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Steps Towards a Pilot Study: Limitations and Opportunities of a Mental Health Response Survey for Puerto Rico Following Hurricane María

Pasos Hacia un Estudio Piloto: Limitaciones y Oportunidades de una Encuesta de Respuesta de Salud Mental para Puerto Rico Después del Huracán María

Leonell Torres-Pagán ^{1*}, Jennifer Hinojosa ², Luis Abreu-Rosario ³, & Carissa Caban-Alemán ⁴

- 1 Department of Psychiatry, Division of Child & Adolescent Psychiatry, Columbia University Irving Medical Center, New York, USA.  <https://orcid.org/0000-0001-9339-259X>
- 2 Center for Puerto Rican Studies, Hunter College, City University of New York, New York, USA.  <https://orcid.org/0000-0002-2779-2381>
- 3 Taub Institute for Research on Alzheimer's Disease and the Aging Brain. Columbia University Irving Medical Center, New York, USA.
- 4 Herbert Wertheim College of Medicine. Florida International University. Miami, Florida, USA.  <https://orcid.org/0000-0002-4287-8984>

* Correspondence: 630 W 168th St., New York, NY 10032. Email: lt2744@cumc.columbia.edu

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ABSTRACT

Hurricane Maria and its impact over the island of Puerto Rico have led to an unmet need to address mental health among its residents; however, not much research has been able to examine the mental health response efforts across the country. We aimed to document the process and outcomes from a pilot study conducted on mental health response provided in Puerto Rico. Participants were active members of institutions that hold administrative, executive, and leadership roles within the field of healthcare or mental health. A pilot survey evaluated the level of mental health services provided after Hurricane Maria. Descriptive statistics (frequencies and percentages) were conducted. Zip codes as spatial reference data were collected for descriptive purposes. Challenges for implementation and subsequent phases, including outreach and data collection were reported. Overall, the amount of offered services for depression; anxiety followed by trauma was comparatively higher for the first period post-Maria; and remained a prevalent pattern for the subsequent periods. This pilot was also able to highlight the concerns by the responders for the inconsistent humanitarian aid and medical care. This study found that mental health services provided post-Hurricane Maria were not equally distributed around the island. Non-for-profit organizations were able to collaborate and assist in providing such services in the lack of corresponding government response. Future studies should consider a most robust sample that would use contemporary tools to collect data needed to evaluate temporal tendencies.

Keywords: mental health-response, disaster, Puerto Rico, data-collection, Hurricane Maria

RESUMEN

El huracán María y su impacto sobre la isla de Puerto Rico han provocado una necesidad sin precedentes de abordar la salud mental. Sin embargo, pocas investigaciones han podido examinar los esfuerzos de respuesta de salud mental en todo el país. Nuestro objetivo fue documentar el proceso y resultados de un estudio piloto sobre la respuesta de salud mental en la isla. Los participantes eran miembros activos de instituciones que desempeñaron funciones administrativas, ejecutivas y de liderazgo en el campo de la medicina o salud mental. La encuesta piloto evaluó el nivel de los servicios de salud mental provistos después de la tormenta. Se llevaron a cabo estadísticas descriptivas (frecuencias y porcentajes), como también un análisis geoespacial descriptivo con el uso de los códigos postales. Se recopilaron los desafíos para la implementación de medidas en respuesta posterior a la tormenta, incluida la administración y la recopilación de datos. En general, la cantidad de servicios ofrecidos para la depresión y la ansiedad fue comparativamente mayor durante el primer período posterior a María; y siguió siendo un patrón prevalente para los períodos subsiguientes. El estudio también resalto las preocupaciones de los participantes por la ayuda humanitaria y la atención médica inconsistente. Este estudio encontró que los servicios de salud mental brindados posteriormente al huracán María no fueron distribuidos equitativa y proporcionalmente en toda la isla. Las organizaciones sin fines de lucro pudieron colaborar y ayudar en la prestación de dichos servicios en caso de la ausencia de una respuesta por parte del gobierno. En el futuro, los estudios deben considerar una muestra más robusta que utilizaría herramientas contemporáneas para recopilar los datos necesarios para evaluar las tendencias temporales.

Palabras Claves: respuesta de salud mental, desastre, Puerto Rico, recolección de datos, huracán María

INTRODUCTION

Information related to the response for natural disasters can provide valuable insight during the acute and subsequent phases of such events. As health needs drastically change during disasters, many limitations could arise leading to communities being affected due to saturation, disruption of services, and isolation. One of the most recent catastrophes in the history of Puerto Rico uncovered many challenges critical to the response following Hurricane Maria, a category four storm that struck the island in September 20, 2017. According to federal agencies, the country's basic services, including water, electricity and communication were severely impacted by the storm, affecting millions of residents across the island (Farber, 2018; Willison et al., 2019). Roads were obstructed by debris, and power shortages occurred for several months after the storm, affecting the operation of community health centers and hospitals (House of Representatives, 2018; Martinez et al., 2018; Rodríguez-Díaz, 2018; Shin et al., 2017). The storm led to severe potential economic long-term effect and 20% decline in economic growth (Martinez et al., 2018). Puerto Rico received federal funding allocation approximating 2.2 billion dollars

for housing, business, and other needs (House of Representatives, 2018). In 2018, an estimated 1.1 million households applied for disaster relief funds from the Federal Emergency Management Agency (House of Representatives, 2018). Yet, the response by local and federal authorities has been slow and fragmented in contrast to other states during and after the emergency (Farber, 2018; House of Representatives, 2018; Willison et al., 2019). Given the importance of such needs, a greater impact is expected for Puerto Ricans, as the island continues to struggle with several complex and historical issues long before Hurricane Maria, including an increasing national debt as a result of limited congressional and economic policies (Farber, 2018; Rodríguez-Díaz, 2018).

According to many researchers, the aftermath has already affected lives. Two major studies found estimated excess death counts of 2,975 (Santos-Burgoa et al., 2018) and 4,644 (Kishore et al., 2018). In spite of a difference in estimates, both studies have indicated that infrastructure; particularly, medical services, played an important role for most of the deaths excess. The needs for mental health were also staggering during the aftermath of the storm. Local government agencies reported an increased number of calls

for crisis from September 2017 to January 2018 compared to previous years, including suicidal ideation (Pedraza, 2018). Similarly, via written communication with the senior associate of Disaster Mental Health Program Development, the American Red Cross reported a total of 23,787 mental health contacts for Hurricane Maria in Puerto Rico (Rodgers, 2018).

A number of studies have also documented mental health outcomes among the population following the hurricane. For instance, a study conducted with a sample of 96,108 high school students across the island, revealed high levels of post-traumatic stress disorder (PTSD) and depressive symptoms (Orengo-Aguayo et al., 2019). Another study, focusing on the low-income population found that 66.2% of their sample were at risk of exhibiting major depression, generalized anxiety and PTSD (Ferré et al., 2019). Overall, research on disasters response have indicated that an increase demand of mental health services ranging from 15% to 25% will be needed for the population directly affected (Elrod et al., 2006). Due to the increasing number of storms hitting the Caribbean every year and more recently due to climate change, understanding mental health response is considered a pressing public health issue. In spite of the needs highlighted above, there is not enough research on data collection strategies on mental health response. At the moment of this review of literature, no studies have addressed the mental health response, which includes pivotal areas such as services, common interventions, mobilization, and linkages provided during and after the storm. Therefore, the study aims to describe the steps in undertaking a pilot study on mental health response by documenting the process and outcomes for a data collection strategy in Puerto Rico. The paper intends to inform future research and public policy initiatives of the importance of these efforts in communities affected by natural disasters.

METHOD

Research Design

Data from institutional and organizational bodies established before and after hurricane Maria was collected through an online survey. The survey was built with input from professionals who have experience in the field of disaster and preparedness on mental health. Input for other key areas linked to

communities, economic policy, and geography was also collected as well during this step. The survey was translated forward and back from English to Spanish (Brislin, 1970). Bilingual members of the research team translated directly from the source document, while others translated blindly. Discrepancies between the versions were discussed and addressed. Other professionals also assisted in reviewing the survey during the last stages of this process. Subsequently, an earlier version of the pilot survey was administered in English and Spanish to five subjects who were part of an organization for content relevance, difficulty, and comprehension. As a result of this process, prompts and definitions were added to aid its completion. In addition, concerns related to documentation from the sample organization, led researchers to add questions that included estimated proportions by categories. These subjects were not included in final sample. Concerns of time-administration were addressed as well. Researchers also held frequent formal meetings to discuss survey changes, aims and protocols. The final research survey included the following sections: 1) basic respondent information (field, position at institution/organization, and years of service), 2) basic institutional and organizational data (zip-code, type of institution, years active, type of service, population served), and 3) reporting periods of two months mental health response that included information on the type of service provided, evidence practice used, and zip-code where services were provided and linkages. The report periods were the following: June to August 2017; September to November 2017; December 2017 to February 2018; March to May 2018. Responders were also asked two main open questions related to mental health response experience, including barriers and lessons learned. The input received from earlier administration helped to refine the final survey in terms of content, comprehension and administration time.

The data for the pilot study was collected from March 2018 to May 2019. The study aimed to recruit 100 to 150 participants who were 18 years or older and active members of institutions or organizations. Eligible subjects held administrative, managerial, supervisory or leadership roles within the field of healthcare or mental health. Collecting data from these subjects would guarantee more accurate and reliable information from the institution or organization.

Professional networks within healthcare, mental health, education, and other professional communities were identified for recruitment purposes. Formal communications were sent via email to the administrators of the accounts or operations. If needed, in-person meetings or phone calls were also coordinated as part of the process. These formal and informal communications contained a study flyer, brief description, document of consent for participation, confidentiality, and the encrypted link for the survey. Distribution was authorized and handled internally by the institution and organization. Researchers were not allowed to have access to professional members or emails accounts. There was no monetary incentive for the participation of the study. The study was approved by the institutional review board of Hunter College, City University of New York. Figure 1 shows a diagram, which summarizes the steps for the pilot study.

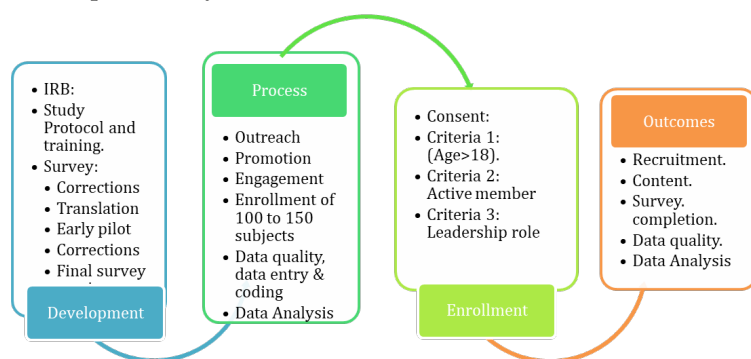


Figure 1. Pilot Study Steps Diagram

Data Collection

The study utilized “Qualtrics” to collect the data, a secured online server approved by Hunter College, City University of New York. Qualtrics is designed to capture data for research by providing friendly user interface for participants, data quality control procedures, data monitoring, data export, and import procedures. The information collected was encrypted to prevent online security threats. Responses were anonymized, which means that any contact association or identifier, including IP address were removed. Survey settings also included the prevention of duplicates and expiration date. Training for the creation and distribution of online surveys was critical for the research team. Part of the training included consent, screening and the encryption of responses. Data

collected through the pilot study was organized for the subsequent transfer to STATA v.15 (StataCorp.2015 Stata Statistical Software: Release 15 College Station, TX: StataCorp LP). The principal investigator was responsible for the coding of variables for the analysis while other members peer-reviewed data entry for reliability and accuracy. Data obtained on basic institutional characteristics and monthly mental health response was analyzed using STATA v.15. Descriptive statistics (frequencies and percentages) were conducted. Zip codes as spatial reference data were collected for descriptive purposes using ArcGIS: ArcMap 10.4 Software. This platform allows the management of geographical data, creation of maps, and the performance of spatial analysis. The data obtained for this study was used to display areas where mental health services were provided in conjunction with hurricane Maria coordinates, shelters, and indicators of damage such as flood zones.

RESULTS

Process

During the course of the earlier stages of the study, one of the major obstacles found was the outreach to hospital systems, local, and federal agencies. Several efforts were conducted, including formal and informal contacts. Some larger systems (hospitals and educational settings) required institutional review board approvals leading to significant delays and eventually dropping from the study. Communication between the investigators and contacts was often compromised due to unreliable internet connection and phone services on the island. Following the aftermath of the hurricane, many geographical regions suffered communication outages for months. Research team members also identified similar problems with other members during the recruitment stage. Some documentation concerns arose due to the lack of certain information, specifically for selected outcomes and mental health response mobility for those participants who were successfully contacted. Many of the body entities have no mechanism to trace their mental health response during and after the storm. As a result, several potential subjects were not able to participate in the study.

To increase recruitment, other team members identified opportunities to promote the study through professional meetings and training sessions. The recruitment period was also extended for six more months. Through the course of the study, the institutions and organizations that agreed to be part of the study remained engaged and collaborative during the process. From March 2018 to May 2019, approximately 103 participants accessed the encrypted survey link. Of these, 61 did not meet the criteria to be included in the study and two did not consent. Only 40 subjects met the inclusion criteria; however, 17 were excluded for not completing major survey sections. The average time of administration was 32.07 minutes.

Outcomes

Some content related issues were found during the data quality checks from participants. Some discrepancies were found for the section of basic institutional and organizational data, as participants were not able to provide detailed information about the number of staffs, volunteers, and funding sources. Some difficulties in obtaining reliable spatial reference data for the mobilization of mental health response were also found. Some of the subjects provided inaccurate zip codes for some reporting periods. Furthermore, despite some modifications with the survey at an early stage, the length could have affected its completion. The motivation and interest from subjects might have decreased during the administration as well. Overall, a total of 23 subjects met the criteria for the study. A series of descriptive statistics were done for the sample as well as geospatial analysis for descriptive purposes. Sixteen of the twenty-three responders were in the field of psychology. Fourteen of the subjects indicated that their organizations and institutions were established post-Maria. Many of the responders described their workplace as academic, while five of them were mental health based. Most of the population (more than 51 individuals) served by these entities occurred during the period of September to November 2017.

The services with the highest prevalence of use were depression, anxiety, trauma, and suicidal ideation respectively. Such proportion remained higher for September to November 2017; yet, there was a similar pattern for the subsequent periods, including

March to May 2018. Other related practical concerns that emerged from the survey were humanitarian aid and medical care, including the need for prescriptions. The most common evidenced-based intervention used for the selected period was psychological first aid. Other non-evidence psychological interventions approaches (research, educational services, pastoral, and social services) were used as well. The highest estimated linkages (between 26% to 50%) were done during the period of September 2017 to November 2017. For the open questions related to mental health response experience, the most common barrier identified by responders was community access and collaboration, linkages, and ethical challenges. As for the lessons learned section, most of the subjects prioritized the development and maintenance of current emergency preparedness protocols, followed by mental health continuity of care.

Data collected for the spatial viewing, was able to illustrate areas affected by the natural disaster. As part of the aims, we selected one of the subjects from the study to show the mobilization of the response in time periods of two months (See Appendix A). The selection of the subject was randomized by using the “RanBetween” excel function. Although this pilot was able to provide some results between the links of the studied variables, data should be interpreted with caution due to sample size.

Table 1.

Basic Respondent and Organization/Institution Information.

Basic Respondent Demographics	n	%
Field		
Psychiatry	2	8.70
Psychology	16	69.57
Counseling	1	4.35
Other fields	4	17.39
Seniority		
< 1 yr.	3	13.04
1 to 5 yr.	10	43.48
6 to 10 yr.	4	17.39
11 to 15 yr.	2	8.70
16 to 20 yr.	0	0
21 or >	4	17.39
Hours Working		
< 20 hrs.	4	17.39
20 to 30 hrs.	8	34.78
40 to 59 hrs.	10	43.48
60 or more	1	4.35
Organizational/Institutional Information		
Type of Structure		
Institution	15	65.22
Organization	8	34.78

<i>Establishment Pre/Post Hurricane Maria</i>		
Pre Maria	9	39.13
Post Maria	14	60.87
<i>Focus of Organization / Institution</i>		
Mental Health	12	52.17
Not Mental Health	11	47.83
<i>Type of Organization / Institution</i>		
Federal	1	4.35
Gov/Public	2	8.70
Private for Profit	2	8.70
Non-Profit	6	26.09
Faith Based	2	8.70
Professional	1	4.35
Academic	9	39.13
<i>Type of Service</i>		
Mental Health	5	21.74
Training	2	8.70
Education	12	52.17
Medical	1	4.35
Social Care	1	4.35
Research	1	4.35
Professional	1	4.35

Note: Institutions are defined as formal governance entity affiliated or part of local municipal, county, state, or federal national or international body (e.g. universities, local or federal government, non-profit, for profit, others). Organizations are also a formal entity, governed by rules and regulations, however, the main difference is that such entity is a smaller group or collective of people or professionals with a community goal (e.g. professionals associations or affiliations, voluntary groups, community members, others).

DISCUSSION

The following article informed of many limitations and opportunities in conducting a study on mental health response in Puerto Rico following a natural disaster. We provided a list of areas of opportunities for future research. First, protocols that informed research team members of working with limited connectivity and resources might mitigate many of the obstacles with the recruitment of subjects in different geographical regions affected or isolated by the storm. Communication among team researchers should be improved with secured devices and mechanisms such as, printed materials and portable laptops. The communication might have led to important progress towards securing IRB process for several larger institutions or systems (e.g. hospitals, federal or state agencies). Second, instead of having multiple IRBs in place, the National Institutes of Health (NIH) has recently established a single IRB policy for multiple sites which significantly decreased any duplication, cost and time-consuming efforts for conducting a study (Tabak, 2016). The policy started in May 2017; yet, implemented later in 2018.

Third, ensuring partnerships and collaborations with communities and rebuilding initiatives from non-institutional bodies is also instrumental for the understanding of the response. As major institutions failed to deliver support in response to the surge in demand to isolated populations during and following the storm, emerging efforts led by community leaders and organizations filled the gap in care. This is consistent with our study, where approximately 60% of the subjects were part of emerging initiatives from the community which included academia bodies followed by non-profit organizations. It is also important to mention that collaboration from communities can be impacted by the service access, which, in most cases varies for either structural limitations, fear, or history of inequalities. Research from the response of Hurricane Katrina, revealed such disparity and the importance of enhancing community resilience as a more effective disaster model of preparedness (Everly et al., 2014).

Fourth, in addition to opportunities to further the understanding and increase collaboration from communities, it is also important to test different methodologies to capture real-time data on response mobilization using geographical applications. With the development of sensor technology, sensors have become smaller, cheaper, more intelligent, and more power efficient (Bröring et al., 2011). The results showed that the method of integrating real-time GIS (Geographic Information System) data model and Sensor Web Service Platform is an effective way to track and manage environmental data under the Geospatial Service Web framework (Gong et al., 2015). The Sensor Web Service Platform obtains and provides real-time observational data. Also, while the real-time GIS model combines the observation and data process, it can be used to predict climate behaviors that can be useful in disaster preparedness. Spatial analysis can also include the study of social vulnerability index or SVI's of areas impacted by large scale disasters. The applications of SVI's provide valuable information to stakeholders in the community about social vulnerabilities at geographical and population levels that might be adversely affected from natural or man-made health hazards (Flanagan et al., 2011). A growing body of research on SVI's have proven effective as a way to better understand and

bridge the gaps in needs during disaster management
(Chau et al., 2014; Karaye et al., 2019).

Table 2.

Mental Health Response

MONTHLY PERIOD	SEPT 17 TO NOV 17		DEC 17 TO FEB 18		MAR 18 TO MAY 18	
	n	%	n	%	n	%
Range of Population Served						
<10	1	4.35	2	9.09	1	5.26
11-25	--	--	1	4.55	3	15.79
26-50	3	13.04	6	27.27	2	10.53
Over 51	19	82.61	13	59.09	13	68.42
Estimated Proportion of Services Provided						
Suicide Ideation						
<10%	12	57.14	11	55.00	11	61.11
11% to 25%	6	28.58	5	25.00	4	22.22
26% to 50%	--	--	1	5.00	2	11.11
> 51%	3	14.29	3	15.00	1	5.55
Depression						
<10%	2	9.09	4	20.00	5	27.77
11% to 25%	5	22.73	5	25.00	5	27.77
26% to 50%	6	27.27	4	20.00	4	22.22
> 51%	9	40.90	7	35.00	4	22.22
Anxiety						
<10%	1	4.55	1	5.26	3	16.67
11% to 25%	6	27.27	4	21.05	4	22.22
26% to 50%	4	18.18	8	42.11	7	38.89
> 51%	11	50.00	6	31.58	4	22.22
Post-Traumatic Stress						
<10%	5	27.78	7	38.89	6	37.50
11% to 25%	2	11.11	5	27.78	4	25.00
26% to 50%	5	27.78	3	16.67	4	25.00
> 51%	6	33.33	3	16.67	2	12.50
Other Concerns						
Humanitarian (Supplies)	2	8.70	--	--	--	--
Medical Care & Prescriptions	3	13.04	--	--	--	--
Financial Aid	--	--	1	4.76	--	--
Other	--	--	--	--	--	--
Evidence Based Interventions						
Psychological First Aid	7	58.33	8	57.14	7	46.67
Trauma-Focused CBT	--	--	--	--	--	--
Anxiety Reduction Tech.	2	12.50	3	21.42	5	33.33
Psychoeducation	1	8.33	1	7.14	1	6.67
Family Therapy	--	--	--	--	--	--
Group Therapy	1	8.33	1	7.14	1	6.67
Medication Management	1	8.33	1	7.14	1	6.67
Non-Evidence Interventions						
Research	1	11.11	1	16.67	1	25.00
Academic / Educational Sev.	2	22.22	1	16.67	1	25.00
Pastoral or Social Services	1	11.11	--	--	1	25.00
Other Interventions						
Estimated Proportion of Linkages						
<10%	3	13.64	3	16.67	4	25.00
11% to 25%	5	22.73	6	33.33	7	43.76
26% to 50%	12	54.55	6	33.33	2	12.50
> 51%	2	9.09	3	16.67	3	18.76

Table 3.

Summary of Common Barriers and Lessons Learned

Common Barriers	Lessons Learned
Coordination & communication with providers	Create/Update Emergency Preparedness Protocols
Community access & collaboration	Build community collaboration
Lack of training on disasters	Research Endorsement/Promotion
Insufficient Volunteers	Training on Mental Health Response and Disaster
Burnout volunteers/providers	Mental Health & Natural Disasters Education for Communities
Linkages obstacles	Mental Health Continuity of Care
Ethical & confidential challenges	Address mental health for first responders

Fifth, given the obstacles early in the study, the inclusion of validated measurements for symptoms among the population served, could have informed of the wellbeing and needs for services. This also shed some light towards the increased need for standardized documentation and/or methodologies to trace symptoms and other health outcomes within healthcare, including governmental bodies. This was evidenced by the media coverage during the recovery phase, where it was revealed substantial discrepancies in death counts by the government of Puerto Rico (Robles, 2018). Since then, a growing attention towards the development of reliable measures and surveillance mechanisms to capture mental health symptoms and other health outcomes in the island have been documented (Adams et al., 2019; Carl et al., 2019; Wong & Parton, 2020).

Lastly, the events that transpired in Puerto Rico because of the hurricane point out the importance of developing a readiness plan for continuity of research. The NIH has developed a training course entitled Disaster for Research Enterprise (DPRE) which aims to address the barriers that researchers might face as well as the funding sponsors during natural and man-made disasters (CITI Program, n.d.). The training content is important as it helps with an

overview of steps needed for research in response to disasters; yet, is limited to English and structured around issues that might be relevant to the mainland. For such reason, is important to work with a plan tailored to the needs of an island like Puerto Rico.

CONCLUSION

This paper shows the importance of mental health responses in Puerto Rico following hurricane Maria. As another hurricane season approaches, the Puerto Rico Bureau of Emergency Management has worked thoroughly into improving its disaster response protocols for any potential threat, yet responses for mental health aid remain questionable. These findings can potentially translate into an increase of health inequities as well as serious consequences for acute and long-term health outcomes and recovery efforts. Bridging the gap between innovative efforts and response is urgently needed as island residents continue to experience mental health related concerns from a major earthquake with a magnitude of 6.4 followed by a series of aftershocks reported earlier in January 2020 (Van Der Elst et al., 2020) and most recently with the global health crisis from SARS-COVID-2 also known as COVID-19 pandemic (New York Times, 2020). It is expected that individuals who fear for their safety might experience anxiety and compound trauma due to the recent catastrophes. The impact of such presents a persuasive rationale for investing in science that can better prepare us for the next large-scale traumatic event in every aspect (Shultz & Galea, 2017). Improving the quality of mental health response services not only serves as an efficient tool for investing in treatment practices for better health outcomes, but also gives a broader perspective into public health policy change.

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Appendix A

Puerto Rico: Post-Hurricane Maria Shelters, Flooding Paths, and Designated Aid Centers

