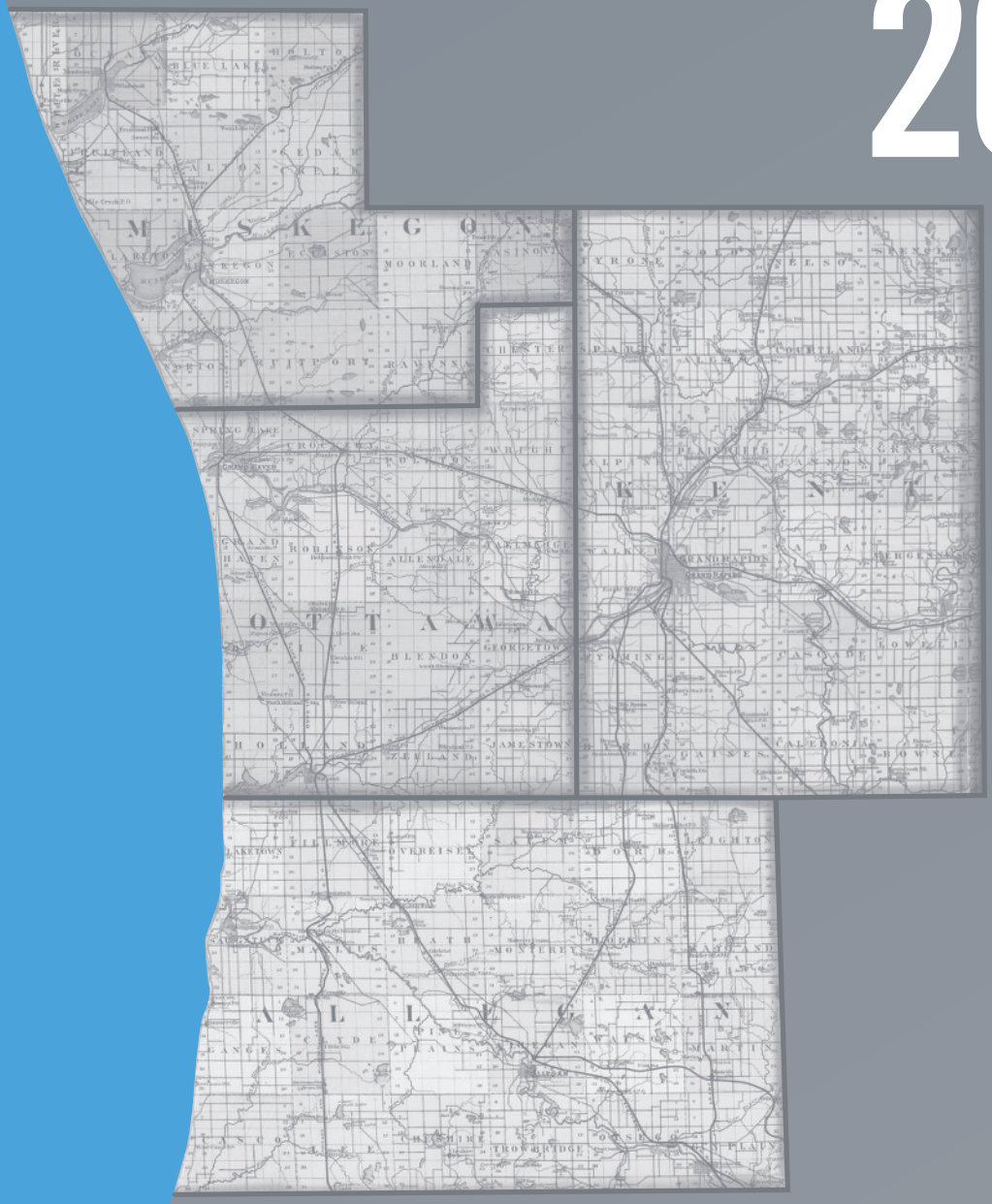
KENT COUNTY OTTAWA COUNTY MUSKEGON COUNTY ALLEGAN COUNTY

Health Check

ANALYZING TRENDS IN WEST MICHIGAN

2022



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Grand Valley State University

Health Check:
Analyzing Trends in West Michigan 2022

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GRAND VALLEY STATE UNIVERSITY
KIRKHOF COLLEGE OF NURSING

February 3, 2022

Dear Colleagues,

We are pleased to present Health Check 2022: Analyzing Trends in West Michigan. This report represents the collaborative efforts of Grand Valley State University's Kirkhof College of Nursing (KCON), Seidman College of Business, Blue Cross Blue Shield of Michigan, Blue Care Network, and Priority Health.

This is the 13th year of Health Check and its analysis of data relevant to health and health care in Kent, Ottawa, Muskegon, and Allegan (KOMA) counties. The ongoing and consistent examination of this health-related data over time continues to serve as an important tool to inform the decision-making processes and policies of the government, health care systems, education, and business.

While the data in this publication is focused primarily on health data during the pandemic, the authors have also made observations on the impact of COVID-19 on job growth and consumer spending related to health care. You will find more detail about these COVID-19 influences in the report.

Economic analysis is provided through benchmarking with other peer communities. The report also utilizes average cost data provided by our insurance provider partners to look more closely at the expenditures for several conditions, including asthma, coronary artery disease (CAD), depression, diabetes, hyperlipidemia, and low back pain. The report also compares KOMA to the Detroit area.

As we move forward in a stressed and uncertain environment due to COVID-19, we will continue to study and bring forward data that will help our communities address major issues in health care. We are pleased to play a role in contributing to relevant decision-making in our local and state partner organizations to ensure safe, high-quality, and cost-effective health care planning for our community.

Respectfully,

Lola A. Coke, Ph.D., ACNS-BC, FAAN
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All the data used in this project 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.

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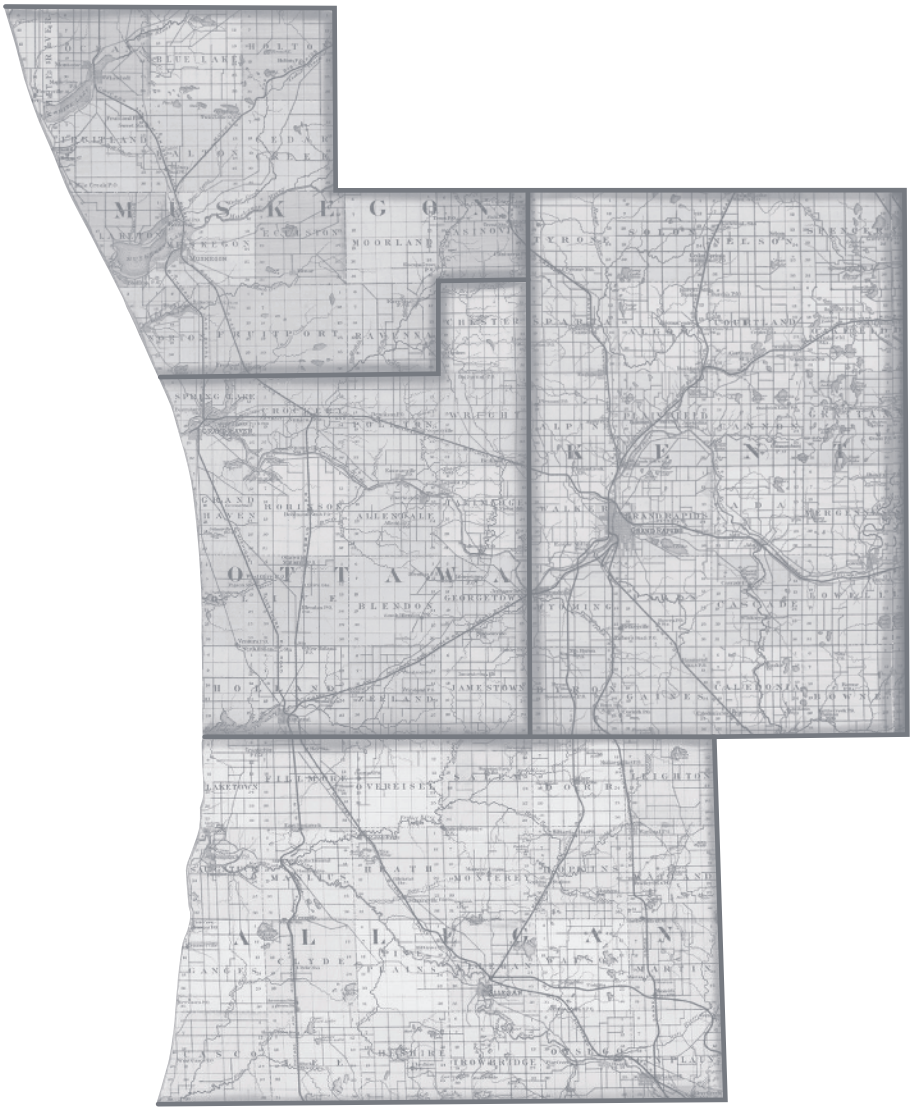
U.S. Census Bureau
U.S. Department of Health and Human Services (ARF file 2011-2012)
United States Patent and Trademark Office
World Intellectual Property Organization



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Executive Summary

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Education and Job Growth

This year's job growth numbers show positive signs of recovery after the global outbreak of the novel coronavirus (COVID-19). In the aftermath of the COVID-19 pandemic, there was a sharp decline in job growth by about 2 percent in April 2020 when compared to the 2005 baseline in the U.S. However, in the following months, from May 2020 through June 2021, the U.S. experienced increases in job growth. In fact, the economy reached a new high since the pandemic, with a 10-percent job growth in June 2021.

A similar trend was also observed in Michigan. However, the job losses due to the pandemic were much more pronounced in Michigan, where the sharp negative dip in April 2020 corresponded to a 23-percent drop in job growth from the 2005 benchmark. On a positive note, the growth gap between Michigan and the entire U.S. has continued to narrow from a gap of 20.7 percentage points in April of 2020 to 15.7 percentage points in June 2021.

Although we currently do not have full information about how jobs in the health care industry were affected by the pandemic, we present data on job growth in 2020. Despite the substantial impact of COVID-19 on job loss in Michigan and the slow recovery in positive job growth, we continue to see large gains in Grand Rapids' health care industry jobs.

Specifically, based on data from the Bureau of Labor Statistics (BLS), we expect to see the highest number of annual job openings for registered nurses, nursing assistants and aides, medical assistants, and home health and personal care aides at both the city and state levels. Different from Grand Rapids, the State of Michigan is also likely to have more job openings for dental assistants, dental hygienists, emergency medical technicians (EMTs) and paramedics, and licensed practical or licensed vocational nurses.

Additionally, we compared earning gains and losses for Grand Rapids to the State of Michigan and the U.S. as a whole. Since 2005, real wages for EMTs, paramedics, and speech-language pathologists increased nationally, but have declined in both Michigan and Grand Rapids. Between 2019 and 2020, we do not find any health care profession that experienced real annual earnings gains above 7 percent in both Grand Rapids and Michigan. Unlike last year, we also observe a sharp decline in mean annual earnings for occupational therapy assistants and optometrists in Grand Rapids.

Medical Innovation

There has been an increase in medical patent activity in West Michigan since the 1990s, along with a growing number of new innovators. Patents with inventors residing in Kent County have increased from an annual average of 12.6 from 1990 to 1999, to 16.3 from 2000 to 2009, and to 18.9 patents from 2010 to 2020. However, behind these averages is a concerning recent development — a significant decrease in the number of medical patents since 2014, mirroring a decline seen nationally and statewide.

In addition, medical patenting in the region is coming from a relatively small number of companies. Because patented medical innovations have a great potential for creating wealth and economic growth in West Michigan, continued research and development support is vital. Fortunately, National Institute of Health funding in West Michigan has grown substantially, possibly resulting in innovations and knowledge that do not result in patents.

Health Care Trends

Demographic Changes

In this year's report, we continue to monitor trends in population demographics in West Michigan and the Detroit region and compare changes in these trends to national averages. We continue to note a shift in population density from East Michigan to West Michigan, with the Detroit region demonstrating -0.40 percent growth rate in 2020, compared to 0.50 percent growth in the Kent, Ottawa, Muskegon, and Allegan (KOMA) counties.

While the 2020 growth rate in West Michigan is below the 1.26 percent growth rate noted in 2013, population growth still surpasses the 2020 national average of 0.35 percent. We also continue to track the increase in population age, with the proportion of the population over the age of 65 continuing to increase across both the KOMA and Detroit regions. In 2020, the 65 and older population made up 15.66 percent of the KOMA region population and 17.15 percent of the Detroit region population.

Health Care Overview

In this year's report, we continue to examine opioid use, self-reported mental health, as well as health risk behaviors and access to health care. In addition, we focus on health disparities by race and gender from 2011 until 2019.

For both KOMA and the Detroit region, we find that more than 30 percent of males and females used prescription pain medication in 2019. Our findings also suggest that females were prescribed more pain medication than males, particularly in the Detroit region. Since drug-induced deaths have been increasing in Michigan, this year we further focus on the fraction of leftover pain medication in West Michigan and the Detroit region.

We find that more than 60 percent of males and females have leftover pain medication from the last time they filled prescriptions in the Detroit region. For KOMA, we find considerable disparities between males and females. Specifically, 62 percent of females report having leftover opioids, whereas about 51 percent of males have leftover opioids.

We continue our analysis by exploring what individuals do with the leftover medications. We find that more than 60 percent of individuals report keeping their leftover medication and very few turn it in at a pharmacy. Leftover medications pose a risk for opioid misuse, as well as accidental poisoning. Given the relatively high rates of leftover medications in Michigan, promoting drug take-back programs and raising awareness about proper ways of disposing unused opioids may be an effective policy to reduce drug overdose deaths.

When examining mental health problems in the Detroit and KOMA regions, we find major disparities by race from 2011 to 2015. On average, 15 percent of non-white individuals reported having mental health problems, whereas this was around 11 percent for white individuals. However, there was a reversal in the trend in the Detroit region after 2015.

In 2019, we observe that the percentage of white individuals with mental problems (14.4 percent) in the Detroit region surpassed the percentage of white individuals reporting mental health issues (12.1 percent) in KOMA, as well as the percentage of non-white individuals with poor mental health days (13.3 percent) in the Detroit region.

A further exploration of the trends in poor mental health days imply that the increase in mental health problems among white individuals in the Detroit region is likely to be driven by males rather than females. However, we also note that females, on average, are more likely to have mental health issues than males in both the Detroit and KOMA regions.

Additionally, we analyze the trends in risk factors related to alcohol consumption, smoking, and obesity by race and gender. Our findings suggest that white individuals are likely to consume more alcohol than non-white individuals in West Michigan and the Detroit region. However, we observe that, historically, non-white individuals in KOMA were more likely to consume four or more drinks on a single occasion (i.e., binge drinkers) than non-white individuals in the Detroit region.

In terms of gender composition, males are more likely to be driving the trends in alcohol consumption than females. We further note that males in KOMA have the highest percentage for both heavy drinking (7.9 percent) and binge drinking (24.3 percent) in 2019, compared to females in KOMA, as well as males and females in the Detroit region.

In terms of cigarette and e-cigarette consumption, non-white individuals in KOMA are disproportionately affected than white individuals. While we observe a decrease in cigarette smoking among non-white individuals from 25 percent in 2011 to 18 percent in 2019 in the Detroit region, the prevalence of smoking among non-white individuals has increased from 14.5 percent to about 30 percent in KOMA.

Quite interestingly, former e-cigarette usage increased substantially by 14 percentage points among non-white individuals in KOMA and decreased by 4 percentage points among non-white individuals in the Detroit region between 2018 and 2019. The results suggest that while there may be a substitution from e-cigarettes to cigarettes among non-white individuals in KOMA, it seems the opposite is true for non-white individuals in the Detroit region who substitute e-cigarettes for cigarettes.

We further explore the trends in obesity in both the KOMA and Detroit regions. First, there is a substantial gap in the percentage of males and females who are overweight. On average, 40 percent of males and 30 percent of females are overweight, which implies a 10-percentage points gap between males and females.

Second, although there is a decline in the percent of non-white and white individuals who are overweight, we find an increase in the prevalence of obesity particularly among non-white individuals in KOMA.

Moreover, in KOMA, 34.4 percent of non-white individuals reported being obese in 2011, whereas 47.5 percent of non-white individuals reported being obese in 2019. We also see an increasing trend in obesity across all genders in KOMA and the Detroit region.

We continue to monitor access to health care with respect to individual health insurance status and utilization of routine and preventative care. Our findings suggest that non-white individuals are more likely to be uninsured, are more likely to have limited access to care due to costs, and are less likely to have a usual source of care, particularly in KOMA. We also note that access problems including access to routine checkups are likely to be more prevalent among males rather than females.

Health Care Spending During COVID-19

We use data from Opportunity Insights to track consumer spending at a daily frequency during COVID-19. This data tracks aggregate credit card and debit card spending collected by Affinity Solutions Inc. Our focus is specifically on consumer spending on health care and social assistance. Health care and social assistance spending includes, among others, expenditures on physician office visits; medical, diagnostic, and treatment services; and family services.

We find a 70 percent decline in health care and social spending in Michigan following the implementation of social distancing and mitigation policies such as public school closures, nonessential business closures, and the stay-at-home order. Although we observe a positive sign of recovery in consumer spending right after the stimulus payment on April 15, this trend was not robust for Michigan in the following months.

Specifically, there was approximately a 12 percent decline in consumer spending for the next 12 months. We also show that second and third stimulus payments were associated with slight increases in spending, but these observed trends were not persistent over time.

Economic Analysis

Major Medical Conditions: Expenditure and Utilization Analysis

We used member data provided by Blue Care Network, Blue Cross Blue Shield of Michigan, and Priority Health to examine average annual expenditures and health care use 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 expenditures for nearly all conditions were relatively stable between 2019 to 2020 in KOMA counties.

The largest increase was observed for low back pain (7 percent) and the only decrease was for depression (-3.8 percent). While average annual expenditures for each of the seven studied diagnoses have historically been higher in the Detroit region than in West Michigan, the opposite is true for CAD, hyperlipidemia, low back pain, and healthy members in 2020.

We find that average annual inpatient admissions, visits to the emergency department, and the average number of prescription fills tend to be greater in the Detroit region than in KOMA for the chronic conditions studied here. While the Detroit region has lagged KOMA in the adoption and utilization of telehealth as recently as 2017, it has since caught up and now clearly exceeds the KOMA region in telehealth utilization.

Disparities

The member data from Blue Care Network, Blue Cross Blue Shield of Michigan, and Priority Health were linked with 2010 census data on population, median income, and race at the ZIP code-level. The goal of this section is to examine differences in private insurance coverage, underlying health characteristics, and the prevalence of several chronic conditions across ZIP codes with different income levels and racial concentrations.

This approach has several limitations, especially concerning the decade-long gap between the insurer data and the income and racial profiles of the ZIP codes, as well as potential differences between the member and general populations. Despite these, we observe patterns that are consistent with disparities by income and race in Michigan, although there are differences between the east and west sides of the state especially concerning race.

Concerning income, the patterns in variables of interest across quintiles are fairly consistent between the KOMA and Detroit regions. This holds for average risk score and private insurance rates, as well as the share of member months that are “healthy”, to a lesser extent. Regarding chronic conditions, both show a large share of member months with a diabetes diagnosis in low-income ZIP codes and low back pain and depression diagnoses in high-income ZIP codes. Differing or no disparities were observed across regions for asthma, CAD, and hyperlipidemia.

Concerning race, there were different patterns for many variables between the two regions. Average risk scores were relatively low in “High Share Black” ZIP codes for KOMA, but the opposite was true for Detroit. Depression was relatively common in “High Share Black” ZIP codes for KOMA, but not so in Detroit. Diabetes was far more prevalent in the “High Share Black” ZIP codes of Detroit than in the “High Share White” ZIP codes, but the pattern was reversed in the KOMA region.

While it is difficult to determine the specific reasons behind the differences in pattern between race and income quintiles, the literature points to racial segregation having an impact in the Detroit region that is not present in the KOMA region.

Knowledge Foundations

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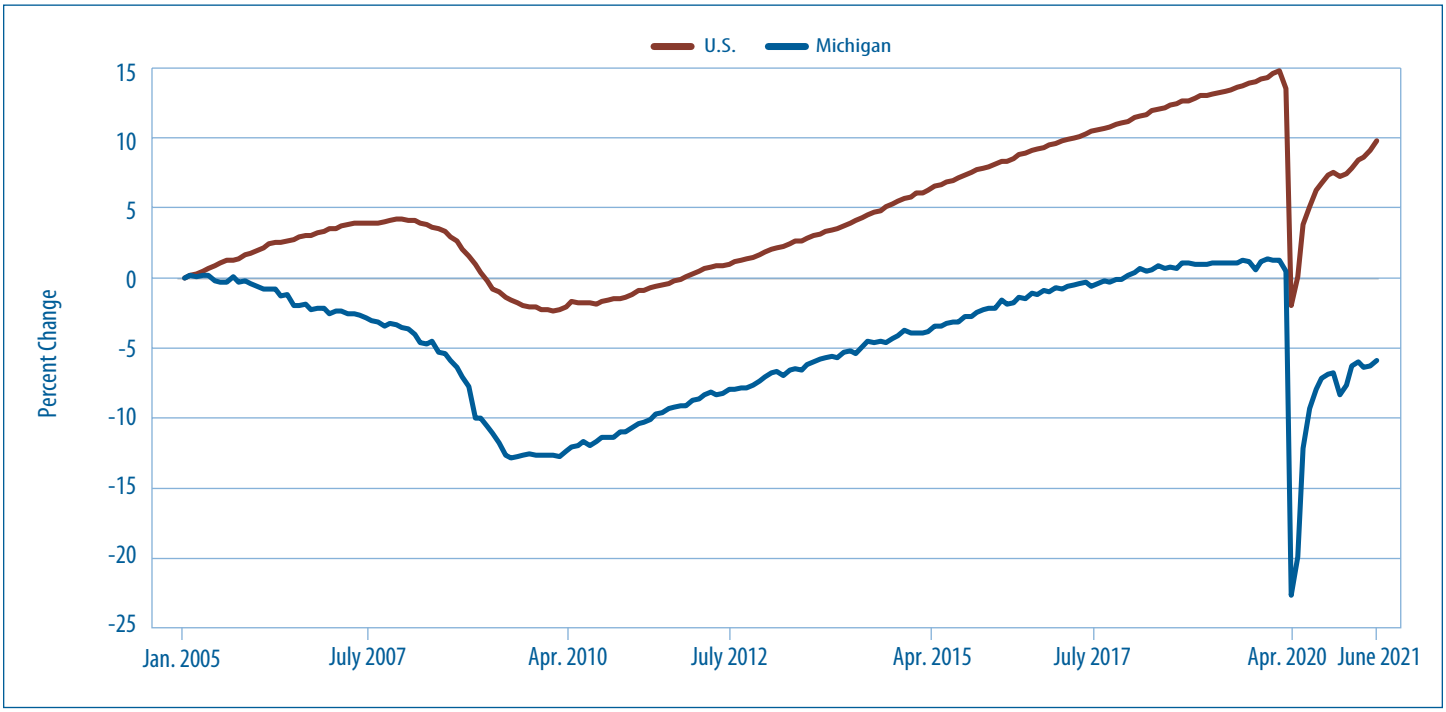
Education and Job Growth

We begin the discussion of trends in job growth by tracking changes in total employment for the U.S. and for the State of Michigan relative to January 2005. **Figure 1** plots growth in non-farm payroll jobs from January 2005 through June 2021. After the 2008 recession, the focus was on the dramatic decline of jobs for both Michigan and the U.S. At the height of the recession, jobs fell by more than 2 percent nationally and by nearly 13 percent in Michigan from their 2005 levels. Both the State of Michigan and the U.S. began adding jobs in early 2010. By April 2014, job growth in the U.S. had recovered to its prerecession level (about 4.2 percent in December 2007) and has continued to increase. However, Michigan did not recover to prerecession job levels until January 2018, meaning that the state has experienced only a small net gain in payroll jobs for more than a decade. The positive economic outlook in Michigan and the U.S. for the past few years was disrupted in the first quarter of 2020 by an unprecedented outbreak of the novel coronavirus (COVID-19) in Wuhan, China, that spread rapidly around the world causing a global pandemic. The pandemic response policies such as business closures combined with a large negative health shock hit a record toll on the job growth rate. In April 2020, job growth declined from a 14 percent annual rate in 2019 to about -2 percent in the U.S., while surpassing that in Michigan. Specifically, Michigan experienced a decline in non-farm payroll jobs by about 23 percent in April 2020. Moreover, the discrepancy between the U.S. job growth and that of Michigan further increased from a gap of 11 percentage points in January 2018 to a gap of 21 percentage points in April 2020. We observed positive signs of recovery from May 2020 through June 2021. In fact, the U.S. economy reached a 10 percent increase in job growth, exceeding the 4.2 percent growth prior to the 2008 recession. Although Michigan has experienced growth in employment relative to April 2020, the numbers are still far below that in the U.S. In other words, there is a gap of 16 percentage points between the U.S. and Michigan job growth as of June 2021.

Figure 1: Non-farm Payroll Jobs Percent Change, January 2005 to June 2021



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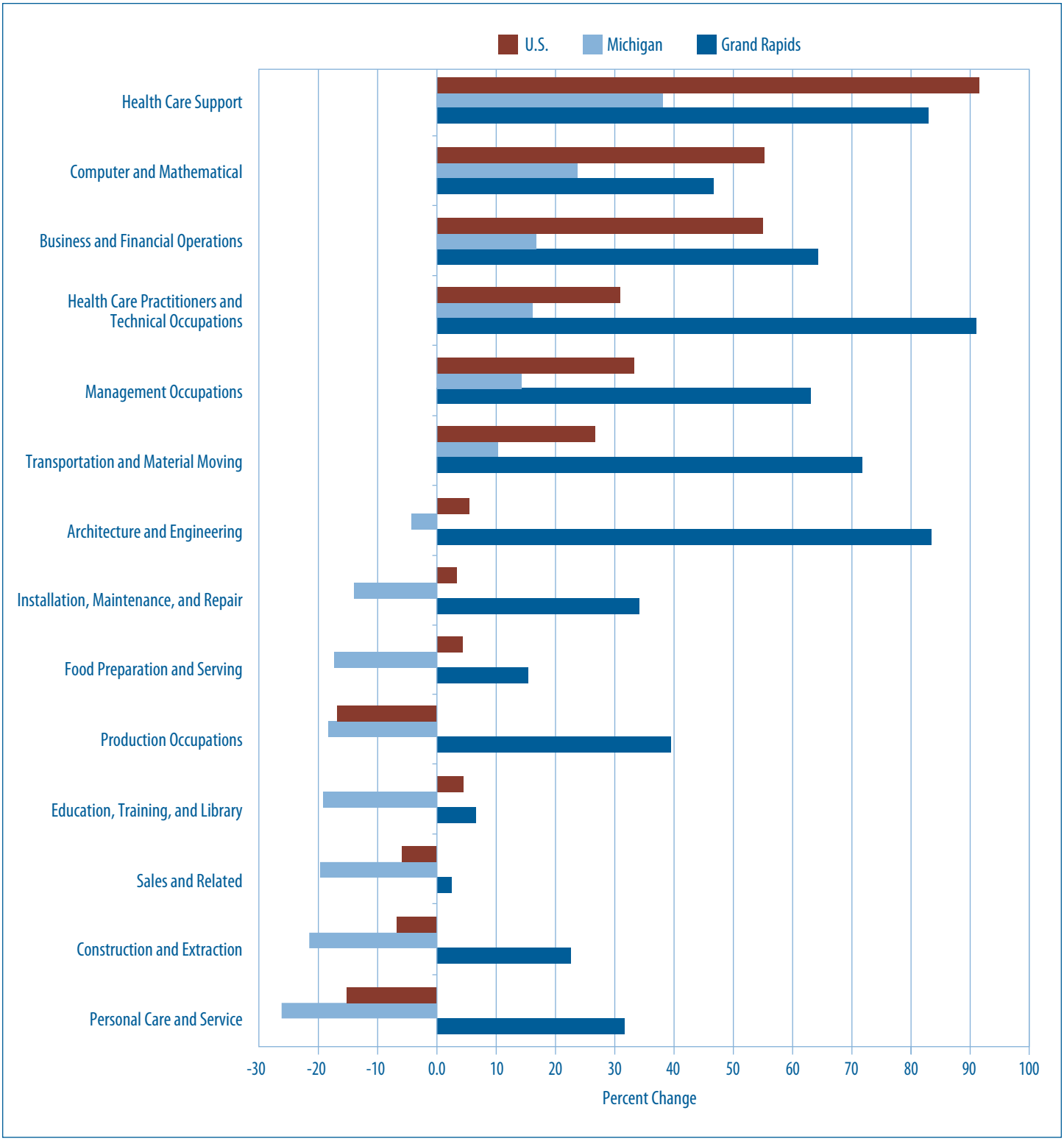
State Source: http://data.bls.gov/cgi-bin/srgate
State Series ID: SMS26000000000000001

Figure 2 provides a more detailed analysis of employment changes by examining job growth or job losses at the industry level from 2005 to 2020. We plot data for the Grand Rapids metropolitan statistical area (MSA), the State of Michigan, and the entire United States. The Grand Rapids region has experienced significant job growth (more than 50 percent) over this period in nine occupational categories: health care practitioners and technical occupations (91 percent), architecture and engineering (84 percent), health care support (83 percent), transportation and material moving (72 percent), business and financial operations (64 percent), and management occupations (63 percent).

Grand Rapids saw substantial employment growth over the past decade in occupations categorized by health care practitioners and technical occupations. Local growth in these occupations surpassed growth rates for the state and for the nation as a whole. In fact, employment for health care practitioners and technical occupations in Grand Rapids grew at nearly six times the state and triple the national rates since 2005. However, it is important to note that these growth rates are relatively lower compared to 2019 (see, e.g., Health Check 2021), mainly due to the negative economic shocks under COVID-19. Employment sectors in the U.S. that suffered the largest job losses over this period include production occupations, personal care and service, construction and extraction, and sales and related occupations.

Figure 2: Job Growth for Select Major Occupational Groups, 2005-2020



Source: Bureau of Labor Statistics, www.bls.gov

We observe large declines in multiple occupations in Michigan, which also implies that the negative effect of COVID-19 was more salient in the rest of the state compared to Grand Rapids. As of May 2020, we show that there are relatively large declines in the growth rate of the following occupations: personal care and service (26 percent), construction and extraction (22 percent), sales and related occupations (20 percent), production occupations (18 percent), food preparation and serving (17 percent), and installation, maintenance, and repair (14 percent). Moreover, there is an increasing negative growth rate within education, training, and library occupations across the state as a whole, where we observe close to a 19 percent drop since 2005. These trends may be related to a decrease in the school aged population, which has shown a steady decline (beyond a 13 percent drop since 2002) in Michigan, as reported in data from the Michigan Department of Education, National Center for Education Statistics. Related to the decrease in the school aged population, reports of a smaller number of high school graduates in Michigan may impact the number of individuals seeking university-level education who supply the labor force for these in-demand occupations (Bransberger & Michelau, 2016).

Given these trends in employment, we further examine the changes in labor supply and demand conditions in the health care sector in both Grand Rapids and Michigan. To analyze this issue, we proceeded with the following steps:

1. We observed job growth for selected health care occupations since 2005.
2. We made specific predictions for employment demand in the Grand Rapids area for several selected health professions.
3. We measured changes in earnings over the past decade for these professions.

Table 1 provides historic employment levels and growth for a variety of health care occupations identified in the Bureau of Labor Statistics (BLS) data for the Grand Rapids metro area and the State of Michigan. We report growth figures since 2005 and since 2019 to illustrate long-term, as well as recent changes. In general, Grand Rapids has experienced greater job growth in the health care sector compared to the state as a whole since 2005. Growth has been especially robust in the areas of diagnostic medical sonographers, dietitians and nutritionists, registered nurses (RNs), occupational and physical therapists, occupational and physical therapy assistants, physician assistants, pediatricians, surgeons, radiologic technologists and technicians, recreational therapists, respiratory therapists, and surgical technicians. Only a few occupations experienced job losses in Grand Rapids since 2005; those include dentists and dental assistants, medical transcriptionists, nuclear medicine technologists, licensed practical or licensed vocational nurses (LPNs or LVNs), opticians, and family and general practitioners. The State of Michigan saw significant job growth among diagnostic medical sonographers, dietitians and nutritionists, medical assistants, medical record technicians, pharmacy technicians, physical therapists, physician assistants, pediatricians, psychiatrists, and surgical technologists. The State of Michigan saw job losses among audiologists, dentists, dental assistants and hygienists, medical transcriptionists, nuclear medicine technologists, LPNs or LVNs, opticians, optometrists, obstetricians and gynecologists, and surgeons.

If we analyze the growth rates in the health care sector since 2019, we observe a slightly different story due to COVID-19. Despite popular belief, the growth rates suggest that there was a contraction in health care jobs between 2019 and 2020. Specifically, the average decline in job growth in health care was about 1.8 and 11 percent, respectively, in Grand Rapids and Michigan. In fact, Cutler (2020) shows that a large share of unemployment claims in Michigan came from health care businesses during March 2020.

Table 2 presents employment projections for Michigan and the Grand Rapids metro area generated by matching data on historic and projected employment levels from the Bureau of Labor Statistics to estimates of employment growth rates from the Michigan Department of Technology, Management and Budget. The left-hand columns in **Table 2** display occupation-specific employment in 2020, the corresponding annualized average growth rates, and projected employment in 2028. In the next two columns, we convert the growth rates into annual job growth numbers. Replacement rate figures in the next two columns indicate the share of current employment that is expected to turn over through retirement or other forms of employment transitions. Projected employment has two components: job growth (i.e., new positions) and replacement (i.e., existing positions that have been vacated). We combine these two components to estimate the average annual job openings in both Michigan and in the Grand Rapids metro area in the last two columns of **Table 2**. Occupations for which we expect to see the highest number of annual job openings include dental assistants (81 in Grand Rapids and 755 for the state), home health and personal care aides (1,078 in Grand Rapids and 10,080 for the state), medical assistants (333 in Grand Rapids and 2,817 for the state), registered nurses (909 in Grand Rapids and 6,442 for the state), licensed practical or licensed vocational nurses (152 in Grand Rapids and 955 for the state), and nursing aides and assistants (887 in Grand Rapids and 5,578 for the state).

Finally, **Table 3** presents inflation-adjusted growth in annual earnings for health professions in Grand Rapids, Michigan, and the U.S. Once again, data for the wage estimates came from the Bureau of Labor Statistics, and we compared changes in these estimates for the long term (from 2005 to 2020) and the shorter term (2019 to 2020). We specifically focused on fields in which real earnings have increased or decreased by more than 7 percent during the 2005 to 2020 period. In Grand Rapids, the occupations with the largest decline in real earnings include dental hygienists, emergency medical technicians (EMTs) and paramedics, occupational therapists, respiratory therapists, speech-language pathologists, and surgical technologists. Dental hygienists, dietitians and nutritionists, EMTs and paramedics, and speech-language pathologists all experienced real earnings losses beyond 7 percent for the State of Michigan. Occupations experiencing the largest real earnings gains in the Grand Rapids region from 2005 to 2020 include family and general practitioners, optometrists, and physician assistants. Family and general practitioners and physician assistants all saw wage growth in excess of 7 percent for the state as a whole.

When we compared earnings changes in Grand Rapids to those in Michigan or the entire U.S., we found several similarities but also several interesting differences. For example, since 2005, real wages for diagnostic medical sonographers, dietitians and nutritionists, EMTs and paramedics, medical assistants, respiratory therapists,

speech-language pathologists, and surgical technologists increased nationally, but have declined in both Michigan and Grand Rapids. We only observe declines in real wages for dental hygienists and optometrists in the U.S. On the other hand, the largest increase in real wages since 2005 is among physician assistants and occupational therapy assistants in the U.S.

Looking at more recent changes between 2019 and 2020 in Grand Rapids, we do not find any occupation with more than 7 percent growth in real annual earnings. However, the growth for diagnostic medical sonographers, dietitians and nutritionists, nurse practitioners, and LPNs or LVNs is considerably higher in Grand Rapids than in both Michigan and the U.S. at large. In the short-term, we also observe a substantial decline in earnings for occupational therapy assistants, as well as optometrists in Grand Rapids.

We emphasize that any estimates presented within this section 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. Furthermore, a decrease in the number of high school graduates, along with a notable decrease in the number of education jobs in the last few years, suggests that the pool of individuals entering university programs may decrease in future years. As such, policy and community efforts will be vital to retain the current skilled healthcare workforce, as well as encourage talented individuals to pursue degrees leading to employment within the health care sector.

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Table 1: Health Care Job Growth for Selected Occupations, 2005-2020

Occupation	Grand Rapids				
	Employment (2005)	Employment (2019)	Employment (2020)	Employment Growth (%) Since 2005	Employment Growth (%) Since 2019
Anesthesiologists	NA	NA	220	NA	NA
Audiologists	NA	40	NA	NA	NA
Cardiovascular Technologists/Technicians	NA	400	400	NA	0.0
Dental Assistants	860	1,000	720	-16.3	-28.0
Dental Hygienists	690	1,070	780	13.0	-27.1
Dentists, General	350	380	210	-40.0	-44.7
Diagnostic Medical Sonographers	130	360	400	207.7	11.1
Dietitians and Nutritionists	140	280	310	121.4	10.7
EMT and Paramedics	450	NA	NA	NA	NA
Home Health and Personal Care Aides	NA	6,060	6,720	NA	10.9
Medical Assistants	1,540	2,500	2,550	65.6	2.0
Medical Records/Health Info Technicians	510	870	830	62.7	-4.6
Medical Transcriptionists	290	90	50	-82.8	-44.4
Nuclear Medicine Technologists	110	70	80	-27.3	14.3
Nurse Practitioners	NA	530	570	NA	7.5
Nurses, RN	6,310	12,820	13,940	120.9	8.7
Nurses, LPN or LVN	1,870	1,780	1,770	-5.3	-0.6
Nursing Aides and Assistants	4,950	7,970	6,910	39.6	-13.3
Occupational Therapists	230	570	690	200.0	21.1
Occupational Therapy Assistants	50	250	340	580.0	36.0
Opticians, Dispensing	320	340	220	-31.3	-35.3
Optometrists	80	130	100	25.0	-23.1
Pharmacists	560	850	920	64.3	8.2
Pharmacy Technicians	700	1,260	1,260	80.0	0.0
Physical Therapists	330	980	1,090	230.3	11.2
Physical Therapist Assistants	100	520	540	440.0	3.8
Physician Assistants	180	680	720	300.0	5.9
Physicians, Family and General Practitioners	270	180	120	-55.6	-33.3
Physicians, Obstetricians and Gynecologists	NA	120	100	NA	-16.7
Physicians, Pediatricians	30	130	130	333.3	0.0
Physicians, Psychiatrists	NA	70	100	NA	42.9
Physicians, Surgeons	100	NA	NA	NA	NA
Physicians and Surgeons, All Other	380	1,070	1,150	202.6	7.5
Radiologic Technologists and Technicians	380	850	840	121.1	-1.2
Recreational Therapists	60	140	140	133.3	0.0
Respiratory Therapists	240	730	770	220.8	5.5
Speech-language Pathologists	390	610	590	51.3	-3.3
Surgical Technologists	220	720	780	254.5	8.3

Source: Bureau of Labor Statistics, www.bls.gov

	Michigan				
	Employment (2005)	Employment (2019)	Employment (2020)	Employment Growth (%) Since 2005	Employment Growth (%) Since 2019
	NA	990	1,010	NA	NA
	690	450	330	-52.2	-26.7
	1,940	2,340	2,410	24.2	3.0
	9,650	9,610	6,900	-28.5	-28.2
	7,850	9,140	6,560	-16.4	-28.2
	4,570	3,720	2,540	-44.4	-31.7
	1,510	2,660	2,510	66.2	-5.6
	1,410	2,040	2,020	43.3	-1.0
	6,670	7,160	6,880	3.1	-3.9
	NA	68,860	68,510	NA	-0.5
	14,490	24,580	22,750	57.0	-7.4
	4,820	8,380	8,090	67.8	-3.5
	3,080	1,450	1,130	-63.3	-22.1
	960	610	610	-36.5	0.0
	NA	4,840	4,880	NA	0.8
	81,370	96,900	97,820	20.2	0.9
	17,850	14,140	12,700	-28.9	-10.2
	48,960	51,270	48,610	-0.7	-5.2
	3,510	4,620	4,400	25.4	-4.8
	890	1,230	1,170	31.5	-4.9
	3,550	3,590	2,670	-24.8	-25.6
	1,290	1,370	990	-23.3	-27.7
	8,110	8,650	8,830	8.9	2.1
	8,560	15,040	13,990	63.4	-7.0
	5,170	8,060	7,270	40.6	-9.8
	2,550	3,540	3,100	21.6	-12.4
	2,320	4,840	4,350	87.5	-10.1
	3,030	3,270	2,320	-23.4	-29.1
	750	930	720	-4.0	-22.6
	370	1,150	900	143.2	-21.7
	400	700	600	50.0	-14.3
	1,640	1,670	1,410	-14.0	-15.6
	10,220	15,810	13,680	33.9	-13.5
	6,020	6,750	6,630	10.1	-1.8
	700	780	790	12.9	1.3
	3,390	4,520	4,440	31.0	-1.8
	3,340	4,300	3,880	16.2	-9.8
	2,610	4,240	3,970	52.1	-6.4

Table 2: Need for Selected Professions in Michigan

Selected Professions	Michigan Employment (2020)[1]	Grand Rapids Employment (2019)[1]	Michigan Annual Growth Rate[3]	Grand Rapids Annual Growth Rate[4]
Dental Assistants	6,900	720	-0.002	0.000
Dental Hygienists	6,560	780	-0.003	0.000
Diagnostic Medical Sonographers	2,510	400	0.008	0.011
Dietitians and Nutritionists	2,020	310	0.002	0.006
EMT and Paramedics	6,880	NA	-0.003	0.000
Home Health and Personal Care Aides	68,510	6,720	0.021	0.028
Medical Assistants	22,750	2,550	0.008	0.012
Nurse Practitioners	4,880	570	0.015	0.019
Nurses, LPN or LVN	12,700	1,770	-0.001	0.007
Nurses, RN	97,820	13,940	0.009	0.009
Nursing Aides and Assistants	48,610	6,910	0.002	0.010
Occupational Therapists	4,400	690	0.008	0.012
Occupational Therapy Assistants	1,170	340	0.016	0.018
Optometrists	990	100	0.001	0.003
Physical Therapists	7,270	1,090	0.009	0.011
Physician Assistants	4,350	720	0.017	0.020
Physicians, Family and General Practitioners	2,320	120	-0.001	NA
Respiratory Therapists	4,440	770	0.012	0.018
Speech-language Pathologists	3,880	590	0.017	0.020
Surgical Technologists	3,970	780	-0.002	0.005

Note: Job growth rate and annual change are based on rounded data.
[1]Source: https://www.bls.gov/oes/2020/may/oes_mi.htm
[2]Source: https://www.bls.gov/oes/2020/may/oes_24340.htm
[3]Source: https://milmi.org/DataSearch/Employment-Projections-Excel-Files (Statewide Long-Term Projections 2018-2028, Occupational Projections)
[4]Source: https://milmi.org/DataSearch/Employment-Projections-Excel-Files (Michigan Regional Long-Term Employment Projections 2018-2028, West Michigan Prosperity Region Occupational Projections)

MI Annual Replacement Rate = (Replacement/Employment 2018)
GR Annual Replacement Rate = (Replacement/Employment 2018)

	Michigan Projected Employment (2028)	Grand Rapids Projected Employment (2028)	Michigan Annual Job Growth	Grand Rapids Annual Job Growth	Michigan Annual Replacement Rate	Grand Rapids Annual Replacement Rate	Average Annual Job Openings in Michigan	Average Annual Job Openings in Grand Rapids
	6,769	720	-15	0	0.112	0.113	755	81
	6,404	780	-17	0	0.067	0.068	420	53
	2,691	441	20	5	0.058	0.060	167	28
	2,060	327	4	2	0.062	0.059	130	20
	6,677	NA	-23	NA	0.066	0.068	429	NA
	82,303	8,616	1,533	211	0.125	0.129	10,080	1,078
	24,546	2,839	200	32	0.115	0.118	2,817	333
	5,583	675	78	12	0.059	0.063	365	47
	12,610	1,885	-10	13	0.076	0.079	955	152
	106,427	15,111	956	130	0.056	0.056	6,442	909
	49,355	7,557	83	72	0.113	0.118	5,578	887
	4,712	768	35	9	0.058	0.056	291	47
	1,344	399	19	7	0.114	0.117	153	46
	1,001	103	1	0	0.030	0.033	31	4
	7,881	1,203	68	13	0.044	0.045	387	62
	5,050	860	78	16	0.064	0.064	355	62
	2,291	NA	-3	NA	0.031	NA	68	NA
	4,955	904	57	15	0.057	0.058	312	60
	4,505	705	69	13	0.059	0.058	297	47
	3,912	816	-6	4	0.078	0.083	305	69

Table 3: Average Annual Earnings for Select Health Care Professions

Selected Professions Color Key: Above Seven Percent Below Negative Seven Percent (-7%)	2005 Mean Annual Earnings*			2019 Mean Annual Earnings*		
	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.
Dental Assistants	$42,870	$41,068	$39,716	$45,150	$39,825	$41,678
Dental Hygienists	$67,930	$73,376	$80,333	$63,959	$66,419	$78,183
Diagnostic Medical Sonographers	$66,869	$68,844	$73,456	$61,712	$63,767	$76,715
Dietitians and Nutritionists	$61,171	$62,112	$60,893	$57,076	$56,762	$63,099
EMT and Paramedics	$40,114	$37,000	$37,689	$31,959	$34,176	$39,309
Home Health and Personal Care Aides	$27,432	$25,417	$25,735	$26,473	$25,977	$26,766
Medical Assistants	$36,072	$35,012	$34,667	$34,936	$34,176	$36,161
Nurse Practitioners	NA	NA	NA	$104,058	$110,001	$113,220
Nurses, LPN or LVN	$48,608	$49,960	$47,985	$47,357	$50,921	$49,098
Nurses, RN	$69,189	$75,788	$75,377	$69,062	$74,103	$78,416
Nursing Aides and Assistants	$30,082	$31,354	$29,419	$29,834	$31,605	$31,099
Occupational Therapists	$85,488	$73,191	$78,319	$72,969	$78,972	$87,274
Occupational Therapy Assistants	$44,712	$52,292	$52,743	$51,923	$53,694	$62,643
Optometrists	$113,013	$127,722	$126,556	$154,108	$127,099	$124,497
Physical Therapists	$83,673	$87,622	$86,602	$87,901	$91,616	$91,282
Physician Assistants	$99,324	$95,136	$94,182	$109,039	$111,873	$113,797
Physicians, Family and General Practitioners	$209,885	$184,931	$186,018	$239,711	$209,888	$215,901
Respiratory Therapists	$73,919	$61,025	$61,317	$59,080	$59,596	$64,739
Speech-language Pathologists	$107,606	$85,647	$76,861	$75,257	$81,868	$83,012
Surgical Technologists	$47,349	$48,595	$47,601	$42,660	$45,140	$50,728

Source: https://www.bls.gov/oes/tables.htm
*2005 and 2019 Mean Annual Wages are inflated to 2020 dollars.
NA = Not Available

	2020 Mean Annual Earnings			Percent Change in Real Annual Earnings Since 2005			Percent Change in Real Annual Earnings Since 2019		
	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.
	$44,550	$40,470	$42,310	3.92	-1.46	6.53	-1.33	1.62	1.52
	$62,330	$66,500	$78,050	-8.24	-9.37	-2.84	-2.55	0.12	-0.17
	$64,690	$66,020	$77,790	-3.26	-4.10	5.90	4.83	3.53	1.40
	$58,280	$56,650	$64,150	-4.73	-8.79	5.35	2.11	-0.20	1.67
	$32,610	$34,410	$40,370	-18.71	-7.00	7.11	2.04	0.68	2.70
	$27,000	$26,200	$28,060	-1.57	3.08	9.03	1.99	0.86	4.83
	$34,890	$34,830	$36,930	-3.28	-0.52	6.53	-0.13	1.91	2.13
	$107,140	$109,150	$114,510	NA	NA	NA	2.96	-0.77	1.14
	$48,910	$52,220	$50,090	0.62	4.52	4.39	3.28	2.55	2.02
	$69,760	$73,980	$80,010	0.83	-2.39	6.15	1.01	-0.17	2.03
	$30,240	$32,030	$32,050	0.53	2.16	8.94	1.36	1.34	3.06
	$69,740	$77,600	$87,480	-18.42	6.02	11.70	-4.43	-1.74	0.24
	$45,590	$50,260	$63,420	1.96	-3.89	20.24	-12.20	-6.40	1.24
	$142,920	$131,320	$125,440	26.46	2.82	-0.88	-7.26	3.32	0.76
	$83,640	$87,610	$91,680	-0.04	-0.01	5.86	-4.85	-4.37	0.44
	$107,150	$111,050	$116,080	7.88	16.73	23.25	-1.73	-0.74	2.01
	$242,810	$213,260	$214,370	15.69	15.32	15.24	1.29	1.61	-0.71
	$59,100	$60,260	$65,640	-20.05	-1.25	7.05	0.03	1.11	1.39
	$74,560	$79,310	$83,240	-30.71	-7.40	8.30	-0.93	-3.12	0.28
	$41,910	$45,910	$51,510	-11.49	-5.53	8.21	-1.76	1.71	1.54

Medical Innovation

Medical innovations contribute to economic growth and improve the human condition. However, measuring innovations generated in a specific geographic area is challenging. One way to do so is to examine the locational aspects of medical patents. Another is to quantify the amount of spending undertaken on medical research.

Patents

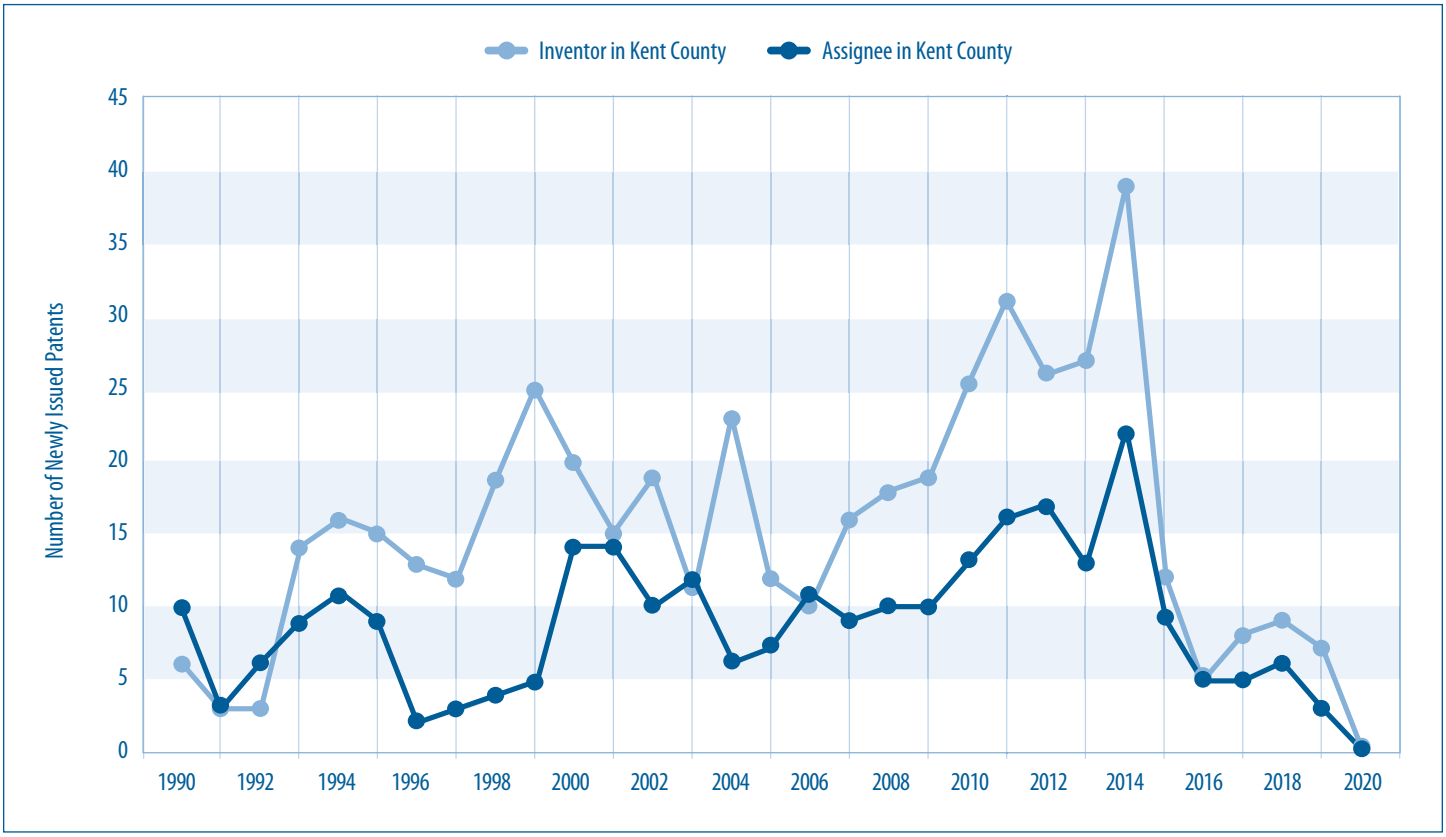
A patent is the property right granted to an inventor or assignee for a new or improved product, process, or piece of equipment. Patents are used as indicators of economic growth because of the investment that went into creating the innovations, as well as the investment opportunities that result from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

However, there are drawbacks to relying on patent data to measure innovative activity. Some inventors and assignees choose not to register patents for their innovations because doing so will require them to divulge details to competitors. In addition, not all patents have a substantial impact on economic progress. On the whole, 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 differentiation can then result in location differences, where, for example, the inventor lives in Kent County, but the company that owns the patent is in China, or the inventor lives in Germany, but the assignee is a company in West Michigan. To evaluate the economic significance of innovative activities, considering inventors and assignees separately is useful.

Figure 1 shows the number of new medical patents granted by the USPTO to inventors residing in Kent County and, separately, patents with assignees in Kent County from the year 1990 through 2020. For those with inventors living in Kent County, the average annual number of patents increased from 12.6 in the years 1990-1999 to 16.3 in the years 2000-2009, with an additional increase to an average of 17.1 in the years 2010-2020. For those with assignees in Kent County, the average annual number of patents increased from 6.2 in the years 1990-1999 to 10.3 in the years 2000-2009 and to 9.9 patents in the years 2010-2020. This growth in medical patents owned by entities in Kent County or invented by innovators 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.

Figure 1: Medical Patenting in Kent County, 1990–2020

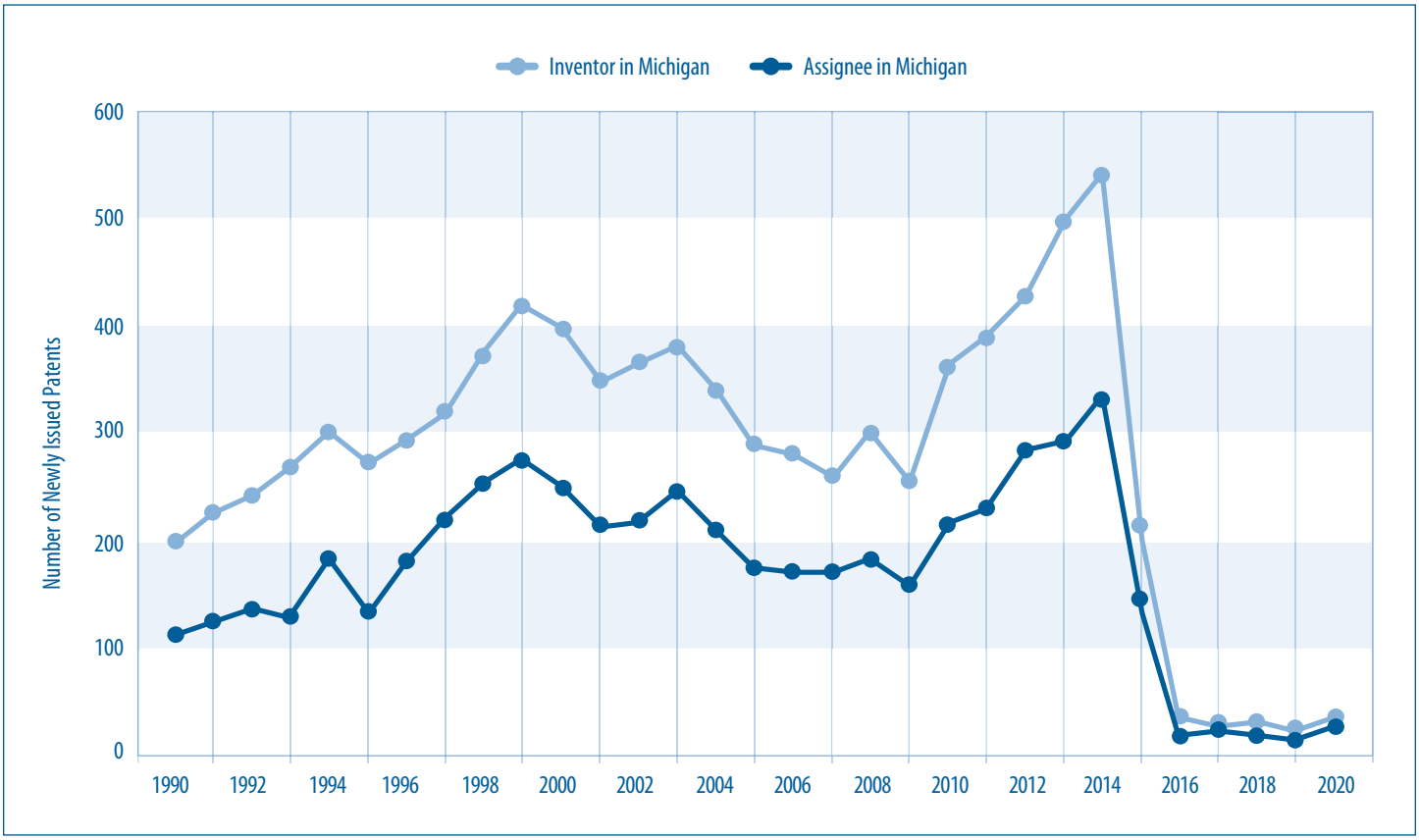


Source: United States Patent and Trademark Office, www.uspto.gov

Although the average, annual number of patents has increased over time, **Figure 1** clearly shows that there has been a significant decrease in patenting since 2014, with the annual number of new patents with inventors living in Kent County falling from 39 in 2014 to zero in 2020, and the annual number of new patents with assignees located in Kent County falling from 22 to zero over the same period.

To determine if this recent change in medical patenting is specific to Kent County, we compared **Figure 1** with **Figure 2**, which shows the parallel data for the State of Michigan as a whole. The two figures have similar patterns, with generally upward trends followed by stark declines since 2014. Furthermore, rather than a regional aberration, the decline in medical patenting appears to be a national phenomenon, as can be seen in **Table 1**, which displays the percentage change in the annual number of new medical patents for Kent County, Michigan, and the entire U.S., from 2014 through 2020.

Figure 2: Medical Patenting in Michigan, 1990–2020



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

Table 1: Percentage Change in Newly Issued Medical Patents by Location of Inventor and Assignee, 2014–2020

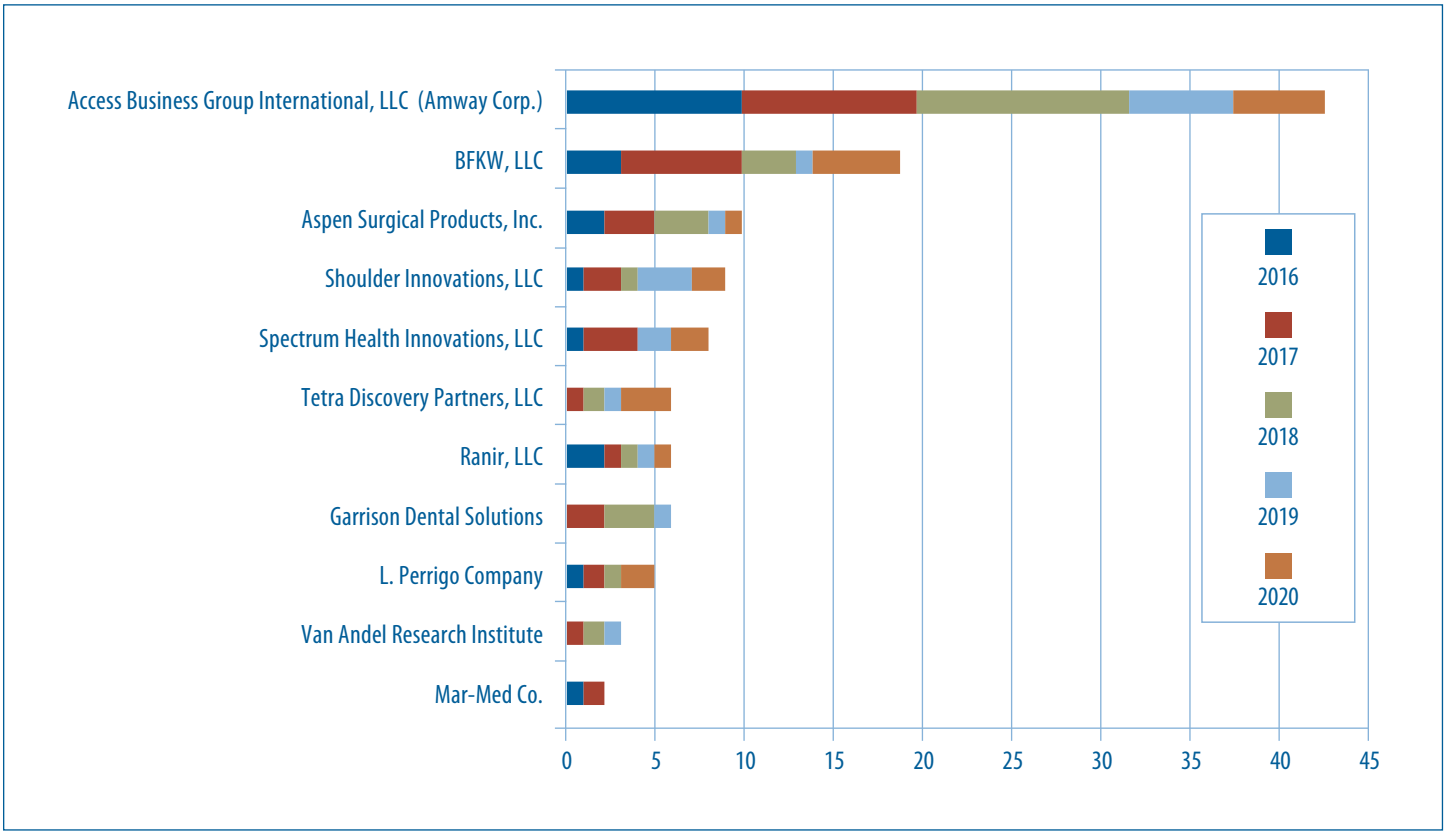
	Location of Inventor			Location of Assignee		
	Kent County	Michigan	U.S.	Kent County	Michigan	U.S.
Percent Change 2014-2020	-100	-94	-94	-100	-93	-96

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

A patent obtained through the USPTO only gives property right protection in the U.S. While this protection is sufficient for some inventors and assignees, 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 193 countries simultaneously.

The number of nonduplicate medical patent applications filed by West Michigan companies at the WIPO and at the USPTO from 2015 through 2020 is shown in **Figure 3**. Since the year 2015, there have been 109 medical patent filings from 12 West Michigan companies. However, the majority of these filings come from only three companies, which together are responsible for approximately 63 percent of the total number of filings. Although the most prolific companies consistently apply for medical patents over time, the same is not true for all of the others, as 25 percent of the listed companies did not apply for any medical patents in 2020.

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

The COVID-19 pandemic and resulting recession likely played a part in the decline in medical patenting in West Michigan from 2019-2020. What, though, could have caused the relatively modest volume of medical patenting in West Michigan after 2014? The patenting process involves time delays between application and approval. Increases in processing time could possibly explain the recent declines in approved medical patents. Data on patent wait times ("pendency") is not available for medical patents specifically, but is available for USPTO patent applications as a whole.

Figure 4 shows the average wait times for the first action made by the USPTO on patent applications and for the entire "start to finish" time, from fiscal years 2000 through 2020. Rather than increasing in recent years, the average wait time has been decreasing since 2010 through 2011, though it is possible that this pattern does not hold for medical patents.

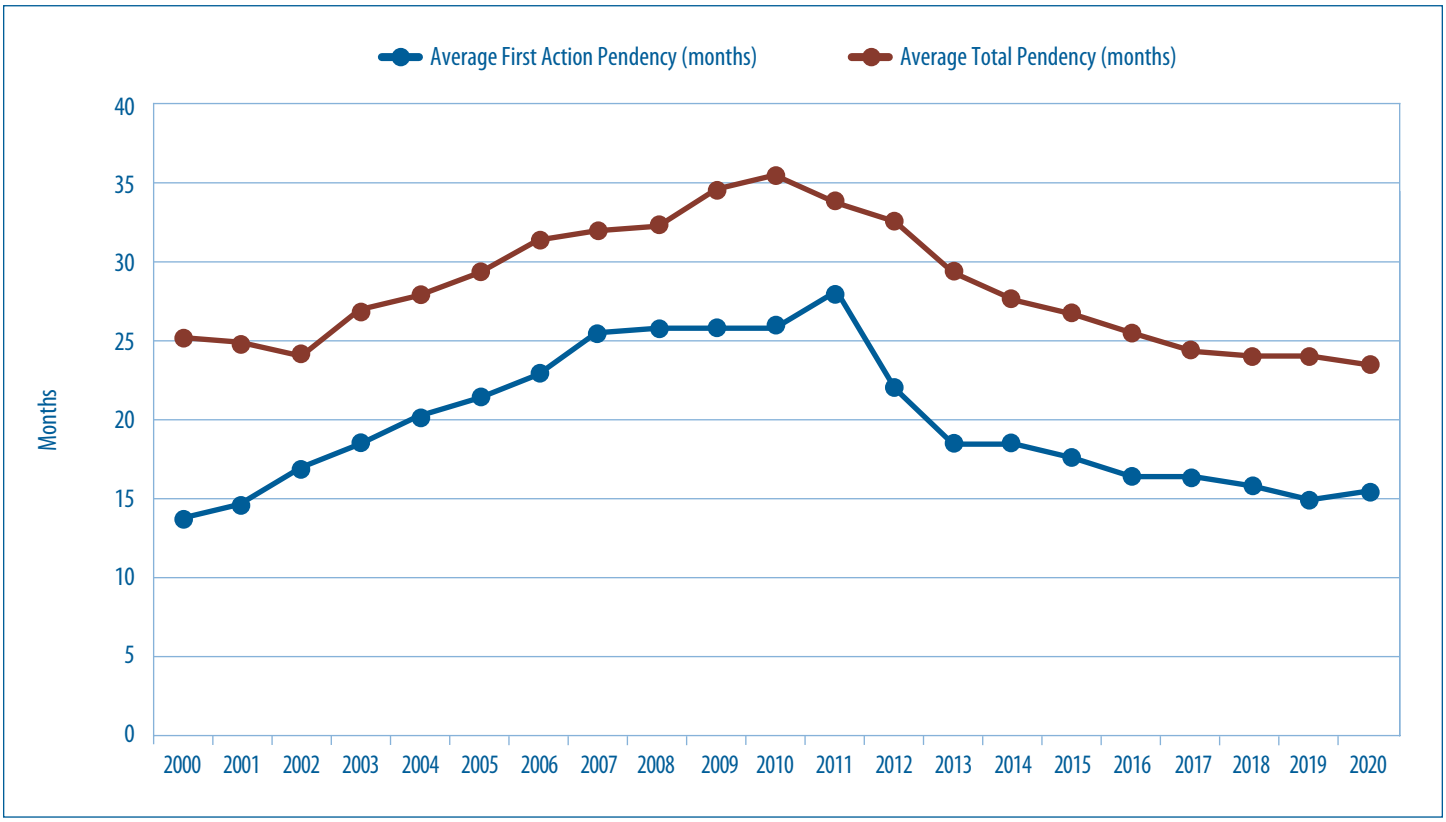
One possible explanation for the recent decrease in medical patents rests on a change in the patenting process itself and the resulting incentive structure. The Leahy-Smith America Invents Act (AIA) of 2011 switched U.S. patenting from a "first-to-invent" to a "first-to-file" system for patent applications filed on or after March 16, 2013. The act also made changes to patenting fees and the definition of "prior art" for patent reviews. Although the AIA was intended to encourage patenting, some have argued that aspects of the law might be particularly disadvantageous to small businesses and independent inventors.

There has also been a shift in global patenting, which could explain some of the decline in medical patents in the U.S. WIPO (2019) reports that the number of patent applications in the U.S. fell by 1.6 percent from 2017 through 2018, while the number of patent applications in many other locations grew by 11.6 percent in China, 7.5 percent in India, 4.7 percent at the European Patent Office, and 5.2 percent worldwide.

Recent court cases are probably another substantial reason for the decline in medical patenting. In 2012, the U.S. Supreme Court struck down medical diagnostics patents in Mayo Collaborative Services v. Prometheus Laboratories, Inc., and in 2013, it struck down patents on gene sequences in Association for Molecular Pathology v. Myriad Genetics. These rulings have likely pushed companies to keep certain medical discoveries secret rather than pursue patents for them.

Other explanations not examined here might also contribute to the patenting changes illustrated previously. Whatever the causes, the recent decreases in patenting are concerning, as patented medical innovation has the potential to become a significant driver of economic growth in West Michigan.

Figure 4: USPTO Patent Wait Times*, 2000–2020



*By fiscal year. First action pendency is the estimated time in months from filing to the date a first action is filed by the USPTO, as well as any time awaiting a reply from an applicant to submit all parts of their application. Total pendency is the estimated time in months from filing to issue or abandonment of the patent application.
Source: United States Patent and Trademark Office, www.uspto.gov

Research Spending

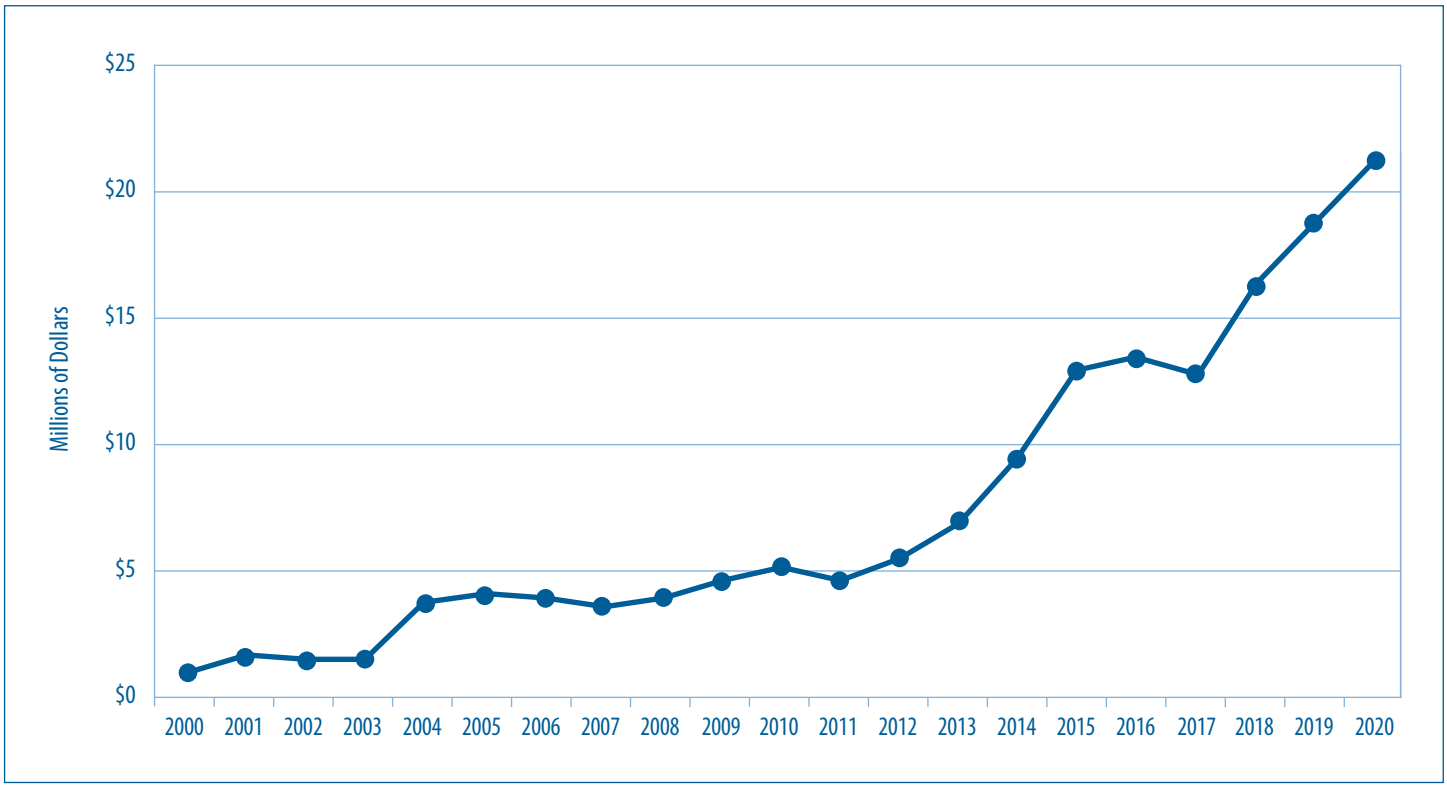
While patents are one of the outcomes of the innovation process, spending on research and development is one measure of the inputs to that process. While R&D spending by private sector companies is not always publicly available, government funding for research is. **Figure 5** shows the dollar value of National Institute of Health (NIH) funding awards to West Michigan organizations by year for 2000-2020. **Figure 6** shows those award amounts as a percentage of the NIH awards for the entire state. These figures show a significant increase in NIH research funding for West Michigan, both in dollar terms and relative to the state as a whole.

The increase in NIH funding is reassuring. Combined with the data on patenting, the funding numbers could indicate that medical innovation itself is not declining, but just that fewer medical innovations are being patented. Unfortunately, the NIH data does not imply that total spending for medical research (public and private) has a similar upward trend.

References

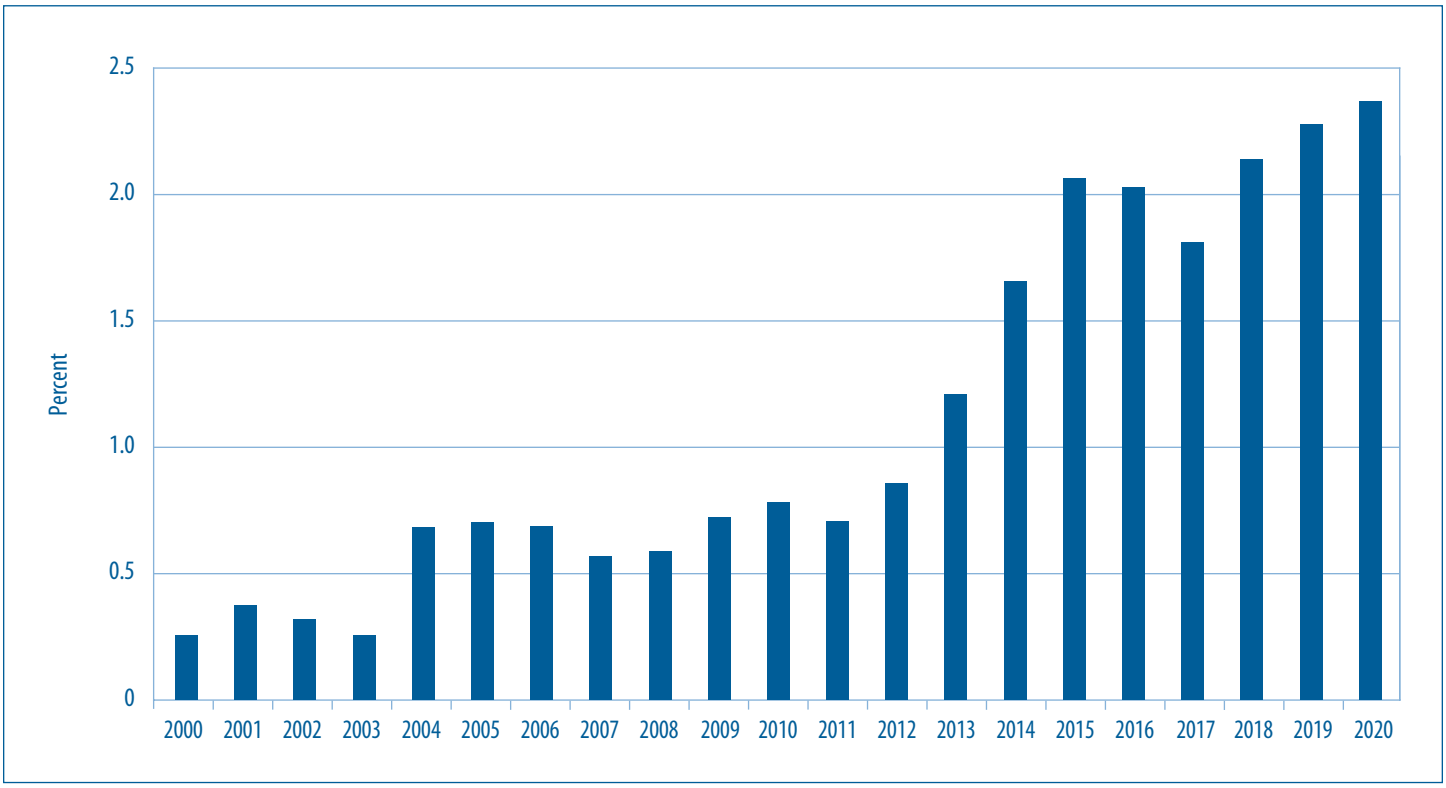
WIPO (2019). *World Intellectual Property Indicators 2019.* Geneva: World Intellectual Property Organization.

Figure 5: National Institute of Health Funding to West Michigan Organizations, 2000-2020



Source: National Institute of Health, www.nih.gov

Figure 6: National Institute of Health Funding to West Michigan Organizations as a Percentage of Total Michigan Funding, 2000-2020



Source: National Institute of Health, www.nih.gov

Health Care Trends

GRAND VALLEY STATE UNIVERSITY
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Demographic Changes

Demographic changes have significant effects on the utilization of health care services. We continue to monitor two key trends: continued population growth on the west side of the state and an increase in the average age of the population. Because older individuals tend to have more health care needs than younger individuals, an aging population can result in increased health care utilization and, as a result, increased expenditures. Additionally, previously noted geographic shifts in population distribution from east to west can affect demand for care and resource allocation in particular regions.

Population Growth

Figure 1 displays population growth rates for Kent, Ottawa, Muskegon, and Allegan (KOMA) counties, the Detroit region (Oakland, Macomb, and Wayne counties), the entire State of Michigan, and the U.S. Throughout the 1990s, KOMA's population growth rate was greater than both the growth rate for the State of Michigan and the growth rate for the U.S. However, during the recession in the mid-2000s, growth rates for both KOMA and the Detroit region fell drastically. Though KOMA maintained positive population growth throughout the 2000s, except for a negative dip in 2010, the Detroit region experienced population loss beginning in the early 2000s that lasted for about a decade. The Detroit region achieved positive population growth in the early part of this decade before dipping into a negative growth rate in 2015. Although the Detroit region has experienced low, but positive, growth between 2016 and 2017 (about 0.13 percent on average), this trend has been reversed since 2018, where the decline in the population growth rate reached a low of -0.40 percent in 2020.

KOMA's population growth rate began increasing rapidly after 2010 and exceeded the national growth rate in 2012. Over recent years, the positive population growth in West Michigan has continued, but at a slower pace, with growth rates falling from 1.26 percent in 2013 to 0.50 percent in 2020. While the western population growth rate appears to be slowing, the KOMA region population growth from 2011 through 2020 continued to surpass that in the Detroit region, illustrating a continued shift in population density to the western part of the state. As 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 2010 to 2014, the relative decline was more than 20 times larger for the Detroit region (Centers for Medicare and Medicaid Services, 2017).

In summary, we note declining population growth rates across both the KOMA and Detroit regions, across the State of Michigan as a whole, and furthermore for the U.S. at large, where the rate fell sharply from 0.73 percent in 2016 to 0.35 percent in 2020.

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. as a whole. The clear trend in all three figures is the steady aging of the population. Persons between the ages of 45 and 64 continue to outnumber all other age groups despite being only the third largest age group in 1990. As noted previously, since 2010, the percentage of the population over the age of 65 has experienced the largest growth of any of the age categories (about 4 percent between 2010 and 2020) in KOMA and Detroit, as well as the U.S. As a result, 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, with more than 50 percent of lifetime spending on medical care occurring after the age of 65 (Alemayehu & Warner, 2004). Due to the demographic shifts (**see Figures 2 through 4**), the Centers for Medicare and Medicaid Services (2017) project total Medicare spending to nearly double between 2015 and 2026. In Michigan, the Detroit region has a higher proportion of its population in the 45 to 64 and 65 and over age categories, which could result in higher medical expenditures. The share of the population over the age of 65 in the Detroit region grew from approximately 12 percent in 1990 to more than 17 percent in 2020. By contrast, KOMA has 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 occur across the entire state.

Second, **Figures 2 through 4** show the proportion of those over the age of 65 in comparison to 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 over 65 age demographics. 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 2.5 by 2030 (Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2021). Moreover, the projections show that the ratio will continue to decline to 2.2 workers per beneficiary by 2095. These altogether suggest an increase in the cost of health insurance by 30 percent by 2095. 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 2026 (Congressional Research Service, 2019).

Finally, the aging of the population has important implications for employer-sponsored health insurance premiums. 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 2008 to 2018, average annual employer-sponsored health insurance premiums for family coverage increased 55 percent, which is more than twice as fast as the real annual wages have grown (26 percent), and three times as fast as the rate of inflation at 17 percent, over the same period (Kaiser Family Foundation, 2018).

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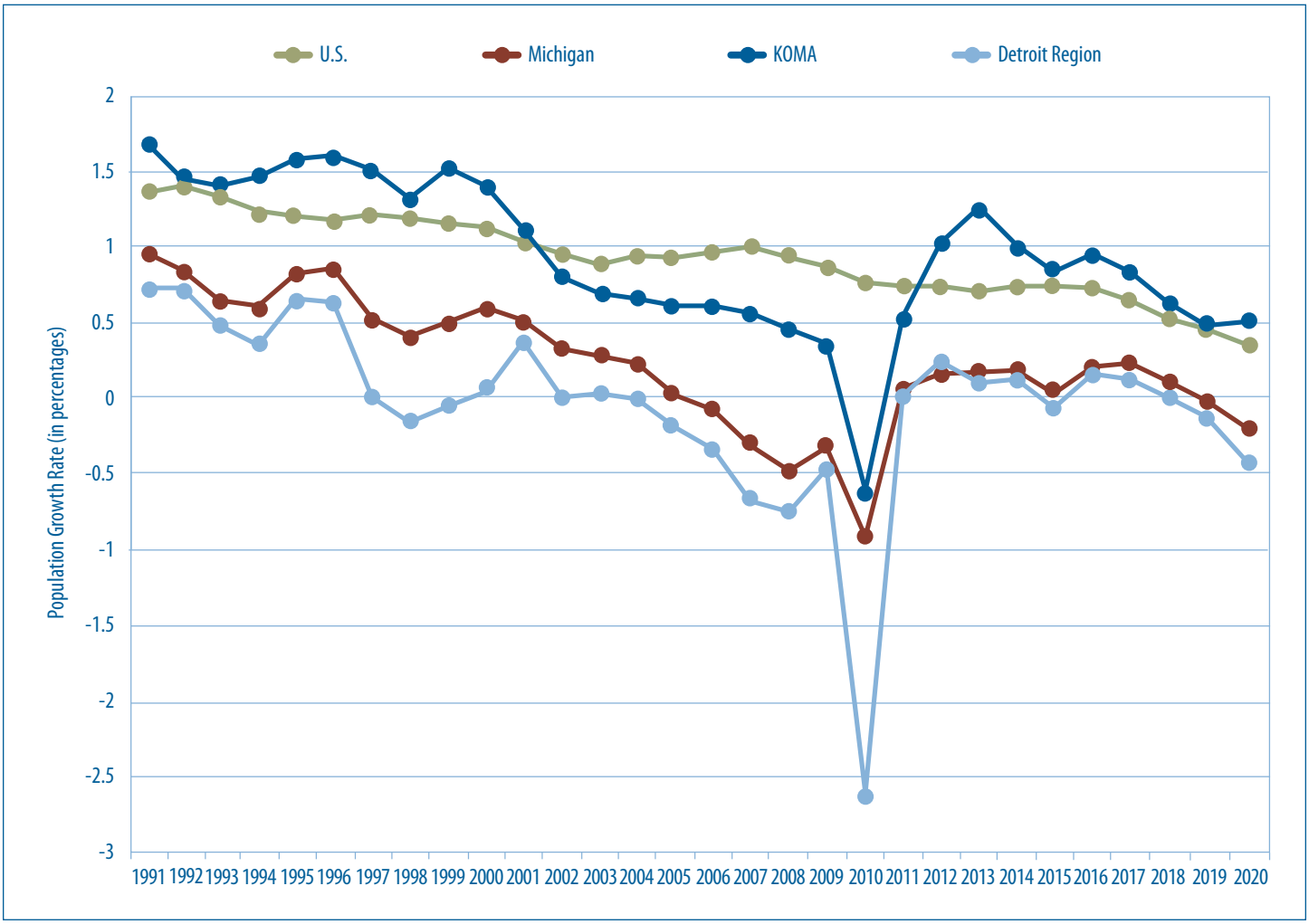
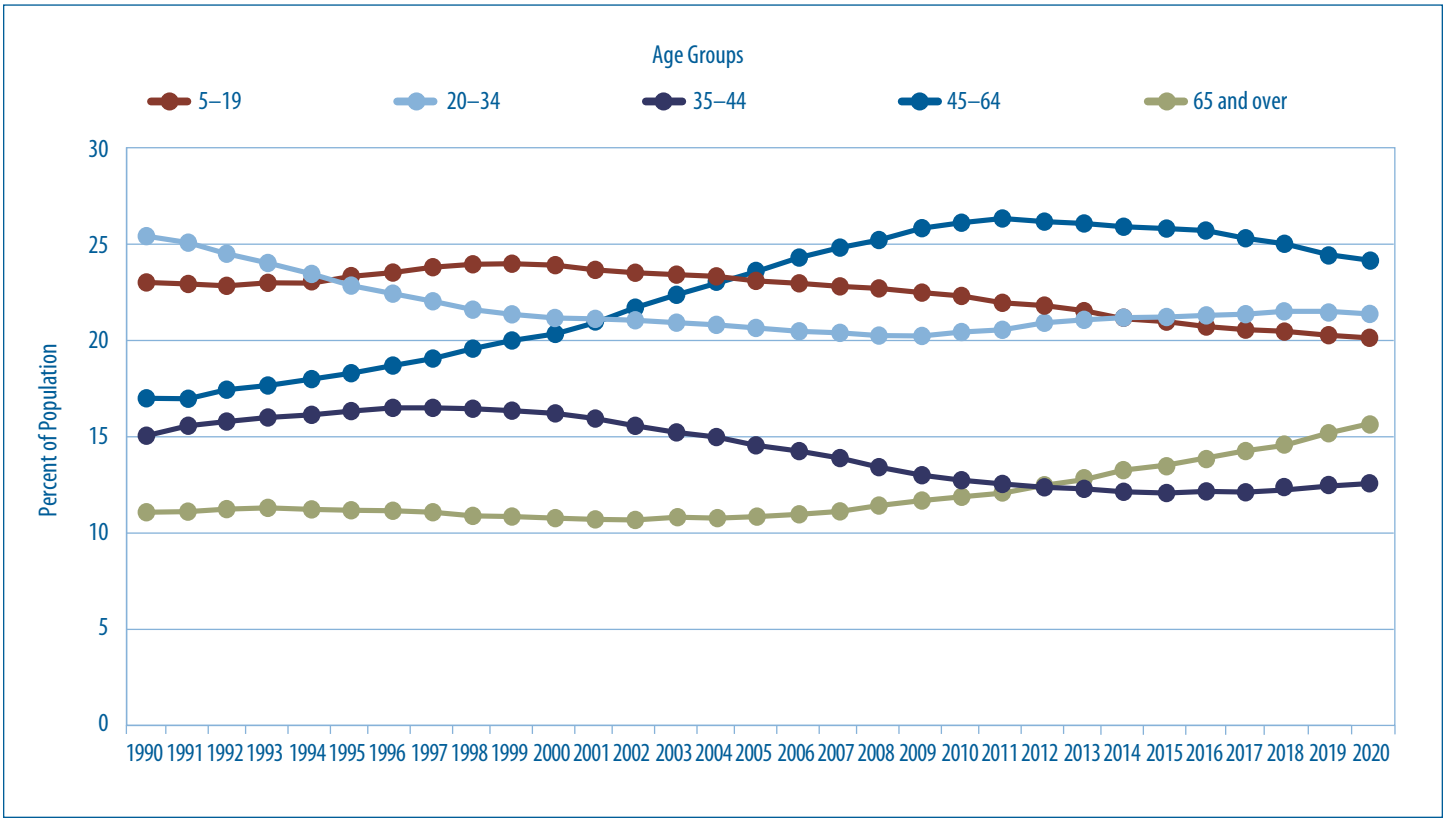
Figure 1: Annual Population Growth Rate, 1991–2020



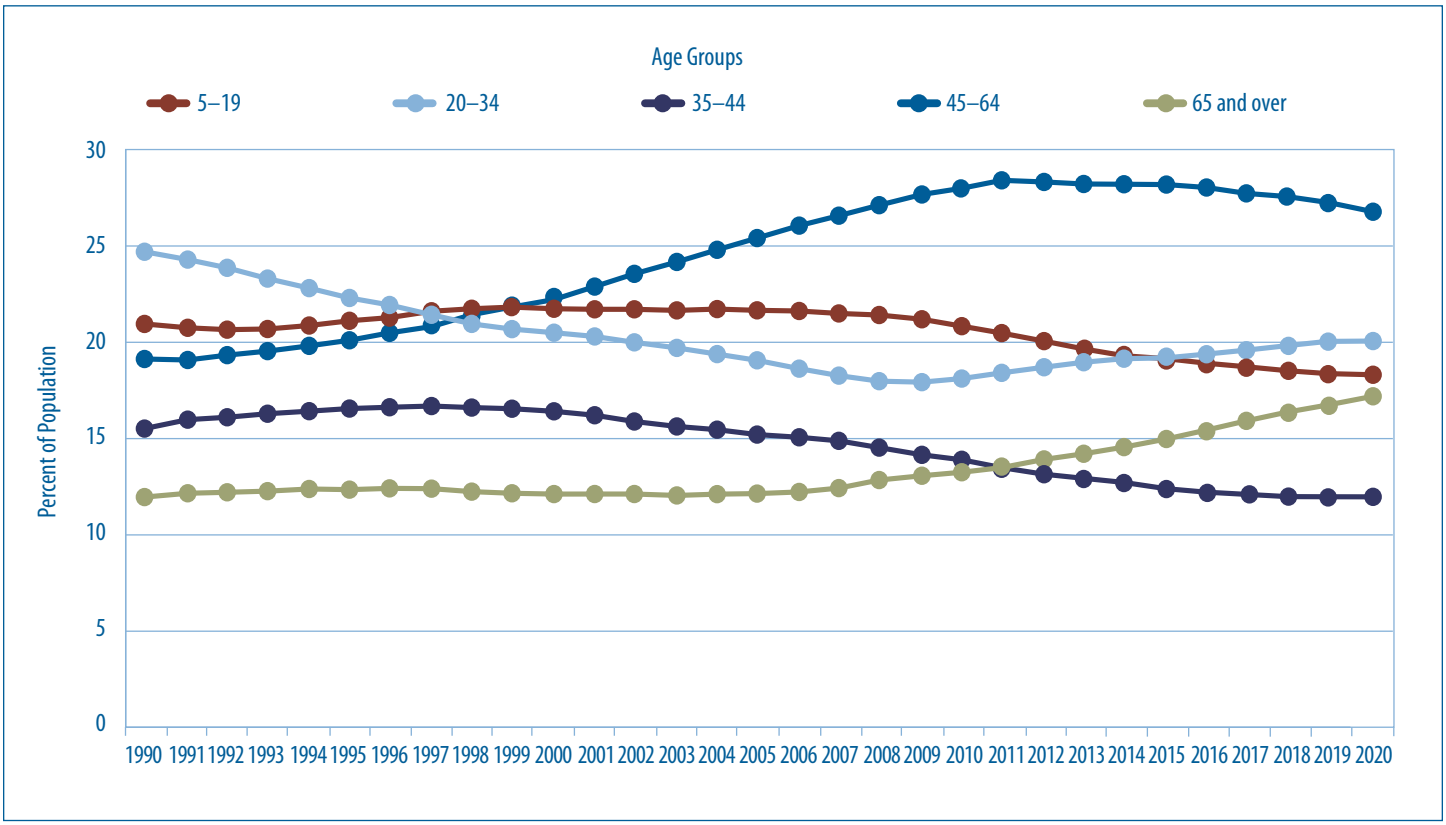
Source: U.S. Census, population and housing unit estimates
Differences compared to previous Health Check editions are due to revisions of U.S. Census Bureau data.

Figure 2: Population Distribution as a Percent of KOMA, 1990–2020



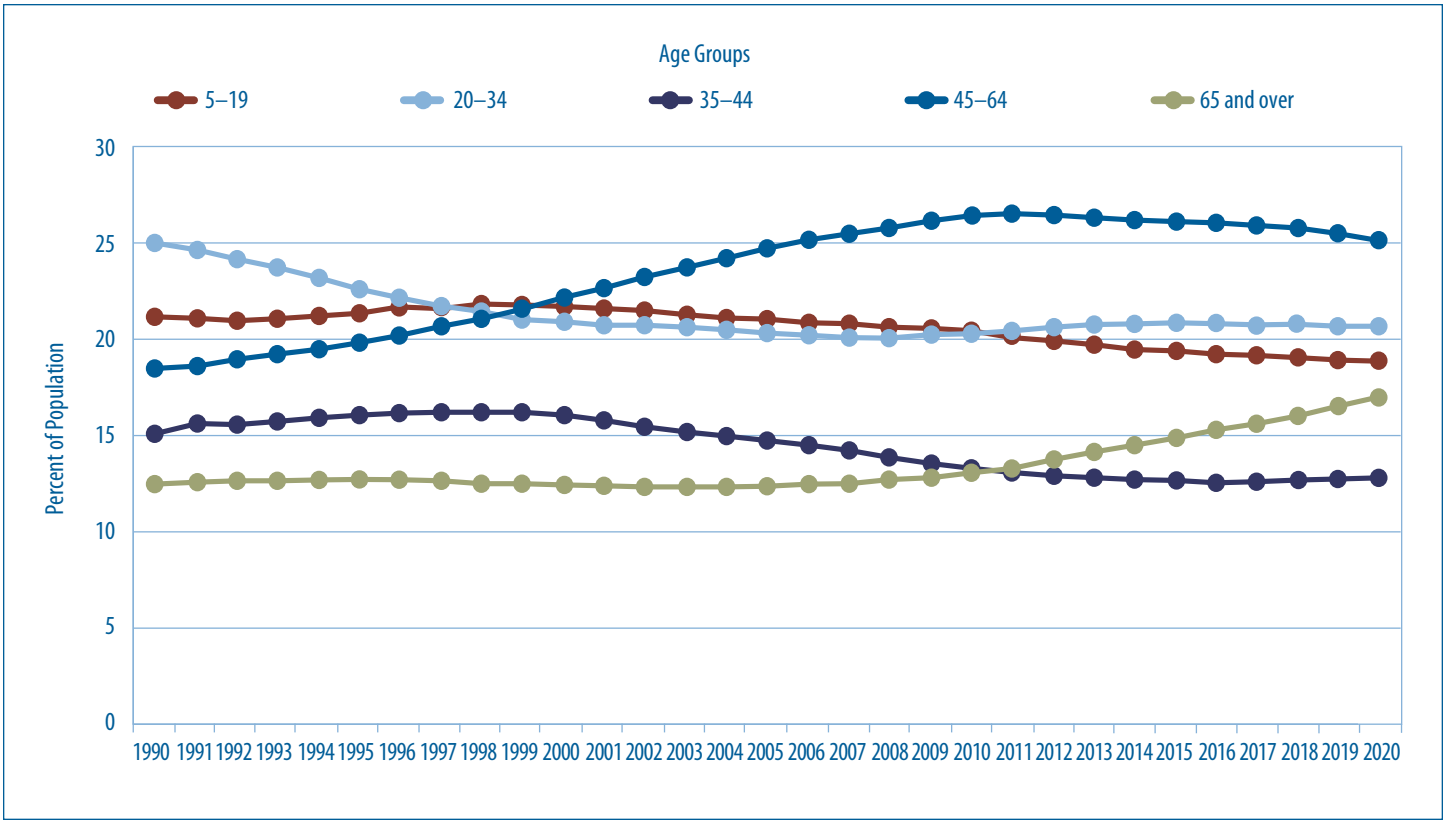
Source: U.S. Census, population and housing unit estimates

Figure 3: Population Distribution as a Percent of the Detroit Region, 1990–2020



Source: U.S. Census, population and housing unit estimates

Figure 4: Population Distribution as a Percent of Total United States, 1990–2020



Source: U.S. Census, population and housing unit estimates

Health Care Overview

In this section, we consider broad health care trends across opioid use, mental health, general health risk factors (e.g., alcohol consumption, smoking, and obesity), and access to care, comparing the West Michigan KOMA counties (Kent, Ottawa, Muskegon, and Allegan counties) and the Detroit region (Macomb, Oakland, and Wayne counties). In this year's report, we specifically focus on health disparities in KOMA and the Detroit region. To do so, we analyze health care trends by race and gender. The data on opioids, mental health, risk factors, and access to care come from the Michigan Department of Health and Human Services Behavioral Risk Factor Surveillance System (MiBRFSS).

There are a few limitations of the MiBRFSS data. First, the estimates are based on self-reported surveys. Consequently, the actual incidence and prevalence rates for the factors examined using this data may differ from those reported by respondents. Second, there is a data suppression rule that restricts the disclosure of certain estimates. If the denominator of a weighted percentage has less than 50 observations and/or has a relative standard error greater than 30 percent, then these estimates are suppressed. It is important to notice that this becomes an issue when stratifying the data by demographics, especially by race. To minimize this issue, we aggregate Black non-Hispanic, other and multiracial, and Hispanic as non-white. Therefore, our analysis by race will compare white individuals to non-white individuals. However, we must note that even in this case there are instances of data suppression according to the suppression rule.

Opioid Prescriptions and Leftover Medication

Figure 1 presents estimates for whether an individual used pain medication prescribed by a physician in the past year. Note that the survey was conducted in 2019. Over one-third of males and females used pain medications in KOMA and the Detroit region. Interestingly, females used more pain medications than males, especially in the Detroit region. About 37 percent of females in KOMA reported using pain medication, whereas this number was 39 percent for females in the Detroit region.

As we can observe from previous Health Check reports, there has been an increasing trend in overdose deaths (per 100,000 individuals) resulting from all drug-induced causes. This year, we specifically focus on the percentage of leftover pain medications in West Michigan and the Detroit region. A higher percentage of leftover opioids is likely to pose a risk for pain medication misuse and increase the likelihood of accidental poisoning (Egan et al., 2017 and Buffington et al., 2019).

Figure 2 shows the percentage of leftover pain medication in KOMA and the Detroit region for males and females. In the Detroit region, more than 60 percent of males and females reported having pain medication leftover from the last time they filled a prescription. However, in KOMA, we observe an interesting difference in the percentage of leftover medication among males and females. Specifically, males had a lower percentage of leftover pain medication (50.6 percent) than females (62.3 percent) in KOMA.

Next, in **Figure 3**, we explore what individuals do with the leftover pain medication. Normally, the questionnaire has the following response options: kept it, put it in the trash, gave it to someone else, sold it, turned it in at an event or pharmacy, and other. Due to the data suppression rule discussed above, we are only able to report two of these responses ("kept it" or "turned in at an event or pharmacy"). We also cannot stratify the estimates by gender or race. Nonetheless, we find that about 69 and 72 percent of individuals in KOMA and the Detroit region, respectively, kept their leftover pain medication. We also find that relatively more individuals in KOMA turned in their leftover medication at an event or pharmacy compared to the Detroit region.

Taken together, **Figures 1-3** highlight that, given the potential risk for misusing prescription pain medications, increasing patient awareness about proper ways of disposing unused pain medications seems imperative. A potential policy action in KOMA and the Detroit region may be to promote drug take-back programs to incentivize the use of these services.

Mental Health

Figure 4 reports the fraction of white and non-white survey respondents (to the BRFSS survey) that reported experiencing more than 14 days of poor mental health. Here, the numerator consists of the number of reporting 14 days or more to the question: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" The denominator, on the other hand, is based on the total number of respondents in a given county.

Looking at both the KOMA and Detroit regions across the period of 2011-2015, there were major disparities in mental health problems between non-white and white individuals. On average, 15 percent of non-white individuals reported having poor mental health between 2011-2015, whereas this number was around 11 percent among white individuals. After 2015, there is a clear increase in the trend of white individuals experiencing poor mental health in the Detroit region. In fact, 14.4 percent of white individuals in the Detroit region reported experiencing more than 14 days of poor mental health in 2019, surpassing the percentage for both white (11.4 percent) and non-white (12.1 percent) in KOMA, as well as non-white (13.3 percent) in the Detroit region. Poor mental health days peaked in 2016 among white individuals in the Detroit region and have remained high since then. On the other hand, despite having a higher fraction of non-white individuals experiencing mental health problems in KOMA, the gap between white and non-white individuals started closing in 2019 and remained relatively low compared to the Detroit region.

In **Figure 5**, we analyze poor mental health days by gender. Combining this figure with **Figure 4** implies that the increase in mental health problems among white individuals in Detroit is likely driven by males rather than females. Moreover, **Figure 5** shows us that females, on average, had more poor mental health days than males in both KOMA and the Detroit region. However, there is a potentially concerning increase in poor mental health days among white males in the Detroit region.

Risk Factors

Figure 6 presents estimates of the prevalence of heavy drinking for white and non-white individuals in KOMA and the Detroit region. Heavy drinking is defined as the proportion of adults in each region who reported consuming an average of more than one alcoholic drink per day for women or more than two per day for men. Due to the data suppression rule, we do not observe any of the estimates for non-white individuals in KOMA. Therefore, we conduct our analysis using white and non-white individuals in the Detroit region, as well as white individuals in KOMA. The data suggests that over 7 percent of white individuals in West Michigan and the Detroit region were classified as heavy drinkers in 2019. Rates of heavy drinking have remained relatively high for white individuals compared to non-white individuals. In fact, based on the 2019 data, heavy drinking is about 3 percentage points less for non-white than white individuals in the Detroit region. The largest gap between white and non-white individuals was 5.6 percentage points in 2011.

Next, **Figure 7** shows the prevalence of heavy drinking by gender. On average, we observe that there are heavier drinkers in KOMA than the Detroit region. In terms of gender composition, males tend to be heavier drinkers than females in the Detroit region. However, we do not have a clear pattern in KOMA. For example, there are certain years, 2013-2014 and 2017-2018, where we observe an increase in the percentage of female heavy drinkers compared to male heavy drinkers. In 2019, 7.9 percent of males and 6.8 percent of females were classified as heavy drinkers in West Michigan.

Figure 8 also focuses on alcohol consumption, but shifts from heavy drinking to binge drinking. Binge drinking is defined as consuming four or more drinks on a single occasion for women and five or more drinks on a single occasion for men. Rates of binge drinking among white individuals on both the west and east sides of the state are similar and remained steady over the time period included in the analysis. However, similar to **Figure 6**, the white population is more likely to binge drink than the non-white population. Approximately 20 percent of white individuals in West Michigan and the Detroit region reported a binge drinking episode in the past 30 days in 2019, whereas the non-white rate was at about 15 percent. It is also important to note the rates of binge drinking among non-white individuals in KOMA is less stable than those in the Detroit region. There are certain years such as 2014-2015 and 2017, where non-white individuals close the binge drinking gap with white individuals in KOMA. In **Figure 9**, we also find that males had a higher percentage of binge drinking (about 23-25 percent) than females (about 14 percent) between 2011 and 2019. Moreover, the trends in KOMA and the Detroit region follow each other closely.

Figure 10 displays estimates of the proportion of the white and non-white population who currently smoke cigarettes. There are two noticeable trends. There is a decreasing trend in the percentage of white and non-white smokers in the Detroit region, albeit the latter is higher in terms of levels. In 2011, 23.2 percent of white individuals and 25.8 percent of non-white individuals were current smokers. These percentages plummeted to 17.3 and 17.7 percent, respectively, in 2019. The second noticeable trend is that there is a considerable increase in the percentage of non-white individuals who are current smokers in KOMA. In 2017, 18.9 percent of non-white individuals were current smokers in KOMA. However, in 2019, 29.5 percent of non-white individuals reported being current cigarette smokers in KOMA, which is about an 11 percentage points increase from the 2017 level.

In terms of gender composition of current smokers in **Figure 11**, we find relatively close trends among males and females in KOMA and the Detroit region. However, there seems to be an increasing trend in the prevalence of male cigarette smokers in KOMA. Pairing this finding with **Figure 10** implies that the increase in the prevalence of smoking among non-white individuals in KOMA is likely to be driven by non-white males rather than females. In 2014, the Centers for Disease Control estimated that 15.5 percent of the U.S. population currently smoked cigarettes and cigarette smoking was responsible for 480,000 annual deaths (CDC, 2018). 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 some relief for rising health care expenditures (Berman et al., 2014).

While **Figure 10** suggests a downward trend in the percentage of white and non-white cigarette smokers in the Detroit region, as well as white cigarette smokers in KOMA, one might be concerned with whether this trend is driven by people giving up their smoking habits, or simply substituting cigarettes for alternative products such as e-cigarettes. Given the increase in the prevalence of smoking among non-white individuals in KOMA, it is also likely that these individuals might have substituted cigarettes for these alternative products.

Although our data do not allow us to look at these potential substitution patterns directly, **Figure 12** provides data on whether a white or a non-white person is a former e-cigarette user in KOMA or the Detroit region. Quite interestingly, we find that while the percentage of non-white former e-cigarette users increases in KOMA, there is a decline in the percentage of former e-cigarette users among non-white individuals in the Detroit region. These are consistent with two opposite substitution patterns in KOMA and the Detroit region:

i) substitution from e-cigarettes to cigarettes among non-white individuals in KOMA; and
ii) substitution from cigarettes to e-cigarettes among non-white individuals in the Detroit region.

Figure 13 presents these trends by gender, which is also consistent with our hypothesis. We find that the increase in the percentage of former e-cigarette users is likely driven by males in KOMA. This is also the case in the Detroit region: the decrease in the percentage of former e-cigarette users is likely driven by males rather than females.

It is important to note that BRFSS data only cover the noninstitutionalized adult population (aged 18 or older), and cannot speak to recent trends in increased e-cigarette use among youth below the age of 18. The CDC and the FDA have recently released figures showing that 1 in 5 high school students and 1 in 20 middle school students were past month e-cigarette users, and that the use of any tobacco product grew by close to 40 percent among high school students between 2017 and 2018 (CDC, 2019).

Next, **Figures 14 through 17** track the share of the West Michigan and Detroit populations that are overweight or obese by race and gender, respectively. An individual is considered overweight if their body mass index (BMI) is greater than or equal to 25 and less than 30 and considered obese if their (BMI) is above 30. First, we observe that although there is a declining trend in the share of overweight adults in both KOMA and the Detroit region, we observe an increase in the share of obese individuals. Specifically, non-white individuals in KOMA again have a distinct trend. In 2011, 37.7 percent of the non-white population were overweight in KOMA, whereas this share dropped down to 26 percent in 2019. However, the obese, non-white population experienced a 13 percentage points increase in obesity between 2011 and 2019 in KOMA. We also observe that there is an increase in obesity across races, genders, and regions in Michigan. Moreover, the gender gap is more pronounced in **Figure 15**, which depicts the share of individuals being overweight on the east and west side of the state. In both KOMA and the Detroit region, about 29 percent of females reported being overweight in 2019, whereas about 38 percent of males reported being overweight on 2019. The upshot is that obesity is slowly increasing for both males and females, as well as white and non-white populations in Michigan and that there is a considerable gap between the share of overweight males (about 40 percent) and females (about 30 percent).

In sum, approximately 68 percent of adults in the KOMA region and 70 percent of adults in the Detroit region were either overweight or obese in 2019. These estimates are similar to the share of the overall U.S. population who is overweight or obese (Ogden et al., 2014). Studies place the health care costs associated with obesity at between 10 percent and 20 percent of the total U.S. health-related spending (Cawley & Meyerhoefer, 2012; Finkelstein et al., 2009).

Finally, **Figures 18 and 19** plot the share of the population in each region reporting that their general health was either "fair" or "poor" by race and gender, respectively. There is a noteworthy gap between the health status of non-white and white populations, as well as some regional disparities. First, non-white populations are more likely to report fair or poor health. This share for non-white populations, on average, is even greater in the Detroit region (24 percent) than KOMA (22 percent). **Figure 19** shows that the disparities across white and non-white populations may be driven by females, especially in the Detroit region. In KOMA and the Detroit region, 16.4 and 20.7 percent of females had either fair or poor health in 2019, whereas these shares are 14.5 and 17.5 percent for males, respectively.

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. **Figures 20 and 21** plot the percentage of the population in the KOMA and Detroit regions that report having no health insurance by race and gender, respectively. Uninsured rates in both regions have fallen since 2013 because of the improving economy and the expanded health insurance options available under the Affordable Care Act. For example, as of September 2020, more than 790,000 people enrolled in the Healthy Michigan expansion of the state's Medicaid program (MDHHS, 2020). In 2011, the first year of our data, nearly 11 percent of the white population in KOMA and the Detroit region was uninsured. By 2019, that figure had fallen to 4.1 and 6 percent, respectively, in KOMA and the Detroit region. However, we observe a completely different trend when we focus on the non-white population. Worth noting here is that, while the trend in having no health insurance has been continuously downward for non-white populations in the Detroit region, non-white populations in KOMA experienced a considerable uptick in the uninsured rate. In other words, about 17 percent of non-white individuals were uninsured in KOMA in 2011, whereas 21 percent of non-white individuals reported having no health insurance in KOMA in 2019, which is a 4 percentage points increase from the 2011 level. This uninsured rate remains by far the highest when comparing other races in both the west and the east side of the state. When we analyze the trends by gender in KOMA, we observe a slight uptick in the uninsured rate for males to 9.1 percent in 2019. However, prior to 2019, there was a steady decline in the fraction of males and females reporting no health insurance in both West Michigan and the Detroit region.

To further understand the health insurance composition of the population in KOMA and the Detroit region, we focus on the health insurance type of individuals by race and gender in **Figures 22 and 23**. The non-white population in both KOMA and the Detroit region was more likely to have Medicaid than the white population. Specifically, in KOMA, 17.9 percent of non-white individuals had only Medicaid, whereas the share of white population having only Medicaid was 6.4 percent. Consistent with **Figure 20**, we find that non-white individuals were more likely to be uninsured, especially in KOMA. We also show that more than one-half of the white population in KOMA and the Detroit region had private health insurance. **Figure 23** shows the distribution of insurance types by gender. In addition, we observe that 11.9 and 13.9 percent of females had only Medicaid, respectively, in West Michigan and the Detroit region, whereas about 5 percent of males reported having only Medicaid in both regions. Males were also more likely to be uninsured in Michigan than females.

The next five figures represent measures of health care access that we would expect to be impacted by the changes in insurance coverage observed in **Figure 20**. **Figure 24** displays estimates of the share of the white and non-white population who reported that they were unable to access health care at some point in the past 12 months due to cost. We see major disparities between non-white and white individuals, especially in West Michigan. In 2019, 21.5 percent

of the non-white population reported lacking access to care because of costs in KOMA. On the other hand, 12.1 percent of the white population experienced access problems due to costs, which implies a racial gap in access to care by a magnitude of 9.4 percentage points. Although these disparities exist in the Detroit region as well, we observe that the gap had been narrowed down to 3.4 percentage points in 2019. Although the gender gap seems modest in **Figure 25**, it is worth noting that females in both regions had more access problems due to costs than males in 2019. More importantly, costs seem to be an important factor in limiting access to care in KOMA.

Figures 26 and 27 continue the examination of access to care by tracking the share of the population that reported having a usual source of care when ill. Consistent with the previously mentioned story, **Figure 26** depicts a sharp decline in a usual source of care among non-white individuals in KOMA. Specifically, the share of non-white individuals having a usual source of care drops from 91 percent in 2018 to 71.8 in 2019. All the other trends, especially in the Detroit region, remain stable. Moreover, the data illustrate that white individuals are more likely to have a usual source of care than non-white individuals. There is also a noticeable gap between females and males in **Figure 27**. Males reported having a less usual source of care compared to females in both regions. For example, while 92.8 percent of females reported a usual source of care, this percentage was at 84.6 for males in the KOMA region in 2019.

Lastly, **Figures 28 and 29** plot the share of the population in West Michigan and the Detroit region with a routine checkup in the past year. Although there is mostly a positive development in both regions in terms of increasing routine checkups, we observe again that the non-white population in KOMA has been disproportionately affected. There is a 13 percentage points decline in the percent of non-white individuals reporting to have routine checkups between 2018 and 2019. Potential reasons for this decline have been depicted in the figures above. In short, non-white individuals are more likely to be uninsured, are more likely to have limited access to care due to costs, and are less likely to have a usual source of care. These altogether have a negative impact on access to preventative care among non-white individuals in KOMA. Pairing **Figure 29** with the figures above suggests that these access problems including access to routine checkups are more likely to be prevalent among males than females.

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. Additionally, given the trends previously noted with respect to individuals' self-reported fair or poor health remaining stable over time, along with stable rates of smoking and obesity, continued stress on the importance of preventative care through an annual exam may be warranted to help promote education and monitoring of these high health risk-related behaviors.

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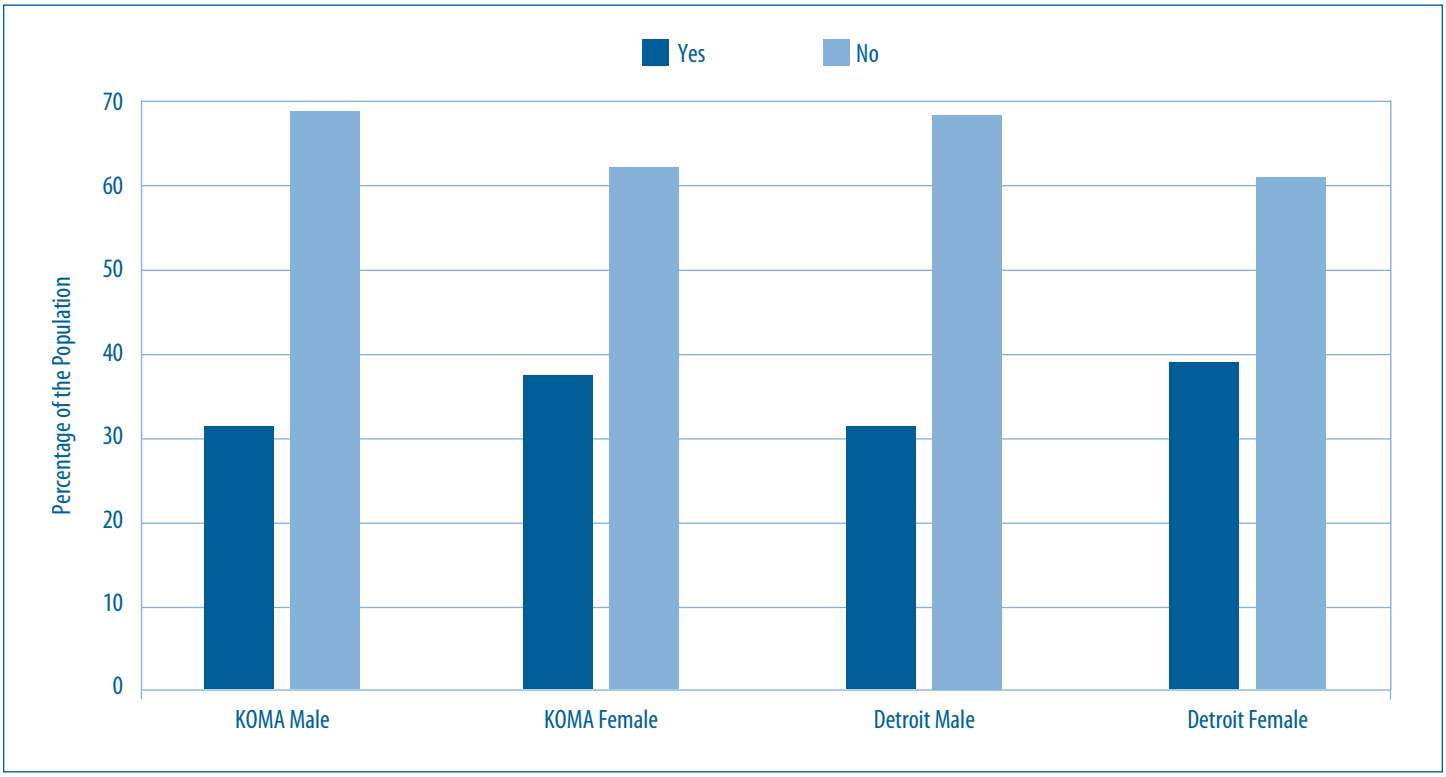
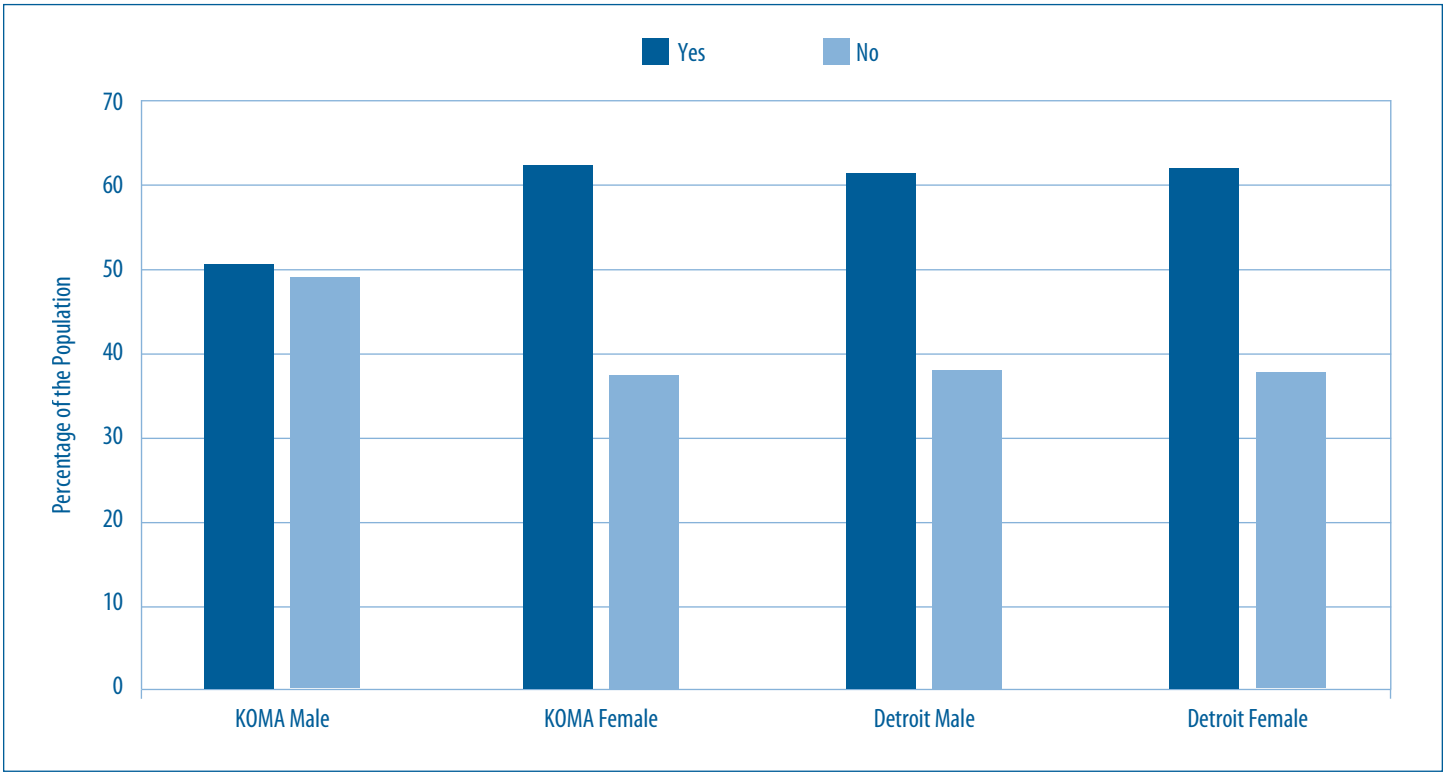
Figure 1: Used Prescribed Pain Medications in Past Year by Gender, 2019



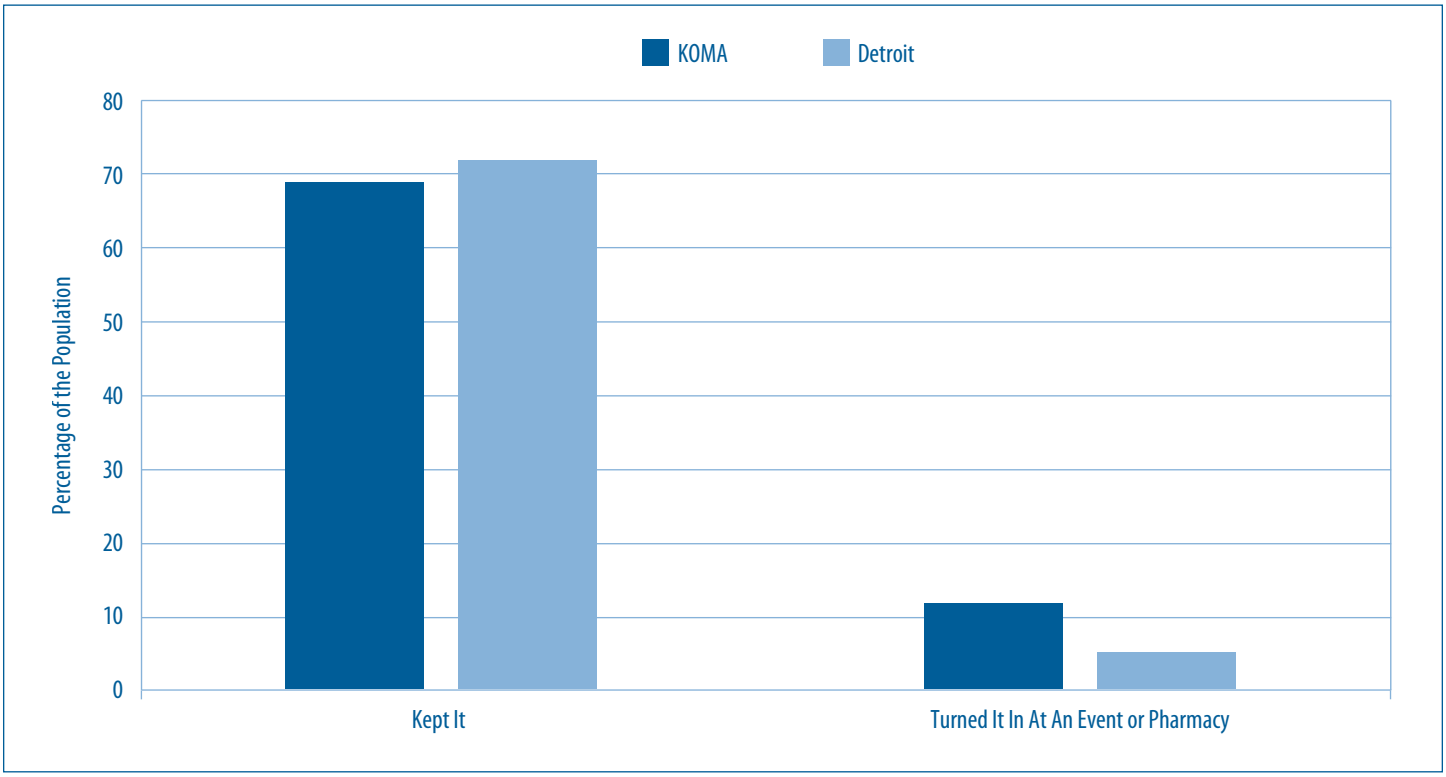
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 2: Pain Medication Leftover by Gender, 2019



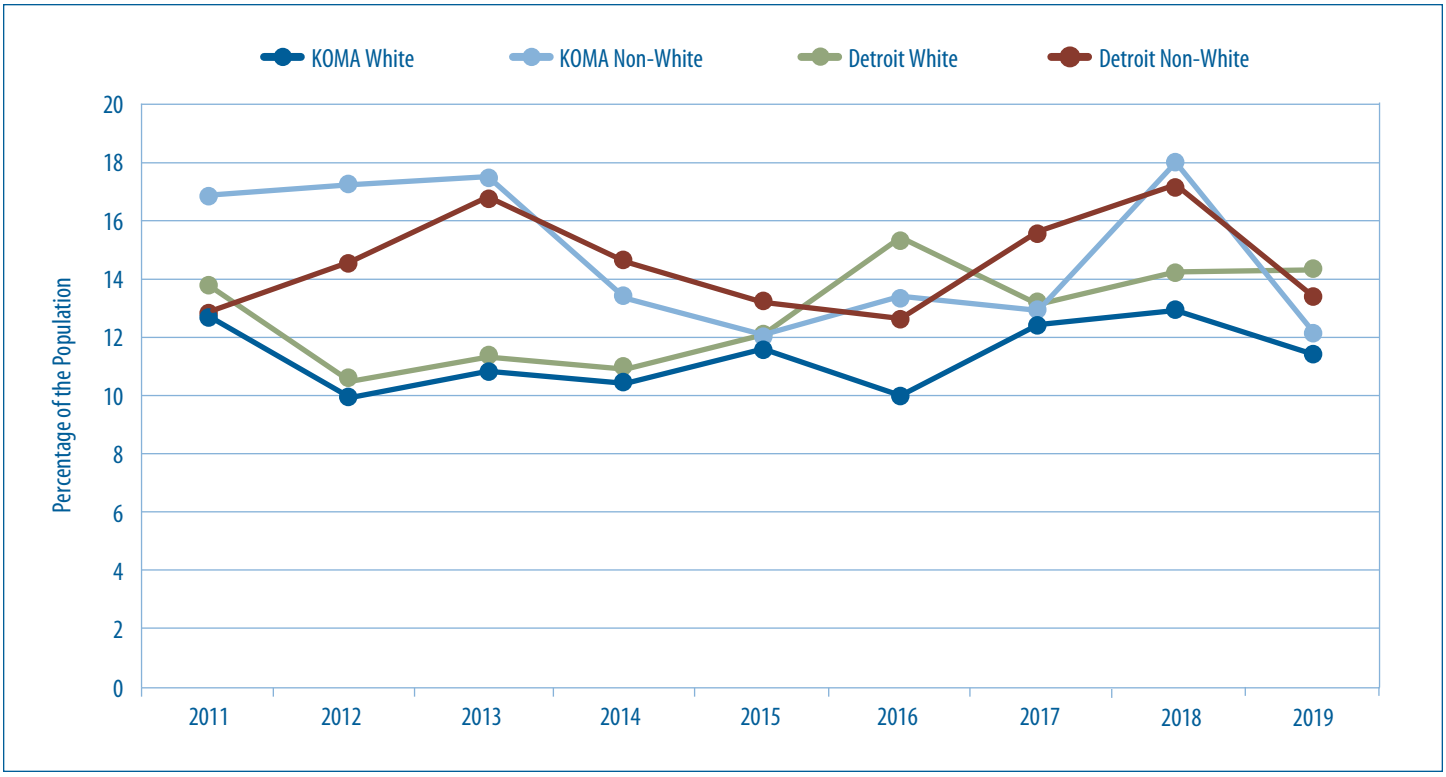
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 3: What Individuals Did With the Leftover Pain Medication, 2019



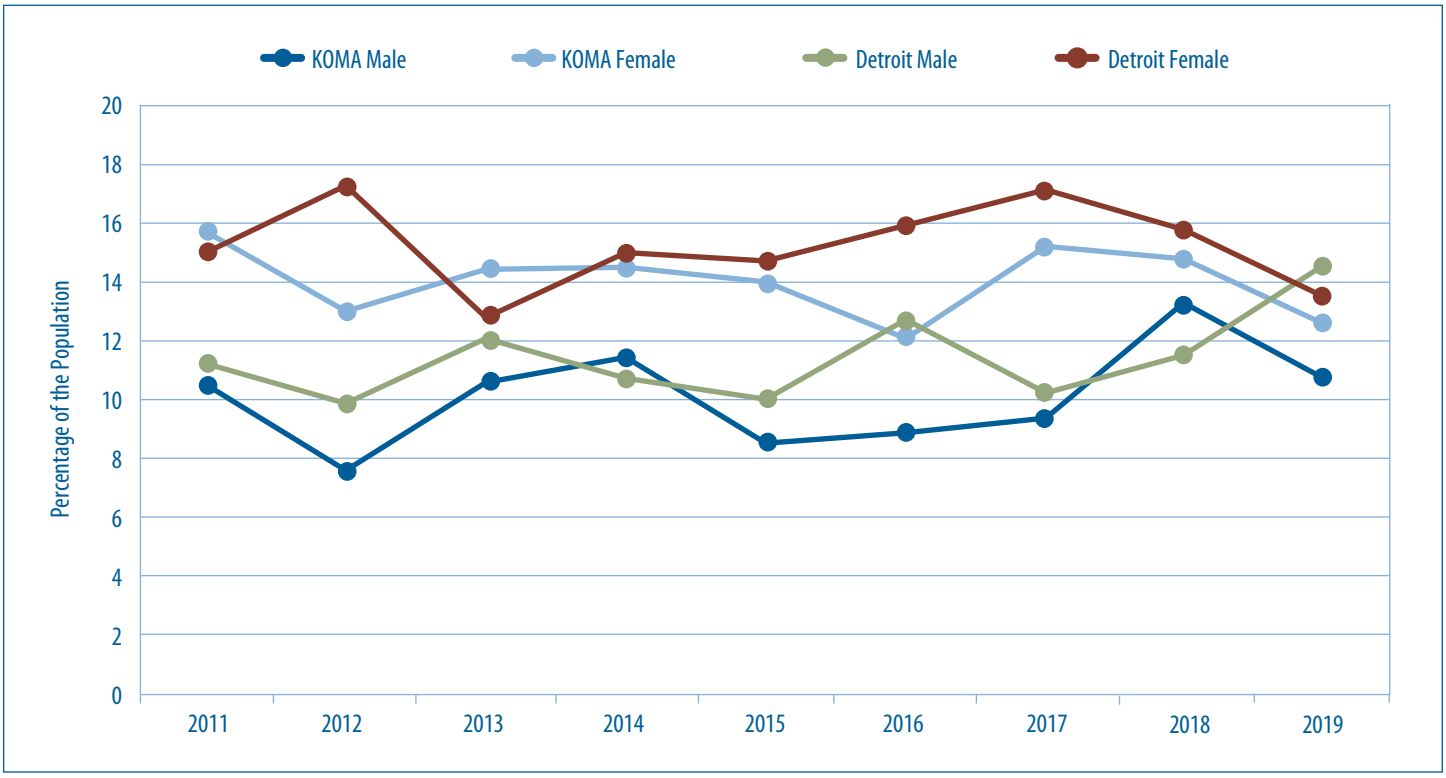
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to the data suppression rule for Michigan BRFSS data, some of the estimates were not disclosed.

Figure 4: Poor Mental Health Days by Race, 2011-2019



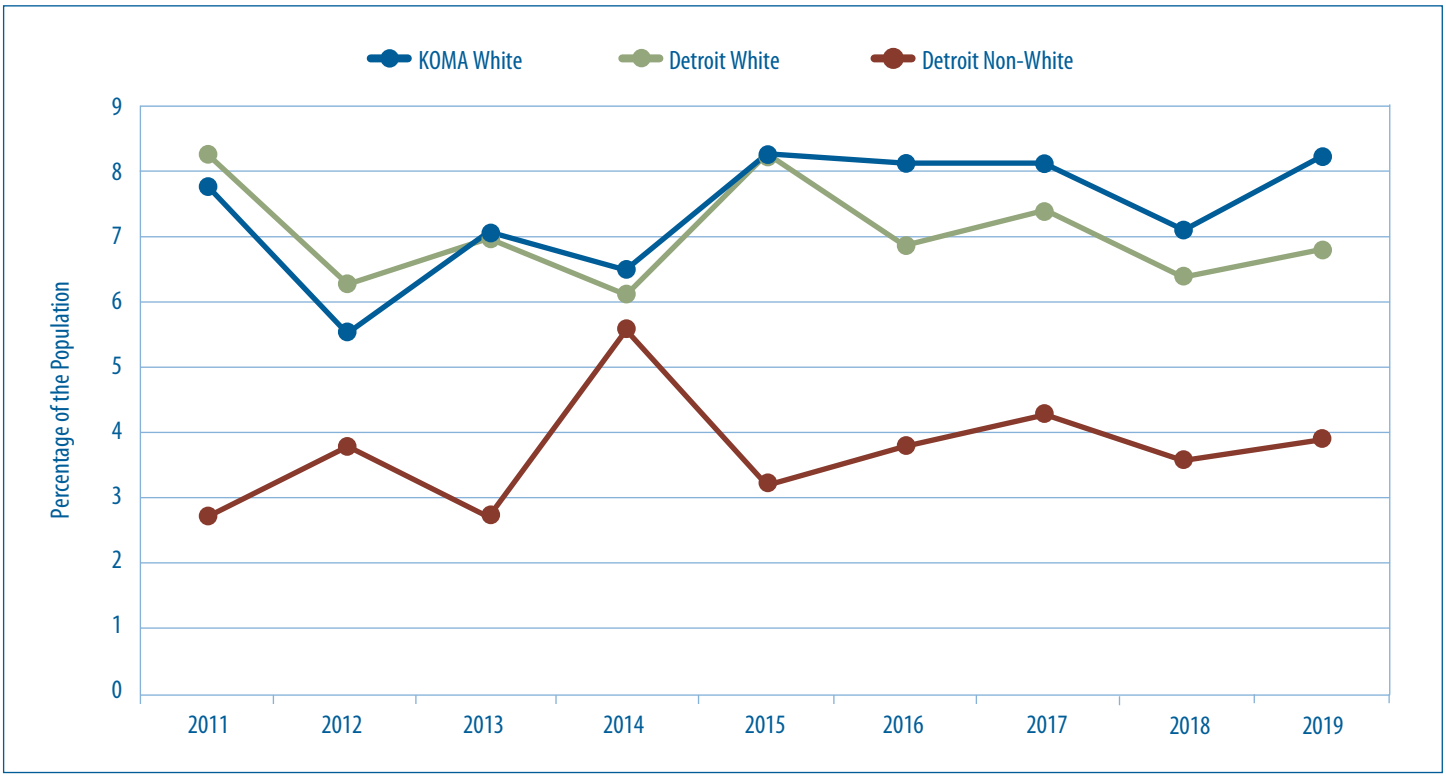
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to the data suppression rule for Michigan BRFSS data, we define Black non-Hispanic, other and multiracial non-Hispanic, and Hispanic as non-white. Moreover, due to missing data, the value for KOMA non-white in 2012 has been imputed using mean substitution.

Figure 5: Poor Mental Health Days by Gender, 2011-2019



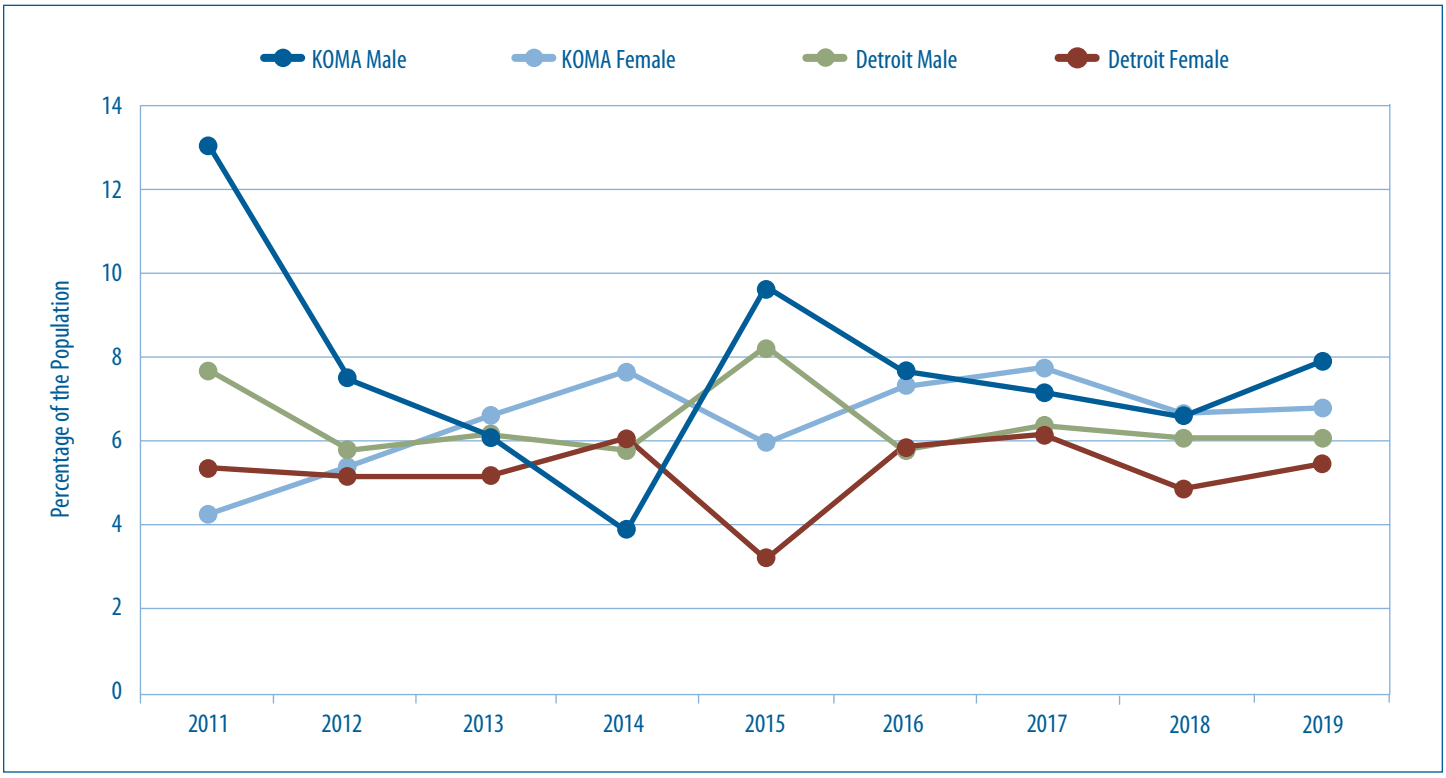
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 6: Heavy Drinking by Race, 2011-2019



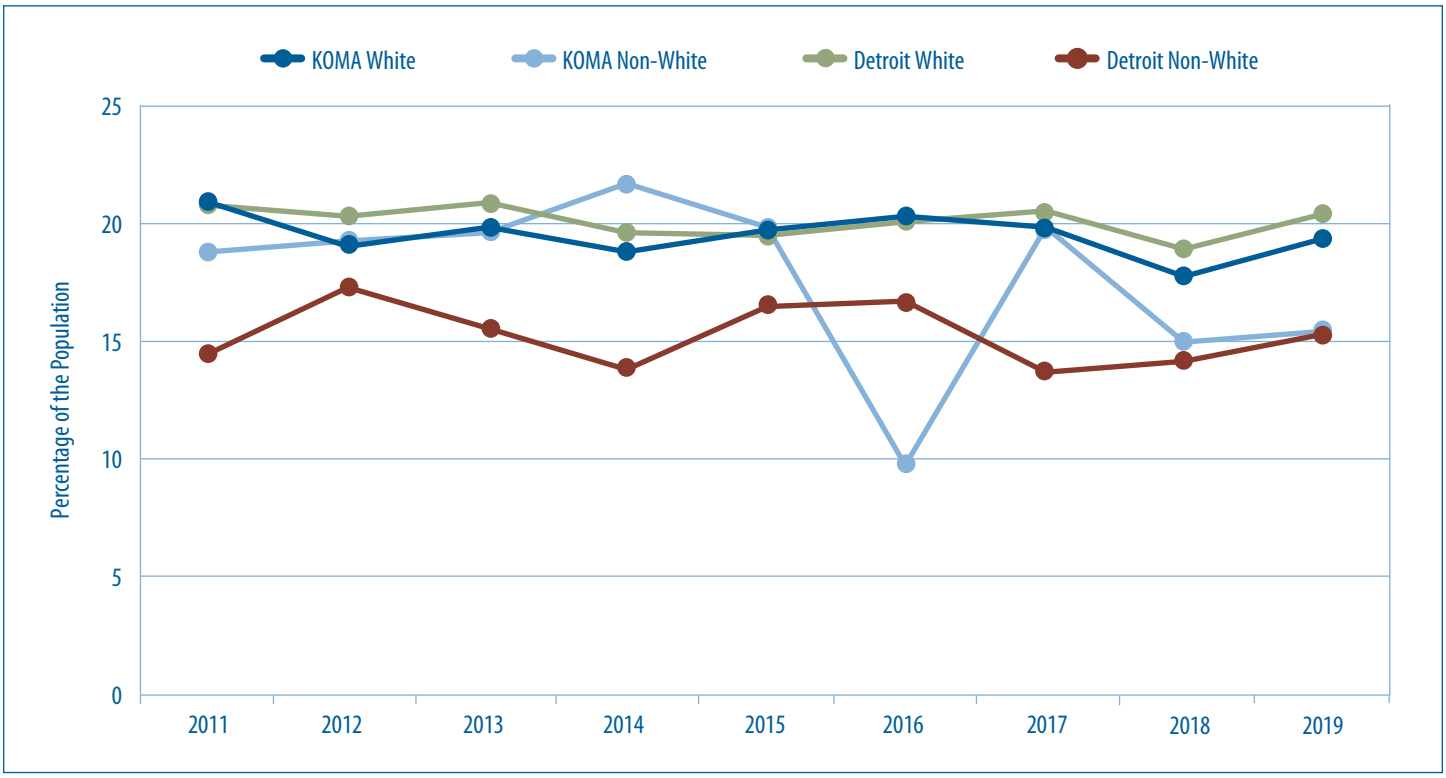
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to the data suppression rule for Michigan BRFSS data, the estimates for KOMA non-white were not disclosed.

Figure 7: Heavy Drinking by Gender, 2011-2019



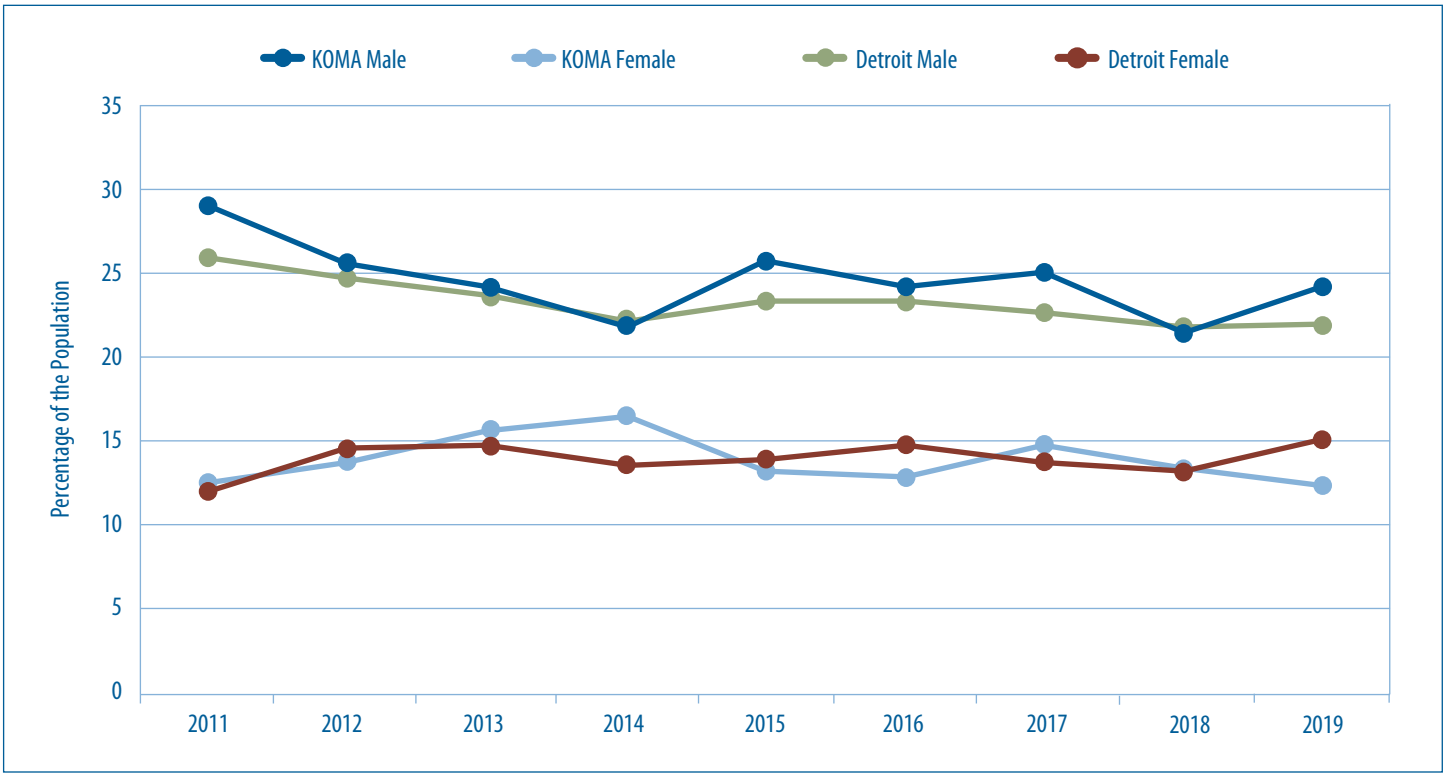
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to missing data, the value for KOMA female in 2012 has been imputed using mean substitution.

Figure 8: Binge Drinking by Race, 2011-2019



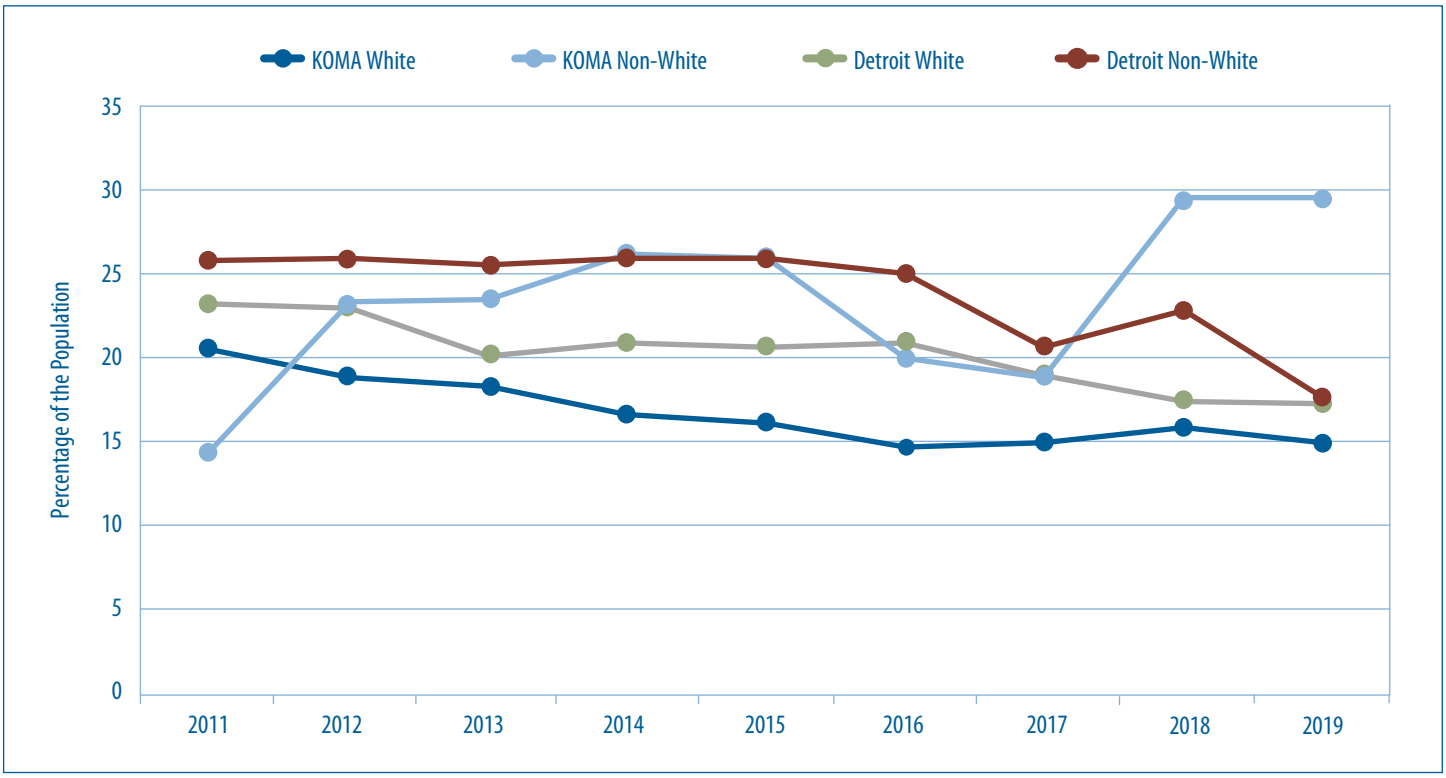
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to missing data, the value for KOMA female in 2012 has been imputed using mean substitution.

Figure 9: Binge Drinking by Gender, 2011-2019



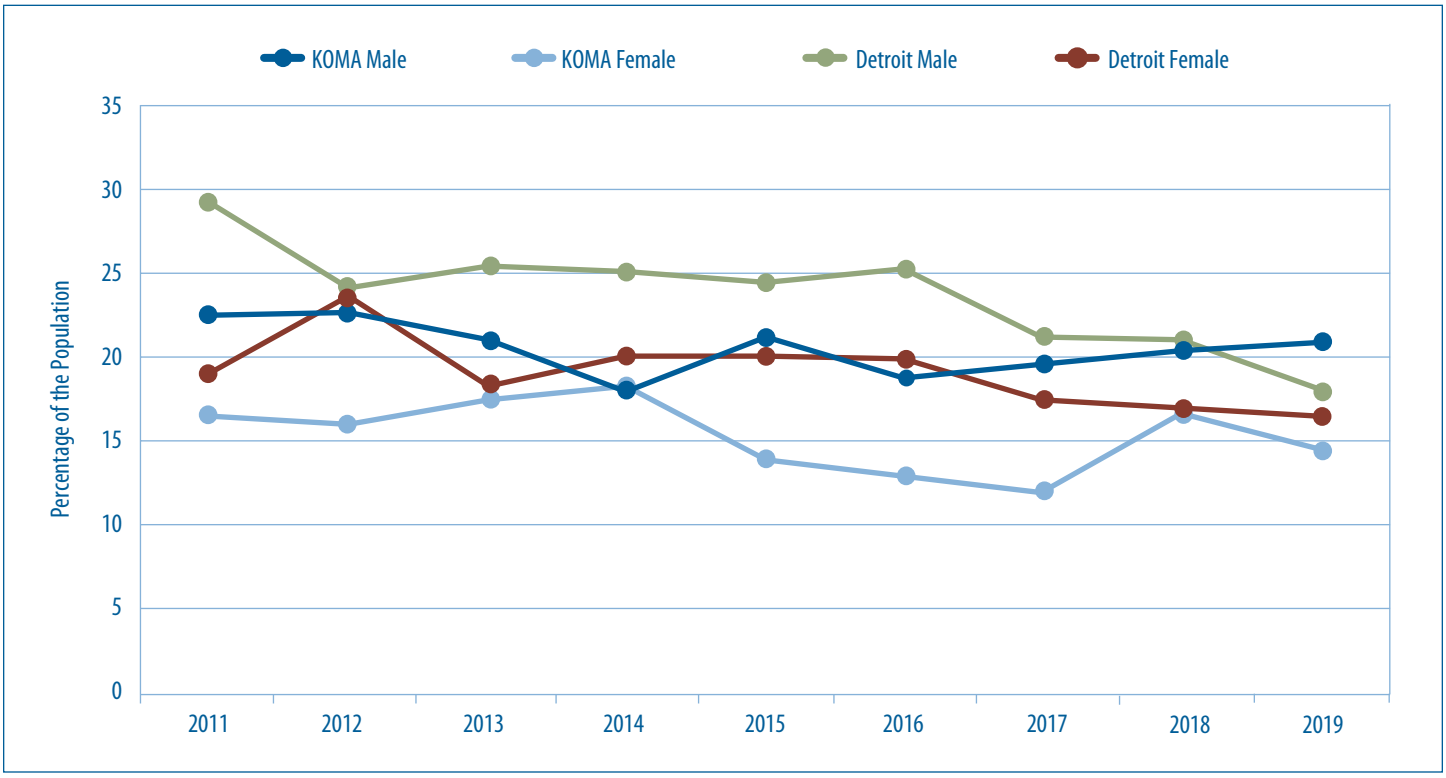
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 10: Current Cigarette Smokers by Race, 2011-2019



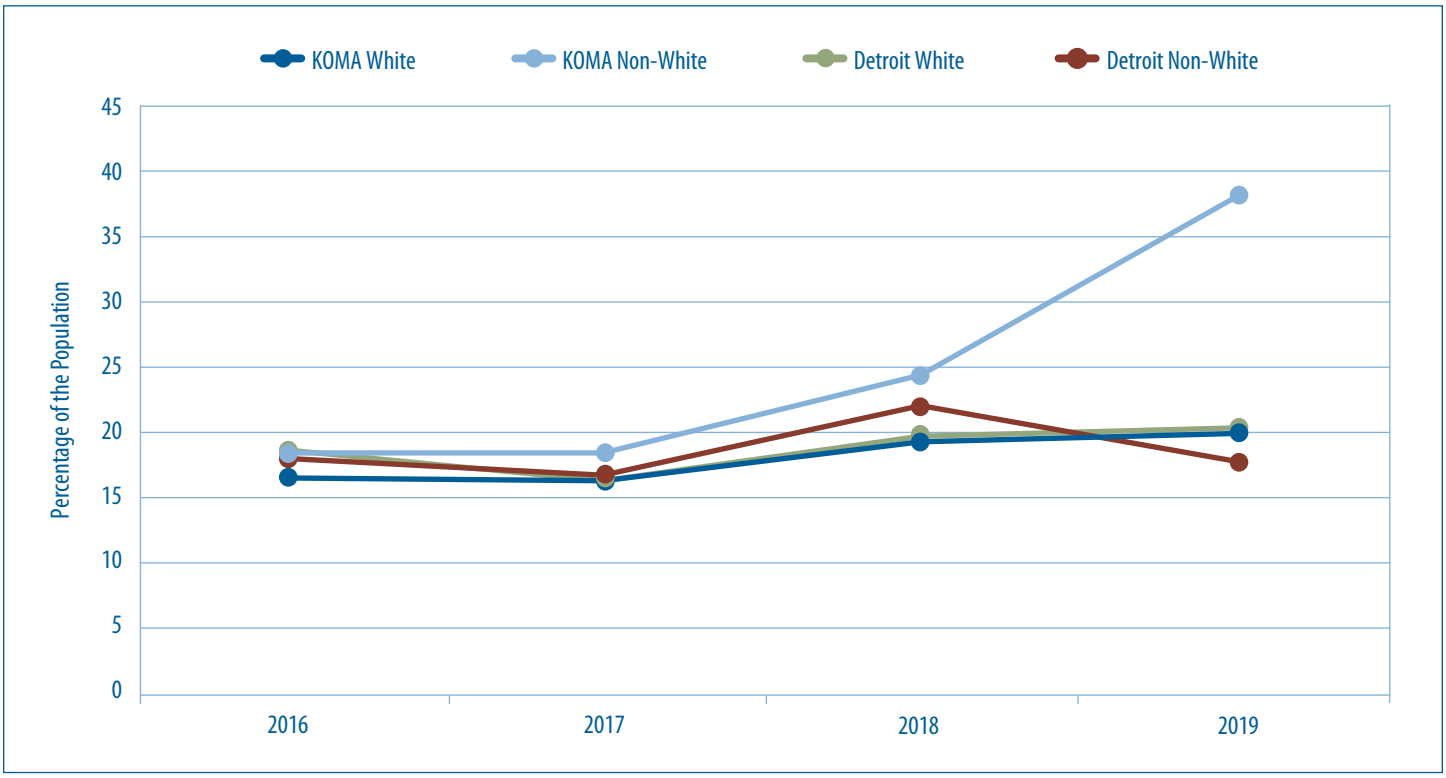
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 11: Current Cigarette Smokers by Gender, 2011-2019



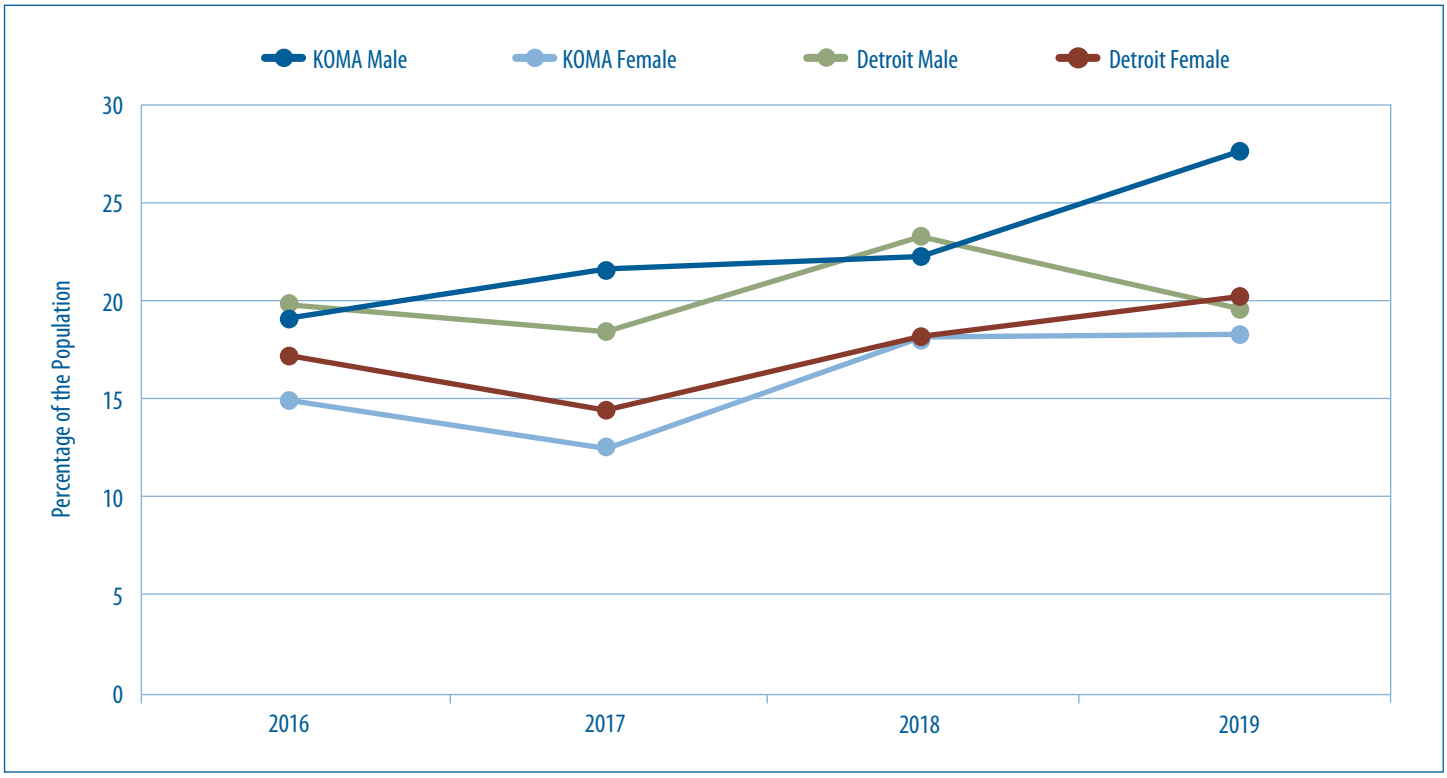
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 12: Former E-cigarette Use by Race, 2016-2019



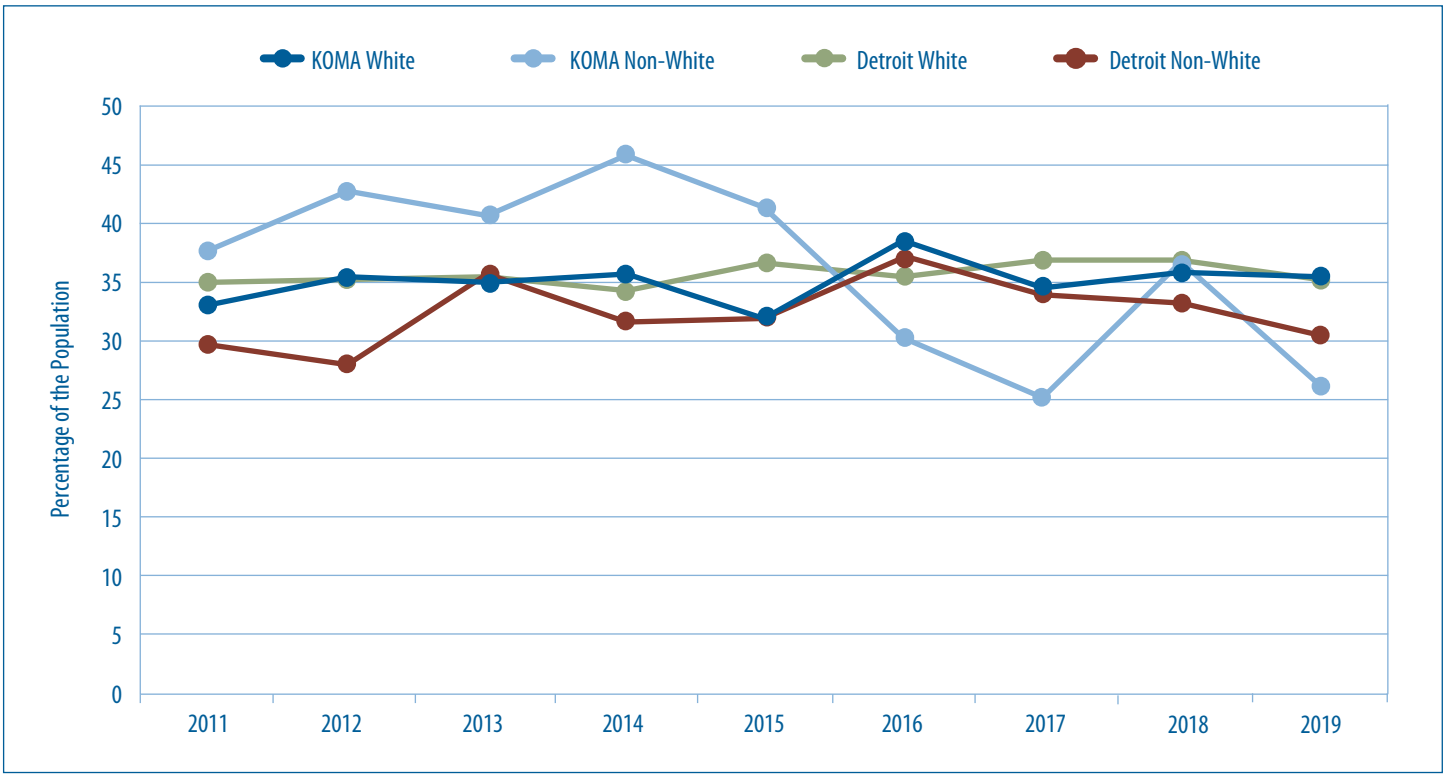
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 13: Former E-cigarette Use by Gender, 2016-2019



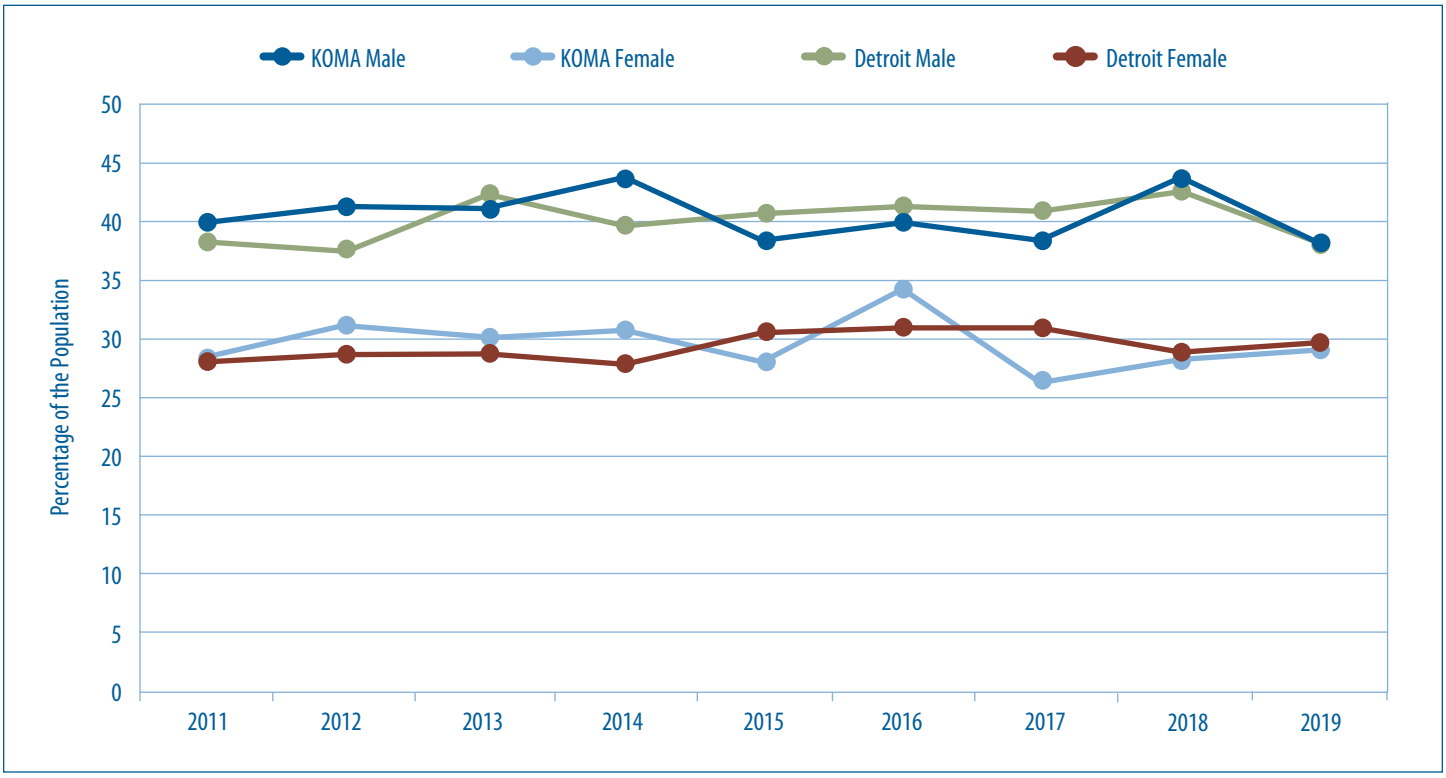
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 14: Overweight by Race, 2011-2019



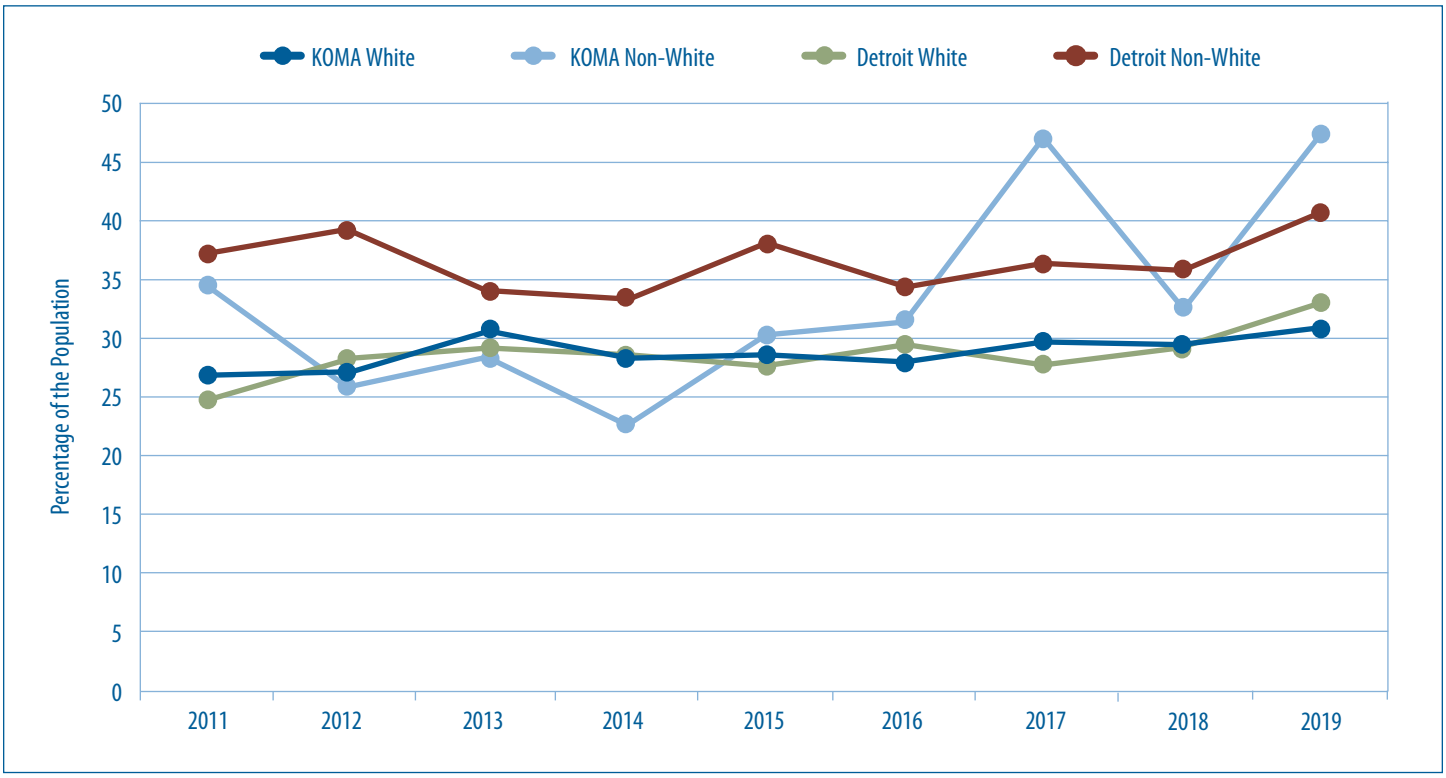
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 15: Overweight by Gender, 2011-2019



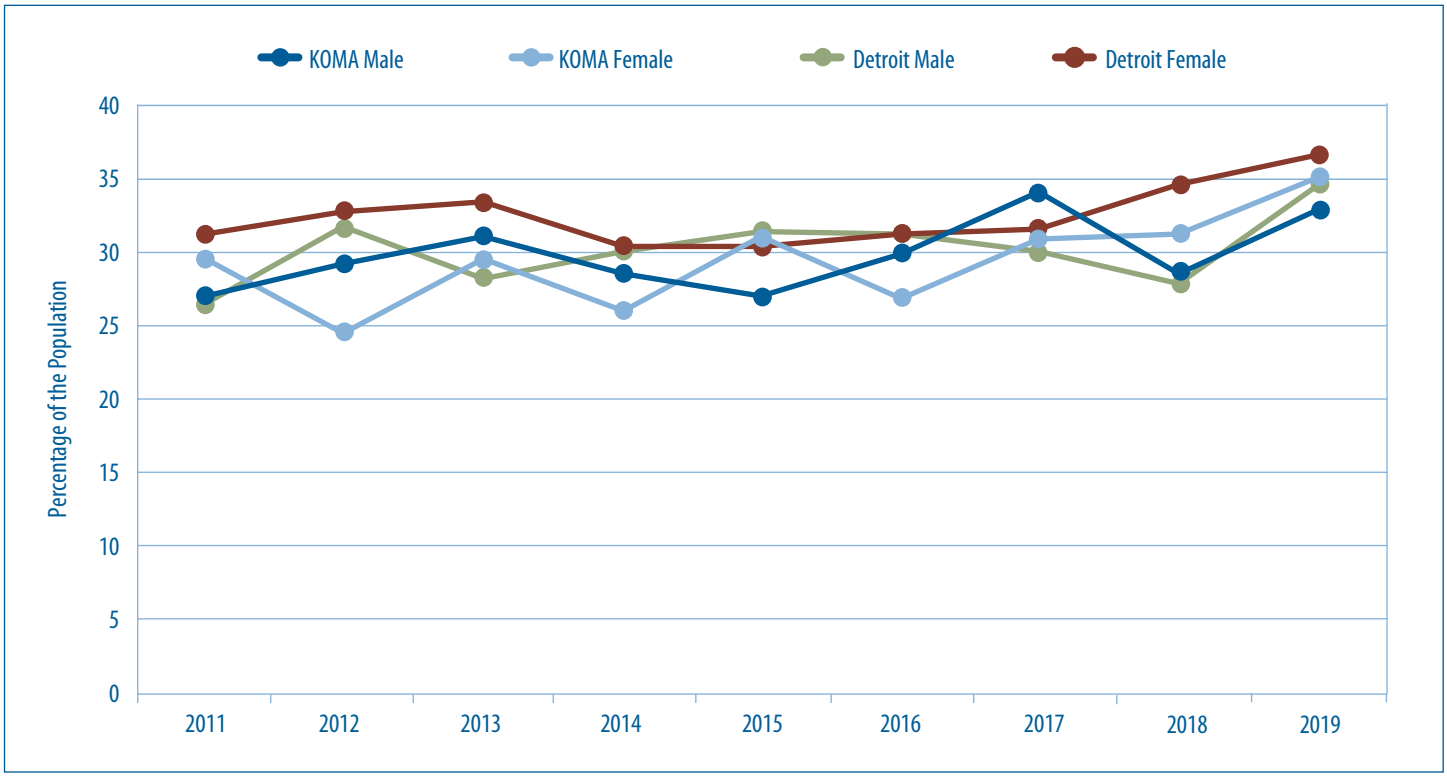
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 16: Obesity by Race, 2011-2019



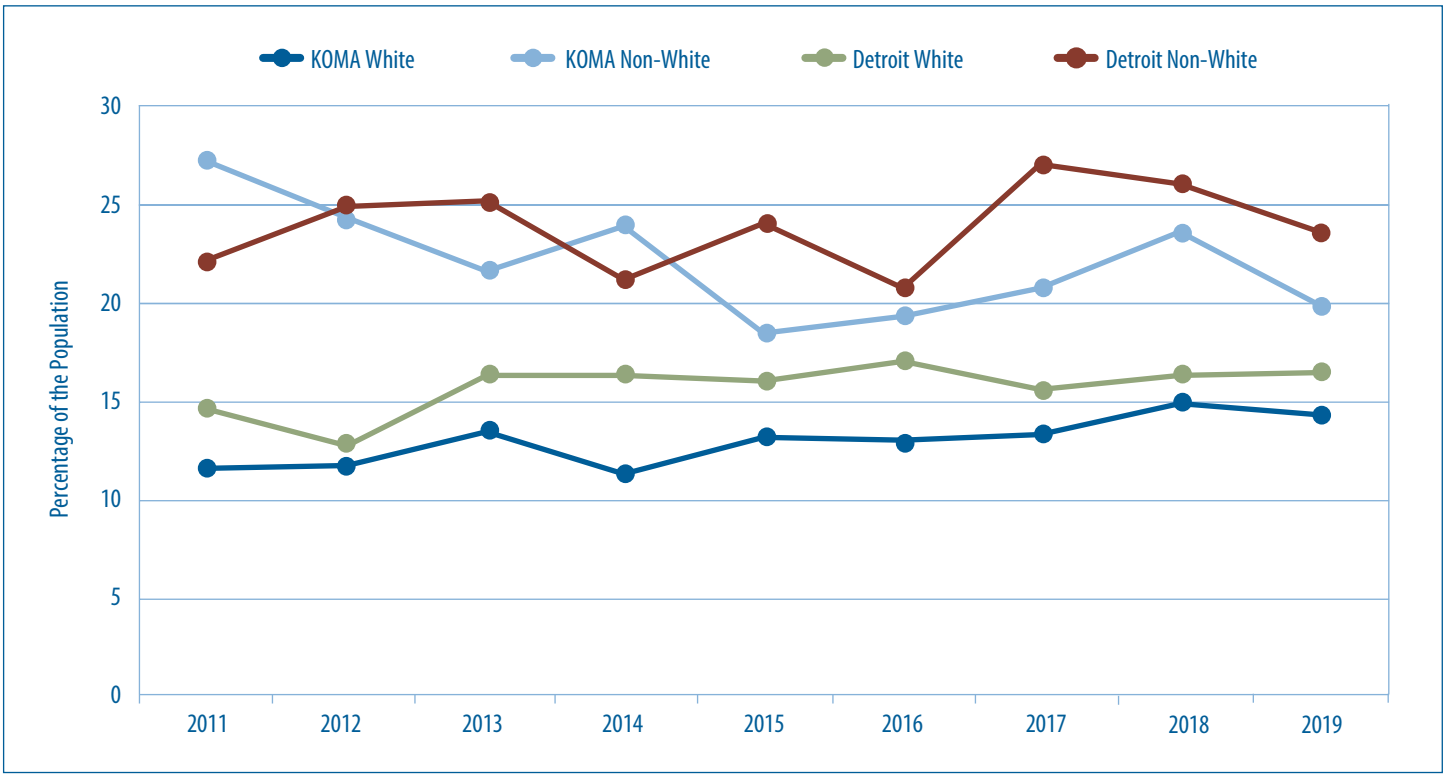
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 17: Obesity by Gender, 2011-2019



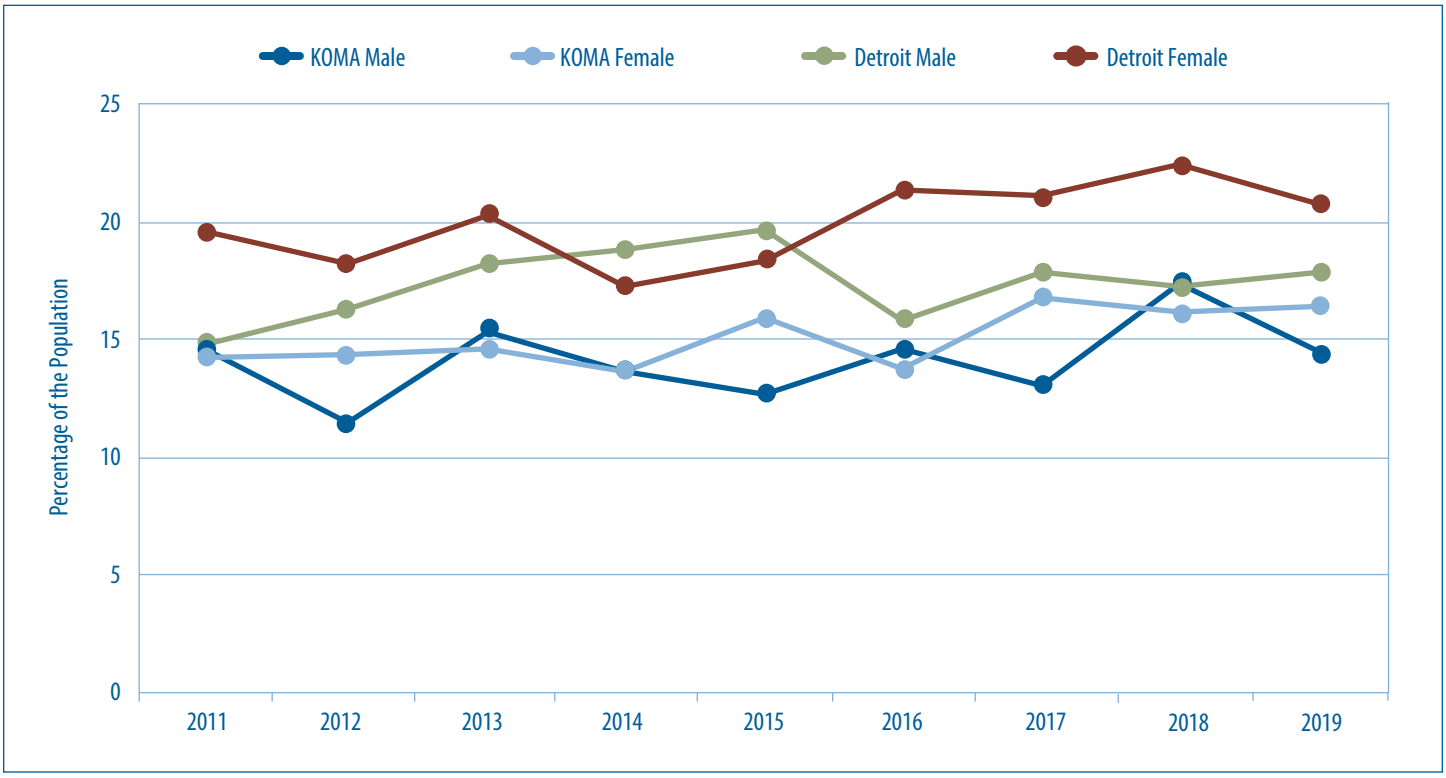
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 18: Health Status - Fair or Poor Health by Race, 2011-2019



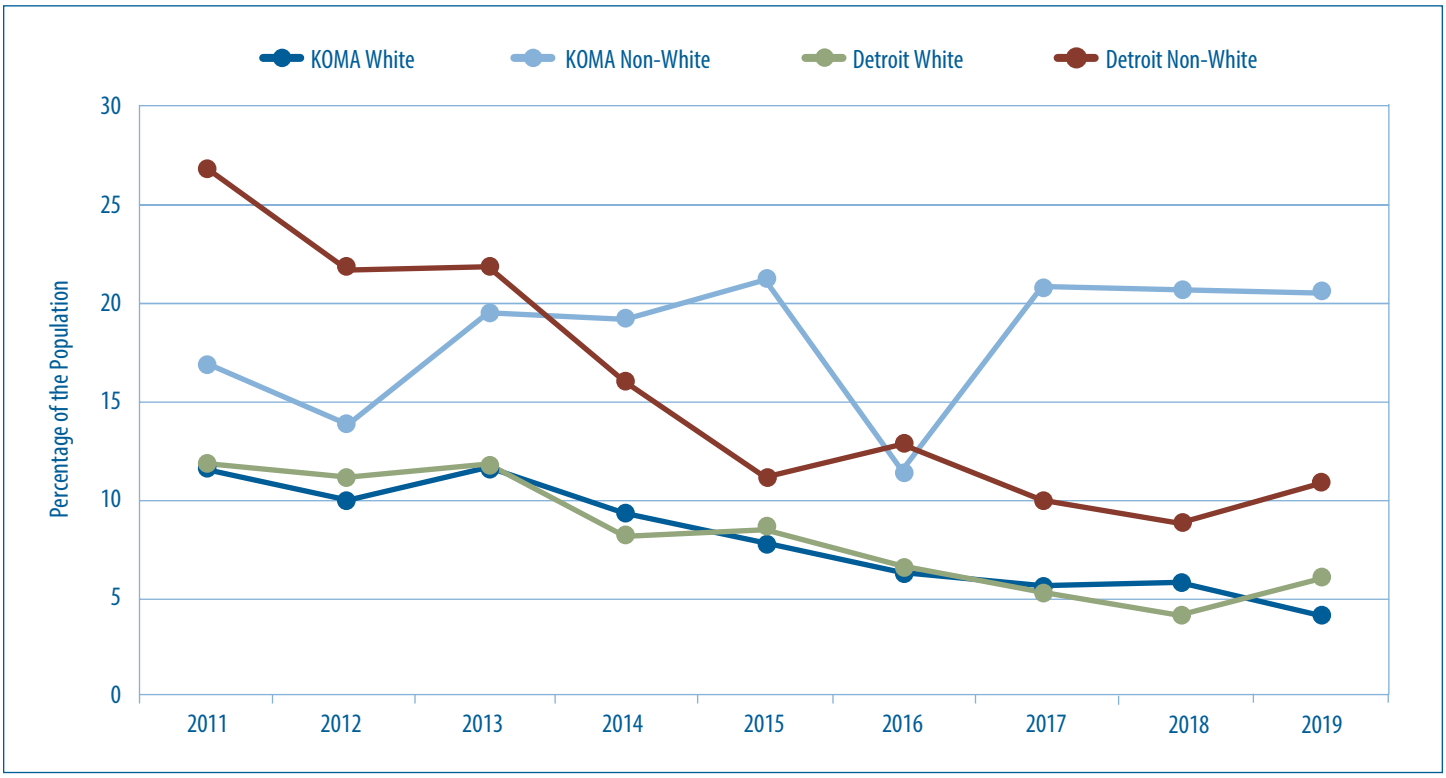
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to missing data, the value for KOMA non-white in 2012 has been imputed using mean substitution.

Figure 19: Health Status - Fair or Poor Health by Gender, 2011-2019



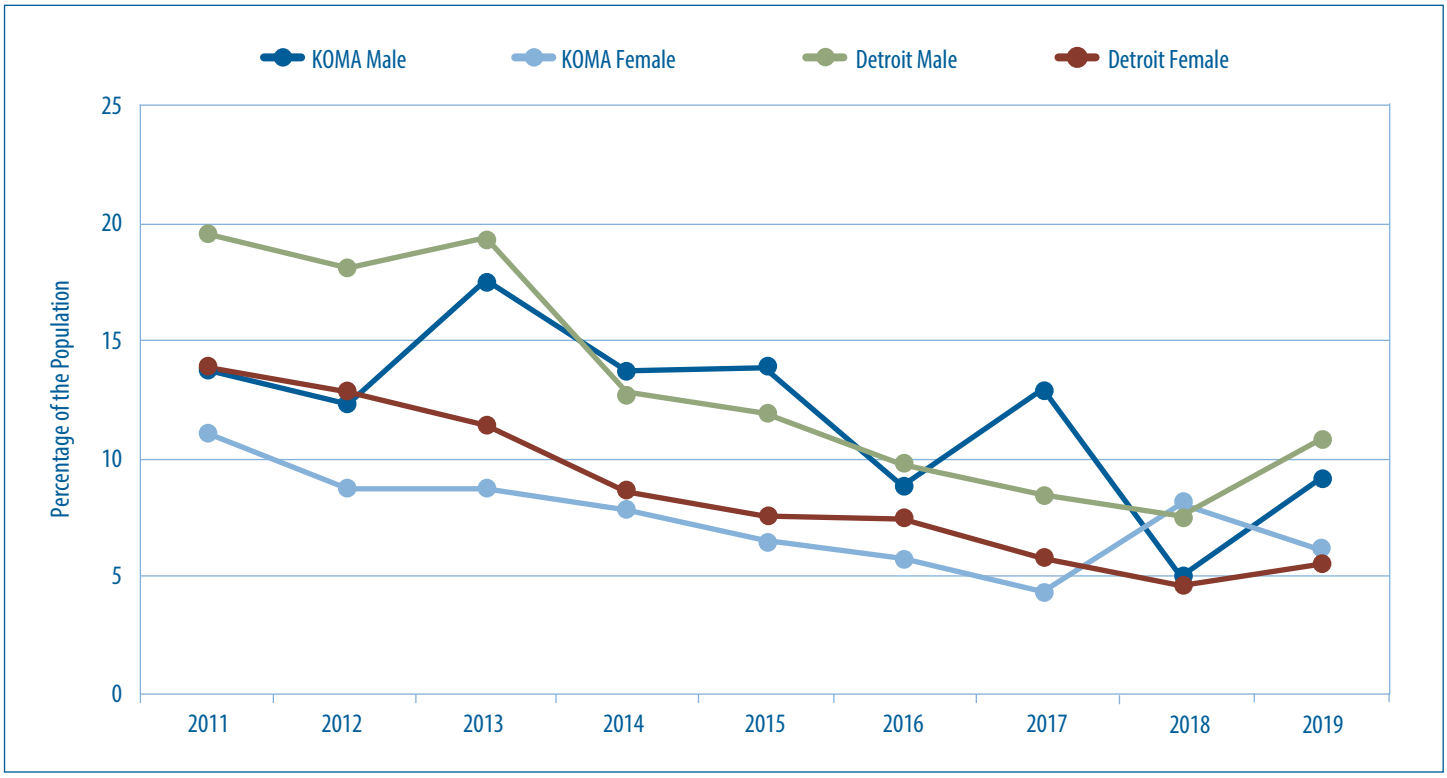
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 20: No Health Insurance by Race, 2011-2019



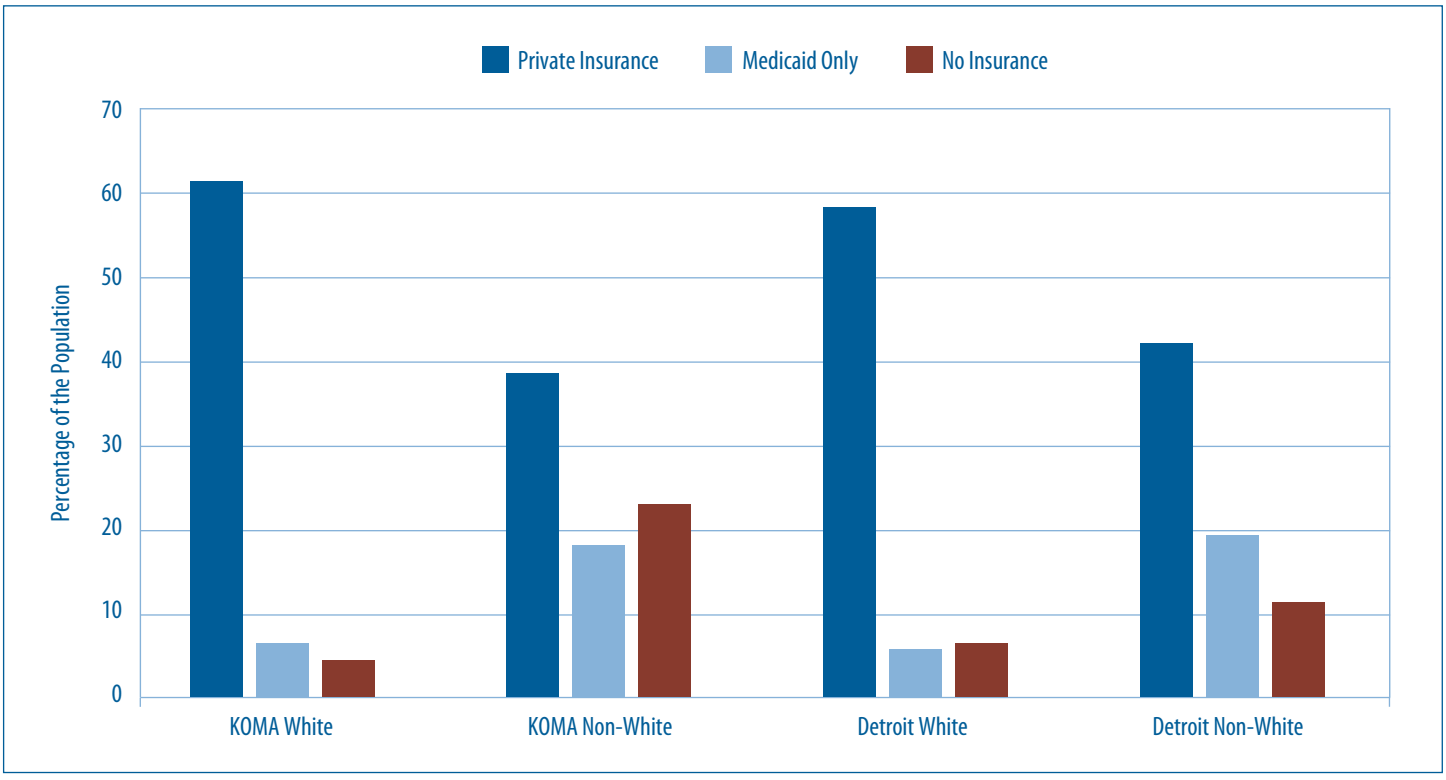
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019
Note: Due to missing data, the value for KOMA non-white in 2018 has been imputed using mean substitution.

Figure 21: No Health Insurance by Gender, 2011-2019



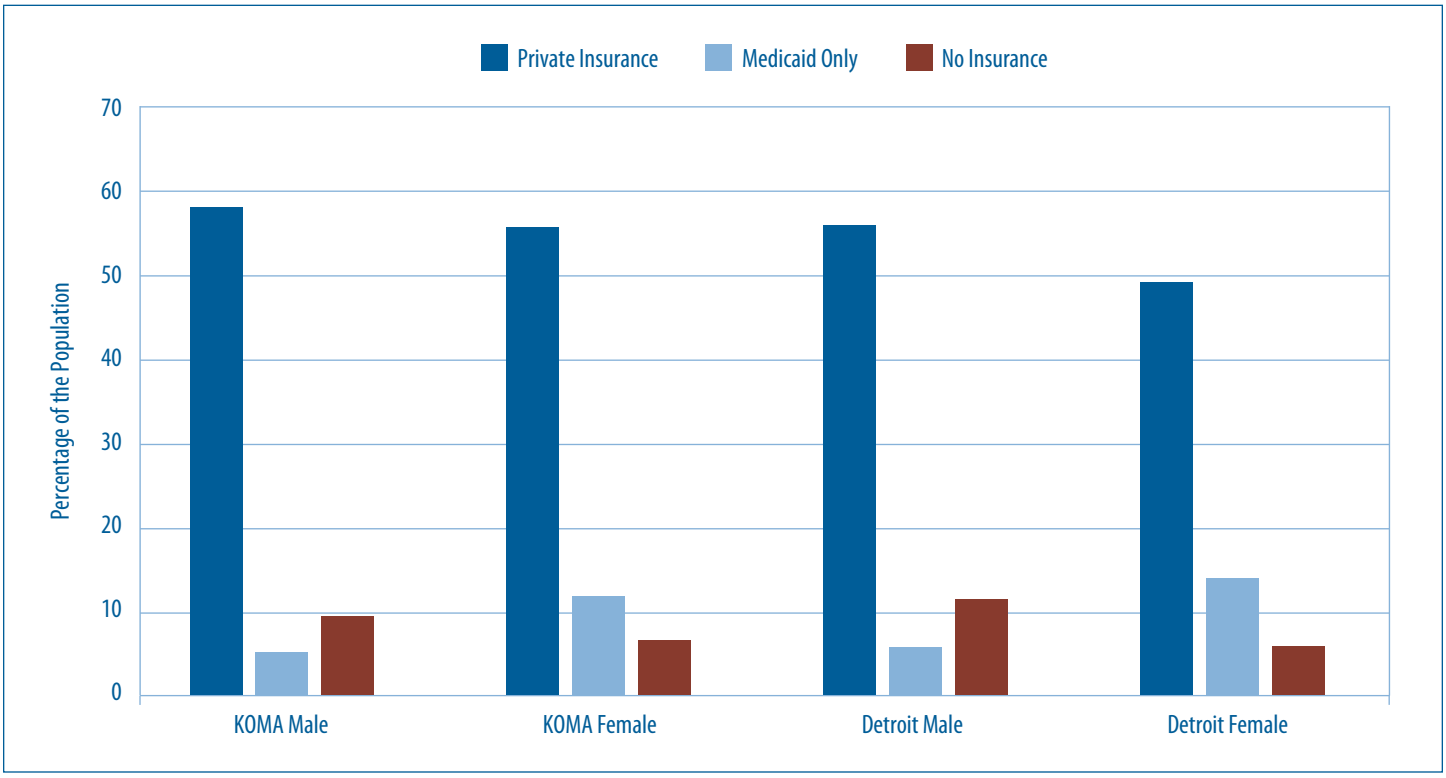
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 22: Insurance Type by Race, 2019



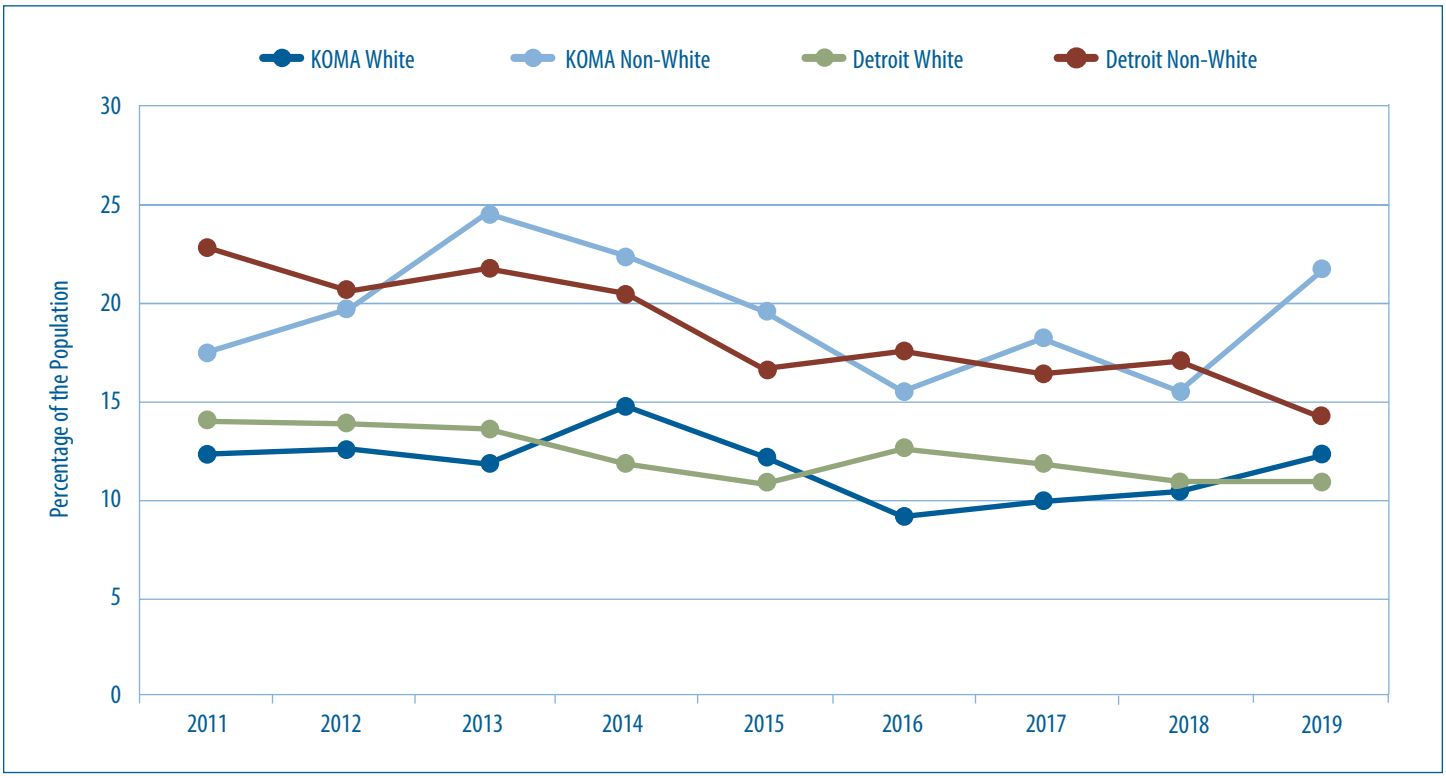
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 23: Insurance Type by Gender, 2019



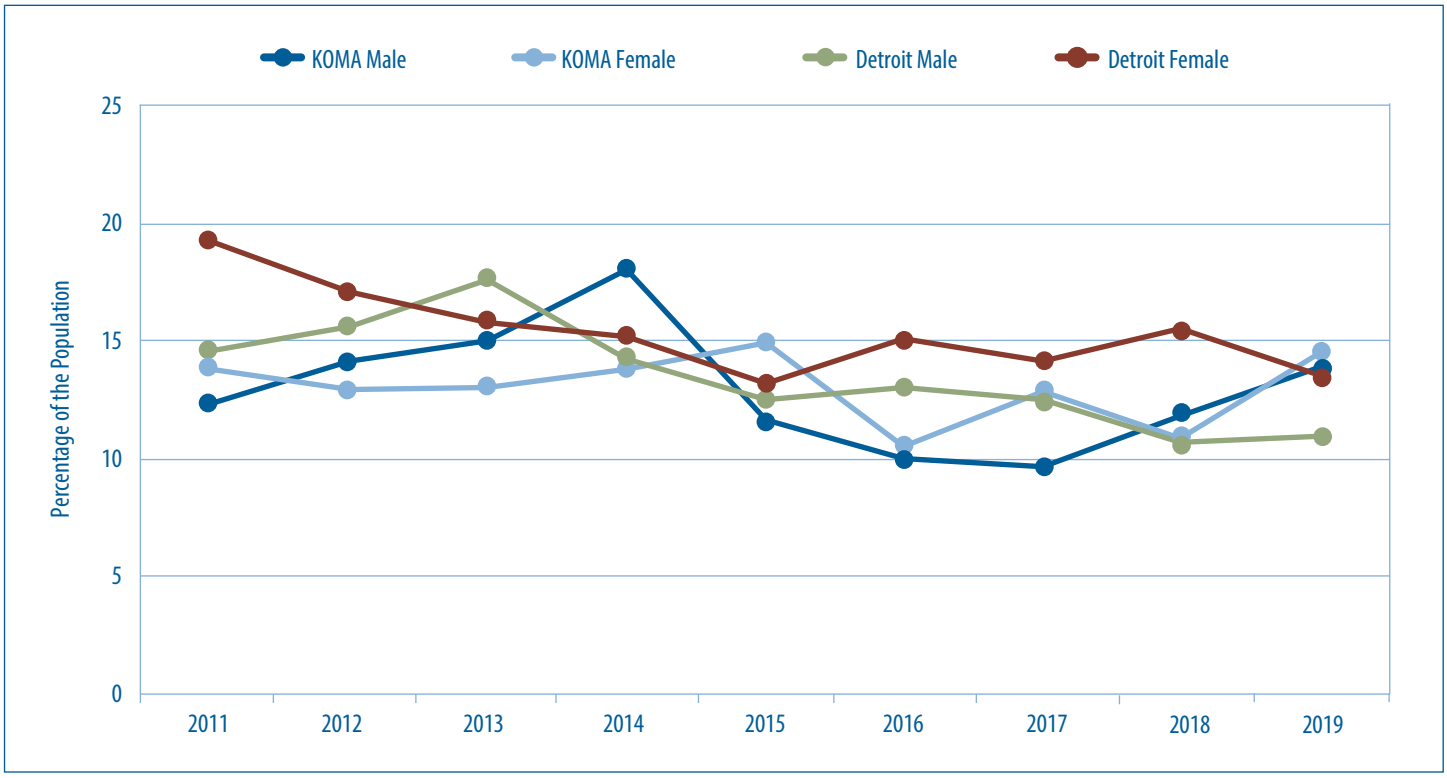
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 24: No Health Care Access Due to Cost by Race, 2011-2019



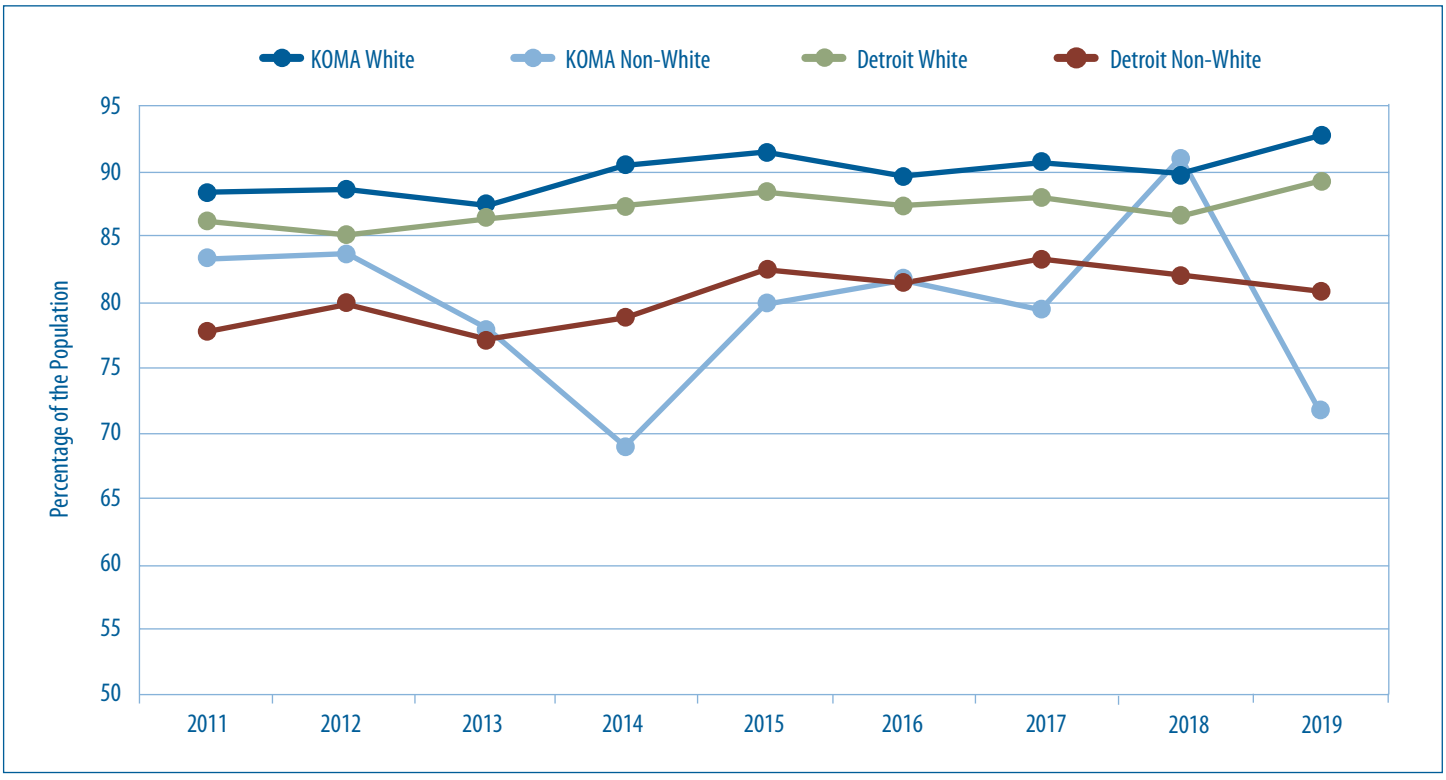
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 25: No Health Care Access Due to Cost by Gender, 2011-2019



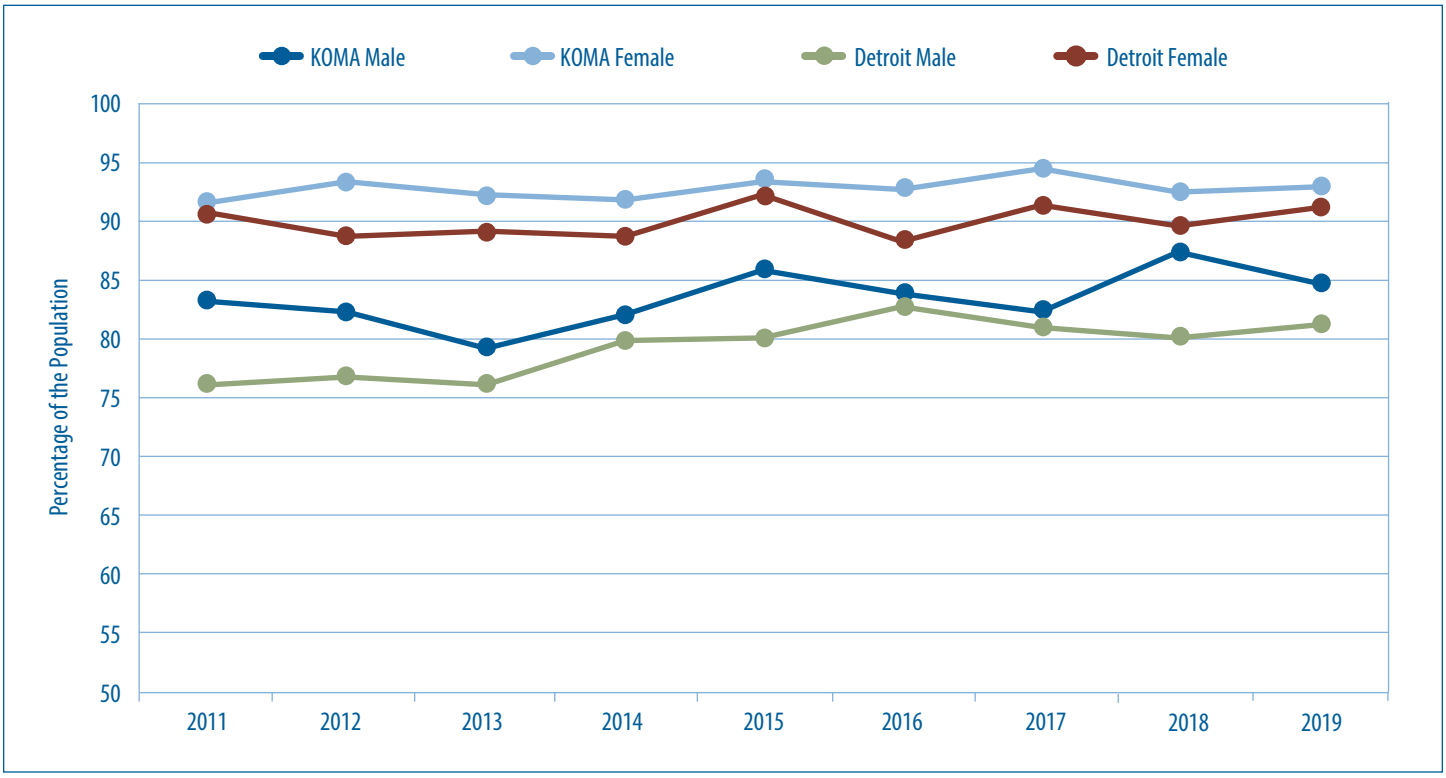
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 26: Has a Usual Source of Care by Race, 2011-2019



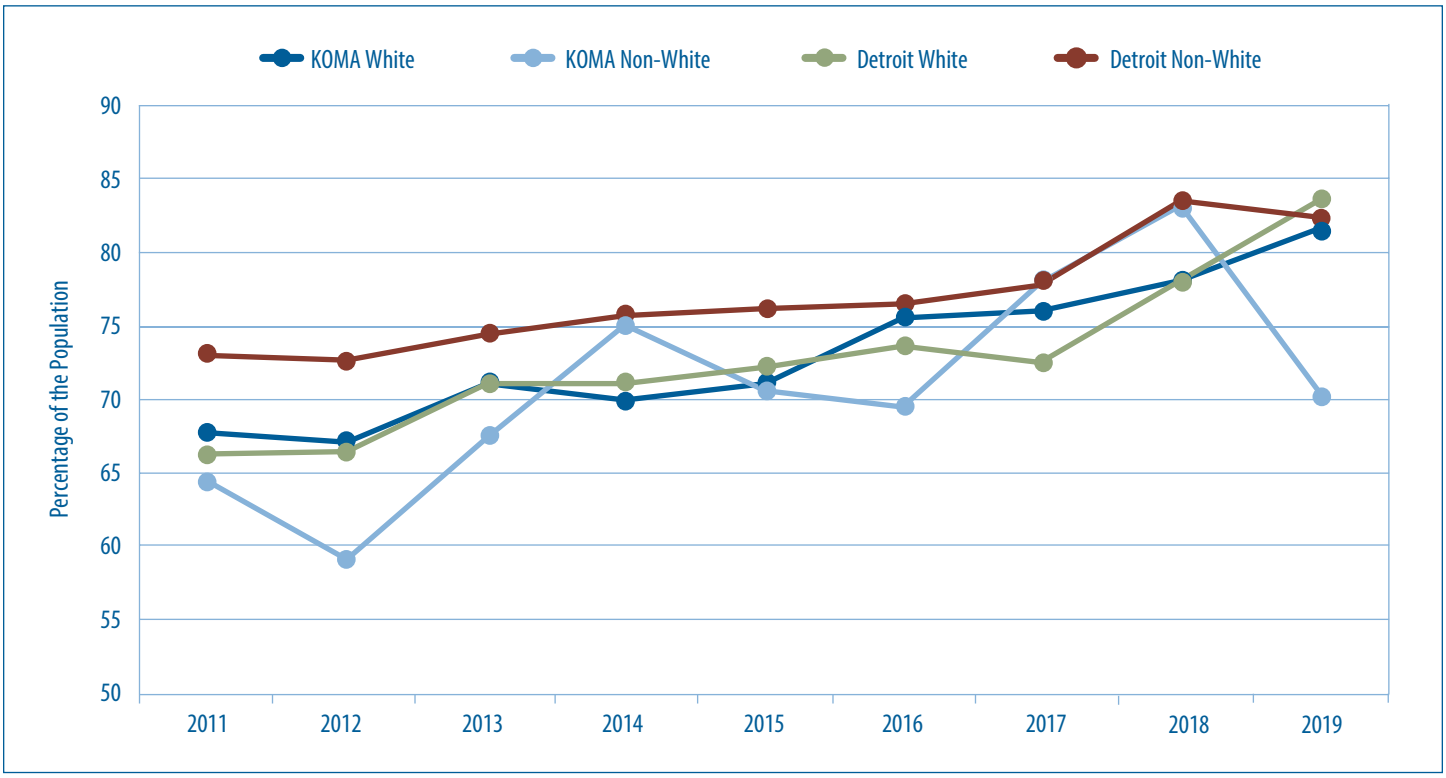
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 27: Has a Usual Source of Care by Gender, 2011-2019



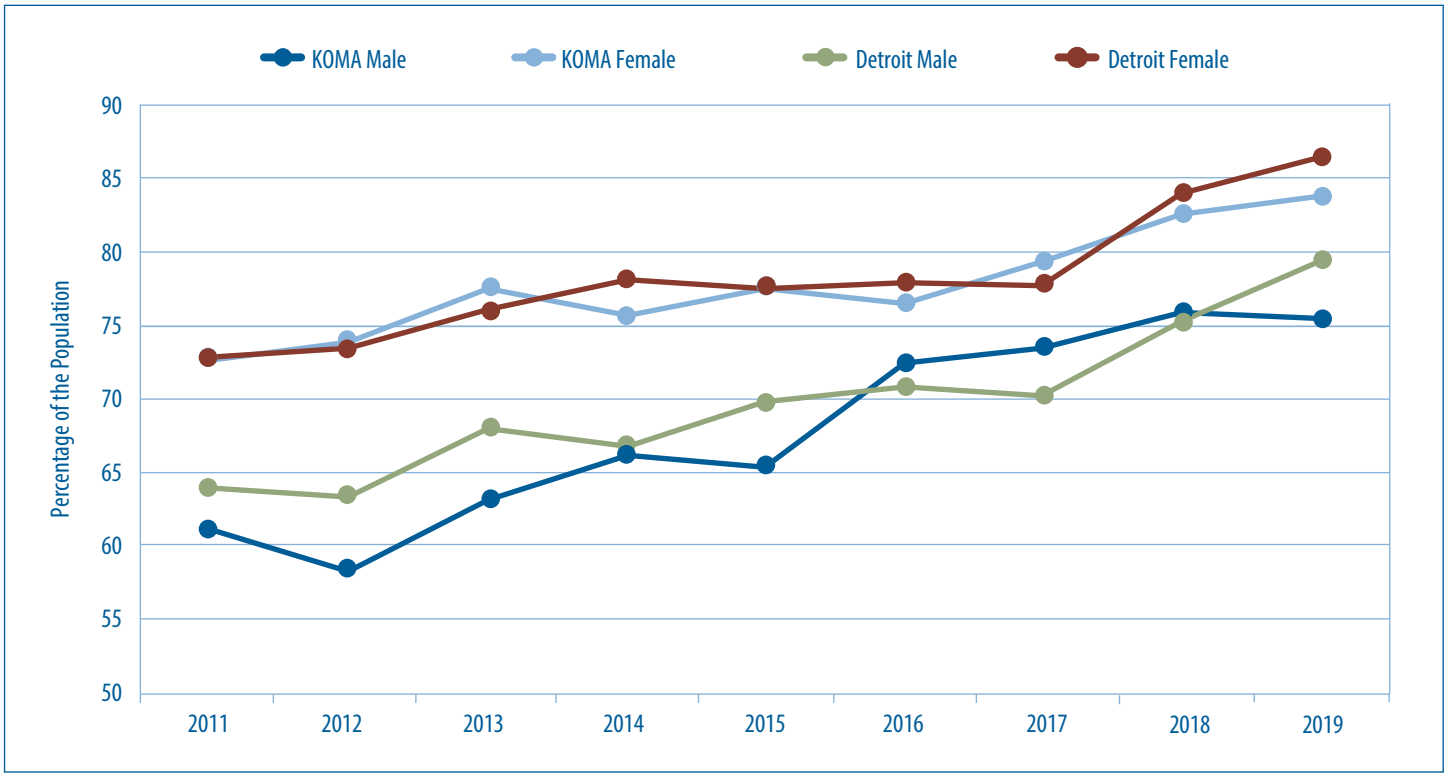
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 28: Had Routine Checkup in Past Year by Race, 2011-2019



Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Figure 29: Had Routine Checkup in Past Year by Gender, 2011-2019



Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2019

Health Care Spending During COVID-19

In this year's report, we continue to use data on consumer spending to obtain insights into the economic implications of the novel coronavirus (COVID-19) outbreak. The consumer spending data come from the Opportunity Insights Economic Tracker, which tracks aggregate credit and debit card spending collected by Affinity Solutions Inc. The ability to track consumer spending at a higher frequency (i.e., days) allows us to understand the immediate economic implications of COVID-19. The data are seasonally adjusted and show percentage changes relative to the mean of January 2020. Moreover, it closely tracks the historical benchmarks of retail spending and services (Chetty et al., 2020). A limitation of the data is that Affinity Solutions captures about 10 percent of debit and credit card spending in the U.S. Chetty and coauthors (2020) note that the Affinity data can be viewed as representative statistics of total card spending, but not total consumer spending. In this section, we are going to specifically focus on health care and social assistance spending by consumers during COVID-19.

Health care spending consists of expenditures associated with the following subsectors: ambulatory health care services (e.g., physician's offices or dentist's offices), hospitals (e.g., medical, diagnostic, and treatment services), and nursing and residential care facilities (e.g., mental health and substance abuse facilities). On the other hand, social assistance services include individual and family services, vocational rehabilitation services, child day care services, community food and housing, and emergency and other relief services. Note that these services are on a short-stay basis and do not require residential stay.

Figure 1 shows a large reduction in health care and social assistance spending following the COVID mitigation measures implemented by the State of Michigan. Specifically, we observe a reduction of more than 70 percent in health care and social assistance spending in Michigan followed by public school and nonessential business closures, respectively, on March 16 and March 23 and the stay-at-home order on March 24. Although similar trends are observed in the nation, the largest decline in the U.S. does not exceed 52.5 percent, which is about 20 percent less than the drop in Michigan.

We observe a recovery in consumer spending after the start of stimulus payments on April 15. This upward trend continues after select businesses open and the stay-at-home order ends in Michigan. In fact, health care and social assistance spending in Michigan reaches a new high of 32 percent on July 7, while surpassing the earlier 10 percent consumer spending in the nation. However, this positive trend was not robust in the following months. Specifically, the average drop in Michigan's consumer spending was about 12 percent for the next 12 months. On the other hand, the U.S. experienced a 2 percent increase in consumer spending during the same time window. We also observe that there are spikes in spending followed by the second and third stimulus payments, though the observed trends are not persistent.

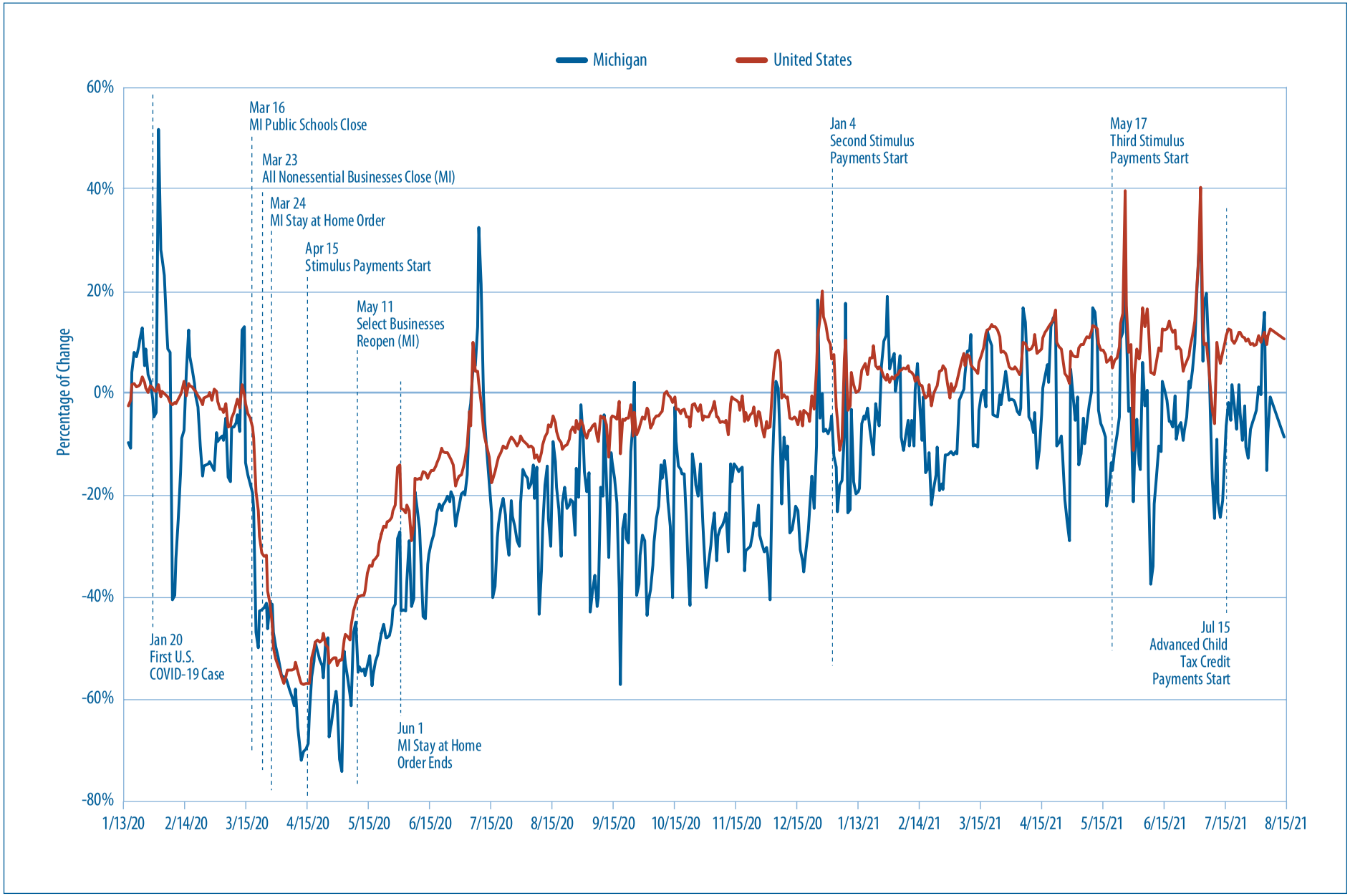
One of the reasons for reductions in health care spending may be the limitations in accessing health care. For example, Aslim and Mungan (2020) highlight these access problems among individuals seeking treatment for substance use disorders during COVID-19. If individuals cannot access health care for conditions that require treatment, we might expect an increase in non-COVID mortality amid the pandemic.

References

Chetty, R., Friedman, J., Hendren, N., & Stepner, M. (2020). The Economic impacts of COVID-19: Evidence from a new public database built from private sector data. Working paper. opportunityinsights.org/wp-content/uploads/2020/05/tracker_paper.pdf.

Aslim, E. G., & Mungan, M. C. (2020). Access to substance use disorder treatment during COVID-19: Implications from reduced local jail populations. *Journal of Substance Abuse Treatment*, 119, 108147. www.sciencedirect.com/science/article/pii/S0740547220304049.

Figure 1: Percent Change in Health Care and Social Assistance Spending by Consumers During COVID-19



Source: Opportunity Insights Economic Tracker, tracktherecovery.org

Economic Analysis

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Disparities

What Data Is Being Used

To investigate for disparities in health outcomes across regions and groups, we use member data provided by the private health insurance plans Priority Health (PH), Blue Cross Blue Shield of Michigan (BCBSM), and Blue Care Network (BCN) at the ZIP code level. For each ZIP code, the data set records the number of member months in the presence of six different diagnoses: asthma, coronary artery disease (CAD), depression, diabetes, hyperlipidemia, and low back pain. We also examine the number of member months where the member is between the ages of 30 and 39, has none of these diagnoses, and has total annual expenditures below $450,000. These are labeled "healthy" member months. In addition to member months, the data also records the average risk score of the members in each ZIP code-diagnosis group. We use this as a measure of the underlying health characteristics of the member population.

In order to categorize ZIP codes on the basis of characteristics potentially subject to health disparities, we combine the insurance plan data with 2010 census data on population, median income, and race at the ZIP code-level. Median income is from the American Community Survey while race and population data are from the 2010 Census Demographic Profile Summary File. We then stratify the ZIP codes into population quintiles, first by income and then by race. The set of ZIP codes containing 20 percent of a given regional population with the highest weighted average income are denoted "High Income" ZIP codes while the set with the lowest weighted average income are labeled "Low Income" ZIP codes. Similarly, the set of ZIP codes containing 20 percent of a given regional population with the highest percentage of white residents are labeled "High Share White" ZIP codes while those with the highest percentage of Black residents are labeled "High Share Black" ZIP codes. This is done separately for the KOMA and Detroit regions, and then descriptive statistics are reported for the entire region, as well as stratified quintiles. Differences in mean outcomes across quintiles are considered health disparities and any patterns with respect to income or race are investigated.

There are limitations with this approach. First, these data are 10 years older than the payer data, and it is almost certainly true that the income and racial profile of various ZIP codes have changed over the previous decade. This could influence the results, especially if gentrification occurred more rapidly in one region than in the other, thus making the 2020 income or racial profile of a ZIP code much different from those in the 2010 Census. This problem will hopefully be mitigated as these files are updated to the 2020 Census. Second, as a simple comparison of descriptive statistics, the analysis does not control for all factors that are correlated with income or race. These include education, drug use, discrimination, opportunity, and family characteristics (Iguchi et al. 2005). Therefore, readers should be cautious in interpreting any patterns or correlations as causal relationships. Third, the insurer data only covers the privately insured population and access for the non-privately insured to public health insurance programs is different across income and race quintiles. Therefore, even controlling for race and income, the privately insured population is bound to be different from the publicly insured and uninsured populations. This means that any inferred correlations between health disparities and income or race rely on assumptions about correlations between the member and general populations of a ZIP code.

Disparities By Income

In **Table 1**, we see that KOMA has a lower median income than Detroit, but it also has a tighter income distribution. We also see the weighted Black and white shares of the populations of these sets of ZIP codes. As has already been noted in the literature, this presents difficulties in disentangling the impacts of socioeconomic status and race (Jamil et al. 2008, Meliker et al. 2009). This introduces an important caveat in the regional comparison that will be reflected again when we stratify by race: while the top income quintiles for KOMA and Detroit are not strikingly different from each other, the bottom income quintiles look very different in terms of racial distribution. So, while we will be comparing across regions those ZIP codes comprising the 20 percent of populations with the highest weighted Black share of the population, we cannot say those quintiles have similar racial distributions

Average Risk Score

A high average risk score indicates the presence of member characteristics that are correlated with high health care spending. These risk scores are estimated by a third-party vendor; the characteristics that affect risk scores and the scoring method are proprietary information and are not known to the authors of this report. As shown in **Figure 1**, the population-weighted average risk score is slightly higher in the Detroit region, compared to KOMA. This is consistent with findings from previous health check reports indicating more severe underlying health characteristics on the eastern side of the state compared to the western. The Detroit region shows a clear trend of increasing average risk scores from the high income ZIP codes to the low income ZIP codes, which is consistent with correlations between socioeconomic status and health-related variables found in the literature. This trend is less clear in KOMA, however. Both the high and low income quintiles in KOMA exhibit average risk scores that are slightly below the mean for the region.

Average Insured Months Per Resident

Figure 2 reports the population-weighted average number of member months in each ZIP code set, relative to the total population of the ZIP code set. This can serve as a rough measure of private insurance rates, although it is likely to be biased upward in areas where residents have multiple comorbidities. This is because an individual insured for a month while diagnosed with two different chronic conditions appears in the data as two member months.

Both KOMA and Detroit regions exhibit a decreasing relationship between income quintiles and member months per capita. This is not surprising, since low-income individuals are more likely to qualify for public health insurance programs and therefore not be privately insured. This pattern of differential member months per capita across income quintiles raises the likelihood that members from low-income ZIP codes are less representative of the ZIP code population. Given the correlation between private health insurance, employment, and other socioeconomic characteristics, the disparities between members across income quintiles may under-represent the disparities between residents.

Average Healthy Months to Total Months

Insured months where the member was between the ages of 30 and 39, had none of the six chronic conditions diagnosed, and had annual health care spending below $450,000 are coded as "healthy" member months. **Figure 3** presents the ratios of healthy months to total member months, which include both healthy months, as well as those where one of the chronic conditions was diagnosed. While the KOMA region exhibits a declining healthy month ratio with the average income of the quintile, the ratios in the Detroit region are relatively constant. While not terribly inconsistent with the pattern of risk scores across income quintiles, there is a notable difference. For both regions, the association between average income and healthy month ratio is more positive than for average risk score, as reported in **Figure 2**. One explanation for this could be differences in the age distribution across quintiles. Members under 30 years of age would be included in the calculations of risk scores but excluded from the tally of healthy member months. Therefore, a positive correlation between the median income of a ZIP code and the average age could lead to fewer healthy months being recorded in low-income ZIP codes.

Average Asthma Months to Total Months

Figure 4 separately reports the average share of member months with a diagnosis of asthma for the KOMA and Detroit regions. For each region, the population-weighted average share of asthma months to total months across ZIP codes is presented, along with the weighted averages for ZIP codes in the top income quintile and those in the bottom quintile. The results show that asthma months make up a larger share of total months in KOMA than they do in Detroit. On the other hand, the share of asthma months is relatively constant across income quintiles in the KOMA region while it declines with income in the Detroit region. Together with the roughly flat pattern of healthy month shares in **Figure 3**, this suggests that other chronic conditions make up a more significant share of non-healthy months for the residents of low-income ZIP codes in the Detroit region.

Average CAD Months to Total Months

Unlike asthma, **Figure 5** reveals that the share of total months with the presence of a CAD diagnosis is nearly double the rate in the KOMA region. There are not any obvious relationships between income quintile and CAD share of total months. Together with the findings regarding expenditure from the Major Medical Conditions section 3.2, **Figure 5** suggests that the differences in CAD spending per member could be explained by economies of scale. With roughly three times the population and double the share of member months with a CAD diagnosis, the much larger number of CAD patients in the Detroit region could lead to a lower average cost per CAD diagnosis, relative to the KOMA region.

Average Depression Months to Total Months

Figure 6 shows the distribution of member months with a depression diagnosis, as a share of total member months, across regions and income quintile ZIP codes. Depression is more common among member months in the KOMA region than in Detroit. While there is some evidence that the share of depression months increases with income quintile, this relationship is more pronounced in the Detroit region. Along with the previous figures, this suggests disparities in diagnoses other than asthma, CAD, and depression fall disproportionately on the members from low-income ZIP codes in the Detroit region.

Average Diabetes Months to Total Months

In both the KOMA and Detroit regions, member months with a diabetes diagnosis are most common among the residents of low-income ZIP codes. This pattern is revealed in **Figure 7**, where the share of member months with a diagnosis of diabetes are approximately 50 percent greater among the low-income ZIP codes in KOMA, relative to the high-income ZIP codes. The difference is approximately 80 percent in the Detroit region. This is consistent with findings in the literature showing greater prevalence of diabetes and its associated comorbidities in groups with lower socioeconomic status (Jamil et al. 2008, Clements et al. 2020, Anderson-Carpenter and Neal 2021, Parpia et al. 2021). The wider variance in income across quintiles in the Detroit region, relative to KOMA, could explain the wider relative disparities in the share of diabetes months across quintiles.

Average Hyperlipidemia Months to Total Months

Figure 8 displays the share of total member months with a diagnosis of hyperlipidemia. The average hyperlipidemia share of member months is slightly higher in Detroit than in KOMA. What is interesting is that the two regions exhibit the opposite association between the hyperlipidemia share of member months and income quintile. In the KOMA region, the low-income quintile has a larger share of member months with a hyperlipidemia diagnosis than does the high-income quintile. The opposite is true in the Detroit region. Across regions, the low-income quintiles exhibit similar shares of member months with a hyperlipidemia diagnosis. For the high-income quintiles, on the other hand, the rate of hyperlipidemia months is roughly 30 percent greater in the Detroit region than in KOMA. This reveals a greater disparity in hyperlipidemia across high-income ZIP codes across regions, rather than across income quintiles within regions.

Average Low Back Pain Months to Total Months

As shown in **Figure 9**, there are not particularly notable differences across regions in the distribution of low back pain months across income quintiles. Both regions exhibit similar shares of total months having a low back pain diagnosis and that low back pain months are a greater share of total months among the residents of high- rather than low-income ZIP codes.

Disparities by Race

Table 2 shows descriptive statistics where ZIP codes in the two regions are categorized by race. As was true in **Table 1**, the KOMA region has a lower weighted median income and smaller Black share of the population than is found in the Detroit region. When isolating the sets of ZIP codes in each region that make up 20 percent of the regional population and have the highest white share of the ZIP code population, which are labeled "High Share White" ZIP codes, we see that the two regions have a similar racial distribution (roughly 95 percent white and 0.5-2 percent Black). On the other hand, the sets of ZIP codes meeting the 20 percent regional population threshold having the highest Black share of the population ("High Share Black" ZIP codes) are quite different across regions. Even the High Share Black ZIP codes in the KOMA region tend to be majority white, having a weighted average Black share of the population equal to approximately 24 percent. The same is not true in the Detroit region, where the same classification of ZIP code has an average Black share of the population equal to roughly 85 percent. Therefore, a key difference between High Share Black ZIP codes across regions is the degree of racial segregation. Descriptions in the literature note the significance of racial segregation in determining a variety of health outcomes (Mechanic 2005, Grady and Darden 2012, Mein 2020, Gu et al. 2020, Parpia et al. 2021). Therefore, while patterns in outcome variables across quintiles in the KOMA region may illustrate different health outcomes varying with racial concentrations, the patterns in the Detroit region may reveal the additional impact of racial segregation.

Average Risk Score

The population-weighted average risk scores across regions and quintiles are presented in **Figure 10**. While the level of risk score is only slightly higher in the Detroit region, the two exhibit the opposite relationship between risk score and racial shares of the population. In the KOMA region, the average risk score of the High Share Black ZIP codes is approximately 10 percent lower than that of the High Share White ZIP codes. The opposite pattern is found in the Detroit region, where the High Share Black ZIP codes have an average risk score 23 percent higher than the High Share White ZIP codes. It should be noted, however, that the Detroit pattern of racial disparity in risk score does closely resemble the racial disparity in income, and so it is not clear whether race or income is most responsible for the risk score differences.

Average Insured Months per Resident

The racial disparities in average member months per resident displayed in **Figure 11** closely resemble the income disparities found in **Figure 2**. Once again, given the relatively low apparent rate of private insurance in the High Share Black ZIP codes in the two regions, there is a greater likelihood that the privately insured population of these ZIP codes is not representative of the ZIP code population. Notably, as private health insurance is associated with better employment and socioeconomic status, this implies that these figures may underrepresent the disparities in outcomes between High Share White and High Share Black ZIP codes.

Average Healthy Months to Total Months

Figure 12 displays differences across regions and racial shares in the ratio of healthy member months to total member months. While the pattern across racial shares in the Detroit region closely matches the pattern across income quintiles shown in **Figure 3**, the same is not true for the KOMA region. The residents of High Share Black ZIP codes in the KOMA region have a greater share of healthy months than do the residents of the region's High Share White ZIP codes. This is despite the High Share Black ZIP codes having a lower weighted median income than the High Share White ZIP codes, which led to the lower relative share of healthy months shown in **Figure 3**.

Average Asthma Months to Total Months

Patterns in the share of member months with an asthma diagnosis across racially defined quintiles are the same as those of the deciles defined by income. In both **Figures 4 and 13**, asthma is a greater share of total months in the KOMA region than in Detroit. Additionally, the Detroit region shows a smaller share of asthma months for High Share Black ZIP codes relative to High Share White ZIP codes. One slight difference is that asthma months were most common among the top and bottom income quintiles relative to the regional average, while they are less common among the High Share White and High Share Black ZIP codes compared to the regional average.

Average CAD Months to Total Months

As with asthma, the patterns regarding regional and racial disparities in CAD found in **Figure 14** are the same as those regarding income disparities found in **Figure 5**. This shows that the greatest disparity in CAD in the state is due to region rather than race or income.

Average Depression Months to Total Months

There is a slight difference in the pattern of depression's share of total months in the KOMA region when stratifying by race instead of income. As shown in **Figure 15**, while depression represented a greater relative share of member months in high income ZIP codes back in **Figure 6**, it represents a smaller relative share of member months in High Share White ZIP codes. Therefore, when classifying quintiles by race, depression is a more significant share of member months for High Share Black ZIP codes than is found when classifying by income. The pattern in the Detroit region is the same regardless of income or racial classification of ZIP codes.

Average Diabetes Months to Total Months

One of the more surprising results in this analysis is found when comparing **Figures 7 and 16**. While **Figure 7** shows the same clear relationship in both regions between the average income quintile and the share of total months with a diagnosis of diabetes, **Figure 16** reveals that the relationships are different across regions when classifying by race. The numbers for the Detroit region show that diabetes months are 73 percent higher for High Share Black ZIP codes, relative to High Share White ZIP codes, which is similar to the difference when stratifying by income. For the KOMA region, however, the pattern is reversed. For the western part of the state, the share of diabetes months is 11 percent lower for High Share Black ZIP codes. This indicates that income and race are reinforcing cleavages in the Detroit region while they are weak cross-cutting cleavages in the KOMA region.

Average Hyperlipidemia Months to Total Months

A reversal of patterns similar to that for diabetes can also be observed for hyperlipidemia, although it is not as noticeable. When stratifying by income as in **Figure 8**, hyperlipidemia made up a slightly larger share of total months for the low-income ZIP codes than for the high-income ZIP codes. The opposite is true when stratifying by race, as shown in **Figure 17**.

Average Low Back Pain Months to Total Months

Finally, **Figure 18** reveals the shares of total member months with a diagnosis of low back pain in the two regions, while also separating out the sets of ZIP codes each with high shares of white and Black residents. While separating by income in **Figure 9** showed some difference across income quintile in the KOMA region, there is not an obvious pattern when separating by race. The Detroit region, on the other hand, shows that low back pain months are more prevalent among High Share White counties than among High Share Black counties. This pattern was not apparent in the Detroit region when classifying by income.

Summary

The goal of this section is to investigate for disparities in health outcomes between the Detroit and KOMA regions according to income or race. It does this using payer data from PH, BCBSM, and BCN regarding member diagnoses and risk scores reported at the ZIP code level. In an attempt to categorize members according to income and race, we use 2010 Census data at the ZIP code level to identify the ZIP codes in each region that both a) have the highest (lowest) median incomes and highest white (Black) share of ZIP code residents, and b) hold a combined 20 percent of the regional population. To the extent that the characteristics of the privately-insured membership from these ZIP codes are correlated with the characteristics of the ZIP code residents, this approach allows us to examine for differences in health outcomes correlated with race or income.

On the whole, when examining disparities due to income, we find patterns that are similar in the two regions. Relative to high-income ZIP codes, low-income ZIP codes in the two regions tend to have higher average risk scores and fewer privately insured months per resident. Additionally, low-income ZIP codes exhibit relatively lower shares of months with diagnoses of asthma, depression, and low back pain, in addition to healthy months. The opposite was true for months with a diabetes diagnosis, which were much more common among low-income ZIP codes in the two regions. Hyperlipidemia was relatively more common among low-income ZIP codes in the KOMA region and among high-income ZIP codes in the Detroit region. CAD rates were much higher among Detroit members than among those from KOMA, with no obvious disparity by income.

Differences in patterns across regions were more apparent when investigating for disparities in outcomes due to race. Average risk score was lower for High Share Black ZIP codes than for High Share White ZIP codes in KOMA, while the opposite was true for Detroit. Unlike in Detroit, depression was a more common diagnosis among member months for High Share Black ZIP codes than for High Share White ZIP codes in KOMA. Diabetes months were much more common in Detroit among the High Share Black ZIP codes than among the High Share White ZIP codes. On the other hand, High Share Black ZIP codes in KOMA had an average diabetes month share below that of the High Share White ZIP codes. Poorer health outcomes for Black residents, particularly in Michigan and the Detroit area, have been noted in the literature concerning cancer (Meliker et al. 2009), hepatitis C (Bourgi et al. 2016), tuberculosis (Noppert et al. 2017), and COVID-19 (Mein 2020, Gu et al. 2020, Anderson-Carpenter and Neal 2021, Parpia et al. 2021).

The patterns observed when stratifying the two regions by income and race pose two suggestions. First, the two regions revealed similar patterns of health disparities due to income that were proportional to their underlying disparities in income. Therefore, even though there are health disparities across income quintiles in the two regions, it appears that both regions exhibit the similar underlying relationships between income and health outcomes. Second, the two regions revealed notable differences in pattern for key health outcomes when stratifying by race. This is likely not simply due to the clear differences in the underlying shares of Black and white residents in the two regional populations, which would presumably influence the magnitude of the disparities rather than the patterns. It is not unreasonable to conclude, therefore, that the relationship between race and health outcomes is different in the two regions. The privately insured membership residing in ZIP codes in Detroit with a relatively large Black population suffer worse health outcomes, especially regarding diabetes and healthy months, than those from ZIP codes in the same region with a relatively large white population. The same is not true in the KOMA region.

Given the data limitations, pinning down an explanation for these findings is difficult. The most obvious candidate from the literature is racial segregation. While there is variation in the Black share of the population among ZIP codes in the KOMA region, none of the ZIP codes has a majority Black population. On the other hand, all ZIP codes included in High Share Black population for the Detroit region are majority Black. While the existing literature makes connections between racial segregation and adverse health outcomes, further research is required before determining the causes of the health disparities found here.

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Table 1: Disparities By Income

Location	High Income ZIP Codes	All	Low Income ZIP Codes
KOMA	Avg Income: $69,291	Avg Income: $51,086	Avg Income: $35,369
	% White: 91.16	% White: 84.29	% White:70.31
	% Black: 4.06	% Black: 7.25	% Black: 17.37
Detroit	Avg Income: $93,451	Avg Income: $58,195	Avg Income: $28,512
	% White: 85.04	% White: 68.18	% White: 22.11
	% Black: 5.26	% Black: 24.44	% Black: 69.48

Table 2: Disparities by Race

Location	High Share White ZIP Codes	All	High Share Black ZIP Codes
KOMA	Avg Income: $58,928	Avg Income: $51,086	Avg Income: $41,085
	% White: 96.15	% White: 84.29	% White: 64.21
	% Black: 0.51	% Black: 7.25	% Black: 23.83
Detroit	Avg Income: $72,814	Avg Income: $58,195	Avg Income: $33,246
	% White: 94.45	% White: 68.18	% White: 10.92
	% Black: 1.79	% Black: 24.44	% Black: 85.12

Figure 1: Average Risk Score, 2020

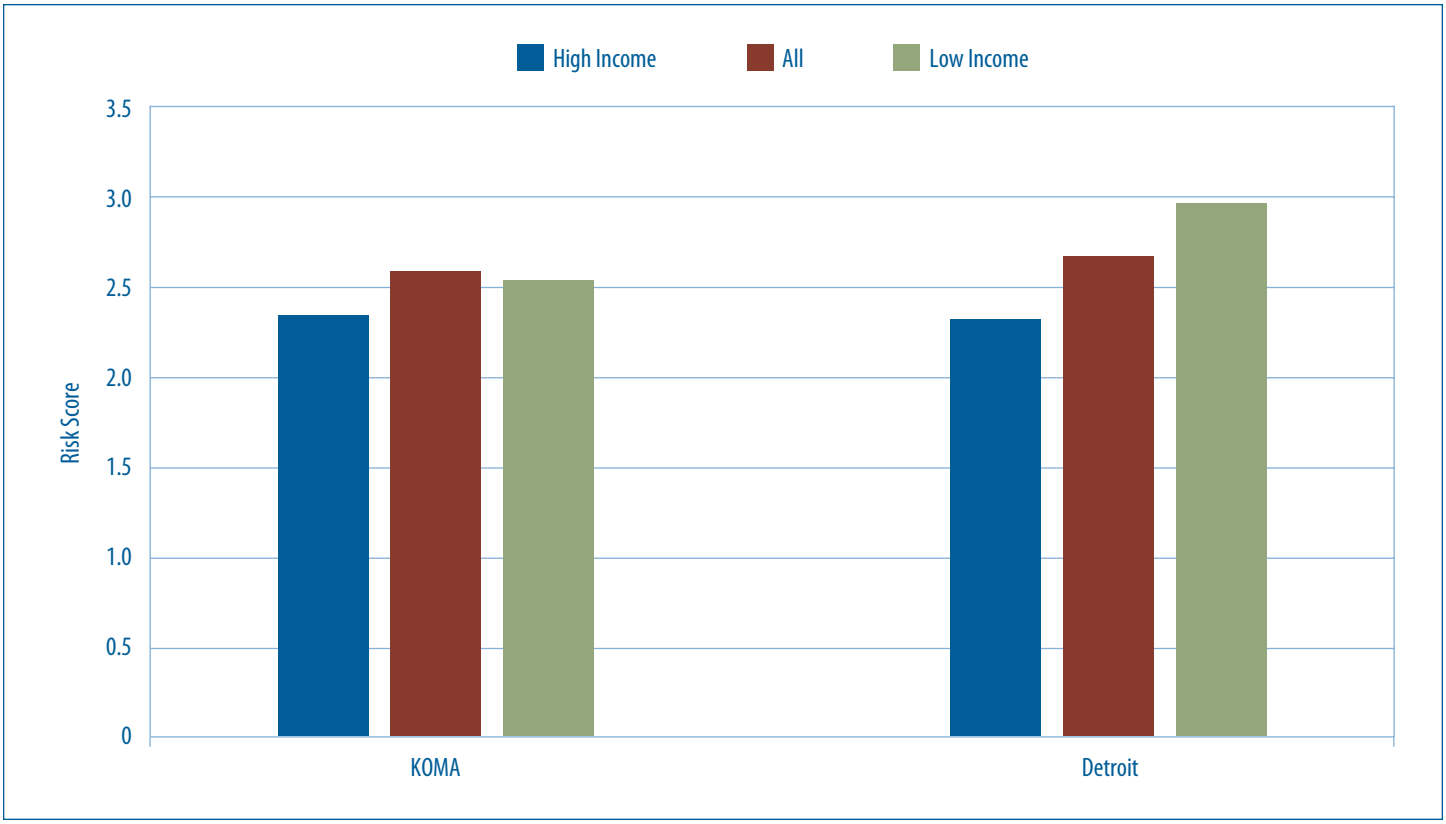


Figure 2: Average Insured Months per Resident, 2020

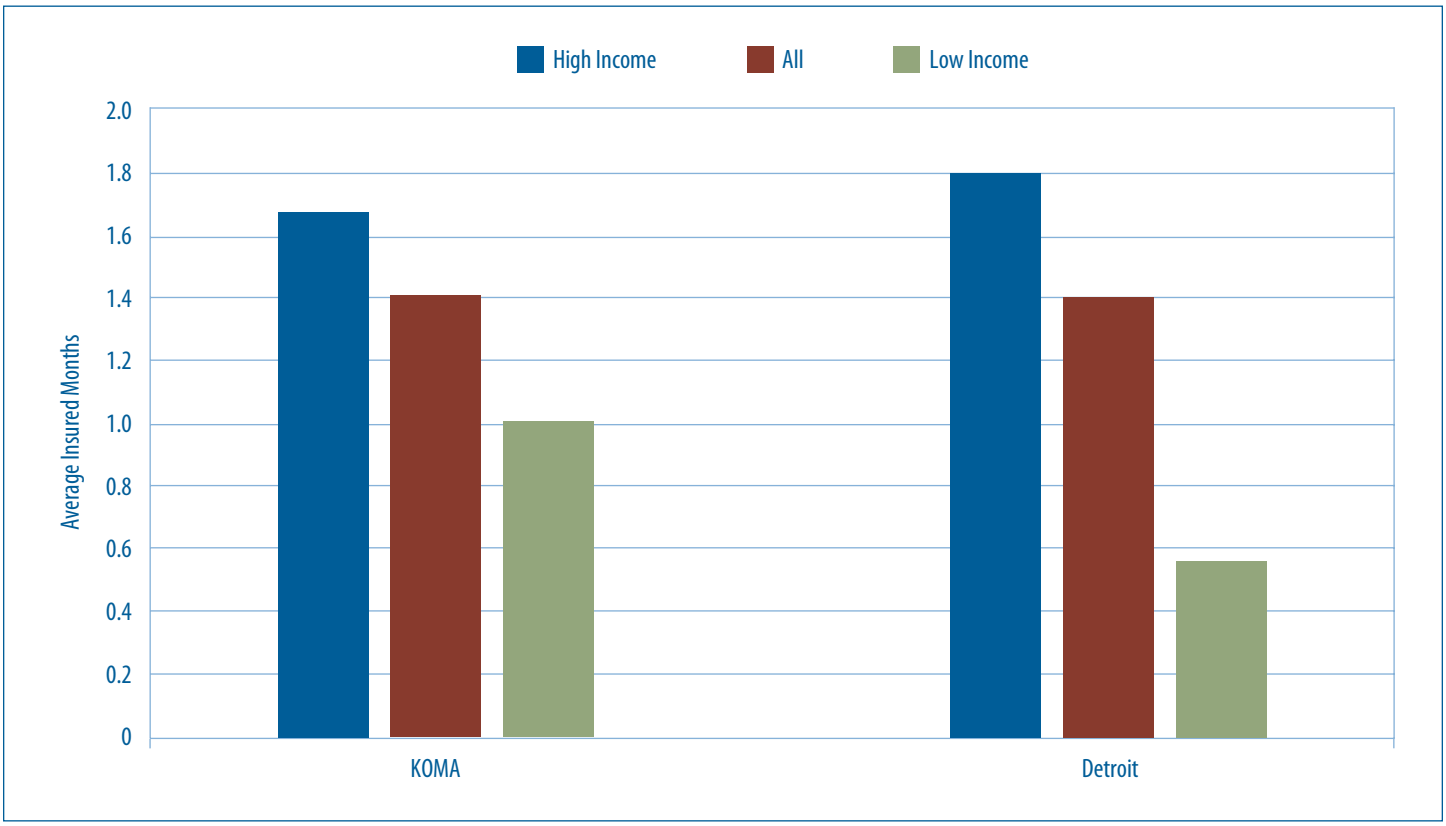


Figure 3: Average Ratio of Healthy Months to Total Months, 2020

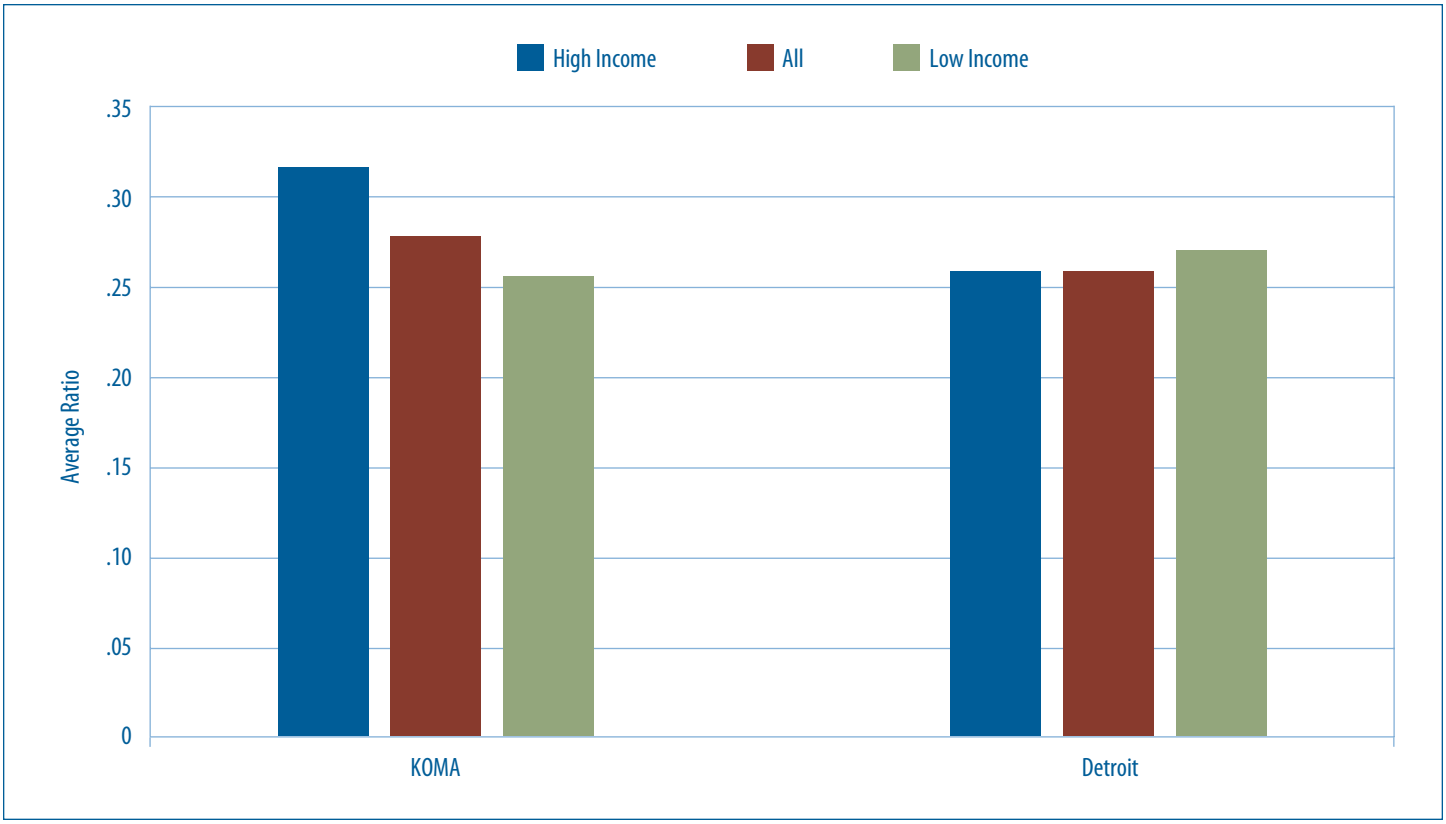


Figure 4: Average Ratio of Asthma Months to Total Months, 2020

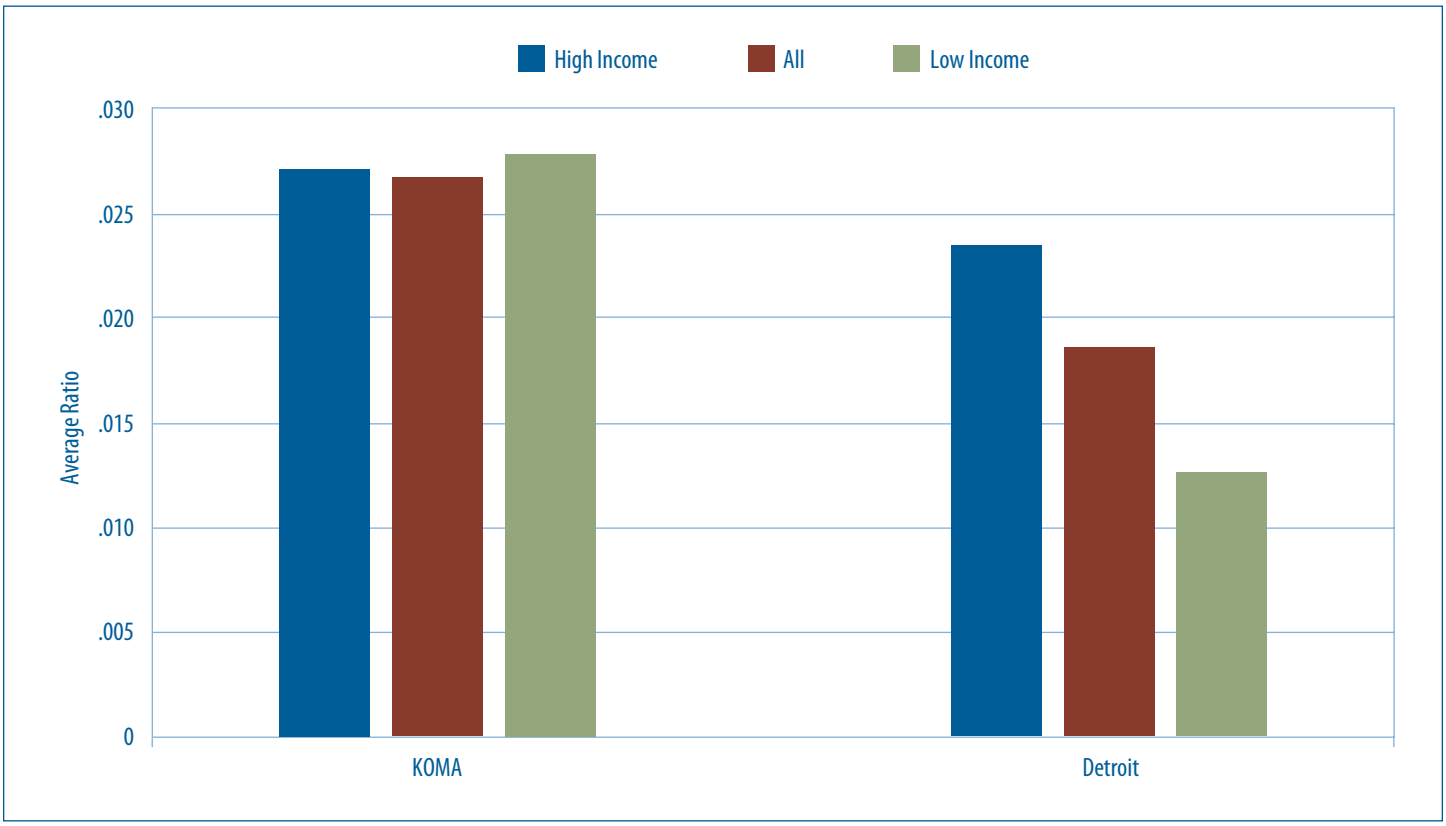


Figure 5: Average Ratio of CAD Months to Total Months, 2020

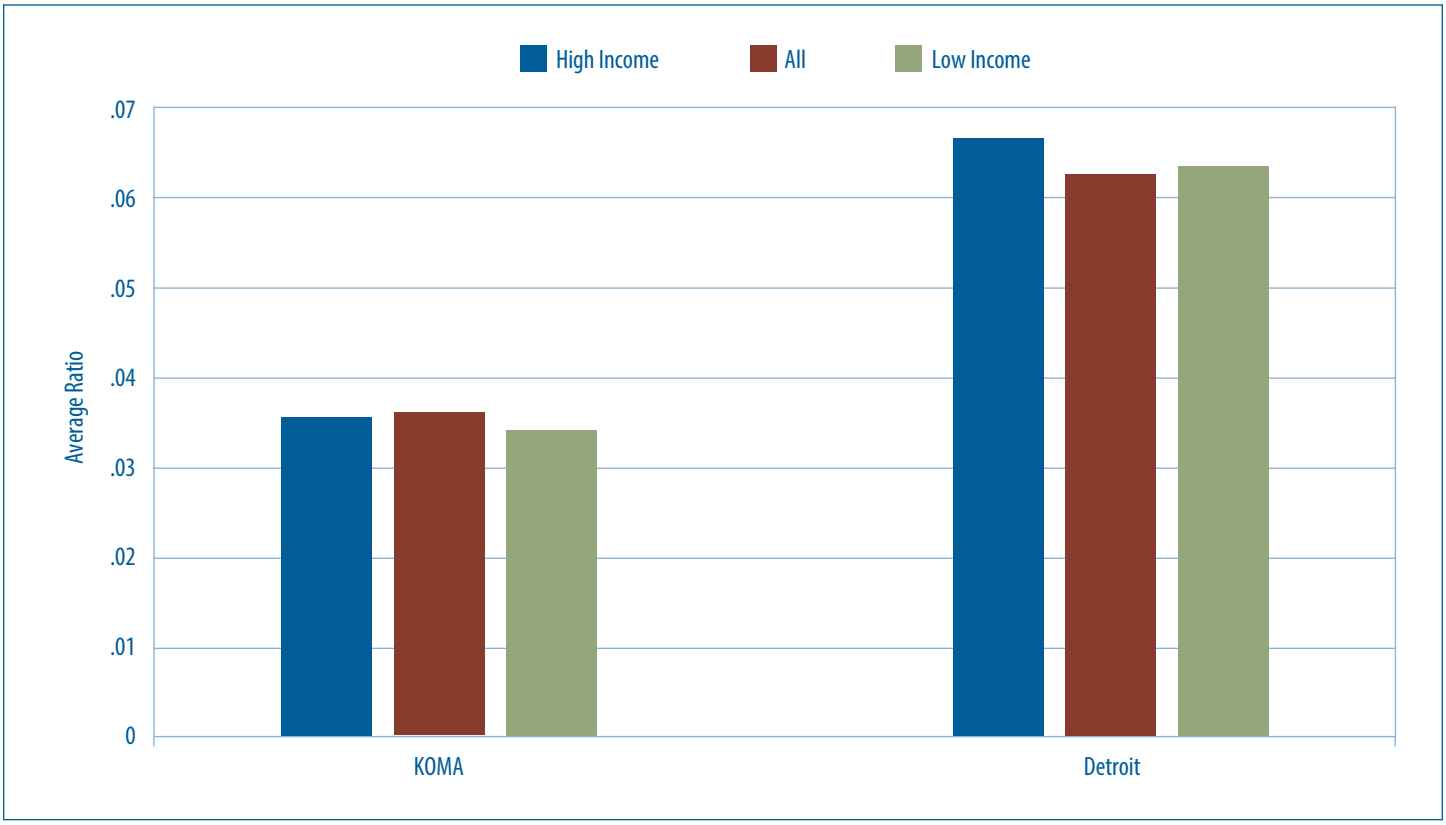


Figure 6: Average Ratio of Depression Months to Total Months, 2020

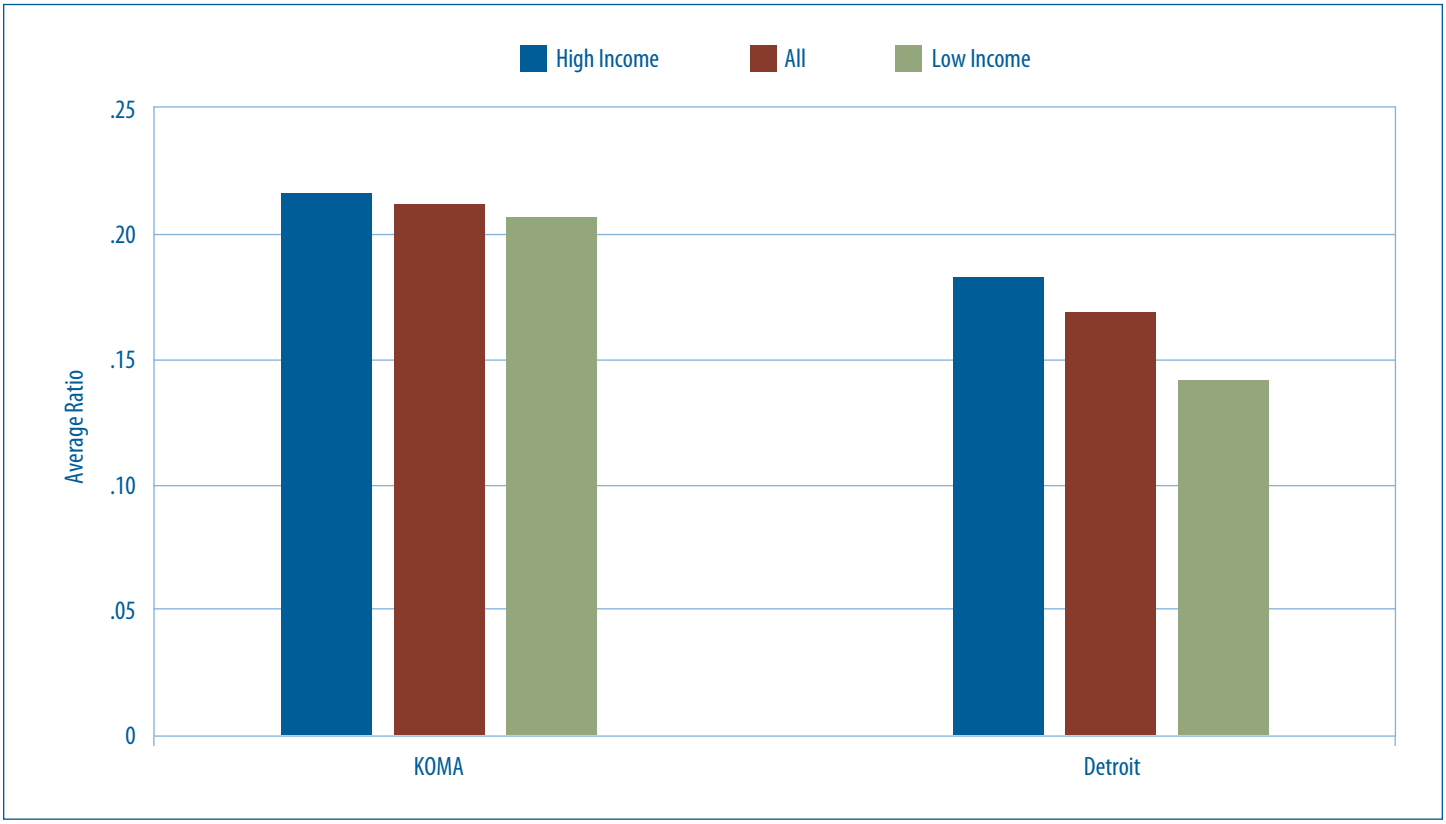


Figure 7: Average Ratio of Diabetes Months to Total Months, 2020

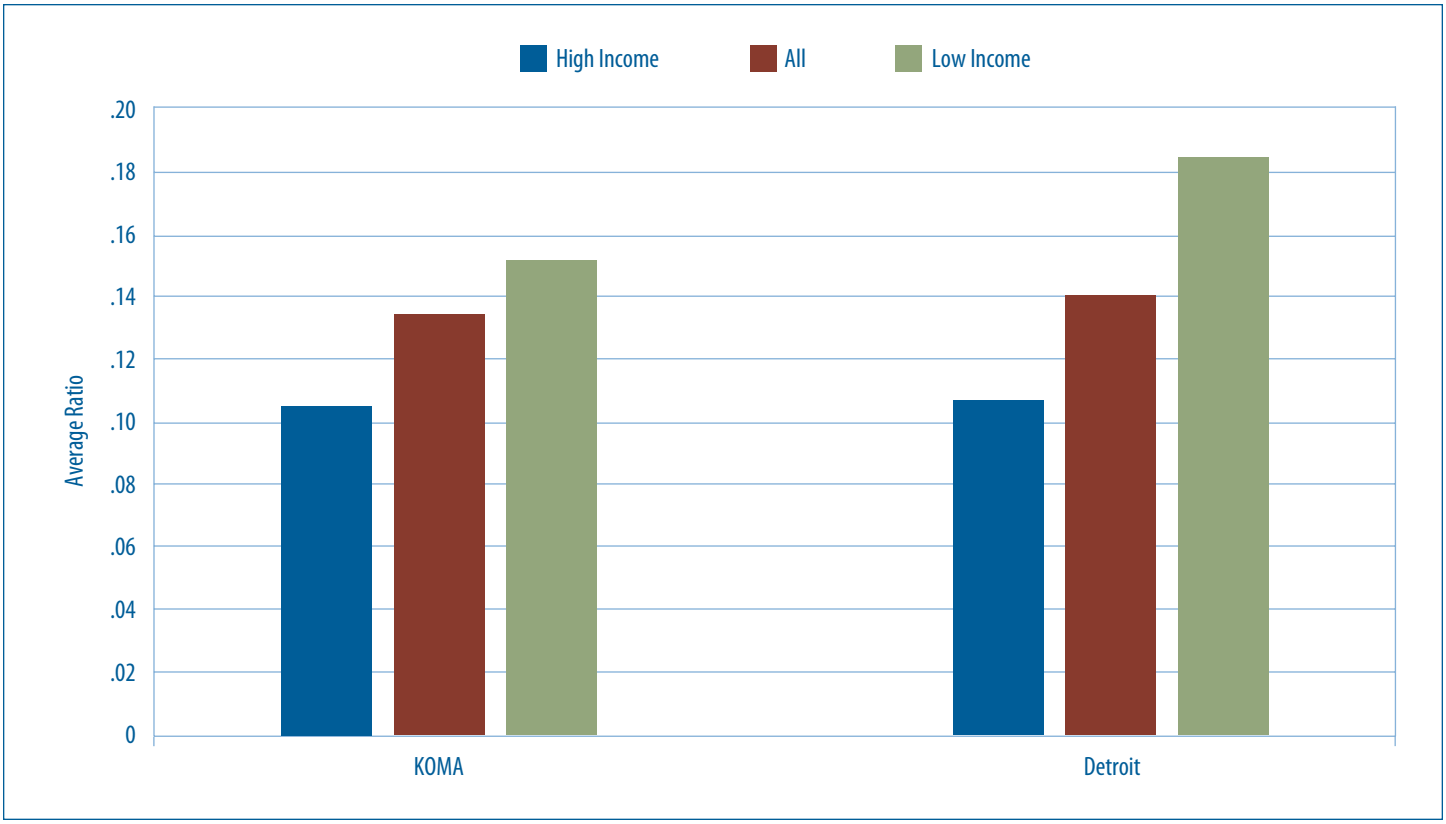


Figure 8: Average Ratio of Hyperlipidemia Months to Total Months, 2020

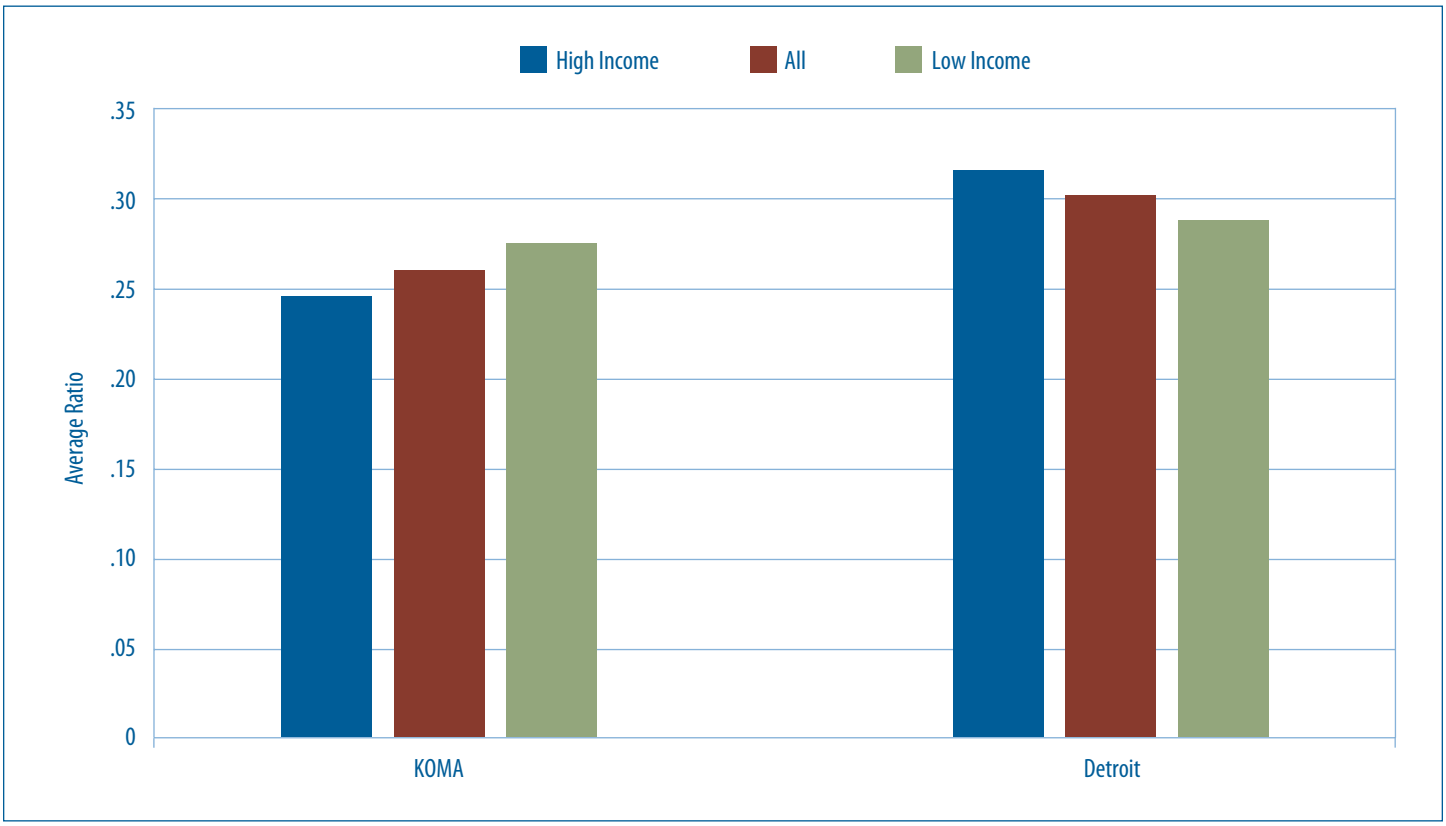


Figure 9: Average Ratio of Lower Back Pain Months to Total Months, 2020

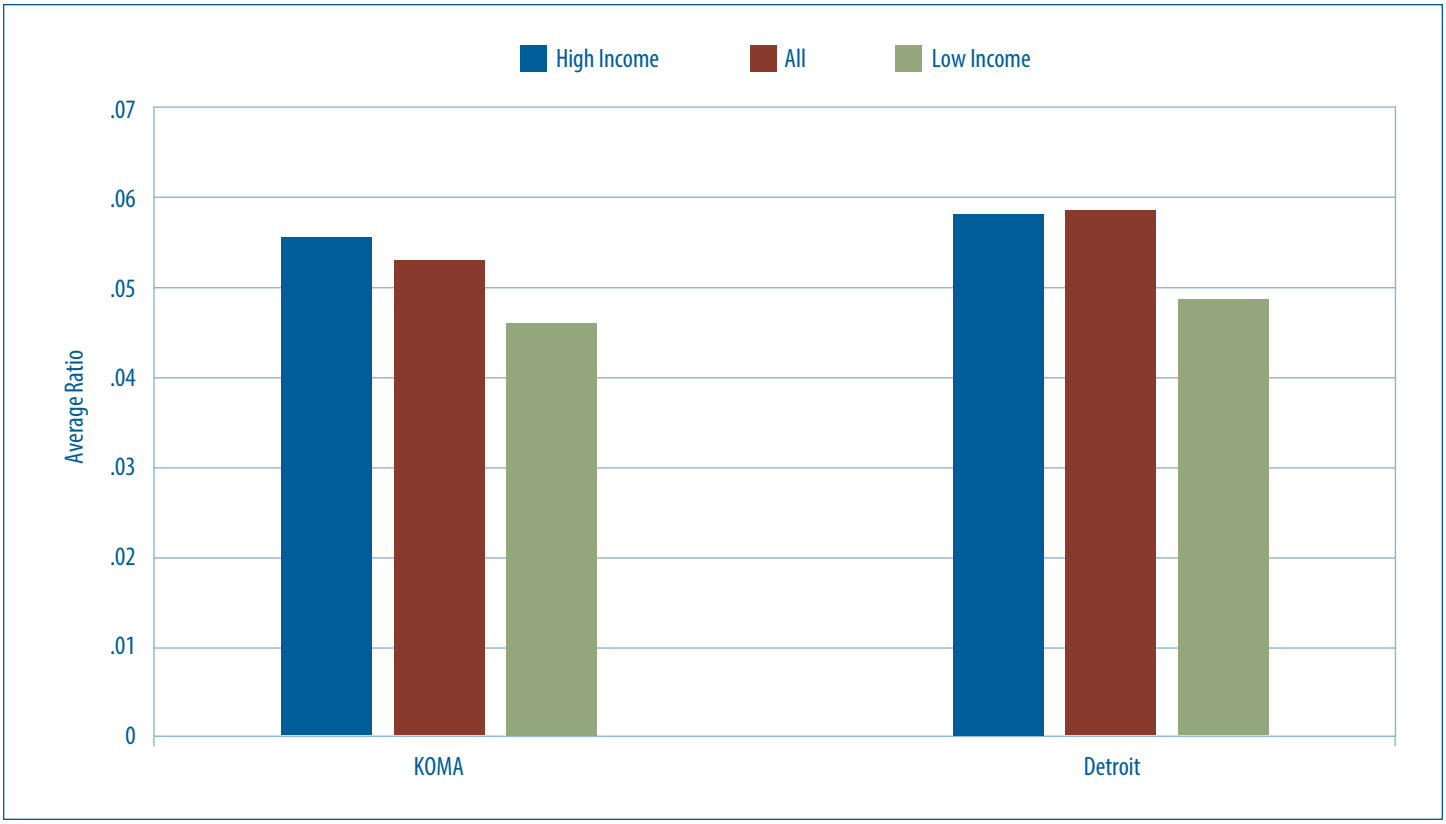


Figure 10: Average Risk Score, 2020

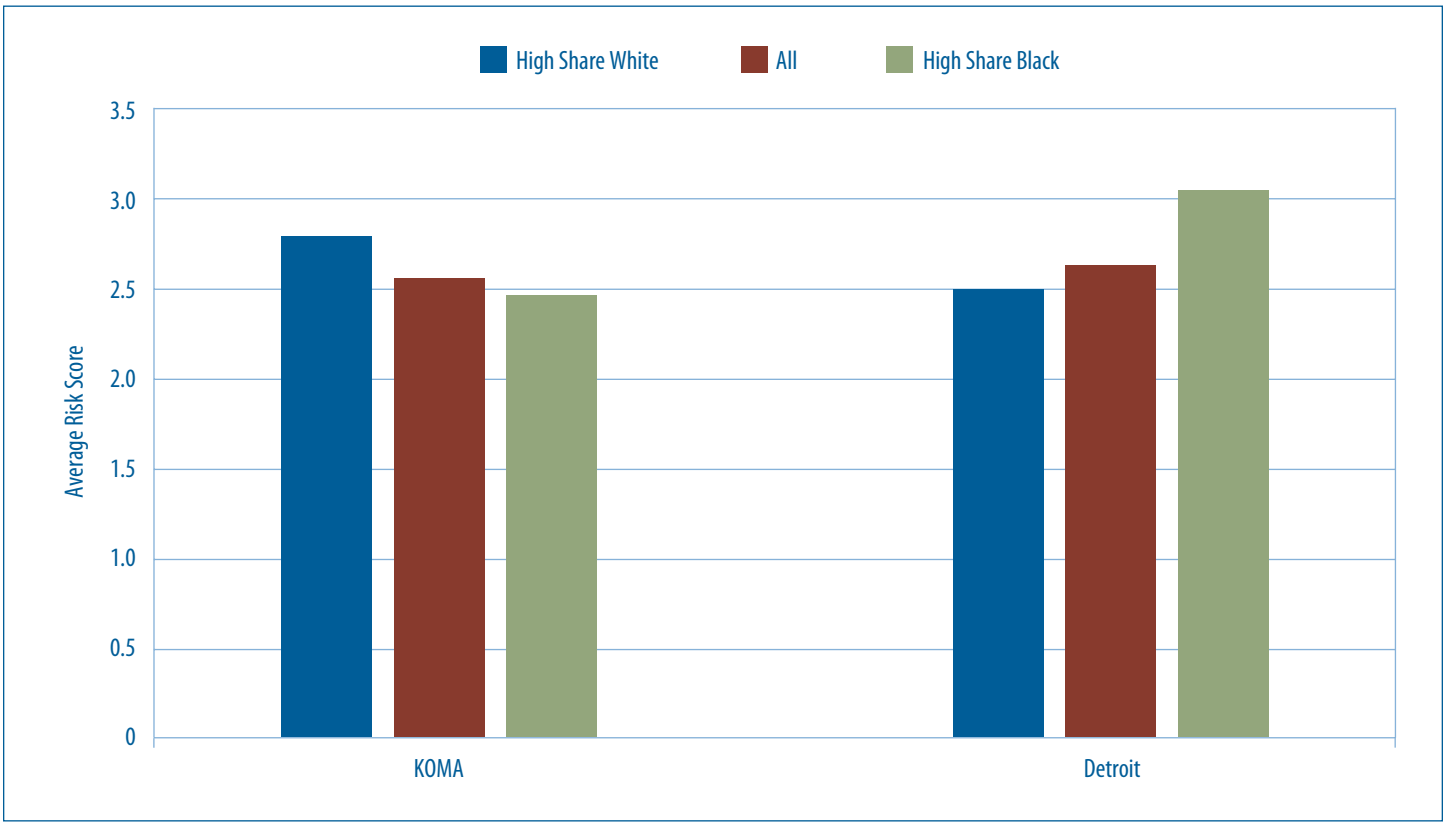


Figure 11: Average Insured Months per Resident, 2020

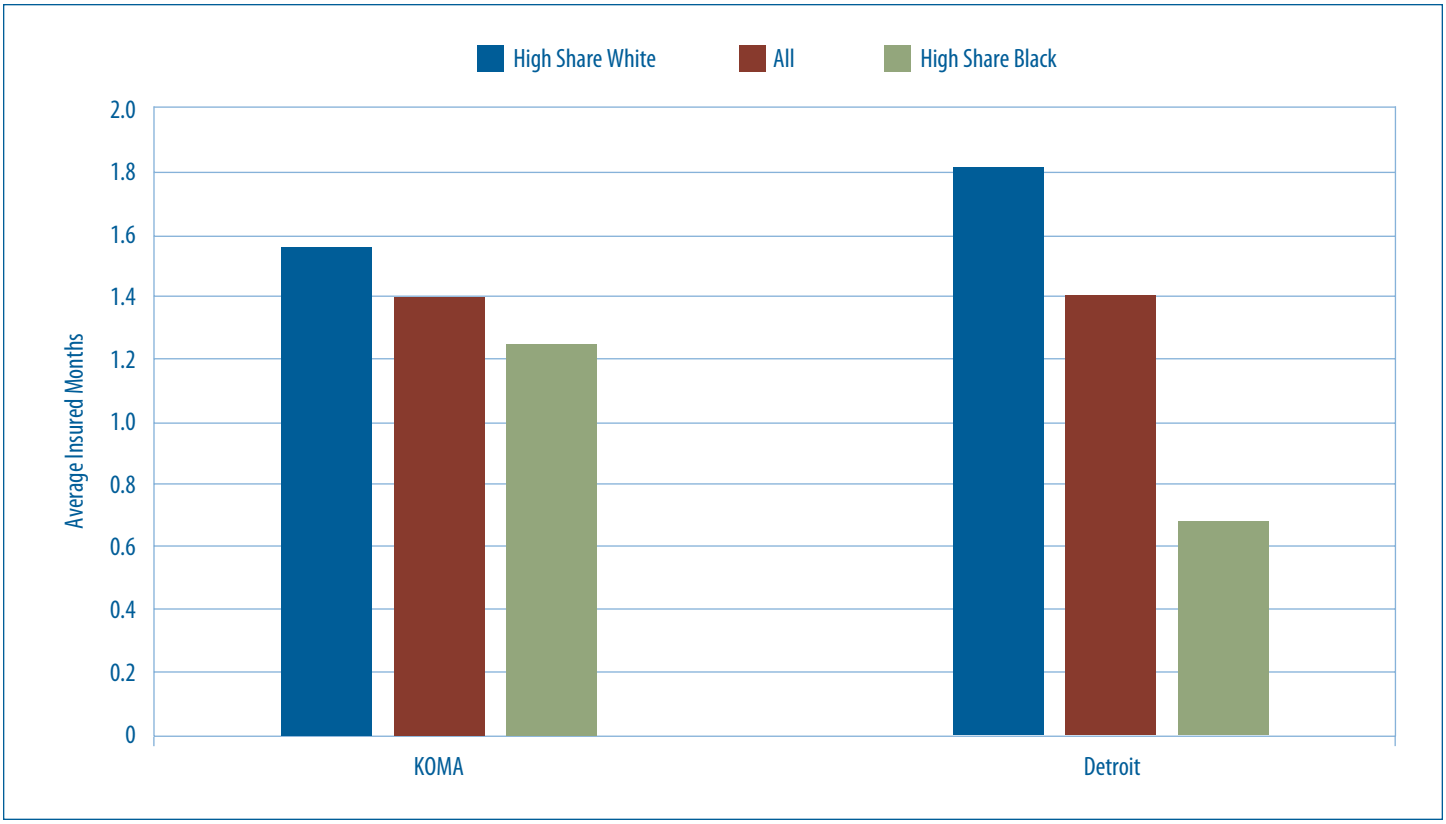


Figure 12: Average Ratio of Healthy Months to Total Months, 2020

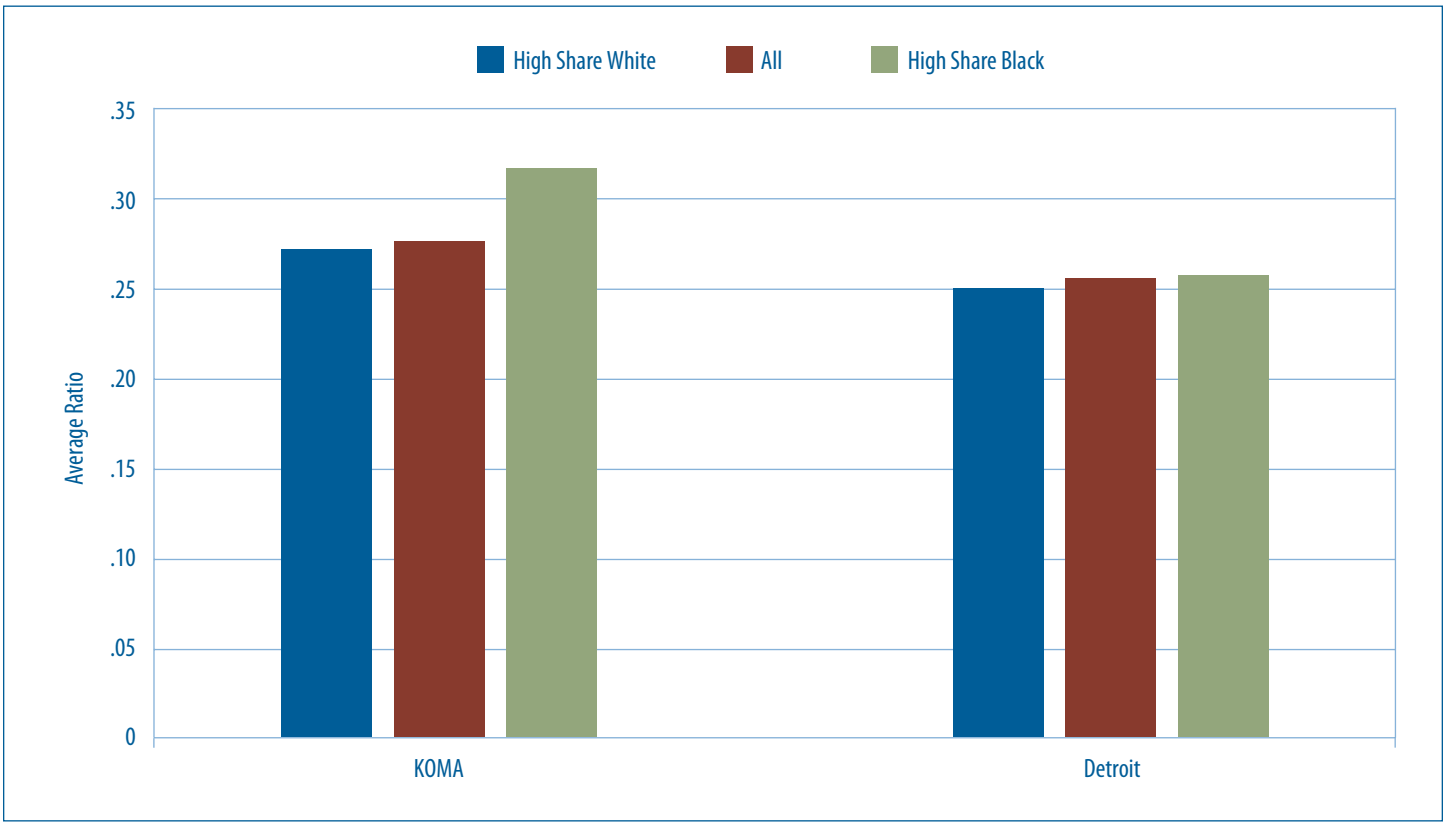


Figure 13: Average Ratio of Asthma Months to Total Months, 2020

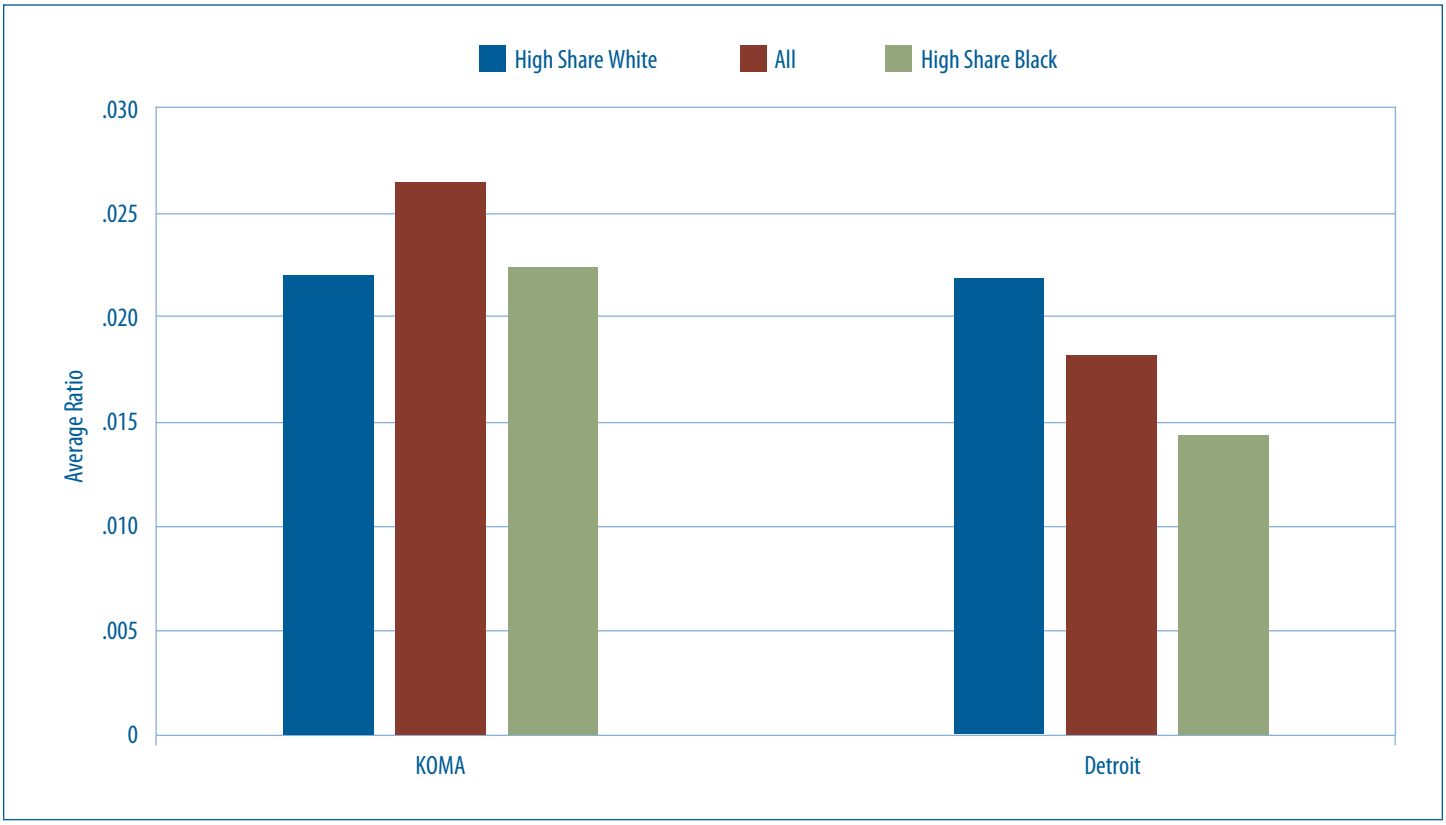


Figure 14: Average Ratio of CAD Months to Total Months, 2020

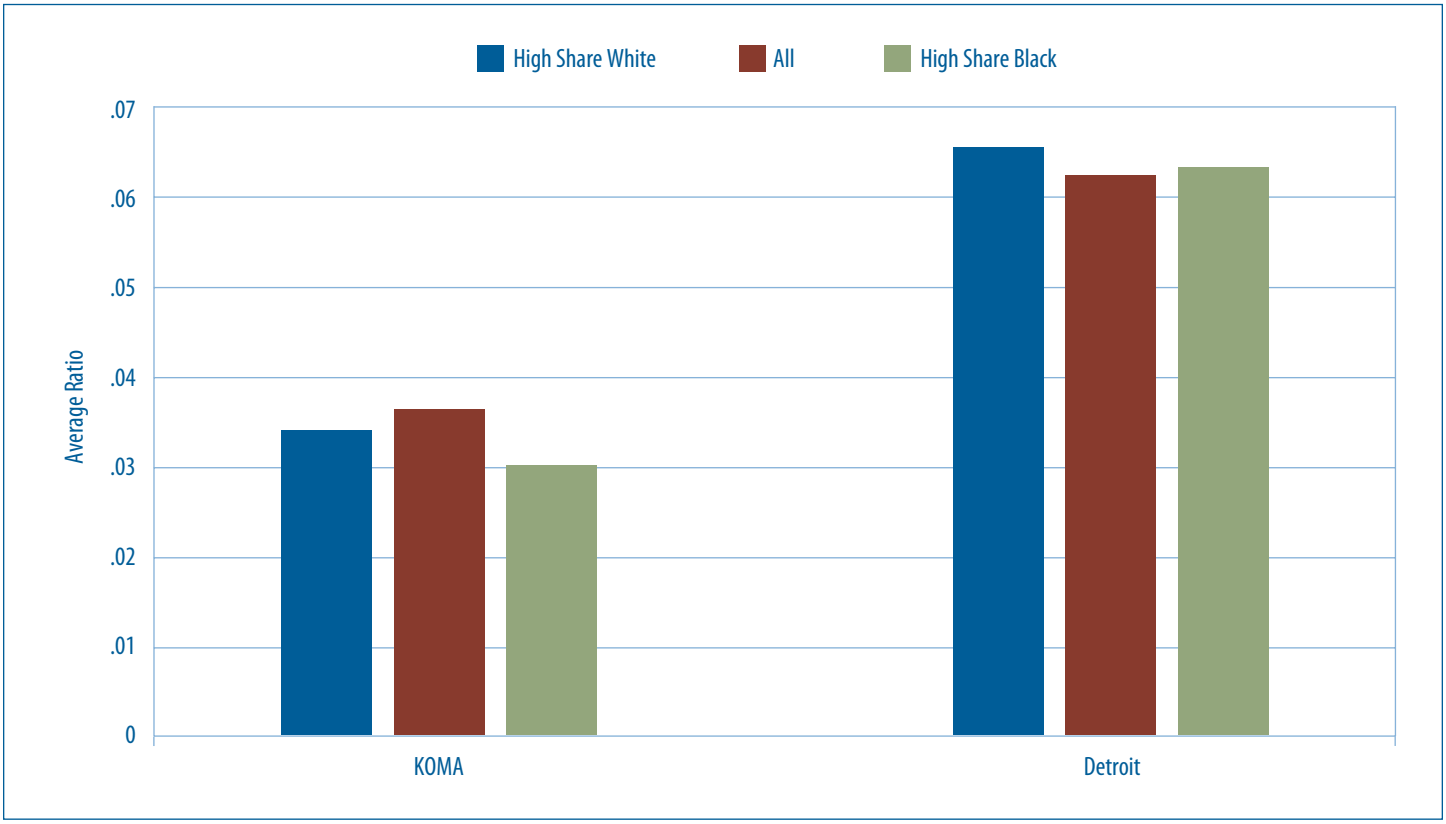


Figure 15: Average Ratio of Depression Months to Total Months, 2020

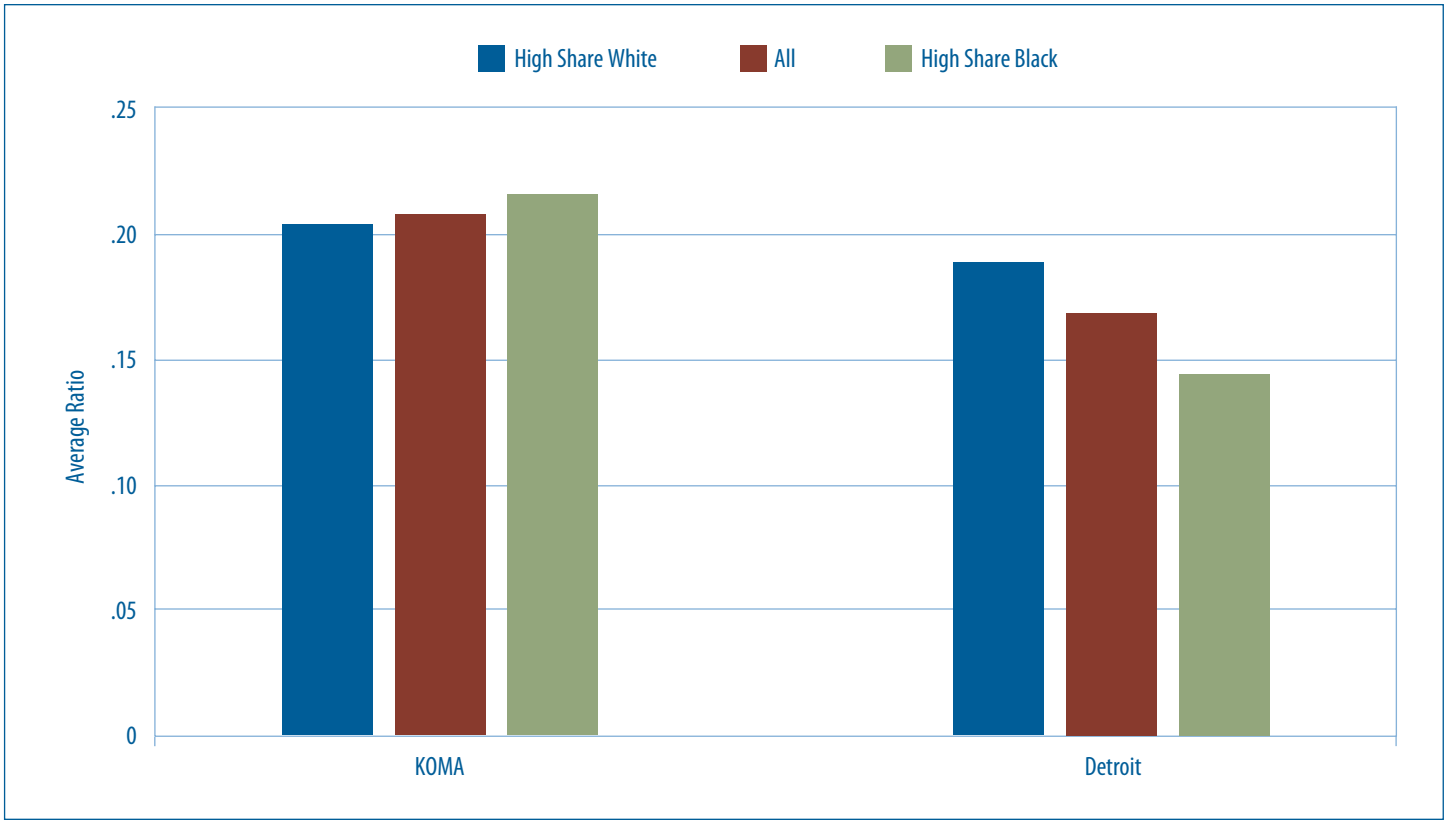


Figure 16: Average Ratio of Diabetes Months to Total Months, 2020

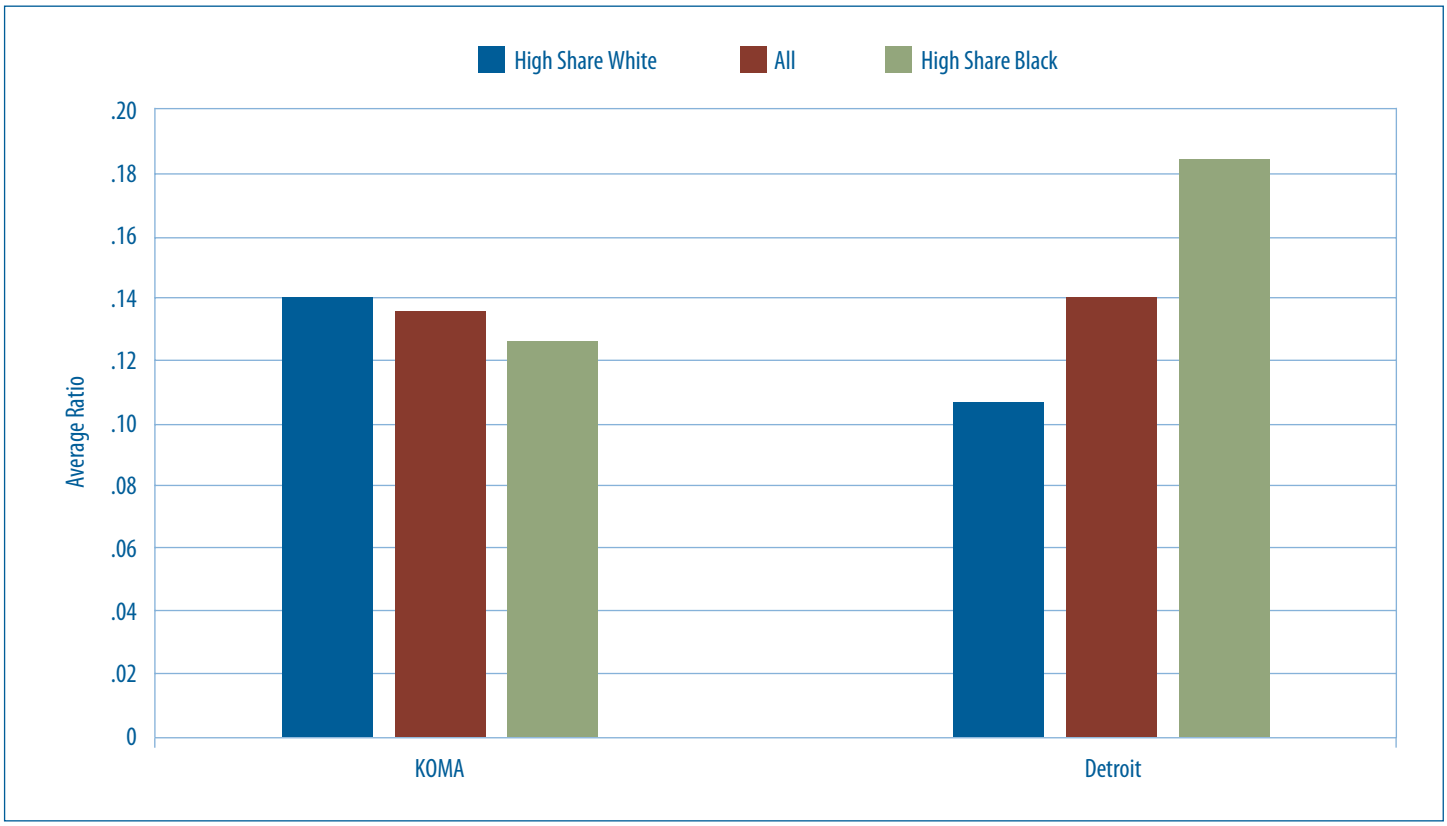


Figure 17: Average Ratio of Hyperlipidemia Months to Total Months, 2020

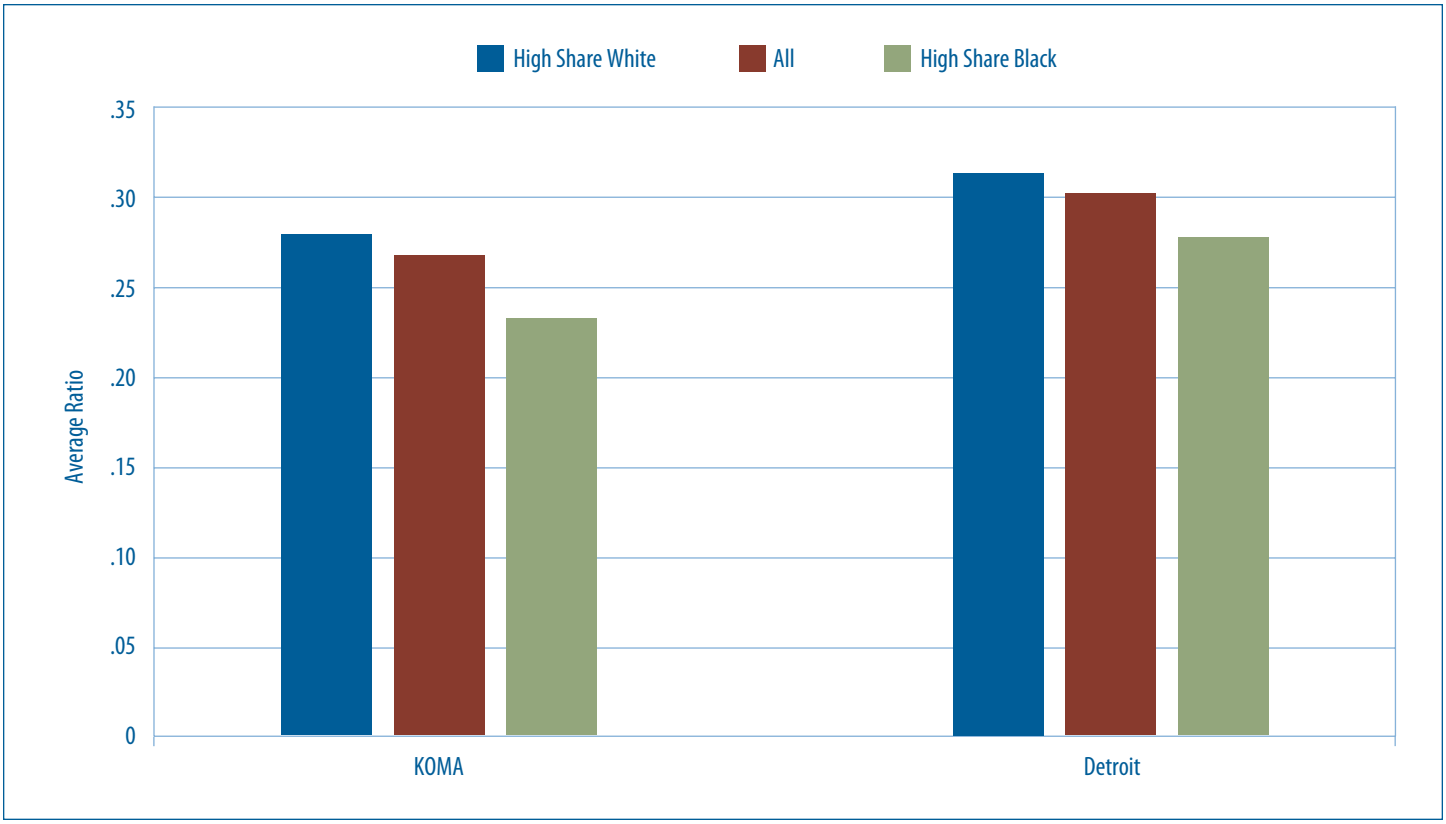
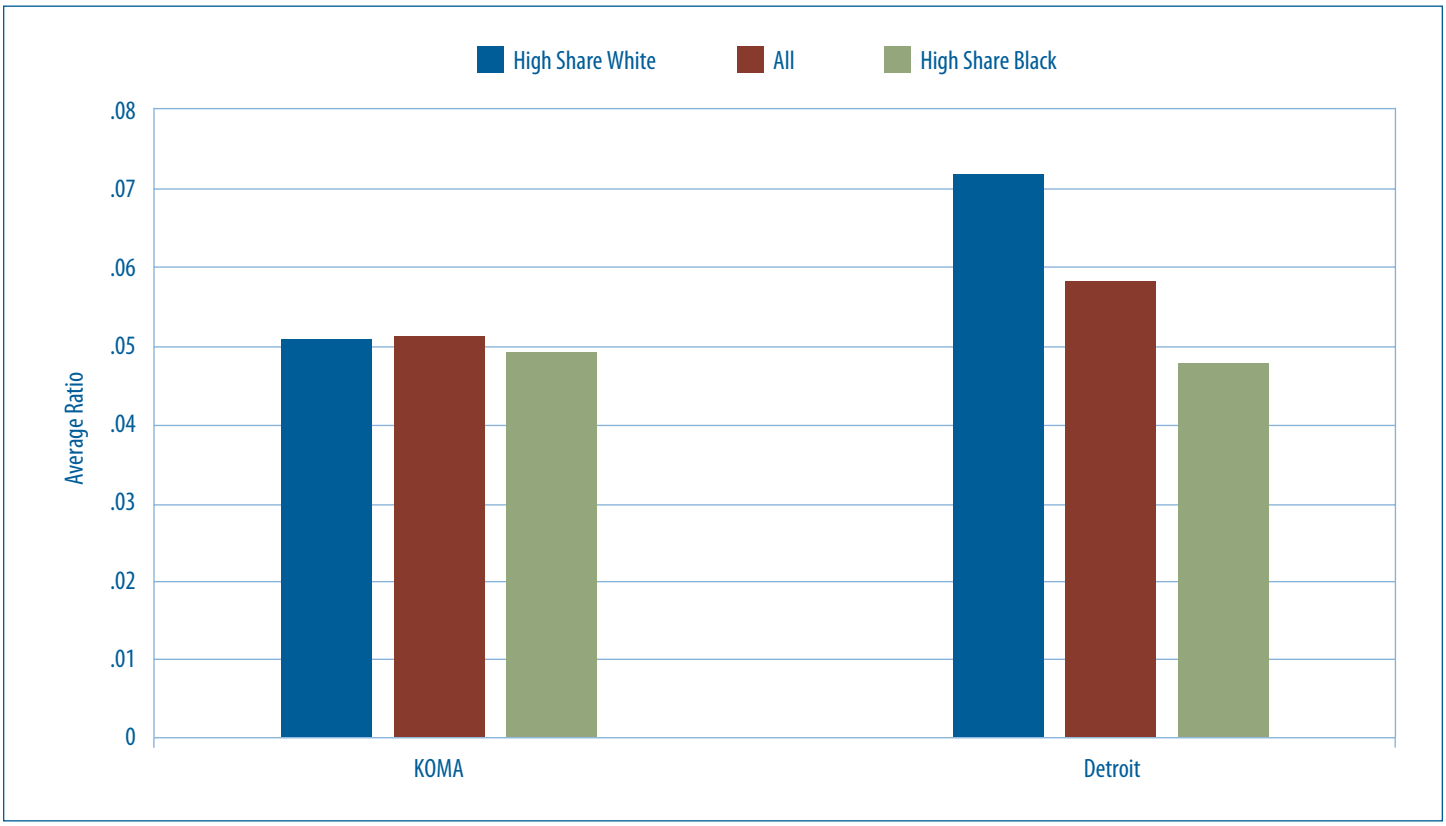


Figure 18: Average Ratio of Lower Back Pain Months to Total Months, 2020



Major Medical Conditions: Expenditure Analysis

This analysis provides general cost information about some of the most prevalent and expensive medical conditions to identify and track trends in health care expenditures for selected chronic health conditions and examines geographic differences in the cost of care. The data presented in this section are average annual 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 years 2019-2020.[1] The following factors should be considered when interpreting analyses in this section:

- **Differences in benefit structures and enrollment.** 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 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). Furthermore, enrollment changes can alter the underlying disease burden of the payer mix resulting in changes in utilization and expenditures.
- **Disease selection.** The health status, and thus the expenditures, for members with specific conditions might vary due to differences in demographics and health behaviors. For example, patients in some counties insured by one payer may be more sick than patients in other counties who are insured by a different payer.
- **Expenditures beyond disease.** In each case, the average patient expenditure data are 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.

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.[2] For comparison, we also include "healthy members", which we define as those between the ages of 30 and 39 who have not been diagnosed with any of the six chronic conditions previously listed and who have total annual expenditures below $450,000. **Figure 1a** provides the average annual expenditures per member for each of these conditions in Kent, Ottawa, Muskegon, and Allegan (KOMA) counties in 2019 and 2020. 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 1a** are reported in 2020 dollars.

We note that, even after adjusting for inflation, **Figure 1a** indicates that expenditures generally increased from 2019 through 2020 across the six conditions, although the magnitudes were modest. **Figure 1b** further highlights the percentage change in average member costs. Here we note that expenditures increased for low back pain (7.0 percent), healthy members (3.9 percent), hyperlipidemia (3.7 percent), asthma (1.0 percent), diabetes (0.8 percent), and CAD (0.1 percent). Expenditures decreased only for depression (-3.8 percent). In dollar terms, the greatest average per-member increases in expenditure were seen in hyperlipidemia ($543) and low back pain ($439). Unfortunately, we are unable to identify the cause of these increases in spending. Possible causes include a change in the composition of non-Medicare/Medicaid patients insured by BCN, BCBSM, and PH; an increase in treatment intensity for diabetes and depression; or an increase in the prices of treatments commonly received by members with these diagnoses.

[1] Analysis of expenditures in previous Health Check reports was based on total allowable expenses for members with prescription coverage. While this variable is present in this year's data for BCBSM and BCN data, it is not present for PH due to a coding change. As an alternative, we used PH data from the year 2018 to estimate the share of total allowable expenses incurred among members without prescription coverage as a linear function of the share of total member months that were without prescription coverage. Only member ZIP codes from 2018 with a share of uncovered months between 0 and 1 were used for the estimation. The model fit the 2018 data well (R2 = 0.701) and the estimated coefficients were used to produce predicted shares for the 2020 data. The predicted shares were used to build total allowable expenses for members with prescription coverage for the member ZIP codes in 2020 with a share of uncovered months between 0 and 1 (25 percent of observations). For the remaining 75 percent, the share was inferred as 1 for member ZIP codes with no covered months and 0 for member ZIP codes where all months had prescription coverage.

[2] Specific definitions for each of these conditions can be found in the online Disease Population Specs Appendix accessible at https://www.gvsu.edu/vphealth/health-check-65.htm.

Tables 1 and 2 examine inpatient admissions for KOMA residents with a primary diagnosis of CAD to further investigate changes in CAD spending over time. The data source for these figures is the Healthcare Cost and Utilization Project's (HCUP) State Inpatient Database, which includes the universe of admissions to hospitals in the State of Michigan in 2006, 2008, 2010, 2012, 2014, 2016, and 2017. While the data include detailed information about an individual's hospital experience, it is important to note two limitations: 1) these data only capture treatment in an inpatient setting and 2) individuals included in the data have various sources of insurance including Medicare, Medicaid, and private insurance and so are not directly comparable to our sample of the privately insured.[3] **Table 1** displays characteristics of KOMA residents admitted to the hospital with a primary diagnosis of CAD. Interestingly, admissions for this population have fallen steeply from 2006 to 2014 despite maintaining a consistent definition of diagnosis codes for CAD, which could reflect a local shift in CAD treatment from inpatient to outpatient settings, consistent with national trends (Truven, 2016). The last two columns provide some indication that those hospitalized with a diagnosis of CAD may have more complex medical needs in recent years. For example, while 2.23 percent of CAD admission in 2006 resulted in an in-hospital death, that number rose to 3.44 percent in 2016, but did fall somewhat to 3.26 percent in 2017. Additionally, the average number of recorded diagnoses for these patients increased from 8.22 in 2006 to 15.32 in 2017. While this may be partially explained by a shift of relatively less-severe cases to an outpatient setting, leaving the hospitalized population with a greater concentration of severe cases, these figures may reflect a growing disease burden among members with CAD, which could explain rising CAD expenditures in recent years. **Table 2** uses the HCUP State Inpatient Database to show outcomes and treatment for KOMA residents hospitalized with CAD. It shows a rise in the share of CAD patients discharged to a skilled nursing facility, intermediate care facility, or inpatient rehabilitation facility. If these coincided with a reduced length of hospital stay, then this could reflect cost-saving substitution between treatment settings, however, as noted in prior years, this does not appear to be the case.

Next, we return to the insurer data. **Figure 2** separates the disease-specific expenditure figures for 2019 and 2020 in **Figure 1a** into medical and prescription drug components. The prescription drug share of total spending for 2020 ranges from 16 percent for members with CAD to 39 percent for those diagnosed with asthma or diabetes. We note that prescription drug expenditure's share of overall disease-specific expenditures has grown from 23 percent to 25 percent in real terms across all conditions between 2019 and 2020. In dollar terms, average real prescription drug expenditures increased for members across all diagnoses, specifically by $484 for those with CAD, $424 for those with hyperlipidemia, $354 for those with diabetes, $342 for those with low back pain, $256 for those with asthma, and $156 for those with depression.

Differences in Average Annual Expenditures Between KOMA and the Detroit Region

Figure 3a 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 3a** indicates that 2020 expenditures for CAD, hyperlipidemia, low back pain, and healthy members are higher in KOMA than in Detroit region. The percent-differences vary across diagnoses, with CAD expenditures in KOMA being 18 percent larger than Detroit while asthma expenditures are 8 percent lower. Differences in spending for the same condition between the east and west of the state would likely be a function of higher prices for care, greater use of medical services/technologies, or geographic differences in the underlying health of the population.

Figure 3b plots the percentage change in expenditures for each condition from 2019 to 2020. So, while **Figure 3a** provides differences in spending levels between the two regions, **Figure 3b** presents a more dynamic look at how those spending levels changed in the past year. Expenditures on those with low back pain and CAD grew in both regions. The growth among members with low back pain was greater in KOMA (7 percent) than in the Detroit region (0.6 percent), while the growth among those with CAD was greater in the Detroit region (0.5 percent) than in KOMA (0.1 percent). Expenditures declined in both regions for those with depression, though the decline was greater in the Detroit region (-6 percent) than in KOMA (-3.8 percent). For all other conditions, expenditures increased in KOMA but declined in the Detroit region. This was true for hyperlipidemia (+3.7 percent in KOMA vs. -1.3 percent in Detroit), diabetes (+0.8 percent in KOMA vs. -2 percent in Detroit), asthma (+1 percent in KOMA vs. -4 percent in Detroit), and healthy members (+4 percent in KOMA vs. -4 percent in Detroit). The broad message from **Figures 3a and 3b** is that, even though expenditures on all seven diagnosis classifications were lower in KOMA as recently as 2017, the KOMA expenditures have caught up (and even exceeded) those of the Detroit region in a relatively short amount of time. Furthermore, for all but one of the diagnoses, expenditures were either growing faster or declining slower in KOMA than in the Detroit region. Should this trend continue, expenditures in KOMA could exceed those in Detroit for most of the diagnoses in a few years.

As was the case last year, we have access to the average risk scores of 2020 members, which allows us to adjust for expenditure differences between the KOMA and Detroit regions that are due to differences in the underlying health of their residents. **Figure 3c** reports two average member expenditure measures in KOMA across all conditions. The first measure is the actual (raw) KOMA expenditures as calculated for **Figure 1a**. The second is the predicted average KOMA expenditures for these members if the KOMA risk scores were the same (on average) as those in the Detroit region, whose expenditures are also shown in the figure. Therefore, a comparison of the middle and right bars for each diagnosis reveals expenditure differences due to factors other than the wellness of the regional member populations.

[3] We have limited the analyses in Tables 2 and 3 to those under the age of 65 who are privately insured.

Figure 3c shows that raw expenditures in KOMA are lower than those in Detroit for members with asthma by 7.4 percent, depression by 6.9 percent, and diabetes by 2.2 percent. Raw KOMA expenditures are slightly greater than those in Detroit for low back pain (by 1.3 percent) and significantly greater for hyperlipidemia (by 11.3 percent), CAD (by 21.8 percent), and healthy members (by 27.3 percent). This is the same pattern observed in the previous year's report, with two exceptions. First, the percentage gap between KOMA and Detroit has decreased for asthma (from 11.6 percent), depression (from 17.7 percent), and diabetes (from 10.2 percent). Second, KOMA expenditures are now slightly higher than those of Detroit for members with low back pain, whereas they were significantly lower in 2019. Finally, for members with hyperlipidemia, the percentage gap grew from approximately 1 percent greater in KOMA to 11.3 percent. The message from this part of **Figure 3c** is that KOMA expenditures remain lower in 2020 than those of Detroit for three of the seven diagnoses, though the percentage gaps have declined significantly compared to 2019. For the other three diagnoses, KOMA expenditures are greater than those of Detroit and the percentage gaps have grown.

The adjusted expenditures for KOMA in the middle columns of **Figure 3c**, however, tell a different story. Upon accounting for differences in the underlying health of members in the two regions, KOMA holds no expenditure advantage in any of the six diagnoses. Considering adjusted expenditures instead of raw, KOMA expenditures are higher than those of Detroit by 13.4 percent for asthma, 29.1 percent for CAD, 11 percent for depression, 7.3 percent for diabetes, 31.4 percent for hyperlipidemia, 19.5 percent for low back pain, and 26.6 percent for healthy members. The adjustment reveals that lower raw expenditures on members with some diagnoses in KOMA relative to those in Detroit can largely be explained by KOMA having a relatively healthy population. **Figure 3c** suggests that, while these members in the KOMA region do ultimately enjoy lower expenditures for three of these diagnoses, there could be additional savings from bringing prices or treatment approaches more in line with the Detroit region. It is not clear how this would affect access to or quality of care in the KOMA region, however, so additional investigation is necessary before a recommendation can be made.

Health Services Use

Figures 4a through 4c examine regional differences in health care utilization for each of the six conditions. This is the fifth year that we have been able to include utilization data in our analysis, and this brings us closer to identifying the causes behind the documented expenditure growth.

Figure 4a displays the average number of annual inpatient visits for members in KOMA and the Detroit region in 2020. On one hand, this figure is consistent with the previous two Health Check reports in showing that hospitalization rates tend to be higher on the east side of the state than the west. For example, members with diabetes experience an average of 0.16 inpatient admissions per year in KOMA while those in Detroit average 0.24 hospital visits per year. On the other hand, the regional difference in hospitalization rates has continued to narrow for four out of six diagnoses, relative to 2019. For example, while the average number of annual inpatient visits for depression were 26 percent lower in KOMA than in Detroit in 2019, that gap was reduced to 17 percent in 2020. There is a similar pattern for low back pain (21 percent to 3 percent), hyperlipidemia (19 percent to 17 percent), and diabetes (34.8 percent to 34.6 percent). On the other hand, the percentage gaps increased for CAD (6.5 percent to 12 percent) and asthma (28 percent to 29 percent). Overall, while the trend is not as stark as in 2019, **Figure 4a** suggests that the 2020 hospitalization rates in KOMA are catching up to those in the Detroit region for the majority of the investigated diagnoses. This remains consistent with the narrowing of the expenditure gap in **Figure 3a**.

Figure 4b extends the utilization analysis to emergency department (ED) use. ED use is higher in the Detroit region than in KOMA for five out of the six conditions in 2020, compared with all six in 2019. For example, those with a low back pain diagnosis average 0.62 ED visits per year in Detroit compared to 0.42 ED visits per year in KOMA (indicating that we observe approximately 48 percent more ED visits per member in Detroit for lower back pain than in KOMA). Once again, however, many of the gaps in ED visits have narrowed, though not as dramatically as for inpatient visits. While those in Detroit consumed 3.5 percent more ED visits per member with CAD than in KOMA in 2019, that difference has reversed in 2020. ED visits for CAD members in KOMA are now greater than in Detroit, although by less than 1 percent. Similar narrowing is observed for depression (27 percent to 17 percent), low back pain (56 percent to 48 percent), hyperlipidemia (13 percent to 10 percent), and asthma (22 percent to 20 percent). The only exception is diabetes, where the gap grew from 26 percent to 28 percent.

Next, utilization in terms of prescription drug fills are presented in **Figure 4c**. As in the previous report, we find evidence of higher use rates in the Detroit region than in the KOMA region. For example, the average member with diabetes in KOMA had 66 prescription fills in 2020 compared to 76 for individuals with diabetes in the Detroit region. Assuming that each member filled a prescription 12 times throughout the year, then this would represent an average of 5.5 distinct prescriptions for a person with diabetes in KOMA and a little over six distinct prescriptions in Detroit. Beyond diabetes, we note an average of 18 percent more prescription fills in Detroit than in KOMA for members with a depression diagnosis, and similarly 20 percent more prescription fills in Detroit for members with a low back pain diagnosis. These gaps have been relatively stable since 2018.

Annual telehealth visits per member constitute the final utilization metric examined here, in **Figure 4d**. As context, the 2018 data showed KOMA well ahead of the Detroit region in telehealth utilization across all six diagnoses. We now see in **Figure 4d** that telehealth visits in the Detroit region have exceeded those of the KOMA region for every diagnosis, and by a wide margin in some cases. For example, a member with diabetes in Detroit had approximately two telehealth visits in 2020 compared with slightly less than one visit for a member from KOMA. Utilization of telehealth visits was also higher in Detroit, relative to KOMA, for CAD (105 percent), hyperlipidemia (99 percent), asthma (46 percent), low back pain (40 percent), and depression (15 percent). While telehealth utilization has grown faster in the Detroit region, there was massive growth in both regions between 2019 and 2020. This is reflected in **Figure 4e**, which shows percentage increases in KOMA ranging from 1,714 percent for low back pain to 4,661 percent for

depression, as well as in Detroit ranging from 2,348 percent for low back pain to 6,117 percent for CAD. While some of this increase is undoubtedly due to changing delivery methods necessitated by the COVID-19 pandemic, there were also revisions to CPT codes at PH, BCBSM, and BCN that broadened the number of visits classified as telehealth. As one of the telehealth CPT codes from 2019 has been eliminated in 2020, it is difficult to determine how much of this increase is due to COVID-19 and how much is due to the coding revisions.

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, but rather only focusing on expenditure differences associated with multiple diagnoses. **Figure 5a** 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 5a**, 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 about $16,085 to the annual expenditure estimate, while a diagnosis of diabetes and CAD (instead of diabetes alone) adds $34,288 to the expenditure estimate.

Figure 5b displays the results of a similar analysis that focuses on depression. The results are consistent with those in **Figure 5a**: the presence of multiple conditions greatly increases average annual expenditures for members with depression. For example, expenditures in Detroit for a member diagnosed with depression and CAD compared to a diagnosis of depression alone adds about $42,843 to the expenditure estimate.

Lastly, looking across **Figures 5a and 5b,** we further note that expenditures for comorbidities do not appear to be additive. That is, average expenditures for members who suffer from both diabetes and depression are higher than if we simply added the average expenditure of a member who suffers from only diabetes with the average expenditure of a member diagnosed with only depression. For KOMA in 2020, the expenditure difference adds up to $5,947 (down from $8,777 in 2019), while the same difference is considerably higher in the Detroit region at $10,735. Notably, however, the 2019 difference in Detroit was $11,449.

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Table 1: Characteristics of KOMA CAD Inpatients, 2006–2017

Year	Number of CAD Admissions	Average Age	Share Female	Share Uninsured	Died During Hospitalization	Average Number of Diagnoses
2006	4,928	65.78	35.45%	4.52%	2.23%	8.22
2008	3,717	65.66	35.63%	4.47%	2.15%	9.97
2010	3,341	66.65	35.83%	4.76%	2.96%	11.18
2012	3,328	66.35	33.98%	4.09%	2.67%	12.42
2014	2,785	66.67	33.39%	1.70%	3.30%	14.62
2016	2,937	66.60	32.24%	0.68%	3.44%	14.63
2017	3,160	66.84	33.13%	0.89%	3.26%	15.32

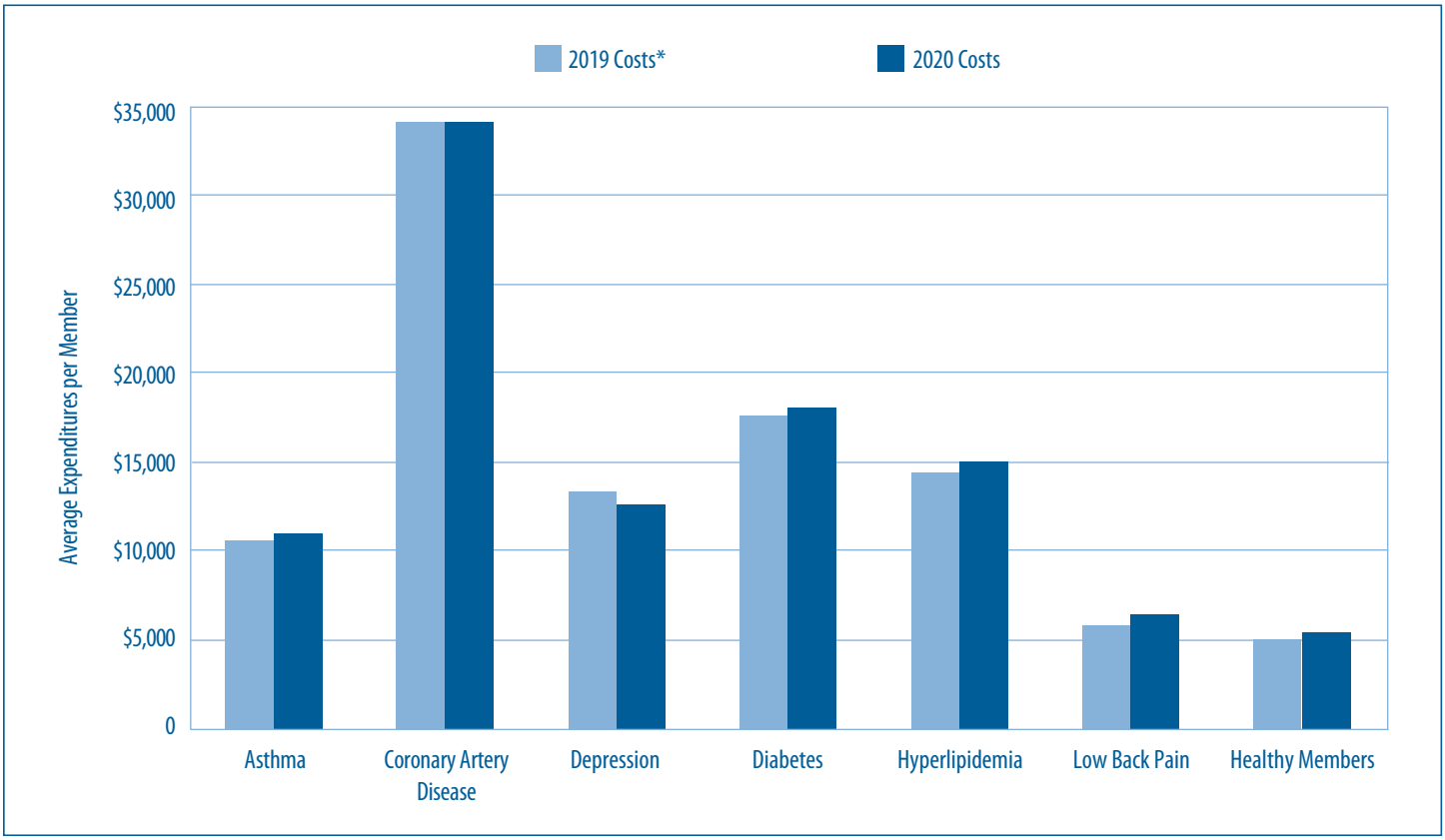
Source: Healthcare Utilization Project's State Inpatient Databases

Table 2: Outcomes for KOMA CAD Inpatients, 2006–2017

Year	Number of CAD Admissions	Average Number of Procedures	Average Length of Stay (days)	Share of Survivors Discharged to Facility	PTCA* Rate	CABG** Rate	Average Total Charges (2017 dollars)
2006	4,928	5.27	3.46	6.71%	53.94%	13.78%	$37,335.81
2008	3,717	5.16	3.83	7.09%	45.90%	15.39%	$38,970.46
2010	3,341	5.15	3.89	10.95%	44.15%	15.18%	$42,635.43
2012	3,328	5.29	4.07	11.36%	43.09%	15.78%	$47,329.89
2014	2,785	5.49	4.58	12.33%	40.39%	20.65%	$55,356.39
2016	2,937	4.50	4.46	10.93%	36.36%	20.39%	$59,586.93
2017	3,160	4.46	4.54	10.34%	32.34%	20.44%	$61,158.00

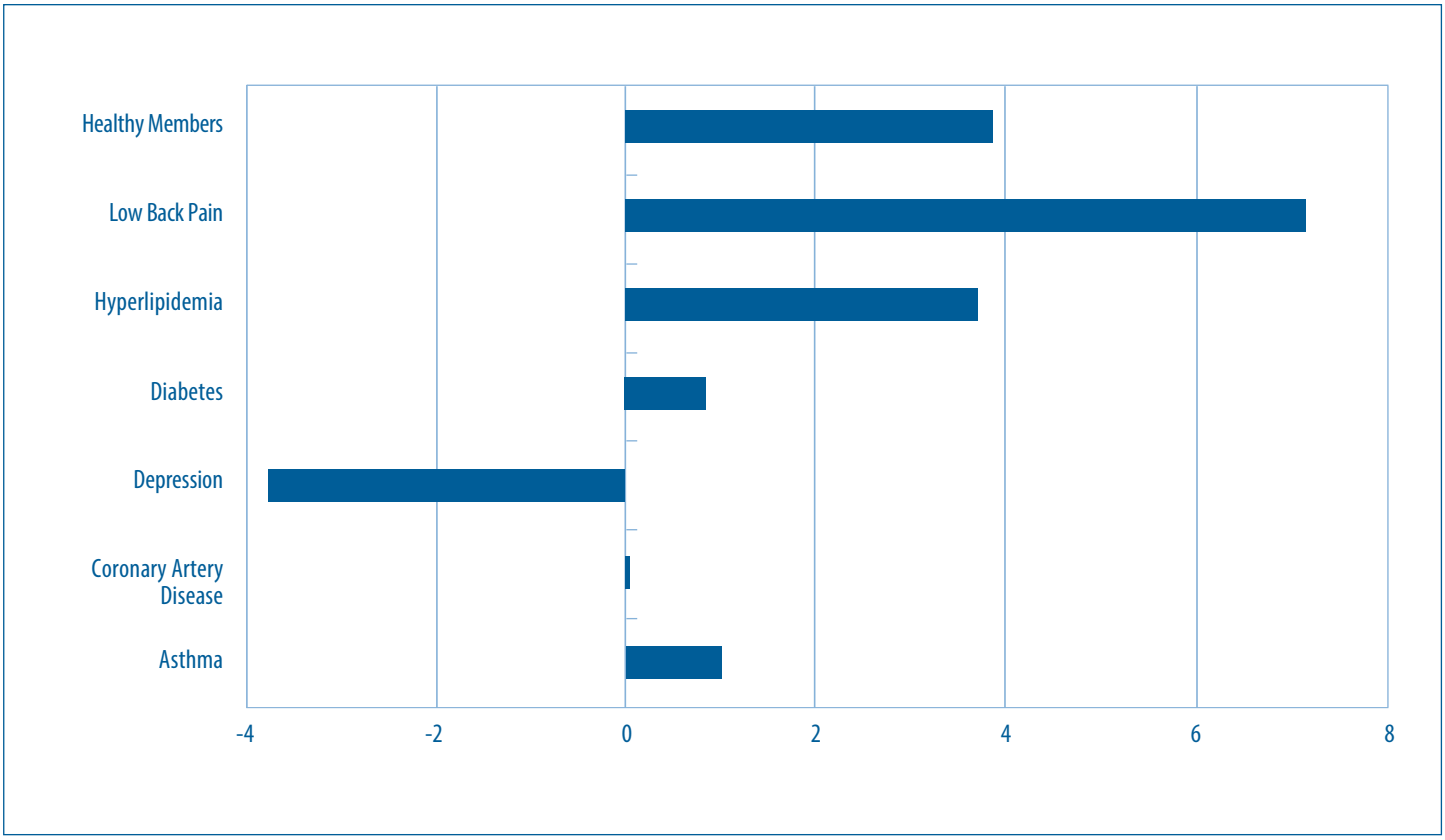
Source: Healthcare Utilization Project's State Inpatient Databases
*PTCA: Percutaneous transluminal coronary angioplasty
**CABG: Coronary artery bypass graft

Figure 1a: Average Expenditures per Member in KOMA, 2019-2020



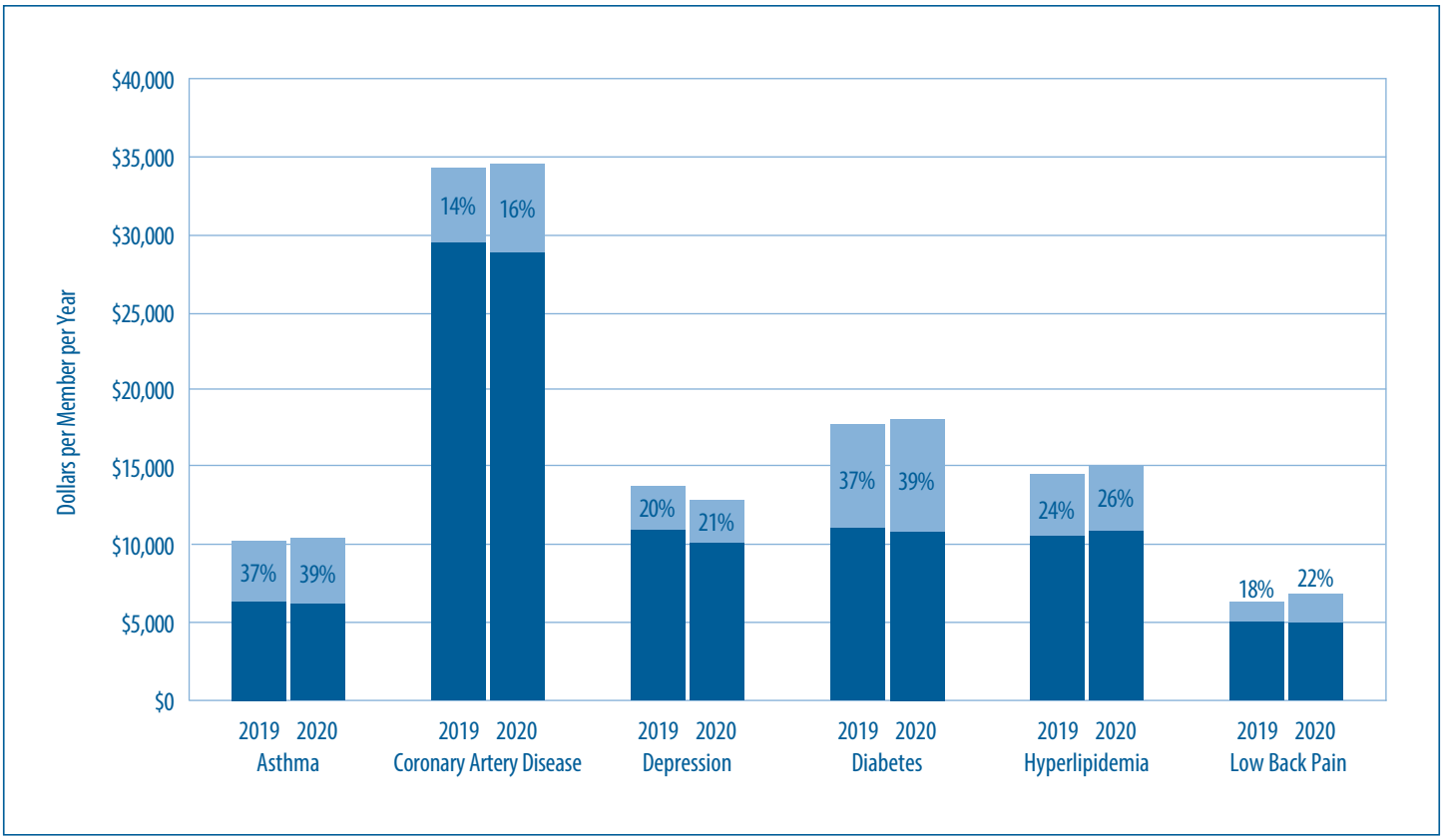
*2019 costs are adjusted for inflation.

Figure 1b: Percentage Change in Average Member Costs in KOMA, 2019-2020



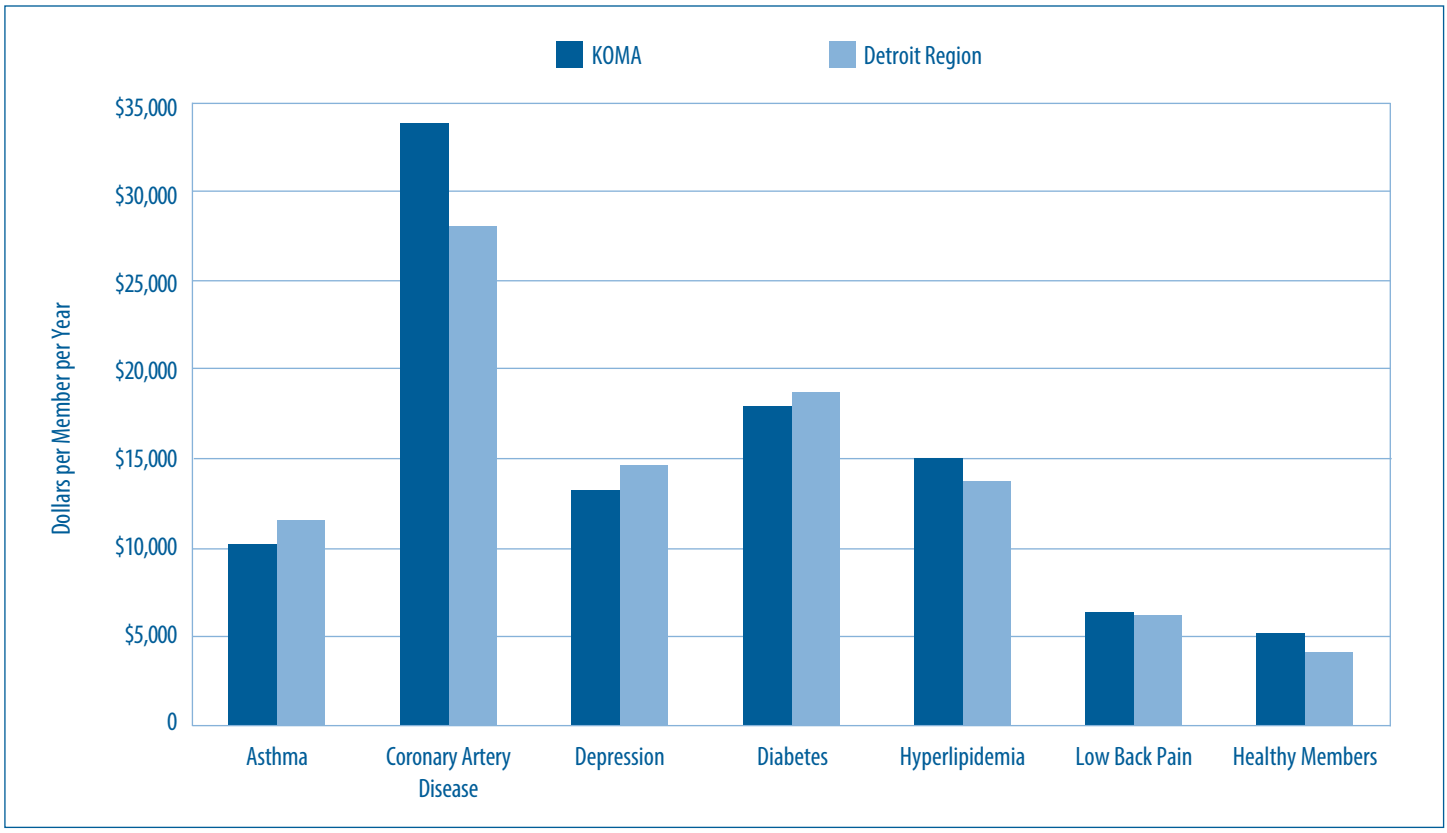
Source: BCBSM, BCN, and Priority Health member data

Figure 2: Rx Share of Average Expenditures per Member in KOMA, 2019 and 2020



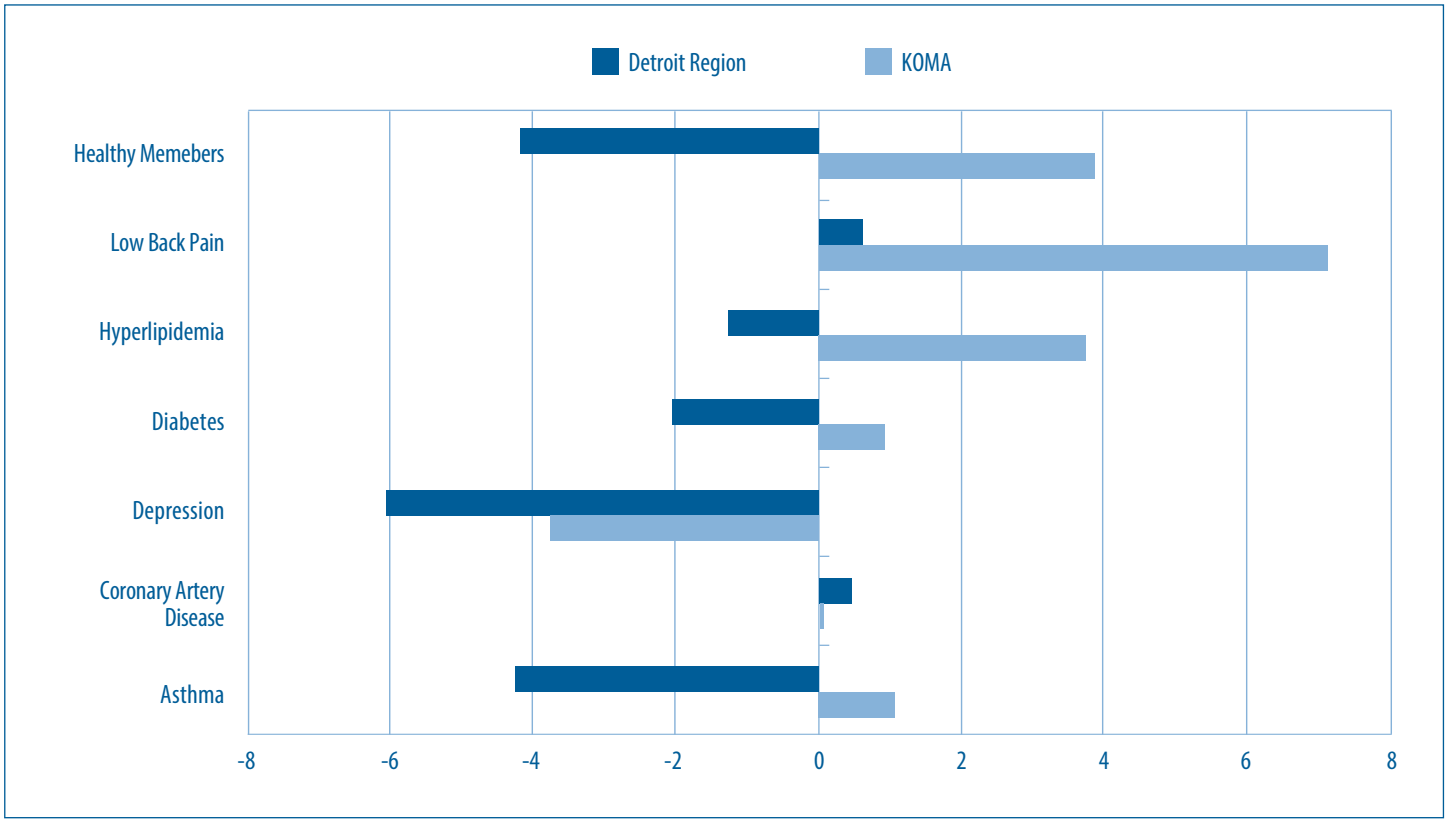
Source: BCBSM, BCN, and Priority Health member data

Figure 3a: Average Expenditures per Member, 2020



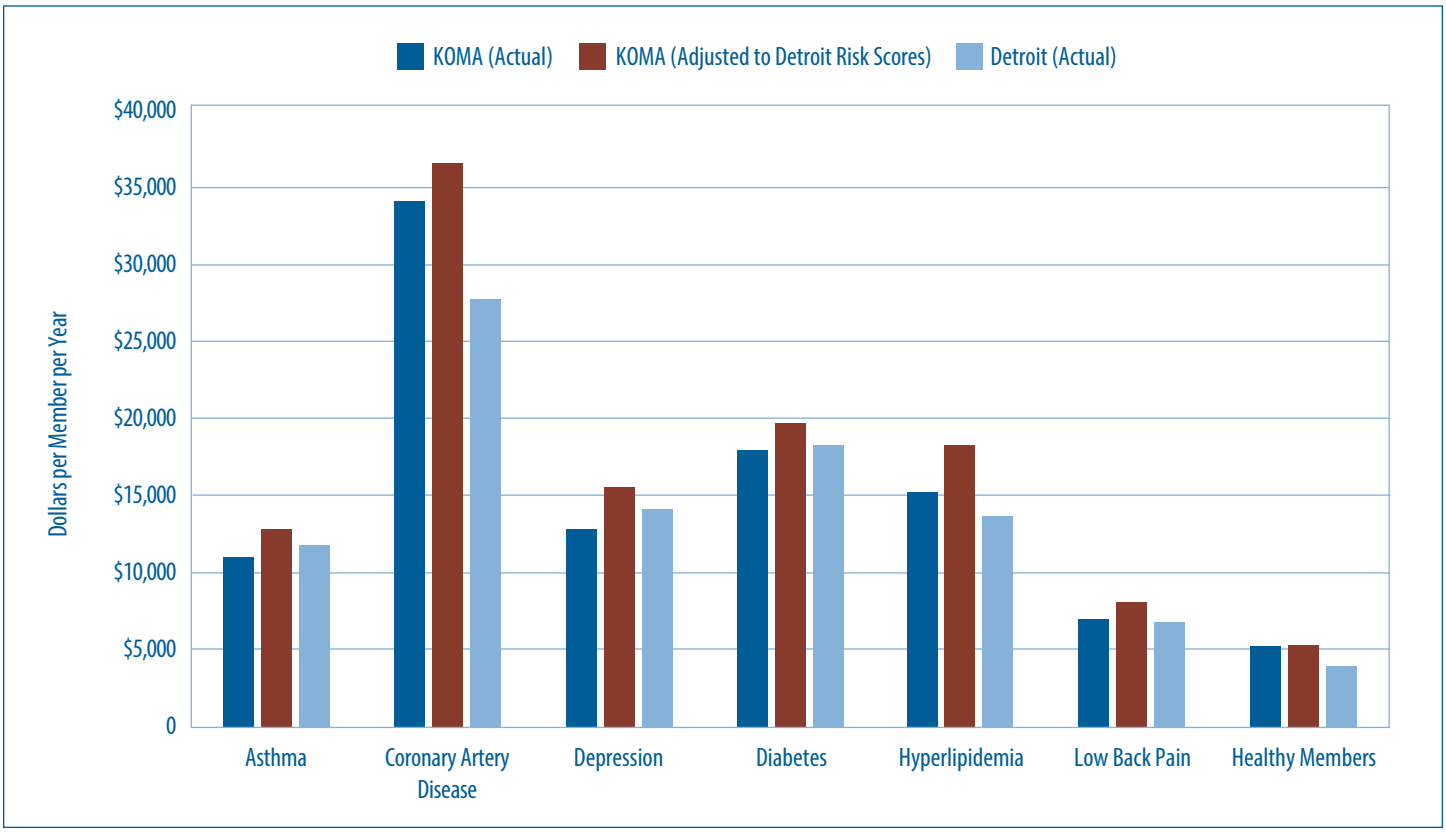
Source: BCBSM, BCN, and Priority Health member data

Figure 3b: 2019-2020 Percentage Change in Average Expenditures per Member



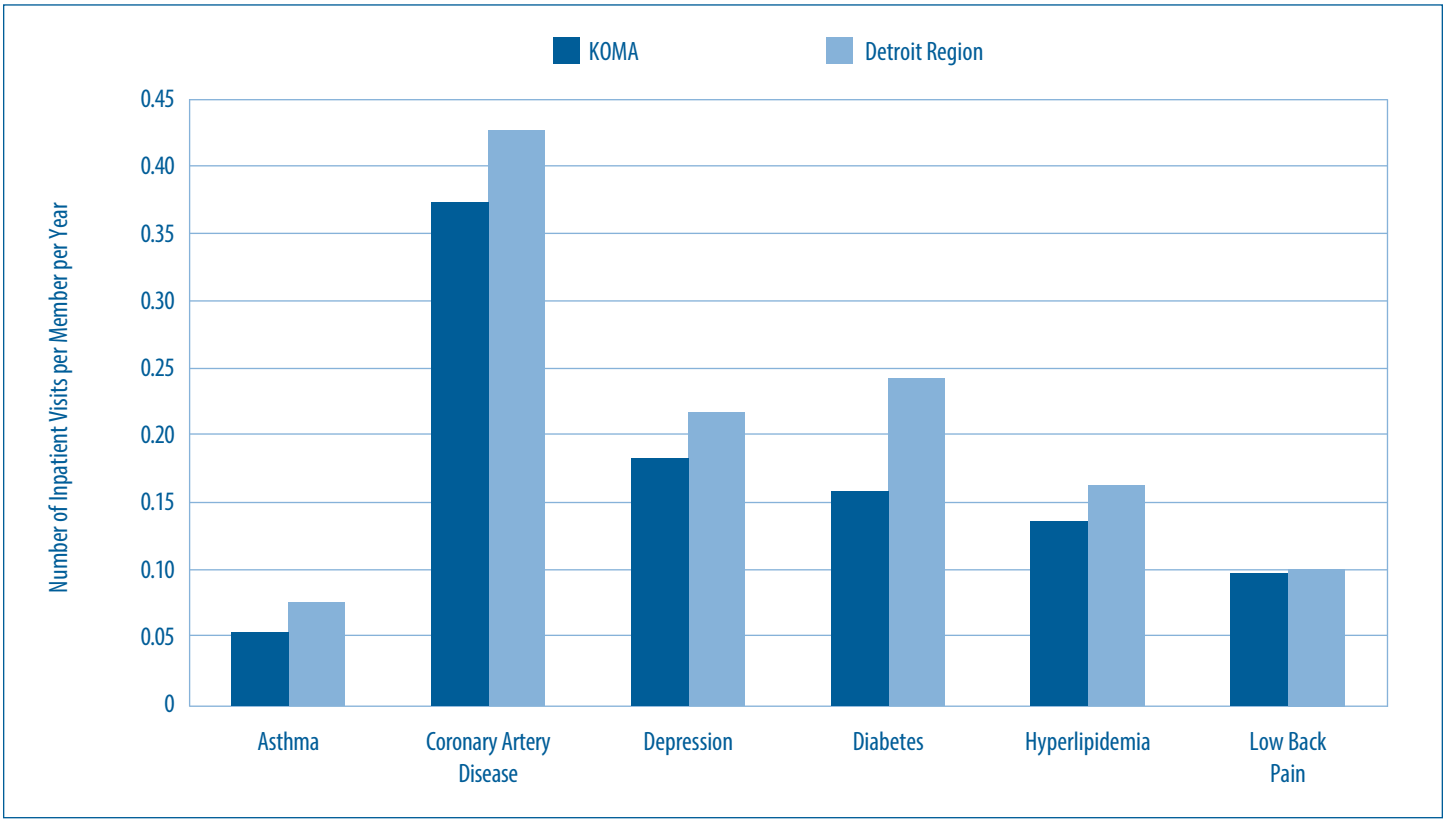
Source: BCBSM, BCN, and Priority Health member data

Figure 3c: Average Expenditures per Member with Risk-Adjusted KOMA Values, 2020



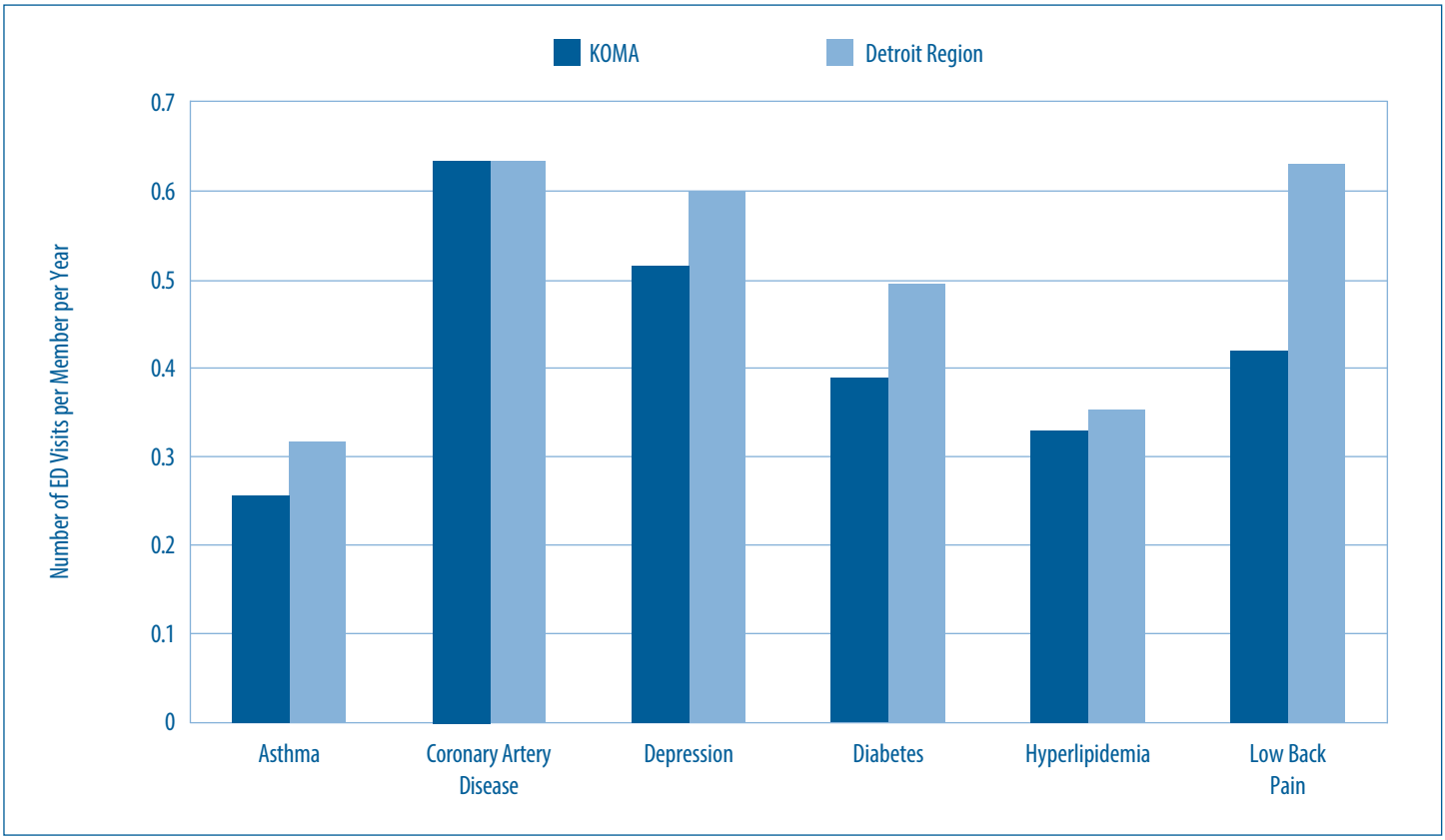
Source: BCBSM and Priority Health member data

Figure 4a: Average Annual Inpatient Visits per Member, 2020



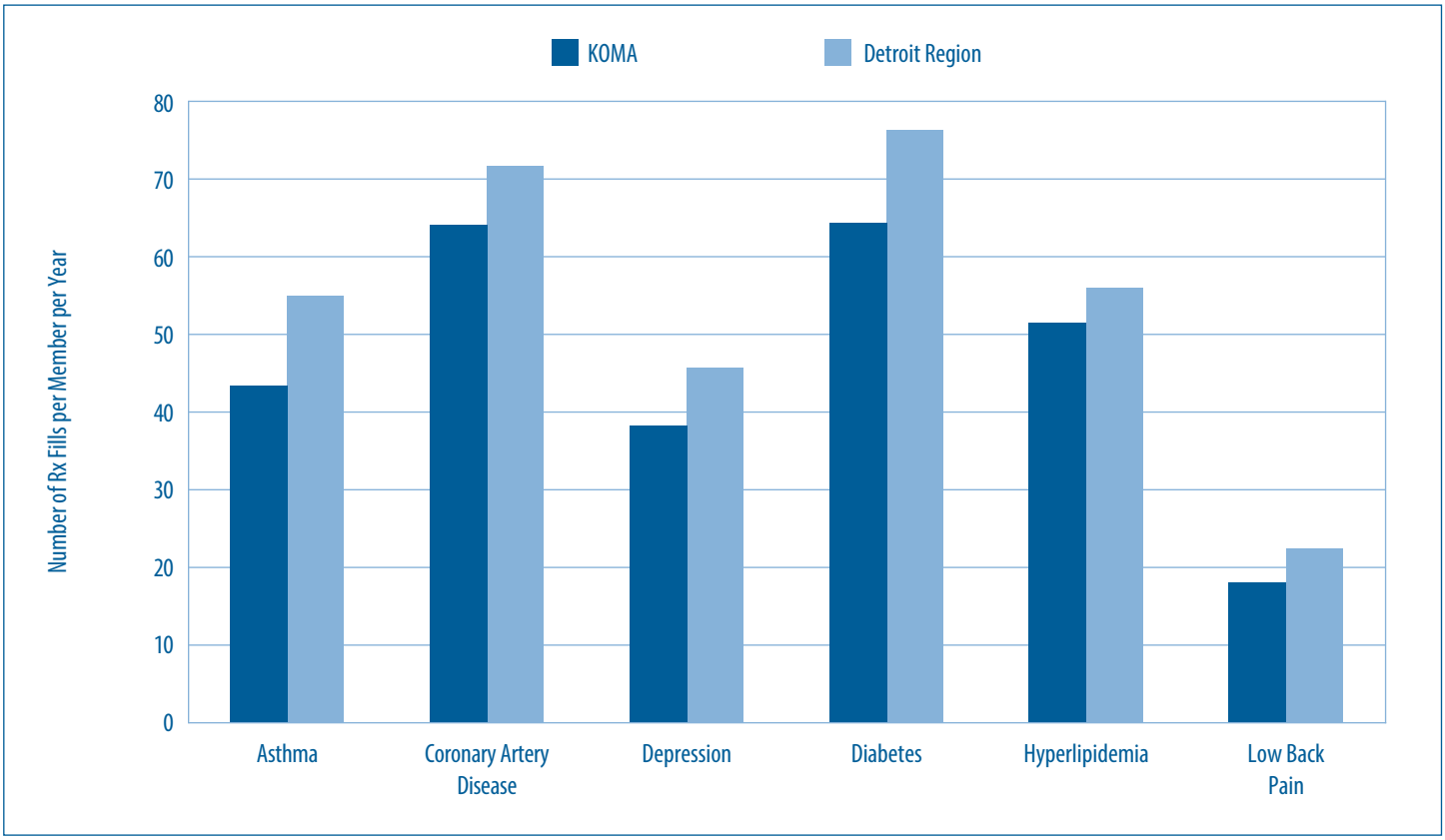
Source: BCBSM, BCN, and Priority Health member data

Figure 4b: Average Annual Emergency Department Visits per Member, 2020



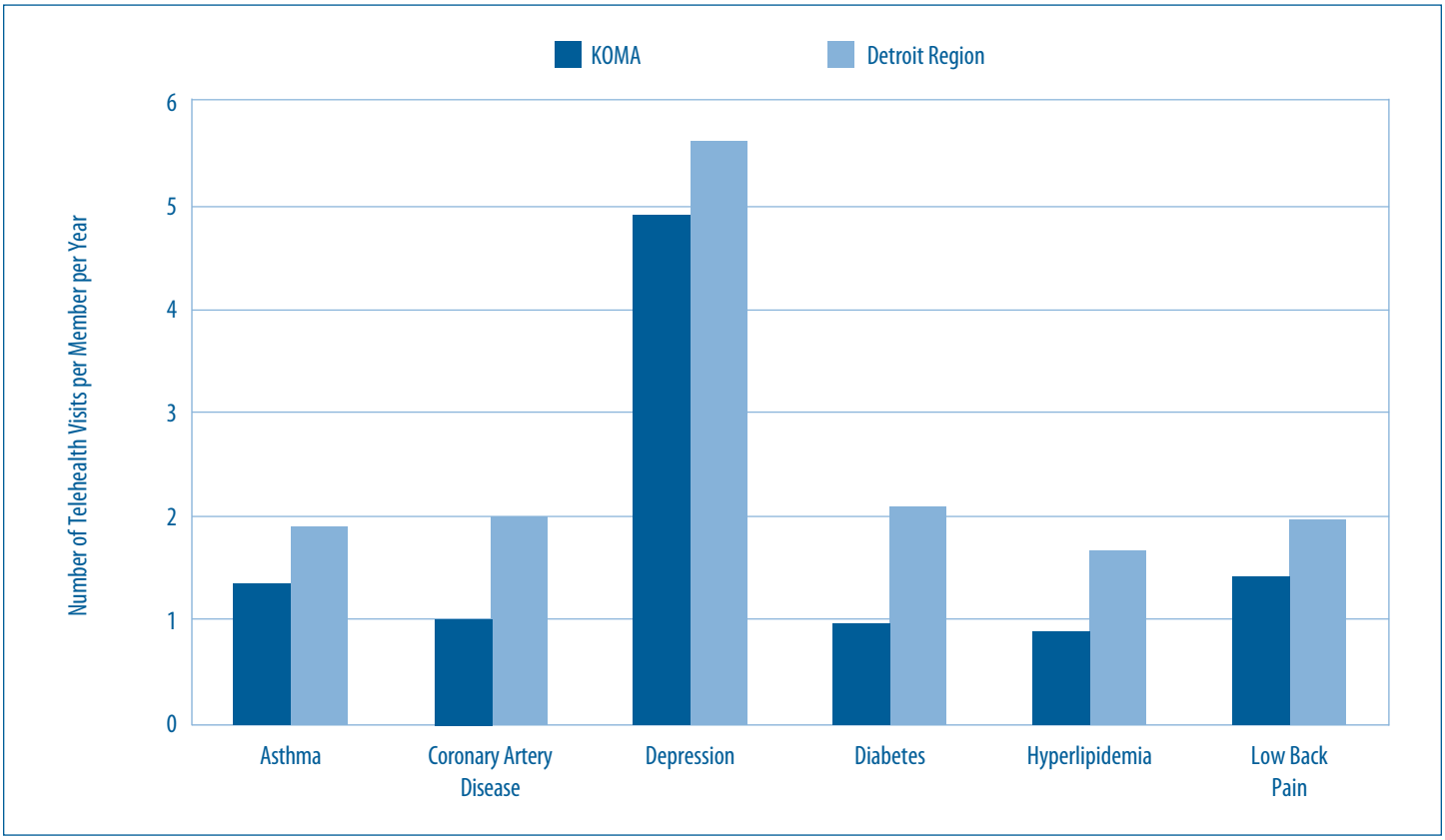
Source: BCBSM, BCN, and Priority Health member data

Figure 4c: Average Annual Prescription Fills per Member, 2020



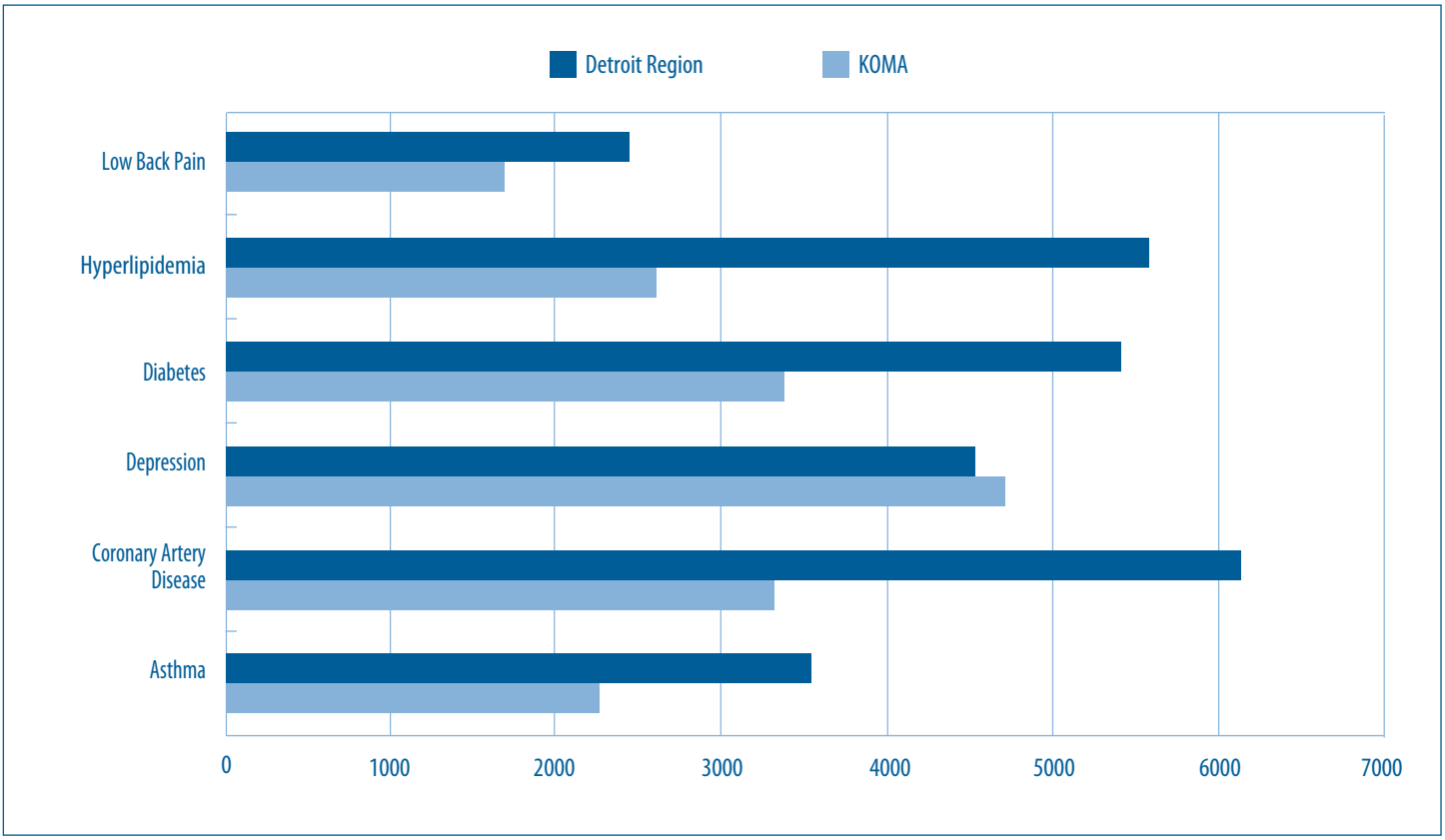
Source: BCBSM, BCN, and Priority Health member data

Figure 4d: Average Annual Telehealth Visits per Member, 2020



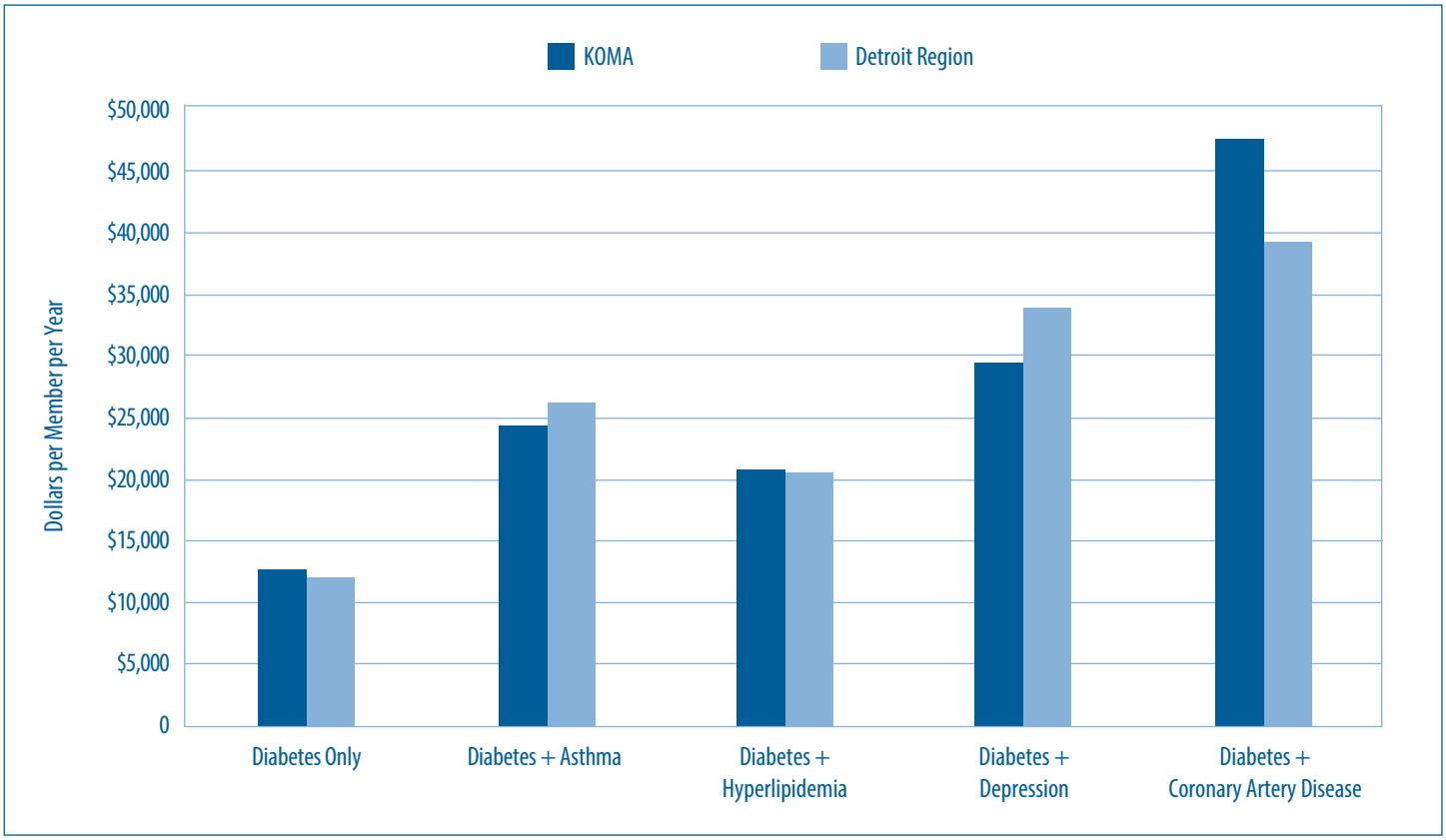
Source: BCBSM, BCN, and Priority Health member data

Figure 4e: 2019-2020 Percentage Change in Average Telehealth Visits per Member



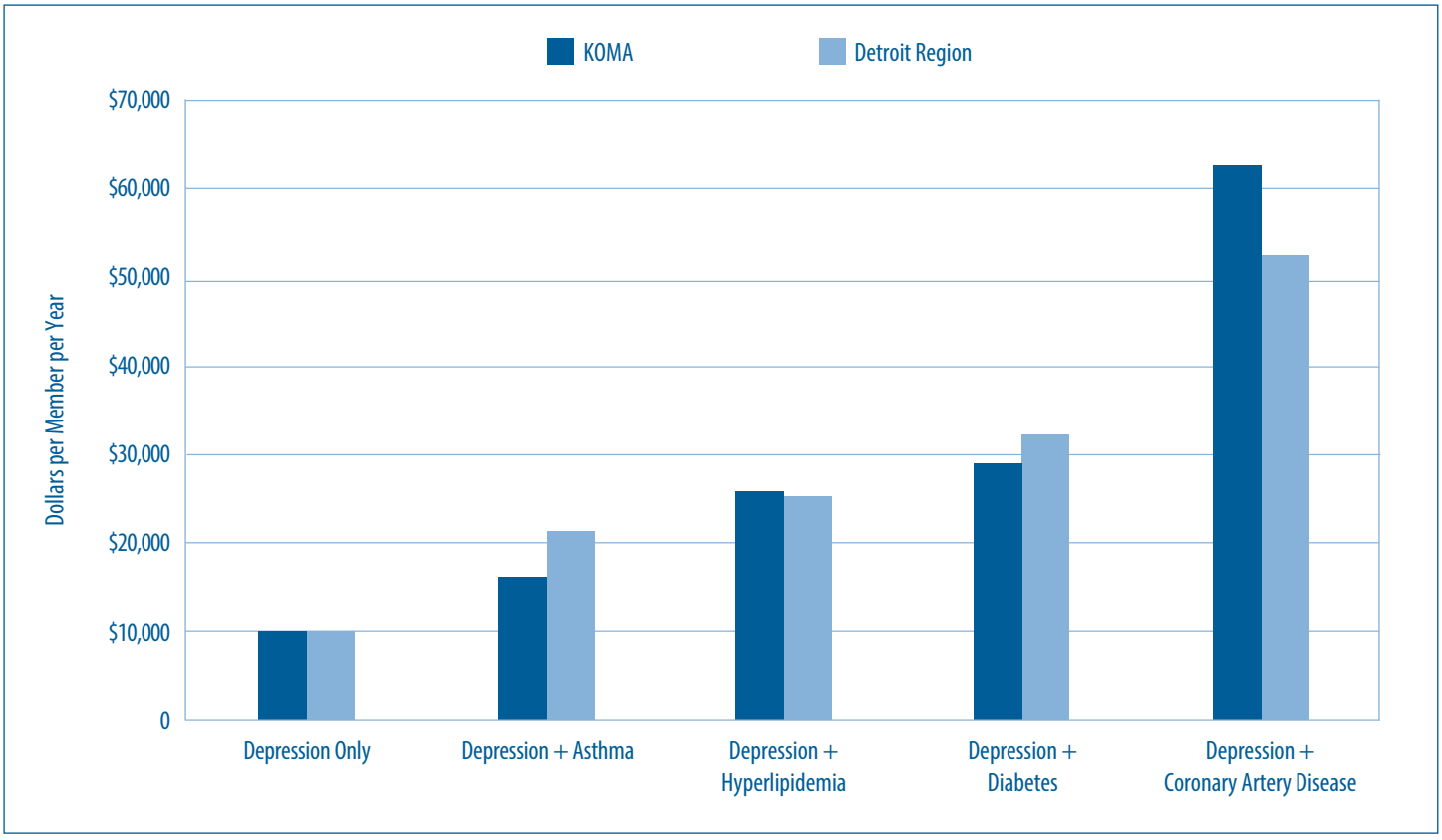
Source: BCBSM, BCN, and Priority Health member data

Figure 5a: Expenditures on Members with Diabetes and Comorbidities, 2020



Source: BCBSM, BCN, and Priority Health member data

Figure 5b: Expenditures for Members with Depression and Comorbidities, 2020



Source: BCBSM, BCN, and Priority Health member data

Appendix

Benchmarking Communities

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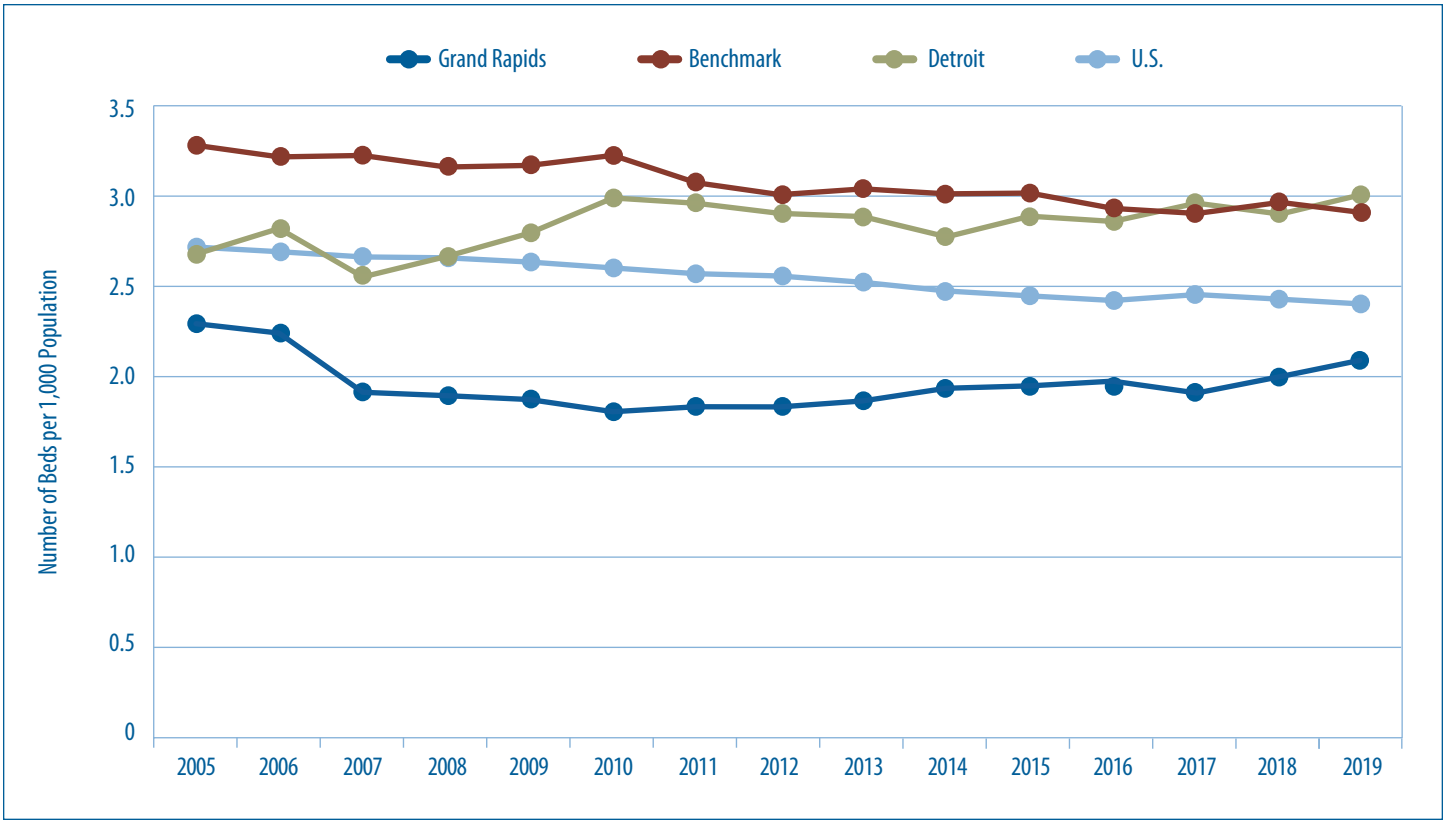
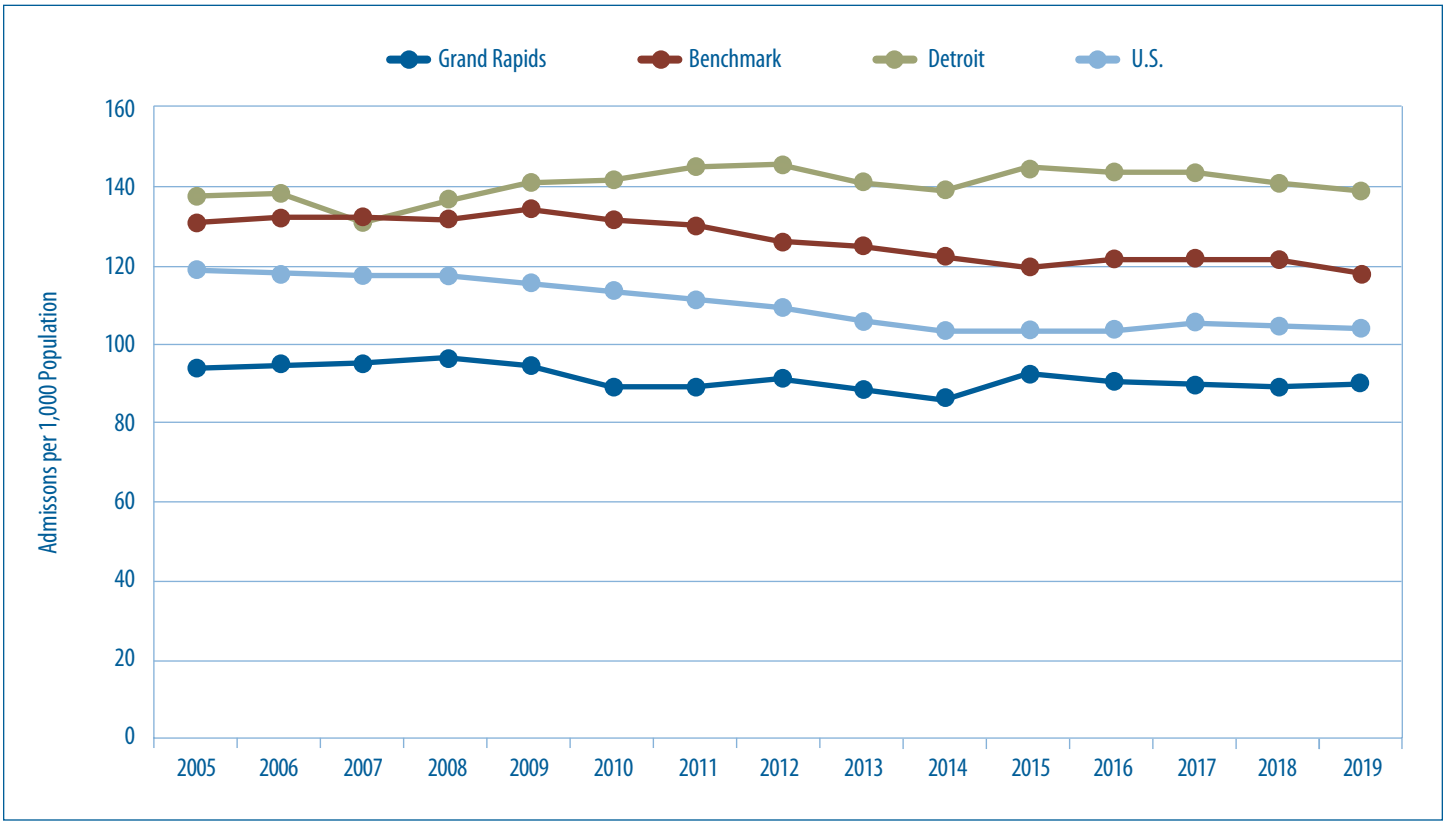
Figure 1: Hospital Beds per 1,000 Population, 2005–2019



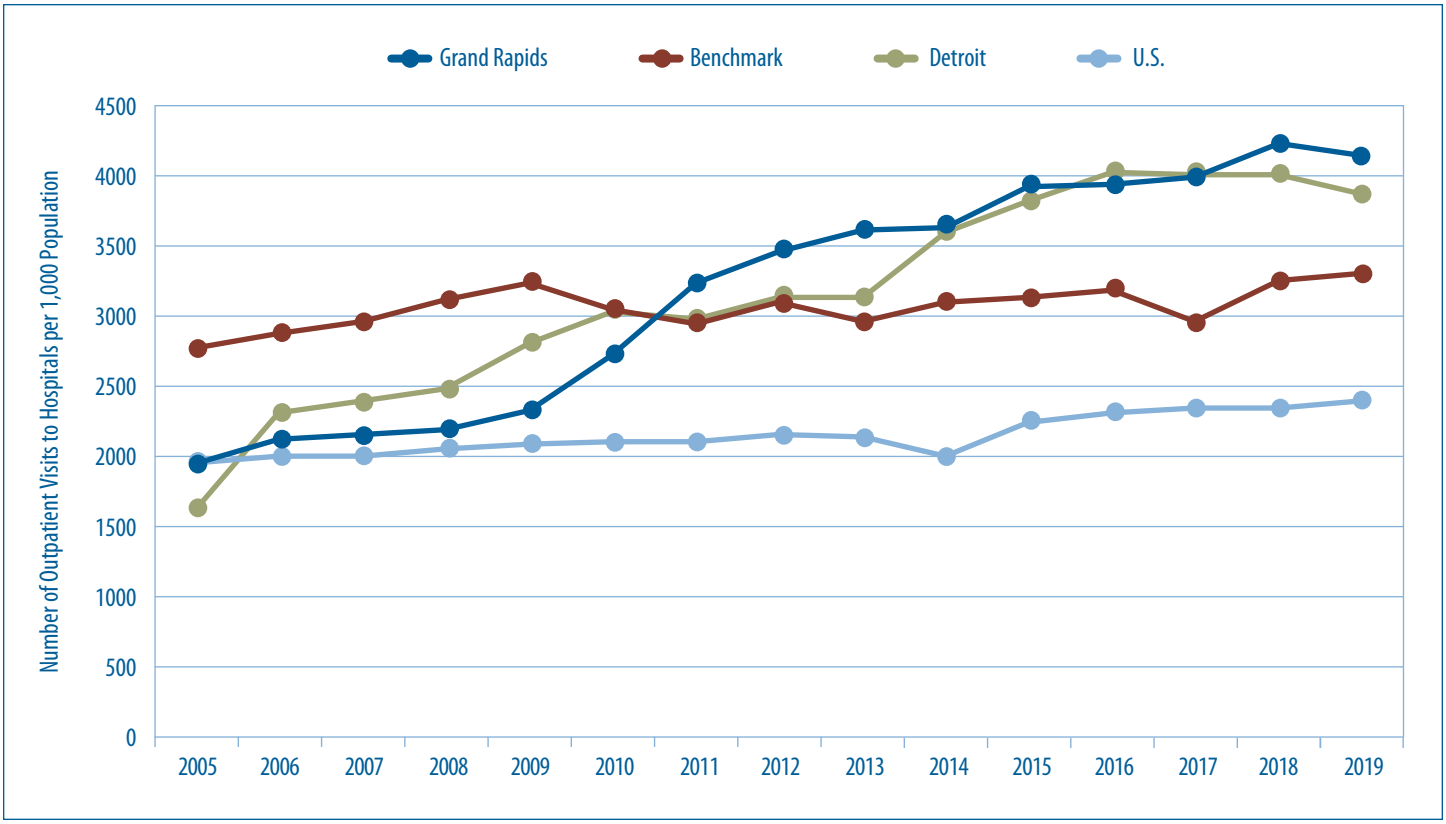
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 2: Hospital Admissions per 1,000 Population, 2005–2019



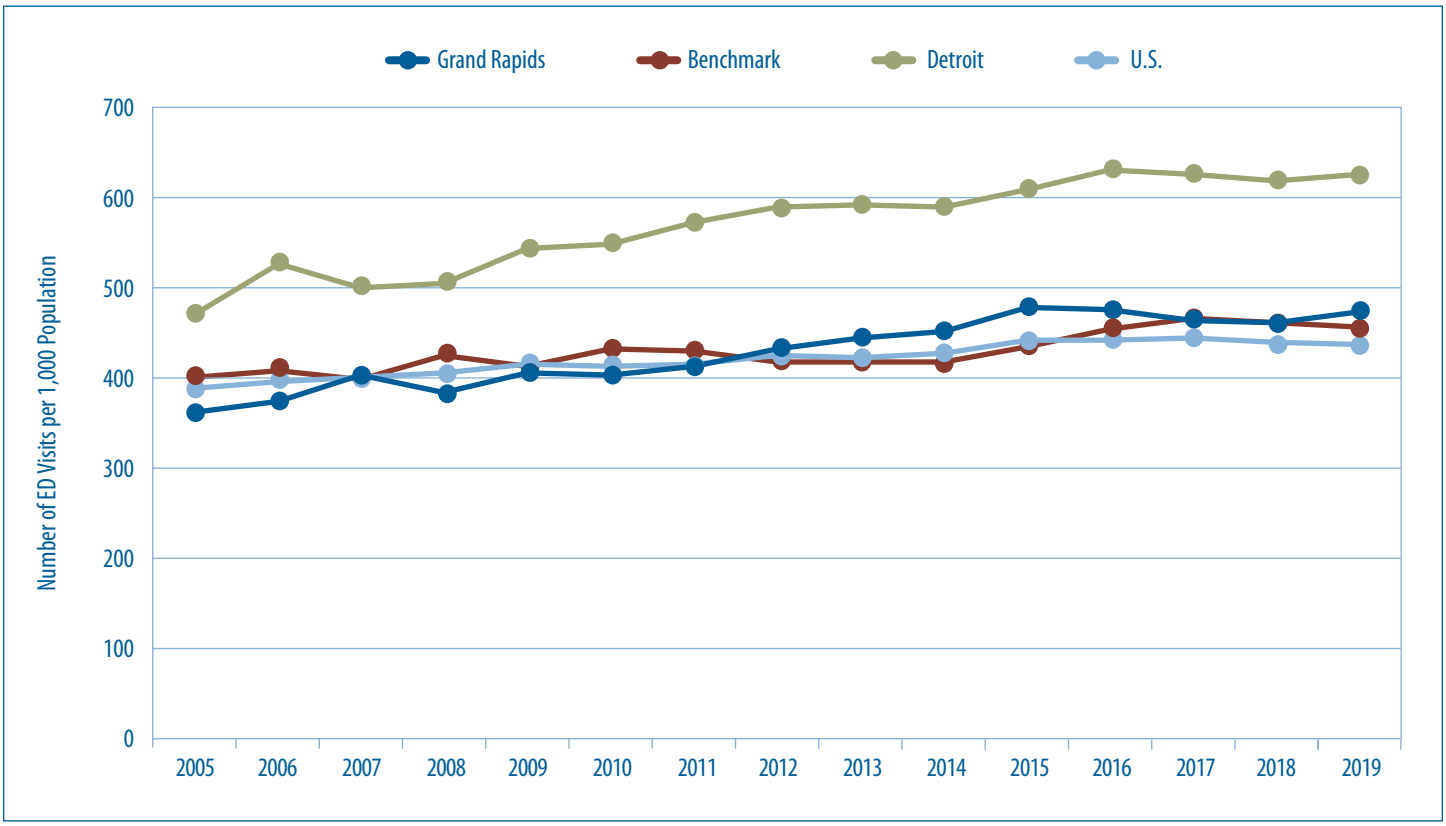
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 3: Outpatient Visits to Hospitals per 1,000 Population, 2005–2019



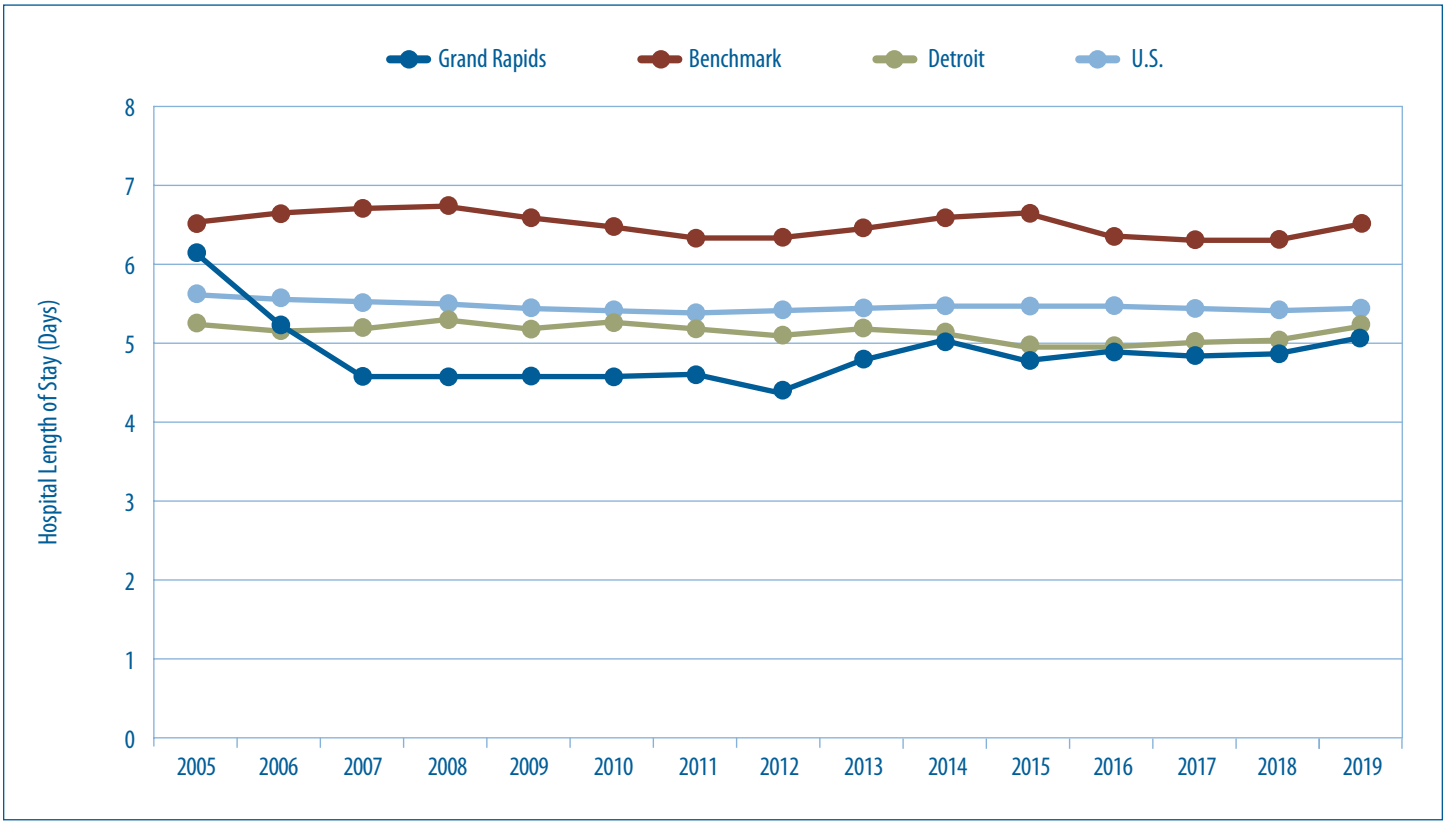
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 4: Emergency Department Visits per 1,000 Population, 2005–2019



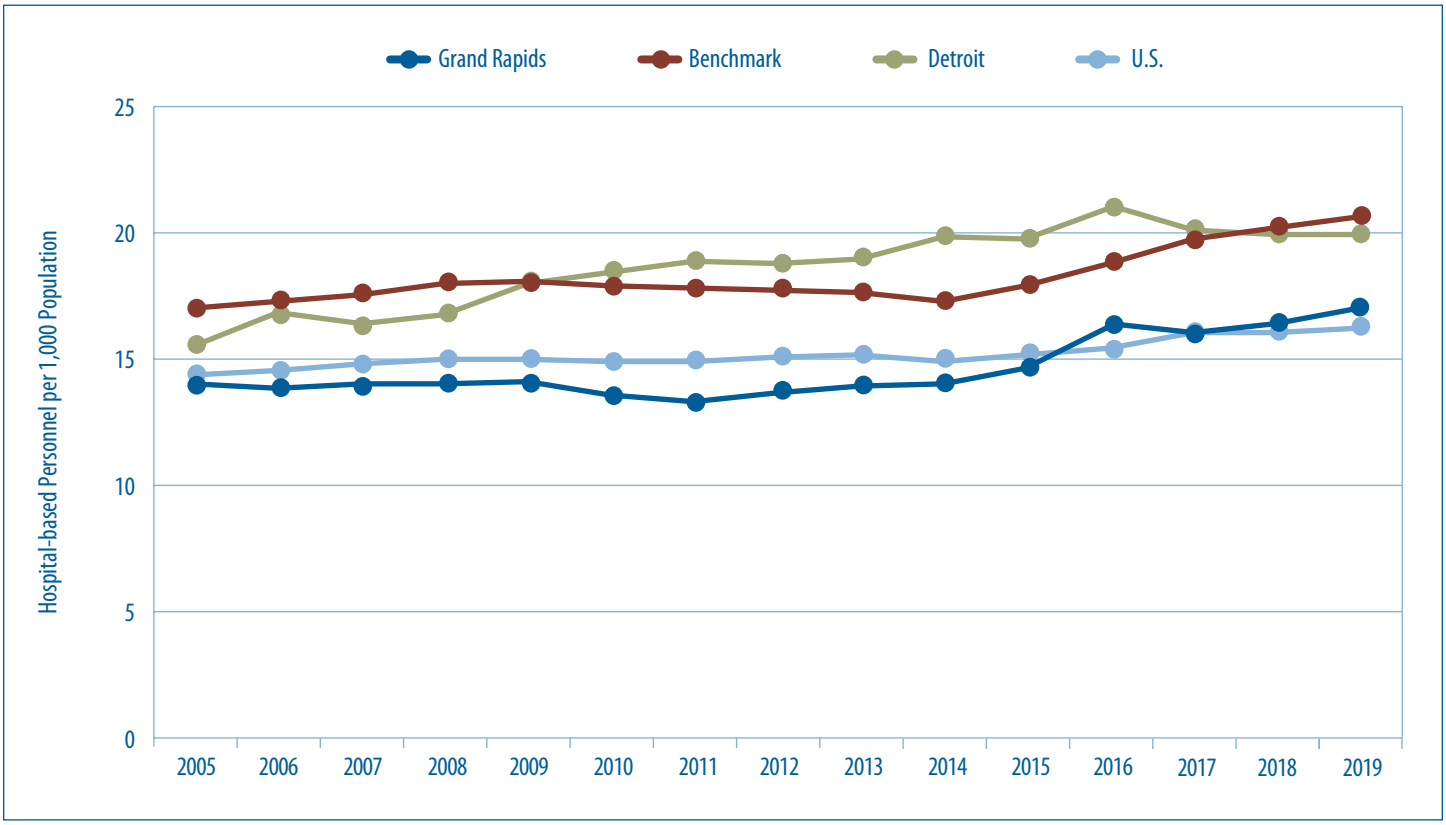
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 5: Average Hospital Length of Stay, 2005–2019



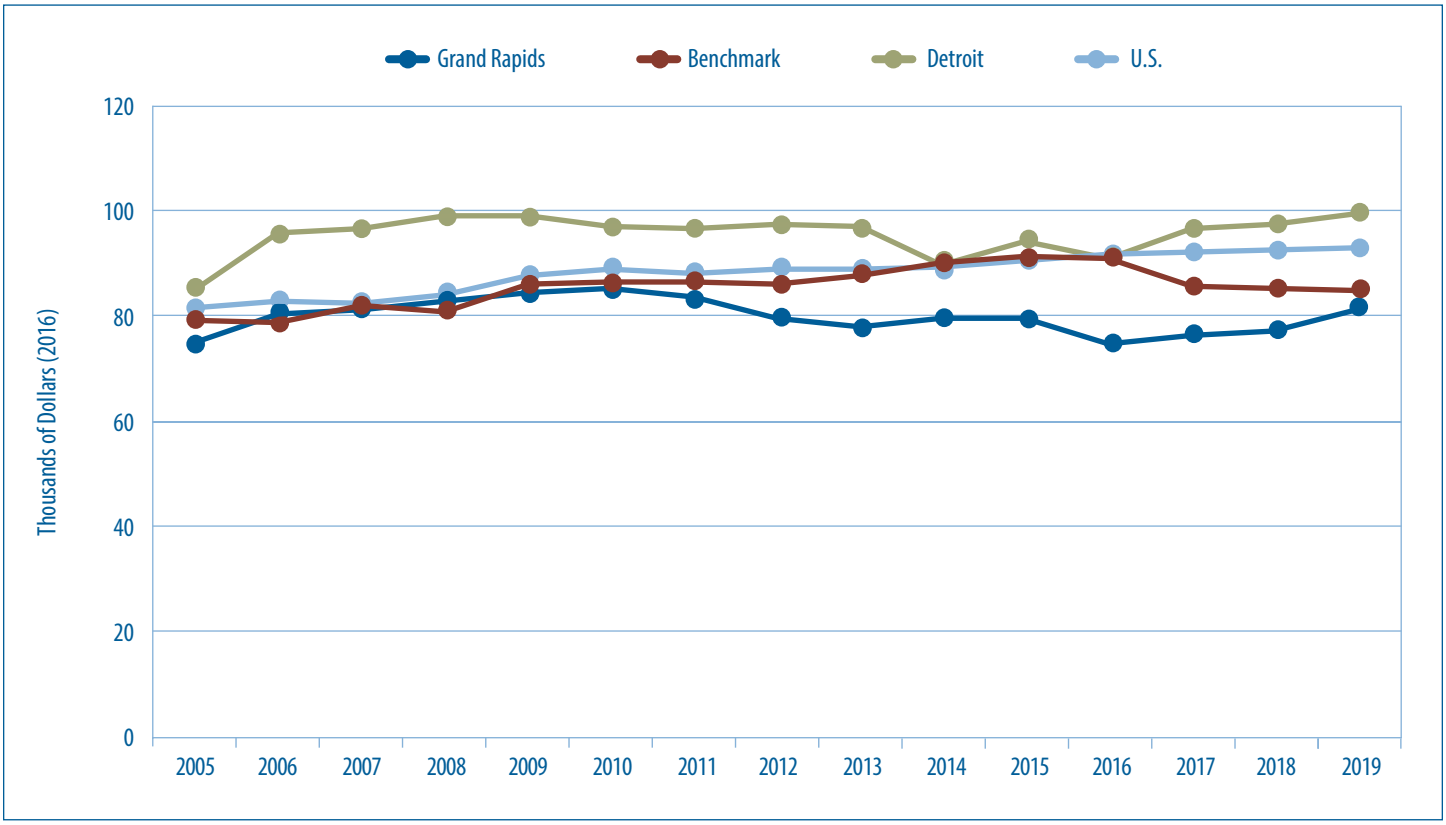
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 6: Hospital-based Personnel per 1,000 Population



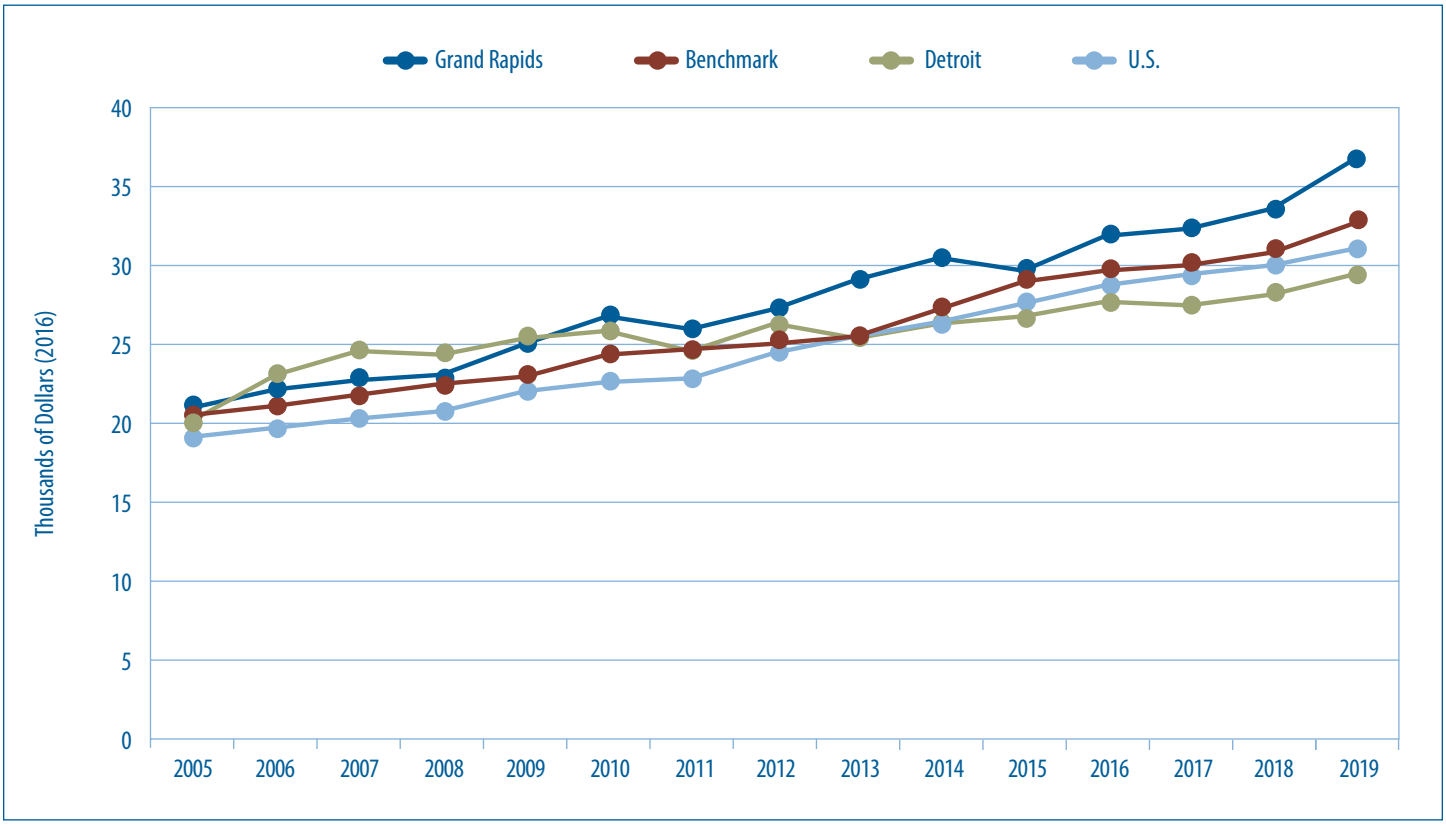
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 7: Average Payroll and Benefit Expenses per Hospital Employee, 2005–2019



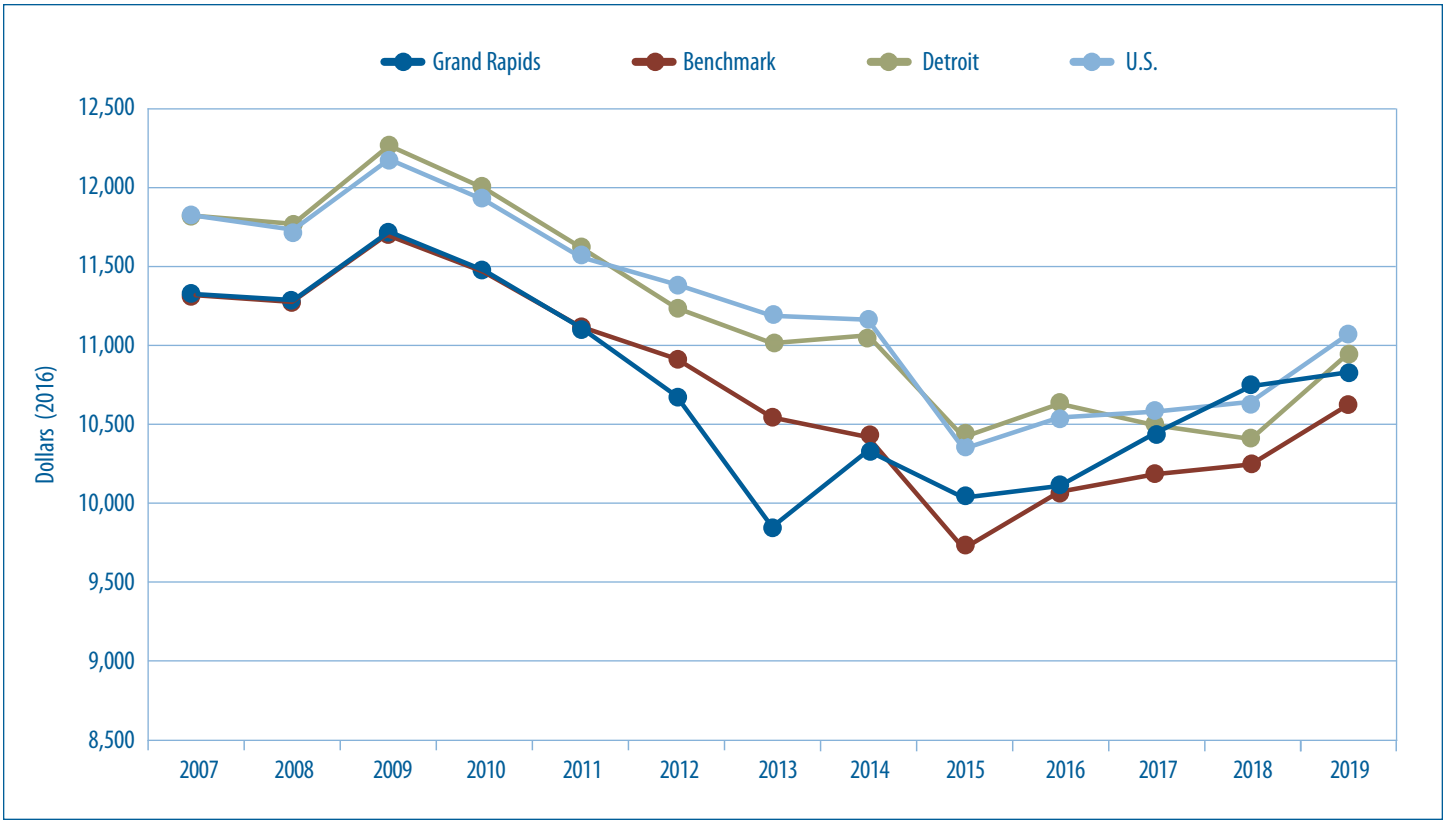
Source: American Hospital Association, AHA hospital statistics, 2020

Figure 8: Total Hospital Expenses per Admission, 2005–2019



Source: American Hospital Association, AHA hospital statistics, 2020

Figure 9: Adjusted Medicare Expenditures per Medicare Enrollee, 2005–2019



Sources: CMS Geographic Variation Public Use File; CMS Monthly Enrollment by Contract/Plan/State/County Files; CMS Plan Payment Data Files, 2020

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