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Program evaluation

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Julien Derdevet, Dembélé Boubacar Siidiki, Vincent Falgairou, Djeri Amani Molamba

Corresponding author: Djeri Amani Molamba, International Operations Division, International Health Department, Vanne, Montrouge, France. djeriamani.molamba@croix-rouge.fr

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Implementation of a One Health approach in the Far North of Cameroon: a narrative report

Julien Derdevet[1], Dembélé Boubacar Siidiki[1], Vincent Falgairou[1], Djeri Amani Molamba[1,&]

[1]International Operations Division, International Health Department, Vanne, Montrouge, France

[&]**Corresponding author**

Djeri Amani Molamba, International Operations Division, International Health Department, Vanne, Montrouge, France

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Abstract

For decades, the One Health approach has been recognized as a priority for effectively preventing and responding to zoonoses. There have been, however, few reports of its applications at local level, especially in African countries and in humanitarians contexts. For decades, the Far North of Cameroon has been suffering from crises - exacerbated by global warming (floods and droughts). This article describes practical examples of One Health implementation in a humanitarian context, analyzing the successes and challenges encountered. Various activities have been carried out, including training sessions, radio broadcasts using the Radiobox® tool and the setting up a community-based surveillance (CBS) system. This evaluation followed a mixed retrospective-observational multicentred approach, combining quantitative indicators for epidemiological data and qualitative indicators (semi-structured interviews), collected from key stakeholders. The One Health approach has been implemented in 4 departments of the Far North region from April 2022 to June 2025. A total of 840 community members received training on zoonoses, and 602 radio programs were also broadcast. The CBS has been deployed in 35 health zones, with good responsiveness, acceptability and perceived usefulness by stakeholders and the community. Two hundred and sixteen (216) cases of zoonoses were reported, including 195 suspected cases of rabies whose management was improved thanks to better coordination. The One Health approach, in particular through the creation of departmental One Health committees, was seen as simple, useful and relevant by most of the stakeholders involved. Its practical integration, however, is hampered by challenges (weak laboratory networks, uncoordinated database management, etc.), the most important remaining sustainable funding.

Introduction

There is no need to demonstrate the importance of a One Health approach to prevent, detect, and respond to the emergence of zoonotic diseases. Defined in 2008 as *"the collaborative effort of multiple disciplines - working locally, nationally, and globally - to attain optimal health for people, animals, and our environment"* [1], the One Health approach has since gradually become essential in the response to today's major epidemics (avian influenza (H5N1), Ebola, SARS-CoV-2, etc.) and those to come. While this approach has since been recognized as a priority [2,3], concrete applications at local levels have been relatively little documented - particularly in African countries. Some countries, such as Kenya, have succeeded in developing a national global health program, with the formation of multidisciplinary committees that are progressively decentralized down to the county level [4,5]. Several procedures have also been proposed for defining priority zoonosis at the regional and national level, and for each of these, the multidisciplinary cooperation required to strengthen surveillance and epidemic response [6,7]. For decades, the Far North of Cameroon has been suffering from a succession of crises, exacerbated by global warming (floods and droughts). Since 2021, the French Red Cross (FRC), in collaboration with the Cameroonian Red Cross (CRC), and as part of the Pilot Programmatic Partnership (PPP) financed by the European Union (DG ECHO), has set up a zoonosis control program by implementing a One Health approach. This project aims to improve preparedness, prevention, and response to diseases with epidemic potential, including zoonosis, by strengthening this approach in the region. This article aims to contribute to the description of concrete examples of implementation of a One Health approach in a humanitarian crisis context, identifying and analyzing the successes and challenges encountered.

Project background and description

Humanitarian background: this project in the Far North of Cameroon was carried out at the request of public authorities and the Cameroonian Red Cross (CRC), in a complex humanitarian context. Geographically, the region is characterized by a

mixed climate: arid in the north, and more tropical in the south. The area is also prone to droughts and floods - the last major one having occurred at the end of 2024, with more than 360,000 people affected [8]. Demographically speaking, the region has seen a population boom in recent decades, rising to a projected 5.3 million inhabitants in 2024 (88.9 inhabitants/km^2) [9]. Fifty three percent (53%) of the working population earn their living from growing cereals or raising livestock (cattle, sheep, goats, etc.) [9]. In addition, the insecurity created by the incursion of non-state armed groups has also led to regular population movements and added pressure in a region where public services are poorly resourced and poverty levels remain high. By January 2025, it was estimated that over 730,000 people were forcibly displaced, and over 1.2 million were in need [10]. In epidemiological terms, infectious diseases continue to play a major role, with vaccination-preventable diseases (yellow fever, measles, meningitis, etc.) and, of course, vector-borne diseases (mainly malaria) continuing to weigh heavily [11]. The zoonoses play a significant role, too, given that the majority of signals detected by national event-based surveillance (EBS) in 2022 concerned snake and dog bites [11].

Project implementation: the project was implemented in four departments (Logone et Chari, Mayo-Danay, Mayo-Kani, and Diamaré) from April 2022 to June 2025. Various activities were conducted to strengthen cooperation among stakeholders.

Departmental One Health committees: were created - after officialization by prefectoral decree (054/AP/K23/SAAJP) - in each department involved. Each of them had 8 members: 1 chairman (departmental prefect), 2 rapporteurs from animal health (departmental delegate for livestock, fisheries, and animal industries) and human health (head of the health district) and 5 members (departmental delegate for agriculture and rural development, delegate for communication, delegate for the environment, nature protection and sustainable development, delegate for forests and wildlife, and representative of the Cameroonian Red Cross/French Red Cross). Each committee met quarterly, intending to improve coordination between veterinary and human health players, helping to raise public and local stakeholders' awareness of zoonosis, and keeping an epidemiological watch. These activities were funded exclusively by the French Red Cross.

A community-based epidemiological surveillance (CBS): system was also set up over the same period. The evaluation of this system - also deployed in Chad, Niger, and the DRC - is described in greater detail in a dedicated article. It was briefly set up in 36 health areas in 4 districts (Kousseri, Maroua 3, Moutourwa and Vele). Aimed primarily at the infectious diseases that are most prevalent in the region (cholera, yellow fever, measles, etc.), it also included some zoonoses (rabies, Guinean worm, Mpox, etc.). Community volunteers were recruited, and underwent training focusing on recognizing diseases under surveillance - using community case definition [12,13] but also including sensibilization on zoonosis and the One Health approach. They then conducted regular home visits to an assigned village. When they detected a suspect case, the volunteers reported it to the supervisor, who confirmed the alert and passed it on to the health center manager if necessary. Detection and reporting of any event of public health interest within a community (event-based surveillance, EBS) was also carried out. Confirmed cases taken into care in health centers were then reported - in the same way as the passive epidemiological surveillance - to the epidemiological surveillance officers in the health district and then at the regional level (DHIS 2 since 2023 for Cameroon).

Training sessions: in addition, several training sessions were also held. It concerned in particular the training of various stakeholders (health center managers, medical and paramedical staff, veterinarians, mothers' club, hygiene committee, etc.) in the One Health approach, the fight against

zoonosis, and community-based surveillance - between March 2022 and August 2024. Training in infection prevention and hygiene and sanitation awareness has also been carried out - notably in schools. Several volunteers were finally trained in the use of Radiobox®. Briefly, it's a portable, easy-to-use radio recording studio for hosting and recording radio programs in and with community members. Several interactive radio programs and awareness-raising spots were broadcast - in different languages (Choas Arabic, Guiziga, Fulfuldé, French, Massa) - on zoonosis (rabies, mpox) and water-borne diseases (cholera, poliomyelitis, etc).

Methods

These activities were evaluated using a descriptive, mixed (quantitative and qualitative), retrospective, and multicentered approach.

Community-based surveillance evaluation: for the CBS evaluation, recommendations published by the WHO [12] and the IFRC [13] were followed, and all alerts reported from January 2022 to March 2025 were analyzed. The evaluation was carried out using the criteria expected of an available epidemiological surveillance system [14,15]. Based on the main comparable articles identified [16-20], several evaluation criteria were used (perceived usefulness, simplicity, reactivity, alert sensitivity, acceptability, adaptability, sustainability, etc.). A definition for each of these criteria is given in Annex 1.

Qualitative evaluation: for the qualitative evaluation, all stakeholders involved in the implementation of the One Health approach (members of One Health committees, health district managers, members of provincial or departmental CRC, managers of health areas, community volunteers involved in CBS, etc.) were interviewed, using semi-structured questionnaires written in French. Open interviews were also conducted with members of One Health committees and health district managers. For the community volunteers involved in CBS, a sampling was carried out - based on a random draw with stratification by gender (female/male ratio 1: 1) and health district (minimum 1 community volunteer per health district). A target of at least 20 volunteers was set. A supplementary list of volunteers was also drawn up, to compensate for participants who could not be reached during the evaluation period or who refused to take part in the evaluation. The interviews were conducted in French by members of the CRC and the FRC - keeping the investigators' direct involvement in the program or hierarchical relationship with the interviewee to a minimum.

Ethical considerations: the ethical principles associated with research were observed to the greatest possible extent. Each participant in the qualitative evaluation received oral and written information, describing the purpose of the evaluation, his or her rights with regard to the answers collected, and how the information gathered would be processed. Written consent was obtained from all participants. All information, which could lead to the identification of participants or suspected cases, was removed. Quantitative epidemiological data and responses to the qualitative evaluation were collected using Excel software (Version 2503). Statistical analysis of the quantitative results was carried out using R Studio software (version 2024.12.1). Confidence intervals were calculated using the binomial distribution (exact method), and statistical tests were performed using the Chi-2 test.

Results

Between March 2022 and July 2024, a total of 840 community members received training on zoonosis and CBS (283 community members involved in the CBS, 350 members of mothers' clubs, and 207 members of hygiene committees). Six hundred and two (602) radio programs were broadcast between October 2023 and December 2024. A total of 72 stakeholders were interviewed between February and March 2025, including 5

members of the One Health committee, 24 CBS community volunteers, 35 health center managers, 4 CRC departmental representatives, and 4 health district managers.

CBS evaluation: for CBS, a total of 158 community volunteers were recruited, 32.9% of them women (52/158, CI95% [25.7-40.8]). Thirty-three percent (33.3%) of volunteers surveyed (8/24, CI95% [15.6-55.3]) had no financial resources apart from the volunteer daily allowance. The CBS program was first characterized by relatively good responsiveness, since 72.7% of suspect cases were investigated within 24 hours of notification (CI95% [71.1-74.2]). Acceptance by the community also appeared to be good - 91.7% of volunteers (22/24, CI95% [73-99]) said their monitoring work was fully accepted. Overall, all the stakeholders involved also testified to the perceived usefulness of CBS. All the volunteers interviewed (24/24, CI95% [85.8-100]) and health center managers (35/35, CI95% [90-100]) considered it to be a relevant and sustainable means of preventing epidemics. Finally, the sensitivity of alerts (syndromic case confirmed by the supervisor) was high (89.1%, CI95% [88-90.2]) compared to other CBS programs [21]. However, a number of areas for improvement were highlighted, including logistical support (travel, communication, etc.), lack of human resources, ongoing training for community volunteers, and communication of results. It should also be noted that only 4.4% of suspected cases (148/3352, CI 95% [3.7-5.2]) were sampled, with very few of them reporting microbiological results.

A total of 216 suspected cases of zoonoses were reported, including 195 suspected cases of rabies. community-based epidemiological surveillance (CBS) was also associated with event-based surveillance (EBS), which involves reporting all unusual events of potential public health interest. Even though this may potentially reduce the sensitivity of alerts, it has enabled the reporting of various alerts related to epizootics (unusual livestock deaths or abortions, etc.) or exposure to wildlife (snake bites, etc.). Community volunteers were also asked about the One Health approach. Their main responses are summarized in Figure 1. In terms of implementation, 62.5% of the volunteers surveyed (15/24, CI95% [40.6-81.2]) felt that integrating this approach into the CBS was simple; the remainder regretting the lack of logistical support (travel, communication, etc.), but also a lack of understanding of the roles and responsibilities of each party, or a difficulty in gaining the trust of the community at the start of the project. In terms of usefulness, all volunteers (24/24, CI95% [85.6-100]) declared that the One Health approach - as implemented - corresponds to the needs of their community. In addition to epidemiological surveillance of zoonosis (CBS) and unusual events (EBS), they report that the approach has strengthened communication and coordination between local players, as well as awareness and knowledge of zoonosis; some noted an increase in the use of livestock vaccination, for example. Finally, 91.7% of the volunteers surveyed (22/24, CI95 [73-99]) reported good integration of this approach with other local health programs; citing as examples joint investigation work with veterinary centers (MINEPIA) and environmental managers (fauna and forestry) in the event of animal bites, rabies vaccination campaigns or support for waste sorting and management following national vaccination campaigns.

Coordination of stakeholders in epidemic response (the example of rabies): the integration of a One Health approach here has focused primarily on the response to zoonosis. The main problem encountered during the project period remains rabies, with 5 human infections notified in 2022 in the region [11], and a recurrence of bites by domestic (dogs) or wild animals - especially in children. Figure 2 summarizes the concrete changes in reporting a suspected case of rabies. In short, integrating this approach has strengthened local multidisciplinary collaboration in the investigation of suspected rabies cases. It has strengthened coordination between health centers and the departmental directorates of the

Ministry of Livestock (MINEPIA), firstly by setting up, under the aegis of One Health committees, teams involving veterinary and human health staff, and investigating suspected animal and human cases potentially linked to the virus transmission chain. The One Health committees were also an opportunity to provide a framework for discussion between the heads of the health districts (human health) and the departmental heads of the Ministry of Livestock (MINEPIA), enabling experience to be shared and the information feedback process to be optimized. Finally, the support in transporting samples facilitated microbiological analysis.

Functioning and sustainability of One Health committees: as part of the assessment, members of the One Health committees were also interviewed. A total of 5 people were interviewed, including members (3), rapporteurs (1) and chairmen (1). The answers to the main questions are summarized in Figure 3. From an organizational point of view, the committees interviewed all met quarterly and reached their decisions by consensus. In addition to committee members, the majority reported working in coordination with local authorities (4/5), veterinary services (4/5), and environmental protection organizations (3/5) present on site. Only 60% of members surveyed, however (3/5, CI95% [14.7-94.7]) reported regular involvement of local authorities; the others preferred to speak of one-off interventions during workshops or field campaigns. Overall, the majority indicated that the recommendations they issued were generally applied (4/5, CI95% [28.4-99.5]). Concerning the implementation of these committees, various resources were provided within the framework of this project to ensure their proper functioning (financial and logistical support (vehicles, computers, diagnostic tools, etc.), training, technical support, etc.). Most of those questioned (4/5, CI95% [28.4-99.5]), however, felt that this support had not been sufficient, citing the lack of logistical support for investigating difficult-to-access areas, transporting biological samples, etc.

Finally, in terms of adaptability, all (5/5, CI95% [47.8-100]) responded that the One Health approach, as implemented, seemed to be a relevant means of detecting the emergence of a hitherto unknown pathogen in their health district. In terms of usefulness, all were enthusiastic, noting a very positive impact on the detection and management of epidemics - notably cases of rabies and the cholera epidemic in 2024. None of the members interviewed, however, mentioned the existence of a plan to ensure the sustainability of actions after the end of the project (0/5, CI95% [0-52.2]); citing the persistent lack of funding (5/5), the lack of logistical support and adapted tools (2/5), or the lack of coordination with local authorities (1/5). The same observation was made by the managers of the Moutourwa, Vele, Maroua 3 and Kousseri health districts (Figure 4). Few of them considered that the implementation of the One Health approach had been straightforward at the start of the project (1/4) - mainly due to a lack of clarification of roles and responsibilities. But all the managers interviewed, however, felt that it had subsequently integrated well into the local surveillance system (4/4). In terms of adaptability, all of them (4/4) felt that this approach was a relevant means of detecting the emergence of a hitherto unknown pathogen, and saw a significant impact on the detection and management of epidemics (4/4); noting a better coordination between players, improved knowledge of zoonoses, and better detection of suspected cases. Concerning sustainability, all districts (4/4) stated that they would continue to integrate this approach after the end of the project. Many challenges remain, however, to be overcome, such as the lack of dedicated funding (4/4), the lack of logistical support (3/4), and the persistent lack of coordination (2/4) with local players. All stress the need to maintain international financial support in order to embed the concept of One Health more sustainably at the local level, with greater community involvement.

Discussion

This study suggests that integrating a One Health approach at the local level is possible, even in a complex humanitarian crisis context. By setting up local committees, integrating epidemiological surveillance, training key stakeholders and raising general community awareness, this *"collaborative effort of multiple disciplines" that characterizes this approach [1] seems to have enabled better coordination between* stakeholders in human, veterinary health and the environment, in liaison with public authorities; with finally, better preparation, prevention, and response to zoonosis.

It should be remembered, however, that this project is not the first attempt to integrate such an approach in Cameroon. A significant proportion of the population lives in rural areas, where livestock and wildlife are still an important source of income. Several emerging zoonoses (Rift Valley, mpox, Ebola, etc.) have also hit neighboring countries over the past decade. In 2012, the country therefore adopted a national program for the prevention and control of emerging and re-emerging zoonoses [22]. With a view to reinforcing the One Health approach, this program set itself the objective of *"strengthening collaboration between national animal health (domestic and wildlife), human health and environmental health services"* by reinforcing epidemiological surveillance, basic research and training on zoonosis. Multidisciplinary national technical steering committees have been set up, with also a view to organizing meetings with decentralized State services (departmental/regional ministerial departments, decentralized local authorities) to oversee program implementation at the local level. It should also be remembered that Cameroon is a member of the Global Alliance for Rabies Control, a Pan-African Rabies Control Network (PARACON) created in 2015 to bring together all the existing rabies networks. In this context, rabies has been recognized as one of the country's five priority diseases, and a Stepwise Approach towards Rabies Elimination (SARE) has been implemented since 2017 [23]. Unfortunately, however, these programs and commitments have yet to be put into practice at the local level. There are many challenges to the practical integration of a One Health approach [4,6], and several methods have already been published to identify priority actions and strengthen national and regional intersectoral collaboration for concerted disease surveillance and epidemic preparedness (One Health Zoonotic Disease Prioritization (OHZDP) from CDC, Regional Disease Surveillance Systems Enhancement (REDISSE) from World Bank group, etc.). A number of challenges seen in this program, however, are worth highlighting.

First, in terms of coordination, while the creation of One Health committees has helped to strengthen cooperation, the lack of a clear division of roles and responsibilities between stakeholders remains an area for improvement, as reported by health districts and members of committees. Even though departmental prefects chair these committees, local authorities - mayors in particular - still seem also to be far too little involved in this approach. One solution would be to involve mayors more closely in promoting human, animal, and environmental health. Similarly, certain key stakeholders in the environmental field (industrial companies) or human health (traditional doctors, community leaders) also deserve to be more closely integrated into health promotion activities, for infectious diseases, but also for all the challenges linked to future climate change (drought and water management plans, flooding, etc.). Because it touches on deeply rooted economic and cultural practices, greater involvement of the community and community leaders seems to be one of the keys to guaranteeing the success and acculturation of the One Health approach. The same projects carried out by FRC in Chad, Niger, and the DRC, with less convincing results despite a similar approach, illustrate this: the involvement of communities and public authorities remain two

essential conditions for integrating a global approach to health recognized by local players. The development of national and international working groups, as mentioned above, and the growing number of post-graduate programs dedicated to this approach [3], including in sub-Saharan African countries, are encouraging signs that an international One Health culture is taking root.

While the initial ambitions of the One Health committees and their training programs covered a wide range of aspects, it is also noteworthy that most initiatives have focused on zoonosis prevention, leaving relatively little room for environmental and nutritional aspects. This is, of course, due to the framework within which the project is being carried out, which focuses on epidemic preparedness. Future projects could, however, take greater account of environmental considerations, both in the prevention of transmissible diseases (vector-borne diseases, medical waste and wastewater management, etc.) and non-transmissible diseases (rational use of pesticides, non-chemical pest control, rational water management, etc.).

Lastly, but not least, the main challenge is probably the overall lack of financial and logistical resources. Whether it's the community volunteers involved in CBS, the health districts, or the One Health committees, all have highlighted this lack of logistical support as a notable obstacle to the successful integration of this approach. The weakness of laboratory networks in low-income countries remains besides a recurrent obstacle to the implementation of the integrated disease surveillance and response (IDSR) strategy; for human health and *a fortiori* for animal health [24]. The lack of coordination in database management, not only between the human and veterinary health sectors, but also between human pathologies (diseases included in DIHS2 versus those that are not) also remains a major challenge. Although the integration of a One Health approach is enthusiastically welcomed by most of the stakeholders, it seems so unlikely that it can be achieved without substantial, long-term financial support.

This issue raises the issue of the sustainability of these committees. Serious doubts can be raised in this respect, given that none mentioned the existence of a plan to ensure the sustainability of the actions, entirely financed by the Red Cross. The perceived usefulness of the various players (community volunteers, health districts, etc.), as well as the announced willingness of the health districts to continue integrating a global health approach after the end of the project, are certainly encouraging elements. Additional international funding, targeted at raising community awareness of the challenges of the One Health approach, would undoubtedly also be appropriate - if only to accelerate the acculturation of this approach into local practices and the integration of One Health committees in the national health system. However, the definition of a long-term financing model involving the public authorities - as is the case here in Cameroon with the national program [22], but also in Guinea or Kenya [4,6] - seems essential to ensure the sustainability of these actions.

Conclusion

Limitations: this evaluation, although carried out as far as possible by staff not directly involved in the project, was first and foremost carried out by CRC and FRC staff. Despite the desire for impartiality and the carrying out of standardized interviews with open questions as unbiased as possible, this constitutes a conflict of interest that potentially influencing the results. The interviews were also conducted in French, which may have led some volunteers to misunderstand the questions. The absence of several information - mainly the lack of systematic microbiological testing - also limits the interpretation of quantitative indicators, including the sensitivity of the events identified. Finally, it was not possible to survey a representative sample of the population targeted by this program.

Adopting a One Health approach has improved the response to health emergencies in the Far North of Cameroon, thereby indicating the effectiveness of synergy between human, animal, and environmental health sectors. By setting up One Health departmental committees, integrating epidemiological CBS for zoonosis, training key stakeholders, and raising general community awareness, this project effectively decentralized the One Health concept at the local level. The involvement of communities and public authorities seems to have been one of the key factors in the success of this project. The practical integration of this approach, however, is hampered by a number of challenges (better integration of environmental considerations, lack of logistical resources, weakness of laboratory networks, and uncoordinated database management, etc.), the most important of which is sustainable funding.

Competing interests

The authors declare no competing interests.

Authors' contributions

Dembélé Boubacar Siidiki and Djeri Amani Molamba were actively involved in the design and management of the project. Dembélé Boubacar Siidiki, Djeri Amani Molamba and Julien Derdevet designed and conducted this evaluation. Julien Derdevet took part in analyzing the responses and writing the article, under the supervision and proofread of Djeri Amani Molamba. Vincent Falgairou provided his expertise to the design of the study and the analysis of this evaluation.

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Figures

Figure 1: rate of positive response from community volunteers to questions relating to the integration of a One Health approach into community-based surveillance (CBS); the average positive response for each question is shown at the top (%)

Figure 2: schema of the reporting process for suspected cases of human (blue) and veterinary (green) rabies; changes made with the integration of a One Health approach are indicated by the dotted arrows (red); inspired by C. Standley *et al.* One Health, 2019

Figure 3: rate of positive responses from One Health committees to questions relating to the integration of a One Health approach; the average positive response for each question is shown at the top (%)

Figure 4: rate of positive response from health districts to questions relating to the integration of a One health approach; the average positive response for each question is shown at the top (%)

Annex

Annex 1: definition of the criteria used to assess the CBS implementedn (PDF-62 KB)

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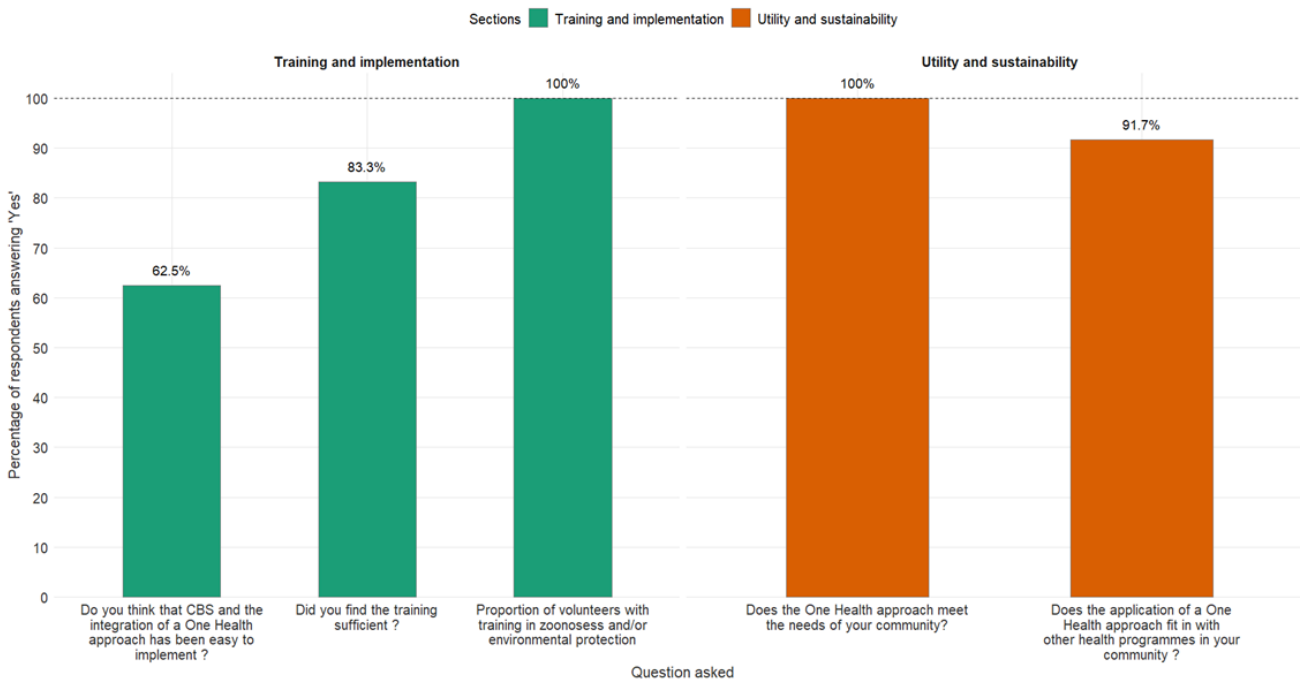

Figure 1: rate of positive response from community volunteers to questions relating to the integration of a One Health approach into community-based surveillance (CBS); the average positive response for each question is shown at the top (%)

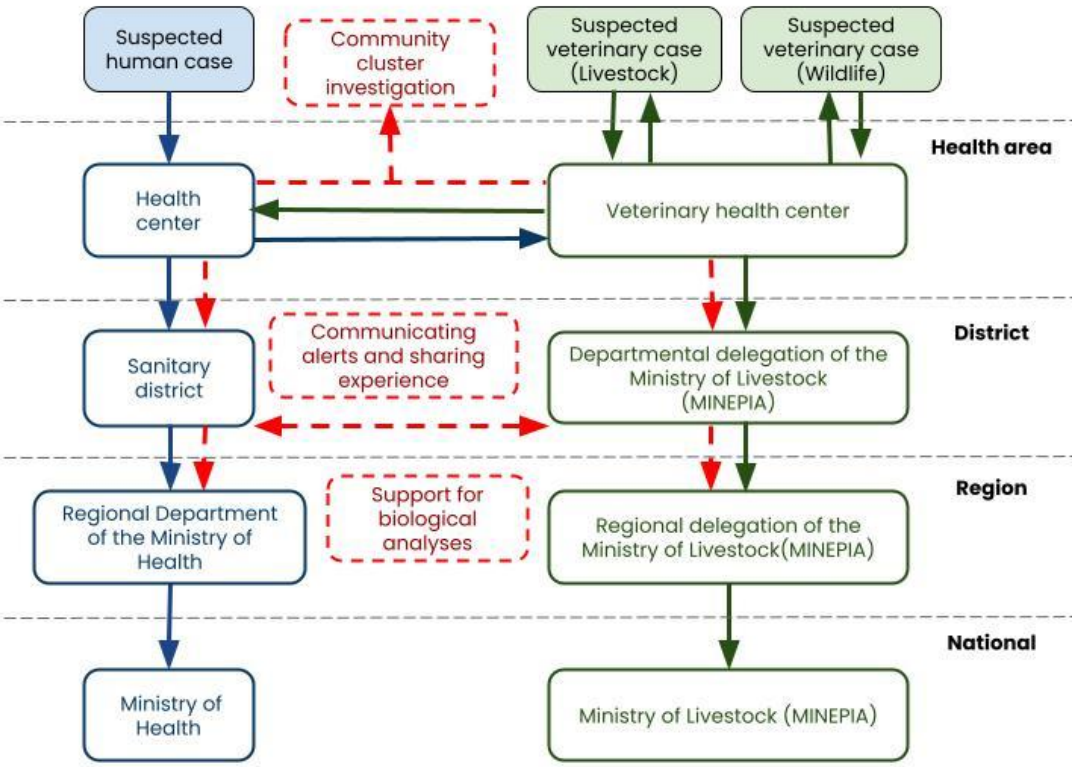

Figure 2: schema of the reporting process for suspected cases of human (blue) and veterinary (green) rabies; changes made with the integration of a One Health approach are indicated by the dotted arrows (red); inspired by C. Standley *et al.* One Health, 2019

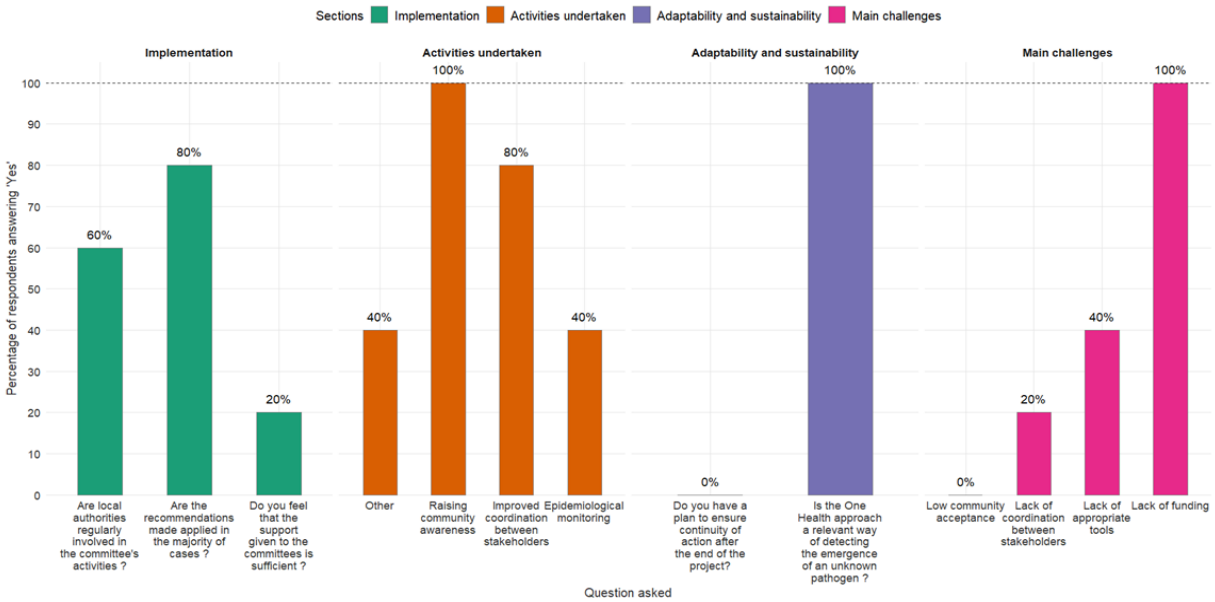

Figure 3: rate of positive responses from One Health committees to questions relating to the integration of a One Health approach; the average positive response for each question is shown at the top (%)

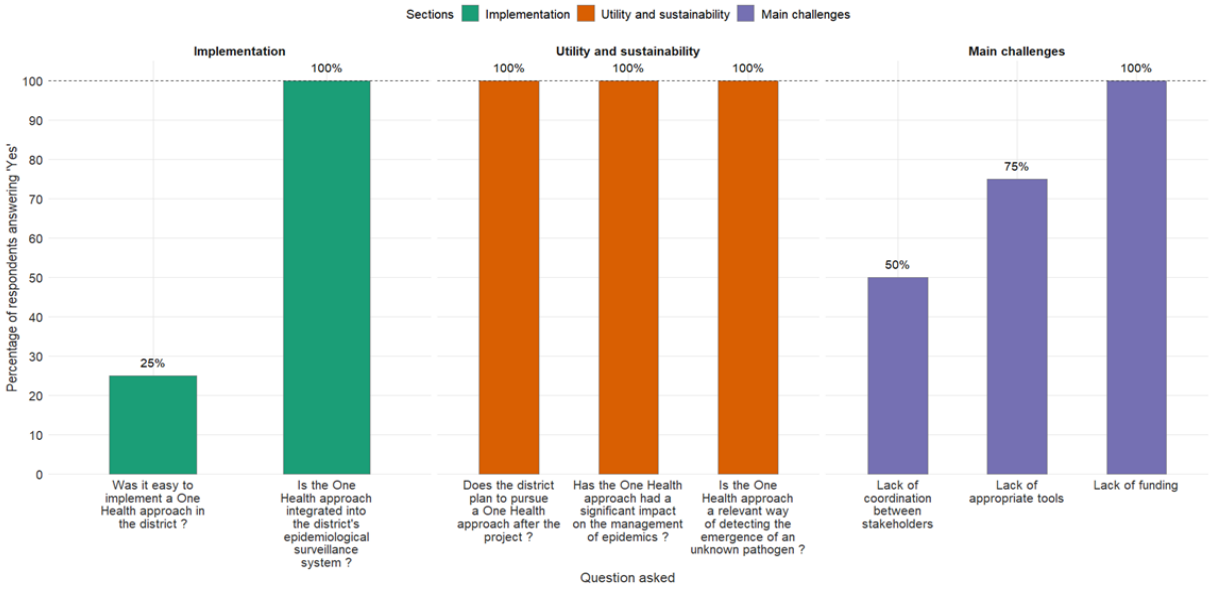

Figure 4: rate of positive response from health districts to questions relating to the integration of a One health approach; the average positive response for each question is shown at the top (%)