



Harris County  
**Public Health**  
Building a Healthy Community



# Public Health Surveillance and Response Post Hurricane Harvey, Harris County, Texas

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Chronic Disease



Food Safety



Emergency Preparedness



Environmental Health



Infectious Diseases



Injury



Social, Mental, and Emotional Wellbeing

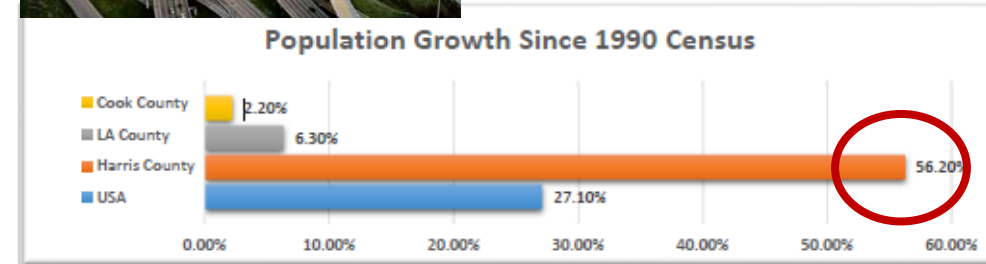
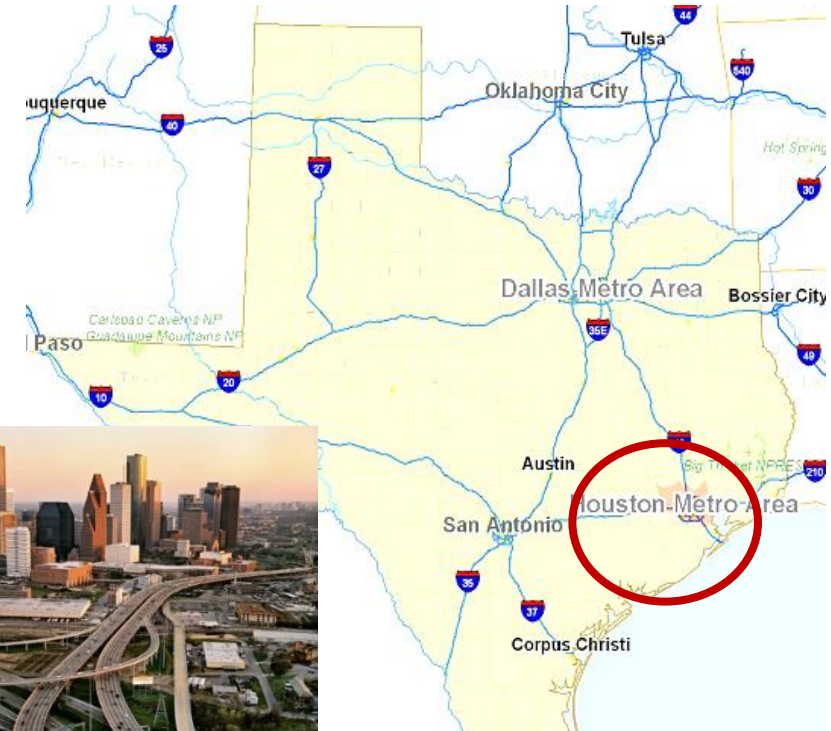
# Harris County & HCPH

## Harris County, TX:

- Third most populous county with over **4.7 million people**
- Geographically spread over **1,778 square miles** (size of Rhode Island)
- Home to 4<sup>th</sup> largest city (**Houston**), world's largest medical center, and one of world's busiest ports.

## Harris County Public Health (HCPH):

- Local health department for Harris County with over **700** public health professionals and over **\$100 million** budget **& growing**
- Annually, see over **100,000** patients in 16 wellness clinics & WIC sites, inspect **7,500** food establishments, house **25,000** animals in our shelter.
- Serve unincorporated Harris County outside of City of Houston. Provide refugee health screening, mosquito control, Ryan White HIV/AIDS funding for entire community, including City of Houston.



# Hurricane Harvey in Texas, August 25<sup>th</sup>, 2017

- A category 4 storm
- Record flooding of at least 18 inches in 70% of Harris County
- Tens of thousands of residents were displaced and 36 deaths occurred due to the devastation.
- At least 53 temporary shelters opened in various parts of Harris County.
- August 29, 2017, 10,000 bed mega-shelter was set up at NRG Center by Harris County and community partners.
- HCPH was responsible for ongoing public health surveillance.





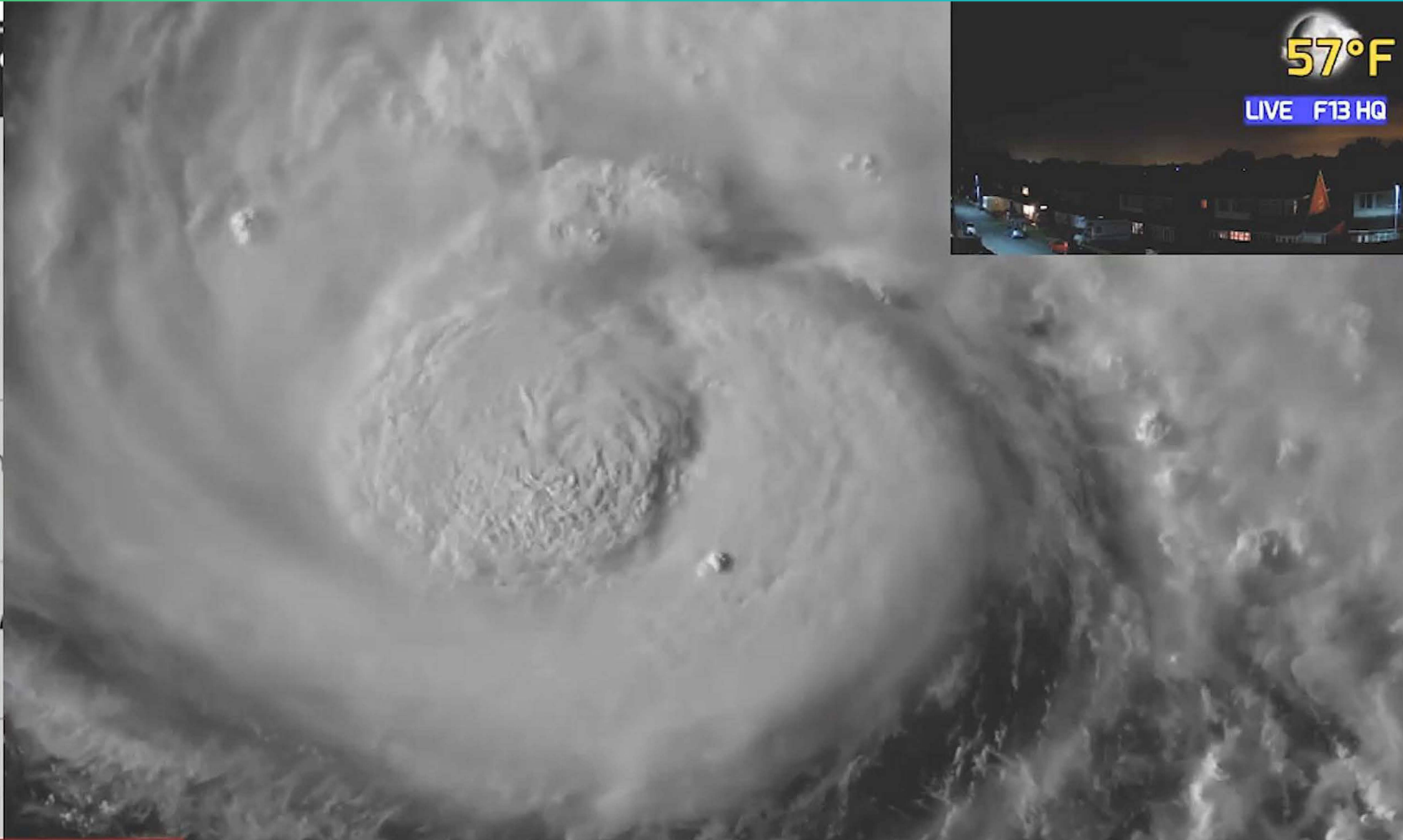
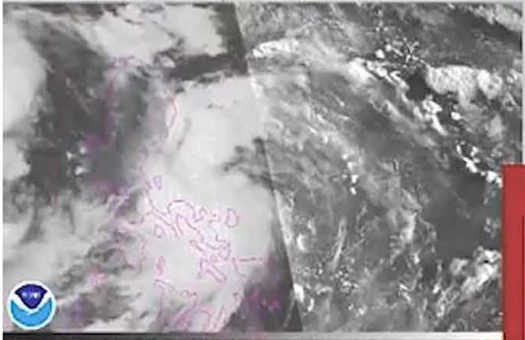
# Before Harvey



# After Harvey







**BREAKING NEWS**

**HURRICANE HARVEY**

NHC - Harvey remains at 85mph

THURSDAY August 24, 2017 23:04:08 UTC

Hurricane Warning in effect for Port Mansfield to Sargent Texas

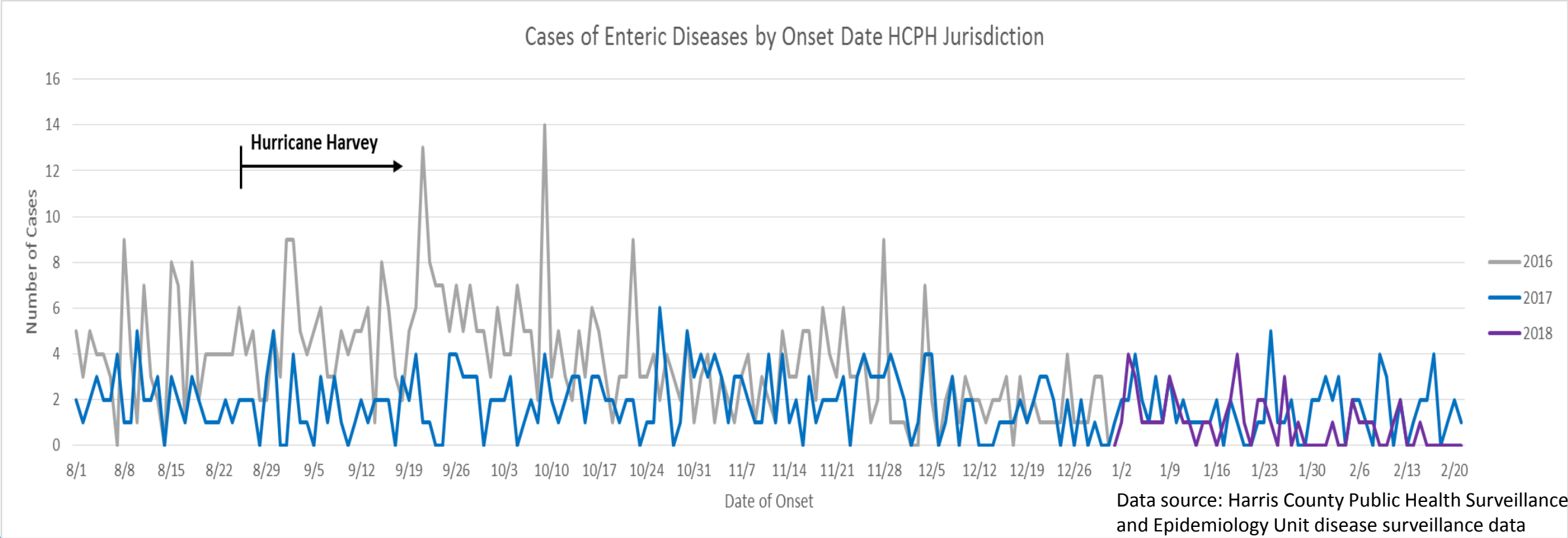
# HCPH Surveillance and Response Post Harvey

- Multi-agency collaboration
- Multi-faceted holistic approach:
  - Functional Needs Medical Refuge (FNMR)
  - NRG mega-shelter surveillance
  - Community shelter surveillance
  - Hospital surveillance
  - Enhanced communicable disease surveillance
- Community outreach
  - Mobile unit services
  - WIC services
  - Mosquito and vector control activities
  - VPH services
  - CASPER (Community Assessment for Public Health Emergency Response)



# Enhanced Community Disease Surveillance

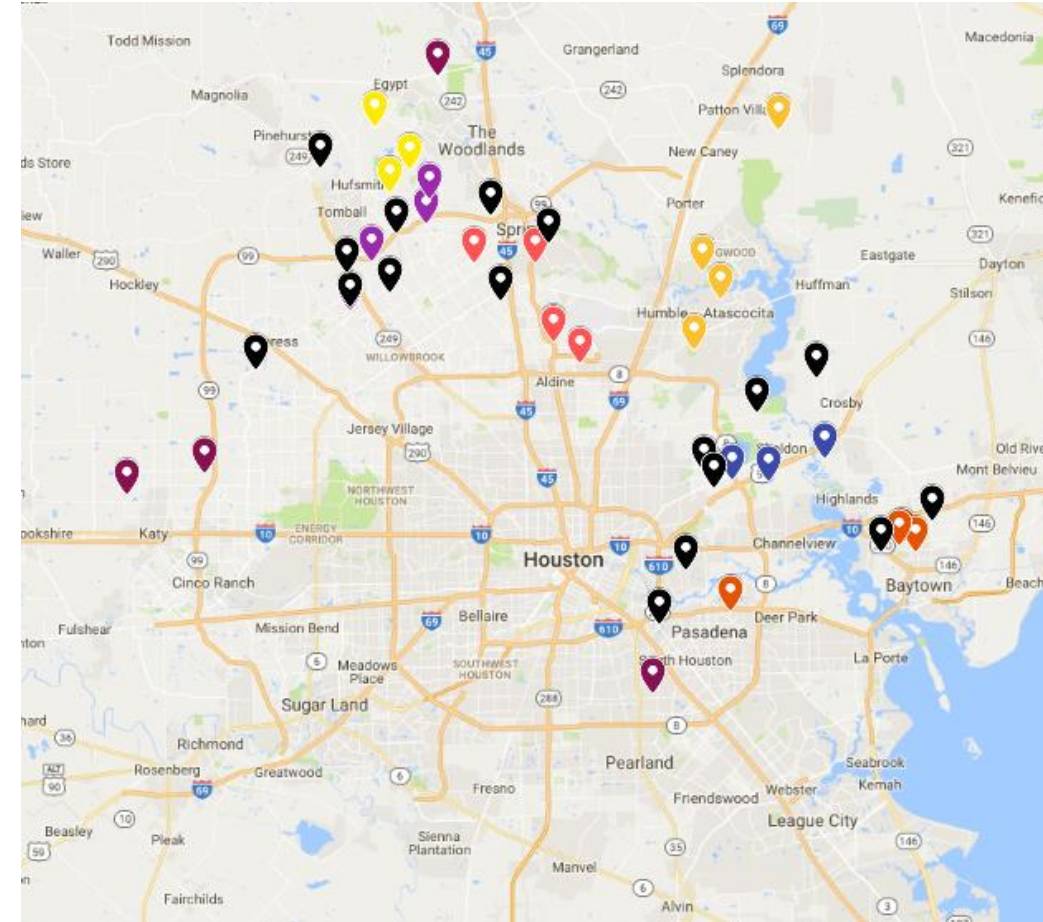
- Conditions potentially related to hurricane and flood were monitored
- No major outbreaks observed post-Harvey





# Community Shelter Surveillance

- 53 community shelters identified in HCPH jurisdiction
- Utilized modified CDC shelter assessment form
- Monitored once a day in person or by phone
  - Shelter census
  - Illnesses/symptoms of concern
  - Hospitalizations/ER visits
  - Any supplies/medications needed
- Environment Public Health inspections
- Requests for supplies sent to OEM

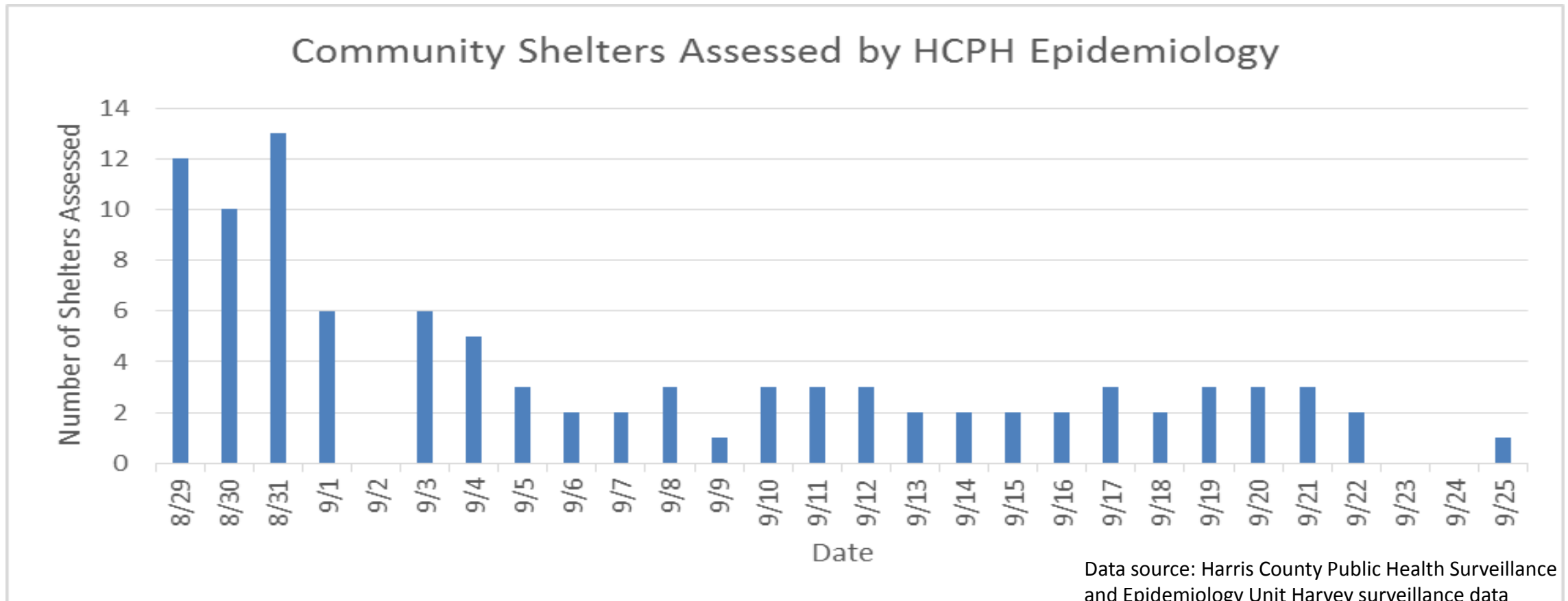


Data source: Harris County Public Health Surveillance and Epidemiology Unit Harvey surveillance data



# Community Shelter Surveillance

- Most community shelters closed by September 5<sup>th</sup>



# Post-hurricane CASPERS

- Two post-hurricane CASPERS in September
- Goals
  - Gauge health status of residents
  - Assess hurricane-caused property damage
  - Determine immediate health care/functional needs
  - Provide information to guide post-disaster response
  - Provide necessary resources to communities

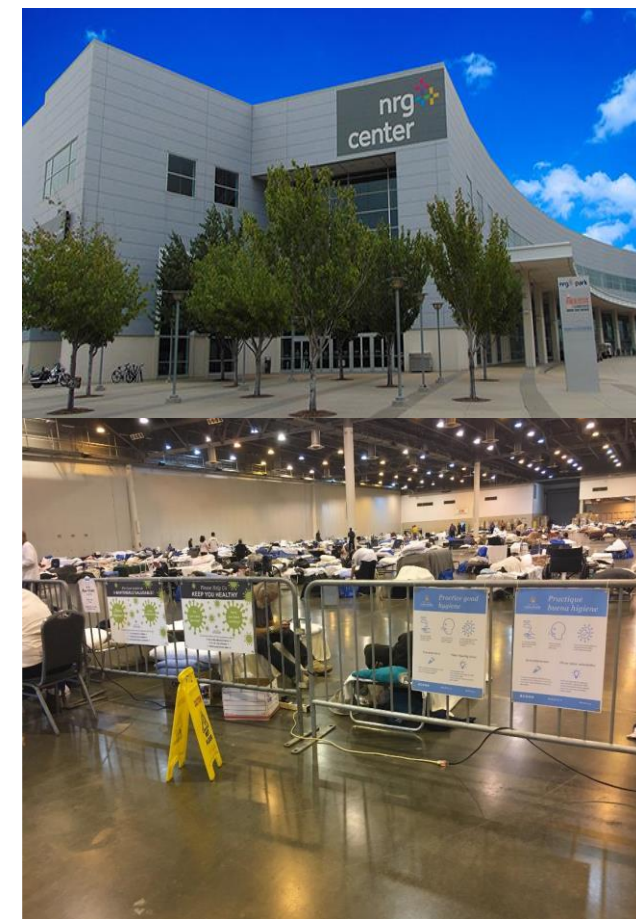
	Area 1		Area 2	
	Frequency	%	Frequency	%
Damage to house	2227	<b>32.5</b>	12497	<b>62.3</b>
Home safe to live in	5635	<b>82.2</b>	13442	<b>67.0</b>
Mold growth in house	962	<b>14.0</b>	6570	<b>32.7</b>
Lost electricity during/since the hurricane	1885	<b>27.5</b>	7632	<b>38.0</b>
Used generator outside house	137	<b>57.1</b>	669	<b>35.9</b>

Data source: HCPH CASPER data- weighted

# NRG Mega-Shelter

On August 29, 2017, the County and community partners set up a 10,000 bed mega-shelter at NRG Center.

- Monitor resident health status and identify their needs on a daily basis.
- Identify infectious diseases and outbreaks in the shelter in a timely manner and implement effective control measures to prevent further spread of illness
- Identify severe exacerbation of chronic conditions, including new or existing mental issues and provide interventions.
- Timely dissemination of health alerts and services available to shelter residents and information sharing between HCPH and partners
- Apply One Health principle to achieve a holistic approach to public health surveillance incorporating various types of disease surveillance along with environmental surveillance and animal health consideration.





# FNMR (August 29<sup>th</sup> – September 2<sup>nd</sup>)

- ✓ Provided care to those require minor or continuous medical care
- ✓ Took in displaced residents with medical conditions (hospital discharges, nursing homes)
- ✓ Staffed with medical providers
- ✓ Approximately 90 people came through (median age of 79)
- ✓ Epidemiologists reviewed medical charts twice daily and completed assessment

- Chronic diseases (HTN, DM, dementia)
- 2 scabies cases
- 2 patients with drug withdrawal symptoms
- Supply needs
  - Glasses, walkers, wheelchairs
  - Ostomy bag, CPAP, prescriptions



# NRG Shelter Surveillance Activities

- 20 days of active surveillance
- 24 hour coverage of on-site surveillance station
  - Day shift (7am – 7pm)
  - Night shift (7pm – 7am)
- Nightly cot-to-cot survey
- Daily data abstraction from patient visits to on-site clinics
- Daily monitoring of vaccine administrations and Tamiflu prescriptions in on-site pharmacies



# Daily Cot-to-Cot Survey

- Survey teams were comprised of HCPH Epidemiologists and staff, student volunteers from local universities.
- Just in Time Training before survey and briefing after survey were provided every night.
- Messages regarding services available and health alerts were delivered to residents daily through surveyors during interviews.
- Epidemiologists led survey teams and conducted epidemiological consultations as needed.





# Daily Cot-to-Cot Survey

- Head of household survey – health status, healthcare needs, and other public health concerns for the entire family.
  - Paper survey → → mobile survey done on mobile phone
- Epidemiology consultation – if symptoms of communicable diseases, exacerbation of chronic conditions, or mental health concerns were identified, further consultation would be conducted by an epidemiologist.
- Immediate referral to onsite clinics, education, and isolation were implemented when necessary.



# Daily Cot-to-Cot Survey

- **3,365** evacuees at its peak.
- **3,606** household surveys were completed during 20 days.
- **395** epidemiology consultations were conducted



# Daily Data Abstraction from On-site Clinics

## Monitored for:

- Number of patients seen
- Infectious disease symptoms
  - Fever, diarrhea, vomiting, rash, etc.
- Diagnoses and tests ordered related to communicable diseases
- Chronic disease exacerbations
- Mental health complaints
- Injuries





# Daily Monitoring of Vaccine Administrations and Tamiflu Prescriptions in On-site Pharmacies

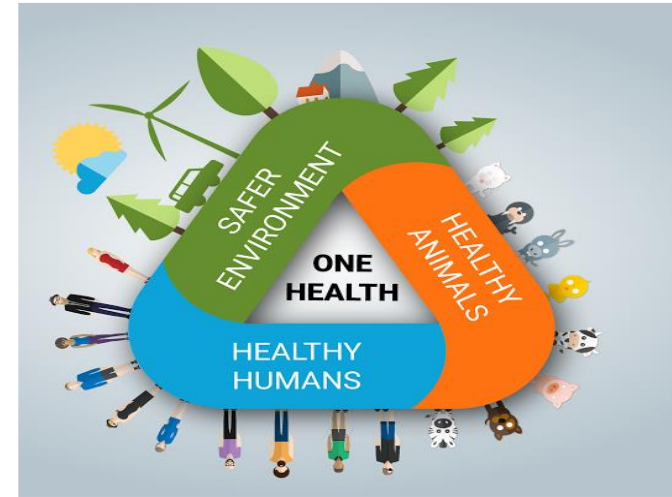
- Walgreens and CVS were on-site to fill prescriptions and provide influenza, tetanus, and other vaccinations.
- A form was provided to document number of prescriptions filled, number of vaccines given, the top 5 prescriptions filled, vaccine supplies
- Hurricane Harvey hit right before flu season
  - Concern for outbreak at the shelter
  - Flu vaccines provided to residents, staff, and volunteers



# One Health Principles

Surveillance & Response Team:  
Epidemiologists, Environmental Sanitarians, Veterinarians, and  
Communication Specialists

- Epidemiology disease surveillance
  - Infectious diseases and outbreaks
  - Exacerbated chronic conditions and mental health issues
  - Bug or mosquito bites; animal bites
  - Control measures to prevent further spread of illness and interventions
- Environmental surveillance
  - Assessment of environmental risks
  - Coordinated hygiene efforts:
    - hand sanitizers throughout dormitory areas
    - ensured proper trash can placement
    - ensured frequent cleaning of common areas including bathroom facilities and eating areas
- Veterinary surveillance
  - On-site animal shelter
  - Assessments of vaccination for pets prior to entry in sleeping areas
- Robust communication efforts included large and ubiquitous signage and messaging for disease prevention placed throughout the shelter



# Surveillance Findings

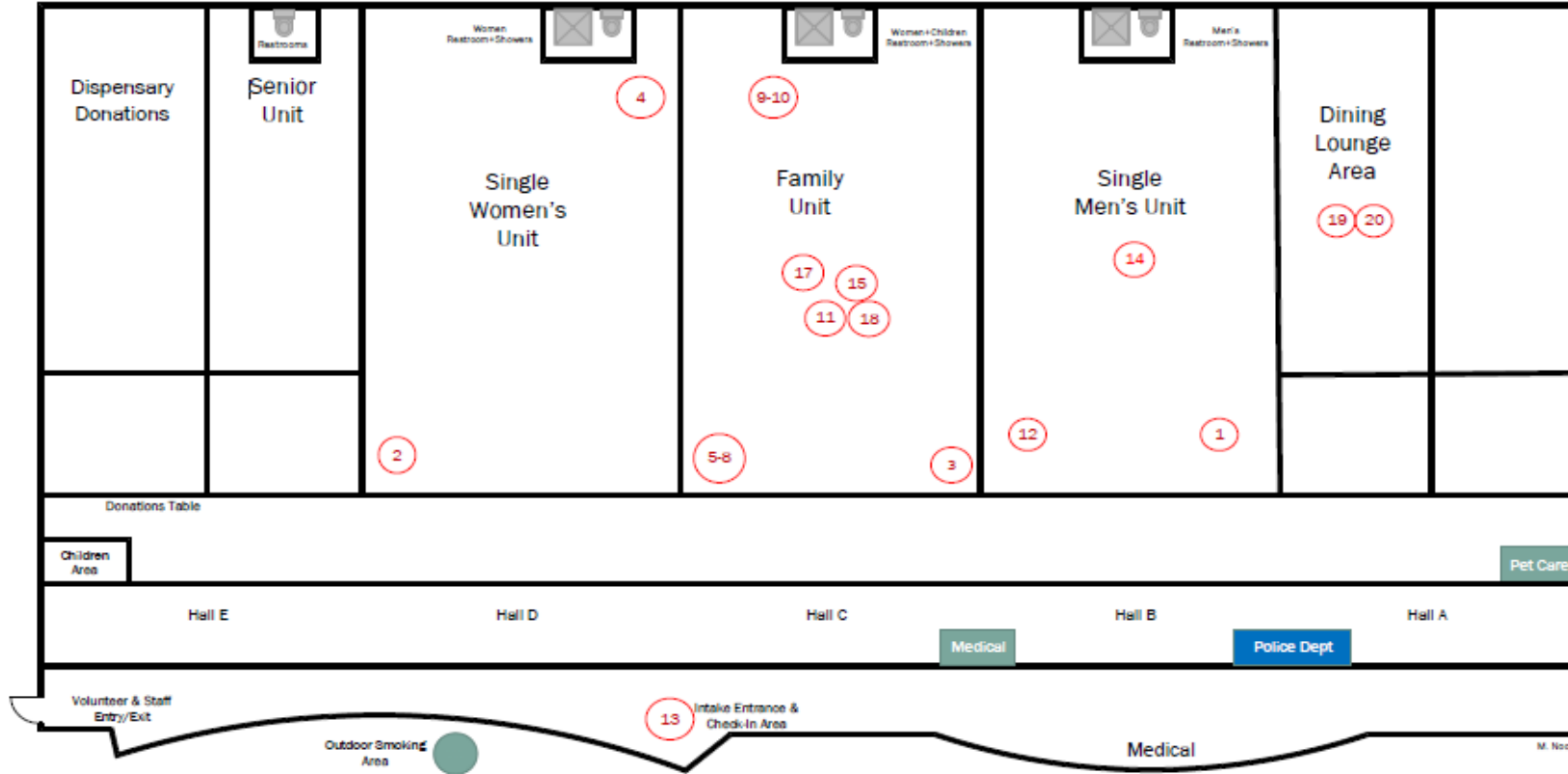
- A Flu A outbreak of 20 laboratory confirmed cases
- A Norovirus outbreak with 4 laboratory confirmed and 1 probable case
- Three isolated cases of strep throat
- A number of residents with mental health issues including one with suicidal ideation
- A number of residents with exacerbation of chronic conditions



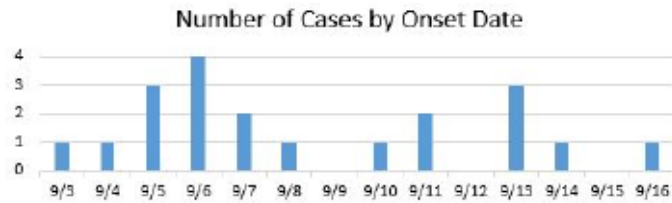
# An Influenza A Outbreak

Figure 1. Locations and Epi Curve of Identified Flu Cases – NRG Mega-Shelter, September 2017

NRG Center Mega-Shelter



Time Period	FLU A/H3 (+) by PCR	By Rapid test	
		A (+)	A & B (+)
	14	5	1



Illness Onset Dates:

- 1. 9/3
- 2. 9/5
- 3. 9/5
- 4. 9/5
- 5-8. 9/6
- 9-10. 9/7, 9/4
- 11. 9/11
- 12. 9/13
- 13. 9/11 (Peace Officer)
- 14. 9/13
- 15. 9/14
- 16. 9/13 (Peace Officer)
- 17. 9/10
- 18. 9/16
- 19. 9/7 (HCPH Staff)
- 20. 9/8 (HCPH Staff)



# Prevention and Control Measures at NRG

- Isolation rooms monitored daily
  - Flu and ILI
  - GI illness
  - Belongings of scabies cases disinfested
- 771 flu vaccines administered to residents, staff, volunteers
- Hand sanitizer and hygiene signage placement throughout shelter
- Bilingual public health service announcements in dormitory areas
- Environmental inspections of the entire facility

Do You Have **Diarrhea**?  
Have You Been **Vomiting**?

• Go to the Medical Station



• Drink a lot of fluids



• Wash your hands often



Please Help Us Keep You Healthy



# Success Achieved

- Timely identification and isolation of patients with influenza-like illness and gastrointestinal illness
- No widespread outbreaks of communicable diseases during the long operation
- Exacerbation of chronic conditions and mental health issues were intervened immediately
- Additional specimens were collected by HCPH surveillance team to confirm the diagnosis
- A mobile survey tool provided flexibility for an easy daily modification of questions and analyses



# Challenges Encountered

- The number of surveyors changed daily depending on the availability of staff and volunteers
- Lack of pre-designed mobile survey tool (development on-site)
- Relatively new staff without sufficient response experience
- Shortage of Epidemiologists
- Simultaneous management of multiple surveillance activities within the community
- Personal hurricane-related losses experienced by HCPH staff



# Acknowledgement

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- HCPH Programs: OPHPR, DCCP, EPH, OCEE, VPH, MCVD, TB
- Houston Health Department
- NRG shelter on-site clinics and pharmacies: Harris County Medical Society Urgent Care Clinic and Pediatric Urgent Care, Baylor College of Medicine/Harris Health Same Day Clinic and Mental Health Clinic, Baptist Child & Family Services, Walgreens, CVS
- Texas Department of State Health Services
- Other Harris County partners
- Other volunteers





# Questions?





# Harris County Public Health

## { Vision }

- Healthy People,
- Healthy Communities,
- A Healthy Harris County

## { Values }

- Excellence
- Compassion
- Flexibility
- Integrity
- Accountability
- Professionalism
- Equity

## { Mission }

- Promoting a Health and Safe Community
- Preventing Injury and Illness
- Protecting You

[www.hcphtx.org](http://www.hcphtx.org)

