Mental health and Associated Risk Factors of Puerto Rico Post-Hurricane María

Marina Stukova M.D [1]., Gina Cardona B.S. [2], Adriana Tormos M.S. [2], Andy Vega M.D. [1], Yaritza Inostroza-Nieves Ph.D. [1], and Yonatan Carl M.D. [1]

[1] San Juan Bautista School of Medicine, [2] Universidad Central del Caribe School of Medicine

Introduction

- Exposure to natural disasters has a significant impact on physical and mental health. [1]
- The degree and length of exposure to traumatic events are considered strong predictors of psychological outcomes. [2]
- Further research is needed to characterize the association between specific risk factors and hurricane-related stressors with the prevalence of mental disorders, such as anxiety, depression, and post-traumatic stress disorder (PTSD) in the months following a natural disaster in Puerto Rico.
- Distress assessment tools (PHDS, TESS, IES-R) can be used to screen for mental health disorders that may arise after exposure to a hurricane and its post-event stressors. [3]

Hypothesis

Unemployment, low income, and having to move from Puerto Rico post-hurricane will be risk factors for increased incidence of negative mental health outcomes (PTSD, anxiety and depression).

Demographics

Table 1. Demographic data with prevalence of population at "High Risk" for any mental disorder

		n	(%)
Gender	Men	333	34%
	Women	648	66%
Age	18-39	424	43%
	40-59	352	36%
	60+	212	21%
Education Status	< High school	80	8%
	High School	164	17%
	Some College	365	37%
	College or Higher	381	38%
Employment Status	Employed	296	30%
	Homemaker	232	24%
	Retired	116	12%
	Other	343	35%
Marital Status	Never Married	355	38%
	Previously Married	298	32%
	Married or Cohabiting	292	31%
Region	Urban	608	61%
	Rural	389	39%

Results

Table 2: Bivariate associations of sociodemographic variables with estimated 30-day dsm5 anxiety mood disorders

Characteristic	SMI (K6)		GAD7		PHQ9		PCL5		PHDS		Any questionaire	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Age												
18-39	0.99	0.387 to 2.68	1.22	0.703 to 2.15	0.65	0.232 to 1.88	0.88	0.345 to 2.32	1.23	0.809 to 1.88	1.14	0.769 to 1.71
40-59	0.77	0.304 to 2.07	1.28	0.754 to 2.20	0.62	0.235 to 1.65	0.77	0.315 to 1.91	1.01	0.670 to 1.523	1.12	0.758 to 1.65
60+	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Sex												
Female	0.61	0.320 to 1.11	0.66	0.436 to 0.974 *	0.66	0.311 to 1.33	0.86	0.454 to 1.60	0.76	0.561 to 1.02	0.72	0.546 to 0.957 *
Male	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Civil status												
Prev Married	0.80	0.345 to 1.91	0.91	0.565 to 1.45	1.22	0.469 to 3.49	1.03	0.450 to 2.49	0.73	0.515 to 1.04	0.79	0.562 to 1.100
Never Married	0.51	0.217 to 1.22	0.73	0.427 to 1.20	0.37	0.122 to 1.17	0.31	0.118 to 0.791 *	0.58	0.401 to 0.848 **	0.83	0.581 to 1.170
Married	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Education												
Less than high school	4.38	1.20 to 15.8 *	2.77	1.30 to 5.89 **	6.57	1.56 to 28.0 **	3.71	0.966 to 13.8	1.10	0.607 to 1.97	1.67	0.920 to 2.99
High school	0.83	0.221 to 2.55	2.90	1.64 to 5.15 ***	1.43	0.288 to 5.59	0.76	0.163 to 2.57	0.76	0.485 to 1.18	1.25	0.804 to 1.93
Some college	1.65	0.860 to 3.25	1.75	1.13 to 2.75 *	2.98	1.31 to 7.51 *	1.78	0.905 to 3.62	1.16	0.846 to 1.60	1.31	0.969 to 1.780
College graduate	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Family income (USD, prehurricane)												
Less than 10K	3.66	1.34 to 11.4 *	1.34	0.781 to 2.34	1.37	0.449 to 4.57	1.26	0.453 to 3.66	1.84	1.23 to 2.57 **	1.72	1.18 to 2.52 **
10,000-30,000	3.61	1.40 to 10.6 *	1.01	0.589 to 1.75	1.40	0.486 to 4.39	1.70	0.685 to 4.53	1.37	0.93 to 2.02	1.20	0.837 to 1.73
30,000-37,000	1.68	0.567 to 5.34	1.00	0.556 to 1.80	1.43	0.463 to 4.67	1.21	0.432 to 3.50	1.03	0.67 to 1.57	0.97	0.665 to 1.43
Above 38,000	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
Occupational status (prehurricane)												
Employed	1.21	0.499 to 2.78	0.48	0.275 to 0.811 **	1.31	0.476 to 3.34	0.77	0.276 to 1.93	0.77	0.541 to 1.09	0.68	0.483 to 0.952 *
Housewife	1.35	0.612 to 2.93	0.62	0.387 to 0.990 *	0.55	0.201 to 1.41	0.49	0.198 to 1.13	0.61	0.404 to 0.880 **	0.77	0.538 to 1.10
Retired	1.18	0.350 to 3.44	0.95	0.513 to 1.72	0.69	0.0984 to 2.93	1.32	0.386 to 3.94	0.63	0.385 to 1.024	0.81	0.515 to 1.27
Unemployed	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]
City type												
Rural	2.48	1.39 to 4.46 **	1.21	0.825 to 1.77	1.61	0.808 to 3.19	1.27	0.673 to 2.35	1.10	0.826 to 1.46	1.12	0.856 to 1.470
Urban	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]	1.00	[Reference]

Abbreviations: * p< .05, ** p<.01, *** p<.001, ****p<.0001

Table 3: Prevalence of Exposure to Hurricane-Related Stressors

Exposure Type	Urban (n = 608)		Rural (n = 389)	
	%	SE	%	SE
Being in need	97.04	0.69	61.35	2.47
Resource loss	74.84	1.76	48.19	2.53
Perceived stability	86.68	1.38	55.76	2.52
Health concerns	48.85	2.03	30.43	2.33
Any other stressor	14.80	1.44	12.99	1.70

Objectives

- Describe the prevalence of mental health disorders after a natural disaster
- Identify post-hurricane related stressors, which include sociodemographic and behavioral factors
- Assess how the prevalence of psychological illnesses after natural disasters varies among people with different behaviors and sociodemographic backgrounds, and thus provide insight into how these may protect or predispose to developing specific mental health disorders.
- Evaluate the prevalence and correlations of DSM-V anxiety-mood disorders and hurricane-related risk factors among inhabitants of Puerto Rico post-hurricane Maria.

Methods

- 998 participants who met inclusion criteria completed a demographic survey and mental health questionnaire packet. The Spanish language versions of the PHDS, K6, GAD-7, PHQ-9 and PCL-5 were included in the questionnaire packet
- Data collection began 3 months after the hurricane and continued until 12 months after the hurricane. Participants were selected via multi-stage random sampling **(SJB-IRB Protocol #22-2018)**.
- Inclusion criteria:
  - 18 years or older
  - 1 participant per household
- Statistics: Descriptive Multivariate Regression Analysis

Conclusions

- Protective factors for anxiety were being employed, being a homemaker, or being a female.
- An education level of high school or lower was associated with an increased risk of anxiety when compared to college graduates. Education level of less than high school was strongly associated with risk of depression.
- Never being married was associated as a protective factor against the development of PTSD.
- Incomes under 30K USD per year were correlated with psychological distress based on the K6 scale. Living in rural areas was also associated with an increased risk of psychological distress.
- Urban dwellers reported higher exposure to all hurricane stressors being evaluated when compared with rural dwellers. This may be due to subjective perception of hardship.

References

[1] Galea S, Brewin C, Gruber M, Jones R, King D, King L et al. Exposure to Hurricane-Related Stressors and Mental Illness After Hurricane Katrina. Archives of General Psychiatry. 2007;64(12):1427.

[2] Springgate BF, Wennerstrom A, Meyers D, et al. Building Community Resilience through Mental Health Infrastructure and Training in Post-Katrina New Orleans. 2011;Ethn Dis. 2011;21(3 Suppl 1):S1-20-29.

[3] Carl Y, Ortiz E, Cintrón M, Vega A, Font C, Stukova M et al. Post-Hurricane Distress Scale (PHDS): A Novel Tool for First Responders and Disaster Researchers. Disaster Medicine and Public Health Preparedness. 2019;13(1):82-89.

Acknowledgements

Thanks to SJB School of Medicine faculty and research team, to Dra. Burgos and Dra. Inostroza.