Inequities in COVID-19 antiviral dispensation in Victoria, Australia: A retrospective cohort study using linked data

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Background and objective
Oral antiviral therapies are recommended for treatment of COVID-19 in people vulnerable to severe outcomes. This study examined COVID-19 antiviral dispensation and incidence of severe outcomes among eligible Victorians by socioeconomic status and cultural and linguistic diversity.

Methods
A retrospective analysis was conducted using linked population data. Dispensation of COVID-19 antiviral treatment (molnupiravir or nirmatrelvir/ritonavir) is described, stratified by socioeconomic and culturally and linguistically diverse (CALD) status between 1 January and 30 June 2023 in Victorian residents aged ≥70 years. Rates of severe COVID-19 outcomes (hospitalisation or death) were also calculated from 1 November 2022 to 30 April 2023.

Results
Victorians living in areas of increasing socioeconomic disadvantage had steadily reduced COVID-19 antiviral dispensation in both CALD and non-CALD groups, with lower rates in CALD groups across all socioeconomic levels. The rate of severe COVID-19 outcomes showed the opposite trend.

Discussion
This analysis suggests that treatment access and outcomes are inequitable in Victorians eligible for COVID-19 antivirals. Increasing equity is a public health imperative.

THE COVID-19 PANDEMIC continues to impact human health globally through acute infections resulting in illness, hospitalisation and death, post-COVID-19 conditions, and broad social and economic impacts. Older people, those living with underlying health conditions and people with disabilities are at greater risk of severe illness and death due to COVID-19.[1]

As the global community has removed exceptional public health and social measures to limit COVID-19 transmission, access to vaccination and antiviral therapy remain key interventions to mitigate COVID-19 impacts. Real-world observational studies have displayed reductions in COVID-19 deaths and hospitalisations with oral antiviral treatment,[2,3] including in Victoria, Australia.[4] As successive generations of new variants of COVID-19 have been characterised by a capacity to evade both natural and vaccine-derived immunity resulting in reinfection, continued access to interventions remains important;[5] however, there are ongoing concerns that access to interventions such as antivirals is not equitable across all population groups.[6] Lower COVID-19 antiviral uptake rates have been observed in more disadvantaged socioeconomic areas in early analyses from Victoria,[6] as well as internationally.[7] Additionally, disparities in uptake of these medications has been observed across racial and ethnic groups.[8]

In Australia, eligibility criteria for COVID-19 antivirals provide access to people vulnerable to severe disease.[9] Following confirmation by a positive COVID-19 test (rapid antigen test or polymerase chain reaction) and prescription by a registered medical or nurse practitioner, people who meet the age- and risk factor-based criteria are eligible to receive government-subsidised oral COVID-19 antiviral treatments, nirmatrelvir/ritonavir (Paxlovid; Pfizer, Sydney, NSW) or molnupiravir (Lagevrio; Merck Sharp & Dohme, Sydney, NSW).[10] However, with increasing barriers to accessing primary care in Australia,[11] and previous evidence of inequity in outcomes of COVID-19 infection,[12] it remains uncertain whether these medications, which save lives and significantly reduce pressure on our hospitals,[4] are being provided equitably to all Australians who need them.[6]

This retrospective analysis aims to describe overall rates of antiviral dispensation for COVID-19 medications (molnupiravir and nirmatrelvir/

ritonavir) in an eligible population in Victoria during a six-month period, and simultaneously describe the rates of severe outcomes from COVID-19 infection (hospitalisation or death) in the same population by cultural and linguistic diversity and socioeconomic status.

Methods

Data sources and study population

We descriptively analysed Person-Level Integrated Data Asset (PLIDA) data including those from the Pharmaceutical Benefits Scheme (PBS), 2021 Census of Population and Housing, national residential aged care data, and the linked Victorian Department of Health COVID-19 surveillance data (Transmission and Response Epidemiology Victoria, TREVi). PLIDA is a secure data asset managed by the Australian Bureau of Statistics (ABS) that uses a unique person-linkage spine to combine information from a range of population data sources at the person level.[13] The PBS contains records of all prescription medicines dispensed through the scheme by item code and includes date of dispensation. The Census includes demographic information including age, sex, cultural and linguistic diversity and socioeconomic status. Aged care data from the national register includes admission and discharge dates to residential aged care facilities. TREVi surveillance data contains all notified COVID-19 cases in Victoria, along with demographic and clinical information including hospitalisations and deaths related to COVID-19.

The study population included Victorians with a linked Census record in PLIDA who were aged ≥70 years and not aged care residents at the outcome of interest. COVID-19 antiviral supply differed in residential aged care settings;[9] therefore, analyses were restricted to non-aged care residents to focus on community uptake of antiviral treatments. Adults aged ≥70 years were eligible for COVID-19 antivirals subsidised from the PBS.[10]

Study definitions

The main study outcome – treatment dispensation – was defined as the supply of molnupiravir or nirmatrelvir/ritonavir from the PBS. A severe COVID-19 outcome was defined as hospitalisation or death, as reported in the TREVi database. COVID-19 hospitalisations (all cases admitted to hospital while infectious) were reported by all Victorian hospitals to the Victorian Department of Health, as collected by the Victorian Healthcare Associated Infection Surveillance Coordinating Centre (VICNISS). COVID-19 deaths were defined as per the Victorian surveillance definition where COVID-19 was listed as a cause of death on the medical certificate of death or death was within 35 days of diagnosis, excluding trauma and accidents. Index of Relative Socioeconomic Disadvantage (IRSD) scores by Statistical Area Level 1 (SA1) geographic area were obtained from the Census (location of usual residence on Census night) and grouped into deciles for analyses.[14] Culturally and linguistically diverse (CALD) groups were defined by a reported non-main English-speaking country of birth or language other than English as the main language used at home or self-reported poor English-language proficiency in the Census.

Analysis

Rates of treatment dispensation and severe COVID-19 outcomes were calculated with 95% confidence intervals, stratified by IRSD decile and CALD status. Rate ratios (RR) were calculated and compared to the most disadvantaged IRSD decile for antiviral dispensation and the least disadvantaged IRSD decile for severe outcome rates.

Table 1. Number and rate per 100,000 population of COVID-19 oral antiviral treatments (molnupiravir and nirmatrelvir/ritonavir) dispensed through the PBS to Victorian, non-aged care residents aged ≥70 years at dispensation from 1 January 2023 to 30 June 2023

	Treatments dispensed		Rate (95% CI) per 100,000 population	
IRSD decile	CALD (n)	Non-CALD (n)	CALD	Non-CALD
1 (most disadvantaged)	895	1381	3583.2 (3359.7–3820.9)	4558.4 (4329.2–4799.0)
2	812	2020	3781.8 (3534.8–4045.4)	4978.8 (4771.4–5194.7)
3	894	2586	4256.7 (3992.0–4538.2)	5201.5 (5009.8–5400.2)
4	878	2340	4504.6 (4222.3–4804.9)	5358.4 (5151.1–5573.5)
5	972	2484	4563.0 (4290.8–4851.5)	5419.9 (5216.3–5631.0)
6	1028	2844	4836.7 (4556.4–5133.4)	5760.5 (5558.4–5969.5)
7	1255	2907	5135.4 (4865.7–5419.3)	5769.2 (5569.0–5976.2)
8	1220	2930	5189.3 (4913.0–5480.2)	5887.8 (5684.4–6098.0)
9	1140	3363	5224.6 (4937.1–5527.8)	6463.6 (6255.5–6678.1)
10 (least disadvantaged)	720	2682	5345.6 (4978.3–5738.4)	6598.3 (6361.0–6843.7)

All numbers were perturbed to maintain confidentiality.

CALD, culturally and linguistically diverse; CI, confidence interval; IRSD, Index of Relative Socioeconomic Disadvantage; PBS, Pharmaceutical Benefits Scheme.

Based on data availability, this study encompassed 1 January to 30 June 2023 for antiviral dispensation rates and 1 November 2022 to 30 April 2023 for severe outcome rates. This includes a period when antiviral treatments had been available through the PBS to this study population since mid-2022 and when a variety of Omicron sublineages were co-circulating in Victoria.[15]

Data preparation analyses were conducted using R version 4.4.0 (R Core Team, Vienna, Austria) within the ABS virtual DataLab, a secure remote-access computer facility. All results were perturbed according to ABS methods to prevent disclosure and potential re-identification. Analyses were conducted under the Australian Government's evaluation of the COVID-19 vaccine strategy and no further ethics approvals were required.

Results

Between 1 January 2023 and 30 June 2023, a total of 35,351 COVID-19 antiviral prescriptions were dispensed to Victorian non-aged care residents aged ≥70 years at the time of dispensation with non-missing Census data. A total of 4477 COVID-19 cases in the study population had a severe outcome event (hospitalisation or death) reported during the six-month period of interest, 1 November 2022 to 30 April 2023. A total of 710,358 Victorian residents who were aged ≥70 years at the time of the Census had records linked to the spine available in PLIDA (from a population of 772,281 in the Census). After exclusion of records missing IRSD or CALD status and restriction to non-aged care residents (as at Census night), the study denominator included 665,020 people. Fewer than 1% of linked records were missing CALD or IRSD status.

People from CALD backgrounds were less likely to receive antivirals than those from non-CALD backgrounds, regardless of the level of socioeconomic disadvantage in the area in which they live (Figure 1, Table 1). Additionally, Victorians living in areas of greater disadvantage had reduced rates of antiviral dispensation for both CALD and non-CALD groups, with a steady decline in rate of antiviral use for each socioeconomic decile in both groups. Those in the least disadvantaged IRSD decile were 1.49- and 1.45-fold more likely to have a COVID-19 antiviral dispensed than those in the most disadvantaged decile for CALD and non-CALD groups, respectively.

The opposite pattern is observed for severe outcomes; people from CALD backgrounds had higher rates of severe COVID-19 outcomes and the rate of severe outcomes increased with increasing socioeconomic disadvantage (Figure 2, Table 2). Those in the most disadvantaged IRSD decile were 1.88-fold (CALD) and 1.68-fold (non-CALD) more likely to be hospitalised with COVID-19 or be reported as a COVID-19 death than those in the least disadvantaged decile.

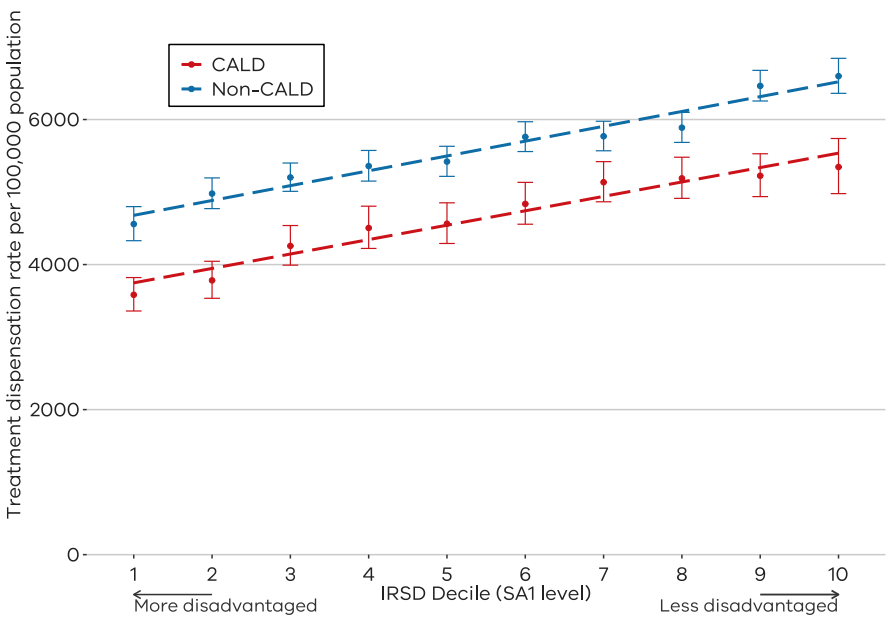

Figure 1. COVID-19 antiviral treatment dispensation rate by IRSD decile at the SA1 level and CALD status, for Victorian non-aged care residents aged ≥70 years from 1 January 2023 to 30 June 2023.

CALD, culturally and linguistically diverse; IRSD, Index of Relative Socioeconomic Disadvantage; SA1, Statistical Area Level 1.

Data presented are point estimates and 95% confidence intervals. The dashed line is the line of best fit. Rates were perturbed to maintain confidentiality.

Discussion

This analysis demonstrates profound inequity in access to antiviral treatment for COVID-19 in Victorians aged ≥70 years who were non-aged care residents. The pattern of antiviral dispensation rates stratified by socioeconomic status and CALD status is pronounced: with further socioeconomic disadvantage, treatment dispensation rates decrease, and CALD groups are disproportionately affected with lower treatment uptake within each socioeconomic stratum.

It is necessary to understand whether rates of antiviral prescription reflect underlying rates of COVID-19 infection among these groups. As notification of COVID-19 cases within the community was no longer mandatory in Victoria from October 2022, the incidence of infections cannot be directly extrapolated from case notification data. Instead, we need to use other more comprehensive indicators to reflect the impact of COVID-19. COVID-19 hospitalisations and deaths have been part of ongoing surveillance in Victoria, and this allows us to more accurately compare rates of these severe outcomes by socioeconomic and CALD status.

If antiviral uptake differences were due to a lower incidence of infections among CALD Victorians and people living in lower

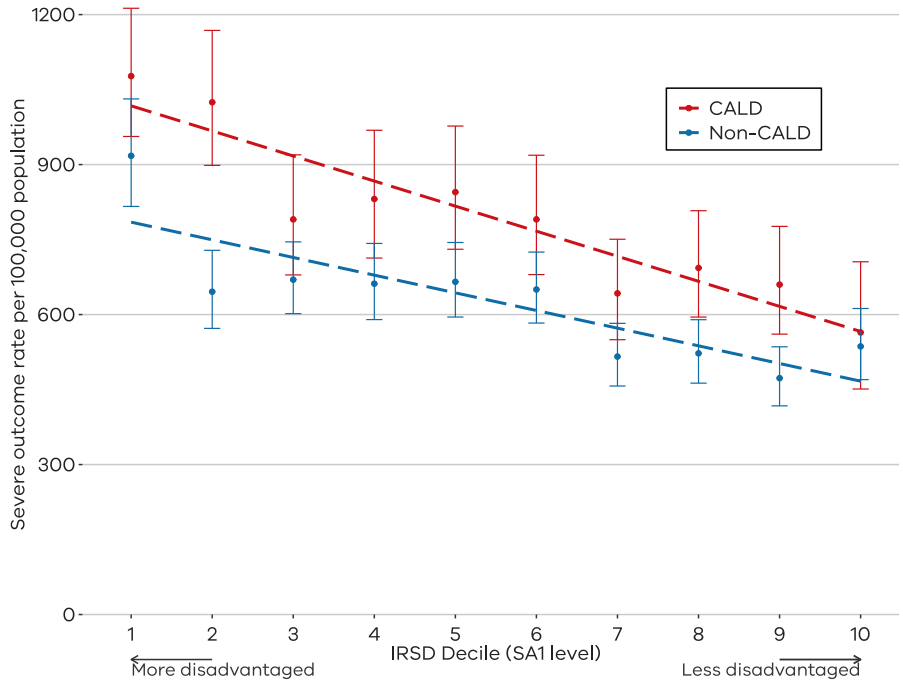

Figure 2. Severe COVID-19 outcome (hospitalisation or death as reported to the Victorian Department of Health) rate by IRSD decile at the SA1 level and CALD status for Victorian non-aged care residents aged ≥70 years from 1 November 2022 to 30 April 2023.

CALD, culturally and linguistically diverse; IRSD, Index of Relative Socioeconomic Disadvantage; SA1, Statistical Area Level 1.

Data presented are point estimates and 95% confidence intervals. The dashed line is the line of best fit. Rates were perturbed to maintain confidentiality.

IRSD areas, we would expect to see similar or lower rates of hospitalisations and deaths in these groups. Instead, the opposite is true. As socioeconomic disadvantage increases, so does the rate of severe COVID-19 outcomes (hospitalisation or death), with CALD individuals disproportionately affected within each socioeconomic stratum.

These inequities are particularly striking in that they are almost mirror images – with increasing socioeconomic disadvantage, we observe steadily falling antiviral uptake, yet steadily rising severe outcomes. In all deciles of disadvantage, CALD Victorians are worse off.

Studies internationally have also observed disparities in COVID-19 antiviral dispensing rates when stratified by similar population groups including ethnicity[8] and social deprivation.[7,16] Australia-wide analyses have also shown lower uptake in people from more disadvantaged socioeconomic backgrounds.[17] Inequalities in severe outcomes from COVID-19 infection have also been well documented in relation to both race/ethnicity and socioeconomic status, with increased risks of mortality and hospitalisation outcomes consistently observed.[18,19] This study adds to the increasing body of evidence on inequities in interventions and outcomes. Although our study was restricted to older adults who were all eligible by age to receive antivirals, further work is required to understand patterns in other cohorts with differing eligibility.

The finding that Victorian non-aged care residents aged ≥70 years from CALD backgrounds and those experiencing socioeconomic disadvantage are less likely to receive COVID-19 antivirals in the community might have many contributing factors, including barriers to access for COVID-19 testing and primary care – prerequisites for access to COVID-19 treatments – as well as lower health literacy, limiting understanding of the benefits and availability of treatment.[20] There might also be financial pressures that impact the uptake of COVID-19 antivirals including the cost of general practitioner (GP) appointments, telehealth restrictions, limited availability of bulk billing clinics, the cost of medicines and difficulty taking time off work or caregiving to obtain medical care.[21,22] These factors should be considered when developing strategies aimed at addressing the disparities in antiviral access.

The clear inequities highlighted in this analysis are not limited to COVID-19 antiviral therapy.[12] Nevertheless, the scale of the COVID-19 pandemic's impact mandates that we aim to improve equity in access to these treatments, which in turn protect the capacity of our hospital system during waves of COVID-19 infections in the community. Improving equity requires that we address the structural inequalities within the health system that create barriers for people accessing primary care and tailoring solutions to the communities most affected.

Potential strategies to make access more equitable include simplifying PBS eligibility criteria, such as the use of age-based thresholds (without the need for additional clinical assessment of risk factors) and allowing eligibility for healthcare card holders. This would streamline the assessment and prescription of antivirals, without placing additional clinical and administrative burden on already overstretched primary care providers. Consideration of additional prescriber options, such as pharmacists, could be piloted.[23,24]

Tailored public health communications to overcome language and cultural barriers, ensuring that information about the benefits of antivirals, eligibility criteria and availability reaches all communities, is vital. Community champions could prove useful in delivering these messages; they have proved beneficial in delivering other COVID-19 interventions such as vaccination.[25]

Primary care is under substantial stress.[11] Currently, Australia's GPs represent the

principal source of primary healthcare and early interventions, including antiviral prescription. Supporting the primary care sector to deliver these services is essential; increased investment in general practice and community health, and specific measures such as MBS item numbers for longer consultation times to facilitate COVID-19 plans, and telehealth services to increase access to GP appointments would help to facilitate antiviral access through primary care.

There are certain limitations to this descriptive analysis. An ideal analysis would use case notifications as the study population; however, with reduced case ascertainment in this study period, this was not possible. The binary definition of CALD and non-CALD does not capture all aspects of cultural and linguistic diversity; there is substantial heterogeneity between CALD groups and important differences might have been masked. Similarly, deciles of socioeconomic disadvantage are area based and do not necessarily reflect individual circumstances. Factors such as age and sex were not able to be controlled for and might have been differentially distributed among subgroups. Additionally, other factors such as health behaviours and health status, and the presence of contraindications for molnupiravir and nirmatrelvir/ritonavir use could not be accounted for. Linkage was performed by the ABS, the accredited integrating authority for the PLIDA data asset, and although rates of linkage to the person-linkage spine were high for all datasets used, there might be systematic and important differences in those who did not link and were hence excluded from analyses.

Conclusion

Equitable access to COVID-19 antiviral treatments for all vulnerable Victorians is a public health imperative. The observed disparities in dispensation and severe outcomes call for an informed response that includes policy adjustments, targeted outreach and the removal of systemic barriers to care. Only through increased equity can we ensure that the protective benefits of medical advancements are shared across all groups of society.

Key points

- Disparities in COVID-19 antiviral dispensation by socioeconomic status and cultural and linguistic diversity have been observed in Victoria, Australia.
- Enhancing equity of access to these antiviral medicines is critical.
- Simplified PBS eligibility criteria could reduce complexity and risk assessments.
- Streamlined access options and additional prescribers could be explored to deliver treatments.
- COVID-19 continues to remain a public health challenge, and access to interventions including vaccination and antiviral treatments need to be equitable.

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Table 2. Number and rate per 100,000 population of COVID-19 severe outcomes (hospitalisation or death as reported to the Victorian Department of Health) in Victorian, non-aged care residents aged ≥70 years from 1 November 2022 to 30 April 2023

	Severe outcomes		Rate (95% CI) per 100,000 population	
IRSD decile	CALD (n)	Non-CALD (n)	CALD	Non-CALD
1 (most disadvantaged)	269	278	1076.9 (956.3–1212.7)	917.6 (816.3–1031.4)
2	220	262	1024.6 (898.4–1168.4)	645.8 (572.4–728.5)
3	166	333	790.4 (679.3–919.5)	669.8 (601.8–745.4)
4	162	289	831.2 (713.0–968.7)	661.8 (590.0–742.3)
5	180	305	845.0 (730.6–977.1)	665.5 (595.1–744.2)
6	168	321	790.4 (680.0–918.7)	650.2 (583.0–725)
7	157	260	642.4 (549.7–750.7)	516.0 (457.1–582.4)
8	163	260	693.3 (595.0–807.7)	522.5 (462.8–589.7)
9	144	246	659.9 (560.9–776.4)	472.8 (417.4–535.5)
10 (least disadvantaged)	76	218	564.3 (451.1–705.6)	536.3 (469.8–612.2)

All numbers were perturbed to maintain confidentiality.

CALD, culturally and linguistically diverse; CI, confidence interval; IRSD, Index of Relative Socioeconomic Disadvantage.

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References

1. Zhang JJ, Dong X, Liu GH, Gao YD. Risk and protective factors for COVID-19 morbidity, severity, and mortality. Clin Rev Allergy Immunol 2023;64(1):90–107. doi: 10.1007/s12016-022-08921-5.
2. Mesfin YM, Blais JE, Kibret KT, et al. Effectiveness of nirmatrelvir/ritonavir and molnupiravir in non-hospitalized adults with COVID-19: Systematic review and meta-analysis of observational studies. J Antimicrob Chemother 2024;79(9):2119–31. doi: 10.1093/jac/dkae163.
3. Souza KM, Carrasco G, Rojas-Cortés R, et al. Effectiveness of nirmatrelvir-ritonavir for the treatment of patients with mild to moderate COVID-19 and at high risk of hospitalization: Systematic review and meta-analyses of observational studies. PLoS One 2023;18(10):e0284006. doi: 10.1371/journal.pone.0284006.
4. Van Heer C, Majumdar SS, Parta I, et al. Effectiveness of community-based oral antiviral treatments against severe COVID-19 outcomes in people 70 years and over in Victoria, Australia, 2022: An observational study. Lancet Reg Health West Pac 2023;41:100917. doi: 10.1016/j.lanwpc.2023.100917.
5. Carabelli AM, Peacock TP, Thorne LG, et al; COVID-19 Genomics UK Consortium. SARS-CoV-2 variant biology: Immune escape, transmission and fitness. Nat Rev Microbiol 2023;21(3):162–77. doi: 10.1038/s41579-022-00841-7.
6. Allard NL, Canevari J, Haslett N, Cowie BC. Access to oral COVID-19 antivirals in the community: Are eligibility criteria and systems ensuring equity? Med J Aust 2023;218(10):438–41. doi: 10.5694/mja2.51949.
7. Gold JAW, Kelleher J, Magid J, et al. Dispensing of oral antiviral drugs for treatment of COVID-19 by zip code-level social vulnerability - United States, December 23, 2021-May 21, 2022. MMWR Morb Mortal Wkly Rep 2022;71(25):825–29. doi: 10.15585/mmwr.mm7125e1.
8. Boehmer TK, Koumans EH, Skillen EL, et al. Racial and ethnic disparities in outpatient treatment of COVID-19 - United States, January-July 2022. MMWR Morb Mortal Wkly Rep 2022;71(43):1359–65. doi: 10.15585/mmwr.mm7143a2.
9. Sturgiss E, Simpson N, Ball L, Hall Dykgraaf S, Kelly P, Kidd M. Community-based access to oral antiviral treatments for COVID-19 in Australia. Aust J Gen Pract 2023;52(6):409–12. doi: 10.31128/AJGP-01-23-6673.
10. Australian Government Department of Health and Aged Care. Eligibility for oral COVID-19 treatments. Commonwealth of Australia, 2024. Available at www.health.gov.au/health-alerts/covid-19/treatments/eligibility [Accessed 18 January 2024].
11. The Royal Australian College of General Practitioners (RACGP). General practice: Health of the Nation 2023. RACGP, 2023. Available at www.racgp.org.au/general-practice-health-of-the-nation-2023 [Accessed 15 April 2024].
12. Australian Institute of Health and Welfare (AIHW). Australia's health 2022: Data insights (AIHW Cat. No. AUS 240). AIHW, 2022. Available at www.aihw.gov.au/reports/australias-health/australias-health-2022-data-insights [Accessed 16 April 2024].
13. Australian Bureau of Statistics (ABS). Person Level Integrated Data Asset (PLIDA). ABS, 2024. Available at www.abs.gov.au/about/data-services/data-integration/integrated-data/person-level-integrated-data-asset-plida [Accessed 15 August 2024].
14. Australian Bureau of Statistics (ABS). Socio-Economic Indexes for Areas (SEIFA), Australia. ABS, 2023. Available at www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release [Accessed 8 June 2024].
15. The Pharmaceutical Benefits Scheme (PBS). Expanded eligibility criteria for COVID-19 oral antiviral treatments, Paxlovid® (nirmatrelvir and ritonavir) and molnupiravir (Lagevrio®). PBS, 2022. Available at www.pbs.gov.au/info/news/2022/07/expanded-eligibility-criteria-for-covid-19-treatments [Accessed 15 February 2024].
16. Malden DE, McLaughlin JM, Hong V, et al. Predictors of nirmatrelvir-ritonavir receipt among COVID-19 patients in a large US health system. Sci Rep 2024;14(1):7485. doi: 10.1038/s41598-024-57633-7.
17. Breadon P, Stoba A. How to prepare for the next pandemic. Submission to the federal government's COVID Response Inquiry. Grattan Institute, 2023. Available at https://grattan.edu.au/news/how-to-prepare-for-the-next-pandemic [Accessed 3 May 2024].
18. Berchet C, Bijlholt J, Ando M. Socio-economic and ethnic health inequalities in COVID-19 outcomes across OECD countries, OECD Health Working Papers No. 153. OECD Publishing, 2023. Available at www.oecd.org/en/publications/socio-economic-and-ethnic-health-inequalities-in-covid-19-outcomes-across-oecd-countries_6c2a96c9-en.html [Accessed 5 May 2024].
19. Irizar P, Pan D, Kapadia D, et al. Ethnic inequalities in COVID-19 infection, hospitalisation, intensive care admission, and death: A global systematic review and meta-analysis of over 200 million study participants. EClinicalMedicine 2023;57:101877. doi: 10.1016/j.eclinm.2023.101877.
20. Khatri RB, Assefa Y. Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: Issues and challenges. BMC Public Health 2022;22(1):880. doi: 10.1186/s12889-022-13256-z.
21. Australian Bureau of Statistics (ABS). Patient experiences. ABS, 2023. Available at www.abs.gov.au/statistics/health/health-services/patient-experiences/latest-release [Accessed 1 April 2024].
22. Swerissen H, Duckett S, Moran G. Mapping primary care in Australia. Grattan Institute, 2018. Available at https://grattan.edu.au/report/mapping-primary-care-in-australia [Accessed 3 March 2024].
23. Victorian Department of Health. Victorian community pharmacist statewide pilot. Government of Victoria, 2024. Available at www.health.vic.gov.au/primary-care/victorian-community-pharmacist-statewide-pilot [Accessed 15 April 2024].
24. New Zealand Government Ministry of Health. Ngā rongoā patu huaketo mō te KOWHEORI-19 COVID-19 antiviral medicine. New Zealand Government, 2022. Available at https://info.health.nz/conditions-treatments/infectious-diseases/covid-19/antiviral-medicines [Accessed 15 August 2024].
25. Kaufman J, Overmars I, Leask J, et al. Vaccine champions training program: Empowering community leaders to advocate for COVID-19 vaccines. Vaccines (Basel) 2022;10(11):1893. doi: 10.3390/vaccines10111893.

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