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About the Health Press

The Health Press is an open-access and peer-reviewed public health bulletin published by Zambia National Public Health Institute (ZNPHI). It was founded with the mission of offering a forum for the exchange and dissemination of health-related research and knowledge in Zambia and around the world. Its goals include spreading information on Zambia's public health security status and guide policy direction on health security in the country. The issue of the Health Press typically includes a research article, outbreak investigation, field notes and epidemiological bulletin. A new issue is published quarterly online and can be accessed at https://thp.znphi.co.zm/index.php/the-healthpress.

EDITORIAL TEAM

Publisher: Zambia National Public Health Institute
Address
Stand 1186, Corner of Chaholi & Addis Ababa Roads, Rhoadespark, Lusaka
Email: healthpress@znphi.co.zm
Website: https://thp.znphi.co.zm/index.php/thehealthpress

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FOREWORD

Dear Readers,

I am delighted to present the fourth issue of the 2024 Health Press. This publication serves as a platform for advancing public health dialogue critical in shaping Zambia's health security.

In the fourth quarter of 2024, Zambia recorded four cases of Mpox—one in Chitambo and three in Kitwe District. Additionally, a cholera outbreak was confirmed in Nakonde District, Muchinga Province, with a cumulative total of 17 cases reported as of December 31, 2024. Given Nakonde's status as a key border town with high cross-border movement, the risk of further cholera transmission remains a significant concern.

This issue features outbreak investigations on Conjunctivitis and Anthrax, providing key insights on the response efforts. Notably, we introduce a new section on Mortality Surveillance, highlighting its value as a powerful tool for health planning and development. I hope this publication informs and inspires readers to take meaningful action toward strengthening public health security in Zambia.

Dr. Cephas Sialubanje
Editor-in-Chief, The Health Press

Why Mortality Surveillance Matters: A Lifesaving Tool for Public Health and Development Planning?

Stephen Longa Chanda[1]
[1]Zambia National Public Health Institute
Corresponding Author: longachandadoc88@gmail.com

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Have you ever wondered how health experts track diseases, evaluate healthcare programs, or detect emerging health threats? One of the most powerful tools at their disposal is mortality surveillance, the systematic collection and analysis of death-related information (Rao et al., 2025). This data helps us understand trends in causes of death, measure the impact of public health interventions, and allocate resources effectively to improve healthcare services (Chanda et al., 2024). Without it, many deaths would go unrecorded, making it difficult to prevent future losses and improve health outcomes.

Mortality surveillance plays a crucial role in detecting emerging health threats, such as outbreaks of infectious diseases, and ensuring that life-saving interventions reach those who need them most. It relies on multiple data sources, including hospital and community death records, civil registration systems, medico-legal investigations, complete diagnostic autopsies, and verbal autopsies conducted through interviews with family members (Rao et al., 2025). However, in many parts of the world, especially in Africa, mortality data collection systems remain underdeveloped or incomplete.

The Challenge: Gaps in Mortality Data

Accurate death records are essential for effective public health planning, yet many African countries struggle to collect reliable mortality data. According to a 2016 Global Burden of Disease (GBD) study, African nations scored just 8.3% in mortality data accuracy and completeness, far below the global average of 46.9%. Between 2010 and 2016, 69% of African countries failed to produce reliable cause-of-death data (World Health Organisation, 2020). A 2020 report from the World Health Organization (WHO) further

revealed that only 10% of deaths in Africa are officially registered, compared to over 90% in Europe and the Americas (World Health Organisation, 2020).

To bridge this gap, mortality surveillance has become a critical complementary strategy to ensure that deaths and their causes are properly documented. By strengthening these surveillance systems, countries can improve healthcare planning, prevent future deaths, and respond more effectively to public health emergencies.

How Do We Determine the Cause of Death?

Determining why someone has died is essential for public health research and policymaking. The gold standard for establishing the cause of death is a complete diagnostic autopsy (CDA), but this method is often unavailable or unaffordable in many healthcare settings. In hospitals, medical professionals typically rely on medical certification of cause of death (MCCOD), which uses patient records and medical history to determine the cause (Blum et al., 2020).

In rural areas and low-resource settings, where autopsies and certified medical records are rare, the WHO recommends verbal autopsy (VA) (Soleman et al., 2006). This method involves structured interviews with the deceased's family members or caregivers to gather information about the symptoms and circumstances leading to death. The data is then analysed by trained physicians or computer algorithms to assign a probable cause. While VA has some limitations at an individual level, it remains an essential tool in low- and middle-income countries (LMICs), where civil registration systems are still developing.

Zambia's Commitment to Strengthening Mortality Surveillance

Recognizing the importance of accurate mortality data, Zambia has taken bold steps to enhance its surveillance efforts. In 2022, the Zambia National Public Health Institute (ZNPHI) launched a routine mortality surveillance program by establishing a dedicated mortality surveillance unit within the Surveillance and Disease Intelligence Cluster (Chanda et al., 2024). This initiative aims to expand mortality data collection nationwide, ensuring that Zambia can track deaths more effectively and better understand health trends across the country.

A key focus of this program is scaling up VA methods from small-scale sentinel sites to a broader, population-wide system. By integrating different data sources and bringing together key stakeholders, Zambia is working toward a more comprehensive, real-time mortality surveillance system that will drive

better health policies and interventions.

The Road Ahead

Reliable mortality data is the foundation of a strong and responsive public health system. Without it, governments and health organizations are left making decisions in the dark, unable to allocate resources effectively or respond to emerging threats on time. Strengthening mortality surveillance, particularly in low-resource settings, is key to ensuring better healthcare, more effective disease prevention, and ultimately, saving lives.

As Zambia continues to lead the way in improving mortality surveillance, it serves as an example for other countries seeking to enhance their health systems. By prioritizing accurate death registration and cause-of-death reporting, we can build a future where no life is lost without a trace, and where every death provides valuable insights to protect and save others.

References

1. Blum, L.S., Karia, F.P., Msoka, E.F., Mwanga, M.O., Crump, J.A. and Rubach, M.P., 2020. An in-depth examination of reasons for autopsy acceptance and refusal in Northern Tanzania. *The American journal of tropical medicine and hygiene*, *103*(4), p.1670.
2. Chanda, S.L., Cheelo, M., Mwango, C., Moyo, P., Kamalonga, K., Kapombe, P., Chisumpa, V., Tembo, E., Kapina, M. and Chilengi, R., 2024. A Retrospective Analysis of Lessons Learned and Perspectives on Expansion of Verbal Autopsy Implementation in Zambia, 2023. *The American Journal of Tropical Medicine and Hygiene*, *112*(1), p.21.
3. Rao, C., de Savigny, D., Atuheire, E., Dolan, S., Munoz, D.C., Fat, D.M., Ebonwu, J., Sharan, M., Ofosu, A., Bradshaw, D. and Dorrington, R., 2025. The role of mortality surveillance in pandemic preparedness and response. *Bulletin of the World Health Organization*, *103*(3), p.213.
4. Soleman, N., Chandramohan, D. and Shibuya, K., 2006. Verbal autopsy: current practices and challenges. *Bulletin of the World Health Organization*, *84*(3), pp.239-245.
5. World Health Organization Regional Office for Africa, 2020. 'What's the cause? Certifying deaths in sub-Saharan Africa'. Available at: https://www.afro.who.int/news/whats-cause-certifying-deaths-sub-saharan-africa (Accessed: 18 February 2025).
6. World Health Organization (2020) *Global report on health data systems and capacity, 2020*. Geneva: World Health Organization. Available at: https://www.who.int/data/data-collection-tools/score/documents (Accessed: 18 February 2025).

Conjunctivitis Outbreak Investigation in Eastern and Northern Provinces, Zambia April 2024.

Abdul M Mohammad[1], Paul Linde[2], Jordan Banda[3], Charles Fanaka[3]
[1]Zambia Field Epidemiology Training Program,[2]Zambia National Public Health Institute,
[3]Eastern Provincial Health Office.
Corresponding Author: mohsinzam@gmail.com

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Viral conjunctivitis is a highly contagious ocular inflammation, caused by adenoviruses and enteroviruses, making up 80% of all conjunctivitis. Common presenting symptoms are redness, itching, tearing, and discharge. While typically self-limiting, viral conjunctivitis can cause patient discomfort and temporary visual disturbances, making accurate diagnosis and appropriate management crucial for patient care and preventing transmission.

The Eastern Province of Zambia experienced an outbreak of viral conjunctivitis, with the first case reported at Mfuwe Day Secondary School in Mambwe District on March 6, 2024. As of April 30th, the number of cases had risen to 1,954, with the majority concentrated in Mambwe District, followed by Chadiza District. Concurrently, Northern Province's Mpulungu District had also seen a cluster of suspected eye infections.

The clinical investigations instituted revealed that patients presented with headache, itchy eyes characterized by redness, swelling, and discharge. Preliminary laboratory investigations of collected eye swabs isolated enterovirus - a known causative agent of viral conjunctivitis. The outbreak highlighted significant gaps in infection control measures and public awareness, with many community members resorting to non-conventional remedies such as herbal solutions and household items for treatment.

Background

Conjunctivitis, commonly known as "pink eye," is a highly contagious eye condition caused by viral, bacterial, or allergic agents. Viral conjunctivitis, often caused by adenoviruses, is the most prevalent form and spreads rapidly in crowded settings (Azari & Barney, 2013; CDC, 2023). The condition presents with symptoms such as eye redness, itching, discharge, and swelling, which can lead to significant discomfort and temporary vision impairment (*CDC*, 2023).

Key risk factors contributing to the spread of conjunctivitis include poor sanitation, overcrowded living conditions, and lack of public awareness about infection prevention (WHO, 2019). Previous studies have shown that individuals with coexisting conditions like HIV may experience more severe manifestations and complications from conjunctivitis, posing an additional burden on healthcare systems (Diana et al., 2015). Healthcare workers are also at an increased risk of contracting and transmitting the infection if proper infection control measures are not adhered to especially during epidemics (Mukwangole et al., 2021).

In early 2024, an outbreak of viral conjunctivitis was reported in Zambia, affecting the Eastern and Northern Provinces. The outbreak in Eastern province was first reported on March 6th at Mfuwe Day Secondary School in Mambwe District, Eastern Province, where leaners and staff exhibited symptoms that included eye irritation, redness, swelling, discharge, and headaches. By April 30th, the outbreak had escalated to 1,954 cases affecting another district of Chadiza. In Mpulungu District of Northern Province, the first cluster of three family members were identified in a household where symptoms began after children returned from school on February 24th. These index cases presented with typical conjunctivitis symptoms and were seen by a clinician at Mpulungu Urban Health Centre on February 26th. A surge in outpatient visits for eye-related symptoms in the three districts led to the Ministry of Health launching an investigation (Ministerial Statement on Conjunctivitis Outbreak in Zambia, 2024).

The primary objective of this investigation was to assess the extent and spread of the outbreak and identify contributing factors to the spread of the outbreak. Here, we describe the epidemiological characteristics of cases and identify high-risk populations, aimed at informing evidence-based public health interventions. Findings from this investigation, aim to enhance surveillance systems and improve timely response in future outbreaks

Methods

Study setting

Eastern Province is predominantly rural with high poverty levels, a young population, and lower literacy rates. The Northern Province is more sparsely populated and ethnically diverse. It also has a large rural population and limited access to healthcare and sanitation infrastructure. The main economic activity in both provinces is agriculture with most households engaged in subsistence farming.

Study design

A mixed-methods study design, incorporating a case-control and exploratory approach, was employed. A case-control investigation was conducted to identify potential exposures and sources of infection. Cases were defined and diagnosed based on clinical presentation, including eye redness, discharge, and associated symptoms such as itching and pain. Controls were selected from households with reported cases, following a 4:1 case-to-control ratio. Only participants who provided informed consent were included in the study, resulting in a total of 221 cases and 46 controls in the 3 districts. Collection of data from study participants was done by use of a semi-structured questionnaire in Kobocollect to gather information on demographics, symptoms, and potential risk factors (Walekhwa *et al.*, 2021). Furthermore, environmental assessments were also carried out to evaluate sanitation practices in the affected areas. Thereafter, data cleaning, processing, descriptive and qualitative analyses were performed using R-Studio. Bivariable and multivariable analyses (logistic regression) were also conducted to inform associations between variables. The reported cases and caregivers with missing information where not included in the analysis to ensure complete case analysis.

Statistical analysis

We summarized the demographic and clinical characteristics of participants, including caregivers, and compared them between cases and controls. Two-sided chi-square tests for association were computed to detect relationships between categorical variables. The significance level was set at a p-value level of 0.05. Explanatory variables that were hypothesized to have an association with the primary outcome diagnosis were analyzed using bivariate logistical regression. Variables that were statistically significant in bivariate models with a pre-specified p-value of < 0.2 were included in the subsequent multivariable analysis and a resulting $p < 0.05$ taken to be statistically significant in the final model. Epidemiological curves were also drawn using Microsoft Excel 2019 to show the trend of the cases per week.

Results

A total of 6,684 suspected cases were reported from March to April 2024 across the three districts (Figure 1). The majority of cases (65%) were reported in Eastern Province. In Chadiza district alone, 98% of cases involved international truck drivers entering Zambia from Mozambique. Females accounted for 181 (68%) of the cases, and 75 (28%) were children under 17 years old, with

a median age of 25 (IQR: 17-40). The facility-based cases were documented to have eye pain (76%), red or pink eyes (71%), and eye discharge (65%). Headache, eye itching, and swollen eyes were also frequently reported, while fever occurred in less than a third of cases as documented in the clinical registers.

The outbreak was characterized by a high attack rate, with 5,933 cases per 100,000 population reported at Chanida Border Health Post in Chadiza District. Mambwe District experienced the highest rates, with 17,337 cases per 100,000 population at Masumba Rural Health Centre and 7,546 cases per 100,000 population at Kakumbi Rural Health Centre. In Mpulungu District, Kaizya Health Post recorded 630 cases per 100,000 population, while Mpulungu District Hospital reported 1,523 cases per 100,000 population. Underreporting was a major issue, with 57% of cases not captured on official line lists.

High household case clustering was evident, with a median of four cases per household in affected areas. Statistical analysis showed that residents of Northern Province were 3.7 times more likely to contract conjunctivitis compared to those in Eastern Province. Additionally, households with prior cases had a 49% increased likelihood of additional members contracting the disease. Elderly individuals aged 65 years and above were less likely to develop the disease.

Environmental assessments found that only 57% of households reported having handwashing facilities outside toilets, while 23% had no facilities at all. Communities relied on alternative remedies such as human urine, glycerine, lemon juice, and herbal soap for treatment, reflecting widespread misinformation and limited access to proper healthcare.

The investigation also revealed significant gaps in response systems and public health practices, including the lack of a dedicated Incident Management System (IMS) to coordinate the response. Finally, port health officers lacked standardized guidelines for identifying and managing cases.

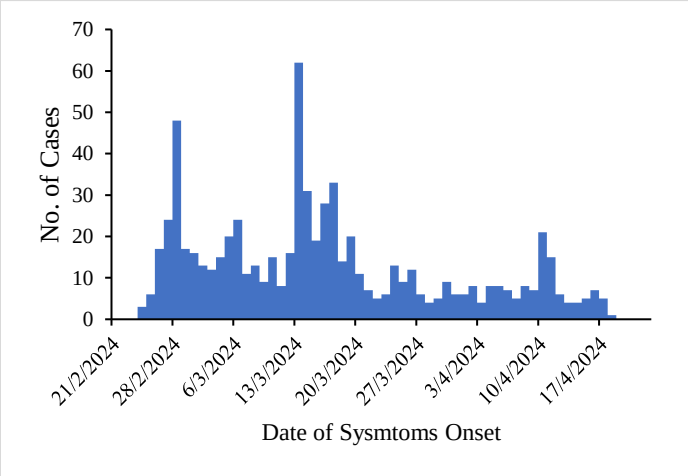

Figure 1. Number of conjunctivitis case by date of symptoms onset, Eastern and Northern Province, March - April, 2024.

Discussion

This investigation documented an extended outbreak of conjunctivitis that occurred in Chadiza, Mambwe, and Mpulungu districts of Zambia. The outbreak was driven by a combination of household transmission factors and potential regional environmental exposures. The case-control study revealed that residing in Northern Province and having a household member with conjunctivitis were significant factors. Previous studies suggest that conjunctivitis spreads rapidly in crowded environments, particularly when hygiene practices are inadequate (Azari & Barney, 2013; WHO, 2019).

Qualitative findings highlighted critical gaps in the public health response, including the absence of an incident management system, unclear case definitions, and missed cases.

Additionally, the widespread use of alternative remedies such as human urine, breast milk, and herbal soap underscores the need for targeted health education interventions. Similar challenges have been observed in other outbreaks, where misinformation and reliance on home remedies have contributed to delayed healthcare-seeking behavior (CDC, 2023; Mukwangole et al., 2021).

The investigation revealed significant underreporting, likely due to the lack of a clear case definition and weak community surveillance systems. Underreporting in public health emergencies is a well-documented challenge, often resulting from inadequate surveillance infrastructure and limited healthcare access (Ministerial Statement on Conjunctivitis Outbreak in Zambia, 2024). Household clustering of cases significantly contributed to the rapid spread of the disease, consistent with findings from other viral conjunctivitis outbreaks (Zambia National Public Health Institute, 2024). Elderly individuals had lower odds of developing conjunctivitis, possibly due to better hygiene practices—a trend also observed in previous studies on infection control (Mukwangole et al., 2021).

Despite the significant findings of this study, several limitations should be acknowledged. The retrospective nature of the study, with reliance on self-reported data from interviews, may have introduced recall bias, potentially affecting the accuracy of exposure assessments. The relatively small sample size of controls compared to cases limited the statistical power of the study. Furthermore, not all potential contributing factors—such as the possibility of conjunctivitis being a symptom of a systemic condition—were explored. The absence of laboratory confirmation for most

cases further constrained our ability to definitively identify the causative agent (Sambursky et al., 2006).

However, this study highlights the need for improved public health response systems in Zambia. It is recommended that all districts establish an IMSto handle future outbreaks. Furthermore, mass awareness campaigns should be implemented to combat misinformation, and surveillance systems should be strengthened to prevent underreporting.

Conclusions

The 2024 conjunctivitis outbreak in Zambia underscores the urgent need for comprehensive public health interventions and educational initiatives aimed at mitigating future occurrences of this highly contagious condition. Effective strategies must focus not only on immediate treatment and management of affected individuals, but also on preventive measures, such as promoting awareness of hygiene practices and the importance of seeking timely medical attention. Furthermore, strengthening healthcare infrastructure, especially in rural and underserved communities, will be crucial in addressing the conditions that facilitate the spread of conjunctivitis and other communicable diseases. Ultimately, an approach that combines both education and infrastructural improvement is essential for safeguarding public health and ensuring that similar outbreaks are effectively prevented in the future, contributing to the overall well-being of the Zambian population.

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References

1. Zambia National Public Health Institute. (2024). Conjunctivitis outbreak investigation among residents of Chadiza, Mambwe, and Mpulungu districts of Zambia. April 2024 Report.
2. Azari AA, Barney NP. Conjunctivitis: A systematic review of diagnosis and treatment. Vol. 310, JAMA. American Medical Association; 2013. p. 1721--9.
3. Sambursky R, Tauber S, Schirra F, Kozich K, Davidson R, Cohen EJ. The RPS Adeno Detector for Diagnosing Adenoviral Conjunctivitis. Ophthalmology.2006 Oct;113(10):1758--64.
4. *DHMOSH guidance for the management of acute conjunctivitis cases & outbreaks* (07-12-2023). Available at: https://www.cdc.gov/conjunctivitis/about/prevention.html#print.

5. Walekhwa, A.W. *et al*. (2021) 'Measles outbreak in Western Uganda: a case-control study', *BMC Infectious Diseases*, 21(1). Available at: https://doi.org/10.1186/s12879-021-06213-5.
6. Diana, Elisabeth N. (2015). A study of measles in adults at Charlotte Maxeke Johannesburg Academic Hospital.https://core.ac.uk/download/188770123.pdf (Accessed: 18 Jan, 2025).
7. Mukwangole et al. (2021), 'Infection control practices among healthcare workers', International Journal of Infectious Diseases, vol. 104. Factors associated with Coronavirus disease 2019 (COVID-19) and an assessment of adherence to infection prevention and control (IPC) guidelines among health workers, Nakonde District, Zambia, 2020. 'African Field Epidemiology Network', https://core.ac.uk/download/551549024.pdf (Accessed: 18 Jan, 2025).
8. World Health Organization (2019) - Sanitation and health. Available at: https://www.who.int/news-room/fact-sheets/detail/sanitation-and-health (Accessed: 18 January 2025).
9. Centers for Disease Control and Prevention (CDC) (2023) - Conjunctivitis (Pink Eye). Available at: https://www.cdc.gov/conjunctivitis/index.html (Accessed: 18 January 2025).
10. Ministerial Statement on Conjunctivitis Outbreak in Zambia (2024) , Available at https://www.parliament.gov.zm/sites/default/files/images/publication_docs/MINISTERIAL%20STATEMENT%20%20On%20the%20Conjuctivitis%20Red%20Eye%20Outbreak%20in%20Zambia.pdf (Accessed: 18 January 2025).

Investigation of suspected anthrax outbreak in Sinazongwe district, Zambia, 2024

Graham Chitempa[1], William Nsemani[2], Dabwitso Banda[2], Warren Malambo[3], Nyambe Sinyange[2]
[1] Levy Mwanawasa Medical University, Zambia, [2] Zambia National Public Health Institute,
[3] Centres for Disease Prevention and Control (CDC), Zambia
Corresponding Author: grahamchitempa@yahoo.com

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Summary

Anthrax remains endemic in Luangwa Valley and the Zambezi floodplains of Zambia. This study investigated a suspected anthrax outbreak in Sinazongwe District to describe case demographics and clinical characteristics to confirm the outbreak. Furthermore, assess knowledge, attitudes, and practices relating to anthrax were assessed.

A case series study was employed using a structured questionnaire on Kobo Collect from five active cases. Clinical examinations and sample collection were conducted on human and domestic animal cases alongside environmental sampling. Demographic and clinical data were analysed using Microsoft Excel while collected samples were submitted to the lab for culture and polymerase chain reaction tests to confirm anthrax.

Among the five cases assessed, four were male, aged 11–45 years. Two cases were from the same household, while three belonged to different families. Occupational risk was evident, with two cases being fishermen (n=2) and two livestock farmers (n=2). Three individuals had prior knowledge of anthrax (n=3), while two (n=2) understood transmission routes, and only one was aware of preventive measures. All assessed cases had consumed meat from animal carcasses and presented with skin lesions. All cases received antibiotic treatment.

The outbreak primarily affected males due to occupational exposure. Limited knowledge of anthrax transmission and prevention, coupled with unsafe carcass handling, underscores the need for targeted health education.

Introduction

Anthrax is a zoonotic infectious disease caused by *Bacillus anthracis*, a soil borne pore forming gram positive bacterium (Doganay et al., 2023). Globally, anthrax is recognised as a significant public health and economic burden, particularly in regions where livestock farming plays a central role in the economy and where close interactions

between humans and animals facilitate zoonotic transmission (Pittiglio et al., 2022). Human anthrax cases are primarily classified into three clinical categories: the cutaneous form, which accounts for approximately 95% of reported cases worldwide; the gastrointestinal form; and the pulmonary form (Hampson et al., 2011). Transmission to humans occurs mainly through contact with infected animals or contaminated animal products, with no evidence of person-to-person transmission (McKendrick, 1980).

In sub–Saharan Africa, anthrax remains a persistent challenge to both public and animal health, particularly in regions with extensive livestock farming. The disease affects both domestic and wild herbivores, posing significant risks to human health. Environmental factors such as temperature, precipitation, soil type and vegetation significantly influence the survival and distribution of *B. anthracis* spores, which can persist in the environment for decades (Antonation et al., 2016). During droughts or dry seasons, herbivores grazing close to the soil due to scarce pastures are at greater risk of anthrax spores exposure, while water scarcity may drive livestock herds into wildlife zones where soil contamination levels with spores are higher (Aladejana et al., 2023). The intertwined challenges of anthrax control in sub–Saharan Africa highlight the importance of integrated strategies that address both environmental and epidemiological factors.

In Zambia, anthrax is endemic, with outbreaks frequently reported in the Luangwa Valley and the Zambezi floodplains due to the high interaction between livestock and wildlife. Between January and November 2023, 684 suspected human anthrax cases, including four deaths (CFR 0.6%), were reported across nine provinces. Sinazongwe District, in Southern Province , an area not known for anthrax endemicity, emerged as the epicentre, accounting for 287 cases (42%) and two deaths (50%) of the total (WHO, 2023). The disease then spread to other towns through consumption of infected meat from the epicentre. We investigated an increase in suspected anthrax cases in Sinazongwe district to describe demographic and clinical characteristics of cases; assess knowledge, attitude and practices; confirm the outbreak and recommend prevention and control measures.

Methods

Investigation site

The study was conducted in Sinazongwe district, a rural area in Zambia's Southern Prov-

ince. The district covers an area of approximately 4813.6 km² and has a human population of approximately159055 and Livestock population (cattle, goats and Sheep of approximately 146000(Census report, 2022). The human population is predominantly rural, with over 70 percent engaged in livestock rearing and Fishing as a primary livelihood. The district is divided into 6 administrative wards, with healthcare services provided by 34 healthcare facilities. According to the Ministry of Health line list from March 2024 to November 2024, Sinazongwe recorded over 199 suspected anthrax cases, although 98% of these cases were not laboratory confirmed. The distribution of cases was as follows: 15 cases (8%) in children under five years, 38 cases (19%) in individuals aged 5–15 years, and 146 cases (73%) in those over 15 years (IDSR 2023),

Study design and population

To investigate the suspected anthrax outbreak, we conducted a descriptive case series study. The study focused on five active suspected human anthrax cases reported from Nabukowa and Sikaneta Health Posts.

Data Collection

Data were collected using a structured questionnaire on Kobo Collect Tool, a mobile-based data collection application. The questionnaire captured demographic information, clinical history, knowledge, attitudes, and practices (KAP) related to anthrax. It also included details on the health services provided to the cases, such as laboratory investigations, treatment received, and follow-up care. The data collection process involved interviews with the five active cases. Clinical data were collected from health facility records, and community-level data were obtained through discussions with healthcare providers and community leaders.

Sample Collection

Human, animal and soil samples were collected and transported to Zambia National Public Health Institute Reference Laboratory for confirmation.

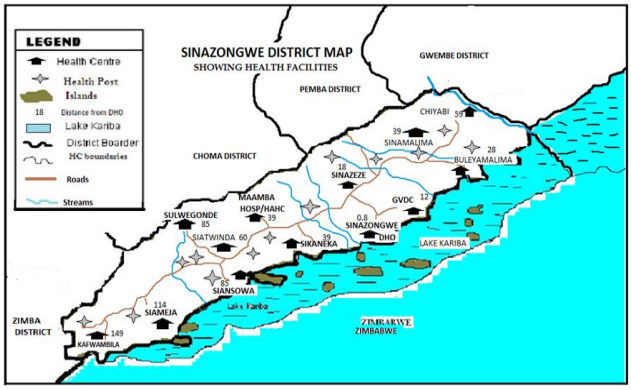

Figure 1 Map of the Investigation Site in Sinanzongwe District

Data Analysis

The collected data were analysed descriptively to summarize the demographics, KAP, and health services provided to the cases. Frequencies and proportions were used to analyse categorical variables; each case was described in detail while narrative synthesis was used to describe community-level findings. Laboratory tests were conducted to confirm anthrax.

Ethical Considerations

Permission to investigate was obtained from Zambia National Public Health Institute, Southern Provincial Health Office and Sinazongwe District Health Office. All participants provided both verbal and written informed consent before participating in the study. Anonymity and confidentiality of the participants' data were strictly maintained throughout the investigation.

Results

Demographic and clinical characteristics of cases

This investigation revealed that more males than females were affected, with majority of those affected being below 40 years (Table 1)

Table 1: Demographic Characteristics of suspected cases of Anthrax, Sinazongwe district, 2024. (N = 5).

Demographic characteristic	Frequency (%)
Sex	
Male	4 (80%)
Female	1 (20%)
Age group	
<40	3 (60%)
≥40	2 (40%)
Place of residence	
Lusinga	2(40%)
Tobonte	1 (20%)
Siavwemu	1 (20%)
Chande	1(20%)
Occupation	
No occupation	1 (20%)
Livestock farmer	2 (40%)
Fishermen	2 (40%)
Marital status	
Single	2 (40%)
Married	2 (40%)
Separated	1(20)
Level of education	
Primary	5 (100%)
Religion	
Christianity	5 (100%)

Clinical symptoms observed

All five cases (n=5, 100%) presented with characteristic skin lesions and swelling around the lesion, consistent with cutaneous anthrax, along with body weakness. Additionally, three cases experienced headaches, while two had fever. Muscle aches and vomiting were reported in one case each. None of the five cases had any underlying medical conditions (Figure 2 and 3).

Figure 2 Anthrax skin lesions of some of the cases assessed during investigations

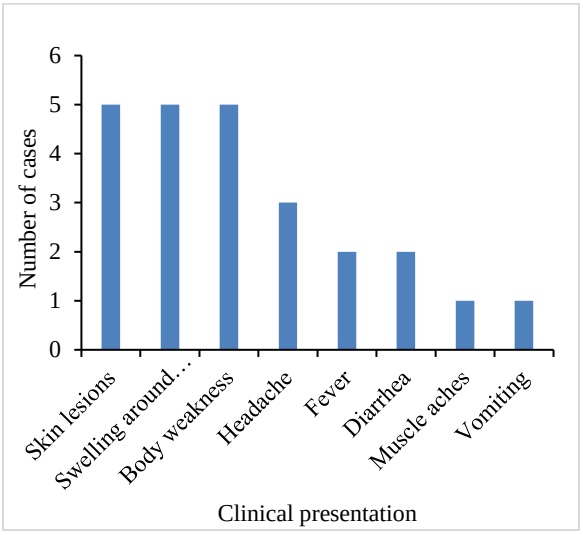

Figure 3 Figure 3: Signs and symptoms of Anthrax among suspected cases, Sinazongwe district 2024

Knowledge, Attitudes, and Practices (KAP)

During community sensitization meetings involving 54 community members, 31 members (57.4%) attributed the anthrax cases to the consumption of contaminated carcasses. Another 10 members (18.5%) believed that poor animal vaccination coverage in livestock was the primary cause, while 8 members (14.8%) pointed to improper disposal of carcasses as a contributing factor. Additionally, 5 members (9.3%) expressed no opinion on the matter.

From the cases assessed, three (n=3; 60%) reported knowing what anthrax is, while two (n=2; 40%) were unaware. Similarly, two cases (n=2; 40%) knew how anthrax is transmitted, but three (n=3; 60%) did not. Only one case (n=1; 20%) was aware of anthrax prevention methods, while the majority (n=4; 80%) lacked knowledge of preventive measures. All cases (n=5, 100%) admitted to consuming meat from animal carcasses prior to falling ill (Figure 5).

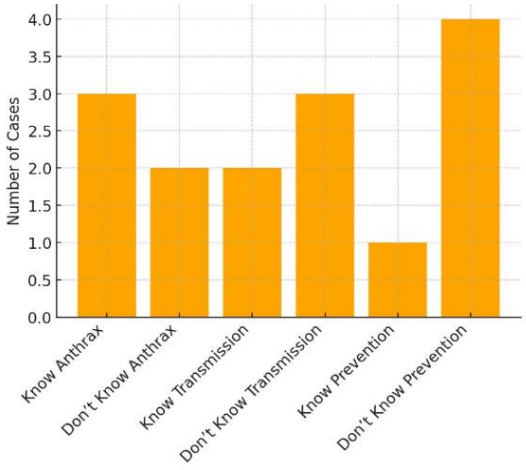

Figure 4 Knowledge among cases at Nabukowa Health Post, Sinazongwe district, 2024.

Confirmation of the outbreak

Only one sample was collected from five active cases and yielded a negative result.

Discussion

Laboratory analysis of soil, animal, and human samples from the 2024 anthrax outbreak in Sinazongwe District yielded negative results. However, affected individuals exhibited classic cutaneous anthrax symptoms, consistent with global epidemiological patterns, where cutaneous anthrax accounts for over 95% of human cases(McKendrick, 1980).. Notably, all reported cases had a history of consuming meat from animal carcasses, a well-documented risk factor for anthrax transmission (Mwakapeje et al., 2018). This indicates that exposure likely occurred through ingestion of contaminated meat, leading to infection despite the absence of laboratory confirmation. These findings highlight the need for a more comprehensive surveillance approach, integrating clinical diagnosis, epidemiological evidence, and laboratory confirmation to enhance anthrax detection and response

The anthrax outbreak predominantly affected males, a pattern commonly observed in previous outbreaks where occupational exposure plays a significant role (Hendricks et al., 2022). Men are more likely to engage in high-risk activities such as livestock handling, slaughtering, and butchering, increasing their likelihood of exposure to *Bacillus anthracis* spores (Doganay et al., 2023). The affected age range reflects that both adolescents and adults are vulnerable, particularly those engaged in agriculture and animal-related livelihoods, as documented in similar outbreaks in sub-Saharan Africa (Ogunleye et al., 2023).

Occupation was a critical determinant of risk, with livestock farmers and fishermen accounting for 80% of cases. These findings align with reports from Ethiopia and Zimbabwe, where anthrax outbreaks were linked to occupations involving direct animal contact (Antonation et al., 2016). In fishing communities, contamination of water sources with anthrax spores has also been proposed as a possible transmission route, warranting further investigation (Islam et al., 2013)

The investigation highlighted substantial knowledge gaps regarding anthrax transmission and prevention. While 60% of individuals from affected communities recognized anthrax as a disease, only 40% understood how it spreads, and just 20% were aware of preventive measures. This is consistent with

previous research indicating that communities were anthrax is endemic often lack accurate information, leading to unsafe behaviours (Traxler et al., 2019).

A major risk factor in this outbreak was the consumption of meat from animal carcasses, which all cases admitted to before developing symptoms. This aligns with findings from other outbreaks in Zambia and Uganda, where cultural and economic factors contribute to the continued consumption of meat from dead animals despite known health risks (Woods et al., 2004). Strengthening risk communication and food safety measures is essential to addressing this issue.

While the majority of community members attributed the outbreak to eating contaminated meat from dead animals, a minority number attributed it to poor animal vaccination while some linked it to improper carcass disposal. Similar misperceptions have been documented in other anthrax-endemic regions, where communities often fail to recognize the role of preventive veterinary measures (Turner et al., 2014). Addressing these knowledge gaps through culturally appropriate education campaigns is crucial for long-term prevention.

Given the significant knowledge gaps identified, targeted risk communication campaigns were emphasized. Previous interventions in anthrax-endemic areas have demonstrated that community education significantly reduces high-risk behaviors (Sitali et al., 2017). While initial sensitization efforts reached 54 individuals, scaling up to broader community coverage is necessary. Key messages should focus on the risks of consuming meat from dead animals, safe handling of animal products, and the importance of reporting sudden livestock deaths.

Animal vaccination remains the most effective strategy for anthrax prevention. In April 2024, 125,592 animals in Sinazongwe were vaccinated, achieving 86% coverage (Ministry of Fisheries and Livestock, 2024). However, reaching the remaining 14% of unvaccinated livestock is necessary for comprehensive control. Strengthening veterinary surveillance and expanding vaccination campaigns will be crucial in preventing future outbreaks and public protection (Turner et al., 2014)).

Surveillance must be improved to detect and respond to anthrax cases in both human and animal populations. Strengthening laboratory capacity for timely diagnosis, increasing

sample collection rates, and integrating human-animal health surveillance can enhance outbreak preparedness (Sitali et al., 2017).

Conclusion

The anthrax outbreak in Sinazongwe District was linked to the consumption of contaminated meat, with all affected individuals presenting with characteristic skin lesions and receiving treatment. Most cases were involved in fishing or livestock farming, and while some had basic knowledge of anthrax, awareness of its transmission and prevention was limited. Surveillance efforts were inadequate, with minimal sample collection.

Community engagement identified key factors contributing to the outbreak, including carcass consumption, poor vaccination coverage, and improper disposal of infected animals. These findings underscore the need for strengthened public health measures, including enhanced surveillance, targeted community education, and improved livestock vaccination strategies to prevent future outbreaks

References

1. Aladejana, O., … J. O.-A. R., & 2023, undefined. (2023). Systematic Review of Anthrax, a Zoonotic Bacterial Infection in Africa. *Search.Ebscohost.Com*, *20*, 5143–5152. https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=15973115&AN=174336497&h=QcByt7QjL09hS2BFBpfvH6iX63n%2F2eNjgYaK2b5Rds9r3h%2FKTcJjbUyRzL4N8G1UrjoZ%2FYVNPqC10220sSNUJg%3D%3D&crl=c
2. Antonation, K. S., Grützmacher, K., Dupke, S., Mabon, P., Zimmermann, F., Lankester, F., Peller, T., Feistner, A., Todd, A., Herbinger, I., de Nys, H. M., Muyembe-Tamfun, J. J., Karhemere, S., Wittig, R. M., Couacy-Hymann, E., Grunow, R., Calvignac-Spencer, S., Corbett, C. R., Klee, S. R., & Leendertz, F. H. (2016). Bacillus cereus Biovar Anthracis Causing Anthrax in Sub-Saharan Africa—Chromosomal Monophyly and Broad Geographic Distribution. *PLoS Neglected Tropical Diseases*, *10*(9), 1–14. https://doi.org/10.1371/journal.pntd.0004923
3. Doganay, M., Dinc, G., Kutmanova, A., & Baillie, L. (2023). Human Anthrax: Update of the Diagnosis and Treatment. *Diagnostics*, *13*(6). https://doi.org/10.3390/diagnostics13061056
4. Hampson, K., Lembo, T., Bessell, P., Auty, H., Packer, C., Halliday, J., Beesley, C. A., Fyumagwa, R., Hoare, R., Ernest, E., Mentzel, C., Metzger, K. L., Mlengeya, T., Stamey, K., Roberts, K., Wilkins, P. P., & Cleaveland, S. (2011). Predictability of anthrax infection in the Serengeti, Tanzania. In *Journal of Applied Ecology* (Vol. 48, Issue 6, pp. 1333–1344). https://doi.org/10.1111/j.1365-2664.2011.02030.x
5. Hendricks, K., Person, M. K., Bradley, J. S., Mongkolrattanothai, T., Hupert, N., Eichacker, P., Friedlander, A. M., & Bower, W. A. (2022). Clinical Features of Patients Hospitalized for All Routes of Anthrax, 1880–2018: A Systematic Review. *Clinical Infectious Diseases*, *75*(3 Supplement), S341–S353. https://doi.org/10.1093/cid/ciac534
6. Islam, M. S., Hossain, M. J., Mikolon, A.,

Parveen, S., Khan, M. S. U., Haider, N., Chakraborty, A., Titu, A. M. N., Rahman, M. W., Sazzad, H. M. S., Rahman, M., Gurley, E. S., & Luby, S. P. (2013). Risk practices for animal and human anthrax in Bangladesh: an exploratory study. In *Infection Ecology & Epidemiology* (Vol. 3, Issue 1, p. 21356). https://doi.org/10.3402/iee.v3i0.21356

7. McKendrick, D. R. A. (1980). Anthrax and its transmission to humans. In *Central African Journal of Medicine* (Vol. 26, Issue 6, pp. 126–129).
8. Ministry of Fisheries and Livestock Zambia (2024) Press statement on Anthrax disease situation in Sinazongwe District, Southern Province, 8 August 2024. Available at: https://www.mfl.gov.zm/wp-content/uploads/2024/08/PRESS-STATEMENT-ON-ANTHRAX-DISEASE-SITUATION.pdf
9. Mwakapeje, E. R., Høgset, S., Fyumagwa, R., Nonga, H. E., Mdegela, R. H., & Skjerve, E. (2018). Anthrax outbreaks in the humans - livestock and wildlife interface areas of Northern Tanzania: a retrospective record review 2006-2016. *BMC Public Health*, *18*(1), 106. https://doi.org/10.1186/s12889-017-5007-z
10. Ogunleye, S. C., Olorunshola, M. M., Fasina, K. A., Aborode, A. T., Akinsulie, O. C., Amoo, A., Olatoye, B. J., Bakare, A., Lawal, M. A., Adekanye, O., & Chinyere, E. C. (2023). Anthrax outbreak: exploring its biological agents and public health implications. *Frontiers in Tropical Diseases*, *4*(January), 1–12. https://doi.org/10.3389/fitd.2023.1297896
11. Pittiglio, C., Shadomy, S., El Idrissi, A., Soumare, B., Lubroth, J., & Makonnen, Y. (2022). Seasonality and Ecological Suitability Modelling for Anthrax (Bacillus anthracis) in Western Africa. *Animals*, *12*(9). https://doi.org/10.3390/ani12091146
12. Sitali, D. C., Mumba, C., Skjerve, E., Mweemba, O., Kabonesa, C., Mwinyi, M. O., Nyakarahuka, L., & Muma, J. B. (2017). Awareness and attitudes towards anthrax and meat consumption practices among affected communities in Zambia: A mixed methods approach. *PLoS Neglected Tropical Diseases*, *11*(5). https://doi.org/10.1371/journal.pntd.0005580
13. Traxler, R. M., Napetvaridze, T., Asanishvili, Z., Geleishvili, M., Rukhadze, K., Maghlakelidze, G., Broladze, M., Kokhreidze, M., Maes, E. F., Reynolds, D., Salman, M., Shadomy, S. V., & Rao, S. (2019). Knowledge, attitudes, and practices related to anthrax and animal care: A case-control study in Georgia. *PLoS ONE*, *14*(10), 1–11. https://doi.org/10.1371/journal.pone.0224176
14. Turner, W. C., Kausrud, K. L., Krishnappa, Y. S., Cromsigt, J. P. G. M., Ganz, H. H., Mapaure, I., Cloete, C. C., Havarua, Z., Küsters, M., Getz, W. M., & Stenseth, N. C. (2014). Fatal attraction: Vegetation responses to nutrient inputs attract herbivores to infectious anthrax carcass sites. In *Proceedings of the Royal Society B: Biological Sciences* (Vol. 281, Issue 1795). https://doi.org/10.1098/rspb.2014.1785
15. WHO. (2023). *Anthrax - Zambia* (Issue December, pp. 1–9).
16. Woods, C. W., Ospanov, K., Myrzabekov, A., Favorov, M., Plikaytis, B., & Ashford, D. A. (2004). Risk factors for human anthrax among contacts of anthrax-infected livestock in Kazakhstan. *American Journal of Tropical Medicine and Hygiene*, *71*(1), 48–52. https://doi.org/10.4269/ajtmh.2004.71.48

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Q4 Public Health Bulletin 1st October – 31st December 2024

Summary of outbreaks

Measles

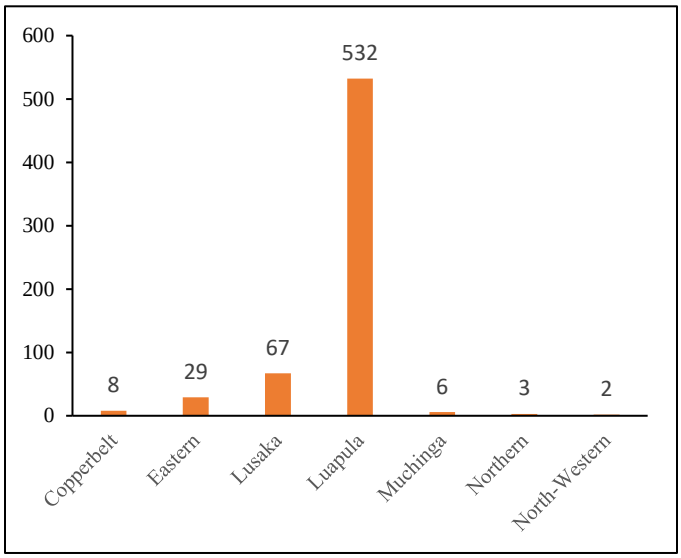

Figure 1 Quarter 4 Suspected Measles Cases by province (Source eIDSR, 2024)

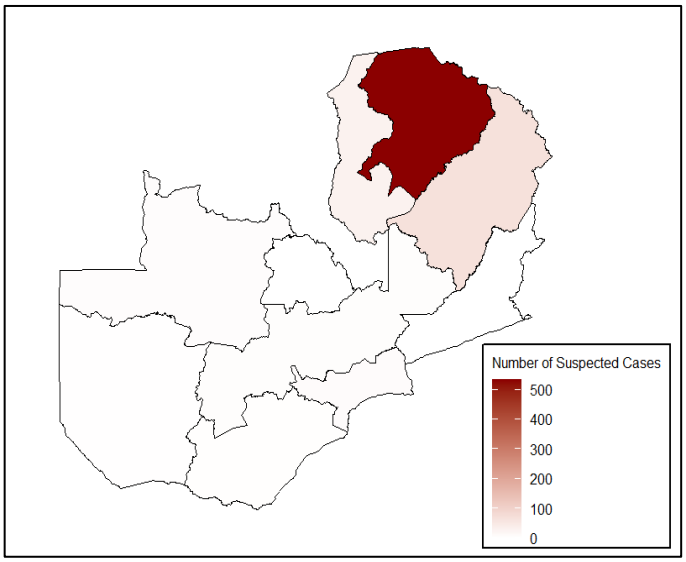

Figure 2 Map showing the distribution of suspected Measles cases, Quarter 4, 2024.

A total of 652 suspected measles cases were reported in Quarter 4, 2024, representing a slight decrease from the 731 cases reported in Quarter 3, 2024. Of note, Northern Province recorded the highest number of suspected cases, increasing from 250 in Q3 to 532. While Muchinga recorded the second highest number of cases with 67, this was a significant decline from the 200 cases reported in Q3. Lusaka also experienced major reduction, with cases decreasing from 83 in Q3 to 8. Eastern and Copperbelt recorded zero cases, with Eastern experiencing the most notable decrease from 52 cases in Q3.

Despite the overall decline, the surge in suspected cases in Northern Province remains a concern, underscoring the urgent need to strengthen immunization coverage and implement targeted vaccination campaigns.

Anthrax

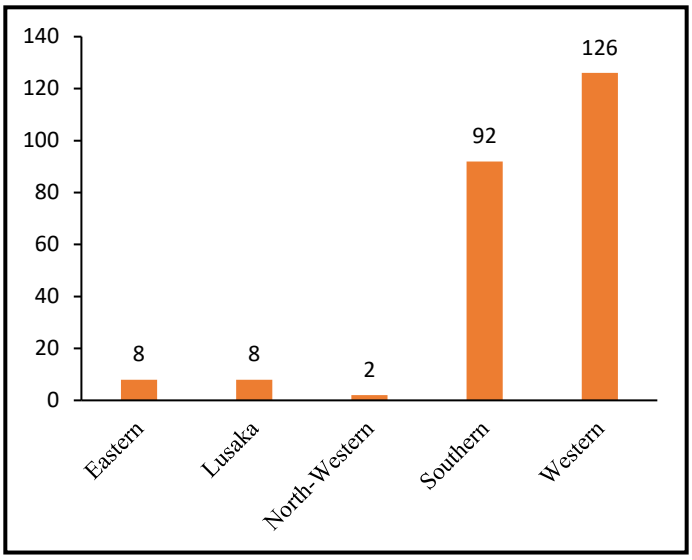

Figure 3 Quarter 4 Suspected Anthrax Cases by province (Source: eIDSR, 2024).

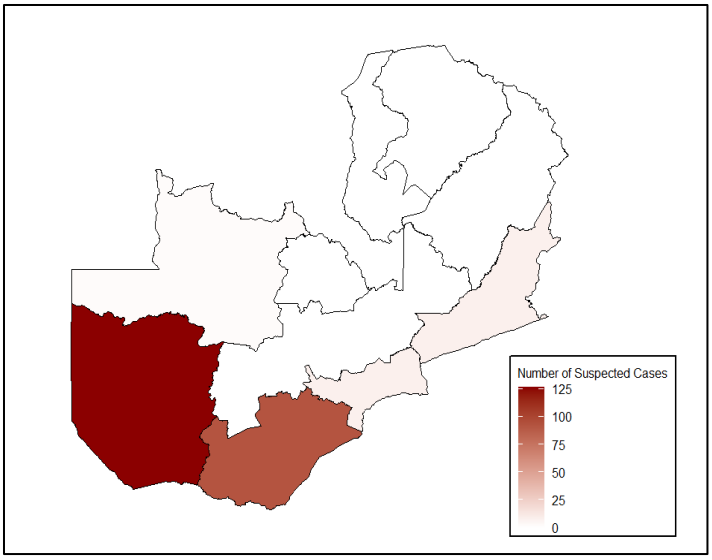

Figure 4 Map Showing the distribution of Suspected Anthrax Cases, Quarter 4, 2024.

A total of 236 suspected Anthrax cases were reported across six provinces in Quarter 4, 2024. This represents a significant increase from the 166 cases recorded in Q3. Western Province recorded the highest number of cases with 126. Southern Province followed with 92 cases, though this marks a slight decline from the 132 cases recorded in Quarter 3. Eastern and Lusaka Provinces each reported 8 cases, while North-Western Province recorded 2. With the continued rise in cases, the public is urged to take precautions, including sourcing meat from reliable vendors, thoroughly cooking meat, and promptly reporting any sick animals.

Bilharzia

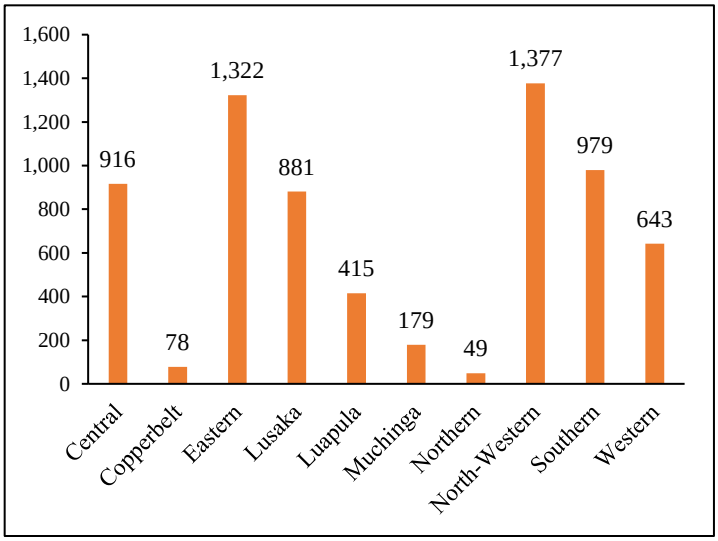

Figure 5 Quarter 4 suspected, tested and confirmed Bilharzia Cases per province (Source eIDSR, 2024)

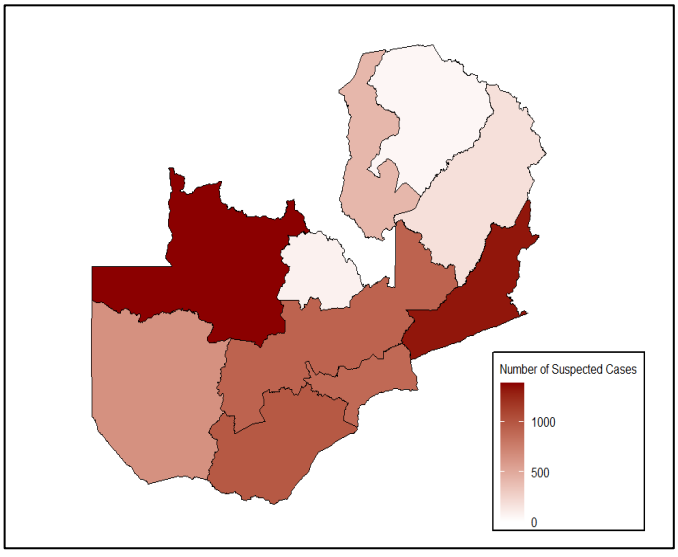

Figure 6 Map showing the distribution of suspected Bilharzia Cases, Quarter 4, 2024.

A total of 6,839 suspected Bilharzia cases were reported across all ten provinces in Quarter 4, 2024, marking an increase from the 6,548 cases recorded in Quarter 3, 2024. North-Western Province reported the highest number of cases with 1,377, surpassing Eastern Province, which recorded 1,322 cases. Southern Province followed with 979 cases, while Central and Lusaka Provinces also reported high numbers at 916 and 881 cases, respectively. Other significantly affected provinces included Western (643), Luapula (415), and Muchinga (179), while Northern Province recorded the lowest number of cases at 49. There is a need to intensify the distribution of Information Education and Communication (IEC) materials and community engagement in the affected provinces to promote the adoption of hygiene and sanitation practices.

Typhoid Fever

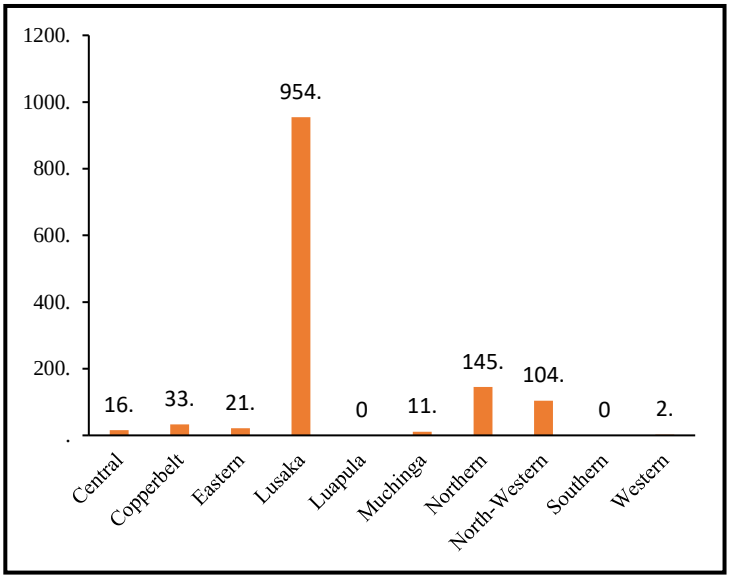

Figure 7 Quarter 4 reported suspected Typhoid Fever Cases per province (Source: eIDSR, 2024).

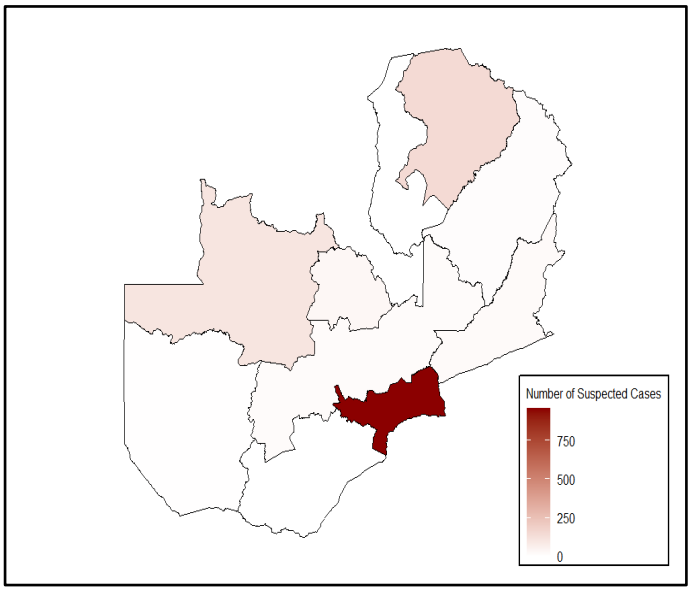

Figure 8 Map showing the distribution of suspected Typhoid Fever Cases, Quarter 4, 2024.

A total of 1,286 suspected Typhoid Fever cases were reported across nine provinces in Quarter 4, 2024, marking a sharp increase from the 451 cases recorded in Quarter 3. Lusaka Province reported the highest number of cases at 954, continuing an upward trend. North-Western Province recorded 145 cases, a significant rise from 74 in Q3, while Eastern and Central Provinces reported 104 and 33 cases, respectively. Muchinga (21), Western (16), and Luapula (11) Provinces also recorded cases, whereas Southern Province remained free of reported cases. Given the surge in suspected cases, strengthening sanitation, ensuring access to clean or boiled water, promoting handwashing, and reinforcing safe food handling practices remain critical in preventing Typhoid Fever.

Maternal Mortality

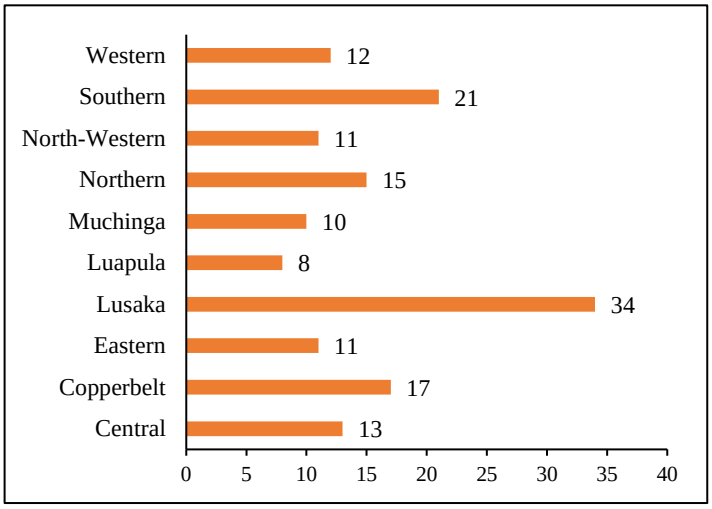

Figure 9 Quarter 4 reported maternal deaths per province (Source: Maternal Child Health Unit (Ministry of Health), 2024)

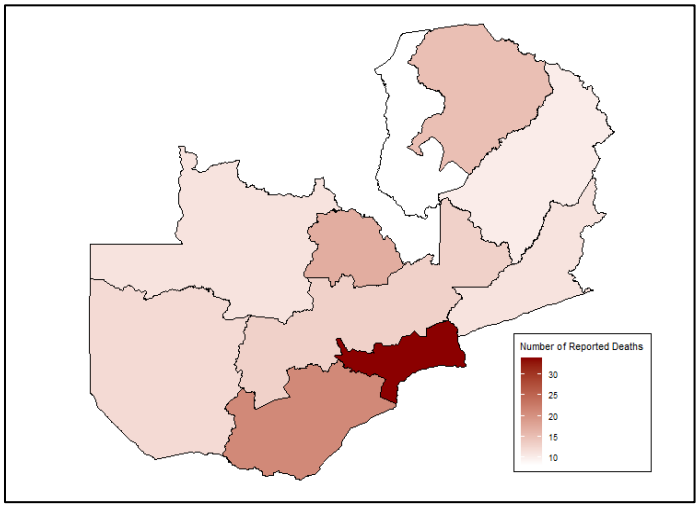

Figure 10 Map showing the distribution of reported Maternal deaths by province, Quarter 4, 2024.

In the fourth quarter of 2024, a total of 152 maternal deaths were reported, a slight increase from the 150 deaths recorded in the third quarter of 2024. Lusaka Province continues to report the highest number of deaths with 34, followed by Southern Province with 21 deaths and Copperbelt Province with 17 deaths. Notably, Muchinga Province experienced an increase from 5 deaths in Quarter 2 to 10 deaths in Quarter 3, 2024. Conversely, Luapula Province saw a decline in deaths, reporting 8 cases in Quarter 4 compared to 17 in the previous quarter.

Acute Flaccid Paralysis

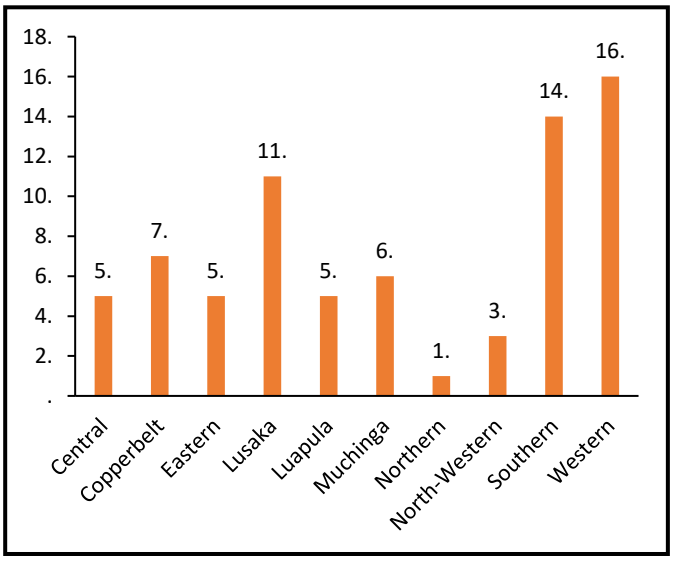

Figure 11 Quarter 4 reported suspected AFP per Province (Source: eIDSR, 2024).

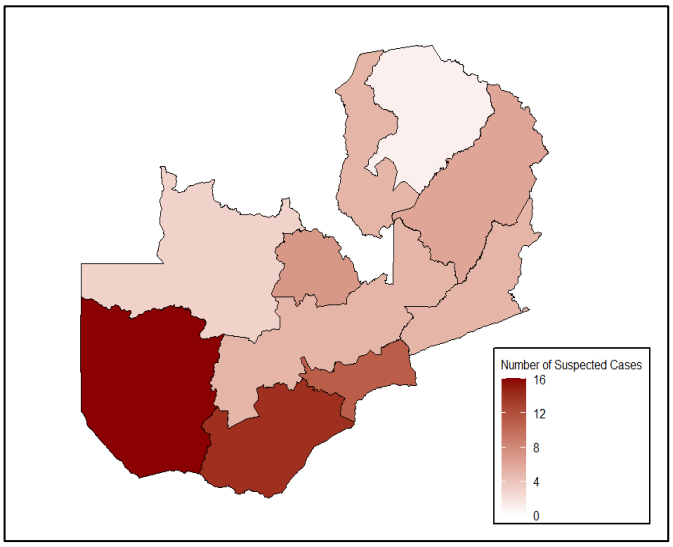

Figure 12 Map showing the distribution of AFP cases, Quarter 4, 2024.

In the fourth quarter of 2024, a total of 73 suspected Acute Flaccid Paralysis (AFP) cases were reported across all ten provinces, marking a decrease from the 124 cases recorded in Quarter 3. Western Province recorded the highest number of cases with 16, followed by Southern Province with 14. Lusaka Province maintained its Q3 figure of 11 cases, while Copperbelt reported 7 cases.

Muchinga (6), Central (5), Eastern (5), and Luapula (5) Provinces recorded moderate case numbers, whereas North-Western Province (3) and Northern Province (1) reported the lowest. This decline underscores the importance of sustaining robust AFP surveillance systems and ensuring rapid case investigations to maintain progress in disease detection and control.

Summary Report Priority Diseases, Conditions and Events , Quarter 4, 2024.

Disease/Event/Condition	Week 27 - 39		
	Suspected	Tested	Confirmed
AFP	73	55	0
Anthrax	236	44	3
Cholera	181	92	18
COVID-19	3,974	3,364	425
Dog Bite	7,121	-	7,121
Dysentery	19,981	1,179	245
Schistosomiasis (Bilharzia)	6,839	2,392	598
Malaria	2,458,626	2,394,364	1,096,252
Maternal Deaths*	152	-	152
Measles	652	477	24
Meningitis (Neisseria)	295	148	10
Monkey Pox	33	22	3
Tuberculosis	144,070	134,577	5,870
Typhoid Fever	1,286	889	51

*Data not extracted from eIDSR

Data used was extracted from eIDSR on 30th January, 2025.

About eIDSR

The Electronic Integrated Disease Surveillance and Response System (eIDSR) is a disease surveillance system that is used to continuously and systematically collect, analyse, interpret, and visualize public health data. Data is collected at facility level and captured by district surveillance officers. The data reported in this bulletin was extracted from the system (except were indicated otherwise) on the aforementioned date.

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