Spatial Analysis and Time-Series Modelling of Lassa Fever Cases in Nigeria: Insights from 2018-2023 National Surveillance Data

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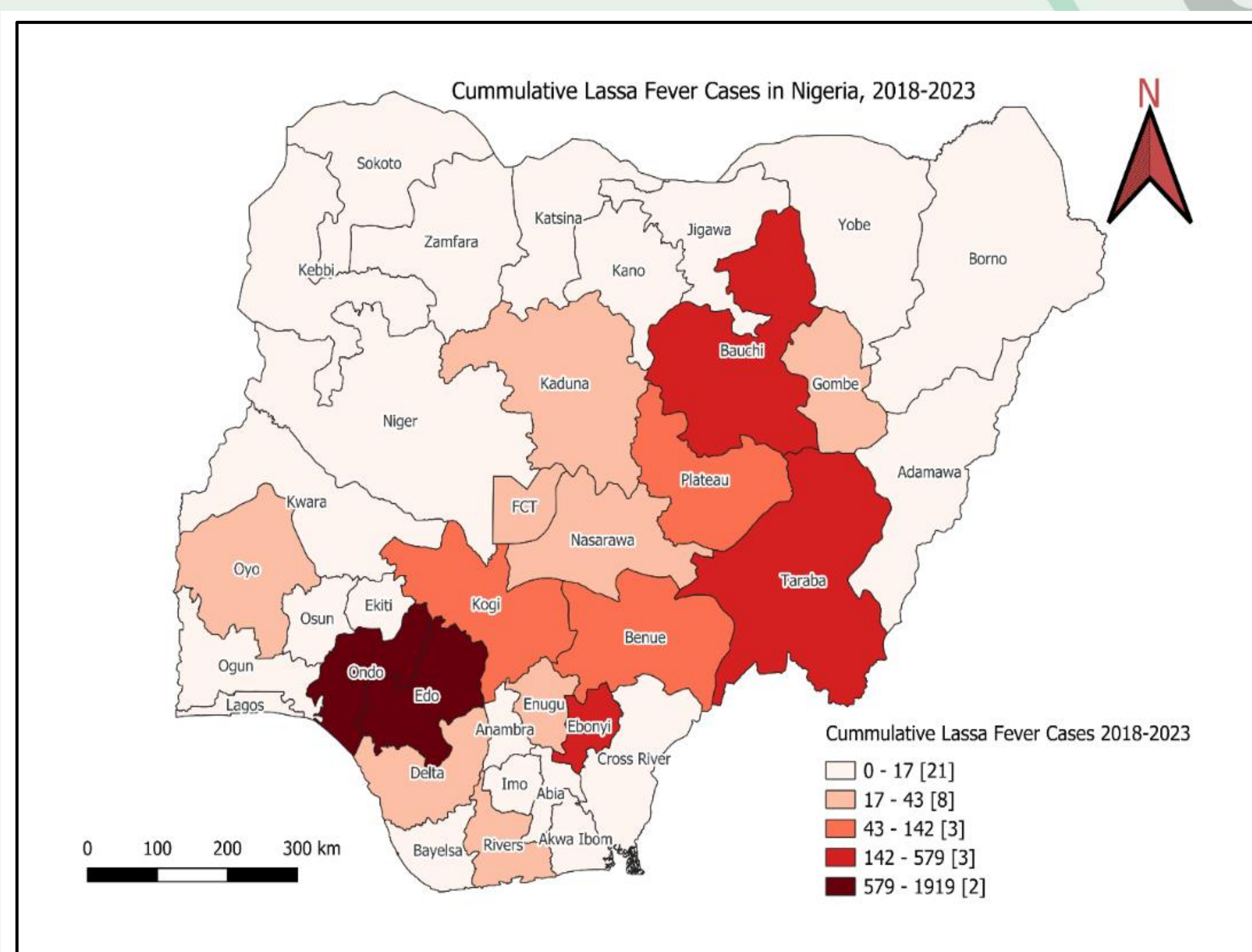
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Background

- Lassa fever (LF) is a viral hemorrhagic fever endemic in Nigeria characterized by high morbidity and mortality rates. Despite significant efforts to reduce the burden of LF in Nigeria, it remains a public health concern with negative socio-economic and health impacts.
- Modeling and predicting LF outbreaks are crucial to ensure timely and targeted interventions. We, therefore, analyzed data to describe the recent five-year trend of LF, identify patterns, and predict future outbreaks in Nigeria.
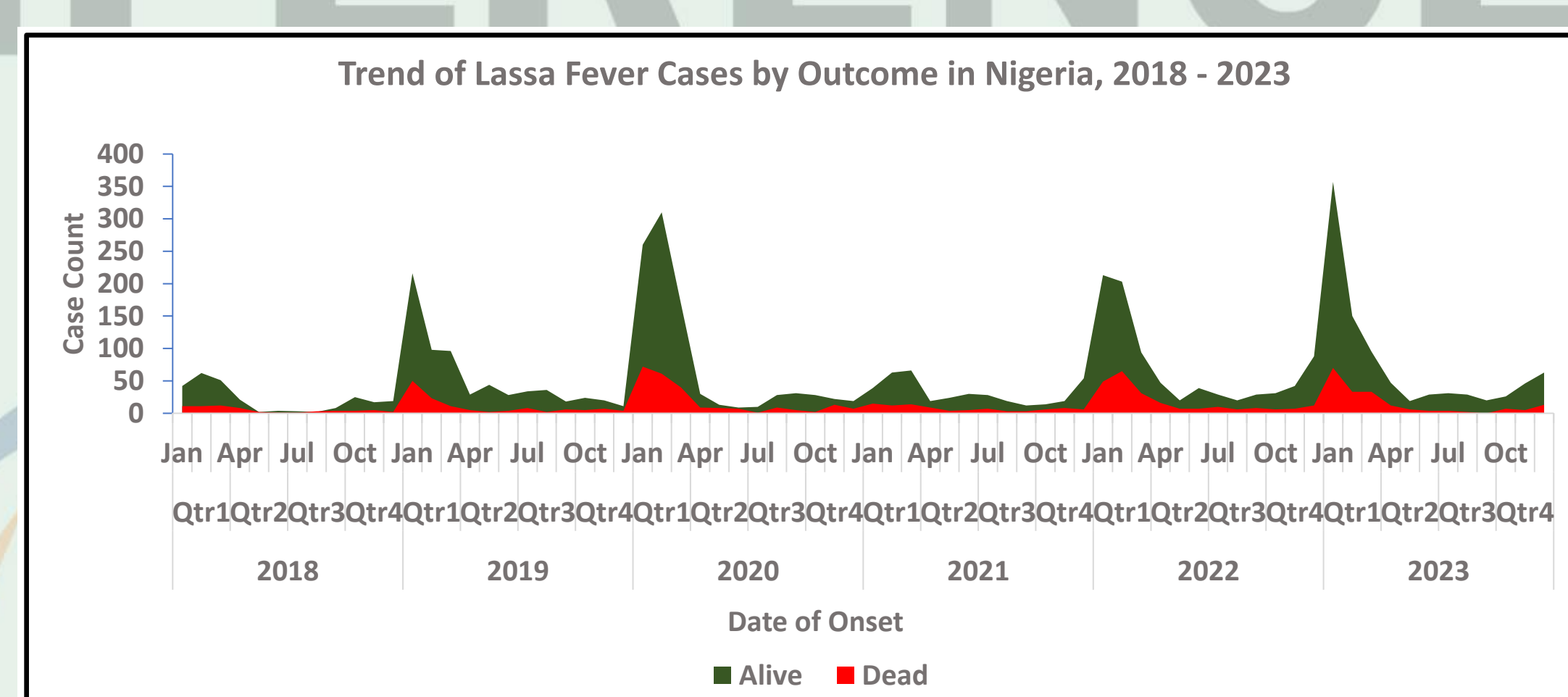
Methods

- We reviewed the LF historical surveillance data from the National Surveillance Database (Surveillance Outbreak Response Management and Analysis System – SORMAS) from January 2018 to December 2023. We summarized data using frequencies and percentages.
- We used a Multiplicative Time-series model to determine the trend and pattern of the Lassa fever cases. We then predicted cases for 2024 and 2025 by de-seasonalizing the observed cases using a seasonal variation index (SVI) adjustment mechanism.
- We employed QGIS version 3.32.2 for spatial analysis.

Results

Cummulative Lassa Fever Cases in Nigeria, 2018-2023

Cummulative Lassa Fever Cases 2018-2023
- 0 - 17 [21]
- 17 - 43 [8]
- 43 - 142 [3]
- 142 - 579 [3]
- 579 - 1919 [2]

High Burden States: Ondo, Edo, Bauchi, Ebonyi, Taraba

Trend of Lassa Fever Cases by Outcome in Nigeria, 2018 - 2023

Trend: Peak at every first quarter of each year

Projection: Downward trajectory for subsequent years

Year	Quarter	Y_L	ITLPQ	Y_L	SVI	Projected Cases
2023	Qtr3	133.67	-3.78	133.67	0.6663	89.07
	Qtr4		-3.78	129.89	0.3249	42.20
2024	Qtr1		-3.78	126.11	2.1637	272.87
	Qtr2		-3.78	122.33	0.5400	66.06
	Qtr3		-3.78	118.56	0.6663	79.00
	Qtr4		-3.78	114.78	0.3249	37.29
2025	Qtr1		-3.78	111.00	2.1637	240.17
	Qtr2		-3.78	107.22	0.5400	57.90
	Qtr3		-3.78	103.44	0.6663	68.93
	Qtr4		-3.78	99.67	0.3249	32.38

Conclusions and Recommendations

- The burden of Lassa fever was predominant in five states. A downward trajectory in confirmed cases of Lassa fever was observed, however, peak periods are expected in the first quarter of every year.
- Focusing on community-driven preventive interventions before the peak periods and in the hot spot areas will facilitate Lassa fever control in Nigeria.

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