CABI

ONE HEALTH CASES

August 2024

Assessing One Health in Zambia: Necessity, Application and Operationalisation

In order to address inter-sectorial challenges affecting ecosystems, animals and human health, a "One Health" approach was adopted as a comprehensive, strategic and transdisciplinary reformative process in Zambia. Consequently, the Zambia National Public Health Institute (ZNPHI) was established to coordinate and operationalise One Health in Zambia.

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COHESA
Capacitating One Health in Eastern and Southern Africa

10.1079/onehealthcases.2024.0021

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Abstract

"*Capacitating One Health in Eastern and Southern Africa (COHESA)*" aims at facilitating the ownership, development, adoption, uptake and adaptation of One Health (OH) solutions in Eastern and Southern African region. Further, COHESA developed a set of tools to assess the OH landscape across various countries and the capacity to better approach their OH strategies. The assessment tool used desktop reviews, key informant interviews and focus group discussions. Implemented in Zambia, the data were triangulated through a synthesis process to generate this case. In Zambia, outside the Zambia National Public Health Institute (ZNPHI), no other physical or virtual infrastructure is solely dedicated to OH. The ZNPHI houses the OH physical infrastructure as well as other OH platforms for OH thinking, planning, coordination and working and information sharing and systemic organisation of all multi-sectoral activities concerning OH. It was observed that the OH was mostly accessed by the Ministries responsible for human and animal health. The environment and plant sectors were less represented. It was clear in Zambia that the operationalisation of OH has gone beyond the conceptual level with the production of the National OH Strategic plan and other key documents that guide the implementation of transdisciplinary activities. Additionally, research, innovation and governance around OH were found to be anchored on five thematic areas in Zambia: antimicrobial resistance (AMR); zoonoses control, food safety; toxicology research; and general OH policy issues. The country is moving towards an operational OH system, although there is still need for all disciplines to fully accept the approach.

What Makes this a One Health Case?

With the start of the COHESA project in 2021, the aim was to strengthen the Zambia National Public Health Institutes (ZNPHI) work alongside earlier programs such as the Southern African Centre for Infectious Disease Surveillance (SACIDS) and Africa Centre of Excellence for Infectious Diseases of Humans and Animals (ACEIDHA). The baseline assessment of OH in Zambia and how far these earlier programmes and government interventions tried into the institutionalisation of OH highlights the complexity of cross-sectoral collaboration.

For example, the ZNPHI works as the platform within Zambia that brings together all relevant actors in OH in order to ensure appropriate OH coordination and governance. This work has been challenging due to the longstanding siloed approach as well as engrained hierarchies between stakeholders; however, the integration of varied sectors has been beneficial to applied OH efforts within Zambia. Academia has

worked closely alongside stakeholders in OH governance to inform their activities, as well as train the future OH workforce.

Learning Outcomes

Working through this case will help one to achieve the following learning outcomes:

1. Assess the One Health status and governance platforms in Zambia
2. Evaluate One Health institutionalisation and operationalisation in Zambia
3. Assess the disciplines involved in One Health implementation in Zambia
4. Assess the level of One Health collaboration among key One Health actors in Zambia
5. Determine at what level of education in Zambia One Health is being offered
6. Identify bottlenecks that hinder the achievement of One Health in Zambia

Background and Context

In Zambia, the adoption of the OH approach was spearheaded simultaneously by the academic sector and through the government ministries. Before the term OH was coined, OH implementation was heavily compartmentalised within human, animal and environmental health sectors. They were exclusively managed as separate sectors with little to no cross-sector communication. Government sectors used to work under 'Multi-Sectoral Task forces', as far back as 2003 during which the country was under the threat of highly pathogenic avian influenza (HPAI) which had caused disease outbreaks in a number of African countries as well as globally.

Faced with the conundrum of a high burden of infectious disease yet a low capacity for its disease risk management, representatives of academic and research institutions (including government research institutions) in five Member States of the Southern African Development Community (SADC) – Democratic Republic of the Congo, Mozambique, South Africa, Tanzania and Zambia, resolved to form the Southern African Centre for Infectious Disease Surveillance (SACIDS) in January 2008 with the major aim of addressing endemic infectious diseases in SADC member states.

In Zambia, the National Centres for Infectious Disease Surveillance (NatCIDS) was formed and consisted of the Schools of Veterinary Medicine and Medicine of the University of Zambia, the Tropical Disease Research Centre (TDRC), the Central Veterinary Research Institute (CVRI) and government Ministries and the Ministries responsible for human, animal and environmental health (Rweyemamu *et al*., 2013). From 2008, when SACIDS was formed, it championed the cause of an OH consortium of academic and research institutions involved with infectious diseases of humans and animals. Later, in Zambia, the Africa Centre of Excellence for Infectious Diseases of Humans and Animals (ACEIDHA) was launched on 25 April 2018 by the Minister of Higher Education. The centre was formed through a World Bank loan to Zambia, with the main objectives of developing research capacity and improving the training of academic staff and students with a focus on researching zoonotic diseases such as avian influenza, Ebola, tapeworm infections, brucellosis, and anthrax (Anon, n.d.-a).

Before the establishment of the Zambia National Public Health Institute (ZNPHI), there was no established physical OH coordination centre. Multi-sectoral task forces used to have ad hoc meetings during an OH threat, and once the threat of the disease waned, they were also dissolved (Muma *et al*., 2012). However, due to the non-permanent nature of these teams, it was difficult to get commitment as well as dedication from sectors that represented these teams. In certain instances, conflicts over reporting hierarchies came into play, and it is one of the hangovers that still exists to this day. Through the establishment of the ZNPHI, an OH approach (with the appointment of a "*National One Health Lead*") has heightened multi-sectoral collaboration within the mandate of the ZNPHI, which has widened the scope beyond any singular issue such as antimicrobial resistance (AMR), zoonoses etc.

The actual realisation and establishment of OH working groups and task forces were implemented following the experiences of highly pathogenic avian influenza (HPAI) and other zoonotic diseases. The central government recognised the need of a collaborative, multi-sectoral team to respond to emerging and infectious diseases that were occurring with increased frequency at interfaces between human, animal and ecosystem health (Mwacalimba and Green 2015). Additionally, within Zambia, a number of studies elucidated the endemicity of zoonotic diseases in certain ecological settings. For example, the Kafue basin was one of the areas that was found to have a high prevalence of bovine tuberculosis (BTB) in Zambian

cattle as well as wildlife. The wildlife-livestock interface was found to be a high-risk area for BTB and the Kafue lechwe antelope (*Kobus leche Kafuensis*), acting as the untreatable wildlife reservoir host (Munyeme *et al*., 2010).

Within a short period of time, ZNPHI enlisted academic experts as well as thematic team lead experts in various challenging areas such as OH policy, OH communication and advocacy, food safety, zoonoses, AMR, environmental aspects as well as toxicology among other key OH issues. Additionally, ZNPHI has positioned itself as a data repository, public health emergency tracker and OH information disseminator for the country, roles which were well exemplified during the COVID-19 pandemic outbreak. Thus, barriers to interdisciplinary collaboration and siloed approaches by different sectors that restrict the ability of professionals to work collaboratively across disciplines are effectively being broken down by ZNPHI. One major positive attribute of establishing the ZNPHI is that the National One Health Lead and his team have managed to bring everyone to the same coordination table. The active engagement of the ZNPHI in the training of field epidemiologists as well as other key OH staff created a shift in the understanding of how OH operates (Kumar *et al*., 2020).

Currently, the monitoring and evaluation (M&E) framework for OH operationalisation in Zambia is still weak, although the OH Strategic Plan 2022–2026 (OHSP) (ZAMBIA, n.d.) moving quickly to try address this gap. The framework for M&E takes recognition of the ever-existing threats to human health, including zoonotic diseases, food-borne diseases, chemical events, radiological events and AMR which all require an OH approach. These threats are complex and cannot be managed by the human health sector alone as they transcend multiple sectors. This identified gap has prompted the Zambian OHSP to take a multi-sectoral approach to M&E of its internal capacities seriously, and it is one of the key strategic directives outlined for the country.

There are currently limited publicly available data or evaluations on the status of OH in Zambia. Therefore, as part of the COHESA project, a baseline assessment was implemented to evaluate the OH status as it pertains to thematic areas: Research and innovation, governance, education, and implementation within Zambia. COHESA is a 48-month project which started in 2022. It is led by the International Livestock Research Institute (ILRI), as part of a consortium with Centre de cooperation international en recherche agronomique pour le development French Agricultural Research Centre for International Development (CIRAD), and International Service for the Acquisition of Agri-biotech Applications (ISAAA) AfriCenter and supported by the University of Pretoria. COHESA aims to better integrate and operationalise OH across Eastern and Southern Africa through improving OH governance, capacitating the future OH workforce and enhancing relevance of OH research, with the goal to improve the implementation of OH nationally and regionally.

Methods

To understand these aspects of OH within Zambia, a desktop review of the aforementioned themes was implemented with a focus on the last 5–10 years. Briefly, it consisted of defining the Scope as well as outlining the purpose of the review. This was followed by document collection for specific thematic areas and included reports, policies, procedures, and any other materials that were related to the subject of the review. These pieces of information were thoroughly reviewed, and the data were processed. Following this, a series of Key Informant Interviews (KII) were implemented with a minimum of 15 individuals who are experts in OH. They were selected from academia ($n=5$), government ($n=5$) and private sector/non-governmental organizations (NGO) with efforts to include those from across human/animal/environmental sectors. A focus group discussion (FGD) was used to further understand the opinions on OH experts (drawn from the Key informants) about the defined OH themes.

Transdisciplinary Process

In this particular context of OH transdisciplinary processes, COHESA in Zambia utilised the collaborative transdisciplinary process of combining knowledge and methodologies through key informant interviews and FGD to evaluate the OH status. The process was anchored on various critical sectors and disciplines that interface with emerging zoonotic diseases, antimicrobial resistance (AMR), food safety and food system transformations, environmental contamination and climate change. Additionally, the transdisciplinary process took into account extra factors such as gender by understanding how interconnected these areas are in the OH sphere.

The Key Informants (KI) comprised 10 men (59%) and seven women (41%) and were on an average of 40 years of age with between 4 and 30 years of time spent working in their field. All but one KI had tertiary level education, and 47.1% participants (95% CI, 23–72%) held senior management positions. Three KI were in academia, eight in government, one from an NGO, and five from the private sector. From the KI, the majority were from the animal health sector (47.1%), followed by the health sector (29.4%), environmental sector (11.8%) and private sector (11.8%) (Table 1).

Table 1. Employment levels of key informants that participated in giving the OH status update in Zambia.

	Variable			
Employment levels	**(*n* = 17)**	**Percent (%)**	**95% CI**	**Comment**
Academic	2	11.8	2.5–40.8	Second lowest
Junior managers	4	23.5	8.1–51.8	Second highest
Manager	1	5.9	1–37	Lowest
Senior manager	*8*	*47.1*	*23–72*	*Highest*
CEO [including farm owner]	2	11.8	2.5–40.8	Second lowest

During the FGDs, a total of 17 participants attended the discussions. There were four groups of OH participants at this FGD. From academia, a total of four participants came for the FGD with three being female and only one being male. From government ministries, a total of five participants participated with three being female whilst two being male. The regulatory agencies were represented by an all-male group of four participants. The private organisations and other developmental organisations were represented by three participants that consisted of two males and one female. Thus, from the overall number of 17 participants, nine were male and eight were female.

Research and innovation

Concerning OH research and innovation in Zambia, identified research publications that were related to the main themes of research, there were no reports of OH research informing innovation. The main areas of research could be categorised as AMR, zoonoses, toxicology, policy and food-borne OH issues.

Zambia has recognised the public health threat of AMR and its impact on morbidity and mortality, as well as the associated economic consequences. The desktop review conducted by COHESA revealed a worrying trend and a very weak M&E framework for antimicrobial usage (AMU) by the animal, human or crop sectors (Desta and Knight-Jones, 2021). Available data are neither useable nor systematically archived.

Zambia has a considerable burden of endemic zoonotic diseases such as anthrax, zoonotic tuberculosis and rabies, all of which are widespread but neglected. Their neglect is compounded in remote areas and contributes to poverty-related disease burden. In addition to neglected zoonoses, there are also emerging zoonoses, and there is little knowledge about potentially emerging diseases in health professionals in Zambia. Surveillance of zoonoses in Zambia remains uncoordinated with parallel running in animal and human health sectors.

One Health issues related to foodborne have been an area of focus for researchers. One of the major food-borne zoonoses of OH in Zambia has been cholera. Zambia has experienced several cholera outbreaks in the past (Available at: https://www.cdc.gov/globalhealth/healthprotection/nphi/stories/zambia-learning-cholera.html, accessed 10 August 2024). The most recent major outbreak is October 2023 and is still ongoing in January 2024 (when this paper was submitted for publication) with over 15,598 cases and over 584 deaths by 29 January 2024. The previous 2017 to May 2018 cholera outbreak was responsible for approximately 5900 cases and 114 deaths. The government responded with a multifaceted public health response that included increased chlorination of the Lusaka municipal water supply, provision of emergency water supplies, water quality monitoring and testing, enhanced surveillance, epidemiologic investigations, a cholera vaccination campaign, aggressive case management and health care worker training and laboratory testing of clinical samples (Available at: https://www.cdc.gov/mmwr/volumes/67, accessed 10 August 2024).

Other areas of research in OH in Zambia include toxicological research centred on heavy metal poisoning especially lead policy concerns and opportunities, challenges and attitudes towards OH (Yabe *et al*., 2015).

Governance

Zambia is a democratic republic with two spheres of government, national and local. There is constitutional provision for local government, and the main governing legislation includes the Local Government Act of 1991 and the Local Government Elections Act of 1992. The 113 local authorities are overseen by the Ministry of Local Government and Housing. Zambia currently consists of six city councils, 15 municipal councils and 84 district councils. Within these districts are chiefdoms governed by traditional rulers, who under traditional authority, have chiefs, and village headmen. In keeping with the democratic and liberal philosophy of the country under the multi-party-political system, the Zambian Government decentralized the management of public service delivery based on corporate governance principles.

Initially under the Ministry of Health, the ZNPHI rose to be such a governance institute by the year 2020. Recognising the critical importance of the OH functions of the ZNPHI, the Ministry of Health working in collaboration with other ministries such as those responsible for animal health (Ministry of Fisheries and Livestock), environment, tourism, agriculture, local government and housing and others has developed a number of policy documents and strategies towards the actualisation of OH implementation. The organisational development of ZNPHI is guided by an advisory group with an OH outlook and steering committee that lead the implementation of a comprehensive operational OH plan. The ZNPHI recognised that the world is facing unprecedented, interconnected threats to the health of people, animals and the environment, and Zambia being part of the globe is not an exception (Bagnol *et al*., 2016). Through a multi-sectoral coordinating mechanism and through ZNPHI, the Zambian Government realised that addressing these threats requires cross-sectoral, system-level approaches. This has been encapsulated in the OH concept which recognises the interconnection between people, animals, plants and their shared environment. This understanding formed the basis for support from a multi-sectoral section from government agencies, academia, NGOs, funding agencies and projects (including COHESA) development of a five-year strategic plan and a one-year implementation plan – The National OHSP 2022–2026 for Zambia (Anon, n.d.-b). The operational plan of the Zambian OHSP as well as the ZNPHI reflects all of the important considerations for achieving the goals for an operational national OH platform and structure.

However, despite the existence of the ZNPHI, a number of OH stakeholders still feel that the current management and organisational structure, staffing, space, governance and legal framework of ZNPHI are still heavily skewed toward the Ministry of Health. During the FGD conducted by COHESA, participants suggested to have the ZNPHI moved to the Vice President's office for it to truly gain a multi-sectoral coordinating status across all Ministries, agencies and stakeholders involved in OH implementation. Several government agencies and ministries involved in OH implementation have recognised the critical role that the ZNPHI plays in establishing an effective OH landscape in Zambia (Carnevale *et al*., 2023). However, the institute still has no dedicated OH surveillance officers and only exists at the national level, without presence at the subnational level such as at provincial and district levels. Despite working on already established ministries, not all understand the reporting channels, and this still creates gaps in reporting public health events of OH nature. While the ZNPHI is working in collaboration with all OH key stakeholders, certain areas still only observe their ministerial vertical surveillance and reporting systems which are fragmented across various levels across different OH stakeholders. There is still an absence of a national integrated data repository system making it difficult for the OH actors to collaboratively present a unified OH system (Malama *et al*., 2021). However, this is one of the gaps that the government through the development of the OHSP is trying to resolve. Already through ZNPHI, a number of Technical Working Groups (TWGs) (Table 2) (Anon, n.d.-b) have been established to operationalise the OHSP.

Table 2. Technical working groups for the One Health strategic plan for Zambia 2022–2026.

Technical working group	Responsibilities
Governance and coordination	Daily management of One Health in Zambia and intersectoral coordination of surveillance, public health emergency investigations, monitoring and evaluation.
Surveillance	Advise and prepare guidelines on public health events, provide technical guidance on surveillance, monitor and evaluation of surveillance, prepare reports on surveillance events and prepare and implement early warning system.
Preparedness and response	Prepare standard operating procedures for epidemic preparedness and response (EPR), proposals for resource mobilisation for EPR, technical guidance on EPR and national reporting and budgeting.
Advocacy, communication and training	Operationalise the One Health Strategic Plan (OHSP), annual planning and progress report on OHSP, develop communication and advocacy strategies and coordinate behaviour change and risk communication.
Research	Coordinate, develop and implement research, operationalise the OHSP within research, and plan for research in One Health.

The positive aspects of the TWGs as well as the OHSP have led to improved collaboration across various sectors with changes signifying a positive trend in OH actualisation within and across institutions. Another positive aspect about the OHSP is that it has prioritised to the integration of effective coordination and implementation of all key OH issues such as AMR, zoonoses, food safety, and environmental toxicity and activities through a multi-sectoral coordination mechanism. From the desktop review, it came out clearly that the multi-sectoral approaches are critical for national planning processes. However, systems are yet to be put in place to actualise what has been tabulated in these policy documents (Table 3) (Nowbuth *et al*., 2023).

Table 3. Policy documents associated with One Health in Zambia.

Policy document	Overview	Link to document
National One Health Strategic Plan 2022–2026	The Zambia National One Health Strategic Plan for 2022–2026 is the first "National One Health Strategic Plan" to be developed in Zambia using a multi-sectoral approach. The OHSP drew expertise from various sectors reflecting shared commitment to enhanced collaboration among animal, environment and human health sectors to tackle public health threats and challenges using an OH approach.	Available at: https://africenter.isaaa.org/wp-content/uploads/2023/05/Zambia_OHSP_Launched14Feb23.pdf (accessed 10 August 2024)
Multi-sectoral National Action Plan on Antimicrobial Resistance 2017–2027	The Zambian Multisectoral National Action Plan on Antimicrobial Resistance was prepared by the National Multisectoral Technical Working Group on Antimicrobial Resistance (NMTWG-AMR), whose membership was drawn from the Ministries of Health; Fisheries and Livestock and Agriculture. Other members were drawn from the Zambia Environmental Management Agency (ZEMA), the Zambia Community Health Initiative (ZCHI), Academia, NGOs and international organisations and agencies such as WHO, WOAH, FAO and Africa CDC. The ZNPHI is responsible for coordinating the implementation of Zambia's Multi-sectoral National Action Plan on AMR. The ZNPHI also serves as a co-Secretariat to the national AMR Coordinating Committee (AMRCC) with the Department of Veterinary Services under the Ministry of Fisheries and Livestock as well as the Ministry of Health being Co-Chairs	Available at: https://www.afro.who.int/sites/default/files/2018-08/ZNPHI%20Document.pdf (accessed 10 August 2024)
Zambia National Adaption Plan 2021–2023	The National Action Plan (NAP) approach was introduced under the United Nations Framework Convention on Climate Change in 2010 to guide governments in planning for climate change in the medium and long-term, by building existing adaptation activities. The NAPs follow a continuous iterative process that is country-driven, participatory and transparent.	Available at: https://unfccc.int/sites/default/files/resource/NAP-Zambia-2023.pdf (accessed 10 August 2024)
National Livestock Development Policy 2020	The Government of the Republic of Zambia has formulated a Livestock Policy to guide the effective implementation of activities and programs in the livestock subsector. The policy defines the overall objective and sets specific priority policy guidelines and strategies to achieve the government's vision for a developed livestock subsector. The policy is the vehicle for coordinating and providing a common framework for interventions by different implementing agencies through the shared vision, objectives and strategies enshrined in it.	Available at: https://www.mfl.gov.zm/wp-content/uploads/2022/08/National-Livestock-Development-Policy.pdf (accessed 10 August 2024)
National Health Policy 2012	This is a national policy that informs the health sector as well as outlining the Zambian Government's clear directions for the development of the Health Sector. The policy is anchored in the Vision 2030 (which encompasses overarching national sustainable goals inclusive health issues) and is implemented through successive National Development Plans and National Health Strategic Plans (Mudenda *et al*., 2023). The policy document underscores Zambian government's commitment to the provision of equitable access to cost-effective and quality health services as close to the family as possible in a caring, competent and clean environment.	Available at: https://bettercarenetwork.org/sites/default/files/Zambia%20National%20Health%20Policy.pdf (accessed 10 August 2024)

Continued

Table 3. Continued.

Policy document	Overview	Link to document
Zambia National Agricultural Policy 2012–2030	The Zambia National Agricultural Policy 2012–2030 is a cross-cutting policy whose vision is to develop a competitive and diversified agricultural sector driven by equitable and sustainable agricultural development.	Available at: https://faolex.fao.org/docs/pdf/zam174991.pdf (accessed 10 August 2024)
National Aquaculture Trade Development Strategy and Action Plan 2020–2024	It is a national development plan and strategy that took an OH approach. The document is signed off by two Ministers and two permanent secretaries (one from the Ministry of Commerce Trade and Industry and the other part from the Ministry of Fisheries and livestock). The strategy aims to provide an overall national strategic vision for the development of the fisheries sector and has a 10-year implementation time frame.	Available at: https://faolex.fao.org/docs/pdf/zam212150.pdf (accessed 10 August 2024)
Biotechnology and Biosafety Policy 2003	This is a national policy that covers the biotechnological activity safety and related matters in Zambia. Zambia enacted the Biotechnology and Biosafety policy of 2003 and the Biosafety Act No. 10 in 2007, which was followed by the establishment of the National Biosafety Authority (NBA). The Biosafety Act provides for issuance of permits for activities involving GMOs that are safe for human and animal health, biodiversity and the environment. This makes the National Biosafety Authority a key OH partner in Zambia.	Available at: https://cbz.org.zm/wp-content/uploads/2023/06/Biotechnology-and-Biosafety-Policy.pdf (accessed 10 August 2024)
National Climate Change Policy 2017	On 3 March 2017, Zambia launched the National Climate Change Policy aimed at stemming the impact of climate change and subsequent reduction of the country's annual economic growth due to crop failure and the impact of climate change on energy production.	Available at: https://www.pmrczambia.com/wp-content/uploads/2017/11/National-Policy-on-Climate-Change.pdf (accessed 10 August 2024)
The National Policy on Environment 2007	The development of the National Policy on Environment employed a broad-based Millennium Development Goal compliant participatory consultative process involving all the major stakeholders, thus achieving and utilising an One Health participatory approach. The National Policy on Environment was designed to create a comprehensive framework for effective natural resource utilisation and environmental conservation sensitive to the demands of sustainable development. The vision was holistic and adequately created a critical mass of public support.	Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/9516/-The_National_Policy_on_Environment-2008Zambia_NPE_2008.pdf.pdf?sequence=3&isAllowed=y (accessed 10 August 2024)

WOAH: World Organisation for Animal Health; WHO: World Health Organisation; FAO: Food and Agriculture Organization of the United Nations; and Africa CDC: Africa Centres for Disease Control.

Within Zambia, there are sectors which are not fully or adequately involved in OH integration, and there are those which are integrated but lack appropriate actions to address the ongoing OH issues. Environmental health is little addressed in the OH approach in Zambia at this time; however, the OHSP does include provisions for more comprehensive inclusion of OH Sectors (Available at: https://onehealthobservatory.org/resources/republic-zambia-one-health-strategic-plan-2022–2026, accessed 10 August 2024). Food safety similarly is underrepresented within OH at this time despite the integration of zoonotic diseases. While zoonoses and AMR are regularly discussed in relation to OH, there are still limitations like limited resources and standard operating procedures to run and report on diagnostics performed. Additionally, prioritising OH issues is limited beyond the recent prioritisation of zoonotic diseases.

In July 2023, COHESA in collaboration with the Africa Centre for Disease Control and Prevention (CDC), UKHSA in collaboration with ZNPHI, WHO and other partners, was involved in the One Health Zoonotic Disease Prioritisation (OHZDP) process in Zambia (Anon, n.d.-c). A diverse array of stakeholders, including public health experts, veterinarians, epidemiologists, environmentalists and representatives from different government departments of line ministries collaborated during the OHZDP. A consensus of 10 zoonotic diseases of concern for Zambia making the priority list for surveillance included the following diseases: African trypanosomiasis, anthrax, enteric diseases (salmonellosis), viral haemorrhagic fevers (Ebola), rabies, plague, influenza-like illnesses (zoonotic avian influenza), zoonotic tuberculosis (ztb), cysticercosis and brucellosis. This multi-sectoral OH approach to prioritise zoonotic diseases of greatest concern for Zambia marked an important OH activity in which COHESA participated. Unfortunately, Zambia has limited capacity to effectively deal with these emerging and re-emerging zoonotic diseases. Furthermore, the

situation is compounded by inadequate surveillance systems and lack robust scientific evidence-based solutions. Due to these limitations, the true burden of zoonotic diseases in Zambia is always underestimated.

Education

In Zambia, the KII and FGD supported the sentiment that OH is still considered a relatively new phenomenon even in higher education establishments. However, the University of Zambia (UNZA) has tried mainly through the School of Veterinary Medicine to actualise OH, and a number of schools are still trying to master the concept. At the School of Veterinary Medicine at UNZA, all OH programs are offered at the postgraduate level (MSc as well as PhD level), without any program at thw undergraduate level except for OH components taught under the course Veterinary Public Health. This leaves a huge gap in terms of trained personnel who need OH skills and competencies. However, a collaboration between UNZA and ZNPHI is assisting in mainstreaming OH in Zambia, and the former OH students (at postgraduate level) have become key advocates in the actualisation of the OH approach in Zambia.

Through the KII and FGD, it also became clear that OH is absent within secondary and primary schools, and the concept is yet to be adopted and included in the syllabus. Nevertheless, in Zambia, the nearest to OH subject at primary and secondary level is known as 'Integrated Science'. This is taught from grades 1 to 7 (*Primary School level*) and then also at grades 8 and 9 (*Basic Secondary School level*). Through FGDs, the syllabus specialist argued that 'Integrated Science' is OH at a lower level of education. The Basic Education Syllabus for grades 8 and 9 emphasises that the approach to be used in teaching of 'Integrated Science' is learner-centred. Therefore, the prime goal for integrated science teaching at this level of education is the development of processes of scientific thinking in the learners. Despite being an integrated science, it is actually taught pillar by pillar without emphasising how these are integrated, which could have been the beginning and basis for teaching OH. In 'Integrated Science' syllabus, the foreword says the following:

> This syllabus has incorporated the emerging needs of society (cross cutting issues) such as sexuality education, environment, gender, HIV and AIDS, Nutrition and Health, in order to ensure children's safety and equip them with basic knowledge, essential skills, values and develop positive attitudes needed for their progression in the field of science and the world of work.

It is a relatively good foreword as it accepts the cross-cutting nature of all the issues surrounding science and society which itself is an acceptance of the OH concept (Mubemba *et al*., 2022).

One thing which is apparent in Zambia is that academic institutions have played a pivotal role in the creation and establishments of the OH platform in Zambia, mainly through advocacy and capacity building. Before the establishment of the OH coordinating platform at the ZNPHI, the UNZA at the School of Veterinary Medicine, under the SACIDS program, had started training an OH workforce in "*One Health Analytical Epidemiology*" at Master's degree level since 2011, and another Masters in "*One Health Food Safety*" was developed by 2013. Later on, with ACEIDHA, other OH programs were established. With a good crop of OH workforce graduating from UNZA, OH governance became a necessity. The KII and FGD themes have indicated the importance of OH education integration at all levels, and this will be key to ensuring the future OH workforce.

Findings from the KII and FGD have provided potential guidance on the integration of OH into both higher and lower education. The first thing identified was to consider mainstreaming OH as a cross-cutting compulsory course. The Zambian government could adopt a standardised approach to the OH syllabus in a much-simplified manner. Transdisciplinary thinking and collaboration are best learnt within truly diverse student cohorts, inclusive of science, technology, engineering, mathematics and medicine, as well as humanities, arts and social sciences. It is in such mixed classes that interdisciplinary thinking, world views, life experiences, cultural backgrounds and knowledge systems can be shared. The breadth of topics is a special category of such subjects, designed for learning complementary ways of thinking about issues and problems and challenging students' active participation and perceptions.

Implementation

Implementation of One Health activities in Zambia

Prior to the ZNPHI in Zambia, human, animal, crops and environmental health sectors were heavily siloed, and they were exclusively managed by separate sectors with little to no communication. However, through the establishment of the ZNPHI, an OH approach mainly to the response to the COVID-19 pandemic and

other national zoonotic disease surveillance was established. With heightened multi-sectoral collaboration, the mandate of ZNPHI widened to including other emerging issues such as AMR.

The major impact of OH in Zambia has been the breaking of institutional silos. Through the ZNPHI, the recent outbreaks of anthrax and even cholera showed how multiple sectors, disciplines and communities at varying levels of society worked together to tackle these disease threats in Zambia through an OH approach.

Project Impact

Overall, the direction in Zambia regarding OH strategies and policies is positive, and this was validated by the COHESA KII and FGDs as well as the desktop review. Although measuring impact is difficult especially given the diversity and variation in the baseline information gathered, the real impact of the COHESA project will be fully assessed at the end of the project to determine what advancement in OH has been possible. However, in the meantime, it is becoming increasingly evident that the relevance of OH activities such as the recent anthrax outbreak in Zambia requires robust policies to enhance national cross-sectoral collaboration between government entities with OH mandates.

COHESA in Zambia has been involved in multi-disciplinary/intersectoral activities and programs as well as establishing its name among the OH actors and structures within the country. In collaboration with respective partners at the local and national levels, the OH situation in the country and beyond has been positively impacted upon with increased OH advocacy and capacity, with defined responsibilities and coordinated plans (Table 4). Currently, a number of requests from within Zambia have been communicated to the COHESA Country team to extend their support to various activities ranging from sponsoring OH prizes under the National Higher Education AMR debates to supporting other OH activities outside the routine activities implemented by the ZNPHI.

Table 4. Key impacts of capacitating One Health in Eastern and Southern Africa (COHESA) project in Zambia since inception in late 2021.

Impact and overview	Link to document
COHESA-Zambia, in collaboration with the Zambia National Public Health Institute (ZNPHI), was deeply involved in conducting the National Bridging Workshop (NBW) from 19 to 21 October 2022 in Livingstone using tools from the International Health Regulations-Performance of Veterinary Services (IHR-PVS) as well as the Joint External Evaluation (JEE), from FAO, OIE/WOAH and WHO.	National Bridging Workshop
COHESA – Zambia actively participated in the Progressive Management Pathway (PMP) on Antimicrobial Resistance (PMP-AMR) in relation to the Implementation of the Antimicrobial Resistance (AMR) National Action Plan (NAP) in Zambia. This was done Using the FAO Progressive Management Pathway for Antimicrobial Resistance (FAO-PMP-AMR) Tool Livingstone, Zambia, 12–16, December 2022 in line with the WHO Global Action Plan (GAP) to combat AMR, supporting the implementation measures to reduce the use of antimicrobials in the food and agriculture sector.	FAO-PMP-AMR
COHESA Expert & Country OH Advocacy DR. Raymond Hamoonga from the Zambia team was called upon to Malawi to assist in the development of their One Health Strategic Plan for Malawi under COHESA sponsorship 2–5 May 2023.	Malawi-Zambia Exchange
COHESA team consisting of the Country Multiplier, the OH Expert and two Enumerators were involved in the literature review processing for Zambia for the development of the One Health Zoonotic Disease Prioritization (OHZDP) from May 2023. The OHZDP tool allows countries to use a multi-sectoral approach to prioritise endemic and emerging zoonotic diseases of greatest national concern to jointly address zoonotic diseases by human, animal and environmental health sectors.	OHZDP
FAO-OH – Regional Training: The Food and Agriculture Organization of the United Nations (FAO) requested the Zambia COHESA Country Multiplier as well as the COHESA OH Expert to be involved in the FAO Virtual Learning Centre for Southern Africa for the first quarter of 2023.	FAO Regional
FAO-OH – National Training: FAO requested the Zambia COHESA Country Multiplier as well as the COHESA OH Expert to be involved in training as national expert trainers for an on-line 'Concepts of One Health for Zambia course' during the second quarter of 2023.	Available at: https://virtual-learning-center.fao.org/course/index.php?categoryid=8 (accessed 10 August 2024)

At a wider scale, COHESA in Zambia strategically utilised the OH platform in association with ZNPHI capitalising on the ongoing national and international OH initiatives (encompassing but not necessarily restricted to OH thinking, co-planning and working; information sharing and systemic organisation of all multi-sectoral activities concerning OH activities in Zambia). Currently, COHESA working alongside other developmental partners especially the quadripartite partners (FAO, WOAH, WHO and United Nations Environment Programme [UNEP]) inclusive of the Africa CDC, UKHSA and other platforms have greatly mainstreamed OH activities in Zambia. Further, these organisations have assisted ZNPHI to start developing a joint, multi-sectoral, interagency multidisciplinary OH coordination mechanism for Zambia. This idea has been well received by a number of government Ministries, among them, the Ministry of Health and the Ministry of Fisheries and livestock (with an increased interaction through meetings as well as joint activities between the human and animal health teams). Environmental teams have been involved through the Ministry of Green Economy and Environment, whilst the plant sectors have been involved through the Ministry of Agriculture.

Project Outlook/Conclusions

Given that OH is a complex and evolving phenomenon and the intrinsic challenges that come with a new concept, will be expected in Zambia. The baseline work may not be able to exhaustively identify the challenges that may impede the implementation of OH in Zambia; however, a few challenges have been observed as follows:

- *Institutionalisation of OH in Zambia*: One of the key challenges for OH is the acceptance, mainstreaming and eventual institutionalisation of the approach across all the sectors involved in OH implementation. One major challenge is the lack of an overarching and unifying policy, framework and governance structure that are not aligned to any ministry. Currently, ZNPHI is deemed by others to be still a Ministry of Health institute. This is still an operational challenge as there is a need for a fully independent OH platform under Vice President's office.
- *Operationalisation*: Another challenge for OH in Zambia is the operationalisation of the approach as was seen during the recent anthrax outbreaks. In districts that had good working knowledge of OH, they were able to immediately form OH teams and operationalise the cross-sectoral interventions. However, despite these efforts, the actual operationalisation was always affected by practical challenges such as coordination in the formative stages were not streamlined. Additionally, from our anthrax outbreak scenarios, it was clear that operationalisation requires a well-established OH workforce in place, so capacity building across all sectors is key to ensure all have necessary skills and knowledge to implement the OH approach.
- *OH education in Zambia*: This involves the development of educational programs that can help build awareness and understanding of the OH concept not only among implementers but also among policymakers (i.e., through development of short-targeted courses). Education also requires the development of training programs that can help build the capacity of all OH actors.
- *Financing*: In Zambia, OH financing seems to always face challenges. The mobilisation of resources to support the implementation of OH interventions needs to be streamlined. Additionally, there seems to be a lack of sustainable financing mechanisms that can ensure the long-term viability of OH interventions in Zambia.

With developmental partners such as COHESA, FAO, WOAH, WHO and UNEP, inclusive of the Africa CDC, UKHSA and IDRC-OH platform all delivering on OH activities, there is indication of a bright future for OH in Zambia. What is required is sustainability of the various OH initiatives that have been put in place by these external institutes/organisations. With co-creation with the government arm through ZNPHI, sustainability is likely to be achieved. Further, the incorporation and mainstreaming of OH activities within different government ministries as well as academia could have a snow-ball effect across many other disciplines.

The OHSP for Zambia, which COHESA participated in developing, has a robust implementation plan which will actualise most of the ambitious targets outlined under OH. Additionally, Zambia managed to secure funding from the Nature for Health (N4H) project as well as the Pandemic Fund. The N4H project will work in Zambia on pandemic prevention and related health risks through strengthening the environmental aspects of One Health, whilst the Pandemic Fund provides a dedicated stream of additional, long-term financing

to strengthen critical pandemic prevention, preparedness, and response capabilities in Zambia. Sectoral-based and single-discipline approach mechanisms are slowly becoming less and less in comparison to the OH landscape which is getting more acceptance across education, research and other developmental sectors.

Group Discussion Questions

1. With regards to OH status and governance platforms in Zambia, based on the information outlined above, how can you rate the OH status, justifying your answer with concrete discussion points?
2. Has OH been institutionalised and operationalised in Zambia? If yes, what makes you say so, and if no what is your justification?
3. At what level of education in Zambia is OH being offered? What are challenges or bottlenecks that stand in the way of OH implementation and operationalisation?
4. What are the general bottlenecks that hinder the achievement of OH in Zambia?

Funding statement

International Livestock Research Institute, (Grant/Award Number: 'Internal Grant Number EUR021')

Acknowledgements

Capacitating One Health in Eastern and Southern Africa (COHESA) is co-funded by the OACPS Research and Innovation Programme, a program implemented by the Organization of African, Caribbean and Pacific states (OACPS) with the financial support of the European Union.

We further extend our sincere appreciation to all the individuals and organisations who participated actively in the Key Informant Interviews and the Focus Group Discussions.

Conflict of interest

The authors have no conflicts of interest to declare.

Further Reading

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