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The role of Higher Education Institutions in improving Early Warning Systems for global health risks in case of a novel pandemic

-UNESCO policy brief-

Executive summary

Higher education institutions (HEIs) have a critical role in promoting global health and well-being, particularly in the context of pandemics, such as the COVID-19. HEIs can contribute to developing robust early warning systems (EWSs) that detect and respond to emerging health threats by leveraging their resources, expertise, and influence. International collaboration, interdisciplinary research, and technological advancements are essential to strengthening these systems. Thus, effective partnerships and networks are vital to enhancing EWSs. Country-level networks, regional networks, and collaborations between HEIs and governments demonstrate the potential for successful cooperation. Through engaging in advocacy, outreach, research, and technology development, HEIs can improve global health outcomes and establish formal partnerships with governments, and advisory committees can further enhance their impact. To improve their contribution, HEIs should implement targeted strategies. These include developing outreach programs, utilizing interdisciplinary research, creating digital health resources, and establishing formal partnerships with local governments. Through the adoption of these recommendations, HEIs can significantly improve EWSs, ultimately promoting global health and well-being.

Introduction

Health and education are deeply intertwined, hence HEIs have the possibility to greatly influence the process of reaching the SDG 3 (*"Ensure healthy lives and promote well-being for all at all ages"*). Through research, in the education of both citizens and health professionals, engagement with government and NGOs, as well as on a more systematic level in the dissemination of research results and knowledge which can contribute to the prevention of disease across land borders.

In a world with increasing globalization combined with threats of climate change, human displacement and viral mutations, the COVID-19 pandemic might have been only the start of more pandemics to come. SDG 3D is to *"Improve early warning systems for global health risks*" in the attempt to combat such challenges. A comprehensive EWS comprises algorithms for risk prediction, strategies to minimize risk, and management capabilities at national and global levels, only achievable with coordinated approaches. HEIs are the center for academic and social advancements, which could provide resources to strengthen the public health and crisis warning system, also across borders. A well-functioning global collaboration is crucial, especially in regard to low- and middle-income countries, where many determinants of health are worsening, and the vulnerability for the effects of the pandemic were shown to be particularly high (World Health Organization, 2024a). This led to large setbacks in achievement of SDG 3, especially in developing countries in Africa, Asia and Latin America (Nkomo, 2021; The Economic and Social Commission for Asia and the Pacific, 2024; United Nations, 2023).

The Global Action Plan for Healthy Lives and Well-being for All (SDG3 GAP) - an initiative of 69 countries for collaboration and coordination across countries and continents - have themselves promoted the importance of learning lessons from coordination of the COVID-19 responses to combat new challenges (World Health Organization, 2024a). If the world is to meet the SDG 3 in general, and SDG 3D in particular, it is clear that a multidisciplinary and multi-stakeholder approach is needed. HEIs are focal points of humanity's progression and collective advancement, and they can play a central role in the years ahead.

Problem statement

Much as international organizations such as UNESCO have tried their best to ensure effective and sustainable implementation of the SDG 3, challenges still remain (Eckermann, 2017). According to Guégan (2018), all humans are facing challenges, regardless of the wealth and progress of their continent or country. The health burden of the COVID-19 pandemic has shown the critical need for the implementation of robust early warning systems to detect and respond to emerging global health threats (Hartley et al., 2023). HEIs,

with their vast resources, diverse expertise, and wide-reaching influence, are uniquely positioned to contribute to the development and improvement of such systems, aligning with the SDG 3D. They can contribute to strengthening the capacity of all countries, in particular developing countries, for early warning, risk reduction, and management of national and global health risks (Alatni et al., 2021; El Masri & Sabzalieva, 2020; Marsicano et al., 2020).

The COVID-19 crisis has demonstrated that in this ever-changing world, educational institutions must be resilient and adaptable, capable of rapidly shifting their teaching and learning approaches to ensure continuity in challenging time (Alatni et al., 2021). As the pandemic unfolded, HEIs across the globe managed to swiftly transition to online delivery, showcasing an impressive ability to innovate and lead the way in public health response (Marsicano et al., 2020). However, the crisis also exposed obvious institutional inequalities, emphasizing the need for comprehensive, equitable, and inclusive strategies to address global health risks. These inequalities, whether financial, logistical, structural or technological, contributed to an increase in the gap between developed and developing countries in the handling of acute health crises and implementation of EWSs.

As the midpoint of the 2030 Agenda approaches, significant gaps remain in cross-scale coordination and communitywide collaboration, particularly in regions such as sub-Saharan Africa (Annan-Aggrey et al., 2021). The importance of intercultural competencies, shared responsibility, and a global citizenship perspective in higher education is highlighted as a key factor in promoting the necessary collaboration. Collaborative governance partnerships involving governments, businesses, and civil society organizations are crucial for fostering accountability, transparency, and sustainable decision-making.

Policies and practices to solve the problem

The World Bank has proposed several options for HEIs and governments to adapt and respond to a large-scale health crisis such as COVID-19, especially for the institutions in LMICs (World Bank, 2020). HEIs should consider diversifying the sources of funding, employing a flexible digital system with a basket of low-tech innovations targeting the worse-off students. This would result in an expansion of their collaboration networks to increase

access to technology advances and resources, re-positioning the role of universities as crucial in the national response system tackling many aspects of the societies, not only health. Countries should develop and implement quality assurance regulations for future flexible learning modalities, strengthen transparency and data security policies, and improve the inclusivity of the worse-off students in technology advances.

A meta-analysis of 68 studies of EWSs across 29 countries of different prosperity has analyzed the effectiveness of implementation of these systems and concluded that models based on health record and staff data are effective, while pharmaceutical sales and laboratory results are not sufficient by themselves (Meckawy et al., 2022). Most evidence in the previously mentioned study concludes that EWSs are effective but also dependent on the type of country they were implemented in (e.g., income, population distribution). Countries with high-density population centers, for example, have a higher effectiveness when implementing admissions-based EWSs. One of the approaches with the highest universal potential for EWSs is the internet and web-based EWS, which can facilitate communication across networks of institutions with the government (Meckawy et al., 2022). Widening these networks to function across countries could present large advantages.
In fact, some countries have already started to implement such network approaches. Strengthened governance of multilateral institutions is essential, with mechanisms in which countries contribute according to their ability and obtain support according to their need (Frieden, 2021). The European Union (EU), which has shown examples of good governance, is often viewed as a credible model for regional cooperation (Kliem, 2021). During the COVID-19 pandemic, the European Observatory on Health Systems and Policies has established the Covid Health System Response Monitor which is tracking health policies across countries of the WHO European region (World Health Organization, 2024b).

After the Ebola outbreak in West Africa in 2014-2016, the African Centres for Disease Control and Prevention (Africa CDC) was established in 2017 in preparation for potential new epidemics or pandemics. These centers have built a network of public health institutions in Egypt, Kenya, Zambia, Gabon, and Nigeria. Mere days after the first case of COVID-19

was reported in early 2020, the network was able to organize an emergency meeting of all health ministers in one place to decide on a joint continental strategy for the African Union States. Just after that meeting, the Africa Task Force for Coronavirus (AFTCOR) was established (Happi & Nkengasong, 2022). Country-wide organizations and collaborations between the Pacific States are further examples of country-level networks, such as platforms for regional responses to security issues or the Pacific Humanitarian Pathway (Farran & Smith, 2021).

In practice, some high-income countries have already collaborated through "country and regional-level networks" (Chapman & Errecaborde, 2016). Universities in low- and middle-income countries are increasingly adopting this model because HEIs "typically have credibility within their own countries and often have longevity outlasting changes in national governments" (Chapman & Errecaborde, 2016). A notable example of this practice is the South East Asia One Health University Network (SEAOHUN), established in 2011. SEAOHUN operates as a regional-level network comprising 14 faculties of medicine, veterinary medicine, public health, and nursing from 10 universities across four countries: Indonesia, Malaysia, Thailand, and Vietnam. Additionally, this network is affiliated with two universities in the United States. Based on the SEAOHUN regional network framework, member universities are responsible for developing country-level networks within their respective nations. These networks are managed through a national coordinating office, and activities are executed via a core member institution. This institution collaborates directly with its university members to engage faculties in annually planned projects, thereby enhancing regional collaboration and capacity building (Chapman & Errecaborde, 2016).

Extending beyond just country-level networks, it is crucial to establish networks between HEIs and government entities. In Nigeria, the Nigeria Field Epidemiology Training Programme (NFETP) was led by the Federal Ministry of Health in collaboration with the Federal Ministry of Agriculture and Rural Development, Ahmadu Bello University, and the University of Ibadan. This program has trained numerous experts who not only aid Nigeria but also support other West African countries in effectively responding to COVID-19. Beyond health surveillance education, NFETP, in collaboration with other agencies, provides training

for African journalists and reporters in health reporting to enhance the quality of health information in the media (Nigeria Centre for Disease Control and Prevention).

During the COVID-19 pandemic, the involvement of HEIs in protecting community health and improving EWSs was further highlighted through projects predicting disease incidence and the efficiency of preventive measures. In Malaysia, the Philippines, and Vietnam, the Woolcock Institute of Medical Research partnered with other universities and government agencies to develop prediction models tailored to each country. These models informed and shaped the pandemic response strategies accordingly (Hughes et al., 2022).

Advances in technology have also played a crucial role in enhancing early warning systems. Medical data from hospitals, such as diagnoses, laboratory tests, and drug applications, along with their date and time, are utilized by many countries to support EWSs. In China, an automatic EWS for clinical data can analyze and issue warnings for 33 different infectious diseases (Zhang et al., 2024). In the USA, an EWS aimed at influenza has delivered excellent results, performing well across geographical scales, seasons, and prediction targets. In various other countries, emerging technologies like blockchains have facilitated the tracking and warning of infectious diseases using data from Google searches or keywords in social media (Zhang et al., 2024). These advancements are poised to be invaluable in the future.

Recommendations

In light of the foregoing, to improve the contribution of HEIs to EWSs for global health risks, particularly in the context of a novel pandemic, this policy brief offers the following tailored recommendations:

1. Establish formal partnerships between international organizations and local governments to develop and implement community health programs, seeking government funding to support these joint initiatives and improve local health infrastructure and services.

2. Collaborate and partner with key stakeholders (such as public health agencies, community leaders, government parastatals, community organizations, social groups, and religious leaders) to create advocacy and awareness campaigns using diverse media, including social media, local radio, TV, and community workshops while ensuring that these campaigns consider the community's unique social and cultural contexts, such as language and traditions.

3. Use interdisciplinary research to develop advanced, cutting-edge technology for disease surveillance and forecasting models. This could be done by integrating real-time data from various sources, like social media, digital health records, and environmental monitoring, to detect emerging health threats early.

4. Create digital resources, including feedback mechanisms, to improve early warning systems through webinars, videos, and websites to raise awareness about health risks and prevention. And also the use feedback to identify areas for improvement and make data-driven decisions to enhance early warning systems.

References

Alatni, B. S., Abubakar, I. R., & Iqbal, S. A. (2021). COVID-19 and rapid course adaptations in Saudi Arabia: An experiential learning and recommendations for online education. Frontiers in psychology, 12, 643203.

Annan-Aggrey, E., Bandauko, E., & Arku, G. (2021). Localising the Sustainable Development Goals in Africa: implementation challenges and opportunities. Commonwealth Journal of Local Governance(24), 4-23.

Chapman, D. W., & Errecaborde, K. M. (2016). The Role of Universities in International Response to Pandemic Threats. Higher Education Studies, 6(4), 12-22.

Eckermann, E. (2017). SDG 3: a Missed Opportunity to Transform Understandings and Monitoring of Health, Well-Being and Development? Applied Research in Quality of Life, 13. https://doi.org/10.1007/s11482-017-9527-6

El Masri, A., & Sabzalieva, E. (2020). Dealing with disruption, rethinking recovery: Policy responses to the COVID-19 pandemic in higher education. Policy Design and Practice, 3(3), 312-333.

Farran, S., & Smith, R. (2021). The 'Pacific way'of responding to the COVID-19 pandemic. The Round Table, 110(2), 217-231.

Frieden, T. (2021). Will We Be Ready for the Next Pandemic? The Wall Street Journal. https://www.wsj.com/articles/will-we-be-ready-for-the-next-pandemic-11613145677

Happi, C. T., & Nkengasong, J. N. (2022). Two years of COVID-19 in Africa: lessons for the world. In: Nature Publishing Group.

Hartley, D. M., Mattingly, T., Margolis, P. A., Kahn, R. S., Miff, S., Barker, P. M., Zafar, M. A., Schroder, K., & Beck, A. F. (2023). Learning From COVID-19 To Overcome

System Hesitancies In Public Health Preparedness And Response. Health Affairs Forefront.
Hughes, A., Ragonnet, R., Jayasundara, P., Ngo, H.-A., de Lara-Tuprio, E., Estuar, M. R. J., Teng, T. R., Boon, L. K., Peariasamy, K. M., Chong, Z.-L., Ghazali, I. M. M., Fox, G. J., Nguyen, T.-A., Le, L.-V., Abayawardana, M., Shipman, D., McBryde, E. S., Meehan, M. T., Caldwell, J. M., & Trauer, J. M. (2022). COVID-19 collaborative modelling for policy response in the Philippines, Malaysia and Vietnam. The Lancet Regional Health - Western Pacific, 29, 100563. https://doi.org/https://doi.org/10.1016/j.lanwpc.2022.100563
Kliem, F. (2021). ASEAN and the EU amidst COVID-19: overcoming the self-fulfilling prophecy of realism. Asia Europe Journal, 19(3), 371-389.
Marsicano, C. R., Barnshaw, J., & Letukas, L. (2020). Crisis and change: How COVID-19 exacerbated institutional inequality and how institutions are responding. New Directions for Institutional Research, 2020(187-188), 7-30.
Meckawy, R., Stuckler, D., Mehta, A., Al-Ahdal, T., & Doebbeling, B. N. (2022). Effectiveness of early warning systems in the detection of infectious diseases outbreaks: a systematic review. BMC public health, 22(1), 2216.
México, V., Guégan, J.-F., Suzan, G., Kati Coulibaly, S., Didier, N., Bonpamgue, & Moatti, J.-P. (2018). Sustainable Development Goal #3, "health and well-being", and the need for more integrative thinking. Veterinaria Mexico, 5. https://doi.org/10.21753/vmoa.5.2.443
Nigeria Centre for Disease Control and Prevention. Nigeria Field Epidemiology Training Programme. https://ncdc.gov.ng/training/nfeltp
Nkomo, S. (2021). Tracking progress in Africa toward Sustainable Development Goals Workshop on Accelerating the Implementation of the 2030 Agenda and AU Agenda 2063 in Africa: Building Resilient Institutions for the SDGs in the time of COVID-19 - APRM and UNDESA, Cape Town.
The Economic and Social Commission for Asia and the Pacific. (2024). ASIA AND THE PACIFIC SDG PROGRESS REPORT: Showcasing Transformative Actions. https://www.unescap.org
United Nations. (2023). The 2030 Agenda: Are Latin America and the Caribbean on Track to Achieve the Sustainable Development Goals by 2030? https://www.cepal.org/
World Bank. (2020). COVID-19 Impact on Tertiary Education in East Asia and Pacific. https://documents1.worldbank.org/curated/en/506241590701178057/COVID-19-Impact-on-Tertiary-Education-in-East-Asia-and-Pacific.pdf
World Health Organization. (2024a). Aligning for country impact: 2024 progress report on the Global Action Plan for Healthy Lives and Well-being for All.
World Health Organization. (2024b). COVID-19 Health System Response Monitor (HSRM). https://eurohealthobservatory.who.int/monitors/hsrm/overview
Zhang, L., Li, M.-y., Zhi, C., Zhu, M., & Ma, H. (2024). Identification of Early Warning Signals of Infectious Diseases in Hospitals by Integrating Clinical Treatment and Disease Prevention. Current Medical Science, 44(2), 273-280.