

# Improving Vector Control Program Performance: An Intervention Guidance Document

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The Public Health Foundation collaborated with 15 local health departments on a performance improvement initiative to increase their vector control programs' efficiency, effectiveness, and capacity. This document shares the lessons learned and outcomes from these communities to tackle the challenge of vector control.

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Public Health Foundation

*Healthy Practices. Healthy People. Healthy Places.*

# Introduction

The Public Health Foundation (PHF) collaborated with 15 local health departments on [performance improvement initiatives to increase their vector control programs' efficiency, effectiveness, and capacity](#). This document shares the lessons learned and outcomes from those improvement projects, and can be used by other communities to tackle the population health challenge of vector control.

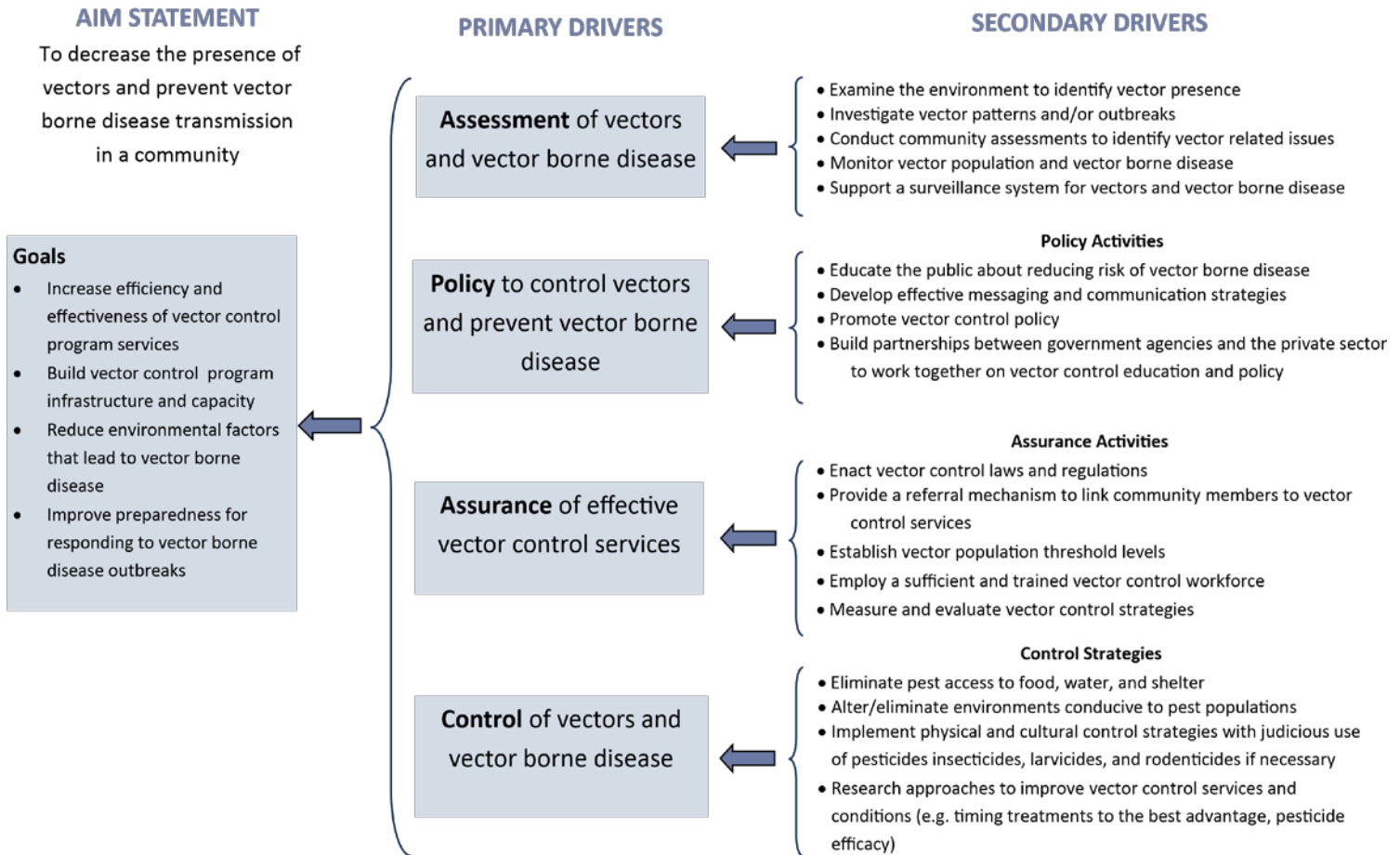
PHF worked with the local health departments to develop the [Vector Control Population Health Driver Diagram](#) that was used as a framework by the health departments as they considered strategies for their performance improvement activities. A [population health driver diagram](#) can be used collaboratively by public health, healthcare, and other stakeholders to identify potential primary and secondary drivers that can help to achieve an identified community health objective.

To assist other communities with use of the Vector Control Population Health Driver Diagram to achieve their vector control goals, the improvement projects and strategies implemented by the 15 local health departments are shared in this document. The aim of the health departments involved in this initiative, as reflected in the driver diagram, was “to decrease the presence of vectors and prevent vector borne disease transmission in a community.” This document is intended to be a companion to the Vector Control Population Health Driver Diagram, and provides information about improvement strategies and interventions that were identified and implemented by the participating health departments to address the secondary drivers in the driver diagram. By learning about actions taken to address the secondary drivers, other communities can use this document to help identify and implement improvement strategies and projects. The AIM statement, goals, and drivers of the Vector Control Population Health Driver Diagram can also be tailored by each community to meet its unique local needs.

The improvement projects to address secondary drivers in the Vector Control Population Health Driver Diagram are described below. In addition, each health department used quality improvement (QI) tools to assist with successfully identifying and implementing its improvement projects, and specific tools used for each project are noted. For questions about this document or to send stories of use, contact Vanessa Lamers, [vlamers@phf.org](mailto:vlamers@phf.org).

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# VECTOR CONTROL POPULATION HEALTH DRIVER DIAGRAM



## **PRIMARY DRIVER: Assessment of vectors and vector borne disease**

SECONDARY DRIVER: *Examine the environment to identify vector presence*

1. St. Louis County Public Health Department (MO)
  - a. **What they did:** The team wanted to determine the presence and distribution of *Aedes* mosquitoes in St. Louis County and report surveillance data to their state health department. To do this, they tested multiple traps and trapping methods to monitor *Aedes* populations in St. Louis County. The health department identified a baseline measurement of mosquitos in the area by conducting surveillance activities for the *Aedes* species at least three nights a week for two months. They largely utilized Gravid *Aedes* Traps (GAT). The information gained from surveillance was used to improve spraying and other mosquito control efforts.
  - b. **What happened:** Through surveillance efforts, the team gained a better understanding of the presence and distribution of different *Aedes* mosquitos, created GIS maps of the distribution, and reported it to the state health department and the Centers for Disease Control and Prevention.
  - c. **QI tools and methods used in this project:** AIM statement, flow chart, and force field analysis were used.
  
2. Tulsa Health Department (OK)
  - a. **What they did:** To better examine the environment for the presence of vectors, the team instituted a process to measure the effectiveness of mosquito control through targeted surveillance. They analyzed data from the 2013 and 2014 Vector Control Program datasets and associations among variables over the course of each year's mosquito season to understand how weather, temperature, and location affect cases of West Nile Virus (WNV). They also wanted to understand how use of mosquito treatments impacted the ability from year to year to control mosquitos. The team identified two variables – positive WNV cases and high mosquito population – to identify areas for increased surveillance. They also developed and implemented new data collection forms to streamline the process, placed all data into one database, and decreased the time between collection and testing of mosquitos.
  - b. **What happened:** The health department documented measureable improvements to their program in 12 months, including an increase of 89

square miles of coverage area, a decrease of 164 work hours, a 57% increase in mosquito testing, and \$2,000 in savings in trap batteries.

- c. **QI tools and methods used in this project:** A Gantt Chart with an incorporated prioritization matrix was useful to prioritize decision-making criteria and keep the projects on track.

SECONDARY DRIVER: *Investigate vector patterns and/or outbreaks*

1. Tulsa Health Department (OK):

- a. **What they did:** To better examine the environment for the presence of vectors, the team instituted a process to measure the effectiveness of mosquito control through targeted surveillance. They analyzed data from the 2013 and 2014 Vector Control Program datasets and associations among variables over the course of each year's mosquito season to understand how weather, temperature, and location affect cases of West Nile Virus (WNV). They also wanted to understand how use of mosquito treatments impacted the ability from year to year to control mosquitos. The team identified two variables – positive WNV cases and high mosquito population – to identify areas for increased surveillance. They also developed and implemented new data collection forms to streamline the process, placed all data into one database, and decreased the time between collection and testing of mosquitoes.
- b. **What happened:** The health department documented measureable improvements to their program in 12 months, including an increase of 89 square miles of coverage area, a decrease of 164 work hours, a 57% increase in mosquito testing, and \$2,000 in savings in trap batteries.
- c. **QI tools and methods used in this project:** A Gantt Chart with an incorporated prioritization matrix was useful to prioritize decision-making criteria and keep the projects on track.

SECONDARY DRIVER: *Conduct community assessments to identify vector related issues*

1. Onondaga County Health Department (NY)

- a. **What they did:** The team developed and implemented an eight question assessment though an initial survey and gathered opinions about pesticide spraying to impact future decisions about pesticide use, and to develop

educational materials for residents for the upcoming mosquito season. The assessment also helped to assess the residents' current satisfaction and knowledge of the mosquito control program. The team used a Force Field Analysis to determine that an assessment of public knowledge and opinion of vector control and vector control services was necessary, and that a survey would be the best way to gather information about public satisfaction and opinions. The survey was available electronically and as a hardcopy that could be returned by mail.

- b. **What happened:** The team sent the survey to 800 residents and got a 20 percent return rate for the survey. From the survey, the team learned that 85 percent of respondents want the county to spray when the mosquito populations are highest, even with no viruses present. They also learned that 99 percent of respondents understand that mosquitos carry viruses such as West Nile Virus.
- c. **QI tools and methods used in this project:** Many QI tools, including a flow chart and a Force Field Analysis, were used to help with this project.

SECONDARY DRIVER: *Monitor vector population and vector borne disease*

1. St. Louis County Public Health Department (MO)
  - a. **What they did:** The team wanted to determine the presence and distribution of *Aedes* mosquitoes in St. Louis County and report surveillance data to their state health department. To do this, they tested multiple traps and trapping methods to monitor *Aedes* populations in St. Louis County. The health department identified a baseline measurement of mosquitos in the area by conducting surveillance activities for the *Aedes* species at least three nights a week for two months. They largely utilized Gravid *Aedes* Traps (GAT). The information gained from surveillance was used to improve spraying and other mosquito control efforts.
  - b. **What happened:** Through surveillance efforts, the team gained a better understanding of the presence and distribution of different *Aedes* mosquitos, created GIS maps of the distribution, and reported it to the state health department and the Centers for Disease Control and Prevention.
  - c. **QI tools and methods used in this project:** AIM statement, flow chart, and force field analysis were used.

2. Tulsa Health Department (OK)
  - a. **What they did:** To better examine the environment for the presence of vectors, the team instituted a process to measure the effectiveness of mosquito control through targeted surveillance. They analyzed data from the 2013 and 2014 Vector Control Program datasets and associations among variables over the course of each year's mosquito season to understand how weather, temperature, and location affect cases of West Nile Virus (WNV). They also wanted to understand how use of mosquito treatments impacted the ability from year to year to control mosquitos. The team identified two variables – positive WNV cases and high mosquito population – to identify areas for increased surveillance. They also developed and implemented new data collection forms to streamline the process, placed all data into one database, and decreased the time between collection and testing of mosquitoes.
  - b. **What happened:** The health department documented measureable improvements to their program in 12 months, including an increase of 89 square miles of coverage area, a decrease of 164 work hours, a 57% increase in mosquito testing, and \$2,000 in savings in trap batteries.
  - c. **QI tools and methods used in this project:** A Gantt Chart with an incorporated prioritization matrix was useful to prioritize decision-making criteria and keep the projects on track.

SECONDARY DRIVER: *Support a surveillance system for vectors and vector borne disease*

1. Broward County Health Department (FL)
  - a. **What they did:** The team held a meeting with local and state health department vector control programs to identify gaps in monitoring and surveying the vector population and vector borne disease and built partnerships for working together. As a collaborative team, they developed flow charts, posters, and door hangers to improve communication, treatment, and enforcement activities related to surveillance and treatment of vector borne illness among providers and community partners.
  - b. **What happened:** Action flow charts and communication processes were developed and helped improve partnerships among agencies to track vector borne illness.

- c. **QI tools and methods used in this project:** The use of flow charts, Gantt Charts, and progress reports helped the community partners work together to improve their processes.
2. St. Louis County Public Health Department (MO)
  - a. **What they did:** The team wanted to determine the presence and distribution of *Aedes* mosquitoes in St. Louis County and report surveillance data to their state health department. To do this, they tested multiple traps and trapping methods to monitor *Aedes* populations in St. Louis County. The health department identified a baseline measurement of mosquitos in the area by conducting surveillance activities for the *Aedes* species at least three nights a week for two months. They largely utilized Gravid *Aedes* Traps (GAT). The information gained from surveillance was used to improve spraying and other mosquito control efforts.
  - b. **What happened:** Through surveillance efforts, the team gained a better understanding of the presence and distribution of different *Aedes* mosquitos, created GIS maps of the distribution, and reported it to the state health department and the Centers for Disease Control and Prevention.
  - c. **QI tools and methods used in this project:** AIM statement, flow chart, and force field analysis were used.

## **PRIMARY DRIVER: Policy to control vectors and prevent vector borne disease**

SECONDARY DRIVER: *Educate the public about reducing risk of vector borne disease*

1. Alexandria Health Department (VA)
  - a. **What they did:** The health department completed the [Environmental Public Health Performance Standards Self-Assessment](#). The assessment identified a need to develop interventions that address barriers to vector control services provided to the public. By using a matrix to identify potential groups that may be at-risk for poor mosquito practices, the health department realized that its outreach efforts were not reaching the populations at highest risk for poor mosquito practices and reconsidered who they needed to target with outreach. The health department developed criteria for identifying target populations and then identified partner organizations with whom to work to improve outreach to the identified populations. Then, the health department



revised its previous outreach materials so that these materials have a new focus on the tourist population and other vulnerable populations.

- b. **What happened:** The health department learned that the largest vulnerable population it faces is tourists to the Washington, DC area because tourists are not often aware of the climate in the area. Improvements are now focused on outreach to tourists to help control mosquito breeding grounds. Partnerships with other organizations in the city were strengthened, and this will help to implement improvement strategies around educating tourists about mosquito control.
- c. **QI tools and methods used in this project:** A Gantt Chart was used to articulate goals and activities, and ensure that goals were attainable in a reasonable amount of time.

## 2. Frederick County Health Department (MD)

- a. **What they did:** The team sought to prevent unnecessary use of rabies post-exposure prophylaxis by implementing an educational program for staff, parents, and campers about bat bite management. Providing rabies post-exposure prophylaxis is part of the protocol for suspected bat bites, at a cost of about \$3,000 per person. Implementing effective bite management practices can prevent unnecessary rabies post-exposure prophylaxis. By preventing unnecessary post-exposure prophylaxis, the health department can reduce hardship for those who take the prophylaxis unnecessarily and save money. To implement this effort, the health department worked with one rural camp, to determine baseline data for number of cases of post-exposure use of prophylaxis based on cases last year and the economic impact. The team then developed a training for the camp's staff and campers about bat management and how to inspect camps to prevent bat exposure and what to do when a bat is found in a camp facility. The 24 camp counselors and one camp manager participated in a one hour training and on-site inspections were completed throughout the summer with staff and campers. All participants took a pre- and post-test to determine the effectiveness of the training.
- b. **What happened:** The number of campers requiring post-exposure prophylaxis decreased from 14 to zero, and the number of counselors requiring post-exposure prophylaxis dropped from four to one, saving an estimated \$51,000.
- c. **QI tools and methods used in this project:** A Gantt Chart was used to keep the project on track.

3. Madison County Health Department (AL)
  - a. **What they did:** The team sought to improve the vector control capacity of the Vector Control Division of the health department in the area of mosquito control by facilitating partnerships among various stakeholder groups. These groups could then assist in disseminating information to homeowners in the area about eliminating breeding environments as a way of reducing mosquitos. To do this, the team used results from an assessment it conducted using the [Environmental Public Health Performance Standards Self-Assessment](#) to identify an area for focusing the efforts of the health department. The team decided to work on mobilizing community partnerships to have the greatest impact on the health department's mosquito control capacity. The health department increased its media presence, sending news releases to seven media outlets and providing interviews so that the public would have access to the educational materials developed by the organizations in the newly expanded organizational partnership. The health department also reached out to 59 tire dealerships about how they can help to reduce the mosquito population.
  - b. **What happened:** The new partnerships formed with nine community organizations resulted in increased distribution of the educational materials for targeted neighborhoods. The letters sent to tire dealerships educated those businesses about how they could help with efforts to reduce mosquitos. The new partnerships with media and other community organizations led to quick distribution of important vector control information.
  - c. **QI tools and methods used in this project:** A Gantt Chart was used to track progress and stay within the determined timeframes, and the team developed a database to track and build on new community partnerships.
  
4. Madison County Environmental Health Division (NY)
  - a. **What they did:** To identify topics for increased public education, the health department sent out a survey developed in collaboration with the agency's mosquito surveillance staff partners and emergency preparedness coordinator. They sought to determine the effectiveness of mosquito spraying notification methods used in previous years. They included with the survey educational materials about mosquito control.
  - b. **What happened:** The health department achieved a return rate of 31 percent for the surveys, which exceeded the team's goal of 10 percent. Information from the surveys was then used to engage in discussions with

the public and partner organizations on aerial spraying activities and the importance of tracking performance.

- c. **QI tools and methods used in this project:** Gantt Charts were used to determine the time required for individual activities and monitor progress.

5. New Hanover County Environmental Health (NC)

- a. **What they did:** In an effort to educate community members about mosquito control, the health department developed a vector control curriculum for a 5<sup>th</sup> grade class and evaluated the effectiveness of the curriculum using pre- and post-tests. The 45-minute curriculum was taught by members of the health department.
- b. **What happened:** The students had a small increase in knowledge about mosquito control following the class. The students increased their performance on the test from 58 percent to 66 percent, with the average score on the pre-test being 3 out of 5 correct, and the average score on the post-test being 3.5 out of 5 questions correct. They also developed activities for the classes and the public, including a word search.
- c. **QI tools and methods used in this project:** A Gantt Chart was used to keep the initiative on track.

SECONDARY DRIVER: *Develop effective messaging and communication strategies*

1. Alexandria Health Department (VA)

- a. **What they did:** The health department completed the [Environmental Public Health Performance Standards Self-Assessment](#). The assessment identified a need to develop interventions that address barriers to vector control services provided to the public. By using a matrix to identify potential groups that may be at-risk for poor mosquito practices, the health department realized that its outreach efforts were not reaching the populations at highest risk for poor mosquito practices and reconsidered who they needed to target with outreach. The health department developed criteria for identifying target populations and then identified partner organizations with whom to work to improve outreach to the identified populations. Then, the health department revised its previous outreach materials so that these materials have a new focus on the tourist population and other vulnerable populations.
- b. **What happened:** The health department learned that the largest vulnerable population it faces is tourists to the Washington DC area because tourists are

not often aware of the climate in the area. Improvements are now focused on outreach to tourists to help control mosquito breeding grounds. Partnerships with other organizations in the city were strengthened, and this will help to implement improvement strategies around educating tourists about mosquito control.

- c. **QI tools and methods used in this project:** A Gantt Chart was used to articulate goals and activities, and ensure that goals were attainable in a reasonable amount of time.

## 2. Frederick County Health Department (MD)

- a. **What they did:** The team sought to prevent unnecessary use of rabies post-exposure prophylaxis by implementing an educational program for staff, parents, and campers about bat bite management. Providing rabies post-exposure prophylaxis is part of the protocol for suspected bat bites, at a cost of about \$3,000 per person. Implementing effective bite management practices can prevent unnecessary rabies post-exposure prophylaxis. By preventing unnecessary post-exposure prophylaxis, the health department can reduce hardship for those who take the prophylaxis unnecessarily and save money. To implement this effort, the health department worked with one rural camp, to determine baseline data for number of cases of post-exposure use of prophylaxis based on cases last year and the economic impact. The team then developed a training for the camp's staff and campers about bat management and how to inspect camps to prevent bat exposure and what to do when a bat is found in a camp facility. The 24 camp counselors and one camp manager participated in a one hour training and on-site inspections were completed throughout the summer with staff and campers. All participants took a pre- and post-test to determine the effectiveness of the training.
- b. **What happened:** The number of campers requiring post-exposure prophylaxis decreased from 14 to zero, and the number of counselors requiring post-exposure prophylaxis dropped from four to one, saving an estimated \$51,000.
- c. **QI tools and methods used in this project:** A Gantt Chart was used to keep the project on track.

3. Madison County Health Department (AL)
  - a. **What they did:** The team sought to educate the public about vector control. To do this, they developed a 45-minute grade school level educational curriculum as well as a separate Zika response-focused educational curriculum for the larger community. The team used a 10 question pre- and post-test for 61 4<sup>th</sup> grade students to test the effectiveness of the educational program in the schools. Students were asked to identify mosquito breeding grounds and were shown live larvae to increase their ability to recognize this risk.
  - b. **What happened:** When comparing the pre- and post-tests of the students following the educational program provided by the health department, over 75 percent of the students improved their scores related to understanding of vector control. An increase in student knowledge shows the benefit of this program related to educating residents about vector control.
  - c. **QI Tools and Methods Used in this Project:** A Gantt Chart was used to keep the project on target.
  
4. New Hanover County Environmental Health (NC)
  - a. **What they did:** The team wanted to reduce the number of tires that were serving as mosquito breeding grounds. They established a protocol for helping tire dealerships and similar businesses storing tires address mosquito control. An important part of the initiative was providing inspections and educational materials, particularly regarding the *Aedes albopictus* mosquito to tire dealerships to educate them about the correct way to store their tires so that they do not collect rain water, and how their efforts in this area can result in fewer mosquitos, fewer complaints about mosquitos, less potential for disease transmission, and fewer pesticides needed to control mosquitos in the area. Once the educational materials were provided, the health department sent a letter for follow-up. The health department then re-inspected the businesses in 60 days to measure the impact of the educational materials. They evaluated the methods for storing tires and provided additional information to further improve practices. Of the 175 tire-related businesses in the area, a randomized beta test of 37 was completed for this project.
  - b. **What happened:** Partnerships were formed and strengthened between tire dealerships and the health department. Of the 37 tire dealerships, about half improved their practices as a result of the education they received.

- c. **QI Tools and Methods Used in this Project:** A Flow chart, Cause and Effect Diagram, and Gantt Chart were used to determine, implement, and track interventions. They also created an inspection form and three maps in GIS.

SECONDARY DRIVER: *Build partnerships between government agencies and the private sector to work together on vector control education and policy*

1. Broward County Health Department (FL)
  - a. **What they did:** The team held a meeting with local and state health department vector control programs to identify gaps in monitoring and surveying the vector population and vector borne disease and built partnerships for working together. As a collaborative team, they developed flow charts, posters, and door hangers to improve communication, treatment, and enforcement activities related to surveillance and treatment of vector borne illness among providers and community partners.
  - b. **What happened:** Action flow charts and communication processes were developed and helped improve partnerships among agencies to track vector borne illness.
  - c. **QI tools and methods used in this project:** The use of flow charts, Gantt Charts, and progress reports helped the community partners work together to build consensus and improve their processes.
  
2. Tulsa Health Department (OK)
  - a. **What they did:** The health department developed key messages about West Nile Virus for the media to help educate people about the threat of this virus and demonstrate the importance of the public taking more responsibility for mosquito control. The health department created the acronym DEET for community education: **D**ump and drain water, **E**liminate mosquito hiding places, **E**ncourage neighbors to do the same, **T**reat yourself with repellent. They started coordinating weekly information sharing among their vector control partners – state health department and vector control agencies – to help ensure that there was consistency in information shared with the public, and the DEET acronym was used across agencies. In addition, the health department developed a questionnaire for the partners about how information sharing can happen more effectively.
  - b. **What happened:** In 2016, the health department aired dozens of media clips on local and national channels, captured videos and values with their TVEyes

Media Monitoring Program, and estimated over 1 million viewers watched their clips, with an estimated ad value of over \$37,000.

- c. **QI tools and methods used in this project:** A Gantt Chart was used to keep the project on track. A Control and Influence Matrix was developed to help determine interventions.

## **PRIMARY DRIVER: Assurance of effective vector control services**

SECONDARY DRIVER: *Establish vector population threshold levels*

1. Tulsa Health Department (OK)
  - a. **What they did:** To better examine the environment for the presence of vectors, the team instituted a process to measure the effectiveness of mosquito control through targeted surveillance. They analyzed data from the 2013 and 2014 Vector Control Program datasets and associations among variables over the course of each year's mosquito season to understand how weather, temperature, and location affect cases of West Nile Virus (WNV). They also wanted to understand how use of mosquito treatments impacted the ability from year to year to control mosquitos. The team identified two variables – positive WNV cases and high mosquito population – to identify areas for increased surveillance. They also developed and implemented new data collection forms to streamline the process, placed all data into one database, and decreased the time between collection and testing of mosquitoes.
  - b. **What happened:** The health department documented measureable improvements to their program in 12 months, including an increase of 89 square miles of coverage area, a decrease of 164 work hours, a 57% increase in mosquito testing, and \$2,000 in savings in trap batteries.
  - c. **QI tools and methods used in this project:** A Gantt Chart with an incorporated prioritization matrix was useful to prioritize decision-making criteria and keep the projects on track.

SECONDARY DRIVER: *Employ a sufficient and trained vector control workforce*

1. Shelby County Health Department (TN)

- a. **What they did:** The health department worked to improve the competency of mosquito control staff using educational classes about commercial pesticide application. Certifications of competency were issued to those completing the training. The goal was to improve the working knowledge and increase accuracy of pesticide application to improve mosquito control and the safety of applications. The health department developed a curriculum to facilitate the classes and held classes at the health department.
- b. **What happened:** The goal was to have a success rate of 75%. Six of the seven people taking the course were certified with the first attempt, and the last person was retaking the exam again after further training. Partnerships between supervisors, staff, administrators, and human resources were strengthened due to this project.
- c. **QI tools and methods used in this project:** A Flow Chart was used to keep the project on track. They also referenced the Cause and Effect diagram and a Force Field Analysis to help identify interventions.

## 2. Frederick County Health Department (MD)

- a. **What they did:** The team sought to prevent unnecessary use of rabies post-exposure prophylaxis by implementing an educational program for staff, parents, and campers about bat bite management. Providing rabies post-exposure prophylaxis is part of the protocol for suspected bat bites, at a cost of about \$3,000 per person. Implementing effective bite management practices can prevent unnecessary rabies post-exposure prophylaxis. By preventing unnecessary post-exposure prophylaxis, the health department can reduce hardship for those who take the prophylaxis unnecessarily and save money. To implement this effort, the health department worked with one rural camp, to determine baseline data for number of cases of post-exposure use of prophylaxis based on cases last year and the economic impact. The team then developed a training for the camp's staff and campers about bat management and how to inspect camps to prevent bat exposure and what to do when a bat is found in a camp facility. The 24 camp counselors and one camp manager participated in a one hour training and on-site inspections were completed throughout the summer with staff and campers. All participants took a pre- and post-test to determine the effectiveness of the training.
- b. **What happened:** The number of campers requiring post-exposure prophylaxis decreased from 14 to zero, and the number of counselors



requiring post-exposure prophylaxis dropped from four to one, saving an estimated \$51,000.

- c. **QI tools and methods used in this project:** A Gantt Chart was used to keep the project on track.

SECONDARY DRIVER: *Measure and evaluate vector control strategies*

1. Tulsa Health Department (OK)

- a. **What they did:** To better examine the environment for the presence of vectors, the team instituted a process to measure the effectiveness of mosquito control through targeted surveillance. They analyzed data from the 2013 and 2014 Vector Control Program datasets and associations among variables over the course of each year's mosquito season to understand how weather, temperature, and location affect cases of West Nile Virus (WNV). They also wanted to understand how use of mosquito treatments impacted the ability from year to year to control mosquitos. The team identified two variables – positive WNV cases and high mosquito population – to identify areas for increased surveillance. They also developed and implemented new data collection forms to streamline the process, placed all data into one database, and decreased the time between collection and testing of mosquitoes.
- b. **What happened:** The health department documented measureable improvements to their program in 12 months, including an increase of 89 square miles of coverage area, a decrease of 164 work hours, a 57% increase in mosquito testing, and \$2,000 in savings in trap batteries.
- c. **QI tools and methods used in this project:** A Gantt Chart with an incorporated prioritization matrix was useful to prioritize decision-making criteria and keep the projects on track.

**PRIMARY DRIVER: Control of vectors and vector borne disease**

SECONDARY DRIVER: *Eliminate pest access to food, water, and shelter*

1. New Hanover County Environmental Health (NC)

- a. **What they did:** The team wanted to reduce the number of tires that were serving as mosquito breeding grounds. They established a protocol for

helping tire dealerships and similar businesses storing tires address mosquito control. An important part of the initiative was providing inspections and educational materials, particularly regarding the *Aedes albopictus* mosquito to tire dealerships to educate them about the correct way to store their tires so that they do not collect rain water, and how their efforts in this area can result in fewer mosquitos, fewer complaints about mosquitos, less potential for disease transmission, and fewer pesticides needed to control mosquitos in the area. Once the educational materials were provided, the health department sent a letter for follow-up. The health department then re-inspected the businesses in 60 days to measure the impact of the educational materials. They evaluated the methods for storing tires and provided additional information to further improve practices. Of the 175 tire-related businesses in the area, a randomized beta test of 37 was completed for this project.

- b. **What happened:** Partnerships were formed and strengthened between tire dealerships and the health department. Of the 37 tire dealerships, about half improved their practices as a result of the education they received.
- c. **QI Tools and Methods Used in this Project:** A Flow chart, Cause and Effect Diagram, and Gantt Chart were used to determine, implement, and track interventions. They also created an inspection form and three maps in GIS.

SECONDARY DRIVER: *Alter/eliminate environments conducive to pest populations*

- 1. Madison County Health Department (AL)
  - a. **What they did:** The team sought to improve the vector control capacity of the Vector Control Division of the health department in the area of mosquito control by facilitating partnerships among various stakeholder groups. These groups could then assist in disseminating information to homeowners in the area about eliminating breeding environments as a way of reducing mosquitos. To do this, the team used results from an assessment it conducted using the [Environmental Public Health Performance Standards Self-Assessment](#) to identify an area for focusing the efforts of the health department. The team decided to work on mobilizing community partnerships to have the greatest impact on the health department's mosquito control capacity. The health department increased its media presence, sending news releases to seven media outlets and providing interviews so that the public would have access to the educational materials

developed by the organizations in the newly expanded organizational partnership. The health department also reached out to 59 tire dealerships about how they can help to reduce the mosquito population.

- b. **What happened:** The new partnerships formed with nine community organizations resulted in increased distribution of the educational materials for targeted neighborhoods. The letters sent to tire dealerships educated those businesses about how they could help with efforts to reduce mosquitos. The new partnerships with media and other community organizations led to quick distribution of important vector control information.
- c. **QI tools and methods used in this project:** A Gantt Chart was used to track progress and stay within the determined timeframes, and the team developed a database to track and build on new community partnerships.

## Conclusion

Using this guidance document as a companion to the Vector Control Population Health Driver Diagram can help organizations determine steps that can be taken to address secondary drivers. The use of QI tools, as well as QI technical assistance to implement interventions has been a key part of the projects described in this document.

PHF encourages users of the Vector Control Population Health Driver Diagram or this Intervention Guidance Document to share with PHF their stories and outcomes from using these resources. PHF hopes that other communities benefit from learning about the successes, challenges, and experiences of those who have used the Vector Control Population Health Driver Diagram or this document. Please submit your examples and stories to Vanessa Lamers, [vlamers@phf.org](mailto:vlamers@phf.org).