

Geospatial Analysis of Cholera Cases in Lusaka District, Zambia: October 2023 - March 2024

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CITATION: William Ngosa et al. Geospatial Analysis of Cholera Cases in Lusaka District, Zambia: October 2023 - March 2024. Journal of Interventional Epidemiology and Public Health. 2025; 8 (Conf Proc 4): 6.

DOI: <https://doi.org/10.37432/JIEPH-CONFPRO4-00006>

LINK: <https://afenet-journal.org/geospatial-analysis-of-cholera-cases-in-lusaka-district-zambia-october-2023-march-2024/>

RECEIVED: 03/06/24 **ACCEPTED:** 11/08/24 **PUBLISHED:** 11/07/25

KEYWORDS: Geospatial, Vibrio cholerae, outbreak response, geographic information system, oral rehydration points

This is part of the proceedings of Zambia Field Epidemiology Training Program Alumni Conference, September 11 – 13, 2024

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Introduction

Cholera outbreaks have plagued Zambia for decades, with Lusaka city, the capital, being particularly vulnerable. Despite numerous outbreaks, understanding of the geospatial distribution and environmental factors driving cholera transmission remains limited. We investigated the geospatial patterns of cholera cases and associated environmental factors during the October 2023 to March 2024 cholera outbreak.

Methods

We conducted a geospatial analysis of the suspected cholera cases in Lusaka district, comprising seven sub-districts and 94 townships. Case investigations were conducted on individuals showing symptoms consistent with cholera. Patient information and geocoordinates were collected using electronic surveillance tools. Geospatial data on water sources and oral rehydration points (ORPs) were collected. Statistical analyses, including Fisher's exact test and Spearman's rank correlation coefficient, were employed to examine the relationship between cholera incidence and various factors.

Results

Over the study period, 7,240 suspected cholera cases with geocoordinate data were identified from

a total of 14,492 with incidence rates varying across the sub-districts. Cholera cases were present in 92% of the townships, with higher incidence rates observed in unplanned residential areas. Among 94 townships in Lusaka, cholera-suspected cases were identified in 86 of them. Median cholera incidence (IQR) was 0.55 (0.27-1.44) in Lusaka District. The proportion of individuals without soap and detergent at home ($\rho=0.449$, $p<0.001$) and those without water for hand washing at home ($\rho=0.441$, $p<0.001$) was significantly correlated with increased cholera incidence. Proportion of females with literacy was negatively correlated with cholera incidence ($\rho=-0.426$, $p<0.001$). The strategic placement of water tanks per area was positively correlated with cholera incidence ($\rho = 0.360$, $p < 0.001$). Similarly, the positioning of ORPs per area showed a positive correlation with cholera incidence, although this did not reach statistical significance ($\rho = 0.341$, $p = 0.057$)

Conclusion

The findings underscore the significance of environmental factors in cholera transmission, particularly in unplanned residential areas with inadequate access to Water, Sanitation, and Hygiene (WASH) facilities. The correlation between cholera incidence and the distribution of water tanks and ORPs highlights the importance of

targeted interventions in high-risk areas. Improving WASH infrastructure and implementing tailored public health strategies are crucial for mitigating cholera outbreaks in the Lusaka District.