





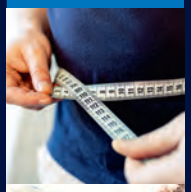



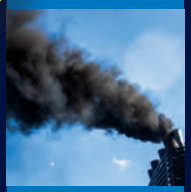



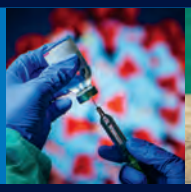


EDUCATION, ADVOCACY, POLICY • CRITICAL DISCUSSIONS • COOPERATIVE ACTION •

MASSACHUSETTS MHC HEALTH COUNCIL

**With 21 Commentaries on the Impact and Implications of COVID-19**

10TH EDITION

# Common Health for the Commonwealth

## Report on Social Determinants of Health, Selected Health Conditions and Injuries, and Risk and Protective Factors

2021

10TH EDITION

# Common Health for the Commonwealth

## Report on Social Determinants of Health, Selected Health Conditions and Injuries, and Risk and Protective Factors

## 2021

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Massachusetts Health Council
200 Reservoir Street, Suite 101
Needham, MA 02494
617-965-3711
www.mahealthcouncil.org

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# Message from the Chief Executive Officer and Board Chair

The Massachusetts Health Council is proud to release the 10th edition of *Common Health for the Commonwealth*, a report that serves as a guide for Council members and policymakers as we work collectively to build a culture of health in the Commonwealth. This nationally recognized publication on preventable conditions and social determinants of health in Massachusetts is being published at a remarkable time in history. The entire globe is confronting the worldwide COVID-19 pandemic, exposing glaring disparities in impacts, resources, and responses among affected populations.

Data in the 10th edition were largely collected before COVID-19 emerged, but it is clear that Black, Indigenous, and people of color and low-income communities in Massachusetts have been disproportionately affected by the pandemic. Socioeconomic impacts have been felt across the state, including record unemployment levels. Health risk factors tied to unemployment and poverty will likely increase. Looking ahead, favorable health outcomes across conditions are uncertain as the entire health care system remains under strain. Many of the chapters in the report include COVID-related addendums, and there is a special section with commentaries about COVID's impact and implications. The commentaries about our collective response to the pandemic are the beginning of a robust discussion the Mass. Health Council will sponsor later in the year.

Among key takeaways from the 10th edition are the following:

- The Big Picture
  - Prior to COVID, Massachusetts mortality was decreasing after two years of increase. The two-year increase had likely been due in part to the opioid overdose epidemic.
- Health Conditions
  - Massachusetts ranks well and is getting better on heart disease, cancer, and HIV.
  - Massachusetts saw an increase in asthma and diabetes.
  - Overdose deaths increased across race, ethnicity, and age group.
  - Alcohol-induced deaths are on the rise; the percentage of young adults 18–25 needing alcohol treatment but not receiving it increased.
- Risk and Protective Factors
  - Massachusetts has among the highest income — and highest income inequality — in the nation.
  - Poverty increased slightly, as did unemployment, and wages were decreasing for the lowest-income residents.
  - Housing cost burden is higher in Massachusetts than the United States and homelessness is up; lack of stable, safe, affordable housing directly increases health risks.

- The rate of those possessing health insurance coverage is very high, but trouble paying medical bills persists across incomes.
- Vaping is a significant behavior of high schoolers.
- Firearm-related deaths are low but increasing in Massachusetts.

The Massachusetts Health Council was founded in 1920 in response to the tuberculosis epidemic of that era. Today we continue to respond to public health emergencies like the COVID-19 pandemic and the deep structural inequities in health that still plague our Commonwealth. Just as we did a century ago, the Council serves as a source of collaboration and cooperation among its member organizations and remains committed to enhancing public health in the Commonwealth, helping residents during the current crisis and addressing future challenges.

Sincerely,

| | |
|---|---|
| David R. Martin | Charles T. Alagero |
| CEO | Board Chair |

# Acknowledgments and Research Collaborators

## Editors

Ball Consulting Group, LLC
David R. Martin
Jeffrey R. Stone

## Principal Investigators

**Rachel Gershon, Matt Maughan, and Mairin O'Brien**
**Health Law and Policy, Commonwealth Medicine, University of Massachusetts Medical School**
Commonwealth Medicine's primary focus is to help Medicaid and other health care organizations accomplish their missions. As the public service consulting and operations division of UMass Medical School, we draw on the academic knowledge and public health service expertise of Massachusetts's only public medical school to provide comprehensive, innovative health care and policy solutions.

## Research Collaborators

**Myron Allukian Jr., DDS, MPH**
President, Massachusetts Coalition for Oral Health
Former Dental Director, Boston Public Health Commission

**Patricia Baker**
Senior Policy Advocate, Massachusetts Law Reform Institute

**Aaron Bernstein, MD**
Interim Director, Center for Climate, Health and the Global Environment
Pediatric Hospitalist, Boston Children's Hospital

**Elana Brochin**
Program Director for Health Equity, Massachusetts Association of Community Development Corporations

**Lydia D. Conley**
President/CEO, Association for Behavioral Healthcare

**Shira Doron, MD**
Associate Professor of Medicine, Tufts University School of Medicine
Hospital Epidemiologist, Tufts Medical Center

**Allyson Perron Drag**
Government Relations Director, American Heart Association

**Marcia Fowler**
Chief Executive Officer, Bournewood Health Systems
Chair, Massachusetts Association of Behavioral Health Systems

**Jonathan M. Gaffin, MD**
Co-Director, Severe Asthma Program, Boston Children's Hospital
Submitted on behalf of the Asthma and Allergy Foundation of America, New England Chapter

**Sandro Galea, MD, DrPH**
Dean and Robert A. Knox Professor, Boston University School of Public Health

**Robert Greenwald**
Clinical Professor of Law and Faculty Director, Center for Health Law and Policy Innovation, Harvard Law School

**Zoe Grover**
Executive Director, Stop Handgun Violence

**Stephen Habbe**
Director, State Government Affairs, American Diabetes Association

**Marc Hymovitz**
Director of Government Relations, American Cancer Society Cancer Action Network

**Margee Louisias, MD, MPH**
Instructor in Medicine, Harvard Medical School
Director of Diversity and Inclusion, Division of Allergy and Clinical Immunology at Brigham and Women's Hospital

**Gina McCarthy**
President and CEO, Natural Resources Defense Council
Former Administrator, US Environmental Protection Agency

**Dariush Mozaffarian, MD, DrPH**
Dean, Friedman School of Nutrition Science & Policy
Jean Mayer Professor of Nutrition, Tufts University
Professor of Medicine, Division of Cardiology, Tufts Medical Center

**Kevin Murray**
Executive Director, Massachusetts Advocates for Children

**Ronda A. Rockett, MD**
Owner and Head Coach, CrossFit Launchpad

**Amy Rosenberg, JD**
Senior Clinical Instructor & Lecturer on Law, Center for Health Law & Policy Innovation, Harvard Law School

**Audrey Shelto**
President, Blue Cross Blue Shield of Massachusetts Foundation

**Neetu Singh, DMD, MPH**
Oral Health Program Director, Health Care For All

**Emily Stein, MPH**
President, Safe Roads Alliance

**Gwendolyn Stewart**
Executive Director, Tobacco Free Mass

**Diane Sullivan**
Independent Consultant

**Marcia A. Testa, MPH, PhD**
Senior Lecturer on Biostatistics, Harvard T. H. Chan School of Public Health
President, Massachusetts Association of Health Boards
Vice Chair, Town of Wellesley Board of Health

**Ron White, LICSW**
Chief Program Officer, Samaritans, Inc.

**Stephen D. Wiviott, MD**
Vice President, Clinical Trials Research and Administration, Mass General Brigham
Cardiovascular Division, Brigham and Women's Hospital
Harvard Medical School

**Gregory Young, MD**
President and CEO, Pediatric Physician's Organization at Boston's Children's Hospital

## COVID-19 Impact and Implications Contributors

**Tom Ambrosino**
City Manager, City of Chelsea

**Charles L. Anderson, MD**
President and CEO, The Dimock Center

**Gaurdia Banister, RN, PhD, NEA-BC, FAAN**
Executive Director, The Institute for Patient Care
Director, Yvonne L. Munn Center for Nursing Research
Connell-Jones Endowed Chair for Nursing and Patient Care Research
Massachusetts General Hospital

**Joseph Betancourt, MD**
Senior Vice President for Equity and Community Health
Founder of the Disparities Solutions Center
Massachusetts General Hospital

**James T. Brett**
President and CEO, The New England Council

**Joe Diamond**
Executive Director, Massachusetts Association for Community Action

**Peter R. Doliber**
CEO, Alliance of Massachusetts YMCAs

**Haywood Fennell, Sr.**
Author, TV Producer, and Veterans Advocate

**Tara Gregorio**
President, Massachusetts Senior Care Association

**Nathalee Kong, MD**
Internal Medicine, MGH Revere HealthCare Center
Chair, City of Revere Board of Health

**Peter J. Koutoujian**
Sheriff, Middlesex County, Massachusetts
President, Major County Sheriffs of America

**Cate Fox-Lent**
Innovation and Strategy Advisor, City of Chelsea

**Manny Lopes**
President and CEO, East Boston Neighborhood Health Center

**J. Keith Motley, PhD**
Consultant President and CEO, Urban League of Eastern Massachusetts

**Jim O'Connell, MD**
President, Boston Health Care for the Homeless Program
Assistant Professor of Medicine, Harvard Medical School

**John R. Regan**
President and CEO, Associated Industries of Massachusetts

**Cheryl Sbarra**
Executive Director, Massachusetts Association of Health Boards

**Gladys Vega**
Executive Director, La Colaborativa

**Alexander Y. Walley, MD**
Associate Professor of Medicine and Director, Grayken Addiction Medicine Fellowship
Clinical Addiction Research and Education Unit
Boston Medical Center/Boston University School of Medicine

**Steve Walsh**
President and CEO, Massachusetts Health and Hospital Association

**David Waters**
CEO, Community Servings

**Frederica M. Williams, MBA**
President and CEO, Whittier Street Health Center

# Special Thanks

We are grateful to the **Massachusetts Medical Society** for publishing the report and to its **Department of Publishing Operations** for providing design, layout, project management, quality assurance, and printing services. The Massachusetts Health Council was founded through the efforts of the Society in 1920 and continues to enjoy its significant support.

# A Note on the Data

This report cites data from a variety of sources. All the data cited in this report are publicly available; most come from reports issued by state and federal agencies. Data from different sources may be based on different methods of data collection and different samples, and the questions asked or information collected may not be exactly the same. Variation in statistics for certain indicators may reflect differences among the sources.

This report highlights trends in health and health-related indicators. It notes year-to-year changes. Not all year-to-year differences may rise to the level of statistical significance. This may be especially true in cases where changes are small or based on smaller sample sizes. Where possible, the report also describes multiyear trends.

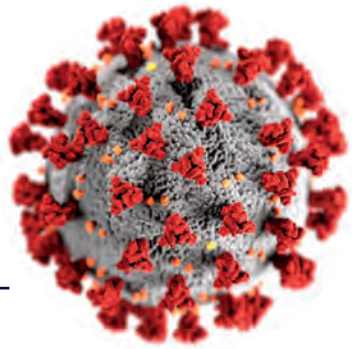
**The 10th edition of *Common Health for the Commonwealth* was originally scheduled for publication in early 2020. The timetable was disrupted by COVID-19, and as a result, much of the data in this edition is a year older than planned. Trends and changes noted in the report are still useful, however, in comparisons with data from preceding years.**

Contributors of the Policy Perspectives include leading practitioners, researchers, and advocates in their respective fields. They have been invited to offer personal insights and recommendations for policies, programs, or funding needs to address the health of Massachusetts residents. Their contributions do not necessarily reflect the opinions or positions of the Massachusetts Health Council or its Board of Directors.

# COVID-19: Impact and Implications

In February 2021, we asked leaders from a wide range of organizations to comment on the impact and implications of COVID-19 on the well-being of communities and on the organization and delivery of health care and social services.

These are their observations and suggestions.



Tom Ambrosino

Cate Fox-Lent

## Tom Ambrosino

*City Manager, City of Chelsea*

## Cate Fox-Lent

*Innovation and Strategy Advisor, City of Chelsea*

COVID-19 laid bare the public health inequities that exist in the Commonwealth. The idea that social determinants of health play a role in a pandemic is certainly not a novel idea. But the startling disparity in the number of cases and deaths from COVID-19 in communities like Chelsea, Brockton, and Lawrence compared to other cities in Massachusetts illuminated this truth in a powerfully stark manner.

The problem is that labeling big systemic issues like inadequate housing, income inequity, food insecurity, and environmental pollution as the cause of poor health makes it easy to push off any real effort at improvement and settle for the belief that these issues are too intractable to solve. So we just end up with a "study" on the issues or launch small pilot projects to gauge effectiveness. But the future of public health in the Commonwealth should be the big investments that are needed to make a meaningful difference. The *social* in *social determinants of health* refers to society as a whole, to all of us who participate in the regional economy and the social contract. It is this whole society that must take responsibility for large, collective, and likely expensive actions that will be needed to tackle these issues.

> **"…LABELING BIG SYSTEMIC ISSUES… MAKES IT EASY TO PUSH OFF ANY REAL EFFORT AT IMPROVEMENT AND SETTLE FOR THE BELIEF THAT THESE ISSUES ARE TOO INTRACTABLE TO SOLVE."**

Charles L. Anderson, MD

## Charles L. Anderson, MD

*President and CEO, The Dimock Center*

During this COVID-19 pandemic, the Centers for Disease Control and Prevention (CDC) found that, as of June 30, 2020, 41 percent of US adults had delayed or avoided medical care. Lost income, loss of employer-sponsored insurance, and increased primary caregiver responsibilities — combined with grief, anxiety, and depression — are all making it harder to seek care. Black and Latinx communities are experiencing these precursors at a higher rate and as a result are deferring more routine and even urgent care. In a survey conducted by PricewaterhouseCoopers, it was found that 56 percent of patients with complex chronic conditions delayed care during the first six months of this pandemic. In a similar study conducted by the Robert Wood Johnson Foundation, it was found that one in three adults reporting delayed or forgone care had experienced worsening of one or more of their health conditions. Community Health Centers, like the Dimock Center, will be required to play a critical role in getting Black and Latinx communities in the Commonwealth of Massachusetts back on the road to wellness. Post-COVID, these communities with the highest social vulnerability indexes will require more resources and support. Therefore, while we are appropriately focused on COVID-19 testing and vaccine equity, we must remember that it was the conditions lurking beneath the surface of the water that sunk the *Titanic*.

> **"POST-COVID, THESE COMMUNITIES WITH THE HIGHEST SOCIAL VULNERABILITY INDEXES WILL REQUIRE MORE RESOURCES AND SUPPORT."**

## Gaurdia Banister, RN, PhD, NEA-BC, FAAN

Gaurdia Banister, RN, PhD, NEA-BC, FAAN

*Executive Director, The Institute for Patient Care*
*Director, Yvonne L. Munn Center for Nursing Research*
*Connell-Jones Endowed Chair for Nursing and Patient Care Research*
*Massachusetts General Hospital*

COVID-19 sounded another alarm that has been ringing for years. While many recognized how the social determinants of health were impacting our communities of color, others, sadly, were not as aware or engaged in the effort to level the health care playing field. We cannot ignore this problem anymore. Harnessing all available resources to improve the health and wellness of our community is paramount. An area for concern for me is the importance of having health care providers who reflect the diversity of patients being cared for. This is not to say that any provider can't provide exemplary care to all patients regardless of their cultural and ethnic differences. However, data show the importance of having a workforce that looks and sounds like the patients receiving care. Encouraging and supporting students of color early on in their formative education to excel in the STEM fields is fundamental to them being successful in pursuing a health care profession. In

> **"… DATA SHOW THE IMPORTANCE OF HAVING A WORKFORCE THAT LOOKS AND SOUNDS LIKE THE PATIENTS RECEIVING CARE."**

doing this, we can begin to eliminate barriers and educate enough diverse providers to care for an increasingly diverse patient population. This is one way to improve the health and well-being of all Massachusetts residents.

Joseph Betancourt, MD

## Joseph Betancourt, MD

*Senior Vice President for Equity and Community Health*
*Founder of the Disparities Solutions Center*
*Massachusetts General Hospital*

There is no doubt that 2020 was hard on the world and the nation, but it was undoubtedly hardest for communities of color. In normal times, issues of structural racism, the social determinants of health, and the significant and persistent racial and ethnic disparities in health and health care are painful enough for those who experience them and seem sometimes insurmountable for us who spend our life addressing them. COVID-19, however, as many have said, put all of these issues front and center, as communities of color were disproportionately impacted, and everything about their lives that was hard became harder — and even more deadly.

We waged a valiant battle during our first surge here in Massachusetts, and just as we were taking a deep breath, George Floyd had his last one taken from him. The second part of the "dual pandemic" emerged, and our fight for racial justice and equity took on greater importance. I'm proud of the work we did, and the commitments we've made, but the true test is how we execute on our promises, and whether, when tested to determine if our words would equal our deeds, we will demonstrate this wasn't a passing fad, but instead a new and promising future. Time will tell, but the fight will go on.

> **"…THE TRUE TEST IS HOW WE EXECUTE ON OUR PROMISES, AND WHETHER… WE WILL DEMONSTRATE THIS WASN'T A PASSING FAD…"**

James T. Brett

## James T. Brett

*President and CEO, The New England Council*

The COVID-19 pandemic has had a devastating impact in Massachusetts and the entire New England region, affecting the physical health of thousands of our residents, putting unprecedented strain on our health care system, and causing one of the worst economic downturns we've seen in decades. However, what has stood out to me throughout this time of crisis is how the Commonwealth has risen to the challenge. Our health care providers have stepped up to provide life-saving care; our life sciences industry went into overdrive developing treatments and vaccines; and the business community at large mobilized to support the communities and individuals who have been most severely impacted by this unprecedented

> **"…WHAT HAS STOOD OUT TO ME THROUGHOUT THIS TIME OF CRISIS IS HOW THE COMMONWEALTH HAS RISEN TO THE CHALLENGE."**

crisis. At the same time, our elected officials have worked tirelessly to advance policies that will provide relief and bolster the economy. It has certainly been a trying time for all of us, but it has also been a time of incredible and unprecedented innovation and collaboration, and I'm proud of the way our region has come together to lead Massachusetts and New England through this crisis.

Joe Diamond

## Joe Diamond

*Executive Director, Massachusetts Association for Community Action*

Community action agencies were designated as essential by the governor at the start of the pandemic. We continue to safely serve our vulnerable friends and neighbors living with low incomes in virtually every city and town with such critical services as fuel assistance, housing, early education and care, and access to the earned income tax credit through free tax preparation.

Experts agree that the blending of human and health services in an integrated approach based on equity is powerful. Across sectors and across government, an understanding that human services support health is animating the way we organize and deliver services. Such an approach, based on the social determinants of health framework, recognizes the need to protect and vaccinate all essential workers, including our frontline staff and core administrative staff. It can be disruptive, if not crippling, to a local agency when a few or more staff members are exposed to COVID-19, requiring quarantining, and closing for cleaning, negatively affecting the health and well-being of vulnerable communities with potentially tragic ripple effects.

An integrated approach would support a safer work environment, protect our clients, and slow the spread of COVID. With their staff members vaccinated, community action agencies and other CBOs — trusted local institutions — can lead by example. Working with state officials and health care providers, through coordinated campaigns of education and outreach, we can encourage more clients and patients — many of whom are people of color — to take the vaccine.

> **"AN INTEGRATED APPROACH WOULD SUPPORT A SAFER WORK ENVIRONMENT, PROTECT OUR CLIENTS, AND SLOW THE SPREAD OF COVID."**

Peter R. Doliber

## Peter R. Doliber

*CEO, Alliance of Massachusetts YMCAs*

The foundation of American health care is that it is a privilege, not an inherit right. A primary impact of COVID is the exposure of this inequitable health care system and the incredible importance of nonprofit community-based services that fill the gap.

Inequity sprawls into all components of health: food security, childcare, working conditions, physical activity, and education access. The result? Our essential workers take the greatest risks, paying the highest price.

When COVID began its ugly spread through our porous nonexistent national pandemic response, it was community-based organizations that stepped up. Organizations like the YMCAs and others established emergency childcare, food distribution, housing supports, remote learning, and vaccination sites. Our collective infrastructure was temporarily able to support the services our communities needed.

As COVID continues and we face years of working our way back, now is the time to change how we, as a society, address access to health care and its social determinants. Now is when we must work together to ensure our nonprofit community-based organizations thrive. It is incumbent upon us to support legislation that creates access to essential services through nonprofit community-based organizations. We have a moral obligation to create an equitable health care system.

> **"… NOW IS THE TIME TO CHANGE HOW WE, AS A SOCIETY, ADDRESS ACCESS TO HEALTH CARE AND ITS SOCIAL DETERMINANTS."**

Haywood Fennell, Sr.

## Haywood Fennell, Sr.

*Author, TV Producer, and Veterans Advocate*

Regarding COVID-19, we cannot forget or neglect the trauma and other impacts of the fallout experienced by Black people from the undisclosed Tuskegee Syphilis experiments. There is a mountain of doubt that must be removed and the best way is to educate the public about that in order to begin the overall process of education as it relates to the pandemic. We should put emphasis on reaching and teaching about prevention as opposed to treatment and keep it like that.

> **"WE CANNOT FORGET OR NEGLECT THE TRAUMA AND OTHER IMPACTS OF THE FALLOUT EXPERIENCED BY BLACK PEOPLE FROM THE UNDISCLOSED TUSKEGEE SYPHILIS EXPERIMENTS."**

Tara Gregorio

## Tara Gregorio

*President, Massachusetts Senior Care Association*

The COVID-19 pandemic has underscored the necessity and critical importance of government and the nursing facility sector working together to develop and implement policies and actions to protect and support the Commonwealth's nursing home residents and their caregivers.

Last spring, the Executive Office of Health and Human Services implemented an Accountability and Supports program that provided significant supplemental funding and programming to support our workforce, increase access to vital personal protective equipment, testing, and infection control. The program, which became a national model, established clear, evidence-based infection control protocols that nursing facilities were inspected on and were required to adhere to as a condition for receiving continued supplemental funding.

A recently published article in the *Journal of the American Geriatrics Society*, authored by Dr. Lewis Lipsitz, thoroughly documents the progress made in reducing the number of COVID-19 cases and deaths under the Commonwealth's Nursing Home Accountability and Supports program. This program demonstrated the positive outcomes that can be achieved when nursing facility care is more adequately funded, and strong and clear guidance is published with supportive education and accountability.

> **"A RECENTLY PUBLISHED ARTICLE… DOCUMENTS PROGRESS IN REDUCING COVID-19 CASES AND DEATHS UNDER THE COMMONWEALTH'S NURSING HOME ACCOUNTABILITY AND SUPPORTS PROGRAM."**

Nathalee Kong, MD

## Nathalee Kong, MD

*Internal Medicine, MGH Revere HealthCare Center*
*Chair, City of Revere Board of Health*

The COVID-19 pandemic has impacted every aspect of our lives, but African American and Hispanic communities have suffered disproportionately at the hands of this virus. Black and Brown communities were infected with and passed away from COVID-19 at disproportionately higher rates.

As an MGH primary care physician and the chair of the Revere Board of Health, I was uniquely positioned to not only witness firsthand the devastation the virus wrought on the diverse communities that make up Revere, but I was also poised to make decisions on how to fight this pandemic in a way that benefits *all* residents, especially those who have been historically marginalized. By working closely with community leaders, we combined the resources of MGH with the inside knowledge that these leaders possess to mobilize our COVID-19 response in a way that was effective and equitable.

Moving forward, if the health care system is to truly deliver equitable care, strong connections with community leaders and local governments need to be forged and fostered. As evidenced by my experience, the sum of such a relationship is indeed greater than its parts and can achieve extraordinary things for all races and ethnicities if given the opportunity.

> **"…IF THE HEALTH CARE SYSTEM IS TO TRULY DELIVER EQUITABLE CARE, STRONG CONNECTIONS WITH COMMUNITY LEADERS AND LOCAL GOVERNMENTS NEED TO BE FORGED…"**

Peter J. Koutoujian

## Peter J. Koutoujian

*Sheriff, Middlesex County, Massachusetts*
*President, Major County Sheriffs of America*

COVID-19 has posed challenges across the nation, especially in congregate care settings like correctional facilities. At the Middlesex Sheriff's Office (MSO), we recognized early that we had to address this pandemic with both public health and public safety in mind. Our process was guided in tandem by our operational staff and our medical team, including an infectious disease physician. This model helped us go from

the end of September to the beginning of February — 18 weeks — without a positive case in our incarcerated population.

In addition to being guided by science, we established trust with external stakeholders by publishing critical information[1] in a conspicuous and timely fashion.

More importantly, we prioritized the trust of those in our care. We conducted a first-in-the-nation survey[2] on vaccine interest among our incarcerated population. We found that 40 percent wanted the vaccine, and 33 percent of those not interested in vaccination were open to changing their minds. Of those not interested, 31 percent were concerned about safety and effectiveness, 30 percent had a general distrust of vaccines, and 16 percent indicated they didn't have enough information.

Armed with this data, we set out to enhance trust in the vaccine through an ongoing educational campaign that has included open forums in-unit with doctors, PSA videos, and check-ins with internal medical staff.

We are not through this pandemic yet. However, the MSO model shows that by being medically informed, patient-engaged, and openly transparent, we can ably protect those in correctional settings during a public health crisis.

> **"WE CONDUCTED A FIRST-IN-THE-NATION SURVEY ON VACCINE INTEREST AMONG OUR INCARCERATED POPULATION."**

[1]www.middlesexsheriff.org/COVID19
[2]www.middlesexsheriff.org/press-releases/news/middlesex-sheriff-announces-results-baseline-vaccination-surveys

## Manny Lopes

Manny Lopes

*President and CEO, East Boston Neighborhood Health Center*

The COVID-19 pandemic has highlighted the existing health disparities and social inequities deeply rooted within our health care and public health systems. In our communities of East Boston, Chelsea, Revere, Everett, and the South End, we have seen firsthand the disproportionate impact of the pandemic on minority populations.

These problems are systemic and big, bold action is needed, but strategies must also focus on the local level, especially in underserved communities. At the East Boston Neighborhood Health Center, we've worked hard to employ solutions *for the community* that are built *by the community*. We've listened to our staff, patients, and partners at community-based organizations who can tell us what is truly happening on the ground, arming ourselves with information and acting intentionally with equity in mind. As a result, we've developed strategies that help manage the spread and impact of COVID-19 in our communities by breaking down barriers like fear, distrust, language, and cost. Thanks to support from our partners at the Commonwealth of Massachusetts and the City of Boston, we've built the capacity necessary to implement these new models.

> **"…WE WILL ENSURE THAT UNDERSERVED COMMUNITIES NOT ONLY HAVE A SEAT AT THE TABLE, BUT AN ACTIVE VOICE…"**

The need for equitable, community-based, and community-informed initiatives highlights the value of organizations like community health centers

that can address large-scale problems with targeted solutions. If together we continue to lean on this hyperlocal model and build public-private partnerships, we will ensure that underserved communities not only have a seat at the table, but an active voice in the discussion when it comes to their health and well-being.

J. Keith Motley, PhD

## J. Keith Motley, PhD

*Consultant President and CEO, Urban League of Eastern Massachusetts*

Throughout the pandemic, the Urban League of Eastern Massachusetts (ULEM) has led the charge to ensure that communities of color have equitable access to information and resources that impact our people.

In direct response to the COVID-19 pandemic, we expanded to include a Community Services and Outreach (CSO) division. CSO uses website updates and email notifications to provide timely, relevant information to the community, as well as our social media platforms, which reach over 14,000 households. CSO also uses our Leaders Over Lunch webinar series to host health care and community leaders who discuss topics that range from healthy lifestyles to available treatment to protect our community.

The Urban League of Eastern Massachusetts is a constant trusted source the community turns to for essentials including food, personal protective equipment, and other resources during the pandemic. We have collaborated with partner organizations to provide needed services such as COVID testing, and we are actively working with organizations to assist getting the vaccine into our neighborhoods and into the arms of the people.

ULEM has a 101-year commitment to strengthening communities and addressing the economic, social, racial, and health disparities in communities of color, made more evident by the pandemic.

> **“…WE ARE ACTIVELY WORKING TO ASSIST GETTING THE VACCINE INTO OUR NEIGHBORHOODS AND INTO THE ARMS OF THE PEOPLE…”**

Jim O’Connell, MD

## Jim O’Connell, MD

*President, Boston Health Care for the Homeless Program*
*Assistant Professor of Medicine, Harvard Medical School*

The strain of the coronavirus that spread through the homeless shelters of Boston came directly from the Biogen Conference in the Long Wharf Marriott. It is a poignant reminder of how lives are intertwined and we depend upon one another for the overall health of communities.

More than 1,100 homeless persons had COVID-19 during the first year of the pandemic, casting the health injustices and inequities long endured by this vulnerable population in stark relief. Testing at Pine Street Inn and Boston’s other large shelters, starting in March, found approximately one-third of guests to be positive, the vast majority without symptoms when tested.

The public health foundations of pandemic containment — physical distancing, handwashing, consistent mask wearing, quarantine for the exposed, isolation for the infected, and sheltering in place — are rendered nearly futile in the dormitory of a crowded shelter. To address the challenge, older and high-risk homeless and marginally housed individuals and those who are positive with less severe symptoms have variously been accommodated at a Suffolk University dormitory, at Boston Hope in a 500-bed field hospital run by Mass General Brigham alongside a 500-bed medical shelter operated by the Boston Health Care for the Homeless Program (BHCHP), and at a 250-bed COVID unit opened at Boston Medical Center.

The heroic clinicians and essential workers in the shelters and hospitals have been buoyed by cautious optimism with vaccinations now available for homeless persons. At the end of January, BHCHP embarked on a daunting but exhilarating campaign of vaccinating all willing guests. But the pandemic has shown that we can no longer ignore or deny the perils of homelessness. A massive federal investment in housing with flexible supportive services is the sine qua non for ending the long nightmare of homelessness in America.

> **“THE PUBLIC HEALTH FOUNDATIONS OF PANDEMIC CONTAINMENT… ARE RENDERED NEARLY FUTILE IN THE DORMITORY OF A CROWDED SHELTER.”**

John R. Regan

## John R. Regan

*President and CEO, Associated Industries of Massachusetts*

If the COVID-19 pandemic has taught us anything, it is the necessity to adapt and innovate to confront daily challenges. As Associated Industries of Massachusetts (AIM) member companies and their employees learned to work from home, the Massachusetts health care system learned how to deliver health care at home. Telehealth became an essential tool for patient care in a matter of weeks, keeping patients and providers safe through remote interactions, increasing access to care, expanding the capacity of scarce health care resources, adding convenience to many elements of health care, and producing cost savings across the health care system. We should celebrate the advances of telehealth and the vast infrastructure that supports virtual care delivery. This required leadership from state governors, including our own Governor Charlie Baker, who — before the pandemic — was well ahead of other states in solidifying telehealth as a permanent part of our health care delivery system. The telehealth law recently passed by the Massachusetts legislature and signed by Governor Baker enables Massachusetts employers to leverage this now-essential benefit for employees during quarantine and beyond. Jason Gorevic, the CEO of AIM’s member Teladoc Health, summed it up well when he said, “The pandemic has accelerated the widespread adoption of virtual care, and I’m confident there’s no going back.”

> **“THE TELEHEALTH LAW… ENABLES EMPLOYERS TO LEVERAGE THIS NOW-ESSENTIAL BENEFIT FOR EMPLOYEES DURING QUARANTINE AND BEYOND.”**

Cheryl Sbarra

## Cheryl Sbarra

*Executive Director*
*Massachusetts Association of Health Boards*

On March 10, 2020, Governor Baker declared a state of emergency in Massachusetts due to the outbreak of the extremely contagious COVID-19. Myriad emergency orders followed affecting all of our lives. Most businesses were closed, gatherings were limited, facial masks were required, and travel was restricted. Local boards of health are charged with enforcing the vast majority of these orders, including providing education and outreach to local residents and business owners.

Isolation and quarantine laws have been resurrected, and local boards of health and health department staff, especially public health nurses, are responsible for tracking down close contacts of those individuals who test positive and notifying them that they needed to quarantine or isolate. If individuals do not isolate or quarantine, orders need to be served by health department staff. If persons fail to comply with the orders, court action needs to follow.

Orders are being revised and rescinded, and boards and their staff members are tasked with providing residents and business owners with education about the changes and enforcing the changes.

COVID-19 has not erased the responsibility local boards of health have to enforce federal, state, and locally mandated laws and to provide services to residents. It has instead revealed that we need to provide local public health with the resources they need to do the jobs we demand.

> **"…WE NEED TO PROVIDE LOCAL PUBLIC HEALTH WITH THE RESOURCES THEY NEED TO DO THE JOBS WE DEMAND."**

## Gladys Vega

Gladys Vega

*Executive Director, La Colaborativa*

*(in Spanish followed by English)*

En asociación con la Escuela de Salud Pública TH Chan de Harvard, La Colaborativa llevó a cabo un estudio de residentes de Chelsea que fueron COVID-19 positivos durante el transcurso de 2020. La investigación reveló inequidades que agravan las necesidades sociales existentes y los determinantes de la salud en Chelsea, que es una de las comunidades de Massachusetts más afectadas por COVID-19.

El ochenta y cinco por ciento de los participantes de la encuesta respondió en español y el 45 por ciento dijo que tenía un nivel básico o muy básico de inglés. Además, el 47 por ciento de los participantes no habían terminado la escuela secundaria, el 83 por ciento de los participantes acceden a los servicios de despensa de alimentos y el 35 por ciento adeuda un alquiler atrasado. Aunque el 90 por ciento de los residentes dicen tener seguro médico, algunos no lo utilizan por temor a las repercusiones de las políticas de inmigración. Estos datos indican que los proveedores de servicios no solo deben traducir los materiales al español, sino también involucrar a la comunidad directamente. Los programas que requieren que los residentes participen a través de menús telefónicos en inglés y a través de sitios web son difíciles de navegar.

Las necesidades básicas solo se están satisfaciendo debido a organizaciones comunitarias como La Colaborativa y otras que se esfuerzan por brindar servicios como asistencia alimentaria y ayuda para solicitar las protecciones y programas disponibles. Por ejemplo, RAFT (Asistencia residencial para familias en transición) prevención de desalojos, SNAP y MassHealth. Chelsea Eats, una iniciativa de la ciudad, y Food for Families, un programa de MGH, no tienen la capacidad suficiente para satisfacer las necesidades extraordinarias de los residentes vulnerables de Chelsea.

Necesitamos que los proveedores de servicios sociales y de salud más grandes en Chelsea, Massachusetts General Hospital y Beth Israel Deaconess HealthCare hagan más. Ninguno de los encuestados mencionó haber recibido servicios de MGH distintos de los servicios médicos durante la hospitalización. Aunque MGH tiene un programa de Trabajadores de la Salud de la Comunidad, los residentes no saben que existe ni cómo acceder a él.

**Recomendaciones:** Food for Families debe ampliar su capacidad para adaptarse al alcance de la necesidad. Los trabajadores comunitarios de la salud y los trabajadores sociales de MGH-Chelsea deben participar más ampliamente en el alcance comunitario directo como agentes confiables para ayudar a las familias que carecen de información sobre cómo acceder a los programas de MGH, protecciones estatales y otros recursos.

**«… LOS PROVEEDORES DE SERVICIOS NO SOLO DEBEN TRADUCIR LOS MATERIALES AL ESPAÑOL, SINO TAMBIÉN INVOLUCRAR A LA COMUNIDAD DIRECTAMENTE.»**

In partnership with Harvard T.H. Chan School of Public Health, La Colaborativa conducted a study of Chelsea residents who were COVID-19-positive over the course of 2020. The research revealed inequities that aggravate existing social needs and determinants of health in Chelsea, which is one of the Massachusetts communities hardest hit by COVID-19.

Eighty-five percent of survey participants responded in Spanish with 45 percent stating they had a basic or very basic level of English ability. In addition, 47 percent of participants had not finished high school, 83 percent of participants access food pantry services, and 35 percent owe back rent. Although 90 percent of residents say they have health insurance, some do not utilize it in fear of repercussions due to immigration policies. These data signal that service providers must not only translate materials into Spanish but also engage the community directly. Programs that require residents to engage through telephone menus in English and via websites are difficult to navigate.

Basic needs are only being met because of community organizations like La Colaborativa and others that are stretching and struggling to provide services such as food assistance and help in applying for available protections and programs, including RAFT (Residential Assistance for Families in Transition) and other eviction prevention, SNAP (Supplemental Nutrition Assistance Program), and MassHealth. Chelsea Eats, a city initiative, and Food for Families, an MGH program, do not have sufficient capacity to meet the extraordinary needs of Chelsea's vulnerable residents.

We need the largest health and social services providers in Chelsea, Massachusetts General Hospital and Beth Israel Deaconess HealthCare, to do more. None of the respondents mentioned having received services from MGH other than medical services during hospitalization. Although MGH has a Community Health Worker program, residents are unaware it exists and how to access it.

**Recommendations:** Food for Families must expand its capacity to match the extent of the need. Community Health Workers and Social Workers from MGH-Chelsea must engage more extensively in direct community-based outreach as trusted agents to assist families that lack information on how to access MGH programs, state protections, and other resources.

> **"…SERVICE PROVIDERS MUST NOT ONLY TRANSLATE MATERIALS INTO SPANISH BUT ALSO ENGAGE THE COMMUNITY DIRECTLY."**

Alexander Y. Walley, MD

## Alexander Y. Walley, MD

*Associate Professor of Medicine and Director, Grayken Addiction Medicine Fellowship*
*Clinical Addiction Research and Education Unit*
*Boston Medical Center/Boston University School of Medicine*

The best data we have appear to show that the COVID-19 pandemic has not slowed the overdose crisis but is likely worsening it. I had early hopes that lockdown and restrictions would lead to a less deadly opioid supply but this does not appear to have happened. Fentanyl appears to be here to stay and is deadly as ever. Accessing treatment and harm reduction is more difficult during the pandemic for many, especially those with other challenges, including homelessness, lack of transportation, and medical and mental health problems. On the bright side, some opportunities to expand access to care have expanded, including broader use of telehealth and reduced regulations on methadone take-home dosing. As with other crises our communities have faced, the innovation, resilience, and persistence among people facing the stigma of substance use, along with their harm reduction and treatment care providers, have been an inspiration. We need to continue to build on this innovation, resilience, and persistence to adapt to the ongoing challenges of the overdose crisis we face in the midst of the COVID pandemic.

> **"…THE COVID-19 PANDEMIC HAS NOT SLOWED THE OVERDOSE CRISIS BUT IS LIKELY WORSENING IT."**

Steve Walsh

## Steve Walsh

*President and CEO, Massachusetts Health and Hospital Association*

COVID-19 has changed virtually everything for our hospitals, our health care system, and our patients. While it has been a year of devastation and heartbreak, there are so many ways in which this crisis has pushed us to be better, more innovative, and more cohesive.

The crisis has turbo-charged innovation in health care. We learned, once and for all, that telehealth works. Since March, there have been almost 5 million telehealth visits within the state's Medicaid program alone. Our providers are thrilled that virtual care now has a permanent place in our health care future.

> **"…THE PANDEMIC HAS HIGHLIGHTED THE EXTRAORDINARY RELATIONSHIP BETWEEN HOSPITALS AND THEIR COMMUNITIES"**

We have weathered the past year because our health care organizations are more united than ever. We are determined to make that lifesaving collaboration a part of the new normal.

David Waters

## David Waters

*CEO, Community Servings*

As a nonprofit providing medically tailored meals (MTM) to isolated, food-insecure individuals experiencing chronic illnesses throughout Massachusetts, we recently partnered with eight accountable care organizations (ACO) through the MassHealth Flexible Services Program in 2020.

Despite launching our Flex programs amid the pandemic, we successfully home-delivered over 649,744 meals in 2020 — a 40 percent increase since March 2020.

Based on their illness and demographic profiles, these food-insecure individuals are at high risk of experiencing the worst impacts of COVID-19 — yet without Flexible Services, they would have lacked critical access to the MTMs essential to maintaining their health. This program allows them to remain safe at home, significantly reducing their exposure to COVID.

The pandemic magnified an already gaping hole in the safety net — the absence of government resources available to address the confluence of food insecurity, which has doubled in Massachusetts since this time last year, chronic illness, and the need to manage conditions at home. While Flexible Services programs are leading examples of addressing these issues, more expansive government initiatives are needed to ensure that the most medically complex and socially vulnerable individuals receive the nutrition they need to manage their illnesses.

> **"THE PANDEMIC MAGNIFIED AN ALREADY GAPING HOLE IN THE SAFETY NET."**

Frederica M. Williams, MBA

## Frederica M. Williams, MBA

*President and CEO, Whittier Street Health Center*

Throughout the COVID-19 crisis, Whittier Street Health Center has been one of the largest community health providers of free testing in Boston's low-income communities of color. With our long-term laser focus on addressing health disparities, social determinants of health, and the economic inequities in minority and low-income communities, we were strategically positioned to proactively respond to the needs of our community with high-quality and culturally sensitive medical, behavioral, and social services. The pandemic has exacerbated the long-standing health, social, and economic issues that have negatively impacted the health and well-being of our patients.

With the arrival of the COVID-19 vaccine, we have turned to the challenge of ensuring that our traumatized Black and Brown communities, where COVID-19 infection rates are 2–3 times that of other populations, will have equal access to the lifesaving tools now available.

We opened a vaccine clinic at our main site and satellite clinic and launched a comprehensive vaccine campaign, incorporating public education and communications and pop-up mobile vaccine clinics at various hot spots, public housing developments, senior housing, and faith institutions, with the goal of overcoming vaccine hesitancy and increasing vaccination rates in communities where the vaccine is needed most.

If there is a silver lining to the challenges we have faced in providing health care to our communities over the past year, it is that the yawning gap in access to quality care and the insidious impact of social health determinants such as poverty, systemic racism, and unemployment finally received wider exposure. These will be harder to ignore as we move forward. It is our hope that these issues will be permanently addressed with policy changes and funding to support the implementation of strategies to address the issues.

Many of the programs we launched to address health equity and social justice are not funded, creating financial challenges for nonprofits with bold visions and tight margins.

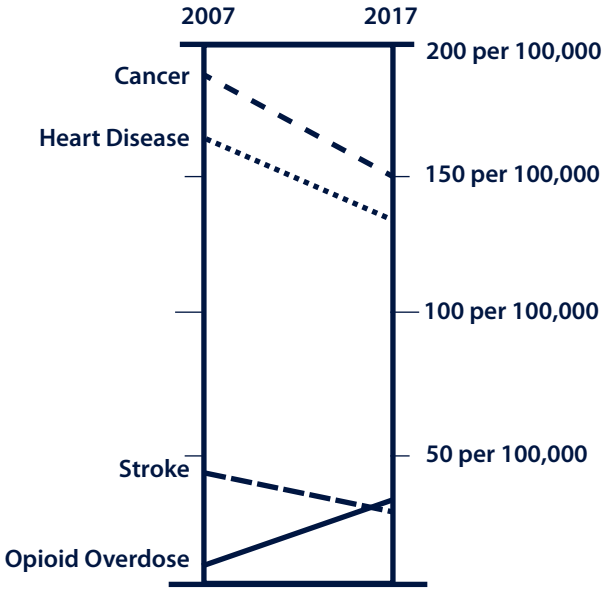
**“… THE YAWNING GAP IN ACCESS TO QUALITY CARE AND THE INSIDIOUS IMPACT OF SOCIAL HEALTH DETERMINANTS FINALLY RECEIVED WIDER EXPOSURE.”**

# Executive Summary

Massachusetts is one of the healthiest states in the nation. Five major killers lost potency in Massachusetts in the decade from 2007 to 2017 — cancer, heart disease, stroke, Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), and motor vehicle collisions.

And yet, overall indicators of health tell a different story about the direction in which Massachusetts is heading. Life expectancy typically increases over time, but it fell three times during that decade in Massachusetts. So-called deaths of despair — deaths due to overdose, alcohol, and suicide — share a large portion of blame. During the decade, opioid overdose deaths rose 210 percent; alcohol-induced deaths rose 35 percent; and death by suicide rose 23 percent. The age-adjusted mortality rate for opioid overdose now exceeds that for stroke (see figure 1).

**FIGURE 1** Age-Adjusted Mortality Rates for Selected Conditions, Massachusetts, 2007–2017




*Source:* Authors' analysis of data from United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 2019.

Talking to someone can be helpful when facing suicidal thoughts. There are resources available, including calling **(800) 273-8255** or texting HOME to 741741 from anywhere in the United States.

Trends in disease and mortality look different depending on education, age, race, and ethnicity. Of note, age-adjusted mortality dropped 16 percent for Black individuals from 2007 to 2017 in

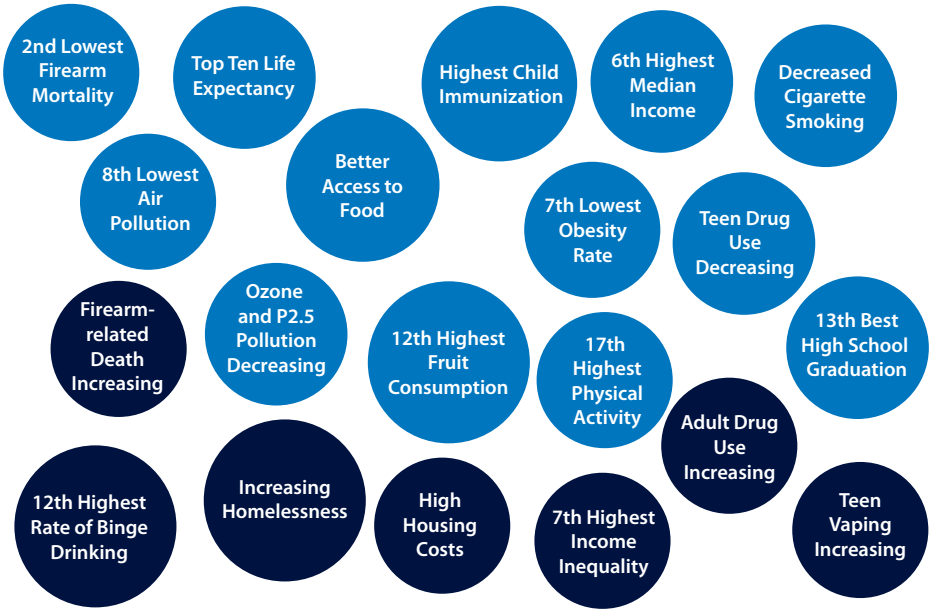
Massachusetts. Improvements in heart disease and cancer mortality drove this trend. Following the national trend, education level is a major indicator of health status. In Massachusetts, the mortality rate for individuals who did not obtain education after high school is three-and-a-half times higher than those that did.

> **"AGE-ADJUSTED MORTALITY DROPPED 16% FOR BLACK INDIVIDUALS OVER THE PAST 10 YEARS IN MASSACHUSETTS."**

Turning to factors that affect health, Massachusetts again ranks among the healthiest states in the nation, but there are areas that could be improved (see figure 2). Looking at health-related behavior, cigarette smoking rates are down, but e-cigarette use is up. Binge-drinking rates remain high. Use of illicit substances is about average compared to the nation. Massachusetts adults are increasing illicit drug use; adolescents are decreasing use.

Looking at economic factors, Massachusetts has among the highest incomes in the country but also has one of the highest indicators of income inequality. While the Massachusetts unemployment rate fell by half from 2007 to 2017, the real wage did not increase for low-income workers. Massachusetts is one of the best 10 states in the nation for access to food, but hunger still exists in the state. Massachusetts is one of the worst states for high housing costs. Homelessness is increasing in the state.

**FIGURE 2** Select Massachusetts Health Factors




Looking at the health care system, great historical strides in access have opened the door to opportunities to improve care. Massachusetts has the highest rate of individuals with health insurance in the nation, but individuals across the income spectrum report issues with accessing medical care. Access to fluoridated water is below average, and dental outcomes are about average when compared to the nation as a whole. Massachusetts has some of the most comprehensive behavioral health coverage in the country but ranks worse than average for individuals needing but not receiving treatment for a range of behavioral health needs.

Even though Massachusetts ranks well on both health and health-related factors, there is still room for improvement and emerging concerns. This report dives deeper into these trends in order to inform readers about potential paths forward to a healthier Massachusetts.

# Introduction

This is the 10th edition of the Massachusetts Health Council's biennial report on the health of Massachusetts residents. The report updates data and trends on health conditions and factors affecting the health of the people of Massachusetts. The report is organized into three chapters:

**CHAPTER 1: THE BIG PICTURE** — Life expectancy, mortality, and a discussion of strategies employed to address the COVID-19 pandemic, including the concept and use of the quality-adjusted life year as a metric to evaluate interventions

**CHAPTER 2: SELECTED HEALTH CONDITIONS AND INJURIES** — Conditions and injuries whose incidence may be reduced or managed through education, prevention, accessible treatment, and affordable treatment, and other public health approaches

**CHAPTER 3: SOCIAL DETERMINANTS OF HEALTH, RISK AND PROTECTIVE FACTORS** — Social, environmental, and behavioral factors that affect health

# 1 The Big Picture

## Editorial Comment

Along with other COVID-19-specific material found throughout this 10th edition of *Common Health for the Commonwealth*, the Massachusetts Health Council presents a special expanded Big Picture chapter. Touching briefly upon recent life expectancy data and mortality rates in Massachusetts, the chapter goes on to provide analysis and commentary on public health mitigation strategies employed nationally and in Massachusetts to address the COVID-19 pandemic. Dr. Marcia Testa of the Harvard T. H. Chan School of Public Health and the Massachusetts Association of Health Boards discusses the concept of Quality-Adjusted Life Years and how giving more weight to that metric in benefit-to-risk calculations would have resulted in different COVID-19 interventions. Dr. Shira Doron of Tufts University School of Medicine provides additional commentary on the harms that may have accrued from prolonged school closures and whether in-person learning could have safely resumed sooner. Their commentaries do not necessarily reflect the positions or views of the Massachusetts Health Council or its members.

Once it became apparent in early 2020 that a truly dangerous pandemic was upon us, federal, state, and local government officials, scientists, hospitals and health care providers, businesses, school districts, and administrators of nursing homes, senior housing, universities, prisons, and other settings responded widely with closures and lockdowns of varying scope and duration. Drs. Testa and Doron make the case that, as data began to come in regarding where and how the virus was being spread and how it was affecting those infected, modifications to interventions could have been made earlier, thereby avoiding many of the negative impacts of closures and lockdowns.

COVID-19 bears some resemblance to previous epidemics — the 1918 influenza pandemic, polio, HIV/AIDS, Ebola, swine flu, etc. — and key differences as well. It is clear that COVID-19 and responses to pandemics in general will be a point of discussion for students and officials in government, public health, education, and other domains for years into the future. The Massachusetts Health Council plans to host a forum later in 2021 at which leaders from the fields of epidemiology, government, medicine, business, and education will reflect on how we have responded to COVID-19, take stock of where we are presently, and offer thoughts on how we must prepare for future epidemics.

We are deeply grateful to Dr. Testa for the robust explication she provides of the value of using Quality-Adjusted Life Years as a key metric in evaluating public health strategies and to Dr. Doron for her commentary on the harms to children and families that may have resulted from well-intentioned school closures. They have helped stimulate a needed discussion of the response to COVID-19, and the Massachusetts Health Council looks forward to furthering this conversation.

# Mortality, Life Expectancy, and Quality-Adjusted Life Years

## *Mortality Tables*

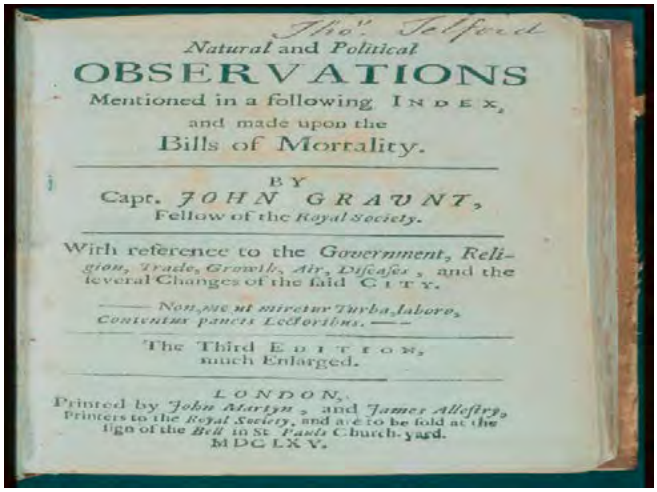
**WHAT IS A MORTALITY RATE?**

*Mortality* measures the number of deaths for a population. A *mortality rate* is the number of deaths in a year per a certain amount of people (for example, 700 deaths per 100,000 people).

*CDC. Principles of Epidemiology*

Crude mortality rates view the "big picture" of the state of the nation's health through a black-and-white lens. Until the 20th century, death was essentially the only health outcome considered when evaluating the risk of disease and the benefits of medical and public health interventions. Historically, the mortality table, the predecessor of the life table, was first systematically recorded by the English statistician John Graunt, born April 1620. Originally a prosperous haberdasher until his business was destroyed in the Great Fire of London in 1666, Graunt held municipal offices and a militia command. While still active as a merchant, he began to study the death records that had been kept by London parishes since 1532. Noticing that certain phenomena of death statistics appeared regularly, he was inspired to write *Natural and Political Observations … Made upon the Bills of Mortality* (1662). He produced four editions of this work; the third (1665) was published by the London-based Royal Society, the oldest scientific academy in continuous existence, of which Graunt was a charter member. The preface to his famous *Observations on the Bills of Mortality* is dated 1662. Graunt, considered the founder of the science of demography, recorded deaths and made the astute observation that deaths surged during the summer.

**FIGURE 3** Title page of *Natural and Political Observations … Made upon the Bills of Mortality* (1662) by John Graunt



Natural and Political

OBSERVATIONS

Mentioned in a following INDEX,

and made upon the

Bills of Mortality.

BY

Capt. JOHN GRAUNT,

Fellow of the Royal Society.

With reference to the Government, Religion, Trade, Growth, Air, Diseases, and the several Changes of the said CITY.

Non, sine ut miretur Turba, labore,
Contentus paucis Lectoribus.

The Third EDITION,
much Enlarged.

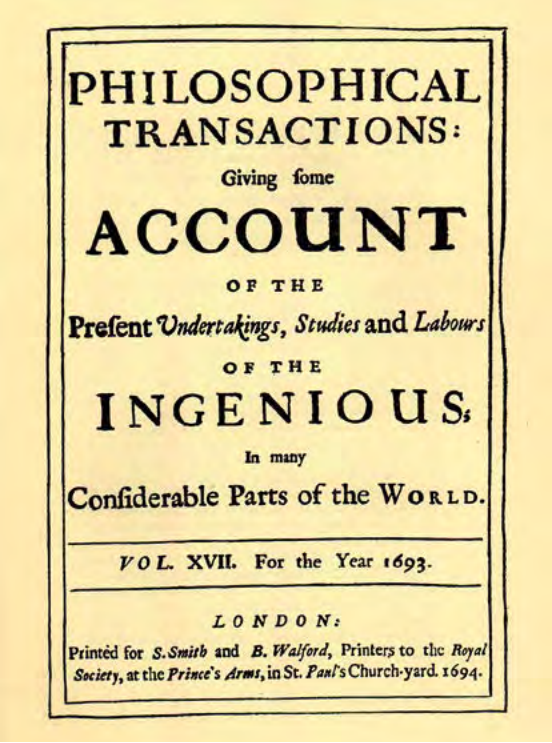
LONDON,
Printed by John Martyn, and James Allestry,
Printers to the Royal Society, and are to be sold at the
Sign of the Bell in St. Paul's Church-yard.
MDCLXV.

*Source:* Photograph of cover page of *Natural and Political Observations … Made upon the Bills of Mortality* by John Graunt. Author's personal collection.

John Graunt died in 1674 of jaundice at the age of 53, much longer than the life expectancy of 34 years in 1693 as later determined by a fellow British mathematician and astronomer and Royal Society member, Edmund Halley (1656–1742). Halley developed the first life table, although he is better known for calculating the orbit of a comet later named after him. Halley worked for the Royal Society in a number of endeavors. Most notably, he edited the Society's journal, *Philosophical*

*Transactions*, which published some of the world's first actuarial tables. These life tables included only the number of deaths since Halley had no population estimates of the numbers of individuals living or the age groups he was studying. Indeed, he used the life table to infer the population size. To convert from cross-sectional to longitudinal, he assumed that the population was stationary. This concept is an important assumption underlying the construction of life tables and assumes that the number of people alive within any given age group never changes. This assumption implies that a census taken at any time point enumerates the same population with the same distribution among age groups. Halley's first life table of Breslau, Germany (currently Wrocław, Poland), published in 1693 was based upon death data collected between 1687 and 1691.[1] It calculated that of 1,000 individuals born, by the age of 34 years, 499 would still be alive. Hence, the concept of average life expectancy was born and estimated as age 34 in Breslau in 1687–1691. Given that Halley himself lived until the age 85, several years longer than the 76.3 years life expectancy of White males in the United States in 2019 is a testament to the concept of human life span versus human life expectancy as described in the next section.

**FIGURE 4** Issue of *Philosophical Transactions* from 1693


PHILOSOPHICAL
TRANSACTIONS:
Giving ſome
ACCOUNT
OF THE
Preſent *Undertakings, Studies* and *Labours*
OF THE
INGENIOUS,
In many
Conſiderable Parts of the WORLD.
*VOL.* XVII. For the Year 1693.
*LONDON:*
Printed for *S. Smith* and *B. Walford*, Printers to the *Royal Society*, at the *Prince's Arms*, in St. *Paul's* Church-yard. 1694.

*Source:* Photograph of cover page of the Journal of the Royal Society, *Philosophical Transactions*, Volume 17, 1693. Author's personal collection.

## *Life Tables*

In contrast to the mortality table, the life table and its associated summary measure, the period table life expectancy, can be used to capture the big picture of health in various shades of gray

[1]Halley, E. An estimate of the degrees of the mortality of mankind; drawn from curious tables of the births and funerals at the city of Breslaw; with an attempt to ascertain the price of annuities upon lives. *Philosophical Transactions*. 1693. 17(196):596–610.

because it is a composite summary of age-specific death rates. Historically, life expectancy has increased over time. Advances in medical care and treatments reduce age-specific mortality rates, resulting in life years gained within age groups. Reduced mortality in the youngest ages results in the most significant gains in life expectancy. However, the maximum human life span has been relatively constant throughout history. The oldest living person of record, Jeanne Calment of France, died on August 4, 1997, at age 122 years and 164 days, reflecting the absolute upper bound of life span. As life expectancy trends closer to the upper bound of life span, life expectancy increases over time due to improvements in living conditions, and medical and public health intervention will plateau unless science finds a way to increase life span. When there are substantively different changes from year to year in mortality among age groups, life expectancy as a big picture summary measure for cross-year comparisons is no longer valid. When this type of age-by-time interaction occurs, the age-specific mortality rates should be compared over time.

**WHAT IS THE PERIOD TABLE LIFE EXPECTANCY?**

Life expectancy estimated from the "period life table" presents what would happen to a hypothetical cohort if it experienced throughout its entire life the mortality conditions of a particular period in time. It renders a "**snapshot**" of current mortality experience and shows the long-range implications of a set of age-specific death rates that prevailed **in a given year**. In this report, the term *life table* refers only to the period life table and not to the cohort life table that represents the mortality experience of an actual birth cohort.

In 2019, life expectancy at birth was 78.8 years for the total US population — an increase of 0.1 years from 78.7 years in 2018[2]. For males, life expectancy increased 0.1 years (1.2 months) from 76.2 years in 2018 to 76.3 years in 2019. For females, life expectancy increased 0.2 years (2.4 months) from 81.2 years in 2018 to 81.4 in 2019. To put this yearly gain in perspective, over 50 years ago in 1969, life expectancy was 70.2 years, 8.6 years lower than in 2019. In 1969, life expectancy was 66.7 years for males and 73.8 years for females. For each year since 1969 through 2014, when life expectancy reached an all-time high of 78.9 years, there had been a steady gain averaging approximately 0.2 years (2 months) per year. However, starting in 2015, there was a drop of 0.2 years to 78.7 years, no change in 2016, and then another reduction to 78.6 years in 2017. In 2018, the trend reversed with an increase to 78.7 years, and then another increase to 78.8 years in 2019. This type of variability signals a plateauing, most likely due to the fixed boundary of life span.

## *Life Expectancy and Health Disparities*

Black Americans have consistently had lower life expectancy than Whites. However, over the past two decades, gains have been greater in the Black population than among Whites, narrowing the gap.[3, 4] Hispanics have consistently had higher life expectancy than Whites, often called the Latino or Hispanic epidemiological paradox. Moreover, even greater improvements in life expectancy in

[2]Kochanek KD, Xu JQ, Arias E. Mortality in the United States, 2019. NCHS Data Brief, no 395. National Center for Health Statistics. Published 2020.
[3]Harper S, Lynch J, Burris S, Davey Smith G. Trends in the black-white life expectancy gap in the United States, 1983–2003. *JAMA*. 2007;297:1224–1232.
[4]Harper S, Rushani D, Kaufman JS. Trends in the black-white life expectancy gap, 2003–2008. *JAMA*. 2012;307:2257–2259.

the Hispanic population widened the gap between Whites and Hispanics in recent years, further increasing the Hispanic mortality advantage.[5]

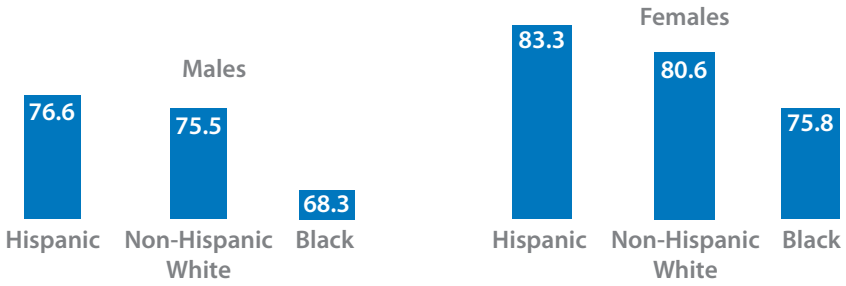
If there is consistency across age-specific mortality rates within population subgroups, life expectancy can provide a valid big picture summary for comparing population subgroups by sex, race, and ethnicity. The latest provisional US 2020 life expectancy was highest across all sex and race/ethnicity groups for Hispanic females (83.3 years), followed by non-Hispanic White females (80.6 years) (see figure 5).[6] Hispanic males also had a higher life expectancy (76.6 years) as compared to non-Hispanic White males (75.5 years). Life expectancy of both non-Hispanic Black females (75.8 years) and males (68.3 years) was lower than either Hispanics or non-Hispanic Whites. These life-expectancy differences were consistent across all age categories.

**WHAT ARE DISPARITIES?**

A disparity is an observed difference, such as the difference in income or in life expectancy. Some disparities reflect unfair differences, which are referred to as inequities.

*Boston Public Health Commission. Health Disparities v. Health Inequities*

**FIGURE 5** 2020 United States Life Expectancy by Sex, Race, and Hispanic Origin




*Source:* Arias E, Tejada-Vera B, Ahmad, F. Provisional Life Expectancy Estimates for January through June, 2020. National Vital Statistics System, Vital Statistics Rapid Release Program. www.cdc.gov/nchs/data/vsrr/VSRR10-508.pdf. Published 2021.

## *Impact of COVID-19 on Life Expectancy*

As an annual snapshot of mortality in time, it was certain that the 2020 life expectancy would decrease as compared to prior years due to the COVID-19 pandemic. While the magnitude of the decrease would depend on the age-specific mortality rates, one trend was certain: the overall COVID-19 impact on life expectancy in comparison to other pandemics, such as the 1918 influenza pandemic, was going to be much smaller.

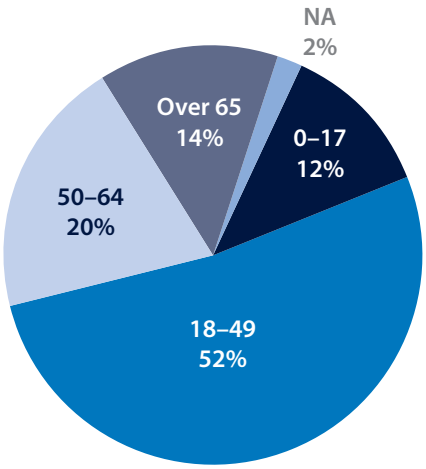
The reason for the differences in life expectancy between the 1918 influenza and the COVID-19 pandemics is that in the case of the latter, serious cases of the disease, unlike the SARS-CoV-2 virus that causes it, are very unlikely to occur in individuals under the age of 50. As shown in the two pie charts, while individuals between 18 and 49 years of age accounted for 52 percent of those that

[5]Fenelon A, Blue L. Widening life expectancy advantage of Hispanics in the United States: 1990–2010. *J. Immigr. Minor. Health.* 2015;17:1130–1137.

[6]Arias E, Tejada-Vera B, Ahmad, F. Provisional Life Expectancy Estimates for January through June, 2020. National Vital Statistics System, Vital Statistics Rapid Release Program. www.cdc.gov/nchs/data/vsrr/VSRR10-508.pdf. Published 2021.

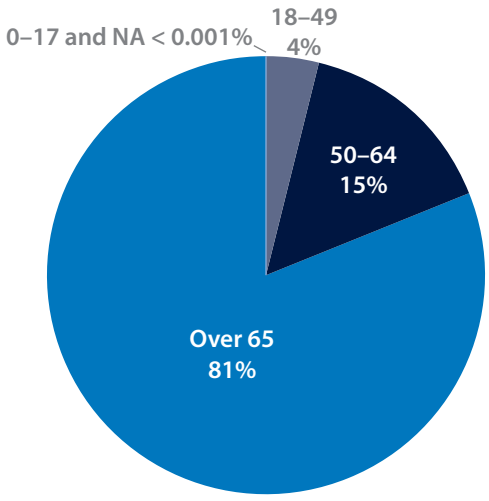
have tested positive for the virus (see figure 6), they accounted for less than 5 percent of COVID-19-related deaths (see figure 7). In striking contrast, while individuals over age 65 accounted for 81 percent of the deaths, they accounted for only 14 percent of those that tested positive. The 2020 US provisional life expectancy estimates described previously showed that life expectancy dropped to 77.8 years during that time, a decrease of one year, equivalent to life expectancy in 2006 and 2007. However, this one-year drop during the COVID-19 pandemic is only a small percentage (8.5 percent) compared to the drop observed during the 1918 influenza pandemic.

**FIGURE 6** US COVID-19 Cases by Age as of March 31, 2021




*Source:* United States Centers for Disease Control and Prevention. National Center for Health Statistics. COVID-19 Case Surveillance Public Use Data with Geography. https://data.cdc.gov/d/n8mc-b4w4/visualization. Accessed April 10, 2021.

**FIGURE 7** US COVID-19 Deaths by Age as of March 31, 2021




*Source:* United States Centers for Disease Control and Prevention. National Center for Health Statistics. Provisional COVID-19 Deaths by Sex and Age. https://data.cdc.gov/NCHS/Provisional-COVID-19-Deaths-by-Sex-and-Age/9bhg-hcku. Accessed April 10, 2021.

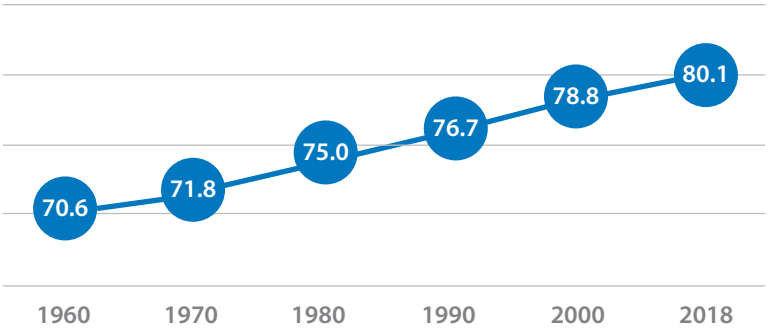
The pre-pandemic 1917 life expectancy of 50.9 years dropped by 11.8 years to 39.1 years in 1918 due to the influenza pandemic. The number of influenza deaths in 1918 was estimated to be at

least 50 million worldwide with approximately 675,000 deaths occurring in the United States alone. At that time, the US population was estimated at approximately 100 million individuals compared to 328 million today. With over three times the population, US deaths for COVID-19 after one full year had not yet reached the number of deaths due to the 1918 influenza pandemic. The primary reason for the 12-fold higher loss in life expectancy in 1918 as compared to COVID-19 was due to the ages most impacted by the disease. Although the 1918 influenza mortality was high among people 65 years and older — similar to COVID-19 — it was also high in children younger than 5 years and younger adults aged 20–40 years. In contrast, COVID-19 mortality in these two age groups accounted for less than 1 percent of deaths. Research on health disparities has gained further momentum during COVID-19.[7] While it is too early to fully determine the COVID-19 impact on race and ethnicity-specific life expectancy, provisional data and modeling have projected an increase in the Black–White life expectancy gap. Hispanics, who have consistently shown an advantage over both Blacks and Whites, are projected to have their survival advantage reduced.[8]

## *Life Expectancy in Massachusetts*

In 2018, Massachusetts life expectancy as calculated by the CDC was 80.1 years, ranking sixth highest out of the 50 US states and the District of Columbia.[9] This translates to nearly a gain of 10 years since 1960 (see figure 8). The simple interpretation is that at birth in 2018, on average, 50 percent of infants should be able to celebrate their 80th birthday.

**FIGURE 8** Massachusetts Life Expectancy — CDC Estimates



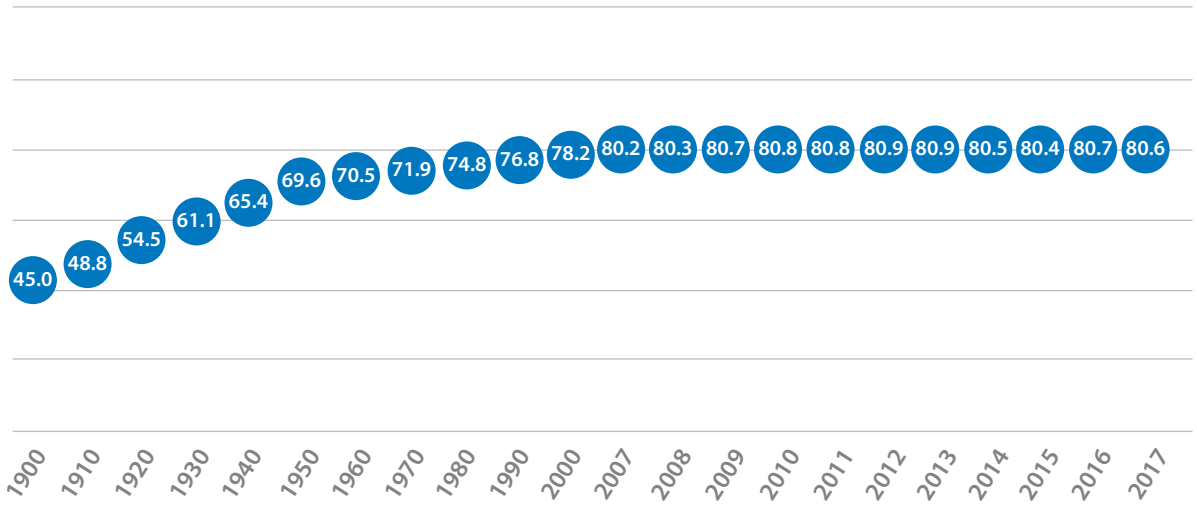

*Source:* United States Centers for Disease Control and Prevention. National Center for Health Statistics. COVID-19 Case Surveillance Public Use Data with Geography. https://data.cdc.gov/d/n8mc-b4w4/visualization. Accessed April 10, 2021.

[7]Andrasfay T, Goldman N. Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino populations. medRxiv [Preprint]. 2020:2020.07.12.20148387. doi: 10.1101/2020.07.12.20148387. Update in: *Proc Natl Acad Sci U S A*. 2021;118(5):e2014746118.
[8]Xu JJ, Chen JT, Belin TR, Brookmeyer RS, Suchard MA, Ramirez CM. Racial and ethnic disparities in years of potential life lost attributable to COVID-19 in the United States: An analysis of 45 states and the District of Columbia. *Int J Environ Res Public Health*. 2021;18(6):2921.
[9]Arias E, Bastian B, Xu JQ, Tejada-Vera B. U.S. State Life Tables, 2018. National Center for Health Statistics. https://doi.org/10.15620/cdc:101128. Published 2021.

The Massachusetts Department of Public Health (DPH) also calculates life expectancy as shown in figure 9. Although the methods of calculating life expectancy used by the CDC and DPH are similar, they are not identical. The DPH data allow one to examine changes in life expectancy back to the turn of the 20th century when life expectancy was just 45 years. If one drills down even further into the more recent DPH annual data, Massachusetts saw year-to-year life-expectancy declines only three times between 2007 to 2017 at years 2014, 2015, and 2017. However, the decreases were very small and likely due to random fluctuations and variations in the denominator population estimates, rather than an enduring health trend.

As shown in figure 9, the plateauing of life expectancy seems to have begun in 2010.

**FIGURE 9** Massachusetts Life Expectancy — DPH Estimates




*Source:* Massachusetts Department of Public Health. Registry of Vital Records and Statistics. Massachusetts Deaths 2016. www.mass.gov/files/documents/2019/08/19/DPH-Death-Report-2016-20190815.pdf. Published November 2018. Accessed April 10, 2021.

As life expectancy reaches the upper life-span boundary, it is important to focus one's attention on what causes mortality in the young — the biggest influencer of life expectancy. It appears that a surge in "deaths of despair" — deaths due to overdose, alcohol, and suicide — will be the most likely culprit for future decreases in, or failure to increase, life expectancies, even with survival gains in the elderly. From 2007 to 2017, Massachusetts opioid overdose deaths rose 210 percent; alcohol-induced deaths rose 35 percent; and death by suicide rose 23 percent. These deaths are concentrated primarily among young adults. In both the United States and Massachusetts, opioid overdose deaths more than doubled in the last 10 years and tripled for individuals aged 24–35.[10] As described previously, life expectancy calculations tend to put heavier weight on conditions that

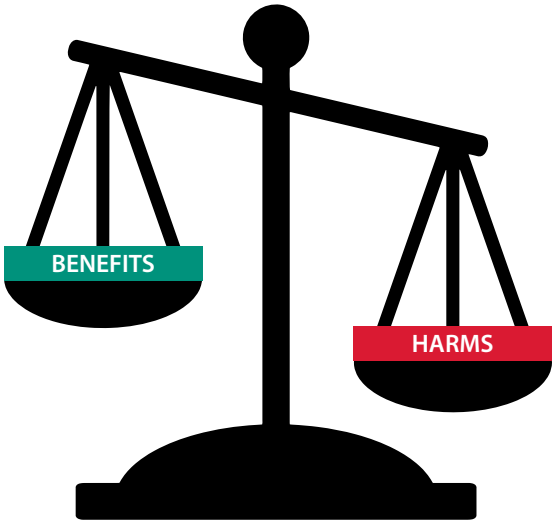
[10]Kaiser Family Foundation. State Health Facts. Opioid Overdose Deaths by Age (Years 2007–2017). www.kff.org/other/state-indicator/opioid-overdose-deaths-by-age-group/?dataView=0&currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

cause deaths among younger individuals. While overdose and suicide rates are small compared to heart disease and cancer, their relative concentration among young individuals drives down life expectancy. Even with these increases, the Commonwealth's low mortality rate places it among the healthiest states in the nation; it boasts the ninth-lowest mortality rate and the third-lowest infant mortality rate.[11]

## *Quality-Adjusted Life Years: Adding Color to the Big Picture*

While life years gained or lost are more informative than crude mortality rates when painting the big picture of health, it is akin to painting only in shades of gray. Using ***quality-adjusted life years*** infuses color into the big picture. Quality of life as the ultimate health outcome has been considered the gold standard for weighing the benefits and harms of public health and medical interventions and treatments for nearly 40 years.

**FIGURE 10**




The quality-of-life construct was first introduced during the early debates of quality versus quantity of life. The debates began seriously in the 1970s when health care providers questioned how far medical care should go to increase survival using extraordinary techniques such as life support for individuals with minimal brain function. As medical and public health decision makers used quality of life as a commonly accepted health outcome, measuring it became a primary focus of health outcomes research over 25 years ago.[12]

Quality-of-life measurement embraces the 1948 World Health Organization definition of *health* as being "a state of complete physical, mental, and social well-being, and not merely the absence of

[11]Kaiser Family Foundation. State Health Facts. Infant Mortality Rate 2016. Kaiser Family Foundation analysis of United States Department of Health and Human Services (US DHHS), Centers of Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics (DVS). www.kff.org/other/state-indicator/infant-death-rate/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Infant%20Deaths%22,%22sort%22:%22asc%22%7D.

[12] Testa MA, Simonson DC. Assessing quality-of-life outcomes. *N Engl J Med.* 1996;334:835–840. PMID: 9809729.

disease or infirmity."[13] The *quality-adjusted life year* (QALY) is a generic measure of disease burden, combining both the quality and the quantity of life lived. It also is used in economic evaluations to assess the relative values of medical interventions. One QALY equates to one year in perfect health. QALY scores range from 1 (perfect health) to 0 (dead). QALYs can be used to inform medical decision-making and treatment decisions, to evaluate the comparative effectiveness of various medical treatments, and to set priorities for public health programs.[14] From a public health framework, the collective population quality-adjusted life years gained or lost are made from the population health or societal perspective, and not solely from the individual patient, hospital, or health care perspective. As discussed in the next section, decisions about population and societal health require one to adopt a societal perspective in addition to a societal, population-based metric of health, such as quality-adjusted life years gained or lost.

## *Painting the Big Picture: Adopting Quality-Adjusted Life Years and the Societal Perspective to Evaluate the Effectiveness of COVID-19 Public Health Mitigation Strategies*

**FIGURE 11** Benefits and Harms of Mitigation Strategies

- **BENEFITS: Positive Outcomes Mitigation**
  **Consequences: Should Always Outweight HARMS**
  - **DIRECT ⟶ Reduces disease burden in individuals.**
  - **INDIRECT ⟶ Reduces transmission in populations. ⟶ Reduces positivity rates for SARS-COV-2. ⟶ Reduces disease burden in individuals.**
- **HARMS: Negative Outcomes Mitigation**
  **Consequences: Should Never Outweight BENEFITS**
  - **Side effects or adverse reactions**
  - **Increased deaths, morbidity, adverse physical, mental, emotional, social, economic impacts on individuals and populations**

Choosing between different medical treatments, watchful waiting, or no treatment for individuals is typically based on the comparison of the benefits and harms of each choice, which is personalized for each patient. Prior to the availability of effective vaccines during the COVID-19 pandemic, various non-pharmaceutical interventions, such as handwashing, masks, lockdowns, and business and school closures, were used to mitigate morbidity and mortality. Population-based restrictions through government executive orders that included school closures, stay-at-home orders, and business closures were imposed originally for a short term of four to eight weeks to keep hospitals

[13]World Health Organization. Preamble to Constitution. www.who.int/governance/eb/who_constitution_en.pdf. Accessed March 13, 2021.
[14]Weinstein MC, Torrance G, McGuire A. QALYs: The basics. *Value in Health.* 2009. 12:S5–S9. https://doi.org/10.1111%2Fj.1524-4733.2009.00515.x.

from being overwhelmed based upon the assumption that these mitigation strategies would reduce the community spread of COVID-19. Since that time, it has been shown that transmission of COVID-19 was spread overwhelmingly within households in contrast to all other environments, such as business offices, schools, or restaurants. During the first quarter of 2021, 97.3 percent of all COVID-19 case clusters in Massachusetts originated through household transmission.[15] Studies have shown that transmission within schools was also extremely rare.[16,17,18] However, many government officials continued to enforce school closures and business lockdowns beyond the four to eight weeks proposed in the spring of 2020. The health metrics used to assess effectiveness were based primarily on the number of positive SARS-CoV-2 test results and deaths with a positive test result. There was no measurable quantification, surveillance, or tracking of the adverse effects of the nonpharmaceutical mitigation strategies.

A reliable, accurate, and valid comparative benefit-to-risk evaluation of medical and public health interventions requires measuring the health benefits and harms using a common metric such as deaths, hospitalizations, life years lost, and quality-adjusted life years lost. Depending upon the metrics chosen, the choice of treatment could be very different. Also, if one considers only the benefits and does not consider the harms associated with the adverse effects of mitigation strategies as was done in many places during COVID-19, decisions will also vary. Particularly relevant to evaluating the benefit and risk of mitigation strategies that are imposed on the entire population, one must integrate the adverse consequences in addition to the health outcomes experienced by those with COVID-19. Consider that only 0.46 percent of America's population lives in long-term care facilities; however, in 2020 over 40 percent of all reported COVID-19 deaths in the United States happened in a nursing home.[19,20] Imposing restrictive mitigation strategies in schools where there were essentially zero deaths has a much lower benefit-to-risk ratio than imposing those same strategies in nursing homes. Targeted mitigation focusing on the hotspots of transmission is a way to increase the benefit-to-risk ratio. For future planning, it will be important to review how the trade-offs associated with lockdowns, stay-at-home orders, and other social isolation mitigation strategies were integrated into the public health decision-making processes. In retrospect, the *number of quality-adjusted life years* lost due to the adverse effects of these mitigation strategies affecting the entire population more than likely outweighed the potential gains in the small fraction of individuals with serious COVID-19 disease. While the actual calculation of quality-adjusted life years lost and gained due to COVID-19 mitigation strategies on health out comes including survival and quality of life is much more complicated than what we can present in the next section, a simple framework and example suffice for illustration purposes.

[15]Massachusetts Department of Public Health. COVID-19 Dashboard — Active COVID Clusters by Exposing Setting Type. Weekly COVID-19 Public Health Reports. January through March 2021.
[16]Lewis D. Why schools probably aren't COVID hotspots. *Nature*. 2020;587:17–17. www.nature.com/articles/d41586-020-02973-3. Accessed February 9, 2021.
[17]Falk A, Benda A, Falk P, Steffen S, Wallace Z, Høeg TB. COVID-19 cases and transmission in 17 K–12 schools —Wood County, Wisconsin, August 31–November 29, 2020. *MMWR*. 2021;70:136–140. www.cdc.gov/mmwr/volumes/70/wr/mm7004e3.htm?s_cid=mm7004e3_w. Accessed February 2, 2021.
[18]Zimmerman KO, Akinboyo IC, Brookhart MA, et al. Incidence and secondary transmission of SARS-CoV-2 infections in schools. *Pediatrics*. 2021;147(4):e2020048090. http://pediatrics.aappublications.org/lookup/doi/10.1542/peds.2020-048090. Accessed February 3, 2021
[19]What Percent Of Elderly People Live In Nursing Homes? Plus Over 101 Nursing Home Statistics! 2021. www.simplyinsurance.com/nursing-home-statistics. Accessed on March 30, 2021.
[20]The Long-Term Care COVID Tracker. https://covidtracking.com/nursing-homes-long-term-care-facilities. Accessed April 1, 2021.

## A Quality-Adjusted Life Years Approach to Assessing the Benefit and Risks of COVID-19 Public Health Mitigation Strategies

We begin with the 539,723 COVID-19 deaths reported in the United States as of March 31, 2021, and within each age group of those that died, calculate the years of life lost using the 2018 US abridged life table (10-year intervals) assuming they had survived to their natural expectation of life. The number of life years lost can be summed over all those that died, yielding 6,969,500 potential life years lost due to COVID-19, or approximately 13 years per person. However, we know that this is an overestimate because the individuals within the age groups that died typically lived in nursing homes who represented the poorest of health among their age cohort. These individuals would have died sooner than the average individual within that age group. Moreover, nearly all those who died had one underlying medical condition and the majority had at least two. For example, in Massachusetts, approximately 50 percent of those dying with a COVID-19 positive test in Massachusetts were residing in long-term care facilities, or were residents of nursing homes and hospitals. As of April 11, 2021, of the 17,061 COVID-19-related deaths in Massachusetts, 9,061 (53 percent) were residents of long-term nursing facilities. These individuals naturally would have a lower number of years of remaining life as compared to their healthier age cohort members.

Assuming a rather conservative 40 percent decrease in the life expectation for all of the aforementioned reasons, we reduced our estimate to 4,181,700 life years lost among the 539,723 individuals who died from COVID-19. To simplify further, we divide the life years lost by 80 years — the average life expectancy today — to calculate a metric representing the full life lost. With this conversion, there are 52,271 full lives lost due to COVID-19 during the corresponding period, prior to any quality-of-life adjustments. Without quality-of-life adjustments for the state of health on a scale of 1 to 0, all these life years are assumed spent in full health (i.e., utility = 1.0). This implies that the 52,271 lives would be valued at full health for the health state of life years remaining. Considering the large number of individuals that died in long-term care and nursing facilities, the assumption of full health for the remaining years of life is not realistic. For example, one study followed nursing home residents with advanced dementia who scored an average utility rating of 0.17.[21] If one assumed that the average utility rating for the COVID-19 population would be a very optimistic 0.6, applying this would yield a valuation of 31,363 quality-adjusted full lives quality-adjusted life years lost. As one can see, this estimate considers not only the number of years of remaining lives for those that died, but the quality of those remaining years, redrawing the big picture estimate from 539,723 deaths to 31,363 full lives lost due to COVID-19. When the number of full quality-adjusted life years lost due to COVID-19 is greater than those lost to the adverse consequences of the treatment or public health mitigation strategy, then the benefit-to-risk ratio favors implementing the mitigation strategy.

[21]Goldfeld KS, Hamel MB, Mitchell SL. Mapping health status measures to a utility measure in a study of nursing home residents with advanced dementia. *Med Care*. 2012;50(5):446–451. doi: 10.1097/MLR.0b013e3182407e0d.

To evaluate the effectiveness of any medical or public health intervention, one must consider the adverse effects and negative consequences of the intervention or treatment. Measuring this is very complex. The assessment of adverse effects would include deaths of despair resulting from lockdowns and closures, such as those due to suicide, addiction, and alcohol, as well as deaths due to missed cancer screenings, medical care, and mental health care. While the topic is beyond the scope of this article, excess deaths in 2020 compared to 2016 due to causes other than COVID-19 can be used. For example, the number of excess deaths due to just one type of deaths of despair, opioid overdoses, is shown in figure 12 on page 14.[22] This graph reveals that there was a substantial increase in opioid overdoses as compared to the previous five years. Whether these deaths were due to lockdowns and closures of society is not certain, but a partial impact is considered highly likely.

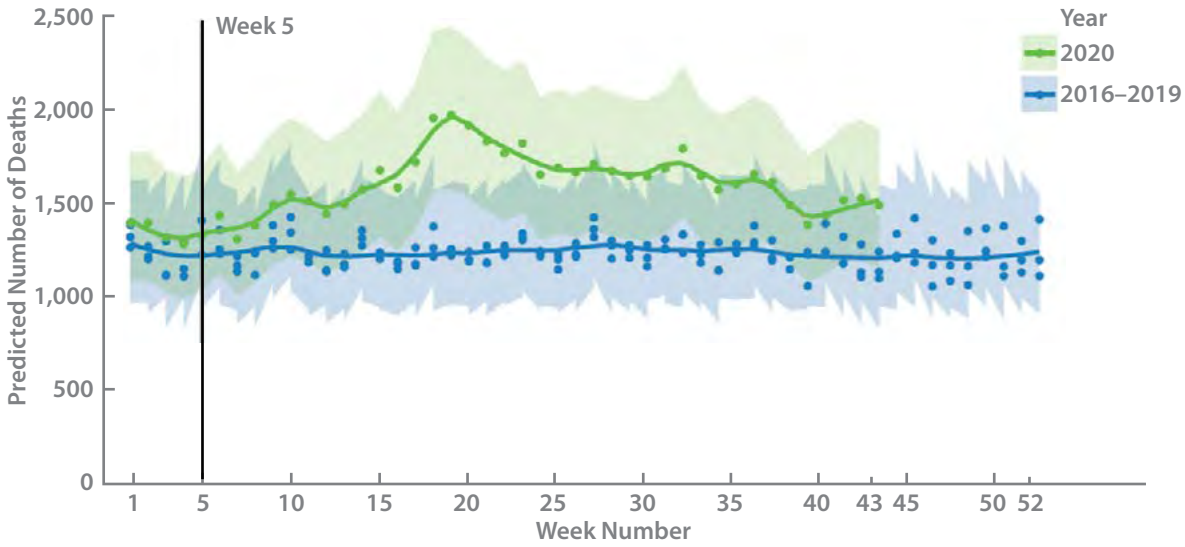
From a quality-of-life perspective, the yearlong COVID-19 lockdowns led to a massive spike in unemployment, rivaling the Great Depression, similarly historic drops in the gross domestic product, and other consequences. The impact of COVID-19 was clear. The disease affected primarily those over the age of 65 and within that age group, those with two or more underlying medical conditions, most notably residents of long-term care and nursing homes. Mitigation lockdown efforts to quell surges in COVID-19 resulted in trillions of dollars of business losses, unemployment, lost wages, and insurmountable decreases in quality of life across an entire population who were by all accounts unaffected by the disease. From a population, quality-adjusted, life-year perspective, the lockdown, if applied to the entire United State population, would have impacted 103,270,000 toddlers, adolescents, and young adults under the age of 25 whose day cares, elementary, middle, and high schools, and colleges and universities were closed. Child abuse, inadequate nutrition, and social isolation of the most vulnerable lower-economic occurred, and disadvantaged populations were the most heavily affected. Universities and colleges either were closed or only allowed limited interactions for their undergraduate and graduate schools, so students experienced not only quality-of-life decrements in social and role functioning, but also substantial increases in anxiety, depression, and for those most seriously impacted, even suicide.[23]

If we only consider the reductions in quality of life in those under 55 years of age and not the excess deaths attributed to lockdowns, one can still visualize the potential benefit-to-harm ratio of a mitigation strategy that applies to an entire population using a comparison of quality-adjusted lives between those that died and all others. We simplify the calculations here for illustration purposes only.

[22]Rossen LM, Hedegaard H, Warner M, Ahmad FB, Sutton PD. Early provisional estimates of drug overdose, suicide, and transportation-related deaths: Nowcasting methods to account for reporting lags. National Center for Health Statistics. https://doi.org/10.15620/cdc:101132. Published 2021.

[23]Ganesan B, Al-Jumaily A, Fong KNK, Prasad P, Meena SK, Tong RK. Impact of coronavirus disease 2019 (COVID-19) outbreak quarantine, isolation, and lockdown policies on mental health and suicide. *Front Psychiatry.* 2021;12:565190. doi: 10.3389/fpsyt.2021.565190. PMID: 33935817; PMCID: PMC8085354.

**FIGURE 12** Excess Opioid Deaths in 2020 Compared to 2016–2019




*Source:* Rossen LM, Hedegaard H, Warner M, Ahmad FB, Sutton PD. Early provisional estimates of drug overdose, suicide, and transportation-related deaths: Nowcasting methods to account for reporting lags. National Center for Health Statistics. 2021. https://doi.org/10.15620/cdc:101132. Note: The vertical grey line on the left corresponds to the week ending February 1, 2020, approximately when the first death from COVID-19 occurred in the United States.

## A QALY Framework for Assessing the Benefit and Risks of Nonpharmaceutical Mitigation Strategies during the COVID-19 Pandemic

There are currently 103,270,000 individuals under the age of 25 in the United States who have a combined 6.9 billion life years remaining. To calculate this number, you simply take the number of individuals in a particular age group and add up their years of remaining life using the life tables. There are 128,460,000 individuals between 25 and 54 with a total of 5.3 billion life years remaining. As one potential scenario, we could assume that on a utility scale of 0 to 1.0, a relatively cumulative life year 0.05 utility unit loss will be experienced by those under the age of 25 due to the acute and lasting effects of one year of lockdown-related mitigation efforts. The construct of cumulative utility applies over the remaining years of life. The utility loss could be greater during the period of the lockdown and less as years went on. While one might argue that once the lockdown period is ended, the utility is regained in full, this has not been the case with other traumatic experiences. For those between 25 and 49, we could assume a somewhat average higher cumulative utility loss of 0.1 during the lockdowns. The older group's higher loss is assumed because this age group was susceptible to enduring impacts of loss of a job, domestic violence, bankruptcy, business closures, being unable to perform work, family, and social roles among other mental, emotional, and role-functioning decrements in health status. For comparison purposes, we consider whether the benefits from saving all the lives lost due to COVID-19 outweigh the harms due to the mitigation interventions. Applying the 0.05 and 0.10 utility losses in the two youngest age groups, quality-of-life adjustment yields a staggering 875,000,000 quality-adjusted life years lost resulting 10,937,500 full lives lost if the lockdowns were imposed for all the remaining years of life. Since the under-55 cohort are the youngest and healthiest among the US population, the major proportion of time lost would have been spent in near full health with a health utility value of over 0.9. However, even assuming a 0.2 reduction in utility over the course of all remaining

years, this would still yield 8,750,000 full lives lost. Again, this does not include the deaths due to despair and failed medical care for other diseases, nor does it include any quality-of-life losses for individuals over 55 years.

From the societal perspective, if one evaluates the benefit-to-harm ratio using quality-adjusted life years and even high estimates of life years lost due to COVID-19 and low estimates of utility lost for the harms, then lockdowns would have a very high bar to overcome the harms. One could make the model more complex by including a disease transmission feedback loop such that the lockdowns prevented a certain amount of the community spread that led to many more lives saved than all those currently observed. However, even if one assumes that the life years lost would have been 10 times higher if there were no lockdowns and school closings, that would result in 313,630 full lives saved. This is still not close to the threshold of 8,750,000 lives lost required to confer a higher benefit than risk for the mitigation strategy. The fact that data confirming that school and business closures did not reduce transmission or the spread and actually led to increased exposure within households where transmission was taking place would argue against the disease transmission feedback loop favoring the benefit side of the equation. Alternatively, one could assume that the cumulative utility reduction was actually much less, proposing a loss of only 0.025 and 0.05 for the under-25 and 25–54 age groups, respectively. Even this model would yield a loss of 4,375,000 full lives due to adverse consequences. While many different models can be employed assuming various parameters in sensitivity analyses, the ultimate goal is to adopt a benefit-to-risk framework for public health decision-making similar to the way that new drugs and devices are approved.

## *Reflections on the Big Picture*

One of the worst plagues in history arrived at Europe's shores in 1347 and just five years later, 25 to 50 million people were dead. The Black Death, as the disease was called, was a devastating global epidemic of bubonic plague that struck Europe and Asia in the mid-1300s. A black-and-white portrait using the numbers of deaths caused by the Black Death was appropriate at the time. Today, an average of only seven human plague cases are reported each year in the United States;[24] however, bubonic plague is treatable with commonly available antibiotics. How one paints the big picture of health to evaluate medical and public health interventions has a huge impact on the programs and interventions that are adopted. Recording only deaths yields a black-and-white picture, while life years and life expectancy give further dimension using various shades of gray representing each death as a number of life years lost. Quality-adjusted life years and measures of quality of life can add the needed dimensions to encompass the World Health Organization's definition of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."

In 1662, 300 years after the plague, John Graunt began analyzing deaths systematically in hopes of observing informative trends to stop the scourge of diseases such as the plague. In 1693, Edmund Halley developed the basic concepts of and published the first life table, which considers that all deaths are not the same and some contribute more life years lost than others. Almost 300 years later, the construct of quality of life as an important health outcome measure gained momentum, beginning with just 317 published articles on the subject in 1980 and rising to 33,876 articles

[24]Centers for Disease Control and Prevention. CDC Plague Home Page. www.cdc.gov/plague/index.html. Access on March 30, 2021.

in 2020. Public health professionals learned many decades ago that crude mortality rates and length of life cannot capture what is important to individuals and populations. The benefit-to-risk framework is used in all decisions involving the approval of new drugs and devices as well as comparative effectiveness therapeutic studies. Furthermore, the 21st Century Cures Act, passed by Congress on December 13, 2016, legislated that "patient experience" involving how treatments impact feelings and functioning should be part of the FDA's drug approval process. The benefit-to-risk and person-focused framework also can be applied to public health interventions. The COVID-19 pandemic will most likely go down in history as the one where quality of life and quality-adjusted life years could have been used to make public health decisions regarding non-pharmaceutical mitigation strategies. For decision makers, these measures can help quantify and balance the benefits and harms within populations of proposed treatments and interventions. Painting the big picture of health in full quality-adjusted color offers a portrait that incorporates physical, mental, and social well-being, and not merely the absence of disease or infirmity.

**Marcia A. Testa, MPH, PhD**
*Senior Lecturer on Biostatistics, Harvard T.H. Chan School of Public Health*
*President, Massachusetts Association of Health Boards*
*Vice Chair, Town of Wellesley Board of Health*

# A Response to "The Big Picture"

I read with interest the chapter by Dr. Marcia A. Testa entitled "Mortality, Life Expectancy, and Quality-Adjusted Life Years." The uncoordinated public health response to the COVID-19 pandemic in the United States in 2020 was disappointing, to say the least. The country has had the fifth highest per capita COVID-19-related death rate in the world, while Massachusetts ranked the second highest out of the 50 states and the District of Columbia.[25] That degree of lost life is inexcusable, owing to many errors made at the federal level and a fragmented approach that left much of the decision-making to governors. Moreover, in addition to our failure to protect people from the dangers of the virus, we also failed to appreciate the importance of a *harm reduction* approach to our pandemic response. Government officials, businesses, and sectors at times implemented interventions with the singular goal of preventing all viral transmission, blind to the negative impact these restrictions might have on the public.

This error was most apparent in the prolonged use of remote schooling during the pandemic. Implemented as a strategy to prevent COVID-19 transmission, schools across the country closed their doors in March 2020, giving birth, unfortunately, to the widespread use of remote schooling. In Massachusetts, this was intended to last only a few weeks as part of a broader stay-at-home order intended to "flatten the curve." The goal of the order was to stop the spread infections over a longer period of time in an effort to prevent the health care system from becoming overwhelmed. This, in turn, would decrease rates of *preventable* morbidity and mortality associated with not having appropriate health care resources (for COVID-19 and all other conditions). At first, this method proved successful. As Massachusetts hospitals filled quickly, and it was clear that they would have been brought to a breaking point if the lockdown had not been implemented as quickly as it had been. Nevertheless, weeks became months as the economy sluggishly reopened. Talk of the "curve" faded, and to some extent, rightly so. As we entered the summer, we were

[25]The Center for Systems Science and Engineering at Johns Hopkins University. COVID-19 Dashboard. http://coronavirus.jhu.edu/map.html. Published May 19, 2021.

succeeding in keeping infection numbers low. COVID-19 treatments were getting better, reducing disease-associated mortality rates, and vaccine development was progressing faster than anyone had imagined possible. It seemed sensible to continue flattening the curve for longer than we had previously planned in order to reap the full benefits of delaying infection in as many Massachusetts residents as possible. Unfortunately, with a full lockdown in place, it was not possible to tell which elements of society could be safely reopened without triggering another surge. Enter the discussion on the reopening of schools.

As the fall of 2020 approached, data were lacking on the safety of in-person schooling. The two big questions were the following:

1. Would teachers and students be in danger due to transmission inside school buildings?
2. Would holding in-person learning increase spread and, in turn, cases and hospitalizations in the communities where the schools were located?

In Israel, schools opened in May 2020 after the country saw low case numbers, only to close again due to large outbreaks. This failure was attributed to a relaxation of mitigation measures. Meanwhile, in Europe and Asia, schools opened quite successfully with one or two meters of distancing and variable masking rules.[26] With this limited information, in the summer of 2020, the Massachusetts Department of Elementary and Secondary Education issued guidance requiring masks in school and at least three feet of distancing, then left the decision-making about learning models to each district. Some chose not to open their doors at all, others chose a six-foot distancing requirement, which meant only half of enrolled students could attend at any given time (a *hybrid-learning* approach) and others opened for full-time in-person learning. Private and parochial schools were more likely to provide fully in-person instruction, and schools in districts with more families of color and lower socioeconomic status were more likely to adopt fully remote models.[27]

Slowly, over the course of the fall of 2020, data on school safety came into better focus. As stated by Dr. Testa, the vast predominance of viral transmission was occurring inside households, calling into question the decision to keep schoolchildren at home. Meanwhile, mounting evidence from countries like Norway and Sweden revealed that, unlike past epidemics such as H1N1 influenza, schools were not sources of transmission or "superspreader" events, even with children seated as close together as one meter (3.3 feet).[28,29,30] In the United States, reputable studies from

[26]Ludvigsson JF, Engerström L, Nordenhäll C, Larsson E. Open schools, Covid-19, and child and teacher morbidity in Sweden. *N Engl J Med.* 2021;384(7):669–671. doi: 10.1056/NEJMc2026670. Epub 2021 Jan 6. PMID: 33406327; PMCID: PMC7821981.
[27]Belsha K et al. A nationwide divide: Hispanic and Black students more likely than White students to start the year online." *Chalkbeat.* www.chalkbeat.org/2020/9/11/21431146/hispanic-and-black-students-more-likely-than-white-students-to-start-the-school-year-online. Published September 11, 2020.
[28]Ludvigsson JF, Engerström L, Nordenhäll C, Larsson E. Open schools, Covid-19, and child and teacher morbidity in Sweden. *N Engl J Med.* 2021;384(7):669–671. doi: 10.1056/NEJMc2026670. Epub 2021 Jan 6. PMID: 33406327; PMCID: PMC7821981.
[29]Brandal LT et al. Minimal transmission of SARS-CoV-2 from paediatric COVID-19 cases in primary schools, Norway, August to November 2020. *Eurosurveillance.* www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.26.1.2002011. Published January 7, 2021.
[30]Earn DJ, He D, Loeb MB, Fonseca K, Lee BE, Dushoff J. Effects of school closure on incidence of pandemic influenza in Alberta, Canada. *Ann Intern Med.* 2012;156(3):173–81. doi: 10.7326/0003-4819-156-3-201202070-00005. PMID: 22312137.

North Carolina, Wisconsin, and Massachusetts demonstrated that, while cases of COVID-19 might enter the building frequently, especially during times of surging community case rates, instances of in-school transmission were extremely rare.

Even in the face of these compelling data, most public schools in Massachusetts remained closed or continued teaching in hybrid mode. Meanwhile, harms to children were accumulating out of proportion to benefits, as depicted in Dr. Testa's diagram of a scale (see figure 10 on page 9). These harms consist of short-term injustices, many of which have long-term implications. It is easy to imagine how the negative impacts of remote schooling on mental health, nutrition, physical activity, social-emotional development, learning loss, and undetected child abuse and neglect can have future implications for earning potential, stability, and the care and well-being of future generations. Indeed, educational attainment is one of the strongest predictors of health, well-being, and life expectancy.[31] To put it simply, school children sacrificed their health and life expectancy for those of adults. Communities of color were also disproportionately affected by poorer-quality remote education, further exacerbating racial disparities in health and life expectancy.[32]

In February 2010, in response to H1N1 influenza, the CDC released a statement advising against school closures, stating, "Based on the experience and knowledge gained in jurisdictions that had large outbreaks in spring 2009, the potential benefits of preemptively dismissing students from school are often outweighed by negative consequences, including students being left home alone, health workers missing shifts when they must stay home with their children, students missing meals, and interruption of students' education."[33] Despite a similar number of pediatric deaths from COVID-19 as H1N1, many students were barred from attending full-time in-person school during the COVID-19 pandemic.[34] In the following sections, I outline several key areas of unbalanced harm reduction as they relate to children and remote- or hybrid-learning models instituted during the COVID-19 pandemic.

## *Learning Loss*

In a study conducted on behalf of the Organization for Economic Cooperation and Development, Eric Hanushek and Ludger Woessmann estimated the loss to lifetime income due to COVID-19 learning-model changes for individual students to be 6 percent (assuming schools were closed or reduced for the equivalent of 67 percent of a year).[35] Given that the US median lifetime earning is $1.7 million, that loss translates to $102,000 per student.

Dr. Testa explained how life tables are used to estimate years lost when someone dies from COVID-19. Using this same methodology, economists Charles L. Hooper and David R. Henderson

[31]Hummer RA, Hernandez EM. (2013). The effect of educational attainment on adult mortality in the United States. *Population Bulletin*. 2013;68(1):1–18. PMCID: PMC4435622.
[32]Galperin H et al. COVID-19 and the distance learning gap. USC Annenberg Research Network on International Communication. http://arnicusc.org/publications/covid-19-and-the-distance-learning-gap. Accessed April 16, 2020.
[33]United States Centers for Disease Control and Prevention. Preparing for the Flu: A Communication Toolkit for Schools (Grades K–12). www.cdc.gov/h1n1flu/schools/toolkit.
[34]Osterholm MT. Making Sense of the H1N1 Pandemic: What's Going On? Center for Infectious Disease Research and Policy. www.cidrap.umn.edu/news-perspective/2009/12/making-sense-h1n1-pandemic-whats-going. Published December 14, 2009.
[35]Hanushek E, Woessmann L. The economic impacts of learning losses. *OECD Education Working Papers*. https://doi.org/10.1787/21908d74-en. Published 2020.

estimated that an 18-year-old who dies from COVID-19 loses 61.5 years of life.[36] However, given the imperfect nature of nonpharmaceutical interventions at preventing COVID-19 acquisition, and a risk of death from COVID of only 0.004 percent among that age group, they estimated that the mitigation measures that we have demanded teenagers practice over the past year and a half would be expected to increase a teen's life expectancy by, on average, approximately 7.5 hours. These experts rightly question whether most individuals would give up $102,000 to live an additional 7.5 hours.

## *Mental Health*

When weighing the risk of harm from COVID-19 and using that calculation to make policy regarding learning models in school or to determine preferences for one's own family, it is also helpful to put it into the context of preexisting risks. As described in figure 13 on page 20, through the age of 34, people are at higher risk of death from transport accidents than from COVID-19.[37] Yet most people travel in some type of transport vehicle at least several times a week. The risk of death from suicide is higher than the risk from COVID-19 between the ages of 5 and 44, and that uses a comparator suicide rate generated in 2018. In reality, the mental health crisis has worsened during the pandemic.

The CDC reported an increase of 44 percent in mental health-related emergency room visits by children during the pandemic compared to the prior year.[38] In Massachusetts, Boston Children's Hospital reported more than 270 admissions of children with suicidal thoughts or attempts, a 40 percent increase from 2019.[39,40] One could therefore argue that for children, the mortality risk associated with keeping schools in remote or hybrid mode outweighs the benefits in terms of prevention of their acquisition of COVID-19 infection.

## *Child Abuse and Neglect*

The 2019 Child Maltreatment report from the US Department of Health and Human Services listed 1,840 abuse-related deaths (which is more than the 388 children who have died from COVID-19 as of this writing).[41] The year 2020 saw a worrisome decline in allegations of child abuse and neglect, reflecting the lack of contact with non-household members such as teachers and health care professionals. One model estimates that more than a quarter of a million instances of child maltreatment that would have otherwise resulted in allegations in the United States between March and May 2020

[36]Hooper CL, Henderson DR. Youth pay a high price for Covid protection. *The Wall Street Journal*. www.wsj.com/articles/youth-pay-a-high-price-for-covid-protection-11620078943?st=jcfew37ur9gy1vx&reflink=article_email_share. Published May 3, 2021.

37 Woolf SH, Chapman DA, Lee JH. COVID-19 as the leading cause of death in the United States. *JAMA*. 2021;325(2):123–124. doi:10.1001/jama.2020.24865.

[38]Leeb RT, Bitsko RH, Radhakrishnan L, Martinez P, Njai R, Holland KM. Mental health–related emergency department visits among children aged <18 years during the COVID-19 pandemic — United States, January 1–October 17, 2020. *MMWR*. 2020;69:1675–1680. http://dx.doi.org/10.15585/mmwr.mm6945a3.

[39]The Editorial Board. Governor Baker is right — Schools must reopen. *The Boston Globe*. February 25, 2021, www.bostonglobe.com/2021/02/25/opinion/governor-baker-is-right-schools-must-reopen.

[40]Mullins L, Jolicoeur L. Mass. Psychiatrists Concerned About Increase In Suicidal Thoughts, Attempts Among Adolescents." Mass. Psychiatrists Concerned About Increase In Suicidal Thoughts, Attempts Among Adolescents | CommonHealth. WBUR. www.wbur.org/commonhealth/2021/03/25/children-suicidal-suicide-attempts-pandemic-hospital. Published March 25, 2021.

[41]Children's Bureau. Child Maltreatment 2019. US Department of Health and Human Services. www.acf.hhs.gov/cb/research-data-technology/statistics-research/child-maltreatment. Published 2021.

alone went unreported due to the pandemic.[42] Despite the decline in reporting, emergency department visits for suspected child abuse and neglect did not decline — it may have even increased.[43] This further highlights that pandemic restrictions, specifically remote and hybrid schooling, may have harmed children more than they helped. Given that the impact of abuse and neglect on children's mental health and well-being is long-lasting with intergenerational effects, it behooves policymakers to learn from the COVID-19 experience before implementing similar restrictions during future epidemics and emergencies.

**FIGURE 13** Age-Specific Mortality Rates (per Million) for COVID-19 (March–October 2020) and Other Leading Causes of Death (March–October 2018)[a]

| | Causes of Death[b] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Unintentional Injuries | | Intentional Injuries | | Leading Causes of Infant Deaths | | |
| Age, y | COVID-19 | Heart Disease | Malignant Neoplasms | Chronic Lower Respiratory Disease | Transport Accidents | Accidental Drug Overdoses | Suicide | Homicide | Birth Defects | Short Gestation | SUID |
| <1 | 7.4 | 51.6 | 8.6 | 2.9 | 15.5 | 1.6 | 0.0 | 46.7 | 773.7 | 682.2 | 603.4 |
| 1–4 | 1.0 | 4.8 | 13.1 | 2.0 | 17.5 | 0.3 | 0.0 | 15.6 | 15.9 | | |
| 5–14 | 1.0 | 2.7 | 13.5 | 2.0 | 14.6 | 0.4 | 9.4 | 4.7 | 6.4 | | |
| 15–24 | 9.9 | 13.8 | 20.9 | 2.8 | 108.3 | 66.1 | 97.0 | 72.1 | 5.5 | | |
| 25–34 | 38.6 | 52.1 | 53.7 | 4.2 | 113.2 | 220.7 | 120.9 | 78.8 | 6.4 | | |
| 35–44 | 109.9 | 169.1 | 172.0 | 10.1 | 93.8 | 234.0 | 128.1 | 54.7 | 7.2 | | |
| 45–54 | 294.8 | 509.7 | 597.5 | 56.1 | 100.7 | 208.2 | 140.3 | 33.9 | 11.2 | | |
| 55–64 | 683.3 | 1239.8 | 1802.4 | 285.8 | 105.0 | 161.2 | 139.8 | 23.7 | 17.8 | | |
| 65–74 | 1574.6 | 2516.9 | 3702.0 | 809.9 | 99.2 | 50.8 | 114.1 | 15.7 | 13.4 | | |
| 75–84 | 3832.4 | 6478.5 | 6845.7 | 2117.3 | 129.9 | 16.0 | 129.6 | 13.2 | 14.9 | | |
| ≥85 | 10 699.7 | 24 530.2 | 10 442.4 | 4278.4 | 139.1 | 14.7 | 133.4 | 13.3 | 31.2 | | |
| Total | 698.8 | 1287.7 | 1219.8 | 307.5 | 89.2 | 122.3 | 102.3 | 39.0 | 19.4 | | |

Abbreviations: COVID-19, coronavirus disease 2019; SUID, sudden unexpected infant death (including sudden infant death syndrome).

[a]Table presents 8-month aggregate COVID-19 mortality rates during the period of March through October 2020[5] and mortality rates for other causes during the period of March through October 2019,[4] the most recent year for which detailed cause-of-death data are available.

[b]Causes of death are defined by *International Statistical Classification of Diseases and related Health Problems* codes for heart disease (I00–I09, I11, I13, I20–I51), malignant neoplasms (C00–C9), chronic lower respiratory disease (J40–J47), transport accidents (injuries) (V01–V99, Y85), accidnetal drug overdoses (X40–X44), suicide (*U03, X60–X84, Y87.1), birth defects (Q00–Q99), short gestation (P05–P08), and sudden unexpected infant death (R95, R99, W75).

*Source:* Woolf SH, Chapman DA, Lee JH. COVID-19 as the leading cause of death in the United States. Reproduced with permission from *JAMA*. 2021. 325(2):123–124. Copyright ©2021 American Medical Association. All rights reserved.

## *Nutrition and Physical Activity*

Another notable harm associated with remote schooling with long-term implications on health and learning is food insecurity. Because many children obtain their meals at school, school closures have exacerbated hunger during the course of the pandemic. The USDA reported that

[42]Rapoport E, Reisert H, Schoeman E, Adesman A. Reporting of child maltreatment during the SARS-CoV-2 pandemic in New York City from March to May 2020. Child Abuse & Neglect. 2020. https://doi.org/10.1016/j.chiabu.2020.104719.

[43] Holland KM, Jones C, Vivolo-Kantor AM, et al. Trends in US Emergency Department Visits for Mental Health, Overdose, and Violence Outcomes Before and During the COVID-19 Pandemic. *JAMA Psychiatry.* 2021;78(4):372–379. doi:10.1001/jamapsychiatry.2020.4402.

approximately 14 percent of US school children experienced food insecurity before the pandemic.[44] By December 2020, the Urban Institute reported 1 in 4 school aged children was hungry, and nearly 4 in 10 school-aged Black and Hispanic children were food insecure.[45] According to the Project Bread website, "Massachusetts has experienced the largest relative increase of food-insecure individuals in the nation due to COVID-19. And the highest increase of food-insecure children at 102%, according to analysis by Feeding America."[46,47]

School closures related to COVID-19 have also exacerbated poor eating habits and contributed to obesity. A July 2020 microsimulation model projected a 2.4 percent increase in obesity through December alone due to inactivity and unhealthy eating.[48] Many pediatricians have reported seeing an increase in overweight patients, and one study demonstrated that children who were obese before the pandemic experienced weight gain and glucose intolerance.[49] This is consistent with a body of literature showing weight gain in children during summer and other school vacations.[50,51,52,53,54]

Compounding the lack of physical education class during school shutdowns, the misguided closing of neighborhood playgrounds and cancelation of outdoor youth sports contributed to sedentary behavior during the pandemic, as documented in a survey study representing families in 35 states and the District of Columbia.[55] This despite the fact that COVID-19 transmission is exceedingly rare outdoors. Of particular concern is that such a sedentary lifestyle could become entrenched, as it is known to be associated with obesity, cardiovascular disease, and diabetes.[56,57]

[44]US Department of Agriculture Economic Research Service. Food Security in the United States. www.ers.usda.gov/data-products/food-security-in-the-united-states.
[45]Gupta P et al. Forty Percent of Black and Hispanic Parents of School-Age Children Are Food Insecure. Urban Institute. www.urban.org/research/publication/forty-percent-black-and-hispanic-parents-school-age-children-are-food-insecure. Published February 9, 2021.
[46]Project Bread. Hunger and Food Insecurity in Massachusetts. www.projectbread.org/hunger-by-the-numbers.
[47]Feeding America. The Impact of the Coronavirus on Food Insecurity in 2020 and 2021. www.feedingamerica.org/sites/default/files/2021-03/National%20Projections%20Brief_3.9.2021_0.pdf.
[48]An R. Projecting the impact of the coronavirus disease-2019 pandemic on childhood obesity in the United States: A microsimulation model. *J Sport Health Sci.* 2020;9(4):302–312. doi: 10.1016/j.jshs.2020.05.006. Epub 2020 May 23. PMID: 32454174; PMCID: PMC7250129.
[49]Kim ES, Kwon Y, Choe YH, et al. COVID-19-related school closing aggravate obesity and glucose intolerance in pediatric patients with obesity. *Sci Rep.* 2021;11. https://doi.org/10.1038/s41598-021-84766-w.
[50]von Hippel PT, Powell B., Downey DB, Rowland, NJ. The effect of school on overweight in childhood: Gain in body mass index during the school year and during summer vacation. *Am. J. Public Health.* 2007;97(4):696–702.
[51]von Hippel PT, Workman J. From kindergarten through second grade, U.S. children's obesity prevalence grows only during summer vacations. *Obesity* (Silver Spring). 2016;24:2296–2300.
[52]Zhang J et al. Summer effects on body mass index (BMI) gain and growth patterns of American Indian children from kindergarten to first grade: a prospective study. *BMC Public Health.* 2011;11:951.
[53]Branscum P, Kaye G, Succop P, Sharma, M. An evaluation of holiday weight gain among elementary-aged children. *J. Clin. Med. Res.* 2010;2;167–171.
[54]Schoeller DA. The effect of holiday weight gain on body weight. *Physiol. Behav.* 2014;134:66–69.
[55]Dunton GF, Do B, Wang SD. Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the U.S. *BMC Public Health.* 2020;20:1351. https://doi.org/10.1186/s12889-020-09429-3.
[56]Bulfone TC, Malekinejad M, Rutherford GW, Razani N. Outdoor transmission of SARS-CoV-2 and other respiratory viruses: A systematic review. *J Infect Dis.* 2021;223(4):550–561. doi: 10.1093/infdis/jiaa742. PMID: 33249484; PMCID: PMC7798940.
[57]Qian H, Miao T, Liu L, Zheng X, Luo D, Li Y. Indoor transmission of SARS-CoV-2. *Indoor Air.* 2021;31(3):639–645. doi: 10.1111/ina.12766. Epub 2020 Nov 20. PMID: 33131151.

In every crisis there is a learning opportunity, and we must move forward with awareness of past mistakes and well-informed plans for the future. Fortunately, at the time of this writing, most schools in Massachusetts are back to full in-person learning, thanks to decisive action by the commissioner of education and supported by advocacy from parents and the medical community alike in the spring of 2021. As vaccination rates increase and COVID-19 cases continue to drop, the next hurdle will be to lift masking and distancing requirements in schools. While vaccination of children under the age of 12 may not occur until later in 2021 or even 2022,[58] depending on whether the FDA chooses to issue an Emergency Use Authorization, restrictions can still be safely lifted when the prevalence of cases reaches a low threshold. The proper threshold is up for debate, but it could reasonably be set at the point where the risk of severe disease or death from COVID-19 is equivalent to the risk of severe disease or death from influenza in a typical year, a scenario for which we do not require such mitigation measures. Children have been resilient and adaptable throughout the pandemic. They have adjusted to and complied with protocols better than anyone expected them to, but indefinite use of face coverings and distancing threaten normal social-emotional development. Children are a vulnerable population in that their capacity to self-advocate is limited. Policymakers and health officials must prioritize their needs.

**Shira Doron, MD**
*Associate Professor of Medicine, Tufts University School of Medicine*
*Hospital Epidemiologist, Tufts Medical Center*

[58]Vaccines and Related Biological Products Advisory Committee. June 10, 2021 Meeting Announcement. FDA. Updated July 7, 2021. www.fda.gov/advisory-committees/advisory-committee-calendar/vaccines-and-related-biological-products-advisory-committee-june-10-2021-meeting-announcement.

# 2 Selected Health Conditions and Injuries

## Cancer

Cancer is the leading cause of death in Massachusetts.[59] Cancer mortality fell for the last quarter century in the United States, thanks to decreased rates of smoking, improved early detection, and improved treatment.[60]

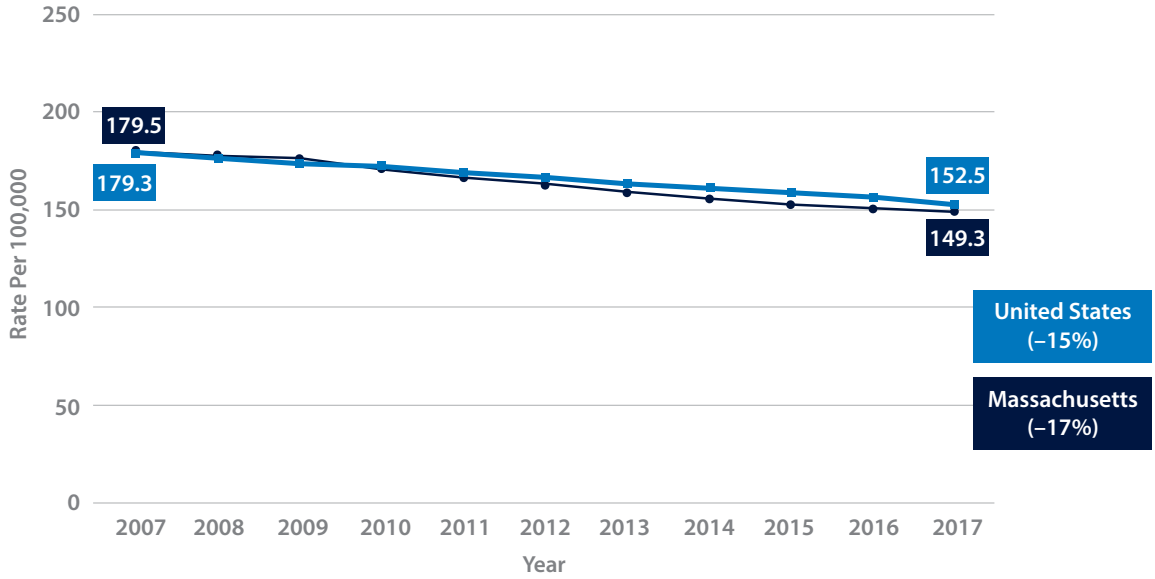
From 2007 to 2017, Massachusetts cancer mortality fell 17 percent, on par with the rest of the nation (see figure 14). Cancer mortality rates decreased across races and ethnicities in Massachusetts, falling fastest for Black individuals (21 percent) (see figure 15 on page 24). At the county level, cancer mortality fell 11 percent (Worcester) to 28 percent (Suffolk) (see figure 16 on page 24). Cancer mortality varies across counties; in 2017 Suffolk County had the lowest rate of cancer deaths and Hampden County had the highest (see figure 16).

**WHAT IS CANCER?**

Cancer refers to a collection of diseases that occur when the cell division process goes awry. Cancer causes pain, disability, and death.

*National Cancer Institute: What is Cancer?*

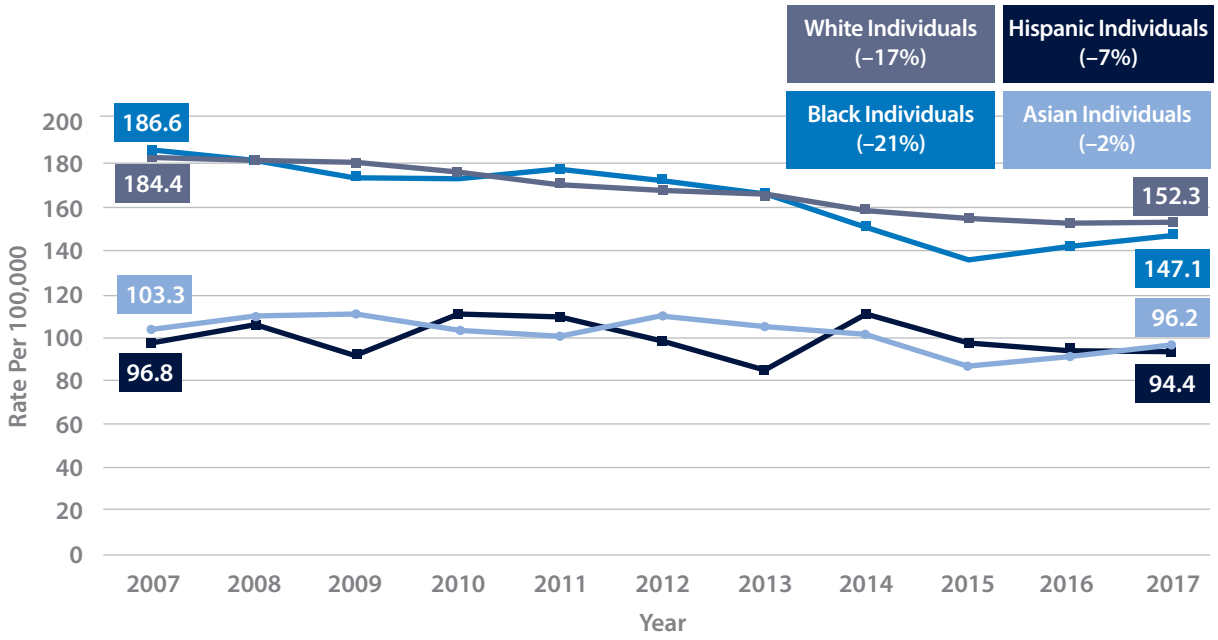
**FIGURE 14** Age-Adjusted Cancer Mortality, Massachusetts and the United States, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for malignant neoplasms (ICD-10 codes: C00–C97).

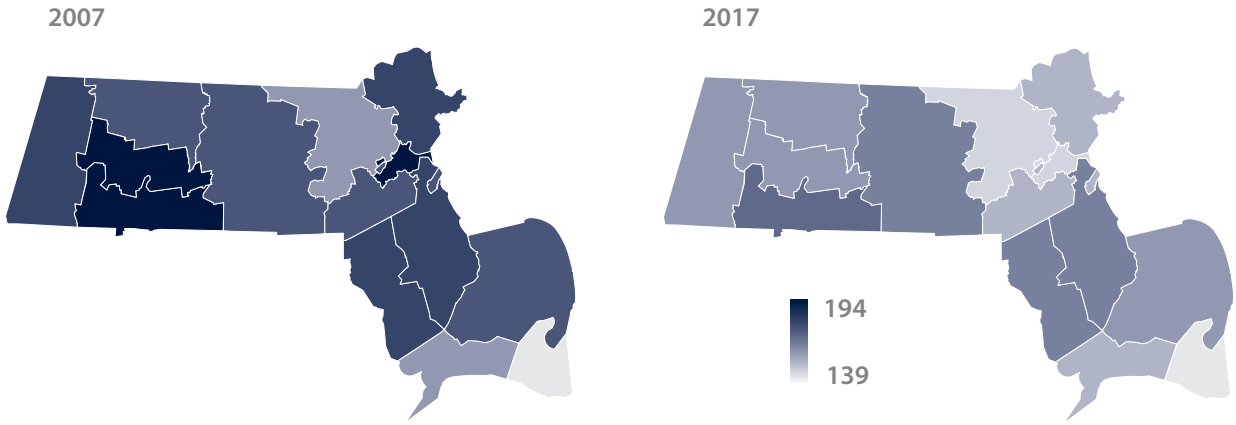
[59]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 6. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[60]American Cancer Society. Cancer Facts & Figures 2019. www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2019/cancer-facts-and-figures-2019.pdf.

**FIGURE 15** Age-Adjusted Cancer Mortality by Race and Ethnicity, Massachusetts, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for malignant neoplasms (ICD-10 codes: C00–C97). Queries for White, Black, and Asian individuals excluded Hispanic individuals.

**FIGURE 16** Age-Adjusted Cancer Mortality by County, Massachusetts, 2007 and 2017 (per 100,000 Individuals)




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for malignant neoplasms (ICD-10 codes: C00–C97). Mortality rate is per 100,000 individuals.

## *Policy Perspective — Cancer*

This year, an estimated 42,750 new cases of cancer will be diagnosed in Massachusetts and 12,540 residents will die from the disease. Since it peaked in 1991, the cancer death rate in the United States has steadily gone down — dropping by a total of 31 percent, "driven by long-term drops in death rates for the four major cancers — lung, colorectal, breast, and prostate," according to the American Cancer Society's report, *Cancer Facts & Figures 2021.*[61]

To promote further, future declines in mortality, other risk factors such as excess body weight, alcohol consumption, poor nutrition, and physical inactivity can be addressed through education and awareness as well as policies that encourage healthy eating and active living. Additionally, encouraging age-appropriate vaccination against the human papillomavirus can protect against cervical, oral, and several other cancers.

Still, with all the progress we have made, far too many individuals for whom screening is recommended remain unscreened, and this situation has been aggravated by the substantial decline in cancer screening resulting from the COVID-19 pandemic. At the onset of the pandemic, elective medical procedures, including cancer screening, were largely put on hold to prioritize urgent needs and reduce the risk of the spread of COVID-19 in health care settings. Early projections indicate that these extensive screening delays will lead not only to missed and advanced stage cancer diagnoses, but also to a rise in cancer-related deaths. Adding concern, the pandemic-related disruptions will likely exacerbate existing disparities in cancer screening and survival across groups of people who have systemically experienced social or economic obstacles to screening and care.

The American Cancer Society's guidance on how public health agencies, health care providers, and screening advocates can promote and deliver cancer screening appropriately, safely, and equitably during the COVID-19 pandemic includes the following:

1. Despite the challenges we face during the pandemic, cancer screening remains a public health priority, and we must provide the public with safe opportunities to prevent cancer or detect it early to improve patient outcomes.
2. Screening disparities are already evident and, without deliberate focus, are likely to increase as a result of the COVID-19 pandemic. Efforts to promote screening and overcome barriers for populations with low screening prevalence must be at the forefront of our focus.
3. Engaging patients in the resumption of cancer screening will require effective and trustworthy messaging.
4. Implementation of process and policy changes are urgently needed to sustain access to primary care and return screening to pre-pandemic rates.

COVID-19 has already caused too much pain and loss. If we do not take steps to ensure that the public feels comfortable seeking evidence-based preventive, diagnostic, and curative care, the impact of the pandemic will be felt for years to come.

**Marc Hymovitz**
*Director of Government Relations, American Cancer Society Cancer Action Network*

[61]American Cancer Society. *Cancer Facts & Figures 2020.* www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2021/cancer-facts-and-figures-2021.pdf.

# Heart Disease

Heart disease is the second-leading cause of death in Massachusetts.[62] Like cancer mortality, heart disease mortality fell for the past quarter century in the United States, thanks to declines in smoking, improvements in hypertension control, and improvements in treatment.[63]

**WHAT IS HEART DISEASE?**

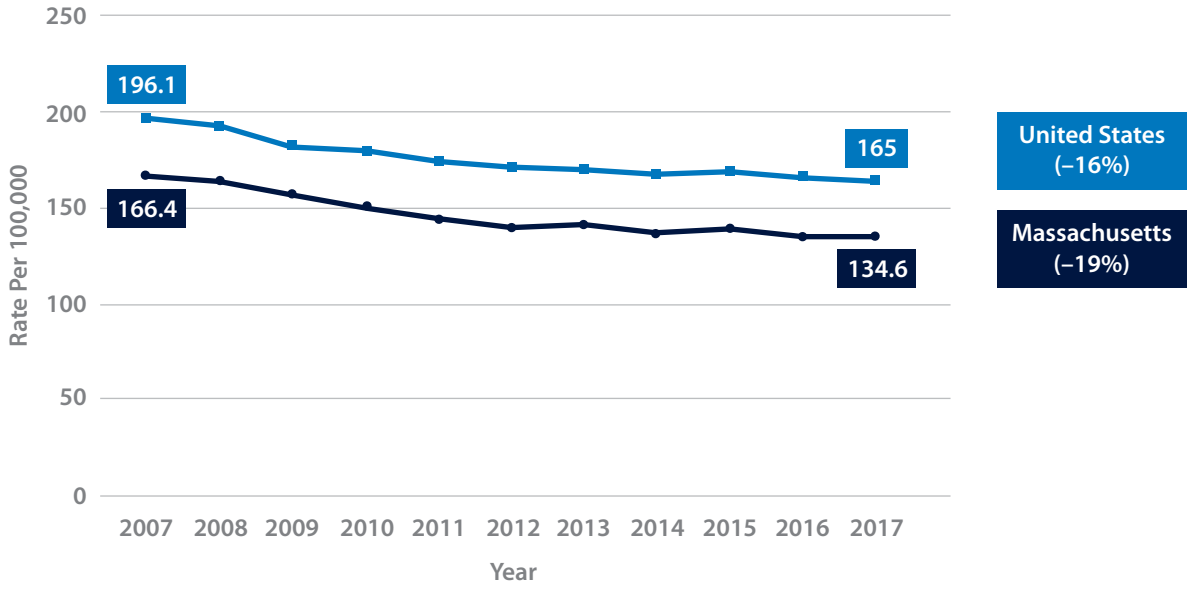
Heart disease refers to a range of illnesses related to the circulatory system, including coronary artery disease and abnormal heartbeats (arrhythmias).

*Mayo Clinic: Heart Disease Overview*

Compared to the nation, Massachusetts had the fifth-lowest heart disease mortality rate in 2017.[64] Heart disease deaths fell 19 percent from 2007 to 2017, a little faster than the national trend (see figure 17).[65] Heart disease mortality rates decreased across races and ethnicities in Massachusetts, falling fastest for Black individuals (28 percent) (see figure 18). At the county level, heart disease mortality fell for most counties; the rate of decrease ranged from 0 percent (Barnstable) to 34 percent (Dukes). Heart disease mortality varies across counties; in 2017 Dukes County had the lowest rate of heart disease deaths and Hampden County had the highest (see figure 19 on page 28).

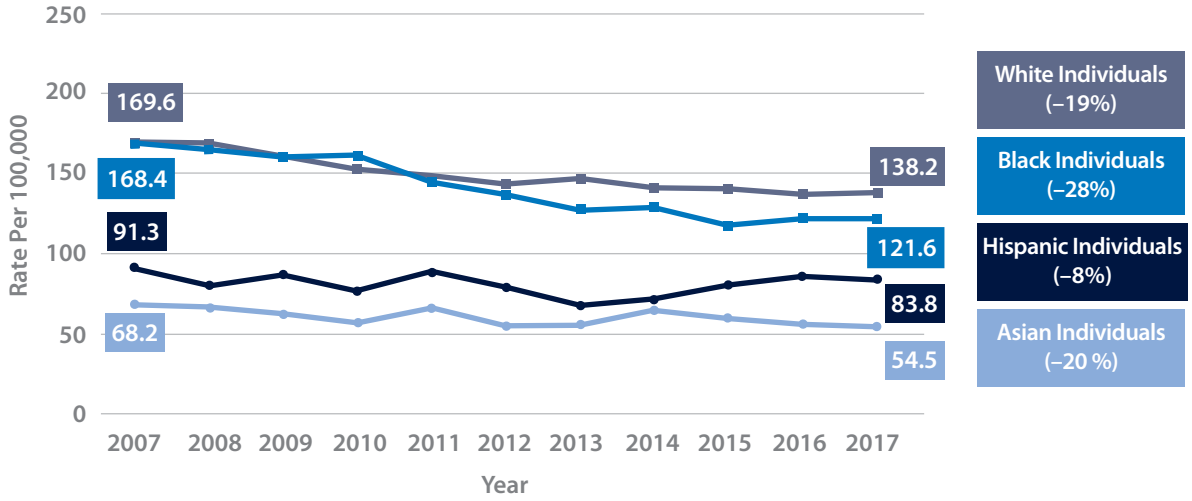
[62]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 6. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[63]Mensah GA, Wei GS, Sorlie PD, et al. Decline in cardiovascular mortality: Possible causes and implications. www.ncbi.nlm.nih.gov/pmc/articles/PMC5268076. Published January 20, 2018.
[64]United States Centers for Disease Control and Prevention. National Center for Health Statistics. Heart Disease Mortality by State. www.cdc.gov/nchs/pressroom/sosmap/heart_disease_mortality/heart_disease.htm.
[65]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed on Nov 15, 2019. Query for underlying cause of death was for ICD-10 113 Cause List: #Diseases of the Heart (I00–I09, I11, I13, I20–I51). United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed on Nov 15, 2019. Query for underlying cause of death was for ICD-10 113 Cause List: #Diseases of the Heart (I00–I09, I11, I13, I20–I51).

**FIGURE 17** Age-Adjusted Heart Disease Mortality, Massachusetts and the United States, 2007–2017



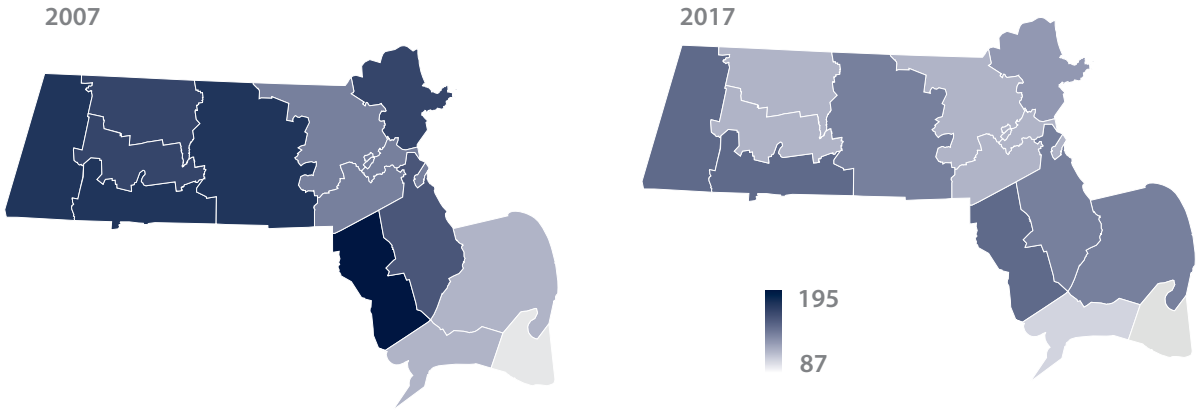

*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for ICD-10 113 Cause List: #Diseases of the Heart (I00–I09, I11, I13, I20–I51).

**FIGURE 18** Age-Adjusted Heart Disease Mortality, by Race and Ethnicity, Massachusetts, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for ICD-10 113 Cause List: #Diseases of the Heart (I00–I09, I11, I13, I20–I51). Queries for White, Black, and Asian individuals excluded Hispanic individuals.

**FIGURE 19** Age-Adjusted Heart Disease Mortality by County, Massachusetts, 2007 and 2017 (per 100,000 Individuals)




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 15, 2019. Query for underlying cause of death was for ICD-10 113 Cause List: #Diseases of the Heart (I00–I09, I11, I13, I20–I51). Mortality rate is per 100,000 individuals.

# Stroke

Stroke is the fifth-leading cause of death in Massachusetts.[66] Stroke mortality has been decreasing in the United States for the past four decades, though the rate of decrease has slowed as of late.[67]

Nationally, Massachusetts has the second-lowest age-adjusted mortality rate from stroke.[68] From 2007 to 2017, Massachusetts stroke mortality fell 28 percent, twice the national trend (see figure 20).[69] Stroke remains comparatively high among Black individuals, at 33.2 per 100,000 (compared to 19.2 per 100,000 for White individuals) (see figure 21).

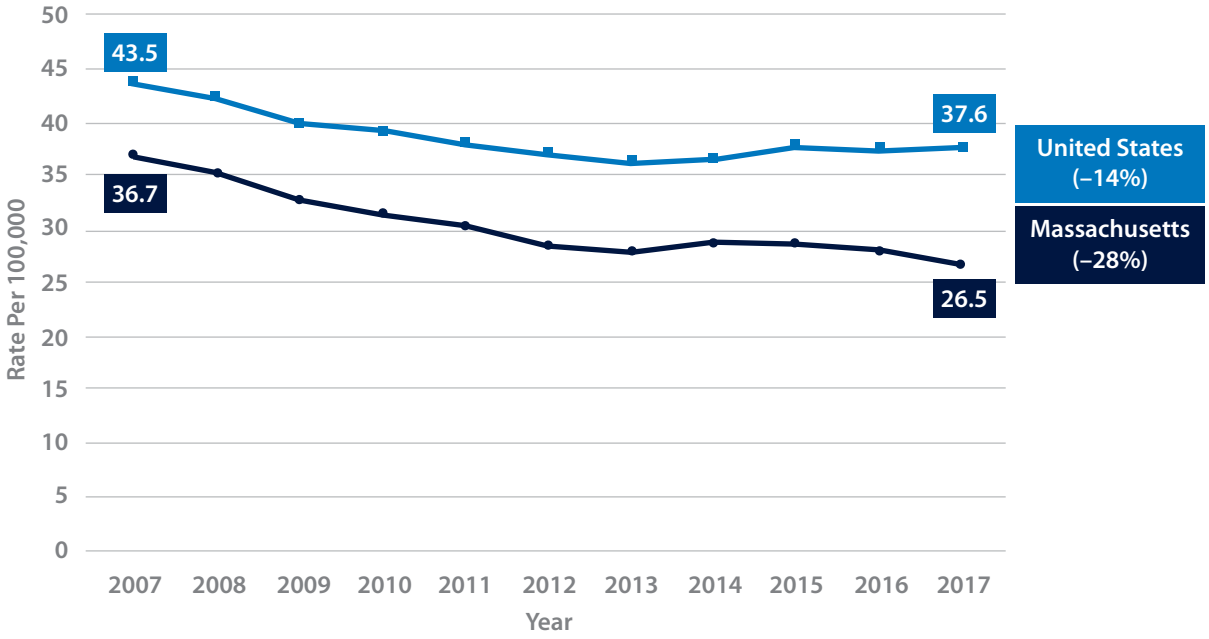
## WHAT IS STROKE?

A stroke occurs "when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts."

*American Stroke Association*

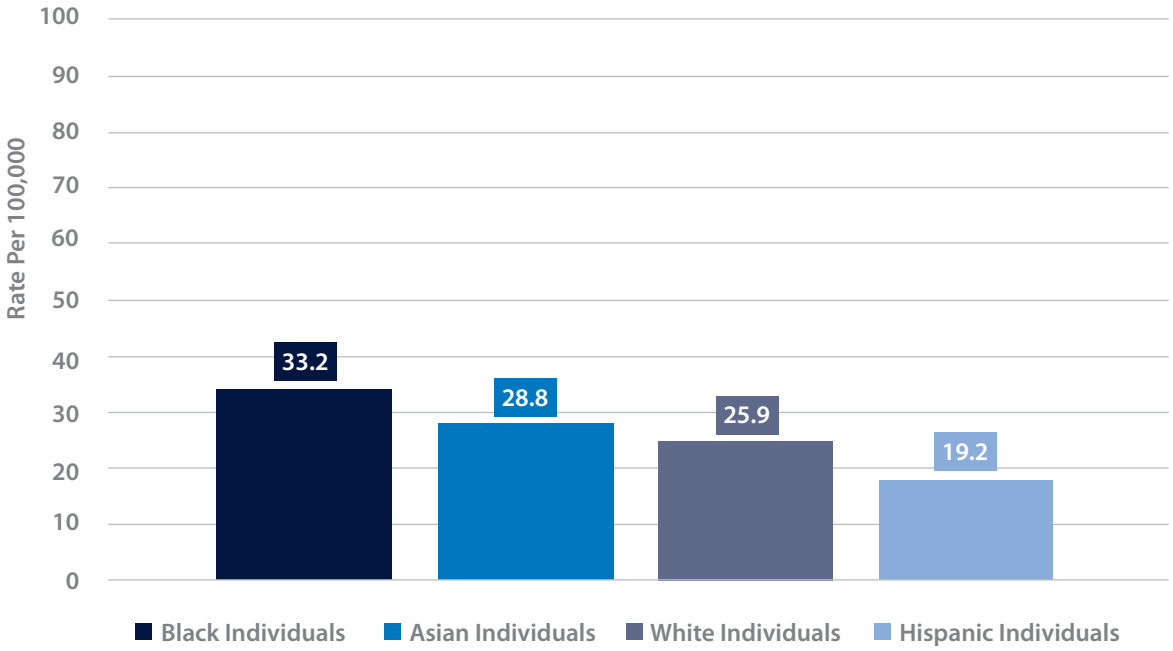
[66]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 6. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[67]Yang Q, Tong X, Schieb L, et al;. Vital signs: Recent trends in stroke death rates – United States, 2000–2015. *MMWR.* www.cdc.gov/mmwr/volumes/66/wr/mm6635e1.htm. Published September 6, 2017.
[68]United States Centers for Disease Control and Prevention. National Center for Health Statistics. Stroke Mortality by State. www.cdc.gov/nchs/pressroom/sosmap/stroke_mortality/stroke.htm.
[69]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed on Nov 18, 2019. Query for underlying cause of death was for cerebrovascular diseases (ICD-10 codes I60–I69), which includes ischemic and hemorrhagic stroke (including aneurysms).

**FIGURE 20** Age-Adjusted Cerebrovascular Mortality, Massachusetts and the United States, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 18, 2019. Query for underlying cause of death was for cerebrovascular diseases (ICD-10 codes I60–I69), which includes ischemic and hemorrhagic stroke (including aneurysms).

**FIGURE 21** Age-Adjusted Cerebrovascular Mortality, by Race and Ethnicity, Massachusetts, 2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 18, 2019. Query for underlying cause of death was for cerebrovascular diseases (ICD-10 codes I60–I69), which includes ischemic and hemorrhagic stroke (including aneurysms). Queries for White, Black, and Asian individuals excluded Hispanic individuals.

## *Policy Perspective — Heart Disease and Stroke*

Every day, the lives of Massachusetts residents are touched by heart disease and stroke. Whether it is our own health that is impacted or the lives of family members, friends, or co-workers, there is a lot at stake when it comes to fighting our state's number 2 and number 5 killers.

The good news is deaths from heart disease and stroke in Massachusetts have fallen over the past decade. Unfortunately, this is not being felt across all populations. For too many residents, health is determined by zip code. In some cases, where someone lives could cost them upward of two decades of their life.

While eating a healthy diet, getting regular exercise, and watching your weight can help lower risk for cardiovascular diseases, environmental and cultural factors also make a difference. Too many communities lack places to buy healthy food, get good health care, and be physically active. Accessible options for healthy living are particularly limited in lower-income neighborhoods, and many cardiovascular disease risk factors disproportionately impact people of color.

We have the power to change this by supporting policies that help build healthier communities and healthier lives. The fight against heart disease and stroke can't be limited to treatment. It must also include prevention. This includes increasing access to affordable housing, fair wages, strong school systems, safe streets, and healthy foods. Only then will we break down the social and economic barriers that prevent people from living longer, healthier lives.

### Addendum: COVID-19 Impact and Implications

As a science-based organization, the American Heart Association (AHA) has nearly a century of experience using research to help patients with heart disease, survivors of stroke, and millions of others trying to live healthier. In the fight against COVID-19, our scientific efforts include three critical areas: a registry, research grants, and resuscitation.

As researchers try to understand COVID-19 and find treatments, they're working through mountains of data to study situations that are entirely new. To answer these questions, the AHA launched a patient data registry to help medical professionals better understand treatment patterns and variations.

Additionally, while the scientific community races to develop vaccines and treatments, many mysteries remain about how COVID-19 affects the heart and brain and why there are health disparities. Accordingly, the AHA is investing at least $2.5 million to fast-track scientific research to better understand these medical and sociologic mysteries.

Finally, more than 350,000 cardiac arrests occur outside of a hospital annually, and about 90 percent of the victims die. That's why the AHA has developed science-based guidance to help health care rescuers treat victims of cardiac arrest who have COVID-19. That guidance gives victims the best possible chance for survival without compromising rescuers' safety.

**Allyson Perron Drag**
*Government Relations Director, American Heart Association*

# Diabetes

Diabetes is the seventh-leading underlying cause of death in Massachusetts and the United States.[70] In addition, diabetes contributes to many other deaths caused by other conditions.[71] Diabetes mortality has stayed relatively stable in Massachusetts over the past 10 years, hovering around 15 deaths per 100,000 individuals.[72] Compared to the rest of the nation, Massachusetts had the second lowest mortality rate from diabetes in 2017.[73]

### WHAT IS DIABETES?

Diabetes is a disease that occurs when a person's blood sugar is too high, and their body does not make or use insulin well enough to bring that blood sugar down. Diabetes is linked to a higher risk of heart disease, stroke, kidney disease, and nerve damage.

*NIH: What is Diabetes?*

Though diabetes mortality is relatively stable, diabetes prevalence may be increasing for adults and decreasing for children. Nationally, after 20 years of increased diabetes prevalence in the United States, prevalence plateaued starting in 2009.[74] It appears that adult Massachusetts diabetes prevalence increased between 2013 and 2017, up to 9.5 percent of the population (see figure 22 on page 32). Pediatric diabetes prevalence, currently at less than 1 percent of the population for K–8 students, decreased since the 2009–2010 school year. While type 1 diabetes prevalence for K–8 students stayed around 250 per 100,000 students since 2009[75], type 2 diabetes prevalence for K–8 students decreased 32 percent since 2009 (see figure 23 on page 32).

[70]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 6. www.mass.gov/doc/2017-death-report/download. Published October 2019. Heron M. Death: Leading causes for 2017. National Vital Statistics Reports. www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_06-508.pdf. June 24, 2019.

[71]Alva ML, Hoerger TJ, Zhang P, and Cheng YJ. State-level diabetes-attributable mortality and years of life lost in the United States. *Annals of Epidemiology*. 2018;28(11):790–795.

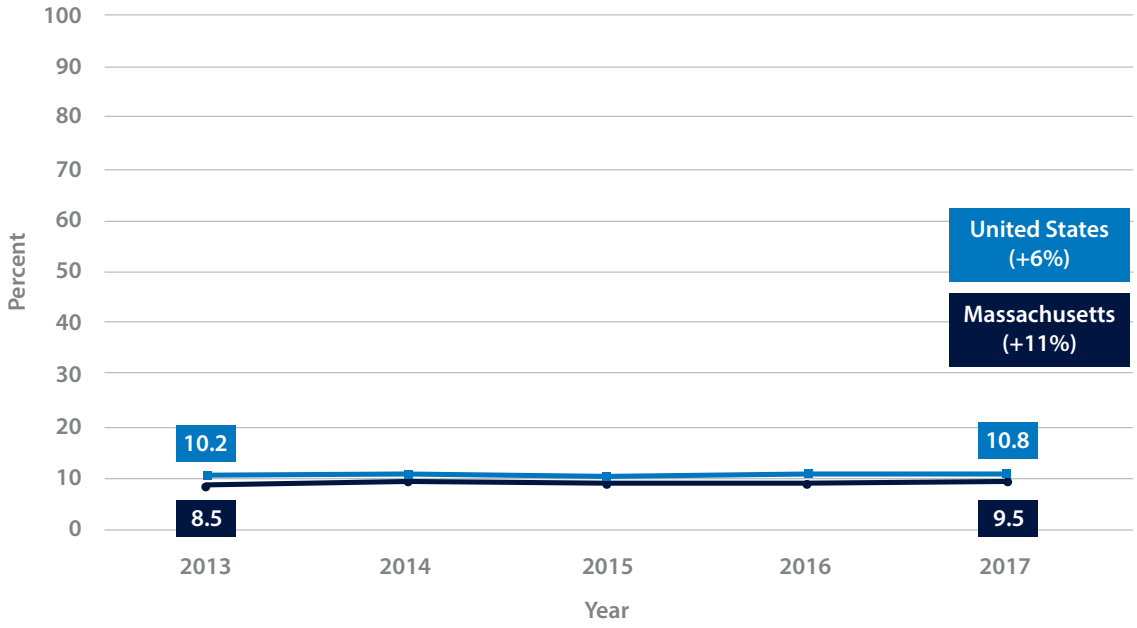
[72]Authors' analysis of CDC Wonder Database. United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed on November 17, 2019. Query for underlying cause of death was for Diabetes Mellitus (ICD-10 codes E10–E14).

[73]United States Centers for Disease Control and Prevention. Stats of the State of Massachusetts (2017). www.cdc.gov/nchs/pressroom/states/massachusetts/massachusetts.htm.

[74]Benoit SR, Hora I, Albright AL, and Gregg EW. New directions in incidence and prevalence of diagnosed diabetes in the USA. *BMJ Open Diabetes Research & Care*. 2019;7(1). https://drc.bmj.com/content/7/1/e000657.

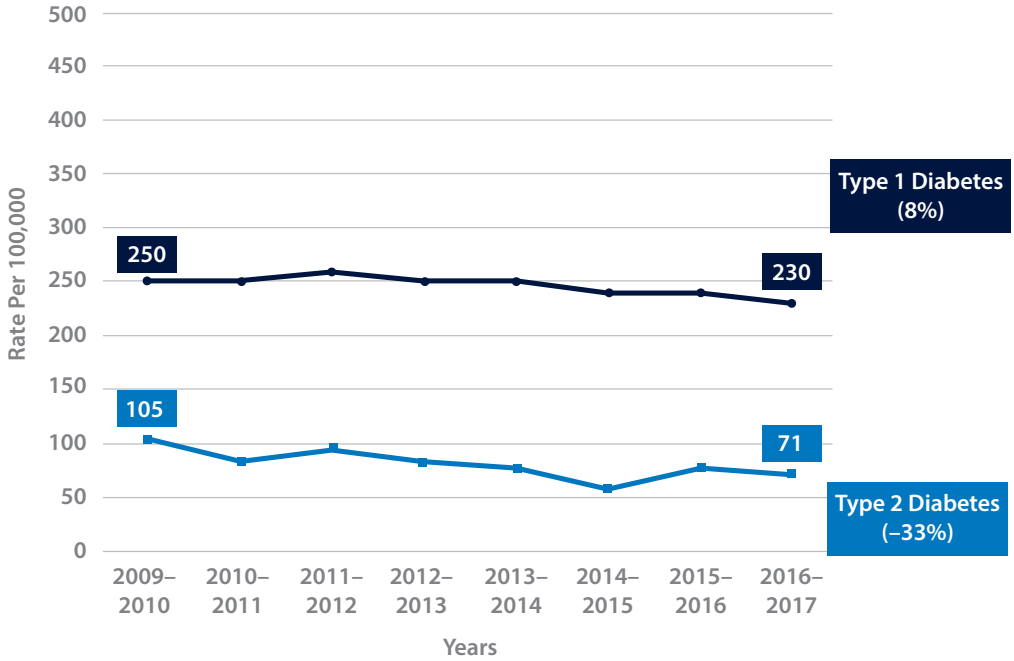
[75]Though the data show an 8 percent decrease, that decrease is within the measurements' standard error.

**FIGURE 22** Diabetes Prevalence among Adults, Massachusetts and the United States, 2013–2017




*Source:* Kaiser Family Foundation. State Health Facts. Adults Who Report Ever Being Told by a Doctor That They Have Diabetes. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who report ever being told by a doctor that they have diabetes. www.kff.org/other/state-indicator/adults-with-diabetes/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

**FIGURE 23** Diabetes Prevalence among K–8 Students, Massachusetts, 2009–2016




*Source:* Massachusetts Department of Public Health. Population Health Information Tool (PHIT): Pediatric Diabetes. Data are collected from approximately 1,800 public, private, and charter schools in Massachusetts. School nurses report the number of children with type 1 and type 2 diabetes by gender and by grade, as well as by the city/town where the students live. Response rates among schools are close to 100 percent, resulting in a dataset that includes nearly all cases of diabetes in students in grades K–8. www.mass.gov/guides/phit-data-pediatric-diabetes. Accessed October 2019.

## *Policy Perspective — Diabetes*

Diabetes has become startlingly common. More than 34 million Americans are living with diabetes and 88 million more with prediabetes.[76] Diabetes is the nation's most expensive chronic condition accounting for one in seven US health care dollars.[77] Modest weight loss through healthier nutrition and physical activity can help prevent or delay type 2 diabetes, the most common form of the disease, even in those at high risk.

Ideas to support healthier lifestyles abound, but a closer look at policies aimed at eliminating food insecurity and increasing access to healthy food and beverages would be well deserved. This is of increased importance as people with diabetes are reporting economic pressures that have impacted their ability to purchase food and have increased their reliance on food assistance programs.

Prediabetes, a condition of higher blood glucose that brings increased risk for disease, precedes type 2 diabetes itself. For individuals with prediabetes, the American Diabetes Association and the Institute for Clinical and Economic Review in Massachusetts have recommended that payers cover CDC-recognized Diabetes Prevention Programs (DPP), which are structured lifestyle change programs focused on nutrition and physical activity improvements to achieve weight loss.[78,79] Yet many Massachusetts public employees and MassHealth enrollees still lack health coverage for DPP.

The rising cost of prescription drugs is one of the most critical issues affecting people with diabetes, particularly those who are insulin dependent. One in four patients report needing to ration their insulin.[80] Insulin should be covered with little to no cost-sharing to increase medication adherence and improve health outcomes.

### Addendum: COVID-19 Impact and Implications

The COVID-19 virus has been devastating to the diabetes community as people with diabetes are more likely to have worse complications if they get the virus. Also, the more health conditions someone has (for example, diabetes plus heart disease), the more at risk that person is for getting those serious complications. Tragically, people with diabetes have been found to make up many of the COVID-19-related fatalities.

The pandemic and its disproportionate toll on minority, low-income, and historically underserved Americans shines a troubling light on historic, systemic inequities in our health care system. These inequities contribute to worse outcomes and higher risk for diabetes and many other diseases. These inequities undermine the well-being of our most underserved communities. Consequently, the American Diabetes Association has launched our Health Equity Now campaign to work to address these issues, including a lack of access to healthy foods and a lack of access to care and the medications and tools needed to manage diabetes.

**Stephen Habbe**
*Director, State Government Affairs, American Diabetes Association*

[76]United States Centers for Disease Control and Prevention. National diabetes statistics report 2020. www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf.
[77]American Diabetes Association. Economic costs of diabetes in the U.S. in 2017. *Diabetes Care*. March 2018. http://care.diabetesjournals.org/content/early/2018/03/20/dci18-0007.
[78]American Diabetes Association. 3. Prevention or delay of type 2 diabetes: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020;43(Suppl. 1):S32–S36. https://care.diabetesjournals.org/content/43/Supplement_1/S32.
[79]Institute for Clinical and Economic Review. Diabetes Prevention Programs: Effectiveness and Value. https://icer-review.org/wp-content/uploads/2016/07/CTAF_DPP_Final_Evidence_Report_072516.pdf. Published July 25, 2016.
[80]Herkert D, Vijayakumar P, Luo J, et al. Cost-related insulin underuse among patients with diabetes. *JAMA Internal Medicine*. 2019;179(1):112–114. https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2717499.

# Asthma

Asthma is a common chronic condition that can cause shortness of breath, disability, and in rare cases death. Both the United States and Massachusetts have an asthma mortality rate that hovers around 1 per 100,000 individuals.[81]

**WHAT IS ASTHMA?**

Asthma is a "chronic lung disease which can make it hard to move air in and out of [the] lungs."

*American Lung Association*

Massachusetts has the fifth-highest rate of adult asthma in the country. In 2018, 10.2 percent of adults reported that they currently had asthma and had been told by a doctor that they had asthma, compared to 9.2 percent in the United States (see figure 24).[82]

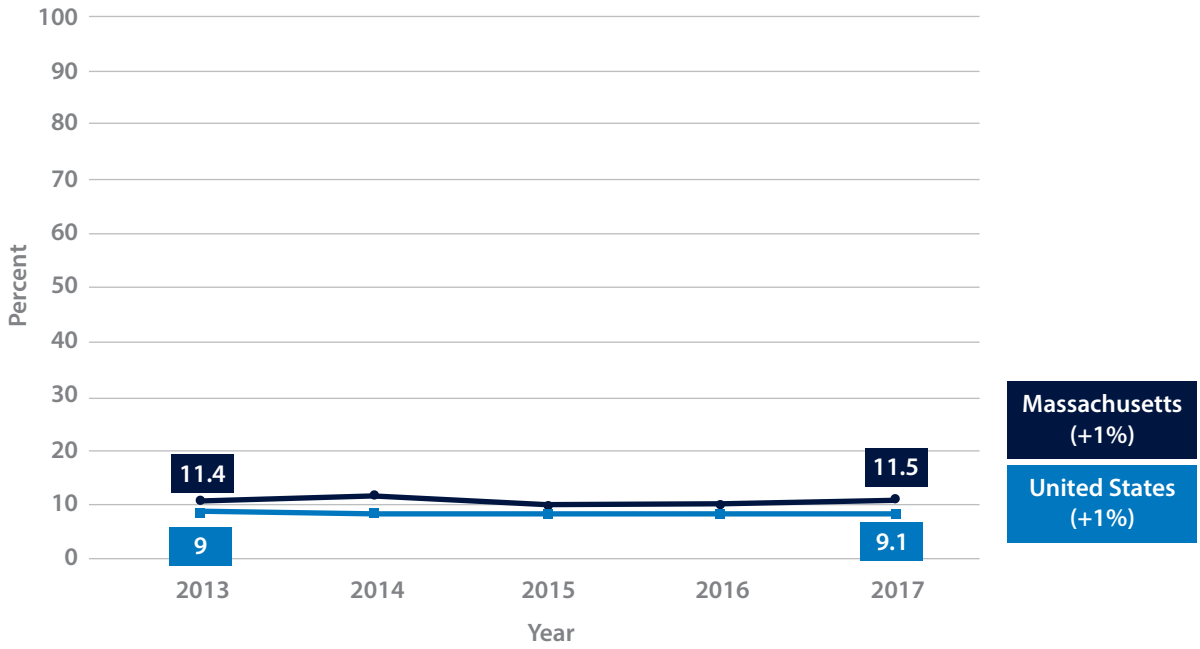
About 12 percent of Massachusetts students (K–8) had asthma in the 2016–2017 school year. The statewide rate for asthma in students (K–8) has increased 5 percent since the 2009–2010 school year (see figure 25). There is variation in pediatric asthma rates across Massachusetts counties, from 8 percent in Dukes County to 15 percent in Suffolk County. Since the 2009–2010 school year, counties have seen changes in pediatric asthma prevalence, with Franklin County seeing the biggest decrease and Berkshire County seeing the biggest increase in pediatric asthma rates (see figure 26 on page 36).[83]

[81]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 2019. Query for asthma was for ICD-10 J45–J46.

[82]Kaiser Family Foundation. State Health Facts. Adult Self-Reported Current Asthma Prevalence Rate. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who reported that they currently have asthma and have been told by a doctor that they have asthma. www.kff.org/other/state-indicator/asthma-prevalence-by-gender/?currentTimeframe=0&sortModel=%7B"colId"%3A"Location","sort"%3A"asc"%7D.

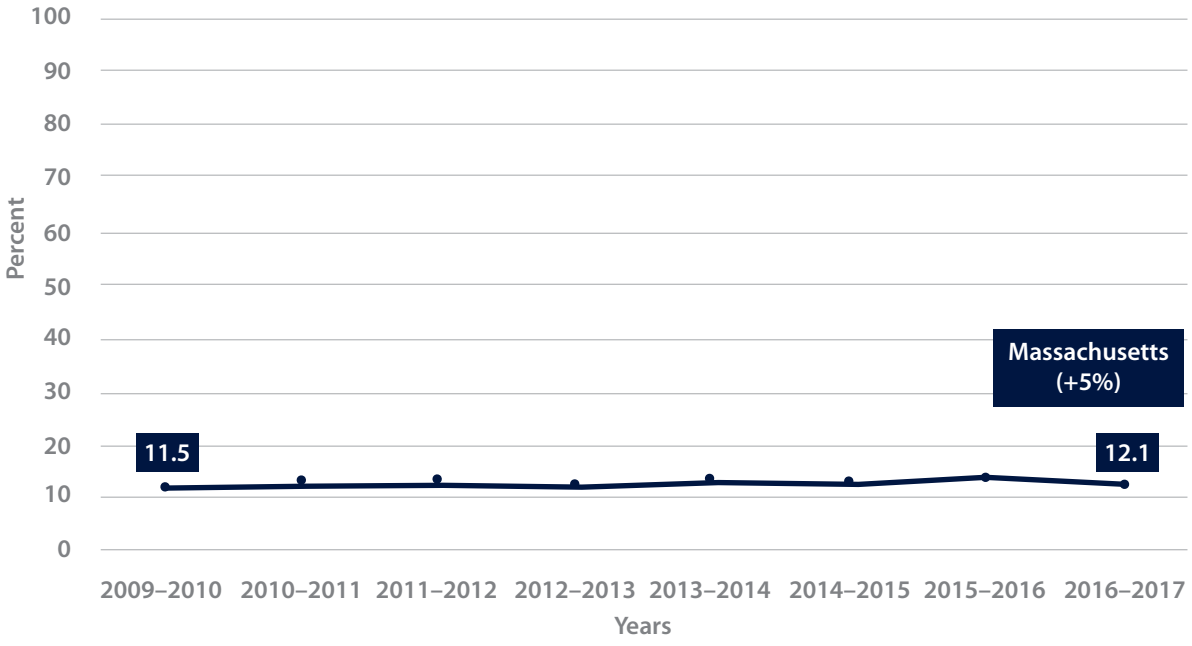
[83]Massachusetts Department of Public Health. Population Health Information Tool (PHIT): Pediatric Asthma. Pediatric asthma data are collected from approximately 1,800 public, private, and charter schools in Massachusetts. School nurses report the number of children with asthma by gender and by grade, as well as by the city/town where the students live. Response rates among schools are close to 100 percent, resulting in a dataset that includes nearly all cases of asthma in students grades K–8.

**FIGURE 24** Asthma Prevalence among Adults, Massachusetts and the United States, 2013–2017



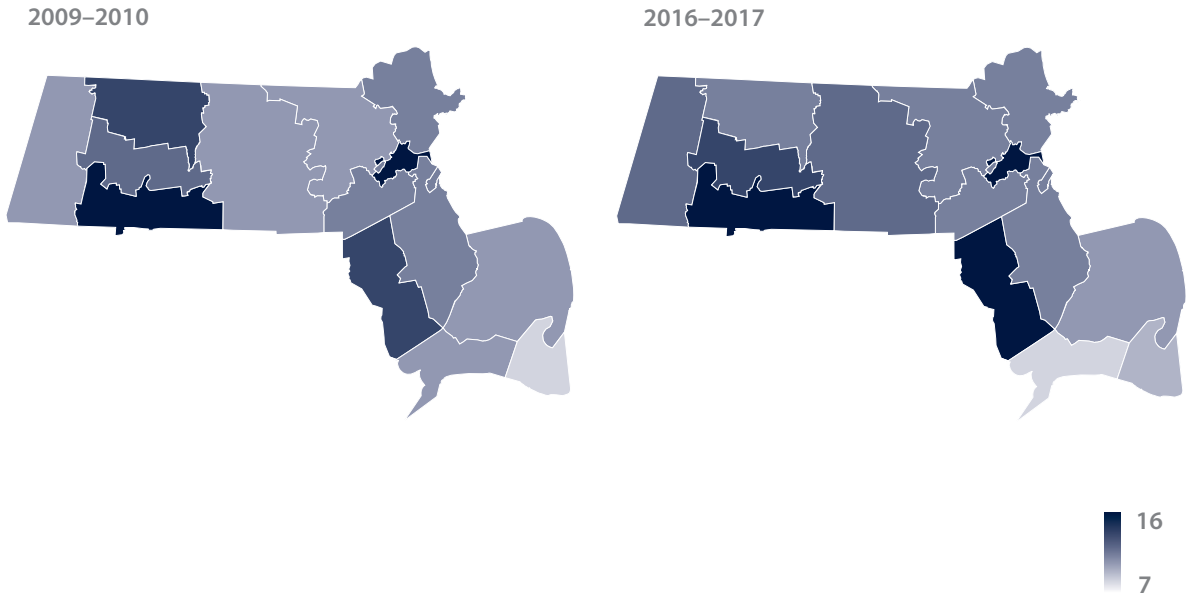

*Source:* Kaiser Family Foundation. State Health Facts. Adults Who Report Currently Having Asthma by Gender. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who reported that they currently have asthma and have been told by a doctor that they have asthma. www.kff.org/other/state-indicator/asthma-prevalence-by-gender/?currentTimeframe=0&sortModel=%7B"colId":"Location","sort":"asc"%7D.

**FIGURE 25** Asthma Prevalence among K–8 Students, Massachusetts, 2009–2017




*Source:* Massachusetts Department of Public Health. Population Health Information Tool (PHIT): Pediatric Asthma. Pediatric asthma data are collected from approximately 1,800 public, private, and charter schools in Massachusetts. School nurses report the number of children with asthma by gender and by grade, as well as by the city/town where the students live. Response rates among schools are close to 100 percent, resulting in a dataset that includes nearly all cases of asthma in students in grades K–8. www.mass.gov/guides/phit-data-pediatric-asthma.

**FIGURE 26** Asthma Prevalence among K–8 Students, by County, Massachusetts, 2009–2010 and 2016–2017 School Years (per 100 Students)




*Source:* Massachusetts Department of Public Health. Population Health Information Tool (PHIT): Pediatric Asthma. Pediatric asthma data are collected from approximately 1,800 public, private, and charter schools in Massachusetts. School nurses report the number of children with asthma by gender and by grade, as well as by the city/town where the students live. Response rates among schools are close to 100 percent, resulting in a dataset that includes nearly all cases of asthma in students in grades K–8. www.mass.gov/guides/phit-data-pediatric-asthma.

## *Policy Perspective — Asthma*

Asthma is the most common respiratory disease in the United States. It's associated with reduced workplace productivity, work and school absences, ER visits and hospitalizations, and reduced quality of life overall for children and adults. A number of studies and programs — both in the Commonwealth of Massachusetts and throughout the nation — have attempted to understand and reduce the prevalence of asthma. But none have yet succeeded in driving down the numbers. In fact, Massachusetts currently has the fifth-highest adult asthma rate in the nation, and the prevalence has continued to rise among children and adults in our state, making this a serious public health problem.

For the most part, asthma is caused by the complex interactions of environmental exposures in susceptible people. Several modifiable factors that have been associated with the development and exacerbation of asthma include obesity, premature birth, viral infections, environmental exposures to allergens, tobacco smoke, air pollution, mold and other toxins, and poor housing conditions. Scientists worry the growing trend of youth vaping (using electronic cigarettes) may also contribute to asthma. In addition, asthma has a hereditary component. Children of Black and Hispanic descent have a higher rate of hospitalizations due to asthma-related complications than their White peers,[84] and children of parents with asthma are more likely to develop the condition.

[84]United States Centers for Disease Control and Prevention. Most Recent Asthma Data. www.cdc.gov/asthma/most_recent_data.htm.

Efforts to control environmental factors have not been enough to stop this growing problem. This is due at least in part to the fact that we don't yet have sufficient knowledge of exactly how asthma is caused and thus how to prevent it.[85] Gaining a deeper understanding of the disease pathway and exploring new ways to reprogram the immune system may ultimately lead to better prevention strategies. In the meantime, it's critical that children and adults in Massachusetts have access to safe and healthy environments and lifestyles so everyone can breathe a little easier.

**Jonathan M. Gaffin, MD**
*Co-Director, Severe Asthma Program, Boston Children's Hospital*
*Submitted on behalf of the Asthma and Allergy Foundation of America, New England Chapter*

## Addendum: COVID-19 Impact and Implications

In the beginning of the COVID-19 pandemic, it was of great concern if asthma or certain asthma medications led to increased risk of contracting COVID or worse clinical outcomes if patients with asthma-contracted COVID. At the time of this writing, when we have reached a year of the COVID pandemic, there has been tremendous research to help clarify these concerns. At this time, asthma does not appear to be a severe COVID risk factor and it is recommended that patients continue regimens maintaining asthma control.[86,87] However, there is growing literature that patients with severe asthma or baseline uncontrolled asthma (recent oral steroid use) may be at increased risk for COVID death. COPD is a known risk factor for severe COVID and can overlap in some patients with asthma.[88] Having COPD as a comorbidity does allow more COVID prevention and treatment options (e.g., monoclonal antibody treatments and earlier vaccination eligibility). However, clinicians and patients should approach this issue with caution as research continues to evolve in this area. Researchers are also continuing to monitor for potential unintended pandemic consequences in our patients with asthma in light of the decline of face-to-face visits and reduced use of nebulization and pulmonary function testing (due to COVID-19 aerosolization).[89] These issues have been further exacerbated by underlying racial disparities.

Now that we have several COVID-19 vaccines available and more coming down the pipeline, it is of utmost importance for patients with asthma to get vaccinated. There is no increased risk of allergic reaction in patients with common allergies or asthma. There is potential for increased risk in those with a history of allergic reaction to an injectable medication or vaccination and these patients should be evaluated by an allergist-immunologist.

**Margee Louisias, MD, MPH**
*Instructor in Medicine, Harvard Medical School*
*Director of Diversity and Inclusion, Division of Allergy and Clinical Immunology at Brigham and Women's Hospital*
*Board of Directors, Asthma and Allergy Foundation of America, New England Chapter*

[85]Beasley R, Semprini A, Mitchell EA. Risk factors for asthma: Is prevention possible? *The Lancet.* 2015;386:1075–1085.
[86]Franco PA, Jezler S, Cruz AA. Is asthma a risk factor for coronavirus disease-2019 worse outcomes? The answer is no, but.... *Current Opinion in Allergy and Clinical Immunology.* 2021.
[87]Sunjaya AP, Allida SM, Di Tanna GL, Jenkins C. Asthma and risk of infection, hospitalisation, ICU admission and mortality from COVID: Systematic review and meta-analysis. *Journal of Asthma.* 2021:1–22.
[88]Williamson EJ, Walker AJ, Bhaskaran K, et al. Factors associated with COVID-related death using OpenSAFELY. *Nature.* 2020;584(7821):430–436.
[89]Bover-Bauza C, Gomila MAR, Pérez DD., et al. The Impact of the SARS-CoV-2 Pandemic on the Emergency Department and Management of the Pediatric Asthmatic Patient. *Journal of Asthma and Allergy.* 2021;14:101–108.

# HIV/AIDS

At least 700,000 people in the United States have died of HIV/AIDS.[90] The gay community and individuals with substance use disorder (SUD) experienced the worst of the epidemic.[91] HIV mortality has fallen dramatically since the 1990s, both because of better treatment and lower rates of transmission.[92]

**WHAT IS HIV?**

HIV (human immunodeficiency virus) is "a virus that attacks cells that help the body fight infection… If left untreated, HIV can lead to the disease AIDS (acquired immunodeficiency syndrome)."

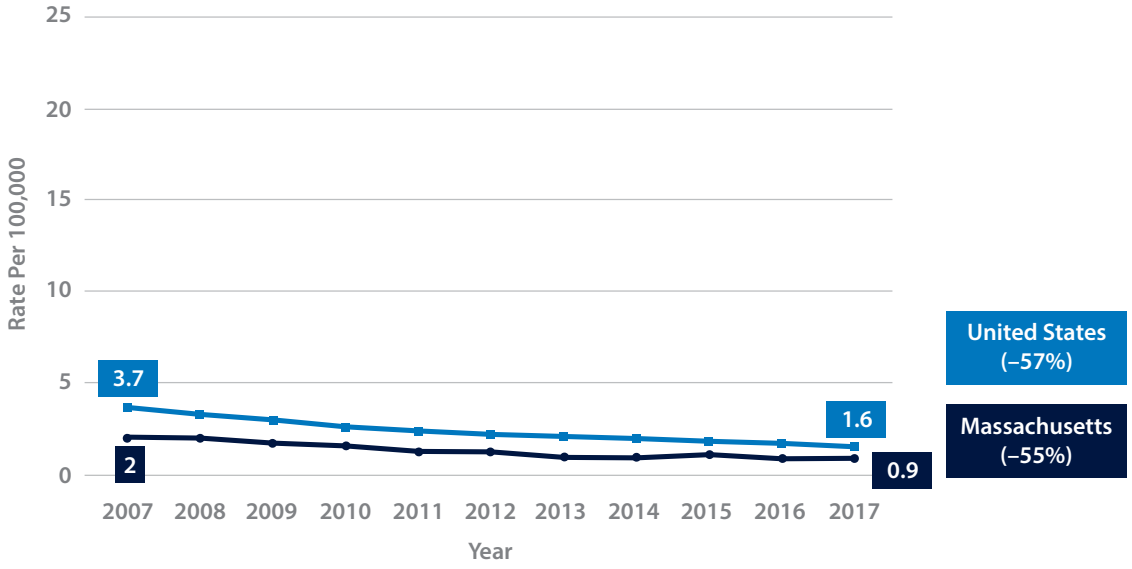
*HIV.gov: What are HIV and AIDS?*

Compared to other states, Massachusetts ranks 21st in mortality for individuals with HIV.[93] From 2007 to 2017, Massachusetts HIV mortality fell 55 percent, on par with the national trend (see figure 27).[94] HIV/AIDS mortality is at least 10 times as high for Black individuals and Hispanic individuals, compared to White individuals (see figure 28).[95]

Compared to other states, Massachusetts ranks 24th in new HIV diagnoses, despite ranking 17th for HIV prevalence.[96] This indicates that the state is doing relatively well at preventing new transmission. From 2008 to 2017, HIV diagnoses fell 25 percent and AIDS diagnoses fell 49 percent in Massachusetts, on par with the national trend (see figure 29 on page 40).[97]

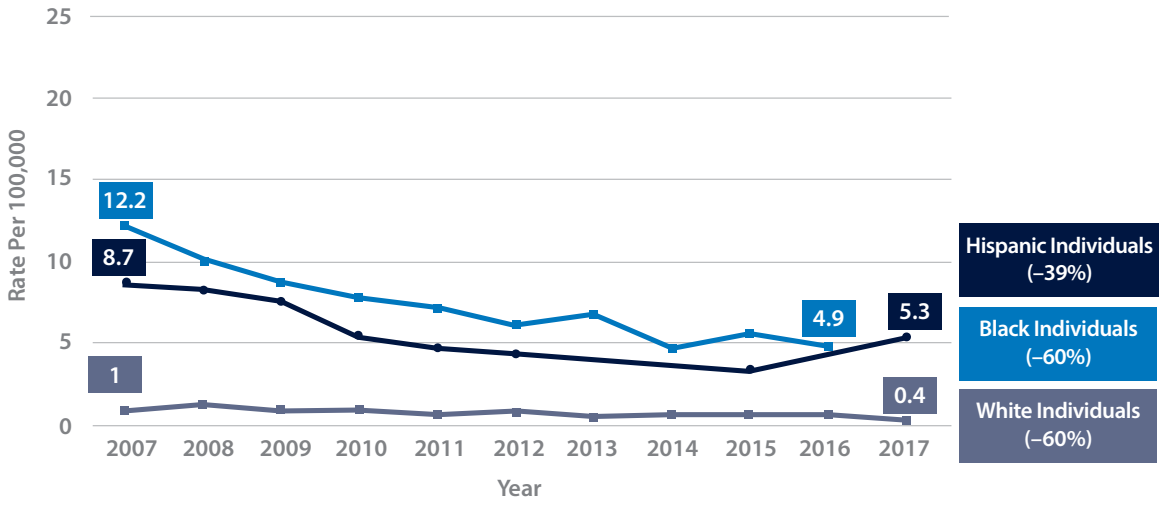
[90]Kaiser Family Foundation. The HIV/AIDS Epidemic in the United States: The Basics. www.kff.org/hivaids/fact-sheet/the-hivaids-epidemic-in-the-united-states-the-basics. March 25, 2019.
[91]Kaiser Family Foundation. The HIV/AIDS Epidemic in the United States: The Basics. www.kff.org/hivaids/fact-sheet/the-hivaids-epidemic-in-the-united-states-the-basics. March 25, 2019.
[92]Kaiser Family Foundation. The HIV/AIDS Epidemic in the United States: The Basics. www.kff.org/hivaids/fact-sheet/the-hivaids-epidemic-in-the-united-states-the-basics. March 25, 2019.
[93]Kaiser Family Foundation. State Health Facts. HIV Diagnoses, Adults and Adolescents. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) AtlasPlus. www.kff.org/hivaids/state-indicator/hiv-diagnoses-adults-and-adolescents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22HIV%20Diagnoses%22,%22sort%22:%22desc%22%7D. Accessed March 2019.
Kaiser Family Foundation. State Health Facts. AIDS Diagnoses, Adults and Adolescents. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) AtlasPlus. www.kff.org/hivaids/state-indicator/aids-diagnoses-adults-and-adolescents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018. Accessed April 2019.
[94]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for human immunodeficiency virus [HIV] disease (ICD-10 codes B20–B24).
[95]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for human immunodeficiency virus [HIV] disease (ICD-10 codes B20–B24).
[96]Kaiser Family Foundation. State Health Facts. HIV Diagnoses, Adults and Adolescents. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) AtlasPlus. www.kff.org/hivaids/state-indicator/hiv-diagnoses-adults-and-adolescents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22HIV%20Diagnoses%22,%22sort%22:%22desc%22%7D. Published 2018. Accessed March 2019.
Kaiser Family Foundation. State Health Facts. AIDS Diagnoses, Adults and Adolescents. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) AtlasPlus. www.kff.org/hivaids/state-indicator/aids-diagnoses-adults-and-adolescents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018. Accessed April 2019.
[97]United States Centers for Disease Control and Prevention. NCHHSTP AtlasPlus. Updated 2017. Note that the number with HIV is likely higher than reported; it is estimated that 15 percent of HIV-positive individuals nationwide do not know that they have the virus. www.cdc.gov/nchhstp/atlas/index.htm. Kaiser Family Foundation. The HIV/AIDS Epidemic in the United States: The Basics. www.kff.org/hivaids/fact-sheet/the-hivaids-epidemic-in-the-united-states-the-basics/amp. March 25, 2019.

**FIGURE 27** Age-Adjusted HIV/AIDS Mortality, Massachusetts and the United States, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for human immunodeficiency virus [HIV] disease (ICD-10 codes B20–B24).

**FIGURE 28** Age-Adjusted HIV/AIDS Mortality, by Race and Ethnicity, Massachusetts, 2007–2017

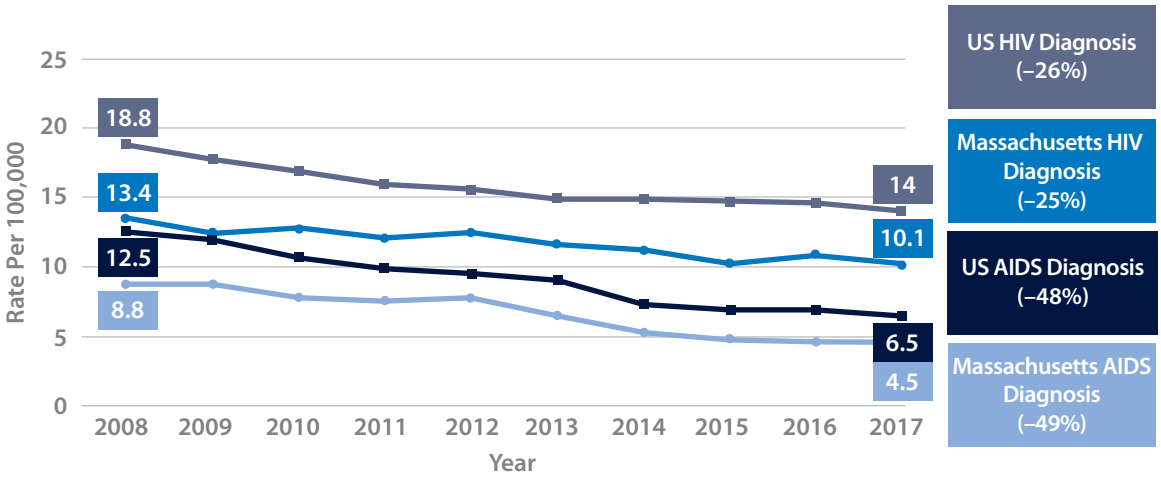



*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for human immunodeficiency virus [HIV] disease (ICD-10 codes B20–B24). Queries for White, Black, and Asian individuals excluded Hispanic individuals. Data for Black HIV/AIDS mortality in 2017 was not available.

Medication is key to treating HIV and preventing its spread. Antiretroviral therapy (ART) helps keep HIV under control and prevents transmission. Pre-exposure prophylaxis (PrEP) and

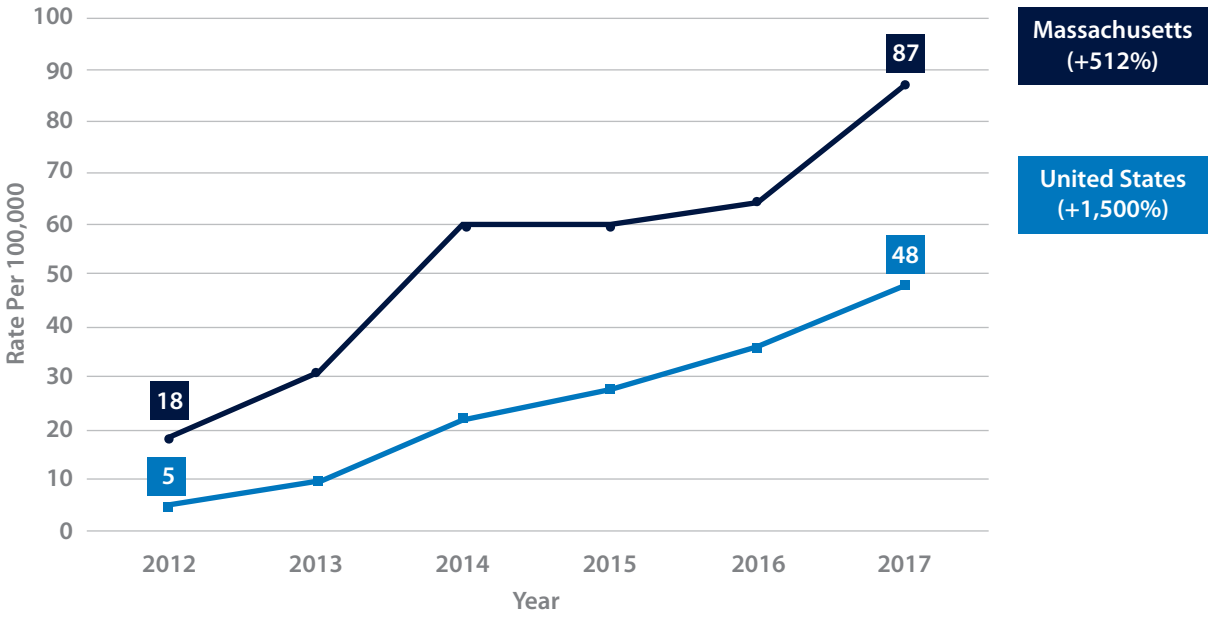
post-exposure prophylaxis (PEP) also help prevent transmission.[98] Following the discovery of PrEP's usefulness in preventing HIV transmission, its use has skyrocketed. Massachusetts ranks third in the nation for its rate of PrEP; its use has risen 512 percent since 2012 (see figure 30).[99]

**FIGURE 29** New HIV and AIDS Diagnoses, Massachusetts and the United States, 2008–2017




*Source:* United States Centers for Disease Control and Prevention. NCHHSTP AtlasPlus. www.cdc.gov/nchhstp/atlas/index.htm. Updated 2017.

**FIGURE 30** Rate of PrEP Use, Massachusetts and the United States, 2012–2017




*Source:* AIDSVu.org, presented by Emory University's School of Public Health in partnership with Gilead Sciences, Inc., and the Center for AIDS Research at Emory University.

[98]United States Department of Health and Human Services. What Are HIV and AIDS? www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/what-are-hiv-and-aids.
[99]AIDSVu.org, presented by Emory University's School of Public Health in partnership with Gilead Sciences, Inc., and the Center for AIDS Research at Emory University.

## *Policy Perspective — HIV/AIDS*

Massachusetts is a national leader in addressing HIV/AIDS and has made significant progress with a proactive public health approach. We have the tools to end HIV in the Commonwealth through sustained, strategic commitment and creative solutions. Accomplishing this for everyone requires tackling the inequities that drive HIV.

HIV is an opportunistic infection; it reflects where we are failing marginalized populations. One example is the re-emergence of HIV among people who inject drugs (PWID), following years of declining transmission. Recent outbreaks underscore the need for comprehensive, accessible prevention and treatment for PWID, including harm reduction services like syringe service programs and supervised consumption sites.

HIV intersects with multiple other public health issues, including hepatitis C virus, substance use disorders, sexually transmitted infections, and mental health. Effectively addressing HIV calls for care models that integrate prevention, testing, and treatment for all these conditions. We cannot end HIV without focusing on underlying social determinants, like systemic racism, stigma, poverty, homelessness, homo- and transphobia, and incarceration. If you have no home, no job, and no food, managing HIV may not be your priority.

While Massachusetts ranks third nationally in rate of PrEP (pre-exposure prophylaxis) use to prevent HIV transmission, the benefits of this important intervention are unequally distributed. We need policies supporting PrEP uptake in communities of color, youth (particularly young Black and Latino men who have sex with men), and transgender and cisgender women. Minors in Massachusetts can obtain HIV treatment without parental permission, but not PrEP. Proposed state legislation (H. 1954/S. 1237) would allow minors to independently consent to prevention services like PrEP. Massachusetts regulators should ensure that health insurers comply with recent federal guidance requiring provision of PrEP and related services without patient cost sharing. Improving health provider knowledge about PrEP would also help.

Implementing policies that better reach our most vulnerable communities with lifesaving prevention, care, and supportive services will move us closer to ending HIV in Massachusetts.

### Addendum: COVID-19 Impact and Implications

Like HIV, COVID-19 reveals the strengths and challenges in our health care and public health systems. Strengths over this past year include the dedication and creativity shown by community providers and public health professionals. They adapted their practices to ensure that people living with and at risk of acquiring HIV continued to access key prevention and care services, even amid the overwhelming challenge of coronavirus response. These service delivery innovations, like increased use of telehealth, should become a permanent part of integrated models for addressing HIV. The greater flexibility for providers and clients around administrative and reporting requirements afforded during COVID-19 should also continue post-pandemic.

Also like HIV, disinvested populations — particularly Black and Latino people — bear a disproportionate COVID-19 burden. HIV prevention and care providers have years of experience building trust and engaging with disinvested communities, who are often justifiably wary of health systems. Massachusetts should continue to leverage its expertise to create an equitable COVID-19 response.

COVID-19 has shown the bleak consequences of chronic underfunding of public health. While public health professionals have done heroic work with available resources, Massachusetts and the nation must invest more to ensure a robust public health infrastructure and workforce before the inevitable next pandemic.

**Amy Rosenberg, JD**
*Senior Clinical Instructor & Lecturer on Law, Center for Health Law & Policy Innovation, Harvard Law School*

# Hepatitis C

In recent years, the United States saw a steep increase in the number of hepatitis C infections, coinciding with the opioid epidemic.[100] In 2017, a total of 3,186 acute Hepatitis C cases (meaning cases within the first six months of infection) were reported to the CDC, but estimates of actual acute Hepatitis prevalence are much higher, around 44,300 people.[101] A large number of people are estimated to have hepatitis C without knowing it; this affects the amount of data available about hepatitis C.[102]

**WHAT IS HEPATITIS C?**

Hepatitis C is a "liver infection caused by the hepatitis C virus. Hepatitis C can range from a mild illness… to a serious lifelong illness."

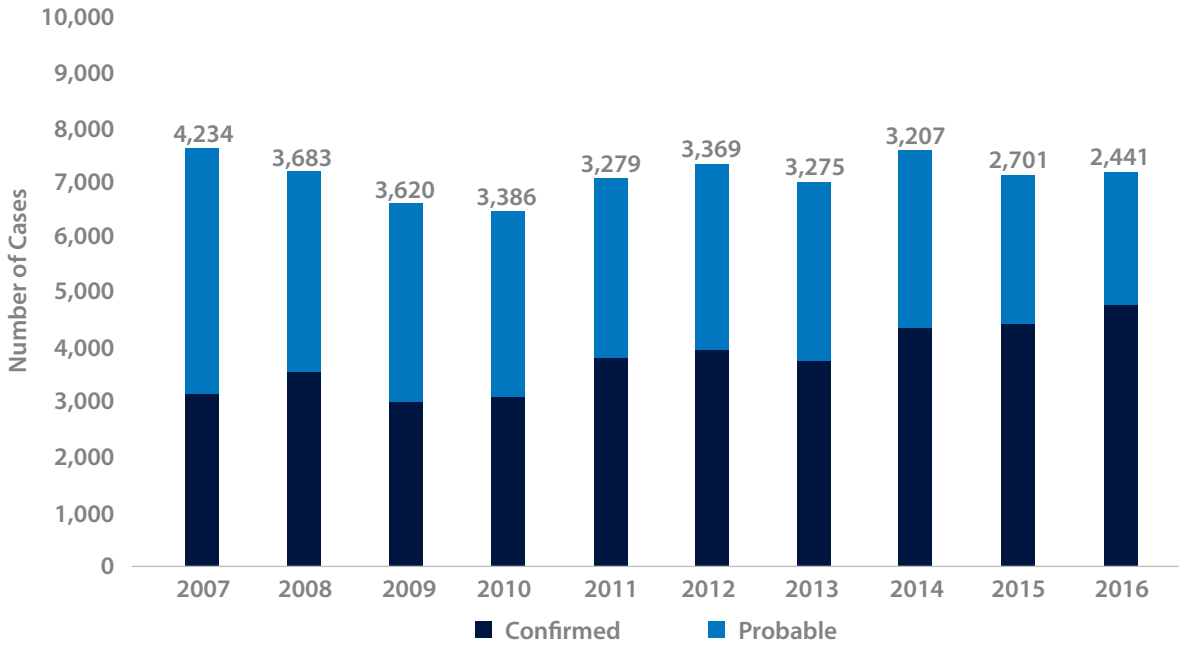
*CDC: Hepatitis C FAQ*

In Massachusetts, about 150 probable or confirmed acute hepatitis cases were reported in 2016, representing an increase from years past (see figure 31). Looking at chronic hepatitis C infection, about 7,000 to 8,000 hepatitis cases were reported to the Massachusetts Department of Health each year from 2011 to 2016. Geographically, case rates range from 69 to 1,094 in any given county. Hepatitis C is more common for men, Black, and Hispanic individuals, and individuals ages 50–69 (see figure 32). Over the past 10 years, reported cases rose the most for individuals ages 60–69 (more than 80 percent), and ages 30–39 (more than 39 percent) (see figure 33 on page 44).

Data are not available for hepatitis C mortality specifically. General viral hepatitis mortality, which includes hepatitis C, stayed relatively stable from 2007 to 2016, hovering around 1.5 deaths per 100,000 in Massachusetts.[103]

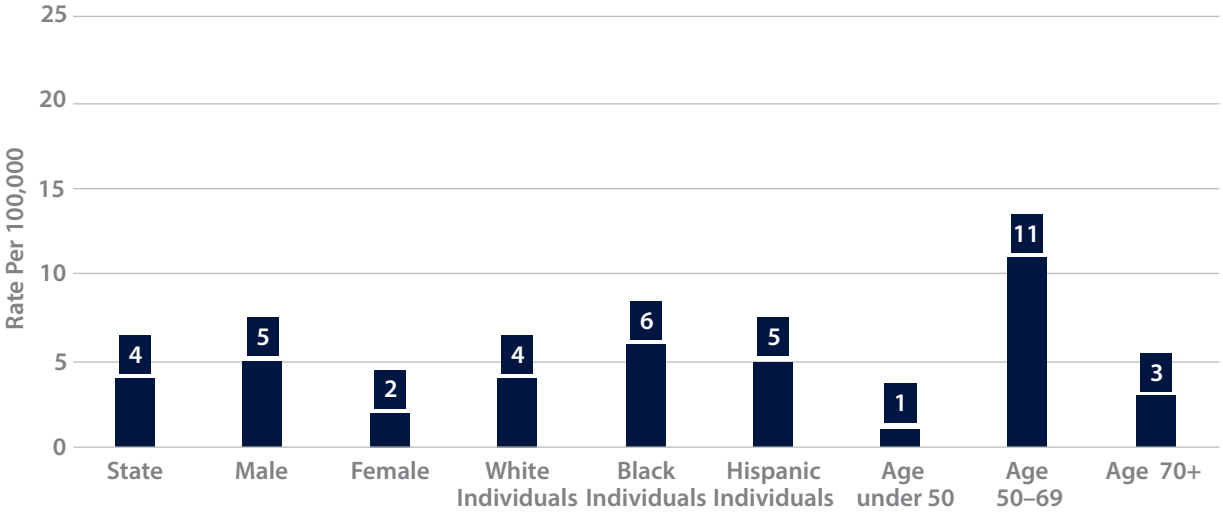
[100]United States Centers for Disease Control and Prevention. Increase in hepatitis C infections linked to worsening opioid crisis. www.cdc.gov/nchhstp/newsroom/2017/hepatitis-c-and-opioid-injection-press-release.html. Published December 21, 2017.
[101]United States Centers for Disease Control and Prevention. Hepatitis C Questions and Answers for the Public. www.cdc.gov/hepatitis/hcv/cfaq.htm.
[102]United States Centers for Disease Control and Prevention. Hepatitis C Questions and Answers for the Public. www.cdc.gov/hepatitis/hcv/cfaq.htm.
[103]Author's calculations using CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 2019.

**FIGURE 31** Number of Confirmed and Probable Hepatitis C Cases Reported in Massachusetts, 2007–2016



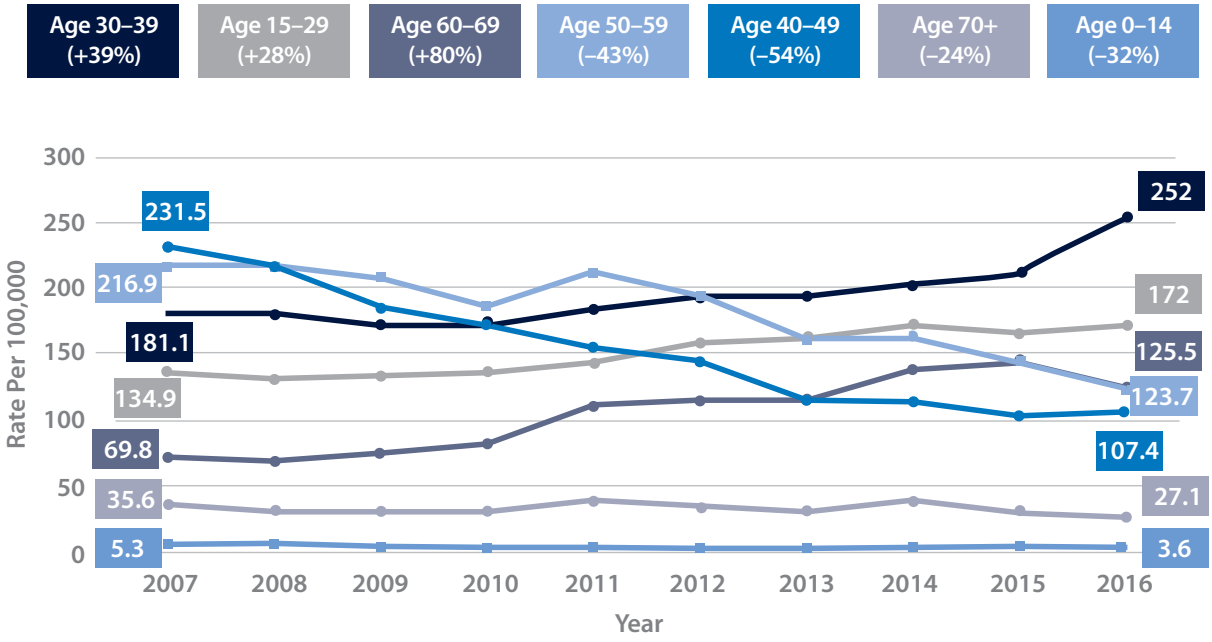

*Source:* Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences. Hepatitis C Virus Infection 2016 Surveillance Report. www.mass.gov/eohhs/gov/departments/dph/programs/id. Published March 2019.

**FIGURE 32** Hepatitis C Prevalence in Massachusetts, by Demographic Factors




*Source:* HepVu.org, presented by Emory University's School of Public Health in partnership with Gilead Sciences, Inc.

**FIGURE 33** Number of Confirmed and Probable Hepatitis C Cases by Age, Massachusetts, 2007–2016




*Source:* Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences. Hepatitis C Virus Infection 2016 Surveillance Report. www.mass.gov/eohhs/gov/departments/dph/programs/id. Published March 2019.

## *Policy Perspective — Hepatitis C*

Direct acting antivirals (DAAs) have transformed hepatitis C virus (HCV) from the deadliest communicable disease in the United States to one that is curable. Despite this breakthrough, many states have failed to advance access to DAA treatment in their Medicaid or correctional health programs. They have also failed to promote strategies for addressing the structural barriers to HCV care, such as a lack of patient and provider information, concerns regarding confidentiality and stigma, and inconsistent access to health services.

Thankfully, the Massachusetts Medicaid program, MassHealth, has eliminated all treatment restrictions to DAAs.[104] Also, the Massachusetts Department of Correction has eased restrictions to DAAs in the state's correction system.[105]

While removing treatment barriers is an important step forward, more needs to be done to eliminate HCV. Recognizing this, several states have established HCV elimination plans, designating evidence-based, action-oriented goals to address treatment, prevention, and

[104]Tsai D. MassHealth Managed Care Organization Bulletin 6. www.mass.gov/eohhs/docs/masshealth/bull-2016/mco-6.pdf. Published July 2016.
[105]McDonald D. Settlement between prisoners, Department of Correction prompts new hepatitis C protocol. *Boston Globe*. www.bostonglobe.com/metro/2018/06/30/settlement-between-prisoners-doc-prompts-new-hepatitis-protocol/fzyHnNSVmN1V0sVruUiTpJ/story.html. Published June 30, 2018.

structural barriers.[106] Given the intersection between HCV and injection drug use, these plans often include strategies to provide comprehensive services for people who inject drugs. They are formalized commitments to ending the HCV epidemic.

Massachusetts has not established an HCV elimination plan. Massachusetts should create one and initiate it with an education campaign to publicize the removal of treatment restrictions. The plan should also highlight the efforts of the state Department of Public Health and others to expand services for people who inject drugs. Additional steps must include proactive plans to ensure that all people living with or at risk for HCV have access to essential screening, treatment, prevention, and structural intervention services.

With strong implementation of an HCV elimination plan, Massachusetts could make the promise of the HCV cure a reality for everyone in the state who needs it.

### Addendum: COVID-19 Impact and Implications

COVID-19 has put into stark relief the Commonwealth's need and capacity to address barriers to accessing direct acting antivirals (DAAs) through a hepatitis C elimination plan. Lessons learned during the pandemic have proven that Massachusetts can improve patients' access to care. We have demonstrated that it is possible to require parity of reimbursement for telehealth services. We have equipped providers with flexibilities that allow for more streamlined drug prescribing. We have suspended prior authorization and other utilization management techniques to eliminate burdensome prerequisites to accessing care.

Massachusetts should learn from the "forced experiment" created by COVID-19 and institutionalize policy changes that support treatment access. We should not return to a time when overly burdensome rules unnecessarily hamper our community providers' ability to engage some of our most vulnerable residents from accessing life-saving treatment. People who use drugs and are experiencing homelessness — populations disproportionately impacted by HCV — can more successfully be treated with fewer barriers to care. A recent international study has shown that eliminating all requirements, other than two remote contacts via telephone during the 12-week course of treatment, achieved a 95 percent cure rate.[107] If this pandemic has taught us anything, it is that we must rethink existing models of care and pivot to a more practical solution: creating an elimination plan that (to quote the authors of the study) "keeps it simple and safe."[108]

**Robert Greenwald**
*Clinical Professor of Law and Faculty Director, Center for Health Law and Policy Innovation, Harvard Law School*

[106]Office of Infectious Disease and HIV/AIDS Policy, United States Department of Health and Human Services. Mapping Hepatitis Elimination in Action. www.hhs.gov/hepatitis/get-involved/hepatitis-elimination/index.html.
[107]Solomon S et al. The "Keep it Simple and Safe" approach to HC treatment: Primary outcomes from the ACTG A5360 (MINMON) Study. AASLD. www.natap.org/2020/AASLD/AASLD_68.htm. Published November 11, 2020.
[108]Solomon S et al. The "Keep it Simple and Safe" approach to HC treatment: Primary outcomes from the ACTG A5360 (MINMON) Study. AASLD. www.natap.org/2020/AASLD/AASLD_68.htm. Published November 11, 2020.

# Oral Health

Oral health contributes to overall health and well-being. Periodontal disease may be linked to heart disease, lung disease, diabetes, pneumonia, and rheumatoid arthritis.[109] Oral health issues bring pain, discomfort, and infection. Lacking access to a dentist can increase unnecessary emergency department visits, increase use of pain medication, and increase use of antibiotics.[110] Oral health issues can impact a person's ability to smile comfortably, which can lead to effects on social connection and employment. There is great potential to improve oral health, as these conditions are among

### WHAT IS ORAL HEALTH?

Oral health refers to "the health of teeth, gums, and the entire oral-facial system that allows us to smile, speak, and chew."

*CDC: Oral Health Conditions*

[109]Otomo-Corgel J, Pucher JJ, Rethman MP, and Reynolds MA. State of the science: Chronic periodontitis and systemic health. *Journal of Evidence Based Dental Practice.* 2012;12(3 Supplement):s20–28. www.sciencedirect.com/science/article/pii/S1532338212700064?via%3Dihub. Cullinan MP, Seymour GJ. Periodontal disease and systemic illness: Will the evidence ever be enough? Periodontology 2000. 2013;62(1). https://onlinelibrary.wiley.com/doi/full/10.1111/prd.12007. Laurence B, Mould-Milman N-K, Scannapieco FA, Abron A. Hospital admissions for pneumonia more likely with concomitant dental infections. *Clinical Oral Investigations.* 2015;19(6): 1261–1268. https://link.springer.com/article/10.1007/s00784-014-1342-y. Jeffcoat MK, Jeffcoat RL, Gladowski PA, Bramson JB, Blum JJ. Impact of periodontal therapy on general health: Evidence from insurance data for five systemic conditions. *American Journal of Preventive Medicine.* 2014;47(2):166–74. www.sciencedirect.com/science/article/pii/S0749379714001536. Massachusetts Health Policy Commission. ED Utilization for Preventable Oral Health Care Conditions in MA (PowerPoint presentation). www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/public-meetings/committee-meetings/20160401-public-presentation-dental-findings.pdf. Published April 6, 2016. Kisely SS. No mental health without oral health. *Can. J. Psychiatry.* 2016;61(5):277–282.

[110]Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. Published July 2019.

the most preventable and can lead to big improvements in health. Massachusetts can improve the oral health of its population through fluoridated water systems and access to oral health care.

## *Oral Health Outcomes*

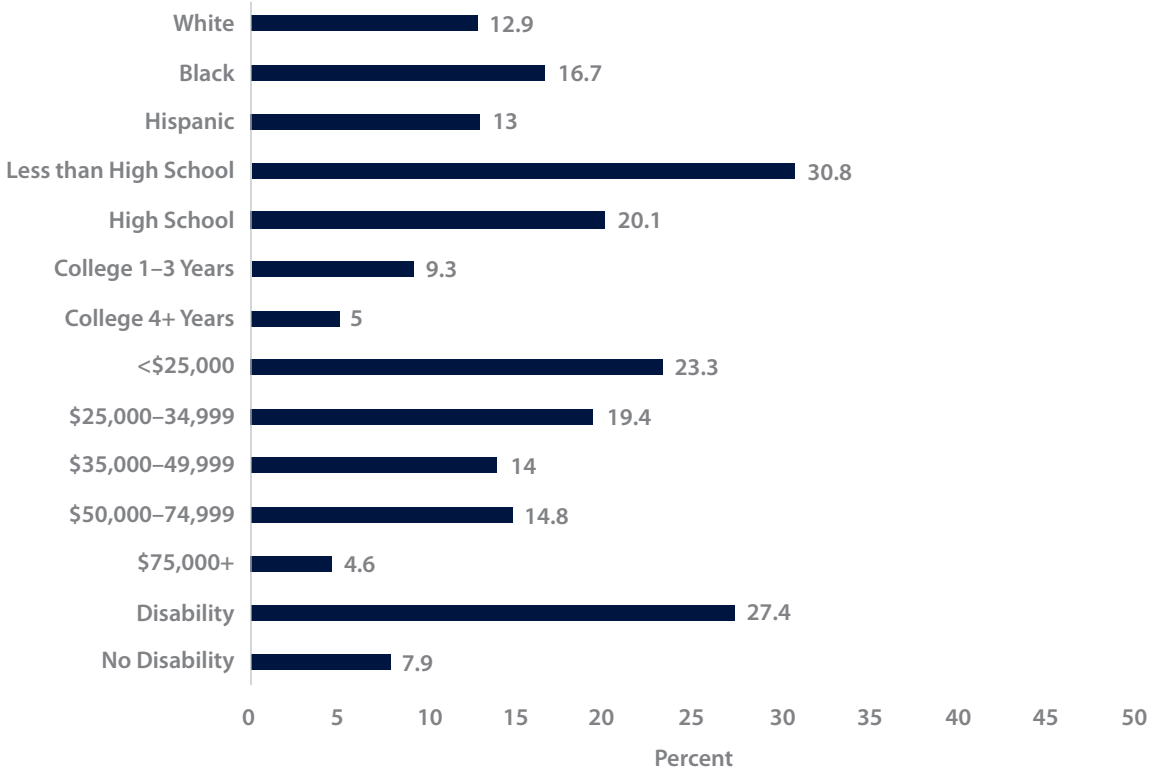
In contrast to its status as one of the healthiest states in the nation, Massachusetts only ranks in the middle of the country for oral health outcomes for children, seniors, and other adults. Massachusetts has the 22nd highest rate of children with oral health problems.[111] About a quarter of Massachusetts middle school students reported having a cavity in 2017, down from 30 percent in 2007.[112] Thirty percent of Massachusetts high school students reported having a cavity in 2017, down from 35 percent in 2007.[113]

About 13 percent of all Massachusetts non-elderly adults reported six or more teeth missing due to decay or gum disease in 2018, down from 15 percent in 2012.[114] Adult dental health outcomes vary widely across demographics (see figure 34 on page 48).[115] More than one in four individuals with disabilities report six or more teeth missing, a rate over three times that of individuals without disabilities.[116] Over a third of individuals with less than a high school education report missing teeth, compared to 5 percent of individuals with four or more years of college.[117]

Among adults ages 65 and older, Massachusetts has the 17th highest rate for individuals with *all* teeth extracted due to decay or gum disease, at 16.3 percent in 2019.[118] The rate of Massachusetts seniors with all teeth extracted has risen 5 percent since 2014, compared to a 10 percent drop nationally (see figure 35).[119]

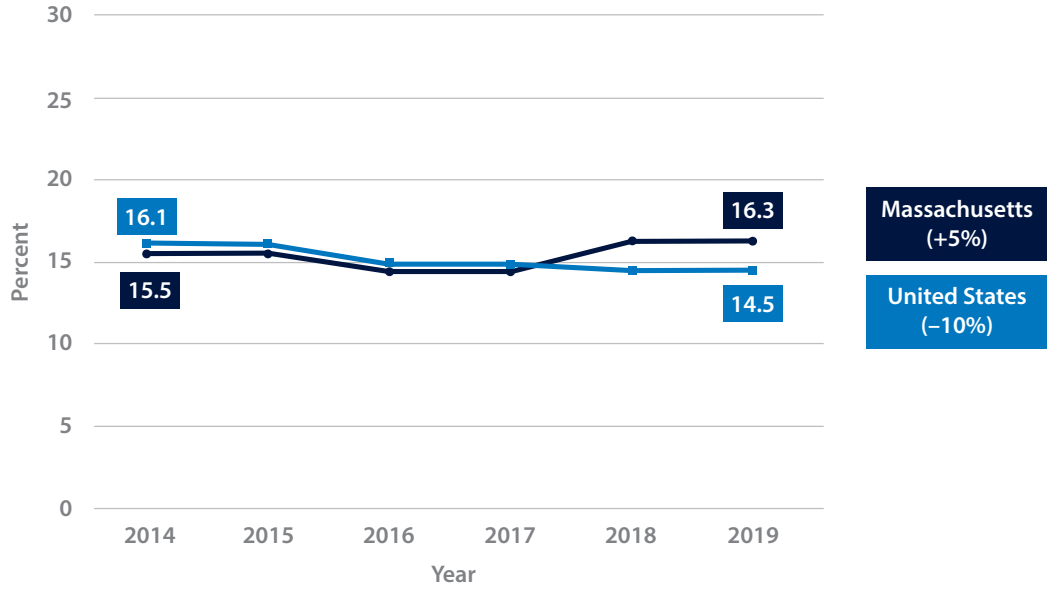
[111]Kaiser Family Foundation. State Health Facts. Percent of Children (ages 1-17) with Oral Health Problems. Kaiser Family Foundation analysis of Child and Adolescent Health Measurement Initiative. www.kff.org/other/state-indicator/children-with-oral-health-problems/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Data Resource Center for Child and Adolescent Health. 2016 National Survey of Children's Health (NSCH) data query. childhealthdata.org. Accessed May 29, 2019. This measure was created using three survey questions: whether the child has had a toothache in the past 12 months, whether the child had bleeding gums in the past 12 months, or whether the child had decayed teeth/cavities in the past 12 months. Missing values due to non-response or a "don't know" response are not included in the denominator for calculations of prevalence estimates and weighted population counts. In the majority of cases, the proportion of missing values is less than 2%.
[112]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (2017). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.
[113]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (2017). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.
[114]Massachusetts Department of Health. A profile of health among Massachusetts adults 2018. www.mass.gov/doc/a-profile-of-health-among-massachusetts-adults-2018/download. Published December 2019.
[115]Massachusetts Department of Health. A profile of health among Massachusetts adults 2018. www.mass.gov/doc/a-profile-of-health-among-massachusetts-adults-2018/download. Published December 2019.
[116]Massachusetts Department of Health. A profile of health among Massachusetts adults 2018. www.mass.gov/doc/a-profile-of-health-among-massachusetts-adults-2018/download. Published December 2019.
[117]Massachusetts Department of Health. A profile of health among Massachusetts adults 2018. www.mass.gov/doc/a-profile-of-health-among-massachusetts-adults-2018/download. Published December 2019.
[118]United Health Foundation. America's Health Rankings Senior Report. Trend: Teeth Extractions—Seniors, Massachusetts, United States. Analyzing results of the CDC Behavioral Risk Factor Surveillance System (percentage of adults ages 65 and older who reported having has all teeth removed due to tooth decay or gum disease).
[119]United Health Foundation. America's Health Rankings Senior Report. Trend: Teeth Extractions—Seniors, Massachusetts, United States. Analyzing results of the CDC Behavioral Risk Factor Surveillance System (percentage of adults ages 65 and older who reported having has all teeth removed due to tooth decay or gum disease).

**FIGURE 34** Adults Missing Six or More Teeth, Massachusetts, 2018




*Source:* Massachusetts Department of Health. A Profile of Health Among Massachusetts Adults, 2018. Analyzing results of the CDC Behavioral Risk Factor Surveillance System (percentage of adults reported having has six or more teeth removed due to tooth decay or gum disease). www.mass.gov/doc/a-profile-of-health-among-massachusetts-adults-2018/download. Published December 2019.

**FIGURE 35** Adults Age 65 and Over Who Report Having Had All Teeth Removed due to Tooth Decay or Gum Disease, Massachusetts, 2014–2019




*Source:* United Health Foundation. America's Health Rankings Senior Report. Trend: Teeth Extractions — Seniors, Massachusetts, United States. Analyzing results of the CDC Behavioral Risk Factor Surveillance System (percentage of adults ages 65 and older who reported having has all teeth removed due to tooth decay or gum disease). www.americashealthrankings.org/explore/senior/measure/teeth_extractions_sr/state/MA.

## *Water Fluoridation*

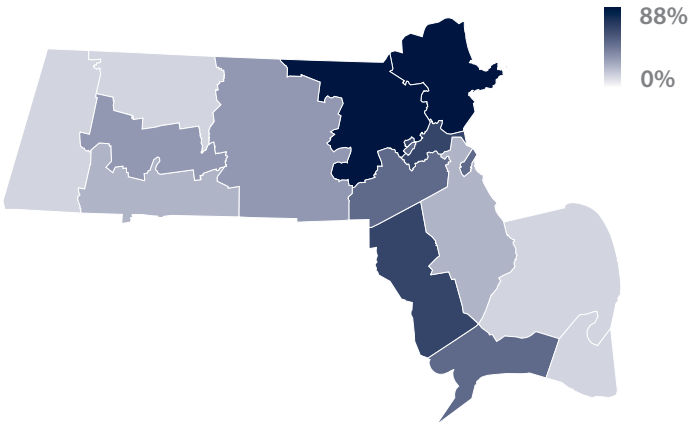
Both safe and cost-effective, fluoride in community water supplies prevents tooth decay community-wide.[120] Living in fluoridated communities reduces income inequalities in dental caries for young children.[121] For every dollar spent on fluoridation, there is about a $38 benefit in better oral health. [122]

Nationally, Massachusetts ranks 38th in populations served by community water systems that receive fluoridated water.[123] In 2019, only 57 percent of Massachusetts residents served by a public water system were served by a system that was fluoridated, compared to 60 percent in 2015.[124] Massachusetts reported no fluoridated public water systems in Berkshire, Franklin, Nantucket Counties, compared to 88 percent of public water systems in Middlesex County (see figure 36).

Aimed at ameliorating the effects of water systems with inadequate fluoride, schoolchildren can participate in the fluoride mouth rinse program. During the 2018–19 school year, 12,309 Massachusetts schoolchildren participated in the school fluoride rinse program, all of them from non-fluoridated communities.[125]

In the last six years, 20 communities faced challenges to continue fluoridation. As individuals increasingly get information from social media, there are indications that they are receiving incorrect information about fluoride.[126]

**FIGURE 36** Percentage of Massachusetts Residents Served by a Fluoridated Public Water System by County, 2019



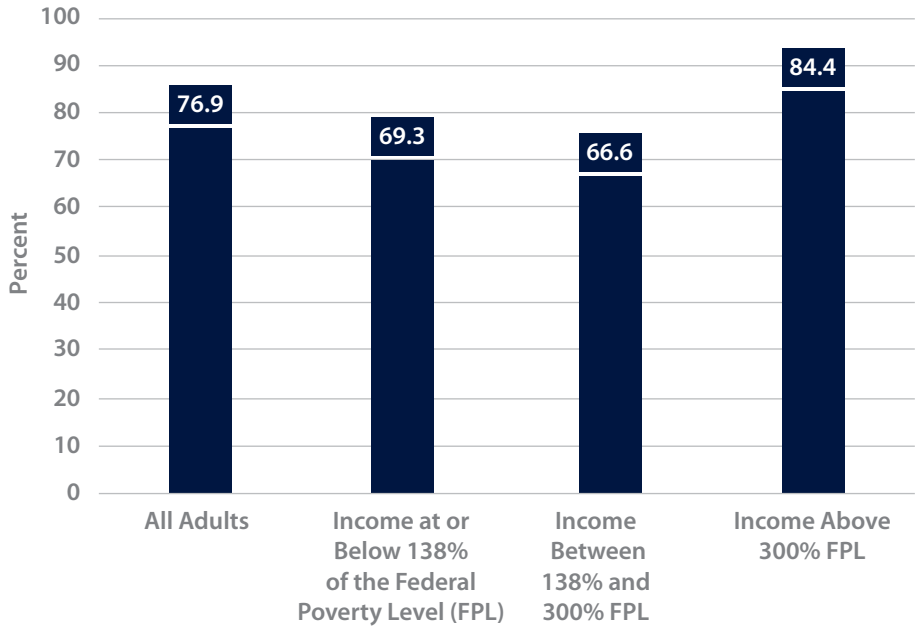

*Source:* United States Centers for Disease Control. 2019 Fluoridation Status Report for Massachusetts. Calculated as number of Massachusetts residents served by fluoridated public water systems, divided by number of Massachusetts residents served by public water systems in each county. This data source does not include non-community public water systems.

[120]United States Centers for Disease Control and Prevention. Community Water Fluoridation. www.cdc.gov/fluoridation/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Ffluoridation%2Findex.htm.
[121]Sanders AE, Grider WB, Maas WR, Curiel JA, and Slade GD. Association between water fluoridation and income-related dental caries of US children and adolescents. *JAMA Pediatr.* 2019;173(3):288–90.
[122]Newbrun E. What we know and do not know about fluoride. *Journal of Public Health Dentistry.* 2010;70(3):227–233.
[123]United States Centers for Disease Control and Prevention. 2016 Fluoridation Statistics. www.cdc.gov/fluoridation/statistics/2016stats.htm.
[124]United States Centers for Disease Control and Prevention. Massachusetts fluoridation status reports (2015 and 2019).
[125]Gershon R. Personal Communication. February 11, 2020.
[126]Abdulraheem A, Allukian M. Anti-fluoridation activities on the internet and social media: A professional challenge. *Journal of the Massachusetts Dental Society.* 2017;66(3).

## *Dental Insurance*

About 77 percent of Massachusetts adults ages 19–64 reported having dental insurance at the time of a recent health care access study, compared to 96 percent of adults who reported having health insurance at the time.[127] Higher income adults (greater than 300 percent of the federal poverty level) were more likely to have dental insurance (see figure 37). For individuals on MassHealth, the state's Medicaid program, and Children's Health Insurance Program, dental coverage (cut in 2010) has gradually been restored for many members (see figure 38). Last spring, some periodontal services were added to the benefit.[128]

**FIGURE 37** Dental Insurance Coverage at the Time of the Survey among Massachusetts Adults 19 to 64, Overall and by Family Income, 2018




*Source:* Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.

**FIGURE 38** Simplified Illustration of Restored MassHealth Dental Benefits for Adults, 2010–2019

| | |
|---|---|
| **2010** | MassHealth Adult Dental Benefits included Cleanings, Extractions, and Oral Surgery |
| **2013** | Fillings (Composite Restorations) for Front Teeth Restored |
| **2014** | Fillings (Restorations) for All Teeth Restored |
| **2015** | Dentures Restored Without Prior Authorization Limitations |
| **2019** | Periodontal Services Restored |

*Source:* Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. Comprehensive coverage is available for members under age 21 and adult members with intellectual or developmental disabilities. https://www.sneptn.org/news/opportunities-masshealth-acos-improve-oral-health-and-reduce-cost-through-emergency-department. Published July 2019.

[127]Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.
[128]MassHealth Transmittal Letter DEN-102 (April 2019)

## *Access to Dental Professionals*

Massachusetts ranks high in annual number of dental visits, ranking third in adults who visited the dentist in the last year,[129] fourth in preventive children dental visits,[130] and 10th in senior dental visits.[131] Massachusetts adult dental visits decreased slightly over the past five years (–2 percent); senior dental visits also decreased slightly (–3 percent) (see figures 39 and 40 on page 53).

Gaps in access remain. Massachusetts has 325,244 individuals living in 60 federally designated dental care health professional shortage areas, resulting in difficulty accessing dental care, with a level of unmet need of 76 percent in those areas.[132] This is a decrease in number of individuals living in dental care health professional shortage areas from 2016, when there were over 500,000 people living in 62 federally designated dental shortage areas.[133] Unmet need among those living in dental care health professional shortage areas, on the other hand, *rose* from 48 percent in 2016 to 76 percent in 2020.[134] Those shortage areas are most commonly seen in Suffolk, Barnstable, and Worcester Counties (see figure 41 on page 54).[135]

Almost 16 percent of Massachusetts survey respondents reported unmet need for dental care due to cost.[136] More respondents reported unmet need for dental care due to cost among individuals lacking health insurance (37 percent), individuals with fair or poor health (23 percent), individuals in Central Massachusetts (20 percent) and the Southcoast (19 percent), non-elderly adults (20 percent), Black individuals (20 percent), and Hispanic individuals (21 percent).[137]

[129]Kaiser Family Foundation. State Health Facts. Adults Who Report Visiting the Dentist or Dental Clinic within the Past Year by Gender. www.kff.org/other/state-indicator/percent-who-visited-the-dentistclinic/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018. Kaiser Family Foundation analysis of the Center for Disease Control and Prevention (CDC)'s Behavioral Risk Factor Surveillance System (BRFSS) 2018 Survey Results. Data represent adults who reported having visited the dentist or dental clinic within the past year for any reason. Percentages are weighted to reflect population characteristics.
[130]United Health Foundation. America's Health Rankings. 2019 Health of Women and Children Report. America's Health Rankings analysis of US HHS, HRSA, Maternal and Child Health Bureau (MCHB), Child and Adolescent Health Measurement Initiative (CAHMI), National Survey of Children's Health Indicator Data Set, Data Resource Center for Child and Adolescent Health, United Health Foundation, AmericasHealthRankings.org. www.americashealthrankings.org/learn/reports/2019-health-of-women-and-children-report/state-summaries-massachusetts. Accessed 2019.
[131]United Health Foundation. America's Health Rankings. 2019 Senior Report. America's Health Rankings analysis of CDC, Behavioral Risk Factor Surveillance System, United Health Foundation, AmericasHealthRankings.org. www.americashealthrankings.org/learn/reports/2019-senior-report/state-summaries-massachusetts. Accessed 2019.
[132]Kaiser Family Foundation. Dental Care Health Professional Shortage Areas (HPSAs). www.kff.org/other/state-indicator/dental-care-health-professional-shortage-areas-hpsas/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Data as of September 30, 2019.
[133]Massachusetts Health Council. *Common Health for the Commonwealth: Report on Preventable Conditions and Social Determinants of Health.* 2017.
[134]Massachusetts Health Council. *Common Health for the Commonwealth: Report on Preventable Conditions and Social Determinants of Health.* 2017. Kaiser Family Foundation. Dental Care Health Professional Shortage Areas (HPSAs). www.kff.org/other/state-indicator/dental-care-health-professional-shortage-areas-hpsas/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Data as of September 30, 2019.
[135]United States Centers for Disease Control and Prevention. Find a Health Professional Shortage Area. Map shows areas with designations updated between January 2016 and January 2020. https://data.hrsa.gov/tools/shortage-area/hpsa-find.
[136]Massachusetts Center for Health Information and Analysis. Massachusetts Health Insurance Survey. Detailed Data Table tabs D.1-1 to D.1-7. www.chiamass.gov/massachusetts-health-insurance-survey. Published 2017.
[137]Massachusetts Center for Health Information and Analysis. Massachusetts Health Insurance Survey. Detailed Data Table tabs D.1-1 to D.1-7. www.chiamass.gov/massachusetts-health-insurance-survey. Published 2017.

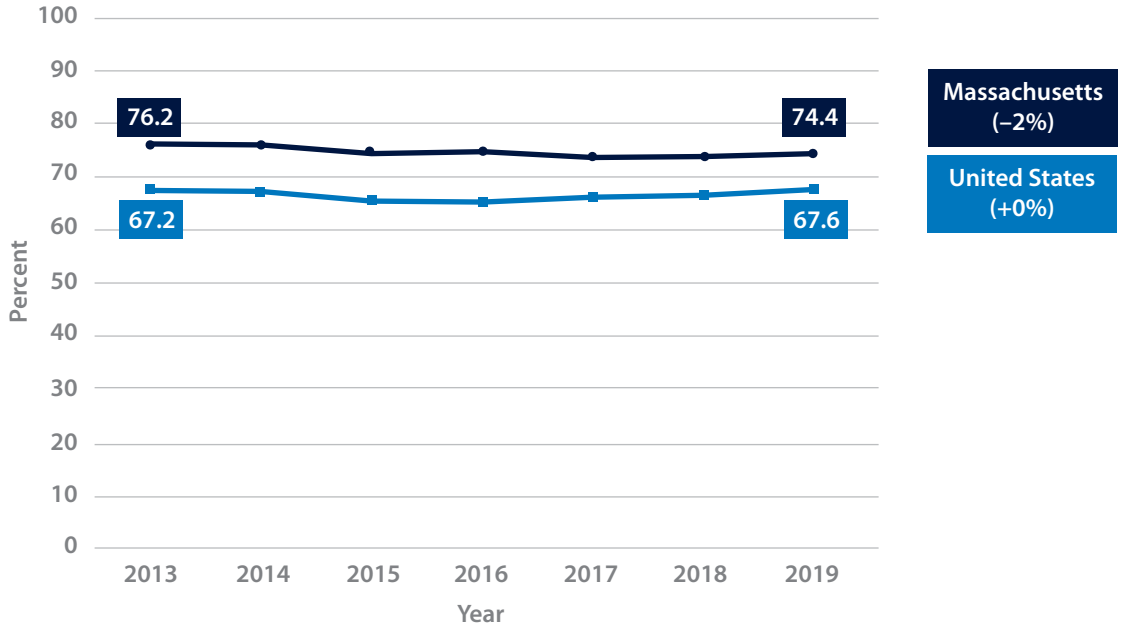
Of adults that report seeing a dentist in the last year, there are differences among age groups, racial and ethnic groups, geography, insurance status, and income (see figure 42 on page 54).[138] Residents of Central Massachusetts, the Southcoast, Metro Boston, and Western Massachusetts were less likely to have a dental visit compared to other parts of the state.[139] Low-income individuals, non-White individuals, uninsured individuals, and adults were all less likely to have an annual dental visit.[140]

Pregnant individuals reported low rates of teeth cleaning during pregnancy. Oral health is particularly important for birth outcomes. In one study, lack of teeth cleaning during pregnancy was associated with a 23 percent greater risk of preterm birth.[141] Slightly less than half of new Massachusetts parents who were pregnant reported that they had had their teeth cleaned during pregnancy, despite 85 percent of pregnant individuals reporting that they had dental insurance coverage (see figure 43 on page 55).[142] The rate of individuals with teeth cleaning during pregnancy has increased since 2011, though the rate is still quite low compared to the general population.[143] Teeth cleaning during pregnancy was less likely for Black, Asian, and Hispanic individuals; this racial/ethnic variation has decreased since 2011 (see figure 44 on page 55).[144]

In 2017, MassHealth saw over 13,000 emergency department visits for oral health issues that could have been treated by a dentist.[145] A MassHealth ED visit for conditions requiring restorative services resulted in an average claim amount that was 2.6 times that of a MassHealth dental office visit for restorative services.[146] Opioid prescriptions were filled after 15 percent of these ED visits. Antibiotics were filled after 41 percent of these visits.[147] This indicates that improving access to dental office visits could reduce costly, unnecessary ED utilization and reduce opioid and antibiotic use.[148] Of 6,515 licensed dentists in Massachusetts, 2,475 participated with MassHealth in state fiscal year 2019.[149] MassHealth has 9,052 total access points, with 8,545 accepting new patients.[150]

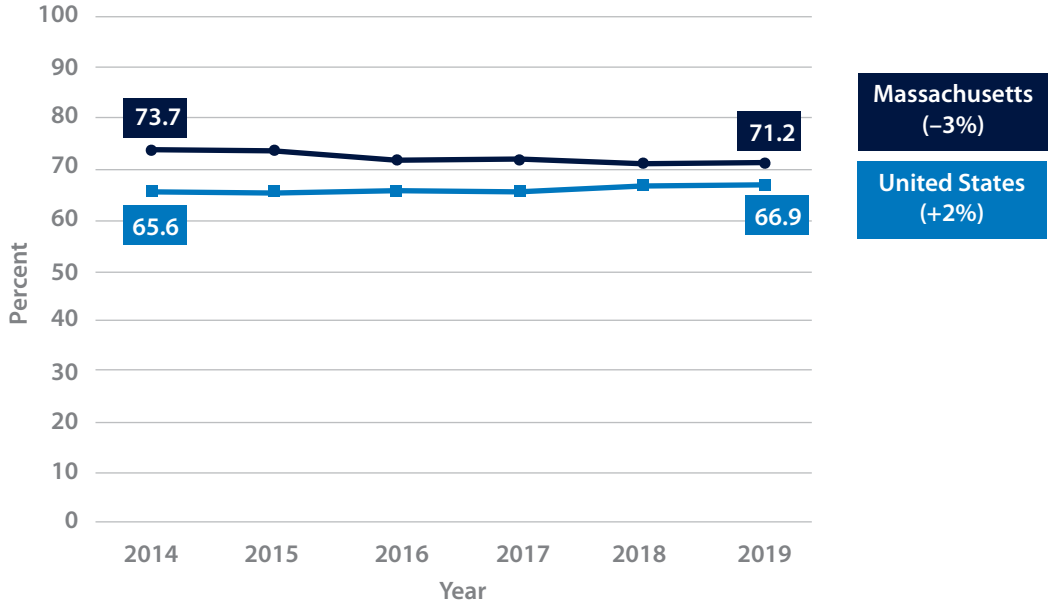
[138]Massachusetts Center for Health Information and Analysis. Massachusetts Health Insurance Survey. www.chiamass.gov/massachusetts-health-insurance-survey. Published 2017.
[139]Massachusetts Center for Health Information and Analysis. Massachusetts Health Insurance Survey. www.chiamass.gov/massachusetts-health-insurance-survey. Published 2017.
[140]Massachusetts Center for Health Information and Analysis. Massachusetts Health Insurance Survey. www.chiamass.gov/massachusetts-health-insurance-survey. Published 2017.
[141]Hwang SS, Smith VC, McCormick MC, Barfield WD. The Association between maternal oral health experiences and risk of preterm birth in 10 states, Pregnancy Risk Assessment Monitoring System, 2004–2006. *Matern Child Health J.* 2012;16(8):1688–1695.
[142]Massachusetts Department of Public Health. Birth Report 2016. www.mass.gov/doc/2016-birth-report/download. Massachusetts Department of Public Health. PHIT Data: Pregnancy Risk Assessment Monitoring System (PRAMS). www.mass.gov/guides/phit-data-pregnancy-risk-assessment-monitoring-system-prams.
[143]Massachusetts Department of Public Health. Birth Report 2016. www.mass.gov/doc/2016-birth-report/download.
[144]Massachusetts Department of Public Health. Birth Report 2016. www.mass.gov/doc/2016-birth-report/download.
[145]Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. https://www.sneptn.org/news/opportunities-masshealth-acos-improve-oral-health-and-reduce-cost-through-emergency-department. Published July 2019.
[146]Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. https://www.sneptn.org/news/opportunities-masshealth-acos-improve-oral-health-and-reduce-cost-through-emergency-department. Published July 2019.
[147]Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. https://www.sneptn.org/news/opportunities-masshealth-acos-improve-oral-health-and-reduce-cost-through-emergency-department. Published July 2019.
[148]Gershon R, Velez E, Jones DC, Ohler T, Deignan H, Polakoff D. Opportunities for MassHealth ACOs to improve oral health and reduce cost through emergency department diversion. Published July 2019.
[149]Gershon R. Personal Communication. February 11, 2020.
[150]Gershon R. Personal Communication. February 11, 2020.

**FIGURE 39** Adults with an Annual Dental Visit, Massachusetts and the United States, 2013–2019



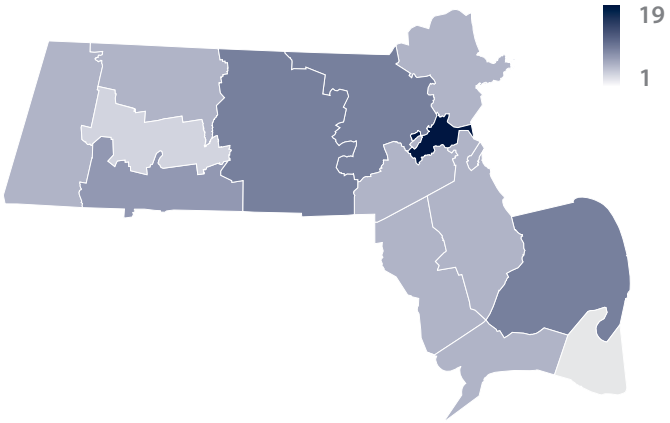

*Source:* United Health Foundation. America's Health Rankings. Trend: Dental Visit, Annual, Massachusetts, United States. Analysis of CDC Behavioral Risk Factor Surveillance System (percentage of adults who reported visiting the dentist or dental clinic within the past year). www.americashealthrankings.org/explore/annual/measure/dental/state/MA.

**FIGURE 40** Seniors with an Annual Dental Visit, Massachusetts and the United States, 2014–2019



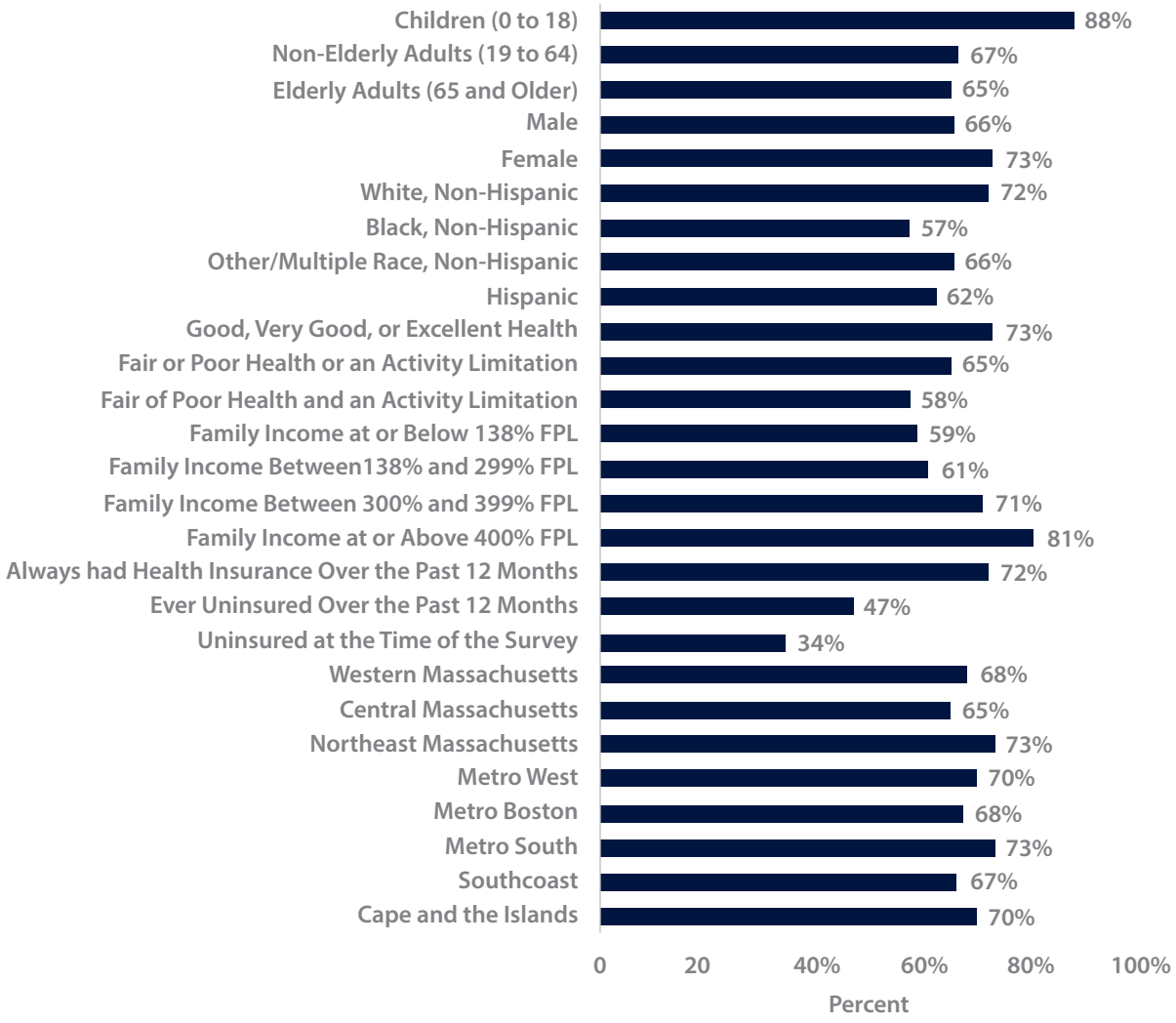

*Source:* United Health Foundation. America's Health Rankings Senior Report. Trend: Dental Visit — Seniors, Massachusetts, United States. Analyzing results of the CDC Behavioral Risk Factor Surveillance System (percentage of adults ages 65 and older who reported visiting a dental health professional within the past year). www.americashealthrankings.org/explore/senior/measure/dental_visit_sr/state/MA.

**FIGURE 41** Federally Designated Dental Health Professional Shortage Areas in Massachusetts



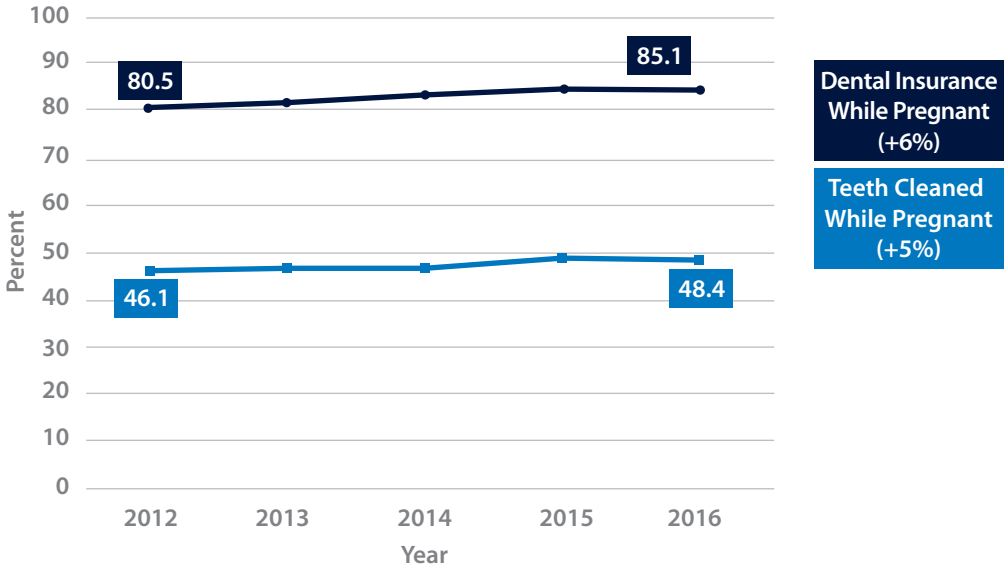

*Source:* United States Centers for Disease Control and Prevention. Find a Health Professional Shortage Area. Map shows areas with designations updated between January 2016 and January 2020. https://data.hrsa.gov/tools/shortage-area/hpsa-find.

**FIGURE 42** Adults with an Annual Dental Visit, by Individual Characteristics, Massachusetts, 2017



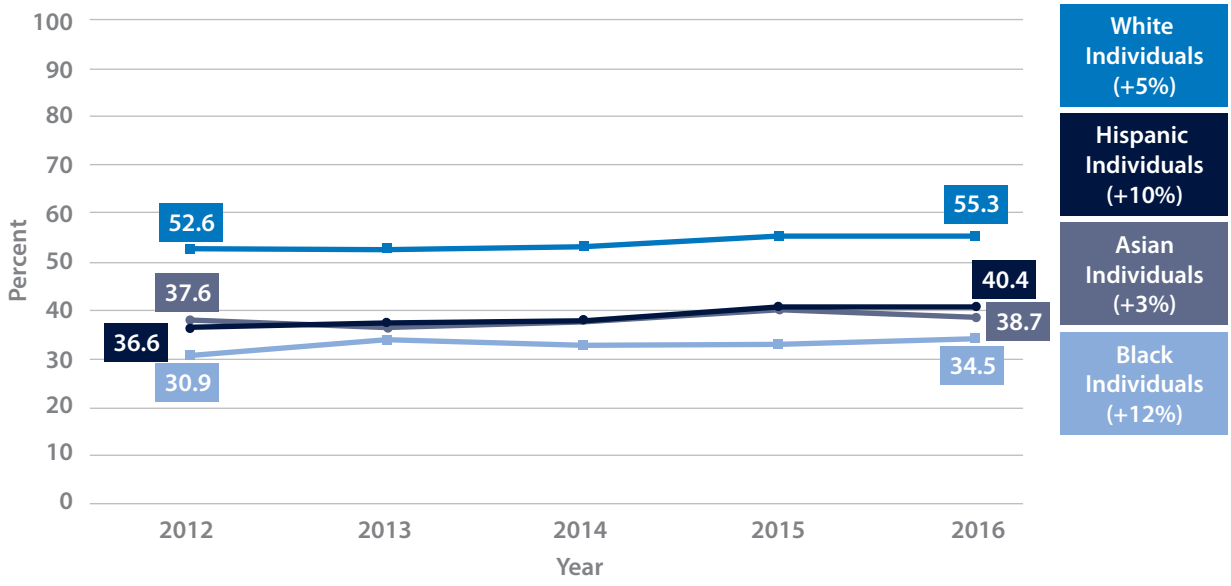

*Source:* Massachusetts Center for Health Information and Analysis. 2017 Massachusetts Health Insurance Survey. www.chiamass.gov/massachusetts-health-insurance-survey.

**FIGURE 43** Dental Insurance and Teeth Cleaning while Pregnant, Massachusetts, 2012–2016




*Source:* Massachusetts Department of Public Health. Massachusetts Births 2016. www.mass.gov/doc/2016-birth-report/download. Published May 2018. Massachusetts Department of Public Health. PHIT Data: Pregnancy Risk Assessment Monitoring System (PRAMS). www.mass.gov/guides/phit-data-pregnancy-risk-assessment-monitoring-system-prams.

**FIGURE 44** Teeth Cleaning while Pregnant, by Race and Ethnicity, Massachusetts, 2012–2016




*Source:* Massachusetts Department of Public Health. Massachusetts Births 2016. www.mass.gov/doc/2016-birth-report/download. Published May 2018.

## *Public Health Dental Hygienists*

One way to increase access to oral health care is through the use of public health dental hygienists. In Massachusetts, public health dental hygienists can work without supervision in public health settings and receive MassHealth reimbursement.[151] These hygienists must receive additional training

[151]Mass. Gen. Law c. 112 s. 51

and have a collaborative agreement with a licensed dentist.[152] Over 6,500 people were licensed as dental hygienists in 2011, and of those responding to a statewide survey, 30 percent indicated that they were likely to practice as a public health dental hygienist in the next five years.[153] Only 33 public health hygienists provided services in FY 2015.[154] Currently, only 29 public health hygienists have permits to practice in the state.[155] One Massachusetts study found a number of barriers to the ability of public health hygienists to practice, including Medicaid coverage, lack of third-party reimbursement, and insurance carriers warning collaborating dentists that they would lose access to malpractice insurance.[156]

## *Policy Perspective — Oral Health*

Oral health is a vital component of a person's overall health, yet the mouth is still often treated as separate from the rest of the body. This is changing. Over the past decade, important work has been done to integrate dental and medical care in community health centers, academic institutions, primary care practices, and dental offices across Massachusetts and the United States.[157]

Many of these efforts have resulted in improved patient health outcomes and reduced health care expenditures.[158] However, progressive new policies are necessary in Massachusetts to create systemic change that will break down historic barriers between medicine and dentistry, transition oral health care delivery into a new era, and significantly improve patient access to oral health and dental services.

MassHealth's accountable care organization (ACO) program is a statewide example of a "new era" of health care delivery and payment reform in Massachusetts. This program is designed to focus on disease prevention, care coordination, health outcomes, quality measures, and financial accountability. In an exciting step, a pediatric oral health quality measure was included within the MassHealth ACO quality measure slate. In other words, MassHealth ACOs and participating primary care providers are incentivized to begin to consider the oral health needs of their patients and build referral networks to community-based dentists.

Other state and federal legislative efforts are underway to increase access and coverage of dental services, particularly for underserved populations. At the state level, the two key bills are the following:

- An Act Relative to the Restoration of MassHealth Adult Dental Benefits (H. 1917/S. 1212), which would fully restore the Medicaid dental benefit including root canals and crowns.[159]
- An Act to Improve Oral Health for All Massachusetts Residents (H. 1916/S. 1215), which would authorize mid-level providers known as dental therapists to expand access to care.[160]

[152]Mass. Gen. Law c. 112 s. 51
[153]Massachusetts Department of Public Health. Health professions data series: dental hygienists 2011 (April 2015).
[154]Massachusetts Health Council. *Common Health for the Commonwealth: Report on Preventable Conditions and Social Determinants of Health.* 2017.
[155]Gershon R. Personal Communication. February 11, 2020.
[156]Rainchuso L, Salisbury H. Public health dental hygienists in Massachusetts: A qualitative study. *Journal of Dental Hygiene.* 2017;91(3):31–36.
[157]Heath Care For All. Case studies in oral health integration from across the care delivery spectrum: Lessons learned for Massachusetts. https://pdfs.semanticscholar.org/0a1e/59ff733568ffd219016d18ce388fd04c4bf3.pdf?_ga=2.47579111.1770374928.1583519984-1071149184.1583519984. Published June 2017.
[158]Massachusetts Health Policy Commission. Oral health care access and emergency department utilization for avoidable oral health conditions in Massachusetts. www.mass.gov/doc/oral-health-brief/download. Published August 1, 2016.
[159]The 191st General Court of the Commonwealth of Massachusetts. https://malegislature.gov/Bills/191/S1212. Accessed January 27, 2020.
[160]The 191st General Court of the Commonwealth of Massachusetts. https://malegislature.gov/Bills/191/S1215. Accessed January 27, 2020.

At the federal level, legislation passed by the House (H.R. 3) includes provisions to add coverage of dental services to Medicare.[161] Unfortunately, Medicare currently provides no dental coverage, leaving enrollees to purchase standalone plans, obtain retiree dental coverage if available, or forgo coverage entirely.

Innovative regulatory and legislative measures are needed to transform the current health care system in Massachusetts to be inclusive of oral health.

### Addendum: COVID-19 Impact and Implications

The COVID-19 health crisis has presented considerable challenges and opportunities for the health care system in Massachusetts, including for dental providers, services, and patients. In fact, the pandemic has highlighted the importance and necessity of designing a health care system that is patient centered, equitable, coordinated, integrated, and inclusive of oral health.

In March 2020, upon Governor Baker's declaration of a state of emergency in the Commonwealth, dental providers were strongly advised to limit dental treatment to urgent and emergency care to help prevent the spread of COVID infections.[162] While these initial restrictions temporarily limited in-person dental treatments, they simultaneously thrust forward new innovations and policies on telehealth and teledentistry.[163,164] As a result, throughout the pandemic these advancements have helped consumers obtain safe and immediate virtual access to community-based dental providers and mitigate against the unnecessary utilization of hospital emergency departments for dental issues.

Excitingly, in December 2020, the Massachusetts Fiscal Year 2021 final budget restored MassHealth adult dental coverage for root canal treatments (endodontics) and crowns (prosthodontics) beginning on January 1, 2021.[165] These services have not been covered by MassHealth since 2010, making this reinstatement a significant victory for oral health advocates and stakeholders.

**Neetu Singh, DMD, MPH**
*Oral Health Program Director, Health Care For All*

## *Policy Perspective — Oral Health*

Oral diseases are a neglected epidemic. Nationally, 66 percent of teenagers and 97 percent of adults aged 50 to 64 years have had tooth decay.[166] Effective population-based prevention measures must be a very high priority for better oral health and lower dental bills for all.

[161]Congress.gov. https://www.congress.gov/bill/116th-congress/house-bill/3?q=%7B%22search%22%3A%5B%22h.r.+3%22%5D%7D&s=4&r=1. Accessed January 29, 2020.
[162]Board of Registration in Dentistry. COVID-19 Guidance.www.mass.gov/news/board-of-registration-in-dentistry-borid-covid-19-guidance. Published March 19, 2020.
[163]ADA Coding and Billing Interim Guidance: Virtual Visits. https://success.ada.org/~/media/CPS/Files/COVID/ADA_COVID_Coding_and_Billing_Guidance.pdf.
[164]MassHealth All Provider Bulletin 289. https://www.mass.gov/doc/all-provider-bulletin-289-masshealth-coverage-and-reimbursement-policy-for-services-related-to/download. Published March 2020.
[165]Massachusetts FY21 Final Budget. https://malegislature.gov/Budget/FY2021/FinalBudget.
[166]Allukian M, Horowitz AM. Oral Health. In: Levy BS, ed. *Social Injustice and Public Health.* Third edition. New York, NY: Oxford University Press, 2019:413–438.

The most cost-effective prevention measure for a population is community water fluoridation. Everyone benefits. Unfortunately, Massachusetts has been stagnant in the number of fluoridated communities for the last 11 years, staying at 139 of 365 communities, for only about 4 million people. This results in unnecessary pain, infections, and higher dental costs for about 3 million people in the non-fluoridated communities. School prevention programs with dental sealants and topical fluorides have been shown to be effective and must be made a higher priority in these non-fluoridated communities and other high-risk communities. Unfortunately, due to the COVID pandemic these school programs were discontinued. Oral health must also be an integral part of health and health education programs for all schoolchildren. School vending machines and school snacks should not include high-sugar, sticky sweets.

Oral health needs to be better integrated into all health policies and primary care services. Access to dental care needs to be addressed for MassHealth (Medicaid) and Medicare recipients and for high-risk populations, such as those with low incomes, minorities, pregnant women, the elderly, homebound, and long-term care patients. Fortunately, the state's adult dental Medicaid was more fully restored in January 2021. The participation rate in Medicaid nationally for dentists is much lower than for physicians — 39 percent vs. 70 percent — and in Massachusetts only 41 percent of dentists participated. This disparity needs to be addressed.

## Recommendations

1. The Massachusetts Department of Public Health (DPH) must have as its highest priority effective community prevention programs like community water fluoridation in more communities and school prevention programs in high-risk communities. Information should be provided to local boards of health, schools boards, water departments, and community leaders and organizations about fluoridation's health and economic benefits.
2. Grants should be made available by the state to communities for fluoridation equipment and non-fluoridated communities should be encouraged to order water fluoridation. Non-fluoridated communities and fluoridated communities with a high ratio of low-income residents should have school-based prevention programs with sealants and topical fluorides.
3. The DPH should determine the current status of oral diseases in Massachusetts as it did in 2009 and also itemize the available dental resources in our state.
4. The DPH should implement an oral health task force for the elderly, homebound, and long-term care patients, which are severely neglected populations.
5. The DPH and the Boston Public Health Commission should each have a full-time dental director with public health training and experience.
6. A sweetened-beverage tax should be implemented with the revenues going to support public health and oral health prevention programs.
7. The laws and regulations for public health hygienists and dental assistants should be less restrictive to improve access to preventive services. The dental therapist bill should be evidence-based and less restrictive with realistic standards; otherwise, it will be a failure like the current public health hygienist law.
8. MassHealth should do an annual dental status report for the public. This report should include the percent of MassHealth-covered children and adults who have seen a dentist in the

last year and those who received preventive and restorative treatment. It should also include the percent of licensed dentists who have seen a Medicaid patient in the last year, as well as those who have provided over $10,000 of treatment. This information is vital to improve access. Strategies then need to be implemented to address the gaps.

9. Efforts to include preventive and basic dental services in Medicare should be promoted and supported.
10. Oral health must be better integrated in primary care systems and all health policies and programs, especially for vulnerable and underserved populations.

## Addendum: COVID-19 Impact and Implications

The COVID pandemic has had a major impact on the health and economy of our country. Thousands have died, millions became infected and/or unemployed, and our public health infrastructure was stretched to the limit. The most vulnerable in our country become even more vulnerable and suffered the most, including their oral health.

Access to dental care has decreased as practices and community health centers were initially closed, limited services were then provided, and costs and fees increased due to stricter infection control measures. The impact on the public and the most vulnerable in our state is not known, but nationally there was a disproportionate negative oral health impact on communities of color and the low income.

Massachusetts allowed dentists and dental hygienists with local anesthesia permits to provide the COVID vaccine and teledentistry was allowed under MassHealth. In addition, dentists, dental hygienists, and assistants were in Phase 1 for receiving the COVID vaccine. These were all positive steps.

### *COVID Pandemic Recommendations*

1. Data need to be collected on how the pandemic has affected access to oral health care and services provided for MassHealth recipients and the number of dentists now participating in the MassHealth program.
2. Community health center dental programs should be surveyed to determine what impact the COVID pandemic has had on their capacity and resources as well as access to dental care for the population they serve and how that can be remedied.
3. Massachusetts has many resources; working together, we can and must improve the oral health for those most in need. More suffering is not an option.

**Myron Allukian Jr., DDS, MPH**
*President, Massachusetts Coalition for Oral Health*
*Former Dental Director, Boston Public Health Commission*

# Mental Health

Mental health is an important part of an individual's health and well-being. About 4 percent of the population in both Massachusetts and the United States report a mental illness such as schizophrenia or bipolar disorder in the last year; that rate has remained relatively stable from 2013 to 2017.[167]

**WHAT IS MENTAL HEALTH?**

Mental health "includes our emotional, psychological, and social wellbeing. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make choices."

*US Department of Health and Human Services: What is Mental Health?*

Other mental health conditions, including depression and anxiety, show signs of increasing in the United States, especially among young people. The percent of adults in Massachusetts and the United States reporting a major depressive episode increased slightly from 2013 to 2017 (more than 1 percent in the United States and more than 5 percent in Massachusetts). Meanwhile, the percent of adolescents (ages 12–17) reporting a major depressive episode increased by double digits in both Massachusetts (more than 22 percent) and the United States (more than 18 percent) (see figure 45).[168]

General mental health also appears to be getting worse nationally and in Massachusetts. Looking at adults reporting poor mental health status, Massachusetts ranks the fourth-worst in the nation.[169] As adults reporting "not good" mental health days increased 5 percent from 2013 to 2017 in the United States, it increased 10 percent in Massachusetts (see figure 46).[170] Massachusetts ranks in the top 10 worst states for individuals needing mental health care but not receiving it.[171]

[167]United States Substance Abuse and Mental Health Administration. National Survey on Drug Use and Health (various years).

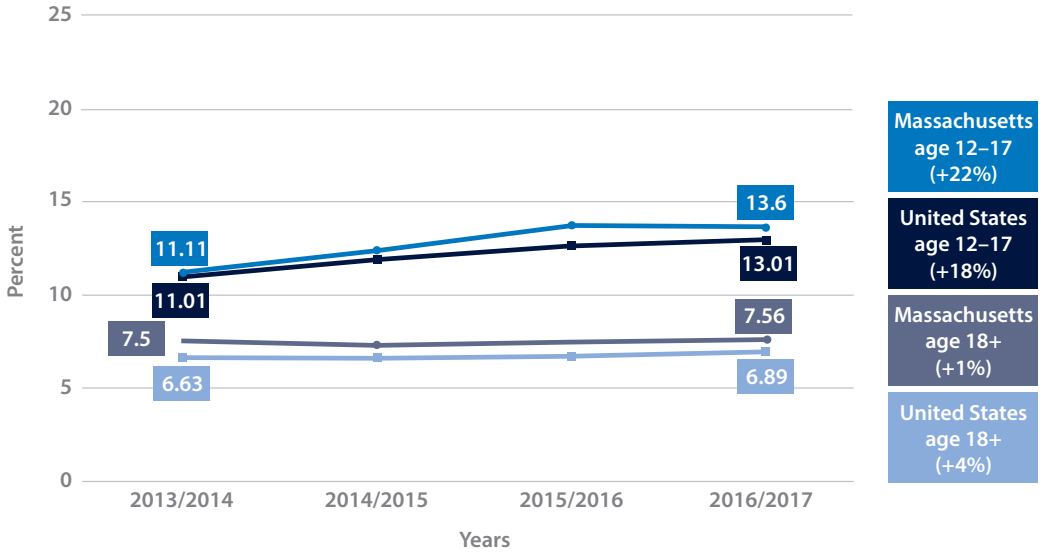
[168]United States Substance Abuse and Mental Health Administration. National Survey on Drug Use and Health (various years).

[169]Kaiser Family Foundation. State Health Facts. Adults Reporting Poor Mental Health Status. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who reported that their mental health was "not good" between one and 30 days in the past 30 days. Percentages are weighted to reflect population characteristics. www.kff.org/other/state-indicator/poor-mental-health-among-adults/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

[170]Kaiser Family Foundation. State Health Facts. Adults Reporting Poor Mental Health Status. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who reported that their mental health was "not good" between one and 30 days in the past 30 days. Percentages are weighted to reflect population characteristics. www.kff.org/other/state-indicator/poor-mental-health-among-adults/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

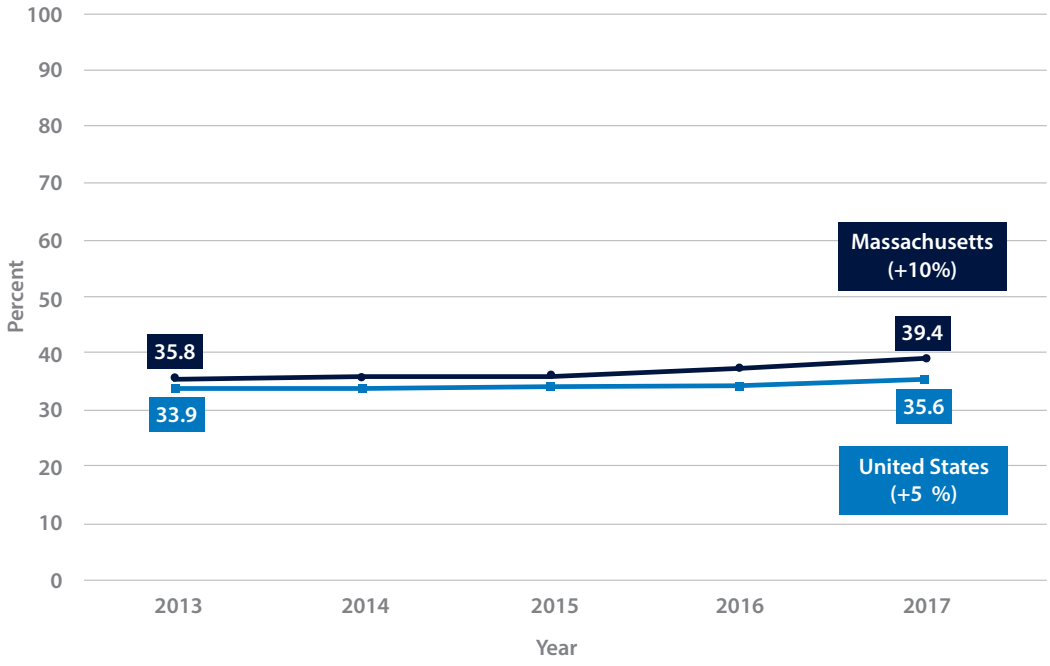
[171]Kaiser Family Foundation. State Health Facts. Adults Reporting Unmet Need for Mental Health Treatment in the Past Year. www.kff.org/other/state-indicator/adults-reporting-unmet-need-for-mental-health-treatment-in-the-past-year/?currentTimeframe=0&sortModel=%7B"colId":"Location","sort":"asc"%7D. Kaiser Family Foundation analysis of Substance Abuse and Mental Health Services Administration (SAMHSA), National Survey on Drug Use and Health (NSDUH), 2016 and 2017, Substance Abuse and Mental Health Data Archive. https://rdas.samhsa.gov. Accessed October 2019.

**FIGURE 45** Adolescents and Adults Reporting a Major Depressive Episode in the Last Year, Massachusetts and the United States, 2013–2017




*Source:* United States Substance Abuse and Mental Health Administration. National Survey on Drug Use and Health (various years).

**FIGURE 46** Adults Reporting Poor Mental Health Status, Massachusetts and the United States, 2013–2017




*Source:* Kaiser Family Foundation. State Health Facts. Adults Reporting Poor Mental Health Status. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System 2013–2017 Survey Results. Data represent adults who reported that their mental health was "not good" between one and 30 days in the past 30 days. Percentages are weighted to reflect population characteristics. www.kff.org/other/state-indicator/poor-mental-health-among-adults/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

## *Policy Perspective — Mental Health*

As policymakers look for innovative ways to reduce skyrocketing health care costs, improve health outcomes, and address the growing prevalence of behavioral health disorders, access to quality behavioral health care has emerged as the central component to achieving these goals.

Massachusetts has taken recent steps to shift from a health care system that rewards volume to one that focuses on value. Under the state's Section 1115 Medicaid Waiver, MassHealth created accountable models that reward improved care quality, reduced cost, and focus on integration of primary and behavioral health care. Through this demonstration, Behavioral Health Community Partners, which are community-based behavioral health providers, work closely with accountable care organizations (ACOs) to coordinate care for individuals with mental illness and/or substance use disorders who are high utilizers of the health care system.

The goal of the demonstration is to reduce total cost of care for these individuals by ensuring they are receiving the behavioral health, physical health, and social support services they need to maintain their health and stay out of the hospital. Early results are showing promise in engaging these historically disconnected individuals.

While these initiatives are encouraging, individuals and families in need continue to face difficulties in obtaining mental health and substance use disorder services. At the state and federal levels, policymakers and advocates are working to re-envision the ambulatory behavioral health treatment system to explore alternative payment and care delivery models that allow greater flexibility in how and where services are provided and expand the treatment team to include individuals with lived experience.

In addition to innovations in service delivery, increasing access depends on a strong behavioral health workforce. This must include establishing reimbursement policy that adequately funds providers so that they can offer competitive salaries to recruit staff, expanding student loan forgiveness programs, and supporting quality training and supervision to retain staff for the long term.

### Addendum: COVID-19 Impact and Implications

While the coronavirus pandemic has presented new threats and demands on the behavioral health system, it has also enabled the rapid expansion of virtual care. Expanded telehealth options, including in-person rate parity and the ability to utilize audio-only or telephonic modalities, have ensured the provision of timely and critical mental health and addiction treatment and care.

Telehealth has proven to be a powerful tool in decreasing geographic and linguistic barriers to care. When the Association for Behavioral Healthcare surveyed its members to better understand the utilization of virtual services, we found that telehealth had reduced the rate of "no show" visits, reduced wait times, and improved access to services for individuals whose primary language was not English.

These gains would not be possible without regulatory and legislative adjustments on the state and federal levels. With the Commonwealth's passage of permanent rate parity for in-person and telehealth behavioral health services, pandemic-related gains in accessibility can now be translated into long-term investments in virtual care. This may include expanding efforts to reach vulnerable populations through a renewed focus on bridging disparities in access to technology and internet connectivity.

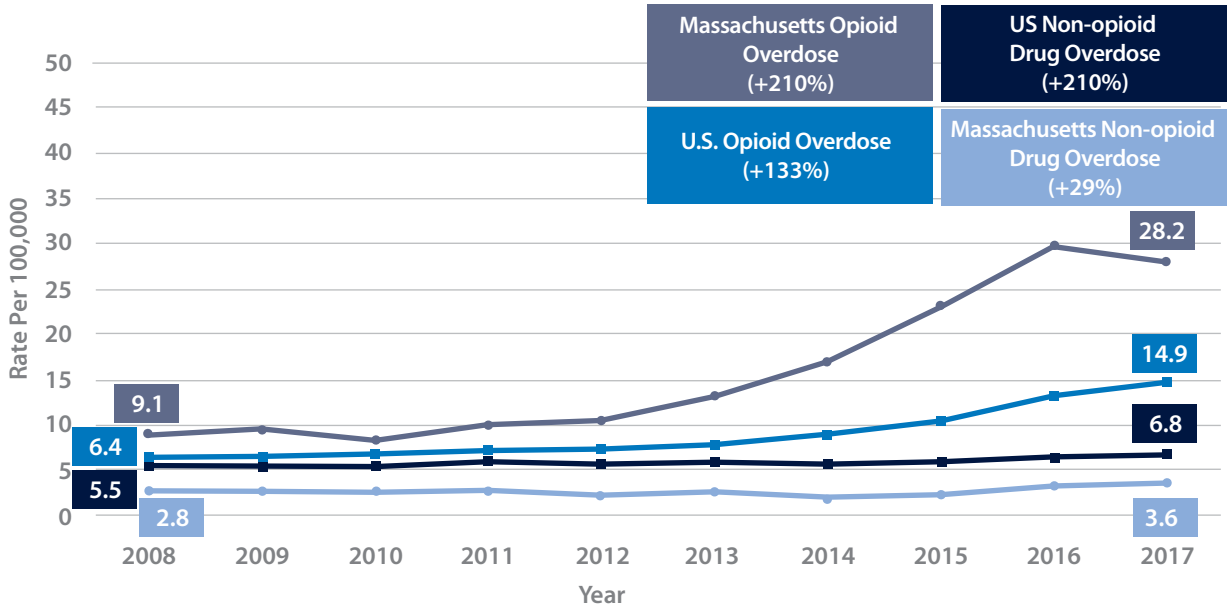
**Lydia D. Conley**
*President/CEO, Association for Behavioral Healthcare*

# Substance Use and Related Conditions

Drug overdose deaths have increased dramatically over the past few years, especially for opioid overdoses, which includes heroin, fentanyl, and prescription opioids. Massachusetts ranks ninth-worst in the nation for drug overdose deaths.[172] As of 2017, the rate of opioid overdose deaths in Massachusetts was twice as much as the nation. Opioid overdose mortality rose 210 percent between 2008 and 2017 in Massachusetts (see figure 47). From 2016 to 2017, opioid overdose mortality leveled off, but it remains high. Preliminary data from the Massachusetts Department of Public Health show that opioid overdose mortality rates declined 2 percent from 2016 to 2017, and 1 percent from 2017 to 2018 (not shown in figures).[173]

Opioid overdose deaths rose across age groups, particularly for individuals below age 34 and above age 55 (see figure 48 on page 64). Deaths also rose for White individuals, Hispanic individuals, and Black individuals (see figure 49 on page 64). From 2008 to 2017, Massachusetts opioid overdose deaths rose 320 percent for Hispanic individuals, 210 percent for White individuals, and 203 percent for Black individuals. While opioid overdose mortality leveled off for White and Hispanic individuals from 2016 to 2017, it did not level off for Black individuals. From 2016 to 2017, age-adjusted opioid overdose deaths increased 27 percent for Black individuals in Massachusetts.

**FIGURE 47** Opioid and Non-opioid Overdose Age-Adjusted Mortality Rate, Massachusetts and United States, 2008–2017

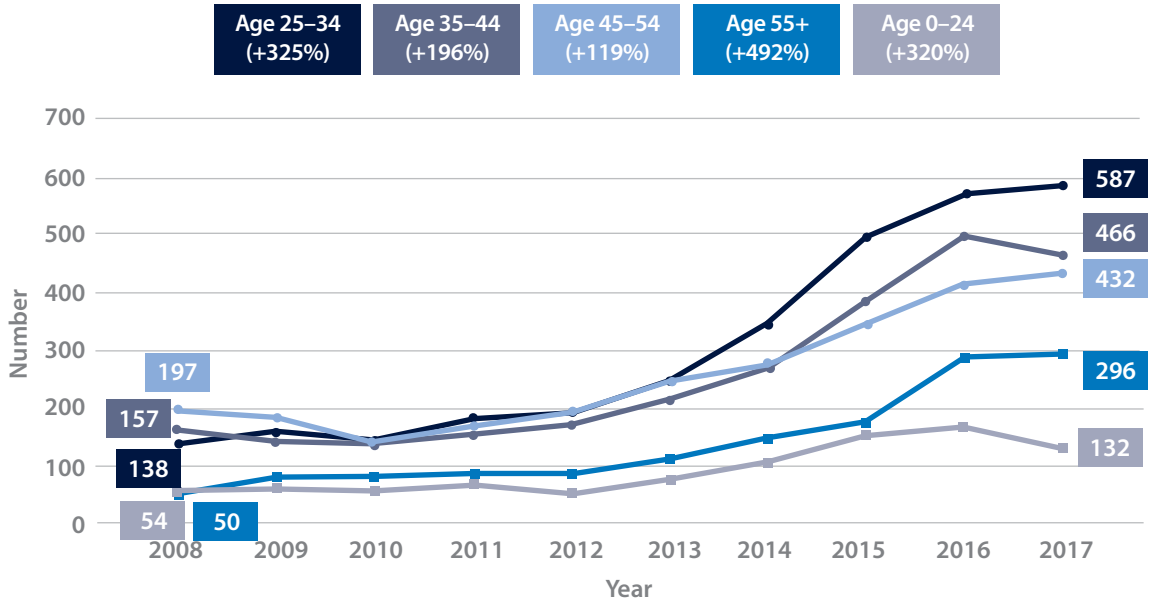



*Source:* Kaiser Family Foundation. State Health Facts. Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted), Kaiser Family Foundation analysis of Centers for Disease Control and Prevention (CDC), National Center for Health Statistics. www.kff.org/other/state-indicator/opioid-overdose-death-rates/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed January 10, 2019.

[172]United States Centers for Disease Control and Prevention. Stats of the State of Massachusetts (2017). www.cdc.gov/nchs/pressroom/states/massachusetts/massachusetts.htm.

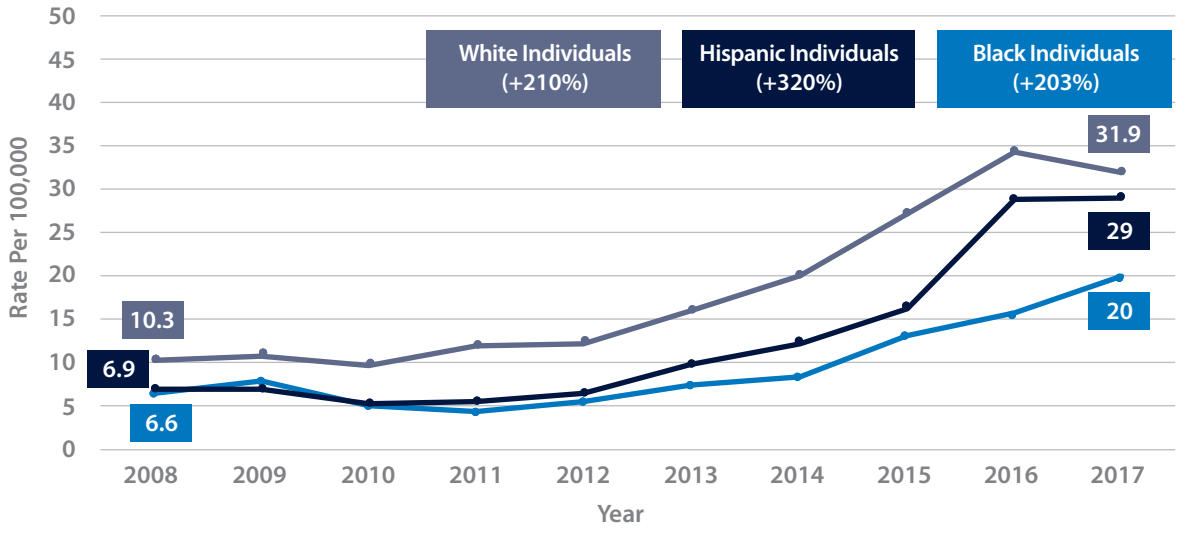
[173]Massachusetts Department of Public Health. Data Brief: Opioid-Related Overdose Deaths among Massachusetts Residents. www.mass.gov/doc/opioid-related-overdose-deaths-among-ma-residents-november-2019/download. Published November 2019.

**FIGURE 48** Opioid Overdose Deaths by Age Group, Massachusetts, 2008–2017




*Source:* Kaiser Family Foundation. State Health Facts. Opioid Overdose Deaths by Age Group, analyzing data from the National Vital Statistics System. www.kff.org/other/state-indicator/opioid-overdose-deaths-by-age-group/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

**FIGURE 49** Opioid Overdose Age-Adjusted Mortality, by Race and Ethnicity, Massachusetts, 2008–2017

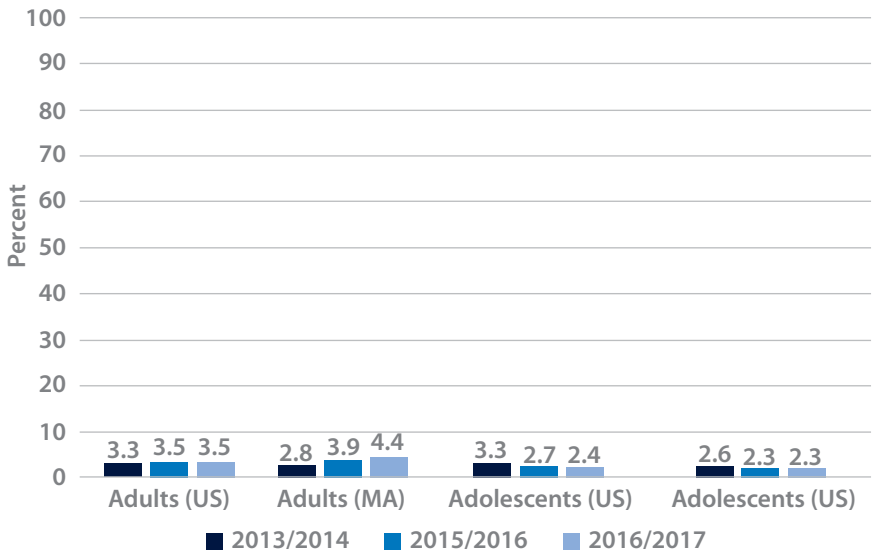



*Source:* Kaiser Family Foundation. State Health Facts. Opioid Overdose Deaths by Race/Ethnicity. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention (CDC), National Center for Health Statistics. www.kff.org/other/state-indicator/opioid-overdose-deaths-by-raceethnicity/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D, Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed January 10, 2019.

Compared to 2013, slightly more adults are using illicit drugs (see figure 50).[174] Misuse of pain relievers among adults appears to be decreasing, while use of cocaine and heroin appears to be increasing (see figure 51 on page 66). Compared to 2013, slightly fewer adolescents are using illicit drugs (see figure 50). Adolescent rates are down for using prescription drugs not their own, synthetic marijuana, cocaine, ecstasy, methamphetamine, and heroin (see figures 52 [page 67] and 53 [page 67]). Disparities in substance use exist; for example, almost six times as many LGBTQ youth reported having used heroin than other students.[175]

About 3 percent of individuals surveyed in Massachusetts note that they needed but did not receive treatment for illicit drug use between 2013 and 2017. Rates of unmet need were highest among young adults; 7.5 percent of individuals ages 18–25 reported needing but not receiving treatment for illicit drug use between 2013 and 2017 (see figure 54 on page 67).

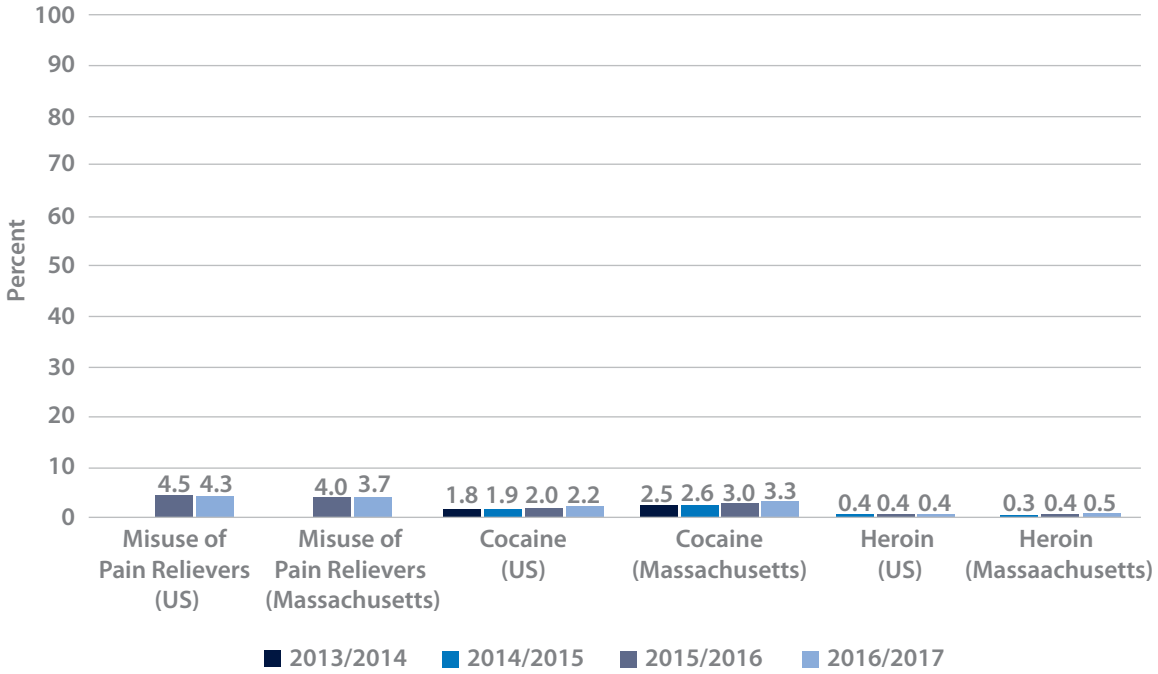
**FIGURE 50** Adolescent and Adult Use of Illicit Drugs in the Past Month (excluding Marijuana), Massachusetts and the United States, 2013–2017




*Source:* United States Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health (NSDUH) (various years). Adolescents are ages 12–17; adults are ages 18 and older.

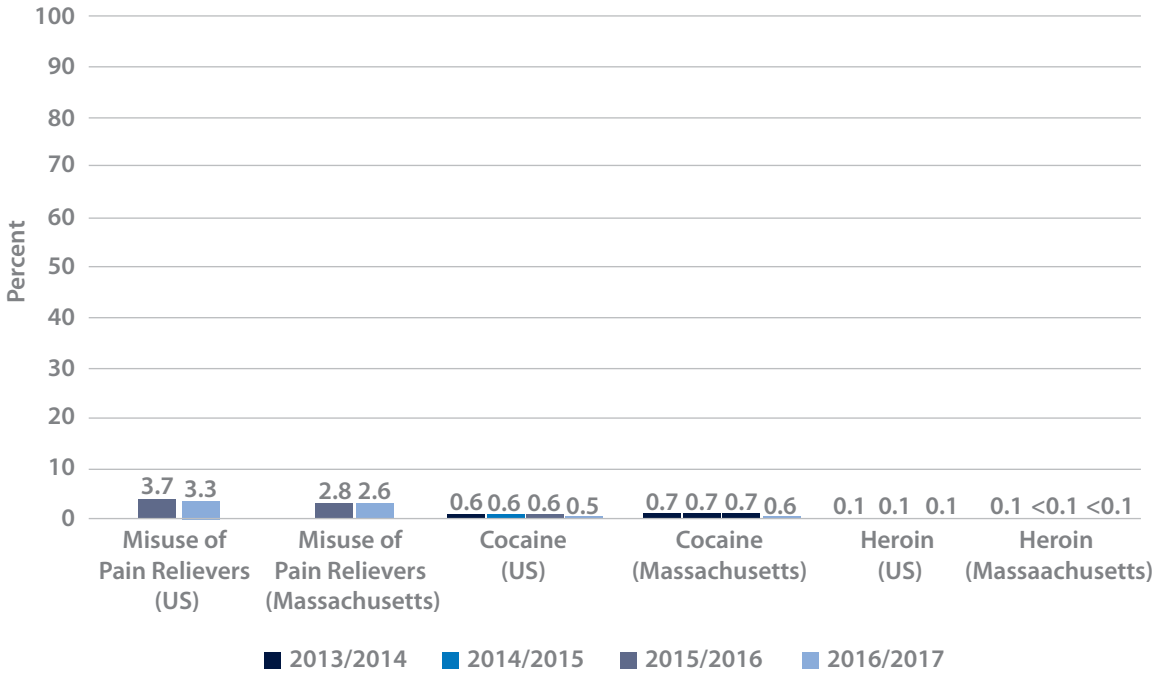
[174]Throughout this report, *illicit drugs* does not include marijuana.
[175]Massachusetts Commission on Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning Youth. Massachusetts Commission on LGBTQ Youth: 2020 Report and Recommendations. www.mass.gov/lists/annual-recommendations-commission-on-lgbtq-youth. Published 2019.

**FIGURE 51** Adult Use of Substances during the Past Year, Massachusetts and the United States, 2013–2017



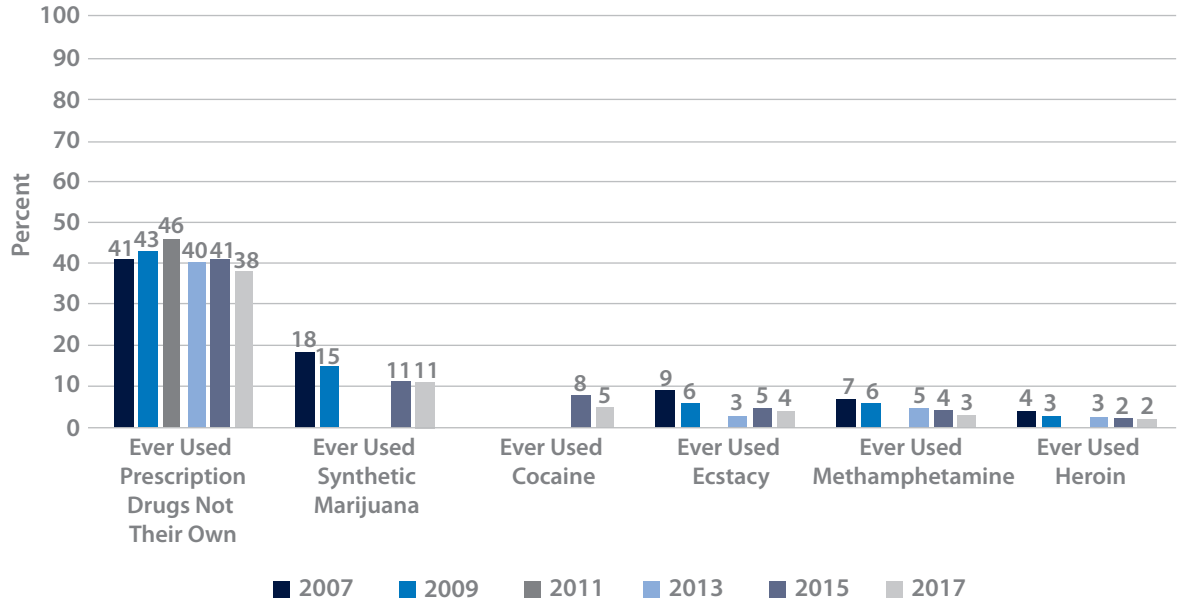

*Source:* United States Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health (NSDUH) (various years). Adults are ages 18 and older. Missing years reflect years when data was not reported.

**FIGURE 52** Adolescent Use of Substances during the Past Year, Massachusetts and the United States, 2013–2017



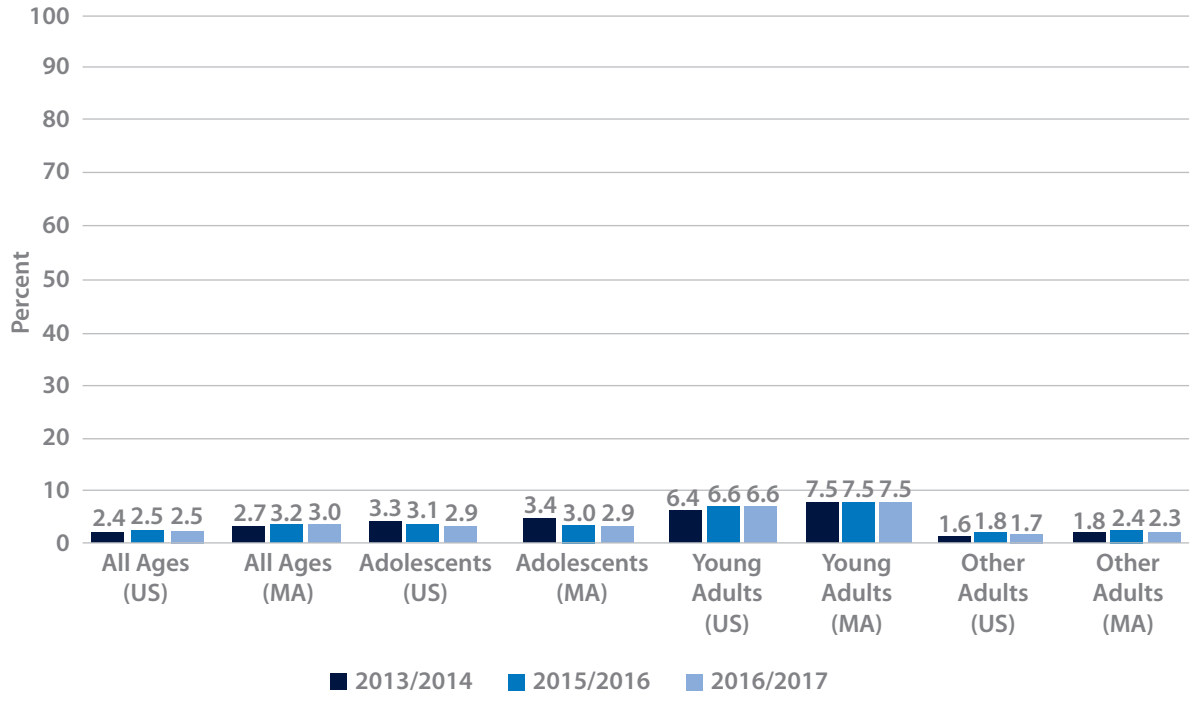

*Source:* United States Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health (NSDUH) (various years). Adolescents are ages 12–17. Missing years reflect years when data was not reported.

**FIGURE 53** Substance Use among Massachusetts High School Students, 2007–2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. Missing years reflect years when data was not reported. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

**FIGURE 54** Adults and Adolescents Needing but Not Receiving Treatment for Illicit Drug Use, by Age Group, Massachusetts and the United States, 2013–2017




*Source:* United States Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health (NSDUH) (various years). Adolescents are ages 12–17; young adults, 18–25; and other adults, ages 26 and older.

## *Policy Perspective — Substance Use*

Massachusetts, under its current administration, has made great strides stemming and finally reversing the trend of rising deaths due to opioid use. This was accomplished through the enactment of impactful legislation and significant investments in services for substance use disorder (SUD). Despite these gains, SUD remains a significant public health crisis. The use of alcohol, opioids, and other drugs is a virtual wrecking ball in the lives of individuals, families, communities, schools, and businesses. We need to maintain our sense of urgency and work to close the gap for those who are in need of services but who are not able to gain access to them. We must also focus attention upstream on screening, prevention, and early intervention. The public must be educated about the positive impact of treatment.

Routine periodic screening and early intervention protocols must be part of all primary care visits. Clinicians in primary care settings must receive education and training in addiction science, the recovery process, and evidence-based practices. Providers, patients, and payers must understand the lifesaving role of both medication-assisted treatment and alcohol treatment medication. Co-locating SUD and mental health services with primary care is cost-effective and reduces the stigma of accessing services, allowing for patient engagement in a setting where they feel more comfortable.

Payers must provide parity between physical and behavioral health coverage, pay rates sufficient to support a skilled and sustainable workforce, and an adequate continuum of care. This must include an outpatient system that delivers urgent behavioral health care, walk-ins, and same-day appointments. Alternative payment methods must be developed to support outreach, engagement, coordination of care, and other support services necessary to sustain recovery from chronic diseases.

Systems of care and treatment for mental health conditions and SUD can no longer be bifurcated. This separation contributes to stigma, gaps in provider competency, and poor treatment outcomes. Those with co-occurring conditions have higher rates of overdose and suicide attempts, and the role of trauma in addiction must be understood.

### Addendum: COVID-19 Impact and Implications

Early in 2020, we saw the COVID-19 pandemic quickly eclipse the opioid epidemic as the most significant public health crisis in the United States. Ongoing news coverage of COVID-19 and the presidential election pushed the opioid epidemic out of public awareness. Likewise, significant public health funds and resources were diverted to combat COVID-19.

For those struggling with SUD during the pandemic isolation, anxiety, grief, and economic stress challenged both mind and body on the path to recovery. Community and peer support so important to recovery were no longer available in the same way. In-person treatment came to a sudden stop. A study funded by the National Institutes of Health found that those with active SUD, including alcohol, were more susceptible to COVID-19, had worse health outcomes, and were more likely to engage in behaviors that increased the risk of transmission. The Centers for Disease Control and Prevention reported that at the end of May 2020, there were 81,000 overdose deaths over the previous 12 months. This was highest number of deaths ever reported in a 12-month period.

Treatment providers quickly and creatively pivoted during the pandemic to provide SUD services remotely via telehealth. There were many lessons learned during this process, mostly positive, as it allowed increased access to many who would or could not receive in-person treatment. The successful use of remote SUD treatment was facilitated by the use of executive order and the relaxation of rules from regulatory entities and well as payers. It is imperative that these practices continue after the pandemic in order to continue to improve access to treatment for those in need.

**Marcia Fowler**
*Chief Executive Officer, Bournewood Health Systems*
*Chair, Massachusetts Association of Behavioral Health Systems*

# Alcohol Use and Related Conditions

Massachusetts ranks 12th-highest in the nation for adults who binge drink.[176] About a quarter of Massachusetts adults binge drink (see figure 55 on page 70). While binge drinking appears to be trending downwards in the United States and Massachusetts, alcohol-induced mortality appears to be increasing (see figures 55 and 56 and page 70).[177] From 2007 to 2017, alcohol-induced mortality increased by 33 percent in the United States and by 35 percent in Massachusetts (see figure 56 on page 70).

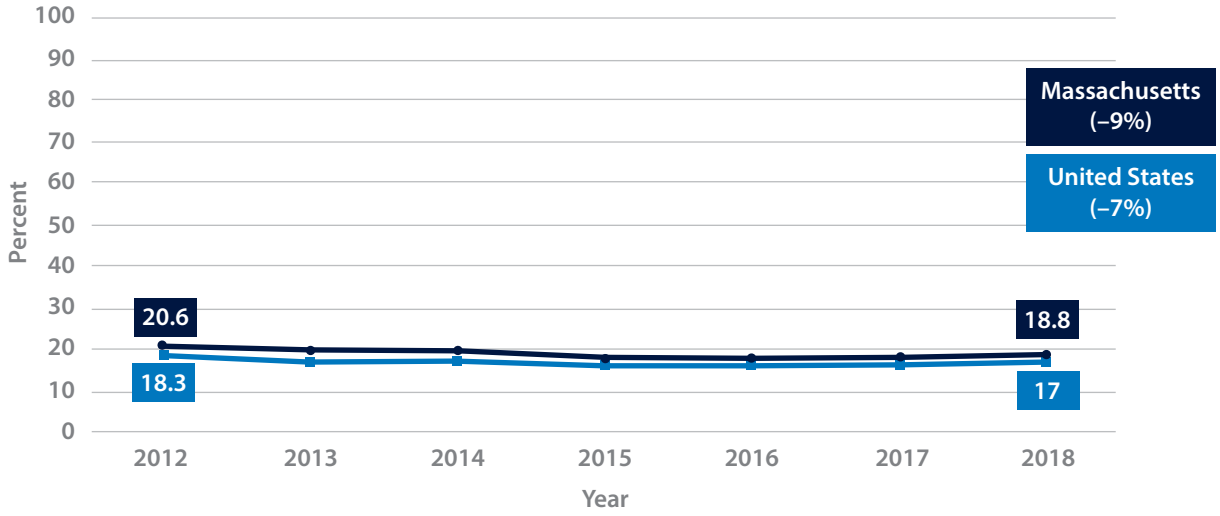
About 7 percent of Massachusetts residents reported needing but not receiving treatment for alcohol use. Rates of unmet need were highest among young adults; 13 percent of individuals ages 18–25 reported needing but not receiving treatment for alcohol use for the 2016–2017 survey year (see figure 57 on page 71).

In 2017, about 30 percent of high school students reported drinking alcohol in the last 30 days, and about 15 percent reported binge drinking in the past 30 days. Rates are higher among high school seniors and among White students (see figures 58 [page 71] and 59 [page 72]).

[176]United Health Foundation. America's Health Rankings. Trend: Binge Drinking, Massachusetts, United States. Analysis of US CDC Behavioral Risk Factor Surveillance System (percentage of adults who reported having four or more [women] or five or more [men] drinks on one occasion in the past month).

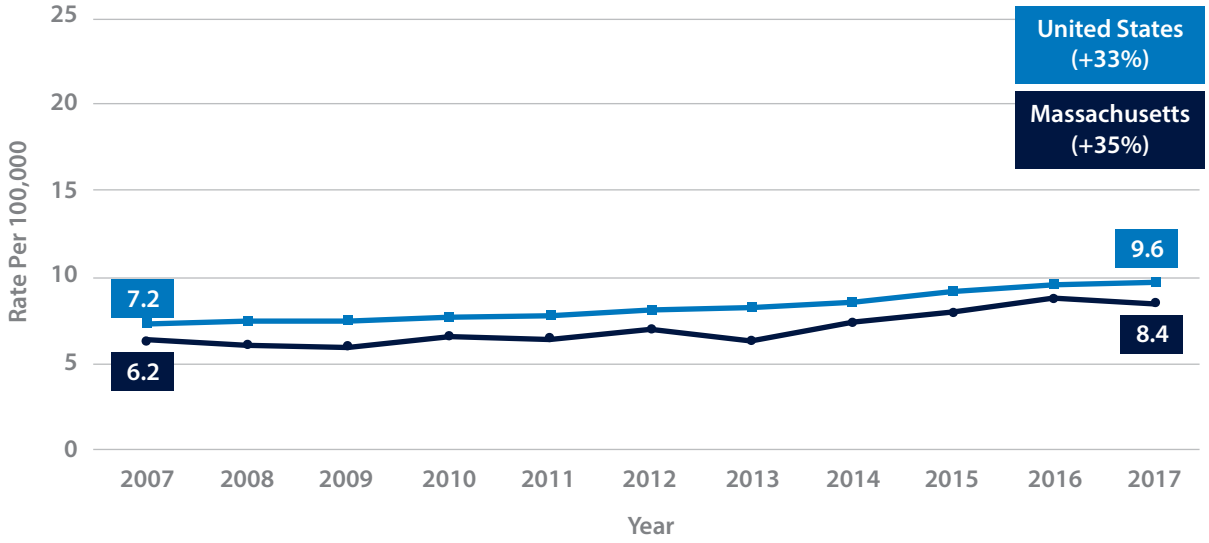
[177]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for alcohol-induced causes. Alcohol-induced deaths include International Classification of Diseases, Tenth Revision codes E24.4, alcohol-induced pseudo-Cushing's syndrome; F10, mental and behavioral disorders due to alcohol use; G31.2, degeneration of nervous system due to alcohol; G62.1, alcoholic polyneuropathy; G72.1, alcoholic myopathy; I42.6, alcoholic cardiomyopathy; K29.2, alcoholic gastritis; K70, alcoholic liver disease; K85.2, alcohol-induced acute pancreatitis; K86.0, alcohol-induced chronic pancreatitis; R78.0, finding of alcohol in blood; X45, accidental poisoning by and exposure to alcohol; X65, intentional self-poisoning by and exposure to alcohol; and Y15, poisoning by and exposure to alcohol, undetermined intent. Alcohol-induced causes exclude unintentional injuries, homicides, and other causes indirectly related to alcohol use, as well as newborn deaths associated with maternal alcohol use. See also National Institute on Alcohol Abuse and Alcoholism. Surveillance Report #113. Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977–2017. https://pubs.niaaa.nih.gov/publications/surveillance113/CONS17.htm. Published April 2019.

**FIGURE 55** Binge Drinking among Adults, Massachusetts and the United States, 2012–2018



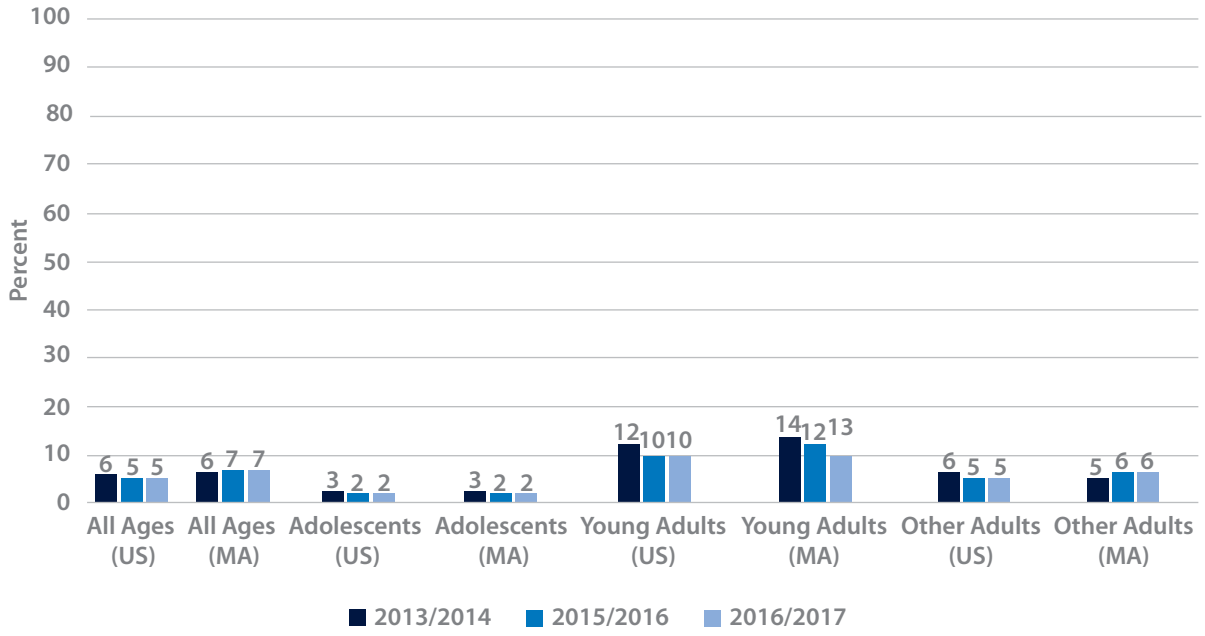

*Source:* United Health Foundation. America's Health Rankings. Trend: Binge Drinking, Massachusetts, United States. Analysis of US CDC Behavioral Risk Factor Surveillance System (percentage of adults who reported having four or more [women] or five or more [men] drinks on one occasion in the past month).

**FIGURE 56** Age-Adjusted Alcohol-Induced Mortality, Massachusetts and United States, 2007–2017



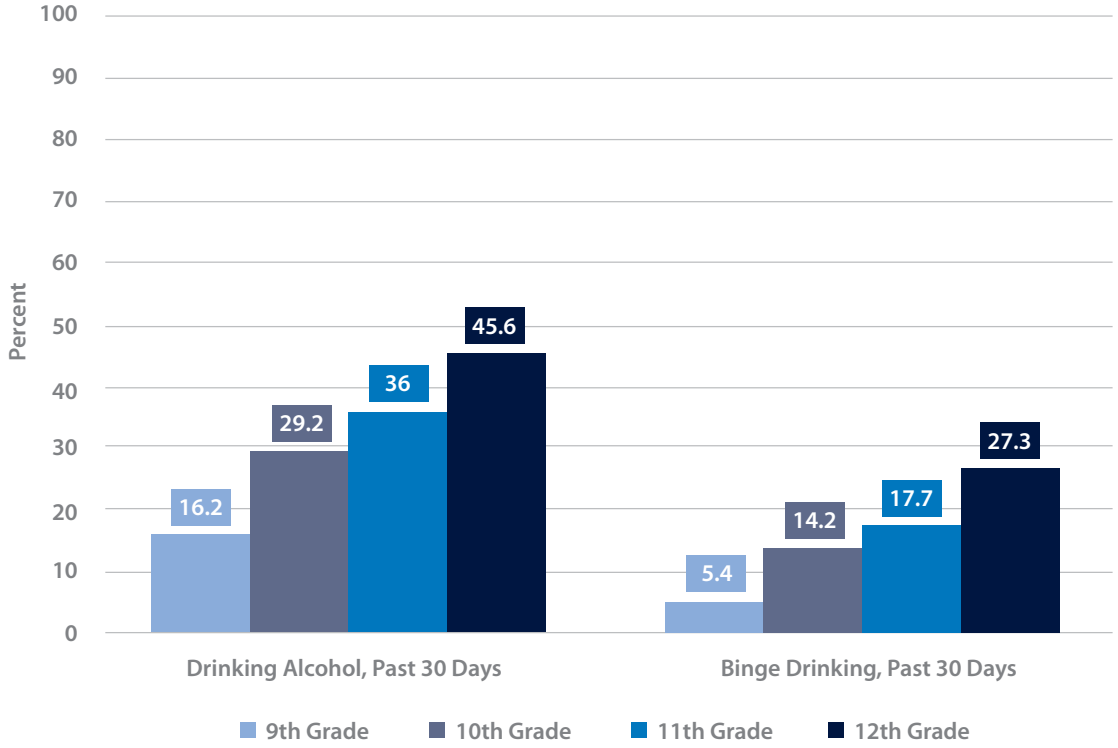

*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for alcohol-induced causes. Alcohol-induced deaths include International Classification of Diseases, Tenth Revision codes E24.4, alcohol-induced pseudo-Cushing's syndrome; F10, mental and behavioral disorders due to alcohol use; G31.2, degeneration of nervous system due to alcohol; G62.1, alcoholic polyneuropathy; G72.1, alcoholic myopathy; I42.6, alcoholic cardiomyopathy; K29.2, alcoholic gastritis; K70, alcoholic liver disease; K85.2, alcohol-induced acute pancreatitis; K86.0, alcohol-induced chronic pancreatitis; R78.0, finding of alcohol in blood; X45, accidental poisoning by and exposure to alcohol; X65, intentional self-poisoning by and exposure to alcohol; and Y15, poisoning by and exposure to alcohol, undetermined intent. Alcohol-induced causes exclude unintentional injuries, homicides, and other causes indirectly related to alcohol use, as well as newborn deaths associated with maternal alcohol use.

**FIGURE 57** Adults and Adolescents Needing but Not Receiving Treatment for Alcohol Use, by Age Group, Massachusetts and the United States, 2013–2017



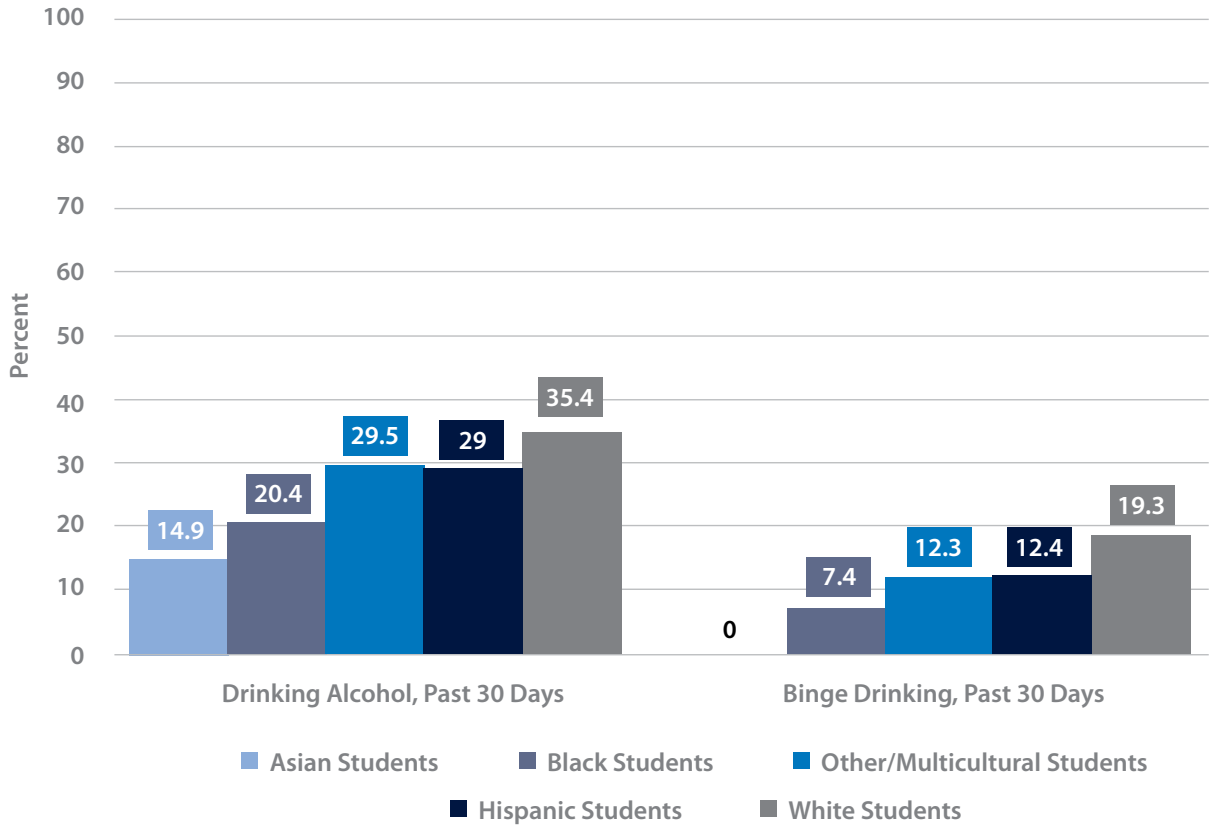

*Source:* United States Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health (NSDUH) (various years). Adolescents are ages 12–17; young adults, ages 18–25; and other adults ages 26 and older.

**FIGURE 58** Drinking by Massachusetts High School Students, by Grade, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

**FIGURE 59** Drinking by Massachusetts High School Students, by Race and Ethnicity, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

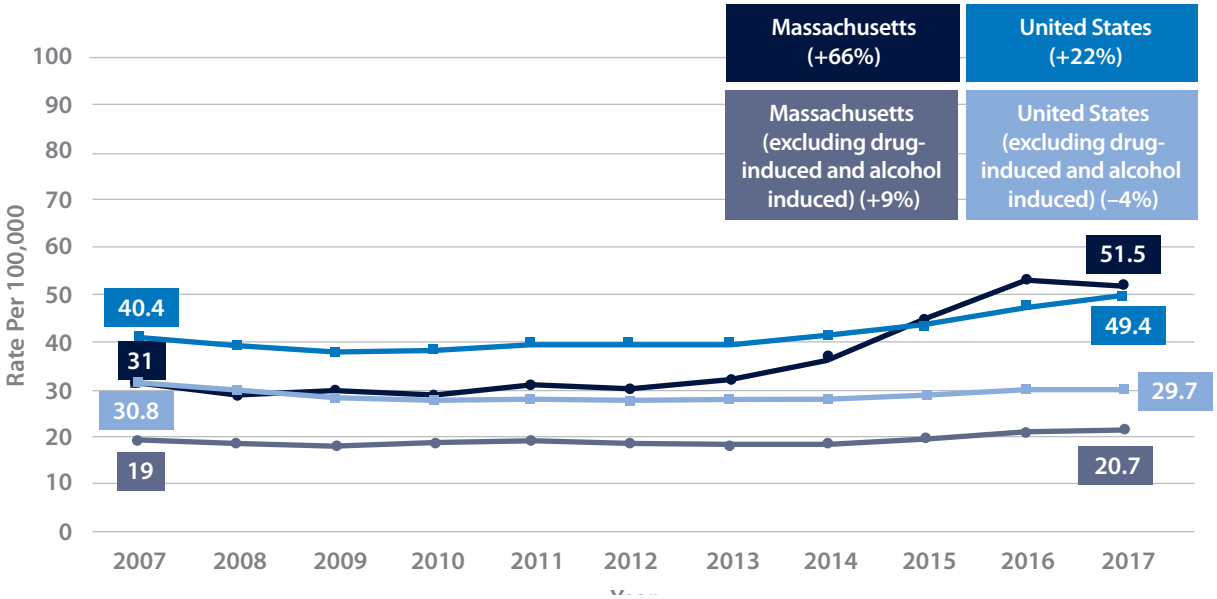
# Unintentional Injuries

Unintentional injuries are the third-leading cause of death in Massachusetts.[178] The majority of these deaths are due to drug overdose, discussed on pages 63–64. Excluding drug-induced and alcohol-induced deaths, Massachusetts unintentional injury mortality rate is about two-thirds of the national rate (see figure 60).

One type of unintentional injury death is death due to motor vehicle collisions. From 2007 to 2017, motor vehicle collision mortality fell in Massachusetts by 13 percent (see figure 61). Massachusetts high school students report several risky driving behaviors. In 2017, among high school drivers, 40 percent report using a cell phone and driving during the past 30 days, while 36 percent report texting or emailing while driving during the past 30 days. Thirteen percent of high school drivers report nodding off or falling asleep while driving during the past 30 days. Six percent of high school drivers report drinking and driving during the past 30 days (see figure 62 on page 74).

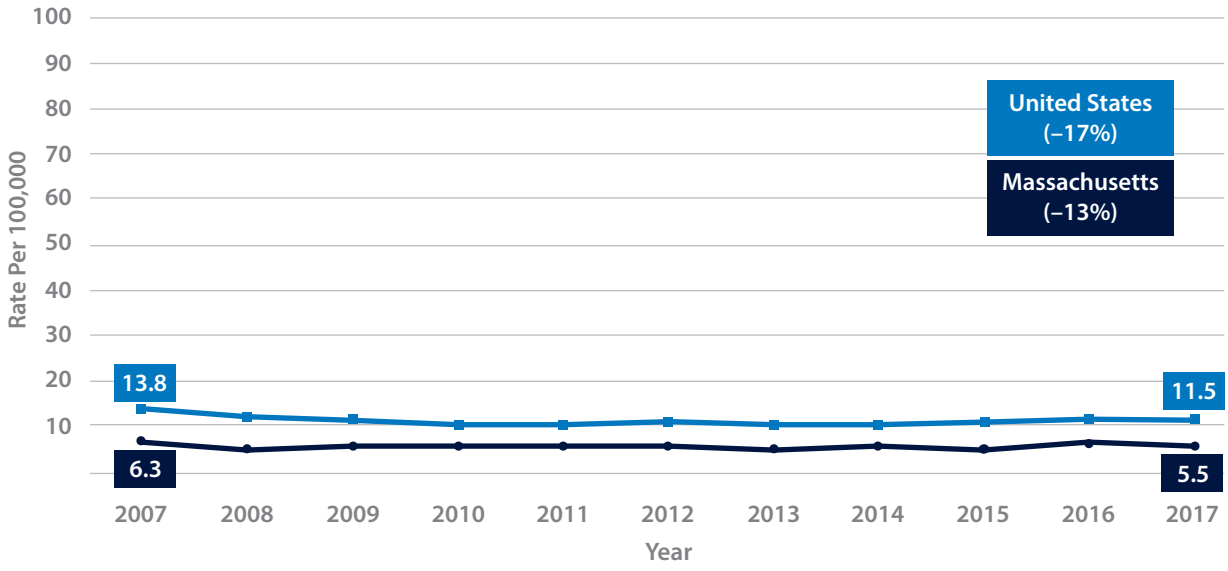
[178]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 24. www.mass.gov/doc/2017-death-report/download. Published October 2019.

**FIGURE 60** Age-Adjusted Mortality for Unintentional Injuries, Massachusetts and the United States, 2007–2017



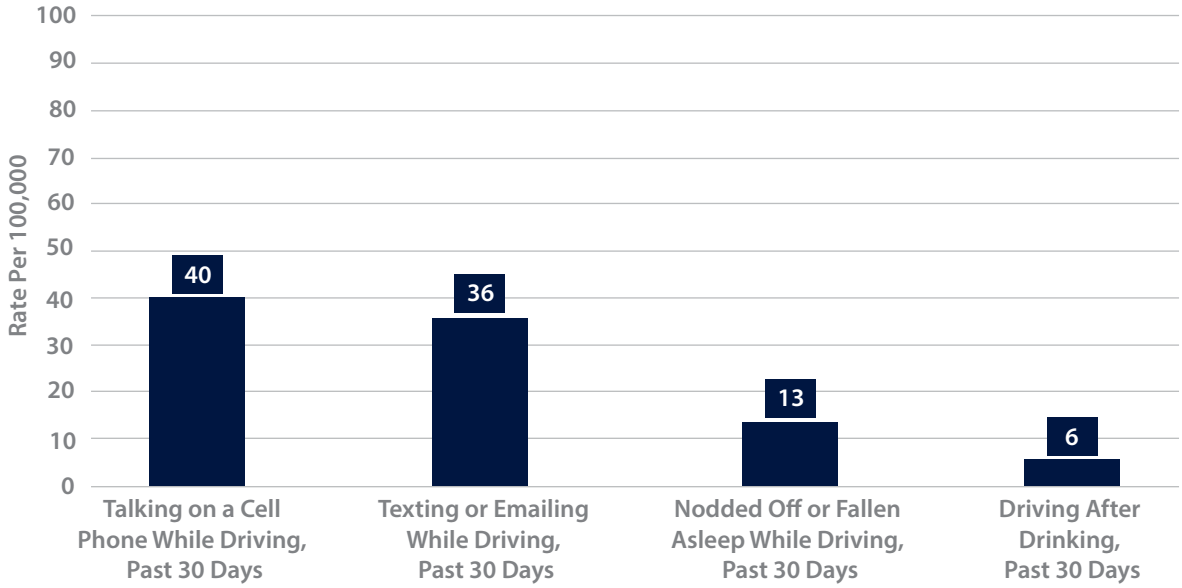

*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for unintentional injury, with and without underlying cause of death as drug-induced or alcohol-induced.

**FIGURE 61** Age-Adjusted Mortality due to Motor Vehicle Collision, Massachusetts and the United States, 2007–2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for unintentional injury and for underlying cause of death — injury mechanism and all other leading cases: Motor Vehicle Traffic.

**FIGURE 62** Driver Risk Behavior among Massachusetts High School Drivers, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

## *Policy Perspective — Unintentional Injuries*

In Massachusetts, motor vehicle crashes are the number one cause of injury death for those ages 1–14; and the number two cause for those ages 15–24.[179] Preliminary data show that 343 people died in 2019 on Massachusetts roads, down from 360 such deaths in 2018[180] — but these numbers are still unacceptably high.

In January 2019, the governor filed a comprehensive traffic safety bill. This legislation would create stronger laws around impaired driving, distracted driving, and seat belt use. The legislation also addresses work zone safety and calls for side guards on trucks to prevent fatalities if there is a collision with a pedestrian or bicyclist.[181]

Massachusetts celebrated a victory in 2019 when the hands-free law was passed. Going forward, we expect to see a decrease in distracted driving-related crashes, injuries, and fatalities. In the four months after Georgia passed a hands-free law, phone use dropped by 21 percent and remained low a year later.[182] Nationwide, distracted driving still kills nine people and injures 1,000 people each day.[183]

We need stronger laws, continued driver education, better enforcement, and improved road engineering to ensure that the rate of fatalities and serious injuries due to car crashes continues to fall.

[179]www.mass.gov/doc/2017-death-report/download
[180]https://apps.impact.dot.state.ma.us/cdp/dashboard-list/12
[181]https://malegislature.gov/Bills/191/S7
[182]https://gotruemotion.com/blog/distracted-driving-is-down-in-georgia-after-hands-free-law
[183]www.cdc.gov/motorvehiclesafety/distracted_driving/index.html

### Our Recommendations

- Because 120 of the state's 360 traffic fatalities were due to an alcohol-impaired driver in 2018, a bill requiring OUI first offenders to use an ignition interlock breathalyzer device should be a legislative priority.[184]
- Massachusetts currently ranks low (46th out of 50 states) in seat belt use. We need a primary seat belt law, allowing police to ticket drivers or passengers for not wearing a seat belt without any other traffic offense.
- Because streets are for people and not just for cars, it's important to consider all modes of transportation when any roadwork is done. Complete Streets, a principle that looks at the entire built environment, should be required for all MassDOT projects. Similarly, Vision Zero is a strategy adopted by cities and nations that encourages us to rethink road design in a way that helps slow the speed of cars and thus lessen the severity of crashes.
- US pedestrian fatalities hit a 28-year high in 2018, and it's clear that we need a multidisciplinary approach to slow traffic and protect all road users.[185]

**Emily Stein, MPH**
*President, Safe Roads Alliance*

## Suicide and Self-Harm

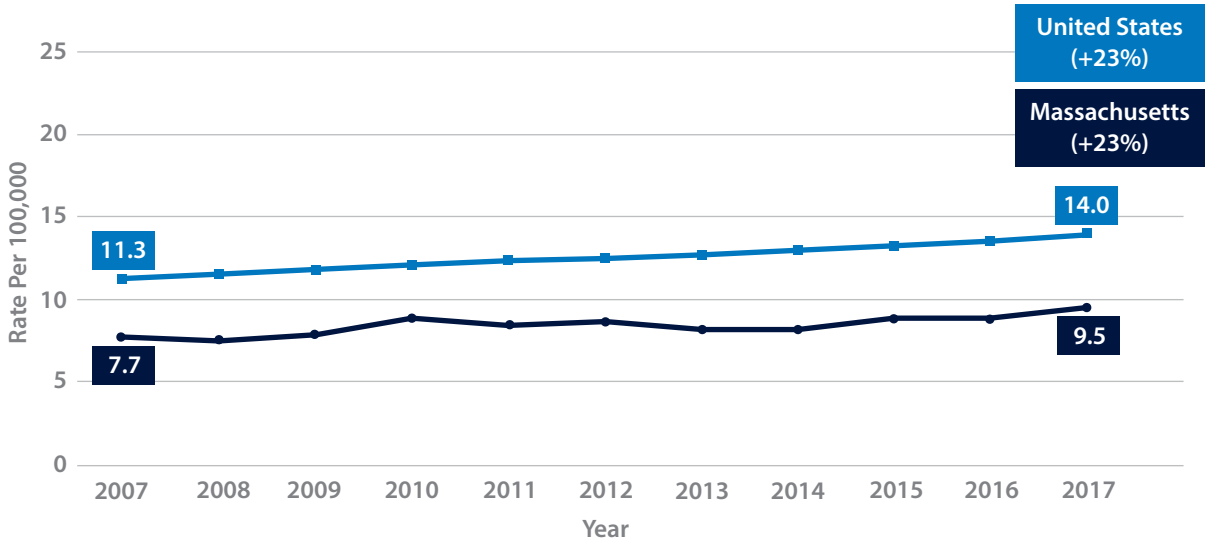
Suicide is the second-leading cause of death in Massachusetts for individuals ages 15–24, and the third leading cause of death for individuals ages 25–44.[186] Nationally, suicide rates are the highest since World War II.[187] Experts point to a period of increased stress, the opioid crisis, and social media as potential causes.[188]

Though Massachusetts suicide rates are lower than the national average, they are increasing at the same rate. From 2007 to 2017, death by suicide rose 23 percent in both the United States and Massachusetts (see figure 63 on page 76). The suicide rate for White individuals is higher than the statewide rate (see figure 64 on page 76).

Among Massachusetts high school students in 2017, 12 percent reported seriously considering suicide, and 5 percent reported attempting suicide in the past year (see figure 65 on page 77). LGBTQ youth were 3.2 times more likely to seriously consider suicide in the past year, and 3.9 times more likely to attempt suicide.[189]

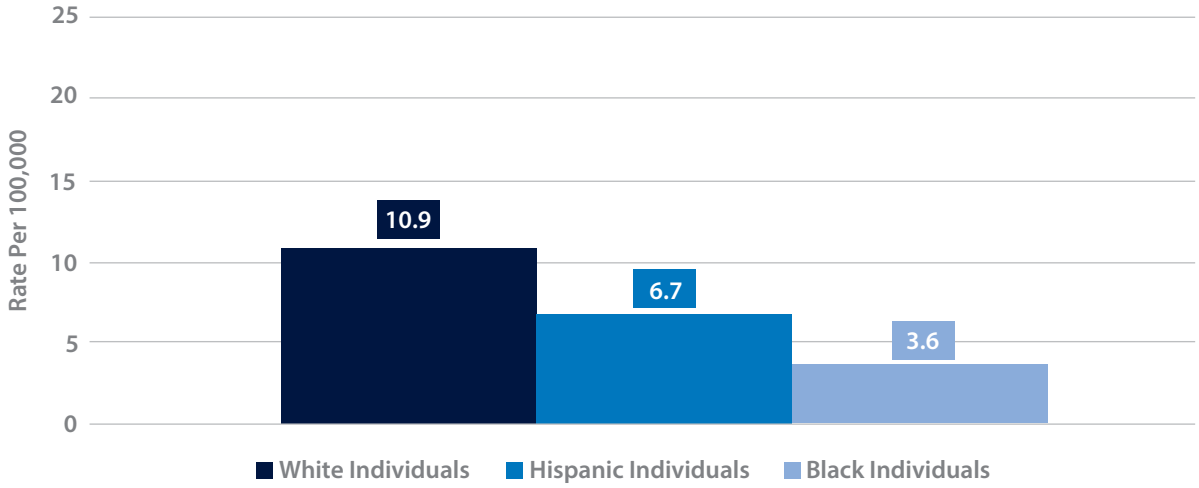
[184]https://cdan.nhtsa.gov/SASStoredProcess/guest
[185]www.ghsa.org/sites/default/files/2019-02/FINAL_Pedestrians19.pdf
[186]Massachusetts Department of Public Health. Massachusetts Deaths 2017. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[187]Ducharme J. U.S. suicide rates are the highest they've been since World War II. *Time*. June 20, 2019. https://time.com/5609124/us-suicide-rate-increase.
[188]Ducharme J. U.S. suicide rates are the highest they've been since World War II. Time. June 20, 2019. https://time.com/5609124/us-suicide-rate-increase.
[189]Massachusetts Commission on Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning Youth. Massachusetts Commission on LGBTQ Youth: 2020 Report and Recommendations. www.mass.gov/doc/ma-commission-on-lgbtq-youth-2020-report-and-recommendations/download. Published 2019.

**FIGURE 63** Age-Adjusted Suicide Mortality, Massachusetts and the United States, 2007–2017



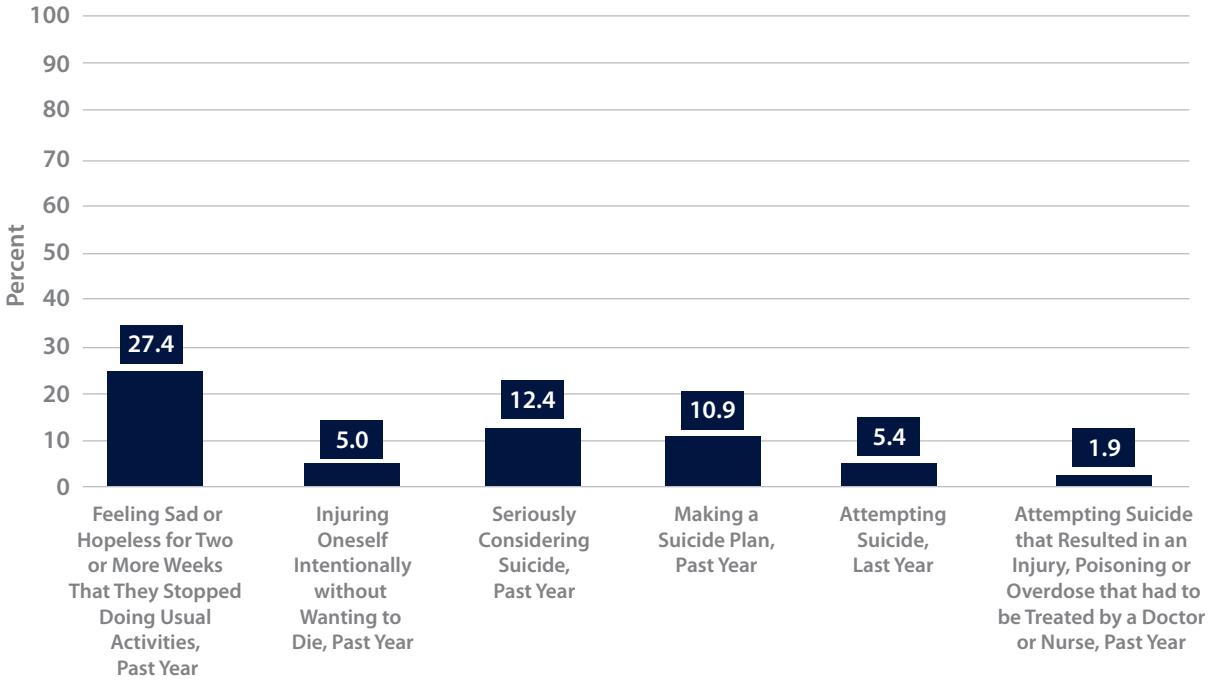

*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for injury intent: Suicide.

**FIGURE 64** Age-Adjusted Suicide Mortality, by Race and Ethnicity, Massachusetts, 2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for injury intent: Suicide. Queries for White, Black, and Asian individuals excluded Hispanic individuals.

**FIGURE 65** Massachusetts High School Student Responses to Suicide and Self-Injury Questions, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

Talking to someone can be helpful when facing suicidal thoughts. There are resources available, including calling **(800) 273-8255** or texting HOME to 741741 from anywhere in the United States.

## *Policy Perspective — Suicide and Self-Harm*

Legislation is currently pending in Congress that would designate a three-digit number for the national mental health crisis and suicide prevention hotline. The designated number will be 988, and expectations are that this hotline could be implemented by the summer of 2021.

The National Suicide Prevention Lifeline (funded by the Substance Abuse and Mental Health Services Administration) is currently operated by 170 crisis centers around the country, with calls to (800) 273-8255 routed to the nearest member center based on the caller's area code. Moving to a three-digit number for crisis centers would be a transformational change in the way Americans can seek help and services in a mental health emergency. Imagine a world in which access to mental health services in an emergency is just as straightforward and easy as calling for help with a medical emergency by dialing 911.

Along with this change comes an expectation of increased call volume (as much as tenfold) and the need to fund crisis centers to be able to meet the increase in demand. Ajit Pai, chairman of the Federal Communications Commission, has said that increasing the convenience and immediacy of access to the hotline via a three-digit dialing code will help spread a proven, effective intervention.

"Crisis centers save lives," Pai wrote in August 2019. "We believe that designating the 988 code for a national suicide prevention and mental health crisis hotline system is highly likely to lower suicide mortality risk in the United States … and thus that the benefits of this action are quite likely to outweigh the costs."

### Addendum: COVID-19 Impact and Implications

In the field of suicide prevention, 2020 was a challenging year. Providers had to quickly pivot and offer virtual services and training. Over the summer months demand for services increased. At its height COVID and related terms were mentioned in more than 25 percent of calls and texts at Samaritans, Inc., in Boston. That has since held steady at 12 percent. What people are saying has changed as well. People are isolated and those who had minimal supports available to them no longer have those supports. There is fear of being able to find basic supplies and worries about food and housing insecurity. We hear about the fear of losing family and friends coupled with fear that there will be no one to care for me if I get sick.

We don't know yet how COVID will affect the suicide death rate but it seems as if a perfect storm is forming as gun sales have increased (the number 1 means of suicide in the United States), isolation takes a toll, and there still remains an uncertainty about the future. The good news is that the 988 legislation was passed and signed into law — it is expected to be live in July 2022.

**Ron White, LICSW**
*Chief Program Officer, Samaritans, Inc.*

# Homicides

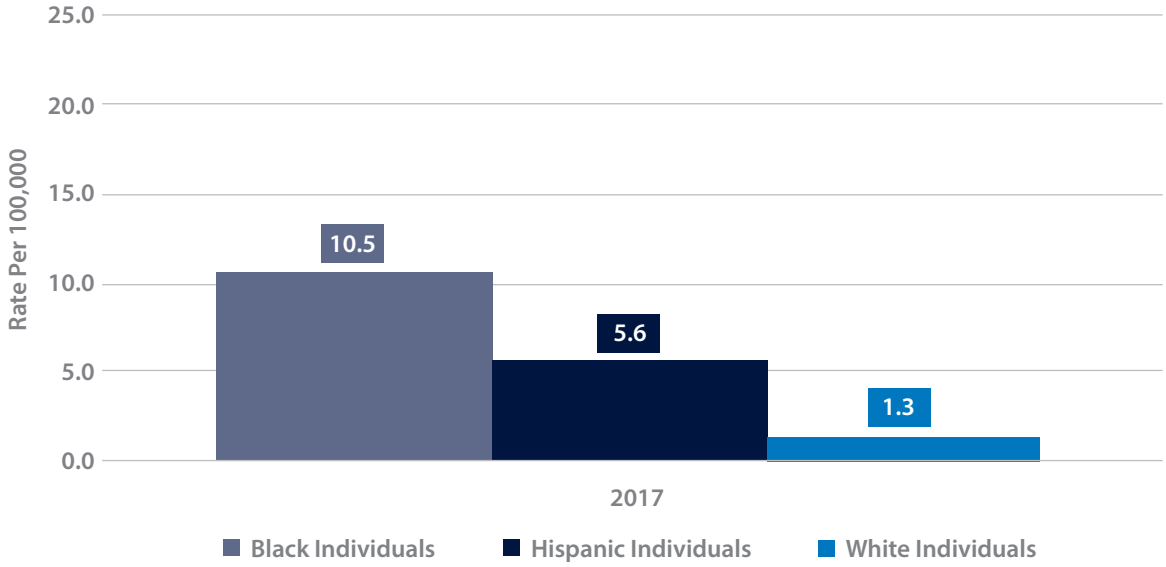
Homicide ranks in the top 10 causes of death in Massachusetts for individuals between 15 and 44 years old.[190] The homicide rate in the United States has remained relatively stable from 2007 to 2017, hovering around 6 per 100,000 individuals.[191]

Massachusetts has the ninth-lowest rate of homicides in the United States.[192] From 2007 to 2017, the homicide mortality rate stayed relatively stable, hovering between 2.5 and 3 per 100,000 individuals.[193]

The homicide mortality rate for Black individuals is eight times the homicide rate for White individuals. The homicide mortality rate for Hispanic individuals is four times the homicide rate for White individuals (see figure 66).

[190]Massachusetts Department of Public Health. Massachusetts Deaths 2017. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[191]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. http://wonder.cdc.gov/mcd-icd10.html. December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed November 17, 2019. Query for underlying cause of death was for injury intent: Homicide.
[192]United States Centers for Disease Control and Prevention. Homicide Mortality by State. www.cdc.gov/nchs/pressroom/sosmap/homicide_mortality/homicide.htm.
[193]United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. http://wonder.cdc.gov/mcd-icd10.html. December 2018. Data are from the Multiple Cause of Death Files, 1999-2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed on November 17, 2019. Query for underlying cause of death was for injury intent: Homicide.

**FIGURE 66** Age-Adjusted Homicide Mortality, by Race and Ethnicity, Massachusetts, 2017




*Source:* United States Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999–2017 on CDC WONDER Online Database, released December 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html. Accessed November 17, 2019. Query for underlying cause of death was for injury intent: Homicide. Queries for White, Black, and Asian individuals excluded Hispanic individuals.

# 3 Social Determinants of Health, Risk and Protective Factors

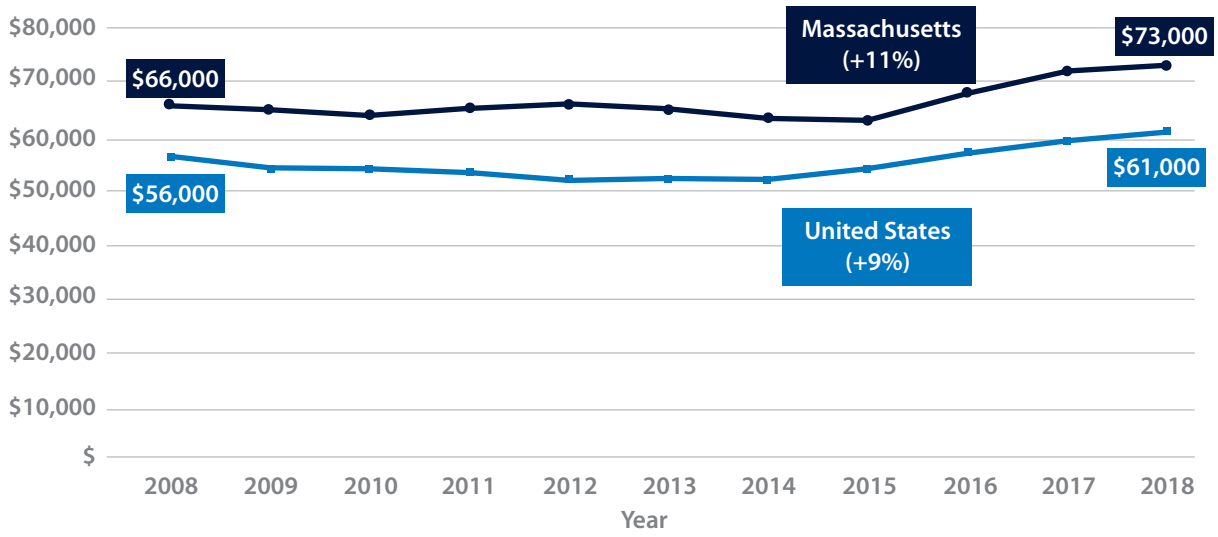
## Income and Assets

Economic factors like income, assets, and inequality have been linked to health. Massachusetts is a wealthy state with low unemployment. Massachusetts ranks sixth in the nation for median income.[194] From 2008 to 2018, the median income in Massachusetts increased 11 percent and during the decade leading to 2019, its unemployment rate decreased 49 percent (see figures 67 and 68 on page 82). Massachusetts also has the 11th-lowest poverty rate in the nation (though the poverty rate increased slightly between 2010 and 2017) (see figure 69 on page 83).

Yet, income, wealth, and opportunity are not distributed evenly. While the real hourly rate has increased on average for other workers since 2003, low-income workers saw a real hourly wage decrease.[195] This exacerbates the Commonwealth's income inequality problem; Massachusetts has the seventh-highest income inequality in 2017.[196] Though asset inequality is not widely measured, the Boston Federal Reserve recently analyzed asset data for the city's residents. Notably, US-born Black Bostonians had $8 net worth on average, compared to $247,500 for White Bostonians (see figure 70 on page 83).

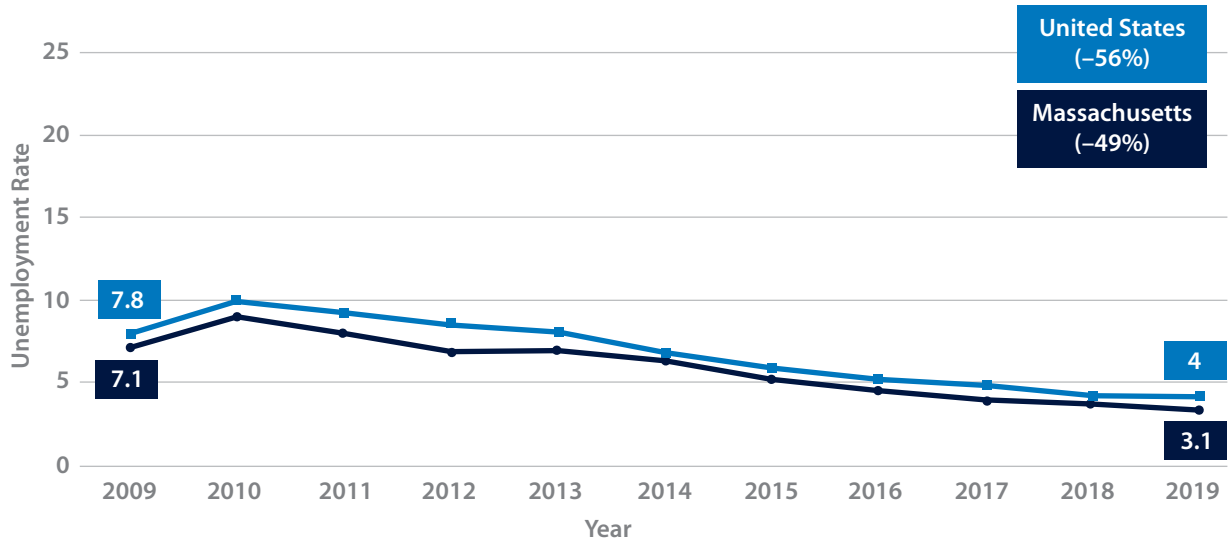
[194]United Health Foundation. America's Health Rankings. Trend: Median Household Income, Massachusetts, United States. www.americashealthrankings.org/explore/annual/measure/Medianincome/state/MA.
[195]Governing. Median Wages by State. www.governing.com/gov-data/wage-average-median-pay-data-for-states.html.
[196]Authors' analysis of United States Census Bureau. One-year American Community Survey Data, 2017 (GINI index).

**FIGURE 67** Median Annual Income, Massachusetts and the United States, 2008–2018



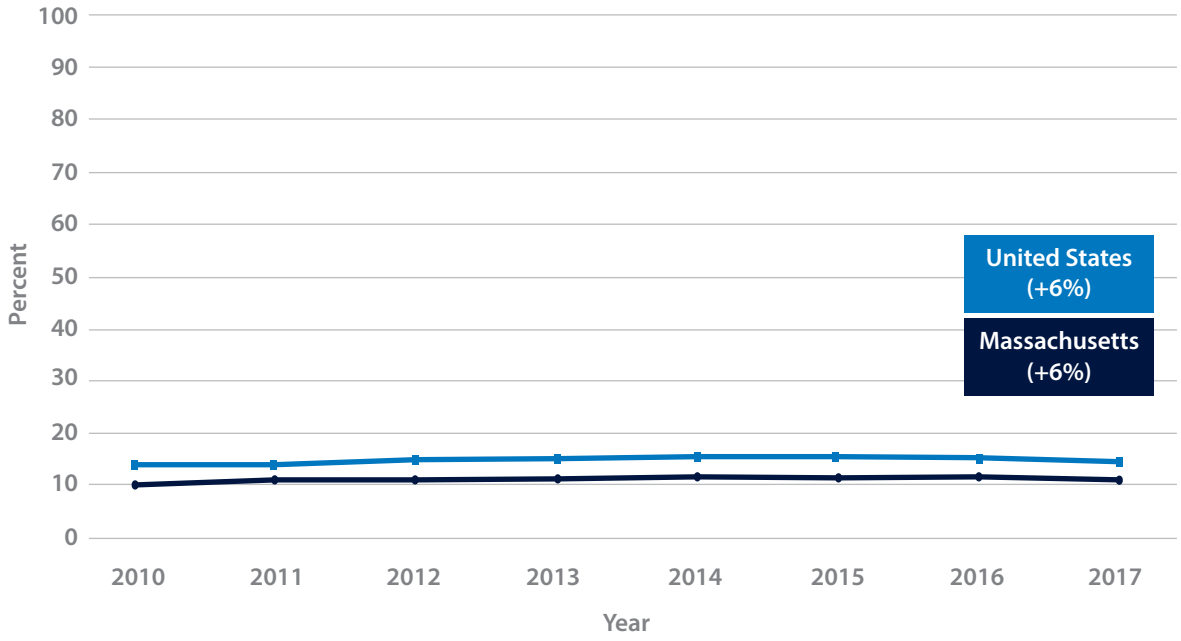

*Source:* United Health Foundation. America's Health Rankings. Trend: Median Household Income, Massachusetts, United States. Analysis of US Census Bureau, Current Population Survey, Annual Social and Economic Supplement (dollar amount that divides the household income distribution of the population into two equal groups). www.americashealthrankings.org/explore/annual/measure/Medianincome/state/MA.

**FIGURE 68** Unemployment Rate, Massachusetts and the United States, 2009–2019



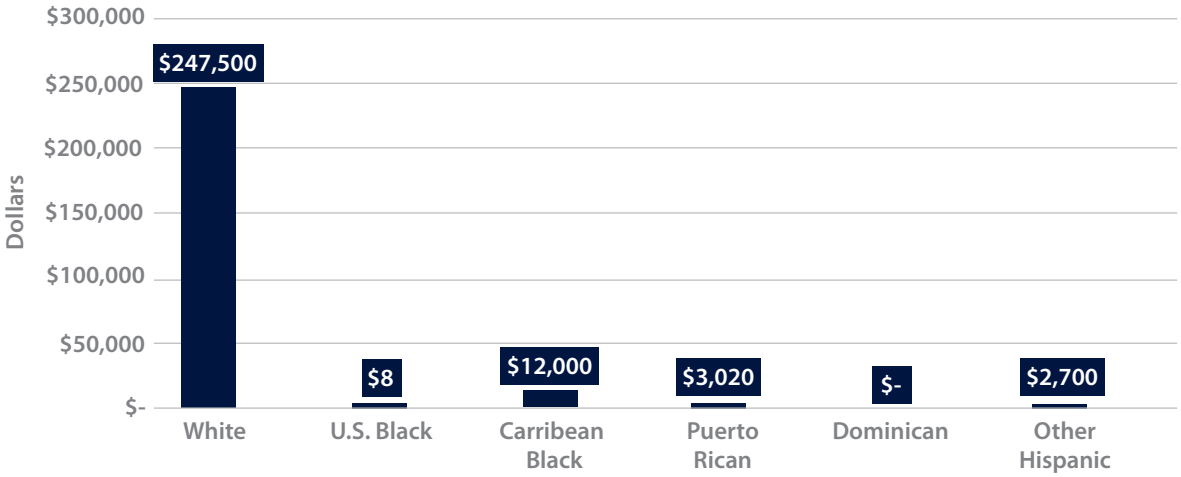

*Source:* Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey (measuring point in time unemployment rate for January of each year). https://data.bls.gov/timeseries/LNS14000000.

**FIGURE 69** Poverty Rate, Massachusetts and the United States, 2010–2017




*Source:* US Census Bureau Population Estimate, American Community Survey 2010–2017. Percent of people below poverty level in the past 12 months (for whom poverty status is determined) — United States (various years).

**FIGURE 70** Net Worth by Race, Ethnicity, and National Origin, Boston




*Source:* Muñoz AP, Kim M, Chang M, Jackson RO, Hamilton D, Darity WA. The color of wealth in Boston. Duke University, the New School, and the Federal Reserve Bank of Boston. www.bostonfed.org/publications/one-time-pubs/color-of-wealth.aspx. Published March 25, 2015.

## *Policy Perspective — Income and Assets*

### Updated re: Impact and Implications of COVID-19

Money allows access to the resources necessary for health, such as nutritious food, quality education, good housing in a safe neighborhood, and the peace of mind that comes with knowing there is enough in the bank to cover unforeseen expenses. Without such resources, health is elusive.

This is clear in the gap between the health of those who have money and those who lack it. Though life expectancy in the United States rose by several decades during the last century, the lives of the poorest Americans are now 10 to 15 years shorter than those of the richest.[197] In addition to reflecting the strong link between income and health, this gap reflects how overall health improvements can mask deep disparities.

We see this in Massachusetts. The state is wealthy, yet wealth is not shared by all. Massachusetts is also one of the healthiest states, yet health gaps persist, such as in Boston, where diabetes rates vary widely from one part of the city to the next.[198] These challenges link to other factors, such as race and employment, creating a status quo where US-born Black Bostonians have far less net worth than their White counterparts, and low-income workers have seen a decrease in hourly wage as hourly rates increased for other workers. These disparities place health at risk.

This has never been more apparent than during the time of COVID-19. The burden of COVID-19 was borne inequitably, with persons with fewer resources (many persons of color) having a disproportionate rate of infection and severity of COVID-19 once infected. Black Americans, in particular, have had more than twice the death rate of White Americans. This is linked directly to assets and resources to protect oneself from getting COVID-19 to begin with and to have been healthy enough to withstand COVID-19 if one did get the infection. The underlying health gap before the pandemic became a COVID-19 gap, which is traceable to the asset and resource gap that characterizes differences between the haves and have-nots. It is the tragedy(and story) of COVID-19 that we knew this long before the virus hit — that it would not affect us all equally, but we did not act.

How can we fix this, to improve health? Through political change. Wages are subject to public policy; racial disparities reflect the intersection of policy and history. We need space in our public debate for a discussion of how money shapes health and how this influence is mediated by social and political forces. We can then move toward creating a better, healthier status quo in Massachusetts and around the country.

**Sandro Galea, MD, DrPH**
*Dean and Robert A. Knox Professor, Boston University School of Public Health*

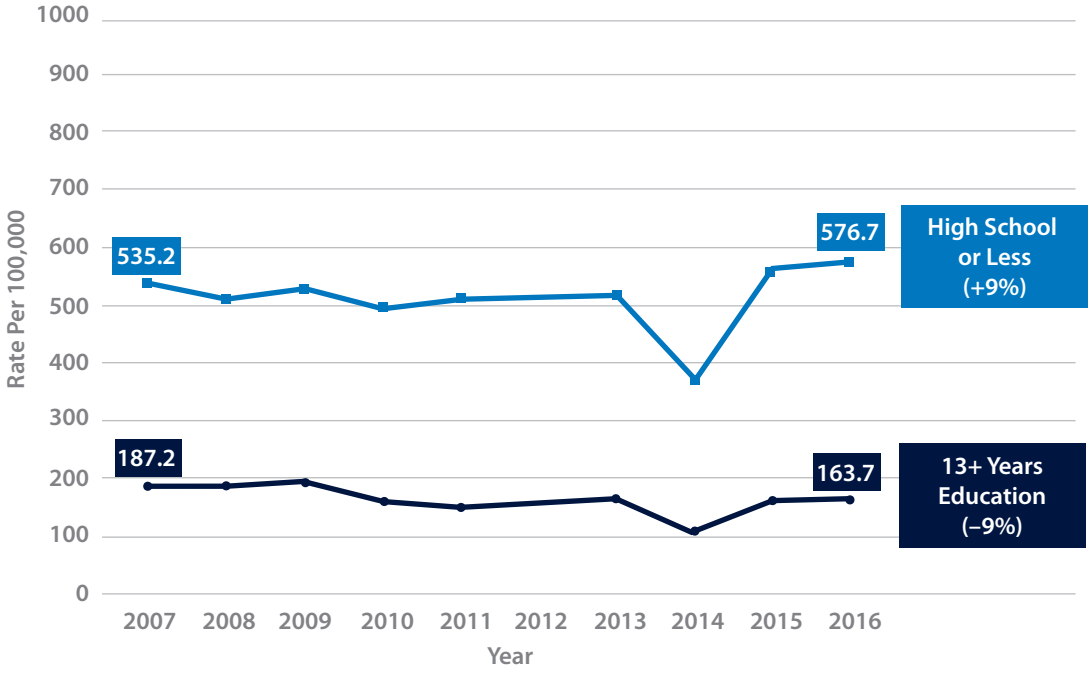
[197]www.sciencedirect.com/science/article/pii/S0140673617305718?via=ihub
[198]www.bu.edu/sph/2015/03/29/health-of-a-city-health-inequalities-in-boston-by-t-stops-a-pictorial-essay

# Education

Education is linked to better economic opportunities and better health outcomes. The Massachusetts mortality rate for individuals without a high school diploma is almost three and a half times higher than those with a high school diploma (see figure 71).[199]

Massachusetts ranks better than the nation on high school completion and bachelor's degree attainment (see figures 72 and 73 on page 86). But disparities remain, as seen in the differential graduation rate for Black and Hispanic students (see figure 74 on page 87). And some students report feeling unsafe at school, with 15 percent report being bullied in school (see figure 75 on page 87).

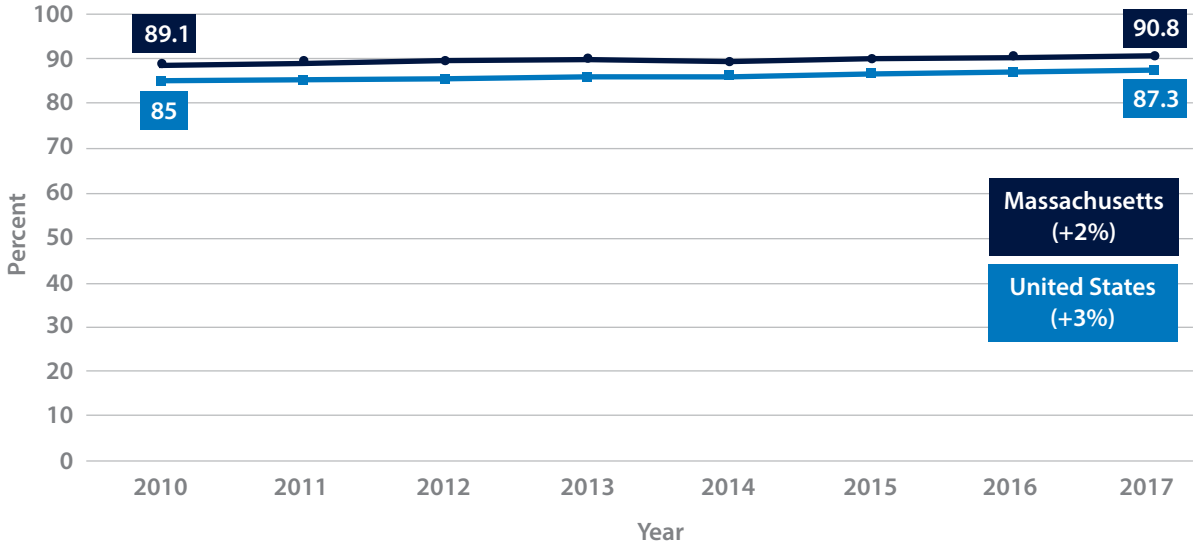
**FIGURE 71** Age-Adjusted Mortality, by Education level, Massachusetts, 2007–2016




*Source:* Massachusetts Department of Public Health. Massachusetts Deaths 2017. www.mass.gov/doc/2017-death-report/download. Published October 2019.

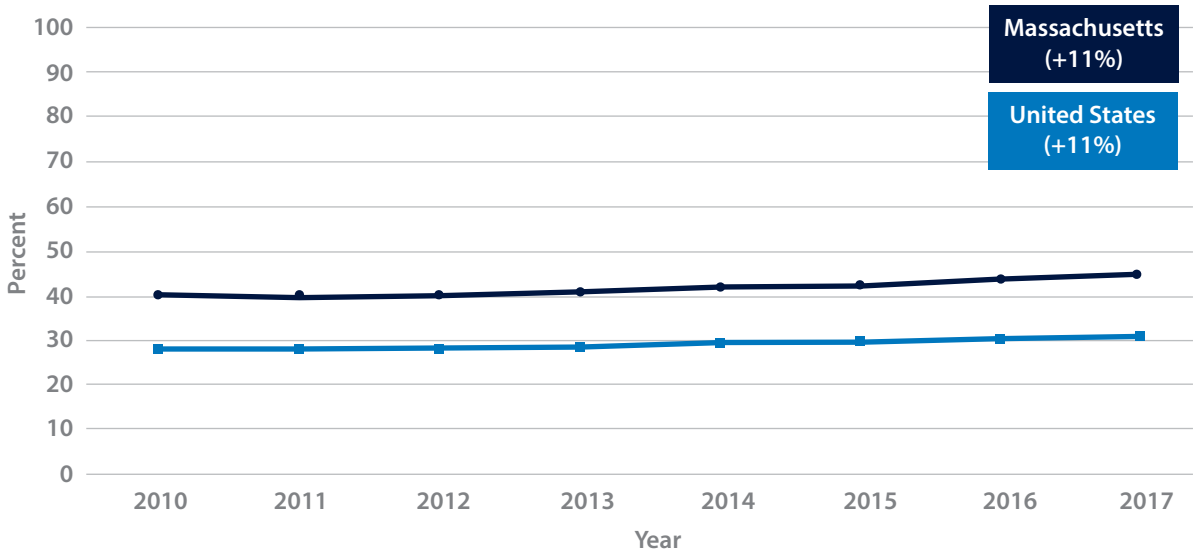
[199]Massachusetts Department of Public Health. Massachusetts Deaths 2017, Table 24. www.mass.gov/doc/2017-death-report/download. Published October 2019.

**FIGURE 72** High School Completion, Massachusetts and the United States, 2010–2017



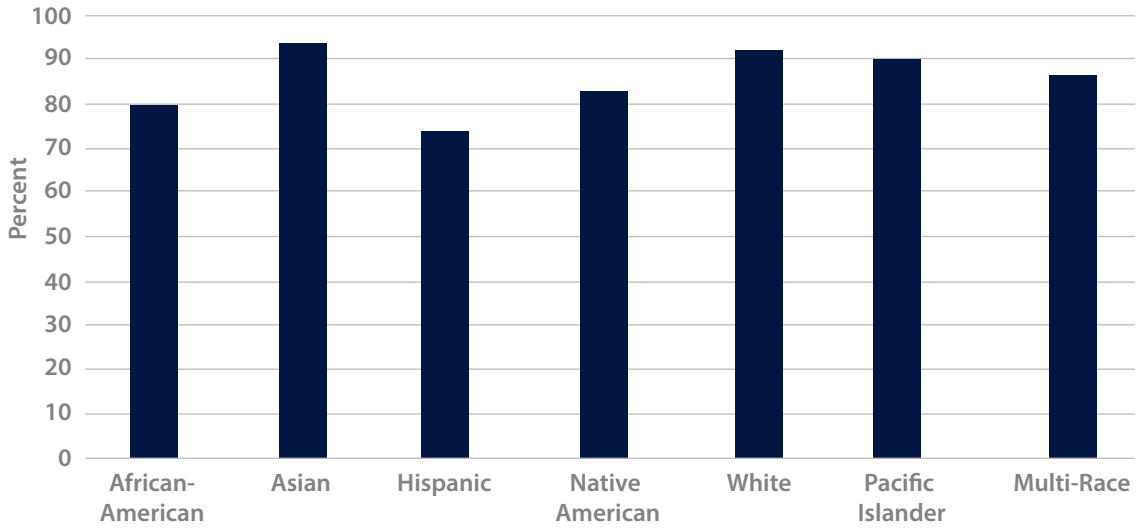

*Source:* American Community Survey.

**FIGURE 73** Bachelor's Degree Completion, Massachusetts and the United States, 2010–2017



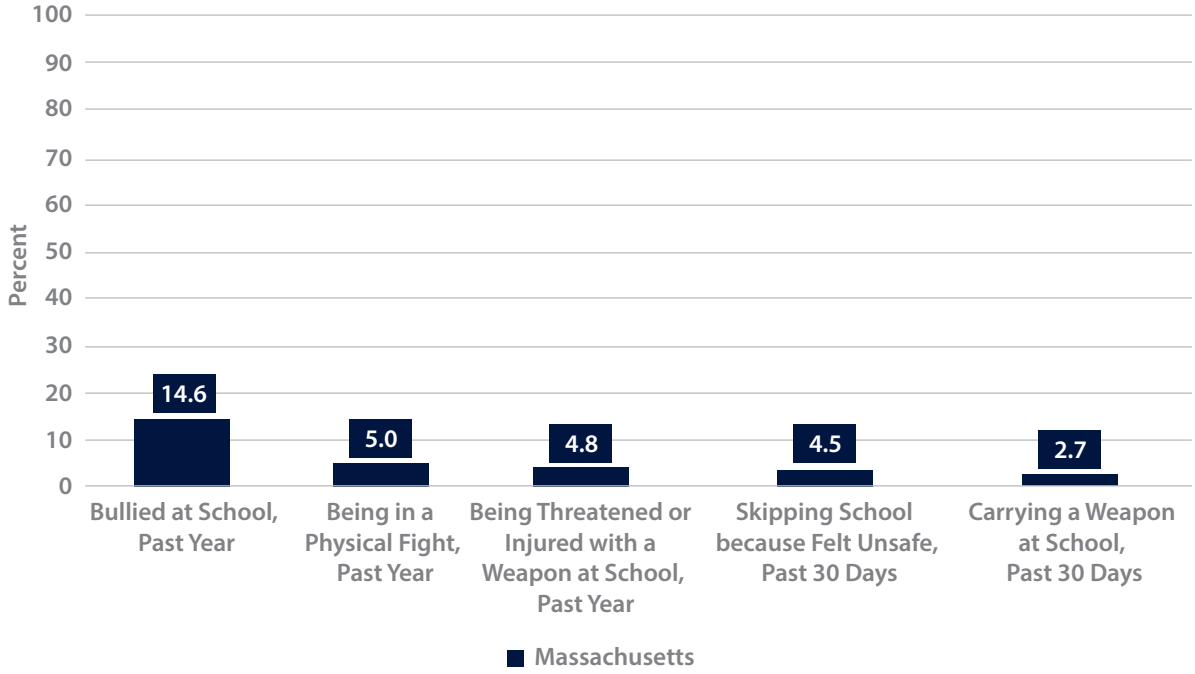

*Source:* American Community Survey.

**FIGURE 74** Massachusetts Graduation Rate, by Race and Ethnicity, 2018




*Source:* MA Department of Elementary and Secondary Education, graduation rates (2017–18). General information on the graduation rate project. www.doe.mass.edu/infoservices/reports/gradrates.

**FIGURE 75** Massachusetts High School Student Self-Reported Responses to School Safety Questions, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

## *Policy Perspective — Education*

A variety of studies have shown that educational attainment, one important measure of educational outcomes, is positively related to health outcomes. For example, figure 71 on page 85 shows a

strong negative correlation between statewide educational attainment and the rate of mortality among Massachusetts residents — a strong negative indicator of health outcomes.

Massachusetts rightly prides itself on the quality and accessibility of its public education system. The overall quality of the system is evident in figure 73 on page 86 that compares bachelor's degree completion rates for Massachusetts with national averages from 2010 to 2017. Not only do the data show higher levels of completion in Massachusetts, but the gap between the state and national average increases over time. Standardized test results and a number of other metrics echo this finding.

As in the case of health outcomes, however, the real story about education in Massachusetts is one of disparities that cannot be captured fully in aggregate indicators. Figure 74 on page 87 uses data from the Department of Elementary and Secondary Education (DESE) to demonstrate that aggregate data regarding statewide high school graduation rates may mask important disparities in attainment across racial and ethnic groups.

Other disaggregated data suggest that disparities in graduation rates may, in turn, understate educational inequities in the state. Through a public records request, Massachusetts Advocates for Children obtained data on the school placements of Massachusetts children diagnosed with autism. An unacceptable 25 percent of White children diagnosed with autism are placed in substantially separate classrooms. For Black children with autism, it is worse, with 51 percent placed in substantially separate classrooms. While there are certainly cases in which a separate setting is indicated for a particular child at a particular time, the bulk of the research on special education outcomes suggests that ongoing exclusion from the general education mainstream has a negative impact on educational and life outcomes. Gaining a full understanding of educational disparities in Massachusetts requires that DESE make available such data as a matter of course.

Per-pupil local spending on education is not a true indicator of educational achievement in Massachusetts, but the availability of adequate resources is certainly a precondition for addressing educational disparities in the state. In November 2019, the legislature passed the Student Opportunity Act (SOA), which commits the Commonwealth to provide an additional $1.4 billion in education funding over seven years. Most importantly, the law gives preference in the distribution of the new resources to school districts serving higher numbers of low-income students. Depending on how additional resources are used at the local level, Massachusetts has an unprecedented opportunity to make progress on the disparities that plague the system. Given the established relationship between educational outcomes and health outcomes, this is also an opportunity to positively affect the latter. Since this formal commitment to provide resources will need to be reaffirmed each year by the legislature, SOA will be at the center of educational policy debates in Massachusetts for the foreseeable future.

### Addendum: COVID-19 Impact and Implications

The public health crisis generated by the COVID-19 pandemic has only dramatized the close connection between health and education outcomes, and highlighted the disparities existing at that intersection.

Pandemic-related school closures led to a major disruption in K–12 education. The immediate shift to remote education created challenges for all students and educators, but, like the pandemic itself, school closures had disparate impacts across different groups of students. There are strong indications that students with disabilities, English-language learners, and low-income students have suffered significant learning loss during a year of closures.

Remote learning made access to technology an immediate issue, so advocacy to provide access to the necessary hardware and broadband connections was an early focus. School districts also

had to be encouraged to make the investments necessary to accommodate the unique needs of students challenged in the remote environment.

As the pandemic wore on, the unmet physical and behavioral health needs of students and their families became more of a concern in many communities. This encouraged an intensified public health response, but also fed advocacy around opening schools for safe, in-person education, especially for the high-needs groups identified above. The discussion of school reopening has become one of the most polemical aspects of public debate around the pandemic.

As the vaccination campaign builds steam, education advocates increasingly seek to define policy options that hold out the potential of an "equitable recovery" in the education sector.

**Kevin Murray**
*Executive Director, Massachusetts Advocates for Children*

# Housing

The stability, quality, safety, and affordability of housing affects health outcomes.[200] For people with disabilities, accessible housing is key to maintaining independence and health.[201]

Housing is harder to pay for in Massachusetts compared to the rest of the United States. Over a third of Massachusetts housing units have housing costs that is over 30 percent of income.[202] Sixteen percent of Massachusetts housing units have housing costs that is over 50 percent of income (see figure 76 on page 90).[203]

While homelessness is trending downwards in the United States, it is trending *upwards* in Massachusetts.[204] From 2008 to 2018, the number of homeless individuals increased

[200]Taylor L. Housing and health: An overview of the literature. *Health Affairs*. www.healthaffairs.org/do/10.1377/hpb20180313.396577/full. Published June 7, 2018.
[201]Ho P-S, Kroll T, Kehn M, Anderson P, Pearson KM. Health and housing among low-income adults with physical disabilities. *Journal of Health Care for the Poor and Underserved*. 2007;18(4):902–915. https://muse.jhu.edu/article/222763.
[202]United States Department of Housing and Urban Development. Consolidated Planning/CHAS Data. www.huduser.gov/portal/datasets/cp.html.
[203]United States Department of Housing and Urban Development. Consolidated Planning/CHAS Data. www.huduser.gov/portal/datasets/cp.html.
[204]National Alliance to End Homelessness. State of Homelessness. https://www.endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-report.

### WHAT IS HOMELESSNESS?

The term homelessness can be defined in many ways. For the purpose of the Point in Time Homeless Count, the United States Department of Housing and Urban Development defines unsheltered homelessness as individuals and families "with a primary nighttime residence that is a public or private place not designed for or ordinarily used as a regular sleeping accommodation for human beings, including a car, park, abandoned building, bus or train station, airport, or camping ground."

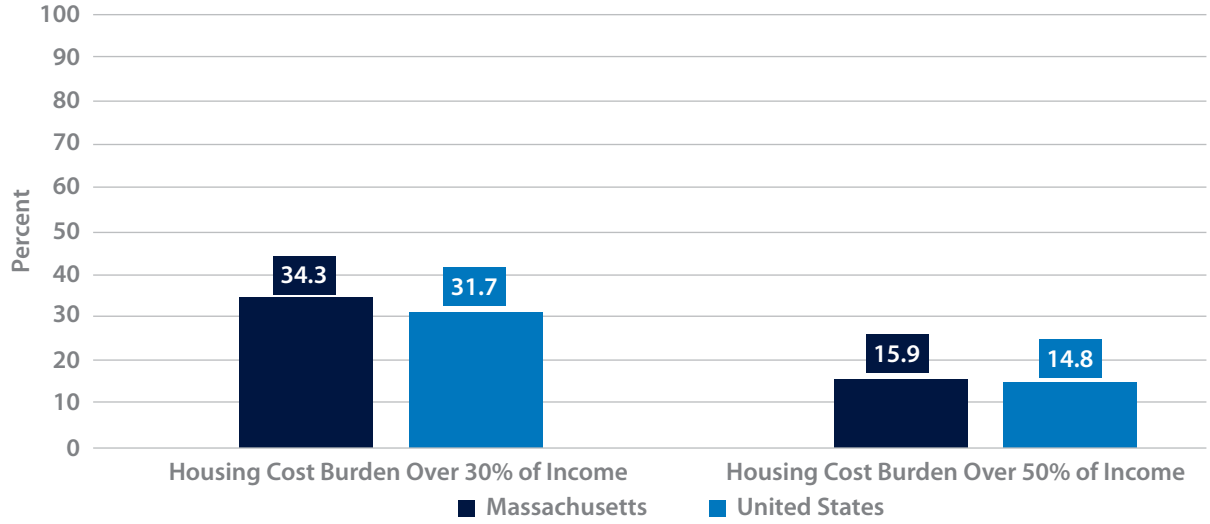
HUD defines sheltered homelessness as individuals and families "living in a supervised publicly or privately operated shelter designated to provide temporary living arrangement (including congregate shelters, transitional housing, and hotels and motels paid for by charitable organizations or by federal, state, or local government programs for low-income individuals)."

Other organizations advocate for an expanded definition, or considerations of different terms to capture the range of housing instability. For example, individuals who are "couch-surfing," and otherwise homeless individuals in hospitals or imprisoned, are not counted.

*National Law Center on Homelessness and Poverty*

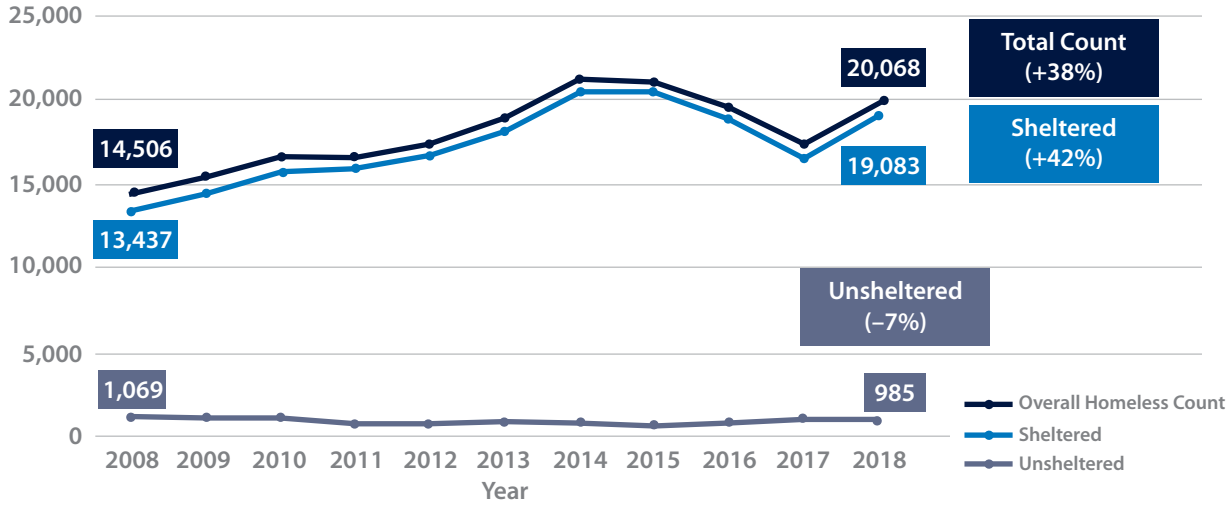
38 percent. From 2017 to 2018, the homelessness count increased 14 percent, the highest rate of increase in the country.[205] Compared to the rest of the country, more of the homeless population in Massachusetts is sheltered. Over the past 10 years, the number of sheltered homeless individuals increased 42 percent and the number of unsheltered homeless individuals decreased 7 percent. The number of homeless families increased 80 percent, and the number of homeless veterans decreased 7 percent (see figures 77 and 78).

**FIGURE 76** Housing Cost Burden, Massachusetts and the United States




*Source:* United States Department of Housing and Urban Development. Consolidated Planning/CHAS Data. www.huduser.gov/portal/datasets/cp.html.

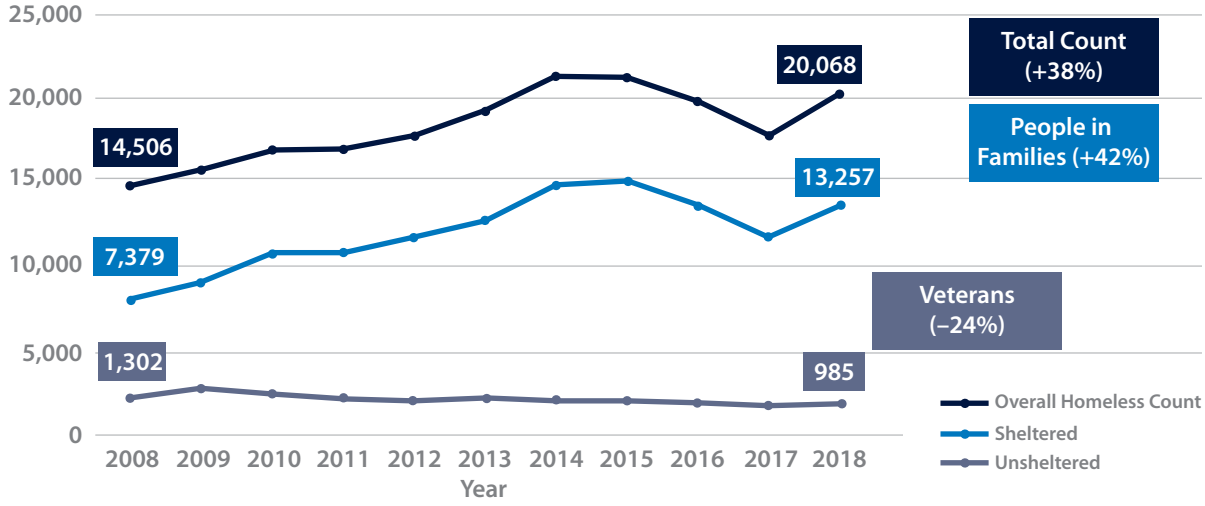
**FIGURE 77** Massachusetts Point-in-Time Homelessness Count, Sheltered and Unsheltered, 2008–2018




*Source:* United States Department of Housing and Urban Development point-in-time data.

[205]Lederman D. Homelessness up slightly nationally, Massachusetts sees the largest hike. MassLive. www.masslive.com/news/2018/12/homelessness_up_slightly_natio.html. Published December 19, 2018. Updated January 29, 2019. There is some speculation that this increase is driven by the number of individuals relocating to Massachusetts following displacement from other states due to natural disasters.

**FIGURE 78** Massachusetts Point-in-Time Homelessness Count, Families and Veterans, 2008–2018




*Source:* United States Department of Housing and Urban Development point-in-time numbers.

Massachusetts-level data are not available regarding the affordability of accessible housing, but the issue is important for the health and safety of people with disabilities.[206] A national study found that only 0.15 percent of housing was wheelchair accessible.[207]

State and national changes to housing benefits, including the federal public charge regulation, may have a future effect on housing security in Massachusetts.

## *Policy Perspective — Housing*

This report documents the large numbers of individuals and families experiencing homelessness in Massachusetts. While homelessness is the extreme consequence of lack of housing, many more Massachusetts residents lack access to safe, affordable, stable, and high-quality housing. There is growing evidence that access to safe, stable, and affordable housing directly impacts individual, community, and population health outcomes.

Fortunately, the state legislature has a wide array of housing priorities on the docket. In the months before the legislative session ends, lawmakers should focus on the following:

1. Generating new funding for affordable housing by:
   - Doubling the deeds excise tax[208]
   - Empowering cities and towns to adopt local transfer taxes to generate new revenue for affordable housing
2. Enacting legislation to accelerate the renovation of vacant and blighted homes in weaker real estate markets[209]

[206]Pierre J. Accessible housing should be affordable, too. Inequality.org. https://inequality.org/great-divide/accessible-affordable-housing. Published November 19, 2018.
[207]United States Department of Housing and Urban Development. Accessibility of America's Housing Stock: Analysis of the 2011 American Housing Survey. www.huduser.gov/portal/sites/default/files/pdf/accessibility-america-housing-Stock.pdf. Published March 19, 2015.
[208]www.macdc.org/sites/default/files/documents/Deeds_Excise_Tax_Fact_Sheet.pdf
[209]www.macdc.org/sites/default/files/documents/MACDC NSI.pdf

3. Securing passage of Housing Choice legislation that would lower the threshold for cities and towns seeking to enact smart zoning and land use practices[210]
4. Recapitalizing the highly successful Get the Lead Out program[211]
5. Passing legislation to create a right to counsel for tenants facing eviction[212]
6. Rolling out new initiatives to help expand homeownership opportunities for first-time homebuyers in general and people of color specifically[213]
7. Fulfilling and implementing the Rural Policy Plan for the Commonwealth of Massachusetts recommendations[214]

In recent years, Massachusetts has begun to see convergence between the health and housing sectors. Health care institutions can further this convergence by investing in innovative programs that link health dollars to housing. Health care institutions can also use their authority and expertise to support legislation that increases access to safe, stable, and affordable housing by linking housing and health outcomes.

We must accelerate the convergence between the health and housing sectors in order to positively affect housing policy and improve health outcomes in the Commonwealth.

## Addendum: COVID-19 Impact and Implications

The COVID-19 pandemic illuminated what we already knew to be the inextricable convergence of health and housing. In addition to its devastating health impacts, the pandemic has revealed and exacerbated the persistent affordable housing crisis in Massachusetts. Furthermore, a lack of safe, stable, and affordable housing exacerbated the health crisis.

Now, as throughout the pandemic, it is necessary to focus on acute housing challenges while simultaneously pushing forward on addressing pre-existing structural problems in our housing market. This includes the following:

- Fully funding and effectively implementing the Eviction Diversion Initiative with legal services, mediation, and sufficient rent relief funding for tenants and landlords
- Extending the eviction moratorium and procedural protections for tenants that minimize evictions during the health emergency and beyond
- Addressing long-term structural problems in our housing market that force tens of thousands of people to pay more than can afford for housing

The COVID-19 pandemic underscores the need to generate increased funding for affordable housing and enact legislation to accelerate the availability of affordable housing to protect public health going forward. Health sector leaders and housing leaders should join forces to jointly push for legislation that increases access to safe, stable, and affordable housing.

**Elana Brochin**
*Program Director for Health Equity, Massachusetts Association of Community Development Corporations*

[210]www.mass.gov/orgs/housing-choice-initiative
[211]www.macdc.org/sites/default/files/documents/MACDC Get the Lead Out Fact Sheet.pdf
[212]www.massrtc.org
[213]www.mass.gov/news/baker-polito-administration-announces-86-million-investment-in-workforce-housing
[214]https://frcog.org/wp-content/uploads/2019/10/Rural_Policy_Plan_10.01.19.pdf

# Access to Food

Access to food is important for health.[215] Massachusetts has lower food insecurity than the nation. About 3.2 percent of individuals have very low food security, and about 9.3 percent of Massachusetts residents have low or very low food security. The number of households with "very low food security" appears to be trending down in Massachusetts, while the number of households with "low or very low food security" appears to be trending up (see figure 79).

The counties with the highest rates of overall food insecurity are (1) Suffolk (14 percent), (2) Bristol (10 percent), and (3) Hampden (10 percent). The counties with the highest level of child food insecurity are (1) Hampden (15 percent), (2) Suffolk (14 percent), and (3) Bristol (14 percent) (see figure 80 on page 94).

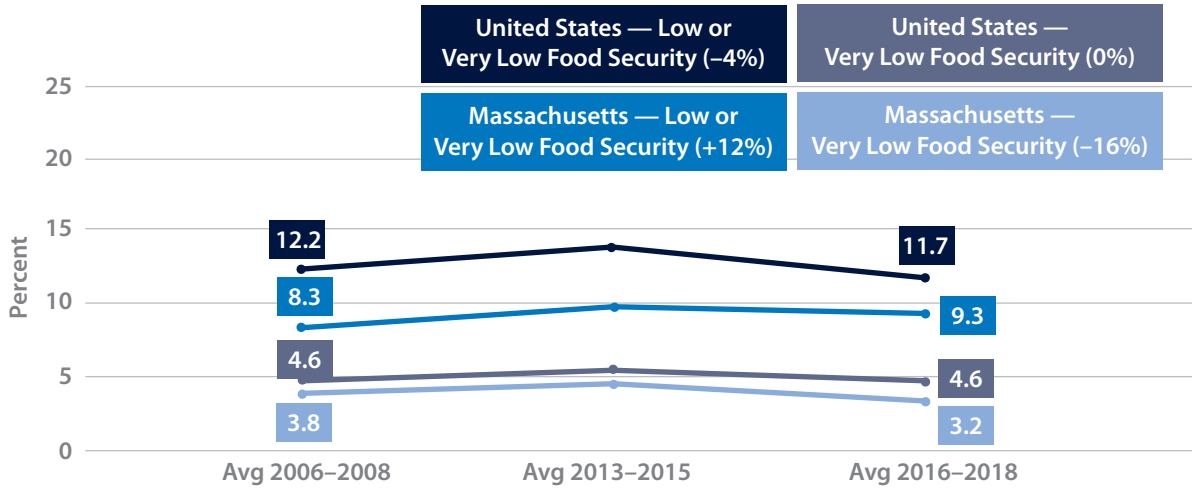
## WHAT IS FOOD SECURITY?

The United States Department of Agriculture (USDA) defines food insecure households as "in which one or more people were hungry at times during the year because they could not afford enough food." The USDA defines "hunger" as "the uneasy or painful sensation caused by lack of food." More specifically, households are categorized as follows:

1. High food security — Households had no problems, or anxiety about, consistently accessing adequate food.
2. Marginal food security — Households had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced.
3. Low food security — Households reduced the quality, variety, and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted.
4. Very low food security — At times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food.

*USDA*

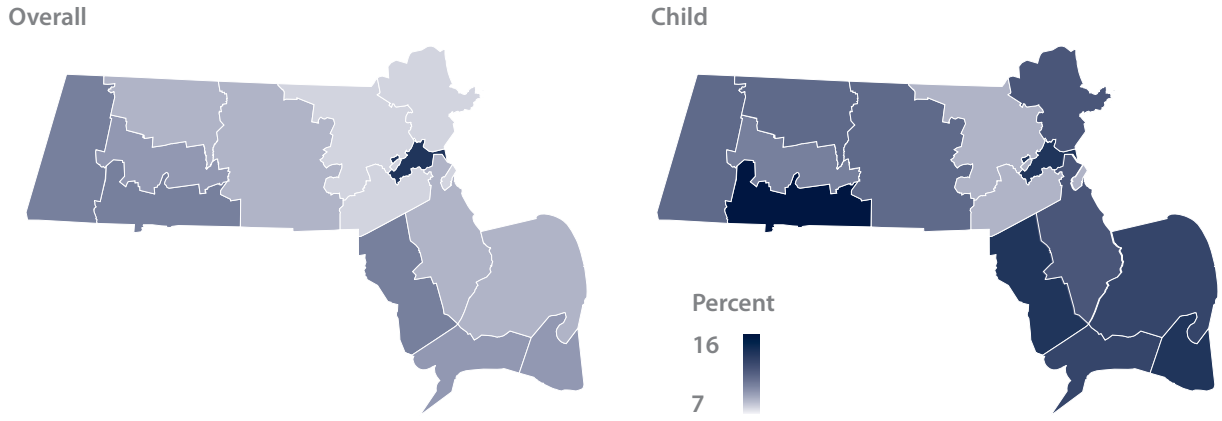
**FIGURE 79** Food Insecurity, Massachusetts and the United States, 2006–2018




*Source:* Coleman-Jensen A, Rabbitt M, Gregory C, Singh A. Household Food Security in the United States in 2018, Table 5. United States Department of Agriculture. www.ers.usda.gov/webdocs/publications/94849/err-270.pdf?v=963.1.

[215]Craig Gundersen G, Ziliak JP. Food insecurity and health outcomes. *Health Affairs.* 2015:34(11). www.healthaffairs.org/doi/full/10.1377/hlthaff.2015.0645.

**FIGURE 80** Overall and Child Food Insecurity by County, Massachusetts, 2017




*Source:* Feeding America. Overall and Child Food Insecurity in Massachusetts by County. https://public.tableau.com/profile/feeding.america.research#!/vizhome/2017StateWorkbook-Public_15568266651950/CountyDetailDataPublic. Published 2017.

## *Policy Perspective — Access to Food*

Growing income disparity is one of many key indicators that low-income residents are struggling to meet basic living expenses. While current data suggest Massachusetts has "lower food insecurity than the nation," that speaks little to the quality or consistency of the available food. Massachusetts is the third most expensive state for renters,[216] has nearly the highest utility costs,[217] and the highest food cost.[218] Furthermore, bureaucratic barriers make it difficult for households to obtain and retain nutrition benefits.

Families need adequate resources to make healthy food purchases based on dietary needs and cultural preferences. Low-income households are often relegated to the inner lanes of supermarkets where the cheaper, processed items are stored versus the perimeter where healthier but costlier items are found. With the average Supplemental Nutrition Assistance Program (SNAP) benefit at $6.92 per day per household,[219] is it any wonder that fresh produce, meat, fish, and dairy are harder to reach for families on a restricted budget?

Research clearly demonstrates that food insecurity negatively impacts the health of children and adults, contributing to low birth weight, impaired brain development, malnutrition, mental health issues, diabetes, and heart problems. Children's HealthWatch estimates that the health care, special education, and lost work time costs attributable to food insecurity were $2.4 billion in 2016.[220] At the

[216]Aurand A, Emmanuel D, Yentel D. Out of Reach: The High Cost of Housing. National Low Income Housing Coalition. https://nlihc.org/sites/default/files/oor/OOR_2018.pdf. Published 2018.
[217]US Energy Information Administration, Primary Energy Source used for home heating (share of households). www.eia.gov/beta/states/states/ma/data/dashboard/consumption.
[218]The Greater Boston Food Bank. New Data Shows Cost of Food In Massachusetts Highest In United States. www.gbfb.org/news/press-releases/cost-food-massachusetts. Published May 1, 2019.
[219]DTA Performance Scorecard. www.mass.gov/doc/performance-scorecard-january-2020-0/download. January 2020.
[220]Children's HealthWatch Policy Brief. An Avoidable $2.4 Billion Cost: Food Insecurity and Hunger in Massachusetts https://childrenshealthwatch.org/an-avoidable-2-4-billion-cost-food-insecurity-and-hunger-in-massachusetts. Published April 2018.

same time, we know that providing access to food improves health outcomes and reduces costs. A 2017 Massachusetts General Hospital study found that participation in SNAP reduced health care costs by $1,400 a year.[221]

Massachusetts needs to take more aggressive steps to close the "SNAP gap" by creating a common application for health care and food assistance. Nearly 700,000 MassHealth-enrolled residents live under 150 percent of the federal poverty line yet do not receive SNAP benefits.[222] Closing the SNAP gap could leverage up to $1 billion in federal nutrition benefits. And SNAP receipt triggers automatic free school meal eligibility for school-age children, regulated utility discounts, and access to Healthy Incentives Program benefits and other discounts at farmers markets.

Additionally, the Commonwealth must demand that Congress and the federal administration increase the value of SNAP benefits from the woefully outdated "thrifty food plan" to minimally the "low cost meal plan." SNAP benefits remain inadequate to meet the dietary needs of our low income residents.

Most importantly, we need to ensure the voices of individuals with lived experience are at the table and informing every policy discussion on poverty, food insecurity, and income inequality.

### Addendum: COVID-19 Impact and Implications

During the height of the pandemic, Massachusetts faced the largest percentage increase in food insecurity in the nation due to the pandemic.[223] Increasing SNAP participation and benefit amounts are the best tools to decrease hunger, improve health outcomes, and boost the economy.

Although the Massachusetts SNAP caseload has increased 30% since March 2020, thousands of eligible families are still not receiving this crucial benefit. Massachusetts must expedite work to close the "SNAP Gap" through a *one-stop* MassHealth/SNAP common application.

At the national level, Congress and the Biden Administration should continue positive SNAP policy changes implemented due to COVID-19 and continue to prioritize addressing inequities and racist policies.

Finally, and most importantly, the voices of individuals with lived experience must be at the table and inform every policy discussion on poverty, food insecurity, and income inequality.

**Victoria Negus**
*Policy Advocate, Massachusetts Law Reform Institute*

**Patricia Baker**
*Senior Policy Advocate, Massachusetts Law Reform Institute*

**Diane Sullivan**
*Independent Consultant*

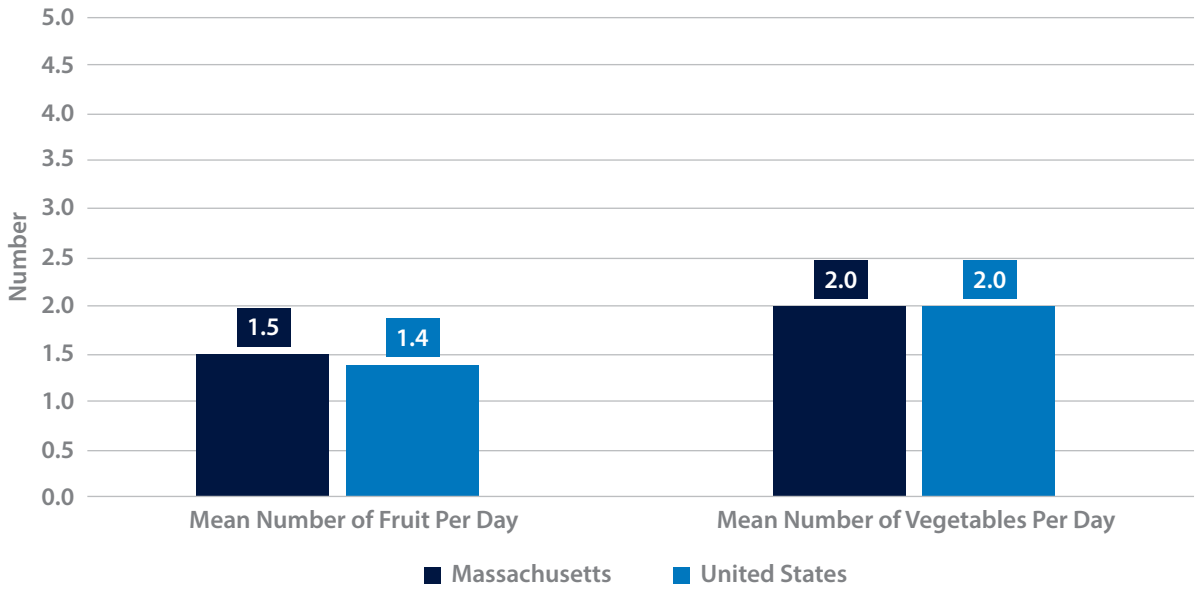
[221]Berkowitz S. Supplemental Nutrition Assistance Program (SNAP) participation and health care expenditures among low-income adults. *JAMA Internal Medicine*. 2017;177(11):1642–1649. https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2653910.
[222]It's Time to Close the SNAP Gap. www.masslegalservices.org/content/its-time-close-massachusetts-snap-gap.
[223]Northwestern University Institute for Policy Research. Weekly Food Insecurity Rates during COVID-19. www.ipr.northwestern.edu/state-food-insecurity.html.

# Nutrition

Nutritious foods are linked to better health. Nationally, Massachusetts ranks 12th in average fruit consumption, and 17th in average vegetable consumption (see figure 81).[224] Less than 20 percent of Massachusetts adults report consuming fruits and vegetables five or more times per day. Among respondents to the Massachusetts Youth Health Survey in 2017, 11 percent report drinking at least one glass of non-diet soda in the past 30 days (see figure 82).[225]

In addition to food insecurity, access to grocery stores is an important part of adequate nutrition. The cities of Chelsea, Springfield, and Taunton have the highest percentage of low-income residents with access to a grocery store.[226] Massachusetts may improve the nutrition of its residents by improving access to food, access to grocery stores, improved economic stability, and access to nutrition education.

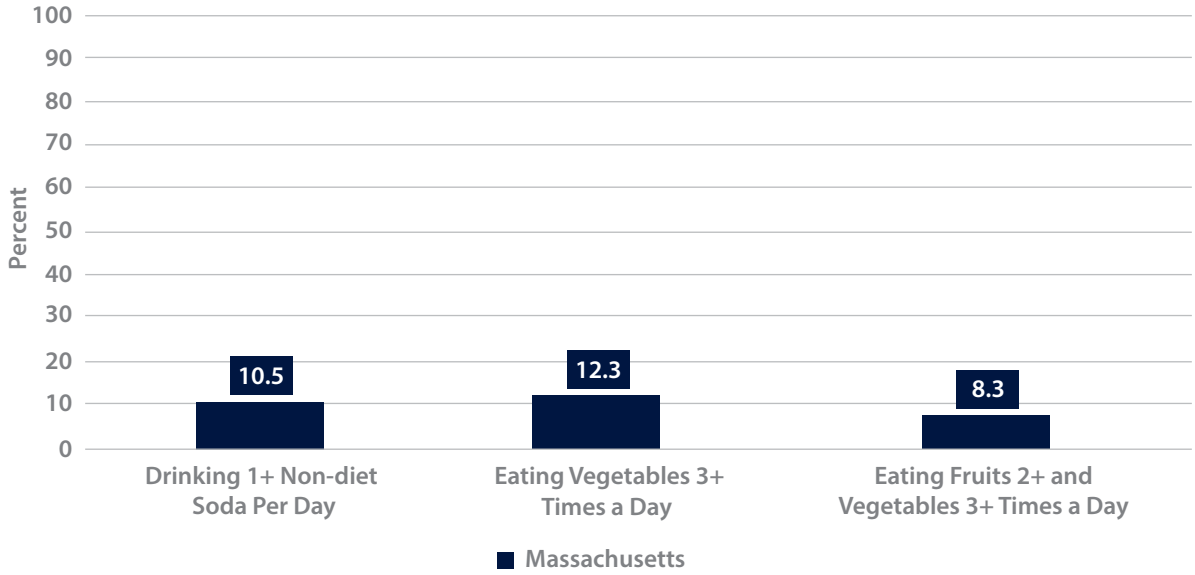
**FIGURE 81** Adult Fruit and Vegetable Consumption, Massachusetts and the United States, 2018




*Source:* United Health Foundation. America's Health Rankings. Trend: Fruits, Massachusetts, United States. Analysis of CDC's Behavioral Risk Factor Surveillance System (mean number of fruits consumed per day by adults). www.americashealthrankings.org/explore/annual/measure/Fruit/state/MA. United Health Foundation. America's Health Rankings. Trend: Vegetables, Massachusetts, United States. Analysis of CDC's Behavioral Risk Factor Surveillance System (mean number of vegetables consumed per day by adults). www.americashealthrankings.org/explore/annual/measure/Veggie/state/MA.

[224]United Health Foundation. America's Health Rankings. 2018 Annual Report. America's Health Rankings analysis of CDC, Behavioral Risk Factor Surveillance System, United Health Foundation, AmericasHealthRankings.org. www.americashealthrankings.org/learn/reports/2018-annual-report/state-summaries-massachusetts. Accessed 2019.
[225]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (2017). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.
[226]Norton MP. Where the food deserts are. CommonWealth. https://commonwealthmagazine.org/economy/where-the-food-deserts-are. Published April 12, 2017.

**FIGURE 82** Massachusetts High School Student Self-Reported Answers to Nutrition Questions, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

## *Policy Perspective — Nutrition*

Between 2012 and 2018, health care spending in Massachusetts rose 3.2 percent each year. As of this writing, the total annual health care spending now exceeds $60 billion, with out-of-pocket costs and personal premiums growing twice as fast as the rates of inflation and wages. These ever-rising costs threaten every other state, private business, and family priority.

Poor food and nutrition are among the biggest drivers of these trends. Nationally, suboptimal diet is the leading cause of adverse health outcomes. For example, just 10 dietary factors are estimated to cause nearly half of all US deaths from heart disease, stroke, and diabetes.[227] Type 2 diabetes can be considered the "canary in the coal mine" for the dietary and metabolic health of a population. In the United States, 1 in 3 children born after 2000 will develop type 2 diabetes in their lifetime, while 2 in 3 will become overweight or obese.[228]

In Massachusetts, 46 percent of adults (2.4 million people) have diabetes or prediabetes, a rate that has doubled since 2000.[229] Costs of diabetes alone in Massachusetts now exceed $7.6 billion per year, including $5.5 billion in direct medical expenditures and $2.1 billion in lost productivity and other indirect costs.

Much of this preventable suffering, death, and health care spending is caused by — and can be reversed by — what we eat. Today, few Massachusetts residents achieve the recommended intake

[227]Micha R, Penalvo JL, Cudhea F, Imamura F, Rehm CD, Mozaffarian D. Association between dietary factors and mortality from heart disease, stroke, and type 2 diabetes in the United States. *JAMA*. 2017;317(9):912–924.
[228]Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for diabetes mellitus in the United States. *JAMA*. 2003;290(14):1884–1890.
[229]American Diabetes Association. The Burden of Diabetes in Massachusetts. 2018. http://main.diabetes.org/dorg/assets/pdfs/advocacy/state-fact-sheets/Massachusetts2018.pdf. Accessed February 1, 2020.

of healthy foods. And these diet-related burdens disproportionately harm lower-income residents, contributing to major health and economic disparities.

It's time for Massachusetts to take on and reverse this growing epidemic of diet-related illness. Sound policies include piloting novel combined incentive/disincentive policies within SNAP;[230] integrating produce prescriptions and medically tailored meals into health care;[231] taxing soda and junk foods with all revenue used to increase access to and affordability of healthy foods;[232] and incentivizing and encouraging private innovation to make Massachusetts the US leader in food and agricultural investment and entrepreneurship for nutrition and wellness.

## Addendum: COVID-19 Impact and Implications

### *Time for Nutrition Security: Our National Opportunity*

Effective measures to address food and nutrition will influence success or failure of many Biden administration priorities: health care, racial justice, the economy, climate, and even COVID-19.

Our country and state are overwhelmed with diet-related diseases. Over the past three decades, sharp rises in obesity and diabetes have created enormous suffering, spiraling costs, and health disparities. Half of US adults now have diabetes or prediabetes, including 46 percent in Massachusetts, a rate that's doubled since 2000. Costs of diabetes in Massachusetts exceed $7.6 billion/year. Seventy percent of American adults are overweight or obese, and over 80 percent of health care spending is on chronic diseases. These diet-related burdens continue to rise. Addressing diabetes, obesity, and related conditions is a top priority, and nourishing food is the most effective foundation.

COVID-19 is a fast pandemic on top of a slower — but no less devastating — pandemic of nutrition insecurity, obesity, and diabetes, and these two pandemics are interlinked. Other than age, top predictors of severe COVID-19 infections are diet-related risks like obesity, diabetes, hypertension, and cardiovascular diseases. These burdens also cause tremendous health inequities, with highest rates among Black, Latinx, and Indigenous Americans.

It's time for our state and nation to prioritize effective policy actions[233] to leverage the power of food and nutrition to build back better and address health, racial justice, COVID-19, the economy, and climate.

**Dariush Mozaffarian, MD, DrPH**
*Dean, Friedman School of Nutrition Science & Policy*
*Jean Mayer Professor of Nutrition, Tufts University*
*Professor of Medicine, Division of Cardiology, Tufts Medical Center*

[230]Mozaffarian D, Liu J, Sy S, et al. Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through the US Supplemental Nutrition Assistance Program (SNAP): A microsimulation study. *PLoS Med.* 2018;15(10):e1002661.
[231]Commonwealth of Massachusetts Senate. Bill S.2453. An Act Relative to Establishing and Implementing a Food and Health Pilot Program. 2020. https://malegislature.gov/Bills/191/S2453. Accessed February 1, 2020.
[232]Pearson-Stuttard J, Bandosz P, Rehm CD, et al. Reducing US cardiovascular disease burden and disparities through national and targeted dietary policies: A modelling study. *PLoS Med.* 2017;14(6):e1002311.
[233]https://nutrition.tufts.edu/sites/default/files/documents/Biden-Harris-nutrition-policy-recommendations-2-8-21.pdf

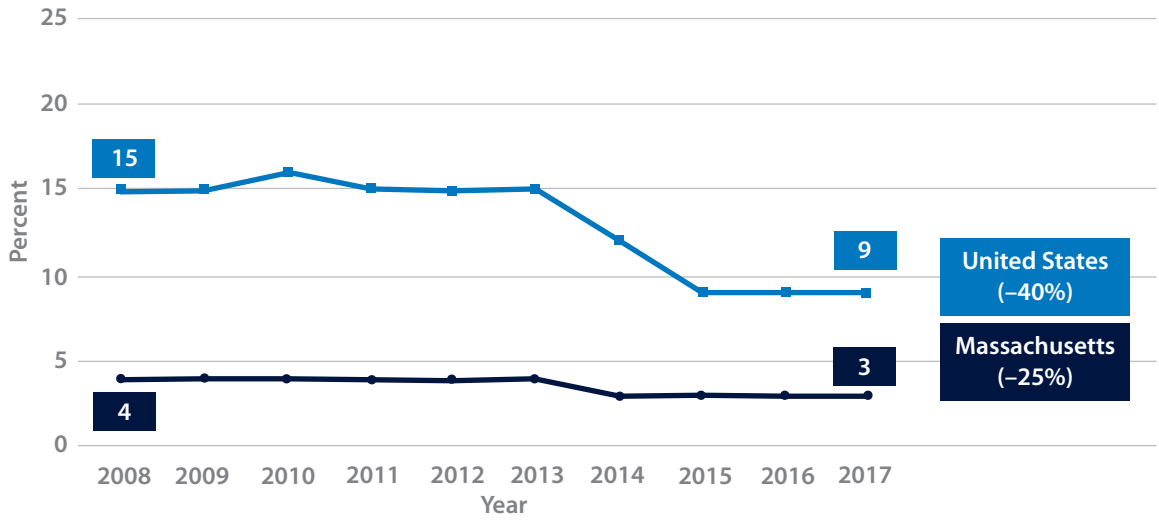
# Access to Health Care

Access to health insurance is linked to better financial security and better health. Massachusetts has the lowest uninsured rate in the nation, with the uninsured rate falling by a quarter between 2008 and 2017 (see figure 83). The insured rate varies geographically within Massachusetts, with Suffolk and Nantucket counties having higher rates of uninsured residents (see figure 84 on page 100). The uninsured rate for Black, Hispanic, and Asian individuals is each more than double the uninsured rate for White individuals (see figure 85 on page 100). Lower-income individuals (less than 300 percent FPL [federal poverty level]) are less likely to have health insurance, as are individuals with mental health or substance use disorder needs (see figure 86 on page 101).

In 2018, 18 percent of adult survey respondents reported trouble with paying family medical bills in the last 12 months. This represents a 20 percent decline since 2006. While lower-income adults report health care cost trouble at higher rates, the problem persists across income groups (see figure 87 on page 101).

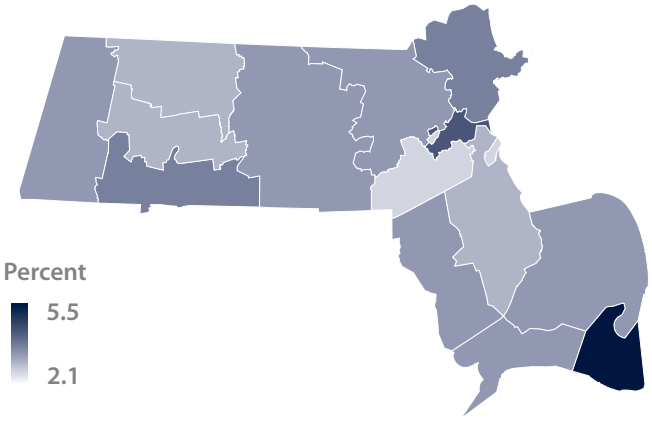
Also, in 2018, almost half of individuals reported having trouble accessing care in the last 12 months. The issue was more common for low-income individuals and individuals with mental health or substance use disorder needs (see figure 88 on page 102).

**FIGURE 83** Uninsured Rate, Massachusetts and the United States, 2008–2017



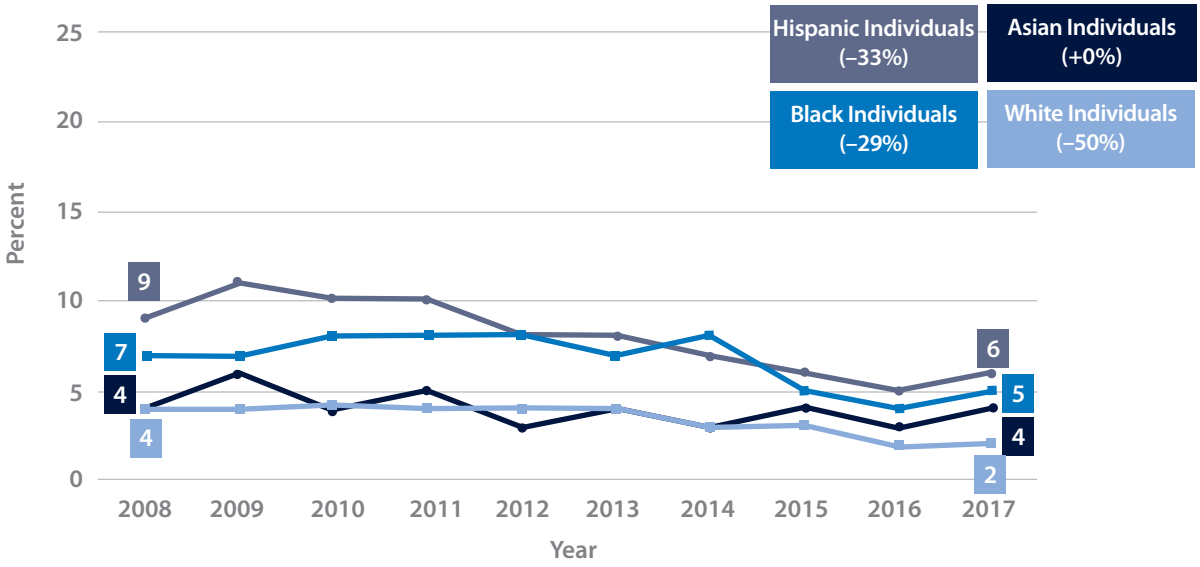

*Source:* Kaiser Family Foundation. State Health Facts. Health Insurance Coverage of the Total Population. Kaiser Family Foundation estimates based on the Census Bureau's American Community Survey, 2008–2017. www.kff.org/other/state-indicator/total-population/?currentTimeframe=9&selectedRows=%7B%22states%22:%7B%22massachusetts%22:%7B%7D%7D,%22wrapups%22:%7B%22united-states%22:%7B%7D%7D%7D&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

**FIGURE 84** Uninsured Rate, Massachusetts Counties, 2017



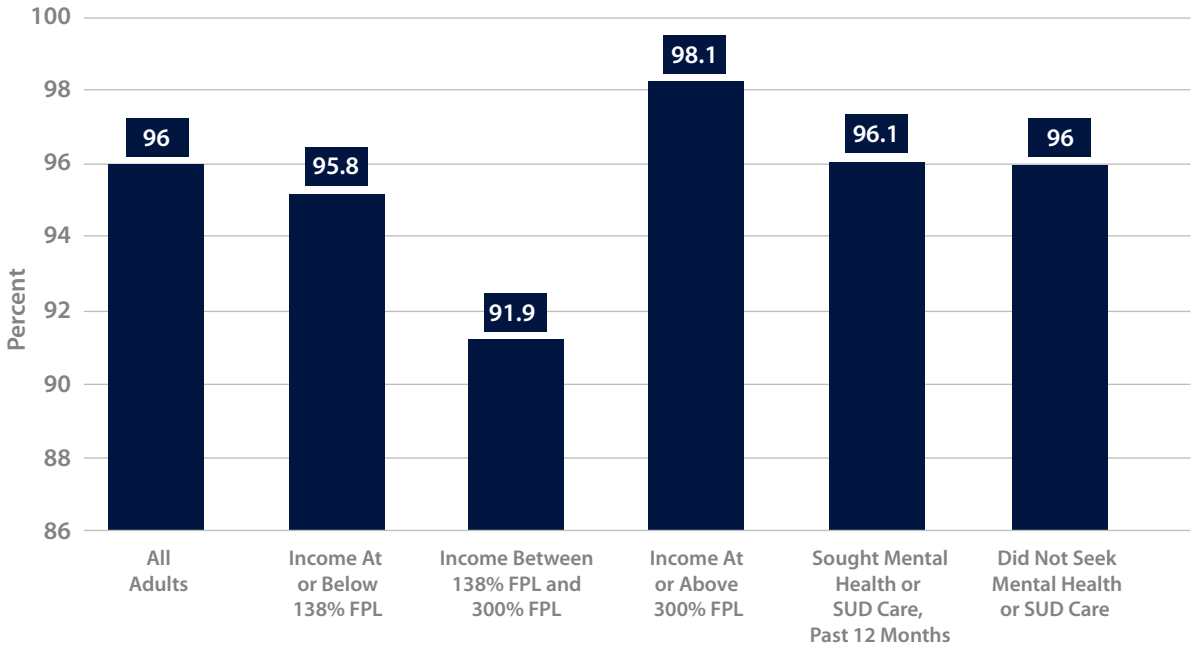

*Source:* United States Centers for Disease Control and Prevention. NCHHSTP AtlasPlus. www.cdc.gov/features/atlasplus/index.html. Updated 2017. Accessed November 2019.

**FIGURE 85** Uninsured Rate by Race and Ethnicity, Massachusetts, 2008–2017



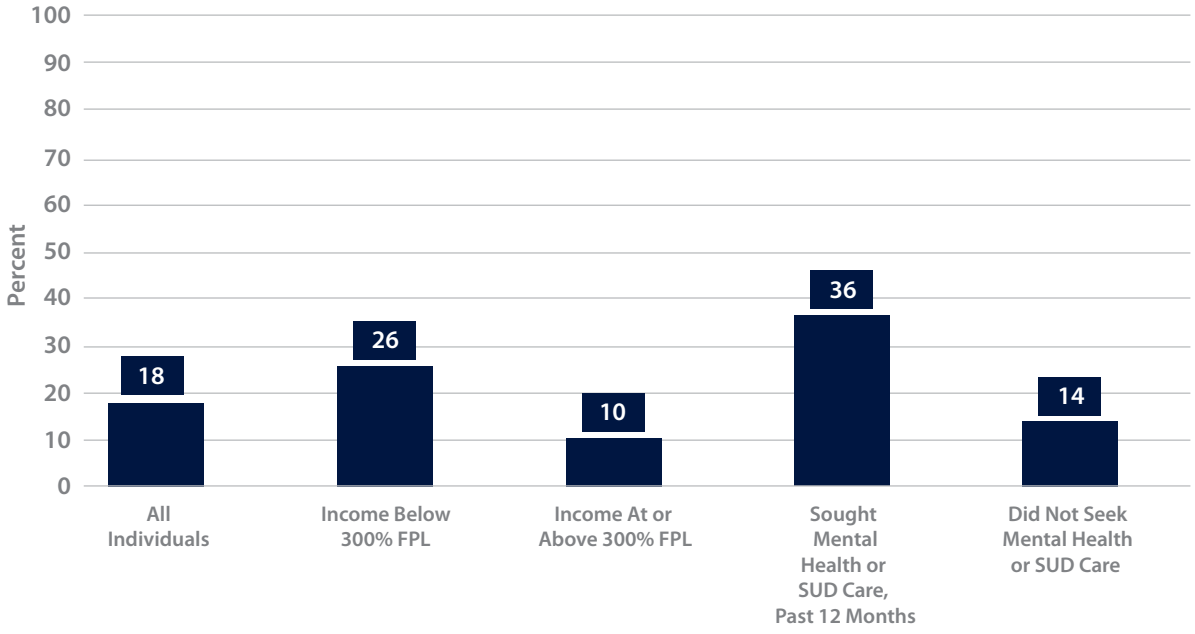

*Source:* Kaiser Family Foundation. State Health Facts. Uninsured Rates for the Nonelderly by Race/Ethnicity. Kaiser Family Foundation estimates based on the Census Bureau's American Community Survey, 2008–2017. www.kff.org/uninsured/state-indicator/rate-by-raceethnicity/?currentTimeframe=0&selectedRows=%7B%22states%22:%7B%22massachusetts%22:%7B%7D%7D%7D&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

**FIGURE 86** Adults Reporting Health Insurance Coverage for the Past 12 Months, Massachusetts, 2018



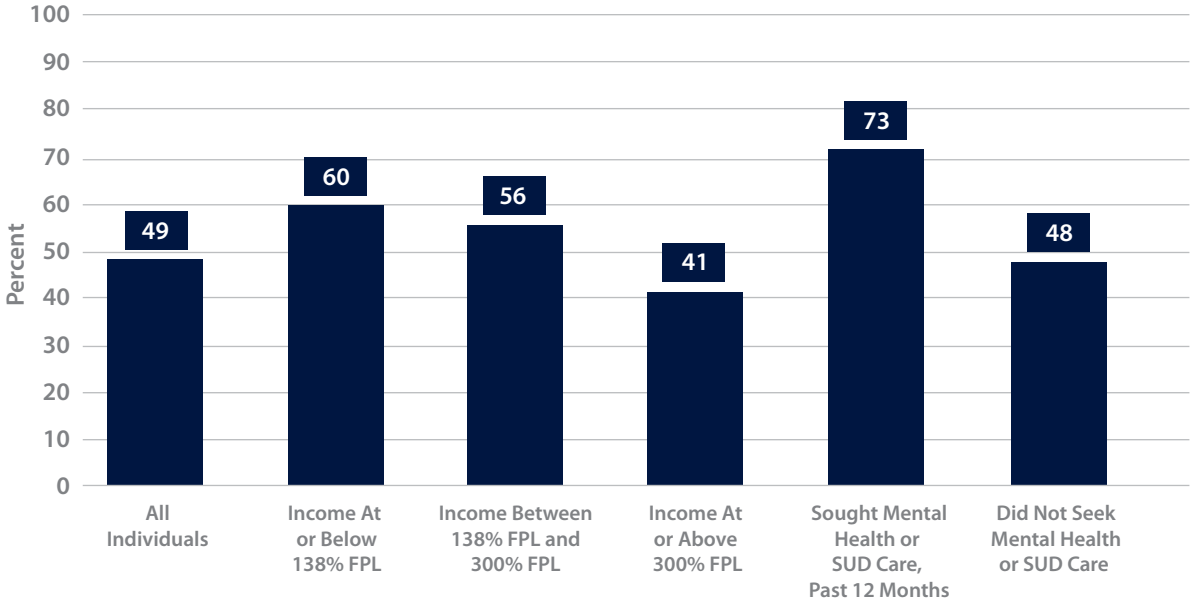

*Source:* Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.

**FIGURE 87** Adults Responding That They Have Trouble Paying Family Medical Bills, Last 12 Months, Massachusetts, 2018




*Source:* Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.

**FIGURE 88** Adults Reporting That They Have Trouble Accessing Care, Last 12 Months, Massachusetts, 2018




*Source:* Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.

## *Policy Perspective — Access to Health Care*

Massachusetts has achieved the highest health insurance rate in the country, with fewer than 3 percent of its residents uninsured, due to a tremendous cross-sector, collaborative commitment to access to health care for all in the Commonwealth. While we have made significant advances toward this goal, our work to remove remaining barriers to access is far from complete.

The average uninsurance rate for Massachusetts masks persistent pockets of high uninsurance and considerable geographic variation, ranging from a low of 0 percent in 30 communities to a high of 25.8 percent in one community.[234] The remaining uninsured are often in hard-to-reach groups, including young adults, males, and noncitizens. The characteristics of these communities highlight the need for targeted outreach and enrollment strategies.

Another stark reality is that individuals in Massachusetts are often not able to access appropriate behavioral health care services in a timely fashion. In 2018, more than half (54.6 percent) of full-year insured adults who sought care for mental health and/or substance use disorders reported difficulty in obtaining behavioral health care services over the past year.[235] Approximately 54 percent of Massachusetts youth who experienced a major depressive episode received no mental health services in 2016–2017.[236]

Finally, affordability of health care continues to be a challenge in our Commonwealth. More than one-third of adults faced problems with health care affordability in 2018,[237] with 18.6 percent reporting unmet need due to cost and 17.5 percent citing problems paying family medical bills.

[234]Blue Cross Blue Shield of Massachusetts Foundation. The Geography of Uninsurance in Massachusetts: An Update for 2013–2017. www.bluecrossmafoundation.org/publication/geography-uninsurance-massachusetts-update-2013-2017.
[235]Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.
[236]Mental Health in America — Youth Data. www.mhanational.org/issues/mental-health-america-youth-data.
[237]Blue Cross Blue Shield of Massachusetts Foundation. 2018 Massachusetts Health Reform Survey. https://bluecrossmafoundation.org/publication/2018-massachusetts-health-reform-survey.

Efforts are underway across the Commonwealth to address these issues, with many recognizing the vital role of a trusted medical home offering care that focuses on prevention, integration of behavioral health, and navigation of the health care system. These will be key in our collective work to ensure everyone has access to the coverage and care they need.

### Addendum: COVID-19 Impact and Implications

The COVID-19 pandemic has highlighted many of the persistent inequities in our health care system that go beyond insurance coverage. Individuals in Black and Brown communities, many who are frontline workers, have experienced much higher rates of infection and barriers to vaccine access and uptake. The impact of structural racism and social determinants of health have increased risk and driven disproportionate morbidity and mortality rates.

Meanwhile, the long-standing challenges in behavioral health access have been exacerbated by the pandemic. Rates of anxiety and depression are soaring amid the unprecedented isolation of the pandemic with demand even further exceeding the supply of care providers. The recent rise of telebehavioral health use is one positive development, with providers reporting fewer missed visits and patients citing the convenience and lower cost of having sessions at home. Yet the digital divide threatens to leave some individuals without access to these services.

The pandemic has only amplified the health care access and inequity issues that we in the Commonwealth have long been experiencing and known about. Let it also amplify our commitment to work together to ensure that all residents of our state have access to the care they need and deserve.

**Audrey Shelto**
*President, Blue Cross Blue Shield of Massachusetts Foundation*

## Smoking and Vaping

Cigarette smoking causes over 400,000 early deaths a year in the United States.[238] Fewer Americans smoke than in the past, but the burden of disease and death related to cigarette smoking has remained high.[239] Cigarette smoking causes about 90 percent of lung cancer deaths, 80 percent of deaths from chronic obstructive pulmonary disease, and increases the likelihood of heart disease, stroke, type 2 diabetes, and low birth weight in infants.[240]

**WHAT ARE E-CIGARETTES?**

E-cigarettes create an aerosol that can contain nicotine, marijuana, flavorings, and other additives. This aerosol is then inhaled.

*US Surgeon General*

Electronic cigarettes (also referred to as electronic vapor products) are a new product on the market that can deliver nicotine, cannabis, and other chemicals to the body when a person inhales the e-cigarette's vapor.[241] Though originally touted as a safer alternative to cigarette smoking, recent reports suggest that e-cigarettes may be causing lung injury and death. As of July 2018,

[238]United States Centers for Disease Control and Prevention. Health Effects of Smoking. www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm.
[239]United States Centers for Disease Control and Prevention. Health Effects of Smoking. www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm.
[240]United States Centers for Disease Control and Prevention. Health Effects of Smoking. www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm.
[241]Katherine Schaeffer. Before recent outbreak, vaping was on the rise in the U.S., especially among young people. Pew Research. www.pewresearch.org/fact-tank/2019/09/26/vaping-survey-data-roundup. Published September 2019.

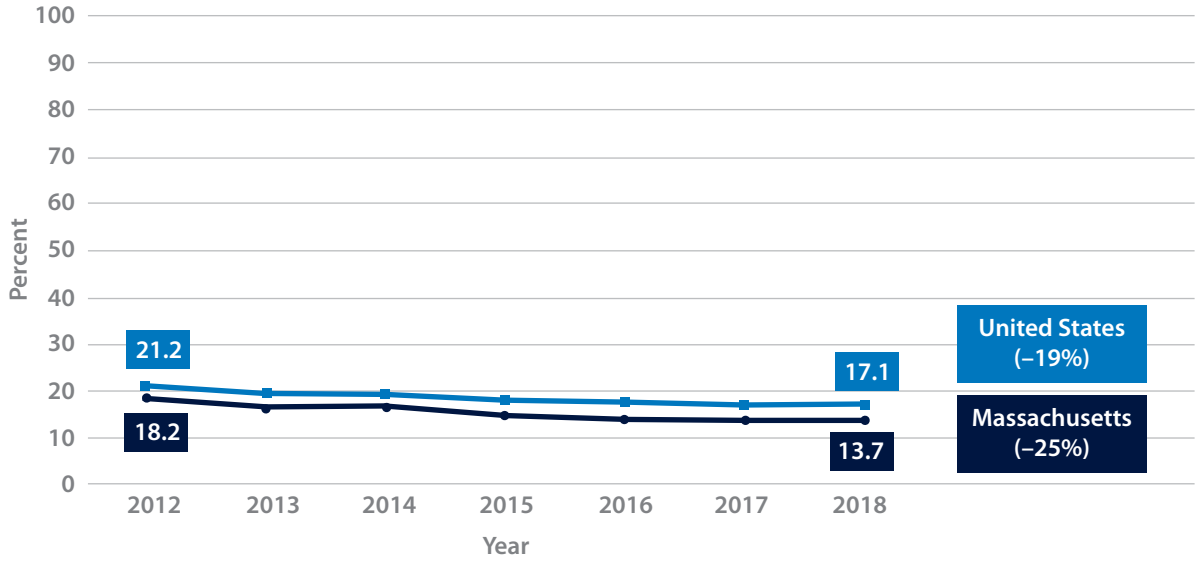
about 9 percent of adults report regularly or occasionally vaping. Among children, high schoolers are showing a rapid increase in vaping — according to a 2019 survey, 25 percent of American high school seniors report vaping in the last 30 days, up from 11 percent in 2017.[242]

Massachusetts residents are decreasing cigarette use and increasing use of vaping products. In the last five years, the prevalence of adult smokers fell in the United States (–19 percent) and Massachusetts (–25 percent); currently, Massachusetts ranks sixth lowest in adult smoking (see figure 89).[243]

The rates are falling for pregnant individuals, too, by 27 percent overall and by 49 percent for Black individuals (see figure 90).[244] White individuals are twice as likely to smoke while pregnant than pregnant individuals of color (see figure 90).[245]

High school students report a reduction in cigarette smoking, dropping 66 percent in 10 years (see figure 91).[246] Over a quarter of the students reported living with someone who smoked in 2017.[247]

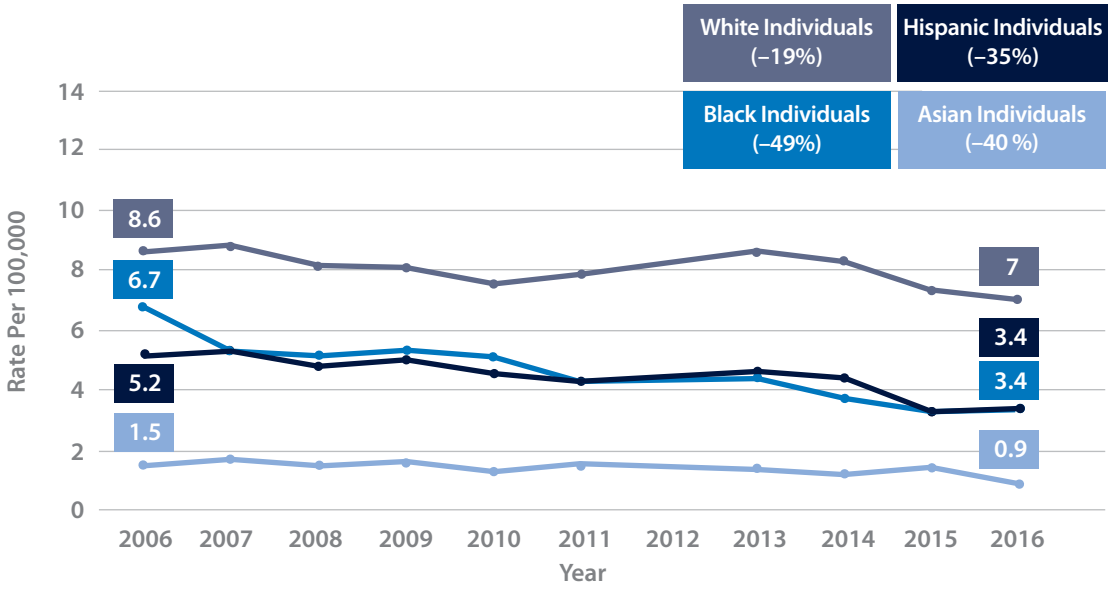
**FIGURE 89** Prevalence of Adult Smokers, Massachusetts and the United States, 2012–2018




*Source:* United Health Foundation. America's Health Rankings. Trend: Smoking, Massachusetts, United States. Using data from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System. Measuring adults who reported smoking at least 100 cigarettes in their lifetime and currently smoke every day. www.americashealthrankings.org/explore/annual/measure/Smoking/state/MA.

[242]Miech R, Johnston L, O'Malley PM, Bachman JG. Trends in adolescent vaping, 2017–2019. *N Engl J Med.* 2019;281:1490–1491.
[243]United Health Foundation. America's Health Ranking. Trend: Smoking, Massachusetts. American Health Rankings, using data from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS). Measuring adults who reported smoking at least 100 cigarettes in their lifetime and currently smoke every day. www.americashealthrankings.org/explore/annual/measure/Smoking/state/MA.
[244]Massachusetts Department of Public Health. Birth Report (various years). www.mass.gov/lists/birth-data.
[245]Massachusetts Department of Public Health. Birth Report (various years). www.mass.gov/lists/birth-data.
[246]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.
[247]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.

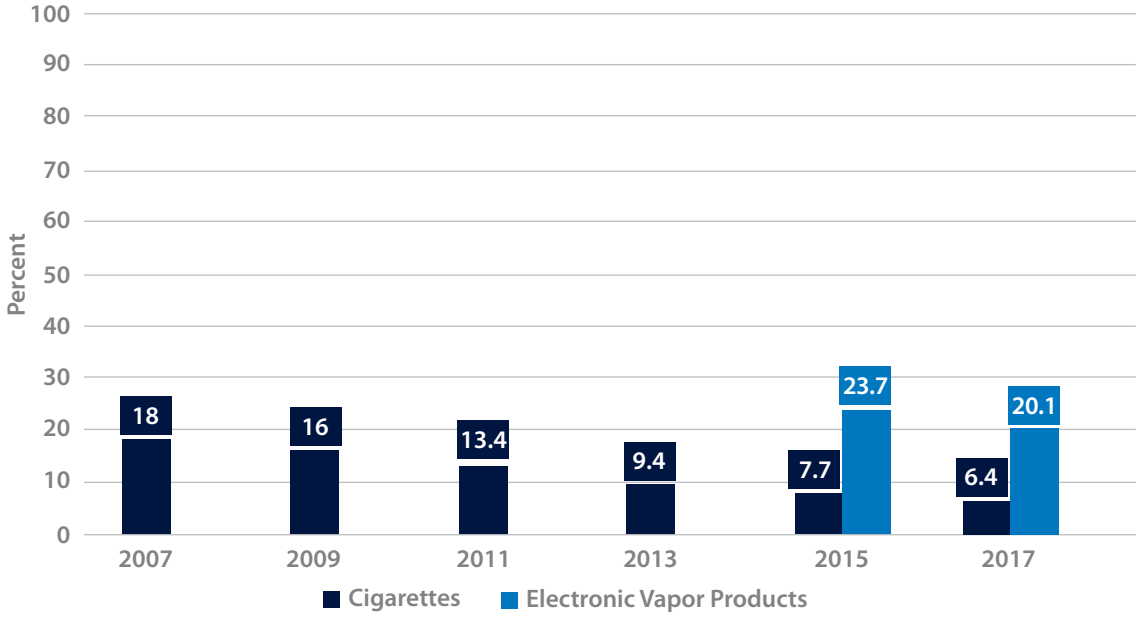
**FIGURE 90** Pregnant Individuals Who Report Smoking during Pregnancy, by Race and Ethnicity, Massachusetts, 2006–2016




*Source:* Massachusetts Department of Public Health. Birth Report (various years). www.mass.gov/lists/birth-data.

Electronic vaping products are being used by a large proportion of high school students. Twenty percent of Massachusetts high schoolers reported using electronic vaping products in the past 30 days in 2017 (see figure 91), and 41 percent reported ever using electronic vaping products.[248]

**FIGURE 91** Massachusetts High School Students Reporting Smoking Cigarettes or Using Electronic Vaping Products in the Last 30 Days, 2007–2017

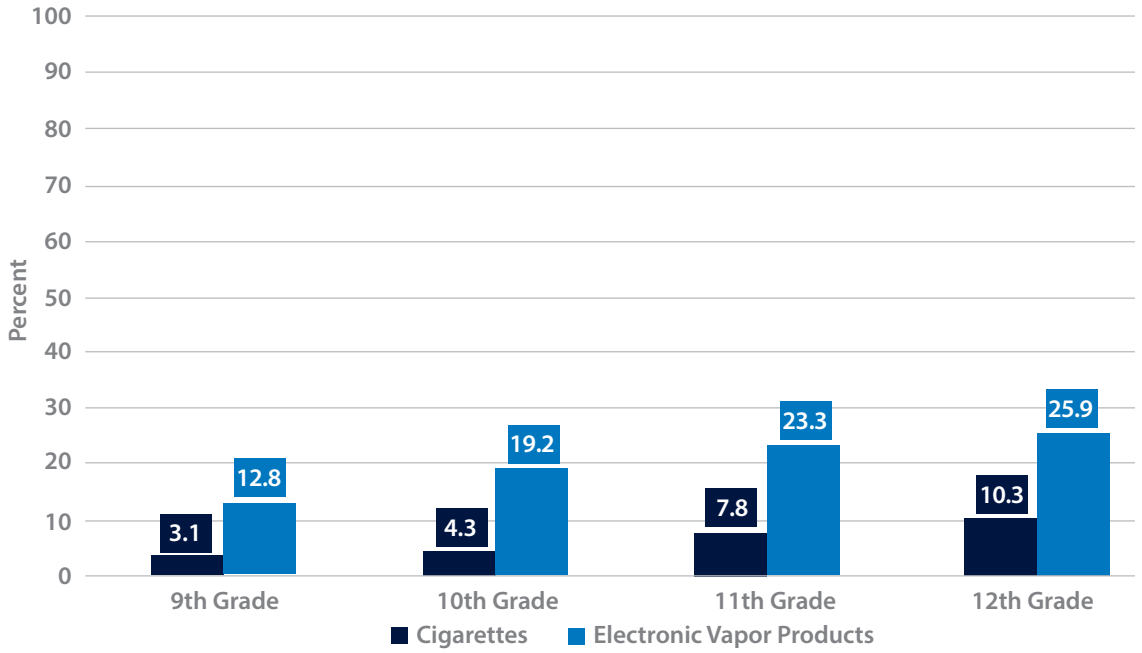



*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.

[248]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.

Among Massachusetts high school students, use of electronic vaping products increased by grade in 2017, ranging from 13 percent of freshmen to 26 percent of seniors (see figure 92).[249] Breaking out the data by race or ethnicity, White students are most likely to use electronic vaping products (23 percent) (see figure 93).[250]

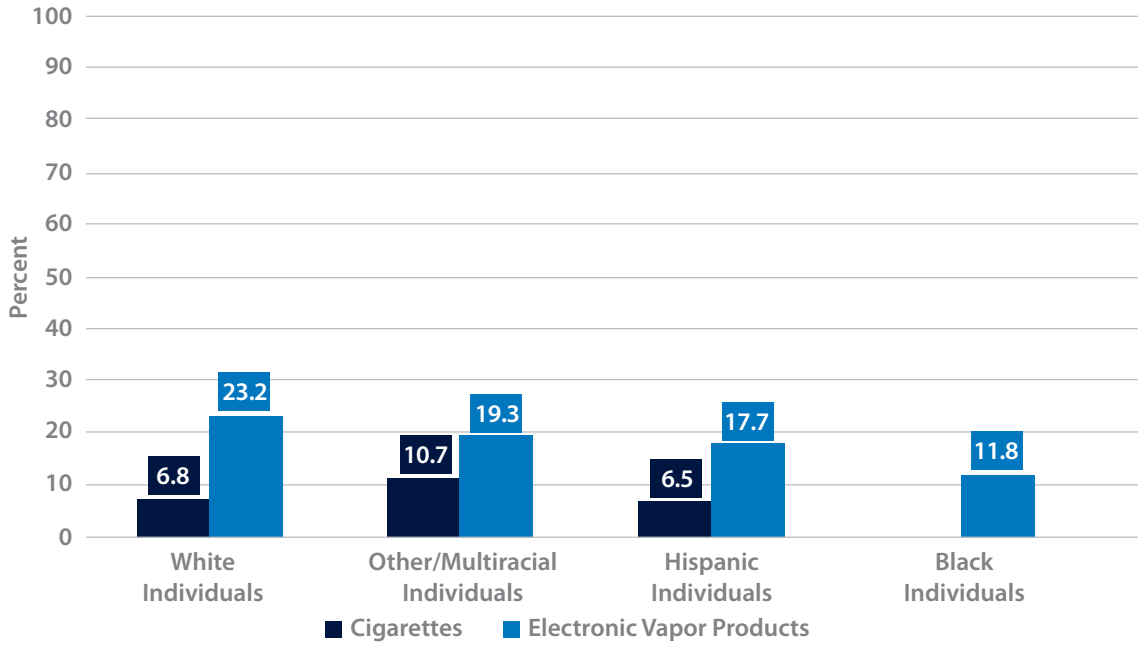
**FIGURE 92** Massachusetts High School Students Reporting Smoking Cigarettes in the Last 30 Days or Using Electronic Vapor Products in the Last 30 Days by Grade, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

[249]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.
[250]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey (various years). www.mass.gov/lists/massachusetts-youth-health-survey-myhs.

**FIGURE 93** Massachusetts High School Students Reporting Smoking Cigarettes in the Last 30 Days or using Electronic Vaping Products in the Last 30 Days, by Race and Ethnicity, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017. Note that the percentages of Black high school respondents who reported smoking cigarettes and Asian high school students who reported smoking cigarettes or using electronic vaping products in the last 30 days were suppressed, either due to a small number of respondents (<100) or a large standard error rate (>30).

Though the rate of cigarette smoking has continued to decline between 2007 and 2017, data from Massachusetts high school surveys indicate that use of electronic vaping products has risen dramatically. National data show a further dramatic rise in vaping from 2017 to 2019, which may mean that Massachusetts rates have also increased since 2017.[251]

## *Policy Perspective — Smoking and Vaping*

Tobacco remains the leading cause of preventable death and disease in Massachusetts, killing more than 9,000 adults each year. The Centers for Disease Control and Prevention (CDC) estimates that annual health care costs in Massachusetts directly caused by smoking exceed $4 billion.

The best way to reduce tobacco use is to prevent it altogether, and Massachusetts has made significant progress in protecting young people from the tobacco industry. In 2018, the legislature passed a law that banned the use of e-cigarettes where smoking is prohibited and made it illegal to sell tobacco products to anyone under the age of 21. The law also prohibited the sale of tobacco products in pharmacies and other health care settings, making Massachusetts the first state in the nation to do so.

In 2019, Massachusetts passed landmark legislation banning the sale of all flavored tobacco products, including flavored e-cigarettes and menthol cigarettes. This bold move recognized the fact

[251]Miech R, Johnston L, O'Malley PM, Bachman JG. Trends in adolescent vaping, 2017–2019. *N Engl J Med.* 2019;281:1490–1491.

that tobacco companies target young people with flavored products. The law also placed an excise tax on all e-cigarette/vaping products and devices, taxing them at a level on par with cigarettes. To help current tobacco users quit, the law increased requirements that insurance companies cover medications and counseling, ensuring that people could try to quit as many times as necessary without the burden of co-pays.

Still, much work remains. These new laws rely heavily on the Massachusetts Tobacco Cessation and Prevention Program for education and enforcement. The legislature has increased the program's budget by nearly $1.5 million over three years to $5.1 million in fiscal 2021, but it is still funded well under the $63 million recommended by the CDC and is a tiny fraction of the $880 million the Commonwealth receives in tobacco tax and Master Settlement revenue. It is essential to fully invest in the Commonwealth's tobacco program for the recently passed laws to have maximum impact and to protect our young people from a lifetime of tobacco addiction.

## Addendum: COVID-19 Impact and Implications

Being a current or former cigarette smoker increases a person's risk of severe illness from COVID-19, according to the Center for Disease Control and Prevention. Severe illness from COVID-19 is defined as hospitalization, admission to the ICU, intubation or mechanical ventilation, or death.

COVID-19 has hit Black communities especially hard, making it especially urgent to reach Black smokers with cessation messages and to tailor current programs to meet their needs. Black people in Massachusetts smoke at a higher rate than average and have lower success in quitting, due in part to the fact that the tobacco industry heavily targeted them with menthol cigarettes for decades.

Nearly all current smokers in Massachusetts started before they turned 18, when they were most susceptible to tobacco industry marketing and their brains were still developing. The lifetime addiction that results requires sustained support to overcome.

Landmark tobacco legislation passed in 2019 required all insurance in Massachusetts to cover unlimited, barrier-free access to FDA-approved medication and counseling. It is essential for the Commonwealth, health care providers, and health insurers in Massachusetts to band together to dedicate funding to publicize the fact that quitting smoking is important, accessible, and free.

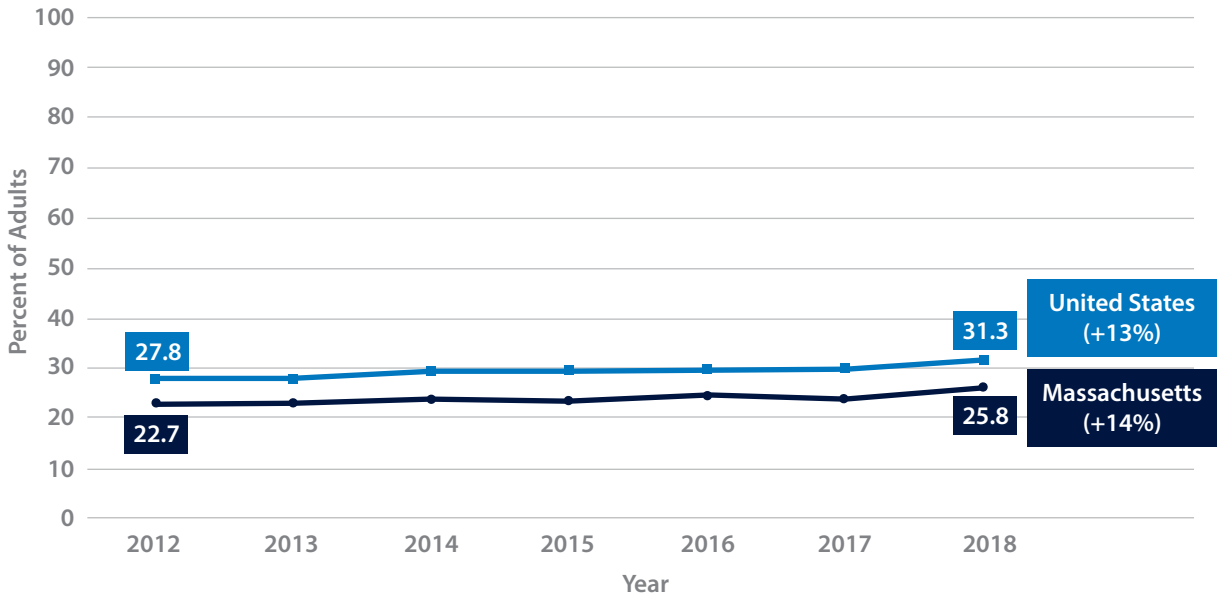
**Gwendolyn Stewart**
*Executive Director, Tobacco Free Mass*

# Weight

Massachusetts ranks seventh-lowest in the nation for adults with a body mass index (BMI) of 30 or above (considered "obese").[252] The rate of Massachusetts residents with obesity rose 14 percent between 2012 and 2018, on par with the national trend (see figure 94).[253] A quarter of Massachusetts adults are now considered obese.[254] Among Massachusetts high school students, a quarter consider themselves overweight, and 12 percent consider themselves obese.[255]

Though weight plays an important part of health, BMI as a measure of health has been critiqued in the scientific literature and should be considered with caution.[256] Consideration of weight and public health communications should also take into account effects on unhealthy measures taken to lose weight. In a 2017 survey of Massachusetts high school students, students report various unhealthy measures taken to lose weight.[257]

**FIGURE 94** Adults with Obesity, Massachusetts and the United States, 2012–2018




*Source:* United Health Foundation. America's Health Rankings. Trend: Obesity, Massachusetts, United States. Analysis of CDC's Behavioral Risk Factor Surveillance System (percentage of adults with a body mass index of 30.0 or higher based on reported height and weight). www.americashealthrankings.org/explore/annual/measure/Obesity/state/MA.

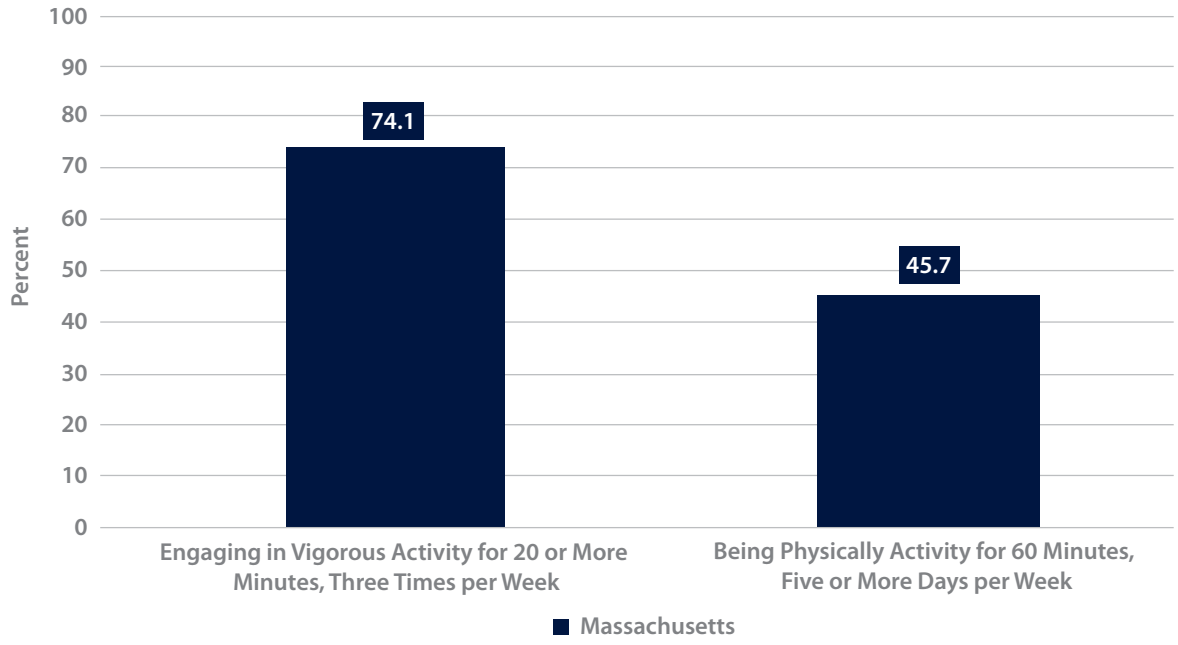
[252]United Health Foundation. America's Health Rankings. 2018 Annual Report. www.americashealthrankings.org/learn/reports/2018-annual-report/state-summaries-massachusetts.
[253]United Health Foundation. America's Health Rankings. 2018 Annual Report. www.americashealthrankings.org/learn/reports/2018-annual-report/state-summaries-massachusetts.
[254]United Health Foundation. America's Health Rankings. 2018 Annual Report. www.americashealthrankings.org/learn/reports/2018-annual-report/state-summaries-massachusetts.
[255]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.
[256]Rothman KJ. BMI-related errors in the measurement of obesity. *International Journal of Obesity.* 2008;32:S56–S59.
[257]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

# Exercise

Exercise is tied to better health. Massachusetts ranks 17th in the nation for physical activity or exercise; three-quarters of adult survey respondents reported engaging in physical activity.[258] Among high school students, three-quarters report that they engage in vigorous activity three times a week.[259]

Access to a safe outdoor space can improve access to exercise but varies by location and other factors. Violent crime rates range widely in Massachusetts; while some communities saw zero violent crimes in 2018, others saw rates as high as one per 100 residents.[260] Whether it is safe to exercise outdoors can be a complex calculation which varies by demographic.

**FIGURE 95** Massachusetts High School Responses to Questions about Exercise, 2017




*Source:* Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

[258]Kaiser Family Foundation. State health facts. Percent of adults who participate in any physical activity or exercise. Kaiser Family Foundation analysis of the Centers for Disease Control and Prevention (CDC)'s Behavioral Risk Factor Surveillance System (BRFSS) 2013–2017 Survey Results. Data represent adults who reported that they participate in any physical activities or exercise during the past month. www.kff.org/other/state-indicator/participation-in-physical-activity/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

[259]Massachusetts Department of Public Health and Massachusetts Department of Elementary and Secondary Education. Massachusetts Youth Health Survey. www.mass.gov/doc/health-and-risk-behaviors-of-massachusetts-youth-2017/download. Published 2017.

[260]Authors' calculations using United States Federal Bureau of Investigations. Crime in the United States 2018. https://ucr.fbi.gov/crime-in-the-u.s/2018/crime-in-the-u.s.-2018.

## *Policy Perspective — Weight and Exercise*

Obesity, defined by a body mass index greater than 30, is a worldwide epidemic. Massachusetts has a lower prevalence of obesity than the nation (25.8 percent vs. 31.3 percent in 2018). But both Massachusetts and US rates have increased similarly over seven years to current levels (from 22.7 percent vs. 27.4 percent in 2011).[261] Obesity-related diseases include heart disease, stroke, type 2 diabetes mellitus, and some cancers.[262] The estimated annual US medical cost of obesity and its sequelae was $147 billion in 2008.[263]

The most effective approach to combating rising obesity rates in populations is to increase physical activity and improve nutrition.[264] Federal recommendations are 150 minutes of physical activity plus two strength sessions weekly. In 2017, only 20 percent of Americans and 21.6 percent of Massachusetts residents met this goal. These numbers have not improved in several years.[265,266]

Strategies to improve physical activity demonstrated to be effective include community and school-based programs such as Michelle Obama's "Let's Move" program, the Department of Health and Human Services' "Move Your Way" program, and the "Build on Our Kids Success" before-school activity program.[267] We recommend expansion of funding for such programs and further development of play spaces.

In July 2011, the Massachusetts Public Health Council eliminated chocolate milk from cafeterias, vending machines, and other venues in public schools. Studies show consuming one flavored milk beverage daily increases the risk of type 2 diabetes.[268] Massachusetts students are now accustomed to choosing from plain milk, water, or juice. Unfortunately, both state and USDA standards allow sweetened beverages to be sold at school fundraisers as well as 30 minutes after the end of the school day. Since there is evidence that excessive juice consumption leads to dental decay and obesity, we suggest offering students only milk or water and ban the sale of juice and sweetened beverages on school campuses.[269]

While beverages are a major contributor to obesity, they are not unique. High-fructose corn syrup (HFCS), prevalent in many sweetened beverages and other sweets, has been shown to contribute

[261]Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity among adults and youth: United States, 2015–2016. US Department of Health and Human Services. www.cdc.gov/nchs/data/databriefs/db288.pdf. Published October 2017.
[262]National Heart, Lung and Blood Institute. Managing overweight and obesity in adults: Systematic evidence review from the Obesity Expert Panel. www.nhlbi.nih.gov/sites/default/files/media/docs/obesity-evidence-review.pdf. November 2013.
[263]Finkelstein EA, Trogdon JG, Cohen JW, Dietz W. Annual Medical Spending Attributable To Obesity: Payer-And Service-Specific Estimates. *Health Affairs*. 2009;28(Supplement 1). https://doi.org/10.1377/hlthaff.28.5.w822.
[264]US Department of Health and Human Services. Physical Activity Guidelines for Americans, 2nd Edition. https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf. Published 2018.
[265]Mayer F, Scharhag-Rosenberger F, Carlsohn A, Cassel M, Müller S, Scharha J. *The Intensity and Effects of Strength Training in the Elderly*. Dtsch Arztebl Int. 2011;108(21):359–64.
[266]Centers for Disease Control and Prevention. State indicator report on physical activity, 2014. www.cdc.gov/physicalactivity/downloads/pa_state_indicator_report_2014.pdf.
[267]Westcott WL, Puhala K, Colligan A, LaRosa Loud R, Cobbett R. Physiological effects of the BOKS before-school physical activity program for preadolescent youth. *Journal of Exercise Sports and Orthopedics*. 2015;2(2):1–7.
[268]Nainggolan L. Sweetened Milk Drinks Now Linked to Type 2 Diabetes. Medscape. www.medscape.com/viewarticle/844017. Published Apr 30, 2015.
[269]Massachusetts Department Public Health. Implementation of the Massachusetts nutritional standards — 5 year review. www.mass.gov/doc/implementation-of-the-massachusetts-nutritional-standards-5-year-review-0/download. Published August 2016.

to increases in inflammation, diabetes, obesity, liver fat, and heart disease.[270] HFCS is commonly found in foods often considered to be healthy such as ketchup, sweetened yogurt, canned fruits, and even some breads. We recommend careful assessment of such foods provided in school systems and substitution of versions without HFCS.

A diet rich in fruits and vegetables can lower blood pressure, decrease rates of heart disease, stroke, and some cancers, and maintain neutral blood sugar.[271] Students who participate in gardening at school have increased academic performance including standardized testing scores, and they are more likely to eat vegetables. The American Heart Association, Annie's Grants for Gardens, and Healthy Planet offer funding for school gardening programs. The Massachusetts Farm to School initiative should be supported in its effort to bring more gardens to schools.[272,273,274]

Massachusetts has come a long way in improving the health of its residents through physical activity and nutrition policies. But with one in four residents suffering from obesity, we still have much work to do. By extending the ban on sweetened beverages to include juice and all activities on the school campus, by exchanging sweetened foods for unsweetened options, and by expanding our community-based exercise programs and school gardens, we can further support healthy lifestyle development and lower rates of obesity and its comorbidities.

**Ronda A. Rockett, MD**
*Owner and Head Coach, CrossFit Launchpad*

**Stephen D. Wiviott, MD**
*Vice President, Clinical Trials Research and Administration, Mass General Brigham*
*Cardiovascular Division, Brigham and Women's Hospital*
*Harvard Medical School*

## Addendum: COVID-19 Impact and Implications

Many of us have limited exposure to gyms or group classes these days due to COVID concerns. Staying physically active is as important as it has ever been for both our physical and psychological well-being. Since diabetes and obesity are risk factors for complications of COVID, maintaining health now has added significance.

The good news is that exercise does not have to take place on a treadmill or in a commercial gym. Simply doing yard work, shoveling, caring for children, doing laundry, washing dishes, preparing meals, walking the dog, carrying groceries, and housecleaning also count as physical activity. With

[270]Lott M, Callahan E, Welker Duffy E, Story M, Daniels S. Healthy beverage consumption in early childhood: Recommendations from key national health and nutrition organizations. Healthy Eating Research. https://healthyeatingresearch.org/wp-content/uploads/2019/09/HER-HealthyBeverage-ConsensusStatement.pdf. Published 2019.
[271]Bertoia ML, Mukamal KJ, Cahill LE, et al. Changes in intake of fruits and vegetables and weight change in United States men and women followed for up to 24 years: Analysis from three prospective cohort studies. *PLoS medicine*. 2015;12(9):e1001878.
[272]Payam Dadvand et al. The association between lifelong greenspace exposure and 3-dimensional brain magnetic resonance imaging in Barcelona schoolchildren. *Environmental Health Perspectives*. 2018;126(2).
[273]Scherr RE, Cox RJ, Feenstra G, and Zidenberg-Cherr S. Integrating local agriculture with nutrition education to improve the health of Californians: Current status of garden-based nutrition education and farm-to-school programs in California schools and after-school programs. *California Agriculture*. 2013;67(1):30–37.
[274]United States Department of Agriculture. 2015 Farm to School Census Respondent Data. https://farmtoschoolcensus.fns.usda.gov/about. Updated October 31, 2016.

the increased popularity of wearable devices, it is now possible to quantify the work associated with these activities in terms of calories burned or steps taken.

For those who sit at a desk for long hours of work or school, getting up at least once an hour to walk up the stairs, around the block, or do a few push-ups can help build exercise into a daily schedule. Taking into account the benefits of fresh air and sunlight, active movement should be a top priority even in a global pandemic.

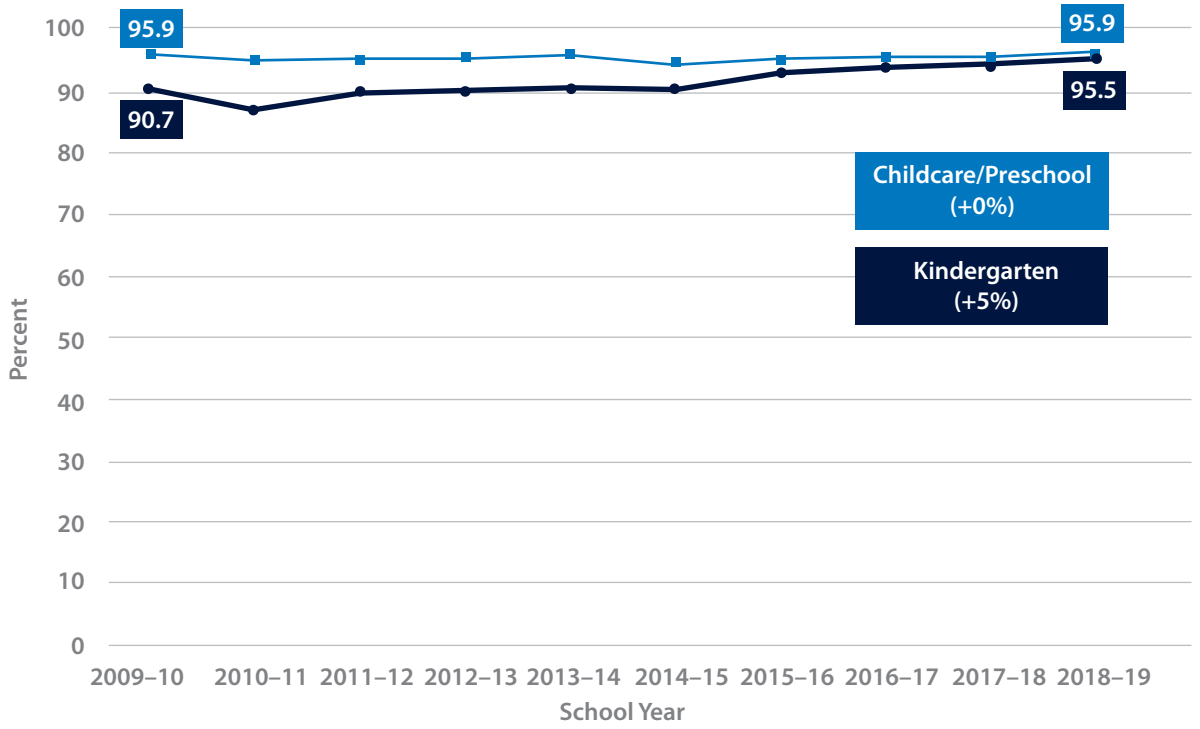
**Stephen D. Wiviott, MD**
*Vice President, Clinical Trials Research and Administration, Mass General Brigham*
*Cardiovascular Division, Brigham and Women's Hospital*
*Harvard Medical School*

# Immunization (Non-COVID-19)


Massachusetts ranks first in the nation for the percent of children age 19 to 35 months who are immunized.[275] Ninety-five percent of children in childcare, preschool, and kindergarten have completed immunization series (see figure 96 on page 114).[276] As immunization exemption rates increase nationwide, Massachusetts exemptions to immunizations have increased as well. Exemption rates range from 0.7 percent (college age) to 1.4 percent (kindergarten) (see figures 97 [page 114], 98, and 99 [page 115]).[277] While medical exemption rates decreased for children in childcare, preschool, and kindergarten, religious exemptions increased across the board (see figure 99).[278] For example, from 2009 to 2019, religious immunization exemptions increased by 91 percent for Massachusetts seventh grade students.[279] As immunization exemptions rise, herd immunity can be compromised, and infectious disease can spread.

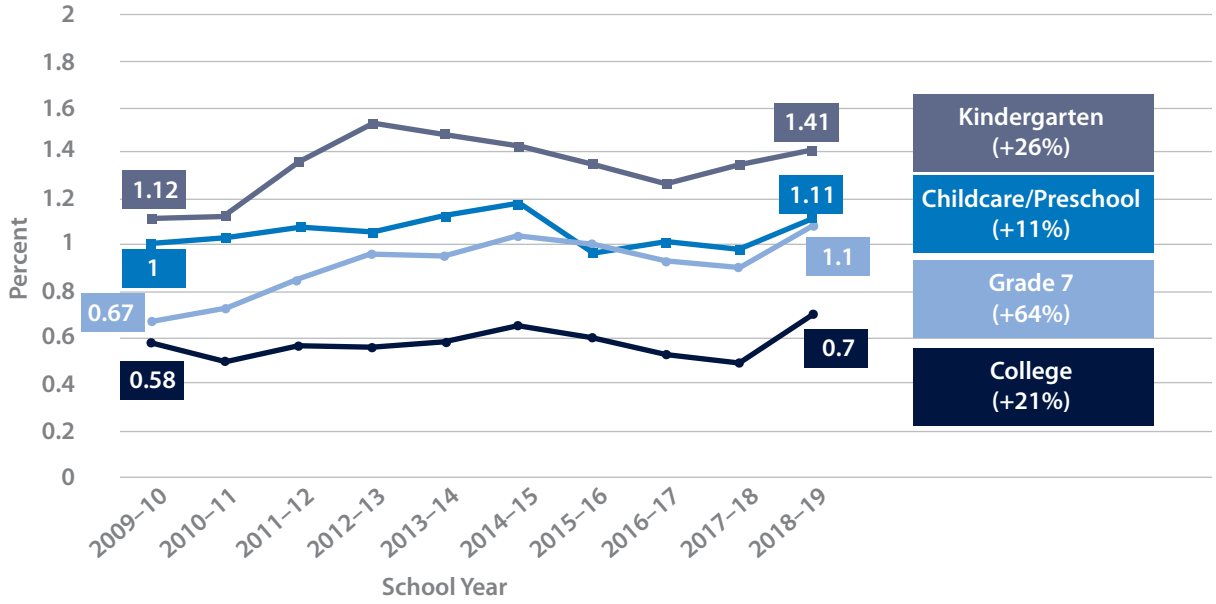
[275]Kaiser Family Foundation. State Health Facts. Percent of Children Age 19–35 Months Who Are Immunized. www.kff.org/other/state-indicator/percent-who-are-immunized/?currentTimeframe=0&sortModel=%7B"colId":"Location","sort":"asc"%7D. Published 2017.
[276]Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. Childcare/Preschool series completion defined as 4 DTaP/DTP and 3 polio and 1 MMR. From 1995 to 2011, kindergarten series completion defined as 5 DTaP/DTP and 4 polio and 2 MMR. From 2012 to 2018, kindergarten series completion defined as 5 DTaP and 4 polio and 2 MMR and 3 Hepatitis B and 2 varicella. www.mass.gov/info-details/school-immunizations.
[277]Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. Childcare/Preschool series completion defined as 4 DTaP/DTP and 3 polio and 1 MMR. From 1995 to 2011, kindergarten series completion defined as 5 DTaP/DTP and 4 polio and 2 MMR. From 2012 to 2018, kindergarten series completion defined as 5 DTaP and 4 polio and 2 MMR and 3 Hepatitis B and 2 varicella. www.mass.gov/info-details/school-immunizations.
[278]Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. Childcare/Preschool series completion defined as 4 DTaP/DTP and 3 polio and 1 MMR. From 1995 to 2011, kindergarten series completion defined as 5 DTaP/DTP and 4 polio and 2 MMR. From 2012 to 2018, kindergarten series completion defined as 5 DTaP and 4 polio and 2 MMR and 3 Hepatitis B and 2 varicella. www.mass.gov/info-details/school-immunizations.
[279]Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. Childcare/Preschool series completion defined as 4 DTaP/DTP and 3 polio and 1 MMR. From 1995 to 2011, kindergarten series completion defined as 5 DTaP/DTP and 4 polio and 2 MMR. From 2012 to 2018, kindergarten series completion defined as 5 DTaP and 4 polio and 2 MMR and 3 Hepatitis B and 2 varicella. www.mass.gov/info-details/school-immunizations.

**FIGURE 96** Immunization Rate (Series Completion), Massachusetts 2009–2019



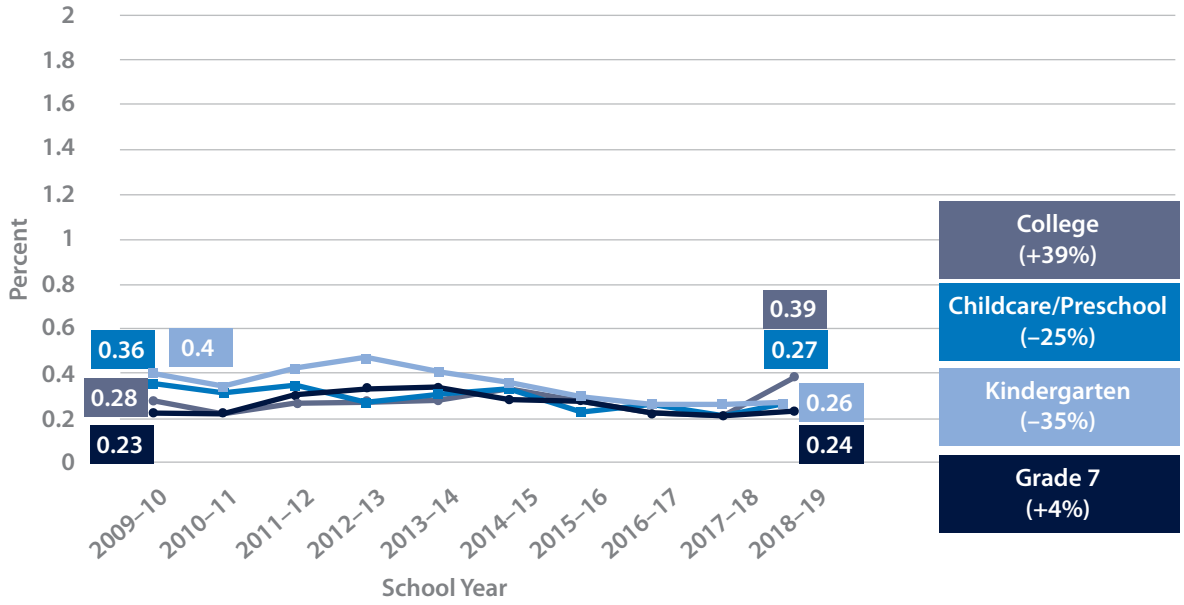

*Source:* Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. Childcare/preschool series completion defined as 4 DTaP/DTP and 3 polio and 1 MMR. From 1995 to 2011, kindergarten series completion defined as 5 DTaP/DTP and 4 polio and 2 MMR. From 2012 to 2018, kindergarten series completion defined as 5 DTaP and 4 polio and 2 MMR and 3 Hepatitis B and 2 varicella. www.mass.gov/info-details/school-immunizations.

**FIGURE 97** Immunization Exemption Rate, Massachusetts, 2009–2019



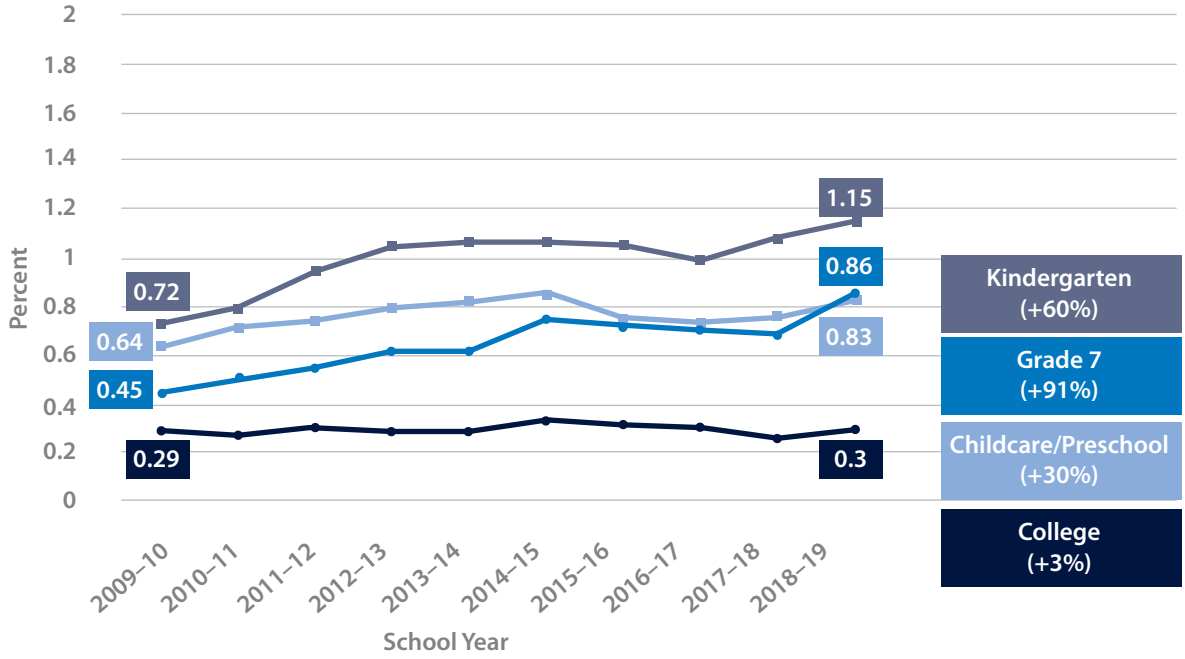

*Source:* Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. www.mass.gov/info-details/school-immunizations.

**FIGURE 98** Immunization Medical Exemption Rate, Massachusetts, 2009–2019




*Source:* Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. www.mass.gov/info-details/school-immunizations.

**FIGURE 99** Immunization Religious Exemption Rate, Massachusetts, 2009–2019




*Source:* Massachusetts Department of Public Health. Bureau of Infectious Disease and Laboratory Sciences. School Immunizations. www.mass.gov/info-details/school-immunizations.

## *Policy Perspective — Immunization*

Massachusetts enjoys some of the highest childhood vaccination rates in the nation. The data in this report illustrate that we have made important gains in the vaccination rate for children at kindergarten entry, a laudable achievement.

While medical exemptions have declined in the last decade, religious exemptions have risen. This appears to be the largest risk to the childhood vaccine rate in the state. A recent study in the journal *Pediatrics*[280] showed that in states that allow both personal and religious vaccine exemptions, the religious vaccine exemption rate is considerably lower than in states that allow religious but not personal exemptions. The authors conclude that in states like Massachusetts that only allow religious and medical exemptions, the expressed religious objections are likely due to some combination of personal and religious beliefs. This will ring true to many clinicians who care for children. Addressing these personal, non-religious beliefs represents our best opportunity to reverse the trend in religious exemptions.

Public health entities are working hard to ensure that reliable vaccine information is available on the internet, often the source of misinformation on the topic, and they must continue to receive resources for that work. Clinicians are also critical resources for families forming beliefs and making choices about vaccines. There are solid data demonstrating that providers who adopt specific communications strategies can improve immunization acceptance. The CDC and numerous professional associations have made these guidelines widely available, but they are variably practiced. Provider groups that have done intensive clinical quality improvement projects to adopt best practices in communicating about vaccines to families have seen substantial increases in immunization rates.

This is an important opportunity for many clinicians in the Commonwealth to help reverse the increase in religious vaccine exemptions, and it deserves the full support of every participant in the health care system.

### Addendum: COVID-19 Impact and Implications

The COVID-19 pandemic has altered nearly every aspect of our lives over the past year. While there has been a much-needed focus on caring for those ill with the disease, it's important to recognize that other aspects of the health care system have changed in profound ways. Elective surgeries were canceled or delayed, and a great deal of care moved to a virtual format. Unfortunately, much of the country saw also received less preventive care, including immunizations.

A report from the CDC in May[281] showed a large drop in measles vaccine rates for children that began with the declaration of a national emergency on March 13, 2020. As is always the case, there was substantial variability in immunizations delivered by provider groups. On the positive end of the spectrum, some networks in Massachusetts actually had an increase in vaccine rates since the beginning of the pandemic. These data demonstrate that provider groups that relentlessly focus on critical preventive services can be quite successful at delivering immunizations through the remainder of the pandemic. Those that have seen a lag in vaccines need to have specific plans to close the gap in the near term so that when masks and social distancing are less ubiquitous, we avoid a return to outbreaks of measles and other preventable diseases.

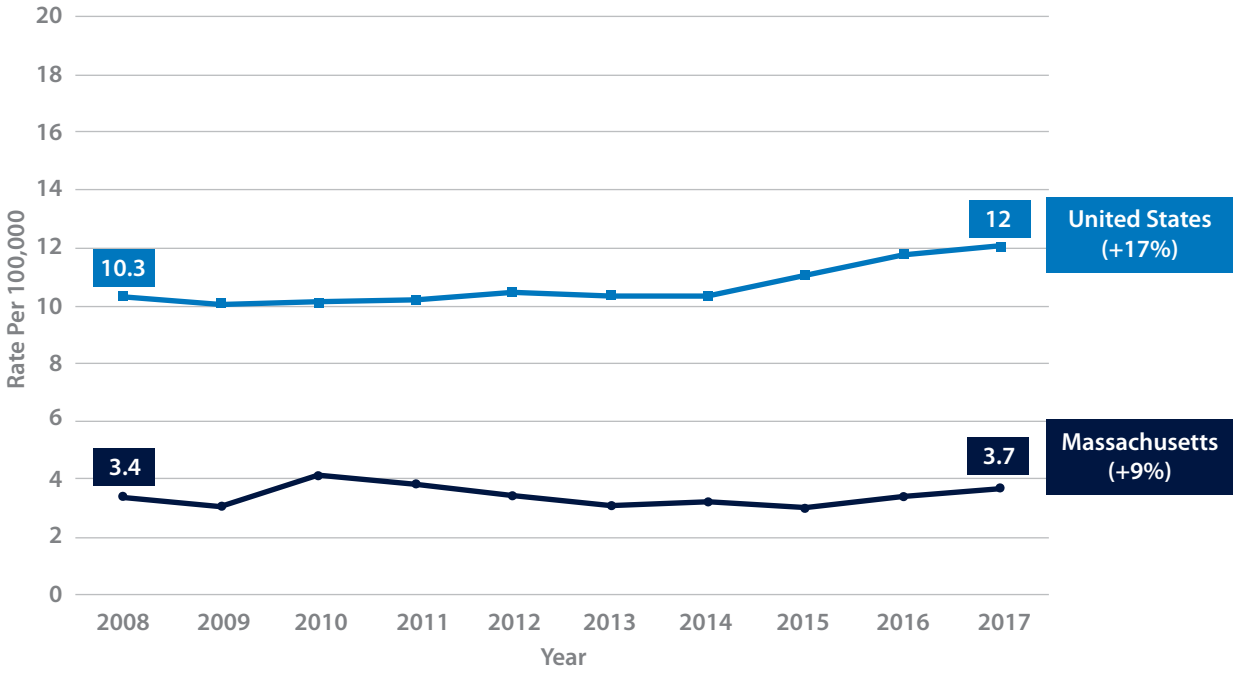
**Gregory Young, MD**
*President and CEO, Pediatric Physician's Organization at Boston's Children's Hospital*

[280]Williams JTB, Rice J, Cox-Martin M, Bayliss EA, O'Leary ST. Religious vaccine exemptions in kindergartners: 2011–2018. *Pediatrics*. 2019;144(6):e20192710. https://doi.org/10.1542/peds.2019-2710.
[281]Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 pandemic on routine pediatric vaccine ordering and administration — United States, 2020. *MMWR*. 2020;69:591–593. http://dx.doi.org/10.15585/mmwr.mm6919e2external icon.

# Firearms

Massachusetts has the second-lowest firearm-related mortality rate in the nation, but it is increasing (following the national trend).[282] From 2008 to 2017, firearm-related mortality increased 17 percent in the United States and 9 percent in Massachusetts (see figure 100).[283]

**FIGURE 100** Age-Adjusted Mortality Rate due to Firearm Injury, Massachusetts and the United States, 2008–2017



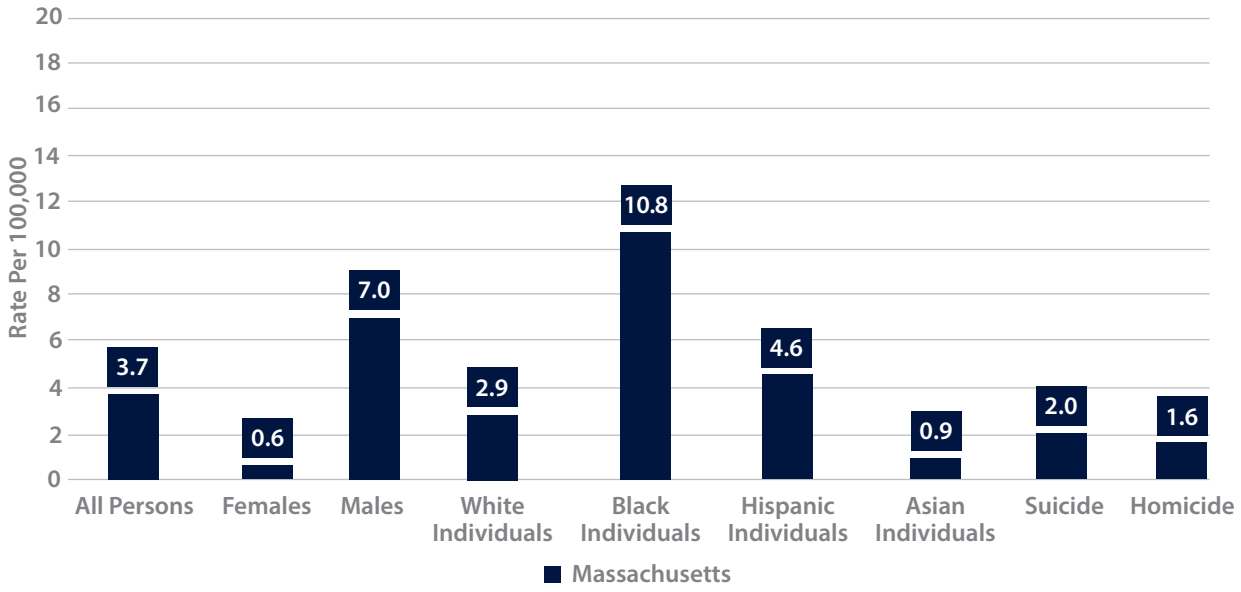

*Source:* Kaiser Family Foundation. State Health Facts. Number of Deaths Due to Injury by Firearms per 100,000 Population. www.kff.org/other/state-indicator/firearms-death-rate-per-100000/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018. Kaiser Family Foundation analysis of Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999–2017 on CDC WONDER Online Database, released 2018. Data are from the Multiple Cause of Death Files, 1999–2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/ucd-icd10.html. Accessed on February 8, 2019. Causes of death attributable to firearm mortality include ICD-10 codes W32–W34, accidental discharge of firearm; X72–X74, intentional self-harm by firearm; X93–X95, assault by firearm; Y22–Y24, firearm discharge, undetermined intent; and Y35.0, legal intervention involving firearm discharge. Deaths from injury by firearms exclude deaths due to explosives and other causes indirectly related to firearms.

[282]Kaiser Family Foundation. State Health Facts. Number of Deaths Due to Injury by Firearms per 100,000 Population. www.kff.org/other/state-indicator/firearms-death-rate-per-100000/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018.

[283]Kaiser Family Foundation. State Health Facts. Number of Deaths Due to Injury by Firearms per 100,000 Population. www.kff.org/other/state-indicator/firearms-death-rate-per-100000/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018. See also Goldstick JE, Zeoli A, Mair C, Cunningham RM. U.S. firearm-related mortality: national, state and population trends, 1999–2017. *Health Affairs.* 2019;38:10. www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00258.

As reported by the Massachusetts Department of Public Health, suicide is the leading type of firearm death in Massachusetts (153 deaths in 2017), followed by homicide (105), legal intervention (less than 5), and unintentional deaths (less than 5).[284] In 2017, one-fifth of Massachusetts suicides and nearly four-fifths of Massachusetts homicides were firearm-related.[285] In Massachusetts, men are more than seven times more likely to die by firearm than women, and Black individuals are almost three times more likely to die by firearm than White individuals (see figure 101).[286]

**FIGURE 101** Age-Adjusted Mortality Rate due to Firearms, by Demographics, Massachusetts, 2017




*Source:* Massachusetts Department of Public Health. Massachusetts Deaths. www.mass.gov/doc/2017-death-report/download. Published October 2019.

## *Policy Perspective — Firearms*

The Massachusetts legislature passed comprehensive gun violence prevention legislation over the past 25 years that includes licensing and registration; banning assault weapons, high-capacity magazines, and lethal accessories; consumer protection standards; safe storage requirements; firearm safety training; extreme risk protection orders; and strong domestic violence laws. These laws have contributed to Massachusetts having the second-lowest mortality rate due to firearm injuries, and the rate of gun deaths is less than one-third of the national average.[287]

However, even with a strong framework of evidence-based policies, homicide remains a top 10 cause of death for individuals ages 15–44. In addition, Black individuals are killed by firearms at more than three times the rate of White individuals in the Commonwealth. Recent funding in

[284]Massachusetts Department of Public Health. Massachusetts Deaths. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[285]Massachusetts Department of Public Health. Massachusetts Deaths. www.mass.gov/doc/2017-death-report/download. Published October 2019.
[286]Kaiser Family Foundation. State Health Facts. Number of Deaths Due to Injury by Firearms per 100,000 Population. www.kff.org/other/state-indicator/firearms-death-rate-per-100000/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Published 2018.
[287]This stat is pulled from the CDC Wisqars system. Searchable here: https://webappa.cdc.gov/sasweb/ncipc/mortrate.html.

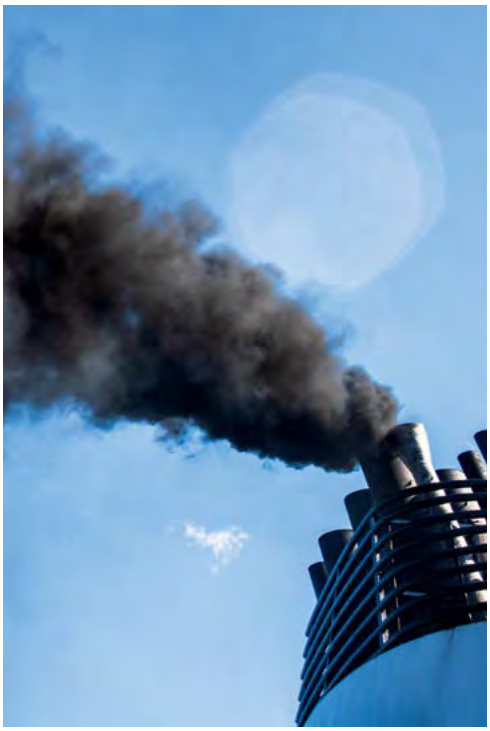
violence intervention programs is aimed at tackling racial disparities, but continued funding is necessary to sustain this effort.

Furthermore, firearm trace data from the Bureau of Alcohol, Tobacco, Firearms and Explosives indicate that 68 percent of traceable firearms used in crime in the Commonwealth are traced to out-of-state sources.[288] To further reduce firearm crimes and deaths in the Commonwealth, states like New Hampshire and Maine, which are the source of guns used in Massachusetts crimes, should further regulate the sale of firearms to keep them out of the hands of prohibited purchasers with a known history of violence. Without comprehensive federal legislation to regulate firearms, Massachusetts will continue to fall victim to our neighboring states' lax gun laws.

**Zoe Grover**
*Executive Director, Stop Handgun Violence*

# Air Pollution

Air pollution increases mortality and is linked to lung cancer, stroke, and heart disease.[289] Two major forms of air pollution are (1) small particulate matter and (2) ozone. Massachusetts ranks eighth best in the country for small particulate matter pollution, and its exposure levels of both small particulates and ozone are decreasing.[290]

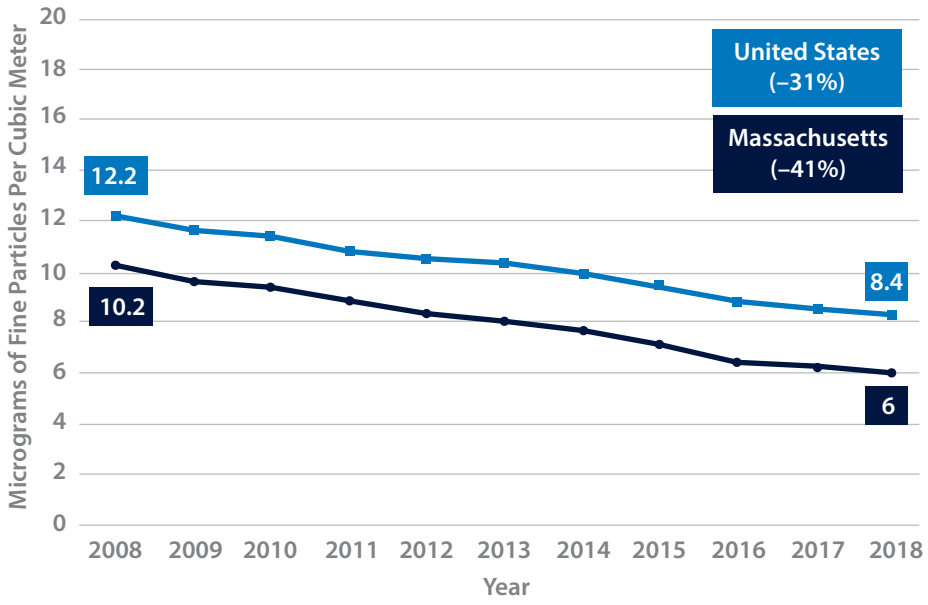


The average exposure to small particulates decreased 41 percent between 2008 and 2018 (see figure 102 on page 120).[291] Decreases in exposure to small particulate matter and ozone occurred across the state. Between 2007 and 2017, exposure dropped by at least a third for both small particulate matter and ozone in every Massachusetts county where data are available (see figures 103 [page 120] and 104 [page 121).[292]

Despite these improvements, challenges remain. For example, recent attention has come to the amount of air pollution around Massachusetts highways and in older public housing and schools.[293] And climate change threatens a potential resurgence of air pollution and its ill effects.[294]

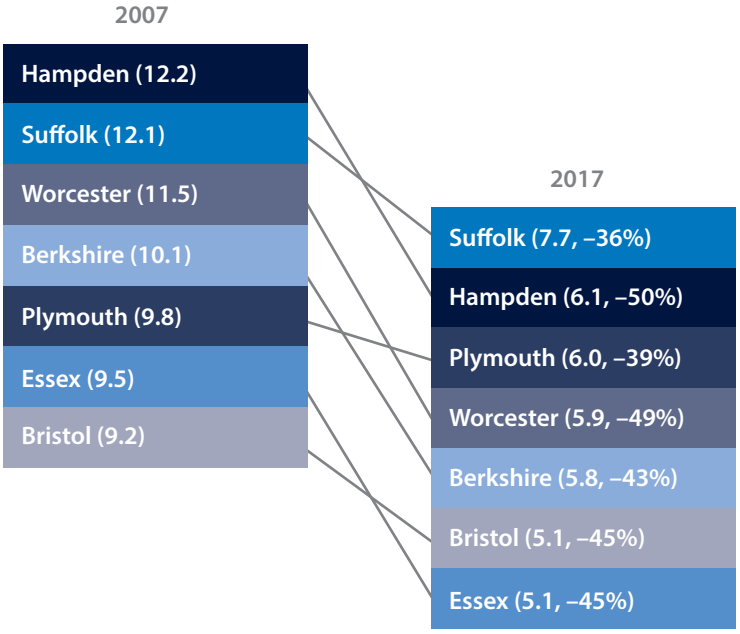
[288]www.atf.gov/file/137141/download
[289]World Health Organization. Ambient Air Pollution: Health Impacts. www.who.int/airpollution/ambient/health-impacts/en.
[290]United Health Foundation. America's Health Rankings. Trend: Air Pollution, Massachusetts, United States. www.americashealthrankings.org/explore/annual/measure/air/state/MA. Published 2018. Massachusetts Department of Public Health. Public Health Information Tool. Modeled Air Quality Data (using monitored data, not modeled).
[291]United Health Foundation. America's Health Rankings. Trend: Air Pollution, Massachusetts, United States. www.americashealthrankings.org/explore/annual/measure/air/state/MA.
[292]Massachusetts Department of Public Health. Public Health Information Tool. Modeled Air Quality Data (using monitored data, not modeled).
[293]LeMoult C. Dangerous Air Pollution is Getting into Schools and Homes Near Highways, Research Shows. WGBH News. September 23, 2019. www.wgbh.org/news/local-news/2019/09/23/dangerous-air-pollution-is-getting-into-schools-and-homes-near-highways-research-shows.
[294]Orru H, Ebi KL, Forsberg B. The interplay of climate change and air pollution on health. *Curr Environ Health Rep.* 2017;4(4):504-513. doi: 10.1007/s40572-017-0168-6.

**FIGURE 102** Average Exposure of General Public to Particulate Matter of 2.5 Microns or Less in Size (Three-Year Average), Massachusetts and United States, 2008–2018



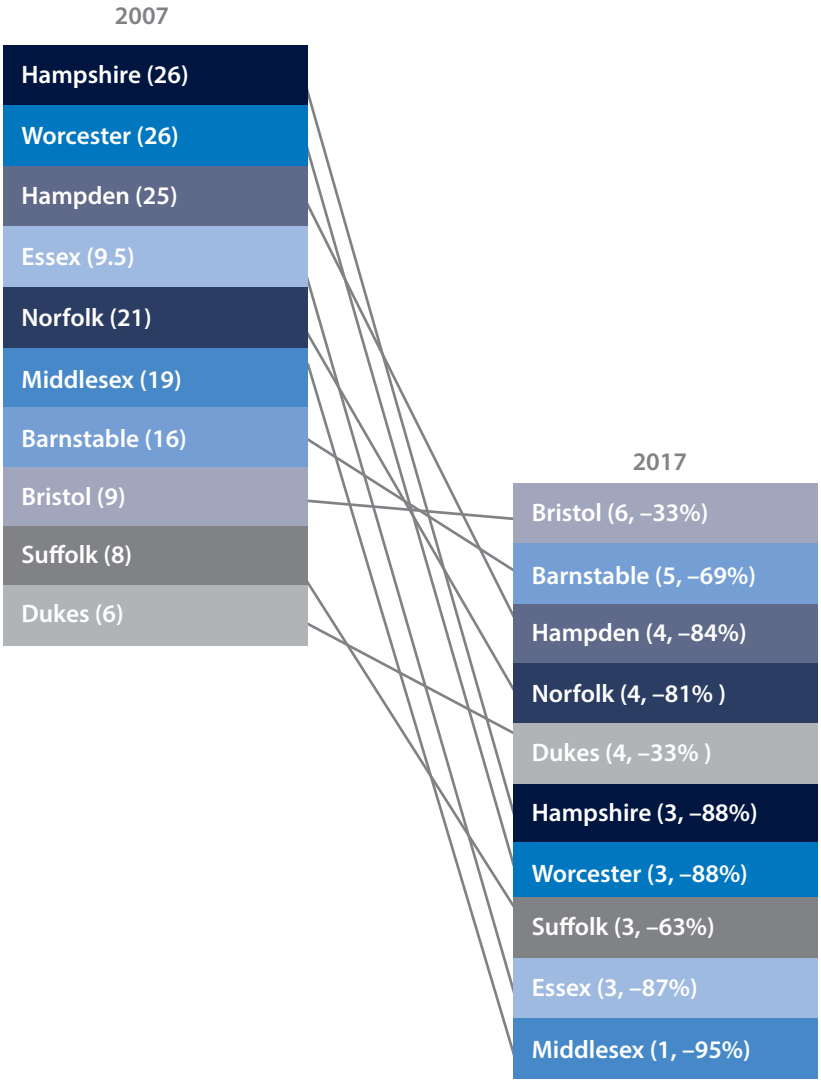

*Source:* United Health Foundation. America's Health Rankings. Trend: Air Pollution, Massachusetts, United States. Analysis of US Environmental Protection Agency; US Census Bureau, Annual Estimates of the Resident Population: April 1, 2010, to July 1, 2017 (average exposure of the general public to particulate matter of 2.5 microns or less [PM2.5] measured in micrograms per cubic meter [three-year estimate]). www.americashealthrankings.org/explore/annual/measure/air/state/MA.

**FIGURE 103** Annual Average PM2.5 Concentrations (Micrograms/Cubic Meter) by County, Massachusetts, 2007 and 2017




*Source:* Massachusetts Department of Public Health. Public Health Information Tool. Modeled Air Quality Data (using monitored data, not modeled). Showing counties where data available. www.mass.gov/guides/phit-data-modeled-outdoor-air-quality-measures.

**FIGURE 104** Number of Days with a Maximum Eight-Hour Ozone Concentrations over National Ambient Air Quality Standards of 75 PPB by County, Massachusetts, 2007 and 2017




*Source:* Massachusetts Department of Public Health. Public Health Information Tool. Modeled Air Quality Data (using monitored data, not modeled). Showing counties where data available. www.mass.gov/guides/phit-data-modeled-outdoor-air-quality-measures.

## *Policy Perspective — Air Pollution*

The burning of fossil fuels generates roughly 80 percent of our country's carbon pollution that contributes not only to climate change but the bulk of air pollutants that cause or exacerbate health problems such as lung disease, strokes, cancer, and asthma.

Over the past 50 years, laws and regulations have cut pollution and driven new technologies and products onto the market. This has resulted in tremendous health improvements that have protected generations of children and adults, created new clean energy jobs, and supported our economy. Air pollutants like carbon monoxide, sulfur dioxide, nitrous oxide, nitrogen dioxide, lead, and particulate matter have been reduced by more than 73 percent, while our GDP nearly tripled. These efforts have saved thousands of lives and reduced health care costs, with benefits that have disproportionately helped the poor, the disenfranchised, and people of color.

But these protections are at risk. Health professionals, advocates, and regulators cannot sit on the sidelines and let the rhetoric in Washington paralyze us. We must work even harder in our communities with our constituents, clients, and patients to protect our families' health. Massachusetts has been and should continue to be a leader on this front. Ozone rates have fallen across the state and exposure to particulate matter fell 41 percent from 2007 to 2017. We have closed our last coal plant. We are investing in clean energy and building resilience in our cities and coastal communities.

Next, we need to improve our infrastructure, starting by weaning off natural gas and tackling our transportation and building emissions. And we cannot forget to demand that our policymakers focus on actions that improve health and prevent illnesses in the communities at highest risk from pollution — where people are living near highways and in older public housing and schools.

We must speak up with clear conviction and support policymakers and politicians that protect the core values we all hold dear: clean air, climate actions, and a healthy future for our children.

**Gina McCarthy**
*President and CEO, Natural Resources Defense Council*
*Former Administrator, US Environmental Protection Agency*

## Addendum: COVID-19 Impact and Implications

With COVID, we can now see the very real consequences of centuries of racial discrimination like redlining that created vast health inequalities in the Commonwealth.

Death rates among people of color in Massachusetts and around the country are as much as two or more times higher than other populations, in part, because they are living in places where air pollution is worse overall (e.g., near major roadways or power plants).

Beyond burning fewer fossil fuels, climate actions can make us more resilient to and even potentially prevent pandemics like COVID. Tropical deforestation drives the emergence of new infections like COVID. It also contributes to about 20 percent of global greenhouse gas emissions. Working to protect forests can help us prevent the next pandemic and cut down a major cause of climate change.

**Aaron Bernstein, MD**
*Interim Director, Center for Climate, Health and the Global Environment and Pediatric Hospitalist, Boston Children's Hospital*

Massachusetts Medical Society

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