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Health and social impacts of a flood disaster: responding to needs and implications for practice

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Carlisle in northwest England suffered its worse floods for more than 180 years in 2005. A study, reported here, was undertaken to assess the health and social impacts of these floods via in-depth, taped individual and focus-group interviews with people whose homes had been flooded and with agency workers who helped them. Respondents spoke of physical health ailments, psychological stress, water health-and-safety issues related to the floods, and disputes with insurance and construction companies, which they felt had caused and exacerbated psychological health problems. Support workers also suffered from psychological stress. Furthermore, it was found that people had low expectations of a flood and were not prepared. The findings are presented in five sections covering flood risk awareness, water contamination issues, physical health, mental health, and impact on frontline support workers. The discussion focuses on the implications of the findings for policy and practice vis-à-vis psychological health provision, contamination issues, training and support for frontline support workers, matters relating to restoration, and preparation for flooding.

Keywords: flood awareness and preparation, flood disaster, flood support workers, physical and psychological health, water health and safety

Introduction

The severe floods in the city of Carlisle in Cumbria, northwest England, in January 2005 prompted a study of the health and social impacts on those people whose homes had been flooded. The findings highlight several issues related to flood awareness, risk and protection, physical and mental health, and water contamination, as well as matters concerning the insurance and construction industries and the need for further training for flood support workers—all of which affect those who suffered flooding and the different agencies involved. This paper discusses the implications for policy and practice at a very pertinent time, given further flooding in 2007 and 2008 in various parts of the United Kingdom and the publication of the Pitt Review (a government evaluation) (Pitt, 2008).

Background to the floods

Carlisle experienced its severest storms and flooding for more than 180 years in January 2005. Parts of the city were under several feet of water, including Carlisle

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City Council's offices, police and fire brigade headquarters and electricity sub-stations. There were extensive power line and telephone cable faults and mobile telephone network breakdowns, resulting in the failure of the entire electricity supply to Carlisle and of telephone communications with many parts of the city (Government Office for the North West, 2005). Heavy rain in Carlisle and Cumbria is common, and Carlisle is situated on the Rivers Caldew, Eden and Petteril, which have flooded before, although substantial flood defences in the city have reduced potential instances of flooding. This time, the floods affected approximately 1,600 houses and 400 business premises. Many people were evacuated from their homes and were not able to return for months—some were unable to return for well in excess of a year.

While the weather conditions in Cumbria were exceptional during the 2005 floods, there is growing concern that climate change is increasing the risk of flooding and floods are likely to become more common (Few et al., 2004; IPCC, 2007; O'Brien, 2008). The widespread floods in 2007 in Yorkshire and the Midlands in the UK may be evidence of this. Such floods prompted a review in 2007 of the government's flood policies, the introduction of the 'Making Space for Water' strategy (DEFRA, 2007), and the Pitt Review (Pitt, 2008).

Research literature

There is now considerable evidence of physical and psychological health effects and social impacts on people who have been subject to flooding in the UK (Baxter, Mellor and Spencer, 2001; DEFRA/Environment Agency, 2004; Reacher et al., 2004; Tapsell and Tunstall, 2001, 2008; Tapsell et al., 2002; Werrity et al., 2007) and elsewhere in the world, such as in Canada (Auger et al., 2000), the United States (Erikson, 1994; Ginexi et al., 2000), France (Verger et al., 2003) and Europe (Hajat et al., 2003). Such evidence is also to be found in international epidemiological reviews (Ahern et al., 2005; Few et al., 2004; Galea, 2005). Below are some of the physical health effects attributed to floods that have been reported in the UK:

- respiratory problems;
- coughs;
- colds;
- upset stomachs;
- throat and ear infections;
- headaches;
- shock;
- skin irritations;
- hypothermia;
- high blood pressure; and
- cuts, bruises and other physical injuries (Reacher et al., 2004; Tapsell et al., 2002; Tapsell and Tunstall, 2008).

It has been argued that longer-lasting effects on health are not yet clear, that psychological ramifications may be more serious in the longer term (Baxter, Mellor and Spencer, 2001; Ohl and Tapsell, 2000; Reacher et al., 2004) and that the social

impacts are not fully understood and are more complex and extensive than first thought (Tapsell et al., 2002). The longitudinal studies of the UK *Department for Environment, Food and Rural Affairs* (DEFRA) (DEFRA/Environment Agency, 2004) and Tapsell and Tunstall (2008) provide a fuller understanding of the longer-term consequences of flooding. In a quantitative study in 30 locations in England and Wales, DEFRA (DEFRA/Environment Agency, 2004) employed the GHQ-12 questionnaire to assess the shorter-term effects on health and the Post-Traumatic Stress Scale (PTSS) to evaluate the longer-term impacts on health. It found that flooded respondents scored higher on GHQ-12 than at-risk respondents and the normal population and therefore suffered higher anxiety levels in the short term. In addition, scores were higher on the PTSS for flooded respondents than those who had not been flooded and the former showed signs of potential post-traumatic stress disorder (PTSD) symptoms in the longer term. The degree of effect was associated with prior health and age, flood characteristics such as flood depth, and post-flood events, including problems with insurers. Carlier and Gersons (1995) and Grubaugh et al. (2005) have suggested that there are a large number of people with PTSD symptoms after an event but who do not reach the full PTSD threshold yet need the same level of care as those who do so. Tapsell and Tunstall's (2008) longitudinal quantitative and qualitative study provided further evidence of long-term severe anxiety and possible PTSD symptoms. Research into other types of disasters also shows that support workers may suffer psychological effects and stress as well (Convery et al., 2006; Paton, 1997; Ursano et al., 1999). In addition, the work undertaken by Burningham, Fielding and Thrush (2008), DEFRA/Environment Agency (2005) and Tapsell et al. (2002) reveals the social distribution of flood risks, vulnerability, flood awareness and understanding of flood experiences, resulting in differential impacts based on socioeconomic factors and demographics. Thus, lower socioeconomic factors and housing factors affect people's ability to insure, replace goods, make appropriate contacts and deal with difficult issues. The elderly and impaired are particularly at risk. Social impacts, such as evacuation and displacement, and events during the restoration period have serious consequences for health. Furthermore, health and social impacts may vary considerably according to local weather and flood conditions, timing of the floods and warnings, preparation and the socioeconomic situation (Tapsell et al., 2002; Reacher et al., 2004), as well as individual and cumulative disaster-related experiences or stressors, including the impact of the water, loss of personal belongings, and reconstruction issues (Verger et al., 2003). Relations with insurance companies and building contractors are among the latter—while some people received good service from both industries, others suffered disputes that caused stress (Tapsell and Tunstall, 2008; Werrity et al., 2007).

Study of the floods in Carlisle

Methods

A decision was taken in 2005 to study the medium-term health and social impacts of the Carlisle floods, characterised by the severity of the floods and the length of

time of the restoration period. The main objectives were, first, to identify, from people whose homes had been flooded, the health and social impacts through their perceptions and reported behaviour before, during and after the floods.

Second, the study sought to explore the perceptions of agency workers who had helped those affected, particularly with regard to the impacts on those flooded and the support that they felt was needed. Qualitative approaches were adopted, utilising semi-structured, in-depth, tape-recorded focus group and individual interviews. A random sample of those flooded was obtained from the City Council's database of flooded properties held by Communities Reunited, an organisation set up by the City Council to help those affected. The sample was first contacted by telephone and asked whether they would take part in group interviews. If they agreed, they were sent a written information sheet and confirmation. Sixty people were expected to attend interviews, although some withdrew and some did not turn up due to timing difficulties, while a few agreed to individual interviews. Five focus group and six individual interviews were conducted, comprising 14 men and 26 women between the ages of 30 and 70. In addition, a sample of workers was obtained through the City Council and the Carlisle Council for Voluntary Services, resulting in one focus group and two individual interviews (with a six respondents in total).

All of the interviews took place between 10 and 13 months after the floods. The main points of focus of the tape-recorded interviews were broadly based on the work of Tapsell et al. (2002), concentrating on the perceptions and behaviour of the respondents before, during and after the floods. The researchers used semi-structured interviews and allowed the respondents to develop responses pertinent to them; field notes were taken.

The appropriate ethics committee approved a protocol for the conduct of the study and the interviews. The framework approach (Ritchie and Spencer, 1993), recommended by Pope, Ziebland and Mays (2000) for health research, was employed to analyse the interviews. This took the form of analyses in the five stages of:

- familiarisation (immersion in data by listening to the recordings and reading through the transcriptions several times);
- identification (pinpointing the issues, concepts and themes and highlighting them on the transcripts);
- indexing (coding the issues, for example, in colour and according to numerical groups);
- charting the issues and themes (transfer to analysis sheets under different headings); and
- mapping and interpretation (selection of quotes for the study report, interpreting meanings, establishing relationships with broader concepts and themes, and providing explanations).

Quality control was maintained through discussions with the research team at each stage. In the study and the report, this evidence was augmented by data from the BBC Radio Cumbria Health Survey (sample: 64; six months after the floods)

and the Communities Reunited Health Survey (sample: 213; 10 months after the floods and not previously published), as well as from an examination of articles in *The Cumberland News* over a period of more than a year (Carroll et al., 2006). The researchers spoke to people informally, individually and in meetings, which provided further evidence with which to confirm that the accounts from the interviews were not uncommon and that the impacts were not confined to those who were interviewed. Draft summaries of the report were sent to the people who were interviewed for comment and to bodies such as the City Council, the Environment Agency (EA) and the North Cumbria Primary Care Trust, as well as to those organisations involved in the interviews; further discussions took place. This led to added confidence in the data and an opportunity for further dialogue with agencies and for them to comment and to offer updates on work done after the floods.

Findings

The findings presented here focus on flood risk awareness, water health and safety issues, physical and mental health, and the impact on frontline workers.

Flood risk awareness

Most of the people interviewed stated that they were aware of possible flood risks due to EA literature, builders withdrawing plans to construct homes in the area, insurance companies, or the knowledge of other people in the locality, some of whom remembered or had heard of the last major flooding event in 1968. Some respondents said that they were not aware of the flood risks and claimed they had not received EA literature, and that their expectations of a flood were very low and that they were ill prepared for one. They employed no flood protection methods and did not have equipment ready or have access to it—many did not know where to get equipment from, even basic items such as sandbags. Some of those interviewed did not place emergency equipment (such as candles and torches) in easily accessible places and could not find it during the flood. The reasons for low expectations and a lack of preparedness appear to be related to the length of time since the last major flood and respondents' belief that it caused low-level problems, as well as to the fact that the EA has made improvements to flood defences. The following comments are illustrative in this regard:

> *'There had been water down Warwick Road before several times but not actually to cause any problems'.* (2.2.4)
>
> *' [There was flooding] in* 1968 *but it didn't get as far as this year'.* (5.1.3)
>
> *'My husband said it won't flood, my mother used to live here for many years and were never flooded, last time it only came to the doorstep'.* (6.1.1)
>
> *'He [neighbour] said: "but no, they built defences since the last flood in* 1968 *or whenever it was, it never came into your house so it's not likely to do it again"'.* (5.2.8)

'I said to the man from the Council, "do you realise you are building on a flood plain?", and he said, "the Petteril will never flood". I said, "how do you know?" He says, "because it won't, it's been designed not to flood"'. (5.2.6)

Water health and safety issues

Serious safety issues manifested themselves as the speed, power and depth of the water put people's lives in danger. The event presented people with a dilemma regarding whether and when to evacuate their homes or to retreat upstairs. Below is an example from one family:

'We just thought, "what are we going to do and do we move, should we set off and get out now", but at the time you don't want to leave your property and I was starting to worry about my mum'. (10.2.1)

Many people stayed upstairs in cold, wet conditions for varying lengths of time and for periods without light, heat and means of communication. There were serious safety and health risks in these cases. All of the respondents commented on the two old women who died in the floods. Some of the respondents were helped by the emergency services and two of the families had to be rescued by boat; according to media reports, many other people had to be rescued by boat or helicopter. Below is one respondent's story:

'It was by then getting really bitter cold. We'd had no sleep, no food. Then a gentleman arrived with a canoe and he just said, "look things are happening, we know you are here, it's entirely up to yourself, we'll try and get some boats to you". Another thing we thought of was how far can we swim, and I thought "well if we are going to have to get out of the bedroom window and go as far as next door, can we walk on the guttering?" Things like this are going through your head and [you're] thinking "how are we going to get out?" (10.3.1.)

Respondents said that they had to make decisions while confused and in shock, leaving themselves in a vulnerable position. One respondent noted:

'So we were left, absolutely soaking wet, freezing cold, in shock, two children and a dog in the freezing cold. I'd put my things and kid's stuff in a bag and forgotten to pick it up . . . We had nothing for the kids, nothing for me, no food for the baby, no bottle, no dummy'. (6.6.1)

It was generally recognised that the emergency services did a tremendous job in spite of their headquarters being flooded. Council and church reception centres received displaced persons and provided them with shelter, heat, food and drink. The respondents acknowledged the excellent work of these centres.

Serious issues also emerged with respect to contaminated and polluted water. Flood restoration and drying-out companies and loss adjusters told people that they should treat everything touched by the water as contaminated and dispose of it.

However, because so many homes were flooded, some houses were not decontaminated early enough. Before these companies arrived, many people, including some of the respondents, had begun to clean up their houses themselves, disinfecting and throwing out carpets and possessions, but not necessarily taking adequate precautions, such as wearing protective clothing. People were often uncertain as to whether they could wash non-porous items and rescue them. Many people who remained upstairs in their property for various reasons, such as security and shortage of accommodation, lived in barely habitable conditions by modern standards, for example, without a functioning kitchen and central heating. In addition, they had to live alongside building work and with dust and noise pollution. Dehumidifiers and drying-out equipment created further adverse and unhealthy conditions.

The following discussion that took place in one focus group highlights the confusion regarding and possible misunderstanding of the consequences of contamination:

'I thought I can wash all my dishes and oh they're not so bad, they're pretty gummy now and . . . and then I was told I wasn't to keep anything even though it had been through a dishwasher. But I kept my vases'.

'Yes, but that was a bit late. There's things that I'm sure now we shouldn't have discarded that we did because we were told to'.

'I'm sure on reflection certain things could have been saved'.

'But there was no epidemic, was there?'

'There was no outbreak of salmonella or anything'.

'And we lived in the house, didn't we? We were never ill and yet everything had to go'.

'There were a lot of people on M . . . Street ill'.

'Oh! I do apologise'.

'I think the waste down our way, there's the sewage works'.

'Oh, I didn't realise'. (5.11)

One of the respondents lived on a farm on the outskirts of the city and recounted how by going out to rescue his animals he put his life in danger, risked contamination from water pollution and caused his relatives anxiety. At one point he was submerged and at risk of being swept away:

'[A]t one point there was a massive shout and then complete silence apart from the roaring water. I later found out that Peter had tried to get hold of a calf, slipped in the water, our son had got hold of him and the other two men had got hold of them and pulled them back to slightly higher ground'. (1.4.7)

The respondents highlighted a number of physical ailments that they attributed to contamination or pollution, such as skin rashes, throat infections and stomach upsets (see the following subsection). The BBC Radio Cumbria Survey and the Communities Reunited Health Survey support their conclusions (see Carroll et al., 2006).

Physical health

Many of the respondents said that they or their families, friends and neighbours had suffered a number of minor ailments, such as coughs, sore throats and stomach upsets, and general sickness that they attributed to the floods:

> *'You felt as if it was just one thing after another. My brother took ill and then my son, then my eldest son . . . I took bad, sickness and I couldn't eat anything'.*
>
> *'You couldn't stomach nothing . . .'* (8.13.3)

Some respondents reported more serious, multiple ailments. For example, one woman recovered from pleurisy only to acquire it again shortly afterwards, while another woman contracted flu, tonsillitis, inflammatory pains and a viral infection, losing approximately 10 kilograms in weight and unable to work for months:

> *'My life was just one big stress . . . [S]ome days it was just hard to even just move . . . went on for months, getting temperatures [. . . I] went to the doctors, and he said I must have viral infection and I had numerous blood tests . . . I was signed off work for four weeks . . . I ended up with tonsillitis. I was off work again. I've lost a stone and a half in weight'.* (6.11)

This reflects a relation between psychological and physical health issues during and after the floods.

In another case, a child contracted chickenpox and then campylobacter, a bacterium often produced by contaminated water (her mother was a respondent):

> *'I ended up in hospital with my daughter. She ended up with campylobacter, she came out with chickenpox and she wasn't at all well. Then . . . a few days later she ended up with campylobacter . . . [W]as it to do with the flood 'cause she fell in the water? She was only two at the time, a mouthful of water'.* (3.8)

There were also reports of serious ailments. Although the floods were not the direct cause, relatives believed that they exacerbated the symptoms and effects. Respondents' examples include a heart attack, dementia, and throat problems diagnosed as cancer after the floods, resulting in the person's death a few months later. Relatives wondered to what extent the flood was to blame for disease or deterioration:

> *'She [the daughter] was saying, "well was that [my husband's heart attack] caused by it [the flood]? I didn't know whether it caused it, but I am absolutely sure it didn't help'.* (2.26.4)
>
> *'[My mother-in-law has] got dementia now, absolutely terrible. She was starting with it, she's living with her sister now, but [the flood] made it worse . . . She doesn't know where she is now'.* (2.11.1)

Respondents also reported injuries due to accidents, including a man who suffered a leg injury because of loose floorboards, leading to a blood clot and hospitalisation.

Mental health

Every respondent reported varying degrees of anxiety and stress, attributing it, directly, to primary factors related to the floods themselves or, indirectly, to secondary factors. Primary factors include the dangers posed by the floodwaters, damage to property and possessions, evacuation from home, displacement issues and living conditions (whether people remained at home or not). Secondary factors include dealing with disputes with insurance companies, loss adjusters, flood restoration companies, building contractors and various agencies. Many of the respondents were not able to return to their homes for months after the floods, and many other people were displaced for more than a year.

For many people, the restoration period was characterised by complaints and disputes, including with respect to delays, inconsiderate attitudes in the workplace, procurement of conflicting information, restrictions on the purchase of new possessions and standards of workmanship. It is clear that stress was experienced not only on a short-term basis during the floods and immediately afterwards, but also during the long process of restoration of homes. Secondary factors exacerbated initial stresses and introduced new ones. In addition, residents were living in constant fear of future flooding.

Not everyone had to contend with all of these issues, and some respondents reported good service from their insurance company, loss adjuster and building contractor. However, many people had to deal with these issues and with disruption while attempting to lead normal lives and continue with fundamental daily activities, such as going to work and earning a living, taking children to school and looking after relatives, often while living in a different location. Two women described such issues vividly:

> *'[I]t's been an emotional nightmare and it is getting more and more stressful the last few weeks because actually, my husband . . . travels a lot and when he's away I have to be at the house."* (3.13.2)

> *'I am off sick at the moment now because I can't cope with any more. I can't keep all these balls juggling in the air . . . I can't be there all the time because I'm supposed to be at work . . . and it is just too much . . . [I]t's the timescale , gone on for so long, ten months that you've lived like that . . . [L]iving in your house but it's not your house, you are like squatters . . . [L]ife is stressful . . . [Y]our home is your security blanket, your safety net and that's gone and you've nothing left to catch you . . . And two close friends died this year . . . We're at the end of our tether'.* (3.13.2)

An agency worker tasked with helping those who had suffered flooding suggested that the mental health of some affected persons had deteriorated and that they were not coping too well:

> *'[T]heir mental health has deteriorated and things seem to be getting worse instead of better . . . [B]ut I suspect that there are a lot of people behind closed doors who are not coping very well at all and we are not reaching those people'.* (4.10.2)

Many people reported suffering from depression, panic attacks, flashbacks, sleeplessness, a lack of motivation, and unsettled or obsessive behaviour related to the floods. All of the latter are potential symptoms of PTSD (NICE, 2005) and have been reported in other studies (DEFRA/EA, 2004; Tapsell and Tunstall, 2008). The following responses are illustrative:

> *'She [the doctor] had given me antidepressants, strong ones, and also sleeping tablets . . . I was going nights just not sleeping well at all'.* (9.12)

> *'One day, I think the end of October . . . I'd seen how the river was and I was nearly physically sick when I saw it. It scared me so much and I thought, "I can't have these feelings every time it rains because it is no good because you are like that for days not just for those hours that it is raining". But it knocks you off pot for days and then it affects your family because you are too busy pacing about and looking at rivers and out of the window that no tea gets made and you make your kids anxious . . . I would feel sick, I would get butterflies, I would feel cold and shaky'.* (6.12)

> *'[I got] panic attacks, walking up the street, really quite severe. I was in such a state of anxiety I couldn't breathe all the time'.* (9.7)

> *'[E]ven though your house is new you can picture it, can't you? I can still see things floating, that's in your mind, and can still see the water'.* (2.4)

> *'I've lost interest in my house . . . I don't care, it's not my house anymore. It sounds a bit bad but I can't even be bothered to clean it to be honest and I was very house proud before'.* (5.8)

> *'I keep tidying the cupboards out . . . they don't need tidying but . . . [M]y husband says, "what are you tidying for? What are you looking for?" I am not looking for anything. I just tidy them. I take everything out and put it back in an orderly fashion . . . I might not remove anything but I still have to take it all out and put it back and I didn't used to be a frequent tidier of drawers. I just have a need to do it'.* (5.2)

These symptoms manifested themselves in the BBC Radio Cumbria Survey (see Carroll et al., 2006), which also included a sense of disorientation and migraines, and in the Communities Reunited Health Survey (see Carroll et al., 2006), which also included loss of confidence and easily upset. Although some respondents reported going to their general practitioner (GP) and being diagnosed with depression and offered prescribed drugs, other people suffering from stress did not seek medical attention for various reasons, including not wanting drugs. Consequently, stress is under-reported in routinely collected health statistics.

However, many did seek help in the form of practical advice, food and shelter, finance, emotional support and health benefits from City Council reception centres, the City Council Benefits Advisory Service, MIND (a mental health charity), Communities Reunited, Cumbria Community Foundation, Floodart (a group for young people) and the Flood Therapy Group. The following statistics obtained

directly from the organisations concerned give an indication of the help sought and received. Communities Reunited dealt with 592 insurance issues, 432 complaints and disputes related to building contractors, 162 issues related to health and stress, 231 debt problems, 129 matters related to the EA, and more than 200 concerns related to other subjects. The Cumbria Community Foundation provided financial support to 697 individuals and 51 organisations. Almost everyone interviewed said that they sought and received various forms of support from their families, friends or neighbours.

Impact on frontline workers

This study also found, by interviewing workers from Carlisle City Council and from the voluntary organisations involved in helping those flooded, that the event also affected staff members themselves. The offices of two such organisations were flooded and they moved to temporary accommodation. The homes of some workers were flooded and hence they were temporarily unable to go to work, causing staff shortages at a time when there was overwhelming demand. There was general agreement that the job became more demanding than usual, stressful and exhausting and that personnel needed more support. One female support worker noted:

> *'[I]t did leave us exhausted . . . I'm only just beginning to feel as if I'm getting my physical health back, strangely enough, I mean, it was probably my mental health, but physically I'm starting to feel stronger again now . . . for a long time I've felt exhausted'.*

Another female worker suggested that listening to distressing stories affected her:

> *'I think the hardest part was the fact [that] day in and day out for quite a long time you were listening to very distressing [accounts] . . . But it is quite traumatic and quite . . . well draining really because you want to give . . . your best, you don't want to let these people down but there are points when you are physically and mentally exhausted'.*

One male worker said that he was putting in 70–80 hours or more per week, and operating seven days a week for a time. For him, the period was:

> *'distressing, shared heartache . . . inevitably tired, physically demanding and emotionally draining'.*

He was still working on cases two years later, in January 2007.

Discussion

In relation to physical and mental health, this research supports the epidemiological studies of the Bristol floods (Bennet, 1970) and the Sussex floods (Reacher et al., 2004) and the qualitative studies of Tapsell and Tunstall (2001, 2008) and Tapsell et al. (2002) in other parts of the country. Furthermore, as this research was conducted

more than a year after the floods, it supports findings (see the DEFRA/Environment Agency (2004) study of 30 locations and Tapsell and Tunstall's (2008) longitudinal study) that suggest that psychological stress lasts longer than the immediate period of the flood (Bennet, 1970; Reacher et al., 2004; Ohl and Tapsell, 2000). Many of the respondents in the Carlisle study experienced symptoms associated with PTSD, supporting the findings of the DEFRA/Environment Agency (2004) study in England, the study of Auger et al. (2000) in Canada, the longitudinal study of Ginexi et al. (2000) in the US, and the study of Verger et al. in Europe (2003). The Carlisle study highlights the impact of secondary factors on some people, including disputes with insurance companies and building contractors and living conditions, either after evacuation to unsuitable accommodation or due to residing in their own home in unsuitable surroundings, as mentioned in DEFRA/Environment Agency (2004), Tapsell and Tunstall (2001, 2008) and Werrity et al. (2007). The Carlisle study provides evidence to support the ideas on the mental health implications of displacement from home in the non-empirical work of Fullilove (1996). The accumulation of distressing factors affecting the level of stress tends to support the work of Verger et al. (2003). The findings also show that workers from the organisations that helped and supported flood victims also suffered due to mental health and work issues, a matter reported in relation to the 2001 foot-and-mouth disease crisis in Cumbria (Convery et al., 2007) and other types of disasters (Paton, 1997; Ursano et al., 1999).

The Pitt Review (Pitt, 2008) recommended monitoring of the impacts on health and well-being among those people affected by the floods and of the support available to mitigate and cope with the effects. This did not occur in the case of the Carlisle floods. Monitoring of the health ramifications seems to have been of an ad hoc nature and left to organisations such as Communities Reunited, which established a database of flooded properties and conducted a health survey. The North Cumbria Primary Care Trust did not monitor health impacts and reported to this research team that uptake of its psychological support services was limited after the floods. However, it is quite clear from the findings of this study, the Communities Reunited questionnaire and the BBC survey mentioned earlier, that many people did suffer severe anxiety and stress and experience symptoms associated with PTSD over a period of at least a few months.

The question is: 'how is monitoring of health impacts to be carried out?' This is not going to be an easy task because it is confounded by the immediate task of dealing with the urgent problems of flooding and safety, property issues, and the evacuation and dispersion of people from flooded houses. In Carlisle, Communities Reunited encountered difficulties in locating people for its database of flooded households. In addition, some people who reported mental and physical health issues did not seek medical help—this has been reported in relation to other disasters, such as after Hurricane Katrina in New Orleans, Louisiana, in August 2005 (Elledge et al., 2007) and following the foot-and-mouth disease outbreak in Cumbria in 2001—and are therefore not recorded in medical statistics (Mort et al., 2005). In this study, respondents did not seek medical help for a variety of reasons, such as belief that the

stress would soon go away, underestimating and misunderstanding the nature of the stress (for example, they were in denial), misperceptions of mental health issues, and possible diagnosis of depression and treatment with drugs, which they did not want. This suggests that monitoring of the impacts of the event and provision of psychological help and emotional support for some people should not necessarily take place in a normal medical facility, such as a GP surgery. Many people utilised the support mechanisms of agencies in the community, such as Communities Reunited with regard to disputes with insurance companies and building contractors, Cumbria Community Foundation on finance matters and Carlisle Benefits Advisory Service on housing benefit issues. Crucially, though, they also used them to relay their stories and to garner emotional support.

These agencies thus administered 'psychological first aid', which reduces psychiatric morbidity (Rao, 2006). However, some of their staff had not been fully trained in this type of 'psychological first aid and therapy', which they appeared to be giving. Primary Care Trusts could draw on non-medical-based facilities and agencies as 'therapeutic spaces' (Convery et al., 2007), offer psychological support in an emergency, and shift from a wholly medical model to a more community-based one (Tew, 2005).

There is a clear need to look at the way support can be given and at coping strategies. This is not to deny, though, that some people will need medical help to address their anxieties, trauma and mental state. This will depend on their personal health history (Galea, Nandi and Vlahov, 2005), apparent and actual social support, and perceived ability to cope (Ozer et al., 2003; Peres, Mercante and Nasello, 2005). The recommendation of the Pitt Review (Pitt, 2008) to monitor health impacts is important and Primary Care Trusts will need to work out how to implement this recommendation and which organisations they will need to work with.

The findings of this study indicate that support workers themselves suffered from overwork, exhaustion and stress and lacked adequate support. It appears that listening to distressing stories and working long hours was emotionally draining, exhausting and stressful and put workers' health at risk. They often became victims of their own commitment to the job. A key factor in this regard is that they were subject to stressors over a period of time rather than in a short, one-off emergency. There is a need for better training in handling these aspects of disaster situations and a need to recruit more trained support workers even if they have to come from outside of the area. Training of frontline support staff is an essential principle of recovery management and of emergency planning (Paton, 1997, Rao, 2006). The Houston Response Team also acknowledged the need for better training after Hurricane Katrina (Elledge et al., 2007). Disaster plans need to recognise that frontline personnel in disasters are going to be subject to distressing situations and that people will seek emotional support from them that goes beyond the practical help and advice they are trained to supply. Paton (1997) suggests that staff should be made aware of this as part of their training and that managers, colleagues and family members should be trained in the part that they may have to play. Emergency plans

also need to provide for the recruitment of staff when there are shortages, even if this means hiring from different areas.

As shown, secondary factors, such as disputes with loss adjusters and insurance companies and builders, prolonged and exacerbated people's stress and anxiety and increased the workload of community organisation staff. People without flood insurance or who are underinsured create potential anxiety problems, but so do insurance companies that will not, or threaten not to, reinsure properties in at-risk areas, as some people reported in this study. Some people said that they were unsure what their policies covered and their entitlements under their policies. Others complained that there was a lack of clarity in the procedures and that they felt misled about their rights. Furthermore, most people had not made large claims before and so could not draw on experience. Other key factors included not understanding the role of the loss adjuster, the supply of conflicting information by loss adjusters and insurance companies, failure to read small print on entitlement to a new replacement item at full cost, and lack of awareness of the stipulation to purchase from a specific consumer outlet as directed by the loss adjuster. These situations bring social demographics into play: education and socioeconomic status can influence understanding of procedures, making a case in a dispute, and drawing on the law and social capital to acquire further advice (Tapsell et al., 2002; DEFRA/Environment Agency, 2005).

The shortage of building contractors created control problems relating to standard of workmanship and quality of customer relations. Many people felt that they had no control over the restoration of their property. It appears that there is a need for further talks between the insurance industry and the government on insurance issues and a need for the industry to look at customer relation matters and to introduce some form of regulation of building contractors undertaking flood renovation projects. Some people were trying to settle disputes through litigation with the help of Communities Reunited two years after the event. It seems that there is a need for an independent body to arbitrate disputes quickly in flood situations, to avoid long drawn-out legal cases.

Water safety and pollution appeared to cause confusion and uncertainty in terms of their nature and consequences. The matter was made worse in the Carlisle case by the severity of the floods, leading to insurance and loss adjuster companies being overwhelmed by demand. This resulted in a delay in appointing flood restoration companies and in the decontamination of houses and hence in the provision of detailed information on contamination and what items and possessions one could save. People were often handling contaminated possessions without protective clothing and trying to save contaminated items. It seems that insurance companies, loss adjusters and restoration firms need to integrate these issues into an emergency plan and that they need to recognise that people will want to check and protect their property and possessions. In addition, as mentioned above, some people lived in unsuitable conditions that posed a risk to health. The North Cumbria Primary Care Trust stated that messages on water pollution and health risks were well distributed

(to individuals, recovery centres and agencies), but these messages clearly failed to reach everyone. It may be useful for health agencies to work more closely with the EA and to place an insertion in its *After a Flood* information booklet, and for the insurance industry to include information with its policies. People need to keep information in waterproof covers with their emergency equipment (batteries, candles and torches, for instance), as advised by the EA, and to put them in an accessible place unlikely to be affected by floodwater (a flood preparation issue).

Flood awareness and preparation is a key issue because it has the potential to prevent or reduce environmental health and social problems in a time of flooding. A striking finding was the low expectation of flooding and the lack of preparation by householders, in spite of the EA having circulated literature in the locality and held meetings for the public. None of the respondents had installed flood defences at their property, most likely because they completely underestimated and misunderstood the risk or because they were in denial and blocked out the thought of their home being flooded. Such explanations are consistent with the work of DEFRA/Environment Agency (2005) and Burningham, Fielding and Thrush (2008).

In the study by Burningham, Fielding and Thrush (2008), length of time in residence influenced flood risk awareness. However, in this study, the length of time since the last major flood led respondents to believe that such an event was unlikely to happen again. The Carlisle study appears to support the conclusion of Burningham, Fielding and Thrush (2008) that assessment of flood risk is based on underestimation of the impact of extreme weather conditions on the possibility of flooding. Many respondents now live in fear of future flooding and are more aware of the risk, although they know that the EA is currently strengthening the city's flood defences. However, none of the respondents had purchased flood defences approximately one year later. It must remain the householder's responsibility to protect his/her property, but cost may well be an issue. The DEFRA/Environment Agency study (2004) commented that flooded and at-risk householders were willing to pay GBP 200 and GBP 140 per year respectively and that these sums will not buy much protection.

The period after a flood offers a unique opportunity to engage with residents and for officials and agencies to work together to improve flood protection. It looks as if there is a need for education on flood awareness and for preparation of people who live in flood-risk areas. The government's 'Making Space for Water' strategy (DEFRA, 2007) has involved pilot projects in five high-risk flood areas, including Appleby on the River Eden in Cumbria. One can apply for government grants of up to GBP 5,000 for protection of individual properties, including resistance measures (such as floodgates) and resilience measures (such as waterproof plaster). The Pitt Review (Pitt, 2008) also recommended that grants should be made available for individual properties in high-risk areas. This type of policy should be extended to all at-risk areas, such as Carlisle.

Carlisle and Cumbria's emergency plans worked well despite many difficulties. It would pay dividends now (with respect to health and social impacts) if individuals and agencies focused on flood protection for individual properties. Paton and Johnston

(2001), discussing vulnerability and resilience in disasters generally, and O'Brien (2008), discussing flooding in the UK, both point to the need for the empowerment of local communities and their involvement in risk awareness, preparedness for events, risk reduction, and developing individual and community resilience. O'Brien (2008) suggests that, as well as the need for a top-down approach, there is also a need for a bottom-up approach and for collaboration with local stakeholders, such as householders and businesses. Involving local stakeholders in identifying risks and solutions will help to build resilience. There are some examples of this in action: notably, the EA has been working with and supporting local flood action groups in Keswick in Cumbria. Flood defence policies and plans now need to be accorded more emphasis generally due to climate changes and increased risk of flooding. This is likely to depend on political will and targeted financial support (Few et al., 2004).

Conclusion

Given the issues highlighted in this paper, policies and practice need to respond more effectively to a disaster situation and there is a need for reviews and development in the following five areas. First, health agencies need to monitor the health impacts of floods in their area, reassess the way in which physical and psychological support is provided in a time of flooding and during other disasters, and recognise the potential for cooperation with local agencies and within community support mechanisms and non-medical-based interventions. Second, local authorities and agencies need to plan for better support for frontline and voluntary workers and to provide them with better training in issues related to floods and other types of disasters, including educating workers in the possible psychological effects of these type of situations and the role of managers, colleagues and family members in recovery processes. Third, in relation to floods and other types of disasters, there is room for improvement in the way in which health authorities notify the public of water contamination, such as through inter-agency mechanisms. Fourth, there are issues relating to disputes between the public and the insurance and building industries that need to be examined, preferably by independent bodies. Finally, while it is necessary to maintain large-scale flood plans, there is a need for a shift in emphasis in the government's flood protection policies and plans towards engaging, empowering and supporting local groups in projects to develop resilience and to protect communities and individual properties. Such policy reviews have wider applicability, particularly in light of climate change.

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References

Ahern, M., R.S. Kovats, P. Wilkinson, R. Few and F. Matthies (2005) 'Global health impacts: epidemiologic evidence'. *Epidemiology Review.* 27(1). pp. 36–46.

Auger, C., S. Latour, M. Trudel and M. Fortin (2000) 'Post-traumatic stress disorder. After the flood in Saguenay'. *Canadian Family Physician*. 46. pp. 2420–2427.

Baxter, P.J., I. Mellor and T. Spencer (2001) *Health Effects of Climate Change in the UK: An Expert Review for Comment*. Department of Health, London.

Bennet, G. (1970) 'Bristol floods 1968. Controlled survey of effects on health of local community disaster'. *British Medical Journal*. 22(3). pp. 458–459.

Burningham, K., J. Fielding and D. Thrush (2008) '"It'll never happen to me": understanding public awareness of local flood risk'. *Disasters*. 32(2). pp. 190–215.

Carlier, I.V and B.P. Gersons (1995) 'Partial posttraumatic stress disorder (PTSD): the issue of psychological scars and the occurrence of PTSD symptoms'. *The Journal of Nervous and Mental Disease.* 183(2). pp. 107–109.

Carroll, B., H. Morbey, R. Balogh and G. Araoz (2006) *Living in Fear: Health and Social Impacts of the Floods in Carlisle 2005*. Research report to agencies. St. Martins College, Carlisle.

Convery, I., M. Mort, C. Bailey and J. Baxter (2006) 'Role stress in front line workers during the 2001 foot and mouth disease epidemic: the value of therapeutic space'. *The Australasian Journal of Disaster and Traumatic Studies*. http://www.massey.ac.nz/~trauma/issues/2007-2/convery.htm (accessed on 13 May 2010).

DEFRA (*Department for Environment, Food and Rural Affair)* (2007) *Making Space for Water: Taking Forward a New Government Strategy for Flood and Coastal Erosion Risk Management in England*. DEFRA, London. http://www.defra.gov.uk/environment/flooding/documents/policy/strategy/strategy-response1.pdf (accessed on 6 May 2010).

DEFRA/Environment Agency (2004) *The Appraisal of Human Related Intangible Impacts of Flooding*. R&D Technical Report FD 2005/TR. DEFRA/Environment Agency, London.

DEFRA/Environment Agency (2005) *Flood Warnings for Vulnerable Groups*. R& D Technical Report W5C-018/1&2. DEFRA/Environment Agency, London.

Elledge, B.L., D.T. Boatright, P. Woodson, R.E. Clinkenbeard and M.W. Brand (2007) 'Learning from Katrina: environmental health observations from the SWCPHP response team in Houston'. *Journal of Environmental Health*. 70(2). pp. 22–26.

Erikson, K.T. (1994) *A New Species of Trouble: Explorations in Disaster, Trauma and Community*. Norton 7 Company, New York, NY.

Few, R., M. Ahern, F. Matthies and S. Kovats (2004) *Floods, Health and Climate Change: A Strategic Review.* Tyndall Centre for Climate Change Research, University of East Anglia, Norwich.

Fullilove, M.T. (1996) 'Psychiatric implications of displacement. Contributions from the psychology of place'. *American Journal of Psychiatry.* 153(12). pp. 1516–1523.

Galea, S., A. Nandi and D. Vlahov (20050 'The epidemiology of post traumatic stress disorder after disasters'. *Epidemiological Reviews.* 27(1).pp. 78–91.

Ginexi, E.M., K. Weihs, S. J. Simmens and D.R. Hoyt (2000) 'Natural disaster and depression: a prospective investigation of reactions to the 1993 Midwest floods'. *American Journal of Community Psychology.* 28(4). pp. 495–518.

Government Office for the North West (2005) *Carlisle Storms and Associated Flooding.* Multi-agency debrief report. Government Office for the North West.

Grubaugh, A.L. et al. (2005) 'Subthreshold PTSD in primary care: prevalence, psychiatric disorder, healthcare use and functional states'. *Journal of Nervous and Mental Disease.* 193(10). pp. 658–664.

Hajat, S. et al. (2003) 'The human health consequences of flooding in Europe and the implications for public health: a review of the evidence'. *Applied Environmental Science and Public Health.* 1(1). pp. 13–21.

IPCC (Intergovernmental Panel on Climate Change) (2007) *Climate Change 2007: The Physical Science Basis. Summary for Policymakers.* IPCC Working Group I Fourth Assessment Report. United Nations, Geneva.

Mort, M., I. Convery, J. Baxter and C. Bailey (2005) 'Psychosocial effects of the 2001 UK foot and mouth disease epidemic in a rural population: qualitative diary based study'. *British Medical Journal.* 331(7527). pp. 1234–1237.

NICE (National Institute for Clinical Excellence) (2005) 'Post-traumatic stress disorder (PTSD): the management of PTSD in adults and children in primary and secondary care'. *Clinical Guidelines.* 26. NICE, London.

O'Brien, G. (2008) 'UK emergency preparedness: a holistic response?' *Disaster Prevention and Management.* 17(2). pp. 232–243.

Ohl, C.A. and S.M. Tapsell (2000) 'Flooding and human health'. *British Medical Journal.* 321(7270). pp. 1167–1168.

Ozer, E.J., S.R. Besat, T.L. Lipsey and D.S. Weiss (2003) 'Predictors of posttraumatic stress disorder and symptoms in adults: a meta analysis'. *Psychological Bulletin.* 129(1). pp. 52–73.

Paton, D. (1997) 'Post-event support for disaster workers: integrating recovery resources and the recovery environment'. *Disaster Prevention and Management.* 6(1). pp. 45–49.

Paton, D. and D. Johnston (2001) 'Disaster and communities: vulnerability, resilience and preparedness'. *Disaster Prevention and Management.* 10(4). pp. 270–277.

Peres, J., J. Mercante and A.G. Nasello (2005) 'Psychological dynamics affecting traumatic memories: implications in psychotherapy'. *Psychology and Psychotherapy: Theory, Research and Practice.* 78(pt. 4). pp. 431–447.

Pitt, M. (2008) *Learning Lessons from the 2007 Floods. The Pitt Review Final Report.* Cabinet Office, London.

Pope, C., S. Ziebland and N. Mays (2000) 'Qualitative research in healthcare'. *British Medical Journal.* 320. pp. 114–116.

Rao, K. (2006) 'Lessons learnt in mental health and psychosocial care in India after disasters'. *International Review Psychiatry.* 18(6). pp. 547–552.

Reacher, M. et al. (2004) 'Health impacts of flooding in Lewes: a comparison of reported gastrointestinal and other illness and mental health in flooded and non flooded households'. *Communicable Disease and Public Health.* 7(1). pp. 1–8.

Ritchie, J. and I. Spencer (1993) 'Qualitative data analysis for applied policy research'. In A. Bryman and R. Burgess (eds.) *Analysing Qualitative Data.* Routledge, London. pp. 173–194.

Tapsell, S.M., E.C. Penning-Rowsell, S.M. Tunstall and T.L. Wilson (2002) 'Vulnerability to flooding: health and social dimensions'. *Philosophical Transactions of the Royal Society of London A.* 360(1796). pp. 1511–1525.

Tapsell, S.M. and S.M. Tunstall (2001) *The Health and Social Effects of the June 2000 Flooding in the North East Region*. Report to the Environment Agency. Flood Hazard Research Centre, Middlesex University, Enfield.

Tapsell, S.M. and S.M. Tunstall (2008) '"I wish I'd never heard of Banbury": the relationship between "place" and health impacts of flooding'. *Health and Place*. 14(2). pp. 133–154.

Tew, J. (2005) *Social Perspectives in Mental Health*. Jessica Kingsley Publishers, London.

Ursano, R.J., C.S. Fullerton, K. Vance and T.C. Kato (1999) 'Post-traumatic stress disorder and identification in disaster workers'. *American Journal of Psychiatry*. 156. pp. 353–359.

Verger, P. et al. (2003) 'Assessment of exposure to a flood disaster in a mental health study'. *Journal of Exposure Analysis and Environmental Epidemiology*. 13(6). pp. 436–442.

Werrity, A., D. Houston, T. Ball, A. Tavendale and A. Black (2007) *Exploring the Social Impacts of Flood Risk and Flooding in Scotland*. Scottish Executive, Edinburgh.