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Understanding stakeholder knowledge, attitudes and practices surrounding mosquito control and dengue in emergent areas in the southern United States: a case study from Key West, FL

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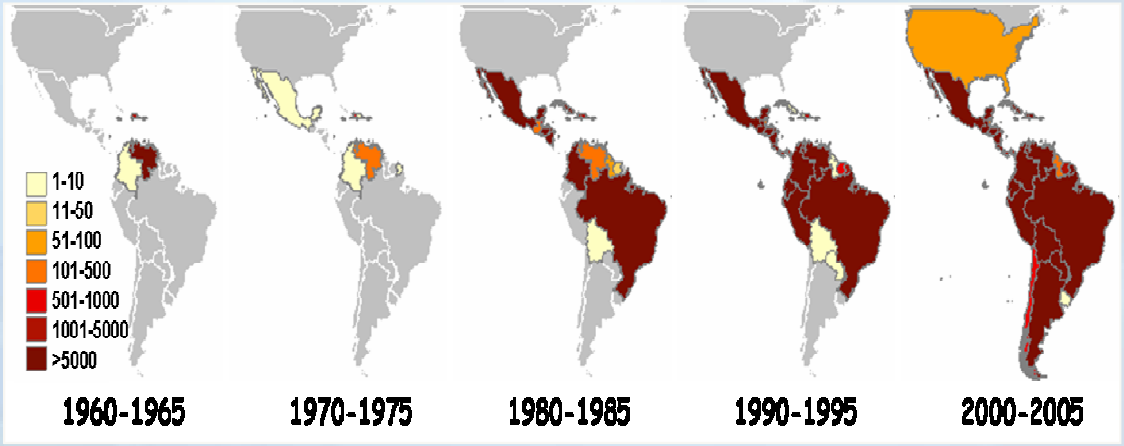
Dengue Fever

- Dengue Fever and Dengue Hemorrhagic Fever are caused by dengue viruses transmitted by *Aedes* mosquitoes
- Annually, 100 million people contract dengue worldwide (new research published this week in *Nature* estimates 390 million annually)
  - 500,000 people develop severe dengue hemorrhagic fever every year
  - No approved vaccine available
  - Increasing number and severity of cases in the Americas…



Source: WHO DengueNet

Aedes aegypti

- Primary dengue virus vector and human commensal; oviposits in artificial containers
- Containers can be rain-filled (tires; discarded items) or filled manually (potted plant bases; buckets; 55 gallon drums)
- Manually filled containers provide oviposition sites even in times of drought
- Even with ‘reliable’ piped water, people store water
- Community engagement in household level control is only method for reduction of mosquitoes in resource strapped regions

Dengue in the U.S.

- **In the last few decades, *Ae. aegypti* populations have resurged in the southern United States.**
  - outbreaks of dengue in the past decade in Brownsville, TX[1] and Key West, FL[2] while others such as Tucson, AZ[3] remain dengue-free despite adjacent transmission in Mexico and established vector populations.
- **Prevention of outbreaks of dengue requires community awareness and vigilance in *Ae. aegypti* population reductions.**
  - Understanding factors that are associated with maintaining community awareness and vector control activities following an outbreak can assist in the development of prevention strategies
  - Understanding the baseline awareness of dengue in pre-emergent communities can inform educational campaigns.

1. Ramos et al. 2008
2. Radke et al. 2012
3. Hayden et al. 2010

Study Site – Key West and Stock Island, FL pop. ~ 24,900

Study Methods

- ***Stakeholder Study Design:***
  - SurveyMonkey internet survey designed in collaboration with the Monroe County Department of Health and sent to their contacts. 36 respondents were surveyed in Key West from among businesses, mosquito control, public health, chamber of commerce, etc.
- ***Household Level Study Design:***
  - A cross-sectional survey design was implemented in Key West, FL and Stock Island, FL (June/July 2012) and in Tucson, AZ (August 2012). Key West survey was designed together with both FL and Monroe County Departments of Health, pre-tested multiple times in the field, and 400 households were surveyed in each location. (FL and AZ)
- ***Physician Survey Design:***
  - SurveyMonkey internet survey designed with Monroe County Dept. of Health and sent to Key West and Stock Island physicians

Stakeholder survey

Organizations involved in dengue prevention participating in stakeholder survey (n=36 respondents)

- **Federal, state, and county governments**
- **Non-profit organizations**
- **Law enforcement**
- **Tourism**
- **Academic**

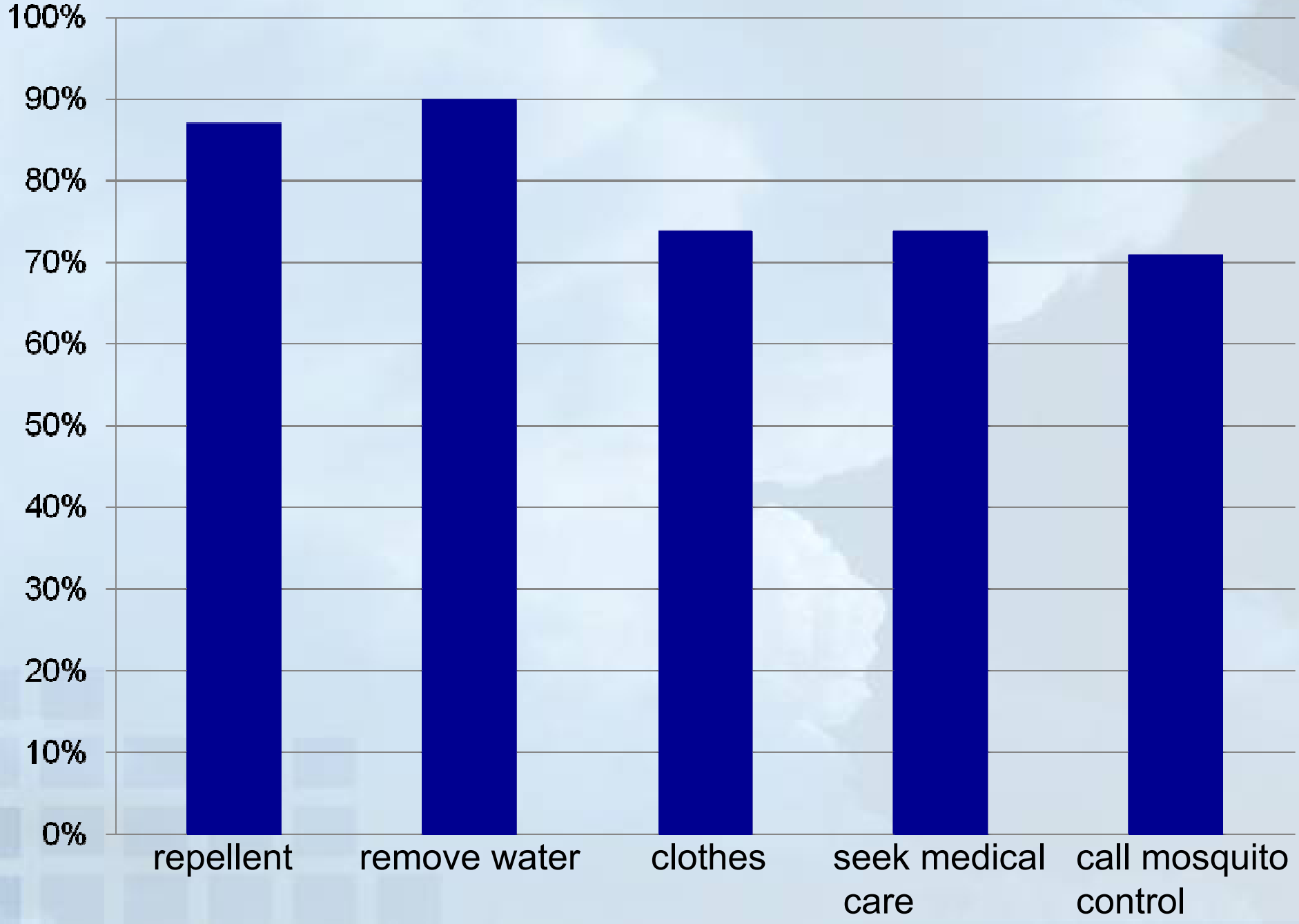
- **The majority were involved in public health, education and outreach (n=25) followed by community based programs. Specific services included:**
  - dengue surveillance (60%)
  - communication to the public (69%)
  - communication to other community based organizations (66%)

Efficacy of activities during outbreaks (stakeholders)

- **Respondents were asked how effective the following were on a scale of 1-5, where 5 is most effective:**

- **Mosquito control inspections: 4**
- **Dengue surveillance: 4**
- **Communication of messages to public via radio/newspaper: 4**
- **Community outreach (e.g., door hangers): 3.9**
- **Keys Action to Break the Cycle of Dengue (ABCD) partnership: 3.8**
- **ABCD newsletter: 3.5**
- **Community clean-up activities: 3.4**
- **Mosquito control TV show: 2.9**

Stakeholder recommended actions to householders to prevent dengue

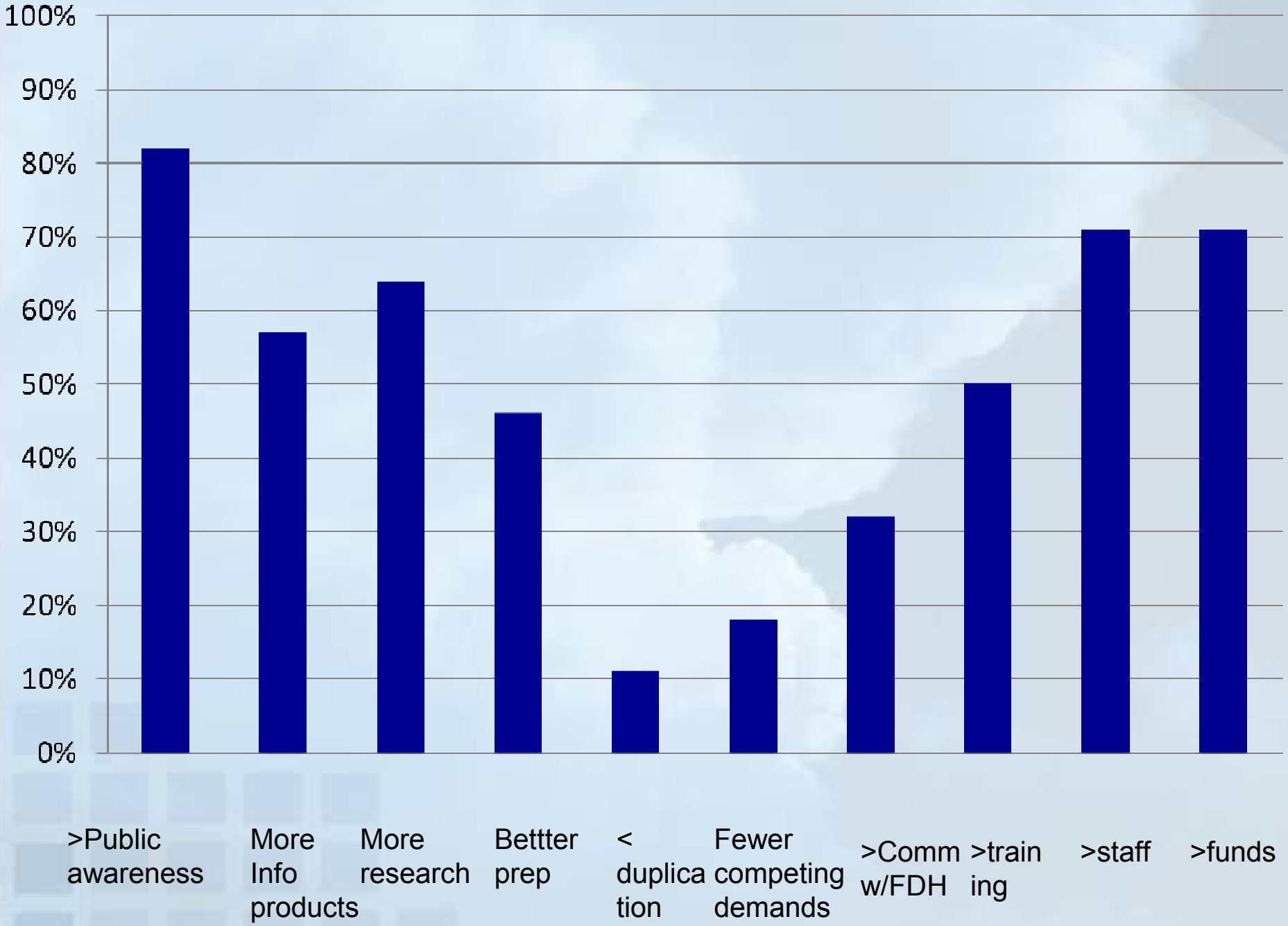


Factors contributing to population vulnerability (stakeholders)

- **"How vulnerable to dengue are residents of KW when you consider the following local concerns?" (scale of 1-5, where 5 is most vulnerable)**

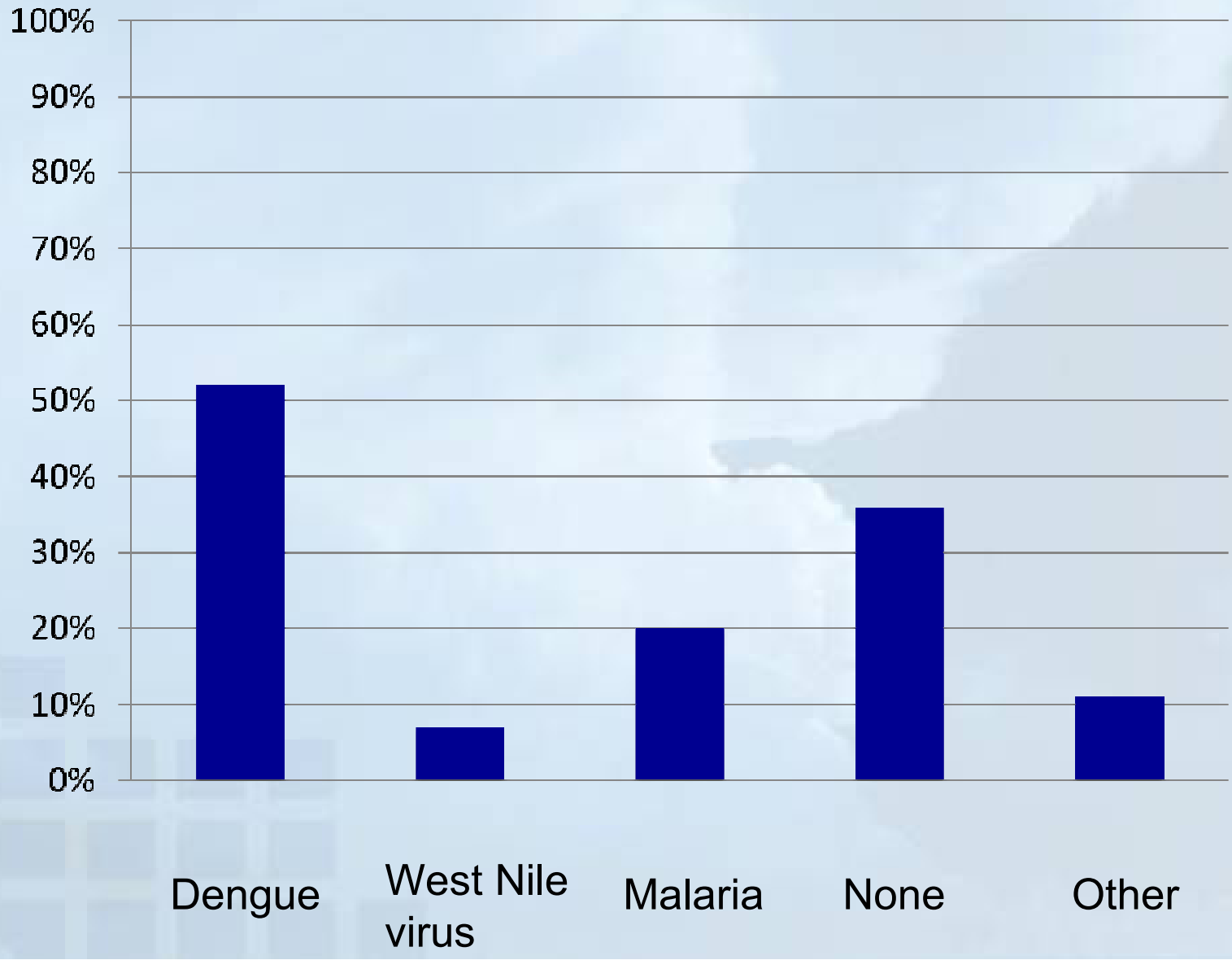
- **Local climate: 4.3**
- **Island lifestyle: 4**
- **Homeless population: 3.9**
- **Housing infrastructure: 3.7 (density, screens, etc.)**
- **SES: 3.5**
- **Proportion of population with language/cultural issues: 3.5**
- **Lack of access to medical care: 3.3**
- **Lack of financial resources for preparedness and response: 3.2**

What would help your organization better protect clients against dengue? (stakeholders)

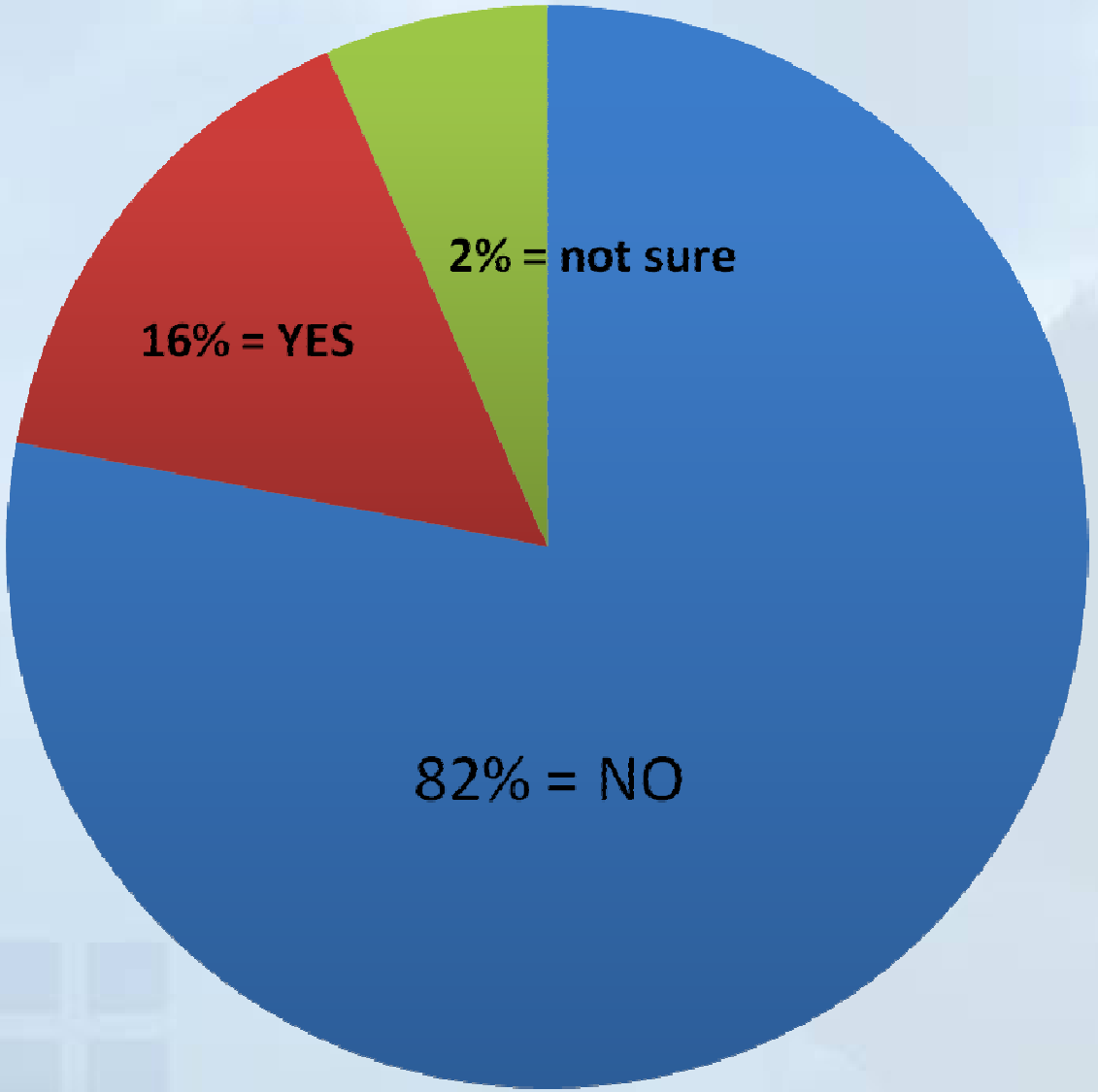


Household Survey

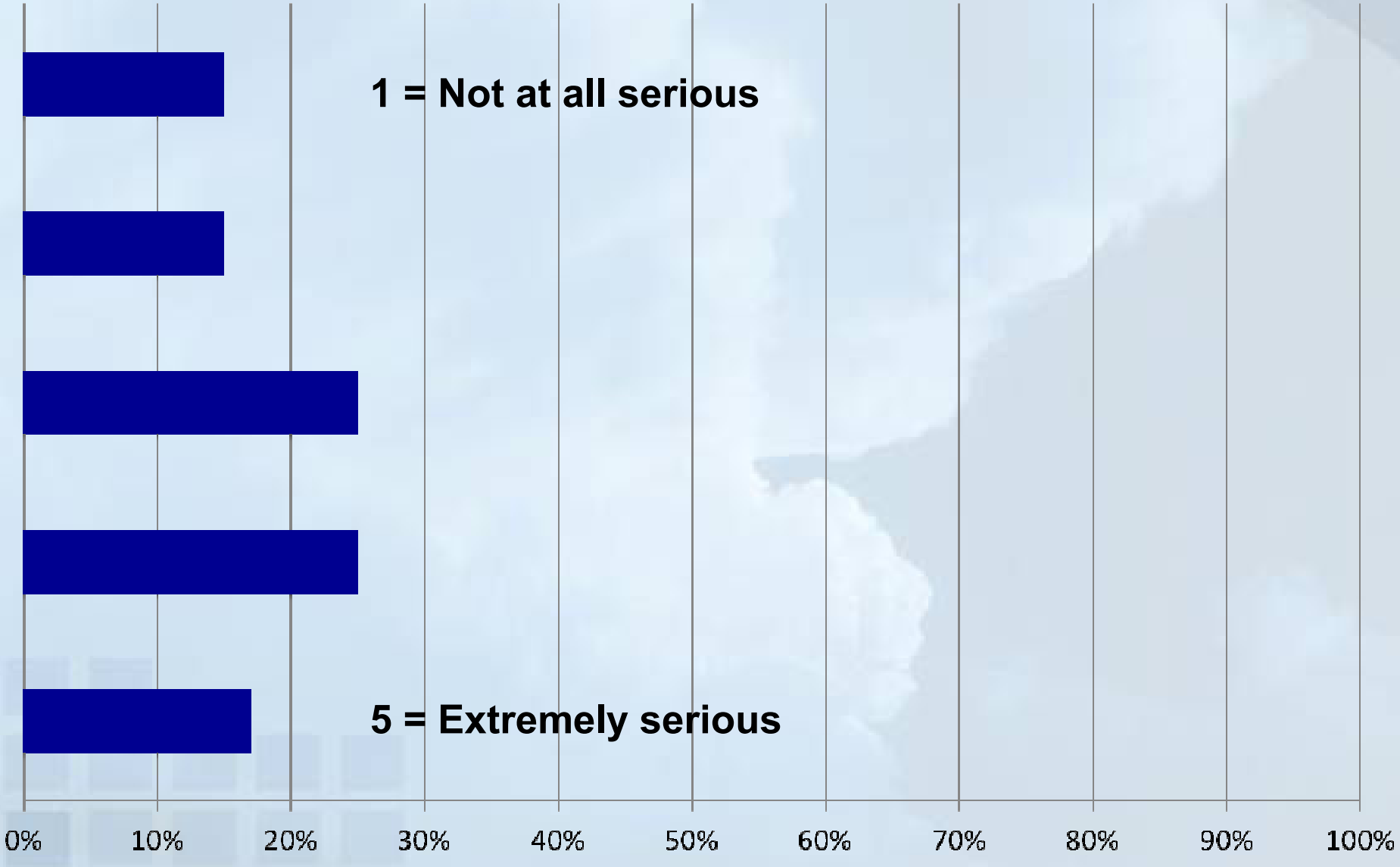
Do you know of any diseases that are transmitted by mosquitoes in the Keys? (households)



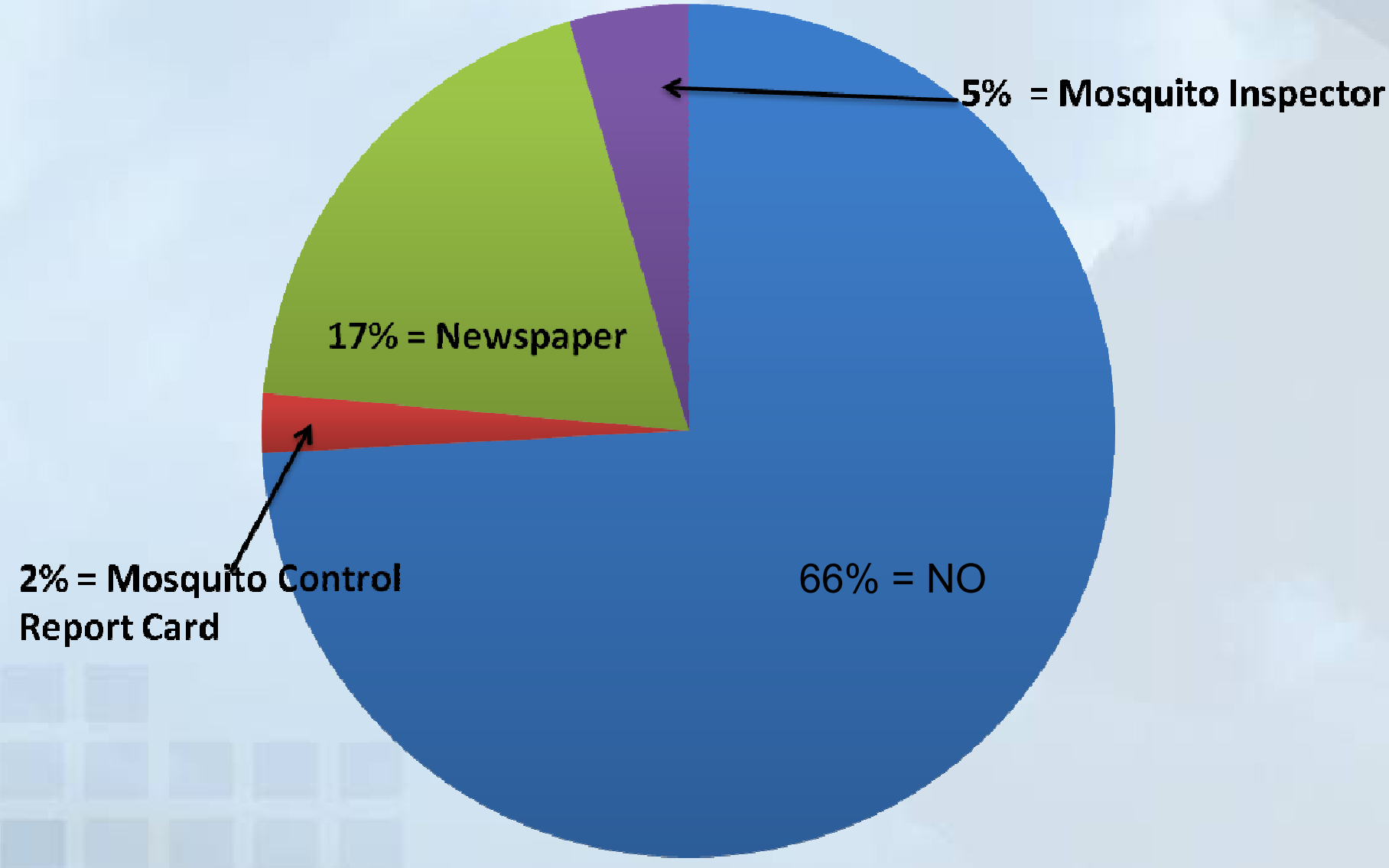
Have you heard of the ABCD? (households)



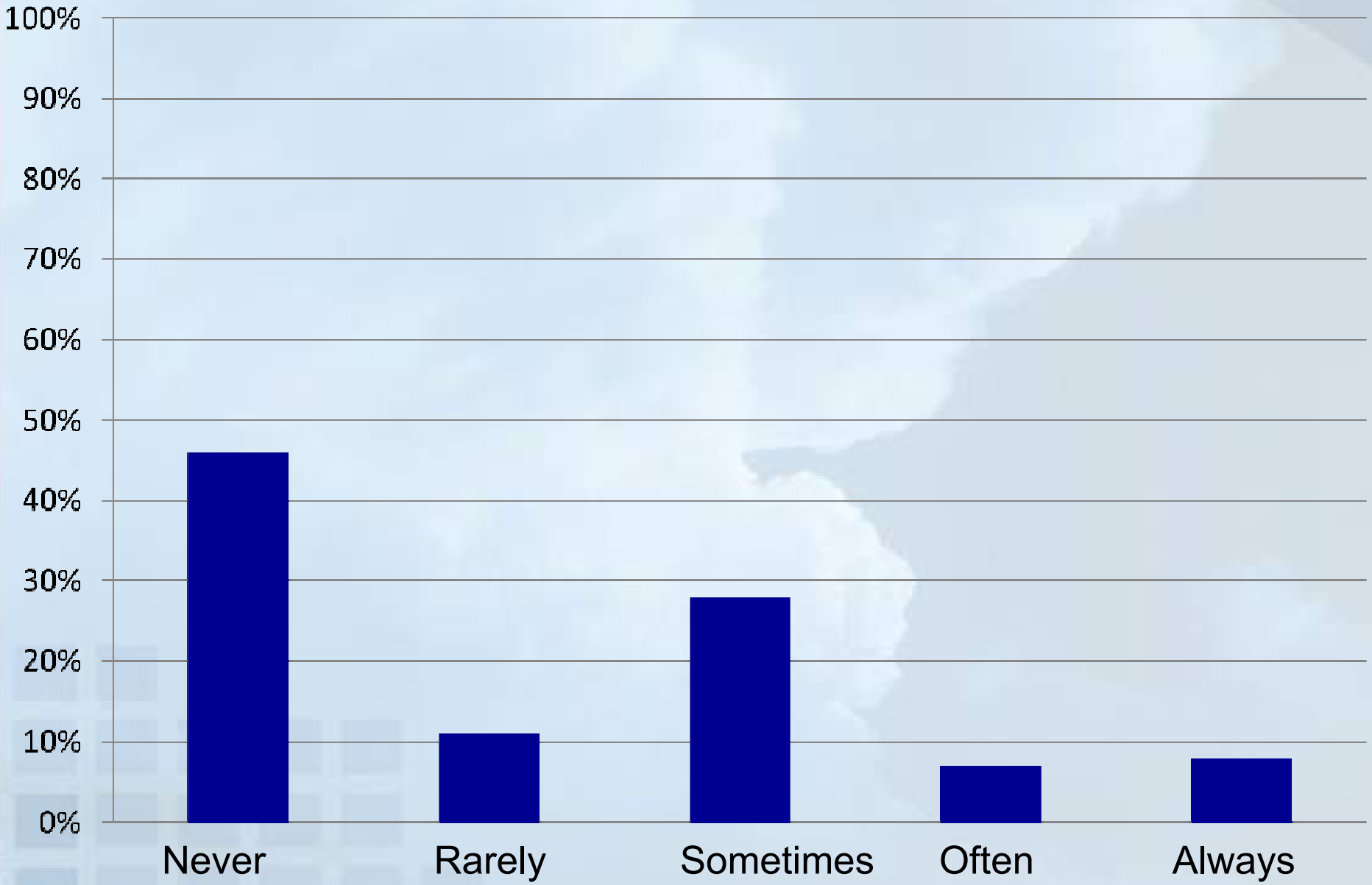
How serious a problem is dengue for the Keys? (households)



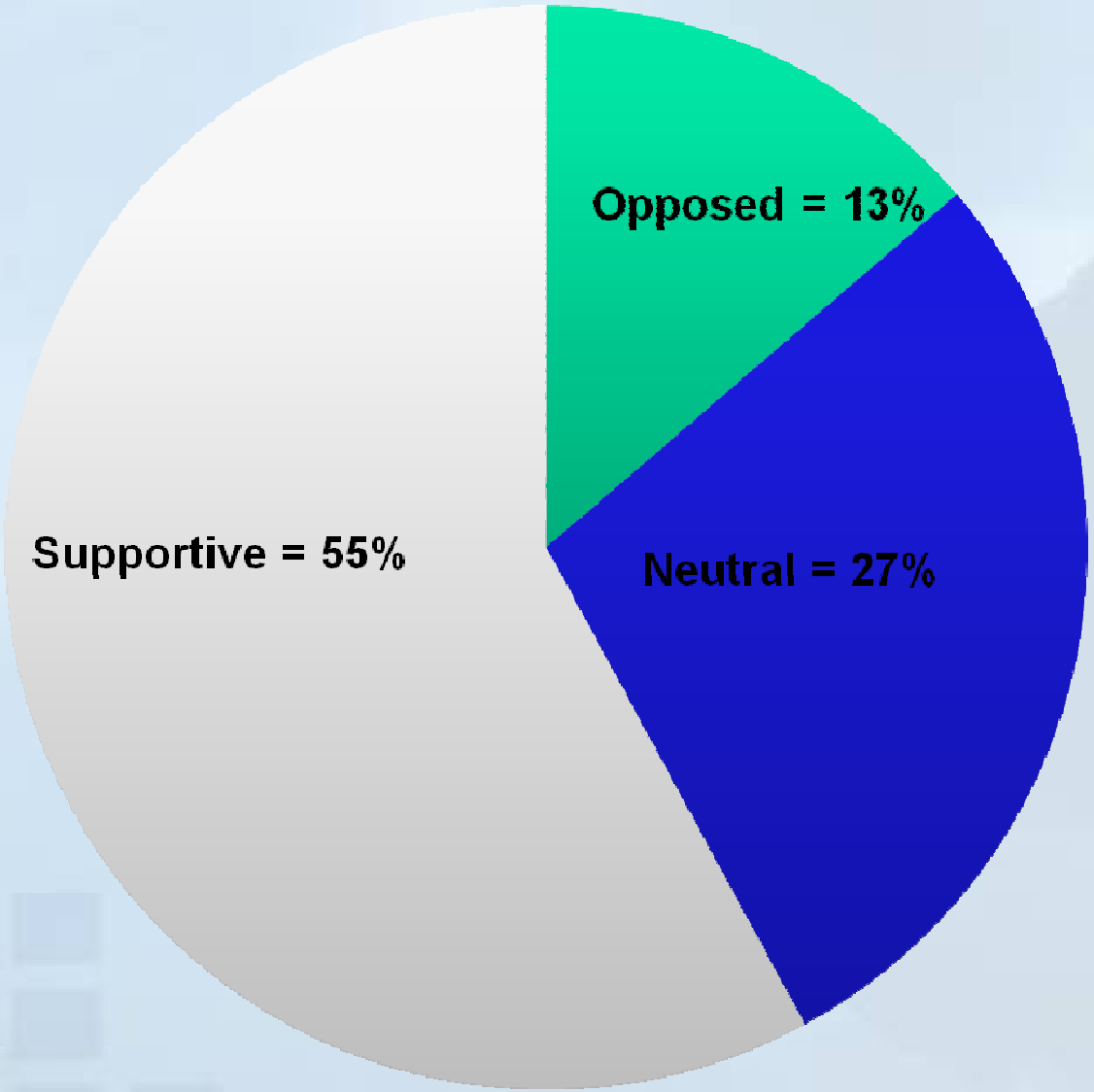
In the past 2 months, have you seen (or heard) any dengue prevention materials? (households)



Do you use repellent on your skin and clothing? (households)



How much would you support a release of sterile male mosquitoes in Key West? (stakeholder driven question for household survey)



Results of Key West Household Survey

- Notable disparities were identified in dengue awareness and experience.
- Higher awareness was found in residents of Old Town (the epi-center of the 2009/2010 dengue outbreaks), in older, non-minority whites with higher education and income.
- Higher awareness was associated with some stated prevention activities:

  ~dumping standing water

  ~knowledge of dengue symptoms

  ~a greater willingness to pay for mosquito control

  ~was ***not*** associated with a greater perception of dengue severity for the Florida Keys.

Summary

- Disconnect between stakeholder initiated prevention outreach and education activities and household knowledge of dengue/dengue prevention
- Need to evaluate efficacy of interventions both short term and long term
- Need more transparency both in provision of dengue surveillance information and mechanisms for development/dissemination of interventions
- More research needed on interface between economics and policy decisions, in particular with provision of information
- Risk assessment and accountability to the public

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