Appendices

Appendix A. Distribution Sociodemographic Characteristics of Study Participants by Professional Category, Puerto Rico, January-April 2023

Sociodemographic characteristics	Professional category								TOTAL
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
Age group (years)									
• 30 - 39	2 (28.6)	2 (12.5)	-	-	-	-	-	2 (15.4)	6 (9.7)
• 40 - 49	-	4 (25.0)	-	1 (33.3)	3 (50.0)	2 (40.0)	1 (25.0)	2 (15.4)	13 (21.0)
• 50 - 59	-	6 (37.5)	2 (25.0)	2 (66.7)	2 (33.3)	-	2 (50.0)	6 (46.2)	20 (32.3)
• ≥ 60	5 (71.4)	4 (25.0)	6 (75.0)	-	1 (16.7)	3 (60.0)	1 (25.0)	3 (23.1)	23 (37.1)
• Mean ± S.D.	56.9 ± 14.3	51.4 ± 10.7	63.9 ± 4.4	52.3 ± 4.2	50.8 ± 7.1	56.8 ± 8.3	54.5 ± 5.5	52.9 ± 10.5	54.6 ± 10.0
Education level									
• High school	-	-	-	-	-	-	1 (25.0)	-	1 (1.6)
• Associate or technical degree	-	-	3 (37.5)	-	3 (50.0)	-	-	4 (30.8)	10 (16.1)
• Bachelor's degree	-	9 (56.3)	2 (25.0)	1 (33.3)	3 (50.0)	-	2 (50.0)	3 (23.1)	20 (32.3)
• Master's degree	-	5 (31.3)	2 (25.0)	-	-	4 (80.0)	1 (25.0)	6 (46.2)	18 (29.0)
• Doctoral degree	7 (100.0)	2 (12.5)	1 (12.5)	2 (66.7)	-	1 (20.0)	-	-	13 (21.0)
Job location									
• San Juan	3 (42.9)	11 (68.8)	-	1 (33.3)	6 (100.0)	3 (60.0)	-	5 (38.5)	29 (46.8)
• Other towns	4 (57.1)	5 (31.3)	8 (100.0)	2 (66.7)	-	2 (40.0)	4 (100.0)	8 (61.5)	33 (53.2)
Professional experience (years)									
• ≤ 20	2 (28.6)	6 (37.5)	1 (16.7)	1 (33.3)	3 (50.0)	1 (20.0)	1 (25.0)	7 (53.8)	22 (36.7)
• 21 - 30	2 (28.6)	4 (25.0)	2 (33.3)	2 (66.7)	2 (33.3)	3 (60.0)	3 (75.0)	4 (30.8)	22 (36.7)
• 31 - 40	2 (28.6)	5 (31.3)	3 (50.0)	-	1 (16.7)	-	-	1 (7.7)	12 (20.0)
• > 40	1 (14.3)	1 (6.3)	-	-	-	1 (20.0)	-	1 (7.7)	4 (6.7)
• Mean ± S.D.	27.0 ± 12.7	25.5 ± 10.7	30.8 ± 6.1	23.0 ± 2.6	20.0 ± 10.9	27.8 ± 9.5	21.3 ± 9.9	21.7 ± 10.0	24.6 ± 10.0
TOTAL	**7 (11.3)**	**16 (25.8)**	**8 (12.9)**	**3 (4.8)**	**6 (9.7)**	**5 (8.1)**	**4 (6.5)**	**13 (21.0)**	**62 (100.0)**

Appendix B. Average Days of Services Interruption at Workplace Due to Hurricane Maria Experienced by Study Participants by Professional Category, Puerto Rico, January-April 2023

Type of disruption	Professional category								TOTAL (mean±s.d.)
	Doctors (mean±s.d.)	Nurses (mean±s.d.)	Patients (mean±s.d.)	Pharmacists (mean±s.d.)	Hospital utility services' operators (mean±s.d.)	Hospital management personnel (mean±s.d.)	Nonprofit/ NGO/ Community organizations (mean±s.d.)	Other relevant key informants (mean±s.d.)	
Electricity	22.3 ± 26.8	33.6 ± 52.3	166.3 ± 52.4	53.3 ± 16.1	65.0 ± 120.6	38.6 ± 81.9	143.8 ± 75.9	42.2 ± 58.6	62.7 ± 77.8
Water	2.9 ± 5.0	7.1 ± 11.9	51.0 ± 82.8	6.3 ± 7.1	5.0 ± 12.2	18.4 ± 26.5	15.3 ± 14.4	8.0 ± 8.8	13.7 ± 33.7
Waste management	11.7 ± 10.7	5.6 ± 7.1	17.7 ± 22.0	7.0 ± 7.0	8.8 ± 13.3	47.2 ± 77.8	22.5 ± 8.7	10.7 ± 8.6	14.3 ± 26.7
Phone/cell phone	4.0 ± 1.7	19.0 ± 28.7	51.5 ± 47.7	26.7 ± 5.8	25.0 ± 19.6	8.8 ± 12.0	14.0 ± 15.2	18.3 ± 20.1	21.2 ± 27.8
Internet and cyber system	14.6 ± 22.6	15.6 ± 14.5	161.0 ± 66.7	53.3 ± 16.1	20.4 ± 39.3	43.4 ± 80.2	67.0 ± 102.4	36.8 ± 60.0	41.2 ± 62.1
Road & public transportation to get to work	1.6 ± 1.7	1.8 ± 2.5	11.4 ± 12.3	1.0 ± 1.7	2.5 ± 3.2	1.0 ± 1.4	8.0 ± 5.0	5.3 ± 6.3	4.2 ± 6.4
Unsafe work environment	4.3 ± 11.3	0.4 ± 1.3	0 ± 0	0 ± 0	0 ± 0	0 ± 0	7.5 ± 15.0	3.6 ± 8.8	2.1 ± 7.1
Unavailability of equipment for providing service	21.9 ± 19.1	9.7 ± 13.2	10.0 ± 17.3	4.7 ± 8.1	0 ± 0	11.4 ± 6.4	20.0 ± 17.3	9.7 ± 8.5	10.7 ± 12.9
Lack of doctors/ nurses in the office	7.3 ± 12.4	1.1 ± 2.3	55.0 ± 72.3	0 ± 0	0 ± 0	3.0 ± 6.7	30.0 ± 30.0	1.2 ± 2.8	8.8 ± 28.4
Lack of other support staff	7.3 ± 12.4	1.7 ± 3.0	58.0 ± 80.4	0 ± 0	0 ± 0	6.0 ± 13.4	22.3 ± 32.8	1.2 ± 2.8	8.3 ± 28.3
Decisions made by upper admin to keep the facility closed	6.1 ± 7.4	5.0 ± 10.4	60.0 ± 79.7	3.0 ± 3.6	0 ± 0	0 ± 0	10.0 ± 17.3	4.2 ± 8.8	9.0 ± 27.8
Closure of emergency care	0 ± 0	0.4 ± 1.8	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.1 ± 0.9
Closure of medical test centers	1.0 ± 2.6	2.1 ± 4.3	13.6 ± 15.1	0 ± 0	0 ± 0	6.0 ± 13.4	5.0 ± 5.0	3.9 ± 8.2	3.5 ± 7.9
Closure of ambulance services	0 ± 0	0.4 ± 1.8	6.0 ± 13.4	0 ± 0	0 ± 0	6.2 ± 13.3	4.0 ± 3.6	0 ± 0	1.4 ± 5.7
Closure of pharmacy/medical supply stores	0.9 ± 1.5	3.4 ± 4.6	6.8 ± 11.5	3.0 ± 3.6	0 ± 0	15.6 ± 25.6	8.3 ± 7.6	6.5 ± 9.0	5.1 ± 9.9

Appendix C. Adverse Events in Workplace/Hospital that Could be Attributed to Disruptions in Healthcare Services by Professional Category of Study Participants, Puerto Rico, January-April 2023

Adverse events	Professional category								TOTAL n (%)
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
Patient deaths									
• Yes	1 (16.7)	6 (40.0)	7 (100.0)	2 (66.7)	4 (66.7)	2 (40.0)	4 (100.0)	8 (61.5)	34 (57.6)
• No	5 (83.3)	9 (60.0)	-	1 (33.3)	2 (33.3)	3 (60.0)	-	5 (38.5)	25 (42.4)
Severe health outcomes									
• Yes	6 (100.0)	12 (75)	8 (100.0)	3 (100.0)	5 (83.3)	4 (80.0)	4 (100.0)	13 (100.0)	55 (90.2)
• No	-	4 (25)	-	-	1 (16.7)	1 (20.0)	-	-	6 (9.8)

Appendix D. Awareness of Study Participants Regarding Current Capacity and Mechanisms of Healthcare Services by Professional Category, January-April 2023

Awareness of healthcare resources	Professional category								TOTAL n (%)
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
Beds, equipment, and facilities									
• Not at all aware	-	1 (6.3)	-	-	-	-	-	-	1 (1.6)
• Not very aware	-	4 (25.0)	-	-	-	-	3 (75.0)	1 (7.7)	8 (12.9)
• Somewhat aware	-	4 (25.0)	7 (87.5)	2 (66.7)	1 (16.7)	1 (20.0)	-	3 (23.1)	18 (29.0)
• Very much aware	7 (100.0)	7 (43.8)	1 (12.5)	1 (33.3)	5 (83.3)	4 (80.0)	1 (25.0)	9 (69.2)	35 (56.5)
Medicines and medical supplies									
• Not at all aware	-	-	-	-	-	-	-	-	-
• Not very aware	-	2 (12.5)	-	-	-	-	1 (25.0)	-	3 (4.8)
• Somewhat aware	-	5 (31.3)	7 (87.5)	-	2 (33.3)	1 (20.0)	2 (50.0)	5 (38.5)	22 (35.5)
• Very much aware	7 (100.0)	9 (56.3)	1 (12.5)	3 (100.0)	4 (66.7)	4 (80.0)	1 (25.0)	8 (61.5)	37 (59.7)
Telemedicine, EHR and communication systems									
• Not at all aware	-	1 (6.3)	1 (12.5)	-	1 (16.7)	-	-	-	3 (4.8)
• Not very aware	-	2 (12.5)	5 (62.5)	-	1 (16.7)	-	2 (50.0)	2 (15.4)	12 (19.4)
• Somewhat aware	-	5 (31.3)	1 (12.5)	-	3 (50.0)	1 (20.0)	1 (25.0)	6 (46.2)	17 (27.4)
• Very much aware	7 (100.0)	8 (50.0)	1 (12.5)	3 (100.0)	1 (16.7)	4 (80.0)	1 (25.0)	5 (38.5)	30 (48.4)
Mechanisms between healthcare providers to maintain healthcare functioning during/after emergencies									
• No	-	6 (37.5)	1 (12.5)	-	-	1 (20.0)	1 (25.0)	4 (30.8)	13 (21.0)
• Not sure	1 (14.3)	3 (18.8)	7 (87.5)	-	5 (83.3)	1 (20.0)	3 (75.0)	6 (46.2)	26 (41.9)
• Yes	6 (85.7)	7 (43.8)	-	3 (100.0)	1 (16.7)	3 (60.0)	-	3 (23.1)	23 (37.1)
Mechanisms in place for tracking progress and evaluating health system performance during/after emergencies									
• No	-	4 (25.0)	4 (50.0)	-	-	1 (20.0)	2 (50.0)	4 (30.8)	15 (24.2)
• Not sure	-	4 (25.0)	2 (25.0)	-	3 (50.0)	-	-	1 (7.7)	10 (16.1)
• Yes	7 (100.0)	8 (50.0)	2 (25.0)	3 (100.0)	3 (50.0)	4 (80.0)	2 (50.0)	8 (61.5)	37 (59.7)
Specific challenges or issues that municipality or local healthcare teams have encountered in managing healthcare services during and after the hurricane									
• No	1 (14.3)	1 (6.3)	-	-	-	1 (20.0)	-	3 (23.1)	6 (9.7)
• Not sure	-	3 (18.8)	3 (37.5)	-	2 (33.3)	2 (40.0)	1 (25.0)	-	11 (17.7)
• Yes	6 (85.7)	12 (75.0)	5 (62.5)	3 (100.0)	4 (66.7)	2 (40.0)	3 (75.0)	10 (76.9)	45 (72.6)

Appendix E. Opinions of Study Participants Regarding Healthcare Service and Preparedness by Professional Category, January-April 2023

Opinions	Professional category								TOTAL n (%)
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
New technologies can provide more flexible and functional infrastructure for responding to a major emergency event									
• Yes	7 (100.0)	13 (81.3)	5 (62.5)	3 (100.0)	5 (83.3)	5 (100.0)	1 (25.0)	10 (76.9)	49 (79.0)
• No	-	1 (6.3)	-	-	-	-	-	1 (7.7)	2 (3.2)
• Not sure	-	2 (12.5)	3 (37.5)	-	1 (16.7)	-	3 (75.0)	2 (15.4)	11 (17.7)
Supportive services for the most vulnerable can be prioritized in responding to a major emergency event									
• Yes	6 (85.7)	13 (81.3)	5 (62.5)	3 (100.0)	5 (83.3)	5 (100.0)	3 (75.0)	8 (61.5)	48 (77.4)
• No	-	1 (6.3)	-	-	1 (16.7)	-	-	2 (15.4)	4 (6.5)
• Not sure	1 (14.3)	2 (12.5)	3 (37.5)	-	-	-	1 (25.0)	3 (23.1)	10 (16.1)
Government has been responsive to the healthcare service needs of the community following Hurricane María									
• Strongly agree	-	-	-	-	-	-	-	-	-
• Agree	2 (28.6)	1 (6.3)	-	1 (33.3)	4 (66.7)	2 (40.0)	2 (50.0)	1 (7.7)	13 (21.0)
• Neutral	2 (28.6)	7 (43.8)	5 (62.5)	1 (33.3)	1 (16.7)	-	1 (25.0)	4 (30.8)	21 (33.9)
• Disagree	3 (42.9)	7 (43.8)	2 (25.0)	1 (33.3)	1 (16.7)	2 (40.0)	1 (25.0)	7 (53.8)	24 (38.7)
• Strongly disagree	-	1 (6.3)	1 (12.5)	-	-	1 (20.0)	-	1 (7.7)	4 (6.5)
Trust in the healthcare system to provide necessary and appropriate care when study participant or a family member needs it									
• Do not trust at all	-	-	-	-	-	-	-	1 (7.7)	1 (1.6)
• Not very much trust	-	3 (18.8)	2 (25.0)	-	-	-	2 (50.0)	2 (15.4)	9 (14.5)
• Somewhat trust	2 (28.6)	8 (50.0)	5 (62.5)	-	2 (33.3)	3 (60.0)	2 (50.0)	6 (46.2)	28 (45.2)
• Mostly trust	5 (71.4)	5 (31.3)	1 (12.5)	3 (100.0)	4 (66.7)	2 (40.0)	-	4 (30.8)	24 (38.7)
Need to integrate natural hazard risks to public health preparedness for enhancing community resilience									
• Highly urgent	7 (100.0)	15 (93.8)	8 (100.0)	2 (100.0)	6 (100.0)	5 (100.0)	4 (100.0)	12 (92.3)	59 (96.7)
• Urgent	-	1 (6.3)	-	-	-	-	-	1 (7.7)	2 (3.3)
Usefulness of a dialogue between affected communities, key public health organizations, and emergency management agencies for laying down an actionable foundation of a resilient health system in Puerto Rico									
• Useful	-	1 (6.3)	1 (12.5)	-	-	-	1 (25.0)	-	3 (4.8)
• Very useful	7 (100.0)	15 (93.8)	7 (87.5)	3 (100.0)	6 (100.0)	5 (100.0)	3 (75.0)	13 (100.0)	59 (95.2)
Level of government health expenditure or investment in your community to support functioning healthcare services during and after an emergency									
• Adequate	1 (14.3)	-	-	-	2 (33.3)	2 (40.0)	1 (25.0)	1 (7.7)	7 (11.3)
• Inadequate	3 (42.9)	11 (68.8)	3 (37.5)	2 (66.7)	1 (16.7)	3 (60.0)	2 (50.0)	9 (69.2)	34 (54.8)
• Don't know	3 (42.9)	5 (31.3)	5 (62.5)	1 (33.3)	3 (50.0)	-	1 (25.0)	3 (23.1)	21 (33.9)

Appendix F. Opinions of Study Participants Regarding Healthcare Digital Information and Coordination Systems by Professional Category, Puerto Rico, January-April 2023

Opinions	Professional category								TOTAL n (%)
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
Usefulness of system in reducing natural disaster-related deaths and adverse health outcomes in preparing for natural hazards									
• Not useful at all	-	-	1 (12.5)	-	-	-	-	-	1 (1.6)
• Somewhat useful	1 (14.3)	1 (6.3)	-	-	1 (16.7)	-	1 (25.0)	-	4 (6.5)
• Useful	2 (28.6)	4 (25.0)	2 (25.0)	1 (33.3)	2 (33.3)	2 (40.0)	1 (25.0)	6 (46.2)	20 (32.3)
• Very useful	4 (57.1)	11 (68.8)	5 (62.5)	2 (66.7)	3 (50.0)	3 (60.0)	2 (50.0)	7 (53.8)	37 (59.7)
Usefulness of system in reducing natural disaster-related deaths and adverse health outcomes in responding to natural hazards									
• Not useful at all	-	-	1 (12.5)	-	-	-	-	-	1 (1.6)
• Somewhat useful	2 (28.6)	5 (31.3)	-	1 (33.3)	3 (50.0)	-	1 (25.0)	4 (30.8)	16 (25.8)
• Useful	4 (57.1)	6 (37.5)	2 (25.0)	2 (66.7)	2 (33.3)	2 (40.0)	1 (25.0)	7 (53.8)	26 (41.9)
• Very useful	1 (14.3)	5 (31.3)	5 (62.5)	-	1 (16.7)	3 (60.0)	2 (50.0)	2 (15.4)	19 (30.6)
Usefulness of system to facilitate communication between health care providers, emergency management personnel, and the public/community in preparing for natural hazards									
• Not useful at all	-	-	-	-	-	-	-	-	-
• Somewhat useful	1 (14.3)	-	-	-	1 (16.7)	-	-	1 (7.7)	3 (4.8)
• Useful	1 (14.3)	3 (18.8)	3 (37.5)	2 (66.7)	-	2 (40.0)	2 (50.0)	3 (23.1)	16 (25.8)
• Very useful	5 (71.4)	13 (81.3)	5 (62.5)	1 (33.3)	5 (83.3)	3 (60.0)	2 (50.0)	9 (69.2)	43 (69.4)
Usefulness of system to facilitate communication between health care providers, emergency management personnel, and the public/community in responding to natural hazards									
• Not useful at all	-	-	-	-	-	-	-	2 (15.4)	2 (3.2)
• Somewhat useful	1 (14.3)	-	-	1 (33.3)	1 (16.7)	-	-	2 (15.4)	5 (8.1)
• Useful	1 (14.3)	6 (37.5)	3 (37.5)	1 (33.3)	1 (16.7)	2 (40.0)	3 (75.0)	3 (23.1)	20 (32.3)
• Very useful	5 (71.4)	10 (62.5)	5 (62.5)	1 (33.3)	4 (66.7)	3 (60.0)	1 (25.0)	6 (46.2)	35 (56.5)

Appendix G. Opinions of Study Participants Regarding the Reasons for Disaster-Related Public Health Management Challenges by Professional Category, Puerto Rico, January-April 2023

Disaster-related public health management challenges	Professional category								TOTAL n (%)
	Doctors n (%)	Nurses n (%)	Patients n (%)	Pharmacists n (%)	Hospital utility services' operators n (%)	Hospital management personnel n (%)	Nonprofit/ NGO/ Community organizations n (%)	Other relevant key informants n (%)	
Due to lack of resources									
• All of it	5 (71.4)	4 (25.0)	3 (37.5)	-	4 (66.7)	2 (40.0)	-	5 (38.5)	23 (37.1)
• Most of it	2 (28.6)	11 (68.8)	3 (37.5)	3 (100.0)	2 (33.3)	3 (60.0)	4 (100.0)	7 (53.8)	35 (56.5)
• Some of it	-	1 (6.3)	2 (25.0)	-	-	-	-	1 (7.7)	4 (6.5)
• None of it	-	-	-	-	-	-	-	-	-
Due to existing practices of health care system									
• All of it	4 (57.1)	11 (68.8)	4 (57.1)	-	3 (50.0)	2 (40.0)	2 (50.0)	7 (53.8)	33 (54.1)
• Most of it	3 (42.9)	4 (25.0)	3 (42.9)	3 (100.0)	3 (50.0)	1 (20.0)	2 (50.0)	5 (38.5)	24 (39.3)
• Some of it	-	1 (6.3)	-	-	-	2 (40.0)	-	1 (7.7)	4 (6.6)
• None of it	-	-	-	-	-	-	-	-	-
Due to existing health insurance system									
• All of it	4 (57.1)	2 (12.5)	1 (12.5)	-	1 (16.7)	2 (40.0)	-	1 (7.7)	11 (17.7)
• Most of it	3 (42.9)	7 (43.8)	4 (50.0)	3 (100.0)	2 (33.3)	1 (20.0)	2 (50.0)	7 (53.8)	29 (46.8)
• Some of it	-	6 (37.5)	3 (37.5)	-	3 (50.0)	2 (40.0)	1 (25.0)	5 (38.5)	20 (32.3)
• None of it	-	1 (6.3)	-	-	-	-	1 (25.0)	-	2 (3.2)
Due to policy constraints at the local level									
• All of it	2 (28.6)	2 (12.5)	1 (12.5)	-	-	2 (40.0)	-	2 (15.4)	9 (14.5)
• Most of it	3 (42.9)	12 (75.0)	5 (62.5)	2 (66.7)	-	1 (20.0)	2 (50.0)	7 (53.8)	32 (51.6)
• Some of it	2 (28.6)	2 (12.5)	2 (25.0)	1 (33.3)	6 (100.0)	2 (40.0)	2 (50.0)	4 (30.8)	21 (33.9)
• None of it	-	-	-	-	-	-	-	-	-
Due to policy constraints at the federal level									
• All of it	-	2 (12.5)	-	-	-	1 (20.0)	-	-	3 (4.8)
• Most of it	4 (57.1)	6 (37.5)	2 (25.0)	1 (33.3)	-	1 (20.0)	1 (25.0)	5 (38.5)	20 (32.3)
• Some of it	2 (28.6)	8 (50.0)	6 (75.0)	2 (66.7)	6 (100.0)	3 (60.0)	3 (75.0)	7 (53.8)	37 (59.7)
• None of it	1 (14.3)	-	-	-	-	-	-	1 (7.7)	2 (3.2)

Appendix H. Qualitative Analysis of Key Challenges for Building Resilient Health Systems in Puerto Rico

Key challenges	Themes	Quotes
1. Impact on Critical Interdependent Infrastructure	1.1 Power Infrastructure	**Nurse Anesthetist** (San Juan, 33 years old): *"The intermittency in electrical power was also worrisome. Even if it was for seconds a blackout in the middle of a surgery is desperate. Imagine a neurosurgeon stapling an aneurysm and at that moment there is a power outage, one wrong move and the aneurysm bursts."* **Surgical Technician** (San Juan, 59 years old): *"The generator was not enough to maintain the temperature in the operating room. The heat and humidity contaminated all the trays. Even if you don't believe me, we had to have the trays sterilized right away. A tray has sterilization processes that were difficult to comply with in those conditions. I will only tell you that those patients had to be covered with a lot of antibiotics. You know what I'm talking about."* **Doctor** (San Juan, 38 years old): *"I remember a patient who was discharged during Maria and was taking a medication that thinned the blood. This patient fell and bled on the head. He had very liquid blood, because he was on anticoagulants. When he returned to the hospital the CT machine was not working due to low voltage. He ended up dying, because they couldn't operate on him. They could not operate on him because there was no imaging study to do and justify the emergency for the operating room. It's just illogical!"*
	1.2 Back-up Generator	**Hospital Service Operator** (San Juan, 53 years old): *"Here at the Medical Center, there is always a lack of supplies and no one can hide that, which is why we get used to working with what is available and not with what should be available to provide excellent care. But in María we have a lot of needs, equipment, replacement of parts. Well, the most painful thing was not having battery backup for equipment that can cost the life of a patient."* **Hospital Utility Service Operator** (56 years old): *"I heard from more than ten people, all bedridden people who needed some biomedical equipment in their homes and had problems with the generators. Some did not have generators and other cases were that their relatives could not get gasoline for their generators."*
	1.3 Transportation Infrastructure	**Patient** (Orcovis, 58 years old): *"I don't personally know of any cases, but I heard in the media that many people died because they couldn't leave their homes to receive medical services because the roads were blocked. I took great care of myself during that time but if I had had an emergency, I would be another death on the list. I need a wheelchair to be able to get around, my sisters had to juggle to get through fallen trees to get to my house, the car couldn't get out, I had no way to get out of my house."* **Nutritionist** (Caguas, 46 years old): *"The island was left in the dark, without water, without communication, with many roads blocked by trees or objects due to the scourge of Hurricane Maria. All the hospitals had the uncertainty of whether they could get the supplies to continue offering the services, and yes, many services were restricted to use the essentials and lengthen the reserves that they had before the uncertainty that was experienced for several months."*
	1.4 Communication Infrastructure	**Doctor** (San Juan, 58 years old): *"The entire communication system was down. It took weeks to be able to reconnect with our patients despite the fact that we had teams assigned to track them by phone and by physical search."* **Hospital Management Personnel** (San Juan, 60 years old): *"We always had patients; yes, the emergency room was saturated. Even so, I think we had a lot of difficulty reaching people who had life and death needs. Communications completely failed for days and we lost many lives that we couldn't get to in time and of course they had no way to get here."* **Doctor** (Juana Diaz, 68 years old): *"The communication problem was the accelerator for so many misfortunes.*

		Medical providers were willing to attend to health needs without knowing if they would pay us for our work. The problem was that we couldn't reach the people who really needed us. Many people were too long incommunicado."
	1.5 Basic Resources and Supplies	**Hospital Utility Service Operator** (San Juan, 48 years old): *"An acquaintance used an oxygen tank and was unable to get a supply from him. When they managed to contact me (because they know that I work at the Medical Center) he had been without his oxygen supply for almost two weeks. I looked for a way to bring him a tank full of oxygen. But those two weeks without his oxygen did him a lot of damage. When I went to bring him the tank, he was no longer the same, he was fading and two days later he died."* **Hospital Utility Service Operator** (San Juan, 53 years old): *"Here at the Medical Center there is always a lack of supplies and no one can hide that, which is why we get used to working with what is available and not with what should be available to provide excellent care. But in María we have a lot of needs, equipment, replacement of parts. Well, the most painful thing was not having battery backup for equipment that can cost the life of a patient."*
		Nurse (San Juan, 41 years old): *"There was instability in the electrical system and in the water system. This insecurity kept us waiting for the medical equipment to be turned off or that we would not even have water to wash our hands. Water is a basic but essential tool to provide care and on the other hand, most life support equipment must have a stable electrical service."*
2. Capacity and Commitment of Human Resources	2.1 Shortage of human resources and work overload	**Doctors** (San Juan, 38 years old): *"The administrators are going to deny me, but the Trauma Center had to close for several days. All incoming patients were referred to the feds' Comfort ship. We were completely overloaded, and they could even close the residence due to the fact that we are seeing more patients than expected. No nursing staff."* **Doctor** (San Juan, 61 years old): *"Many health service providers left the island and decided not to return. Before Hurricane Maria there was a great shortage of specialists in Puerto Rico. This situation was made worse by the hurricane. The great shortage of health professionals and specialists puts great pressure on the few clinics that remain in operation. Patients who should normally see primary care providers are showing up at clinics in greater numbers than ever before. This lengthens the wait for appointments to 6 and 8 months to be able to be seen by a specialist."* **Patient** (Arroyo, 59 years old): *"I can tell you that as a patient I have noticed a tremendous personal shortage. There are no paramedics, no ambulances, very few nurses and other support staff."*
	2.2 Mental health challenges	**Nurse** (San Juan, 63 years old): *"The biggest challenge was maintaining my mental health, everyone's mental health was affected. Not having electricity in your house for three or four months and not having gasoline. I travel from Caguas to San Juan and that is a challenge, getting up in the morning because one wants to provide the service as a nurse."* **Nurse** (Hatillo, 53 years old): *"I prepared my center so that my clients had what they needed before, during and after the hurricane. But the collective hysteria, the thoughts of discouragement and the sadness for the situation in which the Island found itself was palpable. You cannot cover the sun with one hand, the mental health of my clients and employees was tremendously affected."*
3. Plans and Policies	3.1 Bureaucratic practices related (authorization and pre-authorization and referral) challenges	**Hospital Utility Service Operator** (San Juan, 61 years old): *"The offices of the medical plans closed, they have pre-authorization policies and in those circumstances with their offices closed there were no pre-authorizations, therefore many people were left without receiving their treatments".* **Patient** (Ciales, 65 years old): *"It is sad that the health and sometimes even the life of human beings is negatively affected and manipulated by medical plans. Sometimes referrals and authorizations from insurers are required for people to receive treatments that put the health and lives of people at risk. People often cannot wait for the*

		medical plan to give them authorization to receive treatment. I also understand that many medical plans do not pay enough to health providers, especially doctors, hospitals and all the personnel who work there. This affects the service that we patients receive." **Home Health Aide** (Ponce, 58 years old): *"Those of public health here in Puerto Rico are useless, they have no plan for anything. They are some rich children who settle down in a place and only help."* **Nurse** (San Juan, 43 years old): *"A big challenge is the policies and protocols that other health organizations have, which is why I did not collaborate with other units. It is not at all comfortable to arrive at a place where there is no clear protocol of what interventions I can do and what not."* **Nurse** (San Juan, 50 years old): *"There was a lot of problem with bureaucratic procedures and situations that required quick action and were lost in bureaucratic procedures that even put people's lives at risk. To give you an example, patients who did not receive services on time because the dialysis centers did not refer them here to the Medical Center to receive services."*
4. Collaboration, Communication and Coordination	4.1 Duplication, lack of coordination and administratively heavy insurance framework.	**Nonprofit/NGO/Community Organization** (Quebradillas, 51 years old): *"There was a lot of duplication of interventions. Many times, a sector was impacted by many suppliers at the same time duplicating efforts and leaving other areas without services, supplies and equipment."* **Nurse** (San Juan, 41 years old): *"Having to wait for the central administration for instructions was a disaster, I don't even want to remember that."* **Medical Social Worker** (Ponce, 52 years old): *"We never received support from the administration, no one asked us to this day how we felt. It was just orders of what we had to do."* **Doctor** (San Juan, 62 years old): *"It is because of the medical plans that there is a flight of professionals in this country. They want to decide who requires the services and who does not. The medical planners are the merchants of the temple, the money that these people steal in administrative expenses is money that does not reach the people. They do not pay us what corresponds. We doctors are already sick from the ongoing war with the insurers."*

Appendix I. Recommendations to Prevent Deaths or to Reduce Adverse Health Outcomes

Theme	Sub-theme	Quote
1. Reforming electricity supply infrastructure	1.1 Ensuring continuous electricity supply	**Hospital Management Personnel** (San Juan, 60 years old): *"Of course, the most logical recommendation is to improve the electrical distribution system in Puerto Rico…"*
	1.2 Solar power to generate electricity	**Doctor** (San Juan, 61 years old): *"What we really need is solar power so that we can function during a power outage."*
2. Improving human resources management	2.1 Employee retention	**Nurse** (San Juan, 41 years old): *"It is necessary to stop professionals from migrating from Puerto Rico to the United States for better benefits."*
	2.2 Effectively engaging nurses in healthcare service delivery	**Nurse** (San Juan, 41 years old): *"Nurses must be given the opportunity to contribute their knowledge…Nurse Practitioner where they are not allowed to practice as such."* **Nurse** (San Juan, 58 years old): *"Throughout the continental United States, Nurse Practitioners are being recognized as primary health care providers. Here in Puerto Rico, we can only work at the Veterans Hospital in San Juan. Medical plans do not recognize us as health providers, period."*
3. Decentralization of healthcare delivery	3.1 Setting up more community healthcare centers	**Nurse** (San Juan, 40 years old): *"Many people come to the Medical Center, but do not need super tertiary care. I can give that primary care in the community and possibly if I have a doctor, four nurses, a psychologist and a social worker in a school that is empty example: "Fulana de Tal" (similar to Jenny Doe but in Spanish), come this way, look, your blood pressure is high. you should go to your cardiologist, "Fulana", you have diabetes, your sugar levels are a little high, let's do a glycoside test. I don't have to wait for that patient to become chronic before they arrive at the supra tertiary hospital. These are things that I can do in my community, with little money and few resources."*
	3.2 Availability of healthcare services across Puerto Rico	**Doctor** (San Lorenzo, 36 years old): *"Increase primary care centers on the Island. Not all can reach San Juan."*
4. Emergency planning and preparedness	4.1 Prioritizing elderly population and those needing special equipment	**Nurse** (San Juan, 39 years old): *"Our old people died alone in their houses because no one got to them. Here they assumed that whoever needed something could ask for it and that was the case. The ones who needed [help] the most could not get to where the aid was."* **Patient** (Carolina, 61 years old): *"Prioritize…people who require special equipment."*
	4.2 Prioritizing mountainous/remote areas	**Patient** (Salinas, 66 years old): *"Secondly, I believe that health services should be better prepared, especially in mountainous areas…at the level of the neighborhoods, in the municipalities of the center of the Island, clinics are needed, that way when the roads are obstructed it would not be such a big problem. Situations like Hurricane Maria or worse may recur in the future if mountain neighborhoods do not have quality medical services. The citizen who cannot leave those places because the passage has been obstructed by landslides or because bridges and highways have disappeared, well he dies in his house. Medical services are needed in all these places because it is the only way to prevent so many deaths."* **Hospital Management Personnel** (San Juan, 47 years old): *"There are communities that are susceptible to landslides, to other types of disasters and floods."*
	4.3 Triage in emergency department	**Patient** (Salinas, 66 years old): *"Deaths can also be reduced if cases are treated with the priority they deserve when arriving at an emergency room."*
	4.4 Engaging mass media to educate citizens on emergency preparedness and planning	**Patient** (Salinas, 66 years old): *"We can do a mass media [campaign] to guide people on how they can prepare better. Because all this will lead people to reflect: if I know that I have a special situation, for example, if I use a sleeping machine (like so many people in Puerto Rico), how do I prepare for that?"*

	4.5 Improved urban planning	**Patient** (Arroyo, 59 years old): *"I believe one cannot wait for the hurricane to be announced to begin cleaning and maintaining bodies of water, sewers, and roads, knowing that this is a country with severe flaws in construction planning...Well, prevention in flood-prone areas and constant pruning of trees to facilitate the reconstruction of the flow of electricity would have prevented many calamities."*
	4.6 Developing a census for vulnerable communities and demographic groups	**Hospital Management Personnel** (Ponce, 49 years old): *"In this country, there should be a Census system for patients with special needs and special equipment."* **Nurse** (San Juan, 37 years old*): "A plan must be made in order to know in advance which are the highest priority areas and the most vulnerable sectors so that when emergencies arrive, know in advance how to distribute basic necessities among those who really need them."*
	4.7 Universal healthcare system	**Nonprofit/NGO/Community Organizations** (PAYE, Loiza, 57 years old) *"If the public health system were universal, where everyone was treated with the same urgency, it would prevent some health insurance from becoming rich and others impoverished. The above expressed leading to a debacle in the health system, where some have everything, and others lack an adequate and vital health system for survival."*
5. Good governance	5.1 Better management of emergency funds	**Patient** (Vega Baja, 71 years old): *"Let the funds reach the people. The government keeps the money and disappears without the work being seen. If funds are spent where they should be used, services can be improved before disaster strikes."*
	5.2 Autonomous disaster agencies	**Nurse** (San Juan, 58 years old): *"Government disaster agencies must be depoliticized so that they can operate free of disparities. In this way the people of Puerto Rico could enjoy equal services. I understand that the public policy of this country is focused on the welfare that the proponents can obtain for themselves and/or for the party they represent. The benefit for the people will always be your second option."*