

# The Sepsis Burden: Geographic and Social Disparities represented in Stormont Vail Health

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# Background: Why Sepsis?

We found that **sepsis-related/infectious diseases** combine long lengths of stay with high case volume, making them a major driver of overall hospital burden.

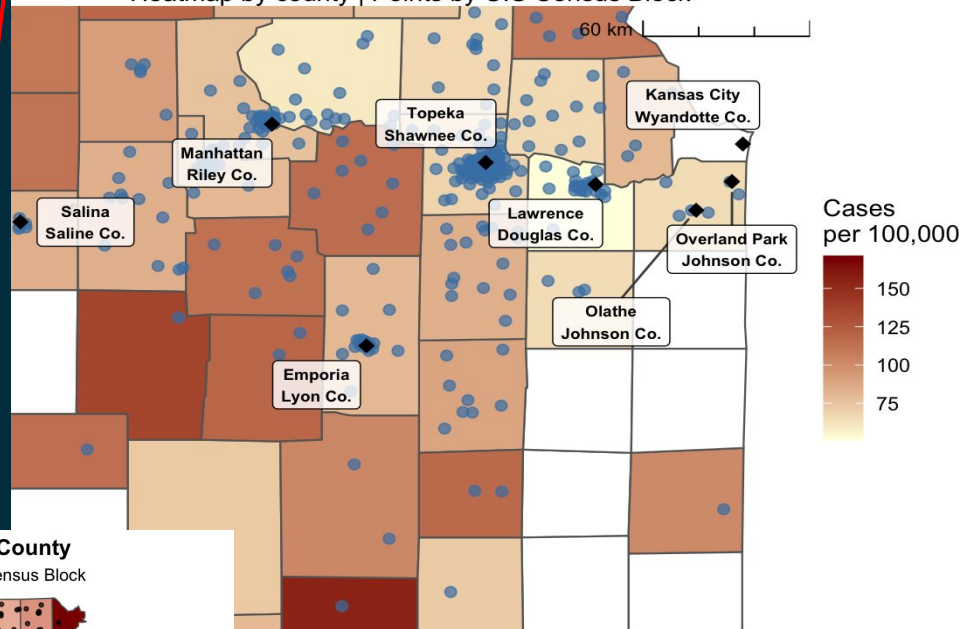
Diagnosis Description	median_LOS_hours	count
Sepsis	101.6167	8676
Fracture of femur	100.4750	1558
Hypertensive heart and chronic kidney disease	90.9833	1614
Persistent mood	88.0000	804
Bacterial pneumonia, not elsewhere classified	79.1000	553

Diagnosis Description	LOS_hours
Intracranial nontraumatic hemorrhage of newborn	648.2917
Disorders of social functioning with onset specific to ...	472.6667
Malnutrition in pregnancy, childbirth and the puerperi...	399.4333
Problems related to medical facilities and other health...	345.0250
Nocardiosis	343.2333
Cryptococcosis	332.8500
Listeriosis	310.0333

Patient Vital Status Summary			
Sepsis study population distribution			
Clinical Status	Patient Count	Percentage	
Alive	4864	88.7%	
Deceased	618	11.3%	
Total	5,482	—	—

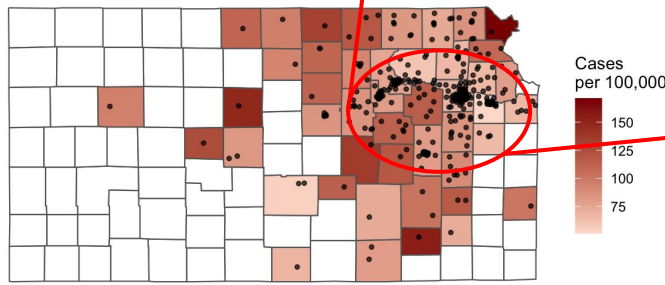
## Infectious Disease Cases — Eastern Kansas

Heatmap by county | Points by U.S. Census Block



## Infectious Disease Cases by Kansas County

Heatmap by county (per 100,000) | Points by U.S. Census Block

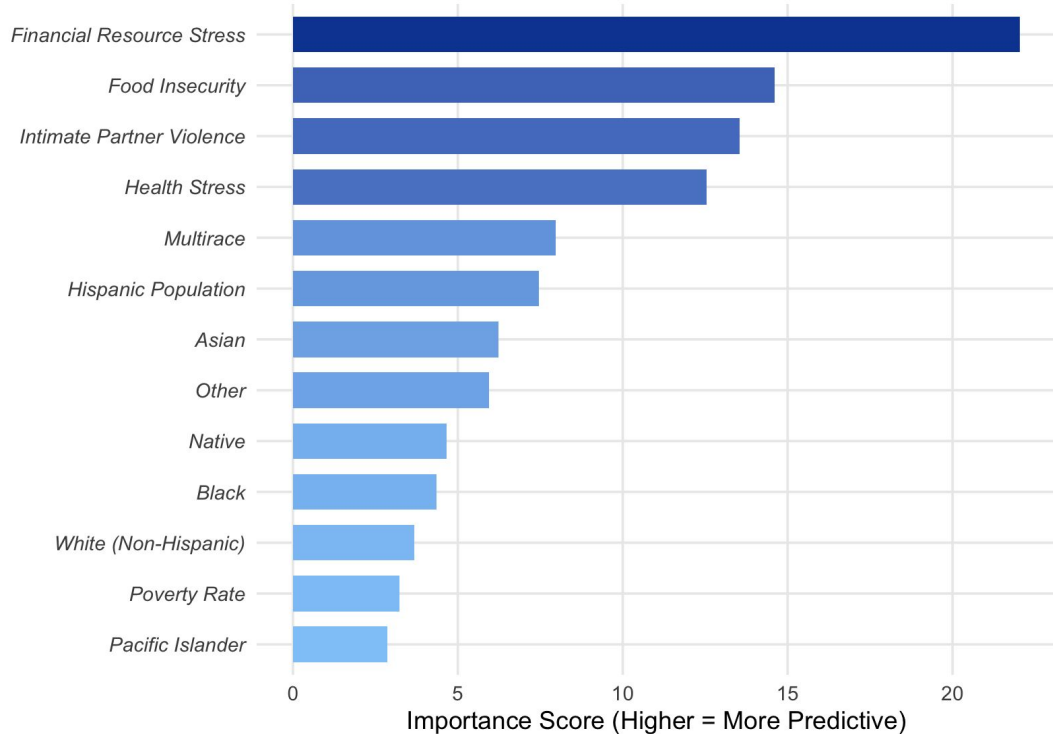


While **volume is high** in urban regions, the **normalized rate intensity** can be even more severe in **less populated more rural** counties.

We built a **random forest model** to predict the number of sepsis cases a U.S census tract had on average. We found that **several social determinants** had the best predictive ability for a tract's sepsis rate

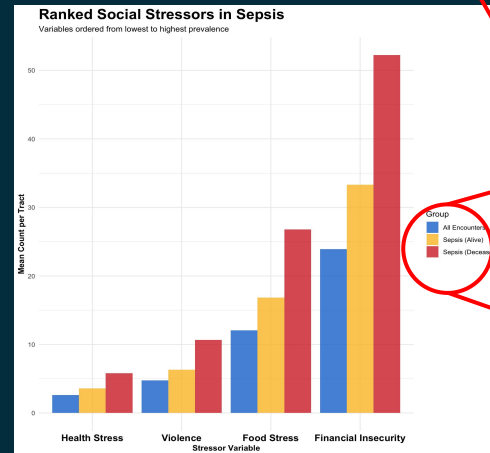
## Key Drivers of Sepsis Rates

Random Forest Variable Importance (% Increase in MSE)

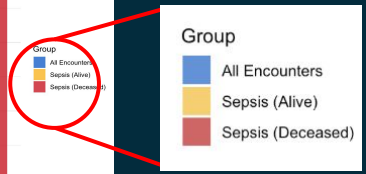


Data Source: Kansas Census & Health Tables

Neighborhood Factor Comparison			
Average values across 265 tracts			
Health/Demographic Factor	Sepsis (Deceased)	Sepsis (Alive)	All Encounters
Average Sepsis Case Count	45.00	26.01	17.97
Food Insecurity	52.25	33.30	23.93
Financial Resource Stress	26.77	16.85	12.07
Intimate Partner Violence	10.65	6.30	4.75
Health Stress	5.81	3.60	2.62
Tract Poverty Rate (%)	41.68	41.91	39.66
Total Population	3,797.65	3,566.97	3,462.80
White (Non-Hispanic)	0.76	0.77	0.78
Hispanic	0.10	0.10	0.09
Black	0.05	0.05	0.05
Asian	0.01	0.02	0.02
Native American	0.01	0.01	0.01
Multi-Racial	0.05	0.05	0.05
Total Minority Proportion	0.24	0.23	0.22



sepsis mortality is consistently associated with neighborhoods with higher **food insecurity**, **financial stress**, and **intimate partner violence**



# Key Takeaways

1. Sepsis is not simply a **public health** issue but also has underlying **social issues** contributing to sepsis prevalence and mortality in underserved communities
2. Areas with high rates of **financial resource strain** are correlated with higher sepsis incidence
3. Need a **Geosocial Strategy**
  - a. **Local**: Address financial resource strain in the Topeka area
  - b. **Rural**: Implement early-detection or "fast-track" protocols for patients coming from distant counties to mitigate the increased LOS and strain caused by travel delays.

By understanding and targeting sepsis through the **lens of social disparities**, the hospital can better target regions with higher sepsis rate and **reduce encounters and total LOS**, ultimately easing the financial burden on both the facility and the community.

Thank you!