One Health Framework Landscape Analysis

UNIVERSITY OF WASHINGTON STRATEGIC ANALYSIS, RESEARCH & TRAINING (START) CENTER

REPORT TO THE BILL & MELINDA GATES FOUNDATION

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Executive Summary

This report summarizes work conducted by the University of Washington's Global Health Strategic Analysis and Research Training (START) Center, in response to the Bill and Melinda Gates Foundation's (the Foundation) work order: "*One Health Framework Landscape Analysis.*"

The Office of the President of Global Development at the Foundation engaged the START Center to conduct a landscape analysis of the One Health framework, in preparation for the delivery of plenary remarks at the 7th World One Health Congress (WOHC) in November 2022. Specifically, the Foundation desired a view on the latest information and literature on the One Health framework, any adaptations on the same as it relates to the post-pandemic world and in pandemic preparedness and response, and a diverse review of external perspectives on the same, particularly looking to how other NGOs are considering the One Health framework.

The START Center conducted a literature review that included grey and peer-reviewed literature, and engaged a small number of key informants to provide additional context on the current state of the framework. We also provided some of our own analyses of the results and included case studies and examples to support the narrative.

We conclude that, while One Health still means different things to different people, it's theoretical emphasis on the interconnectedness between humans, animals, and the environment makes it a useful framework for encouraging the critical collaboration beyond the "normal" infrastructures, networks, and disciplines; although, there is room for improvement in realizing this interconnectedness in practice. Additionally, establishing and maintaining highly integrated, multi-species surveillance systems is imperative for enabling better pandemic preparedness, and NGOs can play a critical role not just in One Health implementation but also in encouraging increased government engagement, capacity-building, advocacy, and in implementing a "decolonized" approach to One Health.

Methodology

Published literature on the One Health framework is limited and comes from various sources beyond peer-reviewed journals. We first conducted a key informant interview (KII) with a One Health expert, Julianne Meisner, to get a sense of what information was available, and where we could find it, along with insights that wouldn't be available in the literature. This report is a combination of takeaways from both the KII as well as from the literature review that followed.

Contents

Pandemic Preparedness & Surveillance

The One Health framework is closely tied to pandemic preparedness and surveillance, as it offers a holistic perspective on infectious diseases and their detection. Historically, though, the implementation of the framework has been anthropocentric, and there are calls for it to better balance the threats to human health with threats to animal and ecosystem health moving forward (1).

In addition to this shift in perspective, the COVID-19 pandemic has brought attention to the need for future pandemic preparedness and surveillance that involves developing better infrastructure for future pandemic threats and assessing the scalability of new surveillance technologies (1).

This section of the report offers some additional context with regards to pandemic preparedness and the need for a One Health perspective, particularly for emerging surveillance.

Pandemic Preparedness

- Considerable scientific evidence suggests that the world is trapped in a positive feedback loop: Disease spillovers from animals to humans become outbreaks that then become pandemics, creating many catastrophic impacts that can reduce resiliency and increase the socioecological drivers of spillovers. Pandemics connect to every aspect of society, both driven by and spilling over into politics, the environment, economics, and systematic inequalities and injustices. This imposes a substantial burden in the negotiation of a “Pandemic Treaty,” intended by the WHO to be an international legal instrument for pandemic preparedness and response, as stakeholders lobby for the treaty to be all things for all interests (2).
- Measures to contain pandemics can put additional strain on people in low-income countries who work in jobs without social security or health insurance, and a balance needs to be struck between measures to contain the pandemic and measures intended to avoid even more harmful consequences, such as hunger or civil unrest (3).
- Preparing for future epidemics and pandemics needs special focus on understanding the complexity of the interactions between humans, animals, and the environment, as well as the different farming systems and their levels of biosecurity, prevention of disease introduction, and rapid control of outbreaks by containment measures. COVID-19 has shown the critical importance of collaboration beyond the "normal" infrastructures, networks, and disciplines, and a real step forward would be to bring essential partnerships between human, animal, and environmental health together (1).

PROPOSED STRATEGY: PANDEMIC TREATY

The World Health Assembly proposed establishing a pandemic treaty, that would be written in the context of One Health solutions. Under international law, a treaty is a legally binding instrument. An international treaty on pandemics would mandate and support WHO member states to build national, regional, and global pandemic capacity and resilience through improved prevention, prediction, preparedness, and response (4). In the absence of key stakeholder collaboration at a local, national, and global levels such a treaty is more likely to fail, thereby failing at its primary purpose: preventing, preparing for, and responding to pandemics. The use of a One Health approach minimizes the potential for gaps in this strategy and closing the "pandemic gap" requires evidence-based solutions that break every step of the cycle, including reducing spill-over risk, reducing pandemic risk and impacts, and ensuring recovery and resilience (2).

Endemic and Emerging Surveillance

A good understanding of the epidemiological patterns of endemic disease will allow human and animal health professionals to detect the presence of emerging disease threats more quickly. While the infrastructure and processes for endemic surveillance have been more established than they are for emerging surveillance, advances in technologies like genomic sequencing – catapulted to center stage by COVID-19 – allow for quicker detection and action; however, this raises questions of what future infrastructure could look like, and how data-sharing in the research community is conducted (1).

- With the changing risks of global spread, the timeliness of early detection is becoming a serious factor in our ability to detect outbreaks at the stage when they still can be contained. USAID's PREDICT Project initiated One Health Surveillance, a transdisciplinary, collaborative approach to understanding infectious disease risk at the animal-human interface. Such surveillance is a challenging yet crucial element of future preparedness, and this is even more critical for diseases with prolonged incubation periods (1).
- Enabling better preparedness by, for example, establishing and maintaining highly integrated multi-species surveillance systems, will also require coordinating the actions of countries while integrating the medical, public health, veterinary, agronomy, engineering, computer sciences, social sciences, and environmental sectors (4).

CASE STUDY 1: PREDICT

CASE STUDY

PREDICT, a project of USAID's Emerging Pandemic Threats (EPT) program, was initiated in 2009 to strengthen global capacity for detection of viruses with pandemic potential that can move between animals and people. **PREDICT has made significant contributions to strengthening global surveillance and laboratory diagnostic capabilities for both known and newly discovered viruses within several important virus groups, such as filoviruses (including ebolaviruses), influenza viruses, paramyxoviruses, and coronaviruses**. The PREDICT-trained workforce, including zoonotic disease specialists and laboratory scientists at more than 60 national, university and partner laboratories, is one of the best response resources to assist with safe and secure detection and response to COVID-19 and other emerging biological threats (5).

CASE STUDY 2: EBOLA VIRUS IN THE CONGO

CASE STUDY

Ebola virus ecology is not fully understood, but the consumption of infected wildlife has been linked to human outbreaks, especially in the Congo Basin. Partnering with the Congolese Ministry of Health, The Wildlife Conservation Society conducted wildlife mortality surveillance and educational outreach in the northern Democratic Republic of Congo (DRC). A low-cost wildlife mortality reporting network was established to detect Ebola virus and to alert public health authorities. Simultaneously, educational outreach promoting behavioral change was delivered. This effort continues to function as an untested early warning system in the DRC, where people and great apes have died from past Ebola virus disease outbreaks. This also **highlights the role of Non-Governmental Organizations (NGO's)** (see Page 8) in implementing cost-effective and local implementation, in collaboration with governments (6).

One Health Implementation Challenges

While the main rationale underpinning the '*why*' of the One Health Framework is generally agreed upon and advocated for at national and international levels, the '*what*' and '*how*' are less clear (7,8). Challenges to the real-world implementation of One Health include the lack of an agreed upon definition, weak governance/institutionalization, insufficient funding, and limited transdisciplinary collaboration.

- Without an agreed upon definition of One Health, updates to systems, policies, and educational curricula may be variable, erroneous, or simply on hold due to a lack of consensus (7,9). This ultimately stagnates progress around broader applications of the One Health framework.

- There are few examples of effective, truly transdisciplinary, and system-wide programming, although this may be related to programs not formally being labeled in the literature or broader media as One Health initiatives, despite sharing these characteristics (7,8,10–13).
- Among the key barriers to effective implementation of programs is weak governance/institutionalization. “One Health requires processes, rules, and institutions that enable policy and practice to be co-managed and co-delivered” (14). Governance has been identified by multiple studies as being hugely important to One Health implementation, although it has often been neglected (8,10,14,15).

EXAMPLES: ENGAGING WITH GOVERNMENTS

Involving local government officials is particularly relevant to pandemic preparedness and responsiveness. When an emerging or endemic disease threat is first identified, it tends to be on a smaller scale. The corresponding initial disease management decisions are typically made at the local level, despite these officials potentially being the least well-equipped (15). Effective containment begins at a local level and thus better engagement of this level of government is needed (8,15,16).

- Limitations around what information is being shared, particularly when dealing with emerging disease threats, has important implications for pandemic preparedness and response. All officials must understand the importance of information sharing, what information to share, and sharing along agreed upon lines of communication (17). An example of real or perceived restrictions around information sharing was when local officials in China were afraid to report COVID-19 cases in their jurisdiction due to potential ramifications.
- In some cases, poor engagement of certain disciplines may be related to a lack of infrastructure, or changes in structure over time: A study in Kenya highlighted that there was no environment ministry to engage with, which contributed to neglect of this domain. The same study noted that changes in government structure, from centralized to localized, also had ramifications on the program implementation and sustainability. It further highlights that there is no ‘one size fits all’ approach when it comes to engaging governments (15).
- Other challenges related to weak governance include that developed policies do not always get implemented into practice: studies in India and the United States identified that, despite having policies in place to include One Health in health professional curricula, minimal updates had been made on later assessments (11,18).

Other barriers to One Health implementation include insufficient funding, limited transdisciplinary collaboration, gaps in data, and competing priorities (7,10–12,14–19).

- Successful implementation and sustainability of One Health programs, like many public health programs, are undermined by insufficient funding (8,15). Successful public health programs risk funding cuts as the health threat may appear less evident, resulting in limited funding being redirected to other priorities. Additionally, programs that rely on donor-funding risk a potentially abrupt discontinuation of activities, weaker government engagement, and/or emphasis on certain donor priorities *in lieu* of local or national priorities (8). Funding has also historically been distributed to researchers in single disciplines, which may stagnate transdisciplinary interventions and be a less efficient overall investment of One Health resources (7,10,19).
- Gaps in data undermine the broad implementation of One Health in a variety of ways, including through limited government buy-in, program scope, and funding. Effective program implementation can also be limited by weak monitoring and evaluation structures for existing One Health interventions, particularly in lower resource settings (12,20,21). Current surveillance and early warning systems are not sufficiently robust to support the breadth that is needed for more comprehensive and One Health driven pandemic preparedness (1,3).

CASE STUDY 3: A STORY OF 2 ONE HEALTH PROGRAMS (BMGF-SUPPORTED)

Uganda: The Human African Trypanosomiasis (HAT) control program in Uganda offers an example of a well-established, integrated, permanent, and successful national-scale One Health program (8). High-level political endorsement and national ownership of the program were key features of the program's sustainability (8). The program's integration within the ministries of health and agriculture demonstrated the national buy-in for the program (8).

- *Lessons learned:* this program demonstrates the importance of all stakeholders understanding their roles and responsibilities. Even if housed under one department, overall financial responsibility and ownership of the program should belong to all disciplines (8). Key challenges included financial and territorial controversies, but these challenges were at least partially managed by the more permanent program infrastructure. Finally, this program illustrates how disease epidemics can lead to nationally integrated One Health programs (8).

Tanzania: The scale-up of rabies interventions in Tanzania is a less successful expansion of One Health interventions. Pilot interventions appeared to be a model of something successful. In practice, though, scaling up the intervention to a national program proved to be challenging and fragmented. Key barriers included weak delivery systems and infrastructure, resource limitations, and misunderstandings of key program targets, as well as insufficient government buy-in (8).

- *Lessons learned:* This case study highlights the need for "government champions" who have a good understanding of the intervention at a policy level, so that they may push the institutionalization process forward (8). It also underscores the need for functional health delivery systems at multiple levels (e.g., human and animal health) (8).

The Role of NGOs

In Pandemic Preparedness & Increasing Collaboration

In addition to having extensive experience working in local communities, NGOs also have access to these populations for rapid needs assessments during times of crisis. This unique proximity allows NGOs to understand the concerns of the populations they serve beyond immediate health risks, including economic impact, school shutdowns, and resource and infrastructure limitations (22).

- NGOs, particularly those working in the health sector, may already be actively engaged in pandemic prevention, preparedness, and response activities (23,24). However, these organizations may use a more traditional 'single discipline approach' when conducting these activities and improved transdisciplinary integration is likely needed (24).
- Limited funding and competition for this funding may limit NGO scope and also undermine intersectoral collaboration (24).
- Actors that make up the One Health landscape include international organizations, grassroots movements (researchers and NGOs) and states. One Health is largely promoted through conferences and networks that spread the approach, and cooperative efforts between international organizations that allow players to see One Health in action (25). Further knowledge dissemination at community levels is needed, and may be a key area for NGOs to emphasize.

CASE STUDY 4: NGOS IN IRAN

In Iran, almost 3,000 NGOs have played an important role in disease control since the beginning of the COVID-19 outbreak. Their most significant activities include providing education and training, controlling stress and psychological pressures, providing and distributing health-care materials, disinfecting cities and villages, fundraising, patient screening, food supply coordination, preparing and distributing essential materials and goods, advocating and communicating with national and international officials, and forming the National Service Network (26). While many NGOs address pandemic response at the human health level, Iranian NGOs create plans of action that are informed by One Health, and connect the dots between animal and human health to support their efforts.

CASE STUDY

CASE STUDY 5: 2008 UGANDAN HUMAN AFRICAN TRYPANOSOMIASIS EPIDEMIC

In 2008, Uganda suffered from an epidemic of HAT that was driven by the transportation of infected cattle into regions previously free of the disease, requiring a strategy for integrated disease control. The Stamp Out Sleeping Sickness (SOS) campaign, a public private partnership between veterinary students in Uganda, infectious disease experts in the UK, and private funders, resulted in a significant decrease in the prevalence of the disease in both humans and cattle herds as part of broader HAT programming in Uganda as highlighted in Case study 4. This collaboration further showed that integrated veterinary and medical surveillance is key to successful control of zoonotic diseases (27).

CASE STUDY

CASE STUDY 6: 1999 ENCEPHALITIS EPIDEMIC

In 1999, a new encephalitis epidemic emerged in New York that was thought to be St. Louis encephalitis. That was, until a veterinarian from the Bronx Zoo insisted that native birds were also dying, which pointed instead towards West Nile virus, a virus previously unheard of in North America. Had the public health officials and veterinarians worked more closely earlier on, an effort to control the mosquito vector may have prevented the virus from overwintering and spreading (22). As of 2020, there have been 52,532 cases and 2,456 deaths due to West Nile virus in the USA (28).

CASE STUDY

In Decolonization

Like many other academic fields, the majority of resources, experts, and networks related to One Health are primarily based in or affiliated with institutions in higher-income settings.

- A systematic analysis of One Health networks (OHNs) in Europe, Asia, & Africa, determined that 96% involved partners in higher-income settings (20).
- Another assessment of 42 antimicrobial resistance (AMR) interventions across the One Health spectrum noted that the majority were located in higher-income countries (16).

Parallels with Humanitarian Crises

In the absence of many examples of effective, transdisciplinary, and system-wide One Health programs with actively engaged NGOs, we looked to other sectors for potential cross-learning. The humanitarian sector, which has a long history of NGO involvement, and faces many similar challenges may offer key insights.

- Both fields, response to humanitarian crises and response to pandemics, have similar high stakes and urgency, with overlap between the two; as the COVID-19 pandemic has exacerbated humanitarian crises in many cases.

- Challenges around effective implementation of One Health and humanitarian responses highlight many of the same key barriers. These may include insufficient financing, weak coordination, weak partnerships, and no/weak political commitment of national and government stakeholders (21).
- Both identify similar gaps between theoretical frameworks and practice. This may include limited data on best or proven actions and limited evidence on what has actually worked well in the past potentially affecting program implementation and scale (29). There tends to be an emphasis on theoretical frameworks or proposed strategies with limited analyses of these frameworks and strategies in practice. The 'Cluster Approach' is a framework establishing clear leadership, accountability, and technical support for the operational side of humanitarian responses. While the cluster approach is understood to be better than previous assistance delivery models, there is a lack of high-quality evidence actually evaluating it (21,30–32).

CASE STUDY 7: 2010 HAITI EARTHQUAKE RESPONSE

Although we may not have clear evidence supporting what the role of NGOs should be, we have some insight into what NGOs should *not* do. The humanitarian response in Haiti after the 2010 earthquake was one of the largest international responses of the pre-pandemic era, and a potential case study into what NGOs should not do in relation to One Health.

- The response in Haiti highlighted the conflicting interests in the humanitarian aid community and the fragmented action, which contributed to unintentional harm (e.g., orthopedic surgeries being performed but minimal post-operative infrastructure in place for physio/rehab, or to even remove external fixation devices, etc.) (32,33).
- It also highlighted an overall inefficient and less effective response model (e.g., multiple NGOs doing the same/similar activities but not coordinating activities led to a fragmented response) or what has been described as "an uncontrollable increase in NGOs implementing relief projects" (32).
- The experience in Haiti steered the development of the UN OCHA health cluster approach "to provide the structure for improved coordination of humanitarian aid action" (32).

More broadly, these opportunities may highlight how better infrastructure and integration is needed across sectors. If NGOs will be relied upon in these capacities, we need to know that they are well equipped to appropriately respond by:

- Learning from challenges encountered by humanitarian sector during COVID-19 (24).
- Understanding increased programmatic costs related to pandemics (e.g., COVID-19 travel restrictions, PPE, etc.).

- Supporting better engagement by local NGOs so that a vacuum is not left when international NGOs step away.

Controversies

An anthropocentric model may be both unethical and impractical.

- Some have argued that a tendency to emphasize human health over that of the other disciplines of One Health is unethical (e.g., when considering the culling of herds of animals for human safety) and also ultimately short-sighted (34). Simply treating the 'symptoms' of disease outbreaks (e.g., by culling infected/exposed animals or relying on mass vaccination programs) may ignore many underlying drivers and enablers of disease emergence (e.g., climate change, land encroachment, etc.). Addressing these broader issues would likely be beneficial for human, animal, and environmental health.
- Another example as presented by the authors related to how mass farming operations may be detrimental to animal, human, & environmental health. Large volumes of animals housed in small spaces in inhumane and increases the potential scale of transmission of emerging or endemic zoonotic illnesses for both animals and humans. Mass farming can also be detrimental and demanding on the environment. By going a step further and transitioning more to plant-based dietary alternatives, all three pillars would benefit (34).

The use of distinct terminology for common issues between disciplines adds complexity.

- An extensive review relating to AMR identified the use of different key terminology between disciplines when describing the same issue between 1990-2019. For example, the use of Antibiotic Resistance (AR) and AMR within different disciplines may affect interdisciplinary collaboration and identification/accessibility of previous literature when conducting searches using key terms (35).
- The Penn State One Health Group has also reported challenges with incongruent technical language impacting interdisciplinary research collaborations (36).

Neglect of the Environmental Health Pillar

- Despite environmental health being identified as one of the key pillars of One Health, multiple articles identified that most projects still largely emphasize human and/or animal health and are not truly interdisciplinary in practice (1,7,10,20,37–39). This can vary slightly depending on the issue (e.g., E. coli and AMR)(16).
    - A systematic analysis of One Health networks (OHNs) in Europe, Asia, & Africa, determined that 32% did not include environmental health (20). And a study assessing

the integration of One Health into health care professional and veterinary curriculum in India only assessed the inclusion of animal and human health topics (18).

- Importantly, there has also been criticism that environmental health has also been neglected in many international and national initiatives or declarations where One Health has been identified by stakeholders as a key component (10,20,37,38).

Neglect of Other Disciplines/Domains

Other domains including government, society, economy, culture/community, industry stakeholders, and legal disciplines have also only been engaged to varying degrees, although there are growing calls for their inclusion (9,10,12,13).

- Systematic analysis of OHNs identified that 90% did not involve community groups, 77% did not involve for-profit organizations, and 22% did not involve government bodies (20).
- Despite some useful One Health collaborations emerging during the COVID-19 pandemic response, input from the social sciences and broader society was very limited or non-existent, limiting any real transdisciplinary action (13).

Conclusion

One Health offers a framework to tackle complex and dynamic problems of the 21st century using a transdisciplinary approach. However, the current more classical three pillars of human, animal, & environmental health may not be sufficiently interdisciplinary nor adequately forward thinking. Social/cultural and community perspectives need to be engaged to a greater degree, along with better engagement of environmental and ecological perspectives and other disciplines including economists, and government/policy makers. More generally, better interdisciplinary collaboration is needed as most existing projects still tend to emphasize human or animal health. Finally, One Health should also consider realigning itself away from an anthropocentric model, which has been identified by some as being both unethical and impractical. A broader and more inclusive remodeling, supported by better governance, will contribute to a more sustainable, responsive, and effective framework.

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