Environmental Research 140 (2015) 325–334

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

An exploration of factors affecting the long term psychological impact and deterioration of mental health in flooded households

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ARTICLE INFO

Article history:
Received 22 October 2014
Received in revised form
1 April 2015
Accepted 9 April 2015
Available online 22 April 2015

Keywords:
Flood memory
PTSD
Anxiety
Frequent flooding
Flood impact
Mental health
Flood recovery

ABSTRACT

The long term psychological effect of the distress and trauma caused by the memory of damage and losses associated with flooding of communities remains an under researched impact of flooding. This is particularly important for communities that are likely to be repeatedly flooded where levels of mental health disorder will damage long term resilience to future flooding.

There are a variety of factors that affect the prevalence of mental health disorders in the aftermath of flooding including pre-existing mental health, socio-economic factors and flood severity. However previous research has tended to focus on the short term impacts immediately following the flood event and much less focus has been given to the longer terms effects of flooding. Understanding of factors affecting the longer term mental health outcomes for flooded households is critical in order to support communities in improving social resilience. Hence, the aim of this study was to explore the characteristics associated with psychological distress and mental health deterioration over the longer term.

The research examined responses from a postal survey of households flooded during the 2007 flood event across England. Descriptive statistics, correlation analysis and binomial logistic regression were applied to data representing household characteristics, flood event characteristics and post-flood stressors and coping strategies. These factors were related to reported measures of stress, anxiety, depression and mental health deterioration. The results showed that household income, depth of flooding; having to move out during reinstatement and mitigating actions are related to the prevalence of psychosocial symptoms in previously flooded households. In particular relocation and household income were the most predictive factors. The practical implication of these findings for recovery after flooding are: to consider the preferences of households in terms of the need to move out during restorative building works and the financial resource constraints that may lead to severe mental hardship. In addition the findings suggest that support with installing mitigation measures may lead to improved mental health outcomes for communities at risk.

1. Introduction

The health and wellbeing of flooded communities can be detrimentally affected by the experience of flooding. In particular qualitative research suggests that symptoms of stress and mental disorder can be encountered in populations many years after the flood occurs (Tapsell and Tunstall, 2008; Carroll et al., 2010). Mental health disorders are considered at least as important as physical health impacts after flooding (Fewtrell and Kay, 2008; Carroll et al., 2010). However the nature and prevalence of mental health issues is highly variable and from the available evidence it is not possible to predict, with any certainty, where and how severely the need for mental health intervention will arise (Few, 2007; Tapsell et al., 2009). Organisations such as Public Health England and the Health Protection Agency call for more research that leans towards the measurement of long term need in previously flooded communities (Stanke et al., 2012). However the measurement of uplift in mental health disorders is complicated, for example by underlying levels of mental health disorder already present, and therefore the true assessment of increased need is difficult to achieve.

Mason et al. (2010) among others, have asserted that it is important to distinguish between natural, short lived reaction to a traumatic event and those reactions that may develop into a longer term disorder or cause for concern. However the majority of quantitative studies of stress and mental health disorders have focussed on measuring severe reactions of individuals a short time after a flood event. These studies have identified many different factors that can influence the prevalence of symptoms for example flood characteristics (Paranjothy et al., 2011; Collins et al., 2013);

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http://dx.doi.org/10.1016/j.envres.2015.04.008

individual characteristics (Alderman et al.; Rosen et al., 2009); socio-economic factors (Collins et al., 2013); preparedness (Shultz et al., 2013); and duration of reinstatement activities (Azuma et al., 2013). Accordingly, while some factors are not within the control of authorities, such as the socio-economic characteristics of populations at risk, others can be more readily influenced. In particular actions to mitigate post flood experiences might be considered as crucial interventions by responders if they can be seen to have a large impact on long term mental health outcomes. This is particularly important in areas that are likely to be subject to repeated flood events.

Therefore this research seeks to explore the long term distribution of, and relationship between, different symptoms of stress and mental health in previously flooded communities. It also seeks to explore the impact of various factors, including post flood experiences, on the mental health and wellbeing of flood affected communities and individuals after several years has passed from the event itself. The underlying aim is to improve understanding of the importance of the recovery experience in mental health outcomes. In turn this could lead to improved provision of support and resources to those potentially most vulnerable to future mental health problems as a result of flooding and flood risk (Tapsell et al., 2009). In Section 2, previous research is explored in more detail in order to identify factors that may influence mental health outcomes, and develop the conceptual framework in order to design suitable representations of those factors for modelling. The following section describes the implementation of a postal survey of flooded communities. Results of the survey analysis are contained in Section 3 and finally the results are discussed in Section 4 and conclusions are drawn in Section 5.

2. Materials and methods

Data collection instruments, survey delivery and the design of a conceptual framework for analysis are described in the following sections. The conceptual framework was informed by the outcomes and findings of previous studies as described in Section 2.1. This was a necessary step given the large potential number of exposure, outcome and co-variate factors that could be included. The application of the framework and analysis is outlined in Section 2.2.

2.1. Development of framework for analysis, selection of outcome, exposure and co-variate measures

As previously noted, mental health impacts from trauma such as flooding span a spectrum from reported stress to depression and post traumatic stress disorder (PTSD) (Norris et al., 2002). Results from previous studies investigating the impact of flooding on mental health are summarised in Table 1 adapted from the review carried out by Alderman et al. (2012). This table illustrates the wide range of measured impacts (from 8.6% to 53% of the population exhibiting symptoms of some kind of psychological impact) and also the different countries, methods and timescales over which studies have been carried out. In particular it is notable that those studies carried out in the short term following a flood event tend to record higher rates of mental health disorder than those carried out some time afterwards, although it is clear that symptoms continue in some individuals for many years (Briere and Elliott, 2000). It is also apparent that minor psycho-social impacts symptoms are not measured or reported as frequently as more severe disorders.

Measurement of the impact of flooding in prompting mental health issues is complicated by the underlying level of psychiatric disorders already present in the population. It is rare for studies to have access to detailed statistics regarding pre-flood mental health disorders; therefore the number of controlled studies is small. In the current study there is similarly no pre-flood measurement available. Co-morbidity of symptoms is also apparent, Norris et al. (2004) observed both PTSD and Mild depressive disorder (MDD) in populations affected by floods in Mexico and found that co-morbidity was substantial; therefore the study will need to be cope with potentially high cross-correlation between variables if more than one disorder is modelled. Therefore the study measured multiple psycho-social impacts, or outcome measures, with the intention of examining the prevalence and co-morbidity of symptoms.

Table 1
Summary of results from studies of mental health and flooding (after Alderman et al.).

Author	Location	Study characteristics	Findings
Chae et al. (2005)	Korea (2002)	3–6 months post flood with control	PTSD 39.5% Anxiety 21%
Paranjothy et al (2011)	England (2007)	3–6 months post flood	PTSD 11.9% Anxiety 17.8% Depression 7.7%
Mason et al. (2010)	England (2007)	6 months post flood	PTSD 27.9% Anxiety 24.5% Depression 35.1%
Liu et al. (2006)	Hunan, China (various)	2.5 years post flood	PTSD 8.6%
Norris et al. (2004)	Mexico (1999)	Longitudinal study Levels at 6 month reported	PTSD 28%
Assanangkornchai et al. (2004, 2007)	Thailand (2000)	Longitudinal study Levels at 20 weeks reported	Generic mental health problems 40%
Heo et al. (2008)	Korea (2006)	18 months post flood pre flood control	PTSD 43.1% Mild depression 53.5%

Research has suggested that incidence of psychosocial impacts of flooding are also related to a number of factors, and studies by Few (2007) and Tapsell et al. (2009) are helpful in identifying potentially influential variables. The relationship between these factors and trauma symptoms can be quite complex and studies do not always agree on their relative importance or even direction of influence.

Among those factors with relatively consistent measured influence is low socio-economic status, seen to be related to higher levels of symptoms across multiple studies (Tierney, 2000). Female gender is also a strong predictor of reported symptoms (Tapsell et al., 2009), while some evidence exists that ethnic minorities suffer worse impacts (Norris et al., 2002; Tapsell and Tunstall, 2008). However for the current study with households as the unit of analysis gender and ethnicity are too complex to consider. Severity of exposure to a traumatic event is universally found to have a significant effect on post event outcomes (Bland et al., 1996; Norris et al., 2002; Tapsell et al., 2009). Indicators of severity are variously measured and can include emotional responses, such as fear of death, as well as objective measures, such as number of casualties or losses. These were considered inappropriate as the 2007 flooding was not of a severity to generate large numbers of human casualties. Other more relevant examples of flood severity indicators are presence of water in the home (Mason et al., 2010), injury, death of a relative, damage levels (Alderman et al., 2012) and direct, indirect, tangible and intangible losses (Norris et al., 2004). High levels of disruption and deterioration of living conditions post flood can also be related to an increase in psychosocial disorders (Norris et al., 2004; Mason et al., 2010; Whittle and