HIV/AIDS Morbidity in Youths and Teens Ages 13-24 in Texas Counties

Author: Meagan Hatton
Faculty Mentor: Joseph Oppong, Department of Geography, College of Arts and Sciences; Associate Dean, Toulouse Graduate School
Department and College Affiliation: Department of Geography, College of Arts and Sciences

Bio:

Meagan Hatton is currently a junior double majoring in Geography and Photojournalism at the University of North Texas. She has been on the Dean's List numerous times and is a member of the Tau Sigma Honor Society as well. She is a proud member of the North Texas Energy and Environment Club and was the Event Coordinator for the club in 2010-2011 and is currently the President for 2011-2012. Meagan is also a member of the Sustainability Council on campus and works with the Operations and Land Use Sub-committee, which is responsible for making recommendations about the physical campus environment and how to sustainably maintain the built environment as well as the Recycling Committee for campus. Meagan is also a campus leader for Re-Energize Texas, an organization devoted to changing Texas's energy future. Among other things, Meagan is also a member of NORML, a dancer for UNT's African Ensemble, and works 20+ hours a week. She plans to volunteer for the Peace Corps after graduation in hopes of helping children in Africa who are living with HIV/AIDS. She wishes to pursue a career in Medical Geography working in Africa and dreams of being a photographer for National Geographic. After working for several years, Meagan plans to return to school to get a Master's degree in Medical Geography and Sustainability. Meagan's overall goal in life, she says, is to "provide positivity while helping others and using education as a tool to get there."

Abstract:

HIV/AIDS has become a serious threat in Texas among youths and teens, and will continue to grow as a problem unless action is taken to prevent the spread of the virus. From 2002-2008, the HIV rate among youths and teens, ages 13-24, increased 38%, from 14.2 per 100,000 to 19.6 per 100,000 (Texas Department of State Health Services, 2010). Using case data provided by the Texas State Department of Health Services, this paper seeks to understand the spatial distribution of HIV/AIDS morbidity among youths and teens ages 13-24 and the variables that are significantly related to the disease. De-identified data on HIV/AIDS for Texas counties from 1999-2008 provided by the Texas State Department of Health are used as the dependent variable. Explanatory variables for this research include: race/ethnicity, level of education, percent urban population, socioeconomic factors, and prevalence of unsafe sex, which is provided by the 2000 U.S. Bureau of the Census and the 2010 County Health Ranking Texas data (Population Health Institute, 2011). Spearman's rank correlation coefficient is used for statistical analysis. The results suggest that race/ethnicity, level of education, percent urban population, unsafe sex, and socioeconomic factors are significant determinants of the HIV/AIDS rate among youths and teens in Texas counties. Higher HIV/AIDS rates tend to appear in counties with high percent Black population, high percent urban population, high chlamydia rates, high percentage of people with a bachelor's degree or higher, and high percentage of single-parent households. HIV/AIDS rates are not uniformly distributed across Texas, therefore ascertaining the significant correlations with high rates of the disease will ensure effective targeting of interventions.

Introduction

HIV/AIDS is a serious threat to health for sexually active people of all ages everywhere including Texas. In fact, the number of people living with HIV/AIDS in Texas increased 30% in the five years between January 2003 and December 2007 (Texas Department of State Health Services [Texas DSHS], 2008). As of December 31, 2006, an estimated 70,577 AIDS cases had been reported in Texas since the beginning of the epidemic in the 1980's (Texas Department of State Health Services, 2010). In 2006, Texas also had the fourth highest number of HIV/AIDS cases in the United States (Centers for Disease Control and Prevention [CDC], 2006) and the rate among youths and teens was high. To develop effective interventions that limit HIV spread, it is important to know the geography of this disease, which counties have higher rates, and what variables are indicators of high HIV/AIDS rates among youths and teens.

Objective

- This research paper will seek to understand the spatial distribution of HIV/AIDS in all (254) Texas counties among youths and teens, ages 13-24, and the associated explanatory variables of the disease. Based on a brief review of the literature, the variables examined in this study include level of education (percent of those with a Bachelor's degree or higher and percent of those with less than a high school graduate degree, or high school drop outs);
- race or ethnicity (percent Black, White, and Hispanic in each county);
- socioeconomic factors- (median family income, percent of single-parent households, and percent of children living in poverty);
- unsafe sex-(teen birth rates and Chlamydia rates); and
- percent urban populations

The Human Ecology of Disease model will be used as the conceptual framework for this paper. This framework emphasizes that any disease may be attributed to environment, genetics, and human behavior.

In terms of genetics, one will contract HIV if the mother had HIV/AIDS prior to the genetic assembly during the formation of the child, as well as through perinatal transmission, also referred to as mother-to-child transmission, where a child contracts a disease immediately before and after birth.

In terms of environment, one may be more vulnerable to HIV/AIDS by a plethora of variables including access to healthcare facilities, the cost of testing, the availability of testing centers, the social norms associated with the environment, and the neighborhood or community one lives in.

Lastly, behavior plays a huge role as well. Using unsterilized needles for intravenous drugs and engaging in sexual activity without protection are well known risk behaviors for HIV/AIDS. In addition, religious beliefs may lead people to engage in a behavior that puts them at risk for disease.

Research Hypotheses

1. Race/ethnicity is a predictor of HIV/AIDS prevalence. Research has shown that in the United States, Blacks are far more at risk than any other race/ethnic group. Therefore, the rate of HIV/AIDS is expected to be higher in counties with high percent of Blacks rather than Whites or Hispanic people.

2. Urban areas are characterized by high population densities. High population densities are more at risk for the spreading of HIV/AIDS simply because there are more people in the

given county. Therefore, the rate of HIV/AIDS is hypothesized to be higher in counties with higher percent urban populations.

3. Unsafe sex is a predictor. When engaging in unsafe sex, a person is more likely to contract a sexually transmitted disease (STD) such as HIV/AIDS and become pregnant. For this study, Chlamydia and teen birth rates are included as predictors of unsafe sexual activity. Areas with high rates of Chlamydia and teen birth rates will also have high rates of HIV/AIDS.

4. Education is crucial to the prevention of HIV/AIDS spread, and awareness about the disease is critical to prevent exposure. Therefore, the rate of HIV/AIDS is higher in areas with a higher percent of people aged 25 years and older who received less than a high school graduate degree (high-school drop outs); it will be lower in areas where a high percentage of people aged 25 years and over have a bachelor's degree or higher.

5. Socioeconomic status is an indicator of HIV/AIDS rates. Because poverty is a major determinant of whether or not healthcare is accessible and affordable, children living in poverty and the median family income will indicate whether or not there is affordable access to healthcare facilities. Single-parent households face the added burden of lacking the parental supervision that may be provided if another parent were present. Therefore, where there are high rates of HIV/AIDS, there will also be:

a. high percentages of children living in poverty;

b. low median family incomes; and

c. high percentages of single-parent households

Methodology

Data on all HIV/AIDS cases reported in each Texas county from 1999-2008 were provided by Texas State Department of Health Services through Dr. Joseph Oppong, my mentor.

SPSS software was used to select the cases aged 13-24 at the time of diagnosis. Populations of people aged 13-24 in Texas counties was provided by the 2000 Census. The rate was calculated by dividing the total number of HIV/AIDS cases among ages 13-24 for each county by the total population of ages 13-24 for each county and then multiplied by 100,000. The rate of HIV/AIDS cases among ages 13-24 is used as the dependent variable. Data for chlamydia rates, teen birth rates, percent of single-parent households, and percent of children living in poverty was provided by the 2010 County Health Ranking Texas Data (Population Health Institute, 2011). Data for race/ethnicity populations, urban populations, median family income, and level of education was provided by the 2000 U.S. Census. These were used as explanatory variables with Spearman's rank order correlation coefficient. Race/ethnicity data were defined as the percentage of each of the major race/ethnicity groups in each county. Level of education was defined as the percentage of the population with less than a high school graduate degree (high school dropout) among ages 18-24 and also the percentage of the population with a bachelor's degree or higher among ages 18-24. Urban populations were defined as the percentage of the population that is urban. Measures of unsafe sex included chlamydia and teen birth rates by county. Chlamydia rates were defined as the rate per 100,000 and teen births were defined as the rate per 100,000 of the female population among ages 15-19. Socioeconomic factors included median family income in 1999 which was expressed in dollars, the percent of children living in poverty which was based on household income using the Gini coefficient of income inequality, and the percent of single-parent households which was defined as the percent of all households that are single-parent. VitalWeb ICD 9 Death data (Expert Health Data Programming, Inc., 2011) were used to gather the age-adjusted mortality rate of HIV/AIDS by county and map the change over time from

1980-1998. Excel Workbook was used to isolate the data, SPSS was used for statistical analysis, and the maps were created in ArcMap using ArcGIS software.

Literature Review

HIV damages human immune cells, weakens the immune system, and without treatment, results in acquired immunodeficiency syndrome, AIDS, in which the immune system gradually fails and infections become life threatening.

HIV was discovered in humans around 1980, and from then on has become a pandemic disease. Since its discovery, HIV/AIDS has killed more than 25 million people worldwide, and in Texas it kills roughly 1,300 every year (Texas Department of State Health Services, 2010). HIV is a virus that targets the T cells of the immune system. T cells are one of the two major types of lymphocytes, or white blood cells. They are also known as "T4", "helper-T," or "CD4" cells and are white blood cells that control immune response and attack of infections. There are only a few ways in which a person can contract HIV: through breast milk, perinatal transmission (from infected mother to her baby during birth), contaminated needles, blood, and bodily fluids that are exchanged during sex. Once infected, the virus can remain dormant for several years and the person that is infected is asymptomatic, which means there are no symptoms (American Association for Clinical Chemistry, 2011).

Because of this, HIV is transmitted most of the time without the person that is infected knowing that they are indeed infected. Most commonly the HIV virus infects the CD4 cell targeting the immune system, but it has been known to attack other parts of the body such as the digestive system, the nervous system, the brain, the lymphatic system, and other areas. The virus reproduces itself very rapidly. It attacks and moves into the T cell, converting it into what some call a "virus factory," until there are so many that the T cell explodes, which causes the HIV to

spread directly into the bloodstream. The virus repeats this process onto fresh T cells until over time, there are no T cells left and the infected person is highly susceptible to infections of all sorts. Since the T cells are considered "leader" cells that control the "soldier" cells to fight off bacteria, viruses, fungi, and parasites, without any of these leader cells or with very few, the soldier cells become virtually powerless and cannot fight off even a relatively common infection, such as a cold. A simple cold is then defined as an opportunistic infection, because of the immune system's weakness allows such organisms to multiply and cause illness that is detrimental. When a person who is infected with HIV contracts one of many opportunistic infections, they are diagnosed with having AIDS; AIDS can also be diagnosed when the CD4 count hits below 200 (Hatano, 2011).

Testing the blood for HIV antibodies is the usual screening and testing done for HIV. Infected persons can be tested at a testing center, healthcare facility, or even at home with a home HIV blood test called Home Access which is available to the public through mail and through pharmacies. Antiretroviral medications are then taken by the infected person to control the reproduction of the virus and to slow its progress. Because HIV is a virus, it cannot be cured; however, medications do help halt the spread of the virus and can relieve many of the symptoms. These medications also do not stop the virus from spreading. If an infected person is taking their daily medications, they can still transmit the virus to another person. When symptoms do occur after HIV infection, they are typically as follows: rapid weight loss, extreme fatigue, shortness of breath, dry cough, swollen glands in the neck, armpits, or groin lasting more than four weeks, high fever, soaking night sweats, appearance of one or more purple spots inside the mouth, on the skin, or the anus or nasal passages, and persistent diarrhea. Once infected with HIV, it can take up to fifteen years before an AIDS diagnosis occurs.

HIV/AIDS and Variables Literature Review

Urban Populations

In 2006, the highest rate of HIV cases in Texas occurred in Harris, Dallas, Bexar, Travis and Tarrant counties, all of which are urban areas (Texas Department of State Health Services, 2010). Cities contain large population densities and concentrated groups of people, which can increase the chances of contracting a communicable disease. Many people live, work, and socialize in urban areas, and the movement of people can easily spread HIV/AIDS in cities. Poverty in urban areas can often lead to informal settlements, where health status is often compromised due to poor sanitation and nutrition. Vulnerable groups living in cities and towns include vulnerable children, young men and women, and the unemployed (The World Bank, 2010).

Race/Ethnicity

In 2006, African Americans made up 43% of HIV case reports, a staggering 54.2 cases per 100,000, making the rate five times higher than for Whites or Hispanics. The rate for Whites in Texas in 2006 was 8.9 cases per 100,000 and 9.5 per 100,000 for Hispanics (Texas Department of State Health Services, 2010). Blacks comprised the biggest percentage of diagnoses of HIV infection among youths and teens, ages 13-24 years, in 37 of the 50 states from 2005-2008 (CDC: HIV Surveillance in Adolescents and Young Adults). In 2008, 17% of youths and teens with HIV infections were Hispanic or White, while a shocking 64% were Black (CDC, 2011). In 2008, HIV infection rates among ages 13-19 years were highest in Mississippi (18.1 per 100,000), Georgia (17.6 per 100,000), Louisiana (17.0 per 100,000), and Florida (16.3 per 100,000), all states that have high percentages of Blacks. It is safe to say that Blacks have been disproportionally affected by the HIV pandemic.

Level of Education

When the pandemic first made its appearance in the 1980's, many studies found a direct positive correlation between level of education and HIV/AIDS rates. Children between the ages of 15-24 were termed as the "window of hope," where education could prevent the spread of HIV (Kim, 2006). The World Bank (2010) considers education to be a huge preventative of youths and teens from contracting HIV and AIDS. Research shows that HIV prevention information education reduces vulnerability of risky activities, such as unsafe sex, which in turn could cause a decrease in rates. Yet, much of the research conducted on the rate of HIV/AIDS among youths and teens and level of education has not established a causal link between the two. Many believe that education will develop personal value systems that will facilitate self-protection, promoting behaviors that will lower the risk (Kim, 2006). In 2002, the World Bank stated that education affects long term behavioral change and protects against HIV infection, particularly for women (Kim, 2006). Many believe that schools provide an environment in which the students are better able to protect themselves. Evidence from the 1990's suggested that higher education is correlated with higher rates of HIV/AIDS. Current evidence is showing that more highly educated people are protecting themselves more than less educated people. This is becoming a greater concern for Texas which currently ranks 25th in the country for teens not in school and not high school graduates and 21st for teens not attending school and not working (Sessions, 2007).

Socioeconomic Factors

Socioeconomic factors are very important as well. Low income families often are poorly educated and are more likely than others to engage in crime and drug use. Disease control can be challenging in counties with low income families, due to a lack of development of public health

infrastructure. Low income families are more likely to have problems paying for HIV testing and antiretroviral medication.

From 1995-2004, Texas had the largest percentage of uninsured children in the United States in terms of private and public insurance (Annie E. Casey Foundation, 2010; Center for Public Policy Priorities, 2010). As of 2010, Texas had an astounding 23% of children living in poverty, compared with the national rate at 18%, giving Texas the seventh highest child poverty rate in the nation. Children living in poverty are more likely to have less access to healthcare and little, if any, insurance to cover health costs, due to the income status of the parent(s) or guardian(s).

Single-parent households are common in Texas and other states in America. Texas ranks 29th in the nation in percentage of children living in single-parent families (Sessions, 2007). Single-parents are often overextended with care giving responsibilities, working to provide income, managing household duties, and, in most cases, having little or no time to promote family functioning. This can lead the children of these single-parent households to feel isolated and often vulnerable, becoming more at risk of engaging in risky behaviors such as unsafe sex and illicit drug use. Research shows that teenagers living without biological fathers are more likely to experience problems with sexual health and are more likely to become teenage parents (Civitas, 2002). Single-parent households are more likely to lack parental supervision and guidance, something that many argue can lead to youths and teens contracting HIV at an early age. Single-parent households also have fewer income-earners in the home, which is a huge contributor to children living in poverty.

Unsafe Sex

Unsafe sex among youths and teens is a common occurrence. Sex-education programs have been implemented worldwide, yet STDs and teen births are increasing. Studies have shown that those with STDs are at a higher risk of contracting HIV/AIDS (CDC, 2008). For example, chlamydia has been associated with increasing HIV infection, and as of 2007, chlamydia rates in Texas rose to 365 cases per 100,000 (CDC, 2010). Research shows that education on STD's can be successful in reducing the number of sexual partners, delaying first sexual encounters, reducing the risk of getting pregnant, reducing HIV infection risks, and, in general, promoting good decision making in terms of relationships and sexual behavior. However, Texas does not require sex education in schools, and when taught, the state must follow federal definition of abstinence-only education (CDC, 2007).

As of July 2010, Texas ranked 48th in the country for teen birth rates, certainly a concern for the state (Associated Press, 2010). Some argue that the federal abstinence-only education actually increases the likelihood of teen pregnancies because they are illogical in today's modern world. Authorized by the United States Congress in 1997 and finished in 2007, a national study concluded that the abstinence-only sex education has no significant correlation with keeping teens from having sex and engaging in sexual activity, nor does it increase or decrease condom usage if they do have sex (Sessions, 2007). When engaging in sexual activities, the chance of contracting STDs increases as well as the possibility of becoming pregnant, even when using protection. Abstinence is the only way to guarantee a clean sexual health status, but it is apparent that teens are engaging more in sexual activities, so preventative measures should be employed. Studies have also shown that only 40% of teen mothers in Texas graduate from high school, therefore education on safe-sex practices should be considered to increase the percentages of

teen mothers who complete high school as education is the key to the future for teen mothers as well as their children (Texas Freedom Network, 2010).

Description and Explanation of the Geography of HIV/AIDS in Youths and Teens in Texas

The highest rates of HIV/AIDS appeared in Dallas, Harris, Jefferson, Houston, Throckmorton, Anderson, and Gregg counties, which are all urban counties that include metropolitan cities. Refer to Figure 1. All four of these counties are shown in the highest quintile. They are located in the eastern region of Texas and HIV/AIDS rates among these counties varied between 402-985 cases per 100,000.

Cases for relatively high rates, ranging from 224-402 cases per 100,000 occur in the south, east, and north regions of Texas. In the south, counties with high HIV/AIDS rates include Willacy, La Salle, Kinney, and Bexar, which have no close proximity to any of the four counties that have the highest rates. In the east, counties with relatively high rates include Travis (located near Bexar County), Colorado (next to Austin and Waller counties), Waller (borders Harris), Grimes (borders Waller), Walker (borders Grimes), Cherokee (borders Anderson and proximity to Houston and Gregg), San Augustine (in proximity to Houston), Wharton (borders Ft. Bend), Ft. Bend (borders Harris), Robertson (vicinity to Anderson), Angelina (borders Houston), Lamar (vicinity to Dallas), Collin (borders Dallas), Travis (vicinity to Bexar), Galveston (borders Harris), and Marion (borders Gregg). In the north counties with relatively high rates include Sherman, Potter, and Carson counties. In the north central region counties with relatively high rates include Tarrant (borders Dallas) and Throckmorton (in proximity to Tarrant). These counties for the most part bordered a county that had the same rate or a moderate rate and were in proximity to a major city or one of the four counties with the highest rates.

Cases for moderate rates (range from 125-224 cases per 100,000) consist of 54 counties and location varies and includes regions in the west, northwest, south along the border, east, northeast, and north central Texas. These counties for the most part bordered a county that had the same rate or higher and were in proximity to a major city or one of the four counties with the highest rates.

Statistical Analysis and Interpretation

Rate and Level of Education

Less than a high school graduate degree. Refer to Figure 1 and Figure 2. There is a negative, weak correlation between education and rates of HIV/AIDS. The R value is -.265, significant at less than .01. Results show that as the percentage of those with less than a high school graduate degree increases, the rate of HIV/AIDS decreases (Table 1).

Bachelor's degree or higher. Refer to Figure 1 and Figure 3. There was a significant positive correlation ($r = 0.987$), significant at less than .01. Results show that as the percentage of those with a bachelor's degree or higher increases, the rate of HIV/AIDS increases (Table 1).

The positive correlation between the percent with a bachelor's degree or higher and the rate of HIV/AIDS is related to urbanization. Urban areas have higher percentages of educated people as well as the highest rates of HIV/AIDS. The results suggest that the more educated the population of a county is, the higher the rate of HIV/AIDS, which refutes my hypothesis that the less educated would have higher rates and the higher educated would have lower rates.

HIV/AIDS and Race/Ethnicity

Percentage of population that is White. Refer to Figure 1 and Figure 4. There is a significant negative, weak correlation between the rate of HIV/AIDS and percent of the

population that is White. The R value is -.135, significant at .03, indicating that as the percent White population increases, the rate of HIV/AIDS decreases (Table 1).

Percentage of the population that is Black. Refer to Figure 1 and Figure 5. There is a positive correlation between the rate of HIV/AIDS and percentage of the county population that is Black. The R value is .458, significant at less than .01, indicating that as the percent Black population increases, the rate of HIV/AIDS increases (Table 1).

Percentage of population that is Hispanic. Refer to Figure 1 and Figure 6. There is a negative, weak correlation between the rate of HIV/AIDS and the percentage of the county population that is Hispanic. The R Value is -.136, and is significant at .03, indicating that as the Hispanic population increases, the rate of HIV/AIDS decreases (Table 1).

Interpretation of the results suggests that the Black population is most affected by HIV/AIDS. Supporting my hypothesis, results show that counties with high populations of Black people have high rates of HIV/AIDS.

Rate and Socioeconomic Factors

Percent of single-parent households. Refer to Figure 1 and Figure 7. There is a positive, moderate correlation between the percent of single-parent households and the rate of HIV/AIDS. The R value is .442, significant at less than .01 indicating that as the percentage of single-parent households increases, the rate of HIV/AIDS increases (Table 1).

Percent of children living in poverty. Refer to Figure 1 and Figure 8. There was no significant correlation between the percent of children living in poverty and the rate of HIV/AIDS. The null was accepted. The R value is -.027, indicating that there is no relationship between the percentage of children living in poverty and the rate of HIV/AIDS (Table 1).

Median family income. Refer to Figure 1 and Figure 9. There is a significant, positive correlation between median family income and the rate of HIV/AIDS. The R value is .233, significant at less than .01, indicating that as the median family income increases, the rate of HIV/AIDS increases (Table 1).

The positive correlation between the percent of single-parent households and the rate of HIV/AIDS can be attributed to many different factors, but the most obvious may be a lack of parental supervision that one would experience with only one parent supervising, working, and maintaining other duties. This result validated my hypothesis that high percentages of single-parent households would also have high rates of HIV/AIDS.

Urbanization is a factor when comparing the rate of HIV/AIDS and median family incomes. The results showed that the higher the median family income, the higher the rate. People living in urban areas tend to have higher median family incomes, and the rates of HIV/AIDS are highest in urban areas. My hypothesis, the lower the median family income, the higher the rate of HIV/AIDS, was not supported because of the urbanization factor.

HIV/AIDS Rate and Urban Populations

Total urban population. Refer to Figure 1 and Figure 10. There is a significant, positive, moderate correlation between urban populations and the rate of HIV/AIDS. The R value is .535, significant at less than .01. Results show that areas with high percentages of urban populations have high rates of HIV/AIDS (Table 1).

For interpretation of the results, it can be inferred that urban populations constitute areas of high population densities. High population densities can spread diseases faster due to an influx of people and concentration of people. My hypothesis was confirmed that urban areas have higher HIV/AIDS rates.

HIV/AIDS and Unsafe Sex

Chlamydia rate. Refer to Figure 1 and Figure 11. There is a significant, positive correlation between the Chlamydia rate and the rate of HIV/AIDS among the counties. The R value is .378, significant at less than .01, indicating that as the rate of Chlamydia increases, the rate of HIV/AIDS increases (Table 1).

Teen birth rate. Refer to Figure 1 and Figure 12. The R value is .039. There is no significant correlation between teen birth rates and the rate of HIV/AIDS (Table 1).

Both HIV/AIDS and Chlamydia are indicators of unsafe sex. Urban areas tend to have higher STD rates as well as higher HIV/AIDS rates. Teen birth rates had no significance because the rates are high in rural and urban counties. Teen birth rates are not an indicator of unsafe sex because the rates are fairly high across all counties. My hypothesis that counties with high rates of Chlamydia will also have high rates of HIV/AIDS was confirmed, yet my hypothesis that counties with high teen birth rates would have high rates of HIV/AIDS was refuted.

Conclusions and Implications

The analysis shows that HIV/AIDS among youths and teens has a positive, significant correlation with Chlamydia rates, high median incomes, percent Black population, percentage of the population with a bachelor's degree or higher, percent urban populations, and percent single-parent households. Thus, areas with high rates of Chlamydia also have high rates of HIV/AIDS because both are indicators of unsafe sex and both occur most frequently among urban populations. High HIV/AIDS rates can also be found where there are high median incomes because, in general, those with high median incomes reside in urban areas. Black populations seem to be the most at risk among the races and the highest Black populations are in East Texas where the highest rates of HIV/AIDS occur. It can also be implied that the higher rates among

those who are more educated exist because of their proximity to urban centers. Higher rates are occurring in urban populations simply because of the high population densities, and the concentration and influx of people. Higher rates may be occurring among single-parent households because of a lack of parental supervision.

Recommendations for Prevention and Control

Recommendations to decrease the rates of HIV/AIDS implied by these findings are listed below.

1. Adequate STD education programs need to be developed in urban areas and colleges, promoting abstinence *and* safe sex. It is apparent that unsafe sex is probably occurring among youths and teens as shown by the Chlamydia rates. Education programs should promote safe sex in order to reduce Chlamydia and HIV/AIDS rates.
2. HIV/AIDS awareness programs need to be developed in East Texas where there are high populations of Blacks. Because the symptoms of HIV can take up to ten years to show, many spread the virus without realizing that they could even have it. Awareness programs should provide context of the virus, how it is spread, the symptoms associated with it, free testing, and a general awareness of the threat that HIV/AIDS has become among Black populations.
3. STD and safe sex education programs need to be developed for middle school students to encourage abstinence and safe sex education among all children especially those in at-risk groups such as children who live in single-parent households.
4. Free testing in urban areas should be implemented in order to reduce the spread of HIV/AIDS. Where there are high population densities, there are higher risks of contracting a disease. Often, infected people are unaware that they have HIV because

they show no symptoms. Free testing will provide the results on an individual basis and the knowledge of one's health status.

5. Testing facilities in East Texas, urban centers, and colleges need to be more accessible to people at risk of developing HIV/AIDS. It is apparent that East Texas and urban populations have the highest rates of infection. If there were access to healthcare facilities in these regions, perhaps the rate would decrease as more people were tested, treated, and made aware of their health status.

Recommendations for Future Research

Future research should focus on the HIV/AIDS rates in East Texas, its spatial distribution including characteristics of neighborhoods with high rates, and the mode of exposure among Black populations to pinpoint risk factors, determinants of susceptibility, and transmission pathways. Targeting HIV/AIDS interventions using such information may reduce HIV transmission and limit spread of the disease.

References

AIDS Education & Training Centers (AETC) National Resource Center. (May 2008). *Overview of HIV/AIDS in the Texas-Mexico border region*. Retrieved from http://www.aids-ed.org/aidsetc?page=rep-umtx-bg

American Association for Clinical Chemistry. (2011). *CD4 and CD8*. Retrieved from http://www.labtestsonline.org/understanding/analytes/cd4/test.html

Annie E. Casey Foundation. (2010). *Kids count data center: Date by state: Texas*. Retrieved from http://datacenter.kidscount.org/data/bystate/StateLanding.aspx?state=TX

Associated Press, News 8 Austin. (2010). *Texas ranks 48th in teen birth rate*. Retrieved from http://www.news8austin.com/content/special_reports/shortchanging_child_care/272893/texas-ranks-48th-in-teen-birth-rate

Centers for Disease Control and Prevention. (2005). *Cases of HIV Infection and AIDs in the United States, HIV/AIDS surveillance report*, Vol.16. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from http://www.cdc.gov/hiv/topics/surveillance/resources/reports/2004report/

Centers for Disease Control and Prevention. (2006). *A glance at the HIV/AIDS epidemic*. Retrieved from http://www.cdc.gov/hiv/PUBS/Facts/At-A-Glance.htm

Centers for Disease Control and Prevention. (2007*). State profile: STD's, HIV/AIDS, and teen pregnancy prevention policies: Texas*. Retrieved from http://www.healthystates.csg.org/NR/rdonlyres/EBB4AE23-8616-49DD-83A3-BDE8B48DFE6F/0/Texasfinal.pdf

Centers for Disease Control and Prevention. (2008). HIV surveillance in adolescents and young adults. Retrieved from http://www.cdc.gov/hiv/topics/surveillance/resources/slides/adolescents/index

Centers for Disease Control and Prevention. (2010). *Sexually transmitted diseases: Chlamydia − CDC factsheet*. (2010). Retrieved from http://www.cdc.gov/std/chlamydia/stdfact-chlamydia.htm

Centers for Disease Control and Prevention. (2011). *Basic statistics*. Retrieved from http://www.cdc.gov/hiv/topics/surveillance/basic.htm#area

Center for Public Policy Priorities (CPPP). *Kids count*. (2010). Retrieved from *http://www.cppp.org/category.php?cid=10*

Civitas: The Institute for the Study of Civil Society. (2002). *Experiments in living: The fatherless family*. Retrieved from http://www.civitas.org.uk/pubs/experiments.php

Expert Health Data Programming, Inc. (2011). *Texas ICD-9 death data*. VitalWeb Standard. Retrieved from http://www.ehdp.com/vn/ro/txu1/eg1/dgw/en_US/std-hlp.htm

Hatano, H. (2011). Expert commentary: Immunologic nonresponders: Suboptimal CD4 T-Cell response in antiretroviral-treated, HIV-infected patients. *HIV InSite*. University of California San Francisco Center for HIV Information. Retrieved from http://hivinsite.ucsf.edu/

Kim, J. (2006). Literature review on the impact of education levels on HIV/AIDS prevalence rates. Retrieved from the World Food Programme website http://one.wfp.org/food_aid/doc/Literature_Review.pdf

Population Health Institute, University of Wisconsin. (2011). *County health rankings: Mobilizing action toward community health.* Retrieved from http://www.countyhealthrankings.org/texas

Sessions, L. (2007, April 14). Study casts doubt on abstinence-only programs. The Washington Post. Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2007/04/13/AR2007041301003.html

Texas Department of State Health Services. (2008). *An overview of HIV/AIDS in Texas*. Retrieved from http://www.dshs.state.tx.us/hivstd/info/edmat/HIVAIDSinTexas.pdf

Texas Department of State Health Services. (2010). Texas integrated epidemiologic profile for HIV/AIDS prevention and services planning: HIV/AIDS in Texas. *Morbidity of HIV/AIDS in Texas 2008.* Retrieved from http://www.dshs.state.tx.us/hivstd/reports/HIVandAIDSinTexas.pdf

Texas Freedom Network. (2010). *Texas Youth Leadership Council*. Retrieved from http://www.tfn.org/site/PageServer?pagename=students_youth_leadership_council

The World Bank. (2010). Urban Health: HIV/AIDS in Urban Areas. Retrieved from http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTURBANHEALTH/0,,contentMDK:20502240~menuPK:1127421~pagePK:148956~piPK:216618~theSitePK:1090894,00.html

U.S. Census Bureau Population Estimates Program Datasets with Geographic Comparisons Tables - Texas. Web. May 27, 2011. <http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US48&-_box_head_nbr=GCT-T1&-ds_name=PEP_2009_EST&-_lang=en&-format=ST-2&-_sse=on

Table 1. Correlation of Teen/Youth HIV/AIDS Rates and Explanatory Variables

Variable	R Value
Percent with less than a high school graduate degree	-.265**
Percent with a Bachelor's degree or higher	.987**
White population	-.135*
Black population	.458**
Hispanic population	-.136*
Percent of single-parent households	.442**
Percent of children in poverty	-.027
Median family income	.233**
Urban population	.535**
Teen Births	.039
Chlamydia	.378*

* significant at less than .03

** significant at less than 01

Figure 1. Rate of HIV/AIDS Among Youths and Teens Ages 13-24 by County, 1999-2008

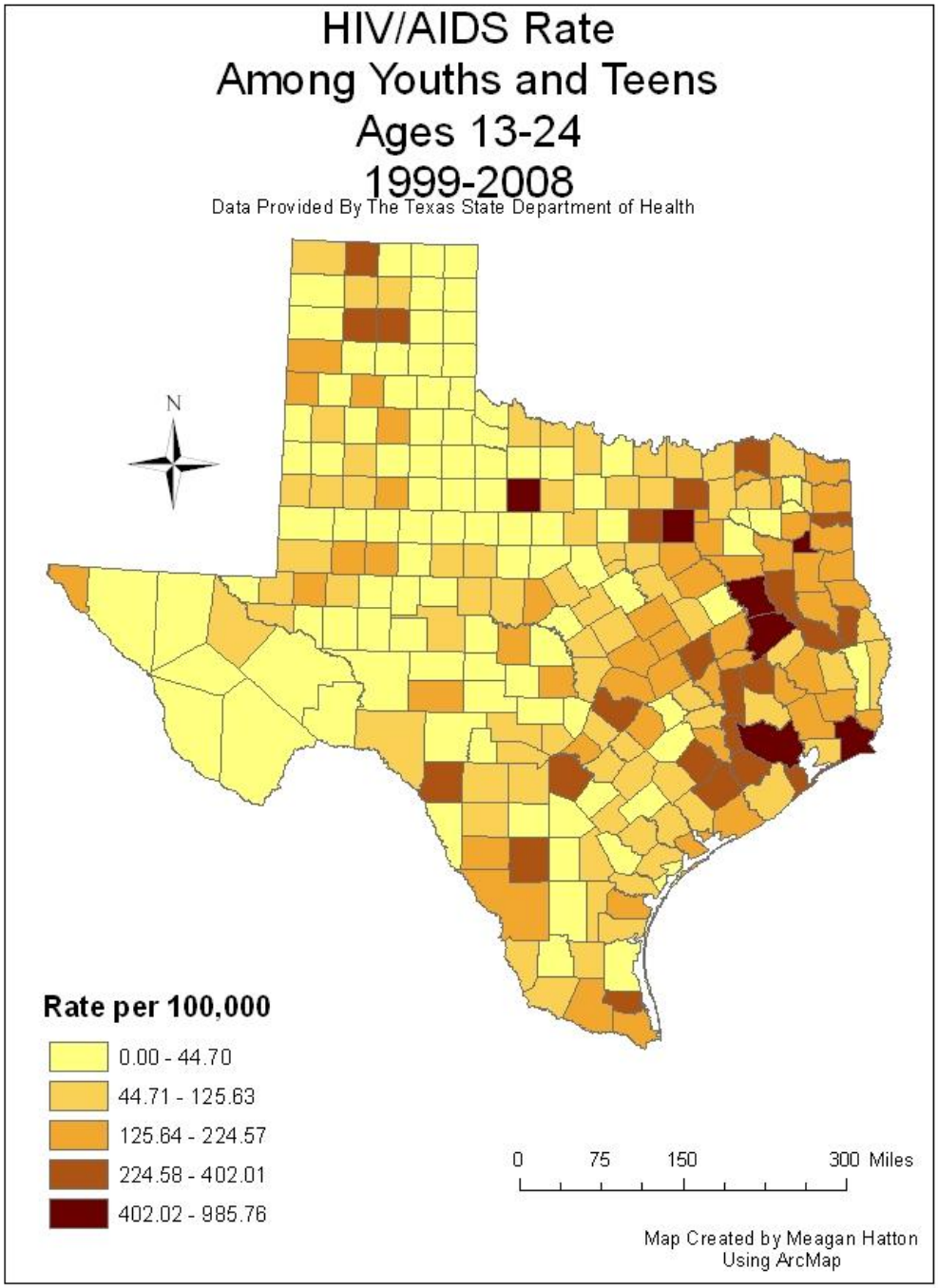

Figure 2. Percent of Population by County With Less Than A High School Graduate Degree Among Ages 18-24

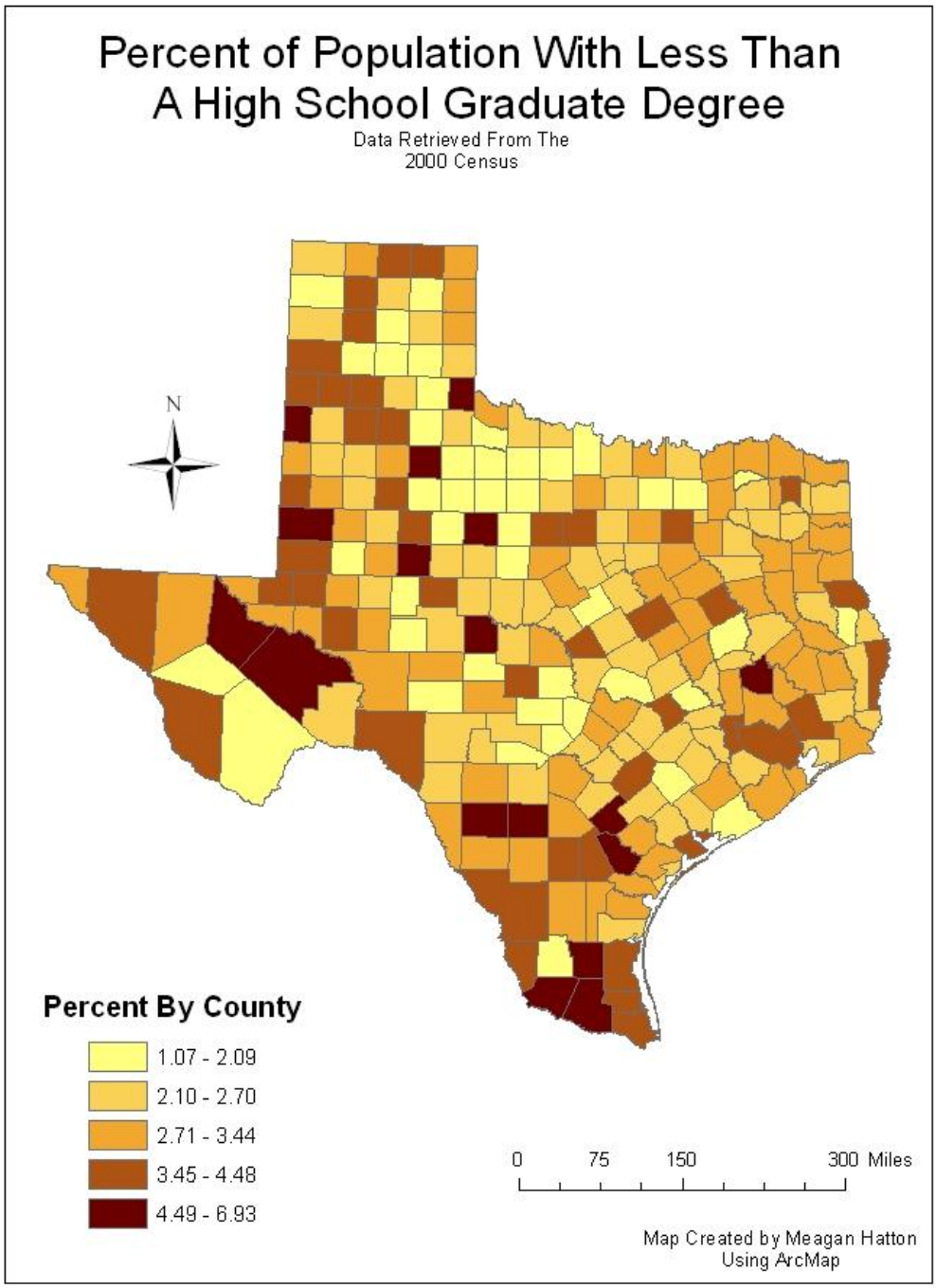

Figure 3. Percent of Population by County With a Bachelor's Degree Ages 18-24

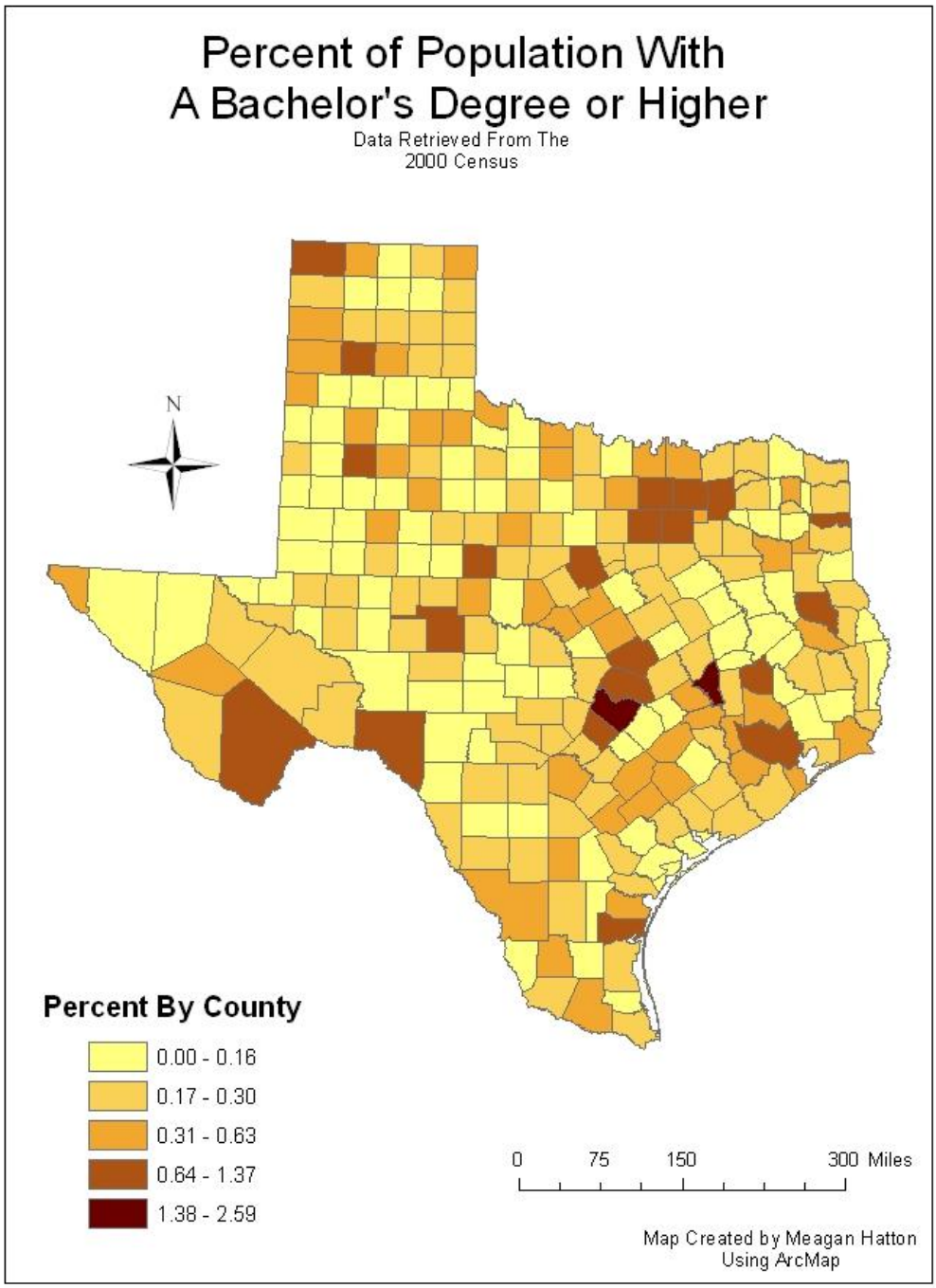

Figure 4. Percent White by County

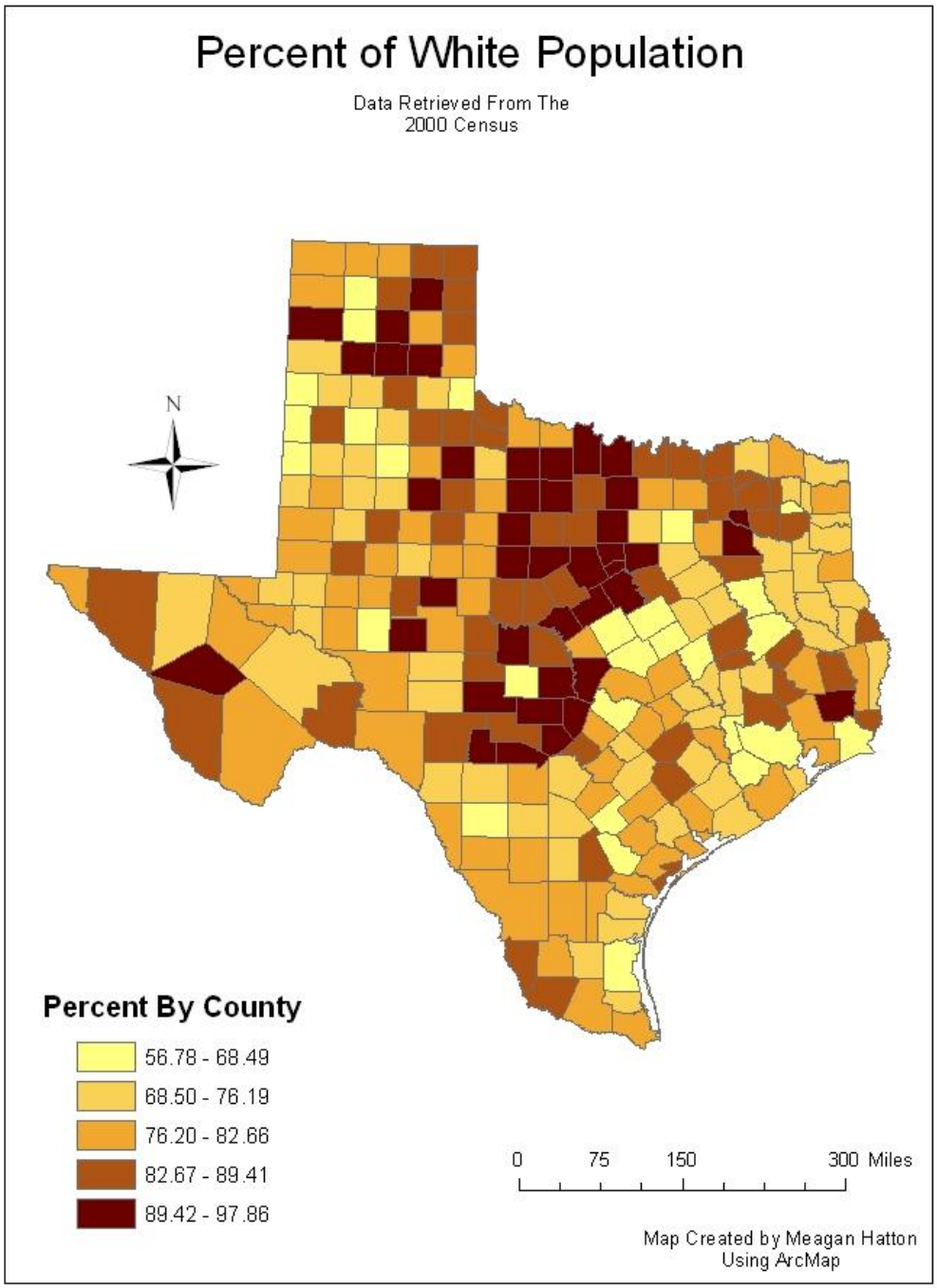

Figure 5. Percent Black by County

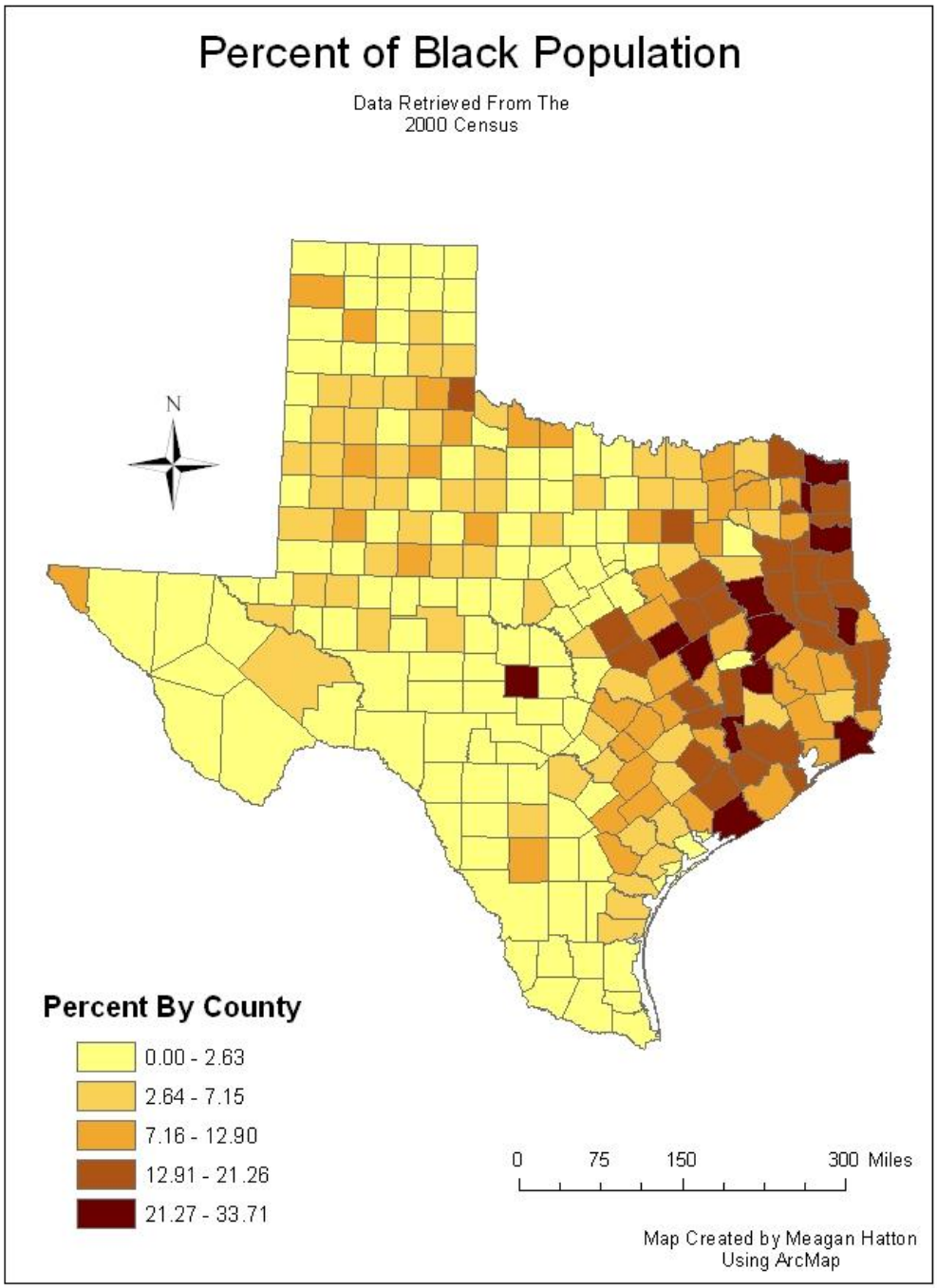

Figure 6. Percent Hispanic by County

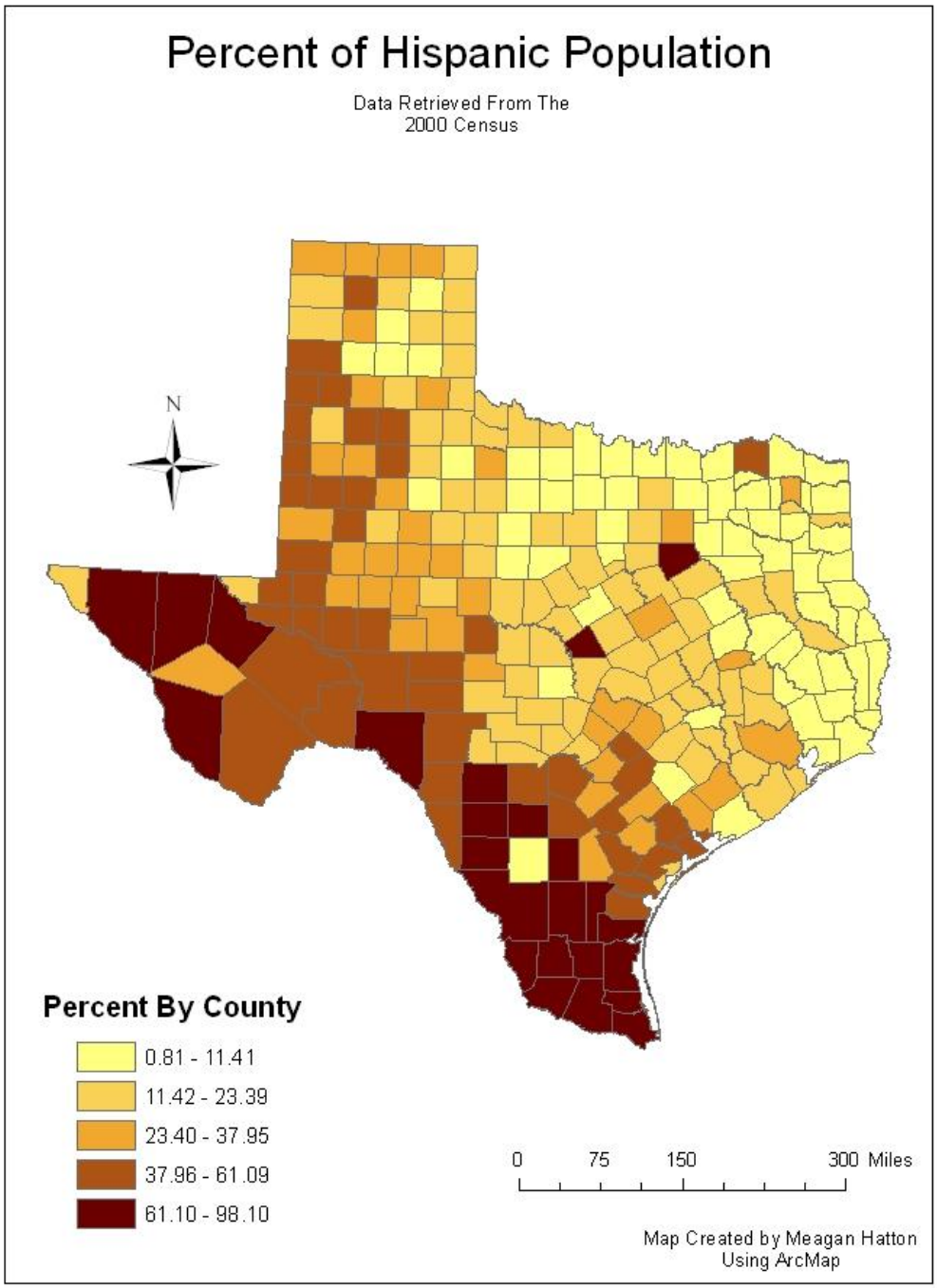

Figure 7. Percent of Single-Parent Households by County

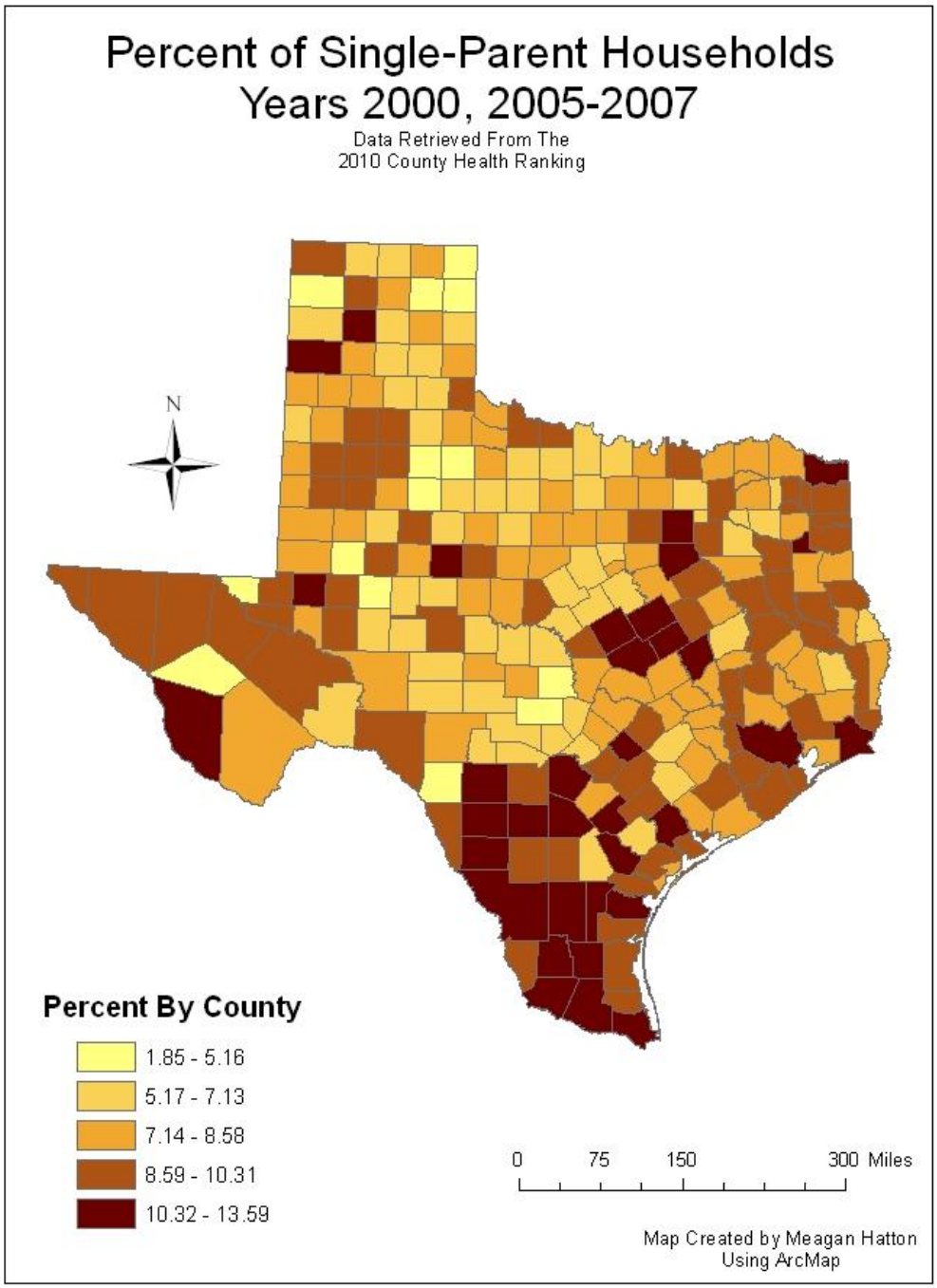

Figure 8. Percent of Children Living in Poverty by County, 2007

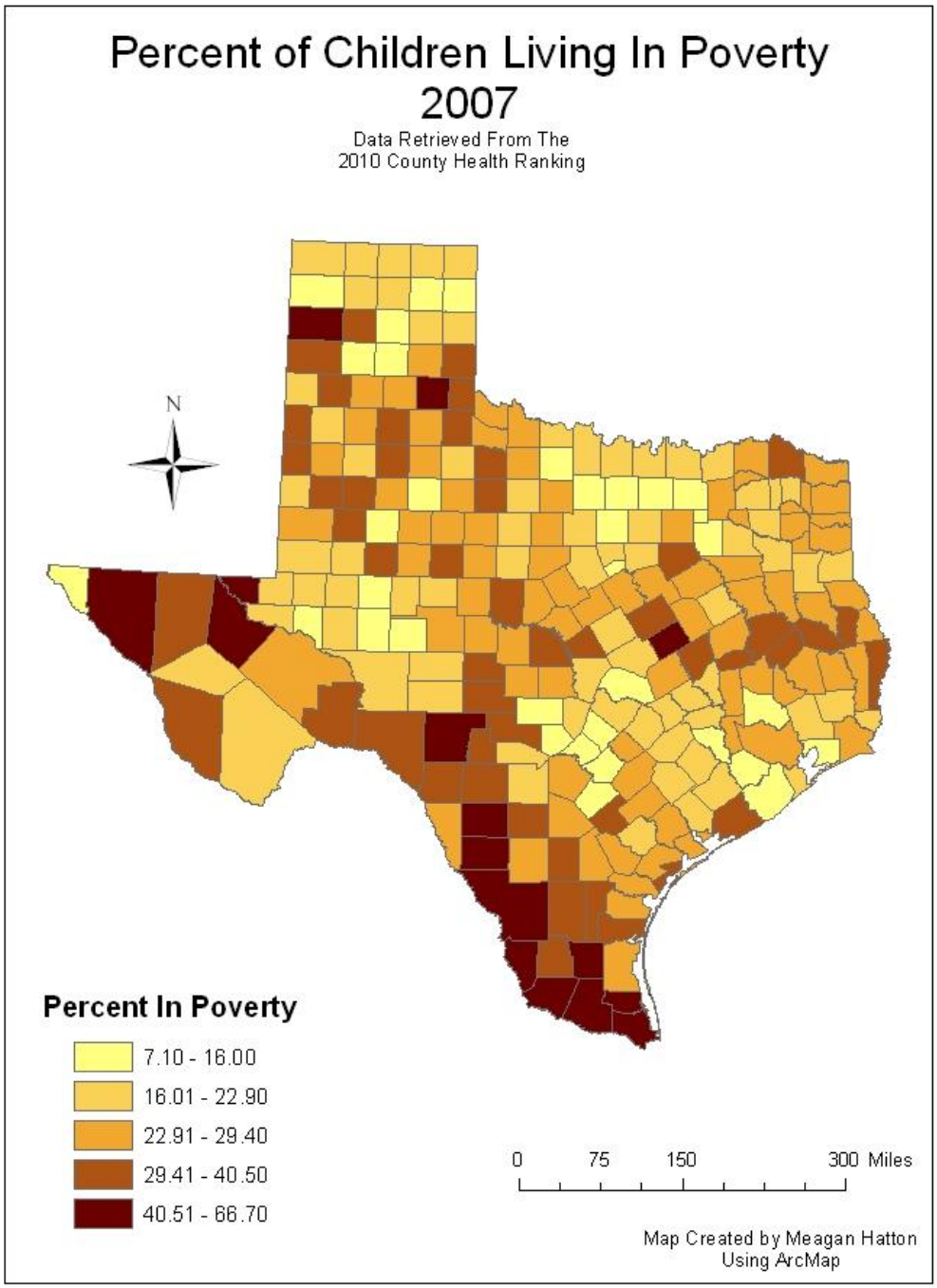

Figure 9. Median Family Income in Dollars by County

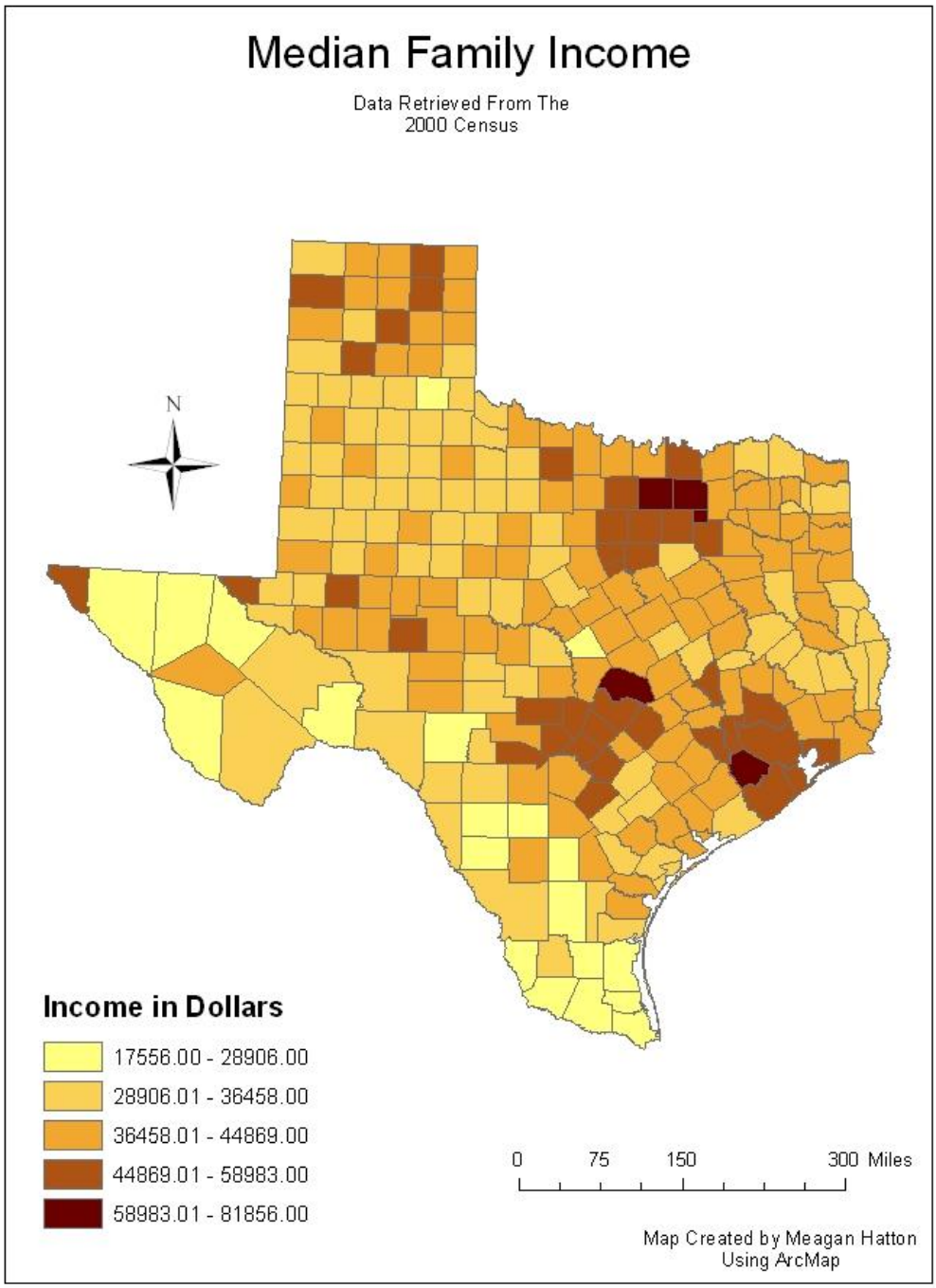

Figure 10. Percentage Urban Population by County

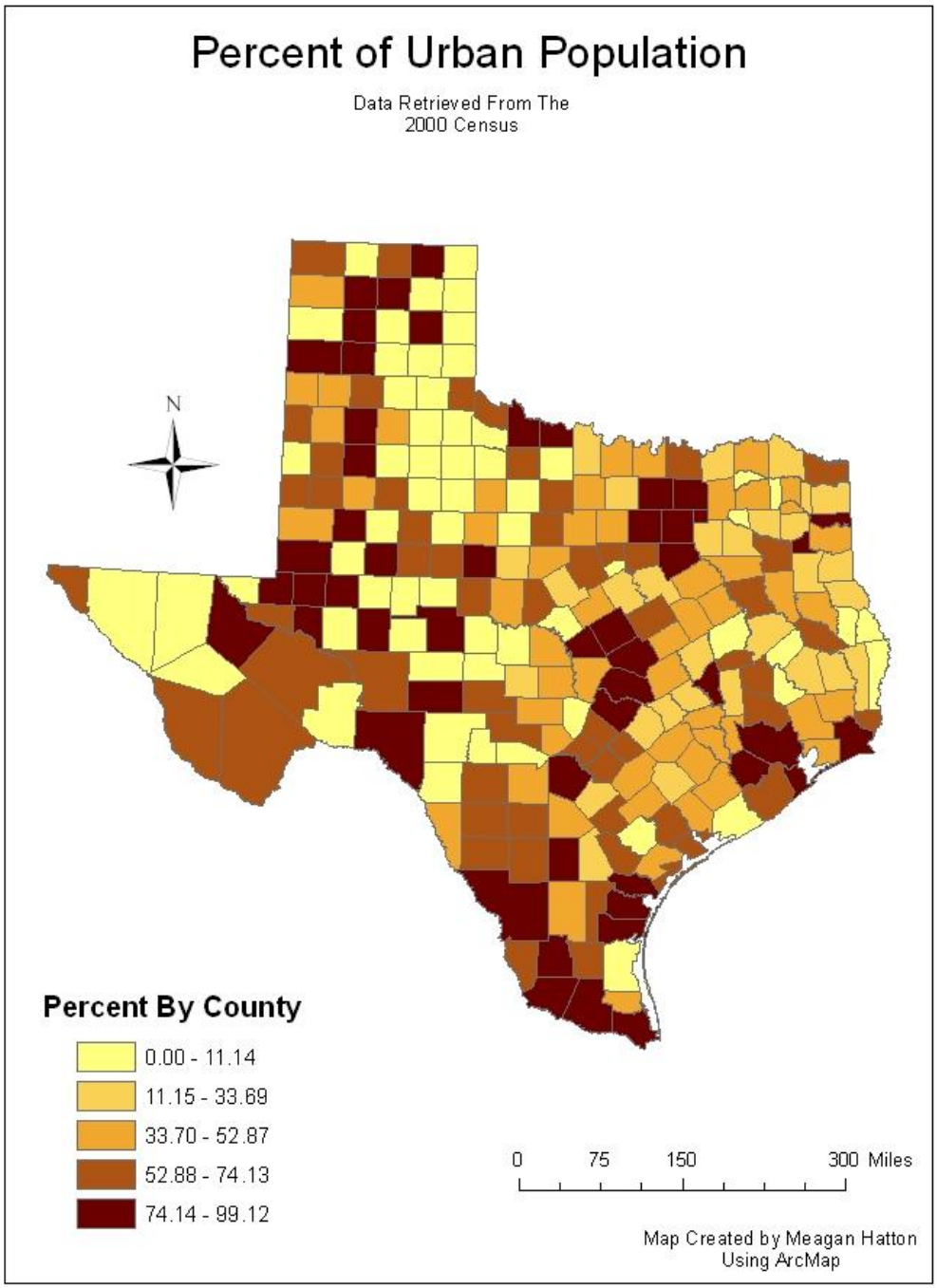

Figure 11. Chlamydia Rate by County

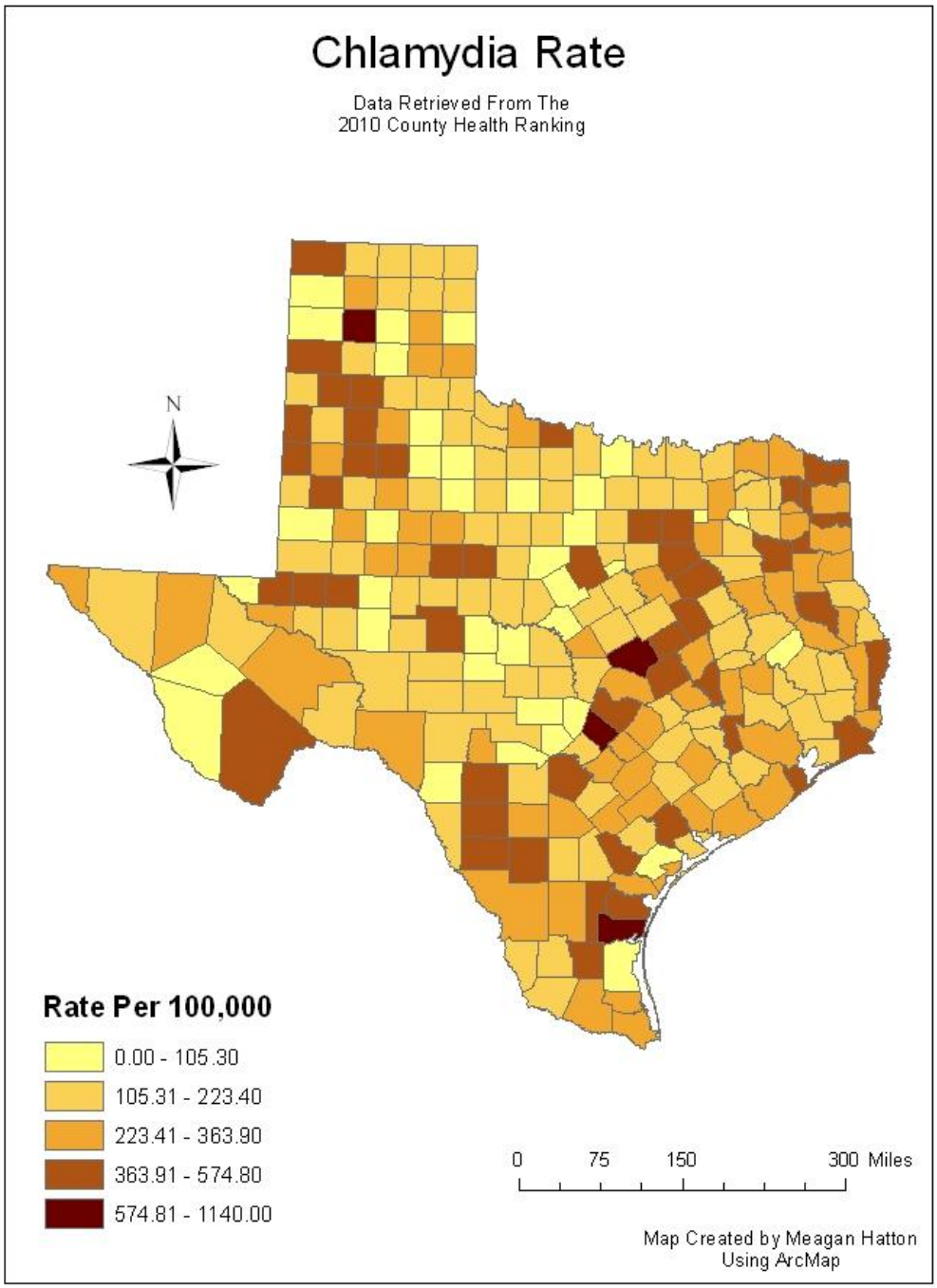

Figure 12. Teen Birth Rates for Ages 15-19 by County