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Implementing One Health at Northwest Nigeria: A Qualitative Cross-State Analysis of Workforce Capacity, Governance, and Intersectoral Collaboration

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Abstract

Background:
The One Health approach is generally advocated to tackle intricate health issues at the intersection of human, animal, and environmental fields. However, data regarding the implementation of One Health at sub-national tiers in low- and middle-income nations is still scarce. This study examined the implementation of the One Health workforce in three states of North West Nigeria.

Methods:
A qualitative study design was utilized, incorporating Key Informant Interviews with One Health focal persons in Sokoto, Kebbi, and Zamfara States. The objective was to reach data saturation, but at least three Key Informants from each state were chosen from the fields of animal, human, and environmental health. A semi-structured interview guide was employed to collect the data, which subsequently underwent thematic analysis. The results were organized according to a conceptual framework based on One Health operational and health systems strengthening models. The research was executed in October and November of 2025.

Results:
All three states showed that they understood the concept of One Health very well. Conversely, the implementation was not the same. There was adequate capacity in the workforce, but it was not evenly spread out, especially at the local government level. Intersectoral collaboration was most effective during outbreak responses, but it was still sporadic. Some of the biggest problems were not having sufficient funds, not enforcing policies well, and having data systems that were not connected. Community engagement was found to be a relative strength.

Conclusion:
In North West Nigeria, the implementation of One Health is marked by conceptual alignment but inadequate institutionalization. For progress to last, investments in policy, financing, workforce development, and integrated surveillance systems need to be coordinated.

Introduction

The One Health (OH) approach has emerged as a globally acknowledged framework for addressing complex and interrelated health challenges at the human-animal-environment interface [1, 2]. The increase in zoonotic disease outbreaks, antimicrobial resistance (AMR), food safety threats, climate change, and environmental degradation has demonstrated that conventional, sector-specific public health responses are insufficient [3, 4]. One Health tackles these issues by encouraging collaboration between the human health, animal health, and environmental sectors, all with the goal of improving the health of the population.

More than 60% of new infectious diseases come from animals, and most of them come from wildlife. This demonstrates the significance of integrated surveillance and response systems [5, 6]. The risk of

pathogens spilling over has increased due to population growth, urbanisation, agricultural expansion, deforestation, and climate change, all of which have resulted in greater interaction between humans and animals [7, 8]. Travel and trade between countries have made it easier for germs to move from one country to another. This makes it even more important for different sectors and jurisdictions to work together [9].

One Health should be put into action in Nigeria as a top priority. The country has had many outbreaks of zoonotic and environmentally linked diseases, like Lassa fever, anthrax, rabies, cholera, and new viral haemorrhagic fevers [10, 11]. These outbreaks have shown time and time again that separate responses do not work and that public health, veterinary, environmental, and other related sectors need to work together to stop, prepare for, and respond to them. In response, Nigeria has put in place national One Health frameworks and ways for different sectors to work together, especially when it comes to emergency preparedness and response structures [12]. There has been some progress at the national level, but we still do not know enough about how One Health works at lower levels. State and local governments are in charge of most of the surveillance, outbreak response, and getting people involved in their communities. However, there is insufficient evidence on workforce capacity, governance structures, and intersectoral coordination at sub-national levels in Nigeria [13]. This gap in implementation is especially important in places with few resources, where health systems have to deal with conflicting priorities and structural limitations. It is important to look at how One Health is being used at the sub-national level in North West Nigeria. There are a lot of animals and people living together in the area, the borders between countries are weak, the ecosystem is fragile, and diseases break out often [10]. Countries in the region have had to deal with both old and new zoonotic threats, as well as issues with safety, people moving around, and stress on the environment [14]. These dynamics require the efficient implementation of One Health for the enhancement of health security and system resilience.

The concept of One Health is widely recognized in Nigeria; however, its implementation at the sub-national level is neither consistent nor robust. Evidence shows that collaboration between different sectors often increases during outbreaks but decreases between them. This makes the One Health approach less effective at preventing and preparing for future outbreaks [15, 16]. There are not enough trained workers, workers are spread out unevenly across administrative levels, and there are not many chances for cross-sectoral training, which makes it even harder to keep the program going [17]. These gaps in the workforce are made worse by problems with funding and governance. A lot of states do not have clear One Health policies, laws that can be enforced or budget lines to pay for regular activities that involve more than one sector. This means they need a lot of help from other people [18]. Different data systems and surveillance frameworks that work at the same time make it hard to do integrated risk assessments, share information quickly, and make decisions across sectors [29, 34]. In North West Nigeria, these issues are exacerbated by social and environmental deficiencies, recurrent zoonotic outbreaks, and constrained institutional capacity at both state and local government tiers. Even though more senior professionals are learning about One Health principles, there is still not enough real-world proof of how One Health is used in practice, especially when it comes to workforce capacity, governance structures, and working together across sectors.

To turn national policy promises into real, long-lasting action, it is important to know how One Health works at the local level. Assessing workforce capacity, governance structures, and collaborative frameworks provides critical insights into the strengths and weaknesses of existing systems, while also identifying leverage points for improving health systems [20]. There are a lot of justifications to do this study. First and foremost, it fills a big gap in the evidence about how One Health is being used in Nigeria, especially in the North West region. It also tells you about the workforce's ability and the institutional arrangements that affect collaboration between different sectors in a certain situation. The research employs a qualitative, cross-state approach to elucidate variations in implementation experiences and to pinpoint prevalent systemic barriers and facilitating factors. Ultimately, the findings are anticipated to influence policies, workforce development strategies, and investment choices that will integrate One Health into standard public health practice. This study aimed to examine the implementation of the One Health approach at the sub-national level in North West Nigeria, focusing on workforce capacity, governance frameworks, and intersectoral collaboration among specific states.

Materials and Methods

Study Setting

The study was conducted in three states in North West Nigeria: Sokoto, Kebbi, and Zamfara. When it comes to their social and environmental conditions, these states have a lot in common. For instance, they all have semi-arid climates, a lot of livestock, a lot of interaction between people and animals, and they are all at risk for diseases that can be spread from animals to people or from the environment to people. But they are different in terms of how well their institutions work, how they are governed, and how well they have dealt with outbreaks in the past. This makes them good for comparing states.

Study Design

This study employed a qualitative descriptive design to investigate the implementation of the One Health approach at the sub-national level in North West Nigeria. A qualitative methodology was considered appropriate as it enables an in-depth analysis of the experiences, perceptions, and institutional practices of key stakeholders involved in multisectoral coordination and outbreak response.

Study Population

The study population comprised senior public health professionals actively involved in the coordination and implementation of One Health at the state level. These included One Health focal persons and high-ranking officials from the fields of human health, animal health, and environmental health who had participated in multisectoral meetings, outbreak investigations, and emergency response efforts [21].

Participants and Sampling

A purposive sampling strategy was utilized to identify participants with significant knowledge and direct responsibility for One Health initiatives. Sampling continued until thematic saturation was achieved in each state, involving at least three key informants from the human, animal, and environmental health sectors [22]. Being a leader in One Health coordination, being involved in outbreak response, and knowing how to work with people from different sectors were all factors in choosing someone.

Data Collection

A semi-structured interview guide was used to collect the data, which we then analyzed by theme. The interview guide was developed from existing literature on the implementation of One Health and outbreak preparedness. It included the following topics: knowledge of One Health, workforce composition and distribution, intersectoral collaboration and coordination mechanisms, governance and financing structures, surveillance and data-sharing practices, capacity gaps, and community engagement. The interviews were conducted in English at the participants' workplaces or other accessible locations. All of the interviews were recorded and then transcribed word for word with the full knowledge and permission of the people who took part. Field notes were made to record nonverbal signals and details about the situation. The English version of the interview guide is provided as Supplementary File 1.

Data Analysis

The data underwent thematic analysis utilizing the six-step framework developed by Braun and Clarke [21]. The transcripts were read several times to become familiar with them, and then the first codes were created inductively. Then, the codes were put into bigger groups that showed patterns across all the interviews. We examined the themes repeatedly, contrasting them across the three states to identify contextual similarities and differences. To improve interpretation, the results were integrated with a conceptual framework based on One Health operational models and principles of health systems strengthening, especially systems thinking methodologies that emphasize the interactions among workforce, governance, and service delivery components [19, 20]. To direct the theme analysis procedure, a systematic codebook was created (Table 1).

Results

This section presents the insights gained from Key Informant Interviews (KIIs) conducted with One Health focal persons and senior officials from the human, animal, and environmental health sectors in Sokoto, Kebbi, and Zamfara States in North West Nigeria. The results reflect the participants' experiences, perceptions, and institutional practices regarding the implementation of One Health at the sub-national level. The analysis yielded eight primary themes, indicating both overarching trends and state-specific variations in workforce capacity, governance, and intersectoral collaboration. A cross-state thematic comparison is presented in Table 2.

Characteristics of Respondents

The individuals who answered were high-ranking public health officials who were in charge of or worked with other public health officials in their states. They had worked in epidemiology, disease surveillance, environmental health, and veterinary public health. Everyone who took part had first-hand experience coordinating One Health, looking into outbreaks, or responding to emergencies at the state level. Most had gone to meetings with people from different fields and worked together to deal with outbreaks with people from the Ministries of Health, Agriculture, and Environment, as well as development partners.

Theme 1: Conceptual Understanding of One Health

Individuals in all three states who answered the question about One Health understood it well as an approach that connects the health of people, animals, and the environment. Participants consistently described One Health as a collaborative framework for addressing zoonotic diseases and public health emergencies. People said that this shared understanding has improved over time, mostly because of being involved in outbreak response activities, national coordination mechanisms, and trainings supported by partners [10]. People said that One Health was easier to understand at the state level, but it was harder to understand at the local government and community levels. People often thought of activities as being part of one sector instead of the whole thing.

Theme 2: Evolution and Institutionalization of One Health

The evolution of One Health was different in each state, but it usually went from separate operations in different sectors to organised collaboration between sectors. One Health activities began in Sokoto State around 2015 and gained momentum after capacity-building efforts like AFENET's Training of Frontliners in 2017. Later on, Zamfara State's institutions became more formal, but not for long. This was because they had to respond to outbreaks and because people with postgraduate degrees led the Public Health Emergency Operations Centre (PHEOC). Kebbi State's One Health program, on the other hand, was fairly new and was made to solve problems that kept coming up during investigations of outbreaks. People in all states said that One Health structures were more active during emergencies than during normal times, even though the situations were different. This suggests that they were not fully institutionalized [15].

Theme 3: One Health Workforce Composition and Structure

All informants who answered said that the three main parts of One Health are the health of people, animals, and the environment. On the other hand, the workforce included people from academia, security agencies, NGOs, the media, customs and quarantine officers, and community informants, in addition to these pillars. Sokoto and Zamfara States had a wider range of multisectoral participation, especially in activities related to responding to outbreaks and keeping an eye on them. Kebbi State clearly named technical pillars like surveillance, laboratory services, IPC, case management, logistics, risk

communication, and coordination. This means that the structure is based on an Emergency Operations Centre. People said that the workforce's capacity was not evenly spread out, with better coordination at the state level and big gaps at the local government level. Respondents said that not having enough trained staff, having staff with only a few skills in different areas, and having experienced staff move around a lot were all big problems. People thought that these problems would make it harder to remember things, keep things going, and keep One Health going [17].

Theme 4: Collaboration and Coordination Mechanisms

All states agreed that the best way to look into outbreaks was for different sectors to work together. Some of the ways that working together was made easier were through meetings at the Emergency Operations Centre (EOC), joint outbreak investigations, and response teams made up of people from different sectors. The PHEOC in Zamfara State worked well together by regularly including the Ministries of Health, Agriculture, and Environment. Sokoto State said that people got along well at the national, state, and local levels. Kebbi State, on the other hand, said that people only worked together when there was an outbreak. Overall, the people who answered agreed that people could work together, but the ways they suggested were not strong enough to keep One Health activities going between outbreaks [16].

Theme 5: Capacity Gaps and Training Needs

There were clear gaps in capacity in all three states, especially at the level of local government. Sokoto and Zamfara States said they did not have enough trained workers, that skilled workers were being moved around for political reasons, and that training was not getting to the lowest levels. Kebbi State said there were no organised One Health training programs. However, Sokoto and Zamfara States got training from donors and partners like LPRESS, NCDC, WHO, and AFENET. But people said that these trainings did not last long enough and did not get enough funding.

Theme 6: Policy, Funding, and Governance Barriers

Problems with governance and funding made it hard to put One Health into action. None of the states said they had a separate line in their budgets for One Health activities. Some states had made plans for what to do, but they could not follow through on them because they did not have enough money at home and depended too much on partners from outside the state. People who answered said that this dependence made it harder to keep things going and plan for One Health activities in the long term [18].

Theme 7: Surveillance, Data Sharing, and Information Systems

SORMAS and the Integrated Disease Surveillance and Response system were used in all three states. Respondents, though, said that sharing data between the health sectors regularly for people, animals, and the environment was not very common. It was found that parallel reporting structures and poor interoperability made it harder to do integrated risk assessments and make coordinated decisions, especially when it came to zoonotic diseases [29].

Theme 8: Community Engagement and Ethical Considerations

Community engagement was acknowledged as a significant asset, particularly in Sokoto and Zamfara States. Respondents said that traditional leaders, religious leaders, and community volunteers were all actively involved in risk communication and surveillance efforts. People thought that this kind of participation would help them find problems early, build trust, and follow the rules of public health. People also talked about problems that were unique to their situation, like not feeling safe and groups of people that were hard to reach. During outbreak responses, these issues sometimes required working with security agencies. People who took part in this kind of activity said that it was easier to get in, but they also said that security concerns should be balanced with ethical engagement and trust in the community. Illustrative respondent quotes supporting key themes are summarized in Table 3.

THEMATIC CODING TABLES

Table 1
Codebook for Qualitative Analysis

Code	Theme	Description
T1	One Health Concept	Definition and Understanding of One Health
T2	Evolution	Historical progress of One Health
T3	Workforce	Composition and organization of the OH workforce
T4	Collaboration	Intersectoral coordination structure
T5	Capacity Gaps	Gaps in training, skills, and manpower
T6	Policy & Funding	Budget, governance, and policy issues
T7	Data Systems	Surveillance and data-sharing systems
T8	Community Engagement	Community involvement and ethical concerns

Table 1

A systematic codebook to guide the thematic analysis process.

Table 2
Cross-State Thematic Matrix

Theme	Sokoto	Kebbi	Zamfara
One Health Concept	Integrated system	Multisectoral platform	Collaborative approach
Evolution	Since ~ 2017	Since ~ 2021	Post-training/outbreaks ~ 2022
Workforce	Broad multisectoral	Core sectors	Expanded multisectoral
Collaboration	Strong, multi-level	Event-based	PHEOC-driven
Capacity Gaps	LGA-level gaps	Lack of training	Veterinary shortages
Policy & Funding	Action plan, no funds	No budget/policy	Framework in progress
Data Systems	Fragmented	IDSR/SORMAS only	Sector-based
Community Engagement	Strong	Moderate	Strong

Table 2

A cross-state thematic comparison that highlights the similarities and differences between the states of Sokoto, Kebbi, and Zamfara.

Table 3
Themes and Illustrative Evidence

Theme	Illustrative Evidence
Collaboration	“Most effective during outbreak investigations/responses”
Capacity Gaps	“Training/skills development not cascaded to local levels”
Funding	“No committed budget line for One Health”
Data Sharing	“Each sector works with its own data in fragment”
Community Role	“Traditional/religious leaders are engaged”

Table 3

Summary of selected themes alongside illustrative participant responses.

Discussion

This study examined the application of the One Health approach at the sub-national level in North West Nigeria, employing qualitative evidence from Sokoto, Kebbi, and Zamfara States. The findings demonstrate strong conceptual alignment with One Health principles; however, there is inadequate institutionalization within conventional public health practices. This trend is in line with the current One Health implementation literature from low- and middle-income countries, where the idea has been accepted more than the creation of long-lasting governance, financing, and workforce systems needed for long-term change [15, 16, 31].

In all three states, key informants articulated a shared understanding of One Health as an integrated framework linking human, animal, and environmental health sectors. This finding aligns with previous studies conducted in Africa and Asia, demonstrating considerable awareness of One Health among senior professionals, yet a lack of operational depth at decentralized levels [23, 24]. This means that in Nigeria, national advocacy, policy dialogue, and coordination efforts driven by outbreaks have successfully promoted One Health concepts; however, investments at the system level are still lacking. The three states implemented One Health in different ways, which showed that the institutions were at different levels of maturity, had different levels of leadership ability, and had different levels of exposure to outbreaks. Sokoto State adopted it early on because of academic involvement and training programs. On the other hand, Zamfara State was able to get things up and running quickly because it kept responding to outbreaks and set up a working Public Health Emergency Operations Centre. Kebbi State, on the other hand, was in an earlier and more reactive stage of implementation. Ethiopia, Bangladesh, and Vietnam have all had similar trends that were caused by outbreaks. In these nations, One Health systems strengthen amid crises yet weaken during inter-epidemic intervals [25–27]. These results show how outbreaks can cause problems and how weak One Health systems are when they do not have formal policies and funding.

The ability of the workers became a key factor in how well One Health was put into action in the three states. People who responded said that the main workers were experts in human, animal, and environmental health. But capacity was not evenly spread out, especially at the level of local government. There were not enough trained workers, the skill sets of the few trained workers were limited, and experienced staff were moved around for political reasons, which hurt continuity and institutional memory. These findings are consistent with the extensive literature on health workforce dynamics in decentralized systems, which identifies misdistribution, attrition, and ineffective retention strategies as persistent barriers to system effectiveness [17, 28]. In One Health-specific studies, inadequate cross-sectoral training has been shown to impede the prompt identification of zoonotic threats and weaken collaborative response capacities [29]. Intersectoral collaboration was most effective during outbreak investigations, facilitated by Emergency Operations Centres, coordinated surveillance initiatives, and rapid response teams. This shows that working together across sectors is possible and helpful, but it mostly happened on an ad hoc basis and only when it was needed. This is similar to what other One Health evaluations have found, which show that routine collaboration outside of emergencies is limited [30, 31]. The absence of established frameworks for routine collaborative

planning, simulation exercises, and collective accountability undermines the preventive and anticipatory effectiveness of the One Health approach.

Governance, policy, and financing constraints were among the most enduring challenges identified in all three states. One Health activities did not have their own budget line in any of the states, so they had to rely on projects that were funded by donors and outside partners. Policies were different in each state. For instance, Sokoto State created a State One Health Action Plan, Zamfara State made a strategic framework, and Kebbi State did not have any formal policy guidance. There have been reports of similar problems with governance in sub-Saharan Africa, where One Health policies are in place but cannot be enforced because they do not have the power or money to do so [32, 33]. These results highlight the imperative of a resilient enabling environment as a crucial prerequisite for the sustainable implementation of One Health. There were surveillance platforms like the Integrated Disease Surveillance and Response system and SORMAS, but data sharing between sectors was still not very good. The presence of parallel reporting structures made it harder to do integrated analysis and make decisions together, especially when it came to watching for zoonotic diseases. A lot of people think that fragmented data systems are a structural weakness in One Health implementation because they make it harder to give early warnings and figure out risks [19, 34]. We need more than just technical platforms that work together to fix this problem. We also need rules that build trust, protect data, and encourage shared ownership across sectors.

Community engagement was recognized as a significant asset, particularly in Sokoto and Zamfara States, where traditional, religious, and market leaders were actively involved in risk communication and monitoring. This finding aligns with participatory health system models that emphasize community engagement as a critical component for effective disease identification and response [35]. There were also moral worries about security agencies being involved in outbreak responses, especially in places that are dangerous or hard to get to. Security involvement can make it easier for people to get in, but it is important to have clear rules for how things work to keep people's trust and ethical standards. The results show a One Health system that has enough workers and collaborative practices, but they are not working well because the environments that support them are weak, with poor funding, policy gaps, and broken data systems. This clarifies why One Health outcomes are often achieved sporadically during outbreaks instead of being sustained as a standard public health practice. Similar systemic constraints have been identified in comparative One Health studies, underscoring the imperative for synchronized improvement across governance, workforce, and operational domains [15].

Conclusions

This study provides empirical evidence concerning the application of the One Health approach at the sub-national level in North West Nigeria, illustrating a persistent pattern of strong conceptual alignment alongside inadequate institutionalization. State-level actors demonstrate a thorough comprehension of One Health principles and collaborate effectively during outbreaks; however, routine implementation is obstructed by inadequate governance frameworks, limited domestic funding, fluctuating workforce

capacity, and fragmented data systems. These results show that we need to move away from short-term, ad hoc collaboration that only happens during outbreaks and toward long-term institutional arrangements. One of the most important things to do is to make and enforce One Health policies at the state level. Other important things are to set up separate budget lines, train workers at all levels and in all sectors, and put money into platforms that can share and collect data. These basic parts need to be made stronger so that One Health in Nigeria can go from being a reactive emergency response system to a strong and institutionalized public health strategy that can deal with complicated health threats at the interface of humans, animals, and the environment.

Strengths

A notable strength of this study lies in its qualitative, cross-state design, enabling a comprehensive analysis of One Health implementation experiences across three states with analogous ecological attributes but divergent institutional contexts. The study yielded significant, policy-relevant insights into workforce capacity, governance structures, and intersectoral collaboration mechanisms by engaging senior One Health focal persons and multisectoral leaders. The use of a systematic thematic analysis methodology enhanced analytical rigour, while the cross-sectoral perspective reinforces the relevance of findings for policy and health system improvement at the sub-national level.

Limitations

The study also has some issues. First, the qualitative design and the small number of key informants make it hard to apply the results to other states. Second, the viewpoints predominantly originated from senior-level stakeholders and may not adequately reflect experiences at the frontline or community levels where One Health is implemented. Third, relying on self-reported data can result in recall bias and social desirability bias. Despite these limitations, the study provides valuable, context-specific evidence from a relatively under-researched setting and offers pertinent information for the formulation and implementation of sub-national One Health policy in Nigeria.

Declarations

Authors' Contributions

A.S., B.A.M., M.S.A., A.N.G. – Conceptualization, methodology, review and editing**.**

A.S. - Data collection, data analysis, and writing original draft.
B.A.M., M.S.A., A.N.G. –Supervision and review.

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Data Availability Statement

Because of confidentiality agreements, the qualitative data from this study are not available to the public. However, they can be requested from the corresponding author.

Ethics approval and consent to participate

This study was carried out in accordance with the Declaration of Helsinki and relevant institutional ethical guidelines. The study got the ethical approval from the Research and Ethics Committee of Usmanu Danfodiyo University, Sokoto (UDUS/UREC/2025/003), as well as the State Ministries of Health Research Ethics Committees of Sokoto (SMO/1580/V.IV), Kebbi (107:028/2025), and Zamfara State (ZSHREC10092025/332). Keeping transcripts anonymous and storing audio recordings and study documents in a safe place helped keep things private. The goal of the study, their voluntary involvement, and their freedom to discontinue participation at any time without facing repercussions were all sufficiently explained to the participants. The appropriate institutional and state ethics bodies granted their permission. Prior to their involvement in the study, each subject provided written informed consent. Every procedure was carried out in compliance with applicable institutional norms and the Declaration of Helsinki. Written informed consent was obtained from all respondents prior to their inclusion in the study. Confidentiality and anonymity were strictly maintained throughout the study.

Consent for Publication

Not applicable.

Declaration of Competing Interest

The authors claim they have no conflicting interests.

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