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# TECHNICAL ITEM I

## Preventing Zoonoses at Source – towards enhancing capacity for prevention, rapid detection, awareness, control, and research on zoonoses

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**TECHNICAL ITEM I**
**Preventing Zoonoses at Source – towards enhancing capacity for prevention, rapid detection, awareness, control, and research on zoonoses**

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*Final*

## Executive Summary

To develop Technical Item 1 ("Preventing Zoonoses at Source – towards enhancing capacity for prevention, rapid detection, awareness, control, and research on zoonoses), a questionnaire was developed with 18 questions for 6 domains. Eighteen WOAH Members participated in the questionnaire and their responses showed substantial differences in their capacity levels for the 6 domains evaluated. Although Members reported quite good capacity in laboratory and surveillance systems, the results showed that integration and multi-sectorial collaboration is still relatively weak. The questionnaire highlighted the need for capacity building to improve multi-sectorial collaboration and better integration of the environmental sector, as well as to improve the Members' levels of capacities in biosecurity.

The main conclusion and recommendation of the report is to encourage Members to develop proactive capacities to tackle the risks of zoonoses at the source (at the level of the ecosystem and including the interface with wildlife) and not only to rely on their capacity of reaction, which nevertheless needs to remain optimal. Members are also not only encouraged to take advantage of several important initiatives such as the Pandemic Fund, Nature4Health and PREZODE, but also the ZODIAC initiative.

## Background

The Quadripartite Organisations (FAO, UNEP, WHO, UNEP, & WOAH) collaborate to drive the change and transformation required to mitigate the impact of current and future health challenges at the human–animal– plant–environment interface at global, regional and country level.

Responding to international requests to prevent future pandemics and to promote health sustainably through the One Health approach, the Quadripartite has developed the One Health Joint Plan of Action (2022–2026) (OH JPA).

The OH JPA, formulated through a participatory process, presents series of activities aimed at enhancing cooperation, communication, skill development, and alignment across sectors responsible for addressing health threats at the intersection between humans, animals, plants, and the environment.

The OH JPA is built around six interdependent action tracks that collectively contribute to achieving sustainable health and food systems, reduced global health threats and improved ecosystem management (Figure 1):

Action track 1: Enhancing One Health capacities to strengthen health systems

Action track 2: Reducing the risks from emerging and re-emerging zoonotic epidemics and pandemics

Action track 3: Controlling and eliminating endemic zoonotic, neglected tropical and vector-borne diseases

Action track 4: Strengthening the assessment, management and communication of food safety risks

Action track 5: Curbing the silent pandemic of AMR

Action track 6: Integrating the environment into One Health

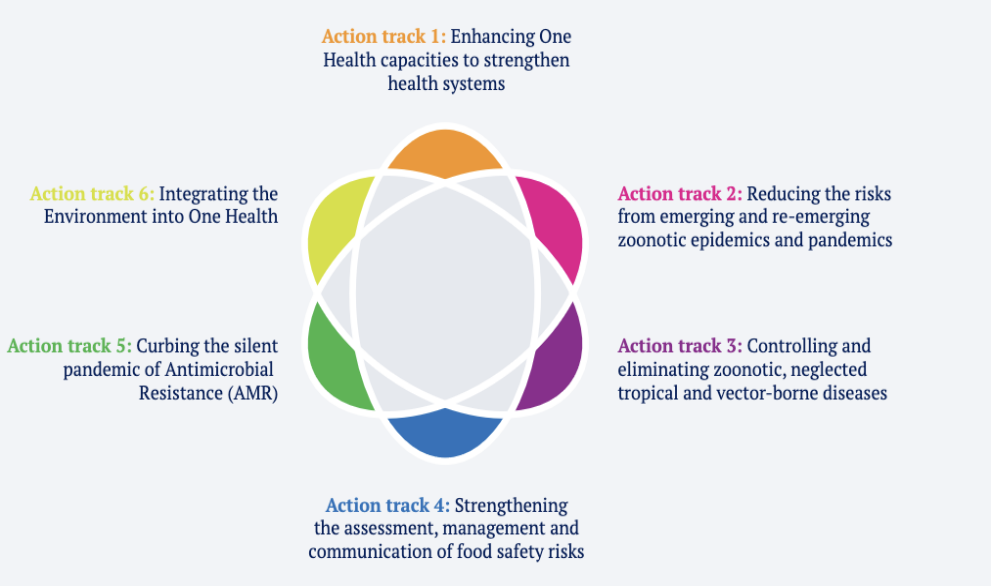


**Figure 1.** The six JPA action tracks

The six JPA action tracks are immersed within three main pathways of change (Figure 2):

1. Pathway 1: Governance, policy, legislation, financing and advocacy

This pathway encompasses all aspects of a national multisectoral, One Health coordination mechanism for the institutionalisation of intersectoral governance, policy development, political will expressed through high- level advocacy, prioritization, enabling regulatory frameworks, dedicated financing and investment. This also includes raising awareness of the One Health approach among all stakeholder groups.

2. Pathway 2: Organisational and institutional development, implementation and sectoral integration

This pathway includes all aspects of putting One Health into action, including multisectoral and multidisciplinary capacity development at national levels, community engagement and mobilisation for action, and the equitable integration of sectors.

3. Pathway 3. Data, evidence, information systems and knowledge exchange.

This pathway comprises of strengthening the scientific evidence base and of information systems, knowledge translation into data for evidence, technical tools, protocols, guidelines, information, and surveillance systems, and the sharing of data and evidence between sectors, stakeholder groups and Members.

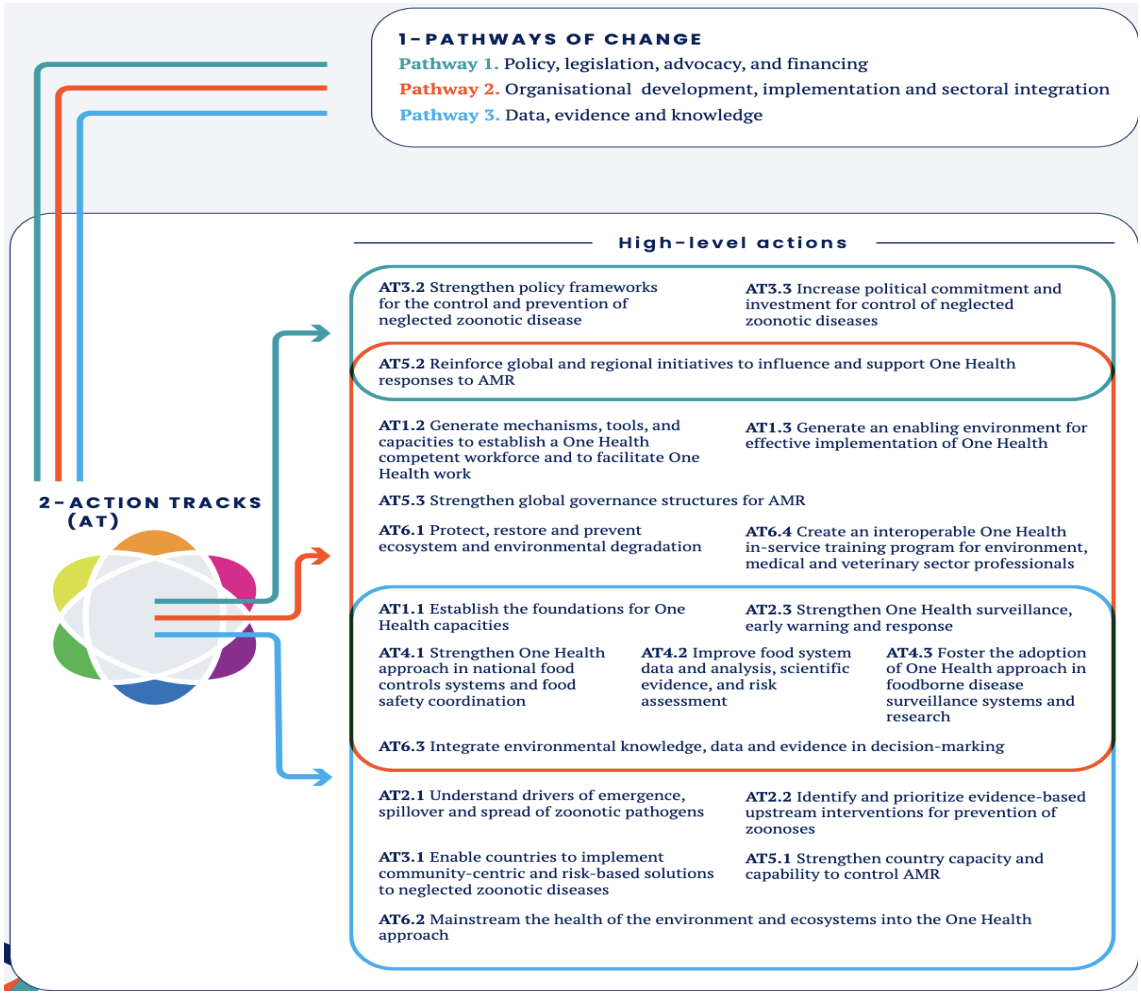


**Figure 2**. The Theory of Change for the OH JPA

The Quadripartite endorsed the One Health definition as (Figure 3):

"*One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems. It recognises the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilises multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.*"

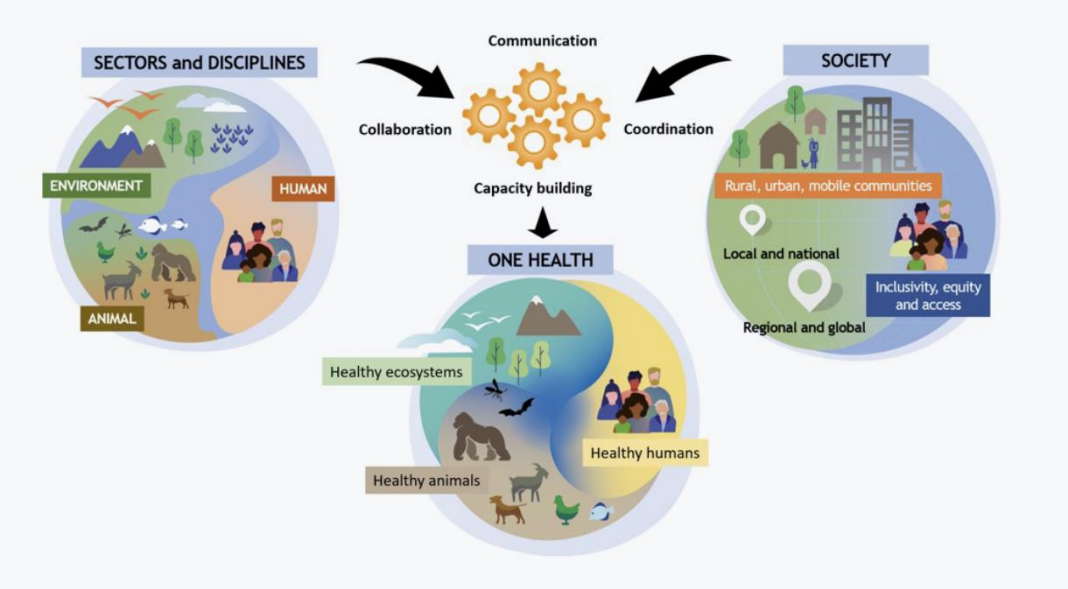


**Figure 3.** One Health promotes a sustainable and healthy future through collaboration, communication, coordination and capacity building.

The Quadripartite also endorsed the definition of prevention of spillover (Figure 4):

"*Prevention of pathogen spillover from animals to humans means shifting the infectious disease control paradigm from reactive to proactive (primary prevention). Prevention includes addressing the drivers of disease emergence, namely ecological, meteorological and anthropogenic factors and activities that increase spillover risk, in order to reduce the risk of human infection. It is informed by, amongst other actions, biosurveillance in natural hosts, people and the environment, understanding pathogen infection dynamics and implementing intervention activities.*"

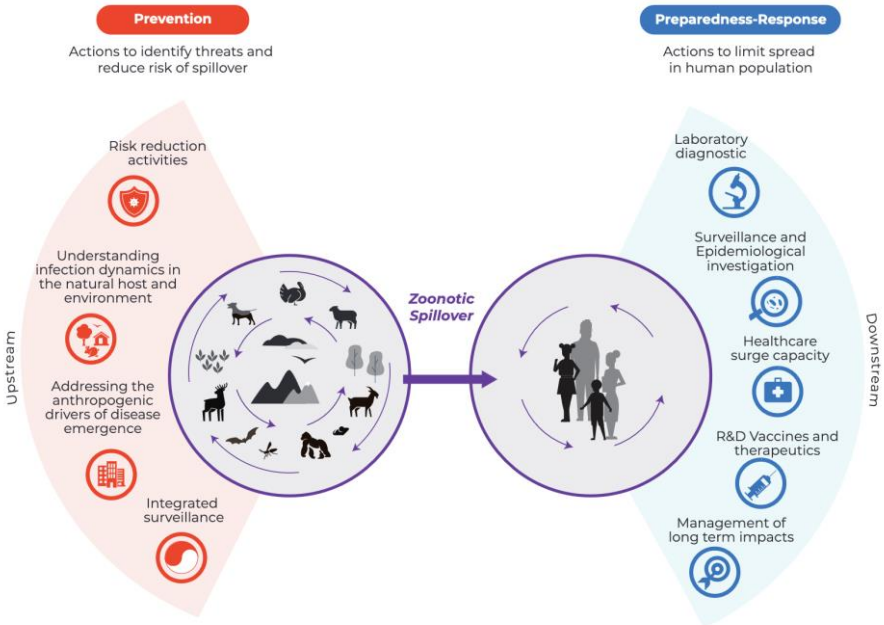


Figure 4. Prevention of zoonotic spillover to humans (OHHLEP)

## Objectives

Key elements to be covered in the technical item:

- Current state-of-play in the Veterinary Services of WOAH Members in terms of capacity and implementation status for prevention (including primary prevention), detection, and response to known/emerging zoonosis (including wildlife diseases) at the human-animal-environment interface.
- Situational analysis of OH coordination updates/progress/challenges since COVID-19 pandemic.
- Situational analysis of the Member's understanding of the OH-JPA, the OH-JPA implementation guideline and updates on development of national action plans on OH.
- Situational analysis of the Member's application/access to the Pandemic Fund applications and/or other funding sources for national OH actions.
- Recommendations to enhance Member capacity in prevention, preparedness, and response to zoonosis including wildlife diseases at the human-animal-environment interface based on the outputs of the questionnaire and research.

## Context

During the 89th General Session held in May 2022, the World Organisation for Animal Health Regional Commission for Asia and the Pacific adopted "Preventing Zoonoses at Source – towards enhancing capacity for prevention, rapid detection, awareness, control, and research on zoonoses" as Technical Item I (with questionnaire), to be presented during the 33rd Conference of the Regional Commission for Asia and the Pacific in New Delhi, India, from 13 to 16 November 2023.

To develop the Technical Item 1, a questionnaire was created by designated experts, **Dr Nitish Debnath,** Country Team Lead for the Fleming Fund (Bangladesh program) and **Dr Serge Morand**, Research Director at the National Centre for Scientific Research (CNRS) (France), both of whom are members of the One Health High Level Expert Panel (OHHLEP), which is an advisory group for the Quadripartite organisations. Questionnaire responses were sought from WOAH Delegates in the region and 18 out of 32 Members provided responses. Members who could not respond in time cited that there was not enough time considering that the data had to be collected from multiple government agencies and collated to respond to the questionnaire. The following Members of the Regional Commission for Asia and the Pacific provided responses to the questionnaire: Afghanistan, Bhutan, China (People's Rep. of). Japan, Korea (Rep. of), Laos, Malaysia, Myanmar, New Caledonia, New Zealand, Pakistan, Papua New Guinea, Philippines, Russia, Sri Lanka, Chinese Taipei, Thailand, United States of America and Vanuatu.

## 1. Introduction

The world witnessed unprecedented impacts in the human population of the COVID-19 pandemic, a zoonotic disease caused by SARS-COV-2. Cases have been reported in both domestic and wild animals. The COVID-19 pandemic brought the world's attention back to zoonoses and how critical it is to prevent, detect, and control such pathogens at source if we are to avoid similar severe impacts to human lives and livelihoods, animal lives, disturbance to trade and other socio-economic effects in the future.

Over the past century, unrestricted anthropogenic activities and interventions have resulted in climate change, nature and biodiversity loss, pollution and waste, and has accelerated the emergence of many health threats, including infectious diseases with pandemic potential. Since more than 60% of human pathogens and 75% of emerging and re-emerging infectious diseases are

of animal origin, zoonoses continue to pose significant threats to humans and animals. Considering this, preventing and controlling zoonoses at source has become a crucial goal, which requires use of a multisectoral “One Health” (OH) approach.

### *Zoonoses in the Asia Pacific Region*

The Asia and the Pacific Region has witnessed emergence of several important zoonoses including SARS in 2003, highly pathogenic avian influenza H5N1 since 2004, Nipah virus in 1999 (predominantly in Malaysia, Bangladesh and India), and incursion of rabies in previously free areas/islands in Malaysia and Indonesia since 2017. The burden of neglected foodborne parasitic zoonoses such as foodborne trematodiases, taeniasis/cysticercosis, and echinococcosis is still significant in many low-income countries in Asia; their transmission continues to occur due to poor hygiene and sanitation.

Over the last two decades, many Members in the region have gradually enhanced their capacity for prevention, detection, and control of zoonotic diseases. Intersectoral collaboration and coordination amongst One Health stakeholders, particularly in the human and animal health sectors, have also improved. However, there are still gaps and challenges in addressing zoonoses at source in most Members, including: under-resourced and inefficient Veterinary Services (VS), weak intersectoral coordination and a lack of involvement of the environment sector, governance issues for One Health, inadequate funding, inadequate capacity for wildlife disease surveillance, inadequate laboratory and epidemiological capacity and skills.

### *WOAH’s role and activities in the Asia Pacific region*

In the Asia Pacific region, WOAH is implementing various activities under the One Health concept and supporting its Members in collaboration with the partner organizations, in particular as the Asia-Pacific Quadripartite (FAO, WHO, WOAH, UNEP). These activities include Antimicrobial Resistance (AMR), Avian Influenza, Bovine Tuberculosis, COVID-19 in Asia and the Pacific Food Safety, Neglected Parasitic Zoonoses, Rabies, Tripartite Coordination Group Activities and Wildlife Health.

Based on WOAH Wildlife Health Framework, WOAH Regional Representation for Asia and the Pacific and Sub - Regional Representation for South-East Asia conduct several wildlife health activities to support Members in enhancing their wildlife disease surveillance and reporting. These capacity building programmes are often conducted and benefit national focal points responsible for wildlife. According to Chapter 1.3 of the *Terrestrial Animal Health Code,* Members are under obligation to notify using WAHIS, WOAH-Listed diseases affecting wildlife some of which are zoonotic. WOAH and its Members have also identified and agreed to report voluntarily some non-WOAH-Listed diseases in wildlife including some zoonoses via another platform. It is important to monitor the trends of these voluntarily reported wildlife diseases and inform Members, but their presence and reporting should not impact trade.

## 2. Methodology

The questionnaire is developed to cover aspects related to the state of play regarding current capacity and implementation status in the VS for prevention, rapid detection, preparedness and awareness, response to zoonoses (including wildlife diseases) and research on vector-borne diseases.

The questionnaire covers the following areas (see Annex 1):

1. Surveillance system (4 questions)

- Early warning surveillance function

- Event verification and investigation

- Data analysis and information sharing

- Surveillance of zoonotic diseases

2. Laboratory system (4 questions)

- Specimen referral and transport system

- Laboratory quality system

- Laboratory testing capacity modalities

- Effective national diagnostic network

3. Biosecurity and biosafety measures (3 questions)

- Sanitary animal production practices

- Biosafety and biosecurity system is in place for human, animal and agriculture facilities

- Biosafety and biosecurity training and practices in all relevant sectors (including human, animal and agriculture)

4. Workforce and epidemiological capacity (3 questions)

- Multisectoral workforce strategy

- Workforce training

- Epidemiological capacity

5. Research capacity (1 question)

- Preventing zoonosis at source by enhancing research capacity on zoonoses

6. Multisectoral coordination capacity (3 questions)

- Multisectoral coordination mechanisms

- Coordination of the response to zoonotic diseases

- Engagement of environment and wildlife sector

Each question/indicator has attributes that reflect various levels of capacity. These are identified with scores ranging from “1” (indicating that implementation has not occurred) to “5” (indicating that implementation has occurred, is tested, reviewed, and exercised, and that the Member has a sustainable level of capability for the indicator):

Level 1: no capacity; attributes of capacity are not in place

Level 2: limited capacity; attributes of capacity in development stage

Level 3: developed capacity: attributes of capacity are in place; however, sustainability has not been ensured

Level 4: demonstrated capacity: attributes are in place and sustainable for a few years

Level 5: sustainable capacity; all attributes are functional and sustainable

The scoring gives a gradient of capacity for each question / indicator from low level (level 1 and level 2), to medium level (level 3) to high level (level 4 and level 5).

For each indicator, a Member receives a single score based on the shared appreciation of its current implementation.

## 3. Results

### 3.1. Overall scores

Eighteen Members responded to the questionnaire (18 questions for 6 domains). The overall scores showed large differences between Members ranging from a little more than 20 to almost 90 (the maximum score) (Fig. 5).

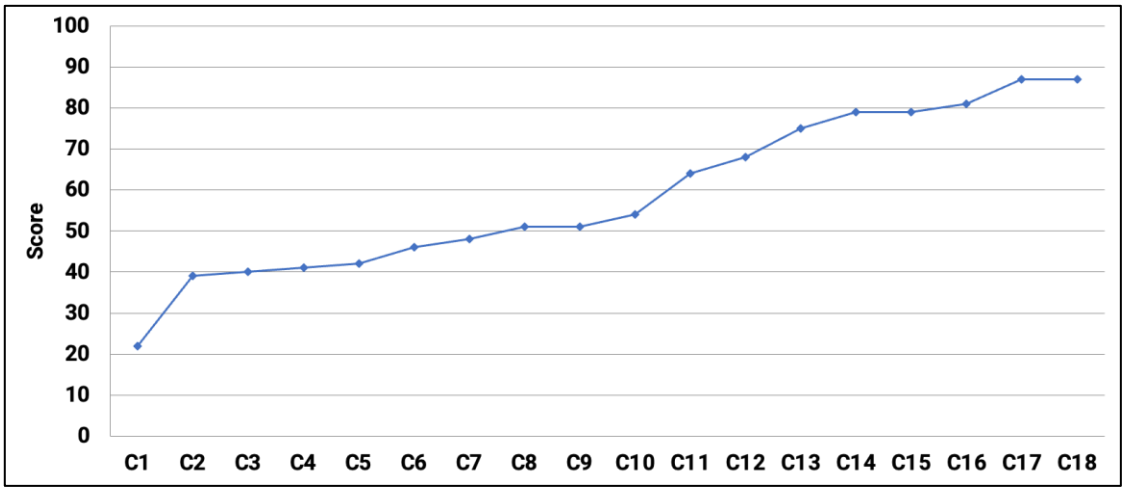


**Fig. 5**. Total scores for all questions (18) of the six domains (maximum score = 90) (C1 to C18 = Members that have responded to the questionnaire).

This large difference between Members is also observed for the total scores by domain, although some variabilities within Members are noted, such as Members C6 or 13 (Fig. 6)

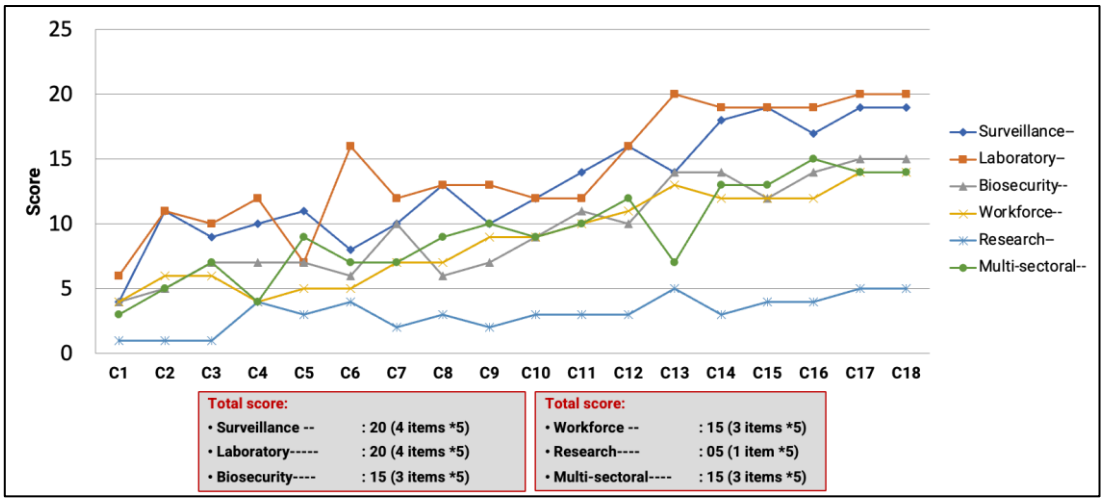


**Fig. 6**. Total scores by domain (C1 to C18 = Members that have participated in the questionnaire).

The global positive association between each pair of domains (total score values for all questions) is further validated using a pair-wise association (Fig. 7).

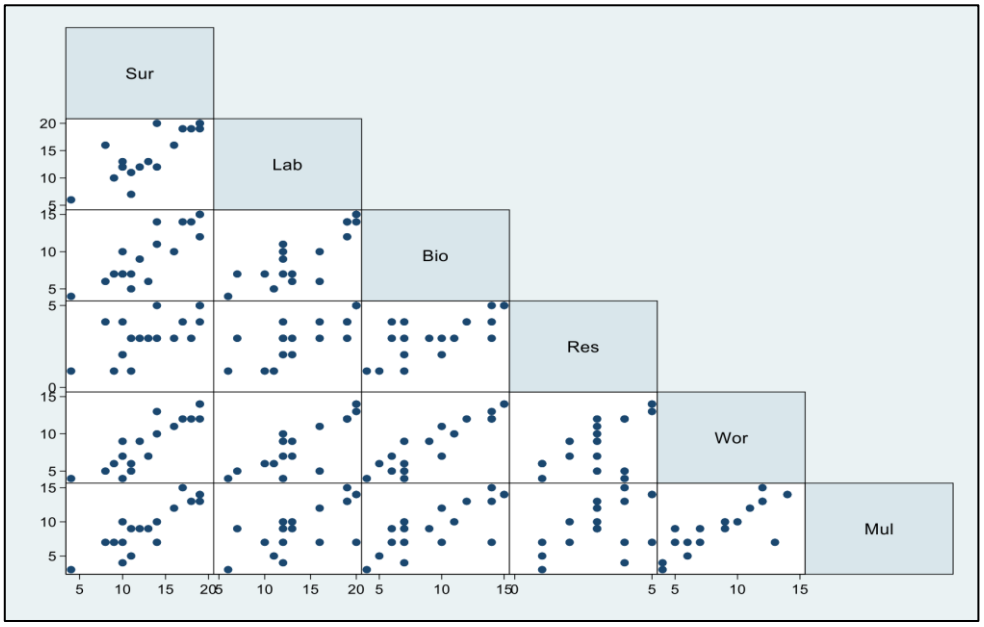


**Fig. 7**. Pair-wise association between scores of each domain (Sur = Surveillance system; Lab = Laboratory system; Bio = Biosecurity and biosafety measures; Wor = Workforce & Epidemiological capacity; Res = Research capacity; Mul = Multisectoral Coordination capacity)

### 3.2. Scores by domain

#### 3.2.1. Surveillance system

On average, Members show medium level (level 3) to high level (level 4) responses regarding their surveillance system (Fig. XX), although a number of Members declared low level (level-1 and level-2) for the surveillance of zoonotic diseases (Fig. 8).

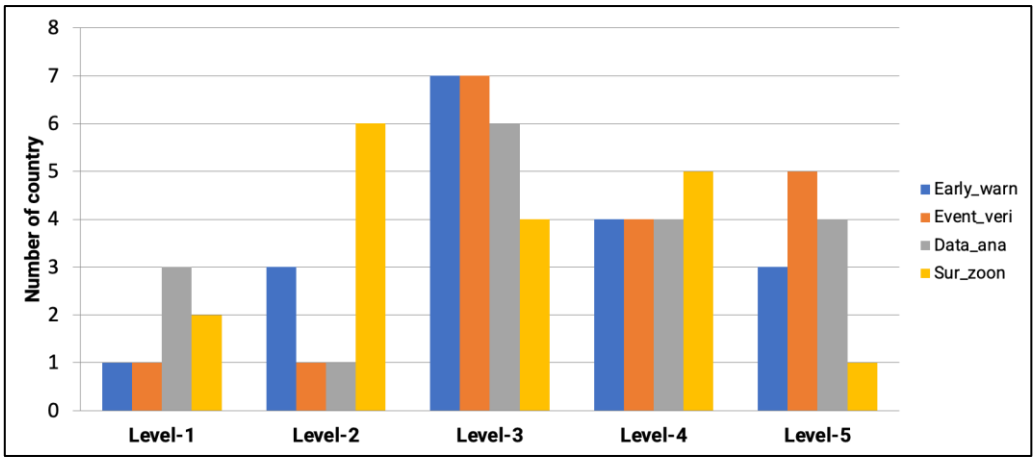


**Fig. 8**. Number of Members responding to the different levels (level 1 to level 5) for the four questions regarding the surveillance system (Early_warn = Early warning surveillance function; Event_veri = Event verification and investigation; Data_ana = Data analysis and information sharing; Sur_zoon = Surveillance of zoonotic diseases)

### 3.2.2. Laboratory system

Members show medium level (level 3) to high level (level 4) responses regarding their laboratory system (Fig. 9), with few Members reported low levels (level 1 and level 2).

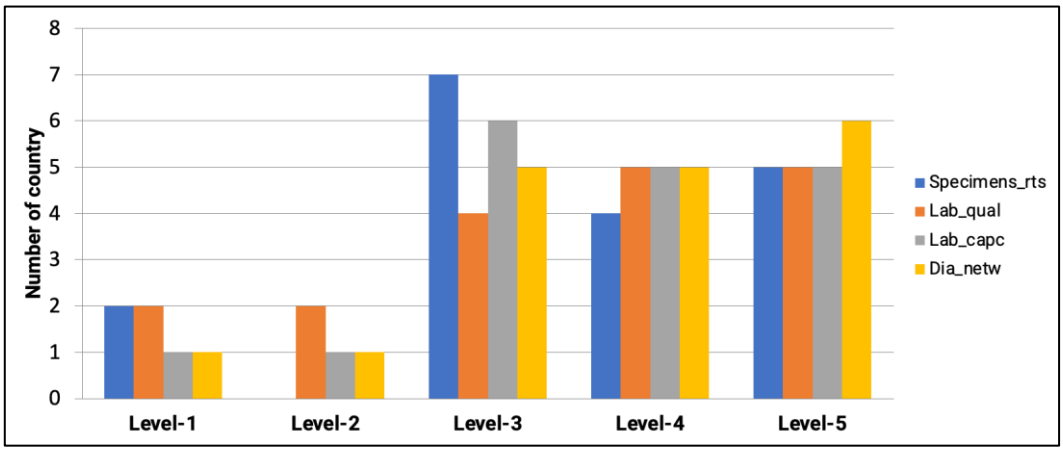


**Fig. 9.** Number of Members responding to the different levels (level 1 to level 5) for the four questions regarding the surveillance system (Specimens_rts = Specimen referral and transport system; Lab_qual = Laboratory quality system; Lab_cap = Laboratory testing capacity modalities; Dia_netw = Effective national diagnostic network).

### 3.2.3. Biosecurity and biosafety measures

Members show either moderate level (level 2 and level 3) or high level (level 5) in their responses regarding biosecurity and biosafety measures (Fig. 10). This discrepancy between two groups of Members, moderate *vs* high level, is particularly evident for the question related to “Biosafety and biosecurity system is in place for human, animal and agriculture facilities”.

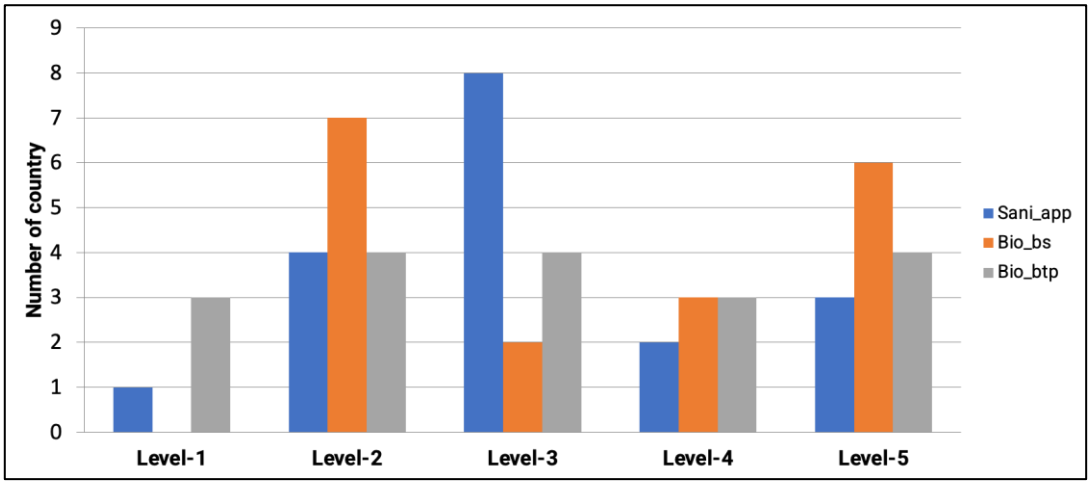


**Fig. 10**. Number of Members responding to the different levels (level 1 to level 5) for the three questions regarding biosecurity and biosafety measures (Sani_app = Sanitary animal production practices; Bio_bs = Biosafety and biosecurity system is in place for human, animal and agriculture facilities; Bio_btp = Biosafety and biosecurity training and practices in all relevant sectors, including human, animal and agriculture).

### 3.2.4. Workforce and epidemiological capacity

Members show high discrepancies in their responses regarding workforce and epidemiological capacity (Fig. 11). While most Members declared medium (level 3) to high levels (level 4 and level 5) for their epidemiological capacity, an important number declared low level (level 1 and level 2) to medium level (level 3) for the workforce training.

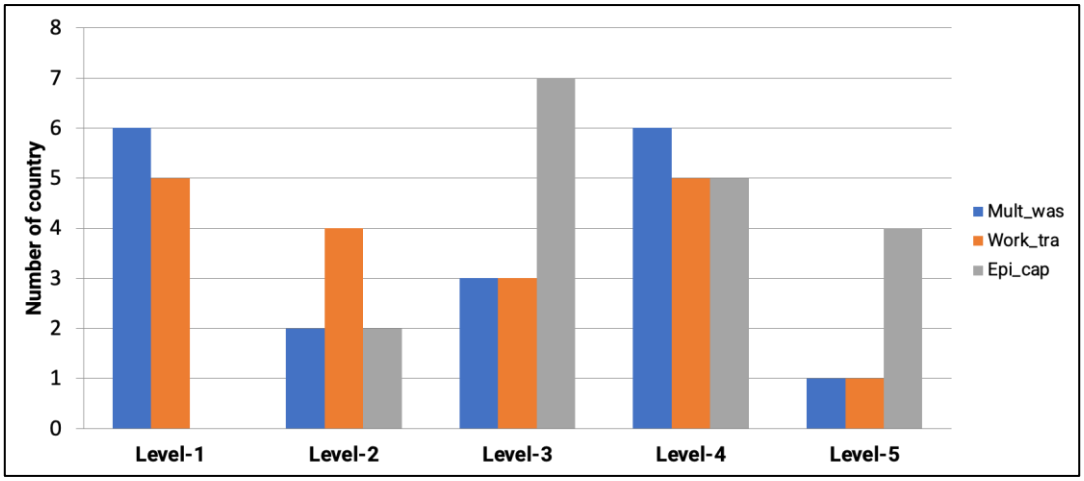


**Fig. 11**. Number of Members responding to the different levels (level 1 to level 5) for the three questions regarding workforce and epidemiological capacity (Mult_was = Multisectoral workforce strategy; Work_tra = Workforce training; Epi_cap = Epidemiological capacity)

### 3.2.5. Research capacity

The responses of the Members regarding the research capacity in preventing zoonosis at source by enhancing research capacity on zoonoses show a quite normal distribution around a medium level (level 3) (Fig. 12). Few Members declared either low level (level 1) or high level (level 5) in their research capacity in the domain of zoonotic disease prevention.

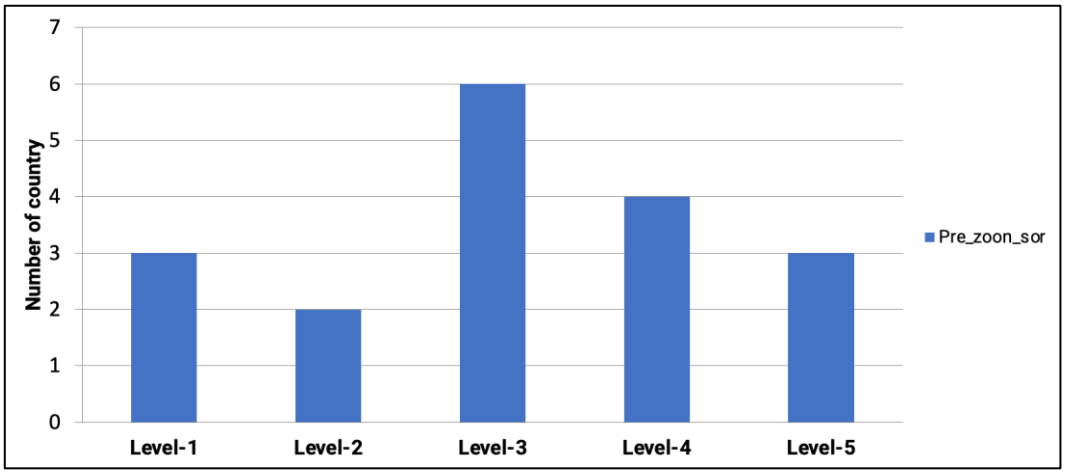

**Fig. 12**. Number of Members responding to the different levels (level 1 to level 5) for one question regarding their research capacity (Pre_zoon_sor = Preventing zoonosis at source by enhancing research capacity on zoonoses)

### 3.2.6. Multisectoral coordination capacity

The responses of the Members regarding the question on “multisectoral coordination mechanisms” show a normal distribution around a medium level (level 3) (Fig. 13), while the responses regarding the “coordination of the response to zoonotic diseases” are evenly distributed (almost equal number of Members for each level. The responses to “Engagement of environment and wildlife sector” show a bimodal distribution with Members declared low levels (level 1 and level 2) or high levels (level 4 and level 5).

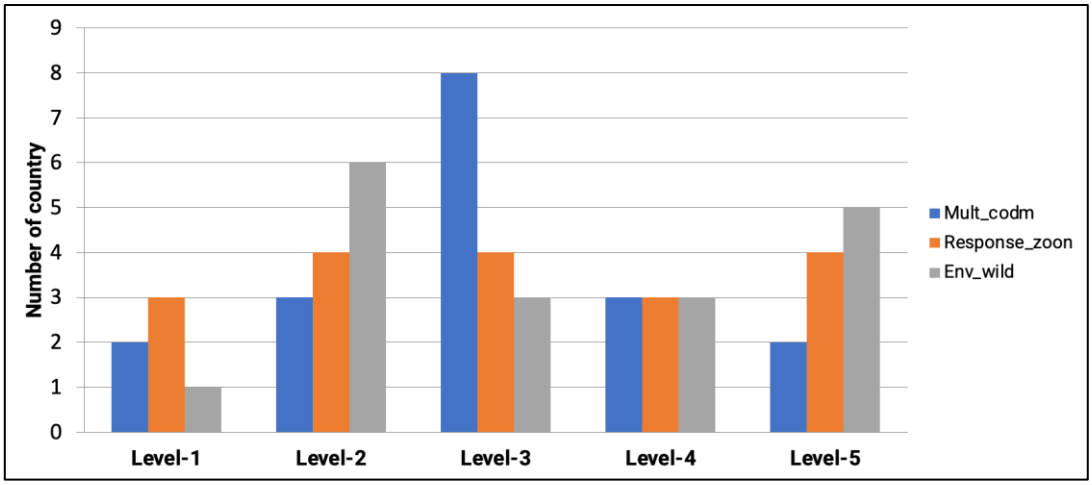


**Fig. 13**. Number of Members responding to the different levels (level 1 to level 5) for three questions regarding their multisectoral coordination capacity (Mult_codm = Multisectoral coordination mechanisms; Response_zoon = Coordination of the response to zoonotic diseases; Eng_wild = Engagement of environment and wildlife sector)

### 3.3. Summary: capacities vs coordination

We used a principal component analysis (PCA) to visualise the positions of Members regarding their responses (5 levels) to the 18 questions of the 6 domains.

As the responses to questions are highly correlated between Members (see also Figs. 5, 6 and 7 above), the PCA reveals a gradient along the horizontal axis of the PCA from Members that gave low level values for all questions (and for all domains) to Members that gave high values for all questions (for all domains), with some Members in between these two extremities (Fig. 14).

Interestingly, Members seemed to improve their performances (high levels to each question) using two ways, described by their positions along the vertical axis of the PCA (Fig. 14).

The Members are improving their overall performance either by:

- increasing their prevention of zoonoses at the source by enhancing their research capacities and/or their laboratory capacities.

- or, improving the coordination of the response to zoonotic disease and/or the engagement of the environmental and wildlife sector.

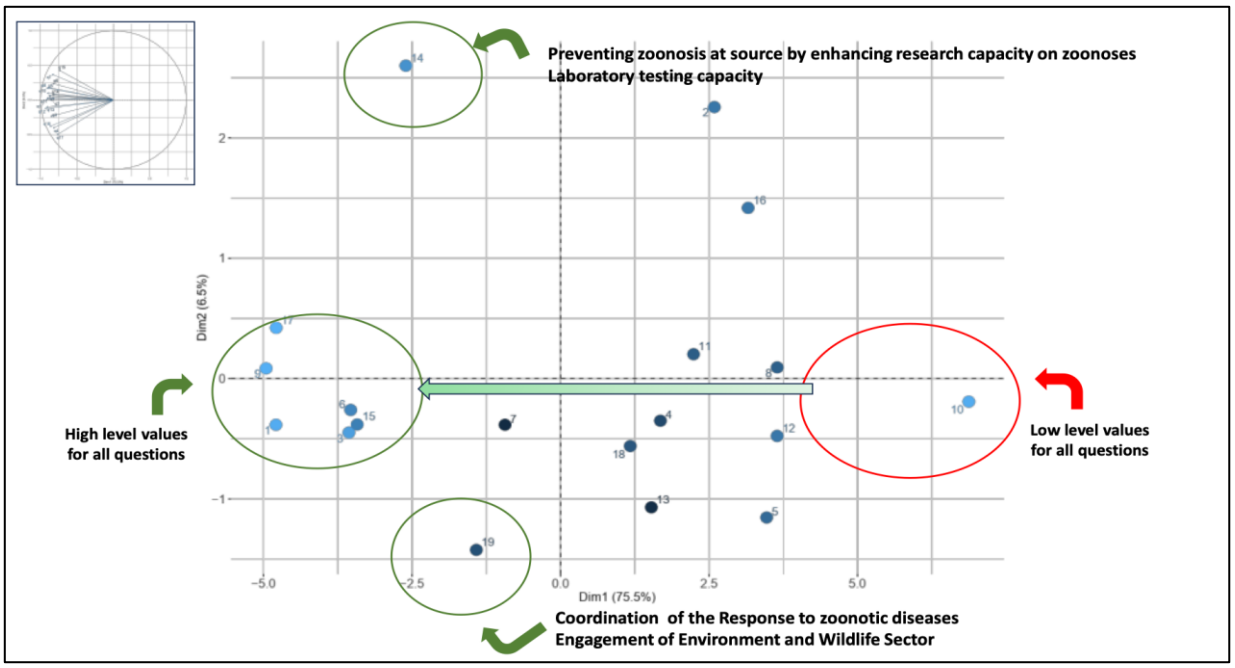


**Fig. 14**. Principal component analysis (PCA) to visualize the positions of each Member regarding to their responses (5 levels) to the 18 questions of the 6 domains.

The horizontal axis of the PCA revealed a gradient from Members that gave low level values for all questions (right side) to Members that gave high values for all questions (left side). The vertical axis of the PCA suggests two pathways the Members seem to follow in order to improve their performances, **either** by increasing their prevention of zoonoses at the source by enhancing their research capacities and/or their laboratory capacities (top side), **or** by improving the coordination of the response to zoonotic diseases and/or the engagement of the environmental and wildlife sectors (bottom side). The graph at the top left illustrates that the responses to questions were highly correlated between Members (see also Figs 5, 6 and 7 above).

## 4. Discussion

### Overall situation

A little more than a third (7 of 18) of Members that participated in the survey showed an overall score below 50 (maximum score of 90), which highlights the important need for them to develop and sustain their capacities in the several domains listed. A little more than a quarter (5 of 18) of Members who participated obtained an overall score between 50 and 70, which encourages them to either ensure sustainability of the capacities or to set up another target. The remaining third (6 of 18), obtained an overall score above 70, that indicates that almost all capacities have been fully developed and are sustainable.

### Situation by domain

The situation greatly varies between domains but also between Members.

In terms of laboratory capacity and surveillance, the results of the questionnaire showed that laboratory capacity scored better than surveillance capacity, although there was quite a good correlation between the scores among Members.

The analysis showed that the surveillance system obtained high scores particularly on capacities for early warning, event verification and data analysis. However, surveillance of zoonoses was declared under level 5 for most Members, i.e., only 1 Member declared it at level 5.

The laboratory system performed quite well, with a great majority of Members reporting capacity at level 3 and above (levels 4 and 5), and to the questions regarding specimen referral and transport system, laboratory quality system, laboratory capacity and effective national diagnostic network.

Concerning the workforce and biosecurity, a little more than half of the Members reported capacity at level 3 or below (levels 1 and 2). This is particularly important for biosecurity and biosafety measures with low scores for sanitary animal production practices and biosafety and biosecurity system multisectoral workforce strategy and workforce training. Higher scores were observed for epidemiological capacity.

The research capacity also varied across Members according to the results, with a majority reporting a medium level in this capacity, with few Members declaring either high level or low level for that domain.

The last domain investigated; the multi-sectoral coordination capacity, appeared to be low regarding either the multisectoral coordination mechanisms, the coordination of the response to zoonotic diseases or the engagement of the environment and wildlife sectors.

Finally, these conclusions by a given domain can be categorised by the way the Members are improving their overall performance. Members seem to either (i) increase their prevention of zoonoses at the source by enhancing their research capacities and/or their laboratory capacities, or (ii) improve the coordination of the response to zoonotic diseases and/or the engagement of the environmental and wildlife sectors.

## 5. Conclusion

Several lessons can be learned from the responses of Members to this questionnaire. The first lesson is that integration and multi-sectorial collaboration is still weak for a great number of Members. Second, there is still a great need for capacity building, including targeted training to improve multi-sectorial collaboration and better integration of the environmental sector. Third, Members reported quite good capacities in their laboratory and surveillance systems. Fourth, despite reporting good capacity in surveillance, the level of biosecurity appeared to be quite low.

Our recommendation is to encourage Members to develop proactive capacities to tackle the risks of zoonoses at the source, at the level of the ecosystem and including the interface with wildlife, and not only to rely on their capacity to react, which however needs to remain optimal.

We also encourage the Members to take advantage of several important initiatives such as the Pandemic Fund, Nature4Health, PREZODE and ZODIAC initiatives to build capacity for the prevention and control of zoonoses at source, rapid detection, awareness and strengthen research.

## Annexes

### Annex 1
Questionnaire (Preventing Zoonoses at Source – towards enhancing capacity for prevention, rapid detection, awareness, control, and research on zoonoses)

### Annex 2

### Relevant OH initiatives

Nature4Health (Nature four health) is an international initiative supporting countries to reduce the risk of pandemics by strengthening environmental aspects of One Health, a multidisciplinary inclusive approach focused on the interdependencies of human, animal and ecosystem health. N4H engages across sectors and communities at different societal levels to catalyse integrated policies, evidence based action and capacity development for impact locally, nationally and regionally.
https://nature4health.org/

PREZODE (Preventing ZOonotic Disease Emergence) is an international initiative with the ambition to understand the risks of emergence of zoonotic infectious diseases, to develop and implement innovative methods to improve prevention, early detection, and resilience in order to ensure rapid response to the risks of emerging infectious diseases of animal origin.
https://prezode.org/

ZODIAC (Zoonotic Disease Integrated Action) has been launched by IAE (International Atomic Agency) to support countries to be better prepared to detect, identify and address, as early as possible, the ongoing and potential outbreaks of emerging or re-emerging zoonotic diseases.
https://www.iaea.org/newscenter/news/zodiac-helping-prevent-future-pandemics-with-nuclear-techniques

### References

1. FAO, UNEP, WHO, and WOAH. 2022. One Health Joint Plan of Action (2022-2026). Working together for the health of humans, animals, plants and the environment. Rome. https://doi.org/10.4060/cc2289en

2. WOAH OH Regional Activities in Asia and the Pacific https://rr-asia.woah.org/en/projects/one-health/

3. OHHLEP, Markotter W., Mettenleiter T.C., Adisasmito W.B. et al. (2023).Prevention of Zoonotic Spillover: From relying on response to reducing the risk at source. PLoS Pathogens, 19(10), e1011504 https://doi.org/10.1371/journal.ppat.1011504

4. OHHLEP, Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, Bukachi SA, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLoS Pathogens 18(6): e1010537