

Racial Disparities in Maternal Mortality

East and Central Southern United States, 2014

Background

Over the last three decades, the maternal mortality rate has increased within the United States from 7.2 per 100,000 live births in 1987 to 18.0 per 100,000 live births in 2014 (1), making the United States one of only two countries with increasing maternal mortality rates in the world (2). For non-white individuals within the United States, the maternal mortality rates are even grimmer. Black women have a maternal mortality rate of 40.0 per 100,000 live births, compared to the 12.4 per 100,000 live births we see in white mothers (1).

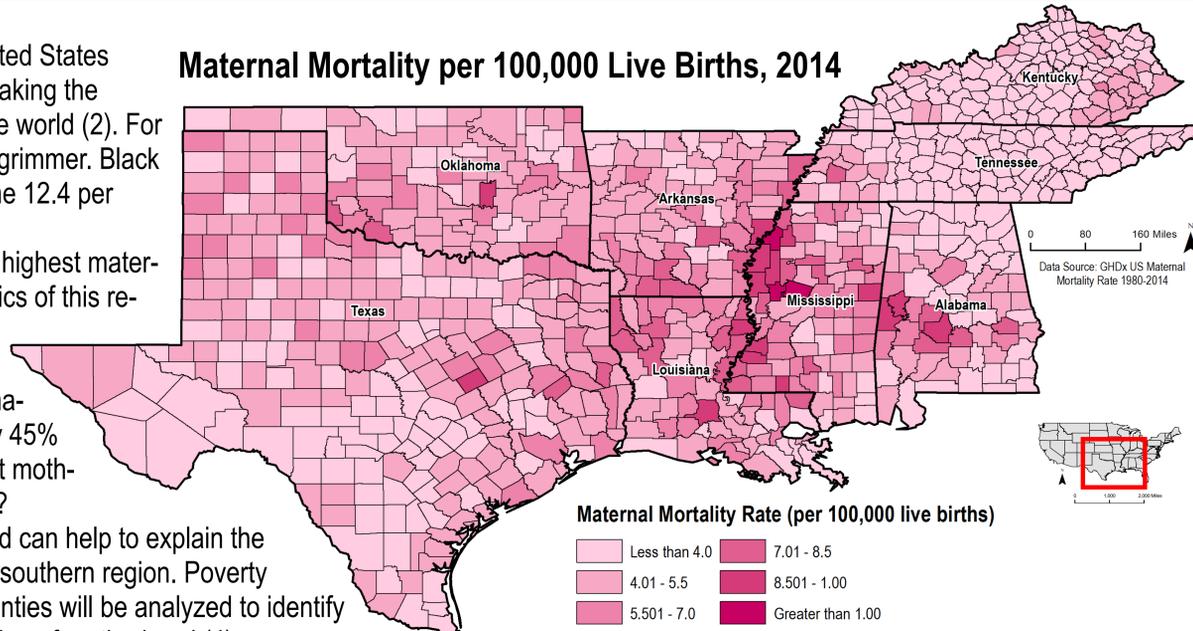
The Southern Region of the United States is home to many of the states with the highest maternal mortality rates, with Louisiana having the highest rate nationally. The demographics of this region vary based on state and county; however, it starkly demonstrates racial disparities within maternal mortality. For example, Louisiana's black mothers die at a 4.1 times higher rate than white mothers (3). There are many factors that contribute to maternal mortality and not all cases are preventable; however, it is believed that roughly 45% of maternal mortality cases are preventable in Louisiana alone (3). If so, why is it that mothers of minority backgrounds are at greater risk of dying than their white counterparts?

In this study we explore different social determinates of health that can impact and can help to explain the racial disparities seen in maternal mortality within the United States, focusing on the southern region. Poverty rates, insurance factors, provider access, and demographic differences between counties will be analyzed to identify any trends that exist and aid in explaining the vast racial disparity seen in the beginning of motherhood (4).

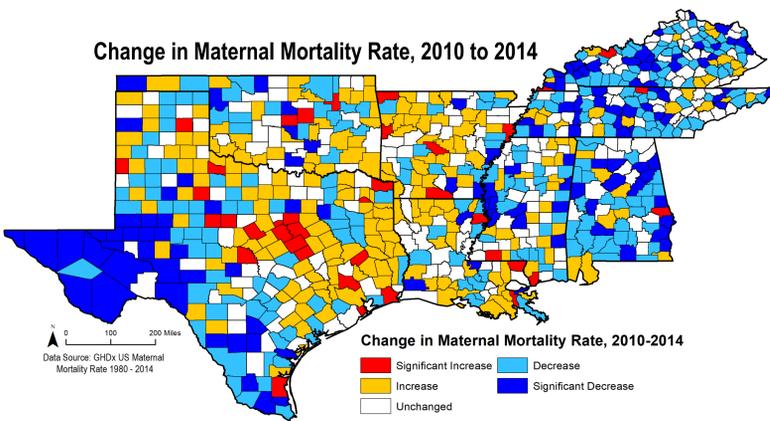
Methodology

To begin, polygon level data for the United States, obtained through the Tufts GIS Lab, was clipped to the region of interest. Next, the layer of county level polygons from the United States Census was added and clipped to fit the region. For all of the factors of interest, data from the United States Census containing rate and percentage information was joined to the county level boundaries and exporting as a shapefile. The maternal mortality data was obtained from the GHDx data center and joined and clipped similar to that of the Census data. From these new shapefiles, choropleth maps were created depicting rates and differences in rates between different races. To add the depiction of provider care access, all geocoded hospitals in the region were added to the map as a shapefile obtained from the United States Census.

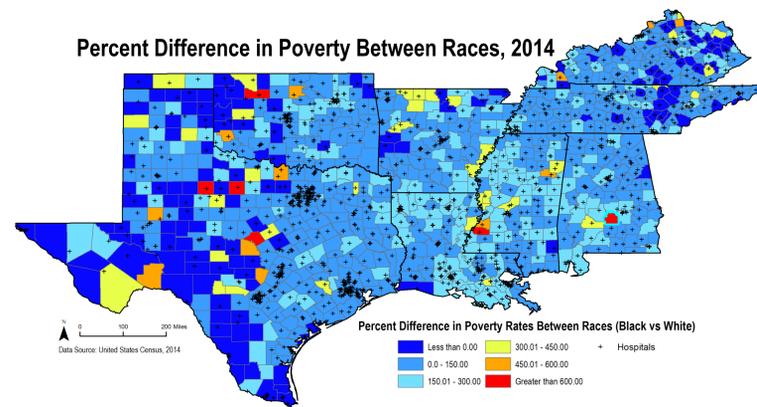
Maternal Mortality per 100,000 Live Births, 2014



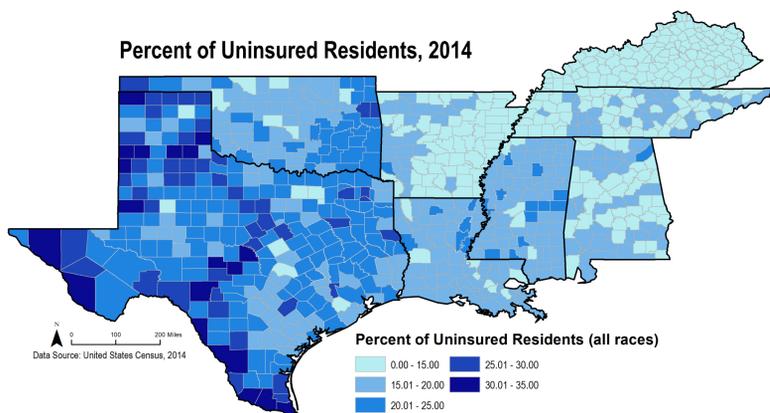
Change in Maternal Mortality Rate, 2010 to 2014



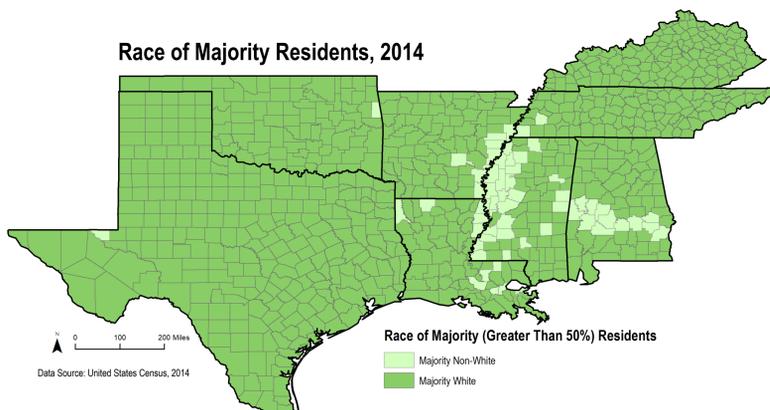
Percent Difference in Poverty Between Races, 2014



Percent of Uninsured Residents, 2014



Race of Majority Residents, 2014



Louisiana Case Study

Parish	Maternal Mortality Rate		Percent Change in Maternal Mortality		Percent Difference in Poverty (Black vs. White)		Uninsured Rate (%)	
	2010	2014	2010-2014	1980-2014	2014	2010	2014	
Acadia	0.65	0.68	4.62	100.00	158.94	21.30	17.80	
Beauregard	0.47	0.49	4.26	104.17	67.64	21.30	16.60	
Bienville	0.78	0.81	3.85	131.43	191.83	19.80	16.10	
Caddo	0.76	0.78	2.63	129.41	210.57	21.20	16.50	
De Soto	0.70	0.71	1.43	86.84	183.21	22.30	17.50	
Iberia	0.54	0.56	3.70	107.41	167.18	20.70	17.60	
Jefferson	0.35	0.37	5.71	15.63	152.17	22.80	18.30	
Lafourche	0.37	0.39	5.41	95.00	186.36	22.70	18.40	
Livingston	0.31	0.32	3.23	60.00	69.69	19.50	15.50	
Madison	0.91	0.97	6.59	51.56	88.23	23.60	19.60	
Ouachita	0.53	0.54	1.89	80.00	195.74	22.90	17.00	
St. Charles	0.39	0.40	2.56	81.82	159.09	15.00	13.90	
St. John the Baptist	0.61	0.63	3.28	110.00	193.1	19.30	16.90	
Terrebonne	0.50	0.51	2.00	131.82	214.4	21.30	19.10	
Washington	0.66	0.74	12.12	105.56	106.15	21.70	19.20	
Webster	0.64	0.66	3.13	120.00	157.33	21.40	17.50	
West Carroll	0.42	0.43	2.38	53.57	110.13	24.10	20.30	

Results

Maternal Mortality is seen in the highest rates along the Mississippi River, a belt in southern Alabama, and scattered throughout Louisiana. The greatest rates, over 1 death per 100,000 live births, are seen hugging the Mississippi River in Arkansas, Mississippi, and Louisiana, in addition to western area of southern Alabama. The changes in maternal mortality from 2010 to 2014, show that the areas with the highest rates also have shown moderate to significant improvement. Areas with the largest increase in maternal mortality are scattered throughout the region, and heavily appear in counties between Dallas and Austin, Texas.

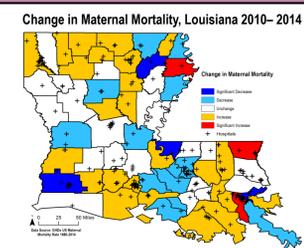
Poverty demonstrates to be a factor as the majority of the hardest hit counties for maternal mortality rates also have disproportional poverty of blacks versus whites. These counties all have black poverty rates at or greater than 150 percent of their other white residents, with some greater than 300 percent. In six counties the poverty difference is between 300 percent and 450 percent, with one county, Lowndes County, having a Black poverty rate is 1220% that of the White poverty rate, and the largest recorded on the map being 3500 percent.

Trends in uninsured populations are similar to that of maternal mortality; however, in Texas there are multiple counties with greater than 30 percent of their population uninsured. Kentucky has the best overall state uninsured rate with every county at or below 15 percent, but Louisiana and Mississippi are both largely 20 percent to 25 percent uninsured. The existence of hospitals does not display a strong pattern within the region, but there are a few areas where there are higher rates of maternal mortality, higher rates of poverty and zero to one hospitals.

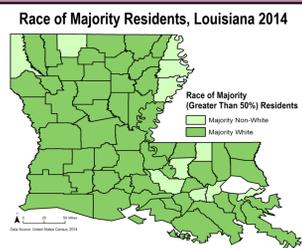
Lastly, nearly every county in the region is dominated by white residents. Counties with the majority of non-white residents are along the Mississippi River in Arkansas, Mississippi, and Louisiana. There is an additional belt of predominately non-white counties in the southern half of Alabama consistent with the highest rates of maternal mortality and disparity in poverty rates.

Looking at the Western part of Texas, there are high uninsured rates and few hospitals, but there are low maternal mortality rates, majority white populations and few differences in white and black poverty rates. Understanding the difference between these areas and the counties along the Mississippi River and in the southern belt of Alabama may aid in understanding racial difference in maternal mortality rates.

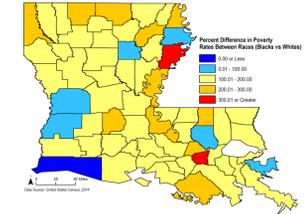
Change in Maternal Mortality, Louisiana 2010-2014



Race of Majority Residents, Louisiana 2014



Percent Difference Between Races, Louisiana 2014



What do we see?

Looking at the data at the county level within Louisiana, the state with the highest maternal mortality rate, we see patterns different than that of the region. Within the region we identified the Mississippi River border counties and southern belt in Alabama as areas with consistent trends of racial disparities. In Louisiana specifically, the trends aren't as apparent. Some of the counties with higher, and increasing, maternal mortality rates are dominated by non-white populations, but the change in maternal mortality rates is mixed. The counties with larger non-white communities display greater disparity in poverty rates when comparing blacks to whites, which is consistent with the regional findings.

Discussion

The patterns seen along the Mississippi River and in the southern belt of Alabama reinforce the data that minority populations, specifically black mothers, have greater rates of maternal mortality than white mothers. Looking further into the geospatial patterns of the social determinates of health observed (poverty, health insurance, provider access and demographics) there are supporting patterns of disparity between black (and other non-white) populations and their white counterparts, concurrent with current literature.

Poverty demonstrates to be highly correlated in areas throughout the region, but specifically near the Mississippi River and the identified Alabama belt, with nearly all counties having black poverty rates of 150 percent or more than the white poverty rates in the same counties, and the six counties of even greater disparity identified prior. These disparities in poverty additionally match with the counties that have a majority non-white population. This overlap would suggest that densely populated areas of non-white residents demonstrate greater poverty, and thus greater disparity compared to whites in the county and region at large. These areas would be locations for policy makers and researchers to target future efforts.

The lack of patterns in hospital existence in nearly all of the most affected areas for maternal mortality lends itself to further research. While hospitals may exist we do not have data to understand if providers are concentrated as employees of the hospitals or if the county residents can get to such hospitals- both of which could use geospatial research for better understanding. Lastly, while the percentage of individuals, regardless of race, not possessing health care in 2014 does not exceed 20 percent in the main areas of focus along the Mississippi River and the southern belt of Alabama, it cannot be ruled out as a contributing factor because of the lack of disaggregated data on the basis of race. It should be noted that the change of maternal mortality rates from 2010 to 2014 accompany the passage for the Affordable Care Act in March of 2010 by President Barack Obama where millions of more American citizens were eligible for healthcare.

Generally, the geospatial analysis performed supports the racial difference between white and black maternal mortality on the basis of poverty and race more than health insurance coverage and access to health providers; however, there are many social determinates of health that were not explored within this study and the data is five years old, from 2014. At the state and national level, there have been increasing trends in maternal mortality from 2014 to present day, thus opening itself to further study as county level data becomes available for years following 2014.

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 3. Louisiana Department of Health. (2018, August). Louisiana Maternal Mortality Review Report. 2011-2016(Rep.). Retrieved April 20, 2019, from Louisiana Department of Health website: http://ldh.la.gov/assets/oph/Center-PHCH/Center-PH/maternal/2011-2016_LMMR_Report_FINAL.pdf
 4. Black Women's Maternal Health: A Multifaceted Approach to Addressing Persistent and Dire Health Disparities. (2018, April). Retrieved March 22, 2019, from <https://www.nationalpartnership.org/our-work/resources/health-care/maternal/health-care/maternal-black-womens-maternal-health-issue-brief.pdf>