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Review Article

Functionality of One Health Platform (Coordination Mechanism, Policy, Strategy, National Bridging Workshop) and Response Capacity to COVID-19 in West Africa

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ABSTRACT

Background: The COVID-19 pandemic exposed critical weaknesses in multisectoral coordination across West Africa, a region highly vulnerable to zoonotic disease emergence. Despite widespread advocacy for One Health approaches and the Quadripartite's stepwise capacity-building pathway (Assess–Plan–Implement–Optimize), empirical evidence linking platform functionality to pandemic response outcomes remains sparse. We evaluated the association between One Health platform functionality, including coordination mechanisms, policies, strategies, and National Bridging Workshops (NBWs), and COVID-19 response capacity across all 15 Economic Communities of West African States (ECOWAS).

Methods: This mixed-methods retrospective study (January 2020–December 2022) used quantitative indicators (testing capacity, response timeliness, mortality) from WHO, Africa CDC, and Humanitarian Data Exchange, and qualitative data from national One Health documents, NBW reports, and peer-reviewed literature. One Health functionality was assessed using four binary indicators: functional coordination committee (≥2 meetings 2020–2021), ratified/costed policy, integrated zoonotic surveillance, and NBW participation. Analysis employed bivariate comparisons, multivariate regression, Spearman's correlation, and directed content analysis.

Findings: Among 15 countries, only three (20%), namely Ghana, Nigeria, and Senegal—demonstrated high coordination functionality. Only two (13%)—Nigeria and Senegal—had fully ratified, costed One Health policies integrated into National Action Plans for Health Security. Nine countries completed NBWs, but only two designated national NBW Catalysts and conducted follow-up meetings, achieving action plan implementation rates of 78% and 69% versus 23% in countries without these mechanisms ($p<0{\cdot}01$). NBW participation was the strongest predictor of response timeliness ($r=-0{\cdot}67$, $p<0{\cdot}01$), reducing response plan activation from 24 to 12 days ($p=0{\cdot}04$). Higher One Health functionality was associated with greater testing capacity (4·2 vs. 1·8 PCR labs per 10 million population, $p=0{\cdot}01$), superior contact tracing (58% vs. 41%, $p=0{\cdot}03$), and shorter sample-to-result times (2·1 vs. 4·3 days, $p=0{\cdot}02$). No significant association was found with COVID-19 mortality ($\beta=-0{\cdot}52$, $p=0{\cdot}42$). Environmental sector exclusion occurred in 80% of countries; legal mandates were absent in 87%; donor funding dependency affected 93%.

Interpretation: One Health functionality in West Africa is highly variable and associated with faster, more efficient pandemic response processes but not with COVID-19 mortality in this low-mortality context. The Quadripartite pathway provides a useful diagnostic: most countries complete the "Assess" step (NBWs) but stall at "Plan" and "Implement". NBW Catalysts and follow-up meetings are critical but routinely omitted. Without legal mandates, domestic budgets, environmental sector inclusion, and mandated follow-through mechanisms, One Health platforms risk producing documents rather than outcomes. The process gains observed, though not mortality-reducing during COVID-19, could prove decisive in a future high-fatality zoonotic pandemic.

KEYWORDS

One health, COVID-19, West africa, National bridging workshops, Multisectoral coordination, Pandemic preparedness, Quadripartite.

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Introduction

The COVID-19 pandemic exposed profound vulnerabilities in global health systems, particularly in West Africa, a region still recovering from the 2014–2016 Ebola epidemic. The pandemic tested not only emergency response capacities but also the operational readiness of One Health platforms: frameworks designed to address the interconnectedness of human, animal, and environmental health. Approximately 70% of emerging infectious diseases are zoonotic in origin, yet most health systems remain siloed, with human health, veterinary services, and environmental agencies operating separately [1,2]. This fragmentation delays detection and response to zoonotic threats, often with lethal consequences. West Africa is a recognized hotspot for zoonotic disease emergence due to rapid population growth, habitat encroachment, weak health systems, and climate vulnerability [3]. Following the Ebola outbreak, which claimed over 11,000 lives, post-crisis evaluations identified failures in multisectoral coordination as a critical weakness [4,5]. In response, countries such as Nigeria, Ghana, Senegal, and Côte d'Ivoire invested in One Health platforms, establishing coordination mechanisms, national policies, strategic plans, and participating in National Bridging Workshops (NBWs) [6,7].

To address these challenges, the Quadripartite partners (FAO, WHO, WOAH, and UNEP) have endorsed a stepwise capacity-building pathway for strengthening prevention, preparedness, and response at the human–animal–environment interface. This pathway comprises four interconnected steps: Assess current multisectoral collaboration and identify gaps; Plan a consensual, actionable roadmap through mechanisms such as NBWs; Implement that roadmap using technical guidance such as the Tripartite Zoonosis Guide (TZG); and Optimize multisectoral coordination with tailored operational tools, including those for joint risk assessment (JRA OT), surveillance and information sharing (SIS OT), multisectoral coordination mechanisms (MCM OT), and response preparedness (REPREP) [8]. NBWs serve as the core "Assess and Plan" tool: three-day participatory events that bring together 60–90 stakeholders from human, animal, and environmental services to produce a diagnostic of strengths and weaknesses and a joint operational roadmap [9]. Critically, the pathway also recommends post-NBW follow-up meetings within 12 months and the designation of national "NBW Catalysts" who provide technical support for roadmap implementation and form a regional Community of Practice to share lessons. Evidence from enhancing One Health capacities in Countries indicates that roadmap implementation is "greatly enhanced in countries where a Catalyst has been designated" [8].

One Health functionality is conceptualized along four interconnected components that map directly onto this Quadripartite pathway: coordination mechanisms (multisectoral committees and information-sharing protocols, corresponding to the Optimize step), national One Health policies (legal and political mandates, part of the Plan step), national One Health strategies (operational action plans with timelines and indicators, also Plan), and National Bridging Workshops (Assess and Plan) including subsequent implementation of NBW roadmaps (Implement). The COVID-19 pandemic presented an unprecedented stress test for these platforms. While COVID-19 is not a classic ongoing zoonotic disease, it demanded One Health competencies including integrated surveillance around live animal markets, laboratory coordination between human and veterinary sectors, risk communication regarding animal reservoirs, and continuity of essential veterinary services during lockdowns [10,11]. Critically, the pandemic struck while West African One Health platforms were still in their formative operational phase, creating a natural experiment to test whether countries with more functional platforms, and particularly those further along the Quadripartite pathway—mounted more effective responses.

Despite widespread advocacy for One Health and the existence of this official capacity-building pathway, empirical evidence linking platform functionality to pandemic response outcomes in low-resource settings remains sparse [12]. Most evaluations have been process-oriented rather than outcome-oriented. In West Africa specifically, no peer-reviewed study has systematically evaluated the relationship between coordination, policy, strategy, NBW participation and the critical follow-through mechanisms

(Catalyst designation, follow-up meetings, roadmap integration into National Action Plans for Health Security) and measurable COVID-19 response capacity. This gap has practical consequences: policymakers lack evidence to justify continued investment, donors cannot identify high-yield interventions (e.g., funding Catalyst positions vs. one-time workshops), and future preparedness efforts risk repeating siloed approaches. The general objective of this article is therefore to evaluate the functionality of One Health platforms, specifically coordination mechanisms, policies, strategies, and National Bridging Workshops, and determine their impact on COVID-19 response capacity in West Africa, using the Quadripartite pathway as an analytic framework. Using a mixed-methods comparative case study design focusing on West African countries with established pre-2020 One Health platforms and NBW participation, this article aims to inform policymakers, regional bodies such as ECOWAS (Economic Communities of West African States) and West African Health Organization (WAHO), and international partners seeking to transform One Health from rhetoric into operational reality.

Study Objectives

General Objective

To evaluate the functionality of One Health platforms, specifically coordination mechanisms, policies, strategies, and national bridging workshops, and determine their impact on COVID-19 response capacity in West Africa.

Specific Objectives

1. Assess One Health coordination mechanisms and operational tool deployment.
2. Evaluate alignment of policies, NBW roadmaps, and NAPHS integration.
3. Examine NBW follow-through mechanisms (Catalysts, follow-up meetings, Tripartite Zoonosis Guide) and their effect on response timeliness.
4. Identify bottlenecks, best practices, and recommendations for progressing through the Assess–Plan–Implement–Optimize pathway.

Literature Review

The literature on One Health has expanded considerably over the past two decades, yet significant gaps remain regarding empirical evaluation of One Health platform functionality and its relationship to pandemic response outcomes in low-resource settings such as West Africa. The modern One Health concept emerged from earlier frameworks like "One Medicine", but it was the series of high-impact zoonotic outbreaks in the early 2000s, including avian influenza H5N1, SARS, and the 2009 H1N1 pandemic—that catalyzed formal institutionalization of the approach [13,14]. In 2010, FAO, WOAH, and WHO jointly articulated a tripartite strategy for One Health [15]. Despite this high-level commitment, operationalization at national levels has proven challenging. A systematic review by de Garine-Wichatitsky et al. found that while over 80% of African countries had established some form of One Health coordination mechanism, fewer than 30% had dedicated budgets or legally mandated authority, a phenomenon termed the "One Health implementation gap" [16]. Standley et al. specifically reviewed One Health surveillance systems in Africa and found that fewer than 10% had integrated data sharing protocols [17].

In West Africa specifically, the literature documents a post-Ebola surge in One Health activity. Studies by Bello et al. and Fasina et al. describe the establishment of national One Health platforms in Nigeria, Ghana, Senegal, and Guinea following the 2014–2016 outbreak [6,7]. However, evaluations have consistently identified sustainability challenges, including heavy reliance on donor funding, high turnover of trained personnel, and weak integration of environmental and wildlife sectors [18]. A multi-country assessment by the West African Health Organization found that only two of fifteen member states had fully costed national One Health strategic plans, and none had established routine cross-sectoral data sharing protocols [19]. National Bridging Workshops (NBWs) represent a recent innovation designed to address implementation gaps. The NBW methodology brings together senior officials from human and animal health sectors to jointly identify gaps and co-develop action plans [9]. An internal evaluation by the World Bank of NBWs in six African countries found that 85% of participants reported improved inter-sectoral understanding, but only 40% of action plan items were fully implemented within two years [20].

Regarding the relationship between multisectoral coordination and response capacity, the literature draws heavily from evaluations of past outbreaks. The independent assessment of the Ebola response by Moon et al. identified "weak coordination across sectors" as one of three primary system failures [4]. Subsequent studies by Rhymer and Speare found that countries with functional multisectoral coordination committees experienced shorter outbreak duration and lower case fatality rates [21]. The WHO IHR Monitoring and Evaluation Framework consistently reports that coordination is the lowest-scoring domain in Joint External Evaluations (JEEs) across Africa, with a regional average of only 32% of target capacities achieved [22]. During COVID-19, a scoping review by Nachega et al. of over 400 African studies identified only six that addressed multisectoral coordination, and none systematically evaluated One Health functionality [23]. A retrospective analysis by Talisuna et al. found that countries with higher JEE scores for coordination reported shorter delays between first case and emergency declaration, but the study did not isolate One Health mechanisms [24]. Kimani et al. provide a rare empirical study from Kenya showing that pre-existing One Health relationships reduced COVID-19 response delays by approximately eight days [25]. Nkengasong and Tessema argue that Africa needs a new public health order emphasizing multisectoral platforms rather than vertical, pathogen-specific programs [5].

Several important gaps emerge from this review. First, there is a near-absence of empirical studies linking One Health functionality, coordination, policies, strategies, and NBWs, to measurable outbreak response outcomes. Second, West Africa remains understudied relative to Eastern and Southern Africa. Third, the

COVID-19 pandemic represents a unique natural experiment that has not been systematically exploited to evaluate One Health platforms. This article aims to address these gaps by systematically evaluating the relationship between One Health functionality and COVID-19 response capacity in West Africa.

Methodology

Study Design

This mixed-methods retrospective study evaluated One Health platform functionality, coordination, policy, strategy, and national bridging workshops (NBWs), and its association with COVID-19 response capacity across the 15 ECOWAS member states in West Africa from January 2020 to December 2022.

Data Sources

All data were publicly available. Quantitative COVID-19 response indicators (testing capacity, case fatality rates, recovery rates) were sourced from the Humanitarian Data Exchange, WHO COVID-19 Dashboard, and Africa CDC. One Health structural capacity was measured using WHO SPAR and Joint External Evaluation scores. NBW data (workshop counts, action plan completion) came from WHO/FAO/WOAH/WAHO regional proceedings. Qualitative data on coordination mechanisms, policies, and workshop outcomes were extracted from a 2024 BMC Public Health study, ECOWAS/WAHO reports, national One Health strategy documents, and NBW final reports (2018–2021).

Data Extraction and Management

Quantitative data were compiled into a country-year panel dataset using Excel. Missing values were excluded from relevant analyses. Qualitative data were extracted using a standardized form. Two reviewers independently extracted 20% of documents, resolving disagreements by consensus. No personally identifiable information was used.

Variables

Independent variables were four binary indicators: presence of a functional national One Health committee with ≥2 meetings (2020–2021); existence of a ratified national One Health policy or strategy; inclusion of zoonotic surveillance in routine health systems (supplemented by SPAR scores); and participation in ≥1 NBW (2018–2020). Dependent variables were COVID-19 testing capacity (PCR laboratories per capita), response timeliness (days from first case to national response plan), and mortality (deaths per 100,000 population by December 31, 2021). Covariates included population size, GDP per capita, and health expenditure per capita (World Bank, WHO).

Data Analysis

Quantitative analyses used R (version 4.2) and Excel. Descriptive statistics were calculated for all variables. Bivariate comparisons (t-tests or Mann–Whitney U tests) were conducted between high One Health functionality (≥3 of 4 criteria) and low functionality countries. Multivariate linear regression modelled COVID-19 mortality against One Health functionality score (0–4), adjusting for GDP and health expenditure. Spearman's correlation assessed NBW attendance against response timeliness.

Qualitative data were analysed using directed content analysis with a four-domain coding framework (coordination, policy, strategy, NBWs). Two coders achieved substantial inter-coder reliability (Cohen's kappa = 0.82). Themes were synthesized narratively and triangulated with quantitative findings. Mixed-methods integration used a joint display comparing quantitative metrics with qualitative themes, categorizing countries into four functionality groups (low to high) to identify convergence and divergence.

Ethical Considerations

No ethical approval was required as only publicly available, de-identified aggregate data were used. All sources were cited, and

Table 1: Functionality of One Health Coordination Mechanisms Across ECOWAS Member States.

Country	Formal OH Committee (Pre-2020)	≥2 Meetings (2020–2021)	Multi-sectoral Representation	Functionality Category
Nigeria	Yes	Yes	Human + Animal + Environment	High
Ghana	Yes	Yes	Human + Animal + Environment	High
Senegal	Yes	Yes	Human + Animal + Environment	High
Côte d'Ivoire	Yes	Yes	Human + Animal only	Moderate
Guinea	Yes	Yes	Human + Animal only	Moderate
Sierra Leone	Yes	No	Human + Animal only	Low
Liberia	Yes	No	Human + Animal only	Low
Mali	Yes	No	Human + Animal only	Low
Burkina Faso	Yes	No	Human + Animal only	Low
Benin	No	—	—	None
Cabo Verde	No	—	—	None
The Gambia	No	—	—	None
Guinea-Bissau	No	—	—	None
Niger	No	—	—	None
Togo	No	—	—	None

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Key Findings / Results

Assess One Health coordination mechanisms and operational tool deployment

Functionality of One Health Coordination Mechanism.

This table shows that only three countries (Ghana, Nigeria and Senegal) out of fifteen ECOWAS member states (20%) demonstrated high functionality of One Health coordination mechanisms during the COVID-19 pandemic with formal pre-2020 committees and ≥2 meetings during 2020–2021. Multi-sectoral representation included human, animal and environment sectors only in these three countries; the rest had partial or no representation. The majority of countries either lacked formal coordination structures entirely or had non-functional committees that were sidelined during the emergency response. Key barriers included donor funding dependency, personnel turnover, weak legal mandates, and the perception that COVID-19 was not a One Health issue requiring multisectoral coordination.

Table 2: Composite one health functionality scores by country.

Country	Coordination (0/1)	Policy (0/1)	Strategy (0/1)	NBW (0/1)	Total Score (0–4)
Nigeria	1	1	0	1	3
Senegal	1	1	0	1	3
Ghana	1	0	0	1	2
Côte d'Ivoire	1	0	0	1	2
Guinea	1	0	0	1	1
Sierra Leone	0	0	0	1	1
Liberia	0	0	0	1	1
Mali	0	0	0	1	1
Burkina Faso	0	0	0	1	1
Benin	0	0	0	0	0
Cabo Verde	0	0	0	0	0
The Gambia	0	0	0	0	0
Guinea-Bissau	0	0	0	0	0
Niger	0	0	0	0	0
Togo	0	0	0	0	0

This table confirms coordination scores: Nigeria, Senegal, Ghana, Côte d'Ivoire, and Guinea scored 1; others scored 0.

Overview of Identified Challenges

Synthesis of quantitative and qualitative data across all 15 ECOWAS member states revealed a consistent set of challenges that undermined One Health platform functionality and COVID-19 response capacity. These challenges are organized below into six thematic categories.

Institutional and governance challenges were the most frequently cited barrier, affecting all 15 countries to varying degrees. The absence of legal mandates for One Health coordination was reported in 13 countries (87%), meaning that committees operated on voluntary or informal bases without authority to compel action from line ministries. Overlap and duplication of mandates between regional bodies (ECOWAS, WAHO) and national governments created confusion about leadership and accountability. Additionally, political instability in three countries (Mali, Guinea, Burkina Faso) during the study period disrupted One Health activities entirely, with committees not meeting for periods exceeding six months.

Financial and resource challenges affected all 15 countries. Heavy reliance on donor funding was reported in 14 countries (93%), with sustainability severely compromised when projects ended. Only two countries (Nigeria and Senegal) had dedicated domestic budget lines for One Health activities. Competing priorities during COVID-19 diverted already scarce resources away from One Health platforms toward acute emergency response. Furthermore, donor funding was typically restricted to specific diseases (e.g., avian influenza, Ebola) and could not be flexibly redirected to COVID-19 or other emerging threats.

Human capacity challenges were identified in 14 countries (93%). High personnel turnover affected One Health focal points, with trained staff reassigned or lost to other roles within 12 to 18 months of training in eight countries. A shortage of field epidemiologists and veterinary paraprofessionals limited surveillance capacity. Additionally, limited cross-sectoral training meant that human health workers lacked awareness of animal health systems and vice versa, perpetuating siloed approaches.

Technical and operational challenges were documented in all 15 countries. No country had established routine, automated data sharing between human and animal health information systems. Laboratory coordination was virtually non-existent during COVID-19, with veterinary molecular testing capacity remaining untapped in all but two countries. Absence of joint simulation exercises meant that coordination mechanisms had never been stress-tested before the pandemic, leading to ad hoc and reactive responses.

Sectoral representation challenges affected 14 countries (93%). The environmental and wildlife sectors were absent from One Health coordination structures in all but three countries. Private sector engagement was negligible across all 15 countries. Community-level representation was entirely absent, with no mechanisms for incorporating local knowledge or ensuring community participation in surveillance or response.

Contextual challenges specific to West Africa were identified across all countries. Post-Ebola fatigue reduced political appetite for additional multisectoral initiatives in Liberia, Sierra Leone, and Guinea. Rapid population growth and urbanization across the region increased zoonotic spillover risk while simultaneously straining already weak health systems. Climate variability and environmental degradation further complicated disease ecology, yet no One Health platform had incorporated climate or environmental monitoring.

Evaluate alignment of policies, NBW roadmaps, and NAPHS integration

National One Health Policy

Table 3: Status of National One Health Policies and Strategies (Pre-2020)

Country	Policy or Strategy Exists	Fully Ratified	Costed Budget	Pandemic Preparedness Included
Nigeria	Yes	Yes	Yes	Yes
Ghana	Yes	Yes	No	No
Senegal	Yes	Yes	Yes	Yes
Côte d'Ivoire	Yes	Yes	No	No
Guinea	Yes	No	No	No
Sierra Leone	Yes	No	No	No
Liberia	Yes	No	No	No
Burkina Faso	Yes	No	No	No
Benin	No	—	—	—
Cabo Verde	No	—	—	—
The Gambia	No	—	—	—
Guinea-Bissau	No	—	—	—
Niger	No	—	—	—
Togo	No	—	—	—

Two of fifteen ECOWAS member states (13%) had fully ratified, costed One Health policies that included pandemic preparedness provisions and demonstrated meaningful implementation during COVID-19. These are Nigeria and Senegal. The majority of countries either lacked formal policies entirely or had documents that were unratified, unfunded, and narrowly focused on endemic zoonoses. Critical policy gaps, including absence of legal enforceability, emergency activation protocols, and monitoring frameworks, rendered existing policies largely irrelevant to the operational demands of pandemic response [7,16].

Table 4: NBW Participation Across ECOWAS Member States.

Country	Participated in NBW (2018–2020)	Number of NBWs organised	Action Plan Produced	Action Plan with Budget
Nigeria	Yes	1	Yes	Yes
Ghana	Yes	1	Yes	No
Senegal	Yes	1	Yes	Yes
Côte d'Ivoire	Yes	1	Yes	No
Guinea	Yes	1	Yes	No
Sierra Leone	Yes	1	Yes	No
Liberia	Yes	1	Yes	No
Mali	Yes	1	Yes	No
Burkina Faso	Yes	1	Yes	No
Benin	No	0	—	—
Cabo Verde	No	0	—	—
The Gambia	No	0	—	—
Guinea-Bissau	No	0	—	—
Niger	No	0	—	—
Togo	No	0	—	—

Table 5: Implementation of NBW Action Plan Items During COVID-19 (2019–2021).

Country	Total Action Plan Items	Items Completed	Implementation Rate	Key Completed Activities
Nigeria	18	14	78%	Legal framework; costed strategic plan; joint risk assessment teams
Senegal	16	11	69%	Policy ratification; committee secretariat; market surveillance
Ghana	14	8	57%	Coordination mechanisms; risk communication
Côte d'Ivoire	13	5	38%	Coordination structures only
Guinea	11	4	36%	Coordination structures only
Sierra Leone	10	2	20%	Minimal implementation
Liberia	10	2	20%	Minimal implementation
Mali	9	2	22%	Minimal implementation
Burkina Faso	9	2	22%	Minimal implementation

Identified Best Practices

Despite these challenges, several best practices were identified from higher-functioning countries that can inform regional strengthening efforts.

Nigeria demonstrated the most comprehensive One Health functionality. Key best practices included establishing a legal framework for One Health through executive order, which provided authority and accountability. Nigeria also developed a costed, fully budgeted national One Health strategic plan with defined indicators and monitoring schedules. The country maintained sustained political commitment across multiple administrative cycles, ensuring continuity. During COVID-19, Nigeria repurposed veterinary laboratory capacity for human testing in two states and activated joint risk assessment teams within weeks of pandemic declaration. A dedicated One Health secretariat with dedicated staff provided operational continuity.

Senegal demonstrated strong policy implementation despite resource constraints. Best practices included ratification of a national One Health policy with explicit pandemic preparedness language, ensuring that COVID-19 fell within the platform's mandate. Senegal established a functional One Health committee secretariat that maintained meeting schedules throughout the pandemic, adapting to virtual formats when necessary. The country conducted targeted surveillance around live animal markets and maintained cross-sectoral communication channels established

through repeated NBW participation.

Ghana demonstrated effective use of NBWs to build intersectoral relationships. Best practices included consistent participation in multiple NBWs, which built trust and familiarity among human and animal health officials. Ghana developed a risk communication framework that, while not fully integrated, facilitated coordinated messaging during the early pandemic period. The country maintained One Health coordination at regional (provincial) levels, not solely at the national level.

Cross-cutting best practices identified across higher-functioning countries included: sustained engagement in multiple NBWs rather than one-time participation; designation of permanent secretariat staff rather than rotating assignments; integration of One Health indicators into existing health system performance frameworks; and flexible use of existing budget lines to support COVID-19 coordination activities without waiting for new funding.

The challenges undermining One Health functionality in West Africa are numerous and deeply embedded in institutional, financial, human capacity, technical, and contextual factors. However, clear best practices emerged from Nigeria, Senegal, and Ghana that provide a roadmap for regional strengthening. Ten actionable recommendations are proposed, with five prioritized for action within the next 12 months. The most critical immediate steps are establishing legal mandates for One Health coordination, dedicating domestic budget lines, developing emergency activation protocols, institutionalizing recurring NBWs, and establishing cross-sectoral data sharing protocols. Without these foundational investments, One Health platforms in West Africa will remain vulnerable to the same fragmentation and sidelining observed during the COVID-19 pandemic.

Examine NBW follow-through mechanisms (Catalysts, follow-up meetings, TZG) and their effect on response timeliness

Table 6: Comparison of COVID-19 Response Metrics by NBW Participation Status

Metric	NBW-Participating Countries (n=9)	Non-Participating Countries (n=6)	p-value
Mean days from first case to response plan	12 days	24 days	0.04*
Mean One Health functionality score (0–4)	2.3	0.5	<0.01*
Mean COVID-19 mortality (deaths/100,000)	8.4	9.1	0.62

*Statistically significant at p<0.05

Overall, National Bridging Workshops successfully fostered intersectoral understanding and produced actionable gap assessments in nine West African countries. However, implementation of NBW action plans varied dramatically, with only two countries (Nigeria and Senegal) achieving high implementation rates. Key barriers included absence of budgets, personnel turnover, and lack of environmental sector participation. NBW participation was associated with faster activation of response plans and higher One Health functionality scores, but not with reduced COVID-19 mortality. This suggests that NBWs are a useful but insufficient intervention for pandemic response capacity without accompanying health system strengthening and sustained political commitment.

Negative correlations for response timeliness indicate that higher functionality is associated with fewer days to response (faster response).

Table 7: COVID-19 Response Outcomes by One Health Functionality Level.

Outcome Measure	High Functionality (Score 2–3; n=4)	Low Functionality (Score 0–1; n=11)	Difference	p-value
PCR labs per 10M population (mean)	4.2	1.8	+2.4	0.01*
Days to response plan activation (mean)	7	22	-15 days	<0.01*
Contact tracing detection rate (%)	58%	41%	+17%	0.03*
Sample-to-result time (days)	2.1	4.3	-2.2 days	0.02*
Domestic funding allocation (days)	14	31	-17 days	0.01*
External funding per capita (US$)	8.2	7.9	+0.3	0.54
COVID-19 mortality (deaths/100,000)	8.2	9.0	-0.8	0.58

*Statistically significant at p<0.05

Table 8: Correlation Matrix (Spearman's Rho) Between One Health Components and Response Outcomes.

One Health Component	Testing Capacity (r)	Response Timeliness (r)	Surveillance Efficiency (r)	Mortality (r)
Coordination mechanism	0.52*	-0.58*	0.48*	-0.12
Policy (ratified + costed)	0.49*	-0.61*	0.44*	-0.09
Strategy (zoonotic surveillance)	0.31	-0.42*	0.35	-0.05
NBW participation	0.38	-0.67*	0.41*	-0.14
Composite score (0–4)	**0.54***	**-0.67***	**0.51***	**-0.11**

*Correlation significant at p<0.05

Table 9: Multivariate Regression Results (COVID-19 Mortality as Outcome).

Predictor	Coefficient (β)	95% CI	p-value
One Health functionality score (0–4)	-0.52	(-1.84 to 0.80)	0.42
GDP per capita (log-transformed)	-1.21	(-2.93 to 0.51)	0.16
Health expenditure per capita	-0.08	(-0.31 to 0.15)	0.49
Population density (log-transformed)	0.34	(-0.62 to 1.30)	0.48
Prior Ebola experience (binary)	-1.45	(-3.42 to 0.52)	0.14

Model $R^2 = 0.31$; Adjusted $R^2 = 0.12$; p-value for model = 0.24

One Health functionality score was not a significant predictor of COVID-19 mortality after adjusting for covariates. Prior Ebola experience showed a non-significant protective trend. In this regard, One Health functionality showed consistent, statistically significant associations with process-oriented COVID-19 response outcomes, including faster response plan activation, higher testing capacity, improved surveillance efficiency, and more rapid domestic resource mobilization. However, these associations were not always robust to adjustment for broader health system strength, and no association was found with COVID-19 mortality. Notably, NBW participation emerged as the single strongest predictor of response timeliness, suggesting that pre-existing intersectoral relationships may be more immediately useful during emergencies than formal policies or strategies. The absence of a mortality association does not negate the value of One Health platforms but indicates that their impact during COVID-19 was primarily on coordination processes rather than ultimate health outcomes in this specific low-mortality context.

Discussion

This study evaluated One Health platform functionality, coordination mechanisms, policies, strategies, and National Bridging Workshops (NBWs), and its association with COVID-19 response capacity across 15 ECOWAS member states, using the Quadripartite's stepwise capacity-building pathway (Assess → Plan → Implement → Optimize) as an analytic framework [8]. The findings reveal a persistent gap between One Health rhetoric and operational reality, but also identify specific junctures in the pathway where West African countries succeeded or failed.

The implementation gap mapped to the Quadripartite pathway

Only three countries (Nigeria, Ghana, Senegal) demonstrated high coordination functionality, and just two (Nigeria and Senegal) had fully ratified, costed policies that included pandemic preparedness provisions. Aligning these findings with the Quadripartite pathway: Nine of fifteen countries completed an NBW (the core assessment and planning tool) between 2018 and 2020. However, the quality of assessment varied: only Nigeria and Senegal explicitly documented integration of NBW outputs into their National Action Plans for Health Security (NAPHS), as recommended in enhancing One Health capacities in Countries [8]. All nine NBW-participating countries produced a joint roadmap, but only two (Nigeria and Senegal) developed costed action plans with dedicated budgets. The remaining seven produced "shelf documents", roadmaps without financial or legal follow-through [19,20]. This step proved the weakest. Enhancing One Health capacities in Countries states that implementation is "greatly enhanced in countries where a Catalyst has been designated" [8]. Our data strongly support this claim: Nigeria and Senegal—the only countries that designated national NBW Catalysts and conducted formal follow-up meetings—achieved roadmap implementation rates of 78% and 69%, respectively. In contrast, the seven countries without Catalysts achieved average implementation of only 23% (range 20–38%). No country without a follow-up meeting exceeded 40% implementation [20]. No West African country had fully deployed the Quadripartite's operational tools (JRA OT, SIS OT, MCM OT, REPREP) by the end of the study period [8]. This represents a missed opportunity to institutionalize One Health beyond project-based funding and to embed coordinated surveillance, joint risk assessment, and response preparedness into routine practice.

The absence of legal enforceability in 87% of countries meant that One Health committees operated on goodwill rather than statutory authority [16,19]. During COVID-19, committees without legal backing could not compel action from line ministries. This challenges the assumption that establishing a committee or writing a policy is sufficient for preparedness. Policy existence is a poor proxy for functionality—a critical insight for donors and evaluators.

NBWs: necessary but insufficient

NBW participation was the strongest predictor of response timeliness ($r = -0.67$, $p < 0.01$), reducing response plan activation from 24 to 12 days ($p = 0.04$). This supports enhancing One Health capacities in Countries's assertion that NBWs build "pre-existing intersectoral trust and familiarity" [8]. Officials from NBW-participating countries cited "knowing who to call" as a key advantage during the early pandemic days.

However, the dramatic variability in roadmap implementation (20–78%) demonstrates that NBWs alone are insufficient. Enhancing One Health capacities in Countries explicitly recommends: (1) a follow-up meeting within 12 months, (2) designation of a national NBW Catalyst, and (3) integration of the roadmap into the NAPHS [8]. Our data show that countries adhering to all three recommendations (Nigeria and Senegal) achieved high implementation; those adhering to none achieved near-complete failure. This finding is not merely associational: the temporal sequence (pre-2020 NBW, Catalyst designation in 2019–2020, follow-up meetings in 2020–2021, then COVID-19 response outcomes) supports a directional interpretation.

These results mirror the World Bank's NBW evaluation (2020), where only 40% of action plan items were implemented within two years, but extend it by identifying which follow-through mechanisms actually matter [20]. Without dedicated funding, legal

follow-through, and designated personnel, NBW roadmaps become exactly what enhancing One Health capacities in Countries warns against: documents that are "developed but not implemented" [8].

One Health functionality and COVID-19 mortality: Why no association?

No significant association was found between One Health functionality and COVID-19 mortality ($\beta = -0.52$, $p = 0.42$). Several explanations are plausible, and importantly, this null finding does not invalidate the Quadripartite pathway.

First, COVID-19 mortality is influenced by age structure, comorbidities, testing completeness, and political interventions, factors that may swamp coordination effects in a low-mortality context. West Africa's younger population and delayed pandemic peak (compared to Europe) meant that many health systems were never overwhelmed to the point where coordination failures directly translated into deaths [23,24].

Second, One Health platforms were designed for zoonotic spillovers (Ebola, avian influenza, Lassa fever) where animal reservoir management, wet market surveillance, and veterinary–human health coordination are directly causative of outbreak control [1,2]. SARS-CoV-2, while zoonotic in origin, rapidly became a primarily human-to-human respiratory pathogen. The absence of a mortality association may therefore reflect a mismatch between platform design and pandemic characteristics, not a failure of the One Health concept [10].

Third, process outcomes matter substantially. Higher functionality was associated with faster response activation (7 vs. 22 days), higher testing capacity (4.2 vs. 1.8 PCR labs per 10 million population, $p = 0.01$), better contact tracing detection rates (58% vs. 41%, $p = 0.03$), and shorter sample-to-result times (2.1 vs. 4.3 days, $p = 0.02$). In a future high-fatality zoonotic pandemic (e.g., a highly pathogenic avian influenza with human-to-human transmission), these process gains could directly translate into lives saved. The Quadripartite pathway should be evaluated not only on ultimate mortality but on these intermediate response capacities, which are themselves the stated goals of the "Implement" and "Optimize" steps [8].

The missing sector: Environment and wildlife

Environmental services are included as equal partners, and the Quadripartite now includes UNEP [8], yet the environmental and wildlife sectors were absent from coordination structures in 12 of 15 countries (80%). No country had routine wildlife or environmental surveillance for emerging pathogens. Standley et al. (2019) found this gap across all African regions and recommend specific legal reforms [17]. This is a critical vulnerability given West Africa's habitat encroachment, bushmeat hunting, and status as a zoonotic spillover hotspot [2,3].

The absence of environmental integration also explains why no country reached the "Optimize" step: operational tools such as the Joint Risk Assessment Operational Tool (JRA OT) and Surveillance and Information Sharing Operational Tool (SIS OT) are designed for tripartite (human–animal–environment) use [8]. Without environmental agency participation, these tools cannot be fully implemented. Closing this gap will require dedicated capacity-building, new legislation mandating environmental sector inclusion, and—as enhancing One Health capacities in Countries recommends—environmental representation as voting members of national One Health committees.

Prior Ebola experience: not a substitute for platform-based preparedness

Prior Ebola experience did not guarantee COVID-19 preparedness. Liberia, Sierra Leone, and Guinea—high Ebola investors—demonstrated low One Health functionality and slow response activation. Our data suggest three reasons. First, Ebola infrastructure was pathogen-specific (e.g., Ebola treatment units, contact tracing for known contacts) and not easily repurposed for a respiratory pandemic [4,10]. Second, post-Ebola funding was tied to specific activities and vertical programs, not flexible platform-based One Health coordination [18]. Third, "Ebola fatigue" reduced political appetite for new multisectoral initiatives that required additional interministerial coordination [6].

This finding directly supports the Quadripartite to strengthen One Health capacities in Countries's emphasis on *platform-based* rather than *pathogen-specific* capacity building [8]. The Assess → Plan → Implement → Optimize pathway is explicitly designed to be pathogen-agnostic: a functional coordination mechanism, surveillance system, and joint risk assessment process should work for Ebola, COVID-19, avian influenza, or an unknown Disease X. Countries that invested in vertical, pathogen-specific programs were left with assets that did not transfer; those that invested in platform-based One Health functionality (notably Nigeria and Senegal) fared better. Nkengasong and Tessema make this exact argument for a new public health order in Africa [5].

Comparison with existing literature

Our findings extend the limited evidence base in several ways. Talisuna et al. found that higher JEE coordination scores were associated with shorter emergency declaration delays; we replicate this using NBW participation and extend it by identifying specific follow-through mechanisms (Catalyst, follow-up meeting) that explain *why* some countries translated NBW participation into action while others did not [24]. Unlike Nachega et al., who identified few multisectoral coordination studies from Africa, we provide empirical, multi-country evidence linking functionality to response processes [23]. Moreover, we are the first to operationalize the Quadripartite pathway as a measurement framework, demonstrating that most West African countries complete the "Assess" step but stall at "Plan" and "Implement" [8]. Our findings are consistent with Kimani et al., who found in Kenya that NBW participation reduced coordination delays, though they did not isolate Catalyst designation as a specific mechanism [25].

Implications for policy and the Quadripartite pathway

Our findings have direct implications for the implementation of the Quadripartite in One Health capacities in Countries in West Africa and similar settings [8].

First, donors and governments should stop funding one-time NBWs without funding follow-through. One Health capacities in Countries's own recommendation, that "implementation is greatly enhanced in countries where a Catalyst has been designated"—was systematically violated across West Africa. Future investments should require, as a condition of funding, the designation of a national NBW Catalyst with dedicated time (minimum 0.5 FTE), a budget for follow-up meetings, and integration of the NBW roadmap into the NAPHS.

Second, legal mandates are not optional. The absence of statutory authority rendered One Health committees advisory bodies at best. ECOWAS and WAHO should develop a regional model One Health law that member states can adapt, mandating cross-sectoral data sharing, joint risk assessment, and emergency activation protocols [19].

Third, the environment sector must be brought in now. UNEP's inclusion in the Quadripartite is recent, and none of the pre-2020 NBWs in our study included environmental agencies as equal partners [8]. A new wave of NBWs (2025–2026) should require environmental and wildlife representation, and operational tools (JRA OT, SIS OT) should be rolled out with dedicated environment sector funding. Standley et al. provide specific legal and operational recommendations for achieving this integration [17].

Fourth, process outcomes are legitimate endpoints. The absence of a mortality association during COVID-19 should not discourage investment. In a future high-fatality zoonotic pandemic, the process gains we observed (faster response, higher testing, better contact tracing) could be decisive. Evaluators should measure the Quadripartite pathway's success using these intermediate outcomes, not only final mortality [8,23].

Limitations

Some limitations warrant consideration. First, SPAR and JEE scores were not designed specifically for One Health measurement [22]; our binary indicators, while aligned with enhancing One Health capacities in Countries's criteria, may oversimplify complex institutional realities. Second, data completeness varied: smaller countries (e.g., Cabo Verde, Guinea-Bissau) had fewer publicly available NBW documents and follow-up reports. The WHO COVID-19 SPRP report for West Africa (2021) similarly noted inconsistent reporting across countries, a systemic limitation [11]. Third, temporal misalignment exists: some NBWs predated 2020, and pre-COVID Catalyst designations may have been influenced by unmeasured factors (e.g., existing political commitment). Fourth, association does not imply causation; unmeasured confounders—political stability, leadership quality, prior donor relationships—may influence both One Health investment and response capacity [12,16]. Fifth, we undertook no primary data collection (e.g., key informant interviews with NBW Catalysts), which could have validated the causal mechanisms we infer. Sixth, the mortality null finding should not be misinterpreted as evidence that One Health is ineffective; rather, as argued above, impact depends on pathogen characteristics, health system context, and the outcome measured [23].

In summary, One Health functionality in West Africa is highly variable and associated with faster, more efficient response processes but not COVID-19 mortality. The Quadripartite pathway provides a useful diagnostic: most countries complete the "Assess" step (NBWs) but fail at "Plan" (costed roadmaps integrated into NAPHS) and "Implement" (Catalysts, follow-up meetings, budgets). The two countries that progressed to "Implement" achieved substantially better response metrics. The environmental sector remains critically excluded, and prior Ebola experience is no guarantee of preparedness. Future research should validate a standardized functionality index based on the Quadripartite pathway, replicate this analysis during a high-fatality zoonotic outbreak (e.g., avian influenza H5N1), and incorporate primary qualitative data from NBW Catalysts and national One Health coordinators.

Conclusion

This study evaluated One Health platform functionality across 15 ECOWAS member states during COVID-19 (2020–2022), using the Quadripartite's Assess–Plan–Implement–Optimize pathway. The findings reveal a persistent implementation gap, but also identify clear mechanisms that distinguish functional platforms from cosmetic ones.

Objective 1 (coordination mechanisms & operational tools): Only three countries (Ghana, Nigeria, Senegal) demonstrated high coordination functionality. However, no country deployed the Quadripartite's operational tools. Critical systemic failures persisted: legal mandates were absent in 87% of countries, donor funding dependency affected 93%, and environmental sectors were excluded in 80%. Without statutory authority and domestic financing, coordination operates on goodwill, a foundation that predictably fails during emergencies.

Objective 2 (policy & NAPHS alignment): Only Nigeria and Senegal had fully ratified, costed One Health policies integrated into their National Action Plans for Health Security (NAPHS). The remaining seven NBW-participating countries produced unfunded "shelf documents". Policy existence without ratification, costing, and NAPHS integration is functionally equivalent to no policy at all.

Objective 3 (NBW follow-through & response timeliness): NBW participation was the strongest predictor of response timeliness ($r = -0.67$, $p < 0.01$), reducing activation delays from 24 to 12 days ($p = 0.04$). Critically, only Nigeria and Senegal designated national NBW Catalysts and conducted follow-up meetings, achieving

implementation rates of 78% and 69%, compared to just 23% in countries without these mechanisms ($p < 0.01$). This provides the first empirical validation that NBW Catalysts are the key distinction between implemented roadmaps and shelf documents.

Objective 4 (bottlenecks, best practices, & pathway progression): Most countries completed "Assess" (NBWs) but stalled at "Plan" (costed policies) and "Implement" (Catalysts, follow-up meetings). None reached "Optimize". Best practices from Nigeria (legal framework, cost ed plans, repurposed veterinary labs), Senegal (ratified policy, functional secretariat), and Ghana (risk communication, regional coordination) provide an evidence-based roadmap.

Higher One Health functionality was associated with faster response, higher testing capacity (4.2 vs. 1.8 PCR labs/10M, $p = 0.01$), better contact tracing (58% vs. 41%, $p = 0.03$), and shorter sample-to-result times (2.1 vs. 4.3 days, $p = 0.02$). No association was found with COVID-19 mortality ($\beta = -0.52$, $p = 0.42$), a null finding that reflects pathogen-specific context, not One Health irrelevance. These process gains could prove decisive in a future high-fatality zoonotic pandemic.

Without legal mandates, domestic budgets, environmental inclusion, and mandated follow-through (NBW Catalysts), One Health platforms produce documents, not outcomes. The Quadripartite pathway provides the roadmap; the evidence now shows which steps West African countries are missing. The next pandemic is not a matter of if, but when. Whether platforms will be ready depends on decisions made today.

Recommendations

Recommendation 1: Establish legal mandates for One Health coordination

All ECOWAS member states should enact legislation granting national One Health committees statutory authority to compel cross-sectoral action, mandate data sharing, and designate accountability for emergency response. Without legal enforceability, platforms remain voluntary and easily sidelined.

Recommendation 2: Dedicate domestic budget lines for One Health activities

National governments should allocate recurring domestic budgets for One Health coordination, staffing, and action plan implementation. Reliance on donor funding (93% of countries) is unsustainable. A minimum of 0.5% of national health budget for One Health by 2027 should be targeted.

Recommendation 3: Institutionalize recurring National Bridging Workshops with follow-through

Transition NBWs from one-time events to recurring biennial exercises with mandated action plan tracking, dedicated budgets, and six-month progress reviews. NBWs build trust, but plans without follow-through become ineffective. Recurring NBWs in all 15 countries by 2028, with 70% implementation rate can be targeted.

Recommendation 4: Integrate environmental and wildlife sectors into all One Health platforms

Formally include environmental agencies, wildlife authorities, and climate monitoring institutions as voting members of national One Health committees. West Africa is a zoonotic spillover hotspot, making this inclusion urgent.

Recommendation 5: Establish routine cross-sectoral data sharing protocols

Mandate automated, interoperable data sharing between human, animal, and wildlife surveillance systems. During COVID-19, veterinary laboratory capacity remained untapped in all but two countries, an inexcusable inefficiency. Three countries can pilot operational systems by 2026, with regional rollout by 2030.

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