

Developing Comprehensive Disaster Assessment and Readiness Tools for Preparedness Activities and Use during Disaster Response and Recovery

National Center for Environmental Health
Agency for Toxic Substances and Disease Registry



Health Care Facility Assessments

- Assessments of hospitals and clinics was requested by the HHS Federal Health Coordinating Official (FHCO).
- Assessments of hospitals (n=64) and health care centers (n=186) were conducted from September 2017 to November 2017.
- Standardized assessment tools
 - Questions about operational unit capability, bed census, structural damage, and medical/medical supply needs
- Field Teams
 - Field assessment teams included engineers, environmental health scientists, toxicologists, and other environmental and/or public health professionals.
 - Translators, provided by FEMA, were used for teams without Spanish-speaking personnel.

HEALTH CLINIC ASSESSMENT					
FACILITY NAME		DATE OF ASSESSMENT		TIME (24 HR)	
ADDRESS		FACILITY CONTACT PERSON		BEST CONTACT METHOD	
		BEST PHONE NUMBER		SECOND PHONE #	
CITY		EMAIL		SAT PHONE/ OTHER CONTACT INFO	
ZIP CODE	HOURS OF OPERATION (regular and current, if different)		SURVEY METHOD <input type="checkbox"/> VISIT <input type="checkbox"/> PHONE <input type="checkbox"/> RADIO <input type="checkbox"/> OTHER		
CURRENT WORKING COMMUNICATIONS (check all that apply): <input type="checkbox"/> PHONE <input type="checkbox"/> E-MAIL <input type="checkbox"/> SATPH <input type="checkbox"/> CELL <input type="checkbox"/> 2/W RADIO OTHER _____					
HAS THIS CLINIC ALREADY BEEN ASSESSED? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK # Yes, by whom? _____					
CURRENT CAPACITY		PATIENT NUMBERS, last 24 hours		OVERALL FUNCTIONALITY	
# Staffed Adult beds _____		# Treated and released _____		<input type="checkbox"/> Operational	
# Staffed Pediatric beds _____		# Treated and transferred _____		<input type="checkbox"/> Operational but needs sustenance	
# Morgue Space Available _____		# Held overnight _____		<input type="checkbox"/> Closed	
# Deceased being held _____		# Expired _____		PATIENT EVACUATION REQUIRED? <input type="checkbox"/> Y <input type="checkbox"/> N	
				EVACUATION STATUS: <input type="checkbox"/> Planned <input type="checkbox"/> In Progress <input type="checkbox"/> Complete <input type="checkbox"/> UNK <input type="checkbox"/> NA	
BLOCK 1 FACILITY DAMAGE ASSESSMENT		BLOCK 2 UNIT OPERATIONAL LEVEL		BLOCK 3 FACILITY NEEDS AND SERVICES	
Damage Level (1-No Damage, 2-Minor, 3-Moderate, 4-Severe, 5-Total, 6-Untk)		Fully Operational Partial NA		Adequate Need None NA	
___ Windows ___ Roof ___ HVAC		Emergency Department <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Medication <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
___ Foundation ___ Walls ___ HeliPad		Outpatient Clinic <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Medical Supplies <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
___ Road Access ___ Lighting ___ Other		Pediatrics <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Blood Products <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
		Maternity <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Vaccine <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
1. Collapsed Structure? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> NA		Mental/Behavioral Health <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		PPE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
2. HAZMAT Issues? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> NA		Pharmacy <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Medical Staff <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
3. Roof/Water Damage <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> NA		Laboratory <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Clinical Staff <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
4. Wind damage? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> NA		X-Ray/Imaging <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Security Staff <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
5. Working Elevators? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> NA		Dialysis <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Custodial Staff <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
		Patient Records: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Medical Waste Pickup <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
		EMR <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Municipal Waste Pickup <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
		Paper <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
BLOCK 4 POWER SUPPLY ASSESSMENT			BLOCK 5 WATER SUPPLY ASSESSMENT		
1. POWER SOURCE <input type="checkbox"/> Fully on grid <input type="checkbox"/> Intermittent <input type="checkbox"/> Generator only			1. WATER SYSTEM (check all that apply) <input type="checkbox"/> Municipal <input type="checkbox"/> Well <input type="checkbox"/> Other <input type="checkbox"/> UNK		
2. Generator Operational? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> Not Needed			2. WATER SYSTEM STATUS <input type="checkbox"/> Fully Working <input type="checkbox"/> Partial <input type="checkbox"/> None <input type="checkbox"/> UNK		
3. Running generator 24 hr/d? <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> UNK <input type="checkbox"/> Not Needed			3. WORKING TOILETS <input type="checkbox"/> Fully Working <input type="checkbox"/> Partial <input type="checkbox"/> None <input type="checkbox"/> UNK		
4. Air Conditioning Working? <input type="checkbox"/> Fully Working <input type="checkbox"/> Partial <input type="checkbox"/> None			4. HOT WATER <input type="checkbox"/> Fully Working <input type="checkbox"/> Partial <input type="checkbox"/> None <input type="checkbox"/> UNK		
5. Generator Type and power rating _____			5. DRINKING WATER SUPPLY <input type="checkbox"/> Adequate <input type="checkbox"/> Shortage <input type="checkbox"/> None <input type="checkbox"/> UNK		
6. Generator Fuel Type Used: <input type="checkbox"/> Gas <input type="checkbox"/> Diesel			6. Current Drinking Water Source _____		
7. Generator Fuel Need/day (gallons) _____			7. Current Drinking Water Need (gallons/day) _____		
8. Fuel Storage Capacity (gallons) _____			8. Water Storage Capacity (gallons) _____		
9. Current Generator Fuel Supply (gallons) _____			9. Current Water Supply (gallons) _____		
10. Comments _____			10. Comments _____		
BLOCK 6 OXYGEN SUPPLY ASSESSMENT			BLOCK 7 EMS AVAILABILITY		
1. Current Oxygen Need (l/day) _____			1. Ambulance <input type="checkbox"/> Adequate <input type="checkbox"/> Need <input type="checkbox"/> None <input type="checkbox"/> UNK <input type="checkbox"/> NA		
2. Current Oxygen Supply (liters) _____			2. Air ambulance <input type="checkbox"/> Adequate <input type="checkbox"/> Need <input type="checkbox"/> None <input type="checkbox"/> UNK <input type="checkbox"/> NA		
3. Estimated date tank will be empty _____			3. EMS Staffing <input type="checkbox"/> Adequate <input type="checkbox"/> Need <input type="checkbox"/> None <input type="checkbox"/> UNK <input type="checkbox"/> NA		
			4. Facilities to which you are transferring: _____		

Initial App -based survey development and testing

- In order to alleviate data entry time and error, PHB leadership identified FEMA resources, specifically iPads, for development and testing of app-based health care facility assessments.
- The Public Health Branch collaborated with the Puerto Rico Planning Board, in coordination the ATSDR Geospatial Research, Analysis, and Services Program, to develop app-based surveys.
 - App allows for immediate data collection and entry in the field
 - Geospatial capabilities
 - Field teams can upload pictures to the site-specific survey
 - Developed a dashboard showing real-time information, such as power status, communications status, and operational capacity
- The Public Health Assessment Field Teams piloted the app-based surveys at from October 31, 2017 to November 18, 2017 at 76 health care centers (42% of all health care centers assessed).

Comprehensive Disaster Assessment and Readiness Tools (CDART): Healthcare Facilities in Puerto Rico

- Building upon the success of the pilot work in October and November 2017 during the Hurricane Maria response activities, the team:
 - Received a request from the Department of Health and Human Services Recovery Support Function in Puerto Rico to further develop the ICAT app
 - Specifically to collaborate with the Puerto Rico Department of Health to develop a set of app-based comprehensive disaster assessment and readiness tools (CDART) for health care facilities in Puerto Rico
 - Project was initiated in May and completed in July
- Project Aims
 - Tool development, in collaboration with PRDOH
 - Train PRDOH staff on implementing CDART
 - Operational ArcGIS Online tool development

CDART Health Care Facility Project Aims

■ Tool Development and Training

- Post-disaster assessments
 - Rapid assessment tool and comprehensive assessment tool
- Readiness check (app-based and web link self-reporting tool)
- Translate tools into Survey123 CDART app
- Pilot tools
- Training manuals and operational methodologies
- Train PRDOH staff on development of tools and implementation of assessments

■ Operational ArcGIS online tools

- Develop operational dashboards
 - Readiness status
 - Assessment data



CDART Healthcare Facility Project

- **Readiness Check**
 - 48 hours prior to known disaster (e.g. hurricane)
- **Rapid Disaster Assessment Tool**
 - Immediately post disaster (<72 hours)
 - Data to prioritize comprehensive assessments
- **Comprehensive Disaster Assessment Tool**
 - <72 hours post-disaster for priority hospitals and clinics
- **PRDOH Hospital Coalition Members were trained on the tools using a train-the-trainer approach.**



GOBIERNO DE PUERTO RICO

Departamento de Salud

C-DART Readiness Check

The purpose of the Readiness Check is to provide the PRDOH with the tools to respond and rapidly support the needs of the health sector in the occurrence of an event that impacts their capacity. By contributing to the survey, it will help in the identification of mitigation actions needed to improve the environment and response planning priorities. Thanks for your time and support!

Warning: The data collected by this survey about your health care facility will be used for emergency readiness and planning purposes. Please ensure that your answers are as accurate as possible before clicking on the "SUBMIT" button

▶ General Health Care Facility Information

Readiness-Specific Information

▶ Communications

▶ Power

▶ Water

General Health Care Facility Information

Readiness-Specific Information

▼ Communications

Do you have back-up communication capability? *

Yes No

▼ Power

Do you have a generator? *

Yes No

▼ Water

Do you have a back-up water source? *

Yes No

▼ Current Capabilities

Hours of Operation *

- 24 Hr/Day
 Regular (8-12 HR/Day)
 Partial (Less than 8 HR/Day)

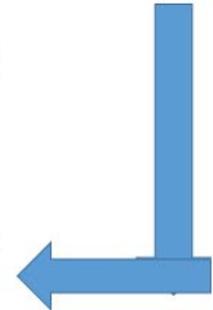
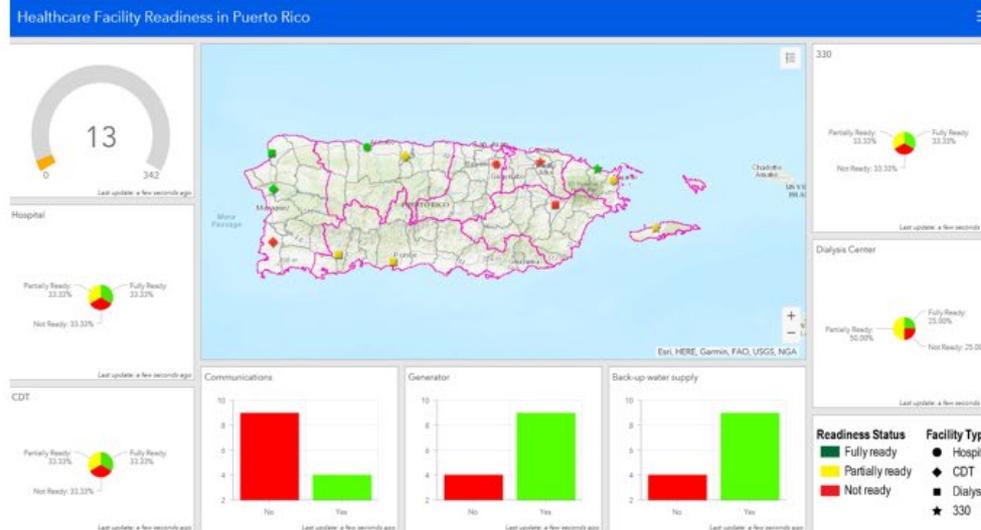
Is there a current operational unit reduction? *

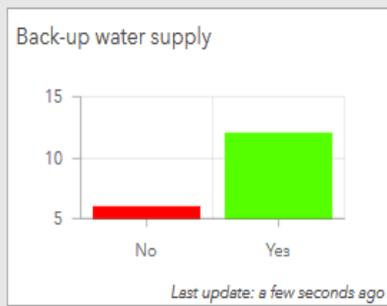
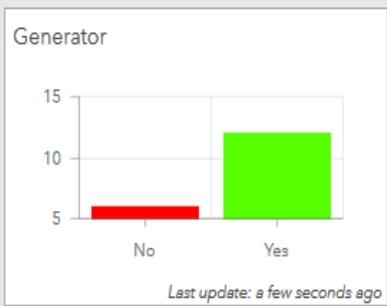
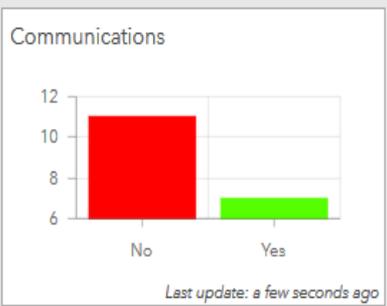
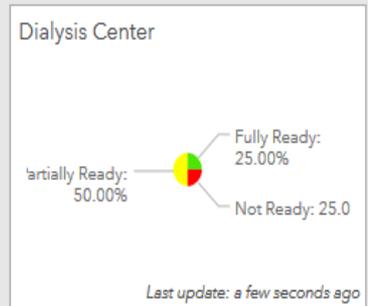
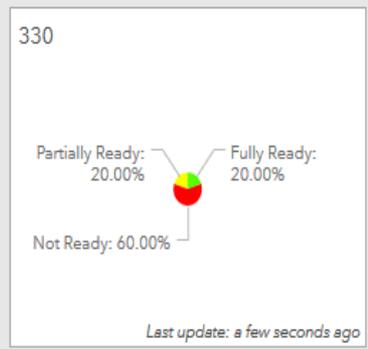
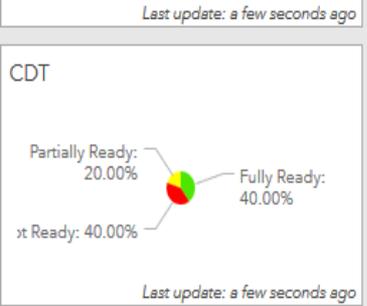
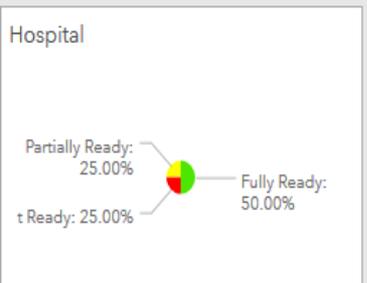
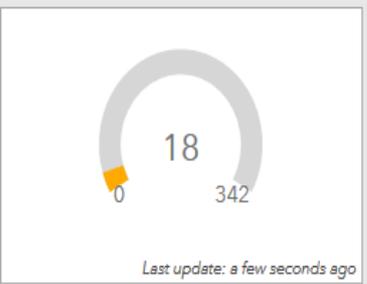
Yes No

Current number of staffed beds *



Facility Name	Communications Available	Facility damage level - windows	Collapsed structures	Power Grid Operational?	Generator Operational?	Facility needs - Medication	HVAC Working?	EMS Availability
	Yes	4	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	3	No	Yes	Yes	Adequate	Partial	Adequate
	Yes	3	No	Yes	Yes	Adequate	No	n/a
	Yes	1	No	Yes	Yes	Shortage	Yes	Adequate
	Yes	1	No	Yes	Yes	Adequate	Yes	n/a
	Yes	2	Yes	Yes	No	Adequate	Yes	Adequate
	Yes	1	No	Yes	Yes	Shortages	Yes	n/a
	Yes	2	No	n	Yes	Adequate	Yes	Adequate
	Yes	3	No	Y	Yes	Adequate	Yes	Adequate
	Yes	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	2	No	Yes	Yes	Adequate	Yes	Adequate
	999	1	No	999	999	Adequate	Yes	Adequate
	Yes	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	1	No	Yes	999	Adequate	Yes	n/a
	Yes	1	No	No	Yes	Adequate	Yes	Adequate
	Yes	2	No	Yes	Yes	Shortage	Yes	n/a
	999	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	2	No	Yes	Yes	Shortage	Yes	Adequate
	Yes	1	No	Intermittent	Intermittent	Adequate	Yes	Adequate
	Yes	1	999	Yes	Yes	Adequate	Adequate	n/a
	Yes	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	2	Yes	Yes	Yes	Shortages	Yes	Adequate
	Yes	2	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	4	Y	Yes	Yes	Adequate	Yes	Adequate
	Yes	1	Yes	Yes	Yes	Adequate	Yes	Adequate
	Yes	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	2	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	1	No	Yes	Yes	Shortages	Yes	Adequate
	Yes	1	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	4	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	3	No	Yes	Yes	Adequate	Yes	Adequate
	Yes	2	Yes	Yes	Yes	Shortage	Yes	Adequate





Readiness Status	Facility Type
■ Fully ready	● Hospital
■ Partially ready	◆ CDT
■ Not ready	■ Dialysis
	★ 330

Rapid Assessment of Hospitals in Puerto Rico - Post Event

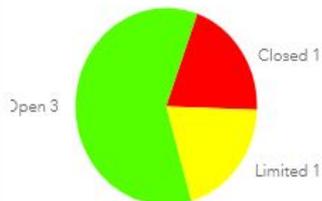


Hospitals Assessed

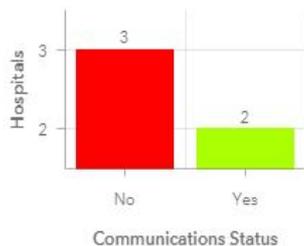
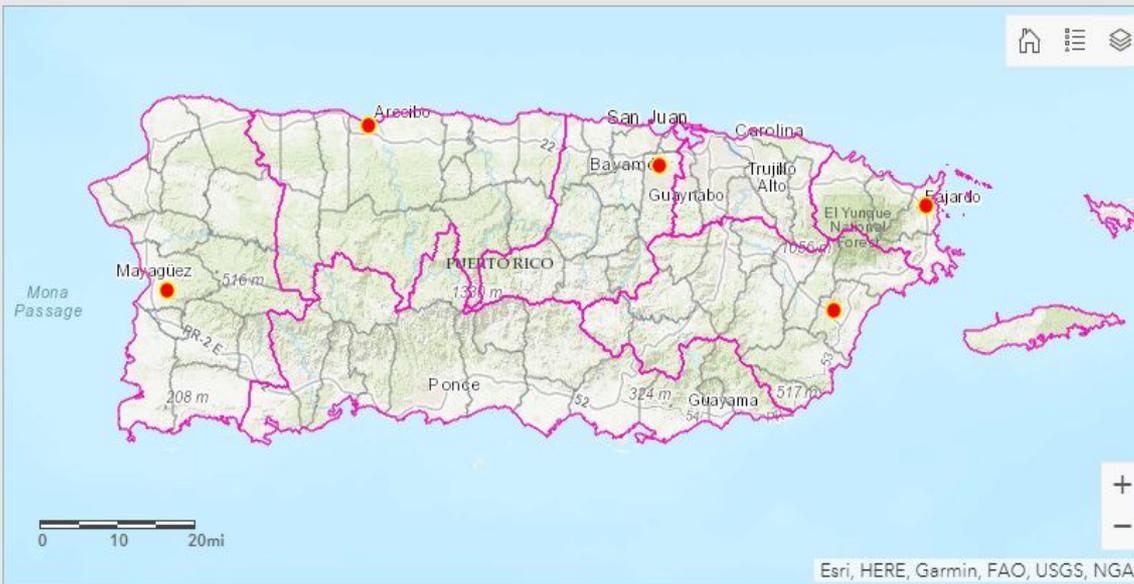


Last update: a few seconds ago

Hospital Operational Status

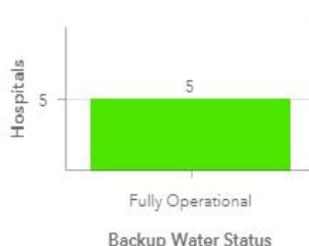


Last update: a few seconds ago



Communications Status

Last update: a few seconds ago



Backup Water Status

Last update: a few seconds ago



Power Grid Status

Last update: a few seconds ago



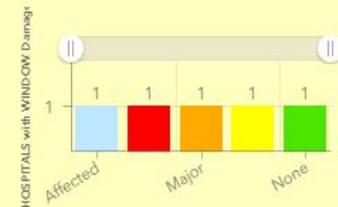
Damage Designation - ROOF

Last update: a few seconds ago



FLOOD/WATER Damage?

Last update: a few seconds ago



Damage Designation - WINDOWS

Last update: a few seconds ago

CDART Expansion

- **The Puerto Rico Department of Family has purview over Elder Care and Senior Living (ECSL) Facilities (>1000 facilities)**
 - Develop and implement tools to allow for enhancement of the DOF's capabilities and capacity
 - Needs that will be addressed:
 - Recovery data
 - Preparedness/Baseline data
 - Post-disaster response data
 - SUPERFUND/NPL site data
 - Improved and corrected mapping and other geospatial information
 - Standardized electronic app-based data entry capabilities

ECSL Facilities Concept – Status Check

Survey123 for ArcGIS

PRDF Status Check for Elder Care Facilities



Status Check for Elder Care and Senior Living Facilities

Warning: The data collected by this survey about your elder care facility will be used for emergency readiness and planning purposes. Please ensure that your answers are as accurate as possible before clicking on the "SUBMIT" button.

Would you like to read the instruction manual for this survey?
 Yes No

- ▶ **General Elder Care or Senior Living Facility Information**
- ▶ **Facility Status and Information**
- ▶ **Special Conditions**

✓

Survey123 for ArcGIS

PRDF Status Check for Elder Care Facilities

Facility Status and Information

Facility Status
 Open Partially Open Partially Closed Closed

Facility Information

Capacity

Enrollment

Vacancies

Do you have medical equipment that requires electricity?
 Yes No

Critical Medications

Special Conditions

Medical Conditions

Does the facility have individuals with the following conditions? If yes, number of individuals per facility.

Cardiac Condition

✓

Survey123 for ArcGIS

PRDF Status Check for Elder Care Facilities

Yes No

Feeding Tube
 Yes No

Non-ambulatory
 Yes No

Oxygen Use
 Yes No

Generator Status

Water

Images

Photos

Photos if available

1 of 1

Drawing

✓

CDART Project Outcomes

- Improved capability of Puerto Rico Department of Family through georeferencing of Elder Care and Senior Living facilities
- Improved capability to provide critical “real-time” information and situational monitoring to drive preparedness, response, and recovery efforts
- Collaboration with the Puerto Rico Department of Health allows for data integration capabilities during preparedness and response phases
- The comprehensive project will result in greater visibility on the status of public health facilities in Puerto Rico pre- and post-disaster.
- CDART allows for enhanced awareness of critical needs during preparedness, response, and recovery activities resulting in the ability to save the lives.

Benefits of CDART and the Operational ArcGIS Online Platform

- **Real-time data entry eliminates manual data entry → increased efficiency and reduced potential for data entry errors.**
- **Immediately available data (after survey upload) in an organized database**
- **Real-time visualization of survey/assessment completion**
- **Dashboard visualization allows for immediate critical information flow**
- **Management of field teams and visualization of field team locations increasing situational awareness during disaster response**

ESF-10 Activities and potential adaptability



ESF-10 Activities – Previous ATSDR support examples

Katrina Response

- ATSDR provided regional staff (from Regions 4,5,and 8) to EPA Region 4 in Division A (Hancock County, MS)
- Provided EPA Region 4 and 6 with technical assistance in environmental health
 - Protocols for disposal of rotting food from meat lockers and flooded grocery stores.
 - Disposal of biohazard waste improperly stored at field hospitals
 - Accompanied or led EPA hazardous materials recovery teams
 - Air monitoring for CO at field hospitals
 - Accompanied EPA OSCs to monitor landfill fires
 - Coordinated Hep B and typhoid vaccination for EPA staff and contactors in the field.
 - Responded to any health related concerns from the public, volunteer organizations, or other agencies, as requested by the OSC.

ESF-10 Activities – ATSDR support during Hurricane Katrina

- In 2005, EPA Region 4 deployed GPS-enabled hazardous materials identification (HMI) field teams and hazardous materials recovery (HMR) field teams, coupled with Incident Command Center GIS support, in the Mississippi/Alabama coastal area to identify and segregate hazardous materials of various types spread through the area by the storm surge.
- HMI reported geospatial information brought back to GIS team and locations, types, categorization and status of HM was mapped on a situational awareness map, as well as maps to prepare the HMR for field work to recover HM in the field, also using GPS to approach the correct position of the item.
- The recovery team would remove the items and segregate the HM in an appropriate segregation facility vetted by EPA. The removed items would then be updated by the GIS team to provide update maps and progress reports

Adaptability and utility of CDART for ESF-10

- **Adaptability**



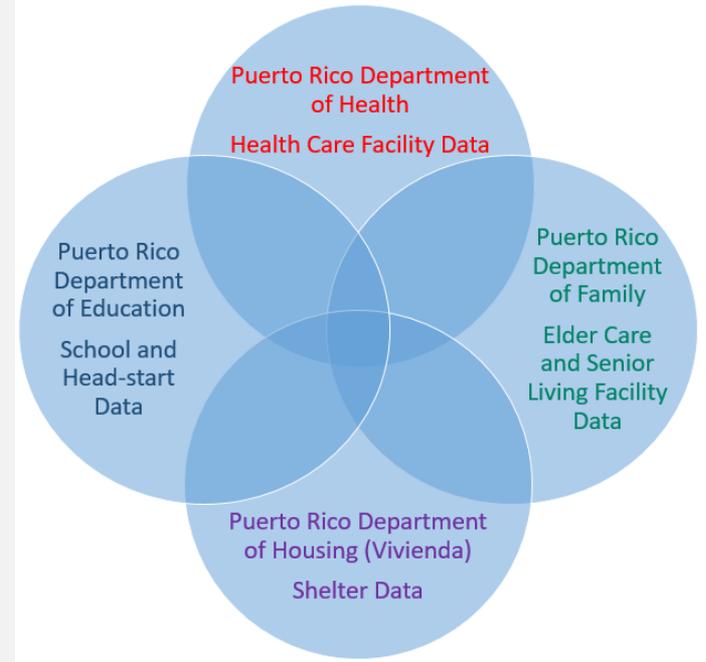
- **Utility**



Next Steps

- **Puerto Rico projects**
 - Puerto Rico Department of Housing (Vivienda) Shelter Project
 - Puerto Rico Department of Education Project
- **Question/Variable Database**
 - Prepopulated questions in Survey123 for use with ArcGIS online tools
 - Multiple response scenarios (e.g. earthquake, radiological events)
 - Potential for ESF-8 and ESF-10 collaboration

CDART Data Integration Diagram



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Aaron Grober

Angela Ragin

Miguel Cruz

Leah Graziano

Andy Dent

Ian Dunn

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1-800-CDC-INFO (232-4636)

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