Burden of Health Disparities in Chronic Illnesses:

A Report on Cardiovascular Disease, Diabetes, and Cancer

in La Crosse County

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I. Executive Summary

The field of public health has contributed to the elimination and reduction of many infectious diseases and deaths in the 20th and early 21st centuries which has spurred public health professionals to actively work towards lessening death and disease rates from chronic diseases today. Although public health professionals in La Crosse County have focused on developing interventions targeted at reducing the prevalence of chronic disease, four of the five leading causes of death in La Crosse County from 2009-2011 were from chronic diseases.

Chronic disease is costly and affects all members of the community. In 2010, Wisconsin spent between $2.5 to $7.1 million dollars on chronic diseases and the costs are projected to substantially rise over the next six to ten years (Center for Disease Control Cost Calculator, 2010). The burden of the projected increase in chronic disease expenditures is ultimately passed on to communities; therefore, every resident of La Crosse County will be affected by the increased costs of these diseases.

Although individual behaviors account for 30% of health outcomes (University of Wisconsin Population Health Institute, 2014), social, economic, and environmental factors influence 50% of health outcomes. Within each of these social, economic, and environmental factors lies the potential for people and populations to experience differences in health outcomes based on gender, sex, race, socio-economic status, educational attainment, and income levels. These differences are known as health disparities.

Health disparities are, "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion" (U.S. Department of Health and Human Services, 2010). Simply put, a health disparity is an important difference in health outcomes between populations due to factors beyond individual behaviors. In the following report we discuss the burden of chronic diseases such as cancer, cardiovascular disease, and diabetes on the La Crosse County community. We further highlight statistically significant racial and health disparities in employment, income, health care coverage, general health status, health outcomes, and health perceptions based on income and provide recommendations to address these disparities.

To assess potential health disparities in La Crosse County, data from the American Community Survey (ACS), the Behavioral Risk Factor Survey (BRFS), the COMPASS NOW 2012 Random Household survey, and the Wisconsin Interactive Statistics on Health (WISH) Query System from the Wisconsin Department of Health

Services were analyzed. Statistically significant differences, or disparities, were identified for La Crosse County and are as follows:

Identified disparities from the American Community Survey include significant differences based on race in:

- Household income
- Acquisition of Supplementary Security Incomes
- Health insurance coverage
- Medicaid/low income assistance
- Physical disability and cognitive difficulty

Identified disparities from the Behavioral Risk Factor Survey include:

- Those who have health care coverage are more likely to be in good or better health, than those who do not have health care coverage
- Those who are older are more likely to be diagnosed with coronary heart disease and more likely to have experienced a stroke compared to those who are younger
- Those with less education were more likely to have a stroke than those with more education.
- Those who were not able to get care because of cost were more likely to have been diagnosed with pre-diabetes than those who were able to get care despite the cost.

Disparities in health perceptions from the COMPASS NOW 2012 report include:

- Those who earn less than $25,000 perceive their access to healthcare, dental care and mental health care to be poorer than did those earning more than $25,000
- Those who earn less than $25,000 also perceived their air quality to be poorer than did those earning more than $25,000

Years of Potential Life Lost (YPLL), another leading indicator of how healthy a community is, was calculated, age-adjusted, and analyzed by race for coronary heart disease, diabetes, and cancer combined for the years 2009-2011. The results of the analysis were as follows:

- Whites had 2041.67 YPLL
- Blacks had 3915.21 YPLL
- American Indians had 2431.35 YPLL
- Asians had 1424.06 YPLL

This analysis indicates that Blacks in La Crosse County are dying earlier than all other races from cardiovascular disease, diabetes, and cancer combined.

Based on the identified disparities in La Crosse County it is recommended that community members, coalitions, non-profit agencies, government entities, businesses, and policy-makers alike do the following:

- Collect data in a targeted and meaningful way as current data used to identify disparities is small, unorganized, and insufficient. One way to achieve this could be to amend the Great Rivers United Way community needs assessment to capture more data pertaining to racial and health disparities.
- Expand work already being done by coalitions, collaborations, and partnerships throughout La Crosse County to help reduce the effects of health disparities on health outcomes.
- Address the racial differences that were discovered in the ACS analysis and the disparities in access to care found in the COMPASS NOW 2012 analysis. This could be done by developing policies aimed at increasing educational and employment opportunities throughout the community.
- Invest, as a community, in public health interventions aimed at preventing chronic diseases by addressing social and economic factors.

The aim of this report is to provide a starting point for further discussion and action to resolve the health disparities that exist in La Crosse County. The report serves as a baseline indicator of where La Crosse County is currently at in identifying and addressing health disparities with recommendations on how community members, organizations, and leaders can lessen the burden of these differences on cardiovascular disease, cancer, and diabetes.
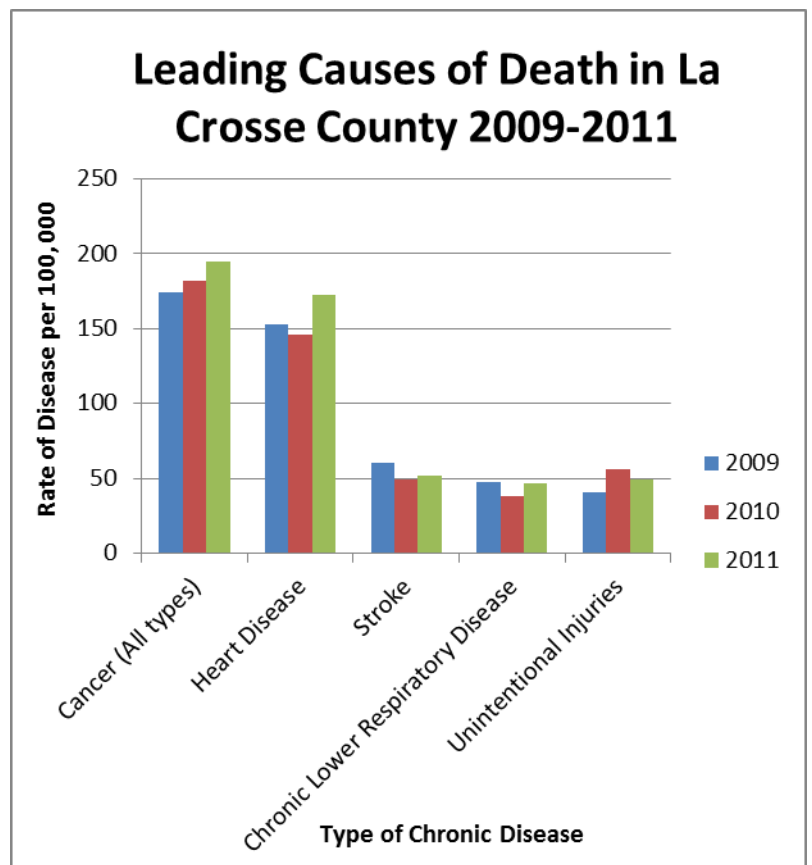
II. Introduction

Over the past century, the field of public health has contributed to the elimination of many infectious/communicable diseases due to the advancements in immunizations and educational campaigns aimed at promoting healthy behaviors. The Centers for Disease Control and Prevention developed a list of the top ten greatest public health achievements in the first decade of the 21st century: vaccine-preventable diseases, prevention and control of infectious diseases, tobacco control, maternal and infant health, motor vehicle safety, cardiovascular disease prevention, occupational safety, cancer prevention, childhood lead poisoning prevention, and public health preparedness and response (Centers for Disease Control and Prevention, 2011).

Public health efforts have effectively reduced infectious disease outbreaks and deaths in the 20th and early 21st centuries and public health professionals are now actively working to lessen death and disease rates from chronic diseases. Chronic diseases include but are not limited to cardiovascular disease, diabetes, cancer, and arthritis.   Public health professionals, advocates, and policy makers in La Crosse County have focused on developing interventions targeted at reducing the prevalence of chronic disease. Examples of this work include creating and implementing the Gundersen Health System 500 Club aimed at creating healthier eating choices at restaurants for consumers and passing a policy prohibiting the use of cigarettes in restaurants prior to the state of Wisconsin implementing a state-wide law, at all work-sites, to help reduce the number of county residents who smoke. The work of many dedicated individuals and organizations has not gone unnoticed. In 2014, La Crosse County was ranked the 19th healthiest county in the state of Wisconsin. Overall, La Crosse County ranked 6th in the state for health behaviors (adult smoking, adult obesity, physical inactivity, etc.; University of Wisconsin Population Health Institute,

Figure 1

Source: La Crosse Medical Health Science Consortium Health Scorecard Project, 2014.

2014). Both rankings are strong indicators of the health of our community. However, in 2009-2011 four of the five leading causes of death in La Crosse County were from chronic diseases (See Figure 1). As such, chronic diseases are a primary concern for public health professionals.

The aggressive response to promoting health by combating biological agents of disease (i.e., viruses, bacteria, etc.) has replaced infectious diseases as the leading causes of death with diseases that have substantial behavioral components (Mokdad et al., 2004). Individual behavior accounts for approximately 30% of health outcomes (University of Wisconsin Population Health Institute, 2014). Others have also noted that over half of deaths can be attributed to individual behavior (Mokdad et al., 2004). While increasing healthy individual behavior is important in creating healthy communities, accounting for factors like education, income, race, gender, the environment, and social policies is needed in intervention development as these variables also impact health outcomes.

As shown in Figure 1, the three leading causes of death in La Crosse County from 2009-2011 were cancer (of all types), heart disease, and stroke. This report will discuss the burden of cancer, cardiovascular disease, and diabetes on the community as cancer and cardiovascular disease are two of the leading causes of death in La Crosse County. In this discussion, disease trends and costs will be highlighted. Furthermore, disparities or differences in these diseases within the population will be presented.

III. Burden of Chronic Diseases

The impact chronic diseases have on communities can be measured in a number of ways such as costs associated with treating diseases and the quality of life experienced by individuals with cardiovascular disease, cancer, and diabetes. La Crosse County residents experience similar prevalence rates as the state of Wisconsin for most chronic diseases. La Crosse County does, however, have a higher prevalence rate of stroke compared to the state of Wisconsin (Table 1).

Table 1: Prevalence of Health Conditions for La Crosse County using data from the 2011-2012 Behavioral Risk Factor Survey

	La Crosse County		State of Wisconsin		
	N	%	N	%	p-value[1]
Risk of poor health	15	15.3	1770	16.9	.85
Have not been to the doctor in the past 2 years	17	17.3	1446	13.9	.51
Do not have health care coverage	12	12.2	1010	9.6	.64
Do not have a personal health care provider	17	17.3	1319	12.6	.16
Could not been seen because of cost	11	11.2	1075	10.3	.75
Coronary Heart Disease	5	5.1	591	5.7	.81
Heart Attack	4	4.1	582	5.6	.53
Stroke	9	9.3	337	3.2	**.001**
Diabetes (not during pregnancy)	6	6.1	1214	11.6	.19
Pre-diabetes (not during pregnancy)	6	6.7	730	8.1	.62
Cancer (not skin)	9	9.2	940	9.0	.94

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between La Crosse county and the state of Wisconsin. A p-value of < .05 indicates that the prevalence rates are statistically different.

A. Monetary Costs

The costs (costs include expenditures for office based visits, hospital outpatient visits, emergency room visits, inpatient hospital stays, dental visits, home health care, vision aids, other medical supplies and equipment, prescription medications, and nursing homes) of chronic diseases, as shown in Figure 2, ranged from $2.5 to $7.1 million dollars in 2010 for the state of Wisconsin. The cost of cardiovascular disease was higher than the costs associated with cancer and diabetes. When broken down, treatment of coronary heart disease and hypertension comprise the majority of spending on cardiovascular diseases (Figure 3). Furthermore, costs of cardiovascular disease, cancer, and diabetes are projected to rise substantially over the next six to ten years. As seen in Figure 4, total spending on cardiovascular diseases is expected to increase from approximately $7.1 million in 2010 to over $13 million in 2020. Spending on cardiovascular disease is expected to increase 69% from 2010 to 2020; 72.1% for cancer in the same period of time, and 67.6% for diabetes.
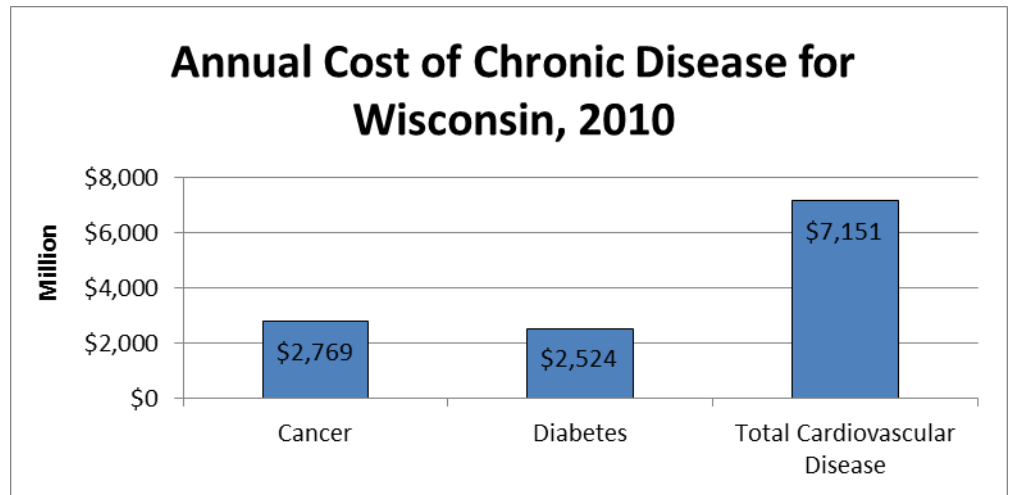
Figure 2
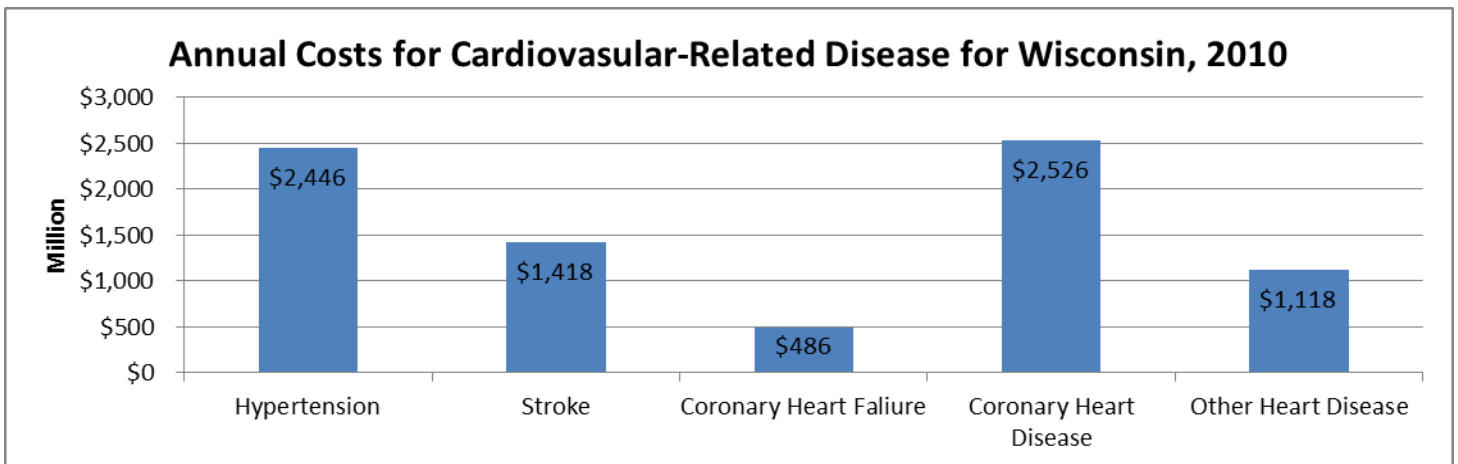
Annual Cost of Chronic Disease for Wisconsin, 2010

Source: Center for Disease Control Cost Calculator, 2010. Costs include expenditures for office based visits, hospital outpatient visits, emergency room visits, inpatient hospital stays, dental visits, home health care, vision aids, other medical supplies and equipment, prescription medicines, and nursing homes. Includes all payers (Medicaid, Medicare and Private Insurers).

Figure 3

Annual Costs for Cardiovasular-Related Disease for Wisconsin, 2010

Source: Center for Disease Control Cost Calculator, 2010. Costs include expenditures for office based visits, hospital outpatient visits, emergency room visits, inpatient hospital stays, dental visits, home health care, vision aids, other medical supplies and equipment, prescription medicines, and nursing homes. Includes all payers (Medicaid, Medicare and private insurers). The costs for Total CVD include diseases of the heart, stroke, and other heart diseases.

Figure 4

Projected Cost of Chronic Diseases in Wisconsin, 2010-2020
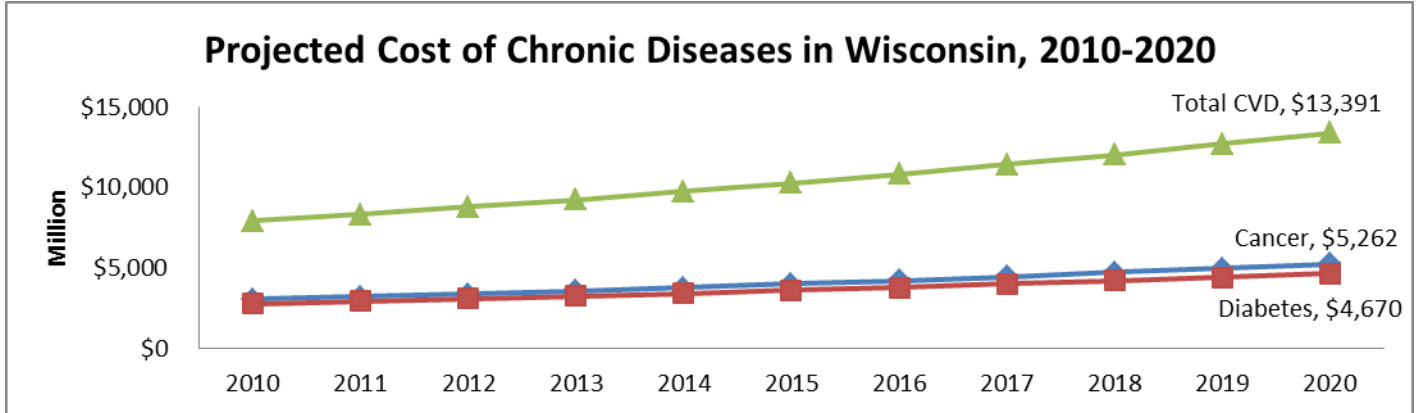
Source: Center for Disease Control Cost Calculator, 2010.

Likewise, as seen in Figure 5, the projected percent increase from 2010 to 2020 for other heart disease (includes rheumatic fever/rheumatic heart diseases, diseases of mitral and aortic valves and other endocardial structures, acute and chronic pulmonary heart disease, etc.) is 70.3%; for coronary heart failure the increase is 71%, hypertension costs are estimated to increase by 65.10%, stroke related costs are anticipated to rise 69.60% and expenses for coronary heart disease are predicted to grow 69.60%.

Figure 5

Projected Cost of Cardiovascular-Related Diseases in Wisconsin, 2010-2012
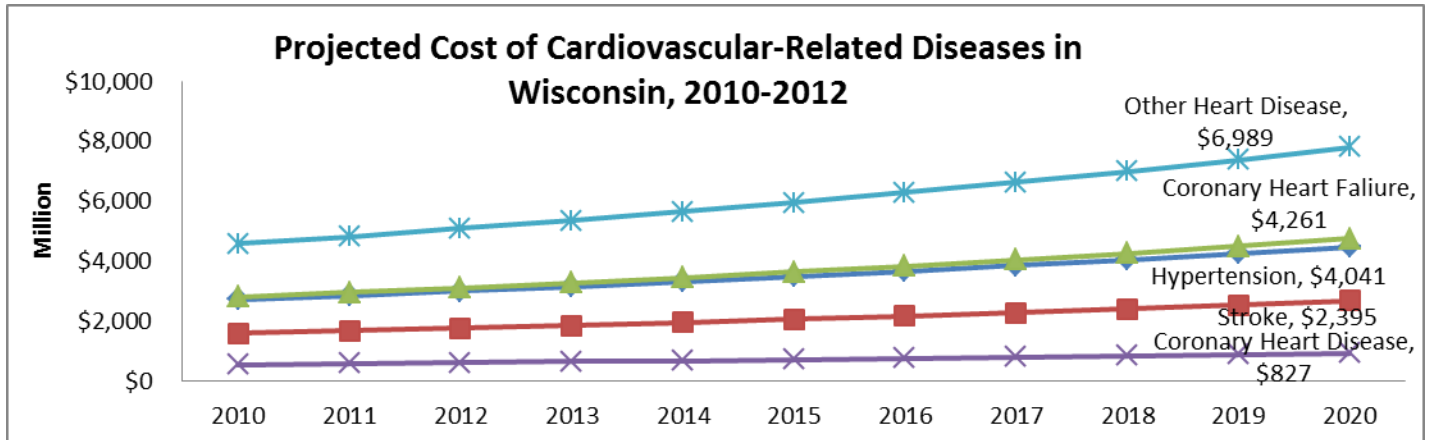
Source: Center for Disease Control Cost Calculator, 2010

The burden of this is ultimately passed on to communities; therefore, every resident of La Crosse County will be affected by these increased costs. Bloom and colleagues (2011) note that chronic disease has important effects on the larger economy, "with respect to cardiovascular disease, chronic respiratory disease, cancer, diabetes and mental health, the macroeconomic simulations suggests a cumulative output loss of US $47 trillion over the next two decades" (pg. 6). Workers will spend less time at work, thereby decreasing output. Additionally, with increasing rates of individuals suffering from chronic illnesses that limit their ability to take care of themselves,

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care-taker burden will increase. Much research has found poor health outcomes of care takers due to the stress experienced with the act of care giving (Epel et al., 2003; Pinquart & Sorensen, 2006; Vitaliano, Zhang, & Scanlan, 2003). Furthermore, an estimated $300 billion dollars of lost productivity was seen throughout the nation due to cardiovascular diseases, cancer, and diabetes from 2005-2012. (American Public Health Association, n.d.).

B. Years of Potential Life Lost (YPLL)

A leading indicator used to determine the quality of life of any given population or community in addition to mortality (death) rates and morbidity (disease) rates is the number of years of potential life lost (YPLL). Years of potential life lost is an indicator of premature death; the YPLL measure acknowledges that death occurring at a younger age reduces lifelong productivity of an individual (Gordis, 2009). Knowing and understanding YPLL can help community

Figure 6
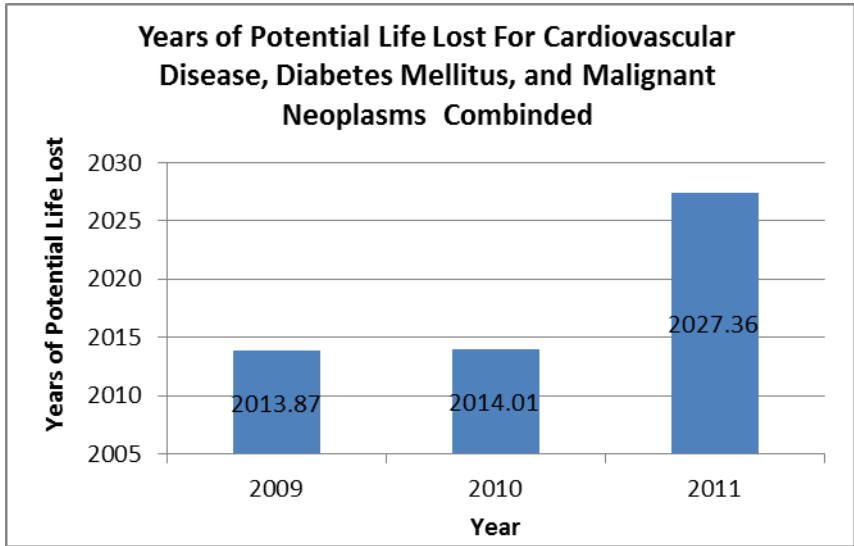
Source: Wisconsin Department of Health Services, WISH query, 2013.

leaders determine if people are dying prematurely or are living until their expected age based on state and national trends. A community should work to lessen the YPLL lost and achieve a number as close to zero as possible to ensure the burden of diseases is reduced. From the years 2009-2011 age adjusted years of potential life lost were calculated; a total of 6,056 years of potential life was lost in all of La Crosse County due to diseases of the heart, diabetes mellitus, and malignant neoplasms (cancer) (Wisconsin Department of Health Services, 2013).

IV. Disparities

The burden of chronic diseases like cardiovascular disease, cancer, and diabetes impacts entire communities, not just the individual with the disease. Individual behaviors only account for 30% of health outcomes where as social and economic factors and the environment influence 50% of health outcomes. Therefore, education rates, income levels, employment levels, community safety, family and social support structures, air and water quality levels, and the availability of housing and transit all factor into whether or not people develop chronic diseases (Wisconsin Population Health Institute, 2014). Within each of these social, economic, and environmental factors lies the potential for people and populations to experience differences in health outcomes based on a gender, sex, race, socio-economic status, educational attainment, and income levels. These differences are known as health

disparities and are defined as, "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion" (U.S. Department of Health and Human Services, 2010). Put simply, a health disparity is an important difference in health outcomes between populations due to factors beyond individual behavior.

A. Disparities in employment, income, health coverage, and general health status

To first understand general disparities in employment, income, health insurance coverage, and general health status in La Crosse County, data from the 2009-2011 American Community Survey (ACS) were analyzed. Population demographics of La Crosse County were first analyzed in order to make meaningful comparisons among racial groups. The results of the ACS are as follows:

Table 2

American Community Survey Racial Categories	N	Percent
White alone	2691	94.7
Hmong alone	47	1.7
Two or more races	45	1.6
Black or African American alone	31	1.1
Chinese alone	6	0.2
Korean alone	7	0.2
Asian Indian alone	3	0.1
Filipino alone	3	0.1
Other specified American Indian tribes alone	3	0.1
Chippewa alone	1	0.03
Creek alone	1	0.03
American Indian or Alaska Native, not specified	1	0.03
Japanese alone	1	0.03
Asian, not specified	1	0.03
Other Native Hawaiian and Other Pacific Islander groups alone or in combination with other Native Hawaiian	1	0.03
Some other race alone	1	0.03

Based on the races identified by the survey respondents, race was coded into the following meaningful groups for further comparisons:

Table 3

American Community Survey Racial Categories Recoded	N	Percent
White	2691	94.7
Hmong	47	1.7
Multi-racial	45	1.6
Black/African American	31	1.1
Other Asian/Pacific Islander	22	0.8
American Indian or Alaska Native	6	0.2

To easily comprehend the results of the La Crosse County ACS analysis, a brief summary of the racial disparities in employment, income, health insurance coverage, and health status are highlighted below (Note: graphs, raw data, and statistical analyses can be found in Appendix A):

Race and Employment:

- There are no significant differences in employment status among racial groups.

Race and Income:

- There are significant differences in household income depending on race.
    - Blacks make significantly less than Whites
    - Those who identify as Asian/Pacific Islander (not Hmong) have the highest median income ($124,500)
    - Blacks have the lowest median income ($41,440)
- There are significant differences in race and acquisition of Supplementary Security Incomes (see appendix A for SSI definition)
    - Those who identify as American Indians take in the most SSI, on average ($2,220)
    - Hmong, on average, take in significantly more SSI each year than do Whites, approximately $722.64 more each year
    - American Indians, on average, take in significantly more SSI each year than do Whites ($2,080 more), Asian/Pacific Islanders ($2,220 more) and Multi-racial individuals ($1,939 more)

Race and Health Insurance Coverage:

- There is a significant difference in race and health insurance coverage
    - Blacks and Hmong are more likely to have no health insurance compared to Whites, Asians, and American Indians
- There is a significant difference in race with Medicaid/low income assistance
    - The highest percentage of Medicaid/low income assistance is for American Indians (50%; N=3), Blacks (32.3%), Hmong (25.5%), and Multi-racial (37.8%) groups. Only 12% of Whites and 4.5% of other Asian groups use assistance

Race and Health Status:

- There are significant differences in physical disability status and cognitive difficulty.
    - American Indian's self-reported the highest prevalence of physical disability (67%; N=4) and cognitive difficulty (50%; N=3)
    - Asians report the lowest physical disability (4.5%) and Whites report the lowest cognitive difficulty (4.3%)

B. Health Disparities

1. Behavioral Risk Factor Survey

Disparities among various chronic disease outcomes were analyzed using data from the 2011-2012 Behavioral Risk Factor Survey (BRFS). Data were aggregated from two years of the BRFS data collection to increase statistical power and support the analyses conducted. Data from La Crosse County residents was isolated and chronic disease outcomes were compared based on several demographic and sociocultural factors. The chronic disease outcomes and demographic and sociocultural factors explored are as follows:

Table 4

Chronic Disease Outcomes	Demographic and Sociocultural Variables
General Health Status	Age
Coronary Heart Disease	Race
Stroke	Income
Diabetes	Education
Pre-Diabetes	Sexual Orientation
Cancer	Access to Care:
	1) Health care coverage
	2) Time since been to a doctor
	3) Barriers to getting care
	4) Having a personal doctor

Statistical Notes: It is important to note that although some disparities were identified in this data set, due to the nature of survey collection the total sample size is small. As such, findings should be interpreted with some caution. Although the rates of illness in La Crosse County are comparable to that within the state of Wisconsin, the total number of people in the sample limits our ability to generalize findings that exist in the data set. To assess reliability, relative standard errors were computed (Wisconsin Department of Health Services, 2013). Some cells with very small numbers (i.e., 2 or less) did result in higher than expected relative standard errors thereby suggesting less reliable results in these comparisons. However, Fisher's exact tests were computed for cells with expected frequencies of less than 5.   Fisher's exact test computes the exact probability for the chi-square test when sample sizes are small (Agresti, 2007; Field, 2013), thereby reducing the error of small sample sizes when using chi-square analyses. Therefore, analyses with small samples, although still a limitation, have been accounted for in the statistical reports.

Again, to easily comprehend and process the results of the BRFS analysis, a succinct and meaningful summary of existing and statistically significant health disparities in La Crosse County can be found below. All other comparisons were not statistically significant. (Note: graphs, raw data, and statistical analyses can be found in Appendix B).

General Health Status:
- Those who have health care coverage are more likely to be in good or better health, than those who do not have health care coverage.

*Ever Diagnosed with **Coronary Heart Disease:***
- Those who are older are more likely to be diagnosed with coronary heart disease.

*Ever Had **Stroke:***
- Those who are older are more likely to have had a stroke and those with lower education levels were more likely to have experienced a stroke.

*Every been diagnosed with **Pre-Diabetes***
- Those who were not able to get care because of cost were more likely to have been diagnosed with pre-diabetes than those who had no issues with access to care because of cost.

2. COMPASS NOW 2012

In addition to the BRFS data analysis, data from the COMPASS NOW community needs assessment conducted in 2012 was analyzed. COMPASS NOW is a community needs assessment conducted every three years by Great Rivers United Way and community partners to identify the most pressing needs in a five county region including La Crosse County, Monroe County, Trempealeau County, Vernon County, and Houston County in Minnesota. COMPASS NOW 2012, the community needs assessment, was published with results from a random household survey distributed to over 5,000 households in the five county region with 1,094 returned and completed surveys for an overall response rate of 21.9% (Great Rivers United Way, 2012). For the purpose of this report, data from La Crosse County regarding health perceptions by income was isolated and analyzed. A chi-square test was used to calculate the perceptions of health based on income levels. The total sample size for the analysis is 485. The analysis found that low-income people, defined as earning less than $25,000 a year, rate the following poorer than do middle- or high-income people: access to healthcare, access to dental care, access to mental health care, and air quality. The differences found in health perceptions are statistically significant. While perceptions regarding access to care vary between income levels, there were no significant differences in perceptions about the affordability of health care in the community.

Table 5: Health Perceptions by Income

% Fair or Poor to the following questions:	< $25,000	$25-$75,000	> $75,000	p-value
The overall health of people in your community.	28.6%	17.4%	22.6%	0.15
Your access to healthcare.	16.1%	6.3%	2.8%	**< .001**
The affordability of healthcare in your community.	50.4%	45.0%	49.1%	0.83
Your access to dental care.	35.6%	15.0%	9.5%	**< .001**
The affordability of dental care in your community.	62.8%	47.8%	50.0%	0.06
Your access to mental health care.	26.7%	17.4%	11.1%	**0.01**
The affordability of mental health care in your community.	53.5%	46.8%	50.0%	0.12
The availability of preventive services (for example, smoking cessation, nutrition, mammography, immunizations).	15.7%	12.3%	8.7%	0.41
Your access to healthy food choices.	13.2%	11.9%	6.6%	0.54
The affordability of healthy food choices in your community.	42.4%	34.0%	32.1%	0.34
The quality of air in your community.	17.2%	7.9%	6.7%	**0.02**
The quality of water in the rivers and lakes in your community.	35.3%	30.0%	34.6%	0.79
The quality of drinking water in your community.	28.1%	18.0%	13.2%	0.07
Your community's ability to respond to health threats (for example, influenza outbreaks).	18.5%	12.3%	15.1%	0.48

Source: Great Rivers United Way Random Household Survey Results, 2012.

3. Years of Potential Life Lost (YPLL)

YPLL is another leading indicator used to determine the health of a community. Data was queried from the Wisconsin Department of Health Services Wisconsin Interactive Statistics on Health (WISH) Query to calculate the YPLL using age adjusted rates for the years 2009-2011 by race for diseases of the heart, diabetes mellitus, and malignant neoplasms. The data indicate a disparity in YPLL for Blacks as Blacks lost 3,915.21 years

Figure 7

Source: Wisconsin Department of Health Services, WISH query, 2013.

of life compared to 2,041.67 for Whites; 2,431.35 for American Indians; and 1,424.06 for Asians. The total age-adjusted YPLL was 6,056 for diseases of the heart, diabetes mellitus, and malignant neoplasms for all La Crosse County residents (see Figures 6); Blacks' YPLL accounts for nearly 65% of the total YPLL for all of La Crosse County from 2009-2011.

V: Recommendations:

Our analysis identifies differences in race, education, income and health outcomes. The results from the American Community Survey (ACS) data analysis found significant differences between race and income, race and health insurance coverage, and race with Medicaid/low income assistance. Although general conclusions from the BRFS analysis cannot be directly applied to the population at large, progress can still be made to mitigate the burden of health disparities on cardiovascular disease, cancer, and diabetes outcomes in La Crosse County.

It is recommended to collect more data in a targeted, explicit, and meaningful way as the data needed to identify disparities is small, unorganized, and insufficient. One way to collect more data is to amend the community needs assessment process to capture more data pertaining to racial and health disparities. Currently, a random household survey is conducted every three to five years through the COMPASS NOW process by Great Rivers
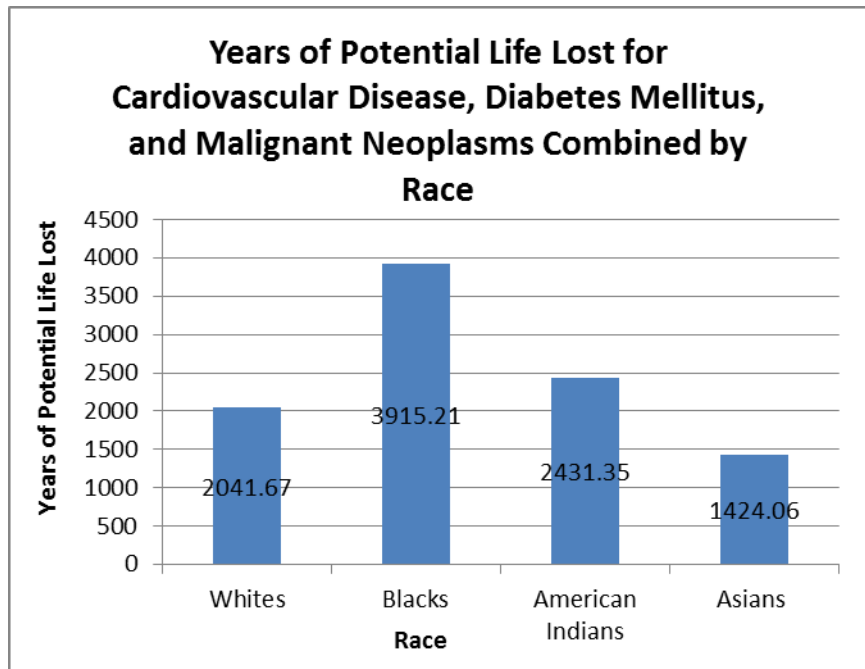
United Way and community partners, including the La Crosse County Health Department and the two largest health systems in La Crosse County. We encourage incorporating questions from the Behavioral Risk Factor Survey (BRFS) into the random household survey used in the assessment process. Merging questions from the BRFS into the random household survey will allow for health disparities to be more easily identifiable. Furthermore, expanding upon the questions asked in the random household survey will allow for concrete conclusions to be made as a larger sample size will eliminate any uncertainty in the data analysis. We also recommend oversampling underrepresented populations in data collection efforts; this could be done by intentionally surveying clients at organizations (the YMCA, libraries, Couleecap, etc.) throughout the community that serve underrepresented populations. Additional data will also allow for the other focus areas of the La Crosse community health improvement plan (mental health, infections disease, and injury and violence) to be examined for health disparities that are currently unknown.

Expanding the work already being done by coalitions, collaborations, and partnerships throughout La Crosse County by specifically designing interventions for disparate populations can also help reduce the effects of health disparities on health outcomes. Continuing to team up to develop up-stream interventions to improve the health of La Crosse County residents as well as evaluating the work being done to better target a variety of resources is needed. As the BRFS analysis indicates, there is a significant difference in stroke rates among those less educated. Developing a potential educational campaign targeting this population may help reduce stroke rates.

Another way to lessen the impacts of disparities on chronic disease outcomes would be to address the racial and educational differences that were discovered in the ACS analysis and the disparities in perceived access to care found in the COMPASS NOW 2012 analysis. The results of these inquiries highlight the effect socioeconomic factors and community perceptions have on health outcomes. Addressing the differences in income, health insurance coverage, and access to care will increase the health status of community members. Initiating and continuing discussions on the social determinants of health, the circumstances and systems in which people are born, grow-up, live, work, and play which are shaped by broader factors such as economics, social policies, and politics will allow for community partners, coalitions, and stakeholders to develop policies and programs that target upstream interventions that will promote health equity (World Health Organization, 2008). An example of an upstream intervention that would address the disparities discovered in the ACS analysis would include advocating for and developing a policy to increase funding for child care subsidies (University of Wisconsin Population Health Institute, 2014). This upstream intervention would likely increase employment which would potentially provide people with more income to support the economy, buy nutritious food, and increase access to health care.

Additionally, community wide investments in public health interventions aimed at preventing chronic diseases by addressing social and economic factors can save billions of dollars nationwide, "In 2008, Trust for America's Health and the Robert Wood Johnson Foundation released a report showing that an investment of $10 per person annually in proven, community-based public health programs could save the United States more than $16 billion within five years---a $5.60 return for every $1 invested." (Robert Wood Johnson Foundation, 2013). As seen in Figure 3, in 2010, $2.5 million dollars was spent in Wisconsin on coronary heart disease (CHD). If 20% ($500,000 dollars) of the cost of treating CHD was invested in evidence-based community interventions such as creating a fitness program in a community setting (University of Wisconsin Population Health Institute, 2014) tax payers could potentially save $2.8 million dollars and possibly eliminate significant costs associated with the disease and lessen the prevalence of coronary heart disease in the state and community.

VI: Conclusion:

Addressing the burden that health disparities have on health outcomes of La Crosse County residents will be difficult and complex. The analysis from the American Community Survey (ACS) indicates several significant differences in household incomes, Supplementary Security Income, health care insurance coverage, Medicaid/low income assistance, physical disability and cognitive difficulty status based on race. Furthermore, the BRFS data analysis indicated there are disparities between general health status, as those who have health care coverage are more likely to be in good or better health, than those who do not have health care coverage. We also found that those who are not able to access care because of cost are more likely to have been diagnosed with pre-diabetes and those with lower educational levels were more likely to have experienced a stroke. All of the identified disparities impact La Crosse County's mortality and morbidity rates. Even with some data limitations, we were able to determine important health disparities in La Crosse County. With more data collection and analysis, we can more accurately assess the current landscape and target interventions more specifically based on the health disparity needs of La Crosse County. This report is meant to be a starting point; a baseline indicator of where La Crosse County currently is at in identifying and addressing health disparities with recommendations how community members, organizations, and leaders can lessen the burden of these differences on cardiovascular disease, cancer, and diabetes.

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VIII. Appendix A

Racial Disparities in La Crosse County

Words of caution in interpreting percentages and frequencies:

    Since the vast majority (i.e., >90%) of respondents are white, percentages/frequencies of findings can be misinterpreted due to the greater number of whites than any other category. As such it is advisable to explore percentages within racial categories and to examine the differences between expected values and actual values on the tables.

Race and Employment

There are no significant differences in unemployment status by race, χ^2 (df = 5) = 2.24, *p=*.82

	Employed		Unemployed		
	N	%	N	%	Total
White	2603	96.7	88	3.3	2691
Black/African American	29	93.5	2	6.5	31
American Indian or Alaska Native	6	100	0	0	6
Hmong	45	95.7	2	4.3	47
Other Asian/Pacific Islander	22	100	0	0	22
Multi-racial	44	97.7	1	2.2	45
Total	2749		93		

Household Income:

There is a significant difference in income among races, χ^2 (df = 5) = 14.79, p=.01. Black/African American make significantly less than do Whites, p = .004[1] All other group comparisons were not significantly different from one another.

Household Income in La Crosse County:
- Average: $75,602
- Median: $66,000

Income by Racial Group (rounded to nearest dollar):

	N	Mean	Standard Deviation	Median	Minimum	Maximum
White	2513	75,634	59,408	66,500	.00	470,000
Black/African American	25	48,525	35,111	41,440	10,600	172,000
American Indian or Alaska Native	4	51,800	16,384	50,350	34,500	72,00
Hmong	45	59,791	23,628	65,700	10,800	90,000
Other Asian/Pacific Islander	21	103,620	74,987	124,500	7,100	333,000
Multi-racial	43	94,754	94,884	67,320	8,700	359,600
Total	2651					

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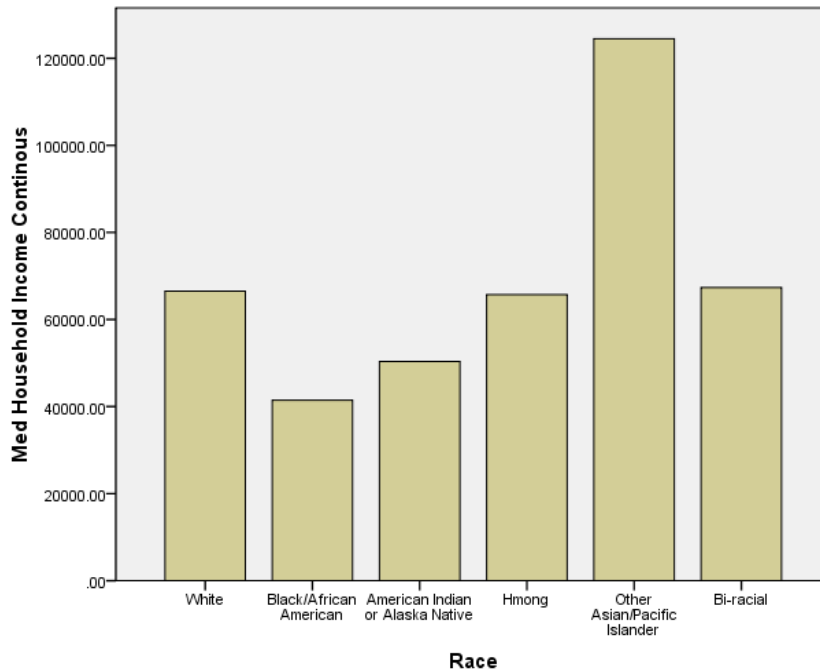
[1] This comparison was made using a Bonferroni correction to control for Type I error rate, where p-value/number of comparisons = .05/12; p = .004.

Income data are skewed and therefore statistical analyses were altered to take into consideration the degree to differences among income depending on race. Mean ranks were calculated to make statistical comparisons.[2]

	N	Mean Rank
White	2513	1,329.25
Black/African American	25	893.78
American Indian or Alaska Native	4	1,013.50
Hmong	45	1,192.98
Other Asian/Pacific Islander	21	1,680.98
Multi-racial	43	1,382.23

Supplementary Security Income in the past 12 months:

We also assessed income disparities by exploring differences in race for supplementary security income received in the past 12 months. Supplemental security income is "a nationwide U.S. assistance program administered by the Social Security Administration that guarantees a minimum level of income for the needy, aged, blind or disabled individuals" (US Census Bureau, 2012). Significant difference among groups, $F_{(5, 2338)} = 5.75$, $p < .001$ were found. Hmong, on average, take in a significantly more SSI than Whites (Mean difference = $722.64). American Indians take in significantly more SSI than do Whites (Mean difference=$2,080), Asian/Pacific Islanders (Mean difference=$2,220) and Multi-racial individuals (Mean difference=$1,939). No other comparisons were statistically significant.

	N	Mean	Standard Deviation	Minimum	Maximum
White	2233	140	1,195	0	30,000
Black/African American	27	644	2,325	0	9,100
American Indian or Alaska Native	8	2,220	3,853	0	8,900
Hmong	32	863	2,604	0	10,200
Other Asian/Pacific Islander	16	0	0	0	0
Multi-racial	31	281	1,563	0	8,700
Total	2347	691			

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[2] A Kruskal-Wallis Test was used because income is not a normally distributed variable. This test is equivalent of running an ANOVA on mean income, but it accounts for the fact that income is skewed data. Kruskal-Wallis Tests are more appropriate because it does not make normality assumptions.

Mean Supplementary Security Income past 12 months
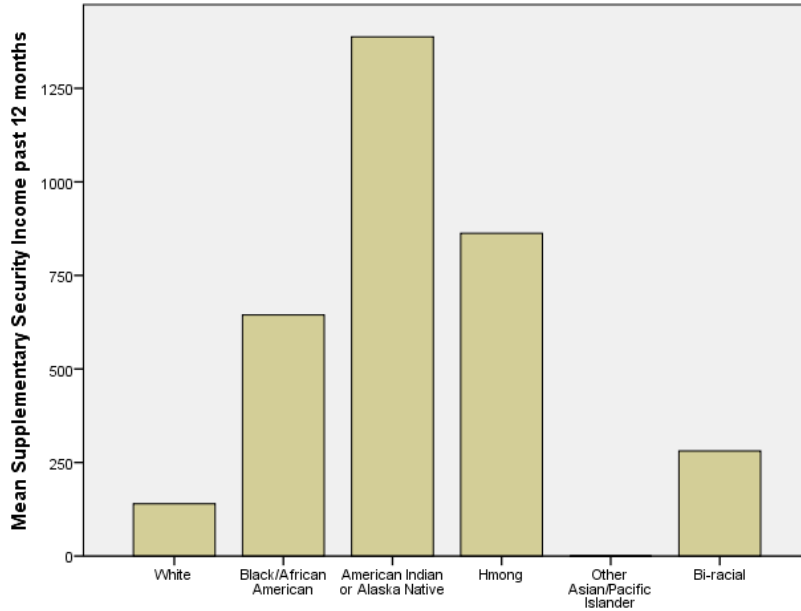
Race and Health Insurance Coverage

With or Without Health Insurance:

In La Crosse County:

	N	Percent
With health insurance coverage	2660	93.6
No health insurance coverage	183	6.4
Total	2843	100.0

By Race:

There is a significance difference between race and health insurance coverage, χ^2 (df = 5) = 57, $p<.001$. Black/African Americans and Hmong having higher percentages of no health insurance compared to Whites, Asians and American Indians.

	With Health Insurance			No Health Insurance			
	N	% of race	% of insured	N	% of race	% of not insured	Total
White	2536	94.2	95.4	155	5.8	84.7	2691
Black/African American	22	71.0	0.8	2	29.0	4.9	24
American Indian or Alaska Native	6	100	0.3	0	0	0	6
Hmong	36	76.6	1.4	3	23.4	6.0	39
Other Asian/Pacific Islander	21	95.5	0.7	1	4.5	0.5	22
Multi-racial	38	84.4	1.4	7	15.6	3.8	45
Total	2659			168			
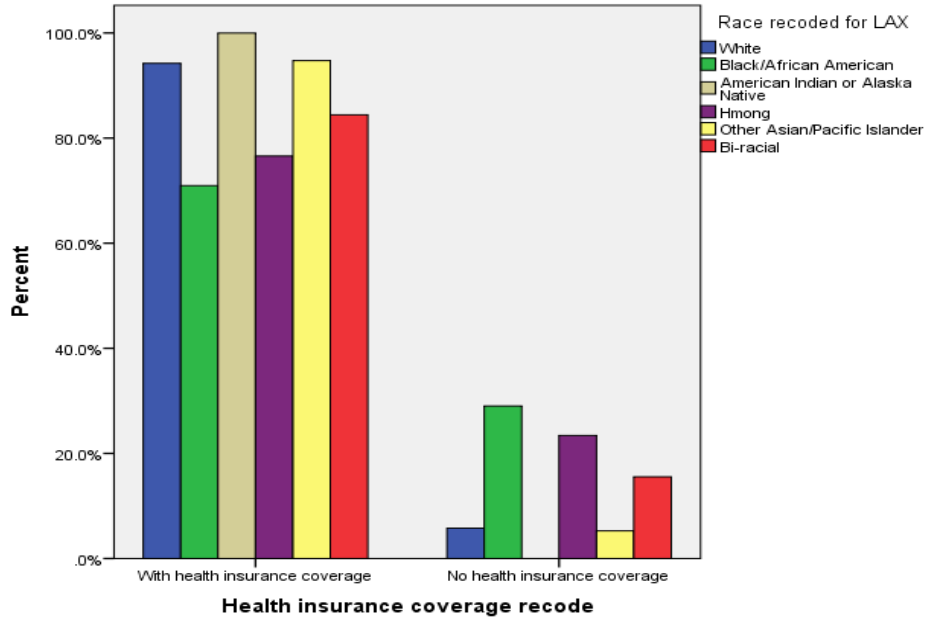
Medicaid or low income Assistance:

La Crosse County:

	N	Percent
Yes	383	13.5
No	2460	86.5

By Race:

There is a significance difference between race and health insurance coverage χ^2 (df = 5) = 48.03, $p<.001$. The highest percentage of Medicaid/low income assistance are for American Indians (50%), Black/African Americans (32.3%), Hmong (25.5%), and Multi-racial (37.8%) groups. Only 12% of Whites and 4.5% of other Asian groups use assistance

	Use Medicaid or Low Income Assistance			Do not use Medicaid or Low Income Assistance			
	N	% of race	% within use of Medicaid	N	% of race	% within use of Medicaid	Total
White	340	12.6	88.8	2351	87.4	95.6	2691
Black/African American	10	32.3	2.6	21	67.7	0.9	31
American Indian or Alaska Native	3	50	0.8	3	50	.1	6
Hmong	12	25.5	3.1	35	74.5	1.4	47
Other Asian/Pacific Islander	1	4.5	0.3	21	95.5	0.9	22
Multi-racial	17	37.8	4.4	28	62.2	1.1	45
Total	383			2459			

ACS asks whether someone has difficulty with the following: self-care, hearing, vision, disability, independent living, ambulatory, cognitive functioning.

La Crosse County:

Health Status	Yes (Percent)	No (Percent)
Self-care	81 (2.8)	2593 (91.2)
Hearing	120 (4.2)	2723 (95.8%)
Vision	31 (1.1)	2812 (98.9)
With a physical disability	312 (11.0)	2531 (89)
Independent living diff	133 (4.7)	2212 (77.8)
Ambulatory	153 (5.4)	2521 (88.7)
Cognitive	123 (4.3)	2551 (89.7)

By Race:
There were no significant differences for self-care, hearing, vision, or ambulatory functioning

There was a significant difference for physical disability, χ^2 (df = 5) = 21.13, p=.001 and cognitive difficulty, χ^2 (df = 5) = 33.21, p=.001. American Indian's report the highest disability (66.7%) and cognitive difficulty (50%). Other Asians report the lowest (4.5%) disability and Whites report the lowest cognitive difficulty (4.3%)

	Has a Disability			Without a Disability			
	N	% of race	% within Disability	N	% of race	% within Disability	Total
White	293	10.9	93.9	2398	89.1	94.8	2691
Black/African American	5	16.1	1.6	26	83.9	1.0	31
American Indian or Alaska Native	4	66.7	1.3	2	33.3	.1	6
Hmong	4	8.5	1.3	43	91.5	1.7	47
Other Asian/Pacific Islander	1	4.5	0.3	21	95.5	.8	22
Multi-racial	5	11.1	1.6	40	88.9	1.6	45
Total	312			2530			
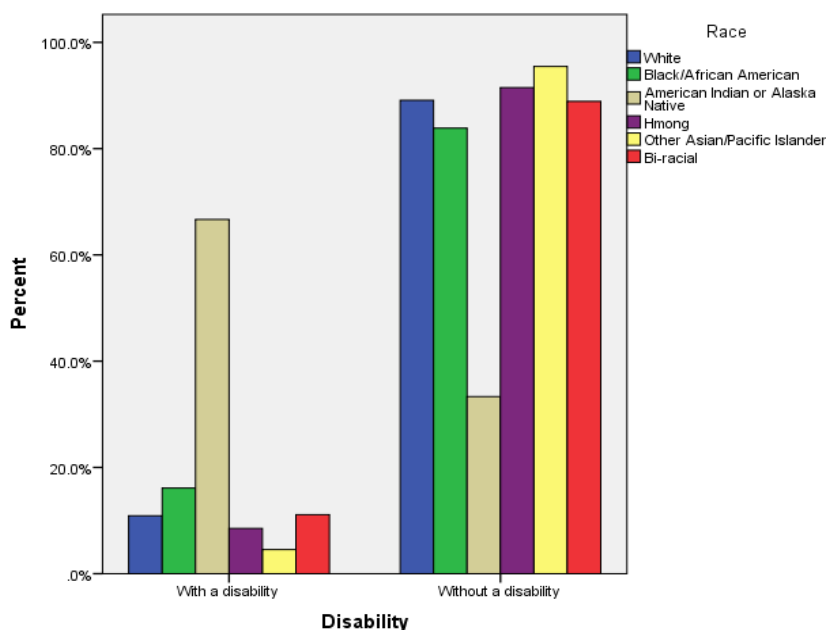
	Has Cognitive Difficulty			Without Cognitive Difficulty			
	N	% of race	% within Difficulty	N	% of race	% within Difficulty	Total
White	110	4.3	89.4	2423	95.7	95.0	2533
Black/African American	3	10.0	2.4	27	90.0	1.1	30
American Indian or Alaska Native	3	50.0	2.4	3	50.0	.1	6
Hmong	2	4.5	1.6	42	95.5	1.6	44
Other Asian/Pacific Islander	1	5.0	0.8	19	95.0	.7	20
Multi-racial	4	10.0	3.3	36	90.0	1.4	40
Total	123			2550			

IX: Appendix B

Health Disparities in La Crosse County

General Health Status

	Good or Better Health		Fair or Poor Health		
	N	**%**	**N**	**%**	**p-value**
Sex					.44
Men	30	81.1	7	18.9	
Women	53	86.9	8	9.3	
Age					.87
18-44	23	82.1	5	17.9	
45-64	33	84.6	6	15.4	
65+	27	87.1	4	12.9	
Race					.58
White	80	85.1	3	3.6	
Non-White	14	93.3	1	6.7	
Income					.16
Less than 25K	18	25.7	6	46.2	
25K to 50K	31	44.3	6	46.2	
More than 50K	21	30.0	1	7.7	
Education					.24
Less than High School	7	77.8	2	22.2	
High School Diploma	24	75.0	8	25.0	
Some College	27	90.0	3	10.0	
College Graduate or Higher	23	92.0	2	8.0	
Sexual Orientation					.97
Heterosexual	64	84.2	12	15.8	
Not Heterosexual	11	84.6	2	15.4	
Access to Care: Health Care Coverage					**.007**
Yes	76	88.4	7	10.2	
No	10	11.6	5	41.7	
Access to Care: Time Since Been to the Doctor					.25
Within past year	55	83.3	11	16.7	
Within 2-5 years	15	18.1	0	0	
Over 5 years	12	75.0	4	26.7	
Access to Care: Not able to get care because of cost					.24
Yes	8	72.7	3	20.0	
No	75	86.2	12	13.8	
Access to Care: Do you have a personal doctor?					.77
Yes	69	85.2	12	14.8	
No	14	82.4	3	17.6	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of < .05 indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.

Ever Diagnosed with Coronary Heart Disease

	Yes		No		
	N	**%**	**N**	**%**	**p-value**
Sex					.95
Men	2	5.4	35	94.6	
Women	3	4.9	58	95.1	
Age					**.05**
18-44	0	0	28	100	
45-64	1	2.6	38	97.4	
65+	4	12.9	27	87.1	
Race					.64
White	5	5.3	89	94.7	
Non-White	0	0	4	100	
Income					.97
Less than 25K	1	4.2	23	95.8	
25K to 50K	2	5.4	35	94.6	
More than 50K	1	4.5	21	95.5	
Education					.53
Less than High School	1	11.1	8	88.9	
High School Diploma	2	6.3	30	33.0	
Some College	2	6.7	28	30.8	
College Graduate or Higher	0	0	25	100	
Sexual Orientation					.10
Heterosexual	3	3.9	73	96.1	
Not Heterosexual	2	15.4	11	84.6	
Access to Care: Health Care Coverage					.39
Yes	5	5.8	81	94.2	
No	0	0	12	100	
Access to Care: Time Since Been to the Doctor					.77
Within past year	4	6.1	62	93.9	
Within 2-5 years	1	6.7	14	93.3	
Over 5 years	0	0	16	100	
Access to Care: Not able to get care because of cost					.41
Yes	0	0	11	100	
No	5	5.7	82	94.9	
Access to Care: Do you have a personal doctor?					.87
Yes	4	4.9	77	95.1	
No	1	5.9	16	94.1	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of < .05 indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.

Ever Had a Stroke

	Yes		No		
	N	**%**	**N**	**%**	**p-value**
Sex					.08
Men	1	2.7	36	97.3	
Women	8	88.9	52	86.7	
Age					**.05**
18-44	1	3.6	27	94.6	
45-64	2	5.1	37	94.9	
65+	6	66.7	24	27.3	
Race					.51
White	9	9.7	84	90.3	
Non-White	0	0	4	100	
Income					.51
Less than 25K	3	12.5	21	87.5	
25K to 50K	2	5.6	34	94.4	
More than 50K	1	4.5	21	95.5	
Education					**.009**
Less than High School	3	33.3	6	66.7	
High School Diploma	5	16.1	26	83.9	
Some College	1	3.3	29	96.7	
College Graduate or Higher	0	0	25	100	
Sexual Orientation					.51
Heterosexual	7	9.3	68	90.7	
Not Heterosexual	2	15.4	11	84.6	
Access to Care: Health Care Coverage					.35
Yes	7	8.2	78	91.8	
No	2	16.7	10	83.3	
Access to Care: Time Since Been to the Doctor					.95
Within past year	6	9.1	60	90.9	
Within 2-5 years	1	7.1	13	92.9	
Over 5 years	2	12.5	14	87.5	
Access to Care: Not able to get care because of cost					.28
Yes	2	18.2	9	81.8	
No	7	8.1	79	91.9	
Access to Care: Do you have a personal doctor?					.65
Yes	8	9.9	73	90.1	
No	1	6.3	15	93.8	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of $< .05$ indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.

Ever Diagnosed with Diabetes

	Yes		No		
	N	**%**	**N**	**%**	**p-value**
Sex					.82
Men	2	5.4	35	94.6	
Women	4	6.6	57	93.4	
Age					.22
18-44	0	0	28	100	
45-64	4	10.3	35	89.7	
65+	2	6.5	29	93.5	
Race					.60
White	6	6.4	88	93.6	
Non-White	0	0	4	100	
Income					.35
Less than 25K	0	0	24	100	
25K to 50K	3	8.1	34	91.1	
More than 50K	1	4.5	21	95.5	
Education					.64
Less than High School	0	0	9	100	
High School Diploma	3	9.4	29	90.6	
Some College	1	3.3	29	96.7	
College Graduate or Higher	2	8.0	23	92	
Sexual Orientation					.73
Heterosexual	4	5.3	72	94.7	
Not Heterosexual	1	7.7	12	92.3	
Access to Care: Health Care Coverage					.73
Yes	5	5.8	81	94.2	
No	1	8.3	11	91.7	
Access to Care: Time Since Been to the Doctor					.34
Within past year	6	9.1	60	90.9	
Within 2-5 years	0	0	15	100	
Over 5 years	0	0	16	100	
Access to Care: Not able to get care because of cost					08.
Yes	2	18.2	9	81.8	
No	4	4.6	83	95.4	
Access to Care: Do you have a personal doctor?					.25
Yes	6	7.4	75	92.6	
No	0	0	17	100	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of $< .05$ indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.

Ever Diagnosed with Pre-Diabetes

	Yes		No		
	N	**%**	**N**	**%**	**p-value**
Sex					.13
Men	4	11.8	30	88.2	
Women	2	3.6	54	96.4	
Age					.18
18-44	0	0	28	100	
45-64	4	11.8	30	88.2	
65+	2	7.1	26	92.9	
Race					.64
White	6	6.9	91	96.4	
Non-White	0	0	3	100	
Income					.72
Less than 25K	1	4.3	22	95.7	
25K to 50K	3	9.1	30	90.9	
More than 50K	1	4.8	20	95.2	
Education					.58
Less than High School	0	0	8	100	
High School Diploma	3	10.3	26	89.7	
Some College	1	3.6	27	96.4	
College Graduate or Higher	1	4.3	22	95.7	
Sexual Orientation					.76
Heterosexual	4	5.7	66	94.3	
Not Heterosexual	1	8.3	11	91.7	
Access to Care: Health Care Coverage					.73
Yes	5	6.3	74	93.7	
No	1	9.1	10	90.9	
Access to Care: Time Since Been to the Doctor					.74
Within past year	3	5.0	57	95	
Within 2-5 years	1	7.7	12	92.3	
Over 5 years	2	12.5	14	87.5	
Access to Care: Not able to get care because of cost					**.05**
Yes	2	22.2	7	77.8	
No	4	4.9	77	95.1	
Access to Care: Do you have a personal doctor?					.89
Yes	5	6.8	68	93.2	
No	1	5.9	16	94.1	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of < .05 indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.

Ever Diagnosed with Cancer (other than skin)

	Yes		No		
	N	**%**	**N**	**%**	**p-value**
Sex					.31
Men	2	5.4	35	94.6	
Women	7	11.5	54	88.5	
Age					.06
18-44	1	3.6	27	96.4	
45-64	2	5.1	37	94.9	
65+	6	19.4	25	80.6	
Race					.52
White	9	9.6	85	95.4	
Non-White	0	0	4	100	
Income					.25
Less than 25K	3	12.5	21	87.5	
25K to 50K	4	10.8	33	43.4	
More than 50K	0	0	22	100	
Education					.19
Less than High School	2	22.2	7	77.8	
High School Diploma	4	12.5	28	87.5	
Some College	3	10.0	27	90.0	
College Graduate or Higher	0	0	25	100	
Sexual Orientation					.50
Heterosexual	7	9.2	69	86.3	
Not Heterosexual	2	15.4	11	84.6	
Access to Care: Health Care Coverage					.91
Yes	8	9.3	78	90.7	
No	1	8.3	11	91.7	
Access to Care: Time Since Been to the Doctor					.53
Within past year	7	10.6	59	89.4	
Within 2-5 years	2	13.3	13	86.7	
Over 5 years	0	0	16	100	
Access to Care: Not able to get care because of cost					.26
Yes	0	0	11	100	
No	9	10.3	78	89.7	
Access to Care: Do you have a personal doctor?					.15
Yes	9	11.1	72	89.8	
No	0	0	17	100	

[1]P-values are the results of a statistical test examining the differences between two or more groups. In this test, the p-value indicates the probability that the prevalence percentages are similar between categories. A p-value of < .05 indicates that the prevalence rates are statistically different. Fisher's Exact tests were calculated for cells with an expected count fewer than 5.