Emergency department mental health presentations in bushfire-, flood-, storm-, drought-, and COVID-19-affected areas: Analysis of growth models between 2017 and 2021

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Abstract

Objective: Repeated exposure to adverse events increases the possibility of negative emotional consequences and the development of post-traumatic stress disorders. Communities who have faced several extreme weather events and pandemic-related disruptions may require emergency care for mental health-related reasons to a greater extent than less affected regions.

Methods: This study investigated linear time trends of mental health-related emergency department presentations of adults residing in regions with high, medium, and lesser exposure to fires, floods, storms, droughts, COVID-19 infections and pandemic-related layoffs. Emergency department data were captured from 2017 to 2021.

Results: Disaster-affected communities presented to emergency departments at a higher rate well before 'the Black Summer bushfires', possibly due to fewer alternatives to hospital care in regional areas. Exposure to multiple disasters was associated with reduced emergency department presentations for mental health reasons. No increase in presentations was noted during the observation period.

Conclusions: Possible reasons for this pattern relate to community characteristics, including resilience, reappraisal of symptom severity, and a possible service gap for those with less acute mental health problems.

Implications for public health: Mental health service usage needs to be observed across multiple service areas and on an ongoing basis with the clear intention to explain how disasters shape support needs.

Keywords: natural disasters, disaster exposure, mental health, emergency department, hospital data

Consistent with climate change models, the frequency and intensity of environmental events such as floods, hurricanes, earthquakes, and wildfires have increased in recent years.[1] Consequently, many communities are projected to be exposed to more severe weather events with shorter periods of calm.[2] The possibility of severe weather events occurring in close succession to each other, or in tandem with an infectious disease outbreak, such as the global coronavirus (COVID-19) pandemic, further adds to the complexities of disaster preparedness and management. This makes prevention efforts and disaster response strategies an important and timely issue. Along with optimising technological advancements to better manage detection and coordination of actions during and immediately after a disaster, additional efforts need to assess the immediate and longer-term public health consequences.[3] Among the public health concerns, mental health service usage provides important information on the overall condition of communities in addition to physical harm that may be inflicted during an environmental disaster or disease outbreak.

Adverse psychological consequences of environmental disasters have been well documented in pre-pandemic conditions. A systematic review and meta-analysis of 27 studies found that psychological distress and psychiatric disorders such as major depression and post-traumatic stress disorder (PTSD) significantly increased following disaster exposure.[4] The impact of environmental disasters on mental health can be both immediate and persistent. During the occurrence

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of an environmental disaster, proximity to the area is an important risk factor for mental illness.[5] Prolonged experiences of stress following a disaster due to ongoing disruptions to social support networks are important post-disaster risk factors for mental illness.[6] Recent meta-analytical findings indicate that about 28 % of individuals impacted by a disaster develop depressive symptoms, 24 % develop post-traumatic stress symptoms, and 23 % develop generalised anxiety symptoms after six months.[7]

Australia is a country that undergoes relatively frequent environmental disasters and hazards that have been shown to negatively impact community mental health.[8] For example, communities affected by the Victorian Black Saturday bushfires in 2009 experienced high rates of post-traumatic stress, particularly if individuals incurred greater property loss, were more threatened by the fires, and experienced additional stressful events after the disasters.[9] These effects persisted for up to 10 years after the event.[9] The 2019/20 bushfire season, termed *Black Summer*, marked a critical point in the intensification of climate events.[10,11] Large-scale fires predominantly in eastern and south-eastern regions caused unprecedented damage to wildlife and residential areas and were closely followed by further damaging floods and the coronavirus pandemic.[12,13]

The Black Summer bushfires did not impact Australian communities equally. Analysis of the relationship between fire hazard exposure and community socio-economic status suggested that fires were more damaging in areas with relatively fewer resources to mitigate fire risks.[14] Consequently, increased fire exposure led to excess hospitalisations in those communities, for example, for smoke-related cardio-respiratory conditions.[15] A similar assessment of the psychological consequences of the Black Summer bushfire season is yet to be established.

The COVID-19 pandemic changed emergency department presentation patterns globally. Reviews of international hospitalisation trends indicate that visits to emergency departments for mental health conditions during the COVID-19 pandemic declined compared to pre-pandemic levels.[16,17] Although suicide rates remained stable, emergency department presentations for suicidal ideation and self-harm increased in adolescents and adults during the pandemic.[16] In New South Wales (NSW), Australia, emergency department presentations due to self-harm and suicidal ideation increased during pandemic times, particularly amongst adolescents and more affluent communities.[18] The occurrence of the global pandemic so soon after the bushfire and flood emergencies experienced by parts of Australia in 2019 and 2020 provides a unique opportunity to examine the impact on cumulative disasters of community mental health. To date, the combined effects of both environmental disasters and the COVID-19 pandemic on community mental health have not been examined.

This article presents an ecological analysis of aggregate regional mental health-related emergency department presentations from 2017 through to the end of 2021, stratified by 2019/20 bushfire, floods, storms, droughts, and COVID-19 impacted areas. The primary outcome measure was presentations for self-harm and suicidal ideation and other mental health conditions to emergency departments in NSW. The principal aim of this analysis was to determine whether cumulative exposure to bushfires, other weather events, and COVID-19 predicted aggregate regional patterns of mental health presentations across services.

Methods

Emergency department presentations

Aggregate data on presentations for suicidal ideation, self-harm or mental health conditions to NSW Emergency Departments were obtained from routine NSW Health reporting. Aggregate data also included age and sex information of presenting persons. Presentations were identified by a combination of International Classification of Diseases [19] problem codes and keyword searching of free text, using a method described and validated on NSW data.[20] ED problem codes recorded in SNOMED terminology [21] were first converted to ICD-10 using mapping tables provided by the Australian Digital Health Agency and augmented by NSW Health with additional codes for self-harm. In-scope presentations met one or more of the following criteria:[1] ICD-10 codes for non-organic mental health conditions (F20-F99) or drug-induced psychosis, [2] ICD-10 codes for self-harm, (X60–X84, Y87.0, R45.81), [3] ICD codes for poisoning by specific substances typically used in deliberate self-harm (paracetamol, sedatives, antidepressants), or [4] regular expressions such as 'self-harm', 'suicidal' or 'overdose'. Emergency department presentations per calendar week were recorded from 1st January 2017 until 24th December 2021 and stratified by the Statistical Area Level 3 (SA3) region of the person's address of residence. Correspondence tables provided by the Australian Bureau of Statistics were used to convert regions into SA4 areas.[22] SA regions refer to the geographical unit employed, whereby the smallest spatial unit is termed Level 1 (SA1) and increasing numbers (i.e., SA2, SA3, & SA4) represent larger aggregated areas. Examples of SA4 areas that have been affected by the Black Summer bushfires are Capital Region, Southern Highlands and Shoalhaven and Mid North Coast. Data custodian permission was obtained to access aggregate administrative and de-identified data.

Cumulative disaster exposure index

The degree of regional exposure to disasters in 2020 was adapted from a cumulative disaster exposure index using a composite of bushfire burns, droughts, floods or storms, COVID-19 infections, and pandemic-related job losses generated by Guardian Australia.[23] This index uses local government area (LGA) boundaries to signify exposure to multiple disasters per region. The percentage of burnt area per LGA was determined using data derived from a national dataset of burnt areas during the Black Summer bushfire season.[23] Droughts were deduced from eligibility for the Drought Communities Programme for drought-affected regions and storm- and flood-affected areas were determined based on Insurance Council of Australia information.[23] COVID-19 infections were derived from health departments' official COVID-19 case counts. Pandemic-related job losses were deduced from layoffs since March 2020 reported by the Australian Bureau of Statistics.

Disaster exposure scores were standardised to create an index per disaster type ranging from 0, signifying the lowest disaster exposure, to 1, signifying the highest disaster exposure.[23] These disaster type indices were then added when regions were affected by multiple disasters to create a cumulative disaster index.[23] For the purpose of this analysis, we utilised disaster index (DI) scores from cumulative disaster exposure reported for LGAs in NSW only. To increase interpretability across SA4s, we provided the average DI score of LGAs per SA4 region using correspondence tables.[22] Guardian Australia provided the authors with permission to use the NSW data adopted from the index.

Analysis strategy

To ease interpretation and analysis, we compared the different data sources on a SA4 level and aggregated regional data to SA4 regions where necessary. Thus, we referred to the largest sub-state regions in NSW. Based on the DI for cumulative disaster exposure in 2020, we used a Ward's linkage cluster analytical approach to group SA4 regions with similar cumulative disaster exposure. This resulted in three regional groupings with low, medium, and high exposure to multiple disasters (see Table 1). As presented in Table 2, the full observation period was coded into the following time periods for modelling purposes: pre-Black Summer bushfires, three bushfire and three COVID phases, followed by a final restrictions and post-intervention phase. Three stages of approximately equal length were defined within the bushfire and COVID emergency periods: early, middle and late. This parameterisation allowed detection of any nonlinear patterns of change in presentations to be detected without imposing any form of such change on the outcome. Within the model, this approach creates step changes in predicted presentation rates. It is not suggested that either emergency onset or transition from one phase to another would result in an instantaneous change in presentations. Rather, the incident rate ratios (IRRs) for each phase should be thought of as representing an average change within that phase. The post-COVID period was included to evaluate the longer-term impacts of the disasters.

Table 1: Cumulative disaster exposure index per statistical areas level 4 (SA4) in new south wales (NSW) grouped into low, medium, and high exposure areas using cluster analysis.

SA4 regions in NSW	SA4 Code	Metropolitan	Disaster index	Cluster
Central coast	102	No	0.786	Low
Sydney - the city and inner south	117	Yes	0.788	Low
Sydney - outer south wst	123	Yes	0.920	Low
Illawarra	107	No	1.016	Low
Newcastle and Lake Macquarie	111	No	1.043	Low
Sydney - north Sydney and Hornsby	121	Yes	1.050	Low
Sydney - inner west	120	Yes	1.056	Low
Sydney - Ryde	126	Yes	1.057	Low
Sydney - south west	127	Yes	1.069	Low
Sydney - Blacktown	116	Yes	1.074	Low
Sydney - Inner south west	119	Yes	1.086	Low
Sydney - eastern suburbs	118	Yes	1.095	Low
Sydney - Parramatta	125	Yes	1.097	Low
Sydney - Baulkham Hills and Hawkesbury	115	Yes	1.302	Medium
Sydney - outer west and Blue Mountains	124	Yes	1.419	Medium
Hunter Valley excluding Newcastle	106	No	1.462	Medium
Southern Highlands and Shoalhaven	114	No	1.524	Medium
Murray	109	No	1.557	Medium
Sydney - Sutherland	128	Yes	1.577	Medium
Richmond - Tweed	112	No	1.583	Medium
Mid-north coast	108	No	1.665	High
Capital region	101	No	1.739	High
Coffs Harbour - Grafton	104	No	1.755	High
Riverina	113	No	1.771	High
New England and North West	110	No	1.978	High
Far West and Orana	105	No	1.979	High
Central West	103	No	2.014	High

Table 2: Pre-Black summer bushfires, black Summer bushfire, COVID-19, and post-disaster time periods in 2020.

Time period	Week numbers	Duration in weeks	Corresponding dates
Pre-bushfire phase*	1 - 131	131	01/01/2017 – 09/07/2019
Bushfire – early phase	132 - 142	10	14/07/2019 – 24/09/2019
Bushfire – mid phase	143 - 153	10	31/09/2019 – 10/12/2019
Bushfire – late phase	154 - 164	10	17/12/2019 – 26/02/2020
COVID – early phase	165 - 186	21	04/03/2020 – 29/07/2020
COVID – mid phase	187 - 208	21	05/08/2020 – 01/01/2021
COVID – late phase	209 - 230	21	08/01/2021 – 04/06/2021
COVID – final restrictions	231 - 245	14	11/06/2021 – 17/09/2021
Post	246 - 260	13	24/09/2021 – 24/12/2021

Using Stata software version 18, a negative binomial model with random intercepts for SA4 regions was used to fit a model containing linear and annual seasonal (sine and cosine) time trends, effects for sex and age group, DI groups and the interaction of DI group and time period classification comprising bushfire, COVID-19, and post-disaster periods. The interaction was fitted in this form to yield estimates of the effect of period for each DI group. This analysis yielded incident rate ratios reflecting differences in emergency department presentation trends for self-harm, suicidal ideation, and mental health conditions across the bushfire, COVID-19, and post-disaster time frames within and between regions according to their DI grouping. Emergency department presentations during the pre-Black Summer bushfire period and emergency department presentations in regions with a low cumulative disaster exposure index were chosen as reference groupings. How the modelled trends compare to observed emergency department presentation rates is depicted in the supplementary material (Supplementary Fig. 1).

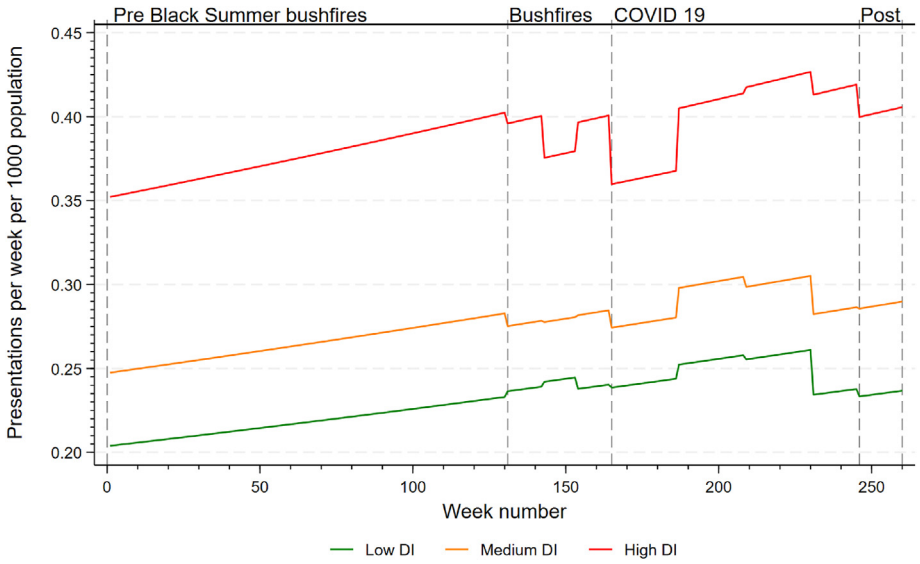
Results

Figure 1 presents modelled mental health-related emergency department presentation rates for each of the three DI classifications in NSW, including pre-disaster time periods, Black Summer bushfires, the COVID-19 pandemic outbreak, and a 3-month immediate post-disaster phase. Presentation rates differed substantially between disaster exposure groups over the entire period of observation including the pre-disaster periods. During disaster periods, there were downward trends (i.e., several dips) across all regions in NSW, and there seemed to be no notable increase (i.e., surge) in mental health-related emergency department presentations in the recorded post-disaster phase.

Table 3 presents the main effects of time, sex[1], age group, and DI groups for cumulative disaster exposure and the bushfire, COVID-19, and post-disaster time periods by DI interactions. Emergency department presentations for mental health-related reasons were amplified for women ($IRR = 1.17$, 95 % CI [1.17, 1.18], $p < 0.001$) and particularly for young adults aged 18-24 years ($IRR = 2.88$, 95 % CI [2.85, 2.91], $p < 0.001$). Only adults aged 65 years and up presented at

[1]Incident rate ratios of men and women presenting to emergency departments during the bushfire, COVID-19 and post-disaster phases are presented in the supplementary material (Suppl. Tables 1 & 2).

Figure 1: Linear trends after removal of seasonal components for weekly emergency department presentations relating to suicidal ideation, self-harm, and other psychological reasons per 1,000 persons per week in the population from January 2017 (Week 1) until December 2021 (Week 260), classified into low, medium, and highly cumulative disaster exposed areas (DI) in New South Wales. The pre Black Summer bushfires period was weeks 1 – 131 (01/01/2017 – 09/07/2019), the Bushfires period spanned weeks 132 to 164 (14/07/2019 – 26/02/2020), the COVID-19 period including the final restrictions phase spanned weeks 165 to 245 (04/03/2020 – 17/09/2021), and the post period was weeks 246 to 260 (24/09/2021 – 24/12/2021).



an attenuated rate to emergency departments for mental health reasons during disaster periods (*IRR* = 0.61, 95 % CI [0.60, 0.62], $p < 0.001$). Compared to the low DI reference group, mental health-related emergency department presentations in regions with high cumulative disaster exposure were almost double (*IRR* = 1.91, 95 % CI [1.49, 2.46], $p < 0.001$).

Differing significant effects of disaster time periods for each of the DI grouped regions indicated that communities with high cumulative disaster exposure more consistently under-presented to emergency departments for mental health-related reasons compared to pre-disaster emergency department presentation rates throughout the bushfires, COVID-19, and post-disaster periods (*IRR*s ranged from 0.86 during the early COVID-19 phase to 0.96 during the late Black Summer bushfire phase). For highly disaster exposed regions, the only time period comparable to pre-disaster emergency department presentation rates was the early Black Summer bushfires phase between July and September 2019 (*IRR* = 0.98, 95 % CI [0.95, 1.02], $p = 0.347$), before the disaster exposure accumulation captured in this analysis began.

Rates of mental health-related emergency department presentations were reduced in the final COVID-19 restrictions and post-disaster periods across all DI-grouped regions. This effect was most pronounced for communities least affected by cumulative disasters (*IRR* = 0.91, 95 % CI [0.88, 0.94], $p < 0.001$ for the final restrictions phase in areas with low DI & *IRR* = 0.89, 95 % CI [0.86, 0.92], $p < 0.001$ for the post-restrictions phase in areas with low DI).

Discussion

Adverse mental health effects of repeated exposure to potentially traumatic events are well documented.[4,9,24–26] In this study, we examined regional patterns of emergency department presentations before, during, and after the onset of a series of disasters and a pandemic impacting communities in NSW, Australia, most notably the Black Summer bushfires and the COVID-19 pandemic outbreak. Data collected from NSW emergency departments between 2017 and 2021 suggested that the presentation rates due to suicidal ideation, self-harm and other psychological reasons were reduced during the 2019/20 Black Summer bushfire season, subsequent flood, storm, and drought periods, and the early stages of the pandemic compared to the pre-Black Summer bushfires time period. Of those presenting to emergency departments for mental health concerns, women and young adults sought care at higher rates compared to those prior to the Black Summer bushfires, a finding that has been previously reported and discussed by Sara and colleagues.[18] Older adults aged 65 years and over were the only demographic who presented to emergency departments at a reduced rate when compared to the pre-Black Summer bushfires reference period. This is similar to findings reported by Macleod and colleagues, which suggested that age was a negative predictor for psychological distress and a positive predictor for positive psychological outcomes 12 to 18 months after the Black Summer bushfires.[27]

Inspection of regional patterns revealed that areas exposed to multiple disasters had a higher rate of mental health related emergency presentations than less affected regions over the entire examination period, including before the Black Summer bushfire season commenced. The more frequent access of emergency departments for psychological reasons in regional NSW compared to urban areas has also been reported by the Mental Health Commission of New South Wales .[28] Given that areas exposed to disasters tend to be regional or remote and the least affected areas are more commonly urban, higher rates of emergency presentations may also reflect a smaller number of alternative care options, such as regional community mental health services, private mental health providers or less rapidly available General Practitioners compared to urban areas .[28]

Table 3: Incidence Rate Ratios (*IRR*) for emergency department presentations for suicidal ideation, self-harm, and other psychological reasons accounting for sex, age group, regions with low, medium, and high cumulative disaster exposure index (DI), and DI interactions with disaster periods.

Emergency Department Presentations	*IRR*	*SE*	*z*	*p*	95 % CI	
Week						
Linear time trend	1.00	0.00	15.24	<0.001	1.00	1.00
Seasonal trend - sine	0.99	0.00	-3.25	0.001	0.98	1.00
Seasonal trend - cosine	1.05	0.00	16.66	<0.001	1.05	1.06
Sex						
Male*	1.00	—	—	—	—	—
Female	1.17	0.00	44.51	<0.001	1.17	1.18
Age (years)						
≤17*	1.00	—	—	—	—	—
18–24	2.88	0.02	182.85	<0.001	2.85	2.91
25–34	1.92	0.01	113.12	<0.001	1.89	1.94
35–64	1.33	0.01	52.98	<0.001	1.31	1.34
65+	0.61	0.00	-70.14	<0.001	0.60	0.62
DI						
Low*	1.00	—	—	—	—	—
Medium	1.29	0.16	2.01	0.045	1.01	1.66
High	1.91	0.24	5.11	<0.001	1.49	2.46
DI × disaster period						
Low DI						
Pre*	1.00	—	—	—	—	—
Bushfire – early phase	1.01	0.01	1.02	0.309	0.99	1.04
Bushfire – mid phase	1.03	0.01	1.78	0.075	1.00	1.05
Bushfire – late phase	1.00	0.01	-0.29	0.773	0.97	1.02
COVID – early phase	0.99	0.01	-1.02	0.306	0.97	1.01
COVID – mid phase	1.02	0.01	1.60	0.109	1.00	1.05
COVID – late phase	1.01	0.01	0.74	0.460	0.98	1.04
COVID – final restrictions phase	0.91	0.01	-6.08	<0.001	0.88	0.94
Post	0.89	0.02	-6.97	<0.001	0.86	0.92
Medium DI						
Pre*	1.00	—	—	—	—	—
Bushfire – early phase	0.97	0.02	-1.46	0.145	0.94	1.01
Bushfire – mid phase	0.97	0.02	-1.61	0.109	0.93	1.01
Bushfire – late phase	0.97	0.02	-1.44	0.149	0.93	1.01
COVID – early phase	0.95	0.01	-4.16	<0.001	0.91	0.97
COVID – mid phase	0.99	0.02	-0.39	0.696	0.96	1.03
COVID – late phase	0.97	0.02	-1.58	0.114	0.94	1.01
COVID – final restrictions phase	0.90	0.02	-5.20	<0.001	0.86	0.94
Post	0.90	0.02	-5.28	<0.001	0.86	0.93
High DI						
Pre*	1.00	—	—	—	—	—
Bushfire – early phase	0.98	0.02	-0.94	0.347	0.95	1.02
Bushfire – mid phase	0.92	0.02	-4.29	<0.001	0.89	0.96
Bushfire – late phase	0.96	0.02	-2.07	0.039	0.93	1.00
COVID – early phase	0.86	0.01	-9.45	<0.001	0.84	0.89
COVID – mid phase	0.95	0.02	-3.27	0.001	0.92	0.98
COVID – late phase	0.96	0.02	-2.67	0.008	0.93	0.99
COVID – final restrictions phase	0.92	0.02	-3.98	<0.001	0.89	0.96
Post	0.88	0.02	-6.24	<0.001	0.85	0.92

Note. * Reference category.

During bushfire and COVID-19 time periods, we noted repeated decreases in mental health-related emergency department presentation rates compared to pre-Black Summer bushfires rates. These decreases were particularly pronounced in regions affected by multiple disasters. In the immediate aftermath of major disasters, communities focus on the acute needs of injured persons, loss of dwellings, and other aspects of the immediate disaster fallout .[29,30] Commonly, mental health needs are not rapidly attended to and, due to the aetiology of PTSD, a worsening of symptoms in the clinical ranges may not occur until several months after the traumatic event .[31] Additionally, restricted access to hospitals during lockdowns and a reluctance to seek public facilities in light of the COVID-19 outbreak contributed to decreases in hospital presentations for all kinds of medical emergencies .[32] As such, an initial slowing down of mental health-related emergency department presentation rates after the Black Summer bushfires and subsequent disasters may have been extended by the COVID-19 pandemic.

More surprisingly perhaps, mental health related emergency department presentations for adults living in highly disaster affected communities did not exceed pre-disaster trends throughout the latter half of 2021, which we marked as the "immediate post-disaster" period, when most pandemic-related restrictions had been lifted across the state. For serious mental health concerns among youth [33] and alcohol use-related physical complaints among adults ,[34] the rates of emergency department visits had increased during the pandemic until the end of 2021. Australian hospitalisation data shows that mental health related emergencies increased per 10,000 population in 2020 and 2021 as compared to 2016 and 2017 .[35] Several scholars pointed out that early speculations around surges in mental disorders, substance use disorders, and suicide deaths were, in fact, not observed during the pandemic and after .[36,37]

The lack of an observable *surge* in mental health-related emergency department presentation numbers of adults throughout 2021 who had been affected by multiple disasters since 2019 was unexpected and gives rise to several possible explanations. The data period captured may not sufficiently span into the post-disaster period to note a delayed escalation in emergency department rates. Thus, an excess in emergency department presentation rates for mental health concerns may have occurred after 2021. Additionally, it is possible that the disaster index we employed combined COVID-19-related impacts (i.e., infections and job losses) with land burns, floods, storms, and drought impact, which may have led us to group regions in a way that obscured the identification of more meaningful trajectories of mental health impacts.

A second possible explanation for the observed decreases in emergency department presentation rates is that primary care, community mental health services and telehealth services absorbed any increased mental health care needs of communities and relieved the necessity to present at emergency departments. For example, the Department of Health established a Bushfire Recovery Access Program including free counselling support to relieve an increased need for mental health care in bushfire affected communities .[38] Telehealth services were further expanded during the COVID-19 pandemic from March 2020 for the entire state .[39] Indeed, a greater number of NSW residents accessed public and non-government community services for their mental health. For example, between July 2021 and June 2022, 142,642 persons accessed public mental health services [40] and the greatest number of telehealth services delivered occurred in the third quarter of 2021 with 515,512 telehealth sessions provided .[39] In comparison, 85,281 persons accessed hospitals across NSW in the fiscal year 2021-22 .[41]

A third possibility is that there is an unmet mental health care need in disaster-impacted communities. Mental health service usage data captures only healthcare access occurrences. It is therefore possible that communities exposed to a series of adverse events have not received appropriate mental health care. A meta-analysis indicated that the prevalence of probable PTSD in Australian communities highly affected by bushfires is 17.5 % between two and four years following the index event, which is greatly heightened compared to a PTSD prevalence of 1.9 % in 2017 and 2018 .[42] After the Victorian Black Saturday bushfires, one third of affected community members with ongoing severe mental illness did not receive treatment in the preceding month .[43] The Royal Commission into Victoria's Mental Health System [44] and Australian health professionals describing national mental health service needs [45] noted that there is a particular service gap for individuals presenting with mental health issues too complex to be resolved with a general practitioner but who do not require hospitalisation, termed the "missing middle". It is possible that the fallout from multiple environmental disasters and adverse effects related to the COVID-19 pandemic increased the number of individuals whose mental health was significantly and negatively impacted, but not to an extent that would lead them to seek emergency care. At present, mental health care systems in NSW are strained with waiting times to access psychological services exceeding 12 weeks .[46,47] Despite this, the state of NSW has been spending less on mental health care per capita than the national average for over a decade .[47] It is therefore possible that the "missing middle" is growing and is experiencing delayed access to specialised mental health services, especially after the temporary expansion of services in response to the Black Summer bushfires and COVID-19 pandemic has ceased.

A fourth explanation is that people with mental health disorders prior to the Black Summer bushfires and COVID-19 pandemic perceived the stress of these events less saliently than those without prior problems, which may contribute to them not attending emergency departments at a greater rate during the disasters. Evidence indicates that there was a lower increase in mental health problems during COVID-19 in people with prior mental disorders than in those with no psychiatric history.[48] According to social comparison theory ,[49] people with pre-existing mental disorders may make comparisons with others during a disaster that lead them to have a more positive view of their own mental health because others are also experiencing mental health problems.

Lastly, it is possible that the lack of surging rates reflects the resilience of communities. Potentially traumatic events can yield trajectories of resilience as well as distress .[50] A wellbeing survey of regional and remote areas of NSW demonstrated how resilience and distress co-existed in disaster-affected communities .[28] Respondents from the South Eastern primary health network who were impacted by multiple disasters between 2019 and 2021 indicated higher levels of psychological distress *and* believed to a greater extent that their community was recovering well from disasters than respondents from other regional and remote locations in NSW .[28] These results were mirrored in the Australian national bushfire health and wellbeing survey, in which more disaster affected individuals reported more psychological distress as well as more psychological growth compared to less affected individuals .[51] Communities have reported a remarkable sense of social cohesion after major incidents.[52,53] A review examining mental health trajectories following potentially traumatic events revealed that most cases, 66 %, followed resilience trajectories.

The current research has several strengths and limitations. This work makes a unique contribution in that it presents regional patterns of mental health-related emergency department presentations while considering exposure levels to adverse environmental events over a period of five years. This is particularly relevant as it relates to the influence of cumulative stressors and the possible long-term mental health effects of disaster exposure .[24,42] As previously mentioned, this research also has limitations. The observed time period does not capture a longer span of emergency department data, which would have given more comprehensive insights, particularly with regards to post-disaster trends. Furthermore, possible alternative solutions to comprise a disaster exposure index may be better suited to distilling regional mental health impacts of adverse events. Additionally, emergency department presentations constitute only one aspect of mental health service use, usually at the more acute, critical incident end. It would have been more informative, although not possible at present, to include all avenues of mental health service use to gain a broader understanding of mental health usage in NSW communities.

While many people experience adverse mental health consequences following environmental disasters, the overall usage of mental health services is complex and not all predictions with regard to mental health-related emergency department presentations have materialised, particularly as it relates to a predicted surge in emergency department presentations among adult populations exposed to environmental disasters and living through the COVID-19 pandemic. At a time when disasters are projected to become more common and more intense, community wellbeing needs to be observed closely. At best, we may be positively surprised by the resilience and strength of communities that thrive after times of crisis, and at worst, this data may point to an increasing number of distressed individuals unable or unwilling to access emergency care. As such, diligent disaster planning and risk mitigation should consider community mental health support needs in addition to financial and built environment considerations.

Conflicts of interest

The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics approval

This study uses routinely collected and aggregated administrative data provided by the NSW Ministry of Health. As indicated in the manuscript, data custodian permission was obtained to access aggregate administrative and deidentified data for this study. Permission to use publically available cumulative disaster index data was also obtained from Guardian Australia.

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Appendix A Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anzjph.2025.100251.