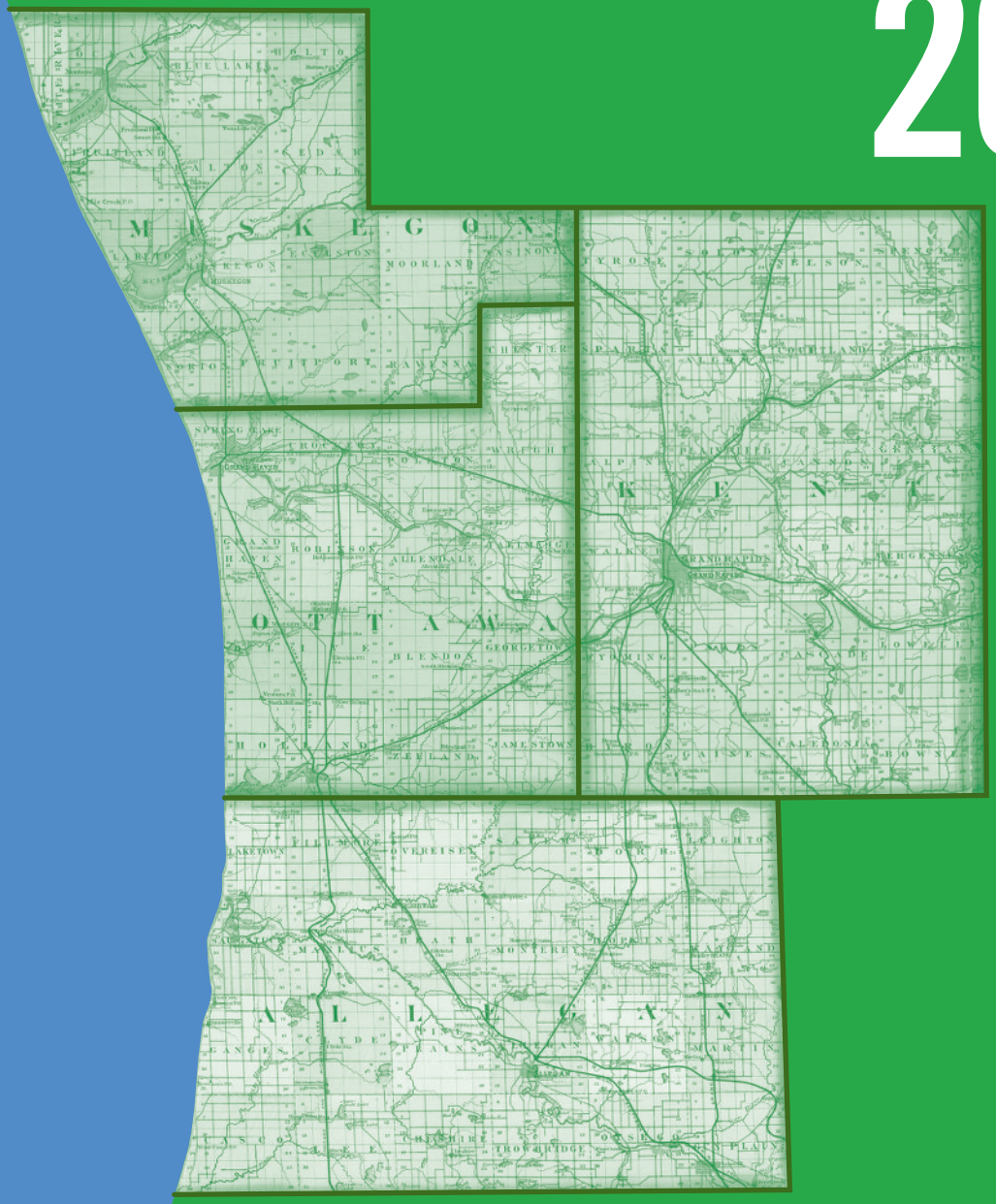
KENT COUNTY OTTAWA COUNTY MUSKEGON COUNTY ALLEGAN COUNTY

Health Check

ANALYZING TRENDS IN WEST MICHIGAN

2024



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Health Check:
Analyzing Trends in West Michigan 2024

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GRAND VALLEY STATE UNIVERSITY
KIRKHOF COLLEGE OF NURSING

February 3, 2024

Dear Colleagues,

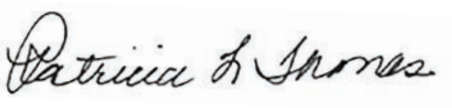
We are pleased to present Health Check 2024: Analyzing Trends in West Michigan. This report represents the collaborative efforts of Grand Valley State University's Kirkhof College of Nursing (KCON), Seidman College of Business, Blue Cross Blue Shield of Michigan, Blue Care Network, and Priority Health.

This is the 15th year of Health Check. The analysis of data is strongly relevant to health and health care in Kent, Ottawa, Muskegon, and Allegan (KOMA) counties. The ongoing and consistent examination of health-related data over time serves to inform the decision-making processes and policies of the government, health care systems, education, and business.

Economic analysis uses data from our insurance provider partners, the American Hospital Association, the Centers for Disease Control and Prevention, and other sources to better understand the economic influence and impact of health care in West Michigan. In addition, the evolution of health care trends over time in West Michigan is explored along with benchmarking with other peer communities as well as the Detroit area. In particular, the insurance provider data on average costs for several conditions provides unique insights into how costs are evolving in our area. In the last two years, we have included the importance of how diverse communities interact with the health care system.

We 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,



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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.

We are particularly indebted to the following organizations for use of their data:
American Hospital Association
Behavioral Risk Factor Surveillance System (BRFSS), based on CDC protocol and the Michigan BRFSS
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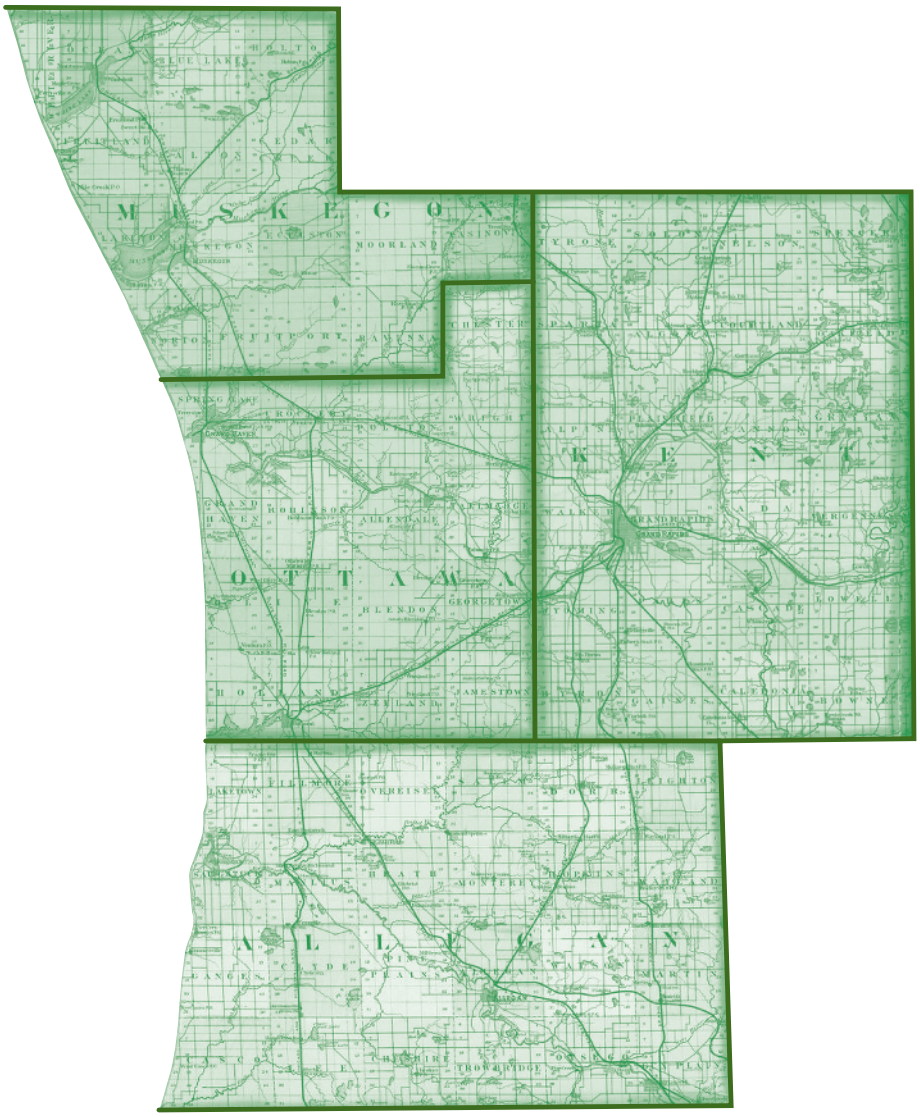
Michigan Department of Health and Human Services
Michigan Health and Hospital Association
Michigan Bureau of Labor Market Information and Strategic Initiatives (milmi.org as part of michigan.gov)
U.S. Census Bureau
U.S. Department of Health and Human Services (ARF file 2011-2012)
United States Patent and Trademark Office
World Intellectual Property Organization



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Executive Summary

Knowledge Foundations

Education and Job Growth

The U.S. economy showcased unparalleled resilience, navigating the turbulent waters caused by the COVID-19 pandemic. After the initial setback in 2020, where job growth plummeted 2 percent in relation to the 2005 baseline, there was a commendable resurgence. By June 2023, the nation celebrated an unprecedented 17.5 percent rise in job growth since the pandemic began.

Michigan, however, faced a steeper challenge. Its job growth experienced a precipitous decline of 23 percent in April 2020 against the 2005 reference point. Although Michigan's rejuvenation journey has been slower in comparison to the U.S. average, it is notable that the differential in job growth rates between the state and the nation has been steadily narrowing — from a 21-percentage point difference in April 2020 to 16 percentage points between June 2022 and June 2023.

Since 2005, the health care sector in Grand Rapids has generally witnessed stronger job growth compared to the entire State of Michigan, with professions like diagnostic medical sonographers, registered nurses, and respiratory therapists among those experiencing the most significant expansions. Conversely, roles like medical transcriptionists and opticians faced job losses in the city. For Michigan, while there was considerable growth in areas such as medical assistants and physician assistants, there were also declines in professions like audiologists and dental hygienists. Post-2021, the effects of the pandemic have brought varied trends with some roles, like dental assistants and RNs seeing employment recovery, whereas others, including dentists and physical therapists, continue to face job losses.

Grand Rapids' health care sector emerges as a bastion of optimism in the broader job market landscape. According to Bureau of Labor Statistics (BLS) projections, the next few years will witness a boom in job opportunities, particularly in roles like dental assistants, home health aides, medical assistants, RNs, LPNs/LVNs, and nursing aides. These positions are touted to record the highest annual job openings at both the municipal and state tiers.

However, the narrative is not solely about job proliferation. Earnings, a pivotal indicator of economic vitality, also demand attention. Over the period from 2005 to 2022, Grand Rapids experienced significant declines in real earnings for several health care professions, with no occupation witnessing a substantial growth beyond 7 percent. This trend contrasted with Michigan as a whole, where physician assistants saw a wage growth exceeding 7 percent. The national scene differed, with some roles like occupational therapists seeing considerable wage increases, while others faced declines. A closer look at 2021-2022 revealed that while no profession in Grand Rapids enjoyed a 7 percent rise in real annual earnings, positions like dietitians and EMTs outperformed their counterparts in Michigan and the broader U.S. in wage growth. However, family medicine practitioners across all regions faced a notable earnings decline during this short term.

As we advance, discerning these shifts and recalibrating our strategies will be imperative for ensuring not just recovery but also continued economic progression in a world reshaped by the pandemic.

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 12.8 from 1990 to 1999 to 46.3 from 2000 to 2009, with a slight decrease to 31.5 patents from 2010 to 2022. 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 comes 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 persist in observing trends in population demographics in West Michigan and the Detroit region and juxtapose these changes with national averages. A sustained shift in population density from East Michigan to West Michigan is evident, with the Detroit region displaying a -0.55 percent growth rate in 2022, compared to 0.22 percent growth in the Kent, Ottawa, Muskegon, and Allegan (KOMA) counties.

While the 2022 growth rate in West Michigan is below the 1.26 percent peak growth rate observed in 2013, it continues to outpace the 2022 national average of 0.38 percent. The aging trend of the population remains a central focus, with the percentage of individuals over the age of 65 steadily on the rise in both regions. In 2022, this demographic constituted approximately 16.3 percent of the KOMA region's population, closely following the 17 percent observed in the Detroit region.

This aging trend carries economic implications, as health care expenditures rise notably after the age of 65. Furthermore, the increasing proportion of those over 65 relative to the prime working ages presents sustainability challenges for health care funding mechanisms, particularly Medicare. As the ratio of workers to Medicare beneficiaries drops, pressures on the Medicare Part A trust fund's solvency intensify. Concurrently, the aging workforce may contribute to escalating employer-sponsored health insurance premiums.

Health Care Overview

This section delves into health care trends in West Michigan's KOMA counties in juxtaposition with the Detroit region, spotlighting health disparities influenced by race and gender. An analysis of health insurance and access trends reveals a declining uninsured rate in both the KOMA and Detroit regions since 2011. However, racial disparities are evident. The Detroit non-white demographic exhibits steady enhancements in health insurance access. In contrast, KOMA saw erratic patterns with marked upticks in uninsured rates in 2017 and 2019, though this shifted favorably in 2020, potentially influenced by the COVID-19 pandemic and correlated public health insurance enrollments. Furthermore, cost-associated health care access disparities exist. White individuals in KOMA generally have a more stable health care source than their non-white counterparts, with women accessing health care more frequently than men.

The pandemic prompted over a third of the populace to defer medical care, possibly causing a downturn in chronic condition diagnoses in 2020. Yet, the advent of COVID-19 vaccinations in 2021 rejuvenated individuals' confidence in seeking medical services, evident from the subsequent surge in health care engagement and chronic condition diagnoses. This resurgence further accentuated with the noticeable rise in routine checkups post-vaccine rollout, after a significant slump in 2020.

Chronic condition patterns spotlight Detroit's higher prevalence of ailments such as cholesterol complications, heart attacks, and diabetes. West Michigan, however, recorded an elevated incidence of cancer and depressive disorders in 2021, underscoring the indispensability of timely medical attention and the implications of postponing care.

Emerging data showcases pronounced racial and gender-specific disparities in general and mental health across KOMA and Detroit. Non-white KOMA residents have reported deteriorating health statuses, particularly females, bringing their health metrics closer to those of Detroit's non-white individuals. Furthermore, the 2019-2021 period marked a significant uptick in poor mental health days among non-white KOMA inhabitants, notably among females, with the percentage escalating from 12.1 percent to 25.3 percent. White males in KOMA also experienced a rise in mental health issues in 2021, highlighting a burgeoning mental health concern in the region.

Between 2019 and 2021, a commendable reduction from 47.5 percent to 35.4 percent was observed in obesity rates among non-white KOMA residents. Conversely, white populations in both regions exhibited a consistent increment in obesity rates. Alcohol and tobacco consumption trends depicted contrasting patterns: while white residents in both locales reported higher alcohol intake, non-white Detroit individuals manifested a worrying spike in binge drinking in 2021. Smoking rates among non-white KOMA individuals dwindled dramatically from 29.5 percent in 2018 to 12.1 percent in 2021. However, this might signal a transition toward e-cigarettes, as evidenced by escalating e-cigarette trends in both regions. This shift in nicotine consumption dynamics, particularly the potential perception of e-cigarettes as a precursor to traditional smoking in Detroit, necessitates a more in-depth exploration, especially targeting the youth demographic.

Economic Analysis

Benchmarking Communities

Compared to a group of peer communities, we find that the hospital admission rate in the Grand Rapids region remains relatively low (90 admissions per 1,000 residents in Grand Rapids vs. an average of 107.04 in the peer communities). This represents a 5 percent increase for Grand Rapids, while the admission rate declined by 2 percent for the benchmark communities and the national average remained unchanged. As a result of this convergence, the admission rate in Grand Rapids is now only 6.6 percent below the national average, which is the smallest difference recorded in any year covered by this report. Grand Rapids and Muskegon continued to have significant growth in outpatient visits, matching last year's 9 percent increase. While 2020 saw declines in outpatient visits per capita among the comparison communities, 2021 brought a rebound in all of them with growth rates between 8 and 20 percent. The end result is that the Grand Rapids region has maintained its separation from the other comparison communities in having the highest number of outpatient visits to hospitals, per capita.

In a departure from recent trends, 2021 brought a spike in emergency department (ED) visits per capita in Grand Rapids and Muskegon. From 2005 to 2020, ED utilization in the Grand Rapids region essentially matched the national average and benchmark communities, while the Detroit region's utilization was 22 to 40 percent higher. In 2021, utilization in Grand Rapids separated from the national average and nearly matched that of Detroit. ED visits per capita in Grand Rapids was only 5.9 percent above the national average in 2020 but were 27.4 percent above in 2021. In explaining this spike, the evidence points to an early onset of wintertime viral illnesses, the rise of delta-variant COVID-19, and a surge in mental health-related emergencies. The latter was predicted in last year's report due to a rise in the prevalence of depression in West Michigan relative to the Detroit region.

The data on number of hospital personnel and compensation per worker reveals the difficulties in hospital staffing experienced in Detroit in 2020 were experienced in all comparison communities in 2021. Hospital personnel per 1,000 residents declined by 4 percent in Grand Rapids and Muskegon, 5 percent in Detroit, and 6 percent in the benchmark communities. This is despite above-trend growth in annual compensation per employee in all three communities. Growth in compensation was greatest in Grand Rapids at 11 percent, while Detroit, benchmark communities, and national average grew by between 2 and 6 percent.

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 mostly declines in per-member expenditures across conditions between 2021 and 2022 in KOMA counties. Spending was down for depression (-15.2 percent), hyperlipidemia (-8.3 percent), diabetes (-5.8 percent), CAD (-4.8 percent), and low back pain (-2.1 percent). Expenditure only increased among healthy patients (+4.9 percent) and patients with an asthma diagnosis (+3.3 percent).

Expenditure differences between 2021 and 2022 in Detroit tended to match those of KOMA in sign and exceed them in magnitude. The greatest difference concerned healthy patients. Whereas spending on these patients increased in KOMA by 4.9 percent, it fell in Detroit by 7.7 percent. Beyond this, similar patterns to those of previous reports were found in 2022. We find that average annual inpatient admissions, visits to the emergency department, and the average number of prescription fills remain greater in the Detroit region than in KOMA for the chronic conditions studied here.

Telehealth utilization also remains higher in the Detroit region than in KOMA across all conditions. However, while telehealth utilization generally declined in both regions in 2022, the declines were much greater in magnitude in KOMA. Across all diagnosis categories, declines in KOMA were in the order of 22 to 30 percent, while those in Detroit were between 2 and 12 percent. The only condition for which telehealth utilization increased between 2021 and 2022 was depression, though the increase was marginal (0.15 percent) and only in Detroit. The percent declines in KOMA in 2022 are similar in magnitude to those observed in Detroit in 2021. Taken together with previous reports, it seems KOMA is roughly one year behind Detroit in year-to-year changes in telehealth utilization.

Disparities

The member data from Blue Care Network, Blue Cross Blue Shield of Michigan, and Priority Health were linked with 2020 census data on population, mean household 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 version of the report marks the first time using the most recent census data, as opposed to that from 2010, which we expect to improve its accuracy. Furthermore, the insurance plans contributing data to this section provided more detailed information on total member months by ZIP code, allowing us to construct more accurate weighted averages and measures of prevalence. We observe patterns that are consistent with disparities by income and race in Michigan, although there are persistent differences between the east and west sides of the state, especially concerning race.

Concerning income, while both KOMA and Detroit regions exhibited a disparity between High- and Low-Income ZIP codes in the underlying health characteristics of the population, the disparity was greater in magnitude in KOMA. This is despite KOMA having less disparity in household income than Detroit. The average risk score among residents of the Low-Income ZIP codes of the KOMA region is 37 percent greater than that of the High-Income ZIP codes; it is only 25 percent in the Detroit region. Similar patterns of greater health disparities by income in KOMA than Detroit were observed for CAD and hyperlipidemia.

Concerning race, despite the updated census information and coding changes, the different patterns in health disparities remain for many variables between the two regions. Average risk scores were relatively high in High Share Black ZIP codes of Detroit, but not so for the KOMA region. High Share Black ZIP codes of KOMA have a greater concentration of healthy members than do its High Share White ZIP codes, while the reverse is true for Detroit. A similar pattern is observed for members with asthma, depression, or low back pain diagnoses. Diabetes was far more prevalent in the High Share Black ZIP codes of Detroit than in the High Share White ZIP codes, while the KOMA region reveals no clear pattern. Hyperlipidemia is much more prevalent in Detroit's High Share White ZIP codes than in its High Share Black ZIP codes, but no pattern is observed in KOMA.

To summarize, the two regions continue to show key differences in racial disparities between the two regions, even after we updated our data and methods. On the other hand, several key income disparities in disease prevalence have emerged in the KOMA region that, while similar in pattern, are greater in magnitude than Detroit. This is a concerning development in this year's report that was not observed in previous years.

Knowledge Foundations

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Education and Job Growth

We will commence our discussion on job growth trends by examining changes in total employment in the United States and the State of Michigan, relative to January 2005. **Figure 1** illustrates the growth in nonfarm payroll jobs from January 2005 through June 2023.

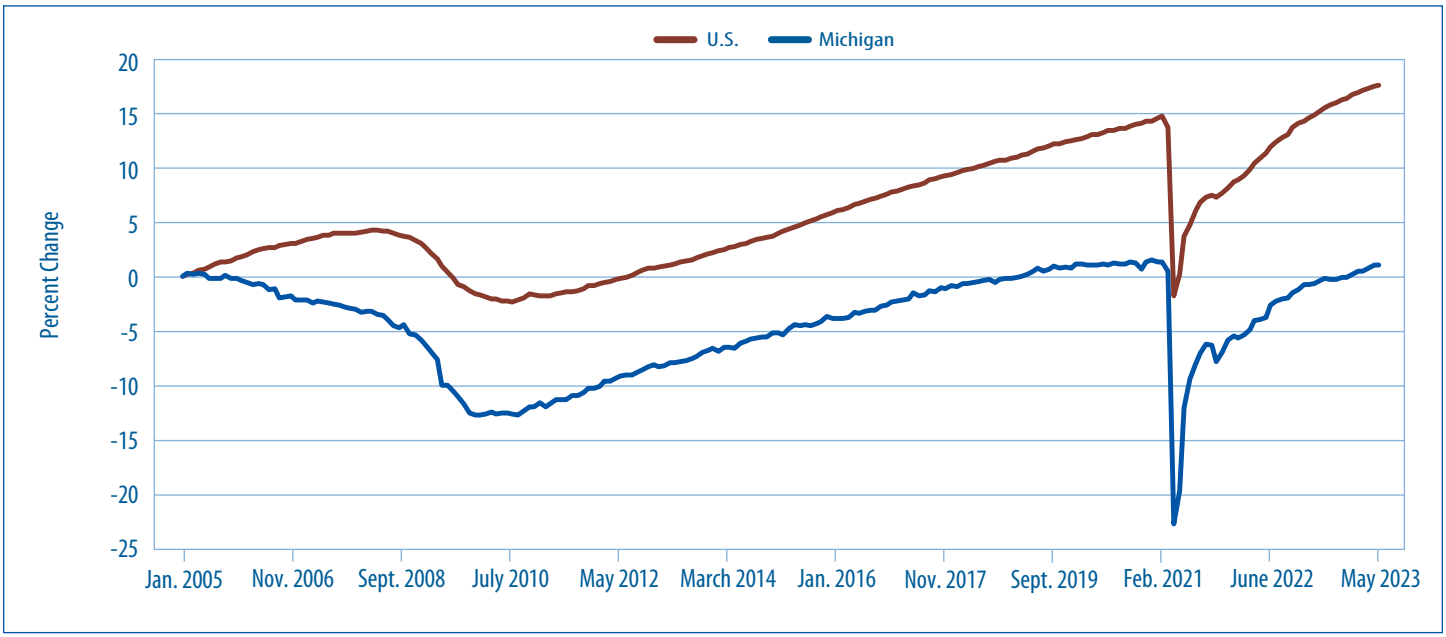
Following the 2008 recession, attention was drawn to the significant decline in jobs in both Michigan and the U.S. At the peak of the recession, jobs fell by more than 2 percent nationally and by nearly 13 percent in Michigan compared to their 2005 levels. Both Michigan and the U.S. began adding jobs in early 2010. By April 2014, job growth in the U.S. had recovered to its pre-recession level of 4 percent and has continued to increase. However, Michigan did not return to pre-recession job levels until January 2018, resulting in the state experiencing only minimal net job gains for over a decade.

The positive economic outlook in Michigan and the U.S. during the preceding years was abruptly disrupted in the first quarter of 2020 by an unprecedented outbreak of the novel coronavirus (COVID-19) in Wuhan, China. This virus rapidly spread worldwide, triggering a global pandemic. The measures taken to mitigate the pandemic's effects, such as business closures, combined with a significant negative health shock, had a severe impact on the job growth rate.

In April 2020, job growth plummeted from a 14 percent annual rate in 2019 to approximately -2 percent in the U.S. Michigan experienced an even steeper decline, with nonfarm payroll jobs falling by about 21 percent in April 2020, surpassing the decline seen in the U.S. Moreover, the gap between U.S. job growth and that of Michigan widened from 13 percentage points in 2019 to a 16 percentage point gap in 2022.

On a positive note, both the U.S. and Michigan economies have undergone a rapid recovery since May 2020. Notably, the U.S. economy achieved a remarkable 15 percent increase in job growth in 2022, surpassing the 4.2 percent growth rate observed before the 2008 recession. Although Michigan has experienced a notable surge in nonfarm payroll jobs since May 2020, its growth rate still significantly lags behind that of the U.S. Nevertheless, it is crucial to highlight that the State of Michigan managed to rebound from a 23 percent decline in job growth in April 2020 to achieve a 1 percent increase in June 2023.

Figure 1: Nonfarm Payroll Jobs Percent Change, January 2005 to June 2023



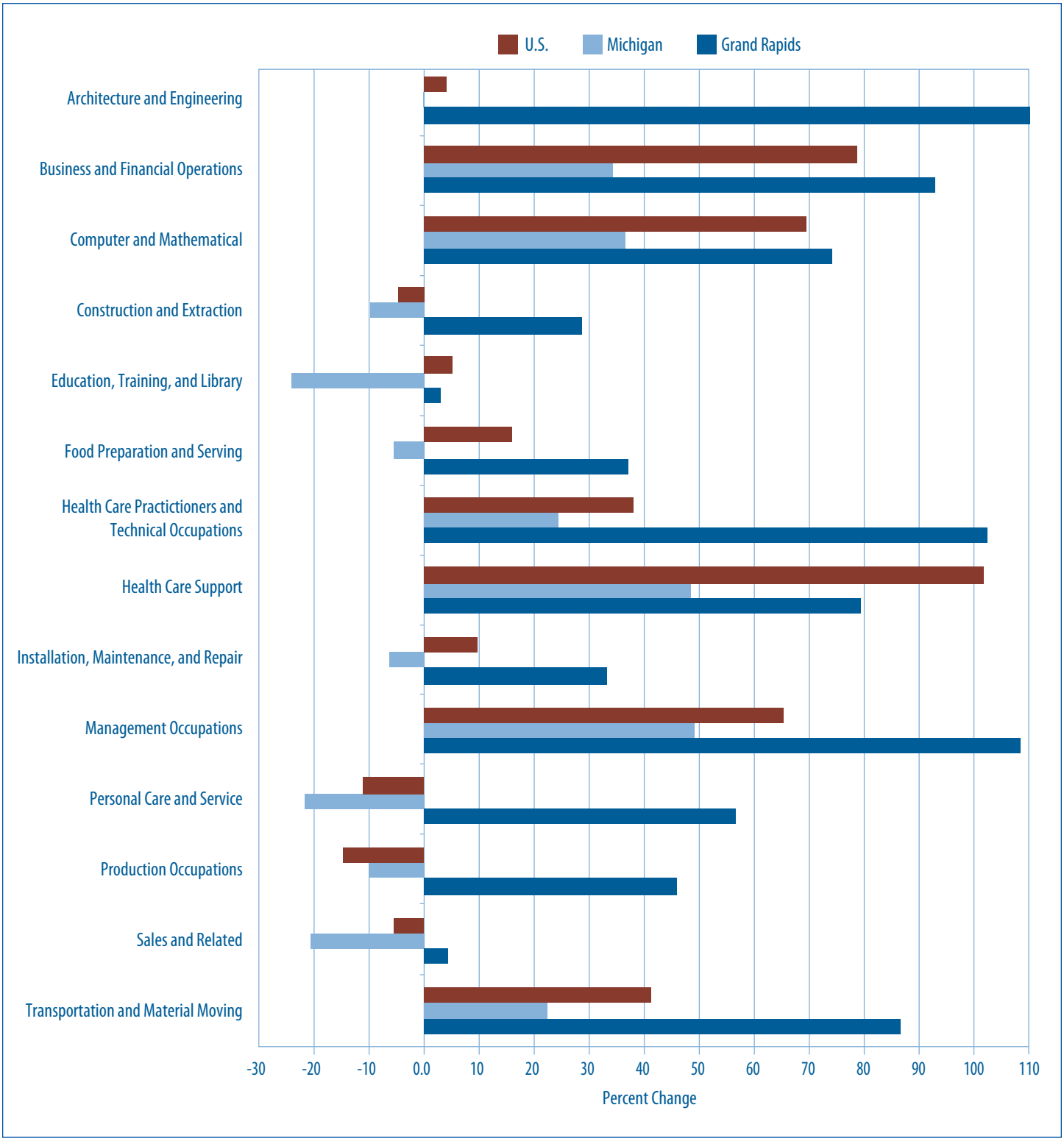
U.S. Source: http://data.bls.gov/cgi-bin/srgate
U.S. Series ID: CES0000000001

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 at the industry level from 2005 to 2022. We present data for the Grand Rapids metropolitan statistical area (MSA), the State of Michigan, and the entire United States. The Grand Rapids region has witnessed significant job growth, exceeding 50 percent, in seven occupational categories:

1. Personal care and service (57 percent)
2. Computer and mathematical occupations (74 percent)
3. Health care support (80 percent)
4. Business and financial operations (93 percent)
5. Health care practitioners and technical occupations (102 percent)
6. Management and occupations (109 percent)
7. Architecture and engineering (111 percent)

Figure 2: Job Growth for Select Major Occupational Groups, 2005-2022



National 2005: http://www.bls.gov/oes/2005/may/oes_nat.htm
National 2021: http://www.bls.gov/oes/2021/may/oes_nat.htm

Michigan 2005: http://www.bls.gov/oes/2005/may/oes_mi.htm
Michigan 2021: http://www.bls.gov/oes/2021/may/oes_mi.htm

Grand Rapids 2005: http://www.bls.gov/oes/2005/may/oes_24340.htm
Grand Rapids 2021: http://www.bls.gov/oes/2021/may/oes_24340.htm

These substantial growth rates in various occupational categories highlight the dynamic employment landscape in the Grand Rapids region over this period.

Grand Rapids has witnessed significant employment growth over the past decade, particularly in health care practitioners and technical occupations. Local job growth in these fields has exceeded both state and national growth rates. In fact, employment in health care practitioners and technical occupations in Grand Rapids has expanded at a rate nearly four times that of the state and triple the national average since 2005.

An important development in 2021 was the increasing trend in the growth rate of these health care occupations, compared to the figures reported in 2020 (for example, refer to **Health Check 2021**. This suggests a robust recovery in health care employment following the initial economic downturn caused by COVID-19.

It is worth noting that certain employment sectors in the U.S. experienced significant job losses between 2005 and 2022. These sectors include personal care and service, production occupations, construction and extraction, as well as sales and related occupations.

We have observed significant declines in multiple occupations across Michigan, indicating that the negative impact of COVID-19 was more pronounced in areas outside of Grand Rapids. As of May 2022, there have been notable decreases in the growth rates of the following occupations: food preparation and serving (-5 percent); installation, maintenance, and repair (-6 percent); production occupations (-10 percent); construction and extraction (-10 percent); sales and related occupations (-21 percent); and personal care and service (-22 percent).

Furthermore, there has been a growing negative growth rate trend within education, training, and library occupations throughout the state, with a nearly 24 percent drop since 2005. Additionally, this trend may be linked to a decline in the school-aged population, which has steadily decreased (with a drop of more than 13 percent since 2002) in Michigan, as reported by data from the Michigan Department of Education and the National Center for Education Statistics.

In connection with the declining school-aged population, reports of a reduced number of high school graduates in Michigan could also impact the supply of individuals seeking university-level education and subsequently entering the labor force for these in-demand occupations (Bransberger and Michelau, 2016). However, it is noteworthy that compared to 2021, the decline in the growth of these occupations is much smaller, indicating a gradual recovery in the labor market in Michigan over the past year.

In light of these employment trends, we conducted an analysis of labor supply and demand conditions in the health care sector in both Grand Rapids and Michigan. Our approach included

1. assessing job growth in selected health care occupations since 2005;
2. formulating specific employment demand predictions for various health care professions in the Grand Rapids area; and
3. evaluating changes in earnings for these professions over the past decade.

Table 1 presents historical employment levels and growth data for various health care occupations based on Bureau of Labor Statistics (BLS) data for both the Grand Rapids metro area and the State of Michigan. We report growth figures since 2005 and since 2021 to capture both long-term and recent changes.

In general, Grand Rapids has seen more substantial job growth in the health care sector compared to the state as a whole since 2005. Notable growth has been observed in occupations such as diagnostic medical sonographers, dietitians and nutritionists, emergency medical technicians (EMTs) and paramedics, medical records specialists, registered nurses (RNs), occupational and physical therapists, occupational and physical therapy assistants, physician assistants, pediatricians, all other physicians, pharmacists, radiologic technologists and technicians, recreational therapists, respiratory therapists, and surgical technicians.

However, a few health care occupations in Grand Rapids experienced job losses since 2005, including medical transcriptionists, nuclear medicine technologists, licensed practical or licensed vocational nurses (LPNs or LVNs), opticians, and family medicine practitioners.

In the State of Michigan, significant job growth has been seen among diagnostic medical sonographers, medical assistants, medical records specialists, occupational therapy assistants, pharmacy technicians, physician assistants, pediatricians, and surgical technologists. Conversely, job losses occurred in occupations such as audiologists, dentists, dental hygienists, medical transcriptionists, nuclear medicine technologists, LPNs or LVNs, nursing aides and assistants, opticians, optometrists, family medicine practitioners, and surgeons.

When analyzing growth rates in the health care sector since 2021, the pandemic has introduced some variations. Employment in certain health care occupations is still in the process of recovery, with job creation in fields like dental assistants, RNs, LPNs or LVNs, opticians, and surgeons. Conversely, job losses persist in occupations such as dentists, diagnostic medical sonographers, dietitians and nutritionists, nursing aides and assistants, occupational therapists, occupational therapy assistants, physical therapists, physical therapy assistants, and recreational therapists.

Table 2 presents employment projections for both Michigan and the Grand Rapids metro area, generated by aligning historical and projected employment data from the Bureau of Labor Statistics with employment growth rate estimates from the Michigan Department of Technology, Management, and Budget.

In the left-hand columns of **Table 2**, you will find occupation-specific employment figures for 2022, corresponding annualized average growth rates, and projected employment figures for 2030. Moving to the next two columns, we have translated these growth rates into annual job growth numbers. The following two columns provide replacement rate figures, indicating the portion of current employment expected to transition due to retirements or other employment changes.

Projected employment consists of two components: job growth (new positions) and replacement (existing positions that become vacant). To estimate the average annual job openings in both Michigan and the Grand Rapids metro area, we combine these two components. These estimates are presented in the last two columns of **Table 2**.

Notably, some of the occupations with the highest expected annual job openings include dental assistants (152 in Grand Rapids and 1,497 for the state), home health and personal care aides (1,208 in Grand Rapids and 13,013 for the state), medical assistants (309 in Grand Rapids and 3,502 for the state), licensed practical or licensed vocational nurses (112 in Grand Rapids and 881 for the state), registered nurses (913 in Grand Rapids and 6,192 for the state), and nursing aides and assistants (704 in Grand Rapids and 5,421 for the state).

It is worth mentioning that compared to last year's predictions for annual job openings, we have revised the estimates for nurses and nurse aides downward.

Table 3 provides a comprehensive overview of inflation-adjusted earnings growth in health professions for Grand Rapids, Michigan, and the entire United States. Once again, the wage estimates are sourced from the Bureau of Labor Statistics, and we have compared changes in these estimates for both the long term (from 2005 to 2022) and the short term (from 2021 to 2022).

Our focus was on fields in which real earnings have either increased or decreased by more than 7 percent during the 2005 to 2020 period. In Grand Rapids, occupations that experienced the largest decline in real earnings include dental assistants, dental hygienists, diagnostic medical sonographers, EMTs and paramedics, medical assistants, occupational therapists, family medicine practitioners, respiratory therapists, speech-language pathologists, and surgical technologists.

For the State of Michigan, real earnings losses beyond 7 percent were observed in dental assistants, dental hygienists, diagnostic medical sonographers, dietitians and nutritionists, optometrists, physical therapists, family medicine practitioners, and speech-language pathologists. Notably, in Grand Rapids, no occupation saw a significant real earnings gain from 2005 to 2022. However, LPNs or LVNs, nursing aides and assistants, occupational therapy assistants, optometrists, and physician assistants experienced positive wage growth in the region during this period. On the other hand, physician assistants saw wage growth exceeding 7 percent for the state as a whole.

Comparing earnings changes in Grand Rapids to those in Michigan or the entire U.S., we discovered both similarities and intriguing differences. For example, since 2005, real wages increased nationally for diagnostic medical sonographers, dietitians and nutritionists, EMTs and paramedics, medical assistants, registered nurses, physical therapists, family medicine practitioners, respiratory therapists, speech-language pathologists, and surgical technologists but declined in both Michigan and Grand Rapids. In the U.S., real wages decreased for dental assistants, dental hygienists, and optometrists. However, the most substantial real wage increases since 2005 were observed for occupational therapists, occupational therapy assistants, physician assistants, and respiratory therapists in the U.S.

When examining more recent changes between 2021 and 2022 in Grand Rapids, no occupation experienced more than a 7 percent growth in real annual earnings. Nevertheless, the earnings growth for dietitians and nutritionists, EMTs and paramedics, LPNs or LVNs, occupational therapists, optometrists, physician assistants, and respiratory therapists was notably higher in Grand Rapids than in both Michigan and the broader U.S. During the short-term, we also noted a significant decline in earnings for family medicine practitioners across Grand Rapids, Michigan, and the U.S. as a whole.

We emphasize that the estimates presented in this section are subject to change based on economic shifts or alterations in the regulatory health care landscape. Additionally, a decrease in the number of high school graduates, coupled with a notable decline in the number of education jobs in recent years, suggests a potential decrease in the pool of individuals entering university programs in the future. Consequently, policy and community efforts will play a pivotal role in retaining the current skilled health care workforce and encouraging talented individuals to pursue degrees leading to employment within the health care sector.

References

Bransberger, & Michelau. (2016). *Knocking at the college door - Projections of high school graduates, Dec 2016 edition.* Retrieved September 4, 2020, from https://static1.squarespace.com/static/57f269e19de4bb8a69b470ae/t/58d2eb93bf629a4a3878e f3e/1490217882794/Knocking2016FINALFORWEB-revised021717.pdf.

Table 1: Health Care Job Growth for Selected Occupations, 2005-2021

Occupation	Grand Rapids				
	Employment (2005)	Employment (2021)	Employment (2022)	Employment Growth (%) Since 2005	Employment Growth (%) Since 2021
Anesthesiologists	N/A	N/A	300	N/A	N/A
Audiologists	N/A	30	60	N/A	100.0
Cardiovascular Technologists/Technicians	N/A	330	330	N/A	0.0
Dental Assistants	860	1,300	1,340	55.8	3.1
Dental Hygienists	690	1,090	940	36.2	-13.8
Dentists, General	350	460	390	11.4	-15.2
Diagnostic Medical Sonographers	130	370	300	130.8	-18.9
Dietitians and Nutritionists	140	310	260	85.7	-16.1
EMT and Paramedics	450	790	870	93.3	10.1
Home Health and Personal Care Aides	N/A	7,440	7,680	N/A	3.2
Medical Assistants	1,540	2,260	2,390	55.2	5.8
Medical Records Specialists/ Medical Dosimetrists/ Health Technologists and Technicians	510	850	990	94.1	16.5
Medical Transcriptionists	290	100	90	-69.0	-10.0
Nuclear Medicine Technologists	110	80	80	-27.3	0.0
Nurse Practitioners	N/A	720	840	N/A	16.7
Nurses, RN	6,310	14,120	14,200	125.0	0.6
Nurses, LPN or LVN	1,870	1,250	1,310	-29.9	4.8
Nursing Aides and Assistants	4,950	5,580	5,530	11.7	-0.9
Occupational Therapists	230	720	540	134.8	-25.0
Occupational Therapy Assistants	50	290	210	320.0	-27.6
Opticians, Dispensing	320	340	250	-21.9	-26.5
Optometrists	80	120	110	37.5	-8.3
Pharmacists	560	970	1,070	91.1	10.3
Pharmacy Technicians	700	1,600	1,630	132.9	1.9
Physical Therapists	330	1,140	750	127.3	-34.2
Physical Therapist Assistants	100	520	360	260.0	-30.8
Physician Assistants	180	870	730	305.6	-16.1
Physicians, Family Medicine	270	170	140	-48.1	-17.6
Physicians, Obstetricians and Gynecologists	N/A	100	100	N/A	0.0
Physicians, Pediatricians	30	240	220	633.3	-8.3
Physicians, Psychiatrists	N/A	100	110	N/A	10.0
Physicians, Surgeons	100	130	140	40.0	7.7
Physicians, All Other	380	910	1,170	207.9	28.6
Radiologic Technologists and Technicians	380	770	860	126.3	11.7
Recreational Therapists	60	170	120	100.0	-29.4
Respiratory Therapists	240	700	730	204.2	4.3
Speech-language Pathologists	390	590	560	43.6	-5.1
Surgical Technologists	220	660	610	177.3	-7.6

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

Michigan 2020: http://www.bls.gov/oes/2020/may/oes_mi.htm
Grand Rapids 2020: http://www.bls.gov/oes/2020/may/oes_24340.htm

Michigan 2021: http://www.bls.gov/oes/2021/may/oes_mi.htm
Grand Rapids 2021: http://www.bls.gov/oes/2021/may/oes_24340.htm

	Michigan				
	Employment (2005)	Employment (2021)	Employment (2022)	Employment Growth (%) Since 2005	Employment Growth (%) Since 2021
	N/A	1,390	1,690	N/A	21.6
	690	350	640	-7.2	82.9
	1,940	2,260	2,380	22.7	5.3
	9,650	11,150	11,390	18.0	2.2
	7,850	7,750	7,400	-5.7	-4.5
	4,570	3,700	3,390	-25.8	-8.4
	1,510	3,040	2,910	92.7	-4.3
	1,410	2,150	1,920	36.2	-10.7
	6,670	6,140	7,260	8.8	18.2
	N/A	79,170	82,230	N/A	3.9
	14,490	23,650	24,710	70.5	4.5
	4,820	7,430	9,640	100.0	29.7
	3,080	1,640	930	-69.8	-43.3
	960	620	630	-34.4	1.6
	N/A	5,830	7,250	N/A	24.4
	81,370	102,480	101,470	24.7	-1.0
	17,850	10,680	10,460	-41.4	-2.1
	48,960	41,200	41,050	-16.2	-0.4
	3,510	4,610	4,400	25.4	-4.6
	890	1,430	1,420	59.6	-0.7
	3,550	3,840	3,500	-1.4	-8.9
	1,290	1,030	1,220	-5.4	18.4
	8,110	10,170	10,200	25.8	0.3
	8,560	15,520	14,890	73.9	-4.1
	5,170	8,000	7,040	36.2	-12.0
	2,550	3,550	3,310	29.8	-6.8
	2,320	5,010	5,370	131.5	7.2
	3,030	1,730	2,310	-23.8	33.5
	750	590	830	10.7	40.7
	370	1,160	1,070	189.2	-7.8
	400	500	520	30.0	4.0
	1,640	1,350	600	-63.4	-55.6
	10,220	11,820	11,970	17.1	1.3
	6,020	6,300	6,710	11.5	6.5
	700	860	700	0.0	-18.6
	3,390	4,820	4,630	36.6	-3.9
	3,340	3,850	4,200	25.7	9.1
	2,610	4,130	3,950	51.3	-4.4

Table 2: Need for Selected Professions in Michigan

Selected Professions	Michigan Employment (2022)[1]	Grand Rapids Employment (2022)[2]	Michigan Annual Growth Rate[3]	Grand Rapids Annual Growth Rate[4]
Dental Assistants	11,390	1,340	0.010	0.000
Dental Hygienists	7,400	940	0.010	0.000
Diagnostic Medical Sonographers	2,910	300	0.017	0.011
Dietitians and Nutritionists	1,920	260	0.008	0.006
EMT and Paramedics	7,260	870	0.011	0.000
Home Health and Personal Care Aides	82,230	7,680	0.023	0.028
Medical Assistants	24,710	2,390	0.016	0.012
Nurse Practitioners	7,250	840	0.042	0.019
Nurses, LPN or LVN	10,460	1,310	0.007	0.007
Nurses, RN	101,470	14,200	0.008	0.009
Nursing Aides and Assistants	41,050	5,530	0.007	0.010
Occupational Therapists	4,400	540	0.015	0.012
Occupational Therapy Assistants	1,420	210	0.032	0.018
Optometrists	1,220	110	0.010	0.003
Physical Therapists	7,040	750	0.017	0.011
Physician Assistants	3,310	360	0.028	0.020
Physicians, Family Medicine	2,310	140	0.003	N/A
Respiratory Therapists	4,630	730	0.021	0.018
Speech-language Pathologists	4,200	560	0.020	0.020
Surgical Technologists	3,950	610	0.007	0.005

Note: Job growth rate and annual change are based on rounded data. The 2030 projections were not available for Grand Rapids as of the writing of this study.
[1]Source: https://www.bls.gov/oes/2022/may/oes_mi.htm
[2]Source: https://www.bls.gov/oes/2022/may/oes_24340.htm
[3]Source: https://milmi.org/DataSearch/Employment-Projections-Excel-Files (Statewide Long-Term Projections 2020-2030, Occupational Projections)
[4]Source: Source: https://milmi.org/DataSearch/Employment-Projections-Excel-Files (Michigan Regional Long-Term Employment Projections 2018-2028, West Michigan Propserity Region Occupational Projections)

MI Annual Replacement Rate = (Replacement/Employment 2020)
GR Annual Replacement Rate = (Replacement/Employment 2018)

	Michigan Projected Employment (2030)	Grand Rapids Projected Employment (2030)	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
	12,482	1,340	109	0	0.122	0.113	1,497	152
	8,104	940	70	0	0.064	0.068	545	64
	3,381	331	47	3	0.075	0.060	266	21
	2,071	274	15	1	0.070	0.059	150	17
	7,977	870	72	N/A	0.068	0.068	567	N/A
	100,666	9,847	1,844	217	0.136	0.129	13,013	1,208
	28,600	2,661	389	27	0.126	0.118	3502	309
	10,486	995	324	16	0.066	0.063	799	68
	11,094	1,395	63	8	0.078	0.079	881	112
	108,697	15,392	723	119	0.054	0.056	6,192	913
	43,877	6048	283	52	0.125	0.118	5,421	704
	5,032	601	63	6	0.058	0.056	320	36
	1,891	247	47	4	0.146	0.117	254	28
	1,339	113	12	0	0.032	0.033	51	4
	8,202	828	116	8	0.044	0.045	426	42
	4,245	430	94	7	0.063	0.064	302	30
	2,382	N/A	7	N/A	0.027	N/A	70	N/A
	5,571	857	94	13	0.052	0.058	336	55
	5,019	669	82	11	0.065	0.058	354	44
	4,209	638	26	3	0.073	0.083	315	54

Table 3: Average Annual Earnings for Select Health Care Professions

Selected Professions Color Key: Above Seven Percent (+7%) Below Negative Seven Percent (-7%)	2005 Mean Annual Earnings*			2021 Mean Annual Earnings*		
	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.
Dental Assistants	$48,476	$46,438	$44,910	$44,130	$42,855	$45,912
Dental Hygienists	$76,813	$82,971	$90,838	$71,303	$72,059	$87,871
Diagnostic Medical Sonographers	$75,614	$77,847	$83,061	$72,059	$72,934	$87,137
Dietitians and Nutritionists	$69,170	$70,234	$68,856	$63,700	$64,056	$70,871
EMT and Paramedics	$45,359	$41,838	$42,617	$38,802	$39,666	$44,803
Home Health and Personal Care Aides	$31,019	$28,741	$29,101	$30,154	$29,690	$31,602
Medical Assistants	$40,789	$39,590	$39,200	$38,546	$38,492	$41,246
Nurse Practitioners	N/A	N/A	N/A	$117,680	$117,475	$127,486
Nurses, LPN or LVN	$54,965	$56,493	$54,260	$56,410	$58,419	$55,999
Nurses, RN	$78,236	$85,699	$85,234	$77,730	$82,006	$89,372
Nursing Aides and Assistants	$34,016	$35,454	$33,266	$35,771	$36,494	$35,911
Occupational Therapists	$96,668	$82,762	$88,561	$79,879	$84,113	$96,630
Occupational Therapy Assistants	$50,559	$59,130	$59,640	$57,306	$58,365	$68,647
Optometrists	$127,791	$144,424	$143,106	$132,077	$131,915	$135,479
Physical Therapists	$94,615	$99,080	$97,926	$89,729	$89,815	$100,356
Physician Assistants	$112,312	$107,577	$106,498	$117,766	$120,952	$129,020
Physicians, Family Medicine	$237,331	$209,114	$210,343	$240,630	$251,279	$254,811
Respiratory Therapists	$83,586	$69,005	$69,335	$63,959	$65,990	$73,647
Speech-language Pathologists	$121,677	$96,847	$86,912	$80,408	$84,761	$92,688
Surgical Technologists	$53,541	$54,950	$53,826	$48,806	$51,895	$57,879

Source: https://www.bls.gov/oes/tables.htm
* 2005 and 2021 Mean Annual Earnings are inflated to 2022 dollars
N/A = Not Available

	2022 Mean Annual Earnings			Percent Change in Real Annual Earnings Since 2005			Percent Change in Real Annual Earnings Since 2021		
	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.	Grand Rapids	Michigan	U.S.
	$43,820	$42,040	$44,710	-9.61	-9.47	-0.44	-0.70	-1.90	-2.62
	$70,770	$70,190	$84,860	-7.87	-15.40	-6.58	-0.75	-2.59	-3.43
	$68,820	$70,560	$84,410	-8.98	-9.36	1.62	-4.50	-3.26	-3.13
	$65,920	$64,720	$69,350	-4.70	-7.85	0.72	3.49	1.04	-2.15
	$39,759	$40,198	$45,000	-12.35	-3.92	5.59	2.47	1.34	0.44
	$29,920	$28,930	$30,930	-3.54	0.66	6.29	-0.78	-2.56	-2.13
	$37,480	$37,190	$40,700	-8.11	-6.06	3.83	-2.77	-3.38	-1.32
	$111,120	$113,780	$124,680	N/A	N/A	N/A	-5.57	-3.14	-2.20
	$56,860	$57,180	$55,860	3.45	1.22	2.95	0.80	-2.12	-0.25
	$76,910	$80,660	$89,010	-1.70	-5.88	4.43	-1.05	-1.64	-0.41
	$35,420	$35,960	$36,220	4.13	1.43	8.88	-0.98	-1.46	0.86
	$79,910	$83,900	$92,800	-17.34	1.38	4.79	0.04	-0.25	-3.96
	$53,900	$57,700	$66,280	6.61	-2.42	11.13	-5.94	-1.14	-3.45
	$134,050	$129,230	$133,100	4.90	-10.52	-6.99	1.49	-2.04	-1.76
	$88,740	$89,570	$97,960	-6.21	-9.60	0.03	-1.10	-0.27	-2.39
	$117,890	$116,870	$125,270	4.97	8.64	17.63	0.11	-3.38	-2.91
	$156,710	$185,420	$224,460	-33.97	-11.33	6.71	-34.88	-26.21	-11.91
	$64,550	$65,720	$74,310	-22.77	-4.76	7.18	0.92	-0.41	0.90
	$80,030	$81,670	$89,460	-34.23	-15.67	2.93	-0.47	-3.65	-3.48
	$48,470	$51,780	$57,500	-9.47	-5.77	6.83	-0.69	-0.22	-0.65

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 goes into creating the innovations and the investment opportunities that result from these innovations.

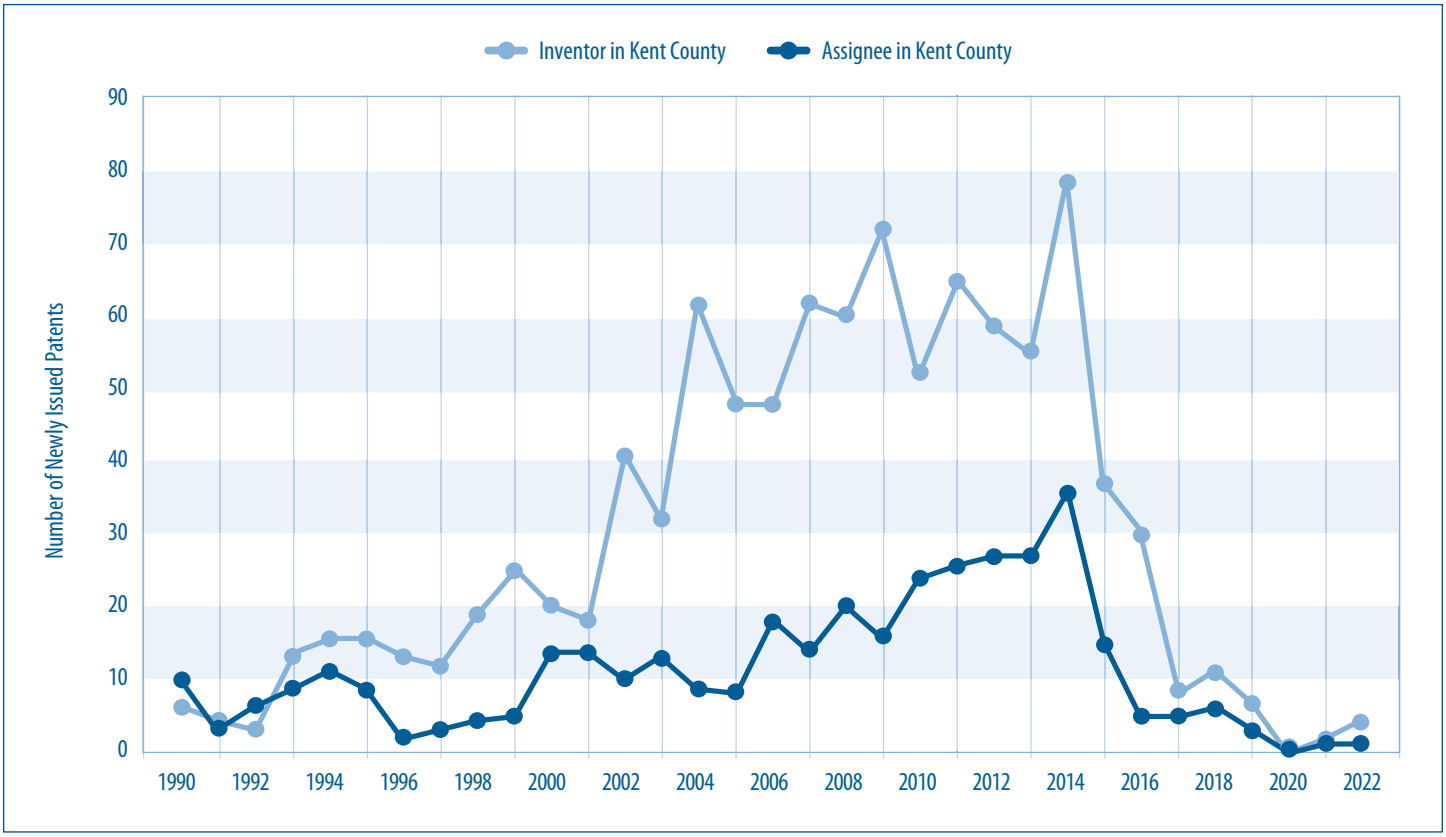
There are drawbacks to relying on patent data to measure innovative activity. Some inventors and assignees choose not to register patents for their innovations because doing so will require them to divulge details to competitors. Additionally, not all patents have a substantial impact on economic progress. Overall, 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 research and development (R&D) of innovative products.

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. In corporate settings, the business itself is usually the assignee while an individual researcher (or group of researchers) is the inventor. This differentiation can then result in location differences. For example, the inventor lives in Kent County, but the company that owns the patent is in China. Another example may be the inventor lives in Germany and the assignee is a company in West Michigan. To evaluate the economic significance of innovative activities, considering inventors and assignees separately is useful.

It should be noted that the USPTO unveiled a new database search tool in September 2022. Because of substantial improvements in the robustness of the search engine, the data and graphs shown here should not be compared directly with those from previous editions of Health Check.

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 2022.

Figure 1: Medical Patenting in Kent County, 1990–2022



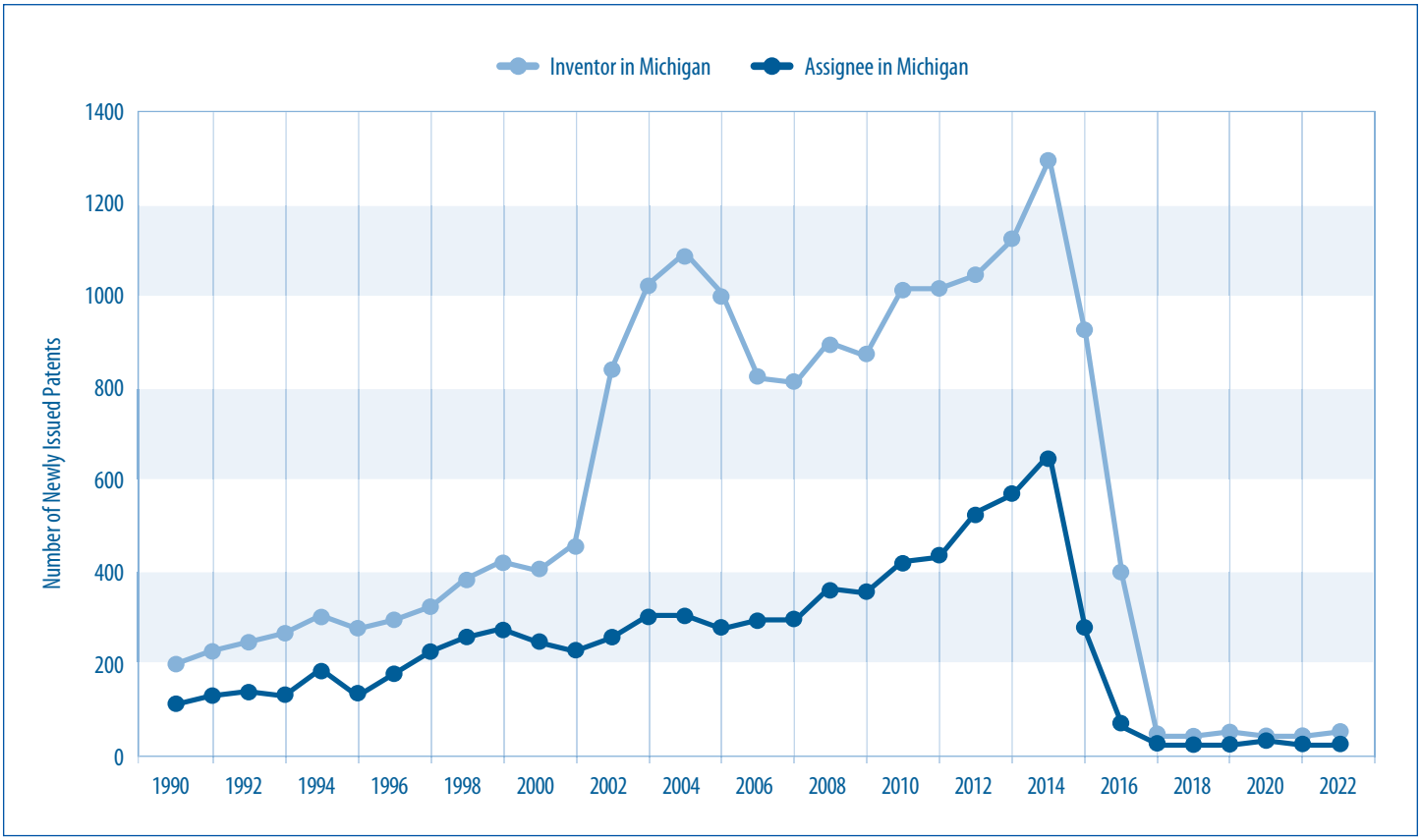
Source: United States Patent and Trademark Office, www.uspto.gov

For those with inventors living in Kent County, the average annual number of patents increased from 12.8 in the years 1990-1999 to 46.3 in the years 2000-2009, with a decreased average of 31.5 in the years 2010-2022. For those with assignees in Kent County, the average annual number of patents increased from 6.2 in the years 1990- 1999 to 13.6 in the years 2000-2009, with a minor decrease to 13.5 patents in the years 2010-2022. 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 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 79 in 2014 to four in 2022, and the annual number of new patents with assignees located in Kent County falling from 36 to one 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 2022.

Figure 2: Medical Patenting in Michigan, 1990–2022



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, 2014–2022

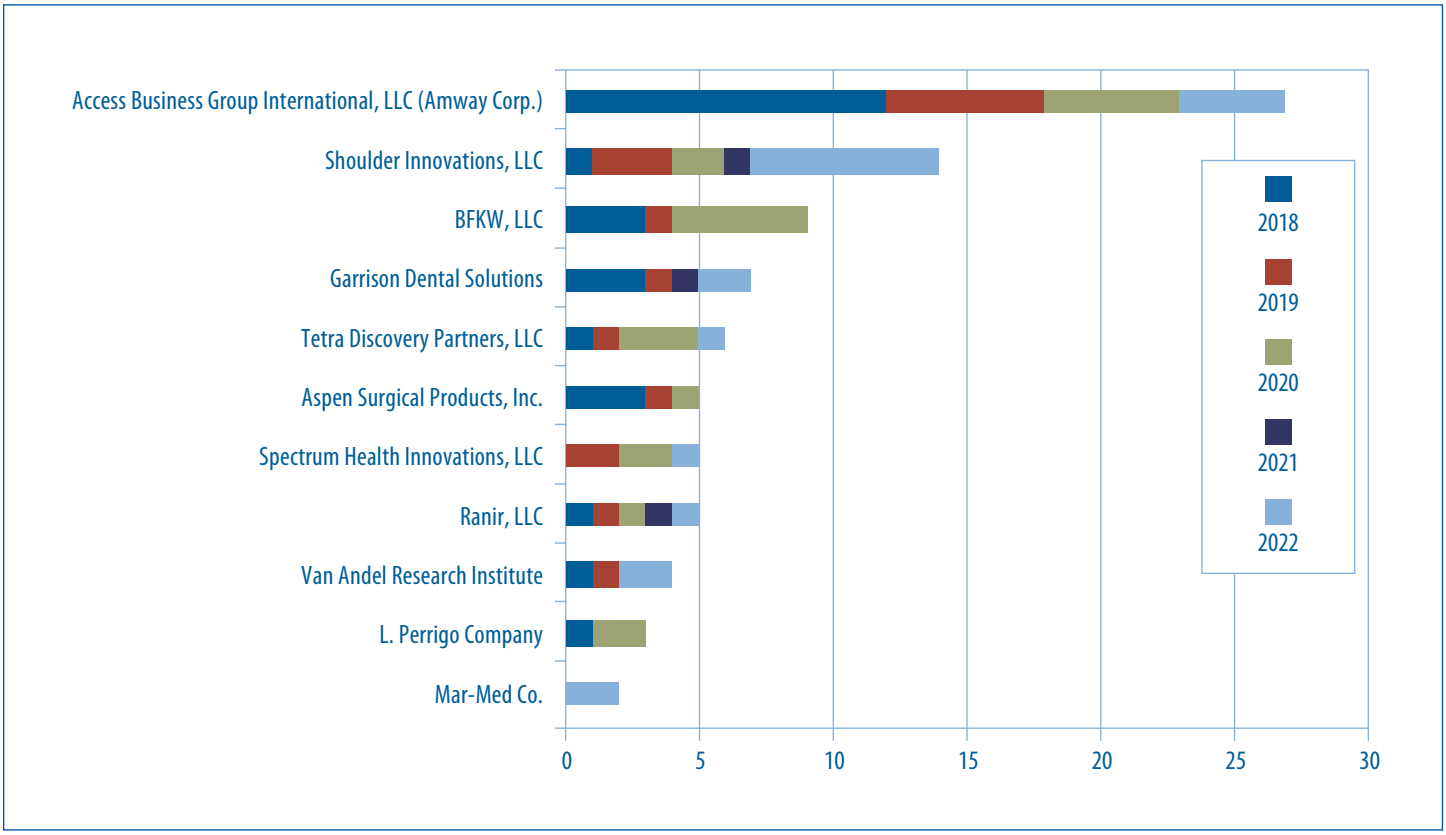
	Location of Inventor			Location of Assignee		
	Kent County	Michigan	U.S.	Kent County	Michigan	U.S.
Percent Change 2014-2022	-95	-96	-96	-97	-94	-96

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 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 2018 through 2022 is shown in **Figure 3**. Since 2018, the 11 West Michigan companies shown in **Figure 3** have been granted 87 medical patents. However, 47 percent of these filings come from only two companies.

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 2019-2022. 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 2022. Rather than increasing in recent years, the average wait time has been generally decreasing since 2010 through 2022, though it is possible that this pattern does not hold for medical patents.

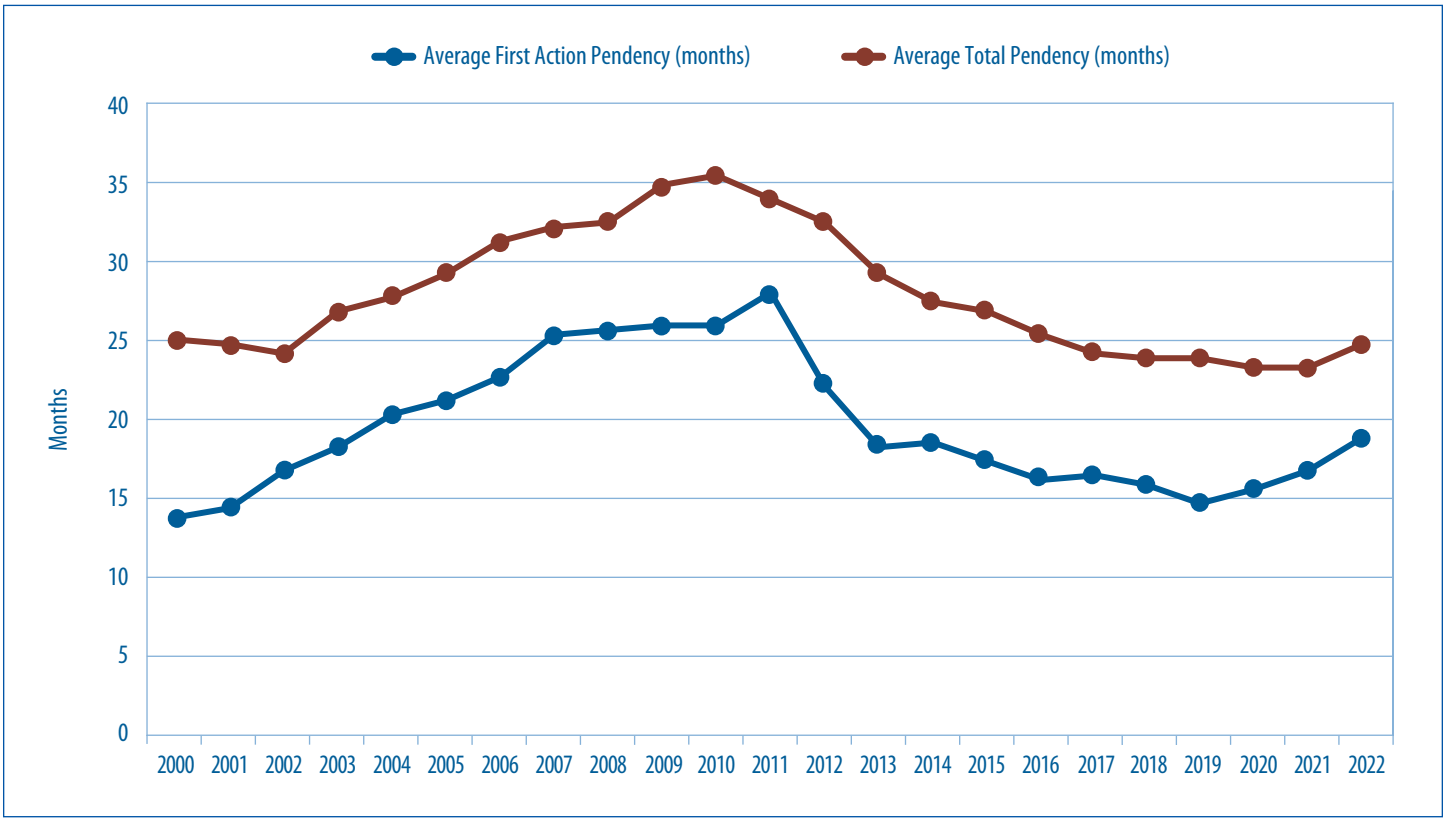
One possible explanation for the recent decrease in medical patents rests on a change in the patenting process itself and the resulting incentive structure. The Leahy-Smith America Invents Act (AIA) of 2011 switched U.S. patenting from a "first-to-invent" to a "first-to-file" system for patent applications 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. Research by Simons (2023) indicates that the implementation of the AIA does not coincide with any decrease in R&D spending on medical innovation. This could imply that the AIA has not led to a decrease in innovative efforts but has resulted in a decrease in desire to patent those innovations.

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*, 2000–2022



*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 2000-2022. **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.

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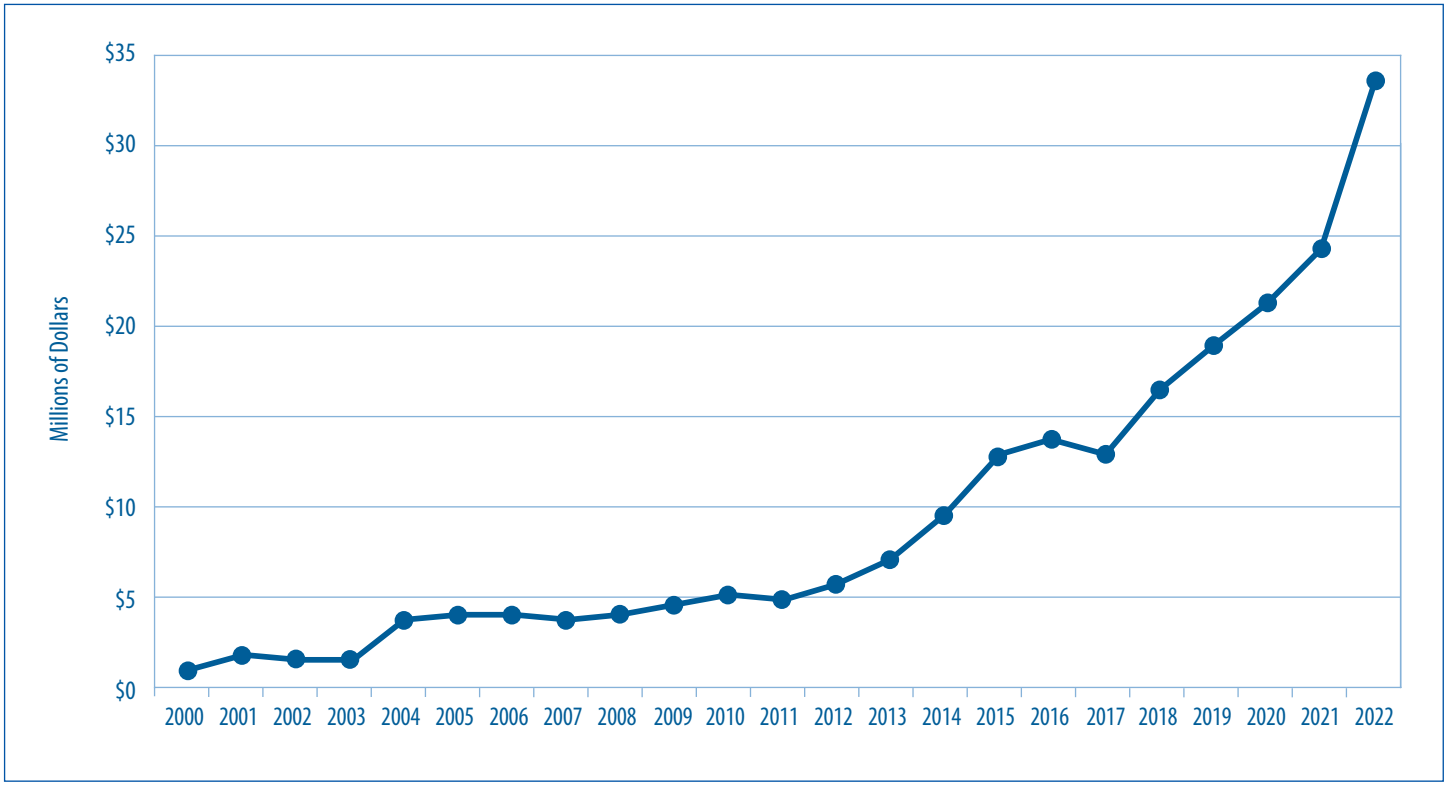
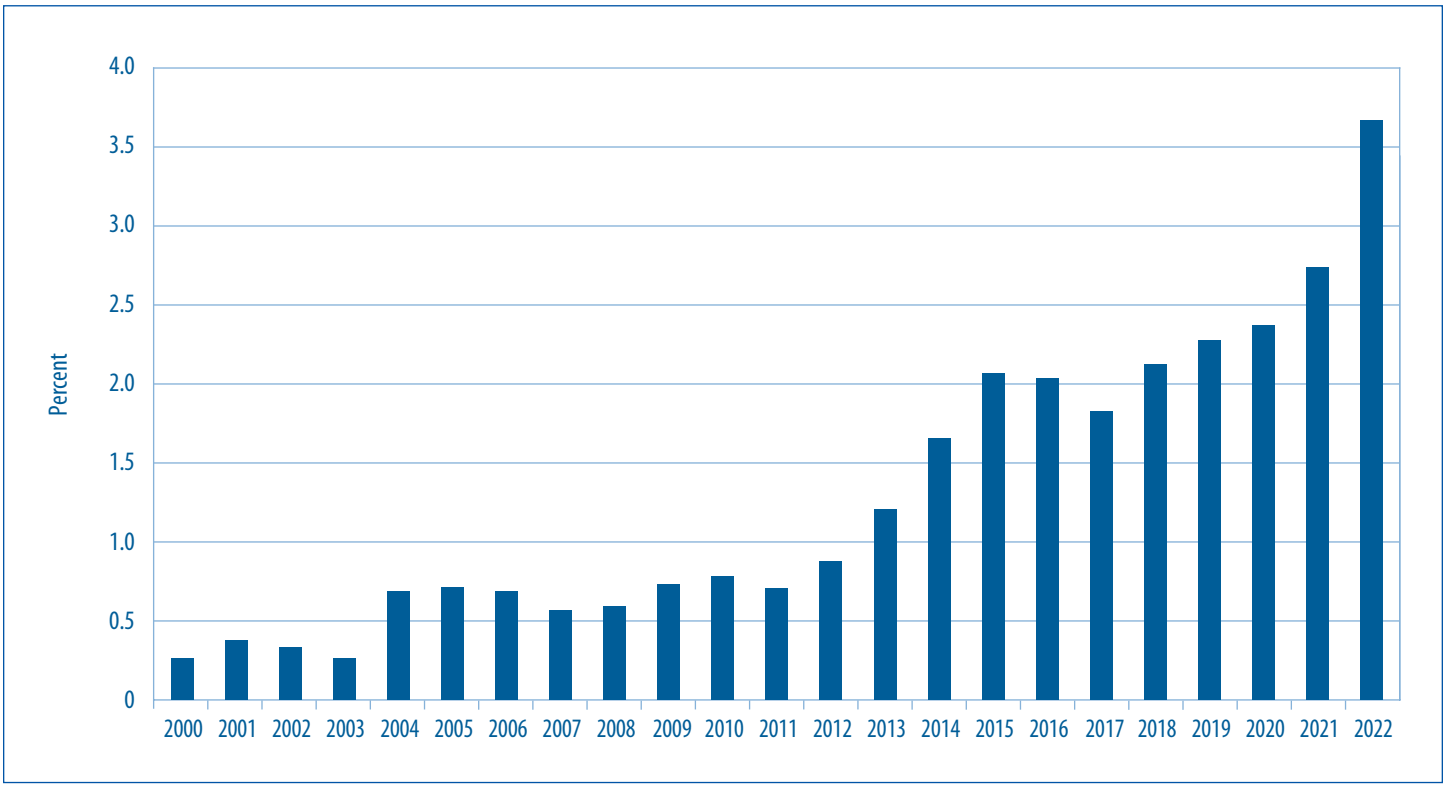
WIPO (2019). *World Intellectual Property Indicators 2019*. Geneva: World Intellectual Property Organization.

Figure 5: National Institute of Health Funding to West Michigan Organizations*, 2000-2022



*Kent, Ottawa, Muskegon, and Allegan Counties
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, 2000–2022



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

Health Care Trends

Grand Valley State University
www.gvsu.edu

Demographic Changes

Demographic changes have significant effects on the utilization of health care services. We are closely monitoring 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 lead to increased health care utilization and, consequently, higher expenditures. Additionally, as previously noted, there have been geographic shifts in population distribution from east to west, which can impact the demand for health care and the allocation of resources in specific regions.

Population Growth

Figure 1 displays population growth rates for Kent, Ottawa, Muskegon, and Allegan counties (KOMA), the Detroit region (Oakland, Macomb, and Wayne counties), the entire State of Michigan, and the U.S.

During the 1990s, KOMA experienced higher population growth rates compared to both Michigan and the U.S. However, in the mid-2000s, all regions, including KOMA and the Detroit region, saw a significant decline in growth rates. KOMA maintained positive population growth through the 2000s, except for a dip in 2010, while the Detroit region faced population loss from the early 2000s, lasting for about a decade.

In the early part of this decade, the Detroit region saw positive population growth before dipping into a negative growth rate in 2015. Between 2016 and 2018, the Detroit region experienced low but positive growth, averaging around 0.09 percent. However, since 2018, this trend has reversed, with the population growth rate reaching a low of -0.55 percent in 2022. The only exception to this trend was the first year of the pandemic in 2020 when there was a spike in population growth across the country and Michigan. Notably, the Detroit region experienced a more significant change in population growth, with an increase of about 1.6 percent.

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 0.22 percent in 2022.

While the western population growth rate appears to be slowing, the KOMA region's population growth from 2011 through 2022, on average, continued to surpass that in the Detroit region. These findings illustrate 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 2020, the relative decline was more than 6 percentage points larger for the Detroit region (Centers for Medicare and Medicaid Services, 2020).

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 down to 0.38 percent in 2022.

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. Individuals 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 4.4 percentage points from 2010 to 2022) 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 and 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 2022. By contrast, KOMA has a population distribution that is slightly younger than the U.S., though the population is still aging compared to 1990. Note that 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 further go down to 2.2 workers per beneficiary by 2095. Taken together, these findings 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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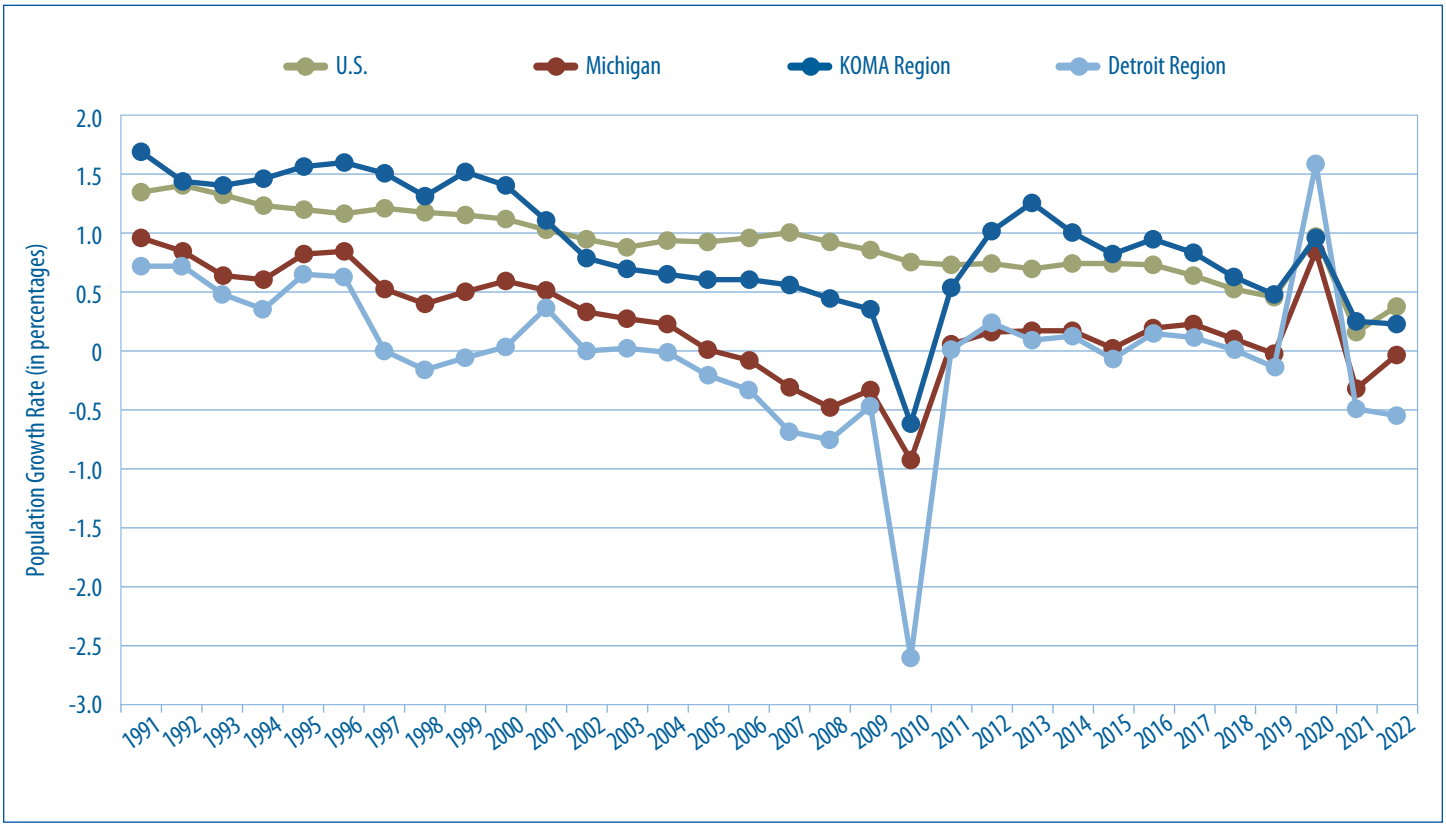
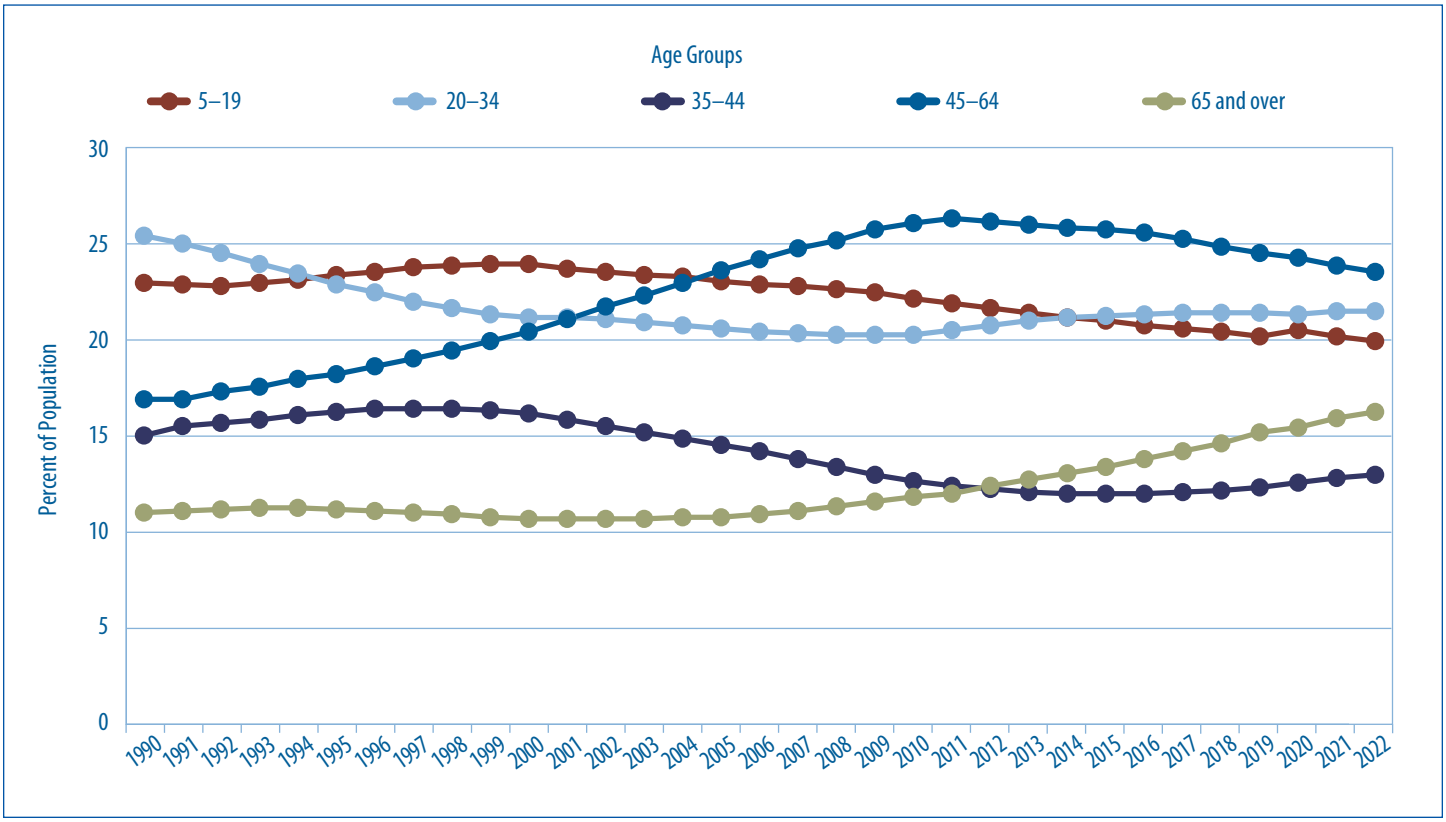
Figure 1: Annual Population Growth Rate, 1991–2022



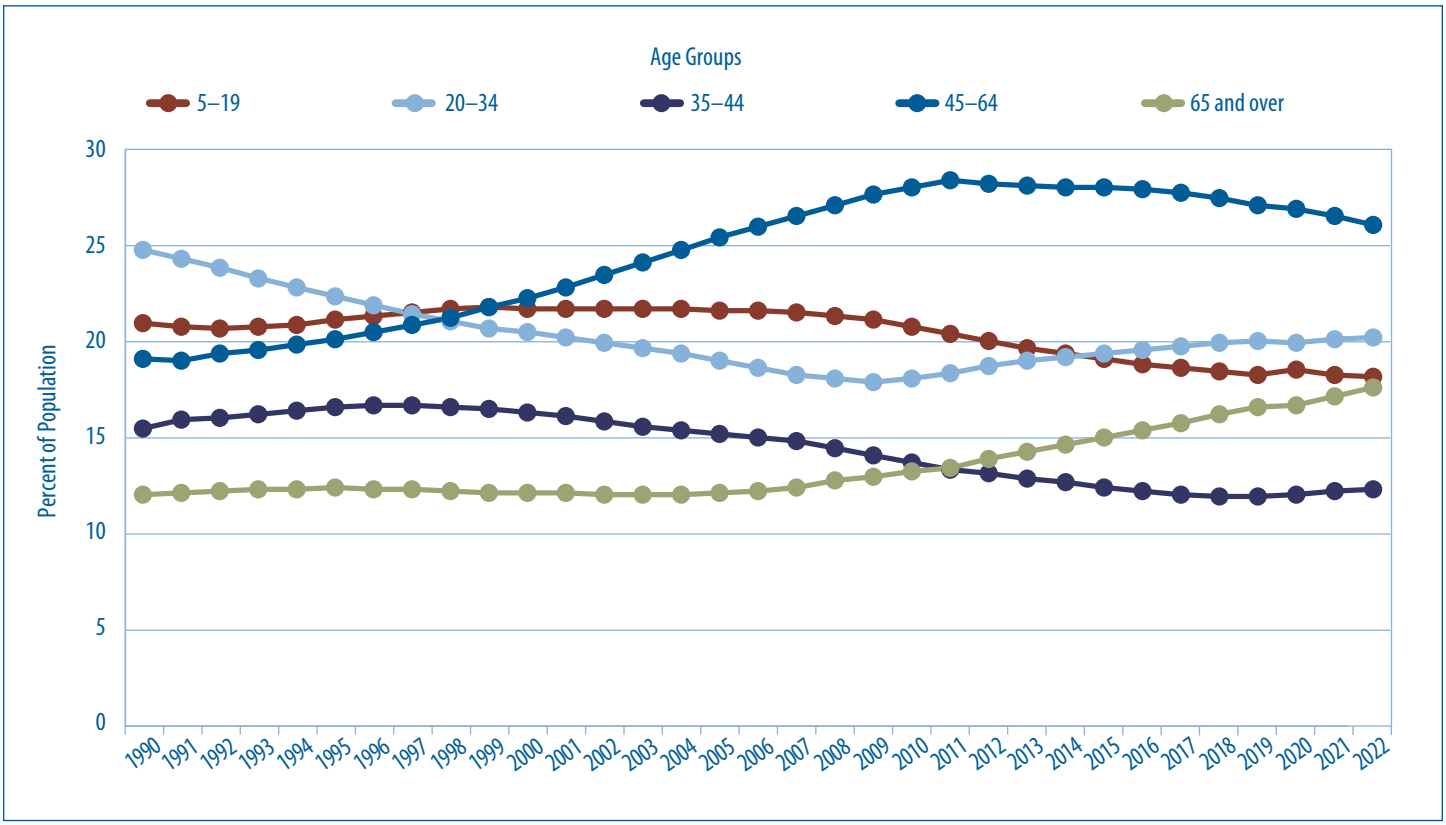
Source: U.S. Census, population and housing unit estimates

Figure 2: Population Distribution as a Percent of KOMA, 1990–2022



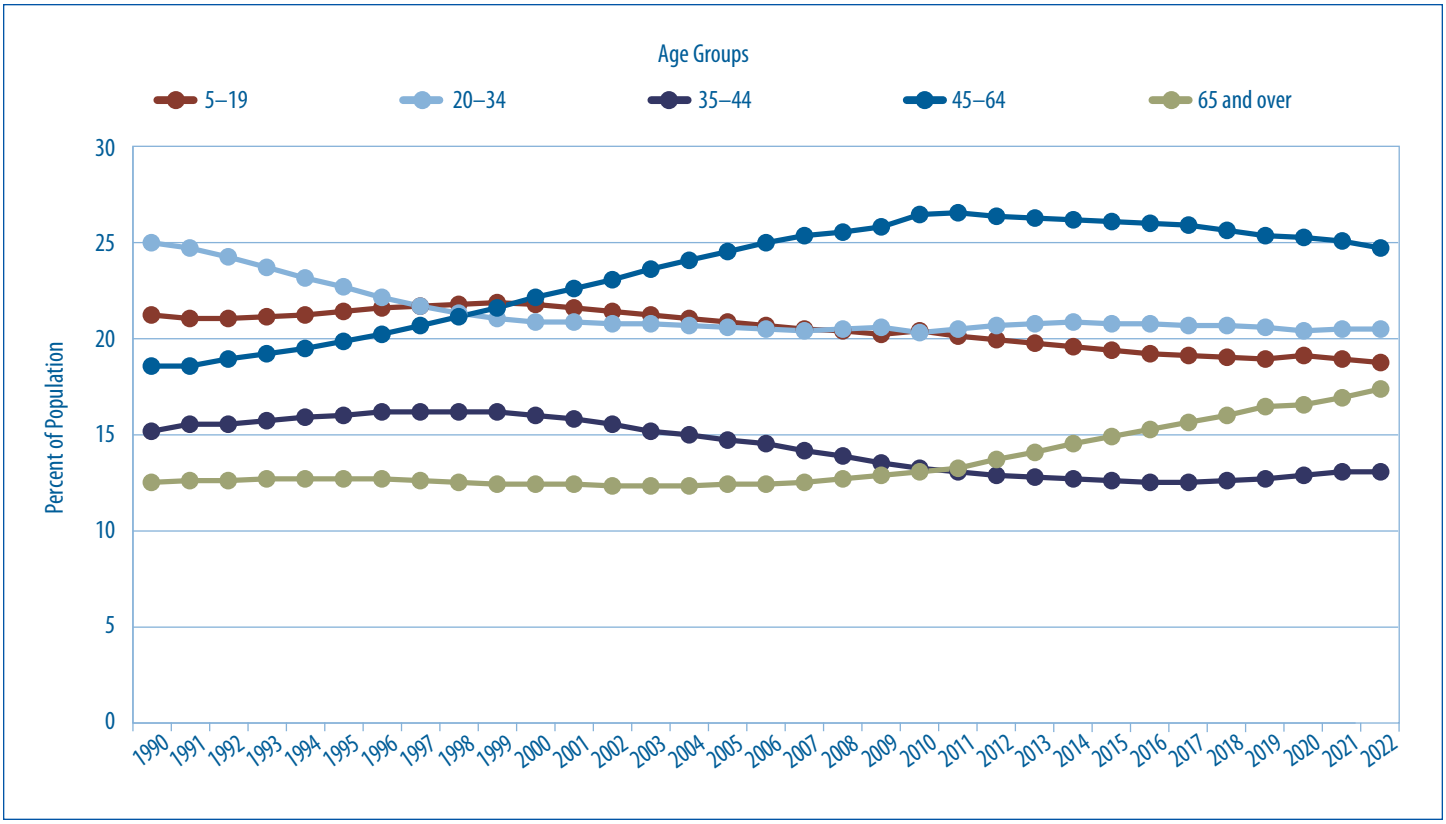
Source: U.S. Census, population and housing unit estimates

Figure 3: Population Distribution as a Percent of the Detroit Region, 1990–2022



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

Figure 4: Population Distribution as a Percent of Total United States, 1990–2022



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

Health Care Overview

In this section, we examine key health care trends across various aspects, including health care access, health status, mental health, general health risk factors (such as alcohol consumption, smoking, and obesity), vaccination behavior, and major chronic conditions. Our analysis focuses on comparing the West Michigan KOMA (Kent, Ottawa, Muskegon, and Allegan) counties with the Detroit region (Macomb, Oakland, and Wayne counties). Building upon last year's report, our primary emphasis is on understanding health disparities within KOMA and the Detroit region. To achieve this, we scrutinize health care trends based on race and gender, utilizing data sourced from the Michigan Department of Health and Human Services Behavioral Risk Factor Surveillance System (MiBRFSS).

It is important to note several limitations associated with MiBRFSS data. Firstly, the estimates are derived from self-reported surveys. Consequently, the actual incidence and prevalence rates for the factors we examine using this data may vary from those reported by respondents. Secondly, there exists a data suppression rule that restricts the release of certain estimates. If the denominator of a weighted percentage contains fewer than 50 observations and/or has a relative standard error exceeding 30 percent, then these estimates are withheld. This limitation becomes particularly relevant when segmenting the data by specific demographics, notably race, sexual orientation, and gender identity. In an effort to mitigate this issue regarding race, we have combined black non-Hispanic, other and multiracial, and Hispanic categories into a "non-white" category for our analysis by race, allowing us to compare white individuals to non-white individuals. However, it is important to acknowledge that, even under this classification, instances of missing estimates may occur in accordance with the suppression rule. Furthermore, due to the data suppression rule, we were unable to explore most of the outcomes by sexual orientation and gender identity.

Health Insurance and Access to Care

We begin our analysis by examining trends in measures related to health insurance and health care access. **Figures 1 and 2** depict the percentage of the population in the KOMA and Detroit regions reporting no health insurance, categorized by race and gender, respectively. The uninsured rates in both regions have decreased since 2011, owing to the improving economy and the increased availability of various health insurance options under the Affordable Care Act. For instance, as of September 2020, more than 790,000 people had 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 both KOMA and the Detroit regions were uninsured. By 2019, this figure had dropped to approximately 5 to 6 percent in both regions. However, a distinct trend emerges when focusing on the non-white population.

It is noteworthy that, while the trend of having no health insurance has consistently decreased among non-white populations in the Detroit region, the trend for non-white populations in KOMA has been more variable. In other words, we do not observe a consistent gain in terms of health insurance access among non-white individuals in KOMA. Specifically, they experienced a significant increase in having no health insurance in the years 2017 and 2019. In 2011, about 17 percent of non-white individuals were uninsured in KOMA, whereas an average of about 21 percent reported having no health insurance in both 2017 and 2019, representing a 4 percentage point increase from the 2011 level. This increase in the uninsured rate remains the largest when compared to other racial groups in both the western and eastern sides of the state.

These trends reversed during the COVID-19 outbreak in 2020, coinciding with a substantial increase in public health insurance enrollment, particularly Medicaid enrollment (Khorrami and Sommers, 2021). This trend is also reflected in our data, as we observe a decline in the percentage of the non-white population reporting no health insurance in 2020. Unfortunately, due to the unavailability of 2021 estimates for non-white individuals in KOMA, we were unable to determine whether this declining trend continued in 2021.

When we analyze health insurance trends by gender in KOMA, we observe an overall decline in the percentage of males and females reporting no health insurance in both West Michigan and the Detroit region. Although there was a slight uptick in the uninsured rate for males in 2019, we find a declining trend in 2020, which is consistent with the increased health insurance take-up during the pandemic.

The following six figures represent various measures of health care access that we would expect to be impacted by the changes in insurance coverage observed in **Figures 1 and 2**. **Figure 3** presents the estimates for the share of the white and non-white population who were unable to access health care at some point in the past 12 months due to costs. We observe significant disparities in health care access between non-white and white individuals, particularly in West Michigan. In 2019, 21.5 percent of the non-white population in KOMA reported lacking access to care due to costs. Unfortunately, the 2020 and 2021 estimates for non-white individuals in KOMA were not provided due to the data suppression rule. However, we find a decline from 12.1 percent in 2019 to 6.2 percent in 2021 among the white population who experienced access problems due to costs. These declining trends are particularly notable in the Detroit region. Since 2019, we have observed a substantial narrowing of the racial gap in health care access due to costs. Specifically, the gap between non-white and white individuals was about 6.2 percentage points in 2018, which then decreased to 0.4 percentage points in 2020 but increased to 4.3 percentage points in 2021. However, there is an overall declining trend in the lack of health care access due to costs on both the west and east sides of Michigan, except for non-white individuals in KOMA. This finding is consistent with the health insurance trends among this group.

In **Figure 4**, we observe similar declining trends for males and females in both regions, particularly for females in the KOMA

region. Although the precise mechanism is ambiguous, these are positive developments considering that federal subsidies during COVID-19 may have played an effective role in alleviating disparities, at least partially, in accessing health care. An interesting avenue for future research is to disentangle the causal effect of federal fiscal responses on health care access by race and gender during the pandemic.

Figures 5 and 6 continue the examination of access to care by tracking the share of the population that reported having a usual source of care when ill. There are two notable observations. First, in **Figure 5**, we observe non-negligible disparities between non-white and white individuals in both regions, with the latter group being more likely to have a usual source of care. The trends in having a usual source of care are relatively stable over time, except for non-white individuals in KOMA, who exhibit higher variability. On average, non-white individuals in KOMA are less likely to have a usual source of care than their white counterparts. However, there is a slight increase in the percentage of non-white individuals having a usual source of care in 2021, slowly closing the gap with white individuals in both regions. Additionally, in 2021, we observe non-white individuals in KOMA catching up with non-white individuals in the Detroit region regarding having a usual source of care.

In **Figure 6**, a noticeable difference exists between females and males. Specifically, males report having a lower likelihood of having a usual source of care compared to females in both regions. For instance, in the KOMA region in 2021, 96.1 percent of females reported having a usual source of care, while only 87.7 percent of males reported having a usual source of care.

Substantial racial disparities in health insurance and health care access still persist to this day in KOMA.

Lastly, **Figures 7 and 8** plot the share of the population in West Michigan and the Detroit region with a routine checkup in the past year. Although earlier figures highlighted that health care access increased during the pandemic, these increases may have been driven by medical conditions related to COVID-19. An important concern during the pandemic was the increase in the number of individuals delaying care for chronic conditions or avoiding preventive care due to the risk of virus exposure. In fact, Aslim et al. (2022) show that more than 30 percent of adults delayed medical care for conditions other than COVID- 19 during the pandemic. Our findings in **Figures 7 and 8** are consistent with the existing literature.

Although there was an increase in routine checkups until 2019, we observed a sharp decline in routine checkups in 2020. This is particularly problematic because delaying care for treatable and preventable conditions may lead to an increase in preventable deaths, whether directly or indirectly related to the pandemic.

A critical finding in the literature is that receiving the COVID-19 vaccination reduces concerns about spreading or contracting coronavirus, in turn reducing the likelihood of delaying care (Aslim et al., 2022). It is important to note that the COVID-19 vaccine was rolled out across states in 2021. That is when we observed a sharp increase in routine checkups for both white and non-white individuals in both regions. This finding supports the idea that the COVID-19 vaccine may have incentivized individuals to seek medical care, including preventative care.

Additionally, when pairing **Figure 8** with the previous figures, it suggests that access problems, including access to routine checkups, are likely to be more prevalent among males than females. Health care providers and public health organizations may need to continue stressing the importance of preventative care through annual exams to promote education and monitor high health risk-related behaviors.

An important takeaway from this section is that substantial racial disparities in health insurance and health care access still persist to this day in KOMA. These disparities underscore the urgent need for policy interventions aimed at reducing these inequities. Potential strategies may include improved outreach efforts for health insurance enrollment, fostering greater diversity among health care staff, and implementing targeted programs to address the unique health care needs of underserved communities.

In the following section, we delve into trends in general health and mental health, exploring how these indicators may naturally change in response to shifts in health insurance and health care access.

General Health and Mental Health

Figure 9 plots the share of the population reporting that their general health was either “fair” or “poor” by race in KOMA and the Detroit regions. There is a noteworthy gap between the health status of non-white and white populations, as well as some regional disparities. Firstly, non-white populations are more likely to report fair or poor health. There has been a recent increase in the share of non-white individuals with fair or poor health in KOMA, from 12.1 percent in 2020 to 17.7 percent in 2021.

Secondly, over the past 6 years, starting from 2015, the share of non-white individuals with fair or poor health was substantially higher in the Detroit region than in KOMA. However, the recent increase in the percentage of non-white individuals reporting poor health in KOMA has narrowed the gap with non-white individuals in the Detroit region.

Figure 10 shows that KOMA and the Detroit region exhibit substantially different trends in poor health for males and females. While the share of females reporting poor health has been decreasing in the Detroit region, there was an increase in the share of females reporting poor health in KOMA in 2021. This finding implies that the increase in the percentage of non-white individuals reporting poor health in KOMA and the decrease in the percentage of non-white individuals reporting poor health in the Detroit region are likely driven by females. We also observe that the share of males reporting poor health in KOMA decreased from 13.7 in 2020 to 12.1 in 2021, while we observe an increase in the share of males reporting poor health in the Detroit region in 2021.

Figure 11 reports the fraction of white and non-white survey respondents who reported experiencing more than 14 days of poor mental health. The numerator consists of the number reporting 14 days or more in response 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 is based on the total number of respondents in a given county.

Non-white individuals have poor general and mental health in West Michigan.

When examining both the KOMA and Detroit regions over the period from 2011 to 2015, there were significant disparities in mental health problems between non-white and white individuals. On average, 17 percent of non-white individuals reported having poor mental health between 2011 and 2015, whereas this number was around 12 percent among white individuals. Although there is a clear upward trend in the percentage of white individuals experiencing poor mental health in both regions after 2015, we can observe the disproportionate impact of the pandemic on mental health among non-white individuals in KOMA. The pandemic negatively affected mental health across individuals in Michigan, but non-white individuals in KOMA have experienced a more pronounced negative impact, resulting in an increase in the prevalence of poor mental health from 12.1 percent in 2019 to 25.3 percent in 2021.

In **Figure 12**, we analyze poor mental health days by gender. Combining this figure with **Figure 11** suggests that the increase in mental health problems among non-white individuals in KOMA is likely driven by females. Moreover, **Figure 12** shows us that, on average, females had more poor mental health days than males in both KOMA and the Detroit region in the years examined. However, there is a potentially concerning increase in poor mental health days among males, particularly white males, in the KOMA region in 2021.

Risk Factors

Figure 13 and 14 track the prevalence of obesity in the West Michigan and Detroit populations, examining it by race and gender, respectively. An individual is considered obese if their Body Mass Index (BMI) is above 30. On average, between 2019 and 2021, the percentage of non-white individuals experiencing obesity is significantly higher than that of white individuals in both regions. In KOMA, there is considerable variability in obesity rates among non-white individuals, influenced by various factors. However, it is noteworthy that we observed a decline from 47.5 percent in 2019 to 35.4 percent in 2021 among non-white individuals in KOMA (refer to **Figure 13**). Similarly, there is a smaller decline in obesity among non-white individuals in the Detroit region during the pandemic.

A critical observation from these trends is that the percentage of white individuals experiencing obesity in both regions has been steadily increasing over the past five years, gradually narrowing the gap with non-white individuals. It is imperative to monitor obesity trends among white individuals in Michigan in upcoming reports, as studies suggest that health care costs associated with obesity account for between 10 percent and 20 percent of total U.S. health-related spending (Cawley and Meyerhoefer, 2012; Finkelstein et al., 2009).

Gender differences in obesity are presented in **Figure 14**. While there has been an overall increase in obesity for both genders in KOMA between 2018 and 2021, males have experienced a more pronounced increase in obesity, rising from 28.5 percent in 2018 to 35.2 percent in 2021. Additionally, we observe that the steady increase in obesity among females in the Detroit region between 2018 and 2020 has reversed in 2021. If these trends persist, it suggests that West Michigan may face a more significant obesity problem than East Michigan in the future.

Figure 15 depicts estimates of alcohol consumption among white and non-white individuals in both KOMA and the Detroit region. Alcohol consumption is defined as the proportion of adults in each region who reported consuming any alcohol in the past month. Notably, there exists a significant disparity in alcohol consumption between these two racial groups. Specifically, the percentage of white individuals who reported consuming alcohol in the past month is substantially higher than that of non-white individuals. To elaborate, in 2021, 61.5 percent of white individuals in KOMA reported consuming alcohol, whereas only 51.5 percent of non-white individuals reported the same.

Next, **Figure 16** illustrates alcohol consumption broken down by gender. In terms of gender distribution, the percentage of males who reported consuming alcohol in the past month is significantly greater than that of females in both regions. Additionally, this figure suggests that, on average, the proportion of individuals consuming alcohol is higher in West Michigan compared to East Michigan.

Figure 17 delves into binge drinking. Binge drinking is defined as the consumption of 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 in both the west and east sides of the state were similar and remained relatively stable until the onset of the pandemic, when we observed changes in the years 2020 and 2021. Specifically, the percentage of white individuals in KOMA who reported a binge drinking episode in the past 30 days declined from 19.3 percent in 2019 to 17 percent in 2021. This decline was more noticeable in the Detroit region. Conversely, we noticed a surge in binge drinking among non-white individuals in the Detroit region in 2021.

In **Figure 18**, we also observe that, on average, males had a higher percentage of binge drinking, at around 23 percent, compared to females, who averaged about 14 percent, between 2011 and 2021. Additionally, the binge drinking trends in KOMA and the Detroit region closely mirror each other. Furthermore, we note a decline in binge drinking among males in 2020 and 2021, which is likely a contributing factor to the trends in binge drinking among white individuals in **Figure 17**.

Figure 19 presents estimates of the proportion of the white and non-white populations who are current cigarette smokers. Two noteworthy trends emerge from the data. Firstly, there has been an increase

in the share of current cigarette smokers in the Detroit region. This increase is particularly pronounced among non-white individuals, rising from 16.1 percent in 2020 to 19.6 percent in 2021. It is worth noting, however, that the current shares of cigarette smokers remain below the levels recorded in 2016 for the Detroit region.

The second notable trend is a significant decrease in the percentage of non-white individuals who are current smokers in KOMA. In 2017, 18.9 percent of non-white individuals in KOMA were current smokers. However, in 2018, this figure surged to 29.5 percent, only to drop sharply to 12.1 percent in 2021. Overall, we observe a declining trend in current cigarette smokers in KOMA, which is a positive development.

There is a substantial increase in e-cigarette use in both West and East Michigan.

In terms of the gender composition of current smokers in **Figure 20**, we observe relatively similar trends in KOMA and the Detroit region when compared to **Figure 19**. Notably, there is an increase in the percentage of both male and female cigarette smokers in the Detroit region in 2021. Conversely, we witness a sharp decline in the share of males who are current smokers in KOMA. Specifically, the percentage of males in KOMA who are current smokers dropped from 22.6 percent in 2020 to 12.4 percent in 2021. Additionally, we see a consistent decline in the share of females who are current smokers in KOMA. It is plausible that both females and males contributed to the significant decline in smoking trends among non-white individuals.

In 2014, the Centers for Disease Control estimated that 15.5 percent of the U.S. population were current cigarette smokers, and cigarette smoking was responsible for 480,000 annual deaths (CDC, 2018). Treating illnesses related to smoking and tobacco use can be both costly and resource-intensive. Reducing the prevalence of smoking and tobacco use could potentially boost worker productivity and offer some relief in the face of increasing health care expenditures (Berman et al., 2014).

While **Figure 19** suggests a declining trend in the percentage of white and non-white cigarette smokers in KOMA, there is a valid concern regarding whether this trend is driven by individuals quitting smoking altogether or simply substituting cigarettes with alternative products such as e-cigarettes. Conversely, in the Detroit region, where there is an increase in the prevalence of smoking among both white and non-white individuals, it is plausible that these individuals might be switching from alternative products back to traditional cigarettes. This highlights the complex dynamics of tobacco and nicotine product use and the need for further examination of these trends.

While our data do not allow us to directly examine substitution patterns, **Figure 21** presents data on current e-cigarette use in both regions. Intriguingly, we observe a rising trend in the prevalence of e-cigarette users in both KOMA and the Detroit region. Although the increase in e-cigarette use began in 2017 in the Detroit region, KOMA experienced an uptick in e-cigarette use during the pandemic years, encompassing 2020 and 2021.

When we align these findings with the data on cigarette consumption, there is some evidence to suggest that individuals in KOMA may be shifting away from cigarettes toward e-cigarettes. Conversely, in the Detroit region, instead of observing a potential substitution, we notice increasing trends in both e-cigarettes use and the number of current smokers. This finding raises the possibility that e-cigarettes may be acting as a gateway to traditional cigarette use in the Detroit region.

It is important to emphasize that BRFSS data exclusively encompass the noninstitutionalized adult population, specifically individuals aged 18 or older. Therefore, these data cannot provide insights into recent trends in increased e-cigarette use among individuals below the age of 18. Notably, the CDC and the FDA have recently released figures indicating that 1 in 5 high school students and 1 in 20 middle school students were past-month e-cigarette users. Additionally, these figures highlight a nearly 40 percent increase in the use of any tobacco product among high school students between 2017 and 2018 (CDC, 2019). This information underscores the pressing concern surrounding youth e-cigarette use and its implications for public health.

Chronic Medical Conditions

As we discussed earlier, more than one-third of individuals postponed at least one type of care during the pandemic (Gonzalez et al., 2021). An important discovery in the literature is that receiving the COVID-19 vaccination has mitigated delayed or missed medical care by addressing concerns about virus transmission or contraction (Aslim et al., 2022). What are the implications of these findings for chronic medical conditions?

Firstly, the increased likelihood of delayed care may lead to fewer chronic conditions being diagnosed. Consequently, we might anticipate a decrease in the percentage of individuals reporting that they have been diagnosed with a chronic medical condition in 2020. It is essential to note that this potential decline does not imply that people have fewer chronic conditions; rather, it is a consequence of delayed care.

Secondly, as vaccines roll out to different age groups in Michigan in 2021, individuals may feel safer and more inclined to seek medical care. This could potentially manifest as an increase in the percentage of individuals diagnosed with a chronic medical condition in 2021. In this section, we aim to test these hypotheses by examining trends in chronic conditions in both KOMA and the Detroit region, with a specific focus on the first two years of the pandemic. Our analysis will delve into the trends related to the following chronic conditions: cholesterol, coronary heart disease, stroke, asthma, cancer, depressive disorder, and diabetes.

West Michigan faces significant mental health challenges.

From our analysis in **Figures 22 through 29**, two significant observations emerge. On average, the percentage of individuals with chronic conditions is higher in the Detroit region compared to KOMA. Specifically, individuals in the Detroit region exhibit relatively higher

shares of conditions such as cholesterol issues, heart attack, coronary heart disease, stroke, lifetime asthma, and diabetes. Notably, the only conditions that are more prevalent in West Michigan between 2011 and 2021 are cancer (including both skin and other types) and depressive disorder. As previously shown in **Figure 11**, we have also observed increasing trends in poor mental health, especially among non-white individuals in KOMA. These findings suggest that West Michigan faces significant mental health challenges. It is crucial to recognize that mental health problems can have adverse consequences on various facets of life, including academic performance, productivity, crime rates, and even suicide rates. Therefore, it becomes increasingly important to address these concerns through policy efforts and appropriate interventions.

The second major observation confirms our hypothesis regarding delayed care during the pandemic and the subsequent rollout of vaccines in KOMA. When we specifically analyze the trends for cholesterol, coronary heart disease, stroke, lifetime asthma, cancer, and depressive disorder, we notice a decline in 2020, which may be attributed to delayed care. However, there is a notable increase in the percentage of individuals diagnosed with these chronic conditions in 2021. This increase could potentially be associated with vaccine development, as vaccinated individuals may have had fewer concerns about seeking medical care during the pandemic. It is worth noting that the only chronic condition where we did not observe a decline in 2020 is diabetes.

Furthermore, although there was a decrease in the percentage of individuals reporting coronary heart disease in 2020, there was a surge in the percentage of individuals experiencing a heart attack in the same year. This may be linked to the increased risk of heart attacks for those infected with SARS-CoV-2 during the early stages of the pandemic (Topol, 2020). These observations shed light on the complex interplay between health care access, delayed care, and the impact of public health crises on chronic health conditions.

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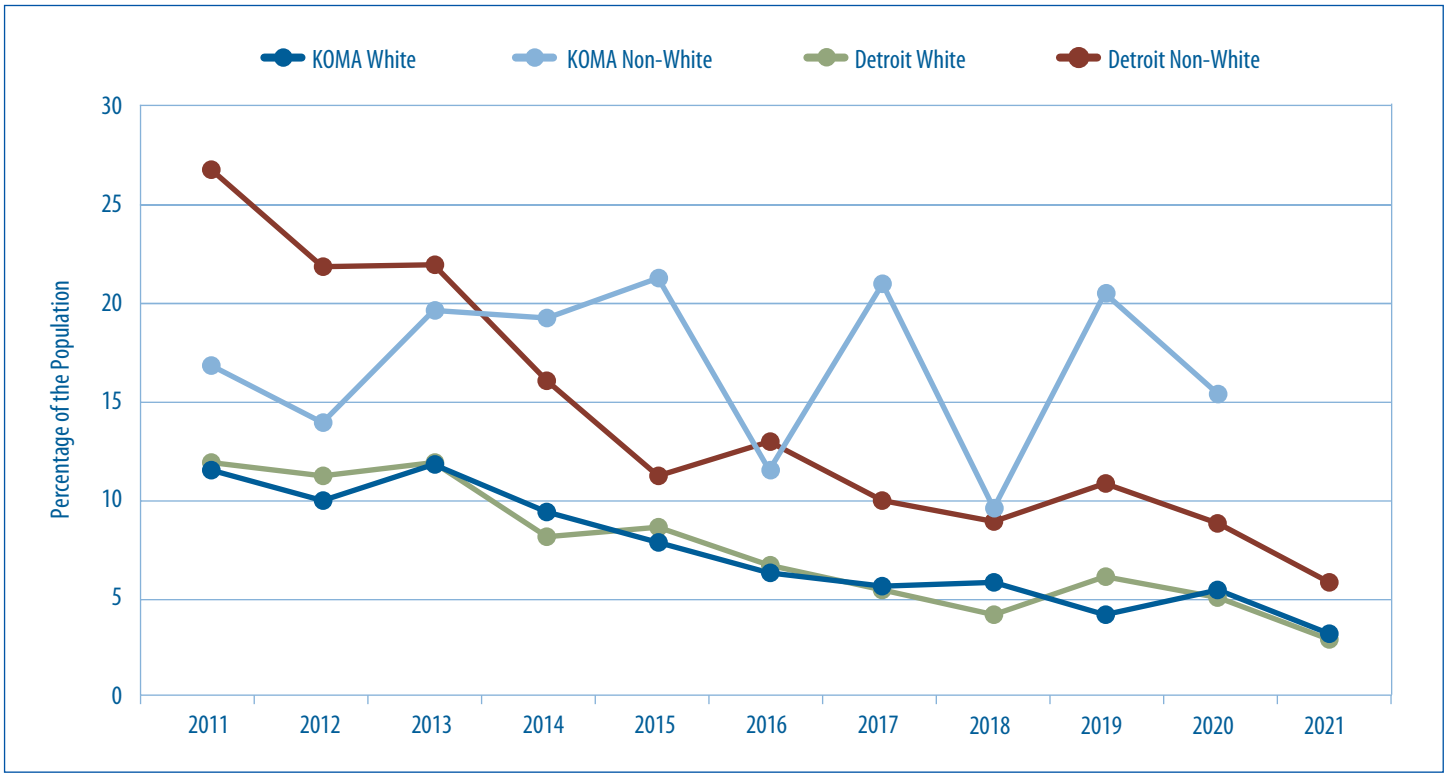
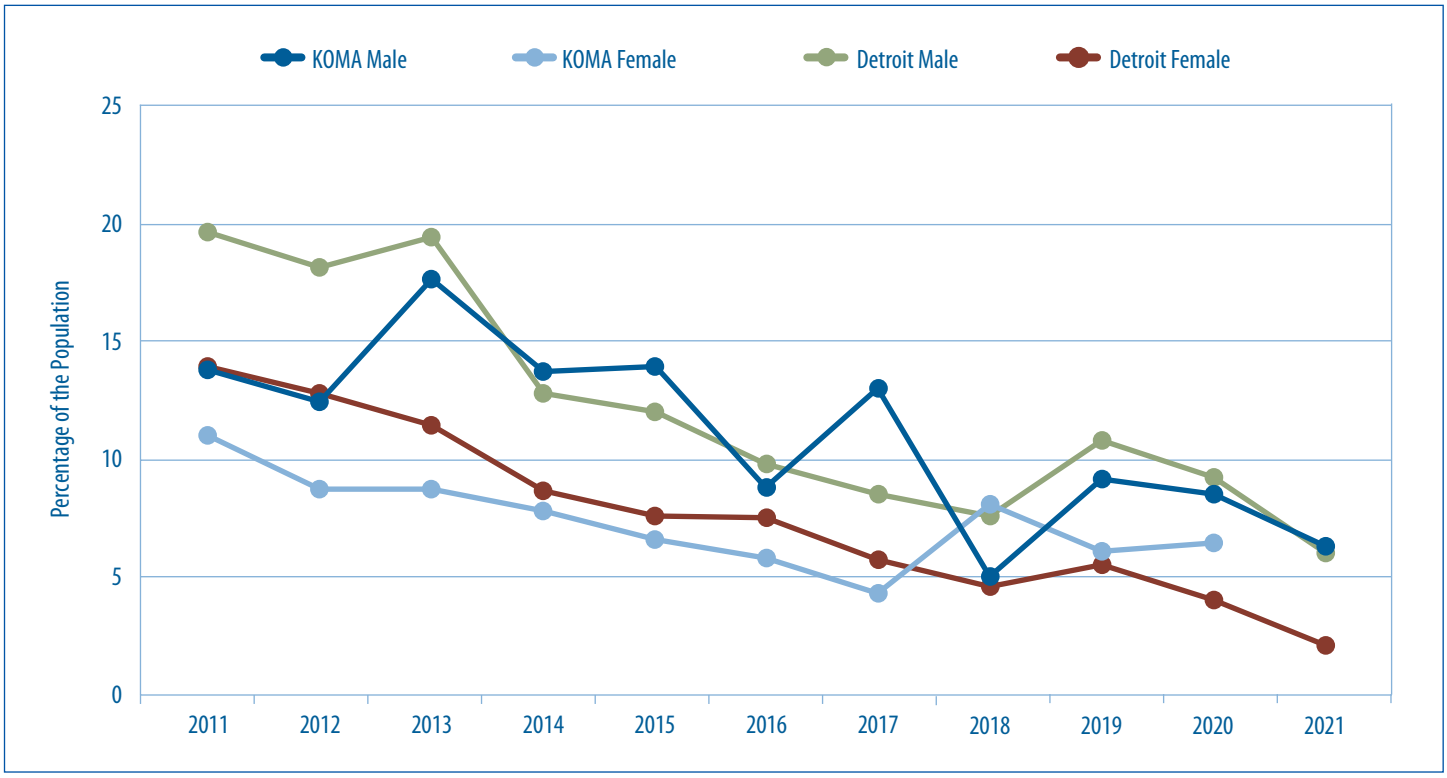
Topol, E. J. (2020). COVID-19 can affect the heart. *Science*, 370(6515), 408-409.

Figure 1: No Health Insurance by Race, 2011-2021



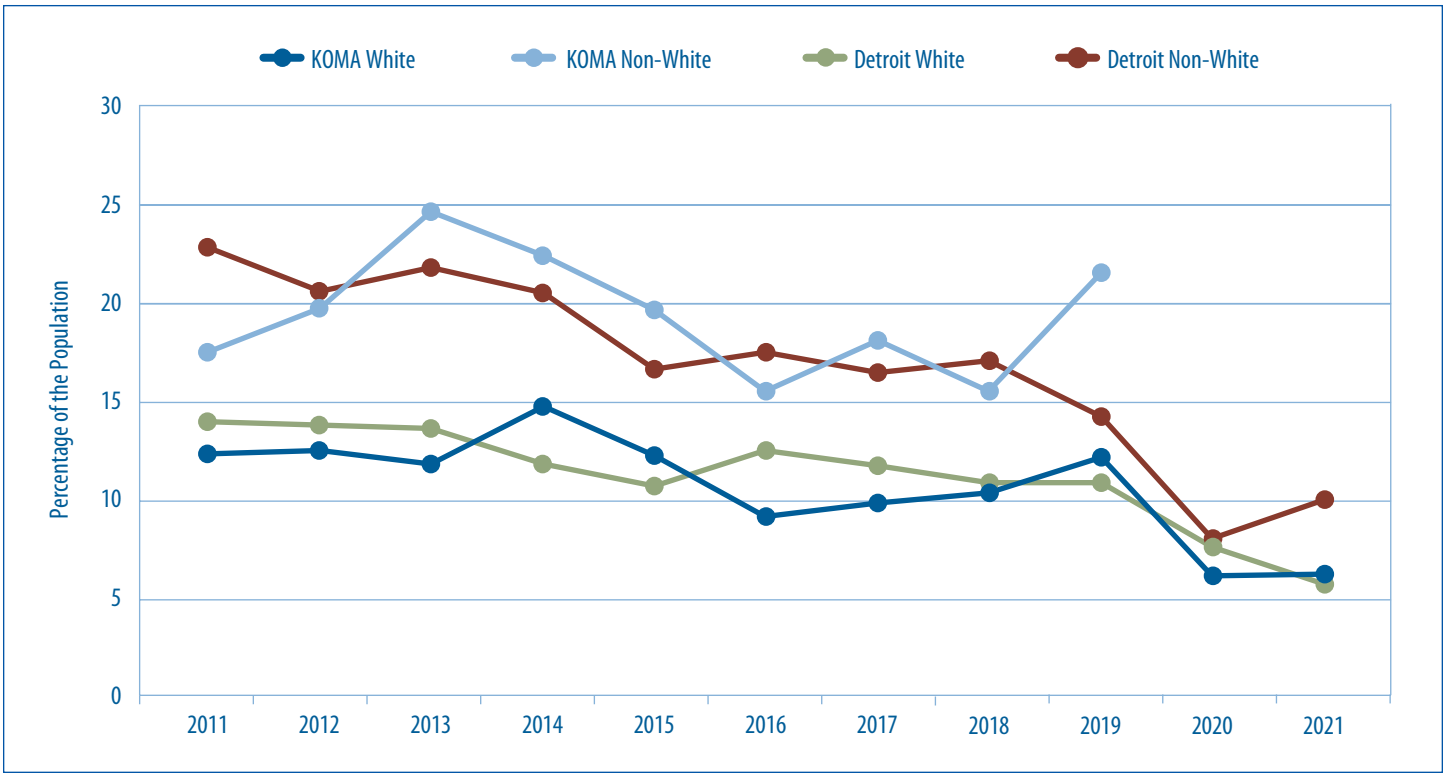
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 2: No Health Insurance by Gender, 2011-2021



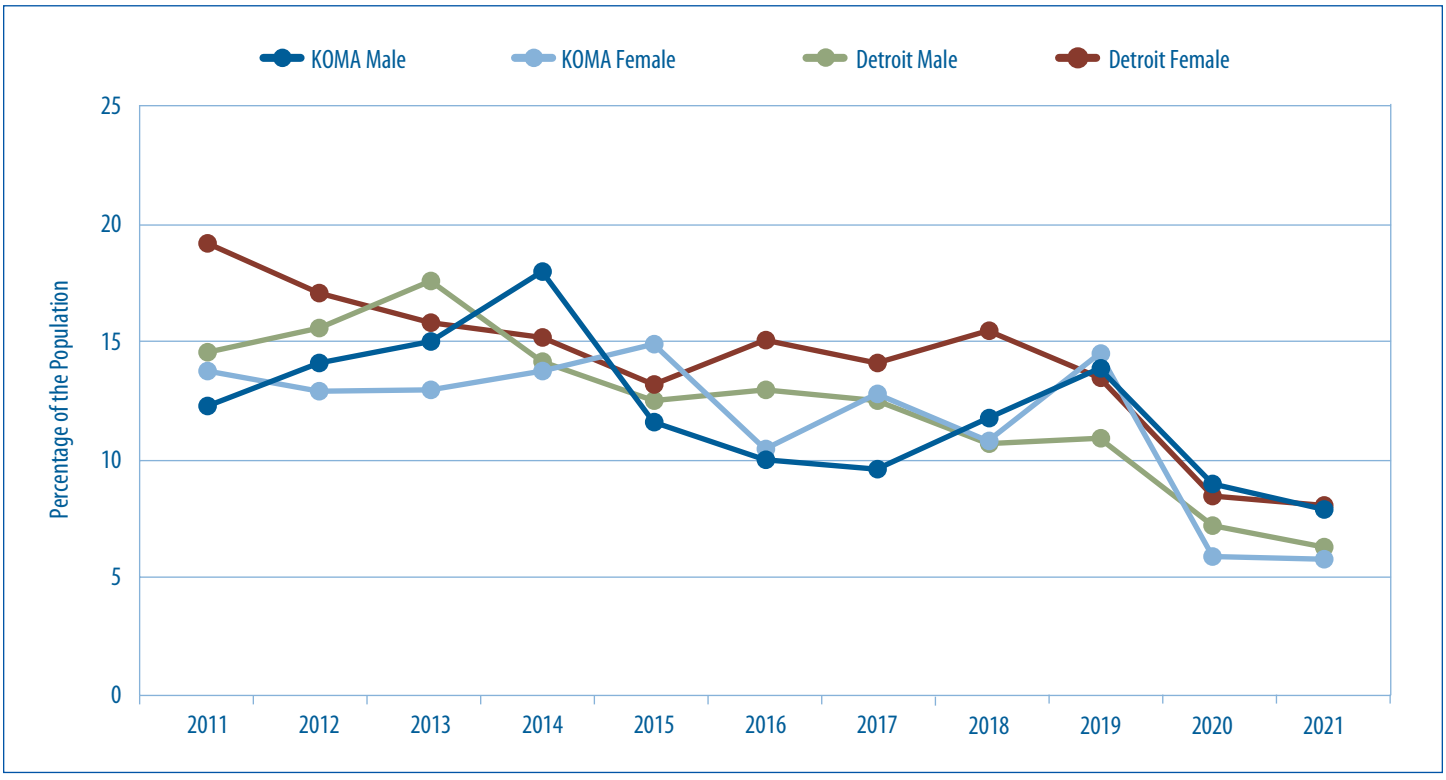
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 3: No Health Care Access Due to Cost by Race, 2011-2021



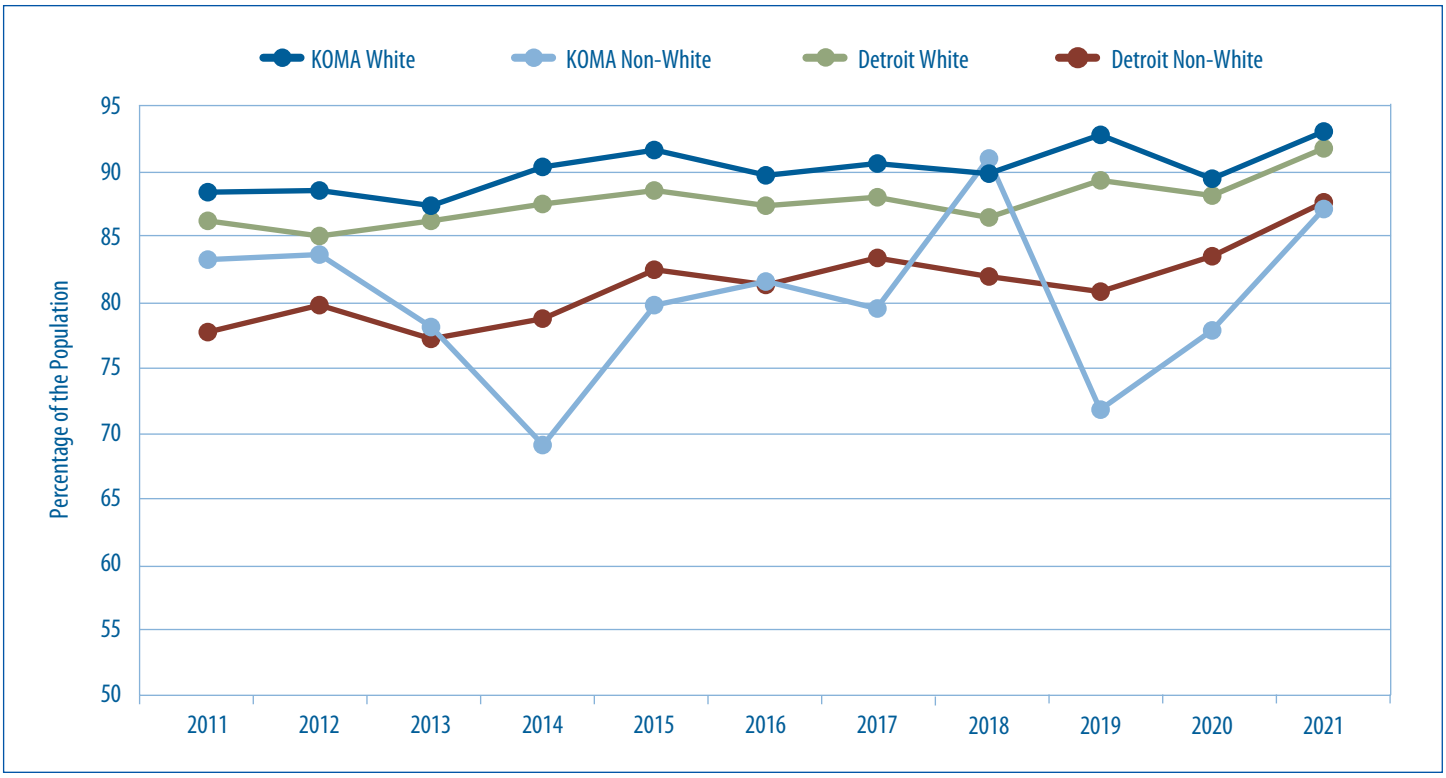
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 4: No Health Care Access Due to Cost by Gender, 2011-2021



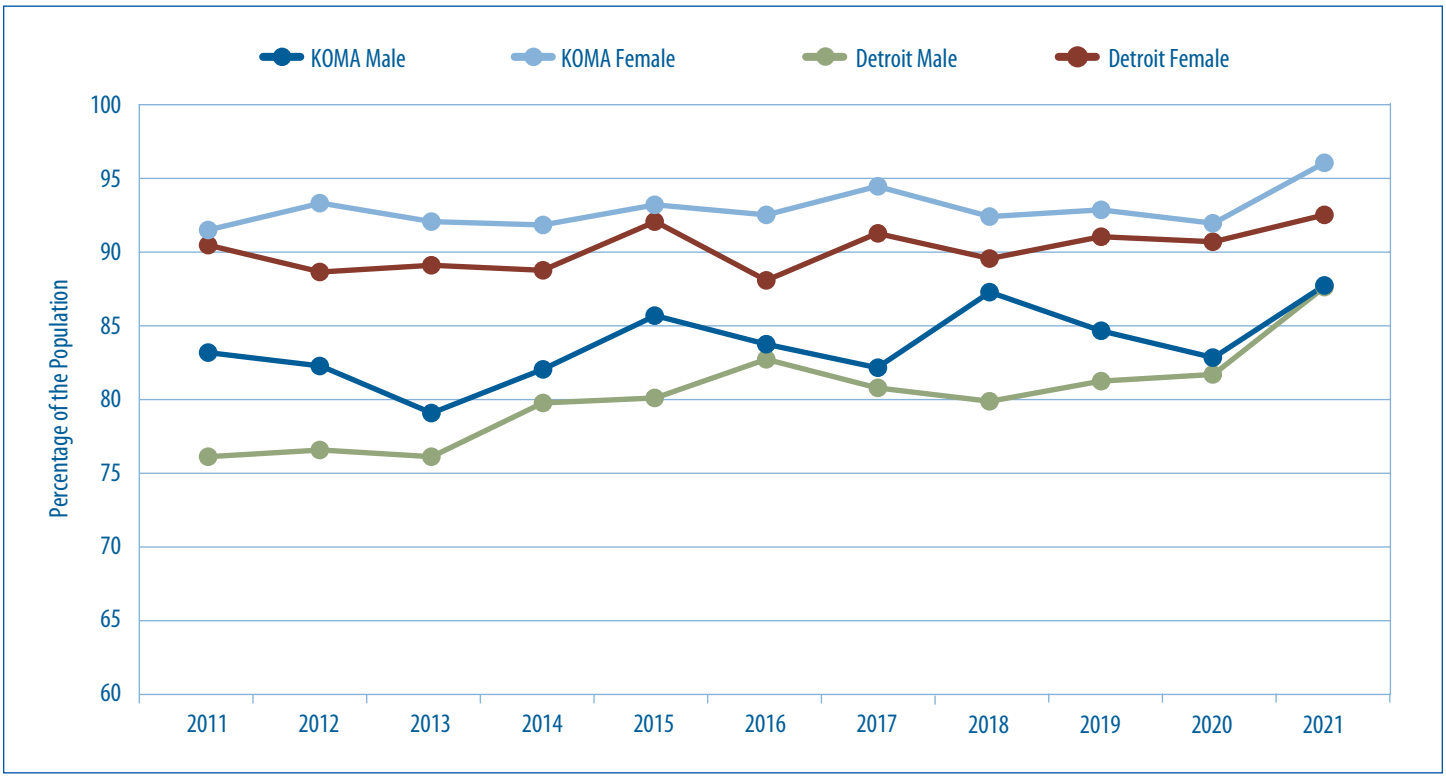
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 5: Has a Usual Source of Care by Race, 2011-2021



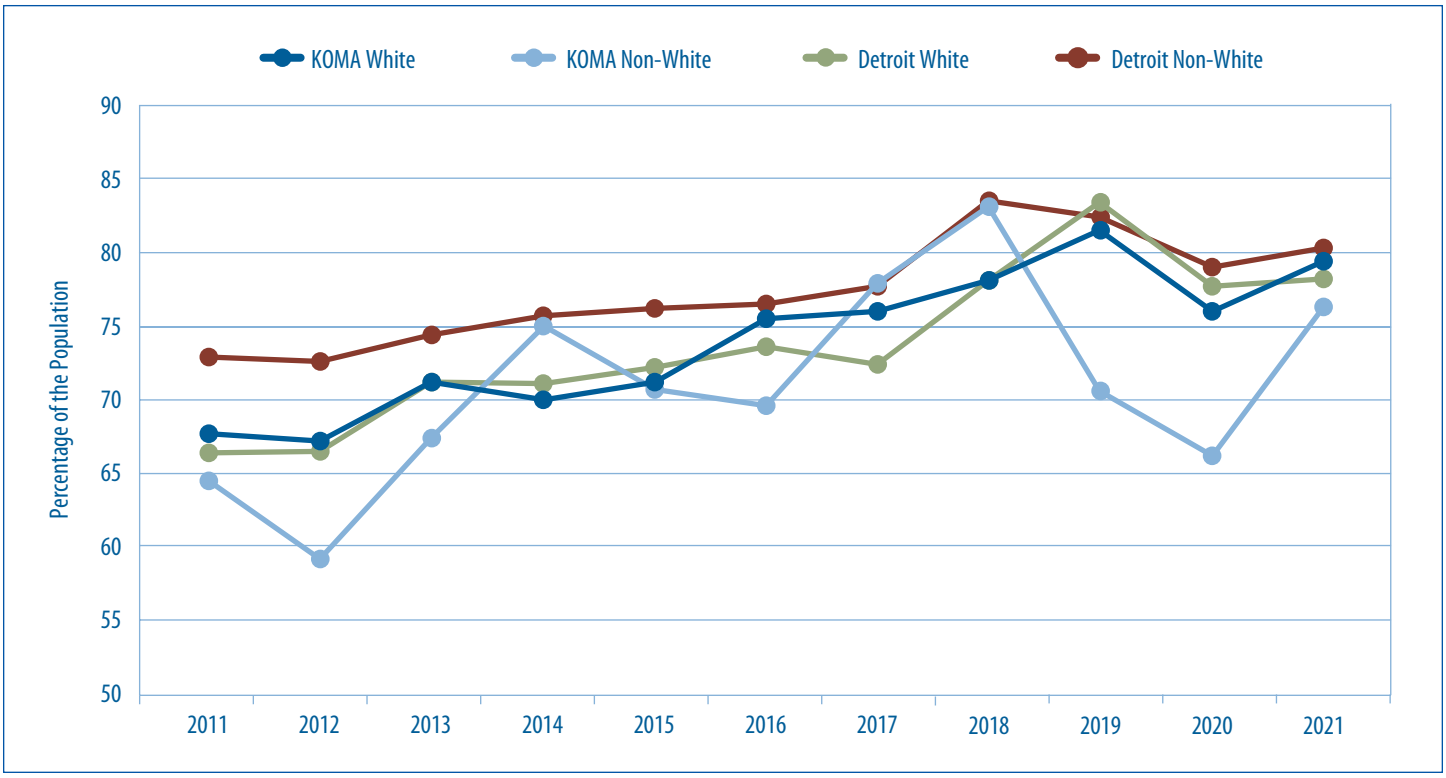
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 6: Has a Usual Source of Care by Gender, 2011-2021



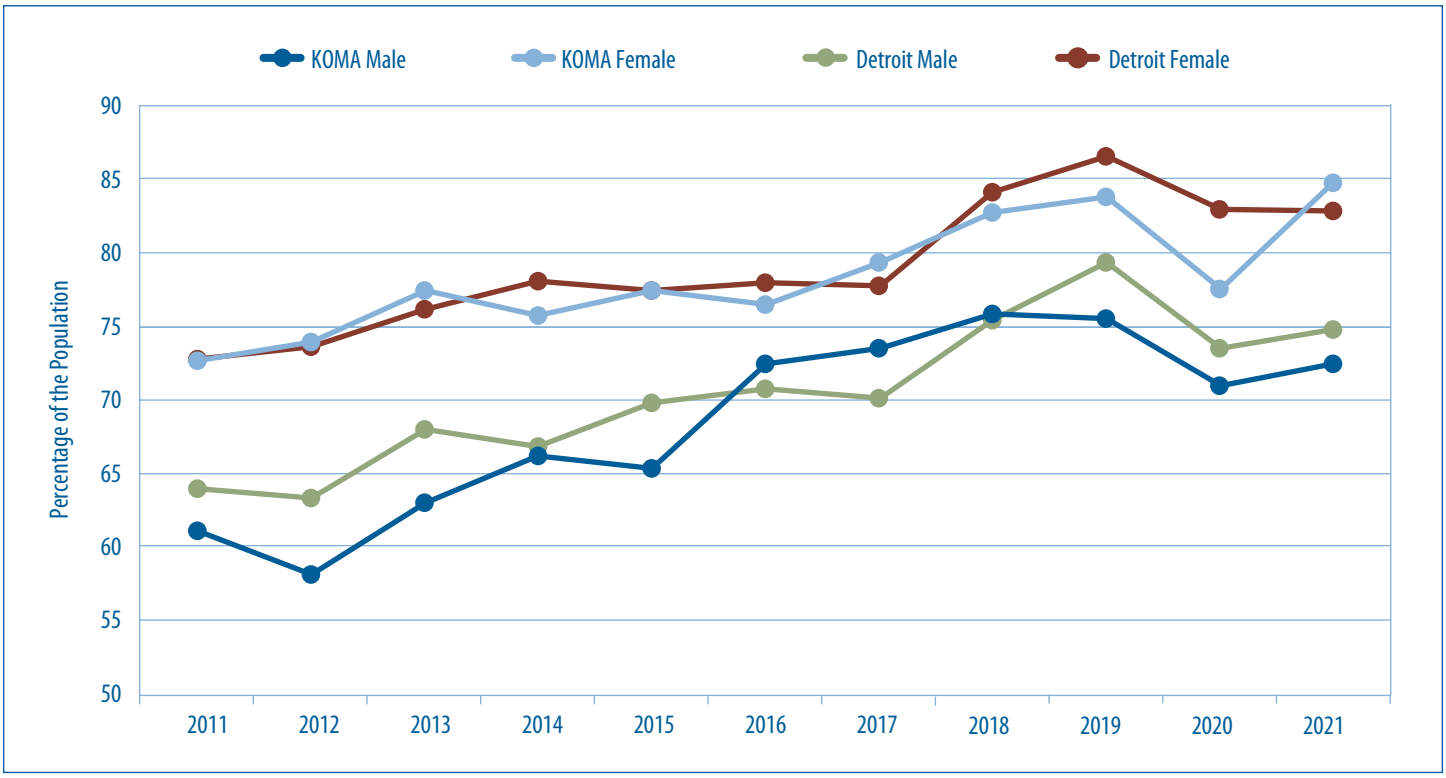
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 7: Had Routine Checkup in Past Year by Race, 2011-2021



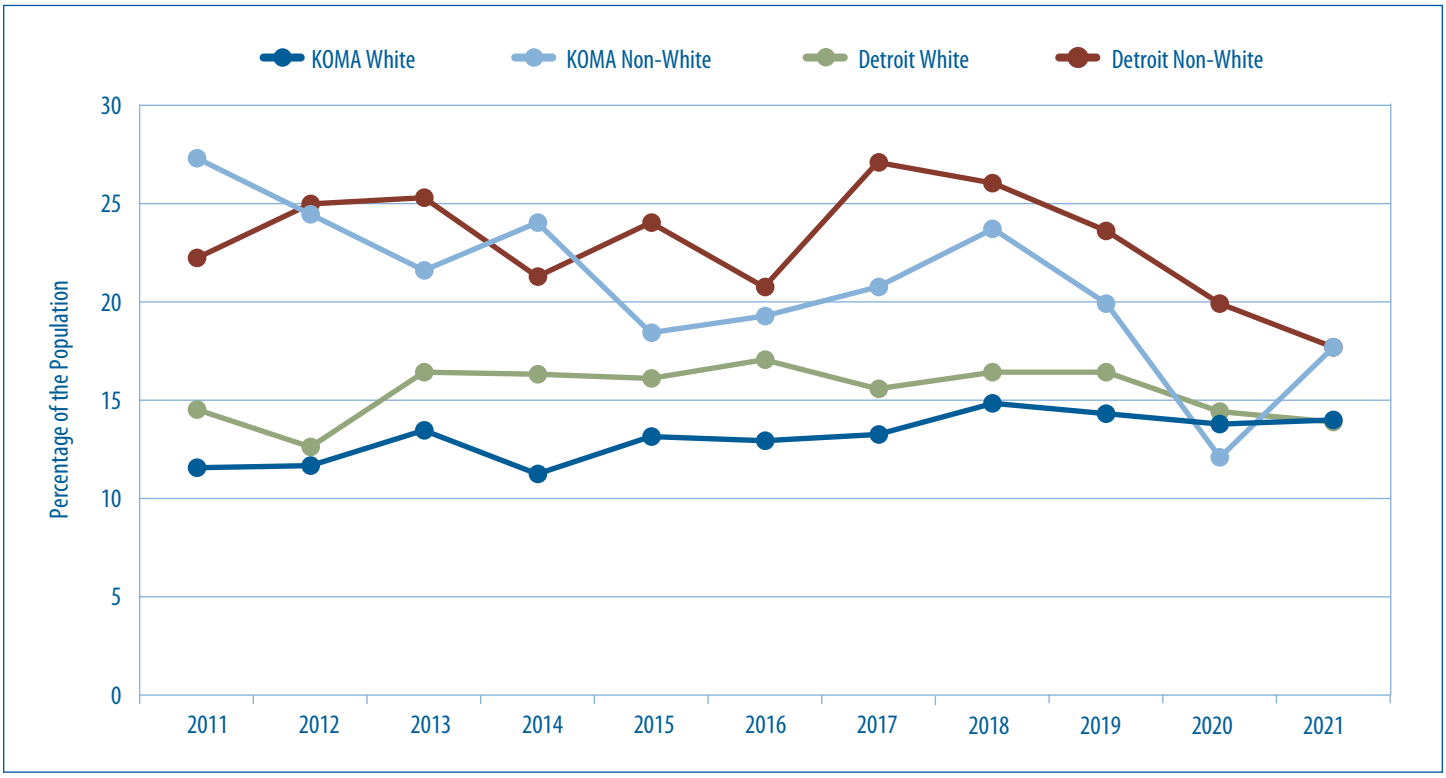
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 8: Had Routine Checkup in Past Year by Gender, 2011-2021



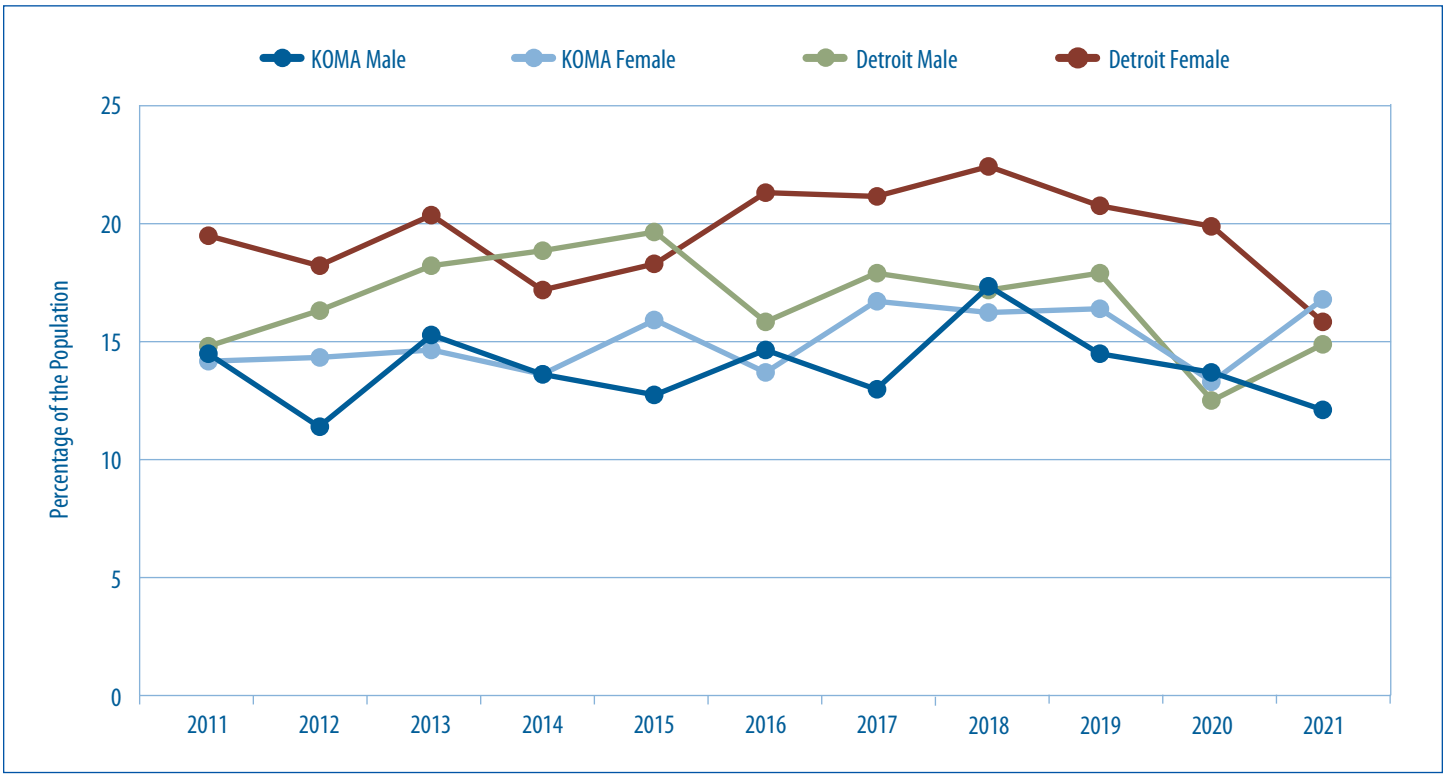
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 9: Health Status - Fair or Poor Health by Race, 2011-2021



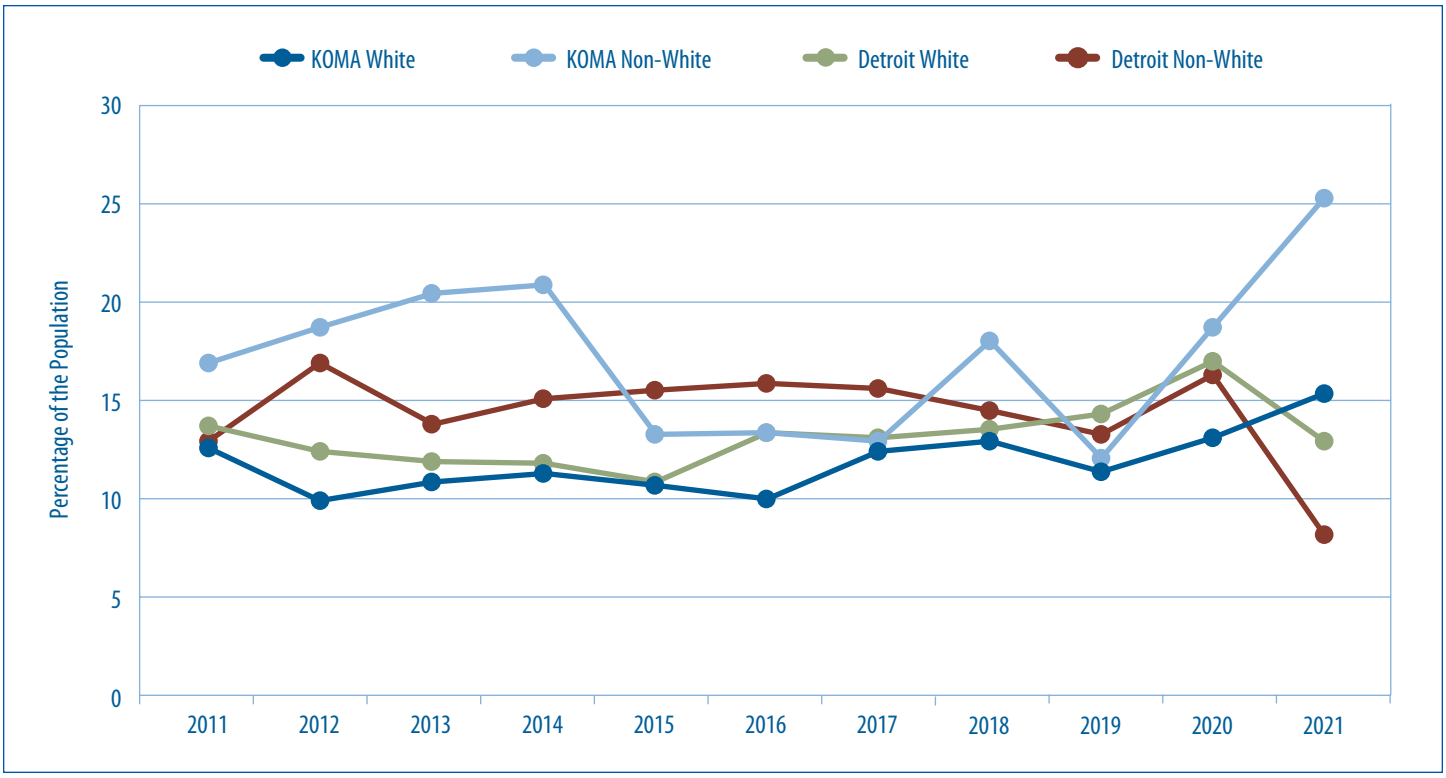
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021
Note: We impute the missing estimate using mean substitution for KOMA non-White in 2012.

Figure 10: Health Status - Fair or Poor Health by Gender, 2011-2021



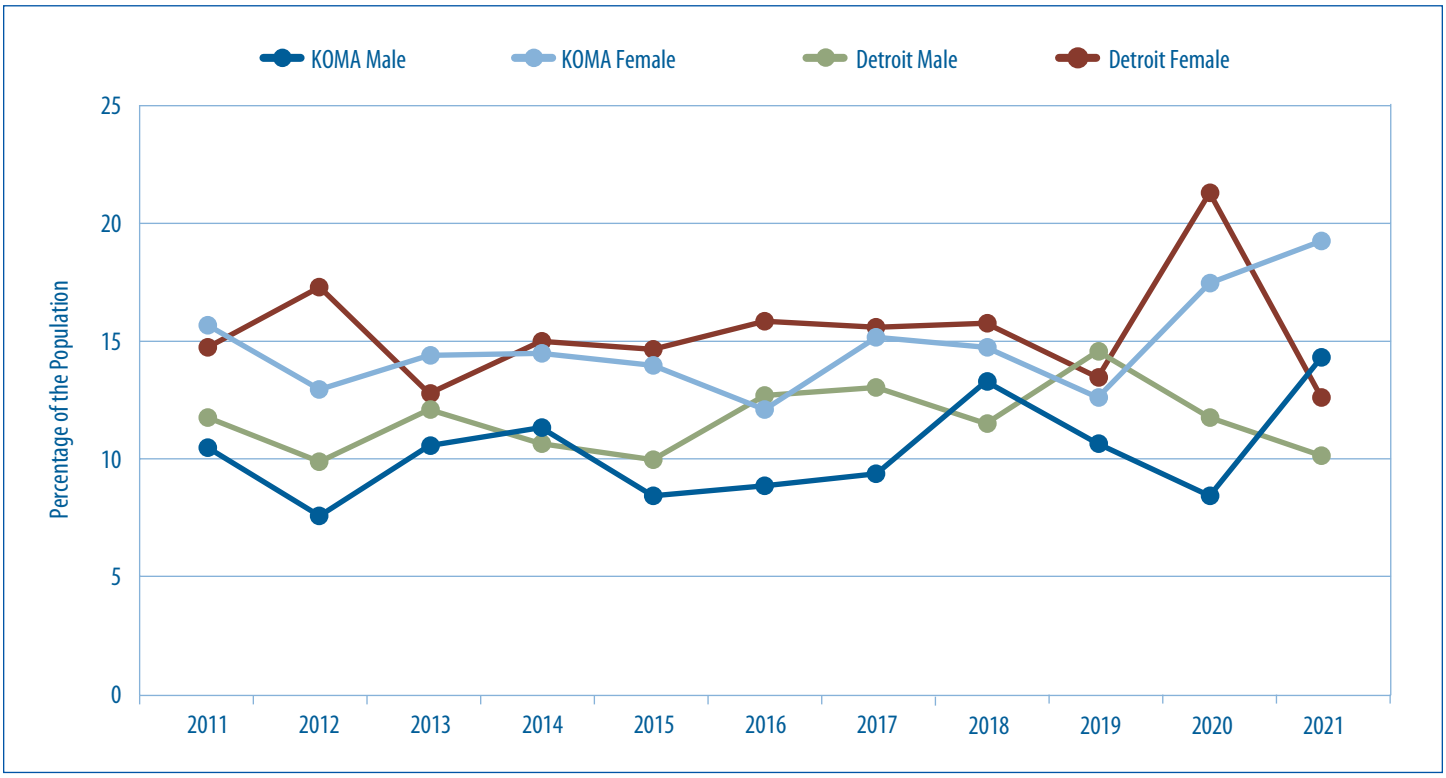
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 11: Poor Mental Health Days by Race, 2011-2021



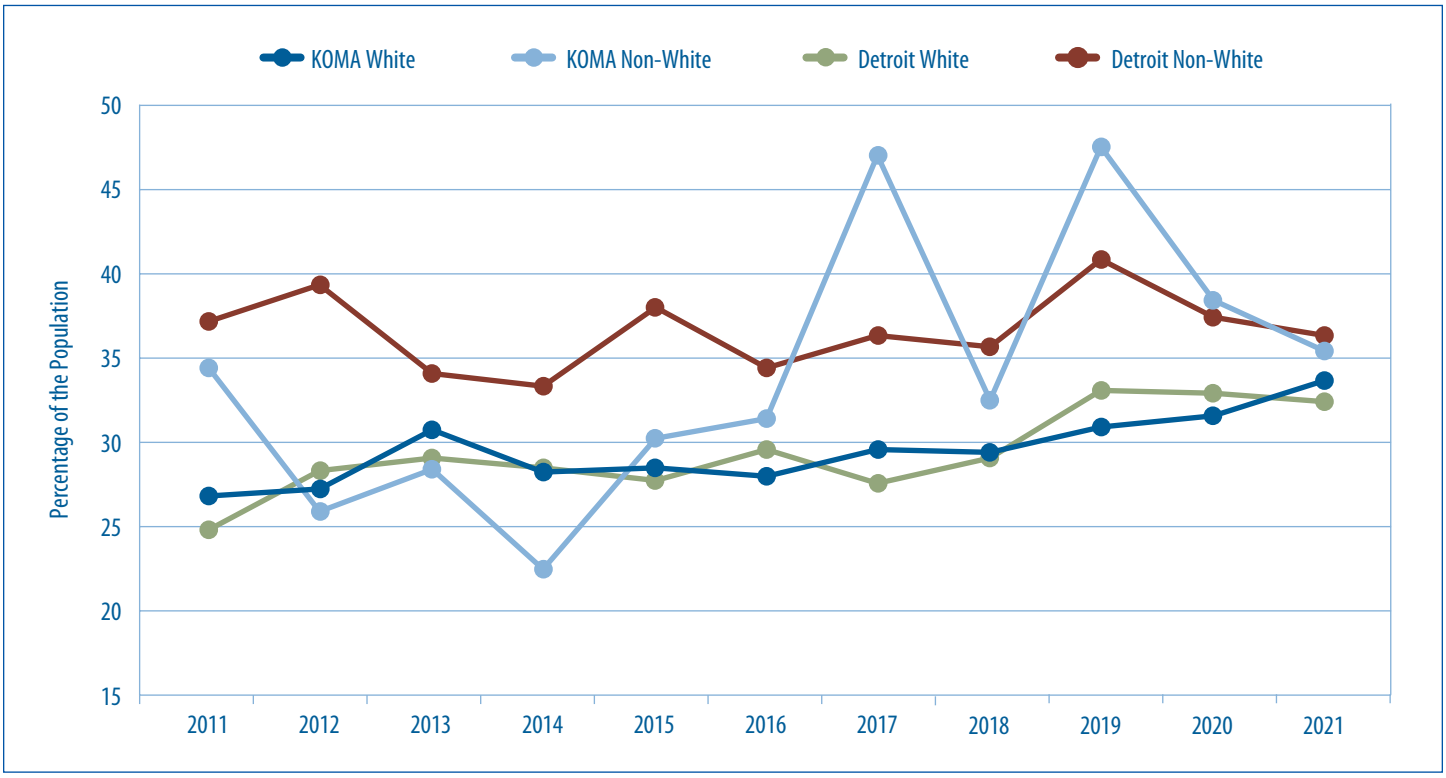
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021
Note: We impute the missing estimate using mean substitution for KOMA non-White in 2020.

Figure 12: Poor Mental Health Days by Gender, 2011-2021



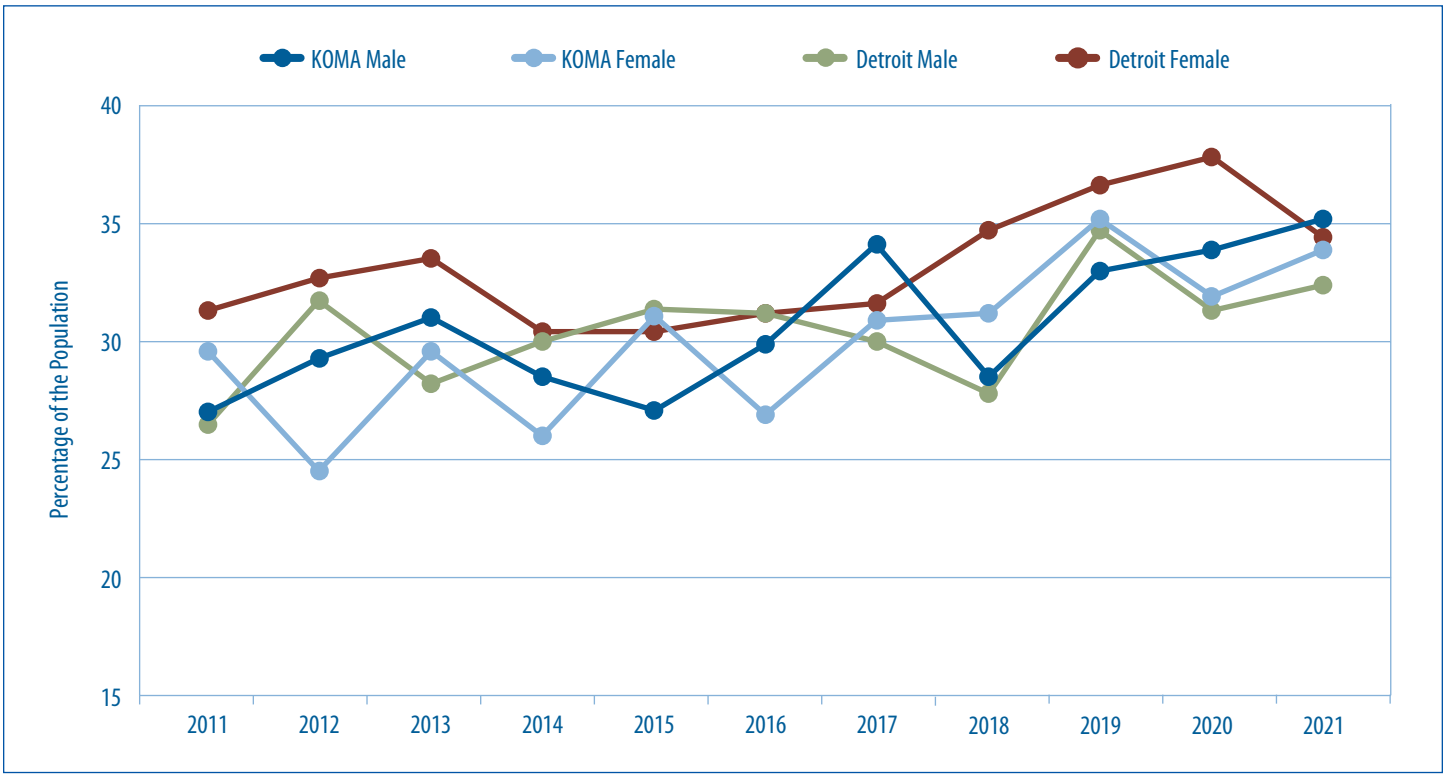
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 13: Obesity by Race, 2011-2021



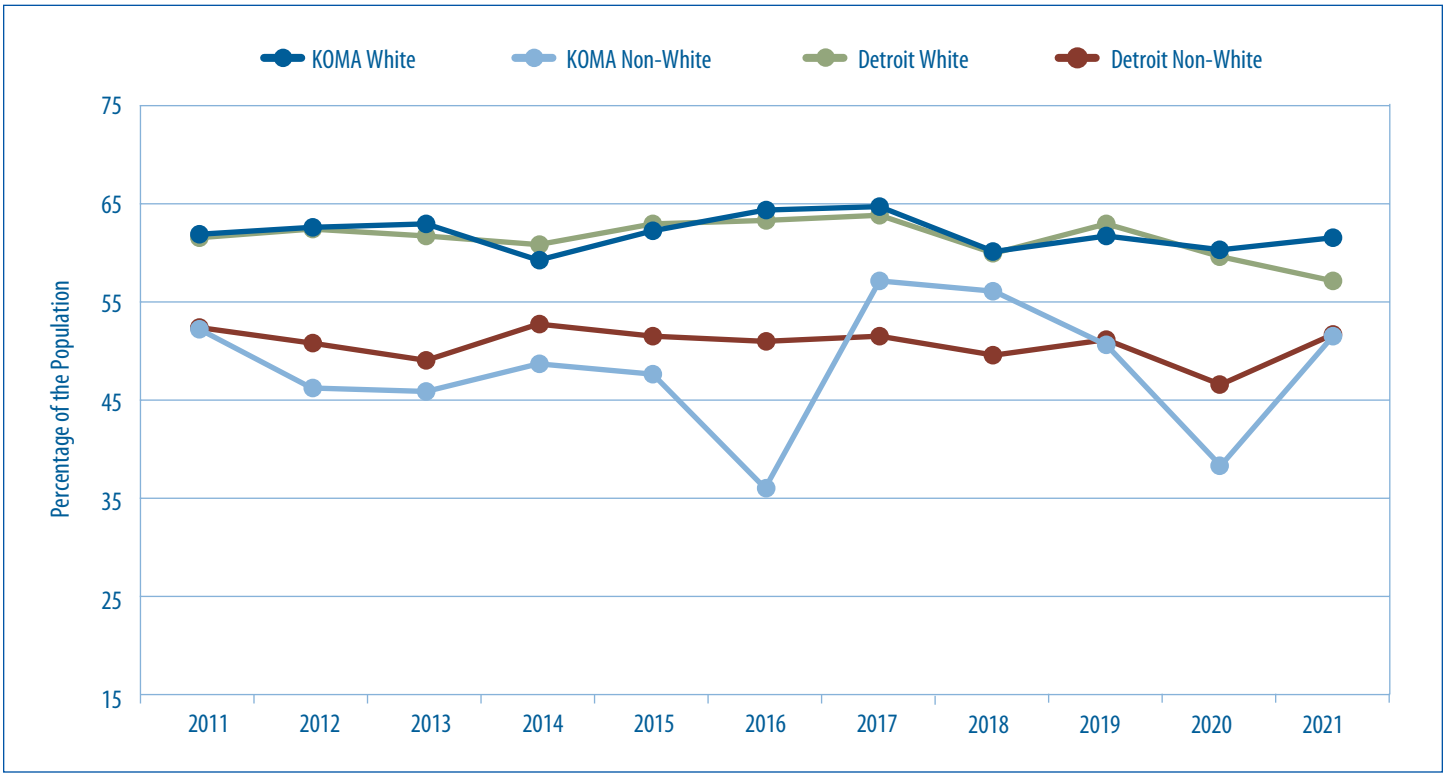
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 14: Obesity by Gender, 2011-2021



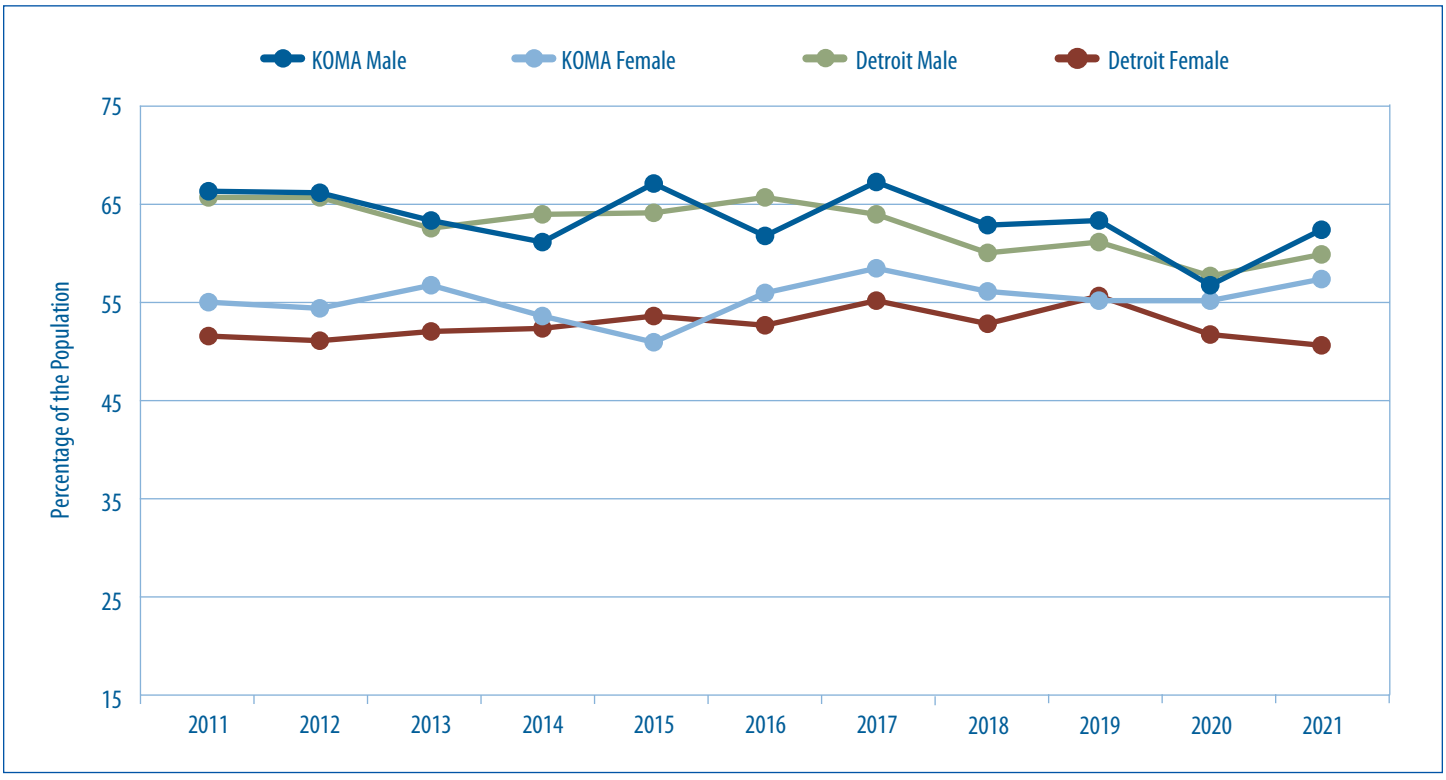
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 15: Alcohol Consumption by Race, 2011-2021



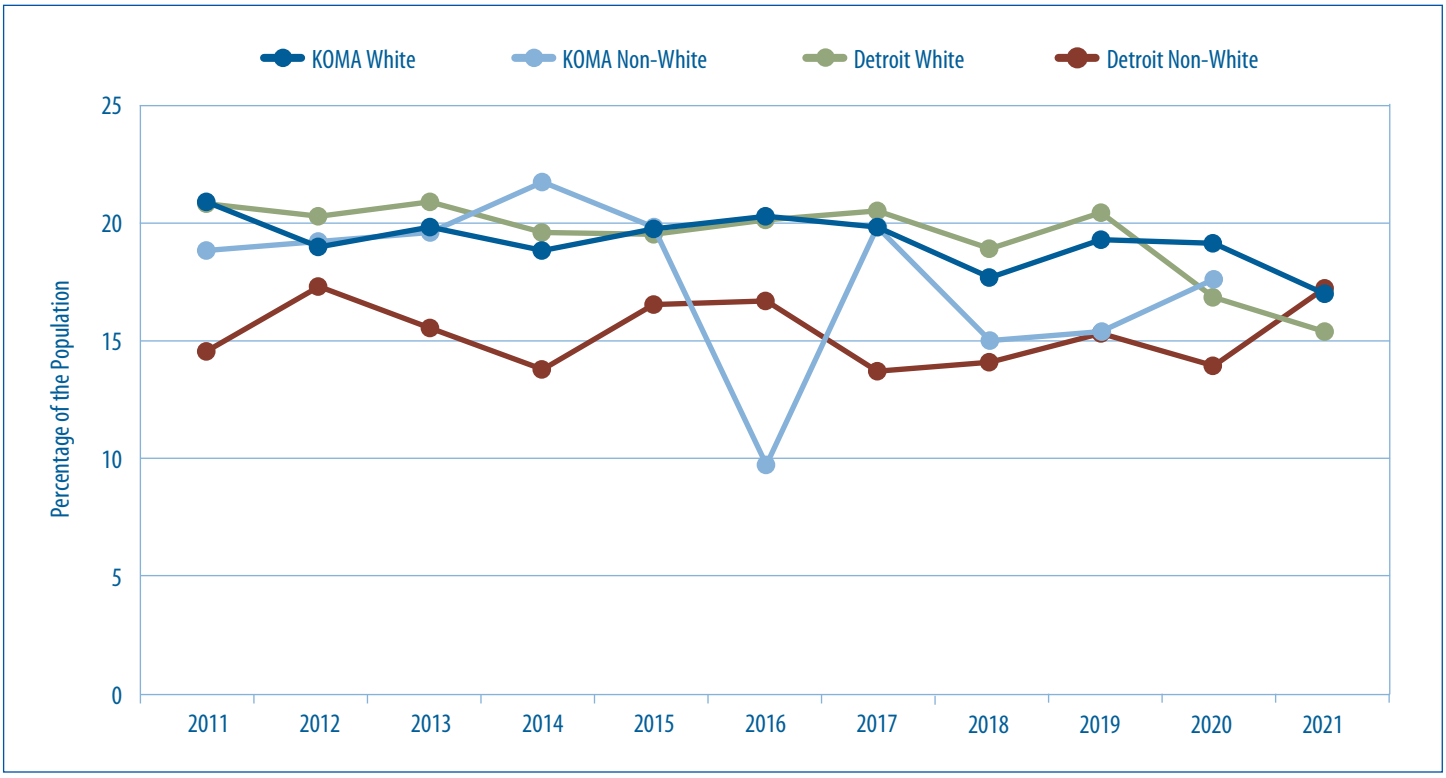
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2020

Figure 16: Alcohol Consumption by Gender, 2011-2021



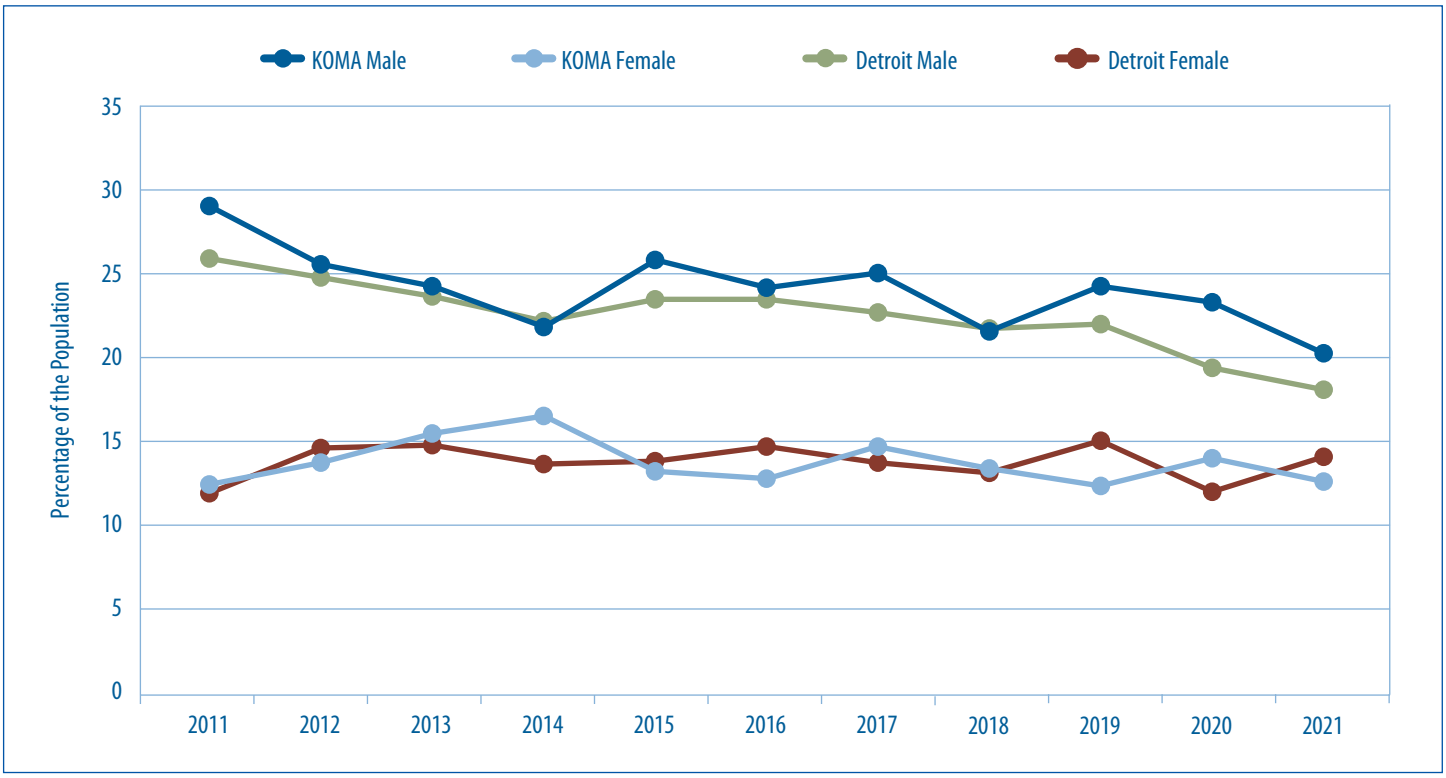
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 17: Binge Drinking by Race, 2011-2021



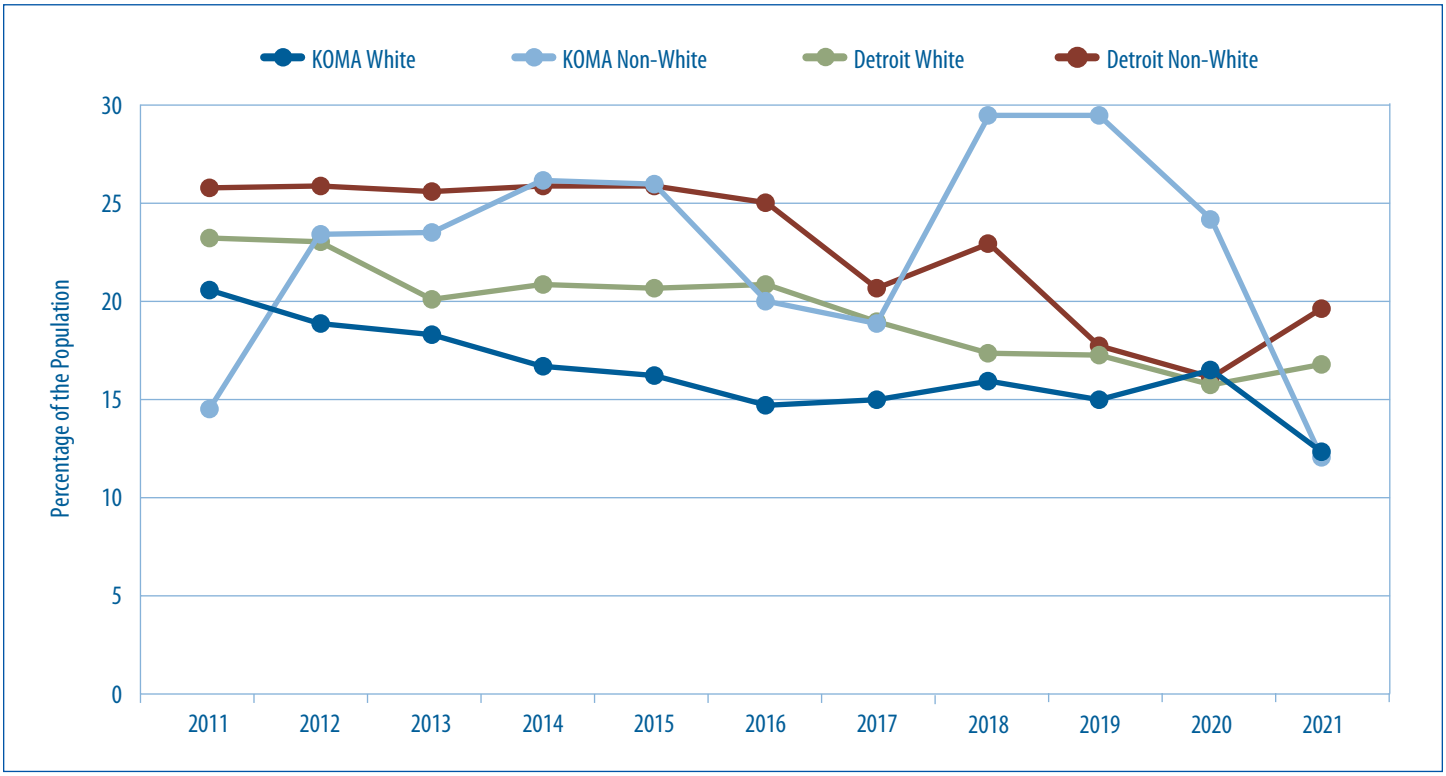
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021
Note: We impute the missing estimate using mean substitution for KOMA non-White in 2012.

Figure 18: Binge Drinking by Gender, 2011-2021



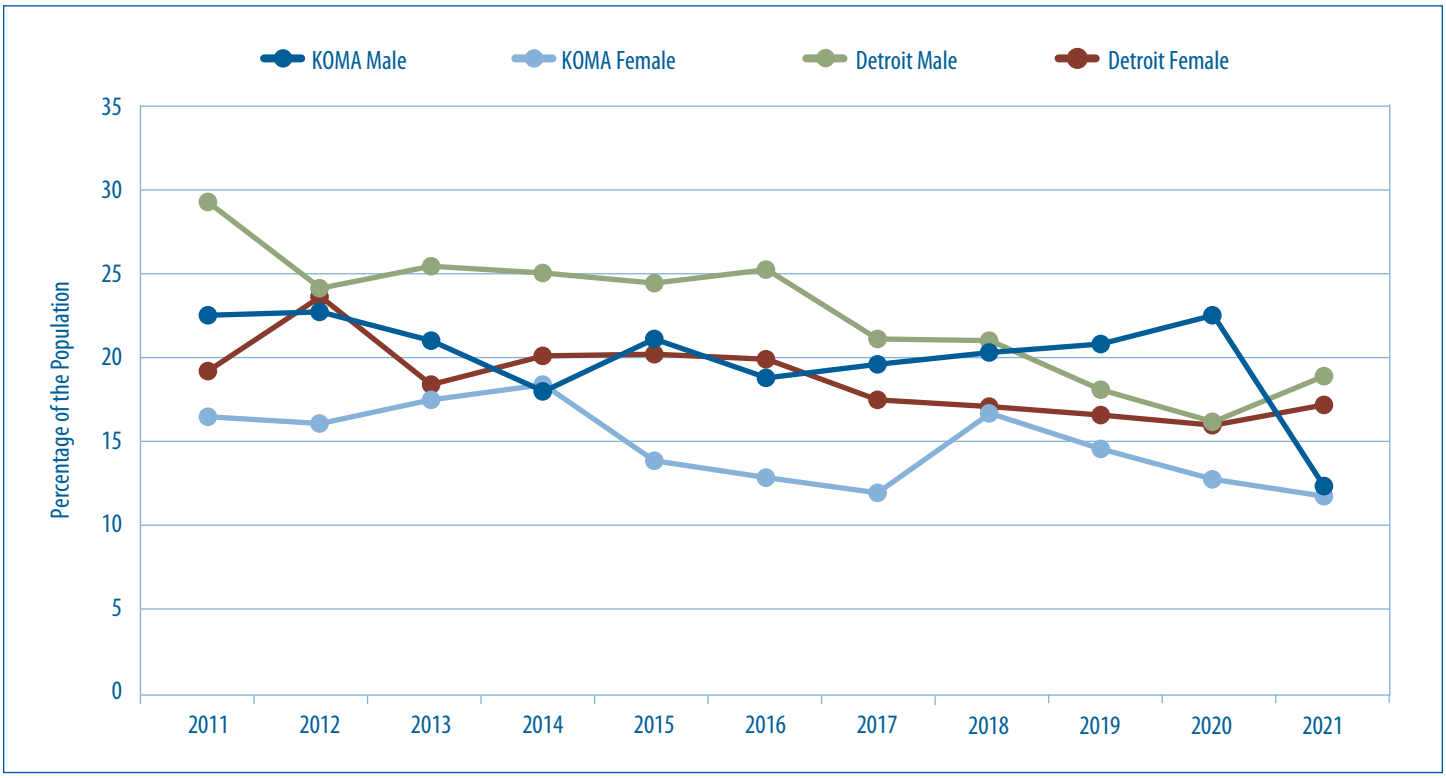
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 19: Current Cigarette Smokers by Race, 2011-2021



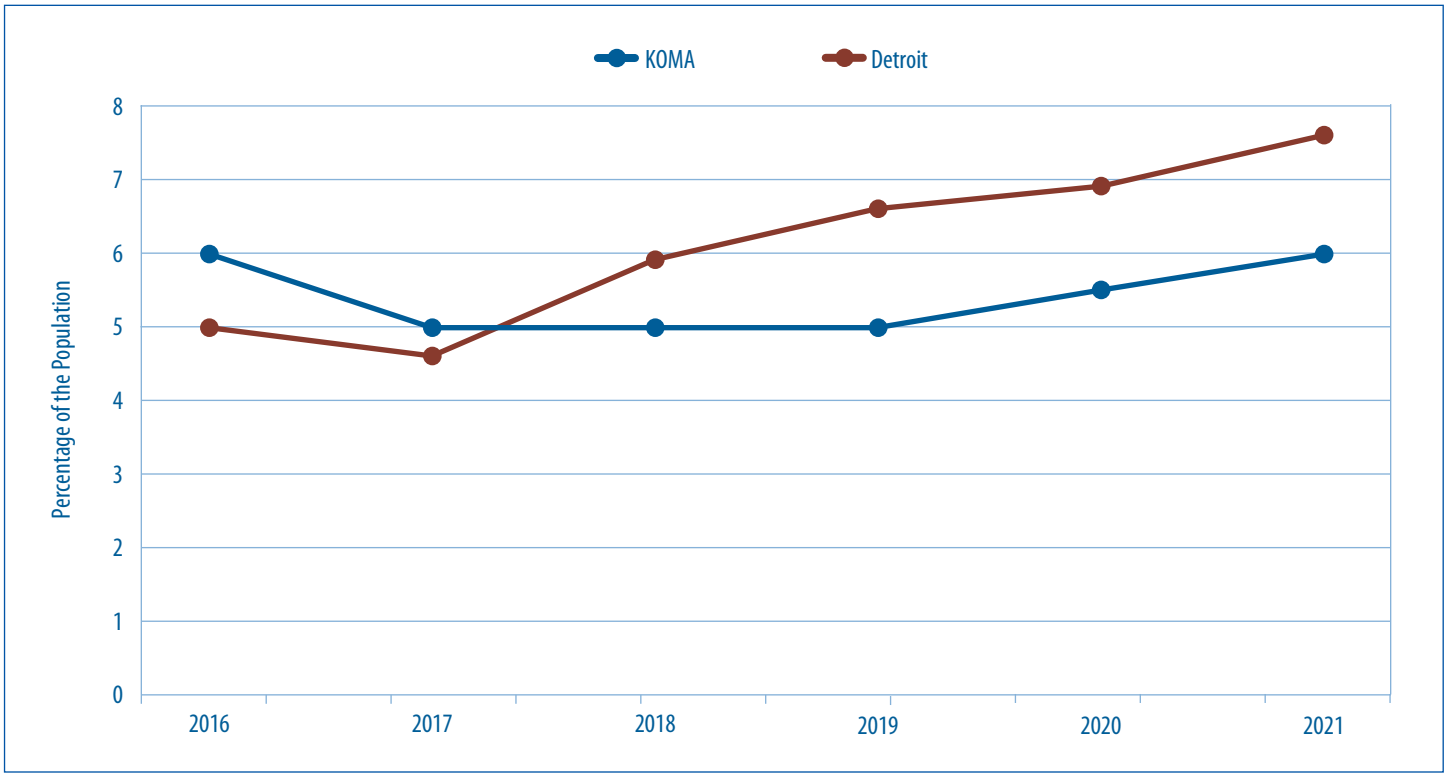
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 20: Current Cigarette Smokers by Gender, 2011-2021



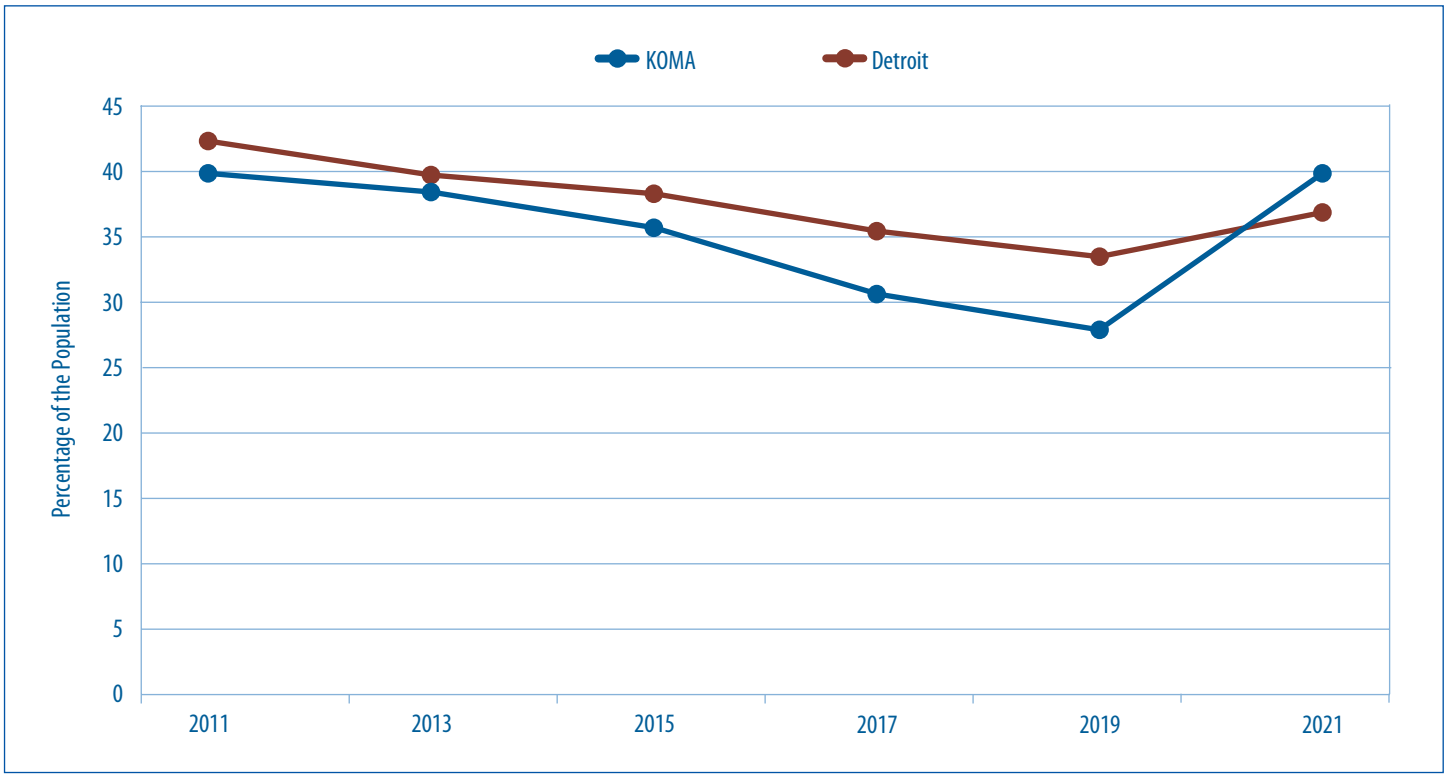
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 21: Current E-cigarette Use, 2016-2021



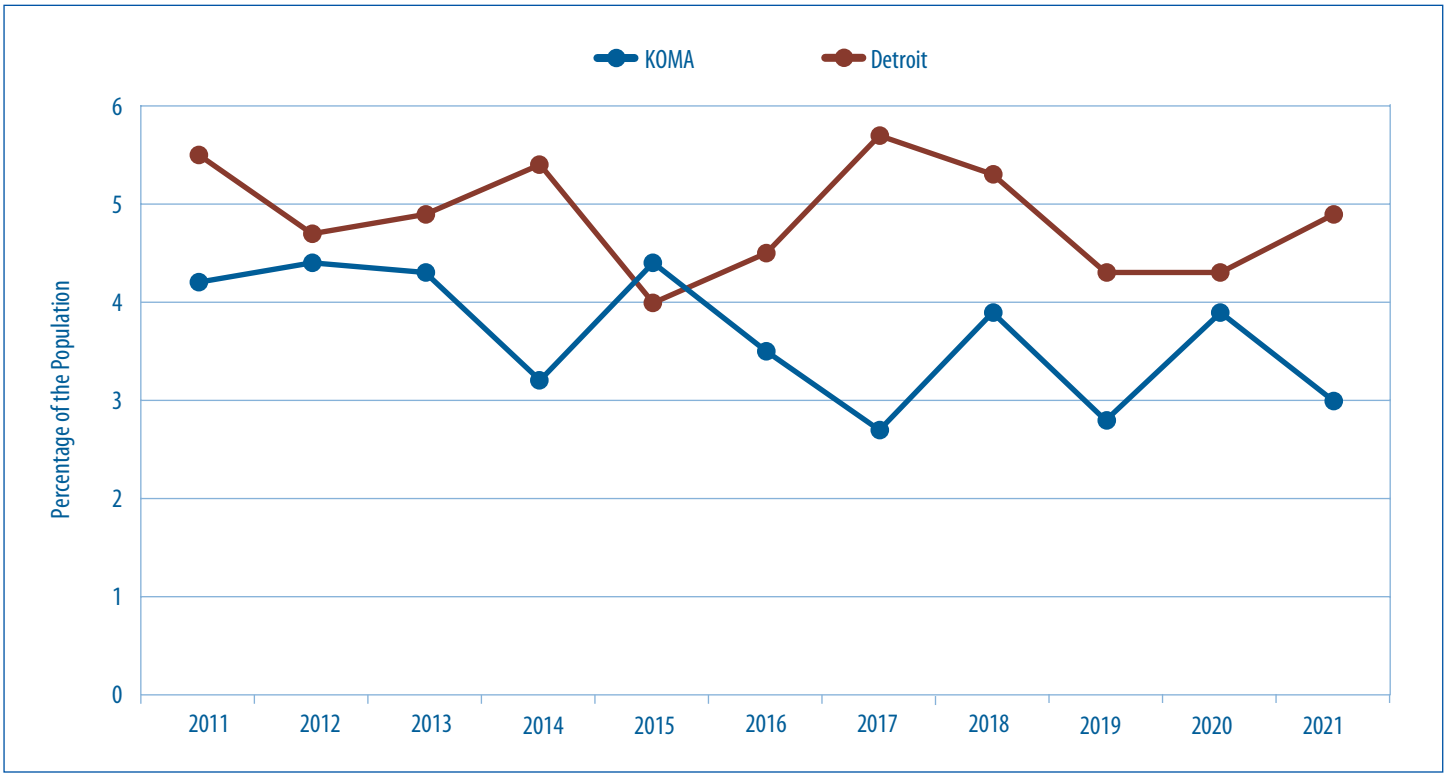
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 22: Ever Told High Cholesterol, 2011-2021



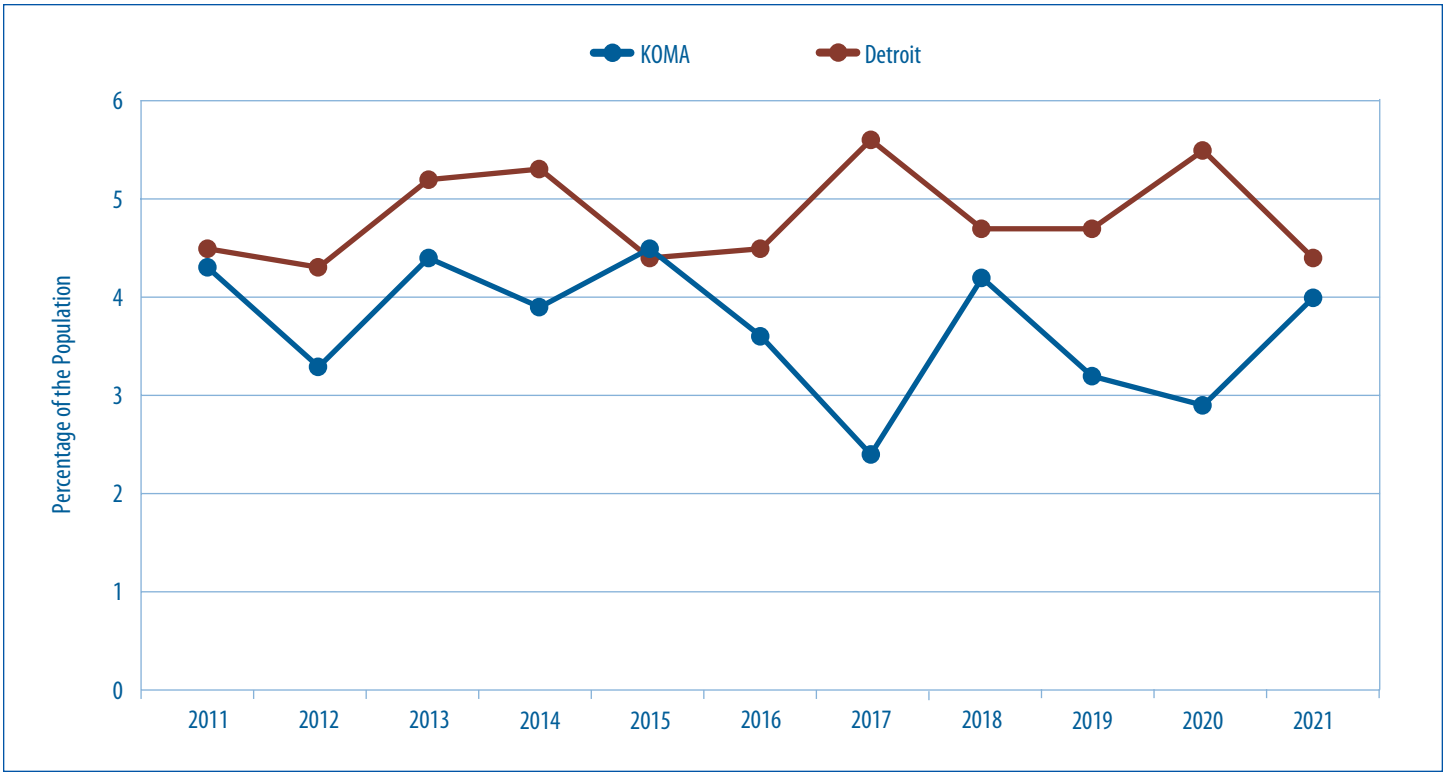
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 23: Heart Attack (18+), 2011-2021



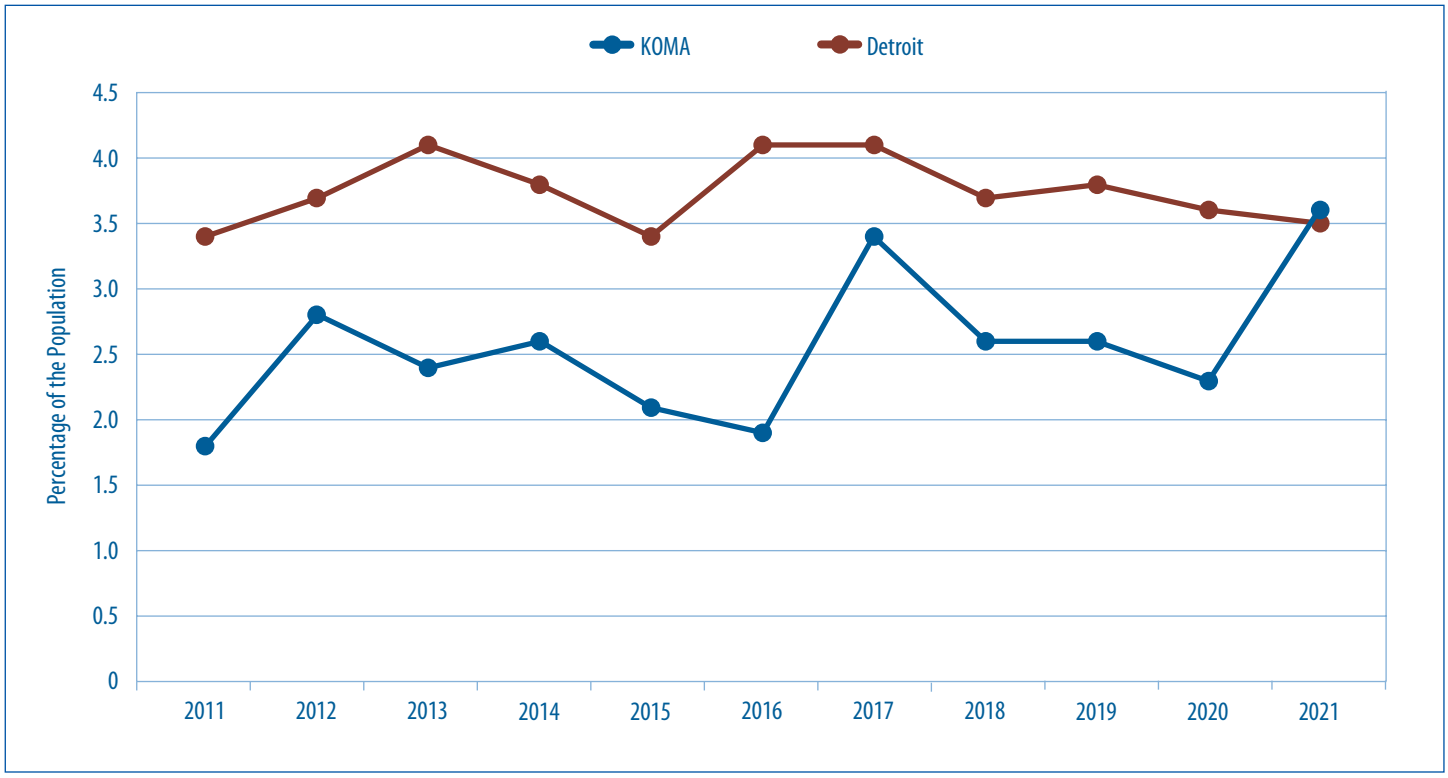
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 24: Angina or Coronary Heart Disease (18+), 2011-2021



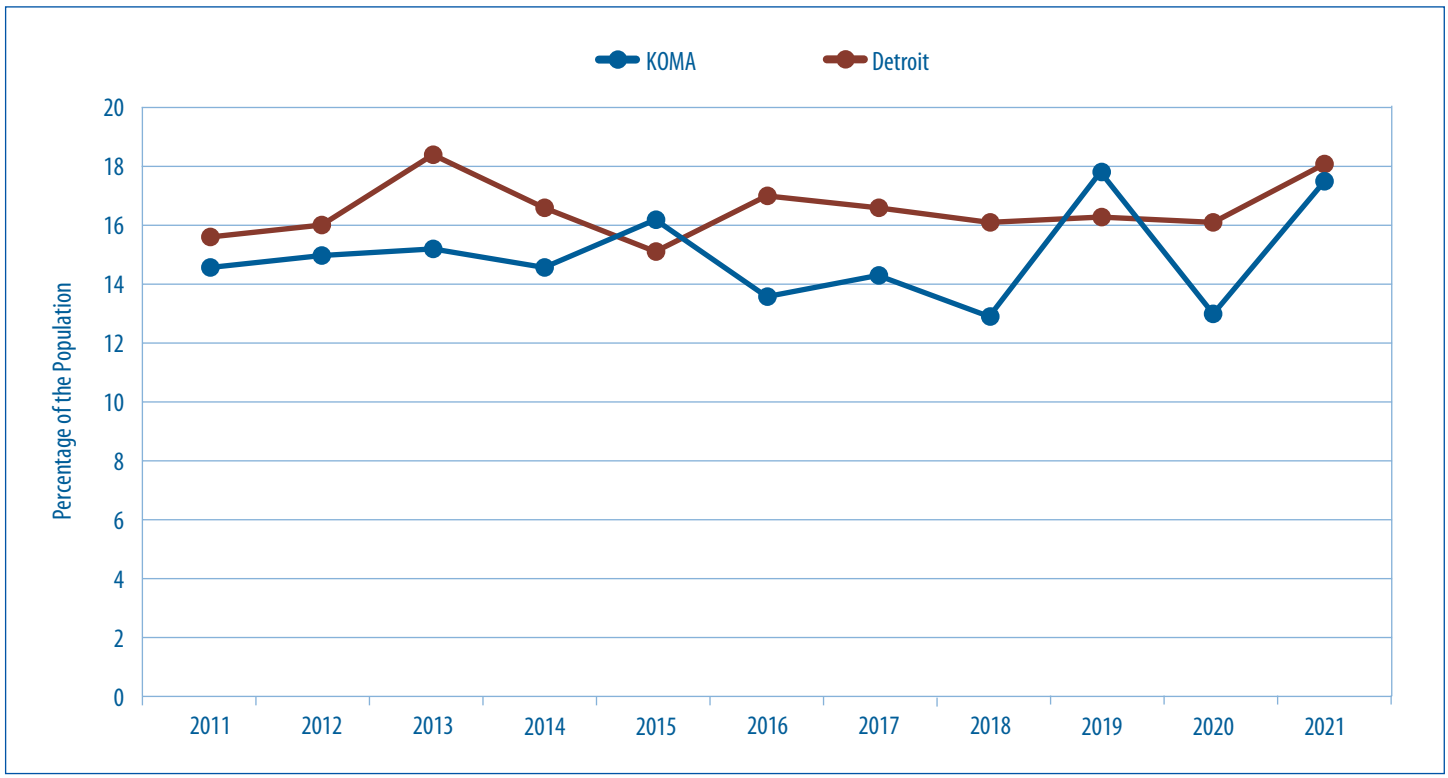
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 25: Stroke (18+), 2011-2021



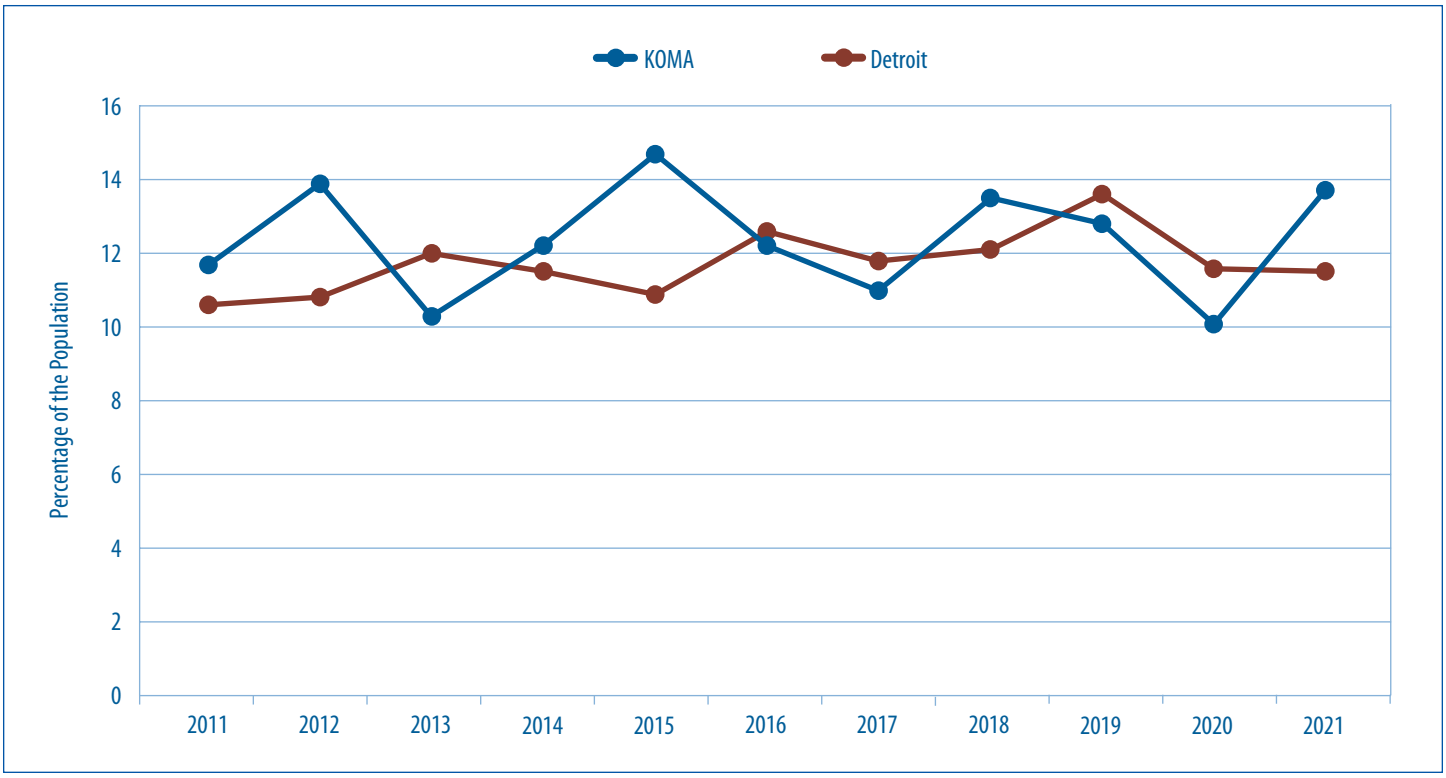
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 26: Lifetime Asthma, 2011-2021



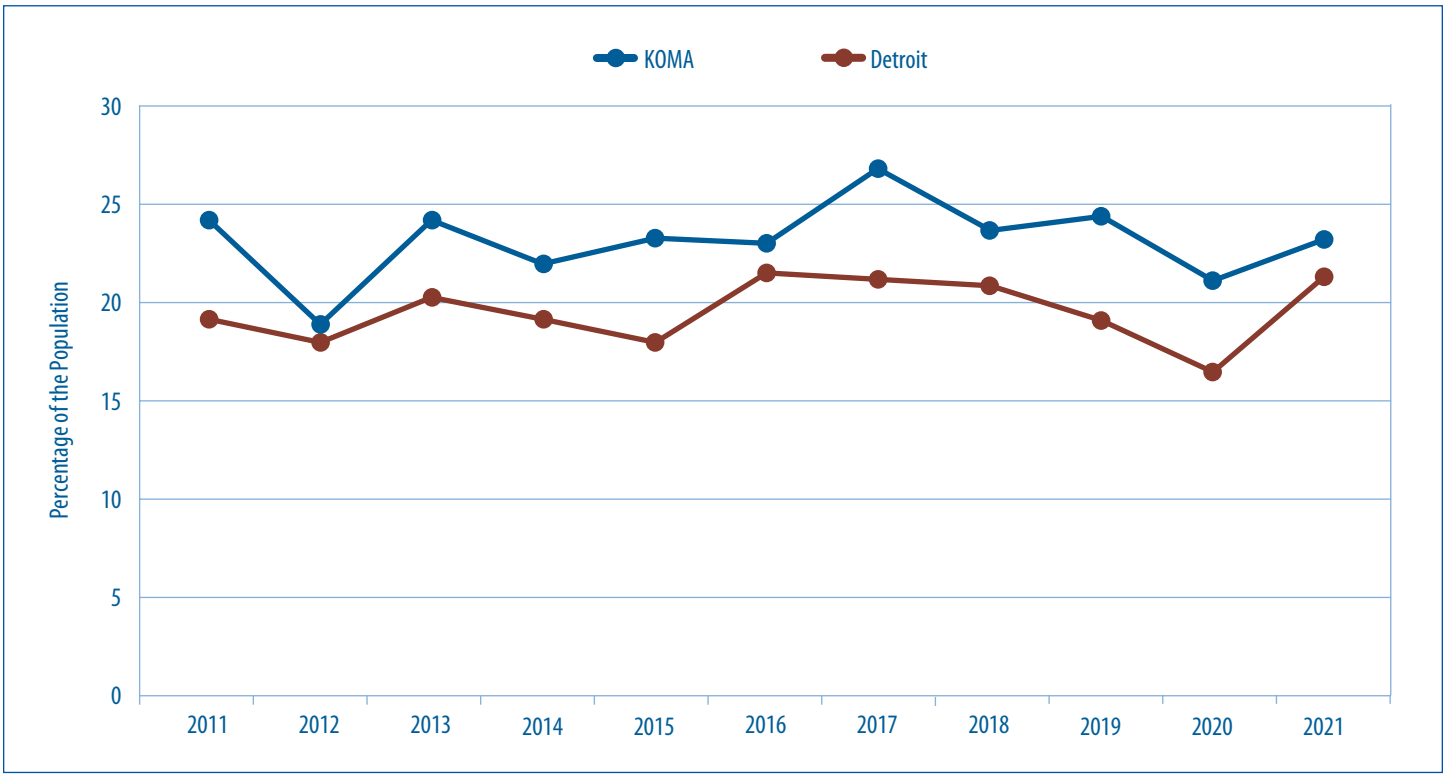
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 27: Ever Told Cancer (Skin and/or Other Cancers), 2011-2021



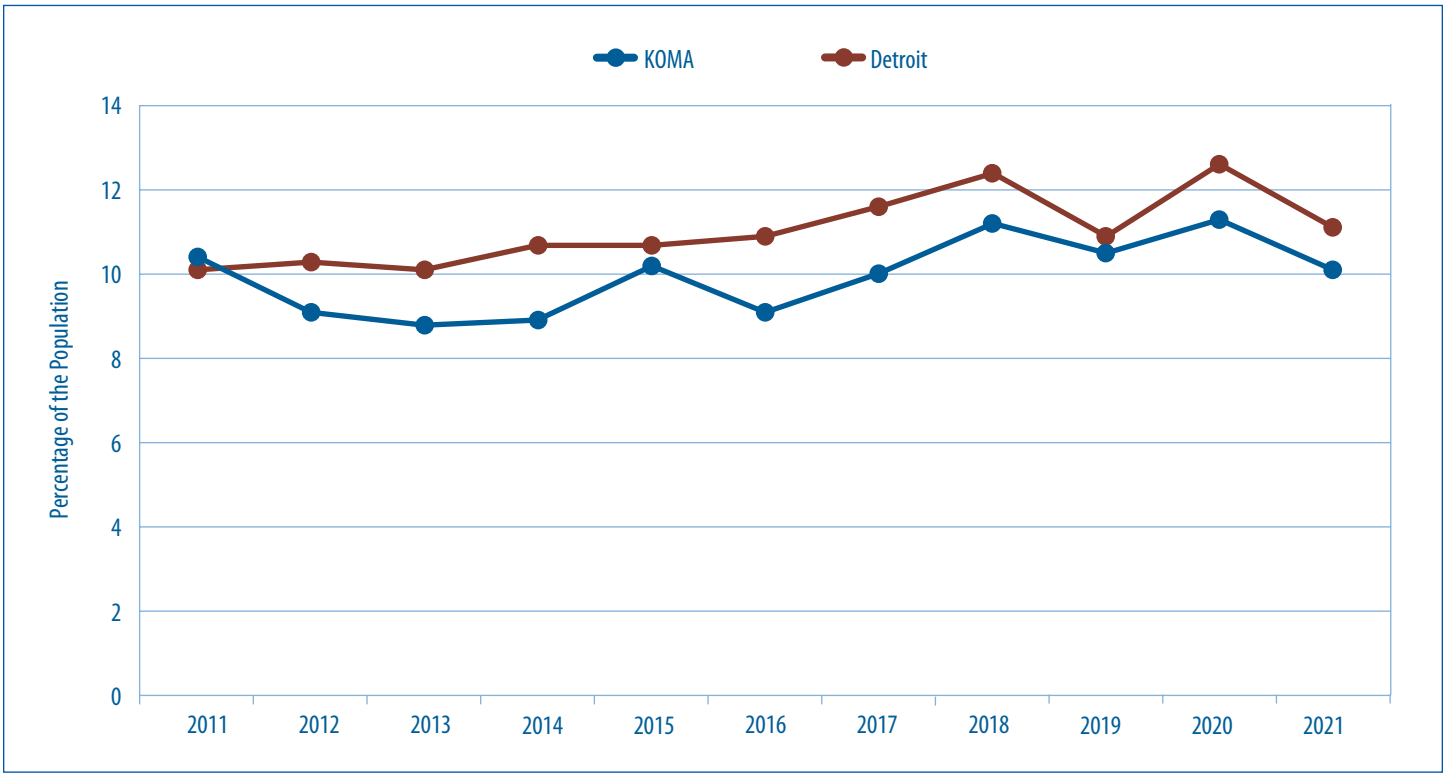
Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 28: Depressive Disorder, 2011-2021



Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Figure 29: Ever Told Diabetes, 2011-2021



Source: Michigan Department of Health and Human Services, Behavioral Risk Factor Surveillance System, 2011-2021

Economic Analysis

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Benchmarking Communities

In this section, we compare the Grand Rapids combined statistical area to a selected group of metropolitan areas to examine differences in the supply of hospital services, hospital expenses, and Medicare expenditures.[1] We compare changes in hospital utilization and expenditures for the Grand Rapids region to changes for a benchmark region calculated as the population weighted outcome average for Louisville, KY; Buffalo, NY; Rochester, NY; and Milwaukee, WI. These regions were selected as benchmark communities based on similarities to Grand Rapids in a variety of regional metrics including population density, earnings estimates, unemployment rates, and population age and race distributions. We also include data for the Detroit region and for the entire United States.

The Supply and Utilization of Hospital Services

Figures 1-6 are constructed using data from the 2023 edition of the American Hospital Association (AHA) Hospital Statistics, which covers survey responses regarding variables of interest in 2021 (American Hospital Association, 2023). These figures focus on both hospital capacity and utilization across Grand Rapids and the benchmark comparison regions. Utilization measures such as admissions, outpatient hospital visits, and emergency department visits are measured as per capita rates using the number of residents in each region as the denominator. As noted previously, a downside to the use of these per capita utilization rates is that they do not account for the inflow of patients from outside the region or the outflow of patients to other regions. As such, if individuals are traveling to a region to receive care despite living outside of that region, those individuals will contribute to the numerator in the utilization calculation, but not to the denominator. In cases where patient inflow is particularly high, utilization measures will be overstated.

Figure 1 includes data on the number of hospital beds per 1,000 residents in each region from 2005 to 2021. This measure serves as a proxy for hospital capacity. For all communities in the graph, hospital capacity has marginally declined over the past three years. This has solidified the relative positions of the communities observed in previous versions of this report. As it historically has, hospital capacity in Grand Rapids remains low relative the U.S. average, and well below the capacities of Detroit and the benchmark communities. Given that hospital care is expensive relative to other health services, this represents a comparative advantage for the region by way of the lower cost of care passed along to employers. While unchanging hospital capacity would suggest relatively constant levels of access and quality of care for a given population, this capacity may become strained as the population ages or becomes sicker.

Figure 2 displays the number of hospital admissions per 1,000 residents. While **Figure 1** focused on inpatient capacity, **Figure 2** provides data on inpatient utilization. With the exception of Grand Rapids, the comparison communities experienced marginal declines in hospital admissions in 2021 relative to the previous year. The year-over-year increase in Grand Rapids has brought its hospital admissions rate back to prepandemic levels. The comparison communities remain 7 to 15 percent below the levels from the beginning of the pandemic. This continues the long-run trend of Grand Rapids losing its comparative advantage in hospitalization rates, as the city is for the first time within 10 percent of the national average. Despite this, the narrowing does not appear to reflect problems with provision in Grand Rapids given that the hospital rate in Grand Rapids remains near its historical low from 2014. The stabilization in rates across the country is good news for hospitals following the COVID-related drop in overall admission rates from 2020 and the resulting negative impact on hospital budgets (Heist et al., 2021).

Figure 3 plots per capita outpatient visits from 2005 to 2021. With the exception of Grand Rapids, the other comparison communities rebounded in 2021 from the COVID-related declines of 2020 and are essentially back on their pre-COVID trends. Grand Rapids, on the other hand, continued to experience unabated growth in outpatient visits per capita in-line with its long-run trend. Despite this, the percentage gap between Grand Rapids and Detroit narrowed in 2021, as has that between Grand Rapids and the benchmark communities. Grand Rapids' outpatient visits per capita are 29 percent higher than Detroit's, down from 42 percent in the previous year. Similarly, Grand Rapids' outpatient visits per capita are 42 percent higher than that of the benchmark communities, down from the 56 percent margin in 2020. The gap in outpatient visits per capital between Grand Rapids and the rest of the country has widened slightly, with Grand Rapids' visits per capita over 108 percent greater than the national average in 2021, up from 105 percent in 2020.

Figure 4 examines an additional component of hospital utilization by plotting per capita emergency department (ED) visits for Grand Rapids and each of the comparison regions. The most striking development is that, despite emergency department utilization in Grand Rapids being around 24 percent less than Detroit's for the 2005-2020 period, this gap shrunk to only 5 percent in 2021. The 20 percent increase of 2021 in Grand Rapids is not a bounce-back from the lows of 2020 due to COVID, as utilization remained essentially unchanged nationally and in the benchmark communities, which experienced similar 2020 declines. Contemporaneous local news sources cite multiple factors for the extreme growth in Grand Rapids, including the early onset of wintertime viral illnesses (Buursma, 2021; McVicar, 2021) and delta-variant surges (Buursma, 2021) particularly among the unvaccinated (Lovern, 2021). A final reason concerns the rise of mental health-related visits to emergency departments in Michigan during and in the wake of the COVID pandemic (Erb and Barrett, 2021). The previous health check report noted large increases in the prevalence of depression in West Michigan in 2021 relative

[1] Because the Grand Rapids metropolitan statistical area (MSA) definition has recently changed, we use the more consistent definition of the core-based statistical area. The Detroit region is defined using the smaller metropolitan division categorization. All other regions are defined using the MSA.

to the Detroit region. This could partly explain the 2021 growth in emergency department utilization in Grand Rapids outpacing that of Detroit. This is all especially troubling since both the east and west sides of Michigan now utilize emergency services in hospitals in a tier above the benchmark communities and the rest of the country.

Just as **Figure 2** showed changes in hospitalization rates across all four hospital comparison communities, **Figure 5** reveals changes in the average lengths of stay, conditional on admission. Grand Rapids and Detroit experienced roughly the same increase of 0.18 and 0.16 days in length of stay, respectively, which is in-line with the 0.22 day increase in the national average. The benchmark communities were an outlier among the comparison communities, experiencing around double the increase at 0.39 days. While some of these increases may continue to reflect hospitals' 2020 efforts to avoid exposing lower-risk patients to the coronavirus (thus increasing the concentration of high-risk patients as well as the average length of stay), we must also consider the longer-run impact of delayed care from 2020. Around 41 percent of adults reported delaying care in 2020 (Czeisler et al, 2020), which could have led to increased morbidity and mortality upon later presentation at hospital in 2021. Though concerning, this effect does not appear particularly strong in Michigan.

Finally, **Figure 6** highlights the number of hospital-based personnel per 1,000 residents in each region. These personnel counts are based on the total number of full-time equivalent (FTE) hospital employees, excluding medical and dental residents, interns, and other trainees. While only Detroit suffered a decline going into 2020, all comparison communities experienced drops in hospital personnel per capita in 2021. Just as in 2020, these declines are not the result of declining compensation, which grew faster in 2021 than in 2020 for most communities (see **Figure 7**). The primary culprit for the broad declines in per capita hospital-based personnel is greater burnout among health care workers. While the early onset and high severity of the COVID-19 pandemic in Detroit precipitated earlier burnout in that region, it eventually extended to all comparison communities as the pandemic dragged on. These findings are relevant to the broad literature studying burnout among health care workers during the pandemic (Bradley and Chahar 2020, Sharifi et al. 2021, Jalili et al. 2021).

Hospital and Medical Expenditures

Figure 7 examines payroll and benefits expenses per hospital employee, which is inflation-adjusted to 2021 dollars using the consumer price index. This figure, along with **Figure 8**, was constructed using the AHA Annual Survey, managed by Wharton Research Data Services (2023). Compensation increased across all comparison communities, even in Grand Rapids, which was the lone community to experience a decline in 2020. While average compensation in Grand Rapids remains the lowest of the comparison communities, it also experienced the largest growth between 2020 and 2021 and is now virtually on par with that of the benchmark communities. Given that the percentage changes for all comparison groups are low, however, this could be due to noise. As was mentioned previously, the fact that growth in real compensation broadly accelerated in 2021, even as hospital personnel per capita declined in every comparison community, is consistent with COVID-related burnout among hospital personnel.

Figure 8 displays total inflation-adjusted hospital expenses per admission. It is important to recognize that **Figure 8** measures the total expenses reported by the hospital, divided by the reported number of admissions. It does not reflect patient or insurer expenditures on hospital care. While real expenses per admission have risen consistently for every comparison group over the past 16 years, the growth slowed to around 2 to 3 percent across all comparison communities in 2021 and even declined by 4 percent in Grand Rapids. This deceleration is difficult to explain, given that admissions stabilized, average length-of-stay increased, and hospital employee compensation grew at an accelerated rate. Further good news for Grand Rapids is that expenses per capita are now virtually the same as the benchmark communities, despite consistently being 7 to 12 percent higher over most of the previous decade.

Figure 9 plots per capita Medicare expenditures for both Fee-for-Service (FFS) and Medicare Advantage (MA) enrollees from 2007 through 2021. These figures represent the average annual per capita government expenditure for a Medicare beneficiary in each of the comparison communities. Data on FFS Medicare enrollment and expenditures and MA enrollment were obtained through the Centers for Medicare and Medicaid Services (CMS) Geographic Variation Public Use File (Centers for Medicare and Medicaid Services, 2023). Measures of MA expenditures were calculated using year-specific benchmark payment rates, which provide an approximate estimate of county-level MA spending. Due to the nature of the data used to construct **Figure 9**, geographic regions are defined as the primary county in the MSA (e.g. estimates for Grand Rapids are specific to Kent County). Expenditures in **Figure 9** are adjusted for regional differences in prices, population age, gender, and race. These figures include expenditures for physician and hospital care but *exclude expenditures on prescription medications*. Additionally, in cases where treatment was received in a county outside of where the patient resides, CMS assigns expenditures to the county in which the patient lived and not the county where the treatment was performed.

Despite rising Medicare expenditures in Grand Rapids from 2016 to 2018, spending has leveled off and remained stable since. There has been considerable narrowing of the gaps between communities in Medicare spending per capita, and all are now within about 4 percent of each other. From 2020 to 2021, growth in per capita Medicare spending in Grand Rapids, Detroit, and the benchmark communities was all below the national average.

In conclusion, and in several ways, the year 2021 represents a return to baseline trends that were disrupted by the first full year of the COVID-19 pandemic. All communities showed large increases in outpatient visits. Despite accelerated growth in overall compensation in all communities, there were declines in per capita hospital personnel across all communities, revealing that burnout among hospital workers has extended beyond the Detroit region

into all other communities. Notable differences in 2021 between Grand Rapids and the other communities include a reduction in expenses per admission. As there were no major changes to rates of admission or length of stay, this would be welcome news. On the other hand, the spike in emergency department utilization is unprecedented and has pushed utilization levels near those normally found in Detroit, the highest of all comparison communities. It is particularly troubling if, as contemporary sources say, increased prevalence of mental illness is a contributor.

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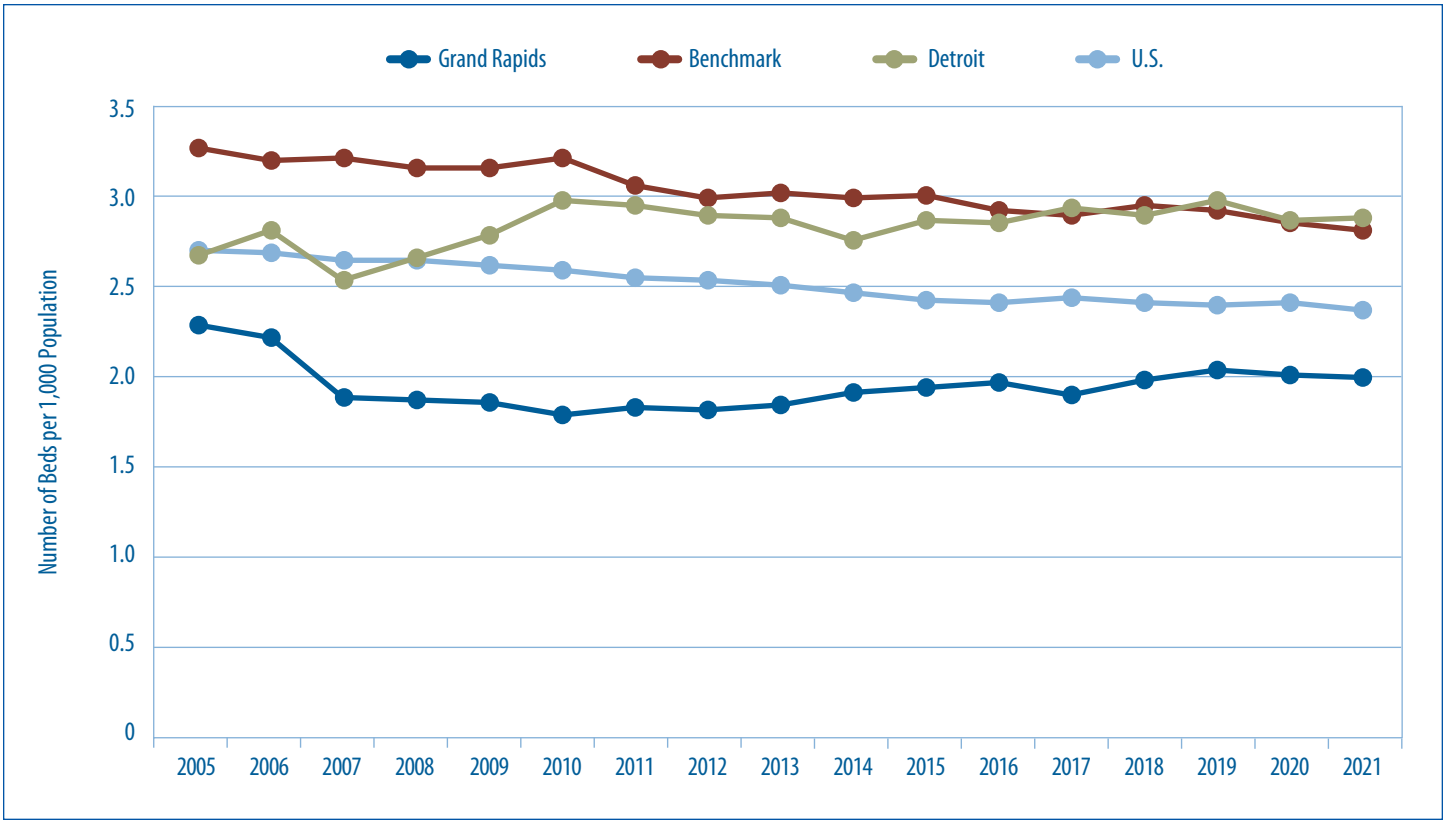
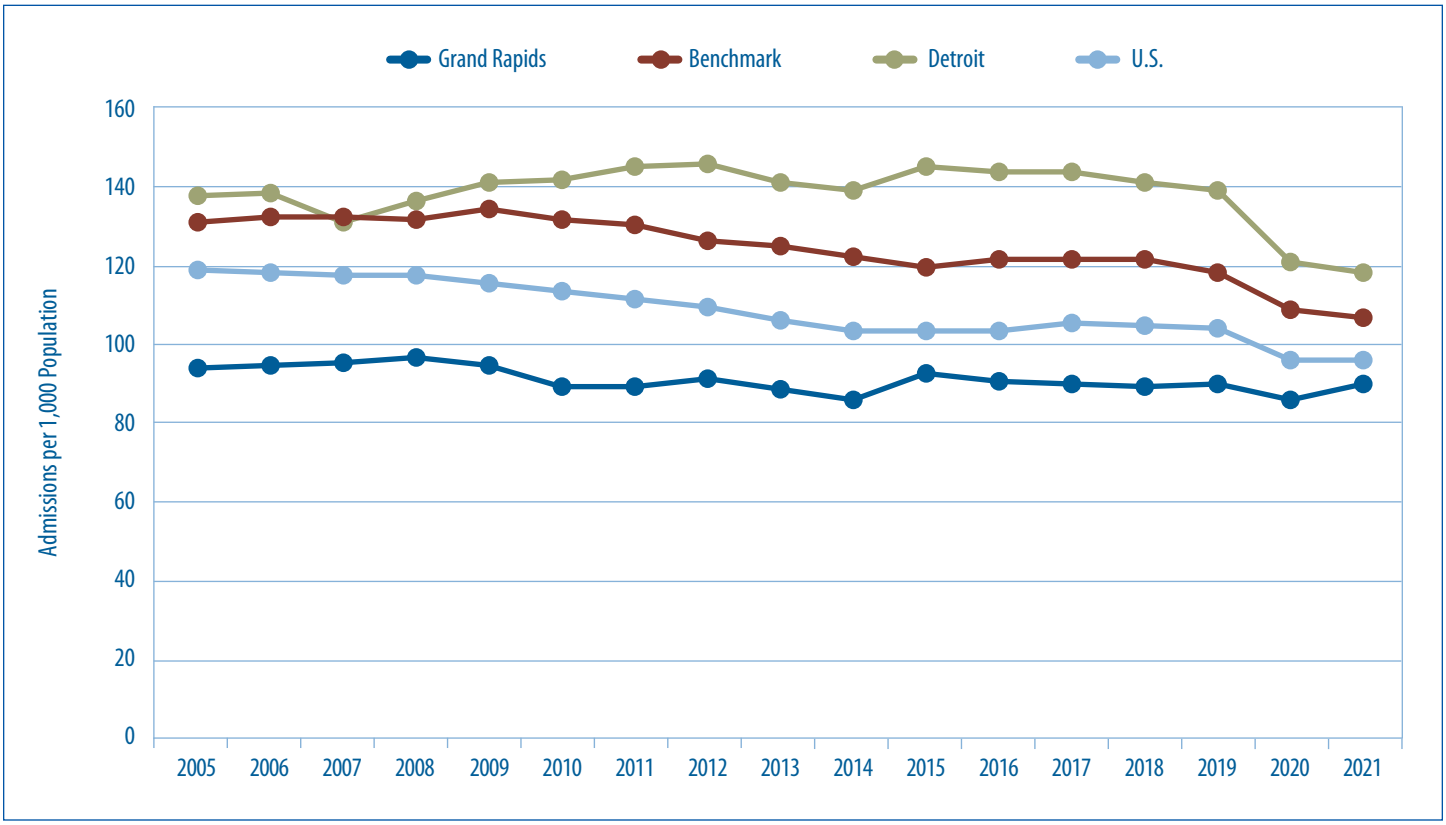
Figure 1: Hospital Beds per 1,000 Population, 2005–2021



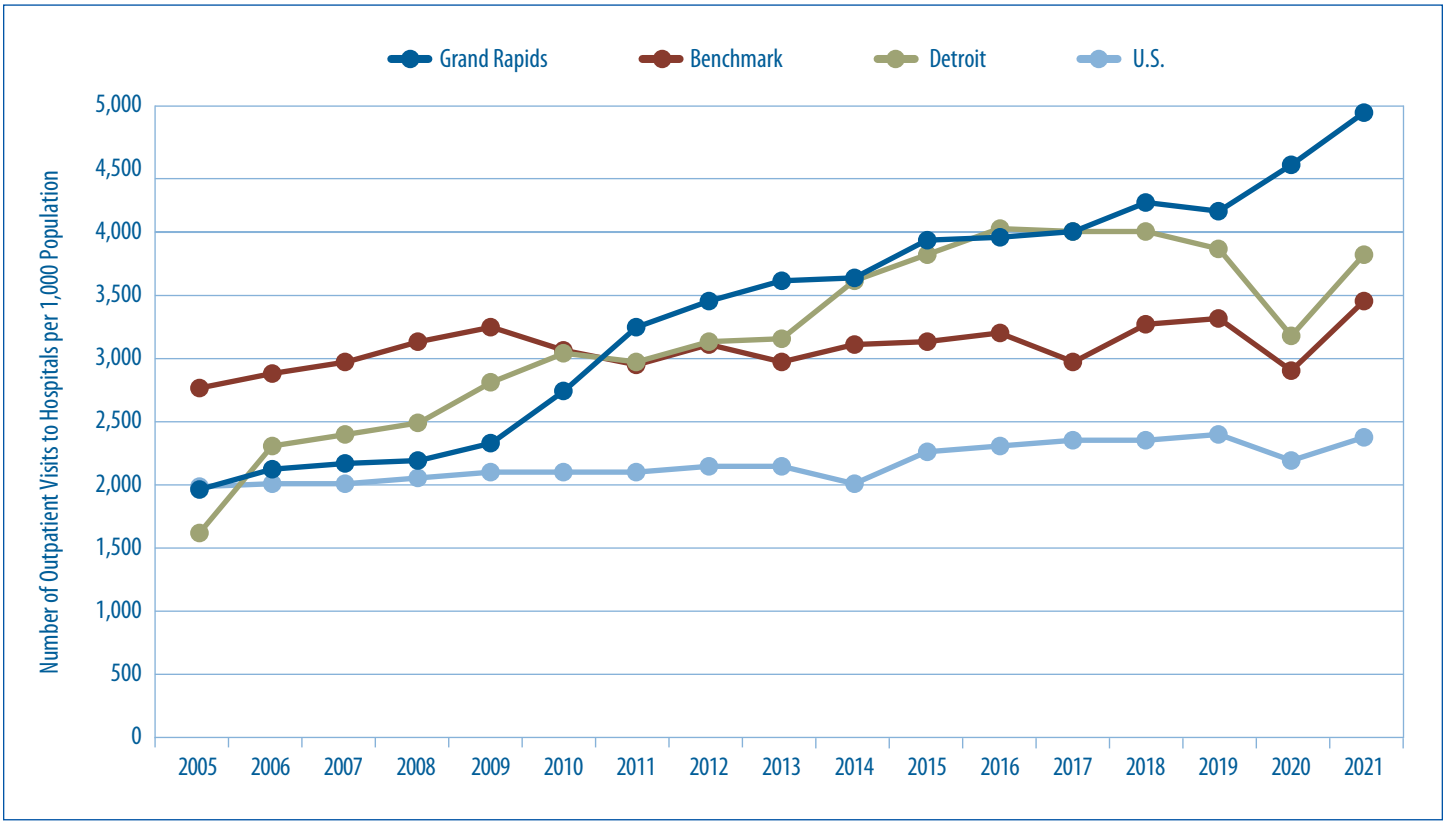
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 2: Hospital Admissions per 1,000 Population, 2005–2021



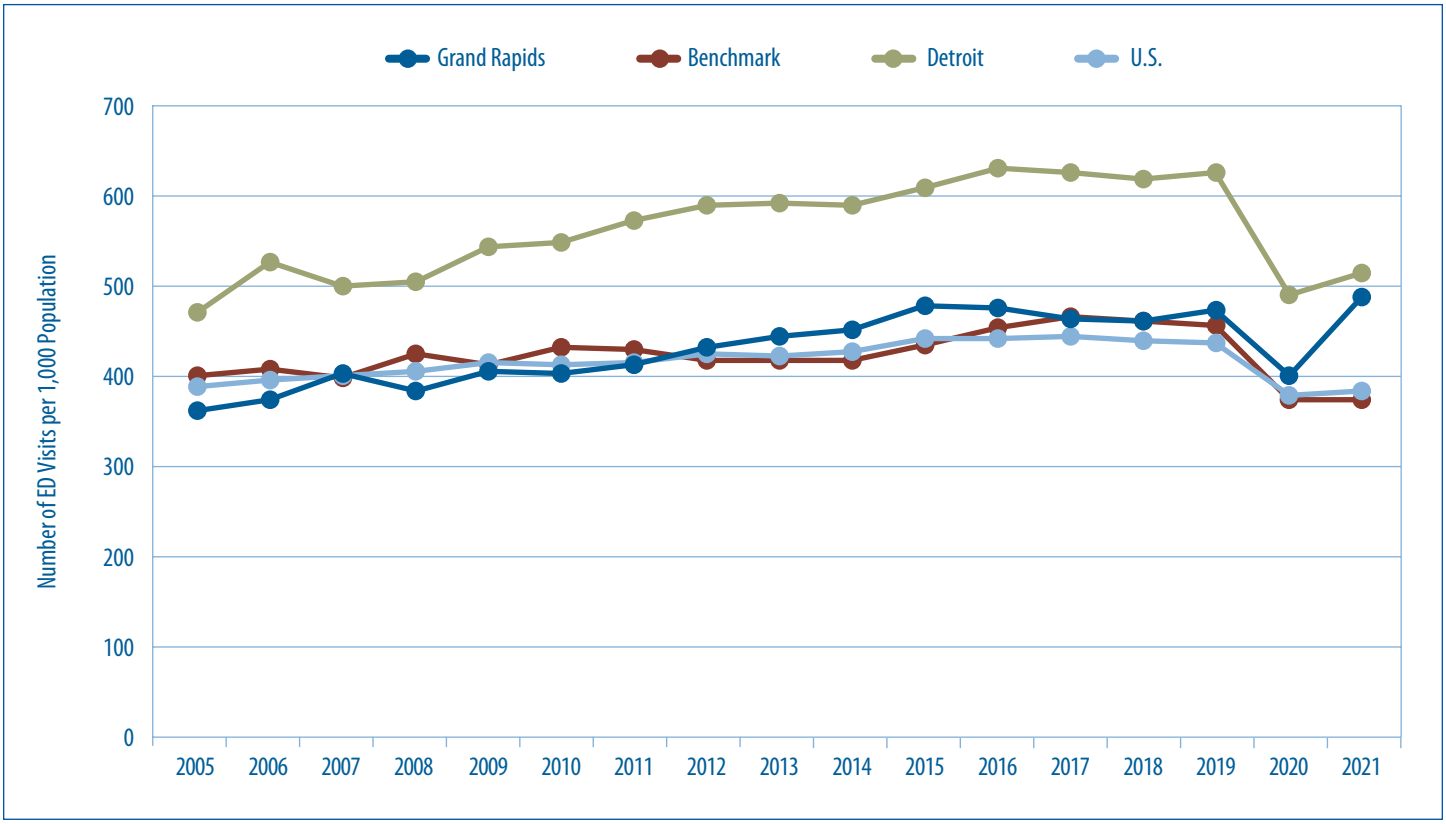
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 3: Outpatient Visits to Hospitals per 1,000 Population, 2005–2021



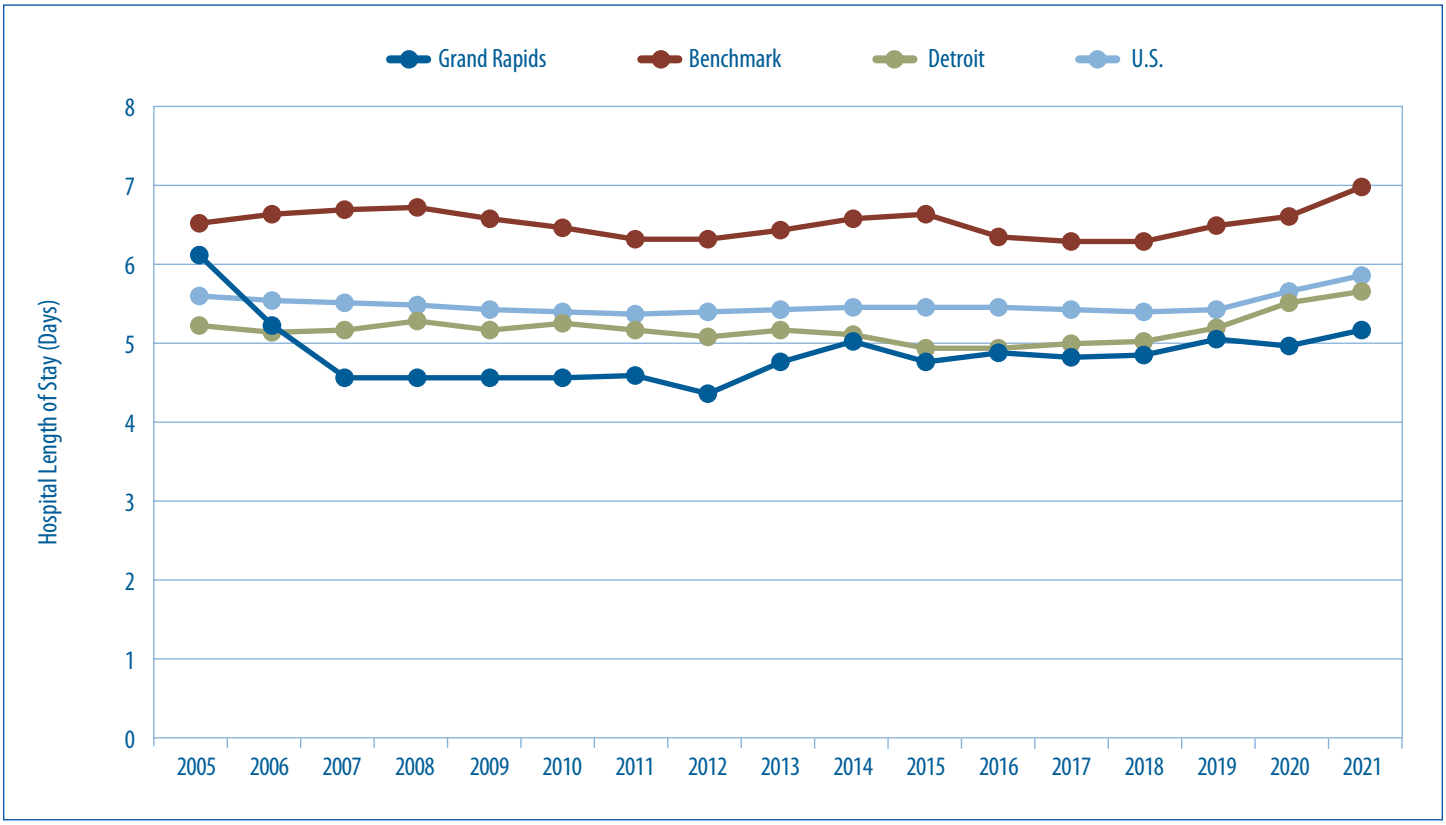
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 4: Emergency Department Visits per 1,000 Population, 2005–2021



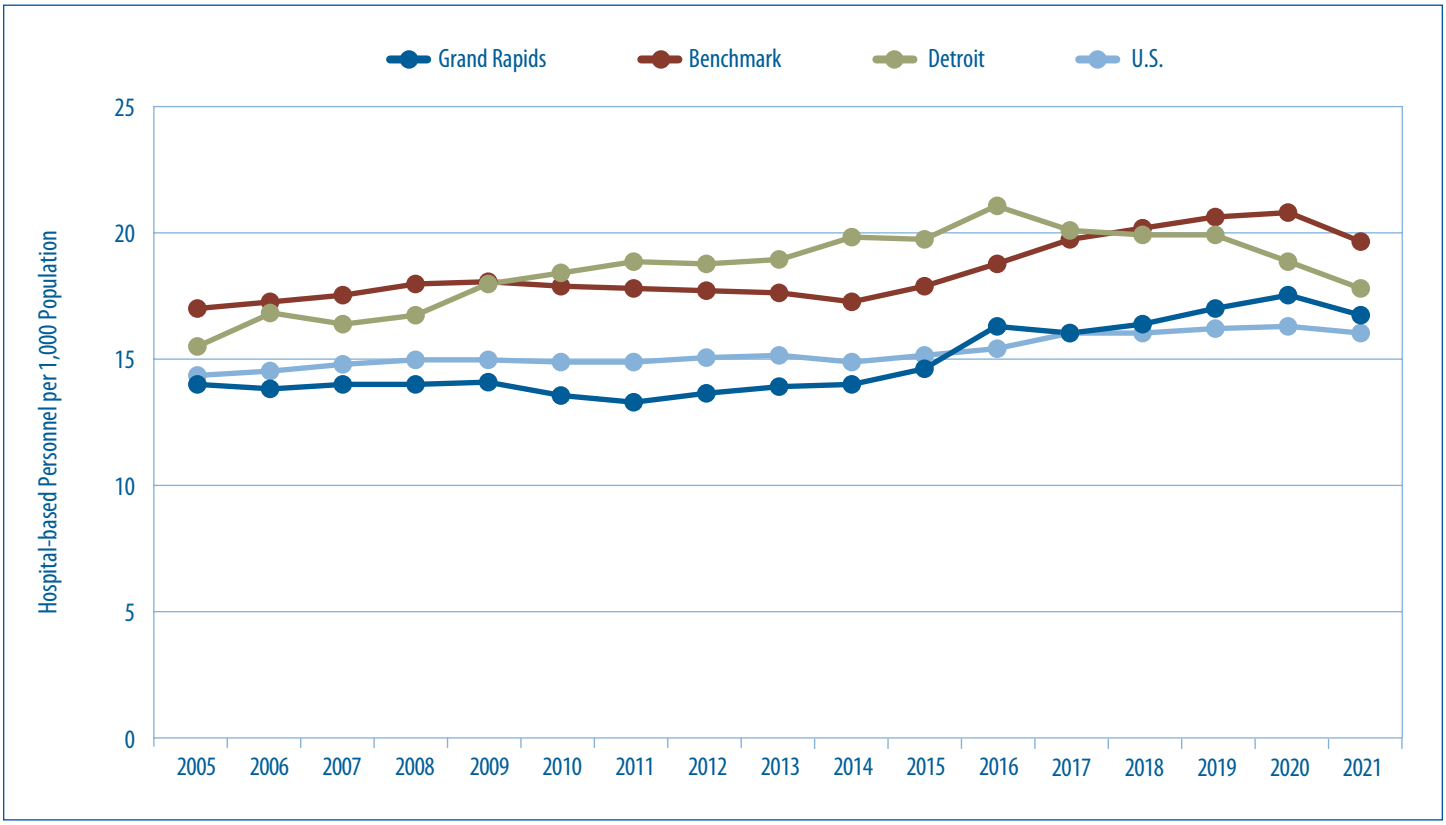
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 5: Average Hospital Length of Stay, 2005–2021



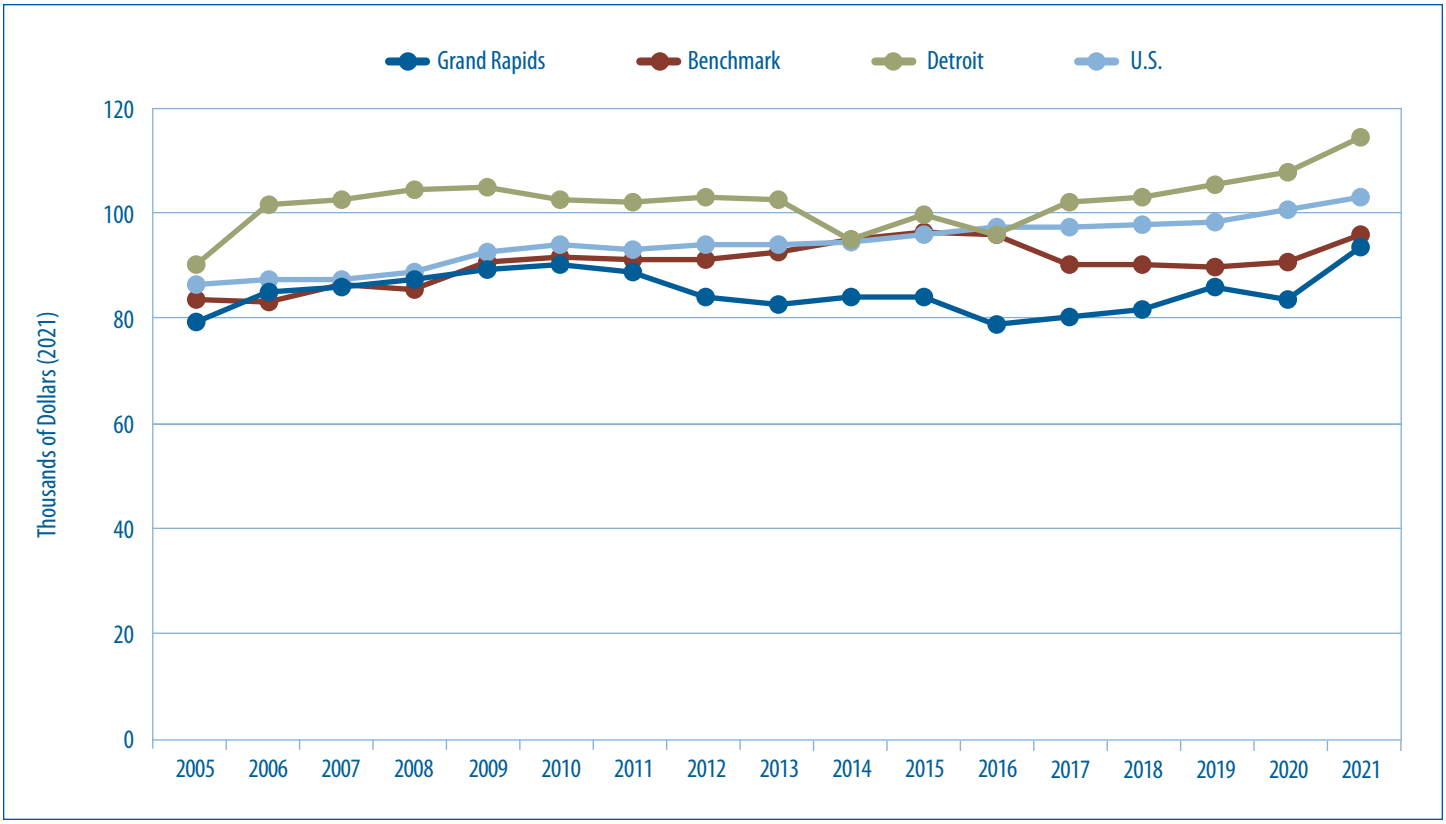
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 6: Hospital-based Personnel per 1,000 Population, 2005–2021



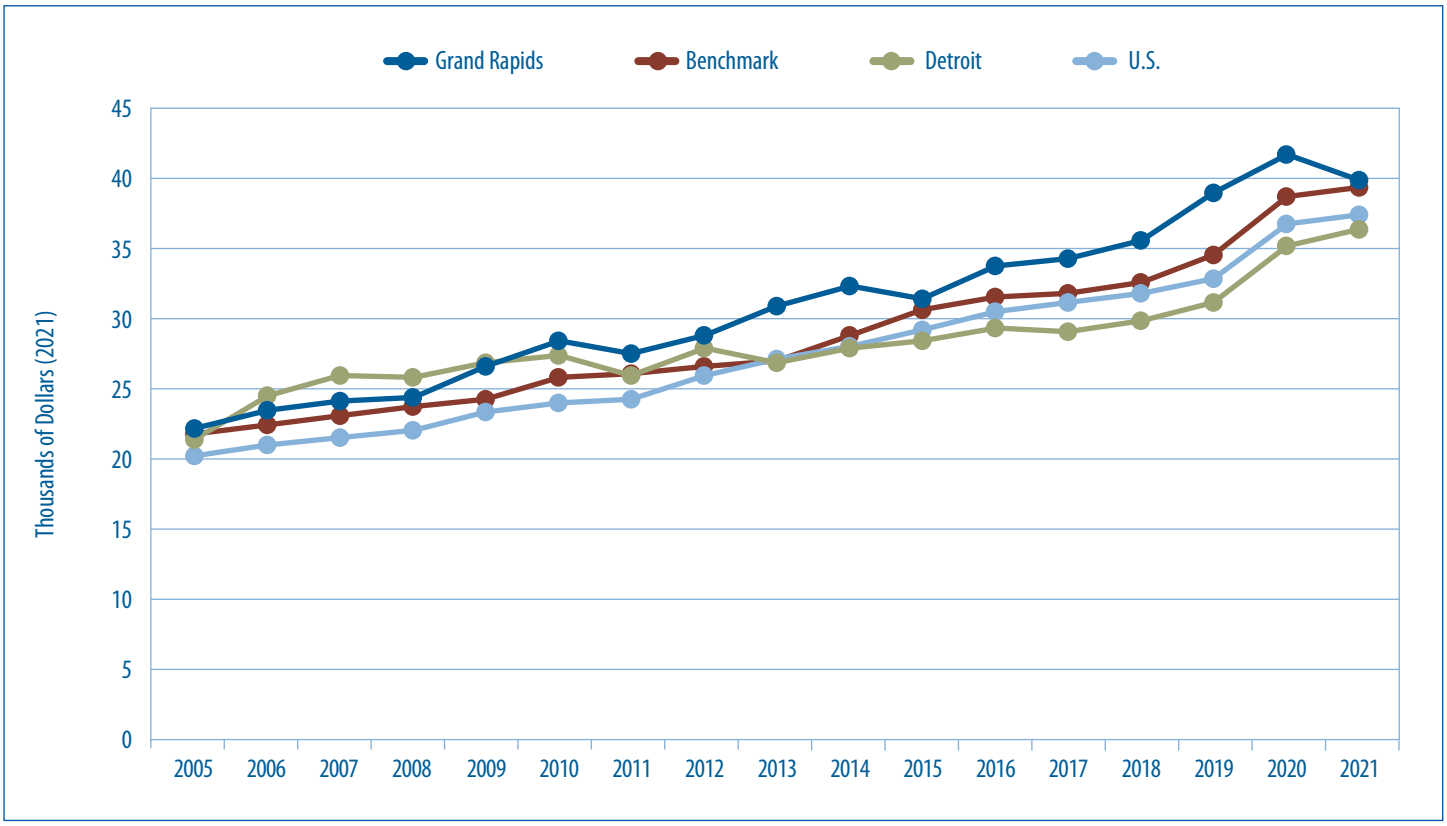
Source: American Hospital Association, AHA hospital statistics, 2021

Figure 7: Average Payroll and Benefit Expenses per Hospital Employee, 2005–2021



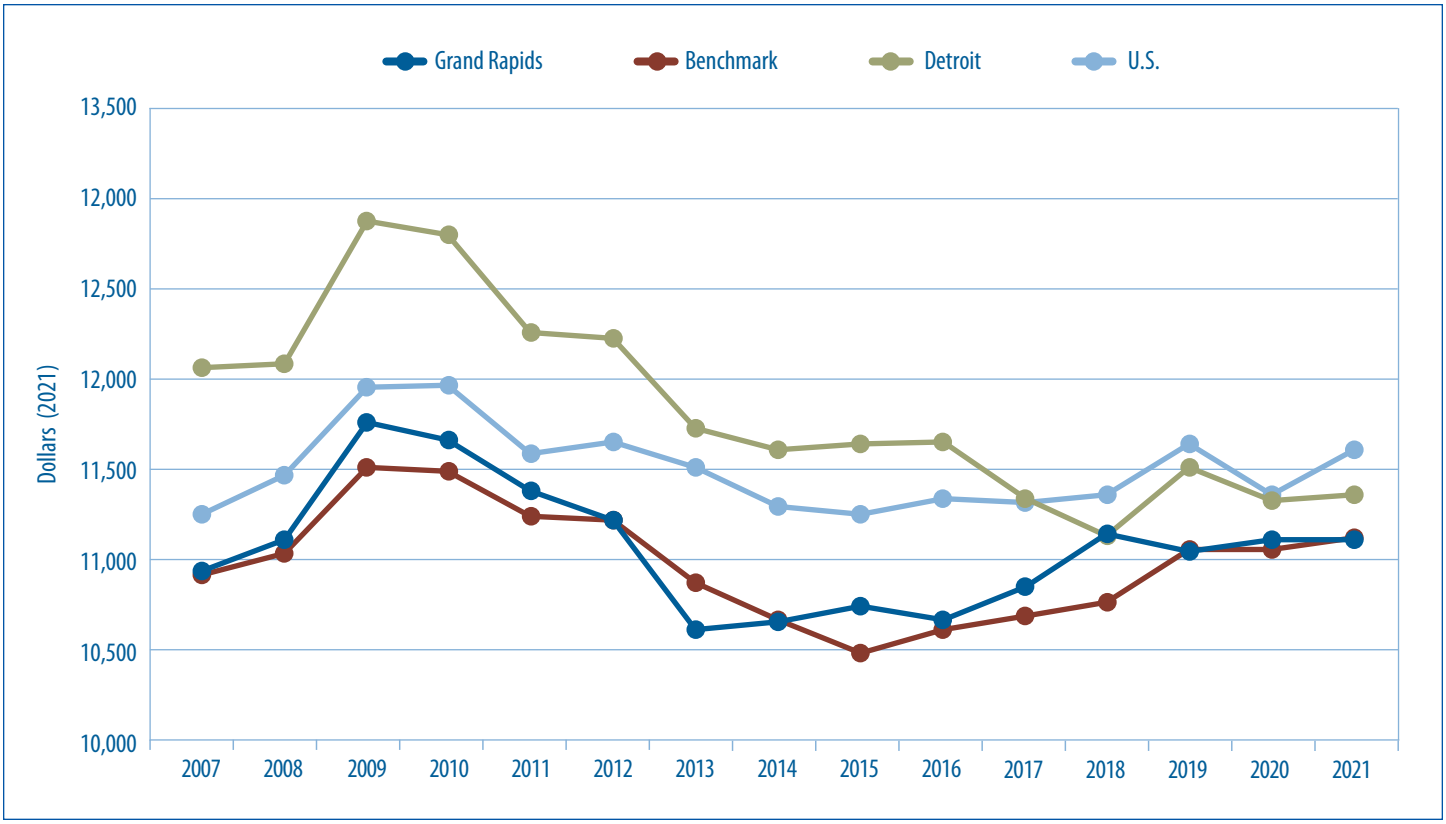
Source: AHA 2021 Annual Survey, managed by Wharton Research Data Services (2023)

Figure 8: Total Hospital Expenses per Admission, 2005–2021



Source: AHA 2021 Annual Survey, managed by Wharton Research Data Services (2023)

Figure 9: Adjusted Medicare Expenditures per Medicare Enrollee, 2007–2021



Source: Centers for Medicare and Medicaid Services Geographic Variation Public Use File

Major Medical Conditions: Expenditure Analysis

This analysis provides general cost information about some of the most prevalent and expensive medical conditions. This section's purpose is to identify and track trends in health care expenditures for selected chronic health conditions and to examine geographic differences in the cost of care. The data presented in this section are 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 2021-2022.[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 in order to achieve cost savings. PPOs tend to have fewer restrictions on members seeking care and, therefore, usually require additional member cost-sharing in the form of higher premiums, higher coinsurance rates, or higher co-pays. Because of these differences in benefit structures, evidence suggests that HMO plans are more attractive to enrollees who are healthier, who have less complex medical needs, or who have no longstanding ties to particular providers (Ji and 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 and 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 sicker than patients in other counties who are insured by a different payer.
- **Expenditures beyond disease.** In each case, the average patient expenditure data is for services not only related to the specific disease in question, but also for other unrelated medical costs the member may have incurred during the year. Differences in expenditures or treatment intensity for these unrelated health issues can result in additional variation in average patient expenditure estimates. Expenditure estimates from each insurer can vary considerably because of these factors. Thus, we average the data for all three insurers to arrive at a more robust estimate of member expenditures.

KOMA Region Expenditures

As we have done in previous versions of this publication, we choose 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. For comparison, we also include "healthy members," which we define as those between the ages of 30 and 39 who had 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 2021 and 2022. 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 2022 dollars.

Figure 1a indicates that, after adjusting for inflation, expenditures in KOMA decreased for five of the chronic conditions from 2021 through 2022 and increased for only one: asthma. While nominal expenditure did tend to increase across the six conditions, the high level of inflation from 2021 to 2022 was sufficient to cause real expenditures to decrease for some of the conditions. **Figure 1b** further highlights the percentage change in average member costs. Here we note that real expenditures decreased for depression (-15.2 percent), hyperlipidemia (-8.3 percent), diabetes (-5.8 percent), CAD (-4.6 percent), and low back pain (-2.1 percent). Expenditures increased for asthma (+3.3 percent), and healthy members (+4.9 percent). In dollar terms, the greatest average per-member decreases in expenditure were seen in depression (-$2,347) and CAD (-$1631). Unfortunately, we are unable to identify the cause of these changes in spending. Inflation played a large role in the year-over-year declines in 2022 dollars. Also, 2022 brought the trailing off of COVID-19 restrictions, which is likely a contributing factor.

[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, 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 2022 data. The predicted shares were used to build total allowable expenses for members with prescription coverage for the member ZIP codes in 2022 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.

Normally, this report presents the disease-specific shares of expenditure related to prescription drugs in **Figure 2**. Due to irregularities in this year's data, however, both the community partners and Health Check researchers agreed to omit this figure from this year's report and revisit it in the future. The numbering on subsequent figures is left unchanged to allow easy comparisons with those from previous years' reports.

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 2022 average expenditures for CAD, hyperlipidemia, and healthy members are higher in the KOMA region than in the Detroit region. The percentage differences vary across diagnoses, with healthy members' expenditures in KOMA being 30 percent higher than Detroit while asthma expenditures are 11 percent lower. Differences in spending for the same condition between the east and west sides of the state may result from several reasons, including 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 2021 to 2022. 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. The year 2022 marked a general decline in average expenditure for these conditions in Detroit, which is a reversal from what was observed in 2021. For most of the chronic conditions, KOMA and Detroit regions experienced changes in expenditure in the same direction. Declines in spending were greater in KOMA for depression and hyperlipidemia. The opposite was true for CAD, diabetes, and low back pain. Unlike 2021, nominal increases in spending across conditions tended to be small, and so the relatively high rate of inflation between 2021 and 2022 tended to cause overall declines in real expenditure. The greatest disparity in expenditure changes involved healthy members. Expenditure on healthy members grew by 4.9 percent in KOMA but declined by 7.7 percent in Detroit. The broad message from **Figures 3a** and **3b** is that real expenditures across the chronic conditions tended to fall between 2021 and 2022 in both KOMA and Detroit regions. This is an acceleration in the recent trend for KOMA and a reversal in Detroit. Specifically, regarding CAD, expenditure on CAD members only 12 percent higher in the KOMA relative to Detroit, which was a significant narrowing of the gap between the two regions. Due to the greater percent decline in CAD spending in Detroit than in KOMA, this gap is now 17 percent, which is in-line with the previous three years.

As was the case for the previous three years, we have access to the average risk scores of 2022 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 region 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.

Figure 3c shows that raw expenditures in KOMA are lower than those in Detroit for members with asthma by 11 percent, depression by 5.3 percent, low back pain by 3.7 percent, and diabetes by 1.7 percent. Raw KOMA expenditures are significantly greater than those in Detroit for healthy members (by 29.8 percent), CAD (by 17.1 percent), and hyperlipidemia (by 4 percent). The message from this part of **Figure 3c** is that KOMA expenditures remain comparable to Detroit for most of the seven diagnoses in 2022, with CAD and healthy members being exceptions.

The adjusted expenditures for the KOMA region in the middle columns of **Figure 3c**, however, tell a different story, as they have for the previous two years. Upon accounting for differences in the underlying health of members in the two regions, the KOMA region holds no expenditure advantages in any of the six diagnoses. Considering adjusted expenditures instead of raw, KOMA region expenditures are higher than those of Detroit by 6.8 percent for asthma, 25.6 percent for CAD, 5.2 percent for depression, 15.9 percent for diabetes, 24.7 percent for hyperlipidemia, 6.7 percent for low back pain, and 27 percent for healthy members. The adjustment reveals that the KOMA region continues to have a relatively healthy population compared to Detroit, which can largely explain the differences in raw expenditures between the regions on members with the same diagnoses. The only category where the adjustment reduced expenditures below the raw level for KOMA is for healthy members, so there is some suggestion that healthy members in KOMA represent a greater risk profile than those in Detroit. **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 seventh 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 2022. This figure is consistent with the previous three 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 0.12 inpatient admissions per year in KOMA, while those in Detroit average 0.20 hospital visits per year. This represents a small percentage point decline in the gap between 2021 and 2022. There is a similar pattern for asthma (45

to 19 percent), and CAD (26 to 24 percent). On the other hand, while the average number of annual inpatient visits for depression were 23 percent lower in the KOMA region than in Detroit in 2021, that gap increased to 26 percent in 2022. There is a similar pattern for low back pain (12 to 27 percent), and hyperlipidemia (27 to 31 percent). These results are decidedly mixed and off-trend in 2022, as the gaps between regions in inpatient visits had tended to narrow over the past three years.

Figure 4b extends the utilization analysis to emergency department (ED) use. ED use was once again higher in the Detroit region than in KOMA for all six chronic conditions in 2022, just as it was in 2021. For example, those with a low back pain diagnosis average 0.61 ED visits per year in Detroit compared to 0.40 ED visits per year in the KOMA region (indicating that we observe approximately 34 percent less ED visits per member in KOMA for lower back pain than in Detroit). These gaps have mostly grown across diagnoses over the previous year. While those in KOMA consumed 5.6 percent fewer ED visits per member with CAD than in the Detroit region in 2021, that difference has grown to 13.9 percent in 2022. A similar widening in gap is observed for asthma (10 to 17 percent), depression (15 to 24 percent), diabetes (13 to 22 percent), and hyperlipidemia (5 to 18 percent), and low back pain (30 to 34 percent). Overall, per-member ED utilization clearly remains higher in the Detroit region than in the KOMA region for each of these diagnoses, and gaps appear to be widening. These per-member statistics appear at odds with the AHA Hospital Statistics data from **Figure 4** of the Benchmarking Communities section, which found a spike in ED use in Grand Rapids relative to Detroit in 2022. However, the two could still be consistent if the prevalence of these diagnoses grew in KOMA relative to Detroit, or if emergency room use grew among other types of patients not fitting into these categories.

Next, utilization in terms of prescription drug fills is 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 the KOMA region had 66 prescription fills in 2022 compared to 75 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 approximately five 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 14 percent more prescription fills in Detroit than in the KOMA region for members with a depression diagnosis, and similarly 18 percent more prescription fills in Detroit for members with a low back pain diagnosis. These represent narrowing of the gaps, relative to 2021, which were 19 and 27 percent, respectively.

Annual telehealth visits per member constitute the final utilization metric examined here, in **Figure 4d**. The Detroit region continues to utilize telehealth to a greater degree than the KOMA region across all six chronic conditions. Interestingly, there has been a reversal in trajectory for KOMA in that telehealth use was rising in 2021 for most of the diagnoses but fell by large percentages in 2022. These declines, which can be observed in **Figure 4e**, follow similar declines that were observed in Detroit during the previous year. Telehealth use in Detroit has continued to fall in 2022, although at lower rates than those observed in KOMA. Depression represents the only exception in the Detroit region, where there was a marginal increase in utilization. It is interesting that qualitative trends in KOMA have appeared to be one year behind those in Detroit for the last two years.

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 $14,445 to the annual expenditure estimate, while a diagnosis of diabetes and CAD (instead of diabetes alone) adds $29,484 to the expenditure estimate. These are slightly lower for diabetes and depression, but higher for diabetes and CAD, compared to previous years.

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 $40,301 to the expenditure estimate, which is a small decline from the previous year.

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 2022, the expenditure difference adds up to $4,236 (down from $8,558 in 2021), while the same difference is larger at $7,907 in the Detroit region. Furthermore, the 2021 difference in Detroit was $8,381, so these figures reveal another apparent widening of the gap in expenditure between regions on members suffering from both depression and diabetes.

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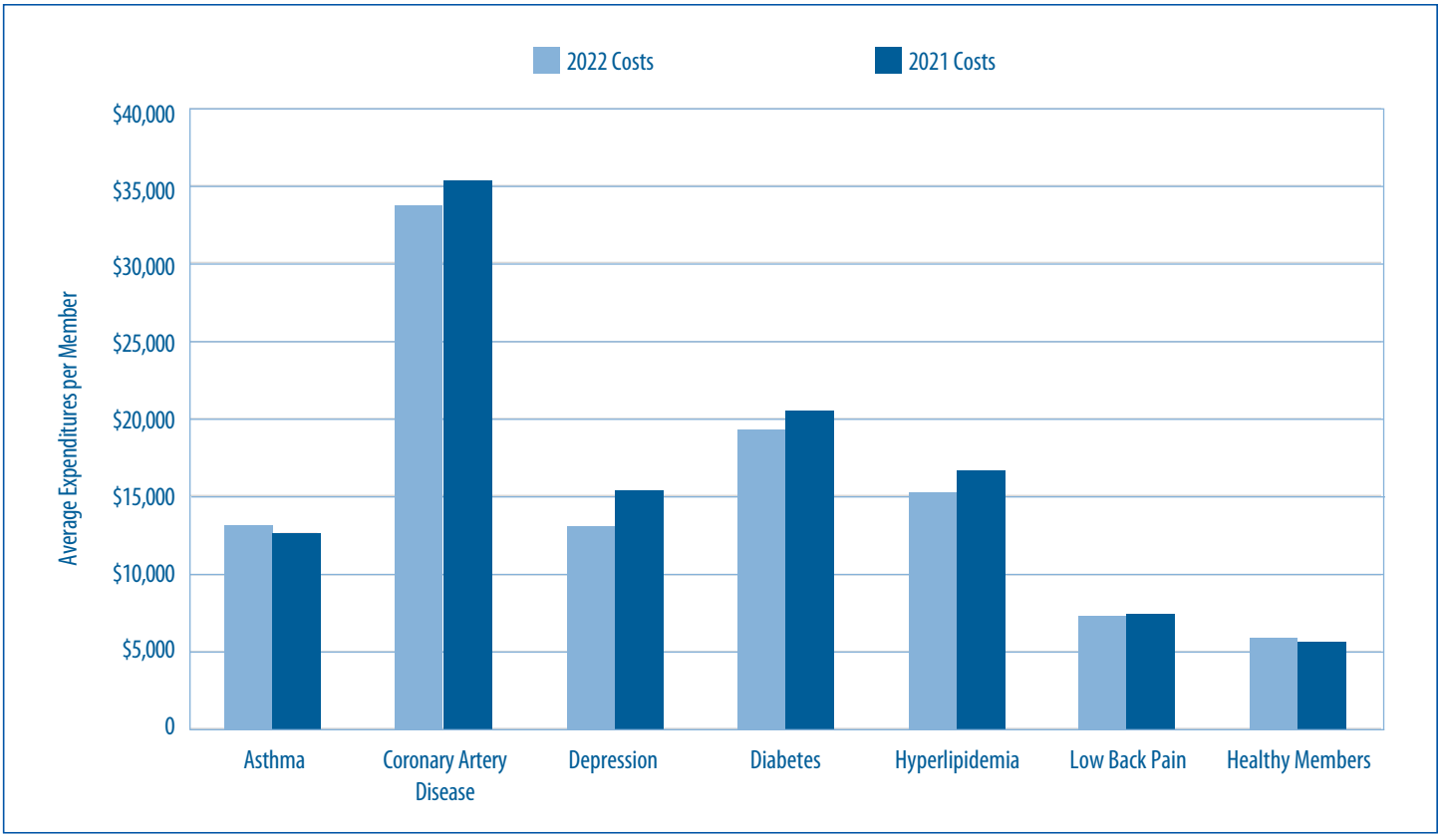
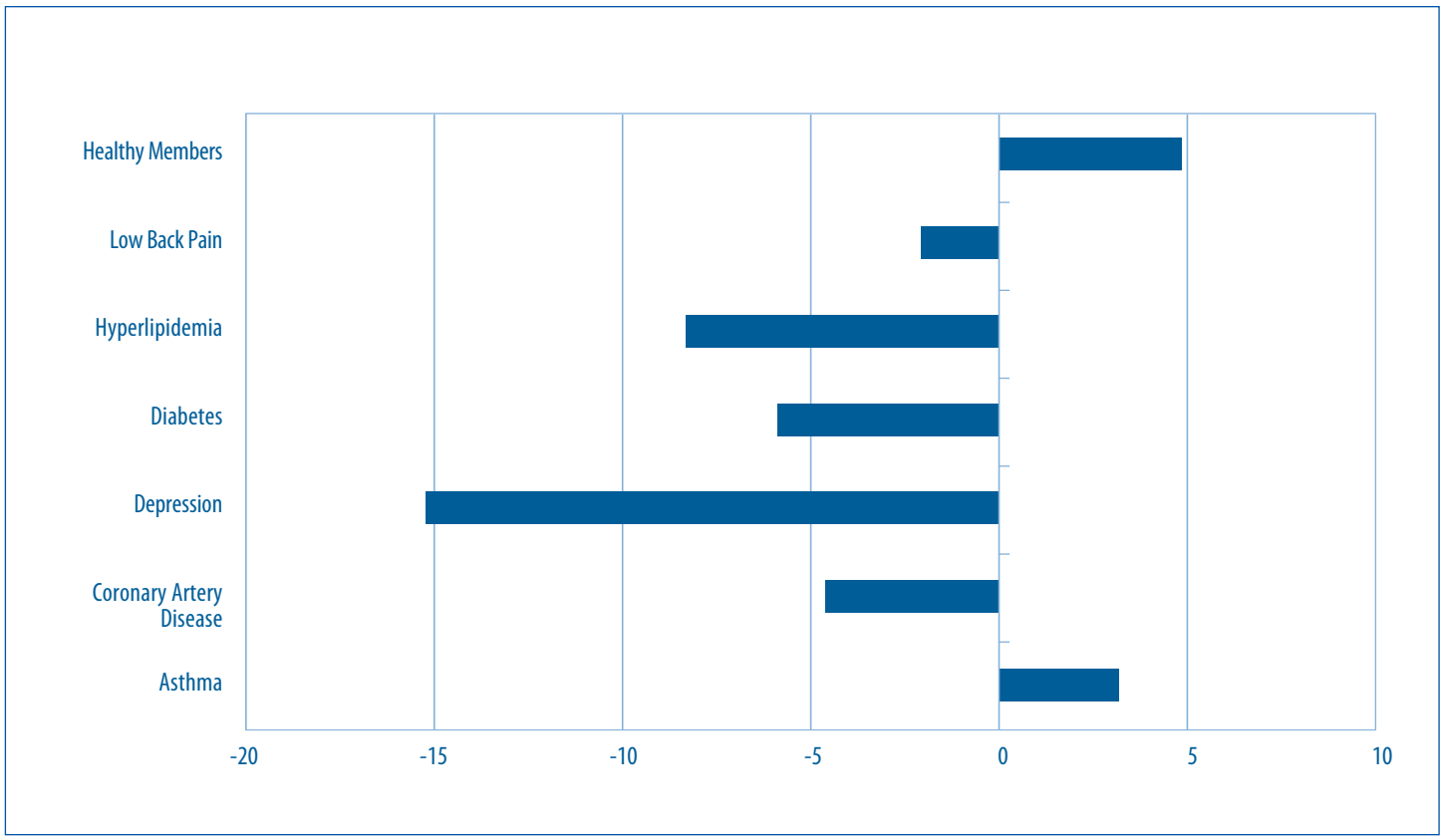
Figure 1a: Average Expenditures per Member in the KOMA Region, 2021-2022



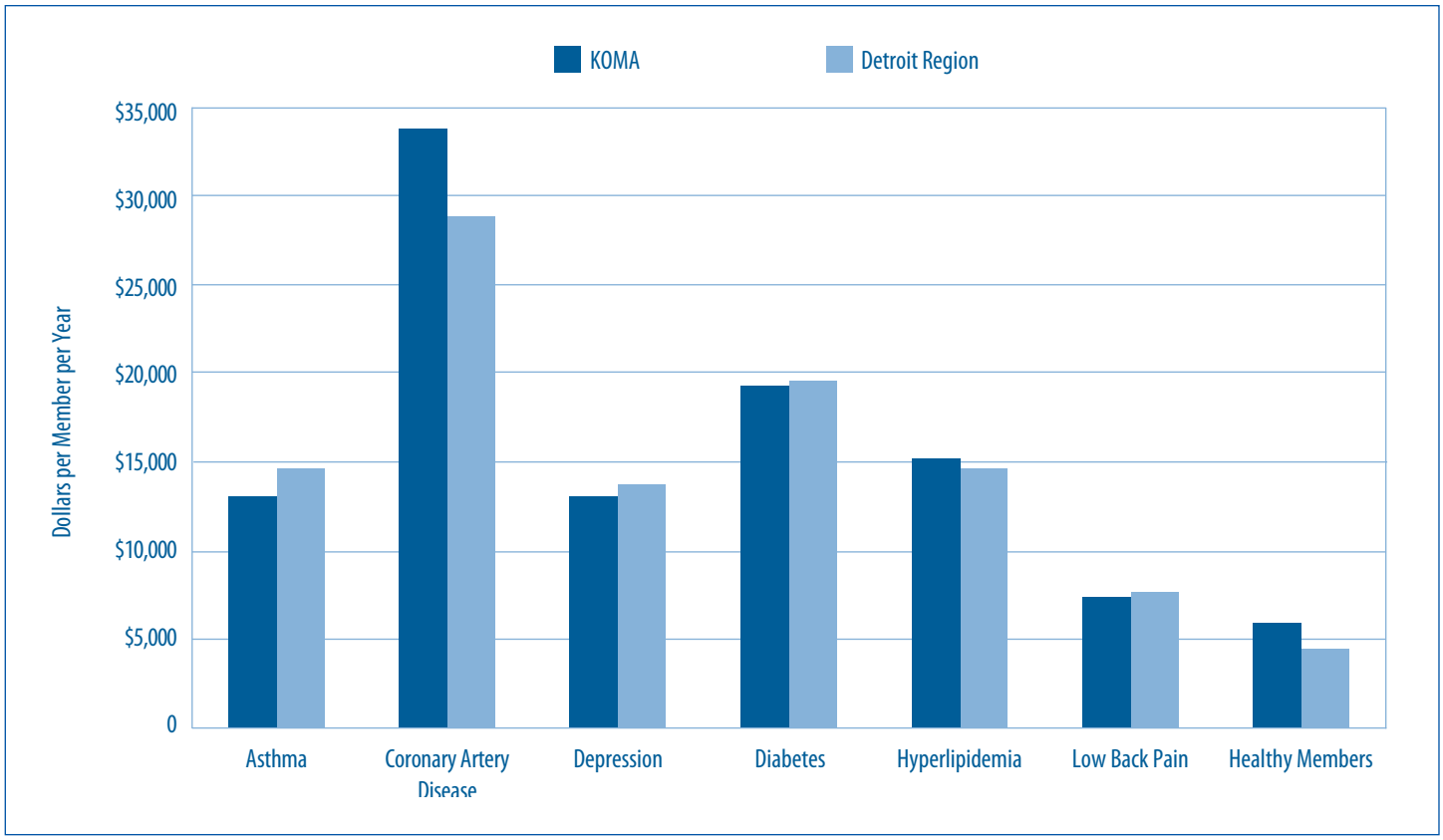
Source: BCBSM, BCN, and Priority Health member data

Figure 1b: Percentage Change in Average Member Costs in the KOMA Region, 2021-2022



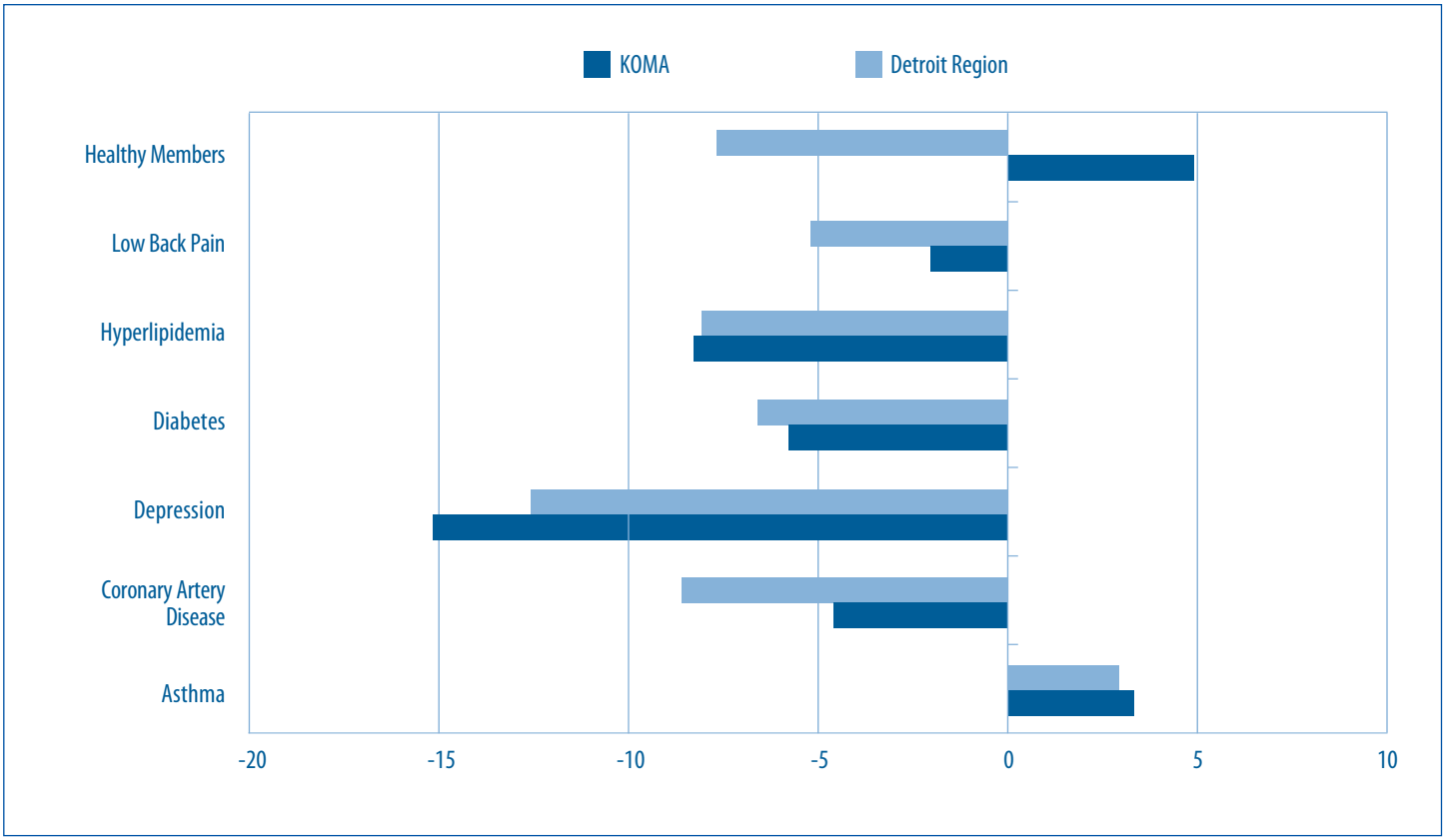
Source: BCBSM, BCN, and Priority Health member data

Figure 3a: Average Expenditures per Member, 2022



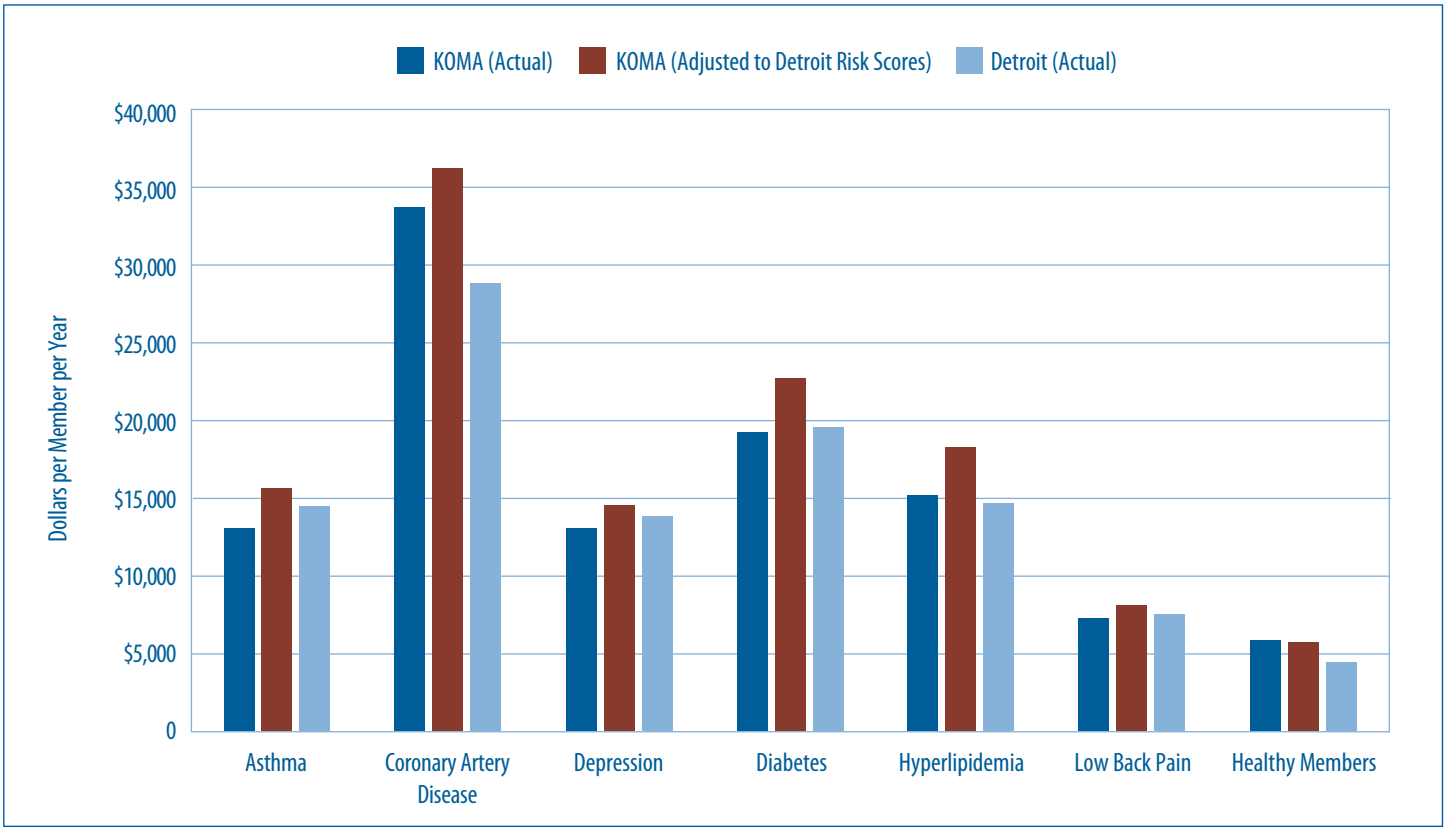
Source: BCBSM, BCN, and Priority Health member data

Figure 3b: 2021-2022 Percentage Change in Average Expenditures per Member



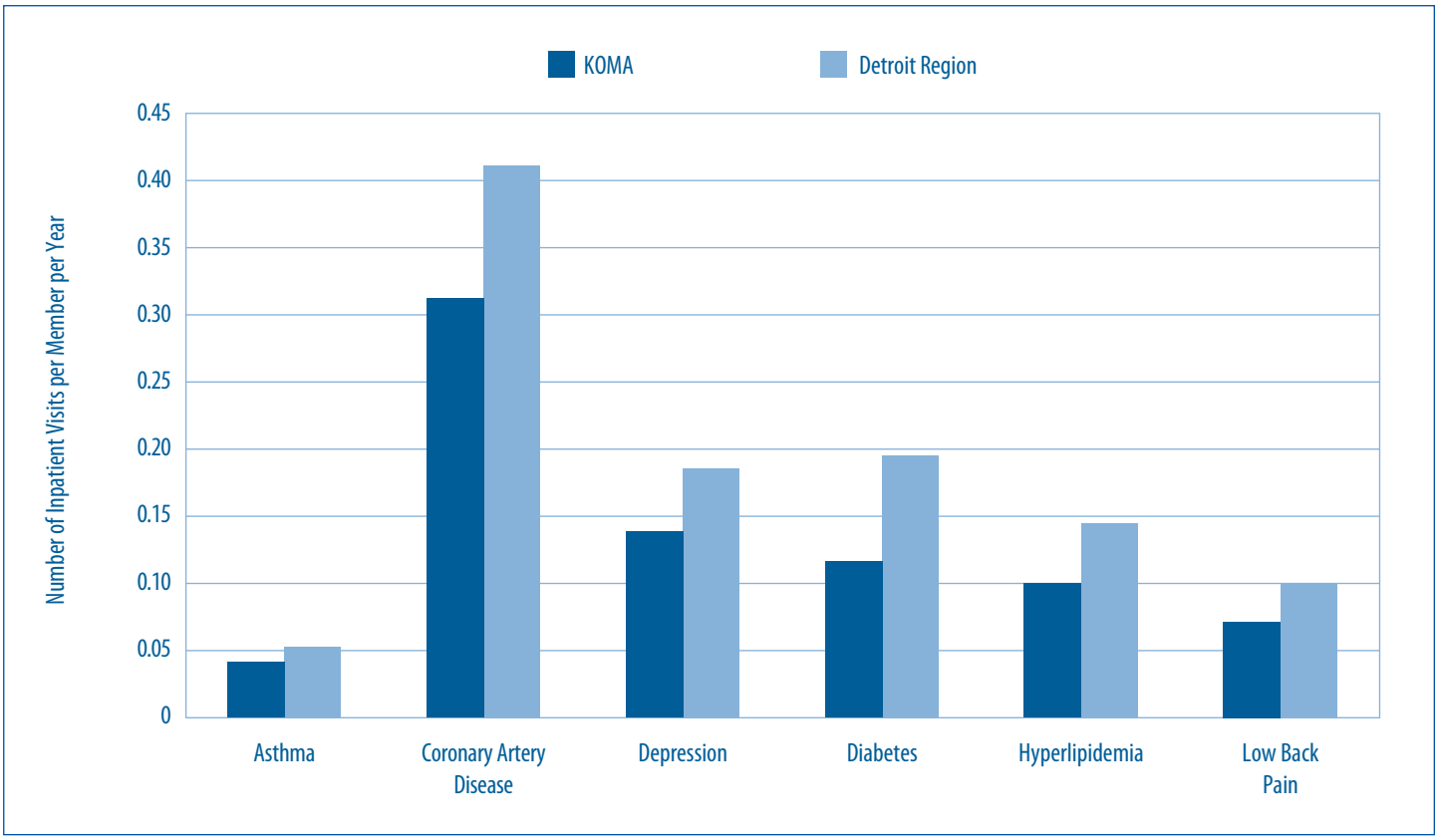
Source: BCBSM, BCN, and Priority Health member data

Figure 3c: Average Expenditures per Member with Risk-adjusted KOMA Region Values, 2022



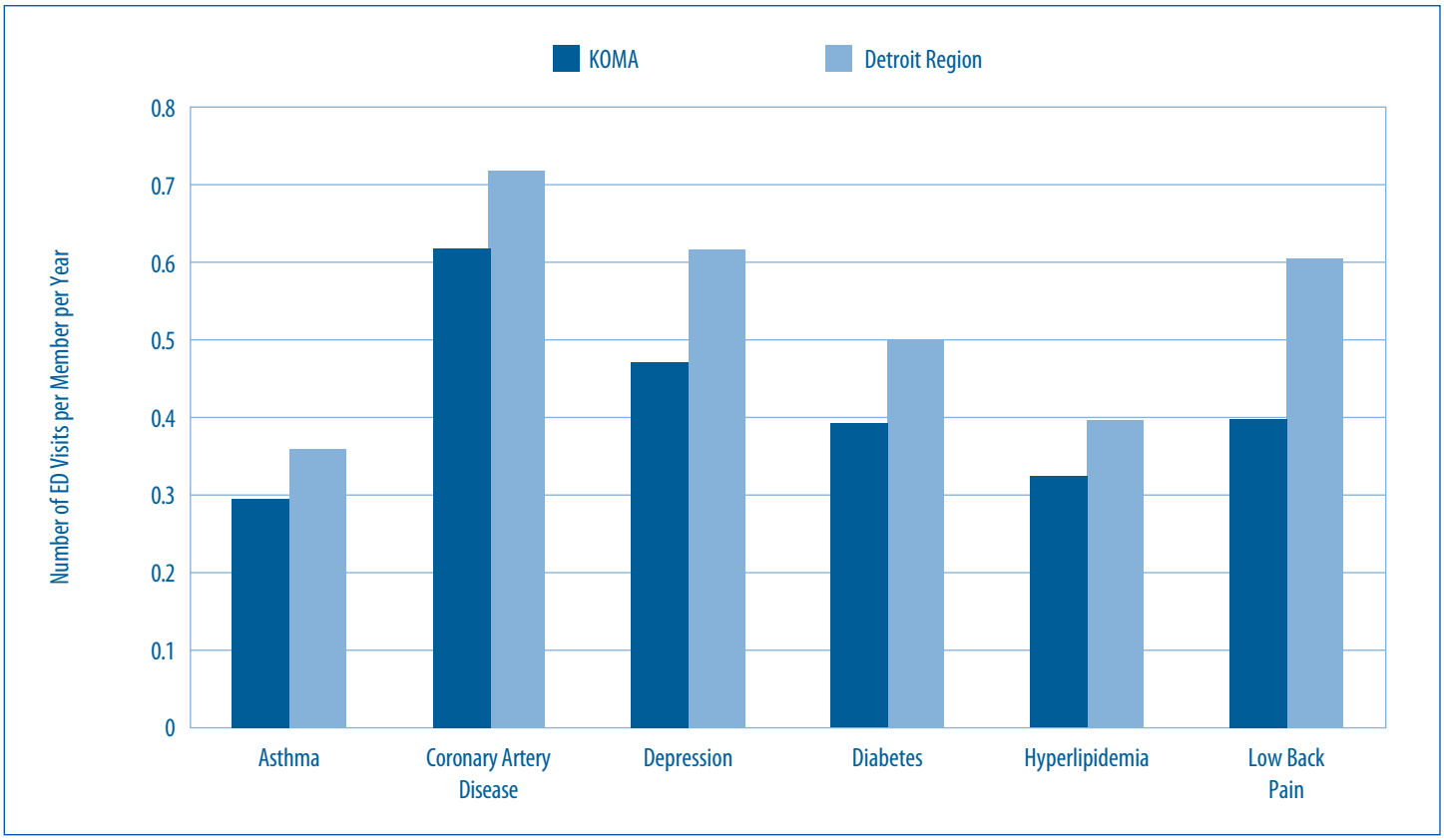
Source: BCBSM and Priority Health member data

Figure 4a: Average Annual Inpatient Visits per Member, 2022



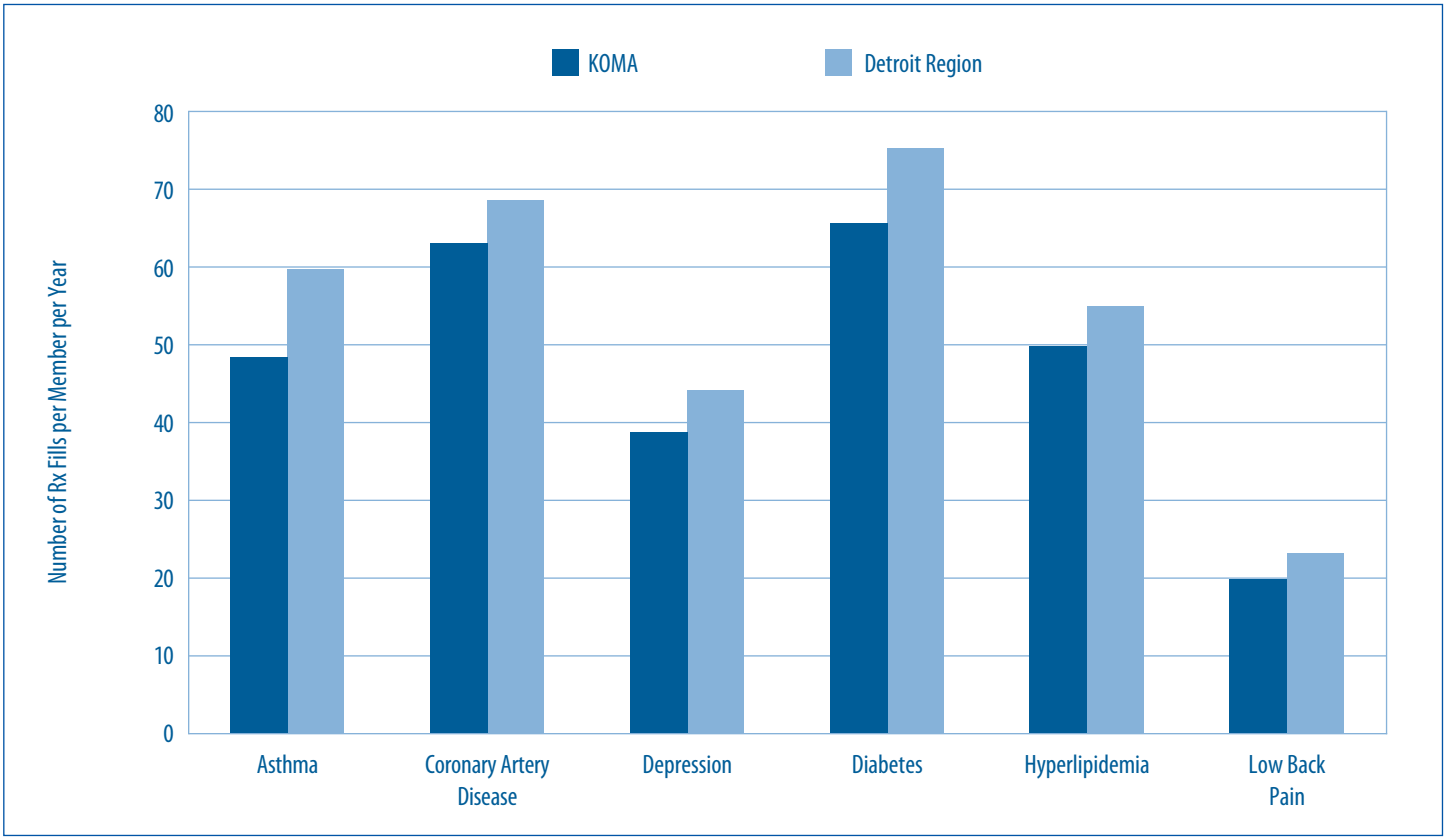
Source: BCBSM, BCN, and Priority Health member data

Figure 4b: Average Annual Emergency Department Visits per Member, 2022



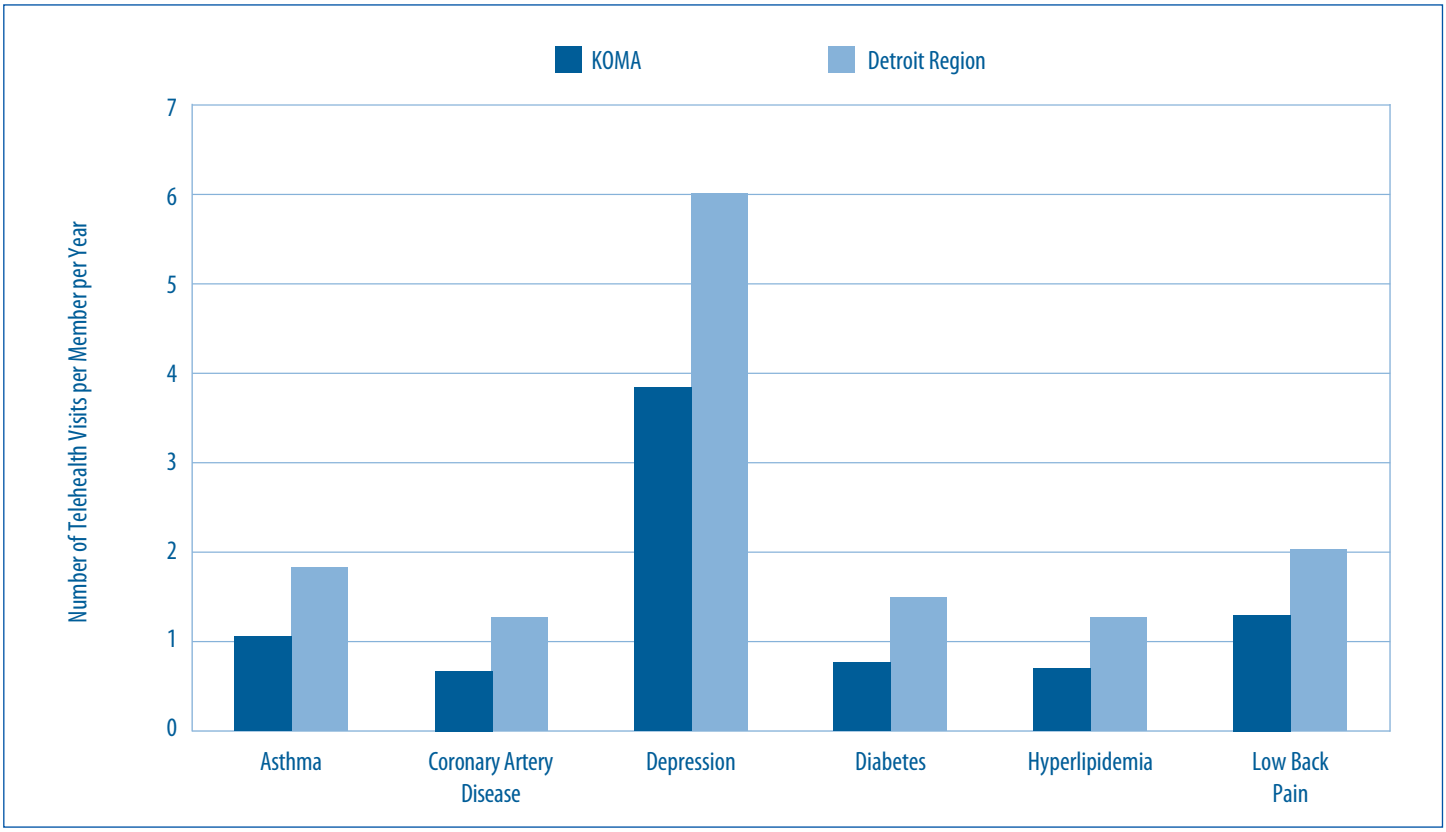
Source: BCBSM, BCN, and Priority Health member data

Figure 4c: Average Annual Prescription Fills per Member, 2022



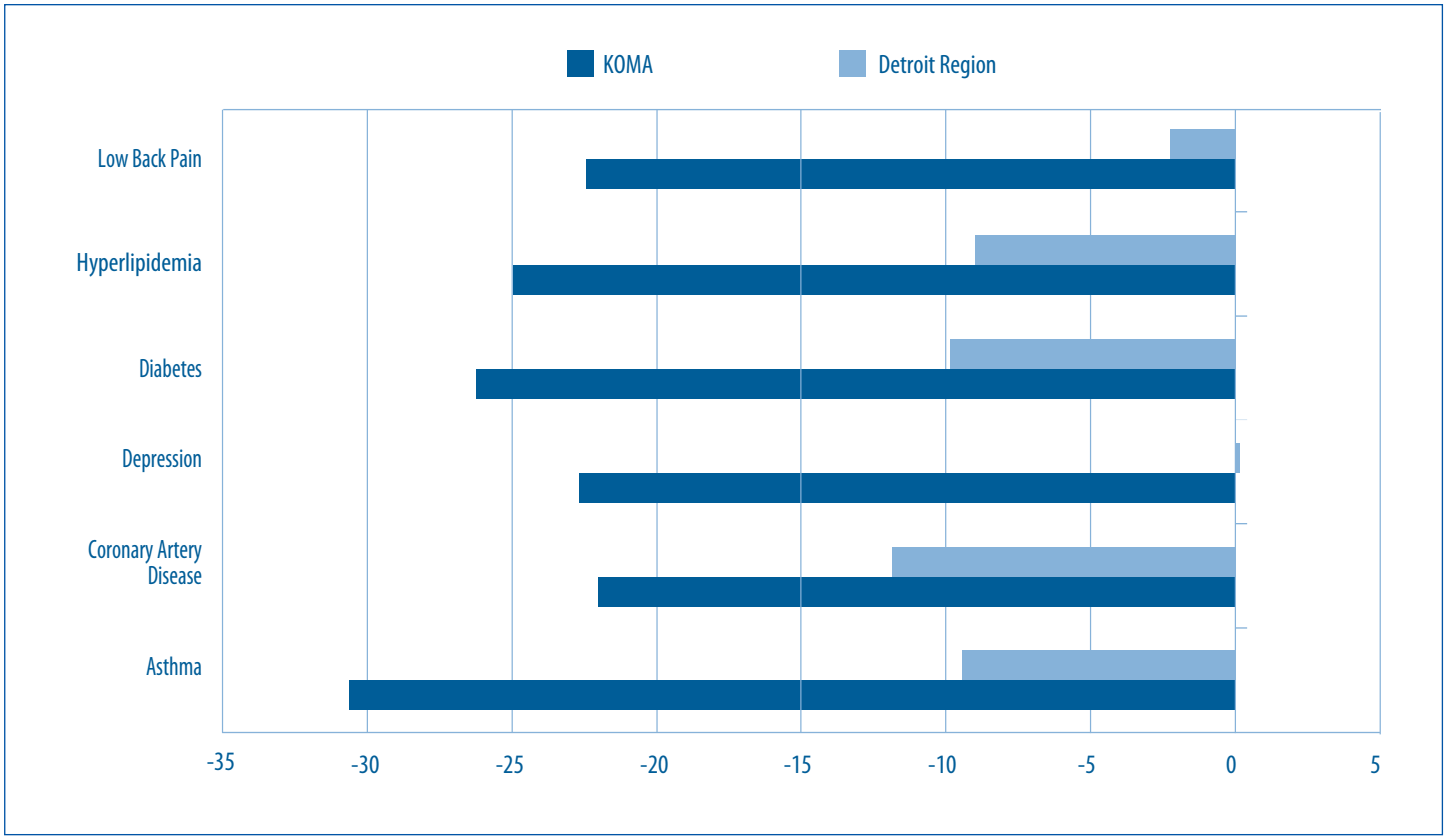
Source: BCBSM, BCN, and Priority Health member data

Figure 4d: Average Annual Telehealth Visits per Member, 2022



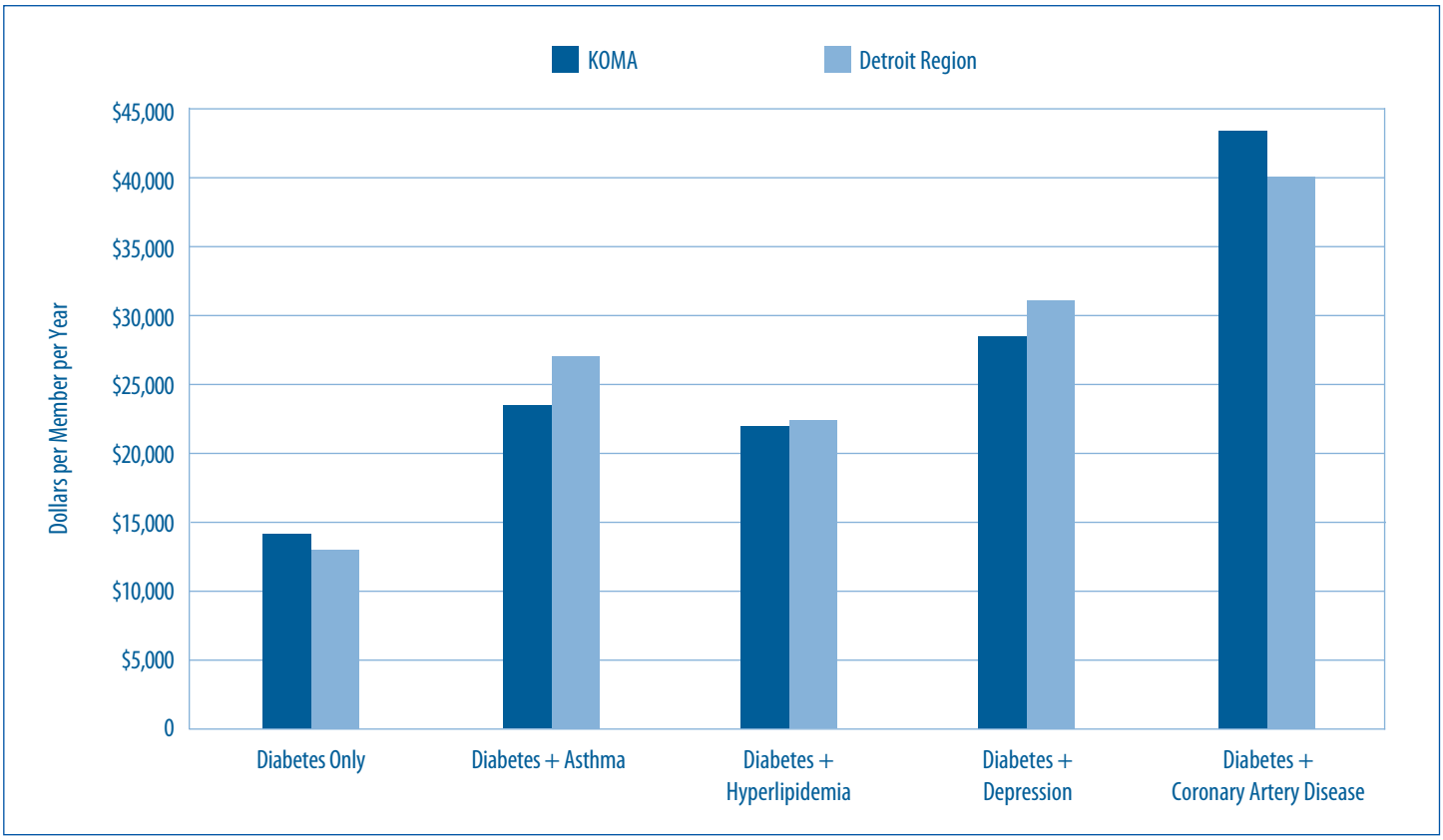
Source: BCBSM, BCN, and Priority Health member data

Figure 4e: 2021-2022 Percentage Change in Average Telehealth Visits per Member



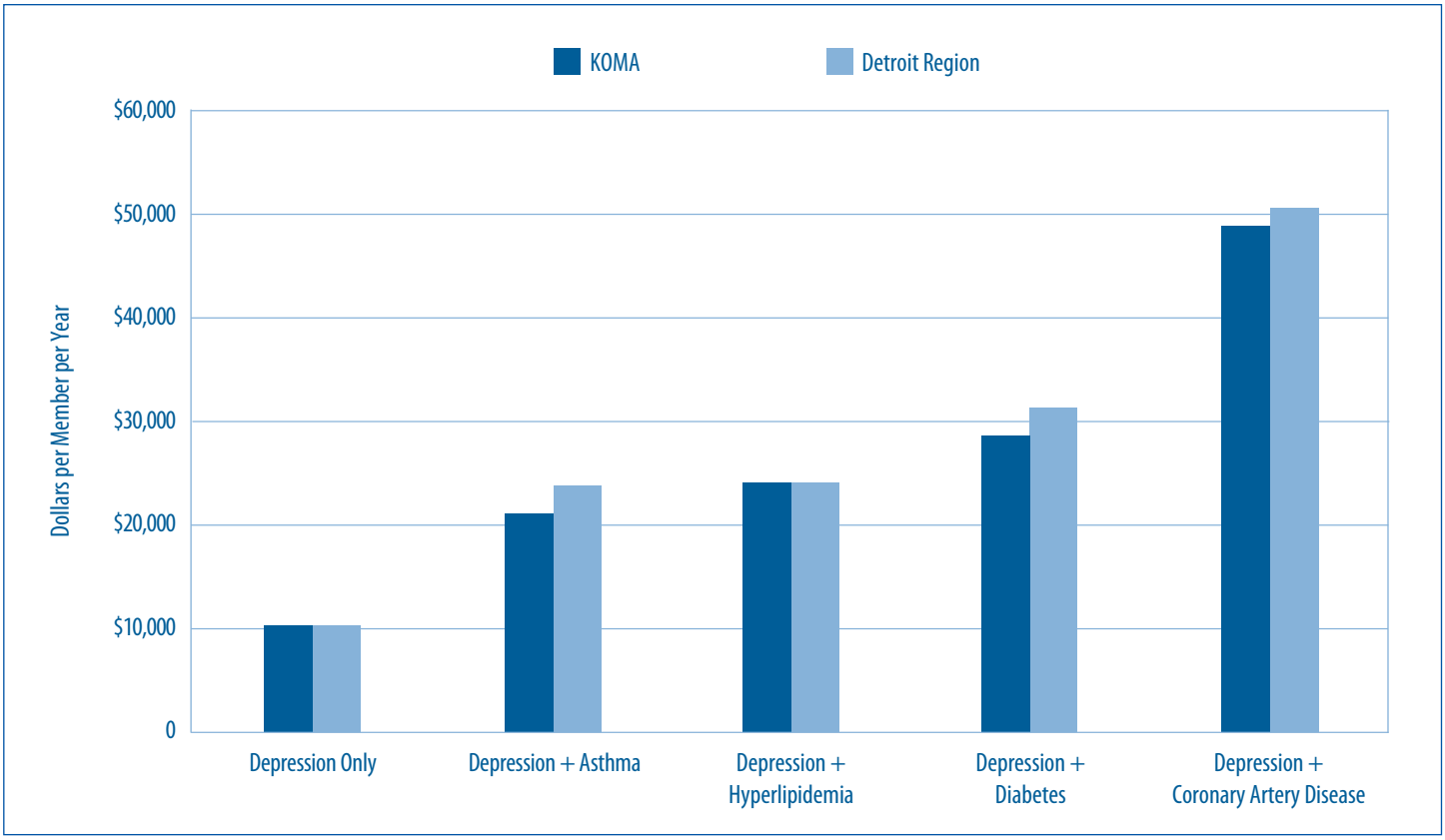
Source: BCBSM, BCN, and Priority Health member data

Figure 5a: Expenditures on Members with Diabetes and Comorbidities, 2022



Source: BCBSM, BCN, and Priority Health member data

Figure 5b: Expenditures for Members with Depression and Comorbidities, 2022



Source: BCBSM, BCN, and Priority Health member data

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. Finally, new for 2024, we have the total number of member months insured by the three private health insurance plans for the residents of each ZIP code. This allows us to better construct weighted averages and measures of prevalence based on the total insured populations, rather than the subsamples provided in previous iterations of this report.

In order to categorize ZIP codes on the basis of characteristics potentially subject to health disparities, we combine the insurance plan data with 2020 census data on population, mean household income, and race at the ZIP-code level. Mean household income comes from the 2020 American Community Survey, while race and population data come from the 2020 Census Demographic and Housing Characteristics 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 weighted average percentage of white residents are labeled "High Share White" ZIP codes, while those with the highest weighted average 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.

This version of the report is the first to use data from the 2020 Census rather than the 2010. As such, previous validity concerns regarding deviations in the makeup of Michigan ZIP codes over time have been mitigated. Still, there are limitations with this approach. First, as a simple comparison of descriptive statistics, the analysis does not control 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. Second, 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 mean household 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 the populations with the highest weighted Black share of the population in later tables, we cannot say those quintiles have similar racial distributions. Fortunately, as is discussed next, correcting for this is straightforward.

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, and so the characteristics that affect risk scores and the scoring method are not known. As is apparent from **Figure 1**, both regions show a 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 is the second year in which a disparity in risk scores by income was observed for KOMA, and the first in which the KOMA disparity is greater than that of Detroit. The average risk score of the Low Income ZIP codes of KOMA is 37 percent greater than that of the High Income Zip codes, while that for Detroit is only 25 percent. This is despite the underlying disparity in income being lower in KOMA than Detroit. This is a concerning trend for West Michigan and reveals worsening disparities in health characteristics by income while those in Detroit have remained stable.

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. This version of the report has improved upon the accuracy of this figure by including in the numerator, not only the member months with one of the seven diagnoses categories mentioned previously, but of all member months attributable to residents of the ZIP codes.

The KOMA region has 6.5 percent more insured months per resident than Detroit, which is a much smaller difference compared to the previous year. This suggests our previous methods overestimated the regional disparity in private insurance coverage. The average insured months per resident of the Low Income ZIP codes of KOMA is 42 percent less than that of the High Income ZIP codes. This figure is 66 percent for Detroit. Even though a higher Detroit figure is not unexpected given that the underlying income disparity in Detroit is greater, it is not enough of a difference to explain away the income disparity in average insured months per resident. While the percentage gap in income between high and low income quintiles is 28 percent greater in Detroit than KOMA, the percentage gap in average insured months per resident is 57 percent greater. Therefore, even controlling for the difference in income disparity, the disparity in average insured months per capita across income groups is greater in Detroit than KOMA.

The increasing relationship between income quintiles and member months per capita in both regions is not surprising. This is because 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 underrepresent 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 diagnoses, 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. While previous reports showed a slight positive relationship between income quintile and healthy month ratio in KOMA, the updated methods now reveal a slight negative relationship. The percentage gap in healthy month ratio between highest and lowest income quintiles in Detroit is 63 percent greater than that for KOMA, which is greater than the underlying difference in percentage gap in income. Interestingly, unlike KOMA, the Detroit region has a greater prevalence of healthy months in the middle of its income distribution than it does at the extremes. While it seems counterintuitive that healthy months would be relatively common among the residents of the Low Income ZIP codes, the age conditions on the definition of healthy months is likely to inflate the measure among ZIP codes with relatively young resident populations.

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. As in previous reports, asthma months make up a larger share of total months in KOMA than they do in Detroit. Both KOMA and Detroit regions show the share of asthma months increasing with income quintile, although the absolute differences are small. The percentage gap in asthma months between low and high income quintiles in Detroit is 130 percent greater than that for KOMA, signaling greater income disparities in asthma prevalence by income in Detroit than KOMA, even controlling for the underlying differences in the income distribution. While this is of some concern, keep in mind that the prevalences are very small and so even slight absolute differences would constitute large percent differences.

Average CAD Months to Total Months

Unlike for asthma, **Figure 5** reveals that the share of total months with the presence of a CAD diagnosis is approximately 82 percent greater than in the KOMA region. This is nearly double the percentage gap found in the previous report under the former set of methods. While CAD prevalence seems concentrated in the middle of the income distribution in Detroit, there is a clear negative relationship between income quintile and CAD prevalence in KOMA. That Low Income ZIP code residents have a prevalence of CAD 28 percent greater than that of High Income ZIP code residents is the first instance of an income disparity in CAD prevalence recorded in this report for KOMA. Together with the findings regarding expenditure in the Major Medical Conditions section, **Figure 5** suggests that, even under our updated methodology, the differences in CAD spending per member could be explained by economies of scale. With roughly three times the population and nearly 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. The data could also be capturing different diagnosis practices. If providers in the Detroit region make an official diagnosis of CAD at lower levels of severity than do those in KOMA, the expected result would be both a greater prevalence of CAD in Detroit and a lower average severity, and thus expenditure, which would be consistent with the findings of this report.

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 member months are 14 percent less common in Detroit than in KOMA, which is smaller than the gap estimated last year. Neither region exhibits an obvious relationship between income and prevalence of depression. Curiously, depression is concentrated in the middle of Detroit's income distribution while in KOMA it is concentrated at the extremes. Overall, as in previous reports, the most up-to-date evidence shows that the KOMA region exhibits a high relative prevalence of depression, and thus suggests greater exposure to aggravating factors affecting mental health.

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 twice as common among the Low Income ZIP codes in KOMA, relative to the High Income ZIP codes. The difference is slightly lower at 96 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). This represents a striking upward revision in the income disparity in diabetes prevalence in the KOMA region under the new methods of this year's report, compared to previous versions. As the percentage gap in diabetes prevalence in KOMA is greater than Detroit, despite Detroit having a greater income disparity, suggests that the income disparity in diabetes prevalence is greater in KOMA than in Detroit

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 43 percent higher in Detroit than in KOMA. While last year's report under our former methods recorded a slight positive association between the hyperlipidemia share of member months and income quintile in Detroit, that is not the case under our revised methods. Hyperlipidemia prevalence is concentrated in the middle of Detroit's income distribution. On the other hand, this year's data reveals a negative association between income quintile and hyperlipidemia prevalence in KOMA. Hyperlipidemia is 43 percent more common among the residents of low income ZIP codes than it is among the residents of High Income ZIP codes. This suggests a previously undiscovered income disparity in hyperlipidemia prevalence in the KOMA region.

Average Low Back Pain Months to Total Months

Differences by region and income quintile in low back pain prevalence can be found in **Figure 9**. These estimates have shown variability in pattern over the previous two years. Based on 2022 data, low back pain makes up a greater share of total months in the Detroit region than it does in KOMA (1.8 versus 1.6 percent). Besides the regional difference in prevalence, there is little evidence of income disparities in low back pain in either region. In both cases, low back pain prevalence is concentrated in the middle of the income distribution rather than extreme.

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 mean household 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 to 97 percent white and 1.5 to 3 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 26 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 81 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 4 percent higher in the Detroit region than in KOMA, the two do not exhibit the same 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 about the same as that of the High Share White ZIP codes for 2022. This is not true in the Detroit region, where the High Share Black ZIP codes have an average risk score 19 percent higher than the High Share White ZIP codes, which is roughly the same as in previous years. The Detroit pattern of racial disparity in risk score does closely resemble the racial disparity in income, so it is not clear whether race or income is most responsible for the risk score differences. For KOMA, on the other hand, the disparity observed when stratifying by income is not observed when stratifying by race.

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**. The residents of KOMA's High Share Black ZIP codes have 25 percent fewer insured months per capita than residents of

its High Share White ZIP codes. This figure is 48 percent for Detroit, but it is important to remember that the underlying disparities in race across sets of ZIP codes is much greater in Detroit. The share of Black residents in KOMA's High Share Black ZIP codes is 16 times greater than that of its High Share White ZIP codes. For Detroit, it is 27 times greater. Therefore, even though Detroit has double the percent difference in insured months per capita between quintiles, it also has nearly double the disparity in the Black share of the population. For this reason, the racial disparities in the two regions in insured months are fairly comparable. 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. The residents of High Share Black ZIP codes in the KOMA region have a 29 percent greater share of healthy months than do the residents of the region's High Share White ZIP codes, which is higher than previous years' reports. This is despite the High Share Black ZIP codes having a lower weighted mean household income than the High Share White ZIP codes, which led to the lower relative share of healthy months shown in **Figure 3**. In Detroit, on the other hand, the residents of High Share Black ZIP codes have a 16 percent lower share of healthy months than do the residents of the High Share White ZIP codes. This is the first example of Detroit and KOMA exhibiting the opposite directional racial disparity.

Average Asthma Months to Total Months

Patterns in the share of member months with an asthma diagnosis across racially defined quintiles are shown in **Figure 13**. The residents of High Share Black ZIP codes in the KOMA region have an 18 percent greater share of asthma months than do the residents of the region's High Share White ZIP codes. The opposite association is found in Detroit. There, the residents of High Share Black ZIP codes have a 42 percent lower share of asthma months than do the residents of the High Share White ZIP codes. This is an increase in Detroit, compared to last year. Just as with healthy months, the two regions of Michigan exhibit the opposite directional racial disparity when it comes to asthma prevalence.

Average CAD Months to Total Months

The patterns regarding regional and racial disparities in CAD can be found in **Figure 14** and are quite different from those regarding income disparities found in **Figure 5**. The High Share Black ZIP codes of KOMA show a CAD prevalence that is 6 percent below that of the High Share White ZIP codes. This is much lower than the 27 percent gap that was estimated last year. The 2022 estimated figure for Detroit is 27 percent, which is significant considering it showed no racial disparity in CAD prevalence last year. Therefore, while the two regions show the same qualitative association between race and CAD prevalence, the racial disparity is quite large in Detroit while being almost negligible in KOMA.

Average Depression Months to Total Months

Whereas stratifying the sample by income revealed no income disparities in depression prevalence in either region in **Figure 6** the same is not true when stratifying by race, as in **Figure 15**. The residents of High Share Black ZIP codes in the KOMA region have a 34 percent greater share of depression months than do the residents of the region's High Share White ZIP codes. Detroit exhibits almost the reverse, where High Share Black ZIP codes have a 35 percent lower share of depression months than do the residents of the region's High Share White ZIP codes. These opposite directional racial disparities were noted in previous reports. Once again, as in **Figure 6**, the regional differences in **Figure 15** show that depression is 14 percent less prevalent in Detroit than in KOMA.

Average Diabetes Months to Total Months

A key insight found in previous versions of this report holds partly true for the 2022 data. As **Figure 7** shows, the two regions exhibit the same disparities in diabetes prevalence when stratifying by income. When stratifying by race, as in **Figure 16**, the disparities are quite different in magnitude. In KOMA, the residents of High Share Black ZIP codes have a 10 percent greater prevalence of diabetes compared to the residents of High Share White ZIP codes. This disparity was not present in previous versions of this report, and so for the first time, we have a racial disparity in diabetes for KOMA. For Detroit, the residents of High Share Black ZIP codes have a 29 percent greater prevalence of diabetes compared to the residents of High Share White ZIP codes. While the greater underlying disparities in race across quintiles can explain part of this, this still indicates that racial disparities in diabetes prevalence are greater in Detroit than in KOMA. Overall, **Figures 7 and 16** indicate that income and race are reinforcing cleavages in the Detroit region, but less so in the KOMA region. Despite this, the emergence of even a small racial disparity in KOMA, where one had not been previously uncovered, is a source of concern

Average Hyperlipidemia Months to Total Months

Figure 17 reveals different patterns regarding racial disparities in hyperlipidemia prevalence in the two regions. Both regions exhibit racial disparities, but in the opposite direction. The residents of High Share Black ZIP codes in the KOMA region have a 6 percent greater share of hyperlipidemia months than do the residents of the region's High Share White ZIP codes. The opposite association is found in Detroit. There, the residents of High Share Black ZIP codes have a 31 percent lower share of hyperlipidemia months than do the residents of the High Share White ZIP codes. This is a significant change from last year's report, where both regions showed positive associations between income quintile and hyperlipidemia prevalence that were equal in magnitude.

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. Separating by income in **Figure 9** shows hardly any pattern indicating disparities in low back pain prevalence. Separating by race in **Figure 18**, on the other hand, shows a relatively small racial disparity in KOMA and a large disparity in Detroit. They are also of the opposite direction. The residents of High Share Black ZIP codes in the KOMA region have an 11 percent greater share of low back pain months than do the residents of the region's High Share White ZIP codes. Detroit exhibits the reverse, where High Share Black ZIP codes have a 30 percent lower share of depression months than do the residents of the region's High Share White ZIP codes. These results are quite different from last year's estimates, which showed a racial disparity in the opposite direction for KOMA and no racial disparity for Detroit.

Summary

The goal of this section is to investigate 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. To categorize members according to income and race, we use 2020 census data at the ZIP code level to identify the ZIP codes in each region that both a) have the highest (lowest) mean household 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 a relatively low share of months with an asthma diagnosis. The opposite was true for months with a diabetes diagnosis, which was more common among Low Income ZIP codes in the two regions. The exceptions to these common patterns were for CAD and hyperlipidemia, where there were small income disparities for KOMA but not for Detroit. While this is not a radical departure from previous reports, the findings of some income disparities for the first time in the KOMA region are a source of concern.

Differences in patterns across regions remain more apparent when investigating disparities in outcomes due to race. This is consistent with the literature, where poorer health outcomes for Black residents have been noted in Michigan and the Detroit area 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). In this study, we find that the average risk score was higher for High Share Black ZIP codes than for High Share White ZIP codes in Detroit, while this was not the case in KOMA. 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. While KOMA showed only a third of the same disparity, it also has a much lower disparity in race across quintiles, and so this racial disparity (while not as large as Detroit's) is a new development.

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 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.

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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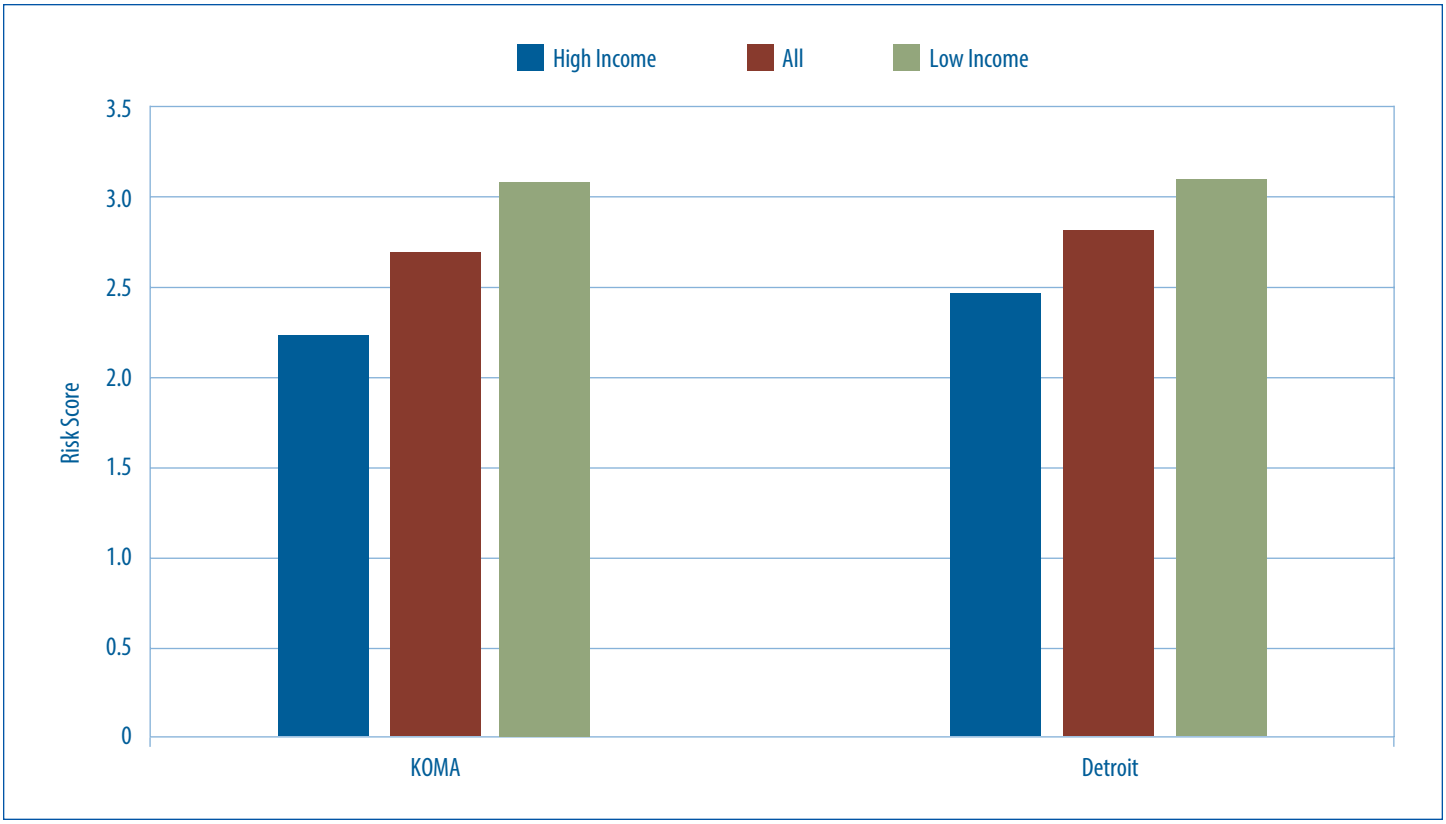
Table 1: Disparities By Income

Region	High Income ZIP Codes	All	Low Income ZIP Codes
KOMA	Avg Income: 128,200	Avg Income: 86,710	Avg Income: 59,369
	% White: 90.82	% White: 84.97	% White: 71.56
	% Black: 4.78	% Black: 8.84	% Black: 19.46
Detroit	Avg Income: 144,834	Avg Income: 88,216	Avg Income: 45,589
	% White: 82.58	% White: 68.51	% White: 24.59
	% Black: 6.59	% Black: 25.17	% Black: 68.66

Table 2: Disparities by Race

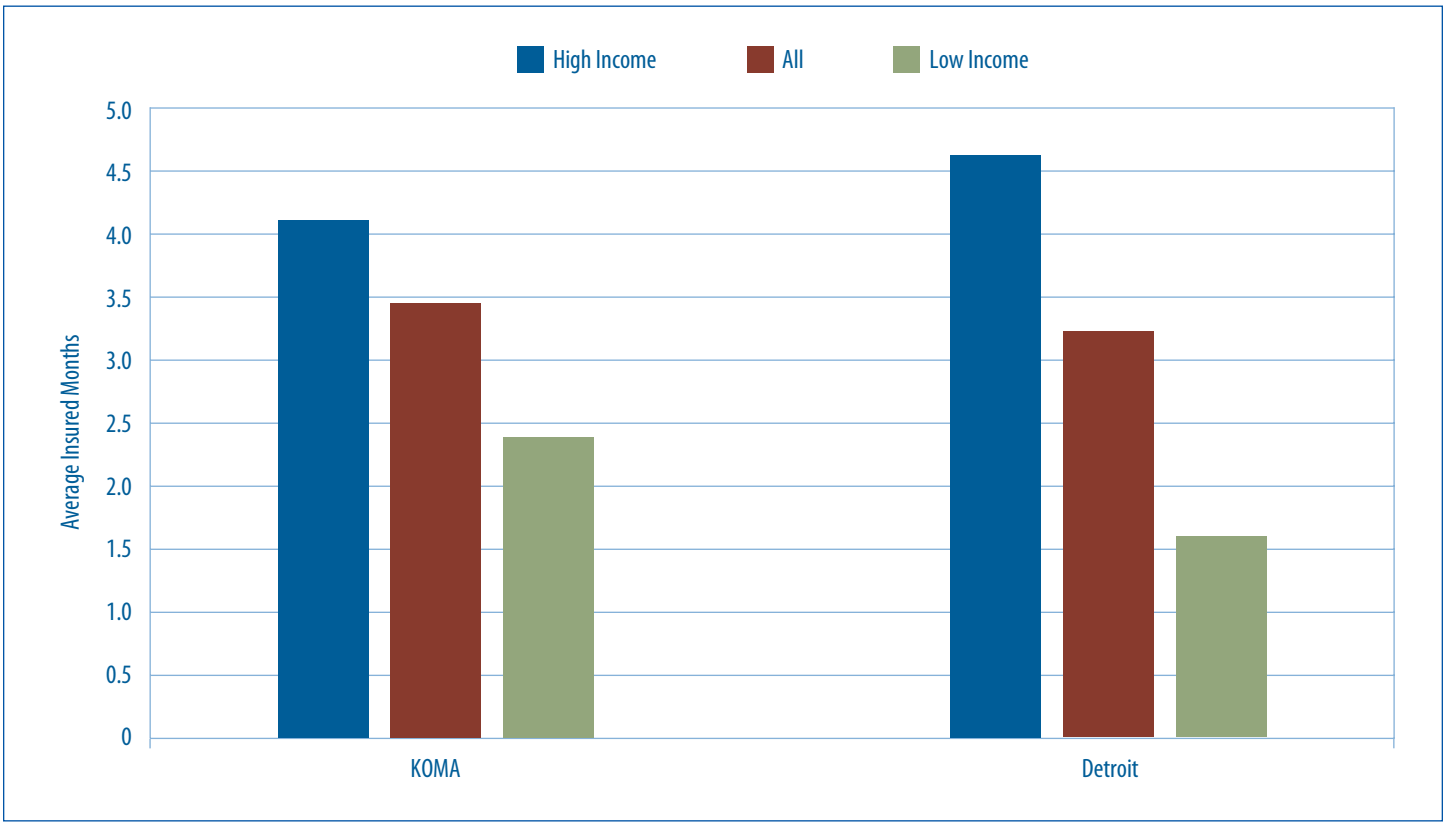
Region	High Share White ZIP Codes	All	High Share Black ZIP Codes
KOMA	Avg Income: 93,503	Avg Income: 86,710	Avg Income: 62,029
	% White: 96.88	% White: 84.97	% White: 64.56
	% Black: 1.52	% Black: 8.84	% Black: 25.63
Detroit	Avg Income: 104,131	Avg Income: 88,216	Avg Income: 51,477
	% White: 94.83	% White: 68.51	% White: 17.81
	% Black: 2.90	% Black: 25.17	% Black: 81.12

Figure 1: Average Risk Score, 2022



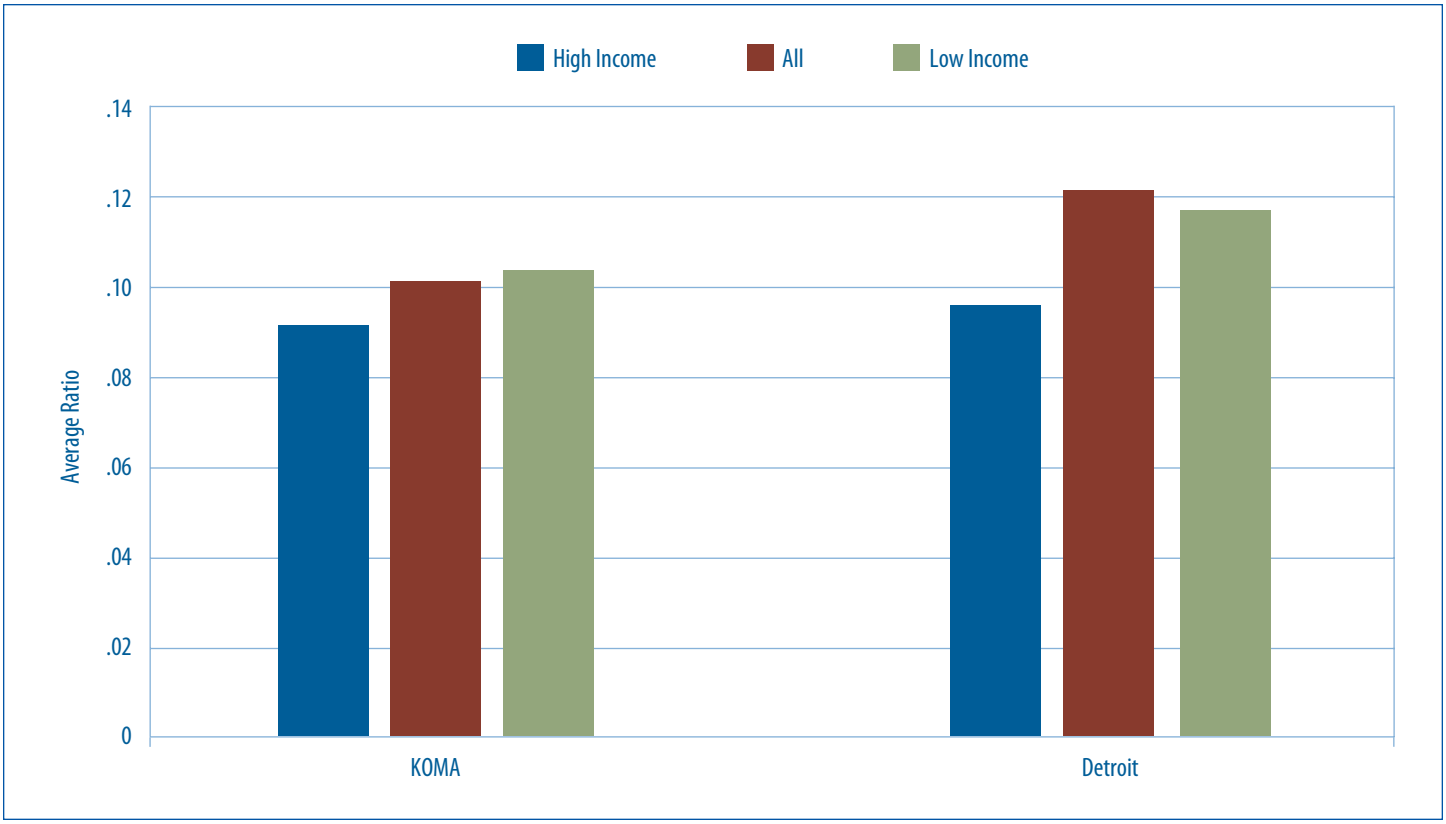
Source: BCBSM, BCN, and Priority Health member data

Figure 2: Average Insured Months per Resident, 2022



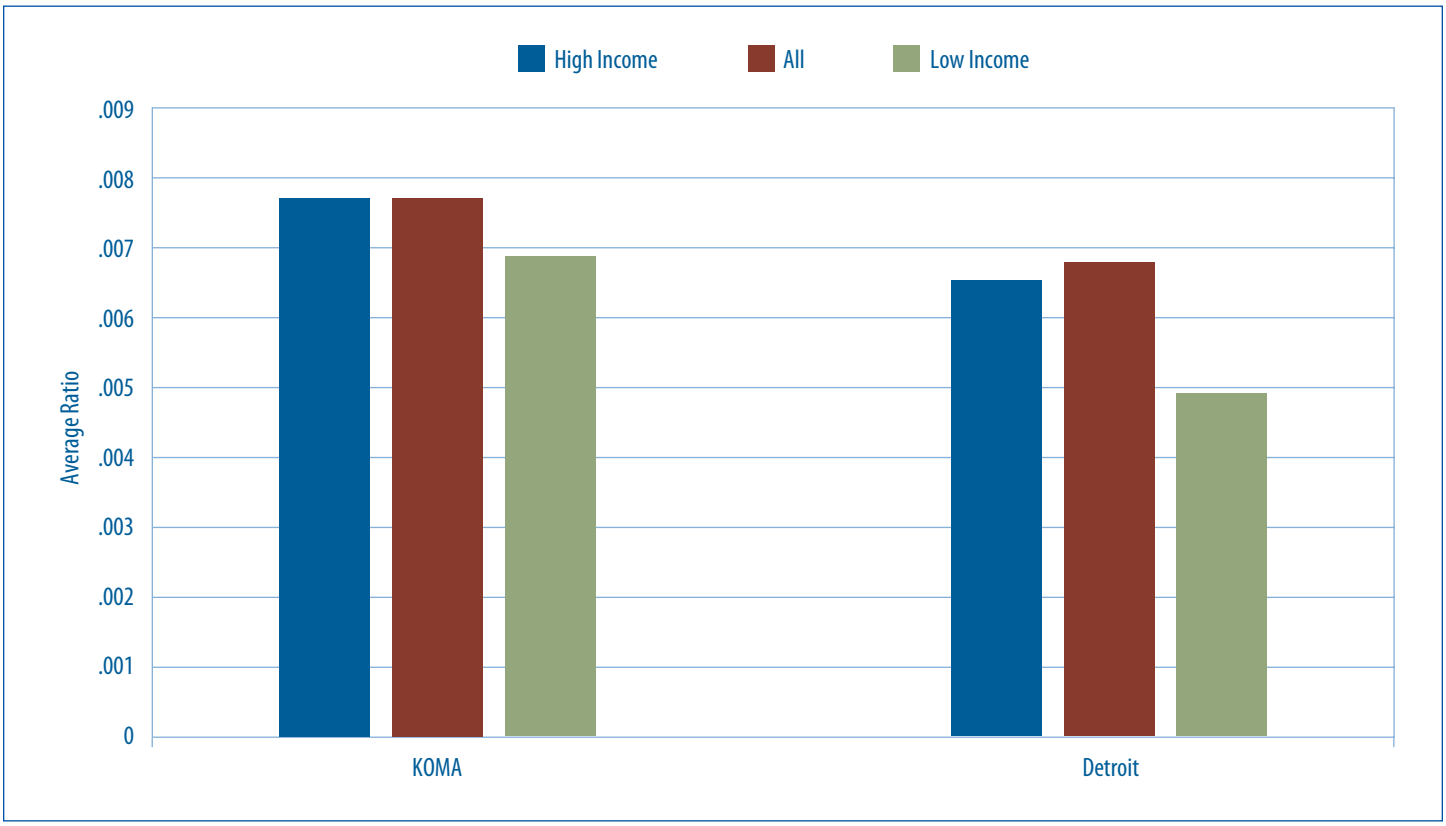
Source: BCBSM, BCN, and Priority Health member data

Figure 3: Average Ratio of Healthy Months to Total Months, 2022



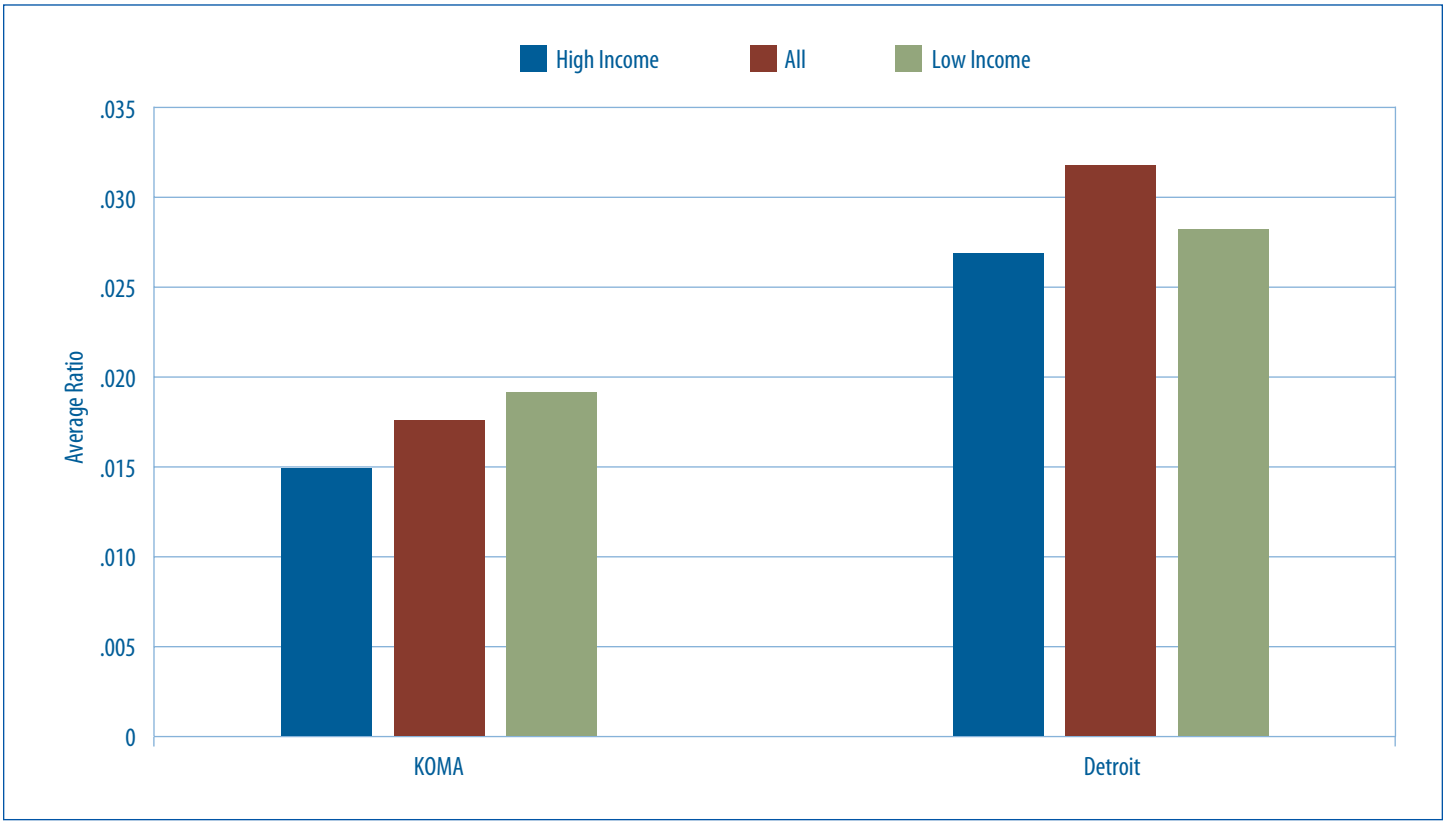
Source: BCBSM, BCN, and Priority Health member data

Figure 4: Average Ratio of Asthma Months to Total Months, 2022



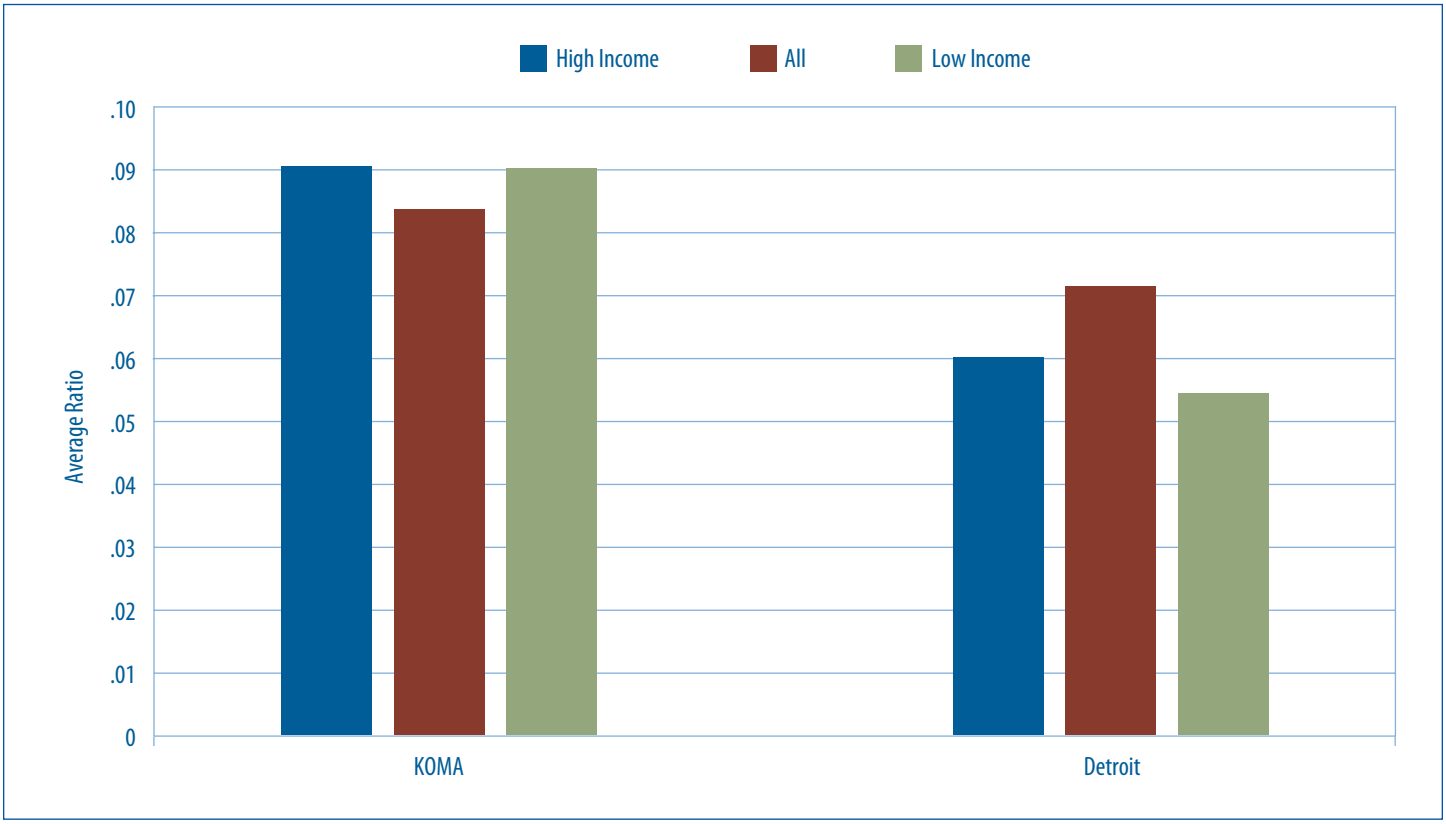
Source: BCBSM, BCN, and Priority Health member data

Figure 5: Average Ratio of CAD Months to Total Months, 2022



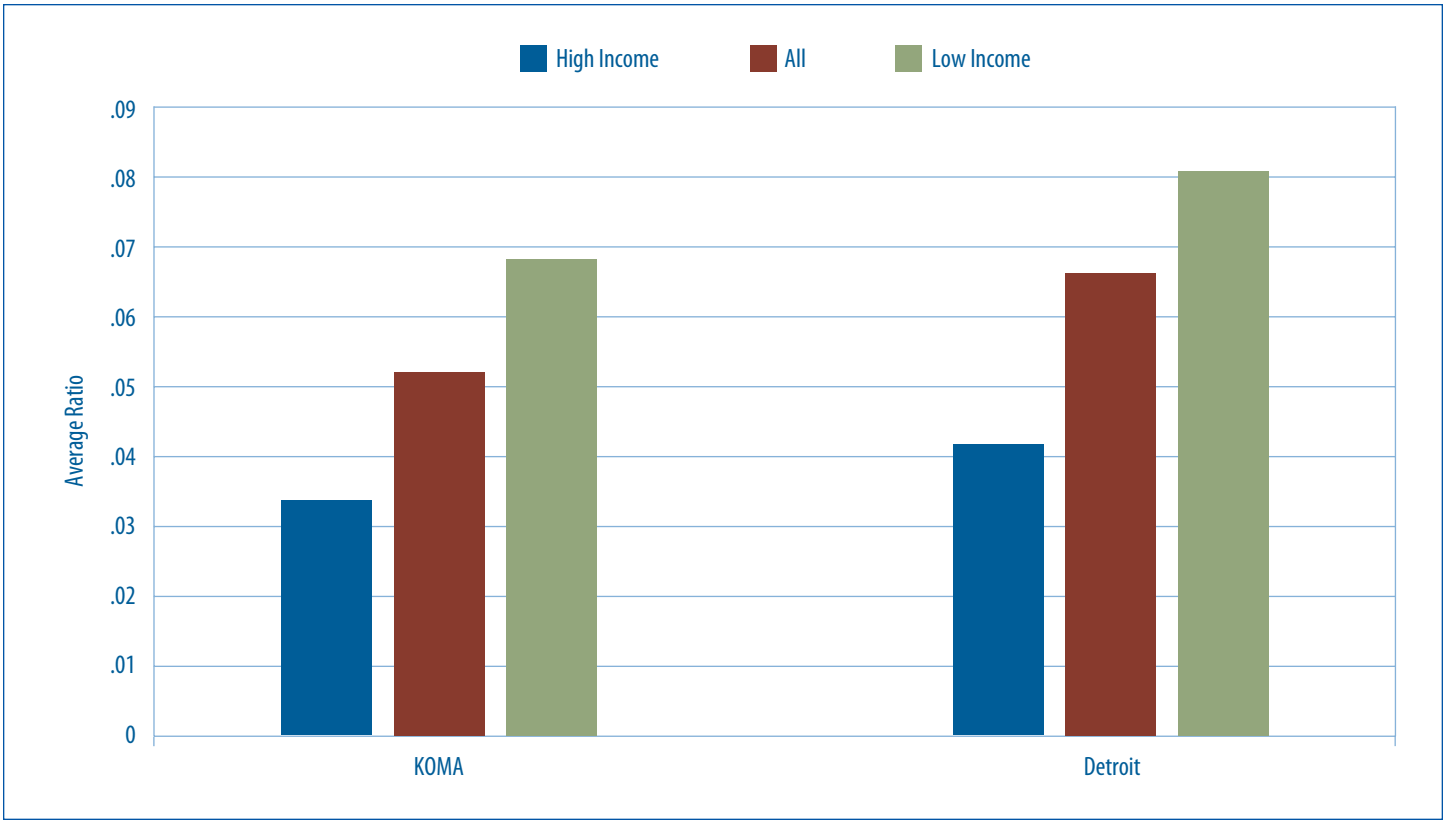
Source: BCBSM, BCN, and Priority Health member data

Figure 6: Average Ratio of Depression Months to Total Months, 2022



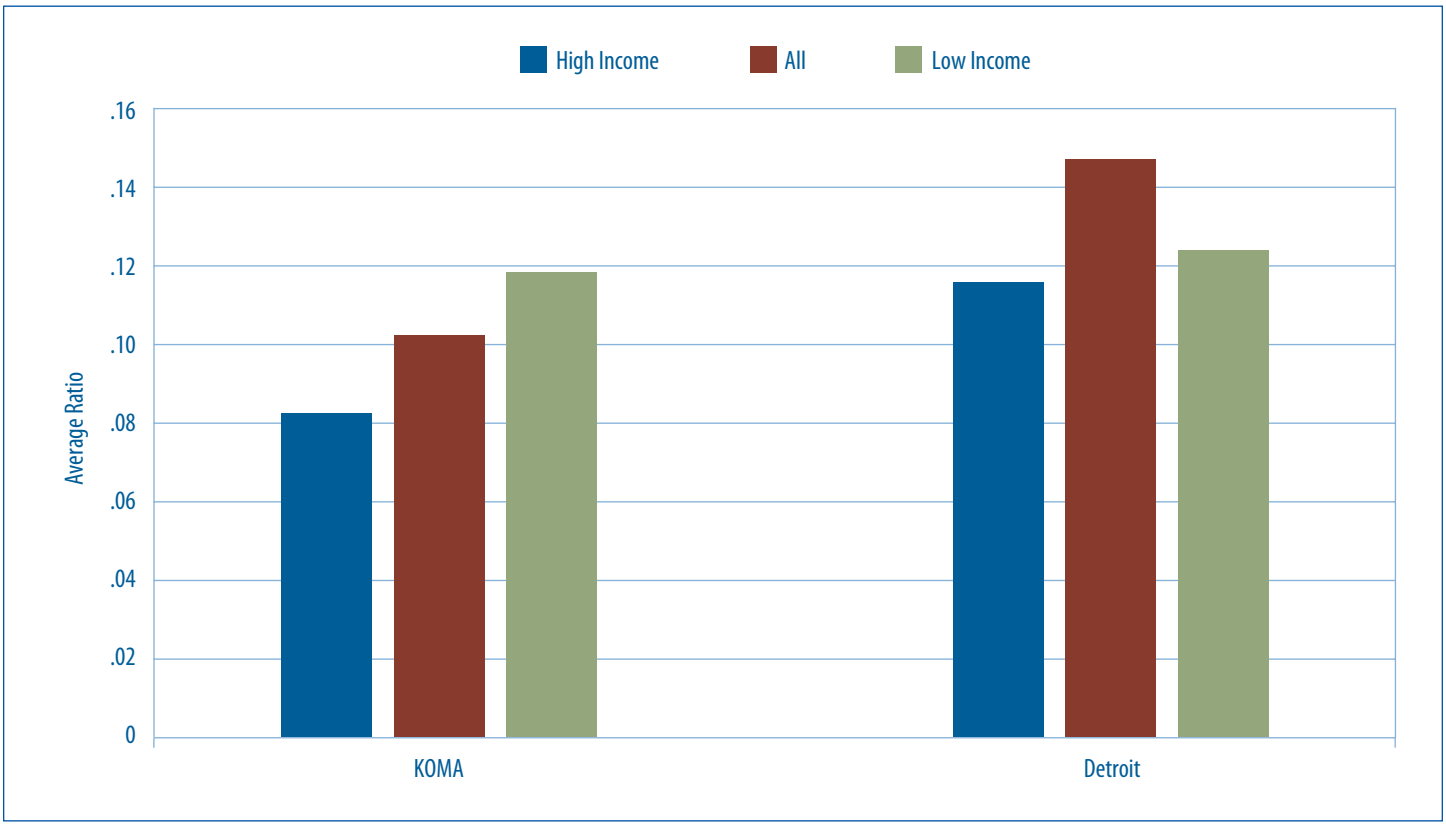
Source: BCBSM, BCN, and Priority Health member data

Figure 7: Average Ratio of Diabetes Months to Total Months, 2022



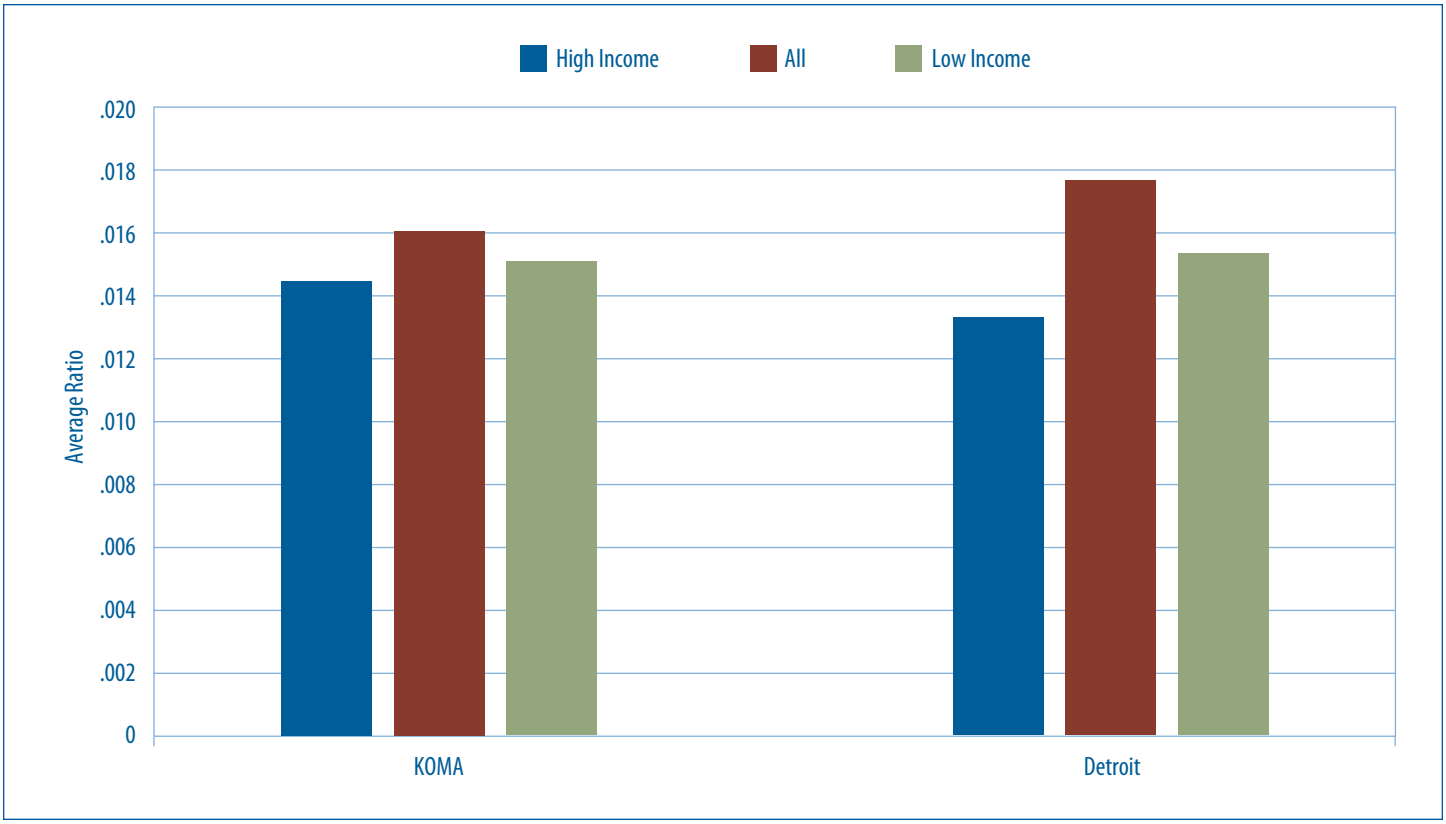
Source: BCBSM, BCN, and Priority Health member data

Figure 8: Average Ratio of Hyperlipidemia Months to Total Months, 2022



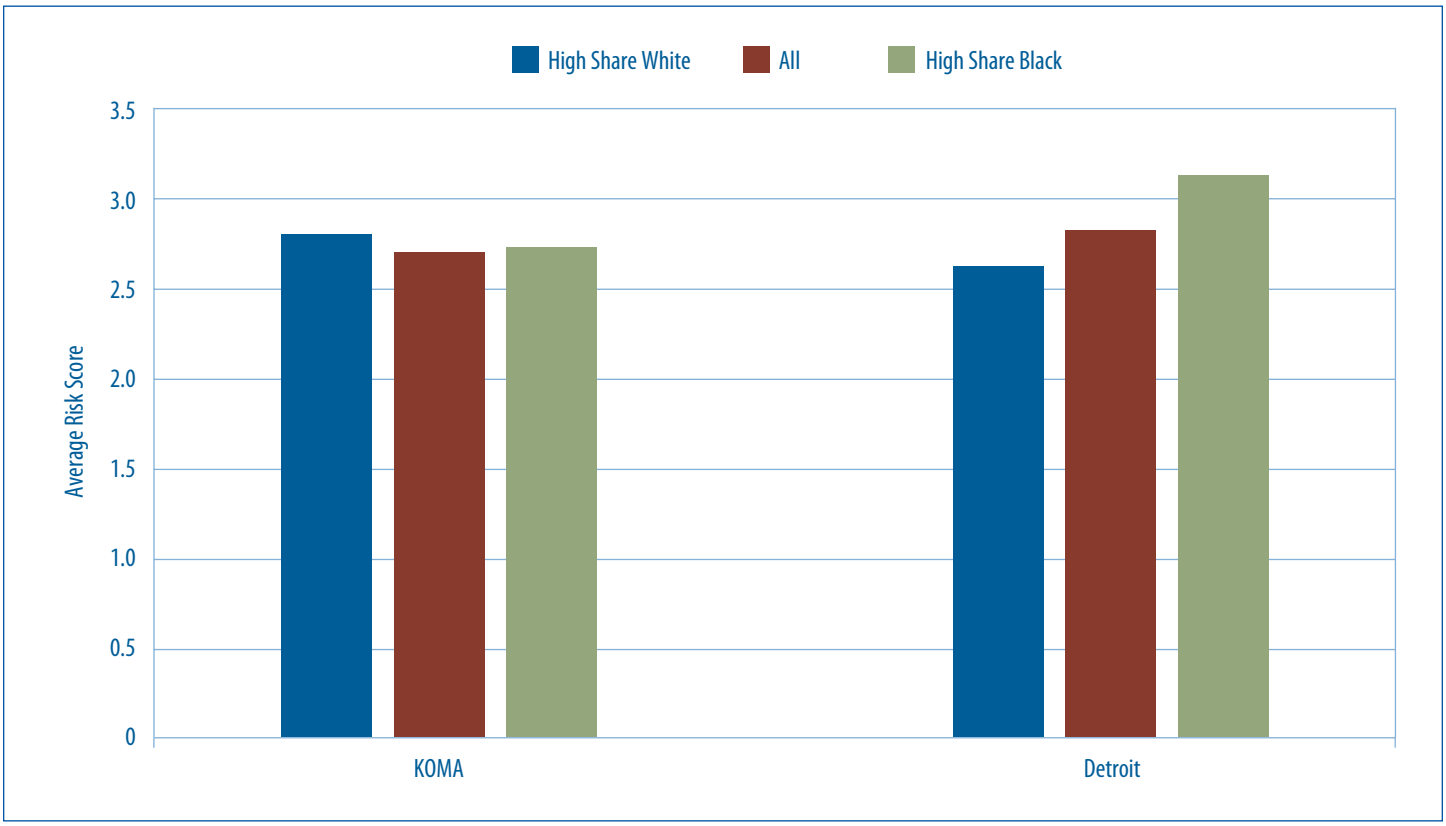
Source: BCBSM, BCN, and Priority Health member data

Figure 9: Average Ratio of Low Back Pain Months to Total Months, 2022



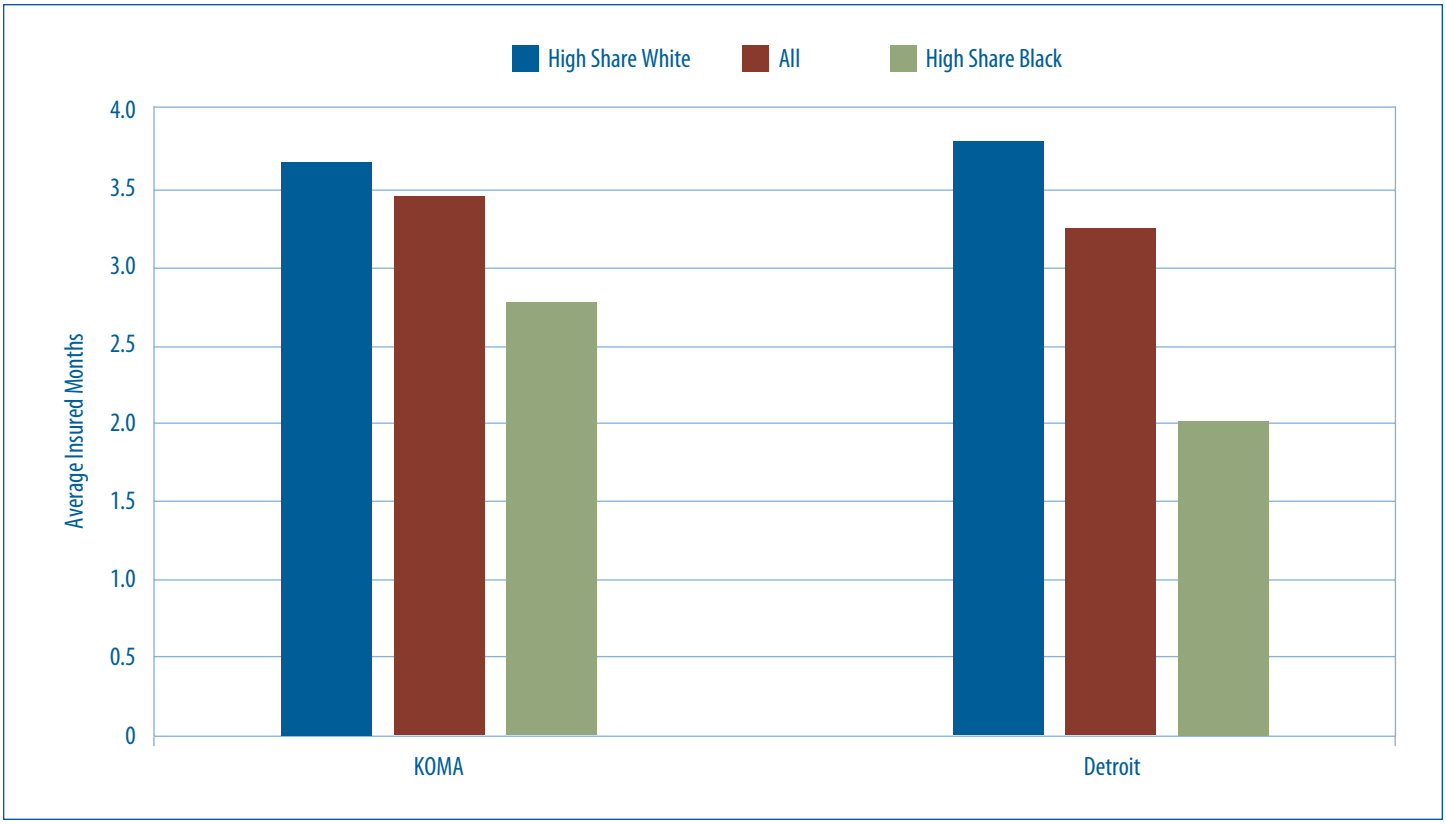
Source: BCBSM, BCN, and Priority Health member data

Figure 10: Average Risk Score, 2022



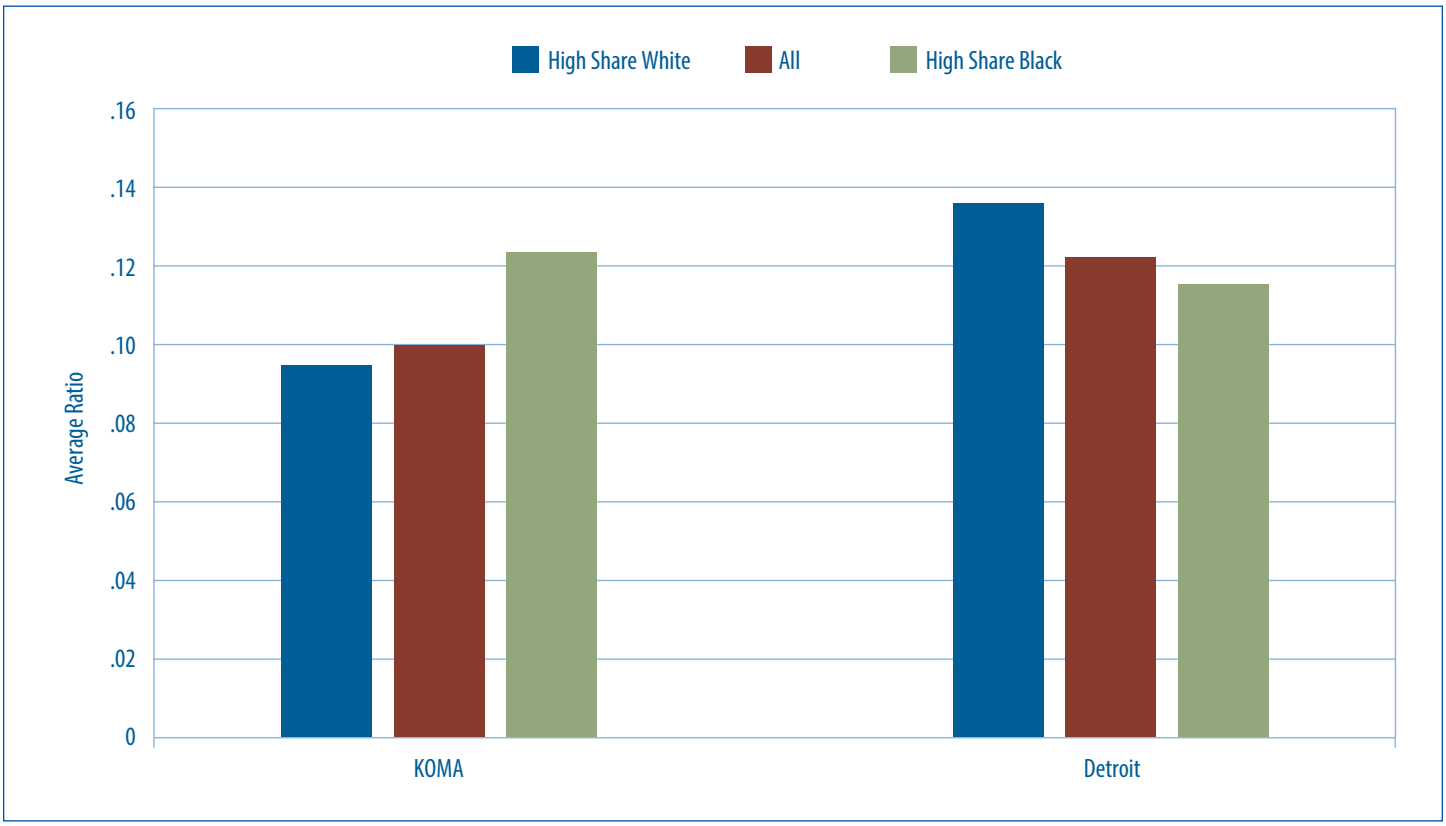
Source: BCBSM, BCN, and Priority Health member data

Figure 11: Average Insured Months per Resident, 2022



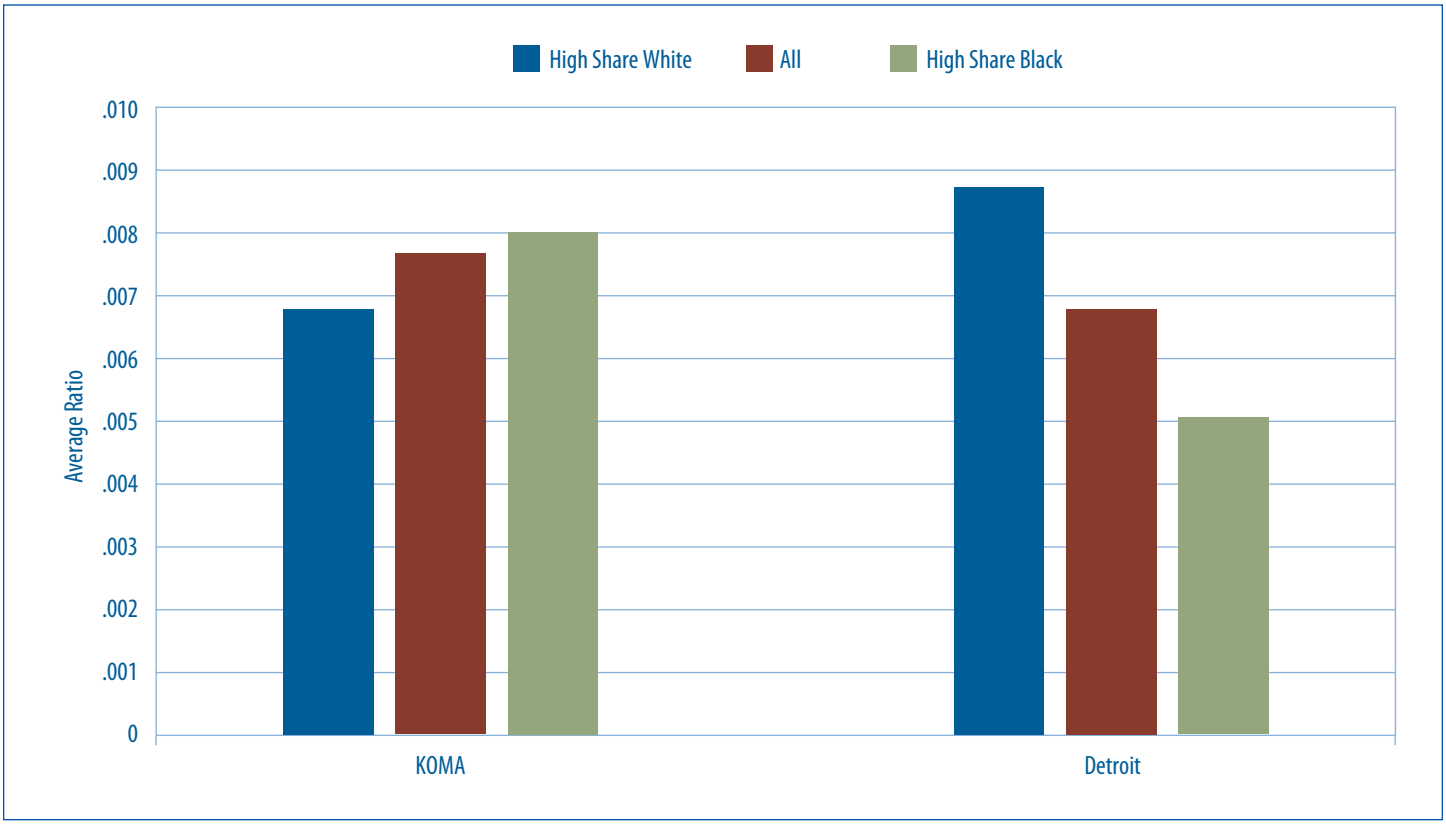
Source: BCBSM, BCN, and Priority Health member data

Figure 12: Average Ratio of Healthy Months to Total Months, 2022



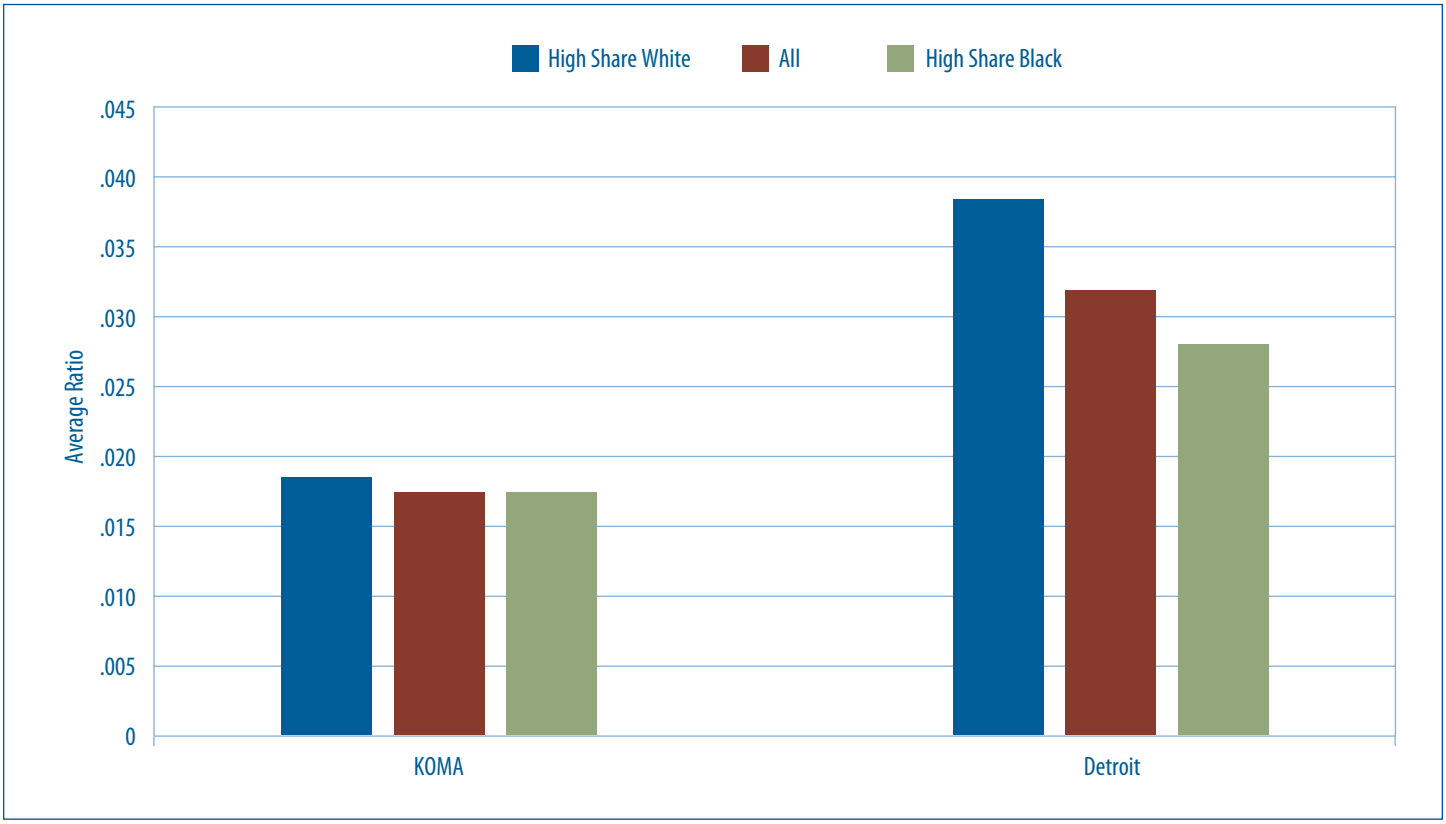
Source: BCBSM, BCN, and Priority Health member data

Figure 13: Average Ratio of Asthma Months to Total Months, 2022



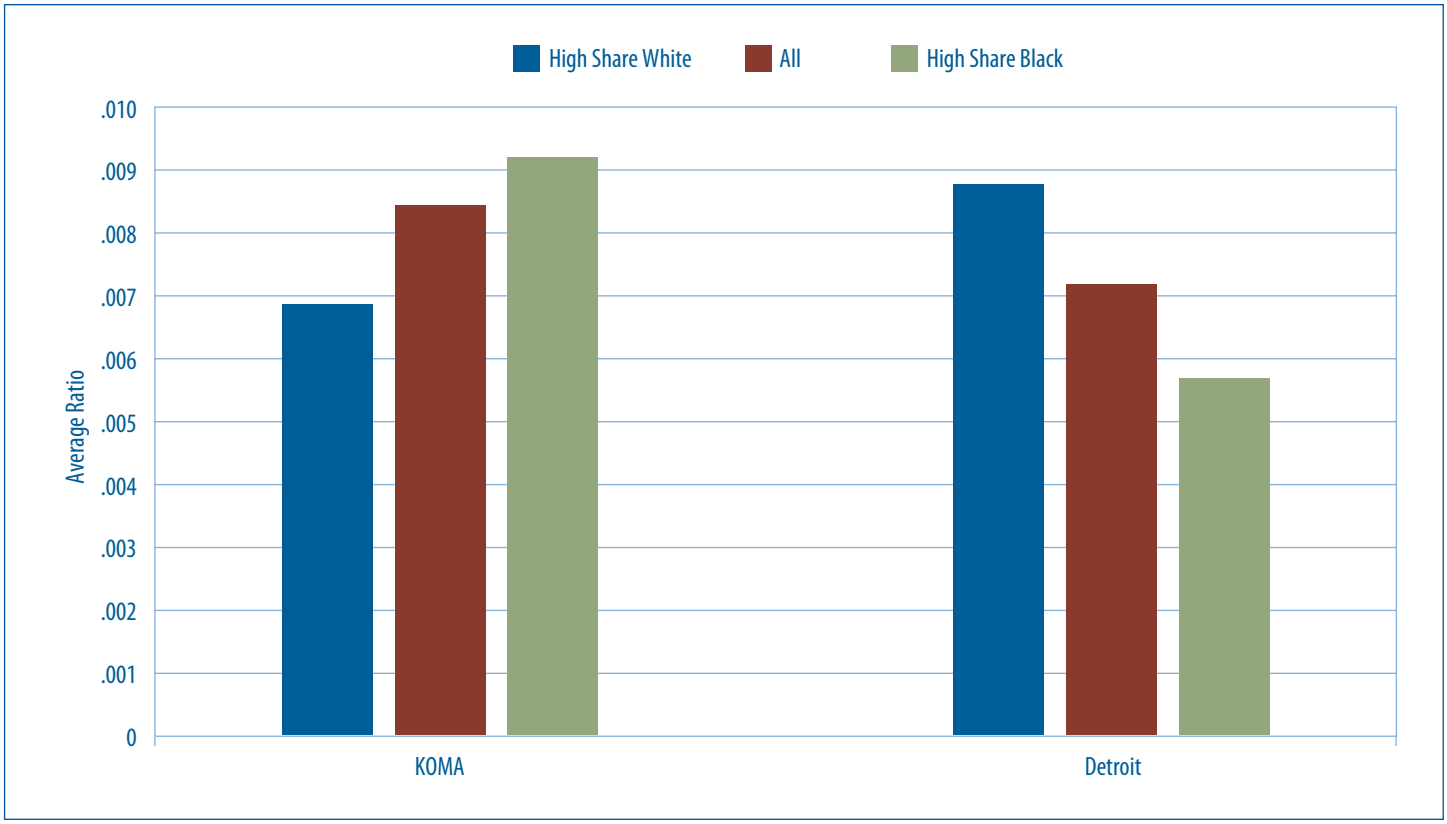
Source: BCBSM, BCN, and Priority Health member data

Figure 14: Average Ratio of CAD Months to Total Months, 2022



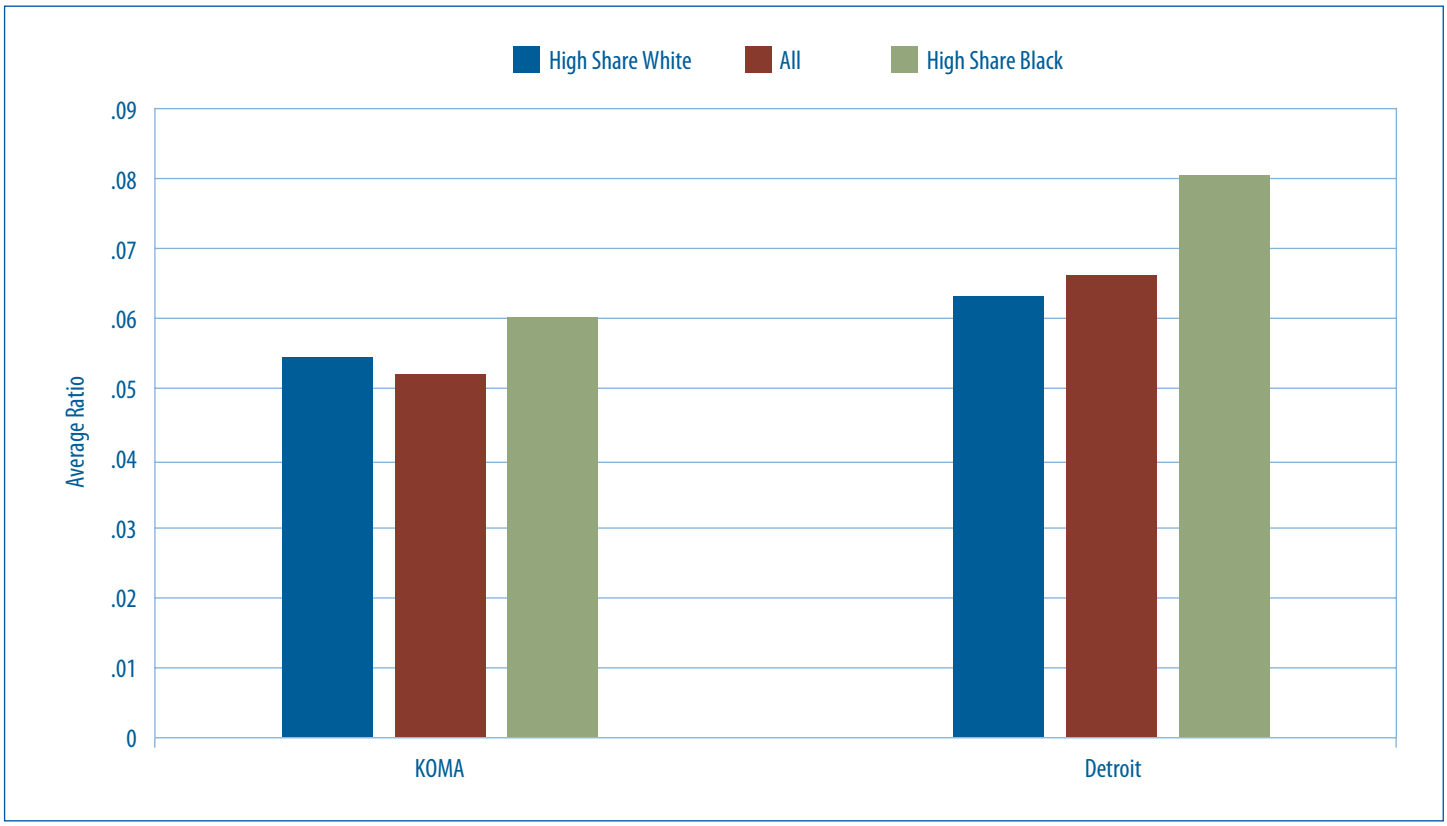
Source: BCBSM, BCN, and Priority Health member data

Figure 15: Average Ratio of Depression Months to Total Months, 2022



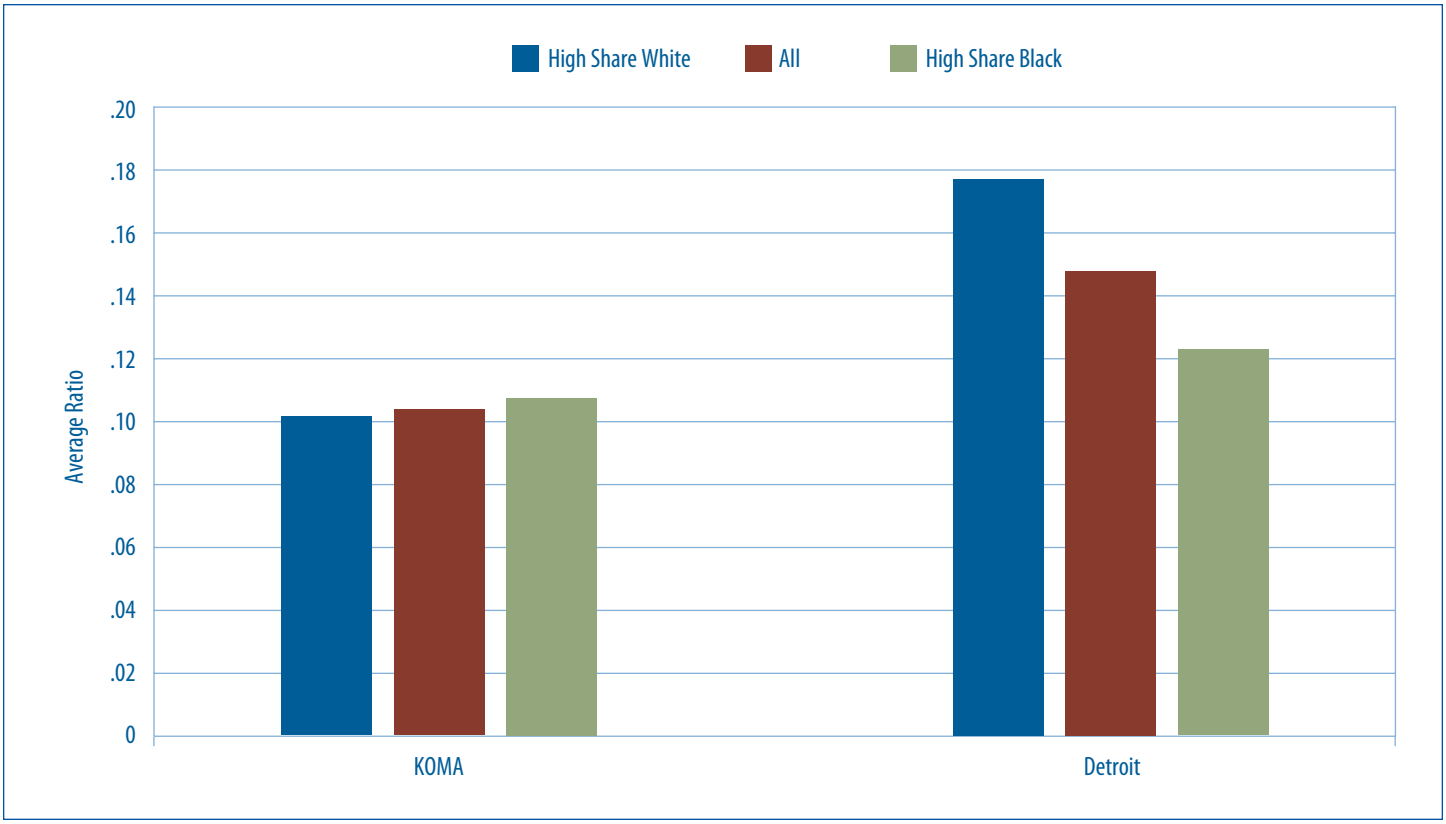
Source: BCBSM, BCN, and Priority Health member data

Figure 16: Average Ratio of Diabetes Months to Total Months, 2022



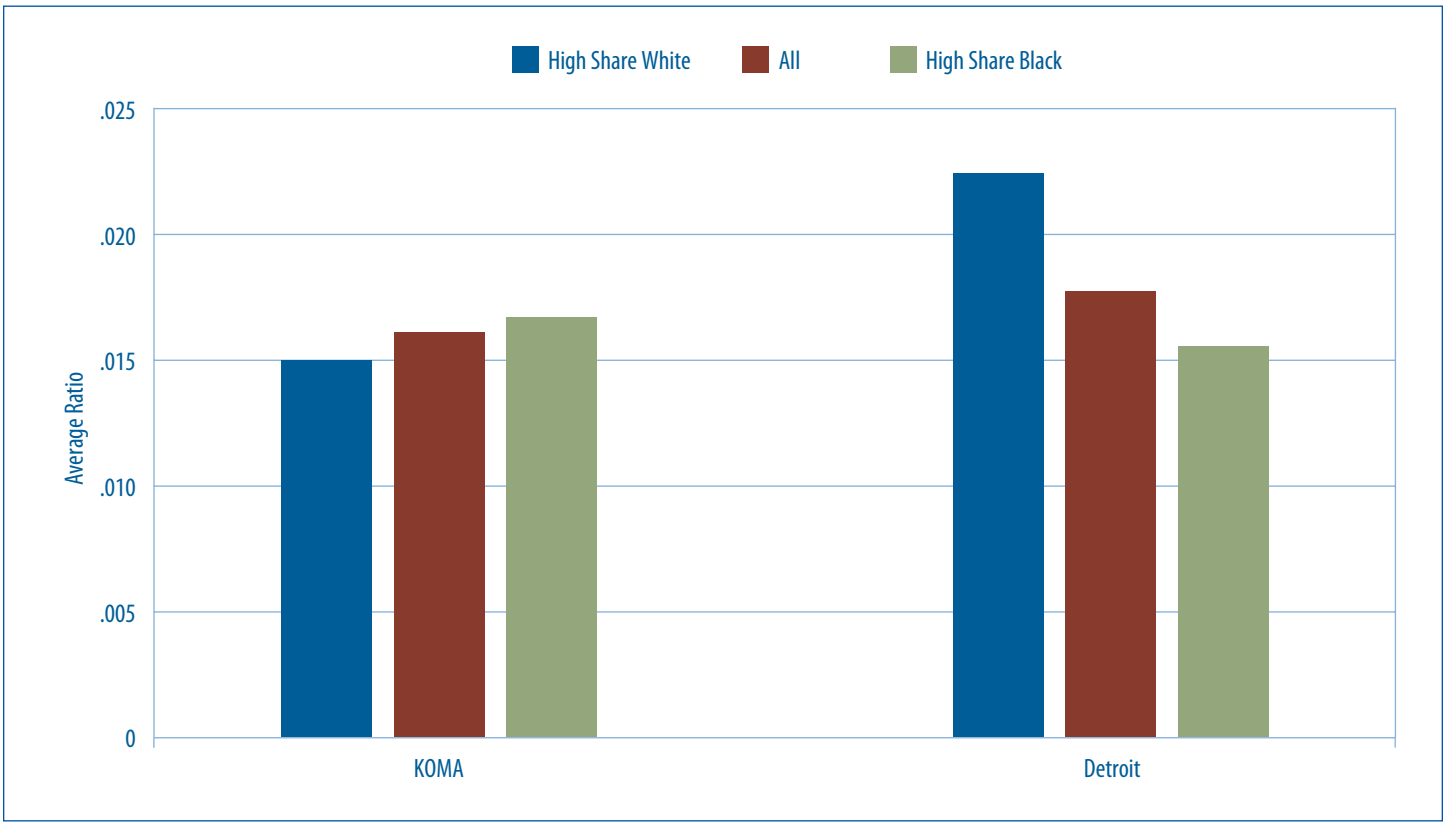
Source: BCBSM, BCN, and Priority Health member data

Figure 17: Average Ratio of Hyperlipidemia Months to Total Months, 2022



Source: BCBSM, BCN, and Priority Health member data

Figure 18: Average Ratio of Low Back Pain Months to Total Months, 2022



Source: BCBSM, BCN, and Priority Health member data

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