Flood Literature Review

Taylor Potter

Factors Increasing Vulnerability to Health Effects before, during and after Floods

Authors: Dianne Lowe, Kristie Ebi, Bertil Forsberg

- The study's main objective is to find the risk factors that increase morbidity and mortality pre, during and post flooding.
- Flash floods have the highest average mortality per event and flooding is the most significant natural disaster.
- The studies methods were to complete a systemic pubmed review of flood risk publications.
- During flooding, women, children, and elderly people are at higher risks of psychological and physical effects while males between 10-29 have higher mortality rates.
- During post flooding, people over the age of 65 have greater risk of physical effects while women in particular are more vulnerable to psychological effects.
- Risk Factors mentioned: previous flood experiences, greater flood depth or flood trauma, existing illnesses, medication interruption, and low education or socio-economic status
- The studies resolution is to try to tailor flood protection messages to specific age groups and at risk groups.

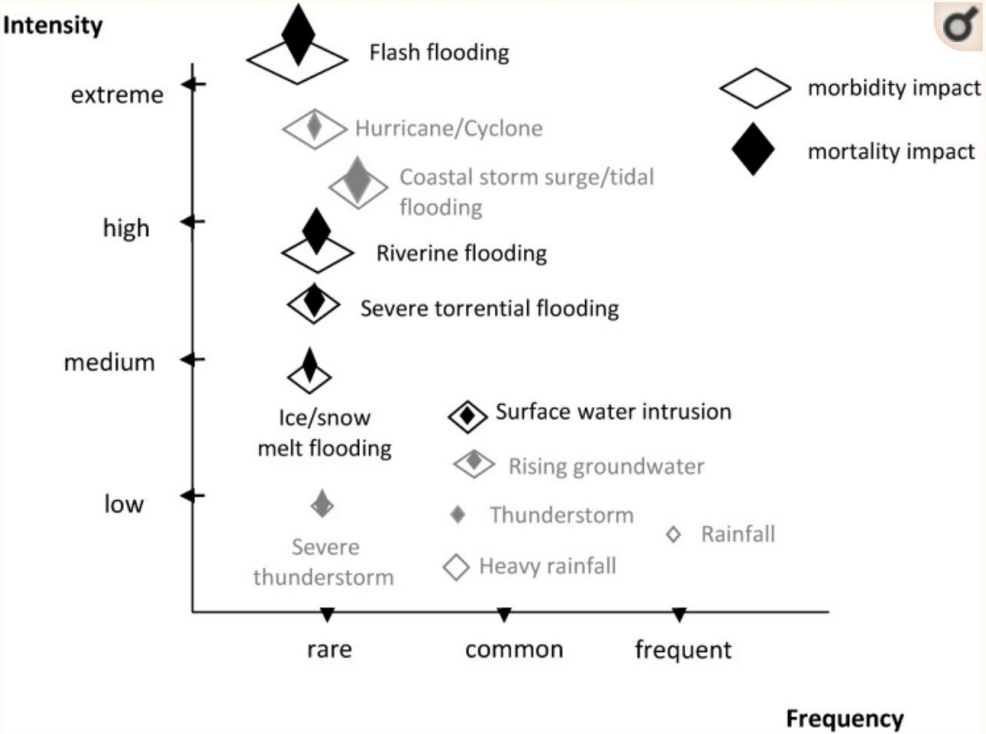

Figure 2

Severity, frequency and impact of extreme hydrological weather events. We focused on extreme precipitation-related flood events that are sometimes compounded by snow and ice melt e.g., severe torrential rain, flash and riverine flooding, (bolded) and excluded minor flooding events and those accompanying extreme wind or tides (greyed). The diamond size illustrates the typical magnitude of the morbidity or mortality impact [1,16,17].

Prenatal Stress due to a Natural Disaster Predicts Adiposity in Childhood: The Iowa Flood Study

Kelsey N. Dancause, David P. Laplante, Kimberly J. Hart, Michael W. O'Hara, Guillaume Elgbeili, Alain Brunet, Suzanne King 2

- Previous research shows that prenatal stress can have many causes including increased risk of childhood obesity.
- First, researchers looked objectively at stress levels for 217 pregnant women. Children's fat levels were taken at the 2.5 year visit with 131 families participating in the visit, and 105 families in the 4 year visit.
- Researchers found that if the pregnant woman is exposed to flooding during early gestation, the child will have a greater chance of having a larger weight gain between the 2.5 and the 4 year visit.
- The biggest indicators of this increase in weight are flood exposure during pregnancy, hardships, and distress together increased variance by up to 10% when compared to covariates.
- Limitations include the size of the sample as well as genetics being a marker for childhood obesity.
- The study says that for future studies, more work must be done on the maternal mental health and how different aspects of it influence the children's development.

Comorbidity of post-traumatic stress disorder and anxiety in flood survivors

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- PTSD and anxiety are very prevalent in trauma exposed populations however, their comorbidity has not been investigated in flood survivors.
- This study had the goal of estimating the extent that PTSD and anxiety had a co-occurrence in flood survivors as well as identify the risks for PTSD alone and the comorbidity of PTSD and anxiety.
- Researchers used participants who experienced the Dongting Lake flood in 1998 using stratified and systematic random sampling with a total of 325 participants sampled.
- The prevalence of PTSD, anxiety, and comorbidity of PTSD and anxiety among survivors of the 1998 Dongting Lake flood at 17-year follow-up was 9.54%, 9.23%, and 6.15%, 64.52% of those with PTSD had anxiety and 66.67% of those with anxiety had PTSD.
- This study showed that flood survivors need interventions that utilize integrated strategies to target PTSD and anxiety in flood survivors especially those who lost a relative, a limb, their home and/or emotional stability,

Table 3

Multivariable logistic regression analyses of factors significantly associated with post-traumatic stress disorder only and comorbidity of post-traumatic stress disorder and anxiety in the univariate analyses.

Variable	Value	PTSD only		Comorbidity of PTSD and anxiety	
		OR (95% CI)	*P*	OR (95% CI)	*P*
Loss of relative	No	1		1	
	Yes	11.45 (3.23–66.44)	.003*	9.13 (1.36–61.30)	.023*
Injury of body	No	1		1	
	Yes	6.39 (1.50–27.27)	.012*	5.40 (1.76–16.57)	.003*
Damage of house	No	1		1	
	Yes	8.25 (1.46–46.51)	.017*	3.34 (1.08–10.36)	.037*
Social support	High	N/A		1	
	Medium	N/A	N/A	3.45 (0.39–30.65)	.266
	Low	N/A	N/A	7.35 (0.88–61.68)	.066
Neuroticism	Middle	1		1	
	Emotional stability	0.50 (0.04–6.31)	.594	0.95 (0.19–4.76)	.952
	Emotional instability	9.28 (1.67–51.42)	.011*	5.71 (1.61–20.30)	.007*

CI = confidence interval, N/A = not applicable, OR = odds ratio, PTSD = post-traumatic stress disorder.
* $P < .05$.

Aerosolization of fungi, (1→3)-β-D glucan, and endotoxin from flood-affected materials collected in New Orleans homes

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- After Hurricane Katrina, standing water and sediment on flood affected materials were a perfect host to many microorganisms including fungi and bacteria. Aerolization was measured using the Fungal Spore Source Strength Tester (FSSST).
- Fungi are associated with allergic respiratory diseases, especially asthma. 1,3 B-D Glucan is a compound that makes up 60% of the fungal cell wall. It has also been associated with dry coughs, phlegm, and hoarseness when in an indoor environment.
- Researchers collected 8 flood-affected floor and bedding materials collected in New Orleans homes after Hurricane Katrina.
- The smaller particles sizes (<1.0 μm and <1.8 μm) had endotoxin and glucan levels comparable to the levels of larger sized particles (>1.8 μm) which is concerning for exposure risks .
- The moist mattress had the highest concentration of viable fungi but the researchers also noted this could be due to sufficient nutrients and materials that support growth.
- The small rug had the greatest level of 1,3 B-D Glucan while the mattress had lower levels.
- This contrast can be explained by doing more research on if viable fungi vs non viable fungi use different sources of glucan.

Table 1

Characteristics of flood-affected homes and locations from where eight floor and bedding materials were collected

Material	Home type	Room type	Flood-water level (feet)	Temperature (°C)	Relative Humidity (%)	Visible mold
Linoleum and Small rug	Wood frame and hardwood floor	Living room and kitchen	~3	23.8	54.2	Only linoleum had several dry spots
Small rug (water affected) and pillow	Wood frame and hardwood floor	Living room and kitchen	~3	21.8	67.8	No
Area rug	Brick ranch home on slab; floor with hardwood, tile, terrazzo, and area rug	Central living area	~10	10.5	34	Several dry spots near the margins
Thick and thin carpets	Raised double (shotgun style); wood flooring in bedrooms, carpet in living room and master bed room	Living room	~5	20.0	31	No
Mattress	Raised double (shotgun style) with wood frame, wood flooring throughout with tile in kitchen and bathroom	Bedroom	~10	22.7	46	A few black spots indicating active mold growth

Increased Medical Visits and Mortality among Adults with Cardiovascular Diseases in Severely Affected Areas after Typhoon Morakot.

Shih HI, Chao TY, Huang YT, Tu YF, Sung TC, Wang JD, Chang CM.

- Natural disasters overall have a negative impact on chronic diseases in impacted populations. The areas most impacted are in rural areas with limited infrastructure and populations that have limited access to healthcare. People suffering from cardiovascular diseases are especially asked to maintain quality of care after natural disasters.
- Researchers conducted a population based control study enrolled adults who had heart disease and cerebrovascular disease histories with a total of 715,244 adult patient files identified. 28% were in the elderly group and 56% were females. All of these people were impacted by the Typhoon in 2009.
- Mortality hazard analysis showed that among affected adults with previous cerebrovascular diseases and acute ischemic heart diseases, patients with diabetes, Chronic Kidney Disease, chronic obstructive pulmonary diseases and asthma had significantly increased mortality rates
- This increase is likely due to psychosocial and posttraumatic stress caused by the disaster and inadequate response after the disaster, especially in the severely affected areas .

Table 3

Hospitalizations after Typhoon Morakot in affected adults with preexisting histories of cardiovascular and cerebrovascular diseases before Typhoon Morakot.

Characteristics	Adult Patients with a Related Cardiovascular History (January 2008–July 2009/)			
	Post-Match			
	Moderately Affected (n = 24,969) No. (%)	Severely Affected (n = 24,969) No. (%)	OR 95% CI	Chi^2-Test p Value
Acute ischemic heart diseases	2607 (10)	2896 (12)	1.096 * (1.037–1.16)	<0.0001
Acute cerebrovascular diseases	1852 (7.4)	2118 (8.4)	1.129 * (1.058–1.205)	<0.0001
Heart failure	1399 (5.6)	1633 (6.5)	1.152 * (1.07–1.24)	<0.0001
Infection	4661 (19)	5301 (21)	1.123 * (1.075–1.173)	<0.0001
Trauma and injury	1238 (4.9)	1456 (5.8)	1.161 * (1.074–1.255)	<0.0001

* $p < 0.05$.

Impact of disasters on child stunting in Nepal

Surya Gaire,1 Tefera Darge Delbiso,1 Srijana Pandey,2 and Debarati Guha-Sapir1

- Stunting is a huge public health issue that results from inadequate nutritional intake over a long period of time. Natural disasters especially have major implications in poor and vulnerable children.
- A sample of 2,111 children from 6 months to 5 years old was obtained from the 2011 Nepal Demographic and Health Survey. Researchers used bivariate and multivariate analyses to examine moderate and severe stunting against disaster, controlling for all possible confounders.
- Results showed 43% of children were stunted with 17.1% being severe. Epidemics were shown to have no impact on the stunting of children.
- Although flooding did show to have an impact on the development of children, outside factors such as children aged 6–11 months, non-vaccinated children, children of working women, children who live in mountainous areas, and children from the poorest households were more likely to be moderately stunted.
- Children aged 36-47 months, Dalit children, children from rural settings, and poor children were very likely to be stunted.

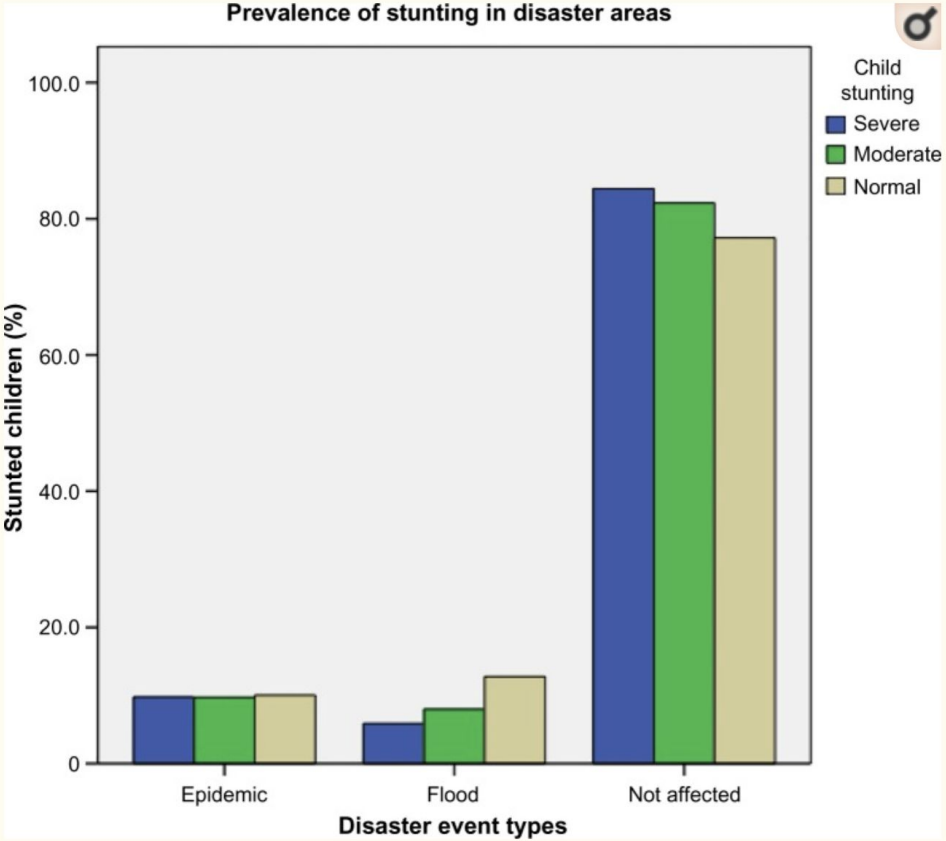

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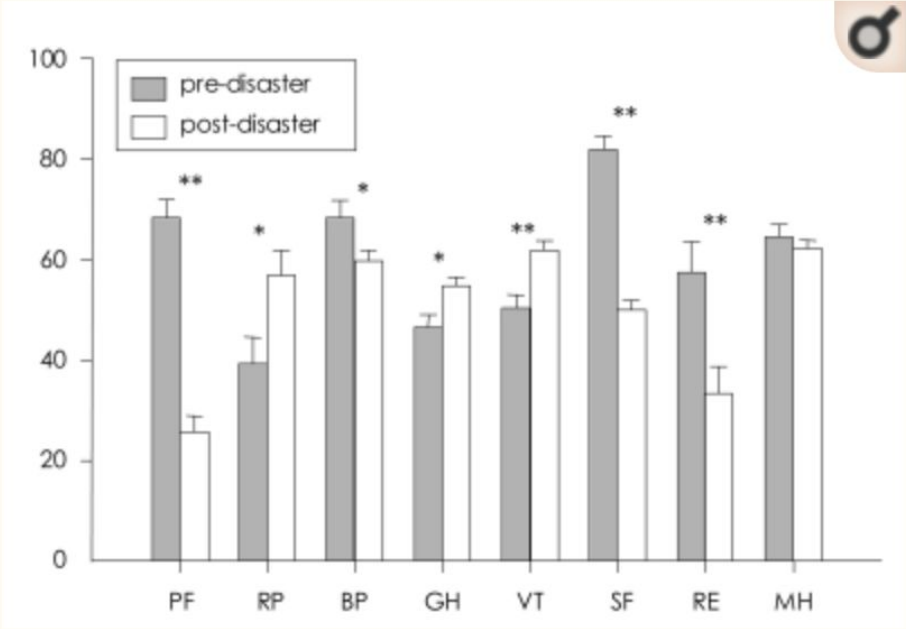
Figure 2

Prevalence of stunting in disaster and nondisaster areas.

A Prospective Study on Changes in Health Status Following Flood Disaster

Ji-hoon Heo, MD,[1] Min-Hyuk Kim, MD,[2] Sang-Back Koh, MD, PhD,[3] Samuel Noh, PhD,[4,5] Joon-Ho Park, PhD,[3] Joung-Sook Ahn, MD, PhD,[1] Ki-Chang Park, MD, PhD,[1] Jongho Shin, MD, PhD,[1] and Seongho Min, MD, PhD[1]

- This study aimed to examine the changes in general health status, depression and PTSD prevalence, and the presence of pre-trauma contributing factor after a major flood in a mostly agricultural town in Korea.
- Eighty-three of 160 residents of Garisan-ni, Inje-gun, Gangwon-do, were assessed using a 36-Item Short-Form Health Survey in 2006 prior to a flood. After the flood, 58 residents were available to follow up 18 months afterwards.
- There was substantial decrease in quality of life following the flooding with a large reduction on physical and social functioning.
- 53% of the participants were at least mildly depressed and 17% had severe depression. Also, 22% had survey results that indicated PTSD.
- The major factors that contributed to a reduction in health status were the number of natural disasters experience and the existence of depression prior to flooding.
- Residents that were younger, male, married, or had a higher educational level and income showed greater deterioration in health status following the disaster, compared to other subjects in the study. In addition, non-smokers and non-drinkers also showed greater deterioration in health status.



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ison of eight categories of SF-36-K between pre- and post-disaster. *p<0.05, **p<0.001. SF-36-
version of the 36-Item Short-Form Health Survey, PF: physical functioning, RP: role liitation-P
ily pain, GH: general health, VT: Vitality, SF: social functioning, RE: role limitation-Emotion,
ealth.