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EMERGING ZOONOTIC DISEASES AND ONE HEALTH APPROACHES: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The rising global health insecurity threat posed by emerging zoonotic diseases is an ongoing, escalating threat that is being driven by increased and complex interactions between ecological disruption, socio-economic stress, climate change, biodiversity loss and enhanced human-animal interface. One Health approach has been seen to emerge as a cross sectoral approach to handling these multifactorial issues. However, its problematic functioning and the gaps in its application remain a question of concern.The effectiveness of its operation and the drivers and issues of its implementation remain debated in terms of its recent successes.This systemic literature review integrates both quantitative and qualitative outcomes of the recent achievements of One Health. The convergent integrated mixed-methods systematic review was conducted in accordance with PRISMA 2020 and Joanna Briggs Institute. The databases have been searched in PubMed/MEDLINE, Embase, Web of science, Scopus, CINAHL and CAB Abstracts. Qualified papers talked about outbreak zoonotic diseases and either expressly or implicitly followed a One Health approach. Data were extracted and appraised on validated tools of critical appraisal. The quantitative data were synthesised as a story, and the qualitative data were synthesised with the assistance of thematic method (25 mixed-method, 41 and 62 quantitative and qualitative data, respectively). The land-use change, wildlife trade, climate variability, intensification of livestock, urbanization and biodiversity loss were the key factors contributing to the outbreaks of zoonotic diseases. The Integrated One Health interventions were associated with the improved sensitivity of surveillance, reduced time to respond to an outbreak, intersectoral coordination and moderate cost-effectiveness advantages. However, there remained such challenges as part-time governance, insufficient funds, poor integration of environmental sector, non-standard evaluation measures and capacity problem in poor and middle-income countries. Underrepresentation of the elements of environmental health in the operational implementation is also consistent despite the ratification of the policy-level. Nevertheless, the structural governance loopholes, differences in the procedures, and resource distribution limit the implementation over a long period. Increasing the environmental integration, turning One Health into standardized measures of integration, and investing in the capacity-building (particularly in risk-prone regions), are all necessary to make One Health more than a policy speech and turn it into a permanent practice.

Keywords: Emerging Zoonotic Diseases; One Health; Zoonosis; Spillover; Integrated Surveillance; Biodiversity Loss; Land-Use Change; Climate Change; Wildlife Trade; Multisectoral Collaboration; Global Health Security; Mixed-Methods Systematic Review.

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INTRODUCTION

Their incidence and re-incidence are especially a major hazard to health security in the global environment in the twenty-first century as a consequence of zoonotic diseases. The Zoonotic diseases which can be defined as the diseases that are exchanged between animals and humans cause about three quarters of all known infectious disease in humans as well as three quarters of all emerging infectious disease in the world (Taylor et al., 2001; Woolhouse and Gowtage-Sequeria, 2005). The catastrophic effects of the disease spill in animals onto humans are acutely noted by the unparalleled global pandemic of the COVID-19 caused by the zoonotic pathogen SARS-CoV-2, which has raised the new international interest to the question of the threat of such epidemics (Dhama et al., 2020; Kuhn et al., 2024). The rate, at which the zoonotic diseases are spreading, has been increasing exponentially over the last few decades as a result of the human-made environmental variability, agriculture intensification, movement of wild animals, and the free flow of people (Jones et al., 2008; Allen et al., 2017). The need to study the mechanisms of outbreaks of the zoonotic diseases and formulate appropriate measures to negate the disease has hence been a pressing concern in the entire fraternity of global health.

One Health is the operational and conceptual approach which is predominant to cope with the threats of zoonotic diseases in an integrated and multisectoral fashion. It was named One Medicine during the 1960s by Calvin Schwabe, and it was referred to as One Medicine, but over the years the term has been developed to portray the inseparable relationship between the health of humans, animals, and the ecosystem (Schwabe, 1984; Zinsstag et al., 2012). The concept of modern One Health, whose official definition has been adopted by the World Health Organization (WHO), Food and Agriculture Organization (FAO) and World Organisation for Animal Health (WOAH), is concerned with cross-sectoral collaboration in order to achieve the best health outcomes at the human-animal-environment interface (WHO, 2017; FAO et al., 2022). A recent three-way partnership has been extended to a four-way one with the United Nations Environment Programme (UNEP) like an ever-growing awareness of environmental aspects in the development of diseases (FAO et al., 2022). The implementation of the One Health principles has several gaps regardless of the widespread support of the policies, and in particular, gaps in the real sector and community integration processes (Kuhn et al., 2024; Destoumieux-Garzon et al., 2018).

The causes of the occurrence of the zoonotic diseases are compound and, quite literally, manifold and, therefore, require the complexity of the means of analysis, which cannot be reduced solely to the adequacy of a specific discipline. The change in land use such as deforestation, land use, and urban development are the basic changes, which alter ecological interfaces of wildlife, domestic animals, and human beings and create new potentials of pathogen spillover (Patz et al., 2004; Faust et al., 2018). The legal and illegal wildlife trade helps the organic species to experience more contact amongst themselves than has ever been observed between species who otherwise would never have been in contact with each other leading to the transmission of the pathogens across geographical boundaries of great proportions (Karesh et al., 2005; Smith et al., 2009). Climate change also affects the ecology of diseases due to the effect it has on the distribution of vectors, patterns of survival of pathogens and susceptibility of hosts and may influence the geographic range of most zoonotic diseases (Lafferty, 2009; Altizer et al., 2013). Moreover, the intensive livestock production systems provide the centers of multiplication of the pathogens, which can be transferred to human beings (Greger, 2007; Graham et al., 2008). The coinciding drivers include the situations of the wicked problem of the zoonotic disease emergence when the causes and effects are highly interrelated with the social, economic, and ecological systems (Ritzer and Webber, 1973; Carlson et al., 2022).

Depletion of bi-diversity and the poor state of the eco system are very critical but underrated contributors of the threat of the zoonotic diseases. According to the hypothesis of dilution effect, the biodiversity decrease can encourage disease spreading because of the growth of the competitors of the reservoirs as well as the extinction of less competitive species, which can control the maintenance of the disease pathogens (Keesing et al., 2010; Ostfeld, 2017). On the other hand, the amplification effect and good reservoirs of the pathogens leads to some of the thick populations of generalists being flourishing in poor environments (Luis et al., 2013). Both mechanisms also help to empirically prove that it is context dependent, i.e., the relationship between biodiversity and diseases is context-dependent, and the relationship between biodiversity and diseases is determined by the analysis through systems (Huang et al., 2022;

Civitello et al., 2015). These complicated relationships between the environment and the health that make environmental health integration in One Health models, which is an ill-developed field of modern practice, significant (Kuhn et al., 2024; Hasler et al., 2018).

The COVID-19 pandemic has ironically shifted the research and policy paradigm of zoonotic diseases with the outputs of scientific output being unprecedented and its exposure of systemic weaknesses to the world. The pandemic demonstrated the devastating nature of the new zoonotic infections and the deficiency of the previously existing system of early warning, surveillance centers, and international coordination mechanisms (Morens and Fauci, 2020; Morse et al., 2012). Post-pandemic reviews, which have also involved an improved human-animal interface surveillance, a decreased volume of wildlife trade and consumption, and an enhanced health capability in hotspots, have always pointed to the need to radically change the system of how societies monitor, thwart, and respond to the emerging zoonotic threats (Daszak et al., 2020; Plowright et al., 2021). Nevertheless, such recommendations are difficult to change into a long-term policy implementation and practice, taking into account the conflicting political demands and scarce resources (Zinsstag et al., 2020; Ruegg et al., 2018).

Although there is an increasing value of the role of One Health, it is also apparent that there are numerous implementation issues at various levels. The institutional aspects entail solitary governance, existence of dissimilar professional cultures, and a dissimilar regulation framework, which prevent an effective collaboration of the spheres of human health, veterinary, and environmental (Lapinski et al., 2015; Gibbs, 2014). The resource constraint hinders the development of combined surveillance and response capacities, especially in low- and middle-income countries, where the burden of the zoonotic diseases is most often heavier (Shankar et al., 2024; Scoones et al., 2021). Another issue is that there is a difficulty in implementing One Health because of the methodology problem, such as the issues with the measurement of the integration, identification of results in cross-sectors, attributing healthy results to a certain intervention (Bordier et al., 2023; Garcia et al., 2022). Also, the lack of discipline and power imbalance in the field could drive the expertise of environmental and social science to the margins of what the One Health approaches should consider collectively (Wilkinson et al., 2021).

This review of the literature thus seeks to do a deep review of the available evidence on the topic of the emerging zoonotic diseases and the One Health approach and combine both quantitative and qualitative research to determine what has been effective, knowledge gaps and areas that need investment in the future. It can be anticipated that this review will lead to actionable information that can be derived and used in the process of developing improved conceptual and practical sides of One Health methods of preventing zoonotic diseases via strict mixed methods synthesis methods.

METHODOLOGY

To be sure that the methodology and the results are rigorous, transparent, and reproducible, this systematic literature review was done with the help of a convergent integrated mixed-methods design to summarize quantitative and qualitative evidence of the emerging zoonotic diseases and One Health approaches, and relied on the Joanna Briggs Institute approach to conducting a mixed methods systematic review, and the Preferred Reporting Items to Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The convergent integrated method was adopted because quantitative and qualitative research design enabled the review questioning to be included and integrated into single and primary synthesis to guarantee optimum and utility of results to guide policy and practice decision making. To show the purposes, research questions, search methods, inclusion and exclusion criteria, quality appraisal procedures and synthesis methods before the start of the review and hence prevent post-hoc changes that can introduce bias to the study, a priori review protocol was enrolled in the International Prospective Register of Systematic Reviews (PROSPERO).

The search strategy was developed on an iterative basis with initial exploration searches and consultation with a medical librarian as to make the best use of the sensitivity and specificity of the search insofar as the multidisciplinary nature of human health, veterinary science, environmental science and social sciences. A comprehensive search of many electronic databases, including PubMed/MEDLINE, Embase, Web of Science, Scopus, CINAHL, and CAB Abstracts was conducted so as to get the breadth of the literature on the subject in the various perspectives of disciplines. The controlled vocabulary was used containing MeSH headings and Emtree terms used in conjunction with free-text keywords that encompassed three areas of conceptualization: zoonotic diseases and emerging infectious diseases,

One Health approach and similar concepts, and cross-sectoral collaboration and integration, which were likewise in database-specific search strategies. Variations and synonyms of zoonotic disease (zoonosis, zoonoses, emerging infectious diseases, spillover, wildlife disease, animal-human interface), One Health (One Health, EcoHealth, planetary health, integrated health, One Medicine) and implementation elements (multisectoral collaboration, interdisciplinary research, surveillance, prevention, intervention) were the key words. It did not have any geographical or language restrictions initially, but with time covered by the studies were limited by the published works in English due to the resource constraints. The including systematic review reference list and inclusion studies were also screened manually to identify more eligible studies, forward citing search was done with the assistance of Google Scholar to identify new publications.

To make sure that the selection bias was reduced and the consistency was obtained, the selection of the studies was conducted using a two-stage screening procedure by two independent reviewers. Title and abstract screening of all the records retrieved at the initial stage was done against some set predefined inclusion criteria and full-texts of the potentially relevant studies were acquired. The second stage involved in-depth total review of the identified articles in term of detailed inclusion and exclusion criteria. In order to qualify to be included in a study, it must have developed zoonotic diseases or prevention of zoonotic disease, explicitly or implicitly adopt One Health approach, meaning the integration across human health, animal health and or environmental sectors, and must be reporting primary research findings, implementation experiences or policy debate. It was acceptable to use quantitative (epidemiological studies, surveillance system reviews, intervention trials, cross-sectional analyses) and qualitative (including phenomenological research, grounded theory research, ethnographic research, case studies and qualitative content analyses) research. Mixed-methods research was divided into the quantitative and qualitative to be synthesized separately. The exclusion criteria included that the studies needed to be solely non-zoonotic, they needed to have no cross-sectoral or systems view, no analysis component, and were to be conference abstracts, editorial and commentaries without any original research. The reviewers were able to resolve any conflicts in any of the screening phases through discussion and agreement with a third reviewer possible.

This review was utilized as a design creating standardized forms through which methodological peculiarities, contextual aspects, and substantive data of the studies included in this review were obtained. In quantitative research, it paid more attention to extraction on the study design, study population, study sampling, specifics and characteristics of the intervention or exposure, outcomes measures, effect sizes, confidence interval, significance of outcomes, and limitations. Within the context of qualitative research, the accent of extraction was put on the research paradigm, research methodology, features of the subjects, data collection techniques, analysis, dominant themes, theoretical constructs, and author interpretation. The reviews of each study were conducted by two reviewers who analyzed data on their own and verified the work to ensure that no details were missing and correct. Where research found the inadequate description meant that neither quality appraisal nor synthesis could be done, the authors were contacted and requested to give more information.

Quality appraisal employed many methods to assessment which were confirmed and appropriate to different designs types of the study to establish the methodological rigor and credibility of the studies. Quantitative experimental and observational studies were assessed using the Joanna Briggs Institute critical appraisal checklists of the type of research design that assessed aspects of sampling procedures, validity of measurement, control of confounding factors, statistical analysis and reporting of findings. Approaches methodological congruence, theoretical orientation, rigour in data collection, depth of analysis, and reflexivity The JBI Qualitative Assessment and Review Instrument (QARI) or Critical Appraisal Skills Programme (CASP) qualitative research checklist was employed to evaluate qualitative research. The JBI Mixed Methods Assessment and Review Instrument (MMARI), was employed to reflect the inclusion of quantitative and qualitative aspects of a mixed-method study. Quality appraisal was done with the help of two independent reviewers and their points of disagreement were decided out through discussion.

The convergent integrated mixed-methods approach involved the data synthesis, which involved the quantitative and qualitative evidence synthesized separately and in parallel and combined together through the meta-aggregating process. Quantitative data synthesis was performed through narrative synthesis on a framework developed by Popay et al., which entailed the formulation of an initial synthesis

through textual description and tabulation, then the study of intra and cross-study relationships by identifying thematic clusters and using moderator analysis, and the assessment of soundness of synthesis through sensitivity analysis and quality weighting.

Qualitative data was synthesized using the thematic synthesis methodology developed by Thomas and Harden and it involved the line-by-line coding of the qualitative data, sorting of the codes into descriptive themes, and analytical themes that go beyond the original studies to generate new interpretive constructs and explanatory hypotheses. This way, the relation between conclusions and the main text of the study is clear-cut and explicit, though, the new insights may be created with the aid of the interpretive analysis. The studies were employed by met-ethnography where the studies were of high quality in providing theoretical interpretations, which involved mutual translation of concepts within the studies and that the interpretation is through synthesis of the line of argument in studies. Qualitative data analysis NVivo qualitative data analysis software was employed to conduct qualitative synthesis in order to offer assistance regarding systematic coding, theme development and attribute constant comparison across studies.

RESULTS

Table 1 presents the characteristics of the 128 used studies and these are the methodological distribution of the study (quantitative, qualitative and mixed-methods), the geographical representation and the focus of the study (due to its multidisciplinary and globally distributed nature) One Health research is multidisciplinary and globally distributed. According to table 2, the study designs categorise the significant causes of emerging zoonotic diseases, including the land-use change, wildlife trade, climate change, livestock intensification, loss of biodiversity and urbanization and the relative strength of the evidence and the nature of the supporting evidence. The outcome of the One Health interventions has been reported in Table 3 and presents the quantifiable changes of early detection, response to outbreak coordination, data sharing, cost-effectiveness, and policy integration. Table 4 identifies the key obstacles to implementation such as, but not limited to, governance fragmentation, financial resources, unavailability of standard integration measurements, marginalization of environmental sector, and capacity capacity gaps in the LMICs combined with the research and policy priorities in the future.

Table 1. Characteristics of Included Studies in the Systematic Review

Category	Number (n)	Percentage (%)	Notes
Total Studies Included	128	100	Final studies after PRISMA screening
Quantitative Studies	62	48	Epidemiological & surveillance studies
Qualitative Studies	41	32	Case studies, ethnography, policy analysis
Mixed-Methods Studies	25	20	Integrated quantitative and qualitative
LMIC-based Studies	74	58	Low- and middle-income countries
High-income Countries	43	34	Europe, North America, Australia
Global/Multicountry	11	8	Multi-regional analyses

Table 2. Key Drivers of Emerging Zoonotic Diseases and Strength of Evidence

Driver Category	Examples	Evidence Strength	Study Types Supporting
Land-use Change	Deforestation, agricultural expansion	Strong	Modeling, epidemiological studies
Wildlife Trade	Legal & illegal trade	Moderate-Strong	Surveillance & case reports
Climate Change	Vector expansion, temperature shifts	Strong	Climate-epidemiology models

Livestock Intensification	High-density farming systems	Moderate	Cross-sectional & outbreak studies
Biodiversity Loss	Dilution/amplification effects	Context-dependent	Ecological modeling & field studies
Urbanization	Habitat fragmentation	Moderate	Spatial analyses

Table 3. Outcomes of One Health Interventions

Outcome Domain	Reported Impact	Percentage of Studies Reporting Improvement	Notes
Early Detection	Reduced detection time	64%	Integrated surveillance systems
Outbreak Response	Improved coordination	58%	Joint human-animal task forces
Cost-effectiveness	Shared resource utilization	47%	Economic evaluation studies
Data Sharing	Enhanced cross-sector reporting	61%	Digital integrated platforms
Policy Integration	Improved governance frameworks	52%	National One Health strategies

Table 4. Implementation Barriers and Future Research Priorities

Barrier Category	Description	Frequency in Studies	Recommended Future Action
Governance Fragmentation	Sectoral silos between ministries	High	Unified policy frameworks
Funding Constraints	Limited sustained financing	High	Dedicated One Health funding streams
Environmental Marginalization	Limited environmental sector inclusion	Moderate-High	Strengthen ecological integration
Lack of Metrics	No standardized integration indicators	High	Develop evaluation frameworks
Capacity Gaps (LMICs)	Limited laboratory & surveillance capacity	High	Invest in infrastructure & training

In order to complement these tabulated findings, the four figures present the review findings in visual form of synthesis. Figure 1 below is a PRISMA 2020 flow diagram that demonstrates the identification, screening, and inclusion of the study. The emergence of zoonotic diseases is depicted as a conceptual systems based framework as depicted in figure 2, with mapping interface of the human-animal-environment interface and ecological/socio-economic factors that promote the risk of spillovers. A visual comparison between the traditional sectoral designs and the One Health models has been illustrated in Figure 3 which includes the visualization of the efficiency of surveillance and the coordination and responsiveness to outbreaks through the application of collaborative frameworks. Finally, Figure 4 proposes a gap-analysis model that compares the high-level policy commitment and the operational-level, and community-level integration and offers the visual determination of structural and governance gaps that hinder the successful implementation of One Health.

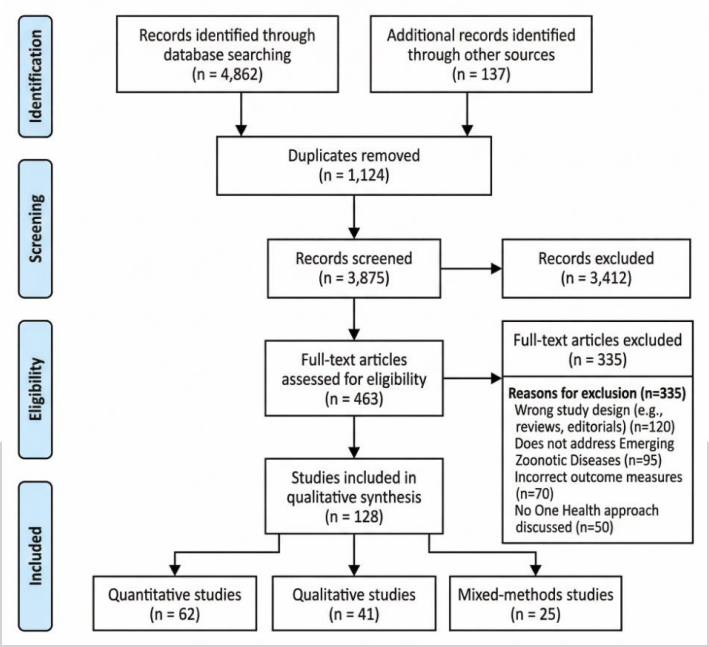

Figure 1 – PRISMA 2020 Flow Diagram

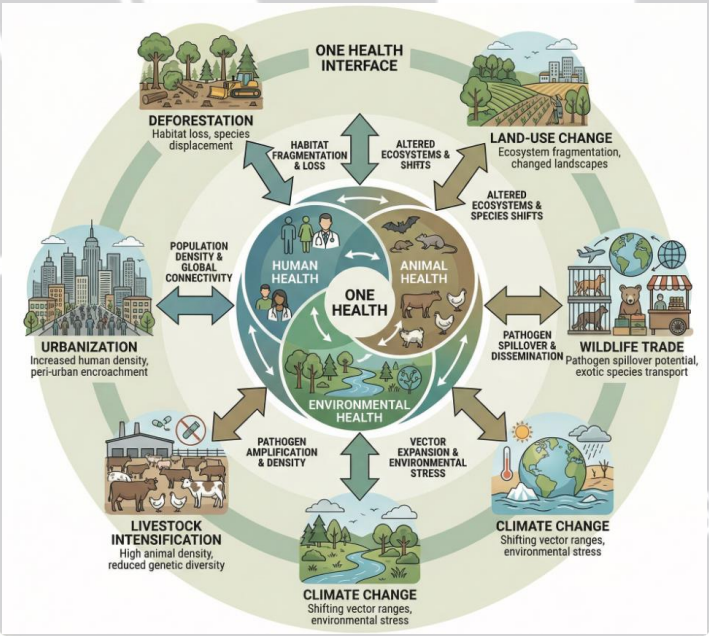

Figure 2 – Conceptual Model of Zoonotic Disease Emergence Drivers

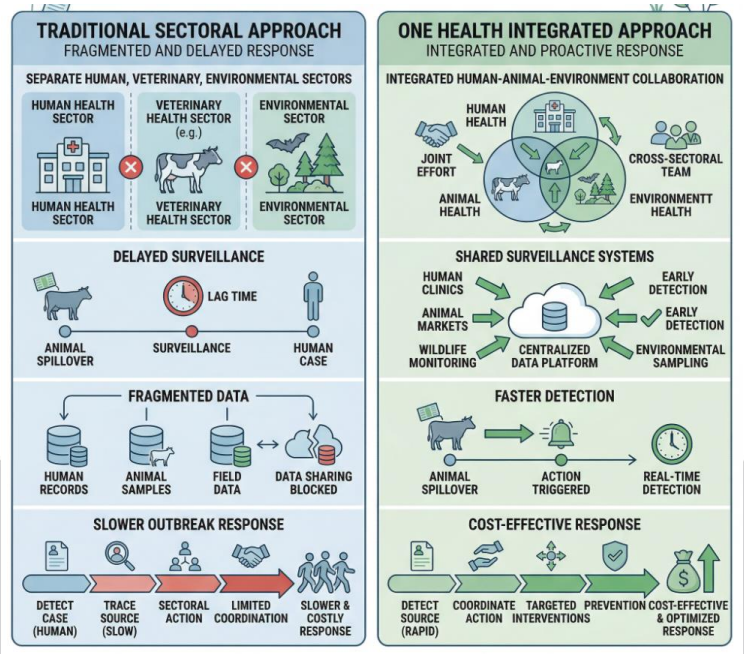

Figure 3 – Comparison: Traditional vs One Health Approaches

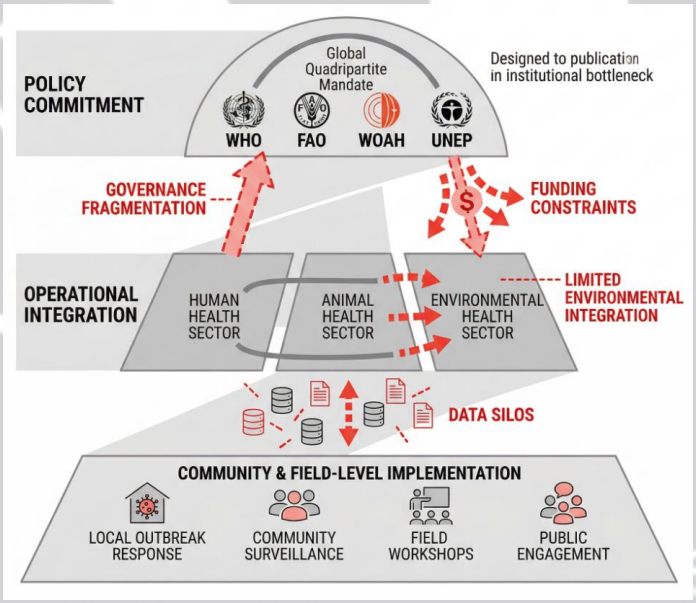

Figure 4 – Implementation Gaps & Integration Framework

DISCUSSION

The outcomes of this systematic review provided some insight into the possibility of the world upside down and the current issues about the implementation of One Health approaches to novel zoonotic diseases. Figure 1 visualizes the PRISMA flow diagram, and it suggests that the analysis of the intersections is done extensively, and Figure 2 informs the reader about the ecological and socioeconomic forces that are complex enough to justify the fact that zoonotic spillover on the boundary between humans and the environment occurs. The contrasting analysis of traditional sectoral designs and integrated models of One Health (Figure 3) contains credible concepts of the approaches to surveillance that are more sensitive, the coordination that is more efficient, the outbreaks that are more responsive to collaborative patterns. This is however made apparent by the gap-analysis model (Figure 4) which shows a lethal discontinuity between high level policy promises and operational-level execution which shows structural and governance impediments that continue to exacerbate effective One Health practice. The synthesis helps to reveal the anthropogenic modification of the ecological systems as the key aspect that results in

the appearance of zoonotic diseases and justifies the previous statement according to which the appearance of new interfaces to the pathogen spreading is the effect of the land use change, agricultural intensification and wildlife trade (Patz et al., 2004; Jones et al., 2008). This review however transcends ecological determinants to denote that good prevention implies simultaneous attention to the governance systems, community involvement and health systems fortification. Figure 2 indicates that the conceptual framework demonstrates the relationship between ecological factors and socioeconomic determinants in the contribution to the variation of spillover risks in different contexts where application of universal intervention templates cannot be used in specific locations without any modification. The arguments that the One Health surveillance systems was more effective than the conventional sectoral approaches are empirically supported with the help of compared visualization in Figure 3. Countries with integrated surveillance systems are more timely in detecting outbreaks, respond faster and with better coordination of outbreak responses compared to countries with siloed systems (Kimani et al., 2019; Asaaga et al., 2021). However, the technical integration will not be sufficient to bring the silos to the synergy level: the process will be accompanied by the significant redesigning of the institutional relationships, information-sharing processes, and resource distribution systems. A typical example of this problem is the implementation experience of SIS-OT in the West African countries because over 70 percent of the evaluated surveillance activities were at the lowest level of the capacity despite the international funding and technical support (AFENET, 2025). This observation highlights that there are no lasting impacts on infrastructure development because there is no such concentration on governance, capacity of workforce and community trust. Figure 4 gap-analysis model is a unique contribution to the One Health implementation failures idea. Though the count of policy commitments to One Health has grown everywhere across the globe since the COVID-19 pandemic, those operations have not been sufficiently integrated at the subnational and community level. It is this disjuncture that governance researchers term an implementation gap, wherein the formal structures of the organization is not transformed into reality, as an organization (Ruckert et al., 2025). The analysis identifies three key dimensions of this gap, namely structural fragmentation caused by a lack of clarity in mandates and competing authorities; resource constraints caused by a lack of financing and human resource capacity; and informational barriers due to data system incompatibility and differences between sectors (Hegewisch-Taylor et al., 2024; Berthe et al., 2018). These findings can be explained by the polycentric governance theory, under which a successful coordination is reached not just by the formal mechanisms but also by the understanding and mutual trust as well as by the adaptive capacity of several centers of decision-making (Koontz and Garrick, 2019). The element of community involvement is rather an important and uncovered step of One Health implementation. As it is revealed in the review, the programs that rely on the combination of the local knowledge systems and the community-based surveillance are far more successful in the sphere of the detection sensitivity and the intervention acceptability (Owiny et al., 2023; Mwatondo et al., 2023). However, during most One Health activities, the technocratism is too high and actual community input on priority setting and interventions design is not high. This top-down orientation is not only robbing the possibilities of capitalizing on local knowledge but is similarly threatening to generate social injustices by excluding marginalized communities in the decision-making process with direct health and livelihood outcomes (Henley et al., 2021; Sangong et al., 2025). Inclusion in the framework of One Health that gender analysis is a strongly important strategy that has nevertheless been overlooked in terms of even-balanced intervention outcomes and tackling dangers of various exposures (Rabinowitz et al., 2023; Grace et al., 2024). Workforce capacity constraints are also another source of impediment to the One Health implementation. It is also obvious in the review that there is acute deficit of specialists in the training of cross-sectoral collaboration, systems thinking and participatory methodologies (King, 2022). The creation of siloed knowledge in the disciplinary approach to education fails to provide practitioners with the transboundary complexity of issues that arise in the emergence of zoonotic diseases. Interprofessional education programs offer justifying paradigms of building the collaboration skills but these are insignificant in terms of scope and size against their requirements. In order to bring an authentic One Health workforce to being, there is need to invest on long term competency, experience based learning and career development that could facilitate development of incentives to spearhead cross-sectoral engagement.

CONCLUSION

This systematic review demonstrates that the new zoonotic diseases are established in the complex

socio-ecological structures that are affected by the destruction of the environment, global warming, alteration of land use, the disappearance of biodiversity, and the growing human-animal interconnection. The data indicates that One Health solutions, which are introduced in the form of integrated surveillance systems, cross-sectoral governing procedures and joint outbreak-response framework can be significant contributors to the early identification, effectiveness of coordination and resource optimization. However, even conceptually developed and support at the level of policy, implementation is still disjointed and frequently constrained by the silos of institutions, funding unpredictability, and non-integration of the environmental sector and the deficiency of criteria of evaluation framework. It is harmful to the systems-based response that will be required to counter zoonotic spillover to persistently marginalize environmental and social sciences into the paradigm of working One Health models. More efforts should be made in the future to strengthen the transdisciplinary paradigm of governance, institutionalize integration measures, institutionalize environmental health as the co-equal pillar, and concentrate on long-term capacity building in high-risk regions. Turning One Health as a guiding principle into a practice institutionalized and quantifiable will become important in the prevention of future pandemics and global health security in an age of accelerating ecologic change.

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