

## Experiences of a prolonged coal-mine fire

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The citation for the final published article and DoI is as follows:

Jones, R., Lee, S., Maybery, D., and McFarlane. (2018). Experiences of a prolonged coal-mine fire. *Disaster Prevention and Management: An International Journal*, <https://doi.org/10.1108/DPM-05-2018-0145>

## **Experiences of a prolonged coal-mine fire**

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### **Abstract**

**Purpose** – The purpose of this paper is to examine the perspectives of local residents regarding the impact of the long-duration Hazelwood open cut coal mine fire in rural Australia.

**Design/methodology/approach** – A qualitative approach was undertaken involving 27 in-depth interviews with adults who lived in the town of Morwell, immediately adjacent to the coal mine fire.

**Findings** – Participant concerns focussed upon fear and confusion during the event, the perceived health effects of the smoke, anger towards authorities and loss of a sense of community and sense of security. One of the significant ways in which people managed these responses was to normalise the event. The long duration of the event created deep uncertainty which exaggerated the impact of the fire.

**Research limitations/implications** – Understanding the particular nature of the impact of this event may assist the authors to better understand the ongoing human impact of long-duration disasters in the future.

**Practical implications** – It is important to provide clear and understandable quality information to residents during and after such disasters.

**Originality/value** – While there is an extensive literature exploring the direct social and psychological impacts of acute natural disasters, less qualitative research has been conducted into the experiences of longer term critical events.

**Keywords** Australia, Impact, Qualitative methods, Fire, Coal mine, One-to-one interviews, Social uncertainty

**Paper type:** Research paper

### **Introduction**

Disasters are often termed traumatic events that happen unexpectedly, are dangerous and overwhelming for those who are impacted by them (Aslam, 2010). All disasters however, are not the same. Events of long duration create less immediate danger of injury and fatality but nonetheless pose indirect, insidious threats to those exposed, particularly for their emotional and psychological wellbeing. In this paper we explore the psychosocial impacts upon the residents of Morwell (in Victoria, Australia) of the Hazelwood coal mine fire. In February 2014 wildfires spotted into the 3,138 hectare Hazelwood open cut brown coal mine. These spot-fires ignited

the coal and burnt for forty-five days resulting in the adjacent town of Morwell and surrounding areas being covered in clouds of thick acrid-smelling smoke and ash. The cause of the coal mine fire was two initial bush (wild) fires that burnt to the edge of the coal mine and embers from those fires spotted into and ignited coal within the mine. The open cut mine consists of large open to the air of coal seams that allow a greater fire hazard and this along with the hot Australian summer weather enabled the fire to spread rapidly and widely within the mine (Hazelwood Mine Fire Inquiry Report, 2014) and made it extremely difficult to extinguish. The resultant enquiry into the disaster highlighted that “The Hazelwood mine fire was a foreseeable risk that slipped through the cracks between regulatory agencies” (Hazelwood Mine Fire Inquiry Report, 2014, p.18). While there was no loss of life or significant destruction of property associated with the fire and smoke, the event contributed to a range of physical symptoms, elicited great distress and dissatisfaction and generated a diverse range of emotions amongst many residents of the nearby town of Morwell and the wider Latrobe Valley community.

Given the extreme weather conditions at the time (Hazelwood Mine Fire Inquiry Report, 2014) and the regular occurrence of such events in south eastern Australia, the wild fires were not unlikely events. However, the smoke event that followed was unusual and distinct for its long duration. While there was no loss of life or significant destruction of property associated with either the initial wildfire or mine fire, the psychosocial impacts are likely from multiple dimensions. McFarlane and Williams highlight that an individual’s reactions will be associated with multiple factors including any pre-existing social (e.g. poverty) or mental health problems, previous critical events, and of importance here, the type of event and its impact, and the resultant response of emergency services (McFarlane and Williams, 2012). While the initial wildfires caused alarm and anxiety regarding the threat and trajectory towards the town, this was quickly (within hours) extinguished.

Of interest here is the ongoing experience of the 45 day mine fire and smoke event that followed the initial wildfires. This paper reports on the impact of this fire on people in the town of Morwell. The purpose of this paper is to explore the impact of a significant environmental event of long duration. The following examines previous literature of disasters with acute and longer duration.

Much disaster research focuses on acute events such as wildfires where the major impacts in the aftermath of the event are dominated by injury and loss of life and property (Kristensen, 2010). There is a large body of literature which analyse responses at the time of the events such as studies exploring the survivorship and property loss during major Australian wild fires (Whittaker et. al, 2013). Another large body of literature focuses on resilience and recovery in the aftermath of these events (Cox, 2011; Pooley, 2010; Hawe, 2009; Carroll, 2005) and a further body of work that focuses upon social and community dynamics is association with such events (e.g gendered responses, Eriksen, Waitt & Wilkinson, 2016; community preparedness and responses to wild fires, Whittaker, Haynes, Handmer & McLennan, 2013). Quantitative studies focusing on psychological impacts of acute events have found higher levels of depression, anxiety and post-traumatic stress disorder (Forbes, 2015; Bryant et al, 2014; Norris et al, 2002, McFarlane, 1988). Qualitative studies which focus directly on the impacts of acute disasters have shown that stress from loss of property as well as dealing with agencies involved in recovery (Hartsough, 1985, Murphy, 1988). In an ongoing mixed method study of the aftermath

of the Black Saturday wildfires in Australia in 2009, Louise Harms and colleagues emphasise the importance of grief following deaths from incineration as an ongoing impact of this fire (Harms et al, 2015). Whittaker et al. (2012) in their study of fires in Australia in 2003 found that incidences of depression and anxiety were still common 12-18 months after the event while Becker et al (2015) exploring the experience of wildfires among South African farmers identified the prevalence of anger about the cause and prevention of the fire and a tendency to seek blame. Similarly, Dodd (2006) in her study of the aftermath of 150 years of coal mine disasters in Canada including the Westray event in 1992 which killed 26 miners, explains that anthropogenic disasters generate a preoccupation with causation, blame and responsibility. In summary, the above outlines the social and psychological impacts from short and severe events with similar characteristics to the initial wildfires which ignited the Hazelwood Mine fire.

The distinct feature of the Hazelwood Mine fire was its duration of forty-five days.

In contrast to short term events, qualitative research has found that while long term events pose less direct threat to life and property, there are still considerable social and emotional impacts. For example, the major impacts of droughts which occur over months and years include financial stress, increased workload, social isolation and uncertainty about the future (Alston & Kent 2004, Stehlik 2003, Jones 2017). Uncertainty is a major theme in studies of many longer term environmental events as the unpredictable trajectory and uncertain endpoint of long term disasters has a profound impact on individuals. Doherty and Clayton (2011) elaborate on this idea suggesting that the uncertainty of the end point of a chronic event results in a lack of clarity about what constitutes an appropriate level of worry which can, in turn, generate 'Environmental Anxiety' characterized by 'obsessive and potentially disabling worry about health risks'. Kroll-Smith and Couch (1990) suggest that the long duration of the Centralia fire prevented people progressing to recovery and imposed a seemingly permanent period of instability and Rob Nixon (2011), outlines the way in which long and incremental emergencies, despite no *immediate* threat to life and property, can hinder decisive action on the part of both authorities and individuals. This is exemplified in the long duration volcanic eruption on the island of Montserrat in the West Indies during which emergency response was characterised by complex social and political responses hindering decisive action (Hayes, 2006). Qualitative research also suggests that long duration disasters hinder recovery: Kroll-Smith and Couch (1990), in their study of a coal mine near the town of Centralia, USA which has been burning for over 50 years, argue that when signals of danger are ambiguous as occurs in longer term events, discordance arises and sub groups within the community compete for understanding and control of the crisis. As a result individual and communal responses become fragmented and adversarial. Baxter et al (1992) reporting on the impacts of a very large long duration tyre fire in Canada identified themes including ongoing preoccupation about adverse health effects and invisibility of contamination, concerns about livelihood and frustration with the government.

This study examines the psychosocial impacts of the Hazelwood mine fire - an event which was of particularly long duration - on residents from the township of Morwell located close to the mine.

## **Methods**

### *Participants*

Interviewees were selected from a cross-sectional study of 3,091 Morwell adults who were participating in a larger study into the impact of the Hazelwood mine fire. The participants were 18 years and older who were residents in the town of Morwell at the time of the Hazelwood smoke event. The study protocol (Project number CF15/872) met the requirements of the National Statement on Ethical Conduct in Human Research and ethics approval was gained for participant interviews from the Monash University Human Research Ethics Committee (Project ID: 9206).

### *Procedure*

An initial subset of 70 eligible people were selected from the 3,091 Morwell adult cohort, using a stratified (by age and gender) random sampling approach. These potential participants were engaged with the study initially via post (including a letter and explanatory statement) and then by up to three follow up emails and/or phone calls. Twenty-three people were unable to be contacted by the research team, one person was deceased, two were living interstate, 17 people declined to participate. Twenty-seven people were interviewed, however, due to competency issues (i.e. capacity for informed consent that only became apparent at the end of one interview), it was decided with the support of the Ethics Committee to withdraw one interview from the study.

The interviews were conducted in 2017, three years after the fire and they followed a semi-structured, face to face format which allowed flexibility in order to meet demands of individual context. Informed consent was obtained at the interview. The interview followed a two-fold topic guide; the first part was designed to prompt recall and impact of the event and the second part focussed on coping both at the time and since the event. Interviews varied in length from 15 minutes to 1 hr 20 minutes with the majority of interviews being between 30 minutes and one hour. Interviews were audio recorded, identifying details were removed and interviews were transcribed verbatim by a transcription company.

### *Data analysis*

The interviews were analysed using thematic analysis as outlined by Braun and Clarke (2006). Researchers applied an iterative process of analysis until theoretical saturation was achieved. The researchers read and re-read data items to both immerse and familiarise themselves with the data and note any initial analytic observation. A recursive process was used to identify initial codes and themes and subthemes which summarised abstract principles of the data-set. These themes were then grouped, checked and refined against the interview data. The researchers triangulated to validate the analysis with transcripts independently analysed by multiple members of the research team, with discrepancies discussed.

## **Results**

Of the 26 interviewees 14 were women and 13 were men. Twenty-two people (82%) interviewed were aged between 40 and 69, with only 2 people in their 20s, two in their 30s and one aged over 70. There were minimal differences in responses from women and men however there were differences according to subgroups of participants, particularly those under forty, and those who were over forty years of age and had lived in the Latrobe Valley for twenty years or more. The

latter subgroup had experienced the privatisation of government owned power generation authority (the State Electricity Commission of Victoria (SECV) in the 1990s, as discussed below. Seventeen participants fell into this latter subgroup.

The following themes exploring the impacts of the mine fire were identified from the interviews.

1. Experience of the event
2. Perceived health effects of the smoke
3. Anger towards authorities
4. Loss of a sense of community and security
5. Normalising the event

While themes 1-4 explore the impact of the mine fire, theme 5 relates to the way people responded and adapted to these impacts.

#### *1. Experience of the smoke event*

In the first 24 to 48 hours of the fire residents of Morwell reported seeing flames in and around the open cut coal mine. Some evacuated at this time while others kept watch from their homes, visited the CFA offices or monitored alert apps. In direct response to the immediate danger of the fire some participants expressed panic and extreme anxiety, as described by one woman:

*Huge anxiety, woke up, there was smoke, the helicopters were doing the water pickups. I was a mess. It was the most terrifying time I've ever had. I'll never forget it. Because the smoke was so thick we thought we were sort of surrounded... There was all this smoke and I just thought, we're goners...*

Once the initial flames subsided but the fire continued to smoulder, residents experienced thick smoke, which smelled acrid and contained coal dust which penetrated houses and clothes. One man recalled that '*you just absolutely reeked of smoke*', while another recalled cleaning the house every day. Most people stayed indoors as much as they were able and took short breaks or day-trips away from the smoke-affected area.

One of the biggest impacts experienced during the smoke event was confusion about the duration and severity of the fire. For example:

*How much longer, you know? And you keep thinking in your mind, oh, a couple more days it will clear, and it just kept going on... You think, oh, shit, I'll work through these couple of days because you kept thinking it's going to end, but it just didn't, and there wasn't much you could do.*

Confusion about procedures for control of the fire and evacuation were also recalled by participants. One participant remarked that that lack of precedent for such an event (in comparison with wildfires) was a source of concern: '*No they didn't know how to proceed or how to handle because there'd never been an event like this before*'. Some participant felt terrified by the lack of clarity about procedures and process during the fire

*That was the most terrifying part – was not knowing – you see ads where the fire comes and gets you... So, all that's coming back in and I'm just thinking, no one knows what they're doing.*

#### *2. Perceived health effects of the smoke*

During the smoke event many participants were concerned about both the long and short term impact of the smoke on their health. When thick smoke and coal dust drifted over the town, people reported experiencing difficulty breathing, coughing, asthma, skin rashes and vomiting. Participants continued to be concerned about their health at the time of the interview, three years after the event. The long term health implications of the fire was of even greater concern. One participant explained these fears:

*It worries me, it scares me, actually, how much damage was done to my lungs...I don't know in the future whether that's going to have an impact... the amount of smoke that I breathed in at that time – we're not talking about a couple of days. ...It would have been a couple of months of breathing in that smoke and the soot in the air after. Even when the smoke subsided every day you were getting a layer of dust. I still, in the back of my mind, wonder whether when I'm 60 or 62 or 59, my lungs are going to be affected by the amount of soot that was inhaled.*

The source of fear was not only visible but also intangible threats of hidden pollution; the intangibility of this threat heightened concern:

*In a bushfire you get the smoke, but with the mine fire, you had all these other particles, and it's not what you can see that's going to hurt you, it's what you can't see that you're inhaling.*

Participants with prior mental health problems were worried that the event might trigger an episode:

*I have clinical depression which I'm really good at managing now. I've had it for years. ... I was worried that [the fire] was going to affect that as well because if I am more stressed it triggers my clinical depression and I can have an episode.*

### 3. Anger towards authorities

Participants expressed deep anger towards authorities regarding the mine fire, particularly towards the State and local government authorities. Anger towards government related principally to perceived misinformation and lack of information about the controllability and duration of the fire and the health implication of the smoke which led them to feeling ignored by authorities:

*We felt that nobody wanted to help us. We felt we were just left to it and that we didn't matter. Yeah I still get angry about it.*

There was a feeling that authorities were out of touch with the realities of living in the smoke as well as out of touch with the needs of rural and regional communities; that non-metropolitan needs were of lesser importance than urban issues.

*The information we were getting from the Department of Health was revolting, hopeless... We got information, seemed to be like day 6 or 7 that the atmosphere was not worth breathing and I mean if you looked out the windows you knew that to start with. It was miles too late. It was all Melbourne centric rather than being interested in what was happening locally. It would be good if the Government authorities were truthful to start with rather than making it sound different to what it was: telling you what exactly is going on, what we really need to know rather than what you choose to tell me.*

As one participant noted, receiving misinformation, lack of information and feeling overlooked by authorities had a severe impact on residents' morale.

*People are still waiting and people have moved on but I think the impact is longer lasting because the response post mine fire wasn't swift. ... They denied that there was health issues, there was some cover-ups or perceived cover-ups, they could have done a lot more and they didn't. I think that affects the community pride, community connectedness and realizing that we're not as valued as somewhere else in the state.*

Anger was also directed towards the private owners of the open cut coal mine who residents of Morwell felt had scaled back fire prevention measures in the open cut.

*Everyone thought that there are sprinklers there, because common sense, you would think, they would have something there. Nothing? That's not fair on the community.*

This fire in turn, many believe, contributed to the early closure of the Hazelwood Power Station due to increased costs and negative publicity.

More profoundly, the communities' perception of lack of information, misinformation, poor firefighting decisions and a Melbourne-centric response to the mine fire compounded and further reinforced residents' pre-existing sense of abandonment and neglect by government authorities, beginning with privatisation.

#### 4. *Loss of community and security*

Although the mine fire itself did not kill or injure anyone nor destroy properties, some participants expressed a feeling of loss, for their town, their community and their security. Unlike following acute events such as wildfire, participants were not grieving for loss of life, property or environment but for intangibles such as the town's future and for community spirit and for the reputation of the town amongst outsiders:

*I am very proud of my town... and my town was copping not a very good rap... It wasn't doing our town's image any good at all. We got known as a smoke town. Morwell has copped enough over the years without having to have that added to it.*

In the longer term, at the time of the interview, participants grieved for their community which they felt had been fragmented by acrimony and anger towards authorities related to the fire:

*Bushfires were ... only short lived with buildings and people losing properties and everything like that, whereas here the destruction was, I suppose, the Valley itself ...*

Some participants expressed disillusionment and a loss of hope in the future of Morwell and the wider Latrobe Valley.

*I think that my experience here in the Valley's changed. So, up to the mine fire I think that life was a certain way, post that, it's almost like my attachment to the area is not as much. My feeling for the area, has waned - my commitment to the region - to where I live. My interest is no longer there.*

Despite the negligible impact to the immediate safety of the town, compared to a forest or grass fire, the mine fire presented a profound, long term, insidious challenge to Morwell residents'

sense of security. Three years after the event many participants expressed concern that the fire had not been fully extinguished and could reignite.

*It is just a real uneasy feeling. The whole mindset of the town changed when that fire came through. ... People became depressed, fearful still, you know, what if it flares up again? You can't put a coal fire out. Coal will burn for thousands of years. Apparently there's a fire still there that they're never going to put out, it's down in the ground.*

Many participants remarked that the fire had entered the coal seams under the town and undermined its stability. This was a narrative of both practical as well as symbolic undermining of the town. The mine fire deeply destabilised participants' sense of safety and security in their hometown, a feeling that was still prevalent three years after the event.

*It threw their stability. The thing that they thought was stable wasn't there anymore. So there's fear upon fear upon that groundless scientific fear. So it was taking people's sense of security away.*

##### 5. Normalising the mine fire

One of the ways in which some Morwell residents coped with the impacts of the mine fire was to normalise the event. This provided some antidote to the perceived misinformation, lack of information, feeling of neglect and loss of community and security. Participants who were long term residents of the Latrobe Valley (for more than 20 years) all of whom had direct connections to the coal mining and power generation industry were most likely to cope with the impacts in this way. Participants found different ways to normalise the event. Some carried on with the normal routines of life:

*Life went on as normal... Your routine stayed the same but it was always present. You just got used to it. I could still do everything I wanted to do and it didn't stop me from doing anything so it was just something that was there... Because it went on for so long it's just part of the background.*

While other residents, unable to continue with their usual activities created new routines around the smoke: a new normal:

*It was hard because you had to sort of readjust and do things differently. You almost forget the normal though don't you?*

Long term Latrobe Valley residents normalised the fire by accepting it as an expected aspect of the experience if living in a coal mining town.

*I am an old time Morwell guy having spent 40 years of my life here. A lot of us probably almost expected this to happen at some stage when you've got a coal mine to the west where the wind blows and a coal mine from the south.*

Others felt that long term exposure to coal, through living close to the open cut coal mine and/or working in the power industry, meant they were to some extent immune to its impact.

*I don't worry about it because ...I've been born in the Valley and I've been breathing this air in since day one. One of the things we've got to live with and put up with. I've been breathing this air in along with the stink and smell whichever way the wind's blowing – I'm acclimatized to it.*

Residents with long term experience of coal itself and an intimate knowledge of the industry felt they had a greater understanding of the fire.

*My husband worked at Hazelwood power. Because my husband was out there and probably knew a bit about what was going on, it never entered my head to really worry about it.*

This response contrasts with that of participants (also long term residents of Morwell) who were angry about the way the fire was fought (discussed above), illustrating the diversity of responses to the fire.

## **Discussion**

Morwell residents' experience of the impact of the Hazelwood Open Cut Coal Mine Fire was underpinned by uncertainty. Many of the experiences which participants reported are defined by ambivalence: the unknown duration of the fire, confusion about lack of fire prevention measures in the open cut mine, ambivalence about the best way to control the fire, absence of experience of large fires in an industrial complex compared to wildfire, confusion about procedures for evacuation of the town and unknown health implications. Kroll-Smith and Couch confirm that the long duration of the Centralia mine fire (like the Hazelwood mine fire) freezes people in a state of chaos and instability, unable to reform and reorganise, (Kroll-Smith & Couch, 1990).

Uncertainty is a key factor in psychosocial responses to disaster events and one of the most profound impacts experienced by the participants in this study was anxiety about potential health impacts both at the time of the fire and in the longer term. Kroll-Smith and Couch (1990) observed that disasters of long duration, generated subjective assessments of potential harm and, as Doherty and Clayton (2011) observed, this generates 'environmental anxiety' which results in obsessive worry about potential harm. Wildavsky and Dake (1990) argue that risk is perceived differently by different people and can therefore give rise to anxiety and worry. The British Medical Association (1987) argued that factors such as the extent to which the risk is under control and the extent to which it represents a threat can all impact upon how risk is perceived. Participants in this study highlighted that there was the initial immediate threat of injury from the fire followed by the prolonged worry about the threat to people's health from the smoke.

The high level of uncertainty experienced by Morwell residents may have also contributed to or exacerbated mental health problems. Santacroce and Lee (2006) have highlighted from physical illness literature, that ambiguity about diagnosis, the course of the illness and lack of, or complexity of, available information, impacts upon health promoting behaviours. These features of uncertainty have parallels with the reports from the current study. In reports from a Japanese volcanic eruption in Japan, Goto and colleagues (2006) highlighted that event uncertainty was related to PTSD symptoms. "Participants who did not know whether they had lost a home and/or pet, showed significantly higher PTSD symptom scores than those who knew they had not lost a home or pet, or few losses" ("Goto, 2006, p. 2020). The considerable uncertainty about the event including physical effects on Morwell residents may have also contributed to mental health impacts for those involved.

For Morwell residents, uncertainty was further compounded by perceived misinformation, and a lack of, or contradictory, information from government authorities about health impacts,

evacuation, duration and trajectory of the fire. As Nixon (2011) observed, incremental hazards without deaths or physical destruction and where first aid and rescue teams cannot be despatched, hinder efforts of governments to mobilize and act decisively. At the same time when the event is associated with an industrial complex (in this case the Hazelwood power generator and open cut coal mine): "...a primary goal of the agency might be seen as minimising political damage to the agency itself at a minimum outlay of public expenditures" (Kroll-Smith & Couch, 1990). At Morwell, as at Centralia, residents looked to humans for a solution and directed anger at State and Local governments who they perceived as responsible for delayed and inadequate advice. As Dodd (2006) found in her analysis of Canadian coal mine disasters, searching for causation and responsibility and blame became one of the principle responses to the fire. For Morwell residents, too, blame created a sense of order out of disorder, certainty out of uncertainty.

Hazelwood and surrounds, much like Centralia, was a community built upon coal, both literally and economically; 'dependent and tenuously adapted to a single industry and poorly prepared to adjust to the decline of coal' (Kroll-Smith & Couch, 1990). Understanding this context is key to understanding how vulnerable the community was during the mine fire. The desire to blame combined with a pre-existing feeling of betrayal and neglect by as a result of the social impacts of privatisation of the power industry in the 1990s. The State Electricity Commission of Victoria was established and directly owned by the State government from the 1920s to the 1990s. Privatisation resulted in large-scale redundancies in the Latrobe Valley: a workforce of 8481 directly employed by the power industry in 1990s had declined to 3000, fifteen years later (LaMontagne and Walker, 2005). These job losses contributed to the transformation of Morwell from a blue collar, industrial, government town to a community with significant socio-economic disadvantage, high unemployment, lower than average median family income, higher levels of disability and lower levels of education (Australian Bureau of Statistics, 2016) with a significant deficit in social support services (Victorian Council of Social Service, 2015). The period following privatisation also coincided with the identification of an epidemic of asbestos related lung disease amongst employees and former employees of the Latrobe Valley power industry as asbestos had been used extensively in power station infrastructure (La Montagne and Walker, 2005). The impacts of privatisation are still being experienced by the Morwell community and have generated an insidious anger among many residents of town which heightened feelings of mistrust and increased psychosocial responses to the event because of perceived risk and threat. This is now been further compounded by the closure of the Hazelwood Power Station and Open Cut Coal Mine in early 2017 with renewed anxiety about employment (Duffy and Whyte, 2017). Understanding the context of a community can help predict social response.

Baxter et al (1992) argues that trust is an important feature in understanding risk, as risk is seen as a threat to a way of life; risk in turn produces anxiety and the potential for mistrust. Established mistrust the community had with government enhanced the distress they felt during the event, made the community more sceptical about government information and perhaps increased their feelings of risk and threat to their community, although, by contrast, other research of Morwell residents has found that some Morwell residents felt that the event may have strengthened aspects of the community (Yell and Duffy 2018).

Many rural communities that have not experienced privatisation of a major industry also suffer isolation, economic disadvantage and limited services in comparison with metropolitan areas (Judd et al. 2006; Stain et al. 2011). Rural communities are also often culturally remote from the central authorities which are sometimes insensitive to the needs of politically weak communities. Such communities, in turn perceive government as uncaring (Kroll-Smith & Couch, 1990). This is a constant irritant to rural communities such as Morwell, a feeling which became exaggerated by the sense of neglect experienced during and following the mine fire.

One of the ways in which people managed the effect of the mine fire was to normalise the event. This occurred particularly strongly among people who had lived in the Latrobe Valley for over twenty years, and had direct involvement with the power generation and coal mining industry. Similar findings were reported by Fowlkes and Miller (1982) and Fitchen (1987), who posited that the longer people have lived in a community, the less they seem to be concerned about a potential contamination event, although it is not clearly understood how or why this affects perceived risk.

This study had some limitations. While 70 participants were randomly (stratified) selected from a large group of Morwell residents only 26 agreed to participate. These volunteers were potentially biased towards residents who were more opinionated about the event. In addition, the larger sample and the group of interviewees were over represented by older people. Proportionally fewer young adults enlisted into the larger study and this was also reflected here resulting in the opinions expressed in this paper being reflective of an older sample of Morwell residents. In addition, the interviews were conducted with participants almost three years after the event. While this may have impacted upon recall of the event it also was able to elicit longer term impacts of the event. The event had many associated factors that are not easily, or perhaps possibly, disentangled for their psychosocial impact on individuals (see McFarlane and Williams, 2012) as the reactions reported by individuals in this study may stem from multiple factors and not just the smoke event. However, these limitations are also balanced by a relatively large qualitative sample (n=27) that was initially randomly selected in a stratified manner which add strength to the design of the research.

## **Conclusion**

This research makes a significant contribution to understanding the longer term psychosocial impacts of a long duration disaster, events which have been under-researched both in the Australian and wider global context in comparison to acute and fatal events. The main psychosocial impacts found in this study were a fundamental uncertainty underpinned by anger, loss, and perceived risk. The implications of findings from this study are: Consideration needs to be given to the context of the community to the event. Responses of participants during the interviews identify the need for enhanced support for rural communities affected by disaster. The responses from participants in this study suggests a need for a greater understanding of how long term disasters, which do not immediately threaten life or property but do disrupt day to day life and trigger emotional distress continue to affect people years later. From a practical perspective, it also appears important to provide clear and understandable quality information to residents during and after such disasters. Further investigation focussing on the impacts on both at individual and community level, further methods of how to better support communities to

recovery from a major mine fire would be valuable and would help address feelings of isolation, feeling forgotten, fear and uncertainty.

## **References**

- Alston, M. and Kent, J. (2004), "Social impacts of drought: a report to NSW Agriculture", Centre for Rural Social Research, New South Wales, Charles Sturt University.
- Aslam, N. and Tariq, N. (2010), "Trauma, depression, anxiety, and stress among individuals living in earthquake affected and unaffected areas", *Pakistan Journal of Psychological Research*, Vol. 25 No. 2, p. 131-148.
- Australian Bureau of Statistics. (2016), *2016 Census QuickStats: Morwell (Eastern Victoria)*, available at: [censusdata.abs.gov.au/census\\_services/getproduct/census/2016/quickstat/SED25402](https://censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SED25402) (Accessed 13 February 2018).
- Baxter, J., Eyles, J. and Willms, D. (1992), "The Hagersville tire fire: interpreting risk through a qualitative research design", *Qualitative Health Research*, Vol. 2 No. 2, pp. 208-237.
- Becker, C., Roos, V. and Coetzee, H. (2015), "Disaster recovery experiences of a South African rural farming community", *Journal of Psychology in Africa*, Vol. 25 No. 3, pp. 182-190.
- Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative research in psychology*, Vol. 3 No. 2, pp. 77-101.
- British Medical Association (1987), *Living with risk: The British Medical Association Guide* Wiley Medical Publications, Hoboken, New Jersey, USA.
- Bryant, RA., Waters, E., Gibbs, L., Gallagher, HC., Pattison, P., Lusher, D., MacDougall, C., Harms, L., Block, K., Snowdon, E. and Sinnott, V. (2014), "Psychological outcomes following the Victorian Black Saturday bushfires", *Australian & New Zealand Journal of Psychiatry*, Vol. 48 No.7, pp. 634-643.
- Carroll, MS., Cohn, PJ., Seesholtz, DN. and Higgins, LL. (2005), "Fire as a galvanizing and fragmenting influence on communities: the case of the Rodeo-Chediski fire", *Society and Natural Resources*, Vol. 18 No. 4, pp. 301-320.
- Cox, RS. and Perry, KME. (2011), "Like a fish out of water: reconsidering disaster recovery and the role of place and social capital in community disaster resilience", *American Journal of Community Psychology*, Vol. 48 No. 3-4, pp. 395-411.
- Dodd, S. (2006), "Blame and causation in the aftermath of industrial disasters: Nova Scotia's coal mines from 1858 to Westray 2006", In: Tucker, E.(ed.) *Working Disasters: The Politics of Response and Recognition*, Baywood Publishing, Amityville, New York. pp. 237-276.
- Doherty, TJ. and Clayton, S. (2011), "The psychological impacts of global climate change", *American Psychologist*, Vol. 66 No.4, pp. 265.
- Duffy, M., and Whyte, S. (2017), "The Latrobe Valley: the politics of loss and hope in a region of transition", *Australasian Journal of Regional Studies*, Vol. 23 No. 3, pp. 421-446.
- Eriksen, C., Waite, G. & Wilkinson, C. (2016). Gendered Dynamics of Wildland Firefighting in Australia. *Society & Natural Resources: An International Journal*, 29, 11 1296-1310. doi-10.1080/08941920.2016.1171938.

- Fitchen, JM. (1987), "The importance of community context in effective risk management", In: Lave, L.B. (ed.) *Risk Assessment and Management*, Springer pp. 677-685. Springer, Boston MA.
- Forbes, D., Alkemade, N., Waters, E., Gibbs, L., Gallagher, C., Pattison, P., Lusher, D., MacDougall, C., Harms, L., Block, K. and Snowdon, E. (2015), "The role of anger and ongoing stressors in mental health following a natural disaster", *Australian & New Zealand Journal of Psychiatry*, Vol .49 No. 8, pp. 706-713.
- Fowlkes, MR. and Miller, PY. (1982), *Love Canal: The Social Construction of Disaster. Final Report for the Federal Emergency Management Agency, Award No. EMW-1-4048*, Federal Emergency Management Agency, Washington, D.C.
- Harms, L., Block, K., Gallagher, H.C., Gibbs, L., Bryant, RA., Lusher, D., Richardson, J., MacDougall, C., Baker, E., Sinnott, V. and Ireton, G. (2015), "Conceptualising post-disaster recovery: incorporating grief experiences", *British Journal of Social Work*, Vol. 45 (suppl. 1), pp. i170-i187.
- Hartsough, DM. (1985) Measurement of the psychological effects of disaster. *Perspectives on disaster recovery*, Appleton, Century, Crofts, East Norwalk, Conn. pp. 22-60. [Jerri Laube Shirley Murphy eds]
- Hawe, P. (2009), "Community recovery after the February 2009 Victorian bushfires: a rapid review", Sax Institute for the Victorian Government Department of Health, Melbourne.
- Haynes, K. (2006), "Volcanic island in crisis: Investigating environmental uncertainty and the complexity it brings", *Australian Journal of Emergency Management*, Vol 21 No. 4, pp. 21-28.
- Jones, R. (2017), *Slow Catastrophes: Living with Drought in Australia*, Monash University Publishing, Clayton.
- Hazelwood Mine Fire Inquiry, (2014) *Hazelwood Mine Fire Inquiry Report*, Victorian Government Printer, Melbourne.
- Judd, F., Cooper, AM., Fraser, C. and Davis, J. (2006), "Rural suicide—people or place effects?" *Australian and New Zealand Journal of Psychiatry*, Vol. 40 No.3, pp. 208-216.
- Kristensen, P., Weisæth, L. and Heir, T. (2010), "Predictors of complicated grief after a natural disaster: a population study two years after the 2004 South-East Asian Tsunami", *Death Studies*, Vol. 34 No.2, pp. 137-150.
- Kroll-Smith, JS. and Couch, SR. (1990), *The Real Disaster is Above Ground: A mine Fire and Social Conflict*, University Press of Kentucky, Lexington, USA.
- La Montagne, A.D. and Walker, HH. (2005), "Community views on responding to a local asbestos disease epidemic: implications for policy and practice", *Policy and Practice in Health and Safety*, Vol. 3 No. 1, pp. 69-84.
- McFarlane, AC. (1988), "The phenomenology of posttraumatic stress disorders following a natural disaster", *The Journal of Nervous and Mental Disease*, Vol. 176 No. 1, pp. 22-29.
- McFarlane, AC. & Williams, R. (2012), *Mental Health Services Required after Disasters: Learning from the Lasting Effects of Disasters. Depression Research and Treatment*, Vol.2012, pp. 1-13 doi:10.1155/2012/970194
- Murphy, SA. (1988), "Mediating effects of intrapersonal and social support on mental health 1 and 3 years after a natural disaster", *Journal of Traumatic Stress*, Vol. 1 No.2, pp. 155-172.

- Nixon, R., 2011. *Slow Violence and the Environmentalism of the Poor*. Harvard University Press, Harvard, Mass.
- Norris, FH., Friedman, MJ. and Watson, PJ. (2002), 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry: Interpersonal and Biological Processes*, Vol . 65 No.3, pp. 240-260.
- Pooley, JA., Cohen, L. and O'Connor, M. (2010), "Bushfire communities and resilience: What can they tell us?", *Australian Journal of Emergency Management*, Vol .25 No.2, p. 33-38.
- Santacroce, SJ. and Lee, YL. (2006), "Uncertainty, posttraumatic stress, and health behavior in young adult childhood cancer survivors", *Nursing Research*, Vol . 55 No. 4, pp. 259-266.
- Stain, HJ., Kelly, B., Carr, VJ., Lewin, TJ., Fitzgerald, M. and Fragar, L. (2011), "The psychological impact of chronic environmental adversity: responding to prolonged drought", *Social Science & Medicine*, Vol .73 No. 11, pp. 1593-1599.
- Stehlik, D. (2003), "Australian drought as lived experience: Social and community impacts", In: Fisher, M. & Botterill, L. (eds.) *Beyond Drought: People, Policy and Perspectives*, CSIRO Publishing, Melbourne, pp. 87-108.
- Victorian Council of Social Services. (2015), *One Year On: Morwell and the 2014 Hazelwood Mine Fire*, Victorian Council for Social Services, Melbourne Available at: <http://vcoss.org.au/> (Accessed 4 September 2017)
- Whittaker, J., Handmer, J. and Mercer, D. (2012), "Vulnerability to bushfires in rural Australia: A case study from East Gippsland, Victoria", *Journal of Rural Studies*, Vol. 28 No. 2, pp. 161-173.
- Whittaker, J., Haynes, K., Handmer, J. and McLennan, J. (2013), "Community safety during the 2009 Australian 'Black Saturday' bushfires: an analysis of household preparedness and response" *International Journal of Wildland Fire*, Vol. 22 No. 6, pp. 841-849.
- Wildavsky, A. and Dake, K. (1990), "Theories of risk perception: who fears what and why?", *Daedalus*, Vol. 119 No. 4, pp. 41-60.
- Yell, S. and Duffy, M. (2018), "Community empowerment and trust: social media use during the Hazelwood mine fire", *Australian Journal of Emergency Management*, Vol .33 No. 1, 66-70.