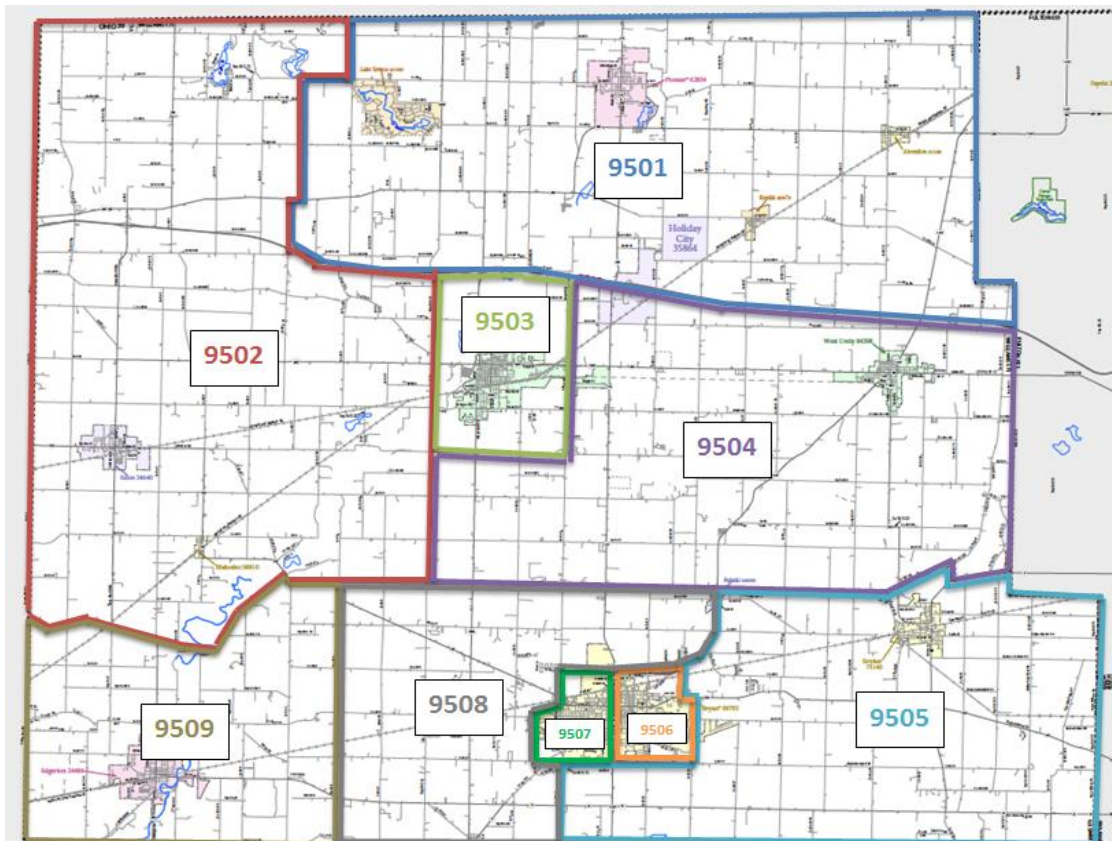


Williams County Health District



Health Inequities by Census Tract 2016 Health Equity Assessment Summary

*Your **zip code** can be more important to your health than your genetic code*



Williams County Health District

Table of Contents

Background.....	4
What is Health.....	4
What is Health Equity.....	4
Difference between equity and equality.....	4
Why health equity is important.....	4
Methods to Determine Health Inequities in Williams County.....	5
Goals of this assessment.....	5
Social Determinants and Your Health.....	6
Your Zip Code vs. Your Genetic Code.....	6
A Closer Look at Williams County.....	7
Average Age of Death.....	7
Age-Adjusted Mortality Rates.....	8
Income.....	9
Education.....	11
Employment.....	13
Health Insurance.....	14
Food.....	15
Housing.....	16
The Census Tracts at a Glance	18
How Williams County Compares	19
Conclusion.....	19
APPENDIX A: Process and Methods.....	20
APPENDIX B: Data Sources.....	21

Williams County Health District

APPENDIX C: County Engineer Maps.....	21
Average Age of Death Map.....	22
Age-Adjusted Mortality Rate Map.....	23
Median Income Map.....	24
Poverty Rate Map.....	25
High School Graduation Rate Map.....	26
Higher Education Graduation Map.....	27
Unemployment Rate Map.....	28
Lack of Health Insurance Map.....	29
Households on Food Stamps Map.....	30
Housing Cost Burden Map.....	31
References.....	32

Our Vision:

Shaping the healthiest and safest community.

Our Mission:

Prevent disease and injury.

Promote health and wellness.

Protect you and your community.

Williams County Health District

BACKGROUND INFORMATION

What is Health?

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”, this definition was created in 1948 and has not changed since (WHO, 1948). Though the definition of health applies to all people, and a healthy life is named as a fundamental human right, many are unable to achieve this level of well-being in their lifetime. These differences in health outcomes can be attributed to various factors, which will be discussed in further detail later in this report.

What is Health Equity?

According to the Health Equity Institute, health equity means that all people have a fair chance to reach their highest possible level of health. To achieve health equity, health inequities must be reduced or eliminated. A health inequity occurs when there is an avoidable difference in health that is associated with social, economic, geographic factors and more (Health Equity Institute, 2010). Often health equity is confused with health equality, though the two concepts do differentiate on one key point.

Health Equity vs Equality:

Health equity and health equality are vastly different concepts. Health equality aims to provide all people with the same resources and opportunities so they can be healthy. While health equality focuses on fairness, this approach is only successful when all people start in the same place and have the same needs to achieve health.

Health equity strives to provide all people with the resources and opportunities they need in order to achieve health (Boston Public Health Commission, N.D.). See Figure 1 for a depiction of equity versus equality.

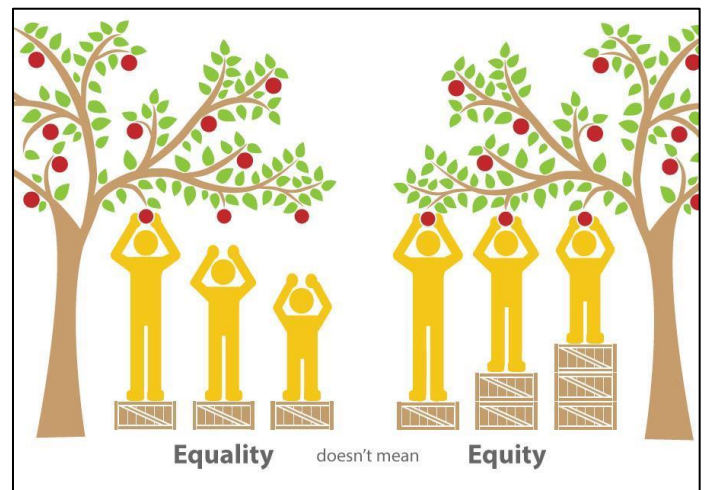


Figure 1: Equality vs. Equity

Why Health Equity is Important:

Health equity is vital, because every person deserves to have the opportunity to live and lead a healthy life. No individual should be deprived of health because of their socio-economic conditions and their geographic location. As stated by the Tacoma-Pierce County Health Department, health equity “represents one of the values that we share as Americans, equal opportunity for all. While we may never achieve the highest life-expectancy possible, we can work to ensure that everyone has the chance to make choices that will allow them to live the longest and healthiest life possible” (Tacoma-Pierce County Health Department, 2016).

Williams County Health District

Methods to Determine Health Inequities in Williams County:

The main health outcome being examined in this report is the average age of death in each census tract of the county. Once this component had been determined, additional factors were analyzed to see what could have contributed to the differences found between the various areas in the county. The contributing factors that were examined were social and economic aspects such as educational attainment, income, unemployment rates, health insurance coverage, housing, as well as food stamps. Each of these topics will be explored individually later in the report.

To make the analysis of this data more manageable, Williams County was broken down by census tract. This was also beneficial as data from the United States Census Bureau can be broken down by census tract for comparison as well. Census tracts are “small, relatively permanent geographic entities within counties...Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow

visible features” (United States Census Bureau, N.D.). See Figure 2 for the nine census tracts in Williams County.

Data from the years 2010 to 2014 were examined for this report. By looking at five (5) years worth of data an average could be calculated. This also allowed for trends to be discovered and helped prevent any one year’s outlying outcome to skew the data. No more than five (5) years were examined as communities can change drastically during long time periods and the data could no longer be representative of the population. The analyzed data

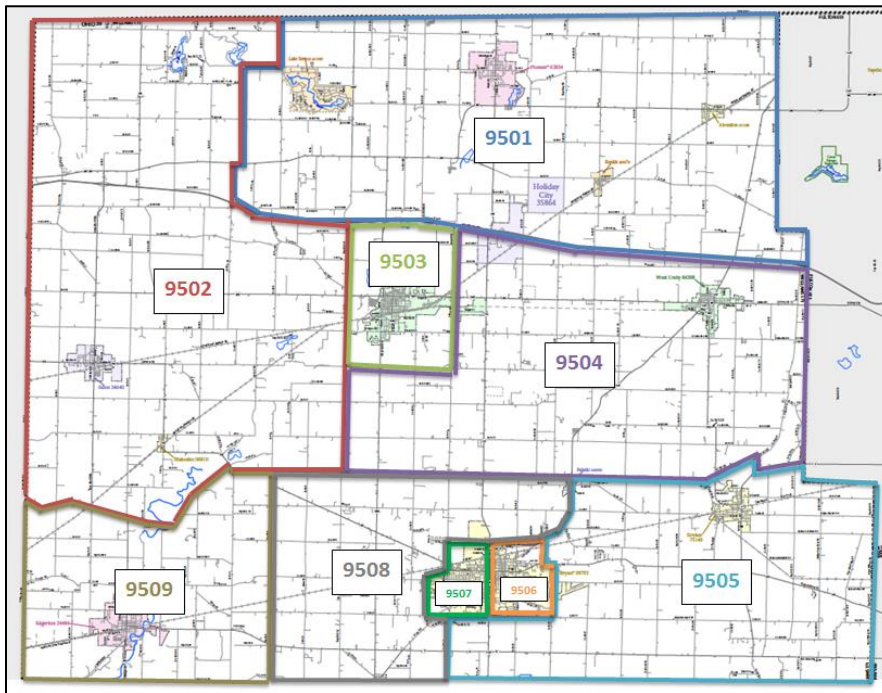


Figure 2: Williams County Census Tracts

originates from several sources, including death certificates of Williams County residents, US Census Bureau, and other national resources. For complete methods and sources, see Appendices A and B.

Goals of the Assessment:

The primary goal of this assessment is to determine where inequities are located within the Williams County. By establishing where the inequities are, organizations like the Health Department are better able to focus their services and resources. This also allows us to determine what each community within the county needs specifically to reach its highest potential for health. This ties in with the concept of equity over equality, as some communities may need more or different resources than those that experience better health outcomes.

Williams County Health District

Social Determinants and Your Health

Zip Code vs. Genetic Code: How can your zip code be more important than your genetic code?

Though genetic codes dictate quite a bit, it may not be the biggest determining factor in health. Where you live can create or reduce obstacles to health. This follows the concept of the social determinants of health, which states that the “conditions in which people are born, grow, live, work and age...are mostly responsible for health inequities” (World Health Organization (WHO), 2016). Often these situations are formed by forces outside the individual’s control. These determinants make up a large portion of your experiences and because of this they can greatly impact your health. “When living in poverty it is

difficult to afford quality housing and access resources that promote good health” such as healthy foods, parks, playgrounds, quality housing, and more, these areas can be considered “low-opportunity communities” (Tacoma-Pierce County, 2015; Ayers, 2016). Low-opportunity communities have been tied to poor health outcomes and contribute to health conditions such as diabetes, cancer, asthma, obesity and

various injuries, evidencing that a zip code may be more important than a genetic code (Ayers, 2016). Though it is vital for people to have healthy habits, they can only have and maintain these healthy habits when they have healthy options and opportunities in their communities. See Figure 3 for a breakdown of what makes people healthy.

The list of social determinants is an extensive one, the ones that will be the focus of this report will be income, education, employment, health insurance coverage, food access, and housing and how these may have impacted the differences found in average age of death in the different census tracts in Williams County.

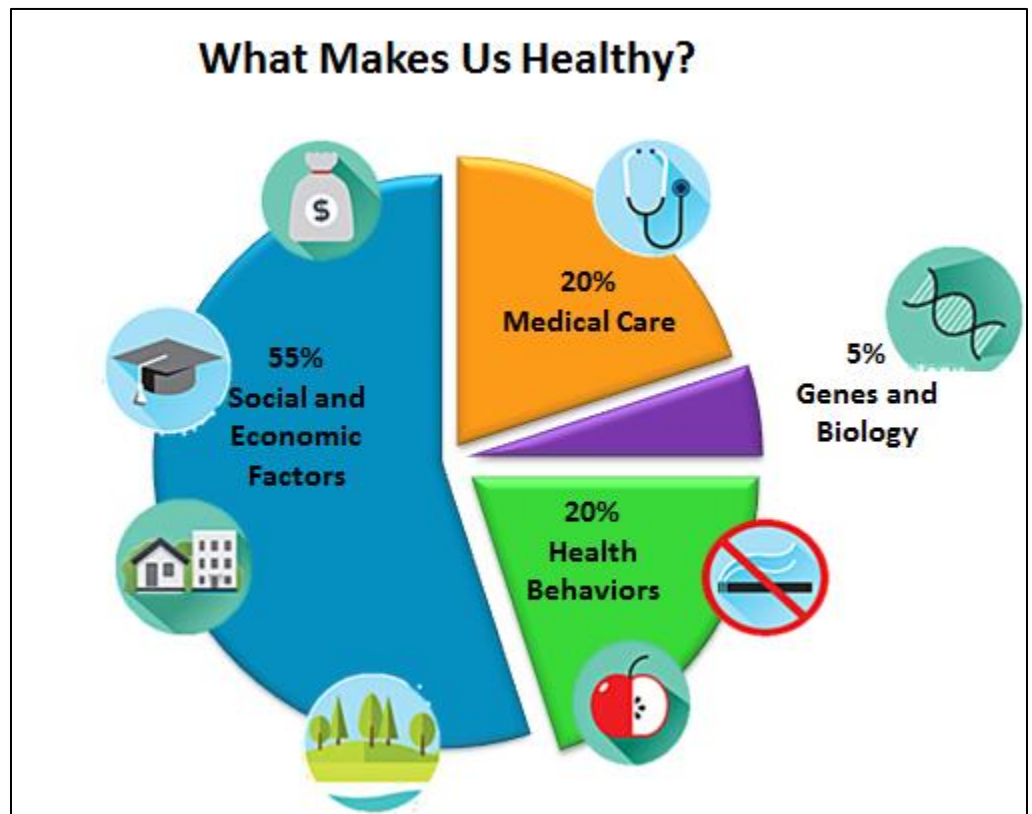


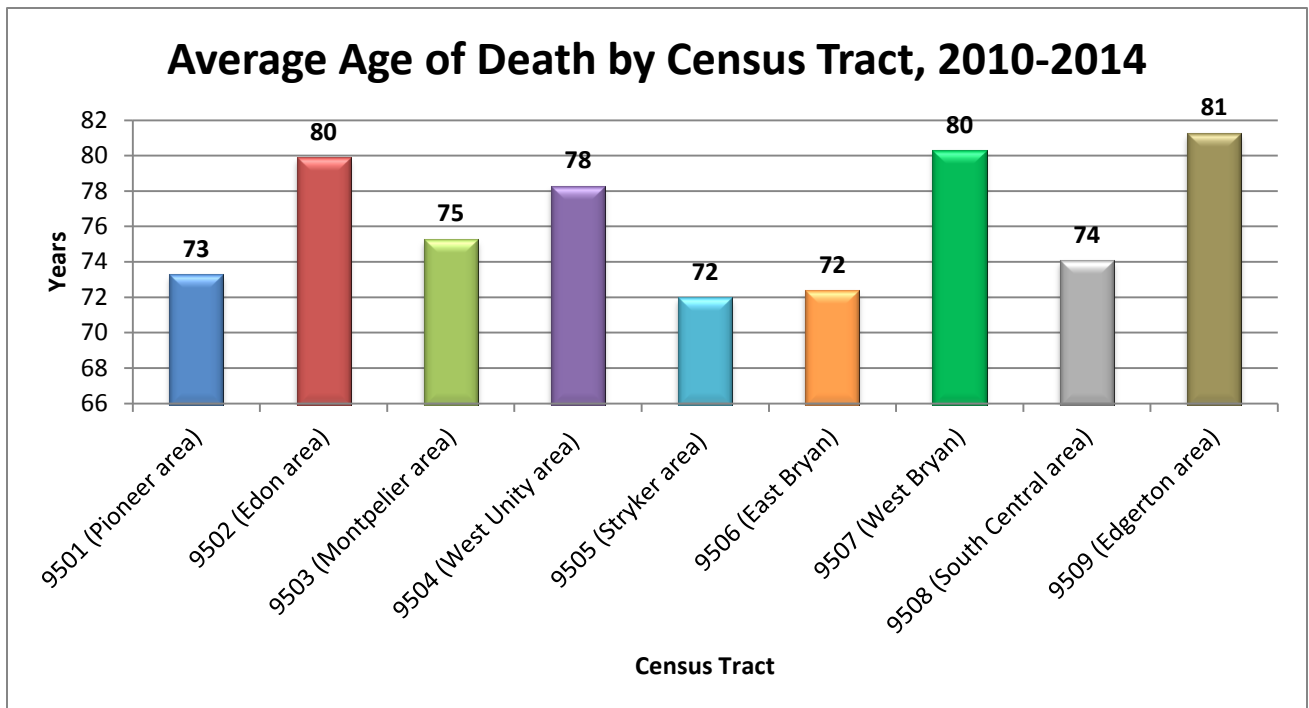
Figure 3: What Make Us Healthy? (Tacoma-Pierce County, 2016) and (CDC, 2014)

Williams County Health District

A Closer Look at Williams County:

Average Age of Death:

The indicator examined was the average age of death in the various census tracts in Williams County. The census tracts range from 9501 to 9509 and the map can be viewed in Figure 2 on page five (5). Average age of death was analyzed to determine if individuals lived longer in certain census tracts than others. The results were found by examining the age of death on the death certificates of Williams County residents between the years 2010 and 2014. The findings can be seen in Graph 1, which compares the average ages of death in each census tract. A map of these findings is in Appendix C.



Graph 1: Average Age of Death in Williams County by Census Tract, 2010-2014

The differences between several of the census tract areas are substantial, especially between tracts that are located next to one another, such as 9506 (East Bryan) and 9507 (West Bryan) which are two sides of one city. Over half of the census tracts have an average age of death that is lower than that of Williams County as a whole, which has an average age of death of 77 years. See Appendix C for Maps of the results.

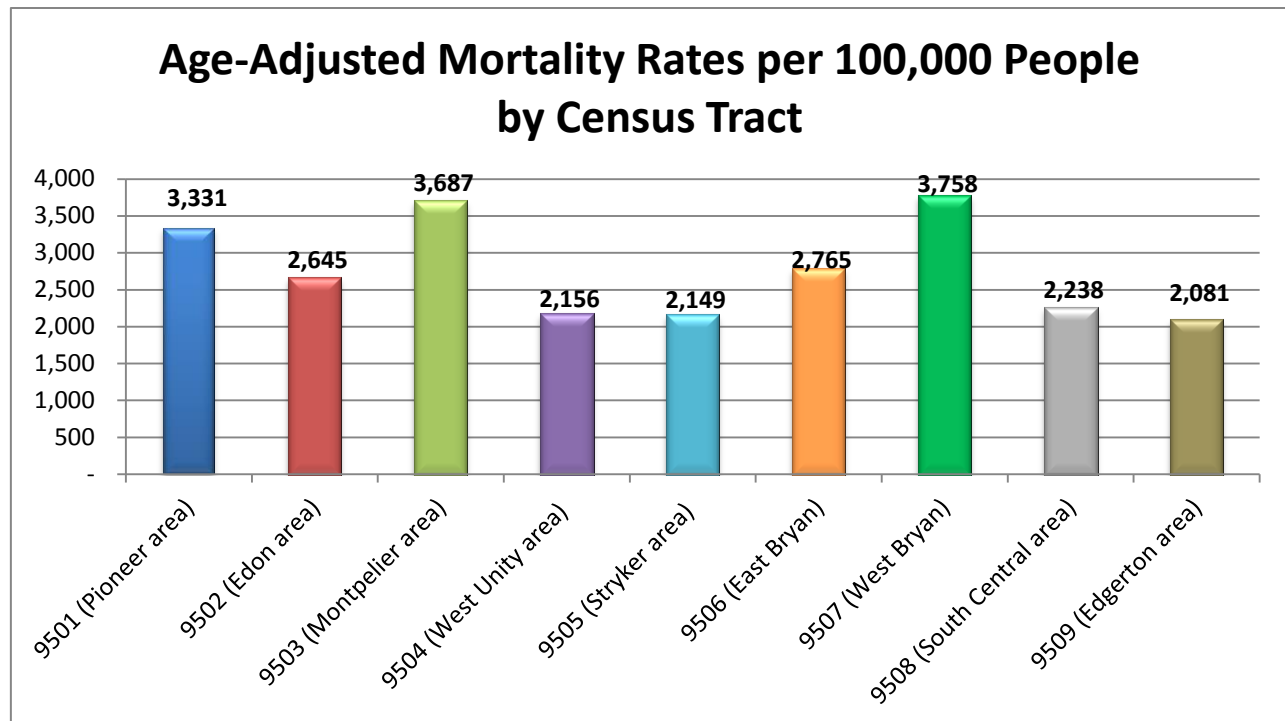
To ensure that the results were not skewed due to differences in the age-distribution in the population, the age-adjusted mortality rate was also calculated. An age-adjusted mortality rate allows for a fairer comparison between groups. This ensures that the difference seen between the populations is not due to an unequal age distribution across the census tracts. For instance, an area with more elderly individuals may have a higher mortality rate than areas with younger populations simply because an older population has “an inherently greater risk of dying” and already have a higher average age (LaMorte, 2016). By conducting an age-adjusted mortality rate, the question being asked is “if the age

Williams County Health District

composition of the populations were the same, would there be any differences” (Gordis, 2014). For more information on how the age-adjusted rates are calculated, see Appendix A.

As several nursing homes and assisted living facilities are located in certain census tracts, such as 9503 (Montpelier area) and 9507 (West Bryan), it was essential that this type of analysis was conducted as well. As there is likely a higher concentration of senior citizens in these areas which could influence the resulting numbers. Graph 2 displays the age-adjusted number of people out of 100,000 that died in that census tract between the years 2010 and 2014.

Graph 2: Age-Adjusted Mortality Rate in Williams County by Census Tract, 2010-2014



The results of the age-adjustments correlate with the locations of the nursing home and assisted living facilities, with the most deaths occurring in these census tracts. However, the results do not appear to correlate with the differences seen between the average ages of death. The age-adjusted rates results suggest that the differences in average age of death are not solely due to a higher population of senior citizens in certain tracts. For instance, while 9503 (Montpelier area) has a nursing home and this could correlate with the higher number of deaths in the area, this does not seem to reflect in the average age of death, which is the third lowest in the county; and one would expect that with a higher population of senior citizens the average age of death would be higher as well. This can also be said for census tract 9509 (Edgerton area); this tract has the highest average age of death of 81 years, yet has the lowest age-adjusted mortality rate. These differences are what lead to the examination of additional components that could have contributed to the variations in the outcomes. This first of these contributing factors to be examined is income and the subcategory of poverty.

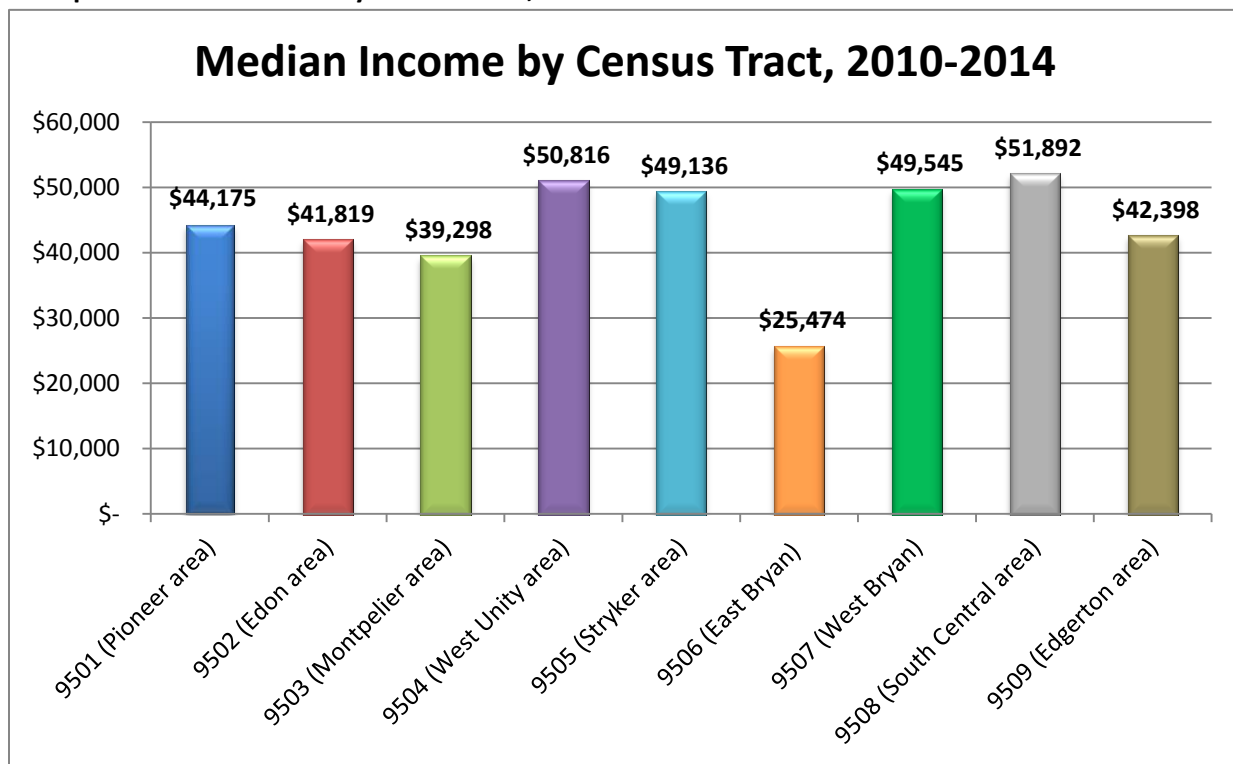
Williams County Health District

Income:

How much money you make can influence how healthy you are and ultimately how long you live. Many studies have been conducted looking at the relationship between income and health outcomes. One in particular stated that higher incomes allow for better use of services that enable health, such as “better nutrition, access to clean water, sanitation, housing and good quality health services” (Subramanian & Kawachi, 2006).

Median income was examined because the income data is not evenly distributed where 50% of Williams County residents have an income higher than the mean and 50% made less (Yates, 2013). The median incomes by census tract can be seen in Graph 3 below.

Graph 3: Median Income by Census Tract, 2010-2014



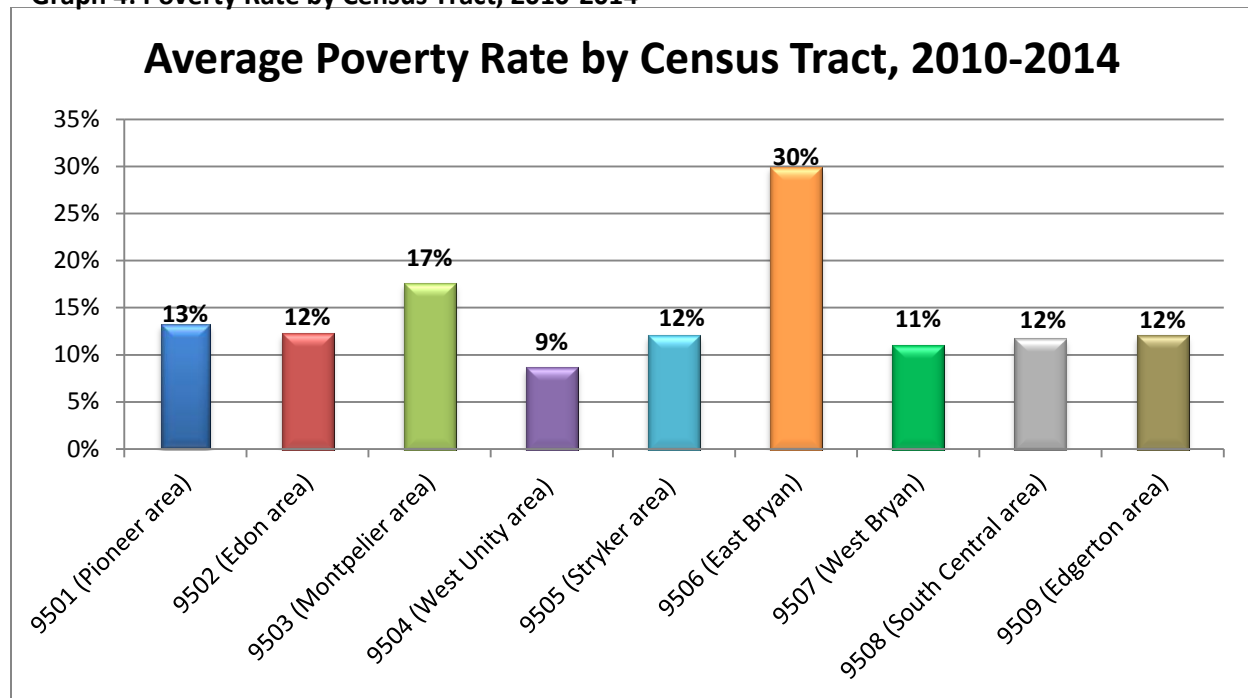
Graph 3 above displays some of the vast differences in median income across Williams County. Four (4) of the nine (9) census tracts also have median incomes lower than the median income for the county as a whole, which was \$42,455.00. To provide further context, the median income in the state of Ohio is \$48,489.00 while the median income for the United States is \$53,482.00 (American Fact Finder, 2016a); see Appendix C for a Map of the results. Though many of the census tracts median incomes are within range of the county, state and national median incomes, one census tract 9506 (East Bryan) has a median income that is almost half of that of the other census tracts, county, state and national median incomes. This dramatic difference can be associated with some of the other differences seen between the census tracts in the county. The results here correlate with the poverty rates that are discussed below.

Williams County Health District

Poverty

Nationally, individuals typically live at least five (5) years longer when they earn an income above the federal poverty level, compared to those under the federal poverty level (Tacoma-Pierce County Health Department, 2016). Federal poverty level (FPL) is a measure of income used to determine an individual's eligibility for services such as certain health insurance plans and Medicaid. Eligibility depends on various factors, such as income and number of family members (HealthCare.gov, 2016). Just as higher incomes benefit health the opposite end of the spectrum, living in poverty, creates poor health. This is because it "forces people to live in environments that make them sick" whether this is due to inadequate housing, unhealthy foods, unsafe neighborhoods and more (World Health Organization, 2016). To see the poverty rate by census tract for Williams County, refer to Graph 4.

Graph 4: Poverty Rate by Census Tract, 2010-2014



As mentioned previously, the findings for poverty rate associate with the findings for median income. The areas with the lowest median incomes, 9503 (Montpelier area) and 9506 (East Bryan), also have the highest poverty rates of 17% and 30% respectively. These census tracts have some of the lowest average age of death as well; with 9503 (Montpelier area) having the 5th lowest average age and 9506 (East Bryan) is tied for the overall lowest average age of death at 72 years. The same correlation can be found for the census tracts with higher incomes, for instance, 9504 (West Unity area) has the second highest median income in the county, has the lowest poverty rate (9%) and an average age of death of 78 years.

The average poverty rate for Williams County as a whole in 2010-2014 was 15% (American Fact Finder, 2016b). Though many of the census tracts are below the county average, it is concerning that one of the census tracts, 9506 (East Bryan), has a rate that is double that of the county as a whole.

Williams County Health District

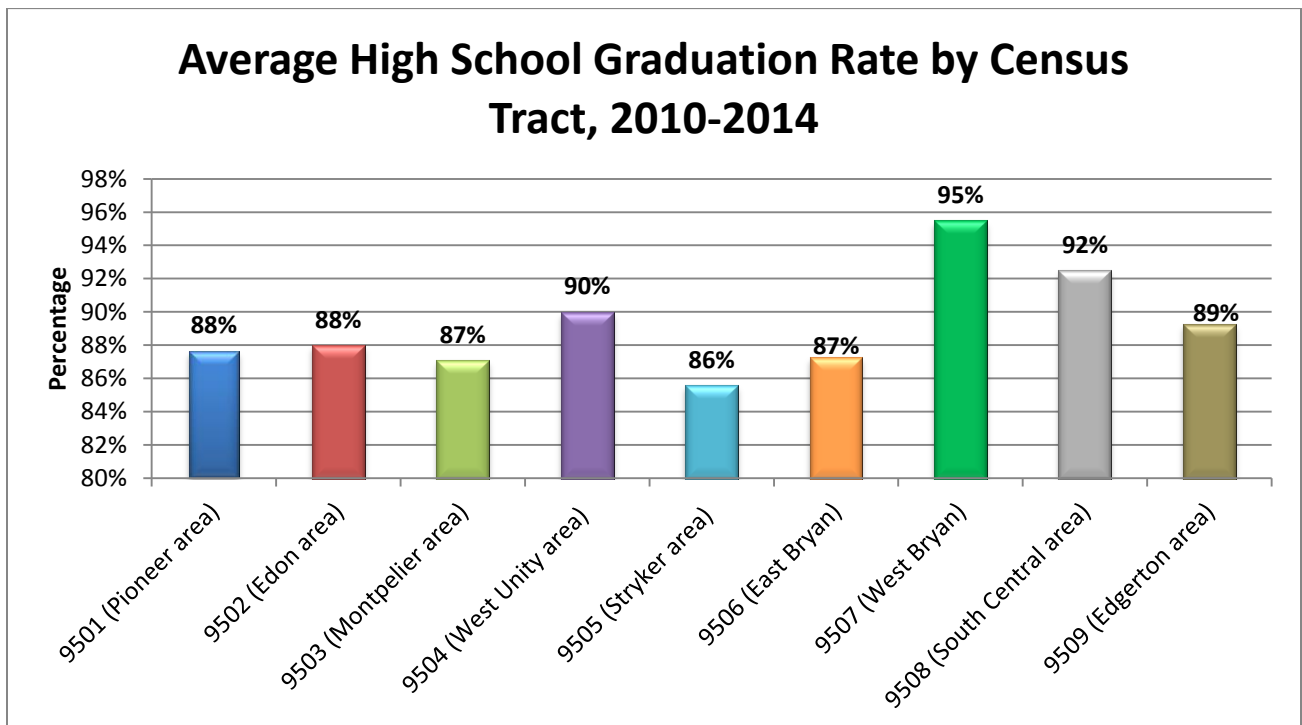
Income, and subsequently poverty, can greatly impact health and its outcomes, however, these factors are not the only ones that can contribute to poor health outcomes. Education has an important role in health outcomes as well.

Education:

Educational attainment has also been linked to various health outcomes. Individuals with higher education report lower rates of common acute and chronic conditions, such as hypertension, cholesterol, heart conditions, diabetes and asthma attacks. More highly educated people that do report conditions such as diabetes or hypertension are more likely to have their condition controlled (Cutler & Lleras-Muney, 2006). It has also been found that people with more education report “spending fewer days in bed or not at work due to a disease”, with the number of days of work lost to sickness lowered by 2.3 days each year for people with four more years of education compared to the average of 5.2 days lost (Cutler & Lleras-Muney, 2006).

Healthy behaviors are more often maintained by individuals with more education as well. Individuals with a higher education are more likely to exercise and receive preventative care like flu shots, vaccines, pap smears, mammograms and colonoscopies. Behaviors such as smoking, excessive drinking, and drug use are also less common among those with higher education (Cutler & Lleras-Muney, 2006). To see the educational attainment rates in Williams County, see Graph 5 for High School graduation rates.

Graph 5: High School Graduation Rate by Census Tract, 2010-2014

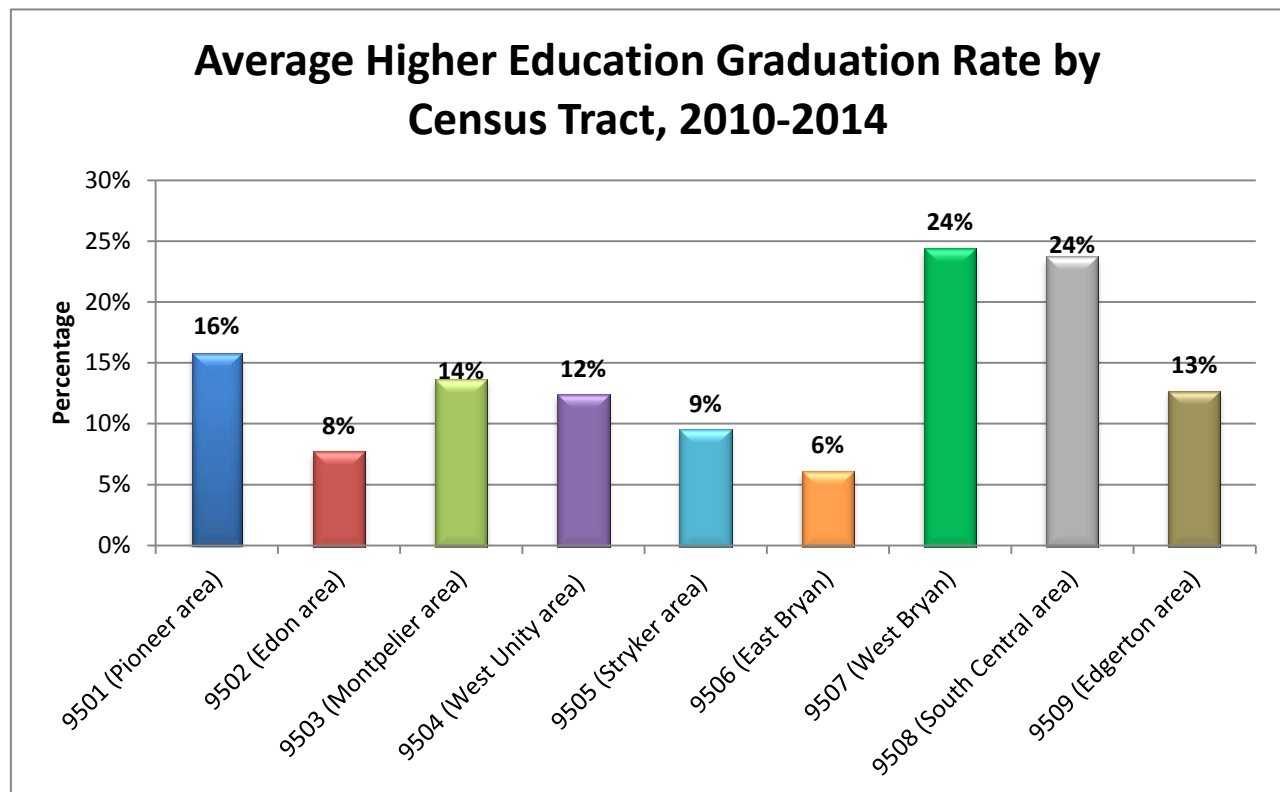


Graph 5 above displays the gaps that were found between census tracts, with a difference of 9% between the lowest graduation rate of 86% in 9505 (Stryker area) and the highest graduation rate of 95% in 9507 (West Bryan). The high school graduation rates also reveal that where someone lives makes a difference even if they attend the same school. Individuals in census tracts 9506 (East Bryan)

Williams County Health District

and 9507 (West Bryan) belong to the same school district yet there is an 8% difference in the graduation rates; see Appendix C for a Map of the results. These results further support the concept that place matters. However, as mentioned above, four additional years of education can positively influence health in many ways and the differences in higher education graduation rates vary greatly among the census tracts, see Graph 6 below.

Graph 6: Higher Education Graduation Rate by Census Tract, 2010-2014



The above graph depicts the large differences on higher education graduation rates among the census tracts. Individuals living in the census tracts, 9507 (West Bryan) and 9508 (South Central area), are four (4) times more likely to graduate with a form of higher education than individuals living in 9506 (East Bryan). The dichotomy between the census tracts 9506 (East Bryan) and 9507 (West Bryan) continues here and further demonstrates that place matters; see Appendix C for a Map of the results.

The average higher education graduation rate for Williams County as a whole is 14%, five (5) of the nine (9) census tracts fall below this average. Compared to the state and national higher education graduation rates of 26% and 29% respectively, the average higher graduation rate in Williams County as a whole is considerably lower, approximately half of the state and national rates. Breaking this down even further, only two (2) of the nine (9) census tracts are within range of the state and national rates while the remaining seven (7) census tracts are significantly lower (American Fact Finder, 2016c).

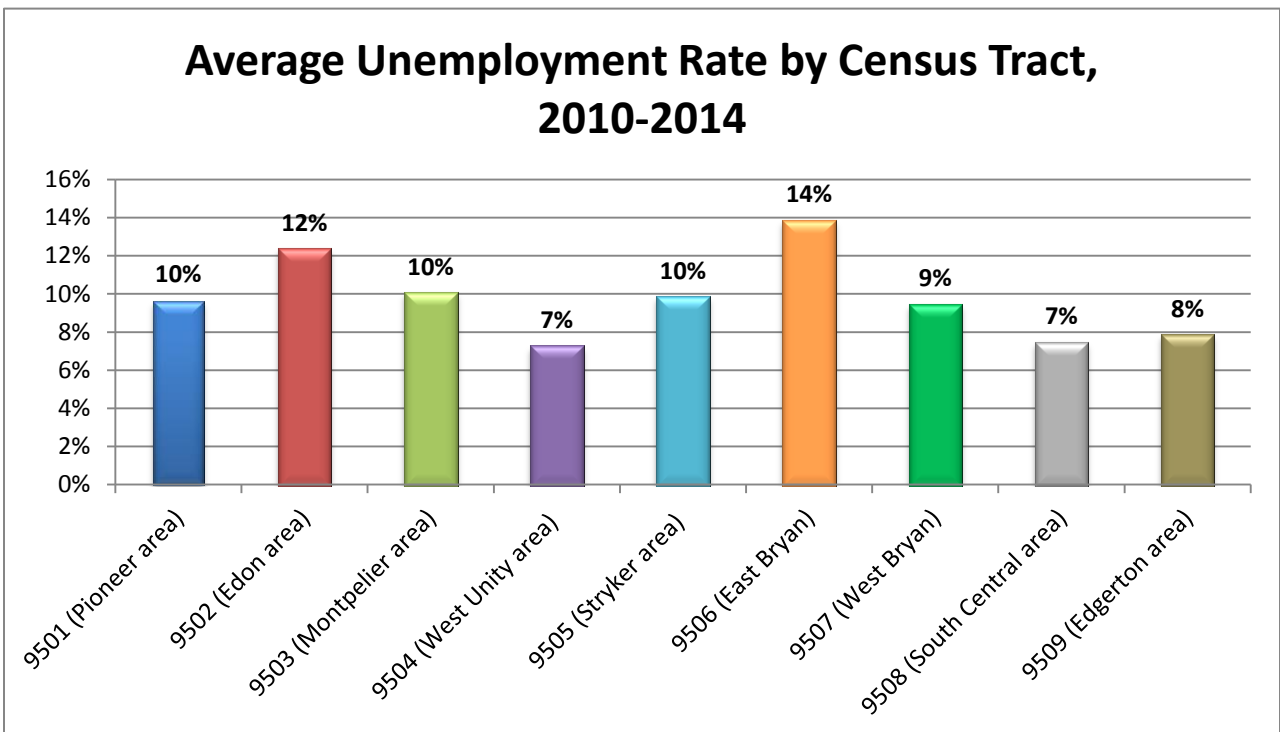
Though educational attainment impacts health in various ways, an individual's employment status can influence health outcomes as well.

Williams County Health District

Employment:

Work can impact health in various ways, whether an individual is employed or unemployed. A place of employment can provide settings where health behaviors and activities are encouraged. These opportunities related to work can have long term effects on health. Studies have found that “higher-paying jobs are more likely than lower-paying jobs to provide workers with safe work environments and offer benefits such as health insurance, workplace health promotion programs, and sick leave” (Weinstein et al., 2017). Without these benefits individuals with lower-paying jobs can be more likely to become sick and miss work due to illness. There is also a debate on whether illness contributes to unemployment, because individuals miss too much work due to illness. Or whether unemployment contributes to illness, due to lack of health insurance and stress-related conditions linked with unemployment (Brown, Demou, Tristram, Gilmour, Sanati & MacDonald, 2012).

Studies have demonstrated that those who are unemployed are more likely to suffer from depression and rate their health as poor than employed individuals (Weinstein et al., 2017). Unemployment has also been linked with higher rates of illicit drug use, heavy alcohol use, and tobacco use as well as connected with disorders surrounding alcohol and drug use (Compton, Gfroerer, Conway, & Finger, 2014). An individual does not need to be unemployed for an extended period of time to experience health impacts. Transitioning from employment to unemployment increases a person’s mortality risk. While moving from unemployed to employed is found to increase self-esteem, improve general and mental health and reduce psychological distress (Brown et al., 2012). See Graph 7 for a look at the unemployment rate in Williams County.



Graph 7: Average Unemployment Rate in Williams County by Census Tract, 2010-2014

Williams County Health District

Though seven (7) of the nine (9) census tracts have unemployment rates below the Williams County average unemployment rate of 10%, the differences between the census tracts still exist (American Fact Finder, 2016d). Census tract 9506 (East Bryan) has the highest rate, with 14% of the residents being unemployed. This result can be associated with the low median income and the high poverty rate in the same area. The rate in 9506 (East Bryan) is double that of the rates in the census tracts with the lowest rates, a tie between 9504 (West Unity area) and 9508 (South Central area) both with a 7% unemployment rate. See Appendix C for a Map of the results.

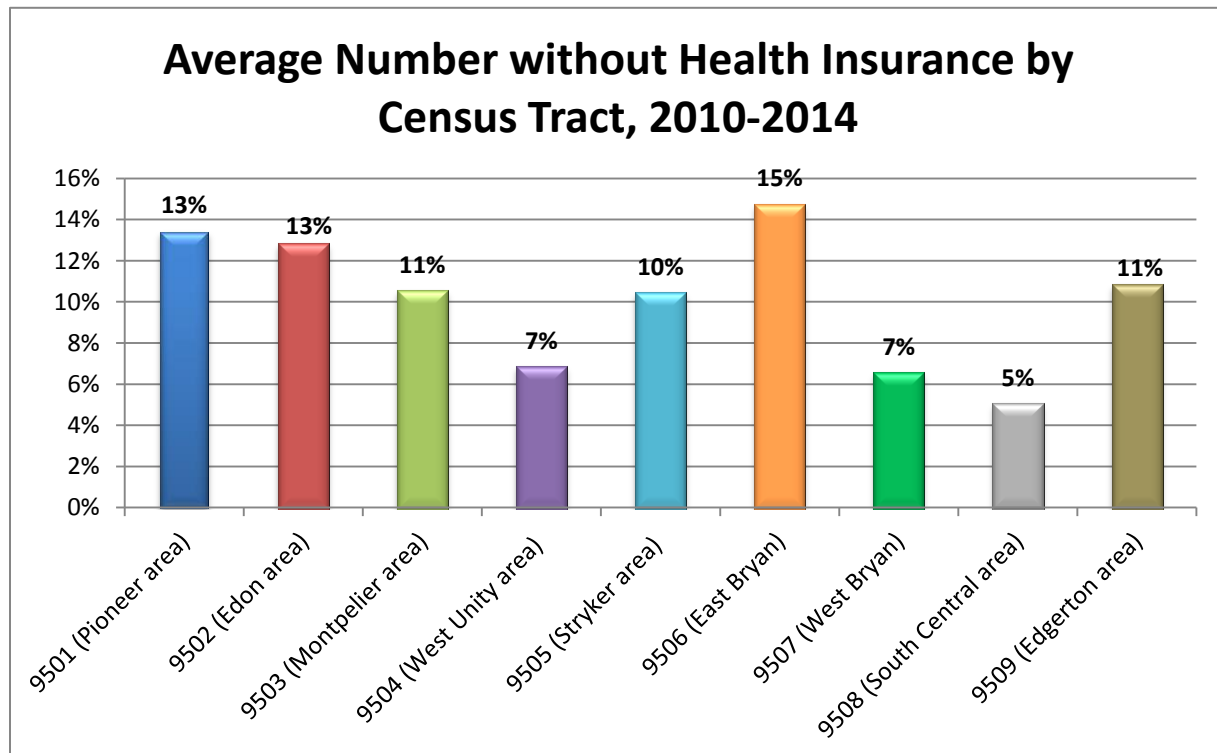
Employment status can impact health in various ways, including whether an individual does or does not have access to health insurance.

Health Insurance:

Health insurance coverage is fundamental to health care and health outcomes. Studies have associated lack of health insurance with negative health outcomes, such as: “preventable health problems, severe disease at the time of diagnosis, and premature mortality” (Hoffman & Paradise, 2008). Those without health insurance are also more likely to describe their health as being fair or poor and less likely to receive preventive services or visit a provider, than those who are insured (Hoffman & Paradise, 2008).

Though many individuals receive health insurance through their employers, as discussed in the section above, unemployment has many impacts on health; one of these impacts can be the loss of health insurance. Even if an individual is employed, “low-wage workers are far less likely than high-wage workers to have access to job-based coverage” and often cannot afford health insurance when it is available due to the costs of basic needs (Hoffman & Paradise, 2008). See Graph 8 for the rate of uninsured in Williams County.

Graph 8: Average Uninsured Rate in Williams County by Census Tract, 2010-2014



Williams County Health District

As with the other factors being examined in this report, differences exist between the census tracts and the number of uninsured individuals that reside in those areas. Census tract 9506 (East Bryan), has the highest rate of uninsured individuals (15%), which is triple that of census tract 9508 (South Central area) which has the lowest rate of uninsured individuals (5%). The 9506 (East Bryan) rate of 15% is also more than double that of its neighbor 9507 (West Bryan) which has a rate of 7% of uninsured individuals. The stark difference between some of these areas reiterates that where someone lives matters. See Appendix C for a Map of the results.

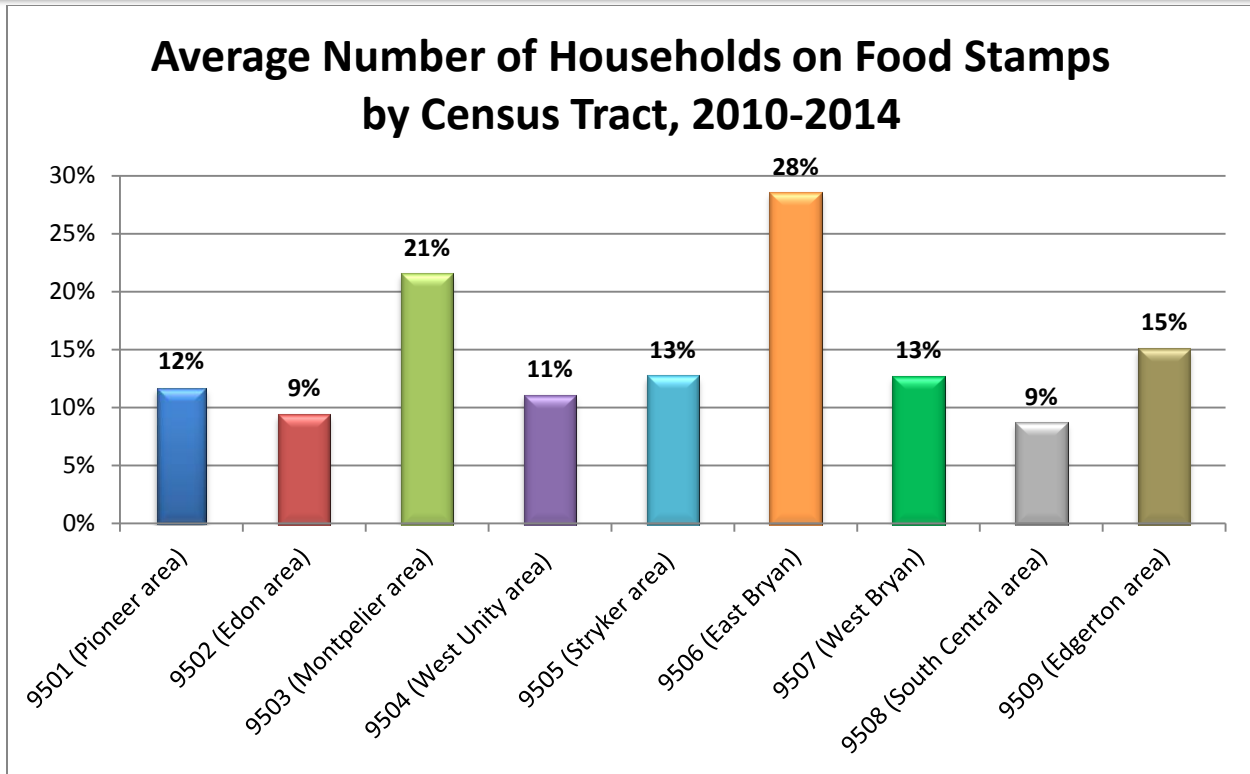
The overall rate of uninsured individuals in Williams County as a whole for 2010-2014 is 10%, with five (5) of the nine (9) census tracts with rates above this average (American Fact Finder, 2016e). Health insurance coverage holds an important role in an individual's health outcomes, and does the food an individual has access to and can afford.

Food:

Access to and consumption of healthier, more nutritious foods has been connected with better public health outcomes (Deller, Canto & Brown, 2015). Though this is relatively common knowledge among the public, knowing that one needs to eat healthy and being able to eat health is another matter. Access to healthy foods can be determined in several ways: the distance to a store or the number of stores in an area, individual-level resources such as vehicle availability, and neighborhood-level indicators such as average income (USDA, 2017). While the measure of income has already been examined earlier in this report, the distance to a store or the number of stores in an area can indicate food deserts or food swamps. A food desert is defined as an area with no access to "affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet" (CDC, 2012). While a food desert is an area that lacks access to most foods, especially healthy ones, food swamps are areas with an overabundance of unhealthy food sources (Stein, 2011). With the presence of food deserts and food swamps, eating healthy to achieve better health can be difficult as those with less money may not be able to travel to areas where healthier foods are available. Areas lacking access to healthy foods often also have "the highest risks of obesity, diabetes, and other preventable food-related health challenges" (Bell, Mora, Hagan, Rubin & Karpyn, 2013).

Even when healthy foods are available this does not mean everyone can afford to buy these healthier foods. In Williams County, 16% of adults answered that cost was a barrier to eating fruits and vegetables, while 53% of adults stated that they selected food based on cost (Williams County Health Department, 2016). By using cost as a determining factor in purchasing foods, people are likely consuming less healthy foods on a more regular basis, as the less nutritious foods are often the cheapest. Even with the provision of food stamps to eligible residents, the aid may still be used to buy less healthy foods, because they are cheaper and more food can be bought for fewer food stamps. Despite this, looking at the number of households on food stamps can further reveal where access or cost may be a barrier to purchasing healthier foods. To see the percentage of homes on food stamps in Williams County, see Graph 9 on the next page.

Williams County Health District



Graph 9: Average Households on Food Stamps in Williams County by Census Tract, 2010-2014

As can be seen in the graph above, the census tracts with the greatest number of households on food stamps are 9506 (East Bryan) and 9503 (Montpelier area) with 28% and 21% respectively. These findings correlate with the median income and poverty rate results, as the same areas also had the lowest median incomes and highest poverty rates of the census tracts. When compared to Williams County as a whole, seven (7) of the nine (9) census tracts fall under the county average of 15% of households using food stamps (American Fact Finder, 2016f). See Appendix C for a map of these results.

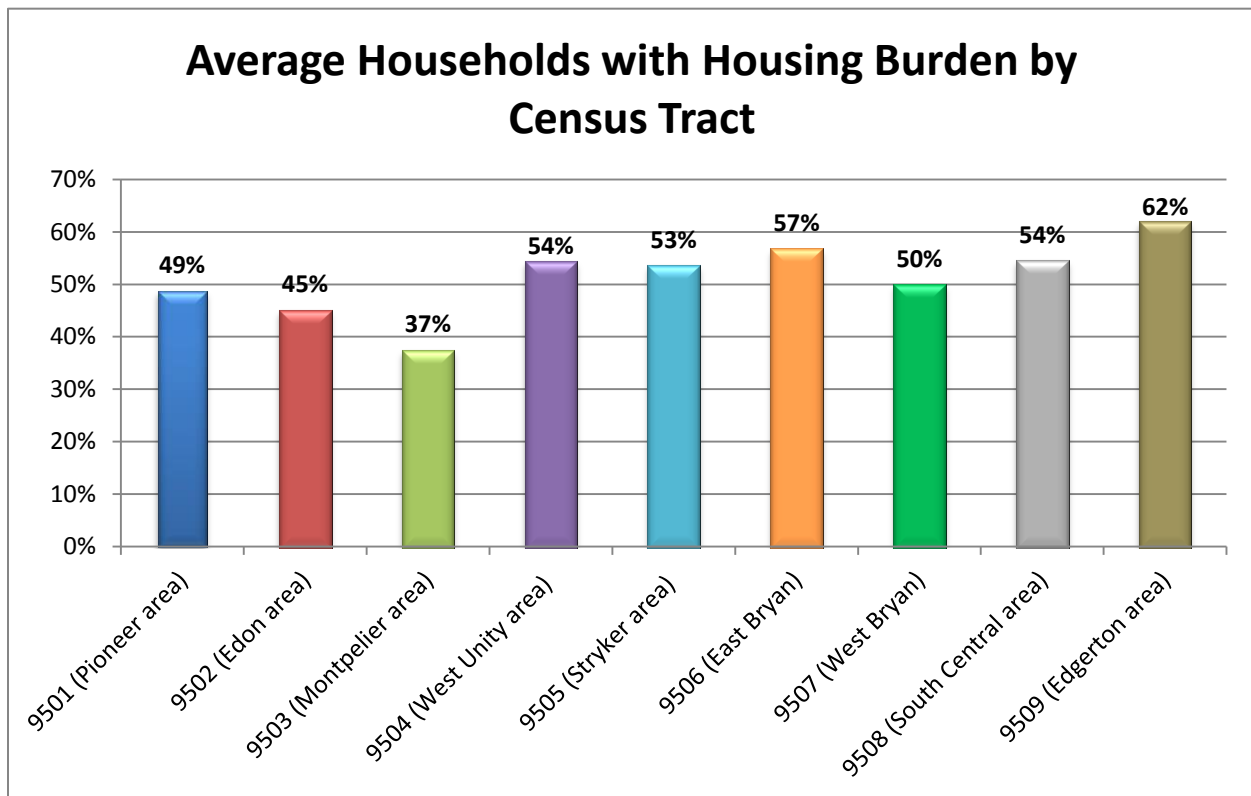
Food access and affordability are not the only factors that impact health, housing also plays a key role in health outcomes.

Housing:

Housing influences health due to the “the physical conditions within homes, the conditions in the neighborhoods surrounding homes, and housing affordability” all of which can be barriers or pathways to healthy choices (Weinstein et al., 2017). Physical conditions within the home can include “chemical factors such as environmental tobacco smoke and lead, [and] biological factors such as mold and dust mites” all of which can negatively impact health (Weinstein et al., 2017). Often homes with these concerns are located in the less affluent areas, further compounding the already existing inequities.

Williams County Health District

Affordable housing also plays an important role. When housing is affordable household resources can be used for other means, such as healthier foods, health care, and has even been associated with the reduction of stress and poor health outcomes (Weinstein et al., 2017). Housing affordability can be difficult though, throughout the nation, and especially within the census tracts of Williams County the housing cost burden is high. Housing cost burden is the percentage of households where the cost of living in that space exceeds 30% of the total household income (Community Commons, 2014). See Graph 10 below for a look at housing cost burden in Williams County.



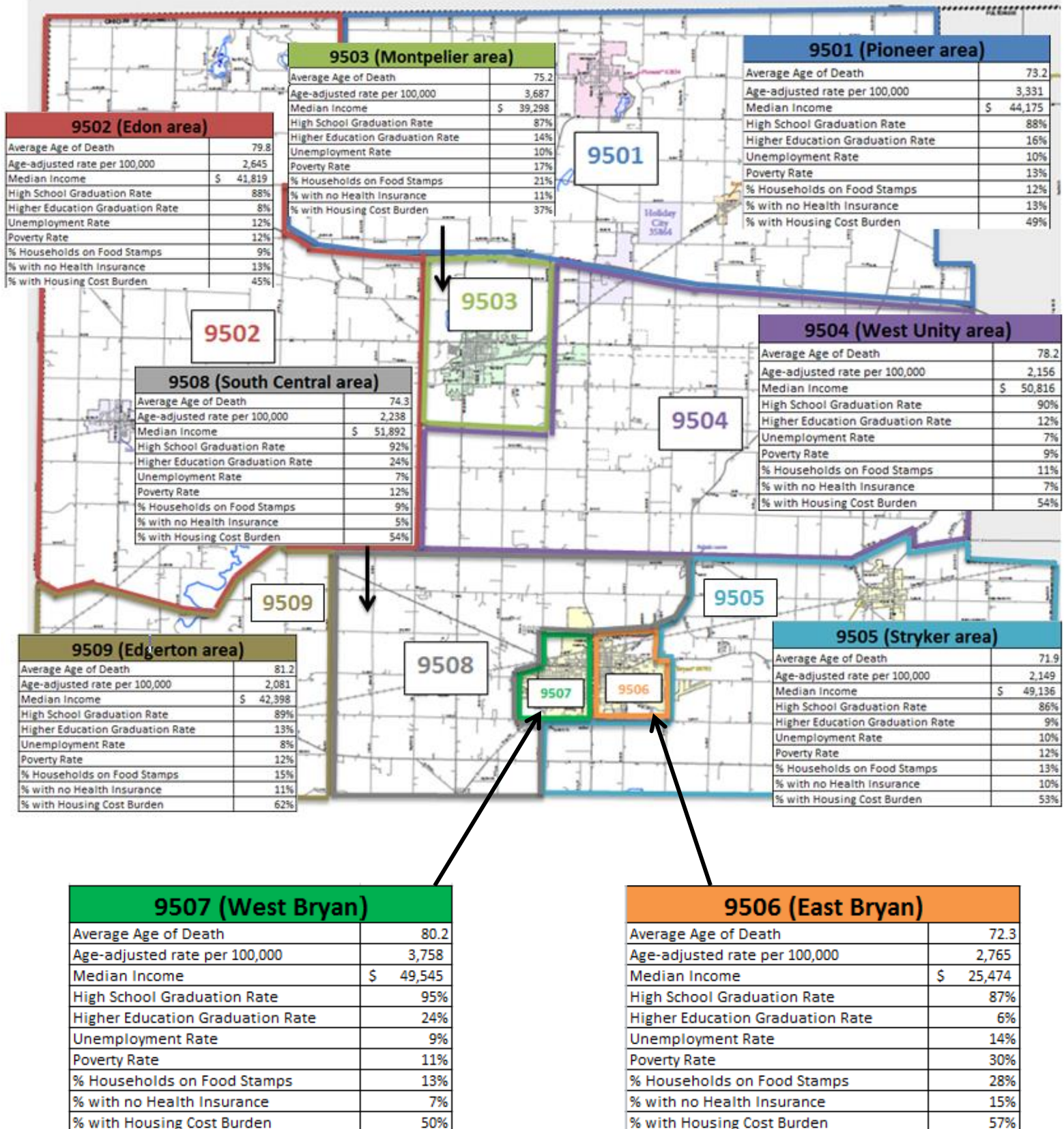
Graph 10: Average Households with Housing Burden in Williams County by Census Tract, 2010-2014

The census tract with the highest percentage of households with housing cost burden is 9509 (Edgerton area) with 62% of households experiencing housing cost burden. This rate is almost double that of the census tract with the lowest percentage, 9503 (Montpelier area) with 37% of households experiencing housing cost burden. These results are at slight odds with the other findings, which if used to predict the outcomes above would indicate that 9503 (Montpelier area) would have a higher rate. Despite this, the number of households experiencing housing cost burden equals or exceeds 50% for six (6) of the nine (9) census tracts in Williams County. Compared to the state and national levels of housing cost burden, at 50% and 52% respectively, several of the census tracts have marginally higher rates (American Fact Finder, 2016g). See Appendix C for a map of these results.

The social determinants of health examined above are just a few on a long list of factors that can impact health. For a comprehensive look at all of the factors for each census tract at once, refer to the section below.

Williams County Health District

The Census Tracts at a Glance:



Williams County Health District

How Williams County Compares:

These results may be shocking; however, without comparisons to other geographically similar areas it can be difficult to put these findings into context. To provide an additional perspective, the Williams County results were compared to those of the surrounding counties, the state of Ohio and the United States as a whole. See Table 1 below for the comparisons.

Table 1: Data Comparison by County, State and Nation, 2010-2014

	Williams County	Fulton County	Henry County	Defiance County	Ohio	United States
Median Income	\$42,455	\$52,872	\$52,526	\$48,853	\$48,849	\$53,482
Poverty Rate	15%	12%	13%	14%	16%	16%
High School Graduation Rate	89%	89%	90%	89%	88%	86%
Higher Education Graduation Rate	14%	17%	15%	16%	26%	29%
Unemployment Rates	10%	9%	8%	9%	9%	9%
Individuals without Health Insurance Coverage	10%	7%	8%	11%	11%	14%
Food Stamp Usage	15%	10%	11%	13%	15%	13%
Housing Cost Burden	50%	44%	42%	46%	50%	52%

**Comparison data was pulled from American Fact Finder from the U.S. Census Bureau, 2016

Conclusion:

Health equity in Williams County means a community in which all people live long, healthy lives. Improving population health and achieving health equity requires a broader approach that addresses the social, economic, and environmental factors that influence health; the social determinants of health. These determinants are often intertwined with one another and with health outcomes as discussed throughout the report. To address the inequities, policies and interventions need to be established that will positively influence the social and economic conditions and can improve health for large numbers of people in ways that can be sustained over time.

As the county wide data often was not representative of what was occurring in the census tracts it was vital to breakdown the data into census tracts. This breakdown allowed us to work towards achieving the goal of this analysis, which was to better identify where inequities existed within Williams County and to better target services and resources on areas in greater need.

Williams County Health District

Appendix A: Process and Methods

Determining Average Age of Death by Census Tract:

Death certificate data was gathered from the years 2010-2014 through the health department database in Excel Spreadsheet format. Each year was calculated separately and then combined at the end to determine overall average age of death for that census tract. The deaths were categorized into census tracts based on the address of the individual listed on the certificate. The name of the individual was withheld, only the location and age of the individual were used in this analysis. Once the deaths were separated, they were then sorted by census tract. The ages of death for each census tract were then selected and entered into an equation to determine average age of death for that tract. An example of the Excel Spreadsheet equation used to calculate the average age of death was the following: =AVERAGE(B2:B10). After the average age of death by census tract was determined for each year, these results were then averaged as well to prevent any one year's outlying data point from skewing the results.

Determining Age-Adjusted Mortality Rate:

To determine the age-adjusted mortality rate by census tract the direct age-adjustment approach was used. In a direct age-adjusted approach a standard population is "used in order to eliminate the effects of any differences in age between two or more populations" (Gordis, 2014). By standardizing the observed cases of death in the compared populations to the same reference population, there is an assurance that any remaining results are not a result of differences in the population makeup in terms of age (Friis & Sellers, 1996). The standardized population that was used was the U.S. 2000 standard population distribution rates, which becomes an Adjustment Factor to eliminate population differences. In order to calculate the age-adjusted rate using the direct method, several components are required, the population broken down by age groups, the number of deaths, and the adjustment factors from the U.S. 2000 standard population. The direct method age-adjusted mortality rate equation can be seen below:

$$= \left(\left(\frac{\text{Number of Age Group Deaths}}{\text{Total Age Group Population}} \right) \times 100,000 \right) \times \text{Adjustment Factor}$$

Though Williams County does not have a population of 100,000, this is considered the constant for this equation. According to the Missouri Department of Health & Senior Services, the constant used in age-adjustments varies based on the outcomes being analyzed. For instance, "the age-adjusted rates for death are per 100,000 population. However, age-adjusted rates for hospitalizations and procedures are per 10,000 population and age-adjusted rates for emergency department visits are per 1,000 population" (Missouri Department of Health & Senior Services, 2016).

Williams County Health District

APPENDIX B: Data Sources

Various data sources were used in the creation of this report, the primary sources and the aspects they contributed to are listed below. For a complete list of sources, see the Reference section at the end of the report.

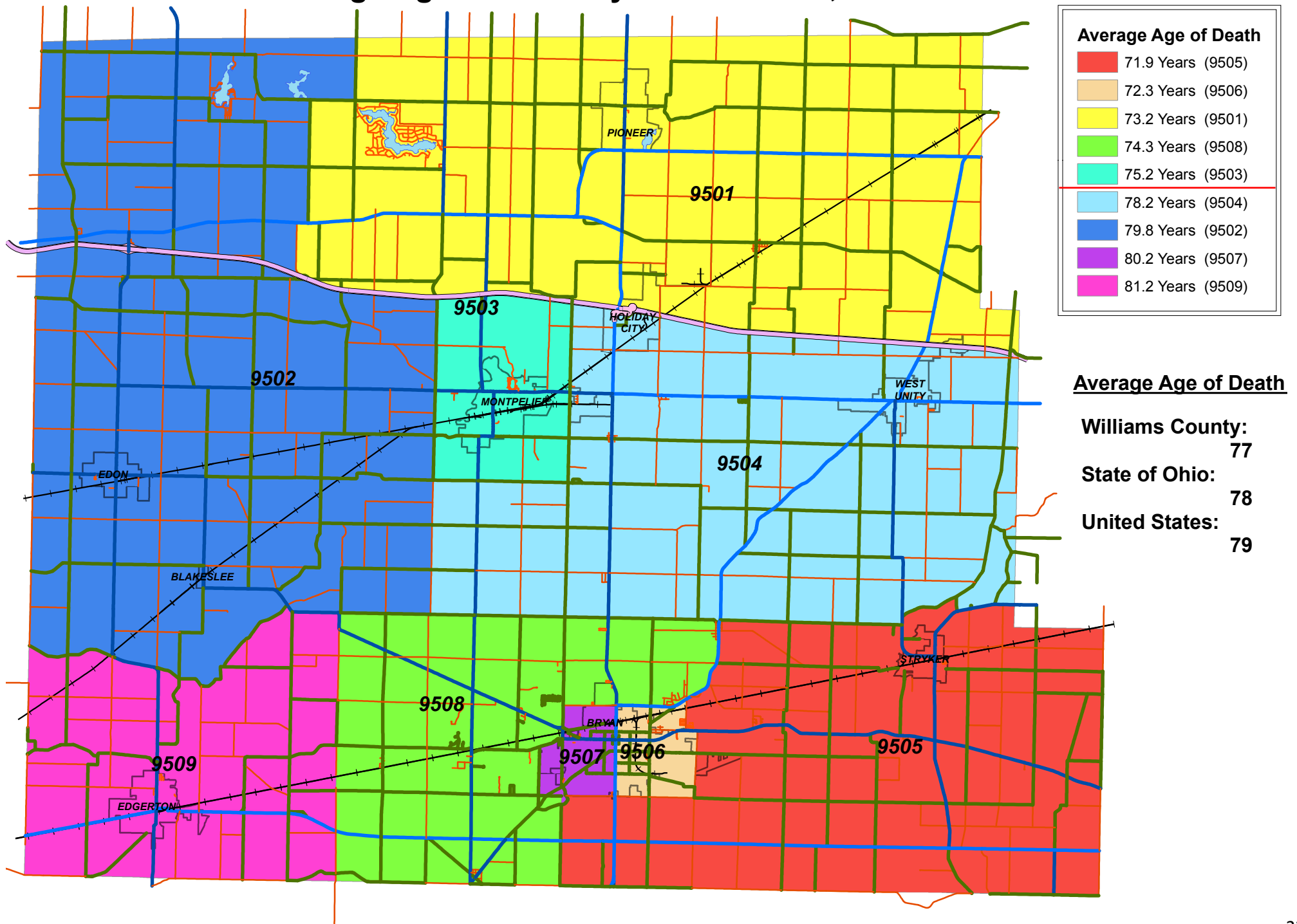
1. Williams County Health Department
 - Death certificates were used to determine the average age of death in the census tracts.
2. United States Census Bureau
 - American Fact Finder and American Community Survey were used to collect data on the social determinants of health that were examined; such as median income and educational attainment. These sources were also used to gather the comparative information on the counties surrounding Williams County, the state of Ohio and the United States.
3. County Engineer's Office
 - The County Engineer's Office, employee Brian Fritsch, created the maps that can be viewed in Appendix C by using the data collected to develop this report.
4. Director of Epidemiology, Surveillance, and Informatics, Chris Kippes, from the Cuyahoga County Board of Health
 - As Cuyahoga County is the only other county in Ohio to have conducted a similar data analysis, Chris Kippes was contacted and offered to act as a reference. Chris Kippes assisted during the initial data analysis phase and provided feedback on the age-adjusted mortality rate calculations.

APPENDIX C: County Engineer Maps

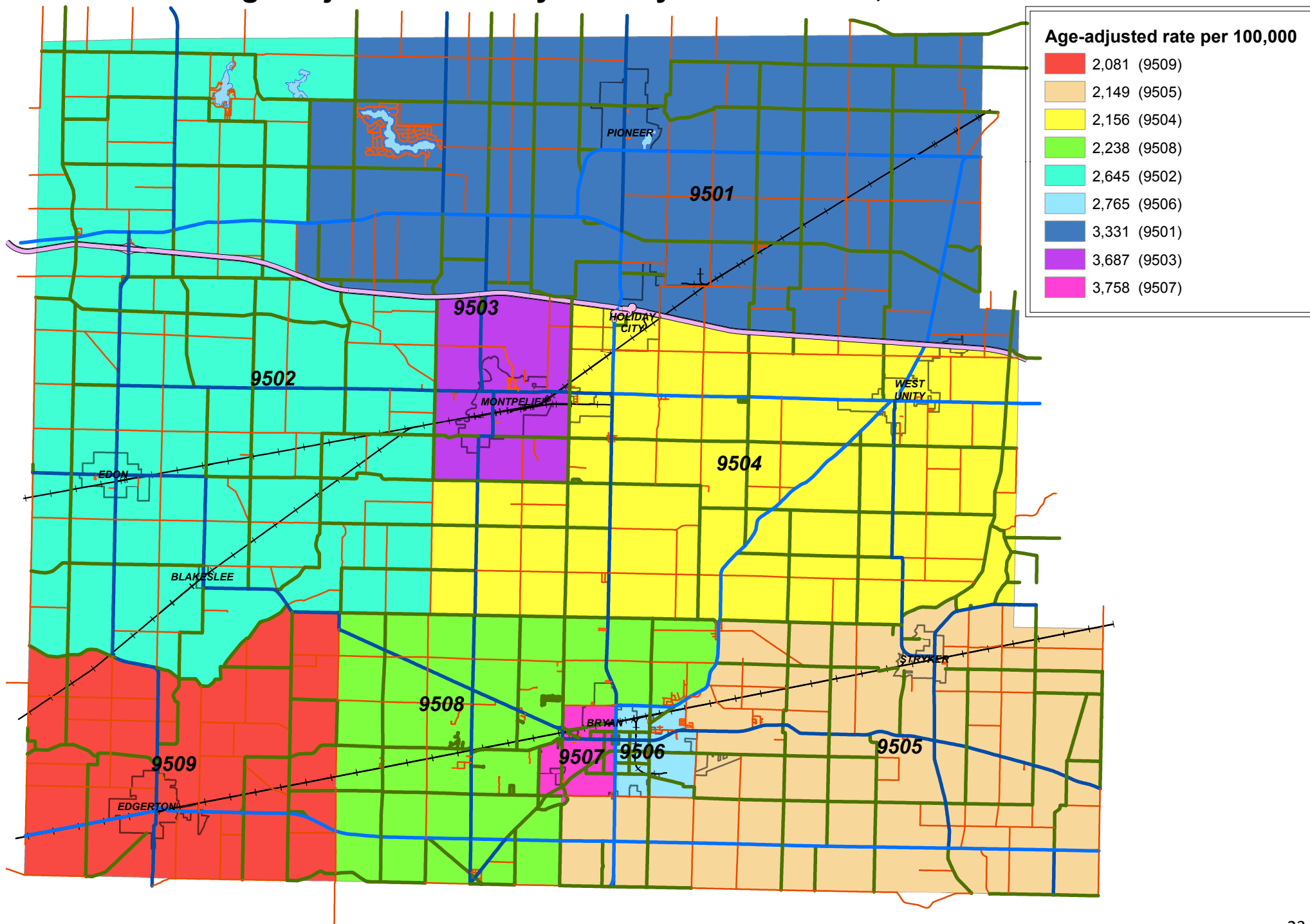
The following maps were created and provided by the Williams County Engineer's Office (Fritsch, 2017).

- Average Age of Death Map (page 22)
- Age-Adjusted Mortality Rate Map (page 23)
- Median Income Map (page 24)
- Poverty Rate Map (page 25)
- High School Graduation Rate Map (Page 26)
- Higher Education Graduation Rate Map (page 27)
- Unemployment Rate Map (page 28)
- Lack of Health Insurance Map (page 29)
- Households on Food Stamps Map (page 30)
- Housing Cost Burden Map (page31)

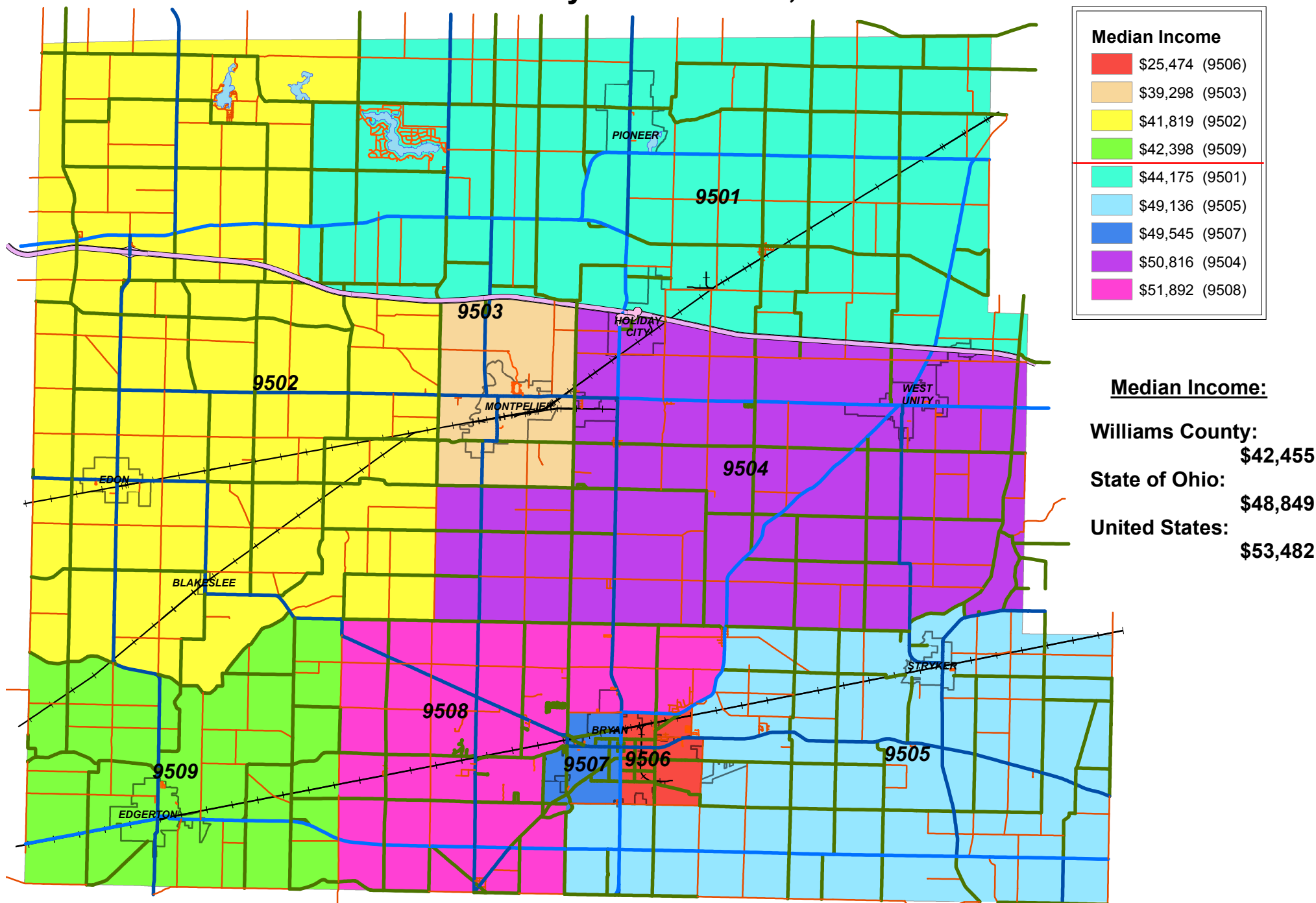
Average Age of Death by Census Tract, 2010-2014



Age Adjusted Mortality Rate by Census Tract, 2010-2014

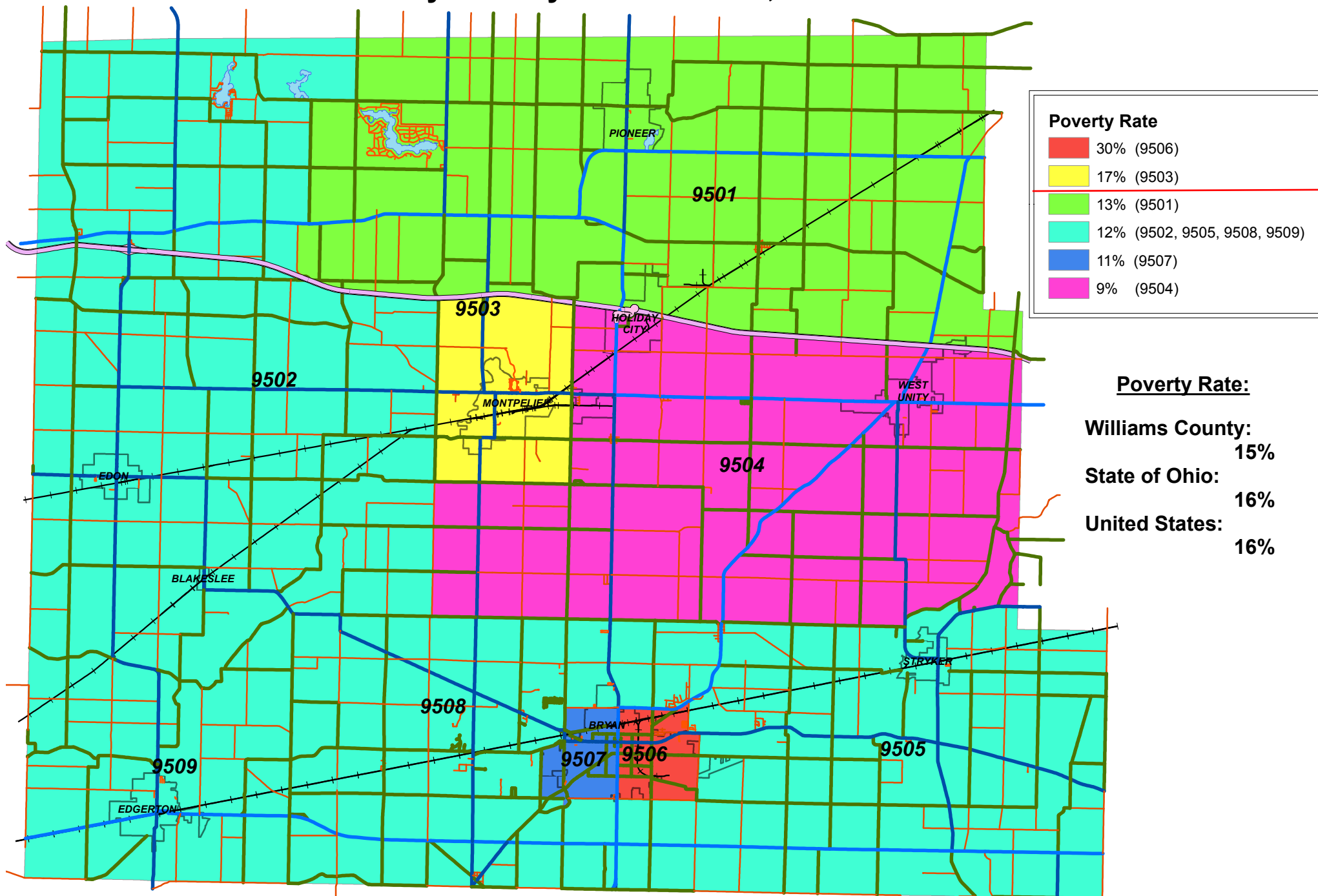


Median Income by Census Tract, 2010-2014



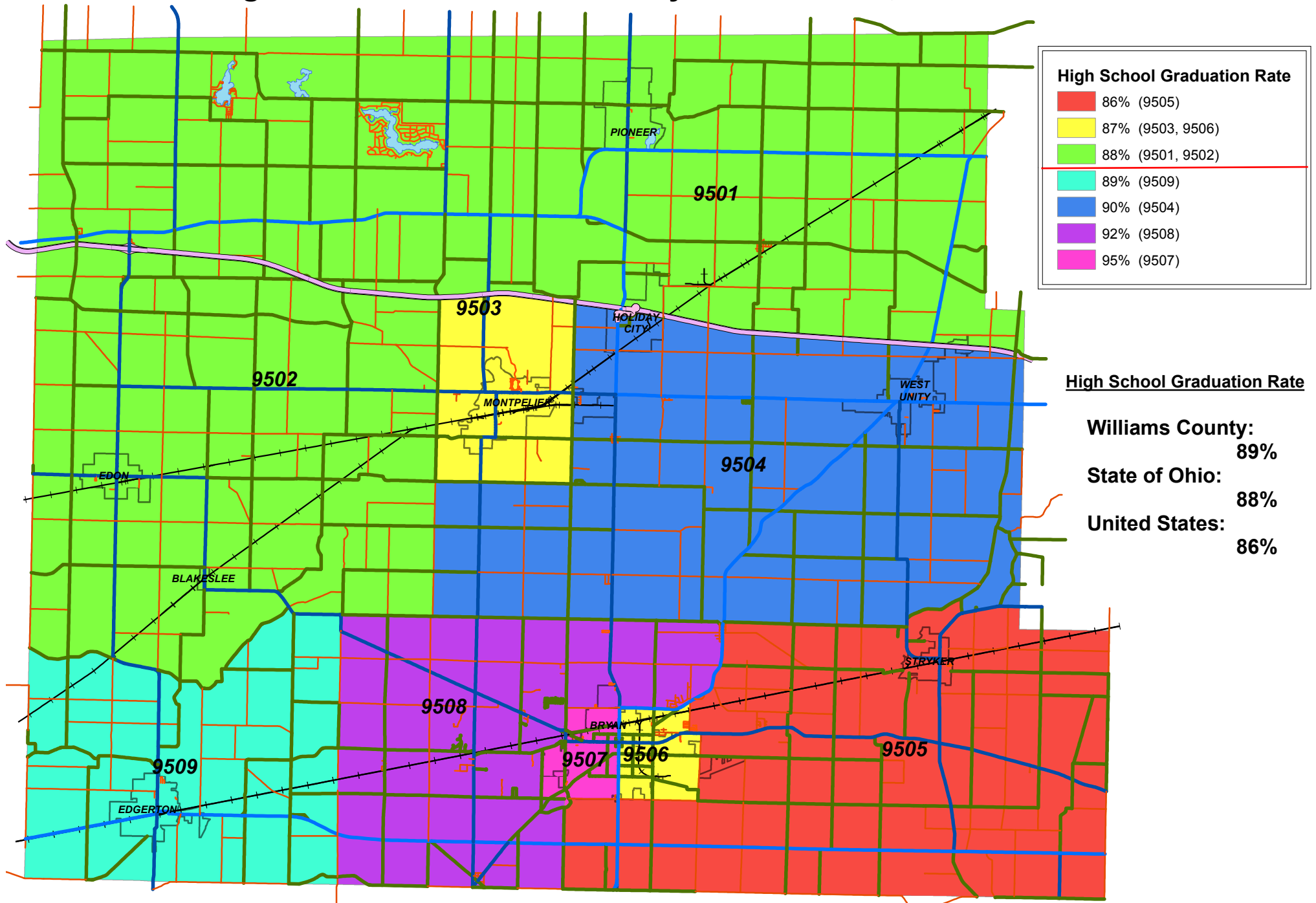
Data selected from: American Fact Finder, U.S. Census Bureau. Median Income in the Past 12 Months
(In 2014 Inflation-Adjusted Dollars) 2010-2014 American Community Survey 5-Year Estimates

Poverty Rate by Census Tract, 2010-2014

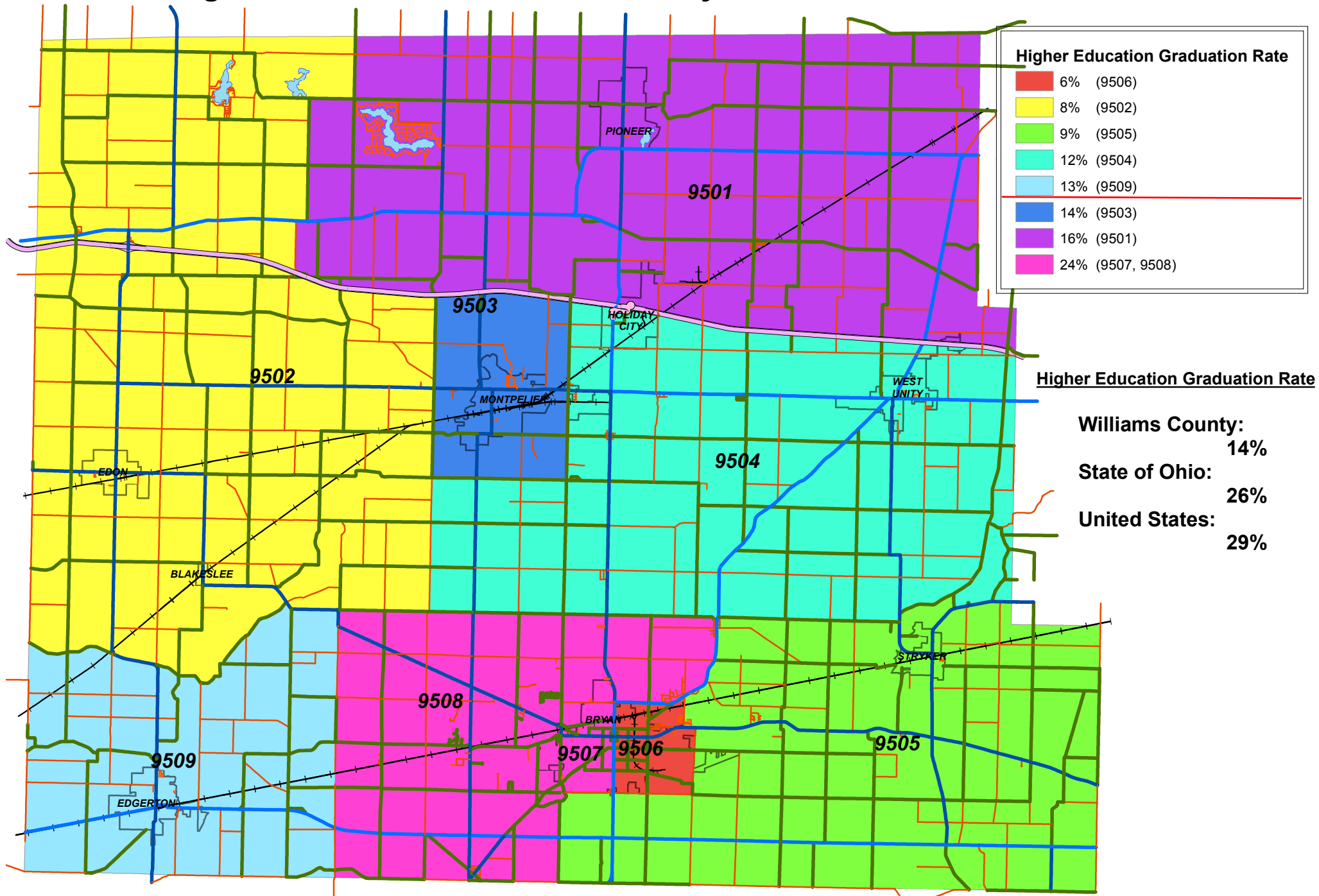


Data from: American Fact Finder, U.S. Census Bureau. Poverty Status in the Past 12 Months 2010-2014
American Community Survey 5-Year Estimates

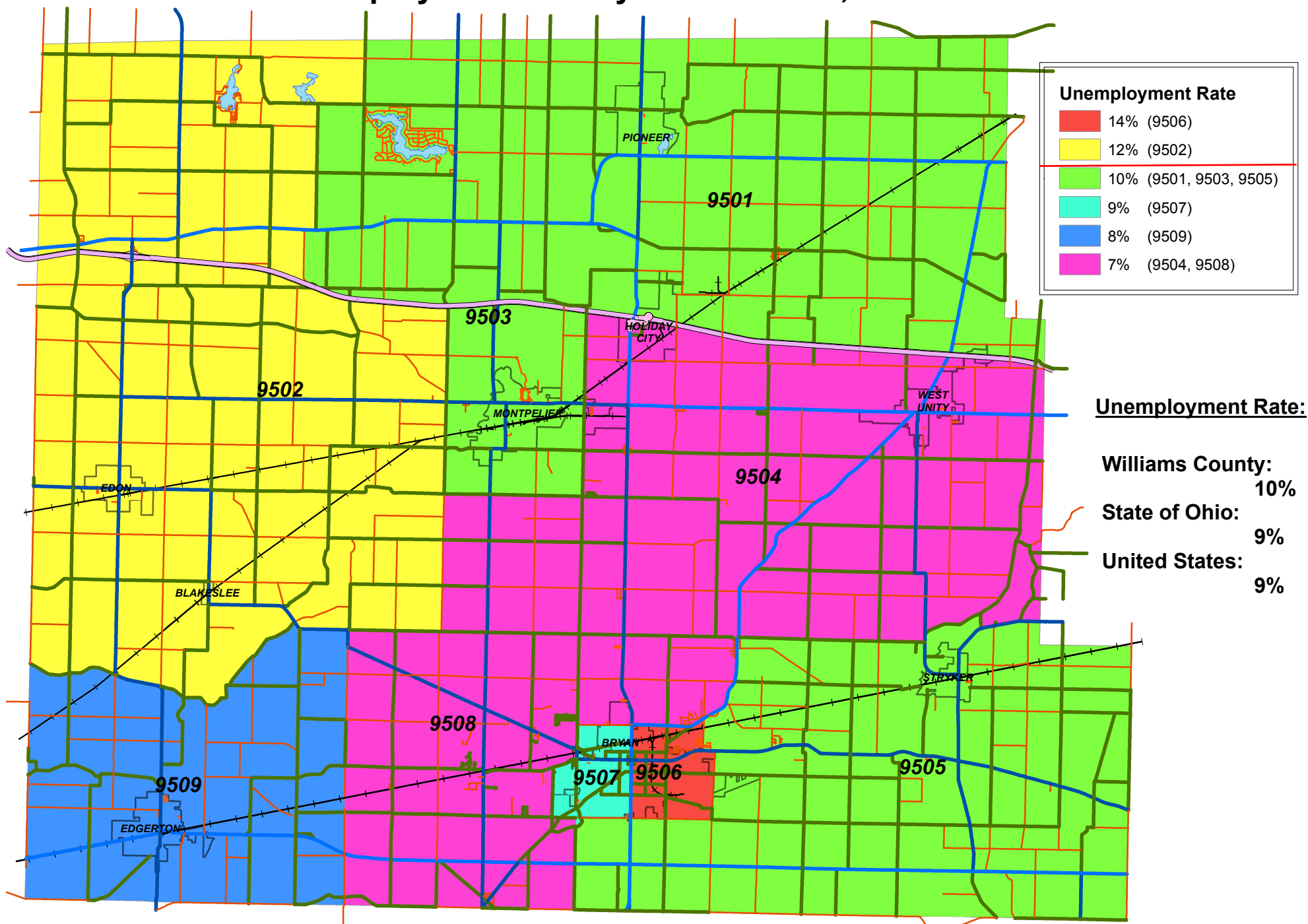
High School Graduation Rate by Census Tract, 2010-2014



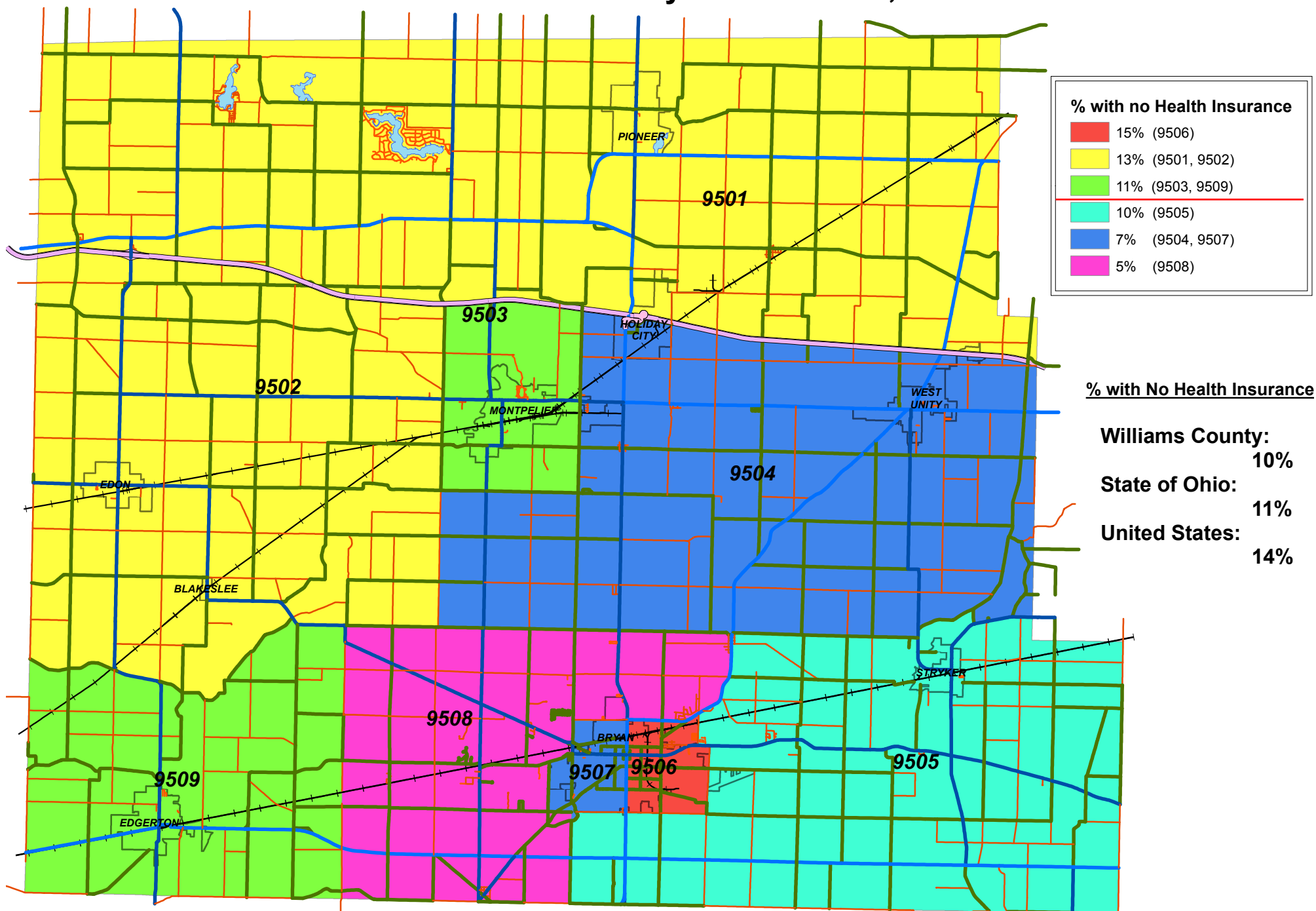
Higher Education Graduation Rate by Census Tract, 2010-2014



Unemployment Rate by Census Tract, 2010-2014

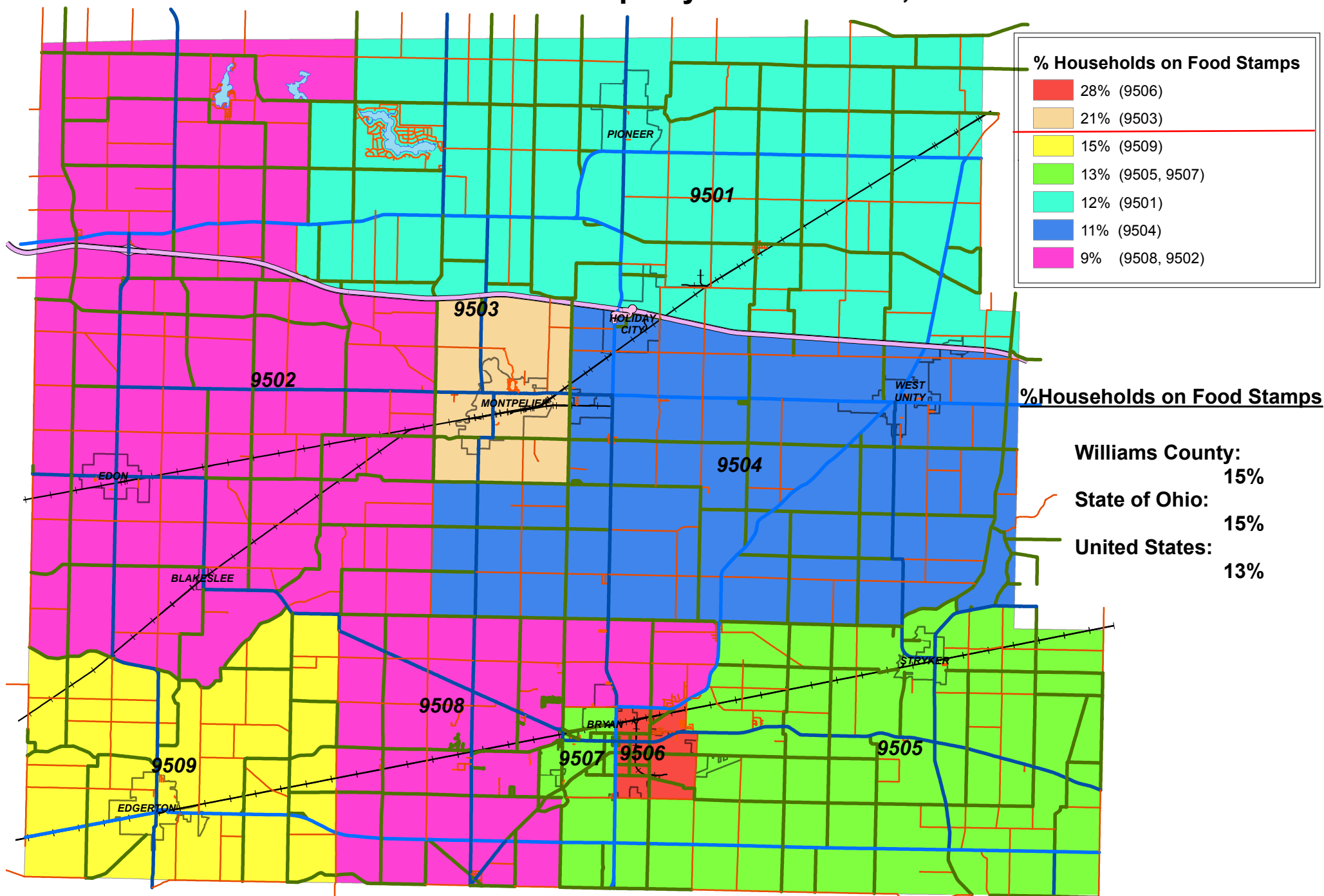


% with No Health Insurance by Census Tract, 2010-2014



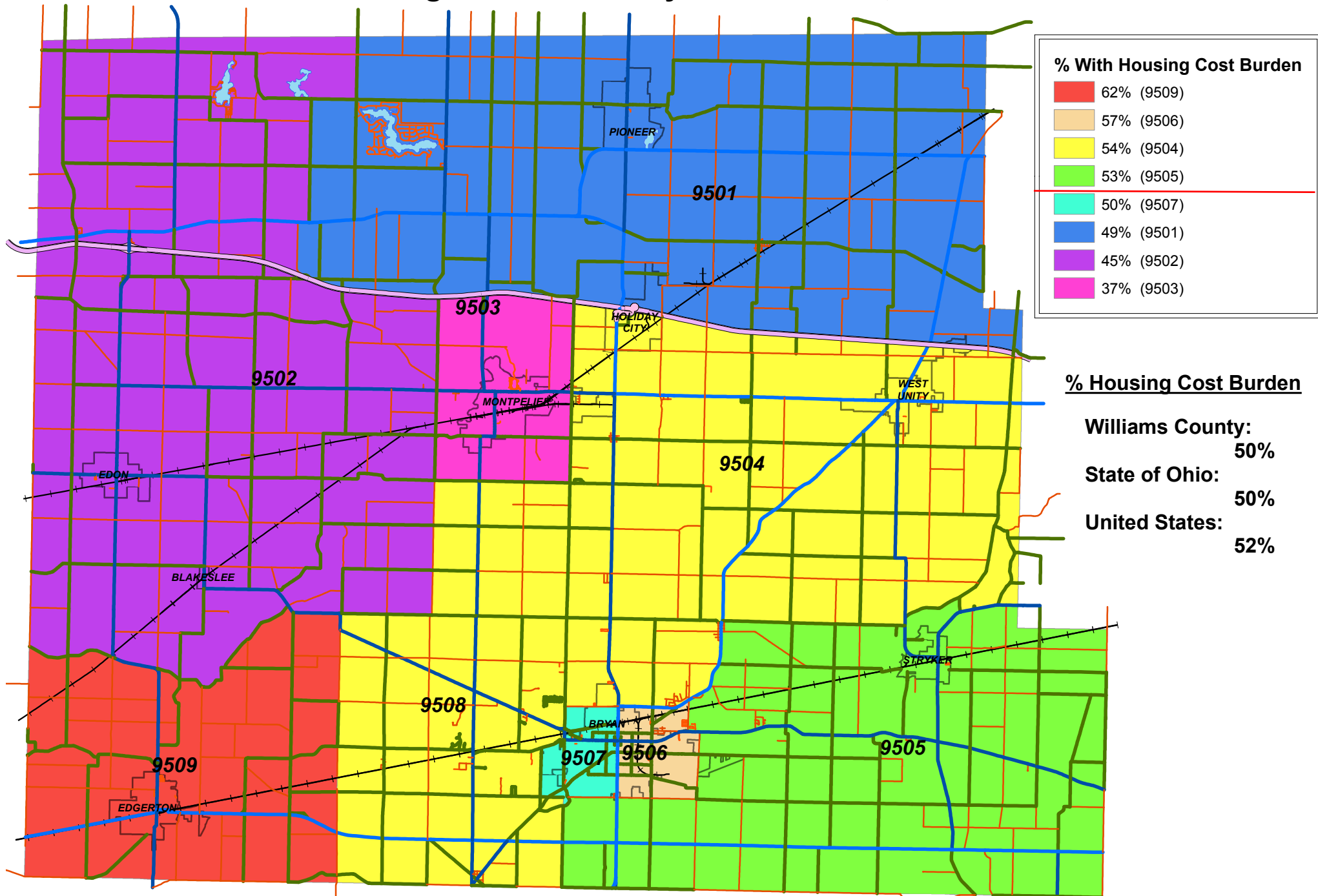
Data from: American Fact Finder, U.S. Census Bureau. Selected Characteristics of Health Insurance Coverage in the United States
2010-2014 American Community Survey 5-Year Estimates

% Households on Food Stamps by Census Tract, 2010-2014



Data from: American Fact Finder, U.S. Census Bureau. Food Stamps/SNAP 2010-2014 American Community Survey 5-Year Estimates

% with Housing Cost Burden by Census Tract, 2010-2014



Data from: American Fact Finder, U.S. Census Bureau. Selected Housing Characteristics 2010-2014
American Community Survey 5-Year Estimates

Williams County Health District

References:

- American Fact Finder. (2016a). Median Income in the Past 12 Months (In 2014 Inflation-Adjusted Dollars) 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016b). Poverty Status in the Past 12 Months 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016c). Educational Attainment 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016d). Employment Status 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016e). Selected Characteristics of Health Insurance Coverage in the United States 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016f). Food Stamps/SNAP 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- American Fact Finder. (2016g). Selected Housing Characteristics 2010-2014 American Community Survey 5-Year Estimates. *United States Census Bureau*.
- Ayers, J. (December 12, 2016). Applying a Health Equity Lens to Public Health Practice. Minnesota Department of Health. Public Health National Center for Innovations.
- Bell, J., Mora, G., Hagan, E., Rubin, V. & Karpyn, A. (2013). Access to Healthy Food and Why It Matters: A Review of Research. *The Food Trust*. Accessed January 23rd, 2017. Retrieved from http://thefoodtrust.org/uploads/media_items/access-to-healthy-food.original.pdf
- Boston Public Health Commission. (N.D.) What is Health Equity?. <http://www.bphc.org/whatwedo/health-equity-social-justice/what-is-health-equity/Pages/what-is-health-equity.aspx>
- Brown, J., Demou, E., Tristram, MA., Gilmour, H., Sanati, K., & MacDonald, E. (2012). Employment status and health: understanding the health of the economically inactive population in Scotland. *BMC Public Health*, 12:327.
- Centers for Disease Control and Prevention (CDC). (2014). Social Determinants of Health: Frequently Asked Questions. Retrieved from <http://www.cdc.gov/nchhstp/socialdeterminants/faq.html>
- Centers for Disease Control and Prevention (CDC). (2012). A Look Inside Food Deserts. Accessed January 23rd, 2017. Retrieved from <https://www.cdc.gov/features/FoodDeserts/>
- Community Commons. (2014). Community Health Needs Assessment (CHNA): Health Indicators Report. Accessed January 20th, 2017. Retrieved from

Williams County Health District

<https://assessment.communitycommons.org/CHNA/report?page=2&id=240&reporttype=librar>
[CHNA](#)

Compton, W., Gfroerer, J., Conway, K., & Finger, M. (2014). Unemployment and substance outcomes in the United States 2002-2010. *Drug and Alcohol Dependence*, 142(2014) 350-353.

Cutler, D. & Lleras-Muney, A. (2006). Education and Health: Evaluating Theories and Evidence. *National Bureau of Economic Research*. Accessed January 6th, 2017. Retrieved from <http://www.nber.org/papers/w12352>

Friis, R. & Sellers, T. (1996). *Epidemiology for Public Health Practice*. Book. Gaithersburg, Maryland: Aspen Publishers, Inc.

Fritsch, B. (2017). Maps. *County Engineer Office*.

Gordis, L. (2014). *Epidemiology*. Book. Philadelphia, Pennsylvania: Elsevier Saunders.

HealthCare.gov. (2016). Federal Poverty Level (FPL). Accessed on December 27th, 2016. Retrieved from <https://www.healthcare.gov/glossary/federal-poverty-level-FPL/>

Health Equity Institute. (2010). Defining Health Equity. *San Francisco State University*. Retrieved from <http://healthequity.sfsu.edu/content/defining-health-equity>

Hoffman, C. and Paradise, J. (2008). Health Insurance and Access to Health Care in the United States. *Annals of New York Academy of Sciences*, 1136(1), pp. 149-159. Retrieved from <http://onlinelibrary.wiley.com.proxy.lib.ohio-state.edu/doi/10.1196/annals.1425.007/abstract>

LaMorte, W. (2016). Crude Rates. *Boston University School of Public Health*. Accessed December 8th, 2016. Retrieved from http://sphweb.bumc.bu.edu/otlt/MPH/Modules/EP/EP713_StandardizedRates/EP713_StandardizedRates2.html

Missouri Department of Health & Senior Services. (2016). Age-Adjusted Rate. Accessed January 24th, 2017. Retrieved from http://health.mo.gov/data/mica/CDP_MICA/AARate.html

Stein, D. (2011). 'Food Deserts' and 'Food Swamps' in Hillsborough County, Florida: Unequal Access to Supermarkets and Fast-Food Restaurants. *Scholar Commons: University of South Florida*. Retrieved from <http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=4561&context=etd>

Tacoma-Pierce County Health Department. (2016). Fairness Across Places? Your Health in Pierce County. Retrieved from <http://www.tpchd.org/health-wellness-1/health-equity/>

U.S. Census Bureau. (2016). Population and Housing Narrative Profile 2010-2014 American Community Survey 5-year Estimates. *American Community Surveys (ACS)*. Accessed December 27th, 2016. Retrieved from https://thedataweb.rm.census.gov/TheDataWeb_HotReport2/profile/2014/5yr/np01.hrml?S_MLEV=140&state=39&county=171&tract=950600

Williams County Health District

- United States Census Bureau. (N.D.). Chapter 10: Census Tracts and Block Numbering Areas. <https://www2.census.gov/geo/pdfs/reference/GARM/Ch10GARM.pdf>
- United States Department of Agriculture (USDA). (2017). Documentation. *Economic Research Service, Food Access Research Atlas*. Accessed January 23rd, 2017. Retrieved from <https://www.ers.usda.gov/data-products/foodaccess-research-atlas/documentation/>
- Weinstein, J., Geller, A., Baci, A., & Negussio, Y. (2017). Communities in Action: Pathways to Health Equity. *The National Academies Press. Book*. Retrieved from <http://www.nap.edu/24624>
- Williams County Health Department. (2016). 2016 Williams County Community Health Status Assessment. Retrieved from <http://www.williamscountyhealth.org/administration/community-health-assessment/>
- World Health Organization. (2016). Poverty and health. *Health and development*. Accessed on December 27th, 2016. Retrieved from <http://www.who.int/hdp/poverty/en/>
- World Health Organization (WHO). (2016). What are social determinants of health?. Accessed November 29, 2016. Retrieved from http://www.who.int/social_determinants/sdh_definition/en/
- World Health Organization (WHO). (1948). About WHO. Retrieved from <http://www.who.int/about/mission/en/>
- Yates, C. (2013). Mean vs. Median Income: Which one to Use and What it Means for South Central Kentucky. <http://wkuappliedeconomics.org/indblogs/mean-vs-median-income-which-one-to-use-and-what-it-means-for-south-central-kentucky/>