CSIRO PUBLISHING

COVID-19 PANDEMIC HEALTH CARE | ARTICLE
https://doi.org/10.1071/AH22183

Australian Health Review
ahha

Impact of the COVID-19 pandemic on access and use of health services by middle-aged and older Australians

Lorraine Ivancic[A,B] (*PhD, Senior Research Analyst*), Diana M. Bond[A,*] (*PhD, Senior Research Officer*) and Natasha Nassar[A,B] (*PhD, Financial Markets Foundation for Children Chair in Translational Childhood Medicine, Child Population and Translational Health Research*)

For full list of author affiliations and declarations see end of paper

***Correspondence to:**
Diana M. Bond
Child Population and Translational Health Research, Children's Hospital at Westmead Clinical School, Faculty of Medicine and Health, 2nd Floor, Charles Perkins Centre, University of Sydney, NSW 2006, Australia
Email: diana.bond@sydney.edu.au

Received: 1 August 2022
Accepted: 1 November 2022
Published: 18 November 2022

Cite this:
Ivancic L *et al.* (2023)
Australian Health Review
47(1), 100–109. doi:10.1071/AH22183

ABSTRACT

Objectives. To examine: the impact of the coronavirus disease 2019 (COVID-19) pandemic on access to health services by middle-aged and older Australians; and the use of telehealth services during the COVID-19 pandemic and its ongoing usefulness. **Methods.** A cross-sectional survey was conducted among participants who completed the COVID-19 supplement in the 45 and Up Study 2020 Survey. Multivariable logistic regression analysis was used to examine the association between socio-demographic characteristics and health conditions with missed/delayed access to health services, changes in health outcomes resulting from missed/delayed access, and use of telehealth services. **Results.** Data for 45 071 participants were analysed (56% female, 72% aged ≥65 years). Almost half (42.2%) reported they had missed/delayed access to health care due to COVID-19; mainly for dental services (26.1%), visits to a general practitioner (GP) (16.3%) and specialists (12.6%). Missed/delayed visits to GPs and specialists were more likely among females, participants from non-English-speaking backgrounds, with disability/illness, living in outer regional/remote areas or with chronic health conditions. People with a disability or high/very high psychological distress were twice as likely to report worse health as a result of missed/delayed care. Half (48.0%) the study participants used telehealth during the COVID-19 pandemic and 81.9% indicated telehealth would be useful post-pandemic. **Conclusions.** The COVID-19 pandemic impacted access to healthcare services, particularly for people with a disability, and chronic or mental health issues who also reported worse health. This may account for their higher use of telehealth services as an alternate way of accessing health care. Ongoing evaluation of telehealth services for vulnerable groups post-pandemic is required.

Keywords: adolescent, child, COVID-19, obesity, overweight, paediatric health.

Introduction

Over the past 2 years, the direct effects of coronavirus disease 2019 (COVID-19) on morbidity and mortality have been well established. There is also increasing evidence of the indirect impacts of the COVID-19 pandemic on health and wellbeing, partly attributed to delayed access to emergency or routine care and missed diagnoses.[1–4] Such delays may increase the risk of adverse health outcomes and affect the morbidity and mortality of individuals.[2,3] This is of particular importance in middle-aged and older people, as the risk of many diseases are known to increase with age.[5]

There is also growing concern, and emerging evidence, that vulnerable groups within society have been disproportionately affected by the indirect impacts of COVID-19.[6–10] Identification of groups that are most at risk is crucial to inform the implementation of policy and health services to minimise adverse impacts on the community and ensure that they do not translate into persisting inequalities, or an exacerbation of adverse health.

Telehealth has been recognised as a means of facilitating continued access to healthcare services during the COVID-19 pandemic while minimising the community risk of

COVID-19 transmission.[11] Prior to the COVID-19 pandemic, telehealth was available in Australia, but remunerated in limited settings, particularly for rural and regional areas.[12] In March 2020, the Australian Government introduced a range of telehealth items into the Medicare Benefits Schedule to reduce barriers to accessing health care during the COVID-19 pandemic.[13] There is currently little information on the use of these services, and whether service uptake was comparable across different socio-demographic groups.

The aim of this study was to examine the impact of the COVID-19 pandemic on access to healthcare services by middle-aged and older Australians, and to assess the use of telehealth services during the COVID-19 pandemic and ongoing acceptability and usefulness.

Methods

Study participants and data source

The study included data collected as part of the Sax Institute's 45 and Up Study, which was established in 2006 to track the health and ageing of individuals aged ≥45 years living in New South Wales (NSW), Australia. Prospective participants were randomly sampled using the Services Australia Medicare enrolment database. Those aged 80+ years and living in rural and remote areas were oversampled, with a response rate of approximately 18% of those invited to participate. Baseline data were collected via postal survey between 2006 and 2009 (n = 267 153), with subsequent surveys conducted in 2012–15 (Wave 2; n = 142 548) and 2018–20 (Wave 3; n = 97 302). The surveys collected information on a broad range of health and social topics, including participants' socio-demographic characteristics, health, lifestyle, behaviours, living situation, carer responsibilities, relationships, psychological distress, quality of life and chronic conditions.[14]

In July–December 2020, the Wave 3 Follow-Up Survey was posted to 85 299 study participants. In addition to the standard questionnaire, participants completed a COVID-19 Supplement, which included questions to explore the impact of the COVID-19 pandemic on health, lifestyle, access and use of health services and experiences with telehealth.[15]

Study outcomes and covariates

The study outcomes included missed or delayed access to a range of health services as a result of the COVID-19 pandemic, and whether this resulted in a change in self-reported health. Health services were pre-defined in the survey (Supplementary Table S1) and did not include access to telehealth services. Use of telehealth services since January 2020, acceptability and perceived ongoing usefulness of these services were explored using separate questions. Overall physical and emotional/psychological health, physical activity, financial situation as a result of the COVID-19 pandemic and social contact were also assessed (survey details are included in Supplementary Table S1 and available online at: https://www.saxinstitute.org.au/our-work/45-up-study/questionnaires/).

Information on socio-demographic characteristics and indicators of potential vulnerability were identified from the 45 and Up Study baseline and Wave 3 survey. These included age at the time of the 2020 survey, sex, residential location and educational qualification. Postcode of residence was combined with the Accessibility/Remoteness Index of Australia[16] to classify geographical location, whereas socio-economic status was determined using the Australian Bureau of Statistics Socio-Economic Indexes for Areas (ABS SEIFA) Index of Relative Socioeconomic Disadvantage.[17]

Vulnerable or at-risk groups were defined as participants classified as most disadvantaged, spoke a language other than English at home, indicated that they regularly needed help with daily tasks due to long-term illness or disability, or received treatment for a range of chronic conditions in the month prior to the time of survey completion. Health conditions assessed in our study included heart disease (heart attack or angina, and other heart disease), cancer, asthma and mental health disorder (i.e. anxiety and depression). Level of psychological distress was assessed using the Kessler 10 (K10), a validated tool that scores psychological distress on a four-point scale from low to very high.[18]

Statistical analysis

The number and rates of participants reporting study outcomes were calculated overall and by socio-demographic characteristics and health conditions. Association of socio-demographic characteristics and health conditions with study outcomes, including missed/delayed access to health services and use of telehealth services, were assessed using multivariable logistic regression analysis. All analyses were conducted using SAS v9.4 (SAS Institute Inc.) and only those results where the P-value was <0.05 or the odds ratios with 95% confidence intervals did not include 'one' were considered to be statistically significant and presented in the text.

Ethics

Ethics approval for this study was obtained from the University of Sydney Human Research Ethics Committee (Project Number: 2021/038), with original ethics for the 45 and Up Study from the University of NSW Human Research Ethics Committee. The research was undertaken with appropriate informed consent of participants or guardians.

Results

In total, 45 071 (53%) participants were included in the second follow-up Wave 3 survey (excluding seven withdrawn

Table 1. Missed or delayed access to GP, specialist and dental health services categorised by socio-demographic characteristics and health conditions.

Socio-demographic characteristics or health conditions	Missed or delayed access			Total
	GP	Specialist	Dental	
	n (%)	*n* (%)	*n* (%)	*n* (%)
Total	*N* = 44 166	*N* = 43 116	*N* = 42 479	*N* = 45 071
Age (years)				
45–64	2612 (20.9)	1711 (14.0)	3961 (32.5)	12 661 (28.1)
65–75	2994 (16.5)	2234 (12.6)	4667 (26.6)	18 516 (41.1)
75+	1569 (11.6)	1483 (11.3)	2444 (19.2)	13 894 (30.8)
Sex				
Male	2569 (13.2)	1953 (10.2)	4084 (21.9)	19 471 (44.1)
Female	4606 (18.7)	3475 (14.5)	6988 (29.4)	24 695 (55.9)
Education				
≤Year 12	2007 (14.3)	1585 (11.7)	2729 (20.6)	14 393 (32.2)
Trade/diploma	2430 (16.7)	1763 (12.4)	3507 (25.1)	14 854 (34.5)
University	2682 (17.7)	2037 (13.6)	4763 (31.9)	15 431 (33.3)
Marital status				
No partner	2002 (19.3)	1562 (13.9)	2831 (25.7)	11 872 (26.5)
Partner	5138 (15.9)	3840 (12.1)	8190 (26.2)	32 928 (73.5)
Language background				
Non-English speaking	519 (19.8)	394 (15.6)	723 (29.1)	2701 (6.0)
English speaking	6656 (16.0)	5034 (12.4)	10 349 (25.9)	42 370 (94.0)
Socioeconomic status				
1 – Most disadvantaged	1193 (16.9)	867 (12.7)	1472 (22.3)	7191 (16.8)
2	1380 (16.2)	976 (11.8)	1978 (24.4)	8697 (20.3)
3	1373 (17.0)	1042 (13.2)	2023 (25.9)	8284 (19.3)
4	1257 (15.5)	940 (11.8)	2149 (27.4)	8281 (19.3)
5 – Least disadvantaged	1607 (15.7)	1340 (13.3)	2876 (28.7)	10 448 (24.4)
Area of residence				
Major city	3595 (16.4)	2678 (12.5)	5886 (27.8)	22 393 (51.7)
Inner regional	2518 (15.9)	1843 (11.9)	3646 (24.0)	16 178 (37.4)
Outer regional/remote	763 (16.5)	697 (15.4)	1065 (24.1)	4738 (10.9)
Health conditions				
Disability or illness				
Yes	708 (22.2)	670 (21.5)	751 (25.2)	3291 (7.4)
No	6408 (15.8)	4713 (11.9)	10 239 (26.1)	41 360 (92.6)
Treatment for chronic illness in the past month				
Cancer – Yes	252 (14.5)	256 (14.8)	379 (23.0)	1775 (3.9)
– No	6928 (16.3)	5172 (12.5)	10 693 (26.2)	43 296 (96.1)
Heart disease – Yes	376 (17.1)	376 (17.3)	518 (25.0)	2256 (5.0)
– No	6799 (16.2)	5052 (12.3)	10 554 (26.1)	42 815 (95.0)

(*Continued on next page*)

Table 1. (*Continued*)

Socio-demographic characteristics or health conditions	Missed or delayed access			Total
	GP	Specialist	Dental	
	n (%)	*n* (%)	*n* (%)	*n* (%)
Asthma – Yes	559 (23.8)	436 (18.9)	661 (29.1)	2401 (5.3)
– No	6616 (15.8)	4992 (12.2)	10 411 (25.6)	42 670 (94.7)
Mental health – Yes	829 (22.6)	658 (18.4)	1061 (30.4)	3737 (8.3)
– No	6346 (15.7)	4770 (12.1)	10 011 (25.7)	41 334 (91.7)
Psychological distress (K10)				
Low	4602 (13.7)	3553 (10.8)	7893 (24.4)	34 060 (80.3)
Moderate	1451 (24.4)	1080 (18.6)	1889 (33.0)	6037 (14.2)
High	546 (30.8)	368 (21.4)	599 (35.4)	1816 (4.3)
Very high	166 (33.1)	112 (22.9)	169 (35.8)	510 (1.2)

Numbers may not add up to totals due to missing data.

consents) (Table 1). The sample comprised slightly more females (55.9%) than males (44.1%), with the highest proportion of participants aged between 65 and 75 years (41.1%), compared with 45–64 years (28.1%) and 75 + years (30.8%). The highest educational qualification completed was evenly distributed between ≤Year 12 (32.3%), trade/diploma (34.5%) and university (33.3%). Nearly 8% of participants had an illness or disability that required help with daily tasks, or had received treatment in the past month for cancer (3.9%), heart disease (5.0%), asthma (5.3%) and mental health issues (8.3%) (Table 1). Approximately half (51.7%) of the participants were residing in a major city, 37.4% in inner regional and 10.9% in outer regional to very remote areas (Table 1).

Regarding the impact of COVID-19 pandemic, 82% of participants reported their overall health and 70% reported their emotional/psychological health to be the same. However, 9% said their overall health and 26% their emotional/psychological health was worse. This was more likely among people aged 45 − 64 years, who have a disability, asthma or mental health condition. Compared to 12 months ago, 28% reported less time spent engaged in physical activity, 25% increased time spent watching TV and 10% more time sleeping. Two-thirds (67%) of participants indicated their financial situation was the same, 4% reported it was better and 28% reported it had worsened. Change in social contact was high, with 92% reporting reduced personal contact, mostly due to health concerns for themselves (76%) or others (72%).

Almost half (42.2%) the participants reported that they had missed or delayed access to health care due to COVID-19, mostly for dental services (26.1%), visits to general practitioners (GPs) (16.3%) and specialists (12.6%). Those with the highest rates of missed or delayed access to these services included participants with moderate to very high levels of psychological distress, those who had treatment in the past month for health conditions (especially mental health) and those with a disability/illness requiring help (Table 1). Missed/delayed access to other services including hospital or aged care, blood tests, psychological care, vaccination, cancer screening, and prescription and non-prescription medication ranged between 1.5 and 4.9% (Supplementary Table S2).

Missed/delayed visits to specialists was more likely to be reported by females and participants from non-English-speaking backgrounds, with disability/illness, living in outer regional and remote areas or have chronic health conditions (Table 2). Increased odds of missed visits to the GP was reported by females, those with disability/illness, with psychological distress or who are undergoing heart or asthma treatment (Table 2). Compared with unaffected participants, an over two-fold increase in negative (worse) impact on health due to missed or delayed access to care was reported by those with a disability or with high or very high psychological distress (Table 2).

Approximately half (48.0%) of the participants had used telehealth services since January 2020, including phone (96.0%) and video (9.0%). The highest rates, with > 1.5 increased odds of telehealth users, were among participants who had received treatment in the last month for cancer, mental health, heart disease and asthma (61.3%), those with a disability/illness and females (60.0%) ($P < 0.05$) (Table 3). A lower proportion of usage was found for males (43.2%), those aged 45–64 years (44.1%), from non-English-speaking backgrounds (41.8%) and residing in outer regional and remote areas (44.7%) ($P < 0.05$) (Table 3).

Acceptability of telehealth services was reported to be 'as good or better than in-person healthcare services' by 59.7% of participants, although 30.2% reported the service was worse (Table 4). Two-thirds (67.7%) would recommend telehealth services to others and 82% indicated that telehealth would be useful post-pandemic. In contrast, 18% did not believe telehealth would be useful post-pandemic,

Table 2. Association between missed or delayed access to GP, specialist and dental health services by socio-demographic characteristics and health conditions.

Socio-demographic characteristics or health conditions	Specialist visits aOR (95% CI)	GP visits aOR (95% CI)	Dental services aOR (95% CI)	Worse health[A] aOR (95% CI)
Age (years)				
45–64	Ref.	Ref.	Ref.	Ref.
65–74	0.93 (0.87, 1.00)	0.81 (076, 0.86)	0.81 (0.77, 0.86)	0.87 (0.75, 1.00)
75+	0.78 (0.71, 0.85)	0.52 (0.48, 0.56)	0.57 (0.54, 0.61)	0.58 (0.48, 0.70)
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	1.45 (1.35, 1.54)	1.43 (1.35, 1.52)	1.46 (1.39, 1.53)	1.24 (1.08, 1.42)
Education				
University	Ref.	Ref.	Ref.	Ref.
Trade/diploma	0.88 (0.81, 0.94)	0.92 (0.86, 0.99)	0.74 (0.70, 0.79)	1.07 (0.92, 1.24)
≤Year 12	0.75 (0.69, 0.81)	0.73 (0.68, 0.79)	0.57 (0.53, 0.60)	0.98 (0.83, 1.15)
Marital status				
Partner	Ref.	Ref.	Ref.	Ref.
No partner	1.09 (1.02, 1.17)	1.04 (0.98, 1.11)	1.00 (0.94, 1.06)	1.35 (1.18, 1.55)
Language background				
English-speaking	Ref.	Ref.	Ref.	Ref.
Non-English-speaking	1.27 (1.13, 1.44)	1.14 (1.02, 1.28)	1.04 (0.94, 1.15)	1.25 (0.97, 1.60)
Socioeconomic status				
5 – Most disadvantaged	Ref.	Ref.	Ref.	Ref.
4	0.85 (0.77, 0.93)	0.97 (0.89, 1.06)	0.98 (0.91, 1.05)	0.99 (0.81, 1.21)
3	0.91 (0.83, 1.01)	1.09 (1.00, 1.19)	0.96 (0.89, 1.03)	0.94 (0.77, 1.16)
2	0.80 (0.73, 0.89)	1.04 (0.96, 1.14)	0.92 (0.85, 0.99)	1.04 (0.85, 1.27)
1 – Least disadvantaged	0.82 (0.74, 0.92)	1.11 (1.01, 1.22)	0.84 (0.78, 0.91)	1.01 (0.81, 1.26)
Area of residence				
Major city	Ref.	Ref.	Ref.	Ref.
Inner regional	1.03 (0.96, 1.11)	0.97 (0.91, 1.03)	0.89 (0.84, 0.94)	1.34 (1.16, 1.54)
Outer regional/remote	1.44 (1.30, 1.60)	1.04 (0.94, 1.14)	0.94 (0.87, 1.02)	1.34 (1.09, 1.66)
Health conditions				
Disability or illness				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.76 (1.58, 1.97)	1.42 (1.28, 1.58)	1.02 (0.92, 1.13)	2.01 (1.67, 2.43)
Treatment chronic illness past month				
Cancer – No	Ref.	Ref.	Ref.	Ref.
– Yes	1.17 (1.00, 1.36)	0.91 (078, 1.06)	0.92 (0.81, 1.05)	1.34 (0.99, 1.80)
Heart disease – No	Ref.	Ref.	Ref.	Ref.
– Yes	1.44 (1.26, 1.64)	1.20 (1.06, 1.36)	1.09 (0.97, 1.22)	1.35 (1.05, 1.75)
Asthma – No	Ref.	Ref.	Ref.	Ref.
– Yes	1.37 (1.22, 1.55)	1.44 (1.29, 1.60)	1.12 (1.01, 1.24)	1.35 (1.09, 1.67)

(*Continued on next page*)

Table 2. (*Continued*)

Socio-demographic characteristics or health conditions	Specialist visits aOR (95% CI)	GP visits aOR (95% CI)	Dental services aOR (95% CI)	Worse health[A] aOR (95% CI)
Mental health – No	Ref.	Ref.	Ref.	Ref.
– Yes	1.14 (1.02, 1.26)	0.95 (0.86, 1.05)	0.99 (0.90, 1.08)	1.49 (1.25, 1.77)
Psychological distress (K10)				
Low	Ref.	Ref.	Ref.	Ref.
Moderate	1.69 (1.56, 1.83)	1.89 (1.76, 2.03)	1.53 (1.43, 1.63)	1.88 (1.62, 2.20)
High	1.85 (1.62, 2.11)	2.47 (2.20, 2.78)	1.72 (1.54, 1.93)	2.84 (2.32, 3.49)
Very high	1.80 (1.42, 2.28)	2.55 (2.07, 3.14)	1.67 (1.36, 2.06)	4.92 (3.62, 6.68)

[A]Participants were asked if their health had gotten worse due to missed healthcare service appointments. Response options included: Yes/No/Don't know. Only Yes or No responses were included in the analysis.

aOR, adjusted odds ratio from multivariable logistic regression analysis adjusted for age, sex, education, marital status, language background, disability/illness, psychological distress, socioeconomic status, area of residence, health conditions; CI, confidence interval.

particularly people aged 75+ years (25.7%), with a disability/illness (25.3%), ≤Year 12 education (24.6%), very high psychological distress (24.1%) or from the most disadvantaged areas (23.5%) (Table 4).

Discussion

Our study found that the COVID-19 pandemic has had a considerable impact on access to healthcare services. Almost half the study population reported missed or delayed visits, particularly for dental, GP and specialist visits. Higher rates of missed health service visits were observed among females, those with a non-English-speaking background, and vulnerable groups including those with a disability/illness, elevated levels of psychological distress and chronic conditions. These groups were also more likely to report worse health during the COVID-19 pandemic, which may account for them being the highest users of telehealth. Telehealth services were accessed by half the study participants, with two-thirds finding it acceptable and 82% indicating it would be useful post-pandemic.

Our results are comparable to other studies reporting decreased access to healthcare services during the COVID-19 pandemic,[19,20] particularly decreased health visits to dentists, GPs and specialists, and primarily affecting those with chronic and mental health conditions. This is supported by a report by the Australian Institute of Health and Welfare (AIHW) that reported a decrease in emergency department presentations, mammogram screenings and Medicare-subsidised GP services for chronic disease management in the early months of the COVID-19 pandemic, but with a subsequent recovery of these services after 6–9 months.[21] One study also noted a recovery of hospitalisations for chronic conditions following a substantial decrease in non-COVID-19 hospitalisations during the peak of the pandemic.[22] However, investigation of the longer-term impact of reduced and delayed access to healthcare services on subsequent morbidity and mortality is required.

Regarding the impact on mental health, our findings are consistent with other studies that showed an increase in psychological distress as a result of the COVID-19 pandemic.[21,23] This is likely due to stressors associated with lockdown and public health restrictions, resulting in major uncertainty, impingement on personal freedom, financial losses, social and support service isolation, adapting to remote work situations and loneliness.[21,24,25] Further, our study found that a change in social contact was high, with 92% reporting reduced personal contact with others.

Telehealth has been identified as an important means of facilitating continued access to primary care services during the COVID-19 pandemic while minimising the community risk of transmission of COVID-19.[14,26] Although almost half of all participants used telehealth in our study, of importance is that the highest users were those with chronic conditions, high levels of psychological distress and a disability.

This may have been driven by the introduction of a temporary Medicare Benefits Schedule item to improve access to telehealth services.[27,28] Despite higher use of telehealth services among these groups, they reported worse health outcomes due to missed/delayed care. This suggests a population with a greater need for access to health care. Although at least half of the telehealth users in each health category found the service to be better or just as good as usual care, there was still one-third of participants who felt the service was worse than usual care. One qualitative study found that telehealth contributed to more isolation and disruption for some individuals, whereas others felt some conditions required a physical examination and were not suitable for telehealth.[25] A small South Australian study found that telehealth services were particularly useful for those with chronic conditions who did not require a physical examination, as the service enabled timely and convenient

Table 3. Use of telehealth services by socio-demographic characteristics.

Socio-demographic characteristics or health conditions	*n* (%)	aOR (95% CI)
Age (years)		
45–64	5568 (44.1)	Ref.
65–75	8850 (48.1)	1.21 (1.15, 1.27)
75+	6821 (50.0)	1.24 (1.17, 1.31)
Sex		
Male	8448 (43.2)	Ref.
Female	12 751 (51.0)	1.41 (1.35, 1.47)
Education		
University	7163 (46.7)	Ref.
Trade/diploma	6964 (47.2)	0.98 (0.93, 1.03)
≤Year 12	6926 (48.8)	0.95 (0.90, 1.00)
Marital status		
Partner	15 472 (47.3)	Ref.
No partner	56 751 (48.2)	0.87 (0.82, 0.91)
Language background		
English-speaking	20 124 (47.9)	Ref.
Non-English-speaking	1115 (41.8)	0.77 (0.70, 0.84)
Socioeconomic status		
5 – Least disadvantaged	4641 (44.8)	Ref.
4	3881 (47.2)	1.11 (1.04, 1.18)
3	3850 (46.9)	1.08 (1.02, 1.15)
2	4200 (48.8)	1.17 (1.09, 1.24)
1 – Least disadvantaged	3586 (50.4)	1.20 (1.12, 1.29)
Area of residence		
Major city	10 543 (47.5)	Ref.
Inner regional	7730 (48.2)	0.96 (0.91, 1.00)
Outer regional/remote	2092 (44.7)	0.82 (0.76, 0.88)
Health conditions		
Disability or illness		
No	18 904 (46.0)	Ref.
Yes	2144 (66.1)	1.74 (1.59, 1.90)
Treatment chronic illness past month		
Cancer – No	20 065 (46.8)	Ref.
– Yes	1174 (66.9)	2.16 (1.93, 2.42)
Heart disease – No	19 872 (46.8)	Ref.
– Yes	1367 (61.5)	1.55 (1.41, 1.71)
Asthma – No	19 785 (46.8)	Ref.
– Yes	1454 (61.3)	1.39 (1.27, 1.53)
Mental health – No	18 815 (45.9)	Ref.
– Yes	2424 (65.5)	1.79 (1.65, 1.94)
Psychological distress (K10)		
Low	15 315 (45.2)	Ref.
Moderate	3227 (53.8)	1.24 (1.17, 1.32)
High	1071 (59.2)	1.35 (1.22, 1.50)
Very high	335 (66.3)	1.64 (1.34, 2.00)

aOR, adjusted odds ratio from multivariable logistic regression analysis adjusted for age, sex, education, marital status, language background, disability/illness, psychological distress, socioeconomic status, area of residence, health conditions; CI, confidence interval.

access to medications.[20] Identifying potential barriers to telehealth services that limited their use is important. A systematic review identified a number of factors to improve patient satisfaction using telehealth.[29] Knowledge of these factors could assist caregivers in targeting those highest at risk of decreased health outcomes and targeting specific telehealth modalities such a videoconferencing to address their needs adequately.

The strengths of this study are the large sample size of almost 50 000 respondents, providing contemporary and detailed self-reported information on health service access, health and wellbeing during the COVID-19 pandemic. However, a limitation is that the cohort primarily comprised NSW residents and people aged >45 years. Future studies including participants from across Australia, those aged <45 years and data linkage to administrative health data to quantify health service use would provide more representative and generalisable responses for the nation. Qualitative studies would also provide further insight into patient experiences of access to health services and impact on health.

Conclusion

The COVID-19 pandemic has impacted access to dental, GP and specialist health care, particularly among women, non-English speakers and vulnerable groups such as those with chronic illness, poor mental health and long-term disability. Vulnerable groups reported worse health and were most likely to access telehealth services. Understanding the widespread and far-reaching impacts of the COVID-19 pandemic, and identifying those who are most at risk, are crucial to inform the implementation of policy and health services that minimise adverse impacts on the community and ensure that they do not translate into persisting inequalities, or an exacerbation of existing inequalities and adverse health.

Table 4. Experiences of people using telehealth services.

Socio-demographic characteristics	Total number (N)	Telehealth compared to usual care (%)				Recommend to others (%)				Useful to have telehealth post-COVID-19 (%)				
		Better	Just as good	Worse	Not sure	Definitely not	Will not	Probably	Definitely	Not at all	Slightly	Moderately	Very	Extremely
Overall	44 166	3.0	56.7	30.2	10.1	5.0	27.2	48.7	19.0	18.1	21.6	30.6	21.6	8.1
Age (years)														
45–64	12 661	5.2	55.9	29.6	9.4	3.4	21.9	50.0	24.8	10.3	20.2	29.2	26.9	13.6
65–75	18 516	2.6	57.9	30.5	9.0	4.8	26.9	49.5	18.4	17.2	22.5	30.9	21.4	8.1
75+	13 894	1.6	55.7	30.3	12.4	6.8	32.2	46.6	14.4	25.7	21.8	31.4	17.4	3.7
Sex														
Male	19 471	3.0	53.7	33.4	10.0	6.1	29.3	48.2	16.4	20.1	21.6	31.5	20.4	6.4
Female	24 695	3.0	58.7	28.1	10.2	4.3	25.8	49.1	20.8	16.7	21.6	30.0	22.4	9.3
Education														
Year 12 or less	14 393	2.3	57.6	28.2	11.9	6.2	30.1	47.6	15.7	24.6	22.2	28.6	18.5	6.1
Trade/diploma	14 854	2.8	56.5	30.8	9.9	5.2	27.7	49.7	17.4	18.9	22.8	32.2	21.3	6.8
University	15 431	3.8	56.1	31.6	8.5	3.4	24.1	48.9	23.7	10.9	20.0	33.1	24.8	11.4
Household income (AUD)														
<$40 k	12 731	2.6	54.4	31.1	11.9	7.0	30.8	46.9	15.3	24.5	22.1	29.6	18.2	5.7
$40 to <$70k	10 258	2.5	58.7	29.7	9.1	4.3	26.4	50.7	18.5	16.0	22.6	32.0	22.0	7.4
$70 to <$120k	8039	3.5	57.7	30.4	8.4	3.3	23.3	50.2	23.2	11.5	20.7	32.1	25.2	10.6
$120k+	6092	5.1	58.0	30.8	6.2	2.9	22.0	48.4	26.7	8.2	18.7	30.7	28.0	14.4
Prefer not to answer	6756	2.6	56.0	29.2	12.2	5.3	29.3	48.5	16.9	21.3	22.4	29.5	19.8	6.9
Country of birth														
Non-Australian born	9493	3.3	57.0	28.1	11.7	5.1	26.7	49.1	19.1	17.3	20.7	31.5	22.7	7.8
Australian born	35 367	2.9	56.7	30.8	9.7	5.0	27.3	48.7	19.0	18.2	21.9	30.4	21.3	8.2
English-speaking background														
No	2701	2.9	50.1	29.2	17.9	7.7	26.6	45.0	20.7					
Yes	42 370	3.0	57.1	30.2	9.7	4.9	27.3	48.9	19.0	22.0	20.7	31.1	18.9	7.3
Carer														
Carer	4788	3.1	53.8	32.6	10.5	5.3	27.4	48.6	18.7	16.9	21.5	31.0	21.5	9.3
Not a carer	39 699	3.0	57.1	29.9	10.1	5.0	27.1	48.8	19.1	18.1	21.6	30.6	21.6	8.0

(*Continued on next page*)

Table 4. (*Continued*)

Socio-demographic characteristics	Total number (N)	Telehealth compared to usual care (%)				Recommend to others (%)				Useful to have telehealth post-COVID-19 (%)				
		Better	Just as good	Worse	Not sure	Definitely not	Will not	Probably	Definitely	Not at all	Slightly	Moderately	Very	Extremely
Socioeconomic status														
1 – Most disadvantaged	7191	2.6	54.8	30.5	12.2	6.5	29.0	48.3	16.2	23.5	23.3	28.2	18.3	6.8
2	8697	3.2	57.0	29.2	10.6	6.0	27.5	48.2	18.3	19.8	21.3	31.4	19.9	7.6
3	8284	3.0	55.6	30.6	10.8	5.5	28.5	47.9	18.1	18.1	22.4	29.6	22.8	7.1
4	8281	2.8	57.3	30.8	9.0	4.1	26.7	49.4	19.8	16.3	21.0	32.0	22.0	8.8
5 – Least disadvantaged	10 448	3.4	57.6	30.1	9.0	3.5	25.1	49.8	21.6	14.0	21.0	31.3	24.1	9.7
Area of residence														
Major city	22 393	3.0	56.5	30.2	10.3	4.4	26.8	49.3	19.6	17.1	21.8	31.2	21.4	8.5
Inner regional	16 178	3.1	56.3	30.6	10.0	5.8	28.4	47.4	18.5	19.5	21.8	30.0	21.2	7.6
Outer regional/rural/ remote	4738	3.1	57.1	29.7	10.2	5.5	26.0	51.0	17.6	18.9	20.9	29.7	23.0	7.5
Treatment in the past month for chronic conditions or long-term illness/disability														
Cancer treatment	1775	1.9	55.6	32.2	10.3	6.0	28.0	50.0	16.0	20.9	20.9	30.0	21.3	6.8
No cancer treatment	43 296	3.1	56.8	30.1	10.1	5.0	27.2	48.6	19.2	17.9	21.6	30.7	21.6	8.2
Heart treatment	2256	2.1	51.0	34.9	11.9	6.8	31.5	45.3	16.4	21.6	23.2	30.4	17.6	7.1
No heart treatment	42 815	3.1	57.1	29.9	10.0	4.9	26.9	49.0	19.2	17.8	21.5	30.6	21.9	8.2
Mental health treatment	3737	3.7	54.3	31.5	10.4	5.2	25.2	49.5	20.2	17.1	20.6	29.5	22.5	10.2
No mental health treatment	41 334	2.9	57.0	30.0	10.1	5.0	27.5	48.6	18.9	18.2	21.7	30.8	21.5	7.9
Psychological distress (K10)														
Very high	510	4.1	45.3	39.9	10.8	10.5	28.1	41.1	20.4	24.1	16.2	27.7	20.1	11.9
High	1816	3.3	43.7	41.5	11.5	7.0	34.0	42.3	16.8	20.5	22.3	31.2	18.3	7.7
Moderate	6037	3.2	51.5	34.4	11.0	5.4	28.4	48.8	17.4	16.4	23.0	30.6	21.0	9.0
Low	34 060	2.9	59.2	28.4	9.5	4.5	26.3	49.3	19.8	17.7	21.4	30.8	22.1	8.1
Asthma treatment (past month)	2401	2.2	53.9	34.4	9.5	2.2	53.9	34.4	9.5	19.6	19.4	31.1	20.6	9.3
No asthma treatment (past month)	42 670	3.1	56.9	29.9	10.2	3.1	56.9	29.9	10.2	18.0	21.8	30.6	21.7	8.0
Disability or illness requiring help	3291	2.4	50.4	34.0	13.3	8.4	30.5	44.3	16.7	25.3	20.6	27.4	20.3	6.5
No disability or illness requiring help	41 360	3.1	57.4	29.8	9.8	4.6	26.9	49.2	19.3	17.2	21.7	31.0	21.8	8.3

Supplementary material

Supplementary material is available online.

References

1 Czeisler MÉ, Marynak K, Clarke KE, *et al.* Delay or avoidance of medical care because of COVID-19–related concerns — United States, June 2020. *Morb Mortal Wkly Rep* 2020; 69(36): 1250–7. doi:10.15585/mmwr.mm6936a4

2 Lange SJ, Ritchey MD, Goodman AB, *et al.* Potential indirect effects of the COVID-19 pandemic on use of emergency departments for acute life-threatening conditions — United States, January–May 2020. *Am J Transplant* 2020; 20(9): 2612–7. doi:10.1111/ajt.16239

3 Williams R, Jenkins DA, Ashcroft DM, *et al.* Diagnosis of physical and mental health conditions in primary care during the COVID-19 pandemic: a retrospective cohort study. *Lancet Public Health* 2020; 5(10): e543–50. doi:10.1016/S2468-2667(20)30201-2

4 Sutherland K, Chessman J, Zhao J, *et al.* Impact of COVID-19 on healthcare activity in NSW, Australia. *Public Health Res Pract* 2020; 30(4): e3042030. doi:10.17061/phrp3042030

5 Niccoli T, Partridge L. Ageing as a risk factor for disease. *Curr Biol* 2012; 22(17): R741–52. doi:10.1016/j.cub.2012.07.024

6 Sam P. Redefining vulnerability in the era of COVID-19. *Lancet* 2020; 395(10230): 1089. doi:10.1016/S0140-6736(20)30757-1

7 Kuy S, Tsai R, Bhatt J, *et al.* Focusing on vulnerable populations during COVID-19. *Acad Med* 2020; 95(11): e2–3. doi:10.1097/ACM.0000000000003571

8 Simon J, Helter TM, White RG, *et al.* Impacts of the Covid-19 lockdown and relevant vulnerabilities on capability well-being, mental health and social support: an Austrian survey study. *BMC Public Health* 2021; 21(1): 314. doi:10.1186/s12889-021-10351-5

9 Jones B, Woolfenden S, Pengilly S, *et al.* COVID-19 pandemic: The impact on vulnerable children and young people in Australia. *J Paediatr Child Health* 2020; 56(12): 1851–5. doi:10.1111/jpc.15169

10 Pedrosa AL, Bitencourt L, Fróes AC, *et al.* Emotional, behavioral, and psychological impact of the COVID-19 pandemic. *Front Psychol* 2020; 11: 566212. doi:10.3389/fpsyg.2020.566212

11 Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health* 2020; 20(1): 1193. doi:10.1186/s12889-020-09301-4

12 Fisher K, Davey AR, Magin P. Telehealth for Australian general practice: The present and the future. *Aust J Gen Pract* 2022; 51: 626–9. doi:10.31128/AJGP-11-21-6229

13 Australian Government Department of Health. COVID-19 Temporary MBS Telehealth Services. 2020. Available at http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Factsheet-TempBB [Accessed 10 February 2021].

14 The 45 and Up Study Collaborators. Cohort profile: the 45 and up study. *Int J Epidemiol* 2008; 37(5): 941–7. doi:10.1093/ije/dym184

15 Sax Institute. 45 and Up Study: Wave 3 data dictionary (Second follow-up). Sax Institute; 2021.

16 Australian Bureau of Statistics. An Introduction to Socio-Economic Indexes for Areas (SEIFA) 2006. ABS Catalogue No. 2039.0. Canberra: Australian Bureau of Statistics; 2008.

17 Hugo Centre for Migration and Population Research. Accessibility/Remoteness Index of Australia (ARIA). University of Adelaide; 2012.

18 Kessler RC, Barker PR, Colpe LJ, *et al.* Screening for serious mental illness in the general population. *Arch Gen Psychiatry* 2003; 60(2): 184–9. doi:10.1001/archpsyc.60.2.184

19 Gonzalez D, Karpman M, Kenney GM, *et al.* Delayed and forgone health care for nonelderly adults during the COVID-19 Pandemic. Washington, DC: Urban Institute; 2021.

20 Javanparast S, Roeger L, Reed RL. Experiences of patients with chronic diseases of access to multidisciplinary care during COVID-19 in South Australia. *Aust Health Rev* 2021; 45: 525–32. doi:10.1071/AH20328

21 AIHW. The first year of COVID-19 in Australia: direct and indirect health effects. Cat. no. PHE 287. Canberra: AIHW; 2021.

22 Blecker S, Jones SA, Petrilli CM, *et al.* Hospitalizations for chronic disease and acute conditions in the time of COVID-19. *JAMA Intern Med* 2021; 181(2): 269–71. doi:10.1001/jamainternmed.2020.3978

23 Xiong J, Lipsitz O, Nasri F, *et al.* Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J Affect Disord* 2020; 277: 55–64. doi:10.1016/j.jad.2020.08.001

24 Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *N Engl J Med* 2020; 383(6): 510–2. doi:10.1056/NEJMp2008017

25 Podubinski T, Townsin L, Thompson SC, *et al.* Experience of healthcare access in Australia during the first year of the COVID-19 pandemic. *Int J Environ Res Public Health* 2021; 18(20): 10687. doi:10.3390/ijerph182010687

26 Isautier JM, Copp T, Ayre J, *et al.* People's experiences and satisfaction with telehealth during the COVID-19 pandemic in Australia: cross-sectional survey study. *J Med Internet Res* 2020; 22(12): e24531. doi:10.2196/24531

27 Australian Government Department of Health. Australians embrace telehealth to save lives during COVID-19. 20 April 2020. Available at https://www.health.gov.au/ministers/the-hon-greg-hunt-mp/media/australians-embrace-telehealth-to-save-lives-during-covid-19 [Accessed 19 September 2022].

28 Reay R, Kisely SR, Looi JCL. Better Access: substantial shift to telehealth for allied mental health services during COVID-19 in Australia. *Aust Health Rev* 2021; 45(6): 675–82. doi:10.1071/AH21162

29 Kruse CS, Krowski N, Rodriguez B, *et al.* Telehealth and patient satisfaction: a systematic review and narrative analysis. *BMJ Open* 2017; 7(8): e01624. doi:10.1136/bmjopen-2017-016242

Data availability. The data that support this study were obtained from the SAX Institute by permission/licence. Data will be shared upon reasonable request to the corresponding author with permission from the SAX Institute.

Conflicts of interest. The authors have no conflicts of interest to declare.

Declaration of funding. N. Nassar is supported by an Australian National Health and Medical Research Council (NHMRC) Leadership Investigator Grant (APP1197940).

Acknowledgements. This research was conducted using data collected through the 45 and Up Study (www.saxinstitute.org.au). The 45 and Up Study is managed by the Sax Institute in collaboration with a major partner, Cancer Council NSW; and partners: the Heart Foundation; NSW Ministry of Health; NSW Department of Communities and Justice; and Australian Red Cross Lifeblood. The Secure Unified Research Environment (SURE) provided a secure computing environment to access and analyse the 45 and Up Study data. We thank the many thousands of people participating in the study.

Author affiliations

[A]Child Population and Translational Health Research, Children's Hospital at Westmead Clinical School, Faculty of Medicine and Health, 2nd Floor, Charles Perkins Centre, University of Sydney, NSW 2006, Australia.

[B]Menzies Centre for Health Policy and Economics, Sydney School of Public Health, Faculty of Medicine and Health, 2nd Floor, Charles Perkins Centre, University of Sydney, NSW 2006, Australia.