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# Disparities in Opioid Agonist Treatment Accessibility for Priority Populations in New South Wales, Australia

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## ABSTRACT

**Introduction:** Opioid agonist treatment (OAT) is effective for managing opioid dependence; however, it can be hard to access in some regions. We investigated OAT access for priority populations living in New South Wales, Australia: Aboriginal and Torres Strait Islander peoples, Culturally and Linguistically Diverse (CALD) peoples, and youth (18–24 years).

**Method:** Using a linked database, we analysed distances between residential postcodes and OAT dosing points for 29,935 individuals from July 2015 to June 2020. We used multi-level models with random intercepts for clients to assess the relative distance lived from dosing points for members of each priority population.

**Results:** The median distance to dosing points was 9.80 km. Multi-level regression predicting log-transformed distance (ln) showed, relative to others, Aboriginal and Torres Strait Islander clients lived 89.98% (95% confidence interval [CI] 82.25%, 98.04%) further, and youth lived 15.09% (95% CI 4.70%, 26.52%) further from dosing points. In contrast, CALD individuals lived 35.32% (95% CI 31.88%, 38.58%) closer than others. Multi-level logistic regression showed Aboriginal and Torres Strait Islander clients were 3.39 (95% CI 2.82, 4.07) times more likely to live 50 km or more from their chosen dosing point.

**Discussion and Conclusion:** Aboriginal and Torres Strait Islander Australians and youth have poorer access to OAT dosing points than others in New South Wales. CALD individuals live closer to dosing points, which could suggest better access, or reticence to travel far for care. Targeted interventions are needed to improve OAT accessibility in regional and remote areas.

## 1 | Introduction

Non-medical opioid use is the leading cause of fatal drug overdoses, accounting for 70% of 128,000 deaths globally in 2019 [1]. Opioids are highly addictive, and the withdrawal symptoms following stopping or reducing use make overcoming dependence difficult without treatment. Opioid agonist

treatment (OAT) is a highly effective treatment and harm reduction measure for opioid dependence, which significantly reduces overdose risk and withdrawal [2–4]. However, globally, less than 10% of those who need OAT receive it [5]. Given the broad harms to individuals and communities from opioids, improving OAT access is a critical public health and socioeconomic priority [6]. Living far from OAT significantly deters

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## Summary

- Opioid agonist treatment (OAT) is the most effective care for people with opioid dependence. Per population mapping of treatment access is necessary to support equity.
- Most people lived close to their selected OAT dosing points in New South Wales; however, there were disparities among priority populations.
- Aboriginal and Torres Strait Islander Australians and youth live further from OAT dosing points than others.
- Culturally and Linguistically Diverse Individuals lived closer to OAT dosing points than others.
- Local assessment is needed to determine how equitable treatment access can be achieved for priority populations.

treatment access [7, 8]. Service mapping should therefore consider the specific needs of populations, especially those who may live in remote areas or where there are limited transport options. Service mapping is often done for entire populations; however, subpopulations who cannot easily or comfortably access general OAT services may need separate mapping.

### 1.1 | Living Far From Opioid Agonist Treatment Reduces Treatment Access and Completion

OAT medicines (e.g., methadone) are tightly regulated in many countries [9]. While OAT can be prescribed in primary care in many countries like Australia [10], prescribers and pharmacists often need training and authorisation to prescribe/dispense or, in some regions, expand patient caps [9, 10]. Due to strict regulations, low practitioner confidence and reservations about helping individuals with substance use disorders [11], many patients in New South Wales (NSW), Australia, rely on specialised public or private OAT clinics for dosing. This presents challenges in ensuring OAT is readily available across large areas, as providing nearby access to OAT dosing is critical for treatment engagement [8]. Having to drive between 10 and 20 min for treatment is associated with 33% lower methadone treatment completion rates relative to estimated drive times of less than 10 min [7]. The importance of living close to care presents problems for equitable access, as regions vary greatly in OAT service availability.

### 1.2 | Access for Priority Populations in New South Wales, Australia

Socio-cultural factors and language barriers can further affect individuals' ability to seek and receive appropriate care [12]. Even when services are available, they may not be provided in a way that is accessible, appropriate, or acceptable for groups with specific cultural, language, or developmental needs [12, 13]. Accordingly, people may need to travel further to seek out more appropriate services. These issues are particularly relevant in Australia, with low population density [14] and high cultural diversity [15]. In the state

of NSW, the NSW Ministry of Health has identified Aboriginal and Torres Strait Islander Australians, culturally and linguistically diverse (CALD) individuals, and youth as priority populations which may require separate service planning.

#### 1.2.1 | Aboriginal and Torres Strait Islander Australians

Draw strength from culture, land and community but are affected by ongoing impacts of colonisation, including policies of child removal, trauma and marginalisation, disadvantage and racism, which contribute to addictions and create barriers to accessing care [16, 17].

#### 1.2.2 | CALD Individuals

Come from diverse cultural and linguistic backgrounds [18], and may require interpreters, have financial constraints, and depending on residency/citizenship status, can fear legal, visa, or asylum repercussions for seeking help. In some CALD communities, drug use is stigmatised due to familial expectations and cultural and religious beliefs discouraging admission of drug use [18]. Thus, some CALD individuals may be hesitant to access mainstream services that do not cater to the needs and concerns of their community.

#### 1.2.3 | Youth

While only making up a small portion of the OAT patient population, stand to gain much from treatment, which can set them on a more positive life trajectory [19, 20]. Youth can be less independent, creating additional transportation and financial barriers [21], are more hesitant to seek help [22], and may have concerns about confidentiality and fear about disclosing use to authorities [21].

### 1.3 | The Current Study

We aimed to map OAT service access by priority populations in NSW, Australia. This study was part of a larger report requested by the NSW Ministry of Health. We measured the distance from the person's residential postcode to postcodes of attended OAT dosing points. We mapped results for the general population and each priority population. By measuring distance lived from care, we can determine whether priority populations are likely to face additional barriers to treatment relative to the general population. Our findings are likely relevant internationally, as well as locally. In NSW, they can be used to guide OAT service provision. Internationally, they underscore the value of monitoring OAT access for specific populations, in addition to the general population.

## 2 | Methods

### 2.1 | Study Design

The study design was developed in consultation with Aboriginal organisations (see below), NSW Health Research Working Groups and staff of NSW Ministry of Health. This work was

originally submitted to NSW Ministry of Health as part of an internal report. The aim of this analysis was to improve NSW Health service delivery. This work has been reproduced here with permission from NSW Health to aid researchers and policymakers from other regions.

## 2.2 | Consultation With Aboriginal Communities in New South Wales

We developed the project proposal and analysis plan in partnership with Aboriginal Community Controlled organisations. We consulted with the Board of the Aboriginal Corporation Aboriginal Drug and Alcohol Network, NSW; Alan Bennett, who at the time was the Chief Executive of Orana Haven (Aboriginal Corporation Residential Rehabilitation Centre); and Peter Malouf PhD, who at the time was the Executive Director of Operations at the Aboriginal Health and Medical Research Council. Three authors (MD, SW, SL) are Aboriginal. Two authors are from CALD backgrounds (KL, BA).

## 2.3 | Dataset

This project was based on a linked data asset containing records of individuals who have presented to a health service for support for alcohol or other drugs or died with evidence of an alcohol or other drug use disorder. We used this database in consultation with the NSW Ministry of Health. The full list of datasets within this database are listed in Table S1 (Supporting Information). The reference period for all analysis was 1 July 2015–30 June 2020. While the patient population was identified from the broader linked database, this analysis focuses on the NSW Controlled Drugs Data Collection dataset and, in particular, the Opioid Treatment Program subcollection. Dosing points within the NSW Controlled Drugs Data Collection are facilities where patients who are participating in the Opioid Treatment Program receive opioid substitution pharmacotherapy [23].

## 2.4 | Ethics Statement

The current analysis was approved by the Human Ethics Research Committee of the Aboriginal Health and Medical Research Council of NSW (reference: 1878/21).

## 2.5 | Population Selection

Client demographics were not kept in a single dataset. Accordingly, we assessed demographics across the linked database to determine eligibility (see Table S1). To be included in our sample, clients needed to be at least 18 years old at the end of the study period (2015-07-01 to 2020-06-30). We excluded IDs with inconsistent birth country, birth year, and gender, which can occur when there are issues with data linkage. Across all datasets, a population of 406,758 eligible individuals was identified. Of these, 29,935 were registered to OAT dosing points and were considered for this analysis. The linkage was performed by the NSW Centre for Health Record Linkage using personal identifiers. The rate of false positive links, based on the Centre for

Health Record Linkage's review of a random 1000 person IDs, was 0.5%.

### 2.5.1 | Aboriginal and Torres Strait Islander Australians

Aboriginal and Torres Strait Islander Australian clients may not always disclose their Indigeneity in all settings, in many cases due to concerns about safety. Health practitioners will not always ask clients if they are Aboriginal or Torres Strait Islander, which can result in some being incorrectly classified as non-Indigenous. Across the linked database, we classified clients as Aboriginal or Torres Strait Islander Australian if they were recorded as belonging to either group at least once across two separate datasets [24]. However, in some cases, likely due to limited contact with the health system, individuals only appeared in single datasets, preventing us from applying this rule. When clients only appeared in a single dataset, we classified them as Aboriginal or Torres Strait Islander if they were reported as such at least once [24].

### 2.5.2 | Culturally and Linguistically Diverse Individuals

We used individuals' preferred language and country of birth as a proxy for CALD status. We classified clients as CALD if they preferred to speak a language other than English at home, or if they were born in a non-English speaking country [25]. That is, in a country other than Australia, New Zealand, Great Britain, Ireland, Canada or the United States of America.

### 2.5.3 | Youth

We classified individuals as youth if they were between the ages 18–24 years (inclusive) at the start of a service presentation. Children and teenagers (under 18) were not considered youth in this study as they have distinct needs and require much more intensive support than young adults.

## 2.6 | Determining Patient Postcode

Residential postcodes are recorded when patients are registered to receive OAT dosing. Postcodes can be updated, but this is done inconsistently. Where possible, we updated patient residential postcodes using linked data from the Non-admitted Patient Service Episodes dataset.

## 2.7 | Estimating Distance From Care

We measured distances between the centres of clients' residential postcodes, and the postcodes of the services they attended. We excluded cases where residential postcodes were not based in NSW. When clients attended services in the same postcode as they resided, we approximated distance by taking the square root of the area divided by four. This represents the distance from the centre of a square postcode to halfway to that

postcode's perimeter. Postcode geographies were sourced from the Australian Bureau of Statistics [26].

## 2.8 | Analysis

All analyses were performed in R version 4.2.1 [27]. To determine whether priority populations live further from care than the general cohort we used multilevel regression models, using the R package 'lme4' [28]. We accounted for clustering due to repeated client observations by including random intercepts for client IDs. As distance was right-skewed, we log-transformed (ln) this variable. This transformation means our linear models describe relative increases in distance for each priority populations compared to others from the cohort. We also examined the odds of living at least 50 km from care for each priority population using multilevel logistic regression with random intercepts for clients. We included a binary independent variable for whether clients were female in all models due to interest from stakeholders. This separates the effect of being female, from belonging to each priority population on outcomes. We tabulated distances across Primary Health Networks throughout NSW. Primary Health Networks are organisations established and funded by the Australian Government to coordinate primary health care across assigned geographic regions. There are 10 Primary Health Networks in NSW and 31 across Australia [29]. A figure was produced using 'ggplot2' [30] which depicts regional variations in distances patients lived from OAT. To provide better confidentiality for small communities, postcodes were mapped to Statistical Area level 3 in visualisations (by largest intersect). Statistical Areas level 3 have a population between 30,000 and 130,000 people and group together significant towns and infrastructure [31].

## 3 | Results

We analysed the distance between dosing points and residential postcodes for 29,935 individuals (31.48% female). The mean age was 40.75 (SD = 10.15). Within this group, there were 6109 Aboriginal and Torres Strait Islander Australians (20.41%), 3748 (12.52%) CALD individuals, and 960 youth (3.21%). Among the Indigenous Australian clients, 43 were Torres Strait Islander Australians (0.70%), and 109 identified as having both Aboriginal and Torres Strait Islander heritage (1.78%).

The median distance between the clients' postcodes (at time of authorisation to receive OAT) and the postcodes of their dosing points was 9.80 km. Table 1 presents the median distance for each population to their dosing points by Primary Health Network. We used multi-level regression to determine whether priority populations lived further from care than others. As clients could have attended multiple dosing points over the reference period, we controlled for clustering by client. We found that, on average, Aboriginal and Torres Strait Islander clients lived 89.98% [95% confidence interval (CI) 82.25%, 98.04%] further from dosing points than the general cohort. Youth lived 15.09% [95% CI 4.70%, 26.52%] further from dosing points than the general cohort. In contrast, CALD individuals lived closer to dosing points than others (−35.32% [95% CI −38.58%, −31.88%]). Female clients lived closer to their dosing points than male clients −22.94% [95% CI −25.70%, −20.09%].

Table 2 describes the odds for an individual living in an area that was at least 50 km from their OAT dosing point. Aboriginal and Torres Strait Islander Australians were more than three times as likely (odds ratio 3.39 [95% CI 2.82, 4.07]) to live more than 50 km from their dosing point than the general cohort. Females and CALD individuals were less likely to live more than 50 km from their dosing point than others.

**TABLE 1** | Median distance clients lived from opioid agonist treatment dosing points by Primary Health Network.

Primary health network	General		Aboriginal		CALD		Youth	
	km	n	km	n	km	n	km	n
Central and Eastern Sydney	3.56	5857	3.65	988	3.78	874	4.01	199
Northern Sydney	6.75	1132	6.27	57	7.93	128	8.77	58
South Western Sydney	5.72	3772	7.57	433	4.82	1111	6.76	97
Western Sydney	10.64	3689	17.61	745	6.52	700	20.63	141
Hunter New England and Central Coast	14.48	5232	17.50	1241	14.87	179	17.27	165
Murray	8.02	175	—	<25	23.85	37	—	<25
Murrumbidgee	49.75	698	126.70	206	25.58	33	103.13	27
Nepean Blue Mountains	28.05	1406	57.24	344	16.67	94	56.21	37
North Coast	15.01	3042	20.30	645	9.25	163	15.01	82
South Eastern NSW	11.72	2277	15.75	408	7.81	200	15.41	66
Western NSW	62.49	1452	61.85	764	134.01	67	53.07	57
NSW total	9.80	29,935	15.93	6109	5.98	3748	13.44	960

*Note:* To estimate distance within a single postcode, we took the square root of the area and divided by four, representing half the distance from the centre to the edge. Hyphens indicate masked values derived from fewer than 25 individuals. Client residential postcode determines Primary Health Network; clients with unknown Primary Health Network are not reported. Access to care likely varies with population size, as well as the need for and availability of services in a given region. Abbreviations: CALD, culturally and linguistically diverse; km, kilometres; n, counts of people; NSW, New South Wales.

**TABLE 2** | The odds that individuals live more than 50km from their opioid agonist treatment dosing points.

Predictors	OR [95% CI]	lnOR	SE	<i>p</i>
Intercept	0.00 [0.00, 0.00]	-7.10	0.09	<0.001
Female	0.59 [0.49, 0.70]	-0.53	0.09	<0.001
Indigenous	3.39 [2.82, 4.07]	1.22	0.09	<0.001
CALD	0.34 [0.25, 0.46]	-1.08	0.15	<0.001
Youth	1.12 [0.73, 1.71]	0.11	0.22	0.60

Note: Based on the New South Wales controlled drugs data collection datasets. Abbreviations: CALD, culturally and linguistically diverse; CI, confidence interval; lnOR, logits; OR, odds ratio; SE, standard error of logits.

Youth were no more or less likely to live more than 50 km from their OAT dosing point.

Figure 1 shows the median distances that people live from OAT dosing point by population and by Statistical Area 3. Individuals from the general cohort and Aboriginal and Torres Strait Islander Australians, who lived in the central northwest of the state of NSW, lived large distances from the dosing points they attended. There was insufficient access among CALD and youth to determine the distances clients lived from dosing points in many regions.

## 4 | Discussion

We aimed to describe how access to OAT dosing points across NSW varies for three priority populations: Aboriginal and Torres Strait Islander Australians, CALD individuals, and youth. We found that Aboriginal and Torres Strait Islander Australians and youth tended to live further from dosing points than others,

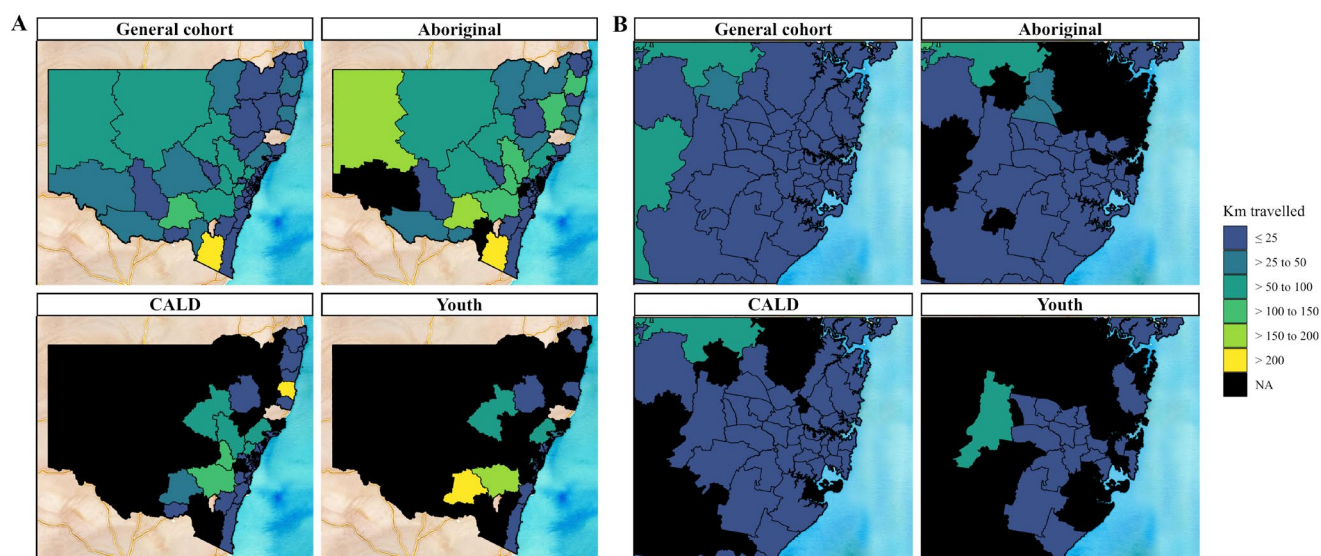
while CALD individuals lived slightly closer to OAT dosing points than others. Having to travel further for care can discourage help-seeking, meaning people from these priority groups, who may especially need care, may be deterred from receiving evidence-based treatment. These differences in accessibility, while having multiple potential causes, demonstrate the importance of tracking treatment access for priority populations who can be especially at risk of harms.

### 4.1 | International Comparisons to OAT Service Access

In the current study, all populations tended to live close to their OAT dosing points in urban areas but further away in regional and remote areas. This mirrors reports from the USA and Canada of reduced OAT access in rural areas [32, 33]. Reduced rural OAT access is partly due to challenges in dispersing health services across large regions and difficulties attracting and retaining providers in areas with limited socioeconomic opportunities [34]. Our study further highlights that within regions, OAT accessibility can vary for populations with additional needs.

### 4.2 | The Need to Monitor Access for Priority Populations

Providing face-to-face specialised services in low population density areas is challenging. Smaller client populations and fluctuations in opioid use driven by socioeconomic stressors and supply [35] mean there is not always a stable client base to justify permanent specialist clinics. Consequently, populations priced out of dense urban centres, or who live elsewhere for cultural or other reasons, will be disadvantaged by poorer access to OAT. This particularly affects Aboriginal and Torres Strait Islander



**FIGURE 1** | Median distances patients live from opioid agonist treatment dosing points by Statistical Area 3 (SA3), by population. (A) shows values for New South Wales, (B) shows values for Greater Sydney. Data based on the New South Wales Controlled Drugs Data Collection dataset. Direct distances measured from centroids of client postcodes to centroids of dosing point postcodes. Black patches indicate an absence of data. That is, fewer than 10 people in those locations accessed New South Wales Controlled Drugs Data Collection dosing points.

Australians, who disproportionately live in regional or remote areas [36].

### 4.3 | Aboriginal and Torres Strait Islander Australians

We found that Aboriginal and Torres Strait Islander Australians face substantial barriers to accessing OAT services, being more than three times as likely to live at least 50km from dosing points. This is a significant obstacle to help-seeking. While partly explained by where Aboriginal and Torres Strait Islander Australians live, even within many rural and remote regions, they were travelling further than others. This could reflect a reluctance to access closer services that do not cater to cultural or language needs, or where there are concerns about confidentiality.

#### 4.3.1 | Culturally and Linguistically Diverse Individuals

Contrary to expectations, CALD individuals tended to live *closer* to dosing points than others in the cohort. This might reflect appropriate, well-located service provision for CALD individuals—we did not have data on service characteristics to test this. Alternatively, as our dataset only included individuals who successfully engaged with services, this finding could reflect reluctance to seek help unless services were nearby. Travelling to unfamiliar areas can be daunting, especially with language, cultural barriers, or financial stress. CALD individuals may also be less aware of services [37] that are not near them. Additionally, substance use can be highly stigmatised in CALD communities [18], and travelling far for treatment might be hard to explain to family and friends. Qualitative research on substance use help-seeking among CALD people would help clarify these possibilities.

#### 4.3.2 | Youth

Young people lived slightly further from OAT dosing points than the general cohort. Given the importance of early intervention, this is something that should be addressed. However, work is needed to identify the exact reasons why this is the case. Many youth value self-reliance and may not want help from people they do not trust [38]. Accordingly, youth may travel further for youth-specific services which are known to them through outreach activities [39].

### 4.4 | Addressing Challenges in Service Provision

Our findings show the value of per-population service mapping, rather than assuming uniform service accessibility within regions. Where possible, targeted services should be made available that meet language, cultural, and other needs of priority populations. Training for staff at mainstream services on engaging people from diverse backgrounds could assist with comfort, encourage help-seeking, and prevent individuals from leaving OAT programs early. Some such training programs are already

in operation in NSW, particularly for Aboriginal and Torres Strait Islander clients [40].

Accessing dosing points in rural regions is particularly challenging, especially when local pharmacies are reluctant to dispense OAT due to concerns about theft, disruptive behaviour, and administrative burden [41]. Discrimination also plays a role, as people with opioid dependence may face judgements from staff and other patients [41, 42]. Public hospitals and clinics provide alternative dosing sites but have limited capacity in smaller towns. Reducing regulatory burdens for both consumers and staff (pharmacists, nurses, and doctors) could improve access [42], while improving data quality could help in planning for fairer treatment access. Some individuals may ultimately require travel support to access dosing points out of town, or need translation or other services for specific cultural or language needs.

### 4.5 | Future Directions

Beyond distance, other factors should be studied to ensure populations have equitable access to OAT and are likely to complete treatment [43]. Telehealth, which expanded during the COVID-19 pandemic, is likely to play an increasing role in facilitating access to OAT in rural and remote regions. Work is needed to understand how telehealth is currently being used in OAT, and how it can be better leveraged to support hard-to-reach populations.

Longer-acting forms of OAT may be especially useful in regions with limited service access. Extended-release buprenorphine injections were approved by the Australian Therapeutic Goods Authority in 2019 and can be administered monthly [44, 45]. This could greatly reduce the burden of travel to dosing points. Service type and prescriber characteristics influence treatment retention [43] and should also be considered. For instance, publicly funded dosing points, such as specialist clinics, are associated with higher patient retention over private settings (private clinics and GP settings were analysed together) [46]. Mapping service availability alongside these factors could be useful in improving access and health outcomes for priority populations in addition to the general population.

### 4.6 | Limitations

Our data were limited to postcodes, which prevented us from considering public transport and road accessibility, which rely on exact addresses. Additionally, we could not know how far people travel when dosing points were within their own postcode. Our analysis assumed people residing in larger postcodes lived further from care than those in smaller postal areas. Given postal areas are defined around population densities, this will generally be true, but our results would be more precise had addresses been available. As CALD status was not available in the source data, we needed to classify it based on available data. Those with cultural differences who speak English at home and who were born in Australia, such as second-generation migrants, were unable to be identified.

Dosing point information is collected at the time a person is authorised for OAT with a prescriber. We cannot know whether that information has been kept up to date. Additionally, we only looked at registered dosing points; short-term transfers to distant/regional dosing points were not captured. Our data are likely to underestimate barriers to access experienced by people in rural areas, and those of Aboriginal or CALD backgrounds, as we only have data on those who *did* successfully access OAT. We do not have data on individuals who needed treatment but were unable to access prescribers or dosing points. In some cases, the ability to take away doses would have made more distant dosing points feasible. This is something we could not explore with our data. Additionally, our modelling focused on population differences across NSW; analyses that break down population differences within regions would be valuable.

## 5 | Conclusion

Aboriginal and Torres Strait Islander Australians, and young people live further from OAT dosing than others in NSW. CALD individuals live closer to dosing points, which could suggest better access or reticence to travel far for care. Mapping healthcare access separately for priority populations is likely useful across Australia and for other countries with routinely collected administrative data on OAT. Our findings are likely to have relevance for groups facing additional barriers to accessing healthcare in other countries. Recommendations for improving treatment access for priority populations include improving the geographic distribution of dosing points and the availability of care that caters to the needs of priority populations.

### Author Contributions

Each author certifies that their contribution to this work meets the standards of the International Committee of Medical Journal Editors.

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### Ethics Statement

The authors were required to submit the complete manuscript to NSW Health and separately to the Aboriginal Health and Medical Research Council Ethics Committee to obtain approval to publish. No substantive requests were made by either body.

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The database used in this study is controlled by the NSW Ministry of Health and is not publicly accessible.

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### Supporting Information

Additional supporting information can be found online in the Supporting Information section.