The public health investigation cycle serves as an important tool for public health to monitor disease and safeguard lives. There are several important concepts in public health such as epidemiology and surveillance, data collection and management, data analysis and assessment, and public health policy development followed by impact assessment that make up important aspects of the investigation cycle.

A primary aspect of the Public Health investigation cycle is to understand epidemiology. The World Health Organization and the Centers for Disease Control and Prevention (CDC) define epidemiology as the study of distribution of health-related events (World Health Organization, n.d.). Case studies such as the cyclospora outbreak in the Midwest associated with fresh produce in June 2013 (Andrews, 2013) as well as the Hepatitis A outbreak in California in May 2013 linked to organic berries (News Desk, 2013) highlight how outbreaks were detected using basic epidemiological techniques and how these techniques helped curb the spread of disease. There are several surveillance techniques that are used by public health practitioners to monitor disease epidemiology, such as the following (Nsubuga, White, Thacker, et al., 2006):

- **Active Surveillance**: This is a technique that employs regular contact with the general population or care agencies to obtain health care information.
- **Passive Surveillance**: This is a system where public health agencies obtain information directly submitted by various sources, including the mandatory reporting of diseases.
- **Categorical Surveillance**: This is an active or passive surveillance system that focuses on one or more diseases or behaviors of interest to an intervention.
- **Integrated Surveillance**: This is a combination of active and passive surveillance systems; a single infrastructure to monitor various diseases, agents, or behaviors.
- **Syndromic Surveillance**: This is an active or a passive system that uses clinical features without laboratory diagnosis.

In addition, there are many advanced surveillance systems at the local and state level such as syndromic surveillance, hospital intake surveillance, over-the-counter drug use surveillance, and school absenteeism surveillance in Los Angeles county. There is also national-level public health surveillance as seen in the Biohazard Detection System (BDS) that is used by the United States Postal Services (USPS). The BDS system was deployed to major mail processing facilities after the mailing of letters tainted with Anthrax in 2003. The Anthrax exposure of postal workers and the facility itself resulted in a major economic disruption for the United States (Bresnitz, n.d.). The system uses a gel
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electrophoresis technique to match strands of DNA and detects the presence of anthrax in the mail by testing air samples from mail sorting and processing machines. If the presence of Anthrax is detected, local first responders as well as the Federal Bureau of Investigation (FBI) are notified. The postal facility is shut down, and all employees at the facility are decontaminated and prophylaxed.

Local public health departments are large stakeholders in the decontamination and prophylaxis operations, but the overall investigation is led by the FBI. In addition to BDS, there is a national-level surveillance system called Biowatch, which is an automated disease detection system that tests for the presence of category A biological agents such as Plague, Anthrax, and Tularemia. Biowatch is deployed to major metropolitan areas in the United States, and once again, local public health agencies are large stakeholders in the process. These systems have various strengths and weaknesses, and they form the backbone of the national surveillance system and strengthen the first responder capabilities per the Federal Emergency Management Agency (FEMA) (McCarter, 2013).

There is also a national surveillance system that combines local surveillance efforts to build a national map of disease clusters called Biosense. Biosense enables the CDC to track public health issues nationally based on data that are provided by local health departments. It answers the question of what is happening “right now” for planners at all levels of the government (Centers for Disease Control and Prevention, 2013). Finally, during a large scale emergency in which the public health surveillance infrastructure may be damaged, there is a field data collection tool called Community Assessment for Public Health Emergency Response (CASPER). CASPER is a quick field data collection tool that uses random sampling for an impacted area. The tool was used during Hurricanes Katrina and Sandy to provide impact data to the health department. Epidemiological data plays a very important role in public health at the local, state, and national levels because it is the primary driver of follow-up surveillance, assessment, and countermeasures. It also guides public health investigations, which was seen in the CDC’s response efforts during the severe acute respiratory syndrome (SARS) and Influenza A (H1N1) outbreaks. Public health analysis is typically driven by three concepts: causation, association, and correlation. These concepts are interrelated but have major differences.

Public health's assessment of epidemiological data drive public policy that can have major implications on all stakeholders. Public policy can be extremely controversial with several the root causes of the controversies (such as religious or moral opposition and economic impact); however, there are several steps that public health analysts can take to make policy much more
acceptable (such as including stakeholder input in determining policy). There have been several recent public health policy controversies, including smoking bans and the Affordable Care Act. The major driver on a national scale for such controversies is the economic impact on businesses and individuals. Communities can face job losses because of environmental assessments or additional costs in the form of taxes on businesses and individuals. There are other important stakeholders that can also drive public health policy controversies such as religious opposition, which can be seen in the sex education (Masland, n.d.) debate nationally; political opposition (Diaz, 2011), which can be seen during the oil spill in the Gulf states; business opposition, which can be seen in the oil sands debate in the northern Midwest states (Swift, 2013); and community opposition, which can be seen in the smoking cessation campaign (ban on public smoking) in Las Vegas, Nevada (Damon, 2011). In addition, there is always a civil liberties debate where public health is accused of acting as a nanny state. There is also a mistrust of government and accusations of scientific data manipulation and opposition because of moral values. There may never be a solution that will be amenable to all stakeholders; however, public health planners can take steps to make public health less controversial. These include making scientific or epidemiological findings public, opening policies to public debate prior to their implementation, providing communities an avenue to publicly debate policy, early stakeholder involvement, and the early involvement of community stakeholders.

References


