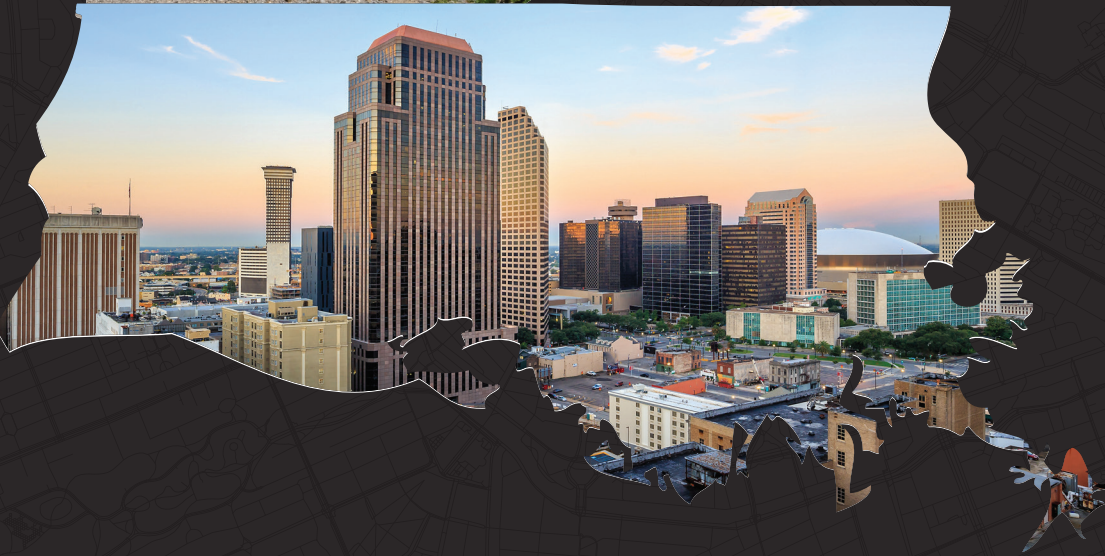


HIV/AIDS in Metropolitan vs. Rural Louisiana



One State,
Two Epidemics.



This report compares risk factors for new infections, morbidity, late diagnosis, and other issues influencing the HIV/AIDS epidemic in the Louisiana population residing outside of major cities as a first step toward finding rural-appropriate solutions for Louisiana and deep South HIV patients. Improving understanding of epidemiologic trends in rural Louisiana is crucial to developing customized solutions to address HIV in these areas. This retrospective analysis examines data from the Louisiana Department of Health (DOH) and other sources. Characteristic risk factors for HIV include stigma, racial disparity, education, poverty, incarceration, and sexually transmitted disease (STD) rates.³ Exploring the contrasts between rural and metropolitan regions for these risk factors will help identify rural-appropriate solutions.

At-Risk Signifiers

Stigma

HIV stigma is known to cause poor patient outcomes.⁴ Stigma is associated with HIV on multiple levels, and HIV tends to be associated with same-sex relations, non-conforming gender identity, multiple sex partners, and drug use; all of which are stigmatized individually, and compounded when put under the umbrella of HIV stigma.³⁻⁵ The effects of this are wide-ranging and include, on an individual level, psychological distress, isolation within one's community, and loss of self-worth.^{5,6} Among people with HIV/AIDS, stigma and related societal consequences may instill fear of HIV testing and reduce seeking out HIV-related support and services and avoidance of disclosure of HIV status to partners out of fear of being shamed.⁶⁻⁹

Racial Disparity

Within the United States, African Americans tend to have an increased likelihood of testing HIV+ when compared to other racial groups due to complex social factors; including the effects of institutionalized racism, racial stigma, and high rates of poverty.^{10,11} In Louisiana, 45% of the African American population lives in poverty compared to only 17% of the Caucasian population.³ In addition to this, numerous factors regarding the healthcare system impact the African American community; African American populations have a history of being experimented on without their consent, have higher rates of reporting unfair treatment by healthcare providers than Caucasians, and receive delayed treatment.^{8,11,13,14} Furthermore, African Americans report higher rates of confidence in African American physicians, though African American physicians make up only 4% of physicians in the US.^{3,8,11,14} In Louisiana, African American populations are four times more likely to be incarcerated than Caucasian populations.³ These forms of historical and present day racial discrimination compound the effects and likelihood of testing HIV+ in African American populations.^{3,11}

Education

In general, higher education is associated with increased awareness of HIV risk and prevention, which is also associated with decreased HIV infection.^{15,16} Less than a high school education has been associated with a greater risk of HIV infection.¹⁷ Medication adherence is also poorer among those with lower educational attainment.¹⁷

Poverty

Those living in poverty face higher rates of morbidity and mortality from HIV for several reasons, including a lack of healthcare coverage, access to transportation, employment, housing, and access to childcare providers.¹⁷ The costs associated with HIV screening and treatment may also impede access.¹⁷ Low-income individuals are more likely to receive HIV testing later in HIV infection, which delays treatment. Homelessness also fundamentally impedes the ability to store medications and for healthcare providers to reach patients.¹⁷

Incarceration

Incarceration can interrupt routine HIV screenings and medical treatment, increase difficulty in access to screening and treatment, and increase the inability to find stable employment and housing.^{3,18} These factors may further compound the effects of poverty on HIV and at-risk populations.

STD Rates

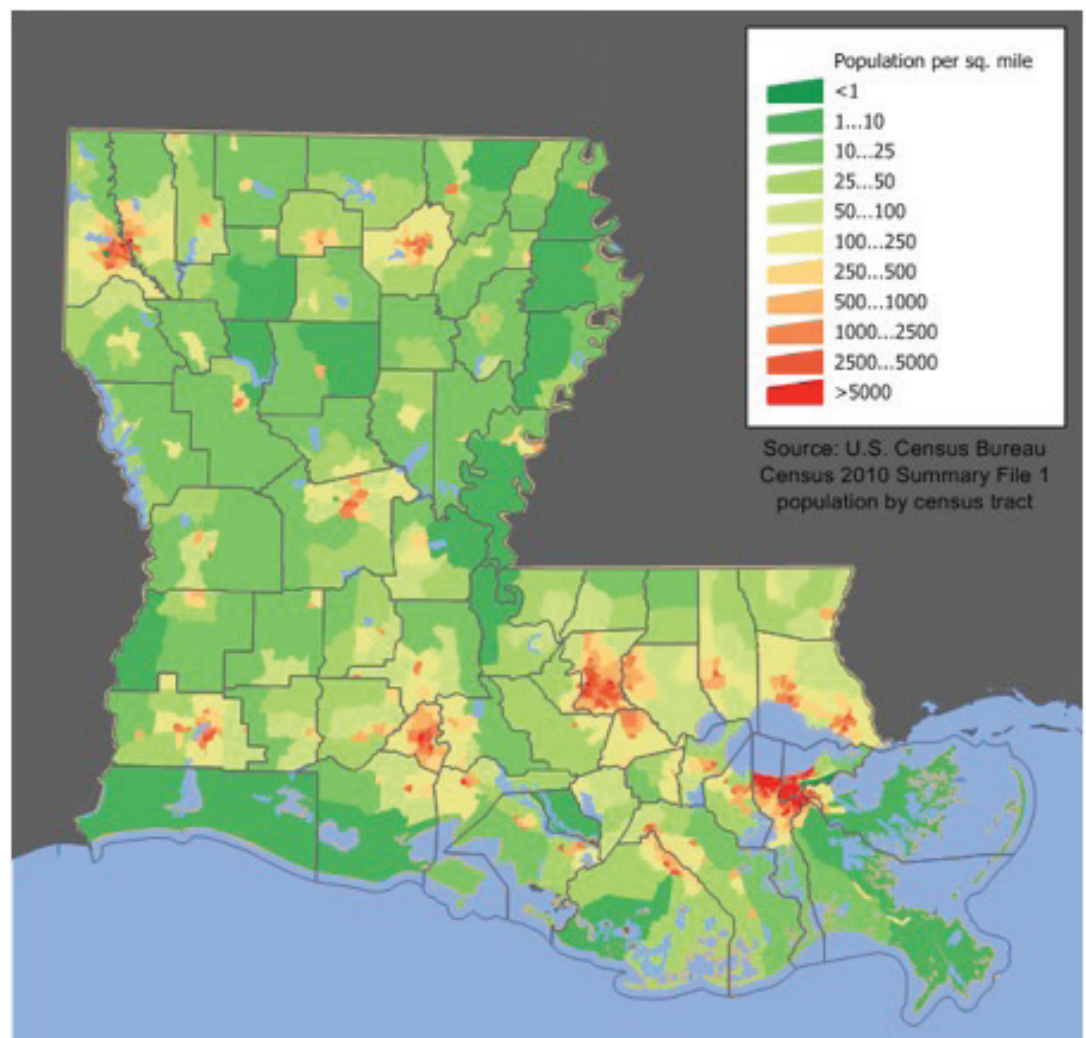
Statistically, contraction of an STD and increased risk of HIV infection tend to be linked.^{19,20} This may be because behaviors that can lead to STD infection, such as not using a condom or having multiple sexual partners, can increase the chances of HIV infection.²⁰ Individuals with HIV infection are more likely to shed HIV when they have genital ulcers or urethritis associated with STDs.²⁰ Pre-Exposure prophylaxis (PrEP) only prevents HIV infection, and cannot prevent STD infection.¹⁹ Therefore, a patient taking PrEP can still transmit a STD. New cases of STDs among African Americans is also a health disparity in Louisiana.³

In this report, we will examine some of these at-risk signifiers related to HIV for the state of Louisiana and compare within metropolitan and rural regions.

General Regional Data for Louisiana

To assess risk factors in rural versus metropolitan Louisiana, the terms rural and metropolitan will be defined for the purposes of this report. We will also define the rural and metropolitan regions of Louisiana that were assessed for risk factors.

Figure 2 illustrates rural and metropolitan areas within Louisiana. The US Census Bureau designates an area as rural if it has <2,500 individuals living there.²² This figure was originally published by the US Census Bureau.



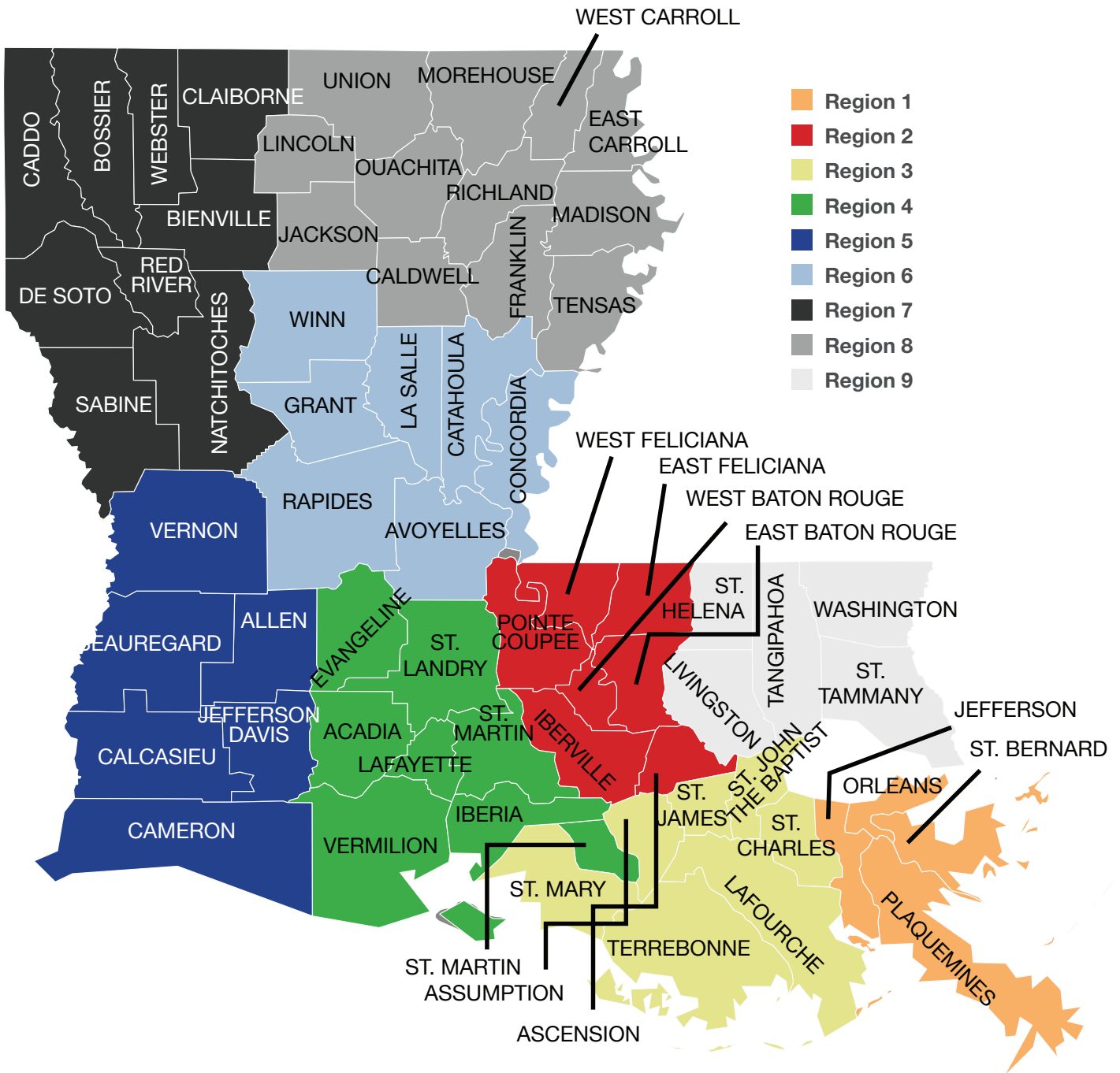


Figure 3 illustrates the regional divisions as defined by the Louisiana DOH.²³ Region 1 parishes make up the MSA (metropolitan statistical area) of New Orleans and Region 2 parishes make up the MSA of Baton Rouge.

Region 8 is predominantly a nonmetropolitan, rural region containing two metropolitan counties (Ouachita and Union) with a small metro MSA population. This region is over twice the size geographically of Region 2 and four times the geographical size of Region 1. Region 8 was selected as the rural region for this study because it is the area served by HEROES Louisiana. The entire population estimate (2015) for the state of Louisiana was 4,533,372, 897,170 for Region 1, 684,525 for Region 2, and 354,451 for Region 8.²⁴

METHODS

At-risk signifiers for HIV were retrospectively compared between metropolitan (Regions 1 and 2) and rural (Region 8) regions of Louisiana during the period 2013 to 2016. We also retrospectively looked at various factors that influence HIV/AIDS prevention, testing, and care. Comparisons of the rural area vs. each of the metropolitan areas were analyzed for significance using the Wilcoxon Signed-Rank Test, a non-parametric statistical hypothesis test used when comparing two related samples.

Data was collected from the Louisiana DOH and other sources. We reference earlier versions of the Louisiana STD/HIV surveillance report when there were no data available in the 2015 report.

FINDINGS RELATED TO AT-RISK SIGNIFIERS IN LOUISIANA

Table 1. Race Demographics by Region* (2010)								
	N=	African American	Asian	American Indian	Pacific Islander	Other Race	2+ Races	White
Region 1 (metropolitan)	835,320	39.7%	3.4%	0.4%	0.04%	3.2%	2.0%	52%
Region 2 (metropolitan)	663,185	41%	2%	0.24%	0.04%	1.4%	1.3%	53.8%
Region 8 (rural)	343,668	36.4%	0.8%	0.2%	0.04%	0.8%	1.0%	60.7%

* Data is from the US Census Bureau²⁵

Although not statistically different, the make-up of rural Region 8 is somewhat different from metropolitan Regions 1 and 2.

EDUCATION

Table 2A. Educational Attainment (High School Diploma or Equivalent)*

	2013-2014 (%)
Region 1 (metropolitan)	82.60
Region 2 (metropolitan)	82.49
Region 8 (rural)	77.07

* Data is from AIDSvu²⁶

More than three-fourths of the population had received high school diploma or equivalent across the three regions. Rural Region 8 was not significantly different from metropolitan Regions 1 or 2.

Table 2B. Educational Attainment (Bachelor's Degree or Higher)*

	Percent of Adult Population (18+) with Bachelor's Degree or Higher in 2015 (%)
Region 1 (metropolitan)	25.52
Region 2 (metropolitan)	25.70
Region 8 (rural)	17.86

* Data is from American FactFinder (2010)²⁷

American FactFinder (2010)²⁷ was used to search for counties in each region, first finding data on total population 18 years of age and over in each region and then on bachelor's degree or higher for each region.²⁷ For consistency, we used bachelor's degree or above. Rural Region 8 had a significantly lower percentage of adults with bachelor's degrees compared to metropolitan Regions 1 and 2 ($P < 0.0001$).

POVERTY

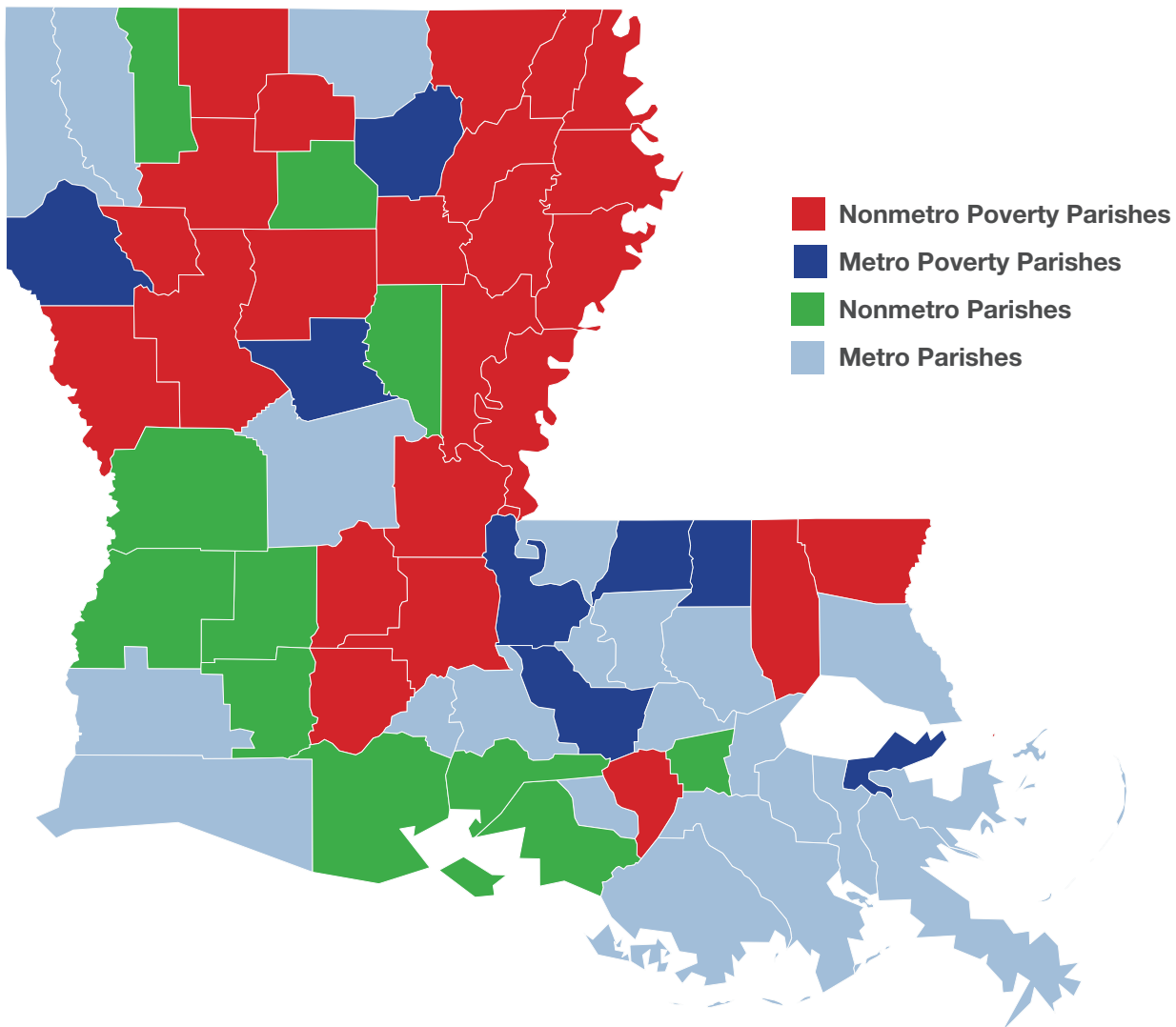


Figure 4 illustrates Louisiana poverty rates, and was published by the Louisiana State University Agricultural Center.²⁸

The Louisiana poverty rate in metropolitan areas is 18.1%, while it is 24.2% in nonmetropolitan, rural areas of Louisiana. There are 24 poverty persistent parishes in Louisiana, nine of which are in rural Region 8, which means that 75% of the parishes in Region 8 are poverty persistent. Poverty persistent is a term used when the Census of Population and Housing measures a parish to have 20% or more of its population living below the poverty line in 1970, 1980, 1990, and 2000.

An African American high poverty parish can be defined in two ways: when over half of the poor population in a given parish is African American, or when the majority of the parish's population is Caucasian, but the poverty rate of the African American population increases the poverty rate of the entire parish to exceed 20%.²⁸ Again, nine out of 12 parishes in rural Region 8 fall into this category. In contrast, three of the seven parishes in metropolitan Region 2 also fall into this category.

Housing-stress parishes are defined as having incomplete kitchen facilities or incomplete plumbing, more than one person to a room, or rent costing more than 30% of a household's income. A total of eight of Louisiana's parishes fall into this category, with four of these located within rural Region 8.

INCARCERATION

Table 4. Average Incarceration Rate per 100,000 County Residents (2014) *

Region 1 (metropolitan)	1794.2
Region 2 (metropolitan)	727.5
Region 8 (rural)	4868.6

* Data is from the Vera Institute of Justice²⁹

Rural Region 8 had significantly higher rates of incarceration compared with metropolitan Regions 1 and 2 ($P < 0.0001$).

STD RATES

Overall, African American residents in rural Region 8 have higher rates of STDs than African American residents in metropolitan Regions 1 and 2. The primary and secondary (P&S) syphilis diagnosis rate for African Americans more than doubled in the period between 2012-2015.³

Table 5A. P&S Rates per 100,000 Residents (2015)*

	Total	Black/African American	Hispanic/Latino	White
Region 1 (metropolitan)	22.2	40	7	5
Region 2 (metropolitan)	18.0	37	0	5
Region 8 (rural)	22.8	54	0	4

* Data is from the Louisiana DOH³

There were no significant differences between regions for syphilis rates.

Table 5B. Chlamydia Rates per 100,000 Residents (2015)*

	Total
Region 1 (metropolitan)	867
Region 2 (metropolitan)	649
Region 8 (rural)	852

* Data is from the Louisiana DOH³

From 2012-2014, rural Region 8 had the highest chlamydia rate in the entire state. The chlamydia rate for metropolitan Region 1 increased by 8% in 2015. However, seven parishes had a chlamydia diagnosis rate higher than 900 per 100,000.³ Four of these parishes were in rural Region 8 and one was in metropolitan Region 1.³

Table 5C. Gonorrhea Rates per 100,000 Residents (2015)*

	Total	Black/African American	Hispanic/Latino	White
Region 1 (metropolitan)	287	562	74	92
Region 2 (metropolitan)	232	37	0	5
Region 8 (rural)	228	54	0	4

*Data is from the Louisiana DOH³

In 2015, the gonorrhea diagnosis rate in Louisiana was 220.0 per 100,000 population, nearly a 14% increase from 193.1 diagnoses per 100,000 in 2014. The 2015 Louisiana rate was 1.8 times greater than the national rate of 123.9 per 100,000 population. The highest age specific gonorrhea rate was among 15-19 year old females, followed by 20-24 year old females.³

There were no statistical differences in gonorrhea rates between rural Region 8 and metropolitan Regions 1 ($P > 0.05$) and 2 ($P > 0.05$). In 2015, eight parishes had a gonorrhea rate higher than 300 per 100,000.³ Of those eight, four were in rural Region 8, and one was in metropolitan Region 1.

In summary, the tables included in this report outline the STD disparities between the metropolitan regions (Regions 1 and 2) and the predominantly rural Region 8. General information, such as the gender of those infected and source of infection, can be found in the Louisiana DOH's 2015 HIV/STD Surveillance Report.³

HIV/AIDS RESOURCE DISTRIBUTION

Table 6. HIV/AIDS Resource Distribution*

	HIV Testing Sites	Pre-Exposure Prophylaxis (PrEP) Services	Ryan White HIV/AIDS Medical Care Providers	HOPWA - Housing Opportunities for Persons with AIDS
Region 1 (metropolitan)	18	11	6	0
Region 2 (metropolitan)	9	4	4	4
Region 8 (rural)	11	1	1	0

* Data is from AIDSvu²⁶

Rural Region 8 has fewer HIV-related resources available compared to metropolitan Regions 1 and 2.

Table 6A. Square Miles per Resource Type*

	HIV Testing Sites	Pre-Exposure Prophylaxis (PrEP) Services	Ryan White HIV/AIDS Medical Care Providers	HOPWA - Housing Opportunities for Persons with AIDS
Region 1 (metropolitan)	90.1	147.5	270.4	N/A
Region 2 (metropolitan)	330.0	742.6	742.6	742.6
Region 8 (rural)	640.3	7043.9	7043.9	N/A

*Data is from the Louisiana DOH

Data demonstrating the size of each Region studied and its relationship to the number of services provided in each Region were calculated. While the absolute numbers appear to demonstrate equal resources across Regions (Table 6), the travel distance for service access in Region 8 is many times greater than that in the metropolitan comparators.

Table 6B. Testing Sites and Frequency of Use

Site Type	1 - Metropolitan	2 - Metropolitan	8 - Rural
Community Based Organization	9,867	8,418	979
Parish Health Unit	3,374	2,440	4,685
Office of Addictive Disorders Clinic	88	0	25
Drug Treatment (Non OAD)	916	0	0
Correctional Facility	15,418	1,068	777
Hospital	15,456	6,563	0
Community Health Clinic	7,419	841	0
College/University	0	770	211
School Based Health Clinic	888	48	17
Total	53,426	20,148	6,694

*Data is from Louisiana DOH. Received 7/31/17.

PERSONS LIVING WITH HIV INFECTION (PLWH)-SPECIFIC DATA

Table 7A. Number of Persons Living with HIV Infection (PLWH, 2015)*

	PLWH (% of total)
Louisiana	20,398 (100%)
Region 1 (metropolitan)	7,052 (35%)
Region 2 (metropolitan)	4,918 (24%)
Region 8 (rural)	1,035 (5%)

* Data is from the Louisiana DOH³

Although 32.6% of Louisiana's population is African-American, African Americans account for 65.9% of HIV/AIDS cases in the state.^{3,22}

Table 7B. Age at Positive HIV Test (2015)*

Region	13-24 Years	25-34 Years	35-44	45+	Total
1 – Metropolitan	92 (25%)	128 (35%)	79 (21%)	71 (19%)	371 (100%)
2 – Metropolitan	73 (29%)	80 (32%)	48 (19%)	51 (20%)	252 (100%)
8 – Rural	21 (33%)	18 (28%)	6 (9%)	19 (30%)	64 (100%)

* Data is from the Louisiana DOH³

Although not statistically significant, the proportion of individuals testing positive in rural Region 8 skewed younger (13-14 years) as compared to the two metropolitan regions. There was also a difference in the percentage of people >45 years who tested positive in our rural area.

Table 7C. Age at AIDS Diagnosis (2015)*

Region	13-24 Years	25-34 Years	35-44	45+	Total
1 - Metropolitan	15 (9%)	44 (26%)	45 (26%)	65 (38%)	170 (100%)
2 – Metropolitan	10 (8%)	35 (29%)	32 (27%)	43 (36%)	120 (100%)
8 – Rural	2 (6%)	10 (29%)	6 (17%)	17 (49%)	64 (100%)

* Data is from the Louisiana DOH³

Interestingly, rural Region 8 constitutes only 5% of total PLWH in Louisiana, while that in metropolitan Regions 1 and 2 are 35% and 24%, respectively. However, rural regions account for more than 15% of all HIV/AIDS cases in the state of Louisiana.³ Region 8 was selected as the rural region for this report as it is the area served by HEROES Louisiana. People with HIV/AIDS in rural Region 8 tend to be tested as HIV positive or diagnosed with AIDS at less than 34 years of age or greater than 45 years of age.

LATE HIV TESTING

Table 8. Late Testers (2014) *

Region	New HIV Diagnoses	AIDS at Time of Diagnosis	AIDS Within 3 Months of Diagnosis	AIDS Within 6 Months of Diagnosis	AIDS Within 12 Months of Diagnosis
Total	1,235	253 (20%)	291 (24%)	314 (25%)	328 (27%)
1 - Metropolitan	364	64 (18%)	76 (21%)	80 (22%)	82 (23%)
2 - Metropolitan	319	69 (22%)	75 (24%)	82 (26%)	84 (26%)
8 - Rural	91	25 (27%)	27 (30%)	29 (32%)	31 (34%)

* Data is from the Louisiana DOH³⁰

In 2015, there was a 14% drop in new AIDS diagnoses in the state. Rural Louisiana saw a 0.7% increase, while metropolitan Louisiana declined by 1.3% over the same period.³

UNMET NEED FOR CARE

Table 9. Persons Living with HIV Infection Receiving At least One Annual Primary Care Visit*

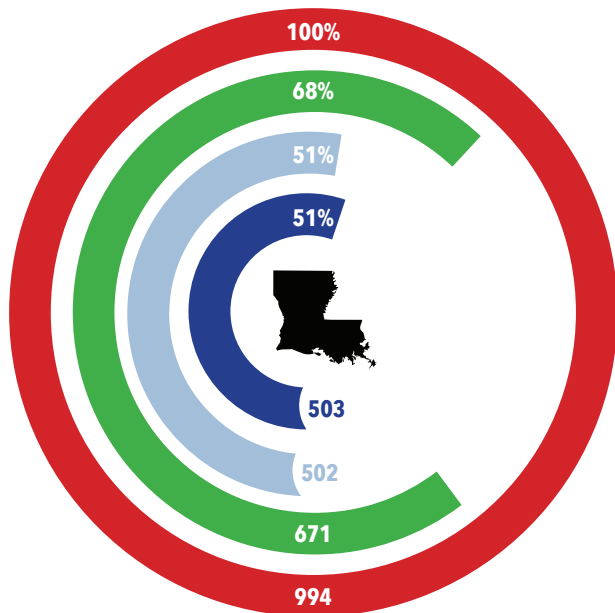
Region	2013 Percent in Care	Percent Not in Care (Unmet Need)	2014 Percent in Care	Percent Not in Care (Unmet Need)
Overall	70%	30%	72%	28%
1 - Metropolitan	70%	30%	72%	28%
2 - Metropolitan	75%	25%	77%	23%
8 - Rural	66%	34%	69%	31%

* Data is from the Louisiana DOH³⁰

Table 9 illustrates that, of persons living with HIV infection in 2014, only 72% had at least one primary medical care visit during the year.³⁰ Rural Region 8 had a higher proportion of people with HIV/AIDS without any healthcare compared to the overall rate across the three regions. This suggests that there is an unmet need for primary medical care among people living with HIV (PLWH) particularly in rural areas of Louisiana.³⁰

HIV CONTINUUM OF CARE, 2015*

Figure 4A. Rural Region 8



- PERSONS LIVING WITH HIV**
- ENGAGED IN HIV CARE**
- RETAINED IN HIV CARE**
- VIRALLY SUPPRESSED (<200)**

These figures show that there is a compromised continuum of care in rural Region 8, resulting in a lower proportion of patients achieving viral suppression (<200) compared to metropolitan Regions 1 and 2. Despite numerous attempts to obtain all-cause mortality and percent of testing performed at each regional site, the Louisiana Department of Health declined to release that information.

Figure 4B. Metropolitan Region 1

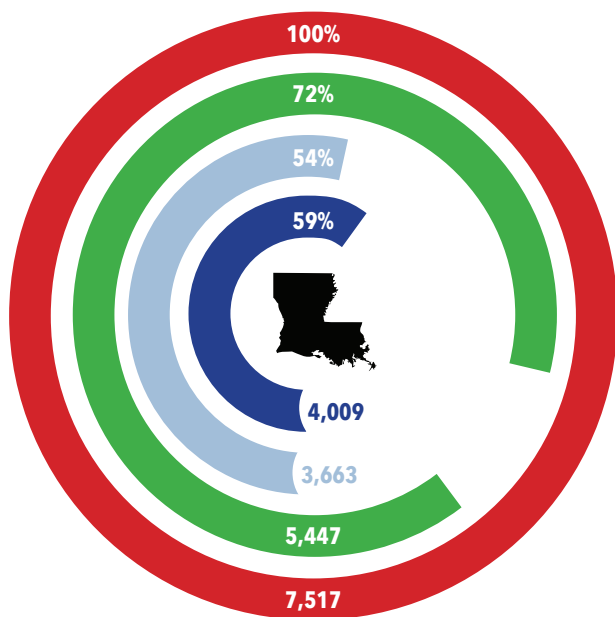
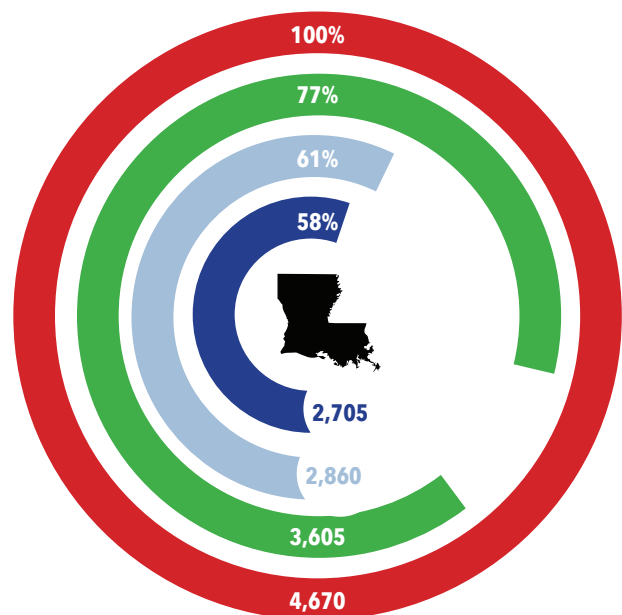
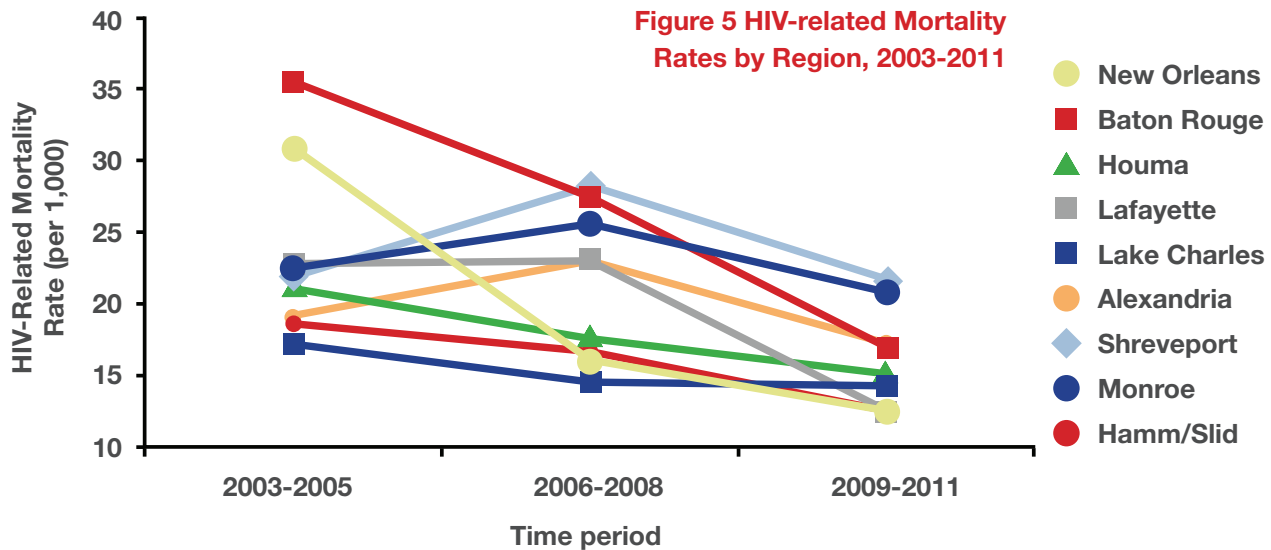


Figure 4C. Metropolitan Region 2



*Data provided by the Louisiana DOH.



Regions in northern Louisiana (Shreveport, Monroe, Alexandria), had the highest HIV-related mortality rates of the 2009-2011 time period. During the same period, the HIV-related mortality rates in the Shreveport and Monroe regions were about 1.6 times that of the New Orleans, Hammond/Slidell, and Lafayette regions. After 2011, the Louisiana DOH no longer published this data.

The mortality rates for rural Region 8 (Monroe) have remained flat over time since 2003 to 2011, while that in metropolitan Regions 1 (New Orleans) and 2 (Baton Rouge) have decreased over this same time. Furthermore, the 2009-2011 mortality rates for rural Region 8 are higher than the metropolitan Regions 1 and 2.

There are no all-cause mortality data included in this report. The Louisiana DOH declined to provide all-cause mortality data despite multiple requests.

CONCLUSIONS

In terms of significant at-risk signifiers for HIV/AIDS, the rural region had a lower population of people with at least a bachelor's degree, a higher proportion of people living in poverty, a higher rate of incarceration, and higher rates of STD infection in African Americans compared with metropolitan regions. There were no differences for the proportion of people with a high school diploma or equivalent in the rural region.

We also looked retrospectively at various factors relating to HIV/AIDS prevention, testing, and care. While there were differences in these parameters between our rural region and the metropolitan ones, we were unable to make a cause/effect relationship between these two groups of findings. However, observational findings demonstrate that there are fewer HIV/AIDS-specific resources (e.g., testing sites and PrEP services) in rural areas. Additionally, rural regions have a higher rate of AIDS diagnosis at the time of their testing positive for HIV. The proportion of people with HIV who are in care and are virologically suppressed is lower in rural Louisiana than in metropolitan areas that were studied. In Louisiana, there is a large unmet need for HIV medical care.⁹ We found that this is also true for rural populations. Previous research has demonstrated that HIV-related mortality rates are decreasing in the metropolitan regions of Louisiana (New Orleans and Baton Rouge), but have remained at the same rate in the rural regions (Monroe).

DISCUSSION

Southern US states, including Louisiana, have higher rates of HIV diagnosis and HIV-related mortality.² In Louisiana, more than 15% of PLWH live in rural regions.³ There are no carefully controlled studies on the risk factors that influence HIV infection and HIV-related mortality in rural regions of the US. However, data from the CDC suggests that higher mortality from HIV is a result of barriers to testing and treatment such as HIV-related stigma, inability to access transportation, and a lack of HIV-medical providers.² These barriers are also present in rural regions of Louisiana.³ Here, we report that some known risk factors for HIV infection, such as education, poverty, incarceration, and STD infection in African American populations were higher in rural areas compared with metropolitan regions. To address regional disparities, it is important to understand the multiple risk factors that contribute to HIV infection and HIV-related mortality in rural Louisiana.

Rural Region 8 had fewer people with at least a bachelor's degree, more people living in poverty, a higher rate of incarceration, and increased rates of STD infection in African Americans compared with metropolitan regions. There are many challenges for the management of HIV/AIDS in rural areas that differ from metropolitan areas. For example, there is a lack of public transportation for testing and access to care as well as a lack of healthcare providers in rural areas.³ The only clinic in rural Region 8 requires that patients be seen at the clinic several times before seeing a provider for care and treatment, which can happen on the fourth visit. This requirement may explain the disparity in rural Region 8 for 'in care' and virologic suppression vs. metropolitan Regions 1 and 2.³² Solutions for these challenges will need to be customized for rural regions in order to overcome barriers to treatment currently being experienced by this rural population, and solutions that might work in large metropolitan areas may not work outside of these areas. An initiative such as a mobile testing and treatment center might be a good option for rural areas. It is important to achieve viral suppression in all PLWH in Louisiana, as people continually migrate. Achieving virologic suppression is important as it improves overall survival and reduces the risk of HIV transmission.^{33,34}

There is very little prospective research examining the epidemiology and treatment of HIV/AIDS in rural versus metropolitan communities. This report is the first study to use retrospective analysis to identify differences between rural and metropolitan regions. At this time, there is no prospective research on how HIV-related stigma affects rural Louisiana and monitoring of access to care and treatment patterns is needed for PLWH in rural regions as well as those in larger metropolitan areas. Among other things, stigma leads to poorer patient outcomes through reduced treatment adherence and retention in care.^{4,35} HEROES Louisiana plans to conduct critical research on stigma in rural Louisiana that includes an embedded intervention cohort. Pre- and post- intervention surveys will determine whether this intervention is effective in increasing early testing, increasing the number of people in continuous care, etc. Stigma studies rarely test the effectiveness of an intervention, so this will be a unique aspect of the planned study. Previous HIV-stigma research suggests that interventions designed to modify racism in general populations or 'teaching' people not to stigmatize people with HIV demonstrate little benefit.^{35,36} Instead our intervention will give individuals the tools to navigate around racism and stigma to get access to care and treatment despite community beliefs. The results of this research will inform future trials to create and assess interventional treatments to reduce stigma, and increase HIV screening and medical treatment in rural Louisiana, and hopefully, be applied to enhance treatment patterns and patient outcomes in this population and have relevance for rural populations elsewhere in the US.

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