Recommendations for world leaders, including G7 leaders, on One Health

RSTMH Supporting UTC

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RSTMH

DEDICATED TO GLOBAL HEALTH SINCE 1907

UNITING TO COMBAT

NEGLECTED TROPICAL DISEASES

Contents

Introduction

This piece of work was carried out by the Royal Society of Tropical Medicine and Hygiene (RSTMH) for Uniting to Combat NTDs (UTC) between 21 January and 5 March 2021.

The review is to develop a set of recommendations on the topic of One Health for the G7 and world leaders. As part of the review we were also looking to understand thoughts on the definition and scope of One Health as a term.

I would like to recognise and thank SCI, specifically Dr Gabrielle Laing and Dr Wendy Harrison, for their support during this process. A special thank you to Dr Laing for attending the majority of the interviews and helping significantly with the analysis of this information.

Respondents to the research

The survey was completed by 87 people across 37 countries. We also carried out comprehensive interviews with 50 people. This group includes those trained in animal and human health as well as environmental science. They are currently working in industry, academia, NGOs, healthcare, government and intergovernmental organisations.

The process followed

For this research we followed the process below:

1. Developed questions
2. Identified stakeholders
3. Developed survey
4. Sent out invitations for the survey
5. Sent out invitations for interview
6. Conducted interviews
7. Analysed survey results
8. Analysed interview results
9. Developed results and recommendations

Executive Summary

The brief for this piece of work was to explore the definition and scope of One Health, and to arrive at One Health recommendations for G7 leaders, for non-G7 leaders and specifically on the topic of pandemic preparedness.

With the time allowed we have arrived at a combination of key areas of focus, and our own recommendations for leaders taking into account responses to the survey, interview discussions and an understanding of current recommendations and activities for the G7. It is important to note that despite an extension of time and our best efforts there remain some gaps in our respondent list in relation to disease area, country of presence, discipline and sector.

The research fell into two parts – a survey completed by 87 people, and interviews with 50 people. The full results of the research can be found in Section 6 of this report. Please find below a summary of the key findings.

One Health Definition

Across the survey and interviews there was significant alignment to the working definition of One Health that we used in the research, as stated below:

"One Health is the collaborative effort of multiple disciplines-working locally, nationally, and globally – to attain optimal health for people, animals and our environment"
One Health Initiative Task Force

99% of the survey respondents aligned to this definition either well or in some ways. Of the interviewees, a large proportion talked about One Health in this or a very similar way.

Overall recommendations

- Harness global examples of successful One Health working
- Broaden 'zoonotic research hubs' to be One Health hubs
- Help influence the One Health High-Level Expert Council
- Ensure the global pandemic early warning systems have clear guidance and policies
- Quantify the cost savings of approaching emerging disease from a One Health perspective
- Initiate plans for an innovative, sustainable, independent funding instrument for One Health
- Recommend countries develop One Health national action plans

Interview results

Thematic analysis on the 50 interviews was carried out and identified the key themes detailed below, with some notable sub-themes. A detailed discussion of all areas is included in Section 6 of this report.

1. Integration of health delivery
   - Surveillance and control
   - Information and data sharing
2. Governance and leadership
   - Global
   - National
3. Funding
   - One Health specific funding
   - Research funding
   - LMIC funding
4. Evaluation and systems thinking
5. Education and training
   - Policy and decision-makers
   - Health professionals
   - Communities and the public
6. One Health specific policy needs.

Survey results

1 G7 areas of discussion and recommendation
- Strengthen knowledge and expertise around One Health
- Increase funding to improve health resilience and for specific areas of One Health
- Advocate for One Health. Articulate its scope and why it is important
- Make technology transfer more straightforward

2. Non-G7 areas of discussion and recommendation
- Increase funding to support One Health
- Establish education programmes in one health
- Strengthen inter-disciplinary and inter-sectoral collaboration

3. Pandemic preparedness areas of discussion and recommendation
- Improve collaboration
- Adopt a One Health approach
- Strengthen early warning systems

Methodology

For this research we followed the process as below:

We developed key questions around the main areas of focus of the research

- Definition of One Health
- Recommendations for G7 leaders
- Recommendations for non-G7 leaders
- Recommendations around pandemic preparedness

A list of individuals, networks and organisations we wanted to engage through the survey or interviews was produced. We were keen to include stakeholders that fall into the following criteria:

- Based in a G7, G20 or 3 observer countries
- Based in highly endemic country or from areas often closely linked to the One Health approach e.g. rabies, zoonotic diseases, AMR
- From Intergovernmental organisations in sectors linked to One Health – WHO, OIE, FAO, UNEP
- Represent the private sector, NGOs, academia and government
- Work in all areas of human health, animal health, environmental health, and agriculture
- Represent national governments from a range of relevant ministries
- From a range of career stages from students through to those leading organisations
- From a range of roles covering research, implementation of programmes, policy, communications, manufacturing, innovation
- From a range of disease areas in global health including NTDs, infectious disease, NCDs, malaria, HIV and TB

We developed an online survey with the questions mentioned before and sent it to key stakeholders and the following networks to circulate to their members

- American Society of Tropical Medicine and Hygiene
- Ecohealth International
- Federation of European Societies of Tropical Medicine and International Health
- G7 Global Health Working Group
- Lancet One Health Commission
- NNN
- RSTMH members and wider networks
- RSTMH Student and Country Ambassadors
- UTC group
- Youth Combatting NTDs
- Zoonotic and Emerging Disease Group Kenya

It was also sent to around 200 individuals and organisations that met the criteria above. The results were analysed as they arrived however the early indications were that the results did not provide enough convergence around recommendations to use as a basis for the interviews. Additionally, as responses to the survey did not come in as quickly as we would have hoped, interview requests needed to be sent out simultaneously. For these reasons, the interviews used the same questions as the survey (see appendix 4 for survey questions).

Methodology continued

Summary of respondents

The survey was completed by 87 people across 37 countries. We also carried out comprehensive interviews with 50 people. This group includes those who trained in animal and human health as well as in environmental science. They are currently working in organisations including industry, academia, NGOs, healthcare, government and intergovernmental organisations. We are referring to this group collectively as the respondents.

Respondents by sector	
Academia	42
Government	24
Intergovernmental organisation	8
Network	5
NGO	22
Private Sector	6
Research Institute	9

Respondents by discipline	
Animal Health	44
Environment Science	3
Human Health	63
Agriculture	4

Discussions and lessons learned from methodology

There were some limitations to the methodology given the timeframe for this work for the G7. Most notably there was not enough time to clarify responses to the survey so as to inform the interview questions. This meant that the interview questions were more open ended than planned, which needed more analysis to identify recommendations.

It also meant that the questions posed to the interviewees were the same as those used in the survey, which provided an interesting comparison.

This is a difficult time for our sector with many people working extra long hours and having been redeployed to work on elements of covid-19 work.

Though we are pleased with the number of people who were able to contribute to this piece of work there are some notable gaps, for example those working in roles. within the environment, agricultural and food security sectors. There were also some notable networks unable to meet the timings. Despite best efforts some countries are not represented extensively. Finally, the multitude of disciplines relevant to One Health, were not represented equally.

Respondents by country

Country where based					
Australia	2	Kenya	13	The Gambia	1
Bangladesh	2	Luxembourg	1	Uganda	1
Belgium	1	Mexico	1	United Kingdom	24
Bhutan	1	New Zealand	1	United States	9
Cameroon	1	Nigeria	9	Vietnam	1
Canada	2	Norway	2	Zambia	3
Democratic Republic of the Congo	1	Pakistan	2		
Ethiopia	2	Peru	1		
France	5	Philippines	2		
Germany	9	Portugal	1		
Ghana	1	Rwanda	1		
India	4	Sierra leone	1		
Ireland	3	Sudan	2		
Italy	1	Switzerland	8		
Japan	2	United Republic of Tanzania	4		

Research Findings

Defining One Health

There are many definitions and narratives used in the public domain for One Health, below is a table of some frequently used ones. There are also many published articles on the topic, some referring to a history of 200 years of this underlying concept of human health being inextricably linked to animal health and the health of the environment. The terminology used for this concept has evolved over this time from *One Medicine* to *One World One Health* to *One Health* which has been used since the early 2000's.

Working definition used for research

For this piece of work we wanted to provide an initial statement for survey respondents to comment on, and chose the statement below. It seems to be used quite extensively and it focuses on what One Health means in practice, as opposed to a more theoretical definition:

"One Health is the collaborative effort of multiple disciplines-working locally, nationally, and globally – to attain optimal health for people, animals and our environment"
One Health Initiative Task Force

Findings around definition

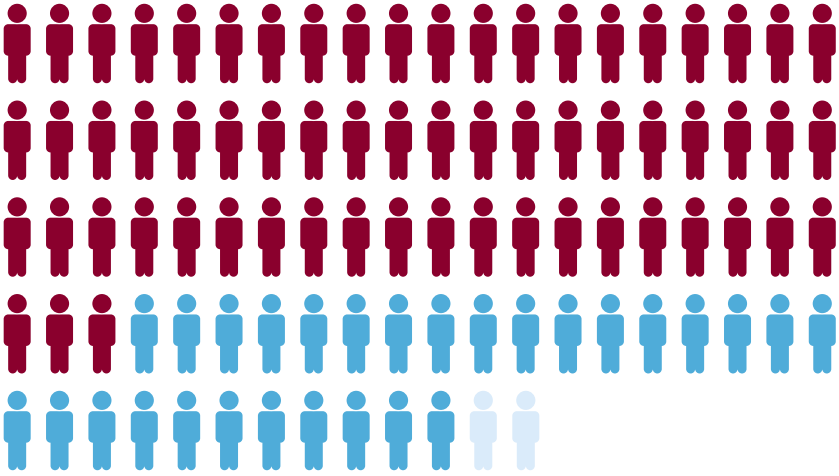
The survey results were quite clear regarding the definition of One Health.

68% of respondents saying they, or their organisation aligned well with this definition.

A further **31%** of respondents said they or their organisation aligned in some ways with this definition.

And just **1%** of respondents saying they or their organisation do not align well to this definition. Two of the comments made in the survey were that we should recognise the added value this approach brings to all parties, and that a definition should also emphasise the impact of the social determinants of health.

In some interviews the definition and concept of One Health was also addressed. During these discussions it was clear that for most people, One Health is an approach to be taken, a framework or lens to be used to view all health matters. For a small number of interviewees there is the view that One Health should be recognised in a more formal way as a discipline or subject area. A small number of people felt it would need to be both, to be an approach applied to all, but should also be recognised as a subject so it is more tangible.



Discussions and lessons learned from definition work

If we consider One Health being seen as a discipline in its own right as a few respondents suggested, this implies education programmes, qualifications, roles, budgets and operational and governance structures e.g a Ministry of One Health. The advantage of this is there is a focal point for decision making and oversight, structures and processes and a clear way to recognise expertise. The disadvantage of this could be that it would require new infrastructure at international and national levels. It may also suggest that knowledge of One Health approaches are niche and specialist, as opposed to a way of approaching broad health challenges.

Thinking about it as more of an approach and context means that it is something everyone in health should consider as a way of approaching existing and new health challenges. The advantage of this may be that more people can take ownership of it, it promotes collaboration across a wider group of disciplines and sectors, and there is perhaps no need for new infrastructure. The disadvantage of this, is there can be a lack of consistency and wide interpretation about whom and how this should influence work in health. As an approach One Health becomes a less tangible concept and requires the coordination and collaboration at governance and operational levels, and for the education system to ensure One Health is integrated into many disciplines.

During the interviews the discussions around One Health also often included discussion about the scope. It is clear that for some One Health is quite a narrow set of topics such as AMR or zoonotic disease. For others the scope is as broad as possible and for some there is consistency around it including AMR, zoonotic disease, food security, climate change and emerging diseases.

A handful of times the topic came up about Planetary Health and its alignment to One Health. This is an area we at RSTMH have been looking at for a few years. It is clear that some people who use the terms Planetary Health and One Health have in mind a similar idea – an approach to human health that incorporates animal health and environment health. However, for others, Planetary Health is more closely defined as the interactions between human health and the natural system, with animal health not being mentioned as explicitly. Planetary Health has also been described as more of a discipline than an approach and focus on it now includes the Lancet Planetary Health journal, and the Planetary Health Alliance which includes a programme of fellowships, a membership network and annual meeting This was not a significant part of our research discussions, however some of the most significant figures in Planetary Health and One Health talk of a need to clarify how these areas co-exist.

Recommendations

Reviewing the surveys and interviews it is clear that many countries have well established definitions and a defined scope of One Health, however these are not entirely consistent. For G7 it would be useful to demonstrate a collective and consistent positioning of the scope and meaning of the term One Health, to underpin other governance, operational and policy calls to action. Proposals on the table for G7 such as the establishment of a One Health High Level Council and the zoonotic research hubs do appear to limit the scope of One Health to zoonotic disease and many experts felt it should be viewed in a broader sense, with specific case studies as focal points. COVID-19 provides a tangible and timely way to describe the concept and benefits of a One Health approach.

This area could benefit from further research, not in terms of attempting to converge the variety of specific definitions, but to provide contextual clarity through key messages to explain the One Health approach at policy and governance, operational level and for the general public, and schools.

Research Findings continued

Organisation	Definition	Reference
UN Tripartite (WHO, OIE, FAO)	One Health approach: An approach to address a health threat at the human-animal-environment interface based on collaboration, communication, and coordination across all relevant sectors and disciplines, with the ultimate goal of achieving optimal health outcomes for both people and animals; a One Health approach is applicable at the subnational, national, regional, and global level.	Zoonoses report 2019 http://www.fao.org/3/ca2942en/ca2942en.pdf
World Health Organisation	One Health' is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.	https://www.who.int/news-room/q-a-detail/one-health
Food and Agriculture Organisation (FAO)	The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and combatting antibiotic resistance. 'A collaborative, international, cross-sectoral, multidisciplinary mechanism to address threats and reduce risks of detrimental infectious diseases at the animal-human-ecosystem interface	http://www.fao.org/one-health/en/
FAO Director General statement, 2021	FAO's priorities in its One Health approach is to strengthen monitoring, surveillance and reporting systems at all levels; to understand risk factors - including socioeconomic and cultural - for disease spillovers from wildlife to domestic animals and humans; to build capacity at all levels for better information-sharing and coordination among institutions and stakeholders; to reinforce veterinary and plant health, infrastructure and safe farm-to-table practices for food and animal production; and to increase the food and agriculture sectors' ability to minimize the risks of antimicrobial resistance (AMR).	http://www.fao.org/news/story/en/item/1368868/icode/
World Organisation for Animal Health (OIE)	The One Health concept is the idea…that human health and animal health are interdependent and bound to the health of the ecosystems in which they exist	https://www.oie.int/en/for-the-media/onehealth/
World Bank	The concept is…" disciplinary involvement of human health, animal health, and environmental health, and focus on those infectious disease-related issues (including antimicrobial resistance) that undermine overall health and well-being"	http://documents1.worldbank.org/curated/en/703711517234402168/pdf/123023-REVISED-PUBLIC-World-Bank-One-Health-Framework-2018.pdf
(Proposed) UN One Health High-level Expert Council	The "One Health" approach is a cross-cutting and systemic approach to health based on the fact that human health and animal health are interdependent and linked to the health of the ecosystems in which they co-exist, as stated by the "Berlin Principles", which were developed at the "One Planet, One Health, One Future" conference and presented during the ministerial meeting of the Alliance for Multilateralism of 25 September 2020.	https://multilateralism.org/wp-content/uploads/2020/11/2020-11-11-Press-release-meeting-AfM-12-November-2020-final-version-EN.pdf
Centre for Disease Control (USA)	One Health is an approach that recognizes that the health of people is closely connected to the health of animals and our shared environment..	https://www.cdc.gov/onehealth/basics/index.html

UK GOV	'One-Health' approach which spans people, animals, agriculture and the wider environment. UK GOV report definition taken from OH Initiative and defined in report glossary as One-Health' approach: Collaborative multi-disciplinary work at local, national, and global levels to attain optimal health for people, animals and the environment.	One Health Report: Antimicrobial Resistance (2013) https://onehealthinitiative.com/about/
One Health Institute of the University of California at Davis	One Health is an approach to ensure the well-being of people, animals and the environment through collaborative problem solving—locally, nationally, and globally	https://www.ucdavis.edu/one-health/what-is-one-health/
One Health Commission	One Health is a collaborative, multisectoral, and trans-disciplinary approach - working at local, regional, national, and global levels - to achieve optimal health and well-being outcomes recognizing the interconnections between people, animals, plants and their shared environment	https://www.onehealthcommission.org/
One Health Initiative Task Force	One Health is the collaborative effort of multiple disciplines-working locally, nationally, and globally – to attain optimal health for people, animals and our environment	https://www.avma.org/sites/default/files/resources/onehealth_final.pdf
One Health Global Network	The aim of One Health is to 'improve health and wellbeing through the prevention of risks and the mitigation of effects of crises that originate at the interface between humans, animals and their various environments'. One Health recognizes that the health of humans, animals and ecosystems are interconnected. It involves applying a coordinated, collaborative, multidisciplinary and cross-sectoral approach to address potential or existing risks that originate at the animal-human-ecosystems interface	http://www.onehealthglobal.net/what-is-one-health/
Commonwealth Health Hub	One Health is an approach recognising that the health of people is connected to the health of animals and the environment. The goal of One Health is to encourage the collaborative, cross-sectoral efforts of multiple disciplines – working locally, nationally, and globally – to achieve the best health for people, animals, and our environment.	https://www.thecommonwealth-healthhub.net/onehealth/

Research Findings continued

Survey results

The survey responses included areas of challenge or desired outcomes as well as recommendations for action. Some recommendations were not directed at world leaders, for example recommendations may have been local or operational in nature and without a link back to how world leaders could empower this change through policy or strategy.

The results below focus on how frequently a broadly similar recommendation or area for focus was mentioned in the survey results. For the G7 leaders there was a tie at 3rd and 4th place, and so there are 4 recommendations below.

G7 – areas of discussion and recommendations

1. **Strengthen knowledge and expertise around One Health**
   The focus of this varied, and included a desire to strengthen knowledge for professionals, politicians and the public on One Health. As per the interviews some had specific recommendations around new undergraduate and postgraduate courses.

2. **Increase funding to improve health resilience and for specific areas of One Health**
   The most frequently cited areas included 'One Health research', AMR, infectious disease, environmental health, universal health coverage, basic amenities and health systems. Some recommended funding scholarships, and national and international funding partnerships.

3. **Advocate for One Health. Articulate its scope and why it is important**
   Consistent advocacy for One Health by G7, leading by example in expressing its importance. The timely, relevant example of COVID-19 was the best backdrop to apply a One Health lens. Some explicitly called for articulation around the environment sector's role in the approach.

4. **Make technology and data transfer more straightforward**
   This was sometimes about the need for better integration across the large range of usable platforms that gather and share data, sometimes about needing policies to encourage/enforce transfers, and sometimes about the need for building expertise and capacity.

Non- G7 – areas of discussion and recommendations

It should be noted that the distinction between G7 country leaders and non-G7 country leaders was not interpreted consistently, which was also seen in the interviews. For respondents this seemed to be interpreted as a mixture of G7/endemic, donor/recipient, G7/LMICs, endemic/non-endemic, G7/G20, G7/all other world leaders. Whereas in interviews it was possible to ask further questions and understand this a little more.

1. **Increase funding to support One Health**
   This covered a number of specific subjects, as above for G7. Not all respondents were clear about who should be funding, some mentioned G7, some G20 and others were explicit to say that donor funding should be matched by recipient funding.

2. **Establish education programmes in One Health**
   Responses here were more focused on professional education, at undergrad, postgrad and professional training levels. Some mentioned modules on One Health, with others citing academic courses. The need for sustainable training was mentioned as a goal, to prevent knowledge diminishing when projects end or outbreaks managed.

3. **Strengthen inter-disciplinary and inter-sectoral collaboration**
   This need was articulated as human and animal health sectors, and also more broadly to include agriculture, environment, and others including engineering. Some stressed the need at local level, others national, regional and international. It was mentioned as relevant at governance, policy and operational levels with some cultural and other practical barriers that need to be addressed.

Pandemic preparedness - areas of discussion and recommendations

One question in the survey was asking for recommendations specifically around pandemic preparedness. The following responses from the survey were the most frequently cited, but as above were not always specific on recommendations for world leaders. In this question we were not explicit asking for G7 or non-G7 recommendations

1. **Improve collaboration**
   Recommendations here were broad – from establishing or strengthening formal policies, regulations, education, joint programmes across sectors, to practical systems for practitioners to share knowledge and experience. Barriers included time, work practices, cultural hierarchies and pay. Some mentioned the need for G7 to work with more experienced non-G7 countries to establish new structures for sharing information.

2. **Adopt a One Health approach**
   As above, this was cited regularly but often without concrete recommendations for achieving outcomes. For some this was about advocating for One Health as a context for preparedness, for others it was about demonstrating One Health as a sustained and 'everyday' approach through establishing processes or activities and leading by example. It also included establishing or improving early warning and surveillance systems. There was a caution around narrowing this to 'control of zoonotic diseases'.

3. **Strengthen early warning systems**
   This area was cited as important to underpin preparedness. For some this focused on the mechanisms for early warning for example regulations and policies, which some felt needed review at global level. For others there is a need to clarify when, what and how information about early signs would flow globally. This area links very closely to surveillance

Interview results

The interviews used the same questions as the survey, asking participants for their recommendations on One Health for G7 and non-G7 leaders and on the specific theme of pandemic preparedness. Participants were also invited to share examples of their experience of One Health, which complemented the question around scope and definition which the survey asked about.

Responses were open ended and often participants' contributions were not entirely specific to the question asked, touching on broader themes. Discussion points were guided by the participant's area of expertise and experience, with interviewers probing deeper on both novel and frequently cited themes according to each individual interview context, and resulting in more open responses.

As a result, thematic analysis was conducted to identify major themes emerging, which were not easy to delineate between the audience of G7 and non-G7. These themes are discussed below, alongside themes emerging specifically in response to a question on pandemic preparedness. Where a specific recommendation was made by participants these are included.

Areas of discussion and recommendation for world leaders

1. **Integration of health delivery**

   It was widely acknowledged that integration of health delivery across human, animal and environment sectors should improve country capacity to identify, share and manage emerging and existing health threats. However, many expressed frustration at the difficulties of achieving this. An example of a past antimicrobial resistance surveillance programme described progress as slow due to issues of hierarchy and working practice stating *"they struggle to integrate vet services with human [services], you can't just have one department telling another what to do – this is not One Health"*. Inequity in funding for surveillance between sectors was also cited as problematic, especially as this inevitably leads to many problems only being identified or control targeted once humans are already affected.

   One participant expressed the *"need to develop a peacetime platform"* to build system capacity, knowledge and resilience to tackle existing diseases as a major component of pandemic preparedness.

Research Findings continued

Surveillance

Surveillance is an area that came up frequently, with interviewees calling for a One Health approach for endemic and emerging infectious pathogens, antimicrobial resistance, livestock-productivity diseases and environmental contamination.

"Post-COVID-19 everyone can see the failure of surveillance" so it is important that we "*understand and respond to weaknesses in on-the-ground capacity"* with an agreed fund.

Similarly, others mentioned the importance of continuing support to cover 'next steps' so that data generated in surveillance programmes is actually reported in a timely and effective way to the right institutions or that evidence generated is used to inform policies and interventions.

Integration of surveillance across sectors was a popular recommendation and it was highlighted that there is much existing infrastructure to build upon e.g. OIE and WHO reference laboratories. Barriers to integration of services across sectors included under-developed veterinary services in many countries, especially where there was a limited export market or formal value chain for animal-based products.

Additional barriers were a lack of technical capacity in the form of physical infrastructure and skills such as laboratories and diagnostics which need to be available at the appropriate level. *"Outbreaks start locally"* so there is often a need to report on a small scale before a mass mortality event can occur. This can demand access to local diagnostics to deliver rapid results and an effective network of local animal, human and environmental health care workers that can bring together disparate cases to see the big picture. In some examples, local human disease outbreaks had been detected by animal care workers in areas where human health care coverage was poor or where livestock health was a priority for the community. In these cases they were able to deliver public health interventions building on their standing in the community.

A case example from Kenya further elaborated on political barriers to integration where staff from animal and human laboratory sectors could not easily be trained or work together in the same physical facilities due to inequity in salaries.

Some participants lamented previous actions to establish surveillance for emerging pathogens as failing to be sustainable, with infrequent use of facilities and staff skills meaning that regular supply chains weren't established and staff lacked the experience and motivation for on-going provision.

There was support for the inclusion of a broad range of stakeholders to contribute in integrated programmes such as those working on vector control, agriculture, wildlife, social sciences or water and sanitation.

There was also a call for improved technology to improve integrated surveillance and interventions such as cheap, portable and easy to use diagnostics and laboratories *"like the lab in a suitcase"* that can be used locally and in remote locations with poor infrastructure. Campaigns that utilise existing platforms on mobile phones for disease reporting or delivery of local public health messages were highlighted as successful. Emphasis was placed on strong action to tackle existing disease alongside emerging threats to avoid the creation of paralleled workforces or surveillance programmes.

Information and data sharing

Participants frequently cited the need to optimise data sharing for One Health but expressed concerns over barriers to this. Regularly expressed concerns included the lack of standardisation and compatibility of various data metrics, collection techniques and reporting structures across sectors at local, national and international levels.

Not only were there difficulties noted in practicalities of creating sharable data, there were also political and regulatory challenges around what data should be shared, for example the Nagoya Protocol was cited by a couple of interviewees as a barrier to sharing information important for research and development. Other difficulties included a lack of resources to generate, report and analyse data sufficiently. Some cited issues around a lack of data gathering in areas of high risk, for example where populations are encroaching on previously unused land. They also mentioned a lack of data sharing in areas of transboundary livestock where data collection practice differed across borders.

Some references were made to the *"zoonotic research hubs"* that are being put forward to G7. There was fairly high levels of support for them but also some caution around the importance of utilising existing hubs where they exist, and also around ensuring they focus more widely than "zoonotic disease". A final recommendation in this area was for them to not be placed in big cities but in areas where they are most likely to be useful, for example in areas of high risk or where emerging pathogens have been found before.

For some the recommendations here involved a review of legal frameworks, policies, and guidance, to achieve greater consistency around global data gathering and sharing. There was also discussion around a need for investment in technologies for some, and also a need for a review to ensure existing infrastructures are maintained and used in a sustained way, not for exceptional emergence events.

Some also mentioned the importance of drawing on existing One Health regional networks for expertise also strengthening or establishing additional One Health networks globally to enable improved communication channels, support advocacy for One Health issues and bring political leaders on board.

2. Governance and leadership

One Health needs to be given enough power to function effectively to bring the sectors together and overcome barriers. These barriers include inequity in capacity, budgets, influence and intrinsic value of the different stakeholder groups.

Many interviewees reported that One Health structures need to be improved or established across all governance levels to enable and support collaboration across sectors at local, national, regional and international level.

Global

Many underlined the clear need for global leadership for a One Health approach at global and multilateral levels, with one quoting *"global issues need global governance"*. Others pointed to a need to tackle global health threats as *"build global capacity [as] a global responsibility"* or specifically to the *"UN's role as a global 'government' in managing global public goods."*

However this reference to UN leadership was also caveated with a need from some to demonstrate equitable leadership, with UN and other agencies *"needing a paradigm shift in operations to achieve One Health collaboration"* which may require funding and reorganisation of existing structures.

Research Findings continued

Some others cited the need for UN agencies to be more aligned between one another and within their own structures as to their objectives and guidance. One commented *"Regional offices often operate independently of the HQ programs that are leading advocacy, policy, and communication"*.

The recent announcement that the UN Environment Programme (UNEP) would be joining the Tripartite of WHO, OIE and FAO was well received by many participants and there was generally good support for this UN 'One Health alliance' to lead a global One Health agenda. However, many expressed concern at the potential for inequity between agencies in this alliance given the notable discrepancies in capacity, status, budget and priorities, with one commenting it is *"difficult to get unilateral agencies to work multilaterally"*.

Some mentioned governance recommendations already with the G7 including the establishment of a One Health High-Level Expert Council. Some supported the need for *"a high level council to drive this global level of One Health, offering a reliable information source and developing guidance. To be the interface between the scientific expertise and political decision makers"* It was emphasised that there needed to be both political and expert members for their work to be meaningful in developing and implementing effective One Health. It was also highlighted that national leaders needed to understand and therefore appreciate One Health for the work of such a council to be operationalised. Others felt there was a greater need to improve collaboration at established institutions to reduce the risk of creating more One Health silos.

National

Many felt that a truly trans-disciplinary and trans-sectoral One Health approach requires an independent facility to the existing national governance structures. For example, in government a separate One Health 'unit' should sit under a central, senior but neutral office, such as the Prime Minister's Office, and this would be preferential to leadership within a relevant ministry. Concerns were that a failure to establish a new governance structure for One Health would risk an inequity of stakeholder influence in agenda setting, given existing inequity between the main relevant ministries of health, agriculture and environment. Case studies that have a rotating ministerial Chair for the 'unit', seemed to help maintain its close relationship with each sector and ensure that it both received and contributed input at the highest level.

However, for others it was stressed that creating a separate focal point for One Health, would risk it losing its identity as an integrated collaborative approach and it becoming a new discipline or silo of its own.

In terms of leadership some felt that without strong explicit leadership, especially from the G7 countries, it would be difficult to get traction on the ground and for sectors to work effectively together. One Health includes a broad range of areas and some felt that leadership was needed in this context to prioritise where a One Health approach should be used.

It was suggested that the G7 nations would hold a pivotal role in the allocation of resources to the UN agencies and therefore some recommended funding global One Health through the UN 'One Health alliance'.

G7 countries were also urged to lead by example to establish One Health as a routine practice in their own countries with clear governance structures, strategies and infrastructure. Where it was suggested that the G7 could support One Health in other countries, it was emphasised that this should work through existing national and existing One Health structures where possible to ensure the engagement and sustainability of one Health practice and aim to support and enable countries national governance.

Although leadership, especially at global and national level was frequently discussed, many also stressed the importance of local governance being able to interact effectively with higher-level institutions in both a traditional top-down approach but also with bottom-up participation.

3. Funding

Given the difficulties arising in cross-sector collaboration (as have been discussed), there was strong advocacy to financially support interdisciplinarity, especially in the establishment of new integrated One Health approaches but also their ongoing support; *"Interdisciplinary working needs to be continuously and proactively encouraged to be sustainable"*. Some of the discussions in this area focused on funding mechanisms as opposed to exactly how it should be directed within One Health.

One Health specific funding

At global level, a few different funding mechanisms were put forwards. There was support to increase funding to UN agencies for One Health through the Quadripartite/ 'One Health Alliance' as a neutral secretariat for the group. Alternatively some wanted to see all relevant multilateral agencies (WHO, OIE, FAO and UNEP) receive direct and earmarked support for One Health work at equitable levels. There was support also for the creation of a neutral, tailored financial instrument that would facilitate public and private investors and which could help increase sectoral equity.

Mirroring the discussions around multilateral funding there were also different views of where the national One Health budget should be held and how they should be utilised.

Some interviewees were promoting a new One Health independent Unit or Ministry, though others were concerned this may create a new silo and reduce the need for existing Ministries and Departments to work together. Others felt budgets should be held at more senior levels, for example at the Prime Minister's office, but with a need for shared decision making by relevant Ministries or Departments to authorise any spending. A third recommendation was to have a rotating held at one of the Ministries with rotating Chair overseeing a One Health group which represents relevant Ministries or Departments and which collectively agrees on investments.

Some participants wanted to see dedicated One Health funding in countries to deliver on a national strategy for One Health - where one exists, or to develop such a policy. There was also counsel to encourage innovation as well as to build sustainability in delivering One Health, with the suggestion that funding should be split to focus on *"core functions to provide year-on-year reliability"* and second fund to *"provide for shorter term innovation grants"*. This was seen as particularly important in the area of vaccines for emerging infectious disease threats. CEPI was mentioned as a successful example in this area, with some calling for this approach to be replicated *"Novel funding mechanisms are needed for new vaccines and antibiotics where there is a market failure but the outcome would be a public good"*.

Many mentioned a need for investment in other under-represented areas – including pandemic preparedness in the environment and veterinary sectors, or investment in surveillance or emerging diseases which "only affect individual regions or small communities" despite the sometimes devastating impact. A couple of interviewees made the argument that investing in vaccines or treatment for diseases endemic in one region of the world is also a safety net of pandemic preparedness for those countries which are not endemic to that disease. One interviewee also recommended that we should learn from examples of success in other regions which could be applied to a different setting, for example GAVI as a worthy model for a veterinary equivalent.

Some mentioned the need to invest in *'skills and training for human epidemiology and the need to bridge the gap between the veterinary and human health professionals'*

Research funding

Many participants cited a lack of multilateral and also multidisciplinary research funding as a barrier to the uptake of One Health. Many commented that existing research funding silos are commonplace and are not the right mechanism for global challenges where interdisciplinary and cross sector expertise and engagement

is needed. Examples of success in this area, and recommendations to follow included AMR and its country funding through the Fleming Fund which provides multisectoral support to help improve lab capacity and AMR surveillance. The reporting of other successful examples of One Health and potential recommendations to showcase as case studies also included emerging zoonotic diseases and outbreaks, including the management of the 2018 Nipah outbreak in India and recent campaign to eradicate Rabies.

LMIC funding

There was special attention paid to the potential for funding to support the implementation of One Health in LMICs. It was suggested that LMICs could demonstrate immediate direct benefits because they may be suffering the most direct impacts of One Health issues such as climate change or zoonosis. Some also added that given the greater understanding of global public health with COVID-19 there was hope for a greater appreciation of how tackling One Health issues such as AMR, disease outbreaks and zoonotic diseases is also benefitting all countries through prevention of the spread of disease and potentially preparedness from knowledge gained.

Funding directed at strengthening general health systems was also recommended, to increase population resilience and capacity to respond in different crises. Investment in developing policies on NTDs, or strengthening technical capacity were also put forward as possible areas of focus.

There was a recommendation here around ensuring that international investments facilitate national ownership and are also provided in a sustainable way. For many, particularly in Africa, this was about ensuring that existing capacity is optimised first before new infrastructure is invested in. Many talked about capacity *"labs, equipment, skills not being used since prior projects or programmes have stopped"*

4. Evaluation and systems thinking

A number of interviewees brought up the limiting influence of unsuitable evaluation frameworks in demonstrating the value and therefore positive impact of a One Health approach, as one person said *"One Health reforms to health should pay for themself"*. The traditionally linear approaches to risk assessment and evaluation may not fully capture the added value of One Health and as such, wider systems-thinking methodologies which should be considered.

Some felt this should be resolved through the development of a more formalised framework for evaluating the outcomes relevant to One Health. Participants also questioned how these may interact with and, benefit from building upon, existing evaluation metrics which are often skewed towards human health outcomes.

Economic assessments often used in policy decision-making were also included in recommendations to better reflect One Health outcomes.

Systems-based thinking could also be applied to existing areas of policy or governance to help identify key areas of cross over to be targeted for integration. The example given during the interview was for the WHO's International Health Regulations to be reviewed specifically in relation to the OIE's Performance of Veterinary Services to assess areas of cross-over and learning.

5. Education and training

As per the survey the need for specific and coordinated education and training for a variety of stakeholders were highlighted by many interviewees.

Policy and decision-makers

As discussed, operationalising One Health requires strong leadership. Many recommended education and advocacy at the highest level of political office to ensure One Health delivers the best possible return on investment. This includes those in ministries of finance or Treasury where return on investment analysis for One Health programmes may be more complex than traditional health programmes. Others also mentioned the need for a consistent understanding of One Health at senior level to inform consistent practice and advocacy.

Health professionals

With One Health knowledge drawing on a number of specialisms, including from animal health, human health, environment, agriculture we heard that education and knowledge of a One Health approach across these disciplines are important and also that collaboration between sectors is vital. Some talked of the need for *"intersectoral rather than multisectoral approaches"* with collaboration and actions outside of health sectors.

The barriers to collaboration were also discussed and many described a siloed education system as one of the factors: *"undergraduate education in the sectors of animal, human and environment health become quite entrenched in their own approaches and it becomes more practically difficult to work across the silos"*

We heard examples of how this has been addressed in some countries through One Health Fellowships providing shared professional training in field epidemiology, and also Masters courses and other training. As was mentioned in the surveys there was a request for scholarships and other training methods to equip others with the broad understanding across sectors needed for a One Health approach.

Some interviewees also expressed concern that health professions were not all seen as equal so there was a failure for disciplines to appreciate both the similarities and differing skillsets between the professions. This was sometimes presented as an additional barrier to collaboration, and is something that education could possibly help address. This was mainly, though not only, expressed as a failure for the expertise and experience of those in animal health roles to be valued by those working in human health. Examples included management of the COVID-19 pandemic, where experience of infectious disease outbreak control and population medicine within the animal health sector was not utilised in many countries. There were also successful examples from countries that had established One Health practice following historic outbreaks of H5N1 avian influenza, Nipah or Ebola viruses, for example in Bhutan (see case studies in Context sections). However, there was little formal evaluation of the successful deployment of One Health practices or what the added value of implementing a One Health response had been.

To enable and support collaboration across sectors at local, national and international levels many recommended a need to establish One Health education across sectors, increasing appreciation for an ecosystem approach to health whilst respecting the advances in specialist disciplines and not creating a new silo in One Health.

It was also highlighted that One Health knowledge across other areas, such as industry or NGOs should have a mechanism to integrate into national and global One Health education and governance.

Communities and the public

As with the survey there was a call to *"educate the public on one health, engage the community so that relationships [are] established before crisis events"*.

Many felt that the COVID-19 pandemic had provided greater general awareness of infectious diseases, viruses specifically, public health measures, and vaccination development and a relevant foundation for building a greater awareness of the benefits of a One Health approach. Others cited the timeliness of building One Health awareness and knowledge from a greater focus on climate change and broader environmental issues.

To build on this some suggested to start teaching the *"essence of One Health from primary school"* to *"dispel the hierarchy between different disciplines that may prevent collaboration and empower the next generations to see the interconnected nature of our existence on earth"*.

6. One Health Policy

Many participants referred to existing One Health Policies or suggested the development of new policies to highlight particular areas in which to apply a One Health approach or to establish the enabling environment for One Health to be delivered.

Some raised concerns that national strategies or action plans such as those for AMR which many countries presented at a previous World Health Assembly are not being implemented, and this may

need further attention and policy. It was emphasised that support, and enabling policies, to develop and deliver a One Health strategy must continue through to implementation to avoid a similar situation to some country's AMR strategies that have yet to be enacted.

Global guidance was considered important but participants felt that nationally or locally focused strategies would allow more targeted application of the One Health approach in priority areas for countries. Some felt that having more context-specific strategies could better increase the operationalisation of One Health policy and improve country ownership, resourcing and sustainable change.

Areas of discussion and recommendation for world leaders on pandemic preparedness

As with the survey there were similar issues and recommendations for world leaders for pandemic preparedness as there were for a broader One Health focus.

A need for greater integration, including surveillance, data collection and sharing was mentioned. The same challenges existed here as for the wider discussions around blockages with integration of data once collected, and around consistency of data collection and sharing. There was also wide-scale support for improved surveillance itself, especially focused at pathogens in non-human species or the environment before they can emerge in humans. This should *"include hospitals, abattoirs, community clinics, food retailers etc"*. Others mentioned the need for surveillance at the borders of countries, in areas where populations have recently started to encroach and in remote rural locations which are often overlooked due to capacity or low priority.

There were similar calls for improvement to governance and leadership but with an added highlight of ensuring learnings of COVID-19 are captured at all levels of policy down to operations and that adjustments are identified which can improve future outcomes. Some mentioned the need to review the global frameworks such as IHR, global leadership, and others focused on learnings for pandemic preparedness for the public and communities, which could lead to improved public health preparedness and more targeted and relevant advocacy from world leaders.

Funding was also mentioned, but again with an additional focus on the challenges of fundraising for preparedness when the *"best outcome of success is that nothing happens"*. This may link back to the discussion around evaluation and a focus on demonstrating the opportunity cost of not investing funds into improving preparedness. Some felt there is now a window of opportunity to quantify this with respect to covid – highlighting differences between a one health approach and a purely human health approach. This comes into the discussions later on around evaluation and systems thinking. Some felt there was less awareness of how beneficial research funding for veterinary research would be for pandemic preparedness, and that this needs to be made more evident. Research funding to advance surveillance and diagnostic techniques in pandemic preparedness was a frequent recommendation of participants, with a *"need to make surveillance and diagnosis suitable for context – cheap, portable, easy to use"*, suitable for rare or novel pathogens, species or sample type and to *"utilise existing infrastructure (e.g. mobile phone platforms)"*. Recommendations around funding being needed for LMICs were made in a similar way as with our wider discussions, including funding to help strengthen systems and resilience, as well as pandemic preparedness specifically.

Similarly to the arguments made above there was a point made about the challenges of moving *"from research, into policy, into practice"*. Some used the example of research or surveillance evidence for emerging infectious disease not being translated, commenting that *"surveillance is only half the battle in pandemic preparedness"*.

In terms of evaluation and systems based thinking *"One Health reforms to health should pay for themself"* but discussion highlighted the limiting influence of unsuitable evaluation frameworks in demonstrating impact of One Health. When discussing pandemic preparedness, concern was expressed that the ultimate aim of prevention is difficult to value appropriately and, that this may also extend to non-monetary health outcomes such as nature or biodiversity or, those taking place over much longer time scales. The traditionally linear approaches to risk assessment and evaluation may not fully capture the added value of One Health and as such, wider systems-thinking methodologies should be considered.

In light of the current global COVID-19 pandemic, preparedness to mitigate the occurrence and impact of predicted future events was specifically addressed. It was widely acknowledged that a One Health approach would be beneficial to apply to these activities. It was felt that taking a One Health approach would help to contribute to "prevention rather than cure" with efforts to prevent an exceptional emerging zoonosis focused on the interaction between humans and animals in their shared environment more strategic when looking for the "needle in the haystack". Some pointed out that pandemic preparedness activities should be applicable for any health crisis including non-communicable diseases, nutrition or climate change. Also that a One Health approach would better value and utilise expertise and resources across diverse sectors to address some failings in COVID-19 responses reported.

There was concern that under-developed veterinary services in many countries could be an effective focus area for many One Health issues, especially as part of pandemic preparedness activities. Education and engagement of local communities was highlighted again as an important feature in pandemic preparedness alongside other One Health issues. Training and education to support professionals was also mentioned, but with a sustainability caution, so that capacity "can be leveraged to detect and respond to new emerging threats without creating paralleled workforces"

Context

During this study we found examples of activities already underway or on the table for G7 to focus on with respect to One Health, as well as a number of interesting case studies. These are both listed below as a quick note, it is hoped these are interesting context to the findings and for recommendations.

Activities linked to G7

- **One Health High-Level Expert Council**, announced on 11 Jan 2021, bringing together WHO, FAO, OIE (referred to as the tripartite) and UNEP https://twitter.com/WHO/status/1348656242433134592

  The role is to collect, distribute and publicize reliable scientific information on the links between human, animal and environmental health. The aim is to assist public officials in making appropriate decisions to avoid future crises and to inform citizens.

- **Worldwide zoonotic research hub** network, announced at UN 75th General Assembly 2020 by UK Prime Minister as part of 5 point plan to prevent a future coronavirus pandemic. https://www.gov.uk/government/speeches/prime-ministers-speech-to-un-general-assembly-26-september-2020

  The hubs will work together to share information and identify dangerous pathogens before they spillover from animals to humans.

- **PREZODE (PREventing ZOonotic Diseases Emergence)**, announced at the One Planet Summit for biodiversity on January 11, 2021 in France.

  https://www.inrae.fr/en/news/one-planet-summit-launch-prezode-first-ever-international-initiative-prevent-future-pandemics

  This is an international initiative to identify and prevent emerging zoonotic risks and pandemics within the framework of a One Health approach. Formed in France, in partnership with Germany and Netherlands.

- **Intelligence Hubs**, these were discussed on a few calls as a new structure to receive information from research hubs, and provide national government with the opportunity to respond in a timely way to research findings in One Health.

Case studies of note

NTDs - a working example

Like NTDS One Health focuses on more than one disease area. It has in common the need for a multi-sectoral and multi-disciplinary approach and cross-cutting issues such as surveillance. Also, individual diseases within NTDs are strong examples of how a One Health approach can be effective e.g. rabies.

Bhutan – One Health integration

In our interviews Bhutan was cited as one of the strongest examples of One Health being integrated into the national strategy and infrastructure. In summary, Bhutan established a One Health organization and has a One Health strategic plan. The organization is a multisectoral agency consisting of human health, animal health, food safety, wildlife, environment and academic institutions. It helped establish the South Asia One Health Disease Surveillance Network (SAOH Network). During COVID-19 it developed a country plan, and brought expertise across veterinary and human health, biosecurity and used capacity across sectors e.g. lab capacity and technicians. http://www.bohnet.bt/boh/wp-content/uploads/2020/11/Bhutan_One_Health_Strategy_Plan-1.pdf

Stop spillover Consortium – global collaboration on One Health

In our research the Stop spillover Consortium was an example of recent collaborations in this area, launched Sept 2020. It is a £100m, USAID-funded project led by Tufts University, with a global consortium of experts in human, animal, and environmental health focused on understanding risk factors, implementing interventions and assessing risk reduction practices and policies to prevent spillover and mitigate spread of disease. https://www.usaid.gov/news-information/press-releases/sep-30-2020-usaid-announces-new-100-million-project-threats-emerging-infectious

World Bank – innovative funding mechanisms

World Bank has been involved in establishing and leading many funds for global health in the past, which could be drawn upon for One Health. In April 2020 it announced a new multi-donor fund to help low-income countries increase investment in health preparedness and support the COVID response - Health Emergency Preparedness and Response Multi-Donor Fund (HEPRF). https://www.worldbank.org/en/news/statement/2020/04/15/world-bank-group-to-launch-new-multi-donor-trust-fund-to-help-countries-prepare-for-disease-outbreaks In the past other Trust Funds for private and public donors to contribute to have been managed by the World Bank, examples including APOC.

Conclusions

Although, some respondents provided recommendations, many responses were more general. Therefore, concluding recommendations in this report are informed by, but not directly extracted from a combination of responses and research around current plans for G7 in this area.

Given the limited time for this research there is also scope to carry out a more in-depth analysis of some of the themes, which are identified below.

Overall recommendations

1. **Harness global examples of successful One Health working:** Many respondents called for G7 to raise the profile of One Health through advocacy. Given the large number of diverse, existing One Health strategies, policies and practices already being utilised around the world we recommend G7 to utilize these as examples of best practice.

2. **Broaden 'zoonotic research hubs' to be One Health hubs:** We understand the establishment of zoonotic research hubs are part of G7 plans, we recommend these are used for wider research, investigations and studies of emerging and also existing infections, and be based on areas of higher risk. These hubs could provide benefit other areas of One Health.

3. **Help influence the One Health High-Level Expert Council:** Following announcements around the new Council in early 2021, a few respondents suggested the Council would benefit from very senior and independent oversight given its global importance and work across so many sectors. This oversight could be provided by the UN Secretary General's office.

4. **Ensure the global pandemic early warning systems have clear guidance and policies:** For this element of G7 plans we recommend based on feedback that there is clear guidance for which data is gathered, which platforms are used to gather it, and how global sharing is managed. Some recommendations included improving training and technical capacity.

5. **Quantify the cost savings of approaching disease from a One Health perspective:** We recommend a study is commissioned, similarly to the Jim O'Neill Report for AMR, which quantifies the financial and social benefits of this approach, to help drive commitment. COVID-19 could provide a tangible and timely example case study for this.

6. **Initiate plans for innovative, sustainable, independent funding instrument for One Health:** This could Scope a new multilateral level fund, overseen on behalf of the tripartite and UNEP, with contributions from national governments, donors, foundations and industry. It would have earmarked budgets for agreed One Health activities, agreed by the High-Level Council, and could be managed by World Bank (as per past Trust Funds and covid funding).

7. **Recommend countries develop One Health national action plans:** Many suggested this as a useful exercise, for those who have not done so, to understand capacity and potential. Given the importance of shared ownership cross sectors it was suggested UNGA is a platform used to share these. This would also involve an audit of existing capacity so that would be utilised before new structures were established.

Reflections and potential next steps

During the research many ideas were put forwards which could, with additional work, be recommendations and discussion points for future meetings of the G7, G20 or broader platforms. These are listed below.

1. **Environment and agriculture sectors:** Professionals working at the intersection of health and environment or agriculture were difficult to identify. Many countries operationalizing One Health cite this expertise as crucial. More research could identify any barriers to sectors outside of animal and human health being more actively involved in One Health practice.

2. **Learning from AMR:** The global movement is well established through the WHO Global AMR Action Plan, national action plans, Global Action Group, Fleming Fund and examples quoted of case studies of integrated surveillance and growing lab capacity. As one of the specific areas of One Health research may uncover opportunities to draw on, or more directly benefit from, the advances AMR has made across countries and sectors.

3. **Moving towards an ecosystem approach to health:** Many discussed this goal, and some mentioned the need for consistent and simple key messages which could be useful for the public and in schools to articulate the importance of a One Health approach. Linked to other suggestions here around the financial and social imperative, these could be developed.

4. **Better understand financing of the sectors within One Health:** There was comment during the interviews around the different financing structures for human and animal health, including private and public funding. It may be beneficial to map global models for health as part of future recommendations around operationalising a One Health approach.

5. **Professional education models for One Health:** Many respondents recommended improving One Health education for professionals, and examples were provided of fellowships, masters courses. It would be an interesting study to map the current examples of best practice in this area, as the basis for potential roll out.

6. **Engage industry:** A few respondents mentioned a need to engage industry more in One Health, to see if there are ways to improve cross-sector working. Desk research on the role of industry, of private/public partnerships, and of barriers to engagement in One Health would be helpful, as we were not able to cover this area in much detail.

7. **Capturing lessons:** During research we heard many examples of countries who have experienced past outbreaks and successfully adopted strategies and operations under a One Health approach. Case studies and learnings from these activities should be captured more comprehensively as context to help move this to be a more global movement of action.

8. **Research at the boundaries:** During the research there appeared to be research gaps to be further explored, and perhaps commissioned. These include transmission and emerging disease at country borders, where land use has changed, where land has been encroached or seen population growth, at boundaries of wildlife/livestock/domestic animals, in areas of high risk of spillover from past evidence e.g. wet markets and bush meat markets.

9. **The power imbalances between sectors:** Many respondents mentioned power imbalances across sectors, some mentioned they are rooted in cultural norms/hierarchies, which drive inequality in finance and focus. This research could be continued, and findings mapped from a social science perspective, to inform strategies to address this and optimise collaboration.

10. **Matrix funding:** Respondents often referred to funding needs, and some cited the problem of funding siloes which has made it difficult to obtain funding for One Health projects and research. This would be an interesting area to research, to provide recommendations of how to address this moving forwards.

11. **Definition and scope of One Health:** Despite there being significant support for the working definition we used for the research it is clear there are different definitions of One Health and understanding of the scope of the work. It is important that a consistent foundation of definition and scope underpin the new One Health structures mentioned above, and further work could be done with existing networks to provide recommendations on this

12. **International vs national funding:** Some mentioned the need to ensure a balance of international and national funding. It would be helpful to scope out ways for this combination to be optimised, for example through matched funding.

13. **Market incentives:** It would be useful to review market incentives for therapeutics and rapid diagnostics as this came up as a current barrier to some innovative activities.

Appendices

Appendix 1 - List of interviewees

Title	First name	Surname	Organisation	Role
Dr	Yewande	Alimi	Africa CDC	AMR Programme Coordinator
Dr	Sarah	Beeching	Oshun Partnership	Executive Director
Dr	Martha	Betson	Veterinary Epidemiology and Public Health, School of Veterinary Medicine, University of Surrey	Senior Lecturer in Veterinary Parasitology, Head of Department, Veterinary Epidemiology and Public Health, School of Veterinary Medicine
Dr	Katherine	Bond	Network Strategies for Health	Founder and Principal
Prof	Peter	Borriello	Veterinary Medicines Directorate	Chief Executive Officer, Veterinary Medicines Directorate
Prof	Hélène	Carabin	Université de Montréal	Canada Research Chair in Epidemiology and One Health, Professor of epidemiology in the Faculty of Veterinary Medicine and at the School of Public Health at Université de Montréal
Prof	Sarah	Cleaveland	Institute of Biodiversity Animal Health & Comparative Medicine, University of Glasgow	Professor of Comparative Epidemiology
Dr	Graeme	Cook	Biosecurity and Agriculture Services , Agriculture Victoria	Chief Veterinary Officer
Prof	Nitish C.	Debnath	FAO, Bangladesh	Senior technical adviser, Emergency Center for Transboundary Emerging Diseases
Dr	Simon	Doherty	Institute of Global Food Security, Queen's University Belfast	Chair, World Veterinary Association One Health Education Sub-Group Past-President, British Veterinary Association Former Chair, UK One Health Coordination Group
Dr	Sithar	Dorjee	Khesar Gyalpo University of Medical Sciences of Bhutan	"Director/Assistant Professor of Epidemiology"
Dr	Marcos	Espinal	Pan American Health Organization, World Health Organization	Director, Department of Communicable Diseases and Environmental Determinants of Health
Prof	Eric	Fevre	Zoonotic and Emerging Diseases research group (ZED group)	Chair of Veterinary Infectious Diseases;
Dr	Abdul	Ghafur	Apollo Cancer Institute	Coordinator, Chennai Declaration on AMR, Apollo Adjunct Professor, Consultant in Infectious Diseases
Mr	Christian	Griebenow	Tierärzte ohne Grenzen e.V, Vétérinaires Sans Frontières Germany	Managing Director
Dr	Barbara	Haeslar	Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH) at the Royal Veterinary College	Senior Lecturer
Mr	Paul	Hagerman	Canadian Foodgrains Bank	Director of Public Policy
Prof	David	Heymann	London School of Hygiene and Tropical Medicine	Professor, London School of Hygiene and Tropical Medicine/ Distinguished Fellow, Global Health Programme Chatham House
Dr	Balla	Jatta	Ministry of Health, The Gambia	Epidemiology & Disease Surveillance Officer & NTD Focal Person
Dr	Nick	Juleff	Bill & Melinda Gates Foundation	Senior Program Officer, Agricultural Development
Dr	Andrew D	Kambugu	Makerere University	The Sande-McKinnell Executive Director, Infectious Diseases Institute, College of Health Sciences

Dr	Laura H.	Kahn	One Health Initiative, Woodrow Wilson School of Public and International Affairs at Princeton University	Co-Founder One Health Initiative, Physician and Research Scholar for the Programme on Science and Global Security at the Woodrow Wilson School of Public and International Affairs at Princeton University
Dr	Joshua	Levens	RBM Partnership to End Malaria	Manager for the Advocacy and Resource Mobilisation Partner Committee.
Dr	Judy	Macarthur Clark	The Soulsby Foundation	The Soulsby Foundation Chair of the Board of Trustees
Mr	Andrew	Mace	Bill & Melinda Gates Foundation.	Senior UK Government Relations Office
Mr	Ryan	MacLaren Wallace	Centers for Disease Control and Prevention	LT US Public Health Service, Lead, Rabies Epidemiology Unit, Head, OIE Reference Laboratory for Rabies
Dr	Diogo	Martins	Wellcome Trust	Policy & Advocacy Lead
Dr	Joanna	McKenzie	Massey University	Specialist in One Health Epidemiology and International Development, T wharau Ora – School of Veterinary Science
Dr	Thomas P.	Monath	COVAXX	Scientific Advisory Board
Ms	Joyce	Msuya	United Nations, United Nations Environment Programme	Assistant Secretary-General of the United Nations and Deputy Executive Director, UN Environment Programme
Prof	David	Nabarro	Nabarro	Special Envoy on COVID-19
Mr	David	Ojok	Centre for Infectious Disease Research in Zambia	Director, CIDRZ Central Laboratory
Dr	Ana	Okello	The Australian Centre for International Agricultural Research (ACIAR)	Research Program Manager for Livestock Systems.
Dr	Oyeladun	Okunromade	Nigeria Centre for Disease Control	Head of Nigeria Centre for Disease Control International Health Regulations Division
Dr	Khadija	Omar	Ministry of Agriculture, Natural Resources, Livestock and Fisheries, Zanzibar-Tanzania	Veterinarian
Dr	Sergio	Recuenco-Cabrera	Universidad Nacional Mayor de San Marcos	Professor at Universidad Nacional Mayor de San Marcos
Dr	Adam	Roberts	Liverpool School of Tropical Medicine	Reader, Antimicrobial Chemotherapy and Resistance
Dr	Helen	Roberts	Department for Environment, Food and Rural Affairs, UK	Government Scientist
Ms	Stephanie Jane Fazekas	Salyer	Africa CDC	Senior Advisor, Technical Strategy & Partnerships
Dr	Xenya	Scanlon	RBM Partnership to End Malaria	SCPC Manager
Prof	Kenji	Shibuya	Institute for Population Health	Director of the Institute for Population Health, Kings College London
Dr	Izukanji	Sikazwe	Centre for Infectious Disease Research in Zambia	Chief Executive Officer and Director
Dr	Keith	Sumption	FAO,Centre for Zoonoses and Anti-Microbial Resistance (CJWZ)	“Chief Veterinary Officer and Leader of the Animal Health Programme at FAO Director of the Joint Centre for Zoonoses and Anti-Microbial Resistance (CJWZ)”
Dr	Nigel	Swift	Boehringer Ingelheim Animal Health	Global Head of Veterinary Public Health
Dr	Gregorio	Torres	The World Organisation for Animal Health (OIE)	Head of Science Department
Dr	Phil	Toye	International Livestock Research Institute (ILRI)	Operating Project Leader, Improving Disease Control and Product Safety
Prof	George M.	Varghese	Christian Medical College, Vellore	Professor & Head, Department of Infectious Diseases
Prof	Joanne	Webster	Centre for Emerging, Endemic and Exotic Diseases (CEEED) and Royal Veterinary College, University of London	Centre for Emerging, Endemic and Exotic Diseases (CEEED) and Royal Veterinary College, University of London
Prof	Andrea Sylvia	Winkler	Centre for Global Health (CGH), the Faculty of Medicine at the University of Oslo	Professor of Global Health, Director Center for Global Health, Technical University of Munich, Germany, Deputy, Director Centre for Global Health, University of Oslo, Norway, Co-Chair, The Lancet One Health Commission
Dr	Jakob	Zinsstag	Swiss Tropical and Public Health Institute	Deputy head of department

Appendices continued

Appendix 2 - survey respondents

Title	First name	Surname	Organisation	Role
Dr	Valentina	Actis	Liverpool School of Tropical Medicine	Research Associate
Prof	Bernice O.	Adegbehingbe	Obafemi Awolowo University, Ile-Ife	Lecturer
Dr	Waqas	Ahmad	KBCMA University College of Veterinary and Animal Sciences, Narowal	Assistant Professor (Epidemiology and Public Health)
Dr	Cassandra	Akinde	The Neo Child Initiative	Team Lead
Mr	Guillaume	Convert	The Veterinary Public Health (VPH) Center chez Boehringer Ingelheim	Technical Manager Veterinary Public Health
Mr	Abdulai	Kandeh	Helen Keller International	One Health Officer
Prof	Donald	Kelly	Soulsby Foundation	Retired veterinary Pathologist
Dr	K.H. Martin	Kollmann	German network against Neglected Tropical Diseases (DNTDs)	Founder-Member
Prof	Salman	Raza	Government Degree Boys College 5L New Karachi College	Prof Salman Raza Principal Government Degree Boys College 5L New Karachi Pakistan College Education Department Government of Sindh Province Pakistan Prof of Zoology World Renowned Zoologist and Entomologist
Mr	Niall	Roche	Irish Global Health Network	Board Member
Dr	Margarida	Simões	University of Évora	Assistant Professor
Dr	Philippe	Solano	Research Institute Pour Le Développement)	IRD/CIRAD Research Unit Lead
Dr	Paul	Torgerson	University of Zürich	Professor of Veterinary Epidemiology
Dr	Bernadette	Abela-Ridder	World Health Organization	Team leader, Neglected Zoonotic Diseases
Prof	Olanisun	Adewole	Obafemi Awolowo University	Professor of Medicine And Consultant Physician
Dr	Anand	Anandkumar	Bugworks Research	CEO
Prof	Christian	Bogdan	University Hospital Erlangen and FAU Erlangen-Nürnberg	Director of Institute of Clinical Microbiology, Immunology and Hygiene
Dr	Rahman A.	Bolarinwa	Obafemi Awolowo University and Teaching Hospital Complex and OAUTHC	Consultant and PIC
Dr	Frank	Busch	Friedrich-Loeffler Federal Research Institute	Project Manager
Dr	Ricardo	Castillo	Department of Biostatistics, Epidemiology and Informatics at University of Pennsylvania	Assistant professor of epidemiology
Dr	Vo Dinh	Chuong	Department of Animal Health, Ministry of Agriculture and Rural Development of Vietnam	Senior Epidemiology Official
Prof	John E.	Cooper	Wildlife Health Services UK	Comparative Pathologist
Prof	Anthony R.	Fooks	Animal and Plant Health Agency	Head of Virology Dept / Lead for International Development
Ms	Anja	Globig	Friedrich-Loeffler Federal Research Institute	Scientific Officer

Ms	Delia	Grace	ILRI, Kenya	Scientist
Dr	Helena	Greter	Swiss Tropical and Public Health Institute	Researcher and Conservationist
Dr	Remy	Hoek Spaans	Liverpool School of Tropical Medicine	PhD Student
Dr	Kayode	Ijadunola	Obafemi Awolowo University Teaching Hospital Ile-Ife	Senior Registrar
Dr	Rosie	James	Irish Global Health Network	Board Member, Medical Doctor
Dr	Sarah	Jayme	Asia Foundation for Tropical Medicine- Japan Philippines One Health Rabies Project	Senior Veterinary Manager
Dr	Albert Kutekemeni	Kaputu	National Malaria Control Program(PNLP)	National Malaria Control Program
Mr	Kennedy	Lushasi	Ifakara Health Institite,	PHD Student
Dr	Fedelino F.	Malbas Jr.	Research Institute for Tropical Medicine	Research, Training. Patient Care for Infectious Tropical DS.
Dr	Diogo	Martins	Wellcome Trust	Policy & Advocacy Lead
Prof	Saidur Rahman	Mashreky	Centre for Injury Prevention and Research Bangladesh (CIPRB)	Public Health Researcher
Dr	Luc	Meissner	Médecins du Monde	Desk
Dr	Gervase	Miriti M'ibui	Meru University of Science and Technology	Chairman of the Department of Public Health/ Asst. Lecturer
Dr	Kennedy Miyoro	Mochabo	Egerton University	Lecturer - Public Health and epidemiology
Prof	Bente E.	Moen	University of Bergen	Professor and Director of a Priority Area of Global Challenges
Prof	Loto Olabisi	Morebise	Obafemi Awolowo University, Ile-Ife	Professor of Obstetrics and Gynecology
Prof	Dilys	Morgan	Public Health England	Consultant in Global Public Health, previously Head of Emerging Infections and Zoonoses
Mr	Titus	Mutwiri	Kenya Methodist University	Assistant Lecturer
Dr	Thumbi	Mwangi	University of Nairobi, University of Edinburgh and Washington State University	Researcher
Dr	Mark	Nanyingi	University of Liverpool	Infectious Dleases Epidemiologist and One Health Postdoctoral Scientist
Dr	Bongo Nare Richard	Ngandolo	Institut de Recherche en Elevage pour le Developpement (IRED)	Head of the Animal Health Department
Mr	Aaron	Nwana	Federal University Oye-Ekiti, Ekiti State Nigeria	PG Student
Ms	Emmanuella	Nzeribe	Kwame Nkrumah university of science and technology, Kumasi Ghana.	Researcher
Dr	Joseph	Ogola	Regional government employee	Public Veterinarian
Dr	Oyeladun	Okunromade	Nigeria Centre for Disease Control	Head International Health Regulations Division/One Health Lead
Dr	Mohammed Awad	Raiyed	Leishmaniasis Research Laboratory / University of Khartoum	Researcher
Prof	V.	Ramasubramanian	Apollo Hospitals	Consultant Infectious Diseases & Tropical Medicine, Apollo Hospitals, Director - The Capstone Clinic, Adjunct Prof Infectious Diseases at Sri Ramachandra Medical College and the Tamilnadu Dr. Mgr Medical Universitya
Dr	Simon	Rüegg	Network for Ecohealth and One Health	Working Group Leader "Learning Organisation"

Appendices continued

Dr	Terence	Scott	Global Alliance for Rabies Control	Technical Lead
Dr	Silvano Mwale	Shikuku	Bukura agricultural college	Trainer in Animal Health Courses
Mr	Chikuni Gelly	Simakechula	Ministry of Fisheries and Livestock, Zambia	Veterinary Officer
Prof	Grant	Stentiford	Centre for Environment, Fisheries and Aquaculture Science (Cefas)	Hazards Theme Lead
Prof	Suad	Sulaiman	Sudanese National Academy of Sciences	Health & Environment adviser
Mr	Nchanji G	Takop	University of Buea	Research Associate & Microbiologist
Prof	Lord	Trees	House of Lords, UK	Crossbench Peer
Dr	Mohammed	Umlai	Kwale County Government	Sub County Veterinary Officer
Dr	Etienne	Waleckx	Centro de Investigaciones Regionales “Hideyo Noguchi”, Universidad Autónoma de Yucatán, Mérida, Yucatán, México	Researcher
Dr	Funmilola	Wuraola	Obafemi Awolowo University Teaching Hospital	Surgeon
Dr	Omnia	Yousif	Federal Ministry of Health	Researcher
Prof	Yoshitake	Yokokura	Japan Medical Association	President Emeritus
Ms	Laura	Zani	Friedrich-Loeffler Federal Research Institute	postdoc

Quotes

Appendix 3 - quotes from interviews and surveys

Please find below a number of quotes gathered during the research, mainly from the interviews. We felt these were important points to share, some of which were not possible to feed into the areas of interest or recommendations. They are presented here in general groups, in no particular order and unattributed.

One Health scope

"Human health is dependent on other species and the environment, and what originates locally can have significant global impact"

"We need to make One Health part of everyday thinking"

"One Health is about seeing health as a social, ecological system"

"One Health approach demands us to break down the silos, which requires effort and support"

"Concept of one health should not be positioned as a donor country initiative, much is already being done across the world"

"One Health also relates to non-communicable diseases and maternal health as well as zoonotic disease and AMR"

"40% of all zoonotic diseases which have emerged since 1940 can be linked to agriculture, and so agriculture must be included"

"We need to de-fragment education, professional qualifications, institutions and financing"

"There is a need for very explicit and rather concerted work at the interfaces between disciplines and sectors, as it is at these interfaces where things fall through cracks"

Research and programme delivery

"We need to avoid the cycle of panic and neglect. The world pays attention to health security and one health approaches when there is a crisis or pandemic, and then neglects it straight afterwards"

"No point focusing surveillance infrastructure only in big cities, need to have these systems on the ground, focused on everyday activities"

"The way research in funded makes it very hard to implement systemic approach"

"Don't reinvent the wheel, structure already exists here, we need support for regional one health collaborations"

"From an environmental point of view – the further we push into forests more likely to encounter viruses we haven't seen before"

"Infectious disease can't be detected and solved without knowing about the animals involved – humans, livestock, pets and wildlife"

"Research hubs should be spread across the world, based where the issue is likely to be. This could be where people come into contact with wildlife, or could be based on previous outbreaks"

"Once the project finished the infrastructure and the knowledge got neglected and lost. We need a sustainable approach to projects"

"Mobilise the existing regional bodies that can act as convenor"

Governance and funding

"Political will is critical, national responsibility must be with the PM or President, demonstrating highest levels of commitment"

"It is always a challenge when it comes to sharing power"

"Every agency has different boxes they need to tick"

"We need to build trust between counties, its not helpful when wealthier countries are only seen to react when it affects them"

"Maintaining One Health links need a lot of facilitation, it is not a natural thing"

"The concept of One Health is clear, the problem is the unbalanced budget. One Health, one budget"

"We need demonstrations of the cost effectiveness and value add of one health"

"We need equity across the whole health system. There is unequitable funding in the human health, animal health and environment sectors"

"The UN agencies that are jointly responsible for One Health need to be better resourced – there are only 2 people looking after One Health at some of these"

"Don't want to see new activities which allow rich countries to protect themselves against future diseases"

"We need ring-fenced, and in perpetuity funds, which are outside of national and political borders and structures"

Quotes continued

Pandemic preparedness

"If we want to prevent the next pandemic, that's easy, stop travel, and stop livestock trade, but we know we can't do that"

"This is the time – we need to prepare now for the next pandemics"

"We need more environment experts at the table"

"If we work on endemic enduring diseases now this will help us to be better prepared for future health crises"

"By improving the conditions of animals and the environment you would improve the conditions of human health - we need a shift from a human centric approach"

"If we could change behaviours and reduce the risks we face, we wouldn't need to rely so much on medicine"

"Sustainable education and training is key…. everyone studying a relevant field of work should have a One Health module so they understand the basics, and that knowledge should be kept up"

"We need to increase the everyday capacity to handle zoonosis! Don't like the needle in the haystack design – this is appropriate for research/ academia but we need a public health approach"

COVID-19

"COVID-19 attacked humanity globally, we responded nationally"

"COVID-19 showed us we all have a lot to learn from one another"

"With COVID-19 the world is now finally waking up to the concept of One Health"

"In COVID-19 even scientists could not convince politicians to act early enough"

"The mistake we made was thinking of COVID as a disease of people, rather than a herd disease"

"The pin has not dropped yet as to how broadly we need to view health, maybe covid will help with that"

"locking down the first cases went well, but in border towns it failed due to the sharing of cigarettes between drivers. we need to include the social elements too"

Questions

Appendix 4 - Survey and interview questions

Question 1

The One Health Initiative Task Force defines One Health as “the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment”.

Do you and/or your organisation align to this definition in your work?

Question 2

If commented do not align well to Q1, please detail how you would add or amend this definition below?

Question 3

What examples of policy change is your organisation planning to deliver or has your organisation delivered with respect to One Health?

Question 4

What are the top 3 recommendations you think G7 (Canada, France, Germany, Italy, Japan, UK, US) country leaders should focus on?

Please specify which area each recommendation falls into - policy, governance, funding, infrastructure, or other

Question 5

What are the top 3 recommendations you think non-G7 country leaders should focus on?

Please specify which area each recommendation falls into - policy, governance, funding, infrastructure, or other

Question 6

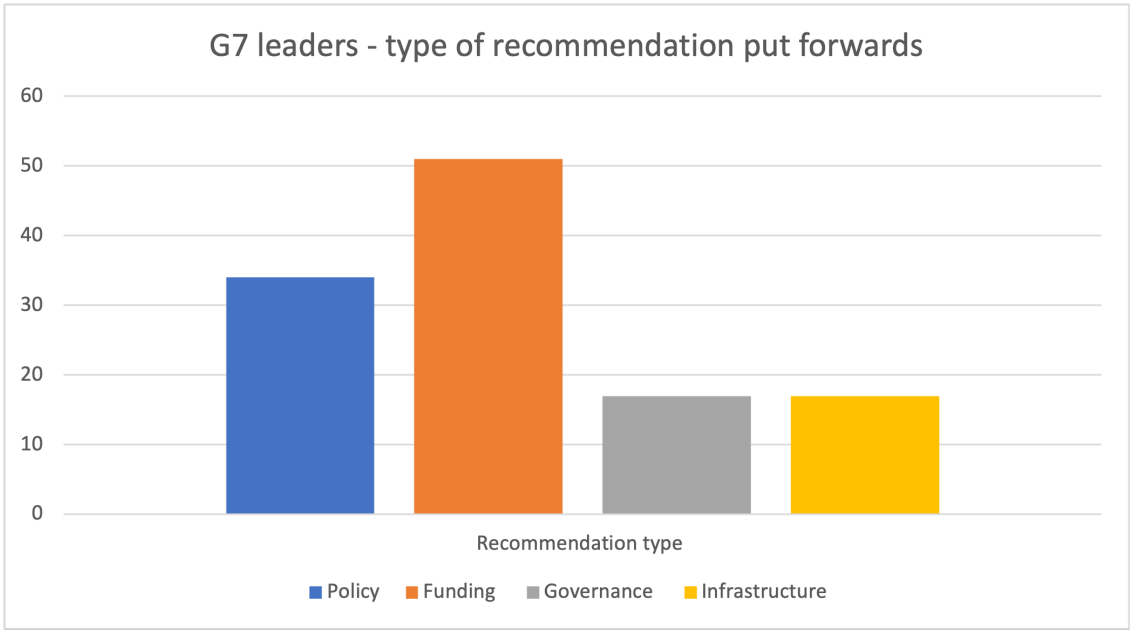
At the moment there is a particular interest in pandemic preparedness.

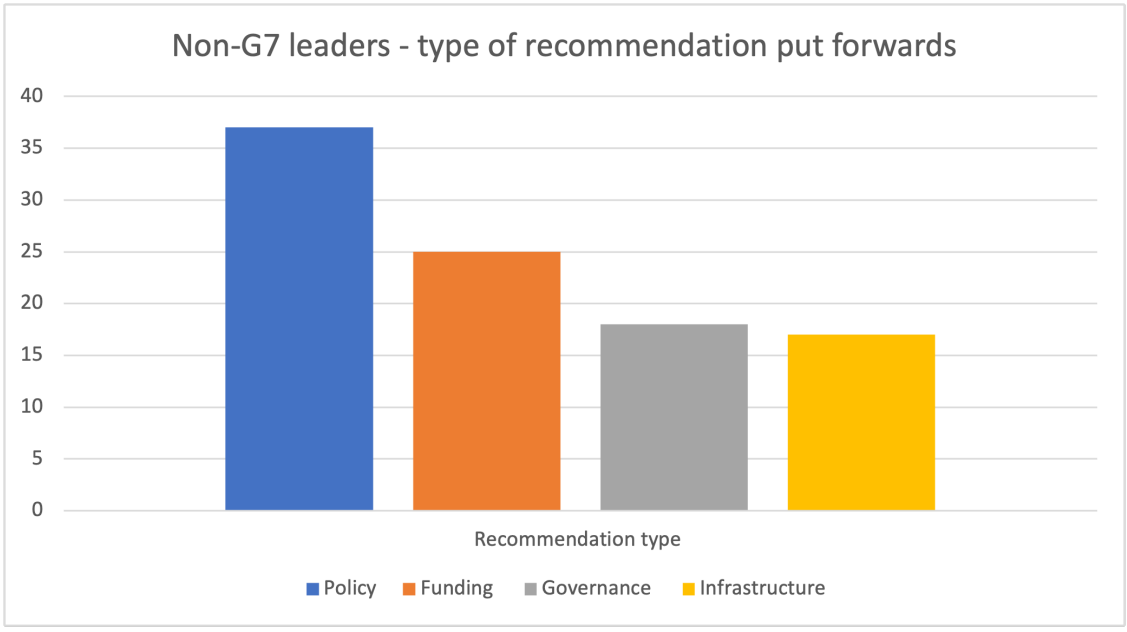
Please tell us any recommendations you have in this specific area for G7 country leaders and/or non-G7 country leaders.

Appendix 4 - Survey detailed results

1. Breakdown of recommendation type by survey respondents

This was only possible to do for recommendations for G7 and non-G7 leaders





2. Recommendations for G7 leaders – collated as provided

1. Define scope and definition of one health
2. Increase funding to tripartite agencies for one health
3. Policy/gov – provide funding under one health banner – not to silos
4. Fund research
5. Share technical information
6. Apply a one health holistic approach
7. Funding to lmics
   a. for policies on NTDs
   b. for capacity building
   c. to strengthen the vet sector surveillance
   d. to strengthen health systems
8. Fund policy implementation on environmental issues e.g. green economy, air pollution
9. Policy: reform agriculture policy to put health and the environment at the centre
10. Develop systems to integrate surveillance of animal and human health
11. Governance – G7 countries to collaborate better
12. G7 countries to share resources more equitably
13. Establish education programmes in One Health
14. Establish a vet version of GAVI
15. Policy: establish M&E in One Health
16. Policy: Establish One Health national networks to share info
17. Utilise NTDs as working example of how One Health works in practice
18. Educate political leaders on topic of One Health
19. Policy: ban use of antibiotics in meat and feed
20. Provide international funding for:
    a. Amr
    b. Zoonotic diseases
    c. Surveillance
    d. Food systems analysis
    e. NTDs
    f. Pollution
    g. Population growth
    h. Global warming
    i. One Health research
    j. Green energy
    k. Sustainable housing
    l. Waste management
    m. Capacity strengthening
    n. Ministries of humans, vets etc
    o. Environmental health
    p. Basic amenities
    q. Health system resilience
21. Establish national OH units
22. Policy: Reform biosecurity and animal welfare standards in animal production
23. Governance: establish global consensus on wildlife protection and conservation
24. Data sharing across different platforms
25. Improve regulations on food security
26. Collaborate with stakeholders
27. Create a One Health task force
28. Policies to bring collaboration between developed and developing countries
29. Establish cross sector funding mechanisms
30. Demonstrate importance of One Health
31. Generate and lead on case studies

3. Recommendations for non-G7 leaders – collated as provided

1. Define scope and definition of one health
2. Increase funding to tripartite agencies for one health
3. Policy/gov – provide funding under one health banner – not to silos
4. Fund research
5. Share technical information
6. Apply a one health holistic approach
7. Funding to lmics
   a. for policies on NTDs
   b. for capacity building
   c. to strengthen the vet sector surveillance
   d. to strengthen health systems
8. Fund policy implementation on environmental issues e.g. green economy, air pollution
9. Policy: reform agriculture policy to put health and the environment at the centre

Questions continued

10. Develop systems to integrate surveillance of animal and human health
11. Governance – G7 countries to collaborate better
12. G7 countries to share resources more equitably
13. Establish education programmes in One Health
14. Establish a vet version of GAVI
15. Policy: establish M&E in One Health
16. Policy: Establish One Health national networks to share info
17. Utilise NTDs as working example of how One Health works in practice
18. Educate political leaders on topic of One Health
19. Policy: ban use of antibiotics in meat and feed
20. Provide international funding for:
    a. Amr
    b. Zoonotic diseases
    c. Surveillance
    d. Food systems analysis
    e. NTDs
    f. Pollution
    g. Population growth
    h. Global warming
    i. One Health research
    j. Green energy
    k. Sustainable housing
    l. Waste management
    m. Capacity strengthening
    n. Ministries of humans, vets etc
    o. Environmental health
    p. Basic amenities
    q. Health system resilience
21. Establish national OH units
22. Policy: Reform biosecurity and animal welfare standards in animal production
23. Governance: establish global consensus on wildlife protection and conservation
24. Data sharing across different platforms
25. Cross border collaboration and sharing of info
26. Develop national strategies for OH
27. Infrastructure: early warning systems / hazards
28. Strengthen technical capacity including lab capacity
29. Develop response plans (national action plans)
30. Interdisciplinary collaboration e.g. partnerships
31. Political leadership
32. Collaboration with G7 countries
33. Tackle/focus water and sanitation policy
34. Educate the public on one health
35. Educate public on food safety and healthy markets
36. Strengthen research capacity
37. Establish legal framework for One Health
38. Implement basic health needs
39. Strengthen capacity to manage diseases
40. Tackle famine
41. Food safety and healthy markets reform

4. Recommendations for Pandemic preparedness – collated as provided

1 Surveillance - improve it, invest in it, fast track it
2 Advocacy - One Health approach
3 One Health approach to education, capability
4 Vaccine awareness
5 Take the issue seriously
6 Financial support, pool funding
7 Funding for capacity building
8 Collaboration, data sharing
9 Early Warning Systems
10 Equitable access to vaccines
11 Fund oh research
12 Speak with one voice
13 Utilise NTD platforms
14 Fund existing NTD platforms
15 Climate change mitigation
16 Livelihood increase
17 Supply chain improvements
18 Vaccine availability
19 LMIC research support
20 Policy Development
21 Infrastructure Development
22 Effective use of existing resources
23 Effective Policies
24 Uniform measurements
25 Incorporate vetrinary medicine
26 Shut off country with suspected outbreak
27 Food security
28 Emergency response
29 Invest in prevention
30 Improve animal welfare standards

31 Better and cheaper diagnostics
32 Create wildlife sanctuaries
33 Global decision making
34 Continent specific preparedness
35 Immediate reporting of any threat
36 Eliminate infectious diseases
37 Private public partnerships for vaccines
38 Institutionalise One Health programmes
39 Establish strong partmerships
40 Strengthen vet systems
41 Prevent exploitation of natural resources
42 Improve One Health education
43 Raise public awareness of pandemics
44 Fund pandemic preparedness research
45 Consistent global policies for preparedness
46 Fund One Health units
47 Food security improvement

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