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Tools to Drive Quality Improvement of Vector Control Services

Editor's Note: NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, EHSB and guest authors share insights and information about environmental health programs, trends, issues, and resources. The conclusions in this column are those of the author(s) and do not necessarily represent the views of CDC.

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Quality improvement efforts are important for increasing the efficiency and effectiveness of health department and environmental health programs and activities. In 2016, the Public Health Foundation (PHF) and the Centers for Disease Control and Prevention collaborated with five local health departments to identify interventions and implement quality improvement projects for their vector control services. The project used an innovative framework called a population health driver diagram, which is often used to capture and discuss specific activities necessary to address a community health objective (Bialek, Moran, & Kirshy, 2015).

The health departments used a driver diagram tailored to vector control (Figure 1), aligned with the 10 Essential Environmental Public Health Services (EEPHS) (Table 1),

and intended to bring together stakeholders and partners to identify improvement areas and establish coordinated approaches. The 10 EEPHS identify necessary activities to improve environmental public health (Centers for Disease Control and Prevention, 2014). Use of the diagram led to the implementation of interventions and strategies to improve performance, enhance services, and increase collaboration among partner agencies to more effectively address vector control issues and concerns.

Each program prioritized intervention areas and worked with their community partners to address a wide range of vector control program services and activities, including

- enhancing public messaging and education,
- developing training for community and nonprofit organizations,
- increasing community outreach,

- promoting vector control policies,
- creating elementary school curricula, and
- altering or eliminating environments conducive to pest populations.

The health departments leveraged the driver diagram to guide quality improvement efforts, with resources such as PHF's *Public Health Quality Improvement Encyclopedia* and tools including the plan-do-check-act cycle (to test, assess, and improve programs and processes), aim statements (to create measurable, time-bound goals), and Gantt charts (for project planning and tracking) (Moran & Duffy, 2012). The following detailed descriptions highlight the results health departments achieved from using these improvement tools.

- **Frederick County Health Department, Maryland:** The health department noted a high number of campers and counselors requiring rabies postexposure prophylaxis in 2015. In response, the Community Health Services Division and Environmental Health Services Division developed a partnership with the camp, serving approximately 250 children each summer, to plan and design interventions. They developed an educational program on bat management, which included new materials mailed out annually and on-site training for camp staff and campers during the 2016 camp season. After providing the training, there was a 94% decrease (18 individuals in 2015 and 1 in 2016) in the number of individuals requiring rabies postexposure prophylaxis in the 2016 season. There are plans to offer this program to other camps in 2017. (Addressed EEPHS 3, 4, and 9.)

Quick Links

- Centers for Disease Control and Prevention's performance improvement resources: www.cdc.gov/nceh/ehs/activities/performance.html
- *Environmental Public Health Performance Standards, Version 2.0*: www.cdc.gov/nceh/ehs/envphps/docs/envphpsv2.pdf
- Public Health Foundation's population health driver diagrams: www.phf.org/driverdiagrams
- Vector Control for Environmental Health Professionals training: www.cdc.gov/nceh/ehs/elearn/vcehp.html
- Vector Control Population Health Driver Diagram and more resources: www.phf.org/vectorcontrol
- Zika-related quality improvement projects: www.phf.org/Zika

TABLE 1

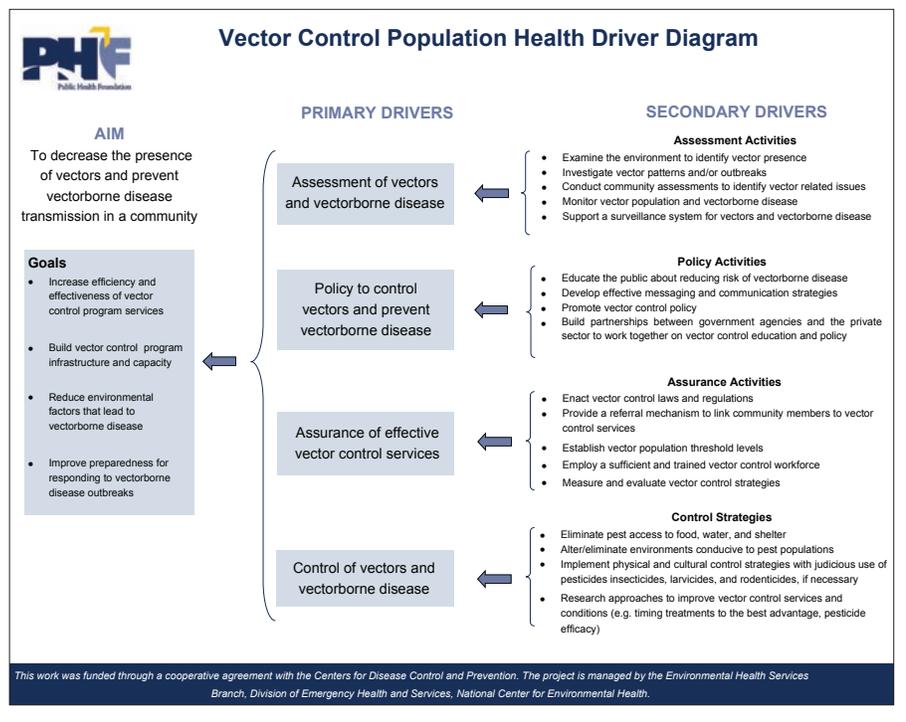
10 Essential Environmental Public Health Services

1. **Monitor** environmental and health status to identify and solve community environmental public health problems.
2. **Diagnose and investigate** environmental public health problems and health hazards in the community.
3. **Inform, educate, and empower** people about environmental public health issues.
4. **Mobilize** community partnerships and actions to identify and solve environmental health problems.
5. **Develop** policies and plans that support individual and community environmental public health efforts.
6. **Enforce** laws and regulations that protect environmental public health and ensure safety.
7. **Link** people to needed environmental public health services and assure the provision of environmental public health services when otherwise unavailable.
8. **Assure** a competent environmental public health workforce.
9. **Evaluate** effectiveness, accessibility, and quality of personal and population-based environmental public health services.
10. **Research** for new insights and innovative solutions to environmental public health problems.

Note. Available online at www.cdc.gov/nceh/ehs/10-essential-services/index.html.

FIGURE 1

Vector Control Population Health Driver Diagram



testing and improving the curriculum, Madison County later documented a 33% increase (58.8% to 91.7%) in knowledge. In addition, the department mobilized more than 80 community partners, completed dozens of informative presentations and interviews, and developed homeowner and practitioner checklists on how to eliminate places where mosquitoes lay eggs. (Addressed EEPHS 3 and 4.)

- **New Hanover County Health Department, North Carolina:** The health department developed a mosquito control curriculum and educational materials for a local elementary school that met and aligned with the state's core curriculum standards. They demonstrated a 15% increase (57.7% to 73.1%) in student knowledge about mosquito control based on the project pre- and post-test results and are now conducting outreach to other districts, schools, and educational programs. (Addressed EEPHS 3.)
- **St. Louis County Department of Public Health, Missouri:** The department built partnerships with the Missouri Department of Health and Senior Services' public health laboratory and neighboring local health authorities, and implemented a new surveillance system to monitor the presence of *Aedes albopictus* mosquitoes in the county. They documenting roughly a 22% increase (66.1% to 88.9%; 58.3% to 80.4%; 56% to 78%) in knowledge about mosquito control based on pre- and post-testing. After
- **Madison County Health Department, Alabama:** The health department developed and provided a mosquito control curriculum to three elementary school classes,

used a plan-do-check-act process to research methodology, test equipment and supplies, establish protocols, determine how to use data, pilot the surveillance program, and evaluate and adjust protocols. Their resulting GIS maps of *Ae. albopictus* mosquito counts around the county gave St. Louis and their partners the necessary information for Zika response and planning efforts in real time. (Addressed EEPHS 1 and 2.)

- **Tulsa Health Department, Oklahoma:** The health department mapped mosquito complaints against West Nile virus-infected mosquito populations and used this information to make decisions about the allocation of resources. They documented measurable improvements within 12 months, including increasing their mosquito surveillance coverage area by 89 square miles while decreasing overall work hours and mosquito trap usage. This trapping and surveillance efficiency saved \$2,000 in trap batteries. Prioritizing and improving their processes also led to a 57% increase in efficiency of West Nile virus testing of collected mosquitoes. (Addressed EEPHS 1 and 4.)

Health departments and environmental health programs are encouraged to use the driver diagram as a resource for collaborating with stakeholders and developing coordinated vector control approaches among partners. While the driver diagram is effective for improving ongoing vector control activities and services, it can also be used for responding to new and emerging vectors and vectorborne diseases. Zika was becoming a top priority as the vector control programs initiated their quality improvement activities. In addition to the activities and accomplishments noted earlier, several of the health departments benefitted from using the driver diagram to establish well thought out and collaborative approaches for their Zika response. The Vector Control Population Health Driver Diagram (Figure 1) and additional information, examples, final products, and resources from these health departments are available on PHF's Web site (see the Quick Links sidebar). For more information on PHF's vector control work, check out their Web site (www.phf.org) or contact Vanessa Lamers at vlamers@phf.org. 🚗

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