

KENT COUNTY

OTTAWA COUNTY

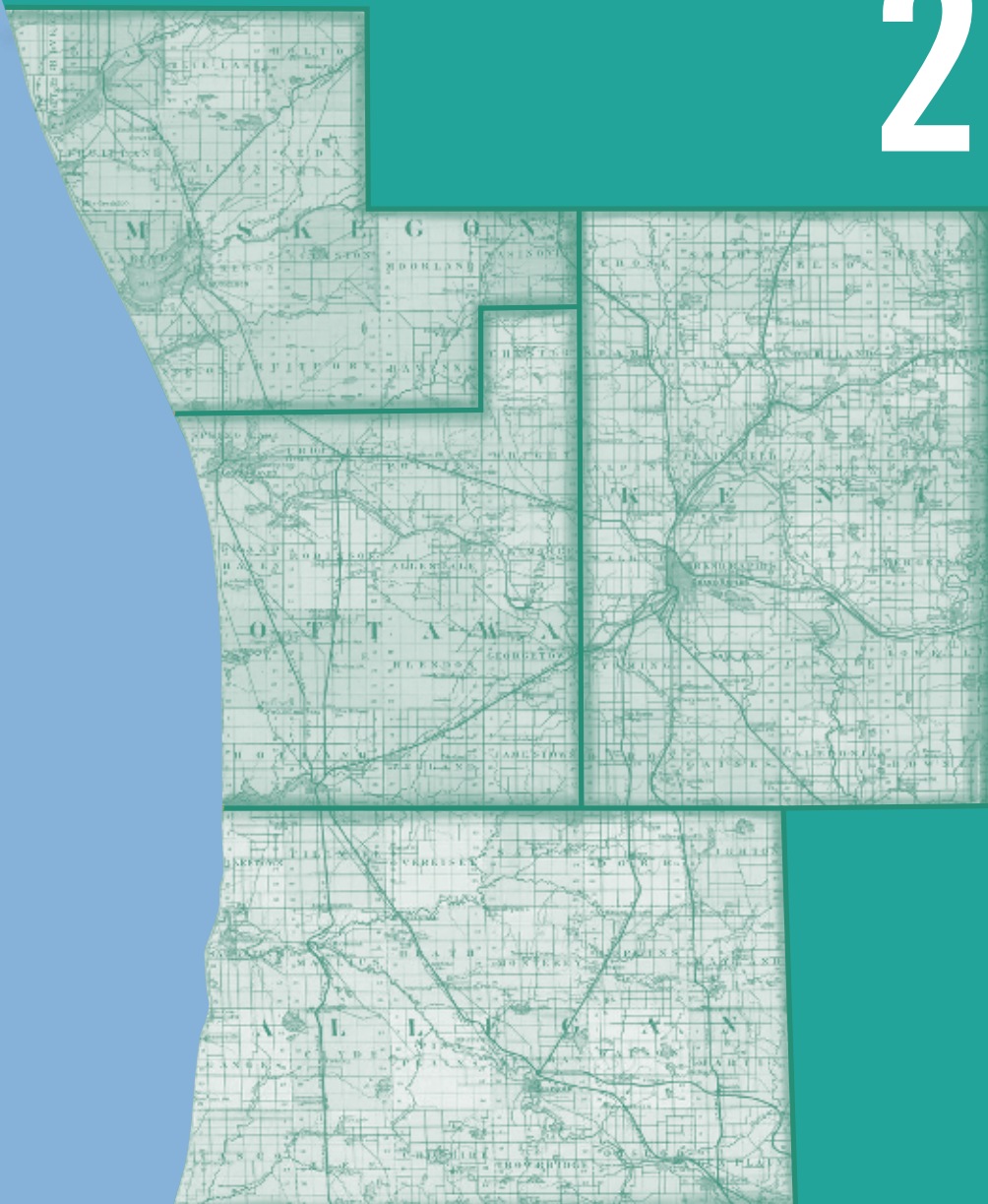
MUSKEGON COUNTY

ALLEGAN COUNTY

Health Check

ANALYZING TRENDS IN WEST MICHIGAN

2017



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Blue Cross Blue Shield of Michigan,
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Health Check:
Analyzing Trends in West Michigan 2017

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Grand Valley State University

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January 13, 2017

Dear Colleagues,

We are pleased to present the eighth edition of *Health Check: Analyzing Trends in West Michigan* for 2017. This report provides insight to the health-related trends, challenges, and opportunities that exist in the Kent, Ottawa, Muskegon, and Allegan (KOMA) counties. Each year, *Health Check* has provided critical data to community decision makers in health care services, government, business, and education to aid in the planning and policymaking that supports our West Michigan community. The analysis is complemented by a survey capturing West Michigan residents' assessment of their health insurance plans and primary care experiences.

In this year's report we see that, overall, the number of jobs in the U.S. is trending upward. While Michigan lags behind the U.S. in job growth, the state has maintained positive job growth since 2010. Healthcare jobs in West Michigan have exceeded growth for the same sector both statewide and nationally. The data also indicate that our educational institutions are poised to meet or exceed the employment needs for most health-related occupations.

The population growth rate for the KOMA region is above one percent, with a slight decrease in population growth over the past year. The West Michigan population growth rate now exceeds both the national and state growth rate. The population age distribution trends remain steady, with the segment over the age of 65 continuing to increase in numbers and in proportion to the overall population, presenting ongoing challenges to healthcare systems and programs throughout the state. The aging of our population is a major factor that will drive the demand for employment in health care occupations.

This year's community survey focused on residents' responses to questions about their health insurance coverage, access to care, and experience with primary care. With the uninsured rate dropping from 9 to 5 percent, 40 percent of the newly insured obtained employer coverage and 21 percent enrolled in Medicaid. West Michigan respondents indicated that access to primary care physicians remained the same or was better than last year and that they are largely (81 percent) satisfied or very satisfied with their current plans.

Health-related challenges will continue locally, statewide, and nationally requiring communities to come together in addressing the education, protection, and health care needs of an expanding population with a growing elderly segment. Collaboration within and between health care organizations, businesses, governmental agencies, foundations, and educational institutions will continue to be key to developing policies and programs that support healthy communities. West Michigan has a strong tradition of collaborative community engagement to develop strategies for improvement of healthcare for our community while also conserving valuable healthcare resources.

Sincerely,

Jean Nagelkerk
Vice Provost for Health

Acknowledgments

We are grateful to Jean Nagelkerk, vice provost for health, for her support and funding from Grand Valley State University. Carl Ver Beek has been a constant source of support and guidance. We are particularly grateful to Brooke Delgoffe, our graduate assistant, for her hard work and diligence. We also thank Violet H. Barkauskas, Ph.D., M.P.H., R.N., FAAN, emeritus faculty, School of Nursing, University of Michigan for diligently proofreading several drafts of the report and to Diane Dykstra, special projects coordinator, for her support and coordination of this project. Philip Batty and Rachael Dykstra helped us with the enrollment and graduation data for Grand Valley State University. Grand Valley students Brody Cragg, Cooper Heaphy, Melissa Morris, Kathryn Vermeriss, and Dominic Zuelch took time and careful effort to conduct the Community Health Insurance surveys, while student assistant Pushpaja Dodla managed the data and produced the figures.

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We thank all the participants in the hospital survey for their time and effort.

All the data used in this project (except the hospital survey and the insurance data) are based on primary and secondary sources. We acknowledge our data sources in each section by listing source information; these sources are not duplicated or specifically cited in text discussions to preserve readability.

We are particularly indebted to the following organizations for use of their data:

- American Hospital Association (AHA)
- Behavioral Risk Factor Surveillance System (BRFSS), based on CDC protocol and the Michigan BRFSS
- Bureau of Labor Statistics (BLS)
- Center for Disease Control (CDC)
- Institute of Medicine of the Academies
- Michigan Department of Community Health (MDCH)
- Michigan Health and Hospital Association (MHHA)
- Michigan Labor Market Information (milmi.org as part of michigan.gov)
- U.S. Census Bureau
- U.S. Department of Health and Human Services (ARF file 2011-2012)
- United States Patent and Trademark Office (USPTO)
- World Intellectual Property Organization (WIPO)

Enrollment and graduation data were collected from websites owned by these colleges and universities:

- Albion College
- Andrews University
- Calvin College
- Central Michigan University
- Cornerstone University
- Davenport University
- Ferris State University
- Grand Valley State University
- Kuyper College
- Michigan State University
- Western Michigan University

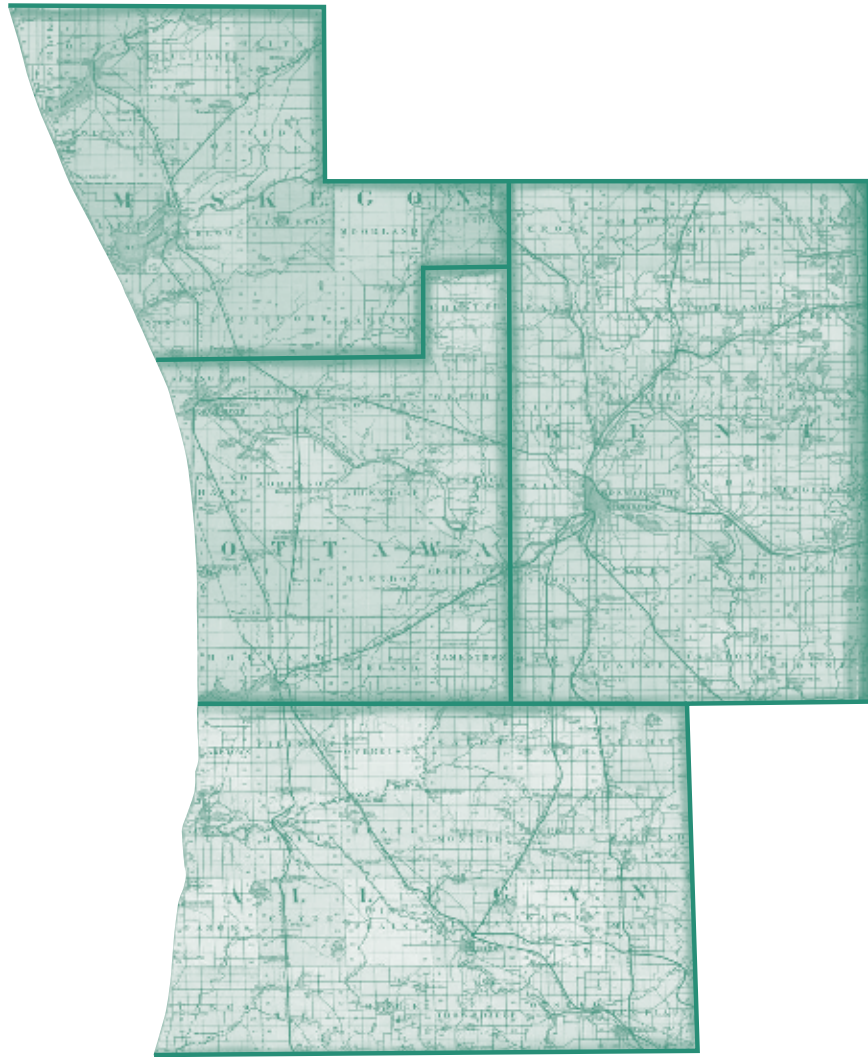


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Executive Summary

Knowledge Foundations

Education and Job Growth

Since emerging from the recession in early 2010, the U.S. has continued to add jobs each month. Overall, the number of jobs in the U.S. is up nearly 9 percent from pre-recession levels in 2005. Although the state of Michigan has not fared as well as the U.S. as a whole, it has maintained positive job growth since 2010, reversing a trend of job losses through much of the 2000s. According to data gathered from the Bureau of Labor Statistics (BLS), job growth in the health care sector has outpaced growth in other industries in West Michigan. In addition, health care jobs have grown at a faster pace in West Michigan than in either the state of Michigan or the entire U.S. Specifically, large job growth is predicted for physical and occupational therapy assistants, orthotists and prosthetists, and home health aides. We also noted high demand for both nurse practitioners and physician assistants. Our analysis indicates that regional educational programs are graduating students at a rate that will meet or, in many cases, exceed projected job growth in many health-related occupations. Finally, we examined wage changes in health care-related occupations in West Michigan over the past decade and find that physician assistants, optometrists, and occupational therapy assistants have seen the largest real wage growth. Alternatively, speech-language pathologists, respiratory therapists, and home health aides all saw large declines in real wages over the same period.

Medical Patents

There has been an increase in medical patent activity in West Michigan since the 1990s and a growing number of new innovators. Patents assigned in Kent County have increased from an annual average of 6.2 from 1990 to 1999, to 10.3 from 2000 to 2009, and to 14.8 patents from 2010 to 2015. However, there was a significant decrease in the number of medical patents in 2015. In addition, medical patenting in the region is coming from a small number of companies. Patented medical innovations have a great potential for creating wealth and economic growth in West Michigan, but continued R&D support is vital.

Health Care Trends

Demographic Changes

We continue to monitor various trends in population demographics in West Michigan and the Detroit region and compare changes in these trends to national averages. The annual population growth rate in the KOMA region continues to be above 1 percent; however, we have seen a decline in population growth over the past year. Despite this recent downturn, the population growth rate in West Michigan exceeds both the national growth rate and the growth rate for the state of Michigan. After several years of population loss, the state of Michigan has seen positive population growth for four consecutive years while the Detroit region once again appears to be experiencing population loss. Population age-distribution trends appear to be holding steady. The proportion of the population over the age of 65 continues to increase both locally and nationally, which will create challenges for the health care system and drive demand for employment in the health care sector.

Health Care Overview

The latest data from the Michigan Behavioral Risk Factor Surveillance System indicate that changes over the last decade in heavy drinking and cigarette consumption have been minimal. However, we continue to see a growing trend in the share of the population that is obese. In both West Michigan and the Detroit region, one-third of the population is obese and another third overweight. Likely due to the aging demographic of the population, we see the proportion of Michigan residents who are either in fair-to-poor health or disabled on the rise. We also examined issues with access to care and find that fewer Detroit residents lack health insurance, while the inability to access care because of cost remains a problem on both the east and west sides of the state.

Economic Analysis

Benchmarking Communities

Compared to a group of peer communities, we find that hospital admission rates in the Grand Rapids region are relatively low; however, outpatient visits to hospitals are high and have grown significantly over the past decade. Emergency department admission rates in Grand Rapids are now above the national average as are total hospital expenses per admission. We find that Medicare expenditures in Grand Rapids are lower than the national average and many of the peer communities and continue to decline. There is also suggestive evidence that these lower Medicare expenditures may be the result of a high level of care coordination and end-of-life care management.

Employer Health Insurance Survey

This year we partnered with The Employers' Association (TEA) to survey member firms regarding health insurance and health savings accounts (HSAs). Ninety-nine percent of responding firms offer health insurance, with two-thirds of them offering one plan and 68 percent offering at least one high-deductible plan (HDHP). HDHPs typically have lower premiums, and with health care costs continuing to rise, these plans are becoming more attractive to firms as an alternative to more traditional types of health insurance (42 percent of our firms offered only an HDHP). To assist workers in paying deductibles, firms also offered HSAs. Fifty-four percent of companies surveyed who offered an HDHP also offered an HSA, with just over half of firms also contributing to the accounts. The average, annual, firm contribution of \$665 for single and \$1,245 for family coverage covers about a fourth of average plan deductibles.

Community Survey on Health Insurance and Primary Care

For the second year in a row we surveyed West Michigan residents about health insurance coverage, access to care, and experiences in their primary care physician's office. The uninsured rate dropped significantly from last year's survey, from 9 percent to 5 percent. Forty percent of those who became insured in 2016 did so by gaining employer coverage, while 21 percent enrolled in Medicaid. Even with this increase in the insured, access to care and experiences at the physician's office have, for the most part, remain unchanged or gotten better in the last year. At least 80 percent of respondents said there was either no change or improvement in time spent in the waiting room and time spent with the physician. In addition, 87 percent of the privately insured and 90 percent of Medicaid enrollees reported that the ability to find a primary care physician remained either unchanged or became easier. Individuals also are happy with their insurance plans, with the vast majority of individuals (81 percent) saying they are very satisfied or satisfied with their current plans.

Major Medical Conditions: Expenditure Analysis

We used member data provided by Blue Care Network, Blue Cross Blue Shield of Michigan, and Priority Health to examine average annual expenditures for those diagnosed with at least one of the following six chronic conditions: asthma, coronary artery disease (CAD), depression, diabetes, hyperlipidemia, and low back pain. Understanding that, from year to year, small coding changes may affect the composition of the diagnosis categories, we find that expenditures for all conditions have increased this year in KOMA after adjusting for inflation. However, expenditures on healthy members (those without a chronic condition diagnosis) are actually slightly lower in 2015 than in 2014. Expenditures for each of the chronic conditions tend to be higher in the Detroit region than in West Michigan with the exception of CAD. This is the third consecutive year of higher CAD spending in KOMA compared to Detroit making it unlikely that this difference is due to random variation. For the second year, we mapped variations in health expenditures for select conditions at the zip code level. In general, the east side of the state contains more high expenditure zip codes than the west, but areas to the north and southwest of Grand Rapids are consistently among the highest expenditure zip codes in our sample. One change from last year's analysis is the cluster of high-expenditure zip codes for CAD in Grand Rapids.

Knowledge Foundations



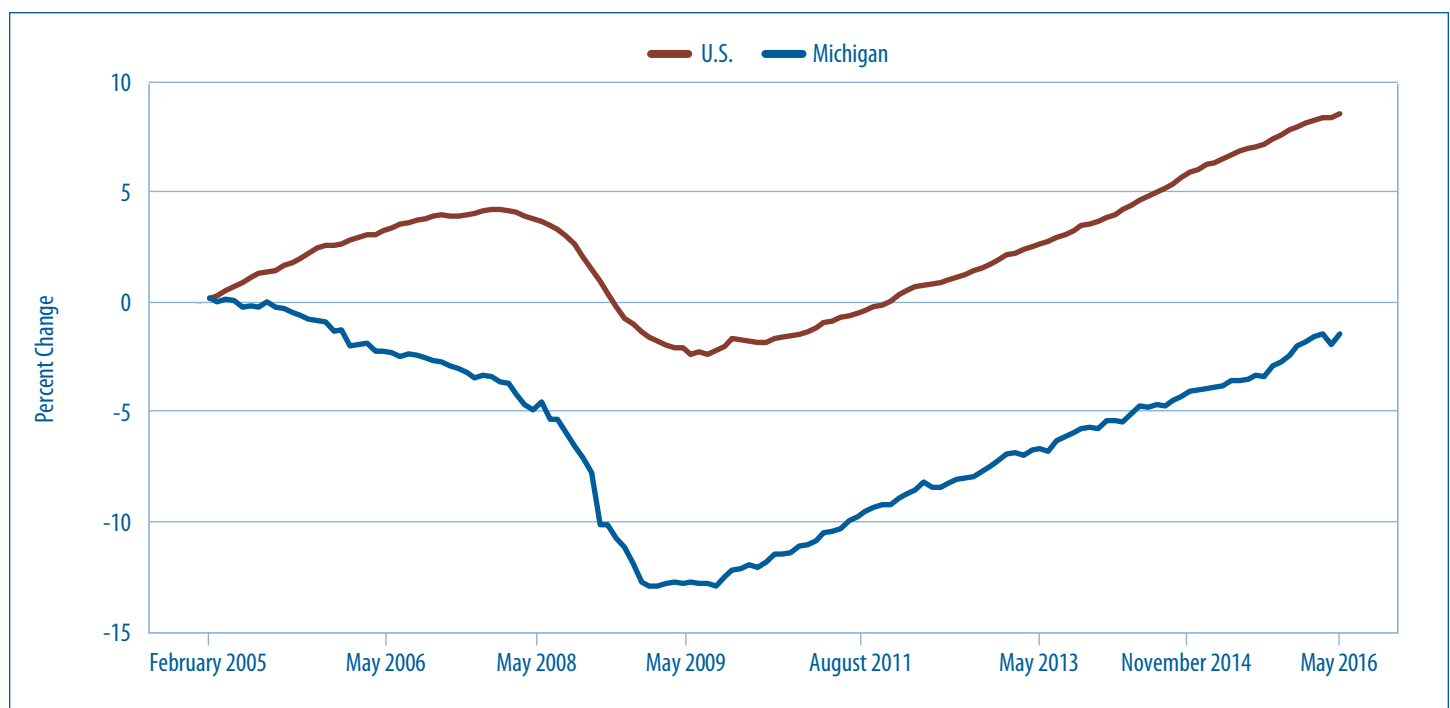
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Education and Job Growth

This year we again find evidence that the Michigan economy continues to recover from the recession in 2008. **Figure 1** plots growth in nonfarm payroll jobs from February 2005 through June 2016. Prior to the recession, the trends in job growth for Michigan and the U.S. were diverging. While the U.S. as a whole added jobs from early 2005 through late 2007, Michigan lost approximately 3.5 percent of its nonfarm payroll jobs over the same period. The recession in 2008 had devastating effects on job growth for both Michigan and the U.S. At the height of the recession, jobs had fallen by more than 2 percent nationally and by nearly 13 percent

in Michigan from their 2005 levels. Despite the divergent prerecession trends, Michigan and the U.S. as a whole began adding jobs in early 2010. By April 2014, job growth in the U.S. had recovered to its prerecession peak and has continued to increase. As of June 2016, the number of nonfarm payroll jobs in the U.S. has grown by more than 8.5 percent since early 2005. Unfortunately, due to its prerecession job losses, Michigan has fewer jobs in 2016 than in 2005. However, if the positive trend of job growth in Michigan continues, we should reach 2005 job levels by mid-2017.

Figure 1: Nonfarm Payroll Jobs Percent Change, February 2005 to June 2016



Source: U.S. Bureau of Labor Statistics, 2016 State Occupational Employment and Wage Estimates

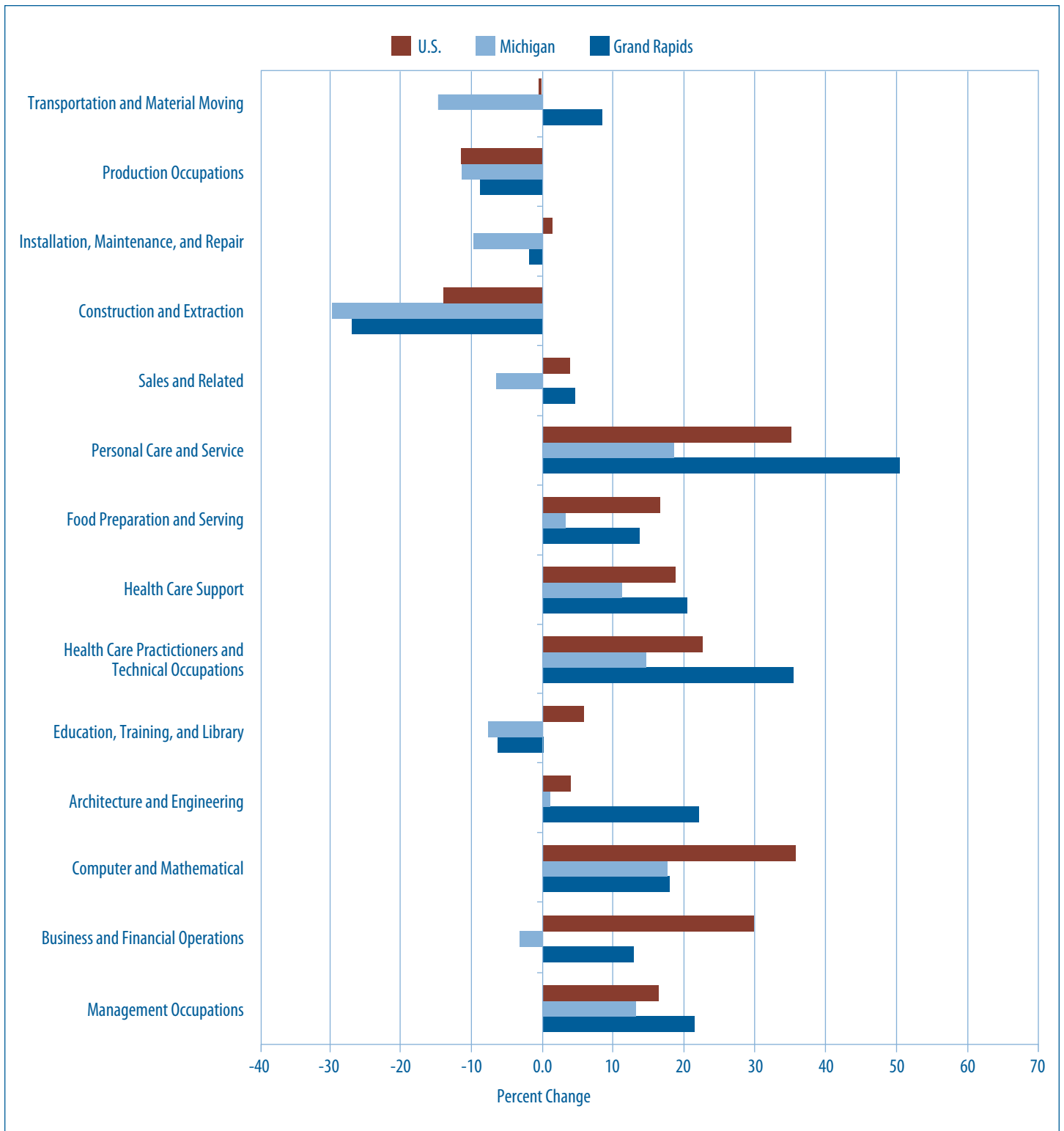
Figure 2 provides a more detailed analysis of employment changes by examining job growth or job losses at the industry level from 2005 to 2015. We plot data for the Grand Rapids metropolitan statistical area (MSA), the state of Michigan, and the entire United States. If we consider employment growth in the categories of Health Care Practitioners and Technical Occupations and Health Care Support, then the health care sector has experienced the largest share of job growth in Grand Rapids over the past decade. In fact, employment for Health Care Practitioners and Technical Occupations in Grand Rapids grew at double the statewide rate and at more than 1.5 times the national rate since 2005. Employment sectors that suffered the largest job losses over this period include Construction and Extraction and Production Occupations.

Given these shifts in employment, we next examined whether universities in the central and western parts of the state are producing students equipped with the required skills to meet the health care sector's growing labor demand.

To analyze this issue, we proceeded in three steps:

1. We obtained the 2024 U.S. Bureau of Labor Statistics (BLS) forecasts for different medical- and health care-related professions in Michigan.
2. We undertook an inventory of health services education programs in colleges and universities in the western and central parts of the state.
3. We made specific predictions for employment demand in the Grand Rapids area for several selected health professions.

Figure 2: Job Growth for Select Major Occupational Groups, 2005-2015



National 2005: http://www.bls.gov/oes/2005/may/oes_nat.htm

National 2015: http://www.bls.gov/oes/2015/may/oes_nat.htm

Michigan 2005: http://www.bls.gov/oes/2005/may/oes_mi.htm

Michigan 2015: http://www.bls.gov/oes/2015/may/oes_mi.htm

Grand Rapids 2005: http://www.bls.gov/oes/2005/may/oes_24340.htm

Grand Rapids 2015: http://www.bls.gov/oes/2015/may/oes_24340.htm

Table 1 provides the employment projections for a variety of health care occupations identified in the BLS data for Michigan. We compared historical employment levels in 2014 to projected employment in 2024 and calculated the projected 10-year employment growth rate. The largest projected growth in employment is in orthotics and prosthetics, home health care, occupational therapy, and physical therapy. We also identified large projected employment growth for nurse practitioners and physician assistants. These projections appear to be heavily influenced by the health needs of an aging population. (See the Demographic Changes section in this publication for further discussion of the implications of the aging demographic in West Michigan.)

Tables 2 through 5 provide data on enrollment and graduation in health-related fields from several central and west Michigan universities. These data are from a number of different programs and, although likely incomplete, represent our attempts to collect as much information as possible.

Table 6 presents projections specifically for West Michigan by matching the data on graduates with the BLS job projections for various occupations. The projections in **Table 6** for the West Michigan component of the average annual job openings were calculated by applying the West Michigan share of total employment for the entire state (26.7 percent) to the BLS projections of the average number of annual job openings in each field. Consequently, these projections of average annual job openings in West Michigan assumed that the current West Michigan share of employment would remain fixed throughout the next 10 years. In addition, we were unable to account for any gains to the labor pool (persons migrating into the area) or leakages (skilled labor leaving Michigan). Areas where the West Michigan region appears to have more annual graduates than projected available jobs include dental hygienists, LPNs, dietitians and nutritionists, speech-language pathologists, and occupational therapists. In contrast, occupations such as EMT and paramedic, dental assistant, and medical assistant show potential job openings in excess of the number of annual West Michigan graduates.

Finally, **Table 7** presents inflation-adjusted growth in annual wages for health professions in the Grand Rapids MSA, Michigan, and the United States. Once again, data for the wage estimates come from the BLS and we compared changes in these estimates over a 10-year period from 2005 to 2015. We specifically focused on fields in which wages have increased or decreased by more than 5 percent over this time. In Grand Rapids, the occupations with the largest decline in real wages included home health aides, respiratory therapists, and speech-language pathologists for which all wage declines were 14 percent or greater¹. Note that speech-language pathologists were

identified as one of the most over-supplied fields in **Table 6**, which would tend to put downward pressure on wages for workers in this field. Occupations seeing large gains in wages in the Grand Rapids region from 2005 to 2015 include physician assistant, optometrist, and occupational therapy assistant.

When we compared wage changes in Grand Rapids to those in Michigan and the entire U.S., we saw several similarities, as well as several interesting differences. For example, over the past decade, real wages for diagnostic medical sonographers, respiratory therapists, speech-language pathologists, and surgical technologists all increased nationally, but have declined in Michigan and Grand Rapids. In addition, wages for occupational therapists increased by double digits in Michigan and the U.S., but are reported to have declined in Grand Rapids.

We emphasize that our estimates are subject to change based on changes in the economy or changes in the regulatory environment in which health care providers and health systems operate. We view our projections as a work in progress. Aligning future graduation rates in a more comprehensive manner with more accurate projections of job growth is a goal for future versions of this publication. Michigan colleges, universities, and, most importantly, students will be well served if the alignment between graduation rates and projected job growth is analyzed more comprehensively and accurately on a regular basis. Colleges and universities could discern future job growth niches and be more proactive in graduating students with the skills that employers require. In the long run, it is important not only to create educational opportunities in Michigan, but also to adopt policies that encourage graduates to continue their lives and employment in Michigan after graduation. The continued growth and success of the West Michigan region will depend largely on our capacity to create and retain a skilled workforce with the ability to adapt to an evolving labor market.

¹ According to the BLS data, wages for family and general medical practitioners declined by nearly 20 percent from 2005, however this appears to be an error in the data. The BLS data reported average 2014 hourly wages for family and general practitioners in Grand Rapids of \$96.46.

Table 1: Projected Health Care Employment in Michigan

Occupation	Employment		Projected 10-year Employment Growth Percentage
	2014 Actual	2024 Projected	
Anesthesiologists	700	760	8.6
Athletic Trainers	940	1060	12.8
Audiologists	460	540	17.4
Biochemists and Biophysicists	550	610	10.9
Biological Scientists, All Other	320	330	3.1
Biological Technicians	840	900	7.1
Cardiovascular Technologists/Technicians	2,110	2,510	19
Chemical Technicians	2,750	3,060	11.3
Chemists	3,470	3,760	8.4
Chiropractors	1,950	2,040	4.6
Clinical/Counseling/School Psychologists	3,300	3,510	6.4
Dental Assistants	9,190	9,590	4.4
Dental Hygienists	9,460	9,850	4.1
Dentists, All Other Specialists	290	300	3.4
Dentists, General	4,530	4,750	4.9
Diagnostic Medical Sonographers	2,490	2,980	19.7
Dietitians and Nutritionists	2,070	2,290	10.6
EMT and Paramedics	6,850	8,010	16.9
Epidemiologists	120	130	8.3
Family and General Practitioners	4,660	4,830	3.6
Health Care Practitioner/Tech Workers, All Other	820	890	8.5
Health Care Support Workers, All Other	3,280	3,570	8.8
Health Diagnosing/Treating Practitioners, All Other	930	980	5.4
Health Technologists and Technicians, All Other	3,110	3,510	12.9
Home Health Aide	37,920	47,870	26.2
Internists, General	6,130	6,100	-0.5
Licensed Practical and Licensed Vocational Nurses	15,000	15,830	5.5
Life Scientists, All Other	n/a	n/a	n/a
Massage Therapists	3,110	3,750	20.6
Medical and Clinical Laboratory Technicians	6,610	7,280	10.1
Medical and Clinical Laboratory Technologists	7,070	7,690	8.8
Medical Assistant	22,960	25,430	10.8
Medical Equipment Preparers	1,740	1,900	9.2
Medical Records/Health Info Technicians	4,090	4,500	10.0
Medical Scientists, Except Epidemiologists	2,540	2,820	11.0
Medical Transcriptionists	2,550	2,470	-3.1
Microbiologists	310	340	9.7
Nuclear Medicine Technologists	750	730	-2.7
Nurse Practitioners	2,890	3,570	23.5
Nursing Assistants	50,710	55,630	9.7
Obstetricians and Gynecologists	540	570	5.6
Occupational Health and Safety Specialists	1,240	1,310	5.6
Occupational Health and Safety Technicians	250	270	8.0
Occupational Therapist Aides	740	790	6.8
Occupational Therapists	4,660	5,420	16.3

Table 1: Projected Health Care Employment in Michigan (continued)

Occupation	Employment		Projected 10-year Employment Growth Percentage
	2014 Actual	2024 Projected	
Occupational Therapy Assistants	920	1,160	26.1
Opticians, Dispensing	3,240	3,710	14.5
Optometrist	1,160	1,310	12.9
Oral and Maxillofacial Surgeons	290	300	3.4
Orthodontists	n/a	n/a	n/a
Orthotists and Prosthetists	300	380	26.7
Pediatricians, General	830	860	3.6
Pharmacists	9,020	9,220	2.2
Pharmacy Aides	810	820	1.2
Pharmacy Technicians	11,230	12,190	8.5
Physical Therapist Aides	1,190	1,490	25.2
Physical Therapist Assistants	3,710	4,770	28.6
Physical Therapists	8,670	10,570	21.9
Physician Assistants	3,770	4,500	19.4
Physicians and Surgeons, All Other	12,620	13,610	7.8
Podiatrists	440	450	2.3
Psychiatric Aides	2,280	2,290	0.4
Psychiatric Technicians	630	640	1.6
Psychiatrists	620	660	6.5
Psychologists, All Other	420	430	2.4
Radiation Therapists	510	560	9.8
Radiologic Technologists	6,830	7,070	3.5
Recreational Therapists	910	1,030	13.2
Registered Nurses	93,670	105,290	12.4
Respiratory Therapists	4,140	4,590	10.9
Respiratory Therapy Technicians	180	140	-22.2
Speech-language Pathologists	3,240	3,490	7.7
Surgeons	830	890	7.2
Surgical Technologists	3,340	3,660	9.6
Therapists, All Other	1,150	1,300	13.0
Veterinarians	2,380	2,700	13.4
Veterinary Assistant and Lab Animal Caretakers	1,900	2,180	14.7
Veterinary Technologists and Technicians	2,990	3,730	24.7

Source:

<http://milmi.mt.gov/datasearch/projections-excel>

Table 2:
College and University Programs — Associate's Degree/Certificate

Color Key: Students Enrolled Over Last 3 Years Graduates Over Last 3 Years	Davenport University		Ferris State University		Grand Rapids Community College		Lansing Community College ¹	
Allied Health Sciences			216	44				
Biology							1,253	31
Chemistry							208	6
Dental Assistant/Assisting					40	79		
Dental Hygiene/Hygienist			186	118	189	96	168	67
Diagnostic Medical Sonography			67	61				
Dietary and Food Service Management			21	3				
Electrocardiogram (ECG) Technician								
Emergency Medical Services								
Emergency Medical Technician ²								
Fire Science							378	148
Gerontology			1	16	31	0		
Health Information Technology	777	257	222	174				
Health Insurance Claims Management	188	37						
Kinesiology							281	14
Magnetic Resonance Imaging (MRI)								
Medical Assistant ³	539	322						
Medical Billing								
Medical Laboratory Technology			8	9				
Medical Office Administration								
Nursing Assistant (CNA)								
Nursing ⁴	186	159			717	447	1,469	565
Occupational Therapy Assistant					154	57		
Paramedic								
Pharmacy Technician								
Phlebotomy	31	51						
Physical Therapist Assistant								
Radiography ⁵			145	129	135	72	185	88
Respiratory Care			138	132				
Surgical Technology							87	59

Notes:

¹Lansing Community College data is for 2012-2014

²Combined Emergency Medical Technician (SWMU) & EMT-Basic and EMT-Paramedic (KCC)

³Includes Medical Administrative Assistance (KCC), Medical Assistant (Davenport & Montcalm), Medical Assistant Office and Clinical (SWMU)

⁴Includes Practical Nursing (Davenport), Practical Nurse (GRCC), Nursing (LMC), Nursing LPN(Muskegon CC) & Nursing-Practical (KCC)
Nursing (RN, Practical Nursing LPN, Paramedic to RN, LPN to RN) (SWMU)

⁵ Includes Radiologic Technology (Lake Michigan College & GRCC)

Note: Tables do not include programs with no information readily available and programs with a value of 0 for both enrollment and graduates.

	Southwestern Michigan College		West Shore Community College		Montcalm Community College		Kellogg Community College		TOTAL ENROLLMENT	TOTAL GRADUATES
									216	44
									1,253	31
									208	6
									40	79
							107	55	650	336
									67	61
									21	3
	3	0							3	0
							95	14	95	14
	1	5					54	108	55	113
	51	8							429	156
									32	16
	85	38							1,084	469
									188	37
									281	14
							14	0	14	0
	157	97			159	48	273	54	1,128	521
			16	6					16	6
							37	25	45	34
					189	38			189	38
	3	0	37	3					40	3
	398	111	97	74	351	144	1077	749	4,295	2,249
									154	57
	12	21	19	7					31	28
	33	16							33	16
	3	9							34	60
							161	71	161	71
			25	0			105	52	595	341
			1	0					139	132
									87	59

Table 3:
College and University Programs — Bachelor's Degree

Color Key: ■ Students Enrolled Over Last 3 Years ■ Graduates Over Last 3 Years	Albion College		Andrews University*		Aquinas College		Calvin College		Central Michigan University	
Allied Health Sciences										
Animal Science/Preveterinarian			75	11						
Athletic Training	66	18			25	0			173	78
Biochemistry	103	50	100	18			386	71	183	44
Biochemistry and Molecular Biology										
Biochemistry and Molecular Biology/Biotechnology							15	8		
Biology	372	110	332	95	260	76	655	139	973	678
Biomedical Laboratory Science										
Biomedical Sciences										
Biophysics			7	0						
Biopsychology										
Biosystems Engineering										
Cell and Molecular Biology										
Chemistry	49	21	26	3	34	6	98	28	114	26
Clinical Laboratory Sciences										
Communication Disorders									611	259
Dental Hygiene										
Diagnostic Medical Sonography										
Diagnostic Molecular Science										
Dietetics									331	100
Environmental Biology/Microbiology										
Environmental Biology/Plant Biology										
Exercise Science	133	40			62	5			856	591
Genomics and Molecular Genetics										
Health Administration									405	191
Health Care Systems Administration										
Health Communication										
Health Fitness in Preventive and Rehabilitative Programs									285	378
Health Information Management										
Health Services Administration										
Human Biology										
Kinesiology							547	90		
Medical Case Management										
Medical Laboratory Sciences			139	30						
Medical Technology										
Microbiology										
Molecular Diagnostics										
Neuroscience	20	0							414	123
Nuclear Medicine Technology										
Nursing**			327	59	532	0	868	183		
Nutrition Science			54	32						
Nutritional Sciences										
Occupational Therapy										
Physics	30	9	50	2			59	18	34	10
Physiology										
Public Health										
Psychology	282	113	280	65	209	101	629	158		
Radiation Therapy										
Radiologic and Imaging Sciences										
Social Work			137	48			341	82	530	173
Sociology	53	23	41	2	69	31	102	38	155	189
Speech Pathology and Audiology							460	99		
Speech-Language Pathology and Audiology			135	46						
Therapeutic Recreation							151	12		

Note: Tables do not include programs with a value of 0 for both enrollment and graduates.

	Cornerstone College		Davenport University		Ferris State University		Grand Valley State University		Hope College		Kuyper College		Michigan State University		Western Michigan University		TOTAL ENROLLMENT	TOTAL GRADUATES
					568	87	2,698	618					1848	363			3,266	705
							813	178	76	17			417	69	85	38	1,923	374
					21	11	85	0							248	38	1,655	398
									122	23			900	164			1,126	232
					134	21							297	80			1,022	187
	260	7			173	247	1,994	301	544	146			37	7	762	131	446	109
													919	199			6,362	1,937
							3,791	721							1,870	273	919	199
																	5,661	994
							211	27									7	0
													608	96			211	27
							256	58									608	96
							497	88					882	176	204	20	256	58
													154	62			1,904	368
					122	47											154	62
							589	86									611	259
																	122	47
													1	7			589	86
													692	213	74	46	1	7
													53	7			1,097	359
													54	11			53	7
	216	43					2,098	437	500	128	8	2					62	13
											11	1	469	133	1,260	254		
																	5,136	1,499
																	469	133
																	405	191
					864	301											864	301
							302	103									302	103
																	285	378
																	887	164
			623	103	264	61											886	143
			886	143									4,098	1,077			4,098	1,077
													3140	785			3,687	875
			521	101													521	101
					98	33	213	54									450	117
					20	22											20	22
													477	148			477	148
					63	21											63	21
													1,133	69			1,567	192
					282	83											282	83
			1,763	425	1914	659	1,266	551	536	120			1,148	575	799	303	9,153	2,875
																	54	32
													546	146			546	146
							162	22							290	141	290	141
													764	101	139	19	1,238	181
													797	266			797	266
					10	0											10	0
	247	121			381	103	3,352	872	862	237			3,935	1,150	1,155	452	11,332	3,372
							232	51									232	51
							98	17									98	17
	160	40			619	155	1,446	403	349	86	174	38	675	198	311	181	4,742	1,404
					33	4	443	126	197	69			383	104	418	138	1,894	724
															214	108	674	207
																	135	46
							410	104									561	116

Table 4:
College and University Programs — Master's Degree

Color Key: Students Enrolled Over Last 3 Years Graduates Over Last 3 Years	Andrews University		Davenport University		Calvin College		Central Michigan University	
Animal Science								
Biochemistry and Molecular Biology								
Biology/Biological Sciences	12	7					92	72
Biomedical Laboratory Science/Operations								
Biomedical Sciences								
Biostatistics								
Cell and Molecular Biology								
Chemical Engineering								
Chemistry							74	24
Clinical Mental Health Counseling	77	27						
Communication Disorders							17	104
Comparative Medicine and Integrative Biology								
Counseling Psychology								
Dietetics							31	64
Epidemiology								
Exercise Physiology								
Health Administration								
Health and Risk Communication								
Integrative Pharmacology								
Kinesiology								
Laboratory Research in Pharmacology and Toxicology								
Medical & Bioinformatics			60	0				
Medical Laboratory Sciences	11	0						
Neuroscience							22	4
Nursing			78	0				
Nursing Education	1	3						
Nutrition and Wellness	66	8						
Occupational Therapy			78	0				
Physician Assistant							232	134
Pathobiology								
Pharmacology and Toxicology								
Physics							71	17
Physiology								
Psychology								
Public Health								
Speech Language Pathology					90	49	237	104
Social Work	193	75						
Sociology							1	2
Vision Rehabilitation Therapy								

Note:
Tables do not include programs with a value of 0 for both enrollment and graduates.

Ferris State University		Grand Valley State University		Michigan State University		Western Michigan University		TOTAL ENROLLMENT	TOTAL GRADUATES
				43	16			43	16
				1	5			1	5
		97	34			97	39	298	152
				36	10			36	10
		43	12					43	12
		105	48	25	3			130	51
		99	38					99	38
				13	10	34	3	47	13
						30	8	104	32
								77	27
				191	93			208	197
				21	9			21	9
						475	114	475	114
								31	64
				43	10			43	10
						66	34	66	34
		204	49					204	49
				30	28			30	28
				42	10			42	10
				183	85			183	85
				1	2			1	2
		55	15					115	15
								11	0
				0	2			22	6
297	63	47	9	539	181	51	10	1,012	263
								1	3
								66	8
		376	130			573	266	1027	396
		417	129			252	105	901	368
				2	2			2	2
				401	60			401	60
				7	46	14	17	92	80
				7	4			7	4
				152	54	223	93	375	147
		234	51	617	261			851	312
		195	106			184	88	706	347
97	0	1,145	476			1,025	409	2,460	960
				0	19	29	12	30	33
						72	49	72	49

Table 5:
College and University Programs — Doctoral Degree

Color Key: ■ Students Enrolled Over Last 3 Years ■ Graduates Over Last 3 Years	Andrews University		Central Michigan University		Ferris State University		
Animal Science							
Audiology			124	34			
Biochemistry and Molecular Biology							
Biochemistry and Molecular Biology -- Environmental Toxicology							
Biological Sciences							
Biosystems Engineering							
Cell and Molecular Biology							
Cell and Molecular Biology -- Environmental Toxicology							
Chemical Engineering							
Chemistry							
Communicative Sciences and Disorders							
Comparative Medicine and Integrative Biology							
Counseling Psychology	90	2					
Epidemiology							
Genetics							
Genetics – Environmental Toxicology							
Health Administration			0	59			
Human Nutrition							
Kinesiology							
Medicine			501	0			
Neuroscience			34	7			
Nursing							
Optometry					441	110	
Pathobiology							
Pharmacology and Toxicology							
Pharmacy					1760	381	
Physics							
Physiology							
Psychology							
Physical Therapy	282	131	448	140			
Rehabilitation Counseling							
Social Work							
Sociology							

Note:
Tables do not include programs with a value of 0 for both enrollment and graduates.

Grand Valley State University		Michigan State University		Western Michigan University		TOTAL ENROLLMENT	TOTAL GRADUATES
		60	13			60	13
				65	14	189	48
		158	20			158	20
		2	6			2	6
				74	14	74	14
		59	16			59	16
		121	14			121	14
		2	0			2	0
		172	29			172	29
		582	97	100	14	682	111
		11	0			11	0
		98	14			98	14
				163	19	253	21
		57	12			57	12
		96	14			96	14
		2	1			2	1
						0	59
		39	6			39	6
		127	26			127	26
		6,257	503			6,758	503
		84	15			118	22
277	37	43	6			320	43
						441	110
		13	5			13	5
		34	5			34	5
						1,760	381
		416	62	77	12	493	74
		38	5			38	5
		128	55	264	40	392	95
475	143					1,205	414
		59	10			59	10
		70	10			70	10
		158	17	86	11	244	28

Table 6: Need for Selected Professions in Michigan

Selected Professions	Average Annual West MI Graduates	Employment 2014	Employment 2024	Projected 10-year Employment Growth	Average Annual Job Openings in Michigan (includes growth and replacement)	Average Annual Job Openings in West Michigan
Dental Assistant	26	9,190	9,590	4.4	267	71
Dental Hygienist	128	9,460	9,850	4.1	194	52
Diagnostic Medical Sonographer	49	2,490	2,980	19.7	96	26
Dietitian and Nutritionist	203	2,070	2,290	10.6	38	10
EMT and Paramedic	52	6,850	8,010	16.9	228	61
Family and General Practitioner	34*	4,660	4,830	3.6	142	38
Home Health Aide	NA	37,920	47,870	26.2	1,852	494
LPN	750	15,000	15,830	5.5	510	136
Medical Assistant	174	22,960	25,430	10.8	725	194
Medical and Clinical Lab Technologist	58	7,070	7,690	8.8	231	62
Nurse Practitioners	NA	2,890	3,570	23.5	136	36
Nursing Assistant	NA	50,710	55,630	9.7	1,637	437
Occupational Therapy Assistant	19	920	1,160	26.1	51	14
Occupational Therapist	179	4,660	5,420	16.3	166	44
Optometrist	37	1,160	1,310	12.9	56	15
Physician Assistant	123	3,770	4,500	19.4	158	42
Physical Therapist	138	8,670	10,570	21.9	422	113
Respiratory Therapist	44	4,140	4,590	10.9	142	38
RN	958	93,670	105,290	12.4	3,372	900
Speech-language Pathologist	185	3,240	3,490	7.7	107	29
Surgical Technologist	20	3,340	3,660	9.6	65	17

Note:

*Assumes that 20 percent of medical school graduates are family or general practitioners.

Table 7: Average Hourly Wages for Select Health Care Professions

Selected Professions	2005 Wages			2015 Wages			% of Change in Real Wages		
	Grand Rapids	Mich.	U.S.	Grand Rapids	Mich.	U.S.	Grand Rapids	Mich.	U.S.
Color Key: ■ Above 7% ■ Below Negative 7% (-7%)									
Dental Assistant	18.87	18.08	17.49	19.69	16.78	17.75	4.34	-7.21	1.50
Dental Hygienist	29.92	32.31	35.38	28.79	29.44	34.96	-3.76	-8.87	-1.18
Diagnostic Medical Sonographer	29.44	30.32	32.34	28.12	28.76	34.08	-4.49	-5.13	5.37
Dietitian and Nutritionist	26.93	27.34	26.81	26.59	26.04	28.08	-1.26	-4.76	4.74
EMT and Paramedic	17.66	16.29	16.60	16.27	15.13	17.04	-7.86	-7.10	2.64
Family and General Practitioner	92.41	81.42	81.91	75.61	83.83	92.36	-18.18*	2.96	12.76
Home Health Aide	12.08	11.19	11.34	10.32	10.68	11.00	-14.54	-4.55	-2.96
LPN	21.41	22.00	21.13	21.2	21.89	21.17	-0.97	-0.51	0.19
Medical Assistant	15.89	15.41	15.27	15.47	14.38	15.34	-2.62	-6.70	0.48
Medical and Clinical Lab Technologist	27.25	27.67	28.36	27.26	27.35	29.74	0.05	-1.16	4.86
Nurse Practitioner	NA	NA	NA	43.66	45.46	48.68	NA	NA	NA
Nursing Assistant	NA	NA	NA	13.31	13.46	12.89	NA	NA	NA
Occupational Therapy Assistant	19.68	23.02	23.22	21.66	23.33	28.05	10.03	1.34	20.82
Occupational Therapist	37.63	32.22	34.48	33.65	35.9	39.27	-10.59	11.42	13.90
Optometrist	49.76	56.24	55.72	56.39	55.42	55.65	13.33	-1.46	-0.12
Physician Assistant	43.74	41.89	41.47	54.4	45.01	47.73	24.37	7.44	15.10
Physical Therapist	36.85	38.58	38.13	40.43	40.56	41.25	9.73	5.13	8.18
Respiratory Therapist	32.55	26.87	26.99	25.37	25.8	28.67	-22.06	-3.98	6.22
RN	30.46	33.37	33.19	29.27	32.54	34.14	-3.91	-2.50	2.85
Speech-language Pathologist	47.38	37.71	33.85	32.91	36.13	36.97	-30.54	-4.18	9.22
Surgical Technologist	20.85	21.40	20.96	20.11	20.51	22.09	-3.55	-4.14	5.40

Note:

*2015 wage data on family and general practitioners in Grand Rapids appears to be inaccurate.

Medical Patents

A patent is the property right granted to an inventor or assignee for a new or improved product, process, or piece of equipment. Patents are used as indicators of economic growth because of the investment that went into creating the innovations as well as the investment opportunities that result from the innovations.

There are drawbacks, however, to relying on patent data to measure innovative activity. Some inventors and assignees choose not to register patents for their innovations because doing so requires them to divulge details to competitors. In addition, not all patents have a substantial impact on economic progress. On the whole, though, patents are seen as reflecting significant contributions to society and the economy in general. The use of patents is particularly relevant in the medical field due to the large amount of spending for medical research and development (R&D).

The database of the U.S. Patent and Trademark Office (USPTO) indicates the name and location of both a patent's inventor and its assignee (owner). In some cases, the inventor owns the patent. But in corporate settings, the business itself is usually the assignee while an individual researcher is the inventor. This can then result in location differences – for example, the inventor may live in Kent County, but the company that owns the patent is located in China; or the inventor lives in Germany, but the assignee is a company in Kent County. To evaluate the economic significance of innovative activities, it can be useful to consider inventors and assignees separately.

Figure 1 shows the number of new medical patents granted by the USPTO to inventors residing in Kent County, from the year 1990 through 2015. There is a positive trend, with the average annual number of patents increasing from 12.6 in the years 1990 to 1999, to 16.3 in the years 2000 to 2009, and a further increase to an average of 26.7 in the years 2010 to 2015. These data represent a 29.4 percent increase in the average annual number of patents from the 1990s to 2000s and a 63.6 percent increase from the 2000s to 2010s. The steady progress of these innovative activities is indicative of a high potential catalyst for entrepreneurship and emerging businesses in the area. A possible cause for concern is the dramatic drop in medical patents issued in 2015, when the number of patents fell by 69.2 percent. Nationwide, the number of medical patents granted with U.S. inventors fell by 58.8 percent. It is too early to tell if this is a temporary aberration or the beginning of a change in the trend.

Figure 2 displays the number of U.S. medical patents assigned to (i.e. owned by) individuals, companies, and organizations located in Kent County from the year 1990 through 2015. Similar to the trend in **Figure 1**, there has been a growth in the average annual number of patents, increasing from 6.2 in the years 1990 to 1999, to 10.3 in the years 2000 to 2009, and to 14.8 patents in the years 2010 to 2015. These data represent a 66.1 percent increase in the average annual number of patents from the 1990s to 2000s, and a 44.0 percent increase from the 2000s to 2010s. This growth in medical patents owned by entities in Kent County is an indicator of economic progress as new discoveries and improvements can result in technological advancements. Over time, such innovations could encourage greater investment and lead to additional job opportunities in the regional economy. As with the drop in patents with local inventors as shown in **Figure 1**, the large decrease in locally-owned medical patents issued in 2015 is troubling. This 63.6 percent decline compares with a 59.6 percent drop nationally.

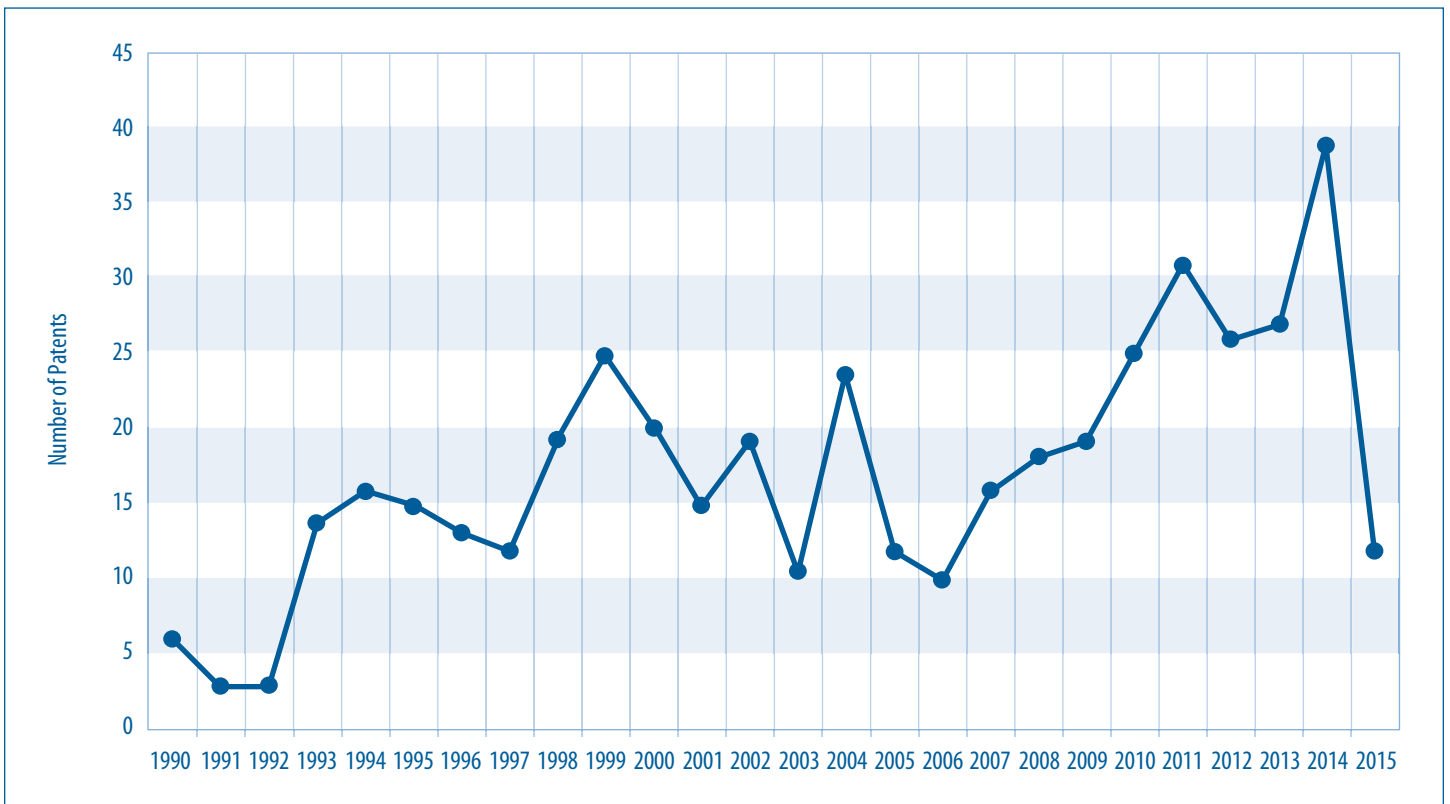
A patent obtained through the USPTO only gives property right protection in the U.S. While this protection is sufficient for some U.S. inventors, others choose to apply for patents in other countries in order to receive property rights elsewhere. One way to do this is through the World Intellectual Property Organization (WIPO). Filing an international patent application with the WIPO allows an inventor to then pursue patent rights in up to 150 countries simultaneously.

The number of nonduplicate medical patent applications filed by West Michigan companies at the WIPO and at the USPTO from 2011 through 2015 is shown in **Figure 3**. Since the year 2011, there have been 94 medical patent filings from twelve West Michigan companies. However, the majority of these filings come from only three companies, which together are responsible for approximately 68 percent of the total number of filings.

Figure 3 shows that the most prolific companies consistently apply for medical patents over time, but the same is not true for all of the others – only one half of all the listed companies applied for patents in 2015. In line with the data shown in **Figures 1** and **2**, there was a 61 percent decline in these West Michigan applications in 2015.

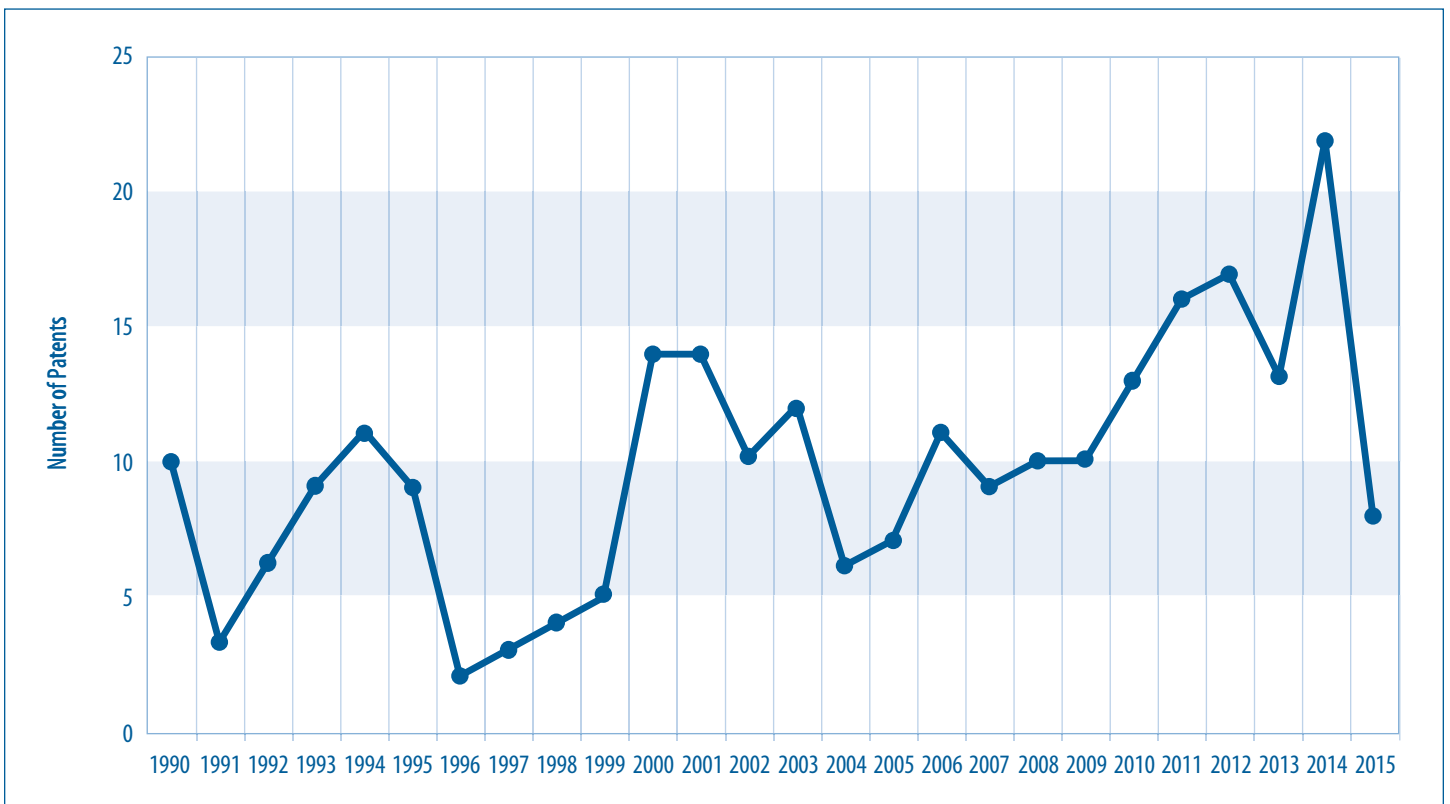
The information shown in these three figures indicates that, although there is a growing rate of overall medical patenting in West Michigan, the level of patenting is relatively modest, with the majority of it being conducted by a small number of regional companies. Furthermore, there is some reason for concern, with the recent decreases in patenting behavior. With increased R&D activity, patented medical innovation in West Michigan could become a significant driver of regional economic growth.

Figure 1: Medical Patents by Inventors Living in Kent County



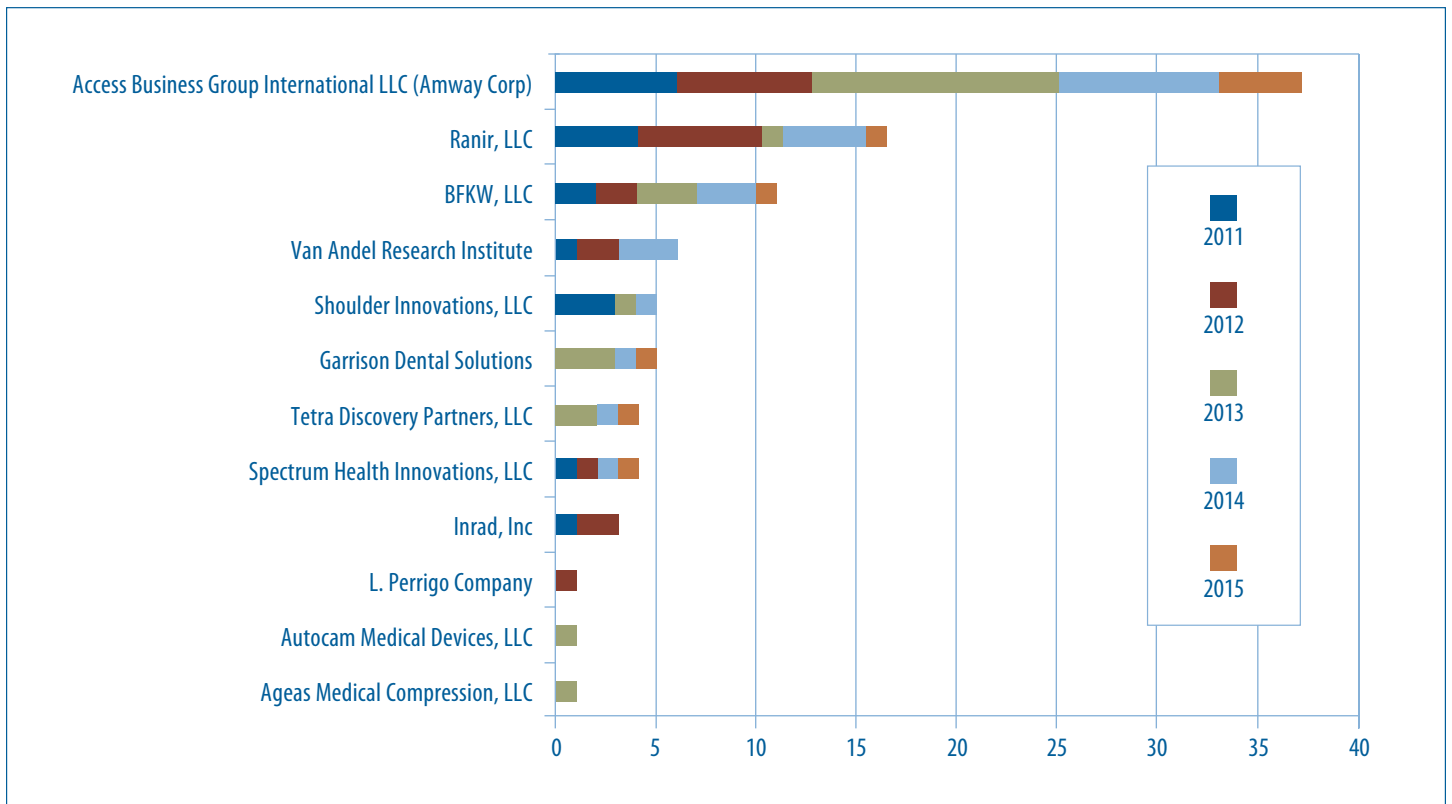
Source: United States Patent and Trademark Office
www.uspto.gov

Figure 2: Medical Patents by Assignee in Kent County



Source: United States Patent and Trademark Office
www.uspto.gov

Figure 3: Medical Patent Applications in West Michigan, KOMA* Region



*Kent, Ottawa, Muskegon, and Allegan Counties

Sources: United States Patent and Trademark Office and World Intellectual Property Organization

www.uspto.gov and www.wipo.int

Health Care Trends



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Demographic Changes

Long-term population and age distribution changes have significant effects on the consumption of health care services. This year, we highlight two trends that have become apparent over the past several years: 1) continued population growth on the west side of the state and 2) a general aging of the population. Since older populations have more complex health care needs than younger populations, an aging demographic can result in increased health care utilization and expenditures. Additionally, geographic shifts in population distribution can affect demand for care and resource allocation in particular localities.

Population Growth

Figure 1 displays population growth rates for Kent, Ottawa, Muskegon, and Allegan counties (KOMA), the Detroit region (Oakland, Macomb, and Wayne counties), the entire state of Michigan, and the U.S. as a whole. Throughout the 1990s, KOMA's population growth exceeded both the growth rate for the state of Michigan and the growth rate for the U.S. However, Michigan was particularly impacted by the recession in the mid 2000s and growth rates for both KOMA and the Detroit region fell precipitously. Though KOMA was able to maintain positive population growth throughout the 2000s, the Detroit region experienced a population loss beginning in the early 2000s that lasted for more than a decade. Although Detroit achieved positive population growth in the early part of this decade, it appears to have turned negative in 2015 indicating a return to population loss. KOMA's population growth rate began escalating in 2010 and has once again surpassed the national growth rate, though the growth rate in KOMA appears to have slowed in the past year. Importantly, given the Detroit region's negative to near zero population growth rate over the past 15 years, these trends are indicative of a geographic shift in the population distribution in Michigan from the east side of the state to the west. In fact, from 2000 to 2010, the state center of population shifted nearly a mile to the west. If this trend continues, demand for health care resources and health care infrastructures could be affected. For example, while the share of total state Medicare expenditures fell for both KOMA and the Detroit region from 2008 to 2013, the decline was more than 10 times larger for the Detroit region (Centers for Medicare and Medicaid Services, 2015).

Age Distribution

An important development in demographic trends in the U.S. continues to be the aging of the baby boomers, those born between 1946 and 1964. **Figures 2 through 4** depict population distributions by age for KOMA, the Detroit region, and the U.S. The clear trend in all three figures is the steady aging of the population. While only the third most populous age group in 1990, now persons between the ages of 45 and 64 outnumber all other age groups. Additionally, since 2010, the percentage of the population over the age of 65 has experienced the largest growth of any of the age categories. Due to the aging of the population and the growth in the percentage of those over the age of 45, the populations between the ages of 5 and 19, 20 and 34, and 35 and 44 all account for a smaller percentage of the total population today than they did in 1990. These trends are important for several reasons.

First, health care expenditures are closely related to age. More than 50 percent of lifetime spending on medical care occurs after the age of 65 (Alemayehu & Warner, 2004). Due to the demographic shifts apparent in **Figures 2 through 4**, the Centers for Medicare and Medicaid Services project total Medicare spending to nearly double between 2015 and 2026. This change will be especially salient for the Detroit region which, compared to the national average, has a high proportion of its population in the 45 to 64 and 65 and over age categories. By contrast, KOMA is in a more favorable position with a population distribution that is slightly younger than the U.S. as a whole. However, increasing medical expenditures associated with an aging population are likely to prove challenging across the entire state.

Second, **Figures 2 through 4** indicate that the proportion of those over the age of 65 has already eclipsed the proportion of the population between the prime working ages of 35 and 44. Since the Medicare program is primarily funded through taxes on employment, participants in the labor market effectively subsidize health insurance for the elderly. The number of workers per Medicare beneficiary has fallen steadily since 1995. Whereas in 2000, four workers supported each Medicare enrollee, the number of workers per beneficiary is projected to fall to 2.8 by 2020 (Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2012). The implications for the long-term sustainability of the Medicare Part A trust fund are grim, despite recent declines in Medicare expenditure growth rate projections. The most recent Congressional Budget Office projections of Medicare solvency suggest that the Part A trust fund will be exhausted by 2030 (Congressional Budget Office, 2015).

Finally, the aging of the population has important implications for employer-sponsored health insurance. As the share of the workforce over the age of 45 grows, the cost of private health insurance obtained through employment will likely continue to increase. From 2005 to 2015, average, annual, employer-sponsored, health insurance premiums for family coverage increased 61 percent, from \$10,880 to \$17,545, while real annual wages increased by only 1.9 percent over same period (Kaiser Family Foundation, 2015). Gains from steady reductions in the growth rate of health care expenditures since the early 2000s, due in part to reduced income growth and a shift toward high-deductible health insurance plans, are likely to be at least partially offset by this shift in the age distribution of workers.

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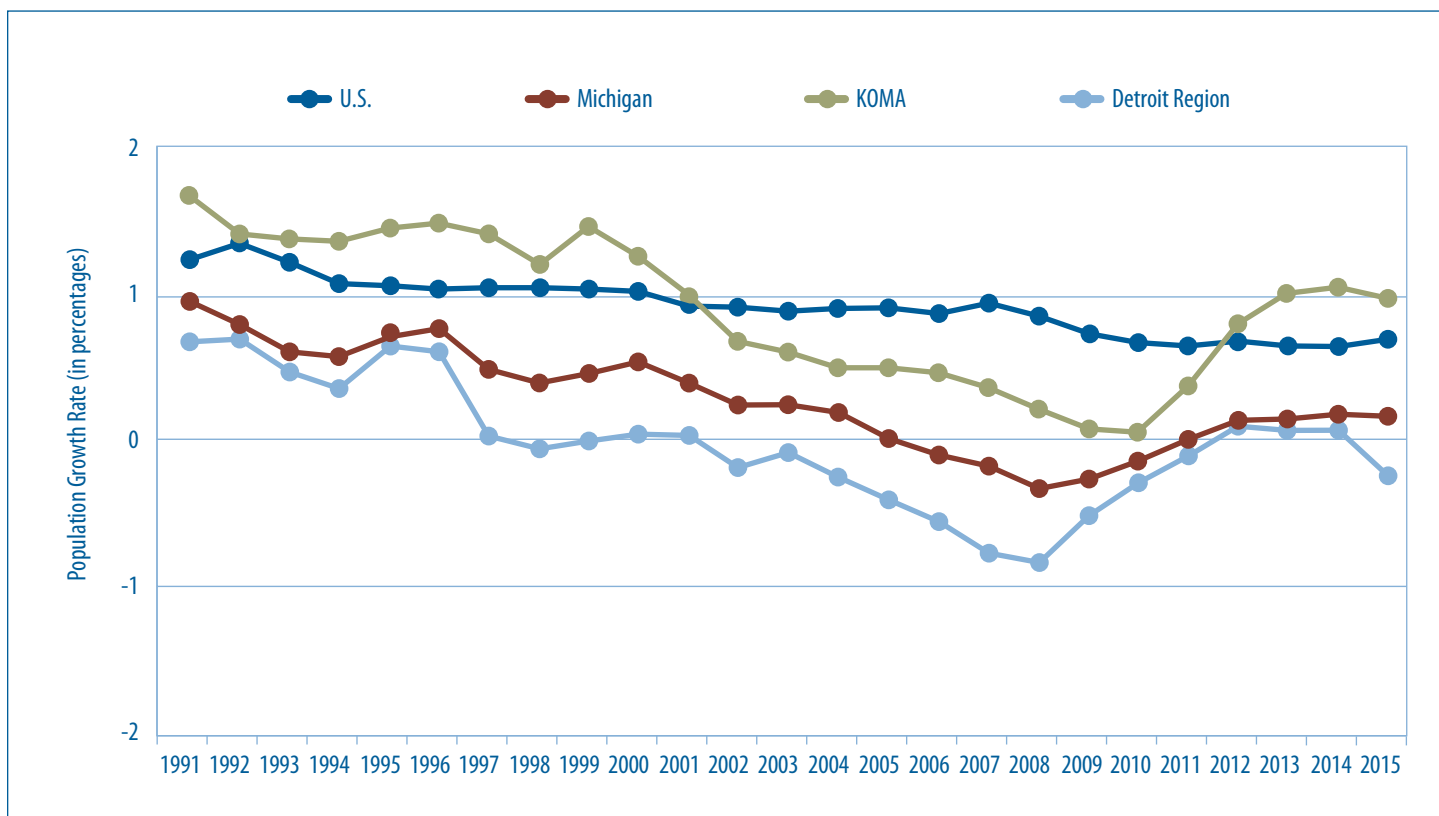
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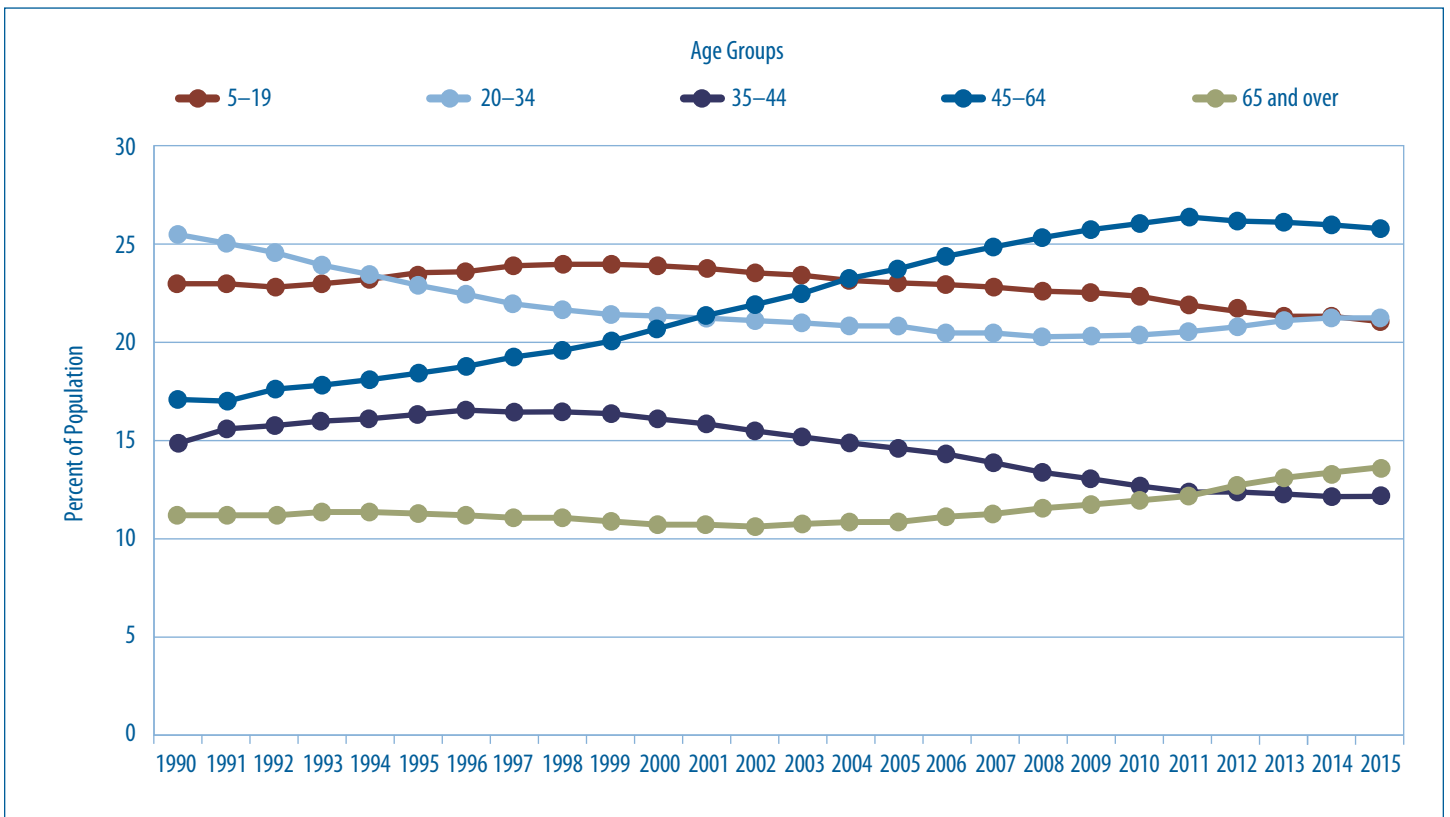
United States Census. (2016). *Population and housing unit estimates*. Retrieved August 31, 2016 from <http://www.census.gov/popest/>.

Figure 1: Annual Population Growth Rate 1991–2015



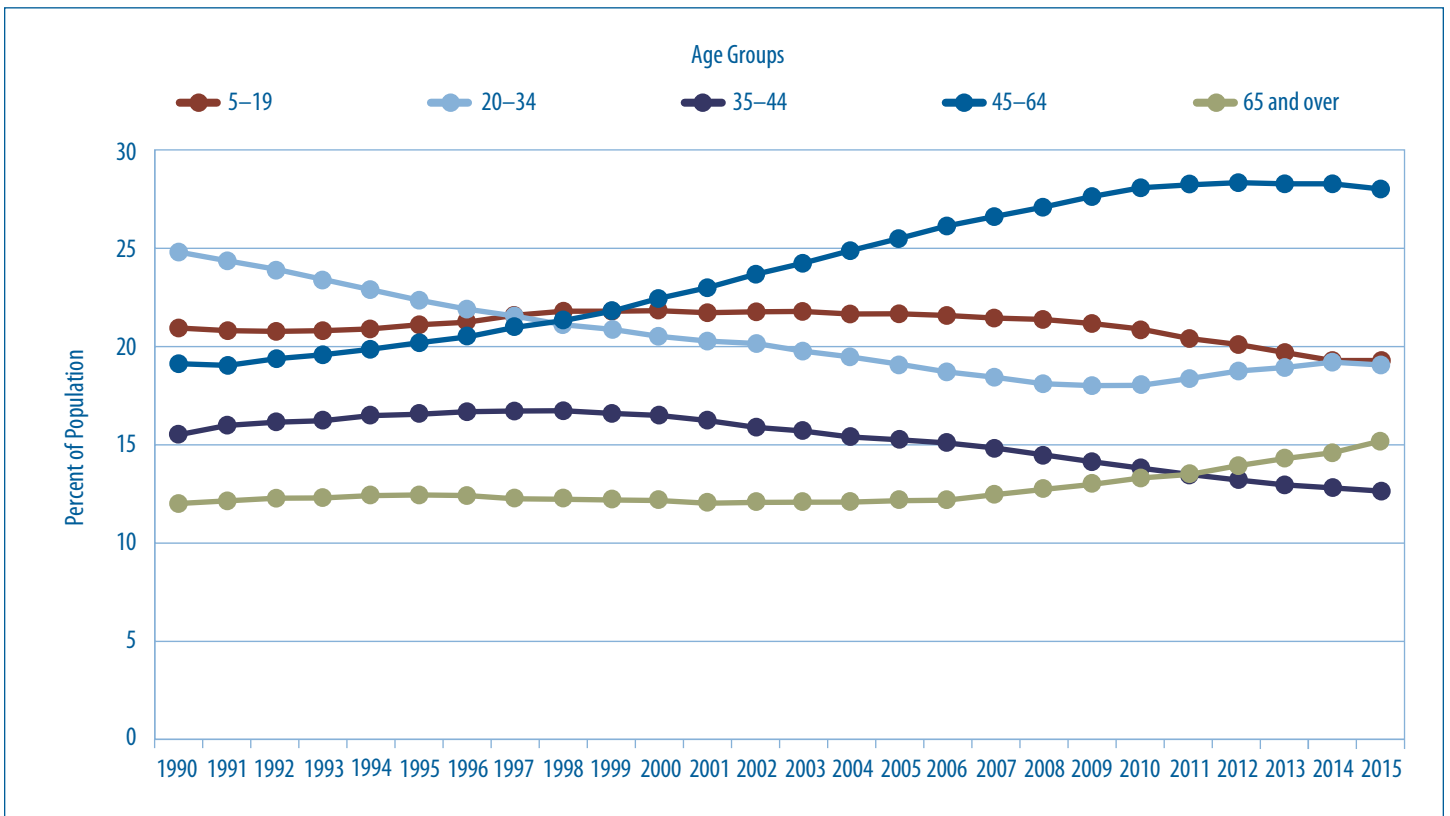
Source: U.S. Census. *Population and housing unit estimates*

Figure 2: KOMA Population Distribution



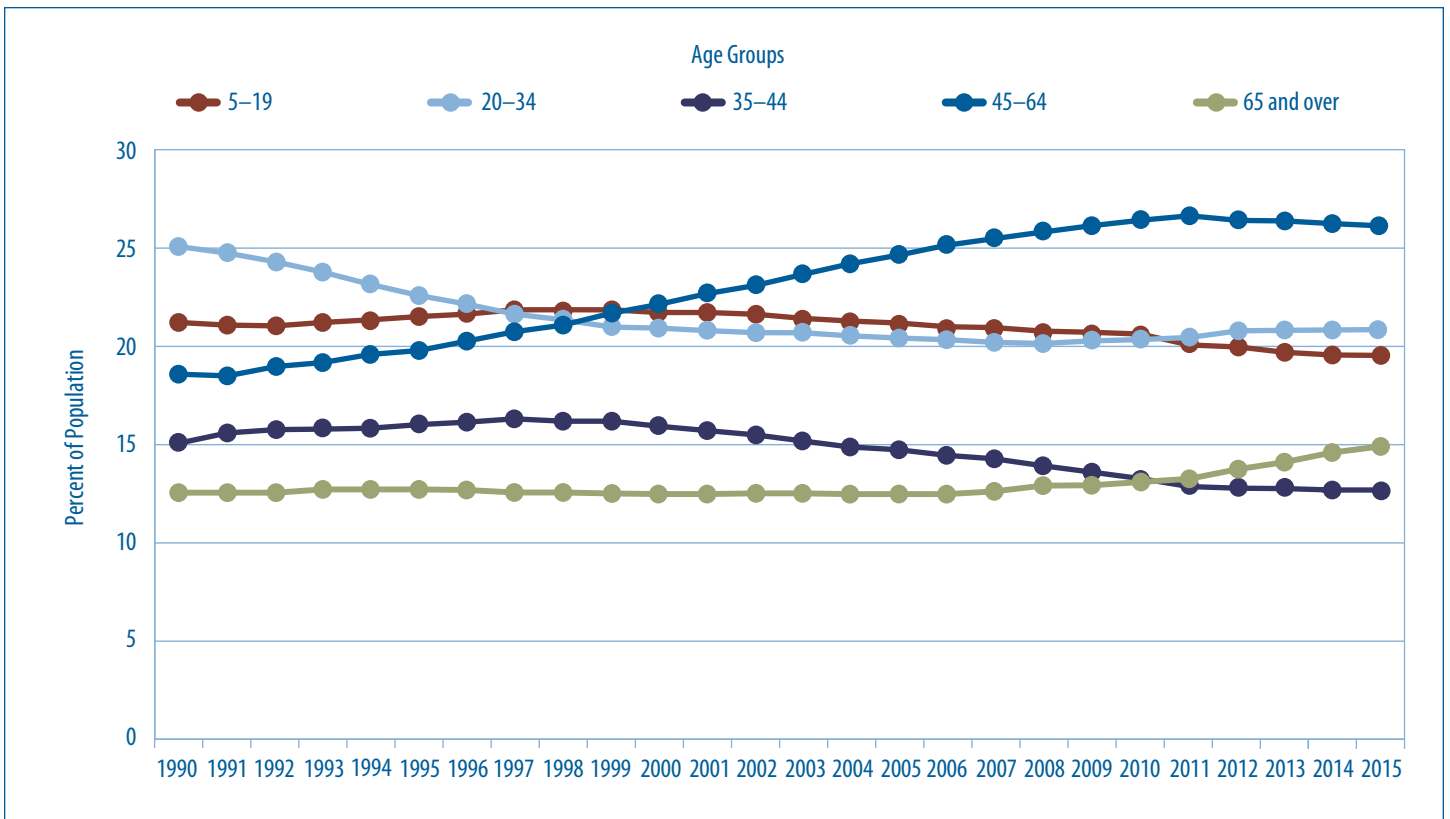
Source: U.S. Census. *Population and housing unit estimates*

Figure 3: Detroit Population Distribution



Source: U.S. Census. *Population and housing unit estimates*

Figure 4: United States Population Distribution



Source: U.S. Census. *Population and housing unit estimates*

Health Care Overview

In this section, we consider differences in risk factors and access to care between West Michigan (Allegan, Ionia, Kent, Montcalm, and Ottawa counties) and the Detroit region (Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne Counties). A caveat about this data: all estimates are based on self-reported surveys. Consequently, the actual incidence and prevalence rates for the factors examined may differ from those reported by respondents. Additionally, due to data availability, estimates are grouped into three year bands. While this increases the precision of the estimates, it means that we are unable to report estimates separately by year. We also note that the survey methodology was changed between 2010 and 2011, which may explain some of the differences between these periods.

Risk Factors

Figure 1 presents estimates of the prevalence of heavy drinking for West Michigan and the Detroit region. Heavy drinking is defined as the proportion of adults in each region who reported consuming an average of more than two alcoholic drinks per day for men or more than one per day for women. From 2005-2007 to 2013-2015 we see a slight increase in the share of heavy drinkers in both regions; however, the difference is not statistically significant. The data from 2013-2015 suggest that slightly more than 6 percent of the population in both regions are classified to be heavy drinkers.

Figure 2 displays estimates of the proportion of the adult population who currently smoke cigarettes. Between 2013 and 2015, 18 percent of the West Michigan population and 22 percent of residents in the Detroit region were current smokers. Using 2015 county population estimates, this equates to approximately 158,000 smokers in West Michigan and 791,000 smokers in the Detroit region. In 2014, the Centers for Disease Control estimated that 16.8 percent of the U.S. population currently smoked cigarettes, and cigarette smoking was responsible for 480,000 annual deaths (CDC, 2016). Treatment for illnesses related to smoking and tobacco use can be costly and resource intensive. Reductions in the prevalence of smoking and tobacco use could lead to increased worker productivity and provide relief for rising health care expenditures (Berman et al., 2014)

Figure 3 plots the obesity rate over time in West Michigan and the Detroit region. Obesity is defined by a body mass index (BMI) greater than or equal to 30. Approximately one-third of the population in each region is considered to be obese and the prevalence of obesity has increased over time. If we include those who meet the definition of being overweight ($25 \leq \text{BMI} < 30$), then 65 percent of adults in both regions either overweight or obese. These estimates are similar to the share of the overall U.S. population who is overweight or obese (Ogden et al., 2014). Recent studies place the health care costs associated with obesity at between 10 percent and 20 percent of total U.S. health-related spending (Finkelstein et al., 2009; Cawley and Meyerhoefer, 2012).

Finally, **Figures 4 and 5** present measures of health status by plotting the share of the population in each region reporting that their general health was either “fair” or “poor” and the share that suffers from a disability. Both West Michigan and the Detroit region have followed similar patterns in both outcomes over time. We see a slight decline in the share of fair/poor health from 2005 through 2010 followed by an increase in the likelihood of reporting fair/poor health from 2011 through 2015. The share of the population suffering from a disability is slightly higher in the Detroit region than in West Michigan and has been increasing over time in both regions. It is likely that both of these trends are due, in some part, to the aging of the population that we reported in the previous section.

Access to Care

In addition to an examination of the risk factors associated with poor health outcomes, we are also interested in measures involving access to health care services. **Figure 6** plots the percentage of the population in West Michigan and the Detroit region that reports having no health insurance. Uninsured rates in both regions have fallen recently because of the improving economy and the expanded health insurance options available under the Affordable Care Act. For example, as of November 7, 2016, more than 615,000 people have enrolled in the Healthy Michigan expansion of the state's Medicaid program (MDHHS, 2016b). As we noted last year, the point estimate of the uninsured rate in the Detroit region is now slightly lower than the rate in West Michigan, however the difference is not statistically significant. It is likely that we will see these uninsured rates continue to fall as we incorporate post-2015 data in later versions of this publication. Gallup (2016) estimated that the uninsured rate fell to 11 percent in the second quarter of 2016, down 6.1 percentage points since the fourth quarter of 2013.

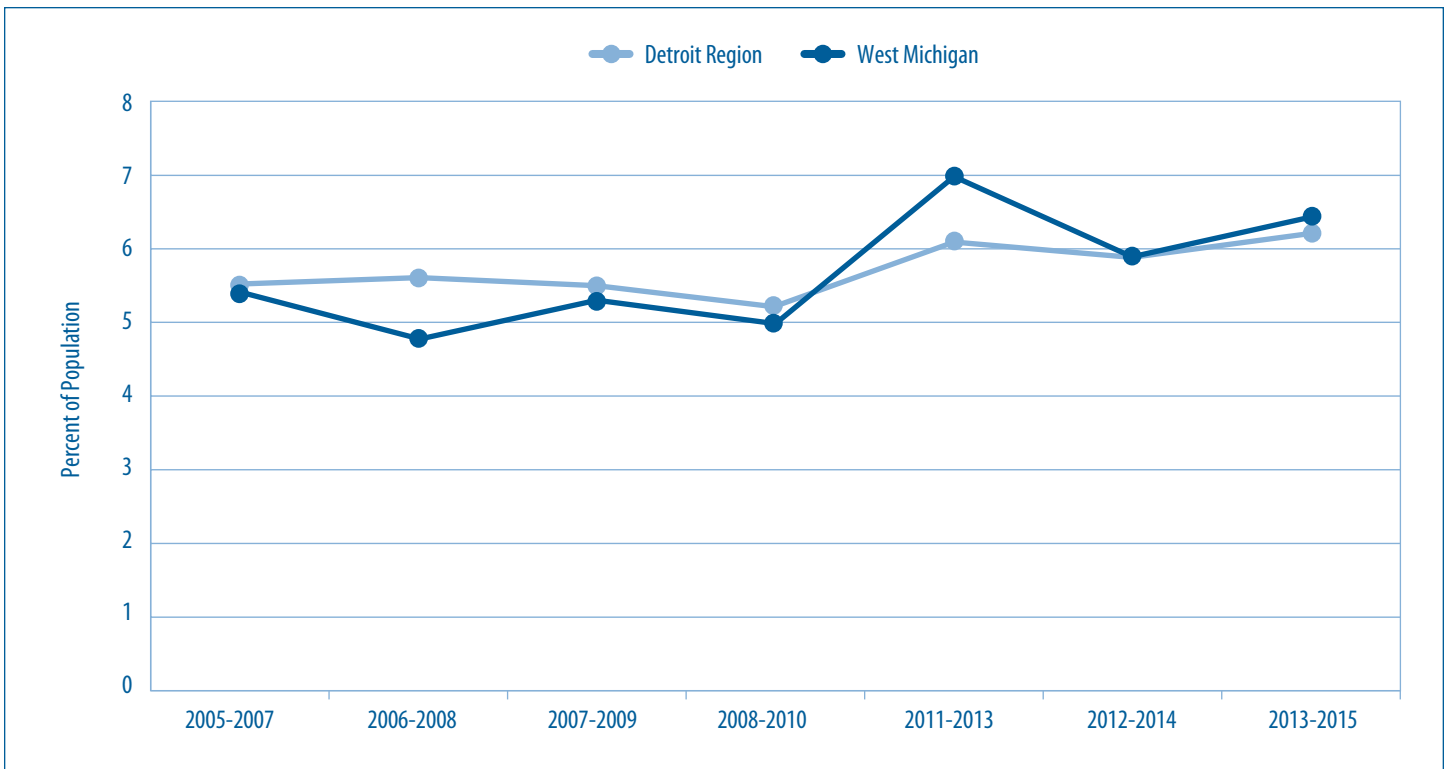
We would hope that the reduction in the rate of those without health insurance would lead to increased access to health care services. However, **Figure 7** suggests that access remains a concern. Nearly 15 percent of adults in both West Michigan and the Detroit region report a lack of access to physician care due to concerns over cost. Furthermore, while access issues associated with cost have become less prevalent on the east side of the state since 2011-2013, the trend in West Michigan has moved in the opposite direction. From 2005-2007, 10.3 percent of West Michigan residents reported a lack of access due to cost, whereas from 2013-2015 that share had increased to 14.7 percent. That we've seen uninsured rates fall while access to care remains problematic for some could indicate that even those with health insurance are experiencing cost-related access issues. As we will discuss in a following section of this publication, out-of-pocket costs for those with insurance have risen recently as high-deductible health plans have become more prevalent.

Figure 8 continues to examine the issue of access to care by plotting the share of the population in West Michigan and the Detroit Region with no routine checkup in the past year. Although we've seen a slight decrease in the past four years, approximately 30 percent of respondents in both regions go without an annual routine checkup. The slightly higher rate of those without a checkup in West Michigan may be due to a healthier population on the west side of the state compared to the Detroit region. Forgoing an annual checkup may act to lower health care expenditures in the short-run but could lead to higher spending in the long-run through reduced early-detection and prevention efforts.

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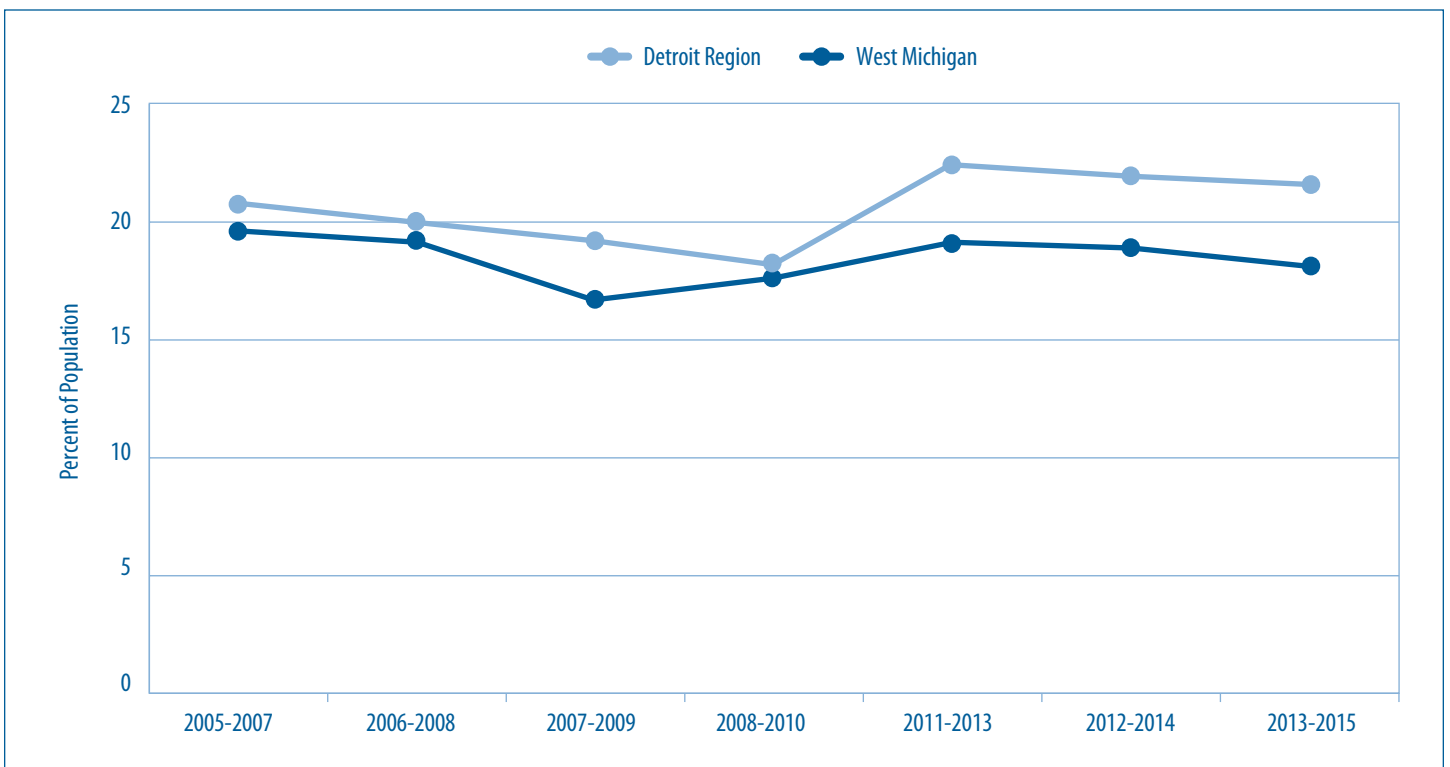
Figure 1: Heavy Drinking



Source: MDHHS, 2016a

Definition: Among all adults, the proportion who reported consuming an average of more than two alcoholic drinks per day for men or more than one per day for women.

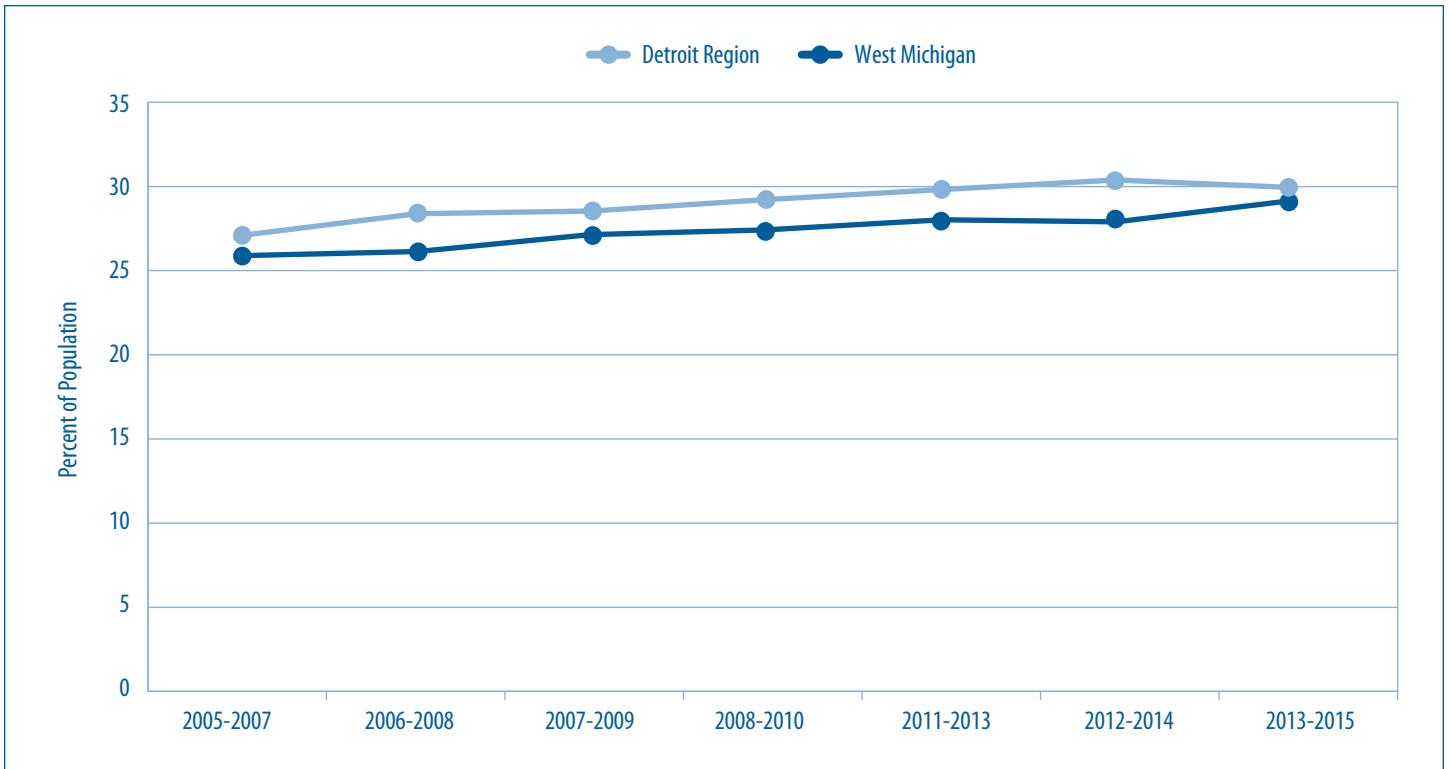
Figure 2: Current Smokers



Source: MDHHS, 2016a

Definition: Among all adults, the proportion who reported that they had ever smoked at least 100 cigarettes in their life and that they smoke cigarettes now, either every day or some days.

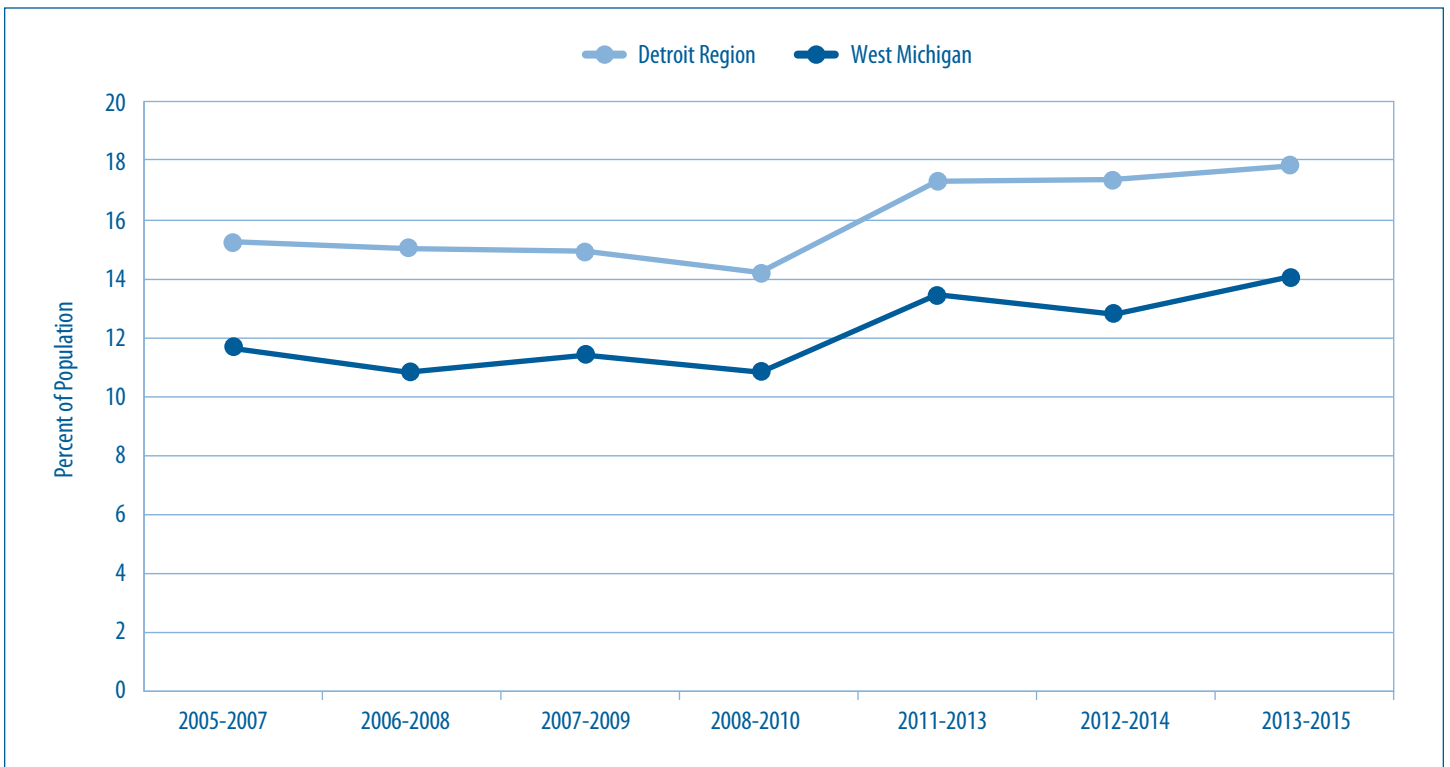
Figure 3: Obesity



Source: MDHHS, 2016a

Definition: Among all adults, the proportion of respondents whose Body Mass Index (BMI) was greater than or equal to 30.

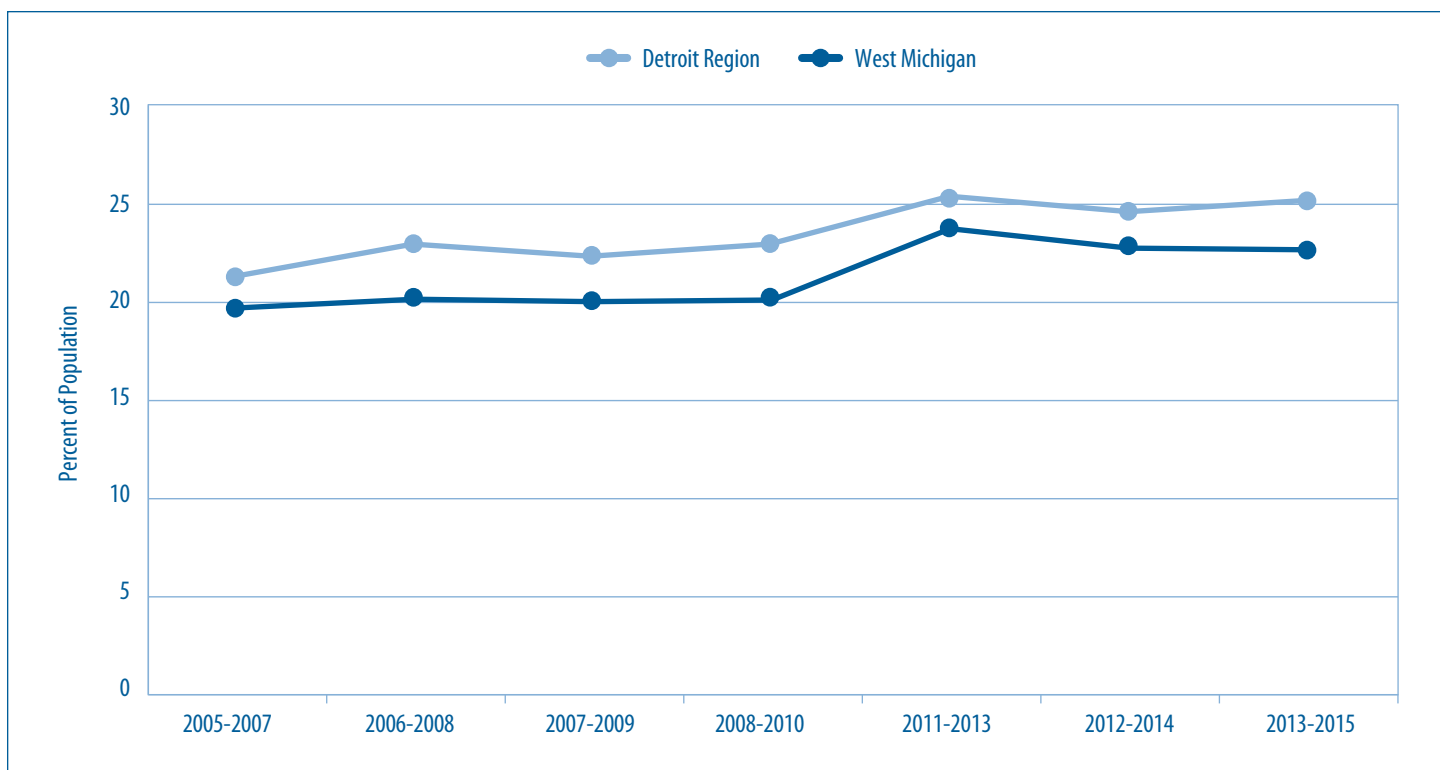
Figure 4: Health Status - Fair or Poor Health



Source: MDHHS, 2016a

Definition: Among all adults, the proportion of respondents who reported that their health, in general, was either fair or poor.

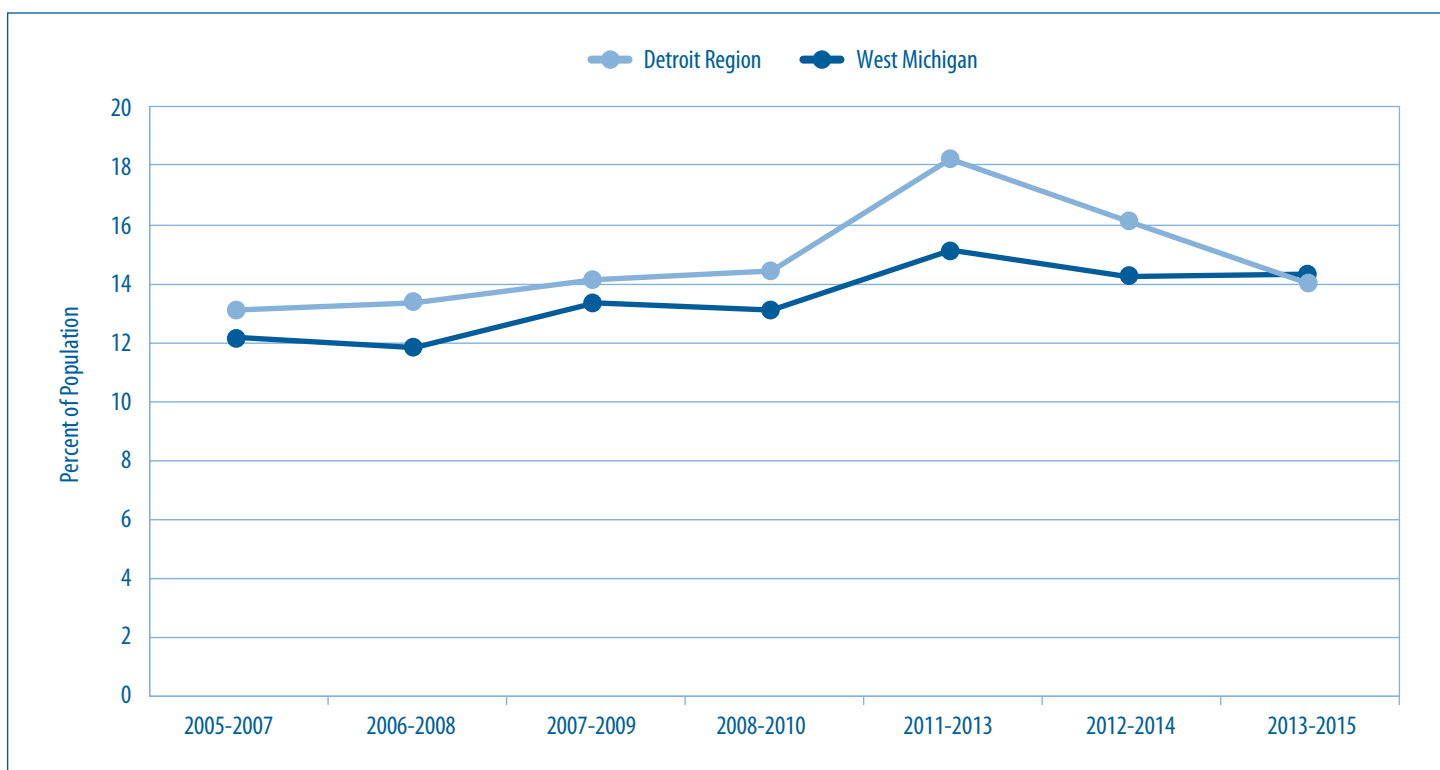
Figure 5: Disabled



Source: MDHHS, 2016a

Definition: Among all adults, the proportion who reported being limited in any activities because of physical, mental, or emotional problems, or reported that they required use of special equipment (such as a cane, a wheelchair, a special bed, or a special telephone) due to a health problem.

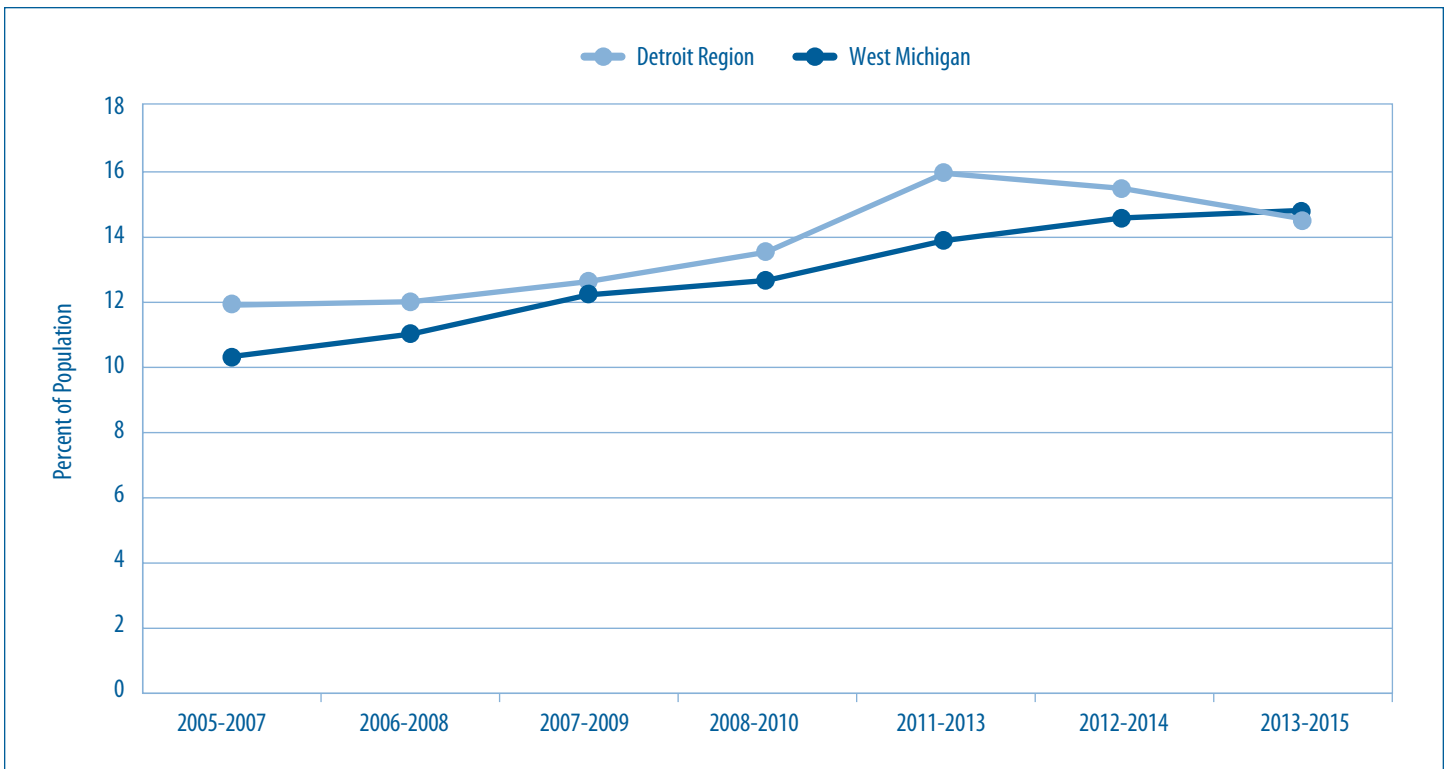
Figure 6: No Health Insurance



Source: MDHHS, 2016a

Definition: Among adults aged 18-64 years, the proportion who reported having no health care coverage, including health insurance, prepaid plans such as HMOs, or government plans, such as Medicare or Medicaid.

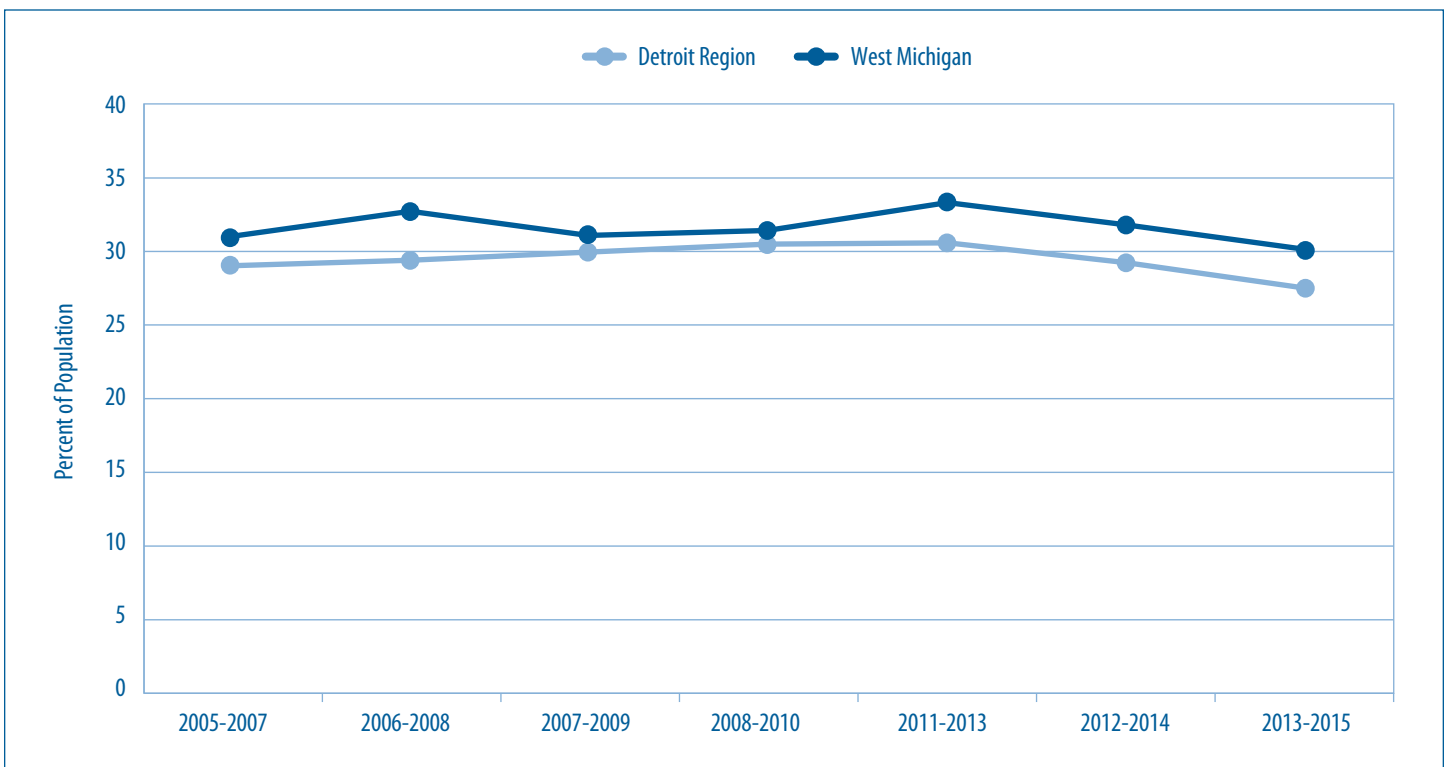
Figure 7: No Health Care Access Due to Cost



Source: MDHHS, 2016a

Definition: Among all adults, the proportion of respondents whose Body Mass Index (BMI) was greater than or equal to 30.

Figure 8: No Routine Checkup in Past Year



Source: MDHHS, 2016a

Definition: Among all adults, the proportion who reported that they did not have a routine checkup in the past year.

Economic Analysis



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Benchmarking Communities

In this section, we compare the Grand Rapids combined statistical area to a selected group of metropolitan areas to examine differences in the supply of hospital services, hospital expenses, and Medicare expenditures¹. Once again this year, we use the peer communities of Rochester, NY; Louisville, KY; and Buffalo, NY as comparison regions for the Grand Rapids area. These regions were selected based on a variety of regional metrics including population density, earnings estimates, unemployment rates, population age, and race distributions. In addition, we retained the metro areas of Cleveland, OH; Milwaukee, WI; Portland, OR; and Akron, OH, which have been used as comparisons for Grand Rapids in earlier versions of this publication. Our data allow us to present utilization measures for each community at two distinct points in time: 2003 and 2014. Unfortunately, we are not able to examine trends in outcomes between these two periods.

Figure 1 displays the population of each community in 2003 and 2014. Compared to the Grand Rapids region, only Portland has experienced greater population growth over the past decade. Both Buffalo and Cleveland have seen population declines over the study period.

The Supply and Utilization of Hospital Services

Figures 2–8 provide a detailed examination of both hospital capacity and utilization across Grand Rapids and the seven comparison communities. Utilization measures such as admissions, outpatient hospital visits, and emergency department visits are measured as per capita rates using the number of residents in each region as the denominator. A downside to the use of these per capita utilization rates is that they do not account for the inflow of patients from outside the region or the outflow of patients to other regions. For example, a destination hospital like the Cleveland Clinic attracts patients from outside of the Cleveland region who contribute to the numerator in the utilization calculation, but not to the denominator. In cases where patient inflow is particularly high, utilization measures will be overstated.

Figure 2 includes data on the number of hospital beds per 1,000 residents in each community. This measure serves as a proxy for hospital capacity. For six of the seven communities, per capita hospital inpatient capacity has declined over the past decade. Only Cleveland has experienced an increase in per capita hospital beds. Nationally, the trend has been a movement away from investments in additional inpatient capacity, which means that Cleveland's

increase is likely due to the population loss noted in **Figure 1**. Only the Grand Rapids and Portland regions have fewer hospital beds per person than the national average.

Figure 3 displays the number of hospital admissions per 1,000 community residents. While **Figure 2** focused on inpatient capacity, **Figure 3** provides data on inpatient utilization. Again, all communities with the exception of Cleveland have seen their inpatient hospital utilization decline over the past decade. Grand Rapids has the fewest hospital admissions per capita with the exception of Portland and is well below the national average. This could be an indication of a relatively healthy population in West Michigan or a stronger reliance on outpatient rather than inpatient care. In either case, given the high cost associated with inpatient care, fewer hospital admissions bode well for the Grand Rapids region.

On the other hand, **Figure 4**, shows that Grand Rapids residents rely heavily on hospitals for the provision of outpatient care. Only Rochester and Cleveland have higher rates of outpatient hospital visits than Grand Rapids, and the growth in outpatient visits in Grand Rapids has eclipsed all other comparison communities. The effect of this high rate of outpatient visits on the overall cost of care in the Grand Rapids area is unclear. If we are substituting additional outpatient hospital visits for inpatient stays, then this would likely represent a net decline in expenditures due to the high cost of a hospital admission. However, an alternative explanation for the growth in outpatient visits to hospitals involves the transition to provider-based billing arrangements (also known as hospital outpatient billing) as independent physician practices increasingly align with hospital systems (Medicare Payment Advisory Commission, 2012). Provider-based billing allows for qualified hospital-affiliated physician practices to charge an additional facility fee for patient care (American College of Physicians, 2013). Reliance on this potential source of additional hospital revenue has increased sharply over the study period and has been credited with accelerating the rate at which physician practices have aligned with hospital systems². Importantly, for the data displayed in **Figure 4**, patient visits to non-hospital settings are often categorized as hospital outpatient visits under a provider-based billing system³. So what appears to be a doubling of per capita outpatient visits to hospitals in Grand Rapids from 2003 to 2014 could simply be a change in billing practices. Moving forward, recent attempts by the Centers for Medicare and Medicaid policy to reduce the advantages of provider-based billing could affect

¹ Because the Grand Rapids metropolitan statistical area (MSA) definition has recently changed, we use the more consistent definition of the core-based statistical area. All other regions are defined using the MSA.

² According to the 2012 MedPac Report to Congress, "Growth in the percentage of [evaluation and management] office visits that are provided in [hospital outpatient departments] has accelerated, increasing at an annual rate of 3.5 percent from 2004 through 2008, by 9.9 percent in 2009, and by 12.9 percent in 2010."

³ The data source for **Figure 4**, the 2016 American Hospital Association Hospital Statistics publication, instructs reporting hospitals that "visits to satellite clinics and primary group practices should be included if revenue is received by the hospital."

⁴ For more information, see the Centers for Medicare & Medicaid Services CY 2017 Outpatient Prospective Payment System Proposed Rule.

future trends in **Figure 4**⁴. Another factor to consider is that since values in **Figure 4** are calculated as the ratio of outpatient visits to the number of area residents, those coming from outside the region to receive treatment are included in the numerator, but not in the denominator of the calculation. Evidence indicates that there has been a recent increase in the number of patients from outside the region seeking care in Grand Rapids. Therefore, large changes from 2003 to 2014 could be partially driven by changes in the flow of patients to the area.

Figure 5 examines an additional component of hospital utilization by plotting per capita emergency department (ED) visits for Grand Rapids and each of the comparison communities. Reflecting the trend seen in **Figure 4**, the Grand Rapids region has experienced a large growth in ED utilization over the past decade. ED admissions per capita in Grand Rapids are slightly higher than the national average and trail only Louisville, Cleveland, and Akron amongst our comparison communities. As we noted in this publication last year, this should be an area of focus for those interested in lowering the overall cost of hospital care in West Michigan. ED utilization is generally more costly than care provided in alternative settings and many visits to the ED are for non-emergent conditions (Honigman et al., 2013; Weinick, Burns, & Mehrotra, 2010).

While **Figure 3** suggests that not only are Grand Rapids residents relatively less likely to be admitted to the hospital than residents in four of the comparison communities, **Figure 6** notes that hospital length of stay for Grand Rapids residents tends to be shorter as well. The average length of stay in Grand Rapids has declined over the past decade and remains below the national average. Given the expense that accompanies a day in the hospital, minimizing the average length of stay can have a substantial impact on the overall cost of care.

Finally, **Figure 7** highlights the supply of hospital-based personnel per 1,000 residents in each region. These personnel counts represent the total number of full-time equivalent hospital employees excluding medical and dental residents, interns, and other trainees. As noted in the Education and Job Growth section of this publication, the rate of employment growth in the health care sector in West Michigan has been positive and is reflected in the increase in hospital-based personnel for Grand Rapids over the past decade. However, despite this increase, the Grand Rapids region remains below the national average for per capita hospital-based personnel. This is likely a contributing factor to the relatively low cost of care experienced in West Michigan.

Hospital Expenses and Medicare Expenditures

Figure 8 examines payroll and benefits expenses per hospital employee, which is inflation adjusted to 2014 dollars using the consumer price index. Total compensation for hospital workers in Grand Rapids is below the national average and is in line with the comparison communities of Rochester, Louisville, and Akron. The remaining regions tend to have employee expenses that exceed those of Grand Rapids and, in the cases of Buffalo, Cleveland, Milwaukee, and Portland, are greater than the national average.

Figure 9 displays total hospital expenses per admission. It is important to recognize that **Figure 9** is measuring the expenses reported by the hospital to provide treatment for the average admission, but does not represent patient or insurer expenditures on hospital care. Even after adjusting for inflation, the growth in hospital expenses per admission for all of the comparison communities has been substantial over the past decade. Despite the relatively low hospital employee compensation noted in **Figure 8**, we see that hospital expenses per admission in Grand Rapids are significantly higher than the national average. Only hospitals in Cleveland and Portland report higher expenses per admission than hospitals in the Grand Rapids region. Growth in per-admission hospital expenses could be explained by at least two factors: 1. increasing reliance on advanced technology; and 2. changes in the overall illness severity of hospitalized patients. Newer and more advanced health care technologies often tend to be cost-increasing rather than cost-reducing (Kumar, 2011). If technological advancement generates improved outcomes, then the additional expenses may be worthwhile. However, even worthwhile spending raises overall costs.

Due in part to changes in the payment incentives for inpatient care, certain types of care have migrated to outpatient settings (Berenson, Ginsburg, & May, 2011). As a result, the health of the average patient admitted to the hospital today is likely to be worse than the health of the average patient admitted in 2003. Ultimately, the effect of this shift in treatment settings has been to reduce the hospital share of total health expenditures, but increase per admission expenses (Moses et al., 2013).

Figure 10 plots per capita Medicare expenditures for both Fee-for-Service (FFS) and Medicare Advantage (MA) enrollees from 2007 through 2014. These figures represent the average, annual, per capita government expenditure for a Medicare beneficiary in each of the comparison communities. Data on FFS Medicare enrollment and expenditures were obtained through the Centers for Medicare and Medicaid Services' (CMS) Geographic Variation Public Use File (2015). Measures of MA plan enrollment were created by using the CMS Monthly Enrollment by Contract/Plan/State/County Files and averaging monthly plan enrollment for each year, while data on plan reimbursements were gathered from the annual CMS Plan Payment Data Files. Due to the methodology employed by these groups, geographic regions for **Figure 10** are defined as the primary county in the MSA (e.g. estimates for Grand Rapids are specific to Kent County). Expenditures in **Figure 11** are adjusted for regional differences in prices, population age, gender, and race. These figures include expenditures for physician and hospital care, but exclude expenditures on prescription medications. Additionally, in cases where treatment was received in a county outside of where the patient resides, CMS assigns expenditures to the county in which the patient lived and not the county where the treatment was performed. Notably, Medicare expenditures for all regions and the U.S. as a whole have fallen from 2010 through 2014. In fact, for many communities, Medicare expenditures in 2014 were below expenditures in 2007 after adjusting for inflation. Expenditures in Grand Rapids are below the national average and lower than those in all but three of the comparison communities.

Utilization of Care and Treatment Intensity

Data for the remaining figures in this section were collected from the Dartmouth Atlas of Health Care and exhibit two primary differences from the previous figures. First, these figures focus solely on Medicare FFS beneficiaries and do not include data on Medicare Advantage enrollees. Claims data for Medicare Advantage enrollees are typically not made available to researchers. Nationally, slightly more than one-third of Medicare beneficiaries are enrolled in a Medicare Advantage plan. However, Medicare Advantage enrollment in Grand Rapids is now above fifty percent. This should be kept in mind when evaluating the following figures. Additionally, the Dartmouth Atlas of Health Care defines geographic regions at the hospital referral region (HRR) level and not the MSA⁵.

Figures 11-13 provide three examples of care coordination across the comparison regions. **Figure 11** displays the percent of FFS Medicare beneficiaries whose predominant provider was a primary care physician in 2012. Those with primary care physicians as their predominant provider are likely to use fewer health care resources and experience lower expenditures than those receiving a greater share of care from medical or surgical specialists. FFS Medicare beneficiaries in Grand Rapids are much more likely to receive the majority of their care from primary care physicians than those in the comparison communities with the exception of Akron.

Figure 12 focuses on the percent of FFS Medicare beneficiaries reporting an annual wellness visit. Beginning in 2011, Medicare provides coverage for an annual visit aimed at developing a health risk assessment and customized prevention plan for the patient (Koh & Sebelius, 2010). While many have touted the cost-saving potential of preventive services such as wellness visits, others have suggested that the costs of most preventive care exceed the benefits. (Cohen, Neumann, & Weinstein, 2008). Nevertheless, wellness visits may point to the receipt of what is seen by many as effective care and could act as a signal of patient engagement. Only FFS Medicare beneficiaries in Buffalo are more likely to have an annual wellness visit than those in Grand Rapids amongst the comparison communities

Figure 13 displays the final and perhaps most comprehensive metric of care coordination, discharges for ambulatory care-sensitive conditions. These are often equated to preventable hospitalizations and can be used as a measure of care efficiency. In this case, a lower number is preferable, so only Portland outperforms Grand Rapids in terms of ambulatory care-sensitive discharges. Overall, it appears that Grand Rapids and West Michigan Medicare FFS residents receive a higher level of care coordination than those in many of the comparison regions.

Figures 14 and 15 shift the focus to resource utilization at the end of life. The management of care at the end of life has profound implications for health care expenditures and the overall cost of

care⁶. **Figure 14** shows the percent of Medicare FFS beneficiaries hospitalized in the last six months of life in 2012. Hospital admissions are costly and may be of marginal value near the end of life. Only those living in Portland experience a lower hospitalization rate at the end of life than Medicare FFS beneficiaries in Grand Rapids.

Figure 15 continues the examination of end of life care by plotting the share of Medicare FFS beneficiaries enrolled in hospice care in the last six months of life. Enrollment in hospice is associated with lower expenditures and higher quality of care for those near the end of life (Kelley et al., 2013). More than 60% of Medicare FFS beneficiaries in Grand Rapids enrolled in hospice in the last six months of life in 2012. This was well above the national average of fifty percent and higher than any other comparison community.

Finally, **Figures 16-18** examine services that are subject to high levels of patient and physician discretion and variation in their utilization (Birkmeyer et al., 1998). **Figure 16** compares inpatient back surgery rates for Medicare FFS beneficiaries in 2012 across the selected regions. Back surgery rates in Grand Rapids are significantly above the national average and higher than any of the comparison regions. Inpatient back surgeries, especially spinal fusions, are among the most commonly analyzed procedures when examining unexplained regional variation in surgical intensity (Deyo & Mirza, 2006). If this high rate of back surgeries represents a significant number of unwarranted or unnecessary treatments, then this area might indicate a potential target for cost savings.

Figure 17 examines rates of inpatient knee replacements, another highly discretionary procedure (Dartmouth Atlas of Health Care, 2007). Once again, procedure rates in Grand Rapids are above the national average. Only Louisville exhibits a higher rate of knee replacements than Grand Rapids.

Lastly, **Figure 18** plots the rates of inpatient, radical prostatectomies for Medicare FFS beneficiaries. The existence of competing treatments for prostate cancer has contributed to variation in the type of care received by prostate cancer patients⁷. Radical prostatectomies represent a more intensive (and costly) approach to prostate cancer treatment (MedlinePlus, 2015). Rates of radical prostatectomies for FFS Medicare patients in Grand Rapids were much higher than the national average and more than double the rates recorded for Louisville, Buffalo, and Cleveland.

In conclusion, while Grand Rapids compares favorably to many of the comparison communities on metrics associated with care coordination and treatment intensity at the end of life, there are several areas of concern and opportunities for potential improvement. For example, rates of outpatient visits to hospitals and ED visits in Grand Rapids are above the national average and have grown substantially over the past decade. Total hospital expenses per admission in Grand Rapids are above the national average and are surpassed by only

⁵ The Dartmouth Atlas of Health Care defines HRRs as "regional health care markets for tertiary medical care that generally requires the services of a major referral center. The regions were defined by determining where patients were referred for major cardiovascular surgical procedures and for neurosurgery."

⁶ Those living to age 85 will spend approximately one-third of their lifetime medical expenditures in their remaining years (Alemayehu & Warner, 2004).

⁷ According to the Dartmouth Atlas of Health Care publication *Variation in the Care of Surgical Condition: Prostate Cancer*, "Previous work by the Dartmouth Atlas shows that prostatectomy had the greatest local variation among the ten most commonly performed inpatient procedures in the U.S. The use of prostate surgery varied nearly tenfold between the hospital referral regions with the lowest and highest rates of prostatectomy."

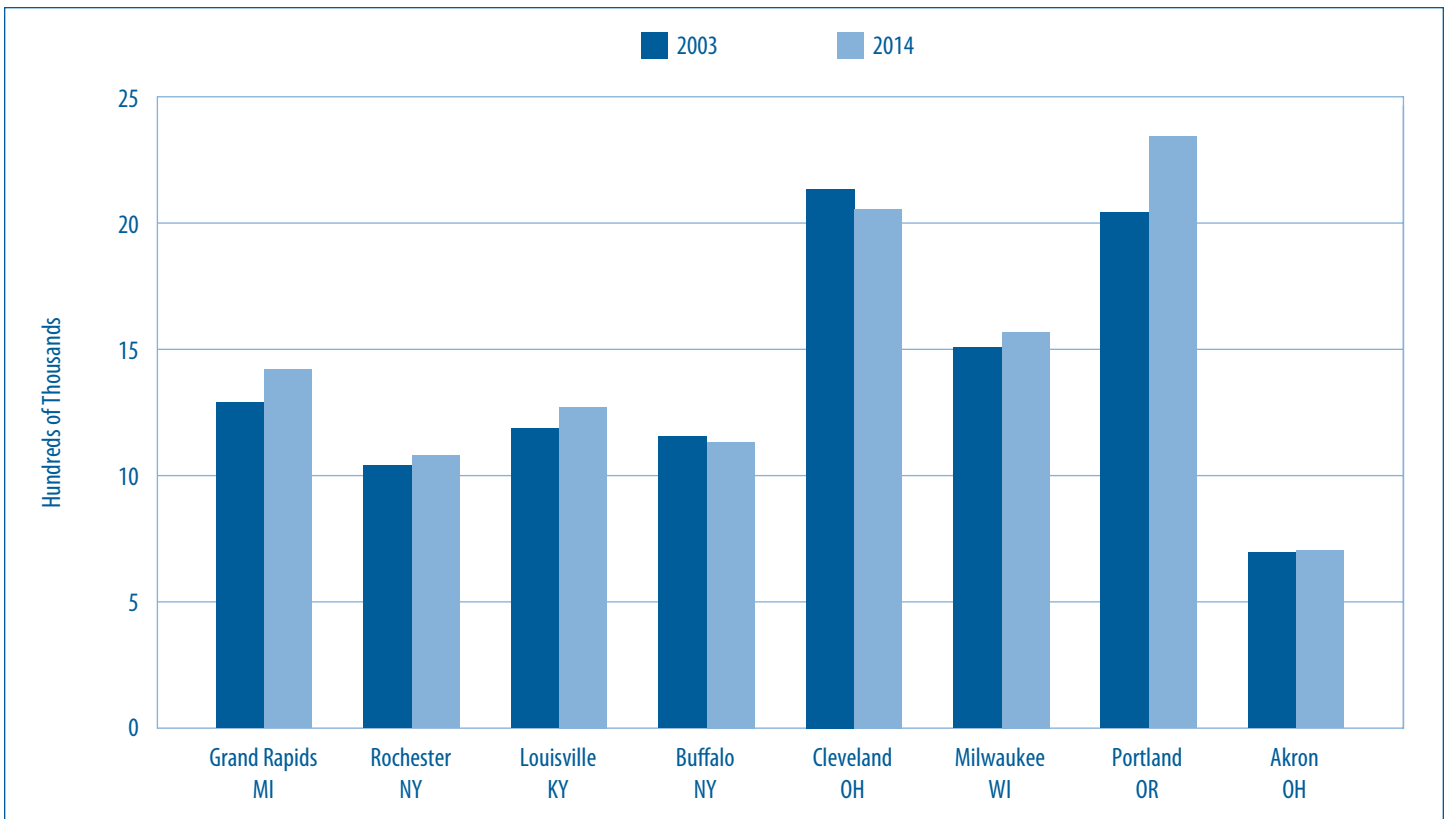
Cleveland and Portland among the group of comparison communities. Examining several commonly referenced indicators of treatment intensity, physicians in the Grand Rapids regions appear to take a more aggressive approach to treatment than those in many of the comparison communities. Since total expenditures on health care in any region are the product of the quantity of services administered and the price of those services, a reduction in treatment intensity, especially for unnecessary or discretionary treatments, could provide

a significant reduction in overall health care expenditures. On the plus side, per capita Medicare expenditures in the Grand Rapids area are below the national average and have experienced a decline since 2010. Evidence presented in this section suggests that the cost-effective management of end of life care may have been a significant factor in limiting the growth of health care expenditures in West Michigan.

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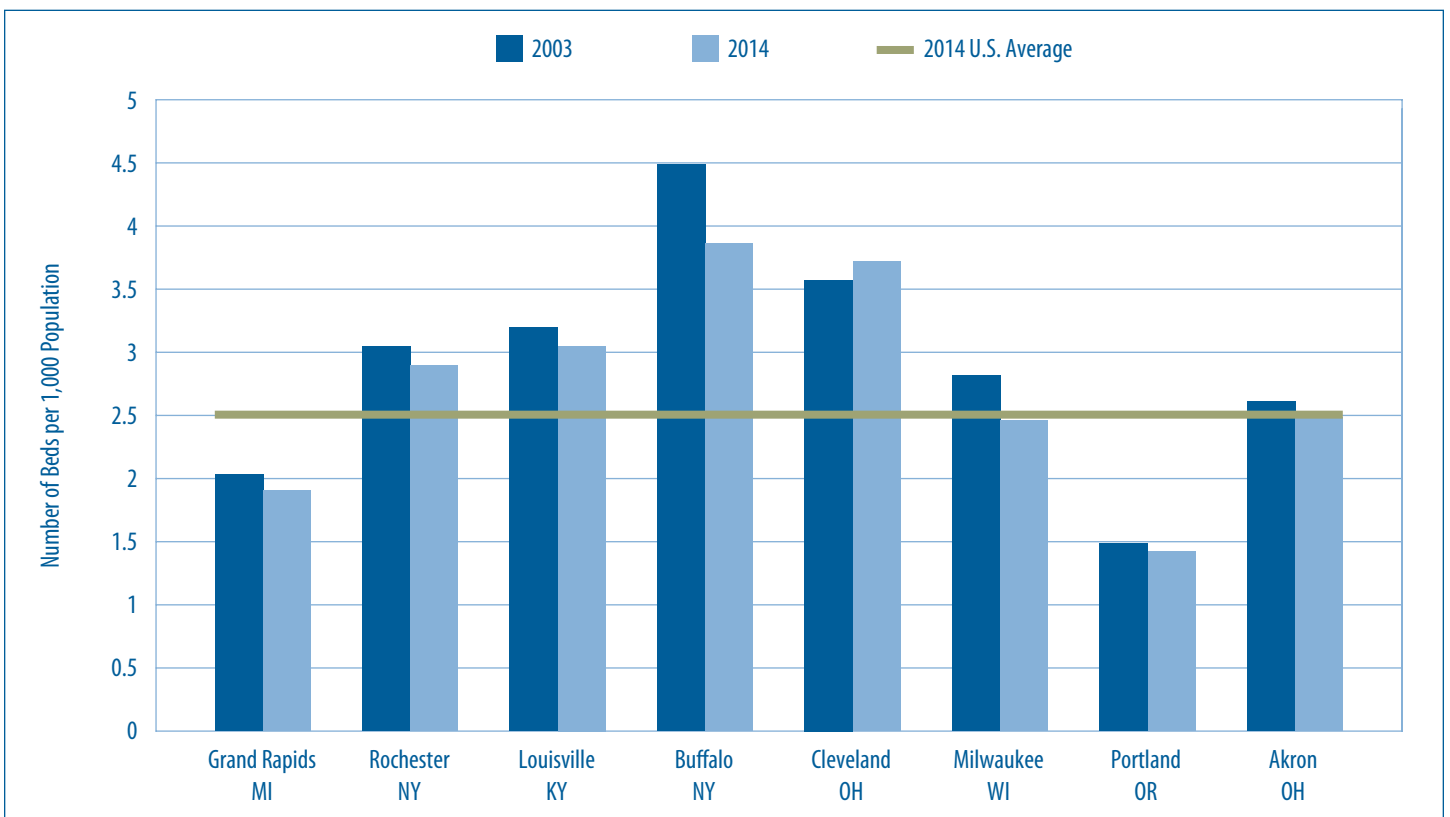
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Figure 1: MSA Population



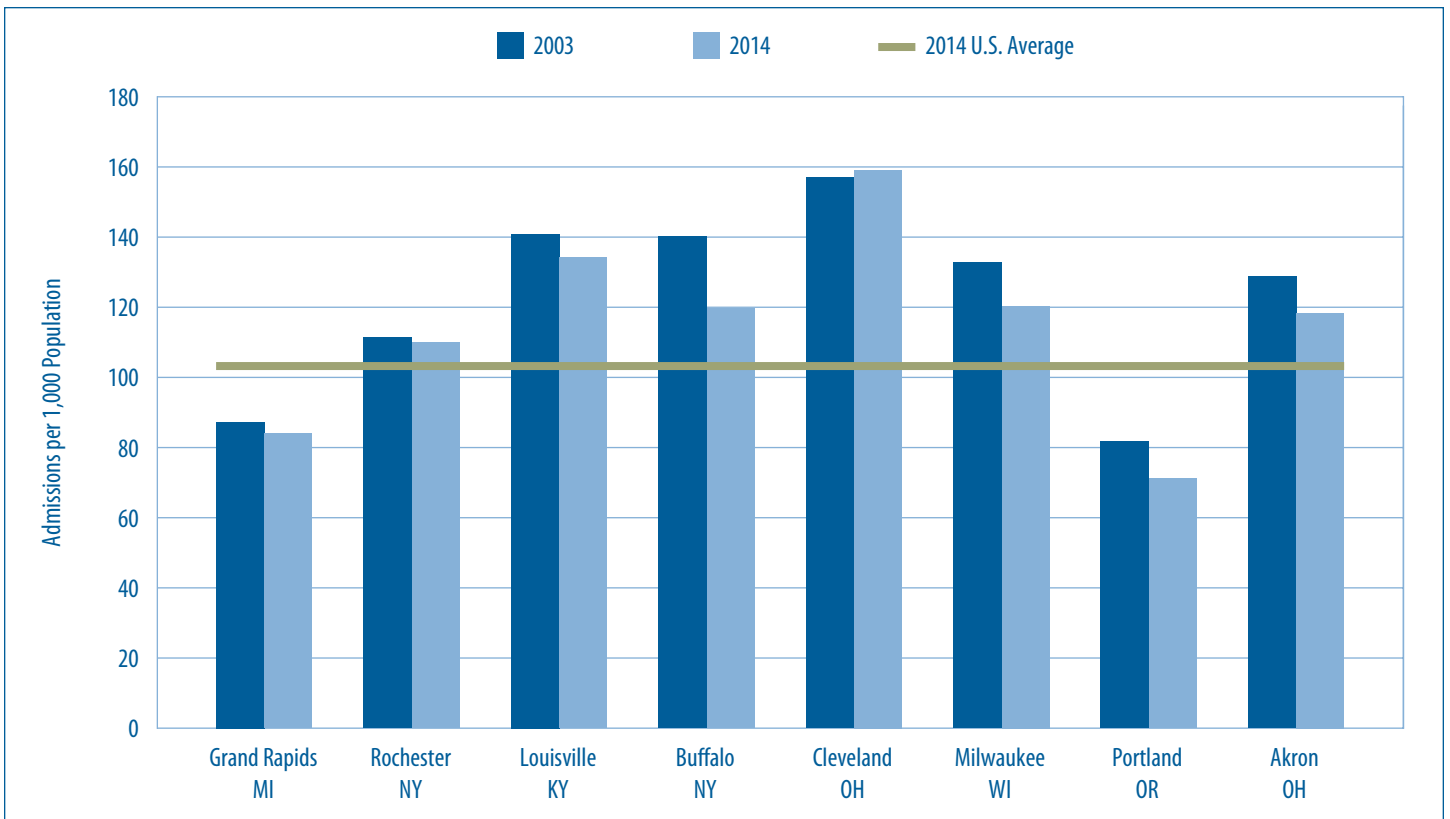
Source: U.S. Census. Bureau population data estimates

Figure 2: Hospital Beds per 1,000 Population



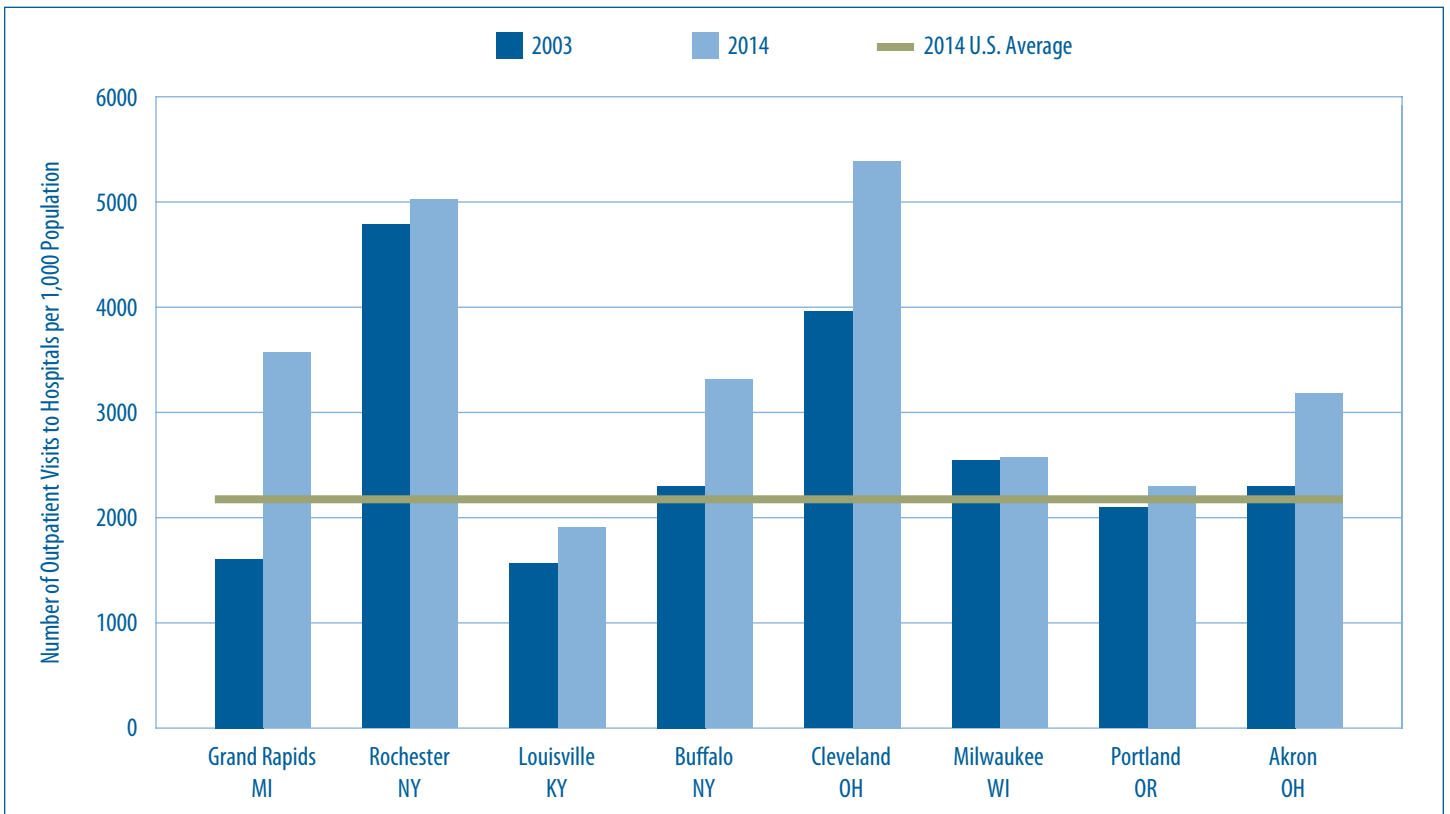
Source: American Hospital Association. AHA hospital statistics, 2016
2003 U.S. average = 2.8 beds per 1,000 population

Figure 3: Hospital Admissions per 1,000 Population



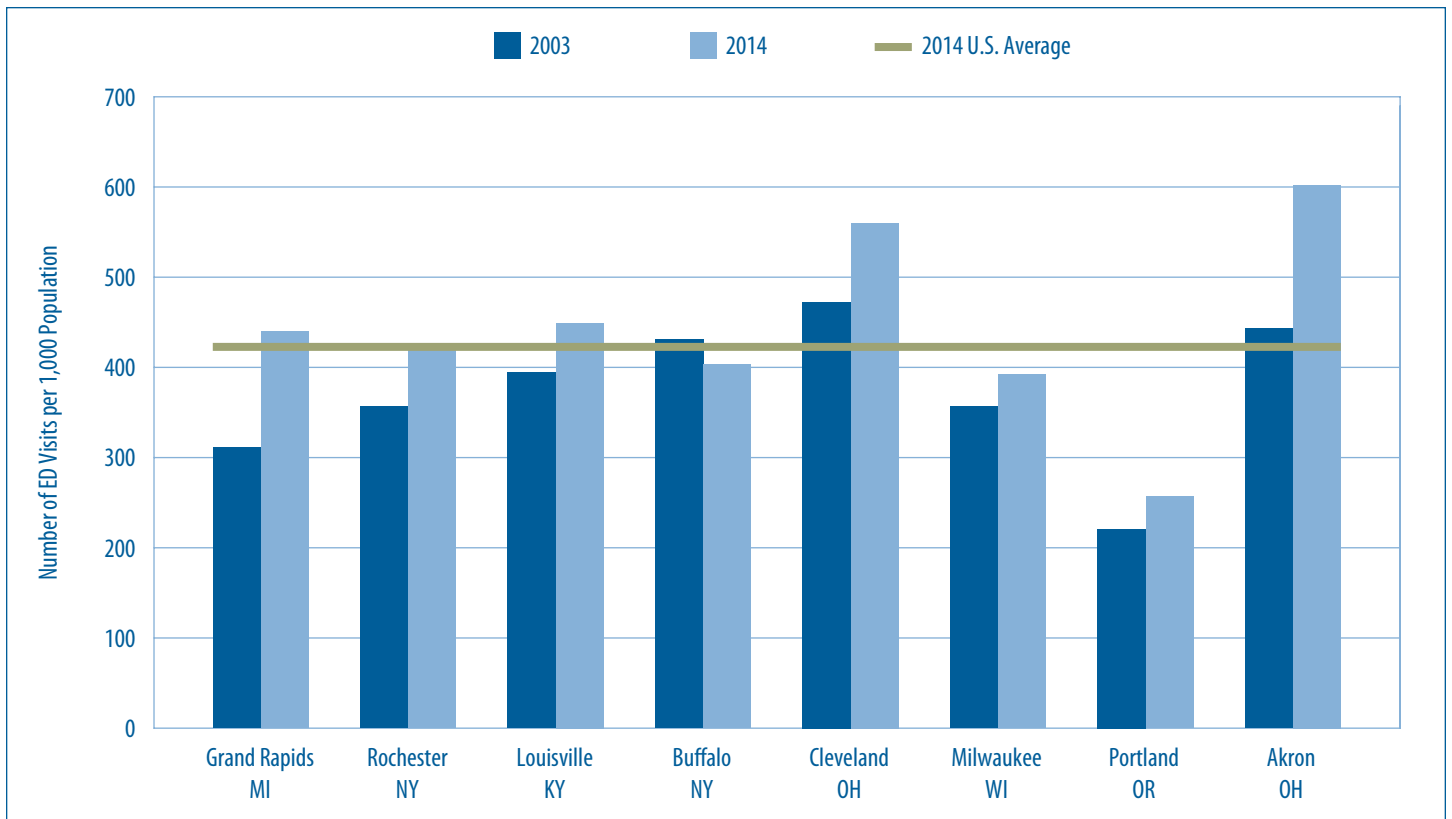
Source: American Hospital Association. *AHA hospital statistics, 2016*
2003 U.S. average = 120 admissions per 1,000 population

Figure 4: Outpatient Visits to Hospitals per 1,000 Population



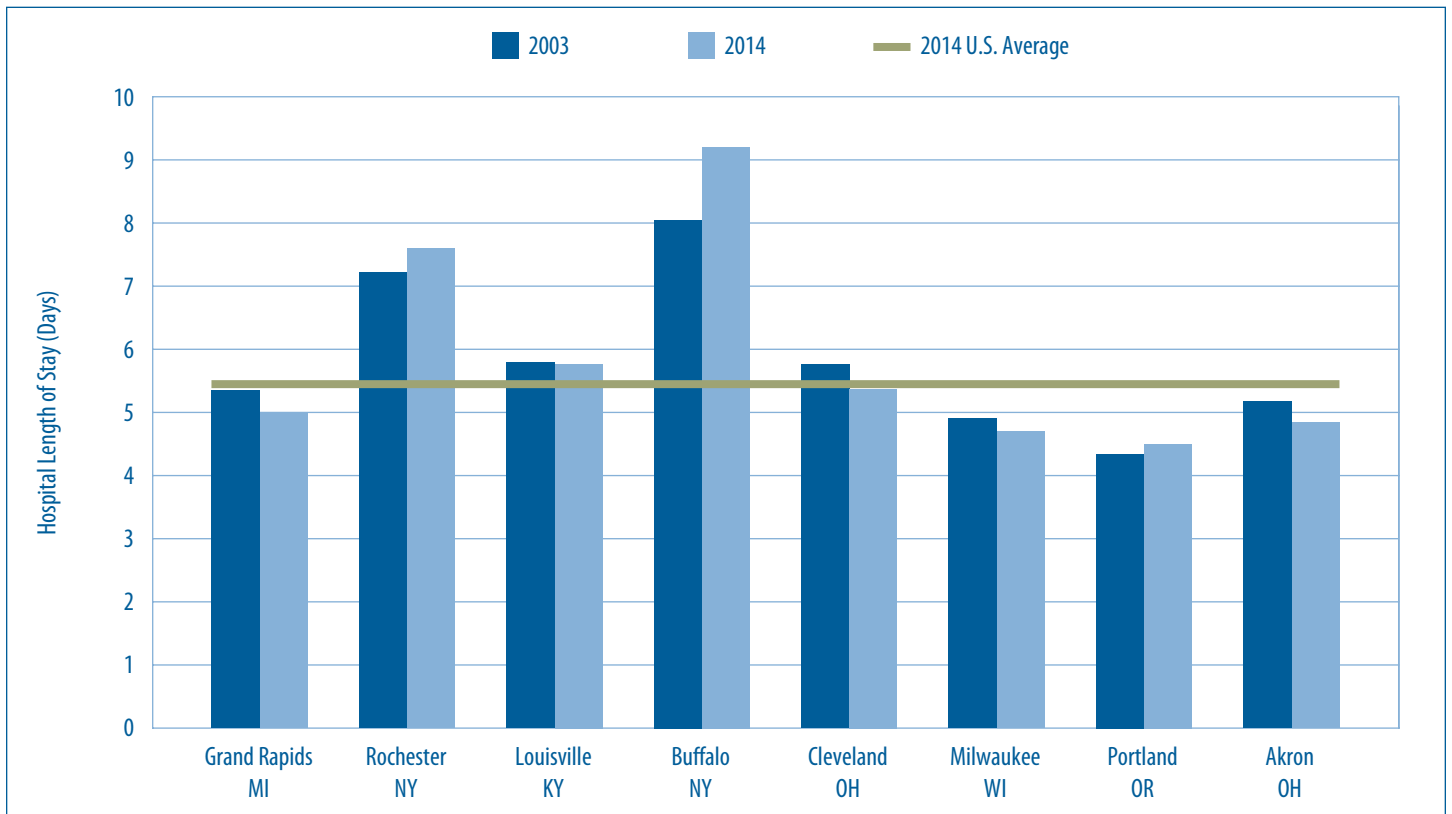
Source: American Hospital Association. *AHA hospital statistics, 2016*
2003 U.S. average = 1,936 outpatient visits to hospitals per 1,000 population

Figure 5: Emergency Department Visits per 1,000 Population



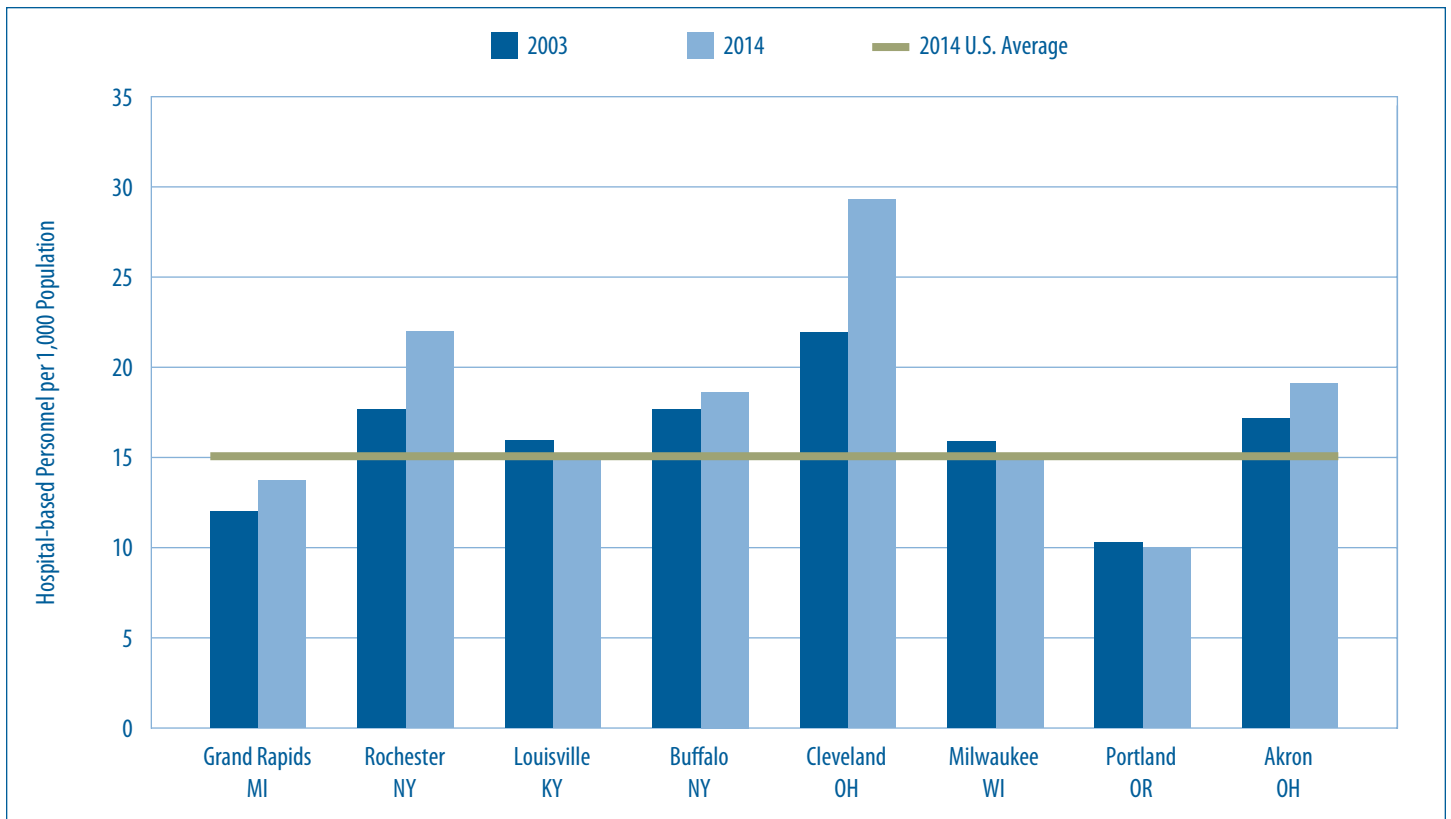
Source: American Hospital Association. *AHA hospital statistics, 2016*
 2003 U.S. average = 382 ED visits per 1,000 population

Figure 6: Average Hospital Length of Stay



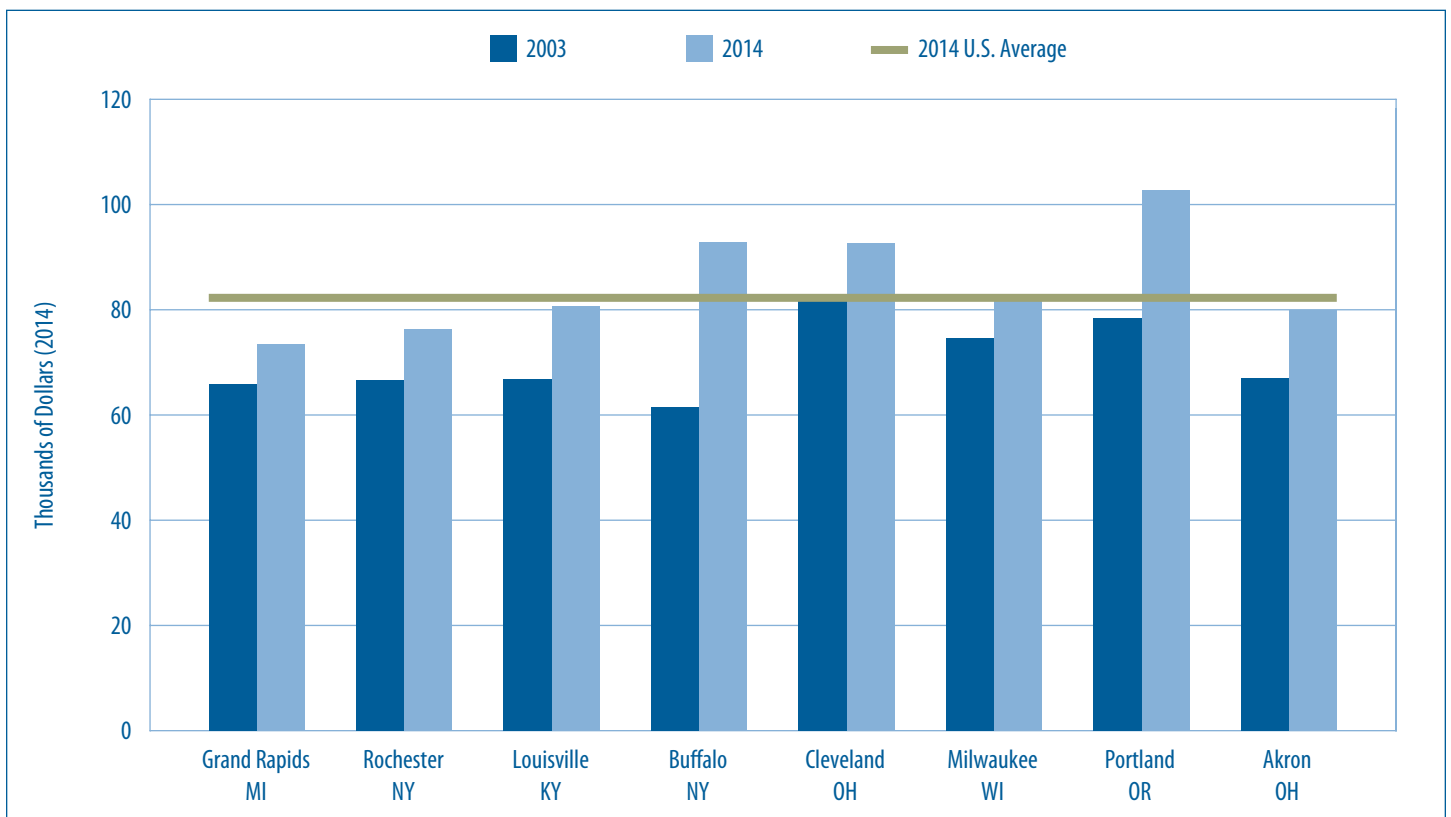
Source: American Hospital Association. *AHA hospital statistics, 2016*
 2003 U.S. average = 5.7 days per hospital admission

Figure 7: Hospital-based Personnel per 1,000 Population



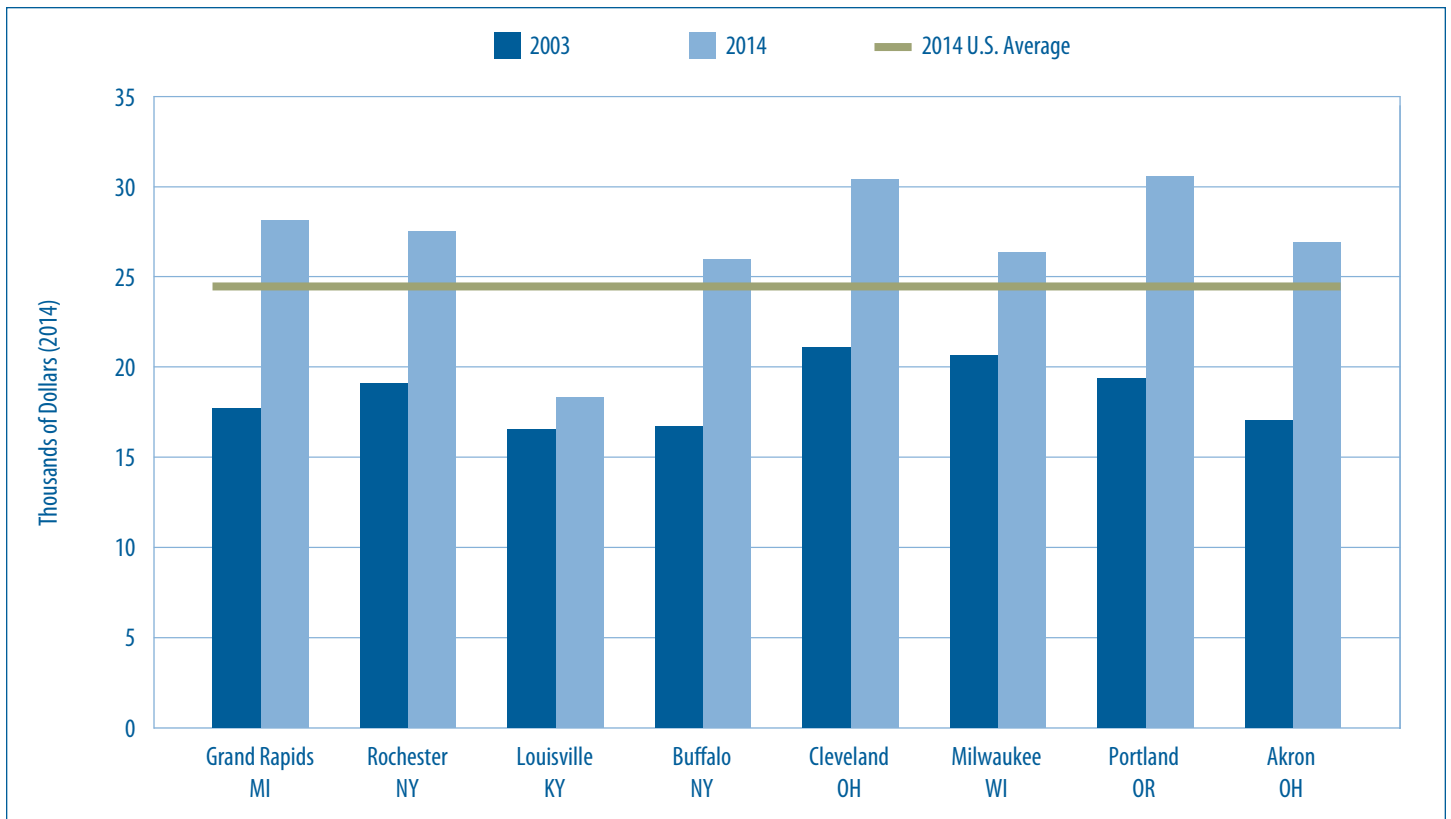
Source: American Hospital Association. *AHA hospital statistics, 2016*
2003 U.S. average = 14.1 hospital-based medical personnel per 1,000 population

Figure 8: Payroll and Benefit Expenses per Hospital Employee



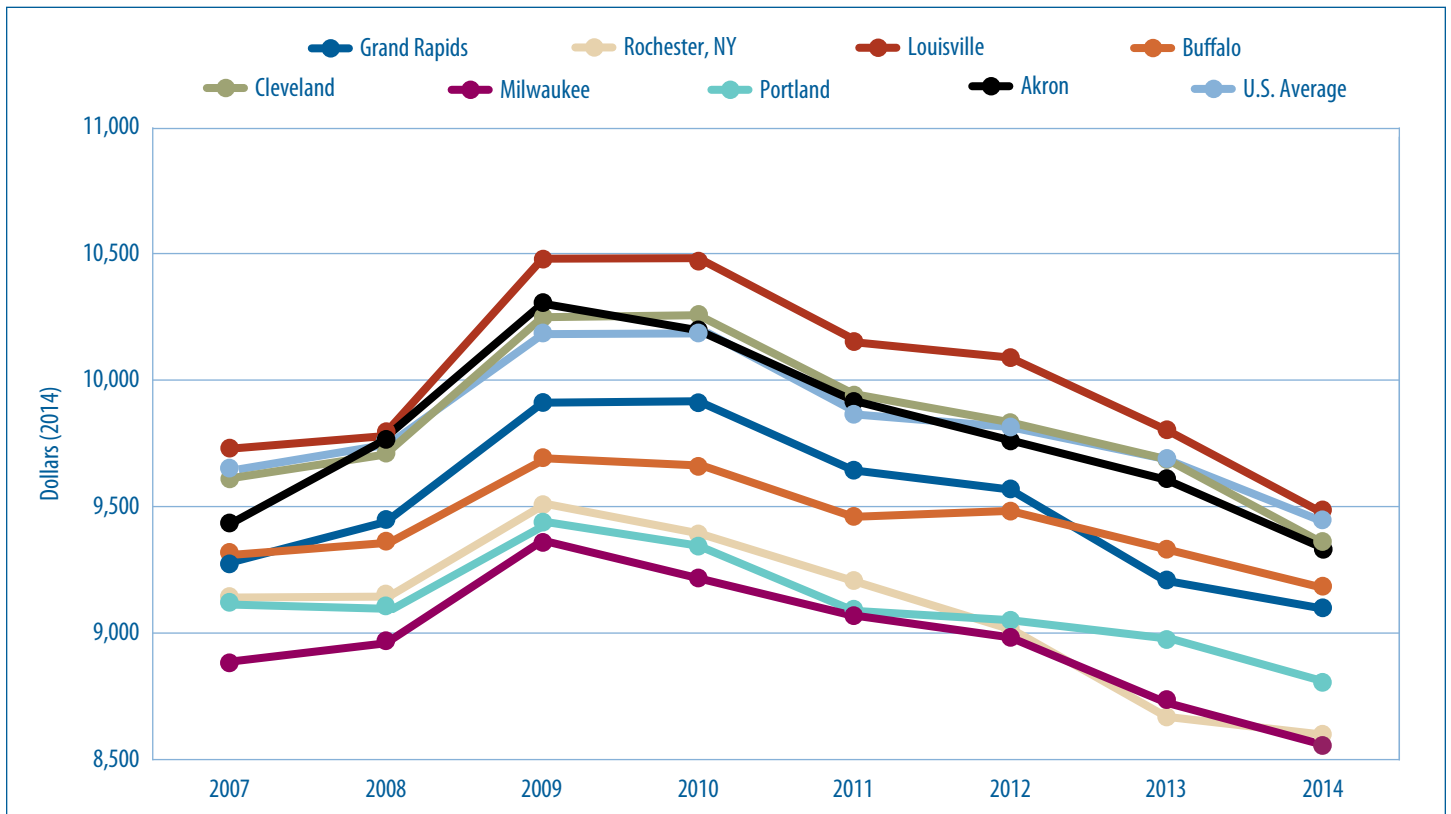
Source: American Hospital Association. *AHA hospital statistics, 2016*
2003 U.S. average = 71.8 thousand dollars (2014)

Figure 9: Total Hospital Expenses per Admission



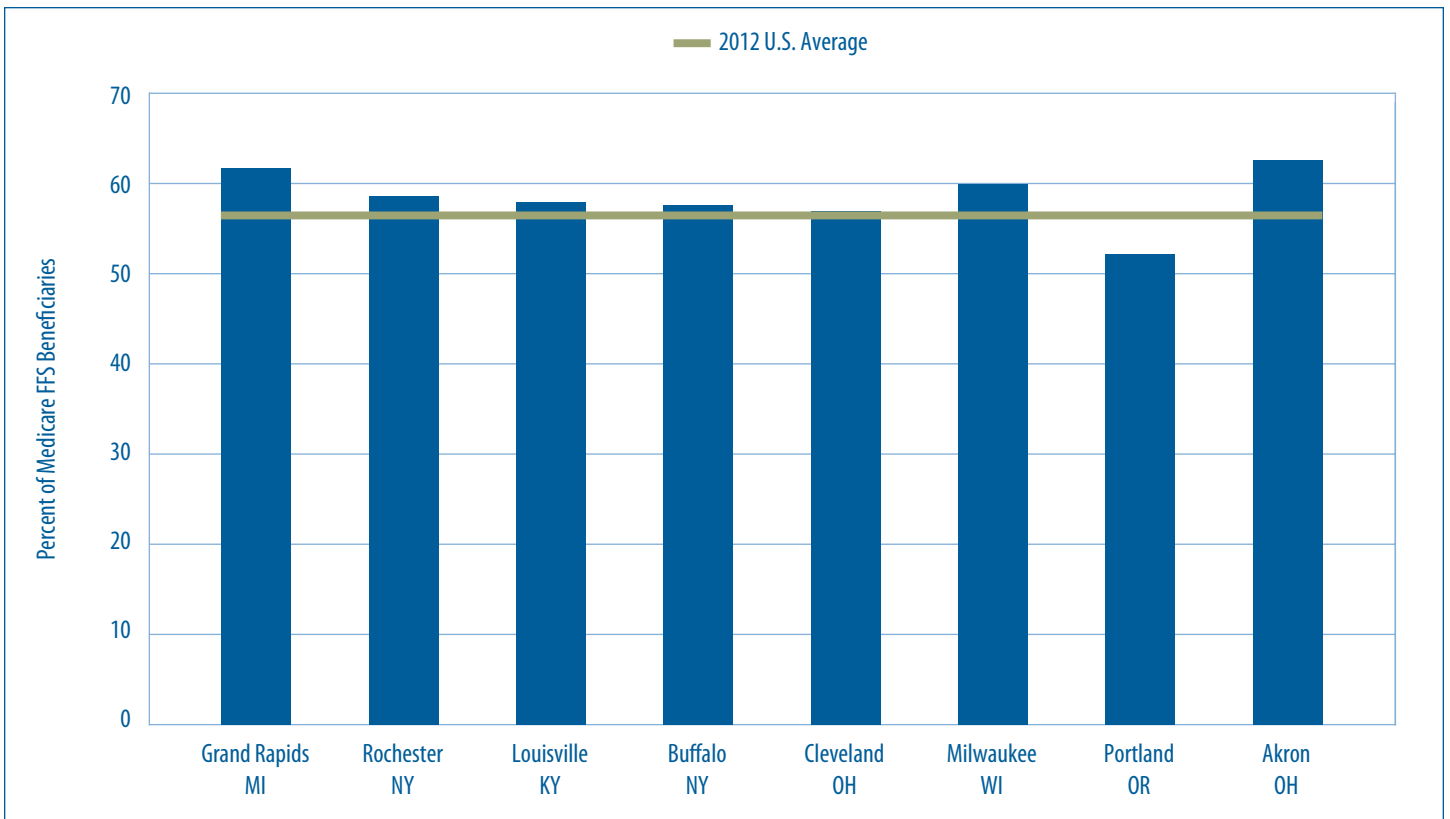
Source: American Hospital Association. *AHA hospital statistics, 2016*
 2003 U.S. average = 16.4 thousand dollars (2014)

Figure 10: Adjusted Medicare Expenditures per Medicare Enrollee



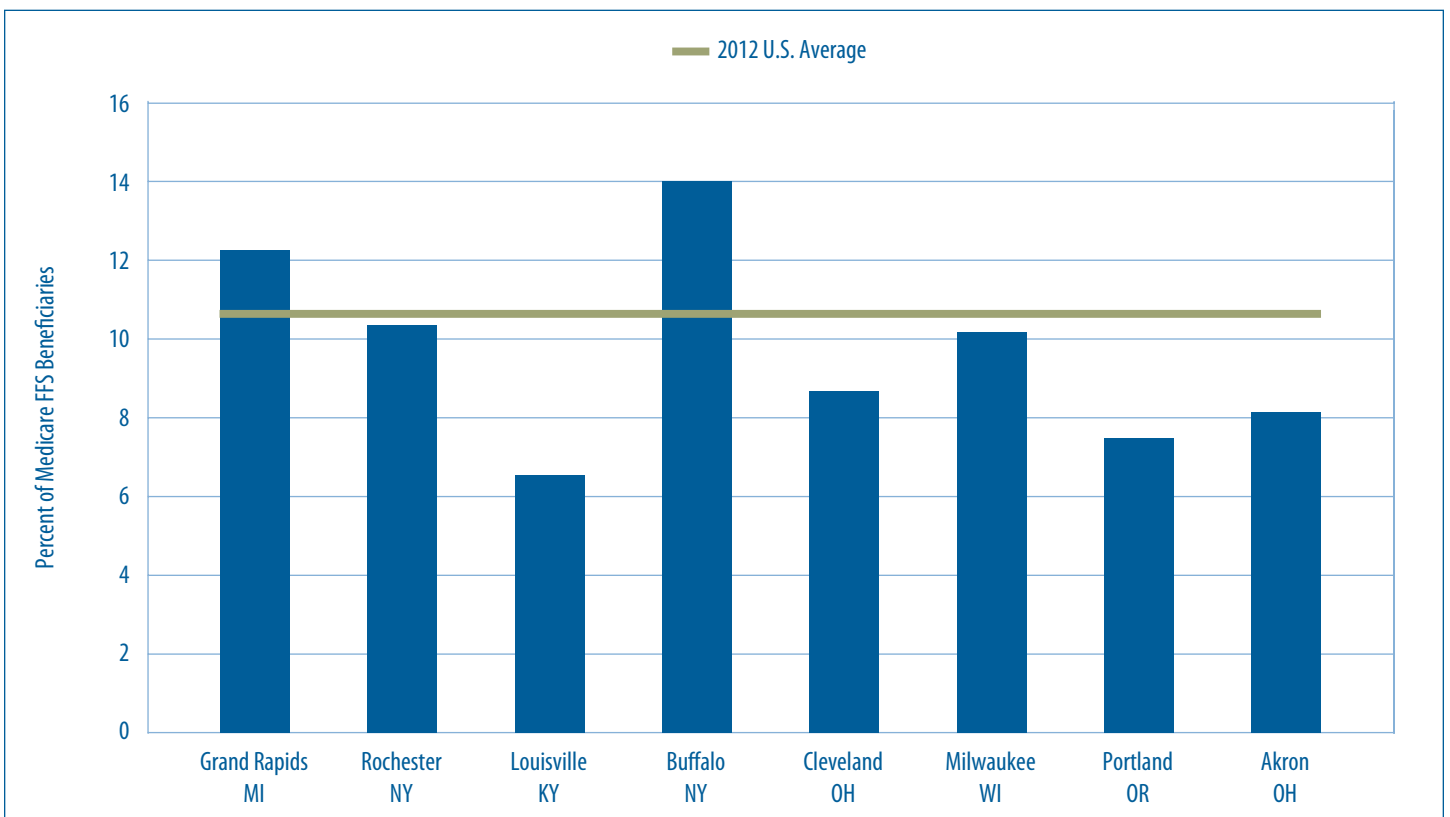
Sources: CMS Geographic Variation Public Use File; CMS Monthly Enrollment by Contract/Plan/State/County Files; CMS Plan Payment Data Files.

Figure 11: Care Coordination - Percent of Medicare FFS Beneficiaries whose Predominant Provider was a Primary Care Physician, 2012



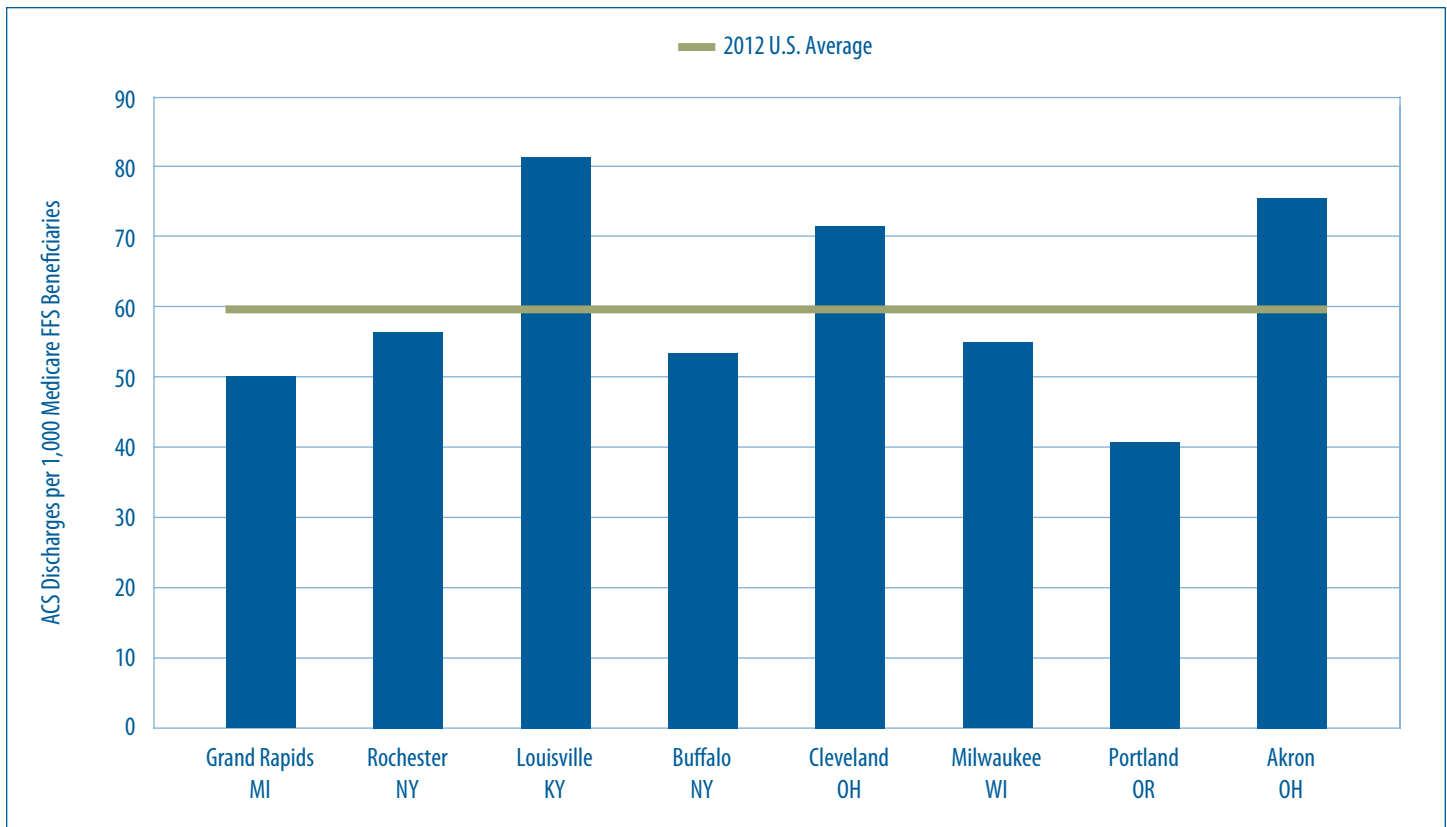
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 12: Care Coordination - Percent of Medicare FFS Beneficiaries Having an Annual Wellness Visit, 2012



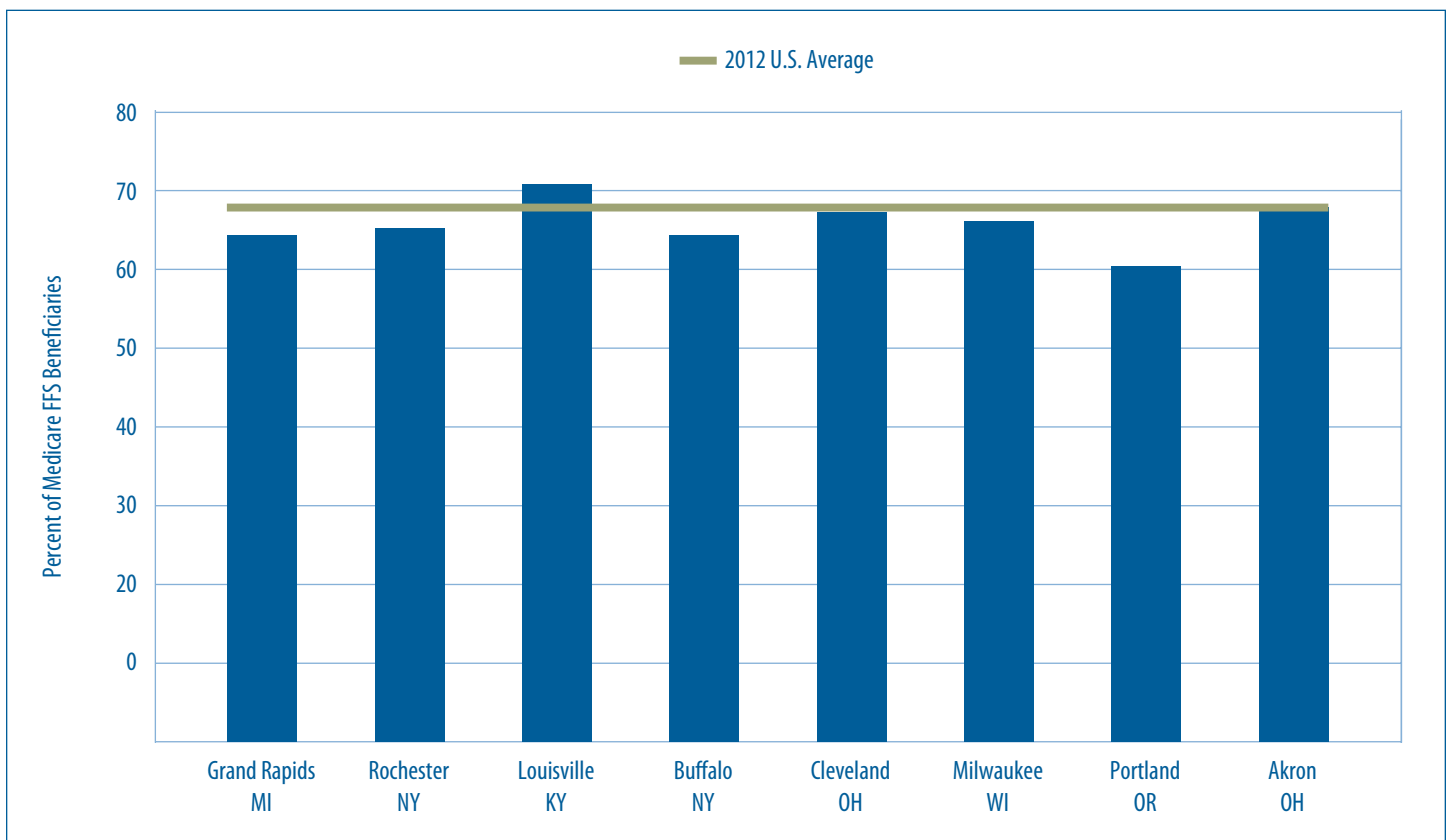
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 13: Care Coordination - Discharges for Ambulatory Care-Sensitive Conditions per 1,000 Medicare FFS Beneficiaries, 2012



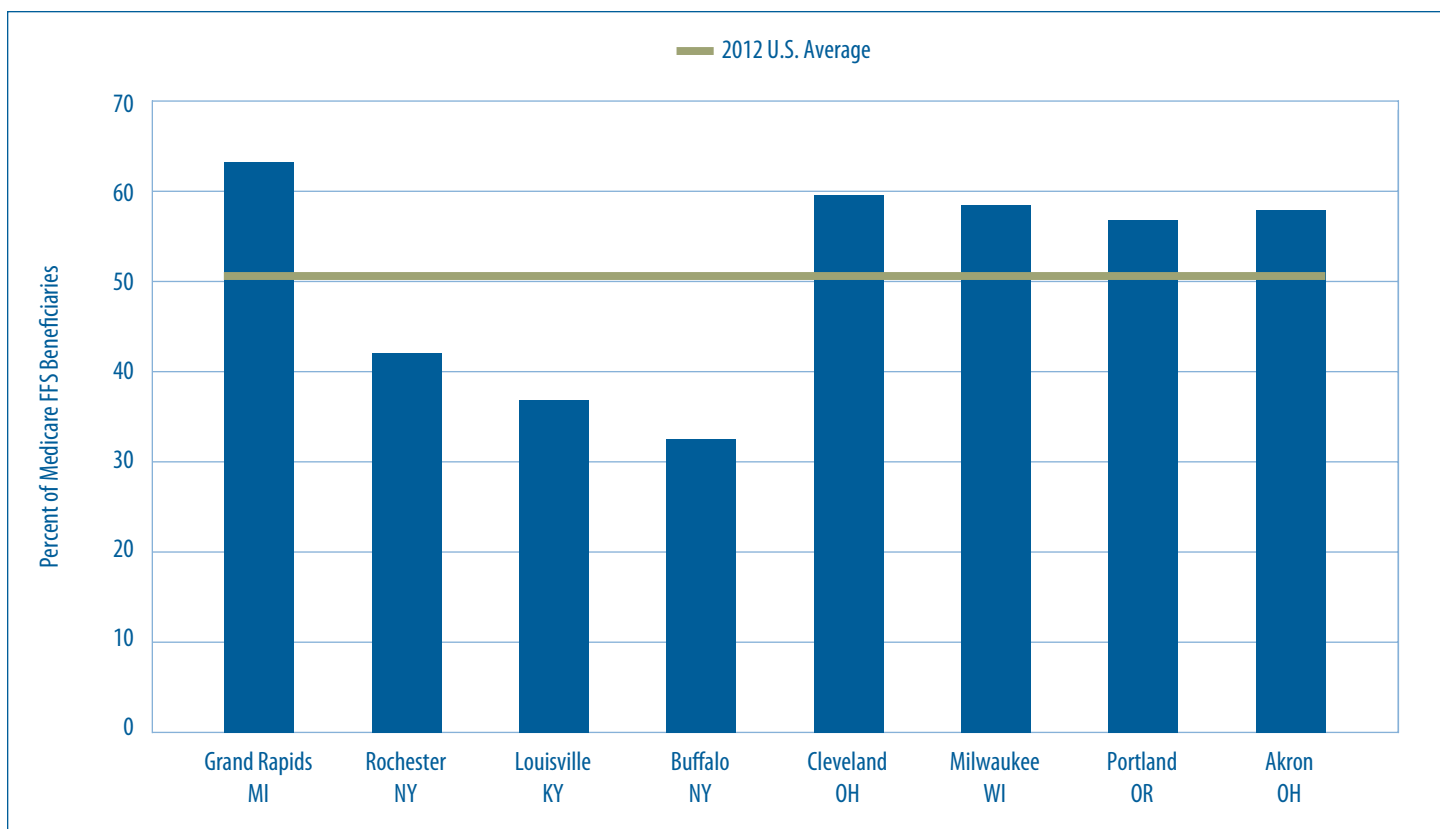
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 14: : End of Life Care - Percent of Medicare FFS Beneficiaries Hospitalized in the Last 6 Months of Life, 2012



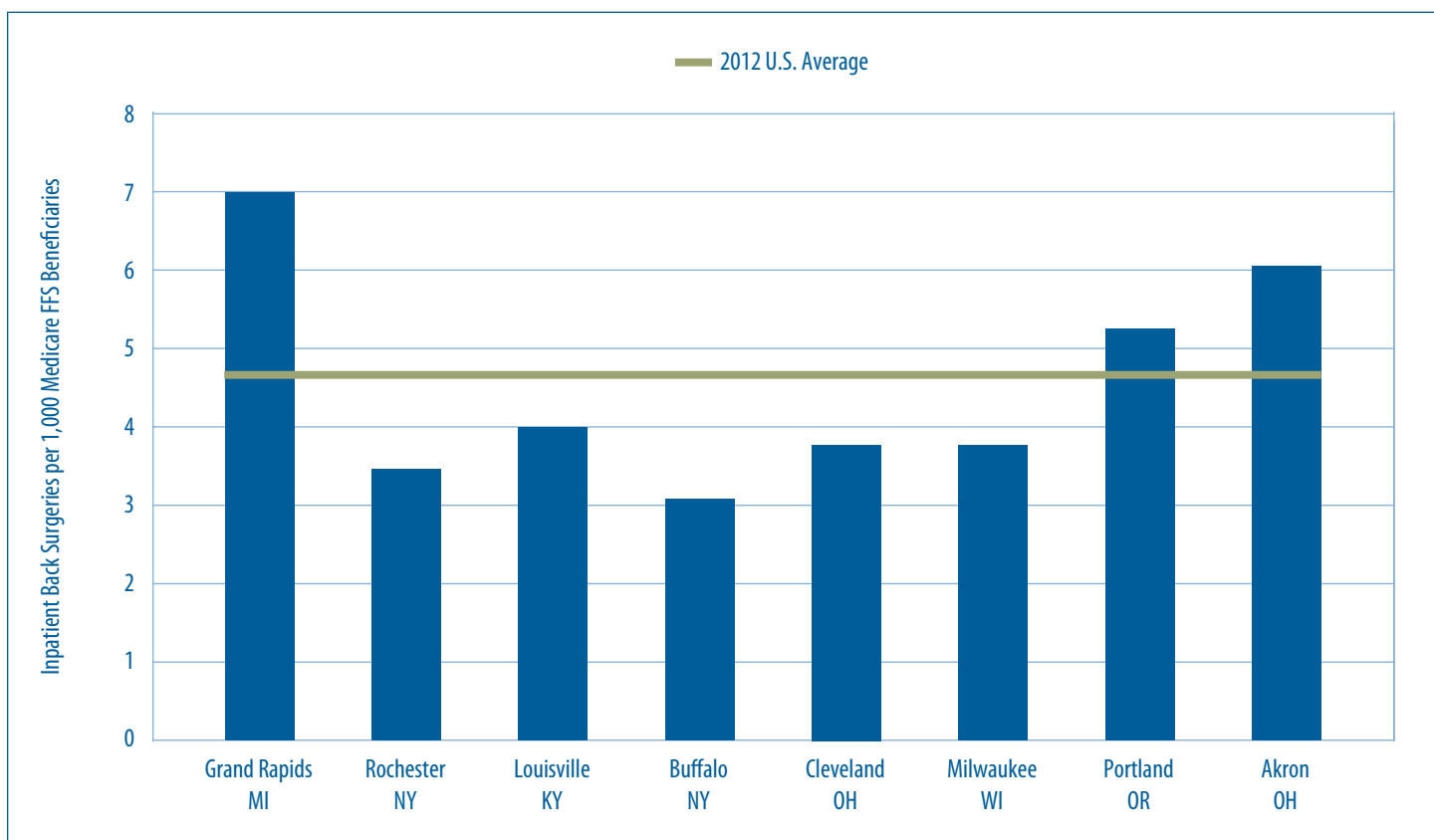
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 15: End of Life Care - Percent of Medicare FFS Beneficiaries Enrolled in Hospice in the Last 6 Months of Life, 2012



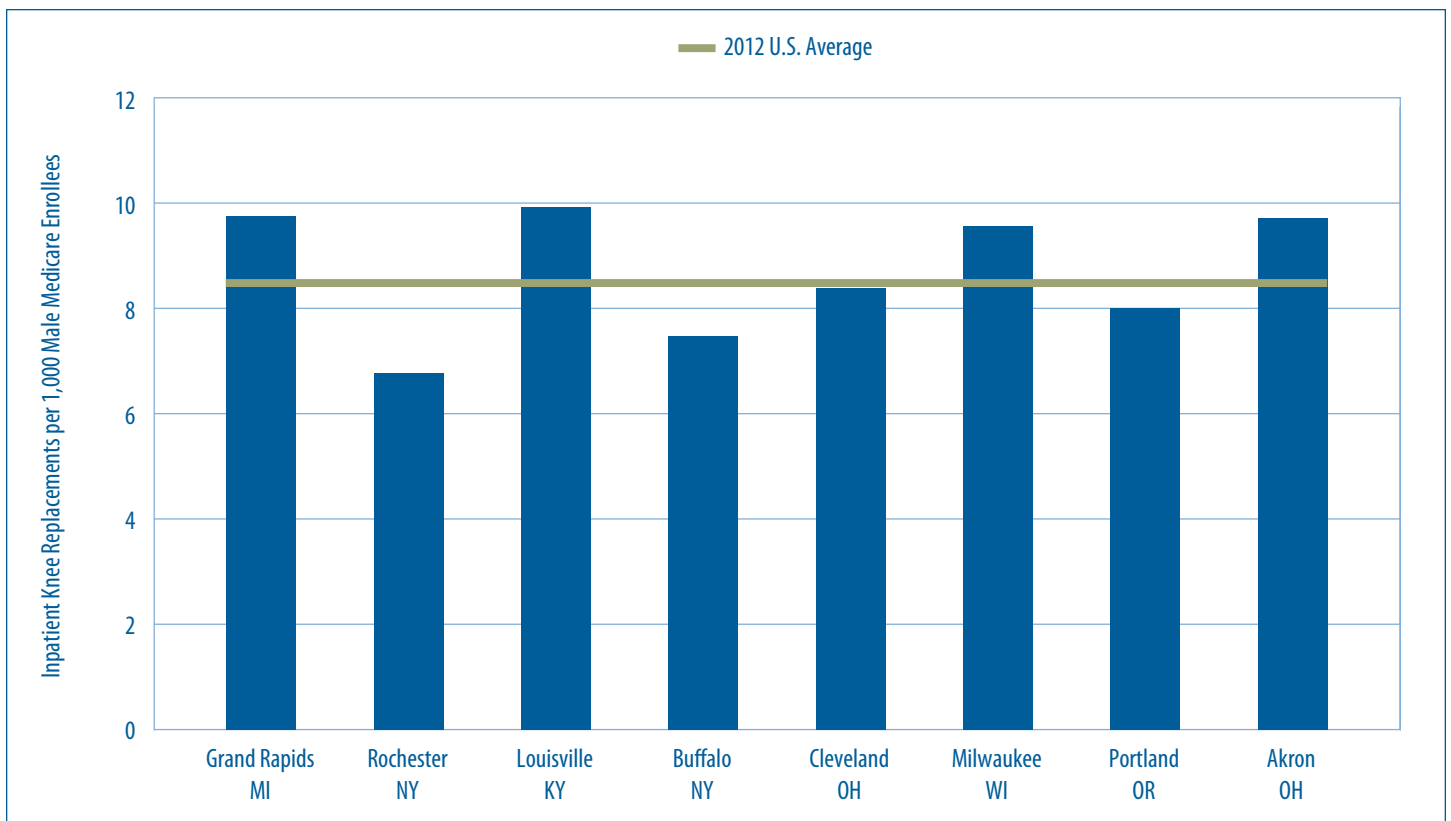
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 16: Utilization - Inpatient Back Surgeries per 1,000 Medicare FFS Beneficiaries, 2012



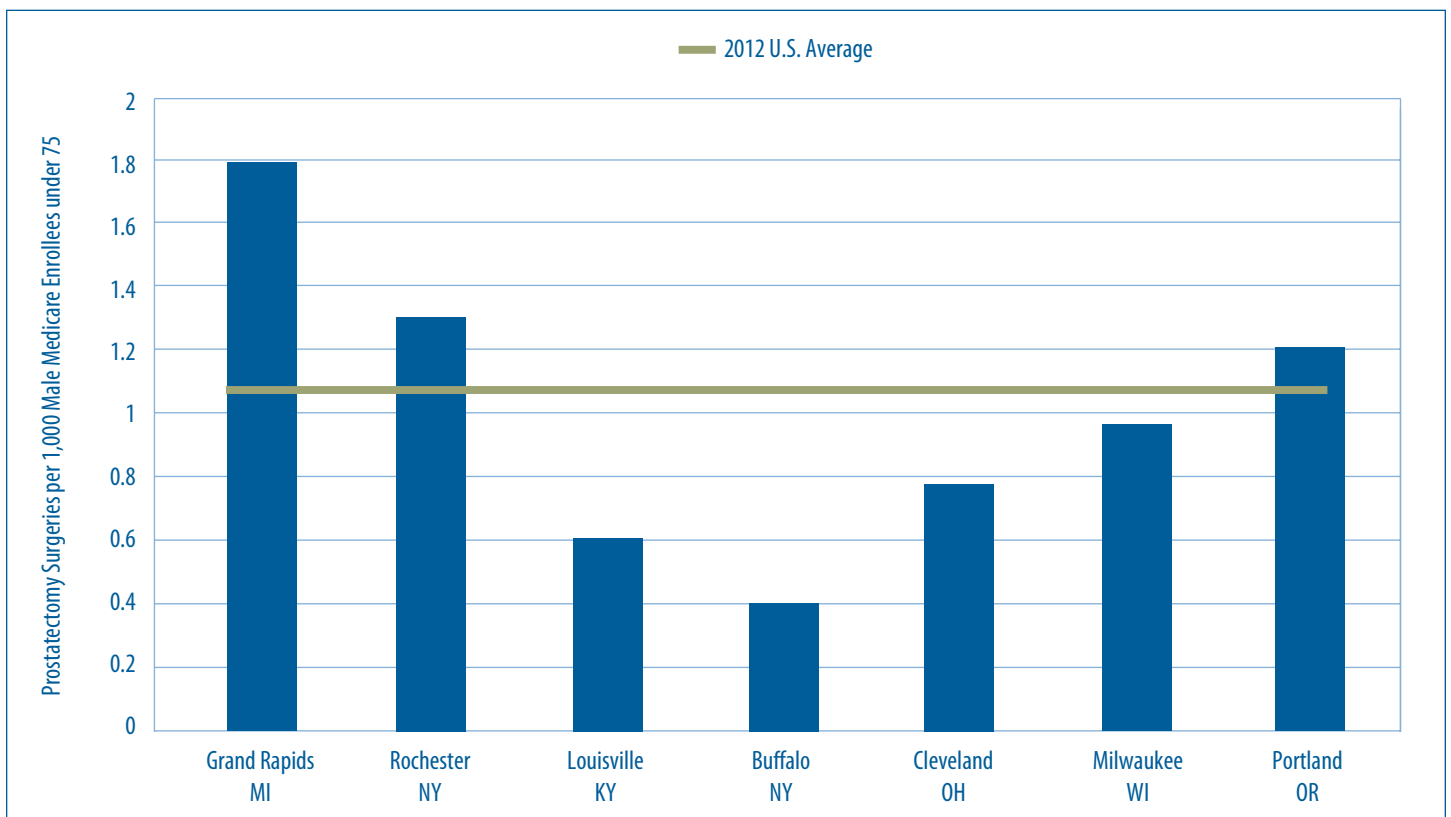
Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 17: Utilization - Inpatient Knee Replacement per 1,000 Medicare FFS Beneficiaries, 2012



Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Figure 18: Utilization - Inpatient Radical Prostatectomy per 1,000 Medicare FFS Beneficiaries, 2012



Source: Dartmouth Atlas of Health Care. *Variation in the care of surgical conditions*

Employer Health Insurance Survey

Employer-sponsored health insurance covered 49 percent of the population – more Americans than any other type of insurance (Kaiser Family Foundation [KFF], 2015). With the unfolding of the Employer Mandate in 2015, many policy analysts wondered if large employers would drop coverage and pay the penalty, given that maintaining coverage is the more expensive option. This prediction has not come to fruition, with coverage rates holding steady and, even in some instances, increasing (Employee Benefits Research Institute, 2016). However, employees continue to pay an increasing portion of their health care expenses as the growth of premiums outpaces the growth in employer premium contributions. Furthermore, companies are turning more and more to high-deductible health plans (HDHPs), which require large outlays from the employee before coverage kicks in.

In this survey, we explore the employer-sponsored health insurance landscape. Seventy-eight firms, all members of The Employers' Association (TEA)¹ of West Michigan, answered a three-page online survey about whether they offered health insurance, the type(s) of insurance, and whether they offered a high deductible plan.² Information about the cost of premiums, deductibles, co-insurance, and savings accounts for medical expenditures, including health reimbursement accounts (HRAs), health savings accounts (HSAs), and flexible spending accounts (FSAs) was collected. We also asked questions about firm size and industry.

Firm Characteristics

The majority of TEA's members are middle to large size manufacturing firms, so the characteristics of the firms who responded to the survey are very similar. **Figure 1** breaks down each firm by the number of full-time (30+ hours per week) employees. About one third of firms

are small (up to 49 full-time employees), 47 percent are mid size (50-249 employees), and 23 percent are large (250+ employees); about half are in the manufacturing industry (**Table 1**). Twelve percent of companies listed their industry as "other"³, while 10 percent are non-profits. Wholesale trade and distribution and professional, scientific, or technical services each make up 8 percent of the sample.

Health Insurance Offerings

Only 1 percent of the firms in our sample did not offer health insurance (**Figure 2**). Given that the majority of the companies are mid-size and large firms, this is not surprising. Mid-size and large firms are more likely to offer health insurance, with 89 percent and 96 percent, respectively, offering insurance in 2016 (KFF, 2016).

Figure 2 also reports the percentage of firms with one, two-three, or more than three plans. Two-thirds of companies offer only one plan, while 28 percent have two or three plans. Five percent offer more than three plans.

The KFF's 2016 Employer Benefits Survey shows that nationally, 83 percent of firms offer one plan. The number of plans typically varies by firm size, however, with the number of plans offered increasing as firm size increases. The KFF survey is more heavily weighted on small firms than is ours, which would explain the larger percentage of firms with only one plan in their sample.⁴

Over the last two decades, PPOs have covered the largest share of workers than any other plan type. This trend continued into 2016, although the percentage of covered workers has dropped from 60 percent in 2009 to 48 percent in 2016. This decrease has been

Table 1. Industry

Industry	Percentage
Manufacturing	52
Other	12
Non-profit	10
Wholesale Trade and Distribution	8
Professional, Scientific, or Technical Services	8
Financial Services	4
Healthcare	3
Construction	3
Total	100

Number of observations: 78

Source: Author's calculations

¹ The Employers' Association is a not-for-profit employers' association, incorporated in 1939, serving the West Michigan employer community from its Grand Rapids office. They assist hundreds of member companies maximize employee productivity and minimize employer liability through practical human resources and management advice, training, survey data, and consulting services.

² The survey was sent out to 564 companies, for a 13% response rate.

³ Industries in the "Other" category include supply chain and logistics, agriculture, property management, sales, and benefit consulting.

eclipsed by strong growth in high deductible plans,⁵ from 8 percent of covered workers in 2009 to 29 percent in 2016 (KFF, 2016). In fact, in 2016, 83 percent of large employers offered at least one high deductible health plan (HDHP) plan, and one-third offered only a HDHP (National Business Group on Health, 2016).

Figures 3 and 4 report information on plan types, with a particular focus on HDHPs. Sixty-eight percent of firms offered at least one HDHP plan, 40 percent a non-HDHP (hereafter referred to as a traditional plan) PPO, 14 percent a traditional HMO, and 3 percent a traditional POS (**Figure 3**). There were no firms with indemnity plans. Furthermore, 42 percent of firms offered only a HDHP to their workers (**Figure 4**).

How might this increasing trend of HDHPs affect the worker? HDHPs typically have lower premiums, which bring down monthly costs. In addition, HSAs are usually offered alongside these plans, which can help the worker pay the high deductible, and many companies also contribute to these accounts.⁶ In addition, firms that otherwise cannot afford to pay the premiums for a more traditional health plan may offer an HDHP.⁷

There are drawbacks to HDHPs, however. Low-income workers may have a difficult time finding the money to contribute to their HSA, or may not be able to afford to see the doctor for a chronic health problem. The Commonwealth Fund (2014) reported that three out of five low income people and half of those with moderate income

found their deductibles difficult to afford. As a result, 40 percent had a medical problem but didn't see the doctor, and 43 percent skipped a test, treatment, or follow-up recommended by their doctor. If these foregone treatments are for chronic conditions, the long run costs may be much more expensive than the cost of maintenance care.

Plan Premiums, Deductibles & Coinsurance Rates

In **Table 2** we report average premiums, deductibles, and coinsurance rates for HDHP and traditional plans. HDHPs have lower monthly premiums, lower coinsurance rates, and higher deductibles than traditional plans.

The HDHP deductibles are considerably larger than the deductibles for traditional plans. Employees with a traditional plan have, on average, a \$689 deductible for single coverage and \$1,974 for a family. HDHPs have deductibles more than 3 times as high, with single coverage averaging \$2,500 and family coverage averaging \$4,842.

HDHPs often trade higher deductibles for lower premiums and lower coinsurance rates. HDHP plans in our sample have monthly premiums of \$233 and \$664 for single and family coverage, respectively. Traditional plan premiums are higher, \$321 for single coverage and \$906 for a family. Coinsurance rates average 17 percent for high deductible plans and 19 percent for traditional plans.

Table 2: Average Premiums, Deductibles, and Co-insurance Rates: High Deductible and Traditional Plans

	Traditional Plans	High Deductible Plans
Monthly Premium, Single (\$s)	321	233
Monthly Premium, Family (\$s)	906	664
Deductible, Single (\$s)	689	2,500
Deductible, Family (\$s)	1,974	4,842
Coinsurance rate (%)	19	17
Number of observations	38	62

Source: Authors' calculations.
Note: Total number plans = 100. Number of plans is greater than total number of firms in the sample, due to some firms offering more than one plan.

⁴We compared our results by firm size with that of KFFs. This comparison was not exact as our size brackets are different than theirs, but overall, the offerings by firm size were similar. However, because our sample by firm size is so small, we do not report any of our results by firm size in this paper.

⁵By law a plan is a high deductible if the deductible for a single person is at least \$1,300 or \$2,600 for a family.

⁶HSAs allow employee and employer contributions; HRAs only allow employer contributions.

⁷Haviland et al. (2016) find that HDHP plans decreased costs over three years for a large sample of firms.

Health Savings, Health Retirement, and Section 125/Flex Spending Accounts

Flexible Spending Accounts (FSAs) were created in the 1970s to assist employees with paying for medical expenses they expected to incur within the coming year. One drawback to FSAs, however, is that the balance in the account does not roll over from year to year.⁸ Health savings accounts (HSAs), legislated in 2004, allow both employee and employer contributions and are increasingly being offered as an alternative or in tandem with FSAs. The increased use of these accounts is largely attributed to the growth in high deductible plans, as an employer cannot offer an HSA without an accompanying high deductible plan. These plans also allow the full balance to be rolled over to the next year, a benefit over FSAs. Health reimbursement accounts (HRAs) only allow employer contributions and are not nearly as popular as HSAs and FSAs.

Figure 5 reports the incidence of the three types of accounts for our sample. Fifty-three percent of firms offer an FSA, 54 percent an HSA (given they offer an HDHP), and 4 percent an HRA. A 2015 Kaiser Family Foundation survey found that 40 percent of firms with 25-199 employees and 70 percent of firms with 200-999 employees offered FSAs in 2015 (KFF, 2015).

Figure 6 provides information on the percentage of firms that contribute to their workers' HSA, given they offer a high-deductible plan. Fifty-four percent of firms that offer an HSA also make a contribution to the account. The average amount contributed per year was \$665 for single coverage and \$1,245 for family coverage (not shown in figure).⁹ Given the average HDHP deductibles reported in **Table 2**, employer contributions will pay for about a quarter of the deductible for both single and family coverage.

If the past few years give us an inkling of what lies ahead, employer provided insurance is here to stay. Firms mandated to provide coverage are still doing so, albeit at higher costs to the employee. High deductible plans continue to grow, as do the number of firms that offer only a high deductible plan to their workers. These plans are less expensive for the firm; however, they require employees to incur large up-front costs before providing coverage. The majority of firms offer some type of savings account and many of these companies also make contributions on the employee's behalf to alleviate some of the initial cost of seeking care.

The Employer Association (TEA) of West Michigan participated in the design and distribution of the survey.

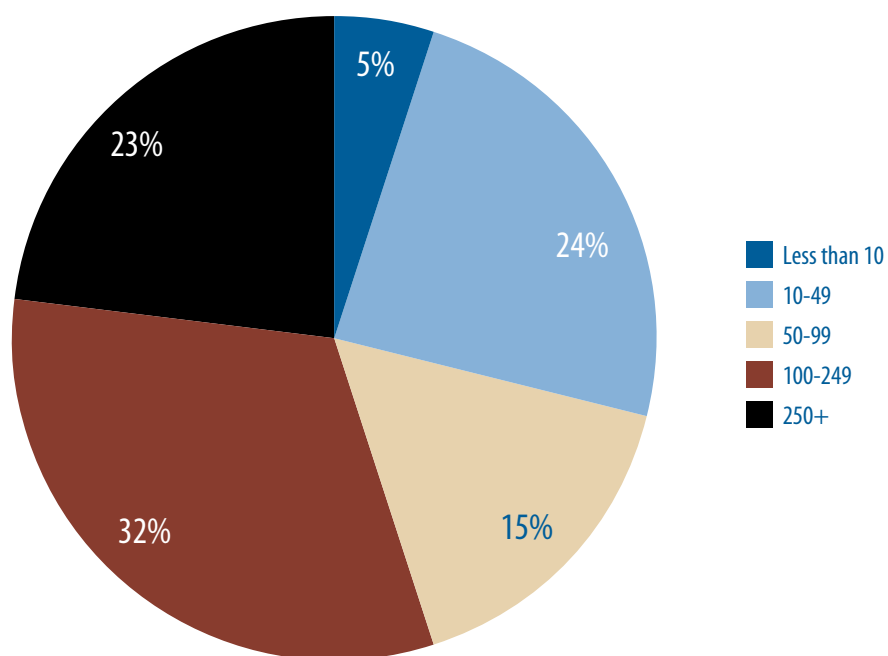
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⁸ Employers are now able to allow employees to roll over up to \$500 in contributions per year (Zane Benefits, 2012).

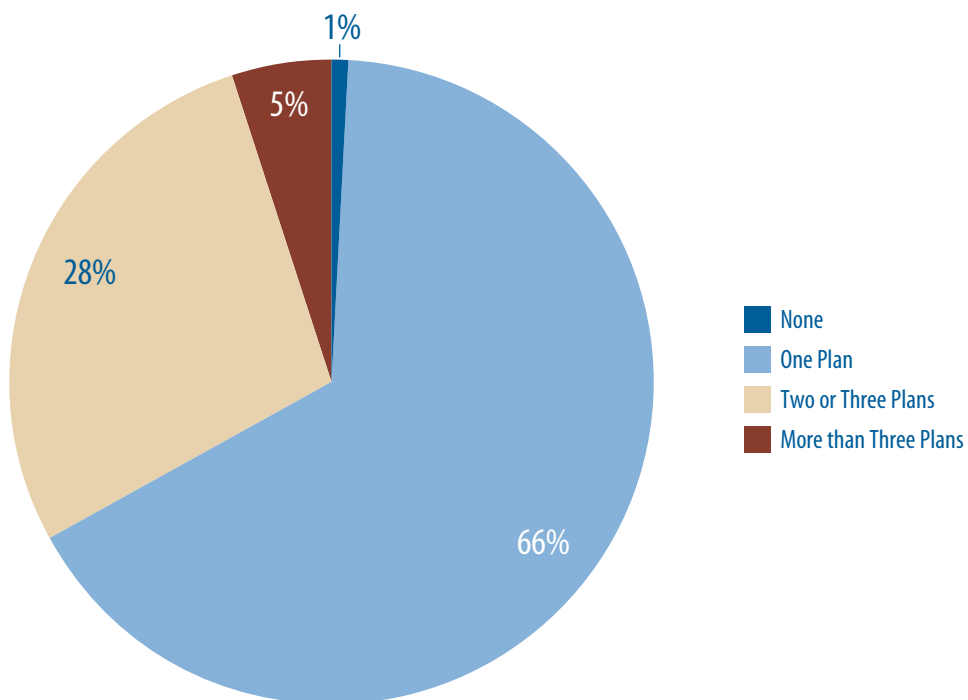
⁹ There are only three firms in our sample that offered HRAs, and two reported the contribution amounts. The mean contribution for single coverage is \$1,850 and for family coverage, \$3,700.

Figure 1: Number of Full Time Employees



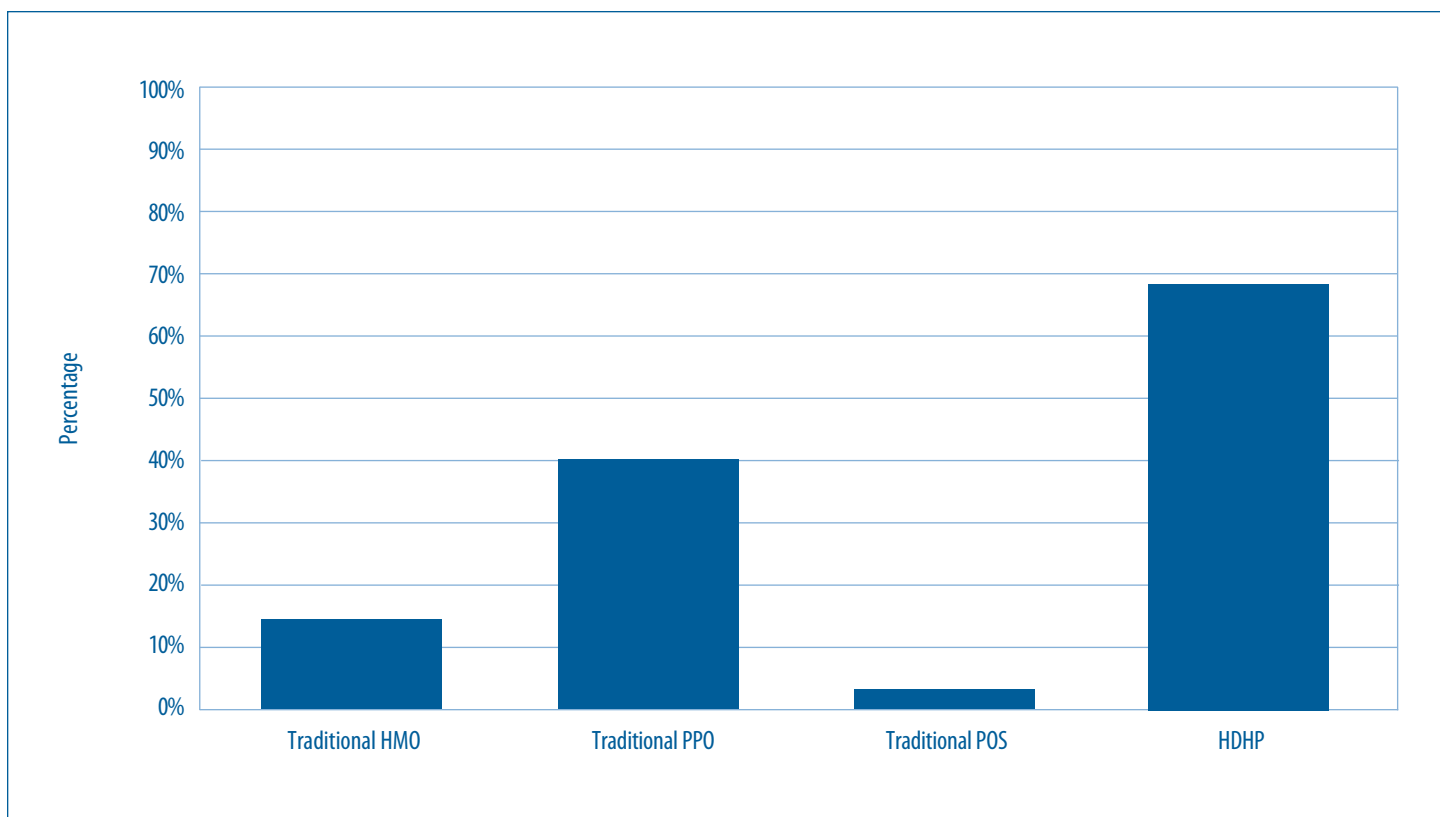
Number of observations: 78
Source: Author's calculations

Figure 2: Number of Plans Offered



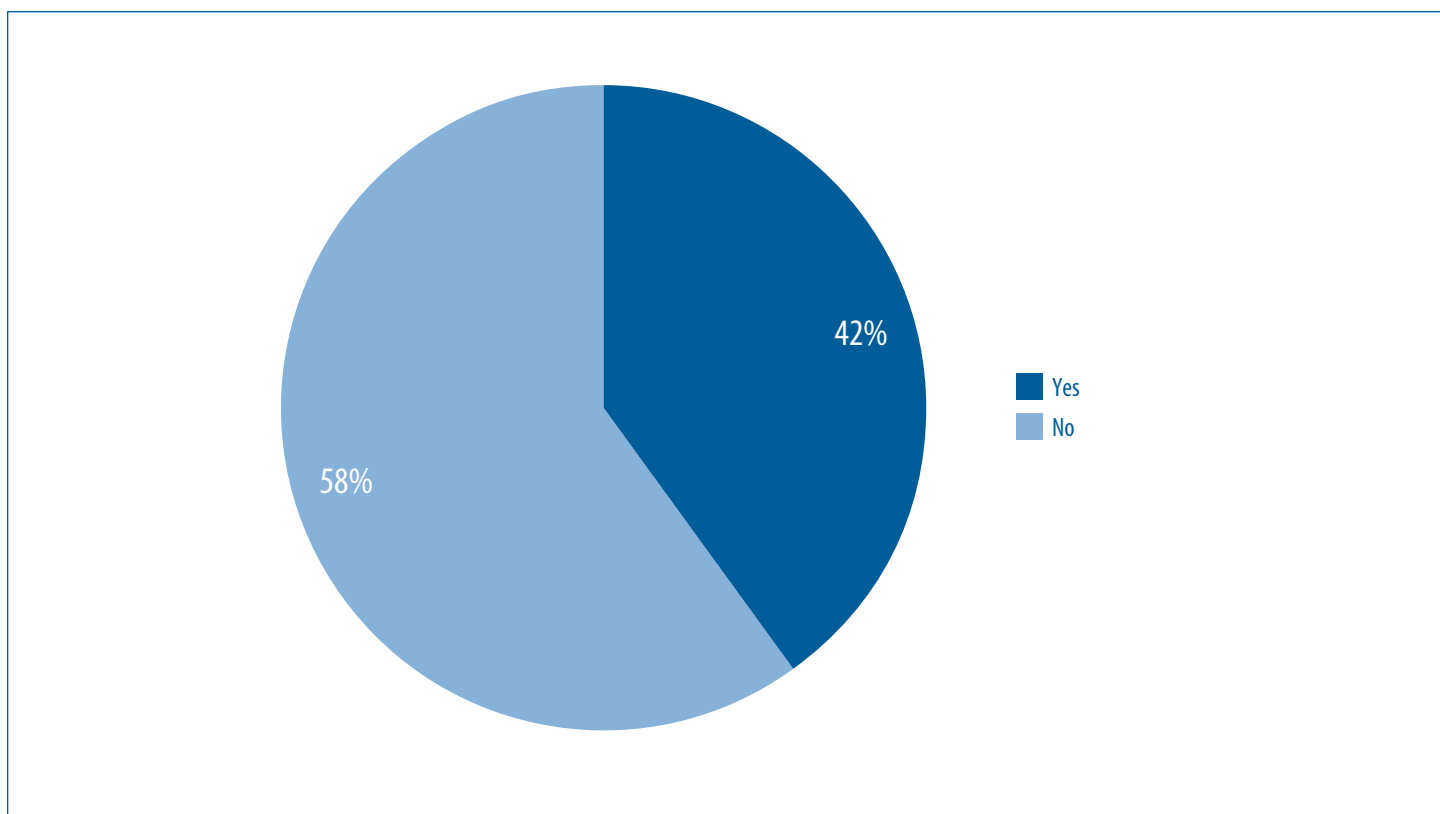
Number of observations: 78
Source: Author's calculations

Figure 3: Percentage of Firms Offering Each Type of Plan



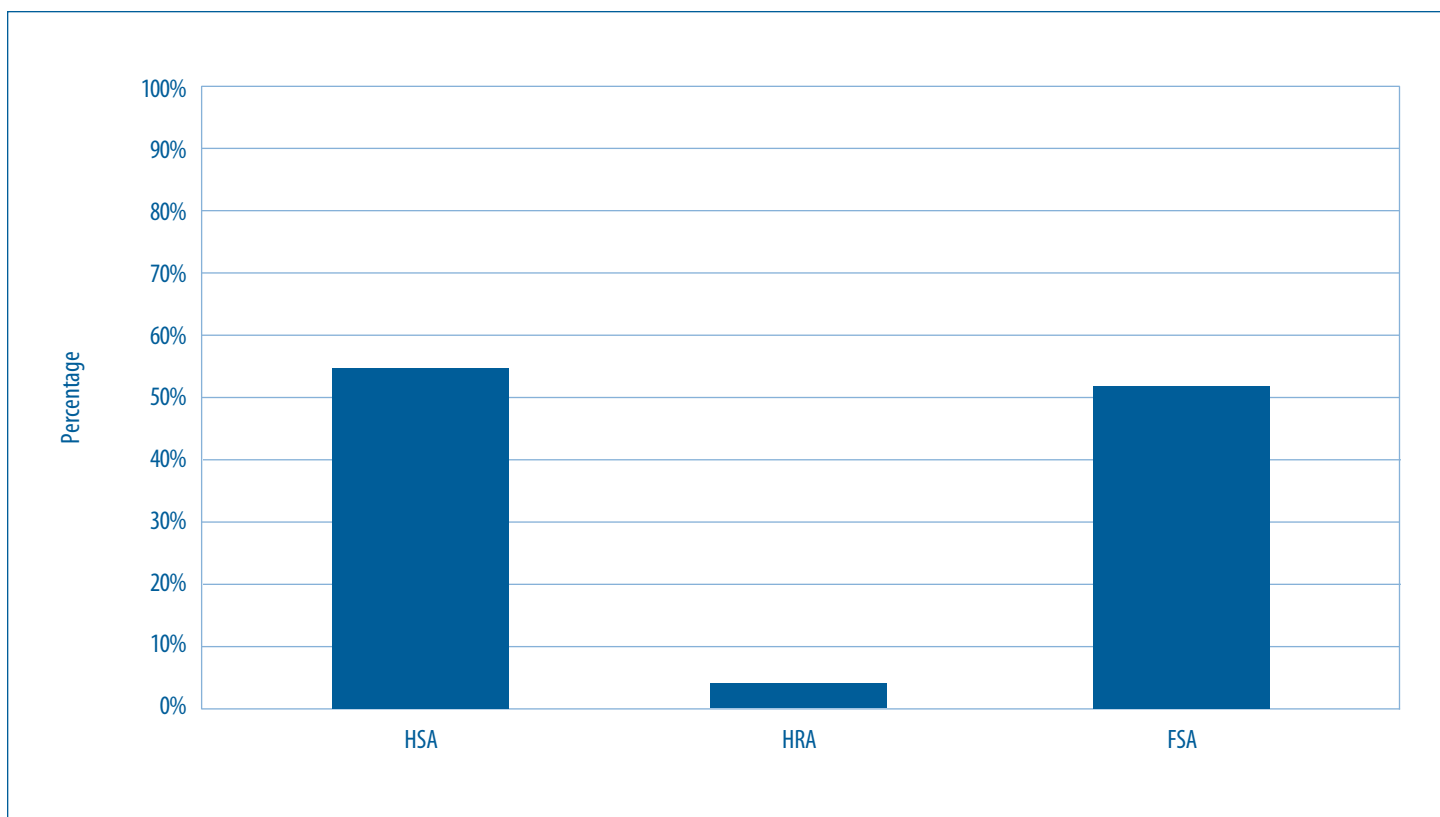
Number of observations: 77
Source: Author's calculations

Figure 4: Percentage of Firms Offering Only a High Deductable Plan



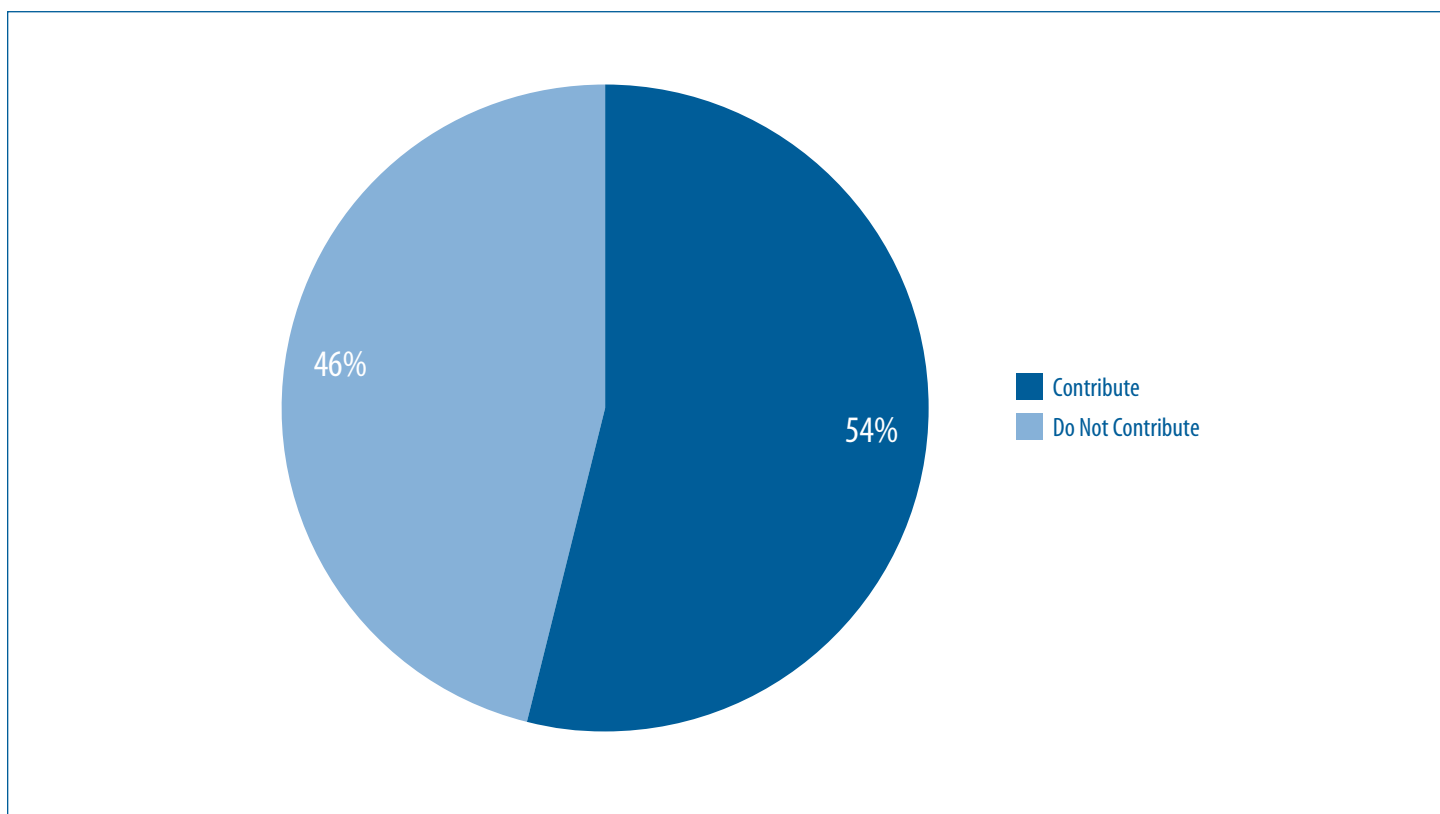
Number of observations: 77
Source: Author's calculations

Figure 5: Percentage of Firms Offering Each Type of Savings Account



Number of observations: 78
Source: Author's calculations

Figure 6: Percentage of Firms that Contribute to Their Employee's HSA Account, Given an Account is Offered



Number of observations: 52
Source: Author's calculations

Community Survey on Health Insurance and Primary Care

Since October 2013, three main provisions of the Affordable Care Act (ACA) have become law in Michigan: 1) the opening of the public exchange in October 2013; 2) the Medicaid expansion in April 2014; and 3) the Employer Shared Responsibility (Employer Mandate) provision in January 2015. These legislative changes, along with a long-standing trend of increasing health care costs, have the potential to make substantial changes in the Western Michigan health insurance and health care industries.

In last year's *Health Check 2016*, we presented an inaugural survey of the West Michigan community, examining health insurance coverage, access to health care, and patient experiences at the primary care physicians' offices. The results were very informative, showing little change from 2014 to 2015 in access to care, time spent with primary care physicians, and waiting room times. Uninsured rates fell, with the majority of previously-uninsured individuals obtaining insurance through an employer or Medicaid.

We were interested to see if these changes continued into 2016. We added a question on health insurance satisfaction, but otherwise, the survey remained essentially the same. We interviewed 408 individuals in July and August 2016 at five free movie nights sponsored by Downtown Grand Rapids Inc. The Grand Valley students administering the surveys were trained in random sampling techniques before surveying took place.

Demographics

Table 1 reports the characteristics of our sample. One quarter of respondents are ages 18–25, 33 percent are ages 26–35, and 37 percent are ages 36–64, and 5 percent are over age 65. The sample is 83 percent white, 8 percent black, 5 percent Hispanic, and 4 percent other race, which is similar to the actual racial mix of West Michigan. The Right Place reports that, in 2015, West Michigan was 82 percent white, 6 percent black, and 8 percent Hispanic (*Data Center Demographics*, 2015). Males comprise 39 percent of the sample and females 61 percent. The overwhelming majority of respondents, 93 percent, live in West Michigan¹.

Health Insurance Status and Type

In **Figure 2**, we report the type of health insurance if the respondent was insured at the time of the interview. Fifty-six percent of individuals have insurance from their employer, with 14 percent getting their coverage from their parents' plan². We under-sampled the Medicaid population, with only 9 percent of our respondents having this type of insurance versus an estimated

22 percent of persons aged 18–64 in Medicaid expansion states (Cohen et al., 2016). Six percent of the respondents have other types of insurance (predominately insurance from a spouse), 4 percent have Medicare, 3 percent purchased their insurance from an agent, and 3 percent bought their plan on the ACA public exchange. Five percent of the sample is uninsured.

When comparing these numbers to national statistics, West Michigan fares very well in its percentage of uninsured. The National Center of Health Statistics reports that, at the beginning of 2016, Medicaid expansion states had an uninsured rate of 9.2 percent, as compared to 5 percent in our sample. The percentage of uninsured in last year's *Health Check* was also slightly lower than the corresponding expansion state average, at 9 percent versus 9.8 percent (Cohen et al., 2016).

Going from Uninsured to Insured

Figure 3 shows the 2016 health insurance status of those who were uninsured in 2015 compared to responses from the same question in *Health Check 2015* (for survey year 2014). In last year's survey, 24 percent of the previously uninsured remained so in the following year; however, of the group sampled in this year's survey only 15 percent remained uninsured the following year. Interestingly, the majority of this increased coverage was due to respondents securing employer-provided insurance (25 percent last year versus 40 percent this year). The rate of Medicaid uptake is slightly higher this year (21 percent) than the last (19 percent), but this difference is small. Lastly, virtually the same percentage of individuals went to the ACA exchange as they did last year, at 8 percent and 9 percent, respectively. The absence of growth in new exchange participation is similar to national data, which shows no statistical difference in exchange uptake between 2015 and 2016 (Cohen et al., 2016).

There are two possible reasons for this increase in employer coverage. Employers not offering insurance before could have begun to do so, and/or individuals who were previously unemployed could have obtained employment with health insurance. Evidence shows that employers have, in fact, increased their health insurance offerings in response to the ACA (Courtemanche et al., 2016). Grand Rapids and the surrounding area has also seen falling unemployment rates from 2015 to 2016, with Kent County's rate falling from 4.4 percent to 3.6 percent (United States Department of Labor, 2016). Additional information about the employment status of our respondents would be required to detail the extent to which either or both of these factors affect the findings.

¹ West Michigan includes Allegan, Barry, Ionia, Kent, Lake, Mason, Mecosta, Montcalm, Muskegon, Newaygo, Oceana, Osceola, and Ottawa counties.

² All of those on their parents' plan were under the age of 26. We did not ask a follow-up question on where the parents got their plan, as most likely the respondent (child) would not be able to answer the question accurately.

Frequency of Doctor's Visits

Figure 4 reports the frequency with which all respondents saw a physician, and frequency by insurance status. Overall, about half (56 percent) of respondents see a physician for regular check-ups. Thirty-four percent see the doctor only if they are sick, and 7 percent do not see the doctor for any reason. Only 3 percent use emergency rooms if sick.

The insurance status results are not surprising: far fewer uninsured go to physicians for regular health checkups (22 percent) than do the insured (57 percent). In addition, 11 percent of those without insurance went to the emergency room instead of seeing a physician when they were sick, compared to 3 percent of the insured (Figure 4).

Primary Care

In *Health Check 2016*, we examined whether waiting room time, time with the physician, ability to find a primary care provider, and ability to pay for health care visits had gotten better, gotten worse, or stayed the same over the past year. These questions were of interest because the increase in insured patients from the Medicaid expansion and the opening of the ACA exchanges increased the demand for medical services, which may result in longer wait times and less time with providers. Access to care was also a concern, as Medicaid patients sometimes have a more difficult time finding physicians than their privately-insured counterparts.

Last year's results showed that the majority of respondents did not experience a change in any of these categories (percentages ranged from 65-75 percent, depending on category). In fact, 24 percent of respondents said that waiting room times had actually gotten better, and 21 percent said the amount of time they spent with their physician increased. The ability to pay for medical visits had gotten better for some (16 percent) and worse for others (17 percent).

This year's responses to these same questions are shown in **Figure 5**. The percentage of respondents who said there was "no change" is a bit lower this year, with numbers ranging from 59 percent (time spent with the doctor) to 70 percent (the ability to find a physician). The percentage of respondents reporting that time spent in waiting rooms has gotten better increased (28 percent vs. 24 percent), as has time spent with the physician (25 percent vs. 21 percent). The ability to pay was essentially unchanged from last year, with 16 percent reporting that it has gotten better and 17 percent reporting that it has gotten worse.

Access to Care

Table 6 reports how access to care — that is, finding a primary care physician — has changed in the last year, by type of insurance. More specifically, we examine whether Medicaid enrollees and the privately-insured had more difficulty finding a physician this year than the last.

For the most part, there was little change for the privately-insured. Seventy one percent saw no change, while 15 percent said it has gotten easier and 13 percent reported that it has become more difficult. Interestingly, a larger proportion of Medicaid enrollees than privately-insured said it is now easier to find a physician (31 percent)

while only 10 percent said it has become harder. This result is unexpected, given that the ACA's mandatory increase of the Medicaid reimbursement rate (the "fee bump") expired on January 1, 2015. Michigan opted to use state funds to keep the reimbursement rate between traditional Medicaid and Medicare rates after 2015, however, the rate still remains lower than the fee bump level (Zuckerman et al., 2014). Thus the expectation would be that access to care would get worse for Medicaid insurees, not better.

Insurance Satisfaction

In **Figure 7** we report insurance satisfaction. Overall, respondents are satisfied with their coverage, with 26 percent and 55 percent being very satisfied or satisfied, respectively. Only 10 percent said they are dissatisfied, and 9 percent are very dissatisfied.

Conclusion

Overall, the uninsured rate in West Michigan fell considerably since last year's report, from 9 percent in 2015 to 5 percent in 2016. A large proportion of those newly insured in 2016 received coverage from employers; however, it is not clear if this increase is due to more employers offering insurance or individuals obtaining jobs with insurance coverage. Access to care continues to improve, specifically for Medicaid enrollees, with 90 percent of them seeing either no change or improved access to care.

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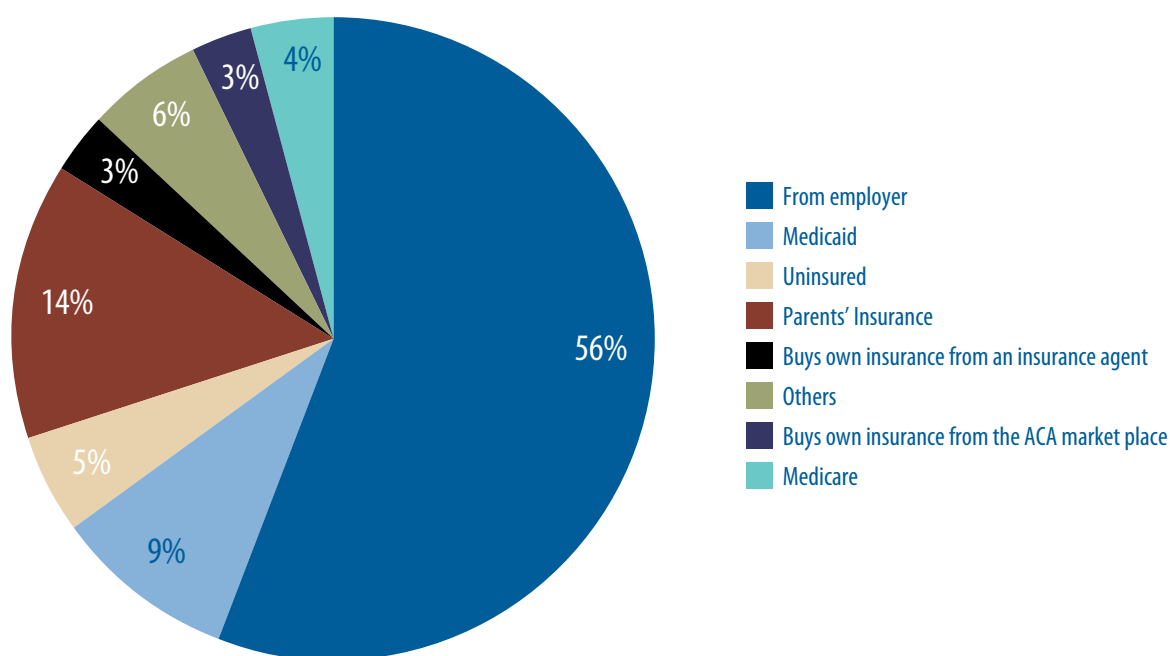
Table 1: Age, Race/Ethnicity, Gender, and Location

	Percentage
Age	
18-25	25%
26-35	33%
36-64	37%
Over 65	5%
Race/Ethnicity	
White, Non-Hispanic	83%
Black, Non-Hispanic	8%
Hispanic	5%
Others	4%
Gender	
Female	61%
Male	39%
Zipcode	
West Michigan	93%
Outside West Michigan	7%

Number of observations: 406

Source: Author's calculations

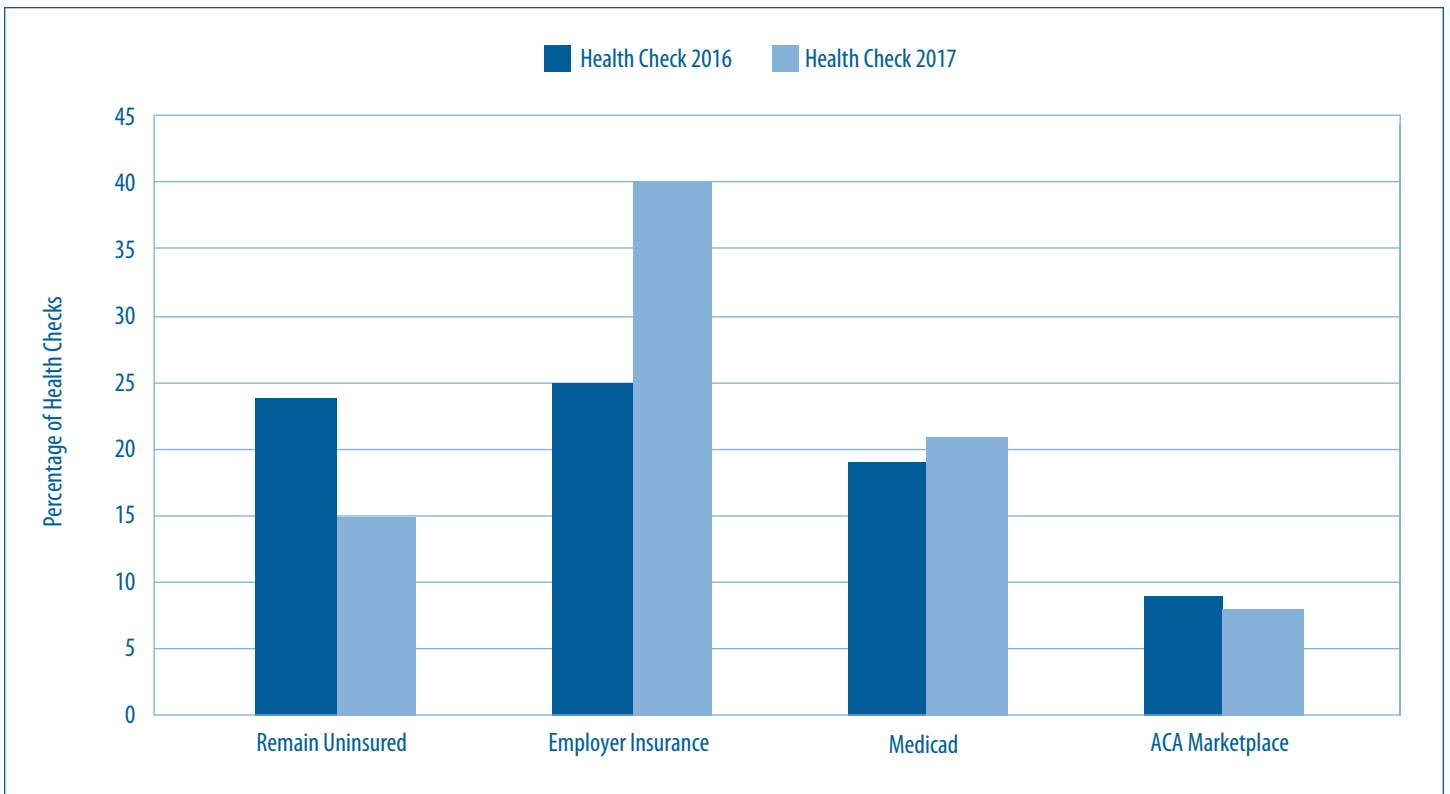
Figure 2: Health Insurance Source



Number of observations: 398

Source: Author's calculations

**Figure 3: Health Insurance Status for Those Uninsured the Previous Year:
Health Check 2016 and Health Check 2017**

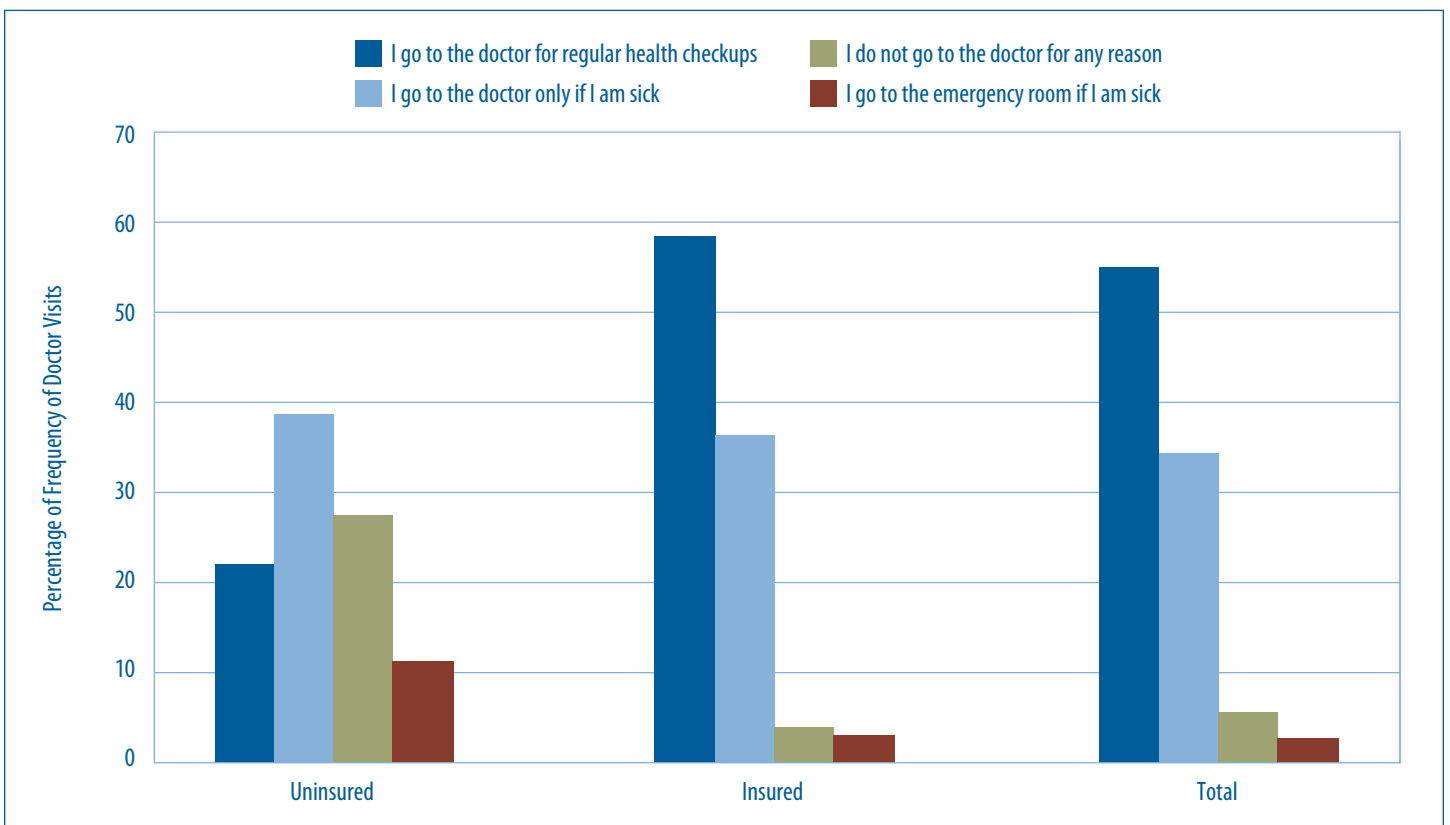


Number of observations: Health Check 2017 (73), Health Check 2016 (96)

Source: Author's calculations from Health Check 2017 and Health Check 2016

Note: Other sources for healthcare 2017 include, Other (5%), Parents plan (4%), Medicare (4%), Insurance Agent (3%)

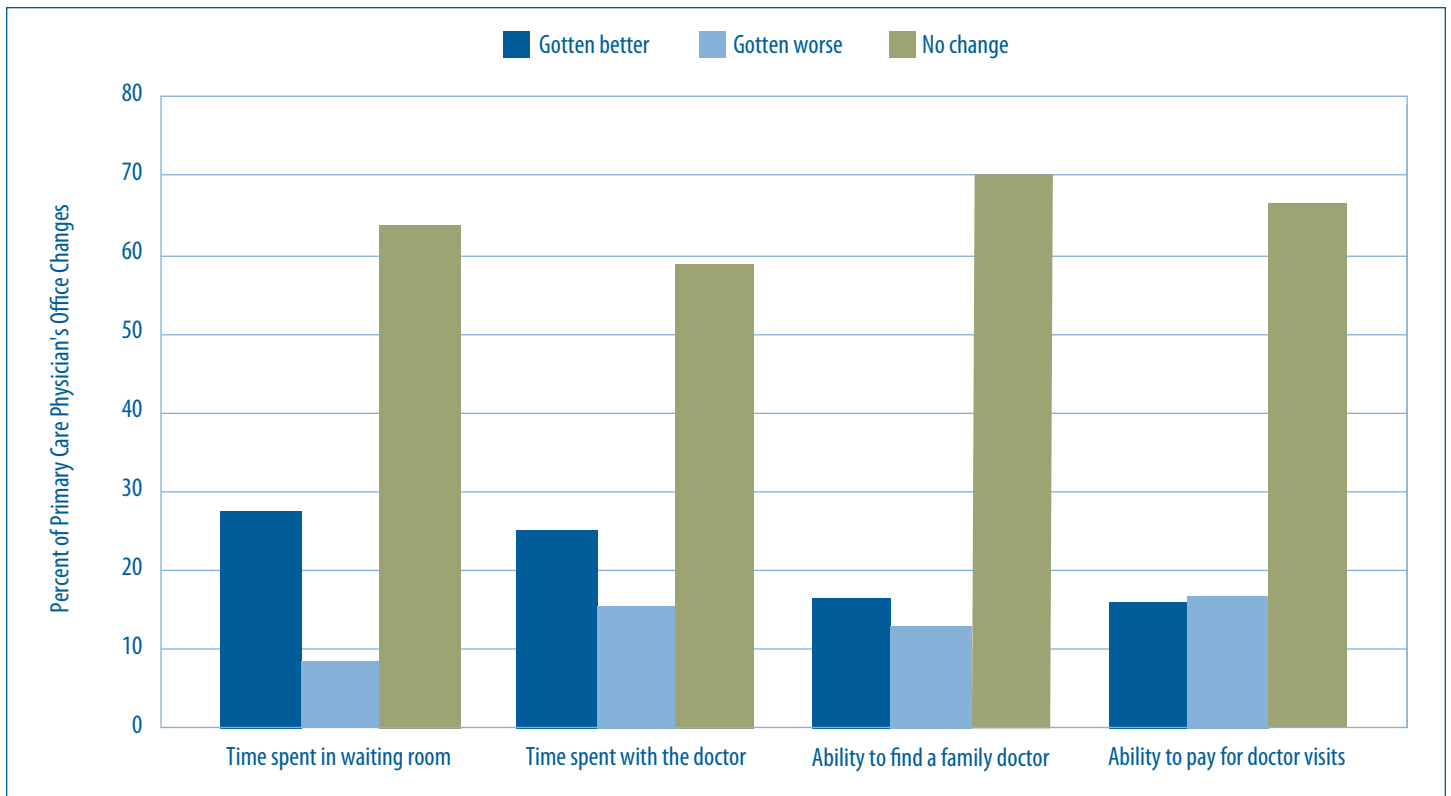
Figure 4: Frequency of Doctor Visits for the Uninsured vs Insured



Number of observations: 399

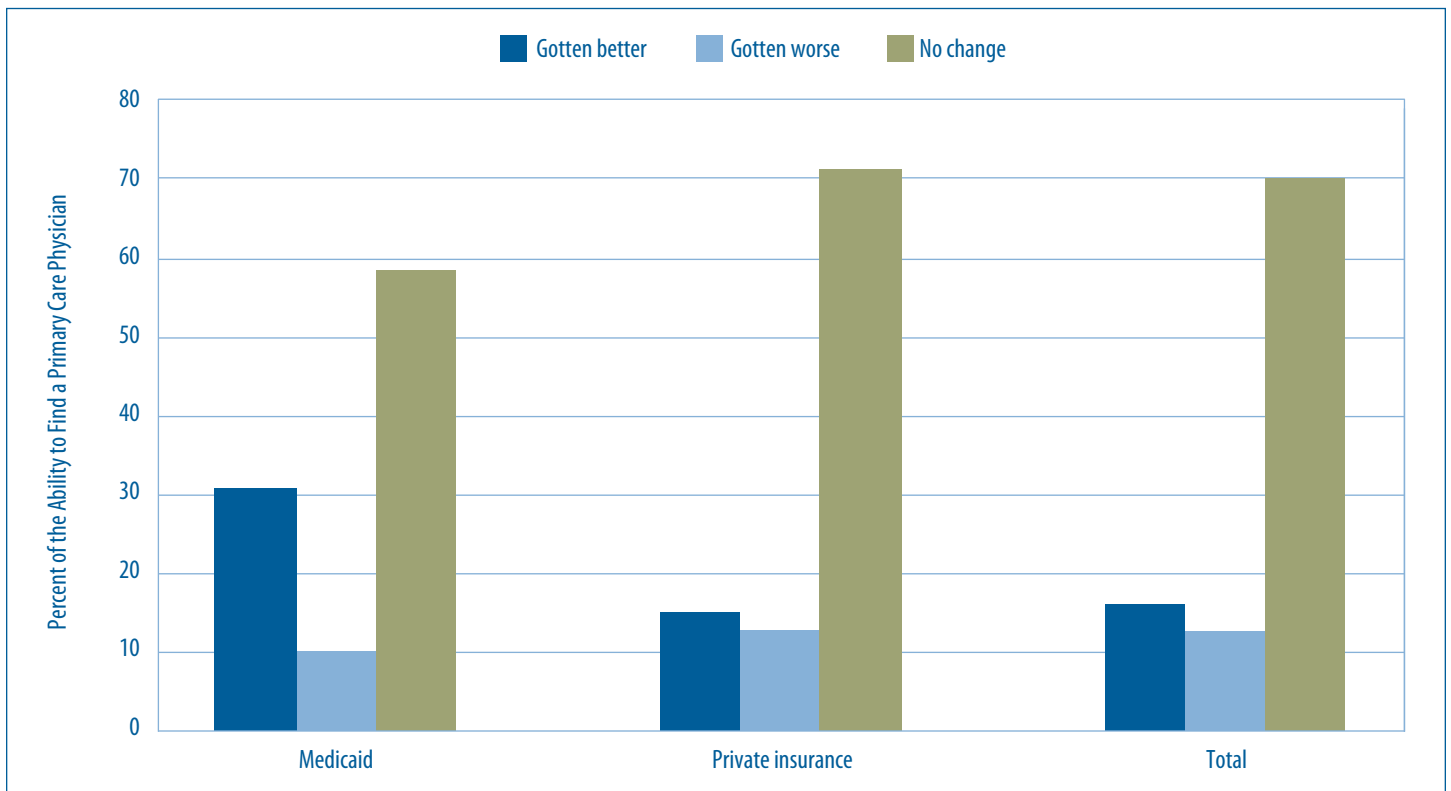
Source: Author's calculations

Figure 5: Primary Care Physician's Office Changes in the Last Year



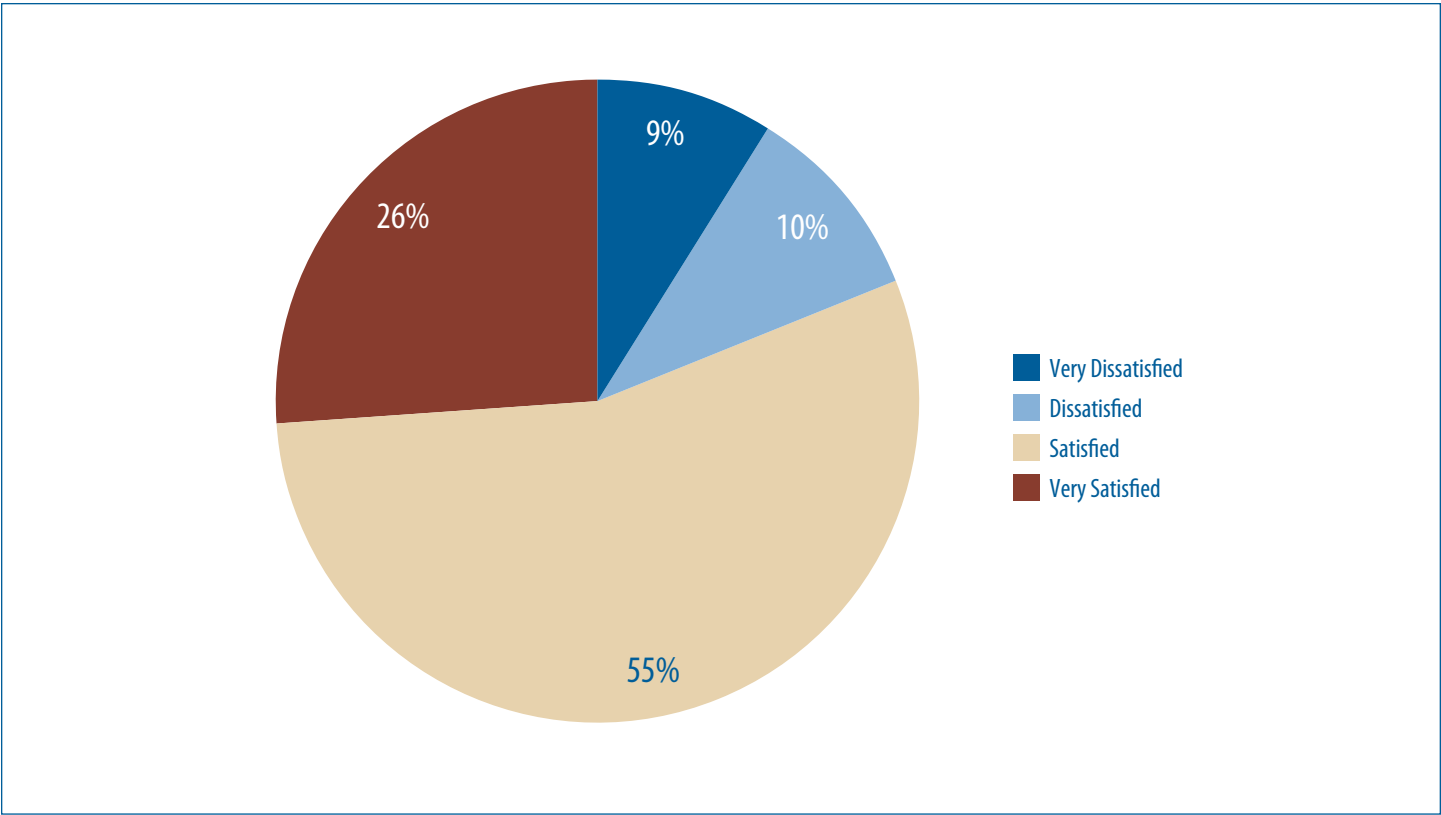
Number of observations: 387
Source: Author's calculations

Figure 6: Ability to Find a Primary Care Physician — Medicaid and Private Insurance



Number of observations: 381
Source: Author's calculations

Figure 7: Insurance Satisfaction



Number of observations: 390
Source: Author's calculations

Major Medical Conditions: Expenditure Analysis

This analysis provides general information about some of the most prevalent and expensive medical conditions to assist with focusing resources to improve community health. The long-term goal of this analysis is to identify and track health care expenditures for selected chronic health conditions and to examine geographic differences in the cost of care.

The data presented in this section are member expenditures, including prescription medication expenditures, for those enrolled in private health insurance plans administered by Blue Care Network (BCN), Blue Cross Blue Shield of Michigan (BCBSM), and Priority Health (PH) for the year 2015. The following factors should be considered when interpreting analyses in this section:

- **Differences in benefit structures.** Both BCN and PH offer primarily HMO products while BCBSM members are predominantly enrolled in PPO plans. HMOs tend to operate through selective contracting and provider referrals, utilizing networks in order to achieve cost savings. PPOs tend to have fewer restrictions on members seeking care, and, therefore, usually require additional member cost-sharing in the form of higher premiums, higher coinsurance rates, or higher co-pays. Because of these differences in benefit structures, evidence suggests that HMO plans are more attractive to enrollees who are healthier, who have less complex medical needs, or who have no longstanding ties to particular providers (Ji & Liu, 2007; Nicholson et al., 2004; Tchernis et al., 2006). However, some research has failed to find a substantial difference in health status for those enrolling in HMO plans (Schaefer & Reschovsky, 2002).
- **Disease selection.** The health status, and thus the expenditures, for members with specific conditions might vary due to differences in demographics and health behaviors. In other words, patients in some counties insured by one payer may be sicker than patients in other counties who are insured by a different payer.
- **Expenditures beyond disease.** In each case, the average patient expenditure data is for services not only related to the specific disease in question, but also for other unrelated medical costs the member may have incurred during the year. Differences in expenditures or treatment intensity for these unrelated health issues can result in additional variation in average patient expenditure estimates.

Expenditure estimates from each insurer can vary considerably because of these factors. Thus we average the data for all three insurers to arrive at a more robust estimate of member expenditures.

One additional caveat is the change from the 9th revision to the 10th revision of the International Classification of Diseases (ICD) codes for the 2015 data. This change impacts the categorization of

specific medical conditions and, therefore, could lead to additional differences in expenditures between 2015 and the previous years included in the analysis.

KOMA Expenditures

As we have done in previous versions of this publication, we chose to focus on six chronic conditions that are associated with high prevalence rates and high levels of resource utilization: asthma, coronary artery disease (CAD), depression, diabetes, hyperlipidemia, and low back pain. **Figure 1** provides the average annual cost per member for each of these conditions in Kent, Ottawa, Muskegon, and Allegan (KOMA) counties in 2012, 2013, 2014, and 2015. Caution must be used when interpreting trends between 2013 and 2014 due to the presence of Affordable Care Act exchange enrollment beginning in 2014. Preliminary studies found that exchange enrollees have higher utilization than those with private insurance coverage through non-exchange plans (Express Scripts, 2014; Truven, 2015). **Figure 1** distinguishes between the pre-exchange years of 2012-2013 and the post-exchange years of 2014-2015. **Figures 2–4** include only data on post-exchange periods. In most cases, we identified members in each disease category according to specifications defined by the Healthcare Effectiveness Data and Information Set (HEDIS). We excluded Medicaid and Medicare enrollees from our expenditure estimates. Finally, all expenditure estimates in **Figure 1** are reported in 2015 dollars.

We note that, even after adjusting for inflation, **Figure 1** indicates that expenditures for nearly every condition increased from 2014 to 2015. The lone exception is expenditures for “healthy members” defined as those between the ages of 30 and 39 who had not been diagnosed with any of the six chronic conditions listed above and who have total annual expenditures below \$450,000. Average annual expenditures for healthy members in the KOMA region were \$3,151 in 2014 and fell to \$2,909 in 2015. Part of this decline in expenditures for the healthy members could be attributed to the increased reliance on high-deductible health plans that increase the marginal cost of seeking care for the insured. High-deductible health plans have been shown to reduce health care utilization and spending (Brot-Goldberg et al., 2015). The largest increase in expenditures from 2014 to 2015 occurred for those suffering from CAD. Inflation-adjusted expenditures for CAD rose by nearly 22 percent from 2014 to 2015. This finding follows an increase of approximately 23 percent for the same diagnosis from 2012 to 2013. We are not able to determine if these expenditure increases were due to increases in prices or increases in utilization for those diagnosed with CAD; however this trend is clearly concerning as total expenditures on CAD in KOMA grew by more than \$17 million from 2014 to 2015 holding the share of the population with CAD constant at the 2015 level.

Differences in Average Annual Expenditures between KOMA and the Detroit Region

Figure 2 compares average annual per member expenditures in both the KOMA and Detroit regions. We define the Detroit region as Oakland, Macomb, and Wayne counties. **Figure 2** indicates that, with the exception of CAD and healthy members, expenditures on all other conditions are higher in the Detroit region than in KOMA. If we consider CAD spending estimates from the previous two *Health Check* publications, this marks the third consecutive year of higher CAD spending in KOMA compared to the Detroit region making it unlikely that these spending differences are due to random variation.

Figure 2 plots the percentage change in expenditures for the same conditions from 2014 to 2015. So while **Figure 2** provides differences in spending levels between the two regions, **Figure 2A** presents a more dynamic look at how those spending levels changed in the past year. Growth in expenditures was higher in the Detroit region for all conditions except CAD. Although spending growth in CAD had increased faster in the Detroit region last year, **Figure 2A** shows that CAD spending growth between 2014 and 2015 was higher in KOMA. Detroit experienced a large decrease in average annual expenditures for healthy members between 2014 and 2015, which caused expenditure levels on healthy members in Detroit to fall below expenditure levels in KOMA for 2015.

Comorbidities

In this section, we take a closer look at expenditures associated with diabetes and depression by examining the impact of additional diagnoses. Joint diagnoses and the presence of multiple comorbidities can lead to higher resource utilization and higher levels of spending. Importantly, we are not examining clinical linkages between these conditions; only focusing on expenditure differences associated with multiple diagnoses. **Figure 3** plots average annual member expenditures for those with only a diagnosis of diabetes, those with diagnoses of diabetes and asthma, diabetes and hypertension, diabetes and depression, and diabetes and CAD. According to **Figure 3**, the addition of comorbidities greatly impacts the average expenditures associated with a diagnosis of diabetes. For example, expenditures in KOMA for a member diagnosed with diabetes and depression compared to a diagnosis of diabetes alone adds approximately \$14,000 to the annual expenditure estimates. Once again, we see a pattern of higher expenditures in the Detroit region with the exception of a diagnosis of diabetes and CAD. Those diagnosed with both diabetes and CAD have average annual expenditures of \$38,233 in KOMA compared to \$36,442 in the Detroit region.

Figure 4 displays the results of a similar analysis that focuses on depression. We find that for depression alone and depression with asthma, hyperlipidemia, or diabetes, average annual expenditures per member are lower in KOMA than in the Detroit region. Average annual expenditures for depression with CAD are slightly higher in KOMA than in the Detroit region this year, due to a significant increase in expenditures this year for members living on the east side of the state.

Geographic Variation in Expenditures

In **Figures 5–8**, we plot expenditure estimates by zip code in order to examine the degree to which expenditures for chronic conditions vary over relatively small geographic areas. For each condition analyzed in this section we limit our analysis to zip codes with at least 25 members distributed across at least two of the three payers supplying member data. We also adjusted our expenditure estimates for differences in zip code level population age, income, and education. Therefore, estimates can be interpreted as a comparison of expenditures for individuals at the same age, with the same income, and the same level of education across different zip codes. On average, over the conditions that we examined, age, income, and education can explain approximately 15 percent of the variation in expenditures at the zip code level. The remaining variation could be attributed to some combination of underlying differences in population health, physician practice styles, or prices for health care services.

Expenditures for diabetes are divided into five quantiles and mapped by zip code in **Figure 5**. Those in the lowest quantile have average annual expenditures between \$12,815 and \$18,308, while those in the highest quantile have average annual expenditures between \$16,609 and \$18,308. As we noted in last year's publication, areas to the north and southwest of Grand Rapids experience the highest average annual expenditures for members with a diabetes diagnosis and tend to have higher expenditure levels for each condition we analyzed.

Figure 6 follows the same methodology in order to map average annual expenditures for depression. In this case, those in the lowest quantile have expenditures ranging from \$7,444 to \$11,582, while expenditures for those in the highest quantile are between \$13,236 and \$16,788. Here we see that the Detroit region contains a greater proportion of high expenditure zip codes than Grand Rapids and its surrounding areas. We also note a similar pattern on the west side of the state for depression and diabetes in that zip codes to the north and southwest of the city of Grand Rapids tend to experience relatively higher expenditures.

Figure 6 follows the same methodology in order to map average annual expenditures for depression. In this case, those in the lowest quantile have expenditures ranging from \$9,233 to \$12,953, while expenditures for those in the highest quantile are between \$14,909 and \$18,275. Here we see that the Detroit region contains a greater proportion of high expenditure zip codes than Grand Rapids and its surrounding areas. We also note a similar pattern on the west side of the state for depression and diabetes in that zip codes to the north and southwest of the city of Grand Rapids tend to experience relatively higher expenditures.

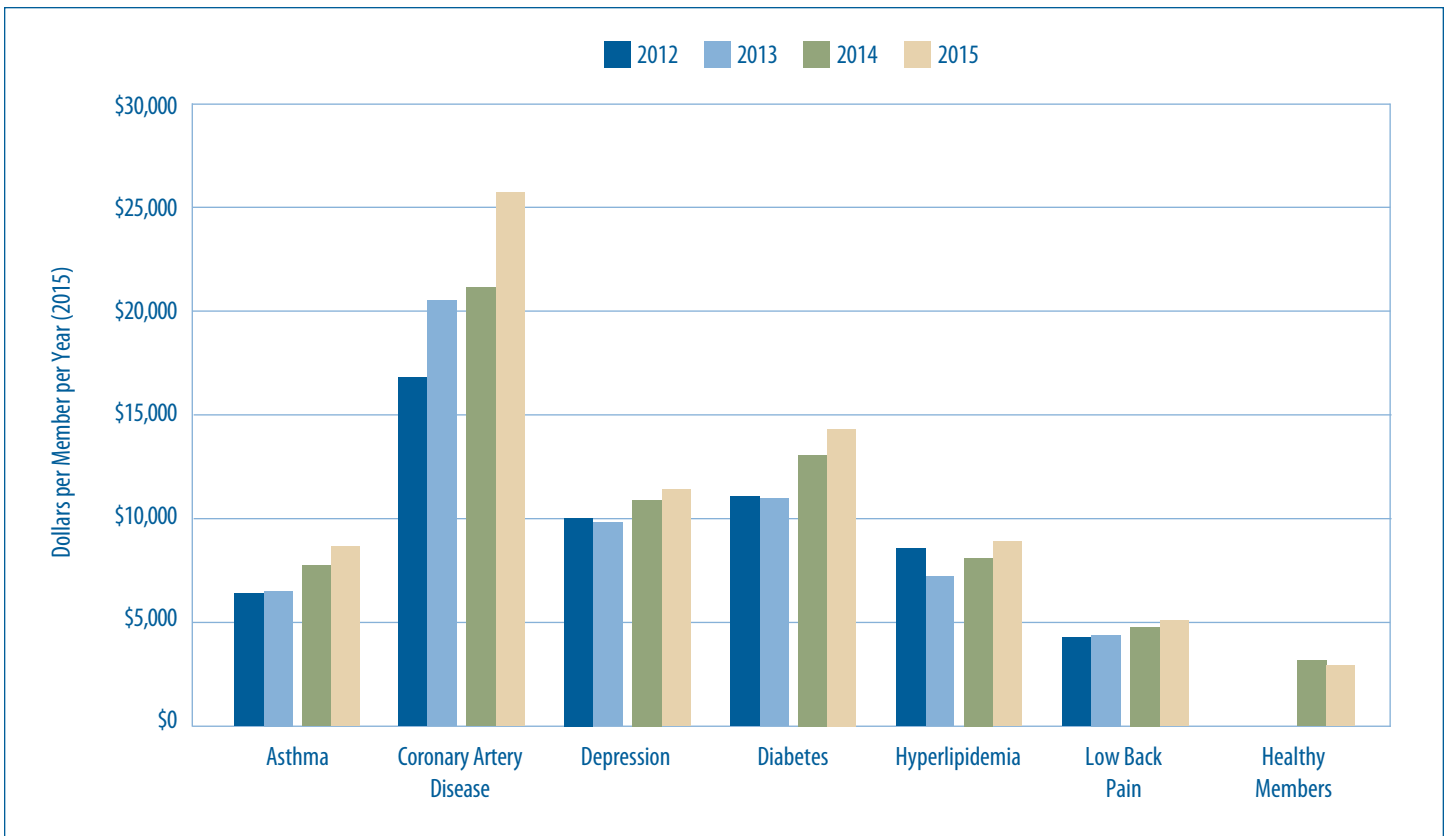
Zip code level estimates for CAD expenditures are mapped in **Figure 7**. Once again, the Detroit region has a higher concentration of high expenditure zip codes. However, we now see that several zip codes within the city of Grand Rapids tend toward the higher expenditure quantiles. In fact, there are now five zip codes in or near the city of Grand Rapids in the highest quantile of CAD spending when last year there were none. This finding coincides with the information presented in the previous figures showing large increases in CAD expenditures in the KOMA region. Also, despite fewer overall zip codes included in the CAD analysis, we still see that areas to the north and southwest of Grand Rapids seem to contain a number of high expenditure zip codes.

Finally, **Figure 8** plots average annual expenditures at the zip code level for members with low back pain. Generally, treatment for low back pain is thought to depend a great deal on the preferences of patients and their physicians. Therefore, we might expect to see a greater variance in expenditures for low back pain. Here the distinction between expenditures on the west and east side of the state is more stark. With the exception of a few zip codes to the north and southeast of Grand Rapids, all zip codes in the highest quantile of expenditures are on the east side of the state. This pattern may be indicative of the higher concentration of manufacturing jobs that require physical labor on the east side of the state.

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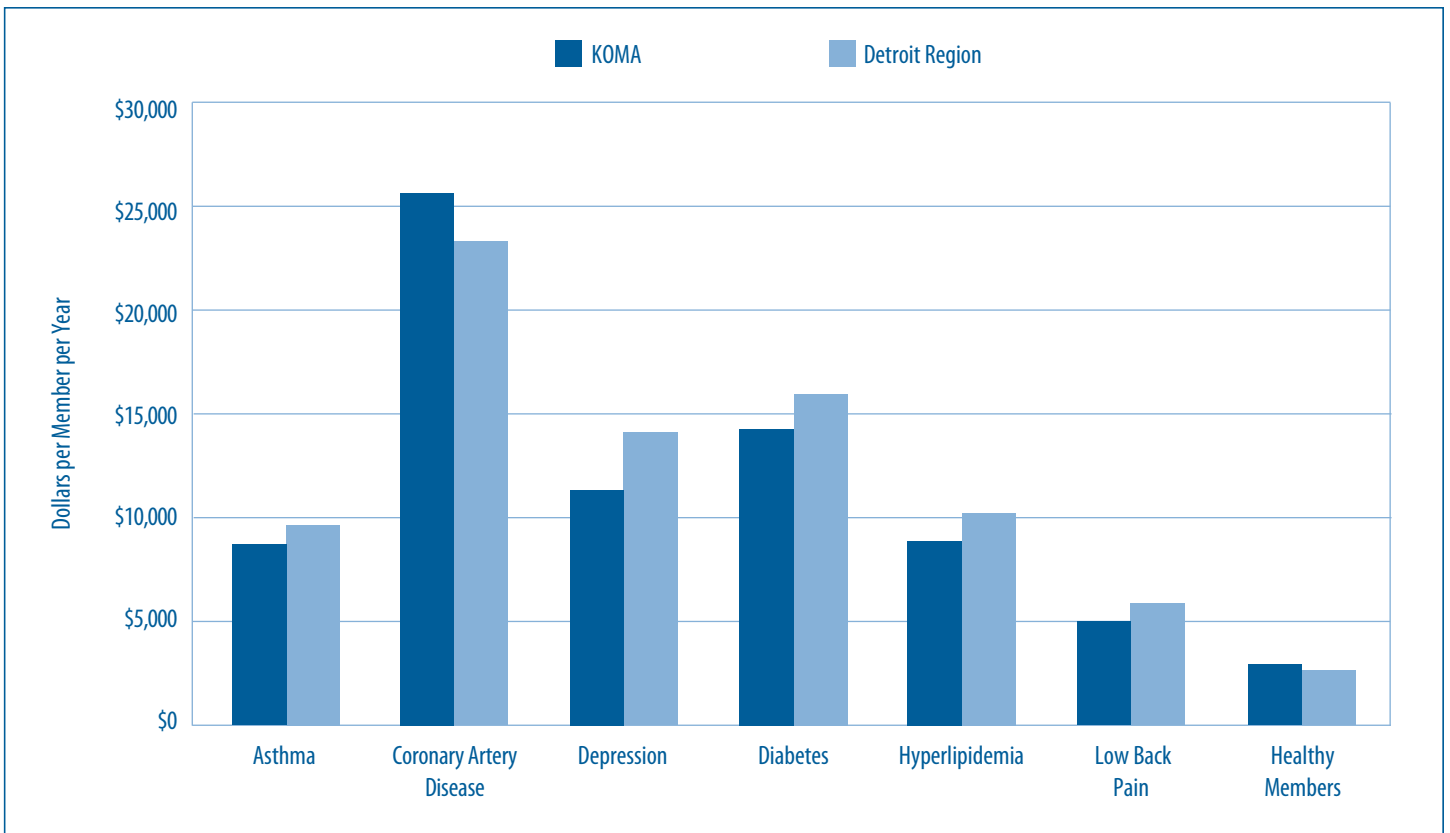
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Figure 1: Average Expenditures per Member in KOMA, 2012–2015



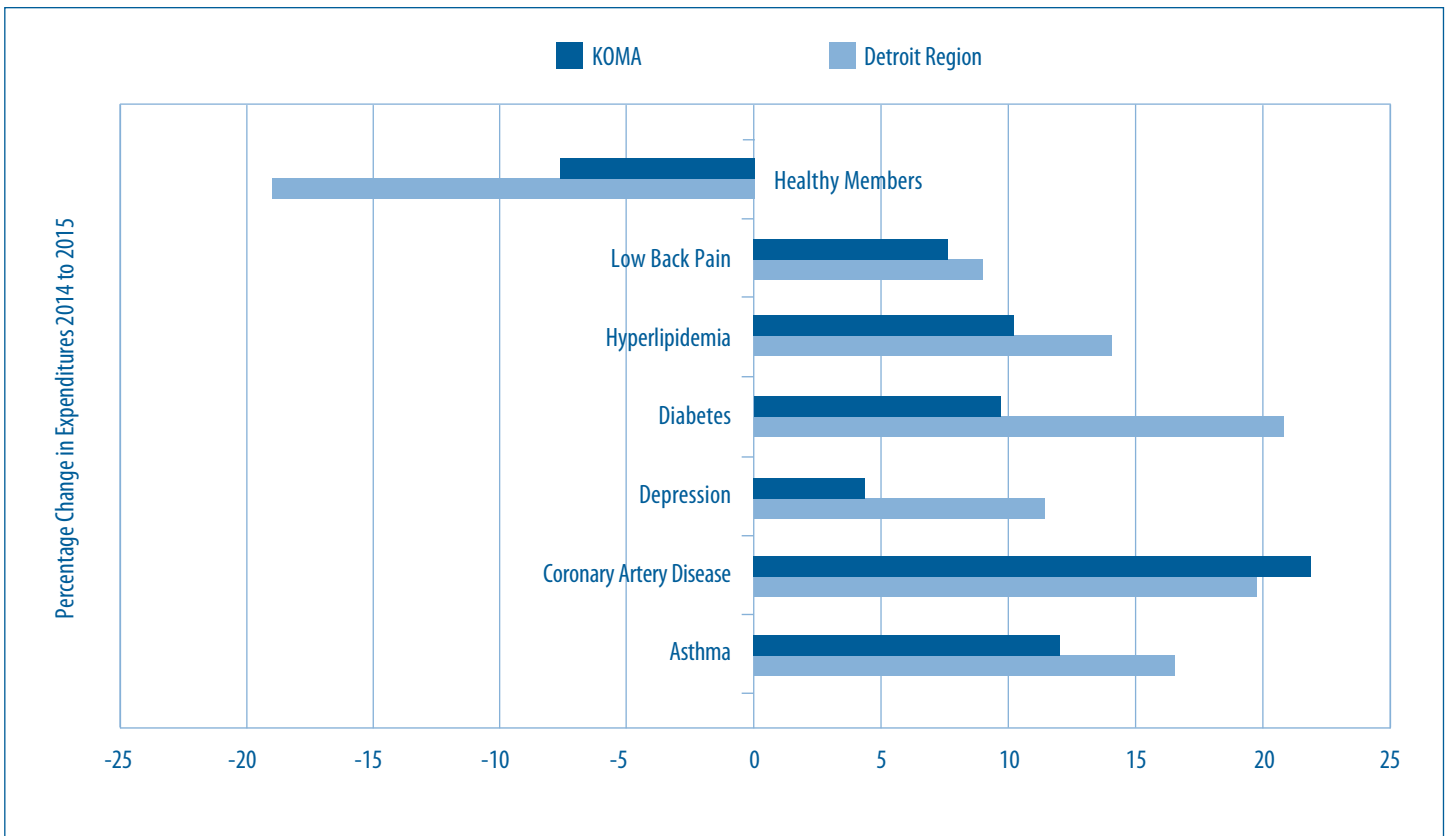
Source: BCBSM, BCN, and Priority Health member data

Figure 2: Average Expenditures per Member, 2015



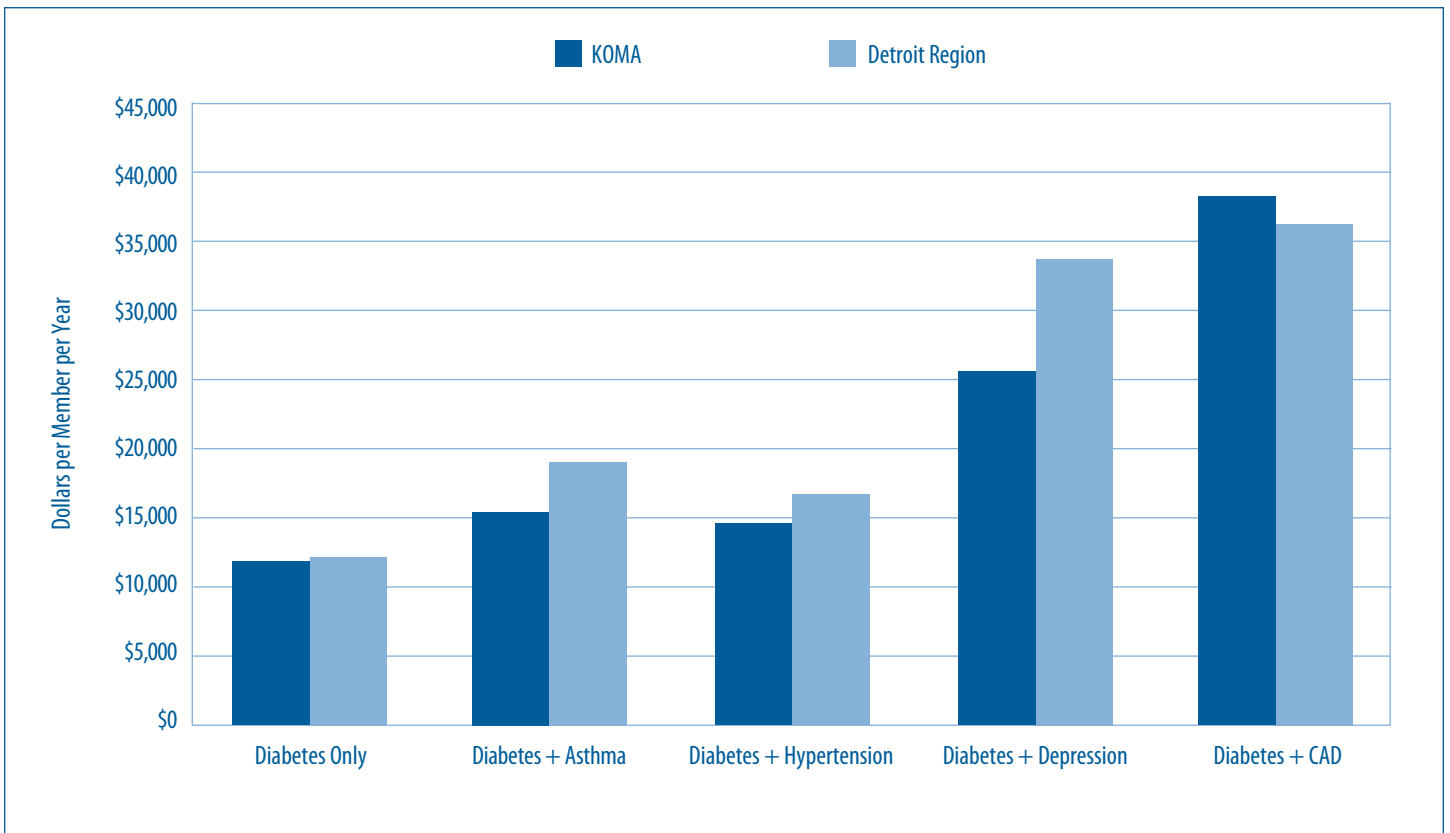
Source: BCBSM, BCN, and Priority Health member data

Figure 2A: 2014-2015 Percentage Change in Average Expenditures per Member



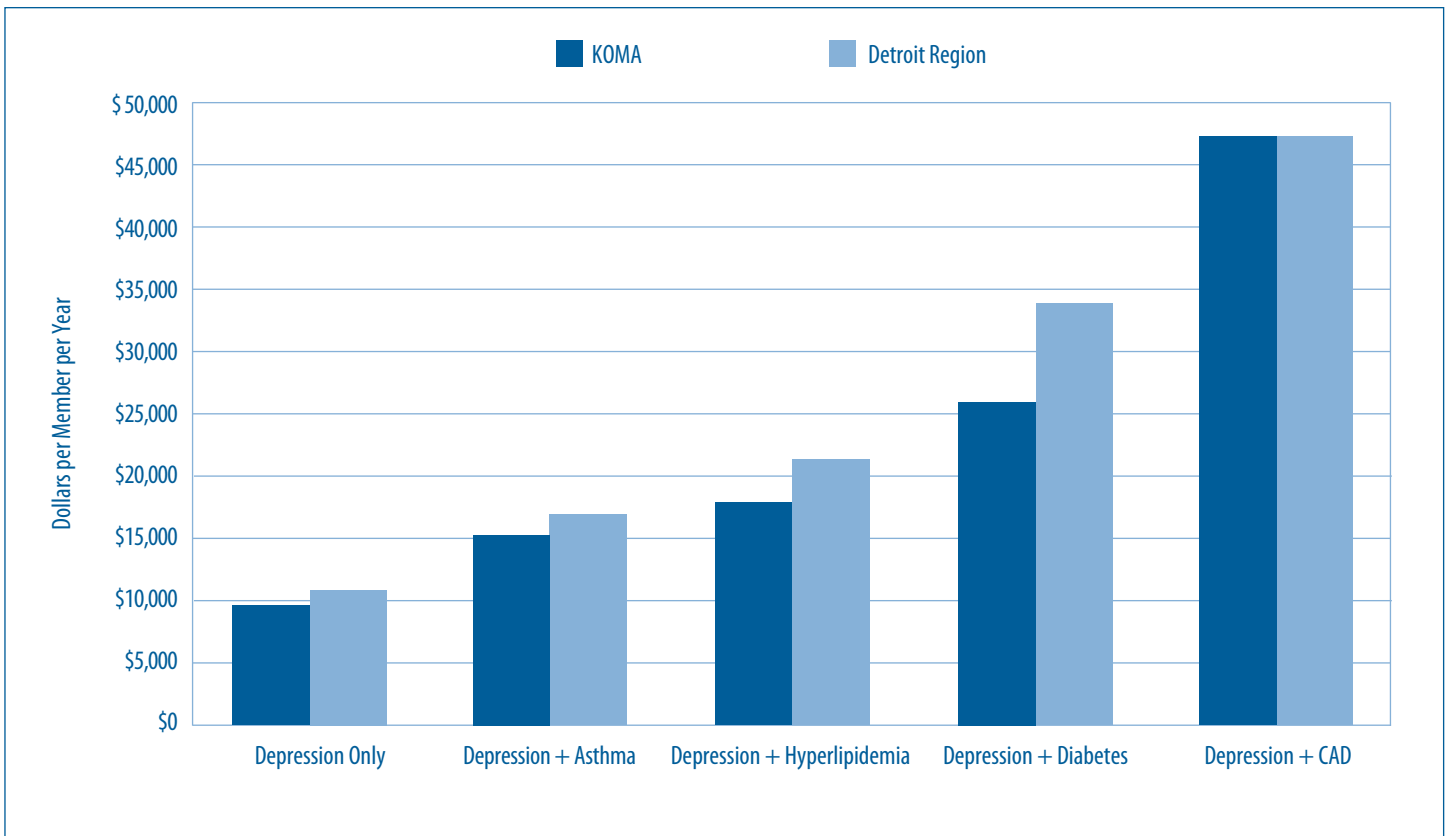
Source: BCBSM, BCN, and Priority Health member data

Figure 3: Expenditures on Members with Diabetes and Comorbidities, 2015



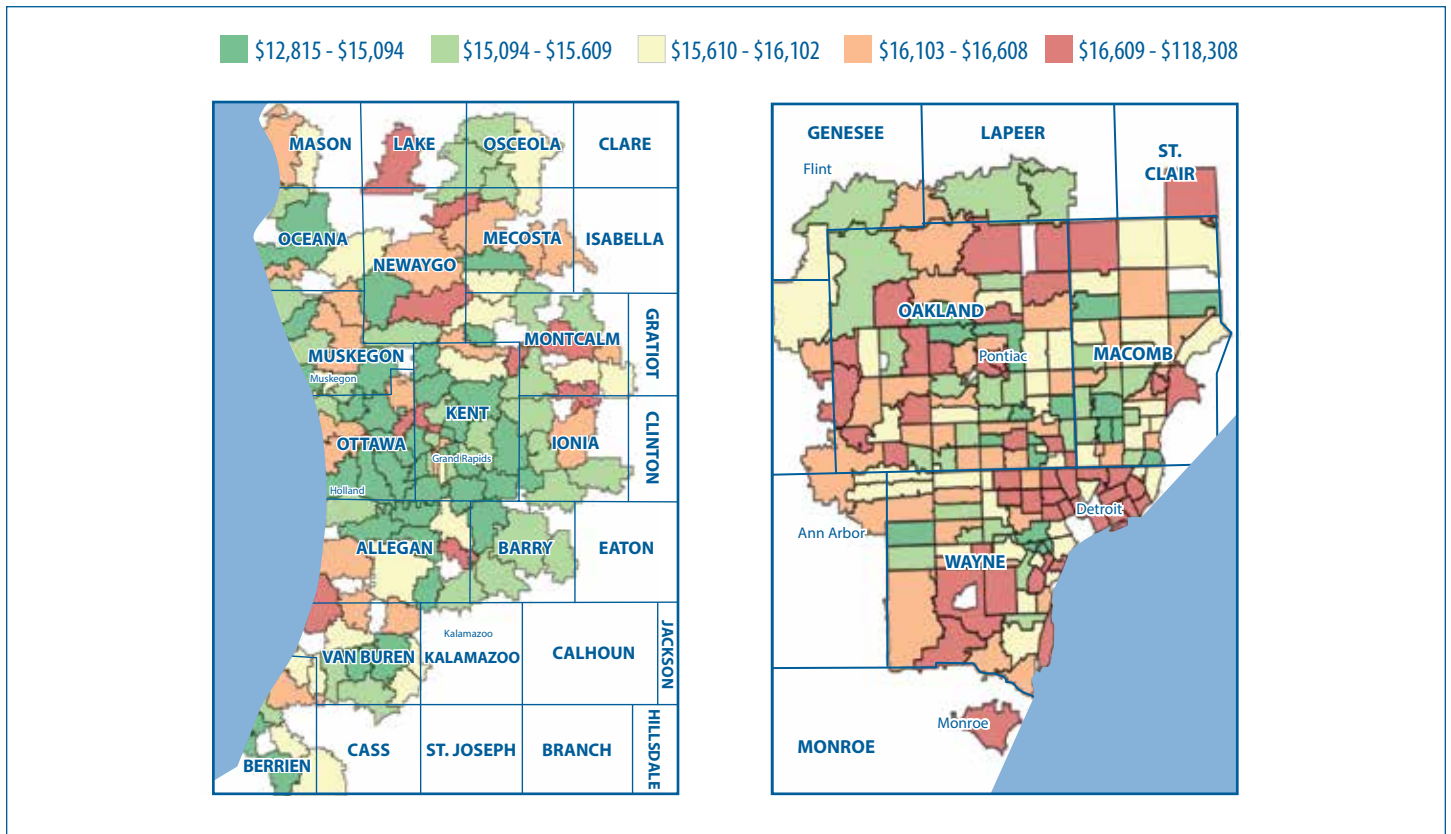
Source: BCBSM, BCN, and Priority Health member data

Figure 4: Expenditures on Members with Depression and Comorbidities, 2014



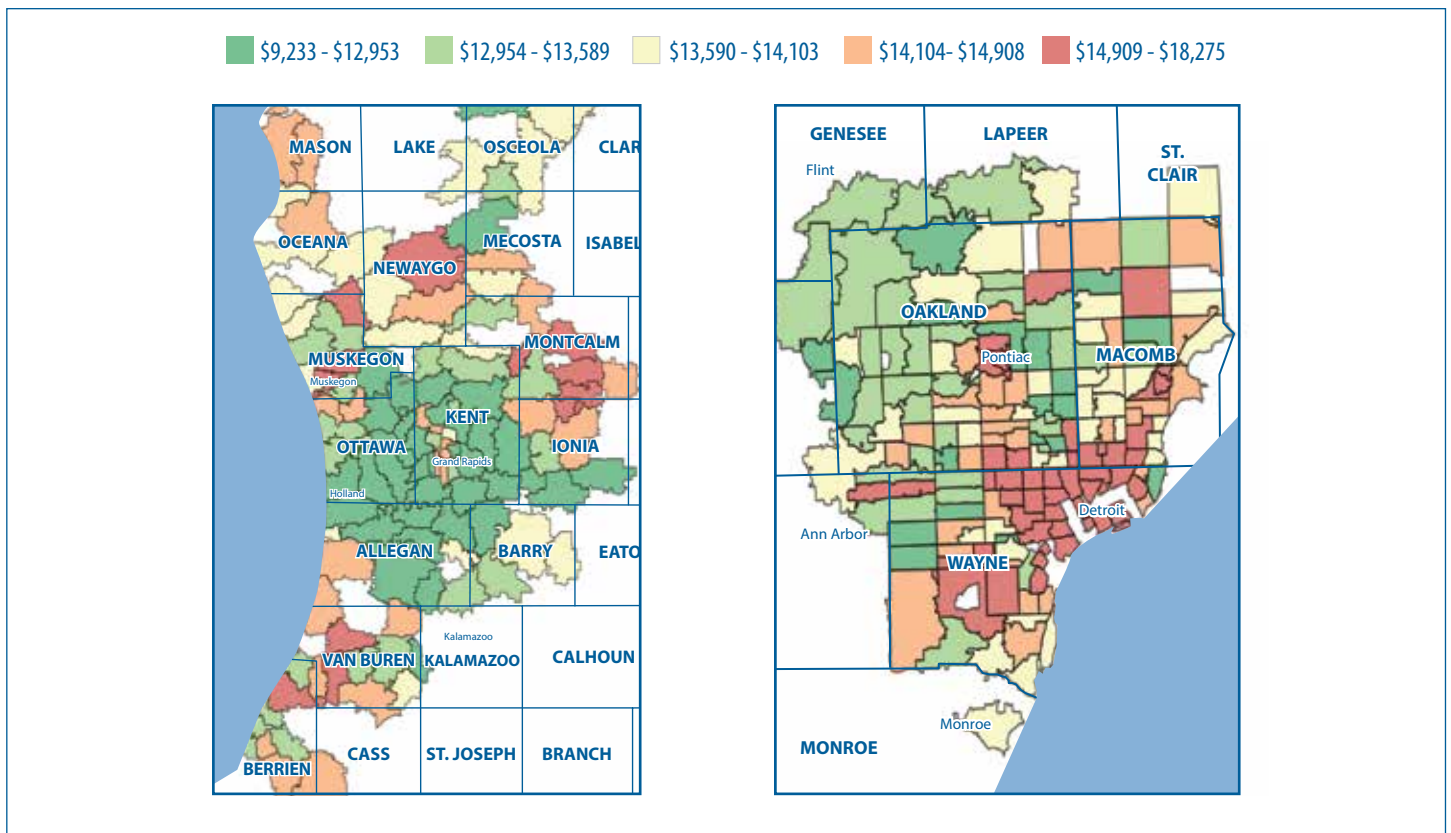
Source: BCBSM, BCN, and Priority Health member data

Figure 5: Distribution of Average Annual Expenditures per Member with Diabetes by Zip Code



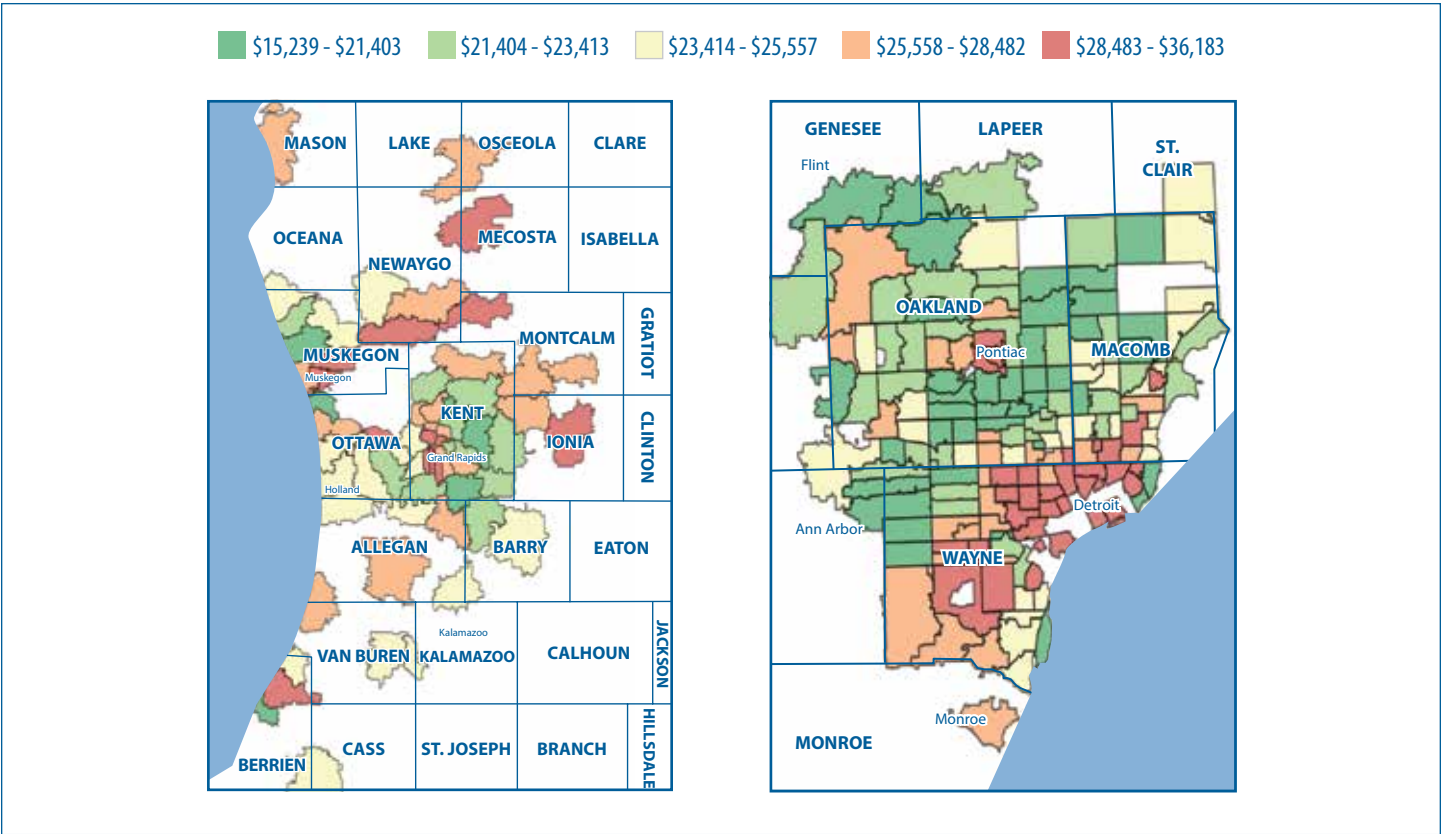
Source: BCBSM, BCN, and Priority Health member data

Figure 6: Distribution of Average Annual Expenditures per Member with Depression by Zip Code



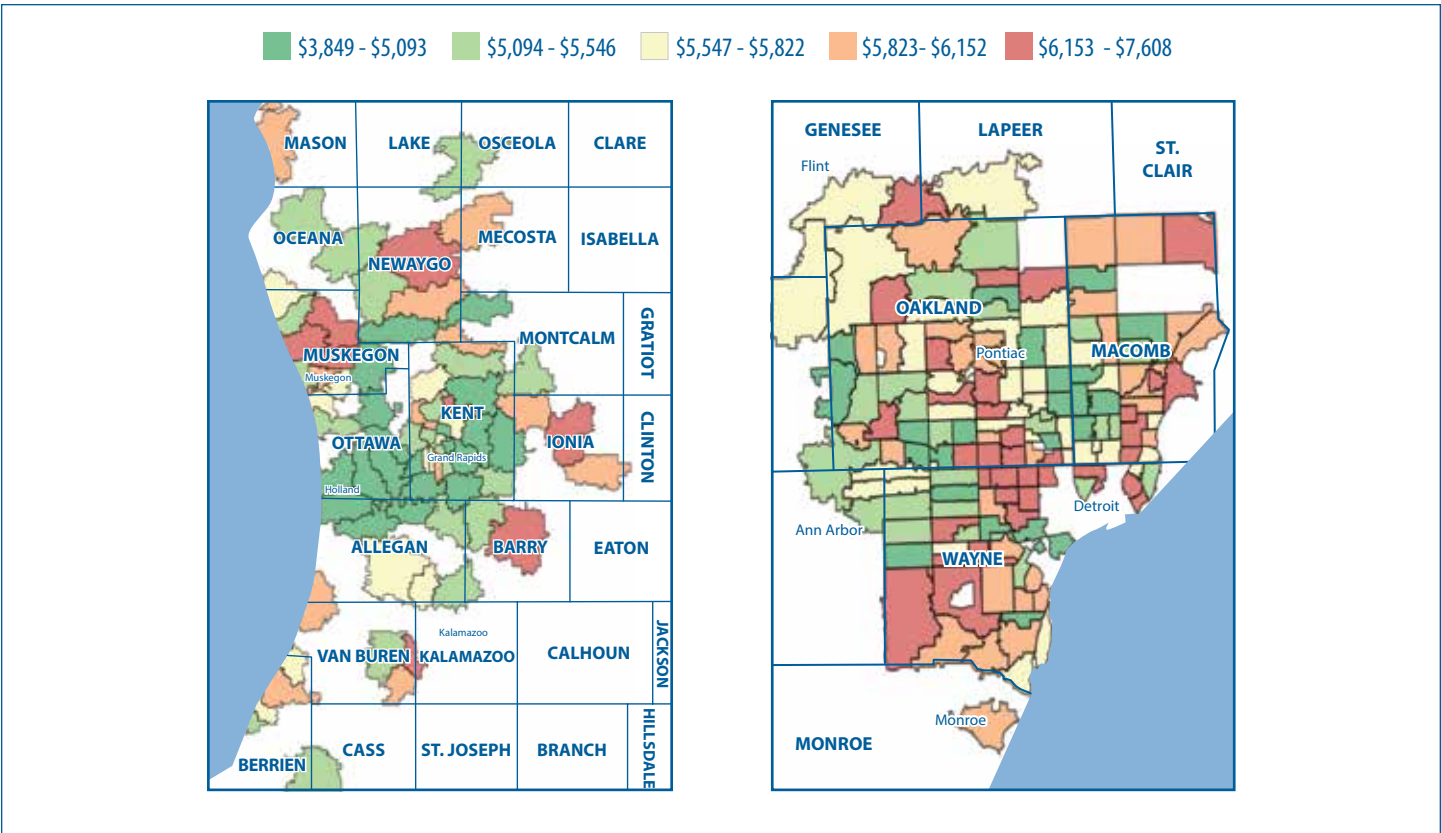
Source: BCBSM, BCN, and Priority Health member data

Figure 7: Distribution of Average Annual Expenditures per Member with Coronary Artery Disease by Zip Code



Source: BCBSM, BCN, and Priority Health member data

Figure 8: Distribution of Average Annual Expenditures per Member with Low Back Pain by Zip Code



Source: BCBSM, BCN, and Priority Health member data

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