HMA

HEALTH MANAGEMENT ASSOCIATES

WHITE PAPER

An Account of Health Disparities in Minnesota's Medicaid Population:

Which Populations Within the Medicaid Program Experience the Greatest Health Disparities and Poorest Health Outcomes?

PHASE I REPORT, PREPARED UNDER THE DIRECTION OF THE HEALTH CARE ADMINISTRATION, MINNESOTA DEPARTMENT OF HUMAN SERVICES (DHS)

AUGUST 1, 2017

RELEASED SUMMER 2018

RELEASED SUMMER 2018 WITH DHS LEGISLATIVE REPORT:
MINNESOTA MEDICAID ENROLLEES WITH SOCIAL DETERMINANTS OF HEALTH:
HOW CAN WE REDUCE THEIR HEALTH DISPARITIES?

Research and Consulting in the Fields of Health and Human Services Policy, Health Economics and Finance, Program Evaluation, Data Analysis, and Health System Restructuring

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Table of Contents

Acknowledgements

This project was carried out under the direction of Justine Nelson, PhD of the Minnesota Department of Human Services' (DHS) Health Care Administration.

The project work was performed by Health Management Associates (HMA), in partnership with the Disability Policy Consortium.

This report reflects a significant analytic undertaking by DHS and its consulting team. The core project team included: the project director, Ellen Breslin, MPP (HMA), and Anissa Lambertino, PhD, (HMA), Dennis Heaphy, MPH, (DPC), and Tony Dreyfus, MCP, (subcontractor to HMA). The team appreciates the assistance of Michelle Janssen (HMA) with this white paper.

The authors of this report also gratefully acknowledge the valuable contribution of the entire team at JEN Associates, Inc., and especially Mr. Daniel Gilden who founded JEN. JEN was hired by HMA to build the data set that HMA used to analyze the data and perform the bivariate and regression analysis shown in this report.

Special thanks to the following: (1) HMA clinical advisors: Dr. Suzanne Mitchell; Dr. Lori Raney; and Dr. Greg Vachon. (2) National experts: David Knutson, former Director of the Center for Delivery, Organization and Markets, the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services; and, Lisa Iezzoni, MD. MSc, Director, Mongan Institute for Health Policy (MIHP), Massachusetts General Hospital (MGH), Boston, MA. (3) Providers. HMA expanded its research beyond the quantitative data to solicit the perspective of providers on the front line of delivering services to persons covered under the Medicaid program to more fully comprehend the complex relationship between the social determinants of health and healthcare delivery to populations experiencing poor health outcomes and health disparities. (4) Consumers. Consumer interviews were conducted by another project team for DHS for another component of this larger DHS project.

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Project Overview

Project Questions

This project was designed around answering two key questions:

- Question 1. Which Medicaid populations have the greatest health disparities?
- Question 2. What are the costs to Medicaid of serving these populations?

The Minnesota Legislative Directive

In 2015, the Minnesota Legislature passed Chapter 71, Section 63 of Article 11, entitled the "Health Disparities Payment Enhancement," which directs the Department of Human Services (DHS) "to develop a methodology to pay a higher payment rate for health care providers and services that takes into consideration the higher cost, complexity, and resources needed to serve patients and populations who experience the greatest health disparities in order to achieve the same health and quality outcomes that are achieved for other patients and populations."[1]

In response to this legislation, in 2016, DHS hired Health Management Associates (HMA) to identify Medicaid populations who experience the greatest health disparities and their related costs to the Medicaid program. The Boston office of Health Management Associates (HMA), working in partnership with the Disability Policy Consortium (DPC) and JEN Associates, Inc., all located in Massachusetts, worked together to identify populations with the greatest health disparities at the greatest cost.

The project has concluded.

- HMA has provided DHS with a report to the Minnesota Legislature on the population groups identified with the greatest health disparities and the costs to Medicaid of serving these populations.
- Other project deliverables include the programming code, the dataset, all excel files including statistical analyses and findings, and this white paper report. Appendix 2 includes a summary of the data used; Appendix 3 includes a list of all files provided to DHS including the excel files.
- This White Paper presents the methodology and data sources used to identify the target populations with the greatest health disparities and costs, the data elements and analytical steps taken to identify the populations, and present the results.

Health People 2000: Health Disparities

Bearing in mind that measuring and understanding health disparities is a complex and evolving science. For purposes of clarity and consistency, the definition of health disparities used in this project was taken from Healthy People 2020.

Health disparity is 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;

[1] https://www.revisor.mn.gov/laws/?year=2015&type=0&doctype=Chapter&id=71#laws.11.63.0

sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion." (Source: Healthy People 2020.)

Research Effort

HMA in tandem with DPC and JEN Associates Inc. undertook a comprehensive qualitative and quantitative to identify the populations with the greatest disparities.

Qualitative Component

HMA and its team conducted: (1) a literature review; (2) interviews with Minnesota providers serving Medicaid members; (3) interviews with national experts in risk adjustment; and, (4) an internal peer-review process. The literature review was conducted to help inform and shape the framework for measuring health disparities in the Medicaid population. Several interviews were conducted with a diversity of providers in Minnesota to also support the identification of populations and measures of interest to providers in Minnesota. Consumers, or Medicaid enrollees, were not interviewed as part of this effort.

- Method 1. Literature Review. HMA conducted a literature review to identify analytical, statistical or other technical approaches or methods that have been used to identify populations with health disparities and to prioritize the populations. A long list of search terms was developed including social risk factors, multiple regression, and statistical methods. The literature review produced many relevant documents for this report and can be found in Appendix 4.
- Method 2. Provider Interviews. Using a standardized interview guide developed for this project, HMA conducted interviews to gather information from providers about their experiences in meeting and paying for the unmet needs of Medicaid members experiencing health disparities. Provider interviewees were selected by DHS based on consideration of their role in serving Medicaid members, including Medical Assistance/Minnesota Care (MA/MNCare) enrollees with significant social risk factors, and their geographic location. The interview guide can be found in Appendix 5. The list of providers who participated in this survey can be found in Appendix 6.
- Method 3. National Expert Interviews. HMA also conducted phone interviews with two national experts in risk adjustment to gather their insights into how they would conceptualize, measure, identify and prioritize Medicaid population groups with the greatest disparities and the greatest costs. HMA is grateful for the insights of (1) David Knutson, Director of the Center for Delivery, Organization and Markets, the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services; and, (2) Lisa Iezzoni, MD. MSc, Director, Mongan Institute for Health Policy (MIHP), Massachusetts General Hospital (MGH), Boston, MA.
- Method 4. Internal Peer-Review Process. In addition to these methods of research, HMA also consulted with an experienced team of consultants with deep experience in Medicaid policy, programs and populations, the social determinants of health, health disparities, payment methodologies, risk adjustment, disability policy, and analytical and statistical methods of research and analysis.

Quantitative Component

The quantitative effort consisted of an intensive data analysis. Several sources of data were used to build an analytic data file that could be used to apply methods of analysis, including statistical methods of analysis to determine the importance or predictive power of key variables. Data sources include

Medicaid eligibility and enrollment files, Medicaid claims files, child protection data, and data from the Minnesota Department of Corrections and the United States Census Bureau.

The analytic file for this project was developed by JEN Associates in partnership with HMA. The file contains multiple variables to identify populations with the greatest health disparities includes several pieces of information. The file contains the following types of data on Medicaid enrollees including: Medicaid eligibility data and claims data, income data from the state's needs-tested programs, children protection involvement, and data from the Minnesota Department of Corrections.

Analytical Framework

To determine which Medicaid populations experienced the greatest health disparities, DHS and its consultants developed a framework for measuring health disparities.

Measures of Health Disparities and Costs

- Health Disparity Measures: Several measures were selected to measure health disparities including: (1) direct measures of health and health outcomes including rates of mortality; and, (2) measures of health care access, use and quality such as potentially preventable emergency department visits, potentially preventable hospital admissions, and HEDIS quality measures. Some measures of health outcomes and health care access, use and quality apply only to very young children, some to all children, and other measures apply only to adults.

- Cost Measures: Based on the data available, two measures of costs were selected including: (1) the cost to Medicaid of providing all services to the Medicaid population under the age of 65; and, (2) the cost to Medicaid of providing services to the Medicaid population under the age of 65 for which ACOs are accountable.

The analysis was limited to children and adults age 0-64 who were enrolled at least one month in a Minnesota Medicaid program in 2014, and who were not enrolled in any other health insurance program such as Medicare. Children were only included in the analysis if at least one parent was also enrolled in 2014. Data limitations drove these exclusions.

See Table 1 for a summary of the measures that were developed by the team and were used to examine both health disparities and costs. See Tables 2, 3, and 4 for more detail on health disparity measures. More specifically, see Table 2 for a summary of the measures of morbidity. See Table 3 for a summary of the measures of health care access and use. See Table 4 for a summary of measures of health care quality.

Table 1. Measures of Health Disparity and Costs

Measures of Health Disparity and Costs Used by DHS to Identify Medicaid Population with the Greatest Health Disparities					
Area	**Description**	**# of Measures**			
HEALTH DISPARITIES		**Young Children < 2 yrs.**	**All Children 0-17**	**All Adults 18-64**	**Total Unique Count**
Health	**Direct measures of health status and health outcomes**				
Mortality	Mortality rate (1 measure)	1	1	1	1
Morbidity	Prevalence rates for chronic disease and conditions including measures for physical health and behavioral health (15 measures)	3	6	13	15
Disability	Disability based on eligibility status (1 measure)	1	1	1	1
Health care	**Measures of health care access, utilization, and quality**				
	Potentially preventable emergency department visits and potentially preventable hospital admissions	0	0	2	2
	HEDIS measures	0	2	3	4
COSTS					
	Total expenditures for individuals over the calendar year for all services and for only services for which an Accountable Care Organization is responsible (2 measures)	2	2	2	2
TOTAL FOR ALL MEASURES, INCLUDING HEALTH, HEALTH CARE AND COSTS		**7**	**12**	**22**	**25**

Table 2. Measures of Morbidity

Measures of Morbidity				
#	Measure	Young Children < 2	Children	Adults
1	Unhealthy infants	1		
2	Type 2 Diabetes			1
3	Asthma	1	1	1
4	HIV/Hepatitis c			1
5	Hypertension			1
6	Cardiovascular			1
7	Chronic Obstructive Pulmonary Disease			1
8	Injury	1	1	1
9	Lung/Laryngeal Cancer			1
10	Substance Use Disorder (SUD)		1	1
11	Attention Deficit Hyperactivity Disorder (ADHD)		1	
12	Post-Traumatic Stress Disorder (PTSD)		1	1
13	Depression		1	1
14	Serious Persistent Mental Illnes (SPMI)			1
15	Developmental Disability		1	1
	Total	3	7	13

Table 3. Measures of Health Care Access and Use

Measures of Health Care Access and Use				
#	Measure	Young Children < 2	Children	Adults
1	Potentially preventable emergency department visits			1
2	Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses			1

Table 4. Measures of Health Care Quality

Measures of Health Care Quality				
#	Measure	Young Children < 2	Children	Adults
1	Annual preventive visit			1
2	Comprehensive diabetes care - A1c test			1
3	Well-child visits for all children		1	
4	Annual dental visit for kids and adults		1	1

Analytical Results

HMA relied upon univariate, bivariate and multiple regression analysis to answer the study questions.

Results: Univariate

The following tables provide an overview of the key results for children and adults.

More detailed results are provided in Appendix 7: Univariate Results.

Table 6. Univariate Results for Children. n = 303,140

The study population for children consisted of 303,140 children including children with a range of social risk factors. Over 80% of the population live in poverty, 51% in deep poverty and 4% of children included in the study population are homeless.

Population Group	Description	Number	% of Medicaid Sample/Study Population
Race/Immigration Status	Asian, Immigrant	18,904	6.2%
	Black, Immigrant	34,705	11.4%
	Hispanic, Immigrant	13,596	4.5%
	Native American	15,224	5.0%
	White, Non Immigrant & Immigrant *	118,641	39.1%
	Other, Immigrant	9,429	3.1%
	Asian, Non Immigrant	5,935	2.0%
	African American	48,746	16.1%
	Hispanic, Non Immigrant	15,651	5.2%
	White, Non Immigrant (combined above) *	-	0.0%
	Other, Non Immigrant	22,309	7.4%
Medical and Disability Risk Factors	Substance Use Disorder (15-17 year olds only)	2,041	5.6%
	ADHD	24,830	8.2%
	PTSD	5,546	1.8%
	Depression	11,225	3.7%
	Developmental Disability	2,738	0.9%
	Disability	10,243	3.4%
Income categories	Below 50% of the Federal Poverty Level (FPL)	155,131	51.2%
	50-100% FPL	92,265	30.4%
	> 100% FPL	41,456	13.7%
	Missing Income	14,288	4.7%
Social Risk Factors	Family Homeless	12,866	4.2%
	Child Protection Involvement	32,648	10.8%
	Parental - Chemical Dependency	38,323	12.6%
	Parental - Mental Illness	18,557	6.1%
	Parental - Disability Condition	11,498	3.8%
	Parental - Marital Status - Not Married	117,159	38.6%
	Child in Household with 4+ children	76,377	25.2%
	Parental Language: English	251,468	83.0%
	Parental Language: Other	51,672	17.0%
	Parent Immigrant	82,519	27.2%
	Likely parental incarceration	6,580	2.2%

Table 7. Univariate Results for Adults. n=550,341

The study population for adults consisted of 550,341 adults including adults with a range of social risk factors. About 62% of the population live in poverty, 43.7% in deep poverty, 7% of adults included in the study population are homeless, and 3.9% have a history of incarceration.

Population Group	Description	Number	% of Medicaid Sample/Study Population
Race/Immigration Status	Asian, Immigrant	20,971	3.8%
	Black, Immigrant	34,925	6.4%
	Hispanic, Immigrant	8,187	1.5%
	Native American	23,464	4.3%
	White, Immigrant	7,007	1.3%
	Other, Immigrant	12,356	2.3%
	Asian, Non Immigrant	15,466	2.8%
	Black, Non Immigrant	66,093	12.0%
	Hispanic, Non Immigrant	16,907	3.1%
	White, Non Immigrant	296,992	54.0%
	Other, Non Immigrant	47,973	8.7%
Medical and Disability Risk Factors	Serious Persistent Mental Illness	30,529	5.6%
	Substance Use Disorder	79,349	14.4%
	Disabilty	45,050	8.2%
Income categories	Below 50% of the Federal Poverty Level (FPL)	240,350	43.7%
	50-100% FPL	104,179	18.9%
	> 100% FPL	116,938	21.3%
	Missing Income	88,874	16.2%
Language	English	446,049	81.1%
	Other	47,257	8.6%
	Miss Language	57,035	10.4%
Homeless	People who are homeless	38,721	7.0%
Incarceration	Person Likely to have been Incarcerated	21,286	3.9%

Results: Bivariate, or Cross Tabulations

Prior to performing the statistical analyses, HMA prepared a plan to create several cross-tabulations of the data to examine measures of health disparities and costs in the Medicaid population for several populations groups. A comprehensive set of results are provided in Appendix 8: Bivariate Results. The same results are presented side by side in the tab called 'Bivariate Results_Adults' in the Social Risk spreadsheet.

See Table 8 below for an overview of the nine adult groups for which bivariate or cross-tabulations were created.

Table 8. Cross-Tabulations Created for Nine Adult Groups

Bivariate Plan or Cross-Tabulation Plan for Adults	
Group	**Description**
1	Adults by male and female
2	Adults with and without serious and persistent mental illness (SPMI)
3	Adults with and without substance use disorder (SUD)
4	Adults by income relative to the Federal Poverty Level (<50% FPL, 50-100% FPL, > 100% FPL)
5	Adults by primary language (English or Other)
6	Adults who are homeless and adults who are not homeless
7	Adults by race and ethnicity and immigration
8	Adults with and without a history of prison incarceration
9	Adults with and without a disability

See Table 9 for an overview of health disparities and costs for both children and adults, based on the cross-tabulations created from the data for CYs 2013 and 2014.

Table 9. Overview of Health Disparities and Costs for Very Young Children, Children, and Adults

The Minnesota Medicaid Program Population - All Persons under 65 years of age Analysis of CY 2013 and 2014 data						
			Very young children (< 2)	All Children < 18 (1)	Adults 18-64 (2)	All (1) + (2)
POPULATION (Sum of All Children + Adults)			36,294	303,140	550,341	853,481
HEALTH DISPARITY MEASURES						
Direct Measures of Health Status and Outcomes						
1	Mortality Rate		0.4%	0.1%	0.78%	
2	Morbidity Rates					
		Unhealthy babies	12.2%			
		Type 2 Diabetes			7.0%	
		Asthma Rate	5.2%	11.7%	9.4%	
		HIV/HEPc			1.6%	
		Hypertension			5.1%	
		Cardiovascular			1.4%	
		Chronic Obstructive Pulmonary Disorder (COPD)			8.5%	
		Injury/Violence	3.7%	4.8%	5.6%	
		Lung/Laryngeal Cancer			0.2%	
		Substance Use Disorder		5.6%	14.4%	
		Attention Deficit Hyperactivity Disorder (ADHD)		8.2%		
		Post-Traumatic Stress Disorder (PTSD)		1.8%	5.9%	
		Depression		3.7%	19.2%	
		Serious Persistent Mental Illness			5.6%	
		Developmental Disability		0.9%	1.4%	
3	Disability Status		0.4%	3.4%	8.2%	
Measures of Health Care Access, Utilization and Quality						
1	Potentially-preventable ED visits 1/				10.5%	
2	Potentially preventable hospital admissions 2/				0.60%	
3	HEDIS measures					
		Annual preventive visit			33.2%	
		Comprehensive diabetes care - A1c test			92.0%	
		Well-child visits for all children		62.8%		
		Annual dental visit for kids and adults		64.3%	48.4%	
COSTS (2014)						
1	Total expenditures 3/		5/	5/	$ 7,104.19	
2	ACO Total 4/		5/	5/	$ 4,961.17	

Source: Health Management Associates, based upon analysis of Medicaid data from the Minnesota Department of Human Services for Calendar Years 2013 and 2014.

Notes:

1 Potentially preventable emergency department visits.

2 Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnosis.

3 Average cost based on total Medicaid claims paid for CY 2014.

4 Average cost based on total Medicaid claims paid for CY 2014 for which the Accountable Care Organization (ACO) is responsible.

5 Average costs based on Medicaid claims were not calculated for children; only log transformed costs are available in this report.

Results: Regression

HMA prepared a plan for performing multiple regression analysis to examine the power of the independent variables to predict the dependent variables or measures of health disparities and costs for Medicaid adults and Medicaid children. A complete list of independent variables, as well as dependent variables, is provided in Appendix 2.

See Table 10 for an overview of the plan for conducting regression analysis. The basic and full regression models are outlined in detail in the excel files provided to DHS. The results of the regression models can be viewed on tab 'Adult_Health Disparities' and 'Kids_Health Disparities' and 'Young Children_Health Disparities' of the spreadsheet.

Table 10. Overview of the Regression Plan

Regression Plan		
1	**Population stratification**	Separate regressions were run for children and adults, using the independent and dependent variables provided in Appendix 2.
2	**Regression models**	Two types of regression models were developed, which involved a selection of independent and dependent variables: the basic model and the full model. The basic model includes a minimum number of independent variables for children and for adults. The full model includes all variables included in the basic model plus all other independent variables.
	Basic model	The basic model included only age, gender, and race/immigration status. These regressions were run for each measure of health disparity and cost and for children and adults separately.
	Full model	The full model included all base model variables including age, gender, and race/immigration status and all other independent variables – including all medical and social risk factors – listed in Appendix 2. These regressions were run for each measure of health disparity and cost and for children and adults separately.

Statistical Analyses and Tests of Validity and Reliability

Several statistical analyses – including univariate, bivariate, and regression – were conducted to examine health disparities and costs in the Medicaid population. To support the validity and reliability of these analyses, several tests were conducted. See Table 11 for a summary of these tests.

Table 11. Overview of the Statistical Analyses and Tests of Validity and Reliability

#	Type	Description
1	**Covariate - imputation**	Purpose: Covariate imputation was used to replace missing data. • Covariate imputation was performed for the 1.1% of Medicaid participants that were missing census data on the characteristics of people living in their census tract. • For this variable, we imputed median values obtained from each covariate, as recorded as follows: census_edperc_im median= 47.6, census_nonusperc_im median=3.3, census_nonengperc_im median=10.6, census_hisplperc_im median=3.9, and census_nonwhiteperc_im median=17.6.
2	**Statistical analyses**	Purpose: Statistical analyses were performed to analyze the data. Univariate, bivariate, and regression analyses were conducted. • Statistical analyses were performed with Stata/IC® 14.2 (StataCorp LP, College Station, Texas). • Natural log transformations of cost variables were used to approximate a normal distribution, with geometric means presented for descriptive purposes. Differences in measures of health status and outcomes, health care access, utilization and quality, and costs for selected demographics and social and medical risk factors were examined. • Crosstab percentages were used for dichotomous variables. • Multiple linear regression or multiple logistic regression modeling was used to predict outcomes, as appropriate. Results were considered significant at $p<0.05$.
3	**Model diagnostics**	Purpose: to determine if multicollinearity occurred between two or more independent variables in the models. • We evaluated the variance inflation factor (VIF) using the command *estat vif* in multiple linear regression models. We excluded variables with a VIF of 10 or greater from all final models. • For adults, these variables were excluded: adults: census_nonengperc_im, VIF=12.6. • For children, these variables were excluded: census_nonengperc_im, VIF=13.3, and parent_immig, VIF=10.9. • For very young children, these variables were excluded: census_nonengperc_im, VIF=13.4, and parent_immig, VIF=13.4).
4	**Overall model fit**	Purpose: Tests of the overall fit of the model was conducted. • The table in Appendix 9 provides the R-squared results for the cost regression models for adults, children, and very young children.
5	**Validity and reliability**	Purpose: Validity and reliability tests were conducted.

#	Type	Description
		• The present investigation has several limitations. We adjusted all models for age, gender, and geographical location with and without additional adjustment for length of eligibility where appropriate, but there may be other important potential confounders for which we have not controlled. • In general, predictive models tend to be more reliable when some physiological (or other theoretical) rationale can be applied. For example, because the time to delivery differs between multiples and singles, multiple births were accounted for in infant subgroup models and may have created a distorted picture of the relationship. • Finally, the findings might be due to chance, as multiple comparisons were made in the statistical analysis. We did not adjust for multiple comparisons. That said, the purpose of these exploratory analyses was to inform and guide future research that could be subject to further rigorous testing. • Despite the limitations, our investigation has several strengths, including a large sample of the MN Medicaid population and multiple risk factors and potential confounders measured. Our investigation adds to literature and increases the confidence that associations we have reported are not the product of chance due to some similar trends and consistency with previous investigations. To our knowledge, only one other investigation, which has been documented and shared publicly, has evaluated the association of SDOH on cost in Medicaid beneficiaries.

Selection of the Populations

The consultant's project summary report to the Minnesota Department of Human Services presents a summary of the populations identified with the worst health outcomes by age group for very young children, all children (including the very young), and for all adults. The extensive list of dependent and independent variables made identifying specific populations with the worst health disparities challenging. Some of the social risk factors, however, predicted a much larger number of poor health outcomes than others. For this project, these populations were chosen as the target populations that Minnesota will focus on in the next stage of this project.

See Table 12 for a summary of the populations that were selected. The excel files provided to DHS include the regression results for each of these populations.

Table 12. Populations Identified with the Greatest Health Disparities

#	Target Population
Very Young Children	
1	Very young children and child protection involvement
2	Very young children and deep poverty
3	Very young children and parents with a Substance Use Disorder and/or serious and persistent mental illness
4	Very young children and a Native American heritage or being a non-immigrant African American
Children	
1	Children and child protection involvement
2	Children and deep poverty
3	Children and parents with a Substance Use Disorder and/or serious and persistent mental illness
4	Children and homelessness
5	Children and parental prison incarceration
6	Children and a Native American or Hispanic heritage
Adults	
1	Adults living in deep poverty
2	Adults with Substance Use Disorder
3	Adults with Serious and Persistent Mental Illness
4	Adults experiencing homelessness
5	Adult who were previously incarcerated
6	Adults who are Native American

Key Methodological and Project Insights

Nearly all analytical projects require some measure of compromise. The project budget for this project was very tight in relationship to the scope of work, which included a literature review, interviews with consumers, the development of a framework, the development of a dataset, the specification of independent and dependent variables, the preparation of an analytical plan, the analysis itself, the interpretation of the results, and production of a legislative report and white paper. Future analyses might expand upon this foundational work. Additionally, there were several other key insights gathered over the course of this year-long project.

A summary of these key methodological and project insights is presented in Table 13.

Table 13. Key Methodological and Project Insights

#	Issue	Key Insights
1	Define children differently	Remove infants from the analysis of children to improve the statistical analyses and interpretation of the results.
2	Examine geography	Examine the importance of geography on health disparities and costs. Examine the difference between rural and urban members to better understand the influence of geography on outcome measures.
3	Conduct bivariate analyses	Conduct bivariate analyses of very young children and children to develop a baseline understanding of the actual health disparities for these two population groups. This was done for adults but not for these two groups of children, due to budget constraints.
4	Interview consumers	Interview consumers to inform the methodology used to analyze health disparities. Very helpful interviews were conducted with providers to inform the analyses.
5	Develop single measures of morbidity	Develop a single measure of morbidity. Several measures of morbidity were examined, and we found differences across population groups in health disparities. This will allow Minnesota DHS to target interventions to address certain problems identified, but it was difficult to know the overall risk for a particular population. A single measure of morbidity would provide a way for Minnesota to summarize which population groups demonstrated a heavier burden from a relative resource perspective.
6	Perform the regressions methodologically	Perform the regression analyses by evaluating one key SDOH variable at a time. The regression analysis was performed by including all variables in the model at the same time. This was preferred by DHS due to budget constraints. • There are generally two goals of mathematical modeling. One is to obtain a "valid" estimate of an independent-dependent variable relationship and the other is to obtain a "good" predictive model (our method). • To obtain a valid measure of effect, the roles of variables – such as confounders and effect modifiers – must be given special attention. • Some of the associations with homelessness were generally not statistically significant. In addition, there was evidence of effect modification (not shown), with substance use disorder. Perhaps this reflected variation in participant selection. In future studies, it may be important to include potential effect modifiers when evaluating associations of SDOH with health, quality, and cost outcomes. • When the goal is the prediction, it may be more appropriate to use computer algorithms, such as backward elimination or all possible regressions which are built into computer packages for different models.

#	Issue	Key Insights
		• A more interactive process might also have been preferred, in which we would have run some initial regressions, discussed results and then settled on additional regressions, perhaps cycling a few times. Instead of running "all possible" regressions, a process of several steps of regression, discussion, and new regressions might have got us to a good result of a model with an intermediate number of variables that also has good face validity for others.
8	Examine persons with disabilities	Conduct a more detailed examination of persons with disabilities. The findings demonstrate that persons with disabilities have the worst health outcomes including the highest rates of mortality.
9	Review results with stakeholders	Present the results to stakeholders to see if they would expand the measures that we examined.

Conclusion

HMA, and its partners from the Disability Policy Consortium and JEN Associates, have appreciated the opportunity to work with DHS to examine health disparities and costs for the Medicaid population.

We hope that this work is helpful to DHS to improve health outcomes for all Medicaid populations in Minnesota.

Finally, we believe that this work is groundbreaking in the Medicaid arena and will help to inform and shape how other states examine health disparities.

Appendix Section

Appendix 1. HMA's Project Summary Report to DHS

HMA prepared a project summary report for DHS to include in its report to the Minnesota State Legislature.

HMA's project summary report includes an identification of the populations with the worst health outcomes for the Medicaid population.

See link to the first related report prepared by DHS: https://www.leg.state.mn.us/lrl/mndocs/mandates

Summer 2018 Update:

DHS will post another report to the Legislature with links to HMA's summary report and this White Paper.

Appendix 2. Data

A large analytic file was created and analyzed for this project with data on the Medicaid population under the age of 65 whose only health insurance was Medicaid.

The data files included many variables to describe the Medicaid population and to measure their health disparities and costs.

Please contact Ellen Breslin at HMA to make inquiries about these files.

ebreslin@healthmanagement.com

Line #	Variable Type	Variable	
			Demographic/Risk Factors
1	Independent	ageall1	Age
2	Independent	ageall1	Age
3	Independent	ageall1	Age
4	Independent	ageall1	Age
5	Independent	ageall1	Age
6	Independent	ageall1	Age
7	Independent	gen	Gender
8	Independent	gen	Gender
9	Independent	raceimmstatusd1	Race, Immigrant
10	Independent	raceimmstatusd2	Race, Immigrant
11	Independent	raceimmstatusd3	Race, Immigrant
12	Independent	raceimmstatusd4	Race, Immigrant
13	Independent	raceimmstatusd5	Race, Immigrant
14	Independent	raceimmstatusd6	Race, Immigrant
15	Independent	raceimmstatusd7	Race, Immigrant
16	Independent	raceimmstatusd8	Race, Immigrant
17	Independent	raceimmstatusd9	Race, Immigrant
18	Independent	raceimmstatusd10	Race, Immigrant
19	Independent	raceimmstatusd11	Race, Immigrant
20	Independent	eliglen	Eligibility
21	Independent	eliglen	Eligibility
22	Independent	eliglen2	Eligibility
23	Independent	eliglen2	Eligibility
24	Independent	eliglen2	Eligibility
25	Independent	eliglen2	Eligibility
26	Independent	geor1d1	Geography
27	Independent	geor1d2	Geography
28	Independent	geor1d3	Geography
29	Independent	geor1d4	Geography
30	Independent	geor1d5	Geography
31	Independent	geor1d6	*no missing data*
32	Independent	ihs	Provider

33	Independent	fqhc	Provider
34	Independent	rhs	Provider
35	Independent	**adg1**	Diagnostic Group
36	Independent	**adg2**	Diagnostic Group
37	Independent	**adg3**	Diagnostic Group
38	Independent	**adg4**	Diagnostic Group
39	Independent	**adg5**	Diagnostic Group
40	Independent	**adg6**	Diagnostic Group
41	Independent	**adg7**	Diagnostic Group
42	Independent	**adg8**	Diagnostic Group
43	Independent	**adg9**	Diagnostic Group
44	Independent	**adg10**	Diagnostic Group
45	Independent	**adg11**	Diagnostic Group
46	Independent	**adg12**	Diagnostic Group
47	Independent	**adg13**	Diagnostic Group
48	Independent	**adg14**	Diagnostic Group
49	Independent	**adg16**	Diagnostic Group
50	Independent	**adg17**	Diagnostic Group
51	Independent	**adg18**	Diagnostic Group
52	Independent	**adg20**	Diagnostic Group
53	Independent	**adg21**	Diagnostic Group
54	Independent	**adg22**	Diagnostic Group
55	Independent	**adg23**	Diagnostic Group
56	Independent	**adg24**	Diagnostic Group
57	Independent	**adg25**	Diagnostic Group
58	Independent	**adg26**	Diagnostic Group
59	Independent	**adg27**	Diagnostic Group
60	Independent	**adg28**	Diagnostic Group
61	Independent	**adg29**	Diagnostic Group
62	Independent	**adg30**	Diagnostic Group
63	Independent	**adg31**	Diagnostic Group
64	Independent	**adg32**	Diagnostic Group
65	Independent	**adg33**	Diagnostic Group
66	Independent	**adg34**	Diagnostic Group

67	Independent	part_mental_ill2	Serious and Persistent Mental Illness
68	Independent	sud_num	Substance Use Disorder
69	Independent	mndiagdd	Developmental Disability
70	Independent	ds	Disability
71	Independent	famincome3d1	Income
72	Independent	famincome3d2	Income
73	Independent	famincome3d3	Income
74	Independent	famincome3d4	Income
75	Independent	**census_povperc**	Poverty Level of the Census Tract (% of people who live in the census tract < FPL)
76	Independent	**census_edperc_im**	Percent of census tract residents who have a high school diploma/GED or less
77	Independent	**census_nonusperc_im**	Percentage of residents of census tract who are not US citizens
78	Independent	**census_nonengperc_im**	Percentage of residents of census tract who speak a language other than English
79	Independent	**census_hisplperc_im**	Percentage of residents of census tract who are Hispanic/Latino
80	Independent	**census_nonwhiteperc_im**	Percentage of residents of census tract who are anything other than "White alone"
81	Independent	homeless	Family Homelessness
82	Independent	eduleveldI1	No high school diploma
83	Independent	eduleveldI2	High school
84	Independent	eduleveldI3	>High school & <College
85	Independent	eduleveldI4	College, College+
86	Independent	eduleveldI5	Missing
87	Independent	langd1	English
88	Independent	langd2	Other
89	Independent	langd3	Missing
90	Independent	probmatch_doc	Likely to have been incarcerated, per DOC
91	Independent	CP1	Child protection involvement (CPI)
92	Independent	parent_chem_dep	Parental chemical dependency
93	Independent	parent_ment_ill2	Parental mental illness
94	Independent	parent_disabled	Parental disability/medical condition

95	Independent	parent_married	Parent married
96	Independent	fourkidsII	Child lives in household with four or more children
97	Independent	parent_other_lang	Parent speaks a language other than English
98	Independent	parent_other_lang	Parent speaks a language other than English
99	Independent	parent_immig	Parent Immigrated
100	Independent	probmatch_doc_par	Likely Parental Incareration
101	Independent	multiple	Multiple Birth
102	**Dependent**	**mort**	**Health Outcome: Mortality**
103	Dependent	**nurserylevelII**	Health Outcome: Morbidity
104	Dependent	**injury**	Health Outcome: Morbidity
105	Dependent	**type2**	Health Outcome: Morbidity
106	Dependent	**asthma**	Health Outcome: Morbidity
107	Dependent	**hivhepc**	Health Outcome: Morbidity
108	Dependent	**hypert**	Health Outcome: Morbidity
109	Dependent	**cardio**	Health Outcome: Morbidity
110	Dependent	**copd**	Health Outcome: Morbidity
111	Dependent	**lunglar**	Health Outcome: Morbidity
112	Dependent	**sud**	Health Outcome: Morbidity
113	Dependent	**adhd**	Health Outcome: Morbidity
114	Dependent	**PTSD**	Health Outcome: Morbidity
115	Dependent	**Depress**	Health Outcome: Morbidity
116	Dependent	**SMI**	Health Outcome: Morbidity
117	**Dependent**	**HCuseEDII**	**Health care access/use/quality**
118	**Dependent**	**HCUsePPA**	**Health care access/use/quality**
119	**Dependent**	**Placeholder: ALOS**	**Health care access/use/quality**
120	**Dependent**	**HWellA**	**Health care access/use/quality**
121	**Dependent**	**HDiab**	**Health care access/use/quality**
122	**Dependent**	**HWellC**	**Health care access/use/quality**
123	**Dependent**	**ADV**	**Health care access/use/quality**
124	Dependent	**LnTotal_Cost**	Health care cost (e to the x), avg. cost
125	Dependent	**LNIncluded_total_cost**	Health care cost (e to the x), avg. cost

Appendix 3. List of Files for DHS

HMA prepared several large excel files containing the work and findings of this project.

The files contents are on the following tables.

In addition, HMA transmitted the programming code and the dataset to DHS that were used to examine health disparities and costs for the Medicaid population.

Please contact Ellen Breslin at HMA to make inquiries about these excel files.

ebreslin@healthmanagement.com

File Name	MN DHS_Plan_July 10 2017
1	Regression Plan
2	Medicaid Study Sample Population
3	Medicaid Pop_Short
4	Medicaid Pop_Leg Rpt
5	All
6	Children Population (formatted for print)
7	Adult Population (formatted for print)
8	All Measures (formatted for print)
9	MN x-waik for 5 regions

File Name	MN DHS_Logs & Regressions July 10 2017
Tab	**Description**
1	Statistics and definitions
2	**Log for young children under 2 (including newborns)**
3	Infant regressions with 4 race/immigration categories for all health disparity measures
4	Infant regressions with 4 race/immigration categories for cost measures
5	**Log for children**
6	Children regressions with 4 race/immigration categories for all health disparity measures
7	Children regressions with 4 race/immigration categories for cost measures
8	**Log for adults**
9	Adult regressions with summary p values
10	Adult regressions with all race/immigration categories for measures
11	Adult regressions with all race/immigration categories for costs
12	Adult regressions with 4 race/immigration categories for all health disparity measures

File Name	MN DHS_Final Project Results_July 10 2017
Tab	**Description**
1	Data Sources
2	Independent variables
3	Dependent variables
4	Race & Immigration variables
5	Univariate Results
6	Bivariarate Results_Adults
7	White Paper Bivariates
8	Adult bivariate template
9	Regression Results
10	Adult Summary Card (formatted for print)
11	Child Summary Card (formatted for print)
12	R-squared results (formatted for print)
13	Cost Results (formatted for print)
14	Deep Poverty tables (formatted for print)
15	Data on the Federal Poverty Limit (FPL) in 2013 and 2014 (formatted for print)

Appendix 4. Literature Review

HMA conducted a literature review to inform and shape the development of the analytical framework and analytical plan.

Methods Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the 2014 National Healthcare Quality and Disparities Report (QDR)	
Source	Coffey R, Barrett M, Houchens R, Moy E, Andrews R, Moles E, Coenen N. Methods Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the 2014 National Healthcare Quality and Disparities Report (QDR). 2015. HCUP Methods Series Report # 2015-02 ONLINE. April 13, 2015. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/reports/methods/methods.jsp.
Summary & Key Points	• Provides an in-depth analysis of the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QIs) used in the National Healthcare Quality and Disparities report • Examines inpatient administrative data to determine costs associates with Quality Indicators • Includes four categories of Quality Indicators: Prevention QIs, Pediatric QIs, Inpatient QIs, and Patient Safety Indicators • Provides charts of different quality indicators in each category with QI codes, age range of patient population, and prevalence in a specific population
Commissioned Paper: Healthcare Disparities Measurement	
Source	Weissman, J.S., Betancourt, J.R., Green, A.R., Meyer, G.S., Tan-McGrory, A, Nudel, J.D., Zeidman, J.A., & Carrillo, J.E. (2011). Commissioned Paper: Healthcare Disparities Measurement. Retrieved from https://www2.massgeneral.org/disparitiessolutions/z_files/Disparities%20Commissioned%20Paper.pdf
Summary & Key Points	• Identifies six different groups of disparities-sensitive measures: (1) practitioner performance measure; (2) consumer surveys that measure the patient experience; (3) hospital, ambulatory care center, home health nursing home performance measures; (4) measures of ambulatory care-sensitive conditions and management; (5) measures associated with cultural competency; and (6) patient-centered measures • Disparities-sensitive measures are defined in the article as measures "that serve to detect not only differences in quality across institutions or in relation to certain benchmarks, but also differences in quality among populations or social groupings (race/ethnicity/language, etc.) • Mentions importance of both absolute and relative disparity calculation. Utilizes formula for relative measures of disparity: • *Relative Disparities = (rate of interest-reference point rate) X 100, reference point rate* • Recommends excluding socioeconomic status (SES) from disparities risk adjustment calculations due other disparities effect' on SES, e.g. race/ethnicity may already be influencing the SES of a person.

Health Disparities and Cultural Competency Consensus Standards: Disparities-Sensitive Measure Assessment	
Source	National Quality Forum. (2012). Health Disparities and Cultural Competency Consensus Standards: Disparities-Sensitive Measure Assessment. Retrieved from http://www.qualityforum.org/projects/Healthcare_Disparities_and_Cultural_Competency.aspx
Summary & Key Points	• To identify disparities-sensitive measures, the National Quality Forum (NQF) highlighted first-tier identification protocol consisting of the prevalence of certain conditions and diseases, the disparities quality gap between different segments of the population, and the impact and severity of the condition. • The second-tier criteria included communication-sensitive services, care with a high degree of discretion, and social-determinant dependent measures. • Six categories were used for disparities: (1) practitioner performance measure; (2) consumer surveys that measure the patient experience; (3) hospital, ambulatory care center, home health nursing home performance measures; (4) measures of ambulatory care-sensitive conditions and management; (5) measures associated with cultural competency; and (6) patient-centered measures. • NQF assigned a score to each disparity based on the Quality Gap Percentage and a quartile system
Using the Peters-Belson Method to Measure Health Care Disparities from Complex Survey Data	
Source	Graubard BI, Rao SR, Gastwirth JL. Using the Peters-Belson method to measure health care disparities from complex survey data. Stat Med. 2005; 24:2659–2668.10.1002/sim.2135 [PubMed: 16118808]
Summary & Key Points	• Provides a logistic regression model previously used in both wage and race/sex discrimination studies to look at health disparities • Uses PB Method to evaluate disparities based on cancer screenings in men and women based on race and ethnicity • Integrates socio-demographic data from larger-scale studies and surveys to evaluate disparities between different groups
Health Disparities: Measuring Health Care Use and Access for Racial/Ethnic Populations	
Source	Bonito, A.J., Eicheldinger, C.R., & Lenfestey, N.F. (2005). Health Disparities: Measuring Health Care Use and Access for Racial/Ethnic Populations. Retrieved from https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Reports/downloads/bonito_part2.pdf
Summary & Key Points	• Analyzes Medicare Data for healthcare utilization, preventive services and screenings, disease prevalence, and mortality rates among different ethnic and racial groups compared to the white population • Identifies barriers to reducing disparities among ethnic and racial groups • Examines 2 million Medicare beneficiaries' claim data to demonstrate disparity patterns and provides in-depth summary of where differences exist among population groups

Data and Measurement Issues in the Analysis of Health Disparities	
Source	Bilheimer, L. T., & Klein, R. J. (2010). Data and Measurement Issues in the Analysis of Health Disparities. Health Services Research, 45(5.2), 1489–1507. http://doi.org/10.1111/j.1475-6773.2010.01143.x
Summary & Key Points	• Reveals the limitations and challenges of health disparities research, including sample size of data, variables used to define disparities, self-reported data, and cross-cultural measurement. • Miscalculations and missing data also significantly limit health disparity research • Offers conclusions based on study of past health disparity research and strategies for analyzing health disparities and inequities between populations
2014 National Healthcare Quality and Disparities Report (QDR)	
Source	Agency for Healthcare Research and Quality. http://www.ahrq.gov/research/findings/nhqrdr/nhqdr14/index.html
Summary & Key Points	• The QDR provides a comprehensive overview of the quality of health care received by the general U.S. population and disparities in care experienced by different racial, ethnic, and socioeconomic groups. • The report is based on more than 250 measures of quality and disparities covering a broad array of health care services and settings.
CDC Health Disparities and Inequalities Report – United States, 2013	
Source	Centers for Disease Control and Prevention (CDC) report, Health Disparities and Inequalities, November 22, 2013, supplement vol. 62. no.3 http://www.cdc.gov/mmwr/pdf/other/su6203.pdf
Summary & Key Points	• *"The purpose of this supplement is to raise awareness of differences among groups regarding selected health outcomes and health determinants and to prompt actions to reduce disparities."*
A Nation Free of Disparities in Health and Health Care	
Source	The National Partnership for Action to End Health Disparities' 2011 National stakeholder strategy for achieving health equity, and the related HHS Action Plan to Reduce Racial and Ethnic Health Disparities; A Nation Free of Disparities in Health and Health Care. http://minorityhealth.hhs.gov/npa/files/plans/hhs/hhs_plan_complete.pdf
Summary & Key Points	• First-ever HHS Disparities Action Plan and the NPA Stakeholder Strategy can be used together to coordinate action that will effectively address racial and ethnic health disparities across the country. • HHS Disparities Action Plan builds on national health disparities' goals and objectives recently unveiled in *Healthy People 2020*, and leverages key provisions of the Affordable Care Act and other cutting-edge HHS initiatives.

Closing the Gap in A Generation	
Source	The World Health Organization 2008 report, Closing the gap in a generation: Health equity through action on the social determinants of health. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)61690-6/abstract
Summary & Key Points	• The Commission on Social Determinants of Health, created to marshal the evidence on what can be done to promote health equity and to foster a global movement to achieve it, is a global collaboration of policy makers, researchers, and civil society, led by commissioners with a unique blend of political, academic, and advocacy experience. • The focus of attention is on countries at all levels of income and development. • The commission launched its final report on August 28, 2008. • This paper summarizes the key findings and recommendations; the full list is in the final report.
Confronting Racial and Ethnic Disparities in Health Care	
Source	The Institute of Medicine's 2002 report, Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care; http://www.nap.edu/read/12875/chapter/1
Summary & Key Points	• The report finds that: "Racial and ethnic minorities tend to receive a lower quality of health care than non-minorities," even when access-related factors such as income and health insurance is controlled.
Advancing Health Equity in Minnesota	
Source	Minnesota Department of Health, Advancing Health Equity in Minnesota, 2014 http://www.health.state.mn.us/divs/chs/healthequity/ahe_leg_report_020414.pdf
Summary & Key Points	The key report findings: • These inequities affect many populations in Minnesota: • African American and American Indian babies die in the first year of life at twice the rate of white babies. • While infant mortality rates for all groups have declined, the disparity in rates has existed for over 20 years. • American Indian, Hispanic/Latino, and African American youth have the highest rates of obesity. • Intimate partner violence affects 11 to 24 percent of high school seniors, with the highest rates among American Indian, African American and Hispanic/Latino students. • African American and Hispanic/Latino women in Minnesota are more likely to be diagnosed with later-stage breast cancer. • Gay, lesbian and bisexual university students are more likely than their heterosexual peers to have struggles with their mental health. • Persons with serious and persistent mental illness die, on average, 25 years earlier than the general public. • These health disparities persist and are neither random nor unpredictable. The groups that experience the greatest disparities in health outcomes also have experienced the greatest inequities in the social and economic conditions that are such strong predictors of health:

Unequal Distribution of Health in Twin Cities	
Source	The unequal distribution of health in the Twin Cities, Blue Cross and Blue Shield of Minnesota Foundation, October 2010. https://www.bcbsmnfoundation.org/system/asset/resource/pdf_file/57/F9790_web.pdf
Summary & Key Points	• People of color fare worse in our region than do whites based on a variety of health measures, including birth weights, obesity, diabetes, and morality.
Accounting for Social Risk Factors in Medicare Payment	
Source	Accounting for Social Risk Factors in Medicare Payment Copyright 2016 by the National Academy of Sciences. http://www.nap.edu/catalog/21858/accounting-for-social-risk-factors-in-medicare-payment-identifying-social
Summary & Key Points	• Recent health care payment reforms aim to improve the alignment of Medicare payment strategies with goals to improve the quality of care provided, patient experiences with health care, and health outcomes, while also controlling costs. These efforts move Medicare away from the volume-based payment of traditional fee-for-service models and toward value-based purchasing, in which cost control is an explicit goal in addition to clinical and quality goals. Specific payment strategies include pay-for-performance and other quality incentive programs that tie financial rewards and sanctions to the quality and efficiency of care provided and accountable care organizations in which health care providers are held accountable for both the quality and cost of the care they deliver.
NonTraditional Variables in Healthcare Risk Adjustment	
Source	Nontraditional Variables in Healthcare Risk Adjustment, Prepared for the Society of Actuaries, 2013. https://www.soa.org/Research/Research-Projects/health/research-2013-nontrad-var-health-risk.aspx
Summary & Key Points	• The results of this research demonstrate that it is important to adjust the traditional risk adjustment model in order to recognize nontraditional variables. • The report develops a new measure (Loss Ratio Advantage or **LRA**) to help quantify the potential of a nontraditional variable to affect a risk adjustment program. With the help of this measure, the report compares the importance of over thirty Nontraditional Variables in Risk Adjustment.
Counties Addressing Health Disparities and Health Inequity	
Los Angeles County (CA): http://publichealth.lacounty.gov/epi/docs/sociald_final_web.pdf **King County (WA):** http://www.kingcounty.gov/elected/executive/equity-social-justice.aspx **Alameda County (CA):** http://www.acphd.org/building-blocks.aspx	

States Addressing Health Disparities and Health Inequity
Massachusetts: http://www.mass.gov/eohhs/gov/commissions-and-initiatives/healthcare-reform/masshealth-innovations/1115-waiver-proposal-information.html **Connecticut:** http://www.ct.gov/dph/lib/dph/ohca/utilizationreport/utilizationreport2013.pdf **Virginia:** http://www.vdh.virginia.gov/OMHHE/2012report.htm **New Hampshire:** http://www.dhhs.nh.gov/omh/documents/disparities.pdf **Michigan:** http://www.michigan.gov/documents/mdch/All_Plan_Health_Equity_Year_3_report_FINAL_488569_7.pdf

Appendix 5. Interview Guide

HMA in partnership with DPC developed a guide to use to interview Minnesota providers about the key health disparities noted in the Medicaid population.

Table 5.1. Interview Guide

1. What are the three, primary unmet medical needs of the people whom you serve that lead to health disparities?
2. What are the three, primary unmet nonmedical needs of the people you serve that lead to health disparities?
3. Are there subpopulations of patients that seem to have a large degree of unmet needs?
4. What steps do you take to mitigate these unmet needs to reduce health disparities?
5. Are there subpopulations of patients that seem to be most costly for your organization to serve, given their need for non-reimbursed services?
6. How do you budget for these expenses and how are they paid for?
7. If you had funding to provide services to reduce the level of unmet needs among the people whom you serve in three areas, what would those costs be?
8. Of the populations that you serve, which, according to the data you collect experience the greatest unmet needs and disparities?
9. What best practices have you developed to address unmet needs and reduce disparities in health outcomes that have not required more monetary resources?
10. DHS is looking for patient-level data on how much health care providers spend on unreimbursed patient care. Does your organization have patient-level cost data or a proxy for cost data that DHS might be able to use?

Appendix 6. List of Providers Interviewed

HMA and DPC interviewed Minnesota providers to inform our identification of the populations and the costs to providers.

Table 6.1. Providers Interviewed

#	Provider Type	Provider Location
1	Health care system which includes a major safety net hospital and clinics.	Urban and suburban locations
2	Community mental health program	Urban and suburban locations
3	Federally-qualified health center (FQHC)	Rural and urban areas
4	Community dental program	Multiple locations in metro and non-metro Minnesota
5	Federally-qualified health center (FQHC)	Urban twin cities
6	Indian Health Services	Rural and urban Minnesota and adjacent states

Appendix 7. Univariate Results

YOUNG CHILDREN < 2, INCLUDES INFANTS			
Description	**Frequency**	**n**	**%**
Age 0	18,303	36,219	50.5%
Age 1	17,916	36,219	49.5%
Female	17,879	36,219	49.4%
Male	18,340	36,219	50.6%
Asian Immigrant	1,915	36,219	5.3%
Black immigrant	4,176	36,219	11.5%
Hispanic Immigrant	1,915	36,219	5.3%
Native American	1,652	36,219	4.6%
White Immigrant	643	36,219	1.8%
Other Immigrant	1,439	36,219	4.0%
Asian Non Immigrant	1,009	36,219	2.8%
Black Non Immigrant	5,059	36,219	14.0%
Hispanic Non Immigrant	1,783	36,219	4.9%
White Non Immigrant	12,496	36,219	34.5%
Other Non Immigrant	4,132	36,219	11.4%

YOUNG CHILDREN < 2, INCLUDES INFANTS			
Description	**Frequency**	**n**	**%**
Age 0	18,303	36,219	50.5%
Age 1	17,916	36,219	49.5%
Female	17,879	36,219	49.4%
Male	18,340	36,219	50.6%
Asian Immigrant	1,915	36,219	5.3%
Black immigrant	4,176	36,219	11.5%
Hispanic Immigrant	1,915	36,219	5.3%
Native American	1,652	36,219	4.6%
White Immigrant	643	36,219	1.8%
Other Immigrant	1,439	36,219	4.0%
Asian Non Immigrant	1,009	36,219	2.8%
Black Non Immigrant	5,059	36,219	14.0%
Hispanic Non Immigrant	1,783	36,219	4.9%
White Non Immigrant	12,496	36,219	34.5%
Other Non Immigrant	4,132	36,219	11.4%
1-6 Months of Eligibility (2014)	8,787	36,219	24.3%
7-12 Months of Eligibility (2014)	27,432	36,219	75.7%
Months 1-6, 2013-2014	8,295	36,219	22.9%
Months 7-12, 2013-2014	10,545	36,219	29.1%
Months 13-18, 2013-2014	9,786	36,219	27.0%
Months 19-24, 2013-2014	7,593	36,219	21.0%

East Metro	6,013	36,219	16.6%
West Metro	8,802	36,219	24.3%
North	8,331	36,219	23.0%
South	7,620	36,219	21.0%
Metro	5,453	36,219	15.1%
Indian Health Services	776	36,219	2.1%
FQHC	2,420	36,219	6.7%
Regional Health System	1,834	36,219	5.1%
ADG 1	See Log	36,219	52.4%
ADG 2	See Log	36,219	0.0%
ADG 3	See Log	36,219	0.0%
ADG 4	See Log	36,219	0.0%
ADG 5	See Log	36,219	0.0%
ADG 6	See Log	36,219	0.0%
ADG 7	See Log	36,219	0.0%
ADG 8	See Log	36,219	0.0%
ADG 9	See Log	36,219	0.0%
ADG 10	See Log	36,219	0.0%
ADG 11	See Log	36,219	0.0%
ADG 12	See Log	36,219	0.0%
ADG 13	See Log	36,219	0.0%
ADG 14	See Log	36,219	0.0%
ADG 16	See Log	36,219	0.0%
ADG 17	See Log	36,219	0.0%
ADG 18	See Log	36,219	0.0%

ADG 20	See Log	36,219	0.0%
ADG 21	See Log	36,219	0.0%
ADG 22	See Log	36,219	0.0%
ADG 23	See Log	36,219	0.0%
ADG 24	See Log	36,219	0.0%
ADG 25	See Log	36,219	0.0%
ADG 26	See Log	36,219	0.0%
ADG 27	See Log	36,219	0.0%
ADG 28	See Log	36,219	0.0%
ADG 29	See Log	36,219	0.0%
ADG 30	See Log	36,219	0.0%
ADG 31	See Log	36,219	0.0%
ADG 32	See Log	36,219	0.0%
ADG 33	See Log	36,219	0.0%
ADG 34	See Log	36,219	0.0%
n.a.			
n.a.			
n.a.			
n.a.			
< 50% FPL	23,040	36,219	63.6%
50-100% FPL	9,816	36,219	27.1%
> 100% FPL	2,430	36,219	6.7%
Missing	933	36,219	2.6%
See Log			
See Log			
See Log			

See Log			
See Log			
See Log			
Family Homelessness	2,217	36,219	6.1%
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
Child Protection Involvement	3,285	36,219	9.1%
Parental Chem Dependency	4,951	36,219	13.7%
Parent Mental Illness	1,720	36,219	4.7%
Parent disability/medical condition	1,436	36,219	4.0%
Parents Married	12,340	36,219	34.1%
Child in Household with 4+ children	6,097	36,219	16.8%
Parent, Language English	29,948	36,219	82.7%
Parent, Language Other	6,271	36,219	17.3%
Parent Immigrated	10,100	36,219	27.9%
Likely Parental Incareration	865	36,219	2.4%
Multiple Birth	819	36,219	2.3%
Mortality	**139**	**36,219**	**0.4%**
Unhealthy babies	4,131	36,219	11.4%
Injury	1,329	36,219	3.7%
n.a.			

Asthma	1,893	36,219	5.2%
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
Total Costs, based on all services	$ 2,668.52		
Total Costs, based on ACO services	$ 2,510.68		

Note: Total costs are log transformed.

CHILDREN < 18			
Description	**Frequency**	**n**	**%**
Age 0-3	81,292	303,140	26.8%
Age 4-5	38,394	303,140	12.7%
Age 6-8	56,795	303,140	18.7%
Age 9-12	62,216	303,140	20.5%
Age 13-17	64,443	303,140	21.3%
Female	148,125	303,140	48.9%
Male	155,015	303,140	51.1%
Asian Immigrant	18,904	303,140	6.2%
Black Immigrant	34,705	303,140	11.4%
Hispanic Immigrant	13,596	303,140	4.5%
Native American	15,224	303,140	5.0%
White Immigrant & Non Immigrant (combined)	118,641	303,140	39.1%
Other Immigrant	9,429	303,140	3.1%
Asian Non Immigrant	5,935	303,140	2.0%
Black Non Immigrant	48,746	303,140	16.1%
Hispanic Non Immigrant	15,651	303,140	5.2%
Other Non Immigrant	22,309	303,140	7.4%

CHILDREN < 18			
Description	**Frequency**	**n**	**%**
Age 0-3	81,292	303,140	26.8%
Age 4-5	38,394	303,140	12.7%
Age 6-8	56,795	303,140	18.7%
Age 9-12	62,216	303,140	20.5%
Age 13-17	64,443	303,140	21.3%
Female	148,125	303,140	48.9%
Male	155,015	303,140	51.1%
Asian Immigrant	18,904	303,140	6.2%
Black Immigrant	34,705	303,140	11.4%
Hispanic Immigrant	13,596	303,140	4.5%
Native American	15,224	303,140	5.0%
White Immigrant & Non Immigrant (combined)	118,641	303,140	39.1%
Other Immigrant	9,429	303,140	3.1%
Asian Non Immigrant	5,935	303,140	2.0%
Black Non Immigrant	48,746	303,140	16.1%
Hispanic Non Immigrant	15,651	303,140	5.2%
Other Non Immigrant	22,309	303,140	7.4%
1-6 Months of Eligibility (2014)	30,176	303,140	10.0%
7-12 Months of Eligibility (2014)	272,964	303,140	90.0%
Months 1-6, 2013-2014	20,161	303,140	6.7%
Months 7-12, 2013-2014	31,909	303,140	10.5%
Months 13-18, 2013-2014	44,708	303,140	14.7%

Months 19-24, 2013-2014	213,280	303,140	70.4%
East Metro	48,456	303,140	16.0%
West Metro	72,686	303,140	24.0%
North	70,906	303,140	23.4%
South	62,807	303,140	20.7%
Metro	46,750	303,140	15.4%
Missing	1,535	303,140	0.5%
Indian Health Services	6,010	303,140	2.0%
Federally Qualified Health Center (FQHC)	23,237	303,140	7.7%
Regional Health System	13,238	303,140	4.4%
ADG 1	See Log	303,140	0.0%
ADG 2	See Log	303,140	0.0%
ADG 3	See Log	303,140	0.0%
ADG 4	See Log	303,140	0.0%
ADG 5	See Log	303,140	0.0%
ADG 6	See Log	303,140	0.0%
ADG 7	See Log	303,140	0.0%
ADG 8	See Log	303,140	0.0%
ADG 9	See Log	303,140	0.0%
ADG 10	See Log	303,140	0.0%
ADG 11	See Log	303,140	0.0%
ADG 12	See Log	303,140	0.0%
ADG 13	See Log	303,140	0.0%
ADG 14	See Log	303,140	0.0%
ADG 16	See Log	303,140	0.0%

ADG 17	See Log	303,140	0.0%
ADG 18	See Log	303,140	0.0%
ADG 20	See Log	303,140	0.0%
ADG 21	See Log	303,140	0.0%
ADG 22	See Log	303,140	0.0%
ADG 23	See Log	303,140	0.0%
ADG 24	See Log	303,140	0.0%
ADG 25	See Log	303,140	0.0%
ADG 26	See Log	303,140	0.0%
ADG 27	See Log	303,140	0.0%
ADG 28	See Log	303,140	0.0%
ADG 29	See Log	303,140	0.0%
ADG 30	See Log	303,140	0.0%
ADG 31	See Log	303,140	0.0%
ADG 32	See Log	303,140	0.0%
ADG 33	See Log	303,140	0.0%
ADG 34	See Log	303,140	0.0%
n.a.			
n.a.			
Developmental Disability	2,738	303,140	0.9%
Disabilty	10,243	303,140	3.4%
< 50% FPL	155,131	303,140	51.2%
50-100% FPL	92,265	303,140	30.4%
> 100% FPL	41,456	303,140	13.7%
Missing	14,288	303,140	4.7%
See Log			

See Log			
See Log			
See Log			
See Log			
See Log			
Family Homelessness	12,866	303,140	4.2%
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
Child Protection Involvement	32,648	303,140	10.8%
Parental Chem Dependency	38,323	303,140	12.6%
Parent Mental Illness	18,557	303,140	6.1%
Parent disability/medical condition	11,498	303,140	3.8%
Parents Married	117,159	303,140	38.6%
Child in Household with 4+ children	76,377	303,140	25.2%
Parent, Language English	251,468	303,140	83.0%
Parent, Language Other	51,672	303,140	17.0%
Parent Immigrated	82,519	303,140	27.2%
Likely Parental Incareration	6,580	303,140	2.2%
n.a.			
Mortality	**344**	**303,140**	**0.1%**
n.a.			

Injury	14,601	303,140	4.8%
n.a.			
Asthma	35,368	303,140	11.7%
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
SUD	2,041	36,657	5.6%
ADHD	24,830	303,140	8.2%
PTSD	5,546	303,140	1.8%
Depression	11,225	303,140	3.7%
n.a.			
n.a.			
n.a.			
n.a.			
n.a.			
Well-child visits for all children	**82,253**	**131,057**	**62.8%**
Annual dental visit	**114,183**	**177,685**	**64.3%**
Total Costs, based on all services	$ 1,157		
Total Costs, based on ACO services	$ 826.6		

Note: Total costs are log transformed.

ADULTS 18-64 (INCLUDES 64)			
Description	**Frequency**	**n**	**%**
Age 18-21	62,922	550,341	11.43%
Age 22-24	45,895	550,341	8.34%
Age 25-34	164,357	550,341	29.86%
Age 35-44	105,982	550,341	19.26%
Age 45-54	93,227	550,341	16.94%
Age 55-64	77,958	550,341	14.17%
Female	305,611	550,341	55.53%
Male	244,730	550,341	44.47%
Asian Immigrant	20,971	550,341	3.81%
Black immigrant	34,925	550,341	6.35%
Hispanic Immigrant	8,187	550,341	1.49%
Native American	23,464	550,341	4.26%
White Immigrant	7,007	550,341	1.27%
Other Immigrant	12,356	550,341	2.25%
Asian Non Immigrant	15,466	550,341	2.81%
Black Non Immigrant	66,093	550,341	12.01%
Hispanic Non Immigrant	16,907	550,341	3.07%
White Non Immigrant	296,992	550,341	53.97%
Other Non Immigrant	47,973	550,341	8.72%

ADULTS 18-64 (INCLUDES 64)			
Description	**Frequency**	**n**	**%**
Age 18-21	62,922	550,341	11.43%
Age 22-24	45,895	550,341	8.34%
Age 25-34	164,357	550,341	29.86%
Age 35-44	105,982	550,341	19.26%
Age 45-54	93,227	550,341	16.94%
Age 55-64	77,958	550,341	14.17%
Female	305,611	550,341	55.53%
Male	244,730	550,341	44.47%
Asian Immigrant	20,971	550,341	3.81%
Black immigrant	34,925	550,341	6.35%
Hispanic Immigrant	8,187	550,341	1.49%
Native American	23,464	550,341	4.26%
White Immigrant	7,007	550,341	1.27%
Other Immigrant	12,356	550,341	2.25%
Asian Non Immigrant	15,466	550,341	2.81%
Black Non Immigrant	66,093	550,341	12.01%
Hispanic Non Immigrant	16,907	550,341	3.07%
White Non Immigrant	296,992	550,341	53.97%
Other Non Immigrant	47,973	550,341	8.72%
1-6 Months of Eligibility (2014)	96,556	550,341	17.54%
7-12 Months of Eligibility (2014)	453,785	550,341	82.46%
Months 1-6, 2013-2014	66,448	550,341	12.07%
Months 7-12, 2013-2014	130,547	550,341	23.72%

Months 13-18, 2013-2014	76,189	550,341	13.84%
Months 19-24, 2013-2014	277,157	550,341	50.36%
East Metro	77,455	550,341	14.07%
West Metro	137,609	550,341	25.00%
North	127,874	550,341	23.24%
South	113,562	550,341	20.63%
Metro	85,917	550,341	15.61%
Missing	7,924	550,341	1.44%
Indian Health Services	8,484	550,341	1.54%
Federally Qualified Health Center (FQHC)	47,185	550,341	8.57%
Regional Health System	22,282	550,341	4.05%
ADG 1	114,726	550,341	20.85%
ADG 2	147,909	550,341	26.88%
ADG 3	41,291	550,341	7.50%
ADG 4	38,245	550,341	6.95%
ADG 5	31,795	550,341	5.78%
ADG 6	20,282	550,341	3.69%
ADG 7	117,918	550,341	21.43%
ADG 8	100,668	550,341	18.29%
ADG 9	12,832	550,341	2.33%
ADG 10	165,571	550,341	30.09%
ADG 11	57,878	550,341	10.52%
ADG 12	23,002	550,341	4.18%
ADG 13	10,106	550,341	1.84%
ADG 14	132,788	550,341	24.13%

ADG 16	9,788	550,341	1.78%
ADG 17	1,809	550,341	0.33%
ADG 18	24,093	550,341	4.38%
ADG 20	58,778	550,341	10.68%
ADG 21	78,324	550,341	14.23%
ADG 22	72,774	550,341	13.22%
ADG 23	124,159	550,341	22.56%
ADG 24	120,432	550,341	21.88%
ADG 25	74,560	550,341	13.55%
ADG 26	213,535	550,341	38.80%
ADG 27	248,249	550,341	45.11%
ADG 28	149,382	550,341	27.14%
ADG 29	70,463	550,341	12.80%
ADG 30	27,700	550,341	5.03%
ADG 31	329,892	550,341	59.94%
ADG 32	6,341	550,341	1.15%
ADG 33	32,211	550,341	5.85%
ADG 34	26,927	550,341	4.89%
Serious and Persistent Mental Illness	30,529	550,341	5.55%
Substance Use Disorder	79,349	550,341	14.42%
Developmental Disability	7,687	550,341	1.40%
Disability	45,050	550,341	8.19%
< 50% FPL	240,350	550,341	43.67%
50-100% FPL	104,179	550,341	18.93%
> 100% FPL	116,938	550,341	21.25%

Missing	88,874	550,341	16.15%
See Log		550,341	0.00%
See Log		550,341	0.00%
See Log		550,341	0.00%
See Log		550,341	0.00%
See Log		550,341	0.00%
See Log		550,341	0.00%
Homelessness	38,721	550,341	7.04%
No high school diploma	101,509	550,341	18.44%
High school	256,084	550,341	46.53%
>High school & <College	58,099	550,341	10.56%
College, College+	6,716	550,341	1.22%
Missing	127,933	550,341	23.25%
English	446,049	550,341	81.05%
Other	47,257	550,341	8.59%
Missing	57,035	550,341	10.36%
Likely to have been incarcerated, per DOC	21,286	550,341	3.87%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%

n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
n.a.		550,341	0.00%
Mortality	**4,297**	**550,341**	**0.78%**
		550,341	0.00%
Injury	307,761	550,341	55.92%
Type 2 Diabetes	38,275	550,341	6.95%
Asthma	51,708	550,341	9.40%
HIV/Hepatitis c	8,827	550,341	1.60%
Hypertension	28,266	550,341	5.14%
Cardiovascular	7,538	550,341	1.37%
Chronic Obstructive Pulmonary Disorder	46,948	550,341	8.53%
Lung/Laryngeal Cancer	1,205	550,341	0.22%
Substance Use Disorder		550,341	0.00%
ADHD		550,341	0.00%
PTSD	32,493	550,341	5.90%
Depression	105,767	550,341	19.22%
Serious and Persistent Mental Illness		550,341	0.00%
Potentially preventable emergency department visits	**57,942**	**550,341**	**10.53%**
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	**3,329**	**550,341**	**0.60%**
Annual preventive visit	**182,879**	**550,341**	**33.23%**
Comprehensive diabetes care - A1c test	**21,631**	**23,511**	**92.00%**

Annual dental visit	**133,209**	**275,045**	**48.43%**
Total Costs, based on all services	$ 2,105.62		
Total Costs, based on ACO services	$ 1,686.82		

Note: Total costs are log transformed.

Appendix 8. Bivariate Results

Note: Adult costs shown on the following tables are not log transformed; they are based on actual Medicaid costs.

	Group 1: Adult Population (18-64)		
Framework	**Male**	**Female**	**All Adults**
	Male	Female	Total
	n=244,730 (44.5%)	n=305,611 (55.5%)	n=550,341 (100%)
	Average age=37.8	Average age=36.8	Average age=37.2
HEALTH DISPARITY MEASURES			
Health: Direct measures of health status			
Mortality	2,572 (1.1%)	1,725 (0.56%)	4,297 (0.78%)
Morbidity			
Unhealthy Newborns			
Type 2 Diabetes	17,623 (7.2%)	20,652 (6.8%)	38,275 (7.0%)
Asthma	16,217 (6.6%)	35,491 (11.6%)	51,708 (9.4%)
HIV/Hepatitis c	5,051 (2.1%)	3,776 (1.2%)	8,827 (1.6%)
Hypertension	5,238 (2.1%)	23,028 (7.5%)	28,266 (5.1%)
Cardiovascular	4,314 (1.8%)	3,224 (1.1%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	18,961 (7.8%)	27,987 (9.2%)	46,948 (8.5%)
Injury	14,200 (5.8%)	16,561 (5.4%)	30,761 (5.6%)
Lung/Laryngeal Cancer	644 (0.26%)	561 (0.18%)	1,205 (0.22%)
Substance Use Disorder	45,474 (18.6%)	33,875 (11.1%)	79,349 (14.4%)
ADHD			
PTSD	9,492(3.9%)	23,001 (7.5%)	32,493 (5.9%)
Depression	36,993 (15.1%)	68,774 (22.5%)	105,767 (19.2%)
Serious and Persistent Mental Illness	11,999 (4.9%)	18,530 (6.1%)	30,529 (5.6%)
Developmental Disability	4,181 (1.7%)	3,506 (1.2%)	7,687 (1.4%)
Disability	**22,460 (9.2%)**	**22,590 (7.4%)**	**45,050 (8.2%)**
Health care, access, utilization and quality			
Potentially preventable emergency department visits	18,242 (7.5%)	39,700 (13.0%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	1,539 (0.63%)	1,790 (0.59%)	3,329 (0.60%)
HEDIS measures (3):			
Annual preventive visit	60,908 (24.9%)	121,971 (39.9%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	9,420 (92.9%) n=10,145	12,211 (91.4%) n=13,366	21,631 (92.0%) n=23,511
Well-child visits for all children	n.a.	n.a.	n.a.
Annual dental visit for kids and adults	49,149 (43.5%) n=113,003	84,060 (51.9%) n=162,042	133,209 (48.4%) n=275,045
HEALTH CARE COSTS			
Total expenditures for each individual over the calendar year	$7,073.992 n= 244,730	$7,128.363 n= 305,611	$7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	$4,611.429 n= 244,730	$5,241.243 n= 305,611	$4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 2: Serious Persistent Mental Illness (SPMI)		
Framework	Variables	Serious Persistent Mental Illness	Non-Serious Persistent Mental Illness	TOTAL
		F=6.1% M=4.9%	F=93.9% M=95.1%	
		n=30,529 (5.6%)	n=519,812 (94.5%)	n=550,341 (100%)
		Average age=39.0	Average age=37.1	Average age=37.2
HEALTH DISPARITY MEASURES				
Health: Direct measures of health status and outcomes				
Mortality	Mort	522 (1.7%)	3,775 (0.73%)	4,297 (0.78%)
Morbidity				
Unhealthy Newborns	nurserylevelII			
Type 2 Diabetes	type2_denom, type2_num	4,311 (14.1%)	33,964 (6.5%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	6,888 (22.6%)	44,820 (8.6%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	1,568 (5.1%)	7,259 (1.4%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	3,107 (10.2%)	25,159 (4.8%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	797 (2.6%)	6,741 (1.3%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	6,020 (19.7%)	40,928 (7.9%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	7,350 (24.1%)	23,411 (4.5%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	98 (0.32%)	1,107 (0.21%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num	15,385 (50.4%)	63,964 (12.3%)	79,349 (14.4%)
ADHD	ADHD_denom, ADHD_num			
PTSD	PTSD_denom, PTSD_num	12,124 (39.7%)	20,369 (3.9%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num			
Serious and Persistent Mental Illness	part_mental_ill2			
Developmental Disability	MNDiagDD	1,164 (3.8%)	6,523 (1.3%)	7,687 (1.4%)
Disability	**DS**	**10,279 (33.7%)**	**34,771 (6.7%)**	**45,050 (8.2%)**
Health care, access, utilization and quality				
Potentially preventable emergency department visits	HCUseEDII	6,571 (21.5%)	51,371 (9.9%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	444 (1.4%)	2,885 (0.56%)	3,329 (0.60%)
HEDIS measures (3):				
Annual preventive visit	HWellA_denom, HWellA_num	15,079 (49.4%)	167,800 (32.3%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	2,796 (91.6%) n=3,054	18,835 (92.1%) n=20,457	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num			
Annual dental visit for kids and adults	ADV_denom, ADV_num	12,244 (57.2%) n=21,394	120,965 (47.7%) 253,651	133,209 (48.4%) n=275,045
HEALTH CARE COSTS				
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 26,815.61 n= 30,529	$ 5,946.516 n= 519812	$ 7,104.185 n= 550341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 16,558.03 n= 30,529	$ 4,280.079 n= 519,812	$ 4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 3. Substance Use Disorder (SUD)		
Framework	Variables	Substance Use Disorder	Non-Substance Use Disorder	TOTAL
		F=11.1% M=18.6%	F=88.9% M=81.4%	
		n=79,349 (14.4%)	n=470,992(85.6%)	n=550,341 (100%)
		Average age=37.8	Average age=37.1	Average age=37.2
HEALTH DISPARITY MEASURES				
Health: Direct measures of health status and outcomes				
Mortality	Mort	1,945 (2.5%)	2,352 (0.50%)	4,297 (0.78%)
Morbidity				
Unhealthy Newborns	nurserylevelII			
Type 2 Diabetes	type2_denom, type2_num	7,384 (9.3%)	30,891 (6.6%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	13,127 (16.5%)	38,581 (8.2%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	5,091 (6.4%)	3,736 (0.79%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	7,068 (8.9%)	21,198 (4.5%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	2,594 (3.3%)	4,944 (1.1%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	14,439 (18.2%)	32,509 (6.9%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	13,731 (17.3%)	17,030 (3.6%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	418 (0.53%)	787 (0.17%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num			
ADHD	ADHD_denom, ADHD_num			
PTSD	PTSD_denom, PTSD_num	14,315 (18.0%)	18,178 (3.9%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num	39,451 (49.7%)	66,316 (14.1%)	105, 767 (19.2%)
Serious and Persistent Mental Illness	part_mental_ill2	15,385 (19.4%)	15,144 (3.2%)	30,529 (5.6%)
Developmental Disability	MNDiagDD	967 (1.2%)	6,720 (1.4%)	7,687 (1.4%)
Disability	**DS**	**12,703 (16.0%)**	**32,347 (6.9%)**	**45,050 (8.2%)**
Health care, access, utilization and quality				
Potentially preventable emergency department visits	HCUseEDII	16,537 (20.8%)	41,405 (8.8%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	1,447 (1.8%)	1,882 (0.40%)	3,329 (0.60%)
HEDIS measures (3):				
Annual preventive visit	HWellA_denom, HWellA_num	32,528 (41.0%)	150,351 (31.9%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	4,064 (89.0%) n=4,566	17,567 (92.7%) n=18,945	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num			
Annual dental visit for kids and adults	ADV_denom, ADV_num	20,776 (49.4%) n=42,035	112,433 (48.3%) n=233,010	133,209 (48.4%) n=275,045
HEALTH CARE COSTS				
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 17,760.96 n= 79,349	$ 5,308.816 n= 470,992	$ 7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 12,797.63 n= 79,349	$ 3,640.948 n=470,992	$ 4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 4: Income Relative to Federal Poverty Level (FPL)				
Framework	Variables	Income Below 50% of the Federal Poverty Level (FPL)	50-100% FPL	> 100% FPL	Missing	TOTAL
		F=42.5% M=45.2%	F=21.1% M=16.2%	F=22.0% M=20.3%	F=14.5% M=18.3%	
		n=240,350 (43.7%)	n=104,179 (18.9%)	n=116,938 (21.3%)	n=88,874 (16.2%)	n=550,341 (100%)
		Average age=37.3	Average age=35.7	Average age=38.1	Average age=37.8	Average age=37.2
HEALTH DISPARITY MEASURES						
Health: Direct measures of health status and outcomes						
Mortality	Mort	3,117 (1.3%)	419 (0.40%)	321 (0.27%)	440 (0.50%)	4,297 (0.78%)
Morbidity						
Unhealthy Newborns	nurserylevelII					
Type 2 Diabetes	type2_denom, type2_num	20,954 (8.7%)	6,457 (6.2%)	6,396 (5.5%)	4,468 (5.0%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	28,018 (11.7%)	10,897 (10.5%)	8,154 (7.0%)	4,639 (5.2%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	6,164 (2.6%)	942 (0.90%)	719 (0.61%)	1,002 (1.1%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	14,625 (6.1%)	7,237 (7.0%)	4,089 (3.5%)	2,315 (2.6%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	4,715 (2.0%)	1,048 (1.0%)	953 (0.81%)	822 (0.92%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	26,907 (11.2%)	8,480 (8.1%)	7,232 (6.2%)	4,329 (4.9%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	17,275 (7.2%)	5,885 (5.7%)	3,969 (3.4%)	3,632 (4.1%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	756 (0.31%)	150 (0.14%)	150 (0.13%)	149 (0.17%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num	48,790 (20.3%)	11,260 (10.8%)	7,343 (6.3%)	11,956 (13.5%)	79,349 (14.4%)
ADHD	ADHD_denom, ADHD_num					
PTSD	PTSD_denom, PTSD_num	20,173 (8.4%)	6,744 (6.5%)	3,140 (2.7%)	2,436 (2.7%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num	60,491 (25.2%)	20,093 (19.3%)	14,974 (12.8%)	10,209 (11.5%)	105,767 (19.2%)
Serious and Persistent Mental Illness	part_mental_ill2	20,162 (8.4%)	5,421 (5.2%)	2,671 (2.3%)	2,275 (2.6%)	30,529 (5.6%)
Developmental Disability	MNDiagDD	6,348 (2.6%)	892 (0.86%)	191 (0.16%)	256 (0.29%)	7,687 (1.4%)
Disability	**DS**	**37,838 (15.7%)**	**5,597 (5.4%)**	**1,311 (1.1%)**	**304 (0.34%)**	**45,050 (8.2%)**
Health care, access, utilization and quality						
Potentially preventable emergency department visits	HCUseEDII	32,415 (13.5%)	13,793 (13.2%)	7,175 (6.1%)	4,559 (5.1%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	2,017 (0.84%)	545 (0.52%)	382 (0.33%)	385 (0.43%)	3,329 (0.60%)
HEDIS measures (3):						
Annual preventive visit	HWellA_denom, HWellA_num	83,524 (34.8%)	36,553 (35.1%)	37,255 (31.9%)	25,547 (28.8%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	12,834 (91.4%) n=14,044	3,736 (90.9%) n=4,109	3,633 (94.2%) n=3,857	1,428 (95.1%) n=1,501	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num					
Annual dental visit for kids and adults	ADV_denom, ADV_num	67,094 (48.3%) n=138,976	29,297 (50.9%) n=57,557	28,799 (49.2%) n=58,492	8,019 (40.1%) n=20,020	133,209 (48.4%) n=275,045
HEALTH CARE COSTS						
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 10,446.51 n= 240,350	$ 5,716.457 n= 104,179	$ 3,694.322 n= 116,938	$ 4,178.541 n= 88,874	$ 7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 6,590.056 n= 240,350	$ 4,452.126 n= 104,179	$ 3,226.294 n= 116,938	$ 3,435.449 n= 88,874	$ 4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 5: Primary Language			
Framework	Variables	Primary language: English	Primary language: Other	Primary language: Missing	TOTAL
		F=82.0% M=79.9%	F=9.5% M=7.5%	F=8.5% M=12.7%	
		n=446,049 (81.1%)	n=47,257 (8.6%)	n=57,035 (10.4%)	n=550,341 (100%)
		Average age=37.4	Average age=37.9	Average age=35.1	Average age=37.2
HEALTH DISPARITY MEASURES					
Health: Direct measures of health status and outcomes					
Mortality	Mort	3,973 (0.89%)	205 (0.43%)	119 (0.21%)	4,297 (0.78%)
Morbidity					
Unhealthy Newborns	nurserylevelII				
Type 2 Diabetes	type2_denom, type2_num	31,252 (7.0%)	4,785 (10.1%)	2,238 (3.9%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	46,589 (10.4%)	2,208 (4.7%)	2,911 (5.1%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	8,124 (1.8%)	515 (1.1%)	188 (0.33%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	23,924 (5.4%)	3,199 (6.8%)	1,143 (2.0%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	6,782 (1.5%)	477 (1.0%)	279 (0.49%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	42,087 (9.4%)	2,499 (5.3%)	2,362 (4.1%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	27,963 (6.3%)	1,053 (2.2%)	1,745 (3.1%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	1,077 (0.24%)	73 (0.15%)	55 (0.10%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num	75,617 (17.0%)	1,108 (2.3%)	2,624 (4.6%)	79,349 (14.4%)
ADHD	ADHD_denom, ADHD_num				
PTSD	PTSD_denom, PTSD_num	28,196 (6.3%)	3,440 (7.3%)	857 (1.5%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num	96,580 (21.7%)	4,651 (9.8%)	4,536 (8.0%)	105,767 (19.2%)
Serious and Persistent Mental Illness	part_mental_ill2	27,798 (6.2%)	2,058 (4.4%)	673 (1.2%)	30,529 (5.6%)
Developmental Disability	MNDiagDD	6,828 (1.5%)	694 (1.5%)	165 (0.29%)	7,687 (1.4%)
Disability	**DS**	**38,915 (8.7%)**	**5,639 (11.9%)**	**496 (0.87%)**	**45,050 (8.2%)**
Health care, access, utilization and quality					
Potentially preventable emergency department visits	HCUseEDII	52,005 (11.7%)	3,460 (7.3%)	2,477 (4.3%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	3,039 (0.68%)	181 (0.38%)	109 (0.19%)	3,329 (0.60%)
HEDIS measures (3):					
Annual preventive visit	HWellA_denom, HWellA_num	152,689 (34.2%)	15,021 (31.8%)	15,169 (26.6%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	17,697 (91.5%) n=19,333	2,787 (94.3%) n=2,956	1,147 (93.9%) n=1,222	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num				
Annual dental visit for kids and adults	ADV_denom, ADV_num	107, 095 (47.9%) n=223,593	13,096 (51.5%) n=25,442	13,018 (50.1%) n=26,010	133,209 (48.4%) n=275,045
HEALTH CARE COSTS					
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 7,706.925 n= 446,049	$ 6,743.569 n= 47,257	$ 2,689.182 n= 57,035	$ 7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 5,397.018 n= 446,049	$ 4,086,.072 n= 47,257	$ 2,277.659 n= 57,035	$ 4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 7: Race and Ethnicity			
Framework	Variables	Black/Non Immigrant	Hispanic/Non Immigrant	White/Non Immigrant	TOTAL
		F=11.1% M=13.2%	F=3.1% M=3.0%	F=54.2% M=53.7%	
		n=66,093 (12.0%)	n=16,907 (3.1%)	n=296,992 (54.0%)	n=550,341 (100%)
		Average age=35.0	Average age=31.2	Average age=38.7	Average age=37.2
HEALTH DISPARITY MEASURES					
Health: Direct measures of health status and outcomes					
Mortality	Mort	529 (0.80%)	87 (0.51%)	2,827 (0.95%)	4,297 (0.78%)
Morbidity					
Unhealthy Newborns	nurserylevelII				
Type 2 Diabetes	type2_denom, type2_num	5,472 (8.3%)	1,285 (7.6%)	18,370 (6.2%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	10,886 (16.5%)	1,686 (10.0%)	28,378 (9.6%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	1,766 (2.7%)	281 (1.7%)	4,405 (1.5%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	6,346 (9.6%)	939 (5.6%)	11,681 (3.9%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	1,296 (2.0%)	110 (0.65%)	4,350 (1.5%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	5,549 (8.4%)	1,136 (6.7%)	30,198 (10.2%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	4,629 (7.0%)	1,110 (6.6%)	17,866 (6.0%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	133 (0.20%)	12 (0.07%)	806 (0.27%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num	13,279 (20.1%)	2,388 (14.1%)	46,436 (15.6%)	79,349 (14.4%)
ADHD	ADHD_denom, ADHD_num				
PTSD	PTSD_denom, PTSD_num	5,713 (8.6%)	1,025 (6.1%)	16,680 (5.6%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num	13,602 (20.6%)	3,251 (19.2%)	66,527 (22.4%)	105,767 (19.2%)
Serious and Persistent Mental Illness	part_mental_ill2	4,684 (7.1%)	807 (4.8%)	18,373 (6.2%)	30,529 (5.6%)
Developmental Disability	MNDiagDD	1,304 (2.0%)	245 (1.5%)	4,667 (1.6%)	7,687 (1.4%)
Disability	**DS**	**9,793 (14.8%)**	**1,117 (6.6%)**	**23,924 (8.1%)**	**45,050 (8.2%)**
Health care, access, utilization and quality					
Potentially preventable emergency department visits	HCUseEDII	12,726 (19.3%)	2,138 (12.7%)	27,691 (9.3%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	671 (1.0%)	84 (0.50%)	1,773 (0.60%)	3,329 (0.60%)
HEDIS measures (3):					
Annual preventive visit	HWellA_denom, HWellA_num	23,748 (35.9%)	5,308 (31.4%)	100,396 (33.8%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	3,031 (90.8%) n=3,337	678 (90.2%) n=752	11,012 (92.5%) n=11,904	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num				
Annual dental visit for kids and adults	ADV_denom, ADV_num	15,070 (45.5%) n=33,103	3,595 (46.8%) n=7,675	75,521 (48.6%) n=155,312	133,209 (48.4%) n=275,045
HEALTH CARE COSTS					
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 8,210.67 n= 66,093	$ 6,158.817 n= 16,907	$ 7,596.508 n= 296,992	$ 7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 5,484.764 n= 66,093	$ 4,465.043 n= 16,907	$ 5,323.021 n= 296,992	$ 4,961.172 n= 550,341

RESULTS FOR ADULTS ONLY (18 TO 64 YEARS OF AGE INCLUDING 64)		Group 6: Homeless		
Framework	Variables	People who are homeless: Yes	People who are homeless: No	TOTAL
		F=5.1% M=9.4%	F=94.9% M=90.6%	
		n=38,721 (7.0%)	n=511,620 (93.0%)	n=550,341 (100%)
		Average age=35.6	Average age=37.4	Average age=37.2
HEALTH DISPARITY MEASURES				
Health: Direct measures of health status and outcomes				
Mortality	Mort	464 (1.2%)	3,833 (0.75%)	4,297 (0.78%)
Morbidity				
Unhealthy Newborns	nurserylevelII			
Type 2 Diabetes	type2_denom, type2_num	2,687 (6.9%)	35,588 (7.0%)	38,275 (7.0%)
Asthma	asthma_denom, asthma_num	5,648 (14.6%)	46,060 (9.0%)	51,708 (9.4%)
HIV/Hepatitis c	HIVHEPc_denom, HIVHEPc_num	1,655 (4.3%)	7,172 (1.4%)	8,827 (1.6%)
Hypertension	Hypert_denom, Hypert_num	2,993 (7.7%)	25,273 (4.9%)	28,266 (5.1%)
Cardiovascular	Cardio_denom, Cardio_num	625 (1.6%)	6,913 (1.4%)	7,538 (1.4%)
Chronic Obstructive Pulmonary Disease	COPD_denom, COPD_num	4,444 (11.5%)	42,504 (8.3%)	46,948 (8.5%)
Injury	Injury_denom, Injury_num	5,015 (13.0%)	25,746 (5.0%)	30,761 (5.6%)
Lung/Laryngeal Cancer	Lunglar_denom, Lunglar_num	91 (0.24%)	1,114 (0.22%)	1,205 (0.22%)
Substance Use Disorder	SUD_denom, SUD_num	14,665 (37.9%)	64,684 (12.6%)	79,349 (14.4%)
ADHD	ADHD_denom, ADHD_num			
PTSD	PTSD_denom, PTSD_num	5,028 (13.0%)	27,465 (5.4%)	32,493 (5.9%)
Depression	Depress_denom, Depress_num	12,467 (32.2%)	93,300 (18.2%)	105,767 (19.2%)
Serious and Persistent Mental Illness	part_mental_ill2	4,681 (12.1%)	12,848 (5.1%)	30,529 (5.6%)
Developmental Disability	MNDiagDD	368 (0.95%)	7,319 (1.4%)	7,687 (1.4%)
Disability	**DS**	**4,195 (10.8%)**	**40,855 (8.0%)**	**45,050 (8.2%)**
Health care, access, utilization and quality				
Potentially preventable emergency department visits	HCUseEDII	8,701 (22.5%)	49,241 (9.6%)	57,942 (10.5%)
Potentially preventable hospital admissions, using the Prevention Quality Indicator (PQI) due to acute diagnoses	HCUsePPA	411 (1.1%)	2,918 (0.57%)	3,329 (0.60%)
HEDIS measures (3):				
Annual preventive visit	HWellA_denom, HWellA_num	13,501 (34.9%)	169,378 (33.1%)	182,879 (33.2%)
Comprehensive diabetes care - A1c test	Hdiab_denom, Hdiab_num	1,145 (87.8%) n=1,304	20,486 (92.3%) n=22,207	21,631 (92.0%) n=23,511
Well-child visits for all children	HWellC_denom, HWellC_num			
Annual dental visit for kids and adults	ADV_denom, ADV_num	6,529 (41.9%) n=15,577	126,680 (48.8%) n=259,468	133,209 (48.4%) n=275,045
HEALTH CARE COSTS				
Total expenditures for each individual over the calendar year	AVERAGE Total_Cost (missing values were imputed as $0)	$ 9,832.988 n= 38,721	$ 6,897.661 n= 511,620	$ 7,104.185 n= 550,341
Accountable Care Organization (ACO) Total: Limited expenditures for each individual over the calendar year 2014, excluding services for which ACOs are not held accountable.	AVERAGE Included_total_cost (missing values were imputed as $0)	$ 7,305.163 n= 38,721	$ 4,783.772 n= 511,620	$ 4,961.172 n= 550,341

Medicaid Costs CY 2014 For Adults (Study Population)								
	Log transformed		Actual - Total	Actual - ACO	% Diff between Total and Actual	n	all adults	%
All	$ 2,106		$ 7,104	$ 4,961	70%	550,341	550,341	100%
Deep Poverty	$ 2,880		$ 10,447	$ 6,590	63%	240,350	550,341	44%
SUD	$ 7,357		$ 17,761	$ 12,798	72%	79,349	550,341	14%
SPMI	$ 14,728		$ 26,816	$ 16,558	62%	30,529	550,341	6%
Homeless	$ 3,280		$ 9,833	$ 7,305	74%	38,721	550,341	7%
Previous Prison Incarceration	$ 3,290		$ 10,506	$ 7,424	71%	21,286	550,341	4%
Native American	$ 3,951		$ 11,578	$ 8,087	70%	23,464	550,341	4%
Disabilty			$ 32,594	$ 15,032	46%	45,050	550,341	8%
Index - ratios								
All	1.00		1.00	1.00				
Deep Poverty	1.37		1.47	1.33				
SUD	3.49		2.50	2.58				
SPMI	6.99		3.77	3.34				
Homeless	1.56		1.38	1.47				
Previous Prison Incarceration	1.56		1.48	1.50				
Native American	1.88		1.63	1.63				
Disability			4.59	3.03				

Appendix 9. Regression Results

HMA conducted several regressions to examine health disparities and costs in the Medicaid population.

In this appendix, the following is provided:

- An example set of results is provided, which shows the results for the basic and full models for adults, where the independent variables for adults are regressed against the mortality rate for adults.
- The cost regression results are also provided for adults.
- The R-squared results for the cost regressions are also provided for adults.

The full regression results were provided to DHS and can be found in the following spreadsheets:

- Adults_Health Disparities
- Children_Health Disparites
- Young Children_Health Disparities

	Description	All	mort	Odds Rat	P>|	mort	Odds Rat	P>|
1	**Age**	ageall1	ageall1	1.076305	0	ageall1	1.07139	0
2	**Gender**	gen	gen	1.7536	0	gen	1.445554	0
3	**Asian Immigrant**	raceimmstatusd1	raceimmstatusd1	0.5928411	0	raceimmstatusd1	0.7174181	0.01
4	**Black Immigrant**	raceimmstatusd2	raceimmstatusd2	0.3110551	0	raceimmstatusd2	0.424434	0
5	**Hispanic Immigrant**	raceimmstatusd3	raceimmstatusd3	0.4405205	0	raceimmstatusd3	0.4685503	0
6	**Native American**	raceimmstatusd4	raceimmstatusd4	1.874841	0	raceimmstatusd4	1.062121	0.366
7	**White Immigrant**	raceimmstatusd5	raceimmstatusd5	0.3935709	0	raceimmstatusd5	0.5819187	0.009
8	**Other Immigrant**	raceimmstatusd6	raceimmstatusd6	0.1299365	0	raceimmstatusd6	0.2299846	0
9	**Asian**	raceimmstatusd7	raceimmstatusd7	0.4660374	0	raceimmstatusd7	0.6900877	0.021
10	**Black**	raceimmstatusd8	raceimmstatusd8	1.054691	0.27	raceimmstatusd8	0.6284867	0
11	**Hispanic**	raceimmstatusd9	raceimmstatusd9	0.9501405	0.642	raceimmstatusd9	0.8153596	0.07
12	**Other**	raceimmstatusd11	raceimmstatusd11	0.5645528	0	raceimmstatusd11	0.7674081	0
13	**Eligibility**	eliglen2	eliglen2	1.019438	0	eliglen2	0.9487837	0
14	**East Metro**	geor1d1				geor1d1	1.019036	0.733
15	**North**	geor1d3				geor1d3	1.085178	0.164
16	**South**	geor1d4				geor1d4	1.115667	0.062
17	**Metro**	geor1d5				geor1d5	1.059761	0.33
18	**Missing**	geor1d6				geor1d6	0.7218308	0.04
19	**SMI**	part_mental_ill2				part_mental_ill2	0.8204132	0
20	**SUD**	sud_num				sud_num	3.483148	0
21	**Developmental Disability**	mndiagdd				mndiagdd	1.454154	0
22	**Disability**	ds				ds	3.478855	0
23	**< 50% FPL**	famincome3d1				famincome3d1	2.963249	0
24	**50-100% FPL**	famincome3d2				famincome3d2	1.637298	0
25	**Missing**	famincome3d4				famincome3d4	1.288393	0.001
26	**Poverty Level of the Census Tract (% of people who live in the census tract < FPL)**	census_povperc				census_povperc	1.001296	0.468
27	**Percent of census tract residents who have a high school diploma/GED or less**	census_edperc_im				census_edperc_im	1.001606	0.115
28	**Percentage of residents of census tract who are not US citizens**	census_nonusperc_im				census_nonusperc_im	1.003927	0.41
29	**Percentage of residents of census tract who are Hispanic/Latino**	census_hisplperc_im				census_hisplperc_im	0.9975806	0.473
30	**Percentage of residents of census tract who are anything other than "White alone"**	census_nonwhiteperc_im				census_nonwhiteperc_im	1.000885	0.519
31	**Family homelessness**	homeless				homeless	0.94069	0.259
32	**No high school diploma**	eduleveldl1				eduleveldl1	1.005001	0.907
33	**>High school & <College**	eduleveldl3				eduleveldl3	0.9102592	0.07
34	**College, College+**	eduleveldl4				eduleveldl4	0.897591	0.374
35	**Missing**	eduleveldl5				eduleveldl5	0.6466536	0
36	**Other**	langd2				langd2	0.9143542	0.419
37	**Missing**	langd3				langd3	0.4838919	0
38	**Likely to have been ir**	probmatch_doc				probmatch_doc	0.8579192	0.009

Cost Regressions for Specific Groups								
	Ln Ave Total Cost	Ave Total Cost	Index to $2,105.62	Group Specific Index	Ln Ave Included Total Cost	Ave Included Total Cost	Index to $1,686.82	Group Specific Index
Children								
Gender								
Females	6.986631	$1,082.07	**0.51**	**0.51**	6.675397	$792.66	**0.47**	**0.47**
Males	7.117524	$1,233.39	**0.59**	**0.59**	6.757703	$860.66	**0.51**	**0.51**
Total	7.053458	$1,156.85	**0.55**	**0.55**	6.71738	$826.65	**0.49**	**0.49**
Neonatal								
Gender								
Females	7.841119	$2,543.05	**1.21**	**1.21**	7.782327	$2,397.85	**1.42**	**1.42**
Males	7.936126	$2,796.51	**1.33**	**1.33**	7.873046	$2,625.55	**1.56**	**1.56**
Total	7.88928	$2,668.52	**1.27**	**1.27**	7.82831	$2,510.68	**1.49**	**1.49**
Cost figures below this line are for adults only.								
Adults								
Gender								
Females	7.784436	$2,402.91	**1.14**	**1.14**	7.59345	$1,985.15	**1.18**	**1.18**
Males	7.46555	$1,746.82	**0.83**	**0.83**	7.195433	$1,333.33	**0.79**	**0.79**
Total	7.652364	$2,105.62	**1.00**	**1.00**	7.430603	$1,686.82	**1.00**	**1.00**
Serious Persistent Mental Illness (SPMI)								
No	7.516353	$1,837.85	**0.87**		7.309546	$1,494.50	**0.89**	
Yes	9.597507	$14,728.02	**6.99**		9.131035	$9,237.58	**5.48**	
Total	7.652364	$2,105.62	**1.00**		7.430603	$1,686.82	**1.00**	
Substance Use Disorder (SUD)								
No	7.400947	$1,637.53	**0.78**		7.19292	$1,329.98	**0.79**	
Yes	8.90335	$7,356.58	**3.49**		8.609576	$5,483.92	**3.25**	
Total	7.652364	$2,105.62	**1.00**		7.430603	$1,686.82	**1.00**	
Family Income								
<50% FPL	7.965583	$2,880.11	**1.37**		7.683656	$2,172.55	**1.29**	
50%-100% FPL	7.606183	$2,010.59	**0.95**		7.408375	$1,649.74	**0.98**	
>100% FPL	7.21633	$1,361.48	**0.65**		7.068519	$1,174.41	**0.70**	
Missing	7.361174	$1,573.68	**0.75**		7.18388	$1,318.01	**0.78**	
Total	7.652364	$2,105.62	**1.00**		7.430603	$1,686.82	**1.00**	
Language								
English	7.737178	$2,292.00	**1.09**	**1.00**	7.519558	$1,843.75	**1.09**	**1.00**
Other language	7.647507	$2,095.42	**1.00**	**0.91**	7.339049	$1,539.25	**0.91**	**0.83**
Missing language	6.920953	$1,013.29	**0.48**	**0.44**	6.733596	$840.16	**0.50**	**0.46**
Total	7.652364	$2,105.62	**1.00**	**0.92**	7.430603	$1,686.82	**1.00**	**0.91**
Homeless								
No	7.618597	$2,035.70	**0.97**	**0.97**	7.397627	$1,632.11	**0.97**	**0.97**
Yes	8.095642	$3,280.14	**1.56**	**1.56**	7.860774	$2,593.53	**1.54**	**1.54**
Total	7.652364	$2,105.62	**1.00**	**1.00**	7.430603	$1,686.82	**1.00**	**1.00**
Race and immigration								
Asian immigrant	7.436885	$1,697.45	**0.81**	**0.77**	7.07491	$1,181.94	**0.70**	**0.66**
Black immigrant	7.497395	$1,803.34	**0.86**	**0.82**	7.245284	$1,401.48	**0.83**	**0.79**
Hispanic immigrant	7.698901	$2,205.92	**1.05**	**1.00**	7.581444	$1,961.46	**1.16**	**1.10**
Native American	8.281661	$3,950.75	**1.88**	**1.79**	8.034695	$3,086.20	**1.83**	**1.73**
White immigrant	7.491521	$1,792.78	**0.85**	**0.81**	7.26189	$1,424.95	**0.84**	**0.80**
Other immigrant	7.193953	$1,331.36	**0.63**	**0.60**	7.029661	$1,129.65	**0.67**	**0.63**
Asian Non immigrant	7.029874	$1,129.89	**0.54**	**0.51**	6.754123	$857.59	**0.51**	**0.48**
Black	7.806753	$2,457.14	**1.17**	**1.12**	7.541846	$1,885.31	**1.12**	**1.06**
Hispanic	7.564881	$1,929.24	**0.92**	**0.88**	7.35771	$1,568.24	**0.93**	**0.88**
White	7.697367	$2,202.54	**1.05**	**1.00**	7.487274	$1,785.18	**1.06**	**1.00**
Other	7.36599	$1,581.28	**0.75**	**0.72**	7.202581	$1,342.89	**0.80**	**0.75**
Total	7.652364	$2,105.62	**1.00**	**0.96**	7.430603	$1,686.82	**1.00**	**0.94**

R-SQUARED RESULTS FOR COST REGRESSIONS FOR BASIC MODEL AND FULL MODEL				
Population: Adults				
All Race Categories (11)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.1035	0.1035	0.6472	0.6471
lnincluded_tot~t	0.1036	0.1036	0.6434	0.6433
Four Race Categories (4)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.1001	0.1001	0.6471	0.647
lnincluded_tot~t	0.0986	0.0986	0.643	0.6429
Population: Children				
All Race Categories (11)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.02070	0.02070	0.57810	0.57800
lnincluded_tot~t	0.0375	0.0375	0.58870	0.58860
Four Race Categories (4)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.0165	0.0165	0.5776	0.5775
lnincluded_tot~t	0.0309	0.0308	0.588	0.5879
Population: Infants				
All Race Categories (11)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.1644	0.1641	0.6113	0.6106
lnincluded_tot~t	0.1831	0.1829	0.6196	0.6188
Four Race Categories (4)				
	Basic (age/gender/race only)		Full (all variables)	
	R-squared	Adj R-squared	R-squared	Adj R-squared
lntotalcost	0.15920	0.15900	0.61100	0.61030
lnincluded_tot~t	0.1778	0.1776	0.61920	0.61850