The Role of Public Health in Promoting Health Surveillance

Kibibi Wairimu H.

School of Natural and Applied Sciences Kampala International University Uganda

ABSTRACT

Public health plays an important role in promoting health surveillance by systematically monitoring, collecting, analyzing, and interpreting health data to guide interventions, policies, and practices. Health surveillance systems are essential for early detection of outbreaks, monitoring disease trends, and evaluating the effectiveness of health promotion initiatives. This paper traces the evolution of health surveillance, examines the role of public health in implementing surveillance systems, and highlights the challenges faced, particularly in the Asia Pacific region. Emphasis is placed on the importance of integrating data from various sources and employing both quantitative and qualitative tools for robust health intelligence. Recommendations for strengthening surveillance systems, including the use of digital tools and better resource allocation, are also discussed.

Keywords: Public health, health surveillance, disease monitoring, health promotion, epidemic intelligence, data analysis.

INTRODUCTION

Promoting both the physical and social well-being of people constitutes the central purpose of public health. Health promotion and disease prevention are the two major responsibilities vested in it. Knowledge and understanding are essential to both these functions; evidence about the nature, distribution, and determinants of health outcomes provides a basis for health promotion policies, and continuous evaluation of such policies provides evidence for effective policymaking. The procedures and practices resulting in scientific knowledge are, in a larger sense, surveillance tools for those involved in public health. Monitoring of health outcomes, guided by appropriate indicators and standards, has been identified as a core public health function in most national Public Health Acts or statutory instruments. Such monitoring is different from but essential for, surveillance of health to fully achieve the above objectives. With its technical knowledge and skills in field epidemiological methods, demography and statistics, social sciences and ethics, and with the appropriate infrastructural setup that it has mainly developed over time, public health is consequently well positioned to be a part of the national health surveillance system for policy-oriented health monitoring as well as for epidemic intelligence, if called for [1, 2]. The purpose of this essay is to trace briefly the genesis of health surveillance and then discuss the roles and functions of public health in guiding and conducting the surveillance and in interpreting and disseminating the results. Finally, the current lag in many national health surveillance systems for the Asia Pacific region, particularly those involving local bodies, is highlighted, with some suggestions to address the lapses. Timely surveillance data need to be collected, analyzed, interpreted, and communicated within appropriate ethical and technical dimensions to facilitate evidence-based decision-making in public health and clinical practice. Public health is taking care of promoting the physical and social well-being of people. Health surveillance may be the best example that illuminates the interconnectedness between public health interventions and surveillance systems. Surveillance data are useful in evaluating health promotion efforts and in helping to control the progress of any disease if epidemics occur. Surveillance is integral to all public health functions and is critical in emergency

response. Routine surveillance data of both undernutrition and overnutrition can help in identifying social disparities in access to food and food insecurity [3, 4].

Understanding Public Health and Its Objectives

Public health refers to the field of science that is dedicated to promoting the health of communities and protecting the members of those communities. Public health is an evidence-based approach. It draws on data and scientific best-practice principles to create policies and programs aimed at disease prevention and the promotion of good health. In modern health promotion, the objectives of public health include promoting good health such that the incidence of illness and chronic disease is reduced and the average lifespan is extended. Other objectives in this area include promoting health equality and creating a society in which good health is encouraged, accessible, and affordable by all. Health promotion and public health have partnerships with communities but also intersect with many other sectors such as education, transport, justice, government, urban development, media, the private sector, and non-government agencies. A healthy community must necessarily work together collaboratively to achieve the interconnected goals and objectives shared between these sectors in the interest of creating a healthy society for its people [5, 6]. Modern public health is, in many ways, defined by the role of public health agencies, whose purpose is to collaboratively develop and coordinate a public health capacity to effectively address contemporary health issues. Contemporary health issues are defined as 'emergent and changing disease patterns' and 'global environmental degradation', as well as the need to develop an adequate response to the health needs out of proportion to current capacities. Within a health system, the tools derived from public health, namely surveillance and effective public health response, are essential aspects of the process of enhancing the resilience of the whole system both in the acute phase and in the recovery and rehabilitation phases [7, 8].

Concepts and Importance of Health Surveillance

Health surveillance is the monitoring and analysis of health data collected continuously from the population to support the planning, implementation, monitoring, and evaluation of health interventions and prevention. Health surveillance systems generally have several components, including the collection and analysis of health data, the investigation of specific causes of sickness and death, the dissemination of data, and the mobilization of decision-makers to take action based on the data collected. The increased emphasis on evidence-based decision-making also increases the value of data collection and analysis. This is why there are increased calls for the development of appropriate systems for health surveillance in the majority of low- and middle-income countries. The data from surveillance systems is used to identify health trends, describe the burden of disease, identify outbreaks or unusual cases, and thus inform appropriate and targeted interventions. The most important user of surveillance data and reports is the public health professional who works in response to reports of diseases or unusual events, characterizes the risks, decides on the most effective actions and mechanisms of disease prevention and control, develops or modifies recommendations and guidelines, and provides information to healthcare providers and program management. There are significant differences between the technique of health surveillance and the goals of public health. Health surveillance does have specific goals of intervention planning, monitoring, and evaluation of the outcomes of interventions, assessing gaps, resource allocation, and the planning and implementation of primary prevention activities to contain risk factors, as well as planning and performing health promotion activities. The empirical use of these goals is justified as the data originating from the surveillance system is representative of the population segments and spatially distributed in the catchment area. Nor can we overlook several aspects relating to the ethical issues in the development of the surveillance system: confidentiality, informed consent by citizens, and the nominal data. Crucial to the enhancement of public health in preparedness and response to emergencies and outbreaks, and in the planning of control activities and vaccine strategies, is effective health surveillance. Control of communicable diseases on a global and national level will depend on the quality and coverage of the surveillance system. The integration of disease surveillance and routine data collection systems is essential [9, 10].

Methods and Tools of Health Surveillance

Health surveillance uses a wide range of methods and tools to capture the relevant information and to turn this data into meaningful health intelligence. Sources include data collection exercises, comprising quantitative distribution of questionnaires or interventions, and qualitative methods, which involve consultation. In general, tools can be focused on generating data at specific time points, such as cross-sectional or more structured case registries for the surveillance of positive cases in the population. Big datasets may conveniently be used for ongoing health intelligence, now with an eye toward the trends

throughout the year. As most surveillance draws on a mix of quantitative and qualitative methods, there is ample scope to adapt tools to requirements [11, 12]. There is an array of surveillance systems available, tailored to different tasks in public health surveillance, such as registries, audited or online; surveillance of laboratory data; and wire networks. The rising curve of the number of web-based registries is testimony to the recognition in developed countries that much health intelligence can be drawn electronically into online systems. A distinct technique for further development of surveillance activities is to include digital citizens, using different digital tools and informatics. Epidemiologists and others are increasingly integrating information from multiple sources to estimate the impact of a particular disease while recognizing that the surveillance methods will only give a part of the picture. A simple extension of surveillance-based registrations is to link data together to form a system. Applying such an approach means that data will be more accurate if the system can be programmed to actively seek data from clinical sources, rather than passively waiting for them to be submitted. In constructing a new surveillance system, the collection of counts should only be the initial step, together with a methodology that sets the basic requirements for the design of a system and defines its observable outcomes. One of the critical aspects of available surveillance data is that they most likely result in underestimates of actual disease trends [4, 13].

Challenges and Opportunities in Implementing Health Surveillance

Maintaining health organizations can tap into various data sources to develop surveillance systems. It is often difficult to integrate and keep these systems updated. Other challenges include a lack of funding for technology infrastructure and resources, public trust, and the need to ensure the privacy and confidentiality of personal data [14, 15].

Policy Considerations to Enhance U.S. Health Surveillance

Health surveillance systems, including those in the United States, may be encountering various challenges, but important opportunities exist to improve the collection, analysis, use, and dissemination of health-relevant information. For one thing, existing non-health-specific initiatives, such as syndromic surveillance of emergency department visits, are helping to open the door of acceptance to much broader health surveillance initiatives. Indeed, public patience for vision whether due to national security concerns or fear of the newest, greatest disease threat is wearing thin, and many are demanding a public health system that can respond effectively and efficiently to their health needs. More pragmatic rules of thumb dictate that higher levels of acceptability will result from integrated systems focused on population health, rather than those that narrowly focus on disease surveillance. Thus, policy changes are indicated to keep the flow of applied informatics expenditures high enough to maintain and expand needed technological infrastructure and basic personnel resources [16, 17].

CONCLUSION

Health surveillance is an indispensable component of public health, providing the data needed to respond to emerging health challenges, monitor disease trends, and promote equitable health outcomes. Public health agencies must ensure the integration of surveillance systems into broader health promotion efforts while addressing challenges such as data integration, funding, and ethical concerns. Enhancing digital infrastructure, fostering cross-sector collaborations, and ensuring the timely dissemination of surveillance data can help optimize health interventions. In the Asia Pacific region, particularly, there is an urgent need to improve local surveillance capacities to address disparities and promote effective health outcomes across populations.

REFERENCES

1. Chorus I, Welker M. Toxic cyanobacteria in water: a guide to their public health consequences, monitoring and management. Taylor & Francis; 2021.
2. World Health Organization. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. World Health Organization; 2021 Jul 16.
3. Budd J, Miller BS, Manning EM, Lampos V, Zhuang M, Edelstein M, Rees G, Emery VC, Stevens MM, Keegan N, Short MJ. Digital technologies in the public-health response to COVID-19. Nature medicine. 2020 Aug;26(8):1183-92. nature.com

4. Ibrahim NK. Epidemiologic surveillance for controlling Covid-19 pandemic: types, challenges and implications. Journal of infection and public health. 2020 Nov 1;13(11):1630-8.
5. Whitman A, De Lew N, Chappel A, Aysola V, Zuckerman R, Sommers BD. Addressing social determinants of health: Examples of successful evidence-based strategies and current federal efforts. Off Heal Policy. 2022 Apr 1;1:1-30. hhs.gov
6. Ferdinand DP, Nedunchezhian S, Ferdinand KC. Hypertension in African Americans: advances in community outreach and public health approaches. Progress in cardiovascular diseases. 2020 Jan 1;63(1):40-5. cdc.gov
7. Health Organization W. Operational framework for primary health care: transforming vision into action. 2020. who.int
8. Maani N, Galea S. COVID-19 and underinvestment in the public health infrastructure of the United States. The Milbank Quarterly. 2020. nih.gov
9. Zeng D, Cao Z, Neill DB. Artificial intelligence–enabled public health surveillance—from local detection to global epidemic monitoring and control. InArtificial intelligence in medicine 2021 Jan 1 (pp. 437-453). Academic Press.
10. Mahmood S, Hasan K, Carras MC, Labrique A. Global preparedness against COVID-19: we must leverage the power of digital health. JMIR Public Health and Surveillance. 2020 Apr 16;6(2):e18980. jmir.org
11. Medema G, Been F, Heijnen L, Petterson S. Implementation of environmental surveillance for SARS-CoV-2 virus to support public health decisions: opportunities and challenges. Current opinion in environmental science & health. 2020 Oct 1;17:49-71. nih.gov
12. Chintala SK. AI in public health: modelling disease spread and management strategies. NeuroQuantology. 2022;20(8):10830.
13. Mishra B, Garg D, Narang P, Mishra V. Drone-surveillance for search and rescue in natural disaster. Computer Communications. 2020 Apr 15;156:1-0.
14. Birje MN, Hanji SS. Internet of things based distributed healthcare systems: a review. Journal of Data, Information and Management. 2020 Sep;2(3):149-65.
15. Wang Q, Su M, Zhang M, Li R. Integrating digital technologies and public health to fight Covid-19 pandemic: key technologies, applications, challenges and outlook of digital healthcare. International Journal of Environmental Research and Public Health. 2021 Jun 4;18(11):6053. mdpi.com
16. Gupta A, Katarya R. Social media-based surveillance systems for healthcare using machine learning: a systematic review. Journal of biomedical informatics. 2020 Aug 1;108:103500.
17. Filip R, Gheorghita Puscaselu R, Anchidin-Norocel L, Dimian M, Savage WK. Global challenges to public health care systems during the COVID-19 pandemic: a review of pandemic measures and problems. Journal of personalized medicine. 2022 Aug 7;12(8):1295. mdpi.com