
ENVIRONMENTAL SCAN ONE HEALTH COMMISSION

SUMMARY OF INTERVIEWS CONDUCTED JANUARY-APRIL, 2018

FINAL SUMMARY OCTOBER 2019

EXECUTIVE SUMMARY

One Health is a very old concept that captures the simultaneous health¹ interdependency of humans, animals and the natural and built environments. As an approach to complex health problems, it requires the engagement of human, animal, environmental and plant health professionals as well as social scientists² and others working collaboratively to investigate the causes of ill health and to develop solutions that optimize the health of all four domains. The One Health Commission has as its mission to connect One Health stakeholders, create strategic networks and partnerships, and educate about One Health issues to support a paradigm shift in information sharing, active health interventions, collaborations, and demonstration projects. This document provides a summary of the perspectives of 25 One Health leaders on the global environment that provides context for the work of the One Health Commission. It will allow the Commission to identify areas where its mission meets current needs, new directions that the Commission may wish to take, and strategic partnerships that may help it to achieve its goal of improving health outcomes and well-being of humans, animals and plants and promoting environmental resilience through a collaborative, global One Health approach.

Although the term “One Health” has been accepted widely, its purchase and application within the organizations represented in this document and global education, research and practice has been limited. The most commonly cited reason for this is that the One Health community has largely failed to provide evidence of the return on investment of One Health initiatives and, for that reason, the public sector, which seeks to justify its investments, has been restrained in its commitment to One Health. Zoonotic diseases, antimicrobial resistance, food and global health safety are the few exceptions to this; investment by the private sector may provide the only solution to the dilemma of having insufficient funding to demonstrate a return on investment. The One Health community has also largely failed to provide the public with concrete examples of how One Health investment affects the daily lives of its members. Without greater demand for a One Health approach, politicians are likely to continue to address health emergencies as they occur rather than seeking to prevent them. The relative lack of investment in One Health by the public sector likewise affects educational and research institutions, which have little financial incentive to lessen or eliminate the silos in which they presently operate.

With limited investment by the public sector and little demand by political constituencies for One Health at the present time, the opportunities to build One Health awareness and commitment may best be fulfilled in two ways – by connecting present One Health academic, research and policy leaders and advocates, and by educating young people who are the planet’s future One Health leaders. Relative to the former, the One Health community itself is fragmented and, because of fierce competition for limited funding, lacks cohesion and a unified voice. Connecting the diverse members of a loose One Health community in an Alliance that supports each member to preserve its unique identity and contributions, may be a role that the Commission can fulfill. Relative to the latter, the Commission should continue its efforts to incorporate One Health thinking and application into educational programs, including those for children at the earliest ages. However, if the Commission is to be successful at identifying funding for these directions, it must first develop methodologies and metrics with which to measure its success so that it can demonstrate the value of its activities to its investors.

¹ Health as defined by the World Health Organization refers to the "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity."

² Anthropologists, sociologists, ethicists, political scientists and economists, among others

ONE HEALTH COMMISSION

The OHC was established in the US in 2009 with an initial focus on human, animal and environmental health. Its focus expanded in 2014 to specifically include plant health and networks of One Health advocates and leaders beyond the United States. Since its inception the OHC has sought to position itself as a trusted information warehouse, connector for current and future OH leaders, and creator of OH education initiatives. The OHC co-created and established with two key partners (the One Health Initiative and the One Health Platform) the annual international One Health Day, supported and facilitated the launch of the newly formed International Students for One Health, initiated action teams to address OH challenges, and created a website that received approximately 300,000 unique visits from January through December, 2017.

PURPOSE OF THIS DOCUMENT

The Environmental Scan document is designed to provide context for internal One Health Commission (OHC) strategic planning by describing the global environment within which the OHC currently operates. It will be used by the OHC to measure its mission, goals and initiatives against global One Health needs, identify areas where it might position itself as a key player, and develop a vision and plan for advancing the One Health concept in the period 2018-2022. It will also identify partners that may help it to realize shared One Health goals.

METHODS

STRUCTURED INTERVIEW

The Environmental Scan structured interview was adapted from a document used for similar purposes by the private sector. The final document was the product of iterative review and modification by three individuals with many years of experience and expertise in One Health.

The interview included the following sections:

1. Introduction to the interviewee and his/her organization(s), with an emphasis on One Health-related goals and activities;
2. Opinions about the most commonly-used definition of One Health;
3. Perspectives on global strengths and challenges associated with One Health;
4. Perspectives on the integration of One Health into education, research and practice;
5. Perspectives on the understanding and appreciation for One Health among members of the scientific community, policy-makers and the public;
6. Perspectives on the nature of relationships among global One Health leaders and organizations;
7. Features of organizations that enhance their influence and funding opportunities in One Health and their investment in One Health initiatives, including anticipated return on investments (RoI)
8. Role of institutions and organizations in preparing a workforce, and the skills required of that workforce;
9. Government support for One Health;
10. Networks that support organizations' One Health activities; and
11. Understanding, perceived value of, and expectations for the One Health Commission.

INTERVIEW PROCESS

The list of potential interviewees was developed from a master list of individuals known to have One Health-relevant experience and/or expertise and whose organizations were characterized as one of the following:

- Institutions and organizations with a primary focus on One Health or a related area (EcoHealth, Conservation Medicine, Planetary Health, others) and/or that employ an interdisciplinary approach to their activities involving individuals from at least three of the four One Health domains (human health, animal health, environmental health and plant health); or
- Institutions and organizations for which One Health or a related area (as defined above) is an important but not the primary focus.

All names and contact information were put into an Excel file and uploaded to Yet Another Mail Merge (YAMM), a Google Sheets add-on. Potential interviewees were contacted in three separate groups (limited by the number of individuals that could be contacted per day using the free YAMM application).

A structured interview template was sent to all interviewees in advance of their scheduled interviews to facilitate their preparation. Interviews were conducted using GoToMeeting platform hosted by the OHC between January 24, 2018 and May 10, 2018. With the exception of two interviews that could not be completed on this platform, all interviews were recorded for internal use only. In addition, two individuals submitted responses in written form.

Interviews lasted from one to two hours. Many respondents, by virtue of their current or past employment or affiliations, represented more than one organization or entity. Respondents were given the option to refuse to answer questions, or to skip over questions that were not relevant to them or the entities they represented. In some cases the interviewer skipped over questions that were known to be irrelevant or, in other cases, redundant where a respondent had answered the question in a previous response. In many cases there was insufficient time to complete the interviews while respecting the respondent's other time commitments. In these cases the interviewer moved to questions of higher priority, typically those that related directly to the respondent's perspectives on the One Health Commission.

Interviews were conducted with the following individuals who represent the organizations indicated:

Phil Arkow

Coordinator, National Link Coalition

(The National Resource Center on The Link between Animal Abuse and Human Violence)

and

Instructor, Animal Abuse and Human Violence, University of Florida

and

Instructor, Animal Assisted Therapy, Harcum College

Stratford, New Jersey

USA

Karin Artursson DVM, PhD

Scientific Coordinator, National Veterinary Institute (SVA), Uppsala Sweden

and

Adjunct Professor in Veterinary Bacteriology with emphasis on One Health, Swedish University of Agricultural Sciences, Uppsala, Sweden

and

Co-Founder One Health Sweden (OHS)

And NEOH and MedVetNet Association

Uppsala, SWEDEN

Linda Birnbaum PhD, DABT, ATS (Retired from NIEHS August, 2019)

Director

National Institute for Environmental Health Sciences and the National Toxicology Program

National Institutes of Health

Durham, North Carolina

USA

Ilaria Capua DVM, PhD

Preeminent Professor and Director of the One Health Center of Excellence for Research and Training

Department of Animal Sciences

University of Florida

Gainesville, Florida

USA

Dennis Carroll PhD

Director, Emerging Threats program

United States Agency for International Development

Washington, DC

USA

Jeanne Coffin-Schmidt MCM

Site coordinator, Karamoja Project,

Department of Infectious Diseases and Global Health

Cummings School of Veterinary Medicine

Tufts University

North Grafton, MA

USA

David Bruce Conn MS, PhD

Dean and Henry Gund Professor of Biology

One Health Center, Berry College

and

Jefferson Science Fellow/Senior Scientific Advisor, Office of International Health and Biodefense

U.S. Department of State

and

Associate of Invertebrate Zoology, Harvard University Museum of Comparative Zoology

Mount Berry, Georgia

USA

Bernadette Dunham DVM, PhD

Professorial lecturer

Milken Institute of Public Health

The George Washington University

Washington, DC

USA

David Dyjack DrPH, CIH

Executive Director and CEO

National Environmental Health Association

Denver, Colorado

USA

Gregory C. Gray MD, MPH, FIDSA

Professor of Global Health

Division of Infectious Diseases, School of Medicine
and
Global Health Institute
and
Nicholas School of the Environment
Duke University
Chapel Hill, North Carolina
USA

Barbara Haesler DVM, PhD

Senior Lecturer in AgriHealth, The Royal Veterinary College
University of London
and
Chair, Network for the Evaluation of One Health
London, ENGLAND

Laura Kahn MD, MPH, MPP

Research Scholar, Program on Science and Global Security
Princeton University
and
Co-Founder, One Health Initiative
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Bruce Kaplan DVM

Contents Manager/Editor, One Health Initiative Website
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Larry Madoff MD

Editor, ProMed Mail
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Director, Emerging Disease Surveillance, International Society of Infectious Diseases
and
Professor, University of Massachusetts Medical School
and
Director, Epidemiology and Immunization, Massachusetts Department of Public Health
Jamaica Plain, Massachusetts
USA

Jonna Mazet DVM, MPVM, PhD

Professor, Medicine and Epidemiology
School of Veterinary Medicine
University of California
and
Principal Investigator
Emerging Pandemic Threats-1, PREDICT-2
USAID
Davis, California
USA

Thomas McGinn DVM

Senior Health Advisor, Office of Health Affairs, US Department of Homeland Security
Former Director, One Health Academy

Senior Health Advisor, Office of Health Affairs
US Department of Homeland Security
Washington, DC
USA

Megan Mehaffey PhD

Deputy Project Lead, EnviroAtlas
National Exposure Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC
USA

Joanna Nurse BM, MPH, MSc, FFPH

Strategic advisor, InterAction Council
London, England, UK

Steve Osofsky DVM

Jay Hyman Professor of Wildlife Health and Health Policy
Department of Population Medicine and Diagnostic Sciences
College of Veterinary Medicine, Cornell University
and
Animal & Human Health for the Environment And Development (AHEAD)
and
Planetary Health Alliance
Ithaca, New York
USA

David Rizzo PhD

Professor of Plant Pathology and Chair, Department of Plant Pathology
Division of Agriculture and Natural Resources
University of California at Davis
Davis, California
and
American Phytopathological Society Executive Officer

Will Sander DVM, MPH, DACVPM

Senior Operations Lead supporting the US Defense Threats Reduction Agency, Cooperative Biological Engagement
Program, Department of Defense for Booz Allen Hamilton
and
Director, One Health Academy
Washington, DC
USA

Matthew Stone BVSc, MVS

Deputy Director General International Standards and Science
World Organization for Animal Health Organization
Paris, FRANCE

Louise Taylor, PhD

Scientific Director
Global Alliance for Rabies Control
Manhattan, KS
USA

Gary Vroegindewey DVM, MSS, DACVPM

One Health Program Director

Associate Professor of Veterinary Medicine, LMU-College of Veterinary Medicine

Lincoln Memorial University and College of Veterinary Medicine

Harrogate, TN

USA

Gladys Kalema-Zikusoka DVM, PhD

Founder and CEO

Conservation through Public Health

Entebbe, UGANDA

This document summarizes the collective perspectives of individuals who were interviewed in 2018 and its conclusions reflect the particular nature of the group but may not represent accurately the realities of individual organizations engaged in One Health or the perspectives of individuals who represent those organizations. Had a different group of 25 One Health leaders been interviewed, it is possible that the conclusions and recommendations of this report would differ somewhat from those contained in this document.

ABBREVIATIONS USED THROUGHOUT THIS DOCUMENT

AMR: Antimicrobial resistance

CAHA: Center for Animal and Human Health in Appalachia

CDC: Centers for Disease Control and Prevention

CTPH: Conservation through Public Health

Dol: Department of the Interior

EHS: Environmental and Health Sciences

EPA: Environmental Protection Agency

FAO: Food and Agriculture Organization (of the UN)

FDA: Food and Drug Administration

NIEHS: National Institutes for Environmental Health Sciences

NIH: National Institutes of Health

NEOH: Network for the Evaluation of One Health

NSF: National Science Foundation

NTP: National Toxicology Program

OHC: One Health Commission

OHCEA: One Health Central and East Africa

OHI: One Health Initiative

OHP: One Health Platform

OIE: Organisation International des Epizooties (World Animal Health Organization)

PENAPH: Participatory Epidemiology Network for Animal and Public Health

Rol: Return on Investment

SACIDS: Southern Africa Centre for Infectious Disease Surveillance

SDGs: Sustainable Development Goals

SEOHUN: Southeast Asia One Health University Network

UGHE: University for Global Health Equity

UN: United Nations

USAID: United States Agency for International Development

USGS: United States Geological Survey

SUMMARY OF FINDINGS

This document represents the collective responses of 25 individuals who represented public and private (for-profit and not-for-profit) sectors, and the four domains of human, other animal, environmental and plant health.

ONE HEALTH TERMS AND RELATED APPLICATIONS

Respondents noted that there was often confusion regarding the meaning of two terms. The term “One Health” is, perhaps for historical reasons, too often applied only to interactions only between human and animal health professionals. The term “environmental health,” which is usually cited as a third domain of One Health, is used in other contexts to refer to effects of the environment on human health. In the context of the One Health definition, “environmental health” refers to the health of the natural and built environments without reference to human health. It may be that One Health would be better served by using the term “ecological health,” although this term incorporates the health of people and other animals in an ecological system. This lack of clarity regarding the use of the term “environmental health” both underscores and explains historical difficulties associated with engaging the environmental sector in One Health. Whereas environmental health, with its emphasis on human health, is represented at the federal level by the National Institutes of Environmental Health Sciences, and receives funding from the federal government, ecological health is represented by many nonprofit organizations, including Greenpeace, The Nature Conservancy, the Audubon Society, the Sierra Club and others, and is less of a priority in the current political environment.

Additional difficulties with the One Health interpretation of environmental health is that it is inherently difficult to communicate how toxins and chemicals in the environment affect people, other animals and plants because causes and effects often have a long intervening timeline and for that reason, the relationship of cause to effect may not be apparent immediately. Furthermore, exposures to single environmental chemicals and toxins do not occur in isolation but are rather mixed with others, making it difficult to discern cause and effect. For these reasons it is often difficult to make the case for what One Health calls environmental health at the local level, and it has been challenged to make itself “everyone’s story.”

The term “One Health” is used by many respondents’ organizations, some without accompanying formal definitions of the term, and many stressed that their organizations take a One Health-type approach. In the latter instance, terms such as “collaboration across disciplines,” “across sectors,” “interdependency/inter-functionality,” “interdisciplinary,” “multisector,” “multi-sectionalism,” and “a spirit of collaborative intent” were all terms that were used to describe One Health without actually using the term ‘One Health.’ This approach respects the identity and importance of excellence in individual sectors/disciplines/fields as contributors to sustainable solutions to global health problems. Several individuals noted that One Health is an *approach* to solving global health problems and not a discipline or field, and the terms applied to it in the list above speak to that idea. The Network for the Evaluation of One Health (NEOH) accepted the challenge of identifying what makes One Health “One Health,” and described six dimensions and associated criteria that ought to be considered and could be measured when applying a One Health approach to an initiative³. Several people described One Health in terms of issues – global health security, infectious diseases and violence, but these are problems and do not constitute One Health itself.

³ 1. Thinking (globally, multidisciplinary, multisectoral, multiple scales); 2. Planning (common aims, problems and financing); 3. Working (transdisciplinary, trans-sectoral, teamwork, participation); 4. Sharing (data, knowledge, resources, staff); 5. Learning (knowledge exchange, institutional memory, feedback, self-regulation); and Systemic Organization (polycentric, high connectivity, synchronization, multidimensional). http://neoh.onehealthglobal.net/wp-content/uploads/sites/2/2015/03/Simon-Ruegg_NEOH-Handbook-1-compressed.pdf

Within their organizations, most respondents reported that there was some understanding and appreciation for One Health but that it could be better. To the extent that there was awareness at all, it was limited to a few key people -- newer ones who were more open to new ideas, or older ones who'd been exposed to it longer -- but awareness and acceptance were not generally present throughout their organizations. One, but likely not the only exception to this is NIEHS, which has a long standing commitment to One Health and engagement in the community, as well as understanding of One Health among staff by virtue of the work that they do. Awareness of One Health was thought to be increasing, nurtured by a few early adopters (often veterinarians because veterinary medicine is widely perceived as being more of a driver for One Health than is human medicine) but it was thought that leaders at the top of organizations must promote One Health for it to gain a foothold and be fully incorporated into culture and policy.

Many respondents indicated that their organizations incorporate interdisciplinarity into their mission statements but few organizations incorporated it into specific goals. Organization goals frequently specified improving human health and sustainability by working with animal health (infectious/zoonotic disease and production) or ecosystem services experts. The organizations that explicitly mention One Health are largely located outside the US (NEOH, One Health Sweden and the National Veterinary Institute Sweden, the InterAction Council in Europe, Conservation through Public Health [CTPH] in Uganda). Among respondents there were two notable exceptions to this statement. USAID acknowledges in its One Health Workforce Monitoring and Evaluation that drivers of demand for animal protein may lead to unintended consequences in terms of disease and environmental degradation. Second, the NIEHS Strategic Plan Theme One states "EHS research is aimed at discovering and explaining how factors, including chemical, physical, synthetic, and infectious agents; social stressors; diet and medications; and our own microbiomes, among others, affect biological systems. The knowledge generated by EHS, inclusive of interactions between humans, animals, and our natural and built environments, provides a critical component of our understanding of human health and disease." Several respondents noted that government institutions in the US that had One Health offices appeared to be backtracking on One Health.

Respondents cited factors that have enabled their organizations to progress towards One Health goals. Of these, leadership qualities attributed to specific individuals in positions of influence was cited most frequently. Also noted were organizations' participation in networks that have a critical number of people and provide opportunities for networking, engagement in key partnerships on a local level (CTPH, Center for Animal and Human Health Appalachia [CAHA], the Link, and One Health Sweden) and having the 'right' people.

Funding was the most frequently cited challenge to organizations for achieving their One Health-related goals. This is because donors like to fund *one* thing and people like to work on *one* thing (often zoonoses) and One Health is so broad in scope and need that it is difficult to fully grasp, conceptualize and embrace. People feel comfortable working in silos where constituents have similar backgrounds, and organizational structures or systems support this preference. It takes time and money to pull people from different disciplines together and to challenge historically siloed organizational structures. Projects that are funded tend to have a clear human health benefit that is understandable to governments and administrators who are not necessarily on the cutting edges of new approaches such as One Health, and people with this focus often don't understand why they should care about animals and plants. This may not apply to federal agencies such as NIEHS and staff members who engage on One Health-specific issues. A more fundamental but related challenge is the fact that One Health is an inherently complex field that does not lend itself to a linear approach to problem-solving.

In some cases where departments or other institutional entities have been given the One Health label this has given other organizational units the freedom to ignore it, further widening the gulf in interdisciplinary thinking. Finally, multisectoral efforts can suffer from a lack of ownership and therefore investment, and it is difficult to measure the success of One Health initiatives.

One Health has been incorporated into many programs, notably those related to academic institutions. These include academic programs and curricula (modules in courses, entire courses, certificate programs, masters and PhD programs). It has also been incorporated into epidemiology and interprofessional education courses, academic publications, conferences and meetings, and specific university-sponsored initiatives such as Lincoln Memorial University's Center for Animal and Human Health in Appalachia (CAHA) and Cornell University's Beyond Fences Program, which aims to simultaneously improve livelihoods of small livestock holders while preserving wildlife populations and international trade for beef and beef products. One Health has been incorporated widely into policies in some countries (Sweden, Switzerland and Uganda) but has gained limited purchase in US government programs apart from institutions such as the CDC, USDA and NIEHS.

OPINIONS ABOUT THE MOST COMMONLY-USED DEFINITION OF ONE HEALTH

Almost everyone agreed with the definition of One Health that is used most often:

One Health is the integrative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment.

A few comments about the definition were that:

- It's hard to define optimal; using the term 'systems approach' would be better.
- Does this imply that everything is of equal value?
- The definition should explicitly recognize mental health and well-being (as does the WHO definition of health).
- Application doesn't always stay true to the definition; the term is used most often to apply to zoonoses and environment/ecological principles have been lost in practice.
- It misses the relationship with the Sustainable Development Goals (SDGs).
- The word "plant," while often interpreted to be included in "environment," should be explicit.
- There is no mention of economics or biodiversity.

PERSPECTIVES ON GLOBAL STRENGTHS AND CHALLENGES ASSOCIATED WITH ONE HEALTH

Nearly every respondent mentioned that the integrative approach of One Health (multiple individuals with different expertise, working across disciplines, collaborative approach/knowledge/capacity, interdisciplinarity, shared concepts) is its most important strength, particularly as that approach is applied to investigating complex health challenges and developing solutions to them. The term "One Health" has been in use for many years and has gained political traction among some countries.

Other features of One Health that were named as strengths were that it is a simple and beautiful concept that resonates with almost any audience, is respectful of different disciplines and is cost efficient on a local level. Good communicators, government support (as in Uganda) and having One Health inserted into public policy documents also lend support to One Health.

Important global assets for One Health included people with expertise in multiple disciplines who are concerned about global health problems and recognize that traditional, more linear methods of problem-solving in our current systems will not solve complex problems. Other global assets that were noted included concrete measures such as the One Health Tripartite Agreement (FAO, WHO, OIE), the Global Health Security Agenda, the USAID Emerging Pandemic Threats (PREDICT) program, the OHC, OHI and OHP, funders such as the Bill and Melinda Gates Foundation, One Health-related surveillance and communication networks, the CDC and large global organizations such as the UN.

PERSPECTIVES ON THE INTEGRATION OF ONE HEALTH INTO EDUCATION, RESEARCH AND PRACTICE

EDUCATION

In education it's generally acknowledged that One Health content has so far been best integrated into veterinary medical curricula, less so in public health, and least so in medical professional education, perhaps because veterinary medical curricula have historically focused on multiple species whereas the human medical profession has focused on only one. Integration has been achieved to a limited extent in health professional education, less so in master's degree programs, and least of all in undergraduate programs. Among respondents, Berry College was cited as one example of where the latter is taking place, although there are others. There are a few PhD programs in One Health; the EU is providing some funding for as many as 12 PhD degree candidates (med-vet-environment) in One Health and the University of Florida offers a PhD degree program in One Health. A few people mentioned professional development programs and no one mentioned K-12 education except to say that we need to confront it. One Health programs appear to be concentrated within a few universities and in only some countries. Only one individual mentioned mandated incorporation of One Health competencies into public health education by the Council on Education in Public Health, although this applies to all schools and programs in public health in the US and is therefore significant.

Even where it's offered there is uncertainty about the degree to which One Health in education includes the environment. It is still largely focused on humans and animals and zoonotic diseases but should be expanded to include ecological integrity and environmental health. As it currently stands One Health is a good initiative but is only being incorporated in a superficial way, and efforts to integrate it into education are often not sustained.

Current One Health education has not yet been transformational, even in the OHCEA and SEOHUN networks. It is theoretical and experiential but how that translates into the positions people occupy after their education, and how their One Health thinking and skills affect organizational thinking and cultural systems remains to be seen. More time is needed to permit the true impact of graduates' thinking and skills to emerge.

Challenges to incorporating One Health into education are that the curricula are already full and institutional and individual inertia (and logistics) make it difficult to do so. If it is inserted as an 'add-on course and not integrated into the rest of the curriculum', then it is not One Health! A better alternative would be to *incorporate* it into current courses. However it is incorporated, it has to be accompanied by specific examples and if not then that is a problem in itself. The overriding issue remains that One Health is viewed by some as a discipline and others as an approach, and how one views it has great implications for curricular content, competencies and in some cases (the Council on Accreditation on Public Health), accreditation.

RESEARCH

It was felt by the interviewees that what One Health driven research exists is limited to only a few institutions (often co-located with veterinary medical schools), in several countries and in limited contexts (infectious/zoonotic disease and AMR) and doesn't usually include the environment. Research conducted by NIEHS scientists and staff provides a counterpoint to this, as it includes the effects of environment on human health as well as effects on environmental health by humans. As in education, how One Health is viewed has implications for how One Health research is undertaken -- is it better to base research on One Health case studies or alternatively, use a multidisciplinary approach to conducting research on any health problem? Funding streams for One Health research are siloed (Cooperative Biological Engagement Program proposals, which require a One Health aspect, are an exception). It's difficult to get funding for interdisciplinary research. One reason for this may be a potential lack of understanding of the value of One Health projects by grant review sections. A possible consequence of this is that the effectiveness, efficiency and practicality of One Health research (as an alternative to funding for individual domain research) have yet to be demonstrated sufficiently to the scientific and donor

communities. Individuals within EPA, USAID and NIEHS recognize the connections, but at this point in time the private foundation donor community is where the venture capital for interdisciplinary research is likely to be. If the idea catches on there, government agencies may follow. In this regard, Europe is far ahead. The discipline of Planetary Health grew out of the recognition that there was not enough good science to understand and quantify important linkages between anthropogenic environmental change and public health outcomes, and this is one reason why funding for it has been relatively easy to get.

PRACTICE

One Health practice was defined in the structured interview document as “the actual application or use of One Health in policies, programs and health practice.” Outside of the US there are a few examples of One Health practice at ministerial levels where different ministries work together for specific purposes (mostly zoonotic diseases such as Avian Influenza, rabies, Ebola and a few others, but not for cancer or general health policies). A few European countries have successfully integrated One Health into policy (Sweden, Switzerland) and globally there is a commitment from the EU to do this. Examples of the latter include the Tripartite agreement and the Global Health Security Agenda. Indonesia was one of the first countries to appoint a One Health ‘czar’ across ministries. Countries where zoonotic diseases threaten (Kenya, Vietnam) do this much better than does the US, which can only point to the bill introduced to Congress by then-Senator Al Franken (and recently Senators Tina Smith and Todd Young). These countries have One Health committees but often their goals are vague and it’s not clear what they are achieving, and the ministries are understaffed and underfunded. It is difficult to change the long-term mindset of politicians and political systems because they are so focused on short term wins and gains. The One Health community has not yet reached into the political science, international relations, or related realms with incentives to incorporate One Health into the thinking of future political leaders. Political decisions about what policies and programs to support usually require some evidence of effectiveness but we don’t yet know the return on investment, including societal and economic benefits of integrating One Health into policy. There are strategic, systemic and operational challenges in applying One Health thinking and delivering the interventions. Finally, decision-makers are responsive to the needs and interests of their constituents; but with few exceptions (NIEHS’s Disaster Research Response Program [DR2], which connects people to quality disaster health information and fosters community resiliency, among other NIEHS programs on climate change and environmental disasters), the One Health community has yet to offer concrete examples of how One Health relates to people’s lives at a local level.

PERSPECTIVES ON THE UNDERSTANDING AND APPRECIATION FOR ONE HEALTH AMONG THE SCIENTIFIC COMMUNITY, POLICY-MAKERS AND THE PUBLIC

SCIENTIFIC COMMUNITY

Most respondents agreed that the scientific community generally takes a One Health approach only to certain issues, namely emerging infectious and zoonotic diseases, AMR, and global health security but the environmental piece, including plants, is largely missing. However, the NIEHS Hazardous Substance Basic Research and Training Program (Superfund Research Program [SRP]) provides practical, scientific solutions to protect health, the environment, and communities by studying environmental contaminants in order to lower environmental cleanup costs, reduce human exposure, and improve human health. The genomic revolution may be changing this.

POLICY MAKERS

Among policy-makers, only a few respondents thought there was a general understanding and appreciation for One Health. “If your neighbors don’t understand it then policy makers won’t either.” Younger people understand it better and are also better at working together. The Elders, an international non-governmental organization of public figures noted as elder statesmen, peace activists, and human rights advocates, who were brought together by Nelson Mandela in 2007, advocate for an interdisciplinary approach to human health that incorporates health equity and development and sustainability of the environment. In a speech to the 2017 Partnership Forum at the

UN Economic and Social Council in New York on 5 April, Mary Robinson, former President of Ireland, referenced the SDGs and urged the international community to develop an entirely new paradigm of inclusive cooperation in order to overcome the world's greatest challenges such as climate change. *“But to pioneer new sustainable development pathways, we need to develop an entirely new paradigm for collaboration. We must remove the silos which have, for too long, divided government, civil society and the private sector. The success of this global transformation hinges on our ability to work towards new partnerships based on - as the 2030 Agenda states - “a spirit of global solidarity, focused in particular on the needs of the poorest and most vulnerable”.* The InterAction Council, an independent international organization established in 1983 to mobilize the experience, energy and international contacts of a group of states [people] who have held the highest office in their own countries, concluded its 34th Plenary Meeting in 2017 with the Dublin Charter for One Health. The preamble of that document states that *“The Charter for One Health is a statement of the values of social justice and fairness for all. The Charter is focused on collective action to protect and promote health and wellbeing; prevent disease and disability; and foster resilience and adaptation that respond to the fragility of the planet and the obligation to safeguard those aspects of the environment that are essential for human health in the Anthropocene epoch. It builds on the Universal Declaration for Human Responsibilities.”* A few respondents mentioned that it’s beginning to be appreciated within some agencies in the US (USAID, FDA, NSF, CDC and USDA, NIEHS) but less so at NIH. Respondents from countries located in Europe and Africa expressed greater optimism about policy-makers. The G20 statement on Global Health in 2017 was cited as one example of increasing understanding among policy makers.

Barriers to policy makers embracing and implementing One Health are that the One Health community has failed to make it tangible by creating a ‘hook’ or by creating a constituency that demands it. In addition, as is the case with educators, the sheer volume of work/bills they face leaves little to no time for addressing long-term issues. In a siloed political environment and without a clear return on investment, although there were some early initiatives to fund interdisciplinary work (NIH/NSF crossover-type grants), these were limited and it’s unlikely that politicians will continue to fund interdisciplinary work that could serve as the basis for policy initiatives. Thus it appears that investment in One Health will have to originate in the private sector and the case for One Health will have to be made there before governments and politicians will embrace and fund it fully. There have been scattered efforts (the Forum on Microbial Threats and a G20 meeting) to address these barriers but there is a need for a one-pager that describes the advantages of a One Health approach and provides evidence for the economic return on investment. Furthermore, there is a need for an umbrella organization to aggregate all One Health entities into a One Health Global Network for the common purpose of advocating for joint funding. The OHC is doing a good job of this although this role might also be filled by the UN. The Welsh government has adopted legislation focused on the well-being of future generations and funded it using a cross-sectoral approach, so this is potentially a model for a global network or alliance.

THE PUBLIC

Most respondents felt that the public doesn’t embrace One Health because although the concept is intuitive, it hasn’t been presented with relevant and easy-to-understand examples. Members of the public understand zoonoses but because of this they think of animals as bad and something to be controlled and contained. The One Health community needs to do a better job of representing this aspect of One Health and valuing animals, environment and biodiversity for the sake of human health and wellbeing. The One Health community needs to focus its efforts on education (including health literacy) at the K-8 or K-12 levels or also through 4H and other clubs so that younger people will understand it and carry it through to their careers. Recycling, an initiative driven initially by teachers and their elementary school students in the US, may offer a model for an issue that has made inroads with younger people. The present political, social and religious climate in the US favors cutting government programs, clouds public discourse with a great deal of background noise, supports the primacy of the human species over all others, and serves as a barrier to the embrace of One Health.

The One Health community faces a number of challenges. In addition to those already noted (the heavy influence of veterinary medicine and the relative lack of emphasis on environmental health, the lack of concrete and relevant examples that appeal to the public and policy makers, siloed funding and insufficient evidence for a return on investment, and more pressing political issues), respondents also noted the following:

- general confusion about the distinction among the OHC, OHI, and OHP; One Welfare, which refers to human and animal welfare and well-being, and ecological welfare through environmental conservation, is a more recent addition to the panoply of players.
- the fact that the One Health community is not using big data effectively; and
- The failure of national and international health leaders to adopt and use the term “One Health” in everyday parlance and professional venues.

The One Health community is itself fragmented. While we should not try to coordinate global One Health efforts, we are in need of an international representative for One Health. This role is filled to some extent by the EU (the Joint Research Centers) and in the US by the OHC (one respondent’s opinion), but these could be brought together by creating a global Alliance using a model for shared governance (with a rotating chair) and other features that promote collegiality such as that used by Rotary International. Making One Health more attractive to people who don’t yet understand or embrace it would include:

- simplifying the message and using common terms among domains;
- identifying examples that are relevant to peoples’ lives;
- moving it beyond the perception that it’s a ploy by veterinarians to get more funding;
- engaging the medical community to a greater extent;
- expanding One Health examples beyond infectious diseases; and
- Starting earlier in the education of young people (in primary and secondary schools and undergraduate majors).

PERSPECTIVES ON THE ROLES OF RESPONDENTS’ ORGANIZATIONS IN EDUCATION, RESEARCH AND POLICY

Respondents who answered these questions generally saw a role for their organizations in improving education even as they acknowledged the challenges that this presented. They saw the need to ground One Health more in the social sciences and to prepare students for One Health through STEM outreach and organizations such as the National Science Teachers Association in the US. Finally, several people noted the need for One Health to be integrated with community engagement so that it addresses problems that are relevant to local populations.

Most respondents saw less of a role for their institutions in research than in education, although institutions such as NIEHS assume a large role in both. Small steps are being taken in universities but larger, government funders are not yet ready to take on this role. Lincoln Memorial University with its Center for Human and Animal Health in Appalachia (CAHA) is one institution among others that that has taken on the challenge of One Health research.

With respect to practice, organizations that are working with governments such as the InterAction Council and CAHA may have more influence in advancing One Health policy. NEOH’s evaluation approach can produce tangible metrics and methodologies that can be used to identify gaps, strengths and opportunities and thereby promote systems thinking that can provide evidence for policy efforts.

In the next five years most respondents anticipate maintaining their current focus on One Health or expanding it to new geographic areas or new sectors. Funding will be a key determinant of whether they are able to do this. For this reason these goals are more aspirational than concrete.

PERSPECTIVES ON THE NATURE OF RELATIONSHIPS AMONG GLOBAL ONE HEALTH LEADERS AND ORGANIZATIONS

Respondents felt that One Health leaders are more collaborative by nature, but their organizations still compete for funding. There is a real desire on the part of people to collaborate but tensions are generated from within their organizations and this is natural. The One Health community should strive to identify overlap among organizations and develop a common agenda in areas where its members could achieve consensus, where their organizations could synergize. These areas have to work for all parties but each organization has its strengths and area of focus and must be permitted to preserve its own mission and identity.

Interactions are better within the European Union than they are in the US; the former funds various joint research and education projects on AMR, food-producing animals, and EIDs. Respondents from the US were less positive about the extent of interactions among organizations, although one respondent indicated that mechanisms to interact do exist.

Organizations represented in this document partner with a range of other organizations in the public and private sectors and at national and international levels and the OHC was one of the organizations mentioned. Key US partners tended to be located in Washington, DC.

FEATURES OF ORGANIZATIONS THAT ENHANCE THEIR INFLUENCE AND FUNDING OPPORTUNITIES

Very few respondents answered this question and among those that did, most felt their organizations had no funding advantage over other One Health organizations. However, among those that reported having a funding advantage, unique features that elevate their influence over other One Health organizations included location (near DC), organizational neutrality, reputation, a unique focus (CAHA) or unique degree programs, the presence of One Health leaders, access to local venues that provide a focus for One Health education, research and policy development, a good website, and historical relationships with funding organizations.

INVESTMENT IN ONE HEALTH INITIATIVES BY ORGANIZATIONS, INCLUDING ANTICIPATED RETURN ON INVESTMENTS (ROI)

Because most organizations represented in this document have no or very limited funds to invest, there are few insights to be gleaned relative to opportunities for support for the One Health Commission. One Health itself, because of its complexity, was noted as a barrier to investment because it lacks a clear focus for donors. Much of the money that is available from donors is dedicated to research. In order to garner investment from the private sector, organizations have to demonstrate how what they do will impact the bottom line for foundations. Finally, there is a great deal of competition for the limited amount of funds that are available.

Only a few respondents indicated that their organizations had invested in One Health initiatives and these were limited to investment in other entities on a university campus (UCD) and periodic opportunistic investments in conferences to highlight an organization's profile.

While most respondents hadn't considered it, a few respondents did suggest what they might expect from a return on investment in One Health if they had funds to invest. They noted recruitment of more students into degree programs, success stories and career paths of graduates, the amount of contributions from member organizations (OIE), a description of activities, and the quality of decisions made at all levels of an organization. Only GARC uses a measure – the number of human deaths from rabies – as a quantitative metric with which to measure their success.

ROLE OF INSTITUTIONS IN PREPARING A WORKFORCE, AND THE SKILLS REQUIRED

Education and research institutions support One Health by training people in health disciplines and related skills, offering interdisciplinary teaching and research, and in the case of the Council on Education in Public Health, establishing criteria that include One Health that are used for the evaluation of their member public health schools and programs. Among individual institutions, schools of veterinary medicine and a few others (University of Washington) stand out for their roles in supporting One Health graduates.

Respondents' organizations have limited One Health partnerships. Where these exist they are formed with universities in the US or elsewhere (the Philippines) or academic associations (Association of Schools and Programs in Public Health), a limited number of government agencies on state (CA Dept. of Health) or national (CDC) levels, or with nonprofits (Mercy Corps).

Approximately half of the respondents were not aware of initiatives to educate, train and employ a One Health workforce. Among those that were aware, USAID (OHCEA and SEOHUN), SACIDS, and a few universities (Univ. of Liverpool, Massey University) were noted. The University for Global Health Equity in Uganda (UGHE) has great potential to achieve this but because it is so new, that potential remains to be realized.

Opportunities in the workforce for people trained in One Health are limited. Respondents noted that it's difficult for people to position themselves in the market and they need to be flexible. A few positions are opening up in the veterinary social work field. Otherwise, people need good, marketable skills and not just an understanding of One Health. The number of opportunities in state and federal government and international inter-governmental organizations (WHO, OIE, FAO) are small but increasing, as are opportunities in the private sector among pharmaceutical companies. However, rarely are positions advertised for individuals with One Health expertise.

A One Health skill set would involve a systems approach and the ability to deal with conflicting information from various sources/disciplines. This would include not only technical skills – the ability to manage data, an understanding of statistics, geospatial expertise, informatics and an overall strong scientific focus, but as importantly, “softer” skills such as communication, the ability to make connections and work with people with different perspectives and expertise, ethics, leadership and management, program development, policy and leadership. Anyone wishing to learn these skills would by necessity be open-minded, flexible and accepting of the unity of nature. The CDC's Ten Essential Public Health services⁴ were mentioned as a framework that could be adapted for One Health skills.

GOVERNMENT SUPPORT FOR ONE HEALTH

There is legal and regulatory support for One Health in Uganda and Sweden. In the US it's limited to agencies such as the USDA, USAID, CDC, USGS and DoI (but not EPA). There is as yet no support for One Health in the US Congress although bi-partisan One Health congressional bills were introduced in the U.S. Senate and House in July 2019. Named the “Advancing Emergency Preparedness through One Health Act of 2019,” these bills aim to establish an interagency One Health Program by requiring the Department of Health and Human Services and the Department of Agriculture, in coordination with other specified agencies and departments, to develop, publish, and submit to Congress a national One Health Framework for coordinated federal activities under the One Health Program, which encourages collaborative efforts to help better prevent, prepare for, and respond to zoonotic disease outbreaks

State government support among agencies with overlapping issues (California, Massachusetts for zoonoses) is better than it is on a national level.

⁴ CDC. <https://www.cdc.gov/stltpublichealth/publichealthservices/essentialhealthservices.html>

Respondents offered suggestions for how national and state governments could support their organization's One Health activities. Those mentioned most frequently included dedicating more funding to One Health, reducing or eliminating the silos within government agencies, standing up a national task force or commission, and facilitating collaborations among agencies. One Health activities are fragmented around the US and the world and government support is needed, but national policy/government leaders who understand the need for One Health approaches are lacking.

NETWORKS FOR ONE HEALTH

Networks that respondents' organizations belong to include the InterAction Council (which is its own network), the Tripartite and United Against Rabies, the OHC and the OHI, the Participatory Epidemiology Network for Animal and Public Health (PENAPH), NEOH, One Health European Joint Programme, and MedVetNet Association. There are also informal networks and networks within universities. These networks have provided opportunities for people to work together, raised awareness of resources, funded activities (NEOH), and assisted members with application of participatory approaches (PENAPH) to initiatives. Existing networks could support stakeholders better with inter-network communication, promotion of best practices for program design, policy development and problem-solving, reaching out to the public and connecting academia and society. Networks that would better serve respondents organizations would provide learning opportunities as well as practical ones. Chatham House has conducted an extensive review of One Health networks and its report should be consulted for more complete information on this topic.

UNDERSTANDING AND EXPECTATIONS FOR THE ONE HEALTH COMMISSION

All respondents reported being familiar with the OHC, although the degree to which they understood what the OHC does varied greatly.

Most respondents reported that their organizations shared interests with the OHC, although some mentioned it was theoretical and others noted shared interests included promotion of multidisciplinary approach to problem solving and raising awareness of One Health. One respondent noted that the OHC is the go-to resource ("a goldmine") for what is otherwise scattered on internet sites, including opportunities for faculty and students, publications, presentations, and news. Another respondent characterized it as a "shared space with a better opportunity for impact."

Respondents were asked what they'd like to see the OHC accomplish over the next 10 years. These are listed to illustrate the richness and variety of responses:

- Whatever is helpful to NEOH
- Actively seek the audience that we think we're missing, find ways to draw them in and connect them
- Serve as a bibliographic reference of high quality
- Campaign for awareness outside the One Health community which will pay off at the policy maker level and among future generations of professionals
- Make a better case for One Health
- See it grow
- Move beyond zoonoses and focus more on violence against people and animals and other topics such as environmental health
- Become the Alliance which works together with other regions to create a global governance structure for clarifying terms, developing strategies, and mainstreaming One Health in policy. Rotary International is a good model for this because it has tremendous ability to influence the international agenda. It /'is community-based yet it still coordinates governance structures of individual chapters which rotate leadership

- Explore what it means to be politically active or serve in a political advisory role, and support members to do that
- Support citizen advocacy and educate people about what they can do to advocate for change; establish a panel of 10 speakers positioned in different venues to advocate for One Health
- Develop standardized metrics to measure our impact
- Integrate plants more into One Health
- Hold more educational and networking webinars
- Support One Health initiatives at the state level and in Congress
- Continue acting as a catalyst to bring relevant communities together but let them each maintain their own strengths
- Research and training
- Develop and feature more concrete and compelling examples of One Health that worked well so that others can use and adapt them.

In terms of the three priorities of the OHC, many respondents felt that all three (connect, create, educate) were important. However, among those respondents who assigned priorities, connecting was thought to be the most important, followed variably by education and creating teams and partnerships to take action and demonstrate impact. One respondent remarked that “Connectivity is a catalyst and the most important thing to do from a practice perspective to make sure those relevant associations and constituents are connected. The OHC needs to “create a virtual tribe.”

The OHC can help respondents’ organizations achieve their goals in general and specific ways. Among the general ways, the OHC can support more webinars, make introductions for organizations to help them promote their agendas, offer guidance and tools for how to put One Health teams together, offer platforms that can help organizations make One Health more concrete, promote activities of these organizations, create platforms for a body of literature that could include textbooks and case reports that support One Health, and influence centers of excellence in research and training in One Health.

If the OHC is thriving five years from now, the following things will have changed:

- the OHC will have more funding or a business model that works
- it will have more people doing more things
- it will demonstrate how to execute One Health and have more tangible activities, and not just serve as a reference source
- there will be balance among human, animal and environmental health
- it will become truly global
- there will be increased awareness of One Health
- the OHC will have demonstrated that there is more to One Health than zoonoses
- it will have been embraced by policy makers
- it will be more aligned with the Sustainable Development Goals
- it will have identified how to measure its impact
- there will be a community of One Health professionals that know each other on a first name basis
- it will have been more institutionalized
- something will have happened in society that makes people understand why One Health is important

If the OHC went away, most respondents agreed that it would be missed. They would miss the one-stop shopping. It would be harder to make connections outside Washington, D.C. Respondents would also miss One Health Day and the facilitation platform that helps people to make connections. But several respondents noted that the One Health movement wouldn’t fold if the OHC went away – another organization would likely step in to take its place.