

Epidemiological Characteristics of mpox Cases in Sierra Leone

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ABSTRACT

Background

Mpox remains a public health concern in Sierra Leone, with changing epidemiological patterns observed during recent outbreaks. Understanding the distribution of cases by person, place, and time is essential for guiding surveillance and response strategies.

Methods

A retrospective case-based analysis was conducted using data from laboratory-confirmed mpox cases reported during the 2025 outbreak in Sierra Leone. Data were obtained from the national surveillance system (DHIS2) and supplemented with field-collected data. Descriptive statistics were used to summarize demographic characteristics, geographic distribution, and temporal trends.

Results

A total of 201 confirmed mpox cases were included in the analysis. Among cases with available age data, individuals aged 16–30 years accounted for 40% (80/199), followed by those aged 31–45 years (31%, 61/199). Children under 15 years represented approximately 10% of cases. The sex distribution was nearly equal, with females accounting for 51% (103/201) and males 49% (98/201). Cases were concentrated in urban districts, with Western Area Urban accounting for 45% (92/201) and Western Area Rural 20% (38/201). The epidemic curve showed an increase in cases beginning in April, peaking between late May and early June, followed by a gradual decline.

Conclusion

Mpox cases in Sierra Leone during the 2025 outbreak were predominantly concentrated among young adults and urban populations, with patterns consistent with community-based transmission. These findings highlight the importance of targeted surveillance and response strategies focusing on high-risk populations and urban settings.

Keywords: Epidemiology, mpox, outbreak, Sierra Leone

INTRODUCTION

Mpox (formerly known as monkeypox) is a viral zoonotic illness caused by the monkeypox virus (MPXV), which belongs to the Orthopoxvirus genus. Historically, mpox has been described as a rare illness in Central and West Africa, with cases attributed solely to zoonotic exposure and minimal secondary human-to-human transmission (Karagoz et al., 2023). Early epidemiological studies classified mpox as a rare infection that was mostly limited to rural and woodland settings. The epidemiology of mpox has varied throughout time, with more instances of outbreaks involving long-term human-to-human transmission (Ranjan et al., 2023). Recent outbreaks have shown that mpox is no longer limited to isolated rural settings and can spread throughout populations, including metropolitan areas. These variations have

underlined the necessity of knowing how the disease spreads across populations, geographical areas, and time (Schmidt-Sane & Wilkinson, 2025).

Descriptive epidemiology investigates the distribution of diseases by person, place, and time, serving as a crucial tool for defining epidemics and informing public health responses. Analyzing demographic variables such as age and gender shows that it is possible to identify the population groups that are most affected. Additionally, examining regional distribution offers insights into clustering and potential causes of transmission (Straif-Bourgeois et al., 2014). Temporal trends, including epidemic curves, are essential for understanding the progression of outbreaks and identifying periods of increased transmission (Mello et al., 2021). In Sierra Leone, mpox has been previously reported, with the first confirmed

human case identified in 2017 (A. A. Jalloh et al., 2025). Following several years without reported cases, the country experienced a resurgence of mpox during the 2025 outbreak, with cases reported across multiple districts (M. B. Jalloh et al., 2025). Preliminary surveillance data indicated that cases were concentrated among young and middle-aged adults, with a relatively equal distribution between males and females, and a higher burden in urban areas (Kangbai et al., 2025).

Despite the availability of routine surveillance data, there is limited detailed epidemiological analysis describing the distribution of mpox cases in Sierra Leone. Understanding these patterns is critical for identifying high-risk populations, geographic hotspots, and temporal trends that can inform targeted interventions and strengthen outbreak response. This study aims to

describe the epidemiological characteristics of mpox cases in Sierra Leone during the 2025 outbreak, focusing on the distribution of cases by person, place, and time.

Methods

A retrospective case-based study was carried out utilizing data from laboratory-confirmed mpox cases reported during Sierra Leone's 2025 outbreak. The study sample consisted of recovered confirmed cases detected through the national surveillance system (DHIS2).

Data from DHIS2 were combined with field-collected data. The data was gathered using a standardized case investigation form embedded in the National Public Health Agency Community Listening App. A data triangulation technique was used to ensure that field data and surveillance records were consistent. Records with inconsistencies or missing essential information were removed,

resulting in a final analytical sample of 201 cases.

R software was used to conduct descriptive statistical analyses. The epidemiological variables examined included age, gender, marital status, education level, and occupation. An epidemic curve was used to assess temporal trends, and geographical distribution was analyzed using district-level case counts. Also, Spatial analysis was performed using Quantum Geographical Information System (QGIS) to describe the geographic distribution of cases.

Results

Demographic Characteristics

A total of 201 confirmed mpox cases were included in the analysis, as shown in Table 1. Among cases with available age data (N = 199), individuals aged 16–30 years accounted for 40% (80/199), followed by

those aged 31–45 years (31%, 61/199). Children under 15 years represented approximately 10% of cases, while individuals aged 46–60 years accounted for 19%. No cases were reported among individuals aged 61 years or older. Two observations (1%) were missing for age. The sex distribution was nearly equal, with females accounting for 51% (103/201) and males 49% (98/201). Among adults aged 18 years and above (N = 182), 61.5% (112/182) were single, while 32.4% (59/182) were married. Smaller proportions were living with a partner (3.8%, 7/182) or divorced (1.6%, 3/182). Educational attainment showed that 43% (85/200) had tertiary education and 37% (73/200) had secondary education. Occupational distribution indicated that students accounted for 29% (51/176), followed by individuals engaged in business activities (23%, 45/176) and unemployed individuals (15%, 29/176).

Geographic Distribution

Figure 1 and Figure 2 present the distribution of mpox cases by district. Cases were concentrated in the Western Area, with Western Area Urban accounting for 45% (92/201) and Western Area Rural 20% (38/201) of all reported cases. Outside the Western Area, cases were distributed across several districts, each contributing a relatively small proportion of the total. Districts such as Bombali, Tonkolili, Kenema, and Kono reported moderate numbers of cases, while the remaining districts reported only a few cases. The spatial distribution shown in Figure 2 further illustrates this pattern, highlighting a clear clustering of cases in the Western Area with more limited and dispersed occurrence across other parts of the country.

Temporal Distribution

The epidemic curve in Figure 3 showed an initial period of sporadic cases, followed by an increase beginning in April, peaking between late May and early June, and declining thereafter.

Discussion

This study describes the epidemiological characteristics of mpox cases during the 2025 outbreak in Sierra Leone. The findings show that cases were predominantly concentrated among young and middle-aged adults, particularly those aged 16–45 years. The findings is consistent with the findings of (Bunge et al., 2022) their study revealed that higher transmission has been reported among socially active age groups with increased levels of close interpersonal contact. Li et al. (2025) found that among individuals aged 18 to 44 years, the spread of mpox starts with a

rapid increase but subsequently shifts to a phase of steady decline after reaching a certain threshold. This pattern may be associated with the contact behaviours and characteristics of this demographic.

The close distribution of diseases between males and females revealed in this study contrasts with patterns described during the 2022 global outbreak, when transmission was predominantly concentrated among men, particularly within specialized sexual networks. The even sex distribution in this study, like in reports from certain African settings Srivastava et al. (2025); Zhang et al. (2024), shows that transmission occurred more extensively among communities rather than being limited to identified risk groups.

The geographic distribution of cases, with a high concentration in urban districts, aligns with findings from previous outbreak investigations where population density,

mobility, and frequent social interaction were identified as key drivers of transmission (Boyce et al., 2019). Urban environments facilitate close contact between individuals, increasing the likelihood of sustained human-to-human transmission (Reyes et al., 2013).

The findings indicate a temporal pattern of an initial increase in cases, followed by a peak and subsequent decrease, which is consistent with a transmitted epidemic. Similar epidemic trends have been observed in mpox outbreaks, which occur in repeated waves of person-to-person transmission (Gubela et al., 2026). The decline in incidence following the peak could be attributable to a combination of public health interventions, behavioural changes, and decreased susceptibility among those affected.

Overall, the epidemiological patterns observed in this study support the understanding that mpox transmission is

driven primarily by close interpersonal contact, with transmission occurring within households and community networks. These findings are consistent with published literature indicating that both physical proximity and social interaction play important roles in sustaining mpox outbreaks (Sypsa et al., 2022).

Limitations

This study has several limitations that should be considered when interpreting the findings. The analysis was based on retrospective case-based data, which may be subject to incomplete or missing information. In particular, missing onset dates may have introduced uncertainty in the temporal analysis and interpretation of the epidemic curve.

Selection bias may be limited, as cases were selected based on the distribution of reported

cases across districts. However, the observed concentration of cases in urban areas, particularly in Western Area Urban, reflects the underlying distribution of reported cases during the outbreak and may limit the generalizability of findings to rural populations. In addition, the study included only recovered cases, introducing potential survivorship bias, as individuals with more severe outcomes may have been underrepresented.

Furthermore, the use of routinely collected surveillance data may be affected by variations in data quality and completeness across districts. These limitations should be considered when interpreting the epidemiological patterns described in this study.

Conclusion

This study provides important insights into the epidemiological characteristics of mpox cases during the 2025 outbreak in Sierra Leone. The findings indicate that transmission was predominantly concentrated among young and middle-aged adults and was widely distributed across both males and females, suggesting broader community transmission rather than restriction to specific risk groups. The geographic concentration of cases in urban districts highlights the role of population density, mobility, and social interaction in facilitating transmission.

The findings reinforce the importance of strengthening surveillance systems, particularly in urban settings, and implementing targeted public health

interventions aimed at reducing close-contact transmission within communities.

Declaration of interest

We declare no competing interest

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List of Figures

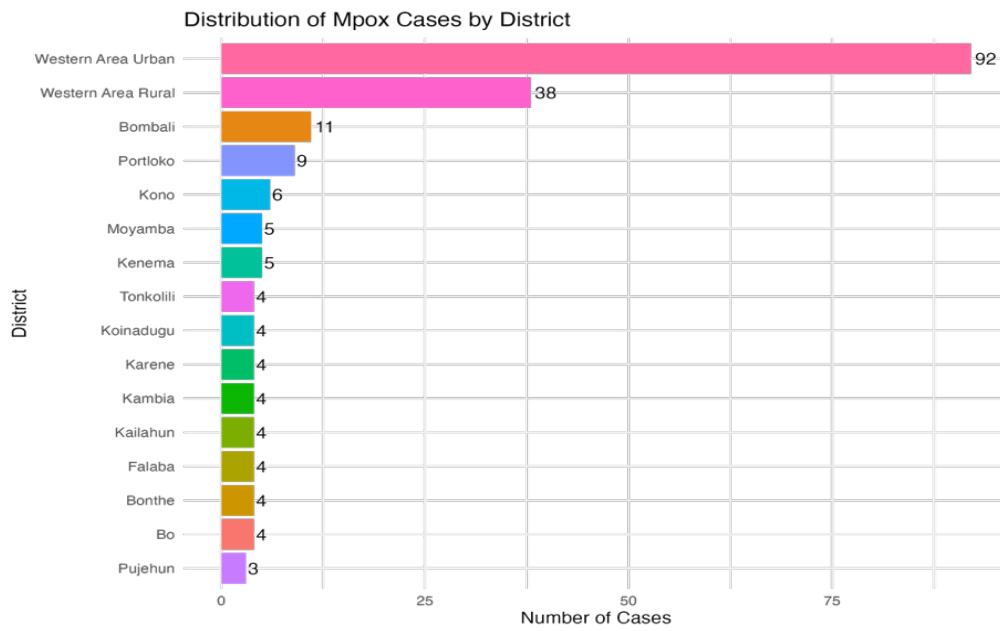


Figure 1: Distribution of mpox cases by districts

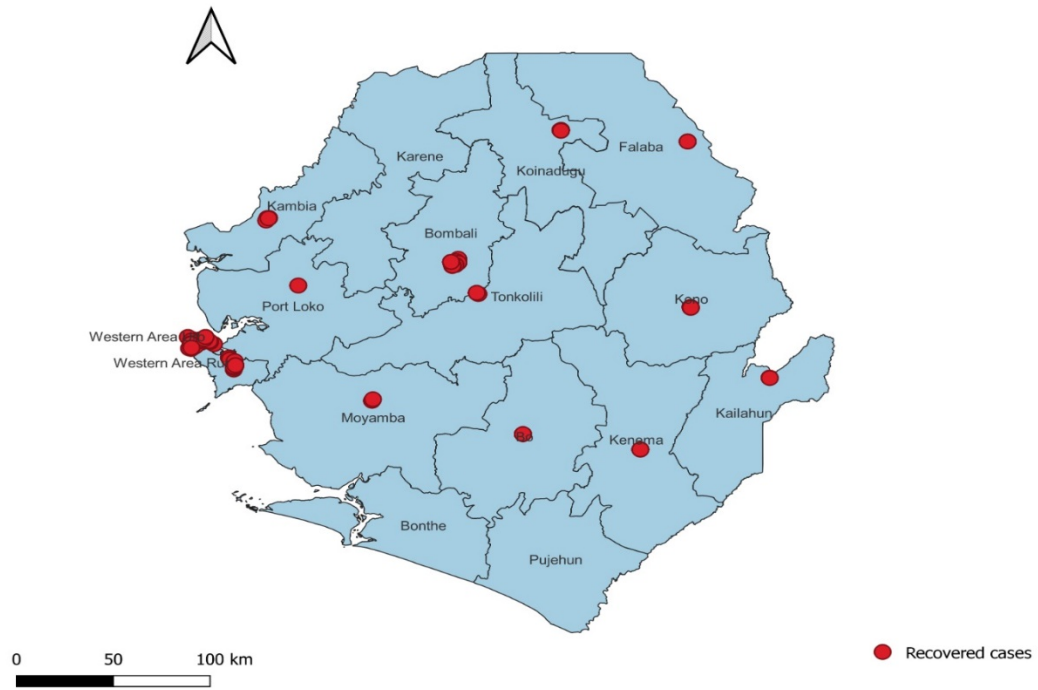


Figure 2: Spatial distribution of recovered mpox cases by district

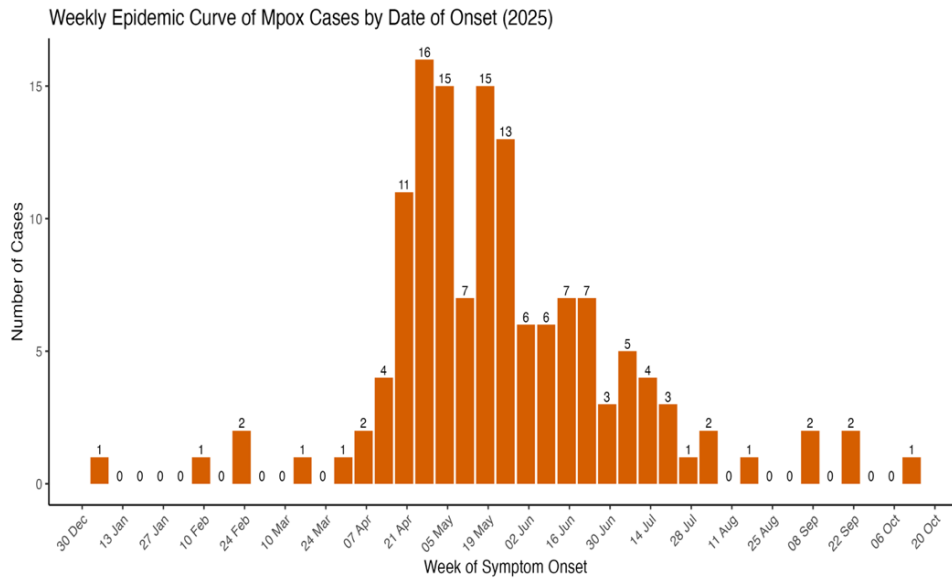


Figure 3: Weekly Epidemic curve

List of Table

Table 1: Demographic Characteristics of mpox cases

Characteristic	N
Age-group(years)	201
0-5	11 (5.5%)
6-15	9 (4.5%)
16-30	80 (40%)
31-45	61 (31%)
46-60	38 (19%)
61-100	0 (0%)
Missing	2 (1.0%)
Gender	201
Female	103 (51%)
Male	98 (49%)
Marital Status	182
Divorced	3 (1.6%)
Living with Partner	7 (3.8%)
Married	59 (32.4%)
Single	112 (61.5%)
Missing	1 (0.5%)
Level of Education	200
Child at home	9 (4.5%)
No Education (adult)	15 (7.5%)
Primary	9 (4.5%)
Secondary	73 (37%)
Tertiary	85 (43%)
Vocational	9 (4.5%)
Missing	1(0.5%)
Occupation	176
Business	45 (25.6%)
No Employment	29 (16.5%)
Professional / Technical	14 (8.0%)
Public Sector	20 (11.4%)
Service Industry	6 (3.4%)
Skilled Trades	19 (10.8%)
Student	31 (17.6%)
Transport & Mobility	6 (3.4%)
Missing	6 (3.4%)

Note: Percentages are calculated excluding missing values