Telehealth Ecosystems in Practice M. Giacomini et al. (Eds.) © 2023 European Federation for Medical Informatics (EFMI) and IOS Press. This article is published online with Open Access by IOS Press and distributed under the terms of the Creative Commons Attribution Non-Commercial License 4.0 (CC BY-NC 4.0). doi:10.3233/SHTI230733

Community-Centered Epidemic and Pandemic Information and Engagement Platform, the Hive

Sylvie BRIAND^a, Ljubica LATINOVIC^{a,1}, Brian YAU^{a,2}, Sarah HESS^a, John LEE^a and Tim NGUYEN^a

^aDepartment of Epidemic & Pandemic Preparedness & Prevention, Health Emergencies Programme, World Health Organization, Geneva, Switzerland ORCiD ID: Sylvie BRIAND https://orcid.org/0000-0001-6929-5335, Ljubica LATINOVIC, Brian YAU https://orcid.org/0000-0003-4255-9243, Sarah HESS https://orcid.org/0000-0002-5111-242X, John LEE https://orcid.org/0009-0009-4066-418X, Tim NGUYEN https://orcid.org/0000-0002-6186-9362

> Abstract. The COVID-19 pandemic underlined that communities are key in sharing trusted, timely and relevant information especially during a health emergency where the overabundance of information makes it difficult to make decisions to protect one's health. The WHO Hive project grew out of the desire to create a communitycentered solution with the potential to change the way credible health information is shared, adapted, understood and used for health-related decision making before, during and after an epidemic or pandemic. The Hive online platform provides a safe space for knowledge-sharing, discussion, and collaboration, including access to timely scientific information through direct engagement with WHO subject matter experts, and the true innovation lies within the platform's ability to leverage the power of communities to crowdsource solutions to community concerns and needs. The platform is equipped with a set of synchronous and asynchronous features and tools to encourage coworking and facilitate cross-sectorial collaboration. The Hive seeks to leverage the expert communities to share resources and knowledge for epidemic and pandemic preparedness and provide an environment that is able to respond to the challenges faced in a complex information ecosystem.

> Keywords. Trust, communities, high-impact health events, health emergencies preparedness, epidemic and pandemic response, health information platform, machine-learning, AI for good, community engagement

1. Introduction

The COVID-19 pandemic emphasized that health emergencies start and finish with communities, where time is of the essence. Use and dissemination of health-related information is based on community trust. To build and maintain trust, members of the

¹ Corresponding Author: Ljubica Latinovic, Department of Epidemic & Pandemic Preparedness & Prevention, WHO Health Emergencies Programme, World Health Organization, Geneva, Switzerland, E-mail: latinovicl@who.int

² Corresponding Author: Brian Yau, Department of Epidemic & Pandemic Preparedness & Prevention, WHO Health Emergencies Programme, World Health Organization, Geneva, Switzerland, E-mail: byau@who.int

communities need to be listened to, have an opportunity to participate in broader discussions with trusted members of their networks, to share the challenges they are facing and address their concerns. Communities are understood as "groups of people who share common interests, concerns, or identities that may or may not be spatially connected. These communities could be local, national, or international, with specific or broad interests [1]. Building networks of communities and connecting people during epidemics and pandemics are challenging because it requires time and resources to establish and maintain trusted relationships. There are changes to the information ecosystem due to the infodemic and the information-seeking behaviors of individuals due to uncertainty and the evolving situation [2]. Furthermore, scientific knowledge changed as the pandemic evolved, and this evolution was often not explained well. Under these circumstances, it was difficult for people to find timely, efficient, and trustworthy information to make decisions to protect their health and the health of their communities. All these aspects impacted trust within societies, including trust in institutions, experts, health authorities, governments, and academia, thereby negatively impacting pandemic response efforts. The global health community sought solutions based on sharing expertise, knowledge, and insights through communities of practice while fostering collaboration and co-development and adaptation of the products based on the best available scientific information.

2. The Hive Platform

Today's highly interconnected world presents benefits for improving public health, such as fast access to information and remote connectivity, but it also brings many challenges to our society [2]. The infodemic during the COVID-19 pandemic presents an unprecedented example. There was an increase in volume of scientific information with more than 20,000 COVID-19 related articles published in the first six months of the pandemic [4]. Many of the articles lacked adequate scientific rigor or review by subject matter experts. Furthermore, scientific knowledge changed as the pandemic evolved and these changes were often not explained well. There were many voices and opinions debating the science and accompanying policies, which often led to polarizing debates. In some cases, response measures were politicized, and media content sensationalized, which amplified uncertainty and fear within societies [2].

WHO uses several strategies to disseminate information to the public and decisionmakers. The WHO Information Network for Epidemics ("EPI-WIN") [5] is one strategy that provides resources and regular updates adapted to different sectors and information needs. Recognizing and promoting local knowledge and expertise is critical to ensure WHO's guidance or public-health interventions are relevant, feasible and appropriate. During the COVID-19 pandemic, a wealth of information and experience was shared between different communities including academics, scientists, medical professionals, diverse sectors like educational, agricultural, trade, tourism, and media. WHO wants to ensure WHO's guidance or public-health interventions are understood and can be adapted to different needs and settings as well as to facilitate systematic sharing of this local knowledge and expertise, capitalize on best-practice, and support community decision makers to connect and share experiences to prepare and respond to high-impact health events. This is the vision behind the WHO Hive platform. The Hive, WHO's community-centered epidemic and pandemic information and engagement platform, is designed to complement the EPI-WIN approach and enhance the way that WHO supports and learns from communities. Communities are where trust is built, information is shared, and collaboration happens. Particularly in times of crisis and uncertainty, people turn to those who have remained trustworthy over time. "For individuals to adopt, change and sustain new behaviors during epidemics, they need to have the ability to enact the recommendations in their living/social/work/faith setting" [6]. The Hive platform is designed to bring together communities, while leveraging current technology and the digital information ecosystem. The Hive platform, like a beehive, has the opportunity to be a space of activity, support and community.



Figure 1. the Hive Platform as a System

The Hive main objective is to facilitate meaningful and systematic connection and collaboration within and across communities through exchange of information and action oriented epidemic and pandemic preparedness activities in order to build and enhance relationships that can easily be scaled up and/or reactivated for the response to health emergencies. As depicted in Figure 1. the Hive as a system is designed to leverage the power of communities and the opportunities to be gained from community participation. Hive will place the specific community and the community's information needs at the center and provide the tools necessary for knowledge exchange and co-creation. During the acute phase of COVID-19, a multitude of expert reviews have analyzed the successes and shortcomings of the global response to the global pandemic. Concurrently, the WHO Health Emergencies Programme has introduced the conceptual framework for health emergency prevention, preparedness, response, and resilience (HEPR) that forms its basis. The Hive platform endeavors to complement one of the components in the domain of health emergencies, contributing to enhanced global preparedness for future highimpact health crises. The specific component, termed Community Protection, accentuates pivotal aspects such as community engagement, risk communication, infodemic management, and comprehensive multisectoral actions addressing the social and economic addressing the social and economic facets inherent to pandemic responses [6]. The Hive platform will persistently cultivate sustainable solutions to facilitate and bolster conversations from community-driven initiatives and substantive dialogues.

2.1. The Technology Behind the Hive

Hive's summarization feature provides a short summary of the presented information. This process uses a technique that replaces some words or expressions with shorter ones while keeping the uniqueness of its topic. A machine learning technique, categorization algorithms assign a pre-determined category to each content. Since the Hive system has been recently launched, it is currently using an unsupervised model. After onboarding early adaptors, the system should be able to receive feedback to assess and improve the classification performance. The data gathered from community feedback and usage patterns will guide machine learning models to produce personalized and appropriate information relevant to the interests of the individual. The Hive uses several ways to gather information about users on the platform: 1) user profile settings indicating the location of interest, categories, and personal and professional information 2) history of community interaction 3) activity data on the Hive platform gathered over time 4) data from community feedback. One of the platform's key functionalities currently in its design phase is illustrated in Figure 2. The Hive system suggests connecting with people and the community and discussing health topics based on each user's prior participation in conversations with others, trends of accessing information, and personal preferences. During this process, users' qualitative and qualitative feedback continuously builds a database of learning data, which provides real-time data to unlock the power of the AI model and build on the knowledge created by networks of communities expediently while delivering the latest trend and best approaches.



Figure 2. AI powered capabilities to connect people, communities and health topics

2.2. Data and information security

The Hive platform data and information security is underpinned by ISO/IEC 27001, a standard focusing on information security management systems (ISMS). It is directed toward the preservation of privacy, the protection of confidentiality, and the mitigation of marginalization or exclusion of individuals or communities resulting from consequences of data aggregation. In scenarios where the dissemination of aggregated data give rise to ethical concerns or engender risks associated with confidentiality, the Hive platform will employ techniques such as anonymization that are relevant to the situation. Moreover, the platform adheres to the agreement of informed consent.

3. Results and Discussion

The Hive platform stands as a pioneering initiative within the WHO Health Emergencies Programme. Its full-scale operations commenced in March 2023, marking the beginning

of a dedicated efforts to onboard communities and establish their presence, enabling them to maximize their potential. Currently Hive boasts 12 vibrant and engaged communities with its members from over 80 countries representing all 6 WHO regions. While tangible outcomes may require some time to manifest, the Hive platform welcomes pioneers, extending an invitation to embrace its nascent stage and fully catalyze on its novel attributes. The early onboarded communities can set up the stage for the others and help build relationships that can be critical for possible next pandemic and epidemics on regional or national scales.

4. Conclusion

The Hive stands as an ambitious, forward-looking platform serves as catalyst, fostering the development and sustenance of community trust. It enables collaborations within communities, allowing them to collectively address questions and concerns, while seamlessly sharing dependable and pertinent information and resources. The platform provides a dedicated communal space that connects community members and collates information tailored to each organization's need. In future work, we aim to continuously improve the ways of working for the communities on Hive and bringing in the latest information technology advancements, including data analytics and machine learning to expand the role of the community in epidemics and pandemics preparedness and prevention. The next milestone on Hive's journey involves utilization of the platform by all WHO regional offices and member states, marking a significant step toward its impact on epidemics and pandemics preparedness and prevention worldwide.

References

- World Health Organization, Community Engagement: a health promotion guide for universal health coverage in the hands of people, Available at: https://www.who.int/publications/i/item/9789240010529 Accessed August 18 2023
- [2] Tina Purnat, Tim Nguyen, Sylvie Briand, Managing Infodemics in the 21st Century Addressing New Public Health Challenges in the Information Ecosystem, Springer 2023 DOI:
 <u>mithtps://link.springer.com/book/10.1007/978-3-031-27789-4</u>
- [3] World Health Organization Infodemic. Available at: https://www.who.int/health-topics/infodemic#tab=tab_1 Accessed 3 Jan 2023
- [4] Teixeira da Silva JA, Tsigaris P & Erfanmanesh M (2012) Publishing volumes in major databases related to Covid-19. Scientometrics 126(1):831–842. https://doi.org/10.1007/s11192-020-03675-3
- [5] WHO, EPI-WIN: WHO Information Network for Epidemics. Available at: https://www.who.int/teams/epi-win. Accessed 3 Jan 2023
- [6] Strengthening the global architecture for health emergency prevention, preparedness, response and resilience, WHO, Health Emergencies Programme. Available at: https://www.who.int/publications/m/item/strengtheningthe-global-architecture-for-health-emergency-prevention--preparedness--response-and-resilience. Accessed 18 Aug 2023