Factors Associated with Behaviors in Response to Health-Related Messaging from Shawnee County Health Department: Results of a CASPER Survey

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Introduction

- Seven years of epidemiology experience at the Kansas Department of Health and Environment

- Field experience with Shawnee County Health Department focusing on mosquito-borne illness prevention
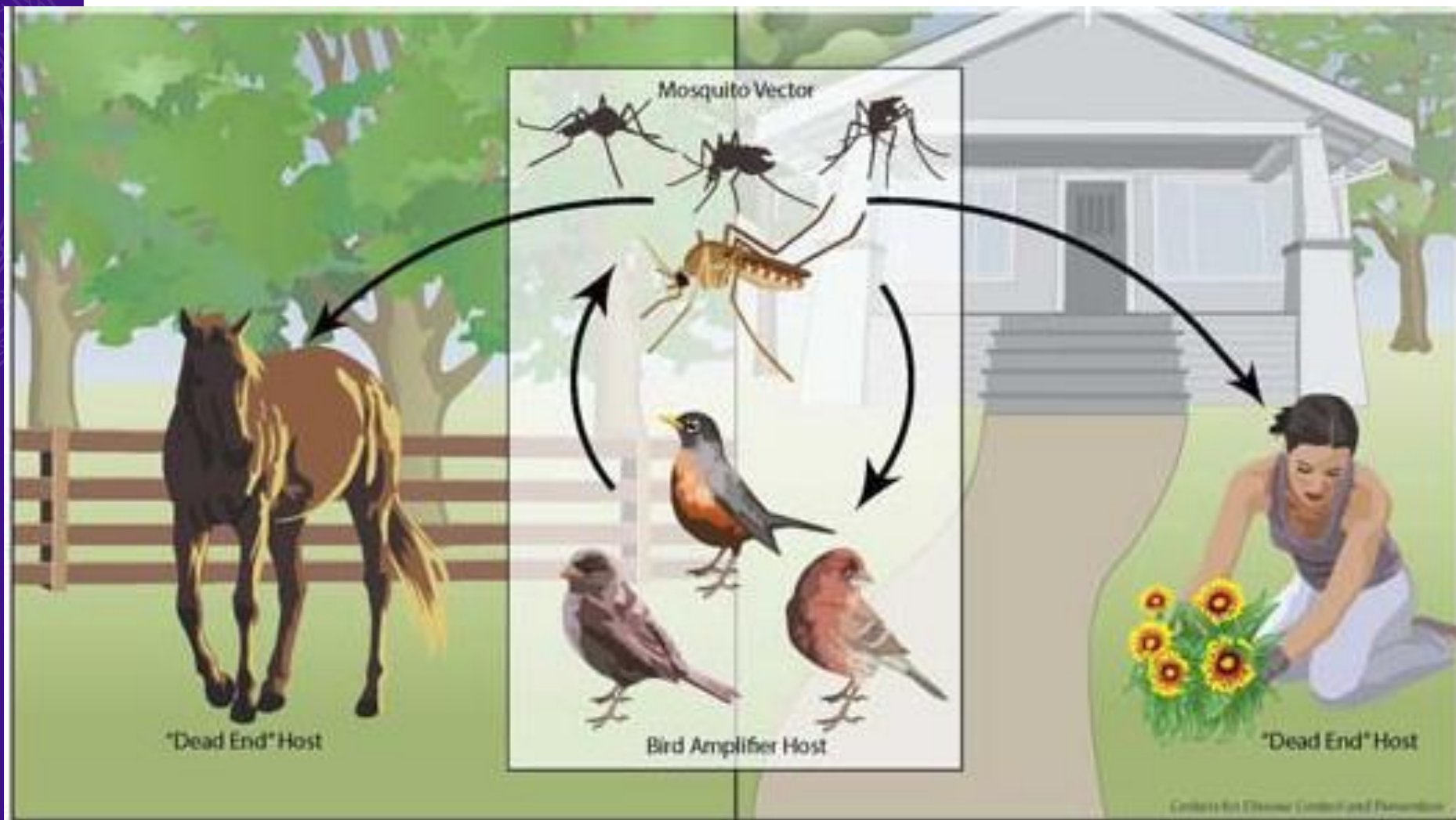
BACKGROUND

Dump Day Campaign

- Began summer of 2016
- Focused on emptying standing water on private property in effort to reduce mosquito breeding sites
- Reminders were sent out weekly on Facebook® and Twitter®

West Nile Virus (WNV)

- Leading cause of domestically acquired arboviral disease in the United States

- Arthopod-borne virus (arbovirus) transmitted to humans by bites of infected mosquitoes and ticks

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Mosquito Vector

Bird Amplifier Host

"Dead End" Host

"Dead End" Host

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WNV Clinical Presentation

- Incubation period 2-6 days (range 2-14 days)
- 80% asymptomatic
- Symptoms include:
  - Fever
  - Headache
  - Weakness
  - Myalgia
  - Arthralgia
  - Rash

WNV Complications

- Less than 1% develop neuroinvasive disease
  - Meningitis
  - Encephalitis
  - Acute flaccid paralysis

- Persons over 50 years are at greater risk for complications and death

WNV Epidemology

- From 1999-2015, 43,937 cases of WNV were reported in U.S.
  - 1,911 resulted in death

- From 2002-2016, 457 cases of WNV were reported in Kansas

Mosquito Life Cycle

Egg	Rafts float on surface of water and hatch into larvae within 48 hours	
Larvae	Live in water and float at surface of water to breathe oxygen	
Pupae	Resting non-feeding state of the life cycle	
Adult	Flying, biting mosquito	

Mosquito Control and Prevention

- Insect repellent containing an EPA approved ingredient

- Wear long-sleeved shirts and long pants

- Ensure screens are in good repair

- Empty items that can collect water once a week
  - Examples: bird baths, buckets, tires, kids' toys, planters

- Larvacide can be used in standing water that cannot be dumped

CASPER

- Community Assessment for Public Health Emergency Response (CASPER)

- Low cost, household based information about a community quickly

- Originally for disaster response, but recently has been used for non-disaster settings

Project Objectives

- Measure the effectiveness of SCHD's Dump Day campaign

- Determine if CASPER is a useful tool for SCHD to evaluate other programs and campaigns

- Examine health prevention measures taken by different age groups

- Assess best ways to reach Shawnee county residents with health messages

METHODS

CASPER Methodology

- Centers for Disease Control and Prevention CASPER toolkit followed closely

- Two stage sampling
  - Stage 1: 30 random clusters
 - Stage 2: 7 households within clusters

Stage 1 Sampling

- Comprehensive list of all census blocks in Shawnee County from U.S. Census website

- 30 clusters selected with probability proportional to number of households in cluster

- Random number generator used to select 30 numbers between 1 and total sum of households
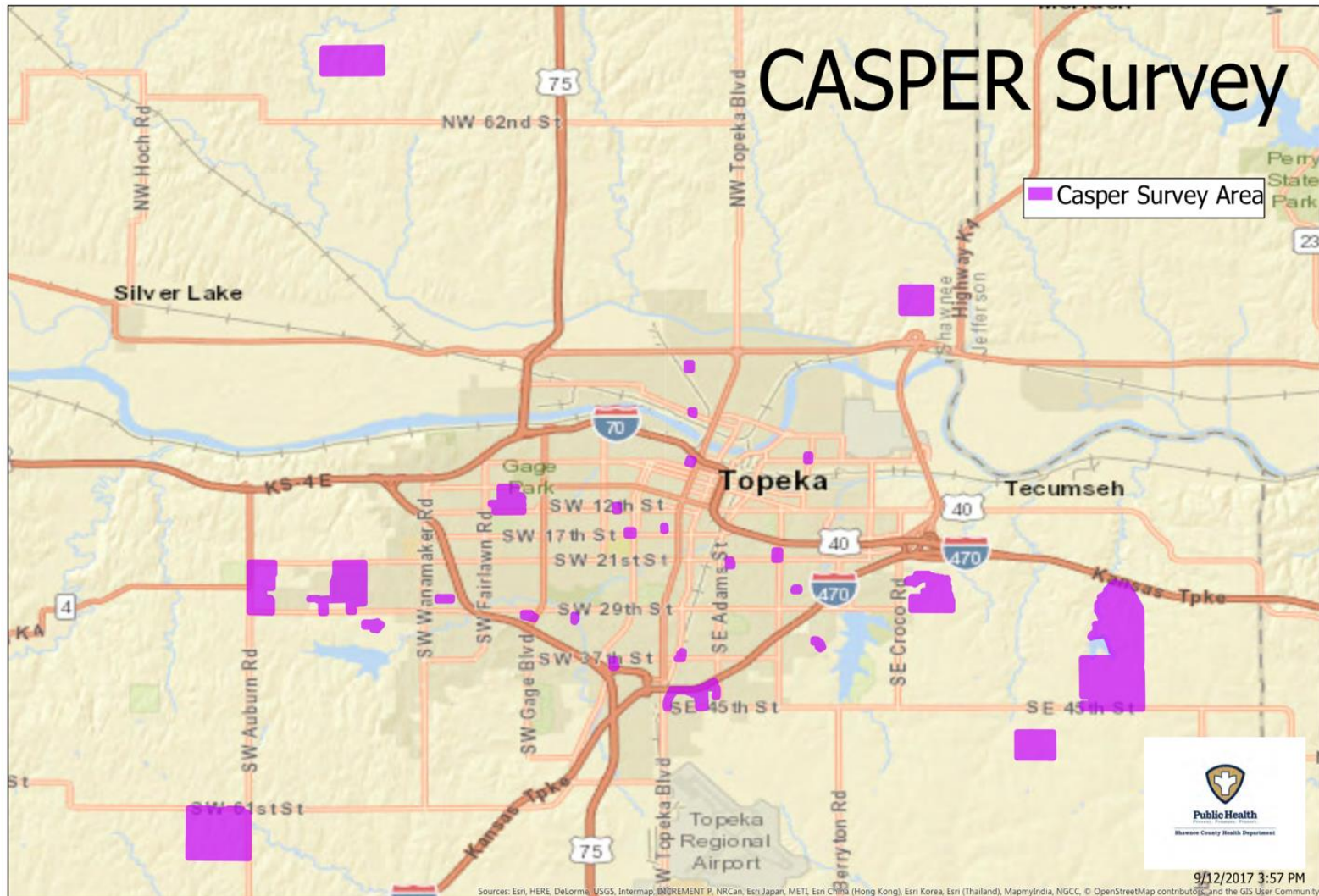
Stage 1 Mapping

- Maps of selected clusters were printed using TIGERweb software

- Maps of selected clusters were then enhanced using Google Earth

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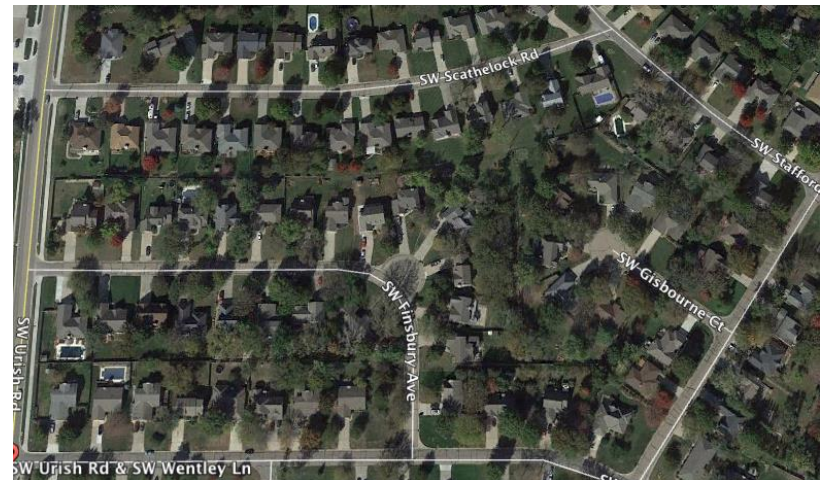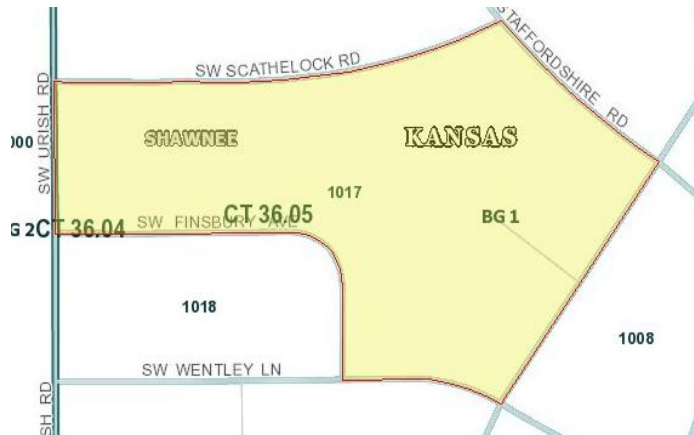
Comprehensive Cluster Map of Selected Census Blocks

Stage 2 Sampling

- Systematic random sampling was used to identify seven households in each cluster
- Every *n*th house was preselected

Tracking

- All households attempted at least two times before moving to the adjacent household in a clockwise manner

- Attempts, refusals, and completed interviews were recorded

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ASSESSMENT TRACKING FORM

Cluster # (i.e., 1-30):_____ # of Houses in Cluster:_____ Interviewer:_____ Date: ___/___/___

Instructions: Use one tracking form per cluster. Check where appropriate, but try to choose only one best option for each of the five categories. Go as far down the list as possible for each site you visit.

Sampled Housing Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type of Dwelling																	
Single Family Home	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mobile Home	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Apartment or Condo	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Answer																	
Door was answered	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Nobody home after 1st visit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Nobody home after 2nd visit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Nobody home after 3rd visit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Interview																	
Language Barrier	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Refused to Participate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Interview begun, not finished	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Interview completed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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CASPER

- Media release on September 13 notified public of door-to-door survey
- Just-in-time training provided on first day of surveying
  - CASPER methodology
  - Alternative household selection
  - Form completion protocol
  - Interview tips

Surveying

- Survey to be completed using up to 20 MRC volunteers

- Volunteers surveyed in teams of two on September 19, 20, 26, 27, 29, and 30, 2017

- Most number of teams on any survey day was four

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CASPER Questionnaire

- 22 question survey
  - Household socioeconomic status
  - Dump Day campaign awareness
  - Mosquito prevention measures
  - Method of receipt of health news
  - Potential exposure to mosquitos
- Reference sheet was provided with categorical options for income and education level and examples of adulticide and larvacide

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Data Analysis

- Survey data entered into Microsoft® Excel 2016

- Completion rate = completed interviews/total interview goal

- Cooperation rate = completed interviews/all contacts made

- Contact rate = completed interviews/all attempts made

Data Analysis

- Analysis performed in SAS® 9.3

- Data was weighted

$$\frac{\text{Total number of housing units in sampling frame}}{\text{Number of housing units interviewed * Number of clusters selected}}$$

- Multiple variables were collapsed into yes or no responses

- Relative risks, 95% confidence intervals, and p values were calculated

RESULTS

Survey Results

Dump Day Campaign Effectiveness

Variables	Relative Risk (95% CI)	P-value
Dump Day Awareness by Dumping Standing Water	**1.92 (1.30-2.83)**	**0.0032***
Adults Over 65 years by Dump Day Awareness	0.66 (0.29-1.50)	0.2842
Households with Children by Dump Day Awareness	1.68 (0.78-3.60)	0.1696

- Education level and household income were not statistically significant

Method of Hearing about the Dump Day Campaign (n=30)

- Facebook — 40.6%
- News/Radio — 26.4%
- Twitter — 11.9%
- Shawnee County Fair — 3.8%
- Other/Don't Know — 9.0%
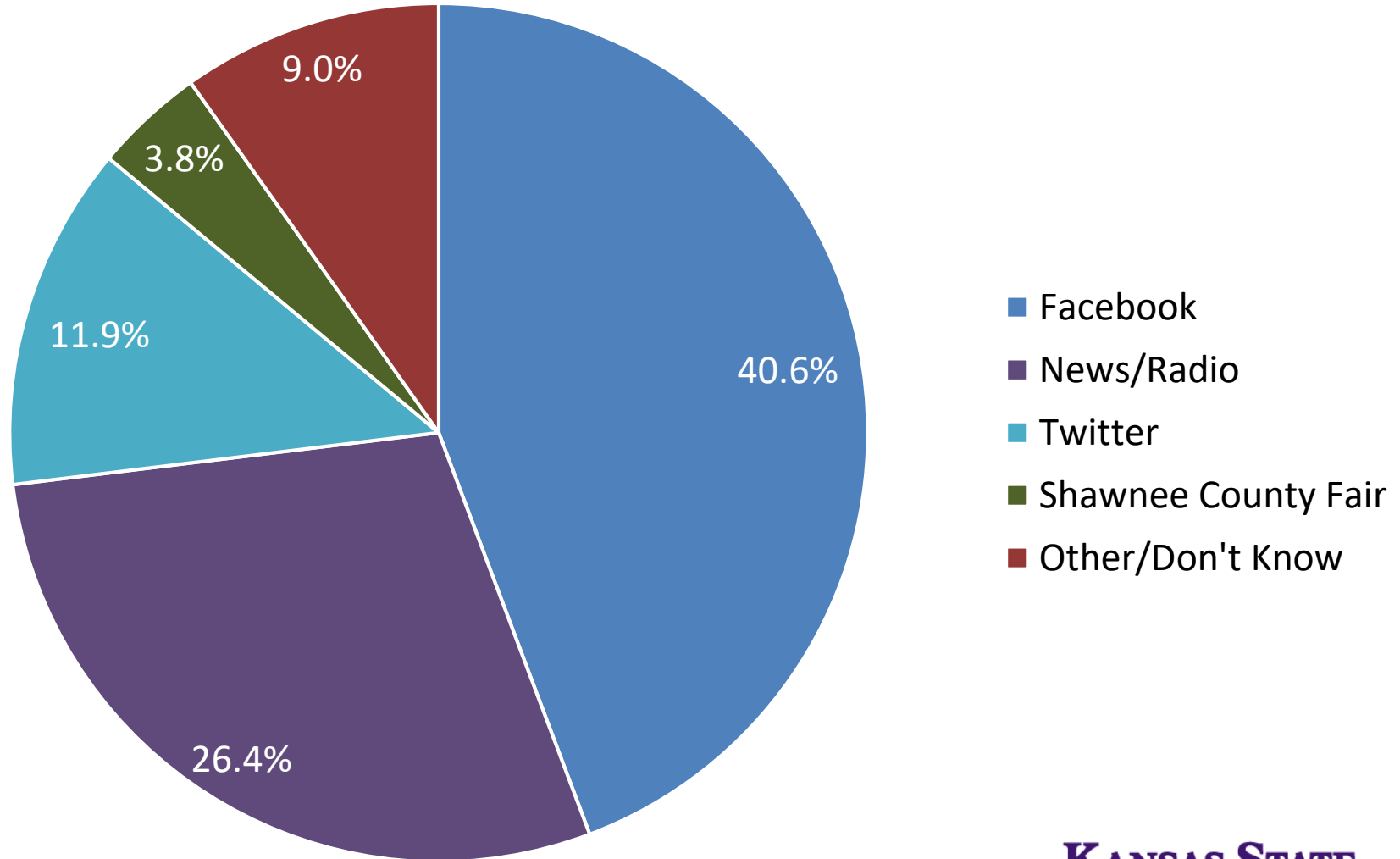
Variables Associated with Households with an Adult 65 Years or Older

Variables	Relative Risk (95% CI)	P-value
Mosquito Repellent Use	0.67 (0.40-1.13)	0.1154
Dumping Standing Water	**0.52 (0.29-0.96)**	**0.0203***
Consider Mosquito Control a Public Health Issue	**0.80 (0.62-1.04)**	**0.0104***
Consider Mosquitoes a Nuisance on Their Property	**0.49 (0.30-0.81)**	**<0.0001***
Seek Out Health News at Least Weekly	1.07 (0.80-1.45)	0.6262
Do Not Use Social Media	**2.91 (1.35-6.32)**	**0.0001***

Variables Associated with Households with Children

Variables	Relative Risk (95% CI)	P-value
Mosquito Repellent Use	1.69 (1.28-3.00)	0.0014*
Dumping Standing Water	1.40 (0.75-2.61)	0.2802
Consider Mosquito Control a Public Health Issue	1.16 (0.96-1.41)	0.0658
Consider Mosquitoes a Nuisance on Their Property	1.75 (1.14-2.67)	0.0022*
Seek Out Health News at Least Weekly	1.08 (0.83-1.41)	0.5207
Use Social Media	0.24 (0.07-0.86)	0.0028*

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Personal Property Factors

Variables	Relative Risk (95% CI)	P-value
Households who Consider Mosquitoes a Nuisance who Dump Water on Their Property	2.19 (1.20-4.01)	0.0009*

Preferred Method of Receiving Health News by Age Group (n=116)
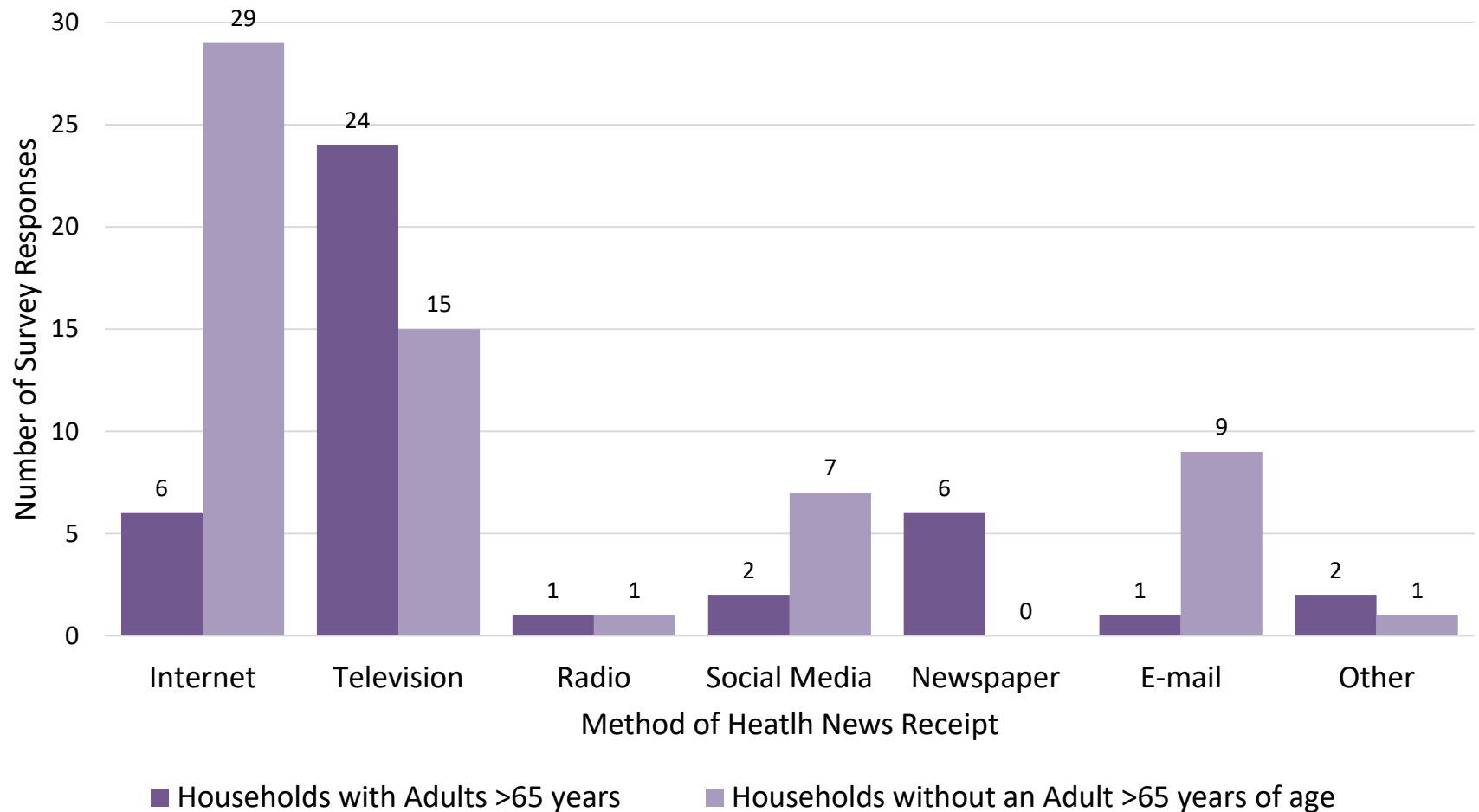
CONCLUSIONS AND DISCUSSION

Conclusions

- Dump Day campaign was effective as individuals who were aware of the campaign were more likely to dump water on their property than those who were not aware of the campaign

- Adults aged 65 years or older were less likely to dump water or use mosquito repellent

- Households with children were more likely to use mosquito repellent and consider mosquitoes a nuisance on their property

Conclusions

- Adults aged 65 years or older were less likely to know about the campaign
  - Majority of advertising was on social media
  - Age group is less likely to use social media and preferred television and newspaper as source of health news
- Randomness of CASPER provided insight on the effectiveness of the Dump Day campaign

Limitations

- Small number of volunteers
- Vacant cluster of mobile homes and three clusters with 11 households or fewer
  - 200 households available for surveying
- Door-to-door surveying
  - Unwillingness to open doors
  - Physical limitations for some volunteers
  - Daylight hours limited
- Education and income level questions not routinely asked

Successes

- Completion rate of 55.7%

- Pre-selection of houses made surveying easier for volunteers

- Short questionnaire encouraged participation

- Larvacide and educational materials were offered to all respondents

Recommendations

- CASPER is a good tool to use to evaluate other campaigns at SCHD with more volunteers

- More volunteers and larger surveying timeframe would get closer to 210 household goal - Larger sample size would increase power of results

- Utilize SCHD GIS services to produce detailed maps as they were helpful in the field

CORE AREA COMPETENCIES

Core Area Competencies

- Biostatistics
  - Provided framework to analyze data collected
  - Statistical calculations were used to determine the effectiveness of the campaign
- Environmental Health Sciences
  - Emphasized need to consider entire health triad
  - Focused on environmental prevention measures to reduce risk of human illness
- Epidemiology
  - Introduced important concepts to analyze data
  - Applied knowledge to investigate relationships between variables collected
  - Encouraged to be aware of bias in survey questions and analysis

Core Area Competencies

- Health Service Administration
  - Provided a precursor to the complexity of local, state, and federal health departments
  - Explained why programs need to be justified to continue to be funded
- Social and Behavioral Health
  - Improved ability to craft a questionnaire that carefully probed for answers to sensitive questions
  - Stressed importance of economic and social barriers; these factors were assessed in the survey and analysis

Thank you!

Questions?