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AN OUNCE OF PREVENTION: WHAT PUBLIC HEALTH MEANS FOR MICHIGAN

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In a Nutshell

- Public health is a central and yet broadly misunderstood function of government that focuses on prevention of disease and injury, and management of environmental factors (physical and social) that affect health. Medicine improves the health of one individual at a time; public health improves the health of entire communities.
- In recent years, the state has invested little more than what was needed to draw down federal public health funding. This leaves the state heavily reliant on diminishing federal funds. This disinvestment has affected the ability of state and local health departments to provide essential services and leaves Michigan lagging the nation in both per-capita funding for public health and measures of population health.
- Improvement may be needed for Michigan's system of public health service delivery that is exceedingly fragmented between multiple state departments. A "Health in All Policies" approach should be adopted statewide so that every government policy (from schools to roads to criminal justice) includes assessment of associated health risks and/or benefits. State and local health departments should endeavor to coordinate public health across sectors and elevate the public's understanding of public health.

Summary

When someone hears "public health" they are apt to think of Medicare or Medicaid, but these programs are not what is commonly understood to be public health. Medicare and Medicaid are publicly-provided health insurance programs that facilitate an individual's access to health care. Public health is much broader and refers to a constellation of activities that assess the health status of communities, design policies and interventions to improve health, and assure that health needs are met by monitoring and evaluating health services and programs. In practice, these activities include preventing disease, poisoning, and injury by:

- Controlling the spread of infectious diseases and other factors that cause harm
- Guaranteeing the safety and quality of food and drinking water
- Ensuring safe and clean environments
- Certifying the quality of the health care workforce and facilities
- Addressing the reasons that some people are more likely to suffer poor health than others

- Educating and empowering individuals to improve their health

Stated more succinctly, public health is the science of protecting and improving the health of people and their communities, and a substantial proportion of the health and well-being each individual enjoys is due to public health. Average life expectancy has more than doubled since the mid-1800s. While medical care might look like the obvious hero, more than 80 percent of this improvement is because of advances in public health.

The water emergency in Flint brought international attention to the perverse irony that citizens of the Great Lakes State were unable to secure potable water. Ongoing, contemporaneous threats from a cornucopia of contaminants—PFAS, dioxane, harmful algal blooms—affect water systems throughout the state, suggesting that lead may be the least of Michigan's water woes. Yet lead remains a longstanding occupant of aging and increasingly unsafe housing found throughout the state from Detroit to Grand Rapids. Moreover, while water seems to have a special importance in Michigan, air and soil contamination are no less cause for concern:

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every source of pollution compromises and erodes the health of the public.

What we eat affects our health as much as the water we drink and the air we breathe. Older residents of the state might recall the horror caused in the 1970s when millions were exposed to polybrominated biphenyl (PBB) through contaminated meat, dairy, and eggs. Packaged food remains a source of human infection from pathogens like *E. coli* and *Salmonella*. Unsafe food handling and preparation can also lead to food contamination and the spread of disease, playing a factor in Michigan's largest-in-the-nation outbreak of Hepatitis A that began in 2016.

Hepatitis A is highly contagious, and, like many infectious diseases, can spread through a population like wildfire if not contained. Reports of other vaccine-preventable diseases, such as measles, mumps, pertussis, and varicella, continue to occur in Michigan. Influenza is responsible for numerous hospitalizations and deaths each year. Additionally, the ease of global travel means that emerging diseases (like Ebola virus) can find their way to Michigan. Infectious diseases are

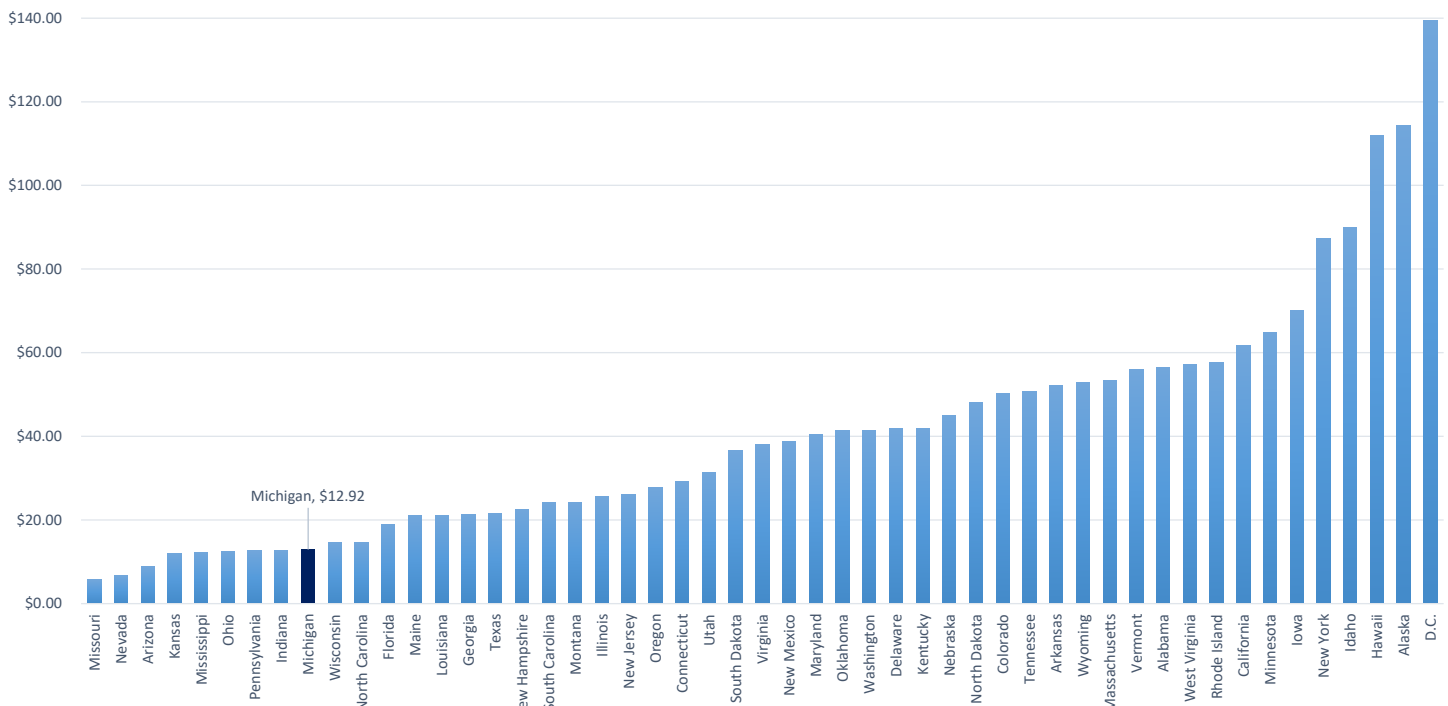
cause for continued (perhaps heightened) concern.

While events like outbreaks and environmental contaminations create clear and immediate threats, ongoing social and environmental factors in communities can also have a profound, insidious effect on health over time. These factors (such as poverty, stress, lifestyle, education, and environment) account for at least 60 percent of health outcomes and premature death. The importance of these social determinants of health has been understood for decades, yet they continue to receive inadequate attention from many policymakers and health care professionals. Public health enables this focus on the underlying factors that contribute to poor health.

It is difficult to put a dollar amount on diseases that people didn't catch, on injuries they didn't sustain, or on poisonings that didn't happen. It's also difficult to monetize incremental changes in health quality throughout the course of a person's life. These benefits are invaluable, however, leading to decades of added life and the potential for productivity and prosperity. It is far less expensive to prevent a disease, injury,

Chart A

Per-Capita State Funding for Public Health, FY2017



Source: Trust for America's Health

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or poisoning than to medically treat them once they have occurred. Yet, Michigan has disinvested in public health over the past 15 years.

State-supported public health expenditures in Michigan have dropped by 16 percent from an inflation-adjusted high point of \$300 million in FY2004. This is not to say that funding was adequate at this expenditure apex. Compared to other states, Michigan ranks near the bottom for its investment in public health (See **Chart A**). Taking away federal funding and programs, Michigan's FY2017 state public health investment totaled \$128.3 million (just \$12.92 per capita).

After multiple past executive reorganizations and administrative restructuring, public health responsibilities have been spread across several state departments (rather than remaining the purview of the state health department – presently the Michigan Department of Health and Human Services). The Department of Environmental Quality and Department of Agriculture and Rural Development have assumed important public health roles, and public health functions are also fulfilled by the State Police and the Department of Licensing and Regulatory affairs. This fragmentation might be considered both a symptom and a cause of the marginalization of public health in Michigan.

While the Michigan Department of Health and Human Services has the largest budget of any state department, public health appropriations within this budget

have accounted for less than one percent of the total state budget and less than one percent of the state's general fund. A total of \$1.4 billion was appropriated to all five departments with public health responsibilities in rough estimation. This suggests that as much as 2.5 percent of Michigan's \$55.8 billion state budget is dedicated to public health. (See **Chart B**.) Given the centrality and importance of public health, this proportion may be inadequate.

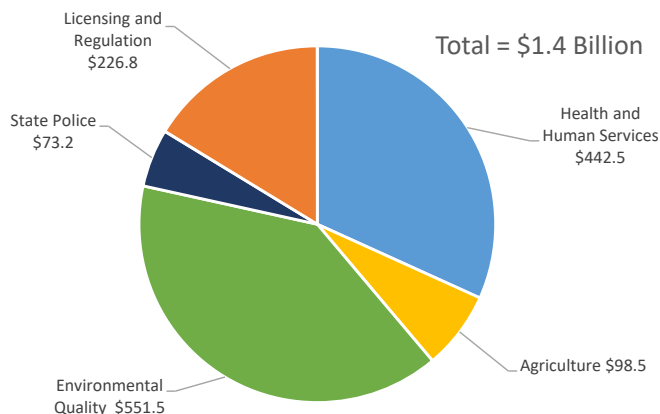
Michigan relies heavily on federal funding to support state and local public health activities, yet federal funding for public health appears increasingly scarce. The combined low levels of funding from both federal and state sources have left Michigan in a state of public health subsistence. Michigan has managed to do what is necessary to generally protect the public's health, but this minimal funding leaves the state potentially unprepared for future crises. Moreover, without additional funding, the state will be far less able to develop new policies or programs to address mounting public health concerns and needs in Michigan.

Michigan, largely because of the social, economic, and physical condition of its communities, has higher than average prevalence of many chronic diseases like heart disease and diabetes (See **Table A**). More Michiganders smoke and/or are obese than the national average. Relatedly, Michigan has a higher rate of infant mortality and its residents have a shorter life expectancy at birth than the U.S. average. Viewed collectively, these broad strokes paint one strikingly clear picture: Michigan pays a price for not prioritizing and funding public health.

That price is evident in Flint and other communities that experience health threats from their water, food, and environment. The insidious nature of this price is revealed in Northern Michigan's "disability belt" and in the communities struggling with opioid addiction. The unfair character of this price is paid especially by low-income communities and communities of color where people live much shorter, sicker lives and watch infants perish at more than twice the rate of other communities. Additionally, Michigan cannot afford to continue to spend massive amounts on health insurance policies and costly medical interventions while failing to invest in population-level health promotion and disease prevention, or, more generally, in social well-being.

Chart B

Public Health Appropriations in Michigan, FY2018
(dollars in millions)



Source: CRC Analysis of State Line Item Appropriations

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Moreover, Michigan cannot afford to be seen as a state that fails to protect the safety and well-being of its people.

The health issues facing Michigan are complex. In contrast, a large part of the solution to these health issues is very simple. Michigan needs greater investment in public health. Investment certainly means greater appropriation of fiscal resources; investment also means greater philosophical buy-in. Each of Michigan's departments, agencies, and local governments should prioritize safeguarding the public health and adopt a "Health in All Policies" philosophy and approach to governance. The public must develop a deeper understanding of public health, assume greater individual responsibility for personal and community health, and hold public leaders accountable for failures to protect the public's health.

A Health in All Policies approach can only be realized by forging strategic partnerships across the public and private sectors, and by increasing public understanding of the importance of public health. In particular, it is important for public health leaders to bring together relevant partners and collaborators and work to explicitly address the upstream factors that determine health. While Michigan has a comprehensive public health code, a well-trained public health workforce, and nationally accredited university programs to train the next generation of public health professionals, it will be impossible to improve the future health of the public absent the public's support, consent, and buy-in. This makes the adoption of well-organized,

Table A

Age-Adjusted Mortality Rates* for the Ten Leading Causes of Death in Michigan, 2016

*Rates are per 100,000 persons

	U.S.	Michigan	Detroit
Heart Disease	165.5	200.8	322.9
Cancer	155.8	167.1	192.7
Chronic Lower Respiratory Diseases	40.6	44.7	33.9
Unintentional Injuries	47.4	50.8	71.9
Stroke	37.3	39.1	47.4
Alzheimer's Disease	30.3	33.8	20.1
Diabetes Mellitus	21	21.5	27.6
Kidney Disease	13.1	14.5	23.5
Pneumonia/Influenza	13.5	13.7	21
Intentional Self-harm	13.5	13.4	8.9
All Causes of Death	728.8	787.8	1,027.4

Source: Detroit Health Department

collaborative, and transparent public health delivery systems essential.

Health underpins every individual's ability to pursue their own happiness and to make productive contributions to their community. Michigan faces numerous health challenges and large numbers of people continue to experience notable health disparities. Greater attention to public health will work to deconstruct physical and social barriers to healthy, productive lives, and to safeguard the health and well-being of all citizens on this pair of pleasant peninsulas.

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Introduction

When people think of health, they are apt to imagine that health is what happens in a hospital or physician's examination room. In reality, the majority of a person's health is determined by factors in their household and community. The concept of health, therefore, includes the health and well-being of communities, the activities that can prevent illness or injury, and the various underlying factors that contribute to a person's overall health. In other words, thinking about health should include thinking about public health.

Public health is the science of protecting and improving the health of people and their communities. Rather than simply treating illnesses or injuries when they occur, public health seeks to prevent them from happening in the first place. While medicine works to help people one at a time, public health works to help entire populations. Moreover, public health relies on the understanding that health is not merely the absence of disease, but rather a state of complete physical, mental, and social well-being.

When public health is working to keep people healthy, it often goes unnoticed. In contrast, it becomes quickly apparent when something goes wrong. Many issues in Michigan might be averted or better addressed by greater emphasis on public health:

- The spread of infectious diseases and the threat of emerging diseases.
- Harm from food that has been contaminated or is otherwise unsafe.
- Exposure to environmental hazards in the air, water, and soil.
- High rates of chronic diseases, substance use and abuse, and obesity.
- Other social and physical factors that contribute to poor health.

While medicine works to help people one at a time, public health works to help entire populations.

From the water emergency in Flint and the Hepatitis A outbreak in Southeast Michigan to sites of contamination and occurrences of preventable diseases throughout the state, it is clear that Michigan needs to pay greater attention to public health.

Michigan's infant mortality rate and age-adjusted mortality for many of the leading causes of death exceed national averages. Michigan also exceeds the national averages in prevalence of tobacco use and obesity—important factors in the development of diseases that lead to premature death. Not surprisingly, the life expectancy at birth is lower in Michigan than in other states on average.

Viewed collectively, the above broad strokes paint one strikingly clear picture: **Michigan is a tremendously unhealthy state.**

Poor health presents clear costs to individuals, shortening the length and impairing the quality of their lives. That these costs are due to preventable factors makes them all the more intolerable. Moreover, the costs of poor health are not restricted to

only the sickest individuals; poor health affects families and communities, and ultimately exacts high costs on society.

Poor health also impairs educational efforts in Michigan schools. Children struggling with physical and/or psychological health issues (often linked to factors in the home or community) will have a difficult time performing well in school and progressing through their education. Environmental hazards and psychosocial trauma can also lead to cognitive impairment.

Poor health also impairs workforce development. An individual's reliability and performance capacity as an employee can be greatly hindered by health issues. Poor health can also lead to functional limitations and

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disabilities that prevent people from joining the workforce or causing them to exit the workforce prematurely.

Poor health also may hinder efforts to attract people to visit or relocate to Michigan. Laughter is contagious, but so too are stress, violence, depression, obesity, and substance abuse. The health of a community is central to attracting new talent. Every dollar spent on the “Pure Michigan” campaign to promote the state is more than offset by national news of infectious diseases, environmental contamination, or widespread illnesses caused by foodborne contamination.

Poor health increases the consumption of health care resources and inflates the already high health insurance costs borne by individuals and businesses in Michigan. While Michigan’s high-quality system of health providers can work to prolong life and reverse damage caused by a disease outbreak or environmental contamination, it is much less costly to prevent these events than it is to mitigate the damage once they occur. Likewise, chronic diseases are both costly and preventable.

Poor health is not an inevitability. Clean air and water, nutritious food, safe neighborhoods, quality schools, healthy lifestyles, and greater social support are all attainable goals. Healthcare alone cannot prevent diseases, poisonings, and injuries – preventing harm and securing the health of all people requires a robust

public health system.

Michigan can do better. Public health is a public good that works to give each person the opportunity to be as healthy as possible and provides benefits far beyond each dollar of investment. Greater emphasis on public health will therefore enable state and local governments to better assess potential problems, develop policies to address problems that are identified, and provide assurance of the public’s health and safety.

Michigan has suffered because of a disinvestment in public health. Additionally, a series of executive reorganizations of state functions has created a very fragmented organization

of public health services across several state departments. Greater attention in the budgeting process is therefore only part of the solution if Michigan is to improve the health and well-being of its citizens. New service delivery models should also be considered

Despite its critical importance, public health has rarely been top of mind for state and local government policymakers. Greater public demand for public health services and the infusion of public health into the policymaking process would ingrain an assessment of health risks and/or benefits into policy making at all levels of government. All policies in Michigan would benefit from greater consideration of public health.

Despite its critical importance, public health has rarely been top of mind for state and local government policymakers.

What is Public Health?

Public health is the science of protecting and improving the health of people and their communities.¹ It seeks to prevent disease and other forms of harm, to address ongoing population health needs, to respond to emergencies when they occur, and to improve the overall health of the population. Public health also seeks to ensure that each person has an opportunity to be as healthy as possible and defines health in a way that recognizes that it is not merely the absence of disease or infirmity, but rather “a state of complete physical, mental, and social well-being.”²

In practice, public health does these things by applying scientific evidence and inquiry to develop solutions to a broad range of health problems, and by utilizing public policy to apply these solutions in ways that promote and protect the health and well-being of all individuals.

Public health works to monitor disease outbreaks, guarantee the safety and quality of food, ensure the safety of environments, and certify the quality of the health care workforce and systems.³ It also works to educate and empower individuals with health information, promote wellness and encourage healthy behaviors, and to determine and address the reasons that some individuals are more likely to suffer poor health than others.⁴ By focusing on whole communities, public health also places a great emphasis on health equity and reducing health disparities.

The term public health is frequently discussed and yet rarely well-defined. Perhaps this is due to the broad range of subject matter and professional activities that are encompassed by the term public health. For example, professionals commonly engaged in public health might include epidemiologists, toxicologists, and sanitarians, as well as health administrators, researchers, and educators. Public health also overlaps with nursing and social work in its clinical application, health promotion, and disease prevention activities. The field of public health includes policies and actions to preserve clean air and water, guarantee safe food,

monitor infectious diseases and prevent epidemics, screen for health risks, promote healthy behaviors, and develop multidisciplinary interventions to address threats to individual and community well-being, such as obesity and depression.

Another source of obfuscation regarding public health might be the frequent conflation of public health with medicine or health care. Health care provided by the government (as with the Veterans Health Administration) or government-administered health insurance (like Medicare) are not public health, despite being financed by taxpayer funds and administered by public agencies. Conversely, privately administered health screening and surveillance, disease prevention, occupational and environmental safety, and health education and promotion are examples of public health activities.

Public health applies a multi-disciplinary scientific approach to identify threats to health and well-being and seeks large-scale solutions that preempt the emergence of disease or injury.

The primary differences between public health and medicine relate to sequence and scope. Public health focuses on prevention: While medicine seeks to treat existing diseases or injuries, public health attempts to prevent diseases or injuries from occurring and, when

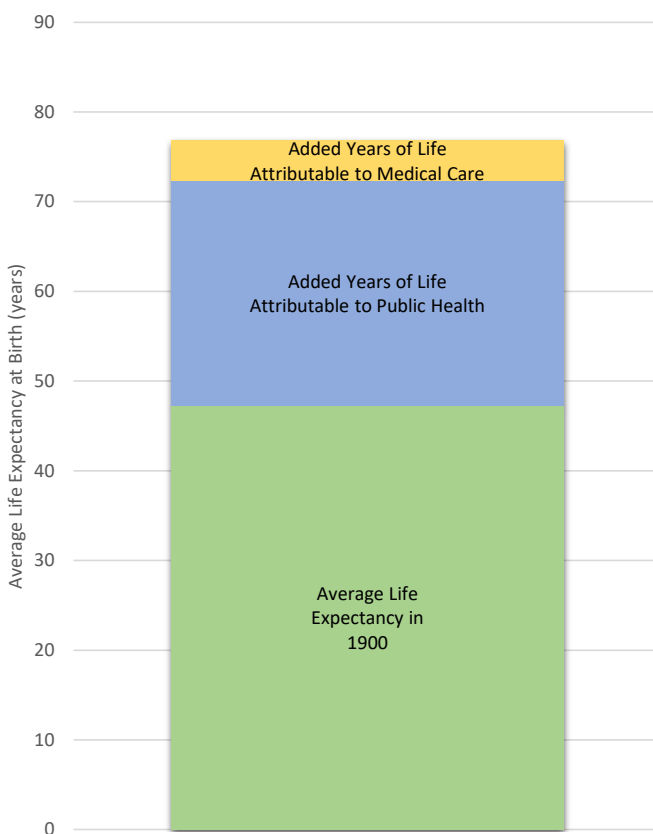
they do occur, seeks to prevent them from spreading or reoccurring. Public health also focuses on the community rather than the individual: While medicine treats individuals, public health focuses on entire populations or subpopulations. Public health constructs broad interventions to improve the health of groups of individuals whether they're small neighborhoods, entire states, or countries. It applies a multi-disciplinary scientific approach to identify threats to health and well-being and seeks large-scale solutions that preempt the emergence of disease or injury.

The impact of public health has been profound. Since 1900, life expectancy in the U.S. has increased by more than 30 years. At least 25 of these extra years of life are attributable to the major achievements of public health, including infectious disease control, vaccination, better nutrition and safer food, occupational/workplace safety,

motor vehicle safety, maternal health and family planning, and remediation of environmental hazards and toxins.⁵ The remaining fraction of the change in life expectancy may be attributed to improvements in medicine (see **Chart 1**). If this timeline is expanded further to the mid-19th century (when average life expectancy at birth was just 39 years), it is fair to say that public health has very nearly doubled individuals' lifespans and substantially improved quality of life.

Chart 1

Proportion of Added Average Life Expectancy Attributable to Public Health Efforts in the Year 2000



Source: CDC Life Expectancy Estimates and "10 Great Public Health Achievements"

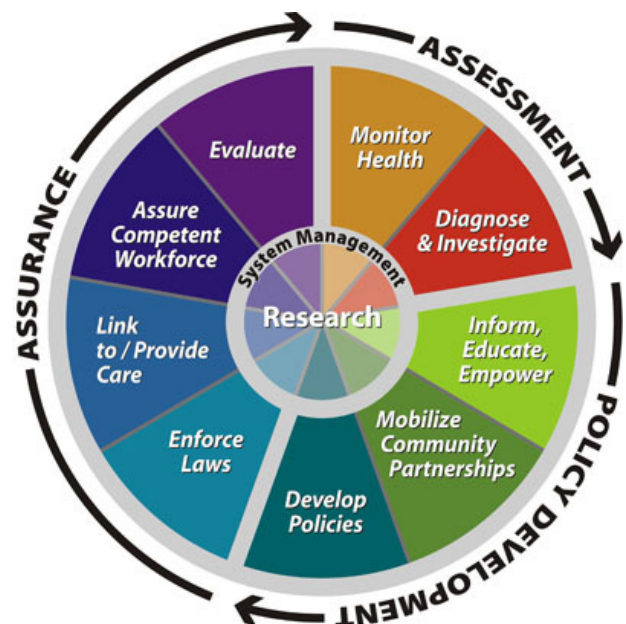
Core Functions of Public Health

The three core functions of public health first outlined by the Institute of Medicine (now called the National Academy of Medicine) are assessment, policy development, and assurance (see **Figure 1**).⁶

- *Assessment* describes the process of monitoring and determining the health status of populations by way of health screenings, testing for environmental hazards, observing the incidence and prevalence of various health conditions, tracking infectious disease, monitoring health disparities, and surveilling air and water for evidence of bio-terrorism or chemical weapons.
- *Policy development* describes the process of constructing new interventions to improve health, establishing goals and standards for health service delivery and population health, and setting priorities for the distribution of health resources.
- *Assurance* describes the implementation and evaluation of programs and services, the guarantee of quality and safety (as through licensure or inspection), and the education and empowerment of the public (to self-manage health) with the goal of assuring that all health needs are effectively and safely met.

Figure 1

Core Functions of Public Health



Source: Centers for Disease Control and Prevention.

The 10 Essential Public Health Services that were adopted by the Centers for Disease Control and Prevention (CDC) in 1994 describe the public health activities that all communities should undertake.⁷

1. Monitor health status to identify and solve community health problems
2. Diagnose and investigate health problems and health hazards in the community
3. Inform, educate, and empower people about health issues
4. Mobilize community partnerships and action to identify and solve health problems
5. Develop policies and plans that support individual and community health efforts
6. Enforce laws and regulations that protect health and ensure safety
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable
8. Assure competent public and personal health care workforce
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services
10. Research for new insights and innovative solutions to health problems.

The integration of public health with primary care in the health sector is essential for disease and injury prevention and health promotion efforts.

Public Health as a Public Good

Public health, as the name implies, has generally been regarded as a public good—that is to say, a product or service that benefits everyone and is not used up or degraded by usage. Public goods have usually been viewed as best provided by government. Environmental factors like clean air and water benefit entire communities, and one person's benefit from clean air is not diminished by another enjoying that benefit.

Moreover, even if a community member decided(s) he didn't want to pay for clean air, there would be no way to prevent that person from enjoying the benefit of clean air if others paid for it. Similarly, it is difficult to put an individual price on prevention activities that keep diseases from spreading and/or injuries from happening throughout communities. Health care providers typically charge patients for diseases or injuries that are treated, not those that are prevented and never require treatment. Because of this, governments continue to have a central role and responsibility for protecting the public's health.

Despite clear public-sector centrality in public health administration and service delivery, public health spans the public, private, and non-profit sectors. The public health system includes not only state and local health

agencies, but also public, private, and/or non-profit entities involved in health care, public safety, human services, education, arts and culture, recreation, transportation, economic development, philanthropy, and the environment. Public health therefore relies on voluntary support and contributions from a wide range of entities across all sectors.

Just as public-private partnerships have become an important vehicle for infrastructure development, there is also an increasing role for non-governmental actors in promoting and improving public health. In particular, the integration of public health with primary care in the health sector is essential for disease and injury prevention and health promotion efforts. Community-based organizations are also essential partners for addressing the specific health needs of a given community and for ensuring that efforts are continued (or expanded) after an initial health program and/or intervention. An emergent ethos of corporate responsibility seems to be leading the business community to consider ways private industry can improve the well-being of communities, such as enhancing the capacity, impact, and sustainability of public health efforts. Ultimately, healthy employees and healthy customers are necessary for healthy businesses.

Health Equity

Health equity is a guiding priority and core value of public health practitioners.⁸ Health equity refers to attainment of the highest level of health for all people, but this is only an attainable priority if various health inequalities and disparities are addressed.⁹ Differences in health can be observed on the basis of differences in income, education, geography, and race/ethnicity, and may also be observed in relation to disability, veteran status, sexual orientation, gender identity, and a variety of other personal characteristics. The cards that a person are dealt (vis-à-vis their physical and social environment) can lead to a life of compromised health, with exposure to various hazards and traumas worsening a person's health through no fault of their own. Health equity, therefore, prioritizes eliminating these unfair health outcomes and making sure that everyone can have an opportunity to live a healthy life, regardless of where they are born or how much money they make.

Improving health equity is as much about providing equal opportunity as it is about striving for equal outcomes. It is nearly impossible to be healthy without safe homes and neighborhoods, and without access to good schools and employment opportunities. If certain individuals and communities do not have the opportunities to live healthy lives, it will be nearly impossible for them to achieve desirable health outcomes. This is especially important to consider as gaps in health status are large, persistent, and increasing across the U.S.¹⁰ While personal responsibility plays an important role in health, the massive differences in health between different communities suggests that the reasons for health inequities are more complex than differences in individual regard for health.

Improving health equity is as much about providing equal opportunity as it is about striving for equal outcomes.

To pursue health equity in Michigan, policymakers need to recognize that “a person’s zip code has become a stronger determinant of health than their genetic code.”¹¹ Consider that the average life expectancy at birth in several Detroit zip codes is just 70 years. This is 8.5 years fewer than the U.S. average and a full 15 years fewer than the residents of the Northville zip code (48168) on the opposite side of Wayne County where the life expectancy at birth is 85 years.¹² This loss of 15 years of life (on average) between communities in

the same region reflects the differing proportions in each community of various factors that worsen health over time and lead to a shorter life. Illustrating that an even starker degree of inequity that can occur between regions, the differences in

average life expectancy among U.S. counties exceeds 20 years.¹³

Health inequities are not exclusive to Michigan’s largest city and region, but rather affect communities in all parts of the state. While analyzing Michigan’s ostensible urban and rural divide, the Citizens Research Council found that individuals in Michigan’s rural communities experience more disease and disability, shorter life expectancies, and higher proportions of pain and despair than do their urban and suburban counterparts.¹⁴ The reasons for these differences are complex, and are primarily related to factors such as income, education level, availability of jobs, access to transportation, access to health care services, housing quality, and social norms and attitudes (i.e., social determinants of health). These interrelated factors in the social, economic, and physical environments have a tremendous impact on health throughout a person’s life and lead to inequitably impaired health and eventually premature death..¹⁵

The Broad Reach of Public Health

The roots of public health extend into a rich history predating its modern existence as a scientific discipline and area of governmental organization and service. Community interest in public health was evident from some of the first written health codes (that appear in the Biblical book of Leviticus). Early descriptions of what is clean and/or safe to eat are paralleled in modern food labeling and health and safety warnings. The community benefits of public health were evident from early sanitation practices among the Romans and have been continued by the creation of modern agencies tasked with ensuring a healthy environment like the U.S. Environmental Protection Agency (EPA) or the Michigan Department of Environmental Quality (DEQ). The security threats that public health must address became evident with the weaponization of plague-ridden corpses by the Mongols during the siege of Kaffa in 1345. These threats remain plainly evident today and are addressed by modern biological, radiological, and chemical weapon surveillance.¹⁶

Throughout its history of struggles against infectious diseases, environmental toxins, and, more recently, inequitable social structures, public health has grown and evolved into a complex science.

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In Michigan today, this means public health should work to ensure:¹⁷

- Infectious diseases are monitored and contained
- Drinking water is safe
- Air is clean
- Sewage is contained
- Grocers and restaurants provide safe, untainted food
- Sources of foodborne illness are identified and investigated
- Health care emergency response plans are in place for natural and human-made disasters
- Children are vaccinated to protect against diseases
- Screening programs are available to identify possible health risks
- Health care services are accessible for all segments of the population
- The underlying causes of disease and injury (including social factors) are identified and addressed.

These various functions of public health are continuously at work in Michigan, the U.S., and around the globe to promote health and prevent harm.

Infectious Diseases

Infectious diseases are caused by pathogens, such as viruses, bacteria, fungi, or parasitic organisms. Infectious diseases may be spread from human to human or may be transmitted from other animals (then referred to as zoonotic diseases).¹⁸ In addition to spreading naturally, infectious diseases may also be spread through malicious human activity, such as bioterrorism. While years of public health activities have worked to suppress and mitigate infectious diseases, they remain a significant threat to human health that require robust public health systems and emergency planning and preparedness to manage.

The plague of Justinian that afflicted the Byzantine Empire, the Black Death that spread through Eurasia and North Africa during the 14th century, and the smallpox epidemic that ravaged the indigenous population of the Americas in the 17th century, provide examples of how infectious diseases have shaped human history as a constant and looming threat. A quick listing of familiar names—SARS, MERS, Ebola, Zika—provides a reminder that epidemics remain an ever-present threat to human health and safety. Infectious diseases are now emerging in greater numbers and spreading more quickly than at any time in human history.¹⁹ Advances in mobility mean that an epidemic in one part of the world is just a few hours of travel away from threatening other parts of the globe.

Michigan continues to suffer from a large outbreak of Hepatitis A that emerged in July of 2016 and has led to 856 cases, 692 hospitalizations, and 27 deaths.²⁰ The Hepatitis A outbreak offers a local example to observe how public health professionals determine the source of an outbreak, identify high risk individuals, and deploy resources to stop the spread of disease.²¹ Public health officials also work to educate the public about steps to take to protect themselves and what to do if they believe they have been infected.²²

The Hepatitis outbreak in Michigan overlapped with a high severity 2017-18 influenza season that affected many Michiganders.²³ Influenza is an ongoing problem for human health, perhaps epitomized by the 1918 influenza pandemic that caused the death of 675,000

Americans and 50 million people worldwide.²⁴ While recent U.S. flu seasons may not measure up to the 1918 pandemic in scope and magnitude, they have still been responsible for 12,000 – 56,000 seasonal deaths and 140,000 – 710,000 hospitalizations annually since 2010.²⁵ Influenza can lead to additional complications (such as pneumonia) and is among the leading cause of deaths in Michigan.²⁶ Yet, only 44.2 percent of people six months of age and older received a flu shot during the 2016-2017 influenza season.²⁷

Vaccination's benefit is, of course, not limited to influenza; a broad range of vaccines have been and

continue to be developed to protect children, adolescents, and adults from disease. Vaccines are a safe and effective preventative measure to control the spread of infectious diseases and prevent sick-

ness and death. Immunization is a core component of disease prevention, and works together with disease surveillance, screening and testing guidelines to keep people safe from infectious diseases.

Foodborne Illnesses and Food Safety

Safe and nutritious food is vitally important for human health and well-being. Because of the tremendous advances in food safety made over the last 50-100 years, it is often taken for granted that the food we buy from grocers and restaurants can be consumed without harming us. Clear and accurate labeling is also often underappreciated. Despite its daily importance for people, however, food is also an important vehicle for disease, injury, or poisoning that warrants continued special consideration.

The 2016 Michigan outbreak of Hepatitis A discussed above illustrates the importance of infectious disease control to prevent an outbreak from spreading, but it also illustrates the importance of safe practices in food handling and preparation since Hepatitis A is a foodborne/waterborne disease. While the virus can spread through close, personal contact with an infected individual, Hepatitis A is usually spread by ingestion of the virus through food/beverages/objects that are contaminated by small, undetectable amounts of feces from someone who is infected.²⁸

Infectious diseases are now emerging in greater numbers and spreading more quickly than at any time in human history.

Older residents of the state might recall the horror caused in the 1970s when millions were exposed to polybrominated biphenyl (PBB) through contaminated meat, dairy, and eggs. Numerous recent occurrences of other diseases have been linked to contaminated food as well. A 2018 multistate outbreak of *E. coli* that was traced back to contaminated romaine lettuce caused 210 reported infections (including five in Michigan) and 96 hospitalizations, leading to five deaths and 27 cases of hemolytic uremic syndrome (a type of kidney failure).²⁹ Overlapping with this *E. coli* outbreak, a multistate outbreak of *Salmonella* Adelaide linked to pre-cut melon has led to 70 cases as of June 19, 2018, (including 38 in Michigan) and 34 hospitalizations.³⁰ A 2018 outbreak of *Salmonella* Mbandaka that led to 73 illnesses and 24 hospitalizations led to a recall of Honey Smacks cereal from Michigan's own Kellogg Company.³¹

Detection, control, and, more importantly, prevention of these kinds of outbreaks require a robust, adequately funded public health system.

Environmental Hazards

Like safe foods, safe environments are something that people tend to take for granted. The Flint water emergency that began in 2014 served to bring the ongoing problems of environmental contamination and (and, in particular, lead exposure) back into state and national conversations; however, Michigan already had some of the worst rates of lead exposure in the nation prior to the 2014 emergency in Flint.³² Moreover, the primary source of lead exposure in children continues to be lead-based paint from pre-1978 housing (not water).³³

Lead is not the only environmental contaminant to threaten the health of the people of Michigan. Toxins abound in Michigan's air and water. A contamination of 1,4-dioxane was discovered in residential drinking wells in Washtenaw County in 1985; the chemical does not break down quickly, and a large plume remains in soil and water surrounding Ann Arbor and Scio Township.³⁴ Cyanotoxins from harmful algal blooms have threatened water safety throughout Michigan and the Great Lakes.³⁵ Sixty-five hazardous waste sites in

Michigan appear on the National Priorities List (and an additional two have been proposed).³⁶

Per- and polyfluoroalkyl substances (PFAS) provide a timely example of a contemporary environmental threat. PFAS are a group of industrially manufactured and utilized chemicals that are persistent in the environment and human body. They are found in a wide range of consumer products, as well as food and drinking water, and evidence suggests that exposure to them harms human health.³⁷ While the effects of this range of chemicals is still being studied, research suggests that exposure may affect infant development, lead to

hormonal changes, increase cholesterol levels, and affect the body's immune system.³⁸ Certain PFAS may also increase the risk of cancer.³⁹ As of May 2, 2018, there are 31 known contamination sites across throughout Michigan.⁴⁰

Detection, control, and, more importantly, prevention of foodborne illnesses require a robust, adequately funded public health system.

What do these and other environmental issues mean for health? Nearly a quarter of all deaths globally are attributable to preventable environmental factors.⁴¹ The Lancet Commission on pollution and health found that diseases caused by pollution are responsible for three times as many deaths globally as AIDS, tuberculosis, and Malaria combined.⁴² Moreover, pollution related diseases also cause productivity losses and increased health care spending leading to \$4.6 trillion in annual losses (6.2 percent of the global economy).⁴³ Environmental factors tend to have the greatest impact on those who already have the greatest health risks and who often have the fewest resources to respond, adapt, or cope.

The health impact of pollution is often farther reaching than many realize. While respiratory illnesses are commonly associated with air pollution, polluted air can also lead to cancer, heart disease, and kidney disease. Additionally, a recently published longitudinal cohort study in *The Lancet* that was funded by the U.S. Department of Veterans Affairs found that PM_{2.5}^a exposure was significantly associated with increased risk of diabetes.⁴⁴

a PM_{2.5} refers to small atmospheric particulate matter that have a diameter less than or equal to 2.5 micrometers.

Chronic Disease Burden and the Cost of Health Care

In 2016, total United States health expenditures amounted to \$3.3 trillion (17.9 percent of GDP).⁴⁵ Around 75 percent of this health care spending is on people with chronic diseases such as heart disease, diabetes, hypertension, and other conditions that may be avoidable through public health interventions.⁴⁶ Although chronic diseases are among the most common and most costly maladies, they are also the most preventable.⁴⁷ Evidence suggests that communities with greater investment in public health have fewer deaths from preventable causes like heart disease and diabetes, as well as lower rates of infant mortality.⁴⁸

Despite the focus that public health places on prevention, less than three percent of total U.S. health expenditures are directed at public health measures to prevent diseases before they occur and need to be treated.⁴⁹ Health spending has grown at a rate far in excess of GDP since the 1960s, and yet spending on public health and prevention have not enjoyed this same kind of growth. According to a study published in the American Journal of Public Health, the share of total health expenditures devoted to public health was 2.65 percent in 2014 (about double the figure from 1960); however, the proportion of health expenditures for public health is projected to fall to 2.40 percent in 2023.⁵⁰ Some have characterized this as a funding crisis for public health and safety.⁵¹

The Social Determinants of Health

Public health seeks to identify the underlying causes of poor health, and it has long been recognized that social factors are substantial contributors to the health of individuals and communities. When it comes to the factors contributing to premature mortality, genetics account for around 30 percent, medical care accounts for 10 percent, and the remaining 60 percent is attributable to social circumstances, environment, and related behaviors.⁵² Of course, it is difficult to separate these

factors from one another. For instance, diseases often develop due to the combination of genetic and social/environmental and/or behavioral factors. Access to medical care is often related to an individual's social circumstances, as are an individual's environment and behaviors. The social circumstances and factors that impact health throughout a person's life are generally referred to as the social determinants of health.

Evidence suggests that communities with greater investment in public health have fewer deaths from preventable causes like heart disease and diabetes, as well as lower rates of infant mortality

According to the U.S. Office of Disease Prevention and Health Promotion, social determinants of health are conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.⁵³

Examples of social determinants of health include:

- Economic conditions (poverty and the stress that accompanies poverty)
- Quality of education and job training
- Availability of social support and community resources (family, church, public spaces)
- Social norms (discrimination, racism, attitudes on education, distrust of government)
- Public safety/exposure to violence/crime
- Language/literacy
- Culture

The social determinants of health are at the core of why Michigan is less healthy than other states, why preventable chronic diseases are so prevalent, and why consumption of expensive health care resources is so high. Because these determinants vary between individuals and communities based on factors like socioeconomic status, geography, race/ethnicity, disability, veteran status, sexual orientation, and gender identity, the social determinants of health are also related to many of the health disparities and inequities discussed in this report.

History of Public Health in Michigan

The creation of Michigan's State Board of Health in 1873 might be viewed as the beginning of Michigan's formal commitment to public health.⁵⁴ Michigan's was the fifth such agency in the U.S. (Massachusetts established the first state health department in 1869).⁵⁵ As understandings of germ theory and sanitation expanded, Michigan passed laws to create a bacterial laboratory and give the State Board of Health jurisdiction over water supply in the first decade of the 20th century. In 1923, Dr. John H. Kellogg (who had become a member of the State Board of Health in 1878) bemoaned that there was almost no inspection of important food supplies even though food should be just as free from bacteria as the water supply, stating that "any farmer can kill any old thing in the dirtiest possible place, and make it up into sausages or hamburger steak and sell it for food."

In 1917, the formation of health districts composed of townships and villages was authorized. A decade later in 1927, counties were granted the authority to establish local health departments to address the growing need for health services. Local health departments became important agents for protecting and enhancing public health in communities across Michigan. By 1961, 69 of Michigan's 83 counties were served by local health departments, and by 1966, all counties were served by full time health departments.⁵⁶

At the same time, the state department of health continued to grow, and in 1949 it contained seven major divisions:

- Local Health Administration
- Laboratories
- Administrative Services
- Disease Control
- Records, and Statistics
- Engineering
- Industrial Health
- Tuberculosis and Venereal Disease Control

In 1964, the Department was designated as Michigan's air pollution control agency, and in 1965, the department was renamed the Department of Public Health and incorporated most of the functions of the former State Health Commissioner, Crippled Children Commission, Board of Alcoholism, and Veterans' Facility. During the same year, the department assumed authority to license solid waste disposal sites, initiated the Ground Water Quality Control Program, and conducted 24 hour/day air sampling to monitor radiation.⁵⁷

The Public Health Code maintained the autonomy of existing local health departments while also creating the framework for a more robust, professionalized state-level public health department.

Since 1978, public health in Michigan has been underpinned by the Public Health Code—Public Act 368 of 1978—that defines various roles and responsibilities

in the public health system.⁵⁸ When it was adopted, the Public Health Code maintained the autonomy of existing local health departments while also creating the framework for a more robust, professionalized state-level public health department. The Department of Public Health included five agencies:⁵⁹

- Public Health
- Food Safety
- Health Facilities Licensing
- Occupational Safety and Health Regulation
- Division of Water Supply

Other health-related functions were performed by the Department of Mental Health and the Department of Social Services (that housed the Medicaid program that had been enacted in 1966).

In 1996, as part of a major state government reorganization by executive orders, the Department of Public Health was broken apart and combined with other departments and agencies. The Department of Public Health, the Medical Services Administration (formerly in the Department of Social Services), and the Department of Mental Health were put together to form the Michigan Department of Community Health (DCH).^{60 61} DCH took responsibility for Medicaid, public

Public Health Advisory Commission

Recognizing emerging public health challenges, as well as the growing role of public health in securing the social, economic, and physical well-being of Michigan residents, Governor Rick Snyder established a Public Health Advisory Commission through Executive Order 2016-19.ⁱ The purpose of the Commission was to assess the public health delivery system by examining the organization of public health functions between various state departments, as well as the division of responsibilities between state and local health authorities. The Commission also considered the regulatory framework established by Michigan's Public Health Code.

While the Commission failed to reach consensus on an optimized public health delivery system for the state, it offered several consensus recommendations to improve public health. These recommendations included a review of funding for public health and increased consideration of public health impacts in all state policy making activities. The Commission also highlighted the importance of a permanent Public Health Advisory Council as a resource to the executive branch and other public health stakeholders, and as a forum to address emerging state and local public health threats and issues.ⁱⁱ

The 20-member Public Health Advisory Council, established through Executive Order 2017-10, is chaired by the state's Chief Medical Executive.ⁱⁱⁱ The Council is made up of 19 other voting members who are specified representatives from various public health stakeholder groups appointed by the governor. The council is to include:

- an epidemiologist
- a toxicologist
- a food safety expert
- an environmental health expert
- a local public health official
- a local director of public works
- a representative of a non-profit health or environmental organization
- a representative from a school of public health
- a hospital administrator
- a physician
- a registered nurse
- a veterinarian
- and a representative of a nationally-accredited medical school.

The Council also includes non-voting positions for the directors of the five executive departments that have public health responsibilities:

- the Department of Agriculture and Rural Development
- the Department of Environmental Quality
- the Department of Health and Human Services
- the Department of Licensing and Regulatory Affairs, and
- the Department of State Police.

i Michigan Executive Order 2016-19, www.michigan.gov/documents/snyder/EO_2016-19_535206_7.pdf

ii Michigan Public Health Advisory Commission. (2017) Final Report. www.michigan.gov/documents/snyder/PHAC_Final_Report_556718_7.pdf

iii Michigan Executive Order 2017-10, www.michigan.gov/documents/snyder/EO_2017-10_606473_7.pdf

health, mental health, drug control policy, services for the aging, and crime victim services.

At the same time, many public health functions were spread out among other departments, continuing a historic trend of fragmenting public health across state (and local) governments. Departments taking on additional public health functions included the Department of Environmental Quality (absorbing the Division of Water Supply), Department of Agriculture (absorbing Food Safety functions), and the Department of Commerce (taking on Health Facilities Licensing and Occupational Safety and Health Regulation).⁶²

This reorganization might be seen as an improvement in efficiency on the one hand (by consolidating food safety with other food-related functions in the Department of Agriculture or water safety with other environmental functions in the MDEQ). Alternatively, it might be argued that the diffusion of public health functions has marginalized public health, eliminating the central role public health plays in securing the health and well-being of all residents.

Through another executive order in 2015, the Department of Community Health was merged with the Department of Human Services to create the Michigan Department of Health and Human Services (MDHHS).⁶³ By merging the responsibility for social services and child/adult care facilities of the Department of Human Services with the various responsibilities of the Department of Community Health, this reorganization made MDHHS the largest of Michigan's executive departments.

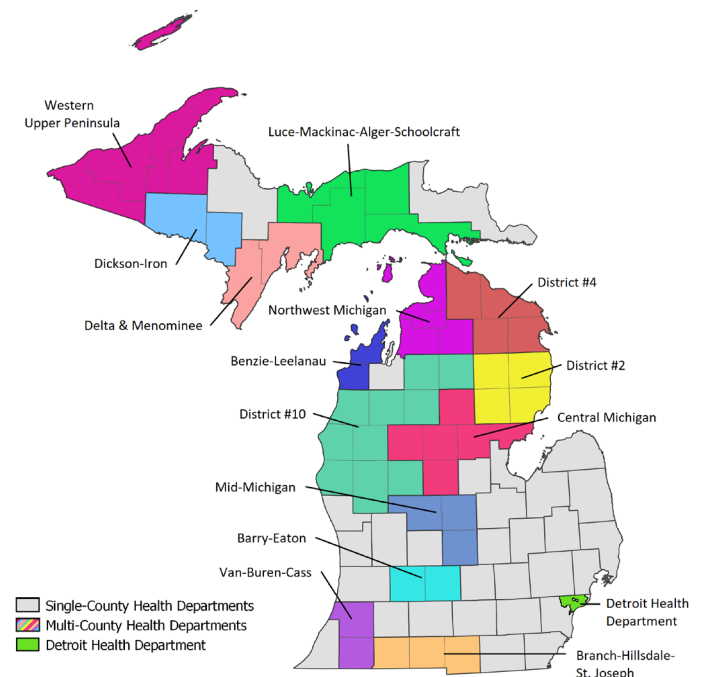
This latest reorganization might be seen as an efficient way to bring all of Michigan's health care and public assistance programs for low-income, disabled, or otherwise vulnerable individuals under the same administrative authority. The reorganization also highlights the substantial link between social and health services, possibly enabling the new department to better address the social determinants of health by bringing programs to address behavioral, psychosocial, and pathophysiological factors together within the same administrative structure. However, the reorganization buried public health within the largest state bureaucratic consolidation—a department with many disparate responsibilities—and may have served

to further marginalize public health. It is unlikely that a public health agency whose functions have been stripped away and given to other departments, and whose funding and staffing are a small fraction of the department in which it is situated, can exercise optimal authority to protect and improve the public's health.

The fragmentation of public health at the state-level in Michigan is further complicated in the context of a system of autonomous local health departments. Section 24 of the Public Health Code outlines powers and responsibilities of local health departments, in many cases making local health departments the primary entities responsible for the organization, coordination, and delivery of public health services within their respective jurisdictions. Local health departments work in tandem with the Department of Health and Human Services, Department of Agriculture and Rural Development, and Department of Environmental Quality to provide essential public health services in all parts of the state.

Michigan's 83 counties are served by 45 local health departments, 30 of which serve a single county while 14 serve multiple counties (see **Map 1**). Detroit, as the state's largest city, operates its own department.

Map 1
Michigan's Local Health Departments



Public Health Investment in Michigan

The Difficulty of Assessing Public Health Funding

It is necessary to have a clear and consistent definition of what constitutes public health to determine how much funding is allocated to all combined public health programs and services. Because international, national, state, and local entities often package differing combinations of services within a general ‘public health’ basket, it is also exceptionally difficult to interpret given estimates and make comparisons between governmental jurisdictions and across levels of government.⁶⁴

At the state level in Michigan (and many other jurisdictions), public health funding exists in multiple budget areas for the various departments and divisions that perform public health functions. As a result, there is no single “public health” budget area in Michigan.

Numerous appropriation units across several departmental budgets must be analyzed to begin to quantify how Michigan funds its public health delivery system. Even then, because of the fragmented responsibility for public health, it is impossible to determine what proportion

of some line items are expended for public health functions; control of zoonotic (animal-borne) diseases is important for the public’s health, but performance of this function within a department of agriculture might also be implemented in ways that maximize service to industrialized animal-based agriculture. Revenue flowing into the state budget to support public health-related spending includes federal funds, state general fund revenue, local revenue captured by the state, fee-generated revenue, and private revenue. Local health department budgets likewise utilize federal, state, local, and private revenue sources.

Imprecise definition, inconsistent line items across years and appropriation units, and an overall fragmented delivery system each muddle attempts to assess funding for public health. Combined, these factors make it a challenge to assemble a comprehensive picture of public investment. This complexity contributes to a lack of public transparency surrounding public health spending, and perhaps also a lack of clear focus for

legislative bodies charged with prioritizing, overseeing, and monitoring state and local spending on public health (and other government functions). This lack of transparency can render oblique the lines of accountability, obscuring which department or division within the state has ultimate authority over and responsibility for a given service or government function.

Michigan’s Public Health Expenditures

Many departments and agencies perform activities and services that fall under the general definition of public health. Given the central role performed by the Michigan Department of Health and Human Services (containing the Population Health Administration), this analysis turns its focus to disease prevention and population health funding within the MDHHS.

Imprecise definition, inconsistent line items across years, and an overall fragmented delivery system each muddle attempts to assess funding for public health.

The MDHHS budget accounts for around 45 percent of the state’s nearly \$56 billion budget, drawing in substantial federal funding for various public assistance and health programs, such as Medicaid and the Special Supplemental Nutrition

Program for Women, Infants, and Children (WIC). Similarly, this budget equals around 43 percent of the \$10 billion general fund/general purpose (GF/GP) budget (the budget for state dollars not already designated and reserved for a specific purpose). While MDHHS has the largest budget of any state department, public health appropriations within this budget account for less than one percent of the total state budget and less than one percent of the GF/GP budget.⁶⁵

In the six MDHHS budget areas that might be considered primarily public health – Health Policy, Laboratory Services, Epidemiology/Disease Control and Prevention, Local Health, Family/Maternal/Child Health, and Emergency Medical Services/Bioterrorism Preparedness – FY2017 spending totaled around \$314 million.^b Of this amount, more than half (\$177 million) came from federal sources while less than a quarter (\$73

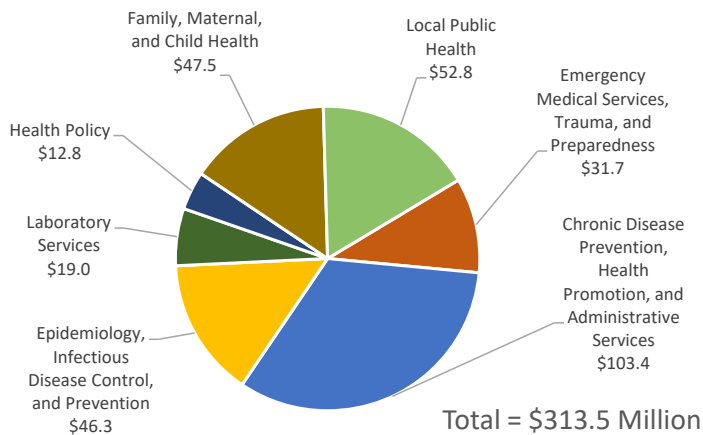
^b This total excludes the federal Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

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million) came from state GF/GP appropriations (mostly for Local Public Health), with the remaining funds coming from private revenue, fees, local revenue, and restricted funding sources (see **Chart 2**).

Chart 2

State Expenditures for Public Health, FY2017
(dollars in millions)



Source: Michigan State Budget Office

Within the funding for Local Public Health, about \$41 million was designated for locally-administered Essential Public Health Services, approximately the same amount allocated in FY2003. While funding for this budget area has ebbed and flowed, it remained basically flat over the 15-year period (see **Chart 3**). After adjusting for inflation using the average Consumer Price Index (CPI) for each state fiscal year, the amount of funding has declined from \$40.8 million in FY2003 to \$32.9 million in FY2017. Holding 2003 dollars constant, this indicates an approximate 20 percent state-level disinvestment in funding for the Essential Public Health Services delivered by Local Health Departments.

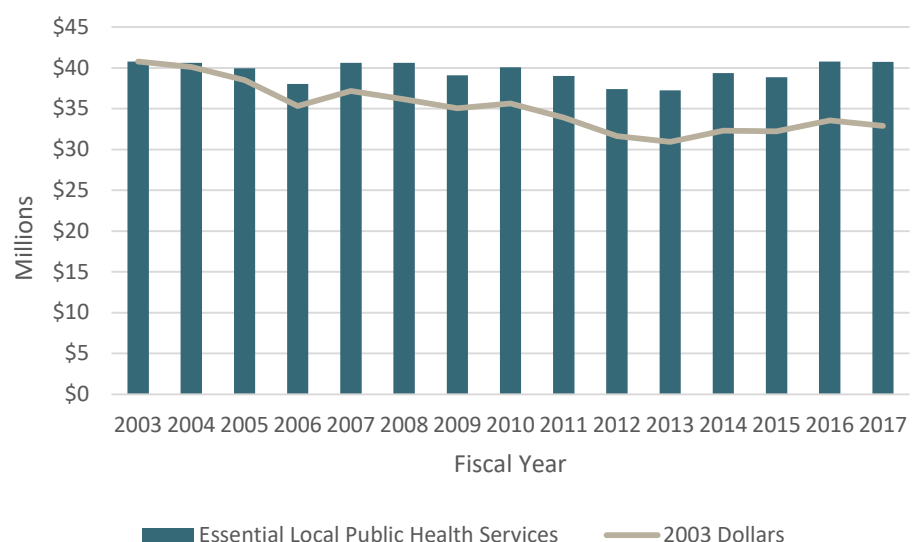
This report does not examine the totality of funding for local health departments. Local health departments also receive funding from local units of government, fees, grants, and private sources that do not pass through the

state budget. Section 2475 of the Public Health Code specifies that the state department will reimburse local entities for 50 percent of the costs for providing required and allowable health services.⁶⁶ State reimbursement is prohibited for direct capital expenditures for facilities, expenditures used to match other state funds, services specifically excluded by state rules, federal and state categorical health program funds, as well as any otherwise reimbursable required and allowable health services that are reimbursed from another source (e.g., fees or federal funding).

Total public health expenditures have also shown marginal growth in recent years (see **Chart 4**, see page 16). This growth is isolated in three areas, Infectious Disease Control (a 21.7 percent increase), Local Public Health (a 15.7 percent increase), and Family, Maternal, and Child Health (a 25.7 percent increase). Conversely, there has been little new investment in chronic disease prevention, preparedness for emergencies, state public health laboratory services, or statewide health policy initiatives and functions (e.g., health innovation grants or human trafficking intervention services). There has also been a more than 20 percent reduction in funding for vital records and health statistics since FY2008, even though health data are essential for public health research and evaluation.

Chart 3

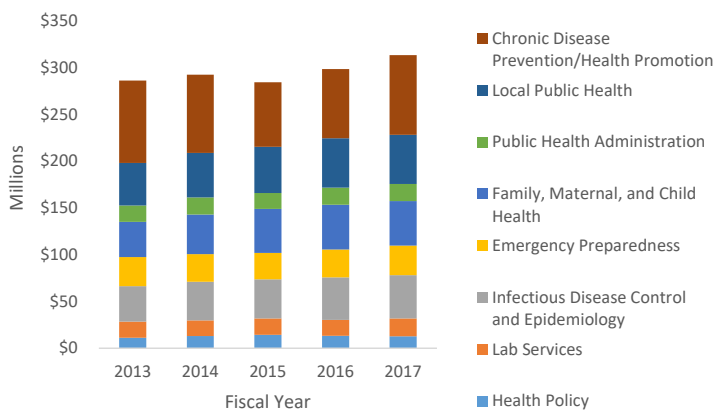
Essential Local Public Health Services Expenditures, FY2003 - FY2017



Source: Michigan State Budget Office

Chart 4

State Public Health Expenditures by Area, FY2013-2017



Source: Michigan State Budget Office

The small amount of growth seen in **Chart 4** recently, however, comes after 15 years of relatively flat total funding (see **Chart 5**). In fact, nominal FY2017 public health expenditures exceeded those in FY2004 by fewer than \$10 million (representing just a three percent increase across the 13-year period). This slow rate of growth is inadequate to meet the increasing cost and demand for services. Adjusted for inflation using the average CPI for each state fiscal year, FY2017 expenditures are \$20 million below expenditures in FY2003. During the 15-year period, public health expenditures

have dropped by 16 percent from the inflation-adjusted high point of \$300 million in FY2004.

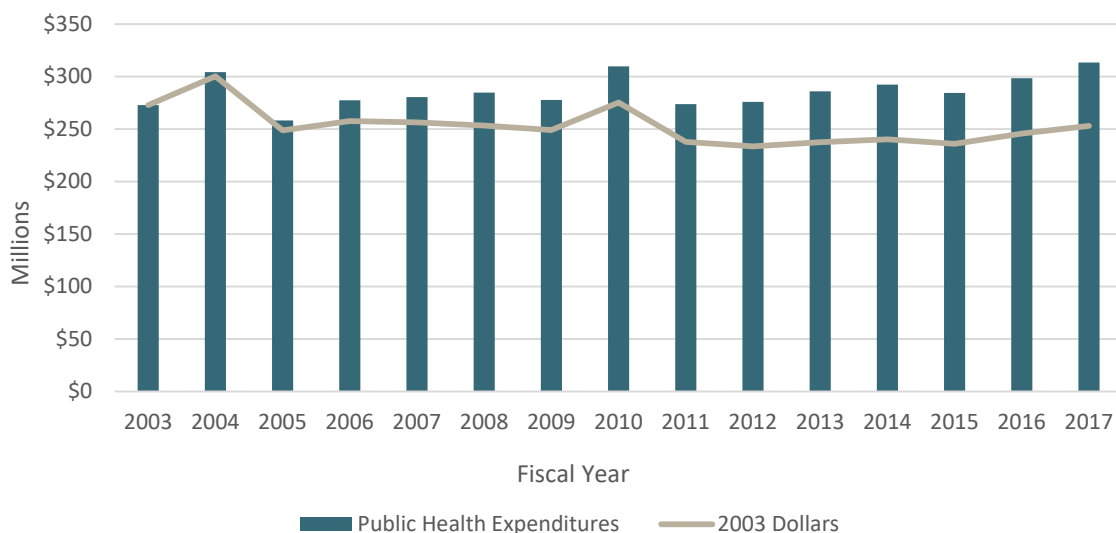
Public Health Investment in Michigan Compared to Other States

Because of differences in the types of services each state calls “public health” and differences in service delivery models, comparison between states is difficult and admittedly imprecise. To make comparisons across state lines, Trust for America’s Health has used a broad definition of “public health” to include all state health funding (with the exception of health insurance coverage programs for low income residents like Medicaid and CHIP). Additionally, the criteria exclude federal funds from state totals, and eliminate predominately federally funded programs like WIC.⁶⁷ The remaining result offers a measure of state investment in population health absent federal support and programs.

Using these criteria, Michigan ranked 37th in state public health funding per capita during FY2012 (\$17.41 per capita). In each subsequent fiscal year, Michigan has remained among the states investing the least amount in public health and one of the states drawing the fewest per-capita federal dollars to support public health funding.⁶⁸ Trust for America’s Health found that Michigan’s FY2017 state public health investment totaled \$128.3 million (just \$12.92 per capita).⁶⁹ **Chart**

Chart 5

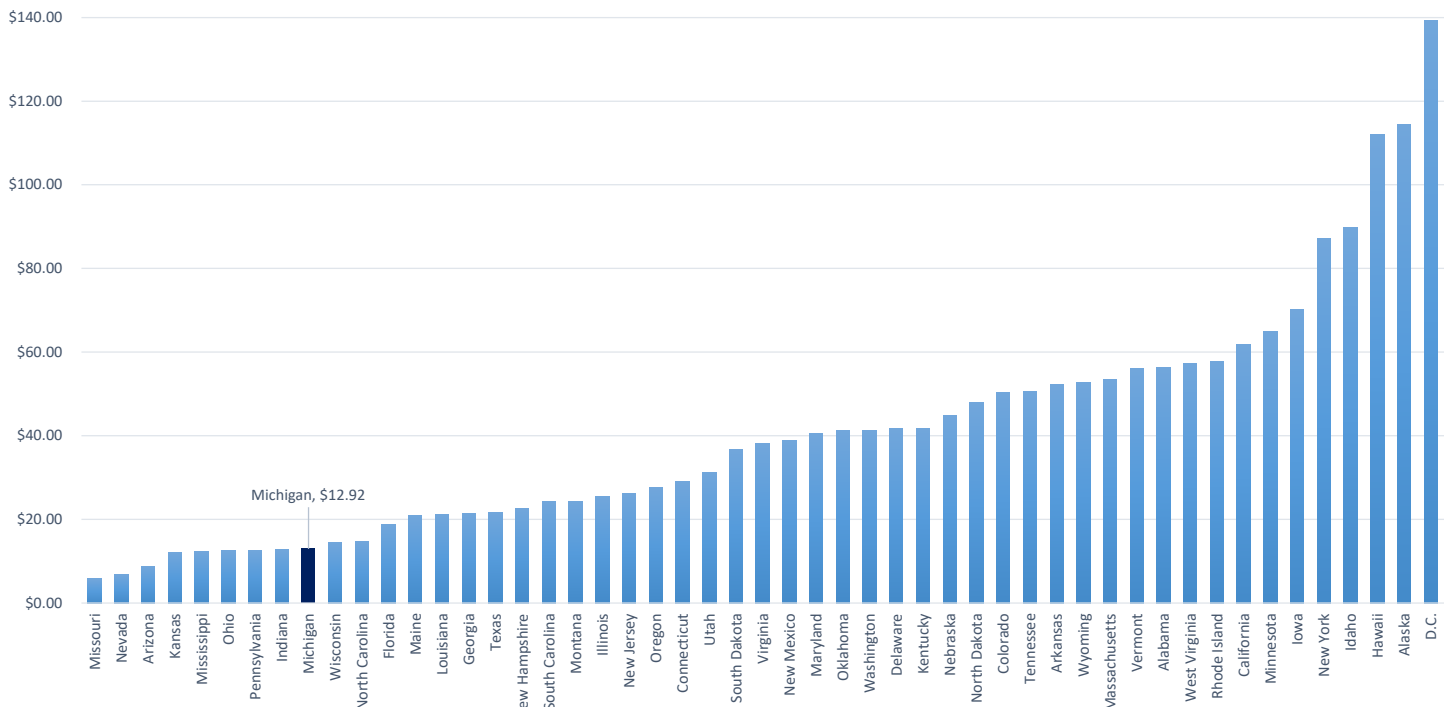
Total Public Health Expenditures, FY2003-2017



Source: Michigan State Budget Office

Chart 6

Per-Capita State Funding for Public Health, FY2017



Data Source: Trust for America's Health

6 displays per-capita funding for all 50 states plus Washington, D.C.

Reliance on Federal Funding for Public Health

A study published in the American Journal of Public Health determined that national public health expenditures fell by 17 percent between 2002 and 2014.⁷⁰ Moreover, federal funding for the Centers for Disease Control and Prevention (CDC) declined by 10 percent from FY2005 to FY2016 before adjusting for inflation (from a high point of \$7.07 billion down to \$6.34 billion).⁷¹ Around 75 percent of CDC funds are distributed to state and local governments for the prevention of illness and harm, such as from infectious disease, substance use, and obesity.⁷²

Michigan's FY2016 state funding per capita from the CDC was \$18.80. Compared to a national average of \$21.31 per capita, Michigan ranked 43rd in state CDC funding.⁷³ Despite this low ranking, Michigan is highly reliant on federal public health funding from the CDC

and other sources (given the low level of state investment highlighted in the previous section). This reliance on federal funding affects Michigan in two key ways.

First, because about one-half of Michigan's public health funds during FY2017 came from federal sources (whereas only a quarter came from the state's general fund), the state is highly sensitive to changes in federal funding. A period of reduced federal funding for public health has coincided with stagnant state public health budgets. Any additional decreases in federal funding will have substantial consequences for public health service delivery in Michigan.

Second, the combined low levels of funding from both federal and state sources have left Michigan in a state of public health subsistence. Michigan has managed to do what is necessary to generally protect the public's health, but this minimal funding leaves the state potentially unprepared for future crises. Moreover, without additional funding, the state will be far less able to address mounting public health concerns in Michigan.

Public Health Funding in Other Departments

While many public health functions remain the responsibility of the state health department (MDHHS), other state departments play important roles in regulating and delivering public health services.

Michigan Department of Agriculture and Rural Development

Funding for the Michigan Department of Agriculture and Rural Development (MDARD) supports numerous crucial public health functions. The Department protects the public from food-borne illness, as well as fraud, deception, and adulteration in the sale of food products. The Department also inspects sites involved in the production, processing, distribution, and sale of food, and oversees local public health restaurant and food safety inspections (under the Public Health Code). Additionally, the department is charged with animal disease surveillance and testing, the regulation and management of pesticides, and environmental stewardship activities.⁷⁴

To assess what proportion of the appropriations in the MDARD budget might be considered designated for “public health,” the Citizens Research Council first examined total appropriations to the department by appropriations unit. The Fairs and Exhibitions and the Agriculture Development appropriations units were then excluded. While all remaining appropriations units represent important public health functions, it is difficult to parse further (even at the line item level) the proportion of funding that might be considered public health versus those dollars used primarily in support of Agricultural Industries. Because MDARD’s funding is holistically integral to public health, these remaining areas are included with the understanding that this might partially overstate the actual amount of funding Michigan is investing in public health.

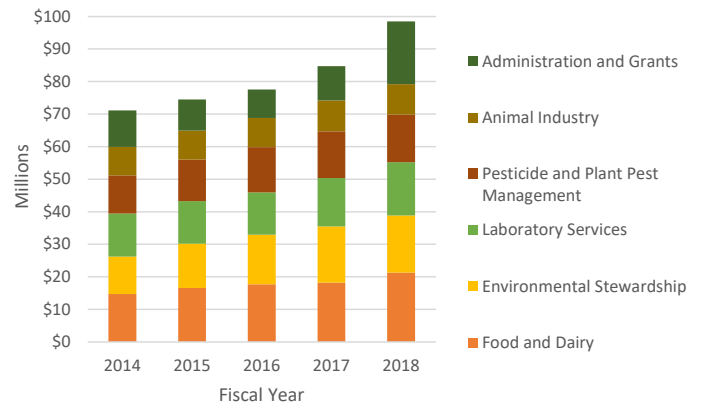
Appropriations for MDARD’s units and divisions performing public health activities have increased steadily over the last five years (see **Chart 7**). The majority (58 percent) of the FY2018 MDARD budget came from general fund appropriations; just 10 percent of the budget came from federal funding.⁷⁵

Michigan Department of Environmental Quality

The Department of Environmental Quality has been responsible for regulatory programs since the department was created in 1995; today, that includes

Chart 7

Appropriations for Public Health Functions in the Michigan Department of Agriculture and Rural Development, FY2014-2018



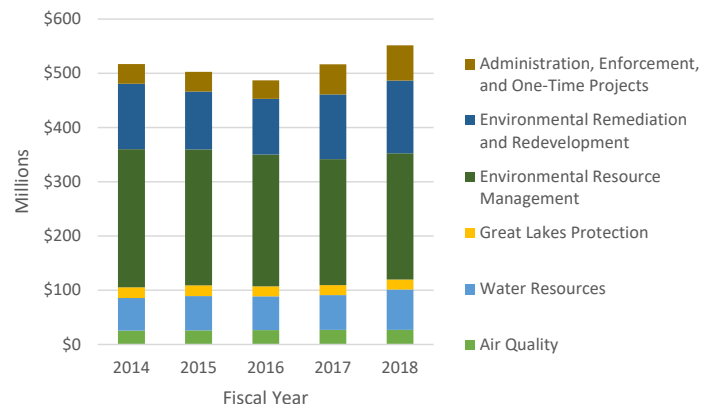
Source: House Fiscal Agency

management of air quality, water quality, underground storage tank, and waste, as well as pollution prevention, environmental investigations/cleanups, and Great Lakes stewardship.⁷⁶ Because of the central role of the environment in determining both length and quality of life, the entirety of funding for the DEQ is considered central to public health.

An overview of this funding may be observed in **Chart 8**, including the five most recent years’ appropriations. More than half of the DEQ budget is comprised of state restricted revenue (coming from 53 different funds); almost one third of the budget is made up of federal fund-

Chart 8

Appropriations for the Michigan Department of Environmental Quality, FY2014-2018



Source: House Fiscal Agency

ing, and just 11 percent comes from the state general fund.⁷⁷ A bump in one-time funding may be observed beginning in FY2017; this is largely due to the Flint water emergency. The FY2017 budget includes \$7.2 million for Flint, as well as other one-time appropriations for drinking water safety and waterway cleanup.

Other Departments

Other state departments also have public health responsibilities, most notably the Department of Licensing and Regulatory Affairs (LARA) and the State Police. LARA has responsibility for health professional and facility licensure, regulation of environmental health threats, and the Michigan Occupational Safety and Health Administration. State Police perform a critical role in hazardous material and disaster response, as well as emergency management and planning. State Police functions geared towards preventing injury and harm (such as highway safety planning and sexual assault prevention) might also be considered public health.

Public Health Funding Across State Agencies

Assembling line item appropriations across departments helps to provide a more complete picture of public health funding flowing through the state budget in Michigan (see **Chart 9**). To accomplish this view, we combined public health-related line item appropriations found

within budgets for a number of state departments. Taken together, these funds represent a total state investment of nearly \$1.4 billion. This suggests that just 2.5 percent of Michigan's \$55.8 billion state budget is dedicated to protecting the health and well-being of Michigan residents through safe foods, roads, workplaces, natural environments, promotion of wellness and prevention of diseases, and assurance of well-trained, high-quality health professionals and facilities.

Social/Political Investment in Promoting Public Health

Protecting (and improving) the health of the public requires collaboration across governments and sectors. The effectiveness of such collaboration is predicated upon belief in the value of public health. Michigan will be unable to improve public health unless leaders in government (and in the private sector) make public health a priority. Those leaders, in turn, may not make public health a priority until members of the public demand it.

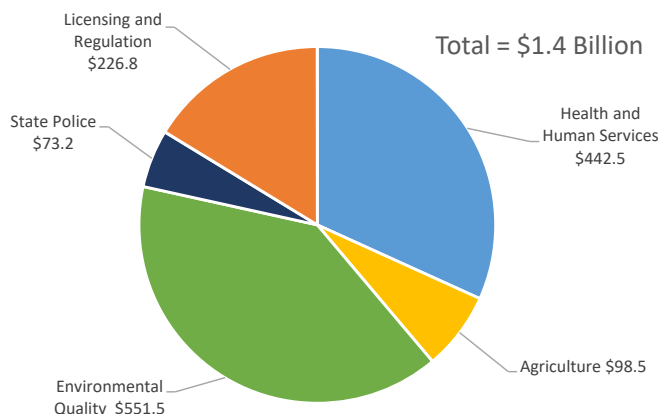
One way to accomplish this broad integration of public health across various sectors is through a "Health in All Policies" approach to policymaking. Health in All Policies—a collaborative approach to public health advanced by the American Public Health Association and the Public Health Institute—provides guidance for reducing health disparities and inequities and addressing the diverse and complex factors that affect health of individuals and communities, such as educational attainment, employment, housing, transportation, and public safety.⁷⁸ By integrating a public health perspective into the formulation and implementation of other policy areas, policymakers can mitigate harm from unintended consequences of policy decisions and can work to maximize individual and community well-being.

Health in All Policies can only be realized by forging strategic partnerships across the public (and private) sector, and by increasing public understanding of the importance of public health. The Public Health 3.0 model proposes that public health leaders should embrace the role of a "Chief Health Strategist" to bring together relevant partners and collaborators and work to explicitly address "upstream" factors that determine health.

Protecting (and improving) the health of the public requires collaboration across governments and sectors.

Chart 9

Public Health Appropriations in Michigan, FY2018
(dollars in millions)



Source: CRC Analysis of State Line Item Appropriations

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This model also suggests enhancing the accreditation process in public health and incorporating the training necessary for a future public health workforce that can build robust, well-structured partnerships.

While Michigan has a comprehensive public health code, a well-trained public health workforce, and nationally accredited university programs to train the next generation of public health professionals, it will be impossible to improve the future health of the public absent the public's support, consent, and buy-in. Public health 3.0

is hardly a panacea for all Michigan's problems, but the shift to a network-based, strategic public health delivery model to address the key factors that lead to poor health across the state could have a large and positive impact.

This paradigmatic shift in public health cannot be accomplished without improved state funding for public health, public health reorganization that empowers strong public health leadership at the state level (and in local communities), and greater understanding and support from the general public.

Public Health 3.0

Public Health 3.0 is a call to action from the U.S. Department of Health and Human Services.ⁱ The terms Public Health 1.0, 2.0, and 3.0 were created as ways to characterize the ongoing evolution of public health. These terms of art, coined by former U.S. Assistant Secretary for Health Dr. Karen DeSalvo, highlight three very different historically-situated conceptualizations of public health.

Public Health 1.0 began in the late 19th century. This was the period when public health became an essential function of government. Public health pursued systematic sanitation, improved food and water safety, expanded understanding of disease, developed disease prevention tools (like vaccines), and expanded epidemiology and laboratory science capabilities.ⁱⁱ With the benefit of scientific progress—from germ theory to public administration and scientific management—entire populations began to enjoy public health protection.

Public Health 2.0 began in the late 20th century, a period during which public health departments became increasingly professionalized. The Institute of Medicine's seminal 1988 report *The Future of Public Health* that established the three core functions of public health was also highly influential in shaping Public Health 2.0. The report asserted that “the nation has lost sight of its public health goals and has allowed the system of public health to fall into ‘disarray,’” and that public health was not prepared to address new epidemics like HIV/AIDS or the rising burden of chronic diseases.ⁱⁱⁱ Public Health 2.0, therefore, was characterized by the move to define core public health functions, essential public health services, and performance standards for public health agencies at every level.^{iv}

Public Health 3.0 proposes a newly broadened and enhanced public health practice characterized by cross-sectoral collaboration and a “Chief Health Strategist” role. It aims to overcome health inequities and disparities. Public Health 3.0 challenges public and private leaders to incorporate a “health in all policies” approach to leadership and governance across the public and private sectors.

This call to action recommends a remodeled approach to public health by expanding community partnerships, enhancing and repurposing funding, clarifying metrics to measure public health successes, enhancing public health accreditation, and creating a strategic approach to public health from the community level up.^v

i United States Department of Health and Human Services. (2016) Public Health 3.0: a call to action to create a 21st century public health infrastructure. www.healthypeople.gov/sites/default/files/Public-Health-3.0-White-Paper.pdf

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The Ongoing Need for Public Health

Public health keeps communities safe from diseases, disasters, and unsafe environments. Strong public health investment (financially, culturally, and politically) also enables people to live healthier, more productive lives. Not surprisingly, there is also a corresponding cost to disinvestment in public health and dismissal of its core principals.

Health Indicators in Michigan

Communities throughout Michigan face serious, ongoing health challenges. While the U.S. tends to rank poorly compared to other peer nations in many measures of health, Michigan often fares even worse than the rest of the country. Measuring various indicators of population health can paint a clearer picture of the health status and needs of Michigan's population.

In 2016, Michigan had the 8th highest rate of deaths due to heart disease and the 15th highest rate of cancer deaths in the U.S. Michigan also exceeded the national average that year for the rates of death from chronic lower respiratory disease, accidental deaths, Alzheimer's disease, diabetes, kidney disease, and influenza/pneumonia.⁷⁹ The state likewise exceeded national averages for total firearm deaths, drug overdoses, and homicides.

Obesity is a condition associated with numerous chronic diseases that impair individual and community health, increase health care spending, and play a factor in many of the leading causes of preventable death.⁸⁰ In 2016, 32.5 percent of Michigan adults were obese; only nine states had higher proportions of obesity.⁸¹ Obesity is strongly associated with social factors (like poverty, social norms, and the availability of healthy food). Obesity is also strongly associated with depression, another growing public health concern.⁸² The relationship between these conditions is reciprocal, whereby each increases the likelihood of developing the other.

Tobacco use—the leading cause of preventable disease and death in the U.S.—continues to be a problem in Michigan. As of 2017, 20.4 percent of adults in

Michigan smoke tobacco^c, a proportion in excess of the national average of 17.4 percent that gives Michigan a rank of 40th nationally.⁸³ Like obesity, tobacco use is related to various social factors.

When tobacco use is stratified by level of educational attainment, one finds that 41.1 percent of adults in Michigan who did not finish high school smoked tobacco, compared with 26.9 percent of adults who completed high school and 14.4 percent of adults with education beyond high school.⁸⁴ The proportion of tobacco use among individuals with a bachelor's degree or higher is further reduced to 7.5 percent. Tobacco use also varies when stratified by race, with the American Indian/Alaskan Native population in Michigan experiencing the greatest proportion of tobacco use (42.4 percent) and the Asian population the least (11.3 percent). As

one might expect, low-income communities have a much greater prevalence of tobacco use when compared with higher income communities.

Infant mortality^d is a common proxy (along with life expectancy at birth) that is used to assess the health of a population.

The U.S. infant mortality rate is higher than average among Organisation for Economic Co-operation and Development (OECD) nations.⁸⁵ Yet again, Michigan fares still worse than the national average on this metric. In 2013, only eight states had a higher rate of infant mortality than Michigan (7.05 deaths per 1,000 live births).⁸⁶ By 2016, Michigan's infant mortality rate improved slightly to 6.4 deaths per 1,000 live births (730 deaths total); however, so did the U.S. rate of 5.9 deaths per 1,000 live births.⁸⁷ Michigan also exceeded national averages for the proportion of preterm births^e (10.1 percent vs 9.9 percent), low birthweight^f births (8.5 percent vs 8.2 percent), and the proportion of births to unmarried mothers (41.0 percent vs 39.8 percent).⁸⁸

While the U.S. tends to rank poorly compared to peer nations in many measures of health, Michigan often fares even worse than the rest of the country.

c Percentage of adults who report smoking some days or every day and who have smoked more than 100 cigarettes in their lifetime.

d The infant mortality rate is defined as the number of deaths of children aged less than one in a given year per 1000 live births

e Babies born prior to 37 weeks of pregnancy (gestation)

f Babies born weighing less than 2,500 grams or 5 lbs. 8oz

There is considerable variation of infant mortality across jurisdictions within the state. While Michigan's 2016 infant mortality rate was 6.4 deaths per 1,000 live births, the rate in Detroit was 12.7 (2012-2016 average: 13.7).⁸⁹ The average infant mortality rates in rural counties⁹ such as Arenac (2012-2016 average: 11.2), Kalkaska (2012-2016 average: 12.5), and Presque Isle (2012-2016 average: 14.7) are all comparable to the rate in Detroit.⁹⁰ These glaring health disparities reinforce the importance of policies addressing health equity so that residents in small rural communities and in major cities all have the same opportunities to live a healthy life.

To further illustrate how morbidity and mortality can differ across populations, **Table 1** shows age-adjusted mortality rates in Detroit, Michigan, and the U.S. for the ten leading causes of death for Michigan residents in 2016.

Some might assume that these differences in health outcomes throughout the state might be explained by differences in access to health care. Access to health care is an important determinant of health, and it is true that people of lower socioeconomic status tend to have less access to quality health care. Previous Citizens

Table 1

Age-Adjusted Mortality Rates* for the Ten Leading Causes of Death in Michigan, 2016

*Rates are per 100,000 persons

	U.S.	Michigan	Detroit
Heart Disease	165.5	200.8	322.9
Cancer	155.8	167.1	192.7
Chronic Lower Respiratory Diseases	40.6	44.7	33.9
Unintentional Injuries	47.4	50.8	71.9
Stroke	37.3	39.1	47.4
Alzheimer's Disease	30.3	33.8	20.1
Diabetes Mellitus	21	21.5	27.6
Kidney Disease	13.1	14.5	23.5
Pneumonia/Influenza	13.5	13.7	21
Intentional Self-harm	13.5	13.4	8.9
All Causes of Death	728.8	787.8	1,027.4

Source: Detroit Health Department

Research Council research has highlighted that many rural communities and urban core communities consistently have shortages of primary care health providers, restricting access to health care services when they are needed in these communities.⁹¹ Yet, Michigan tends to rank better than the average among states with regard to healthcare access, cost, and the proportion of the population with health insurance. Many of Michigan's hospitals also rank among the best in the U.S. Why, then, aren't people in Michigan also healthier on average?

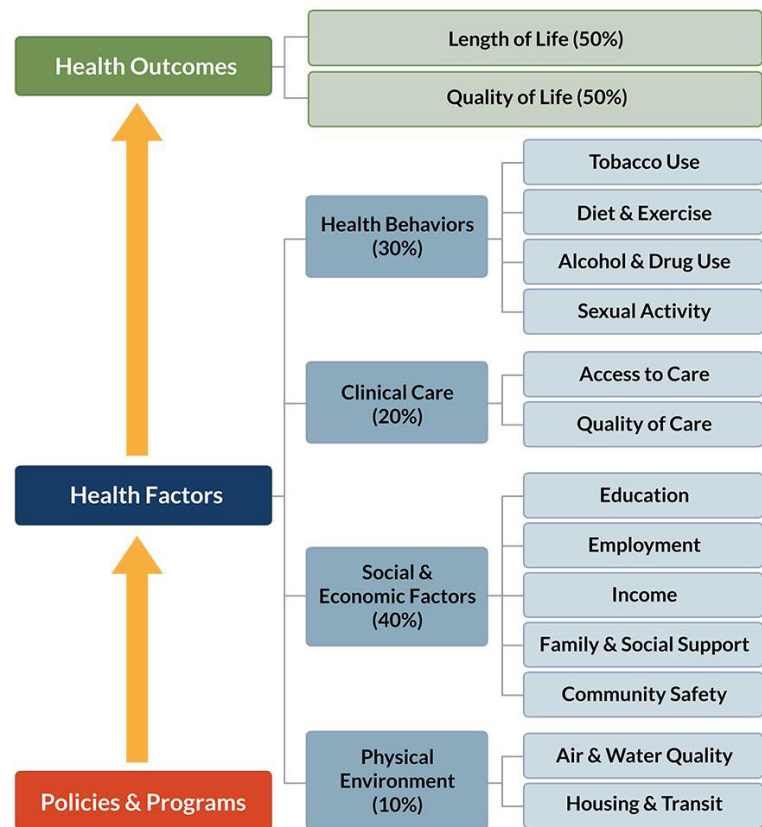
^g Small sample sizes in rural counties lessen statistical power, leading to wider confidence intervals for rate estimates.

Among the changeable factors that affect health outcomes, medical care accounts for only 10-20 percent, while social determinants account for the other 80-90 percent (see the population health model in **Figure 2**).⁹²

To understand Michigan's poor health outcomes, we must consider two things:

1. It is the social determinants of health—not differences in medical care—that account for the greatest proportion of disparities in the health of different communities. Michigan's economic struggles in the 21st century, below average educational achievement and degree attainment, and a litany of other social factors have contributed to poorer health outcomes
2. Lack of investment in public health has contributed to a variety of harmful exposures (from accumulated environmental toxins to increased viral load to chronic stress) that both cause immediate damage and erode health over time, worsening the health of Michigan citizens. This lack of investment has also left state and local health officials less equipped to intervene in ways that promote better health and to address the underlying societal factors that contribute to poor health and increase health inequities between communities.

Figure 2
Model of Population Health Emphasizing Modifiable Health Determinants



County Health Rankings model © 2016 UWPHI

Source: University of Wisconsin Population Health Institute. County Health Rankings & Roadmaps 2018. www.countyhealthrankings.org

Infrastructure and Public Health

Just as natural and social environments affect the health of individuals and communities, so does the built environment. Infrastructure has a very strong effect on the health and well-being of the public; however, Michigan has fallen into an historic trend of remaining at the bottom nationally with regard to infrastructure investments in everything from water systems to highways and bridges.ⁱ

Poor drinking water infrastructure has led to very serious public health threats. Michigan faces \$13.8 billion in drinking water infrastructure needs over the next two decades, as well as an additional \$2.1 billion for wastewater infrastructure.ⁱⁱ The state's antiquated infrastructure inhibits cost-effective delivery, threatening both access and safety. Potable water, functional wastewater treatment systems, and drain infrastructure are important not only to human health, but to economic and industrial development as well as environmental conservation.

Vehicle and transportation safety is also an important public health concern, and the policy-driven reduction in traffic fatalities during the twentieth century was an important public health achievement. Road and bridge infrastructure is failing, and this is perhaps the most visible symbol of Michigan's infrastructure needs; more than one-fifth of the state's roads are categorized as in "poor condition" and 11 percent of bridges are structurally deficient. There is an estimated \$540/year excess cost to Michigan motorists for driving on roads in states of disrepair.ⁱⁱⁱ

Multimodal public transportation also enhances public health in a variety of ways, by reducing traffic fatalities, limiting emissions/pollution, encouraging physical activity and improving walkability, enhancing access to healthcare services and healthy foods, and reducing financial stress on lower-income households.^{iv} Yet, Southeast Michigan is the largest region in the U.S. without a comprehensive, regional public transportation system.

The internet plays a growing role in connecting individuals to, among other things, jobs, social support, health information, and mobile health technologies. For this reason, some have suggested that broadband access should be considered a social determinant of health.^{vi} Rural areas and lower-income urban neighborhoods that tend to experience the worst health outcomes also tend to be areas lacking adequate broadband access.

Replacement of aging water infrastructure, prompt investment to clean up contamination sites, and incorporation and strict adherence to science-based environmental and drinking water standards will help Michigan promote and protect the health of the public. Energy waste reduction and pursuit of clean energy that minimizes negative environmental impacts is also an important ongoing consideration to safeguard the public's health. Safer roadways, modernized transportation infrastructure, and robust public transportation systems all likewise would improve health and safety. The Governor's 21st Century Infrastructure Commission identified "a healthy environment" as a key outcome the state should pursue, stating:

"The state's infrastructure system is interconnected with the health of our people, environment, and communities. Investments in communications, energy, transportation, and water networks and technologies support a Pure Michigan that, in many ways, defines the character of our state."^{vii}

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Conclusion

Public health is an important set of critical functions performed by state and local health departments, as well as national health agencies and partners inside and outside of government. These critical functions include preventing epidemics, containing environmental hazards, ensuring that food and water are safe, and promoting health and wellness. Despite the importance of public health, many are unaware of the role of public health and how it differs from medical care or social services.

Because of this lack of awareness, public health is rarely at the forefront of public policy discussions. These discussions tend to focus on infrastructure, schools, economic development, and medical care—the things on which governments spend the most money. Nonetheless, public health affects student achievement in schools, as well as the success of talent attraction and workforce development efforts. It also impacts outcomes and spending in the health care sector. Public health is interrelated with state and local infrastructure and is at the core of government's responsibility to provide for the public good.

The Governor's Public Health Advisory Commission identified a need for a comprehensive review of all state public health funding; the Citizens Research Council shares this assessment. Michigan would benefit from consistent, transparent, and flexible pathways to better invest in public health. Moreover, current funding levels are inadequate to respond to future crises or undertake the work necessary to address poor health across the state. Michigan cannot continue this subsistence approach to public health.

Michigan also has a fragmented public health delivery system that demands improvement. Further study is needed to determine the best way to maximize service efficiency and equity without sacrificing effectiveness of the services provided. On the surface, it appears that numerous unutilized opportunities for collaboration exist within government and with private and non-profit partners.

Each of Michigan's departments, agencies, and local governments should prioritize safeguarding the public health and adopt a "Health in All Policies" philosophy

and approach to governance. Policy decisions in areas as disparate as road construction, education, city planning, and policing all impact the health of the public, and public health assessments and impact statements should accompany all state and local policymaking. On the one hand, programs or policies that create health risks should be reevaluated and risks should be minimized or eliminated. On the other hand, policies across government (e.g., education, agriculture, and arts grants) should be strategically leveraged to promote and improve health. Education programs might incorporate mechanisms for coping with stress, a greater focus on health literacy, or an expanded role for school-based nurses and social workers. Policies that support local agriculture might also promote better nutrition. Arts programs supported with state grants might work to facilitate social and cultural capital in communities. Strategic policymaking can maximize public benefit and enhance the value of each public dollar that is spent.

Michigan pays a price for not prioritizing and funding public health. That price is evident in Flint and other communities that experience health threats from their water, food, and environment. The insidious nature of this price is revealed in Northern Michigan's "disability belt" and in the communities struggling with opioid addiction. The unfair character of this price is paid especially by low-income communities and communities of color where people live much shorter, sicker lives and watch infants perish at more than twice the rate of other communities. Michigan cannot afford to continue to spend massive amounts on health insurance policies and costly medical interventions while failing to invest in population-level health promotion and disease prevention, or, more generally, in social well-being.⁹³ Moreover, Michigan cannot afford to be seen as a state that fails to protect the safety and well-being of its people.

Health inequities and health disparities experienced throughout Michigan are not inevitabilities, but rather may be addressed through various public health activities. The Michigan Department of Health and Human Services has declared that higher than average proportions of tobacco use, obesity, heart disease, stroke, vaccine preventable illnesses, and poor neonatal health are

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all winnable battles.⁹⁴ Winning these battles, however, requires adequate funding. Winning will also require strategic partnerships and collaborations with a variety of public, private, non-governmental, and community-based organizations. Moreover, many differences in health that exist across the state are because of social factors over which people have little control; this leads to unfair health outcomes. Michigan will not be able to improve the well-being of its citizens without paying greater attention to the social determinants of health.

Health underpins every individual's ability to pursue their own happiness and to make productive contributions to their community. Michigan faces numerous health challenges and large numbers of people continue to experience notable health disparities. Greater attention to public health is needed to remove physical and social barriers to healthy, productive lives, and to safeguard the health and well-being of all citizens on this pair of pleasant peninsulas.

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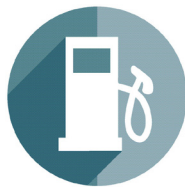
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