

# Rates of Extended-Spectrum Beta-Lactamase-Producing *Enterobacterales* across Tennessee from 2019 – 2022

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## Background

- Extended-spectrum beta-lactamase (ESBL)-producing *Enterobacterales* were responsible for an estimated 197,400 infections and 9,100 deaths amongst hospitalized patients in 2017 in the United States.
- Little is known specifically about the rates of ESBL- *Enterobacterales* geographically in Tennessee.
- Surveillance of ESBL-producing *Enterobacterales*, as a part of the Multi-site Gram Negative Surveillance Initiative (MuGSI) project was conducted in four Tennessee counties (Maury, Marshall, Lewis, and Wayne).
- We calculated and compared rates at the county and census tract level for the Tennessee MuGSI catchment area for 2019 – 2022.

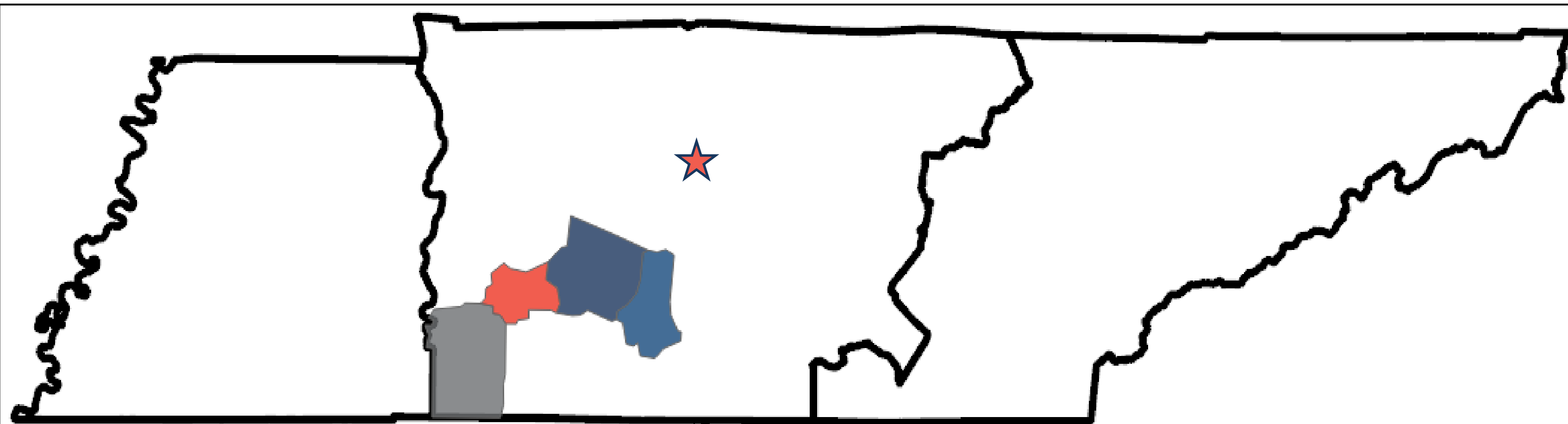
## Methods

- Passive surveillance of ESBL-producing *Enterobacterales* was conducted in the Tennessee MuGSI ESBL catchment area.
- Data from MuGSI Case Detection System for 2019 – 2022 were geocoded to the county and census tract level using ArcMap.
- Population counts, including demographics, were taken from the U.S. Census Bureau's 2020 Census. Analysis was completed in SAS 9.4.

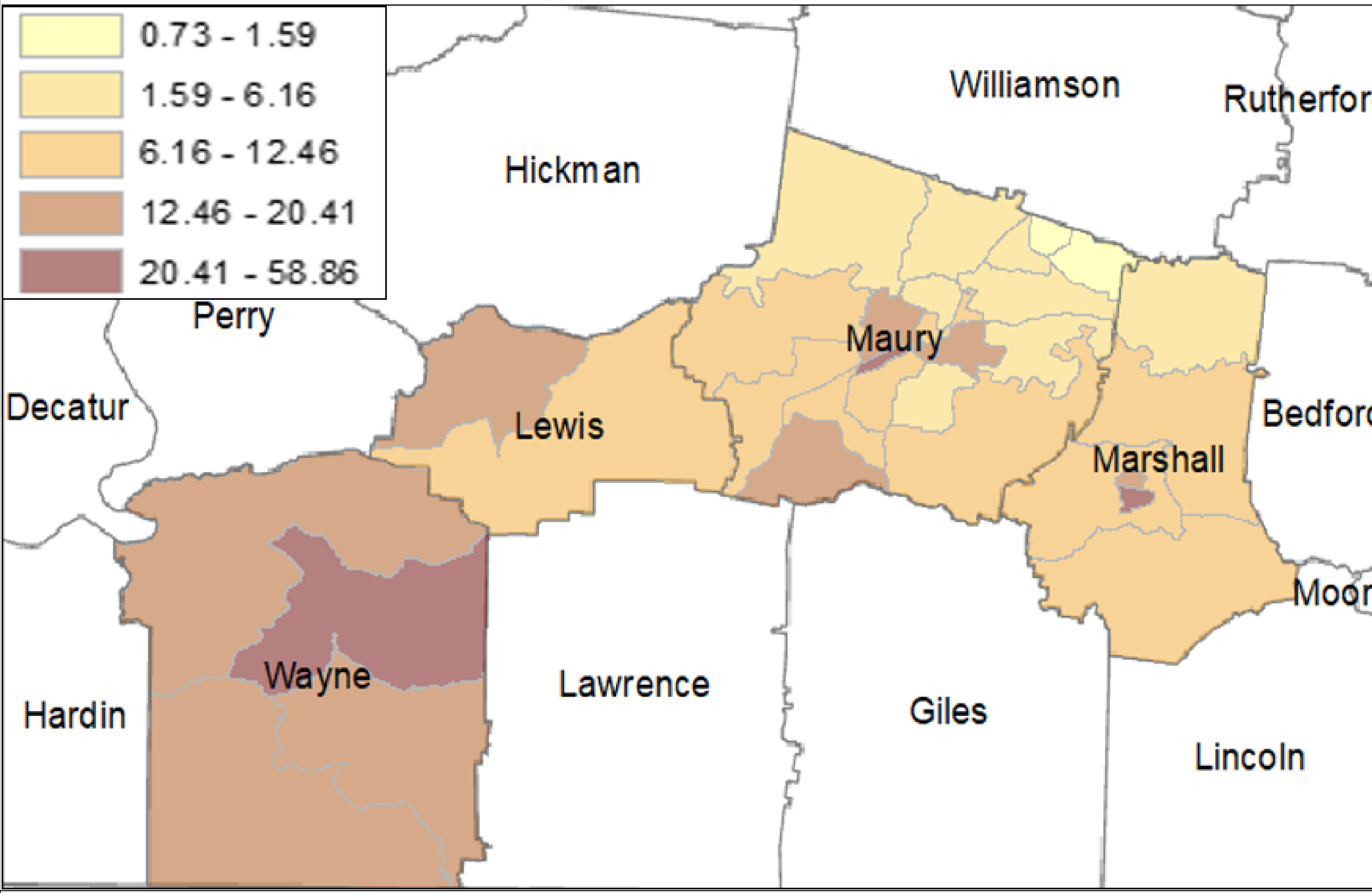
## Tables/Figures

County Name	County Rate of ESBL cases per 1,000 residents	Census Tract Number	Rate of ESBL cases by Census Tract
Lewis	15.27	9701	9.68
		9702*	18.87
Marshall	12.67	9550	5.02
		9551	8.43
		9552	8.97
		9553*	18.12
		9554*	38.68
		9555	8.63
Maury	9.39	101	5.90
		102.01	4.55
		102.03	5.35
		102.04	1.59
		102.05	0.73
		103.01	5.75
		103.02	4.26
		104.01*	11.10
		104.02	5.93
		105*	14.10
		106	9.31
		107*	15.31
		108.01*	31.98
		108.02*	15.36
		109	9.31
110.01*	11.04		
110.03*	14.60		
110.04*	12.33		
111.01*	12.46		
111.02	6.16		
112	8.78		
Wayne	29.69	9501	13.48
		9502*	58.86
		9503	20.41
		9504	15.13

**Table 1: Rates of ESBL cases per 1,000 residents by Census Tract and County.** This table illustrates both county and census tract level rates of ESBL cases per 10,000 residents. Census tracts denoted with an asterisk had higher rates than their county average.



**Figure 1: Tennessee Multisite Gram-Negative Surveillance Initiative ESBL catchment area.** The catchment area for TN's MuGSI project includes Wayne, Lewis, Marshall, and Maury Counties. Nashville, TN is represented as a star.



**Figure 2: Rates of ESBL cases per 1,000 residents by Tennessee Census Tract and County.** This map shows all census tracts for each county within the MuGSI ESBL catchment area in TN. Darker coloration indicates higher rates of ESBL cases per 1,000 residents.

## Results

- At the county-level, the average prevalence was 16.76 cases per 1,000 residents.
- Wayne county had the highest prevalence at 29.69 cases per 1,000 residents, while Maury county had the lowest, at 9.39 cases per 1,000 residents.
- Prevalence amongst the census tracts varied widely, with a mean of 13.04 cases per 1,000 residents, and ranging from 0.73 cases up to 58.86 cases (Figure 1).
- Wayne County's 4 census tracts consistently showed the highest rates, ranging from 13.48 to 58.86 cases per 1,000 residents, while Maury County's 21 tracts had the lowest rates, ranging from 0.73 to 31.98 cases per 1,000 residents.
- From 2019 to 2022, most counties had stable prevalence, however Wayne County showed an increase from 3.60, to 9.60 cases per 1,000 residents by 2022.

## Conclusions

- Rates of ESBL-producing *Enterobacterales* varied substantially, even amongst a relatively small catchment area within the state.
- Highest rates of this pathogen were found in census tracts from Wayne and Lewis County, with Wayne County also showing a large increase of cases from 2019 to 2022
- Understanding of what drives rates disproportionately in these areas is crucial to prevention and mitigation, not only for ESBL-producing *Enterobacterales*, but for many other gram-negative multidrug resistant organisms.
- More research is needed to highlight the drivers of these disparate rates.

## Contact Information

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