

Navigating Implementation: A Qualitative Exploration of the Integrated Disease Surveillance Response in Zambia

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Abstract Surveillance is an imperative for health systems to thrive and respond to emerging and re-emerging diseases. It is even more important for planning and technical planning for public health emergencies. Having a system that integrates various components not only improves a country capability to prepare for such events but also, it provides a platform for continuous reporting and steady flow of information. A qualitative study conducted 14 key informant interviews with officers who play a pivotal role in the implementation of the Integrated Disease Surveillance System (IDSR) from eight districts of five provinces executed. Various common themes emerged, these were roles and oversight in implementation, enablers of IDSR, implementation challenges/barriers, intersectional coordination and recommendations for improvement and sustained use. A consensus emerged regarding the improvements in reporting, which after the IDSR is considered timelier, prompt, accurate and efficient. This implies that as a country, there has been an improvement in case detection and management. However, gaps still remain in capacity emanating from attrition of designated surveillance staff which threatens sustainability of implementation.

Keywords Health Systems Management, Integrated Disease Surveillance Response, One Health, Public Health Emergencies, Re-Emerging Diseases.

Introduction

Disease surveillance is an important foundation upon which strong public health systems are built to effectively and efficiently respond to disease outbreaks [6, 10]. A strong public health system is one that can identify an outbreak early and respond quickly to save lives. This is why the integrated Disease Surveillance and response system is important. Ibrahim et al defines it as a health system specifically designed to systematically and continuously collect, analyse and interpret public health data which is used for public health action in the case of an outbreak [8].

In the past, most of the African countries implemented disease surveillance in uncoordinated manner such that each disease

had its own surveillance structure and reporting formats. This brought in challenges such as splitting of limited resources and delays when it comes to identifying disease outbreaks [10].

To bring together existing fragmented surveillance systems in different countries, the World Health Organisation (WHO) under the regional office for Africa (AFRO) introduced the Integrated Disease Surveillance Response (IDSR) in 1988, initially as the Integrated Disease Surveillance [26]. The strategy was adopted for developing and implementing broad public health surveillance and response systems in African countries. Later, the strategy was changed to Integrated Disease Surveillance and Response (IDSR) to emphasize the linkage between response and surveillance [26] as shown in Figure 1.

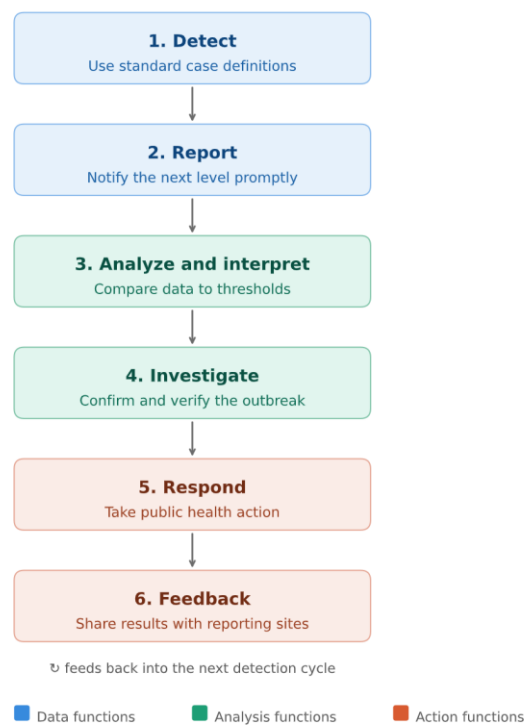


Figure 1. WHO IDSR Flow Chart and its Core Functions

Some authors argue that the IDSR system was designed to provide a common approach for member states to strengthen the detection, reporting, investigation and control of priority diseases through a comprehensive framework [9, 12].

Figure 2 below shows the surveillance chain or structure that Zambia has adopted which is similar to that in Liberia [17]. It begins at the community level comprising of community-based volunteers who live and work within communities and can pick out any emerging

public health events. The community-based volunteers then report to the nearest health facility of any public health event. The health facilities, through facility surveillance focal point person, verifies the information and compile surveillance reports from communities and report to the district Surveillance officer who also verifies health facility reports and report to the province. After receiving the reports, the province also reports to the Ministry

of Health[10] through the Zambia National Public Health Institute (ZNPHI). However, with the adoption of an electronic IDSR (eIDSR) system in Zambia, surveillance data is entered at the facility and district level while the province and National verify the correctness of the data and confirm cases. Feedback on submitted surveillance reports from the National flow through the same channel up to the community.

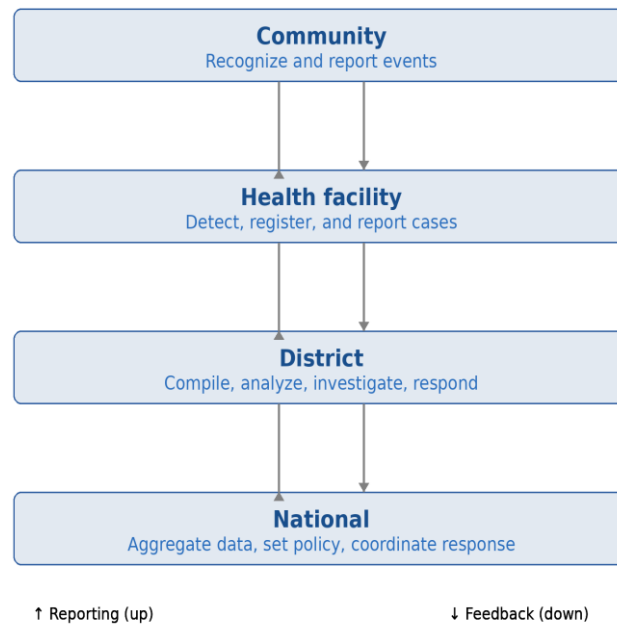


Figure 2. WHO IDSR Multi-Level Breakdown

The adoption of an electronic IDSR system in Zambia was in response to the many challenges that come with the paper-based IDSR system previously used for reporting, tracking purposes and immediate response. In this system, officers had to write paper-based reports and submit them to the next office. This comes with challenges of duplication, reporting errors, legibility and lack of timeliness in the reporting process [1, 20].

Even with the adoption of an electronic IDSR system in Zambia accompanied by an established surveillance structure as shown in figure 2, the implementation and management of the e-IDSR system have not been seamless. At the centre of the Zambia's Surveillance chain are designated Surveillance Officers at District, Provincial and National level. While

they play an important role in the implementation and management of the IDSR system in Zambia, the researcher was unable to find studies that have been conducted to capture the experiences of Surveillance officer with the IDSR system covering all the 10 provinces of Zambia. The studies that have been conducted in Zambia have focused on selected Districts or provinces and certain aspect of the IDSR system. Therefore, this study bridges this gap by capturing the experiences of Surveillance officers in all the 10 provinces representing a diverse list of districts of Zambia.

Materials and Methods

Study Setting

The study covered the 10 provinces and 10 Districts of Zambia in order to have a

comprehensive understanding of the IDSR system in Zambia from the perspective of the Surveillance Officers at National, Provincial and District level. The study covered Northern, Eastern, Central, Western, Luapula, North-Western, Northern and Copperbelt provinces of Zambia. The districts that were covered included Chembe, Mansa, Nchelenge, Kaoma, Kasama and Mkushi. Some district officers interacted with, were from boarder areas which are prone to emerging diseases and outbreaks due to migration issues.

Study Design

The study used a qualitative exploratory design [11,24]in its endeavour to explore the implementation of the integrated disease surveillance and response in Zambia from the perspectives of surveillance officers from the National, Provincial and district level. Key informant interviews were conducted with selected Surveillance Officers at three level of the ISDR implementation structure, except for the facility and community level.

Sampling Procedure

The researcher purposefully sampled [2, 18] all the officers designated as Surveillance officers in the IDSR implementation structure, except for health facilities. At National level, the researcher sought to interview surveillance officers at the Zambia National Public Health Institute. All ten provincial and district surveillance officers were selected. This means that within each province, two districts were sampled based on a rural or urban status of the district for the study to establish a comprehensive understanding of the ISDR system in Zambia. The working sample included 10 health facilities to make 33. However, the working sample was narrowed to 22, leaving out the healthcare workers because the officers covered all details including what happened on the ground after reaching data saturation [5, 16] during the data collection process. Table 1 below shows a summarised working sample. However, only 14 were interviewed as the study was guided by the principle of data saturation. Summary of the study sample and actual interviews conducted is provided in Table 1.

Table 1. Distribution of Sampled Surveillance Officers by Administrative Level and Number of Interviews Conducted for the Qualitative Study

Level	No. of Sampled So Officers
National	2
Provincial	10
District	10
Health facility	0
Total	22
Interviews Conducted	
Actual Interviews	14

Data Collection

Data collection was conducted between April and July 2026. Qualitative data was collected from sampled key informants using an interview guide. The interview guide had four sections covering the ISDR implementation in Zambia in term of 1) knowledge and awareness

of the ISDR system, 2) experiences with the IDSR system and 3) recommendations for improvements. Specifically, key informants were asked about their experiences with the IDSR, the transition from paper-based surveillance and reporting to the e-IDSR, the Successes of the integrated IDSR system, its demerits and what could be changed to make

the current system work better as well as how they interact with other partners in the disease surveillance response.

Aside from having physical interviews especially for key informants in Lusaka Province, some interviews were conducted via mobile phone at the request of the key informants as they were busy during the day while others it was due to long distances to where key informants are located. Two research assistants were engaged and trained to assist with data collection. However, the interview guide was developed and tested by the Author. The duration of the interviews ranged between 25 minutes to 60 minutes. At the end of each interview, audio interviews were transcribed by the research assistants within two days after the interview and checked for accuracy by the Author.

Data Analysis

The study utilized thematic data analysis to facilitate the analysis process of qualitative data. Both deductive and inductive methods of analysis was used during the analysis process. While major themes naturally emerged from the interview transcripts, the study objectives and questions were also used as a guide during the analysis process. The themes were generated based on the four objectives of the study. The transcripts were read severely by the Author to have a deeper understanding of the data on the transcripts. The coding and analysis of the data was done by the Author.

A rapid qualitative analysis of the data, using a rapid qualitative analysis matrix [7] was conducted by the team. As in any qualitative inquiry, the data reduction[7, 27] process was started from the first interaction. The notes were put together during the interactions to extract meaning and ensure that the data collected in the process improved the quality of the subsequent interviews. Furthermore, this was to allow for analysis that refines, organizes, concentrates and rides of data as well as

explains data in a manner such that the final analysis can occur coherently [3].

The matrix was structured using the questions below. These formed the domains through which the findings were summarized and took note of the quotes that arose. The domains were summarized as role in implementation, Enablers of IDSR, Challenges/Barriers, Intersectional coordination, recommendations and other notable findings.

Questions

1. What enablers exist in the IDSR in Zambia?
2. What role do surveillance officers play in integrated disease surveillance response in Zambia?
3. What challenges do surveillance officers experience in implementing IDSR at National, Provincial and District levels?
4. How is inter-ministerial/sectorial coordination actioned/enacted during outbreak response?
5. How would the IDS response be improved from the lessons learned?

Study Credibility and Trustworthiness

This was achieved by recording the actual interviews on a digital recorder and then transcription was done within a 24-hour window period to ensure that the transcripts speak to the audio interviews. To manage personal bias, reflexivity was used during data collection by engaging two research assistants who also assisted with transcription of the interviews. The study also ensured that the findings reflected the views of the participants by using participate quotes. Lastly, data triangulation was achieved by comparing the views of surveillance officers at both district, provincial level and national levels. This was to ensure trustworthiness according to Lincoln and Guba [28].

Results

After reading and sorting of the data and familiarisation by the researcher, various common themes emerged. These were roles and oversight in implementation, enablers and benefits of the IDSR, implementation challenges, intersectional coordination and recommendations for improvement and sustained use. The researcher and the team had connectivity and continuous training as sub-themes under the recommendations. The results are present under each section below.

Roles and Oversight in Implementation

Participants frequently noted that the role of surveillance officers is to coordinate surveillance activities in their jurisdictions be it at National, Provincial and District levels. One participant at district level explained that “..... I coordinate the activities of disease surveillance and response system. So, whenever a facility records an event..... I am able to analyse that trend and then inform the relevant teams, then we respond” (DKII 1). The study participants consistently described themselves as an important link for the flow of surveillance information as they ensure that accurate surveillance data moves from the community to the health facilities and from the health facility to the district through to the province and eventually to the National.

They further shared that they had to ensure that all activities, cases, conditions and events were tracked on time and reported as required. They frequently noted that it was part of their role to ensure that reporting and investigations were undertaken at both facility and community level. Furthermore, they highlighted the importance of working with other partners in executing their mandate as it provides them with a flow of information thus keeping abreast. They are also responsible for update on disease and conduct active case search ensuring the level of priority. Officers are also tasked with providing guidance to necessary personnel on sample collection as well as investigation of cases, follow-ups, contact tracing for all

positive case of both outbreaks and notifiable diseases. Furthermore, they ensure close monitoring of activities implemented under event-based surveillance (EBS), where signals and events are uploaded in the system. Additionally, they monitor the key performance indicators of the vaccine preventable diseases, timeliness and completeness.

“I collect and compile and analyse surveillance data from the facilities...ya, and also, I do eehh... aaa... epidemiological bulletins, situational reports.... we also compile and also prepare and update monthly disease and vaccine trends. Conduct weekly active case search from the facilities, following the levels of priority. Ya, enlist all suspected cases and all aaa.... suspected cases are reported timely to the next level which is the province ...We establish and aaaa... maintain a database of all trends... surveillance for the patients in the facilities. We also ensure that the IDSR standard case definitions are available in the facilities. We monitor the key performance indicators of the vaccine preventable diseases, timeliness and completeness...”. (DKII02)

Furthermore, overall monitoring is provided by the Zambia National Public Health Institute who provide support to relevant officers from various partners including WHO. They provide necessary resources by mobilizing what is required on the ground to ensure the smooth flow and efficient implementation of IDSR. Among these services provided include distribution of transportation support, electronic gadgets for timely data capture, analysis and reporting of surveillance activities. A surveillance officer at National level explained that:

“Working with the Zambia National Public Health Institute, which is ZNPHI... So, they made our work easier. For example, in 2023, they procured laptops countrywide for all the district

surveillance officers. So early this year, they again procured tablets... that should be countrywide in short ...all the facilities have tablets, except the four that were recently opened. So, they have tablets at facility level where they are entering this data...". (DKII02)

"Partners have really been helpful, ZNPHI, CDC have" (KII04)

The findings of the study revealed that Provincial Surveillance officers play an advisory role to the Ministry of Health and other stakeholders within their provinces. They shared that they provide technical guidance and guide decision making in the case of an outbreak. One Provincial Surveillance officer explained that *".... My role is to provide disease surveillance data that influence decision making, planning and intelligence in order to protect the population in the province and the country at large....."* (PKII 3). The surveillance data is used during planning meetings as a basis for making decisions at provincial and national level.

Enablers and Benefits of IDSR

Prior, reporting was challenging given the limitations of paper-based systems including it being time-limiting and consuming, travelling long distances to submit reports as well as legibility of different handwriting styles of the reporting officers. IDSR saw the transition from paper-based reporting to electronic reporting. This has made provision for real time reporting and hastened processes were reviews and analyses can be done promptly. This has also improved the response to early warning signs and initial response.

"For that paper to reach..., it will take a little bit of some time. So, with the coming of the new second edition, where we have integrated the IDSR, where we are using electronic platforms, I think we have real-time information, because what is done now is we have trained people, even in the community, from event-based

surveillance, where data is entered as quickly as possible into the system, and then we can review that all at once, where it needs to go. So, basically, we have seen a big improvement in terms of reporting, and then improvement in early warning and initial response" (KII003)

Furthermore, most participants reported having received motorbikes to aid with transportation of samples and personnel who needed to go in for verifications or to follow-up on alerts. One participant when asked to make recommendations that would assist the district, they said:

"That's been sorted out. Mm-hmm. So now I'm here thinking, okay, what else do we need? Mm-hmm. We used to cry for reporting tools. Mm-hmm. The booklets. Mm-hmm. The ND tools. We say, no, we are tired of making copies. But that has been sorted out. Mm-hmm. Booklets have been distributed" (KII05)

Additionally, one participant echoed that updates made to IDSR and decentralization had made surveillance and reporting easier and more efficient since before facilities spent more time on data entry than analysis.

"If there is a notifiable medical condition, they are able to enter that at facility level since they now have a user account. So, I think the updates or additions that have been added to the IBSR has really been a game changer. I think it's making work easy... even for colleagues at district level, because now they will have a lot of time to actually look at their data and run a bit of analysis, like where we're coming from, where they [were] spending more time on data entry" (KII07)

Improved Event-Based Surveillance

The study noted that through the trainings provided at different tiers of health workers including the community-based volunteers (CBVs) there has been improved disease and case reporting and tracking systems.

"I think that has been working well for us. Mm-hmm. Yes, because I can give you an example of the MPOPS cases which were detected last year.... I think those were picked under event-based surveillance. That was before they reached the health facility" (KII06)

Intersectional Coordination

Intersectoral coordination was one theme that stood out as an important theme for ISDR in that Ministry of Health has harnessed support from other line ministries to tackle disease surveillance and emergency preparedness. They noted that the one health approach has proved advantageous and beneficial for the response and health systems. Moreso, they echoed that one health approach has improved surveillance of human animal interactions and threats posed by sharing of borders with countries that have incidents of important animal bites such as Jackals and foxes. These are important for prevention of diseases such as rabies but as well as prevention of emerging and re-emerging diseases that may be caught from interacting with such animals.

"The response from stakeholders has been excellent, aaaa for example, in our district. I remember when we had the Mpox outbreak, over 20 confirmed cases of Mpox that we had. So, we had stakeholders coming on board, contributing, buying food, charcoal, just to strengthen aaaa isolation, aaa that was really a good thing. But by and large, what I can say, issss the response, we are okay, and now, we are battling with human-animal conflict...As we speak now... we have got these, we are bordering, so, we have animal bites, like

jaguar bites, fox bite on the border side with Congo, and aaaa rabies is nowhere to be seen. But we have the stakeholders using the One Health approach, where they procure this anti rabies, ...and we respond timely to the victims that have been bitten by wild animals. So, in a nutshell, we are collaborating very well as a district, and I'm happy about that" (DKII06)

Additionally, they noted that communication has improved given the forming of one health committees and epidemic preparedness committees. This has seen the reporting of cases that were once a challenge to report or track. They cited examples such as dog bites and other zoonotic diseases that pose a threat to human health.

"...depending on what we are dealing with at that particular time, other aligned ministries are able to come in. Mm-hmm...for example, with VET...If we've got an increase in dog bites. we ...engage VET as well as the local authority that is the council. Mm-hmm...So we could sit and look at what is happening, what can we do about it. Mm-hmm. So, there are aaa times when we sit down and just try to compare the cases..." (KII05)

Implementation Challenges/Barriers

Staff Attrition and Capacity Building

All participants alluded to staff attrition due to transfer of surveillance designated officers from one district to the other but also from one department to another being an important challenge they face in the various offices. Moreso, they argued that those trained in ISDR move without continuity of service because those who remain may have not been trained. This leaves a gap for smooth running of ISDR services. This was tied to capacity building as a gap that is important to note.

Other challenges shared were delayed roll-out and systemic challenges as a result of lack of resources to use for other stations to also

benefit from IDSR. Moreso, these facilities have a limitation of electronic gadgets for reporting in spite of having some form of improvement in this view.

“So, the main challenge is the delayed roll-out, and those systemic challenges arising from maybe lack of resources. Because our target, according to the population standards, is to at least train 80% of the staff who work in the health sector...in IDSR, so that we can get a response to some of the challenges that we have. So, mostly, what has been the problem is, mostly speaking, is the resource to roll out the IDSR to the lower levels. And then the other thing, maybe electronic gadgets, though we have seen some improvements in terms of electronic gadgets for reporting. So, mostly that has been the challenges, because we haven't reached out to a lot of people in terms of getting capacity to get a response to a challenge” (KII03)

“And the other one is also issues around inadequate trained community-based volunteers in the event-based surveillance” (KII07)

Recommendations for Improvement and Sustained Use

Respondents echoed a number of recommendations for best practice but also to improve the current challenges faced. Under this one theme emerged strongly which is resources for sustained use. They shared that connectivity and transport support as well as capacity building through continuous training was not only imperative but required. Community engagements were also proposed through ensuring that more CBVs were trained.

“.....community-based surveillance is very important because it bridges the gap between the community and health facilities.... we have community health volunteers who have been trained to identify specific conditions or symptoms

such as clustering of cases, unusual deaths or conditions with endemic potential” (DKII 2)

“.....inadequate trained community-based volunteers in the event-based surveillance. Most of these public health events are happening in the community, and we need to have those disease detectives at community level.....” (PKII 1)

Other participants suggested training for public health officers should be prioritized as also by saying “.....there was so much focus on our colleagues under public health... those under case management need to be trained in the IDSR because once they are trained, it will be very easy for them to detect these cases... they are the first contact to these suspected cases.....” (PKII 1)

Resources for Sustained Use

Connectivity and Transport Support

Some participants recommended that ensuring that facilities and surveillance officers had reliable internet access is imperative for sustainable use of the IDSR. They said that the system in itself is very reliable and it enhances disease surveillance processes. They provided examples of how the challenge of connectivity as a barrier can be rectified, saying that connections like star link work even in remote areas where the local network is a challenge.

“Starlink can help so that everyone can have access because connection affects timely reporting.” KII01

They further suggested that transport was required especially for those facilities that were based in far flung areas to facilitate reporting as well as verification of events and alerts reported under EBS.

Continuous Training

Participants across the interactions proposed continuous training as a recommendation for community-based surveillance as well as a tool to ensure continuity of surveillance processes

cut down due to attrition. Additionally, they argued that this training should be provided to all those that have access to the IDSR systems on how to improve the dashboard as well as for data analysis. They argued that this would enhance evaluation of trends in disease patterns as well as quality of reporting.

So, I've got 86 facilities. Then out of those 86 facilities, we've only managed to train 56 facilities in IDSR. So, if that agenda can be pushed to train the remaining facilities, that could be better. It would enhance the surveillance in the district KII05

One participant suggested that IDSR training should be embedded in curriculum so that those health care workers replacing those leaving already know what they are to do, thus bridging the gap between attrition and non-performance.

.... for now, I'm seeing much of the problem that we're having is lack of capacities in some of the facilities. ...So, we are suggesting.... maybe we can streamline the trainings, the training institutions, aaaa...let them [it] be part of their curriculum, so that as they are about to graduate, we add to the curriculum overall, and the trainees that are about to graduate will be part of the system [IDSR]. We should ensure that the people that are already in the facilities, at least, we train about 80% (KII04).

While this was suggested, one of the officers from the national level shared that this was being done as an initiative called pre-service training to ensure that all healthcare workers are exposed to IDSR early on to cushion challenges that come with staff attrition.

Yeah, pre-service [training] entails that we are going to the universities, and we are asking these universities that we need to come up with a curriculum together.... So that even as you[universities] are training your nurses, your clinical officers, your doctors, they need to know

that there is this program called IDSR (KII14).

Discussion

This study is the first to explore the implementation of IDSR in Zambia that has broadened the scope of review to the whole country by interviewing officers from the province and the districts. Despite this study being qualitative and limiting the generalisability, the study provides an in-depth analysis of the experiences on the ground as well as the challenges and the recommendations from the perspective of the users of the system. Moreso, it presents ground for solutions that are not only practical but sustainable. From literature, most studies in Zambia examined IDSR in line with a specific disease especially Cholera and some only explored an aspect of disease surveillance mostly considering the challenges [14, 15]. This study explored the experiences in totality, including challenges as barriers, enablers and what can be done to improve the response and ensuring sustainability going forward.

Moreso, this study provides insights covering a longer time period exploring views of how it has evolved through time, it broadens the scope of inquiry thus bring out results that cover re-emerging diseases like that of Polio in Zambia and how IDSR plays an imperative role for detection and response [17, 20].

Another important finding is that in regard to the One health approach taking centre of the response especially for districts that share borders with other countries. This puts emphasis on important events such as jackal bites, fox bites and mpox. Similar with other studies, it cements the importance of using the one health approach which provides a broad and effective framework for addressing future pandemics [22, 23]. Additionally, the study discusses the importance of intersectoral response bringing to light issues and events such as dog bites, measles, polio and road traffic accidents including motorbike accidents.

Similarly, a study done in India [25] established that this approach is vital because resources are combined to collect information including on traffic accidents from a single focal point at each level than using scarce resources to maintain vertical activities. They further argue that the Integrated Disease Surveillance Project (IDSP) integrates both public and private sector by involving the private participation which is the same with IDSR being implemented in Zambia currently.

The study in India further suggests that gaps in receiving health information from the urban areas needs to be bridged urgently [25] but our study found that the gap that needs to be bridged is that of receiving and reporting in rural areas' given limitations in connectivity in these areas.

Similar to our findings, fall et al [4, 17] found that some of the 44 countries implementing IDSR in Africa had initiated IDSR training at subnational levels, commenced community-based surveillance, event-based surveillance, electronic IDSR and had a weekly/monthly bulletin for sharing IDSR data. This is imperative as it has improved overall public health systems and initiatives. However, gaps remain especially with inconsistent funding or inadequate funding to ensure sustainability of implementation including for training and resources. Similarly, Onmwe [19] argues that participants recommended for improved funding and increased resource allocation. This finding was consistent with the recommendations brought forward by this study participants. Funding is a core support function of IDSR and as such, should be prioritised for continued and functioning response for Zambia but the region too.

Data is available and it is possible to detect diseases and prevent public health events harnessing the existing structures and resources available. The researcher presents this in Table 1 and discuss the five main domains of CFIR [3, 21] and how these fits in the current representative of IDSR in Zambia from the findings, which can be extended to other

settings with similar characteristics. Under the domain Innovation, IDSR is the main innovation which has seen the establishment of committees like epidemic preparedness and one health committees, frequent collaborative discussions through multisectoral approach and training for improved outcomes. Some authors argue that this leads to effective coordination and collaboration vital for tackling zoonotic diseases [22]. More importantly, the innovation domain includes the transition from a paper-based IDSR system to an electronic IDSR system which has come with the provision of electronic devices such as phones and laptops for timely reporting.

The outer setting importantly supports the intersectoral collaboration, partners reporting timelines, periodic update of the IDSR implementation guidelines that includes latest revision to incorporate emerging public health threats. An important feature of the IDSR implementation is community-based volunteers who live and work within communities and play an active role when it comes to identifying public health events and reporting to health facilities. For these to be active and efficient, the researcher argues that targeted training and capacity building is necessary. Agreeing with other authors, external funding is also important to complement the limited resources from the Government [13]. However, the sustainability of the IDSR system ultimately depends on government ownership and commitment to adequate financing, as reliance on donor funding is not a viable long-term strategy and may be withdrawn at any time.

In terms of the inner setting domain, it was established that internet connectivity and transport support are important features that support the functionality of the IDSR system especially in view of the adoption of the e-IDSR system. However, for rural districts, it is challenging to actualise this because internet connectivity is a big challenge. Another important feature is partner support and multisectoral coordination among lines

ministries that include Health, Fisheries and livestock as well as Agriculture among others. The IDSR implementing and reporting structures provides a well-coordinated system for timely identification of public health events and feedback mechanism. Finally, laboratory equipment and medical supplies support public health interventions in response to the IDSR feedback mechanism. However, these required to be well stocked for effective management and implementations of the public health interventions.

The individual domain consists of the personal attributes of the people handling the

surveillance functions such as skills and competencies adequate training and capacity building. This is the core of the response because it makes up the drivers of implementation. This study highlights the need to build capacity as an important need and opportunity for improving surveillance. However, the study is limited by only including the officers attached to the ministry of health and did not explore the perspectives from those in other line ministries. The study findings were aligned with the five CFIR domains to illustrate key implementation factors influencing IDSR in Zambia, as shown in Table 2.

Table 2. Mapping of Integrated Disease Surveillance and Response (IDSR) Implementation Findings in Zambia to the Consolidated Framework for Implementation Research (CFIR) Domains

CFIR Domain	Definition	Results Themes
Innovation	The intervention, program, or practice being implemented - its evidence strength, design, complexity, cost, and adaptability.	IDSR as main innovation Establishment of committees like epidemic preparedness committee one health strategy Frequent collaborative discussions Training and capacity building Electronic ISDR Provision of electronic gadgets (Phones and laptops)
Outer setting	The broader context surrounding the organization -policy, external pressures, partnerships, patient/community needs.	Periodic updates of IDSR guidelines technical support Policy guidance Reporting timelines Quality assurance processes Intersectoral collaborations Donor funding Community based volunteers
Inner setting	The implementing organization itself - culture, leadership, structure, available resources, communication.	Connectivity and transport support Partner support considered an important resource Continued reporting structures with IDSR IDSR implementing structure Medical supplies Laboratory equipment Health workers, Government funding Supportive supervision

Individuals	Roles and characteristics of the people involved - capability, motivation, opportunity, need, and innovation deliverers/recipients.	Data management Quality assurance Supervision Reporting and feedback Community expansion through CBV Trainings Capacity building
Implementation process	The activities and strategies used to implement the innovation - planning, engaging, doing, reflecting and evaluating.	Continuous training Meetings with other stakeholders Intersectoral collaborations Staff attrition and capacity building as an evaluation of the process and improvement suggestion Improved event-based surveillance Provision of electronic Gadgets like phones and laptops Internet connectivity e.g. Starlink

Conclusion

IDSR has improved the reporting, timeliness, completeness and promptness of the response to cases and events in the health system. It has been pivotal in detection and management of emerging and re-emerging diseases but also highlighting important events such as accidents including motor bike accidents. However, it is imperative to be put in place measures that will assure sustainability of IDSR such as stable consistent funding, continuous training of relevant personnel, building capacity at facility levels, as well as harnessing the one health approach. The one health approach provides potential for collaborative action among animal, environmental, human and health sectors to addressing and preventing anticipated pandemics. Moreso, integrating the community-based volunteers and equipping them with necessary skills is not only vital but timely.

Conflict of Interest

The author serves as a Surveillance Officer within the public health sector and is engaged in activities related to disease surveillance and

response in Zambia. This professional role may be perceived as a potential source of bias regarding the evaluation of the IDSR system. To mitigate this risk, the study followed established scientific methods, and findings were reported objectively. The author declares no financial conflicts of interest.

Ethical Approval

Ethical approval for this study was obtained from the National Health Research Authority (NHRA), Zambia (NHRA-R-4104/23/04/2026) and the University of Zambia Biomedical Research Ethics Committee (UNZABREC) (Reference No. 7902-2026) prior to study implementation. Administrative permission to conduct the study was obtained from the relevant health authorities. Participation was voluntary, and informed consent was obtained from all participants before data collection. Confidentiality, anonymity, and privacy of participants were maintained throughout the study, and all data were securely stored and used solely for research purposes.

Data Availability

The datasets generated and/or analysed during the current study are not publicly

available because they contain information that could compromise the privacy and confidentiality of study participants. De-identified data may be made available by the corresponding author upon reasonable request and subject to applicable ethical and institutional requirements.

Author Contributions

Precious C. Kalubula conceived and designed the study, developed the research methodology, and provided overall supervision of the project. Data collection was conducted by trained research assistants under the author's direction and oversight. Data management, coding, and preliminary analysis were undertaken with the support of research personnel, while P.C.K. led the interpretation and validation of the findings. P.C.K. drafted, critically revised, and approved the final manuscript for publication and accepts full responsibility and accountability for all aspects of the work.

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Authors' Information

The authors are public health professionals and researchers with experience in disease surveillance, health systems strengthening, and implementation research in Zambia. Further details are available from the corresponding author upon request.

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