



Australian Government
**Australian Institute of
Health and Welfare**



Geographic variation in suicide risk and service delivery to Indigenous Australians



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About the cover artwork:

Artist: Linda Huddleston

Title: The journey towards healing

At the centre of the artwork is the Clearinghouse. The black half-circles are the people who come to the Clearinghouse for information about mental health and suicide prevention.

The waves of red, yellow and white dots surrounding the inner circle represent strength and healing.

The footprints represent the journey towards healing.

The red and white circles around the edge represent different programs and policies aimed at helping people heal.

The hands represent success and wellbeing.



Caution: Some people may find the content in this report confronting or distressing.

Please carefully consider your needs when reading the following information about Indigenous mental health and suicide prevention. If you are looking for help or crisis support, please contact:

13YARN (13 92 76), Lifeline (13 11 14) or Beyond Blue (1300 22 4636).

The AIHW acknowledges the Aboriginal and Torres Strait Islander individuals, families and communities that are affected by suicide each year. If you or your community has been affected by suicide and need support, please contact Thirrili's **Postvention Suicide Support service** on **1800 805 801**.

The AIHW supports the use of the [Mindframe guidelines](#) on responsible, accurate and safe suicide and self-harm reporting. Please consider these guidelines when reporting on these topics.





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Introduction



1 Introduction

This report examines geographic variation in factors of relevance to suicide prevention and the association between service provision and suicide outcomes. The first part of this work compared the geographic variation in suicide rates during 2011–2020 among Aboriginal and Torres Strait Islander people with the geographic variation in a few key circumstances of relevance to suicide risk and prevention. These include:

- historic Indigenous suicide rates
- socioeconomic circumstances
- availability of mental health services
- relevant health outcomes (for example, hospitalisations due to self-harm).

To interpret regional differences in suicide risk more easily, the Australian Bureau of Statistics' (ABS) Indigenous Regions (IREGs, see Appendix A) have been classified as either 'low', 'medium' or 'high' risk, based on these indicators. Section 2.5 presents a ranking of IREGs based on this aggregate metric. It is important to note that the ranking is relative and that a classification of "low" does not imply that suicide prevention is easy or not required in any region.

The second part of this work used regression modelling to explore the regional level association between:

- recorded Indigenous suicides
- a range of variables that can be interpreted as proxies for individual and social functioning/cohesion and
- delivery of mental health services at the level of the ABS Statistical Areas level 3 (SA3).

However, the analysis found that the nature of the available data, in combination with the number of suicides and the geographic distribution of services, makes it difficult to provide robust insights into the association between Indigenous suicides and service availability/delivery at the SA3 level.



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Indicators of suicide risk by Indigenous region



2 Indicators of suicide risk by Indigenous region

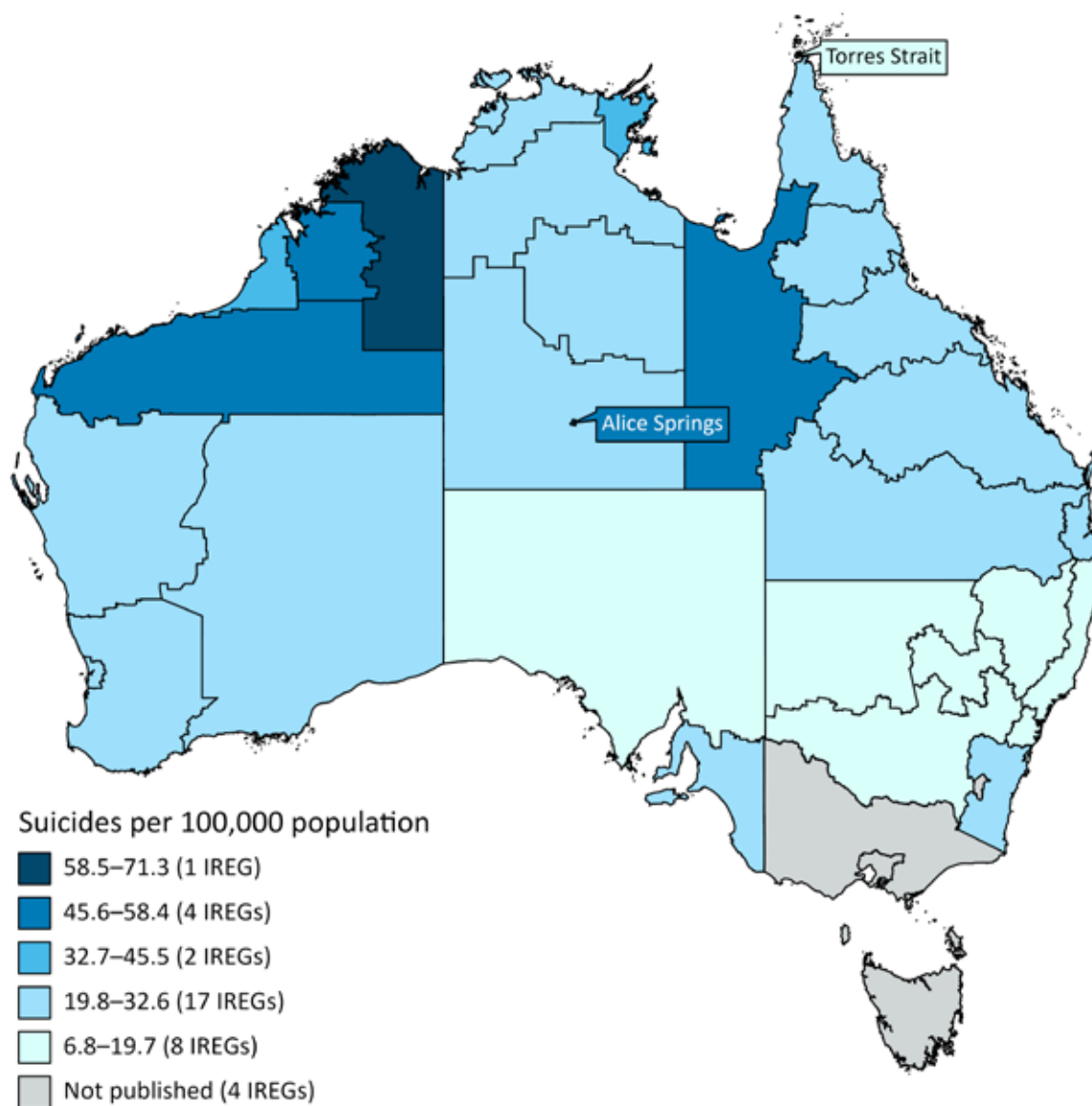
2.1 Suicide rates

The following data refer to the average crude suicide rate among Indigenous Australians, by IREG, covering New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. To account for the small number of suicides in some IREGs, these rates are averaged over the 2011–2020 period and are presented on a per-100,000 Estimated Resident Population (ERP) basis, where the ERPs are modelled by AIHW, based upon ABS 2016 census data.

The regions with the highest crude suicide rate among Indigenous Australians over the 2011–2020 period were (Figure 2.1):

- Kununurra (71 suicide deaths per 100,000 population)
- Mount Isa (57 per 100,000 population)
- West Kimberley (49 per 100,000 population)
- Alice Springs (47 per 100,000 population)
- South Hedland (46 per 100,000 population).

Figure 2.1: Suicide deaths among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020



Notes

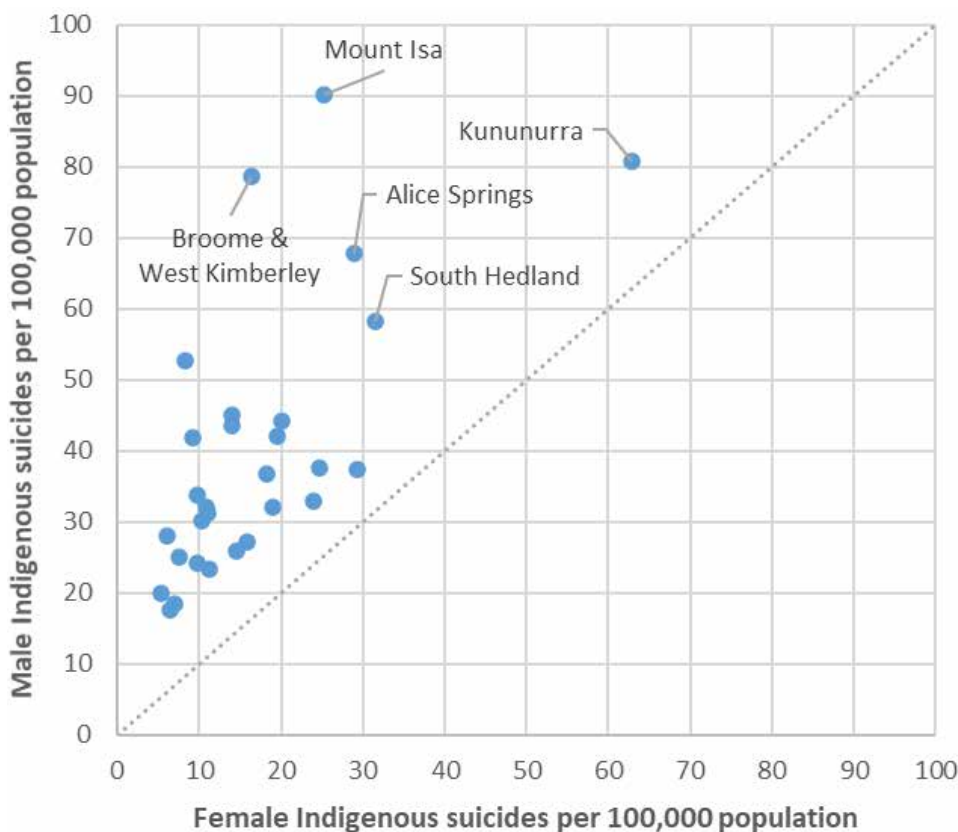
1. Analysis based on deaths registered between 2011 and 2020. Death registrations were 'Final' for 2011–2017; 'Revised' for 2018; and 'Preliminary' for 2019 and 2020.
2. Only data from NSW, Qld, WA, SA and the NT are included. These jurisdictions were considered to have adequate levels of Indigenous identification in mortality data at the time the data were released by the Australian Bureau of Statistics (ABS).
3. Crude rates were calculated from the average number of suicides over 10 years, divided by the average population estimates over 10 years (2016-based estimates, Series B projections, and backcasts), multiplied by 100,000.
4. Crude rates are not directly comparable with age-standardised rates presented elsewhere.
5. Deaths were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Deaths that could not be concorded to IREG were not included. Excludes Other Territories.
6. 'Port Augusta' IREG and 'Port Lincoln - Ceduna' IREG in SA have been combined to avoid suppressing data.
7. See Appendix A: Figure A1 for IREG names and Appendix D: Table A1 for data values.

Sources: AIHW National Mortality Database; AIHW analysis of ABS population data.

The rate of suicide deaths was higher for Indigenous men than for Indigenous women in all regions (Figure 2.2). However, there is considerable variation in how large the difference is between IREGs.

Kununurra, which had the highest overall suicide rate, had by far the highest female suicide rate at 63 per 100,000. This is around twice the rate of the next highest region (South Hedland, with 31 female Indigenous suicide deaths per 100,000 population) (Figure 2.2). How well these data reflect variation in the underlying risk of suicide should be considered with a degree of caution given the small numbers of suicide deaths (from a statistical point of view) in many of the regions.

Figure 2.2: Suicide deaths among Indigenous males and females, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020



Notes

1. Analysis based on deaths registered between 2011 and 2020. Death registrations were 'Final' for 2011–2017; 'Revised' for 2018; and 'Preliminary' for 2019 and 2020.
2. Only data from NSW, Qld, WA, SA and the NT are included. These jurisdictions were considered to have adequate levels of Indigenous identification in mortality data at the time the data were released by the Australian Bureau of Statistics (ABS).
3. Crude rates were calculated from the average number of suicides over 10 years, divided by the average population estimates over 10 years (2016-based estimates, Series B projections, and backcasts), multiplied by 100,000.
4. Crude rates are not directly comparable with age-standardised rates presented elsewhere.
5. Deaths were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Deaths that could not be concorded to IREG were not included. Excludes Other Territories.
6. Certain IREGs in WA, SA and the NT have been combined to avoid suppressing data.
7. See Appendix A: Figure A1 for IREG names and Appendix D: Table A2 for data values.

Sources: AIHW National Mortality Database; AIHW analysis of ABS population data.



2.2 Hospitalisations for self-harm and mental health

Data for Indigenous patients who were hospitalised for non-fatal intentional self-harm injuries, or for mental health-related reasons, have been sourced from the AIHW's National Hospital Morbidity Database.

- Mental health-related hospitalisations are those for which: there was a principal diagnosis of *Mental and behavioural disorders* or a number of other selected diagnoses in ICD-10-AM; or the hospitalisation involved specialised psychiatric care.
- Non-fatal self-harm hospitalisations are instances of admission to hospital for self-poisoning or self-injury, with or without suicidal intent (that is, the data reflect both suicide attempts and non-suicidal self-harming behaviours), that did not result in death by suicide.

Figures 2.3 and 2.4 show the hospitalisation rate per 100,000 ERP by IREG for both mental health-related diagnoses (Figure 2.3) and for non-fatal self-harm (Figure 2.4) over the 3-year period, 2018–19 to 2020–21.

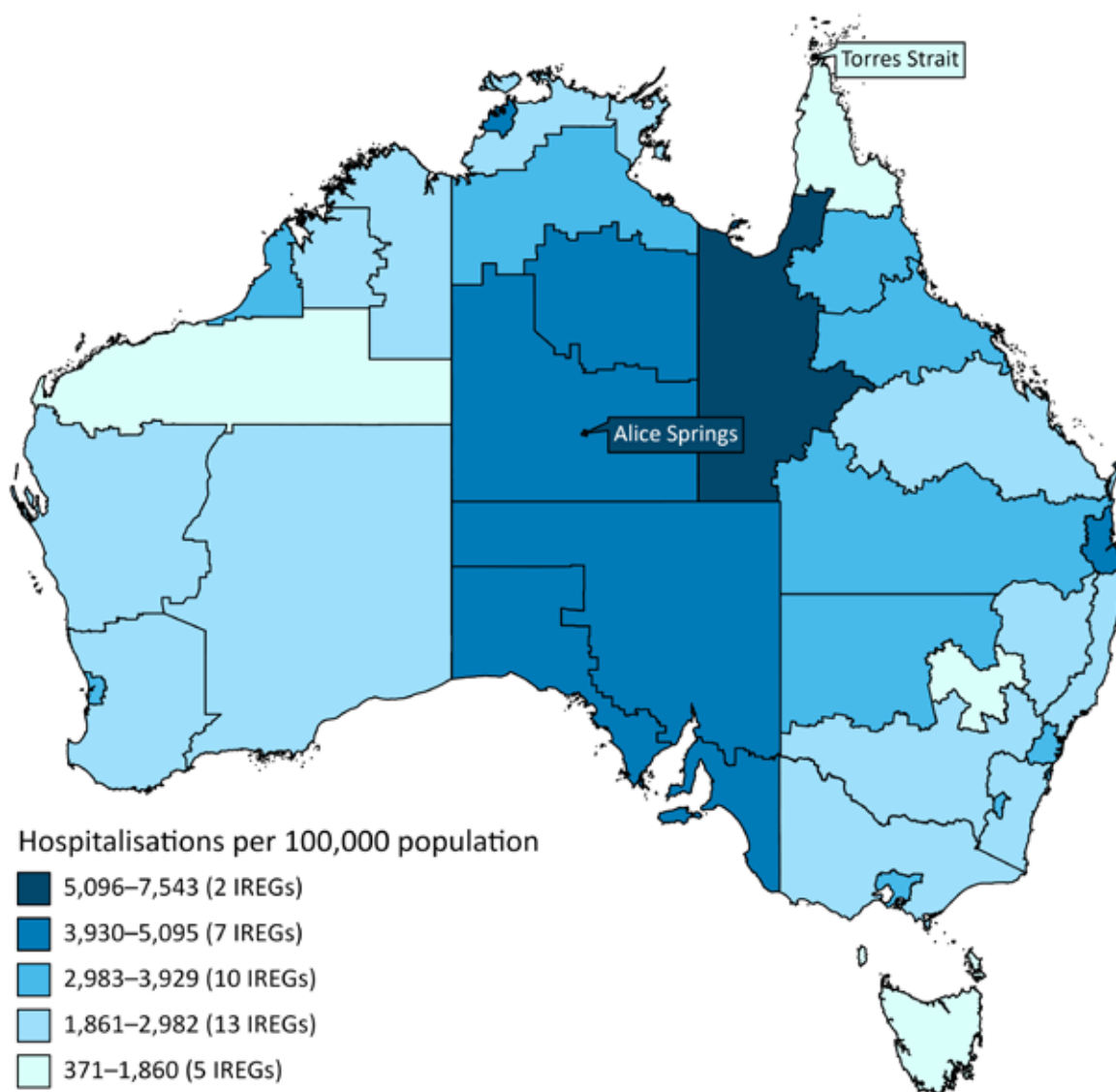
The IREGs with the highest rate of mental health-related hospitalisations were:

- Alice Springs (7,543 per 100,000 population)
- Mount Isa (6,563 per 100,000 population)
- Port Lincoln – Ceduna (5,095 per 100,000 population)
- Apatula (5,069 per 100,000 population)
- Tennant Creek (4,797 per 100,000 population).

The IREGs with the highest rate of self-harm related hospitalisations were:

- Alice Springs (908.8 per 100,000 population)
- Mount Isa (903.6 per 100,000 population)
- Tennant Creek (666.1 per 100,000 population)
- Adelaide (501.6 per 100,000 population)
- Darwin (487.3 per 100,000 population).

Figure 2.3: Hospitalisations for mental health-related care among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21

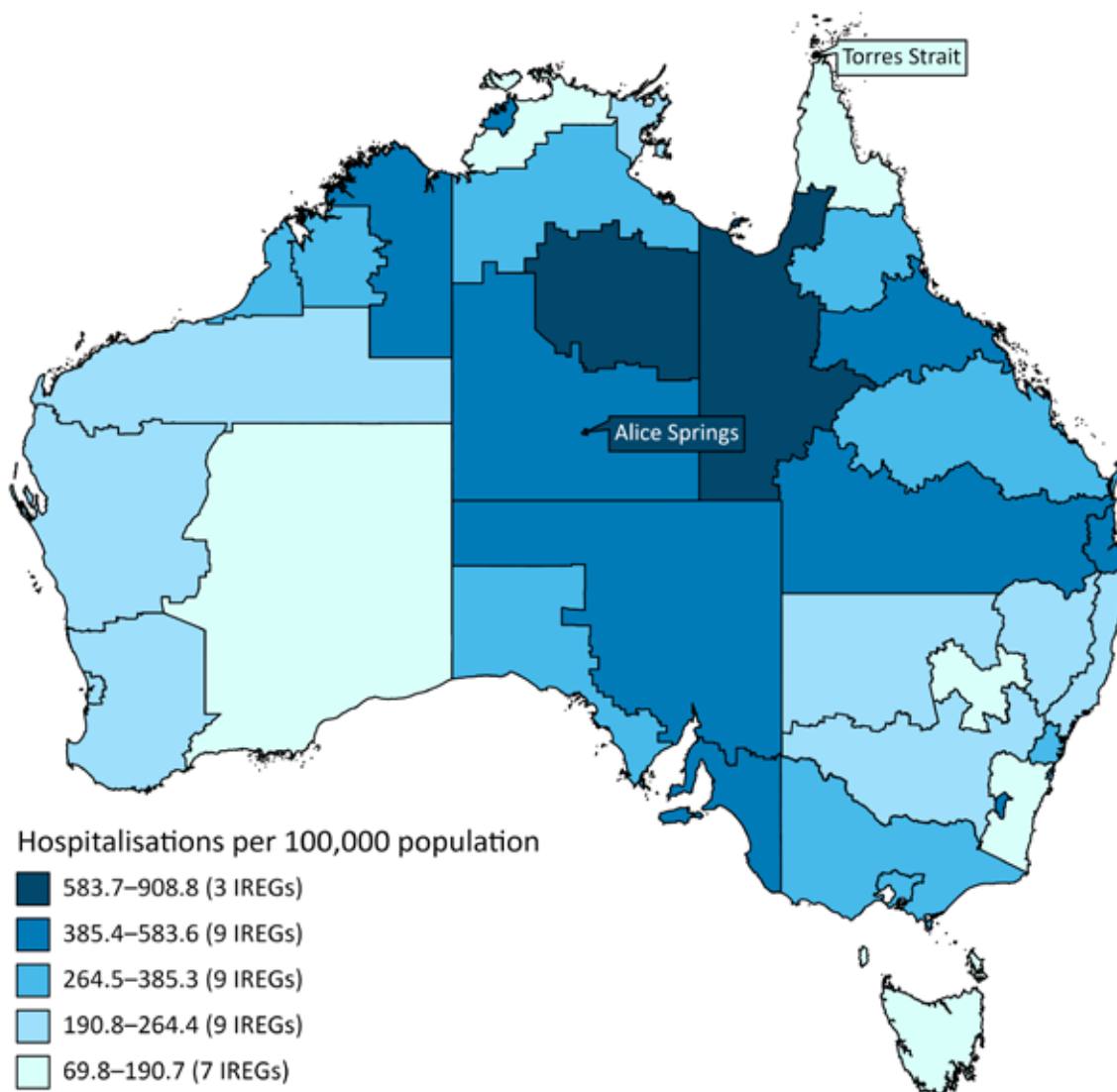


Notes

1. Data are included from public and private hospitals in all jurisdictions.
2. Includes hospitalisations where the principal diagnosis is in the ICD-10-AM range: F00–F99 (excluding F52.5, F84.2, F98.5 and F98.6), G30, R44, R48, G47.0, G47.1, G47.2, G47.8, G47.9, O99.3, R45.0, R45.1, R45.4, Z00.4, Z03.2, Z04.6, Z09.3, Z13.3, Z50.2, Z50.3, Z54.3, Z61.9, Z63.1, Z63.8, Z63.9, Z65.8, Z65.9, Z71.4, Z71.5, Z76.0, R45.81 and/or included any specialised psychiatric care. Excludes hospitalisations for newborn care (without qualified days), hospital boarders, and posthumous organ procurement.
3. Crude rates were calculated from the average number of hospitalisations over 3 years, divided by the average population estimates over 3 years (2016-based Series B projections), multiplied by 100,000.
4. Includes all ages.
5. Hospitalisations for Tasmania and the ACT were concorded from state/territory of usual residence. Hospitalisations for other jurisdictions were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Hospitalisations that could not be concorded to IREG were not included. Excludes Other Territories.
6. See Appendix A: Figure A1 for IREG names and Appendix D: Table A3 for data values.

Sources: National Hospital Morbidity Database, 2018–19 to 2020–21; ABS population data.

Figure 2.4: Hospitalisations for non-fatal intentional self-harm among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21



Notes

1. Data are included from public and private hospitals in all jurisdictions.
2. Includes hospitalisations where the principal diagnosis is in the ICD-10-AM range: S00–T75, T79 and the first reported external cause code is in the ICD-10-AM range: X60–X84, Y87.0. Excludes hospitalisations for newborn care (without qualified days), hospital boarders, and posthumous organ procurement. Excludes hospitalisations where mode of admission is reported as ‘transfer from another hospital’. Excludes hospitalisations where care involving the use of rehabilitation procedures (Z50) is an additional diagnosis. Excludes hospitalisations where death was recorded as the separation mode.
3. Crude rates were calculated from the average number of hospitalisations over 3 years, divided by the average population estimates over 3 years (2016-based Series B projections), multiplied by 100,000.
4. Includes all ages.
5. Hospitalisations for Tasmania and the ACT were concorded from state/territory of usual residence. Hospitalisations for other jurisdictions were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Hospitalisations that could not be concorded to IREG were not included. Excludes Other Territories.
6. See Appendix A: Figure A1 for IREG names and Appendix D: Table A4 for data values.

Sources: National Hospital Morbidity Database, 2018–19 to 2020–21; ABS population data.

2.3 Socio-economic disadvantage of Indigenous populations, by IREG

Socioeconomic status has been identified as an important factor in suicide risk, with age-standardised rates and numbers of deaths by suicide tending to be higher in more disadvantaged areas. Previous AIHW analysis of suicides among all Australians (Indigenous and non-Indigenous) found that the risk of suicide was higher for individuals with fewer years of education; for those who were not employed (either unemployed or not in the labour force); and for lower-income earners (AIHW 2021).

Differences in the socioeconomic and demographic characteristics of Indigenous and non-Indigenous populations explain a large proportion of the difference in risk of death by suicide between these groups.¹ For this reason, differences in socioeconomic factors between Indigenous Regions may be a useful indicator of differences in suicide risk. Here, we use the Indigenous Relative Socioeconomic Outcomes (IRSEO) Index to assess these differences. The IRSEO combines nine socioeconomic indicators (detailed in Appendix B) at the level of Indigenous Areas (IARE), for the Indigenous population usually resident in these areas (Biddle and Markham 2017). IAREs are smaller than IREGs but fit within them without gaps or overlaps. The number of IAREs per IREG ranges between 1 and 31.

Figure 2.5 shows the percentage of the Indigenous population in each IREG living in an area that is in the highest quartile in terms of socioeconomic disadvantage – that is, in the top 103 (25%) most disadvantaged IAREs, out of the total 408 that were scored.

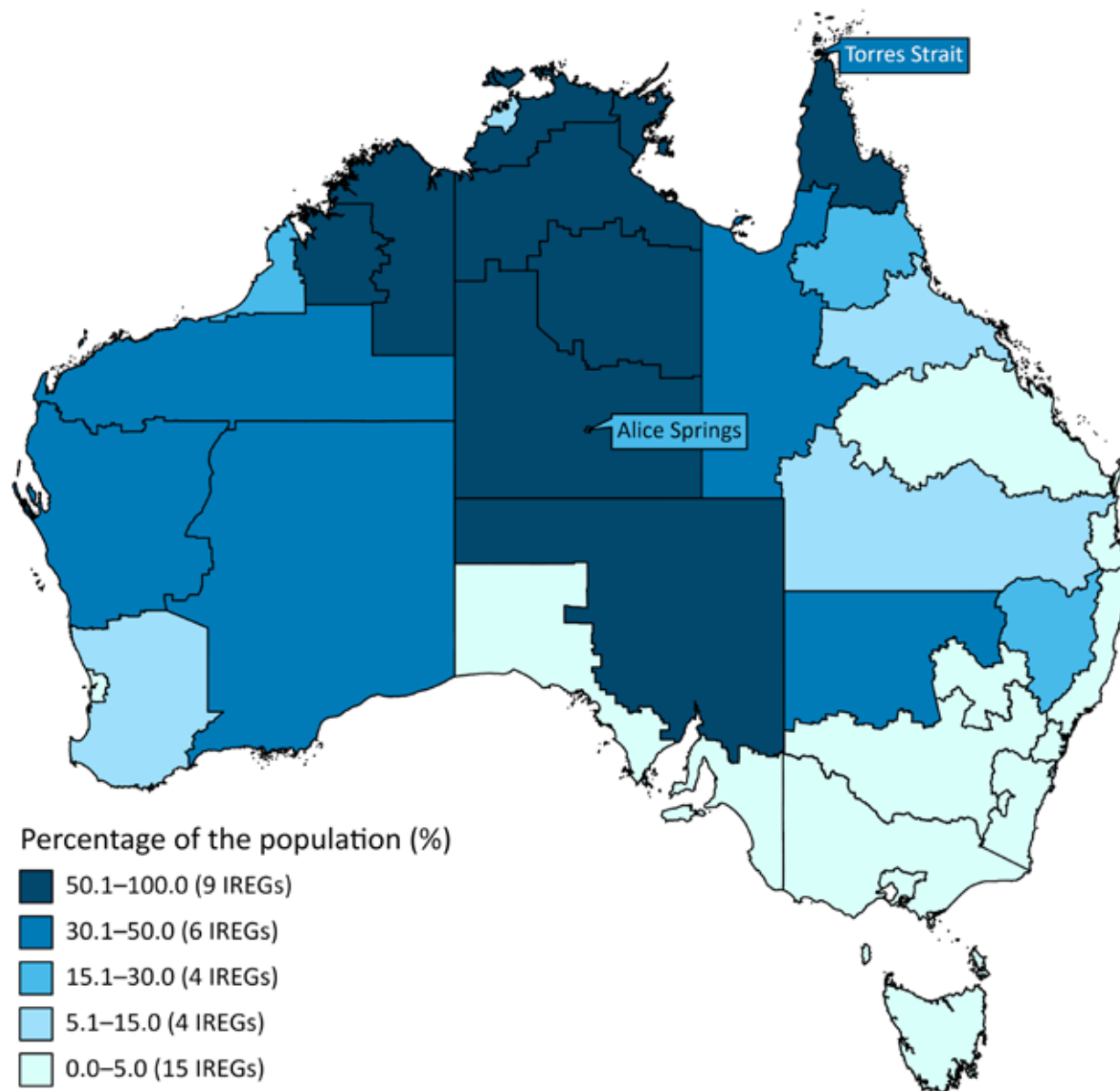
The following IREGs all had 100% of their Indigenous population living in areas among the highest quartile for disadvantage:

- Kununurra
- West Kimberley
- Katherine
- Nhulunbuy
- Tennant Creek.

It is important to remember that the components that make up the IRSEO index (see Appendix B) are a narrow set of indicators that do not necessarily reflect the lived experience of mental health and wellbeing for Indigenous Australians – for whom other social factors, such as cultural and linguistic connection, may contribute more to overall wellbeing. However, given that many of these indicators have been linked with suicide risk, it is important to take these into account when comparing risk profiles of IREGs.

¹ Accounting for sociodemographic differences using multivariate analysis, the risk of death by suicide for Indigenous Australians is estimated to be 1.3 times higher than for non-Indigenous Australians. Without accounting for these differences (that is, using univariate analysis) the Indigenous risk of death by suicide is approximately double the non-Indigenous rate (AIHW 2021).

Figure 2.5: Percentage of the Indigenous population living in the most socioeconomically disadvantaged quartile of areas (Indigenous Areas with IRSEO score ≥ 75), by Indigenous Region (IREG), 2016



Notes

1. The Indigenous Relative Socioeconomic Outcomes index (IRSEO) is an Indigenous-specific index derived by the Centre for Aboriginal Economic Policy Research (CAEPR) from the ABS 2016 Census of Population and Housing. The IRSEO reflects relative advantage or disadvantage at the Indigenous Area (IARE) level, where a score of 0.25 represents the most advantaged area and a score of 100 represents the most disadvantaged area.
2. Population estimates for IAREs were derived by the AIHW using 2016 population data and 2016 census counts from the ABS.
3. Includes 'Jervis Bay' IREG, but excludes external territories.
4. See Appendix A: Figure A1 for IREG names and Appendix D: Table A5 for data values.

Source: Biddle and Markham (2017) using ABS 2016 census data; AIHW analysis of ABS population data.

2.4 Access to mental health services

Mental health issues are a major risk factor for suicide. For example, a recent meta-analysis by Too and colleagues (2019) found that people who have been diagnosed with a mental health disorder are at an almost eight times greater risk of suicide than other people. Adequate access to mental health care is therefore likely to be an essential part of suicide prevention (Too et al. 2019). However, many individuals at risk of suicide will not seek care (or may be unable to seek care) through professional services or ever be diagnosed with a mental disorder meaning that physical access to, or use of, these services is not a perfect predictor of future risk of self-harm or suicide. For example, a study that examined all suicide cases from Queensland during the period 1994–2007 found that only 23.8% of Indigenous Australians who died by suicide had ever received help for mental health problems (Sveticic et al. 2012).

The analysis of geographic variation in access to mental health services, conducted for this project, was based on a larger analysis using service location information from the Australian Health Practitioner Regulation Agency, AIHW, healthdirect and Infoxchange (*Aboriginal and Torres Strait Islander people's access to mental health care services*, AIHW, forthcoming). This analysis modelled Indigenous Australians' access to mental health services at the regional level to identify service gap areas.

The analysis included three of the relevant service types: psychologists; psychiatrists; and hospital emergency departments (EDs) or urgent care facilities (UCFs) where self-harm injuries or acute mental health episodes can be treated. Regional level access to these services was estimated as the proportion of Indigenous Australians in each region who have access to these services within a 60-minute drive.

We used the average access across the service types to identify regions with particularly low access. The following Indigenous regions have the lowest average access to the service types discussed above:

- Tennant Creek
- Nhulunbuy
- Jabiru – Tiwi
- Katherine
- Apatula.

It should be noted that physical access as measured by drive times represents only one of the many possible barriers to receiving mental health care. Access is also affected by the cultural appropriateness of services; by financial cost; and by long waiting lists that may discourage individuals from seeking help and limit the available care. On the other hand, access may in some cases be improved through services not considered here, such as the availability and use of phone or video consultations.

2.5 Composite profile of suicide risk by Indigenous region

To interpret and compare regional differences in suicide risk more easily, we have created composite profiles based on four of the risk indicators described in sections 2.1–2.4. Regions with the highest 10 values for each indicator are considered to be most at risk – that is, the 10 most at-risk regions, independently, in terms of: historic suicide rate; high socioeconomic disadvantage (IRSEO) scores; poor access to services; and mental health-related hospitalisations. Regions assessed to have 2 of these indicators are considered ‘medium’ risk, while regions with 3 or all 4 are of most concern. These regions are shown in Table 2.1 below.

Table 2.1: Suicide risk profile by Indigenous region

Region	High historic suicide rate	High disadvantage score (IRSEO)	Poor access to services	High rate of mental-health hospitalisations
Highest risk regions (having 3 or more risk indicators)				
Apatula				
Kununurra				
Tennant Creek				
Nhulunbuy				
West Kimberley				
Kalgoorlie				
Medium risk regions (2 risk indicators)				
Mount Isa				
Alice Springs				
Katherine				
Jabiru Tiwi				
Port Augusta				
South Hedland				
Cape York				

Notes

1. A region is considered to display the risk indicator (shaded cell) if it is in the top 10 regions according to that metric. Darker cells indicate the region is also in the top 5 regions for the metric.



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Estimating associations between suicides and access to mental health services

3. Estimating associations between suicides and access to mental health services

3.1 Data sources

Indigenous suicide data over the period 2009–2018 were extracted from the National Mortality Database (NMD), along with associated SA3 information. These data were combined with the following four types of data to enable an analysis of any SA3-level association between suicide and service delivery that also controlled for other important factors.

NATSEM-modelled data

The National Centre for Social and Economic Modelling (NATSEM), using a spatial microsimulation model, has created a synthetic data set of small area (SA2) estimates of Indigenous social, economic, community, family and personal functioning indicators based on census data and other available survey data. The following variables were included in the analysis:

- Indigenous language use
- employment
- degree/diploma attainment
- management/professional employment
- labourer/machine operator employment
- full-time students
- access to vehicle
- equivalised income
- home ownership
- cultural activities
- psychological distress
- financial stress
- violence
- community safety ('felt unsafe')
- discrimination
- poor health.

National Hospital Morbidity Database (NHMD)

Published rates of all hospitalisations for self-harm at the SA3 level were included in the analysis as a proxy for the risk of suicide in the general population of each SA3.

Medicare Benefits Schedule claims

Medicare Benefits Schedule (MBS) claims data for the 2018–19 financial year at the SA3 level were used to estimate relevant service delivery in each SA3. Three key variables were included in the modelling:

- psychologist services rate, based on 'Clinical psychologists' and 'Other psychologists' combined
- psychiatrist services rate
- GP mental health services rate.

National Health Workforce Dataset

Clinical full-time equivalent (FTE) staff employed in Aboriginal Health Services (AHS) in each SA3, averaged over the 6 years 2013–2018, were extracted from the Department of Health's Health Workforce Data online data tool. These data are specific to Indigenous health and complement the MBS data, which reflect health care delivery to all Australians. These AHS workforce data are a proxy for Indigenous-specific health care delivery.

3.2 Analytical approach

Poisson regression was used to explore the association between suicide and service delivery. In brief, this type of regression was used because:

- the Poisson distribution models counts data (such as the number of suicides) – the estimates produced as strictly positive, which is interpreted as the underlying risk never being zero
- the Poisson distribution can account for a large proportion of zeros (many age-sex-SA3 cells have zero Indigenous suicides)
- A regression framework is used to account for a range of 'control' variables (as discussed above).

Two types of Poisson regression were implemented: one to account for clusters, and one to account for spatial relatedness:

- clustered Poisson regression, which accounts for the repeated SA3-level data (clusters) for each age-sex group in that SA3
- spatial autocorrelation Poisson regression, which accounts for geographically proximate SA3s having similar suicide risk.


Furthermore, to determine the robustness of the parameter estimates on the three variables of interest (psychology, psychiatry, and GP mental health service rates), a range of other models were investigated:

- a Poisson model without age-sex disaggregation
- models without self-harm hospitalisation rates, as this may be highly correlated with psychology/psychiatry use rates
- models without self-harm hospitalisation rates and without the 7 variables from the 2011 NATSEM (to use only the latest 2016 NATSEM data).

3.3 Limitations and issues

It is clear from the different modelling approaches that an SA3-level analysis of the available data is not suitable for producing robust estimates of the association between service delivery and risk of suicide among Indigenous Australians. A range of factors are likely to contribute to this, including:

- the relatively low number of suicides (from a statistical point of view) at the SA3 level
- variation in circumstances within SA3s not captured by the available data (for example, pockets of relative disadvantage)
- existing services having a distribution that is influenced by both need and other factors (such as socioeconomic disadvantage) that are also associated with suicide risk.



Some data concerns may be of particular relevance to Indigenous Australians:

- The MBS data may not be appropriate for the analysis undertaken. Specifically:
 - use of MBS-funded psychologists, psychiatrists and GP mental health appointments may not be capturing the ways Indigenous Australians access mental health services. For instance, Indigenous Australians may be using community services (such as Aboriginal health services) to access advice about and treatment of mental health issues – events not always fully reflected by MBS claims.
 - MBS data – which capture service-use by the total population and not only by Indigenous Australians in each SA3 – may be masking a lack of use of mental health services by Indigenous Australians. This could be investigated by using a linked data set like the National Integrated Health Services Information (NIHSI), coupled with an Indigenous identifier.
- The clinical FTE extracted from the National Health Workforce Dataset may not adequately represent the variation in access to Indigenous-specific health care in each SA3.
 - Whereas care activities may vary over time or be seasonal, the annual FTE estimates are based on reported activities over a limited period.
 - The SA3 information is based only on the main reported practice location.
- A lack of access to culturally appropriate mental health services could result in Indigenous Australians living with potentially treatable mental health issues even in areas where some services are available.

3.4 Alternative approaches

The regression analysis highlighted the limited ability of the analysed data to provide robust insights into Indigenous suicides and the importance of service availability and delivery at the SA3 level. To identify areas and times of risk, we need more detailed data that are fit for purpose.

Future work using linked data sets with more accurate and detailed information about Indigenous Australians – such as the Multi-Agency Data Integration Project (MADIP) data set – could help identify the most critical risk factors and the areas that would benefit most from improved service delivery.



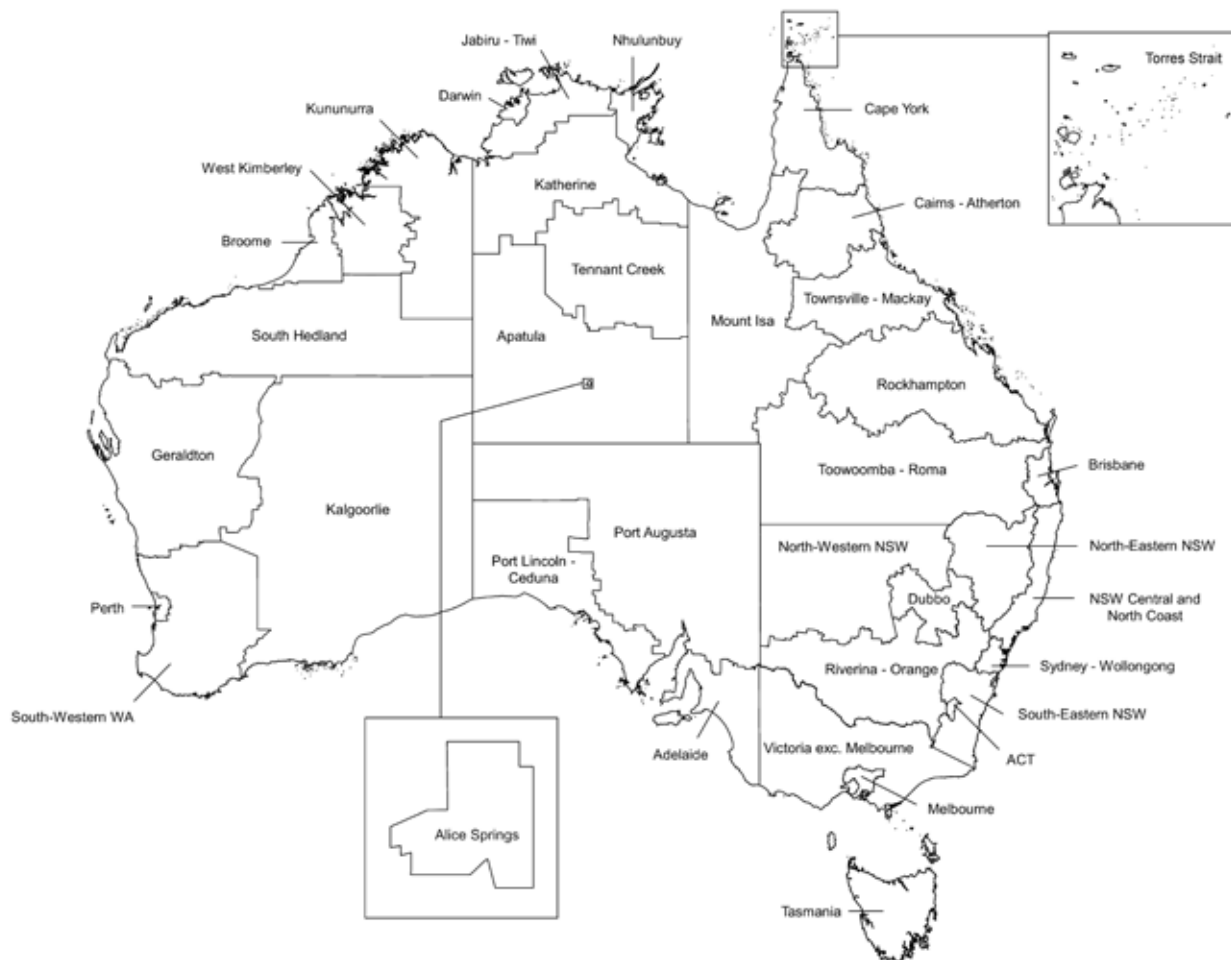
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Appendixes

Appendix A: Indigenous Regions

The names and boundaries of the Indigenous Regions (IREGs) are shown below, with two insets to show small areas in more detail (Figure A1).

Figure A1: Indigenous Region names and boundaries, 2016



Source: Australian Statistical Geography Standard (ASGS) Edition 2 (2016)



Appendix B: The Indigenous Relative Socioeconomic Outcomes index

Components of the Indigenous Relative Socioeconomic Outcomes (IRSEO) Index (Biddle and Markham 2017):

- population 15 years and over employed
- population 15 years and over employed as a manager or professional
- population 15 years and over employed full-time in the private sector
- population 15 years and over who have completed Year 12
- population 15 years and over who have completed a qualification
- population 15 to 24 years old attending an educational institution
- population 15 years and over with an individual income above half the Australian median
- population who live in a house that is owned or being purchased
- population who live in a house with at least one bedroom per usual resident.

Appendix C: Data sources

Medicare Benefits Schedule (MBS) data collection

The Medicare Benefits Schedule (MBS) data collection contains information on services that qualify for a benefit under the Health Insurance Act 1973 and for which a claim has been processed. The database comprises information about MBS claims (including benefits paid), patients and service providers. For more information see <https://www.aihw.gov.au/about-our-data/our-data-collections/medicare-benefits-schedule-mbs>

National Health Workforce Dataset (NHWDS)

The National Health Workforce Dataset is a combination of registration and survey data collected through the registration renewal process for registered health practitioners. Collection methodologies include survey administration and sourcing of administrative data. Data are collected annually by the Department of Health and Aged Care. For more information see <https://www.aihw.gov.au/about-our-data/our-data-collections/national-health-workforce-dataset>

National Hospital Morbidity Database (NHMD)

The National Hospitals Database contains a compilation of episode-level records from admitted patient morbidity data collection systems in Australian public and private hospitals. It includes information that reflects suicidal behaviour and the use of services and carers. For more information see <https://www.aihw.gov.au/about-our-data/our-data-collections/national-hospitals-data-collection>

National Mortality Database (NMD)

The National Mortality Database contains records of deaths in Australia including information about causes of death, sex, age at death, area of usual residence and Indigenous status. The NMD reports suicide deaths as part of the ABS Causes of Death collection. The other collection included in the NMD is the ABS Deaths, Australia collection. For more information see: <https://www.aihw.gov.au/about-our-data/our-data-collections/national-mortality-database>

NATSEM – Social and Economic Indicators – Synthetic Estimates SA2 2016

The National Centre for Social and Economic Modelling (NATSEM) at the University of Canberra has used a spatial microsimulation model to create a synthetic data set of small area (SA2) estimates of Indigenous social, economic, community, family and personal functioning indicators based on census data and other available survey data. For more information see <https://data.aurin.org.au/dataset/uc-natsem-natsem-social-indicators-estimates-sa2-2016-sa2-2016>

Appendix D: Data tables

Table A1: Suicide deaths among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020

IREG code	IREG name	Suicides	
		Number	Crude rate (per 100,000)
504	Kununurra	45	71.3
304	Mount Isa	53	57.1
508	West Kimberley	29	49.2
701	Alice Springs	32	47.4
506	South Hedland	53	45.7
501	Broome	27	44.4
706	Nhulunbuy	38	33.3
503	Kalgoorlie	24	31.7
702	Apatula	32	31.7
505	Perth	119	31.0
502	Geraldton	26	30.9
707	Tennant Creek	13	29.4
306	Toowoomba – Roma	62	29.3
308	Townsville – Mackay	91	28.7
704	Jabiru – Tiwi	36	28.4
703	Darwin	48	27.9
705	Katherine	28	25.5
507	South-Western WA	39	25.4
305	Rockhampton	58	21.8
401	Adelaide	64	21.5
301	Brisbane	176	21.4
106	South-Eastern NSW	35	21.1
303	Cape York	21	20.2
302	Cairns – Atherton	62	20.0
402 403	Port Augusta Port Lincoln – Ceduna (2 IREGs combined)	21	17.2
105	Riverina – Orange	52	17.1
103	North-Western NSW	17	16.8
101	Dubbo	26	16.3
102	North-Eastern NSW	32	12.6
104	NSW Central and North Coast	105	12.6

Table A1 (continued): Suicide deaths among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020

IREG code	IREG name	Suicides	
		Number	Crude rate (per 100,000)
107	Sydney – Wollongong	96	11.9
307	Torres Strait	5	6.8
201	Melbourne	n.p.	n.p.
202	Victoria exc. Melbourne	n.p.	n.p.
601	Tasmania	n.p.	n.p.
801	ACT	n.p.	n.p.

n.p. not published

Notes

1. Analysis based on deaths registered between 2011 and 2020. Death registrations were 'Final' for 2011–2017; 'Revised' for 2018; and 'Preliminary' for 2019 and 2020.
2. Only data from NSW, Qld, WA, SA and the NT are included. These jurisdictions were considered to have adequate levels of Indigenous identification in mortality data at the time the data were released by the Australian Bureau of Statistics (ABS).
3. Crude rates were calculated from the average number of suicides over 10 years, divided by the average population estimates over 10 years (2016-based estimates, Series B projections, and backcasts), multiplied by 100,000.
4. Crude rates are not directly comparable with age-standardised rates presented elsewhere.
5. Deaths were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Deaths that could not be concorded to IREG were not included. Excludes Other Territories.
6. 'Port Augusta' IREG and 'Port Lincoln - Ceduna' IREG in SA have been combined to avoid suppressing data.

Sources: AIHW National Mortality Database; AIHW analysis of ABS population data.

Table A2: Suicide deaths among Indigenous males and females, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020

IREG code	IREG name	Male suicides		Female suicides	
		Number	Crude rate (per100,000)	Number	Crude rate (per100,000)
504	Kununurra	24	80.8	21	62.8
304	Mount Isa	41	90.2	12	25.3
701	Alice Springs	22	67.9	10	28.9
501 508	Broome West Kimberley (2 IREGs combined)	46	78.6	10	16.3
506	South Hedland	36	58.3	17	31.5
706	Nhulunbuy	22	37.3	17	29.3
503	Kalgoorlie	16	44.2	8	20.0
505	Perth	82	42.1	37	19.5
702 707	Apatula Tennant Creek (2 IREGs combined)	39	52.8	6	8.2
502	Geraldton	16	37.5	11	24.7
306	Toowoomba – Roma	47	45.1	15	14.0
308	Townsville – Mackay	69	43.6	22	13.9
704	Jabiru – Tiwi	21	32.9	15	23.9
703	Darwin	33	36.7	15	18.3
705	Katherine	17	32.1	10	18.9
507	South-Western WA	32	41.8	7	9.1
305	Rockhampton	45	33.7	13	9.8
401	Adelaide	40	27.1	24	15.9
301	Brisbane	131	32.1	45	10.9
106	South-Eastern NSW	26	31.2	9	11.0
303	Cape York	14	25.8	8	14.6
302	Cairns – Atherton	45	30.2	16	10.3
402 403	Port Augusta Port Lincoln – Ceduna (2 IREGs combined)	14	23.3	7	11.3
105	Riverina – Orange	43	28.0	9	6.0
103	North-Western NSW	12	24.2	5	9.7
101	Dubbo	20	25.1	6	7.5
102	North-Eastern NSW	23	18.4	9	7.0
104	NSW Central and North Coast	83	20.0	22	5.3
107	Sydney – Wollongong	70	17.5	26	6.4
307	Torres Strait	n.p.	n.p.	n.p.	n.p.
201	Melbourne	n.p.	n.p.	n.p.	n.p.

Table A2 (continued): Suicide deaths among Indigenous males and females, crude rate (per 100,000), by Indigenous Region (IREG), 2011–2020

IREG code	IREG name	Male suicides		Female suicides	
		Number	Crude rate (per100,000)	Number	Crude rate (per100,000)
202	Victoria exc. Melbourne	n.p.	n.p.	n.p.	n.p.
601	Tasmania	n.p.	n.p.	n.p.	n.p.
801	ACT	n.p.	n.p.	n.p.	n.p.

n.p. not published

Notes

1. Analysis based on deaths registered between 2011 and 2020. Death registrations were 'Final' for 2011–2017; 'Revised' for 2018; and 'Preliminary' for 2019 and 2020.
2. Only data from NSW, Qld, WA, SA and the NT are included. These jurisdictions were considered to have adequate levels of Indigenous identification in mortality data at the time the data were released by the Australian Bureau of Statistics (ABS).
3. Crude rates were calculated from the average number of suicides over 10 years, divided by the average population estimates over 10 years (2016-based estimates, Series B projections, and backcasts), multiplied by 100,000.
4. Crude rates are not directly comparable with age-standardised rates presented elsewhere.
5. Deaths were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Deaths that could not be concorded to IREG were not included. Excludes Other Territories.
6. Certain IREGs in WA, SA and the NT have been combined to avoid suppressing data.
7. IREGs are ordered by published person-level suicide rates (descending) (AIHW 2022).

Sources: AIHW National Mortality Database; AIHW analysis of ABS population data.

Table A3: Hospitalisations for mental health-related care among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21

IREG code	IREG name	Hospitalisations	
		Number	Crude rate (per 100,000)
701	Alice Springs	1,572	7,543
304	Mount Isa	1,791	6,563
403	Port Lincoln – Ceduna	425	5,095
702	Apatula	1,602	5,069
707	Tennant Creek	641	4,797
703	Darwin	2,642	4,663
402	Port Augusta	1,328	4,546
301	Brisbane	12,194	4,351
401	Adelaide	4,071	4,151
201	Melbourne	3,656	3,929
107	Sydney – Wollongong	9,610	3,706
302	Cairns – Atherton	3,497	3,636
705	Katherine	1,130	3,511
308	Townsville – Mackay	3,574	3,475
505	Perth	4,336	3,423
306	Toowoomba – Roma	2,217	3,260
801	ACT	769	3,096
103	North-Western NSW	929	3,088
501	Broome	587	3,061
507	South-Western WA	1,485	2,982
706	Nhulunbuy	1,103	2,978
504	Kununurra	542	2,923
503	Kalgoorlie	696	2,889
508	West Kimberley	535	2,797
202	Victoria exc. Melbourne	2,628	2,745
704	Jabiru – Tiwi	1,092	2,740
106	South-Eastern NSW	1,475	2,738
305	Rockhampton	2,187	2,536
502	Geraldton	644	2,439
104	NSW Central and North Coast	6,725	2,426
102	North-Eastern NSW	1,887	2,333
105	Riverina – Orange	2,144	2,162
506	South Hedland	706	1,860

Table A3 (continued): Hospitalisations for mental health-related care among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21

IREG code	IREG name	Hospitalisations	
		Number	Crude rate (per 100,000)
601	Tasmania	1,653	1,829
101	Dubbo	897	1,783
303	Cape York	586	1,738
307	Torres Strait	85	371

Notes

1. Data are included from public and private hospitals in all jurisdictions.
2. Includes hospitalisations where the principal diagnosis is in the ICD-10-AM range: F00–F99 (excluding F52.5, F84.2, F98.5 and F98.6), G30, R44, R48, G47.0, G47.1, G47.2, G47.8, G47.9, O99.3, R45.0, R45.1, R45.4, Z00.4, Z03.2, Z04.6, Z09.3, Z13.3, Z50.2, Z50.3, Z54.3, Z61.9, Z63.1, Z63.8, Z63.9, Z65.8, Z65.9, Z71.4, Z71.5, Z76.0, R45.81 and/or included any specialised psychiatric care. Excludes hospitalisations for newborn care (without qualified days), hospital boarders, and posthumous organ procurement.
3. Crude rates were calculated from the average number of hospitalisations over 3 years, divided by the average population estimates over 3 years (2016-based Series B projections), multiplied by 100,000.
4. Includes all ages.
5. Hospitalisations for Tas. and the ACT were concorded from state/territory of usual residence. Hospitalisations for other jurisdictions were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Hospitalisations that could not be concorded to IREG were not included. Excludes Other Territories.

Sources: National Hospital Morbidity Database, 2018–19 to 2020–21; ABS population data.

Table A4: Hospitalisations for non-fatal intentional self-harm among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21

IREG code	IREG name	Hospitalisations	
		Number	Crude rate (per 100,000)
701	Alice Springs	189	908.8
304	Mount Isa	247	903.6
707	Tennant Creek	89	666.1
401	Adelaide	492	501.6
703	Darwin	276	487.3
301	Brisbane	1,339	477.8
306	Toowoomba – Roma	296	435.4
504	Kununurra	78	420.7
702	Apatula	133	419.6
402	Port Augusta	116	397.1
801	ACT	97	390.5
308	Townsville – Mackay	401	389.8
508	West Kimberley	73	381.7
705	Katherine	123	381.4
305	Rockhampton	319	370.0
403	Port Lincoln – Ceduna	28	335.7
202	Victoria exc. Melbourne	308	321.7
302	Cairns – Atherton	307	318.9
107	Sydney – Wollongong	787	303.5
201	Melbourne	282	303.0
501	Broome	54	281.6
505	Perth	331	261.3
706	Nhulunbuy	96	259.8
506	South Hedland	95	251.0
105	Riverina – Orange	242	243.7
502	Geraldton	64	242.4
507	South-Western WA	114	228.9
102	North-Eastern NSW	182	225.0
104	NSW Central and North Coast	611	220.4
103	North-Western NSW	61	202.8
503	Kalgoorlie	45	186.0
601	Tasmania	166	183.7
704	Jabiru – Tiwi	68	170.4

Table A4 (continued): Hospitalisations for non-fatal intentional self-harm among Indigenous Australians, crude rate (per 100,000), by Indigenous Region (IREG), 2018–19 to 2020–21

IREG code	IREG name	Hospitalisations	
		Number	Crude rate (per 100,000)
106	South-Eastern NSW	89	165.9
303	Cape York	54	158.9
101	Dubbo	71	141.1
307	Torres Strait	16	69.8

Notes

1. Data are included from public and private hospitals in all jurisdictions.
2. Includes hospitalisations where the principal diagnosis is in the ICD-10-AM range: S00–T75, T79 and the first reported external cause code is in the ICD-10-AM range: X60–X84, Y87.0. Excludes hospitalisations for newborn care (without qualified days), hospital boarders, and posthumous organ procurement. Excludes hospitalisations where mode of admission is reported as ‘transfer from another hospital’. Excludes hospitalisations where care involving the use of rehabilitation procedures (Z50) is an additional diagnosis. Excludes hospitalisations where death was recorded as the separation mode.
3. Crude rates were calculated from the average number of hospitalisations over 3 years, divided by the average population estimates over 3 years (2016-based Series B projections), multiplied by 100,000.
4. Includes all ages.
5. Hospitalisations for Tasmania and the ACT were concorded from state/territory of usual residence. Hospitalisations for other jurisdictions were concorded from SA2 of usual residence to IREG (ASGS 2016 edition) based on ABS Indigenous-weighted correspondence files. Hospitalisations that could not be concorded to IREG were not included. Excludes Other Territories.

Sources: National Hospital Morbidity Database, 2018–19 to 2020–21; ABS population data.

Table A5: Percentage of the Indigenous population living in the most socioeconomically disadvantaged quartile of areas (Indigenous Areas with IRSEO score ≥ 75), by Indigenous Region (IREG), 2016

IREG code	IREG name	Number of Indigenous Areas (IARE)	Population distribution by IARE-level socioeconomic scores (IRSEO)			
			Least disadvantaged 3 quartiles (IRSEO <75)		Most disadvantaged quartile (IRSEO ≥ 75)	
			Estimate	%	Estimate	%
504	Kununurra	8	—	—	6,040	100.0
508	West Kimberley	4	—	—	6,054	100.0
705	Katherine	9	—	—	11,067	100.0
706	Nhulunbuy	8	—	—	11,372	100.0
707	Tennant Creek	6	—	—	4,374	100.0
704	Jabiru – Tiwi	6	745	6.0	11,682	94.0
702	Apatula	17	727	7.1	9,466	92.9
303	Cape York	9	1,246	11.8	9,348	88.2
402	Port Augusta	6	3,520	37.4	5,883	62.6
503	Kalgoorlie	7	3,951	52.7	3,546	47.3
307	Torres Strait	5	4,167	56.4	3,223	43.6
304	Mount Isa	4	5,347	59.4	3,652	40.6
506	South Hedland	5	7,376	62.5	4,429	37.5
502	Geraldton	7	5,433	63.8	3,077	36.2
103	North-Western NSW	6	6,334	64.3	3,512	35.7
501	Broome	2	4,279	70.6	1,778	29.4
102	North-Eastern NSW	14	20,810	81.7	4,665	18.3
302	Cairns – Atherton	11	24,730	82.3	5,318	17.7
701	Alice Springs	2	5,757	84.6	1,048	15.4
507	South-Western WA	15	13,786	88.2	1,845	11.8
308	Townsville – Mackay	15	27,943	88.7	3,549	11.3
703	Darwin	14	16,559	90.4	1,749	9.6
306	Toowoomba – Roma	18	20,076	94.0	1,281	6.0
105	Riverina – Orange	22	29,760	96.5	1,064	3.5
101	Dubbo	8	15,965	100.0	—	—
104	NSW Central and North Coast	21	85,169	100.0	—	—
106	South-Eastern NSW	5	16,719	100.0	—	—
107	Sydney – Wollongong	31	81,675	100.0	—	—
201	Melbourne	20	28,584	100.0	—	—
202	Victoria exc. Melbourne	19	29,181	100.0	—	—
301	Brisbane	14	84,454	100.0	—	—

Table A5 (continued): Percentage of the Indigenous population living in the most socioeconomically disadvantaged quartile of areas (Indigenous Areas with IRSEO score ≥ 75), by Indigenous Region (IREG), 2016

IREG code	IREG name	Number of Indigenous Areas (IARE)	Population distribution by IARE-level socioeconomic scores (IRSEO)			
			Least disadvantaged 3 quartiles (IRSEO <75)		Most disadvantaged quartile (IRSEO ≥ 75)	
			Estimate	%	Estimate	%
305	Rockhampton	9	26,941	100.0	—	—
401	Adelaide	23	30,124	100.0	—	—
403	Port Lincoln – Ceduna	3	2,737	100.0	—	—
505	Perth	21	38,919	100.0	—	—
601	Tasmania	11	28,538	100.0	—	—
801	ACT	3	7,513	100.0	—	—
902	Jervis Bay	1	237	100.0	—	—

— nil or rounded to zero

Notes

1. The Indigenous Relative Socioeconomic Outcomes index (IRSEO) is an Indigenous-specific index derived by the Centre for Aboriginal Economic Policy Research (CAEPR) from the ABS 2016 Census of Population and Housing. The IRSEO reflects relative advantage or disadvantage at the Indigenous Area (IARE) level, where a score of 0.25 represents the most advantaged area and a score of 100 represents the most disadvantaged area.
2. Population estimates for IAREs were derived by the AIHW using 2016 population data and 2016 census counts from the ABS.
3. Includes 'Jervis Bay' IREG but excludes external territories.

Sources: Biddle and Markham (2017) using ABS 2016 census data; AIHW analysis of ABS population data.



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Abbreviations

ABS	Australian Bureau of Statistics
AHS	Aboriginal Health Services
AIHW	Australian Institute of Health and Welfare
ED	Emergency department
ERP	Estimated Resident Population
IARE	Indigenous Area
IREG	Indigenous Region
IRSEO	Indigenous Relative Socioeconomic Outcomes
MADIP	Multi-Agency Data Integration Project
MBS	Medicare Benefits Schedule
NATSEM	National Centre for Social and Economic Modelling
NHMD	National Hospital Morbidity Database
NIHSI	National Integrated Health Services Information
NMD	National Mortality Database
SA3	Statistical Area Level 3
UCF	Urgent Care Facility



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Historic suicide rates, socioeconomic circumstances, access to services and hospitalisations for mental health were used to create regional profiles of suicide risk. Six Indigenous Regions were found to have circumstances that categorise them as relatively high-risk for suicide among Aboriginal and Torres Strait Islander people.



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