Public Health Entomology: There is Always One More Bug

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HCPH Organizational Framework

- 4 Offices: **BREADTH** of application of specific skill sets/expertise broadly across all public health activities:
  - Office of Communications, Education, & Engagement
  - Office of Policy & Planning
  - Office of Public Health Preparedness & Response
  - Operations & Finance

- 5 Divisions: **DEPTH** of expertise on specific programmatic disciplines
  - Disease Control & Clinical Prevention
  - Environmental Public Health
  - Mosquito & Vector Control
  - Veterinary Public Health
  - Nutrition & Chronic Disease Prevention
HCPH serves as the county health department for Harris County (TX) with over 700 public health professionals.

Third most populous county in nation with estimated population of 4.34 million.

Spread over 1,778 square miles (larger than the state of Rhode Island).

Geographically, politically, and socio-demographically diverse and growing.

Home to world’s largest medical center.
What is Public Health?

“What we as a society do collectively to assure the conditions in which people can be healthy.”

-The Future of the Public’s Health in the 21st Century, Institute of Medicine, 2003
Global Issues Constantly on Our Mind

H5N1/H7N9: 2005-16
H5N1: Bird Flu Pandemic May Be Closer than Thought, Study Finds
H1N1: 2009-10
H1N1: Influenza A virus (H1N1) pandemic
Dengue: 2013-present
Yellow Fever: 2016
Measles: 2015
Ebola: 2014-15
MERS-CoV: 2013-15
Zika: 2015-2016
Chagas Disease: 2014-present
Unaccompanied Minors: 2014
Refugee Health: 2016
Chikungunya: 2014-18
Let’s Talk Zika . . .
January 11, 2016 - HCPH Confirms First Texas Zika Case
Multi-Disciplinary Zika Response Team

- OPHPR
- DCCP
- MVCD
- VPH
- EPH
- OCEE
- Ops and Finance
- OPP
- Legal
ONE HEALTH TEAM
- Epidemiology (DCCP Division)
- Veterinary Public Health Division (VPH)
- Mosquito & Vector Control Division (MVCD)
- Environmental Public Health Division (EPH)
HCPH Planned Zika Response Levels

- **Level 4 - Normal Conditions**: No cases of locally acquired Zika in Harris County
- **Level 3 - Increased Readiness**: One or more cases of locally acquired Zika in **one** geographic area within Harris County
- **Level 2 - High Readiness**: One or more cases of locally acquired Zika in **more than one** geographic area within Harris County
- **Level 1 - Maximum Readiness**: Widespread cases of locally acquired Zika throughout Harris County
Culex quinquefasciatus

Aedes albopictus

Aedes aegypti

Culex Mosquitoes versus Aedes Mosquitoes
HCPH Approach to Fighting Aedes

- Understand *Aedes* vector predominance in Texas and Harris County
- Recognize need to shift from primarily *Culex*-based program to incorporation of *Aedes* mosquito as a targeted vector
- Emphasize importance of public education, personal protection, and source reduction as major components in fight against *Ae. aegypti* and *Ae. albopictus*
- Assure principles of “One Health” and health equity are applied to evolving multidisciplinary response

*Aedes albopictus*  
*Aedes aegypti*
Three Maps: The Presence of the Aedes Mosquito Equates to Increased Risk

Source: CDC, presented at ZAP Summit, April 1, 2016

Counties where Aedes aegypti was reported between Jan. 1, 1995, and March 2016. Counties in yellow recorded one year of A. aegypti being present; those shown in orange recorded two years; and those shown in red, three or more years. Centers for Disease Control and Prevention

Mosquito Traps by Type and Operational Area in Harris County, TX

Legend:
- Mosquito Control Operational Areas (268)
- Current Biogens Trap Areas (60)
- Additional Biogens Trap Areas (Pending Funding) (74)
- Gravid Trap Areas (GV) (134)
- Storm Sewer Trap Areas (SS) (134)

Biogens (BG) Sentinel Trap (Aedes)
Gravid Trap (Culex & Aedes)
CDC Storm Sewer Trap (Culex)
Microsoft Smart Trap (Aedes/Culex)
Zika Innovation: Microsoft “Smart” Trap
Microsoft Project Premonition

HCPH Priority Public Health Issues for 2013-2018
Selected for the magnitude of the issue and our ability to make progress in Harris County
Citizen and Service Requests

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Citizen Requests for Operational Area in 2014
Harris County Public Health and Environmental Services Mosquito Control Division

Service Requests 2014
- 1
- 2 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 35
- 36 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- 56 - 60
- 61 - 65
- 66 - 70
- 71 - 75
- 76 - 80
- 81 - 85
- 86 - 90
- 91 - 95
- 96 - 100

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Mosquito-Borne Disease Activity Maps

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HCPH Planned Zika Response Focus Areas

- Emergency Preparedness and Response
- Vector Surveillance and Control
- Legal Review and Authority
- Epidemiology Surveillance & Testing
- Environmental Public Health
- Health Care Provider/Clinical Outreach
- Veterinary Public Health
- Communications and Community Engagement
HCPH Planned Zika Response Activities

Emergency Preparedness and Response

- Coordinate and communicate with Harris County partners regarding HCPH activities relating to Zika virus
- Coordinate and train a multi-disciplinary team (MDT) to conduct epidemiological, environmental, and mosquito assessments when a symptomatic confirmed Zika case is reported within Harris County
- Coordinate response efforts with Office of Emergency Management (OEM) to launch a Joint Information Center (JIC) (for local transmission)

Legal Review and Authority

- Review legal issues relating to the specific vector borne disease to include evaluation of legal powers, insecticide spraying issues, authority to go onto private property, privacy issues, nuisance abatement, and emergency procurement
- Work with Harris County Attorney’s Office to enforce codes/initiate warrants if needed
HCPH Vector Surveillance and Control

- Utilize **mosquito surveillance** using (limited) historical data on *Aedes* combined with (expanded) surveillance including incorporation of predictive modeling within the 268 operational areas.

- Generate **GIS maps** indicating key metrics such as mosquito population density levels of *Aedes*, Zika confirmed mosquito samples, local cases of human infections, and sources of breeding, etc.

- Conduct necessary **staff training** for inspectors, larvicide applicators, and other MC support personnel.

- Acquire **testing** materials and laboratory equipment for mosquito virology laboratory for Zika.

- Work with **partners** and community members on key issues around reducing mosquito habitats.
Field Release: Oxitec Mosquitoes

- Separate, but similar, sites to the Wolbachia sites will be selected based on Ae. aegypti numbers in MCOA in Precinct 4.
- Genetically-altered male Ae. aegypti carrying a lethal gene will be released in these sites.
- Ae. aegypti populations will be monitored.
UK & MosquitoMate
Wolbachia Field Release

Egg cups were placed in high Ae. aegypti areas; eggs were collected for rearing.

These will be used for a male competitiveness bioassay before the Wolbachia releases.

Release sites are selected based on Ae. aegypti numbers in MCOA in Precinct 4. Males carrying Wolbachia bacteria will be released in these selected areas, and populations will be monitored.
Epidemiology Surveillance & Testing

- Evaluate and monitor surveillance data for travel-related cases of Zika and identify emergence of locally-acquired Zika cases and alternate modes of transmission through regular surveillance.

- Monitor clinical outcomes of any women infected during pregnancy, congenital virus diseases, other atypical transmission routes (e.g. sexual transmission), severe disease cases, including Guillain-Barre syndrome.

Health Care Provider/Clinical Outreach

- Disseminate information through the locally-operated Health Alert Network (HAN) regarding Zika national and local surveillance data with suspected modes of transmission and new information when available.

- Work with local clinicians, hospitals, clinics, and other healthcare partners (e.g., blood bank, etc.) on clinical situations including in context of updates to clinical guidance for activities such as handling and testing of specimens, updating Zika testing sites, etc.
HCPH Communications and Engagement

- Conduct disease prevention education, personal protection, and source reduction **campaigns**
- Utilize **media** and other community partners to provide credible information to the public
- Distribute insect repellent and other **prevention modalities** when feasible and appropriate
- Create **messaging** in languages appropriate for affected communities, working with area consulates, etc.
- Conduct door to door education and **outreach** in targeted communities
- Engage federal, state, and local **stakeholders/partners** to coordinate efforts
Outreach Events

- Permanent Exhibit at Houston Museum of Natural Science
- City Of Houston Water Festival
- Earth Day Houston
- HC Precinct 1 Earth Day
- Harris County Public Library
- City of Houston Public Library
- YardWise
- NatureFest
- The Health Museum
Schools, Libraries, Museums and Community Forums

HARRIS COUNTY PUBLIC LIBRARY
ATASCOCITA BRANCH

WIGGLE TALES STORY TIME TUESDAY APRIL 26 - 4PM

HCPH Priority Public Health Issues for 2013-2018
Selected for the magnitude of the issue and our ability to make progress in Harris County
Skeeter School Bus
Radio, Television, Print, Social Media and Web
Importance of Understanding Community HCPH Priority Public Health Issues for 2013-2018

Selected for the magnitude of the issue and our ability to make progress in Harris County
Getting the Word Out About Zika

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Common Effective Repellents

- Deet
- IR 3535
- Picaridin
- PMD
Western Gulf Center for Excellence in Vector-Borne Diseases (1 of 4 in the nation)
Our Partners

HCPH Priority Public Health Issues for 2013-2018
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Thank you