RESEARCH ARTICLE

Strengthening Zambia's Response Using the 7-1-7 Framework: An evaluation of the management of national public health events in 2024.

Steven Nonde[1] , Danny Sinyange[1] , Moses Mulenga[1] , George Kapapi[1] and Paul Zulu[1]

[1]Zambia National Public Health Institute
Corresponding author: Stefanenonde@gmail.com

Cite this article: *Nonde, S., Sinyange, D., Mulenga, M., Kapapi, G., & Zulu, P. (2025). Strengthening Zambia's response using the 7-1-7 framework: An evaluation of the management of national public health events in 2024. Health Press, 09(1): 21- 29.*

Abstract

Timely detection, notification, and response are pivotal for controlling public-health emergencies. The 7-1-7 performance framework sets global benchmarks of ≤ 7 days for detection, ≤ 1 day for notification, and ≤ 7 days for response initiation. We evaluated Zambia's implementation of this framework in 2024. We retrospectively reviewed all nationally reported public-health events from 1 January to 31 December 2024. Timeliness for each 7-1-7 indicator was calculated, and bottlenecks were classified using the National Action Plan for Health Security bottleneck taxonomy. Ten public-health events met inclusion criteria. Eight events (80 %) achieved the detection target and nine (90 %) met the notification target, whereas only two (20 %) met the response initiation target. Bottlenecks were concentrated at the health-facility/community level (37 %), driven primarily by low clinical suspicion and limited familiarity with case definitions. Key system enablers included community-based surveillance, mobile notification technologies, and task-sharing strategies. Zambia has made substantial progress in detection and notification but faces persistent delays in initiating early response actions. Strengthening capacity at primary-health-care level, improving access to diagnostics, institutionalising digital notification platforms, establishing flexible financing mechanisms, and enhancing multisectoral collaboration are essential to meet all 7-1-7 targets.

Keyword: 7-1-7 framework, public health emergencies, health system strengthening

Introduction

Globally, the detection and response to infectious disease outbreaks remain a significant challenge, particularly in low- and middle-income countries (LMICs) (1). Outbreaks pose major threats due to their potential for rapid transmission, resulting in widespread illness and mortality, as well as economic and social disruptions at both national and global levels (2,3). The COVID-19 pandemic exposed global health system deficiencies in detecting, notifying and responding to these public health threats (1). Public health emergencies are complex events that demand coordinated capacities across various levels for timely detection and effective response. The rising frequency and scale of emerging infectious disease outbreaks in recent decades underscore the need for countries particularly LMICs to adopt structured frameworks to assess and strengthen health system performance in managing public health emergencies. Timeliness indicators provide a pragmatic means of assessing health system performance in managing public-health emergencies.

In 2021, the 7-1-7 framework was proposed as a set of global performance benchmarks to guide evaluation, advocacy, and prioritization of response improvements.(1,3,4). The framework defines three critical time-bound benchmarks: detection of a public health threat within seven days of emergence, notification of public health authorities within one day of detection, and initiation of early response actions within seven days of notification (5). It integrates timeliness metrics with real-event bottleneck analysis and applies a systems-based approach to evaluate national capacity and identify performance gaps for continuous improvement (4). Similar to the 95-95-95 targets for HIV, the 7-1-7 framework establishes a structure for accountability and facilitates communication, advocacy, and

prioritization of response improvements (1).

Zambia adopted 7-1-7 in 2023. This paper presents preliminary findings of an evaluation of Zambia's implementation of the 7-1-7 framework in 2024 to determine timeliness of public health event detection, notification and response initiation, as well as to identify bottlenecks and system enablers.

Methods

Study Design and Data Sources

We conducted a retrospective analysis of secondary data of events reported to the Zambia National Public Health Institute (ZNPHI) between 1 January and 31 December 2024. Events included were those classified as national public-health emergencies according to ZNPHI criteria. Each event was assessed against the 7-1-7 metrics. Detection time was defined as the interval between the index case or first epidemiologically linked case onset of symptoms and official case recognition. Notification time was measured from detection to reporting to the national authority. Response initiation was defined as commencement of interventions (e.g., case investigation, community engagement, vaccination campaigns) documented through action reports.

Bottlenecks and enablers identification and categorisation

Bottlenecks associated with delays and enablers were abstracted from the 7-1-7 consolidated spreadsheet and mapped according to the National Action Plan for Health Security (NAPHS) domains.

Analysis

Data was analysed in Excel. Descriptive statistics and bar-plots were produced. The overall 7-1-7 target achievement was assessed by calculating: (i) the number and proportion of events detected within seven days of emergence (First 7); (ii) the number and proportion of events notified within one day of detection (Next 1); and (iii) the number and proportion of events for which all seven early response components were completed within seven days of notification (Second 7). The proportion of events achieving full adherence to all 7-1-7 targets was also evaluated. Second, identified bottlenecks and enablers were summarized by metric and health system levels (community, facility, district, national).

Ethical Consideration

Ethical approval was obtained from the University of Zambia Biomedical Research Ethics Committee (REF. No. 6 610 202 5).

Results

Timeliness of detection, notification, and response

Ten public-health events were assessed (Table 3). Overall, 80 % (8/10) of events were detected within seven days and 90 % (9/10) were notified to the next administrative level within 24 h. In contrast, only 20 % (2/10) achieved early response initiation within seven days, meaning just two events met the complete 7-1-7 benchmark (Table 1).

Performance across the seven predefined early-response actions was heterogeneous (Table 2). While 70 % of events met targets for Actions 1, 2, 4, 5 and 6, and all applicable events met the target for Action 7, fewer than half (44 %) achieved the target for Action.

Bottleneck analysis

A total of 110 discrete bottlenecks were identified. Most (61 %, 67/110) impeded response initiation, whereas 35 % (38/110) affected detection and only 1 % (1/110) hindered notification (Table 4). As shown in Figure 1, bottlenecks were most common at the health-facility/community level (37 %), followed by district/provincial systems (31 %), national level processes (12 %), and issues spanning multiple levels (20 %).

The leading detection bottlenecks were low clinical suspicion among front-line health workers (34 %) and delayed care-seeking by patients (21 %). For response, the most frequent obstacles were lack of readily deployable response funds (16 %) and weak incident-management capacity (13 %). Other notable constraints included limited availability of diagnostics, delays in specimen transport, and shortages of personal protective equipment (Table 4).

Enablers Analysis

A total of 31 enablers supporting timely detection, notification, and response were identified. The majority facilitated response initiation (42%, 13/31), followed by detection (29%, 9/31), and notification (29%, 9/31) (Table 5). Enablers were mapped to six thematic categories: training and knowledge, surveillance systems, clinical vigilance, communication tools, multisectoral collaboration, and resource availability.

The leading enablers for detection were health work-

er training and knowledge of standard case definitions (44%) and functional surveillance systems such as routine IDSR reporting and event-based surveillance (33%).

Table 1 Overall Performance Against 7-1-7 Framework Targets

	Detection	Notification	Response	All Targets
# Met Target	8	9	2	2
% Met Target	80%	90%	20%	20%

Table 2 Performance on Early Response Actions

	Action 1	Action 2	Action 3	Action 4	Action 5	Action 6	Action 7
# Met Target	7	7	4	7	7	7	4
# Events Applicable	10	10	9	10	10	10	4
% Met Target	70%	70%	44%	70%	70%	70%	100%

Table 3 Enablers to detection, notification, and response

Event	District	Days to Detection	Days to Notification	Days to Early Response
Cholera	Kitwe	1	1	9
Suspected VHF	Chibombo	13	10	10
Suspected Mpox	Ikelenge	5	0	NA
Suspected Mpox	Kalumbila	1	0	26
Anthrax	Sinazongwe	0	0	99
Methanol Poisoning Outbreak	Pemba	2	0	NA
Methanol Poisoning Outbreak	Monze	1	0	NA
Methanol Poisoning Outbreak	Namwala	12	0	NA
Mpox	Chitambo	2	0	6
Cholera Outbreak	Nakonde	1	0	3

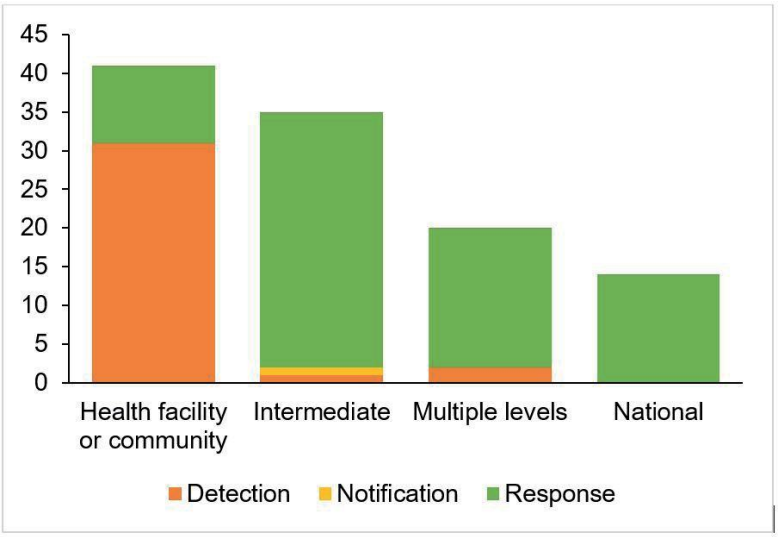

Figure 1 Distribution of bottlenecks by health system level and outbreak management function (detection, notification, and response)

Table 4 Bottlenecks to detection, notification, and response

Bottleneck Category (n = 110)	**Detection (n = 38)**	**Notification (n = 1)**	**Response (n = 67)**
Access issues (e.g. remote, fragile, conflict settings, climate conditions)	0	0	2 (3.0 %)
Delay in care-seeking by patient	8 (21.1 %)	0	6 (9.0 %)
Delayed specimen collection	0	0	3 (4.5 %)
Delayed specimen transportation	0	0	4 (6.0 %)
Failure to act on surveillance data	1 (2.6 %)	0	0
Failure to follow initial risk assessment or event verification procedures	0	0	1 (1.5 %)
Health professional with inadequate training in surveillance and response	5 (13.2 %)	0	5 (7.5 %)
Human resources gaps for public health	1 (2.6 %)	0	2 (3.0 %)
Inadequate coordination across public health units or agencies	0	0	2 (3.0 %)
Inadequate diagnostic commodities (lab reagents, RDTs, specimen collection kits)	0	0	2 (3.0 %)
Inadequate public financial assistance (e.g. treatments, to offset public health/social measure [PHSM] impacts)	0	0	4 (6.0 %)
Inadequate risk assessments, preparedness, or response plans	1 (2.6 %)	0	2 (3.0 %)
Laboratory reporting failure	0	0	1 (1.5 %)
Lack of available resources for response initiation or rapid resource mobilization	0	0	11 (16.4 %)
Lack of clinical surveillance focal point/capacity	1 (2.6 %)	0	0
Lack of coordination across public health units or agencies	0	0	1 (1.5 %)
Lack of diagnostic commodities (lab reagents, RDTs, specimen collection kits)	3 (7.9 %)	0	3 (4.5 %)
Lack of one health information sharing/collaboration	0	0	1 (1.5 %)
Lack of timely or complete surveillance data	1 (2.6 %)	1 (100 %)	0
Limited availability of countermeasures or personal protective equipment	1 (2.6 %)	0	4 (6.0 %)
Limited clinical case management capacity	2 (5.3 %)	0	2 (3.0 %)
Low awareness or clinical suspicion by health workers	13 (34.2 %)	0	0
Other	0	0	1 (1.5 %)
Risk communications or community engagement	1 (2.6 %)	0	1 (1.5 %)
Weak response coordination, including incident management and rapid response team capacity	0	0	9 (13.4 %)

Table 5 Enablers to detection, notification, and response

Enabler Category (n = 33)	Detection (n = 11)	Notification (n = 9)	Response (n = 13)
Training and knowledge in surveillance and case definitions	4 (36.4%)	1 (11.1%)	3 (23.1%)
Functional surveillance systems (routine, IDSR, EBS, FPPs)	3 (27.3%)	1 (11.1%)	1 (7.7%)
High index of suspicion by health workers	3 (27.3%)	0	0
Direct phone calls and personal communication tools	0	6 (66.7%)	0
Multisectoral collaboration and stakeholder support	1 (9.1%)	1 (11.1%)	5 (38.5%)
District-level preparedness and resource availability	0	0	5 (38.5%)

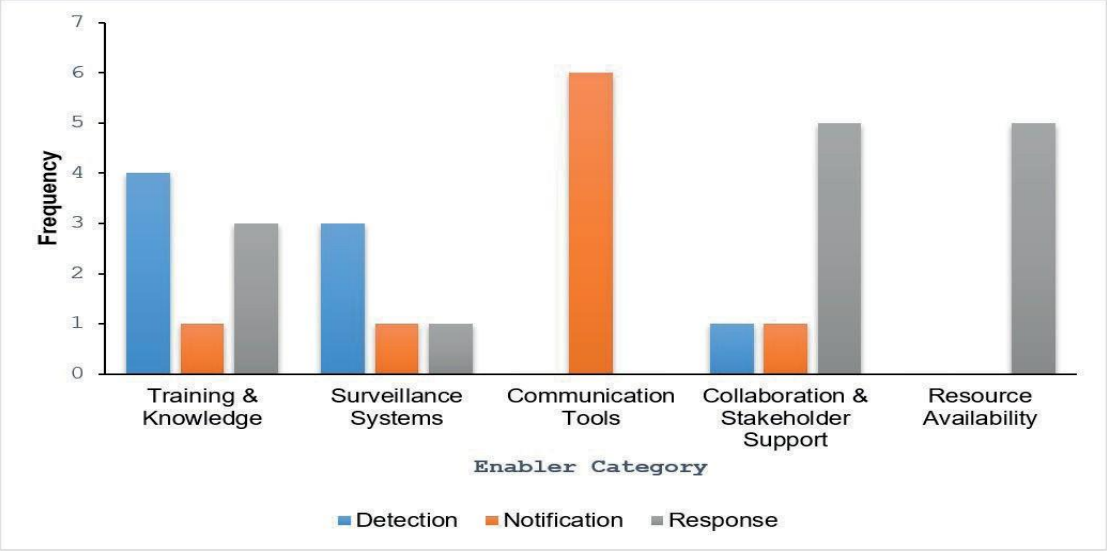

Figure 2 Enablers by Metric (Detection, Notification and Response).

High clinical suspicion by frontline providers also contributed to early case identification.

For notification, as shown in figure 2, the most cited enabler was communication tools such as the use of mobile phones and direct phone calls to relay alerts across facility, district, and national levels (67%). Enablers for response were largely structural and operational. The most common included multisectoral collaboration mechanisms (39%) and availability of resources at district level, such as GRZ funds and logistics support (39%), which facilitated timely deployment of response teams and countermeasures.

Discussion

This evaluation of Zambia's management of national public health events in 2024 assesses the country's performance in the detection, notification, and response to public health threats.

During the review period, a total of 10 nationally significant public health events were recorded. Assessment against the 7-1-7 time- lines indicate a strong performance in early detection and timely notification, with 80% and 90% of events meeting the respective targets. Similar high detection and notification rates have been reported in other low- and middle-income countries (LMICs) implement- ing structured surveillance frameworks. For example, Frieden and others (2021) documented detection rates exceeding 75% across multiple African countries, indicating that systematic surveillance significantly en- hances early disease identification.

However, only 20% of the public health events in Zambia met the early response initiation target, and consequently, only 20% achieved all three 7-1-7 benchmarks.

This underscores significant challenges in promptly initiating response actions following detection and notification Comparable assessments have also found that achieving all three 7-1-7 targets remains a challenge for most LMICs. A retrospective study across five LMICs (Brazil, Ethiopia, Liberia, Nigeria, and Uganda) from 2018 to 2022 found that only 27% of 41 public health events met the complete 7-1-7 target (1), similar to Zambia's 20% achievement rate. While early detection and notification rates in the multi-country study were 54% and 71% respectively, the response initiation target was met in only 49% of events indicating that rapid response initiation is a common hurdle across LMICs (1).

The bottleneck analysis revealed that delays were concentrated at the health facility and community levels, which accounted for 37% of all identified bottlenecks. These bottlenecks predominantly affected detection and were primarily attributed to low clinical suspicion and limited familiarity with case definitions among frontline health workers. In contrast, bottlenecks at the intermediate and multiple levels were mainly related to response, while the national level recorded the fewest bottlenecks, all of which were also response-related.

These findings align with evidence from other low- and middle-income countries (LMICs), where limited preparedness at the primary health care (PHC) level often impedes effective outbreak control (6). Additionally, workforce shortages and constrained diagnostic capacity have been consistently reported as barriers to timely outbreak management in LMICs (7). Taken together, these findings highlight the need for increased and targeted investments at the health facility level where most events are initially detected to strengthen disease detection and response capacity (2).

Several enablers of improved response capacity were identified. These included community-based surveillance systems, mobile notification technologies, and task-sharing strategies, all of which contributed to more timely detection and response. Evidence from other studies supports these findings, highlighting that empowering community health workers (CHWs), strengthening digital reporting systems, fostering strong community engagement, adopting digital innovations, and enhancing multisectoral coordination are effective strategies for building resilient health system (8-11).

Strategic investment in these areas could substantially enhance the timeliness and effectiveness of outbreak responses.

In light of these findings, future strategies to enhance outbreak response in Zambia should prioritize: (i) regular capacity-building initiatives at the primary health care (PHC) level to improve clinical suspicion and response readiness; (ii) improved access to diagnostic tools and essential medical supplies at PHC facilities; (iii) increased adoption of digital tools to strengthen surveillance, notification, and case management; and (iv) the expansion of task-sharing approaches to optimize the use of available human resource (6,8). Investments in community-based surveillance and mobile notification systems should be accelerated, complemented by efforts to strengthen risk communication and community engagement (RCCE) to build public trust and ensure active participation during outbreaks (12,13). Moreover, establishing flexible funding mechanisms to support rapid resource mobilization during outbreaks will be critical to consistently achieving the 7-1-7 tar- gets (14). In addition, fostering multisectoral collabo- ration among government agencies, non-governmental organizations, and communities will be essential to en- sure timely and effective outbreak response (15).

This study has several limitations. First, the analysis relied on secondary data sources, which may be subject to reporting biases and inaccuracies. Second, the small number of events assessed (n=10) limits the generalizability of the findings, and results should be interpreted with caution. Future research should involve larger datasets and prospective study designs to generate more robust evidence and to validate these findings. Additionally, longitudinal studies could help track improvements in Zambia's outbreak response capabilities over time.

Conclusion

Zambia's implementation of the 7-1-7 framework in 2024 shows strong capacity for early detection and prompt notification of public-health events; however, timely initiation of response actions particularly at the primary health care level remains a persistent challenge. Translating early detection into early response will require targeted investments that strengthen PHC readiness and streamline incident management.

Additionally, strengthening the use of emergency funds by enacting a Statutory Instrument (SI) that formalizes rapid fund disbursement protocols, as well as prioritizing the use of local resources in times of financial instability or aid freeze to maintain essential outbreak response capabilities.

Community-based surveillance, mobile notification platforms, and task-sharing emerged as practical enablers and should be scaled to accelerate response timelines. Leveraging these strategies can help Zambia and other LMICs with similar constraints, consistently meet all 7-1-7 targets and enhance overall outbreak preparedness. Furthermore, leveraging global best practices and fostering partnerships will be essential to closing the gaps identified. This study reaffirms the 7-1-7 framework's utility for assessing system performance and exposing vulnerabilities.

References

1. Bochner AF, Makumbi I, Aderinola O, Abayneh A, Jetoh R, Yemanaberhan RL, et al.Implementation of the 7-1-7 target for detection, notification, and response to public health threats in five countries: a retrospective, observational study. Lancet Glob Health. 2023 Jun 1;11(6):e871-9.

2. Brown GW, Rhodes N, Tacheva B, Loewenson R, Shahid M, Poitier F. Challenges in international health financing and implications for the new pandemic fund. Global Health [Internet]. 2023 Dec 1 [cited 2025 May 10];19(1):97. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10696881/

3. Frieden TR, Lee CT, Bochner AF, Buissonnière M, McClelland A. 7-1-7: an organising principle, target, and accountability metric to make the world safer from pandemics. Vol.398, The Lancet. Elsevier B.V.; 2021. p. 638-40.

4. Mayigane LN, Vedrasco L, Chungong S. 7-1-7: the promise of tangible results through agility and accountability. Vol. 11, The Lancet Global Health. Elsevier Ltd; 2023. p. e805–6.

5. Frieden TR, Lee CT, Bochner AF, Buissonnière M, McClelland A. 7-1-7: an organising principle, target, and accountability metric to make the world safer from pandemics. Lancet [Internet]. 2021 Aug 14 [cited 2025 May 10];398(10300):638. Available from: https://pmc.ncbi.nlm.nih.gov/articles PMC9636000/

6. Carter C, Anh NTL, Notter J. COVID-19 disease: perspectives in low- and middle-income countries. Clinics in Integrated Care[Internet]. 2020 Jul [cited 2025 May 10];1:100005. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7261656/

7. Siedner MJ, Gostin LO, Cranmer HH, Kraemer JD.Strengthening the Detection of and Early Response to Public Health Emergencies: Lessons from the West African Ebola Epi-demic. PLoS Med [Internet]. 2015 Mar 1 [cited 2025 May 10];12(3):e1001804. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC4371887/

8. Weishaar H, Pozo-Martin F, Geurts B, Lopez de Abechuco E, Montt-Maray E, Cristea F, et al. Capacity-building during public health emergencies: perceived usefulness and cost savings of an online training on SARS-CoV-2 real-time polymerase chain reac- tion (qPCR) diagnostics in low- and middle-income settings during the COVID-19 pandemic. Front Public Health [Inter- net]. 2024 [cited 2025May 10];12:1197729. Available from: https://pmc.ncbi.nlm.nih.gov/articlesPMC11192048/

9. Policy B on HS, Medicine I of, National Academies of Sciences E and M. Strengthening Outbreak Management and Emergency Response Systems. Global Health Risk Framework [Internet]. 2016 May 6 [cited 2025 May 10]; Available from: https://www.ncbi.nlm.nih.gov/books/NBK367950/

10. McGowan CR, Takahashi E, Romig L, Bertram K, Kadir A, Cummings R, et al.Community-based surveillance of infectious diseases: a systematic review of drivers of success. BMJ Glob Health [Internet]. 2022 Aug 19 [cited 2025 May 10];7(8):e009934. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9396156/

11. Alhassan JAK, Wills O. Public health surveillance through community health workers: a scoping review of evidence from 25 low-income and middle-income countries. BMJ Open [Inter- net]. 2024 Apr 5 [cited 2025 May 10];14(4):e079776. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11002386/

12. Keating P, Murray J, Schenkel K, Merson L, Seale A. Electronic data collection, management and analysis tools used for outbreak response in low- and middle-income countries: a systematic review and stakeholder survey. BMC Public Health [Internet]. 2021 Dec 1 [cited 2025 May 10];21(1):1741. Availa- ble from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8464108/

13. Dash S, Parray AA, De Freitas L, Mithu MIH, Rahman MM, Ramasamy A, et al. Combating the COVID-19 infodemic: a three-level approach for low and middle-income countries. BMJ Glob Health [Internet]. 2021 Jan 29 [cited 2025 May 10];6(1):e004671. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7849320/

14. Biswas RK, Huq S, Afiaz A, Khan HTA. A systematic assessment on COVID-19 preparedness and transition strategy in Bangladesh. J Eval Clin Pract [Internet]. 2020 Dec 1 [cited 2025 May 10];26(6):1599.Available from: https://pmc.ncbi.nlm.nih. gov/articles/PMC7461018/

15. Yasobant S, Lekha KS, Thacker H, Solanki B,Bruchhausen W, Saxena D. Intersectoral collaboration and health system resilience during COVID-19: learnings from Ahmedabad, India. Health Policy Plan [Internet]. 2024 Nov 1 [cited 2025 May 10];39(2):i29–38. Available from: https://pubmed.ncbi.nlm.nih. gov/39552345/