



When Outbreaks Happen in Paradise

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Disclosures

- I have no financial relationships related to this presentation.
- I will not be speaking about any specific commercial product, device, or medication.
- I will not be speaking of any off label use of medications or devices.



Objectives

- Review of two recent major Hawaii State outbreaks and the public health response
 - Dengue 2015–16
 - Hepatitis A 2016
- Understand how fear of disease motivated positive and negative reactions in community



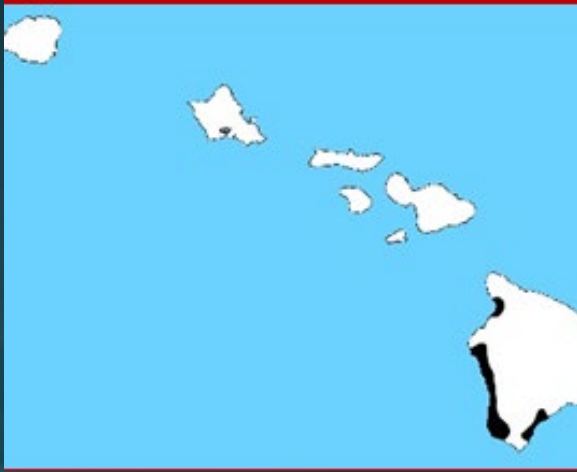
Dengue

A constant threat



Mosquitoes of Concern: *Aedes (Stegomyia)*

- Day biters
- Most competent and ideal mosquito vector, *Aedes aegypti*
 - Females bloodfeed primarily on humans to produce eggs
 - Tropical and subtropical
- *Aedes albopictus*, found statewide
 - Opportunistic, aggressive biter (females) with wide host range (man, domestic, and wild animals)
 - Subtropical but expanding into temperate climates



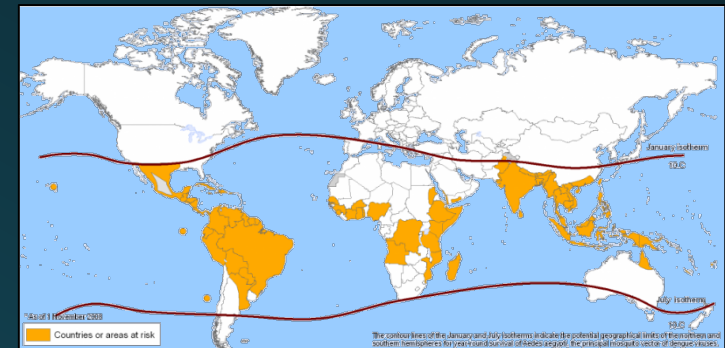
Dengue Epidemiology

- Major global health threat per WHO; rapidly re-emerged, past 20 yrs
- Spread via mobile, viremic humans and rapid rise in urban mosquito populations
 - Unplanned urban overpopulation
 - International travel
 - Poor vector management
- Subtropical and tropical regions



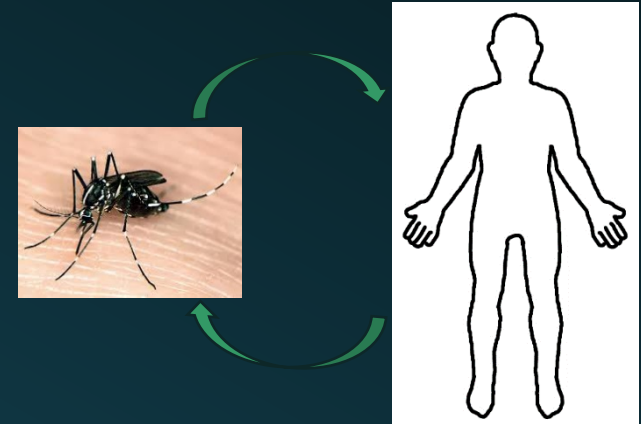
Dengue Epidemiology

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Dengue Epidemiology

- Reservoir: Humans
- Extrinsic incubation in mosquitoes
 - 8–12 days
 - Infected for remainder of lifespan (days–a few wks)
- Intrinsic incubation in humans: usually 4–7 days (range, 2–15)



HI Dept of Health (HDOH) Response to Suspect Case of Dengue Infection

- **URGENTLY NOTIFIABLE** in Hawaii
- Dependent on lab reporting—clinicians rarely report
- Epi notifies Vector
 - Survey residence and other areas of concern—200 yd radius
 - Conduct abatement and source reduction as necessary
- Advise case to stay indoors and avoid mosquitoes



Hawaii Island Outbreak, 2015–16

HDOH notified 21 Oct 2015 about positive dengue IgM result

Initiated investigation

Contacted physician to obtain medical records and history

Located patient to obtain epi history: illness onset 3 wks prior, recovered + no travel off island

Sent specimen to CDC to verify via plaque reduction neutralization test (PRNT)

Hawaii Island Outbreak, 2015–16

- Meanwhile, 24 Oct 2015 non-Hawaii residents with illness compatible with leptospirosis vs. dengue reported to HDOH
 - Specimens routed for testing at HI State Laboratories Division
 - 28 Oct 2015, confirmed positive for dengue by RT-PCR
- 29 Oct 2015:
 - Sent medical advisory to Hawaii healthcare providers
 - Distributed press release

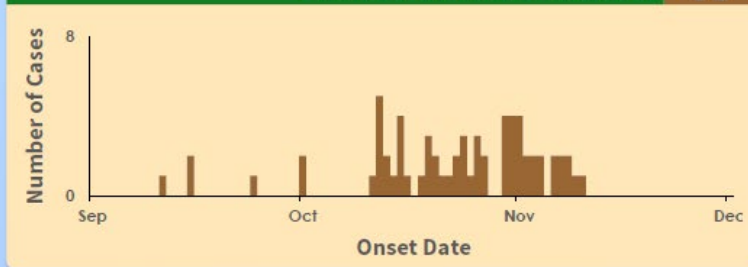


Hawaii Island Outbreak, 2015–16: Maps?

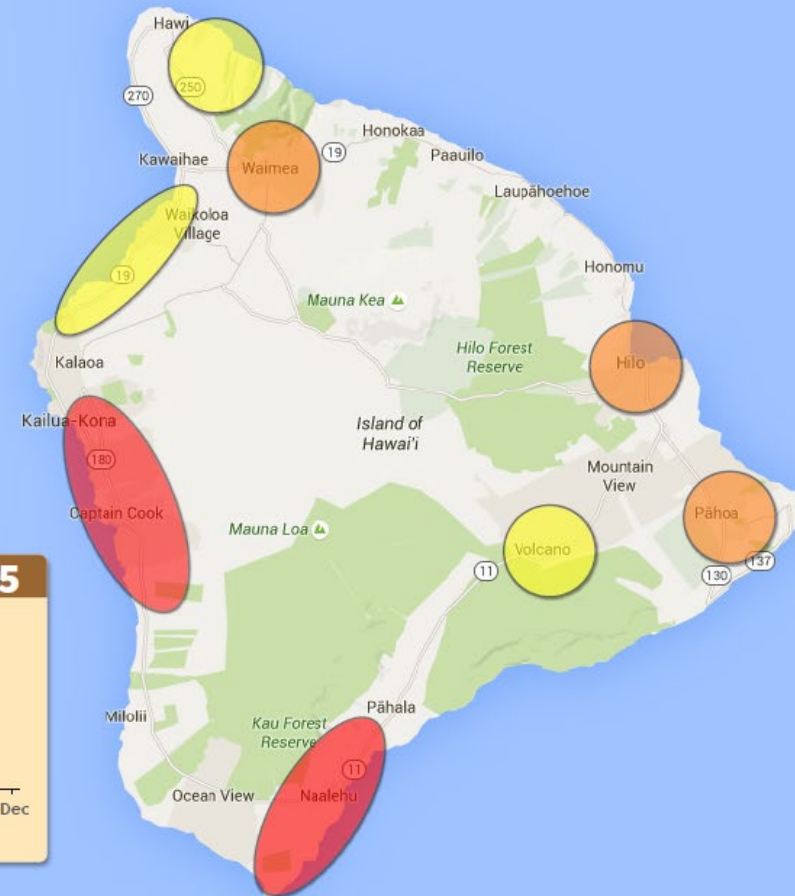
Possible Areas of Infection by Mosquito for Confirmed Dengue Fever Cases

As of November 17, 2015

Total number of confirmed cases **65**



HDOH preliminary data - subject to change pending new information



Map data ©Google

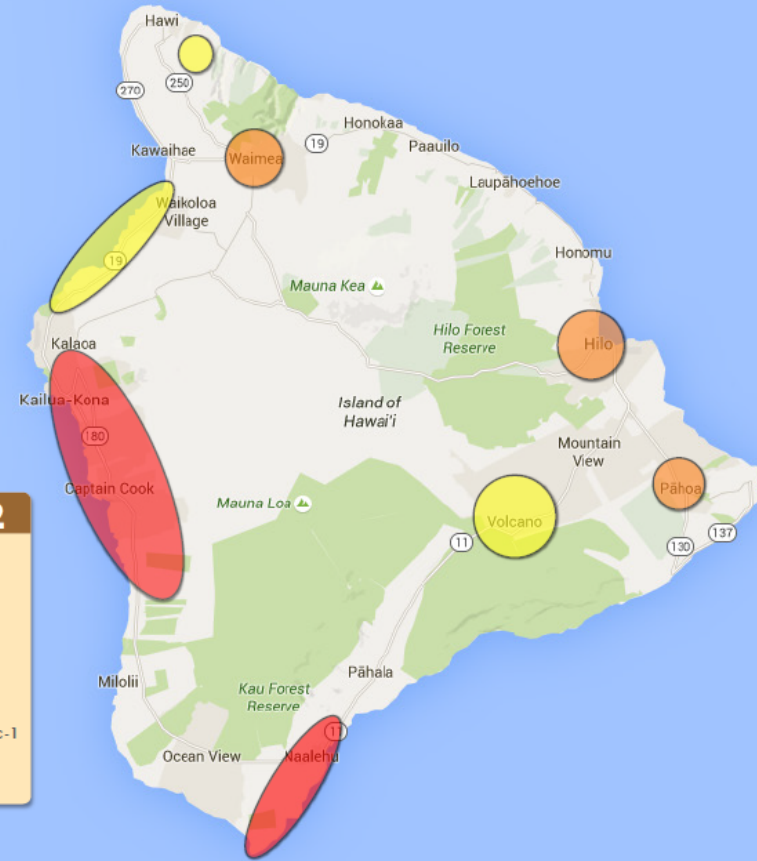
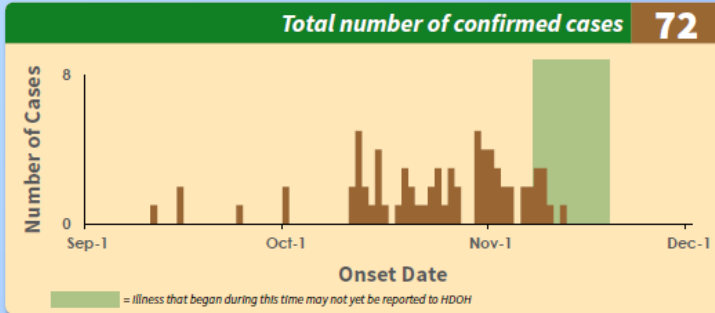
Risk level for possible dengue infection: ● High ● Moderate ● Low



How about this?

Possible Areas of Infection by Mosquito for Confirmed Dengue Fever Cases

As of November 18, 2015
(HDOH preliminary data - subject to change pending new information)



Map data ©Google

Risk level for possible dengue infection: ● High Risk ● Moderate Risk ● Some Risk



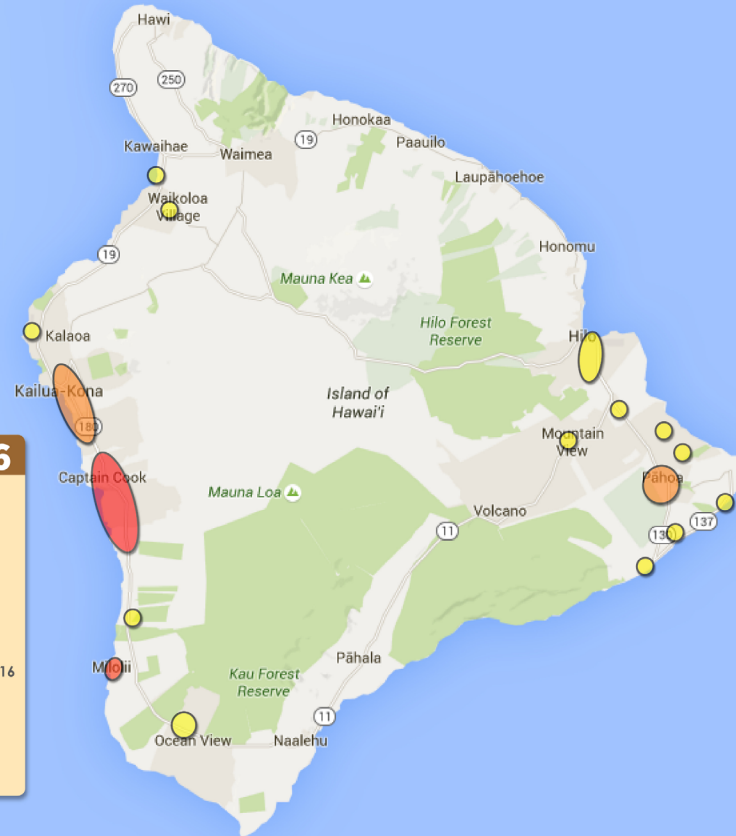
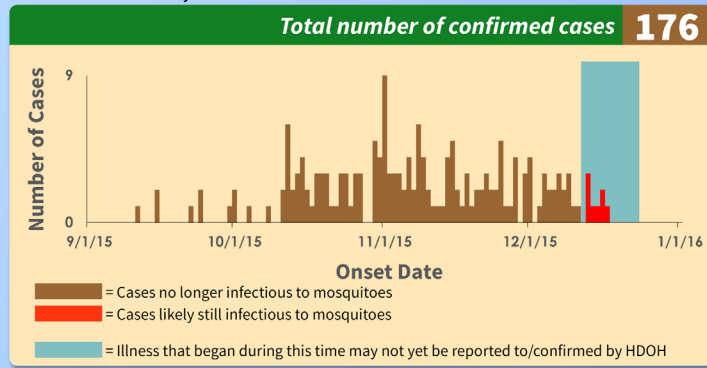
Risk levels of areas where confirmed cases may have contracted dengue fever are determined by factors including the number of confirmed cases that reported visiting those areas, as well as observed mosquito activity. Individuals should always protect themselves against mosquitoes and mosquito bites island-wide; extra precaution should be taken in areas of risk. For more information on dengue fever and ways to protect yourself from mosquitoes, visit: <http://health.hawaii.gov/docd/dengue-outbreak-2015/>



Work in Progress...

Risk Areas for Potential Dengue Infection Hawaii—2015

As of December 23, 2015



Map data ©Google

Risk levels for potential dengue infection*: ● High Risk ● Moderate Risk ● Some Risk

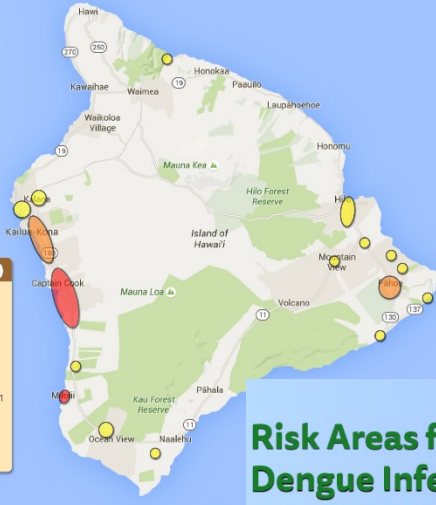
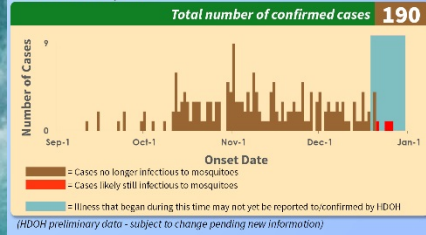


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Risk Areas for Potential Dengue Infection Hawaii—2015

As of December 30, 2015



Map data ©Google

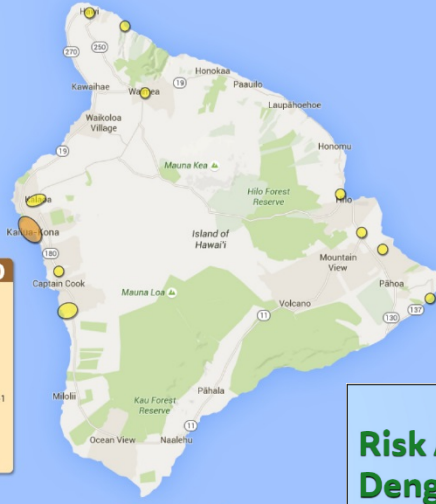
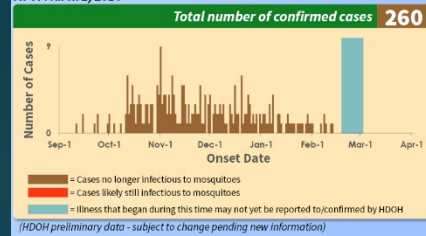
Risk levels for potential dengue infection*: High Risk Moderate Risk Some Risk



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Risk Areas for Potential Dengue Infection Hawaii—2015-2016

As of March 2, 2016



Map data ©Google

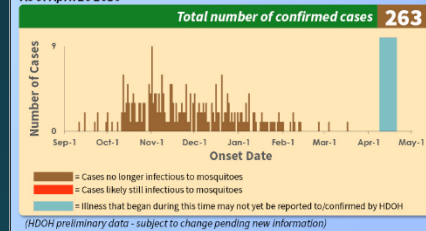
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Risk Areas for Potential Dengue Infection Hawaii—2015-2016

As of April 20 2016



Map data ©Google

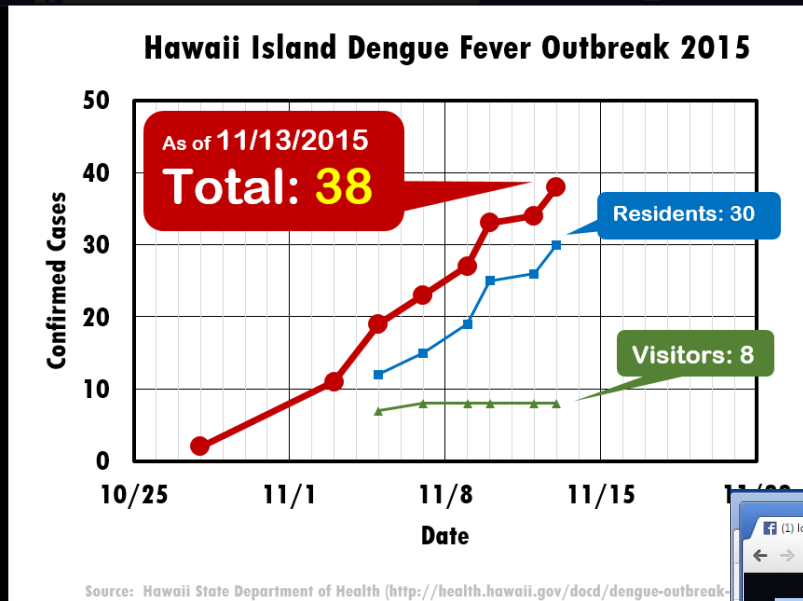
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Social Media and Public Interpretations of Data



Lower Puna Infographics by Dr. Mark Kimura
Page Liked · November 13 · Edited

(There was a typo within the graphic I posted 1 hour ago.)

Dengue Fever Outbreak Update (11/13). There are now 38 confirmed cases. As you can see in the figure, the increase has been coming from just the residents for the past five days.

This may not look like the most interesting chart now, but it will help us monitor whether/when the increase is slowing down. If you haven't seen the video on Big Island Video News, I strongly suggest you do (If you don't have 80 minutes to watch the whole thing, at least watch the first video clip and skip the first 11 minutes, or follow this link: youtu.be/6ICKGYEcaW0?t=11m).

Source: health.hawaii.gov/doc/d/dengue-outbreak-2015/

Like · Comment · Share

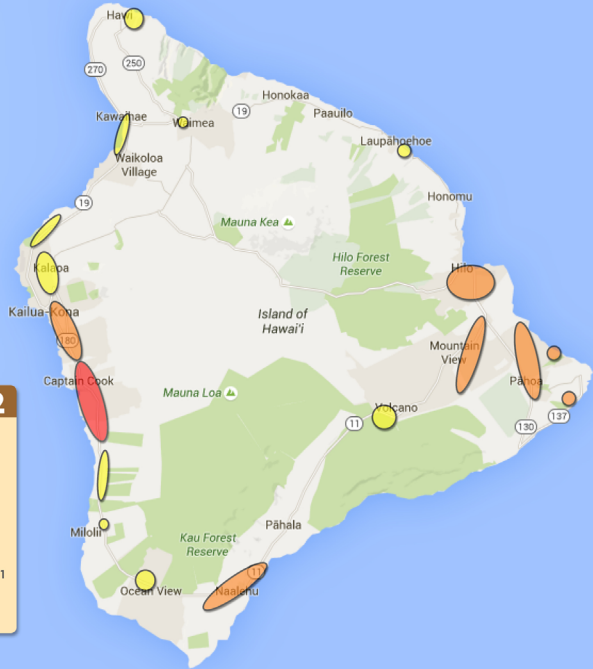
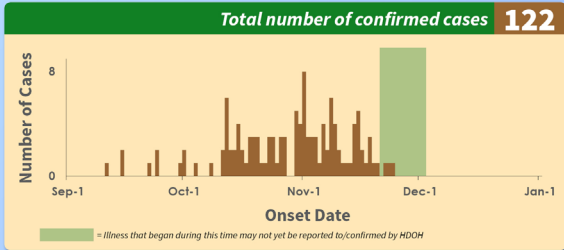
Pat Hickey Rechtman, Jennifer Hussong and 12 others like this.



Mapping Outbreaks in Future

Potential Areas of Infection by Mosquito for Confirmed Dengue Fever Cases

As of December 2, 2015
(HDOH preliminary data - subject to change pending new information)

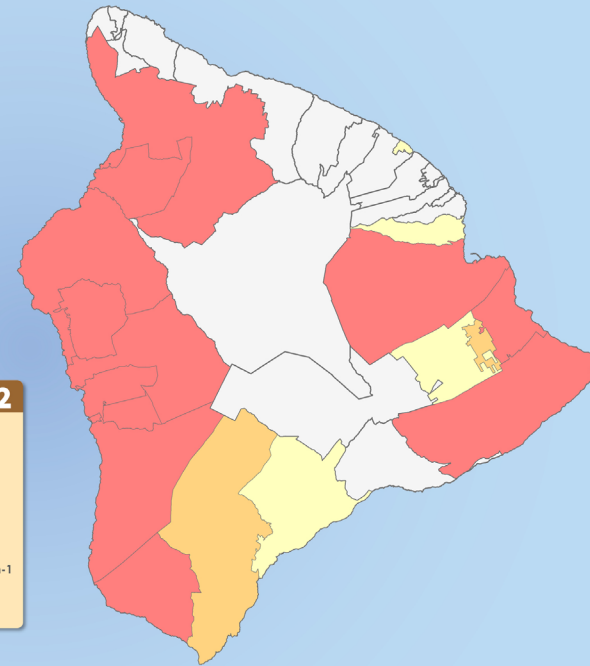
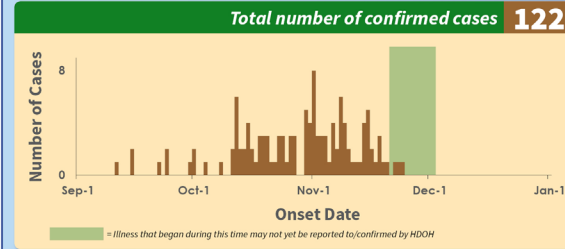


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Hawaii Island Outbreak, 2015–16: Outcome

- As of 26 April 2016, evaluated 1,907 persons for dengue infection
- Confirmed 264 (14%) with laboratory positive dengue infection
 - 238 Hawaii Island residents (90%), 26 visitors—all from out of state
 - 218 adults (83%), 46 children—under age 18 yrs
 - Onsets of illness ranged from 9 Sept 2015–17 Mar 2016
 - 37 (14%) hospitalized (median stay, 2 days)
 - No cases with severe dengue



Hawaii Island Outbreak, 2015–16: Outcome

- DENV 1 identified as outbreak type
- During outbreak period, identified unrelated imported cases:
 - Dengue (16)
 - Chikungunya (2)
 - Zika (5)

Origin of Imported Dengue Cases in Hawaii, 2011–2015

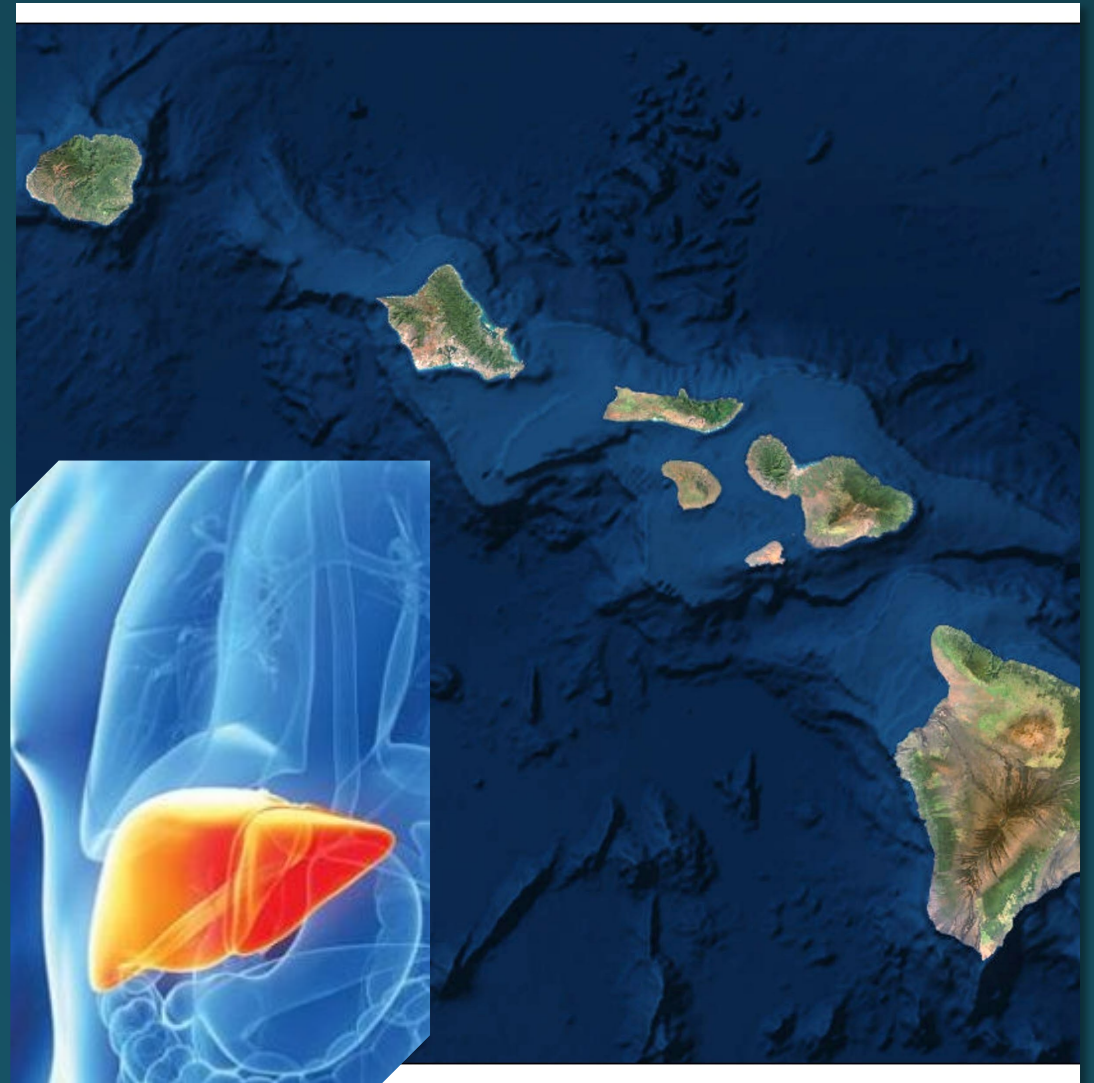
Year	No. of Cases	Import Countries
2011	7	Philippines, Bangladesh, Guatemala, Thailand, Puerto Rico
2012	7	Philippines, Singapore, Costa Rica, Haiti, Indonesia
2013	10	Philippines, Puerto Rico, Indonesia, Brazil, Kiribati
2014	14	French Polynesia, Indonesia, Thailand, Philippines, American Samoa, Fiji, Tonga, Japan
2015	16	Philippines, Brazil, French Polynesia, Indonesia, Burma, Cambodia, Thailand, American Samoa

Unpublished Hawaii Department of Health data.



Hepatitis A

How safe is the food you eat?

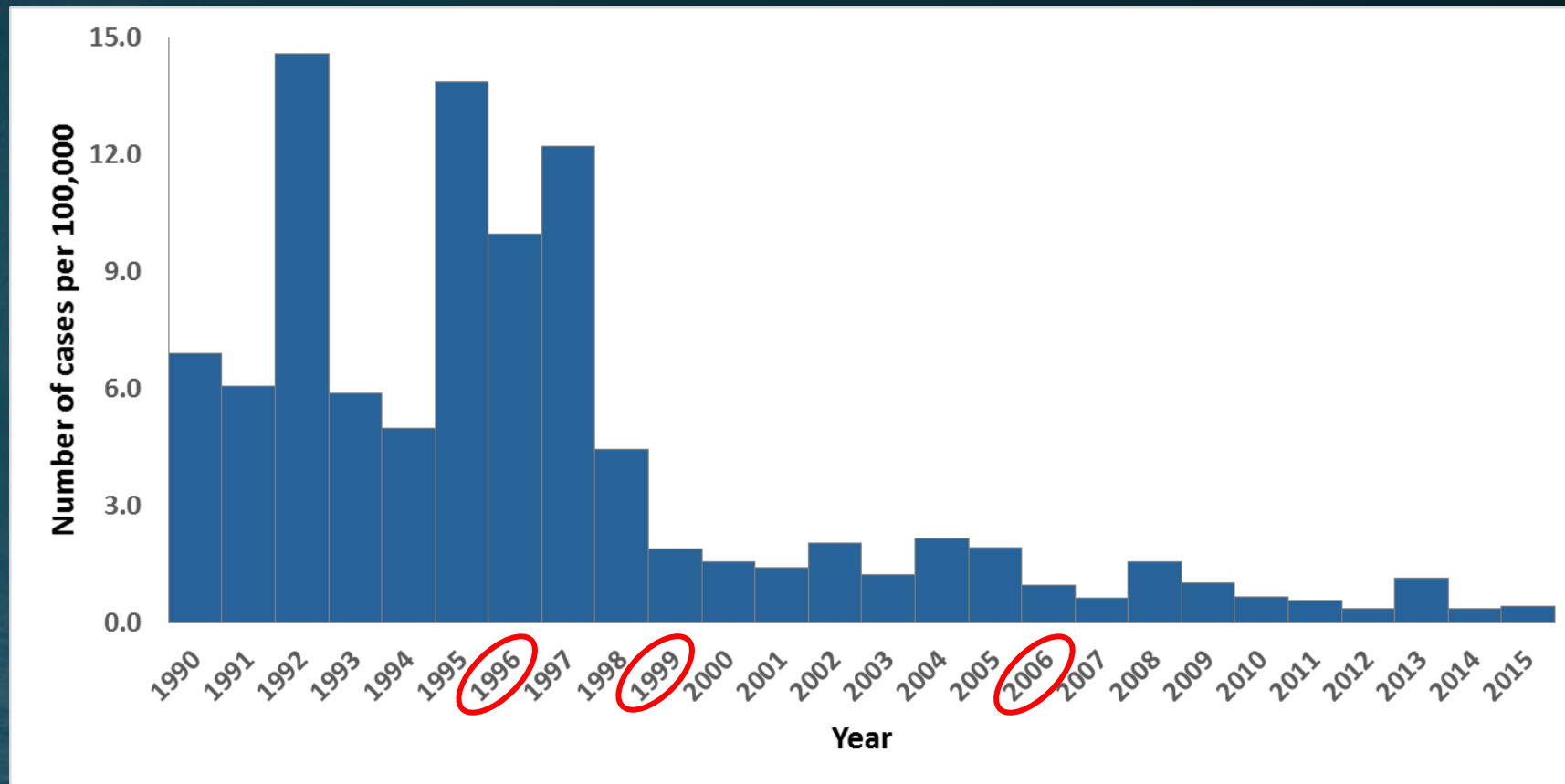


Hepatitis A Virus (HAV)

- Transmission fecal-oral
- Average incubation period (time from infection to symptoms), 28 days (range 15–50 days)
- Infectious period
 - 1–2 wks before symptoms begin until 1 wk after onset of jaundice (yellow skin)
 - Babies and young children shed longer—up to 10 wks after illness onset
- Vaccine preventable! (licensed in 1995)



Number of Reported Hepatitis A Cases per 100,000 Population by Year (Hawaii, 1990–2015)



Unpublished Hawaii Department of Health data.



HI Dept of Health (HDOH) Response to Suspect Case of Hepatitis A Infection

- **URGENTLY NOTIFIABLE** in Hawaii
- Recommend prophylaxis for those non-immune and if within 2 wks after exposure
- Exclude:
 - Persons with HAV infection from food-handling and direct-care occupations for first 2 weeks of illness and at least 7 days after onset of jaundice
 - Food handlers, if they are contacts, from work until demonstrate neg IgM anti-HAV
 - Children (i.e., in diapers) with HAV infection from preschool x 10 days after illness onset



Hepatitis A Outbreak—Hawaii, 2016



20–27 Jun 2016, DOH alerted to 4 separate persons from different parts of Oahu with positive IgM anti-HAV and acute hepatitis symptoms—*laboratory reports*

Initiated investigations for each: no history of vaccination, no history of travel

By 29 Jun 2016, 2 more cases reported—both from Oahu

30 Jun 2016, sent medical advisory to Hawaii healthcare providers

1 Jul 2016, issued press release

Unpublished Hawaii Department of Health data.





Employee at Chart House Restaurant infected with Hepatitis A

The Hawaii State Department of Health has confirmed an additional case of hepatitis A in a food service employee on Oahu.



Tamashiro Market worker tests positive for hepatitis A

State health officials confirmed an additional case of hepatitis A on Oahu in a food service worker at Tamashiro Market, located at 802 N. King St. in Honolulu. The employee worked from July 2 through July 23.



Hawaiian Air, Chili's employees test positive for Hepatitis A

Tom Atchison just got off a flight from Oakland. He was surprised to hear that a Hawaiian Air crew member recently tested positive for Hep A, but he wasn't overly concerned. "Every time you fly you put yourself in a sardine can with a couple hundred people, there's always risks when you fly. I usually get a cold or flu. Hope no Hep A, right?" Atchison said, Health officials stress no infections have been linked to the exposure, but as a

precaution, Hawaiian is working...



Hepatitis A confirmed for Chili's Kapolei, Hawaiian Air employee

State health officials confirmed on Tuesday two new cases of hepatitis A for a food service employee at the Chili's restaurant in Kapolei and a Hawaiian Airlines flight attendant.



See How to Cleanse Your Liver

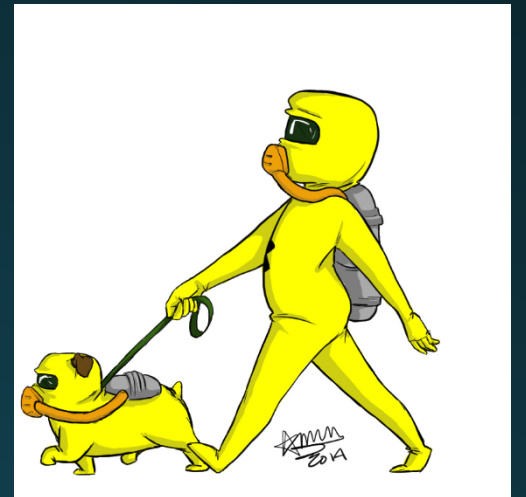
1MD.org

This Doctor Urges His Patients to Make This Simple Change to Their Routine



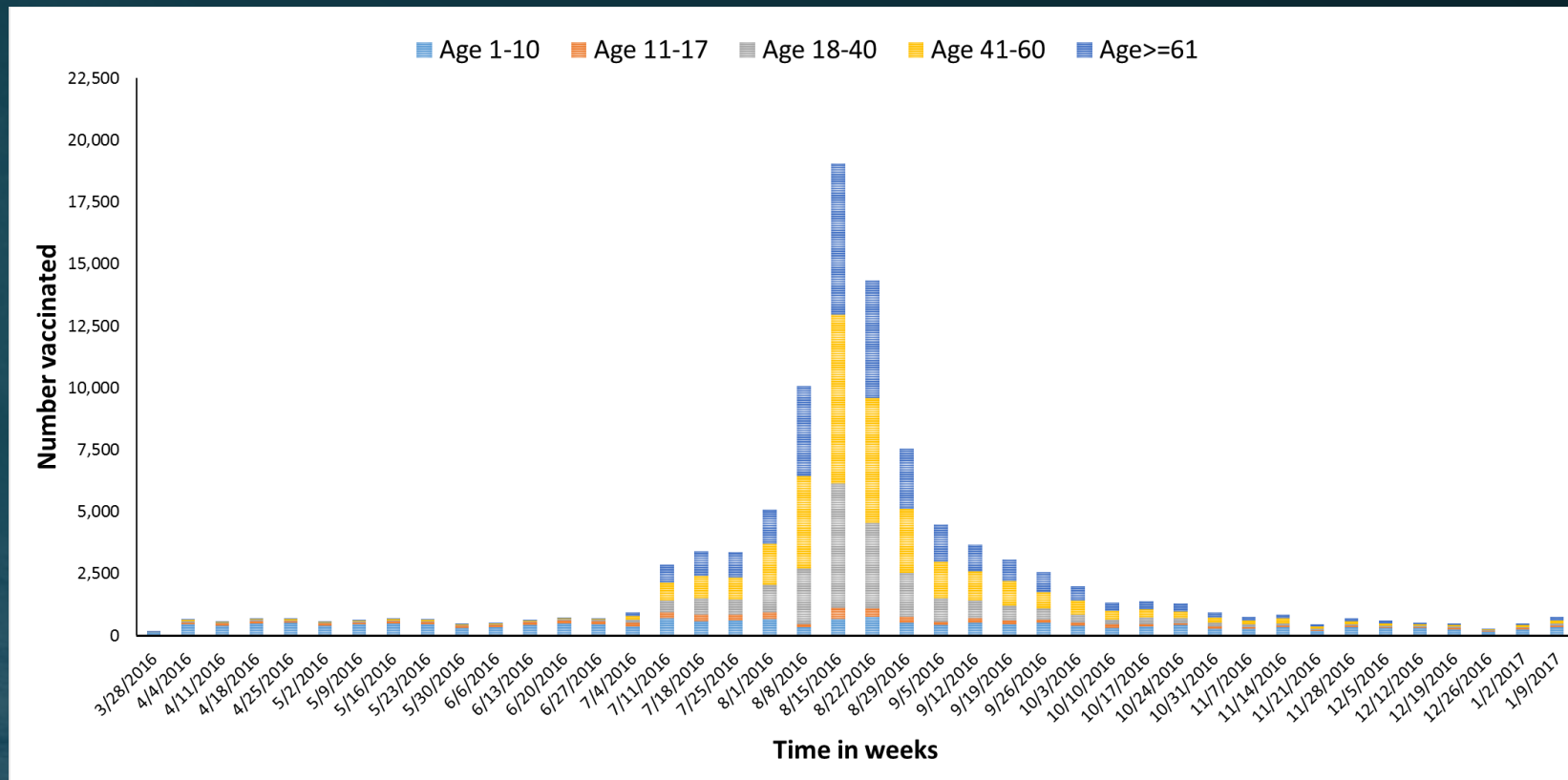
Hawaii hepatitis A cases increase to 31

Additional cases of hepatitis A infection have been reported to the Hawaii State Department of Health, increasing the number of confirmed cases to 31, according to a press release.



Fear Can Motivate: Weekly HAV Vaccination Data

Hawaii Immunization Registry, 28 March 2016–15 January 2017



Unpublished Hawaii Department of Health data.



Lots of Signals, but What's Real?— Leveraging Fear/Attention

- Plenty of numerators, no denominator, no background
- Launched online survey, 10–16 August 2016, to estimate baseline commercial food consumption behaviors
- Included national and Hawaii-specific grocery retailers and chain restaurants frequented in previous 7 weeks
- 5,886 responses—5,422 from island of Oahu
- 25% of respondents reported exposure to Restaurant Chain A in preceding 50 days, compared with 94% of HAV cases



Viray MA, Hofmeister MG, Johnston DJ, ...Park, SY. Public health investigation and response to a hepatitis A outbreak from imported scallops consumed raw—Hawaii, 2016. *Epidemiol Infect.* <https://doi.org/10.1017/S0950268818002844>. Published online: 17 October 2018



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Hepatitis A Outbreak—Hawaii, 2016

- Confirmed 292 persons infected with HAV
 - Illness onsets range from 12 June–9 October 2016
 - 74 (25%) required hospitalization
 - All Oahu residents except:
 - 11 from Hawaii Island, Maui, or Kauai
 - 7 Visitors from mainland or overseas with Oahu Exposure
- One unique strain

Viray MA, Hofmeister MG, Johnston DJ, ...Park, SY. Public health investigation and response to a hepatitis A outbreak from imported scallops consumed raw—Hawaii, 2016. *Epidemiol Infect.* <https://doi.org/10.1017/S0950268818002844>. Published online: 17 October 2018



Hepatitis A Outbreak—Hawaii, 2016: Outcome

- Embargoed scallops evening of 15 August 2016
- Closed all Genki Sushi restaurants on Oahu (10) and Kauai (1)
- Distributed press release on 16 August 2016
- 50-day maximum incubation period from date of embargo lapsed on 4 October 2016
- Continued to monitor for and investigate cases presenting late and potential secondary cases



Some Lessons Learned

- Communication and collaboration critical
- Establish data sharing agreements/understanding in advance or as soon as possible
- Fear of disease perennial—can drive response but consider leveraging to public health advantage





Mahalo!