Scientific Poster – Australia

“Bushfire – The Vicious Cycle of Mental Illness, Indecisiveness and Excess Mortality”

Aditya Tedjaseputra1*, Amanda Lim2, Caroline Stolarek1, Lee Jae Rym3, Neville Tan4, Nicholas Voon2*, Radhika Ruwanpathirana5, Sanjay Chavali2, Shirley Xue Li Lau5, Marcel Boulat4 and Nabil Cherrawala2
1 University of Melbourne, Victoria, Australia
2 University of Tasmania, Tasmania, Australia
3 James Cook University, Queensland, Australia
4 Monash University, Melbourne, Australia
5 University of New South Wales, New South Wales, Australia
* Corresponding authors: adityat@student.unimelb.edu.au; nickolasvoon@hotmail.com

Introduction

Bushfires represent a common and important natural disaster in Australia, causing substantial numbers of morbidity and mortality. By virtue of its risk factors, the majority of high-impact bushfires occur in a predictive manner: in the Australian summer season, where severe weather conditions including extremely dry and hot weather and lightning storms occur1. This predictability signifies the importance of preparedness to mitigate the impact of bushfires. Importantly, indecisiveness has been found to hamper the multiple measures implemented with the aim to enhance preparedness2. Here, we find evidence that mental illness, partially as a consequence of bushfires, is associated with indecisive behaviour, which in turn might result in excess morbidity and mortality – creating a vicious cycle between mental illness, indecisiveness and death.

Impact of Bushfires - Mortality

Bushfires yield the greatest number of mortality on its own and in totality compared to other natural disasters in Australia:

Table 1. Mortality from major natural disasters in Australia in the last 100 years
### Impact of Bushfires - Mental Illness

Two most prevalent mental illnesses in the survivors of bushfire events are contemplated here:

1. **Post-Traumatic Stress Disorder:**
   - Definition: a specific form of anxiety disorders that happens from one month after one experiences a major emotional shock following a stressful event\(^\text{10}\).
   - PTSD is the most commonly observed illness in disaster studies.
   - 5.0% young adults screened positive for PTSD three months after Canberra Bushfire cf. 1.5% for unaffected Australian young adults\(^\text{11}\).
   - A positive relationship between the number of bushfire experienced and PTSD – 51% of the population who experience nine or more fire-related events suffer PTSD cf. 8% of the unaffected population\(^\text{10,11}\).
   - 60% of PTSD cases resolve in a mean of 36 months and 64 months in the treated and untreated, respectively\(^\text{12}\).

2. **Depression:**
   - Definition: a persistent feeling of sadness, low mood and loss of interest\(^\text{10}\).
   - Depression is the second most commonly observed illness in disaster studies.
• 48% of PTSD cases have comorbid depression\textsuperscript{13} – whilst rate of depression is about the same compared to general population, this represents an excess case of depression that would otherwise not occur\textsuperscript{14}.
• Depressive symptoms persist for a long time period, with evidence of bushfire victims committing suicide more than three years post bushfire event\textsuperscript{15}.

3. Data from large-scale literature:
• In a review involving sixty thousand post-disaster victims worldwide, PTSD and depression is diagnosed in 68% and 36% of the victims, respectively\textsuperscript{16}. This is consistent with Australian data, elaborated above.
• Mental illness represents a significant consequence of bushfires and should be taken into consideration in its ramifications.

**Mental Illness and Indecisiveness – A Hypothesis to Excess Mortality**

**Premise 1:**
“When given the choice between defending versus evacuating, the majority of Australian residents of wildfire prone areas indicate to have an indecisive fire-plan instead (\textit{wait and see} what the fire is like before deciding).”\textsuperscript{2}

“These plans have been linked to an increased risk of harm and damage during an actual fire.”\textsuperscript{2,17,18} (e.g., Dunlop \textit{et al.} 2012a; McLennan \textit{et al.} 2012)

**Premise 2:**
“At any time in the year, there are always specific Australian regions that are prone to bushfire due to the different weather patterns between regions. Southern Australia (Victoria and South Australia) are most prone in their summer and autumn whilst Queensland and New South Wales in their spring and early summer.”\textsuperscript{19}

This implies that bushfires are recurrent in Australian regions, and hence the same community may suffer bushfire repeatedly in a periodic manner.
Hypothesis: Does baseline mental illness (due to previous bushfires and otherwise) contribute to indecisiveness, which underpins the failure of preparatory measures to these predictable, recurrent bushfires?

Recent evidence from literature:

Depression, PTSD and anxiety (as a common component of multiple anxiety disorders) have been shown to affect decision-making in a complex manner:

1. Depressions and PTSD:
   - Indecisiveness is a common feature observed in depressive patients.\textsuperscript{20}
   - Particularly, there is evidence that they experience \textit{higher decisional conflict}\textsuperscript{21} – which may manifest in:
     - A prolonged decision time in response to an actual fire
     - Repeated revision of a decision, which might be unnecessary
   - \textit{Increased sensitivity to loss and decreased sensitivity to reward}: this might underpin the indecisiveness observed. This is \textit{also observed in PTSD}. For instance, in an actual fire, a person might choose to stay at home because of an overestimation of ‘loss’ household assets in conjunction with underestimation of the ‘reward’ of safety by evacuating.\textsuperscript{22}

2. Anxiety symptoms:
   - Anxiety is a key component of PTSD and is a major cause of indecisiveness.\textsuperscript{10,22}
   - Anxiety contributes to indecisiveness by:
     - \textbf{Perturbing} cognitive processes important for decision-making, including \textit{evaluation of relevant and irrelevant cues}\textsuperscript{22};
     For instance, on how dangerous a fire is when it actually occurs, by considering the warning from the authorities as well as stimuli from the environment (temperature, wind speed).
- **Increasing risk aversion**, where anxious people favor alternatives they perceived as “safe”, which might not be the safest option for a given scenario\(^2\):
  For instance, when presented with two options perceived as “risky” eg. to stay (risk of endangerment of self and family) vs. to leave (risk of lose of household assets), they would be more likely to opt for a middle plan, which is perceived as less immediately risky eg. ‘wait and see’ (which might not be the safest alternative in all scenario).

- **Increasing preference for a known rather than an unknown risk**\(^2\):
  This might lead to people selecting a ’wait and see’ plan, which they might have carried out in previous bushfires, irrespective of the severity of the present fire.

Our review has concluded that mental illness; in the forms of depression, PTSD and other anxiety disorders (and possibly more yet to be studied) has significant contribution to indecisiveness. This occurs alongside an inherent weakness of the current bushfire response plan, where perceived lack of distinctiveness has been reported\(^2\). Indecisive plan, in an urgent event such as bushfire, is fatal as it translates into suboptimal preparation and execution of both survival options: whether it is to “evacuate early” or to “stay and defend”.\(^2,17\)

**Mental Illness-Indecisiveness-Excess Mortality Vicious Cycle**

Pictorial representation of our hypothesis:

Bushfire $\rightarrow$ Unpreparedness $\rightarrow$ Excess mortality

$\downarrow$  $\uparrow$

[Mental illness $\rightarrow$ indecisiveness]

$\uparrow$

Opportunity to intervene = proposed solution
**Proposed Solutions**

Here we propose a number of medical approaches to reduce the risk of harm associated with indecisiveness in bushfires:

- Physicians can reduce the risks of harm by contributing to **psychological preparedness**. Psychological preparedness refers to the emotional capability of dealing with such a situation, and to make rational decisions in response to it.\(^{24}\) Whilst behavioural preparedness often receives more emphasis, psychological preparedness is also important from previous bushfire experiences, as it enables the individual to actually **act confidently and rationally in the acute disaster setting**, leading to reduced injury and loss of life.\(^{25}\)

- **Identifying and addressing risk factors** such as anxiety and stress disorders (which can hamper psychological preparedness), can strengthen psychological preparedness.\(^{26}\) Health professionals are placed in a unique position to help in this regard, as they are often able to anticipate, identify and management the concerns and feelings of the patients, who might otherwise feel unenthusiastic about discussing such issues with a general support agencies due to the loss of familiarity. The high-risk or overwhelmed patients can also be identified for **preventative intervention and referral for psychiatric support**. As such, physicians have the potential to reduce risks of harm by reducing indecisiveness and enhancing decision-making.

- Physicians’ assessment of medically vulnerable risk groups can sway indecisive attitudes. Staying to defend a home requires significant effort and physical fitness, sometimes being subjected to extreme conditions for days.\(^{27}\) Thus, certain groups of people may be safer by re-locating rather than remaining in their properties if threatened by fire. The CFA strongly recommends that children, elderly, and people disabilities, asthma, or heart conditions should not stay to defend. Yet, people with mild to moderate medical conditions may be reluctant classify themselves as vulnerable, and this could contribute to indecision, as well as insecurity in their actions.
Increasing response capacity for preparation (for the general population):  

- There should first be a consideration of the beliefs/attitudes & social conditions that influence the likelihood of preparing.
  - **Home ownership status, length of residence, age, gender** and **previous bushfire experience** impacted significantly on the respondents’ bushfire preparation.

- Secondly, there should be a sound risk-communication strategy which involves:
  a) Engaging local communities to identify prevailing personal beliefs/attitudes and social norms.
  b) Providing people regularly with info tailored to specific living circumstances and to specific phases of preparation in a manner that they can relate to and understand.
  c) Encouraging & facilitating discussion of pertinent issues amongst community members.
  d) Assisting and encouraging people to interpret preparedness information relative to its implications for themselves and their family members.

- The risk communication strategy should be built on motivation factors (e.g. responsibility). To enhance beliefs in the effectiveness of preparing, this information needs to also specifically outline how and why such measures protect both lives and property.
Bibliography:

1 What is a Bushfire? (2011, July). Retrieved from:
2 McNeill, I., Dunlop, P., Skinner, P., Morrison, D., (2012), Exposing the Killer in
   Disaster Planning through Antecedents of Decision Avoidance, in press.
   www.hardenup.org
   www.hardenup.org
   from: www.hardenup.org
   Retrieved from:
   natural-disasters
7 Ash Wednesday Bushfire. (2012, October). Retrieved from:
   in-victoria/ash-wednesday-1983
   (2011). Bushfire Disaster Burn Casualty Management: The Australian
   “Black Saturday” Bushfire Experience. Annals of plastic surgery, 67(5),
   460.
9 van den Honert, R. C., McAneney, J. (2011). The 2011 Brisbane Floods: Causes,
   Impacts and Implications. Water, 3, 1149-1173.
10 Type of Anxiety Disorders. (2010, December). Retrieved from:
    www.beyondblue.org
   attributes and trauma exposure with screening positive for PTSD:
   Analysis of a community-based study of 2085 young adults. Psychological
   Medicine, 36(3), 387-396.


17 Dunlop, P., McNeill, I., Skinner, T., & Morrison, D. (2012). *Brief report on the University of Western Australia and Bushfire CRC pilot study.* Crawley, Western Australia: University of Western Australia, Bushfire Cooperative Research Centre.


19 *Where do Bushfires Occur?* (2011, July). Retrieved from: 


16(9), 476-483.
28 Paton, D & Burgelt, PT Unknown ' Living with Bushfire Risk: Social & environmental influences on preparedness', Information Poster, 1. School of Psychology, University of Tasmania, Launceston, Australia, 2. School of Psychology, Massey University, Palmerston North, New Zealand.