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Emergency disaster epidemiology the state of public health in emergencies, Public Health Information Network (PHIN)

Disaster Epidemiology

Disaster epidemiology provides an assessment of the short- and long-term adverse health effects of disasters to support emergency response and recovery efforts and to predict the consequences of future disasters. As such, it provides situational awareness, i.e., information that helps us understand the needs, plan the response, and gather the appropriate resources. The main goals of disaster epidemiology are to prevent or reduce the number of deaths, diseases, and injures caused by disasters, provide timely and accurate health information to decision-makers, AND enhance prevention and mitigation strategies for future disasters by gathering information to prepare for future response. [1]

Examples of Public Health emergencies:

Emergencies in public health can be triggered by infectious diseases, natural disasters, or wars/conflicts. The following are some drastic cases that have occurred recently.

Pandemic of Coronavirus Disease (COVID-19) -> The 2019 COVID-19 pandemic, otherwise known as the coronavirus pandemic, was an ongoing global pandemic of coronavirus disease (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This novel virus was first identified in an outbreak in the Chinese city of Wuhan in December 2019.

North Ethiopia crisis-> Over 20 million people in Ethiopia, including 5.2 million people in Tigray, are in need of aid due to the conflict that erupted in late 2020.

Ebola, Northern Kivu, Democratic Republic of Congo, February-May 2021-> The Democratic Republic of Congo Ministry of Health declared an outbreak of Ebola virus disease (EVD) on February 7, 2021, after laboratory confirmation of a case in Butembo, North Kivu Province.

A(H7N9) -> A(H7N9) bird flu is a subtype of influenza viruses that has been detected in birds in the past. This specific A(H7N9) virus had not previously been detected in animals or humans until it was discovered in China in March 2013.

The Middle East Respiratory Syndrome (MERS-CoV) -> Middle East Respiratory Syndrome Coronavirus (MERS-CoV) is a virus that is transmitted to humans from infected dromedary camels. This is a zoonotic virus, meaning it is transmitted between animals and humans and can be transmitted through direct or indirect contact with infected animals. Specifically, MERS-CoV has been detected in dromedaries in several countries in the Middle East, Africa and South Asia. A combined total of 27 countries have reported cases since 2012, resulting in 858 known deaths due to the infection and associated complications. [2]

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The Public Health Information Network (PHIN)

The Public Health Information Network (PHIN) is a national U.S. initiative developed by the Centers for Disease Control and Prevention (CDC) designed to promote fully functional and interoperable information systems in public health organizations. Specifically, the initiative involves the creation and implementation of a framework for public health information systems.

The PHIN is intended to do the following:

- Allow for the unified exchange of health data.
- Protecting the security of the health data being exchanged
- Ensuring that the network is always available

The PHIN includes the following five functional areas:

- Recognition and Monitoring
- Analysis of data
- Management of knowledge
- Alarming
- Reaction

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FIGURE 1. Public Health Information Network (PHIN) component functions and initiatives

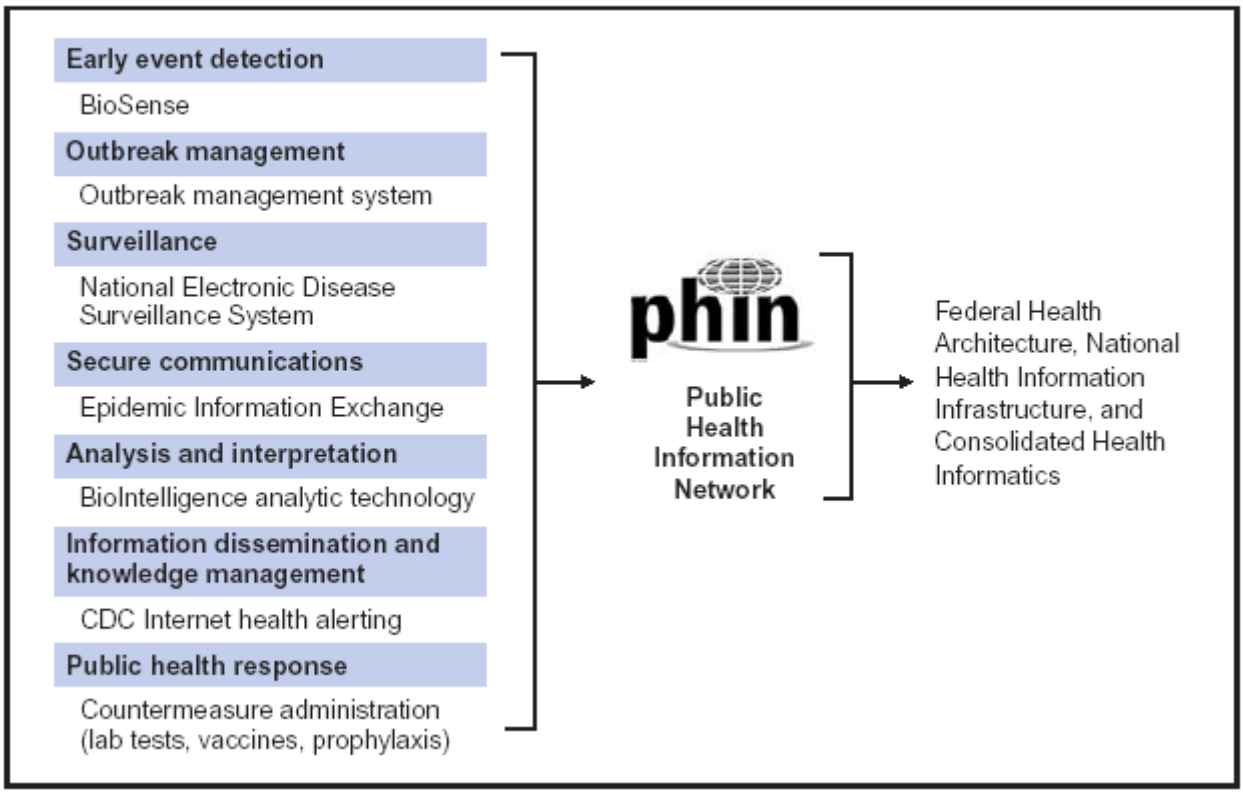

Figure 1: That figure is from the following website, retrieved April 14, 2023<https://www.cdc.gov/mmwr/preview/mmwrhtml/su5301a13.htm

The Public Health Information Network (PHIN) Preparedness initiative aims to create a unified national network of information systems to support public health preparedness for public health emergencies. Drawing on the principles and practices of the broader PHIN initiative, PHIN Preparedness focuses in the near term on ensuring that all public health agencies have or have access to systems to perform known preparedness functions. This PHIN Preparedness initiative defines functional requirements, technical standards and specifications, and a process to achieve coherence and interconnectivity of preparedness systems across the public health system.

The PHIN Preparedness defines a set of functional system areas required for public health preparedness and a process to implement them nationally to create a consistent and interoperable infrastructure for preparedness systems. Respect state and local investments in information technology, but also guide them through specific requirements, standards, specifications, and certifications. However, for those who do not have systems in place or need a "bridging system," the CDC has developed software and systems to meet these

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requirements. The linkage of PHIN to CDC funding for preparedness makes it possible to implement PHIN Preparedness nationally to meet the public's expectations for public health preparedness. [3]

In the preparedness area, PHIN has created systems for early detection of events. These data systems, which interface between medical providers and the PHIN, consider the rapid reporting of cases that could lead to public health crises. Such information systems include call reporting systems, web-based systems, and other electronic case reporting systems. Specific requirements have been established by the PHIN to ensure that facilities are able to participate in these rapid reporting systems. Those requirements also ensure that facilities can protect patient privacy in their reports and integrate with outbreak management.

The PHIN's Outbreak Management Division is another part of preparedness that enables health departments to be ready for real outbreaks. The Outbreak Management System is coordinated with the Early Outbreak Detection Systems to ensure rapid and smooth outbreak detection. The CDC and PHIN are now using an outbreak management program to effectively manage outbreak-related data.

In addition, the PHIN seeks to track and support the delivery of immunizations as well as the organization of these tasks. As a component of this functionality, the PHIN allows for the allocation of limited supplies of vaccines and other needed medications when they are in short supply. Certain vaccines and medications will be identifiable to clinics and medication administrators. The PHIN also supports response organization by enabling monitoring of adverse events and quarantine populations when appropriate. [4]

PHIN's Impact on Public Health

The PHIN seeks to provide public health with continuous access to necessary health care information. By providing nearly real-time access to data, it aims to improve community-based interventions implemented as a result of terrorism attacks or disease outbreaks.

The PHIN offers support and helps improve the results of a variety of public health programs, including the following:

- The U.S. Department of Health and Human Services.
- Requested outcome: improvement of public health information systems.
- The Secretary of the U.S. Department of Health and Human Services.
- Supports: Terrorism defense, health care improvement, and IT improvements.
- Supports: Priority Area 23 - Ensure health departments have adequate infrastructure to effectively deliver essential public health services.

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- Requested Outcome: "Roadmap" for building national capacity for public health systems.

Being healthy is one of the most important components of a successful life. There are three aspects to health and fitness: physical health, mental health, and social health. The symptoms of a healthy life include a good and healthy diet, a peaceful sleep, a strong immune system that can defeat diseases, an exceptionally creative mind, and good cooperative behavior in a social environment. Healthy and peaceful living requires exercise, walks, vitamins and supplements. [4]

Deployment of systems compatible with the public health information network.

PHIN's set of specifications and functions are the building blocks for interoperable, standards-based systems. There has been considerable discussion, however, about appropriate processes for translating these relatively sophisticated specifications into working systems. However, the CDC Information Council, the official governing body of CDC and its public health partners (including the Association of State and Territorial Health Officials, National Association of County and City Health Officials, Council of State and Territorial Epidemiologists, Association of Public Health Laboratories, and the National Association of Public Health Statistics and Information Systems) asked the Gartner Group, an experienced IT consulting firm, to recommend implementation approaches for the PHIN specifications and functions, as well as processes for managing the development of the architecture and data standards. In 2003, The Gartner Group published a report that addressed PHIN features and specifications and recommended approaches that could accelerate their implementation. [5]

Health and Human Services has developed and made available tools to assist in the development of PHIN-compliant systems. The PHIN Messaging System is a software program that supports standards-based, bidirectional, inter-institutional message transport using the ebXML standard with Public Key Infrastructure (PKI) encryption. Offering a message transport tool for point-to-point messages, it meets the requirements for secure authentication and authorization between sender and receiver, as well as encryption of message payload data.

The CDC released a beta version of PHIN Vocabulary Services in January 2004 that provides access to more than 80 key standards reference tables and supports version control and maintenance of these standards reference tables. [6,7]

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