Melbourne - Outer East	1740	324
212	Melbourne - South East	2302	261
213	Melbourne - West	1801	208
214	Mornington Peninsula	1279	410
215	North West	654	430
216	Shepparton	554	411
217	Warrnambool and South West	528	420

Table 17. 2020 Queensland prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
301	Brisbane East	847	348
302	Brisbane - North	701	309
303	Brisbane - South	954	251
304	Brisbane West	544	282
305	Brisbane Inner city	593	199
306	Cairns	811	308
307	Darling Downs	502	387
308	Central Queensland	681	295
309	Gold Coast	2135	321
310	Ipswich	953	243
311	Logan Beaudesert	920	251
312	Mackay Isaac Whitsunday	478	265
313	Moreton Bay North	1,038	389
314	Moreton Bay South	514	231
315	Queensland Outback	176	219
316	Sunshine Coast	1,665	408
317	Toowoomba	556	347
318	Townsville	689	279
319	Wide Bay	1,450	475

Table 18. 2020 South Australian prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
401	Adelaide - Central & Hills	1,340	432
402	Adelaide - North	1,909	426
403	Adelaide - South	1,672	446
404	Adelaide - West	1,023	421
405	Barossa - Yorke - Mid North	558	486
406	South Australia - Outback	376	447
407	South Australia - South East	966	496

Table 19. 2020 Western Australian prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
501	Bunbury	648	348
502	Mandurah	478	454
503	Perth - Inner	578	309
504	Perth - North East	724	263
505	Perth - North West	1,639	283
506	Perth - South East	1,417	267
507	Perth - South West	560	407
509	Western Australia - Wheat Belt	560	407
510	Western Australia - Outback (North)	102	103
511	Western Australia - Outback (South)	316	272

Table 20. 2020 Tasmanian prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
601	Hobart	844	353
602	Launceston and North East	592	400
603	South East	169	421
604	West and North West	475	418

Table 21. 2020 Northern Territory prevalence figures by Statistical Area 4 (SA4) Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
701	Darwin	245	166
702	Northern Territory - Outback	130	131

Table 22. 2020 Australian Capital Territory incidence figures by Statistical Area 4 Region.

SA4 Code	Name of Area	Prevalent cases in 2020	Prevalence per 100,000
801	Australian Capital Territory	1,101	255

Parkinson's by region (SA4 Statistical Areas)

The ABS also provides population figures stratified by those living in the greater capital city areas and those in the rest of each State. Using these data, we calculated that in 2020, 39% of new cases of PD in that year lived outside the greater capital city regions of Australia (Table 23). A similar percentage of all prevalent cases were living outside capital cities. This percentage was greatest in Tasmania and Queensland and lowest in Western Australia and South Australia. Interestingly, the calculated incidence and prevalence figures (normalised per 100,000 people) are higher for those residing outside the greater capital cities (see Table 23 for incidence and prevalence outside the greater capital city area, respectively).

Appendix 1 presents all the incidence and prevalence figures for each State and their respective SA4 regions for 2020, together with the statewide projections to 2050. Appendix 2 lists incidence and prevalence in each Australian Commonwealth Electoral Division for 2021.

Table 23. Incidence (inc) and prevalence (prev) in Greater Capital Cities and outside.

Name of area	Absolute inc #	% inc jurisdiction	Inc/ 100K	Absolute prev #	% prev jurisdiction	Prev/ 100K
Greater Sydney	2,349	57%	44	15,071	57%	281
Rest of NSW	1,765	43%	63	11,315	43%	404
Greater Melbourne	2,231	70%	43	14,351	70%	278
Rest of Victoria	953	30%	62	6,084	30%	396
Greater Brisbane	1,104	43%	43	7,065	44%	273
Rest of Queensland	1,437	57%	54	9,142	56%	342
Greater Adelaide	742	73%	54	4,803	73%	349
Rest of SA	274	27%	70	1,737	27%	441
Greater Perth	954	79%	45	6,121	79%	288
Rest of WA	258	21%	48	1,626	21%	302
Greater Hobart	131	40%	55	844	41%	353
Rest of Tasmania	194	60%	64	1,237	59%	410
Darwin	40	66%	27	245	65%	166
Rest of NT	21	34%	21	130	35%	131
Canberra	172	100%	40	1,101	100%	255
Greater Capital Cities	**7,723**	**61%**	**44**	**49,601**	**61%**	**284**
Outside Capital	**4,902**	**39%**	**59**	**31,271**	**39%**	**375**

5. Discussion

The estimation of incidence and prevalence for conditions like Parkinson's is a complex task. This is because the onset of the condition is insidious (developing slowly and with a number of prodromal features that do not reach a threshold that would warrant a formal diagnosis for, in some cases, many years). It is also true that formal diagnosis requires experts skilled in movement disorders and accuracy of diagnosis may be limited, particularly at the earliest stages of the condition. Formal estimates of incidence (that is, the number of new cases in a particular population over a defined period of time) is also highly dependent upon the methods of case ascertainment, the formal diagnostic criteria used and, importantly, the structure of the population being assessed. Prevalence (the number of people living with a condition in a defined population) not only depends on incidence (and its associated determinants) but also disease trajectory, differential survival of individuals with the condition and any possible reversions from the condition back to normal health. Currently for Parkinson's, there are no curative treatment options available and no spontaneous remission to normal health. This means that prevalence is also highly dependent on case-ascertainment, diagnostic criteria and differential survival, as well as population structure, which not only impacts on incidence itself but also survival and time lived with the condition.

Unlike for some reportable diseases, which compel clinicians to report the diagnosis of new cases and keep information about those with a diagnosis, there is no straight-forward way to ascertain the number of people formally diagnosed with PD, in a given year, or the number of people living with Parkinson's in Australia. So, knowing exactly how many people are currently living in Australia who have a formal diagnosis of PD is difficult to ascertain. Moreover, there are likely a considerable proportion (up to 24%) (de Rijk et al., 1997) who would meet the criteria for a diagnosis but who, for reasons including the inaccessibility to appropriate specialist care, have not come to the attention of those who can make the diagnosis. Similarly, there are a proportion of those with the diagnosis who may, in fact, be misdiagnosed. Health care availability and diagnostic certainty may vary depending on the location of the individual and their socioeconomic status. To account for these limitations, the Gold Standard for assessing incidence and prevalence in a population has been to conduct comprehensive door-to-door surveys for a selected population (or sample thereof) with sensitive screening for symptoms and strict diagnostic criteria. This is expensive, socially challenging and complicated, particularly in a dispersed country like Australia. Importantly, such studies have been performed across the world, and the data suggests that when standard methodologies are used, estimations of age- and gender-stratified incidence and prevalence is relatively similar (see Part 2 of the Ecosystem of Parkinson's Report and the cited meta-analyses therein).

There may be very important (but subtle) geographical, cultural, or ethnic differences in the number of people developing or living with PD; this could provide critical etiological clues and novel targeted strategies for interventions. However, current comparisons of the incidence and prevalence between countries, regions or ethnic groups are significantly hampered by a lack of consideration to the impact of age- and sex-demographics.

There have been no formal primary studies of the incidence of Parkinson's in Australia, so estimates rely on the extrapolation of primary information from international studies in an Australian context. Here we use the best available international data (generated from a formal meta-analysis of all previous high-quality studies that provide age and sex stratified incidence information) to estimate incidence figures for Australia and the various States and Territories, Statistical Regions and Commonwealth Electoral Divisions. It was also possible to forecast projected figures based on predictions of future population age and sex distributions in Australia provided by the Australian Bureau of Statistics. A similar approach was used to estimate prevalence nationally, in each State jurisdiction and region. As is the case for all such estimations, the point estimates come with statistical confidence intervals based on the certainly of the estimates provided in the meta-analyses. The national prevalence estimate generated here is in broad agreement (within the confidence limits) of the previously published primary prevalence estimates using a wide range of different methodologies (as summarised in Part B of this report). Moreover, the estimates provided here for the various States, Territories and Regions, clearly demonstrate the considerable variation in both incidence and prevalence estimates per 100,000 individuals in a population that can result solely from differences in population structure.

This is the first structured examination of the distribution of the incidence and prevalence of Parkinson's across Australia and the first to make projections into the future of numbers across different jurisdictions. It is the first analysis to clearly show the impact of population structure on the normalised incidence and prevalence figures, highlighting the significant variation in estimates that can exist purely on the basis of differences in the age and sex distributions of the area being investigated. The data confirm that care needs to be exercised when assumptions are made that differences in incidence and prevalence are due to non-demographic etiological variables, particularly in situations where there has not been appropriate adjustment for demographic differences. The data also re-enforce the impact of Australia's growing population and changing demographic on the numbers of people living with PD, and provide insight into the regions which may be most affected if the current population predictions prove correct.

There are limitations to this analysis. Firstly, it provides estimates, not actual figures for the numbers of new diagnoses or numbers of people living with PD. The methodology makes predictions that consider diagnostic criteria, clinician expertise, health care access and capacity for patient presentation are equivalent in all areas of Australia – an assumption that is unlikely to be true. Secondly, future predictions assume that the age- and sex-standardized incidence and prevalence remain constant over the next 30 years and that these are not influenced by new therapies that can prevent or slow the onset or progression of PD or changes in any survival differential between PD cases and those without PD over time.

Finally, the true burden of Parkinson's is not represented by the prevalence alone. It is critically dependent on the progression of the condition. Parkinson's evolves from a manageable condition, in which symptomatic therapy can maintain a satisfactory quality of life and reasonable physical function. It moves towards more advanced stages, which are challenging to manage, with a much greater impact on one's physical, mental and emotional wellbeing. These stages are accompanied by social and economic consequences to the individual, their families, carers and society more generally. Presently there is no data that enables analysis of the trajectory of PD in large numbers of Australians and, specifically, no information that compares the distribution of PD cases in terms of their stage of the condition. There is also no information available that assesses this issue in different regions of Australia. Moreover, we do not know if this differs between men and women, those of different socioeconomic status or in people from different ethnic backgrounds (including our First Nations people). It would be particularly interesting to investigate this issue, as economic burden analysis depends substantially on such figures being available.

6. Acknowledgements

The author acknowledges the important research assistance of Ms Alicia Shaw and Ms Isabel Cybulski in the data collection aspects of this project.

7. References

Access_Economics. (2007). *Living with Parkinson's Disease: Challenges and Positive Steps for the Future.*

Australian_Bureau_of_Statistics. (2022). *Population Projections, Australia. ABS, 2022-base---2071,*. Retrieved June 2022 https://www.abs.gov.au/statistics/people/population/population-projections-australia/latest-release

Australian_Bureau_of_Statistics. (2024). *Commonwealth Electoral Divisions*. Retrieved January 2024 https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/non-abs-structures/commonwealth-electoral-divisions.

Australian_Electoral_Commission. (2022). Elector count by division, age group and gender for 2021. Retrieved June 2022 from https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/non-abs-structures/commonwealth-electoral-divisions.

Ayton, D., Ayton, S., Barker, A. L., Bush, A. I., & Warren, N. (2019). Parkinson's disease prevalence and the association with rurality and agricultural determinants. Parkinsonism Relat Disord, 61, 198-202. https://doi.org/10.1016/j.parkreldis.2018.10.026

Begg S, Vos T, Barker B, Stevenson C, Stanley L, Lopez AD, 2007. The burden of disease and injury in Australia 2003. PHE 82. Canberra: AIHW.

de Rijk, M. C., Tzourio, C., Breteler, M. M., Dartigues, J. F., Amaducci, L., Lopez-Pousa, S., Manubens-Bertran, J. M., Alperovitch, A., & Rocca, W. A. (1997). Prevalence of parkinsonism and Parkinson's disease in Europe: the EUROPARKINSON Collaborative Study. European Community Concerted Action on the Epidemiology of Parkinson's disease. J Neurol Neurosurg Psychiatry, 62(1), 10-15. https://doi.org/10.1136/jnnp.62.1.10

Deloitte_Access_Economics. (2011). Living with Parkinson's Disease - Update.

Deloitte_Access_Economics. (2015). Living with Parkinson's Disease: An updated economic analysis 2014.

Fealy, S., Logan, P. A., Micalos, P. S., Rossiter, R., Jones, D., Irwin, P., Schwebel, D., Carroll, V., Wong, A., Fung, V. S. C., Morales-Briceno, H., & Bramble, M. (2023). Exploring Parkinson's disease prevalence in regional, rural and remote Australia: A systematic scoping review. Aust J Rural Health, 31(6), 1156-1167. https://doi.org/10.1111/ajr.13054

Hirsch, L., Jette, N., Frolkis, A., Steeves, T., & Pringsheim, T. (2016). The Incidence of Parkinson's Disease: A Systematic Review and Meta-Analysis. Neuroepidemiology, 46(4), 292-300. https://doi.org/10.1159/000445751

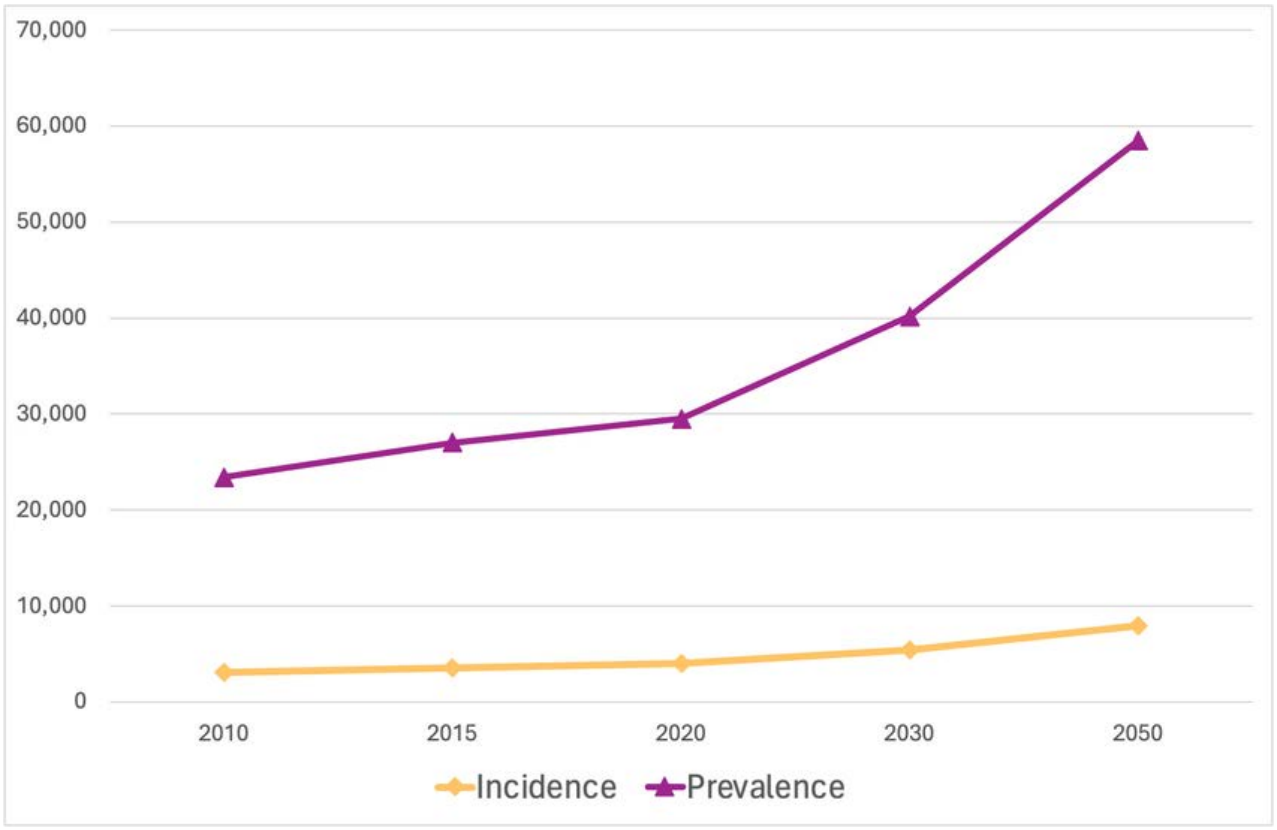
Peters, C. M., Gartner, C. E., Silburn, P. A., & Mellick, G. D. (2006). Prevalence of Parkinson's disease in metropolitan and rural Queensland: a general practice survey. J Clin Neurosci, 13(3), 343-348. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=16540321

Pringsheim, T., Jette, N., Frolkis, A., & Steeves, T. D. (2014). The prevalence of Parkinson's disease: a systematic review and meta-analysis. Mov Disord, 29(13), 1583-1590. https://doi.org/10.1002/mds.25945

8. Appendices

Appendix 1. Incidence and prevalence figures for each Australian jurisdiction and their respective SA4 Regions.

Appendix 2. Incidence and prevalence figures for each Australian Commonwealth Electoral Division. (n.b. separate document found on our website *Reports & submissions* page here)



Year	Incidence	Prevalence
2010	3,104	20,319
2015	3,599	23,429
2020	3,974	25,515
2030	5,426	34,728
2050	7,983	50,488

Figure 5. Projections of incidence and prevalence for New South Wales.

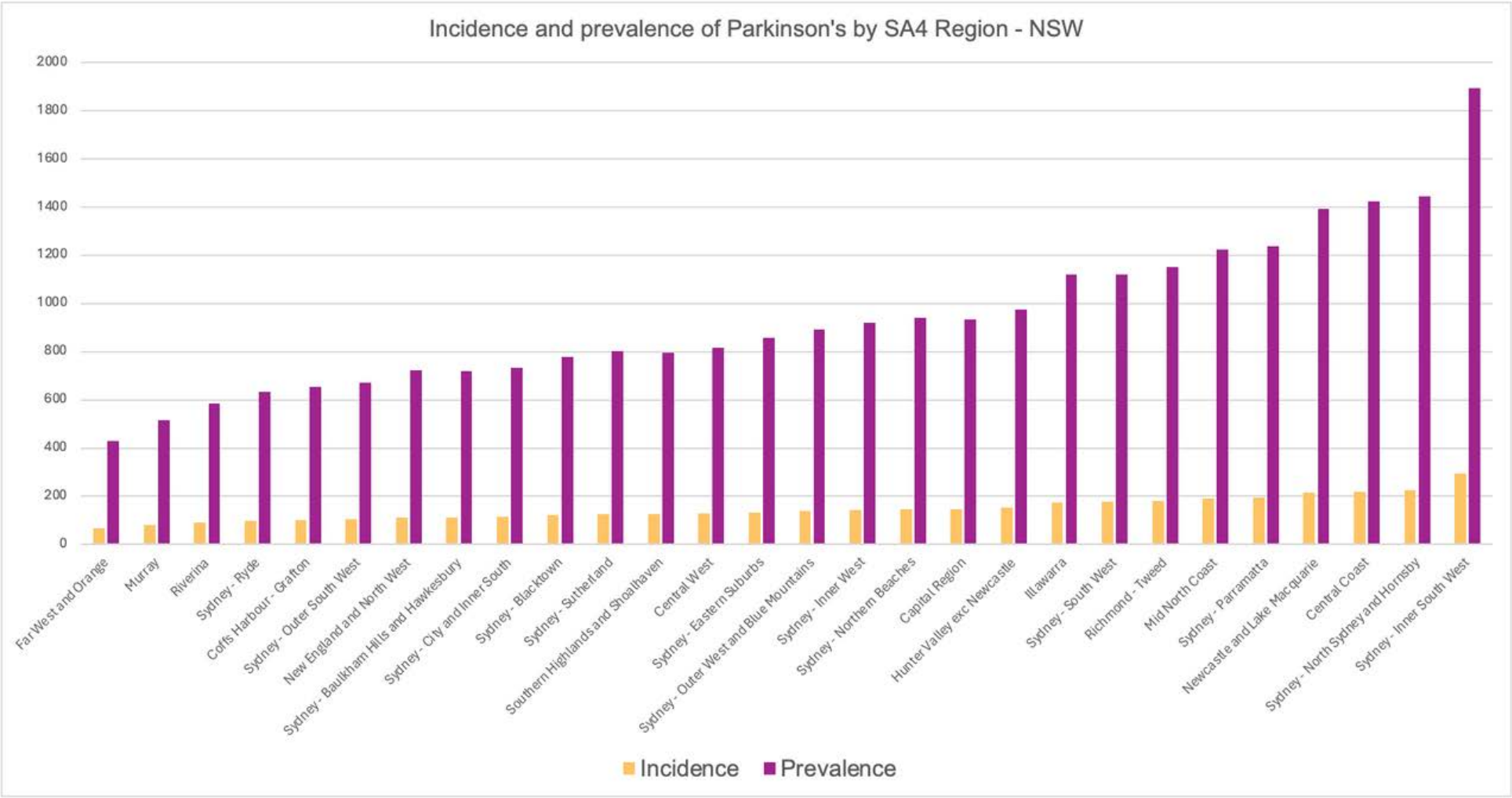
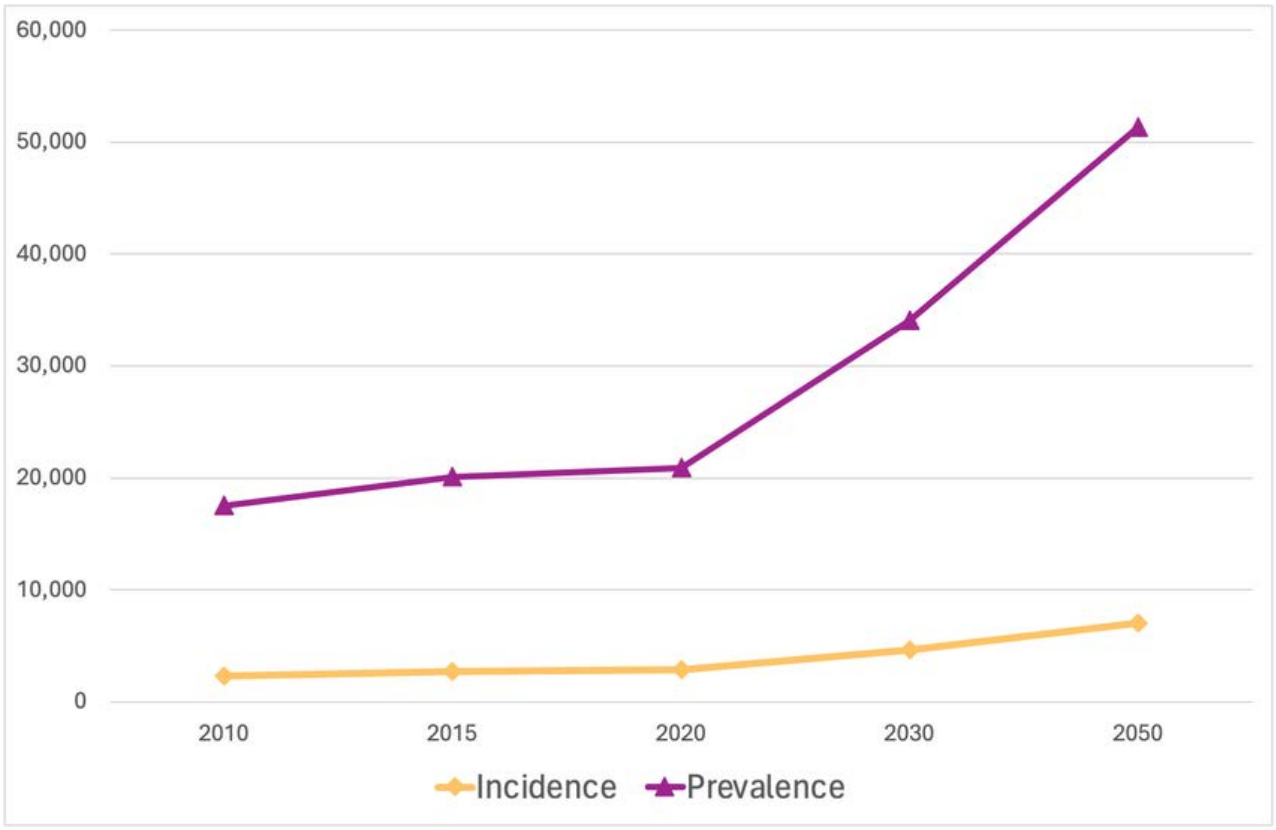


Figure 6. New South Wales data by Statistical Area 4 for 2020 (see Table 24).

Table 24. 2020 NSW Statistical Area 4 (SA4) Region from lowest incidence. .

SA4 Code	Name of Area	Incidence	Prevalence
105	Far West and Orange	67	431
109	Murray	81	515
113	Riverina	91	585
126	Sydney - Ryde	98	634
104	Coffs Harbour - Grafton	103	654
123	Sydney - Outer South West	105	671
110	New England and North West	112	724
115	Sydney - Baulkham Hills and Hawkesbury	113	721
117	Sydney - City and Inner South	116	735
116	Sydney - Blacktown	122	779
128	Sydney - Sutherland	124	803
114	Southern Highlands and Shoalhaven	125	795
103	Central West	128	816
118	Sydney - Eastern Suburbs	133	859
124	Sydney - Outer West and Blue Mountains	138	892
120	Sydney - Inner West	143	920
122	Sydney - Northern Beaches	145	939
101	Capital Region	147	933
106	Hunter Valley exc Newcastle	153	976
107	Illawarra	173	1120
127	Sydney - South West	176	1121
112	Richmond - Tweed	180	1152
108	Mid North Coast	192	1223
125	Sydney - Parramatta	194	1238
111	Newcastle and Lake Macquarie	215	1392
102	Central Coast	220	1423
121	Sydney - North Sydney and Hornsby	224	1443
119	Sydney - Inner South West	296	1892



Year	Incidence	Prevalence
2010	2,326	15,213
2015	2,698	17,424
2020	2,915	18,009
2030	4,613	29,467
2050	7,018	44,306

Figure 7. Projections of incidence and prevalence for Victoria.

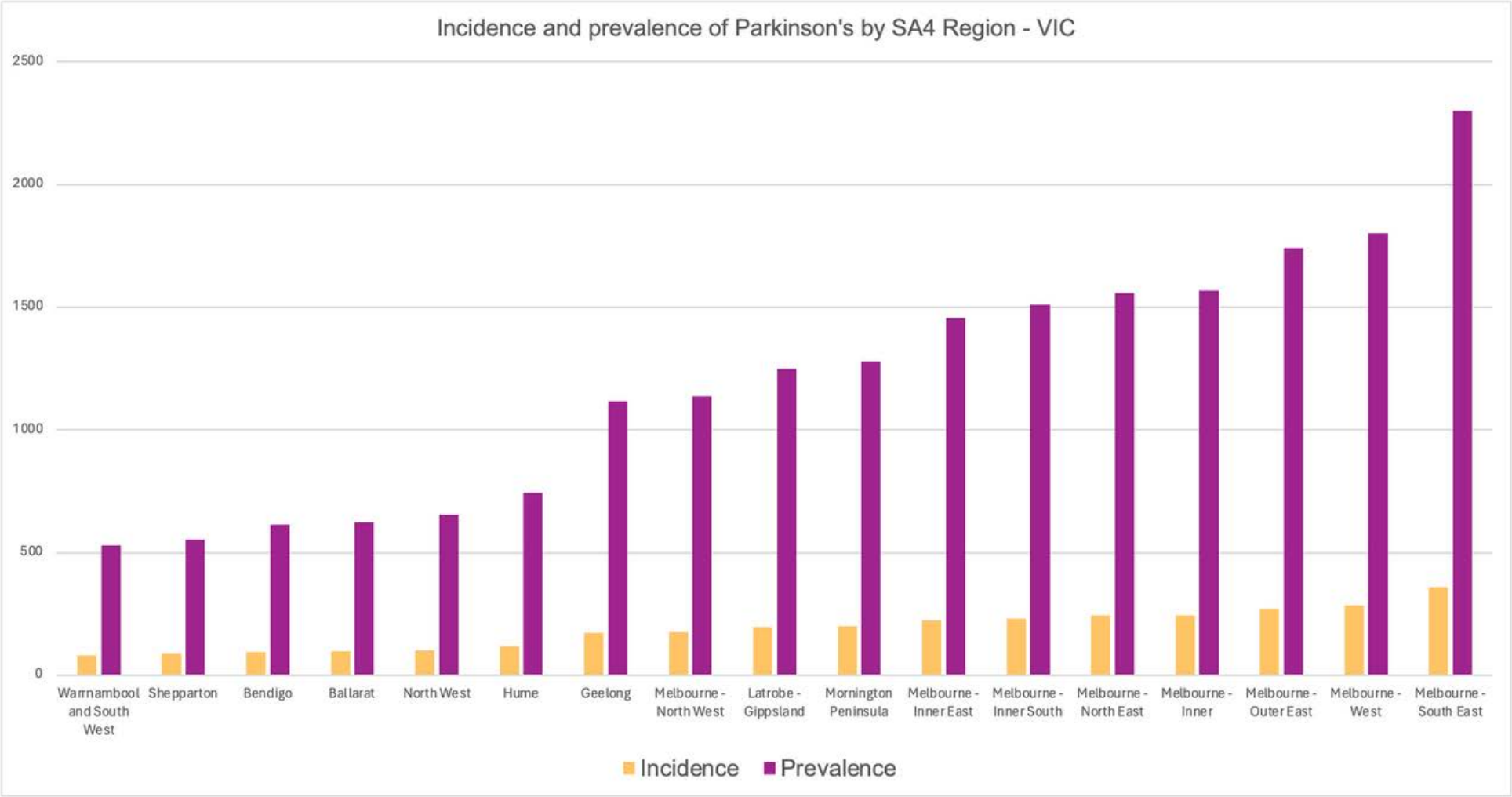
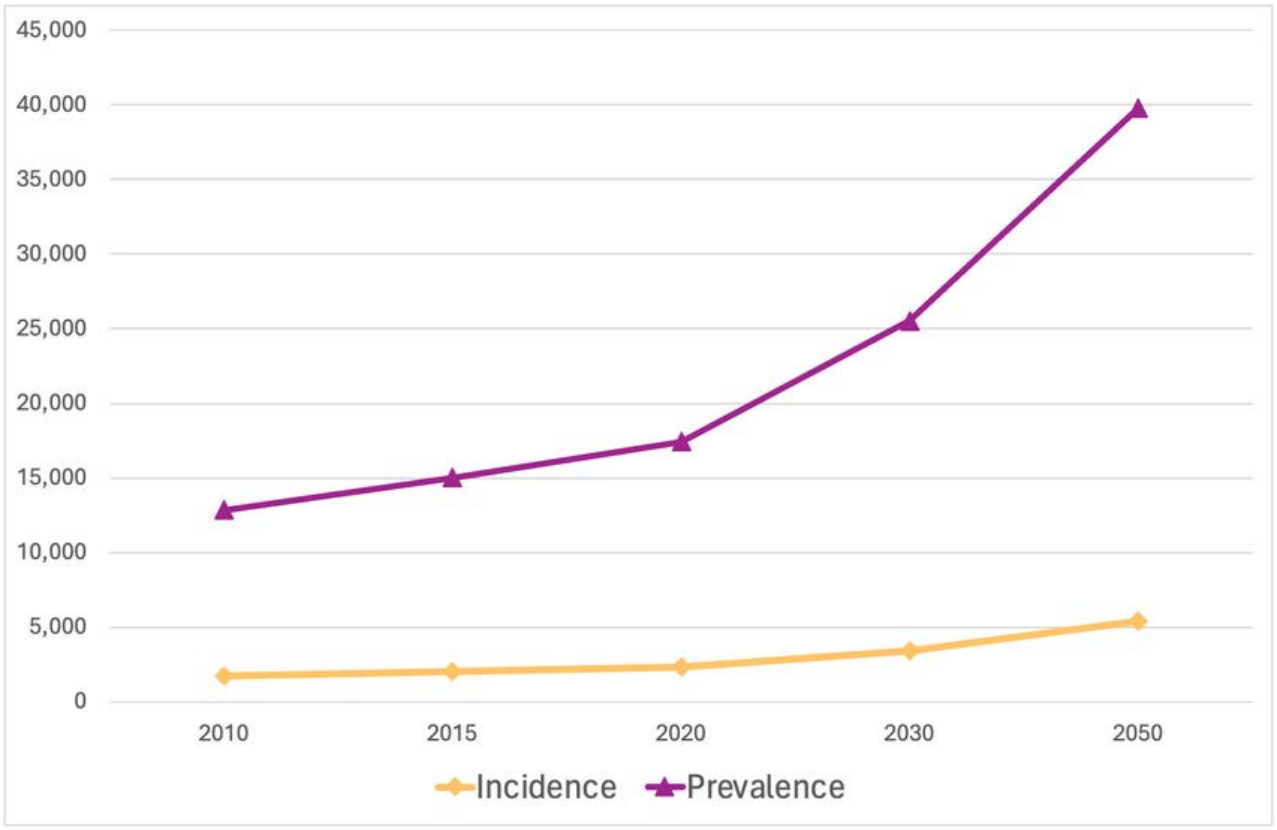


Figure 8. Victorian data by Statistical Area 4 for 2020 (see Table 25 for raw data).

Table 25. 2020 VIC Statistical Area 4 (SA4) Region from lowest incidence.

SA4 Code	Name of Area	Incidence	Prevalence
217	Warrnambool and South West	82	528
216	Shepparton	87	554
202	Bendigo	96	614
201	Ballarat	97	625
215	North West	102	654
204	Hume	117	743
203	Geelong	173	1116
210	Melbourne - North West	177	1138
205	Latrobe - Gippsland	198	1250
214	Mornington Peninsula	199	1279
207	Melbourne - Inner East	224	1457
208	Melbourne - Inner South	232	1509
209	Melbourne - North East	243	1558
206	Melbourne - Inner	244	1568
211	Melbourne - Outer East	270	1740
213	Melbourne - West	283	1801
212	Melbourne - South East	360	2302



Year	Incidence	Prevalence
2010	1,724	11,138
2015	2,031	12,995
2020	2,362	15,072
2030	3,452	22,063
2050	5,412	34,344

Figure 9. Projections of incidence and prevalence for Queensland.

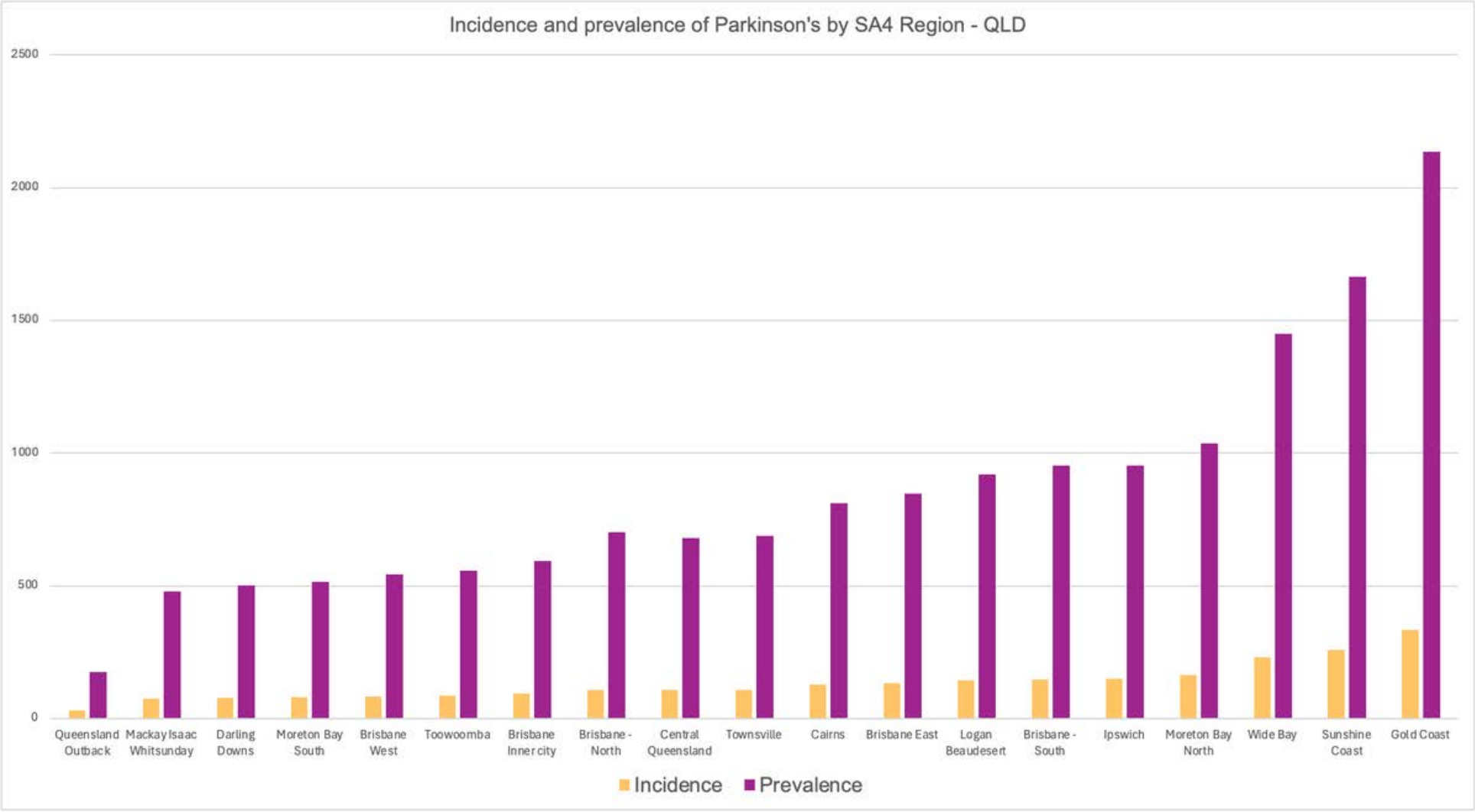
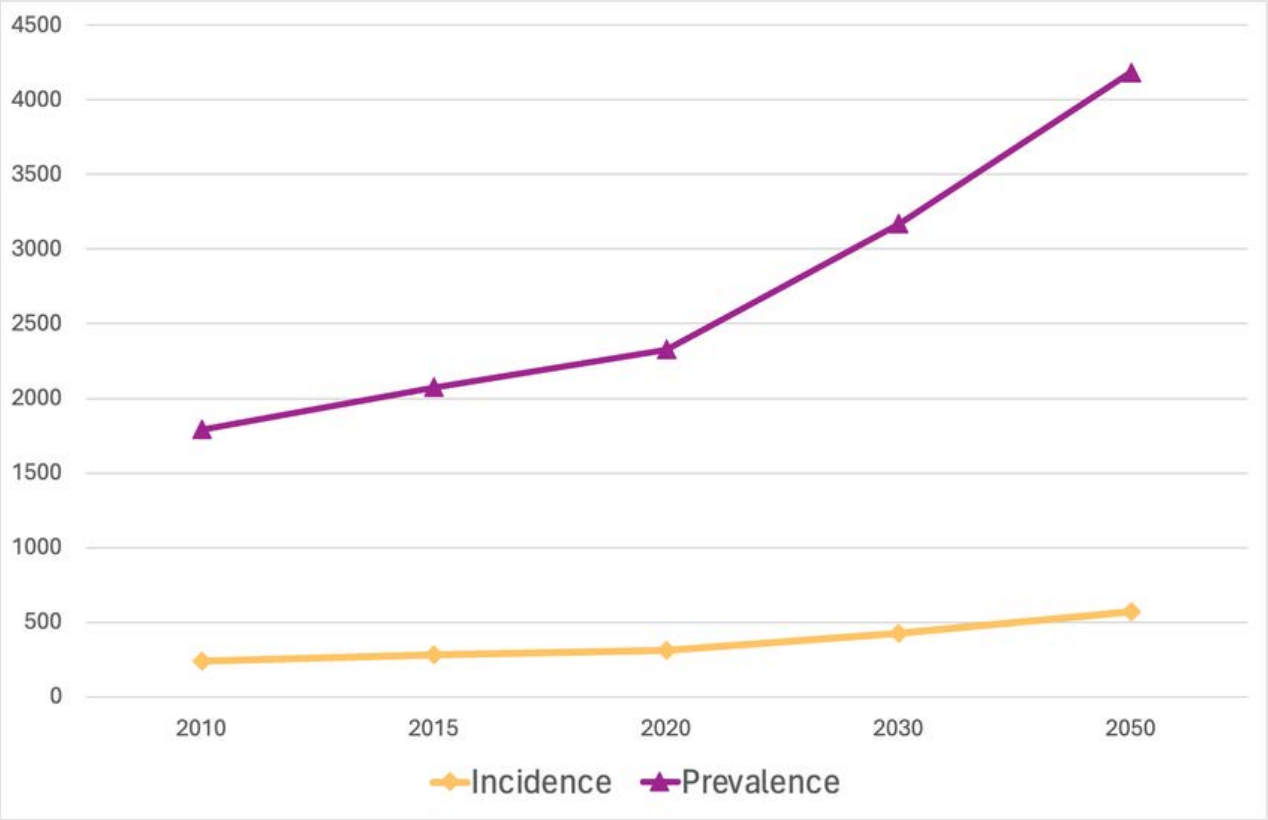


Figure 10. Queensland data by Statistical Area 4 for 2020 (see Table 26 for raw data).

Table 26. 2020 QLD Statistical Area 4 (SA4) Region from lowest incidence.

SA4 Code	Name of Area	Incidence	Prevalence
315	Queensland Outback	29	176
312	Mackay Isaac Whitsunday	76	478
307	Darling Downs	79	502
314	Moreton Bay South	81	514
304	Brisbane West	84	544
317	Toowoomba	85	556
305	Brisbane Inner city	93	593
302	Brisbane - North	107	701
308	Central Queensland	107	681
318	Townsville	108	689
306	Cairns	129	811
301	Brisbane East	132	847
311	Logan Beaudesert	145	920
303	Brisbane - South	148	954
310	Ipswich	150	953
313	Moreton Bay North	163	1038
319	Wide Bay	230	1450
316	Sunshine Coast	260	1665
309	Gold Coast	334	2135



Year	Incidence	Prevalence
2010	238	1,553
2015	280	1,793
2020	315	2,013
2030	428	2,741
2050	569	3,613

Figure 11. Projections of incidence and prevalence for Tasmania.

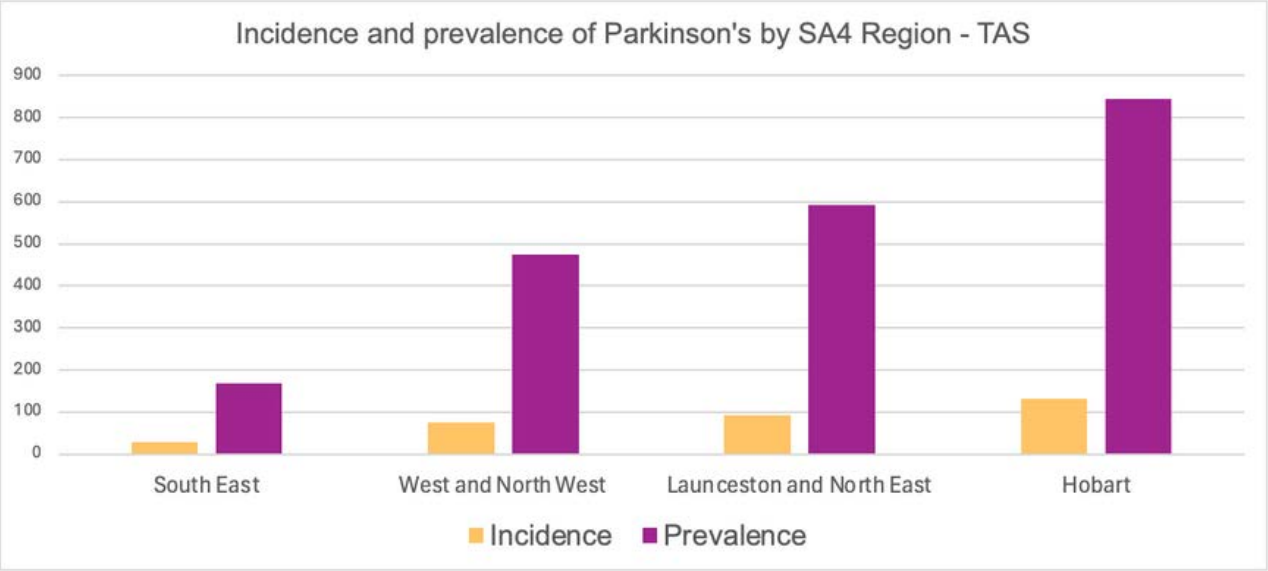
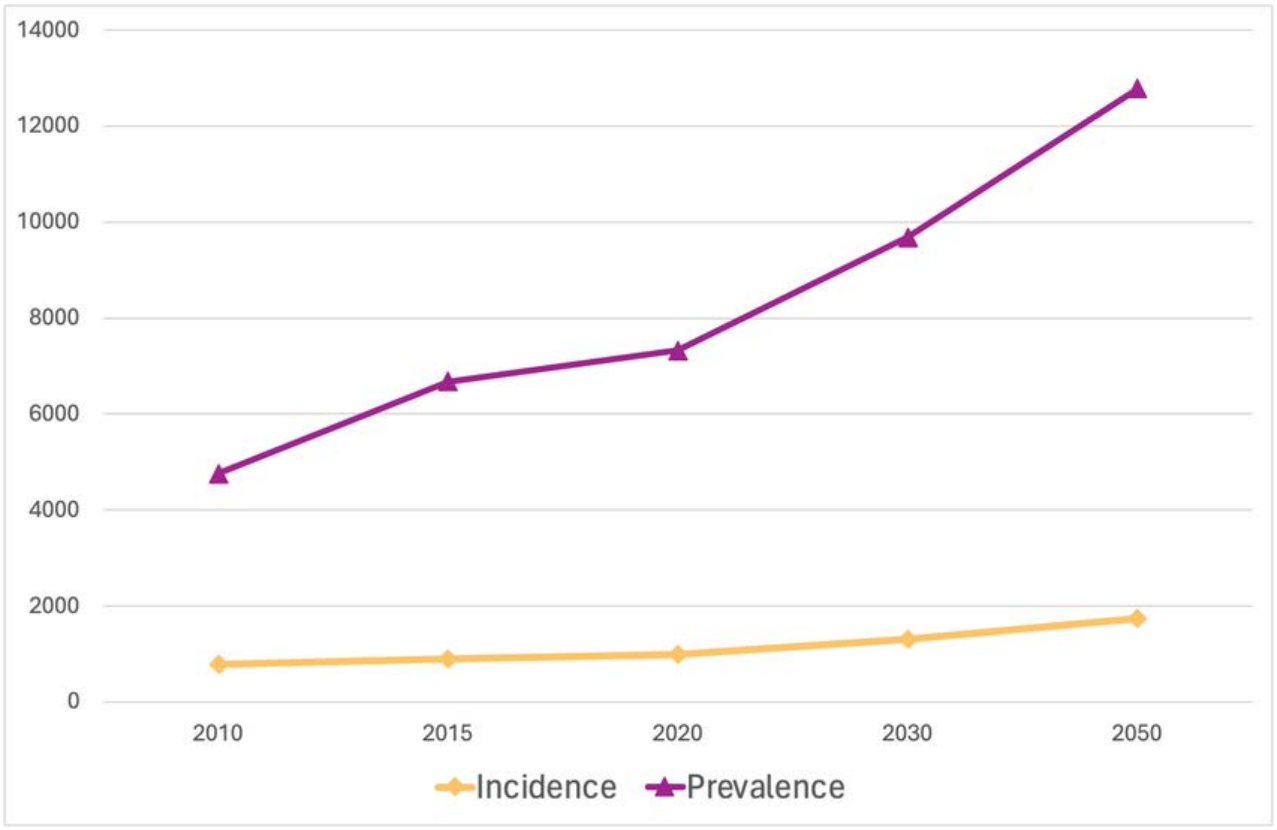


Figure 12. Tasmania data by Statistical Area 4 for 2020

SA4 Code	Name of Area	Incidence	Prevalence
601	Hobart	131	844
602	Launceston and North East	92	592
603	South East	28	169
604	West and North West	74	475



Year	Incidence	Prevalence
2010	790	3,969
2015	892	5,784
2020	984	6,339
2030	1,302	8,383
2050	1,743	11,035

Figure 13. Projections of incidence and prevalence for South Australia.

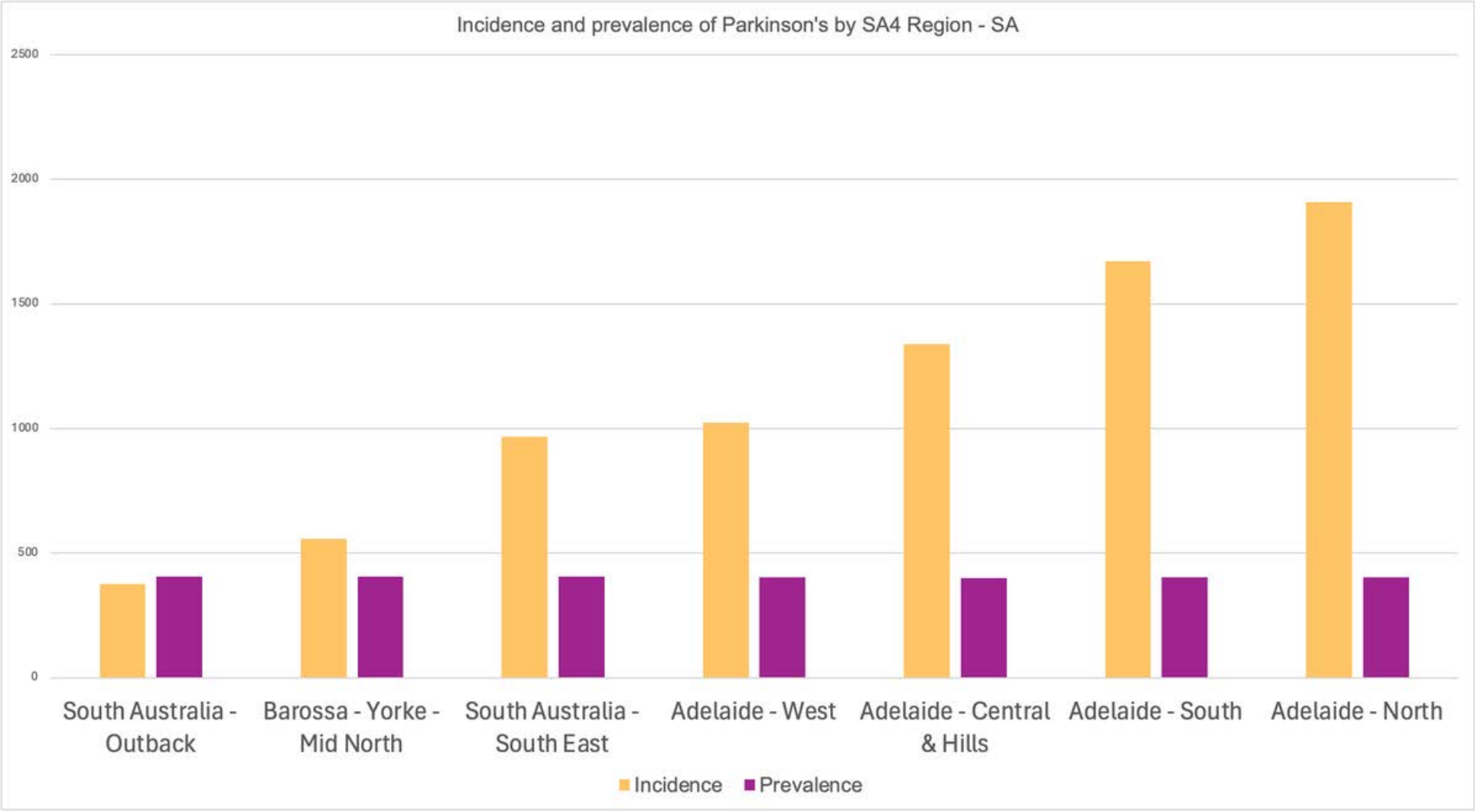
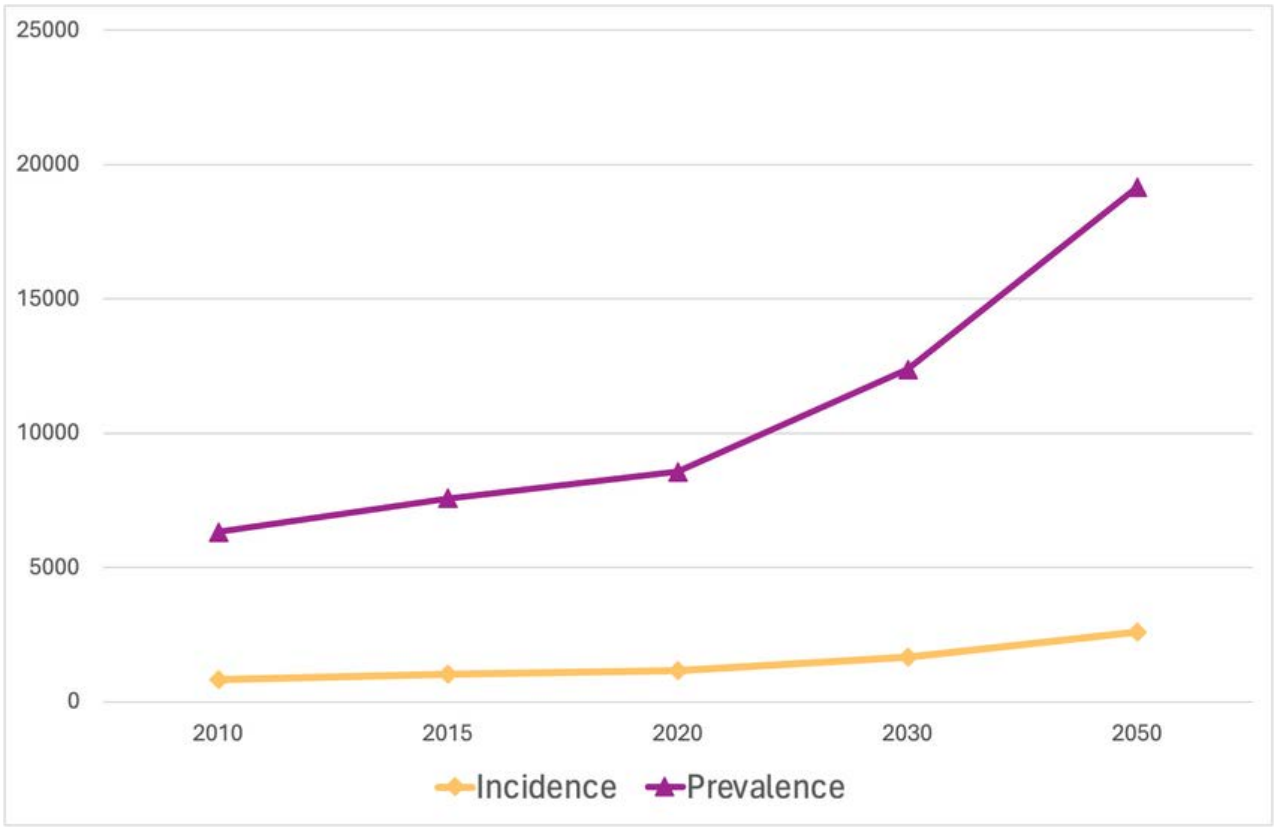


Figure 14. South Australia data by Statistical Area 4 for 2020 (see Table 29 for raw data).

Table 29. 2020 SA Statistical Area 4 (SA4) Region from lowest incidence.

SA4 Code	Name of Area	Incidence	Prevalence
406	South Australia - Outback	376	406
405	Barossa - Yorke - Mid North	558	405
407	South Australia - South East	966	407
404	Adelaide - West	1,023	404
401	Adelaide - Central & Hills	1,340	401
403	Adelaide - South	1,672	403
402	Adelaide - North	1,909	402



Year	Incidence	Prevalence
2010	846	5,473
2015	1,019	6,551
2020	1,157	7,403
2030	1,672	10,708
2050	2,614	16,553

Figure 15. Projections of incidence and prevalence for Western Australia.

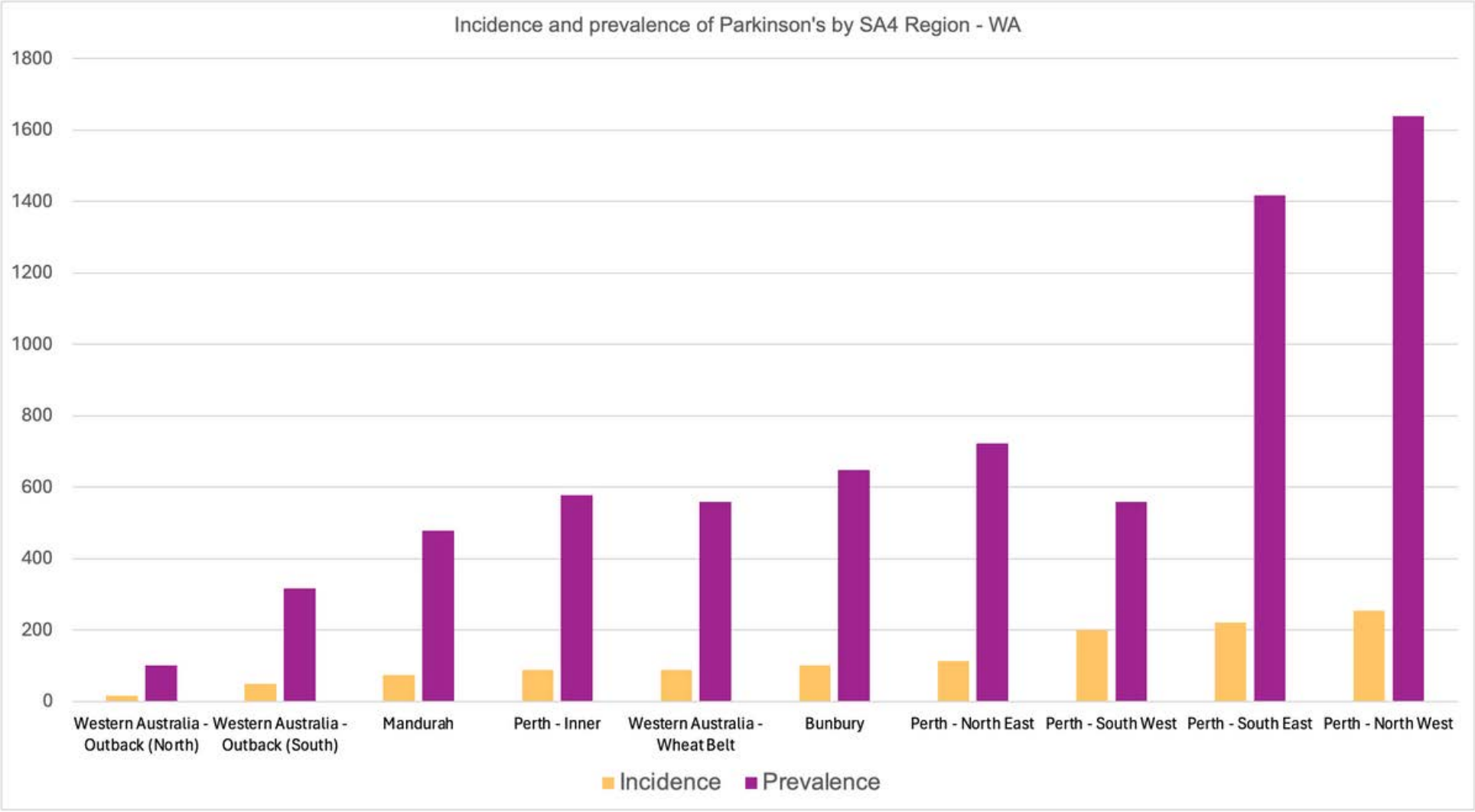
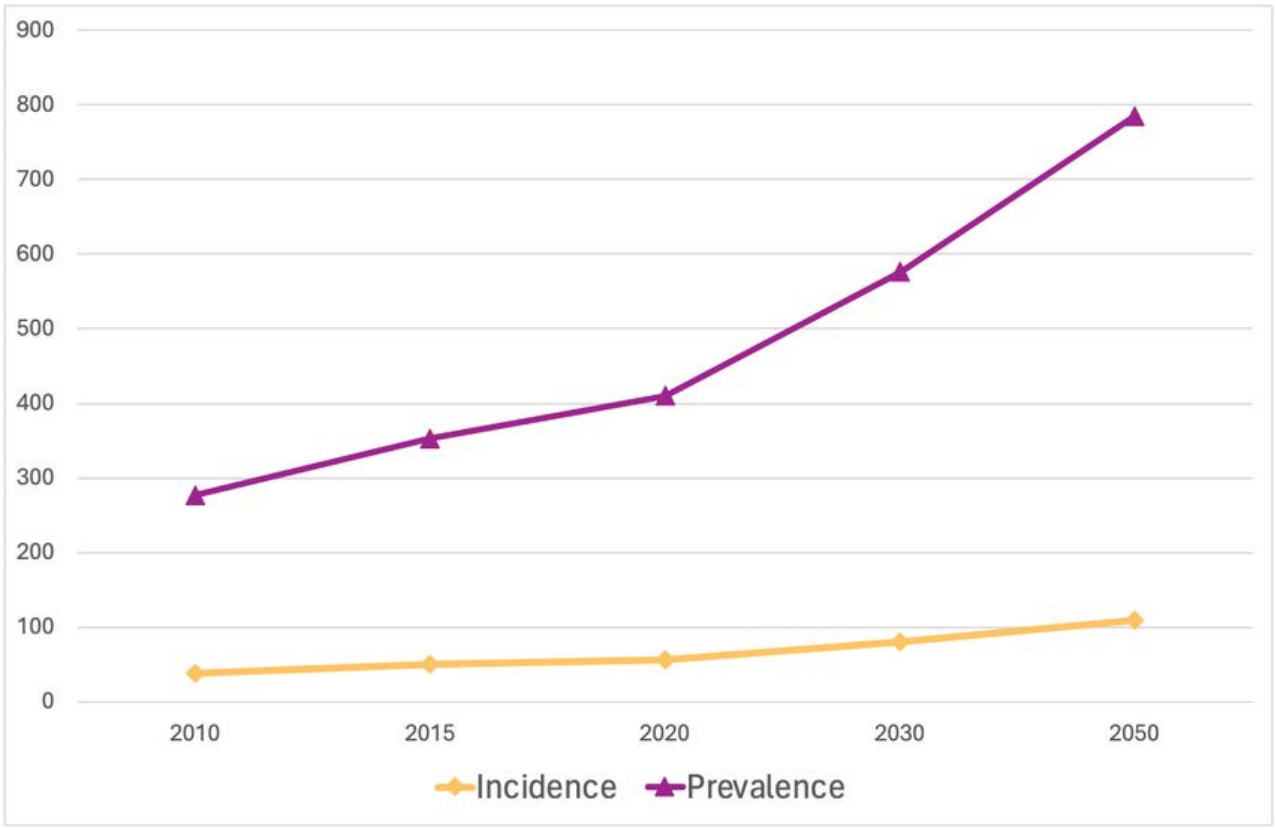


Figure 16. Western Australia data by Statistical Area 4 for 2020 (see Table 30 for raw data).

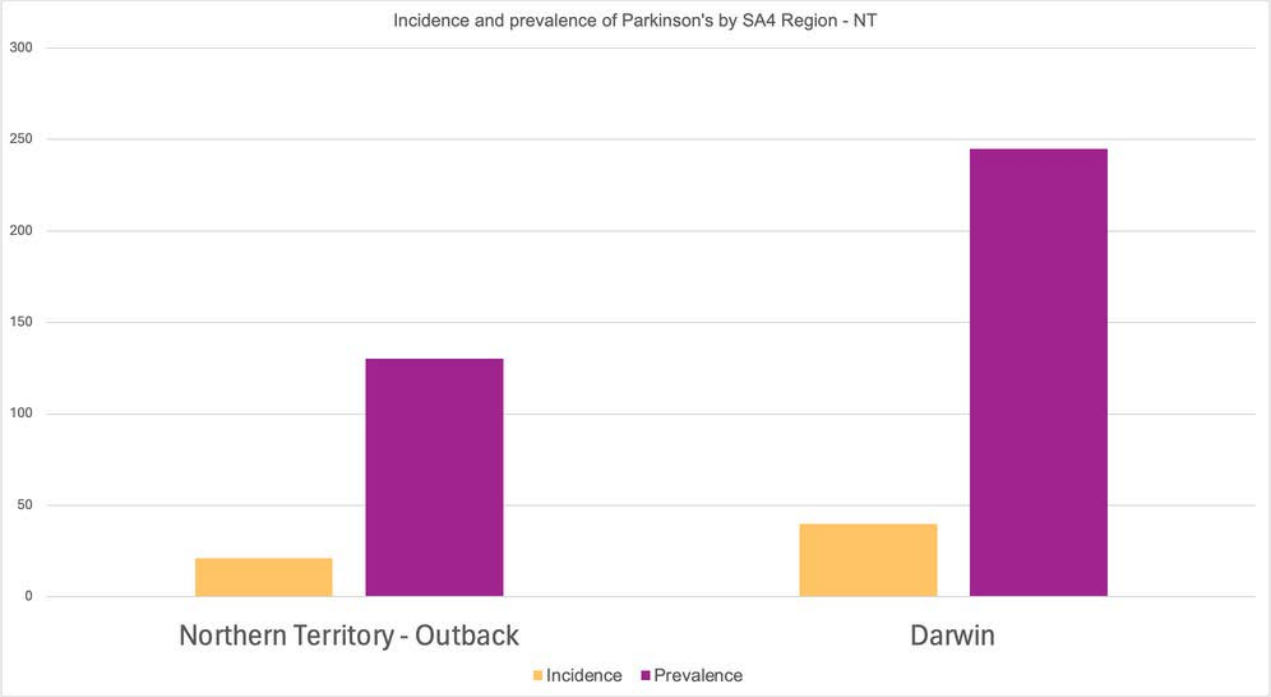
Table 30. 2020 WA Statistical Area 4 (SA4) Region from lowest incidence.

SA4 Code	Name of Area	Incidence	Prevalence
510	Western Australia - Outback (North)	17	102
511	Western Australia - Outback (South)	50	316
502	Mandurah	75	478
503	Perth - Inner	89	578
509	Western Australia - Wheat Belt	89	560
501	Bunbury	102	648
504	Perth - North East	113	724
507	Perth - South West	200	560
506	Perth - South East	221	1,417
505	Perth - North West	255	1,639



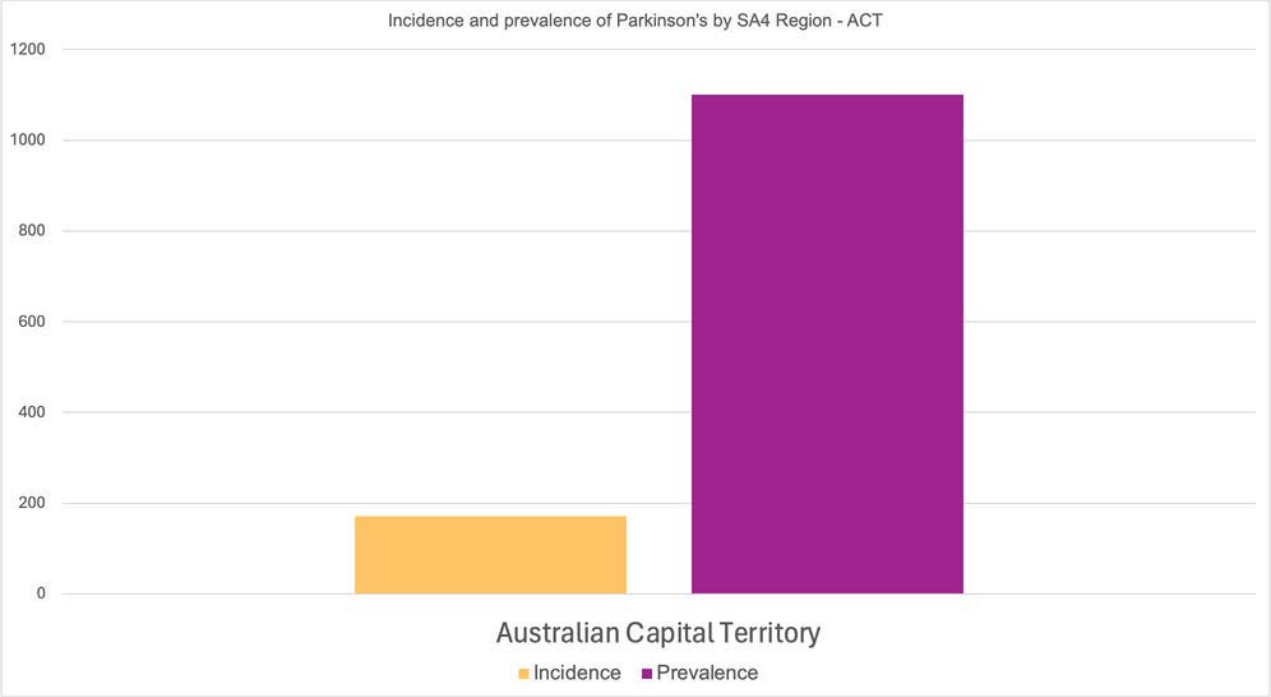
Year	Incidence	Prevalence
2010	39	238
2015	50	303
2020	57	353
2030	80	496
2050	110	675

Figure 17. Projections of incidence and prevalence for Northern Territory.



SA4 Code	Name of Area	Incidence	Prevalence
702	Northern Territory - Outback	21	130
701	Darwin	40	245

Figure 18. Northern Territory data by Statistical Area 4 for 2020.



SA4 Code	Name of Area	Incidence	Prevalence
801	Australian Capital Territory	172	1,101

Figure 19. Australian Capital Territory data by Statistical Area 4 for 2020.

We thank you for your continued support in our efforts to contribute to knowledge about Parkinson's.

Contact

Parkinson's Australia Ltd

Infoline 1800 644 189

www.parkinsons.org.au

info@parkinsons.org.au

@parkinsonsaust