

Notes From the Field: Control and Prevention of Zika Virus

November 15, 2017
2:00-3:00 pm (ET)



Council of State and Territorial Epidemiologists

Webinar Housekeeping



- **Today's webinar is being recorded**
 - The webinar recording and presentation slides will be available in the webinar library on CSTE's website:
<http://www.cste.org/?page=WebinarLibrary>
- **All lines have been muted**
- **There will be a question-and-answer session at the end of the webinar**
 - To ask a question, please use the Q&A box on the right side of your screen

Webinar Objectives



Participants will:

- Understand the elements of a newly-designed mosquito management training program;
- Understand the factors that drive public support or health behavior change in an emerging disease event;
- Understand the variety of chemical control options and considerations in their selection



NYU

COLLEGE OF GLOBAL
PUBLIC HEALTH

Informing US Residents' Perception of Zika Risk: Knowledge, Decision- Making, and Receptivity to Public Health Interventions

Rachael Piltch-Loeb, MSPH
November 15, 2017

reinvent THE PUBLIC HEALTH PARADIGM

Controlling an emerging disease event relies on public support or individual behavior change

- **Public support for policies that mitigate disease spread such as vector control**
- **Individual preventive measures such as changing travel plans, taking a vaccine, etc.**

But, what drives public support or health behavior change in an emerging disease event?



- 1. Study Design and Framework**
- 2. Awareness and Knowledge of Zika Virus**
- 3. Intervention Receptivity Among the Public**
- 4. Implications**



Project

Date	Step
Feb 11, 2016	Initial communication with NSF Program Officer
Mar 31, 2016	Final proposal submitted
Apr 11, 2016	Rapid grant approved
Apr 15, 2016	Data collection for Wave 1 begins
July 13, 2016	Data collection for Wave 2 begins
Oct 12, 2016	Data collection for Wave 3 begins
October 30, 2017	Data collection for Wave 4 begins



Aim: To understand the drivers of intervention receptivity during the Zika epidemic, and the specific role of risk and knowledge as drivers of intervention receptivity

Nationally representative phone survey conducted by SSRS

- **Oversample of women of child bearing age (WCBA)**
- **Part of a regularly conducted Omnibus**

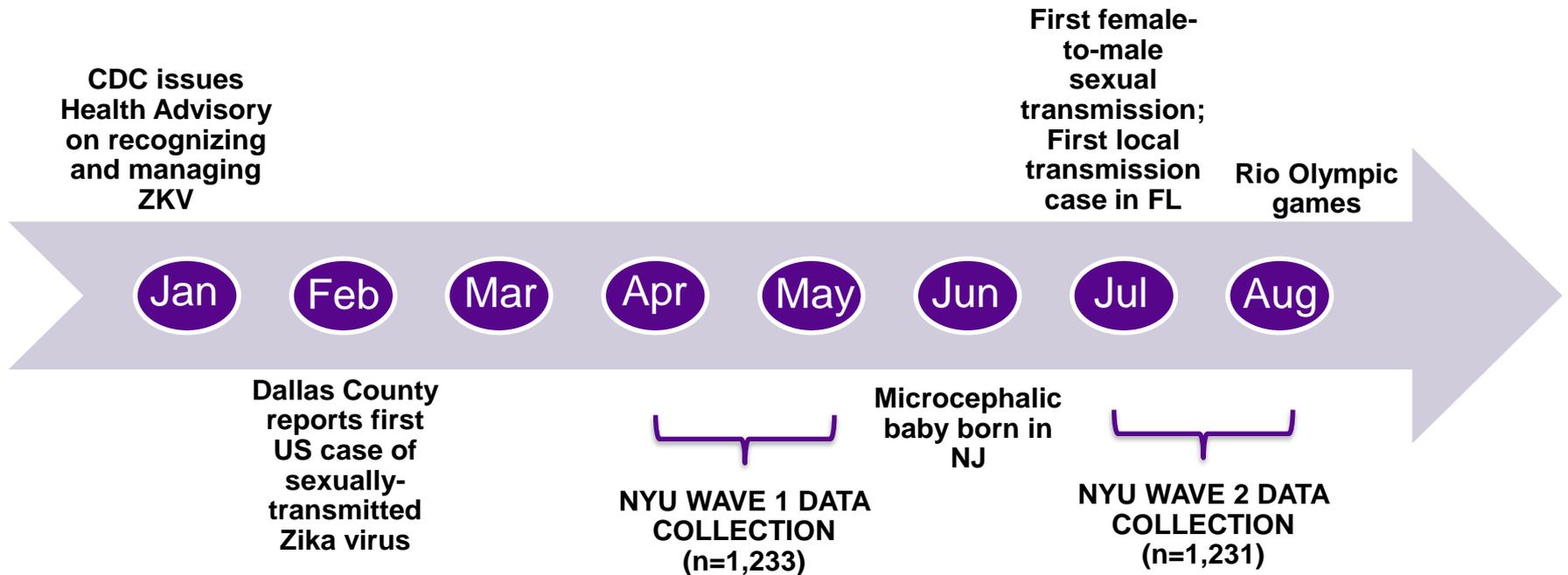
Conducted three times in 2016

Currently collecting data again



NYU

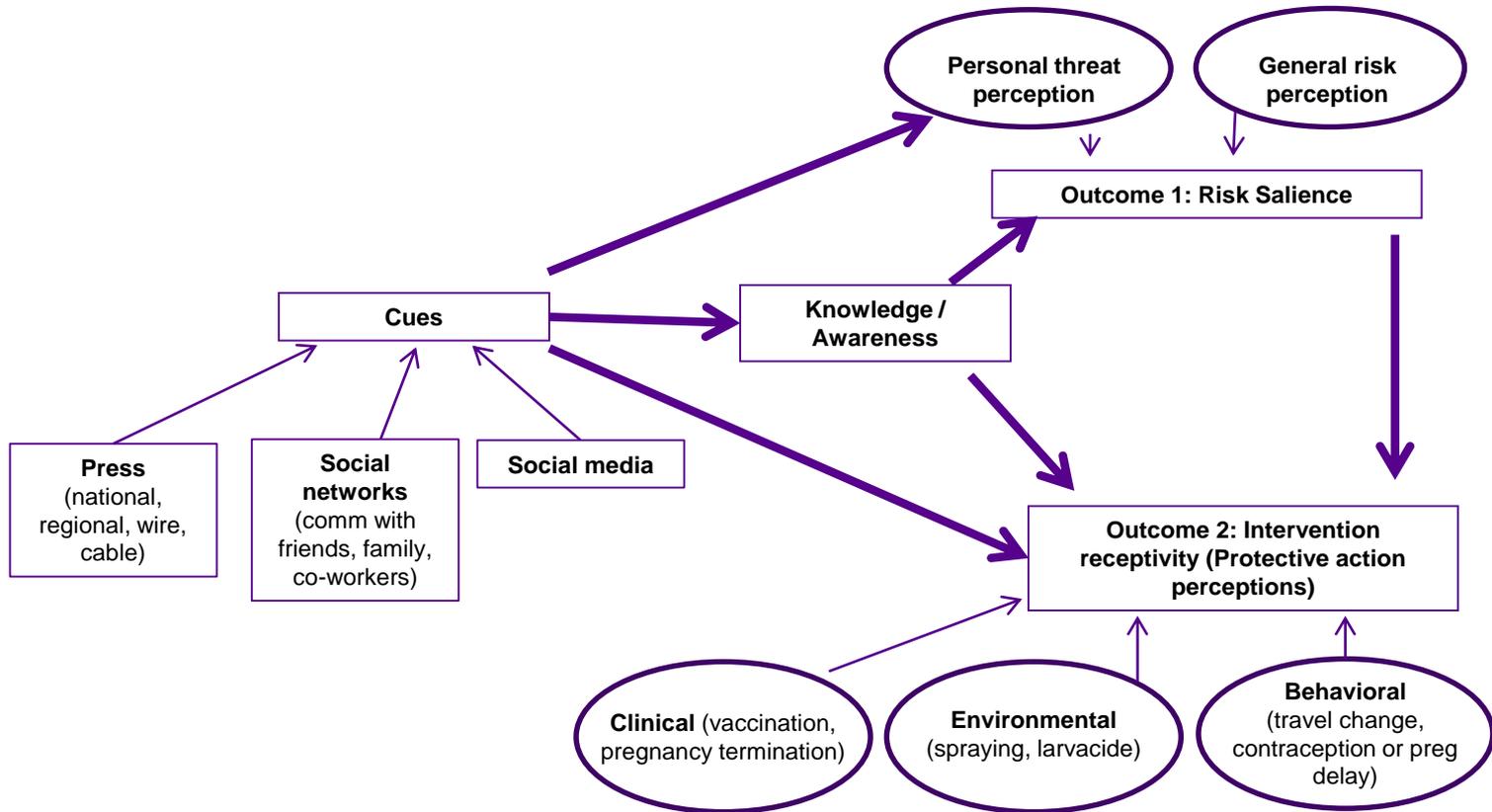
COLLEGE OF GLOBAL
PUBLIC HEALTH





Moderators

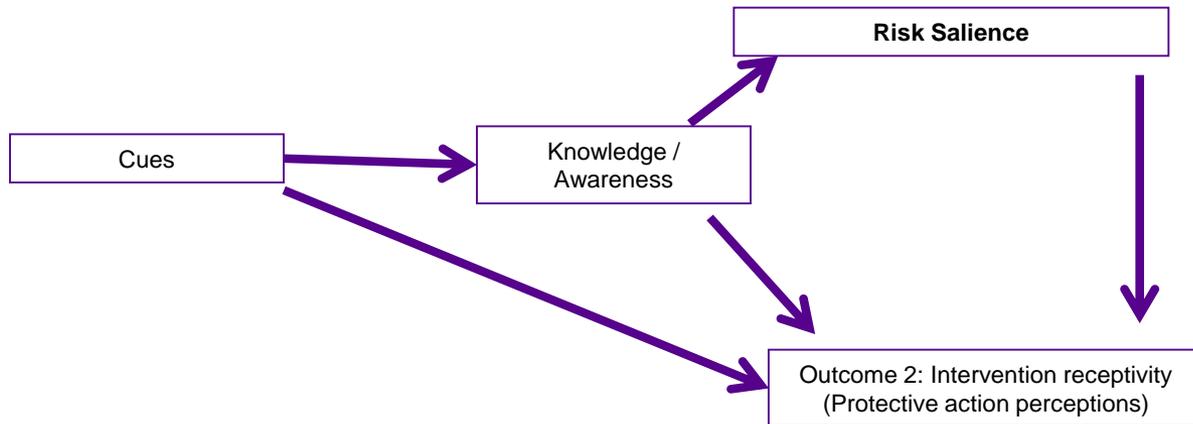
- Socio-demographics
- Political ideology
- Confidence in gov't
- Health Self-efficacy
- Access to health care
- Decision-making style

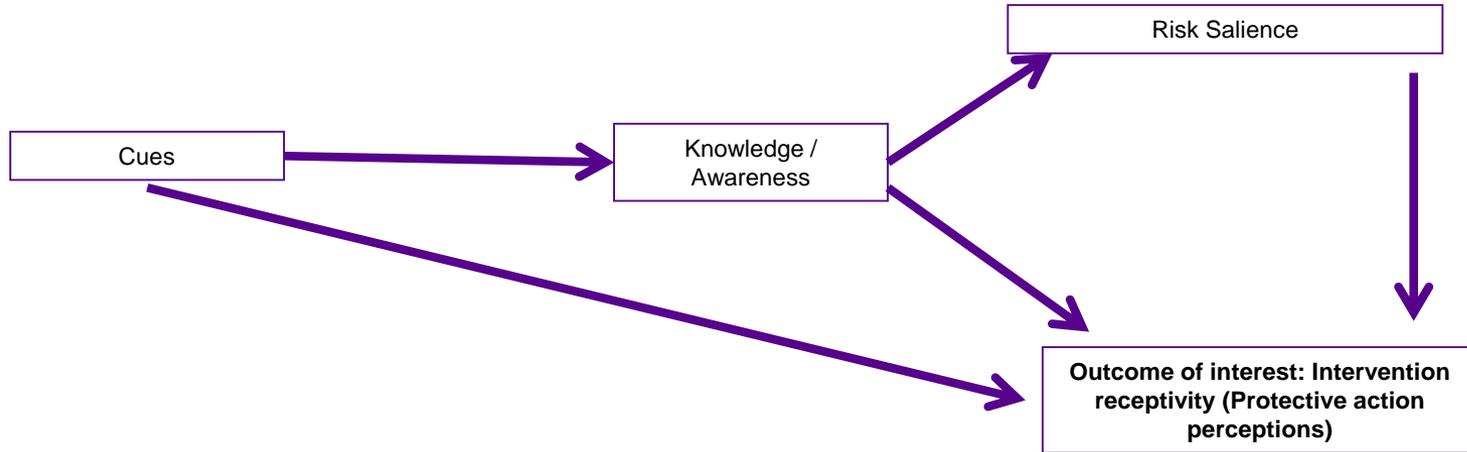




Personal risk: *Do you think your family could be directly affected by the Zika virus?*

General risk: *Do you think your community could be affected by the Zika virus?*





Indoor Spray: *Do you agree or disagree with the government using targeted mosquito spraying inside some homes*

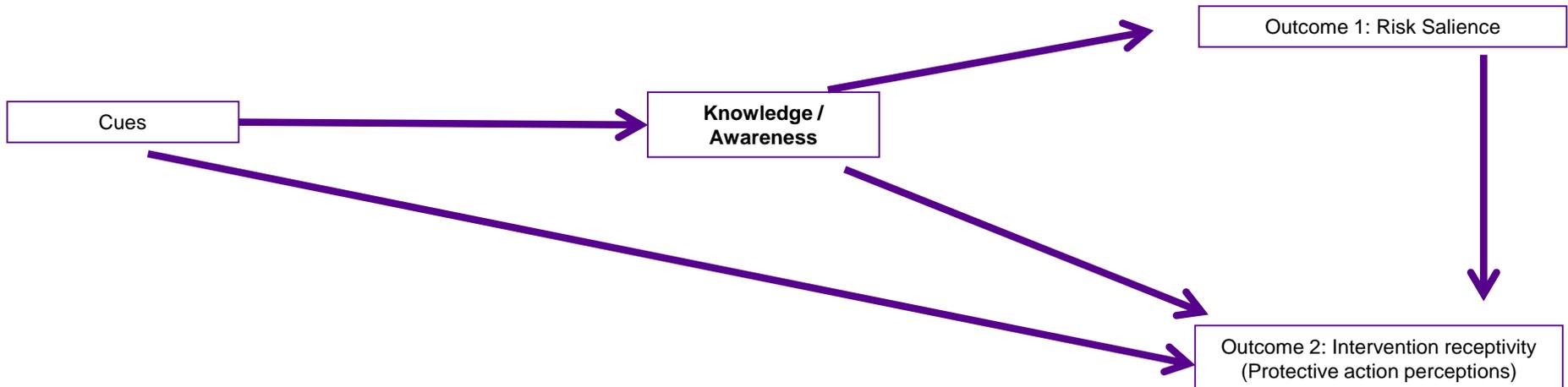
Delay Pregnancy: *In terms of actions you might take yourself, how likely would you be to delay getting pregnant, perhaps for a year or more, because of public health warnings*

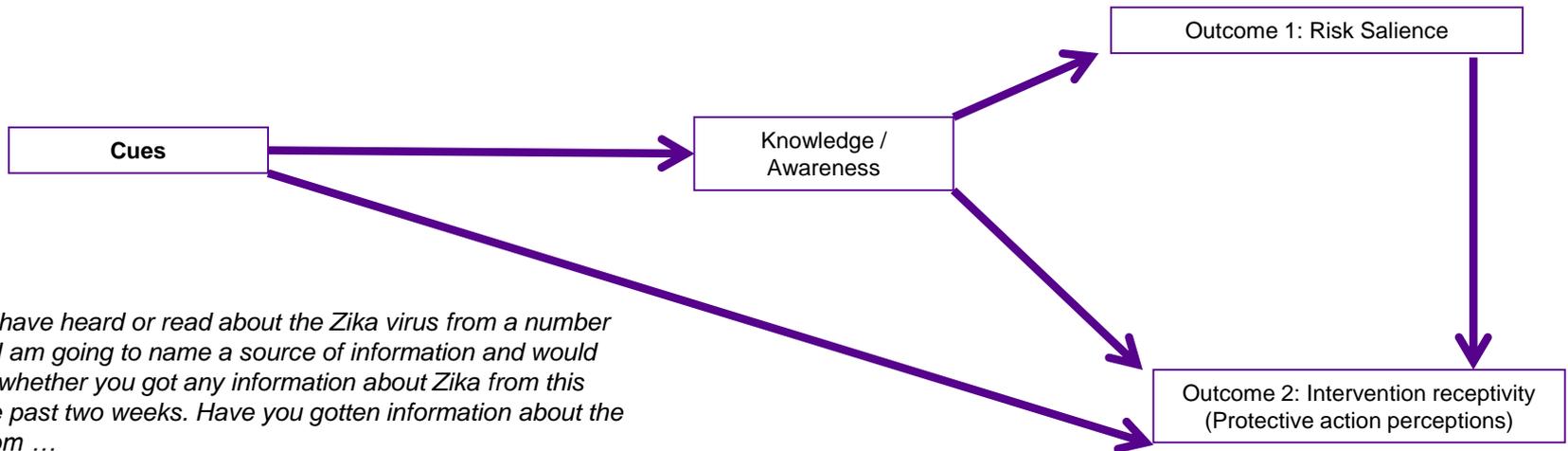
Availability of abortion services: *Some pregnant women may learn that their unborn child has a birth defect as a result of a Zika infection. Should the government make sure that services are available for women who wish to terminate their pregnancy as a result?*



Awareness: *Have you heard about the Zika virus?*

Knowledge: (1) *If a pregnant woman is infected with the Zika virus, there is some possibility that her baby will be born with birth defects*
(2) *It is possible for people to become infected with the Zika virus by having sex with someone who is infected*
(3) *Somebody can be infected with the Zika virus without having symptoms*





People may have heard or read about the Zika virus from a number of sources. I am going to name a source of information and would like to know whether you got any information about Zika from this source in the past two weeks. Have you gotten information about the Zika virus from ...

- a. *News sources, either online or in print*
- b. *Television or radio*
- c. *Social media such as Facebook, You Tube, Reddit or other apps*
- d. *Your doctor*
- e. *Government agencies*
- f. *Friends, family, or co-workers*

Of these sources you just mentioned, which is your primary source of information?

Analysis included:

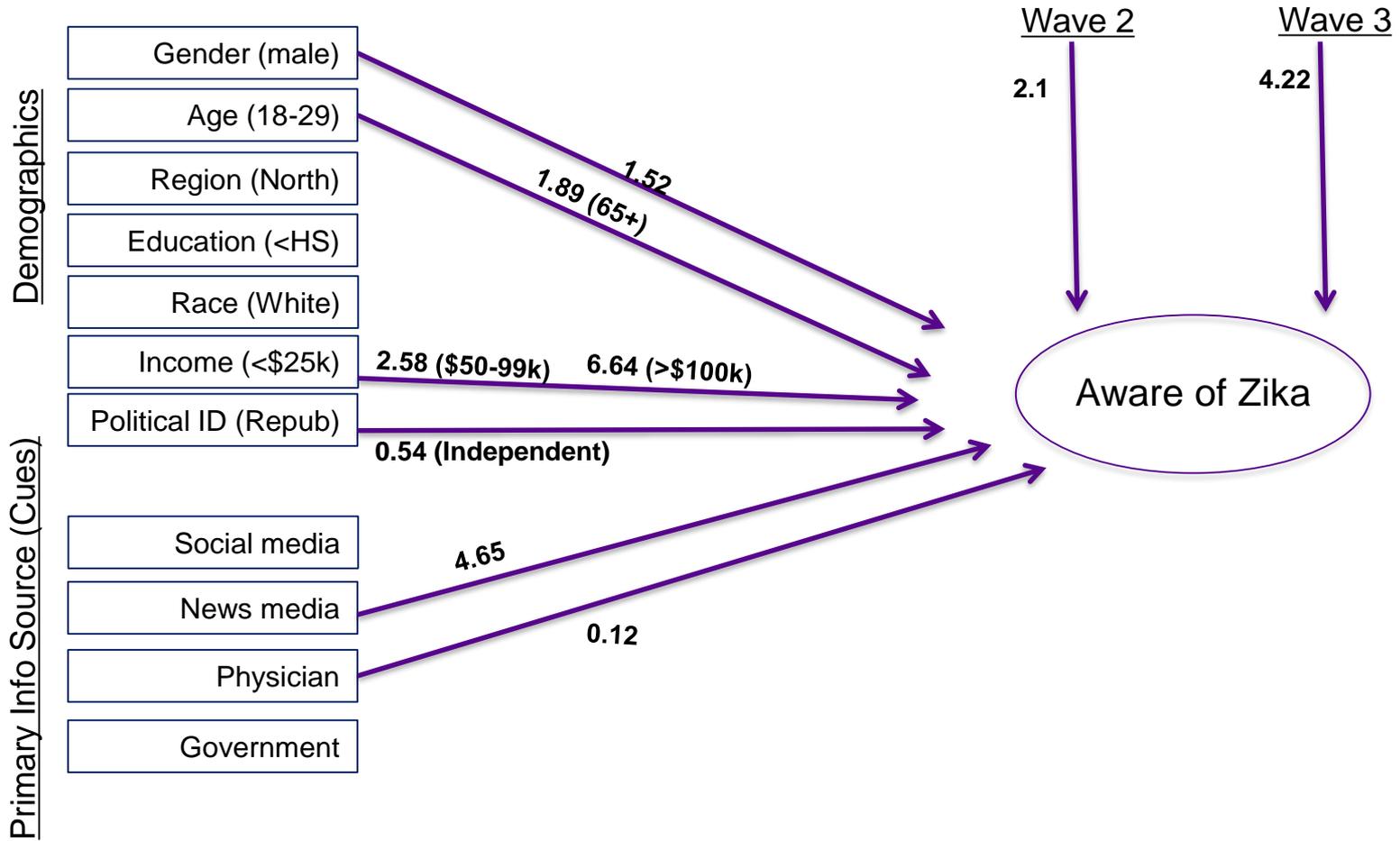
- **Frequency table to identify change over time**
- **Descriptive statistics**
- **Multivariable logistic regression**
- **Note: despite having a structural theoretical model, analyses only examined associations (not structural relationships)**

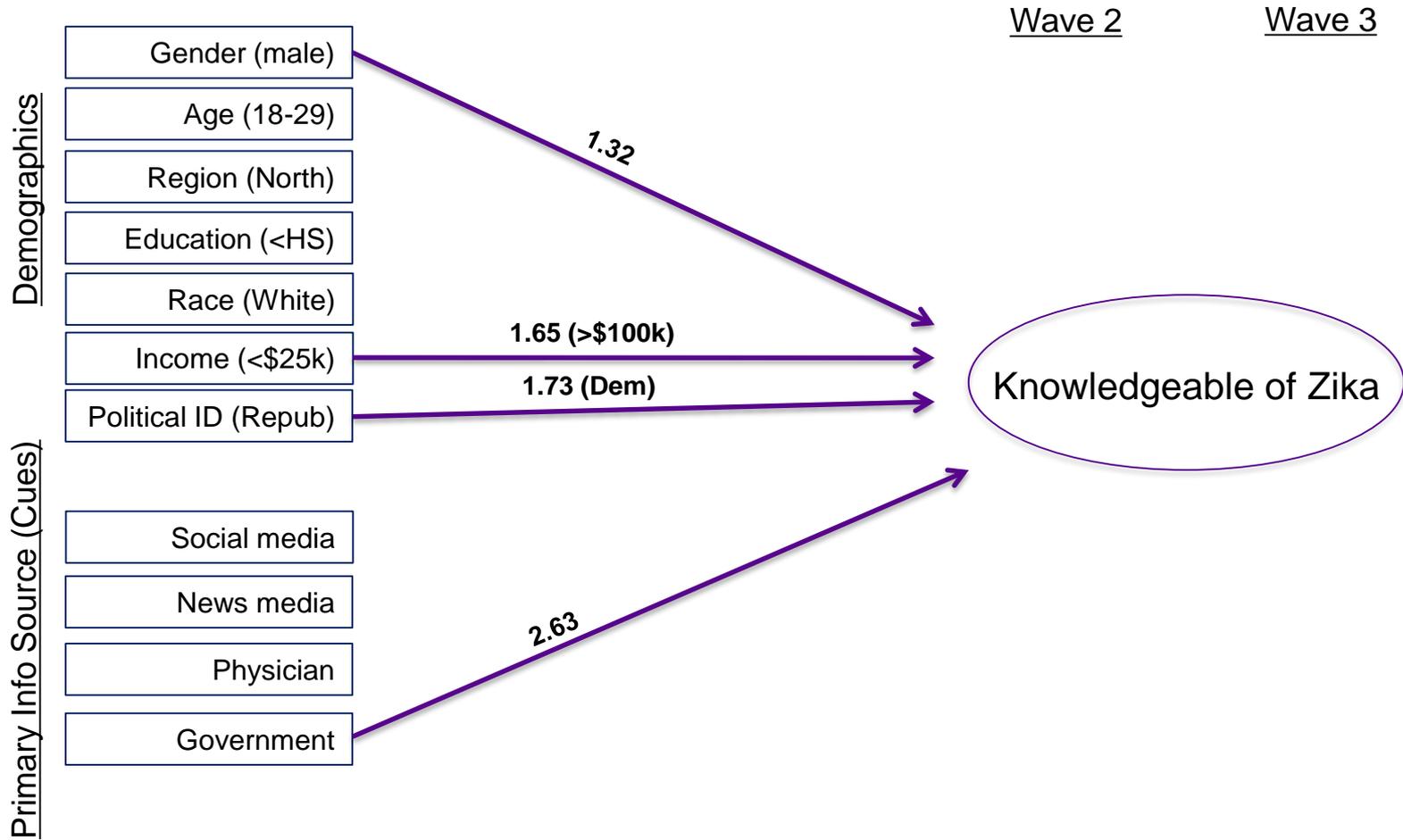


Results: Awareness and Knowledge of Zika



	Wave 1 (Apr/May)	Wave 2 (Jul/Aug)	Wave 3 (Oct/Nov)	p-value
Aware of Zika	77.9%	84.8%	89.6%	<.0001
Knowledge of Birth Defect	90.1%	86.1%	78.0%	<.0001
Knowledge of Sexual Transmission	51.9%	50.3%	46.1%	.109
Knowledge of Asymptomatic Infection	66.3%	68.8%	59.8%	.002
Knowledgeable (All)	38.7%	38.2%	33.9%	.167



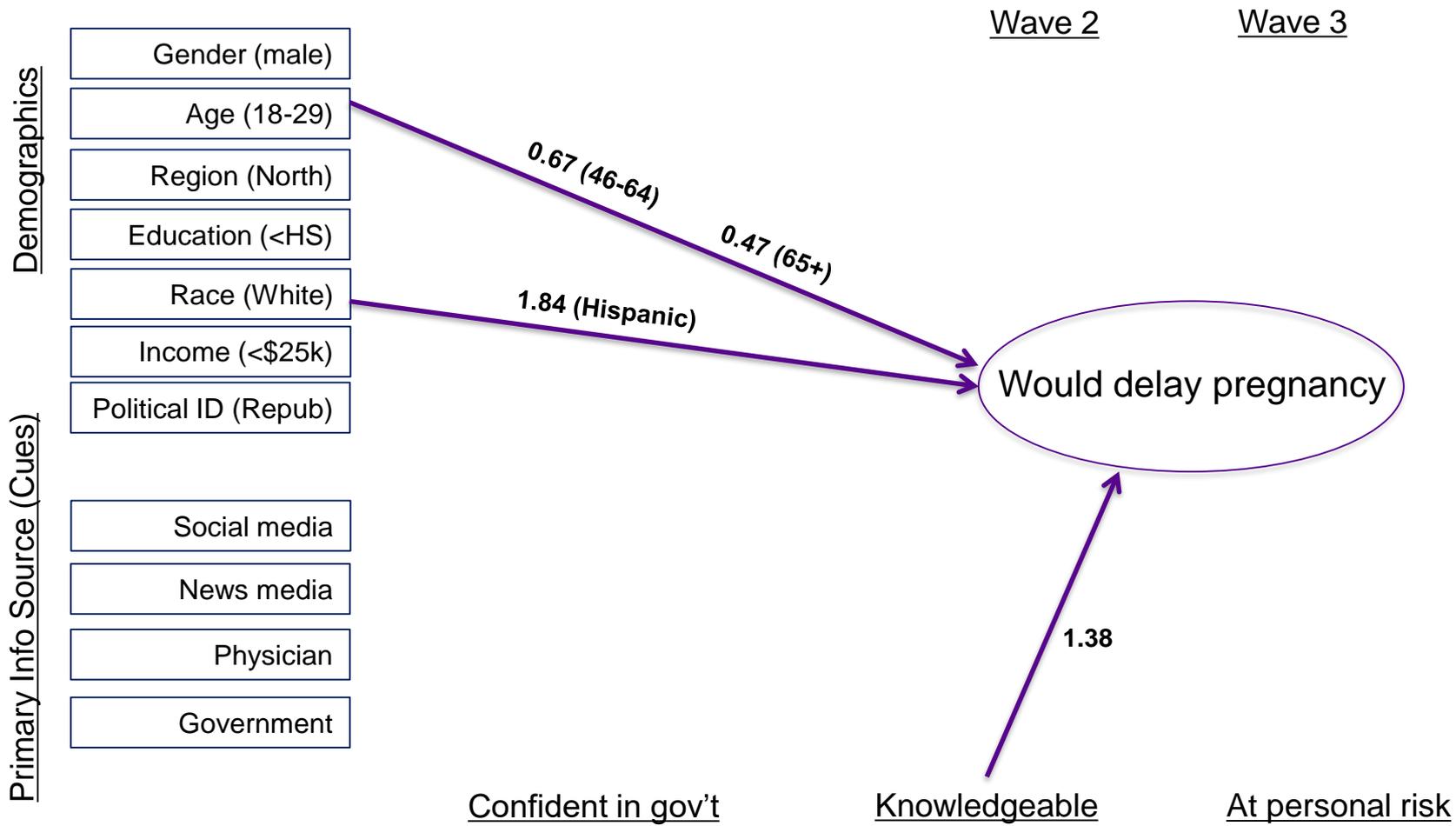


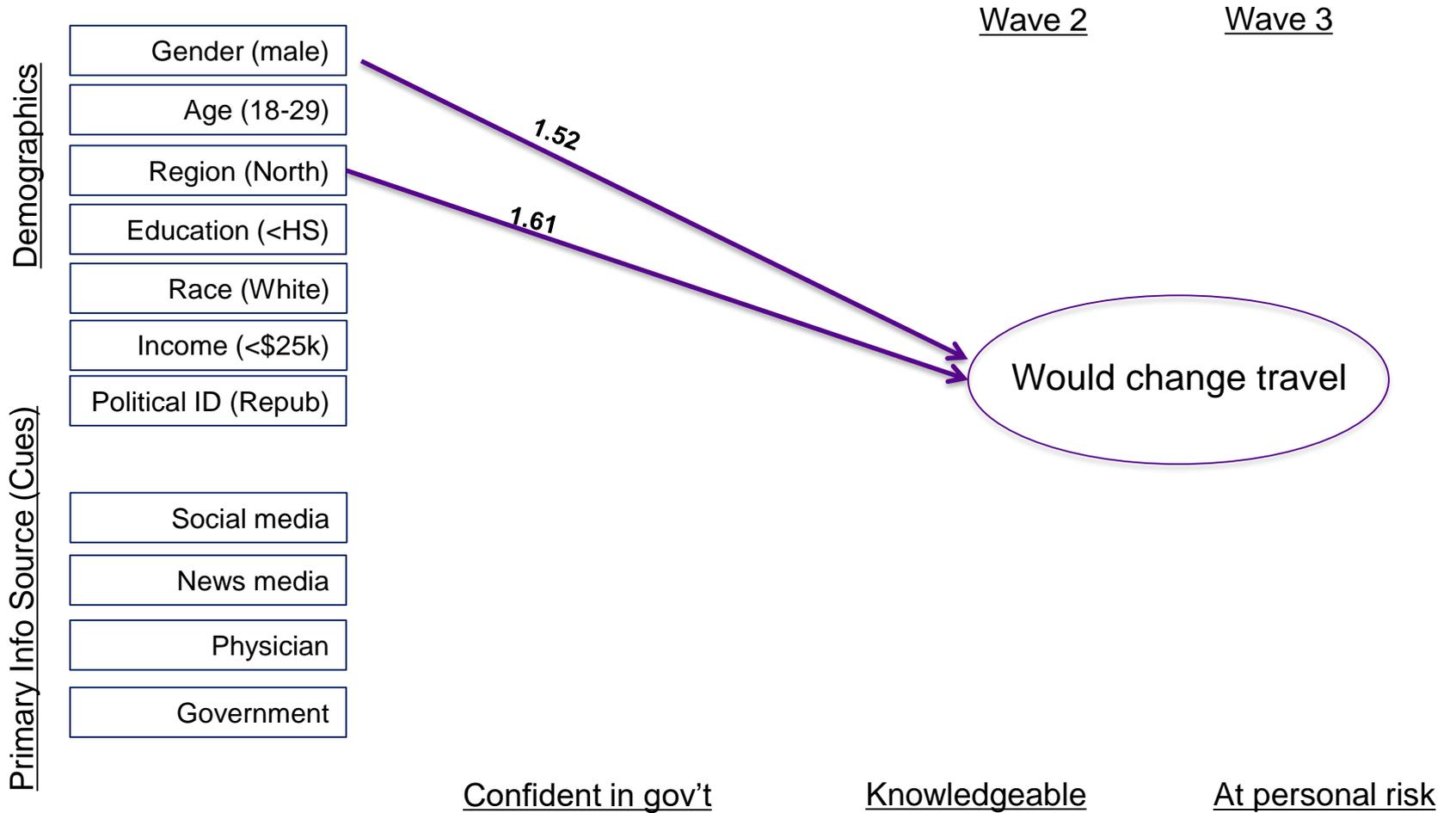


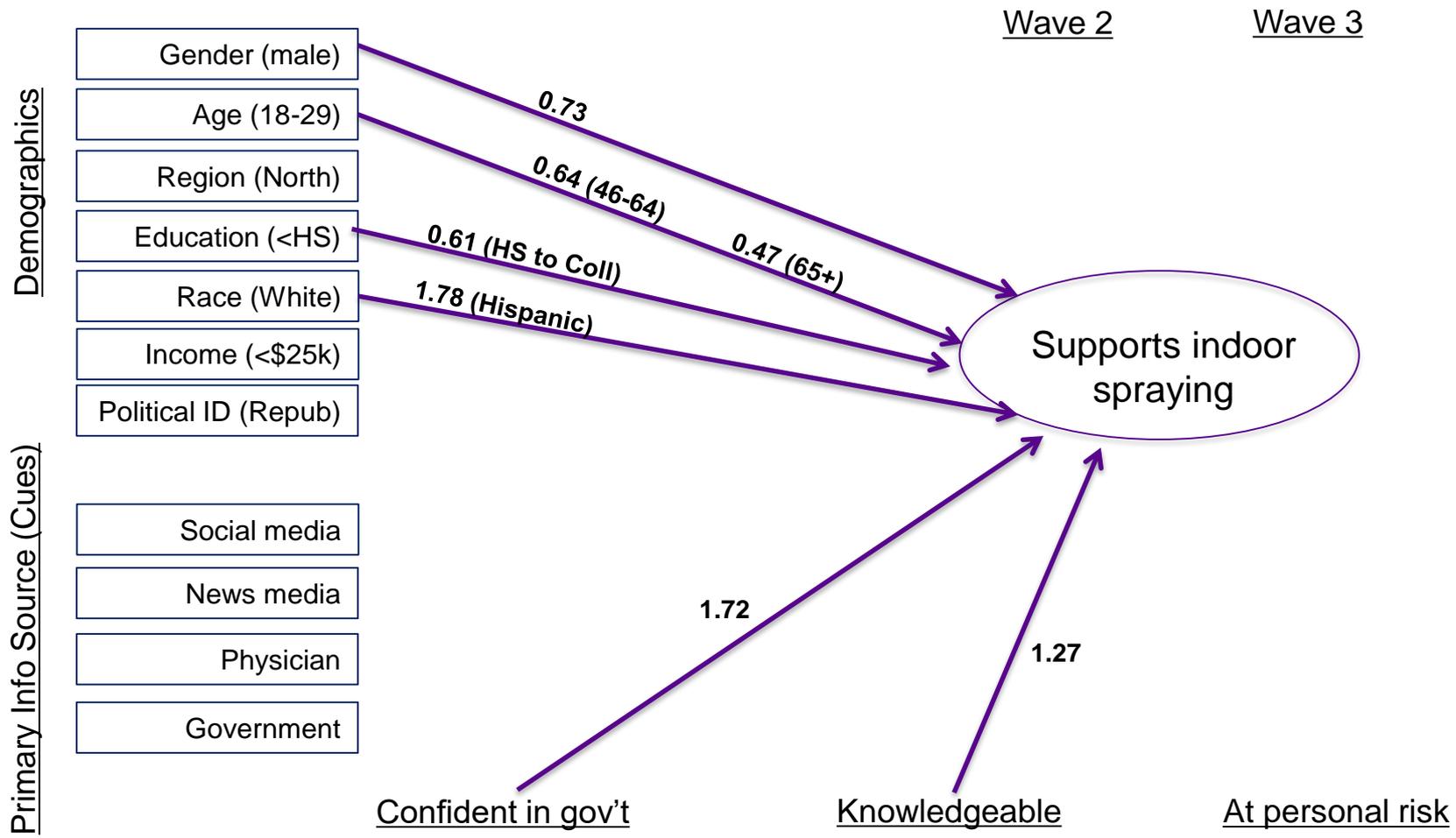
Results: Intervention Receptivity

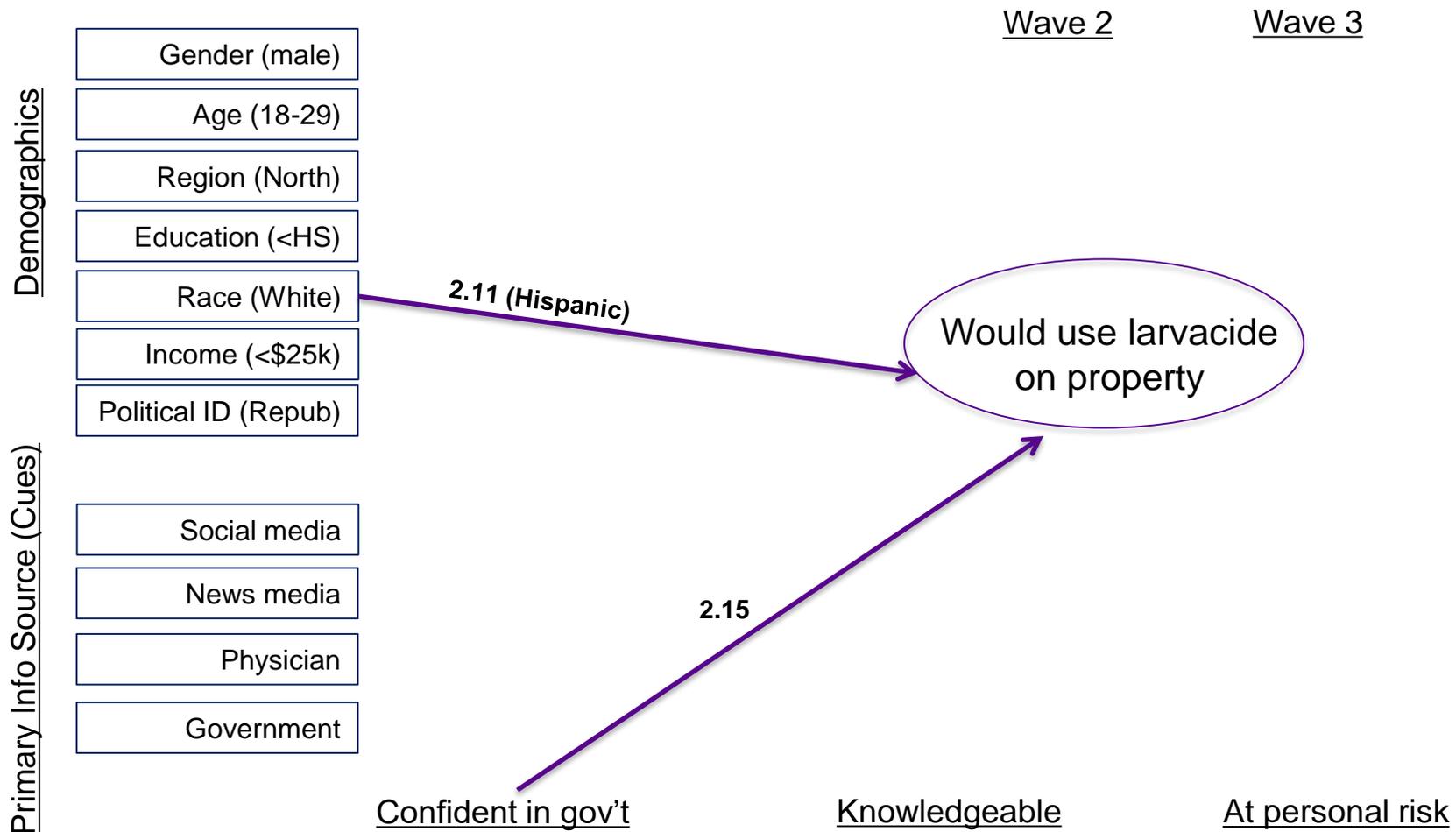


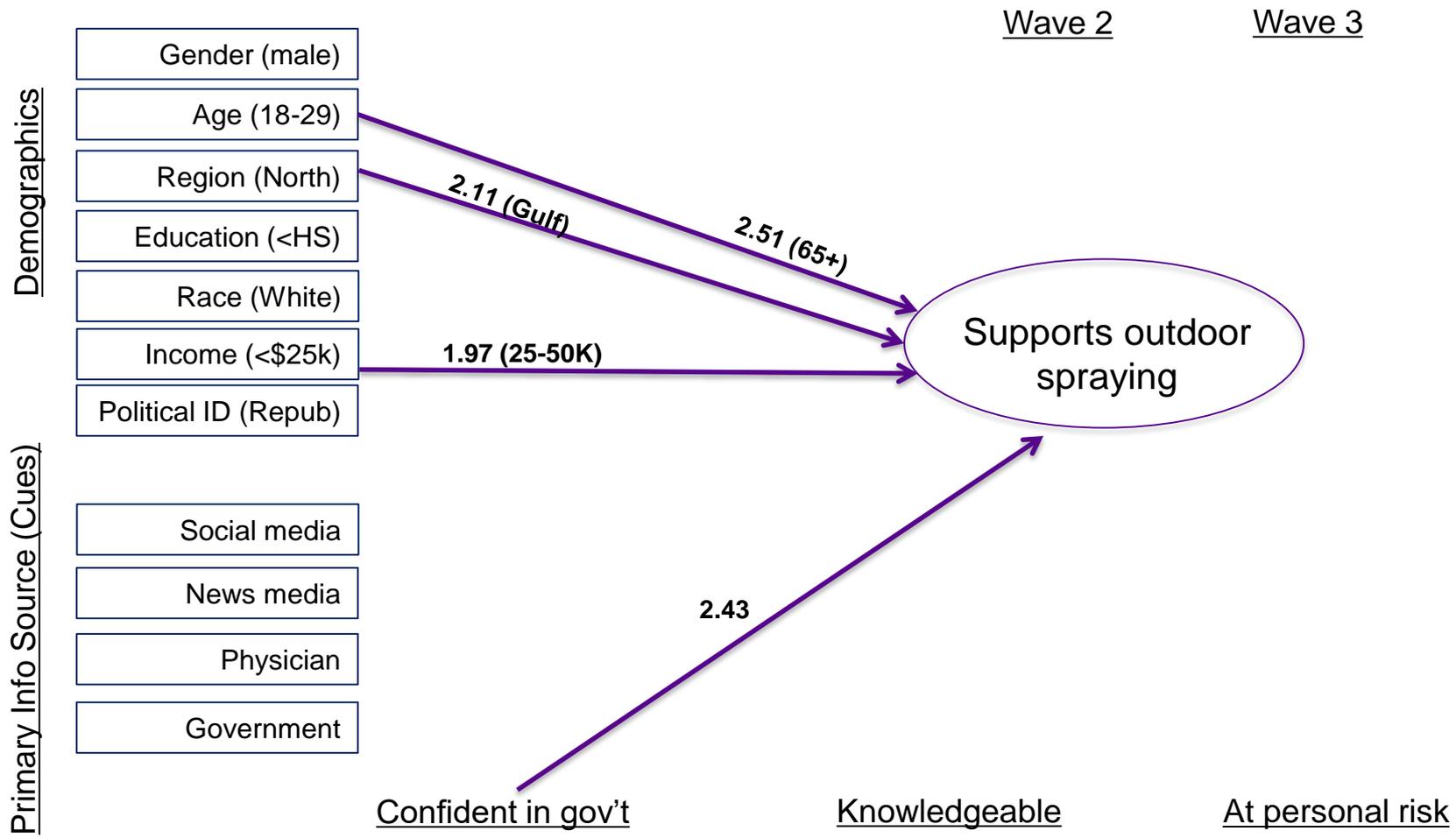
	Wave 1 (Apr/May)	Wave 2 (Jul/Aug)	Wave 3 (Oct/Nov)	p-value
Willing to delay pregnancy	55.0%	45.5%	49.5%	.004
Willing to change travel plans	78.2%	76.4%	71.9%	.013
Accept outdoor spraying	78.7%	79.1%	77.6	.763
Accept indoor spraying	38.2%	40.2%	40.8%	.429
Would use larvacide on property	71.9%	64.8%	60.7%	<.0001
Gov't should assure access to abortion	64.4%	58.9%	58.3%	.061

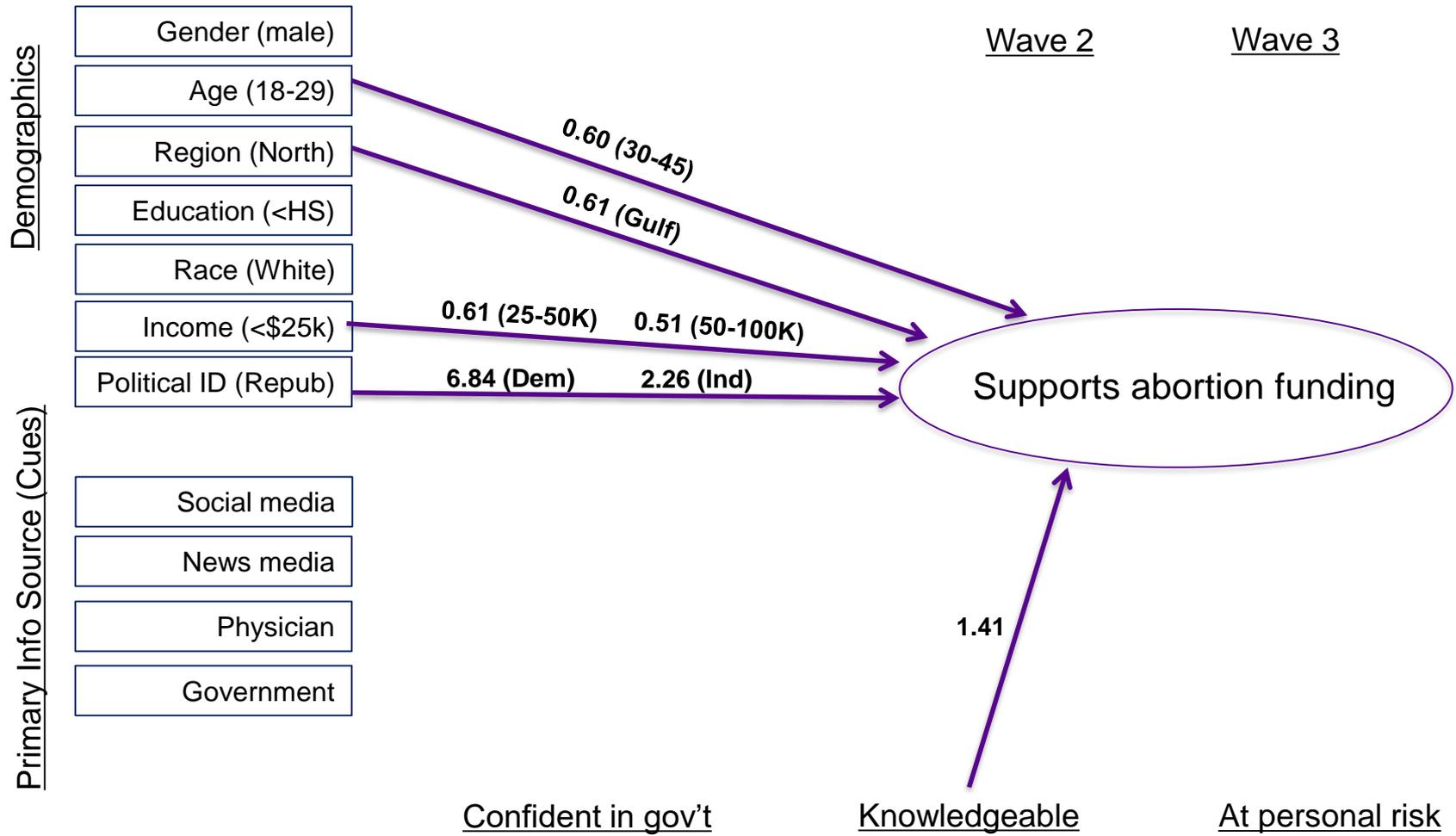














Discussion



Domain	Intervention	Strong driver
Behavioral	Delay pregnancy	Knowledge
Environmental	Spraying, larvacide	Confident in gov't
Clinical	Abortion access	Knowledge

- 1. “Different Strokes for Different Interventions”**
- 2. Region, income, ethnicity, and politics matter**
- 3. Its not just about risk salience**
- 4. Public perception can impact epidemiologic control measures**
- 5. Potential concern of Zika fatigue**

- 1. Structurally analyze cues and media channels**
- 2. Focus on information seeking and sharing**
- 3. Identify subgroup differences and effect modification**
- 4. Qualitative analysis on interactions with providers**



- 1. Use of population parameters in agent-based model of behavior change, and cost-benefit of various interventions**
- 2. Establish baseline of intervention receptivity**
- 3. Test and refine capability of quickly measuring public knowledge, attitudes, and behavior during evolving hazard**
- 4. Use national data to identify wedge issues that can be explored in greater depth with panels or small area analyses**



Questions?



Selecting control and prevention strategies when dealing with Zika virus in your community

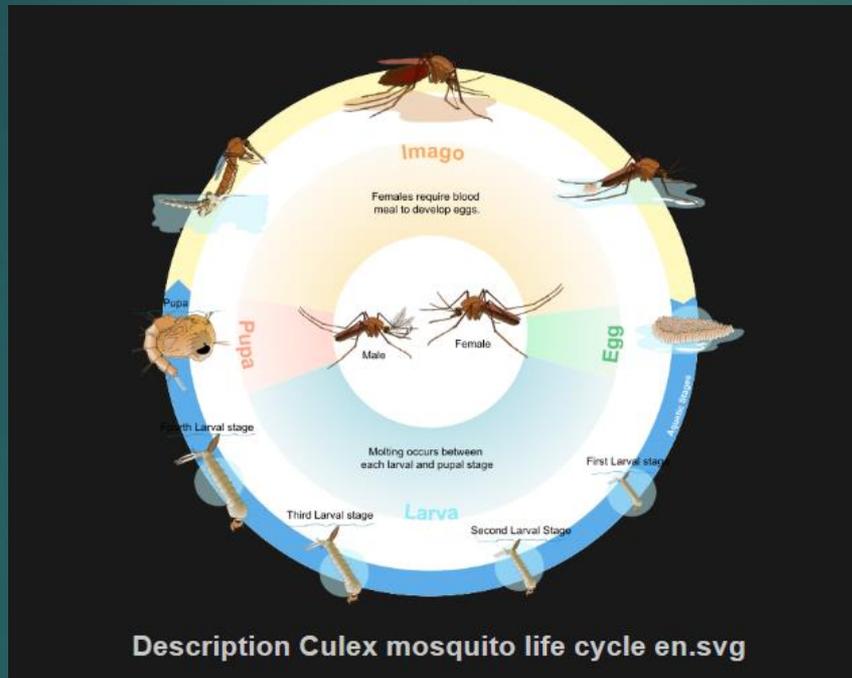
JANET MCALLISTER, PHD, BCE

JVM6@CDC.GOV

There is no such thing as “A” mosquito



General Mosquito Life Cycle



KNOW YOUR MOSQUITO

Aedes aegypti/*Ae. albopictus*

- Mostly bite during the day, but can also bite at night
- *Ae. aegypti* prefers to feed on people
- *Ae. albopictus* will feed on people and animals
- Prefers to lay eggs in man made containers that may dry out completely
- BG Sentinel traps and ovicups for surveillance

Culex pipiens/*Cx. quinquefasciatus*

- Night biter
- Prefers birds
- Lays eggs in standing water with a lot of organic material (ditches, gutters, neglected pools)
- CDC gravid and light traps for surveillance



Aedes aegypti and *Aedes albopictus*

Aedes aegypti

- ▶ Prefers containers
- ▶ Prefers humans
- ▶ Larvicides with *L. sphaericus* are not as effective as Bti



Aedes albopictus

- ▶ Prefers treeholes and containers
- ▶ Will feed on anything



Missions vary-

Nuisance biting vs. Disease vectors

Routine Control vs. Outbreak



Components of IMM

- Surveillance –
 - Disease surveillance
- Data management
- Physical control
- Biological control
- Chemical control
 - Resistance management
- Legal control
- Education and outreach



Adult Control



Strategies for the chemical control for mosquitoes are almost always 180° opposite from those in agriculture.



Ground

- Single truck can treat about 2,000 acres in a night

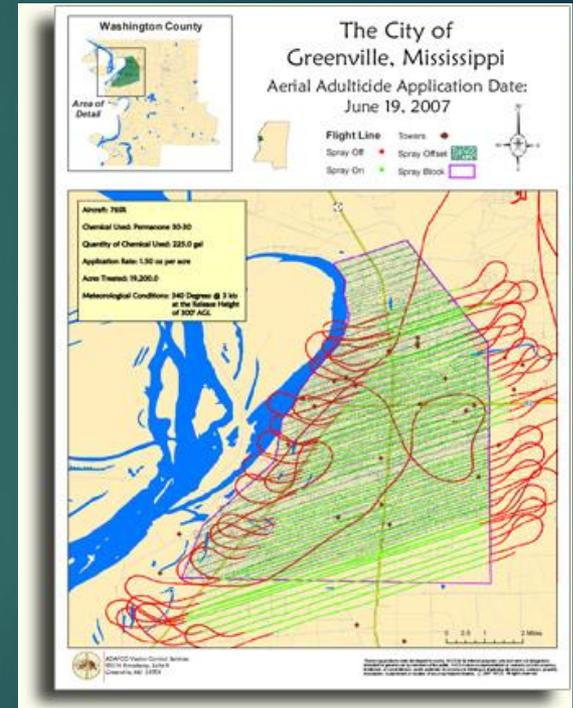
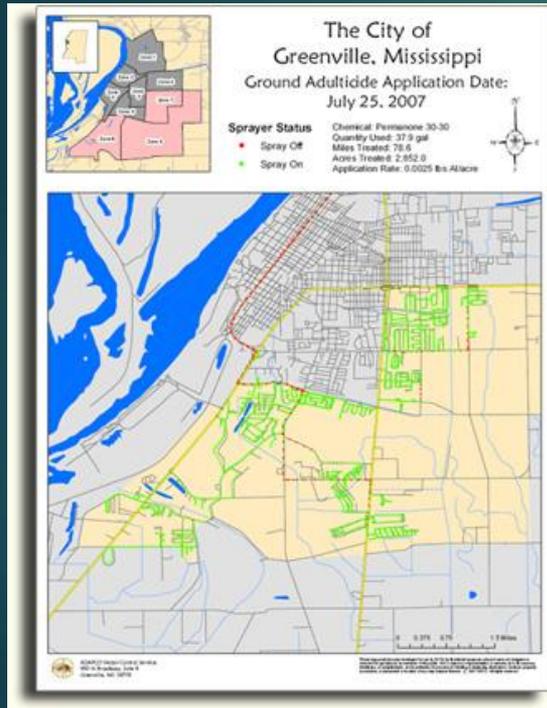
- Single plane can treat >40,000 acres in a night

- Aerial spraying is not dependent on road systems so less gapping in treatment area

- In most cases the products are the same

- Resistance status important

Aerial



Aedes Aegypti and *Aedes Albopictus* Control

Focus at individual property level for routine control

- Targeted outdoor residual spraying
- Targeted indoor residual spraying when appropriate
- Larvicide in containers, tires, plants/tree holes
- Sanitation
- Widespread space spraying when required – elevated importance during outbreaks

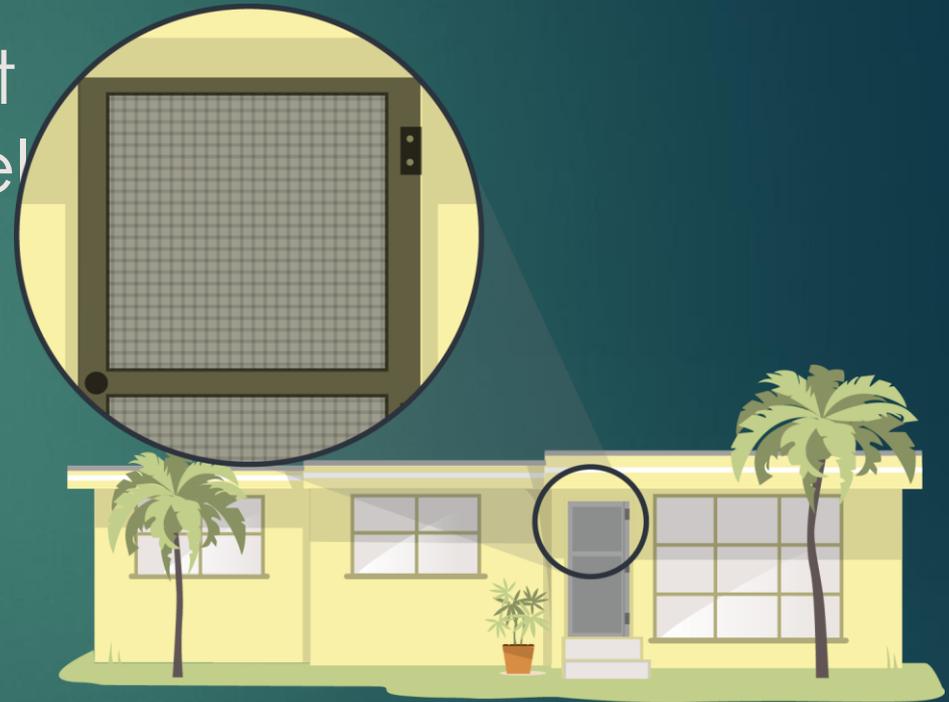


Communications – especially where no mosquito control is done

- Fact sheets, chemicals and processes
- Press releases
- Frequent questions
- Where will public be able to get answers
- Personal protection messaging
- Things the public can do themselves

STEP 1 Keep mosquitoes outside

- Keep mosquitoes out of your home or hotel
 - ▶ Stay in places with air conditioning and with window/door screens.
 - ▶ Do not leave doors propped open.



STEP 1 Keep mosquitoes outside

- Keep mosquitoes out of your home or hotel.
 - ▶ Once a week, empty and scrub, turn over, cover, or throw out items that hold water. Mosquitos lay eggs near water.
 - ▶ Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitos cannot get inside to lay eggs
 - ▶ If you have a septic tank, repair cracks or gaps

Preventing Mosquito Bites



STEP 2 Create a barrier between you and mosquitoes

- Cover up!
 - ▶ Wear long-sleeved shirts and long pants.



STEP 2 Create a barrier between you and mosquitoes

- Treat clothing and gear
 - ▶ Use permethrin to treat clothing and gear or buy permethrin-treated clothing and gear. Read product information to find out how long the protection will last.



STEP 3 Wear insect repellent

- Use Environmental Protection Agency (EPA)-registered insect repellents.
 - ▶ Use a repellent with DEET, picaridin, IR535, or oil of lemon eucalyptus, or para-menthane-diol

Preventing Mosquito Bites



<https://www.epa.gov/insect-repellents/find-repellent-right-you>

How much time will you need to be protected from biting insects? ⓘ
Any ▼

Do you need protection from mosquitoes, ticks or both ?
Mosquitoes and ticks ▼



All products work against mosquitoes, and not all against ticks.

You can refine your search by specifying one or more of the following options:

Which product are you interested in?
You can leave blank to get a list of all products which fall under your criteria

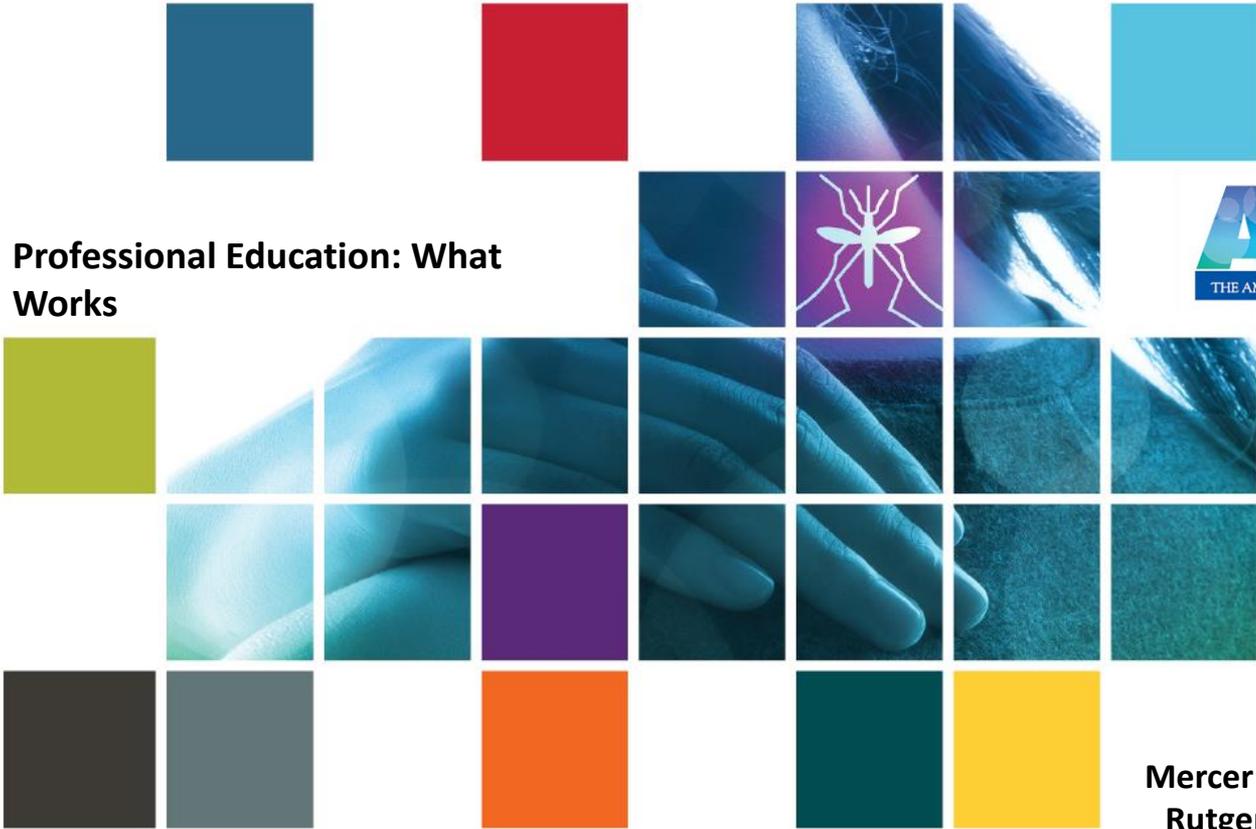
Are you interested in a particular active ingredient?
All Ingredients ▼

Are you looking for a specific company name?
All Companies ▼

Do you know the EPA registration number of the product you are looking for?
 ⓘ
You can leave blank to get a list of all products which fall under your criteria.

 [Export the entire insect repellent dataset to PDF format](#)

Professional Education: What Works

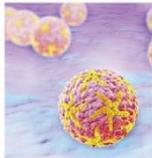


**Isik Unlu, PhD
Superintendent
Mercer County Mosquito Control,
Rutgers University Entomology
(Center for Vector Biology), NJ
November 15, 2017**

Zika Training: The Unmet Need



- Mosquitoes are vectors for arboviral diseases highlighted most recently by the increasing incidence of Zika virus infections in the U.S. and its territories
- The mosquito species *Aedes aegypti* and *Aedes albopictus* are the principal vectors for chikungunya, dengue, yellow fever, and Zika viruses
- Both the US Centers for Disease Control and Prevention (CDC) and the Environmental Protection Agency (EPA) recognize the need for chemical control measures for mosquitoes
- A critical update to the 2009 American Mosquito Control Association (AMCA) Best Practices for Integrated Mosquito Management was recognized to raise the awareness level and new training requirements with respect to the prevention, surveillance, and control
- In late 2016, the CDC commissioned work through the AMCA to update the Best Practices manual and provide appropriate training to educate public health and mosquito control professionals



Major Manual Updates



Revise the 2009 Best Management Practices for IMM with latest recommendations to include *Ae. aegypti* and *Ae. albopictus* as well as all mosquito species – January 2017



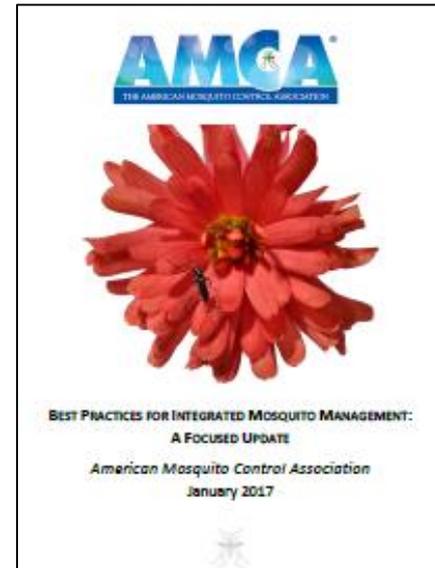
Best Management Practices
for
Integrated Mosquito Management

American Mosquito Control Association

December 2, 2009

2009 Version

- 6 pages
- No references



2017 Updated Version

- 52 pages
- 93 references

www.mosquito.org

Participant Training Curriculum



Develop student training manual and TTT classroom workshop materials for delivery in high-risk areas.

INTEGRATED MOSQUITO MANAGEMENT

HIGH LEVEL DESIGN

The Integrated Mosquito Management Curriculum will be built based on numerous sources and references including, but not limited to:

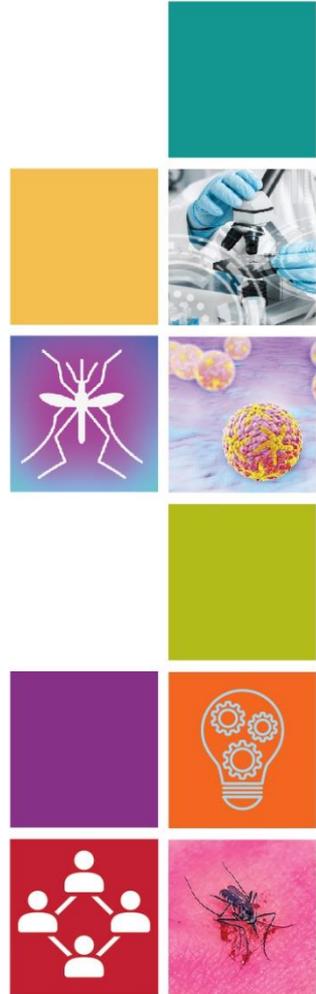
- Advisory Board October 2016 Event
- Current guidelines and recommendations from various states and authorized organizations
- Presentations and webinars by individuals considered experts in the field
- Literature and research chosen as credible sources by the AMCA

This curriculum will encompass eLearning modules and live sessions utilizing adult learning principles with targeted audience and prerequisite recommendations. The learning events are as follows:

Track 1: A series of eLearning Modules

Track 2: Mosquito Management Best Practices Live Workshop

Track 3: Mosquito Management Local Strategic Planning Live Workshop



“Train-the-Trainer” (TTT) workshops



Develop and deliver comprehensive, interactive “Train-the-Trainer” (TTT) workshops in geographically diverse locations (approximately 10 locations) – March 2017

MASTER TRAINER STRATEGY AND PURPOSE

It is the strategy of this initiative to organize trainers and support so that an efficient and cohesive communication, delivery, and evaluation strategy can be executed. Since the number of end learners and consequently, the number of trainers required across the participating states, is unknown, there will be a Master Trainer strategy used to drive effective rollout and sustainability.

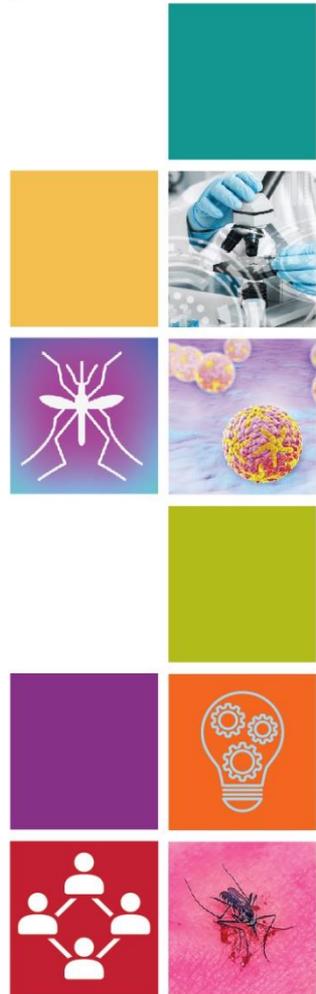
Master Trainer Event – March 22 and 23, 2017:

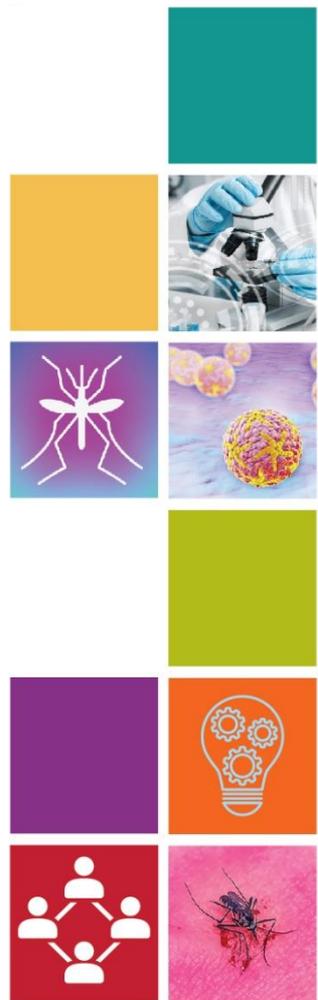
This event will be held at the AMCA headquarters in Marlton, NJ, where two designated Master Trainers from each state will receive Master Certification. This certification will:

- Enable them to experience the training as an end user
- Practice delivering key components of the training (focusing on Track 2 as essential material)
- Provide what they need to coach and certify local trainers for each geographic area
- Give them time to network and build their knowledge regarding different areas of the country
- Enable them to participate on conference calls to share best practices, challenges, and solutions

MASTER TRAINER ROLE

Each Master Trainer will work with their Master Trainer colleague from that state to organize and deliver the number of Train-the-Trainer sessions necessary for initial rollout. The Master Trainers will also add value to local departments by observing and coaching trainers, ensuring consistency of delivery, and fielding questions as end user training rolls out.



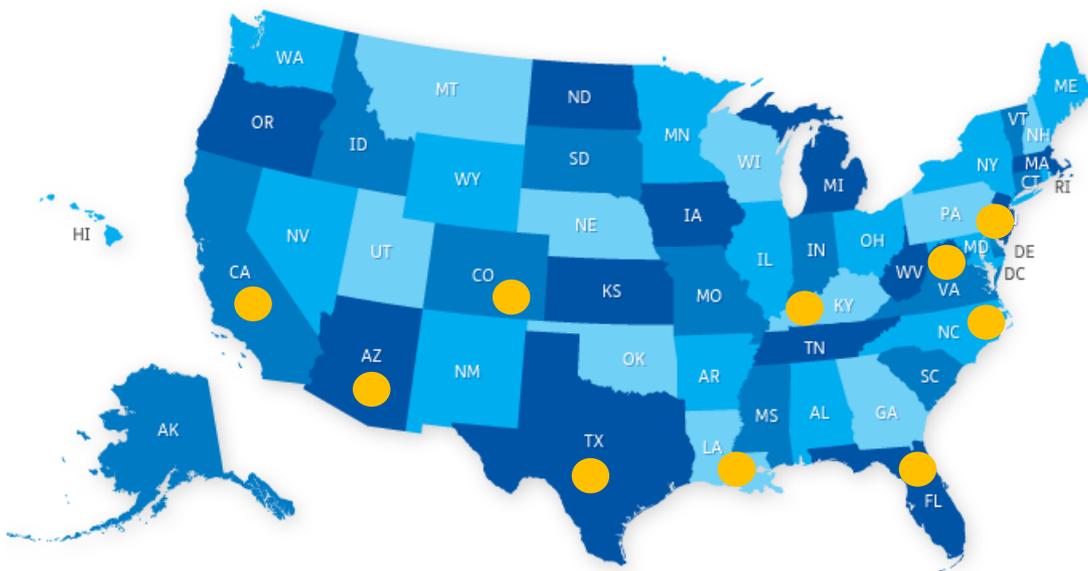


10 Training Hubs



Develop and deliver comprehensive, interactive “Train-the-Trainer” (TTT) workshops in geographically diverse locations (approximately 10 locations): June – December 2017

- Arizona
- California
- Colorado
- Florida
- Kentucky
- Louisiana
- New Jersey
- North Carolina
- Texas
- Virginia



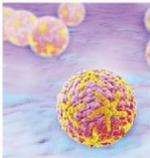
Comprehensive web-based training



Develop and deliver comprehensive web-based training materials, reference manual, and certification testing: March – June 2017

Track 1: A series of eLearning Modules

- eLearning Module 1: Mosquitoes and Disease: *Aedes* and *Culex*
- eLearning Module 2: The What and Why of *Aedes* Species Ecology and Behavior
- eLearning Module 3: The What and How of *Aedes* Surveillance
- eLearning Module 4: The What and How of *Aedes* Control



AMCA eLearning Modules



CHAOS^{to} CALM

Understanding and Controlling
the Zika Virus

MODULE
ONE



OVERVIEW

MODULE
TWO



MOSQUITOES

MODULE
THREE



SURVEILLANCE

MODULE
FOUR



CONTROL

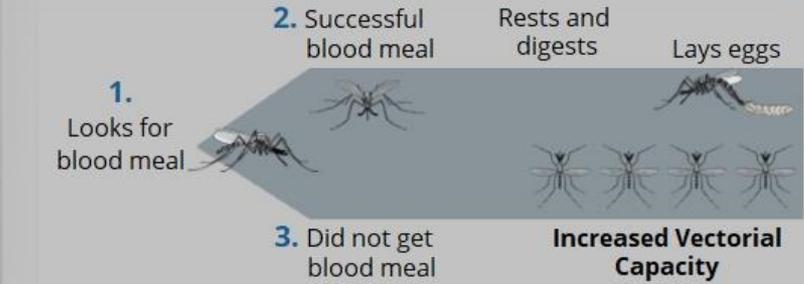
You are about to take an online certification course on controlling mosquitoes that carry the Zika virus. To receive your certification, you must complete each of these modules in order, passing a test before advancing to the next module.

Please select a module.

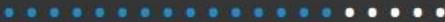
INCREASED VECTORIAL CAPACITY EXAMPLE



- 1. Females need a blood meal to lay eggs.
 - 2. If a female becomes fully engorged with a blood meal, for the next week she will rest, digest the blood meal, and lay eggs.
 - 3. On the other hand, if she did not get a blood meal, she will keep probing until she gets her meal. She needs the protein from blood to produce eggs.
- Therefore, the probing female may still transmit virus repeatedly because of the constant probing.



So if a female mosquito capable of transmitting a virus probes and does not get a blood meal, there is an increased likelihood that it will infect more hosts by more probing, which tremendously increases vectorial capacity.



PROGRESS



GLOSSARY

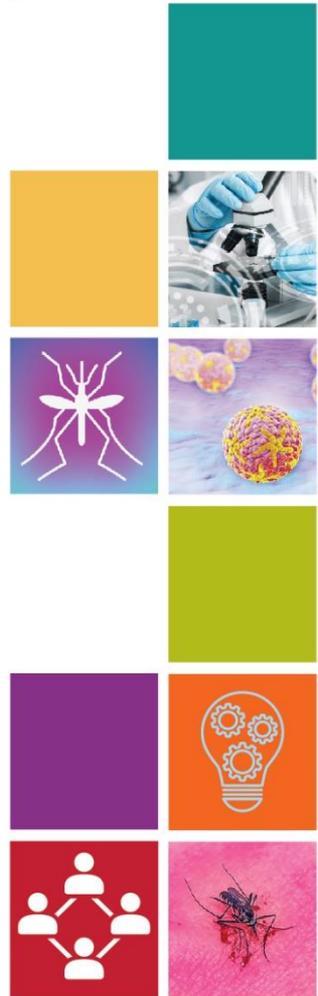
REFERENCES

Certification



Develop a knowledge based testing program and certification process to evaluate primary participant knowledge

- Master Trainer participation and presentations, at their event in NJ, will act as their Certification Process (including basic Level 1 evaluation)
- Train-the-Trainer participation and presentations at their local hubs will act as their Certification (including basic Level 1 evaluation)



Evaluation

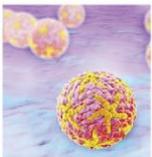


Evaluation of the TTT training effectiveness

EVALUATION STRATEGY

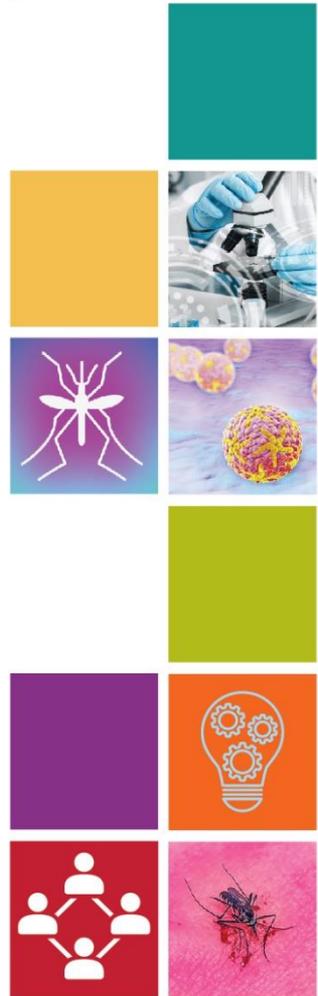
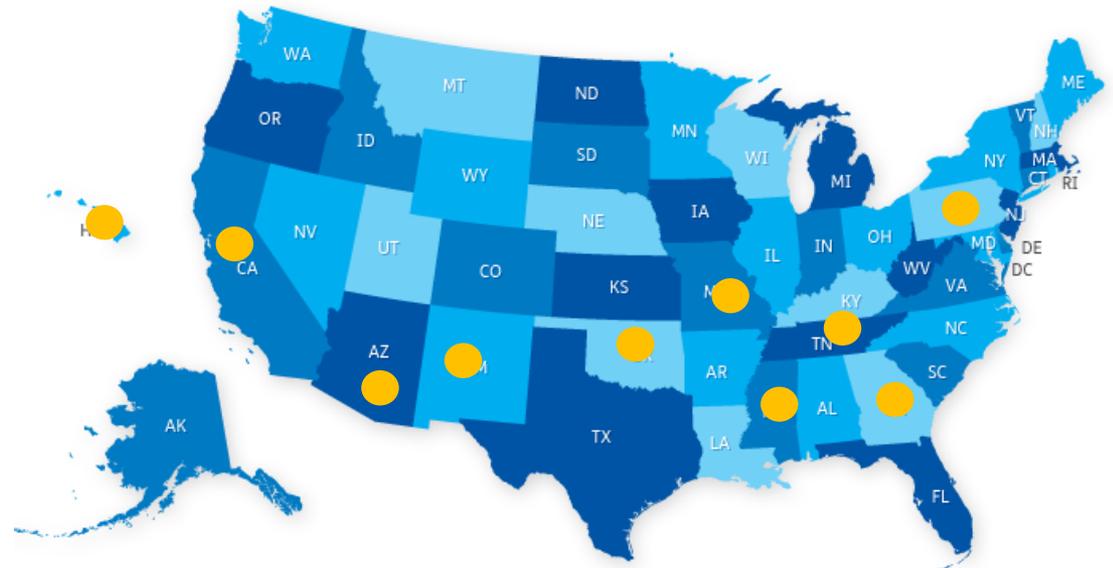
There will be several methods by which AMCA will be able to gather feedback from the field:

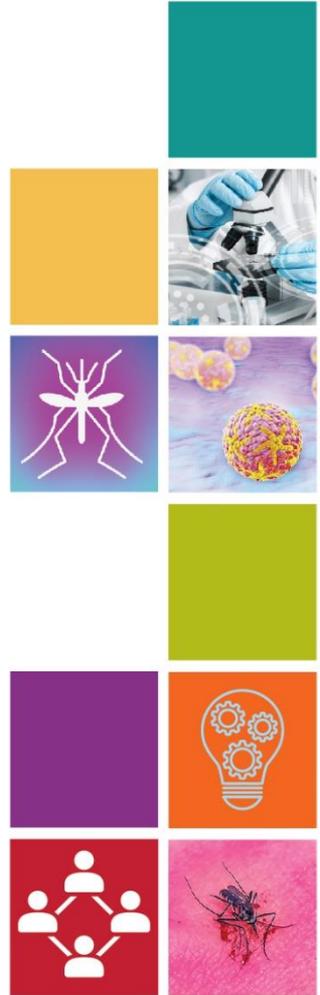
- Evaluations will be created for all components of the curriculum, as appropriate to the content
- End Learners will participate in numerous activities throughout the live sessions in order for the trainer to gauge their comprehension and ability to execute. Level 1 and 2 evaluations will be utilized and periodic conference calls between Master Trainers and local Trainers will be recommended for specific problem solving and coaching
- Level 1 and Level 2 evaluations will be rolled up to AMCA for analysis and decision-making
- eLearning modules will have embedded questions/progress checks to keep the learner engaged. A comprehension test is included at the end of each module



2018 and Beyond Needs

- Additional Train-The-Trainer Workshops
- Updates / additional educational eModules
- Updates to the Professional website





Thank You

Q & A

Thank you for your participation!

- Please complete the webinar evaluation
- The webinar recording & slides will be available CSTE's website in the webinar library:
<http://www.cste.org/?page=WebinarLibrary>

The background features a large, stylized letter 'E' in a light beige color. The 'E' is set against a light blue background with a repeating geometric pattern of interconnected lines forming a grid of squares and triangles. The 'E' itself has a subtle pattern of these same geometric shapes. The overall design is clean and professional.

CSTE National Office

2872 Woodcock Boulevard, Suite 250
Atlanta, Georgia 30341

 770.458.3811

 770.458.8516

mphillips@cste.org