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A Systematic Review of the Integrated Disease Surveillance and Response Implementation Among African Countries Between 2010 and 2024

Chisotwa Muyembe[1,2], Eustarckio Kazonga[1], Rogers Shitiavayi Songole[1], Keegan Shamisale[3], Josphat Nkole[4], Titus Haakonde[5], Precious Kalubula[6]

[1]Department of Public Health, School of Medicine and Health Sciences, University of Lusaka, Lusaka, Zambia.
[2]Department of Public Health, Kafue District Health Office, Ministry of Health, Zambia.
[3]Department of Family Health and Nutrition - Jhpeigo, Eastern Province Zambia.
[4]Department of Laboratory and Clinical Services, Ministry of Health, Lusaka, Zambia
[5]School of Applied and Health Sciences, Environmental Health Section, Evelyn Hone College of Applied Arts and Commerce, Lusaka, Zambia.
[6]World Health Emergencies, World Health Organization Country Office- Zambia

Corresponding Author: Chisotwa Muyembe

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ABSTRACT

Background: The Integrated Disease Surveillance and Response (IDSR) approach, developed by the World Health Organization (WHO) and the African region, aims to enhance African countries' capacity to identify and address public health threats. This approach is crucial in mitigating the prevalence of emerging and re-emerging infectious diseases in Africa, where health systems often face significant challenges. However, the implementation of IDSR systems varies across the continent. The object of the review was to evaluate the performance of IDSR systems in Africa by examining their core and supportive functions and surveillance attributes. The objective of the review is to identify strengths and weaknesses in IDSR implementation, assess the effectiveness of these systems in detecting and responding to public health threats, and provide recommendations for improvement.

Methods: Following PRISMA guidelines and the PICOS framework, an extensive search of scholarly databases identified 61 relevant publications from 2010 to 2024. These studies were evaluated using the AACODS (authority, accuracy, coverage, date, and significance) checklist the STROBE critical review checklist, and the Joanna Briggs Institute checklist. Furthermore, key metrics were used such as data reporting, outbreak detection, and response timeframes, considering contextual factors affecting IDSR success in different countries.

Results: The review reveals significant variability in IDSR performance across African countries. Some countries have effectively implemented IDSR, demonstrating strong data reporting, timely outbreak detection, and rapid response capabilities. Others face challenges such as inadequate infrastructure, insufficient training, and poor data management, limiting their IDSR effectiveness. Supportive functions like supervision, feedback, and resource availability are critical in enhancing IDSR performance.

Conclusion: Strengthening IDSR systems in Africa is crucial for better detecting and responding to public health threats. Despite progress, significant gaps remain, particularly in countries with less developed health systems. Targeted actions, including increased budget allocation, infrastructure development, and capacity building, are needed to address these gaps.

Key words: Infectious; Implementation; International Health Regulations; challenges; opportunities

1.0. INTRODUCTION

Infectious diseases pose a significant global threat, necessitating effective disease surveillance to detect and respond to outbreaks. The International Health Regulations (IHR) enacted in 2005 by WHO member states aim to help countries prevent, detect, and respond to acute public health threats that cross borders (WHO, 2005). To improve public health monitoring and response in Africa, WHO member states are implementing the Integrated Disease Surveillance and Response (IDSR) concept at various levels, including community, health institution, district, and national levels (WHO, 2010).

Public health surveillance systems are a critical component of information systems and a fundamental element of WHO's health system framework (Thacker, 1998; WHO, 2010). The IHR (2005) provide a legally enforceable framework for managing and coordinating public health risks within the healthcare system (WHO, 2008). These regulations require all WHO member nations to assess the effectiveness of their national institutions, capacities, and resources for disease surveillance and response.

Prior to the adoption of the IHR (2005) among WHO Africa member states, the WHO Regional Office for Africa (WHO-AFRO) and its member nations implemented the IDSR system. Both IDSR and IHR frameworks share the objective of improving timely responses to public health threats through early detection, notification, verification, response, and coordination activities (WHO, 2010; Kasolo *et al.*, 2013). Consequently, member states in the WHO African region indicated that the existing IDSR approach would be used to implement the IHR (2005) (WHO, 2008).

To enhance core competencies for disease surveillance and response, as defined by the IHR (2005) implementation, a review of the IDSR guidelines was conducted in 2010 (Chretien, 2008; Kasolo *et al.*, 2008; WHO, 2010). Despite advancements, there remains a significant need to improve detection, monitoring, and response systems in Africa, particularly in neglected and low-resource areas (Haakonde *et al.*, 2018; Fall *et al.*, 2020). Many developing countries face substantial challenges in implementing effective IDSR systems. This systematic review assesses the implementation of the successes and challenges of the implementation of IDSR among African countries from 2010 to 2024.

2.0. METHOD

2.1. Study Design

A scoping review was conducted following Arksey and O'Malley's methodological enhancement guidelines for scoping review projects, examining original articles on the implementation of Integrated Disease Surveillance and Response (IDSR) and the 2005 International Health Regulations (IHR) in the African region from January 2010 to February 2024. The review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines. Studies were evaluated using the AACODS checklist (authority, accuracy, coverage, date, and significance), the STROBE critical review

checklist, and the Joanna Briggs Institute checklist.

2.2. Research Question

The research question was: What are the key strengths, challenges, and outcomes associated with the implementation of IDSR systems in Africa?

Search Strategy

In accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) 2019 guidelines, a systematic review of peer-reviewed literature published from 2020 to 2024 was conducted in three phases. The investigation team used the Population, Intervention, Comparison, Outcome, and Setting (PICOS) framework developed by the Joanna Briggs Institute (2014) to assess the eligibility of the primary research topic. The search strategy keywords were based on healthcare workers (population) and the integrated disease surveillance system, including core, support, and attribute surveillance functions (phenomenon of interest). The evaluation focused on Sub-Saharan Africa, aiming to propose enhancements for surveillance functions based on health professionals' opinions.

Table 1.0 demonstrates the PICOS model used to define the eligibility of studies for the primary research question.

2.3. Criteria for including Studies in the Review

If the PICOS format did not fit the research question, the question was divided into separate concepts and categorized under each heading.

Table 1.0: The PICOS model for defining the eligibility of studies for the primary research question

PICOS Criteria	Details
Population	Healthcare workers; Health faciltites
Intervention	Integrated Disease Surveillance and Response System
Comparison	Not Applicable
Outcome measure	Key strengths, Challenges, and outcome
Setting	African countries

2.4. Data sources and Literature Search

A comprehensive search of grey and peer-reviewed literature was conducted, focusing on the research issue. Five electronic databases were searched: Africa Journals Online (AJOL), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Excerpta Medica dataBASE (Embase), and PubMed. Additionally, Google Scholar was explored. The search criteria included: "Integrated disease surveillance and response," "Integrated disease surveillance and response" with "International Health Regulations (2005)," "disease surveillance system," “indicator-based surveillance,” and “event-based surveillance,” using Boolean terms (AND/OR). Reference lists of included papers were also reviewed for relevant materials.

2.5. Study Selection

The study selection process consisted of two phases. First, titles from the obtained materials were screened. Second, duplicates and studies not addressing the research question were eliminated. Endnote X9 software was used to upload and screen all studies that met the criteria for both abstract and full-text screening.

2.6. Eligibility Criteria

2.6.1. Inclusion Criteria

The current review included qualitative and quantitative primary studies conducted globally. These include:

Articles published in English.

Articles published between January 2010 and February 2024.

Research articles reporting information regarding integrated disease surveillance and response, Public Health surveillance
Articles that explored any study design published in peer-reviewed journals addressing the research question of this study.

2.6.2. Exclusion Criteria

The review did not include the following types of studies;
Studies not reporting on integrated disease surveillance and response, public health surveillance, event-based surveillance, or indicator-based surveillance.
Studies in languages other than English.
Commentaries and editorials.
Surveillance assessment studies conducted outside of Africa and those published before 2010.

2.7. Condition or Domain Being Studied

This review investigated the Africa's implementation of IDSR.

2.8. Participants/Population

The study population included all WHO AFRO member states implementing the integrated disease surveillance and response strategy in Africa.

2.9. Data Charting

Data from the included articles were organized into themes using NVivo 10 (QSR International, Burlington, VT, USA) (QSR, 2016)

2.10. Methods of Review

The initial review was conducted by CM and JN, followed by a second review by TH. A third group of reviewers, including EK, RSS, KS and PK, resolved any scientific, contextual, or structural disagreements between the first two sets of reviewers until all reviewers reached consensus.

2.11. Quality Assessment

The quality of studies was assessed using the STROBE tool, evaluating the relevant content and methodologies of each paper reviewed.

2.12. Data Extraction

Information collected from each included study was identified. Data was recorded using Word or Excel forms, and tracking references was managed through a data extraction form. Reviewer 1 (CM) conducted the initial review, followed by Reviewer 2 (JN), both working independently. Reviewer 3 intervened to resolve any disparities between the initial reviews by CM and JN. Then EK, RSS, KS and PK ensured consensus among all the reviewers.

3.0. RESULTS

Following PRISMA 2019 guidelines, the search strategy yielded 218 results from PubMed, AJOL, Google Scholar, Embase, and CINAHL (Fig. 1). After reviewing titles and abstracts, 122 articles were selected for full-text review. Additional articles were identified through references, resulting in 61 articles included in this systematic review as shown in Table 2.

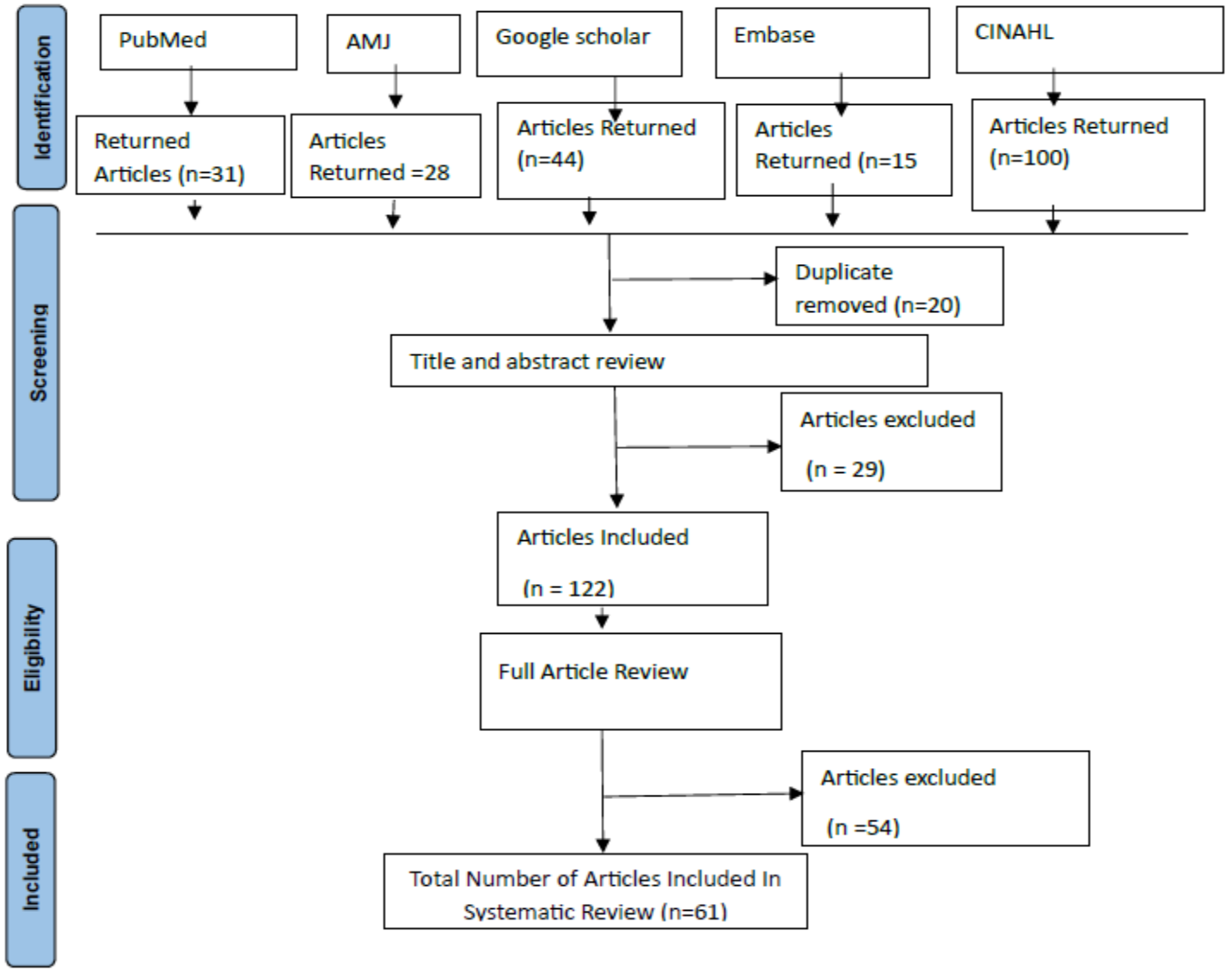

Figure 1: Presentation of Results using this PRISMA Strategy

Table 2: Summary characteristics of included articles, listed by year of publication and then alphabetically by author

SN	Author(s)	Country of origin	Disease	Year	Level of focus	Year implemented	Priority Disease Detection/ Notification	Data Reporting	Data Management	Data analysis	Information Dissemination	Outbreak response, preparedness & control	Gaps Requiring further Investigation	Laboratory	Personnel	Challenges with IDSR Implementation
							N= 17	N= 14	N= 11	N=8	N=0	N= 52	N=2	N =2	N =2	N=9
1	Abwao, F., et al.	Kenya	multiple	2017	Country	2001 - 2019	X									
2	Achieng, M.S. *et al*	Sub-Sahara	multiple	2024	Country	2023				X						
3	Adebowale, A.S.,*et al*	Congo, Nigeria, Senegal, Uganda	COVID-19	2023	Region	2022	X									
4	Adeoye, O., *et al*	Nigeria	Multiple	2020	Country	2019										X
5	Adokiya, M.N., *et al*	Ghana	multiple	2016	Region	2015						X				
6	Amekudzi, L. K., *et al.*	Ghana	Multiple	2021	Country	2020		X								
7	Amekudzi, L. K., *et al.*	Ghana	Multiple	2021	Country	2020						X				
8	Bakahirwa, P.M.,	Uganda,	Multiple	2017	Country	2022										X
9	Diallo, A.O., *et al*	Bukina Faso	Multiple	2019	Region	2018				X						
10	Fall, I. S., *et al*	Africa	multiple	2020	Region											X
11	Fawole, O.I., *et al*	Congo, Nigeria, Senegal, Uganda	COVID-19	2023	Region	2019 - 2022						X				
12	Haakonde, C., *et al*	Africa	Multiple	2018	Region	2017										X

13	James, R., *et al*.	Sierra Leone	Multiple	2016	Country	2012 - 2016										X
14	Jima, D., *et al*	Ethiopia	Malaria	2012	Country	2012				X						
15	Joseph Wu, T.S.,*et al*	Malawi	Multiple	2018	Country	2017										X
16	Kallay, R., *et al*	DRC	Ebola	2024	Country	2021						X				
17	Kambalame, D., *et al*	Malawi	Multiple	2024	Country	2023				X						
18	Kapata, N., *et al.*	Zambia	Cholera	2019	Country	2019						X				
19	Kasolo, F., *et al* .	Africa	Measles	2013	Region	2012						X				
20	Kavulikirwa, O.K. *et al*	DRC	Ebola	2022	Country	2020							X			
21	Kayiya, B.N., *et al*	West Africa	Multiple	2019	Region	2019			X							
22	Kebede, S., *et al*	Rwanda	Multiple	2011	Country	2010								X		
23	Kihembo, C., *et al*	Uganda	Multiple	2018	country	2013 - 2016						X				
24	Lar, L.A., *et al*	Nigeria	Multiple	2015	Country	2014	X									
25	Lee, A.C.K., et *al*	Africa	Multiple	2023	Region	2022						X				
26	Lukwago, L., *et al.*	Uganda	Multiple	2016	Country	2001 - 2007										X
27	Lukwago, J., *et al.*	Uganda	Multiple	2020	Country	2019	X									
28	Lutwama, J. J., *et al.*	Multiple	Multiple	2020	Region	2019								X		
29	Macheso, M., *et al.* (2021).	Mozambique	Malaria	2021	Country	2020			X			X				
30	Mandyata, C.B., *et al*	Zambia	Multiple	2017	Country	2018										X
31	Masiira, B.,*et al*	Uganda	Multiple	2019	Country	2018						X				
32	Mengistu, S.T., *et al*	Eriteria	Measles	2023	Country	2020 - 2021					X					
33	48. Mercy, K., et al	Africa	Multiple	2023	Region	2022	X									

34	Motilewa, O.O., *et al*	Nigeria	Multiple	2015	Country	2014			X							
35	Mukwege, D., *et al*	Rwanda	COVID 19	2020	Country	2020						X				
36	Mukwege, D., *et al*	Rwanda, South Africa	COVID-19	2020	Country	2020						X				
37	Mutonga, D., *et al.*	Kenya	Multiple	2020	Country	2023								X		
38	Mghamba, J. B., *et al.*	Tanzania	Multiple	2019	Country	2017		x								
39	Mghamba, J. B., *et al.*	Tanzania	Multiple	2019	Country	2018									X	
40	Mremi, I.R., *et al*	Sub Africa	Multiple	2021	Region							X				
41	Nansikombi, H.T.,*et al*	Uganda	Multiple	2023	Country	2022	X									
42	Nagbe, T., *et al*	Liberia	Ebola	2019	country	2015 - 2017						X				
43	Negash, A., *et al*	Ethiopia	Multiple	2022	Country	2021						X				
44	Ngwa, M.C., *et al*	Cameroon	Cholera	2016	Country	2020										X
45	Ng'etich, A.K.,	Africa	Multiple	2021	Region	2023						X				
46	Njuguna, C., *et al*	Sierra Leone	Ebola	2019	Country	2018						X				
47	Njuguna, C., *et al*	Sierra Leone	Ebola	2022	country	2021		X								
48	Nkengasong, J., et al.	Kenya	COVID-19	2020	Country	2019			X							
49	Nnebue, C., *et al*	Nigeria	Multiple	2014	Country	2013	X									
50	Omondi, A.J., *et al*	Kenya	Multiple	2020	Country	2019			X							
51	Onyebujoh, P.C., *et a*	Africa	Multiple	2016	Country	2022								X		
52	Ope, M., *et al* .	East Africa	Multiple	2013	Regional	2012						X				
53	Osagiede, E.F.,*et al* .	Nigeria	Multiple	2020	Region	2019						X				
54	Saleh, F., *et al* .	Tanzania	Multiple	2021	Country	2020						X				X
55	Shannon, F.Q., et *al*.	Ethiopia	Ebola	2023	Country	2022	X		X							
56	Sharan, M., *et al*	Multiple	Zoonotic	2023	multiple	2022	X									
57	Ssendagire, S., *et al*	Somalia	Multiple	2023	Country	2016 - 2023						X				
58	Tetuh, K.M., *et al*.	Africa	Multiple	2023	Region	2016				X						
59	Toda, M., *et al*	Kenya	Multiple	2018	Country	2017									X	
60	World Health Organization. (2010).	Multiple	Multiple	2010	Region	2010						X				
61	World Health Organization. (2015).	Africa	Ebola	2015	Region	2016						X				

4.0. DISCUSSION

The current study has revealed that the implementation of IDSR in Africa has made significant advancements when addressing the control, containment and prevention of notifiable diseases despite being impeded by remarkable varying challenges among different countries.

4.1. Advancements in IDSR Implementation

The study reveals that several African nations, including Nigeria, Ghana, Kenya, and Ethiopia, have made substantial progress in implementing and scaling up Integrated Disease Surveillance and Response (IDSR) systems. However, discrepancies in performance are notable due to differences in national infrastructure, financial capacity, and political commitment.

4.1.2. Improved Disease Detection and Reporting

The World Health Organization (WHO) developed the IDSR to enhance public health surveillance and response in African countries. IDSR aims to streamline and integrate various disease surveillance systems, improving the identification, reporting, and management of emerging and reemerging infectious diseases. Studies indicate that IDSR has significantly improved the timely detection and reporting of infectious diseases. For example, in Uganda, IDSR reduced the time taken to detect and report outbreaks of diseases such as cholera, Ebola, and COVID-19. From 2010 to 2015, Uganda saw a 75% improvement in weekly disease reporting timeliness (Lukwago *et al.*, 2016). Similarly, in Kenya, the average time from disease onset to reporting decreased from 14 days to 5 days after IDSR adoption (Abwao *et al.*, 2017).

Accurate disease detection ensures effective public health responses. IDSR has enhanced laboratory capacity and standardized case definitions, improving diagnostic accuracy. Between 2010 and 2020, Nigeria saw a 60% increase in the accuracy of detecting notifiable diseases (Adeoye *et al.*, 2020). Regular training and capacity-building programs for healthcare professionals contributed to this improvement. Comprehensive disease detection requires data on a wide range of illnesses, including newly emerging and re-emerging infectious diseases. IDSR facilitated the integration of novel illnesses into national surveillance systems. In Ethiopia, the number of diseases under surveillance increased from 20 to 32 between 2012 and 2022 (Negash *et al.*, 2022).

The efficacy of IDSR in disease detection was notably demonstrated during the Ebola epidemics in West Africa. Early identification and reporting of Ebola cases in Sierra Leone were facilitated by the IDSR system, crucial for initiating prompt public health actions (WHO, 2015). Community-based surveillance within IDSR was particularly effective in early case identification and isolation. The COVID-19 pandemic also highlighted IDSR's advantages and disadvantages. Pre-existing IDSR infrastructure enabled swift integration and adaptation for COVID-19 surveillance in countries like Rwanda, aiding in timely case detection and response (Mukwege *et al.*, 2021). However, in some countries, the pandemic exposed weaknesses such as insufficient data management infrastructure and limited laboratory capacity.

4.1.2. Improved Community Engagement in Disease Reporting

Community involvement is critical for successful disease detection. The review highlights that countries with robust community-based surveillance systems achieve better disease detection outcomes. Engaging community health workers and volunteers in surveillance activities has proven effective in early detection and reporting of health events, especially in remote and underserved areas (Fall *et al.*, 2020). Several studies confirm that IDSR has significantly

improved the timely detection and reporting of infectious diseases. For instance, a study in Uganda reported a reduction in the time taken to detect and report outbreaks of diseases such as cholera and Ebola.

4.1.3. Enhanced Laboratory Capacity

One major result of IDSR deployment is the improvement of laboratory infrastructure. Nations have invested significantly in modernizing laboratory facilities, procuring advanced diagnostic tools, and developing laboratory networks. For example, between 2012 and 2020, the number of laboratories in Kenya equipped for polymerase chain reaction (PCR) testing increased by 50% (Mutonga *et al.*, 2020). Similarly, the introduction of IDSR in Nigeria led to the construction of over 100 new public health laboratories with advanced diagnostic equipment (Adeoye *et al.*, 2019).

Integrated Disease Surveillance and Response has facilitated comprehensive training programs for laboratory staff, emphasizing biosafety procedures, quality control, and contemporary diagnostic methods. From 2010 to 2020, more than 1,500 laboratory workers in Uganda received training in advanced diagnostic techniques, enhancing diagnostic accuracy and reliability (Lutwama *et al.*, 2020). Integrating laboratory data with surveillance systems is crucial for accurate disease identification and response. In Ethiopia, the incorporation of laboratory data into the national monitoring system improved the promptness of epidemic identification and response by 40% (Negash *et al.*, 2022).

Enhanced laboratory capabilities were vital during the West African Ebola epidemics. The establishment of new diagnostic centers equipped with PCR machines in Sierra Leone enabled rapid confirmation of Ebola cases, essential for outbreak management (WHO, 2015). The implementation of mobile laboratories supported field-based diagnostic efforts, demonstrating the adaptability of the improved laboratory network. The COVID-19 pandemic underscored the importance of strong laboratory capacity. Countries like Rwanda and South Africa swiftly expanded their testing capacities and integrated COVID-19 testing into their existing laboratory networks, highlighting the value of continuous investments in laboratory infrastructure and training (Mukwege *et al.*, 2021).

4.1.4. Strengthened Health Information Systems

The improvement of data quality in health information systems is a significant accomplishment of IDSR. Standardized data collection tools, training initiatives, and quality control measures have increased data accuracy and reliability. In Ghana, IDSR implementation improved reported data accuracy on notifiable diseases by 70% between 2010 and 2020 (Amekudzi *et al.*, 2021). Similarly, in Tanzania, data quality scores increased from 50% to 85% during the same period (Mghamba *et al.*, 2019).

Timely reporting of health data is essential for prompt public health interventions. IDSR has significantly improved data reporting timeliness in several African countries. For instance, in Ethiopia, the average reporting time for weekly surveillance data decreased from 30 days to 7 days after IDSR implementation (Negash *et al.*, 2022). This enhancement enables faster identification and response to outbreaks, reducing the spread and impact of infectious diseases. Data completeness is crucial for comprehensive disease surveillance. IDSR has facilitated the collection of more comprehensive data by integrating multiple surveillance systems. In Uganda, disease reporting completeness improved from 60% to 90% between 2010 and 2020, covering a wider range of illnesses and health issues (Lukwago *et al.*, 2020).

Improved health information systems promote evidence-based public health decision-making. IDSR has contributed significantly by providing reliable data for policy development,

resource allocation, and intervention planning. For example, immunization efforts guided by IDSR data led to a 40% decrease in measles infections in Nigeria between 2012 and 2022 (Adeoye *et al.*, 2020). Similarly, in Mozambique, IDSR data facilitated tailored malaria control initiatives, resulting in a 30% decrease in malaria incidence (Macheso *et al.*, 2021).

The integration of IDSR into national health information systems has been instrumental in managing cholera outbreaks. In Zambia, the timely detection and reporting of cholera cases through IDSR enabled prompt public health measures, reducing the case fatality rate from 5% to 1% between 2010 and 2018 (Kapata *et al.*, 2019). The COVID-19 pandemic demonstrated the importance of strong health information systems. Countries like Kenya and South Africa quickly adapted their surveillance systems to monitor COVID-19 cases, ensuring continuous data flow and guiding public health actions such as lockdowns and vaccination programs (Nkengasong *et al.*, 2020).

4.2. Challenges in IDSR Implementation

Despite the advancements in IDSR implementation reported in several African countries, IDSR implementation faces several challenges. Resource limitations, including funding constraints and lack of skilled healthcare personnel, hinder the effective adoption of IDSR. For instance, a study in Sierra Leone found that only 60% of the required funding for IDSR activities was obtained between 2010 and 2015, leading to gaps in surveillance coverage and delayed outbreak responses (James *et al.*, 2016). In Ethiopia, a shortage of skilled epidemiologists and laboratory technicians has been a major obstacle to effective IDSR operation (Negash *et al.*, 2022).

4.2.1. Infrastructure for IDSR implementation

Inadequate infrastructure, such as poor data management systems and insufficient laboratory facilities, also hampers IDSR implementation. In Nigeria, infrastructural limitations were identified as a key challenge to timely disease outbreak detection and reporting (Adeoye *et al.*, 2019). The West African Ebola outbreaks highlighted the impact of resource constraints, with insufficient laboratory capacity and healthcare personnel delaying containment measures (WHO, 2015). The COVID-19 pandemic further exposed these limitations, with countries like Kenya struggling to scale up testing and contact tracing efforts due to limited resources (Nkengasong *et al.*, 2020).

4.2.2. Data Quality and Timeliness

Data quality and timeliness are critical for effective disease surveillance. The review identifies significant inconsistencies and gaps in data quality across African countries. Incomplete or inaccurate data collection hampers disease monitoring and response (*et al.*, 2024). Factors contributing to poor data quality include inadequate training of health personnel, lack of standardized data collection tools, and insufficient supervision and feedback mechanisms. Continuous training programs and capacity-building initiatives are essential to equip health workers with the necessary skills and knowledge to maintain high data quality standards (Fall *et al.*, 2020).

Timeliness of data reporting is crucial for prompt public health action. Reporting delays are common in many African countries, leading to delayed responses to disease outbreaks. Factors such as inadequate infrastructure, logistical challenges, and bureaucratic hurdles contribute to these delays. Technological solutions, such as mobile health (mHealth) applications and electronic reporting systems, have significantly improved data reporting timeliness in some countries. For example, Kenya and Ethiopia have implemented electronic IDSR systems,

enabling real-time data entry and transmission (Fall *et al.*, 2020; Mndene *et al.*, 2021). Investments in surveillance infrastructure, including reliable internet connectivity and well-equipped health facilities, are crucial for timely data collection and reporting (WHO, 2010).

4.2.3. Inadequate Training and Capacity Building

The review highlights significant deficiencies in the training and capacity building of healthcare personnel. Many health workers lack the necessary skills and knowledge to effectively conduct disease surveillance activities, leading to inconsistent and inaccurate data collection. A study in Ghana reported that only 40% of health workers received training on IDSR protocols (Amekudzi *et al.*, 2021). In Tanzania, health worker capacity improved after targeted training programs, leading to a 35% increase in accurate disease reporting (Mghamba *et al.*, 2019).

Regular and comprehensive training programs are essential to equip healthcare personnel with the skills required for effective IDSR implementation. Continuous education initiatives, including workshops and on-the-job training, can enhance health workers' capabilities in disease surveillance, data collection, and reporting (WHO, 2010). Capacity-building efforts should also include laboratory personnel, data managers, and epidemiologists to ensure a holistic approach to disease surveillance (Negash *et al.*, 2022). Furthermore, strengthening the capacity of local health departments is crucial for sustainable IDSR implementation. Decentralized training programs that target district and community health workers can significantly improve disease surveillance at the grassroots level (Lukwago *et al.*, 2016).

4.2.4. Coordination and Collaboration

Effective coordination and collaboration among stakeholders are vital for successful IDSR implementation. The review identifies challenges in coordination between national health authorities, local health departments, and international partners. Fragmented efforts and lack of synergy among stakeholders often result in duplication of activities and inefficient resource utilization. National governments should establish clear coordination mechanisms, including interagency committees and task forces, to streamline IDSR activities and ensure cohesive efforts (James *et al.*, 2016).

International partnerships and support from organizations such as WHO, CDC, and UNICEF are crucial for resource mobilization, technical assistance, and capacity building (WHO, 2010). Collaborative initiatives, such as cross-border disease surveillance and information sharing, can enhance regional disease control efforts. For example, the East African Community's (EAC) IDSR platform facilitates real-time information exchange and coordinated response to disease outbreaks in member countries (Fall *et al.*, 2020). National governments should also engage local communities and civil society organizations in IDSR activities to ensure comprehensive coverage and community participation (WHO, 2010).

4.2.5. Sustainability and Funding

Sustainable funding mechanisms are essential for the long-term success of IDSR programs. The review identifies significant funding gaps in IDSR implementation, with many countries relying heavily on donor support. Over-reliance on external funding can lead to program interruptions and lack of continuity when donor funds are exhausted (James *et al.*, 2016). National governments should prioritize domestic resource allocation for IDSR activities, ensuring adequate funding for infrastructure, training, and operational costs

(WHO, 2010). Exploring innovative financing mechanisms, such as public-private partnerships and leveraging corporate social responsibility initiatives, can also help bridge funding gaps and ensure sustainable IDSR implementation.

5.0. CONCLUSION

The study discovered that many African nations, including Nigeria, Ghana, Kenya, and Ethiopia, have made significant advancements in implementing Integrated Disease Surveillance and Response (IDSR) systems. These improvements have led to enhanced disease detection, timely reporting, and stronger laboratory capacities. However, challenges persist due to variations in infrastructure, financial capacity, and political commitment. Inadequate infrastructure, inconsistent data quality, and insufficient training hinder effective IDSR implementation. Sustainable funding and improved coordination among stakeholders are crucial for overcoming these challenges. Prioritizing domestic resources, leveraging international partnerships, and fostering community engagement are essential for the long-term success of IDSR programs. Addressing these issues will enable African countries to further enhance their IDSR systems, leading to better public health responses and outcomes.

Declaration by Authors

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Ethical Considerations: The current study's ethical clearance was not required as it was a systematic review.

Declaration of Interest: The authors declare no competing financial interest.

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