Climate change and mental health following flood disasters in developing countries, A review of the epidemiological literature: What do we know, what is being recommended?

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Abstract

Among the expected consequences of climate change are extreme weather events, increased sea levels and the melting of glaciers all of which can lead to an increase in the number of flooding disasters which will impose greater burdens on vulnerable populations. This article reviews the epidemiological literature concerning climate related flooding and mental health in developing countries. It also examines what is being recommended. All studies show that there are serious mental health problems following flooding events and this gives us good grounds to mainstream mental health issues in disaster response.

Keywords: *Climate Change, Flooding, Mental Health*

Introduction

Estimates suggest that for the years 2000-9 flooding affected approximately 949 million people worldwide. The vast majority of these, 900 million, lived in countries of medium human development (IRFC, 2010). If the assessments of the Intergovernmental Panel on Climate Change (IPCC) are correct, climate change is now with us (IPCC, 2007). Among the expected consequences are extreme weather events, increased sea levels and the melting of glaciers all of which can lead to an increase in the number of flooding disasters. This will impose greater burdens on vulnerable populations, and international organizations, governments and NGOs need evidence based plans to meet future risks. An examination of the psychological consequences of flooding is essential both in relation to present and future flooding disasters.

The present paper concentrates on the psychological consequences of flooding in developing countries

which are expected to be affected most and where the consequences are expected to be worse. It reviews the present epidemiological evidence, and the recommendations made, and suggests areas for future research. It is not claimed that any of the events discussed here are due to climate change rather they are the kind of event we can expect from climate change.

Methods

The definition of "developing country" is contentious, however it is now widely agreed that defining poverty in terms of income alone is inadequate and the notion of income poverty should be replaced by one of multidimensional poverty (World Bank, 2001; Sen, 1999). Here the Human Development Index (HDI), a composite of income, education and longevity, is used. While this does not capture all aspects of multidimensional poverty (e.g. gender issues or social exclusion), it is broader than a purely income approach and has an internationally comparative data sets for a large number of countries since 1990. Introducing other indicators of poverty rapidly reduces the data set as is the case with the Human Development Report's Multidimensional Poverty Indicator (UNDP, 2010).

The HDI categorizes countries into Very High Human Development, High Human Development, Medium Human Development and Low Human Development (UNDP, 2010). All those countries outside the very high human development category are considered "developing"; this categorization is comparable with the previous most extensive literature review of the mental health consequences of flooding in developing countries and so is used (Norris et al., 2002a). However, it should be noted that HDI levels at country level can be misleading as there can be great variation within countries (in terms of income it is now estimated that three quarters of the world's poor live in middle-income countries (Sumner, 2010). For example, of the studies reviewed here, Telles et al.'s (2009; 2010) were undertaken in Bihar, India which is one of the poorest areas in the world and ranked as Low on the HDI scale

(UNDP, 2010), whereas India is ranked as Medium. Unfortunately, HDI data for the specific locations of the studies reviewed here is not available and therefore only country level indicators are used. The Polish cases are included as Poland was not of Very High Human Development when the events took place (Poland is also included in Norris et al, 2010).

Having defined "developing country", literature searches were made in the PsychInfo (American Psychological Association, Washington DC and Medline/PubMed (National Library of Medicine, Bethesda, Maryland) and Google scholar using the words flood, flooding, cyclone, hurricane, mental health and mental disorder, Post Traumatic Stress Disorder, depression, suicide, anxiety in the title, keywords or abstracts. No time limits were placed. Only peer reviewed epidemiological studies were included. Reports were excluded, as were articles relating to Tsunamis as the latter are not related to climate change. This review is, unfortunately, limited to articles published in English. A review covering more languages would be welcome.

Results

A total of 34 articles met the above criteria (27 relating to Medium Human Development countries (Table 1) and seven to High Human Development countries (Table 2)). This is a much higher number than previous literature review, Norris, (2010) which identified nine in all, however the review was completed in 2005 and a number of studies have been published since then). Tables 1 and 2 provide an overview of the studies that have been undertaken, countries' HDI level, the specific disaster, the time at which the study was carried out, and, when available, the percentage of the target population classified as having or potentially having a given disorder. The tables show, not surprisingly, that in all countries and cultures there are considerable negative mental health consequences of flooding. However, there is sizeable variation among them.

No studies have been undertaken in countries of Low Human Development. The number of articles masks the number of flood events covered (indicated by bands in the tables), for example, four articles concerned the 1998-9 Hunan floods in China, two of which used the same data sets but highlight different aspects of flooding and mental health (Feng et al., 2007; and Huang et al., 2010). Nine studies were carried out within six months

of flood onset, 17 within one year and none were carried out later than two years post. Only three studies were longitudinal. Four studies make comparisons between different places affected by the same flood. A simple distinction between studies of adults and those of children is not possible as different age categorizations are used. Furthermore, even within the same study the desirability of categorizing children of the age range two to nine in the same group (Durkin et al., 1993) is questionable given the considerable developments that take place within those years.

By far the majority (16) investigated Post Traumatic Stress Disorder (PTSD), five examined Major Depressive Disorders (MDD), three suicide, Acute Stress Disorder (ASD), two, and studies that included panic disorder (PD), general anxiety disorder (GAD), alcoholism, and general psychological disorders as measure by the General Health Questionnaire 12 (GHQ 12) were limited to one each. Durkin et al. (1993) examined behavioural disorders among children. An older study (Patrick and Patrick, 1981) included disaster syndrome which is no longer studied. Interestingly, despite the emphasis on PTSD, it is not necessarily the most prevalent disorder. In studies that examined more than one disorder both and found higher rates of major depression disorder - 19.5% compared with 10.6% in Honduras (Kohn et al., 2005) and 5.9% compared with 2.6% in Vietnam (Amstadter et al., 2009). Sample sizes range from 45 (Kar et al., 2002) to 40,028 (Abuaka et al., 2009). It should also be noted that ten per cent prevalence can translate into large numbers of people; Kohn et al. (2005) estimate that 492,000 adults in Honduras suffered from PTSD because of Hurricane Mitch. At the time, Honduras had an adult population of 3.3 million.

There is no straightforward relationship between mental disorders found and HDI level. Some of the poorest countries show low levels of disorders despite the severity of the flooding event, for example Kim et al. (2010) report PTSD levels of 5.4% followings cyclone Nargis in Myanmar which killed at least 84,537 people with a further 53,836 missing. This percentage is just over half that found in Honduras following Hurricane Mitch (10.6%) as a result of which 5,657 were killed and 8,058 were missing (Kohn et al., 2005), or Venezuela where 62% out of a sample population were *diagnosed* as having PTSD. We now turn to the findings concerning specific disorders.

Table 1 : Mental Health Following Floods in Countries of Medium Human Development

Country	Disaster	Study	Time after onset	Sample size	PTSD	Depression	Suicide/ Suicide Ideation (SI)	Addictive disorders (alcohol)	Acute Stress Disorder	Acute Psychotic Episode	Panic Disorder	Adjustment Disorder	General Anxiety Disorder	Mental health problem GHQ 12
Bangladesh	Flooding (1988)	Durkin et al (1993) (Children)	Pre-flood & 5 months post	N=162 Children 2-9 years	n.a.									
China	Yangtse Basin (suicide belt)	He ZX (1998)	Period 1973-77				40% above national average							
China	Hunan Floods (1998-1999)	Liu et al. (2006)	24 months	N=33,340	8.6%									
China	Hunan Floods (1998-1999)	Feng et al. (2007) & Huang et al. (2010)	24 months	N=25,478	9.2%									
China	Hunan Floods (1998)	Abuaku et al. (2009)	24 months	N=40,028			0.3% (actual suicides)							
China	Hunan Floods (1998)	Li et al.(2010) (Children and parents)		N=4,327 children	4.7%									
				N=6,584 parents	11.2%									
Dominican Republic	Hurricane Georges (1998)	Sattler et al. (2002)	4 weeks post	N=272										
Honduras	Hurricane Mitch (1998)	Kohn et al. (2005)	1 month post	N=800	10.6%	19.5%		5.8%						
India	Flooding Orissa 1994	Kar et al. (2006)		N=45	6.6%	33%				6.6%		46.7%		
India	Super cyclone Orissa	Kar et al. (2004)		N=540	44.3%	52.7%							57.5%	
India	Super-cyclone Orissa (1999)	Kar and Bastia. (2006)	12 months	N=108	26.9%	17.6%								
India	Super-cyclone Orissa (1999)	Kar et al. (2007)	12 months	N=447 7-17 years	30.6%		SI 4.9%							
India	Super cyclone Orissa	Suar et al. (2002); Suar and Khuntia (2004); Suar (2004); Suar et al. (2007)	3 months post	N=135	50%									
India	Kosi River (2008)	Telles et al. (2009) & Telles et al. (2010)	1 month post	N=1,289	n.a.	n.a.								
Myanmar	Cyclone Nagris (2008)	Kim et al (2010)	1 month post	N=2,575	5.4%					2.2%				
Nicaragua	Hurricane Mitch (1998)	Caldra et al (2001)	Wave 1: 6 months post	N=496	Range 0-4.5-9% (three sites)		8.5%							
			Wave 2: 12 months post	N=23 (case follow-up)	50% of Wave 1 cases		Not checked							
Nicaragua	Hurricane Mitch (1998)		6 months post	Posoltega N=52	90%	81%								
		Goenjian et al. (2001) (Children)		Chinandega N=55	55%	51%								
				Leon N=51	14%	8%								
Sri Lanka	'78 cyclone (1978)	Patrik and Patrick (1981)	12 months post	Paddirupu (affected) N= 61 Thirukovil (control) N=92		41%	SI 41%	3%					84%	
Thailand	Hat Yai Floods (2000)	Assanangkornchai et al. (2004)	2 ½ months post	N=590										40%
Thailand	Hat Yai Floods (2000)	Assanangkornchai et al. (2007)	1 year	N=400										16.5%
Vietnam	Typhoon Xangsane (2006)	Amstadter et al. (2009) Acierno et al. (2009)	Wave 1 immediately pre-flood Wave 2 2-2 ½ months post onset	N=798	2.6%	5.9%					9.3%		2.2%	

Table 2 : Mental Health Following Floods in Countries of High Human Development

Country	Disaster	Study	Time after onset	Sample size	PTSD	Depression	Suicide/ Suicide Ideation (SI)	Addictive disorders (alcohol)	Acute Stress Disorder	Acute Psychotic Episode	Panic Disorder	Adjustment Disorder	General Anxiety Disorder	Mental health problem GHQ 12
Mexico	Hurricane Paulina (1997)	Norris et al. (2001) & Norris et al. (2002)	6 months	N=200	Men 14.4% Women 43% 29%									
Mexico	Mexican flood (1999)	Norris et al. (2004) & Norris et al. (2005)	Wave 1 6 months	All four waves Villaher-mosa (V) N=385	V=12% T=33%		V=6.5% T=14.8% (SI)							
			Wave 2 12 months	Tezuitlán (T) N=176	V=8% T=19%									
			Wave 3 18 months		V=8% T=19%									
			Wave 4 24 months		V=14% T=46%									
Poland	Opole (1997)	Norris et al. (2002)	12 months	N=285										
Poland	South West Poland	Bokszczanin (2007)	28 months	N=533	18%									
Venezeula	Vargas state floods (1999)	Otero & Njenga (2006)	18 months	N=5,000	62%									

Post Traumatic Stress Disorder

As already mentioned and as is clear from Table 1, PTSD is by far the most studied disorder which is not surprising given the nature of the disasters investigated. The diagnosis continues to be highly contentious and the criteria are in the process of revision for DSM-V due to be published in 2013 (for an update of the controversy see Rosen and Frueh (2010)). Apart from the studies by Kohn et al. (2005) (Honduras), Amstadter et al. (2009) (Vietnam) and Otero and Njenga (2006) (Venezuela), the studies reviewed here are not diagnostic on DSM-IV criteria.

The range of PTSD prevalence varies considerably even amongst diagnostic studies of which at the top end we find Venezuela (62%) and at the bottom end Vietnam (2.6%). Predictive factors include: Exposure (Caldera et al., 2001; Goenjian et al., 2001; Suar et al., 2002; Norris et al., 2004; Kohn et al., 2005; Liu et al., 2006; Kar et al., 2007; Abuaku et al., 2009), gender (Caldera et al., 2001; Kohn et al., 2005; Liu et al., 2006; Bokszczanin, 2007; Abuaku et al., 2009; Kim et al., 2010), age (Norris et al., 2002b; Suar, 2004; Liu et al., 2006; Bokszczanin, 2007; Telles et al., 2010), educational level (Suar and Khuntia, 2004; Abuaku et al., 2009; Caldera et al., 2001), flood type (Liu et al., 2006; Abuaku et al., 2009), social support (Norris et al. 2005; Feng et al., 2007), previous mental health problems (Caldera et al., 2001; Amestadtler et al. (2009), family size (Suar and Khuntia, 2004; Abuaku et al., 2009), families with PTSD (effect on children) (Huang, 2010), low caste (Suar and Khuntia, 2004), culture (Norris et al., 2001; Norris et al., 2002a) and externality of survivors (Suar and Khuntia, 2004).

Depression

Five studies concerned major depressive disorders or depression. Norris et al. (2004) found that first time MMD after six months following the 1999 Mexican floods varied from 2.1% to 4.5% depending on location. Twenty five per cent of adults who had PTSD also had MDD. In Honduras, 19.5% suffered from MDD compared with 10.6% PTSD. The range varied from 24.4% in the high impact neighborhoods to 14.9% in the low impact area. Rates also varied in relation to Social and Economic Status (SES) with the highest rates occurring in the lowest SES group (25.9%), followed by the highest SES group (15.6%) with the middle SES group having the lowest rates (11.0%). In Vietnam 5.9% were found to have MDD which was twice as many as PTSD (2.6%). Risk factors included exposure, prior caseness, and previous traumatic experience. In India, Telles et al. (2009 and 2010) found higher depression increased in relation to age in Bihar and the same tendency was found by Suar et al. (2007) in Orissa. Suar et al. (2002) found that the mean depression rate for the most affected area was 20.11 (SD 3.72) while the equivalent data for the unaffected area was Mean 18.72 (SD 2.57). Support received ameliorated depression. Patrick and Patrick (1981) found 41% to have symptoms of depression in the Sri Lankan case. Otero and Njenga (2006) state that depression rates were checked in Venezuela but unfortunately they are not provided.

Suicide

Caldera et al. (2001) found a suicide ideation rate of 8.5% with illiterates (OD 2.84 95% CI 1.12-4.37) and those with pre-flood mental health problems (OR 2.84; 95% CI=1.12-4.57) being most at risk. A further paper raises the question of flooding's effect on suicide rates in China. He (1997) maintains that the major difference between the Yangse Basin and other areas of China is the existence of extensive flooding and suggests that the extremely high rates of suicide in the basin, 40% higher than the rest of China, are the result of those floods. Hunan province has a rate which is 173% higher than the national average. Abuaka et al. (2009) studying morbidity and mortality after the 1998 Hunan floods, found 11 cases of suicide (0.3%) out of 40,028 people that had been affected by the floods, this refutes He's hypothesis. If anything, this may suggest that the suicide rate had decreased. Following super-cyclone Orissa (India), Kar et al. (2004) found that 12 times as many people felt that their lives were not worth living after the cyclone than before, a 9.76 times increase in suicide ideation, 7.1 in suicidal plan and 9.7 in suicidal attempts. In all 12% of the population studied had attempted to commit suicide. A study amongst children in the same area found a suicide ideation rate of 4.7% (Kar et al., 2007). Patrick and Patrick (1981) found 15% suicide ideation following cyclone '78 in Sri Lanka.

General Anxiety Disorder

Three studies included General Anxiety Disorder, in Vietnam, pre-typhoon caseness and exposure were predicative of GAD (Amestadtler et al., 2009), in India following super-cyclone Orissa found a rate of 12% of school children in their middle teens (Kar et al., 2004). Patrick and Patrick (1981) found a level of 84% having symptoms of anxiety.

Others

Other disorders received attention in just one or two studies. Alcohol consumption is the only addictive disorder that has been studied. There was a 5.8% alcohol abuse rate in Honduras and a 3% rate in Sri Lanka. Acute Stress Disorder was found among 2.2% in Myanmar, 46.7% of respondents showed symptoms of adjustment disorder in Orissa (N=45), Durkin et al. (1993) examined behavioral disorders among children and found that aggressive behavior increased from zero to 10% and that 34% developed enuresis. Disaster syndrome is no longer examined as a category, but Patrick and Patrick (1981) found symptoms of that categorization including apathy, aimless wondering, mute and motionless behavior among 23% of the population affected by cyclone '78.

Longitudinal studies

Assanangkornchai et al. (2007) undertook a longitudinal study using the General Health Questionnaire 12 (a screening test for common disorders) to explore adverse stress reactions following the 2000 flooding in Hat Yai city, Thailand. Four areas were chosen, three reflected different socio-economic status within the city, whereas the fourth was rural. The first study was carried out 10 weeks after the flood and thereafter at eight to ten week intervals, thus giving an unusual temporal dimension to the study (by the fifth study N=400). The data suggests a general remittance followed by an anniversary effect in which the number of symptoms increased in the rural area, which is flooded annually, and in the semi-slum area, but not in the two wealthier districts. The authors concluded that socio-economic status and impact were the most important factors.

Norris et al. (2004) carried out a four wave (six month intervals) study of PTSD in Tezuitlán and Villahermosa following Mexico's 1999 flood. At Wave 1 46% of the victims at Tezuitlán met PTSD criteria and 14% in Villahermosa (less hard hit). The rates decreased to 19% in Tezuitlán and 8% in Villahermosa by the end of the study (2 years). Both studies show that although symptoms decline there are substantial long term consequences.

Recommendations for response and risk reduction

The epidemiological studies provide crucial information relating to disaster response and disaster risk reduction. All studies show the importance of mental health problems be they at clinical or sub-clinical levels. They show, even if there are considerable difference, that there are substantial problems in all countries and cultures studied. Thus all studies recommend interventions. Specific recommendations are also made relating to particular aspects: social support (Norris et.al., 2002a; Feng et al., (2007), paying particular attention to vulnerable groups (Kar et al., 2004; Suar and Khuntina, 2004; Caldera et al., 2001; Assanangkornchai et al., 2004), appropriate mental
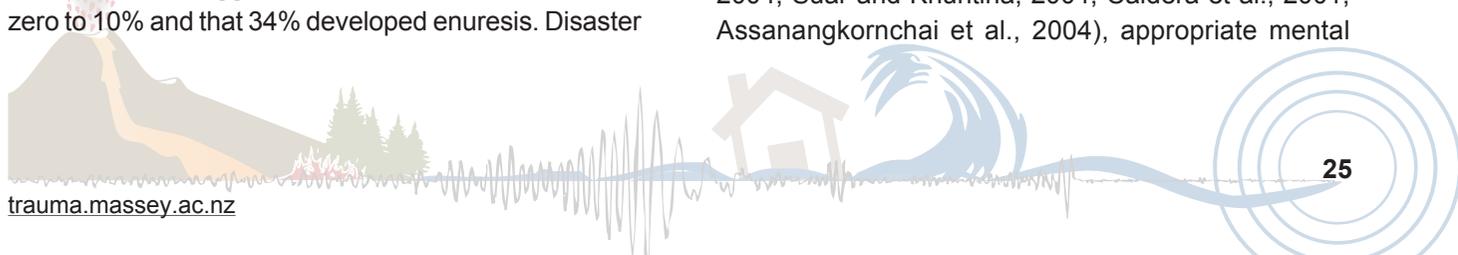
health interventions (Suar et al., 2002), yoga (Telles et al., 2010), psychosocial interventions (Kim et al., 2010), develop mental health programs (Kar et al., 2007). Some authors suggest a diversity of interventions depending on context (Norris et al., 2004; Otero and Njenga, 2006). The longitudinal evidence suggests that while symptoms decline of themselves over time, there can be, even after two years, substantial problems requiring long term interventions.

Discussion

Any criticism of epidemiological studies of disasters should bear in mind that they may be undertaken under extremely difficult conditions and that there is little likelihood of being able to carry out the prefect study. It is far from clear that post-disaster populations want to answer long questionnaires relating to many predictive factors that we find important, and mental health issues may not be the main aim of those undertaking the studies (e.g. Kim, 2010). Thus the information gained from individual studies is often limited. Baseline information is often missing so it is impossible to infer the actual increase in mental health problems following a flood. The location of the study may depend on features such as accessibility which may mean that those worst affected are not included. This may be significant as degree of exposure is an important predictor. Such disasters often cover large areas and affect large numbers of people. The studies of the Hunan floods are exceptional in terms of sample size. Although the number of studies may seem high, the actual information we have is very little. The studies cover a few events in a few countries and cultures. Many of them are small in relation to the numbers affected by the events.

This literature review is limited to peer reviewed epidemiological studies in English. Kim et al. (2010) state their finding of 9% of the population they studied (2,641) following cyclone Nargis had mental health problems was markedly below the 23% found by the (non-peer reviewed) study published by the World Health Organisation (WHO, 2008). However, as the 23% was amongst households (WHO, 2008), the actual figure is unclear as we do not know household size or the actual number of people who had psychological problems within each household, and there is no breakdown in terms of the type of problem. Interestingly the Report found a variation from 6% to 51% depending on location. This huge difference raises the unanswerable question

as to what the effects of location have on the results presented in Tables 1 and 2.

The issue of diagnosis is also problematic. The fourth version of the Diagnostic and Statistical Manual (DSM-IV) of the American Psychiatric Association which provides the basis for many of the epidemiological studies reviewed here introduced the "clinical significance criterion" which states that to be diagnosed, the symptoms of a disorder must cause "clinically significant distress or impairment of social, occupational, or other areas of functioning" (Spitzer and Wakefield, 1999, p 1857). The idea behind the criterion was that "false positives" should be eliminated, having all the symptoms on a list relating to a specific disorder was deemed inadequate as a normal response to an abnormal situation may mean that someone may have the symptoms without having a disorder *per se*. There is a lack of clarity about what the clinical significance criterion actually means, but if it entails that a clinician is needed to make a diagnosis, then epidemiological studies carried out be non-clinicians, as most of the studies reviewed here are, cannot be considered to be diagnostic (Spitzer and Wakefield, 1999). In other words *we do not know how valid the findings are in terms of clinical diagnosis*, as Norris et al. (2002b: 171) state:

> "It must be remembered that a diagnosis of PTSD requires functional impairment as well as presence of symptoms. Although the former can never be assumed to be synonymous with the latter, this may be especially true in the context of cultures that encourage expression of distress. Pathologizing what may be a normal response to extreme stress is inappropriate."

However, the alternatives seem to be that either one gives up undertaking such epidemiological studies, especially in developing countries where there are insufficient numbers of clinicians to undertake them (WHO, 2005) and have no information, or, as studies do, point to the limitations and state that the results are only *indicative*, and hope that others do not take them to be true diagnoses when data is used in a different context and where all the data limitations reported in the original article are not repeated.

A further complication is that different studies use different criteria from the same disorder. An example of the problem comes from one comparative study concerning PTSD in which a target population was categorized using both the World Health Organisation's

International Classification of Mental and Behavioural Disorders 10th revision: Diagnostic Criteria for Research (ICD-10-DCR) and DSM-IV criteria found a discrepancy of 4% with the ICD-10-DCR schedule categorizing 7% of the target population as having PTSD and the DSM-IV diagnostic schedule finding just 3%. Forty eight per cent of the difference was due to the clinical significance criterion. The authors' conclusion was that "ICD 10-DCR PTSD cannot be assumed to be identical to DSM-IV PTSD" (Peters et al., 1999, p, 335). Furthermore, the quality of screening tests varies substantially, ranging from Norris et al. (2004) who used the WHO's translation of Module K of Version 2.1 of the Composite International Diagnostic Interview (CIDI), which had previously used in Mexico to Tells et al. (2009) who used the Screening Questionnaire for Disaster Mental Health developed for a Japanese context and which, as they point out, had not been validated on an Indian population.

Of all studies, the Venezuelan case found by far the highest percentage of PTSD, and was diagnostic (Otero and Njenga, 2006). It took place as part of a community response to the 1999 Vargas flooding disaster. It included mass media and community campaigns (supported by *Pfizer*) were used to convey the message that PTSD was a normal reaction to an abnormal condition (contrast with Norris above). Thus it was hoped to de-stigmatize the condition. Several secondary stressors were present – separation of family members, drug and alcohol abuse and movement from one camp to another. Furthermore, people were still living in the affected area. This suggests that either the campaigns led to people over emphasizing the severity of their symptoms and clinicians are making mistakes, or that people covered in other studies are possibly unwilling to report theirs and thus the data are underestimates. These possibilities certainly deserve further investigation.

Sample size varies considerably. However, small studies can be important, Kar et al. (2002) is the only study to include Acute Psychotic Episodes (6.6%) and Adjustment disorders (46.7%). While these figures might be misleading, they do suggest an avenue for further research which is not captured by larger studies.

Different studies take different factors into consideration. To this extent, what is found depends on what is being investigated. In India, for example, only Suar and Khuntia (2004) considered caste, so it is only they who had a chance to find it significant. In addition, studies often only consider the flood to be the stressor. This means that we know too little about secondary stressors and the impact they might have though the literature sometimes points to them as possible risk factors (Kohn et al., 2005; Otero and Njenga, 2006). The analysis itself is also important. For example, in their initial regression analysis Kohn et al. (2005) found female gender to be of significance (one of the most common findings), but not on their backward regression.

Studies differ on how relevant they find different categorizations in specific cultural contexts (Amestadtler et al., 2009), and as to what influence culture has on responses. Are men just as traumatized as women, but unwilling to talk about it (Norris, 2001)? Much points towards sensitivity to context and culture as being decisive.   All studies agree that mental health interventions are important in the wake of floods which implies preparedness. The importance of social support is suggested directly, and also indirectly in terms of support for particularly vulnerable groups and the use of psychosocial interventions. These may be particularly important given the lack of mental health systems.

Conclusion

This review found 34 epidemiological studies of the mental health consequences of flooding in developing countries. On a general level we can say that all studies show that there are serious mental health problems following flooding events and this gives us good grounds to mainstream mental health issues in disaster response. We can also expect this burden to increase as a result of climate change. This review studied developing countries. The results show that there is no clear relationship between a countries degree of development and mental health outcomes at the national level. However, within countries the relationship to poverty is unclear as the data is missing. The diversity of results suggests that culture and context are of great importance. However, it must be said that too few cases have been studied, too few disorders investigated, and too few variables have been analyzed to make many strong claims beyond these generalizations. All aspects deserve further research.

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