



# The impact of disasters on children and young people

UNICEF Australia

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**Deloitte**  
**Access Economics**

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# Glossary

Acronym	Full name
CPI	Consumer Price Index
LSAC	Longitudinal Survey of Australian Children
PTSD	Post-traumatic stress disorder

# Definitions

For the purpose of this report, the terms children, young people and disaster are defined in the following manners:

- Children: any person aged 6 to 18 years
- Young people: any person aged 19 to 25 years
- Disaster: includes all natural hazards and extreme weather events including bushfires, floods, droughts and severe storms (including hail, cyclones, hurricanes, etc.)



# Executive summary

Disasters and extreme weather events have devastating social and economic impacts on individuals, families, local communities, businesses and governments. These impacts are particularly pronounced for children and young people as they are uniquely vulnerable and physiologically different. They are at greater risk of mental ill-health; physically more at risk of death, injury, illness and abuse; and may experience disruptions to their developmental and educational progress as a result of disasters.

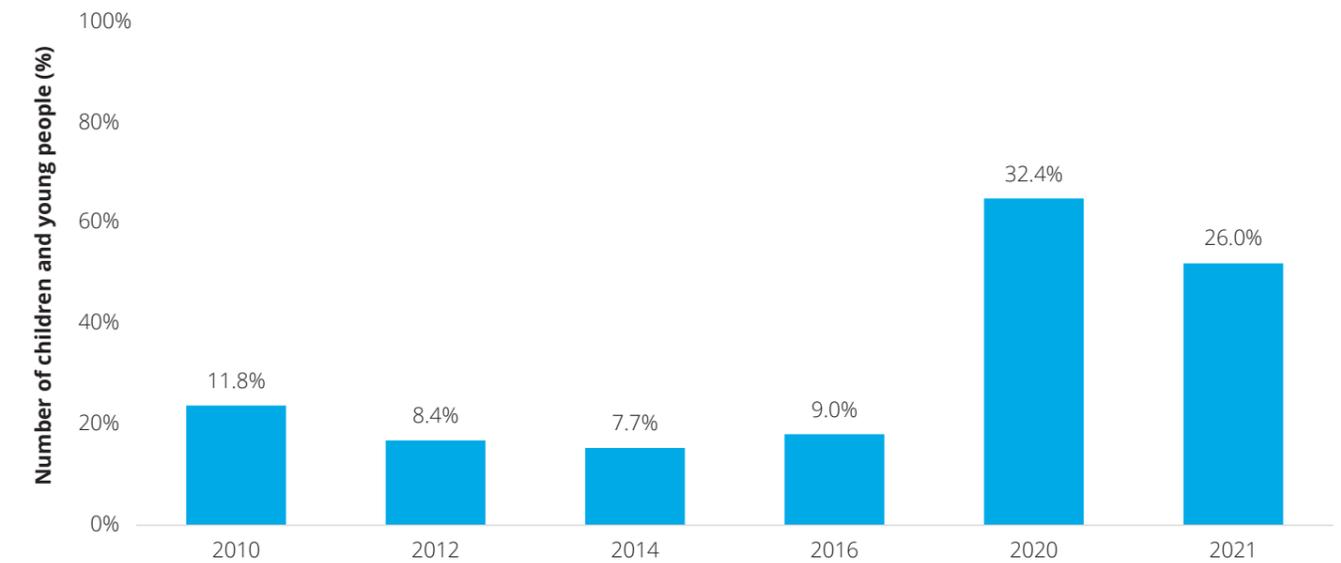
While there are studies that estimate the impact and economic costs of disasters, only a few focus specifically on children and young people despite their unique vulnerability to the negative impacts of disasters. Understanding these impacts and costs can inform decision making around disaster preparedness, response

and recovery so that they are tailored to the specific needs of children and young people.

As such, UNICEF Australia engaged Deloitte Access Economics to estimate the impact and costs of disasters on children and young people in Australia. This study uses data from the Longitudinal Study of Australian Children (LSAC) which follows children from 0 to 22 years.

Between 2010 and 2021, 7.7% to 32.4% of children and young people in the LSAC data reported experiencing a disaster in the last 12 months (Chart i).

Chart i: Percentage of children and young people reporting having experienced a disaster in the last 12 months in LSAC data



Source: LSAC data.

Based on this, an estimated 1.4 million children and young people experience a disaster or extreme weather event in an average year. This is comprised of 1.05 million children and 393,000 young people.

LSAC data also shows that children who lived in remote areas, from a lower socioeconomic background, and Indigenous children were more likely to be exposed to disasters and extreme weather events.

Evidence from the last two waves of LSAC data provided a greater level of detail into the types of disasters children and young people experienced. In 2020, 17.6% of children and young people were affected by bushfires – reflecting the impacts of the Black Summer bushfire events in 2019-20. Across both 2020 and 2021, approximately 16% of children and young people were exposed to significant storm or hail events. Droughts and floods were also experienced by a significant share of children and young people in both years.

The data shows that due to exposure to disasters and extreme weather events, children and young people are on average:

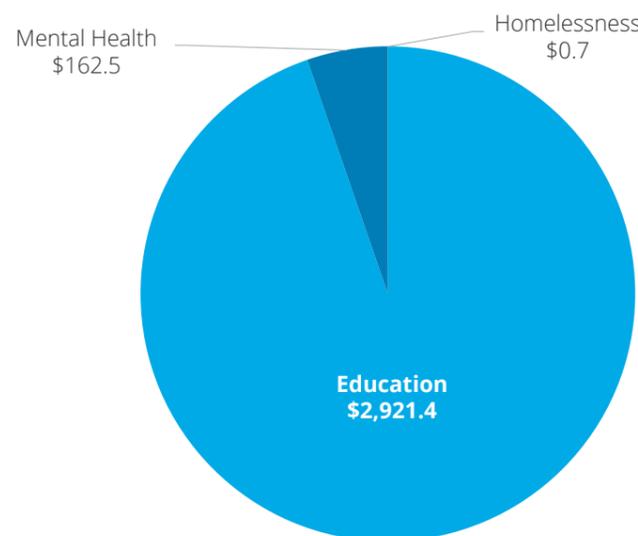
- 1.3% to 4.5% more likely to experience psychological distress,
- 4.2% less likely to finish year 12, and
- 0.01% more likely to experience homelessness.

These outcomes were valued in monetary terms based on the following:

- Increased mental health support for those experiencing psychological distress,
- Lower lifetime income for those who did not finish year 12 due to disruptions to their schooling, and
- Higher homelessness support service costs for those who experienced homelessness.

From this, the economic impact of disasters on children and young people’s mental health, educational attainment and homelessness status is estimated to be \$3.1 billion in an average year (Chart ii).

Chart ii: Cost of disaster on children and young people by outcome domain (\$million)

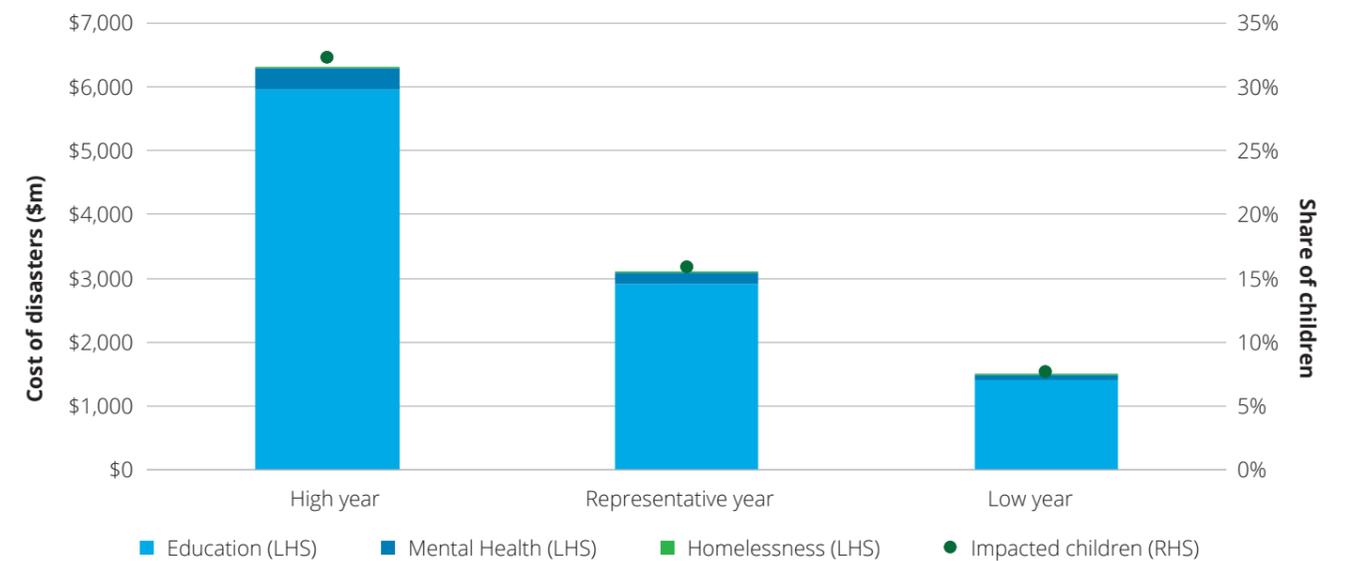


Source: Deloitte Access Economics analysis using LSAC data.

The number of children and young people who experienced disasters in the previous 12 months increased significantly in the most recent waves of data. On average, 9.2% of children and young people reported experiencing a disaster in the four waves between 2010 and 2016. This jumps to 29.2% on average in 2020 and 2021.

This means that the cost was as high as \$6.2 billion in a high disaster year (in 2020), and as low as \$1.5 billion in a low disaster year (in 2014; Chart iii).

Chart iii: Cost of disaster on children and young people in a low, average and high year based on LSAC data



Source: Deloitte Access Economics analysis using LSAC data.

This study focuses on a small subset of outcomes where data is available and that are specific to children and young people. It does not aim to provide a comprehensive estimate of the cost of disasters and extreme weather events, nor all the impacts of disasters on children and young people. As such, this is likely to be a conservative estimate.

The analysis suggests children and young people face additional and unique challenges post-disasters, and these impacts might be long-lasting and warrants further research. A greater emphasis should be placed on longer-term policies and programs that are tailored to assist children and young people after a disaster or extreme weather event. This should include sustained educational support and mental health interventions, in both the short and long term.





# Key insights

## In an average year...

### 1.4 million

Australian children and young people are impacted by disasters



**Equivalent to 1 in 6**  
children and young people



In regional or remote areas



From lower socioeconomic backgrounds



Indigenous

Disasters negatively impact all people. But children and young people are particularly vulnerable in a variety of ways that means the impacts can persist well into their adult lives:



4.2% less likely to finish year 12 later in life leading to **\$2,921m** in lost lifetime earnings



**This is a total of \$3.1 billion in average annual costs**

Ranging from \$1.5 billion in 2014 and \$6.2 billion in 2020



1.3% to 4.5% more likely to experience psychological distress leading to **\$126m** in healthcare costs

0.01% more likely to experience homelessness leading to **\$0.7m** in emergency homelessness services

But this is just the tip of the iceberg. This study focuses on a small subset of outcomes where data is available and that are specific to children and young people. As such, this is likely to be a conservative estimate.

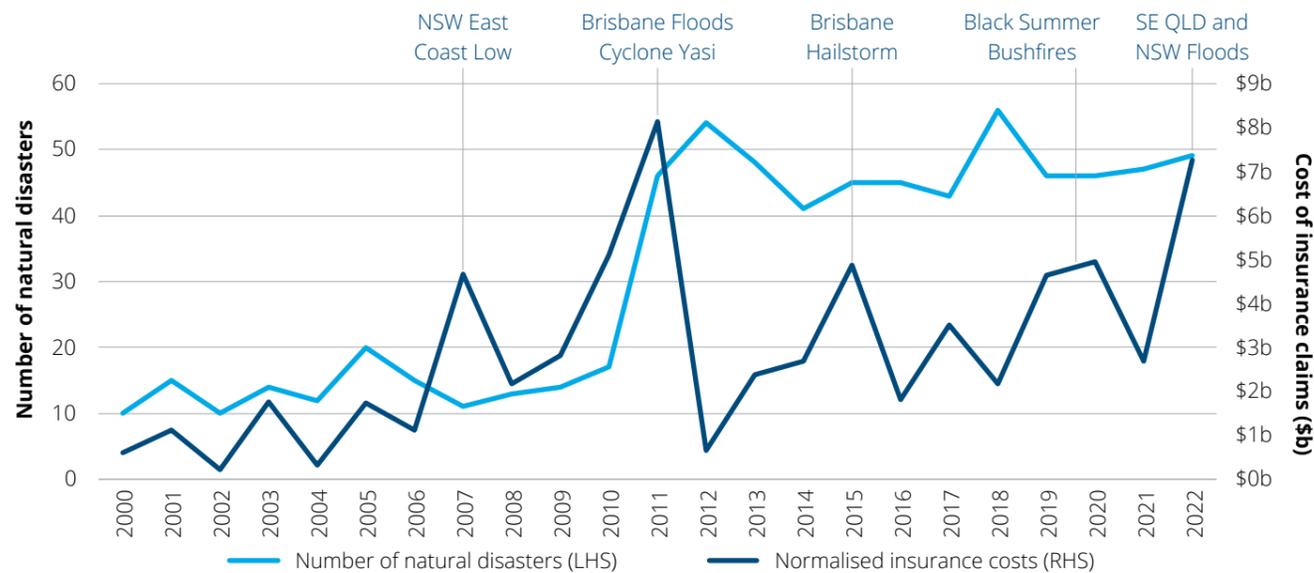
# 1 Disasters in Australia are increasing in frequency and severity



Disasters and extreme weather events are increasing in both frequency and severity throughout the world, and especially in Australia.<sup>1</sup> In the five years from 2018 to 2022, Australia has experienced 244 disasters including droughts, bushfires, floods

and cyclones – 22 more than the 222 experienced from 2013 to 2017.<sup>2</sup> However, we are also seeing an increase in the cost of extreme weather events on average over a longer period of time (Chart 1.1).

Chart 1.1 Disasters and extreme weather events and cost covered by insurance, 2000 to 2022



Source: Deloitte Access Economics; DisasterAssist; Insurance Council of Australia

Note: Number of disasters is based upon Insurance Council of Australia data from 2000 to 2009, then on DisasterAssist data from 2010 to 2022 in order to reflect the most complete data sources across given years. Insurance costs are normalised according to a wide array of factors including changes in prices and population.

Disasters have devastating economic and social impacts on individuals, families, local communities, businesses and governments, both tangible and intangible.<sup>3</sup> Tangible impacts have direct monetary costs, such as the destruction of infrastructure, loss of private property, crop loss and relief expenses.<sup>4</sup> Intangible impacts include loss of lives, education, community engagement, and physical and mental health and wellbeing impacts.<sup>5</sup> In fact, many people develop Post Traumatic Stress Disorder (PTSD), anxiety or depression following a disaster.<sup>6</sup> Due to the devastating social and environmental impacts of disasters, intangible costs are often more long-lasting than tangible costs.<sup>7</sup>

In 2021, Deloitte Access Economics estimated that disasters cost the Australian economy \$38 billion per year including both economic and social impacts. This is predicted to increase to at least \$73 billion per year by 2060.<sup>8</sup> Floods are the costliest type of disaster across Australia, with an average yearly cost of \$8.8 billion.<sup>9</sup>

The increasing costs are driven by three key factors – climate change, growth in population in exposed areas and the real value of property. Climate change is causing the Earth's atmosphere to warm, which is leading to more extreme weather events such as heat waves, droughts, floods, and storms.<sup>10</sup> Population growth is also putting more people at risk from disasters, as more people are living in hazard-prone areas.<sup>11</sup>

### 1.1 Impact of disasters on children and young people

Disasters and extreme weather events have negative impacts on all people. However, evidence suggests that children and young people are more vulnerable due to these events sometimes being their first exposure, their age and developmental stage, and the increased likelihood of indirect exposure to disasters through media and social media.<sup>12</sup>

Children and young people are particularly affected by psychological impacts compared to other populations. They may lack the skills to articulate and voice their emotional trauma, and psychological impacts may manifest in other ways such as behavioural changes and sleeplessness. A UNICEF report observed behaviour changes in children and families after a flood, and educators noticed an increase in disruptive behaviour during rain.<sup>13</sup>

For almost a third of children and young people who experience disasters, the mental health impacts persist beyond PTSD in the immediate period after a disaster.<sup>14</sup> This is particularly true when a child or young person faces cumulative disasters in their youth, leading to psychological distress that can last for decades.<sup>15</sup> One study found that children who experience a disaster by age five has a 15.7% higher probability of having a lifetime mood, anxiety or substance use disorder.<sup>16</sup>

There is also evidence that suggests social disruption caused by disasters can interrupt schooling and education for children and young people. One Australian study found that reading and numeracy expected gains from Year 3 to Year 5 scores were reduced in schools exposed to major bushfires.<sup>17</sup> The emerging evidence shows that the impact of trauma on children and young people may only be observed at later stages of development. This means experiencing disasters at a younger age may impact on children's neurodevelopment, which in turn may have potential to impact educational and functional outcomes many years post-disaster.<sup>18</sup>

Furthermore, as children and young people are often dependent on their family and guardians, the resilience of their caregivers also determines how they are impacted by and how they recover from a disaster. For example, if a family experiences financial pressures after a disaster, often the stress induced on the parents in a family can have negative impacts on the children and young people.<sup>19</sup> The way families and teachers respond to disasters and provide support to these children may influence their longer term outcomes.

### 1.2. Objective of this report

In light of this, Deloitte Access Economics was engaged to estimate the impact of disasters on children and young people, and where possible, quantify the economic cost of these impacts. The report is structured as follows:

- **Chapter 2 – An approach using longitudinal data:** This chapter outlines the approach taken to measure and monetise the impacts of disasters on children and young people.
- **Chapter 3 – Children and young people who experience disasters have poorer outcomes:** This chapter outlines the approach taken to measure and monetise the impacts of disasters on children and young people.
- **Chapter 4 – Implications for future research and investment:** This chapter outlines the implications of this research for public investment as well as recommendations for further research.





# 2 An approach using longitudinal data

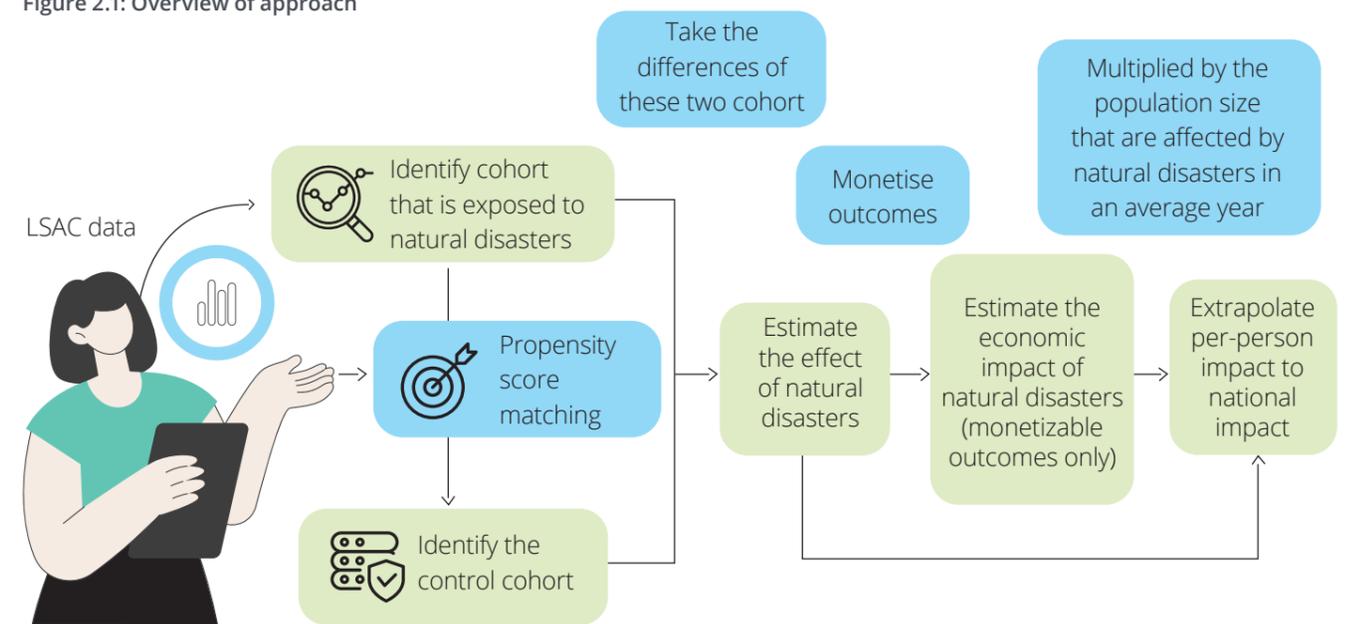
## 2.1. Conceptual approach

This report uses data from the Longitudinal Survey of Australian Children (LSAC) to understand the impact of disasters across a range of outcome domains that are specific to children and young people including education, mental health and housing. An overview of the approach is summarised in Figure 2.1.

### The Longitudinal Study of Australian Children

The Longitudinal Study of Australian Children (LSAC) is a survey data collection study that follows the development of 10,000 young people ('study children') and their families from across Australia. The sample is roughly evenly split across two cohorts – one which started when the children were zero to one years old, and another which started when children were four to five years old. The study is conducted in partnership by the Department of Social Services, the Australian Institute of Family Studies and Roy Morgan. Officially launched in 2004, the study has surveyed the same group of children and their families every two years since the first survey wave started its data collection in 2003. Notably, due to COVID-19, Wave 9 was completed across two shorter surveys in 2020 and 2021.

Figure 2.1: Overview of approach



Source: Deloitte Access Economics

## 2.2. Number of children and young people who have experienced disaster/s

In order to identify children and young people who had experienced one or more disasters in the LSAC dataset, two sets of questions were used. For the years 2010, 2012, 2014 and 2016 (waves 4 to 7), the LSAC dataset asks the parents of study children the following question with respect to disasters:

- In the last 12 months have you or Parent 2: Lived in a drought-affected area?
- In the last 12 months have you or Parent 2: Was your home or local area affected by bushfire, flooding or a severe storm?

However, these questions are not asked in other survey waves. In the 2020 and 2021 dataset (waves 9.1 and 9.2), the LSAC survey asks the following question with respect to disasters:

- Have you been affected by any of the following extreme weather events or disasters in the past 12 months? [Responses available for bushfire, drought, flood, storm or hail, cyclone, other]

LSAC surveys in 2004, 2006, 2008 and 2018 (waves 1, 2, 3 and 8) do not ask whether a child experienced a disaster and, as such, these waves were excluded from our analysis.

Using propensity score matching, children and young people who did not experience a disaster in the dataset but who have similar demographics and socioeconomic characteristics (based on demographic information such as Socio-Economic Indexes for Areas, remoteness, state and Indigenous status) were identified. This is then extrapolated to all children and young people impacted by disasters in an average year using the 2022-23 population structure from the Australian Bureau of Statistics.<sup>20</sup>

### 2.3. Impact of disasters on children and young people

#### 2.3.1. Identifying impact domains

Disasters in Australia result in significant financial and social repercussions, impacting individuals, families, communities, businesses, and governmental entities. These impacts can include physical injuries, psychological trauma, an increased rate of domestic and family violence, costs associated with clean-up, emergency response, temporary housing, and evacuation, as well as reduced economic activity and family incomes.<sup>21</sup>

These impacts are particularly pronounced for children and young people as they are uniquely vulnerable and physiologically different. Various studies have suggested that children and young people are at greater risk of mental ill-health; physically more at risk of death, injury, and illness; and may experience disruptions to their developmental and educational progress as a result of disasters.<sup>22</sup> Children may also face other challenges such as increased rates of domestic and family violence and homelessness, and substance abuse.

In this study, we examined the following domains based on the literature:

- **Physical health:** Impact of disasters on the risk of injuries, chronic illness, and deaths.
- **Mental Health:** Assessing the psychological and emotional impacts of disasters upon children and young people.
- **Education:** Gauging disruptions or alterations in academic trajectories leading to worse education outcomes.
- **Homelessness:** Understanding displacement rates and housing challenges post-disaster.
- **Domestic and family violence:** Whether disaster increases the risk of domestic and family violence towards children.

Due to data limitations in the LSAC survey, only mental health, education and homelessness were quantified in this study.

#### Physical health

Physical health can be impacted through a lack of access to sufficient food and nutrition, destroyed health infrastructure and poor sanitation and hygiene allowing diseases to spread.<sup>23</sup> Significant disasters can also lead to an increased likelihood of injury and death.<sup>25,26</sup> Disasters such as bushfires may induce chronic conditions such as asthma.<sup>27</sup> Additionally, disasters can also lead to pre-natal issues leading to worsened birth outcomes.<sup>28</sup>

#### Mental health

With respect to mental health, disasters and extreme weather events can lead to higher rates of PTSD, depression, substance abuse and aggression.<sup>29,30</sup> Specifically, common post-disaster psychiatric morbidities among children are acute stress reactions, adjustment disorder, depression, panic disorder, PTSD, anxiety disorders specific to childhood, and phobias.<sup>31,32</sup> Psychotic disorders, even schizophrenia, have also been reported in survivors. Comorbidities and subclinical psychiatric syndromes are also common,<sup>33</sup> and in some cases these outcomes can arise or be worsened through a reluctance to seek support.<sup>34</sup>

Some of these conditions can be short-term in nature; however, it has been shown that often there are long-term impacts on mental health from a disaster, with long-term anxiety being significantly more prevalent in cohorts exposed to disasters.<sup>35</sup> These conditions and symptoms may increase the risk of substance misuse of children and young people.<sup>36</sup> Further, it has been established that the mental health impacts are not always evident in the short-term, as might be expected. Instead, it is possible for mental health effects to arise later in life, without prior short-term presentations.<sup>37,38</sup>

#### Education

The education outcomes of children and young people are affected through the destruction of schooling facilities, extended school closures, reduced school attendance and household income and wealth being affected by the disaster. This leads students to fall behind in school which can lead to worse results and lower completion rates.<sup>39</sup>

A study of the impacts of the 2009 Black Saturday bushfires found students who were exposed to the disaster had reduced academic scores for reading and numeracy, though notably there was not an impact to children's writing, spelling and grammar skills.<sup>40</sup> Other studies have also found that the interruption to learning caused by bushfires impact the short-to-long-term education outcomes for students.<sup>41</sup>

Attendance is also reduced due to destroyed infrastructure, exacerbating the negative effects on children's educational outcomes. Furthermore, important skills learnt in early school years can be negatively impacted by disasters. The Black Saturday bushfires impacted the reading and numeracy skills of those in Year 3 and Year 5, with expected gains in the skills being reduced.<sup>42</sup> There is evidence to suggest that disasters may also have delayed impacts on the education of children and young people which cannot be observed immediately.<sup>43</sup>

#### Homelessness

Severe disasters, such as bushfires or floods, can destroy housing, leaving people unhoused and needing shelter after an event. For example, after the 2009 Black Saturday bushfires in Victoria, more than 2,000 houses were destroyed.<sup>44</sup> The devastating Cyclone Yasi in 2011 significantly impacted approximately 1,000 people's homes.<sup>45</sup>

A more recent study of major floods in 2022 in Northern Rivers also found that the disaster had led to greater vulnerability to homelessness while also reducing the quality of accessible housing.<sup>46</sup> A UNICEF children's needs assessment following the February/March 2022 Eastern Australia floods found that almost 8,200 people needed to access emergency accommodation after the floods in NSW and Queensland.<sup>47</sup> In 2022, globally, 240,807 people's housing was impacted by disasters.<sup>48</sup>

#### Domestic and family violence

Disasters are highly disruptive and can produce negative changes in social dynamics and the environment which increase violence against children. A systematic review has found that children, especially those from socioeconomically disadvantaged

backgrounds, are at an increased risk of abuse following disasters.<sup>49</sup> A particular study has found five key pathways linking between disasters and violence against children: (i) environmentally induced changes in supervision, accompaniment, and child separation; (ii) transgression of social norms in post-disaster behaviour; (iii) economic stress; (iv) negative coping with stress; and (v) insecure shelter and living conditions.<sup>50</sup>

#### 2.3.2. Measuring impact

Regression analysis was used to estimate whether the key outcome measured were statistically different between children and young people who experienced disasters to those who did not for the four identified domains, controlling for factors such as demographics and socioeconomic characteristics. The full list of variables considered in this analysis is summarised in Table 2.1, as well as an indication of whether results were identified and included.

Table 2.1: Outcome variables

Category	Survey question	Outcome variable	Treatment of survey question	Note
Education	What is the highest year of school you have completed?	Completion of year 12	If a child has reported receiving a certificate of education from their state in any way, a binary variable is generated from that wave onwards for their completion status	This variable was used to assess the impact of disasters upon education outcomes
	In the past 2 years, did you ever leave or drop out of school with the intention of not returning?	Left school early	Binary variable for whether child or young person left school in last two years	Statistically insignificant results
	What is the intended outcome of your current course of study?	Indicator for level of education attainment	Categorical variable for type of study child or young person enrolled in post-school	Statistically insignificant results
	What type of institute are you currently studying in?	Indicator for level of education attainment	Categorical variable for institution study child or young person enrolled in	Statistically insignificant results
Homelessness	About how many days in the last 12 months have you been unable to be at your place of study or work because of... [numerous reasons provided across multiple question iterations]	Number of missed days of school	Continuous variable for number of days of school missed in a given year	Statistically insignificant results
	In the last two years, have you experienced any of these things because you did not have a permanent place to live?	Experienced homelessness	A binary variable is generated to determine whether a child or young person experienced homelessness in the last two years	This variable was used to assess the impact of disasters upon experiences with homelessness
	Are you currently without a permanent place to live?	Experiencing homelessness	A binary variable is generated to determine whether a child or young person was experiencing homelessness at the time of survey	Excluded due to statistically insignificant results and because this variable is less likely to capture the impact of disasters than the other homelessness variable

Category	Survey question	Outcome variable	Treatment of survey question	Note
Domestic and family violence	We would like to know if you experienced any of these actions from any currently or former partner(s) in the past 12 months. [range of options]	Experienced intimate partner violence	Frequency with which different forms of intimate partner violence	Excluded as data only available for one cohort and in one wave, and the question is not children specific
	Short Mood & Feelings Questionnaire score above or equal to 8 (waves 5-8)  K-10 Depression scale summed score (wave 9.1 and wave 9.2)	Evidence of psychological distress using validated tools	The two variables are combined based upon cut-offs at which point the tools indicate a probability of psychological distress. For the Short Mood & Feelings Questionnaire there is a pre-prepared variable. For the K-10 Depression scale, this is taken from a score of 20 or more which indicates a probability of minor psychological distress. These cut-offs are used to generate a binary indicator for psychological distress	This variable was used to assess the impact of disasters upon mental health outcomes
Mental health	Have you smoked cigarettes in the last twelve months/four weeks?	Drug use - cigarettes	Binary variable for whether child or young person used cigarettes in given period of time	Statistically insignificant results
	Have you smoked/used marijuana in the last twelve months/four weeks?	Drug use - marijuana	Binary variable for whether child or young person used marijuana in given period of time	Statistically insignificant results
	Have you used any of these drugs in the last twelve months/four weeks?	Drug use - other	Binary variable for whether child or young person used other drugs in given period of time	Statistically insignificant results
	Do you have any conditions that have lasted, or are likely to last for six months or more?	Experiencing disability	Binary variable for whether child or young person experiences chronic condition	Statistically insignificant results
Physical health	Does child need or use more medical care than is usual for most children of the same age?	Experienced greater medical needs than usual	Binary variable for whether a greater amount of medical care is required than usual	Excluded as this is a relative measure and could not be reasonably monetised
	In the last 12 months, how many times did child need medical attention from a doctor or hospital because he/she was hurt or injured?	Experienced physical injury	Continuous variable for number of injuries experienced in a given year. Can be converted into binary variable for whether an injury was experienced in given year	Results statistically significant and positive, however variable does not appropriately capture the long-term impacts on physical health

Source: Deloitte Access Economics

### 2.4. Valuing the impact of disasters

A monetary value was then applied to the outcome variables that were found to be statistically significant in the regression analysis.

This gives us the longer-term cost of disasters and extreme weather events for children and young people. The types of costs included are summarised in Table 2.2.

Table 2.2: List of outcomes that are measured in this analysis, and the method we use to map these outcomes to lifetime costs

Category	Description	Per person lifetime cost due to disaster	Source
Mental health	The cost of accessing mental health services.	\$5,024 per person	Report on Government services, Productivity commission  Medicare-subsidised service costs, Australian Institute of Health and Welfare
Education	The loss of lifetime income due to a lower level of education attainment in net-present value terms.	\$119,343 per person	LSAC Department of Education
Homelessness	The cost of accessing homelessness support services.	\$3,827 per person	Report on Government services, Productivity commission

Source: Deloitte Access Economics; National Hospital Cost Data Collection; Productivity Commission; Department of Education; Australian Bureau of Statistics

#### 2.4.2. Mental health costs

Mental health costs can be measured in a range of different ways, from impacts on quality of life through to costs to the healthcare system. Our approach considers the cost of delivering mental health services to both individuals and government. The costs to individuals was estimated using 2021-22 Medicare-subsidised services data from the Australian Institute of Health and Welfare (AIHW).<sup>51</sup> For children and young people aged 0 to 24, the total fees, Medicare benefits and number of patients were calculated in order to estimate the total out of pocket costs per person. After adjusting for CPI, this was estimated to be approximately \$810.

Cost to government is derived from the Report on Government Services which publishes the total government spending on mental health care services each financial year.<sup>52</sup> The Report on Government Services also published the share of Australians who used mental health services in a given year and, alongside ABS population estimates, this allowed us to estimate the cost per person<sup>1</sup> per year of mental health services to government. In order to avoid including changes in consumption of mental health services due to COVID-19, the estimate for 2018-19 was used as a basis for this analysis. Adjusting for CPI, this totalled \$4,213 per person per year. Notably, this approach was taken instead of using AIHW data because it provides a more comprehensive estimate of the total costs of mental health services to government.

In total, the cost per year for children and young people accessing mental health services was estimated to be \$5,024 per person.

#### 2.4.3. Educational costs

The costs of poorer education outcomes can be measured in a number of ways. However our analysis considers the lifetime cost of exposure to disasters and extreme weather events for the children and young people cohort by considering lost lifetime earnings. Lost potential earnings were estimated based upon data retrieved from LSAC alongside median earnings by educational attainment data retrieved from the Department of Education.

We first calculated the weighted average lifetime earnings of people completing year 12. This was based on the distribution of children from the LSAC dataset across post-school education environments, from being enrolled in a university or TAFE degree to not being enrolled in further study. Department of Education average earnings data was then applied to the distributions of children and young people who had and had not completed school, and these earnings were discounted at a 7% rate over a forty-year period.<sup>53</sup> The per student difference in lifetime earnings was estimated to be \$119,343.



<sup>i</sup> Per person estimates include both children and adult related costs

various other approaches. We measure the lifetime cost of the impact of disasters on homelessness for the children and young people cohort based upon the per person cost of providing homelessness support services.<sup>54</sup> The cost of homelessness was retrieved from the Productivity Commission's estimation of expenditure on Specialist Homelessness Services for the 2019 financial year. Previous literature suggested that the impact of homelessness on children and young people includes physical health such as hospitalisation, disrupted education, mental health, and behaviour challenges; however, to avoid double counting, we did not include other costs associated with homelessness in the report.<sup>55</sup>

Unit cost of homelessness support services was derived from the cost of government expenditure on homelessness support services divided by the number of people who sought homelessness support services, resulting in a per person annual cost to homelessness services. We adjusted cost estimates to 2023 dollars using CPI in order to estimate an average year's costs by avoiding changes in costs caused by the COVID-19 pandemic in our estimates. The estimated cost of homelessness support services per person, per year is \$3,827. Given that not all families that have experienced homelessness would access homelessness support services, this might lead to an overestimation of the cost to the government.



- Due to data limitations, the costs estimated in this report are not exhaustive and do not encompass all impacts. This means that the total cost of disasters to children and young people is underestimated in this study. Future studies with more comprehensive datasets should consider a broader array of economic and social costs.
- Determination of whether a child experienced a disaster relies on what children, young people and/or their parents report in their survey answers. The questions used ask about a child's experiences in the last year, and given all surveys are not filled out on the same day, this means annual estimates should only be taken as approximate. Additionally, because the LSAC survey is only administered every two years, it is plausible that some disasters will not be recorded in the data.<sup>56</sup>
- The LSAC survey does not adequately sample children and young people from very remote localities, so while there is some representation from this group, it is limited.
- Questions in the LSAC survey are introduced, reworded and removed across different waves, leading to limitations in the number of waves outcomes can be measured.
- The LSAC dataset began with just over 10,000 children, however the number of respondents has fallen across waves, and this reduces the statistical power of data in more recent waves.
- Additionally, only the last two survey rounds provide details about the specific types of disasters, so we cannot look at the impact of each type in the earlier data.
- Lastly, each survey wave only includes children and young people in two different age groups; however, this is unlikely to lead to significant issues in the approach as geography alone is expected to be a determinant of experiencing a disaster or extreme weather event. Therefore, if the survey is appropriately sampled, the experiences of surveyed children should be representative of the population in a given year.





Children and young people who experience disasters have poorer outcomes

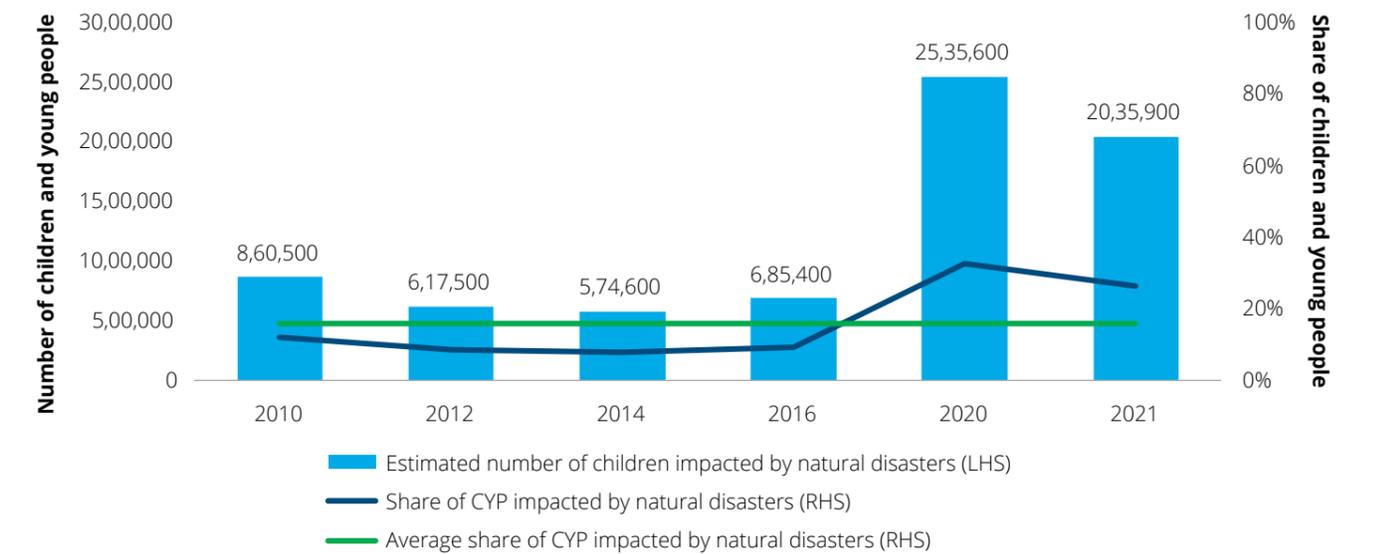
The analysis contributes to the evidence and understanding of the extent to which disasters impact children and young people in Australia. The analysis finds that disasters impacted between 7.7% and 32.4% of children and young people in Australia across the years where data was available from 2010 to 2021 – on average impacting 15.9% of children and young people per year. Exposure is concentrated on children and young people in Queensland and New South Wales, though exposure increased across states and territories in 2020 and 2021. Our econometric analysis identified costs of disasters in terms of lost lifetime income, mental health care costs and homelessness support service costs. In total, we estimate that the expected annual cost of disasters could approximate \$3.1 billion per year. In 2020, a year with a greater than average number of disasters, the cost of disasters is estimated to be \$6.2 billion.

**3.1. Number of children and young people who experience a disaster in an average year**

Data from LSAC was used to estimate the total share of the survey sample who experienced disasters in each year where data was available. These results were then scaled by relevant survey weights to estimate the share children and young people in Australia who were impacted by disasters and extreme weather events across survey years.

As Chart 3.1 shows, 15.9% on average of children and young people in the LSAC dataset reported having experienced disaster/s since 2010 in the waves where the question was asked.

Chart 3.1: Children and young people impacted by disasters by year



Source: Deloitte Access Economics using the Longitudinal Survey of Australian Children  
 Note: sample sizes were as follows: 2010 – n=8,313; 2012 – n=7,845; 2014 – n=7,022; 2016 – n=6,328; 2020 – n=3,566; 2021 – n=4,996.

Notably, data from 2020 and 2021 exhibit a substantially larger share of children and young people impacted by disasters. Data suggests a significant number of children and young people experienced droughts and bushfires in 2020, likely reflective of the Black Summer Bushfires, while 2021 exhibited a significant uptick in people experiencing floods and dangerous storms. However, limited data from 2010 to 2016 prevents deeper analysis.

At the state level, it is evident that Queensland and New South Wales are the states where children and young people are most at risk of exposure to disasters, though estimates increased across the board in 2020 and 2021. The estimated share of Australian children and young people who experienced disasters at the state level are provided in Table 3.1.

Table 3.1: Share of children and young people experiencing disasters by year

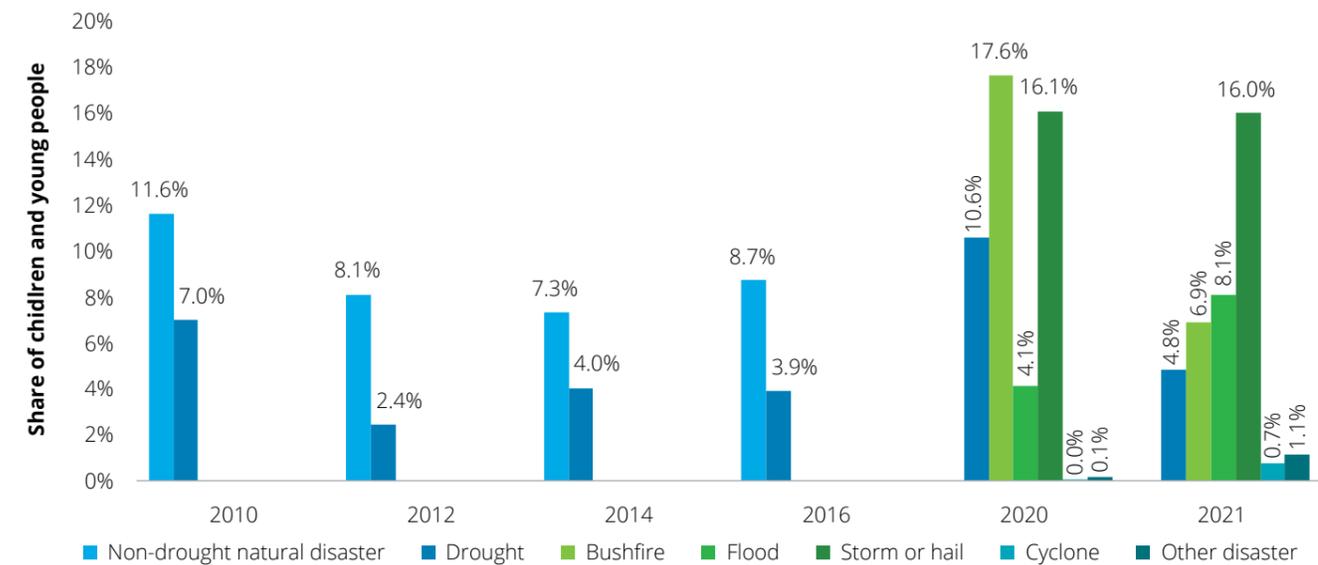
Year	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
2010	10.3%	15.7%	11.2%	9.8%	13.2%	5.8%	0.9%	8.9%	11.8%
2012	7.9%	8.3%	12.8%	3.8%	6.6%	2.1%	2.5%	4.0%	8.4%
2014	9.0%	5.1%	12.6%	3.9%	3.4%	5.6%	3.2%	1.8%	7.7%
2016	11.0%	6.7%	9.8%	10.3%	5.1%	16.6%	2.2%	4.0%	9.0%
2020	44.0%	22.5%	34.2%	17.8%	21.1%	20.1%	13.6%	68.8%	32.4%
2021	32.5%	20.0%	26.6%	14.6%	27.7%	11.6%	19.2%	38.4%	26.0%
Avg	19.1%	13.0%	17.9%	10.0%	12.9%	10.3%	6.9%	21.0%	15.7%

Source: Deloitte Access Economics using LSAC data

As demonstrated in Chart 3.2, estimates for those impacted by disasters are significantly higher in 2020 and 2021 than in previous years. This is likely a result of the Black Summer bushfires in 2020 and the increased flooding in 2021. It is noted that this does

not likely explain all variation and that the cause may be in-part because of the change in the LSAC survey's question. For a full distribution of disaster occurrences by type to the greatest level of detail available per wave, see Chart 3.2.

Chart 3.2: Share of children and young people who experienced disasters by type

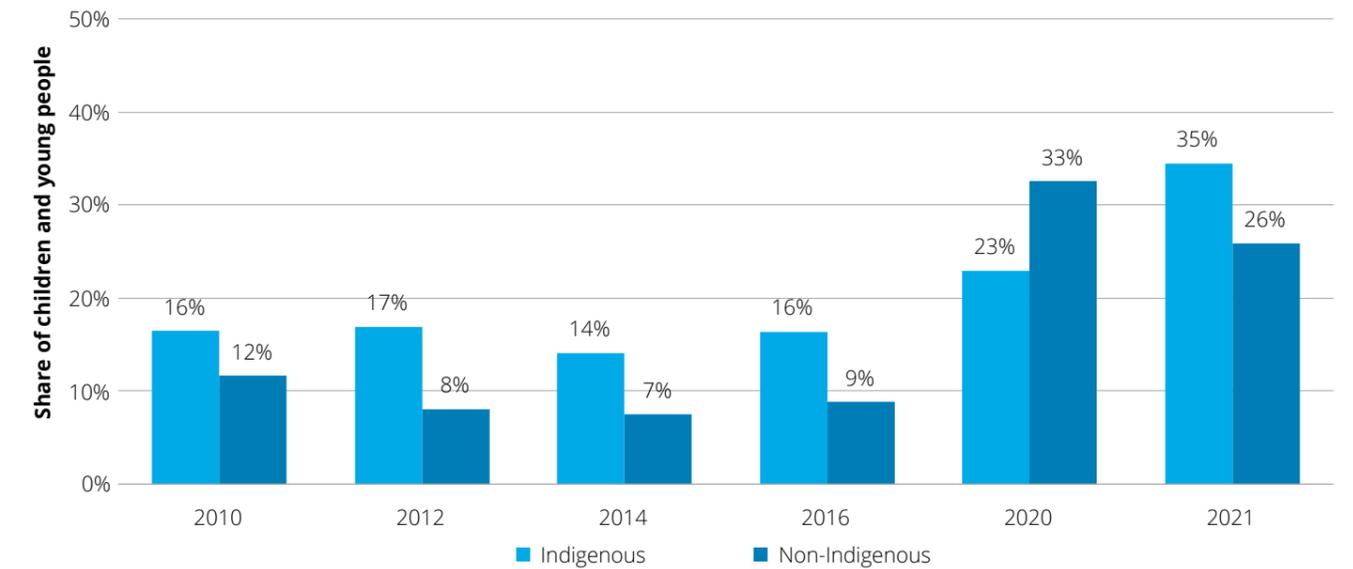


Source: Deloitte Access Economics using LSAC data

Note: Question methodology changes between 2016 and 2020.

Disaggregating these findings by Indigenous status suggests that children and young people from First Nations backgrounds are more likely to be impacted by disasters. These estimates are provided at the national level in Chart 3.3.

Chart 3.3: Share of children and young people impacted by disasters by year and Indigenous status

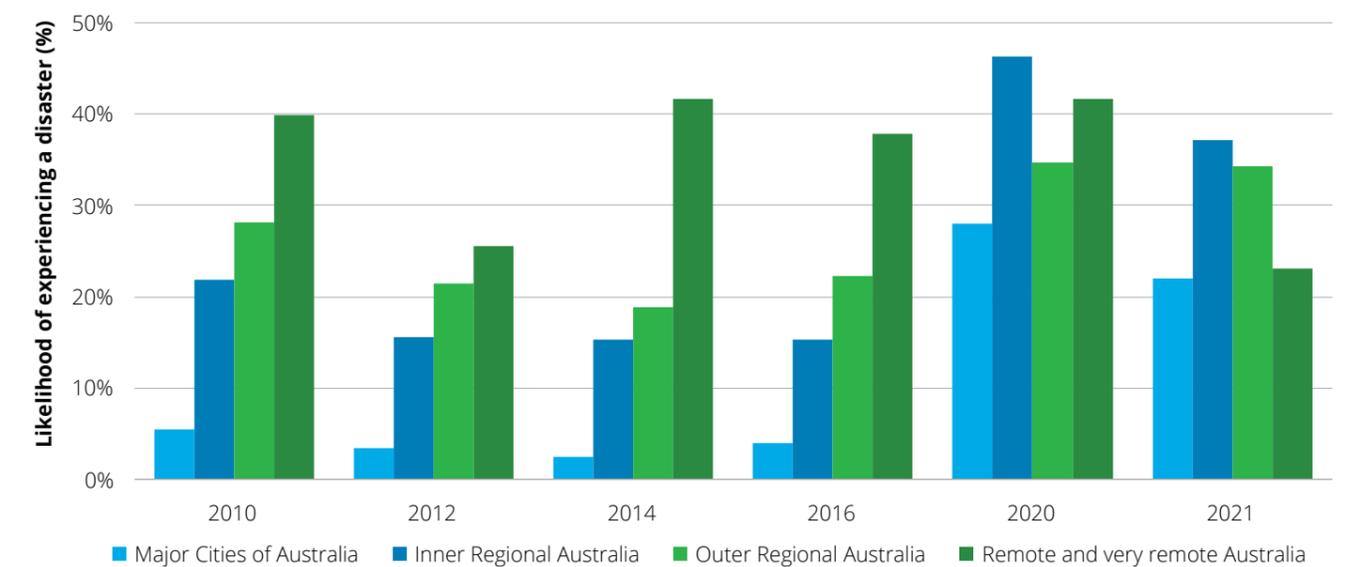


Source: Deloitte Access Economics using the Longitudinal Survey of Australian Children

Note: sample sizes were as follows: 2010 - n=8,313; 2012 - n=7,845; 2014 - n=7,022; 2016 - n=6,328; 2020 - n=3,566; 2021 - n=4,996.

Survey data suggests a relationship between remoteness and experiencing a disaster, as outlined in Chart 3.4. Across 2010 to 2016, children and young people from inner and outer regional areas were between 3.8 and 7.5 times more likely to experience a disaster than children and young people in major cities, and this figure climbs to 7.2 to 16.5 times more likely for children and young people in remote or very remote locations. Notably, in 2020 and 2021 the disparity between major city locations and locations not based in major cities decreased, though children and young people in regional and remote locations were still more likely to experience disasters.

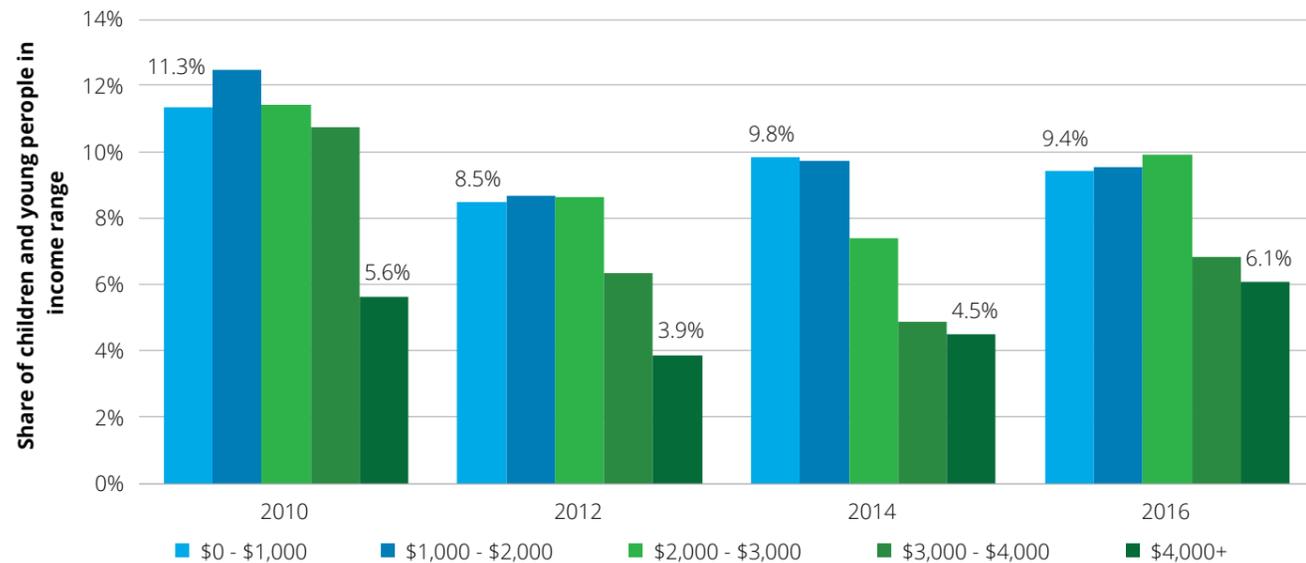
Chart 3.4: Probability of children and young people experiencing disasters depending on remoteness by year



Source: Deloitte Access Economics using the Longitudinal Survey of Australian Children

Disaggregating the survey data by weekly household earnings suggests that children in lower income households are more likely to experience disasters than children in higher income households. This was generally true across time for children in households earning \$3,000 to \$4,000 and more than \$4,000 per week. For instance, in 2016, 6.1% of children from households earning \$4,000 or more experienced a disaster, while 9.4% of children from household earning between \$0 and \$1,000 experienced a disaster in the same year. Full results can be found in Chart 3.5.

Chart 3.5: Probability of children and young people experiencing disasters depending on weekly household income by year



Source: Deloitte Access Economics using LSAC data

Note: Percentage represents the share of children from households which fell within income band. For example, 11.3% of children and young people from households earning \$0 to \$1,000 in 2010 experienced a disaster, indicating that 88.7% of children and young people from households earning \$0 to \$1,000 in 2010 did not experience a disaster. Data from 2020 and 2021 was not included due to low sample size.

Evidence also suggests that a significant number of children and young people experience more than one disaster each year, with 11.3% of children and young people experiencing two or more disasters. The full sample distribution is available in Table 3.2.

Table 3.2: Share of children and young people who have experienced multiple disasters

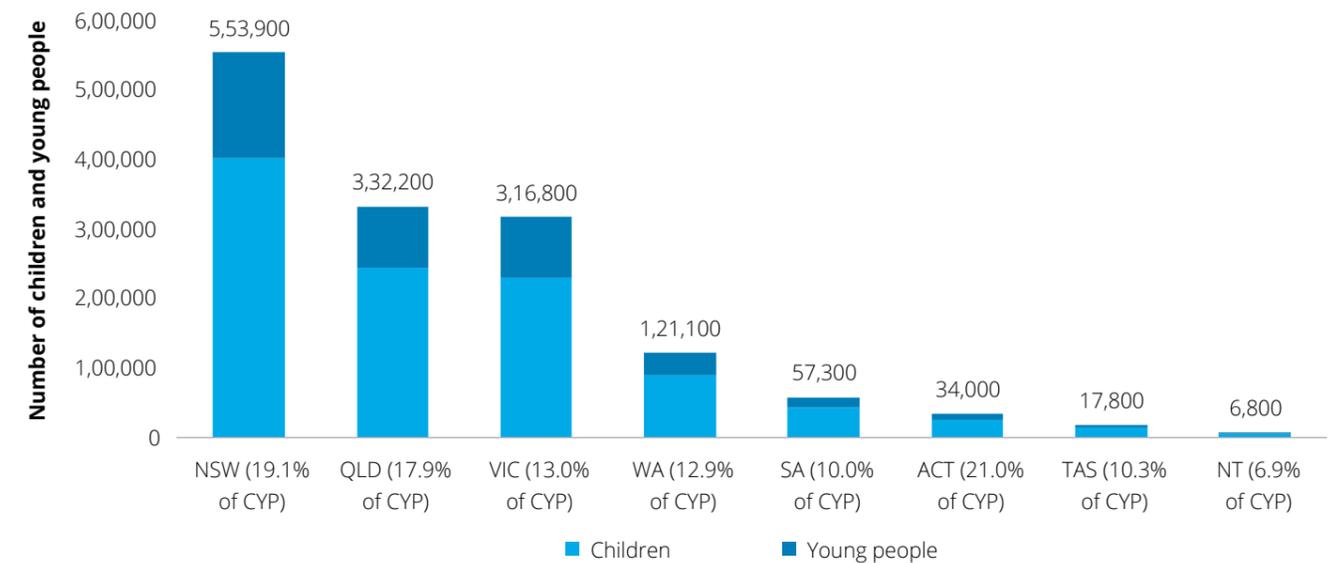
Number of years disaster experienced	0	1	2	3	4	5+
Share of children and young people	68.3%	20.3%	7.3%	2.6%	1.1%	0.3%

Source: Deloitte Access Economics using LSAC data

Note: Estimates are unweighted due to complexities of weighting data over time

By applying Australian population projections and structure estimates from the Australian Bureau of Statistics, this evidence suggests that 1,046,800 children and 393,100 young people, or 16% of the cohort could be impacted by disasters in an average year. These estimates are broken down to the state level in Chart 3.6.

Chart 3.6: Extrapolated number of children and young people impacted by disasters in an average year



Source: Deloitte Access Economics using the Longitudinal Survey of Australian Children

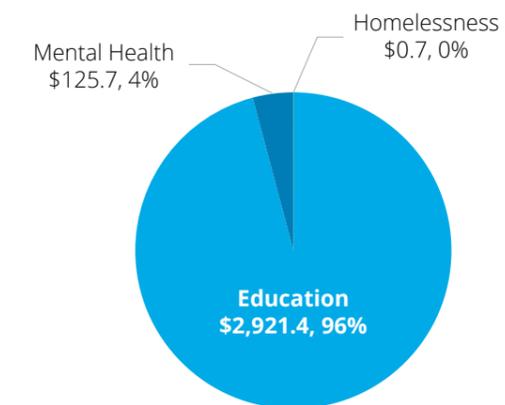
Note: Projected populations based upon average of 2010 to 2016 incident rate of experiencing disasters at the state level.

### 3.2. Economic cost of disasters on children and young people

The cost of disasters and extreme weather events to children and young people in terms of mental health, education and homelessness was estimated to be \$3.1 billion in an average year, impacting 15.9% of the population. In 2020, when 32.4% of children and young people were impacted, the cost is estimated to be \$6.22 billion. In the average year, the costs comprise of:

- \$2,921.4 million of lost potential lifetime earnings
- \$125.7 million of cost to mental health services over a lifetime
- \$0.7 million of homelessness service costs (Chart 3.7).

Chart 3.7: Cost of disasters on children and young people by outcome.



Source: Deloitte Access Economics using LSAC data

### 3.2.1. Mental health

**The analysis shows that:**

- Children and young people experiencing disasters are up to 4.5% more likely to experience psychological distress compared to those who do not experience a disaster. This does not consider the potentially large impact on mental health which could arise in the child or young person's adult years, as suggested in the literature.
- This costs \$162.5 million to government and individuals in mental health service use and wellbeing costs.

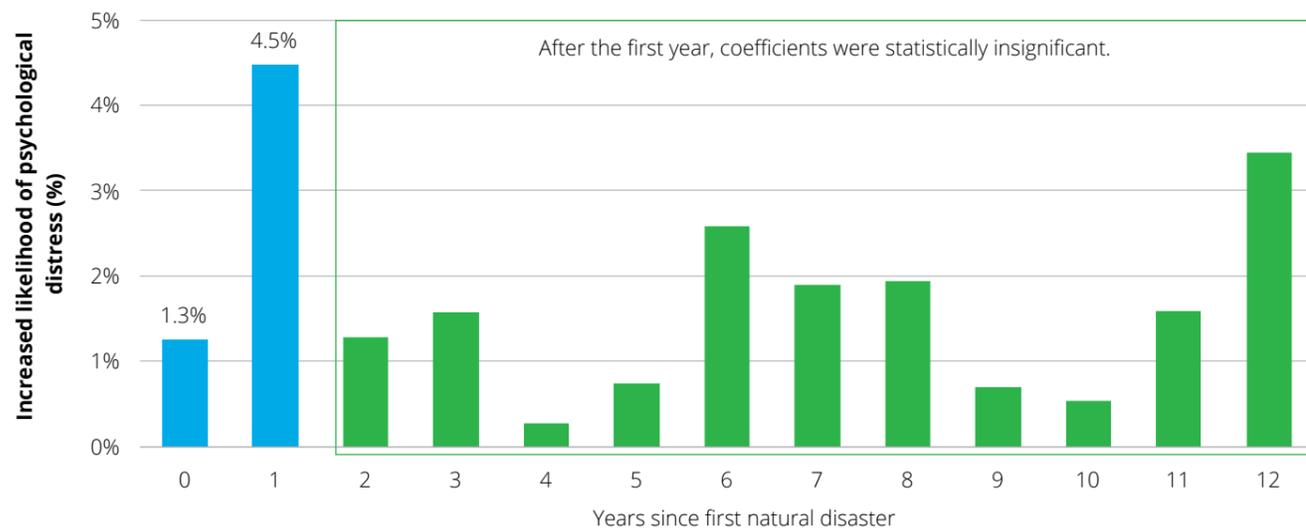
Children and young people can experience poorer mental health outcomes due to post-traumatic events such as disasters, such as:

- acute stress reactions
- adjustment disorder
- depression
- panic disorder
- PTSD
- anxiety disorders.

The analysis shows that children and young people who experienced a disaster have a 1.3% to 4.5% higher probability of having psychological distress compared to those who did not experience a disaster. This effect was only statistically significant in the year of and the year after a disaster, suggesting that mental health impacts from disasters may be highest in the immediate term.

However, it should also be noted that another study indicates that there may be lingering impacts of disasters on mental health outcomes; affecting approximately 30% of those who experienced the event and were immediately affected. While this effect is not observed in the LSAC dataset, it could be caused by the limitations of LSAC data in the context of disasters.

Chart 3.8: Increased probability of experiencing psychological distress due to experiencing a disaster



Source: Deloitte Access Economics using LSAC data.

Note: Year 0 and Year 1 were statistically significant at p<0.05 level.

Applying these estimates suggests that, in an average year, we estimate that 15,700 children and young people experience psychological distress in the year they experience a disaster, while 56,000 experience psychological distress in the year after. The increase in the number of children and young people experiencing psychological distress the year after the disaster may reflect experiences of psychological distress developing over a period of time.

However, not all impacted people will seek help. The National Survey of Mental Health and Wellbeing suggests that 45.1% of those who suffer from experiences of poor mental health will seek help.<sup>57</sup> As such, it is estimated that psychological distress as a result of disasters cost a total of \$152.5 million -- \$1036.3 million to government and \$26.2 million to individuals.<sup>58</sup>

### 3.2.3. Education

**The analysis shows that:**

- Children and young people experiencing disasters are 4.2% less likely to finish year 12 compared to those who do not experience a disaster.
- This comes at a cost of \$2,921.4 million to individuals in lost lifetime earnings.

A number of factors make children and young people more susceptible to poorer education outcomes post-traumatic events such as disasters:

- Disrupted school attendance,
- Destruction of school infrastructure, and
- Parental financial stress

Our analysis estimated that, in an average year, approximately 28,200 fewer children and young people aged 6 to 17 years would complete school due to their exposure to disasters. That is, for 28,200 individuals, their educational outcomes will be negatively impacted by experiencing one or more disasters. Applying this figure to the per person cost of not completing year 12 from section 2.4, the lifetime cost of the educational impacts of disasters on the cohort was estimated to be \$2,921.4 million.

Our analysis is consistent with the previous findings. Our statistical analysis found that when accounting for other drivers of education outcomes, experiencing a disaster or extreme weather event between ages 6 to 17 years reduces the probability of completing high school by 4.2% versus an average year.

### 3.2.4. Homelessness

**The analysis shows that:**

- Children and young people experiencing disasters are 2.9% more likely to experience homelessness compared to children who were not exposed to disasters.
- This costs \$0.7 million to government in increased homelessness service use.

Through the damage or destruction of homes and essential local infrastructure, disasters and extreme weather events can make children and young people more susceptible to experiencing short-term homelessness or temporary displacement.

Data from LSAC suggests that, in a year where they were impacted by disaster, a child or young person has a 2.9% chance of experiencing homelessness – 1.3 percentage points more than a child who did not experience a disaster. After adjusting for other factors, our statistical approach found that disasters increase the likelihood of a child or young person experiencing homelessness by 0.01% on average - a total of 170 additional children and young people per year based upon a average year. Applying this figure to

the per person cost of providing homelessness support services from section 2.4, the per year cost of homelessness caused by disasters on the cohort was estimated to be \$0.7 million.

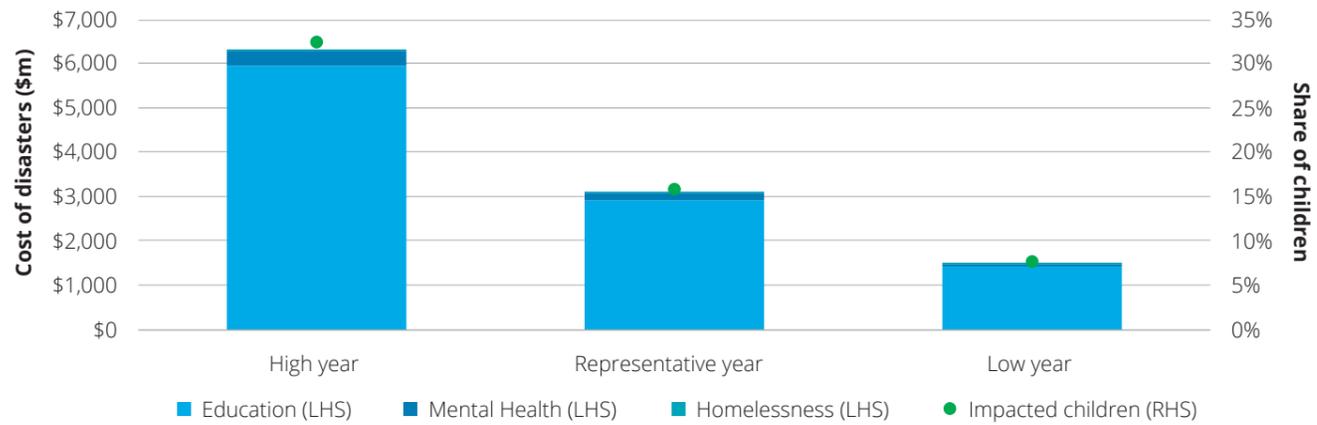
Notably, the homelessness and temporary displacement experienced by children and young people will be highly dependent upon the type of disaster, and since this analysis treats all disasters as the same due to data limitations, it is likely that this analysis underestimates the impact of disasters upon the frequency of homelessness. However, as mentioned earlier in section 2.4.4, not all families that have experienced homelessness would have accessed homelessness services, the total cost might be overestimated.

### 3.2.4 Sensitivity analysis

Each year the number and type of disasters experienced in Australia vary. As such, the number of children and young people that are impacted, and the impact of the events vary. For example, in 2020, 32.4% of children and young people experienced a disaster. Alternatively, in 2014, 7.7% were impacted.

The below chart outlines the changing total costs incurred by children and young people depending on the number impacted by the disasters. The High scenario is based on 2020; with an estimated cost of \$6.2 billion. The Low scenario is based on 2014 which is estimated to have a total cost of \$1.5 billion.

Chart 3.9: Sensitivity analysis of the impact of disasters on children and young people



Source: Deloitte Access Economics using LSAC data.



# 4 Implications for future research and investment

Children and young people who experience disasters face a multitude of challenges. This report has established that they are at a higher risk of psychological distress in the years after the disaster, poorer educational prospects which leads to impacts on lifetime productivity and income losses, as well as higher risk of experiencing homelessness. The repercussions of these events extend beyond their immediate aftermath and can persist throughout children and young people's lives. It was estimated that in a average year, 15.9% of children and young people are impacted by disasters, with an estimated lifetime economic cost of \$3.1 billion.

Considering children and young people's vulnerability and unique needs after experiencing a disaster, as well as the long-term impacts they may face, there is a case for tailored, sustainable, and scaled support to address the unique needs and challenges that children and young people face in disasters.

#### 4.1. Disaster resilience that is tailored to children and young people's needs

As demonstrated in previous studies and in our research, children and young people face significant challenges after disasters, much like adults.<sup>59</sup> However, these challenges are unique to their physiology, age and development phases and, consequently, governments should consider implementing child and young person-centric disaster policies and frameworks.

Our findings align with previous studies which have found that children and young people feel lost, worried, anxious and are stressed about the financial situation of their families after a disaster.<sup>60</sup> Additionally, because their families face the same difficult situations, children and young people may not receive the support they need to overcome these issues. In some cases, they may be made worse through the presence of increased domestic and family violence.<sup>61</sup>

Children and young people are often overlooked after a disaster.<sup>62</sup> While regions that are affected by disasters are supported through disaster aid and financial assistance, a greater emphasis should be placed upon policies and programs which are specifically designed to support children and young people recover after a disaster whilst also building resilience for more frequent and severe disasters going forward. These might include multifaceted, multi-year, wrap-around programs to support the long-term psychosocial recovery of children and young people.

Additionally, to circumvent disruptions to their education, resources such as tele-education, flexible education delivery programs and financial assistance should be made available where possible so children and young people can keep pace with their peers.

#### 4.2. Ensure supports are longer-term

Our research suggests that the impact of disasters upon children and young people in Australia are often long-lasting. While our analysis found an impact of disasters upon mental health to last only until the year after the disaster, literature suggests there

could be lasting impacts throughout a child or young person's lifetime – even if they did not experience psychological distress in the two years after the event. Further, by reducing year 12 completion rates, disasters reduce the lifetime incomes of individuals. This signifies that even if the disaster was experienced early in life, its detrimental effects on education persist well into later years. Previous research points to a substantial lifetime income disparity between those who do not complete year 12 and their completing counterparts, underlining the lasting economic ramifications on affected young individuals.<sup>63</sup>

This evidence highlights the importance of offering long-term support to children and young people, going beyond just the initial response phase. Ensuring robust mental health and educational assistance is not just limited to immediate relief; it is an investment in the lifelong well-being of children and young people. The long-term psychological strain and the effects of lost learning we have identified necessitates ongoing interventions.

#### 4.3. Disasters are predicted to increase in frequency and severity and therefore costs may rise into the future

This analysis only focuses on a small number of outcomes using the LSAC survey and is not a comprehensive study of the impact of disasters on children and young people, focusing on education, mental health and housing. Consequently, the total costs estimated are likely to be conservative and would increase when accounting for other costs such as long-lasting physical health impacts.

Further, this analysis does not consider changing risk profiles of disasters into the future and the impact of climate change on extreme weather events. Accounting for this would suggest that the estimated annual costs will increase not only with respect to population, but also the number and severity of disasters.

Given the unique challenges faced by children and young people in disasters compared to adults, as well as their levels of vulnerability, there should be consideration of their specific needs in disaster policy frameworks. This could be enabled through further research into disaster forecasting and climate risk in order to support government planning and preparation for future disasters and extreme weather events.

Risk assessments will also likely reveal that some regions experience greater exposure to more frequent, severe, and longer natural hazards, necessitating place-based strategies for recovery and building resilience in these communities. Similarly, tailored, co-designed, multi-year strategies must be put in place to increase resilience in rural and remote communities, areas with lower socio-economic status, and First Nations communities, drawing in particular on the indigenous knowledge of land, weather, and hazard response.

#### 4.4. Further research

##### 4.4.1. A more comprehensive analysis

This study has explored the impact of disasters on children and young people. As one of the first studies that focused on children and young people's unique needs after a disaster in

Australia, we have focused on three areas that have been found most significantly impacted: mental health, education and homelessness.

To understand the impact of disasters and extreme weather events on children more comprehensively, future studies could focus on a wider range of outcomes, such as domestic and family violence, nutrition, respiratory issues and other stress-induced conditions.

#### 4.4.2. Bring additional data into the analysis

This study has focused on the LSAC data. As explained in earlier chapters, LSAC has followed two cohorts of children since 2003. Though this data is a rich source of information from a wide range of perspectives, it is relatively limited in its scope to investigate the impacts of disasters and extreme weather events. For instance, although it asked children if they have experienced a disaster, only the last two waves of data break these down to a sufficient level of detail. Additionally, the dataset does not currently include any individual older than age 22 in the dataset – though this issue will be rectified in future waves.

Another point to consider is that, given the nature of LSAC as a survey, the indicators are largely (but not always) self-reported; which is a less accurate form of data collection compared to other data sources such as medical records. A future study could link the LSAC data to other datasets such as Disaster Assist to more accurately identify children and young people that are impacted by disasters and consider further health-related outcomes through linked Medicare data.<sup>64</sup>

The other feature of the LSAC dataset is that it follows two cohorts of children over many years. This helps us understand long-term

effects, but there are some challenges. For instance, we don't see every age group in every year, and some people have stop participating over successive waves. While we didn't find any other widely accessible data that was better for this analysis, this greater level of detail may provide further insights.

#### 4.4.3. Interventions that may help children before, during and after a disaster

Our study has estimated the impact of disasters and extreme weather events on children from mental health, education and homelessness perspectives, and it has built a foundation from which to investigate interventions which may assist children and young people in the future.

To achieve this, further analysis should be undertaken into what drives poorer outcomes for children impacted by disasters. For example, our analysis found that disasters reduce the probability of children and young people completing year 12, but we still do not know if it is due to the financial stress their families face after a disaster, interruptions to their education which compromises their performance at schools, or some other factor. Further understanding of these causal mechanisms will enable the development of targeted assistance for children and young people who have experienced a disaster or extreme weather events.

Additionally, research should be undertaken into the factors which can enable greater resilience against disasters and, therefore, may limit the severity of impacts from disasters. These factors could include environmental factors and intervention-based factors. By undertaking this research, governments and non-profits can reduce the impacts of disasters on children and young people by being better enabled to implement targeted and effective support programs before disasters even occur.

# Appendix A: Technical appendix

## A.1. Detailed overview of the methodology

### A.1.1. The population

To understand how disaster affect children and young people, we compare children who have experienced these events (the 'exposed cohort') with children who have not but were otherwise similar (the 'control cohort'). To estimate the number and share of children expected to be impacted by disaster in 2022-23, we employ survey results from the Longitudinal Survey of Australian Children (LSAC) in tandem with population projections for 2022-23 from the Australian Bureau of statistics.

For this analysis, we count children who responded affirmatively to questions indicating they were impacted by a disaster in a given wave as children who have experienced disaster, and children who responded in the negative as children who have not experienced disaster.

Notably, this approach has some limitations. It is based upon self-reported experiences with disaster which may be assessed differently depending on the survey respondent. Further, only data from the last two waves breaks-down the disaster by type, meaning there is insufficient data to analyse impacts to the disaster type-level. Finally, data from each survey wave is only based upon children in two different age ranges as detailed above, meaning there is not a distribution of children across age ranges in a given survey wave – however, as age is not expected to influence whether a child experiences a disaster, this is not anticipated to be a significant issue.

### A.1.2. Causal inference

While whether a child or young person is affected by disasters in a particular year in a largely random process, it also depends in-part on where they live. This means that children and young people who live in geographies which are more prone to be impacted by disasters are likely to be part of the exposed group than children who live in geographies which are not as prone to disasters. This phenomenon can lead to a problem called "selection bias," making it difficult to accurately measure how disasters really affect children and young people.

To overcome this selection bias, a propensity score matching approach was employed in order to balance the two groups with respect to their geographies. This improved the comparability of the two groups and reduced the risks imposed by selection bias. Further, a fixed effects modelling approach was employed as LSAC data is provided in a panel data format.

## A.2. Modelling the effect of disasters upon children and young people

### A.2.1. Propensity score matching

#### A.2.1.1. About propensity score matching

Propensity score matching is a statistical technique used to reduce bias in observational studies by creating comparable groups of subjects. It involves estimating the probability (propensity score) of an individual belonging to a particular treatment group based on their covariates. Once these scores are calculated, individuals from the treatment and control groups with similar scores are matched, ensuring that they are comparable in terms of observed characteristics. This method helps control for confounding variables and allows researchers to make more valid causal inferences from observational data.

Propensity scores can be valuable in assessing the impact of disasters on children by matching them to control groups of children who did not experience the disaster but are similar in relevant characteristics, such as age, socioeconomic status, and geography. This approach helps isolate the effect of the disaster on outcomes for children and young people, for example by:

- Mitigating selection bias: Propensity scores aid in balancing observed covariates between exposed and unexposed groups, reducing selection bias when assessing disasters' impact on children and young people.
- Addressing confounding variables: Propensity score matching facilitates the creation of matched groups with balanced confounding variables, enhancing the isolation of the disaster's effect on children and young people.
- Enhancing robustness: Propensity scores bolster the robustness of analyses by focusing on covariate balance, reducing sensitivity to modelling assumptions when studying disasters' impact on children and young people.

#### A.2.1.2. Application of propensity score matching approach

Due to sample size limitations, propensity scores were developed in the following age cohorts:

- Ages 6 to 9
- Ages 10 to 13
- Ages 14 to 17
- Ages 18 to 22.

In each case, the control group was set to individuals who were at the top of a given age range (ie. for the first cohort, the control group was individuals aged 9). This approach enabled the estimation of propensity scores for treated individuals, then the

scores were estimated for the control group by comparing their most recent data to the treated group in the year of their first disaster. The propensity score model was specified as follows:

$$Experienced\_disaster_i = \beta_1 State_i + \beta_2 Remoteness_i + \beta_3 SEIFA\_region_i + \beta_4 Indigenous\_Status_i + \epsilon_i$$

Where:

- Experienced disaster: A flag for whether an individual had experienced a disaster
- State: The state in which an individual lived
- Remoteness: The geographical remoteness of an individual as per the Australian Statistical Geography Standard Remoteness Structure
- SEIFA\_region: The Socio-Economic Index for Area (SEIFA) in which an individual lived
- Indigenous\_status: The binary Indigenous Status of an Individual
- $\epsilon_i$  is the error term.

### A.2.2. Regression analysis

#### A.2.2.1. About fixed effects models

Applying a fixed effects model is valuable in panel data analysis because it helps account for individual-specific or time-invariant factors that could bias the estimated relationships. By including fixed effects for each entity or individual in the dataset, the model controls for unobservable characteristics that remain constant over time, ensuring that the estimated coefficients primarily capture the within-entity variation. This approach is particularly useful when studying longitudinal data as it enables the isolation of time-varying factors while minimizing the influence of persistent individual-specific effects. Because LSAC is a panel dataset, this analysis applied a fixed effects approach to analyse the impacts of disasters upon children and young people in the most robust way available where relevant.

#### A.2.2.2. Model specifications

The fixed effects model was specified differently depending on the type of outcome, though the covariates did not vary across regressions. The full list of covariates used are as follows:

Variable	Category	Mental health	Year 12 completed	Experienced homelessness
Years since first disaster	Treatment	✓		
Experienced natural disaster from age 6 to 17	Treatment		✓	
Experienced disaster during year	Treatment			✓
Age	Covariate	✓	✓	✓
First Nations status	Covariate	✓	✓	✓
Language background other than English	Covariate	✓	✓	✓
Sex	Covariate	✓	✓	✓
Remoteness	Covariate	✓	✓	✓
State	Covariate	✓	✓	✓
SEIFA	Covariate	✓	✓	✓
Father Qualification	Covariate			✓
Father Occupation	Covariate	✓	✓	✓
Father Income	Covariate	✓	✓	✓
Mother Qualification	Covariate			✓
Mother Occupation	Covariate	✓	✓	✓
Mother Income	Covariate	✓	✓	✓
Parents separated	Covariate	✓	✓	✓
Number of older siblings	Covariate		✓	✓

Source: Deloitte Access Economics

Note: Variables excluded either due to data limitations or theoretical irrelevance

Notably, time independent variables (such as Indigenous status) were not explicitly included in fixed effects models as they are implicitly accounted for within the model.

### Mental health (fixed effects logistic model)

$$Outcome_{it} = \beta_x Natural\_disaster\_y\_years\_since_{it} + \beta_z Covariates_{it} + u_{it}$$

Where:

- Outcome: 1 if the child or young person experienced psychological distress in the same year they experienced a disaster, 0 if they did not
- Disaster y years since: vector of treatment variables for the number of years since a child or young person experienced their first disaster. y ranges from 0 (signifying that the disaster occurred that year) to 12.
- Covariates: as listed above
- $u_{it}$ : the error term.

### Education outcomes (logistic model)

$$Completed\_school_{it} = \beta_0 + \beta_1 Natural\_disaster\_school\_flag_{it} + \beta_z Covariates_{it} + \epsilon_{it}$$

Where:

- Completed school: 1 if the child completed school, 0 if they did not.
- $\beta_0$ : The model intercept
- disaster flag: 0 if no disaster experienced in a given year, 1 if disaster experienced in given year
- Covariates: as listed above
- $\epsilon_{it}$ : the error term.

### Homelessness (fixed effects logistic model)

$$Outcome_{it} = \beta_1 Natural\_disaster\_flag_{it} + \beta_z Covariates_{it} + u_{it}$$

Where:

- Experienced homelessness: 1 if the child or young person experienced homelessness in the last two years, 0 if they did not
- Natural disaster flag: 0 if no natural disaster experienced in a given year, 1 if natural disaster experienced in given year
- Covariates: as listed above
- $u_{it}$ : the error term.

### A.3. Extrapolating to the national level

LSAC sample weights were utilised in order to estimate the national share of children impacted by disasters. Sample weights were produced for LSAC survey waves to reduce the effect of bias in sample selection and participant non-response. In principle, the purpose of sample weights is to place greater weight on under-represented groups and lower weight upon over-represented groups.

LSAC sample weights are based upon the distribution of the full original sample which was established by randomly selecting 311 Australian postcodes, then randomly selecting children from within these selected postcodes. The numbers of selected

children approximately represented the proportion of children across states and territories, as well as major city and regional populations within states and territories. Notably, very remote postcodes were excluded from this process, and this may impact the statistical inference of LSAC results.

With these shares, the costs of disasters in a average year were estimated based upon projected population estimates from the Australia Bureau of Statistics. The number of children and young people were then carved out from these estimates using the standard population structure published by the Australian Bureau of Statistics.

#### A.4. Descriptive statistics and results

##### A.4.1. Descriptive statistics

A detailed breakdown of sample distribution across demographics are provided on a wave-by-wave basis from Table A.1 to Table A.6

Table A.1: Descriptive statistics, wave 4 (2010)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	509	3,692	41
Cohort	K	572	3,539	53
Sex	Male	563	3,705	49
Sex	Female	518	3,526	45
Indigenous status	ATSI	48	208	7
Indigenous status	Non-ATSI	1,033	7,023	87
Language background other than English	English	1,041	6,476	53
Language background other than English	Non-English	40	755	41
Remoteness	Major Cities of Australia	328	5,011	57
Remoteness	Inner Regional Australia	417	1,422	12
Remoteness	Outer Regional Australia	287	710	17
Remoteness	Remote Australia	27	80	7
Remoteness	Very Remote Australia	22	8	1
State	NSW	319	2,209	20
State	VIC	346	1,678	39
State	QLD	206	1,569	17
State	SA	57	512	6
State	WA	120	736	6
State	TAS	14	225	6
State	ACT	18	194	-
State	NT	1	108	-

Source: Deloitte Access Economics using LSAC data

Table A.2: Descriptive statistics, wave 5 (2010)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	334	3,668	83
Cohort	K	352	3,491	113
Sex	Male	348	3,677	91
Sex	Female	338	3,482	105
Indigenous status	ATSI	36	191	25
Indigenous status	Non-ATSI	650	6,968	171
Language background other than English	English	665	6,586	146
Language background other than English	Non-English	21	573	50
Remoteness	Major Cities of Australia	172	4,789	132
Remoteness	Inner Regional Australia	283	1,539	35
Remoteness	Outer Regional Australia	201	729	20
Remoteness	Remote Australia	15	84	7
Remoteness	Very Remote Australia	15	18	2
State	NSW	218	2,197	49
State	VIC	155	1,669	79
State	QLD	230	1,509	26
State	SA	19	519	10
State	WA	49	752	21
State	TAS	4	222	9
State	ACT	8	196	-
State	NT	3	95	2

Source: Deloitte Access Economics using LSAC data

Table A.3: Descriptive statistics, wave 6 (2010)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	296	3,362	106
Cohort	K	263	3,101	173
Sex	Male	284	3,304	139
Sex	Female	275	3,159	140
Indigenous status	ATSI	25	149	15
Indigenous status	Non-ATSI	534	6,314	264
Language background other than English	English	541	5,873	203
Language background other than English	Non-English	18	590	76
Remoteness	Major Cities of Australia	110	4,333	174
Remoteness	Inner Regional Australia	245	1,378	52
Remoteness	Outer Regional Australia	160	691	34
Remoteness	Remote Australia	22	56	13
Remoteness	Very Remote Australia	22	5	6
State	NSW	211	1,884	100
State	VIC	85	1,577	65
State	QLD	198	1,362	54
State	SA	17	470	9
State	WA	31	708	20
State	TAS	11	210	10
State	ACT	4	179	7
State	NT	2	73	14

Source: Deloitte Access Economics using LSAC data

Table A.4: Descriptive statistics, wave 7 (2010)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	276	3,058	47
Cohort	K	315	2,679	95
Sex	Male	297	2,937	76
Sex	Female	294	2,800	66
Indigenous status	ATSI	25	124	8
Indigenous status	Non-ATSI	566	5,613	134
Language background other than English	English	565	5,212	81
Language background other than English	Non-English	26	525	61
Remoteness	Major Cities of Australia	164	3,843	97
Remoteness	Inner Regional Australia	230	1,246	27
Remoteness	Outer Regional Australia	165	586	15
Remoteness	Remote Australia	17	53	3
Remoteness	Very Remote Australia	15	9	-
State	NSW	232	1,649	51
State	VIC	102	1,346	33
State	QLD	139	1,311	32
State	SA	47	376	4
State	WA	33	651	10
State	TAS	32	169	10
State	ACT	4	167	2
State	NT	2	68	-

Source: Deloitte Access Economics using LSAC data

Table A.5: Descriptive statistics, wave 9.1 (2020)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	633	931	31
Cohort	K	396	925	40
Sex	Male	460	816	32
Sex	Female	569	1,040	39
Indigenous status	ATSI	9	26	3
Indigenous status	Non-ATSI	1,020	1,830	68
Language background other than English	English	962	1,649	64
Language background other than English	Non-English	67	207	7
Remoteness	Major Cities of Australia	639	1,407	48
Remoteness	Inner Regional Australia	284	300	15
Remoteness	Outer Regional Australia	99	139	7
Remoteness	Remote Australia	4	10	1
Remoteness	Very Remote Australia	3	-	-
State	NSW	415	420	27
State	VIC	192	577	13
State	QLD	213	358	18
State	SA	39	163	3
State	WA	74	221	7
State	TAS	21	73	2
State	ACT	71	28	-
State	NT	4	16	1

Source: Deloitte Access Economics using LSAC data

Table A.6: Descriptive statistics, wave 9.2 (2021)

Demographic	Category	Experienced disaster	Did not experience disaster	No response
Cohort	B	674	1,498	56
Cohort	K	436	1,484	40
Sex	Male	513	1,353	47
Sex	Female	597	1,629	49
Indigenous status	ATSI	17	42	8
Indigenous status	Non-ATSI	1,093	2,940	88
Language background other than English	English	1,033	2,652	86
Language background other than English	Non-English	77	330	10
Remoteness	Major Cities of Australia	684	2,255	72
Remoteness	Inner Regional Australia	303	487	14
Remoteness	Outer Regional Australia	117	226	9
Remoteness	Remote Australia	3	12	1
Remoteness	Very Remote Australia	3	2	-
State	NSW	441	832	29
State	VIC	204	836	22
State	QLD	223	590	20
State	SA	43	235	6
State	WA	114	274	10
State	TAS	16	101	4
State	ACT	63	89	4
State	NT	6	25	1

Source: Deloitte Access Economics using LSAC data

**A.4.2. Results**

The marginal effect results from regression analysis are provided from Table A.7 to Table A.9. These estimates reflect the change in base probability of an outcome due to experiencing disasters. Base probabilities were derived from either the LSAC sample or national data according to remoteness, as outlined in Table A.10.

**Table A.7: Marginal effect estimates for probability of experiencing psychological distress**

Treatment effect variable	Coefficient	Standard error	t-value	p-value
Natural_disaster_years_ago_0	0.0339	0.0177	1.922	0.0546
Natural_disaster_years_ago_1	0.1210	0.0302	4.004	0.0001
Natural_disaster_years_ago_2	0.0347	0.0289	1.200	0.2299
Natural_disaster_years_ago_3	0.0426	0.0411	1.036	0.3000
Natural_disaster_years_ago_4	0.0073	0.0347	0.211	0.8326
Natural_disaster_years_ago_5	0.0200	0.0398	0.502	0.6157
Natural_disaster_years_ago_6	0.0699	0.0375	1.865	0.0622
Natural_disaster_years_ago_7	0.0511	0.0443	1.153	0.2490
Natural_disaster_years_ago_8	0.0526	0.0422	1.247	0.2126
Natural_disaster_years_ago_9	0.0189	0.0486	0.388	0.6976
Natural_disaster_years_ago_10	0.0143	0.0514	0.278	0.7810
Natural_disaster_years_ago_11	0.0431	0.0506	0.853	0.3936
Natural_disaster_years_ago_12	0.0933	0.0715	1.306	0.1916

Source: Deloitte Access Economics using LSAC data

**Table A.8: Marginal effect estimates for probability of completing year 12**

Treatment effect variable	Coefficient	Standard error	t-value	p-value
Natural_disaster_school_flag	-0.0543	0.0207	-2.6235	0.0087

Source: Deloitte Access Economics using LSAC data

**Table A.8: Marginal effect estimates for probability of completing year 12**

Treatment effect variable	Coefficient	Standard error	t-value	p-value
Natural_disaster_school_flag	-0.0543	0.0207	-2.6235	0.0087

Source: Deloitte Access Economics using LSAC data

**Table A.9: Marginal effect estimates for probability of experiencing homelessness**

Treatment effect variable	Coefficient	Standard error	t-value	p-value
Natural_disaster_flag	0.0067	0.0030	2.196	0.0281

Source: Deloitte Access Economics using LSAC data

**Table A.10: Base probabilities for analysis**

Outcome	Region	Base probability	Source
Experienced psychological distress	Major Cities of Australia	35.1%	LSAC
	Inner Regional Australia	40.5%	LSAC
	Outer Regional Australia	34.5%	LSAC
	Remote and very remote Australia	32.3%	LSAC
Completed Year 12	Major Cities of Australia	82.10%	ACARA
	Inner Regional Australia	71%	ACARA
	Outer Regional Australia	74.40%	ACARA
	Remote and very remote Australia	63.20%	ACARA
Experienced homelessness	Major Cities of Australia	1.7%	LSAC
	Inner Regional Australia	2.0%	LSAC
	Outer Regional Australia	1.7%	LSAC
	Remote and very remote Australia	1.1%	LSAC

Source: Deloitte Access Economics using LSAC data; Australian Curriculum, Assessment and Reporting Authority (ACARA)

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# Endnotes

- 1 Royal Commission into National Natural Disaster Arrangements (2020) "Chapter 2: Natural Disaster Risk".
- 2 Disaster Assist (2016) "Australian Disasters" <https://www.disasterassist.gov.au/find-a-disaster/australian-disasters>
- 3 Productivity Commission (2015) "Inquiry Report on Natural Disaster Funding Arrangements".
- 4 Australian Business Roundtable (2015) "The Social Impact of Natural Disasters".
- 5 Ibid.
- 6 Makwana, N. (2019) "Disaster and its impact on mental health".
- 7 Australian Business Roundtable (2015) "The Social Impact of Natural Disasters".
- 8 Deloitte Access Economics (2021) "Special report: Update to the economic costs of natural disasters in Australia" (report for the Australian Business Roundtable for Disaster Resilience and Safer Communities)
- 9 CSIRO, (2023) "Understanding the causes and impacts of flooding"
- 10 Banholzer, S., Kossin, J. & Donner, S. (2014) "The Impact of Climate Change on Natural Disasters" Reducing Disaster: Early Warning Systems for Climate Change 21-49.
- 11 Satterthwaite, D. (2009) "The implications of population growth and urbanization for climate change" Environment & Urbanisation 21(2): 545 - 567
- 12 Kousky, C. (2016). "Impacts of natural disasters on children". The Future of children, 73-92.
- 13 UNICEF Australia. "2022 Flood Response and Recovery – Children's Needs Assessment."
- 14 Ibid.
- 15 Melzer, C., Zacher, M., & Merdjanoff, A. (2021) "The effects of cumulative natural disaster exposure on adolescent psychological distress." J Appl Res Child. 1-19.
- 16 Maclean, J. C., Popovici, I., & French, M. T. (2016). Are natural disasters in early childhood associated with mental health and substance use disorders as an adult?. Social Science & Medicine, 151, 78-91.
- 17 Gibbs, L., Nursey, J., Cook, J., Ireton, G., Alkemade, N., Roberts, M., ... & Forbes, D. (2019). Delayed disaster impacts on academic performance of primary school children. Child development, 90(4), 1402-1412.
- 18 Ibid.
- 19 Abrams, Z. (2023) "Are your kids stressed about family finances? Psychologists offer answers for addressing anxiety over tight budgets" American Psychological Association. 16 December.
- 20 Australian Bureau of Statistics (2018). "Population Projections, Australia".
- 21 Deloitte Access Economics (2021) Special report: Update to the economic costs of natural disasters in Australia. Australian Business Roundtable for Disaster Resilience & Safer Communities.
- 22 Society for Research in Child Development (2020) Understanding the Impacts of Natural Disasters on Children
- 23 Kousky, C. (2016). "Impacts of natural disasters on children." The Future of children, 73-92.
- 24 Felix, E., Rubens, S., & Hambrick, E. (2020). The relationship between physical and mental health outcomes in children exposed to disasters. Current psychiatry reports, 22, 1-7.
- 25 Kousky, C. (2016). "Impacts of natural disasters on children." The Future of children, 73-92.

- 26 Felix, E., Rubens, S., & Hambrick, E. (2020). The relationship between physical and mental health outcomes in children exposed to disasters. *Current psychiatry reports*, 22, 1-7.
- 27 Johnston FH, Kavanagh AM, Bowman DM, Scott RK. Exposure to bushfire smoke and asthma: an ecological study. *Med J Aust*. 2002 Jun 3;176(11):535-8. doi: 10.5694/j.1326-5377.2002.tb04551.x. PMID: 12064985.
- 28 Kousky, C. (2016). "Impacts of natural disasters on children." *The Future of children*, 73-92.
- 29 Ibid.
- 30 Substance Abuse and Mental Health Services (2018). "Behavioural Health Conditions in Children and Youth Exposed to Natural Disasters." Disaster Technical Assistance Center Supplemental Research Bulletin.
- 31 Nilamadhab Kar. (2009) "Psychological impact of disasters on children: review of assessment and interventions" *World J Pediatr* 5(1): 5.
- 32 Felix, E., Rubens, S., & Hambrick, E. (2020). The relationship between physical and mental health outcomes in children exposed to disasters. *Current psychiatry reports*, 22, 1-7.
- 33 Nilamadhab Kar. (2009) "Psychological impact of disasters on children: review of assessment and interventions" *World J Pediatr* 5(1): 5.
- 34 NSW Department of Education, (2020) "The impact of bushfires on student wellbeing and student learning"
- 35 McFarlane, A. C., & Van Hooff, M. (2009). "Impact of childhood exposure to a natural disaster on adult mental health: 20-year longitudinal follow-up study." *The British Journal of Psychiatry*, 195(2), 142-148.
- 36 REIJNEVELD, S., CRONE, M., SCHULLER, A., VERHULST, F., & VERLOOVE-VANHORICK, S. (2005). The changing impact of a severe disaster on the mental health and substance misuse of adolescents: Follow-up of a controlled study. *Psychological Medicine*, 35(3), 367-376. doi:10.1017/S0033291704003575
- 37 Curtin, M., Brooks, R., Verdon, S., Crockett, J., & Hodgins, G. (2020). "The impact of bushfire on the wellbeing of children living in rural and remote Australia." *Medical Journal of Australia*, S14-S17.
- 38 McFarlane, A. C., & Van Hooff, M. (2009). "Impact of childhood exposure to a natural disaster on adult mental health: 20-year longitudinal follow-up study." *The British Journal of Psychiatry*, 195(2), 142-148.
- 39 Kousky, C. (2016). "Impacts of natural disasters on children." *The Future of children*, 73-92.
- 40 Gibbs, L., Nursey, J., Cook, J., Ireton, G., Alkemade, N., Roberts, M., ... & Forbes, D. (2019). "Delayed disaster impacts on academic performance of primary school children." *Child development*, 90(4), 1402-1412.
- 41 NSW Department of Education (2020). "The impact of bushfires on student wellbeing and student learning".
- 42 Gibbs, L., Nursey, J., Cook, J., Ireton, G., Alkemade, N., Roberts, M., ... & Forbes, D. (2019). "Delayed disaster impacts on academic performance of primary school children." *Child development*, 90(4), 1402-1412.
- 43 Ibid.
- 44 Australian Institute for Disaster Resilience, (2019). "Ten years after the Black Saturday fires, what have we learnt from post-fire research?", *Australian Journal of Emergency Management* .
- 45 Australian Disaster Resilience, "Tropical Cyclone Yasi, 2011" <https://knowledge.aidr.org.au/resources/cyclone-cyclone-yasi-queensland-2011/>.
- 46 Nouwelant, Ryan van den and Ciben, Alessia, (2022). "The impact of housing vulnerability on climate disaster recovery: The 2022 Northern Rivers Floods." University of New South Wales City Futures Research Centre.
- 47 UNICEF Australia (2022). "2022 Flood Response and Recovery – Children's Needs Assessment."
- 48 Our World in Data, (2022). "Number left homeless from natural disasters, 1900 to 2023".
- 49 Seddighi, H., Salmani, I., Javadi, M. H., & Seddighi, S. (2021). Child Abuse in Natural Disasters and Conflicts: A Systematic Review. *Trauma, Violence, & Abuse*, 22(1), 176-185. <https://doi.org/10.1177/1524838019835973>
- 50 Cerna-Turoff, I., Fischer, HT., Mansourian, H. et al. The pathways between natural disasters and violence against children: a systematic review. *BMC Public Health* 21, 1249 (2021). <https://doi.org/10.1186/s12889-021-11252-3>
- 51 Australian Institute of Health and Welfare (2022). "Medicare-subsidised GP, allied health and specialist health care across local areas: 2021–22".
- 52 Productivity Commission (2023). "13 Services for Mental Health".
- 53 Department of Education (2023). "Benefits of Educational Attainment".
- 54 Productivity Commission (2023). "19 Homelessness Services".
- 55 Li, A., Toll, M., & Bentley, R. (2023). "Health and housing consequences of climate-related disasters: a matched case-control study using population-based longitudinal data in Australia." *The Lancet Planetary Health*, 7(6), e490-e500.
- 56 Department of Social Services (2023). "Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC)".
- 57 Australian Bureau of Statistics (2023). "National Study of Mental Health and Wellbeing".
- 58 Slade, T., Johnston, A., Oakley Browne, M. A., Andrews, G., & Whiteford, H. (2009). "2007 National Survey of Mental Health and Wellbeing: methods and key findings." *Australian & New Zealand Journal of Psychiatry*, 43(7), 594-605.
- 59 UNICEF Australia (2022) "After The Disaster: Recovery for Australia's Children".
- 60 Ibid
- 61 Cerna-Turoff, I., Fischer, H. T., Mayhew, S., & Devries, K. (2019). "Violence against children and natural disasters: A systematic review and meta-analysis of quantitative evidence". *PloS one*, 14(5), e0217719.
- 62 World Vision Australia (2020). "Our world our say: National survey of children and young people on climate change and disaster risk".
- 63 NSW Department of Education, (2020). "The impact of bushfires on student wellbeing and student learning".
- 64 It is noted that both of these approaches are available but were outside the scope of this analysis.



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