JPA HEALTH

One World, One Health

Exploring the Connectability between Human, Animal and Environmental Health

November 2023

Foreword by Professor Michael Lairmore

As we navigate the complex challenges of the 21st century, it has become increasingly evident that the health of humans, animals and the environment is interconnected in ways that cannot be ignored. The concept of 'One Health' has emerged as a powerful framework that recognizes the interdependence of these three domains and emphasizes the need for collaborative and holistic approaches to address global health issues.[1]

The importance of adopting One Health has become increasingly evident in recent times. The COVID-19 pandemic, which was believed to be originated from zoonotic transmission (the spread of infectious diseases from animals to humans), has starkly demonstrated the consequences of neglecting the interconnectedness of human, animal, and environmental health.[2] The devastating impacts of climate change, habitat destruction and biodiversity loss further underscore the need for a unified approach that transcends traditional disciplinary boundaries.[3]

Real-world examples serve as poignant reminders of the significance of One Health. Consider the outbreak of Ebola in West Africa,[4] where transmission of the virus from animals to humans highlighted the critical role of wildlife and ecosystem health in safeguarding human populations. Similarly, the emergence of antimicrobial resistance poses a grave threat to both human and animal health, necessitating collaborative efforts to preserve the effectiveness of life-saving drugs.

In this report, we delve into the state of One Health communication and explore the gaps that exist in effectively conveying the principles and importance of this integrated approach. By leveraging the power of GRETEL data, we uncover insights that can guide strategic recommendations to improve One Health communication and foster a deeper understanding among diverse stakeholders.

Through the analysis of these data, we acquire valuable insights into the present state of One Health communication. This allows us to pinpoint influential voices, media outlets and user groups that can shape the narrative and drive meaningful engagement. Our objective with this analysis is to bridge existing knowledge gaps, increase awareness and inspire action towards a more integrated and sustainable approach to health.

The strategic recommendations presented in this report are designed to empower communicators, policymakers, and stakeholders to enhance One Health communication efforts. By tailoring messages, leveraging influential platforms, and fostering partnerships, we can amplify the impact of our communication initiatives and foster a collective understanding of the interconnectedness of health.

We hope that this report serves as a catalyst for change, igniting conversations and inspiring collaborative action towards a future where One Health is embraced as the foundation for addressing the complex health challenges of our time. Together, let us embark on a journey towards a healthier, more resilient and sustainable world.

Professor Michael Lairmore
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Executive Summary

Introduction

One Health recognizes the interconnectedness of human, animal, and environmental health.

It is a concept that is rapidly gaining relevance and importance at a time when climate change is accelerating, rising water temperatures in our oceans and waterways has devastated coral reefs, created toxic algae blooms, and threatened aquatic species critical to the planet. Ecosystems around the world are losing biodiversity and infectious diseases that spread from animals to humans are on the rise. The One Health approach addresses these and related challenges facing the world through holistic, collaborative efforts by individuals and different stakeholder groups.

The principles of One Health are reflected in five of the United Nations' 17 Sustainable Development Goals, including Zero Hunger *(Goal 2)*, Good Health and Wellbeing *(Goal 3)*, Clean Water and Sanitation *(Goal 6)*, Life Below Water *(Goal 14)* and Life on Land *(Goal 15)*. That makes it imperative for us to understand the current state of conversation and interaction that is happening among stakeholders in the One Health arena.

By doing so, we can have a better understanding of areas requiring attention, strategies for enhancing better connections and engagement, and the essential steps needed to develop comprehensive solutions for the challenges arising from the intersection of animal, human and environmental health, all with the overarching goal of safeguarding the well-being of our planet.

One Health – Advancing the health of people, animals, and the environment

According to the United States Centers for Disease Control, One Health is an approach that recognizes that the health of people is closely connected to the health of animals and our shared environment. One Health is not new, but it has become more important in recent years. This is because many factors have changed interactions between people, animals, plants, and our environment.

Objective

The purpose of our analysis was to better understand the stakeholders, influencers, key topics, and interaction shaping One Health conversations. Knowing these data patterns will allow a more comprehensive and effective means to convey the concepts and practices of One Health to enhance the health of people, animals, the environment, and ultimately the planet, between engaged partners.

Methodology

For this analysis, we employed GRETEL®, JPA Health's industry-leading healthcare insights engine, and GRETEL Trails, our AI-powered chatbot interface.

With GRETEL we were able to develop two key metrics:

1. **Connectability Score,** which measures the tendency of different stakeholders to make social connections and spread messages. A Connectability Score of 1.0 or higher indicates messages that are more likely to spread, though it is much more desirable to have a score closer to 2.0 or higher for effective message penetration and therefore higher awareness.

2. **Stakeholder Penetration,** which we gauge by tracking user engagement within each stakeholder audience on a specific topic over a defined period of time.

Using these metrics, we made several important observations about the current state of One Health communication that must be considered and addressed to realize the full potential of this novel approach.

To learn how different groups within the One Health sphere communicate and interact, we created a custom GRETEL map to understand and visualize how One Health stakeholders engage with each other on social media. The map identified three core sectors—human health, animal health, and environmental health—and a variety of subgroups within these key sectors ***(see GRETEL map)***.

Next, we turned to GRETEL Trails to:

- Profile the size, influence, and messaging of each sector to obtain a deeper understanding of the conversations and language that resonates with them.
- Analyze the interaction between each sector to understand where the communication gaps lie.

The data generated by GRETEL and GRETEL Trails provide actionable insights that can inform communication strategies, ensuring that messages reach the right stakeholders within the One Health community in the most effective way.

By understanding the key players, the influential voices, and the prevailing narratives within the One Health community, we can tailor our communication efforts to resonate with our target audiences, ultimately driving awareness and action on critical health issues.

Further information about the GRETEL methodology can be found in ***Appendix 2***.

How does Connectability lead to impact?

Connectability in the context of One Health refers to the interaction and communication between key stakeholders across various sectors such as Human Health, Animal Health and Environmental Health.

To maximize the impact of Connectability in One Health, it's important to foster open communication, collaboration and mutual respect among all stakeholders. This includes recognizing and valuing the unique contributions of each sector and working together toward shared health goals.

The impact of this Connectability can be seen in several ways:

Comprehensive understanding

When stakeholders from diverse sectors communicate and collaborate, they can share their unique perspectives and insights. This leads to a more comprehensive understanding of health issues that are interconnected across humans, animals, and the environment.

Coordinated response to health threats

Connectability allows for a coordinated response to health threats. For example, if a zoonotic disease emerges, stakeholders from the human health, animal health and environmental health sectors can work together to manage and mitigate the threat more efficiently, if existing networks are in place.

Policy development

Connectability can influence policy development. By bringing together stakeholders from various sectors, it's possible to develop and implement policies that consider all aspects of One Health.

Resource optimization

Through Connectability, resources can be optimized. For example, research efforts can be coordinated to avoid duplication and resources can be pooled to tackle large-scale health issues.

Education and awareness

Connectability can lead to increased education and awareness about One Health issues. Stakeholders can share their knowledge with each other and with the public, leading to increased understanding and support for One Health initiatives.

Long-term health improvement

Ultimately, the goal of Connectability in One Health is to improve health outcomes. By working together, stakeholders can develop and implement fundamental strategies that protect and improve the health of people, animals and the environment.

The Consequences of Limited Connectability in One Health

There are many implications of insufficient Connectability, all of which can negatively affect any organization's ability to build value amongst audiences and stakeholders.

The failure to build engagement and act can lead to a variety of negative consequences for the environment, human and animal health. Importantly, there are opportunities to formulate strategies that promote the One Health concept within each of these constituent areas while simultaneously enhancing organizations' authorization to operate, potential for leadership, and ultimately their capacity to fulfill their organizational or business requirements.

1 Spread of diseases and public health crises:

Potential consequences

Failure to efficiently convey information about a new or existing disease can result in its swift proliferation and elevated rates of illness and death. The COVID-19 pandemic serves as a pertinent illustration of the significance of promptly and precisely disseminating information. Lack of clear messaging in the early stages contributed to the rapid global spread of the virus.

Ineffective communication can exacerbate public health crises. For example, during the Ebola outbreak in West Africa that lasted from 2014 to 2016, misinformation and lack of trust in health messages led to behaviors that contributed to the spread of the disease.

Connectability opportunities

Learning from the mistakes of recent disease outbreaks will be key to rapid implementation of both prevention and containment plans. NGOs and governments can, for example, work together to better understand the relationships between climate change and spread of disease in animals and humans, harness new and emerging technologies, use rapid communication channels and develop and activate specific networks and taskforces across borders.

Building public trust in a rapidly evolving situation is also key to the adherence of containment strategies. This includes transparency, clear concise messaging, and regular updates in the situation. Sharing best practices around awareness programs to ultimately improve outcomes at a population level, both for human and animal health is also important. Business leaders can help by facilitating these activities and providing support, knowledge and even amplification of activities to achieve these goals.

2 Misuse of antibiotics and poor animal health

Potential consequences

Without clear messaging about the dangers of antibiotic overuse, these drugs can be misused in both human and veterinary medicine, leading to antibiotic resistance, a major global health threat.

Inadequate, culturally sensitive, messaging can result in adverse outcomes across animal health. For instance, if farmers are not aware of or do not understand the importance of certain animal health practices, it can trigger disease outbreaks in livestock populations. A poignant example of this occurred during the 2001 outbreak of foot-and-mouth disease in the United Kingdom, leading to the culling of over six million animals and significant economic repercussions.

Connectability opportunities

Public education about the dangers of antibiotic resistance and the importance of appropriate antibiotic use is key. This includes the need for educating healthcare providers and livestock managers to ensure their responsible prescription and utilization of antibiotics. Furthermore, the use of cultural anthropologists and social scientists to help understand community norms, language issues and religious influences, can be helpful in educating people that antibiotics are not always the best way to treat a particular infection.

By preventing infections in the first place in both humans and animals, the need for antibiotics is reduced. This can be achieved through measures like vaccination, regular hand washing, safe food preparation, and using antibiotics in livestock responsibly.

Governments and health organizations need to enforce policies that regulate the use of antibiotics in both human and veterinary medicine. This includes policies that restrict the use of certain antibiotics in livestock and aquaculture, for example.

Antibiotic resistance is a problem that affects human health, animal health, and the environment, necessitating the adoption of a One Health approach.

This entails a collaborative effort across all sectors to formulate and execute strategies that enhance animal health, particularly within the livestock industry, including reducing the use of antibiotics, through the implementation of effective awareness campaigns.

3 Climate change, environmental damage and sustainable nutrition

Potential consequences

The urgency of climate change and the calls for action around our fractured global food system is limited and can lead to continued behaviors and policies that exacerbate this global crisis. For example, our global food-system contributes to almost one-third of the worlds greenhouse gas emissions. Furthermore, it stands as a primary catalyst for biodiversity loss.[5,6]

In the last few years, climate change has had a severe impact on wheat crops, with unprecedented floods in China, the worst drought in the Horn of Africa in four decades, and an extraordinary shortage of rainfall in wheat belts of the United States and the Beauce region of France.[7,8,9,10,11]

The resulting transition of fertile land to desert, soil erosion, fewer crops, and flooding all have ripple effects on local and regional economies. For business, the cost can mean the equivalent of multimillions of dollars in fines, loss of customers and falling share prices. For others, it can lead to steep reputational damages that can impact organizational reach and effectiveness.

Connectabilty opportunities

To balance their needs, businesses, NGOs, government and multilateral organizations have an opportunity to work together to look broadly at the impact they have on their value chains, prioritize locations, give precedence to high-impact actions and partnerships that seek to improve production practices in key landscapes and introduce precautionary measures that not only thwart the impact to local communities, but also the ongoing threat of global malnutrition and starvation.

These examples highlight the importance of effective communication in One Health, but there are many more. Recently, the heads of the Quadripartite organizations, namely the (FAO, United Nations Environment Programme (UNEP), WHO, and World Organisation for Animal Health (WOAH), issued a call to action for enhanced global efforts in line with the One Health approach. They emphasize the need for collaboration and commitment from all countries and key stakeholders to prioritize and implement One Health policies, plans, and strategies.

Thus, there is an urgent need for clear, accurate and timely engagement and interaction that can help prevent disease spread, protect the environment, and improve health outcomes for both humans and animals.

Findings

Although One Health-inspired initiatives are making a difference around the world, our analysis found that many key players in the health, medical and science communities are not engaged in ongoing or in-depth conversations about this critically important topic.

Further, we found that there's currently only limited communication and exchange of messages about One Health imperatives between these key stakeholders, indicating that critical steps are necessary to ignite the conversations and engagement that are necessary to foster the kinds of collaboration that will bring about the solutions to the problems we face.

1 The One Health conversation is taking place in a bubble.

One Health stakeholders are talking to themselves and not engaging critical stakeholders across animal, human and environmental health sectors.

Our analysis found that overall stakeholder engagement in One Health conversations is low. Using a tool known as Social Network Analysis ***(see Appendix 2)***, we identified an audience of 137 social media accounts for stakeholders who were most engaged with, influential in and related to One Health topics. For comparison, we identified 2,336 accounts in the climate stakeholder group, 1,640 in the human health stakeholder group, and 544 accounts in the animal health stakeholder group.

As a reminder the Connectability Score, measures the tendency of different stakeholders to make social connections and spread messages. A Connectability Score of 1.0 or higher indicates messages that are more likely to spread, though it is much more desirable to have a score closer to 2.0 or higher for effective message penetration and therefore higher awareness.

We found that conversations between stakeholders—which include animal health, human health, conservation, climate, science, global/EU policy and U.S. policy—are limited. However, within that context, there is a relatively greater amount of interaction between the One Health and animal health stakeholders, with a Connectability Score of 2.76, the highest inter-audience Connectability score ***(see Figure 1)***. The human health with One Health Connectability score was 1.4, representing the second highest Connectability score, though still significantly lower than the One Health/animal health score ***(see Figure 1)***.

Surprisingly, even between two aligned sectors, human health and animal health, the Connectability Score was exceedingly low at 0.59. For certain topics, such as zoonosis *(the passage of diseases between animals and humans)* or emerging infectious diseases, the different stakeholders are highly engaged in the topic, although not necessarily with each other.

These low scores are likely predictors of poor communications among groups responsible for public health actions that protect humans and animals.

Delays or inaction in a time-dependent public health crisis, such as the fragmented and fractured responses to the COVID-19 pandemic have been shown to increase negative outcomes of interventions and corrective measures.[12,13,14]

2 Climate and Conservation stakeholders are almost absent in One Health conversations and interaction.

While two of the key stakeholders—animal health and human health—are engaged in One Health discussions, there is little engagement from climate and conservation stakeholders in conversations and interactions in the One Health arena.

The lack of integration of climate and conservation stakeholders into One Health conversations is reflected in both their low Connectability Scores (0.21 and 0.33 respectively) and poor stakeholder penetration for One Health ***(see Figure 1, see Figure 3)***.

There is also very little direct conversation between climate stakeholders with animal health and human health (Connectability Scores of 0.35 and 0.32, respectively) or conservation with animal health and human health (Connectability Scores of 0.59 and 0.17).

This is particularly striking considering the potential impact for climate change to increase the risk for infectious diseases, imperil food security and threaten both animal and human health.

3 Policymakers are disconnected from One Health.

In the United States, one of the most powerful and influential nations, policymakers are generally detached from the One Health conversation.

This lack of connection is illustrated by a low Connectability Score of 0.11 and low stakeholder penetration on One Health messages ***(see Figure 1, see Figure 3)***. There is an urgent need to explore and understand this disconnect. Although there is greater potential for viral messaging—or the rapid spread of an idea, image, or other content across social media platforms—between One Health stakeholders and global/EU policy stakeholders (1.02 Connectability Score), stakeholder penetration, although somewhat better, is still low ***(see Figure 1, see Figure 3)***.

Figure 1: One Health Connectability Chart

	Science	One Health	Animal Health	Global/EU Policy	Human Health	Climate	Conservation	U.S. Policy
Science	3.01							
One Health	0.7	9.05						
Animal Health	0.62	2.76	6.44					
Global/EU Policy	1.29	1.02	0.5	3.16				
Human Health	1.36	1.4	0.59	0.87	2.82			
Climate	0.89	0.21	0.35	0.73	0.32	2.11		
Conservation	0.95	0.33	0.59	0.75	0.17	1.28	2.19	
U.S. Policy	0.95	0.11	0.28	0.33	0.46	0.66	0.26	4.5

How to read the Connectability Chart

Each stakeholder group is represented by a row and a column. The intersection of a row and a column gives the Connectability Score, which measures the tendency of different stakeholders to make social connections and spread messages.

A Connectability Score of 1.0 or higher signifies messages with a greater propensity for widespread dissemination. However, achieving a score closer to 2.0 or higher is preferable for optimizing message reach and overall awareness.

One Health Engagement Insights Between Stakeholders

If the One Health concept is to gain momentum and realize its potential, our analysis underscores the necessity for various stakeholders, each contributing to its success, to intensify their efforts to develop approaches that transcend disciplines and sectors to build engagement and interaction around targeted One Health initiatives.

In addition, there are some core takeaways that call for a more strategic communication and engagement approach in One Health.

The following are key insights based on our analysis:

Existing One Health Stakeholders

Given the low engagement and interaction scores we have found among key stakeholders in the One Health arena beyond the specific One Health 'bubble', there is a clear need for leaders in One Health to expand this relatively small group and conversation across wider audiences. While our analysis found that the overall One Health conversation still needs to be amplified and broadened, it is encouraging to see that initiatives such as One Health Day have piqued interest between various stakeholders and offer the potential to increase connections and dialogue. The challenge is to generate ongoing conversations that amplify and expand existing efforts, as well as build new dialogue and action.

Animal Health and Human Health Communities

While these stakeholders are more engaged in the One Health space, they have limited direct interaction with each other. With so few active participants in the One Health 'bubble' this means that the connections and dialogue between the animal and human health audiences needs to grow in volume without delay to tackle issues that we know are of pressing urgency for both groups such as zoonotic disease, pandemic preparedness, and antimicrobial resistance, for example. Further understanding of these shared challenges through increased dialogue and engagement is crucial to overcoming some of the ongoing threats to both animal and human health, today and in the future.

Climate and Conservation Stakeholders

These groups represent a significant untapped opportunity for One Health. Animal health and human health leaders have an opportunity to propel, amplify, and extend their reach, drive One Health conversations and engagement, broaden support, and make that coalition whole. A good example of how effective communications can make a difference are systems established to warn of harmful algae blooms. The United States National Oceanic and Atmospheric Administration (NOAA) has a harmful algae bloom forecasting system to help US states, public health officials, and industry manage risks.[15] This integrated ocean observing system helps scientists to track and predict the spread of harmful algal blooms. When a harmful algal bloom is identified, scientists relay the information into predictive algorithms that can estimate where it is traveling. This information is then used by local health officials to create warnings about the threat and information about which beaches to close.

Unfortunately, this example of linked communications to prevent an environment threat is not the norm. The first step is to deeply understand why the climate and conservation communities have not been engaged to date. Next, it will be important to build narratives and messaging that will resonate and meet their needs. Finally, mapping, tiering, targeting, and making the case for how such engagement builds value for the climate and conservation communities will be critical to successfully engaging them.

Policymakers

There is an urgent need for policymakers across the globe to become more engaged with the One Health conversation.

This is underscored by the outsize influence of the United States on the global stage, as well as the potential impact that the interconnected human, animal, and environmental health sectors have on the U.S., EU and global health systems, economies, and infrastructure.

There are many diverse and influential organizations in the One Health space, including the United Nations, the Bill & Melinda Gates Foundation, the One Health Institute, the World One Health Congress, the One Health Commission, the Food and Agricultural Organization of the United Nations (FAO), the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH) and these have significant influence on national, regional, and global policy. However, engagement across stakeholders among these groups is inconsistent, with climate and U.S. policy stakeholders being relatively less engaged. The data in ***Appendix 1*** indicates that organizations that do have at least some impact across all stakeholders, such as the Gates Foundation, WHO, WOAH and the One Health Institute, have potential to collaborate to bring policy stakeholders closer together.

Business Leaders and C-Suite Executives

Business leaders and C-suite executives, including CEOs, CFOs and CMOs, hold a crucial position in the integration and implementation of the One Health approach, which will benefit their businesses and the planet. Senior executives can leverage their influence to champion policies that support One Health and promote awareness among employees, stakeholders, and the general public. Moreover, they can cultivate partnerships that facilitate collaboration and the exchange of resources.
By embodying these principles in their leadership, business leaders and C-Suite executives can inspire wider adoption of the One Health approach within their organizations and throughout their respective industries.

Media

Media outlets and online influencers have a vital role in disseminating the One Health message and serve as valuable collaborators. With dwindling newsroom staff, journalists are often tasked with covering a wider range of topics, even those outside their areas of expertise.
For stakeholders in the realms of human, animal, and environmental health, the rapidly changing journalism landscape presents both an opportunity and an obligation to educate the media and help reporters understand the urgency of embracing the One Health approach.

Recommendations

Build Collaboration Around the One Health Concept

To fully unlock the potential of a unified approach in addressing the challenges before us, the relatively small size of the One Health community must undergo rapid expansion.

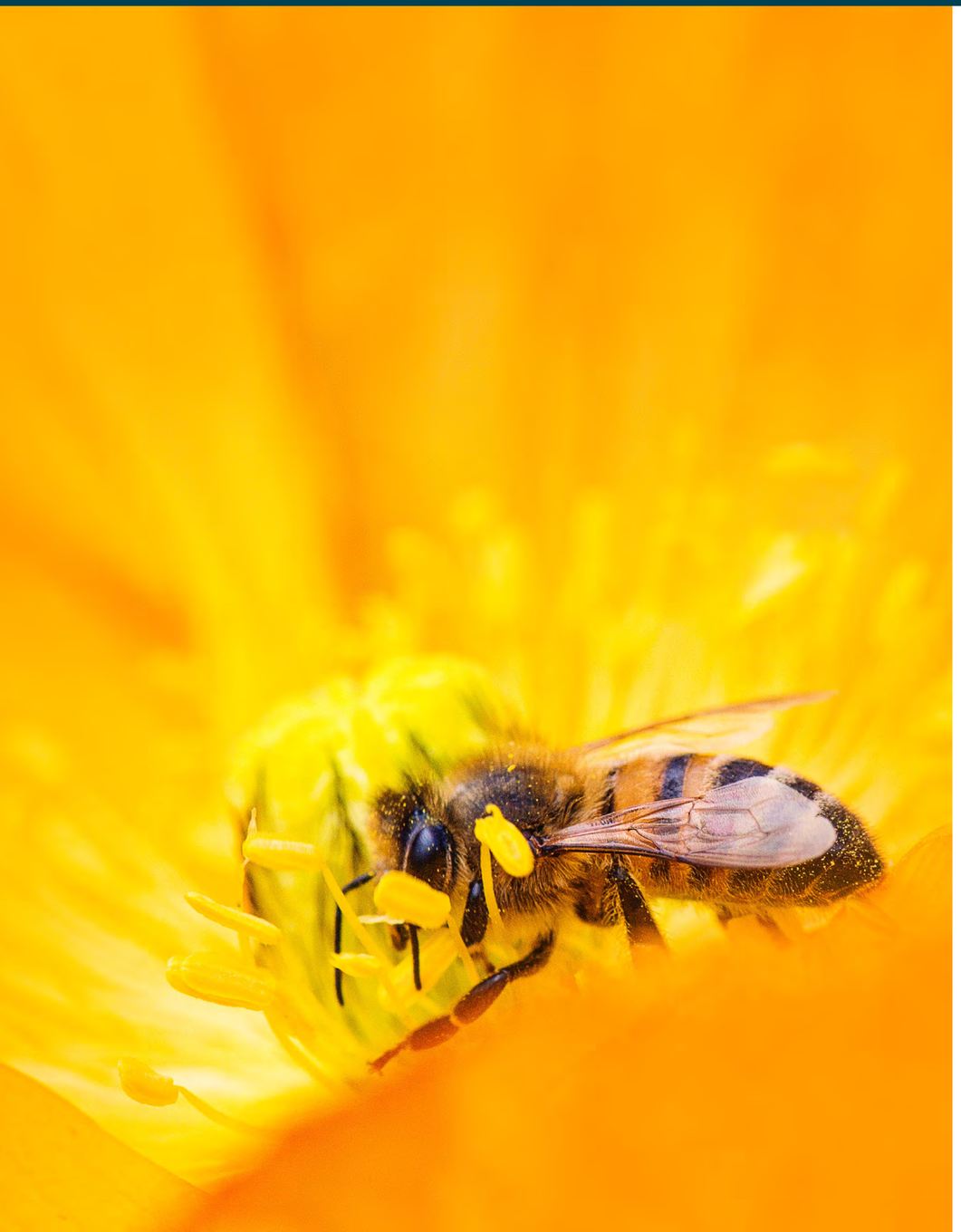
The first step to enabling those efforts is to build a more comprehensive engagement infrastructure around the One Health concept, which will serve to strengthen the ability of stakeholders who are already engaged to drive messaging, build collaboration, and identify actions that will lead to solutions in the One Health arena.

Tailor the Message

The GRETEL analysis demonstrated that different stakeholders engage with specific topics related to One Health when they are tailored to their area of expertise. For example, animal health and human health stakeholders are actively discussing the topics of zoonotic disease, surveillance, and infectious disease. The climate stakeholder group is focused on the health impacts of climate change, while the conservation stakeholders are engaged on the impact of climate change on biodiversity and ecosystems.

These findings indicate that specific topics can act as "hooks" to attract different audiences that can be embedded into a framework that more broadly discusses One Health and educates on the importance of collaboration between stakeholders.

Emphasizing policy and public health topics of interest such as antimicrobial resistance and pandemic preparedness—and the importance of taking a collaborative approach across different disciplines to address them—may provide opportunities to increase understanding of One Health among policymakers and public health leaders.



What Can We Do?

1 Promote Cross-Sectoral Collaboration

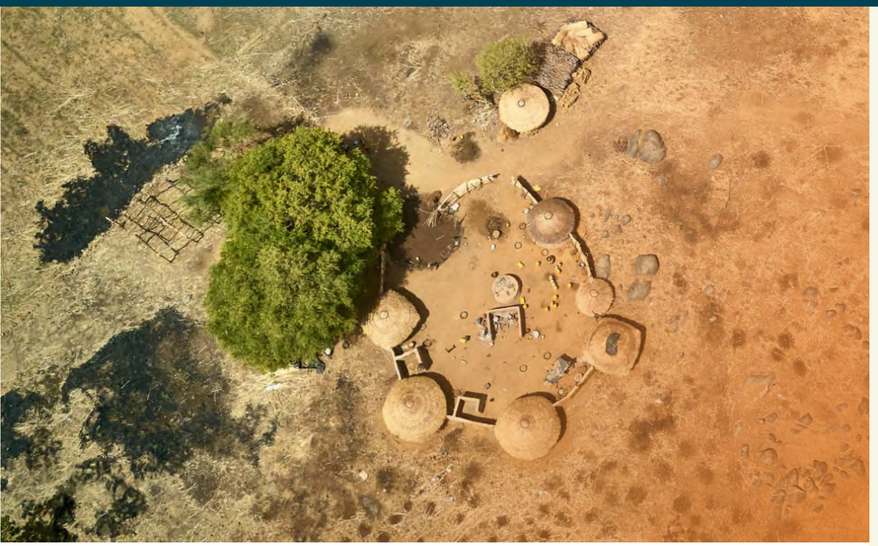
Encouraging professionals from human health, animal health, and environmental health sectors to work together is key. This can involve creating interdisciplinary teams or organizing joint workshops. For instance, the One Health Commission,[16] a globally focused organization, facilitates these collaborations. Another prime example is the Tripartite Collaboration between WHO, FAO and WOAH. These organizations, along with the United Nations Environment Programme (UNEP), also form a One Health Quadripartite and work together to combat health threats at the intersection of humans, animals, and the environment.[17]

2 Educate and Raise Awareness

Developing and implementing educational programs or campaigns to raise awareness about the One Health concept is a priority. The One Health Initiative[18] is a movement that forges co-equal, all-inclusive collaborations and educates about One Health through a robust website and social media presence. Similarly, the European One Health/EcoHealth (OHEH) workshop series[19] aims to foster and increase awareness of One Health and a related concept, EcoHealth, among European stakeholders.

3 Advocate for One Health Policies

It is critically important to advocate for the integration of One Health principles into local, national, regional, and international policies. The EcoHealth Alliance[20] works to influence policy by providing lawmakers and stakeholders with scientific research that highlights the importance of a One Health approach. The book *One Health: People, Animals, and the Environment*[21] is a good source for anyone wishing to develop initiatives that advocate for One Health policies.



4 Foster Community Engagement

Engaging local communities in One Health initiatives can include organizing community events, creating citizen science projects or involving community members in decision-making processes. In Burkina Faso, community-based One Health units engage local communities in disease surveillance and response.[22] Similarly, initiatives undertaken in Ethiopia aim to improve the health and livelihoods of vulnerable communities by implementing a community-based One Health approach.[23]

5 Prioritize Funding and Investment in One Health Research

Supporting research that explores the connections between human health, animal health and environmental health is vital. This can involve funding research projects, publishing research findings or promoting interdisciplinary research collaborations. The U.S. Agency for International Development's (USAID) Emerging Pandemic Threats program invests in global research on zoonotic diseases.[24] The One Health European Joint Programme (OHEJP) is another initiative that aims to create a collaborative, transdisciplinary and cross-sectoral research community to enhance understanding of foodborne zoonotic diseases.[25] Global research charities such as The Wellcome Trust, contribute to vital research through substantial funding, fostering numerous projects and collaborations. Efforts like this, enable industry research and development, innovation initiatives, and the creation of new technologies and treatments. This work is key to advancing our understanding and management of One Health related issues.

6 Develop One Health Skills and Competencies

Encouraging professionals and academics to develop the skills and competencies needed to work effectively within a One Health framework can involve providing training programs, creating professional development opportunities, or integrating One Health concepts into existing education and training programs. For example, the One Health Institute at the University of California, Davis, brings together veterinarians, physicians, environmental scientists, and social scientists to tackle complex problems affecting health.[26] The University of Edinburgh, in Scotland, also offers a One Health postgraduate program which is funded by the Wellcome Trust. A growing number of other universities across the world are also developing post-graduate courses in One Health. These will provide students with a foundation in the principles of diseases in the context of ecological systems.[27]

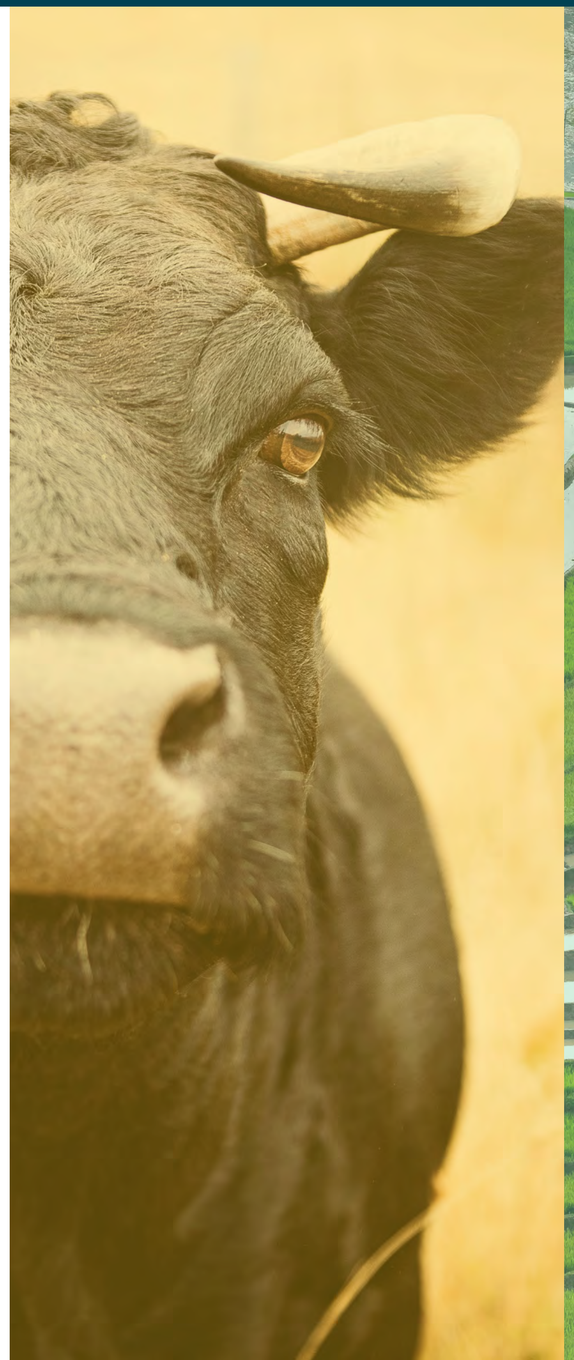
Call to Action

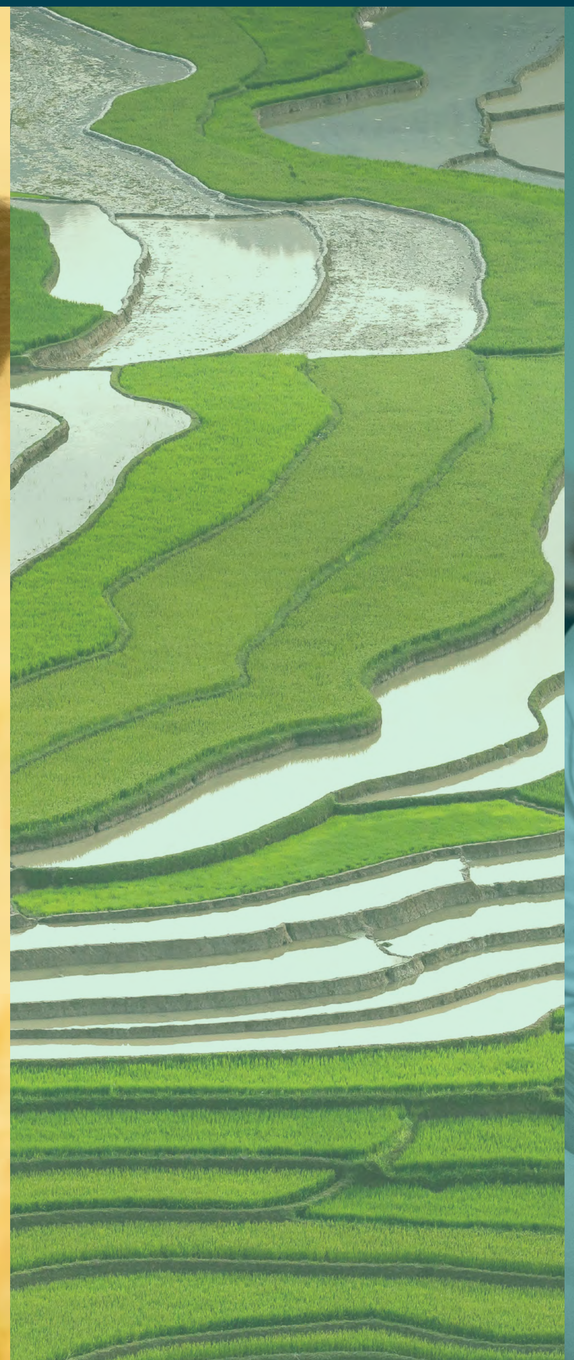
One Health, One Voice

The One Health concept is an untapped opportunity for leaders in each major stakeholder group—animal health, human health and environmental health—to further their own objectives by engaging more broadly across the One Health conversation.

Gaps in the One Health conversation identified by this analysis must be addressed through targeted campaigns, stronger partnerships, integrated and enhanced policies, communication and inclusivity efforts. Key stakeholders need to amplify the message about One Health. All members of the One Health community need to connect with people from other disciplines with whom they do not normally interact, so that there is a broader exchange of information, ideas and collaborative action.

Realizing the potential of the One Health approach will require a unified effort. Therefore, all stakeholders including—academics, industry veterans, policymakers, healthcare professionals, veterinarians, climate and conservation specialists, business leaders, influencers, and journalists—have an opportunity to bring One Health to the forefront of conversations, foster engagement and collaboration, and celebrate those pioneering this important cause.

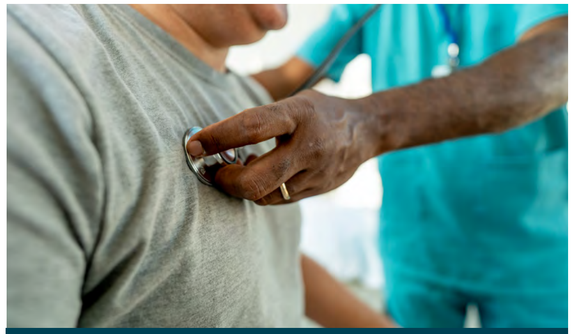




The One Health Landscape

Introduction to the One Health Landscape

Human health, animal health and environmental health are the three core sectors within the One Health space and are widely acknowledged as the fundamental pillars of the One Health approach.

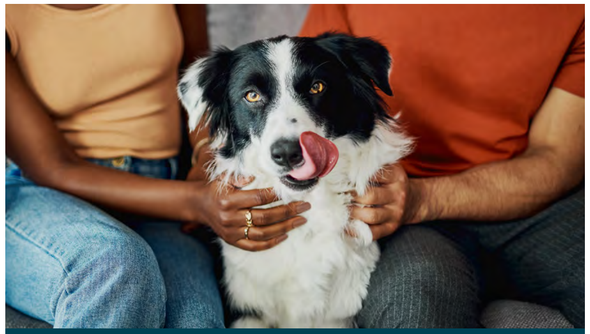


Human Health

Refers to the physical, mental and social well-being of individuals and communities.

Stakeholders may include:

healthcare providers, public health agencies, medical professionals, business leaders and the public

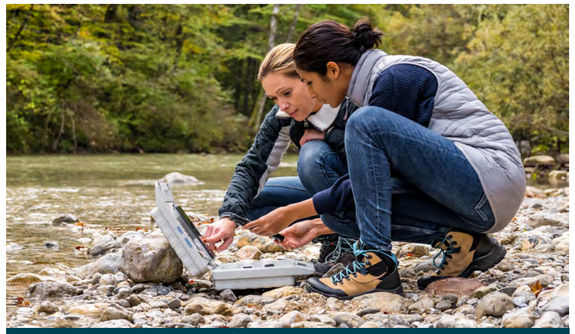


Animal Health

Refers to the health and well-being of both domestic animals, such as pets and livestock, and wildlife.

Stakeholders may include:

veterinarians, veterinary clinics, animal welfare organizations, farmers, business leaders and pet owners



Environmental Health

Refers to the condition of the environment regarding factors such as climate, conservation, ecological diversity and pollution, as well as the management of factors in the environment that can impact human and animal health.

Stakeholders may include:

environmental health professionals, government agencies, business leaders, the public, researchers and academics

The One Health approach, while fundamentally grounded in its three core pillars, necessitates a more granular understanding of its various sectors. Our GRETEL analysis has determined that the One Health ecosystem is much broader, encompassing several disciplines that can fall under the three core sectors.

These can often be overlooked yet play pivotal roles in creating a comprehensive and effective One Health ecosystem.

Understanding the nuances between these disciplines and how they relate to the core sectors is crucial, as it allows for interdisciplinary collaboration, tailored strategies, enhanced communication, informed policy and practice, research and monitoring.

Expanding Our Understanding of the One Health Landscape

Alongside human health, animal health and environmental health, the following sub-sectors have been identified within the One Health space through our GRETEL analysis.

While each sector has its own specific focus, they all overlap and interact within the broader One Health ecosystem ***(Figure 2)***. Understanding these interactions can help us develop more effective, holistic strategies for promoting good health and preventing disease.

Conservation

Refers to the protection, preservation, management or restoration of natural environments, ecosystems, vegetation and wildlife.

Stakeholders may include: conservationists, environmental organizations, government agencies and researchers

Climate

Refers to the long-term patterns of weather in a specific region or the planet. It includes factors such as temperature, humidity, wind, rainfall and atmospheric particle count.

Stakeholders may include: climate scientists, environmental non-governmental organizations (NGOs), government agencies, policymakers and activists

Global/EU Policy

Refers to international and European Union (EU) policies, regulations and initiatives that aim to address health issues related to One Health.

Stakeholders may include: policymakers, government agencies, international organizations and the public

Science

Evidence-based systemic study and application of knowledge about the natural and social world.

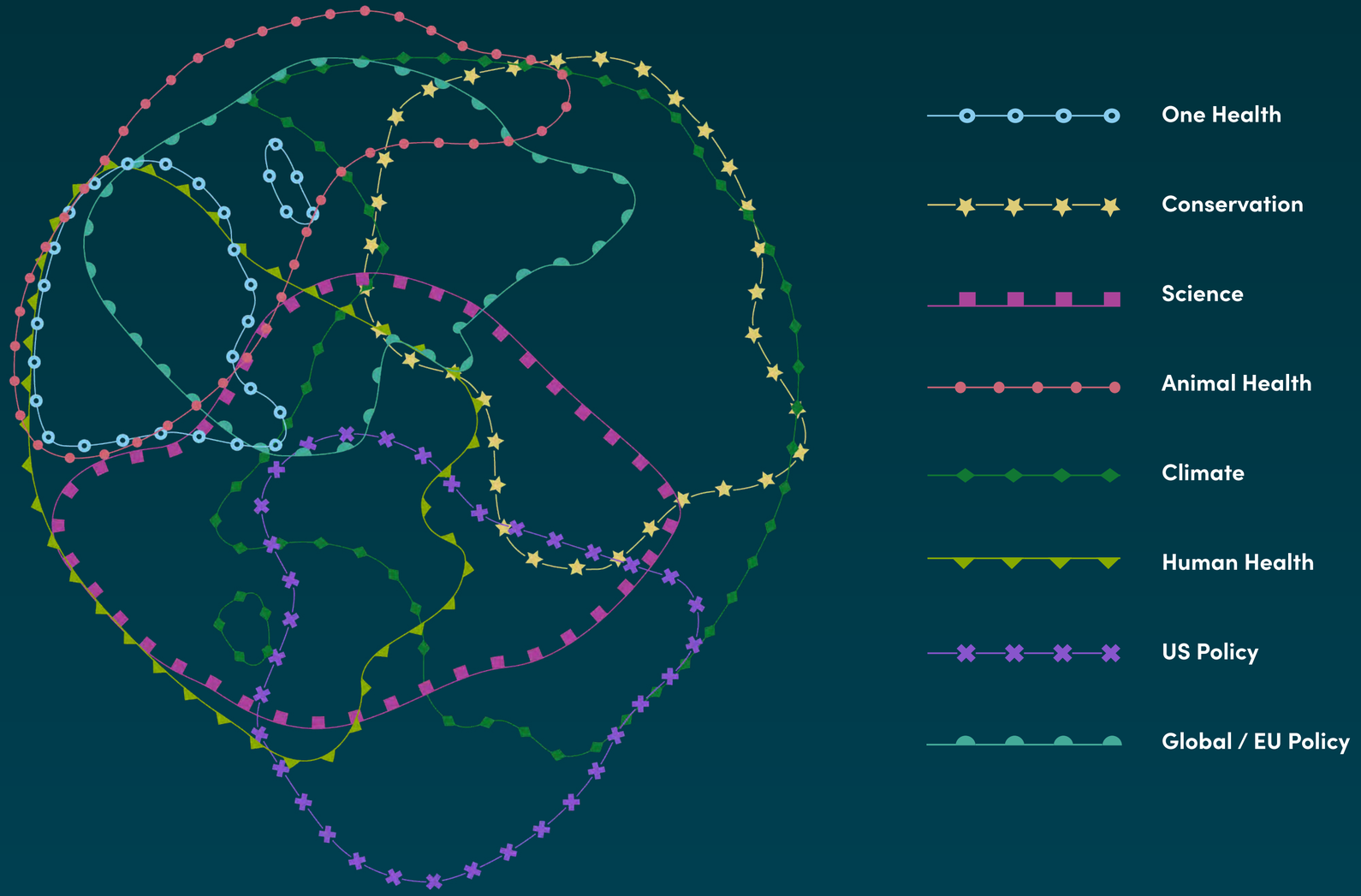
Stakeholders may include: academic institutions, veterinary, environmental and biological scientists

U.S. Policy

Refers to the policies, regulations and initiatives established by the United States at the federal, state or local level that aim to address health issues related to One Health.

Stakeholders may include: policymakers, government agencies and advocacy groups in the United States

Figure 2: The One Health GRETEL Map



How to read the map

Color / Pattern: Each color and corresponding pattern represents a stakeholder group with unique points of influence.

Proximity: Stakeholders that are near one another share more connections.

Key Stakeholders in the One Health Landscape

To effectively communicate and engage with the different sectors in the context of One Health, it is important to understand the key influencers involved and the language and messaging that resonate with each of them.

The following section provides an overview of stakeholders identified by the GRETEL analysis who are involved in the One Health landscape and the roles they could play.

Business Leaders and C-Suite Executives work to ensure that sustainable and ethical business practices are implemented to help protect the health of humans and our planet.

Scientists and Researchers contribute to the understanding of the interconnectedness between human, animal and environmental health through their research, publications and expertise.

Healthcare Professionals play a vital role in implementing the One Health approach by being involved in the treatment and prevention of diseases that affect humans.

Veterinarians are key stakeholders in the One Health approach. They not only provide care for animals but also monitor and control zoonotic diseases, contribute to food safety and security, and work toward the well-being of animals, humans and the environment.

Engineers design, build, or maintain infrastructure or public works to facilitate One Health outcomes.

Social Scientists understand and study of societies and the relationships among individuals within those societies to translate One Health inventions and practices.

Environmentalists and Conservationists work toward maintaining biodiversity and sustainable ecosystems, while mitigating environmental factors that can affect human and animal health.

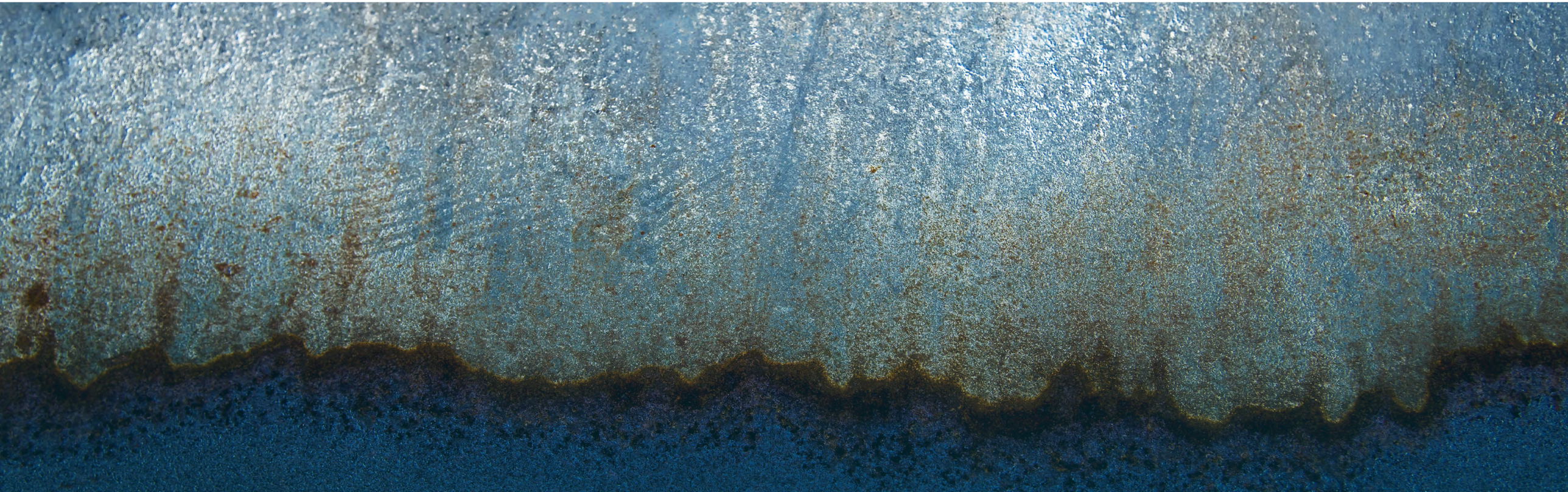
Policymakers and Government Officials shape regulations and initiatives that promote One Health principles and address health challenges across sectors.

NGOs collaborate with various stakeholders to raise awareness, advocate for policy changes and implement programs that address social, environmental and humanitarian issues.

Educators and Students play a crucial role in disseminating knowledge about One Health, training future professionals and fostering interdisciplinary collaboration.

Public Health Agencies recognize the importance of One Health in preventing and controlling infectious diseases that can impact both humans and animals.

Community Members, which may include patients, pet owners, farmers and other members of the public who recognize the importance of a holistic approach to health.



Stakeholder Penetration

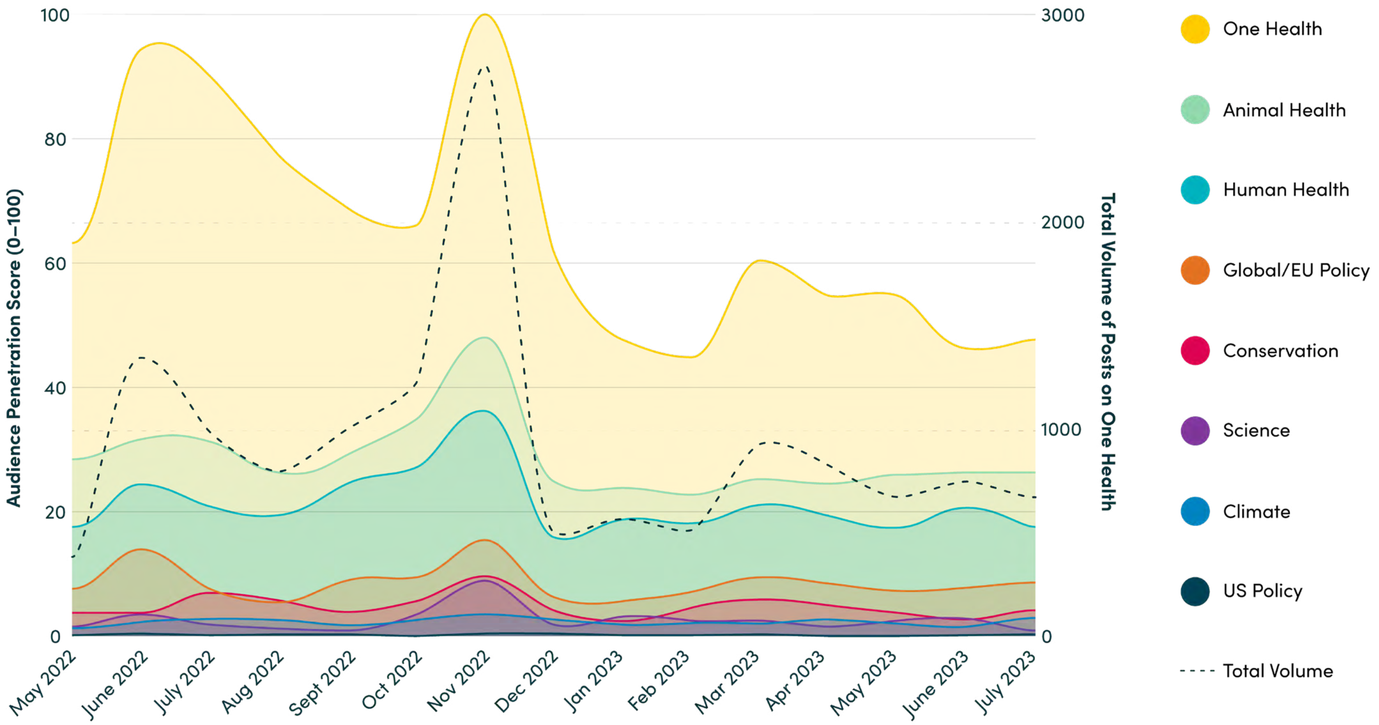
GRETEL gauges stakeholder penetration by tracking user engagement within each stakeholder group on a specific topic over a period of time.

This measure was applied to quantify the level of engagement (Figures 3–5) of the various One Health stakeholders on the topics of:

- One Health
- Infectious diseases and antimicrobial resistance
- Environmental concerns

Figure 3: Stakeholder Penetration on One Health

Rolling Month-Over-Month Audience Penetration Compared to Total Post Volume



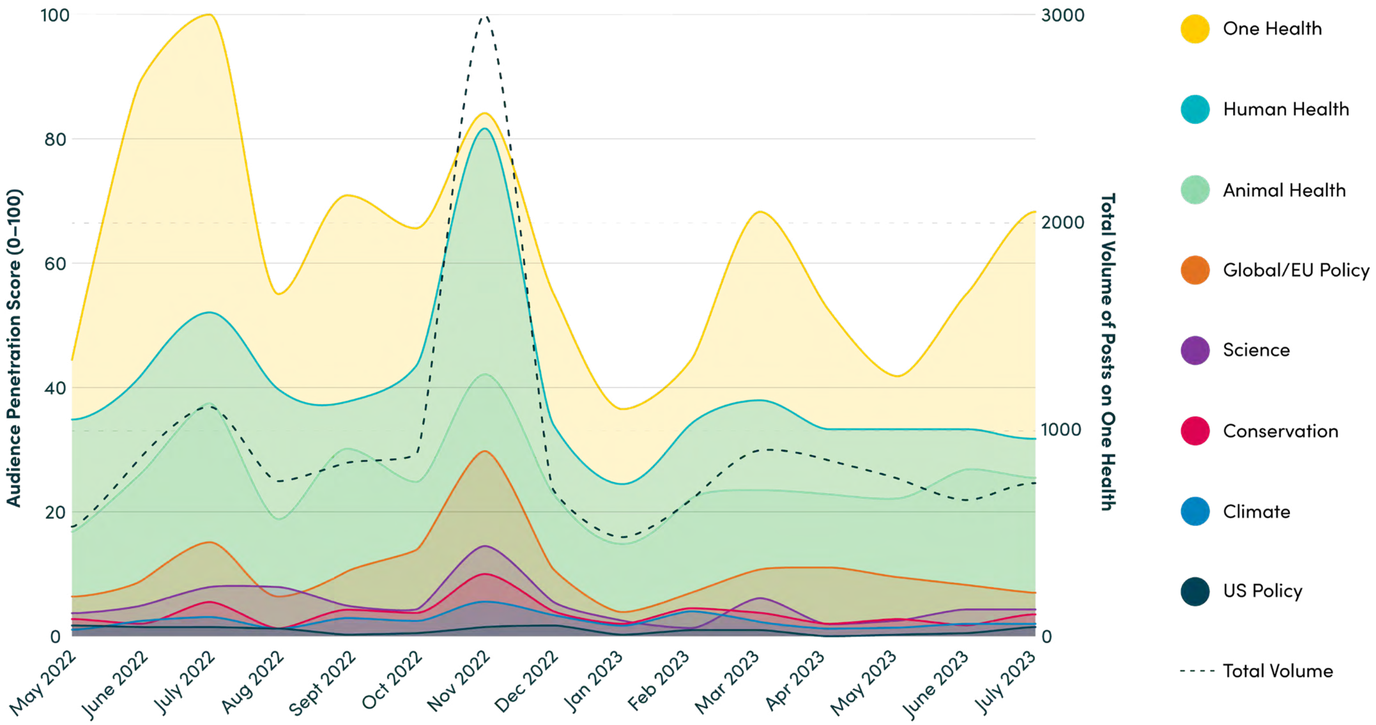
A collection of posts that received the highest level of engagement can be found in ***Appendix 3.***

- Overall, engagement with One Health conversations is low, with peaks coinciding with well-established awareness days, such as International One Health Day, which took place in November 2022.
  - The total conversation volume, represented by the dotted line, also peaked during this time, indicating that all stakeholder groups engaged with this awareness day.
- As expected, the One Health stakeholder group is the most engaged audience on the topic of One Health, followed by animal health, then human health.
  - Their engagement peaked in November 2022, coinciding with International One Health Day and other awareness events.
- U.S. Policy, Climate, Science and Conservation stakeholder groups show the least engagement.

How to read the graph: The left vertical axis represents the level of engagement, with a score of 100 indicating the highest level of engagement for a stakeholder group on the topic within the tracked time period. The horizontal axis represents time. The dotted line on the graph represents the total volume of conversation about the topic, which is also measured on the right vertical axis. Each stakeholder group is represented by a different color on the graph. This chart shows the analysis of stakeholder penetration of the following mentions: *#WOHC OR #OneHealth OR #OneHealthDay OR #AggiesInOneHealth OR #worldonehealthcongress*

Figure 4: Stakeholder Penetration on Zoonoses, Infectious Diseases and Antimicrobial Resistance (AMR)

Rolling Month-Over-Month Audience Penetration Compared to Total Post Volume



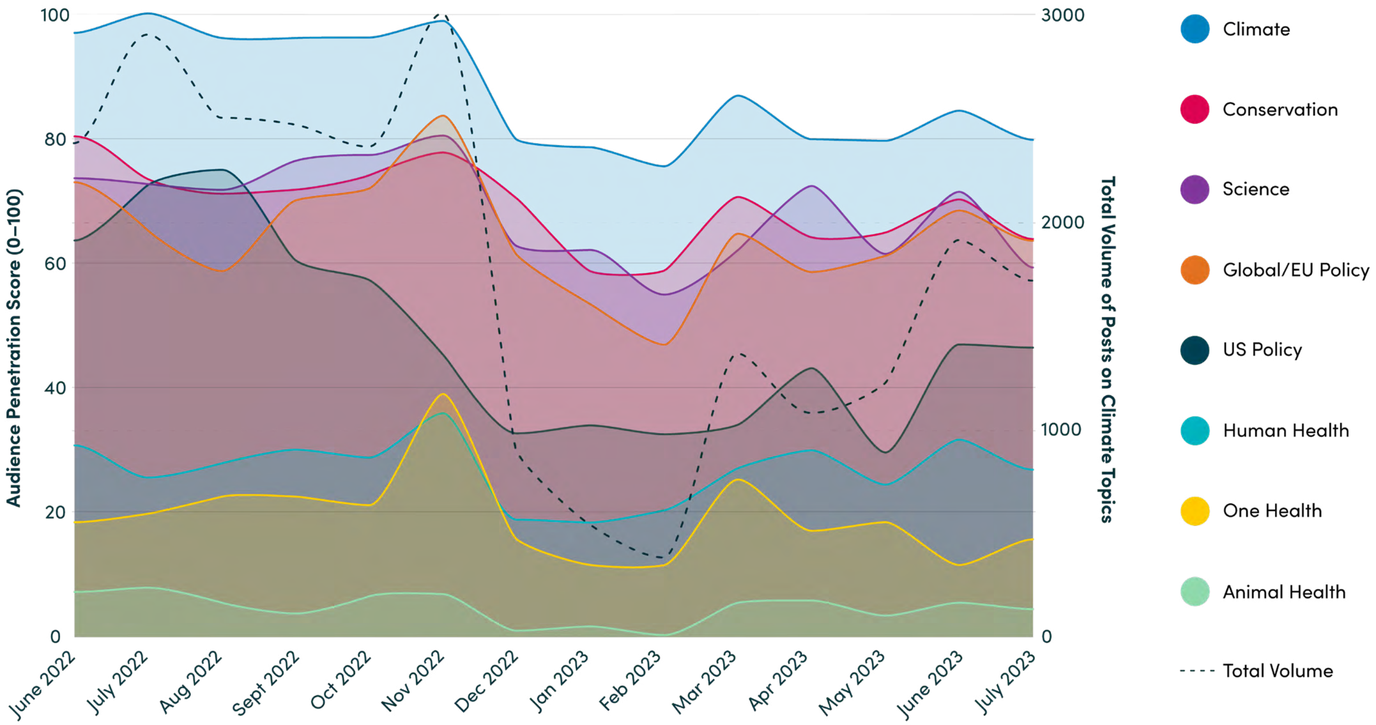
A collection of posts that received the highest level of engagement can be found in ***Appendix 3.***

- Compared to One Health-specific conversations, mentions of zoonosis and emerging infectious diseases receive higher engagement from other stakeholder groups, such as human health and animal health.
- The highest level of engagement from One Health stakeholders occurred in June 2022, coinciding with World Zoonoses Day and a Centers for Disease Control and Prevention (CDC) webinar on zoonoses and One Health.
- The overall volume of conversation around the specified mentions reached its peak in November 2022, coinciding with awareness days such as International One Health Day and World Antimicrobial Awareness Week.
- Engagement of Human Health stakeholders peaked in November 2022, during World Antimicrobial Awareness Week.
- U.S. Policy, Climate and Conservation stakeholders were the least engaged on the topics of infectious diseases and antimicrobial resistance.

How to read the graph: The left vertical axis represents the level of engagement, with a score of 100 indicating the highest level of engagement for a stakeholder group on the topic within the tracked time period. The horizontal axis represents time. The dotted line on the graph represents the total volume of conversation about the topic, which is also measured on the right vertical axis. Each stakeholder group is represented by a different color on the graph. This chart shows the analysis of stakeholder penetration of the following mentions: *Zoonoses OR "Zoonotic disease" OR "Vector-Borne Disease" OR VBDs OR "Emerging Infections" OR #EmergingInfections OR #ZoonoticDisease OR #VectorBorneDisease OR #VBD OR #AntimicrobialResistance OR #EmergingInfections.*

Figure 5: Stakeholder Penetration on Climate Topics

Rolling Month-Over-Month Audience Penetration Compared to Total Post Volume



A collection of posts that received the highest level of engagement can be found in ***Appendix 3.***

- Total volume of posts related to climate topics is significantly higher compared to One Health and infectious diseases/antimicrobial resistance topics.
- The highest level of engagement from climate stakeholders occurred in July and November 2022, coinciding with:

  July 2022

  – ***Record-breaking high temperatures, wildfires and air pollution epidemic, in particular in London/UK.***

  – Manchin's veto of Democratic party climate legislation, which terminated the bill and prevented its passage.

  – State of the Environment Report released by Australia.

  November 2022

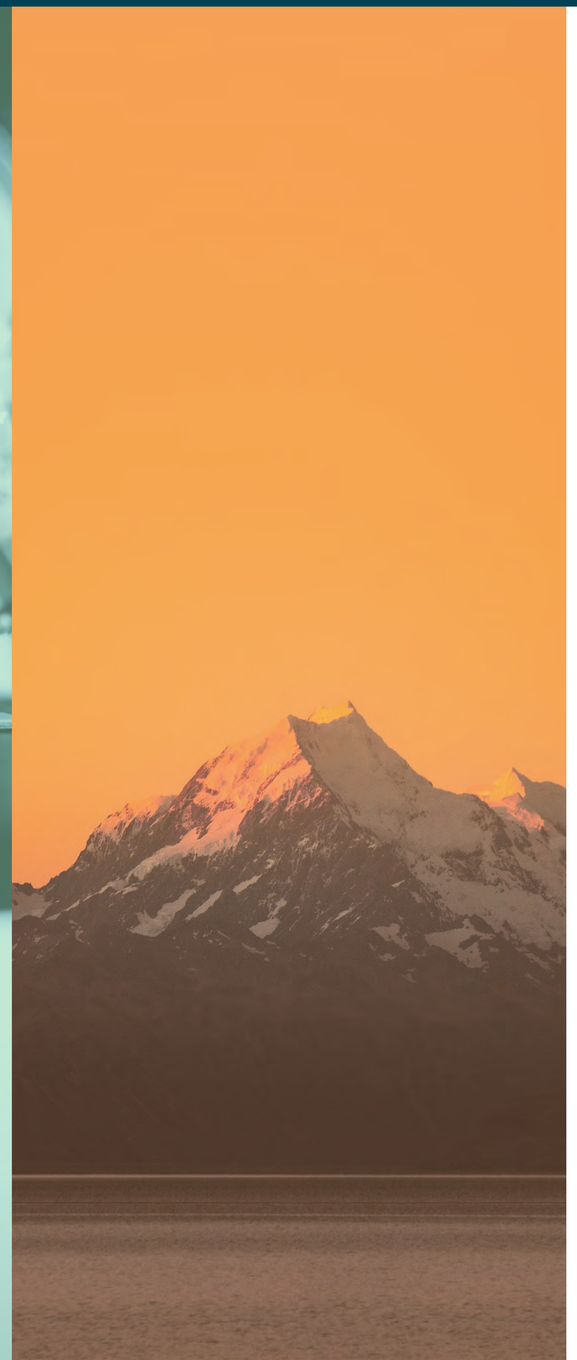
  – The 2022 United Nations Climate Change Conference, more commonly referred to as COP27, was the 27th United Nations Climate Change conference, held from November 6 to November 20, 2022.

- Conservation, global/EU policy and U.S. policy stakeholders are significantly more engaged with climate topics than they are with One Health, infectious diseases and antimicrobial resistance topics.
- Animal health, human health and One Health stakeholders show the least engagement.

How to read the graph: The left vertical axis represents the level of engagement, with a score of 100 indicating the highest level of engagement for a stakeholder group on the topic within the tracked time period. The horizontal axis represents time. The dotted line on the graph represents the total volume of conversation about the topic, which is also measured on the right vertical axis. Each stakeholder group is represented by a different color on the graph. This chart shows the analysis of stakeholder penetration of the following mentions: *"Climate change" OR "Biodiversity loss" OR "Air pollution" OR "Deforestation" OR "widespread pesticide use" OR "Water scarcity" OR "Soil health" OR "loss of pollinators" OR "Plastic pollution."*

CAVEAT: Analysis only includes stakeholder groups identified in the Gretel map

Conclusion



The concept of One Health has been a topic of discussion and exploration for many years, but its relevance and significance today are greater than ever.

In a world grappling with crises on multiple fronts, it is imperative for influential figures from various fields such as health, medicine, veterinary medicine, science, policy, infectious diseases and more, collaborate to devise solutions for the intricate challenges arising from the interplay between humans, animals, and the environment.

For that to happen, there needs to be robust communication and sharing of ideas among these groups. Our analysis suggests that these conversations must be broadened, and the messaging must penetrate more deeply across stakeholders for One Health to flourish.

Appendix

Appendix 1: Stakeholder Engagement

The content posted within the sectors was mapped to identify the primary topics and themes they emphasize. This information can be analyzed to collect insights on effective communication, fostering collaboration and conducting relevant outreach.

This section provides an overview of each stakeholder group identified by GRETEL by looking at the following:

- Key themes discussed among each stakeholder group, identified through GRETEL Trails.
- Stakeholder engagement with the topic of One Health, profiled through the analysis of social media data from posts published between August 2022 and July 2023.
- Words, phrases and hashtags most commonly used among each stakeholder group, identified through the analysis of One Health posts published between August 2022 and July 2023.

By understanding the messaging that resonates within each stakeholder group and looking at how often they engage with the topic of One Health, we can discover where the gaps lie.

One Health Stakeholders

A collection of posts from the one health stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Zoonotic diseases
- Interdisciplinary collaboration
- Public health
- Environmental health
- Animal-human interactions

Engagement Trends

When engaging in One Health-specific conversations, the One Health stakeholder group focused their discussion on the application of the One Health concept, as well as learning opportunities and workshops, including webinars on antimicrobial resistance and current research projects focused on infectious diseases, climate change and animal viruses. They also discussed long-term outcomes of a One Health approach.

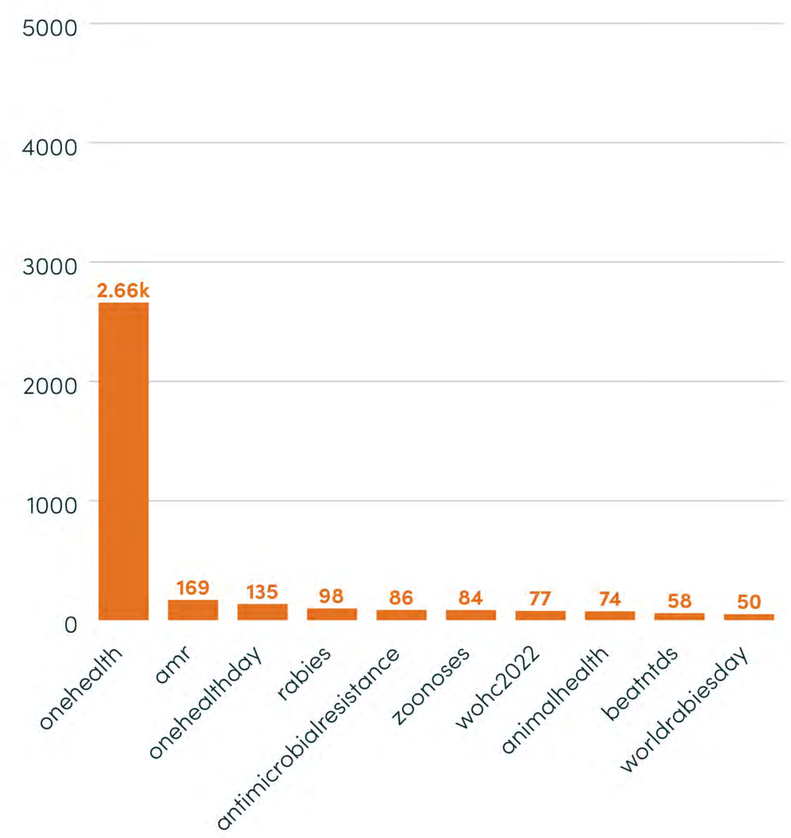
Posts with the most engagement highlighted newly available One Health educational resources and the role and importance of One Health.

Most Frequently Used Words and Phrases in One Health Conversations Among the One Health Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

challenges importance colleagues
work diseases project research
action environment plants health
humans team partners disease animal
impact **approach** interests
countries research world call
initiative environmental health animals
antimicrobial resistance event
human health animal health workshop

Top Hashtags Used in One Health Conversations Among the One Health Stakeholder Group



Animal Health Stakeholders

A collection of posts from the animal health stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Zoonotic diseases
- Veterinary medicine
- Animal welfare
- Livestock health
- Biodiversity

Engagement Trends

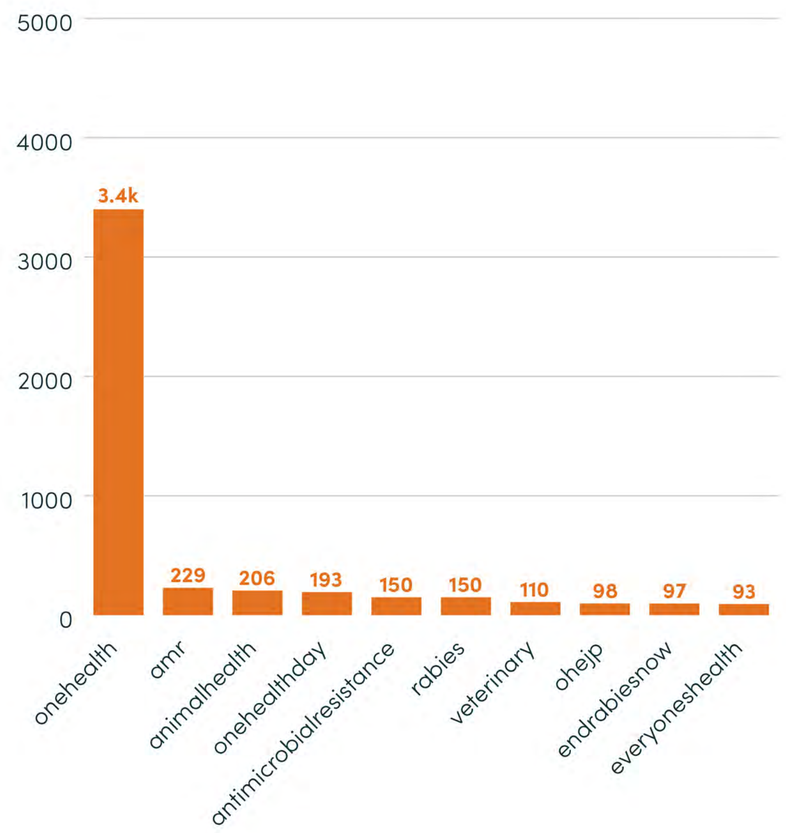
When engaging in One Health-specific conversations, the animal health stakeholder group discussed disease rates and causes in animals, the need for improved veterinary support and the role healthy animals play in One Health.

Posts with the most engagement were related to One Health Day, animal health and safety, animal-to-human disease transmission and disease surveillance.

Most Frequently Used Words and Phrases in One Health Conversations Among the Animal Health Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Animal Health Stakeholder Group



Human Health Stakeholders

A collection of posts from the human health stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Disease prevention and control
- Healthcare systems
- Epidemiology
- Health promotion
- One Health approaches in healthcare

Engagement Trends

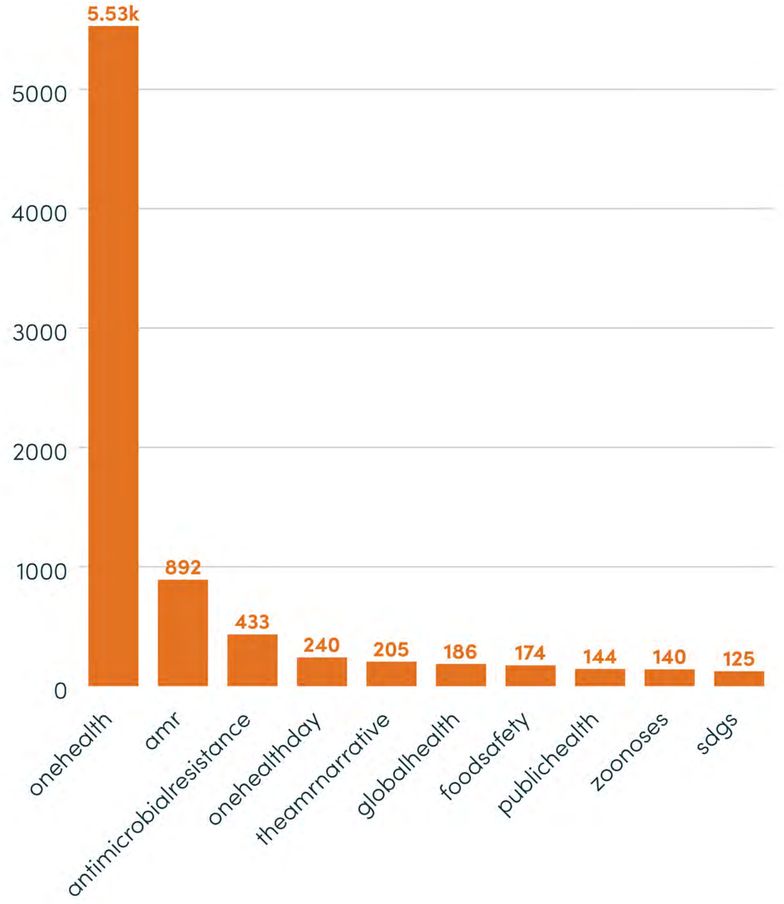
When engaging in One Health-specific conversations, the Human Health stakeholder group discussed the Quadripartite Executive Annual Meeting, the need for behavior change for pandemic prevention, and how One Health approaches could bolster global health security. It also focused on the importance of public awareness and education.

Posts with the most engagement focused on the need for collaboration and policy change, as well as the COVID-19 pandemic and other outbreaks, and the need for a One Health approach for the benefit of human health.

Most Frequently Used Words and Phrases in One Health Conversations Among the Human Health Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Human Health Stakeholder Group



Conservation Stakeholders

A collection of posts from the conservation stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Biodiversity loss
- Conservation strategies
- Wildlife health
- Habitat preservation
- Conservation and human health

Engagement Trends

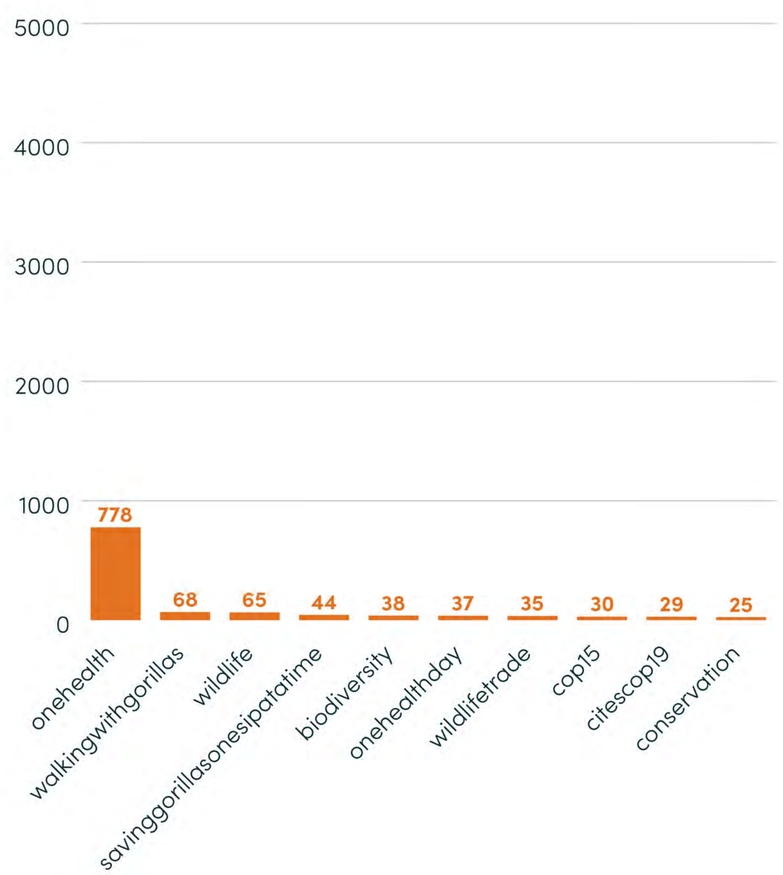
When engaging in One Health-specific conversations, the Conservation stakeholder group discussed topics such as green living and environmental issues, animal and wildlife well-being, biodiversity and the need to engage in conservation programs and a One Health approach.

Posts with the highest engagement talked about the partnership between people and the planet, the need for collaboration across sectors and the importance of biodiversity.

Most Frequently Used Words and Phrases in One Health Conversations Among the Conservation Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Conservation Stakeholder Group



Climate Stakeholders

A collection of posts from the climate stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Climate change impacts on health
- Environmental sustainability
- Climate change mitigation
- Climate change and zoonotic diseases
- Climate policy

Engagement Trends

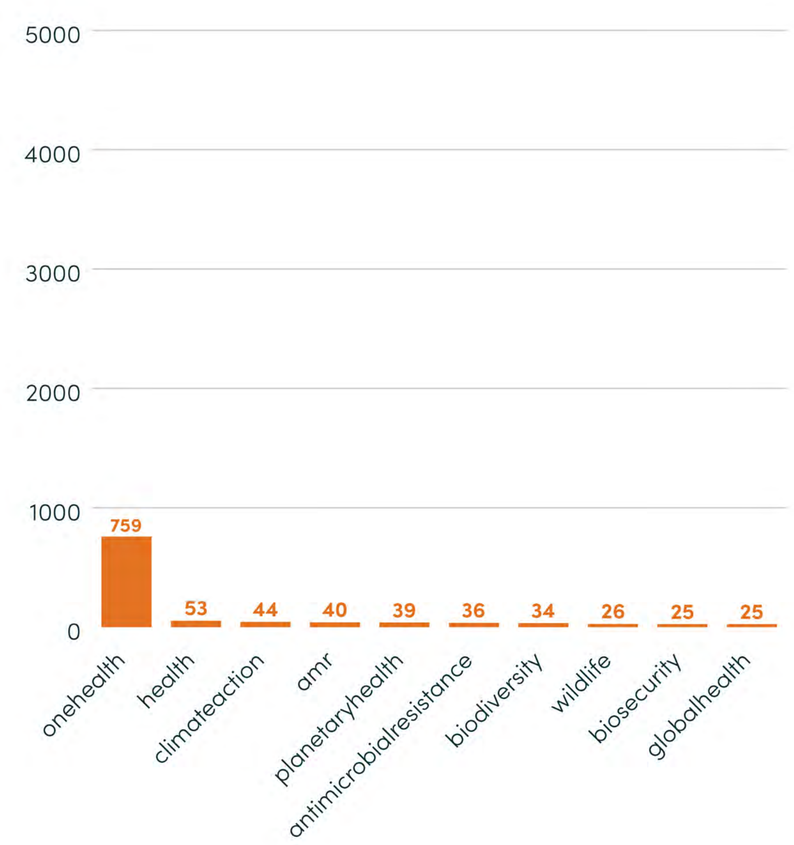
When engaging in One Health-specific conversations, the climate stakeholder group discussed climate risk frameworks and a One Health approach, as well as the need to protect the health of our ecosystem.

The climate stakeholder group also highlighted the interdependence of human, animal and environmental health; discussed related conferences; and uniquely addressed plastic and waste management. Posts with the most engagement focused on One Health Day; the need to increase awareness about the interdependence of human, animal and environmental health; and biodiversity's contributions to health and well-being.

Most Frequently Used Words and Phrases in One Health Conversations Among the Climate Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Climate Stakeholder Group



Science Stakeholders

A collection of posts from the science stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Zoonotic diseases research
- Advancements in health
- Biodiversity loss
- Conservation strategies
- Wildlife health

Engagement Trends

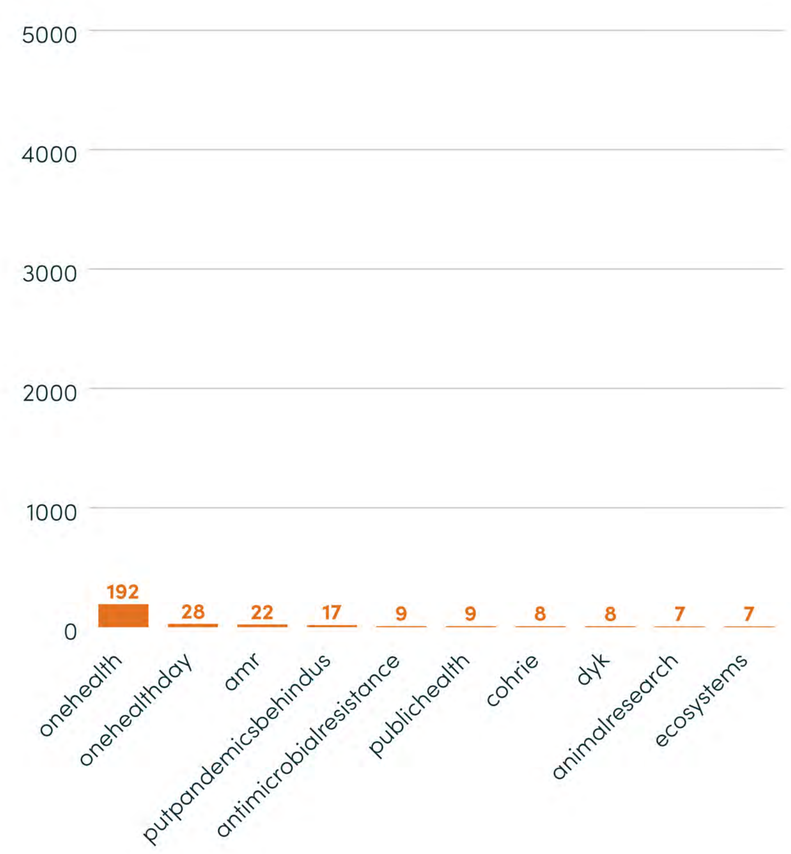
When engaging in One Health-specific conversations, the science stakeholder group discussed topics that included related research discoveries, virus diversity, the One Health framework and the environment's role in One Health.

Posts with the most engagement focused on COVID-19, One Health Day and the interconnectedness of our ecosystem.

Most Frequently Used Words and Phrases in One Health Conversations Among the Science Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Science Stakeholder Group



Global EU/Policy Stakeholders

A collection of posts from the Global EU/Policy stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- Global health policy
- EU health regulations
- International cooperation on health issues
- Zoonotic diseases
- Antimicrobial resistance

Engagement Trends

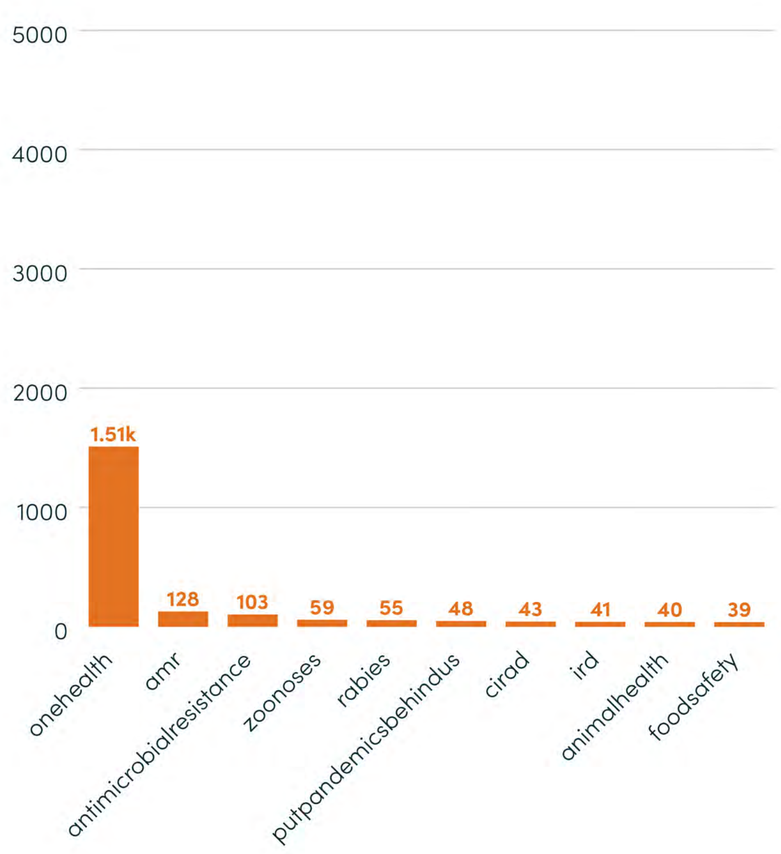
When engaging in One Health-specific conversations, the global/EU policy stakeholder group discussed the need for collaboration and for working groups to invest in safeguarding One Health, as well as the threat antimicrobial resistance poses in the European Union.

Posts with the most engagement focused on the importance of a One Health approach, the need to address global health issues to establish health for all, and related events and symposiums.

Most Frequently Used Words and Phrases in One Health Conversations Among the Global/EU Policy Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

Top Hashtags Used in One Health Conversations Among the Global/EU Policy Stakeholder Group



U.S. Policy Stakeholders

A collection of posts from the U.S. Policy stakeholder group that received the highest level of engagement can be found in ***Appendix 3.***

Key Themes

- U.S. health policy
- U.S. environmental policy
- U.S. animal health policy
- Health policy and climate change
- Health policy and zoonotic diseases

Engagement Trends

When engaging in One Health-specific conversations, the U.S. policy stakeholder group discussed topics that included outbreaks, emergency preparedness and the need to protect human, animal and environmental health.

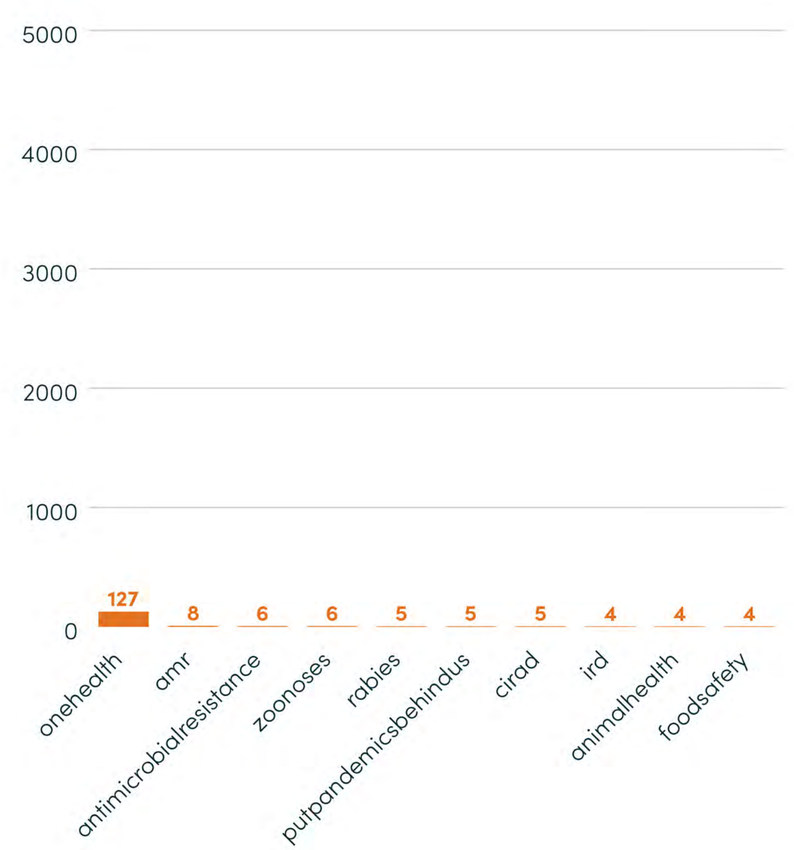
Posts with the most engagement focused on animal safety, the climate crisis and COVID-19.

Most Frequently Used Words and Phrases in One Health Conversations Among the U.S. Policy Stakeholder Group

The larger the word or phrase, the more frequently it occurred in conversations.

agencies birds & animals climate crisis
human health disease environment water
humans virus health pleasure
deaths decision study glyphosate
actors **approach** communities
ability advocates **animals**
critical role plants birds wildlife
historic moment risk pets climate change
Robinson-Huron Treaty territory elders

Top Hashtags Used in One Health Conversations Among the U.S. Policy Stakeholder Group



The Role of Business Leaders and C-Suite Executives in One Health

GRETEL Trails was applied to understand how business leaders and C-suite executives talk about One Health compared to other users.

It found that their posts tend to focus on the implications of One Health for business operations, policy development and strategic planning. From the social media posts analyzed, business leaders and C-suite executives often highlighted the need for cross-sector collaboration and the integration of One Health principles into business and policy decisions.

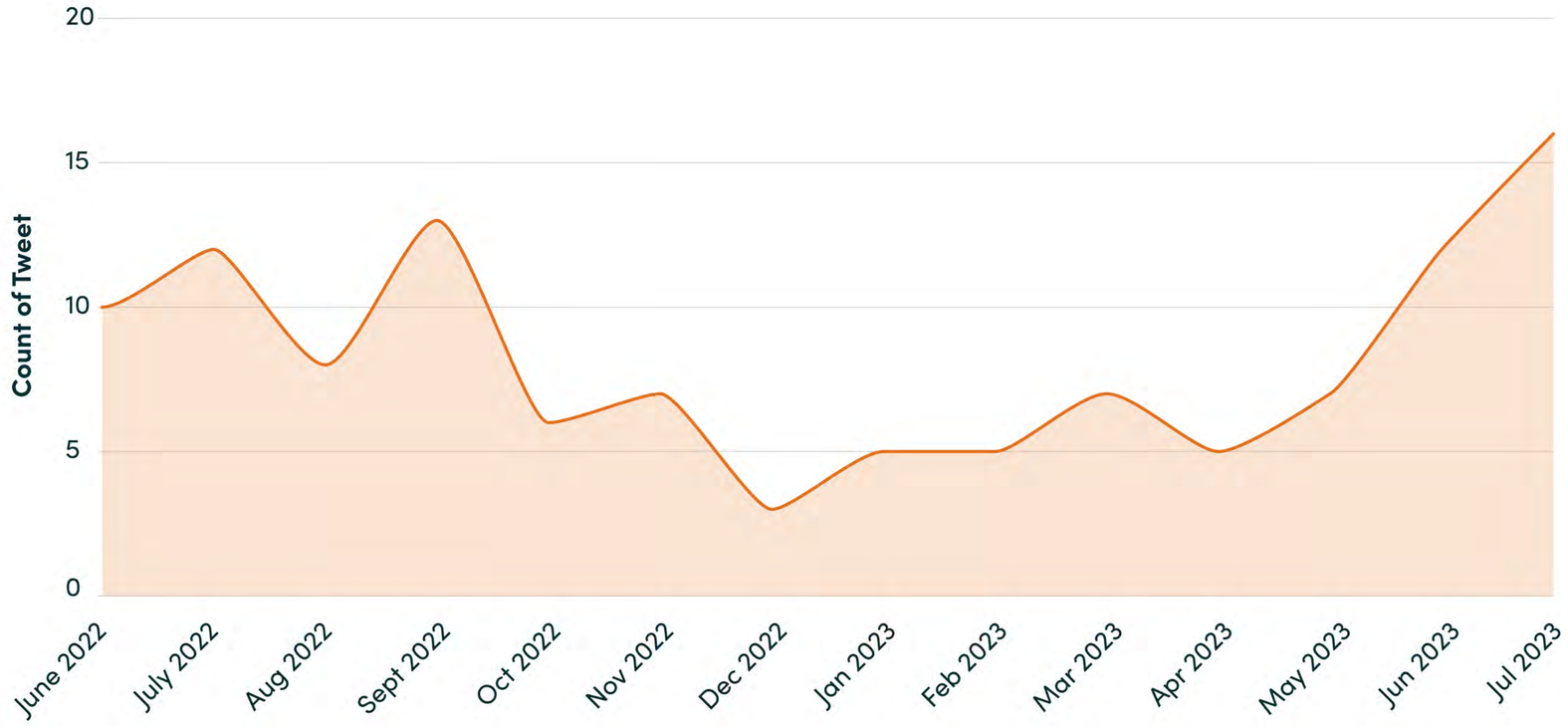
In relation to One Health, the following key themes discussed among business leaders and C-suite executives were identified:

- Strategic integration
- Policy advocacy
- Collaboration & partnership
- Awareness & education

On the other hand, other users, such as health professionals, veterinarians and organizations, were more prone to discussing One Health in a more practical and application-focused context. Their posts often highlighted specific examples of One Health in action, such as zoonotic disease outbreaks, including COVID-19 and bird flu. They also frequently discussed the practical challenges and opportunities of implementing One Health approaches in their work.

Business Leaders and C-Suite Executives Engagement on One Health

Using GRETEL, we analyzed the engagement on One Health by health business leaders and C-suite executives.



How to read the graph: This chart shows the number of One Health Tweets by health business leaders and C-Suite executives across a 1-year time span. Tweets analyzed contained one of the following mentions: "*#WOHC OR #OneHealth OR #OneHealthDay OR #AggiesInOneHealth OR #worldonehealthcongress*." Note that this is not all-inclusive of every single health business leader / C-suite executive.

Overall, there was relatively little engagement on One Health by business leaders/ C-suite executives Across the year, health C-suite executives engaged on the following events:

- July 2022 and July 2023: World Zoonoses Day, Zoonotic diseases and antimicrobial resistance, in particular their impacts on human death rates.
- September 2022: World Rabies Day, European Health Forum Gastein.
- November 2022: One Health Day and the 7th World One Health Congress and World Antimicrobial Awareness Week.

Business leaders/C-suite executives highlight the need for a One Health approach to address zoonotic disease and antimicrobial resistance as global health threats, and often share the work or research their organizations are doing on these fronts.

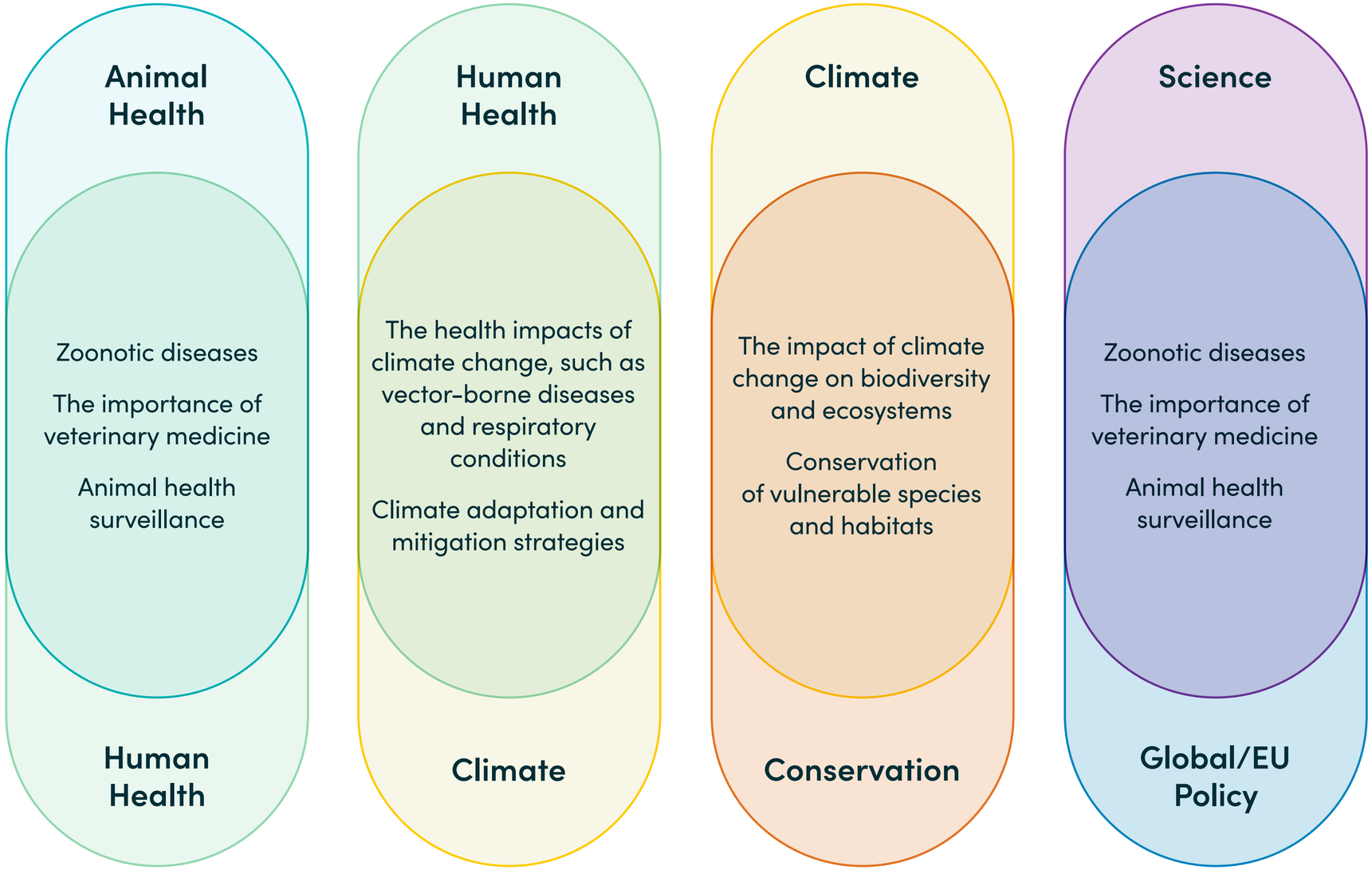
Business leaders/C-suite executives also emphasize the need to improve cooperation and communication between One Health sectors.

Other key topics discussed by Business leaders/C-suite executives included:

- Building climate-resilient systems/ecosystem restoration
- Food safety and foodborne diseases
- Need for policy updates, regulation and cross-governmental cooperation
- Insights from conferences, webinars or events focused on One Health.

Stakeholder Engagement Overlap

When profiling the key themes within each stakeholder group, there is overlap in messaging between them.



Influencers within One Health

Top Influential Organizations Within One Health Stakeholder Group

Rank on 0–10 scale indicates level of influence within stakeholder group (0 = no influence; 10 = maximum influence)

- Many organizations that are influential within the One Health stakeholder group also have significant influence within human health, animal health and global/EU policy, though they often lack influence within climate and U.S. policy stakeholder groups.
- However, some organizations, including the Gates Foundation, WHO and FAO, seem to have greater influence across a range of stakeholder groups and may have potential to accelerate bringing stakeholders together.
- Organizations that are not influential with the climate stakeholder group also tend to lack influence with conservation and science stakeholder groups.
- There is very little influence from any of the organizations within the One Health stakeholder group on the U.S. policy stakeholder group.

	One Health	Human Health	Animal Health	Conservation	Climate	Science	Global/EU Policy	US Policy
WOAH	10	6	9.4	1.1	0.3	0.3	5.8	0.3
FAO Animal Health	9.7	5.4	8.6	2.6	0.3	0.2	6	0.2
World Health Organization (WHO)	9.3	10	8.3	3.5	3	9	9.5	2.3
Food and Agriculture Organization	9.2	5.8	7.3	7	3.6	5.6	8.7	0.5
OneHealth Commission	8.7	5.9	7.1	0.4	0.2	0.3	4	0.4
World One Health Congress	8.6	5.8	6.7	0.5	0.2	0.4	4.4	0.4
One Health Institute (OHI)	8.2	6	6.3	1.3	0.3	0.8	4.3	0.5
Gates Foundation	8.1	8.1	5.8	4.6	1.9	8.5	7.9	1.2
FAO in Africa	8	3.6	5.3	4.9	0.9	1.6	6.6	0.3
United Nations	8	7.9	6.3	7.9	4.1	8.7	10	2.2

Influencers within One Health

Top Influential Outlets Within the One Health Stakeholder Group

Rank on 0–10 scale indicates level of influence within stakeholder group (0 = no influence; 10 = maximum influence)

- Many outlets that are influential within the One Health stakeholder group also have significant influence within the human health, animal health, conservation, and science stakeholder groups.
- Outlets that are influential within the One Health stakeholder group often lack influence within the climate and U.S. policy stakeholder groups, despite occasionally having moderate influence among the global/EU stakeholder groups.
- The discrepancy between the EU policy and U.S. policy stakeholder groups may be a result of delayed adoption of One Health in the United States and needs further exploration.

	One Health	Human Health	Animal Health	Conservation	Climate	Science	Global/EU Policy	US Policy
The Guardian	10	5.2	10	10	10	9	10	2.4
Nature	9.1	10	6.8	5.5	2.7	10	2.2	0.4
Science Direct	7.1	6.8	7.4	4.7	1.7	4.9	0.3	0.2
Wiley Online Library	7.1	5.8	5.1	4.3	0.5	6.1	0.8	0.2
Food Safety News	6.1	4.9	6	0.6	0.7	0.9	4.1	2.6
Medscape	6.1	5.4	0.9	0.4	0.7	0.6	0.6	2.5
MDPI	6	5.2	5.9	3.5	1.4	4.3	4.3	0.3
Daily Mail	6	0.2	5.5	3.2	0.5	4.3	5.3	5.1
WHO	6	7.2	5	0.3	0.2	0.1	5.2	0.2
BBC	5.9	4.4	8.5	6.7	4.4	6.4	8.1	0.5

Appendix 2: GRETEL Methodology

GRETEL maps are developed using Social Network Analysis (SNA), a research methodology based on both sociology and graph theory, which focuses on the relationships between social entities (e.g., people) and the patterns and implications of those relationships. SNA refers not to analysis of social media or social networks, but rather to the process of analyzing networks of individuals or groups; in other words, our social structures.

Network analysis has been used frequently in past research to study health-related issues and is an "approach to research that is uniquely suited to describing, exploring, and understanding structural and relational aspects of health."[28]

In the context of health communications, SNA can be used to map and analyze the relationships between different stakeholders, such as healthcare providers, patient advocacy organizations, media outlets and more who are engaged on a specific health issue. Analyzing these relationships can allow us to identify key influencers, understand the flow of information and reveal communities of interest and how they interact with each other. JPA Health leverages social media data and a specialized algorithm to produce a network analysis of 5,000 to 14,000 thought leaders on each health topic to identify where they get information and how to reach each stakeholder group engaged on the topic.

GRETEL maps, therefore, are the visualizations of those relationships and connections between individuals and stakeholders. Not only do GRETEL maps provide insights and targeting data on stakeholders engaged on health issues, but each map identifies the influence of media outlets, individuals and organizations based on how frequently they are referenced or cited by each stakeholder group within the map's health issue.

Through GRETEL, we better understand stakeholders, create customized communications strategies and use the data to quickly zero-in on the influencers and partners that will enable us to reach and engage key opinion leaders and priority populations.

Appendix 3: Social Media Posts

Stakeholder Penetration: Posts With the Highest Level of Engagement by All One Health Stakeholders

One Health Mentions

- *x.com/JVLazarus/status/1588201919054581762*
- *x.com/WHO/status/1588098899197034498*
- *x.com/NASAEarth/status/1588178825917222912*
- *x.com/WOHCongress/status/1588042566637096960*
- *x.com/CDCgov/status/1588184336356057090*

Infectious Diseases and Antimicrobial Resistance Mentions

- *x.com/Microbiota_Inst/status/1593606994807726081*
- *x.com/WHO/status/1593510311146962945*
- *x.com/WOAH/status/1595039528980746246*
- *x.com/WOAH/status/1594971505896873984*
- *x.com/Microbiota_Inst/status/1594677245251313664*

Climate Mentions

- *x.com/elonmusk/statuses/1632113740807061504*
- *x.com/bethsawin/statuses/1537559794642472966*
- *x.com/ClimateHuman/statuses/1547994520972718086*
- *x.com/DanRather/statuses/1549768121841582080*
- *x.com/vonderleyen/statuses/1586989546180382721*

Stakeholder Messaging: Posts With the Highest Level of Engagement by Each Stakeholder Group

One Health

- *x.com/WOHCongress/status/1588042566637096960*
- *x.com/OneHealthUofG/status/1559550563372748802*
- *x.com/OneHealthUofG/status/1649450277412511744*

Animal Health

- *x.com/Health4Animals/status/1588080650216767490*
- *x.com/Health4Animals/status/1587076794204700672*
- *x.com/animalhealthEU/status/1654370339013423105*

Human Health

- *x.com/EckerleIsabella/status/1593975565748510723*
- *x.com/DrTedros/status/1640279955681550336*
- *x.com/DrTedros/status/1590796888571199488*

Climate

- *x.com/NASAEarth/status/1588178825917222912*
- *x.com/DrMariaNeira/status/1604784850703372289*
- *x.com/IPBES/status/1677276775569829888*

Conservation

- *x.com/UNEP/status/1642149816401788928*
- *x.com/UNEP/status/1679173786585686016*
- *x.com/theGEF/status/1569506415420522497*

Science

- *x.com/WorldBank/status/1585705748784463873*
- *x.com/SciDiplomacyUSA/status/1588199323212210176*
- *x.com/WorldBank/status/1658910590708981786*

Global/EU Policy

- *x.com/UNESCO/status/1644369595753529348*
- *x.com/FAO/status/1593574782443872262*
- *x.com/FAODG/status/1640293367614406658*

U.S. Policy

- *x.com/urbanhorsedoc/status/1569688934610763778*
- *x.com/chrishendel/status/1565787025999122434*
- *x.com/urbanhorsedoc/status/1644332495998009346*

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