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EDITORIAL

Public Health as a Global Good: The Need for Health Information Systems to Enhance Global Health Security

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1. STATE OF THE ART

The world is quickly changing. Modernizing public health approaches has become a necessity. Historically, public health initiated the collection of population-level data. However, it often relies on 20th-century instruments, thus needing to rethink its classical approaches, as it must consider new scenarios. Looking at current and future trends in populations' health, such as climate change, aging, conflicts, people's movement, changes in ethnic composition patterns, health disparities, emerging infections, antibiotic resistance, and an upsurge in information technologies, it can be stated that public health will face challenges and prospects in the following years.

The COVID-19 pandemic has given us a lesson that we must work collectively to ensure capacity at a global level. As a matter of fact, in a globalized world, epidemic threats hold the potential to devastate countries' assets not only by increasing mortality but also through an upsurge in medical costs, economic dislocation, decreased productivity, and negative incentives for investments. At the same time, the pandemic has also shown the importance of data for outbreak modelling, drug development, and detection of actual health needs.

Global health security (GHS) has become a worldwide priority. Health promotion is now considered a must if we want to accelerate progress toward a safer world by tackling security threats through multilateral and multisector approaches [1]. One of the primary responsibilities of any government is to protect the population's health and safety through three key elements: prevention, detection, and response [2]. War-torn countries, where months or years of conflict have deeply debilitated public health systems, also have a need for promoting and protecting the population's health. Yet, post-war recovery is a complex and long-running process involving many stakeholders and resources at both national and international levels, with epidemiological surveillance being crucial during the reconstruction of a fully operational and high-quality public health system [3]. Limited epidemiological surveillance is a crucial gap in global health security, especially in low-middle-income countries [4].

As stated by WHO and UNICEF, investments in primary healthcare are "*the most efficient and cost-effective way to achieve universal health coverage around the world*" [5]. These investments play a key role in the provision of global public goods (GPGs), an important element of the development agenda and a prerequisite for further reduction of poverty and inequality across and within countries. GPGs are interventions that require collective financing and include investing in essential public health functions, building local health systems, and incentivizing UHC [6]. Key building blocks to achieve this goal are well-performing and successfully functioning health information systems (HIS) that produce timely information and comprehensive statistics to promote the population's health [7], reliable data to effectively manage health systems, and provide quality control, essential information to guide the formulation and evaluation of public health policies, allocating resources [8], and underpin countries' ability to detect and respond to disease threats [9]. HIS are also needed to measure progress toward the Sustainable Development Goals (SDGs) [10], while striving in the direction of Universal Health Coverage (UHC) [11]. UHC and GHS are considered to have a 'marriage of convenience' with mutual benefits since one can help advance the other. As stated in a recent paper, "*the availability of accessible and universal healthcare services in all countries is the crucial first line of defense for all against such threats to*

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health" [12]. The development of evidence-based public health in each country worldwide is substantial, with epidemiological monitoring of outcomes by means of HIS being paramount.

1.1. Challenges

WHO suggests strengthening the HIS as a method to achieve both GHS and UHC, leading to more "equitable and sustained improvements across health services and health outcomes" [13]. However, HIS are not yet implemented at scale [14], lagging behind on both the technological and institutional dimensions, with challenges in accurate data collection on even the most basic health indicators, such as births, causes of death, diagnoses, and medical procedures [15]. Therefore, the capacity of the health system to address the major health problems of the population is considerably reduced. Paradoxically, in societies that are increasingly digitalized, public health often continues to rely on paper-based data systems. There are several reasons for such a gap, such as resistance to change by public health managers and providers, absence of a community of developers to build up and implement informatics tools, weak human resources capacity, non-standardized data, non-shared data flows, and differing legal requirements. Many countries have not capitalized on the benefits of technological advancements, i.e., connectivity, cloud, and mobile computing, so the limited use of standardized approaches to designing, building, and implementing HIS is still a challenge. Some public health facilities might be equipped with manual or standalone systems which differ from facility to facility, and are usually very basic and without the possibility to interact with other systems. Therefore, ad-hoc inter-operable tools are needed to exchange and use information.

1.2. Way Forward

The need for a well-timed translation of newly acquired knowledge and information technologies into public health is unquestionable [16]. In the last decades, some governments have adopted open-source platforms and supporting resources (e.g., training materials and user guides) as global public goods to set up HIS at the national level [17]. Open-source platforms are flexible and created with the principles of "build once, use multiple times", so that they can constantly evolve upon using the same technical framework. These characteristics, coupled with their free and open-source licensing, allow them to be adapted to a multitude of local contexts and use cases [16]. For example, the District Health Information System 2 (DHIS2) is one of the world's largest health management information system platforms, used by more than 73 low- and middle-income countries, allowing health data collection, analysis, management, reporting, quality checks, and dissemination. An open-source online software maintained by centralized and decentralized data management teams would be key to ensuring standardization and coordination at a national scale [18].

1.3. Field Experience

Since technological advances provide a major opportunity to strengthen health data quality and analyses at local and national levels, the authors supported the implementation of an electronic system for epidemiological monitoring and health surveillance using the open-source platform DHIS2, designed to collect and manage healthcare data, in the northern region of Iraq (the Iraqi Kurdistan). The program aimed to network all the main health centers and hospitals of the region and train medical and administrative staff in the management and analysis of health data. By July 2022, 128 hospitals and health centers have been included and are active in the HIS, covering at present nearly 50% of the overall public health facilities of the area. The Pentaho Data Integration tool was used to effectively automate the process of data integration and bulk import from different local systems already in use in health facilities. This experience shows that even within conflict situations, the development of a HIS is feasible [19].

1.4. Outlook

Achieving both GHS and UHC requires states to comply with their obligations and duties under the domestic, regional and international right to health. The right to health includes a convergence between UHC and GHS, which is obtainable through the realization of functional national integrated HIS using a common international language, therefore being able to communicate and universally timely share information, especially when public health threats require global cooperation for a combined approach. Without such global capacity available to all, no country is safe from future pandemics.

CONCLUSION

Functioning health monitoring systems are essential in guiding the development of appropriate public health interventions. However, these instruments should not be conceived and developed by high-income countries and then imposed on low-income ones [6]. The task ahead is enormous and rapid progress is feasible only if there is a multidisciplinary approach and inclusive governance, involving experts from different disciplines, including informatics specialists, integrating their knowledge into a global vision aimed at improving population health and quality of services. Public health workers should be encouraged to recognize the need for a wider interaction with technical experts in the context of engineering sciences and integrate prevention, treatment, and recovery management of the health systems with the support of newly developed informatics. Hence, public health systems will be capable of managing ordinary and emergency situations only by recognizing that information built upon data is one key factor in populations' health.

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise.

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