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When Protection Fails: Disasters and Violence Against Women

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Rafat Mahmood[†] and Pushkar Maitra[‡]

May 1, 2026

Abstract

Natural disasters are a growing global threat, yet their consequences for gender-based violence (GBV) in high-income countries with strong institutional protections remain largely unknown. We address this gap using administrative crime records linked to disaster declarations at the Local Government Area level in Australia. Applying staggered difference-in-differences estimation techniques, we find that disasters cause short-run increase family, domestic and sexual violence with effects concentrated in the first one to three months following a disaster. Strikingly, these effects are larger in urban and affluent areas, an outcome that is difficult to reconcile with a pure economic-stress mechanism, and is more consistent with institutional strain and differential reporting environments. To probe the underlying pathway, we draw on complementary household survey evidence, which points to mental health deterioration and increased intra-household conflict as individual-level mechanisms. Together, our findings suggest that even well-resourced institutional settings offer only incomplete protection against disaster-induced violence against women.

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1 Introduction

Climate change is increasing the frequency and severity of natural disasters worldwide (IPCC, 2021, CSIRO and Bureau of Meteorology, 2022). It has been argued that by disrupting livelihoods and generating fluctuations in incomes and earnings (Miguel, 2005, Sekhri and Storeygard, 2014, Abiona and Koppensteiner, 2016, Diaz and Saldarriaga, 2023), natural disasters or environmental shocks can have significant effects on many different dimensions of life. Through it effects on conflicts (Miguel et al., 2004, Harari and La Ferrara, 2018) and household bargaining (Aizer, 2010, Anderberg et al., 2016), such shocks can increase the prevalence of gender based violence. However, this evidence is drawn entirely from low and middle income countries, where the dominant mechanism through which environmental shocks affect gender based violence is economic stress operating through livelihood disruption (see, for example, Thurston et al., 2021). Virtually nothing is known about whether the disaster-violence link persists in high-income settings where there are extensive legal protections, a generally well functioning welfare system, and specialist support services. This gap matters for two reasons. *First*, the mechanisms that drive disaster-related violence in developing countries, primarily agricultural income shocks, may be largely absent in advanced economies, raising the question of whether alternative channels, such as institutional disruption or psychosocial stress, can independently generate violence (Brady et al., 2004, Card and Dahl, 2011, Luca et al., 2015). *Second*, disaster exposure is a global phenomenon that extends well beyond low- and middle-income countries; over the past 20 years higher-income countries experienced 56% of recorded disasters, while lower-income countries experienced 44% (CRED, 2015). While substantial populations in high-income settings have relatively strong legal, welfare, and disaster response systems, a key policy question is whether such institutional capacity is sufficient to buffer the gendered social costs of environmental shocks.

This paper investigates the causal effect of officially declared natural disasters on gender based violence in Australia. We do so by combining administrative data on reported crime and disaster declarations at the local government area (LGA) with nationally representative household surveys. Australia provides a compelling setting: it ranks among the most disaster-exposed high-income countries (OECD, 2022, Maes et al., 2022), with annual disaster costs projected to rise from approximately $38 billion (AUD) to over $70 billion (AUD) by 2060 (Deloitte Access Economics, 2017). Relatedly, the prevalence of gender based violence is high and possibly increasing. Approximately one in four Australian women has experienced violence by an intimate partner since the age of 15 (Australian Bureau of

Statistics, 2023), and domestic and family violence imposes estimated costs exceeding $26 billion (AUD) annually (KPMG, 2016).[1]

To examine the impact of natural disasters on gender based violence, we use administrative crime data (police records) from New South Wales, the largest state in Australia. It is also the only state with consistently defined and sufficiently granular monthly data on both crime outcomes and disaster declarations at the local government area level. Comparable administrative series from other states are not harmonised in terms of crime classification and granularity, limiting their suitability for a consistent panel analysis. We complement this with household level survey data, focusing on New South Wales, Victoria, and Queensland, which together account for over 80 percent of the population that report disaster exposure.

Event study estimates (where the event is the declaration of a natural disaster in a local government area or LGA) show that domestic violence related assaults, measured by the registered cases as per police records rise by approximately 1.9 incidents in month 2 post the first disaster affecting the LGA, relative to baseline levels. Sexual assaults increase by roughly 1.4 incidents in the first month post-disaster. Sexual acts (which include non-penetrative sexual offences and sexual touching), exhibit short-lived increases of around 1.3 incidents immediately post-disaster. Aggregating these outcomes into a broader measure of gender based violence, we find an overall increase of roughly 2.3 incidents per LGA in the first month following a disaster. Effects are concentrated in months 1 to 3 post-disaster and dissipate thereafter. Stacked event-study estimates that incorporate repeated disaster exposures confirm these patterns.

A notable pattern of heterogeneity emerges in the results. Post-disaster increases in gender based violence are larger in urban and affluent LGAs than in rural and disadvantaged ones. This pattern is difficult to reconcile with a pure economic-stress mechanism, which would predict stronger effects in poorer areas where households have fewer resources to absorb shocks. One possible interpretation is that the results reflect a combination of institutional factors and reporting behaviour. Urban and affluent communities are more embedded in

[1]The National Community Attitudes Survey (NCAS) 2021 finds that one-in-four Australians adults agreed that much of what is called domestic violence is a normal reaction to day-to-day stress and frustration (see, for example Coumarelos et al., 2023). Close to 25% of Australians hold attitudes that minimize violence against women and shift blame; almost a third of Australians hold attitudes that mistrust women's reports of violence and a significant minority (10–25%) hold attitudes that objectify women and disregard their consent. It is also a matter of concern that there has been a lack of any significant improvement in attitudes towards family and domestic violence between 2017 and 2021.

formal support systems, including specialist police units, family violence services, and crisis counselling, which may be temporarily strained or reallocated during disaster response (Parkinson and Zara, 2013, Parkinson, 2019, Thurston et al., 2021). At the same time, however, reporting of gender based violence may be less likely in rural areas due to limited access to services and conservative social norms (Community Legal Centre NSW, 2020).[2] We are not able to separately disentangle these channels, and the observed heterogeneity likely reflects both mechanisms.

To understand the mechanisms driving our results, we trace an individual-level pathway using two nationally representative longitudinal surveys. Data from the Household, Income and Labour Dynamics in Australia (HILDA) survey show that disaster exposure is associated with mental health declines of 5.0 points for women and 3.8 points for men on the MHI-5 scale, with the gender gap being statistically significant. Data from the Longitudinal Study of Australian Children (LSAC) show that disaster-affected households report increased partner conflict, with fathers' reports of conflicts rising by approximately 2.8 to 3.5 percentage points and mothers' reports by approximately 2.3 to 2.8 percentage points following exposure. Three separate data sources thus document each link in the chain: disasters generate psychological distress, which spills over into household tension, which possibly manifests as violence.

This paper makes three contributions. *First*, it provides the first large-scale causal evidence on the disaster-gender based violence link in a high-income country using administrative data, extending a literature that has been almost entirely confined to developing-country settings (Miguel et al., 2004, Harari and La Ferrara, 2018, Lackner, 2018). *Second*, it contributes to the literature on determinants of violence against women by identifying disasters as macro-level shocks that influence household behaviour and gender norms (Aizer, 2010, Stevenson and Wolfers, 2006, Miller and Segal, 2019, Amaral et al., 2021) and relates to the emerging evidence from the COVID-19 pandemic on how large-scale crises affect intra-household violence (Chandan et al., 2020, Aguero, 2021, Brink et al., 2021). *Third*, it documents the individual-level psychosocial pathway using complementary survey data, tracing the chain from disaster exposure through mental health deterioration to household conflict and violence.

The remainder of the paper proceeds as follows. Section 2 provides institutional background

[2] The NCAS surveys report that men, older individuals, respondents in the lower socio-economic areas and those without university education are more likely to hold attitudes associated with greater tolerance of gender based violence.

on disasters and gender based violence in Australia. Section 3 describes the data sources and outlines the empirical strategy. Sections 4 and 5 present the main results for administrative and household data, respectively, followed by supplementary analyses and mechanisms. Section 6 concludes.

2 Institutional Background: Disasters and GBV in Australia

Australia is highly exposed to natural hazards, including bushfires, floods, cyclones, and severe storms. Cross-country comparisons highlight the scale of this exposure: Australia ranks second globally in population exposure to wildfires, fifth in forest exposure to wildfires, third in cropland exposure to drought, and sixth in population exposure to extreme temperatures (OECD, 2022, Maes et al., 2022). Climate trends indicate rising heat stress and intensifying fire activity (Canadell et al., 2021). Consistent with these trends, the number of properties exposed to high risks from river flooding, coastal inundation, bushfires, and wind damage is projected to double from about 383,000 in 2020 to 736,000 by 2100 (Mallon et al., 2019).

These hazards vary in their geographic distribution and frequency, but collectively they impose substantial economic and social costs on communities. Over the past several decades, major disasters such as the 2009 Black Saturday bushfires in Victoria, the 2010–2011 Queensland floods, and repeated large-scale bushfire seasons have underscored the vulnerability of both urban and regional populations to environmental shocks (Teague et al., 2010, Queensland Floods Commission of Inquiry, 2012, CSIRO and Bureau of Meteorology, 2022). In response, Australia has developed a relatively comprehensive disaster management framework that emphasizes preparedness, coordinated emergency response, and post-disaster recovery (Australian Government Department of Home Affairs, 2018). Disaster declarations typically trigger the mobilization of state and federal resources, including emergency services, financial assistance, and reconstruction programs administered through arrangements such as the Disaster Recovery Funding Arrangements (DRFA). Disaster policy has historically focused on infrastructure damage, economic losses, and community recovery. However, there is increasing recognition that disasters also generate critical social impacts at the household level, including changes in intra-household dynamics and wellbeing (Australian Institute for Disaster Resilience, 2018).

One such impact concerns gender based violence. Research and policy reports increasingly highlight that disasters may exacerbate existing gender inequalities and expose women to heightened risks of violence during the recovery period (Parkinson and Zara, 2013, Parkinson, 2019, Thurston et al., 2021). These risks can arise through multiple channels. Disasters often disrupt employment, housing stability, and household finances, generating stress and uncertainty that may intensify conflict within families. Emergency conditions may also weaken informal and formal support networks that typically help prevent or respond to violence. For example, displacement, temporary housing arrangements, and damaged infrastructure can reduce privacy, increase crowding, and limit access to support services, thereby affecting both the incidence and reporting of violence (Enarson and Chakrabarti, 2009, Enarson and Pease, 2016). In addition, emergency responses that prioritize physical safety and infrastructure restoration may initially overlook gendered vulnerabilities, particularly during the immediate aftermath of disasters.

Evidence from Australia suggests that these dynamics can manifest in measurable ways. Studies examining post-disaster recovery following major bushfires and floods report that incidents of domestic and family violence may rise in affected communities, sometimes several months after the initial event (Parkinson, 2019). Qualitative and community-based research conducted after disasters has documented increases in controlling behaviour, emotional abuse, and physical violence reported by women during the recovery phase. These patterns have been attributed to a combination of economic stress, loss of housing, disruptions to employment, and the psychological effects of trauma experienced by households and communities (Parkinson and Zara, 2013). Such findings align with broader international evidence suggesting that disasters can amplify existing social inequalities and power imbalances within households.

The Australian institutional context may, however, mitigate some of these risks. Australia has a relatively extensive network of legal protections, welfare programs, and support services addressing domestic and family violence. National and state-level initiatives, including dedicated hot-lines, specialized police units, and integrated support services, aim to assist victims and improve reporting and enforcement. Over the past decade, governments have also increasingly incorporated gender considerations into disaster resilience and recovery planning. For example, national policy frameworks such as the National Strategy to Reduce Violence against Women and their Children emphasize the importance of coordinated responses across emergency management, policing, and social services (Commonwealth of Australia, 2022). These institutional features suggest that the effects of disasters on gender based violence in Australia may differ from those observed in lower-income or institutionally weaker contexts where support services are limited.

This institutional strength, however, also generates specific vulnerabilities. Communities that rely heavily on formal protective services may be most exposed when those services are temporarily disrupted. Emergency evacuations, temporary accommodation, and the reallocation of policing resources during disaster response can temporarily reduce access to protective services and weaken informal social monitoring. Urban areas, which depend disproportionately on formal institutions rather than informal networks, may therefore experience the largest gaps in protection precisely when disasters strike.

In addition, disaster-related stress and trauma have been linked to increased substance use and relationship strain, factors associated with a higher risk of interpersonal violence (Brady et al., 2004, Card and Dahl, 2011). Qualitative research further clarifies the nature of these dynamics by showing that disasters tend to exacerbate pre-existing patterns of intimate partner violence rather than generate entirely new behaviours. In the Australian context, interview-based evidence from women affected by the 2009 Black Saturday bushfires indicates that post-disaster violence is often experienced as a continuation or escalation of prior abuse (Parkinson, 2019, Parkinson and Zara, 2013). These studies also highlight forms of institutional mis-recognition. Women's reports of violence are sometimes minimized or re-framed as situational "outbursts" linked to crisis stress, which can limit access to support services (Parkinson and Zara, 2013). More broadly, qualitative accounts suggest that gender based violence becomes less visible, and is less in focus, during disaster response and recovery, as policy attention shifts toward reconstruction and community resilience, reinforcing barriers to recognition and help-seeking (Enarson and Morrow, 1998). These impacts may be amplified in rural and remote areas, where barriers to reporting are already more pronounced (Community Legal Centre NSW, 2020).

3 Data and Methodology

We use a number of different data sets in our analysis.

3.1 Crime Statistics

Our analysis of gender related violence outcomes uses monthly criminal incident data from the New South Wales Bureau of Crime Statistics and Research (BOCSAR). BOCSAR publishes open datasets containing verified records of criminal incidents reported to or detected by the New South Wales (NSW) Police Force and recorded on the Computerized Operational Policing System (COPS; BOCSAR (2025a)). These datasets provide comprehensive monthly counts of criminal incidents by offence type and geographic unit, including Local Government Areas (LGAs), for the period 1995 to the most recent release September 2025 (BOCSAR, 2025a).[3]

BOCSAR's criminal incident data classify offences according to major offence categories aligned with police incident categories. The standard recorded crime publications report on 13 major offence groups, including personal violence categories such as assault and sexual offences, as well as property and other crime types (BOCSAR, 2025b). For this paper, we focus on two gender-relevant offence categories: domestic violence-related assault and sexual assault incidents.

Domestic violence-related incidents are a subset of assault offences where the police have flagged the incident as involving family or domestic violence. In BOCSAR's classification system, any assault or related offence is flagged as domestic when it involves violence or threats within a current or previous intimate or family relationship, consistent with NSW Police procedures for identifying domestic violence incidents in the COPS database (BOCSAR, 2025b). These incidents capture non-fatal physical violence and threats of violence perpetrated by intimate partners or family members and are reported as monthly counts at the LGA level.

Sexual assault incidents in the BOCSAR dataset include police recorded categories of sexual assault, aggravated sexual assault, and assault with intent to have sexual intercourse (BOCSAR, 2025b). Sexual assault is treated as a major offence category distinct from other violent and property offences. We also use data on sexual touching, sexual act and other sexual offences as a separate outcome named *Sexual acts*, that captures non-penetrative

[3] We focus on New South Wales because it is the only state with consistently defined, publicly available, and sufficiently granular monthly administrative crime data by offence type and Local Government Area (LGA) over a long time horizon. Comparable data from other Australian states are either not publicly available at the same level of geographic and temporal disaggregation or are not harmonized in offence classification and reporting structures, which limits cross-state comparability in a panel event-study framework.

sexual offences defined under the NSW Crimes Act.

Finally, we compute a composite measure of Family, Domestic and Sexual Violence (FDSV) defined as follows:

$$\text{FDSV}_{lmt} = \text{Domestic Violence}_{lmt} + \text{Sexual Assault}_{lmt} + \text{Sexual Acts}_{lmt},$$

Domestic Violence$_{lmt}$, Sexual Assault$_{lmt}$, Sexual Acts$_{lmt}$ and FDSV$_{lmt}$ denote the number of reported domestic violence assaults, sexual assaults, sexual acts and the composite (aggregated) measure of gender based violence in LGA l in month m in year t. Figure 1a provides a cross-sectional snapshot of incidence of Family, Domestic and Sexual Violence (FDSV) across LGAs in NSW. To keep the map legible we restrict it to a single year (2022); the geographic pattern is broadly representative of the sample period. Incidence is highest in the north-east coastal strip and the Hunter Valley, and tends to be lower in inland and far-western areas. This is not surprising since the former region is more populated than the latter. In our regressions we take into account LGA fixed effects so econometrically all comparisons are within LGA.[4]

While the BOCSAR data do not explicitly identify the gender of the victim, research consistently demonstrates that the victims in domestic violence-related assaults and sexual offences are disproportionately women. National surveys indicate that while around one in four Australian women has experienced violence from a current or former partner since the age of 15, the prevalence among men is markedly lower (Australian Bureau of Statistics, 2023). Similarly, sexual assault and other non-consensual sexual acts overwhelmingly target women, with over 80 percent of victims in national crime statistics being female (Australian Institute of Health and Welfare, 2023). Studies of police-reported incidents corroborate this pattern: In 2018, females experienced police-recorded sexual assault at a rate nearly seven times higher than that of males (Australian Institute of Health and Welfare, 2023). As these offence types predominantly capture harm experienced by women, it allows us to meaningfully measure gendered vulnerabilities despite the absence of individual-level gender identifiers.

Panel A1 of Table 1 presents the average number of reported cases by the different categories for the period 1995–2025, the entire period for which the reported crime data is available.

[4] Figure A2 in the Appendix present the distribution of reported DV assaults, Sexual assaults and Sexual acts across the LGAs in 2022. The patterns for the individual component is similar to those presented for the aggregated measure FDSV.

Table 1: Selected Descriptive Statistics

	Mean	**SD**
Panel A: NSW Crime (BOCSAR)		
Panel A1: Full Sample (1995–2025)		
DV Assaults	16.92	25.01
Sexual Assaults	3.29	5.28
Sexual Acts	4.05	6.05
FDSV	24.26	34.45
Panel A2: Matched Period (2019–2025)#		
DV Assaults	22.10	30.75
Sexual Assaults	5.52	7.81
Sexual Acts	5.25	7.33
FDSV	32.87	44.08
Panel C: National Emergency Management Agency (NEMA)		
Total Number of Disasters	4.98	1.49
Disaster Payments	7438840.00	18500000.00
Disaster Payments (25th Percentile)	40000.00	
Disaster Payments (50th Percentile)	398163.00	
Disaster Payments (75th Percentile)	4785400.00	
Panel D: HILDA		
Disaster Experienced†	0.013	0.112
Male		
Mental Health Score	74.555	17.011
Mental Health Problem (Score $<$ 50)	0.083	0.277
Female		
Mental Health Score	71.900	17.952
Mental Health Problem (Score $<$ 50)	0.112	0.316
Panel E: LSAC§		
Disaster Experienced‡	0.063	0.243
Mother Reports *Domestic Violence*	0.374	0.484
Father Reports *Domestic Violence*	0.495	0.500

Notes: # Years for which disaster data is available. † HILDA *Disaster Experienced* = 1 if the household reports weather-related damage (flood, bushfire, cyclone) in the past 12 months. ‡: LSAC *Disaster Experienced* = 1 if the household reports exposure to bushfire, flooding, or severe storm in the past 12 months. § Panels D and E report statistics for NSW, Victoria, and Queensland only.

Domestic violence assaults makes up the large majority of the total number of reported cases of gender based violence. Across the different LGAs in the state, the average number of DV assaults reported is 17, sexual assaults is 3.3 and sexual acts is 4.05. Aggregating over the three categories, the average number of reported cases of the composite measure FDSV is 24.3.

Figure A1 in the Appendix presents the patterns of reported cases by year (Figure A1a) and month (Figure A1b). Over the period 1995–2025, there is a large increase in the number of reported cases: for example, the total number of reported cases gender based violence has gone up by roughly 400%: 10 in 1995 to around 40 in 2025. The increase in particularly sharp over the period 2019–2025 (the key period of our analysis because the data on disasters is only (publicly) available for this period, see Section 3.2, below). However, one cannot say whether the increase observed over the period is due to increased reporting or increased incidence.

Panel A2 of Table 1 presents the average number of reported cases by the different categories for the period 2019–2025 (this is the period for which the data on disasters is available).[5] The average number of cases in each of the four categories is higher during the period 2019–2025, than the corresponding averages over the entire period 1995–2025.

3.2 Disasters

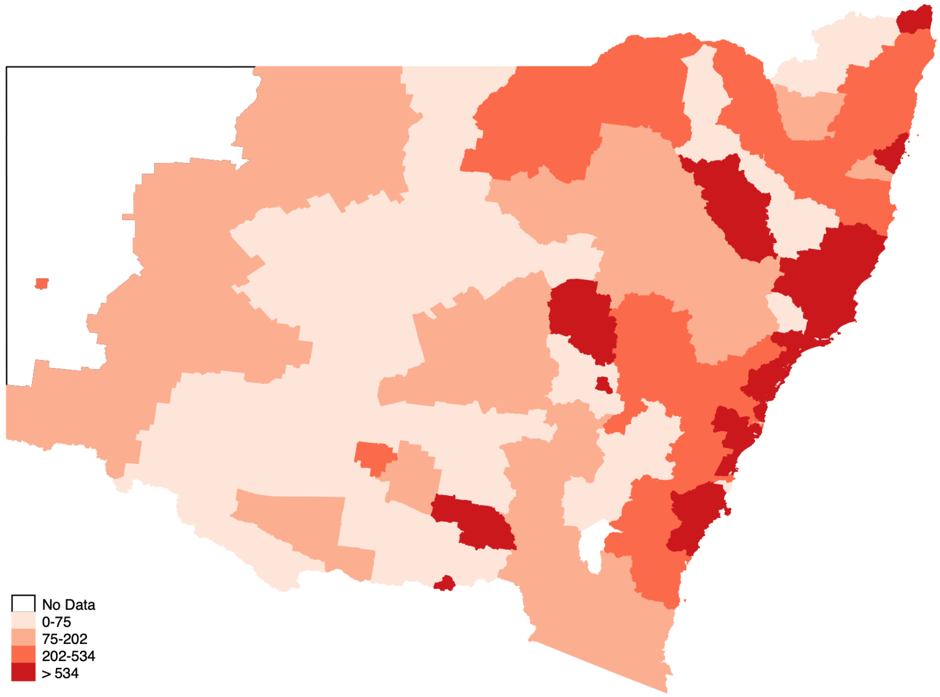
Our primary measure of disaster exposure is derived from the *Location-Based Disaster Assistance Payments* dataset, published by the Australian Government's National Emergency Management Agency (NEMA) and made publicly available online. This dataset provides a comprehensive history of disaster assistance payments at the LGA level for all Australian states and territories, covering disaster declarations and related relief payments since 2019 (NEMA, 2025).

We aggregate these data to construct panel treatment variables capturing both the timing and intensity of disaster exposure by LGA. Because the timing of disasters varies across LGAs, we adopt a staggered treatment design that exploits this variation in treatment timing. In our main specification, we focus on the first disaster experienced by each LGA

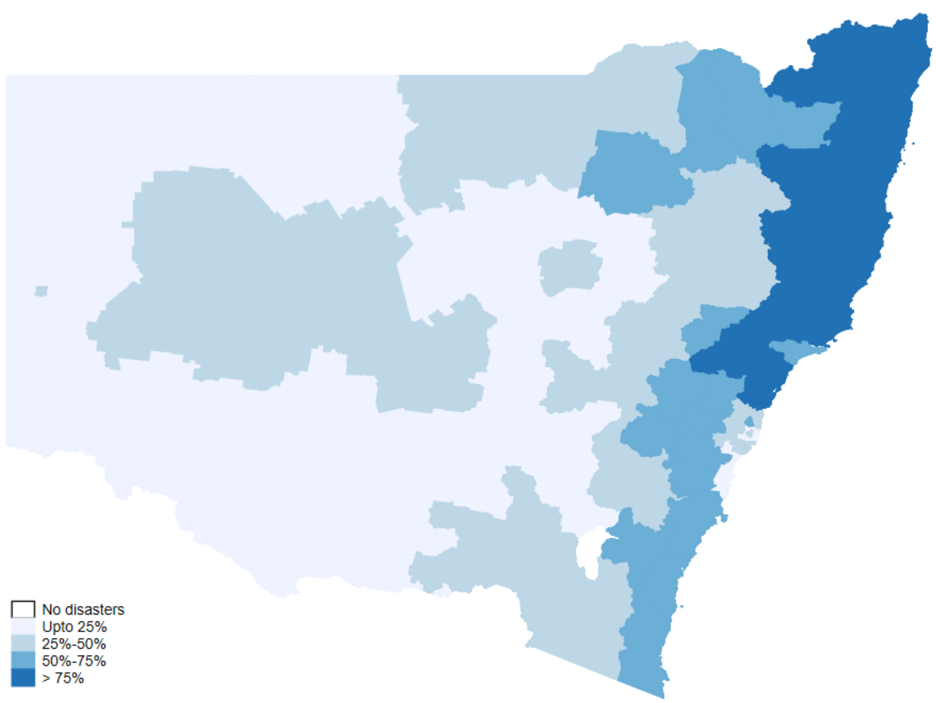
[5] Since we estimate both a first-disaster design and a staggered event study specification with LGA and time fixed effects, time-varying aggregate shocks such as COVID-19 are absorbed and are unlikely to confound the estimated effects.

Figure 1: Crime and Disasters by LGA in NSW

(a) Family, Domestic and Sexual Violence



(b) Disasters



Notes: Figure 1a presents the distribution of incidences of GBV (the composite measure) across LGAs in NSW 2022. Figure 1b presents the distribution disasters by percentiles of disaster payments across LGAs, during the period 2019–2025. Distribution of the individual components of GBV across LGAs presented in Figure A2 in the Appendix.

during the sample period. This approach isolates the initial impact of disaster exposure and avoids conflating effects across repeated events. To capture the dynamic effects of repeated shocks, we implement a stacked event study design that incorporates all disaster occurrences within an LGA. In alternative specifications, we restrict the sample to the top 50 percent of affected LGAs ranked by total disaster payments, thereby focusing on areas experiencing more severe exposure. Together, these measures capture variation in both the incidence and intensity of disasters at a granular geographic level.

The use of payment-based disaster histories has several advantages. *First*, it reflects the official recognition of adverse events by relevant authorities and is directly tied to economic and social disruption experienced by households and communities. *Second*, the consistent coverage across states and years facilitates comparison and longitudinal analysis. *Finally*, the linkage to Services Australia payment systems means that the dataset captures events that triggered tangible financial assistance, which is closely related to households' disaster experience and potential socio-economic stressors that may influence behavioural outcomes.

Panel B of Table 1 presents descriptive evidence on the number of disasters and disaster payments. The average number of disasters per LGA over the period 2019–2025 is 5. The average disaster payments is AUD 7,438,840 (the median is a considerably lower AUD 398,163). Figure A3a in the Appendix shows that there is a wide variation in the total number of declared disasters per year: from none in 2020 and 2024 to almost 400 in 2022. In the same vein there is wide variation in the median disaster payments per year (see Figure A3b in the Appendix).

Figure 1b presents the cross-sectional distribution of disaster exposure across NSW local government areas, measured by percentile of total disaster payments over 2019–2025. Disaster-affected areas are concentrated along the north-east coast, consistent with the flood- and storm-prone character of that region, while many inland and far-western LGAs recorded no qualifying disaster events over this period.

3.3 Supplementary Household Data

To complement the administrative crime data, we leverage nationally representative longitudinal household surveys in Australia, namely the Household, Income and Labour Dynamics in Australia (HILDA) Survey (Waves 1–23) and the Longitudinal Study of Australian Children (LSAC). Because more than 85 percent of disaster exposure in HILDA and 82 percent in LSAC is concentrated in New South Wales, Queensland, and Victoria, we restrict our supplementary analysis using household level data from these three states. This restriction improves statistical power by concentrating on regions with meaningful treatment variation, while limiting attenuation bias arising from a large share of observations with little or no exposure.

The HILDA survey is a longitudinal household-based study conducted in Australia that has been running since 2001. It tracks a large sample of Australian households over time, collecting detailed information on economic and personal well being, labor market dynamics, and family life. The LSAC is another major national study that tracks the development and well being of Australian children from infancy through to young adulthood. It follows two cohorts: the first recruited as infants (the "Birth cohort") while the second recruited four-to-five-year-olds (the "Kindergarten cohort"). The survey collects rich data from children, their parents, care-givers, and teachers across a wide range of domains including physical health, cognitive development, social and emotional well being, and family and community environments. These datasets allow us to examine individual- and household-level outcomes related to disaster exposure, including mental health and experiences of intra-household conflict.

In HILDA, respondents report whether their household was affected by a major natural disaster, such as floods, bushfires, or cyclones, during the survey reference period. We define a variable $Disaster\ Experienced = 1$ if the household responded yes to the following question: *in the last 12 months, a weather related disaster (flood, bushfire, cyclone) damaged or destroyed your home*. We use this information to construct an individual- and household-level measure of disaster exposure, enabling an analysis of the broader social and psychological impacts of such events beyond administrative crime counts.

HILDA includes a validated measure of mental health via the Mental Health Inventory (MHI-5), derived from the SF-36 health scale. The index captures psychological distress and emotional well being, with higher values indicating better mental health. We interpret decreases in MHI-5 scores as deterioration in well being and increases as improvements. While our administrative analysis identifies the causal impact of disasters on crime, the survey data allow us to explore potential individual-level pathways. In particular, we examine whether individuals exposed to disasters report worse mental health outcomes, providing suggestive evidence on the link between disaster exposure and psychological distress.

Panel D of Table 1 shows that around 1% of households in NSW, Queensland, and Victoria across the HILDA waves report *yes* to *Disaster Experienced*. For males, the average mental health score (MHI-5) is 74.5 and 8% of males have a mental health problem (mental health score < 50). The corresponding averages for women are 72 and 11%.

The LSAC also includes questions related to disaster exposure, allowing us to examine similar mechanisms within a household context. We use the LSAC question covering stressful life events: specifically households are asked *in the last 12 months, have you had your home or local area affected by bushfire, flooding or a severe storm*?. In this case the indicator variable $Disaster\ Experienced = 1$ if the response was *yes* to this question. Additionally, the LSAC data contains information on intra-household conflict: reported experiences of violence between partners. Both the mother and the father of the sampled child is asked about violence with partners. Specifically they were asked: *how often do you have arguments with your partner that end up with people pushing, hitting, kicking or shoving?* Responses are on a five-point scale (Never, Rarely, Sometimes, Often, Always). We consider any response other than *Never* as an indication of intra-household conflict: $Domestic\ Violence = 1$ if the parent responds Rarely, Sometimes, Often, Always to the question. Panel E of Table 1 shows that 6% of households in NSW, Queensland, and Victoria respond *yes* to the question on *Disaster Experienced*. 37% of mothers and 49.5% of fathers in the sample report that they have had arguments with their partner that ended up with people pushing, hitting, kicking or shoving (exposure $Domestic\ Violence$). The LSAC data therefore provides an additional lens to study the association between disaster-related shocks, household stress, and risks of violence.

3.4 Empirical Strategy

To identify the causal effect of natural disasters on gender based violence outcomes, we exploit the staggered timing of disaster exposure across Local Government Areas (LGAs) in New South Wales. We implement event-study difference-in-differences (DID) designs following the methodology developed by Sun and Abraham (2021). Our approach accounts for treatment effect heterogeneity and variation in treatment timing across units.

First Disaster Event

Let Y_{lmt} denote the outcome of interest (e.g., counts of DV assault, sexual assault, sexual acts or FDSV) in LGA l in month m of year t. We define the first disaster exposure month for LGA l as T_l^{first} and construct event-time indicators

$$D_{l,m}^k = \mathcal{I}\{m - T_l^{first} = k\}, \quad k \in \{-6, \ldots, -2, 0, \ldots, 6\},$$

where $k = -1$ serves as the omitted baseline month. To improve precision and avoid sparsely populated leads, all periods $k \leq -6$ are pooled into a single pre-treatment bin.

The canonical event-study DID specification is:

$$Y_{lmt} = \sum_{k=-6}^{-2} \beta_k D_{l,m}^k + \sum_{k=0}^{6} \beta_k D_{l,m}^k + \alpha_l + \gamma_m + \delta_t + \lambda_l \times t + \epsilon_{lmt} \tag{1}$$

where Y_{lmt} is the outcome of interest, as defined above. The event-time dummy $D_{l,m}^k$ equals one if month m falls k months from the first disaster in LGA l, and zero otherwise. The coefficients β_k capture the dynamic effect of disaster exposure relative to the baseline month $k = -1$, which is omitted. Pre-disaster coefficients allow testing for parallel trends, while post-disaster coefficients reveal dynamic treatment effects.

The LGA fixed effects α_l control for all time-invariant characteristics of the LGA, including baseline population, baseline crime rates, or long-standing policing practices. This means that the analysis compares outcomes within the same LGA over time. Month fixed effects γ_m account for seasonality or temporal patterns common across LGAs, for instance, higher rates of certain crimes during holiday periods. Year fixed effects δ_t capture annual shocks that affect all LGAs simultaneously, such as changes in state-level policing policies, reporting standards, or macroeconomic conditions.

$\lambda_l \times t$ captures LGA-specific linear time trends, allowing each LGA to follow its own smooth trend in outcomes over time. This is important because different LGAs may be experiencing gradual changes unrelated to disasters. For example, some LGAs may see steady population growth or urbanisation, leading to rising reported crime over time, while others may experience declining crime due to long-run investments in policing or community programs. Similarly, improvements in reporting infrastructure, such as the rollout of domestic violence reporting units or awareness campaigns, may increase recorded incidents in some LGAs but not others. Without controlling for these differential trends, such gradual changes could be incorrectly attributed to disaster exposure. Finally, ϵ_{lmt} is the idiosyncratic error term.

Equation (1) is estimated using the Sun and Abraham (2021) method, which allows for heterogeneity in treatment effects across time and treated units. As there are no never-treated units in this sample, our identification relies on using the last-treated LGAs as the comparison group, following the standard staggered adoption framework in Sun and Abraham (2021). In the estimation of equation (1), we cluster standard errors at the LGA by calendar month level to account for persistent seasonal correlation in crime outcomes. Crime exhibits strong and systematic seasonal patterns, with outcomes in, for example, January within a given LGA likely to be correlated across years due to recurring factors such as weather conditions, holidays, and policing cycles. Clustering at the LGA-month level allows for arbitrary correlation in the error term within each LGA and calendar month cell over time, thereby addressing serial dependence driven by seasonality. At the same time, this approach preserves cross-month variation within LGAs, which is central to identifying the dynamic effects of disasters in the event study framework.[6]

Stacked Event-Study

Many LGAs experience multiple disasters over the study period. To account for repeated exposures while maintaining clear pre- and post-treatment windows, following Sun and Abraham (2021) we implement a stacked event-study design.

For each disaster cohort c, we define a cohort-specific event-time variable:

$$E_{l,m}^{(c)} = m - T_l^{(c)},$$

where $T_l^{(c)}$ is the month of the c^{th} disaster affecting LGA l. We then create a separate 12-monthly stacked dataset for each disaster event, including all LGA-month observations around the disaster.

A key challenge in the stacked event-study design arises when the pre-disaster period of a

[6] As a robustness check, we also report results by incrementally adding fixed effects and clustering standard errors at the LGA level in Tables B1, B2, B3, and B4 in the Appendix. The results are consistent across various specifications and clustering choices.

later disaster overlaps with the post-disaster period of an earlier disaster in the same LGA. To avoid contamination between events, we first identify, for each LGA, the month of the next disaster following the current event. Any observations in the six-month pre-period of this subsequent disaster that fall within the post-period of a previous disaster are flagged as overlapping. These overlapping months are then removed from the stacked dataset, ensuring that each disaster's pre- and post-disaster windows are mutually exclusive. After dropping the overlapping observations, event-time variables are recomputed relative to each disaster in the stack. Leads and lags for the event-study are defined as $k = -6, \ldots, -2$ for pre-disaster months and $k = 0, \ldots, 6$ for post-disaster months, with extreme bins (e.g., $k \leq -6$) collapsed to improve estimation precision. Last treated LGAs serve as the comparison group.

Formally, the stacked event-study regression is:

$$Y_{lmt} = \sum_{c} \sum_{k=-6}^{6} \beta_k^{(c)} \mathcal{I}\{E_{l,m}^{(c)} = k\} + \alpha_l + \gamma_m + \delta_t + \lambda_l \times t + \epsilon_{lmt} \tag{2}$$

where α_l are LGA fixed effects, γ_m are month fixed effects, δ_t are year fixed effects, $\lambda_l \times t$ are the LGA-specific time trends, and ϵ_{lmt} is the error term. Standard errors are clustered at the LGA-month level. By construction, each $\beta_k^{(c)}$ measures the effect of disaster c relative to its baseline month ($k = -1$), without contamination from other disasters in the same LGA. This approach allows us to estimate dynamic, causal effects of repeated disasters on FDSV and other crime outcomes while preserving clean pre-disaster baselines for each event.

Alternative Specifications and Validation.

To address potential concerns regarding identification and measurement, we implement a series of robustness checks, with full results presented in Section 4.3. *First*, we estimate alternative event-study specifications using recently proposed DID estimators that differ in how they handle treatment effect heterogeneity and comparison groups, including Callaway and Sant'Anna (2021) and Borusyak et al. (2024). *Second*, we assess sensitivity to the definition of disaster exposure by restricting the sample to high-intensity events, defined as LGAs in the top 50% of disaster-related payment receipts, thereby focusing on areas most likely to have experienced direct impacts and reducing potential misclassification due to population displacement. *Third*, we augment the baseline specification by including time-varying LGA-level population to account for potential changes in exposure arising from population variation over time. Across these alternative specifications, the estimated dynamic effects remain qualitatively similar, supporting the robustness of the baseline results.

4 Results. Administrative Crime Data

4.1 Main Results: First Disaster

The regression results are presented graphically in Figure 2. The tabular version is in Table 2. The table presents the pre-average, post-average and the dynamic effects of disasters. Specifically, pre-average denotes the average effect prior to the disaster; Post-average represents the average effect post-disaster. The estimated coefficient of the Post-average variable then captures the average treatment effect. The Pre-average variable is never statistically significant. While the post-average variable is never statistically significant, indicating that the average treatment effect of disasters on FDSV or its components is not statistically significant, there are dynamic short-term effects as we discuss below. It is also worth noting that the short term effects, dissipate quickly, and by month 6 the coefficient turns negative and (often) statistically significant, indicating a modest medium-term decline relative to the baseline.

Figure 2a reports event-study plots for domestic violence-related assaults around the timing of the first disaster, relative to the omitted period ($k = -1$). The tabular version of the results are presented in column 1 of Table 2. Pre-treatment coefficients are small and statistically indistinguishable from zero, indicating no evidence of differential pre-trends. Following disaster exposure, there is no immediate effect, and the first post-disaster month shows no significant change. Starting in month 2 after the first disaster, domestic violence incidents increase, with an estimated rise of approximately 1.9 incidents relative to the baseline. The effect remains positive through month 3 post-disaster and becomes statistically indistinguishable from zero from month 4 post-disaster onwards. These patterns suggest a short-term elevation in domestic violence following disasters.

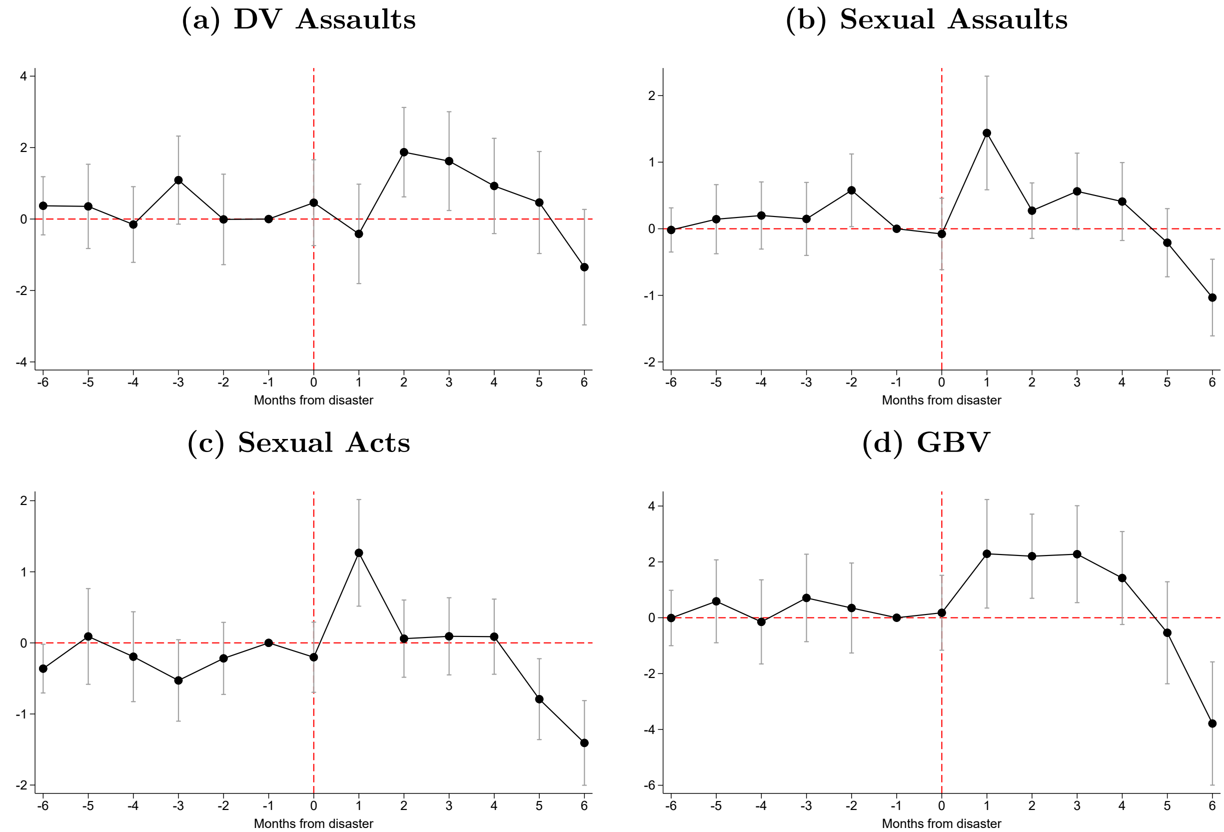
Figure 2b (and column 2 of Table 2) shows sexual assault incidents. Pre-treatment coeffi-

Table 2: Dynamic Effects of Disaster Exposure on gender based Violence. First Disaster Only

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	FDSV (4)
Pre 6	0.451	-0.112	-0.391*	-0.0522
	(0.785)	(0.223)	(0.211)	(0.846)
Pre 5	0.322	0.182	0.102	0.606
	(0.823)	(0.292)	(0.338)	(1.053)
Pre 4	-0.186	0.237	-0.183	-0.132
	(0.800)	(0.316)	(0.337)	(1.129)
Pre 3	1.058	0.186	-0.517*	0.726
	(0.725)	(0.304)	(0.297)	(0.835)
Pre 2	-0.0429	0.616**	-0.207	0.366
	(0.645)	(0.305)	(0.295)	(0.773)
Post 0	0.453	-0.0727	-0.200	0.180
	(0.727)	(0.241)	(0.258)	(0.760)
Post 1	-0.420	1.444***	1.268***	2.292**
	(0.749)	(0.421)	(0.376)	(1.050)
Post 2	1.868**	0.277	0.0611	2.206**
	(0.754)	(0.201)	(0.276)	(0.900)
Post 3	1.618*	0.567**	0.0936	2.278**
	(0.897)	(0.285)	(0.267)	(1.107)
Post 4	0.922	0.414	0.0888	1.425*
	(0.680)	(0.295)	(0.264)	(0.865)
Post 5	0.459	-0.205	-0.790**	-0.536
	(0.936)	(0.297)	(0.323)	(1.192)
Post 6	-1.364	-1.013***	-1.401***	-3.779***
	(0.886)	(0.292)	(0.287)	(1.136)
Pre-average	0.320	0.222	-0.239	0.303
	(0.617)	(0.227)	(0.216)	(0.732)
Post-average	0.505	0.202	-0.126	0.581
	(0.552)	(0.133)	(0.159)	(0.647)
Mean dependent variable‡	17.05	3.308	4.078	24.44
Observations	46,464	46,464	46,464	46,464

Notes: The outcome is the monthly count of the crime incidence, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. The estimating equation is given by equation (1). Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. Significance: $^{***}p < 0.01,^{**} p < 0.05,^{*} p < 0.1$. ‡: The mean dependent variable is computed over the estimation sample used in the interaction-weighted event-study, which differs from the simple unweighted average reported in Panel A1 of Table 1 due to cohort and event-time weighting.

Figure 2: First Disaster in LGA and Reported GBV in NSW



Notes: Event study coefficient estimates for NSW, considering the first disaster in an LGA irrespective of its scale as an event of interest. All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

cients remain imprecisely estimated and do not display systematic trends. In contrast to domestic violence, sexual assaults respond earlier, with a statistically significant increase emerging in month 1 post-disaster, corresponding to roughly 1.4 additional incidents. Effects at months 2 and 3 are smaller (0.28 and 0.57 additional incidents respectively) with the month 3 effect statistically significant, before returning toward zero in months 4, 5 and 6 post-disaster.

Figure 2c (and column 3 of Table 2) presents the estimated effects on sexual touching, sexual acts, and related non-penetrative sexual offences. Pre-treatment estimates are close to zero across all lead periods. No contemporaneous effect is observed; however, incidents increase sharply in month 1 following disaster exposure, with an estimated rise of approximately

1.3 cases. The effects quickly drop back to 0 and surprisingly in months 5 and 6 there are fewer cases of reported sexual acts than in the baseline.

Finally, Figure 2d (and column 4 of Table 2) reports the composite measure FDSV, defined as the sum of domestic violence, sexual assault, and sexual acts. Pre-treatment estimates remain indistinguishable from zero. Post-disaster coefficients indicate a significant increase beginning in month 1 post-disaster, with FDSV rising by roughly 2.3 incidents relative to baseline. Elevated levels persist through months 2 and 3 (at approximately 2.2 additional incidents relative to the baseline) before attenuating by month 4 onward. Overall, the aggregated measure confirms that disasters are associated with short-run increases in FDSV concentrated in the first few months following exposure.

4.2 Stacked Event Study

Table 3 present stacked event-study estimates that account for repeated disaster exposure within LGAs. Figure 3 presentes the diagrammatic version of these results. The estimated Post-average variable is positive and statistically significant: post- disaster the average reported number of cases of DV assaults, sexual assaults, sexual acts and the composite measure FDSV increase by 0.34, 0.29. 0.23 and 0.86 cases respectively. The dynamic effects are strong. FDSV rises almost immediately following a disaster (see column 4, Table 3). There are 0.7 additional cases relative to the baseline in the month of the disaster rising to 1.66 and 2.5 additional cases 1 month and 2 months post-disaster and falls slightly to 1.7 additional cases 3 months post disaster (the effect remains statistically significant, $p < 0.001$) before falling sharply, 4 months and longer post-disaster. Turning to the individual components, the number of reported cases of DV assaults, sexual assaults and sexual acts also spike immediately or in the first month post-disaster, remain higher in the first 3 months following a disaster and taper quickly beyond 4 months. Interestingly, as with the first disaster results, beyond 5-months, the estimated effects are negative (though not always statistically significant), i.e., gender based violence declines below the baseline.

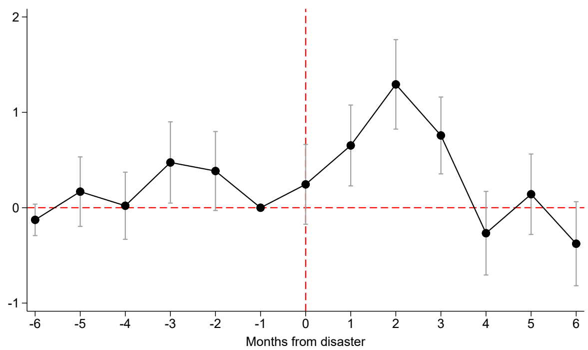
Table 3: Dynamic Effects of Disaster Exposure on gender based Violence. Stacked Event Study

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	GBV (4)
Pre 6	-0.0556	-0.0543	-0.0513	-0.161
	(0.153)	(0.0430)	(0.0439)	(0.172)
Pre 5	0.198	0.0679	0.229	0.494
	(0.236)	(0.0870)	(0.139)	(0.335)
Pre 4	0.0441	0.0248	0.00830	0.0772
	(0.187)	(0.0972)	(0.0971)	(0.248)
Pre 3	0.506**	-0.0968	-0.0963	0.313
	(0.249)	(0.107)	(0.0910)	(0.315)
Pre 2	0.441*	0.198*	0.319***	0.958***
	(0.241)	(0.115)	(0.108)	(0.329)
Post 0	0.235	0.297**	0.182	0.714**
	(0.233)	(0.128)	(0.122)	(0.335)
Post 1	0.654***	0.498***	0.506***	1.658***
	(0.249)	(0.120)	(0.124)	(0.357)
Post 2	1.281***	0.636***	0.598***	2.514***
	(0.313)	(0.134)	(0.139)	(0.451)
Post 3	0.754***	0.514***	0.443***	1.711***
	(0.238)	(0.130)	(0.142)	(0.396)
Post 4	-0.275	0.163	0.142	0.0303
	(0.293)	(0.128)	(0.0967)	(0.382)
Post 5	0.131	-0.00175	-0.154	-0.0245
	(0.240)	(0.107)	(0.110)	(0.281)
Post 6	-0.404*	-0.109	-0.106	-0.619**
	(0.236)	(0.105)	(0.111)	(0.274)
Pre-average	0.227	0.0279	0.0818	0.336*
	(0.142)	(0.0537)	(0.0623)	(0.197)
Post-average	0.339**	0.285***	0.230***	0.855***
	(0.138)	(0.0689)	(0.0665)	(0.200)
Mean dependent variable	22.42	5.610	5.373	33.40
Observations	14,899	14,899	14,899	14,899

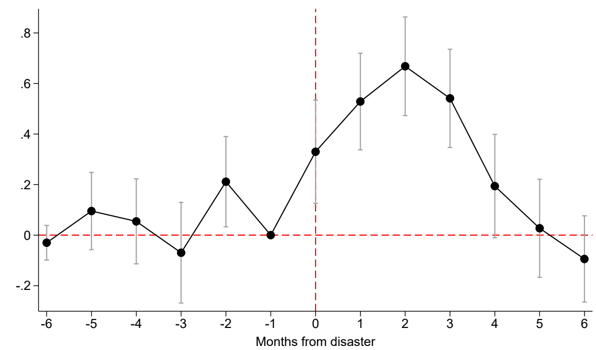
Notes: Event-study coefficient estimates from the stacked event design considering all disasters in NSW. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment using the stacked event study design. The estimating equation is given by equation (2). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event. Estimates are reported relative to the omitted period ($t = -1$). Standard errors, clustered at LGA level, in parentheses. Significance: $^{***}p < 0.01$;$^{**}p < 0.05$;$^{*}p < 0.1$.

Figure 3: Stacked Event Study Design. Disaster in LGA and Reported GBV. NSW Only

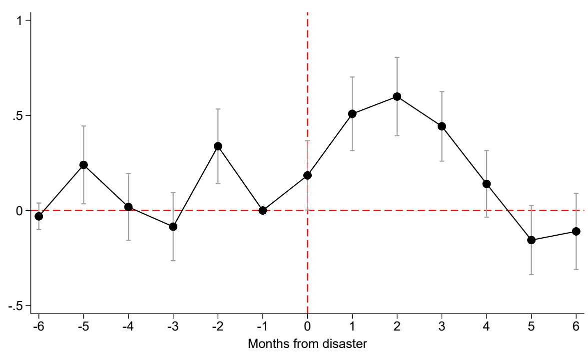
(a) DV Assaults



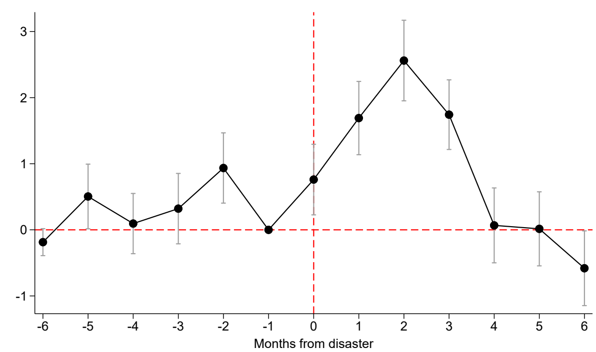
(b) Sexual Assaults



(c) Sexual Acts



(d) FDSV



Notes: Event-study coefficient estimates from the stacked event design considering all disasters in NSW. All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

4.3 Robustness

4.3.1 Alternative Estimators

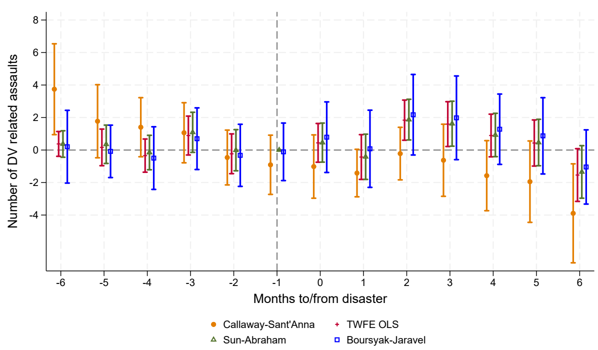
The results presented in Figure 2 (and Table 2) use the Sun and Abraham (2021) approach. To assess robustness, we compare these baseline estimates with a range of alternative estimators that are commonly used in recent difference-in-differences applications. These include: (*i*) the dynamic TWFE event-study specification estimated via OLS (Wooldridge, 2025), (*ii*) the group-time average treatment effects framework of Callaway and Sant'Anna (2021), and (*iii*) the imputation-based estimator of Borusyak et al. (2024).

These approaches differ in how they handle treatment effect heterogeneity, the construction of counterfactual outcomes, and the weighting of treated cohorts. Sun and Abraham (2021) provide a heterogeneity-robust estimator for staggered difference-in-differences designs by decomposing the average treatment effect into cohort-specific average treatment effects (CATTs), using cohort-specific interactions to avoid the contamination bias of the standard dynamic Two-Way Fixed Effects (TWFE) model. The Dynamic TWFE, gives biased estimates under heterogeneous treatment effects, as it implicitly uses already-treated units as controls and can generate negative weights, potentially yielding sign-reversed estimates. Additionally, the dynamic TWFE model estimated using OLS delivers consistent estimates only under relatively strong assumptions regarding treatment effect homogeneity. Callaway and Sant'Anna (2021) share Sun and Abraham's motivation and similarly estimate cohort-time average treatment effects, but offer greater flexibility in the choice of comparison group, permitting either never-treated or not-yet-treated units as controls, and provide a transparent aggregation framework that maps cleanly to policy-relevant parameters. The Sun and Abraham (2021) and the Callaway and Sant'Anna (2021) approaches are closely related and often yield similar results in practice. Borusyak et al. (2024) on the other hand adopt an imputation-based approach, estimating a TWFE model on untreated observations to impute counterfactual outcomes for treated units, then computing treatment effects as the difference between observed and imputed values.

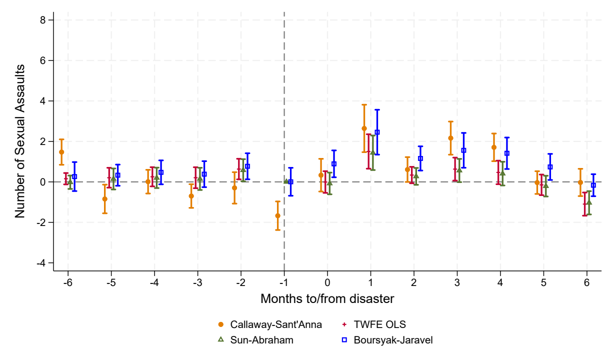
Figure 4 shows that the estimated event-study profiles are generally consistent across estimators, suggesting that the baseline results are not driven by the specific identifying assumptions of any single method. In particular, pre-treatment coefficients largely remain close to zero across all specifications, supporting the parallel trends assumption, while post-disaster dynamics are stable in both magnitude and timing. Overall, this provides

Figure 4: Effects of Disasters on Gender Based Violence: First Disaster. Alternative Estimators

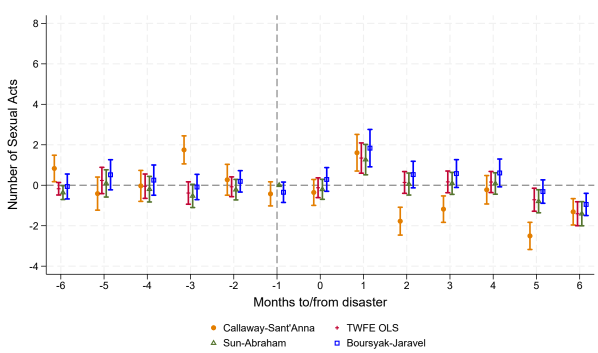
(a) DV Assaults



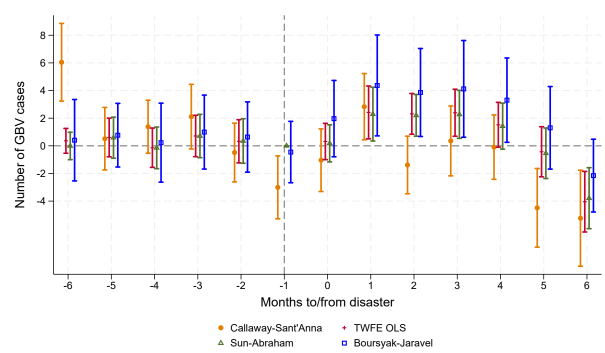
(b) Sexual Assaults



(c) Sexual Acts



(d) FDSV



Notes: Event study coefficient estimates for NSW, considering the first disaster in a LGA irrespective of its scale as an event of interest. This figure overlays the event-study plots constructed using four different estimators: a dynamic version of the TWFE model, estimated using OLS; Sun and Abraham (2021); Callaway and Sant'Anna (2021); and Borusyak et al. (2024). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

reassurance that the estimated effects of disasters on gender based violence are robust to alternative estimators that allow for heterogeneous and dynamic treatment effects. The results are qualitatively similar if we consider repeated exposure i.e., the stacked disaster approach. See Figure A4 in the Appendix.

4.3.2 Robustness to Definition of Disaster

A potential concern with defining disaster exposure using disaster relief payments is that these payments may not perfectly map to the location of impact. In particular, if individuals affected by a disaster relocate to other LGAs, payments received in those destination areas could lead to misclassification of treatment status. To address this concern, we adopt a more restrictive definition of disaster exposure by focusing only on high-intensity events. Specifically, we classify an LGA as treated only if it falls within the top 50% of LGAs in terms of disaster payment receipts, thereby capturing areas most likely to have experienced substantial direct impacts.

Results for effects of the first disaster (thus defined) are presented in Figure A5 in the Appendix. The tabular version of the results are in Table A1 in the Appendix. These results are consistent with the baseline results. The patterns for sexual assaults (Figure A5b), sexual acts (Figure A5c) and overall FDSV (Figure A5d) are qualitatively similar to those presented in Figure 2: Pre-treatment estimates remain indistinguishable from zero; there are short term post-treatment effects with an increase in the number of sexual assaults, the number of sexual acts and in the number of the composite measure FDSV relative to the baseline, roughly a month post-disaster. For DV assaults, we observe a short-term increase in reported incidents around 2–3 months after the disaster (Figure A5a). However, this effect is not statistically significant under the first-disaster specification.

The estimated average and dynamic effects are again stronger when we consider the repeated exposure to disasters (see Figure A6 and Table A2 in the Appendix). There is a large and statistically significant increase in the reported number of DV assaults, sexual assaults, sexual acts and the composite measure FDSV 1 to 3 months post-disaster. These effects, however, dissipate beyond 4 months, but the average post-treatment impact is positive and statistically significant (Table A2): on average, post disaster the number of DV assaults, Sexual assaults, Sexual acts and the composite measure FDSV are respectively 0.55, 0.45, 0.46 and 1.45 more than in the pre-disaster period.

Figures A7 and A8 in the Appendix present the corresponding event-study figures using alternative estimators (as discussed above). These figures show that the estimates are consistent with the parallel trends assumption irrespective of the estimator used. These two figures also show that the dynamic treatment effects are robust, even with the alternative definitions of disasters and irrespective of whetehr we consider first disaster ir repeated disaster at the LGA level.

4.3.3 Robustness to Population Controls

A potential concern is that changes in population size, due to migration, displacement, or differential growth across LGAs, may confound the estimated effects if crime counts mechanically scale with population. To address this, we re-estimate equation (1) controlling for LGA-level population. As population data from the Australian Bureau of Statistics (ABS) are available annually for the period 2013 to 2023, this specification is estimated on a reduced sample.

Table 4 reports the results for the first disaster only. When population controls are included, the estimated post-average effect remains positive and statistically significant even for the first disaster case. On average, post-disaster reported counts of DV assaults, sexual assaults, sexual acts, and the composite measure FDSV are all significantly elevated relative to the reference period, with an average of 1.20, 0.65, 0.44, and 2.29 additional reported cases, respectively. Consistent and statistically significant dynamic effects are also observed, with reported counts across all four measures increasing between one and four months post-disaster. In the case of FDSV, an immediate effect is also apparent. The magnitudes are substantial: there are 2.2 additional reported FDSV cases immediately following a disaster, rising to 3.7, 4.7, 4.2, and 2.95 additional cases at one, two, three, and four months post-disaster, respectively. However, the reversal is sharp: by six months post-disaster, reported case counts fall below the pre-disaster baseline. The stacked disaster approach yields qualitatively similar findings (see Table A3).

Table 4: Dynamic Effects of Disaster Exposure on gender based Violence. Controlling for population.

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	FDSV (4)
Pre 6	0.881	-0.736***	0.0976	0.244
	(0.731)	(0.267)	(0.262)	(0.897)
Pre 5	0.888	-0.294	0.556*	1.150
	(0.762)	(0.316)	(0.337)	(1.001)
Pre 4	-0.162	-0.387	0.157	-0.392
	(0.710)	(0.316)	(0.345)	(0.975)
Pre 3	1.264	-0.374	-0.102	0.789
	(0.788)	(0.357)	(0.314)	(1.051)
Pre 2	-0.117	0.124	0.237	0.244
	(0.552)	(0.187)	(0.191)	(0.754)
Post 0	1.500**	0.386	0.341	2.227**
	(0.722)	(0.298)	(0.262)	(0.869)
Post 1	0.0583	1.826***	1.797***	3.681***
	(0.735)	(0.454)	(0.403)	(1.122)
Post 2	2.860***	1.021***	0.866***	4.747***
	(0.772)	(0.265)	(0.300)	(0.984)
Post 3	2.408***	1.052***	0.686**	4.146***
	(0.818)	(0.334)	(0.296)	(1.097)
Post 4	1.613**	0.778**	0.554**	2.945***
	(0.771)	(0.311)	(0.269)	(0.945)
Post 5	1.146	0.244	-0.214	1.176
	(0.745)	(0.286)	(0.314)	(0.967)
Post 6	-1.209*	-0.763**	-0.944***	-2.917***
	(0.705)	(0.304)	(0.302)	(0.958)
Pre-average	0.551	-0.333	0.189	0.407
	(0.557)	(0.228)	(0.206)	(0.747)
Post-average	1.197***	0.649***	0.441***	2.287***
	(0.461)	(0.183)	(0.171)	(0.618)
Mean dependent variable	20.23	4.273	4.886	29.39
Observations	16,764	16,764	16,764	16,764

Notes: The outcome is the monthly count of the crime incidence, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, and LGA-specific time trends. Standard errors, clustered at the LGA-month level, are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

4.4 Heterogeneous Effects by Socioeconomic Conditions and Location

The main results establish that disasters cause short-run increases in gender based violence. A natural follow-up question is: through what channels might these effects operate? Several mechanisms offer different predictions. Under an *economic stress* mechanism, disasters increase violence by reducing household resources and amplifying financial strain. This channel predicts stronger effects in poorer and more disadvantaged areas, where households have fewer buffers and livelihood disruption is most acute. Under an *institutional disruption* mechanism, disasters may increase violence by temporarily straining the formal services that normally prevent and respond to it. This channel predicts the opposite pattern: stronger effects in urban and affluent areas, where reliance on formal protective infrastructure is highest and where temporary service disruption leaves the largest gap. Distinguishing between these channels is important both from an academic and a policy point of view. We bring two types of evidence to bear on this question.

First, we utilize the Socio-Economic Indices for Areas (SEIFA), developed by the Australian Bureau of Statistics. SEIFA is a suite of indices developed by the Australian Bureau of Statistics (ABS) that rank geographic areas across Australia according to their relative socioeconomic advantage and disadvantage, based on Census data. We consider three indices: the Index of Relative Socio-economic Disadvantage (IRSD), the Index of Education and Occupation (IEO), and the Index of Economic Resources (IER).[7] These indices are correlated but capture distinct dimensions of socio-economic conditions. We group the 128 LGAs into above and below median (which we call rich and poor LGAs respectively) based on each index and estimate equation (1) separately for the rich and poor LGAs.

The regression results (for the 3 indices) are presented in Table A4 in the Appendix. The estimates are consistent with the parallel trends assumption: the Pre-average variable is never statistically significant. The patterns are roughly consistent across the index used

[7] The IRSD focuses specifically on disadvantage, drawing on indicators such as low income, low educational attainment, high unemployment, and dwellings without internet access. A low score indicates greater disadvantage. The IEO ocuses specifically on the educational and occupational characteristics of an area's residents, reflecting the skills and human capital present in a community, independent of income. Finally, the IER focuses specifically on the financial and economic resources available to households within an area. It draws on indicators such as household income, housing costs, and the value of dwellings, essentially capturing the material wealth and economic capacity of a community rather than broader dimensions like education or occupation. A higher IER score indicates greater access to economic resources, while a lower score suggests households in that area have relatively limited financial means.

and the post disaster effects are stronger in the richer LGAs. Irrespective of the index used, we observe a statistically significant increase in the composite measure FDSV (column 8 in Table A4) one month after the disaster; the effects range from $3.6 - 4.1$ additional reported cases relative to the baseline. For the IER and IEO indices (Panels B and C) the effects persist longer. There are 2.78 additional reported cases of GBV 2 months post-disaster when we use the IER index and there are 3.3 additional reported cases of GBV 3 months post-disaster when we use the IEO index. The effects are weaker and often not statistically significant for the poorer (below median) LGAs.

We next examine whether the effects differ across rural and urban LGAs, defined using distance to the Sydney CBD (above and below 100 km).[8] The regression results are presented in Table A5. The pre-trends are generally small and statistically not significant in both sub-samples, consistent with the identifying assumption.

Post-disaster effects are substantially larger and more persistent in urban LGAs. We observe strong increases in all four measures of gender based violence, particularly between 1 and 4 months after the disaster, with effects peaking around 2–3 months post-disaster. In this period, the composite measure FDSV increases by approximately 5–10 additional reported cases depending on the specification, driven by increases in both sexual assault and sexual acts, which remain statistically significant for several months. In contrast, rural LGAs show comparatively smaller and less persistent post-disaster responses across outcomes. While some short-run variation is observed, the effects do not exhibit the same sustained pattern as in urban areas.

These patterns are not fully consistent with a simple economic stress explanation. If income losses and financial hardship were the dominant mechanism, one would expect relatively larger effects in disadvantaged and rural areas, where households have fewer financial buffers. Instead, the heterogeneity analysis suggests that the post-disaster increase in reported FDSV is more pronounced in urban and relatively advantaged LGAs. One interpretation is that these areas are more reliant on formal support systems, including policing, courts, and specialist family violence services, which may be temporarily stretched or reallocated during disaster response, potentially affecting the ability to report or respond to incidents. At the same time, however, reporting behaviour itself may also vary across locations, with higher baseline reporting rates and better access to formal channels in urban areas potentially making changes in incidence more visible in administrative data. Taken

[8] Changing the threshold to 150 km and 200 km gives us consistent results. See Tables A6 and A7.

together, these channels are difficult to fully separate in our setting, but they suggest that disasters increase gender based violence broadly, while differences across areas may reflect both differential exposure of formal services and differences in reporting intensity.

5 Results. Household Data

The administrative crime data establish that disasters cause short-run increases in reported gender based violence. We now turn to nationally representative household surveys to trace the individual-level pathway that may underlie these aggregate patterns. If disasters generate psychological distress that spills over into household conflict, we should observe: (i) deterioration in mental health; (ii) elevated partner conflict within affected households. We test each prediction using separate data sources.

5.1 Mental Health

We complement the evidence obtained from administrative data by next examining whether direct household exposure to disasters is associated with changes in individual mental health. In HILDA, respondents report whether their household was affected by a major natural disaster, such as floods, bushfires, or cyclones, during the survey reference period. We use this information to construct an individual- and household-level measures of disaster exposure, allowing us to explore broader social and psychological impacts of disasters that may complement the patterns observed in interpersonal violence. Specifically disaster expsure is measured by a dummy variable $Disaster\ Experienced = 1$ if the household was affected by a major natural disaster, such as floods, bush-fires, or cyclones, during the survey reference period.

Table 5 presents associations between household disaster exposure and the MHI-5 mental health score in the three most disaster affected states (NSW, Queensland and Victoria). Direct exposure is associated with declines in mental health, with reductions of 3.76 points for men and 5.04 points for women. In the pooled sample (column 3), the interaction with female respondents is negative and significant (-1.23 points, $p < 0.10$), indicating larger declines for women. Including individual controls (column 4) reduces the sample size, but the estimated effects remain sizeable, attenuate only slightly, and stay statistically significant, with a persistent gender gap. These patterns are consistent with the notion

Table 5: Association Between Direct Household Disaster Exposure and Mental Health (HILDA Survey)

	Male (1)	**Female** (2)	**Pooled** (3)	**Pooled with controls** (4)
Disaster Experienced	-3.760***	-5.042***	-3.844***	-3.303***
	(0.533)	(0.443)	(0.553)	(0.587)
Female			-2.437***	-1.352***
			(0.201)	(0.219)
Disaster × Female			-1.234*	-1.469*
			(0.690)	(0.757)
LGA and Year Fixed Effects	✓	✓	✓	✓
Individual controls[a]	✗	✗	✗	✓
Observations	104,878	121,383	226,268	168,177

Notes: OLS Regressions presented. Dependent variable is the 5-item Mental Health Score (MHI-5). *Disaster Experienced* = 1 if the household was affected by a major natural disaster, such as floods, bush-fires, or cyclones, during the survey reference period. Estimation sample restricted to households residing in NSW, Queensland and Victoria. Standard errors clustered at LGA-level in parentheses. Significance: $^{***}p < 0.01$;$^{**}p < 0.05$;$^{*}p < 0.1$. [a] Individual controls include age and age squared, indicators for relationship status (de facto, separated, divorced, widowed, married), number of children, income, education, and employment status.

that psychological stress from disaster exposure may coincide with elevated vulnerability to household tensions, complementing observed increases in sexual and domestic violence.

5.2 Intimate Partner Violence

Next, using data from the LSAC surveys, we examine whether household disaster exposure is associated with changes in reported violence within intimate partnerships (intra-household conflict). Table 6 presents estimates linking the stressful life event indicator that the local home was affected by a disaster. to reports of conflict (violence) within the household, reported separately by the father and the mother. Disaster exposure is measured by a dummy variable $Disaster\ Experienced = 1$ if the household responded *yes* to the question: in the last 12 months, have you had your home or local area affected by bushfire, flooding or a severe storm?. $Domestic\ Viokence = 1$ if the father or the mother responded anything other than never (i.e. responded rarely, sometimes, often, always) to the question *how often do you have arguments with your partner that end up with people pushing, hitting, kicking or shoving?*

Across specifications, disaster exposure is positively associated with an increased likelihood of intra-household conflict/violence. Fathers (Panel A) report increases of roughly 2.8 to 3.5 percentage points, while mothers report smaller but positive associations of 2.3 to 2.8 percentage points in fully controlled models. Although not interpreted causally, these consistent positive relationships suggest that disaster exposure aligns with heightened household tension and elevated risk of partner violence.

We further test whether disaster effects differ by respondent type by estimating a pooled specification with an interaction between disaster exposure and an indicator for father-reported outcomes (Panel C). The results indicate that disaster exposure increases reported violence for both mothers and fathers. While the point estimate is larger for fathers, the interaction term is not statistically significant, suggesting no strong evidence of differential responses by respondent type.

6 Conclusion

Our findings show that natural disasters are associated with short-term increases in gender based violence that are largest in the first one to three months following a disaster. Administrative crime data show that gender based violence, including domestic violence-related assaults, sexual assaults, and sexual acts, experiences immediate and short-lived spikes following disasters, with the largest increases occurring within the first one to three months following a disaster.

Household survey evidence using nationally representative data sets complements this picture by providing individual- and household-level insights. Direct household exposure to disasters is associated with reductions in mental health, suggesting a potential psychosocial pathway linking disaster exposure to elevated vulnerability to interpersonal conflict. We also find evidence of consistent increases in partner violence in households affected by disasters, as reported by both fathers and mothers. While these associations are not interpreted causally, the alignment of observed mental health declines and intrahousehold conflict points to a broader pattern whereby disaster-related stress and household disruption may coincide with heightened tension within families.

The evidence presents a coherent story: disasters are associated with immediate, short-term surges in gender based violence at the community level, delayed but observable increases in individual-level victimization for women, and reductions in mental well-being following direct household exposure. The convergence of administrative and survey-based findings provides consistent evidence that disasters are followed by changes in both reported violence and related household conditions.

The heterogeneity analysis provides additional nuance. Increases in reported gender based violence are more pronounced in urban and relatively advantaged areas. This pattern is suggestive of differences in how violence is observed and recorded across locations, potentially reflecting variation in access to reporting channels, service availability, and reliance on formal institutions during periods of disruption. While not definitive, these differences indicate that measured impacts may partly reflect both underlying incidence and reporting environments.

More broadly, the evidence indicates that disasters generate short-run social disruptions that extend beyond physical and economic impacts, affecting household dynamics as well as measured safety outcomes. As climate change increases the frequency and severity of extreme events, these short-run social costs are likely to become increasingly relevant for policy design.

Current disaster response frameworks in high-income countries remain primarily focused on infrastructure restoration and physical recovery. The evidence presented here suggests that such approaches may understate short-run increases in gender based violence during the early recovery phase. The concentration of effects in the first one to three months highlights the value of integrating gender-responsive measures into disaster response, including strengthened referral pathways, mobile support services, and closer coordination between emergency management and specialist family violence services during periods of acute disruption.

Table 6: Disasters and Intimate Partner Violence

	(1)	(2)	(3)	(4)
Panel A: Reported by Fathers				
Disaster Experienced	0.028*	0.033*	0.035*	0.034**
	(0.016)	(0.018)	(0.018)	(0.017)
LGA and Year Fixed Effects	✓	✓	✓	✓
Income group Fixed Effects	✗	✓	✓	✓
State Fixed Effects	✗	✗	✓	✓
Individual controls	✗	✗	✗	✓
Observations	15,038	14,022	14,022	14,021
Panel B: Reported by Mothers				
Disaster Experienced	0.023**	0.027***	0.027***	0.027***
	(0.010)	(0.010)	(0.010)	(0.010)
LGA and Year Fixed Effects	✓	✓	✓	✓
Income group Fixed Effects	✗	✓	✓	✓
State Fixed Effects	✗	✗	✓	✓
Individual controls	✗	✗	✗	✓
Observations	15,038	14,022	14,022	14,021
Panel C: Differential Reporting - Pooled Specification				
Disaster Experienced	0.017	0.021*	0.020*	0.021**
	(0.010)	(0.011)	(0.010)	(0.010)
Father	0.201***	0.198***	0.198***	0.198***
	(0.007)	(0.007)	(0.007)	(0.007)
Disaster Experienced ∗ *Father*	0.017	0.019	0.019	0.019
	(0.016)	(0.017)	(0.017)	(0.017)
LGA and Year Fixed Effects	✓	✓	✓	✓
Income group Fixed Effects	✗	✓	✓	✓
State Fixed Effects	✗	✗	✓	✓
Individual controls	✗	✗	✗	✓
Observations	30,076	28,044	28,044	28,042

Notes: OLS Regressions presented for NSW, Queensland and Victoria. Dependent variable is *Domestic Violence* reported by the Father (Panel A) and Mother (Panel B). *Domestic Viokence* = 1 if the father or the mother responded anything other than never (i.e. responded rarely, sometimes, often, always) to the question *how often do you have arguments with your partner that end up with people pushing, hitting, kicking or shoving? Disaster Experienced* = 1 if the home was affected by a disaster. Estimation sample restricted to households residing in NSW, Queensland and Victoria. Column 1 is without additional controls, column 2 controls for income groups, column 3 additionally controls for state fixed effects, and column 4 additionally controls for maternal employment, mother's age and age squared, and the number of children in the household. Standard errors clustered at LGA-level in parentheses. Significance: $^{***}p < 0.01$;$^{**}p < 0.05$;$^{*}p < 0.1$.

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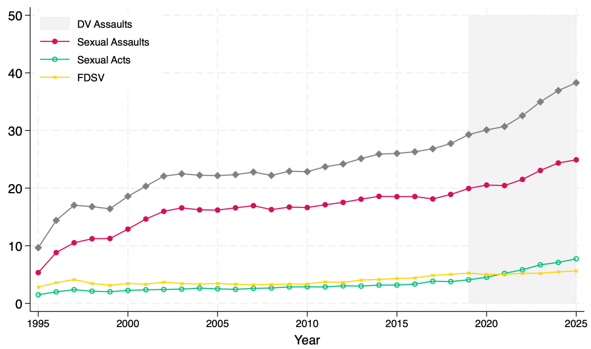
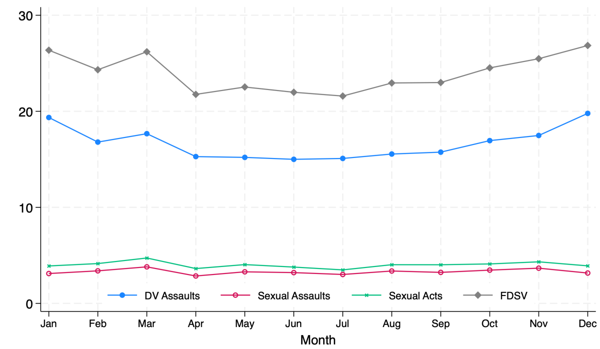
A Appendix. Additional Figures and Tables

Figure A1: Reported Gender Based Violence. NSW only. Patterns by Year and Month

(a) Patterns by Year



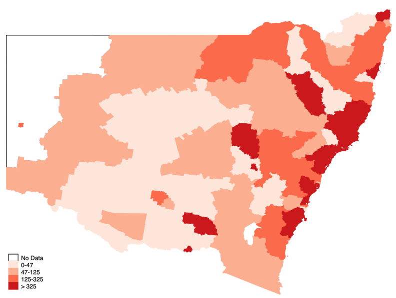
(b) Patterns by Month



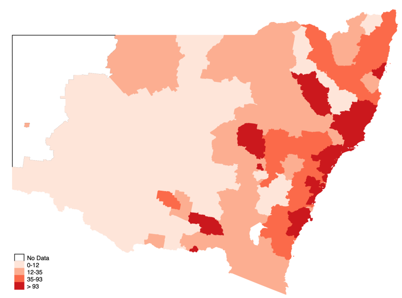
Notes: Figure A1a presents the average number of reported crimes under the different headings over the different years. The shaded area refers to the period for which the disaster payments data is available (from the National Emergency Management Agency (NEMA)). Figure A1b presents the average number of reported crimes under the different headings over the different months, pooled over years.

Figure A2: Components of gender based Violence by LGA in NSW

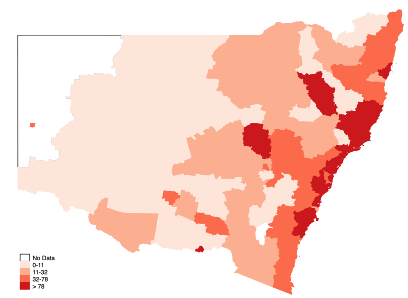
(a) DV Assaults



(b) Sexual Assaults



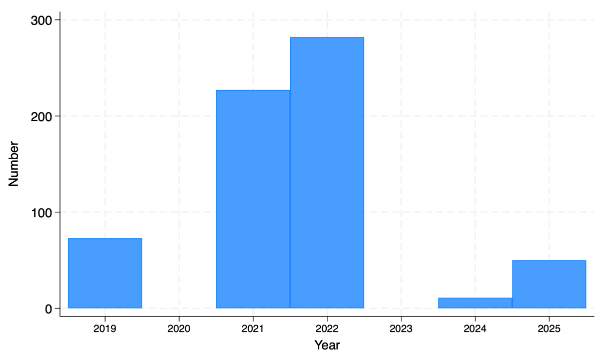
(c) Sexual Acts



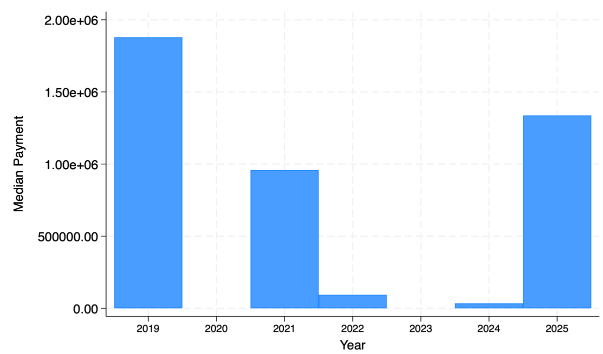
Notes: Distribution of incidences of DV assaults (Figure A2a), Sexual assaults (Figure A2b) and Sexual acts (Figure A2c) across LGAs in 2022 presented.

Figure A3: Total Number of Disasters and Median Disaster Payments by Year

(a) Total Number of Disasters by Year



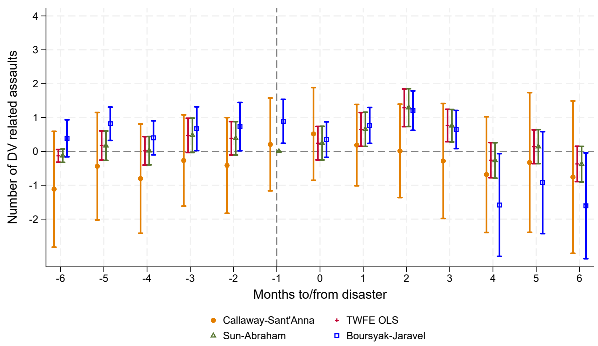
(b) Median Disasters Payments by Year



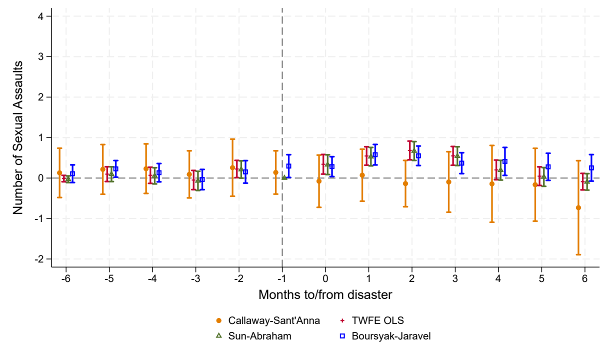
Notes: Figure A3a presents the total number of declared disasters by year. Figure A3b is the median disaster payments by year. Data source National Emergency Management Agency (NEMA).

Figure A4: Effects of Disasters on Gender Based Violence: Alternative Estimators for Stacked Approach

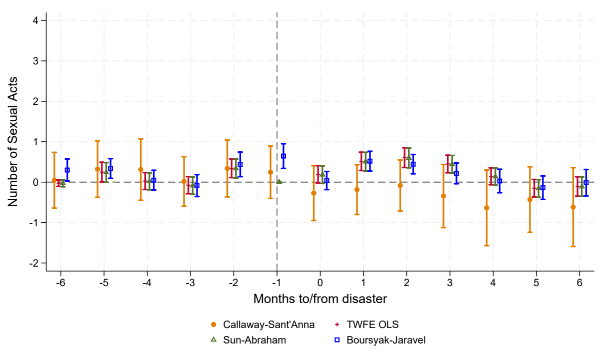
(a) DV Assaults



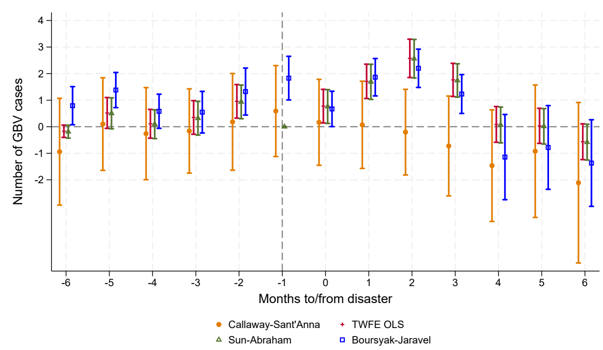
(b) Sexual Assaults



(c) Sexual Acts



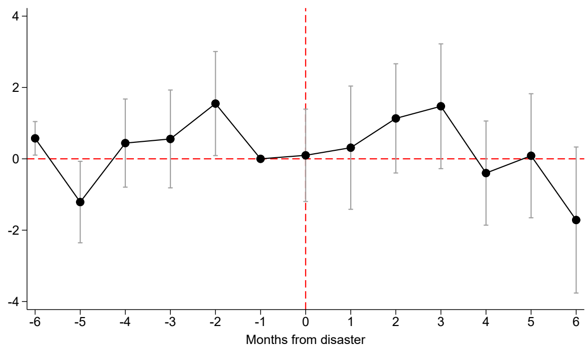
(d) FDSV



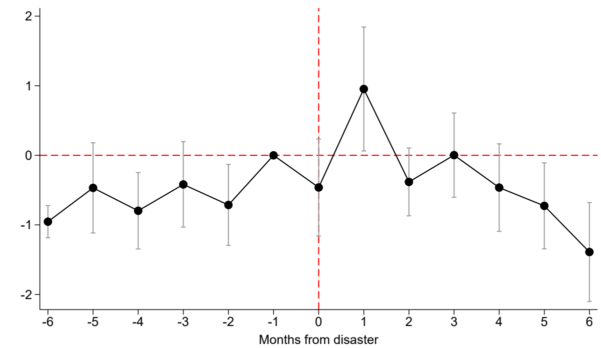
Notes: Event study coefficient estimates for NSW, considering the stacked disasters approach irrespective of its scale as an event of interest. This figure overlays the event-study plots constructed using four different estimators: a dynamic version of the TWFE model, estimated using OLS; Sun and Abraham (2021); Callaway and Sant'Anna (2021); and Borusyak et al. (2024).All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

Figure A5: First Disaster in LGA and Reported Gender Based Violence. Top 50% of Disasters

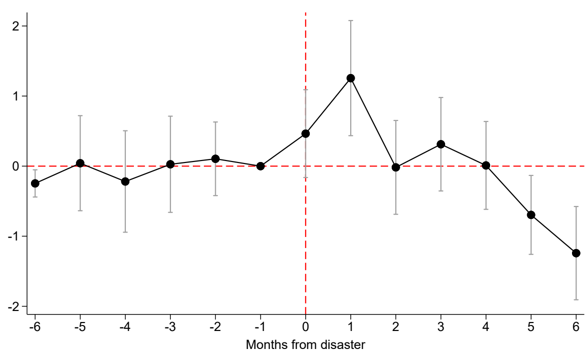
(a) DV Assaults



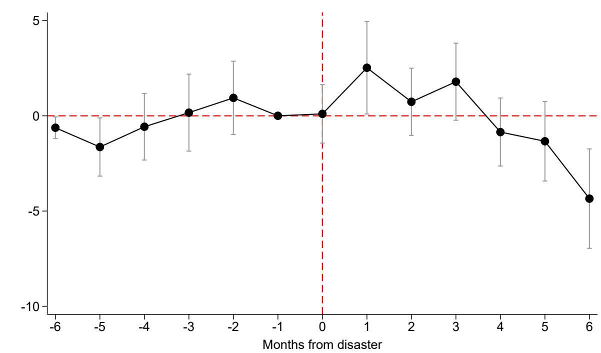
(b) Sexual Assaults



(c) Sexual Acts



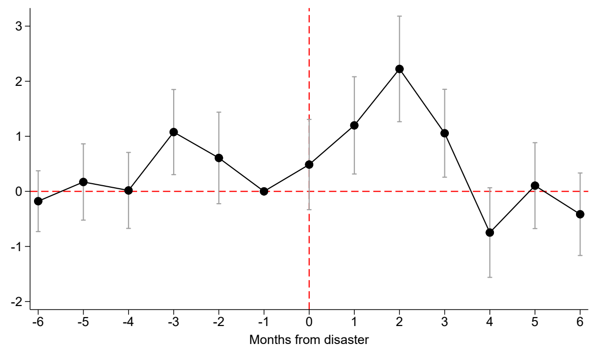
(d) FDSV



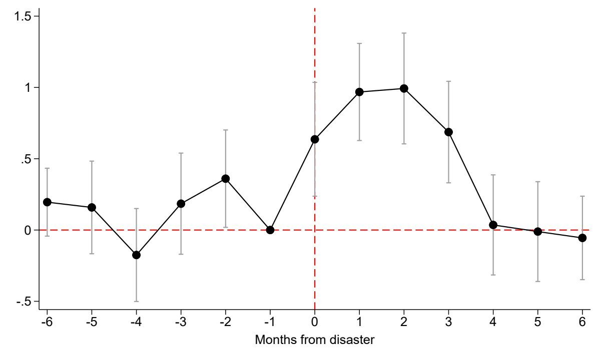
Notes: Event study coefficient estimates for NSW, considering the first disaster in an LGA and restricting the sample to top 50% of the disasters in scale as an event of interest. All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

Figure A6: Stacked disasters in LGA and Reported Gender Based Violence. Top 50% of Disasters

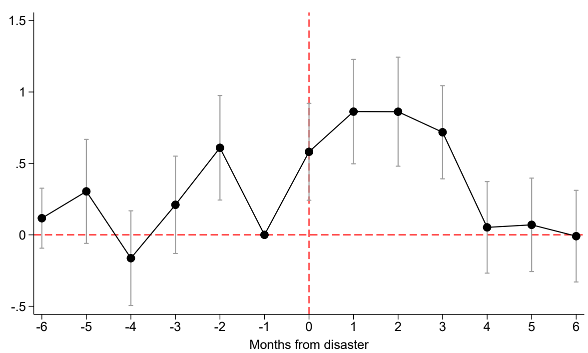
(a) DV Assaults



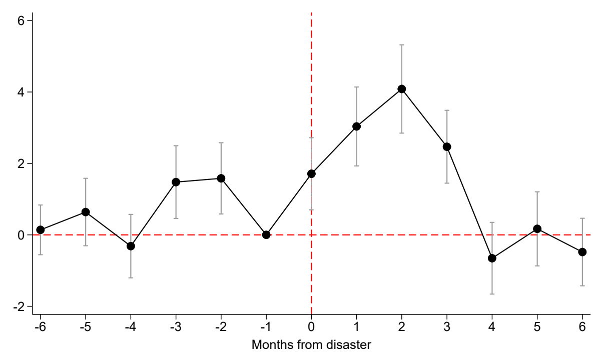
(b) Sexual Assaults



(c) Sexual Acts



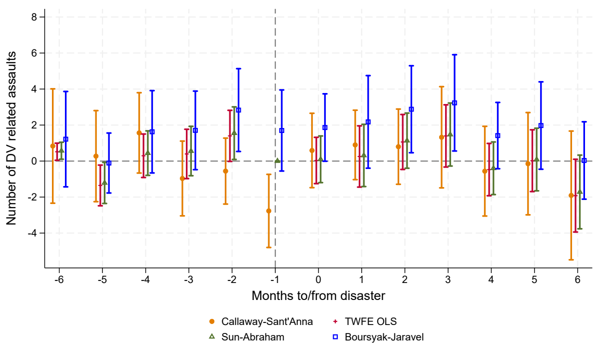
(d) FDSV



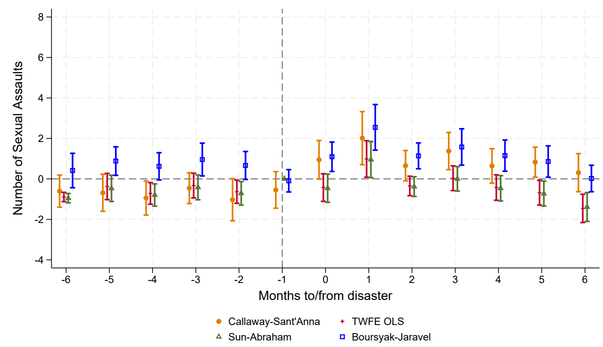
Notes: Event study coefficient estimates for NSW, considering the stacked disaster approach and restricting the sample to top 50% of the disasters in scale as an event of interest. All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

Figure A7: Effects of First Disasters on Gender Based Violence: Alternative Estimators (Top 50%)

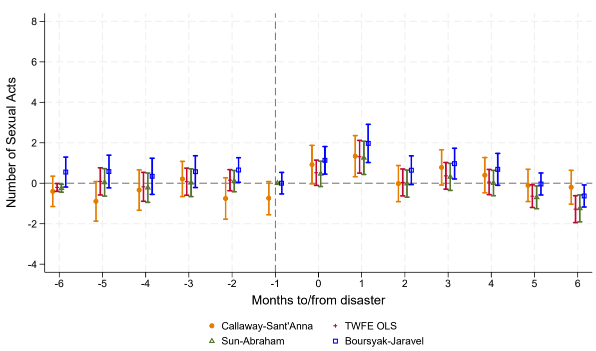
(a) DV Assaults



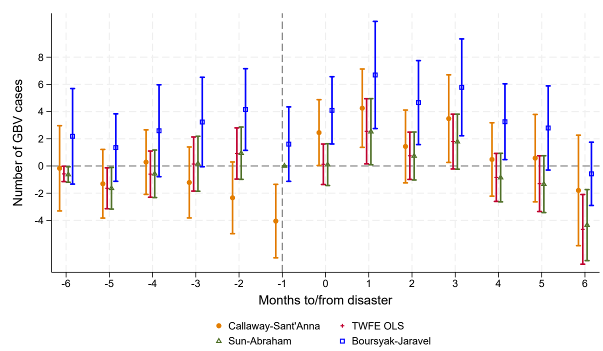
(b) Sexual Assaults



(c) Sexual Acts



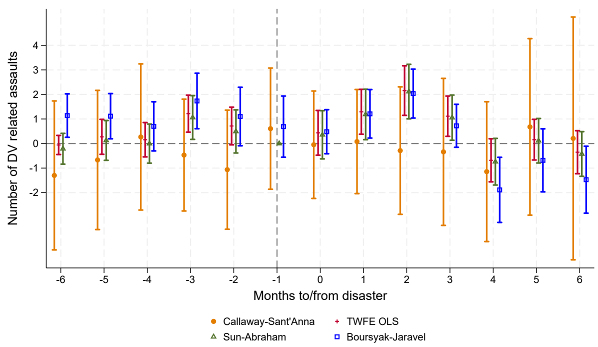
(d) FDSV



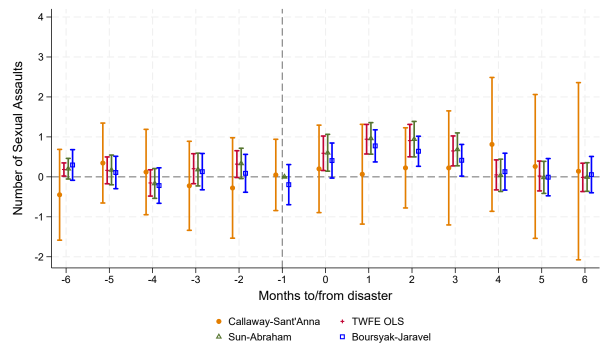
Notes: Event study coefficient estimates for NSW, considering the first disaster in an LGA that falls in top 50% of disaster-affected LGAs. This figure overlays the event-study plots constructed using four different estimators: a dynamic version of the TWFE model, estimated using OLS; Sun and Abraham (2021); Callaway and Sant'Anna (2021); and Borusyak et al. (2024).All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

Figure A8: Effects of Stacked Disasters on Gender Based Violence: Alternative Estimators (Top 50%)

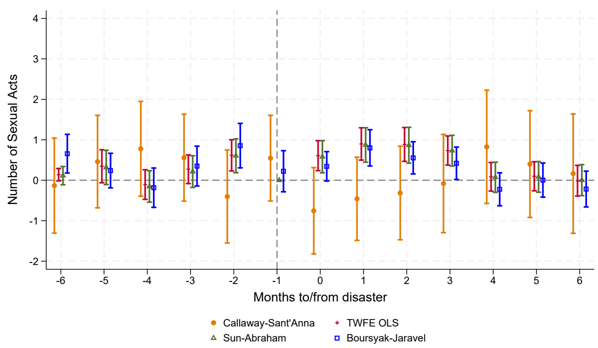
(a) DV Assaults



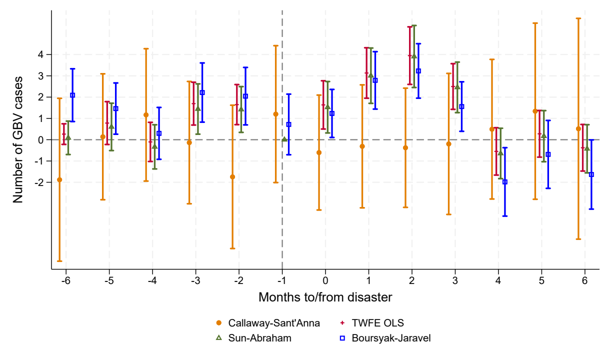
(b) Sexual Assaults



(c) Sexual Acts



(d) FDSV



Notes: Event study coefficient estimates for NSW, considering the stacked disaster approach in LGAs that falls in top 50% of disaster-affected LGAs. This figure overlays the event-study plots constructed using four different estimators: a dynamic version of the TWFE model, estimated using OLS; Sun and Abraham (2021); Callaway and Sant'Anna (2021); and Borusyak et al. (2024). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Vertical bars denote 95% confidence intervals.

Table A1: Dynamic Effects of Disaster Exposure on gender based Violence. Top 50% of Disasters. First Disaster

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	FDSV (4)
Pre 6	0.575**	-0.954***	-0.246**	-0.626**
	(0.240)	(0.118)	(0.0990)	(0.290)
Pre 5	-1.212**	-0.468	0.0421	-1.638**
	(0.583)	(0.331)	(0.346)	(0.781)
Pre 4	0.441	-0.797***	-0.219	-0.575
	(0.630)	(0.280)	(0.369)	(0.891)
Pre 3	0.557	-0.419	0.0265	0.165
	(0.700)	(0.313)	(0.350)	(1.030)
Pre 2	1.550**	-0.714**	0.105	0.940
	(0.744)	(0.297)	(0.268)	(0.981)
Post 0	0.0987	-0.462	0.464	0.100
	(0.661)	(0.356)	(0.320)	(0.784)
Post 1	0.313	0.953**	1.256***	2.522**
	(0.881)	(0.455)	(0.419)	(1.239)
Post 2	1.134	-0.382	-0.0178	0.734
	(0.781)	(0.249)	(0.342)	(0.899)
Post 3	1.474*	0.00222	0.313	1.788*
	(0.893)	(0.309)	(0.340)	(1.032)
Post 4	-0.399	-0.464	0.0103	-0.853
	(0.745)	(0.321)	(0.320)	(0.911)
Post 5	0.0864	-0.727**	-0.696**	-1.336
	(0.887)	(0.315)	(0.287)	(1.066)
Post 6	-1.716	-1.390***	-1.241***	-4.347***
	(1.044)	(0.363)	(0.339)	(1.332)
Pre-average	0.382	-0.670***	-0.0585	-0.347
	(0.306)	(0.147)	(0.151)	(0.414)
Post-average	0.141	-0.353**	0.0126	-0.199
	(0.361)	(0.146)	(0.145)	(0.452)
Mean dependent variable	16.92	3.286	4.050	24.26
Observations	46,827	46,827	46,827	46,827

Notes: The outcome is the monthly count of the crime incidence, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment using first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, and LGA-specific time trends. Standard errors, clustered at the LGA-month level, are presented in parentheses. Significance: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table A2: Dynamic Effects of Disaster Exposure on gender based Violence. Top 50% of disasters. Stacked Disasters

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	FDSV (4)
Pre 6	-0.173	0.165	0.132	0.111
	(0.337)	(0.137)	(0.124)	(0.421)
Pre 5	0.159	0.138	0.318	0.604
	(0.418)	(0.193)	(0.221)	(0.575)
Pre 4	0.0382	-0.197	-0.151	-0.321
	(0.412)	(0.194)	(0.202)	(0.535)
Pre 3	1.081**	0.162	0.222	1.453**
	(0.463)	(0.212)	(0.205)	(0.612)
Pre 2	0.488	0.304	0.589***	1.370**
	(0.457)	(0.199)	(0.221)	(0.562)
Post 0	0.476	0.623**	0.600***	1.689***
	(0.514)	(0.245)	(0.208)	(0.628)
Post 1	1.248**	0.937***	0.887***	3.060***
	(0.535)	(0.203)	(0.222)	(0.671)
Post 2	2.114***	0.903***	0.893***	3.896***
	(0.570)	(0.227)	(0.232)	(0.742)
Post 3	1.096**	0.665***	0.740***	2.488***
	(0.479)	(0.212)	(0.199)	(0.615)
Post 4	-0.699	0.0168	0.0775	-0.619
	(0.495)	(0.210)	(0.194)	(0.611)
Post 5	0.172	-0.0369	0.0942	0.216
	(0.472)	(0.209)	(0.200)	(0.626)
Post 6	-0.528	0.0165	-0.0469	-0.557
	(0.461)	(0.184)	(0.194)	(0.582)
Pre-average	0.319	0.114	0.222*	0.643*
	(0.297)	(0.132)	(0.133)	(0.382)
Post-average	0.554*	0.446***	0.464***	1.453***
	(0.314)	(0.129)	(0.116)	(0.385)
Mean dependent variable	30.20	7.402	7.148	44.75
Observations	7,289	7,289	7,289	7,289

Notes: The outcome is the monthly count of the crime incidence, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment using stacked disasters approach. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, and LGA-specific time trends. Standard errors, clustered at the LGA-month level, are presented in parentheses. Significance: $^{***}p < 0.01,^{**} p < 0.05,^{*} p < 0.1$.

Table A3: Dynamic Effects of Disaster Exposure on Gender based Violence. Controlling for Population. Stacked Disasters

	DV assault (1)	Sexual assault (2)	Sexual acts (3)	FDSV (4)
Pre 6	-0.135	-0.0489	-0.0365	-0.221*
	(0.0997)	(0.0418)	(0.0396)	(0.125)
Pre 5	0.185	0.0913	0.237**	0.513*
	(0.217)	(0.0910)	(0.120)	(0.294)
Pre 4	0.106	0.0495	0.0580	0.213
	(0.211)	(0.105)	(0.104)	(0.276)
Pre 3	0.395	-0.0678	-0.0630	0.264
	(0.248)	(0.118)	(0.107)	(0.319)
Pre 2	0.383	0.221**	0.264**	0.869***
	(0.260)	(0.112)	(0.114)	(0.332)
Post 0	0.170	0.356***	0.234**	0.760**
	(0.251)	(0.123)	(0.114)	(0.334)
Post 1	0.708***	0.526***	0.515***	1.748***
	(0.247)	(0.117)	(0.114)	(0.331)
Post 2	1.428***	0.681***	0.622***	2.731***
	(0.283)	(0.117)	(0.122)	(0.376)
Post 3	0.809***	0.535***	0.464***	1.808***
	(0.248)	(0.118)	(0.109)	(0.325)
Post 4	-0.250	0.181	0.158	0.0897
	(0.251)	(0.119)	(0.105)	(0.331)
Post 5	0.172	0.0125	-0.161	0.0228
	(0.237)	(0.110)	(0.111)	(0.320)
Post 6	-0.398	-0.123	-0.0971	-0.617*
	(0.268)	(0.112)	(0.115)	(0.348)
Pre-average	0.187	0.0491	0.0921	0.328**
	(0.122)	(0.0576)	(0.0596)	(0.162)
Post-average	0.377***	0.310***	0.248***	0.935***
	(0.134)	(0.0607)	(0.0573)	(0.179)
Mean dependent variable	22.55	5.640	5.406	33.60
Observations	14,530	14,530	14,530	14,530

Notes: The outcome is the monthly count of the crime incidence, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment with stacked event study approach. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, and LGA-specific time trends. Standard errors, clustered at the LGA-month level, are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A4: Dynamic Effects of Disaster Exposure on gender based Violence. Poorer vs Richer LGAs. First Disaster

	DV assault		Sexual assault		Sexual acts		FDSV	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: IRSD Index								
Pre 6	0.637	0.403	-0.029	-0.034	-0.314	-0.403	0.294	-0.035
	(0.501)	(0.649)	(0.235)	(0.425)	(0.216)	(0.274)	(0.603)	(0.807)
Pre 5	0.428	0.407	0.189	0.045	-0.082	0.199	0.535	0.652
	(0.714)	(0.949)	(0.361)	(0.409)	(0.336)	(0.589)	(0.816)	(1.250)
Pre 4	0.891	-1.033	0.334	0.014	-0.425	-0.033	0.800	-1.052
	(0.669)	(0.835)	(0.366)	(0.465)	(0.355)	(0.524)	(0.962)	(1.180)
Pre 3	1.462**	0.902	0.441	-0.163	-0.368	-0.719*	1.535	0.020
	(0.723)	(1.009)	(0.327)	(0.463)	(0.397)	(0.425)	(1.041)	(1.203)
Pre 2	1.722**	-1.463	0.326	0.764*	-0.112	-0.367	1.936*	-1.066
	(0.818)	(0.985)	(0.370)	(0.428)	(0.308)	(0.412)	(1.071)	(1.246)
Post 0	0.976	-0.067	-0.076	-0.069	-0.054	-0.374	0.847	-0.510
	(0.865)	(0.867)	(0.298)	(0.381)	(0.266)	(0.422)	(0.944)	(0.990)
Post 1	-0.689	-0.154	0.432	2.425***	0.650	1.832***	0.392	4.103**
	(0.738)	(1.209)	(0.304)	(0.757)	(0.399)	(0.635)	(0.865)	(1.720)
Post 2	1.463*	2.237**	0.310	0.239	-0.029	0.101	1.744*	2.578**
	(0.805)	(0.980)	(0.241)	(0.325)	(0.328)	(0.444)	(1.027)	(1.134)
Post 3	1.147	2.000*	0.409	0.717	0.460	-0.313	2.016*	2.404*
	(0.930)	(1.060)	(0.297)	(0.483)	(0.417)	(0.363)	(1.167)	(1.332)
Post 4	1.277	0.487	0.157	0.642	0.061	0.051	1.496*	1.179
	(0.792)	(1.099)	(0.348)	(0.474)	(0.305)	(0.439)	(0.907)	(1.421)
Post 5	0.281	0.502	-0.187	-0.218	-0.184	-1.433***	-0.090	-1.149
	(0.834)	(1.168)	(0.333)	(0.496)	(0.297)	(0.489)	(1.183)	(1.423)
Post 6	-1.372	-1.339	-0.453	-1.610***	-0.852**	-1.949***	-2.676*	-4.897***
	(1.199)	(1.126)	(0.309)	(0.480)	(0.372)	(0.470)	(1.591)	(1.592)
Pre-average	1.028**	-0.157	0.252	0.125	-0.260	-0.265	1.020*	-0.296
	(0.455)	(0.575)	(0.257)	(0.338)	(0.222)	(0.283)	(0.592)	(0.715)
Post-average	0.441	0.524	0.084	0.304	0.008	-0.298	0.533	0.530
	(0.423)	(0.530)	(0.133)	(0.229)	(0.163)	(0.230)	(0.519)	(0.681)
Mean dependent var	13.09	20.89	2.255	4.328	2.69	5.423	18.04	30.64
Observations	22869	23595	22869	23595	22869	23595	22869	23595

Continued . . .

Dynamic Effects of Disaster Exposure on gender based Violence. Poorer vs Richer LGAs. First Disaster Only

	DV assault		**Sexual assault**		**Sexual acts**		**FDSV**	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel B: IER Index								
Pre 6	0.584	0.517	-0.265	0.101	-0.319	-0.360	-0.0000714	0.258
	(0.533)	(0.600)	(0.278)	(0.373)	(0.259)	(0.236)	(0.658)	(0.731)
Pre 5	0.440	0.462	-0.0206	0.186	-0.162	0.281	0.258	0.928
	(0.737)	(0.896)	(0.414)	(0.357)	(0.406)	(0.519)	(0.926)	(1.120)
Pre 4	0.756	-0.701	-0.239	0.461	-0.296	-0.132	0.222	-0.372
	(0.745)	(0.755)	(0.466)	(0.372)	(0.395)	(0.481)	(1.036)	(1.086)
Pre 3	1.959***	0.607	0.430	-0.138	-0.596	-0.464	1.793*	0.00455
	(0.713)	(0.968)	(0.324)	(0.430)	(0.436)	(0.390)	(1.031)	(1.171)
Pre 2	1.486*	-0.949	0.406	0.619	0.120	-0.484	2.012*	-0.814
	(0.830)	(0.943)	(0.391)	(0.394)	(0.387)	(0.350)	(1.157)	(1.146)
Post 0	2.044**	-0.817	-0.0231	-0.0863	0.0819	-0.367	2.102**	-1.270
	(0.891)	(0.816)	(0.323)	(0.351)	(0.378)	(0.340)	(1.039)	(0.892)
Post 1	-1.834*	0.727	1.115**	1.739***	1.068**	1.479**	0.349	3.945**
	(0.997)	(0.992)	(0.546)	(0.627)	(0.441)	(0.585)	(0.855)	(1.617)
Post 2	1.207*	2.396**	0.162	0.394	0.0112	0.143	1.380*	2.933**
	(0.669)	(1.018)	(0.255)	(0.295)	(0.366)	(0.405)	(0.825)	(1.207)
Post 3	1.186	1.915**	0.337	0.776*	0.284	-0.0215	1.808	2.670**
	(1.075)	(0.944)	(0.315)	(0.452)	(0.482)	(0.314)	(1.346)	(1.181)
Post 4	1.470*	0.412	0.150	0.627	0.0192	0.170	1.639*	1.209
	(0.848)	(1.023)	(0.360)	(0.452)	(0.364)	(0.388)	(0.896)	(1.356)
Post 5	-0.267	0.945	-0.447	0.0272	-0.502	-0.992***	-1.217	-0.0200
	(0.879)	(1.086)	(0.425)	(0.412)	(0.521)	(0.309)	(1.403)	(1.220)
Post 6	-2.106	-0.756	-0.659*	-1.336***	-0.997**	-1.704***	-3.762*	-3.796***
	(1.369)	(0.992)	(0.393)	(0.418)	(0.472)	(0.391)	(1.950)	(1.290)
Pre-average	1.045**	-0.0131	0.0623	0.246	-0.250	-0.232	0.857	0.000853
	(0.476)	(0.537)	(0.280)	(0.301)	(0.254)	(0.253)	(0.618)	(0.665)
Post-average	0.243	0.689	0.0905	0.306	-0.00486	-0.185	0.328	0.810
	(0.474)	(0.477)	(0.167)	(0.200)	(0.211)	(0.189)	(0.601)	(0.604)
Mean dep. var.	14.76	18.89	2.636	3.847	3.259	4.735	20.65	27.47
Observations	20691	25773	20691	25773	20691	25773	20691	25773
Panel C: IEO Index								
Pre 6	0.925**	-0.0980	0.161	-0.185	-0.469**	-0.267	0.617	-0.551
	(0.423)	(0.686)	(0.171)	(0.436)	(0.193)	(0.282)	(0.511)	(0.839)

Continued ...

Dynamic Effects of Disaster Exposure on gender based Violence. Poorer vs Richer LGAs. First Disaster Only

	DV assault		Sexual assault		Sexual acts		FDSV	
	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median	Below Median	Above Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre 5	0.510	0.236	0.451*	-0.141	-0.526	0.621	0.435	0.717
	(0.577)	(1.007)	(0.271)	(0.457)	(0.354)	(0.547)	(0.834)	(1.211)
Pre 4	0.745	-0.928	0.561*	-0.133	-0.366	-0.0572	0.941	-1.118
	(0.625)	(0.854)	(0.286)	(0.498)	(0.299)	(0.536)	(0.826)	(1.245)
Pre 3	0.476	1.666*	0.427	-0.106	-0.613	-0.462	0.290	1.098
	(0.689)	(0.997)	(0.287)	(0.486)	(0.373)	(0.442)	(0.918)	(1.253)
Pre 2	0.921	-0.787	0.318	0.793*	-0.532**	0.0463	0.707	0.0531
	(0.805)	(0.991)	(0.299)	(0.470)	(0.250)	(0.428)	(0.990)	(1.280)
Post 0	1.220*	-0.212	-0.0257	-0.128	-0.467**	0.0265	0.727	-0.315
	(0.730)	(0.948)	(0.266)	(0.391)	(0.189)	(0.439)	(0.913)	(1.005)
Post 1	-0.715	-0.143	0.587*	2.186***	0.568*	1.877***	0.440	3.919**
	(0.652)	(1.206)	(0.307)	(0.739)	(0.341)	(0.650)	(0.803)	(1.699)
Post 2	-0.232	3.724***	0.193	0.334	0.0359	0.0710	-0.00249	4.129***
	(0.663)	(1.008)	(0.213)	(0.330)	(0.322)	(0.436)	(0.743)	(1.252)
Post 3	0.651	2.466**	0.0661	0.993**	-0.112	0.261	0.606	3.720**
	(0.585)	(1.218)	(0.317)	(0.452)	(0.258)	(0.472)	(0.740)	(1.516)
Post 4	1.294*	0.584	0.579*	0.250	-0.265	0.385	1.607*	1.219
	(0.720)	(1.108)	(0.324)	(0.481)	(0.223)	(0.462)	(0.840)	(1.416)
Post 5	0.420	0.473	0.125	-0.511	-0.315	-1.224**	0.231	-1.262
	(0.706)	(1.194)	(0.259)	(0.511)	(0.289)	(0.478)	(0.938)	(1.523)
Post 6	0.415	-2.921**	-0.516	-1.497***	-0.641**	-2.085***	-0.742	-6.502***
	(0.673)	(1.392)	(0.350)	(0.444)	(0.297)	(0.489)	(0.761)	(1.946)
Pre-average	0.715*	0.0180	0.384**	0.0456	-0.501**	-0.0239	0.598	0.0397
	(0.413)	(0.596)	(0.167)	(0.378)	(0.207)	(0.286)	(0.541)	(0.738)
Post-average	0.436	0.567	0.144	0.232	-0.171	-0.0985	0.409	0.701
	(0.340)	(0.560)	(0.128)	(0.226)	(0.146)	(0.233)	(0.419)	(0.714)
Mean dep. var.	9.496	23.72	1.797	4.641	2.089	5.832	13.38	34.19
Observations	21780	24684	21780	24684	21780	24684	21780	24684

Notes: The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. Regressions by different SEIFA indices presented. All LGAs are grouped into above and below median (rich and poor) LGAs. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A5: Dynamic Effects of Disaster Exposure on gender based Violence. Rural vs Urban LGAs. First Disaster

	Rural (>100km from Sydney CBD)				Urban (≤100km from Sydney CBD)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV assault	Sexual assault	Sexual acts	FDSV	DV assault	Sexual assault	Sexual acts	FDSV
Pre 6	0.422	0.0557	-0.366**	0.112	-0.452	0.837	-0.573	-0.188
	(0.349)	(0.150)	(0.159)	(0.416)	(1.510)	(0.634)	(0.556)	(1.860)
Pre 5	-0.269	0.351	-0.0252	0.0565	0.786	0.847	0.683	2.316
	(0.504)	(0.225)	(0.301)	(0.659)	(1.904)	(0.876)	(0.973)	(2.370)
Pre 4	-0.114	0.450*	-0.285	0.0515	-1.216	0.774	0.421	-0.0208
	(0.488)	(0.259)	(0.219)	(0.619)	(1.765)	(0.752)	(0.988)	(2.520)
Pre 3	0.416	0.153	-0.829***	-0.261	0.973	1.114	0.297	2.385
	(0.586)	(0.253)	(0.265)	(0.727)	(1.901)	(0.864)	(0.804)	(2.280)
Pre 2	-0.0221	0.595**	-0.0329	0.540	-2.360	1.723**	-0.419	-1.056
	(0.598)	(0.282)	(0.220)	(0.764)	(1.817)	(0.810)	(0.789)	(2.295)
Post 0	0.239	-0.0368	-0.154	0.0483	1.292	0.330	-0.00400	1.618
	(0.600)	(0.229)	(0.227)	(0.726)	(1.472)	(0.759)	(0.659)	(1.540)
Post 1	-1.054*	0.233	0.600	-0.221	1.003	4.802***	3.148***	8.954***
	(0.616)	(0.330)	(0.379)	(0.708)	(1.895)	(1.138)	(0.856)	(2.732)
Post 2	-0.156	0.0111	0.115	-0.0296	7.216***	1.510***	0.454	9.180***
	(0.581)	(0.206)	(0.278)	(0.658)	(1.536)	(0.565)	(0.653)	(1.982)
Post 3	0.172	0.0812	-0.354*	-0.100	6.076***	2.327***	1.685**	10.09***
	(0.518)	(0.263)	(0.210)	(0.640)	(2.001)	(0.757)	(0.752)	(2.452)
Post 4	0.690	0.287	-0.154	0.823	2.791	1.402*	1.327*	5.520**
	(0.591)	(0.299)	(0.216)	(0.778)	(1.793)	(0.733)	(0.720)	(2.216)
Post 5	0.517	0.0279	0.0380	0.582	2.054	-0.199	-2.132***	-0.278
	(0.550)	(0.225)	(0.237)	(0.649)	(2.025)	(0.692)	(0.738)	(2.595)
Post 6	-0.232	-0.475**	-0.536**	-1.243**	-2.557	-1.785**	-3.333***	-7.675**
	(0.520)	(0.223)	(0.228)	(0.571)	(2.312)	(0.793)	(0.780)	(3.177)
Pre-average	0.0864	0.321**	-0.308*	0.0999	-0.454	1.059*	0.0820	0.687
	(0.327)	(0.157)	(0.163)	(0.407)	(1.403)	(0.606)	(0.595)	(1.732)
Post-average	0.0253	0.0183	-0.0636	-0.0200	2.554***	1.198***	0.164	3.915***
	(0.287)	(0.126)	(0.130)	(0.342)	(0.943)	(0.370)	(0.370)	(1.230)
Mean dep. var.	9.597	1.988	2.289	13.874	34.703	6.434	8.314	49.452
Observations	32670	32670	32670	32670	13794	13794	13794	13794

Notes: The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A6: Dynamic Effects of Disaster Exposure on gender based Violence. Rural vs Urban LGAs. First Disaster

	Rural (>150km from Sydney CBD)				Urban (≤150km from Sydney CBD)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV assault	Sexual assault	Sexual acts	FDSV	DV assault	Sexual assault	Sexual acts	FDSV
Pre 6	-1.461**	4.349	0.489	3.377	-6.956***	3.550	-0.495	-3.901
	(0.654)	(4.267)	(0.836)	(4.868)	(2.388)	(6.034)	(1.182)	(7.273)
Pre 5	-1.073*	3.677	0.670	3.274	-3.719	2.942	0.624	-0.152
	(0.630)	(3.069)	(0.636)	(3.537)	(2.343)	(4.715)	(1.153)	(5.990)
Pre 4	-0.978	3.706	0.392	3.121	-5.089**	2.981	0.392	-1.717
	(0.659)	(3.042)	(0.620)	(3.515)	(2.012)	(4.658)	(1.157)	(5.829)
Pre 3	-0.435	3.328	-0.221	2.673	-3.061	3.444	0.382	0.764
	(0.607)	(3.062)	(0.621)	(3.523)	(2.053)	(4.697)	(1.093)	(5.710)
Pre 2	-1.061	3.804	0.612	3.354	-5.064***	3.805	-0.160	-1.419
	(0.703)	(3.043)	(0.619)	(3.521)	(1.703)	(4.643)	(1.095)	(5.635)
Post 0	-0.0556	1.929	0.144	2.017	-1.659	1.741	0.116	0.198
	(0.679)	(2.004)	(0.414)	(2.355)	(1.637)	(2.373)	(0.702)	(2.988)
Post 1	-1.319**	1.961	0.813	1.455	-1.908	5.894**	3.064***	7.051**
	(0.558)	(2.012)	(0.526)	(2.349)	(1.835)	(2.464)	(0.836)	(3.499)
Post 2	-0.518	2.074	0.542	2.098	3.058*	2.550	0.267	5.875*
	(0.617)	(2.018)	(0.465)	(2.343)	(1.753)	(2.351)	(0.681)	(3.244)
Post 3	-0.628	1.787	0.0820	1.241	2.853	3.791	1.141	7.784**
	(0.689)	(1.990)	(0.417)	(2.341)	(2.066)	(2.351)	(0.718)	(3.441)
Post 4	0.200	2.322	0.453	2.974	-0.310	2.344	0.538	2.572
	(0.669)	(1.954)	(0.408)	(2.316)	(1.673)	(2.268)	(0.735)	(3.128)
Post 5	0.373	2.159	0.469	3.001	-1.579	0.861	-1.941**	-2.659
	(0.653)	(1.961)	(0.435)	(2.320)	(2.235)	(2.310)	(0.777)	(3.650)
Post 6	-0.295	1.087	-0.356	0.436	-4.343**	-0.908	-2.625***	-7.875**
	(0.460)	(1.260)	(0.314)	(1.516)	(2.167)	(1.942)	(0.737)	(3.349)
Pre-average	-1.002*	3.773	0.389	3.160	-4.778***	3.345	0.148	-1.285
	(0.527)	(3.292)	(0.647)	(3.765)	(1.843)	(4.931)	(1.020)	(5.920)
Post-average	-0.320	1.903	0.307	1.889	-0.555	2.325	0.0800	1.849
	(0.433)	(1.873)	(0.366)	(2.162)	(1.338)	(2.213)	(0.516)	(2.821)
Mean dep. var.	8.025	1.728	1.928	11.68	30.21	5.901	7.333	43.45
Observations	30,492	30,492	30,492	30,492	18,150	18,150	18,150	18,150

Notes: The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table A7: Dynamic Effects of Disaster Exposure on gender based Violence. Rural vs Urban LGAs. First Disaster

	Rural (>200km from Sydney CBD)				Urban (≤200km from Sydney CBD)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV assault	Sexual assault	Sexual acts	FDSV	DV assault	Sexual assault	Sexual acts	FDSV
Pre 6	-1.441**	4.690	0.577	3.826	-5.749***	3.312	-0.343	-2.780
	(0.698)	(4.538)	(0.889)	(5.183)	(2.128)	(5.424)	(1.055)	(6.455)
Pre 5	-0.993	4.055	0.704	3.766	-3.389*	2.424	0.542	-0.423
	(0.690)	(3.298)	(0.687)	(3.806)	(1.992)	(4.107)	(1.006)	(5.153)
Pre 4	-0.920	3.965	0.460	3.506	-4.565***	2.627	0.236	-1.702
	(0.717)	(3.268)	(0.668)	(3.781)	(1.714)	(4.063)	(1.008)	(5.031)
Pre 3	-0.340	3.644	-0.171	3.132	-2.598	2.951	0.245	0.598
	(0.659)	(3.289)	(0.665)	(3.788)	(1.758)	(4.096)	(0.954)	(4.930)
Pre 2	-1.016	4.117	0.694	3.796	-4.215***	3.277	-0.206	-1.143
	(0.756)	(3.268)	(0.668)	(3.785)	(1.502)	(4.050)	(0.949)	(4.876)
Post 0	0.0189	2.027	0.136	2.182	-1.813	1.601	0.0644	-0.148
	(0.729)	(2.059)	(0.423)	(2.430)	(1.434)	(2.307)	(0.661)	(2.848)
Post 1	-1.451**	2.063	0.811	1.423	-1.837	5.209**	2.705***	6.077*
	(0.582)	(2.069)	(0.555)	(2.419)	(1.623)	(2.380)	(0.761)	(3.251)
Post 2	-0.631	2.150	0.528	2.047	2.440	2.324	0.206	4.970
	(0.665)	(2.076)	(0.486)	(2.411)	(1.532)	(2.293)	(0.633)	(3.045)
Post 3	-0.650	1.957	0.0797	1.387	2.003	3.236	0.891	6.131*
	(0.731)	(2.047)	(0.429)	(2.415)	(1.839)	(2.291)	(0.660)	(3.238)
Post 4	-0.0220	2.244	0.384	2.606	-0.425	2.365	0.478	2.418
	(0.629)	(2.000)	(0.420)	(2.374)	(1.585)	(2.226)	(0.671)	(2.980)
Post 5	0.306	2.288	0.466	3.061	-1.822	0.805	-1.758**	-2.774
	(0.690)	(2.015)	(0.442)	(2.390)	(1.972)	(2.256)	(0.749)	(3.426)
Post 6	-0.294	1.142	-0.379	0.469	-4.272**	-0.785	-2.312***	-7.368**
	(0.499)	(1.356)	(0.336)	(1.634)	(1.934)	(1.768)	(0.669)	(3.056)
Pre-average	-0.942*	4.094	0.453	3.605	-4.103***	2.918	0.0950	-1.090
	(0.572)	(3.527)	(0.695)	(4.038)	(1.583)	(4.333)	(0.890)	(5.140)
Post-average	-0.389	1.982	0.289	1.882	-0.818	2.108	0.0392	1.329
	(0.459)	(1.932)	(0.377)	(2.234)	(1.192)	(2.147)	(0.494)	(2.689)
Mean dep. var.	8.214	1.750	1.957	11.92	27.23	5.360	6.630	39.22
Observations	27,951	27,951	27,951	27,951	20,691	20,691	20,691	20,691

Notes: The outcome is the monthly count of the crime incidence. Time is measured in months relative to the disaster event, with the baseline period being one month prior to the disaster. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of first disaster only. Estimates are reported relative to the omitted period ($t = -1$). All specifications include LGA, year, and month fixed effects, as well as LGA-specific time trends. Standard errors clustered at the LGA-month level are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

B Robustness. Incrementally adding controls.

Table B1: DV Assaults: Incrementally adding controls. First Disaster

	(1)	(2)	(3)	(4)	(5)
Pre6	0.391	0.451	0.371	0.371	0.371
	(0.500)	(0.493)	(0.369)	(0.824)	(0.415)
Pre5	-0.109	0.322	0.354	0.354	0.354
	(0.879)	(0.872)	(0.654)	(0.785)	(0.602)
Pre4	0.500	-0.186	-0.153	-0.153	-0.153
	(0.879)	(0.872)	(0.653)	(0.761)	(0.541)
Pre3	1.172	1.058	1.090*	1.090	1.090*
	(0.888)	(0.869)	(0.650)	(0.699)	(0.629)
pre2	1.476	-0.043	-0.011	-0.011	-0.011
	(0.933)	(0.875)	(0.658)	(0.695)	(0.646)
Post0	-0.533	0.453	0.458	0.458	0.458
	(0.828)	(0.820)	(0.612)	(0.723)	(0.613)
Post1	-0.642	-0.420	-0.416	-0.416	-0.416
	(0.831)	(0.821)	(0.613)	(0.747)	(0.710)
Post2	0.303	1.868**	1.872***	1.872**	1.872***
	(0.828)	(0.825)	(0.619)	(0.750)	(0.639)
Post3	0.507	1.618*	1.622***	1.622*	1.622**
	(0.827)	(0.830)	(0.626)	(0.892)	(0.706)
Post4	-0.111	0.922	0.926	0.926	0.926
	(0.829)	(0.821)	(0.615)	(0.674)	(0.680)
Post5	0.421	0.459	0.463	0.463	0.463
	(0.881)	(0.822)	(0.616)	(0.922)	(0.729)
Post6	-1.191	-1.364*	-1.347**	-1.347	-1.347
	(0.869)	(0.813)	(0.611)	(0.822)	(0.825)
LGA- and Year-FE	✓	✓	✓	✓	✓
Month-FE	✗	✓	✓	✓	✓
LG-specific time trend	✗	✗	✓	✓	✓
Clustered standard errors (LGA)	✗	✗	✗	✓	✗
Clustered standard errors (LGA-Month)	✗	✗	✗	✗	✓
Observations	46,464	46,464	46,464	46,464	46,464

Notes: The outcome is the monthly count of **Domestic Violence** incidents, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. Estimates are reported relative to the omitted period ($t = -1$). Standard errors are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table B2: Sexual Assaults: Incrementally adding controls. First Disaster

	(1)	(2)	(3)	(4)	(5)
Pre6	-0.174	-0.112	-0.018	-0.018	-0.018
	(0.171)	(0.171)	(0.149)	(0.253)	(0.169)
Pre5	0.143	0.182	0.144	0.144	0.144
	(0.307)	(0.308)	(0.268)	(0.279)	(0.265)
Pre4	0.471	0.237	0.199	0.199	0.199
	(0.303)	(0.305)	(0.265)	(0.303)	(0.257)
Pre3	0.253	0.186	0.148	0.148	0.148
	(0.317)	(0.309)	(0.269)	(0.295)	(0.280)
Pre2	0.518*	0.616**	0.577**	0.577**	0.577**
	(0.310)	(0.313)	(0.273)	(0.294)	(0.278)
Post0	-0.198	-0.073	-0.078	-0.078	-0.078
	(0.287)	(0.287)	(0.249)	(0.241)	(0.274)
Post1	1.701***	1.444***	1.439***	1.439***	1.439***
	(0.319)	(0.316)	(0.281)	(0.422)	(0.435)
Post2	0.005	0.277	0.272	0.272	0.272
	(0.285)	(0.288)	(0.251)	(0.200)	(0.213)
Post3	0.638**	0.567**	0.562**	0.562**	0.562*
	(0.284)	(0.286)	(0.248)	(0.284)	(0.293)
Post4	0.498*	0.414	0.409*	0.409	0.409
	(0.284)	(0.285)	(0.248)	(0.295)	(0.299)
Post5	-0.440	-0.205	-0.209	-0.209	-0.209
	(0.284)	(0.285)	(0.248)	(0.297)	(0.261)
Post6	-1.041***	-1.013***	-1.033***	-1.033***	-1.033***
	(0.279)	(0.281)	(0.244)	(0.290)	(0.294)
LGA- and Year-FE	✓	✓	✓	✓	✓
Month-FE	✗	✓	✓	✓	✓
LG-specific time trend	✗	✗	✓	✓	✓
Clustered standard errors (LGA)	✗	✗	✗	✓	✗
Clustered standard errors (LGA-Month)	✗	✗	✗	✗	✓
Observations	46,464	46,464	46,464	46,464	46,464

Notes: The outcome is the monthly count of **Sexual Assault** incidents, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. Estimates are reported relative to the omitted period ($t = -1$). Standard errors are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table B3: Sexual Acts: Incrementally adding controls. First Disaster

	(1)	(2)	(3)	(4)	(5)
Pre6	-0.416**	-0.391**	-0.362**	-0.362*	-0.362**
	(0.185)	(0.185)	(0.176)	(0.202)	(0.175)
Pre5	0.154	0.102	0.090	0.090	0.090
	(0.327)	(0.328)	(0.310)	(0.333)	(0.344)
Pre4	0.146	-0.183	-0.195	-0.195	-0.195
	(0.326)	(0.326)	(0.309)	(0.329)	(0.323)
Pre3	-0.456	-0.517	-0.529*	-0.529*	-0.529*
	(0.333)	(0.329)	(0.311)	(0.298)	(0.292)
Pre2	-0.245	-0.207	-0.218	-0.218	-0.218
	(0.326)	(0.326)	(0.309)	(0.296)	(0.259)
Post0	-0.354	-0.200	-0.202	-0.202	-0.202
	(0.308)	(0.308)	(0.292)	(0.258)	(0.252)
Post1	1.677***	1.268***	1.266***	1.266***	1.266***
	(0.320)	(0.315)	(0.299)	(0.377)	(0.383)
Post2	-0.174	0.061	0.060	0.060	0.060
	(0.307)	(0.308)	(0.292)	(0.276)	(0.277)
Post3	0.138	0.094	0.092	0.092	0.092
	(0.312)	(0.314)	(0.298)	(0.267)	(0.277)
Post4	0.060	0.089	0.087	0.087	0.087
	(0.307)	(0.308)	(0.291)	(0.263)	(0.270)
Post5	-1.151***	-0.790**	-0.792***	-0.792**	-0.792***
	(0.307)	(0.308)	(0.292)	(0.322)	(0.290)
Post6	-1.424***	-1.401***	-1.408***	-1.408***	-1.408***
	(0.302)	(0.304)	(0.287)	(0.287)	(0.304)
LGA- and Year-FE	✓	✓	✓	✓	✓
Month-FE	✗	✓	✓	✓	✓
LG-specific time trend	✗	✗	✓	✓	✓
Clustered standard errors (LGA)	✗	✗	✗	✓	✗
Clustered standard errors (LGA-Month)	✗	✗	✗	✗	✓
Observations	46,464	46,464	46,464	46,464	46,464

Notes: The outcome is the monthly count of **Sexual Acts** incidents, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. Estimates are reported relative to the omitted period ($t = -1$). Standard errors are presented in parentheses. Significance: $^{***}p < 0.01$,$^{**}p < 0.05$,$^{*}p < 0.1$.

Table B4: FDSV: Incrementally adding controls. First Disaster

	(1)	(2)	(3)	(4)	(5)
Pre6	-0.199	-0.052	-0.009	-0.009	-0.009
	(0.653)	(0.647)	(0.457)	(0.948)	(0.506)
Pre5	0.187	0.606	0.588	0.588	0.588
	(1.154)	(1.152)	(0.820)	(0.965)	(0.758)
Pre4	1.117	-0.132	-0.149	-0.149	-0.149
	(1.148)	(1.146)	(0.811)	(1.032)	(0.769)
Pre3	0.969	0.726	0.709	0.709	0.709
	(1.186)	(1.148)	(0.813)	(0.782)	(0.799)
Pre2	1.750	0.366	0.349	0.349	0.349
	(1.211)	(1.156)	(0.825)	(0.795)	(0.822)
Post0	-1.084	0.180	0.178	0.178	0.178
	(1.086)	(1.077)	(0.759)	(0.753)	(0.684)
Post1	2.736**	2.292**	2.290***	2.290**	2.290**
	(1.128)	(1.102)	(0.794)	(1.054)	(0.991)
Post2	0.135	2.206**	2.204***	2.204**	2.204***
	(1.082)	(1.087)	(0.773)	(0.892)	(0.769)
Post3	1.283	2.278**	2.276***	2.276**	2.276**
	(1.085)	(1.098)	(0.788)	(1.100)	(0.886)
Post4	0.447	1.425	1.422*	1.422*	1.422*
	(1.082)	(1.079)	(0.764)	(0.855)	(0.849)
Post5	-1.170	-0.536	-0.538	-0.538	-0.538
	(1.125)	(1.076)	(0.759)	(1.176)	(0.932)
Post6	-3.656***	-3.779***	-3.788***	-3.788***	-3.788***
	(1.112)	(1.069)	(0.761)	(1.062)	(1.126)
LGA- and Year-FE	✓	✓	✓	✓	✓
Month-FE	✗	✓	✓	✓	✓
LG-specific time trend	✗	✗	✓	✓	✓
Clustered standard errors (LGA)	✗	✗	✗	✓	✗
Clustered standard errors (LGA-Month)	✗	✗	✗	✗	✓
Observations	46,464	46,464	46,464	46,464	46,464

Notes: The outcome is the monthly count of the composite measure FDSV, while time is measured in months relative to the disaster event. Coefficients are estimated using Sun and Abraham (2021) interaction-weighted estimator of dynamic treatment effects under staggered treatment of the first disaster only. Estimates are reported relative to the omitted period ($t = -1$). Standard errors are presented in parentheses. Significance: $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.