



## IHR-PVS National Bridging Workshop in Cameroon: An interactive and participatory approach to engage stakeholders in the development of a One Health road map

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### ABSTRACT

**Introduction:** Stakeholders involved in the implementation of the One Health (OH) welcome support for the operationalization of the approach and advice on how to address OH collaboration challenges. The IHR/PVS National Bridging Workshop (NBW) is an operational and outcome-oriented tool approach that allows animal health, human health and other relevant sectors to focus on their coordination. This paper describes how Cameroon leveraged on the NBW success factors to engage stakeholders in strengthening multisectoral collaboration.

**Methods:** Stakeholder's engagement was implemented in two phases. Phase one consisted of engaging the multisectoral national task team for the preparation of the workshop. Phase two consisted of the bridging exercise itself during a three day workshop. The WOA/WHO standardized IHR/PVS NBW toolkit was used throughout the workshop.

**Results:** A total of 66 participants took part in the exercise. In total, 36% each came from human and animal health sectors with 23% and 5% from the environmental health and other sectors respectively. A total of 55% participants came from the national level and 39% from the regional level. The joint roadmap contained 55 activities and 13 objectives. Priority objectives were the establishment of a OH platform at all levels (62% of the vote) and building stakeholder's capacity on the OH approach (56% of the vote). A total of 67% of the activities required low or moderate cost and 87% would have a high impact on multisectoral collaboration.

**Conclusion:** The NBW allowed consensus on operational activities to fill the gaps in coordination to build health security capacities. It enabled Cameroon to create a joint road map for enhanced multisectoral collaboration for health security. The output will be integrated in the National Action Plan for Health Security operational plan and support operational One Health activities. It would be crucial to develop global capacity assessment frameworks for environmental health, which could be included in the NBW, to incorporate interconnections with environmental sector. This should allow for a stronger multisectoral linkage of sectors all together for a more the robust OH approach in responding to emerging public health threats.

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## 1. Introduction

Collaborative efforts known as the “One Health approach” support countries to effectively prevent, detect, and respond to health challenges, originating at the human-animal-environmental interface [1]. However, designing and implementing this new approach can incur various challenges. Individual, organizational, and network factors are some of the challenges obstructing the operationalization of the concept at the country level [2]. These factors are associated with political will, existing funding, relevant education and training, existing interdisciplinary and intersectoral relationships, organizational structures and culture, communication, and leadership [2,3]. These challenges occur in three stages of collaboration: (i) the starting condition, (ii) process-based factors, [2], and (iii) monitoring and evaluation [3]. In order to overcome these challenges, stakeholders need to be guided on how to address One Health collaboration and implementation challenges [3]. Therefore, operational and outcome-oriented tools are essential to allow the animal health and human health sectors to focus specifically on collaboration [2]. For decades, the human and animal health sectors have operated in silos. This situation greatly contributed to the use of separate evaluation frameworks at national, subnational and global levels to assess and further develop their existing health capacities [1]. On one hand, Member States of the World Health Organization (WHO) adopted the International Health Regulations, 2005 (IHR (2005)), which require establishing capacities to prevent, detect, assess, and rapidly respond to health emergencies, particularly those of international concern [4]. The Joint External Evaluation (JEE) process helps state parties assess their (IHR, 2005) capacities and identify critical health security gaps [5]. On the other hand, the World Organization for Animal Health (WOAH, founded as OIE) developed the Performance of Veterinary Services (PVS) Pathway in 2007 to support the sustainable strengthening of countries’ veterinary services to comply with WOAH standards prescribed in the Terrestrial and Aquatic Animal Health Codes [6]. The PVS evaluation, which is a main component of the PVS pathway, provides a situational analysis outlining the country’s veterinary services’ strengths and weaknesses, which paves the way to the PVS gap analysis, which includes strategic planning and budgeting of activities [7]. Although both the WHO JEE and WOAH PVS Pathway processes cover and promote some components of the One Health approach, the need for a specific tool still remained to help operationalize the concept and support countries in improving and applying collaborative efforts at the human-animal-environment interface [1]. Furthermore, the JEE often reveals low scores in collaborative technical areas, thus recognizing a real need to work on the human-animal-environment interface to improve health security [8].

In this regard, WHO, WOAH, and the World Bank (WB) first developed the “operational framework for good governance at the human-animal interface: bridging WHO and WOAH tools for the assessment of national capacities” after analyzing the differences and synergies between the two frameworks and their associated tools in 2013 [9]. Building on the outcomes and outputs from that analysis and exploiting the strength of these institutional frameworks, WHO and the WOAH jointly established approaches to enable communication between the animal health and human health sectors [10]. After several consultations, this led to the development of the IHR-PVS National Bridging Workshops (NBWs), which offer One Health country stakeholders an exceptional opportunity to identify the existing collaboration barriers and gaps between sectors and jointly develop a roadmap to strengthen collaboration that supports both PVS and IHR [1].

Consequently, in 2018, the PVS Pathway was further tailored to better fit into a changing global context, with not only new activities to improve its efficiency and impact but also new activities that target the One Health approach, such as the PVS/IHR NBW, that facilitate multi-sectoral collaboration while supporting sector-specific needs [11]. Conducting the IHR-PVS NBW in Cameroon was very relevant, even if the PVS Evaluation mission was old (conducted in December 2006). In

addition, Cameroon had conducted the PVS gap analysis mission in February 2011, the veterinary legislation support mission in June 2011, and the JEE mission in September 2017. These assessments generated the different data used during the NBW. As of 2020, a total of 32 countries across all the continents had conducted the IHR-PVS NBW with high levels of success as judged either from the final workshop evaluation or from the facilitators’ impressions [1]. There is, indeed, evidence that there is no one-size-fits-all methodology for One Health operationalization [12]. Even though the NBWs follow a specific approach, some adjustments are frequently made to suit the local context and culture [1]. From the experience of the NBW conducted in the 32 countries, success factors identified were: (i) high-level engagement and country ownership; (ii) participant’s representation; (iii) an interactive and participatory approach with robust facilitation; and (iv) linkages with IHR and PVS sector-specific goals [1]. Though there is notable progress in designing and implementing various One Health tools and processes, lessons learned and best practices on how to synergize or link these tools for maximal benefit at the national level are not usually shared [13]. Furthermore, early engagement of stakeholders in the development of a One Health roadmap can create a favorable environment for the emergence of acceptable, accepted collaborative solutions that are consequently executed in a sustainable manner. This article describes how Cameroon leveraged on these success factors and adapted the standard methodology to engage stakeholders to strengthen multisectoral collaboration through the NBW.

## 2. Methods

In Cameroon, stakeholder engagement during the IHR-PVS NBW was implemented in two phases. Phase one consisted of engaging the multi-sectoral national task team for the preparation of the bridging exercise itself. This task force consisted of one representative from each of the following organizations: human health, animal health, environmental health, WHO, WOAH, and FAO.

Phase two consisted of a three-day workshop, which took place from August 10–12, 2021, in Douala, Cameroon. A structured method and interactive approach have been developed for NBW and include user-friendly material, case studies, group exercises, and videos [1]. The workshop was structured into seven sessions that were organized in a step-by-step process from gap identification to the development and adoption of a joint roadmap for the enhancement of multisectoral collaboration to prevent and control zoonotic diseases. The WHO-WOAH standardized toolkit, comprising of posters, technical cards, fact sheets, stationery supplies, facilitator manuals, participant handbooks, and assessment reports (JEE and PVS), was used throughout the workshop [1]. Participants were divided into groups, with each group ensuring an equal representation of sectors and levels.

### 2.1. Ethics and consent to participate

The need for ethical approval was waived by the Institutional Review Board of the National Public Health Observatory, because of the retrospective nature of the study. Participants were nominated by their institution and written informed consent was obtained from all subjects. All methods were performed in accordance with the relevant guidelines and regulations [1] or declaration of Helsinki.

## 3. Results

### (i) The high-level engagement and country ownership

The government of Cameroon voluntarily requested the organization of the workshop through an official request of the Ministry of Public Health to WHO in March 2019. But the workshop finally took place in August 2021 because of the public health restrictions on travel due to the COVID-19 pandemic. Before the workshop, a series of pre-workshop

meetings were organized with representatives from WHO (country and African regional offices), representatives from WOAHA, a national task force constituted with representatives from the Ministry of Public Health, the Ministry of Livestock, Fisheries, and Animal Industries, the Ministry of Environment, Nature Protection, and Sustainable Development, and the National Program for the Prevention and Control of Emerging and Re-Emerging Zoonosis. The main objectives of the pre-workshop meetings were to present the approach and process of the workshop to the country ministry representatives, validate the agenda, ensure that the minimum number of required participants would be present, and emphasize the country's ownership and leadership of the overall process.

A session during the pre-workshop concerned the development of the simulation scenario, which engaged the national task force. Five common diseases were agreed upon by the ministries to be used during preparatory meetings for short outbreak scenarios and used as case studies during the workshop. Rabies, monkey pox, and avian influenza were selected because they are on the list of Priority Zoonotic Diseases (PZDs) under surveillance in the country and have caused outbreaks in the past. Although not a zoonotic disease, cholera was selected because many outbreaks have been reported in the country and its control requires collaborative efforts between many sectors. COVID-19 was also selected mainly because it was an ongoing outbreak where the whole of the government's efforts were directed, and this could be an ideal burning situation that could help identify multisectoral collaboration gaps. The Ministry of Public Health provided scenarios for cholera, monkey pox, and COVID-19, and the Ministry of Livestock, Fisheries, and Animal Industries provided scenarios for rabies and avian influenza. In addition, the national taskforce also moderated the working groups and acted as chairperson during the workshop, alternating between the three sectors on a daily basis. Besides this, the last session concerned ways forward, ownership, and future implementation of the roadmap entirely led by the country's national task force.

#### (ii) Participant representation

The NBW requires representatives from different levels (national, sub-national, and local) to jointly share the actual status of collaboration and agree on how to operationalize the roadmap. A total of 66 national and international participants took part in the exercise. There was equal representation in the human and animal health sectors, with 36% each, and 23% from the environmental health sector. Other sectors, such as the Ministry in charge of Water and Energy and the Ministry in charge of Civil Protection, were also convened to the workshop up to the extent of 5%. The National Program for the Prevention and Control of Emerging and Re-Emerging Zoonosis participated in the exercise. The coordination of activity was conducted by the National Public Health Observatory, which is the IHR national focal point in Cameroon. National experts who have participated in PVS or JEE missions and technical partners such as WHO, WOAHA, FAO, Tackling Deadly Disease in Africa (TDDA), and Infectious Disease Detection and Surveillance (IDDS) were also represented. Based on a consensus, eight out of the 10 regions of the country were selected to represent the subnational and local levels in the exercise. The main selection criteria for these regions were that they have a strong livestock activity (either for economic or domestic purposes), favoring frequent human-animal interaction, and had recorded at least one zoonotic disease outbreak in the past. A total of 55% of participants came from the national level, 39% from the regional level, and 6% from the international level. The Ministry of Public Health selected participants from the human health sector; the Ministry of Livestock, Fisheries, and Animal Industries selected participants from the animal health sector; and the Ministry of Environment, Nature Protection, and Sustainable Development selected participants from the environmental sector. When selecting the participants, priority was given to those who participated in the JEE and/or PVS assessments. The invitation letter for all participants was signed by the Minister of Public Health, who

coordinated the activity through the IHR National Focal Point.

#### (iii) Interactive and participatory approach through group work

The Cameroon's NBWs were facilitated by two lead facilitators from WHO (one from the African Regional Office and one from the country office) and two national facilitators (one from the Ministry of Public Health and one from the Ministry of Livestock, Fisheries, and Animal Industries). During group discussions or plenary sessions, facilitators supervised groups without interfering in the discussions. Their individual experiences were not used to bias the discussions, where ultimately the solutions were discovered by the participants themselves. The purpose was to create a conducive environment to identify what works best for the country and how they can realistically improve the collaboration with locally grounded solutions that fit the Cameroonian system and context. To enable the full contribution of all participants, five groups were constituted according to the selected diseases. This set-up allows the stakeholders to self-assess their status of collaboration for the 15 key technical areas (Table 1).

#### (iv) Linking IHR and PVS sector-specific goals

Videos presenting the IHR and related assessment tools (SPAR and JEE) as well as the PVS pathway (PVS Evaluation and PVS Gap Analysis) were first projected to all participants to help them reach the same level of understanding of the two frameworks. In a session, participants mapped cards selected for strengths and weaknesses of collaboration during the disease-specific simulation (Table 1) onto a matrix built with both the JEE and the PVS indicators. This enabled stakeholders to visualize, on a snapshot, matching areas between the two sectors and their respective frameworks, as well as the general strengths and weaknesses of the collaboration on the priority diseases considered. Based on the collective analysis of the results, five technical areas showing the most important gaps were identified. The five technical areas prioritized for the road map were: coordination at all levels; risk analysis; education and training; surveillance, laboratory, and response; and communication. The human health sector participants consulted the PVS Evaluation report, and the animal health sector participants consulted the JEE report to extract key gaps and recommendations that are relevant for the operationalization of the One Health approach.

#### (v) Outputs of the IHR-PVS NBW

Using the assessment results from the case-study exercises as well as key extracts from the PVS and JEE reports, participants initiated the development of the joint roadmap through a brainstorming session. The identified activities were then further detailed on activity cards in order to make them as operational and concrete as possible. Notably, participants had to identify the process of implementation for each activity by detailing all the actionable steps to take. The final joint roadmap contained a total of 55 activities that the sectors have pledged to implement in order to fill the identified gaps and improve their future collaboration.

A rapid prioritization was then conducted, during which each participant selected five activities considered to be of the highest priority, based on cost and impact, by placing stickers on the activity cards. A total of 13 objectives were raised. Participants were then invited to re-prioritize only five objectives. A total of 45 participants submitted their votes by selecting the objectives and corresponding activities listed on the joint roadmap. The priority objective with the most votes (62%) was the establishment of a one-health platform at all levels and improving multisectoral communication at all levels (national, intermediate and operational). The second objective was related to building a One Health laboratory capacity and building stakeholder capacity for the One Health approach, which received 56% of the votes. Lastly, 40% of participants selected community sensitization using the One Health approach (Fig. 1).

**Table 1**  
performance of collaboration by technical area based on five diseases.

Technical areas	Rabies	Cholera	Monkey Pox	Avian influenza	COVID-19
Coordination at central level	1	2	1	1	1
Coordination at local level	1	2	1	1	1
Coordination at technical level	1	2	1	1	1
Legislation/Regulation	1	2	1	1	1
Finances	2	2	2	2	2
Communication with media	2	2	2	1	0
Communication with stakeholders	1	1	1	1	1
Cluster investigations	1	1	0	1	2
Risk analysis	1	2	1	2	0
Joint surveillance	1	1	1	1	1
Laboratory	1	2	1	0	0
Response	0	2	0	2	1
Education and training	2	1	1	2	1
Emergency funds	2	1	2	2	2
Humain ressources	1	2	1	1	1

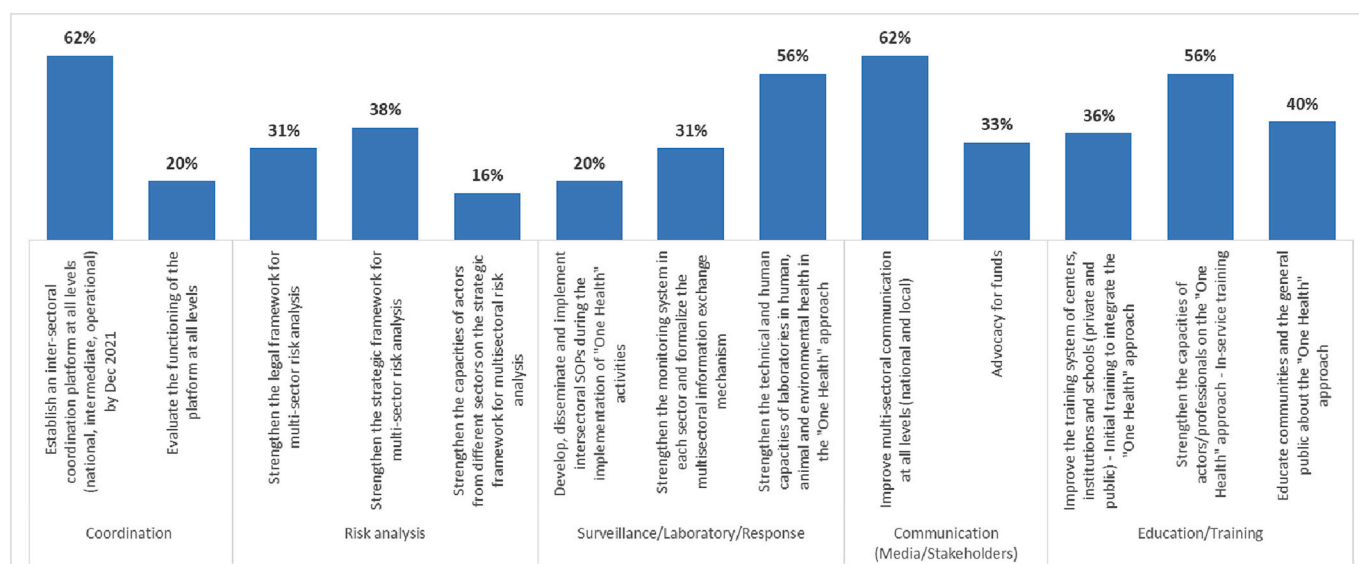
\*Legend: For each disease, the performance of collaboration between sectors is color-coded: green for “good collaboration,” yellow for “average collaboration,” and red for “collaboration that urgently needs improvement.” The score uses a semi-quantitative scale: 2 points for a red card, 1 point for a yellow card, and 0 points for a green card.

During the wrap-up session, the evaluation showed that 97% of participants were “satisfied” or “fully satisfied” with the workshop. A total of 96% of the participants reported that the workshop will have “significant impact” and 98% will have “a very high impact” on their Department’s work. A total of 98% of participants indicated that the workshop improved their knowledge of the One Health approach. All (100%) of the participants were in favor of involving other sectors in their daily activities, while 96% and 89% of the participants, respectively, indicated that during the workshop they had a better understanding of the IHR (2005) and the PVS assessment tools.

A total of 13 objectives and 55 activities were developed for the roadmap. **Table 2** below summarizes the total number of activities according to their cost and high impact. A total of 37 (67%) activities required low or moderate cost to be implemented, and 48 (87%) activities were identified to have a high impact on multisectoral

**Table 2**  
number of activities in the road map by cost/difficulty in implementation and impact.

Cost/Difficulty in implementing activities	Impact		Total
	Activities with potential moderate impact when implemented	Activities with potential high impact when implemented	
Low	1	8	9
Moderate	6	22	28
High	0	18	18
Total	7	48	55



**Fig. 1.** Priority objectives of the Cameroon One Health road map by technical areas.

collaboration.

#### 4. Discussion

##### (i) High-level engagement and country ownership

The country's high level political engagement was demonstrated by the Ministry of Public Health reaching out to WHO in order to request external support to carry out the IHR-PVS NBW and the attendance of a significant number of high level government workers from several sectors, which were pulled into a three-day's workshop. However, unlike Indonesia and Morocco [1], the workshop was not funded with domestic funds. The involvement of a national task force from the three key sectors, very early in the preparation process, in the facilitation and chairing of the sessions was instrumental in generating buy-in and a sense of ownership for the resulting joint roadmap. Anchoring the joint roadmap into an already existing plan is a contributing factor to the uptake of the roadmap [1]. This is seen in Bhutan, Kazakhstan, and Nigeria, where the joint activities identified during the NBW were anchored into the One Health Strategic Plan, and Jordan and Pakistan, where the activities of the NBW roadmap were inserted into the National Action Plan for Health Security (NAPHS) [1]. Unfortunately, this was not done in Cameroon. Indeed, the NAPHS 2019–2024 was developed in 2018, prior to this NBW. However, it was recommended that the activities from the joint roadmap be incorporated into the annual operational plans. However, the NBWs have provided countries with opportunities to review and identify the critical gaps in coordination mechanisms among all relevant ministries, agencies, and stakeholders for optimal actions to address zoonotic diseases and other complex events at the human-animal-environment interface, whether it comes before or after other relevant One Health instruments and documents. Results from several NBWs indicated that there is a need for strong and sustainable multisectoral coordination mechanisms in countries to address the outbreak of zoonotic diseases. To improve and/or strengthen the multisectoral coordination mechanism, or national One Health platforms, the WHO-FAO-WOAH tripartite has developed a Multi-sectoral Coordination Mechanism Operational Tool (MCM-OT), which was piloted in a few countries, including Kazakhstan, Kenya, Armenia, and The Gambia. This instrument should be utilized by the Cameroon government to evaluate its coordination mechanism to support One Health activities.

##### (ii) Participant representation

One of the key successes of the workshop was attributed to the prior experience of participants in the JEE and PVS assessments. This situation was different in Azerbaijan, where the first pilot NBW was conducted and where it was reported that the low level of knowledge of the participants on the IHR (2005) and the PVS Pathway limited the capacity for sectors involved to engage in the discussion of outputs reported for both the IHR and the PVS [1]. Another element of success in Cameroon's NBW was the number of participants who attended the workshop there. This number was consistent with the recommended 50–90 participants [1]. Considering the very active role they played throughout the workshop, there was an approximately equal distribution of participants between the human health, animal health, and less so for the environmental health sector. This representation is different from the recommended distribution, with about half from the human health and animal health sectors and a few representatives of other relevant sectors [1]. In addition, the representation of the different levels of the administration was respected, as it was documented that challenges with the operationalization of One Health are often reported at the subnational level [14]. This mixed distribution of sectors and levels encouraged a diversity of points of view throughout the chain of command and throughout the country. This will also facilitate ownership across all sectors and increase the likelihood of implementation across all sectors.

##### (iii) Interactive and participatory approach with robust facilitation

The need for regular interactions between the human health, animal health, and environment sectors was widely documented and systematically mentioned in the JEE reports across all relevant technical areas [8]. The design of the NBW facilitated the engagement of the stakeholders by using user-friendly materials. This was very helpful in breaking the ice between the different sectors and levels. The NBW was organized in group sessions, allowing easy interactions and participants to express themselves and engage more openly, and allowing every participant to feel comfortable sharing their thoughts and experiences. The interactive process facilitated the brainstorming phase, helping participants identify concrete solutions that were homegrown and fit the reality on the field.

##### (iv) Linkages with IHR and PVS sector-specific goals

The visual illustration of the human-animal health interface in the IHR-PVS matrix facilitated the identification of bridges between the IHR and PVS frameworks. Indeed, the matrix crosses the indicators of the IHR (in rows) and the critical competencies of the PVS Pathway (in columns). The same situation was reported in Thailand (and subsequent NBWs), where the IHR-PVS matrix enabled stakeholders to easily visualize the links between the two sectors and the two frameworks [1]. In addition, allowing the human health stakeholders to be confronted with the PVS report and the animal health stakeholders to be confronted with the JEE report to extract key gaps and recommendations for the joint road map enabled a more concrete connection between the two sectors. Furthermore, (i) it allowed participants to highlight complementarities between the two frameworks; (ii) it helped to inform all sectors about the IHR (2005) and its importance; (iii) it allowed the human health sector to improve its understanding of the objectives and activities of the veterinary services and identify possible synergies for an upgraded performance [8]. This practice constituted an advantage to enable full engagement and appropriation of the output of the NBW by the stakeholders so that required adjustments at the human-animal-environment interface are made.

##### (v) Outputs of the IHR-PVS NBW

A high proportion of participants who attended the IHR-PVS NBW expressed a good level of satisfaction and reported that the workshop will have a great impact on their departments' works, when they return to their official schedules in the office. Same results were reported from the analysis of the post-workshop questionnaire from 32 countries, where a 97.7% overall satisfaction rate was recorded among participants, and 80.6% of participants reported that the workshop would have a high impact level on strengthening the collaboration, coordination, and communication between the human health and animal health sectors in their country [1]. In Cameroon, 98% of the participants reported they would recommend the NBW to other countries.

#### 5. Study limitations

The methodology of the workshop is based on the country's self-assessment, which can add bias and subjectivity into the results. The session was conducted in a short amount of time, which may not have allowed for appropriate in-depth analysis and capacity building. The National IHR-PVS Bridging Workshop is a method for strengthening the capacities of countries to meet their obligations under IHR and PVS. The success of the workshop also depends on the government's willingness to execute the recommendations and develop the nation's health and veterinary systems, which is not always guaranteed.

## 6. Conclusions

In Cameroon, the NBW provided the opportunity for the human, animal, and environmental health sectors to jointly review the results of the IHR (JEE) and PVS pathways. It allowed consensus on tangible and operational activities to fill the gaps in their coordination to build health security capacities. The NBWs are a very flexible tool, as in Cameroon, a water-borne disease such as cholera was used as a scenario to discuss the strengths and weaknesses of multisectoral collaboration. The government endorsed and recognized that the prioritized technical areas were vital points to foster collaboration between both sectors. Defined activities are the key instruments to gain synergy in the work of human and veterinary services in Cameroon. The engagement of a multisectoral core team early in the preparatory process was a key contributing factor to the success of the workshop. This exercise has reinforced the need for a strong and well-established One Health platform in the country. Indeed, both sectors recognized the importance of a “One Health” approach, which is key to implementing the joint interventions. Through this exercise based on integrating sector-specific and collaborative goals, the NBWs have enabled Cameroon to create a realistic, concrete, and practical output (a joint road map) for enhanced compliance with international standards. The output from the NBW will guide the prioritization of strategic actions in the NAPHS annual operational plans. This output will also guide national authorities in establishing a coordination mechanism for multisectoral, One Health coordination to manage zoonotic diseases and other One Health threats. Joint activities under the surveillance technical area will serve as baseline needs for the establishment of coordinated multisectoral surveillance and information sharing for zoonotic diseases to enable early detection of health threats and timely routine data sharing among sectors involved to support a well-coordinated response. Finally, it would provide the preliminary information necessary to implement the joint risk assessment of zoonotic disease threats.

## 7. Recommendations

1. The priority objectives of the road map should be seen as a pathway to follow and a robust understanding of how to convert the gaps identified in the collaboration between the two sectors into strengths to be better prepared for future health emergencies.
2. While it is understood that the IHR/PVS NBW concerns the animal and human sectors, it would be crucial to also look into interconnections with other sectors, including the environment sector as well. Such bridging, including the environmental sector, will allow a stronger linkage of sectors all together for a more robust “One Health” approach to emerging public health threats.

## Ethical considerations

The need for ethical approval was waived by the Institutional Review Board of the National Public Health Observatory, because of the retrospective nature of the study. Participants were nominated by their institution and written informed consent was obtained from all subjects. All methods were performed in accordance with the relevant guidelines and regulations [1] or declaration of Helsinki.

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## CRediT authorship contribution statement

**Viviane Ndoungué Fossou:** Conceptualization, Methodology, Writing – original draft, Data curation, Writing – review & editing. **Djamilla Bello:** Conceptualization, Methodology. **Jean Marc Feussom Kameni:** Conceptualization, Methodology. **Antoine Damou Lamtoing:**

Conceptualization, Methodology. **Christian Emmanuel Douba Epee:** Conceptualization, Methodology. **Salla Abdou:** Conceptualization, Methodology, Writing – review & editing. **Mohamed Moctar Mouiche Mouloum:** Writing – review & editing, Validation. **Omer T. Njajou:** Writing – review & editing. **Traoré Tieblé:** Conceptualization, Methodology, Writing – review & editing, Data curation. **Roland Kimbi Wango:** Writing – review & editing. **Guillaume Belot:** Writing – review & editing. **Serge Agbo Kouadio:** Writing – review & editing. **Stéphane de La Rocque:** Writing – review & editing, Supervision.

## Declaration of Competing Interest

None.

## Data availability

Data will be made available on request.

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