

# Preparedness and vulnerability: an issue of equity in Australian disaster situations

Dr Helen Boon, James Cook University, indicates that preparedness is linked to an individual's financial capacity to meet the costs of an event, which raises critical issues of equity when examining preparedness for disaster.

## ABSTRACT

The character and severity of impacts from natural disasters depends not only on the particular disaster but also on exposure and vulnerability. This study examined preparedness for a natural disaster and financial capacity in four regional Australian communities which had experienced climate extremes: Innisfail (cyclone) and Ingham (flood) in Queensland and Beechworth (fire) and Bendigo (drought) in Victoria. The study employed a quantitative design using a survey (1008 respondents) across the four communities as well as demographic statistics about each community. The key findings showed that preparedness was primarily linked to an individual's financial capacity (defined by their capacity to meet the costs of the event) and their insurance cover for the event's damage. It is clear therefore that there are critical issues of equity when examining preparedness for disaster. <sup>R</sup>

*determine the degree to which someone's life and livelihood are put at risk.' Blaikie et al. (1994, pp. 8-9)*

Research literature on vulnerability is diverse, addressing a variety of hazards and attributes of social vulnerability (Zahran *et al.* 2008), including gender (Neumayer & Plumper 2007; Morrow 1997), race and ethnicity (Fothergill *et al.* 1999; Peacock & Girard 1997) and measures of economic status such as income and poverty (Fothergill & Peek 2004; Vaughan 1995). In their review of 160 studies of disaster victims Norris *et al.* (2002) found that lower socio-economic status has been consistently associated with greater post-disaster hardship. The poor have been more vulnerable to natural disasters, suffering significant disaster losses with limited access to public and private recovery assets, both in the developed and developing world (Blaikie *et al.* 1994; Gladwin & Peacock 1997).

Of particular interest is how financial capacity intersects with disaster preparedness. Preparedness refers to activities undertaken before a disaster event to reduce its expected ramifications (Zahran *et al.* 2008). It is perhaps self-evident that disaster preparedness is critical to recovery and resilience (Cutter *et al.* 2008; Godschalk 2003). In Australia responsibility for disaster preparedness is distributed across the different actors in the community: individuals and families, local governments, non-governmental organisations (NGOs) and emergency services providers. As it is beyond the capacity of most institutional bodies to undertake preparedness actions on a household level, individuals and families are encouraged to take shared responsibility for preparing their homes prior to a disaster.

In developed countries like the US various socio-economic indicators have been linked to preparedness. Zahran *et al.* (2008) stated in their review of several US studies that earthquake preparedness (e.g. possession of first-aid kits, emergency food supplies and evacuation plans) was less common in low income and minority populations, presumably partly because of the cost of such measures. Vaughan (1995) reported that individuals with inadequate resources or living in poverty in the US were less likely to undertake activities to mitigate the effects of disaster events perhaps because of a lack of a sense of personal control over potential outcomes. Fothergill (2004) indicated that poorer residents in the US could not

## Introduction

Disasters cause significant loss of life, damage and hardship across one or more strata of society. The impact of a disaster depends not only on the type of disaster itself but also on the exposure and vulnerability of the individuals and communities involved. Disasters do not eliminate pre-existing systems of social stratification. Inequalities expressed through levels of wealth and education, disability, age and gender, among others, may differentially expose and render vulnerable individuals or communities to natural disasters (Fothergill & Peek 2004). Blaikie *et al.* (1994) provide an authoritative definition of vulnerability in the context of natural disasters:

*'The characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard. [Vulnerability] involves a combination of factors that*

afford flood insurance, even though they were aware of its availability and benefits.

Little research has examined the links between financial capacity and preparedness in Australia. Australia not only experiences frequent natural disasters including flood, cyclone, drought and fire, its population and the built environment continue to develop in hazard-prone areas across Australia. This increases the vulnerability of individuals and communities to natural disasters. This research, part of a larger project examining community resilience to disaster, retrospectively examined, among other factors, preparedness for disaster and financial capacity in four disaster-impacted, Australian communities. The communities, Beechworth (bushfire 2009) and Bendigo (drought 2006-10) in Victoria, Ingham (floods 2009) and Innisfail (cyclone 2006) in Queensland, were selected because we wanted to explore common and disparate elements in the experience of different types of disaster to understand community resilience and develop a generic model of community resilience to natural disasters.

### Method

A survey was distributed in each community between October 2011 and February 2012 to collect demographics and information about financial capacity, prior experience and household preparedness factors. Survey questions included:

- Financial capacity indicators:** I had financial resources to deal with the impact of the event; I had adequate insurance to deal with the impact of the event.
- Household preparedness indicators:** I felt I knew enough about how to best prepare myself and my property for the floods/cyclone/drought/fire; I had an emergency kit/water saving plan to use in event; I had a fire action plan/household emergency plan/water saving plan to follow; I prepared/ secured my home/property well; I was prepared to deal with the physical impact of the event; I was prepared to deal with the emotional impact of the event.

Responses were collected on a Likert scale coded 1 (Definitely Disagree) to 4 (Definitely Agree). Questions below were responded to by Yes or No (coded 1/0).

- Prior disaster experience indicators:** I have lived through a disaster event prior to this event; I have experienced traumas prior to this event; I have experienced major financial difficulties prior to this event.

These factors or constructs were validated through Rasch analyses (using Winsteps 3.68 software) which, also yielded interval-level measurements for each person on each construct for use in regression analyses (see Boon *et al.* 2012 for complete method descriptions). Descriptive analyses extracted the sample means and standard deviations from each community sample for all indicators, followed by analyses of variance (ANOVAs) of indicators

to determine differences between communities. Regressions were performed using a range of demographics and the Rasch measures of each construct to ascertain which variables best predicted preparedness. Analyses were conducted on IBM SPSS 20 software.

Cluster sampling was used to select participating households. Research assistants approached households identified on map grid points, hand-delivered surveys to residents, then collected them some days later by arrangement. Research assistants offered the surveys only to those householders who confirmed they had been through the natural disaster in question. Survey response rates ranged between 88-94 per cent across the communities.

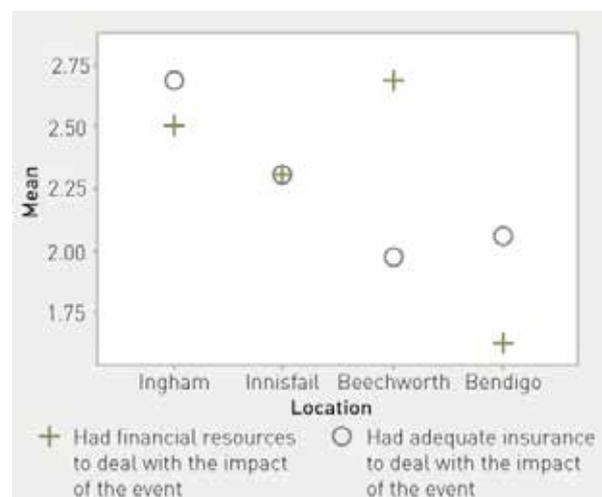
### Results

Table 1 shows some demographic characteristics of the sample (N=1008). Differences in receipt of financial assistance reflected the policies of the Australian Government, which provided extensive financial assistance to individuals affected by cyclone or flood but not to those affected by bushfire or drought. As a corollary, most residents from Ingham and Innisfail received financial assistance from the Queensland or federal governments.

ANOVAs of sample means (Table 1) showed significant differences between communities. In each case, more Ingham and Innisfail respondents than Beechworth or Bendigo respondents experienced prior traumas, disasters and financial difficulties, suggesting higher exposure to disasters and disadvantage in Queensland, as confirmed by their relative economic disadvantage assessed by SEIFA (Socio Economic Indices for Areas) constructed from the 2006 census data (Boon *et al.* 2012).

ANOVAs of financial capacity and preparedness indicators also showed significant differences across communities (Figures 1 and 2, Table 2).

**Figure 1.** Means of financial indicators by community (lower means indicate lower financial capacity)



**Table 1.** Sample characteristics by community (N=1008)

|  |          | Ingham<br>N=287<br>N% | Innisfail<br>N=231<br>N% | Beechworth<br>N=249<br>N% | Bendigo<br>N=241<br>N% |
|--|----------|-----------------------|--------------------------|---------------------------|------------------------|
| Gender   | Male     | 34.6                  | 31.9                     | 35                        | 49.3                   |
|  | Female   | 65.4                  | 68.1                     | 65                        | 50.7                   |
| Current age  | 18-25    | 8.9                   | 5.3                      | 2.5                       | 3.4                    |
|  | 26-40    | 15.6                  | 23.5                     | 16.3                      | 15.3                   |
|  | 41-55    | 41.1                  | 36.3                     | 25.5                      | 35.2                   |
|  | 55+      | 34.4                  | 35                       | 55.6                      | 46.2                   |
| Residence during disaster                                      | Rented   | 18.7                  | 35.6                     | 11.6                      | 6.8                    |
|  | Own home | 78.4                  | 61.7                     | 87.2                      | 91.5                   |
| Assistance from council  |          | 19.6                  | 35.9                     | 5.1                       | 9.5                    |
| Assistance from charity groups                                 |          | 16.1                  | 31.3                     | 3.6                       | 7.1                    |
| Financial assistance from state or federal government          |          | 82.5                  | 90.2                     | 15.8                      | 18.9                   |
| Disaster experience prior to this disaster                     |          | 88.5                  | 79.6                     | 62.5                      | 46.0                   |
| Trauma experience prior to this disaster                       |          | 72.4                  | 73.5                     | 61.4                      | 57.0                   |
| Major financial difficulties experience prior to this disaster |          | 42.7                  | 40.8                     | 33.1                      | 34.7                   |

**Figure 2.** Means of preparedness indicators by community (lower means indicate lower preparedness)



**Table 2.** Financial capacity and preparedness ANOVA results across the four communities (N=1008)

| Indicator   | F-ratio |
|---|---------|
| I had financial resources to deal with the impact of the event          | 19.09** |
| I had adequate insurance to deal with the impact of the event           | 33.73** |
| I had a fire action plan/household emergency plan to follow             | 3.93*   |
| I had an emergency kit to use in event                                  | 41.20** |
| I prepared/ secured my home/property well                               | 21.93** |
| I was prepared to deal with the physical impact of the event            | 13.53** |
| I was prepared to deal with the emotional impact of the event           | 11.03** |
| I knew enough about how to prepare myself and my property for the event | 21.6**  |

\* Significant at p < .05 level; \*\* Significant at p < .001 level.

To examine which indicators predicted preparedness, stepwise regressions were conducted across all communities using demographic variables which have been significantly linked to preparedness in the research literature (i.e. age, gender, employment, prior disaster experiences and financial capacity). Results (Table 3) showed preparedness was significantly predicted only by financial capacity (Model 1: standardised regression weight ( $\beta$ ) = 0.44,  $p < .001$ ). Prior disaster experience increased the variance explained ( $\Delta R^2$ ) by 2 per cent (Model 2). Analyses repeated for each segregated community, (Model 2) predicted 27 per cent ( $R^2$ ) of preparedness in Ingham, ( $p < 0.001$ ) and 24 per cent ( $R^2$ ) in Bendigo ( $p < 0.001$ ). However, prior disaster experiences did not predict preparedness in Beechworth (Model 1:  $R^2 = 15$  per cent,  $p < 0.001$ ) or Innisfail (Model 1:  $R^2 = 14$  per cent,  $p < 0.001$ ). The role of financial capacity for preparedness therefore appears to be more significant than prior disaster experience.

**Table 3.** Stepwise regression analyses for preparedness

| Model | Step and predictor variable | B*   | S. E.* | $\beta$     | $R^2$ | $\Delta R^2$ | p     |
|-------|-----------------------------|------|--------|-------------|-------|--------------|-------|
| 1     | Financial capacity          | .311 | .026   | <b>.440</b> | .20   |              | 0.001 |
| 2     | Financial capacity          | .324 | .026   | <b>.458</b> | .22   | .022         | 0.001 |
|       | Prior disaster experiences  | .173 | .042   | <b>.150</b> |       |              |       |

\*B is the regression coefficient; S.E. is the standard error of the test statistic.

## Discussion

Across the four communities, the research found that preparedness was predicted by an individual's financial capacity defined by their ability to meet the costs of the disaster and their insurance cover for the damage sustained. The results showed that irrespective of disaster type, people with greater financial capacity were better prepared, since findings were consistent within each community. It was noted that even in a slow onset event such as a drought, people who reported being better prepared also reported stronger financial capacity. Notwithstanding a possible limitation caused by recall bias due to the elapsed time between each disaster event and the research, results support previous findings showing that lower income is correlated with poorer household preparedness (Fothergill & Peek 2004).

It is not unexpected that financial capacity should be positively correlated to those aspects of preparedness which incur a financial cost such as emergency kits and insurance coverage. Nonetheless, this study incorporated questions which referred to those

aspects of preparedness which do not appear to have a monetary cost such as: *I prepared/ secured my home/ property well; I was prepared to deal with the emotional impact of the event*. It is perhaps surprising that these aspects of preparedness were correlated with financial capacity. Perhaps these aspects of preparedness also incur an indirect financial cost, for example, by requiring an investment of time in these activities which might otherwise be directed to income producing or other activities. In addition, financial capacity may be related to another construct which was obscured in the research, for example, a personal attribute such as lack of self-efficacy or disability (Paton 2000).

Given that 'financial capacity' is a subjective measure, individuals who did not endorse the items *I had adequate insurance to deal with the impact of the event* and *I had financial resources to deal with the impact of the event* may have had a range of incomes which did not necessarily correlate with objective measures of poverty or low income. Nonetheless, these questions represented a degree of perceived economic vulnerability to disasters which would be expected to overlap with such measures. In addition, results showed that some individuals agreed/ strongly agreed with these items, indicating that they believed they had sufficient financial resources and/ or adequate insurance, or that they were not directly impacted by the disaster. Innisfail was notable among the four communities as having the most individuals stating they had insufficient financial capacity, which is perhaps unsurprising given the extent and gravity of the cyclone and the communities relative economic disadvantage, evaluated by SEIFA socioeconomic indices. In this sense, vulnerability to a natural disaster depends on the nature of the event and the circumstances of the individual. Research needs to explore the relationship between reported financial vulnerability and an objective measure of income in Australia with regard to disaster preparedness. Such research should also untangle whether personal attributes, as outlined and indicated in the disaster literature (Paton, Smith & Johnson 2005), are related to vulnerability.

It should be noted that Model 2 explained 22 per cent of the variance in preparedness, with some variations within each community, leaving 78 per cent of preparedness unexplained. Other factors clearly predict preparedness, for example, self-efficacy beliefs (Paton, 2003), a sense of community (Bishop *et al.* 2000) or initiatives from local organisations like the State Emergency Service. For example, Kim & Kang (2009) reported that an integrated connection to community-level communication resources including local media, community organisations and interpersonal networks had a direct impact on the likelihood of engaging in pre-hurricane preparedness among US residents' responses to *Hurricane Ivan* (2004). Conversely, an absence of these factors, coupled with reduced financial capacity, might result in an individual being unprepared for a disaster. Moreover, other forms of vulnerability might exist in tandem with reduced financial capacity such as ethnic minority status, gender, disability or age. It seems that preparedness

for a natural disaster depends on a multitude of influences as well as individual personality traits which would presumably vary from one event to another. Nonetheless, reduced financial capacity is relatively easy for policy makers to identify for the provision of support to individuals/householders when undertaking disaster planning and education.

## Conclusion

This paper highlights findings from research examining the links between financial capacity and preparedness in four disaster-impacted Australian communities. Research in the US showed the poor suffer disproportionately from disasters (Zahran *et al.* 2008). Results reported here suggest a similar situation in Australia, for a range of natural disasters. If this is partly due to a lack of preparedness, then greater intervention to protect those with diminished financial capacity needs to take place in Australia. Governments and policy makers need to make provision to alleviate the economic impacts of natural disasters on the disadvantaged. Provision could take the form of subsidised insurance to diminish dependence on charity assistance post-disaster, subsidised low-cost emergency kits and targeted community education to help householders lessen the burden of disaster ramifications. Given the increasing numbers of natural disasters in Australia, policies to mitigate disaster impacts and vulnerability of individuals and communities are an equity issue.

## References

- Bishop, B, Paton, D, Syme, G & Nancarrow, B 2000, *Coping with environmental degradation: Salination as a community stressor*, *Network*, vol. 12, pp. 1–15.
- Blaikie, P, Cannon, T, Davis, I & Wisner, B 1994, *At Risk: Natural Hazards, People's Vulnerability and Disasters*, Routledge, London.
- Boon, HJ, Millar, J, Lake, D, Cottrell, A & King, D 2012, *Recovery from Disaster: Resilience, Adaptability and Perceptions of Climate Change*, National Climate Change Adaptation Research Facility, Canberra. ISBN: 978-1-921609-63-3.
- Cutter, SL, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E & Webb, J 2008, *A place-based model for understanding community resilience to natural disasters*, *Global Environmental Change*, vol.18, pp. 598–606.
- Fothergill, A. 2004. *Heads Above Water: Gender, Class, and Family in the Grand Forks Flood*, State University of New York Press, Albany, NY.
- Fothergill, A, Maestas, EGM & Darlington, JD 1999, *Race, Ethnicity, and Disasters in the*
- United States: A Review of the Literature, *Disasters*, vol. 23, no.3. pp. 156–173.
- Fothergill, A & Peek, LA 2004, *Poverty and Disasters in the United States: A Review of Recent Sociological Findings*, *Natural Hazards*, vol.32, no.1, pp. 89–110.
- Gladwin, H & Peacock, WG 1997, *Warning and evacuation: A night for hard houses*, In: W. G. Peacock *et al.* (eds), *Hurricane*

- Andrew: Ethnicity, Gender, and the Sociology of Disasters*, Routledge, New York, pp. 52–74.
- Godschalk, DR 2003, *Urban hazard mitigation: Creating resilient cities*, *Natural Hazards Review*, vol. 4, no.3, pp. 136–143.
- Kim, Y-C & Kang, J 2010, *Communication, neighbourhood belonging and household hurricane preparedness*, *Disasters*, vol.34, pp. 470–488.
- Morrow, BH 1997, *Stretching the Bonds: the Families of Andrew*. In W.G. Peacock, B.H. Morrow and H. Gladwin (eds.) *Hurricane Andrew: Ethnicity Gender and the Sociology of Disasters*, Routledge, London, pp. 141–170.
- Neumayer, E & Plümper, T 2007, *The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981–2002*, *Annals of the Association of American Geographers*, vol. 97, no. 3, pp. 551–566.
- Norris, FH, Friedman, MJ, Watson, PJ, Byrne, CM & Kaniasty, K 2002, *60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001*, *Psychiatry*, vol. 65, pp. 207–239.
- Paton, D 2000, *Emergency Planning: Integrating community development, community resilience and hazard mitigation*, *Journal of the American Society of Professional Emergency Managers*, vol. 7, pp. 109–118.
- Paton, D 2003, *Disaster Preparedness: A social-cognitive perspective*, *Disaster Prevention and Management*, vol. 12, pp. 210–216.
- Paton, D, Smith, L & Johnston, D 2005, *When good intentions turn bad: Promoting natural hazard preparedness*, *Australian Journal of Emergency Management*, vol.20, pp. 25–30.
- Peacock, WG & Girard, C 1997, *Ethnic and Racial Inequalities in Hurricane Damage and Insurance Settlements*. In W.G. Peacock, B.H. Morrow and H. Gladwin (eds.) *Hurricane Andrew: Ethnicity Gender and the Sociology of Disasters*, Routledge, London, pp 171–190.
- Peacock, WG, Morrow, BH & Gladwin, H (eds.) 1997, *Hurricane Andrew: Ethnicity, Gender and the Sociology of Disaster*. Routledge, London.
- Vaughan, E 1995, *The significance of socioeconomic and ethnic diversity for the risk communication Process*, *Risk Analysis*, vol. 15, no. 2, pp. 169–180.
- Zahran, S, Brody, SD, Peacock, WG, Vedlitz, A & Grover, H 2008, *Social vulnerability and the natural and built environment: a model of flood casualties in Texas*, *Disasters*, vol.32, pp. 537– 560.

## About the author

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