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EDITORIAL

The impact of climate change on mental health (but will mental health be discussed at Copenhagen?)

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Climate change will shortly be assuming centre stage when Copenhagen hosts the United Nations Climate Change Conference in early December 2009. In Copenhagen, delegates will discuss the international response to climate change (i.e. the ongoing increase in the Earth's average surface temperature) and the meeting is widely viewed as the most important of its kind ever held (http://en.cop15.dk/). International agreement will be sought on a treaty to replace the 1997 Kyoto Protocol. At the time of writing it is not known whether agreement will be reached on the main issues of reducing greenhouse gas emissions and financing the impacts of climate change, and it appears that the impact of climate change on mental health is unlikely to be on the agenda. We discuss here how climate change could have consequences for global mental health and consider the implications for future research and policy.

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Introduction

In recent years public health scientists have begun to document and predict the health impacts of climate change. This has gained momentum in the past year with the publication of several influential papers (Frumkin & McMichael, 2008; Costello *et al*. 2009; Wiley *et al*. 2009). In 2007, the Fourth Intergovernmental Panel on Climate Change (IPCC) assessment report was published and included a chapter on the health effects of climate change (Confalonieri *et al*. 2007); the report clearly documents the evidence for a wide range of adverse health outcomes consequent on climate change and alludes to the fact that many important outcomes will be psychological. Mechanisms for the health impacts of climate change include altered patterns of infectious disease, injuries from severe weather events, food and water scarcity, and population displacement (Confalonieri *et al*. 2007; Costello *et al*. 2009). Meanwhile, others have pointed to the increased global health disparities that climate change will bring, as the poorest countries are likely to suffer the greatest health impacts (McMichael *et al*. 2008). By the beginning of this decade it was estimated that in excess of 150 000 deaths per year were already occurring as a result of climate change (Patz *et al*. 2005) and this number is expected to greatly expand as we approach the middle of the century (Confalonieri *et al*. 2007). Planning to protect public health in relation to climate change is therefore ongoing on the international stage (WHO, 2009), although the economic and environmental impacts seem to be the prime focus of governments' interests, rather than the health impacts.

Despite this recent activity and the broad recognition that the mental health effects of climate change will be significant, such effects are mostly discussed in vague terms and rarely by those actively involved in mental health research or policy. Mental health is unlikely to feature on the Copenhagen agenda. In this editorial we argue that some of the most important health consequences of climate change will be on mental health and we consider the mechanisms by which these may occur. We also suggest that this is an opportune time for those involved in mental health research to become involved in the debate.

Direct effects

Natural disasters, such as floods, cyclones and droughts, are predicted to increase as a consequence of climate change (IFRC, 2009). This is largely due to the greater likelihood of extreme meteorological events in the years ahead. Adverse psychiatric outcomes are well documented in the aftermath of (natural) disaster (Norris *et al*. 2002) and include, among others, post-traumatic stress disorder (Galea *et al*.

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2005), major depression (Marshall *et al*. 2007) and somatoform disorders (van den Berg *et al*. 2005). Although enhancing disaster preparedness has become an international priority in recent years, the psychological implications of disasters are often under-recognized (Costello *et al*. 2009). Hurricane Katrina is a striking example of how disaster-related mental health problems can become intractable, even in Western industrialized countries (Kessler *et al*. 2008). Hurricane Katrina also illustrated how medical and psychiatric care can dramatically diminish for those with pre-existing mental illness in the period following a disaster, at a time when it is needed most (Weisler *et al*. 2006). The needs of people with chronic mental illness have often been overlooked following disaster in favour of trauma-focused psychological interventions and yet the mentally ill occupy multiple vulnerabilities for increased mortality and morbidity at such times. Fortunately, recent guidance now specifically advises humanitarian agencies on how to better care for people with chronic mental illness in the mass emergency situation (IASC, 2007).

As global temperatures increase, heat waves will become more common, last longer and be more severe (Meehl & Tebaldi, 2004). It is now well recognized that, above a certain threshold, there is a relationship between increasing temperature and increasing mortality (Basu & Samet, 2002). This heat effect is particularly pronounced during heat wave episodes, with an estimated 70 000 dying as a result of the European heat wave of summer 2003 (Robine *et al*. 2008). There are a variety of reasons to believe that people with mental illness are particularly vulnerable to heat-related death. For example, psychotropic medication is a risk factor for heat-related death (Bouchama & Knochel, 2002), as is pre-existing respiratory and cardiovascular disease (Basu & Samet, 2002) and substance misuse (Marzuk *et al*. 1998), all of which are highly prevalent in people with serious mental illness. In addition, maladaptive coping mechanisms and poor quality housing are likely to confer further vulnerability on people with mental health problems (Kovats & Ebi, 2006). Finally, there is preliminary evidence that death by suicide may increase above a certain temperature threshold (Page *et al*. 2007; Qi *et al*. 2009), suggesting that psychological mechanisms such as impulsivity and aggression could be triggered during periods of hot weather. At present, research and policy interest is focused on the vulnerability to heat-related death of people with chronic physical illness and the elderly, but such interest has not been extended to the mentally ill.

In addition, several infectious diseases are predicted to become more common as a consequence of global warming (e.g. malaria, dengue fever, schistosomiasis, tick-borne encephalitis; see Costello *et al*. 2009). Adverse impacts such as psychological distress, anxiety and traumatic stress resulting from emerging infectious disease outbreaks have previously been documented in infected patients (De Roo *et al*. 1998), staff (Maunder, 2004) and the general public (Leung *et al*. 2005). Therefore, should outbreaks become more widespread, an increased burden of mental health problems is likely.

Not all of the mental health effects of climate change will necessarily be negative. Akin to postulated physical health benefits of fewer cold-related winter deaths and shorter influenza seasons, it is possible that warmer average temperatures could benefit some people with mental illness. At present, this remains speculative, as this possibility has not been investigated.

Indirect effects

Indirect consequences of climate change, such as migration and economic collapse, are potential drivers of adverse health outcomes (Costello *et al*. 2009). Low-lying coastal areas will become uninhabitable as coastlines disappear; this is particularly concerning as 13 of the world's largest 20 cities are situated on the coast. Coastal areas in poor countries will be the worst affected. Coastal change and other manifestations of climate change, such as increased flooding events in some areas and water scarcity in others, are predicted to lead to forced mass migration. Conflicts may also increase in number and constitute another cause of population displacement (Costello *et al*. 2009). Mass migration will undoubtedly lead to an increased burden of mental illness in affected populations. The vulnerability of those with pre-existing serious mental illness during complex emergencies has recently been highlighted (Jones *et al*. 2009).

Urbanization (the drift of populations from rural to urban areas) is predicted to continue for the foreseeable future, particularly as droughts and floods threaten traditional rural economies. Urban drift in conjunction with population growth means that the urban population in low- and middle-income countries is predicted to increase from 2.3 billion in 2005 to 4 billion by 2030 (Costello *et al*. 2009). Urbanization brings with it some potential health advantages, mainly due to increased opportunities for work and economies of proximity and scale (for example by bringing more of the population closer to major health infrastructure so that access to mental health services is improved). However, urbanicity in developed countries is associated with an increased incidence of schizophrenia (March *et al*. 2008), and concerns have also been expressed about the negative

impact of urbanization on mental health in low- and middle-income countries (Trivedi *et al*. 2008).

Mental health provision in many low- and middle-income countries is already hugely inadequate (Jacob *et al*. 2007) and is unlikely to be prioritized should further economic collapse occur secondary to climate change. Capacity to support the infrastructure needed to train and supervise mental health workers will deteriorate if mental health budgets are not protected. Finally, some have postulated that the knowledge of man-made climate change could in itself have adverse effects on individual psychological well-being (Fritze *et al*. 2008).

Research challenges

Mental health professionals in clinical, research and policy arenas need to realize that their expertise is crucial to further understanding of the health effects of climate change. Given the likely scope and geographical range across which health effects will be felt, the methodological challenges of studying the themes outlined above are considerable. Collaboration with other disciplines will be crucial; we may need to work with climatologists, geographers, environmental epidemiologists, urban planners, economists, modellers and development specialists to plan and execute meaningful research on these topics. Recent initiatives by funding bodies such as the National Institutes of Health in the USA and the Wellcome Trust in the UK indicate that there is a willingness to fund health research related to climate change. This will be important to inform future mental health policy priorities as climate change progresses.

Conclusion

We suggest that climate change has the potential to have significant negative effects on global mental health. These effects will be felt most by those with pre-existing serious mental illness, but there is also likely to be an increase in the overall burden of mental disorder worldwide. In this editorial we have attempted to explore the mechanisms by which these effects might occur and highlight the vulnerability of those living in the poorest countries. Research is almost entirely lacking in this area, a situation we would urge be addressed so that mental health policy makers can plan for the impact of climate change on mental health.

Declaration of Interest

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