Contributing Causes of Health Challenges

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Chronic Disease

Contributing Causes of Health Challenges

BACKGROUND

Arthritis is a term used to describe more than 100 chronic diseases and conditions that affect the joints, surrounding tissues, and other connective tissues. Common types of arthritis include osteoarthritis, rheumatoid arthritis, gout, bursitis, and tendinitis. Symptoms of these conditions include stiffness in the joints, pain, and swelling. Some types of arthritis, such as rheumatoid arthritis, involve the immune system, causing widespread symptoms and impacting multiple organs. The severity and location of symptoms varies, depending on the form of arthritis.[1] Often, opioids are prescribed to relieve arthritis pain, contributing to the growing opioid use epidemic.[2,3]

Nationally, arthritis affects 25.5% of adults, approximately 63.6 million people.[4] In New York State (NYS), 3.6 million adults (23.7%) reported being told by a health care provider that they had some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia*.[5]

In some cases, the risk for arthritis is associated with specific demographic characteristics, such as age or sex. In others, it may be influenced by risk factors such as obesity, lack of physical activity, and joint injuries. These risk factors can be addressed to reduce the risk of arthritis or to mitigate the impact arthritis symptoms have on adults' overall quality of life.[1]

In addition to its high burden, arthritis is costly. In 2013, medical costs and lost earnings associated with arthritis reached $304 billion nationally, including $65 billion for ambulatory care and $31 billion in drug prescriptions.[6] Osteoarthritis is also the leading cause for total joint replacement procedures. Eighty-two percent of all total hip replacements and 94.8% for all total knee replacements are attributed to this condition.[7]

There is no known cure for arthritis, but its onset can be delayed by addressing risk factors such as, maintaining a healthy weight, engaging in regular physical activity, and avoiding activities that could cause joint injury.

BURDEN

Data on arthritis prevalence and arthritis management are collected periodically through the New York State Behavioral Risk Factor Surveillance System (BRFSS).

Data from the BRFSS show that arthritis is more common among women, older adults, and adults with a disability. It is also more common in adults with other chronic conditions, such as diabetes, cancer, asthma, and cardiovascular disease. More than half of adults with two or more chronic conditions also have arthritis which can lead to difficulties in the management and control of those other conditions (Figure 1).

* In BRFSS 2016, arthritis prevalence is calculated based on the question: Has a doctor, nurse, or other health professional EVER told you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?

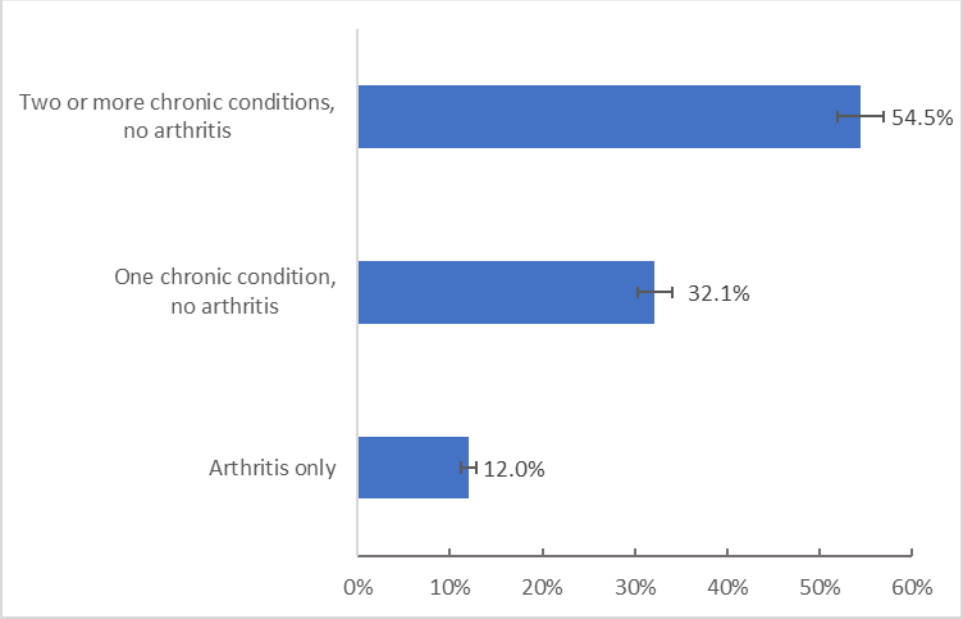


Figure 1: Percent of adults with arthritis only, and prevalence of arthritis among adults with one, or two or more other chronic conditions, BRFSS, 2016

Arthritis and its symptoms affect quality of life and productivity. Among adults who have arthritis, 48.3% report activity limitations due to their symptoms.[8] Approximately 30.9% of adults with arthritis report a 7-10 level of pain on a 1-10 scale where 10 is pain or aching as bad as it can be.[9] Forty-six percent of adults with arthritis report experiencing some to a lot of disruption to their normal social activities, such as going shopping or attending social gatherings due to their arthritis and joint symptoms. Additionally, 33.3% of adults with arthritis report that their symptoms affect the type and amount of work they do, showing an association between arthritis and work productivity.[10]

Maintaining a healthy weight and engaging in regular physical exercise can help control arthritis and joint symptoms. Forty-one percent of adults with arthritis report that their doctor suggested they lose weight and 63.3% report that their doctor suggested they use physical activity or exercise to control their arthritis and joint symptoms.[11] Evidence-based chronic disease self-management programs may help adults with arthritis manage their symptoms and improve their quality of life. Yet, only 10.6% of adults with arthritis have taken a class specifically to learn how to manage their arthritis and its symptoms.[12]

Arthritis risk is associated with body weight. The prevalence of arthritis among adults who are obese (34.6%) is two times greater than the prevalence among adults who are neither overweight nor obese (16.7%). Among those who do not engage in leisure-time physical activity the prevalence of arthritis is 31% (Figure 2).[13]

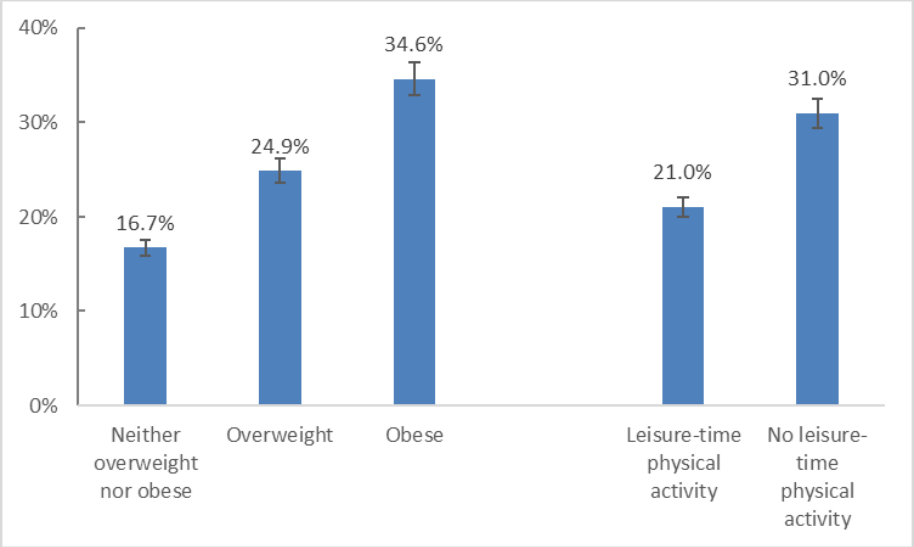


Figure 2: Prevalence of arthritis by Body Mass Index (BMI) category and leisure-time physical activity, BRFSS, 2016

Geographic distribution

The prevalence of arthritis varies based on geographic location. The percent of adults with arthritis varies widely across counties in NYS, from 14.8% (New York City) to 38.0% (Montgomery County). The five counties with the highest prevalence are: Montgomery (38.0%), Fulton (30.9%), Cattaraugus (36.2%), Franklin (35.5%), and Hamilton (35.3%). The five counties with the lowest prevalence are: New York (14.8%), Rockland (18.8%), Kings (19.3%), Queens (19.6%), and Bronx (19.9%). The prevalence of arthritis in these counties is below the state average. Yet its impact is high because these counties have a large population size.

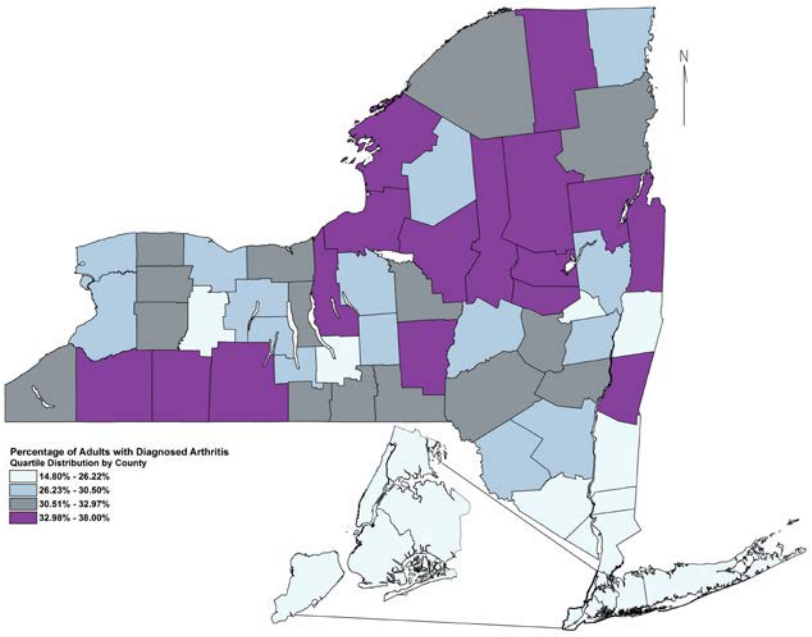


Figure 3: Percentage of adults with arthritis, by county, BRFSS, 2016

DATA TRENDS

The prevalence of arthritis in the United States and NYS has remained relatively constant over the past five years. In 2016, 23.7% of New Yorkers reported that they have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia (Figure 4).

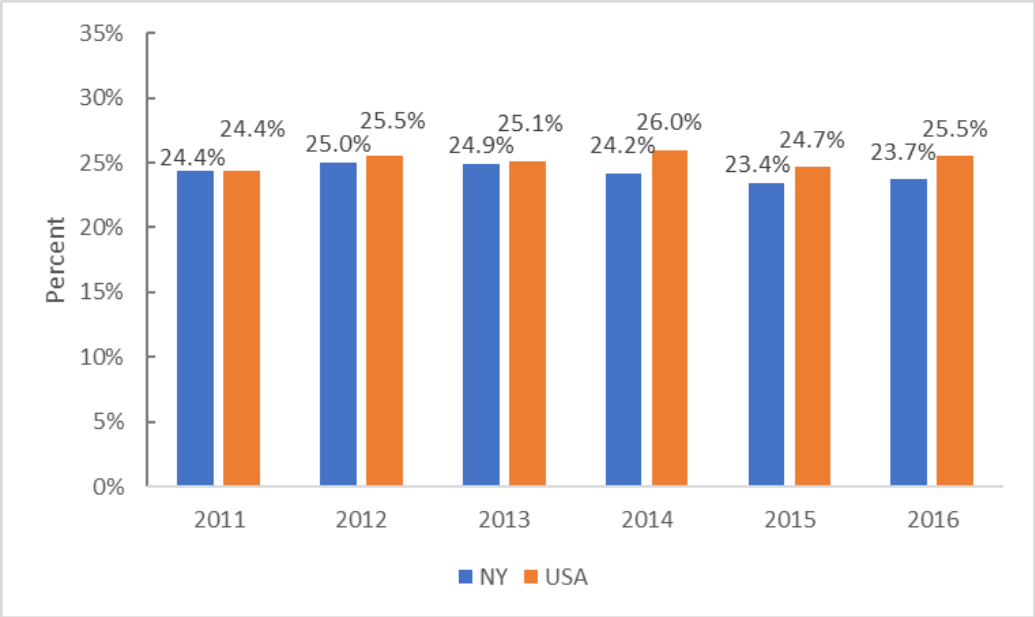


Figure 4: Prevalence of arthritis in the United States and in New York State, BRFSS, 2011-2016

Arthritis is the most prevalent chronic condition among New Yorkers. Its prevalence (23.7%) is more than two times higher than the next most prevalent chronic conditions, diabetes (10.5%) and asthma (9.5%) (Figure 5).[14]

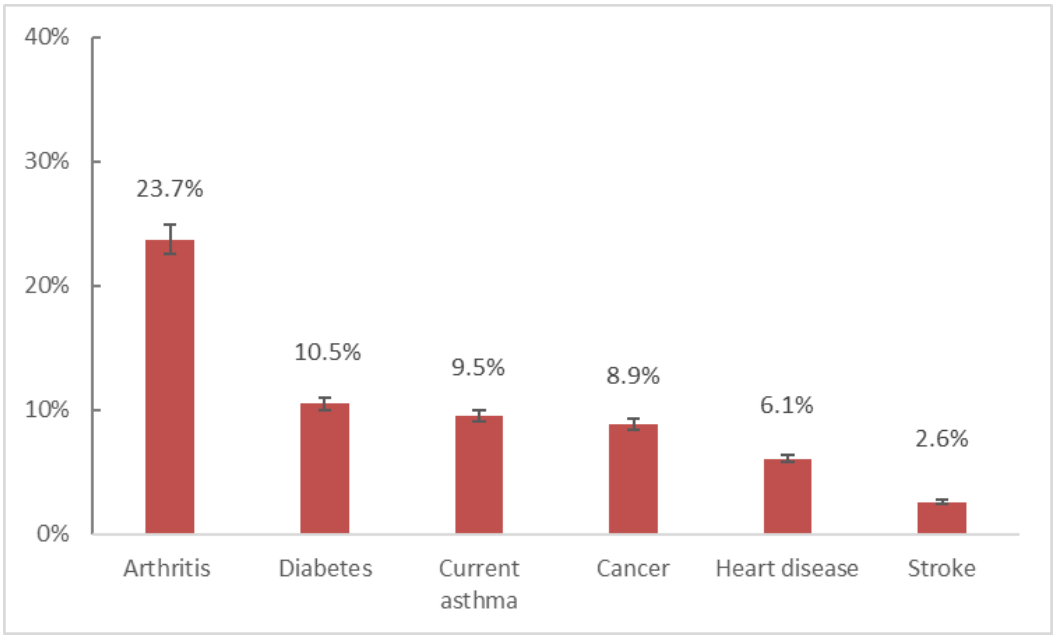


Figure 5: Prevalence of chronic disease among New York State adults, BRFSS, 2016

DISPARITIES

Age and sex

In NYS, approximately 50% of adults 65 years and older have arthritis. Adults who report having arthritis are more likely to be women and 65 years and older. Twenty-seven percent of women and 19.3% of men in NYS have arthritis. Although, the prevalence of arthritis is higher among females across all age groups, the gap in the prevalence between females and males increases with age (Figure 6).[15]

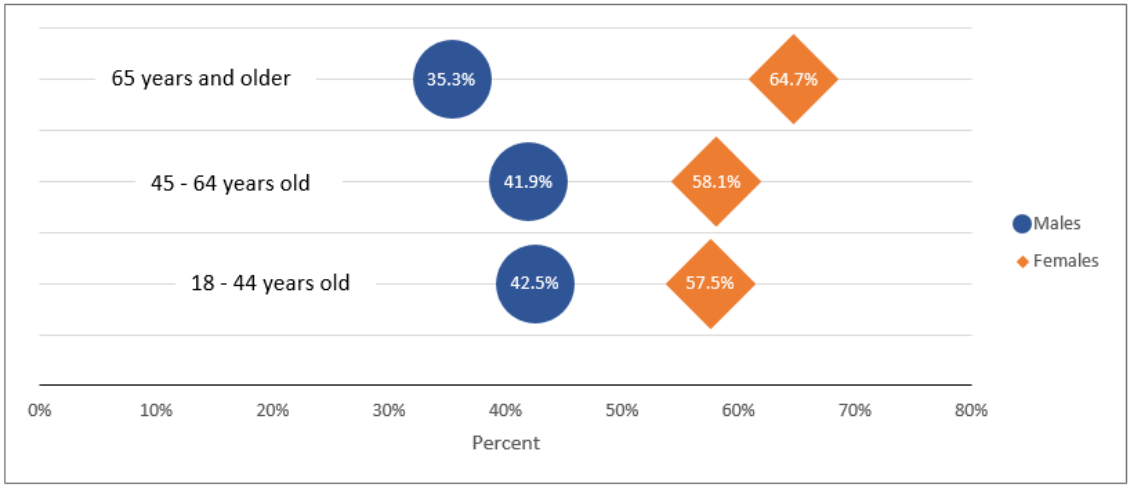


Figure 6: Percentage of adults living with arthritis who are female and male by age group, New York State adults, BRFSS, 2016

Race and ethnicity

The prevalence of arthritis varies by race and ethnicity. White non-Hispanic adults are two times more likely to have arthritis than Hispanic adults (28.5% versus 16.8%) (Figure 7).[16]

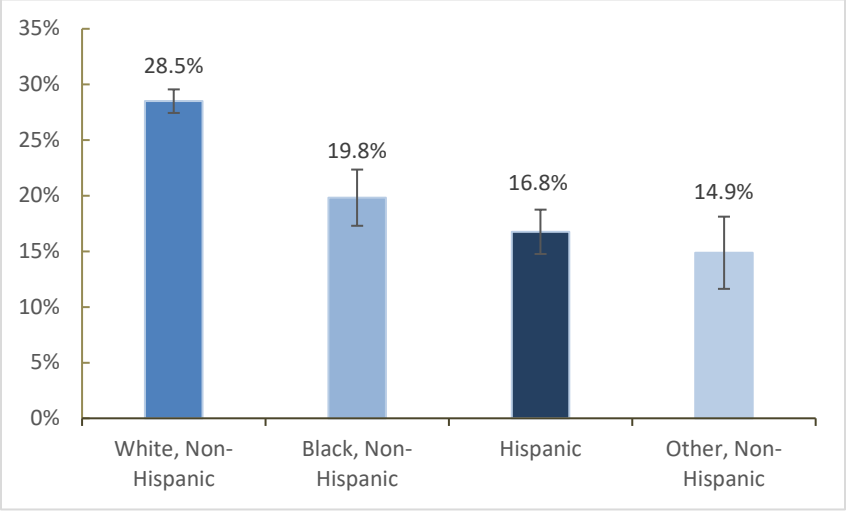


Figure 7: Prevalence of arthritis among adults, by Race/Ethnicity, New York State, Behavioral Risk Factor Surveillance System, 2016

Disability

Arthritis is more prevalent among adults with a disability, adults who report having difficulty with self-care, independent living, cognition, mobility, vision, or hearing. Adults with a disability are more than three times as likely (50.5%) to have arthritis than adults without a disability (16.4%) (Figure 8).[17]

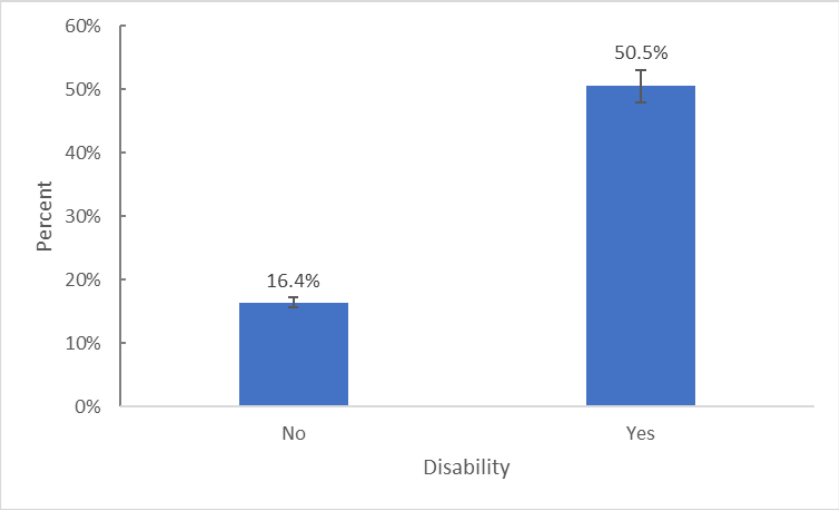


Figure 8: Prevalence of arthritis among adults with a disability, New York State, BRFSS, 2016

SOCIAL DETERMINANTS

Recent research has focused on the impact social determinants (i.e., education attainment, income, occupation, and characteristics of the community and built environment) have on arthritis-related health outcomes.[18]

The prevalence of arthritis is higher among adults who have not graduated from high school (25.5%) than among adults with college or technical degrees (19.1%). Arthritis is more common among adults with an annual household income lower than $25,000 (27.1%) than there is among adults with annual household income greater than $75,000 (20.2%).[19]

Community-level factors and characteristics of the built environment are also associated with arthritis. Individuals living in communities with higher poverty rates are more likely to have arthritis. [20] As adequate physical activity is a key arthritis management strategy, communities with incomplete sidewalks or areas with inadequate lighting that may hinder physical activity, can have bigger challenges to promote such strategy. [21]

References

[1] Centers for Disease Control and Prevention. (2017). Arthritis basics. Retrieved October 10, 2017 from https://www.cdc.gov/arthritis/basics.

[2] Barbour KE, Helmick CG, Boring M & Brady TJ (2017). Vital Signs: Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation- United States, 2013. *Morbidity and Mortality Weekly Report, 66(*9); 246-253.

[3] Hootman JM, Cisternas M, Murphy L, Losby J. Prevalence and Trends in Prescribed Opioid Use Among US Adults with Arthritis, 2008-2013, Medical Expenditure Panel Survey [abstract]. Arthritis Rheumatol. 2016; 68 (suppl 10). http://acrabstracts.org/abstract/prevalence-and-trends-in-prescribed-opioid-use-among-us-adults-with-arthritis-2008-2013-medical-expenditure-panel-survey/. Accessed November 8, 2017.

[4] Centers for Disease Control and Prevention. (2017). BRFSS Prevalence and Trends Data. Retrieved November 10, 2017 from https://nccd.cdc.gov/BRFSSPrevalence

[5] New York State Department of Health. (2017). BRFSS Brief arthritis: New York State adults, 2015. Retrieved October 4, 2017 from https://www.health.ny.gov/statistics/brfss/reports/docs/1708_brfss_arthritis.pdf

[6] Murphy LB, Cisternas MG, Pasta DJ, Helmick CG, & Yelin EH (2017). Medical expenditures and earnings losses among US adults with arthritis in 2013. Accessed October 13, 2017 from https://www.ncbi.nlm.nih.gov/pubmed/28950426.

[7] Helmick CG, Watkins-Castillo SI. The Burden of Musculoskeletal Diseases in the United States: Prevalence, Social, and Economic Cost, Bone and Joint Initiative USA, Retrieved March 22, 2018 http://boneandjointburden.org/2014-report/ive0/joint-replacement

[8] New York State Department of Health, Arthritis – New York State Adults, 2015 Behavioral Risk Factor Surveillance System Brief. Accessed October 19, 2017 https://www.health.ny.gov/statistics/brfss/reports/docs/1708_brfss_arthritis.pdf

[9] NYS, Behavioral Risk Factor Surveillance System, 2015

[10] NYS, Behavioral Risk Factor Surveillance System, 2015

[11] NYS, Behavioral Risk Factor Surveillance System, 2015

[12] NYS, Behavioral Risk Factor Surveillance System, 2015

[13] NYS, Behavioral Risk Factor Surveillance System, 2016

[14] NYS, Behavioral Risk Factor Surveillance System, 2016

[15] NYS, Behavioral Risk Factor Surveillance System, 2016

[16] NYS, Behavioral Risk Factor Surveillance System, 2016

[17] NYS, Behavioral Risk Factor Surveillance System, 2016

[18] Luong MN, Cleveland RJ, Nyrop KA, Callahan LF. "Social determinants and osteoarthritis outcomes." Aging health 8, no. 4 (2012): 413-437.

[19] Behavioral Risk Factor Surveillance System, 2016

[20] Knight JB, Callahan LF, Luong MLN, et al. The association of disability and pain with individual and community socioeconomic status in people with hip osteoarthritis. Open Rheumatol J. 2011; 5:51–58 Accessed November 10, 2017. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3204417/

[21] Martin KR, Schoster B, Woodard JC, Callahan LF. What community resources do older community-dwelling adults use to manage their osteoarthritis? A formative examination. J Appl Gerontol. 2011 Accessed November 10, 2017. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3462463/

Asthma

BACKGROUND

Asthma is a chronic disease of the lungs that causes wheezing, breathlessness, chest tightness, and coughing. Asthma that is not well controlled can greatly limit a person's quality of life. The exact cause of asthma is not known, and while not curable, asthma can be controlled using current clinical guidelines set by the National Asthma Education and Prevention Program (NAEPP).[1] NAEPP's guidelines for the diagnosis and management of asthma include appropriate medical care with assessment of asthma severity and control status, asthma self-management education (ASME), and identification and management of environmental triggers. Both genetic and environmental factors can affect asthma prevalence.[2] Asthma exacerbations can be impacted by multiple factors, including asthma severity and control status, access to care, medication adherence, and environmental triggers. Asthma has been linked with exposure to a number of pollutants from both outdoor and indoor sources.[3,4] Potential asthma triggers include environmental tobacco smoke; allergens produced by pets, dust mites, rodents and cockroaches; irritant chemicals; pollen and mold allergens; damp indoor environments; nitrogen dioxide emissions from unvented natural-gas appliances; and ambient air pollutants, including ozone, sulfur dioxide, and fine particles. Exposure to these contaminants can trigger allergic reactions or cause respiratory irritation that exacerbates symptoms in those with asthma. Some of these factors, including indoor environmental tobacco smoke and allergens from dust mites, cats, dogs and cockroaches, have also been associated with the development or onset of asthma.[5] Asthma is also correlated with conditions such as influenza and allergies. Due to this comorbidity and seasonal impacts, asthma-related emergency department (ED) and hospitalization rates fluctuate throughout the year.

BURDEN AND DATA TRENDS

The number of people with asthma continues to increase in the United States (US) and in New York State (NYS). Prevalence of asthma is measured by assessing the number of people who have ever been told by a healthcare provider that they have asthma (prevalence of lifetime asthma) and the number who still have asthma (prevalence of current asthma). Among adult New Yorkers, the prevalence of current asthma increased from 7.3 percent in 2001 to 9.9 percent in 2015, or approximately 1.5 million adults. Current asthma prevalence rates in NYS are higher than the national average (Figure 1). In 2015, more than 400,000 children, or 10%, had asthma in NYS.

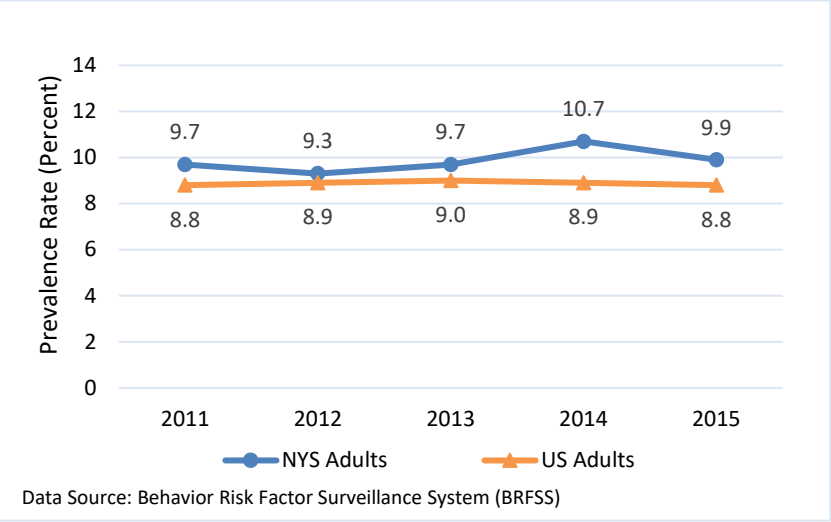


Figure 1: Current Asthma Prevalence, NYS and US Adults (18+ Yrs)

The economic costs of asthma are significant. According to the Centers for Disease Control and Prevention (CDC) Chronic Disease Cost Calculator, the estimated medical cost of asthma in NYS in 2017 was $3.5 billion.[6] Asthma morbidity, healthcare costs, lost productivity, and mortality continue to be a high burden in NYS.

The rates of asthma-related ED visits and hospitalizations for both adults and children are indicators of asthma burden, and vary throughout NYS (see Figures 2 and 3). The counties with the highest asthma burden based

on quartile distribution appear in dark blue and, as the maps illustrate, occur primarily in the Hudson Valley, New York City (NYC) region, and Long Island, with pockets of high burden throughout the Capital District and Western NY.

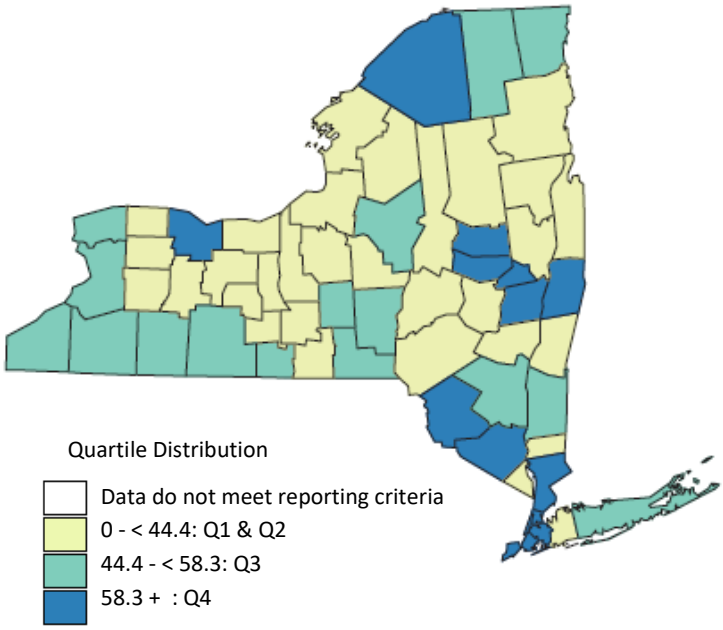


Figure 2: Asthma ED visit age-adjusted rate per 10,000 (2012-2014)

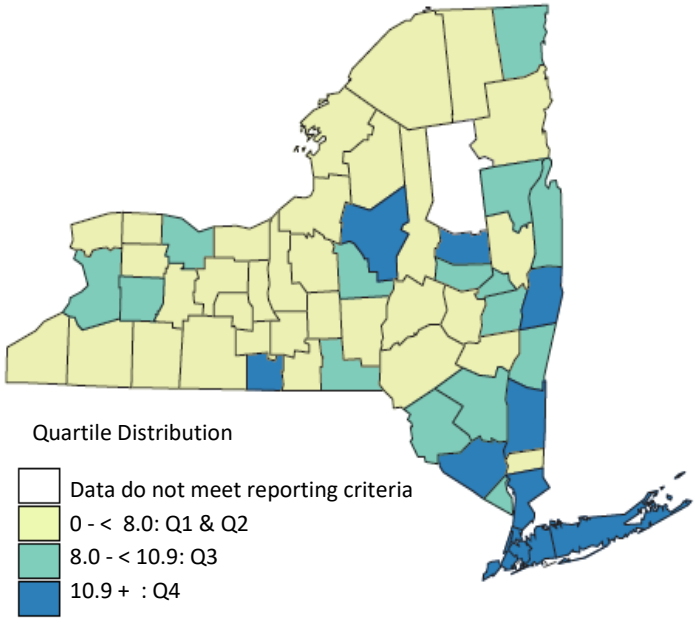


Figure 3: Asthma hospitalization age-adjusted rate per 10,000 (2012-2014)

Asthma-related ED visits and hospitalizations are key indicators for measuring the burden of asthma and assessing progress using a comprehensive approach to control asthma. Data for ED visits and hospitalizations from 2012 to 2014 indicate a decrease in both the crude and age-adjusted rates for NYS overall, as well as for NYC and NYS, excluding NYC. For the age-adjusted rates, there has been a 3.8% reduction in ED visits in NYS (from 94.4 per 10,000 to 90.8 per 10,000) and an 8.4% reduction in hospitalizations in NYS (from 19.0 per 10,000 to 17.4 per 10,000).

Progress toward Prevention Agenda (PA) goals, as shown in Table 1, show that the asthma-related ED rate per 10,000 population did not change significantly between 2013 and 2014 (Table 1). However, the rate decreased from 2012 (89.9) to 2014 (86.2), showing progress toward the PA target of 75.1. For children aged 0-4, there was greater improvement. The PA 2018 objective for this age group is a rate of 196.5 per 10,000. While NYS has not yet met the PA objective target rate, it is moving in that direction and has demonstrated a 7% reduction in the rate from 2013 to 2014 (Table 1).

	ED visit rate per 10,000 population of all ages		ED visit rate per 10,000 - Aged 0-4 years	
Year	**ED visit rate**	**PA 2018 Objective**	**ED visit rate**	**PA 2018 Objective**
2014	86.2	75.1	205.7	196.5
2013	86.3	75.1	221.3	196.5

Table 1: 2013-2018 Prevention Agenda Asthma Measures: Emergency Department Visits
Data Source: SPARCS 2016

In helping to control asthma and reduce asthma exacerbations, more can be done to promote use of the NAEPP Guidelines, which stress the importance of using daily controller medications. Per guidelines, inhaled asthma controller medications, including inhaled corticosteroids (ICS), are recommended for daily use for all individuals to prevent and control asthma symptoms and attacks.[7] Among New Yorkers whose asthma is not controlled, the daily use of recommended inhaled asthma controller medications is low (43%).[8] Additionally, data show a low percentage of individuals filled their prescriptions 50% of the time, especially children aged 5-18 years (Figure 4).

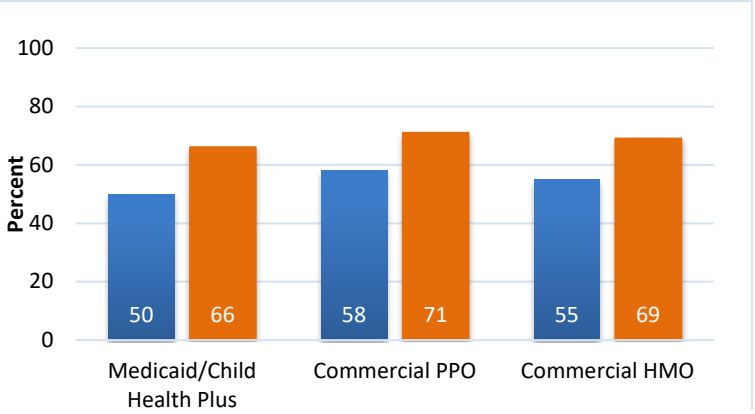


Figure 4: Percentage of people with persistent asthma who fill controller medication prescriptions during at least 50% of their treatment period, 2014

Healthy People 2020 (HP 2020) establishes benchmarks and monitors the progress of national health objectives in order to measure the impacts of prevention activities across the state and country.[9] In examining progress toward meeting guidelines-based asthma-related objectives, it is evident that in NYS, a gap exists between NAEPP Guidelines and the actual care provided.

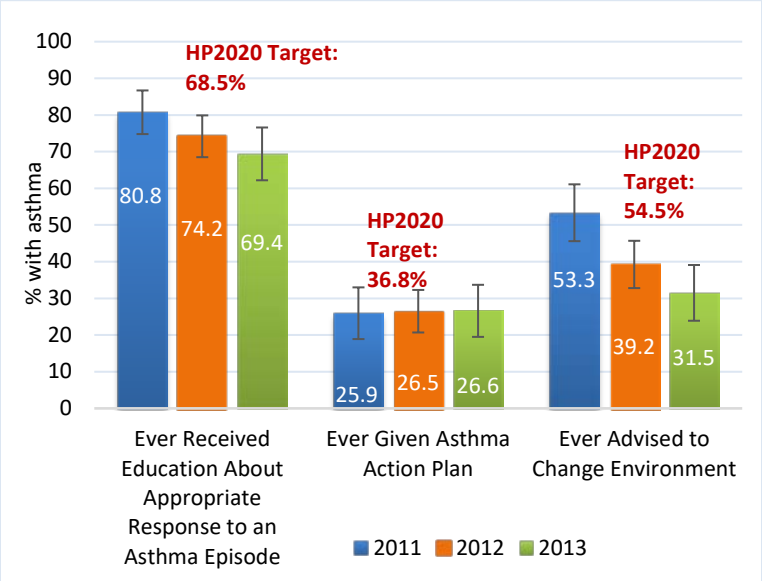


Figure 5: Healthy People 2020 Objectives related to adult asthma self-management education (2011-2013)

For instance, patients in NYS are not consistently meeting HP 2020 goals for asthma self-management education given by a healthcare provider. Data from 2011-2013 show that while NYS met the HP 2020 objective regarding adults with asthma who received education about the appropriate response to an asthma episode, the percentage decreased each year (Figure 4). Data for two other HP 2020 objectives (being given an asthma action plan and changing one's environment) show that NYS has not met the national targets (Figure 5).

SOCIAL DETERMINANTS AND DISPARITIES

Asthma is a multi-factorial condition and exacerbations are influenced by factors such as access to care and exposure to environmental triggers. Asthma prevalence, ED visits, hospitalizations, and mortality rates differ by age, gender, race, and geographic region. Current asthma prevalence is higher among black, American Indian, and multiracial New York adults (Figure 6).[10] Higher poverty rates among black and/or Hispanic residents may contribute to these disparities. In general, low-income minority populations have poorer asthma control, in part because populations with lower socio-economic status (SES) are more likely to live in neighborhoods with sub-standard housing conditions. This results in increased exposure to common asthma triggers such as cockroaches, mice, and other pests, and poor building conditions, including leaks and mold. Those of lower SES are also more likely to smoke or be exposed to second-hand smoke; thus, instituting smoke-free policies for multi-unit housing is a priority strategy for tobacco control.[11,12]

In addition to exposure to environmental triggers, asthma morbidity and mortality rates are correlated with income and insurance coverage, which may impact healthcare quality and access.[13] Morbidity and mortality rates for asthma are higher for racial minorities, younger age groups, and those of lower SES. NYS respiratory disease indicators demonstrate that asthma hospitalizations are higher among black and Hispanic New Yorkers (Table 2). According to the CDC's 2015 data, non-Hispanic black Americans have a significantly higher asthma mortality rate (23.9 deaths per million population) than non-Hispanic whites (8.4 deaths per million population), Hispanics (7.3 deaths per million population), and other non-Hispanics (10.0 deaths per million population).[14]

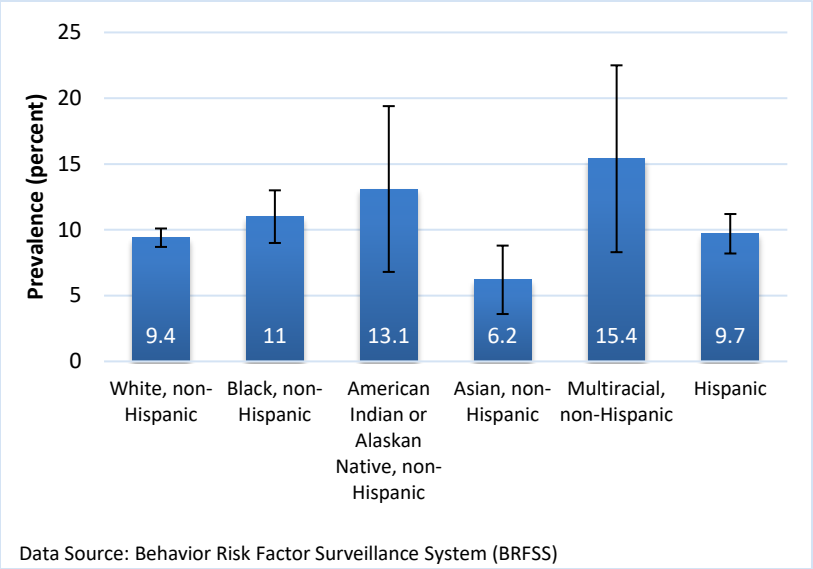


Figure 6: Current asthma prevalence among NYS adults, by race/ethnicity (2016)

	NH/White	NH/Black	NH/A&PI	Hispanic	Total
Asthma hospitalizations per 10,000 population, age-adjusted	7.3	38.0	5.4	28.0	17.6
Asthma hospitalizations per 10,000 population, aged 0-17 years	8.9	59.2	8.9	33.5	27.0

Table 2: New York State Health Indicators: Respiratory Disease (2012-2014)
NH= Non-Hispanic, A&PI = Asian and Pacific Islander
Data Source: SPARCS 2016

Asthma is one of the most common chronic diseases among children. ED and hospitalization rates in NYS are higher for children than adults (Table 3).[15] While there was no reduction in ED visits in NYS excluding NYC between 2012 and 2014, a 4.7% reduction occurred in NYC (from 260.3 per 10,000 to 248.0 per 10,000). In that same time period, children aged 0-4 experienced one of the largest improvements, with a 9.5% decrease for NYS overall, and a 13.5% reduction in NYC, specifically. So while health disparities do exist, there is progress in reducing them.

	Aged 0-17		Aged 18-64	
Year	**New York State excl. NYC**	**New York City**	**New York State excl. NYC**	**New York City**
2014	79.1	248.0	46.4	113.9
2013	73.3	260.2	45.8	113.6
2012	78.6	260.3	49.9	118.3

Table 3: Asthma Emergency Department Visit Rate per 10,000
Data Source: SPARCS 2016

Asthma ED visit rates for NYS overall and for children ages 0-4 can also be examined by race/ethnicity; again, disparities exist but improvements are occurring. From 2012 to 2014, there was a 4% decrease in the ED visit rate for black non-Hispanic New Yorkers and a 10.7% decrease for Hispanic New Yorkers. Among the youngest age group (0-4), the ED visit rate decreased 8.5% among black non-Hispanic children and 15.5% among Hispanic children.

Improvements in asthma care and health outcomes have been documented in areas across the state, where performance is monitored and system change interventions are evaluated. But more needs to be done. The New York State Asthma Control Program (NYSACP) aims to reduce the burden of asthma in NYS, with a focus on populations disproportionately impacted by asthma. NYSACP works to expand comprehensive asthma control services delivered in accordance with NAEPP Guidelines to provide quality medical management of asthma, including asthma self-management education and patient access to home-based asthma services.

References

[1] National Asthma Education and Prevention Program. Expert Panel Report 3: Guidelines for the diagnosis and management of asthma. NIH pub. no. 07-4051.Bethesda, MD: National Heart, Lung, and Blood Institutes of Health. 2007. https://www.nhlbi.nih.gov/health-topics/guidelines-for-diagnosis-management-of-asthma. Last accessed January 3, 2018.

[2] Forno, E. Health disparities in asthma. AJRCCM. 2012; 185(10):1033-1043. doi/full/10.1164/rccm.201202-0350ED

[3] Guarnieri, M. B., J.R. Outdoor air pollution and asthma. Lancet. 2014; 383: 1581-1592

[4] Kanchongkittiphon, W., Mendell, M.J., Gaffin, J.M., Wang, G. & Phipatanakul, W. Indoor environmental exposures and exacerbation of asthma: an update to the 2000 review by the Institute of Medicine. Environmental health perspectives. 2015; 123: 6-20

[5] Institute of Medicine. Clearing the Air: Asthma and Indoor Air. 2000 https://www.nap.edu/read/9610/chapter/1#viii. Last accessed January 3, 2018.

[6] Centers for Disease Control and Prevention. Chronic Disease Calculator. https://www.cdc.gov/chronicdisease/calculator/index.html. Last accessed January 3, 2018.

[7] Asthma Care Quick Reference, Diagnosing and Managing Asthma. NIH pub no. 12-5075, September 2012. https://www.nhlbi.nih.gov/files/docs/guidelines/asthma_qrg.pdf. Last accessed January 4, 2018.

[8] New York State Department of Health. Prevention Agenda Brief 2017: Asthma education and self-management support are essential to achieve asthma control. August 2017. https://health.ny.gov/statistics/ny_asthma/pdf/asthma_data_to_action-self-mgmt_education.pdf

[9] US Department of Health and Human Services Office of Disease Prevention and Health Promotion. Health People 2020: Respiratory Diseases. January 2018. https://healthypeople.gov/2020/topics-objectives/topic/respiratory-diseases/objectives. Last access January 4, 2018.

[10] Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data [online]. 2015. https://www.cdc.gov/brfss/brfssprevalence/. Last accessed January 9, 2018.

[11] New York State Dpartment of Health. StatShot: Smoke-Free Public Housing in New York State: Household Rules, Secondhand Smoke Exposure, and Policy Support, June 2017. https://www.health.ny.gov/prevention/tobacco_control/reports/statshots/volume10/n3_smoke_free_public_housing.pdf

[12] Forno, E. & Celedón, J.C. Asthma and ethnic minorities: socioeconomic status and beyond. Curr Opin Allergy Clin Immunol. 2009; 9(2):154-160.

[13] Holsey, C.N., Collins, P., & Zahran, H. Disparities in asthma care, management, and education among children with asthma. Clin Pulm Med. 2013; 20(4):172-177.10.1097/CPM.0b013e3182991146

[14] Centers for Disease Control and Prevention. Most Recent Asthma Data: National Data. https://www.cdc.gov/asthma/most_recent_data.htm. Last accessed January 3, 2018.

[15] New York State Department of Health. New York State Health Indicators by race/ethnicity, 2012-2014. https://www.health.ny.gov/statistics/community/minority/county/newyorkstate.htm. Last accessed January 18. 2018.

Breastfeeding

BACKGROUND

Breastfeeding helps mothers and babies stay healthy. The US Surgeon General and most experts, including the American Academy of Pediatrics, American Academy of Family Physicians and American College of Obstetricians and Gynecologists recommend exclusive breastfeeding for the first six months of life, with continued breast milk feeding until one year of age, or longer, as complementary foods are introduced.[1-3] Breastfeeding benefits infants by promoting overall health, growth, and development, and strengthening the bond between mother and baby. The risks of not breastfeeding have been well documented. Infants who are not breastfed have increased risks of ear, respiratory, and gastrointestinal infections, asthma and Sudden Infant Death Syndrome (SIDS). The benefits of breastfeeding also extend beyond infancy. Children who were breastfed have decreased risk of childhood obesity, type 1 and type 2 diabetes, high cholesterol, high blood pressure, and childhood cancers.[1, 2, 3] Breastfeeding also provide short- and long-term benefits to mothers. Women who breastfeed return more quickly to their pre-pregnancy weight. Women who do not breastfeed have increased risks of postpartum bleeding after delivery, breast and ovarian cancers, and postpartum depression.[4-8]

Increasing breastfeeding initiation is a priority at both the national and state levels. The Prevention Agenda 2013-2018 established two specific objectives related to breastfeeding, to be achieved by December 31, 2018. The first goal is to increase the percent of infants born in New York State (NYS) who are exclusively breastfed by at least 10% to 48.1%. The second objective is to reduce racial, ethnic and economic disparities in breastfeeding rates in NYS by at least 10%. At the federal level, a Healthy People 2020 objective was established to increase the proportion of infants who are ever breastfed to 81.9%.

NYS has demonstrated leadership by enacting legislation to promote and support breastfeeding in public, at work and in hospital settings. Examples include the NY Civil Rights Law enacted in 1994, which granted women the right to breastfeed in public. In addition, the *NYS Nursing Mothers in the Workplace Act* was passed in 2007, making NYS one of the first states with legislation protecting the rights of women to express breast milk in the workplace. In 2010, the *NYS Breastfeeding Mothers Bill of Rights* was passed, requiring hospitals to include their breastfeeding rates in maternity information brochures. The bill is intended to make new mothers aware of their right to breastfeed and is required to be posted in all hospital maternity care areas as well as child day care centers licensed by the NYS Office of Children and Family Services. New York State's Maternity Information Law requires each hospital to provide information about its childbirth practices and procedures and to share their breastfeeding rates publicly on the NYS Department of Health public website. This information can help families to better understand what to expect, learn more about childbirth choices, and plan for baby's birth.[9]

More recent policy changes that support breastfeeding include the Paid Family Leave policy and the updated NYS perinatal services regulations. In 2016 Governor Cuomo signed into law the nation's strongest and most comprehensive Paid Family Leave policy. The NYS Paid Family Leave Program provides New Yorkers with job-protected, paid leave to bond with a new child, care for a loved one with a serious health condition or to help relieve family pressures when someone is called to active military service.[10] In 2017, the NYS perinatal services regulations for hospitals were updated to more closely align with the evidence-based *10 Steps to Successful Breastfeeding* and the *International Code of Marketing of Breast-Milk Substitutes*.[11, 12]

BURDEN

In NYS, most mothers initiate breastfeeding with their newborn infants, but far too many breastfed infants receive formula supplementation by the time they leave the hospital. In the months following hospital discharge, breastfeeding rates continue to drop off, especially for exclusive breastfeeding.

Data describing breastfeeding rates among New Yorkers come from multiple federal and state surveillance systems, including NYS Birth Certificate data, the Centers for Disease Control and Prevention National Immunization Survey and the Pediatric Nutrition Surveillance System for infants enrolled in New York State's Women, Infants and Children (WIC) Program.

In 2015 in NYS, 87.6% of women initiated breastfeeding, yet only 44.8% of infants were exclusively fed breast milk in the hospital (see Figure 1). Of the infants who were breastfed, nearly half (48.9%) were supplemented with formula before they left the hospital.

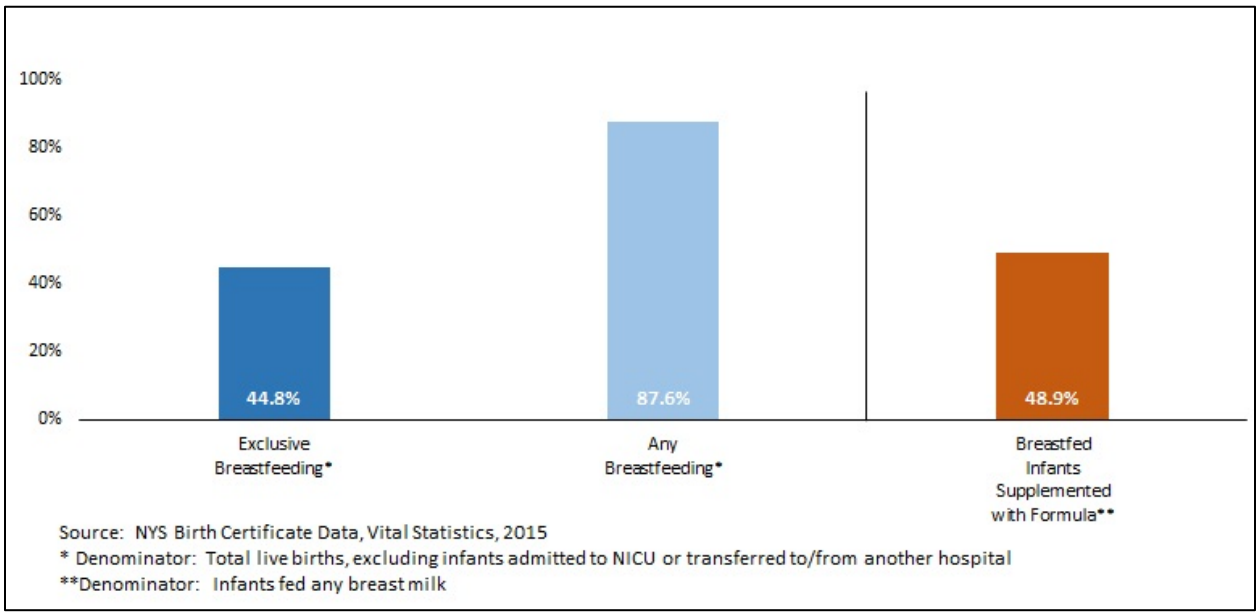


Figure 1: Percent of infants fed breast milk in the hospital, 2015

Increasing rates of breastfeeding, both exclusive breastfeeding and duration, can help reduce the number of illnesses and health conditions and in turn, lead to lower healthcare costs. It is estimated that if 90% of infants were exclusively fed breast milk for six months, the United States (US). would save approximately $13 billion annually and prevent more than 900 deaths.[13]

In NYS, breastfeeding rates vary across counties. Figure 2 illustrates the percentage of infants exclusively breastfed in the hospital in 2015. Lower performing counties are depicted in blue, moderate performing counties are depicted in green and the highest performing counties are depicted in yellow.

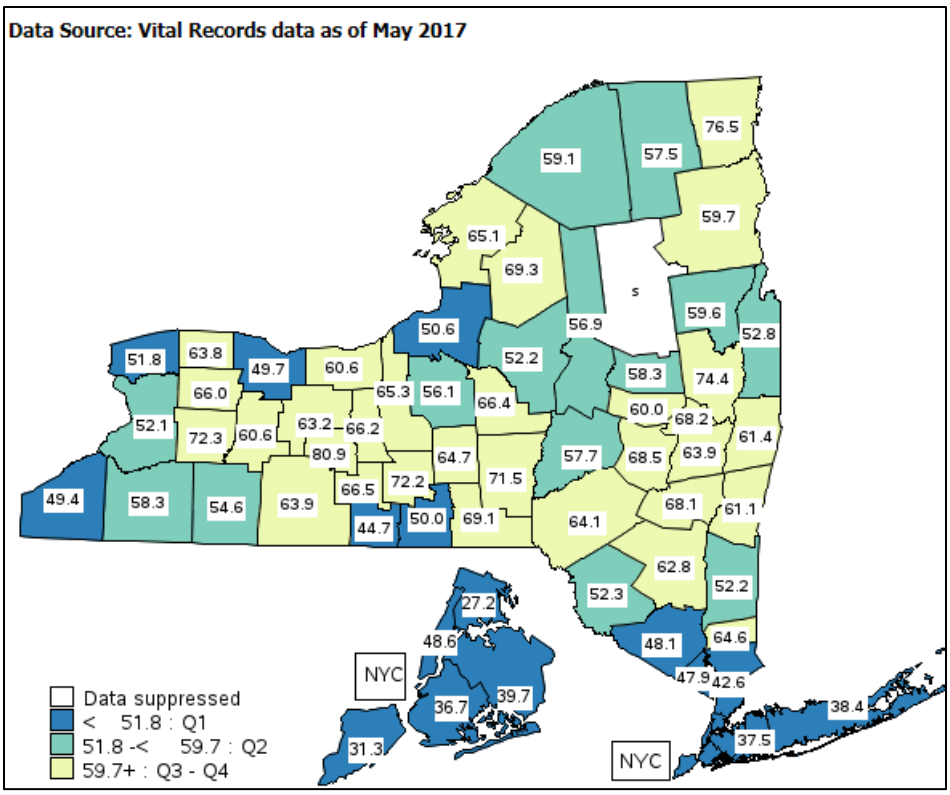


Figure 2: Percent of infants exclusively breastfed in the hospital, 2015 NYS County Map

At the federal level, Heathy People 2020 objectives were established to increase the proportion of infants who are breastfed exclusively through 3 months (46.2%) and 6 months (25.5%) of age and those who received some breastmilk ever (81.9%), at 6 months (60.6%), and at one year (34.1%). In 2015, NYS exceeded the national objective for breastfeeding initiation (see Figure 1) but fell below the national objectives for all other measures (see Figure 3).

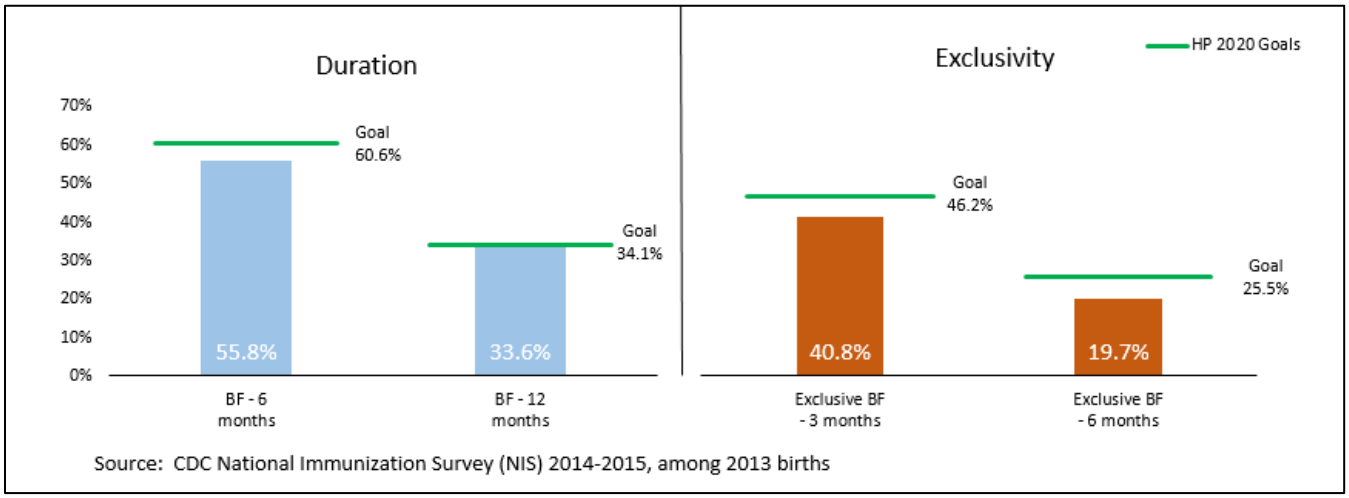


Figure 3: Percent of infants breastfed post-hospital discharge, by exclusivity and duration, 3-, 6- and 12-months, NYS.

Figure 3 depicts the percentage of NYS infants who were breastfed at 6 and 12 months of age, and the percentage of infants who were exclusively breastfed at 3 and 6 months of age. Among 2013 births, 55.8% and 33.6% of infants were breastfed at 6 and 12 months, respectively. The proportion of infants exclusively breastfed at 3 and 6 months was 40.8% and 19.7%, respectively.

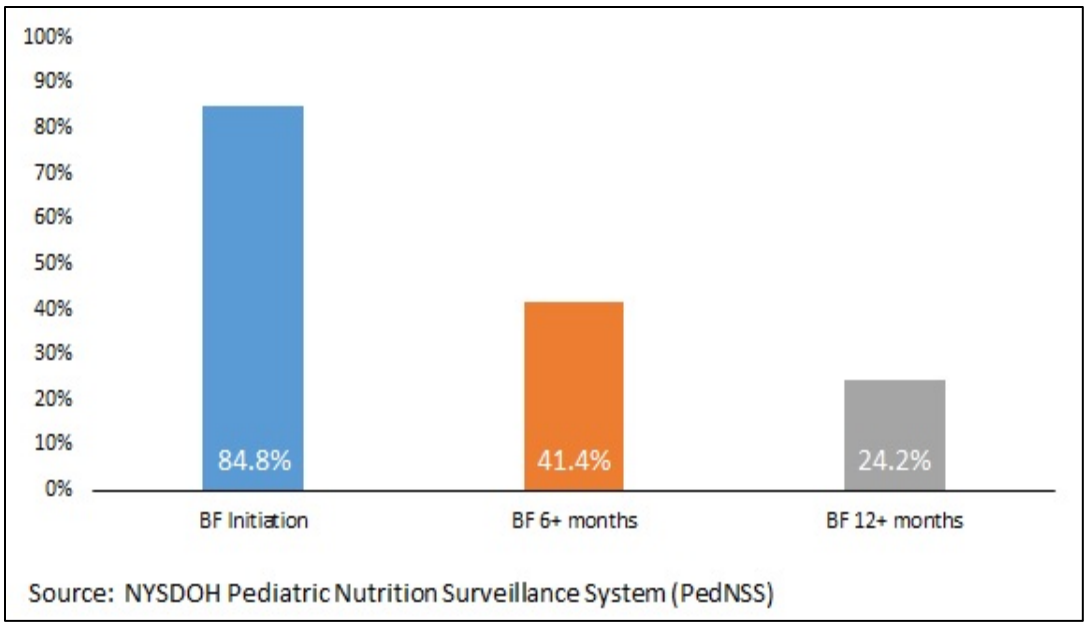


Figure 4: Percent of infants enrolled in WIC and fed any breast milk, by duration, 2016

Figure 4 shows that 84.8% of women enrolled in WIC initiate breastfeeding. At 6 months of age, 41.4% of infants are still receiving breast milk and at 12 months, 24.2% of infants are still receiving breast milk. The proportion of infants exclusively breastfed at 1 month, 3 months and 6 months is 24%, 15% and 9%, respectively.

DATA TRENDS

Breastfeeding initiation rates in NYS have increased over the past several years and the rates of formula supplementation have decreased slightly (see Figure 5).

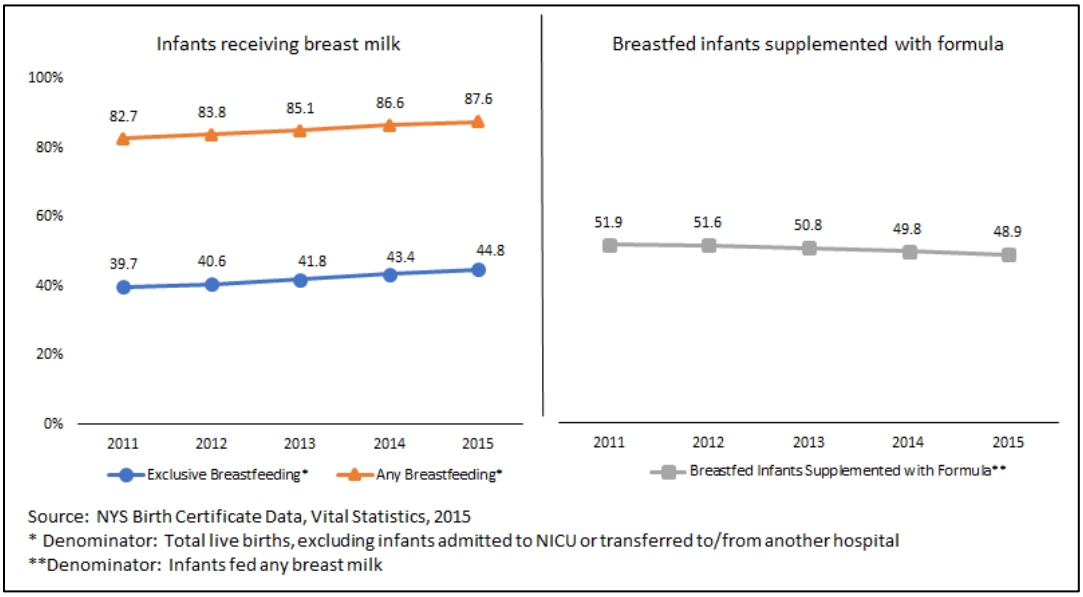


Figure 5: Trends in percentage of infants breastfed in the hospital, 2011-2015

Figure 5 shows that breastfeeding initiation rates have increased over the last several years (from 82.7% in 2011 to 87.6% in 2015), including an increase in the percent of infants exclusively breastfed in the hospital (from 39.7% in 2011 to 44.8% in 2015). The percent of breastfed infants supplemented with formula has decreased slightly over the same time period (from 51.9% in 2011 to 48.9% in 2015).

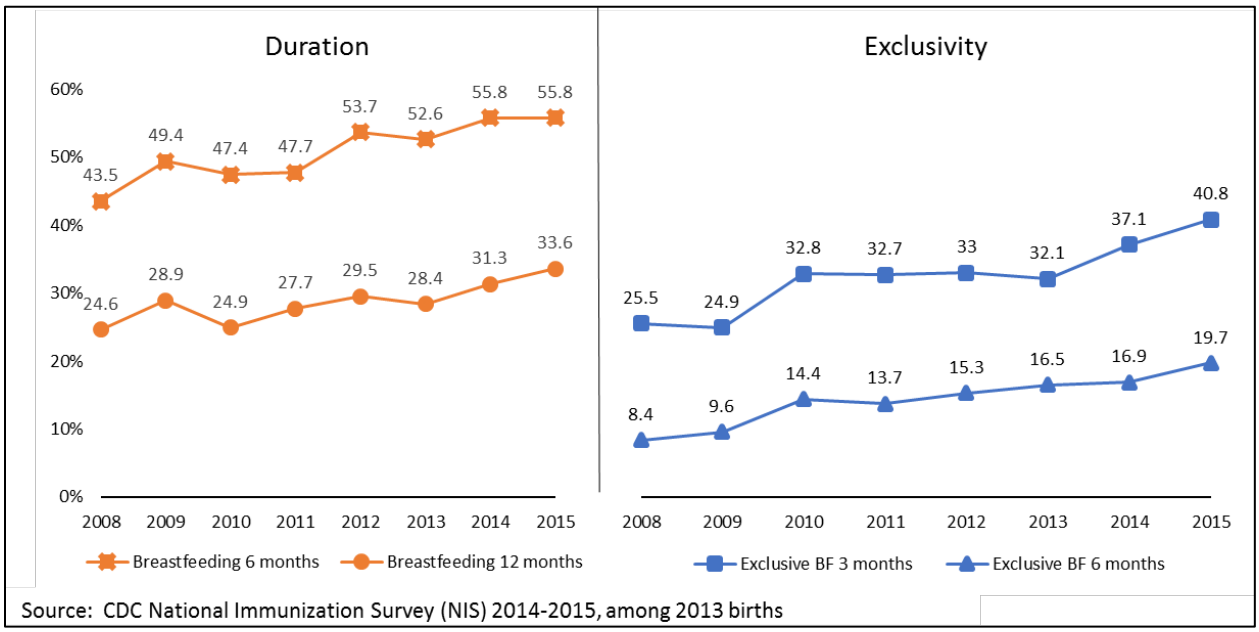


Figure 6: Trends in percent of infants exclusively BF at 3 and 6 months, breastfeeding 6 and 12 months

Figure 6 depicts the trends in the percentage of infants breastfed at 6 and 12 months of age and the percentage of infants exclusively breastfed at 3 and 6 months of age in NYS. Although rates of breastfeeding exclusivity and duration have increased over time, they remain below national objectives.

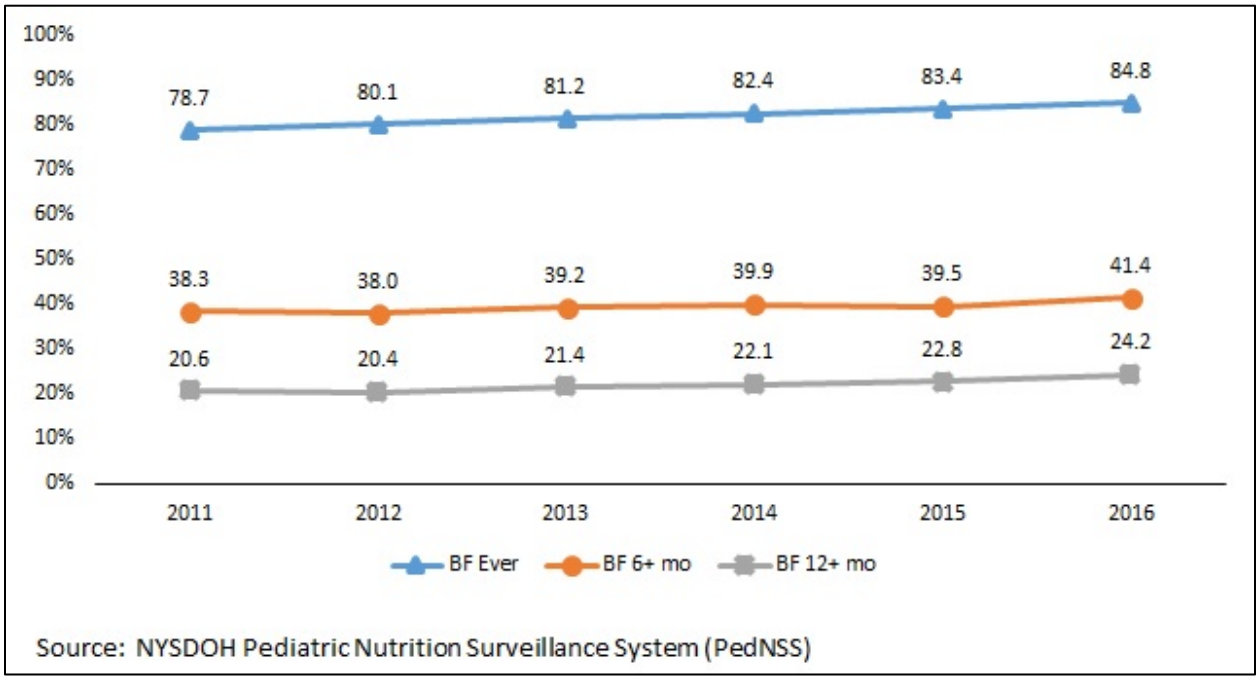


Figure 7: Trends in breastfeeding among infants enrolled in WIC, 2011 – 2016

Figure 7 depicts the trends in breastfeeding among infants enrolled in WIC, from 2011 to 2016. There have been increases in breastfeeding initiation (from 78.7% in 2011 to 84.8% in 2016), breastfeeding at 6 months (from 38.3% in 2011 to 41.4% in 2016) and breastfeeding at 12 months (from 20.6% in 2011 to 24.2% in 2016) among infants enrolled in the NYS WIC Program.

DISPARITIES

There are large disparities in breastfeeding initiation, exclusivity, and duration among mothers of different races and ethnic backgrounds as well as those with different education levels and various kinds of health insurance. With regard to race and ethnicity, Hispanic mothers have the highest breastfeeding initiation rates (91%), followed by Other, non-Hispanic (86%), black, non-Hispanic (85%) and white, non-Hispanic (85%). However, for exclusive breastfeeding rates, the pattern is reversed (see Figure 8).

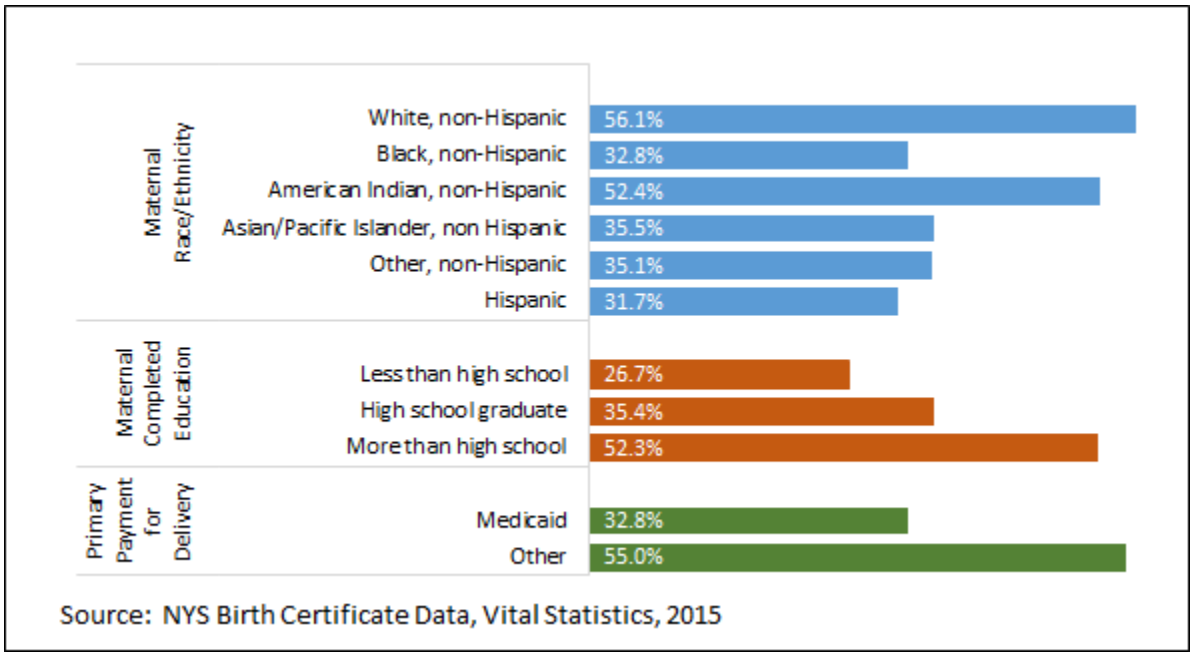


Figure 8: Percent of infants exclusively breastfed in the hospital, by maternal characteristics, 2015

As shown in Figure 8, exclusivity is highest among white, non-Hispanic women (56.1%) and lowest among Hispanic mothers (31.7%). When looking at maternal completed education, breastfeeding rates are highest among mothers who have completed more than a high school education (52.3%) and lowest among mothers who completed less than a high school education (26.7%). Lastly, when looking at maternal insurance type, exclusive breastfeeding rates are highest among mothers who are insured by a payer other than Medicaid (55.0%).

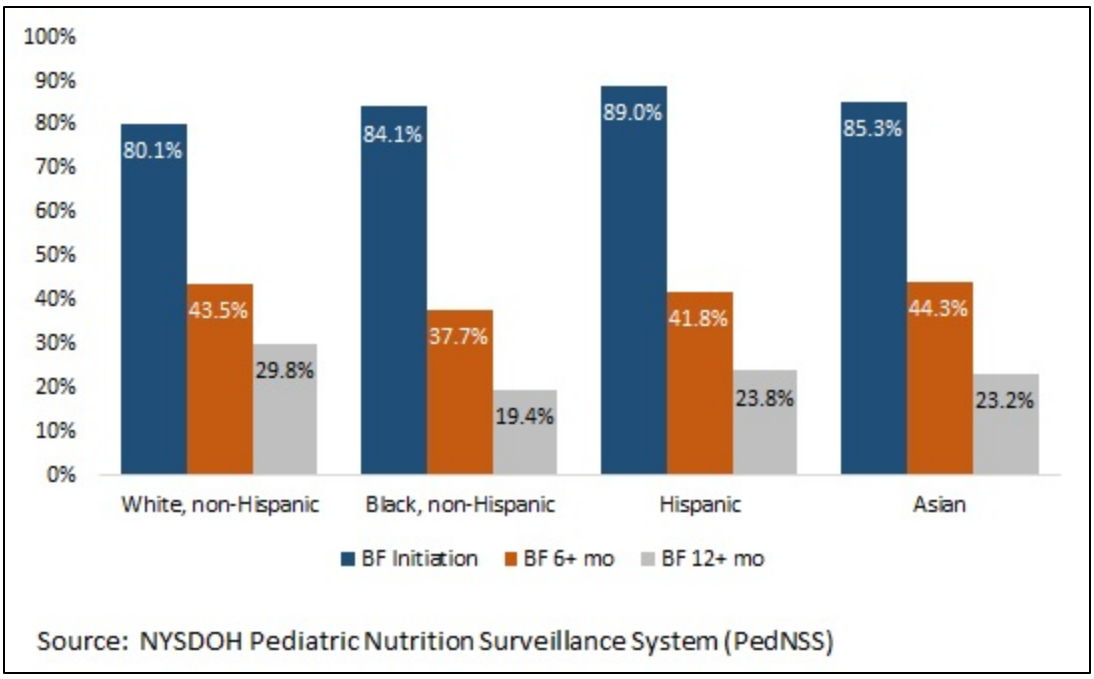


Figure 9: Percent breastfeeding among infants enrolled in WIC, by race/ethnicity, 2016

Figure 9 shows the percentage of breastfeeding among infants enrolled in WIC by race and ethnicity for breastfeeding initiation, breastfeeding at 6 months and breastfeeding at 12 months. Hispanic mothers start out with the highest breastfeeding initiation rate (89.0%), but only 41.8% and 23.8% continue breastfeeding at 6 and 12 months. Asian mothers have the second highest initiation rate (85.3%) and continue to have the highest rate of breastfeeding at 6 months. At 12 months, only 23.2% of infants of Asian mothers are still breastfeeding. 84.1% of black, non-Hispanic mothers start off breastfeeding, yet only 37.7% and 19.4% are breastfeeding at 6 and 12 months. Lastly, for white, non-Hispanic mothers, 80.1% initiate breastfeeding and 43.5% and 29.8% are breastfeeding at 6 and 12 months.

SOCIAL DETERMINANTS

Breastfeeding saves lives, improves health, and reduces costs. As a public health issue, improving breastfeeding rates is not the sole responsibility of individual women, but rather the shared responsibility of governments, policy makers, hospitals, healthcare providers, communities, and families. Healthcare providers and hospital staff can have a significant impact on improving breastfeeding rates by supporting breastfeeding women.[14-16]

Many factors negatively impact a woman's breastfeeding experience including social norms that do not support breastfeeding, lack of knowledge by the woman herself; lack of support and encouragement from healthcare providers, family and peers; difficulties breastfeeding upon returning to work, and lactation challenges.[4, 5, 17]

The NYS Department of Health aims to influence the social determinants of health and help mothers meet their breastfeeding goals. This is achieved by working with internal and external partners to assess, develop, implement, and evaluate evidence-based strategies and promising practices to promote, support and protect breastfeeding. Due to the complex nature of this challenge, a socio-ecological approach with a focus on policy, systems and environmental change strategies across multiple sectors and levels of influence is needed for sustainable improvement.

References

[1] American Academy of Pediatrics (AAP). Breastfeeding and the Use of Human Milk: Section on Breastfeeding. Pediatrics *2012;*129(3). Available at: http://pediatrics.aappublications.org/content/129/3/e827

[2] American Congress of Obstetricians and Gynecologists (ACOG). Optimizing support for breastfeeding as part of obstetric practice. Committee Opinion No. 658. (Replaces Committee Opinion No. 361, 2007) Obstet Gynecol 2016;127:e86-92.

[3] American Academy of Family Physicians (AAFP). Breastfeeding, Family Physicians Supporting (Position Paper). 2008. Available at: http://www.aafp.org/about/policies/all/formula-hospital.html Accessed December 2017.

[4] Ip S, Chung M, Raman G, Chew P, Magula N, Devine D, Trikalinos T, Lau J. Breastfeeding and maternal and infant health outcomes in developed countries. Evidence Report/Technology Assessment No. 153 (Prepared by Tufts-New England Medical Center Evidence-based Practice Center, under Contract No. 290-02-0022). AHRQ Publication No. 07-E007, 1-415. 2007. Rockville, MD, Agency for Healthcare Research and Quality. U.S. Department of Health and Human Services. The Surgeon's Call to Action to Support Breastfeeding, Washington, DC: US Department of Health and Human Services, Office of the Surgeon General; 2011.

[5] U.S. Department of Health and Human Services. The Surgeon's Call to Action to Support Breastfeeding, Washington, DC: US Department of Health and Human Services, Office of the Surgeon General; 2011.

[6] Stuebe AM. The risks of not breastfeeding for mothers and infants. Rev Obstet Gynecol 2009;2(4):222-231.

[7] Schwartz E, Ray R, Stuebe A, et al. Duration of lactation and risk factors for maternal cardiovascular disease. Obstet Gynecol 2009;113:974–982.

[8] Godfrey JR, Lawrence RA. Toward optimal health: the maternal benefits of breastfeeding. J Women's Health 2010;19(9):1597-1602.

[9] Hospital Related Maternity-Related Procedures and Practices Statistics. New York State Department of Health. 2009.

[10] New York State Programs. *New York State Paid Family Leave.* Available at: https://www.ny.gov/programs/new-york-state-paid-family-leave. Accessed November 6, 2017.

[11] World Health Organization (WHO), Division of Child Health and Development. Evidence for the Ten Steps to Successful Breastfeeding. Geneva, Switzerland: World Health Organization; 1998. Report No. WHO/CHD/98.9. Available at: http://whqlibdoc.who.int/publications/2004/9241591544_eng.pdf.

[12] World Health Organization. International Code of Marketing of Breast-milk Substitutes. 1981. ISBN 92 4 154160 1. Available at: http://www.who.int/nutrition/publications/code_english.pdf. Accessed November 6, 2017.

[13] Bartick MC, Reinhold AR. The burden of suboptimal breastfeeding in the United States: A pediatric cost analysis. Pediatrics 2010;125(5):e1048-e1056.

[14] DiGirolamo AM, Grummer-Strawn LM, Fein SB. Effect of maternity-care practices on breastfeeding. Pediatrics 2008;Suppl 2:S43-9.

[15] Philipp BL, Merewood A, Miller LW, Chawla N, Murphy-Smith MM, Gomes JS, Cimo S, Cook JT. Baby-friendly hospital initiative improves breastfeeding initiation rates in a US hospital setting. Pediatrics 2001;108(3):677-81.

[16] DiGirolamo AM, Grummer-Strawn LM, Fein S. Maternity care practices: implications for breastfeeding. Birth 2001;28(2):94-100.

[17] UNICEF United Kingdom. Protecting Health and Saving Lives: A Call to Action for Breastfeeding in the UK. 2016. Available at: http://www.unicef.org.uk/BabyFriendly/News-and-Research/News/call-to-action/. Accessed November 6, 2017.

BACKGROUND AND BURDEN OF CANCER

Cancer is not a single disease, but a collection of more than 100 different diseases, each with its own set of causes, occurrence patterns, natural history, effective treatments, and outlook. Each year, nearly 110,000 New Yorkers learn they have cancer. In 2014, the overall cancer incidence rate of 476.5 cases per 100,000 persons in New York State (NYS) was the fifth highest among 50 states and the District of Columbia, significantly above the national average of 436.6/100,000[12]. Prostate, female breast, lung, and colorectal cancers are among the most frequently diagnosed cancers in NYS (Figure 1) and account for 50% of all new cancer cases.

Approximately 35,000 individuals in NYS die from cancer annually, making the disease the second leading cause of death in the state and the leading cause of premature death (death before age 65). In NYS, the leading causes of cancer deaths are lung, female breast, prostate and colorectal cancers (Figure 1)[3].

The burden of cancer in NYS can be reduced by encouraging health promoting behaviors, reducing risk factors, and supporting early detection. Many cancers can be prevented by avoiding modifiable risk factors. For example:

- Tobacco use, the leading preventable risk factor for cancer, causes nearly 40% of all cancers[4] and is associated with an increased risk of 16 different types of cancer, including cancers of the lung, larynx (voice box), mouth, and esophagus[5].
- Up to a third of cancers may be attributed to excess weight, physical inactivity, and unhealthy diet; overweight and obesity are associated with at least 13 different types of cancers[6].
- Drinking alcohol increases an individual's risk for several cancer types, including oral cavity and pharynx, larynx, esophagus, liver, colon, rectum, and female breast cancers[7].
- Unprotected or extended exposure to ultraviolet (UV) radiation from the sun, indoor tanning, and tanning lamps can lead to skin cancers, including melanoma, the deadliest type of skin cancer. When non-melanoma skin cancers are taken into account, skin cancer is the most common form of cancer in the US.

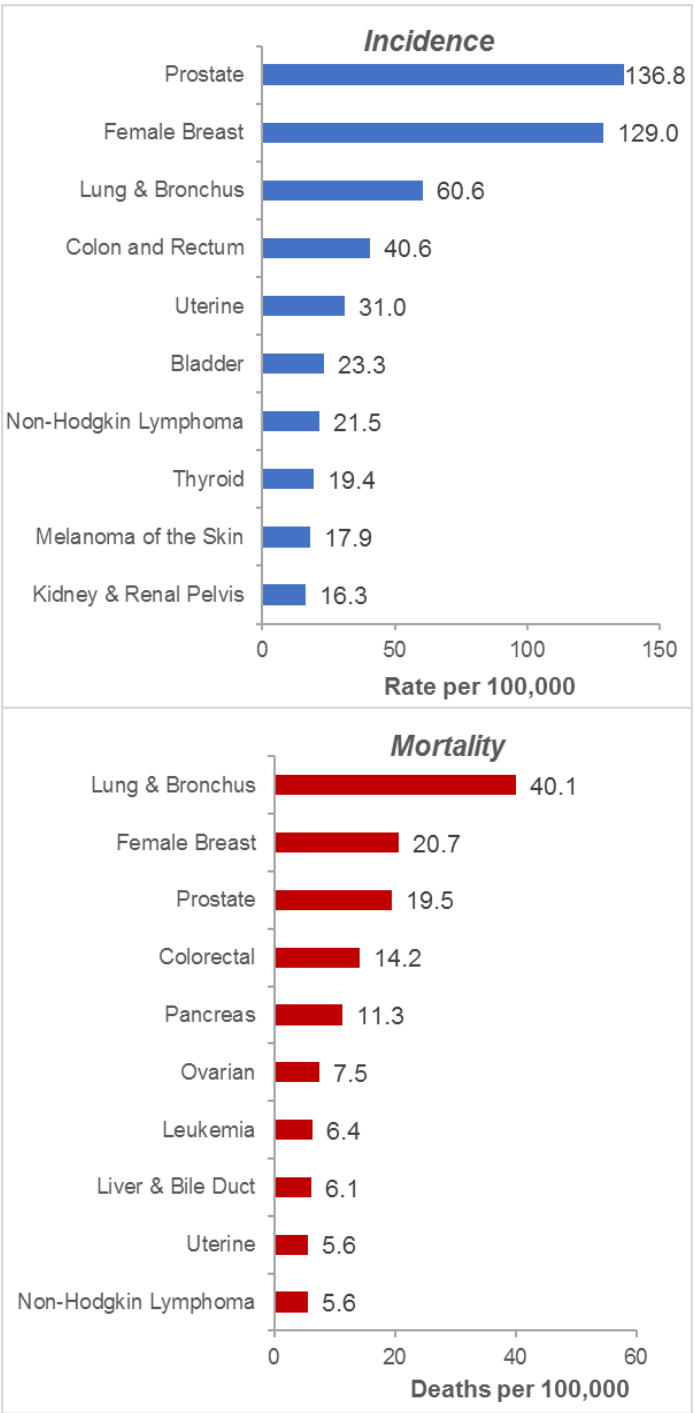


Figure 1: Average Annual Age-Adjusted Cancer Incidence and Mortality Rates for Top 10 Sites among Men and Women, New York State, 2010-2014

Source: New York State Cancer Registry

- Infectious diseases such as the human papillomavirus (HPV) infection and chronic hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are associated with several cancers. HPV causes cervical, vaginal, vulvar, penile, anal, and oropharyngeal (throat) cancers. Chronic HBV and HCV infections are risk factors for liver cancer.
- Exposure to numerous substances and potential toxins in the environment, consumer products, and substances in the workplace may have cancer-causing potential.

Identifying early stage cancer can also reduce cancer mortality. Through the use of recommended cancer screening tests, certain cancers can be detected at their earliest stages before it has spread to other areas of the body and when treatment is most effective. Screening tests for cervical and colorectal cancers can find pre-cancerous conditions that can be treated before cancer develops.

Due to improvements in early detection and treatment and a growing population of older adults, the number of cancer survivors is increasing. An estimated 1 million individuals with a history of cancer live in NYS.[8] Cancer can influence every facet of life, presenting challenges that may impact a survivor's physical, psychological, and spiritual well-being, as well as relationships, and financial and legal matters. Survivors have a significantly higher risk of developing second cancers and may be at an increased risk of other chronic diseases.[9] Survivors typically report higher levels of depression and anxiety than individuals without a history of cancer.[10] They might also experience problems with employment, housing, access to benefits, and keeping track of medical records.[11]

The overarching goals of cancer prevention and control efforts in NYS are to reduce the burden of cancer by decreasing the number of new cancer cases, decreasing the number of cancers diagnosed at a late stage, improving the quality of life of those diagnosed with cancer, and decreasing the number of deaths caused by cancer. The continuum of cancer control (which includes health promotion and prevention, early detection, diagnosis, treatment, palliative care, and survivorship) is a useful framework to address priorities and monitor progress on cancer prevention and control goals in NYS. The NYS Cancer Registry has further information about cancer incidence and mortality rates in NYS. The NYS Cancer Consortium has more information about NYS' 5-year strategic plan to address cancer prevention and control.

DATA TRENDS

Cancer rates change over time. Cancer incidence rates can change due to changes in the underlying occurrence of the disease, changes in factors contributing to cancer and changes in cancer screening and clinical practices. Cancer mortality rates are affected by the incidence of the disease, factors contributing to survival, and the effectiveness of screening and treatment. [12]

From 2010 to 2014 the cancer incidence rate for all cancer types in NYS decreased on average by 1.2% per year.[13] Changes in incidence rates by cancer site varied:

- For males and females combined, rates of melanoma and thyroid cancer are increasing
- The rate of kidney cancer increased between 1995 and 2007, but has now leveled off.
- In females, the rate of uterine cancer is increasing.
- Prostate cancer incidence rates have been decreasing since 2009.
- The incidence of lung cancer has been decreasing since 2008.
- Since 2000, the incidence of colorectal cancer has been decreasing.
- The incidence of cervical cancer in females has been declining since 1996.

Increasing the uptake of recommended cancer screening tests and improving cancer treatment outcomes may increase the rate of early stage cancers, but ultimately may reduce cancer deaths. Increased cancer screening is expected to reduce the incidence of cancers diagnosed at later stages. Figure 2 illustrates trends in the incidence of regional- and distant-stage disease for three cancers for which screening tests have been widely used -- female breast, cervical and colorectal.

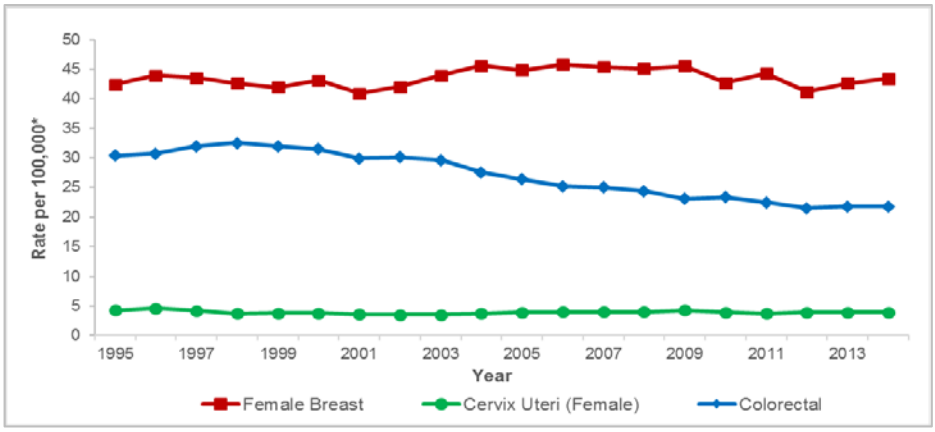


Figure 2: Incidence of Regional/Distant Stage Cancer in NYS, 1995-2014
Source: New York State Cancer Registry
*Age-adjusted to the 2000 US standard million population

Regional/distant stage indicates disease has spread beyond the limits of the organ of origin at diagnosis. Additional information on these three cancers are presented in later sections of this report.

The state's overall cancer mortality rate for all cancer types decreased by 1.5% each year from 2010-2014. Annual mortality rates decreased for most cancer sites during this period except for the liver cancer death rate which increased by 1.7% per year.

DISPARITIES

The burden of cancer is not distributed evenly. The risk of developing or dying from cancer is linked to a variety of social determinants of health, such as race, ethnicity, gender, sexual orientation, age, disability, socioeconomic status, and geographic location.[14]

The National Cancer Institute defines cancer-related health disparities as "differences in the incidence, prevalence, mortality, and burden of cancer and related adverse health conditions that exist among specific population groups. These groups may be characterized by gender, age, race, ethnicity, education, income, social class, disability, geographic location, or sexual orientation."[15] The risks of developing or dying from various cancers often differ for New Yorkers from racial and ethnic minority groups. For example[16]:

- Non-Hispanic whites have the highest rate of newly diagnosed cancers in NYS.
- Non-Hispanic blacks have the highest rate of death from cancer in NYS.
- Cancer incidence and mortality are lower in persons of Hispanic origin, and non-Hispanic Asians and Pacific Islanders.

Different cancers have different patterns of cancer incidence and mortality by racial and ethnic group. There are also disparities by race and ethnicity when looking at specific cancer sites. For example:

- Non-Hispanic black males have the highest rates of prostate cancer incidence and mortality of any racial/ethnic group.
- The incidence of breast cancer is highest among non-Hispanic white women, while mortality is highest among non-Hispanic black women.
- Lung cancer incidence and mortality rates are highest among non-Hispanic whites.
- While non-Hispanic blacks experience the highest rates of death from colorectal cancer, incidence of this cancer is only slightly higher in non-Hispanic blacks than in non-Hispanic whites.
- Cervical cancer incidence and mortality are higher among non-Hispanic black and Hispanic women.

- Rates of incidence and mortality from melanoma are very low among Hispanics, non-Hispanic blacks, and non-Hispanic Asians and Pacific Islanders.

Other disparities related to cancer incidence and mortality include:

- Age: An individual's cancer risk increases with age; half of cancers in NYS are diagnosed in people over 50 years old.
- Geography: New York is notable for both its size and its diversity. With a population approaching 20 million[17], New Yorkers are spread out over a land area of more than 47,000 square miles, the largest in the northeast. Although much of New York's population is concentrated in the metropolitan area comprising New York City and its suburbs, there are sizeable rural regions upstate where distance can be a barrier to accessing health services. More specific county-level cancer incidence and mortality data can be found on the NYS Cancer Registry's website.

In addition to disparities in cancer incidence and mortality, there are disparities related to cancer risk factor behaviors, and early detection and screening. The leading modifiable risk factors for cancer such as cigarette smoking, poor diet, physical inactivity, obesity, HPV infection, and sun exposure are often more common in certain demographic groups. In NYS, low socio-economic status (SES) is one of the strongest factors contributing to disparities in these behaviors. Individuals at lower levels of SES, including those with a lower annual household income and low educational attainment, are more likely than those with higher SES levels to be current smokers, physically inactive, and obese. Detailed data and information on disparities related to these risk factors is described in separate sections of this report (link to relevant sections).

Disparities in health care access and use, particularly in preventive health services like cancer screening, contribute to differences in cancer stage distributions, especially in the late stage diagnosis. Disparities related to screening behaviors for different demographic groups are further described in the separate cancer-site specific reports on breast, cervical, and colorectal cancers. Information on cancer outcomes in different groups can be used to focus cancer control efforts on those in greatest need, and to help understand and possibly address the causes of these disparities.

SOCIAL DETERMINANTS

Social determinants of health are the conditions in which we live, learn, work, and play, [18] such as biology and genetics, individual behavior, the social environment, the physical environment, and health services. These determinants of health are important for achieving an optimal level of health and may impact cancer prevention and control efforts across the cancer continuum including individual risk factors for cancer, access to health care for early detection and screening, treatment, and palliative care and access to on-going health promotion and supports for cancer survivors.

Each phase of the cancer continuum, including prevention, early detection, treatment and care for survivors, is influenced by multiple, complex social and environmental factors. Social factors such as access to safe and healthy environments are closely associated with modifiable cancer risk factors such as physical inactivity, tobacco use, and poor diet and can present barriers to prevention efforts. Social determinants also affect access to high quality, affordable health care and can influence an individual's ability to obtain appropriate cancer detection and screening services and cancer treatment. Disparities in cancer incidence may be related to socioeconomic and demographic differences in cancer-related risk factors and behaviors.

Public health and community organizations, health care providers, policy advisors, advocates and health systems are charged with ensuring that cancer services across the continuum of care are available and accessible to all populations. To reduce the burden of cancer and promote health equity among different

population groups, policies and programs to prevent cancer and improve access to cancer-related services and treatments must address economic, institutional, and environmental factors that contribute to health disparities. Special efforts to promote health equity among the most vulnerable populations are needed. The NYS Cancer Services Program is one example of a statewide cancer control effort that seeks to reduce barriers to screening and diagnosis that are related to socioeconomic factors and other social determinants of health. This program provides breast, cervical, and colorectal cancer screening services to uninsured and underinsured individuals throughout the state. Many individuals diagnosed with cancer or certain pre-cancerous conditions through the Cancer Services Program are eligible for treatment through the Medicaid Cancer Treatment Program. This program provides full Medicaid coverage for the entire treatment period, helping to reduce barriers related to health care access and cost.

BACKGROUND AND BURDEN OF LEADING CANCERS IN NYS: BREAST, CERVICAL, AND COLORECTAL CANCERS

This section describes the burden, trends, and disparities in the incidence, mortality and screening behaviors within NYS for screening-detectable cancers (breast, cervical and colorectal cancers). Cancer screening refers to the use of tests to detect cancer, or pre-cancerous conditions that may lead to cancer, before symptoms appear. For most types of cancer, treatment is more effective when the disease is found early. The United States Preventive Services Task Force (USPSTF) is an independent panel of national experts that weighs the evidence from research studies on cancer screening and issues recommendations for clinical preventive services. These recommendations are typically endorsed by the NYS Department of Health. Screening guidelines vary, depending on the type of cancer, and can change due to new and emerging technology and research. The USPSTF recommends population-based screening for three cancer sites: breast, cervical, and colorectal. For these three cancer sites, screening has been shown to reduce the number of cancer-related deaths. In December 2013, the USPSTF issued new screening recommendations for lung cancer that apply to former or current heavy smokers. Because population-based screening for lung cancer has yet to be implemented, lung cancer is not included in this report.

BREAST CANCER

Burden of Breast Cancer

Breast cancer is the leading cause of cancer and second leading cause of cancer death among women in NYS. The average annual incidence rate of breast cancer in NYS between 2010-2014 was 129.0 per 100,000 females compared to 123.5 per 100,000 females for the nation. In NYS, over 30% of female breast cancer cases are diagnosed at a regional or distant stage or and the incidence of female breast cancers detected at a regional or distant stage is 42.9 cases per 100,000 females. In NYS, the average annual breast cancer mortality rate for 2010 to 2014 was 20.7 deaths per 100,000 females, which is equal to the average annual breast cancer mortality rate for the US during the same time.

Data from the 2016 NYS Behavioral Risk Factor Surveillance System (BRFSS) indicate that 79.7% of women between the ages of 50 and 74 years reported having a mammogram in the past two years. This is higher than the national prevalence of 77.5% of women in this age group who reported being screened according to guidelines, but falls short of the Healthy People 2020 objective of 81.1%.

Data Trends

While breast cancer incidence has increased slightly in NYS and nationally (0.4 and 0.5 average annual percentage change from 2010 to 2014, respectively), the breast cancer mortality rate has declined in both NYS and nationally (-2.6 and -1.6 annual percent decrease from 2010 to 2014, respectively). Regional/distant stage female breast cancer incidence rates declined between 1996 and 2001, and between 2004 and 2014.

According to BRFSS data, breast cancer screening in NYS has remained stable since 2012. Data from earlier years are not comparable because of changes to the BRFSS data collection methods in 2011.

Disparities

The incidence of breast cancer is highest among non-Hispanic white women, while mortality is highest among non-Hispanic black women. Disparities also exist in the incidence of regional/distant stage disease, which in many cases may be preventable by screening. The non-Hispanic black population experiences higher incidence of regional/distant stage disease for female breast cancer as compared to other racial and ethnic groups. Incidence of breast cancer also varies across NYS. The breast cancer incidence rates in Wyoming and Erie counties are significantly higher than the statewide incidence rate, while breast cancer mortality rates in Schuyler, Sullivan, and Essex counties are significantly higher than the statewide breast cancer mortality rate.[19] Detailed county-level data can be found on the New York State Cancer Registry's website, which has maps of breast cancer incidence and incidence rates of regional/distant stage breast cancer by county. While some disparities may reflect the underlying occurrence of the disease, identification of groups with disproportionate incidence of regional/distant stage disease may help to inform strategies for cancer screening.

Some subpopulations of women in NYS are less likely to be screened for breast cancer. Hispanic women were most likely to report receiving a mammogram within the past two years (88.5%), followed by black non-Hispanic women (82.5%), White non-Hispanic women (79.5%) and women of other races (66.1%). Women with higher income were more likely to have been screened than lower income women (Figure 3). The proportion of women ages 50 to 74 years who reported receiving a mammogram within the past two years was 83.0% for women with a household income of $50,000 or higher compared to 75.9% for women with a household income of less than $25,000. Women ages 50 to 74 years without health insurance were less likely to have received a mammogram within the past two years (68.1%) compared to women in the same age group who had health insurance (80.4%), although this difference was not statistically significant. In addition, women ages 50 to 74 years without a regular health care provider were significantly less likely to have received a mammogram within the past two years (51.7%) compared to women ages 50 to 74 years with a regular health care provider (81.9%). The proportion of women screened was similar in New York City (80.4%) and NYS excluding New York City (79.2%). However, the proportion screened for breast cancer varied by county (Figure 4) and ranged from 61.5% screened in Delaware County to 88.2% screened in Oneida County.

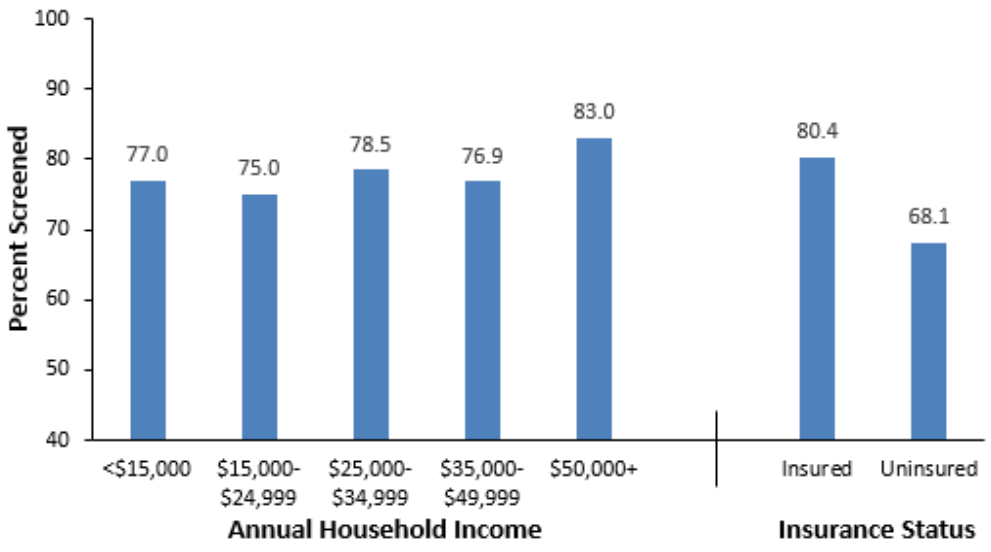


Figure 3: Percent of women ages 50 to 74 years screened by mammography within the past two years, by income and insurance status, New York State, 2016

Source: Behavioral Risk Factor Surveillance System

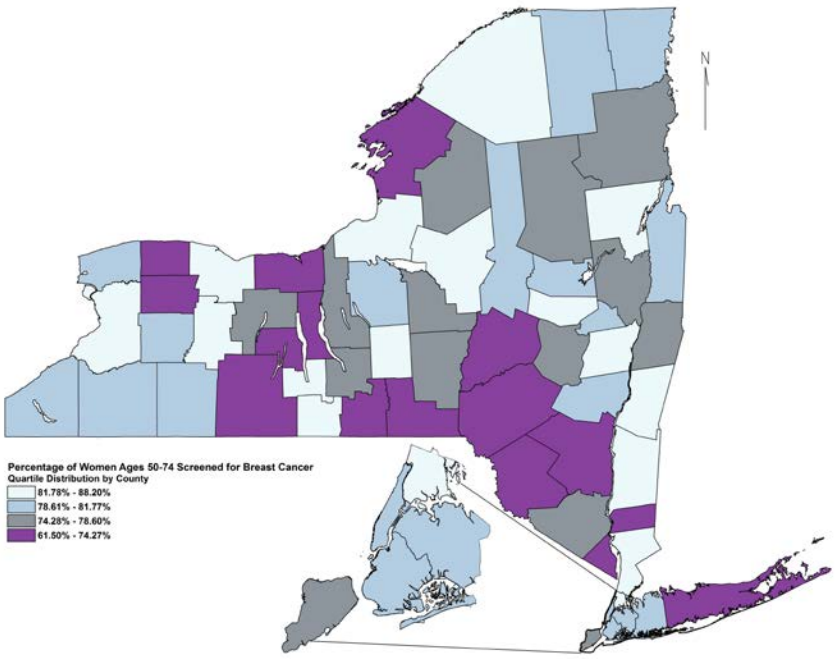


Figure 4: Percentage of women ages 50 to 74 years screened by mammography within the past two years, by county, New York State, 2016

Source: Behavioral Risk Factor Surveillance System

CERVICAL CANCER

Burden of Cervical Cancer

The average annual incidence rate of cervical cancer in NYS for 2010-2014 was 7.7 cases per 100,000 females. In NYS, the cervical cancer mortality rate for 2010-2014 was 2.4 deaths per 100,000 females. According to 2016 BRFSS data, 80.7% of women ages 21 to 65 years reported being screened for cervical cancer with a Pap test within the past three years. This is slightly higher than the national prevalence of 79.8% screened but lower than the Healthy People 2020 goal of 93.0%. However, these percentages do not consider use of the high-risk human papillomavirus (HPV) test, which lengthens the recommended screening interval to every five years for women ages 30 to 65 years.

Data Trends

Cervical cancer incidence has seen generally downward trends since 1995. For whites, rates have leveled off since 2000, but blacks and Hispanics have seen pronounced declines between 1990 and 2010, reducing some of the black-white and Hispanic-white disparities in cervical cancer incidence. These patterns are mirrored in the mortality data. Regional/distant stage incidence rates for cervical cancer declined between 1996 and 2002 and have remained steady since then. The proportion of women ages 21 to 65 years screened for cervical cancer with a Pap test within the past three years was slightly lower in 2016 (80.7%) compared to 2012 and 2014 (82.6% in both years). This may be due in part to increased use of the HPV test as a co-test and the corresponding longer interval between screenings for women ages 30 to 65 years. Data from earlier years are not comparable because of changes to the BRFSS data collection methods in 2011.

Disparities

Cervical cancer incidence and mortality are higher among non-Hispanic black and Hispanic women. The non-Hispanic white population has the lowest incidence rate of regional/distant stage disease for cervical cancer while non-Hispanic black women experience higher incidence rates of regional/distant stage cervical cancer. The incidence of cervical cancer varies across NYS. Counties with incidence rates that are significantly higher than the statewide rate include Brooklyn, Queens, Rockland and Bronx. Delaware, Franklin, and Cortland counties have rates that are significantly lower than the statewide rate. Detailed county-level data can be found on the NYS Cancer Registry's website which has maps of cervical cancer incidence and incidence rates of regional/distant stage cervical cancer by county.

There are disparities in cervical cancer screening related to SES. Among women ages 21 to 65 years of age, 87.6% of those with a household income of $50,000 or higher reported receiving a Pap test within the past three years as compared to 68.9% of women with a household income of less than $15,000 (Figure 5). Women ages 21 to 65 years who do not have health insurance are significantly less likely to have received a Pap test within the past three years (69.8% screened), than women with health insurance (82.7% screened). Similarly, women with a regular health care provider were more likely to have been screened with a Pap test (83.2%) than women without a regular provider (67.8%). Screening also varies by age group, race/ethnicity, and region. Women ages 21 to 30 years are less likely to have been screened with a Pap test within the past three years, compared to older women. According to 2016 BRFSS data, the proportion screened with a Pap test within the past three years was 63.6% for women ages 21 to 30 years vs. over 80% for women older than 30 years of age. Asian non-Hispanic women ages 21 to 65 years were significantly less likely to have received a Pap test within the past three years (61.5%) than Hispanic (80.1%), black non-Hispanic (83.1%) and white non-Hispanic (83.4%) women. The proportion of women ages 21 to 65 years who received a Pap test within the past three years was similar but slightly lower for women living in New York City (79.4%) versus outside of New York City (81.7%).

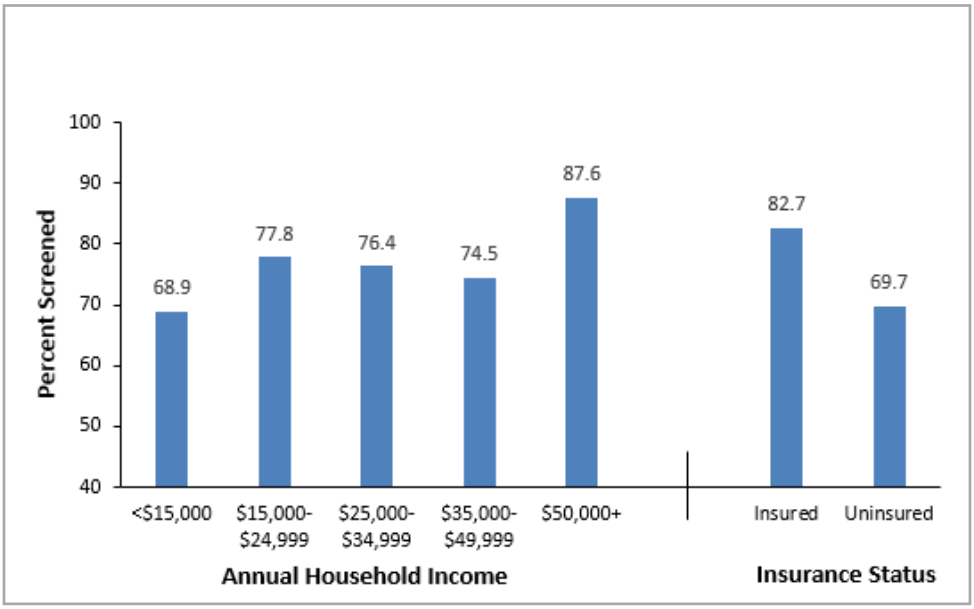


Figure 5: Percent of women ages 21 to 65 years screened by Pap test within the past three years, by income and insurance status, New York State, 2016

Source: Behavioral Risk Factor Surveillance System

COLORECTAL CANCER

Burden of Colorectal Cancer

Colorectal cancer is one of the most common cancers in NYS, and the second leading cause of cancer deaths among men and women combined. During 2010 to 2014, more than 9,000 New York residents were diagnosed with colorectal cancer each year; the average annual incidence rate for men was 46.9 cases per 100,000 and for women 35.7 cases per 100,000. During the same period, colorectal cancer caused over 3,000 deaths annually (mortality rates: 16.7 per 100,000 men; 11.9 cases per 100,000 women). Data from the 2016 BRFSS survey indicate that 68.5% of New York adults ages 50 to 75 years met the USPSTF colorectal cancer screening recommendations. This included individuals in this age group who were screened with a blood stool test in the

past year, a sigmoidoscopy in the past five years with blood stool test in the past three years, or a colonoscopy in the past ten years, but did not include newer screening tests such as the FIT-DNA, a type of stool test that detects altered DNA in the stool, or computed tomography (CT) colonography (also called a virtual colonoscopy), which uses x-rays to produce images of the colon. The estimate of 68.5% of New York adults screened for colorectal cancer is higher than the national estimate of 67.1%, but falls short of the Healthy People 2020 objective of 70.5% of adults aged 50 to 75 screened and the National Colorectal Cancer Roundtable's goal of 80% screened by 2018.

Data Trends

Colorectal cancer incidence has been in steep decline since about 2000. Rates have dropped by more than 3% per year since then. Incidence of colorectal cancers diagnosed at regional/distant stage has also declined from 31.5 in 2000 to 21.8 per 100,000 cases in 2014. According to BRFSS data, colorectal cancer screening in NYS has remained stable since 2012. Data from earlier years are not comparable because of a change to the BRFSS data collection methods in 2011. The proportion of New York adults ages 50 to 75 years screened for colorectal cancer was 69.6% in 2012; 68.1% in 2014; 70.5% in 2015; and 68.5% in 2016. Although the percentage screened is slightly lower in 2016 versus 2015, this difference is not statistically significant and may be a result of increased use of newer screening tests such as the FIT-DNA and CT colonography, which were not included in the 2016 BRFSS survey.

Disparities

While non-Hispanic blacks experience the highest rates of death from colorectal cancer, incidence of this cancer is only slightly greater in non-Hispanic blacks than in non-Hispanic whites. The incidence of colorectal cancer varies across NYS, with Lewis, Chenango, and Jefferson Counties having the highest incidence rates, and Ontario, Manhattan, and Schenectady Counties having the lowest[20]. Detailed county-level data can be found via the NYS Cancer Registry's website which has maps of colorectal cancer incidence and incidence rates of regional/distant stage colorectal cancer by county.

There are demographic differences in colorectal cancer screening. Women were significantly more likely to be screened than men, with 71.0% of females and 65.6% of males meeting the USPSTF colorectal cancer screening recommendations. The proportion of New York adults screened for colorectal cancer is higher in older age groups, with 58.8% of adults ages 50 to 59 years screened; 72.9% of adults ages 60 to 69 years; and 79.3% of adults ages 70 to 75 years. Asian non-Hispanic individuals were least likely to be screened, with 53.1% screened compared to 64.8% for black non-Hispanics ls; 67.5% for Hispanics individuals, and 70.6% for white non-Hispanics i. Adults with a higher household income were more likely to be screened. Among individuals with a household income of $50,000 or higher, 73.8% were screened versus 59.0% screened among those with a household income of less than $15,000 (Figure 6).

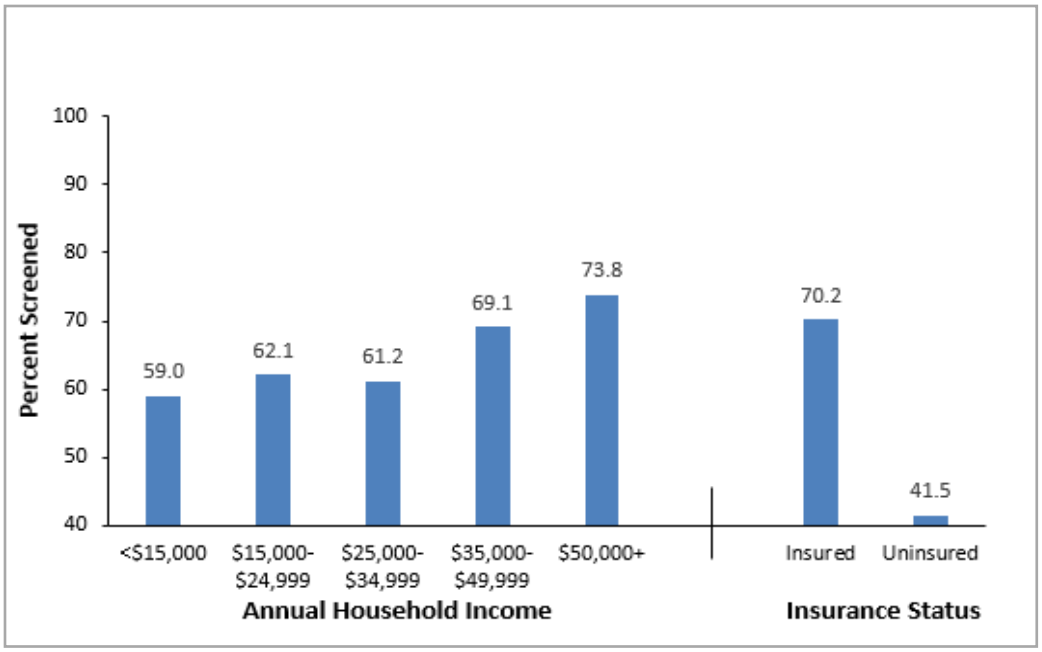


Figure 6: Percent of adults ages 50 to 75 years meeting USPSTF colorectal cancer screening recommendations, by income and insurance status, New York State, 2016

Source: Behavioral Risk Factor Surveillance System

Individuals with health insurance were significantly more likely to meet screening recommendations than those without insurance, with 70.2% of insured individuals and 41.5% of uninsured individuals screened for colorectal cancer. Similarly, the proportion screened was 71.4% among adults with a regular health care provider and 34.9% among those without a regular provider. The proportion screened was lower in New York City compared to the rest of the state, with 66.5% of New York City residents screened and 69.7% screened in NYS excluding New York City. The percent of adults screened for colorectal cancer also varied by county (Figure 7) and ranged from 53.7% screened in Sullivan County to 84.3% screened in Tompkins County.

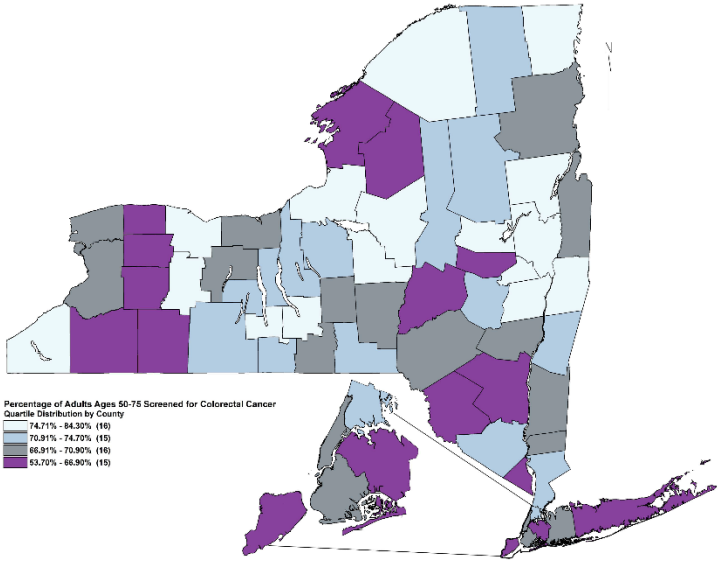


Figure 7: Percentage of adults ages 50 to 75 years screened for colorectal cancer according to US Preventive Services Task Force recommendations, by county, New York State, 2016

Source: Behavioral Risk Factor Surveillance System

References

[1]United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. (2017). *United States cancer statistics: 1999–2014 incidence and mortality web-based report.* Retrieved from www.cdc.gov/uscs

[2] New York State Cancer Registry. (2017). *Cancer Incidence and Mortality in New York State, 1976-2014*. Retrieved from www.health.ny.gov/statistics/cancer/registry.

[4] Center for Disease Control and Prevention. (2017). *Health effects of cigarette smoking*. Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm

[5] United States Department of Health and Human Services. (2014). *The health consequences of smoking: 50 years of progress. A report of the Surgeon General*. Retrieved from www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf

[6] Centers for Disease Control and Prevention. (2017). Cancer and obesity: Overweight and obesity are associated with cancer. *CDC Vital Signs, October 2017*. Retrieved from www.cdc.gov/vitalsigns/pdf/2017-10-vitalsigns.pdf

[7] World Health Organization International Agency for Research on Cancer. (2010). Evaluation and rationale. In *Alcohol consumption and ethyl carbamate*. (chapter 6). Retrieved from http://monographs.iarc.fr/ENG/Monographs/vol96/mono96-6F.pdf.

[8] New York State Cancer Registry. (2016). *NYS Cancer Registry & cancer statistics.* Retrieved from https://www.health.ny.gov/statistics/cancer/registry

[9] Rock CL, Doyle C, Demark-Wahnefried W, Meyerhardt J, Courneya KS, Schwartz AL.…Gansler T. (2012), Nutrition and physical activity guidelines for cancer survivors. *CA: A Cancer Journal for Clinicians, 62*: 242–274. doi:10.3322/caac.21142

[10] George Washington Cancer Center. (2016). *Supporting cancer survivors through comprehensive cancer control programs*. Retrieved from https://smhs.gwu.edu/cancercontroltap/sites/cancercontroltap/files/Survivorship%20Report.pdf

[11] Institute of Medicine & National Research Council of the National Academies. (2006). *Employment, insurance, and economic issues*. In M. Hewitt, S. Greenfield, & E. Stovall (Eds.), From cancer patient to cancer survivor: Lost in transition (chapter 6). Retrieved from www.nap.edu/read/11468

[12] New York State Cancer Registry. (2017). *Snapshot of cancer in New York.* Retrieved from https://www.health.ny.gov/statistics/cancer/registry/pdf/snapshot

[13] New York State Cancer Registry. (2017). *Cancer Incidence and Mortality in New York State, 1976-2015.* Retrieved from www.health.ny.gov/statistics/cancer/registry

[14] United States Department of Health and Human Services Office of Disease Prevention and Health Promotion. (2017). *Disparities*. Retrieved from www.healthypeople.gov/2020/about/DisparitiesAbout.aspx

[15] National Cancer Institute. (2016). *Health disparities*. https://cancercontrol.cancer.gov/research-emphasis/health-disparities.html

[16] New York State Cancer Registry. (2017). *Snapshot of cancer in New York.* Retrieved from https://www.health.ny.gov/statistics/cancer/registry/pdf/snapshot

[17] United States Census Bureau. (2016). Population estimates July 1, 2015 [Data file]. Retrieved from https://www.census.gov/quickfacts/table/PST045215

[18] United States Department of Health and Human Services. (2017). *Social determinants of health*. Retrieved from www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

[19] New York State Cancer Registry. (2017). *Maps of cancer incidence by county*. Retrieved from www.health.ny.gov/statistics/cancer/registry/cntymaps/index.htm

[20] New York State Cancer Registry. (2017). *Maps of cancer incidence by county*. Retrieved from www.health.ny.gov/statistics/cancer/registry/cntymaps/index.htm

BACKGROUND

Diabetes has reached epidemic proportions in New York State (NYS) and across the nation, and is one of the major public health threats of our time. Nationally, diabetes affects 30.3 million Americans, or 9.4% of the population. An additional 84.1 million adults (33.9%) have prediabetes and are at high risk of developing diabetes in the future.[1] People with prediabetes have blood glucose levels higher than normal, but not high enough to be diagnosed as diabetes. Without intervention, 15% to 30% of people with prediabetes will develop type 2 diabetes within five years.[2] If current trends continue, more than 50% of Americans could have diabetes or prediabetes by 2020, costing $3.35 trillion in medical care and lost productivity over the next decade.[3]

Diabetes is a chronic disease in which blood sugar (glucose) levels are above normal. Normally, body cells access the energy stored in glucose, which is created from digestion of food, through a process involving the hormone insulin. In people with diabetes, this process is impaired. In type 1 diabetes, the pancreas fails to produce insulin, while in type 2 diabetes, body cells become resistant to insulin.4 Type 2 diabetes accounts for 90% to 95% of all diagnosed cases of diabetes, and type 1 diabetes accounts for about 5%.[5] Type 2 diabetes can sometimes be prevented with appropriate lifestyle changes.

Both type 1 and type 2 diabetes are characterized by high blood sugar or hyperglycemia. Over time, high blood sugar damages nerves and blood vessels, leading to complications such as heart disease, stroke, blindness, kidney disease, and amputations. Other complications of diabetes may include increased susceptibility to other diseases, loss of mobility with aging, depression and problems during pregnancy.[6]

The risk factors for type 2 diabetes include characteristics that cannot be modified, including race, ethnicity, family history and age, and behavioral and lifestyle characteristics that can be modified, including sedentary behavior, eating habits and the management of other chronic conditions, such as hypertension, sleep apnea and obesity.[7] Many of these are also risk factors for prediabetes. Gestational diabetes, or diabetes during pregnancy, is a risk factor for developing prediabetes or type 2 diabetes later in life.

In 2015, diabetes was the seventh leading cause of death in the United States (US), and was listed as a cause of death on 252,806 death certificates that year (crude rate, 78.7 per 100,000).[8] Diabetes is not only a common and serious disease, but it is also very costly. The total direct and indirect estimated cost of diagnosed diabetes in the US in 2012 was $245 billion.[1] Medical expenditures for people diagnosed with diabetes are more than double those for people without diabetes.[9] A sustainable reduction in the health and economic burden of diabetes requires effective partnerships among clinicians, public health organizations, community-based lifestyle programs, and third-party payers.[10]

BURDEN

In NYS, an estimated 1.6 million people, or 10.5% of the adult population, have been diagnosed with diabetes, with almost 761,000 of those individuals living in New York City.[11] The prevalence of diagnosed diabetes varies by county across the state, from 5.4% in Tompkins County to 16.0% in the Bronx. The five counties with the highest prevalence are: Bronx (16.0%), Oneida (15.6%), Yates (14.6%), Essex (14.2%) and Seneca (14.2%). The five counties with the lowest prevalence are: Rockland (7.9%), Rensselaer (7.7%), Greene (7.6%), Columbia

(6.0%) and Tompkins (5.4%) (Figure 1). Even though prevalence rates may be low, counties with low prevalence may still have a significant number of adults with diabetes due to large population size.

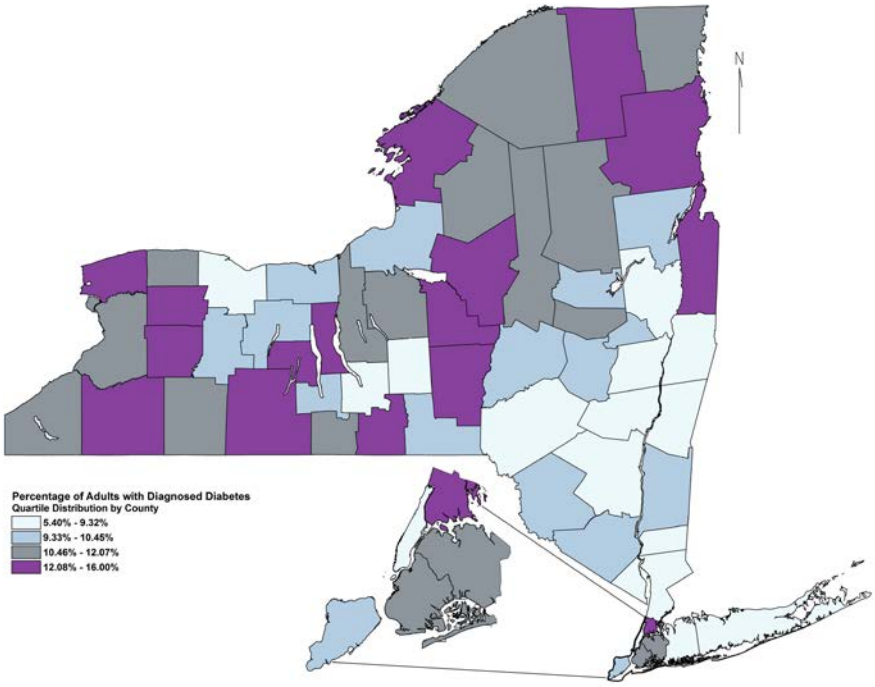


Figure 1: Percentage of adults with Diagnosed Diabetes by NYS County, BRFSS 2016
Source: 2016 NYS Behavioral Risk Factor Surveillance System (BRFSS)

Another 1.5 million people, or 9.9% of adults in NYS without diabetes, have been diagnosed with prediabetes.[12] Given that national data indicate only 11.6% of people with prediabetes are aware of their condition, it is estimated that significantly more New Yorkers have prediabetes but are undiagnosed.[1] Among NYS adults who have not been diagnosed with diabetes, almost six in ten adults (58.3%) report receiving a test for high blood sugar or diabetes within the past three years.[13]

The prevalence of diagnosed prediabetes varies by county across the state, from 4.7% in Lewis County to 13.4% in Kings County (Brooklyn). The five counties with the highest prevalence are: Kings (13.4%), Nassau (12.6%), Clinton (12.6%), Queens (12.3%) and Wyoming (12.2%). The counties with the lowest prevalence are: Niagara, Fulton and Yates (6.3%), Cortland (6.0%), Rensselaer (5.8%), Tompkins (5.1%) and Lewis (4.7%) (Figure 2). Even though prevalence rates may be low, counties with low prevalence may still have a significant number of adults with diabetes due to large population size.

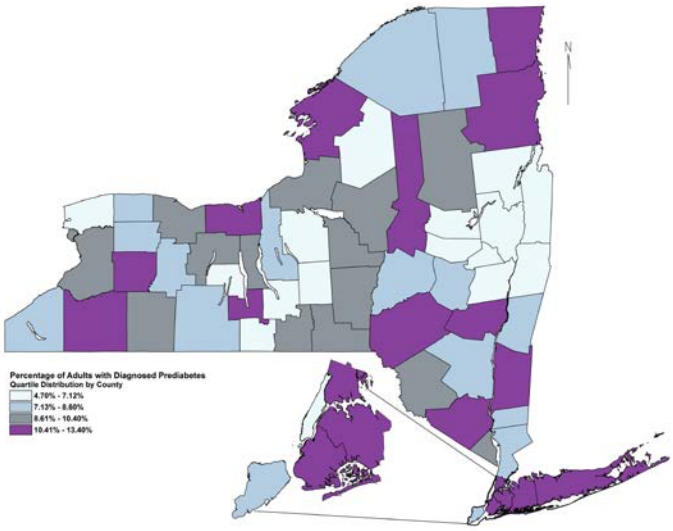


Figure 2: Percentage of adults with Diagnosed Prediabetes by NYS County, BRFSS 2016
Source: 2016 NYS Behavioral Risk Factor Surveillance System (BRFSS)

Gestational diabetes, or diabetes that develops during pregnancy, is a risk factor for developing type 2 diabetes later in life. According to data from the 2013 NYS Pregnancy Risk Assessment Monitoring System, 10.3% of women who had live births report being told by a health care provider that they had gestational diabetes during their most recent pregnancy.[14]

Diabetes and prediabetes tend to co-occur with obesity. More than 60.8% of NYS adults are either overweight (35.3%) or obese (25.5%). High blood pressure is also an important risk factor for both diabetes and prediabetes. Nearly three-quarters (74.4%) of NYS adults with diabetes report being diagnosed with hypertension, or high blood pressure, compared to only 26.7% of those without diabetes.[15]

Prediabetes can be prevented through lifestyle change programs, including the Centers for Disease Control and Prevention's (CDC) National Diabetes Prevention Program (NDPP). Lifestyle change programs, like the NDPP, focus on physical activity, healthy eating, and weight loss for people with or at risk for prediabetes, and have been shown to reduce the risk of developing type 2 diabetes by 58%.[16] These programs are recognized by the CDC's Diabetes Prevention Recognition Program (DPRP). As of July 2017, NYS has a total of 139 recognized organizations delivering the NDPP. Of the 8,376 New Yorkers who have attended the program, 5,982 (71.4%) have either a blood test indicating prediabetes or a history of gestational diabetes.

If not properly managed, diabetes can lead to serious complications. In general, adults with diagnosed diabetes are more likely to report being in fair or poor health compared to adults without diabetes (45.5% vs. 13.6%, respectively).[17] Nearly one-quarter (23.5%) of adults with diagnosed diabetes report being told by a doctor that diabetes has affected their eyes.[18] Cardiovascular disease is another common comorbidity of diabetes: 23.7% of NYS adults living with diabetes reported having a heart attack, angina, coronary heart disease and/or stroke in their lifetime, compared to only 5.7% of NYS adults without diabetes.[19]

Hospitalizations for diabetes are often preventable and may be considered a marker for poor diabetes control. In NYS, the age-adjusted rate of hospitalization where diabetes is the primary diagnosis is 17.3 per 10,000.[20] When diabetes is included as any diagnosis code, the rate of hospitalization is much higher at 210.8 per 10,000.[21]

Short-term complications of diabetes, which include ketoacidosis, hyperosmolarity, and coma, are life-threatening emergencies that can be prevented. The rate of hospitalization for short-term complications of diabetes is 3.0 per 10,000 for children aged 6-17 and 6.6 per 10,000 for adults over the age of 18.[22,23]

Diabetes is the seventh leading cause of death in NYS.[24] According to NYS Vital Statistics data, the age-adjusted diabetes mortality rate is slightly higher in NYC (20.3 per 100,000) when compared to NYS overall (17.3 per 100,000).[25]

The economic costs of diabetes in NYS are staggering. In 2011, it was estimated that approximately 8% of NYS Medicaid members had diabetes, and that those members accounted for 20% of the overall annual Medicaid costs ($9.9 billion).[26]

Fortunately, diabetes can be managed through a combination of high quality preventive care, medication use, and self-management. According to BRFSS data, most adults with diabetes (92.6%) reported seeing a healthcare professional for diabetes care in the past year, and 79.4% reported having their A1c tested at least twice in the past year. Nearly three-quarters of adults with diabetes report receiving an eye exam (73.7%) or having their feet checked by a healthcare professional (73.6%) in the past year. However, only 38.6% of adults with diabetes reported ever attending a class or course on diabetes self-management.[27]

In 2016, nearly two-thirds (63%) of Commercial HMO and 58% of Medicaid managed care (MMC) members with diabetes received the three clinical preventive care services recommended in national guidelines for diabetes management (A1c test, nephropathy screening, and eye exam). In the same year, 57% of MMC members with diabetes and 55.6% of Commercial HMO members with diabetes had blood glucose in good control (A1c <8.0). Similarly, 68% of MMC members with diabetes and 62% of Commercial HMO members had their blood pressure controlled (<140/90 mmHg).[28]

DATA TRENDS

Figure 3 shows that the prevalence of self-reported, diagnosed diabetes among adults in NYS has remained stable over the past six years, ranging from 10.4% in 2011 to 10.5% in 2016). As of 2016, more than 1.6 million adult New Yorkers have been diagnosed with diabetes. By comparison, the prevalence of self-reported, diagnosed prediabetes has significantly increased over the past six years, from 5.4% in 2011 to 9.9% in 2016. As of 2016, more than 1.5 million adult New Yorkers have been diagnosed with prediabetes.

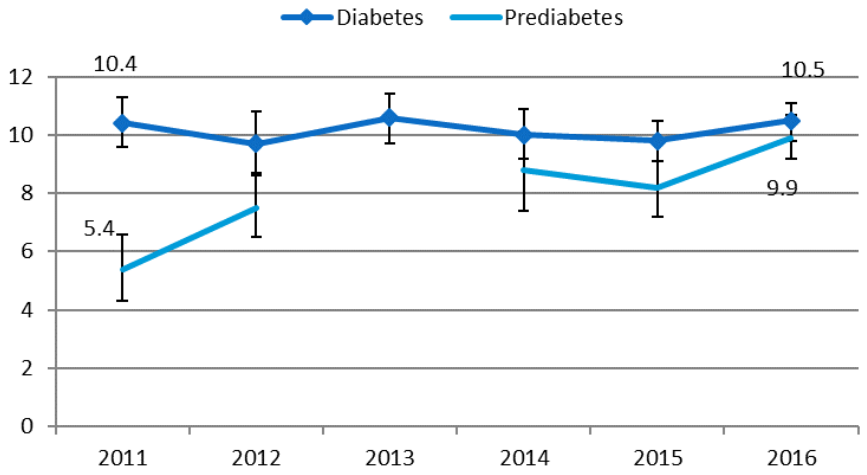


Figure 3: Diabetes and prediabetes prevalence among adults (18+), 2011-2016, NYS
Source: NYS BRFSS; Prediabetes data not available for 2013

Diabetes control for Commercial and Medicaid managed care members has remained relatively stable since 2009. A majority of (55.6%) and Medicaid (57.1%) managed care members with diabetes had blood glucose levels in good control in 2015 (Figure 4).

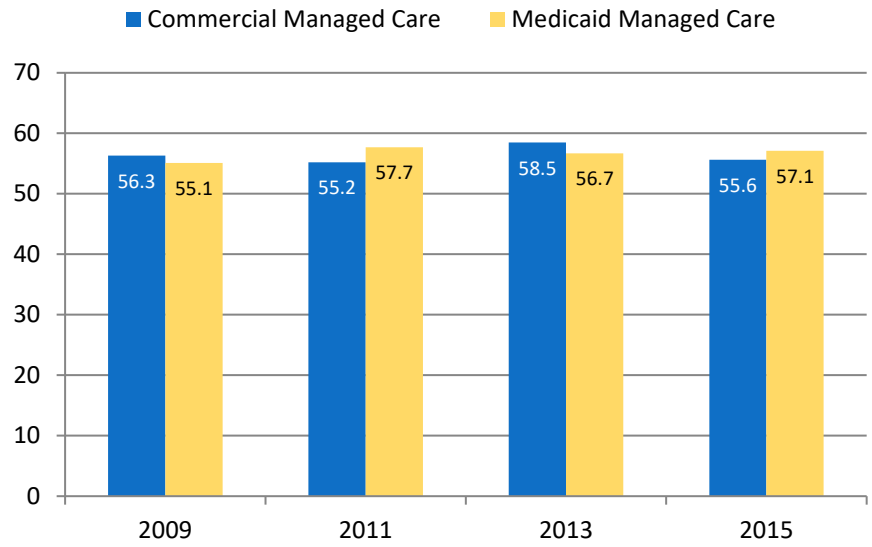


Figure 4: Percentage of Adult Health Plan Members with Diabetes who have Blood Glucose in Good Control (A1c<8.0), 2009-2015, NYS
Source: NYS Quality Assurance Reporting Requirements (QARR)

Hospitalizations for short-term complications of diabetes have increased among adults but remained relatively stable for youth over the past 10 years. The rate of hospitalizations for short-term complications among adults aged 18+ years increased from 5.4 per 10,000 in 2003 to 6.6 per 10,000 in 2014. The rate of hospitalizations for short-term complications among youth aged 6-17 years remained stable at 2.9 per 10,000 over the same time (Figure 5).

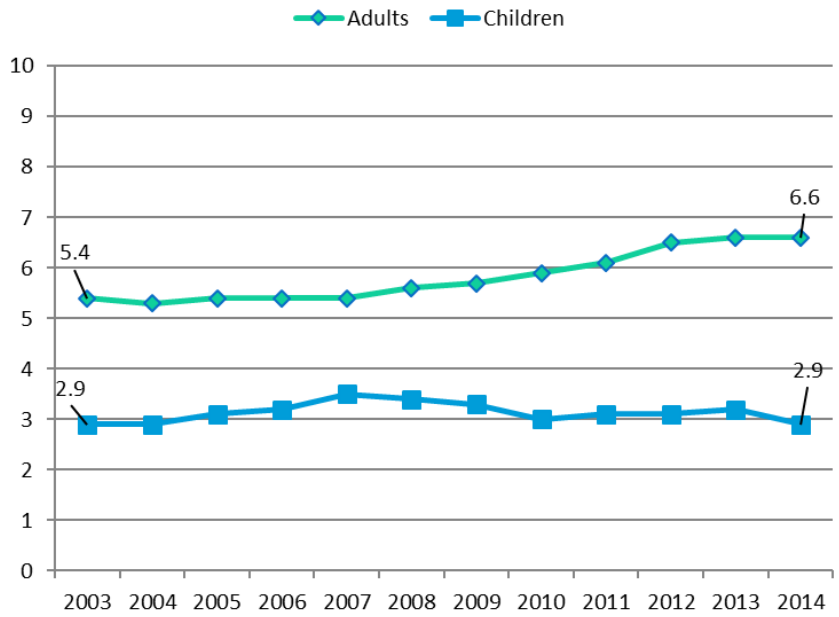


Figure 5: Rate of Hospitalization per 10,000 Residents for Short-term Complications of Diabetes for Children Aged 6-17 and Adults Aged 18+ Years, NYS, 2003-2014
Source: SPARCS

DISPARITIES

Diabetes disproportionately affects certain segments of the population, including racial and ethnic minorities, the elderly, people with disabilities, and those who are socioeconomically disadvantaged. While the prevalence and incidence of diabetes have increased among all populations in the US over the past 20 years, racial and ethnic minorities, and socioeconomically disadvantaged groups have experienced the steepest increases and borne much of the disease burden.[29]

New York State

- The risk of diabetes increases with age and is most prevalent among adults over the age of 65 (23.3%). Prediabetes prevalence also increases with age. [30]
- Self-reported diabetes is more prevalent among non-Hispanic blacks (13.8%) and Hispanics (11.6%) than among non-Hispanic whites (8.8 %).
- Non-Hispanic blacks (13.0%) and those who identify as other non-Hispanic (14.4%) are more likely to report being diagnosed with prediabetes than non-Hispanic whites (8.9%) and Hispanics (8.0%).
- Adults with annual household incomes less than $15,000 are nearly three times as likely to report having diabetes as adults with annual household incomes of more than $70,000 (18.3% versus 6.4%).
- Self-reported diabetes prevalence is highly correlated with education. Adults with less than a high school education were nearly three times as likely to report being diagnosed with diabetes than adults who graduated college (18.5% vs. 6.8%, respectively).
- Self-reported diabetes prevalence is higher among people who are overweight (10.9%) and obese (19.4%) compared to people who are neither overweight or obese (4.7%). Individuals who are obese are also more than three times as likely to report being diagnosed with prediabetes (17.7%) compared to those who are neither overweight nor obese (5.6%).

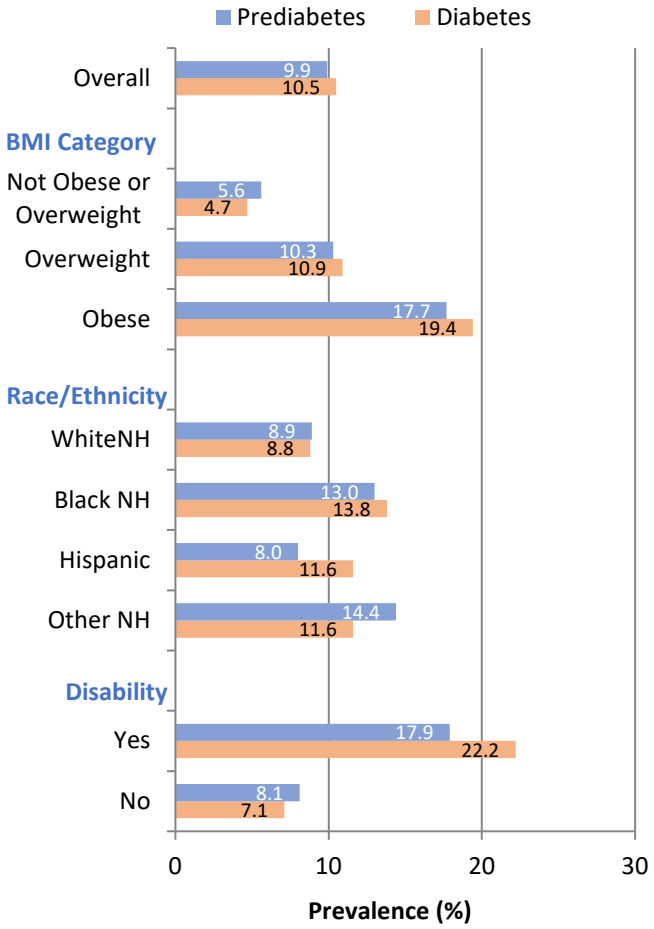


Figure 6: Diabetes and Prediabetes Prevalence Among Adults (18+), by Selected Demographic Factors, NYS, 2016

- In 2016, self-reported diabetes was more prevalent among adults with a disability (22.2%) than among adults without a disability (7.1%). Adults with a disability are also more likely to report being diagnosed with prediabetes (17.9%) compared to those without a disability (8.1%)

Access to Care

- Individuals who are insured by Medicare and Medicaid are more likely to report having been diagnosed with diabetes (20.8% and 12.8%, respectively) than those who have private insurance (7.1%).[31]

- Testing for high blood sugar is significantly less prevalent among adults without insurance (43.0%) and adults who report having Medicaid (55.5%) compared to adults who report having Medicare (66.0%) or private insurance (60.4%).
- NYS adults with a regular healthcare provider were significantly more likely to receive a test for high blood sugar in the past three years than those without a regular healthcare provider (62.8% vs 36.4%, respectively).
- Non-Hispanic black adults are more likely to report having a test for high blood sugar in the past three years (65.0%) compared to Hispanic adults (53.0%) and non-Hispanic white adults (58.7%).

Complications

- Among adult New Yorkers with diabetes, Hispanics (34.9%) are more likely to have diabetic retinopathy, or eye disease, (34.9%) than non-Hispanic whites (15.6%). [32]
- The age-adjusted hospitalization rate per 10,000 population for which diabetes was the primary diagnosis was much higher among non-Hispanic blacks (36.9/10,000) and Hispanics (20.7/10,000) than among non-Hispanic whites (14.2/10,000) and non-Hispanic Asian/Pacific Islanders (12.1/10,000). [33]
- The rate of hospitalizations for short-term complications of diabetes was higher among non-Hispanic black adults (15.2/10,000) and Hispanic adults (5.7/10,000) than among non-Hispanic whites (4.6/10,000) and non-Hispanic Asian/Pacific Islanders (0.9/10,000).
- Similarly, the rate of hospitalizations for short-term complications of diabetes among children aged 6-17 years was higher among non-Hispanic blacks (4.7/10,000) than among non-Hispanic whites (2.3/10,000), Hispanics (2.0/10,000) and Asian/Pacific Islanders (0.6/10,000).

Mortality

- In NYS, blacks are twice as likely as whites to die from diabetes.[34]
- In NYS in 2014, diabetes was the third leading cause of death among non-Hispanic blacks and the fourth leading cause of death among American Indian and Alaska Natives. Diabetes was not in the top five leading causes of death for non-Hispanic whites, non-Hispanic Asian/Pacific Islanders, and Hispanics.

SOCIAL DETERMINANTS

Social determinants of health are conditions in the environments in which people are born, live, learn, work, play, worship and age that affect a wide range of health and quality-of-life outcomes and risks.[35] Social determinants influence the development and progression of type 2 diabetes. Poverty and lack of access to resources such as adequate housing, transportation, nutritious food, and healthcare services, can have a negative impact on diabetes management. When diabetes goes unmanaged, it can lead to reductions in productivity, loss of employment, chronic stress, and poor mental health, which further exacerbate disparities.[36]

A first step to addressing social determinants is to strengthen data collection capacity to analyze social, economic, and biologic factors more effectively.[38] An improved understanding of the link between social determinants of health and diabetes can help develop new strategies for improving diabetes outcomes in at-risk communities where health disparities are most common. Health professionals must promote interdisciplinary interventions that bring together partners from housing, education, transportation, employment, and safety, among others, to improve diabetes prevention and management among vulnerable populations.[37]

References

[1] Centers for Disease Control and Prevention (CDC). National diabetes statistics report, 2017. Atlanta (GA): CDC, U.S. Dept. of Health and Human Services; 2017. Available from: https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

[2] Centers for Disease Control and Prevention. Prediabetes[online]. 2015. Accessed October 20, 2017.

[3] United Health Group. The United States of Diabetes: Challenges and Opportunities in the Decade Ahead. Minnetonka (MN): UHG; 2010. Available from: http://www.unitedhealthgroup.com/~/media/UHG/PDF/2010/UNH-Working-Paper-5.ashx?la=en Accessed October 20, 2017.

[4] National Institute of Diabetes and Kidney Diseases, National Institutes of Health. Diagnosis of Diabetes, National Diabetes Clearinghouse[online]. Available from: http://diabetes.niddk.nih.gov/dm/pubs/diagnosis Accessed October 20, 2017.

[5] Centers for Disease Control and Prevention. Diabetes: Successes and Opportunities for Population-Based Prevention and Control: At a Glance, 2016. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2016. Available at: https://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2016/diabetes-aag.pdf Accessed October 20, 2017.

[6] National Institute of Diabetes and Kidney Diseases, National Institutes of Health. Preventing Diabetes Problems, National Diabetes Clearinghouse[online]. Available from: https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems Accessed October 20, 2017.

[7] National Institute of Diabetes and Kidney Diseases, National Institutes of Health. Risk Factors for Type 2 Diabetes, National Diabetes Clearinghouse[online]. Available from: https://www.niddk.nih.gov/health-information/diabetes/overview/risk-factors-type-2-diabetes Accessed October 20, 2017.

[8] Centers for Disease Control and Prevention. About Underlying Cause of Death 1999–2015. CDC WONDER Database. http://wonder.cdc.gov/ucd-icd10.html. Updated December 2016.

[9] American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. Diabetes Care. 2013;36(4):1033–1046.

[10] Venkat Narayan KM, Williamson DF. Prevention of type 2 diabetes: risk status, clinic, and community. *J Gen Intern Med*. February 2010; 25(2):154-7.

[11] NYS Behavioral Risk Factor Surveillance System, 2016

[12] Ibid

[13] Ibid

[14] NYS Pregnancy Risk Assessment Monitoring System (PRAMS), 2013, Available from: https://www.health.ny.gov/statistics/prams/reports/tables/table_pg_gdb_2013_nys.htm Accessed October 23, 2017.

[15] NYS Behavioral Risk Factor Surveillance System, 2016

[16] National Institute of Diabetes and Kidney Diseases, National Institutes of Health. Diabetes Prevention Program[online]. October, 2008. Available from: https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/diabetes-prevention-program-dpp/Documents/DPP_508.pdf Accessed October 20, 2017.

[17] NYS Behavioral Risk Factor Surveillance System, 2016

[18] NYS Behavioral Risk Factor Surveillance System, 2015

[19] NYS Behavioral Risk Factor Surveillance System, 2016

[20] NYS SPARCS 2012-2014, Data as of August 2016. Available from: https://www.health.ny.gov/statistics/chac/hospital/h11.htm Accessed October 20, 2017.

[21] NYS SPARCS 2012-2014, Data as of August 2016. Available from: https://www.health.ny.gov/statistics/chac/hospital/h12.htm Accessed October 20, 2017.

[22] NYS SPARCS 2012-2014, Data as of August 2016. Available from: https://www.health.ny.gov/statistics/chac/hospital/h47.htm Accessed October 20, 2017.

[23] NYS SPARCS 2012-2014, Data as of August 2016. Available from: https://www.health.ny.gov/statistics/chac/hospital/h48.htm Accessed October 20, 2017.

[24] NYS Vital Statistics, 2015, Available from: https://www.health.ny.gov/statistics/vital_statistics/2015/table34a.htm, Accessed October 20, 2017.

[25] NYS Vital Statistics, 2013-2015, Data as of April 2017. Available from: https://www.health.ny.gov/statistics/chac/mortality/d22.htm Accessed October 20, 2017.

[26] Office of Quality and Patient Safety, Division of Quality Measurement. Quality Connection: Diabetes Self-Management Education/Training Use Among Medicaid Recipients. Volume 5, Issue 1. June 2015. Available from: https://www.health.ny.gov/health_care/managed_care/reports/docs/2015-06-vol5_no1_qarrqcv.pdf Accessed October 31, 2017.

[27] NYS Behavioral Risk Factor Surveillance System, 2015

[28] NYS Quality Assurance Reporting Requirements (QARR), 2016. Available at: https://www.health.ny.gov/health_care/managed_care/reports/eqarr/

[29] CDC Health Disparities and Inequities Report, MMWR. January 14, 2011.

[30] NYS Behavioral Risk Factor Surveillance System, 2016

[31] NYS Behavioral Risk Factor Surveillance System, 2016

[32] NYS Behavioral Risk Factor Surveillance System, 2015

[33] NYS SPARCS 2014

[34] NYS Vital Statistics, 2014, Data as of March 2016

[35] The Institute of Medicine. Disparities in Health Care: Methods for Studying the Effects of Race, Ethnicity, and SES on Access, Use, and Quality of Health Care, 2002.

[36] Hill J, Nielsen M, Fox MH. Understanding the Social Factors that Contribute to Diabetes: A Means to Informing Health Care and Social Policies for the Chronically Ill. Perm J. 2013 Spring; 17(2):67-72. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3662286/pdf/permj17_2p0067.pdf Accessed November 8, 2017.

[37] Jack L, Jack NH, Hayes C. Social Determinants of Health in Minority Populations: A Call for Multidisciplinary Approaches to Eliminate Diabetes-Related Health Disparities. Diabetes Spectrum 2012; 25(1):9-13. Available from: http://spectrum.diabetesjournals.org/content/diaspect/25/1/9.full.pdf Accessed November 9, 2017.

BACKGROUND

Cardiovascular disease (CVD), including heart disease and stroke, is the leading cause of death in New York State (NYS). In 2015, there were 54,457 deaths from CVD, representing 35.4% of all deaths in NYS. Nationally, 30.7% of all deaths were due to CVD in 2015.[1] That year, approximately 1.2 million adults in NYS reported having had a heart attack, stroke or angina; 4.6 million reported having high blood pressure; and the same number reported having elevated cholesterol.[2]

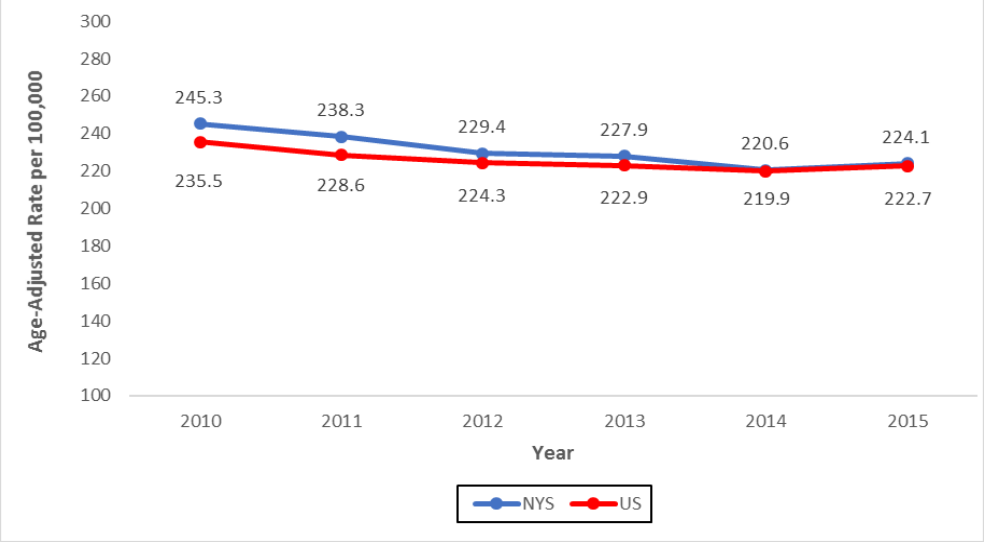
CVD is responsible for nearly 17% of national health expenditures.[3] Nationally, the total direct and indirect medical costs of CVD are projected to more than triple from $316 billion to $1044 billion by 2030.[4] By 2035, it is projected that nearly half of the United States (US) will have some form of CVD.[5]

Many cases of CVD are preventable. The major modifiable risk factors for CVD are elevated blood pressure, elevated cholesterol, uncontrolled diabetes, smoking, obesity, lack of physical activity, and poor diet (high sodium, low fruit and vegetable intake). Some nonmodifiable risks for CVD are related to heredity, medical history, age, gender, and race. Many risk factors do not have any signs or symptoms so it is important to see a doctor regularly. Controlling these risk factors through health behavior change and appropriate medication could reduce the chance of CVD by more than 80%.[3]

DATA TRENDS

Mortality

- The 2015 age-adjusted CVD mortality rate was slightly higher in NYS than the national age-adjusted mortality rate (224 deaths per 100,000 population in NYS vs. 222 deaths per 100,000 population nationwide) (Figure 1). After decades of decline, progress has slowed in preventing CVD and stroke deaths in the US and in NYS.[1]



Source: Centers for Disease Control and Prevention (CDC)

Figure 1: Cardiovascular Disease Mortality Rate by Year, NYS and US

- In NYS, the age-adjusted stroke mortality rate declined from 27.9 per 100,000 in 2005-2007 to 26.1 in 2013-2015.[6] In 2015, the stroke mortality rate in NYS was lower than the US rate (26.0 per 100,000 people in NYS vs. 37.6 nationwide).[1]

- Mortality rates for CVD associated with hypertension (HTN) increased slightly since 2009 and have been consistently higher in NYS than in the US.[1]

Hospitalizations

- In 2014, there were 297,765 hospital discharges due to CVD in NYS. The age-adjusted hospital discharge rate for all CVD decreased from 184.0 per 10,000 of population in 2005 to 129.5 in 2014.[7,8]

- In NYS, the age-adjusted hospital discharge rate for stroke declined from 26.7 per 10,000 in 2005 to 22.5 per 10,000 in 2014.[8]

- Hospitalization with a primary diagnosis of HTN has been identified as an indicator of poor outpatient care. In NYS, the crude rate of HTN-related hospitalizations decreased from 8.0 per 10,000 in 2009 to 6.0 per 10,000 in 2014, with the highest rates being in New York City (NYC) (8.2 per 10,000 vs. 4.4 per 10,000 in NYS excluding NYC in 2014).[10]

Risk Factors

- Obesity and tobacco use are significant risk factors for HTN and CVD. Despite reductions in mortality, with the exception of a decline in smoking, the prevalence of several CVD risk factors have increased or slightly decreased. Obesity rates in NYS have risen in recent years and are likely to lead to continued increases in HTN rates. (See Tobacco Prevention Agenda Challenge Report and Obesity Prevention Agenda Challenge Report.)

- According to self-reported data in NYS Behavioral Risk Factor Surveillance System (BRFSS), the prevalence of adults with high blood pressure (HBP) decreased slightly from 30.7% in 2011 to 29.3% in 2015 (Figure 2). The prevalence of elevated cholesterol (among those who had ever had their blood cholesterol checked) also declined overall from 38.8% in 2011 to 36.6% in 2015.[2]

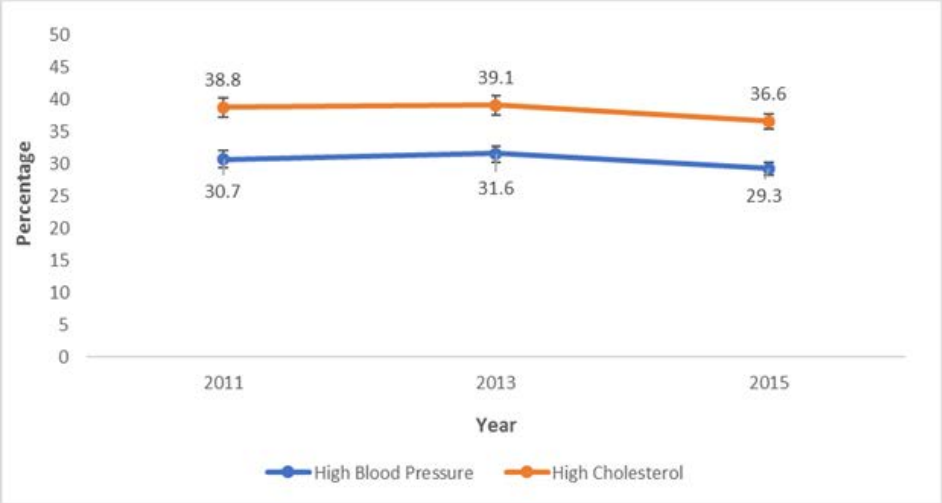


Figure 2: Diagnosed High Blood Pressure and High Cholesterol Among NYS Adults, BRFSS 2011-2015

DISPARITIES AND SOCIAL DETERMINANTS

Despite decades of effort to reduce health disparities in CVD, they continue to persist. The persistence of health disparities is rooted in long standing social and structural issues, or the social determinants of health. Social determinants of health are conditions in the environments in which people are born, live, learn, work, play, worship and age that affect a wide range of health, function and quality-of-life outcomes and risk.[11] In NYS:

- Almost one-quarter of Hispanics and black non-Hispanics (24% and 20%, respectively) live below the poverty line compared to 6.5% of white non-Hispanics.

- Over half of black non-Hispanics and Hispanics (57% and 55%, respectively) die prematurely (<75 yrs.) compared to 34.6% of white non-Hispanics.[12]

Minority populations bear the greatest burden of CVD in the US and in NYS. The national initiative Million Hearts® is focused on improving cardiovascular outcomes for black/African Americans as a priority population to reach an overall nationwide goal of preventing one million heart attacks and strokes by the year 2022.[13] The NYS Prevention Agenda 2013-2018 also sets specific targets for improving the use of evidence-based care to manage chronic diseases for black/African Americans, including controlling HTN. In NYS, disparities exist for minority populations in cardiovascular conditions, outcomes, and risk factors.

Cardiovascular Disease

The age-adjusted mortality rate for CVD was higher for black non-Hispanics (202.8 per 100,000) compared to white non-Hispanics (173.3) and Hispanics (141.1); and higher in black non-Hispanic males (256.6) compared to white non-Hispanic and Hispanic males (214.8 and 181.0 respectively).[14]

Stroke

Stroke is the fourth leading cause of death in the US and in NYS. Healthy People (HP) 2020 set a target of reducing stroke death rates to 34.8 per 100,000. NYS has achieved the HP 2020 goal with a mortality rate for stroke of 25.7. However, a closer look at the death rates by race and ethnicity shows:

- Black non-Hispanics have an age adjusted mortality rate of 27.7 per 100,000 compared to white non-Hispanics (24.3 per 100,000) and Hispanics (22.8 per 100,000).[14]

Hypertension

HTN is one of the leading risk factors for CVD, stroke, and heart disease. NYS's Prevention Agenda has a goal of achieving a 70% HTN control rate for black adults in Medicaid managed care programs.[15] Currently in NYS, the overall HTN control rate is 56% among adults in Medicaid Managed Care programs while the HTN control rate for adults in commercial Managed Care programs is 63%.[16]

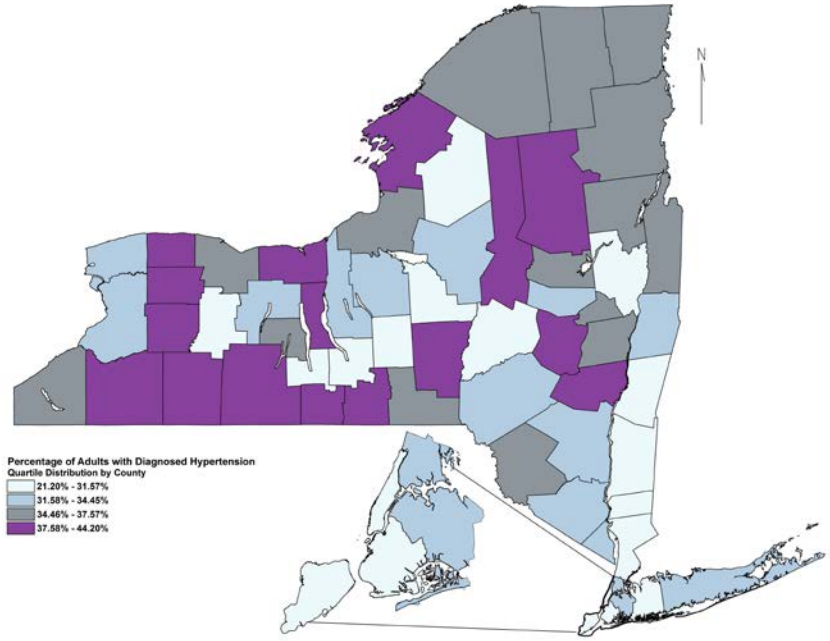
- In 2015, the prevalence of HBP was 33.8% in black non-Hispanic adults, versus 30.6% and 25.0% of white non-Hispanics and Hispanics, respectively.[2]

- Among adults diagnosed with HBP, 75.6% are taking medicine to control their condition. Those aged 18-44, males, and Hispanics are significantly less likely to be taking medication for their HBP than those 45 years and older, females, and non-Hispanic whites.[2]

- The mortality rate related to hypertension in NYS is 15.7 per 100,000 for black non-Hispanics compared to white non-Hispanics 7.8 per 100,000.[17]

The prevalence of hypertension by county is shown in Figure 3.

Figure 3: Percentage of Adults with Diagnosed Hypertension, New York State by County, BRFSS 2016



Cholesterol

Healthy People 2020 has a goal of reducing the proportion of people with high total blood cholesterol (>=240mg/dl) to 13.5%. In NYS, 36.6% of adults have high cholesterol. The disparities in cholesterol control are related to social determinants other than race and ethnicity. In NYS, someone with less than a high school education or a household income below $25,000 is significantly more likely to have high cholesterol than someone who is a college graduate or has a household income greater than $50,000. [2]

Many NYS adults have more than one chronic disease. Among adults with diabetes, 67% reported having hypertension and 66% have elevated cholesterol. Among obese adults, 44% reported having HTN and 48% said they have elevated cholesterol.

References

[1] Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2015 on CDC WONDER Online Database, released December, 2016. Data are from the Multiple Cause of Death Files, 1999-2015, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html

[2] NYS Behavioral Risk Factor Surveillance System, 2015.

[3] Center for Disease Control and Prevention (CDC) https://www.cdc.gov/chronicdisease/resources/publications/aag/heart-disease-stroke.htm

[4] American Heart Association. https://www.heart.org/idc/groups/ahamah-public/@wcm/@sop/@smd/documents/downloadable/ucm_491265.pdf

[5] American Heart Association. http://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_491543.pdf

[6] Interactive Atlas of Heart Disease and Stroke, Centers for Disease Control and Prevention (CDC), Division of Heart Disease and Stroke Prevention, https://nccd.cdc.gov/DHDSPAtlas/Reports.aspx

[7] Statewide Planning and Research Cooperative System (*SPARCS) 2012 - 2014 (data as of August, 2016).* https://www.health.ny.gov/statistics/chac/hospital/h1.htm

[8] Statewide Planning and Research Cooperative System (*SPARCS) 2012 - 2014 (data as of August, 2016).* http://www.health.ny.gov/statistics/chac/hospital/h1_999.htm

[9] Statewide Planning and Research Cooperative System (*SPARCS) 2012 - 2014 (data as of August, 2016).* http://www.health.ny.gov/statistics/chac/hospital/h5_999.htm

[10] Statewide Planning and Research Cooperative System (*SPARCS) 2012 - 2014 (data as of August, 2016).* https://www.health.ny.gov/statistics/chac/hospital/h6_999.htm

[11] Centers for Disease Control and Prevention – Division of Community Health. *A Practitioner's Guide for Advancing Health Equity: Community Strategies for Preventing Chronic Disease*. Atlanta, GA: US Department of Health and Human Services; 2013. https://www.cdc.gov/NCCDPHP/dch/pdf/HealthEquityGuide.pdf

[12] NYS Department of Health County Health Indicators by Race and Ethnicity (CHIRE) 2012-2014. https://www.health.ny.gov/statistics/community/minority/county/newyorkstate.htm

[13] US Department of Health and Human Services. Million Hearts Campaign. https://millionhearts.hhs.gov/about-million-hearts/index.html

[14] NYS Department of Health Annual Report of Vital Statistics 2014. https://www.health.ny.gov/statistics/vital_statistics/docs/vital_statistics_annual_report_2014.pdf

[15] NYS Department of Health. https://www.health.ny.gov/prevention/prevention_agenda/2013-2017/

[16] https://www.health.ny.gov/health_care/managed_care/reports/eqarr/

[17] NYS Department of Health. https://www.health.ny.gov/statistics/vital_statistics/2015/table33a.htm

BACKGROUND

A healthy diet can reduce the risk of many chronic diseases, such as obesity, cardiovascular disease, diabetes, osteoporosis, and some cancers. Poor nutrition, on the other hand, can negatively affect growth, development, and health status. Food insecurity is a household-level economic and social condition of limited or uncertain access to nutritionally adequate food.[1, 2] Statistics reported by the USDA indicate that in 2016 more than 41 million people in the US lived in food-insecure households.[3] Adults experiencing food insecurity are at increased risk of chronic diseases such as hypertension, heart disease, diabetes, stroke, cancer, hepatitis, asthma, arthritis, chronic obstructive pulmonary disease and kidney disease.[2] Pregnant women, infants, children, and older people are especially vulnerable. The current Dietary Guidelines for Americans recommend a healthy eating pattern that includes a variety of vegetables from all the subgroups. Fruits are also recommended in a healthy eating pattern, especially whole fruits. The Healthy US-Style Eating Pattern at the 2,000-calorie level recommends 2 ½ cup-equivalents of vegetables and 2 cup-equivalents of fruit per day.[3] Substituting fruits and vegetables for higher calorie foods can support a healthy weight, meet nutrient needs, and help reduce the risk of stroke, high blood pressure, diabetes, and some cancers.[4]

Consumption of sugar-sweetened beverages (SSBs) has decreased over the past 20 years, but Americans still consume an average of 138 calories from SSBs on a given day. Studies have found that SSB consumption is linked to weight gain, metabolic syndrome, dental caries and type 2 diabetes in adults.[5] SSBs provide only empty calories; they are of little to no nutritional value. Consumers who drink sweetened beverages have been shown to have an overall lower quality diet.[6]

Choosing beverages with no added sugars and consuming more vegetables and fruits can help individuals to achieve a healthy diet. For most people, adopting healthy behaviors like these requires a supportive environment. People need ready access to affordable healthy foods and beverages, and limited access to less healthy foods and beverages, to support nutritious diets.

BURDEN

Consuming a diet rich in fruits and vegetables is an important part of a healthy lifestyle. The National Fruit and Vegetable Alliance National Action Plan 2015 Report Card indicates that per capita vegetable and fruit consumption (excluding fried potatoes) has declined 5% between 2009 and 2014.[4] An increased fruit and vegetable intake is associated with a lower risk of mortality from all causes.[7] A reduction of sodium intake to 2300 mg/day from the current 3500 mg/day level might save $1,990/person per year in hypertension treatment in the US.[8] Additional savings of $1,568/person per year in cardiovascular treatment costs could be achieved with increasing consumption of vegetables and fruit from 0.5 cups or less per day/per person to 1.5 cups or more per day/per person.[8]

In New York, more than 4.5 million adults in NYS consume fruit less than once a day, and almost 3 million consume a sugary drink at least once a day. Data for monitoring nutrition indicators in NYS come from the Youth Risk Behavior Surveillance System (YRBSS), Youth Tobacco Survey (YTS), and the Behavioral Risk Factor Surveillance System (BRFSS). The prevalence of perceived food security is shown in Figure 1. In 2016, 76.4% of NYS adults were food secure and 23.6% were food insecure. The prevalence of low fruit consumption and high SSB consumption is shown in Figure 2 for youth and adults. The percentage of high school students who report eating fruit or drinking 100% fruit juice less than once a day is 43.8% (YRBSS). The percentage of middle and high school students who report drinking soda or other at least once a day is 22.3 (YTS). The percentage of

adults who report consuming fruit less than once a day is 37.4%, and the percentage of adults who report consuming soda or other at least once a day is 23.2% (BRFSS). Figure 3 shows that the prevalence of SSB consumption varies by county in NYS.

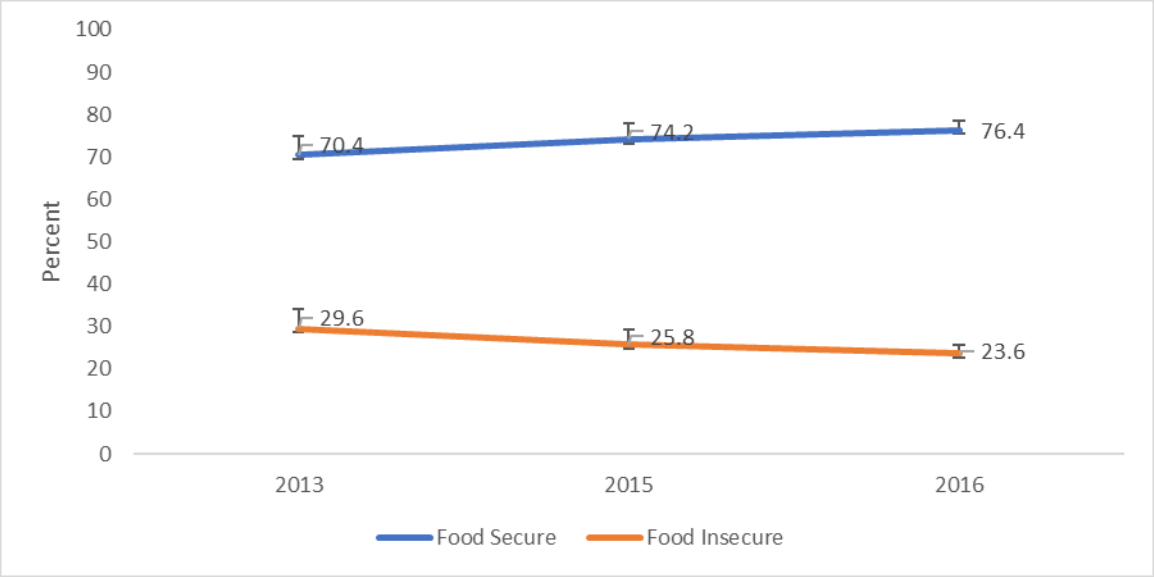


Figure 1: Perceived food security among NYS adults, BRFSS 2013, 2015, 2016

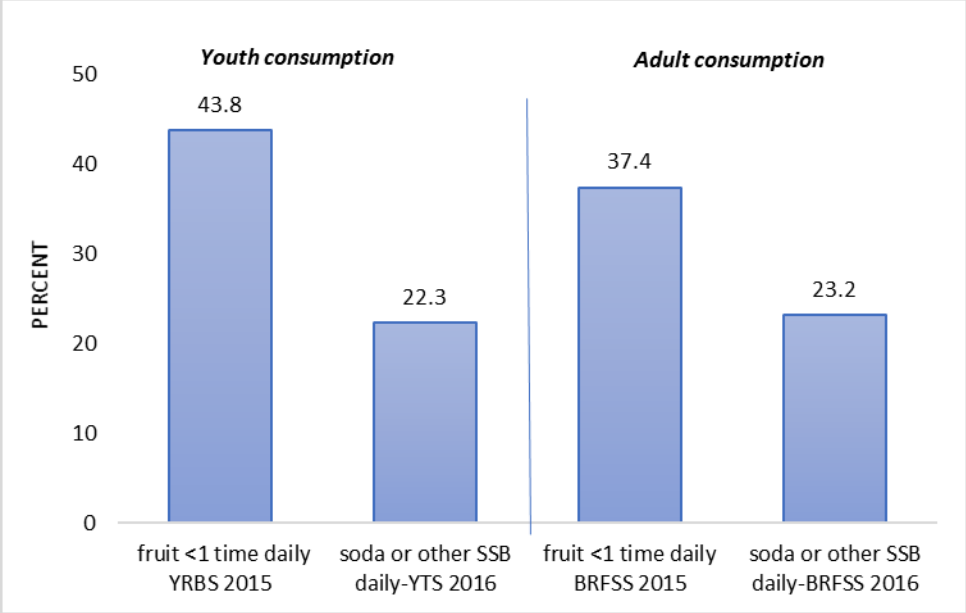


Figure 2: Key nutrition indicators in NYS
Sources: NYS Youth Risk Behavior Surveillance System, NYS Youth Tobacco Survey, NYS Behavioral Risk Factor Surveillance Survey

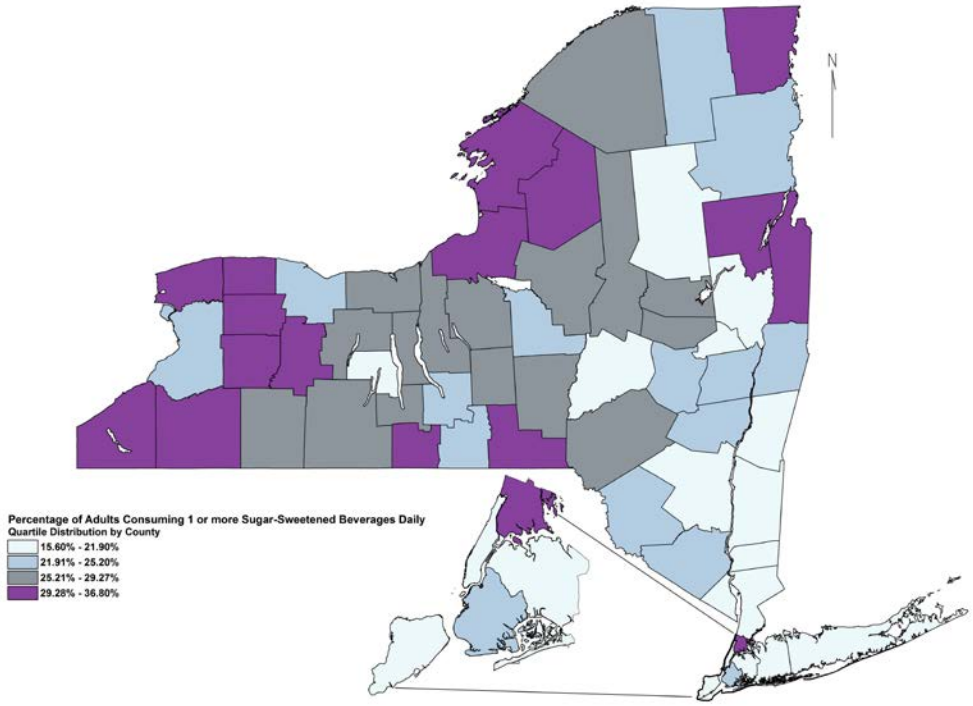


Figure 3: Daily consumption of at least one regular soda or other SSBs, by county (BRFSS data)

DATA TRENDS

The percentage of high school students in NYS who reported unhealthy nutrition behaviors from 2007 to 2015 is depicted in Figure 4. The percentage of students who reported consuming fruit less than once a day was stable between 2007 (38.5%) and 2013 (37.2%), but it increased suddenly in 2015 (43.8). Survey results from 2017 will help determine if this change represents a trend or an anomaly. The prevalence of students who reported consuming soda at least once a day decreased from 24% in 2007 to 14% in 2015. This decrease coincides with an increase in consumption of "other SSBs" such as sport drinks and energy drinks; unfortunately, consumption of "other SSBs" was not captured in the YRBS during the years the reduction in soda consumption was observed.

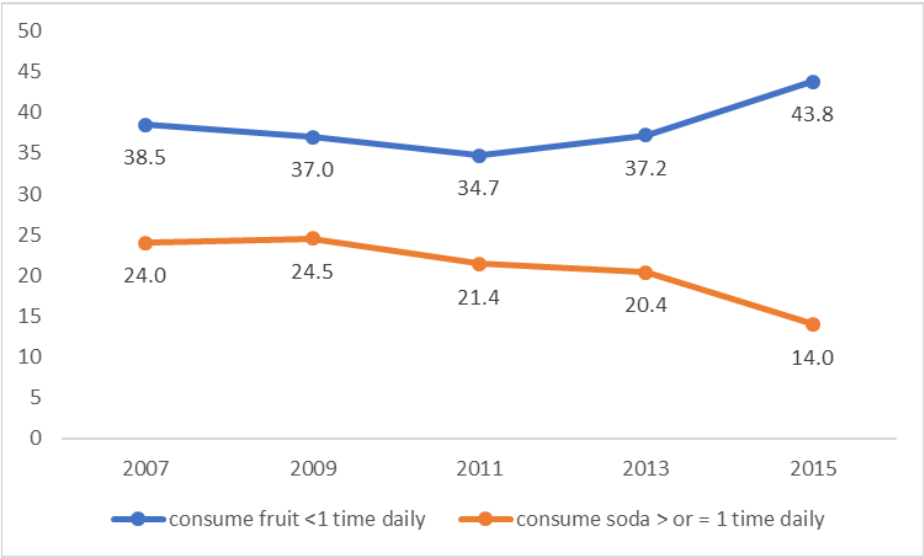


Figure 4: Trends in percentage of high school students in NYS who report consuming fruit less than once a day and consuming regular soda at least once a day (YRBS data)
Source: New York Youth Risk Behavior Surveillance System.
(Note: This data source does not track consumption of "other SSBs")

The percentage of adults in NYS who reported unhealthy nutrition behaviors from 2011 to 2015 is depicted in Figure 5. The percentage of adults who reported consuming fruit less than once a day increased from 33.9% in 2011 to 37.4% in 2015. The percentage of adults who reported consuming vegetables less than once a day was relatively stable during the same time-period (23% in 2011 and 22.4% in 2015). The prevalence of adults who report consuming fruit less than once a day is consistently higher than the prevalence of adults who report consuming vegetables less than once a day.

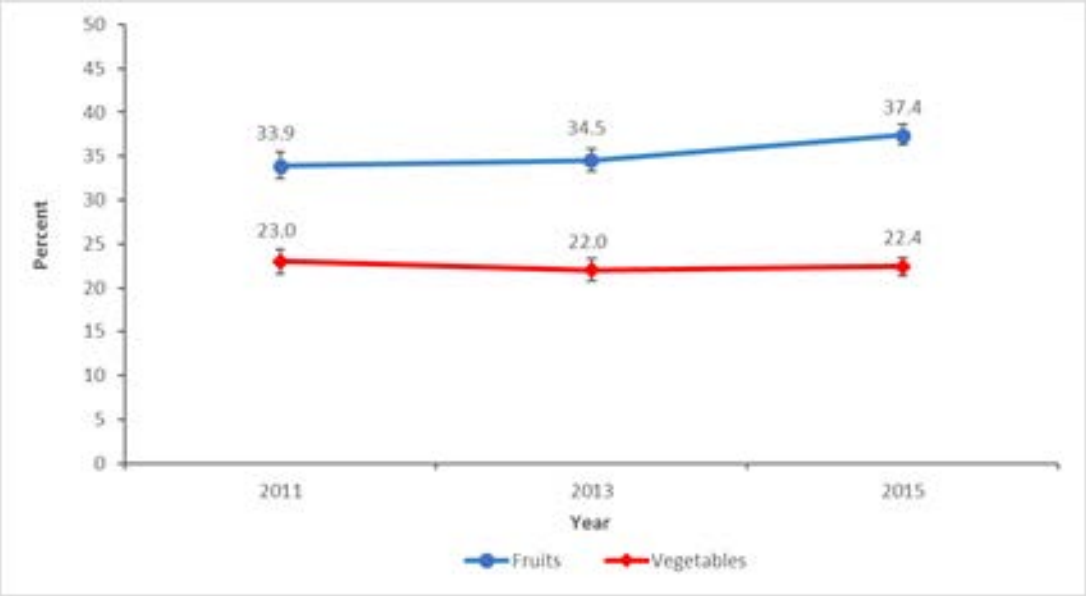


Figure 5: Trends in percentage of NYS adults who report consuming fruits and vegetables less than once a day
Source: New York Behavioral Risk Factor Surveillance System

As shown in Figure 6, there has been no significant change in the percentage of adults reporting consuming soda or other SSBs at least once a day between 2012 (22.2%) and 2016 (23.2%), although there was a temporary decline in 2015 (19.6).

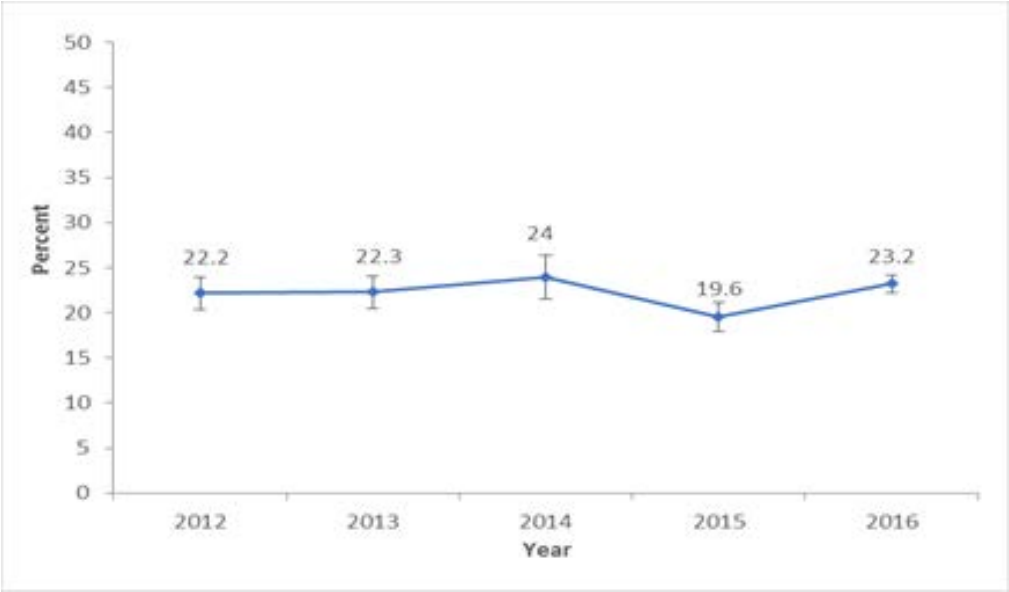


Figure 6: Trends in percentage of NYS adults who report consuming regular soda or other SSBs at least once a day
Source: New York Behavioral Risk Factor Surveillance System

DISPARITIES

It is especially challenging for families living in low-income neighborhoods or in rural areas, and for communities of color to access healthy food.[9] Easy access to food sources that are calorie-dense but not nutrient-dense can be a barrier to healthy eating and may play a part in obesity.[10] In addition to difficulty with access, there are additional disparities in the quality, variety, quantity and cost of healthy food that is available to these families. Residing in closer proximity to healthy food stores is associated with improved nutritional intake and reduced risk of obesity and diet-related illnesses.[9]

The percentage of students in NYS who report unhealthy nutrition behaviors by sex, grade, and race/ethnicity is shown in Table 1. For consumption of fruit less than once a day, prevalence is highest for students who are male (45.8%), in 10th grade (46.1%), or black (47.5%). Prevalence of this behavior is lowest for students who are female (41.5%), in 12th grade (42.9%), or white (41.2%). For consumption of soda or other SSBs at least once a day, prevalence is highest for students who are male (23.6%), in high school (23.8%), or black (29%). Prevalence of this behavior is lowest for students who are female (21.0%), in middle school (20.1%), or white (19.2%).

	2015 YRBS **Consume fruit < 1 time daily (%)**	***2016 YTS*** **Consumed soda or other SSB daily (%)**
Sex		
Male	45.8	23.6
Female	41.5	21.0
Grade		
6th-8th	--	20.1
9th	43.5	23.8
10th	46.1	
11th	43.1	
12th	42.9	
Race/Ethnicity		
White, non-Hispanic	41.2	19.2
Black, non-Hispanic	47.5	29.0
Hispanic	45.8	26.8
Other, non-Hispanic	45.9	16.5
Sources: NY Youth Risk Behavior Surveillance System and NY Youth Tobacco Survey		

Table 1: Percentage of students in NYS who report unhealthy nutrition behaviors, by sex, grade, and race/ethnicity (YRBS and YTS)

The percentage of NYS adults who reported unhealthy nutrition behaviors by demographic characteristics is shown in Table 2. For consumption of fruit less than once a day, prevalence is highest for adults who are black or Hispanic (39.8% and 39.3%, respectively), live in households that earn less than $25,000 a year (40.4% and 43.7%), have less than a high school education (42.1%), or are living with disability (41.7%). For this behavior, prevalence is lowest for adults who are non-Hispanic white (36%), living in households that earn $50,000 or more (34.4%), have a college degree (31.8%), or are living without disability (36.2%).

For consumption of vegetables less than once a day, prevalence is highest for adults who are non-Hispanic black (29.3%), live in households that earn less than $15,000 a year (32.8%), have less than a high school education (30.5%), or are living with disability (29.8%). For this behavior, prevalence is lowest for adults who are non-Hispanic white (20.5%), living in households that earn $50,000 or more (16.5%), have a college degree (14.6%), or are living without disability (20.4%).

For consumption of soda or other SSBs at least once a day, prevalence is highest for adults who are non-Hispanic black (31.3%), live in households that earn less than $15,000 a year (35.4%), have less than a high school education (33.3%), or are living with disability (28.2%). For this behavior, prevalence is lowest for adults who are non-Hispanic white (19.9%), living in households that earn $75,000 or more (15.5%), have a college degree (13.5%), or are living without disability (21.8%).

	2015 BRFSS **Consume fruit < 1 time daily (%)**	***2015 BRFSS*** **Consume veggies < 1 time daily (%)**	***2016 BRFSS*** **Consume soda or other SSBs daily (%)**
Race/ethnicity			
White, non-Hispanic	36	20.5	19.9
Black, non-Hispanic	39.8	29.3	31.3
Hispanic	39.3	23.9	28.9
Other, non-Hispanic	37.7	21.3	20.8
Annual household income			
<$15,000	40.4	32.8	35.4
$15,000-$24,999	43.7	28.4	29.4
$25,000-$34,999	37	24.8	25.3
$35,000-$49,999	39.4	22.3	25.1
$50,000-$74,999	34.4	16.5	22.0
$75,000 and greater	--	--	15.5
Missing	36.6	26.3	24.5
Education			
Less than high school	42.1	30.5	33.3
High school or GED	40.7	28.8	29.3
Some post-high school	38.2	21.4	23.2
College graduate	31.8	14.6	13.5
Disability Status*			
Yes	41.7	29.8	28.2
No	36.2	20.4	21.8
*In 2015, includes respondents who reported having at least one of five types of disability: cognitive, mobility, vision, self-care or independent living. In 2016, includes respondents who reported at least one of six types, including deafness. ***Source: New York Behavioral Risk Factor Surveillance System***			

Table 2: Percentage of NYS adults who report unhealthy nutrition behaviors, by selected demographic characteristics (BRFSS data)

SOCIAL DETERMINANTS

Highlighting the importance of social determinants, Healthy People 2020 set a goal to "create social and physical environments that promote good health for all."[11] Nutritious food and beverages that are affordable and accessible to all are crucial to a person's health. Access to healthy food is particularly limited in low-income, rural, and minority neighborhoods that have few supermarkets (food deserts) and an abundance of fast food restaurants and convenience stores (food swamps). Research suggests that access to healthy food is associated with improved diets and lower risk for diet-related chronic diseases. A comprehensive policy, system and environmental approach is needed to increase access to affordable healthy food which will improve the physical and economic well-being of these communities.[9]

References

[1] Anderson SA. *Core Indicators of Nutritional State for Difficult to Sample Populations,* J. Nutr. 1990 120:1557S-1600S.

[2] Gregory CA, Coleman-Jensen A. *Food Insecurity, Chronic Disease, and Health Among Working-Age Adults,* ERR-235, U.S. Department of Agriculture, Economic Research Service, July 2017.

[3] Coleman-Jensen A, Rabbitt M, Gregory CA, Singh A. 2017. *Household Food Security in the United States in 2016*, ERR-237, U.S. Department of Agriculture, Economic Research Service.

[4] U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015-2020 *Dietary Guidelines for Americans. 8th Edition*. December 2015. Available at http://health.gov/dietaryguidelines/2015/guidelines/

[5] New York State Department of Health. Fruit and Vegetable Consumption New York State Adults 2015. BRFSS Brief, Number 1711.

[6] New York State Department of Health. Sugar-Sweetened Beverages: New York State Adults, 2016. BRFSS Brief, Number 1703.

[7] Piernas C, Mendez MA, NG SW, Gordon-Larsen P, Popkin BM. *Low-calorie and calorie-sweetened beverages: diet quality, food intake, and purchase patterns of US household consumers.* Am J Clin Nutr. 2014 Mar;99(3):567-77.

[8] Wang X, Ouyang Y, et al. *Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies.* BMJ 2014;349: g4490.

[9] Zhang,D, Cogswell ME, et al. Evidence of Dietary Improvement and Preventable Costs of Cardiovascular Disease. *Am J Cardiol.* 2017;120 (9):1681-1688.

[10] Bell J, Mora G, Hagan E, Rubin V, Karpyn A. Access to Healthy Food and Why It Matters: A Review of Research. Oakland, CA: PolicyLink, 2013.

[11] Ver Ploeg M, et al. Access to affordable and nutritious food-measuring and understanding food deserts and their consequences: report to Congress. US Department of Agriculture, Economic Research Service. *Administrative publication AP-036. June 2009.*

[12] Healthy People 2020 [Internet]. Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion [cited 10.17.17] https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Obesity

BACKGROUND

Obesity and overweight are currently the second leading cause of preventable death in the US and may soon overtake tobacco as the leading cause.[1] By the year 2050, obesity is predicted to shorten life expectancy in the US by two to five years.[2] Nationally, 18.5% of children and adolescents aged 2-19 are obese, and obesity prevalence among adults exceeds 39%.[3,4] In NYS, an estimated 8.5 million adults are overweight or obese.[5] NYS ranks second among states in medical expenditures attributable to obesity. Expenditures (2009 dollars) totaled $11.1 billion, with $4 billion financed by Medicaid and $2.7 billion financed by Medicare.[6] Preventing and controlling obesity has the potential to save hundreds of millions of dollars annually. Failing to win the battle against obesity will mean premature death and disability for an increasingly large segment of New York residents. Without strong action to reverse the obesity epidemic, for the first time in history, children may face shorter life spans than their parents.[7]

Obesity is a significant risk factor for many chronic diseases and conditions that reduce the quality of life for adults, including Type 2 diabetes, asthma, heart disease, high blood pressure, high cholesterol, stroke, several forms of cancer, and osteoarthritis. Increasingly, some of these conditions are being seen in children.[8]

For most children and adults, overweight is the result of unhealthy eating patterns (too many calories) and too little physical activity. Because these habits are established in childhood, efforts to prevent obesity should begin early. The causes of obesity are complex, and occur at social, economic, environmental, and individual levels. Successful prevention strategies should employ public health approaches, including policy and environmental change strategies that reach large numbers of people in multiple settings, such as childcare, schools, workplaces, communities, and health care.

BURDEN

The financial burden of obesity in NYS is significant. Estimates suggest that without obesity, medical expenditures among states would be 7% to 11% lower. Therefore, effective measures to prevent and control obesity are needed to contain healthcare costs.[2] Obesity also casts a shadow over New York's economic future. Nationally, adolescent overweight is expected to result in large economic and health burdens, particularly lost productivity from premature death and disability.[9]

The rise in obesity is directly linked to the rise in diabetes. NYS is experiencing a twin epidemic of diabetes and obesity. Between 1999 and 2009, the prevalence of both diabetes and obesity increased among adults.[10] Because obesity is a leading risk factor for diabetes, the increase in obesity prevalence translates to nearly one million additional New Yorkers at risk for diabetes and its associated costs of healthcare and lost productivity.

DATA TRENDS

Data describing the prevalence of obesity among New Yorkers comes from multiple surveillance systems, including the Pediatric Nutrition Surveillance System (PedNSS), the Student Weight Status Category Reporting System (SWSCRS), Fitnessgram, and the Behavioral Risk Factor Surveillance System (BRFSS).

- The prevalence of obesity among children aged 2-4 years old that participate in New York's Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is 13.7% (PedNSS data, 2016).[11]

- The prevalence of obesity among public school students in New York State exclusive of New York City is 17.3%, and the prevalence of overweight is 16.5%. One-third of NYS students are either overweight or obese (SWSCRS data, 2014-2016).[12]
- The prevalence of obesity among public school students in New York City is 20.4% and the prevalence of overweight is 17.6 %. More than 1 in 3 students in NYC are either overweight or obese (Fitnessgram data, 2015-6).[13]
- The prevalence of obesity among adults in New York State is 25.5%, and the prevalence of overweight is 35.3%. Almost two-thirds of NYS adults are overweight or obese. These conditions affect an estimated 8.5 million adults in NYS (BRFSS data, 2016).[5] As shown in Figure 1, the prevalence of adult obesity varies considerably across counties in NYS.

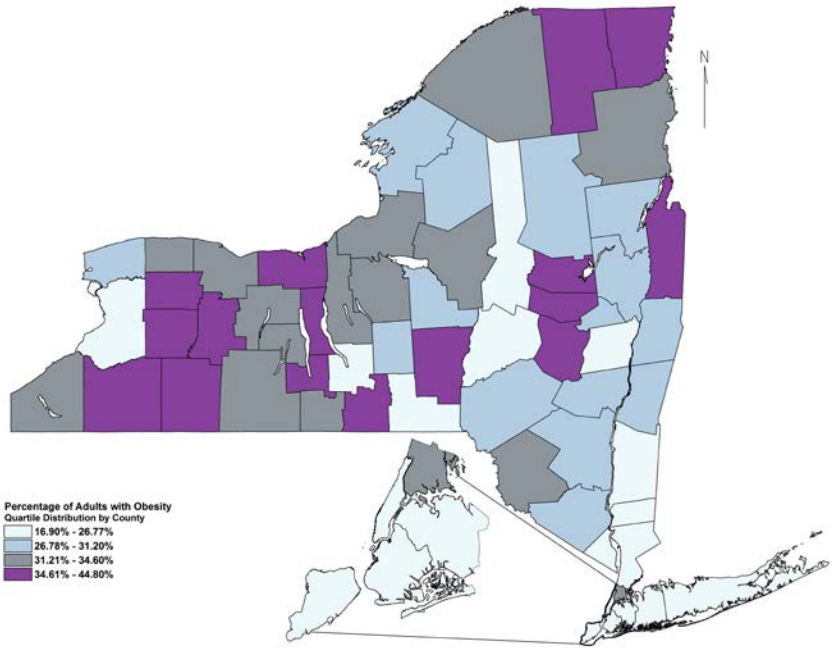


Figure 1. Prevalence of obesity in NYS adults, by county (BRFSS data)

Low Income Preschool Children

The prevalence of obesity among 2-4 year-old children enrolled in NYS's WIC program has declined over the past 10 years from 15.7% in 2006 to 13.7% in 2016 (see Figure 2), but it still exceeds the Healthy People 2020 target of 9.6%.

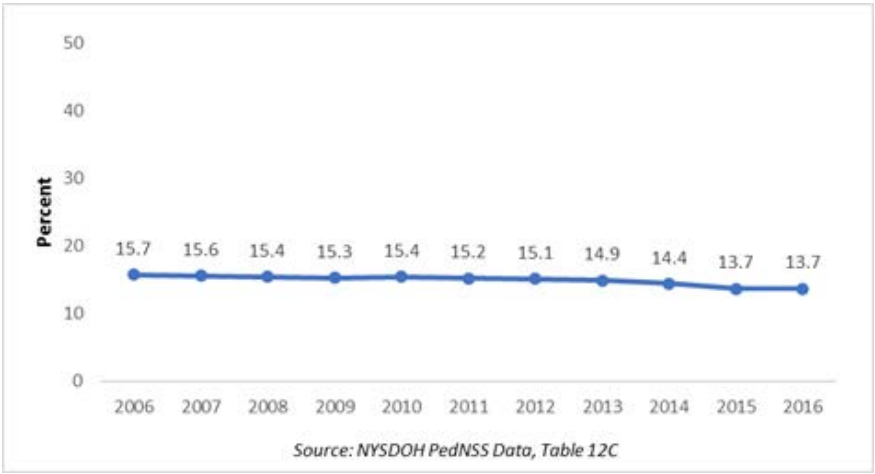


Figure 2: Trends in prevalence of obesity among 2-4 year old children enrolled in NYS's WIC program (PedNSS data, Table 12C)

School-Age Children

In NYS, the rise in childhood obesity rates has slowed. In some locations, it has even decreased. In NYS exclusive of NYC, the prevalence of obesity (BMI> 95th percentile) among public school students has not changed significantly over the past six years (see Figure 3). It was 17.6% in 2010-12, 17.3% in 2012-14, and 17.3% in 2014-16 (SWSCRS data). In NYC, rates of obesity in public school children in kindergarten through Grade 8 have declined from 21.7% in 2009-10 to 20.4% in 2015-16 (NYC Fitnessgram, 2018).[13]

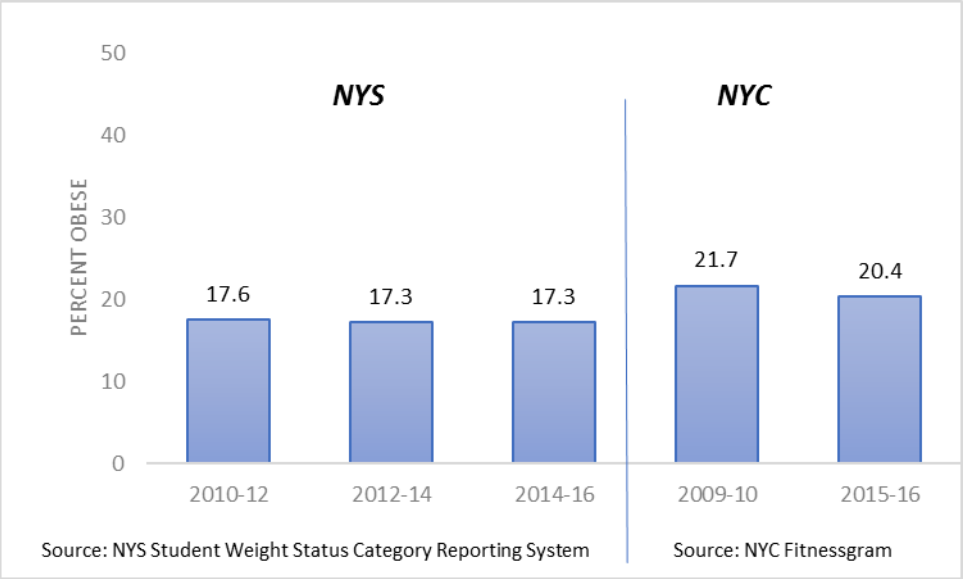


Figure 3: Trends in prevalence of obesity among public school students in NYS and NYC (SWSCRS and Fitnessgram data)

Adults

Trends in the prevalence of obesity are depicted in Figure 4. The prevalence of obesity among NYS adults has increased slightly over the past six years, from 24.5% in 2011 to 25.5% in 2016. During the same period, the prevalence of obesity among adults in the US increased from 27.8% to 29.9%. NYS adult obesity rates are consistently lower than national rates.

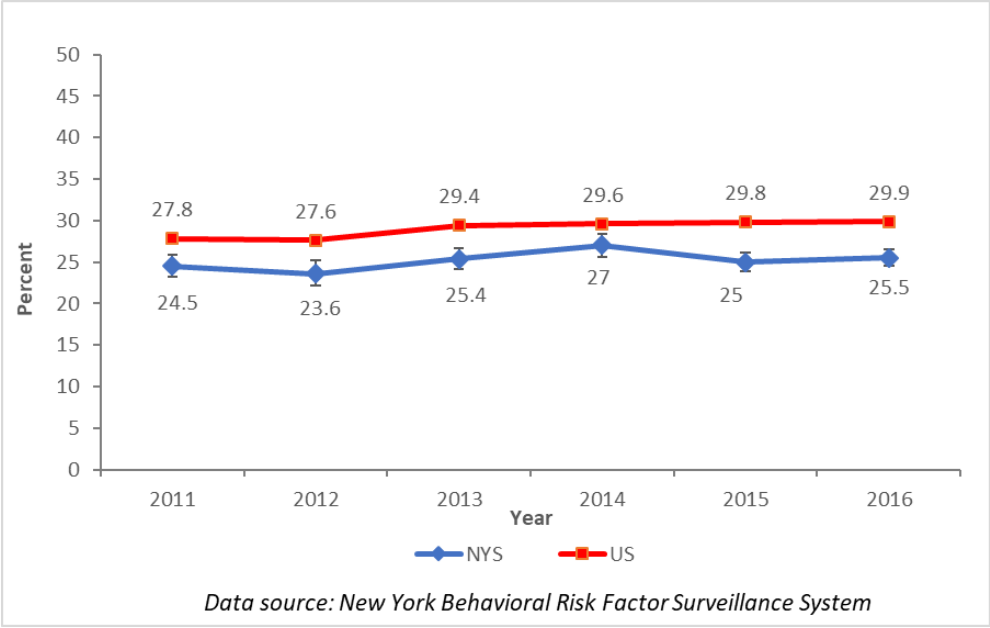


Figure 4: Trends in prevalence of obesity among adults, NYS and US (BRFSS data)

There are also trends in the prevalence of obesity throughout the life course. Overall, obesity rates increase as adults age, but rates of obesity are lower in adults 65 year or older than among adults between the ages of 35 and 64 years of age.[5] This pattern is likely a reflection of the connection between obesity and premature mortality.

DISPARITIES

Obesity disproportionately affects minorities and low-income individuals. Figure 5 shows the prevalence of obesity among 2-4 year-old children enrolled in NYS's WIC program, by race and ethnicity (PedNSS data, 2016). The prevalence of obesity is highest among Hispanic children (17%), and lowest among non-Hispanic white children (11.7%).

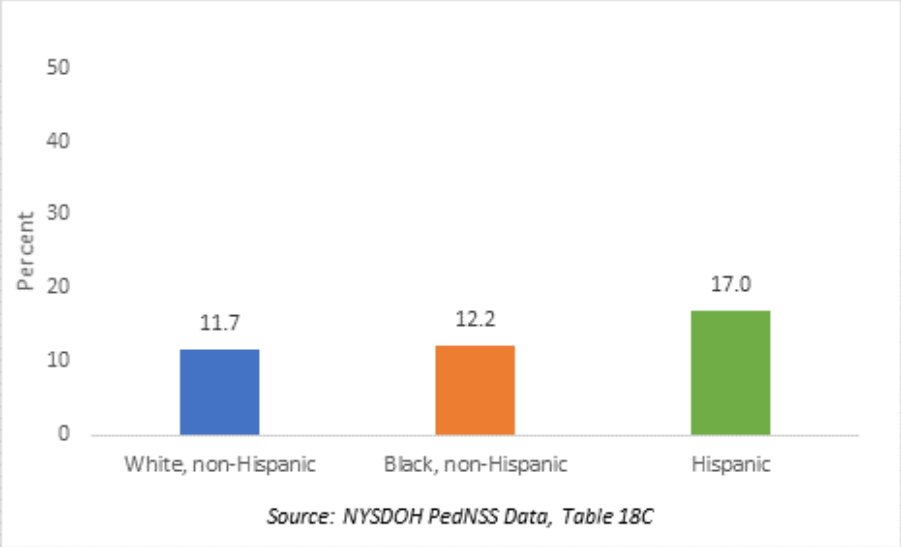


Figure 5: Prevalence of obesity among 2-4 year old children enrolled in NYS's WIC program, by race and ethnicity (2016 PedNSS data, Table 18C)

Table 1 shows the prevalence of obesity among NYS adults by demographic characteristics (BRFSS data, 2016). The prevalence of obesity is highest among adults who are black (33.8%) or Hispanic (29.8%), have an annual household income of less than $25,000 (30.5%), have a high school education (30.2%), or are currently living with disability (38.1%). The prevalence of obesity is lowest among adults who are non-Hispanic white (24.4%), have an annual household income of $75,000 or more (20.9%), or have a college degree (18.5%).

Rates of adult obesity also vary across geographic regions of the state. As depicted in Figure 1, the rate of obesity in adults is higher in counties in the southwestern, central, and northeastern regions of the state than in counties in the lower-Hudson and Long Island regions. Geography can impact both access to affordable healthy foods and opportunities to be physically active.[14,15]

	Obese (%)	CI
Race/Ethnicity		
White, non-Hispanic	24.4	23.4-25.5
Black, non-Hispanic	33.8	30.4-37.2
Hispanic	29.8	27.1-32.5
Other	13.6	10.4-16.7
Annual Household Income		
<$25,000	30.5	28.4-32.6
$25,000-$34,999	25.9	22.7-29.2
$35,000-$49,999	29.6	26.6-32.7
$50,000-$74,999	27.5	24.8-30.3
$75,000 and greater	20.9	19.3-22.6
Missing	21.8	19.1-24.6
Education		
Less than high school (HS)	31.9	28.6-35.2
High school or GED	30.2	28.2-32.3
Some post-HS	26.1	24.1-28.0
College graduate	18.5	17.2-19.8
Disability Status*		
Yes	38.1	35.8-40.3
No	21.9	20.9-23.0

Source: New York Behavioral Risk Factor Surveillance System, 2016

*All respondents who reported having at least one type of disability: cognitive, mobility, vision, self-care or independent living, or deafness.

Table 1: Prevalence of obesity among NYS Adults, by selected demographic characteristics (2016 BRFSS data)

SOCIAL DETERMINANTS

Conditions in the places where people live, learn, work, and play affect a wide range of health risks and outcomes, including obesity. These factors are known as social determinants of health.[16]

One of the overarching goals of Healthy People 2020 is to "create social and physical environments that promote good health for all."[16] Use of a Health Across All Policies approach is essential to addressing social determinants of obesity. Health Across All Policies is a collaborative approach that integrates health considerations into policymaking across all sectors to improve community health and wellness. It acknowledges that a community's greatest health challenges are complex and often linked with other societal issues that extend beyond healthcare and traditional public health activities. To successfully improve the health of all communities, health improvement strategies must target social determinants of health and other complex factors that are often the responsibility of non-health partners such as housing, transportation, education, environment, parks, and economic development.[17] Furthermore, strategies to improve any environment must ensure that their design and implementation are relevant to and inclusive of those living with a disability.

Applying these concepts to address obesity means ensuring the availability and accessibility of healthy foods and beverages, and opportunities for physical activity are available to all, regardless of where people live, what they earn, the level of education they've attained, the color of their skin, the language they speak, or their physical or mental abilities.

References

[1] Jia H, Lubetkin EI. Trends in quality-adjusted life-years lost contributed by smoking and obesity. *Am J Prev Med* 2010;38(2):138-144.

[2] Ludwig DS. Childhood obesity – the shape of things to come. *NEJM* 2007; 357:2325-2327.

[3] Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity among adults and youth: United States, 2015-16 *NCHS data brief, no 288.* Hyattsville, MD: National Center for Health Statistics. 2017. https://www.cdc.gov/nchs/data/databriefs/db288.pdf

[4] Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA* 2012;307(5):491-497.

[5] Behavioral Risk Factor Surveillance System, 2016. Available at: https://www.health.ny.gov/statistics/brfss/

[6] Trogdon JF, Finkelstein EA, Feagan CW and Cohen JW. State-and payer-specific estimates of annual medical expenditures attributable to obesity. *Obesity* 2012;20(1):214-220.

[7] Olshansky SJ, Passaro DJ, Hershow RC, et al. A potential decline in life expectancy in the United States in the 21st Century. *NEJM* 2005; 352:1138-1145.

[8] NYSDOH Obesity Prevention Program website. Available at: http://www.health.ny.gov/prevention/obesity/

[9] Lightwood J, Bibbins-Domingo K, Coxson P, et al. Forecasting the future economic burden of current adolescent overweight: an estimate of the coronary heart disease policy model. *Am J Public Health* 2009 Dec; 99(12):2230-7.

[10] New York State Department of Health. Dual epidemics of diabetes and obesity. Information for Action #2011-4. 3/25/2011. Available at: https://www.health.ny.gov/statistics/prevention/injury_prevention/infomation_for_action/docs/2011-4_ifa_report.pdf

[11] NYS Pediatric Nutrition Surveillance System (PedNSS), 2016. Available at: https://www.health.ny.gov/statistics/prevention/nutrition/pednss/2016/docs/state_level.pdf

[12] New York State Student Weight Status Category Report: 2014-16. Available at: https://health.data.ny.gov/Health/Student-Weight-Status-Category-Reporting-__Results-B/es3k-2aus/data

[13] Prevalence Estimates of Weight Class among NYC public school students, grades K-8, ages 5-15 from NYC FITNESSGRAM,2018. Prepared by NYC Department of Health and Mental Hygiene and New York City Department of Education, Office of School Health.

[14] Morland KB and Evenson, KB. Obesity prevalence and the local food environment. Health & Place 2009 June; 15(2) 491-495. https://doi.org/10.1016/j.healthplace.2008.09.004.

[15] Sallis, JF and Glanz, K. Physical activity and food environments: Solutions to the obesity epidemic. The Milbank Quarterly 2009 Mar.; 87(1) 123-154.

[16] Healthy People 2020. Social Determinants of Health. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health (accessed 11/29/2017)

[17] New York State Department of Health. Health Across All Policies. https://www.health.ny.gov/prevention/prevention_agenda/health_across_all_policies/ (accessed 11/29/2017)

BACKGROUND

Physical activity is bodily movement of any type and may include recreational, fitness and sport activities such as walking, biking, tennis, and strength training, as well as daily activities such as cleaning, climbing stairs or raking leaves.

Participating in regular physical activity has significant benefits across the lifespan. These behaviors lower the risk of chronic diseases and conditions, such as heart disease, stroke, high blood pressure, high cholesterol, type 2 diabetes and certain cancers. It can also contribute to an increase in life expectancy, better weight control, stronger muscles and bones, and improved mental health.[1] Studies suggest that moderate to high levels of physical activity substantially reduce, or even eliminate, the health risks associated with obesity.[2] An examination of existing meta-analyses on population-attributable risk of Alzheimer's disease found that In the United States (US), Europe and the United Kingdom, physical inactivity was the leading modifiable risk factor for Alzheimer's disease, ahead of diabetes, midlife hypertension, midlife obesity, depression, smoking, and low educational attainment.[3]

In 2008, the US Department of Health and Human Services released the Physical Activity Guidelines for Americans.[4] For substantial health benefits, all adults should engage in moderate-intensity physical activity for at least 150 minutes per week, or 75 minutes of vigorous-intensity aerobic activity, performed in bouts of at least ten minutes each. These guidelines include adults aged 65 and older as well as those with disabilities. Children and adolescents should accumulate 60 minutes or more of physical activity daily, including muscle and bone strengthening activities. Updated Physical Activity Guidelines are anticipated in 2018. The SHAPE America Active Start physical activity recommendations for young children from birth to age five years outline a variety of specific guidelines for infants, toddlers, and preschoolers.[5]

NYSDOH works with its partners to assess, develop, and evaluate evidence-based strategies to increase access to physical activity, using the socio-ecological approach across multiple sectors and levels of influence.

BURDEN

A sedentary lifestyle is a major risk factor for developing obesity and type 2 diabetes. The lack of regular physical activity increases the risk for premature death, hospitalizations, and hospital charges that might be averted through regular exercise.[6]

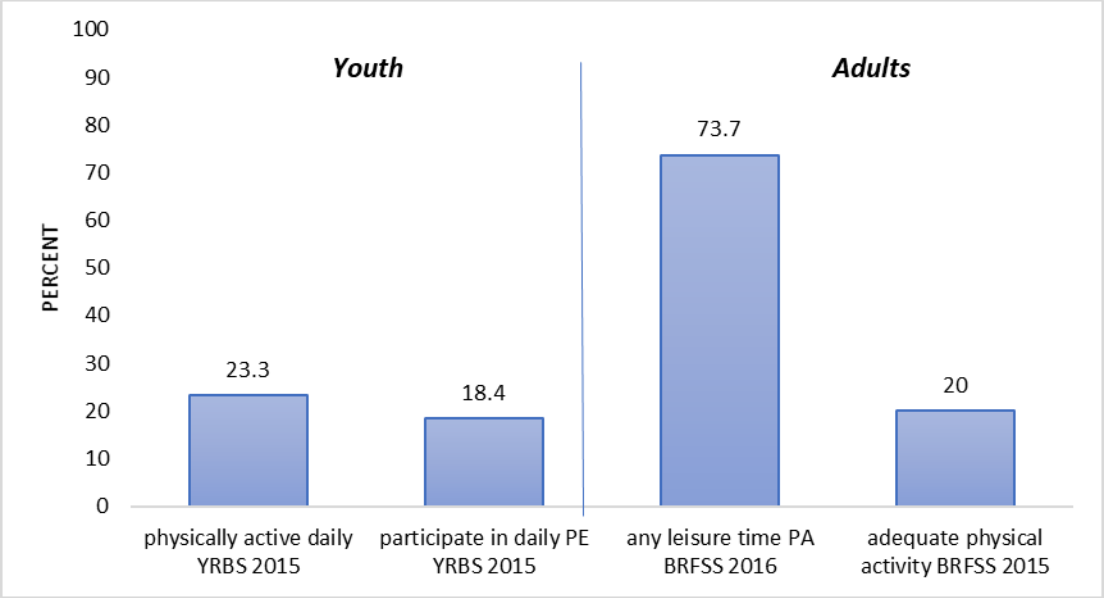
In 2013, the cost of physical inactivity to healthcare systems (direct) and lost productivity (indirect) across five major non-communicable diseases (coronary heart disease, stroke, type 2 diabetes, breast cancer, and colon cancer) was estimated at $27.8 billion in the US, with direct costs estimated at $24.7 billion. The proportion of healthcare system costs borne by households, public, and private sectors were $2.9, $11.6, and $10.1 billion respectively.[7]

In NYS, the Prevention Agenda 2013-2018 set goals for increasing physical activity by December 31, 2018. Goals include increasing the number of school districts that meet or exceed state-wide regulations for physical education (PE), and increasing the percentage of adults who participate in leisure-time physical activity (77.4% among all adults, 65% among adults with less than a high school education, and 54.9% among adults with disabilities). Data for monitoring physical activity indicators in NYS come from the Youth Risk Behavior Surveillance System (YRBSS) and the Behavioral Risk Factor Surveillance System (BRFSS).

Less than one-quarter of high school students in NYS (23.3%) report being physically active at least 60 minutes per day during the past seven days (see Figure 1, left side). This includes any kind of physical activity that increased their heart rate and induced heavy breathing. For PE, only 18.4% of high school students report attending PE classes on all five days in an average school week.

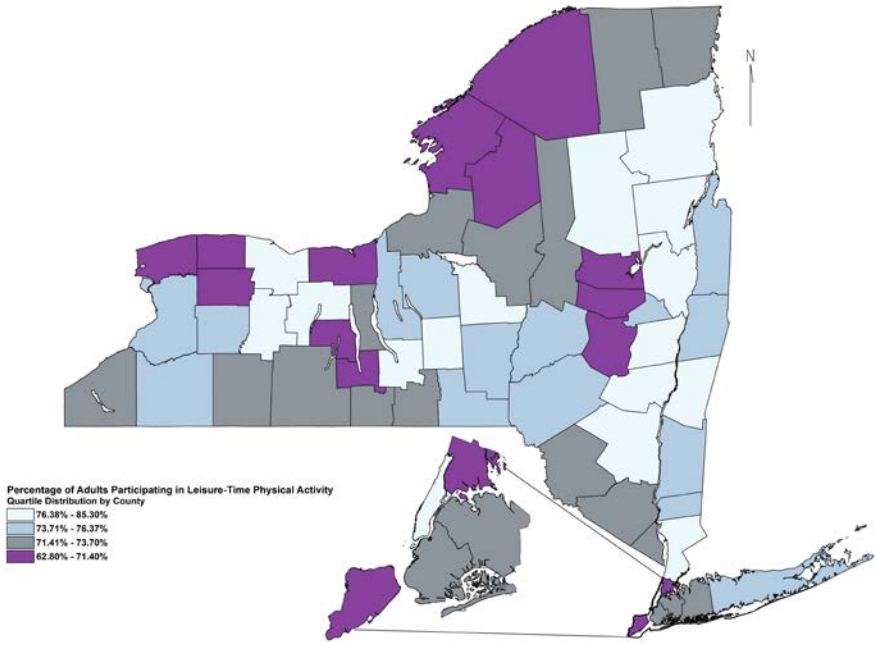
Most NYS adults (73.7%) report participating in leisure-time physical activity during the past month, defined as any physical activity or exercise other than a regular job. However, only 20.0% of adults reported meeting the recommended physical activity guidelines for both aerobic and muscle strengthening activity (see Figure 1, right side). This means that more than 4 million adults in NYS do not participate in any leisure time physical activity, and approximately 12.5 million adults do not meet aerobic and muscle strengthening guidelines.

Figure 1: Key physical activity indicators in NYS



Adults who are obese are significantly less likely to be physically active: 67.4% of adults who are obese reported participating in leisure-time physical activity and 13.5% reported meeting both aerobic and muscle strengthening guidelines. Figure 2 shows that the prevalence of participation in leisure-time physical activity varies by county in NYS.

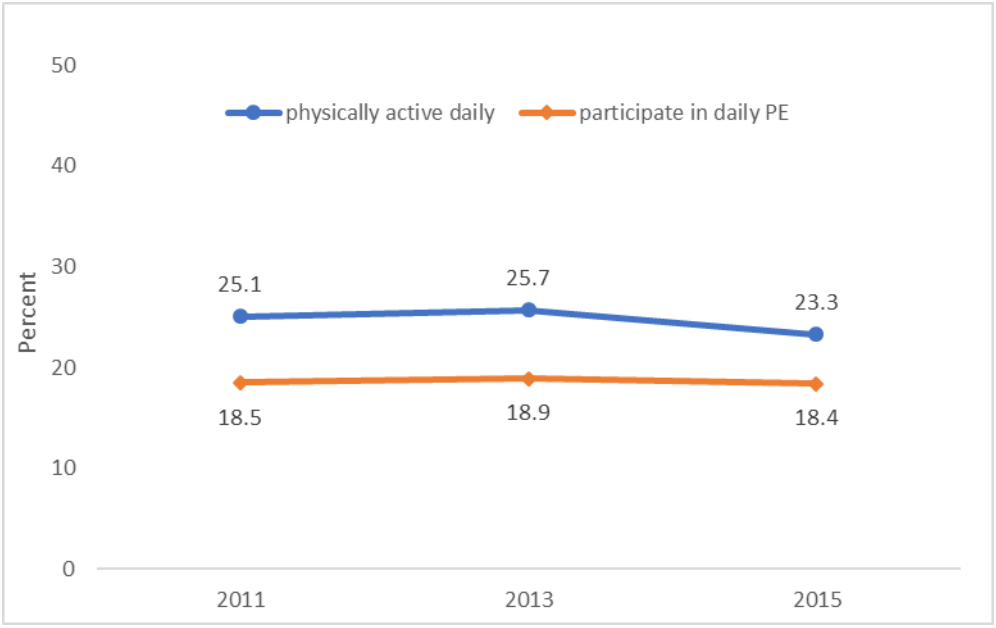
Figure 2: Any leisure-time physical activity during the past month, by county (BRFSS data)



DATA TRENDS

The percentage of students in NYS who report healthy physical activity behaviors has not changed significantly in the past six years (see Figure 3). One-fourth of students reported being physically active daily in 2011 (25.1%), in 2013 (25.7%), and in 2015 (23.3%). One-fifth of students reported attending physical education classes daily in 2011 (18.5%), in 2013 (18.9%) and in 2015 (18.4%). Prevalence of daily physical activity is consistently higher than prevalence of daily physical education participation.

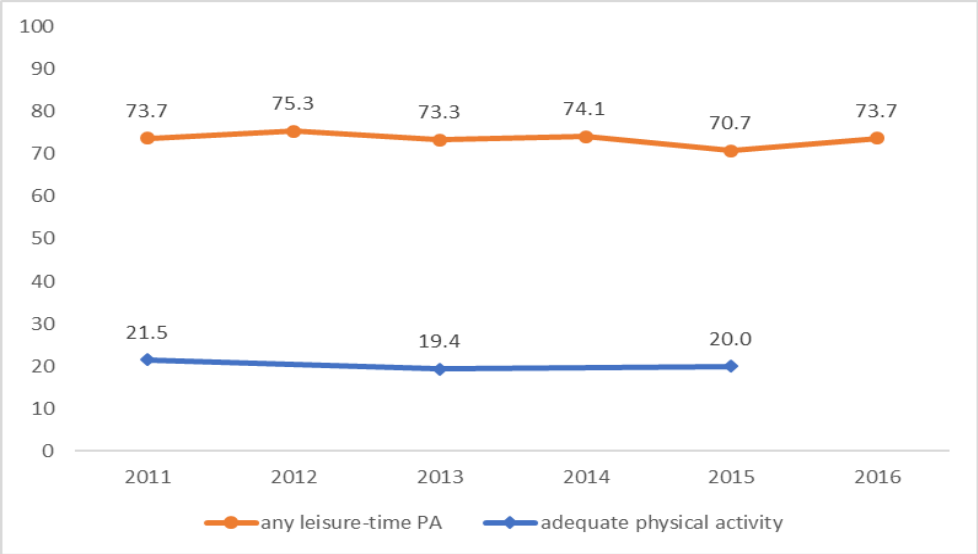
Figure 3: Trends in percentage of high school students in NYS who report being physically active daily and participating in physical education daily (YRBS data)



Source: New York Youth Risk Behavior Surveillance System

The percentage of NYS adults who report healthy physical activity behaviors during the past month has also been stable over the past six years (see Figure 4). Three-quarters of adults reported engaging in leisure-time physical activity in 2011 (73.7%), 2013 (73.3%), and in 2016 (73.7%). Less than one-quarter reported activity that meets recommended guidelines for both aerobic and muscle strengthening activity in 2011 (21.5%), 2013 (19.4%) and 2015 (20%). Prevalence of leisure-time physical activity is consistently higher than prevalence of meeting aerobic and muscle strengthening guidelines.

Figure 4: Trends in percentage of NYS adults who report leisure-time physical activity in the past month and meeting both aerobic activity and muscle strengthening guidelines (BRFSS data)



Source: New York Youth Risk Behavior Surveillance System

DISPARITIES

The percentage of high school students in NYS who report healthy physical activity behaviors by gender, grade, and race/ethnicity is shown in Table 1. For daily physical activity, the prevalence is highest for students who are male (27.8%), in 9th grade (29.0%), or white (26.7%). The prevalence is lowest for students who are female (19%), in 12th grade (20%), Hispanic or Asian (18.4% and 18.8%, respectively). For daily physical education, the prevalence is highest for black students (33.8%), lower for Hispanic students (22.6%), and lowest for white students (10.6%). Disparities in daily physical education reflect variability in school policies and practices.

Table 1: Percentage of high school students in NYS who report healthy physical activity behaviors, by sex, grade, and race/ethnicity (2015 YRBS data)

	Physically active daily (%)	Participate in daily physical education (%)
Sex		
Male	27.8	17.8
Female	19	18.7
Grade		
9th	29	17.3
10th	21.8	16.9
11th	22.4	21.7
12th	20	17.4
Race/Ethnicity		
White, non-Hispanic	26.7	10.6
Black, non-Hispanic	22.4	33.8
Hispanic	18.4	22.6
Asian	18.8	29.2
Source: New York Youth Risk Behavior Surveillance System, 2015		

The percentage of NYS adults who reported healthy physical activity behaviors by demographic characteristics is shown in Table 2. Monthly participation in leisure-time physical activity is highest among adults who are non-Hispanic white (77.9%), have a household income of $50,000 or more (83.9%), have a college degree (85.6%), or are living without disability (79.1%). Participation in leisure-time physical activity is lowest among adults who are Hispanic (63.5%), have a household income of less than $25,000 (56.5%, 61.9%), have less than a high school education (53.4%), or are living with disability (56.2%).

The percentage of NYS adults who reported meeting both aerobic and muscle strengthening guidelines by demographic characteristics is also shown in Table 2. The prevalence of adults who met both guidelines is highest among non-Hispanic adults (21.2% and 22.1%), people living in households that earn $50,000 or more (25%), people with college degrees (25.6%), and people living without disabilities (22.8%). The prevalence of adults who met both guidelines is lowest among adults who are Hispanic (16.9%), have a household income of less than $50,000 (11.9% for <$15,000; 15.7% for $15,000-$24,999; 17.9% for $25,000-$49,999), have less than a high school education (10.9%), or are living with disability (9.5%).

Table 2: Percentage of NYS adults who report healthy physical activity behaviors, by selected demographic characteristics (BRFSS data)

	Leisure-time physical activity during past month, 2016 (%)	Met both aerobic and muscle strengthening guidelines, 2015 (%)
Race/Ethnicity		
White, non-Hispanic	77.9	21.2
Black, non-Hispanic	71.2	22.1
Hispanic	63.5	16.9
Other, non-Hispanic	72.3	17.9
Annual Household Income		
<$15,000	56.5	11.9
$15,000-$24,999	61.9	15.7
$25,000-$49,999	71.8	17.9
$50,000+	83.9	25.0
Missing	70.5	17.1
Education		
Less than high school	53.4	10.9
High school or GED	67.6	17.2
Some post-high school	76.7	21.0
College graduate	85.6	25.6
Disability Status*		
Yes	56.2	9.5
No	79.1	22.8
*In 2015, includes respondents who reported having at least one of five types of disability: cognitive, mobility, vision, self-care or independent living. In 2016, includes respondents who reported at least one of six types, including deafness.		
Source: New York Behavioral Risk Factor Surveillance System		

SOCIAL DETERMINANTS

"The social determinants of health are the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics."[8]

Factors in the built environment can have a significant impact on behaviors that influence health. These, along with social and individual factors such as gender, age, race and ethnicity, level of education, and socioeconomic and disability status can all affect nutrition, physical activity, and obesity.[9]

The opportunity to engage in physical activity is most often directly influenced by factors in the social and physical environments. This may include income and education inequality and community traits such as social cohesion and perceived benefits and attitudes towards physical activity. Determinants in the built environment may include access to public green spaces, provision of safe walking routes, and residential design that can promote walkable neighborhood routes.[10]

Substantial health benefits to the community could be achieved through government policies to improve infrastructure that promotes physical activity as part of commuting to work or school.[11] Combining public transportation with access to safe and attractive routes for walking and biking, can promote physical activity. The provision of public open space, including parks, improved footpaths, and lighting can also encourage and support physical activity.[12]

References

[1] US Department of Health and Human Services. *2008 Physical activity guidelines for Americans*. Hyattsville, MD: US Department of Health and Human Services, 2008.

[2] Lee DC, Sui X, Blair SN. Does physical activity ameliorate the health hazards of obesity? *Br J Sports Med.* 2009, 43(1): 49-51.

[3] Norton S, Matthews FE, Barnes DE, Yaffe K, Brayne C. Potential for primary prevention of Alzheimer's disease: an analysis of population-based data. *Lancet Neurol,* 2014, 13: 788–94.

[4] US Department of Health and Human Services. *2008 Physical activity guidelines for Americans*. Hyattsville, MD: US Department of Health and Human Services, 2008. https://health.gov/paguidelines/

[5] Shape America. *Active Start: A Statement of Physical Activity Guidelines for Children From Birth to Age 5, 2nd Edition.* (2009). https://www.shapeamerica.org/standards/guidelines/activestart.aspx

[6] US Department of Health and Human Services. (2002). Physical Activity Fundamental in Preventing Chronic Diseases.

[7] Ding D, Lawson KD, Kolbe-Alexander TL, Finkelstein EA, Katzmarzyk PT, van Mechelen W, Pratt M, The economic burden of physical inactivity: a global analysis of major non-communicable diseases, *Lancet,* 2016, Volume 388, Issue 10051, 1311-1324.

[8] World Health Organization. Social Determinants of Health. http://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/ (accessed October 31, 2017).

[9] US Department of Health and Human Services. Healthy People.gov. Determinants of Nutrition, Physical Activity, and Obesity. https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Nutrition-Physical-Activity-and-Obesity/determinants (accessed October 31, 2017).

[10] Heath GW, Brownson RC, Kruger J, Miles R, Powell KE, Ramsey LT. The effectiveness of urban design and land use and transport policies and practices to increase physical activity: a systematic review. *Journal of Physical Activity and Health,* 2006, Vol 3, Issue s1, Pages s55-s76.

[11] Pucher J, Dill J, Handy S. Infrastructure, programs and policies to increase bicycling: an international review. *Preventative Medicine,* 2010, 50, s106-s125.

[12] Hunter RF, Christian H, Veitch J, Astell0Burt T, Hipp JA, Shipperijn J. The impact of interventions to promote physical activity in urban green space: A systematic review and recommendations for future research. *Social Science & Medicine,* 2015, Vol 124, Jan, 246-256.

BACKGROUND

Cigarette smoking is the leading preventable cause of mortality in New York State (NYS) and the United States (US), responsible for nearly one in five adult deaths in the US.[1-3] Nicotine, which occurs naturally in tobacco, is a highly addictive drug, and more people in the US are addicted to nicotine than to any other drug.[4,5] Nationally, smoking causes more deaths each year than human immunodeficiency virus (HIV), drug use, alcohol use, motor vehicle injuries and firearm-related incidents combined.[6] In addition, about 58 million nonsmokers in the US are exposed to harmful and lethal secondhand smoke yearly.[7]

According to the US Surgeon General, tobacco use is a pediatric epidemic.[8] The average age of first use of a cigarette in NYS is 13; nearly 90% of adult smokers start by age 18, and virtually all smokers begin by age 25.[1,8,9] Coinciding with smoking initiation is brain development, which continues until the early to mid-20s.[10] Addictive nicotine and other chemicals in cigarettes and cigarette smoke cause permanent, negative brain changes in adolescents and young adults that can lead to lower impulse control and mood disorders; disrupt attention and learning; and prime the developing brain for addiction to alcohol and illicit drugs.[10] Smoking also accelerates the development of chronic diseases throughout a smoker's life.[8]

Nearly 70% of adult smokers want to quit, and more than half try to quit each year, but most relapse.[11] Tobacco dependence is a chronic disease; permanent cessation often takes multiple attempts, and some people who smoke will never be able to quit despite repeated tries.[11,12] Evidence-based treatment, covered in part or in full by health insurance, that consists of brief counseling by a health care professional and use of one or more of the seven cessation medications approved by US Food and Drug Administration (FDA), is proven to be effective in helping smokers quit.[12] Studies show a combination of both counseling and medication is more effective than either one alone.[12]

Use of new tobacco products, such as electronic cigarettes (e-cigarettes), is a major public health concern. NYS youth now use e-cigarettes more than any other tobacco product; almost five times as many NYS high schoolers use e-cigarettes than smoke cigarettes.[13] Most e-cigarettes contain highly addictive and harmful nicotine. Device safety is unknown and research on e-cigarette aerosol continues to identify harms. Studies also indicate e-cigarette use among youth is associated with both intention to smoke cigarettes and subsequent smoking among adolescents and young adults, suggesting e-cigarettes are a gateway to combustible tobacco use.[14,15]

Concerted efforts on the state and local level by government and nonprofit organizations have led to record low youth and adult smoking rates in NYS. Yet, tobacco-related health disparities persist. Smoking rates continue to be highest among adults with poor mental health; who are unemployed; covered by Medicaid; live with a disability; have less than a high school education; and/or have a lower annual income.[16] Disparities also exist among children and nonsmoking adults exposed to secondhand smoke; exposure is higher among adults with lower income and educational attainment, and children and adults who live in rental and/or multiunit housing.[7]

BURDEN

Cigarette use results in an estimated 480,000 deaths in the US and 28,000 deaths in NYS each year.[1,16] Despite over 50 years of reports by the Surgeon General on the risks of smoking, about two million NYS adults smoke, and an estimated 750,000 adults live with smoking-attributable disease.[16,17] Approximately half of all smokers

will die prematurely as a result of their addiction. The list of illnesses caused by tobacco use is extensive and contains many of the most common causes of chronic disease and death. These include cancer almost anywhere in the body, (e.g., lung, mouth and throat, bladder, blood, and colon and rectum), cardiovascular diseases (e.g., heart disease and stroke) and respiratory diseases (e.g., COPD, which includes chronic bronchitis and emphysema).[1] Almost all deaths from lung cancer (90%) and COPD (80%) are caused by smoking.[1] Smoking also causes type 2 diabetes, certain eye diseases (e.g., cataracts and age-related macular degeneration), immune system and autoimmune diseases (e.g., rheumatoid arthritis and lupus), impaired fertility and certain birth defects in babies whose mothers smoked while pregnant.[1]

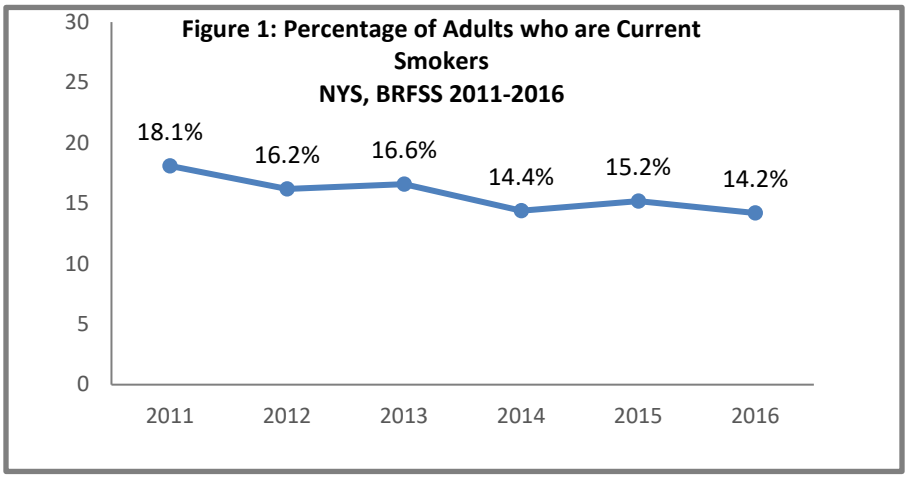
The scientific evidence on the health risks from exposure to secondhand smoke is also clear, convincing, and overwhelming. Since the first Surgeon General's report on smoking and health in 1964, 2.5 million nonsmoking adults have died from secondhand smoke exposure.[1] In NYS, 38% of nonsmoking adults in NYS who live in multiunit buildings report exposure to tobacco smoke in their private dwellings.[1,35] Thirty-five of NYS's public housing authorities (PHAs) have 100% smoke-free housing policies in place, and 74.1% of adult PHA residents reported they do not allow any smoking in the home. Yet, half of them report that secondhand smoke entered their home sometime in the past month. Over half of public housing residents (54.6%) in NYS support smoke-free housing policies in multi-unit housing, including indoor areas, private balconies and patios.[18]

The economic costs of tobacco dependence in NYS are staggering. Annual smoking-attributable health care costs total over $10 billion in NYS, of which $3.3 billion are paid for by state Medicaid dollars.[19,20] In addition, smoking-related morbidity and premature mortality cost NYS over $7 billion in lost productivity annually.[21] Reducing tobacco use and eliminating secondhand smoke exposure in NYS has the potential to save lives and billions of taxpayer dollars.

DATA TRENDS

Cigarette Use

The adult smoking rate in NYS is measured using the NYS Behavioral Risk Factor Surveillance System (BRFSS). A current smoker is defined as an adult over the age of 18 who has smoked at least 100 cigarettes in their lifetime and currently smokes on at least some days. Cigarette use among adults 18 years and older has declined significantly from 2011-2016, from 18.1% to 14.2% (Figure 1, BRFSS 2011-2016).[22]



The youth smoking rate is measured using the New York Youth Tobacco Survey (NY-YTS). Among youth in grades 6-12, a current smoker is defined as having smoked at least one cigarette in the past 30 days. Smoking rates among NYS's middle and high school aged youth have declined dramatically since 2000, leading to historically low rates of smoking in 2016. In 2016, the smoking rate among high school students was 4.3%, an

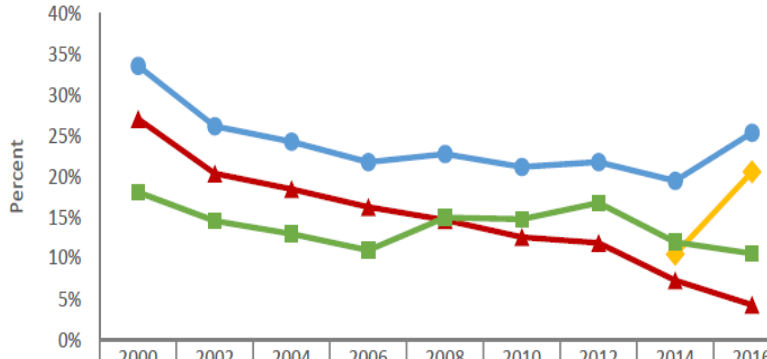
84% decline from the 2000 rate of 27.1% (Figure 2, YTS 2000-2016).[13] Smoking among middle school students decreased from 10.5% in 2000 to just 1.4% in 2016.[9]

Other Tobacco Products

Cigars and Smokeless Tobacco: In 2015, 6.7% of adults smoked cigars and just under two percent of adults reported using some form of smokeless tobacco.[23] However, young adult males smoke cigars at a much higher rate than older adult males. Rates of cigar use have declined dramatically among middle and high school students in NYS. Less than one percent of middle school students and four percent of high school students reported current cigar use in 2016.[9] Youth use of smokeless tobacco in NYS is also low; in 2016, less than two percent of middle school and less than two percent of high school students reported current use of smokeless tobacco.[9]

Electronic Cigarettes: Electronic cigarettes, also referred to as e-cigarettes or electronic nicotine delivery systems (ENDS), have emerged as a new tobacco product in recent years. E-cigarettes are battery-powered devices that heat a solution of liquid nicotine and other chemicals to create an aerosol inhaled by the user. NYS began tracking rates of e-cigarette use among adults in 2012 and among middle and high school age youth in 2014. Based on the BRFSS definition that was used in 2016, among adults, a current e-cigarette user is defined as an adult who reports ever using an e-cigarette or similar product and who also now uses e-cigarettes or similar products every day or some days. In 2016, 4.1% of adults in NYS reported current e-cigarette use and 19.5% reported ever using an e-cigarette.

Figure 2: Percentage of High School Youth who use Cigarettes, E-Cigarettes, and Other Tobacco Products, NYS, NY-YTS 2000-2016



	2000	2002	2004	2006	2008	2010	2012	2014	2016
Any Tobacco Products	33.6%	26.2%	24.3%	21.8%	22.8%	21.2%	21.8%	19.5%	25.4%
Cigarettes	27.1%	20.4%	18.5%	16.3%	14.7%	12.6%	11.9%	7.3%	4.3%
ENDS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10.5%	20.6%
Other Tobacco Products[2]	18.1%	14.6%	13.0%	11.0%	15.0%	14.8%	16.8%	12.0%	10.6%

Among middle and high school age youth, a current e-cigarette user is defined as having used an e-cigarette at least once in the past 30 days. According to data from the NY-YTS, current use of e-cigarettes doubled between 2014 and 2016, from 10.5% to 20.6%. E-cigarettes are the most commonly used tobacco product among high school youth, surpassing cigarettes, cigars, smokeless tobacco, and hookahs (Figure 2).[13] Rates of current e-cigarette use among middle school students also doubled between 2014 and 2016, from 3.2% to 6.4%.[9]

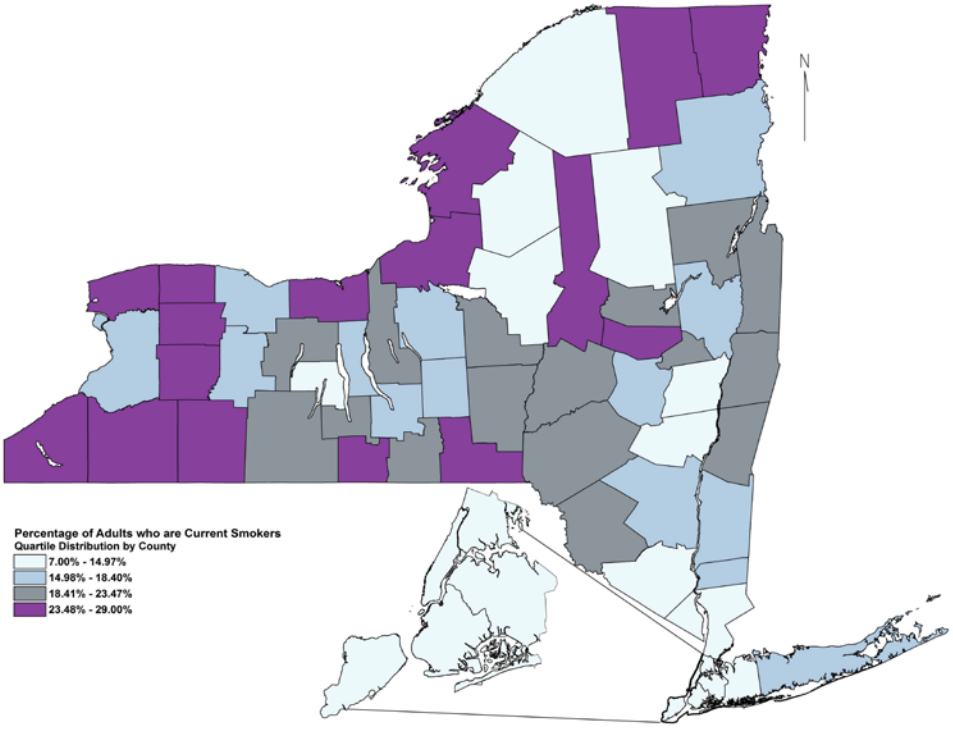
Geographic Variation

Smoking rates are significantly lower in New York City (NYC) than in the rest of the state. Smoking rates have declined significantly in both regions of the state between 2011 and 2016, from 16.1% (2011) to 11.5% (2016) in NYC and from 19.6% (2011) to 16.2% (2016) for the rest of the state.[22] At the county level, the five counties with the lowest smoking rates in the state are Rockland (7.0%), Westchester (8.4%), Nassau (8.5%), New York (9.6%), and Queens (10.9%) (Figure 3). The counties with the highest smoking rates in the state are Oswego (29.0%), Franklin (28.8%), Orleans (28.6%), Jefferson (28.0%), and Montgomery (26.8%) (Figure 3, BRFSS 2016).[22]

Gender

Smoking rates are significantly higher among males than females in NYS for both adults and youth. Among adults, smoking rates have declined significantly for both males and females from 2011 to 2016, from 19.5% (2011) to 16.7% (2016) among males, and from 16.8% (2011) to 11.9% (2016) for females.[21] Among high school age youth, the smoking rate declined significantly for both males and females from 2010-2016, from 14.2% (2010) to 5.0% (2016) among males and from 11.0% (2010) to 3.6% (2016) among females.[9]

Figure 3: Percentage of Adults who are Current Smokers
NYS by County, BRFSS 2016



Age

Smoking rates are lower among young adults aged 18-24 years old than adults age 25 and older. Smoking rates have declined significantly among both age groups between 2011 and 2016, from 21.6% (2011) to 11.7% (2016) among adults 18-24 years old and from 17.7% (2011) to 14.6% (2016) among adults age 25 and older.[22] The rate of decline has been much faster among the 18 to 24-year-old age group compared with those age 25 and older.[23]

Race and Ethnicity

The current smoking rate among non-Hispanic white adults is not statistically different from the smoking rate among non-Hispanic black adults. But Hispanic adults smoke at a significantly lower rate than both non-Hispanic whites and non-Hispanic blacks. Smoking rates declined significantly across NYS's three most populous racial and ethnic categories between 2011 and 2016, from 21.3% (2011) to 16.3% (2016) among black non-Hispanic adults; 17.9 (2011) to 15.7% (2016) among white non-Hispanic adults; and 17.4% (2011) to 11.9% (2016) among Hispanic adults.[22]

Income

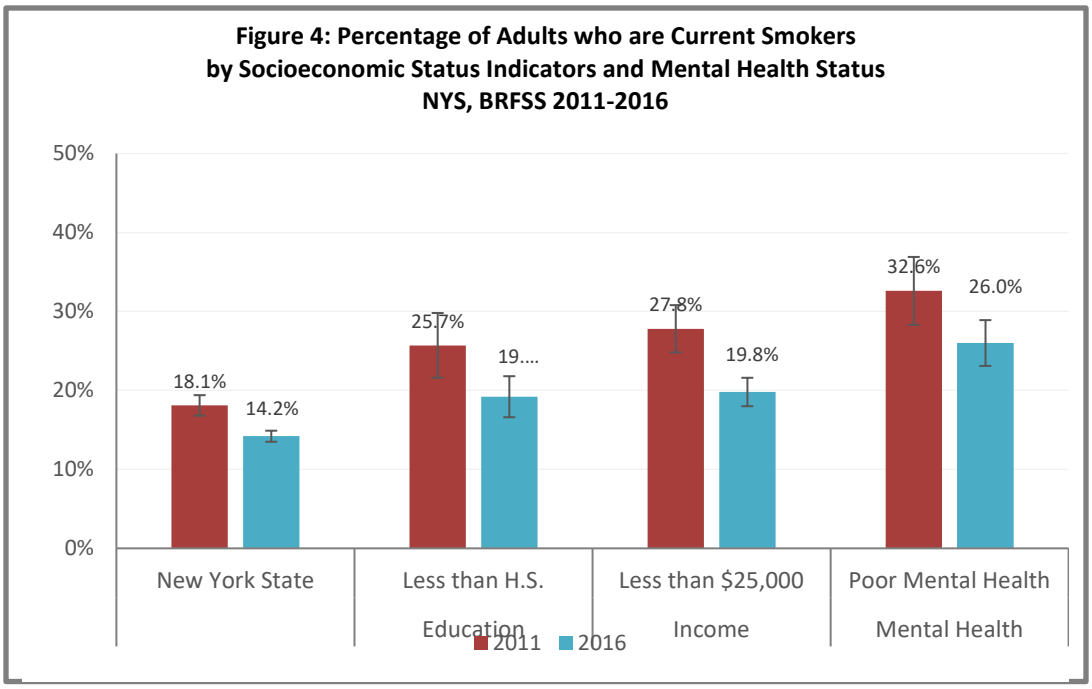
Smoking rates are significantly higher among adults with annual household incomes of less than $25,000 compared to adults with annual household incomes of $25,000 or more. While smoking rates have declined significantly between 2011 and 2016 for lower income populations (<$25,000) from 27.8% (2011) to 19.8% (2016), declines in smoking rates for higher income populations ($25,000 or more) from 13.7% (2011) to 12.5% (2016) were not statistically significant (Figure 4, BRFSS 2011-2016).[22]

Education

Smoking rates are highest among adults with less than a four-year college degree and lowest among adults with a four-year college degree, a difference that is statistically significant. Smoking rates declined significantly between 2011 and 2016 among adults with less than a high school education, from 25.7% (2011) to 19.2% (2016).[22] Significant declines were also observed for adults with a high school education or GED, from 24.0% (2011) to 18.5% (2016), and among adults with a 4-year college degree or more education, from 9.2% (2011) to 6.5% (2016).[22] Among adults with some college education, smoking rates declined from 17.7% (2011) to 16.6% (2016), a difference that was not statistically significant (Figure 4, BRFSS 2011-2016).[22]

Mental Health

BRFSS participants are categorized as having poor mental health if they report experiencing problems with stress, depression, or emotional issues on at least 14 of the last 30 days. Currently, the prevalence of smoking among NYS adults reporting poor mental health is twice as high as the rate of smoking among those who do not report poor mental health, a difference that is statistically significant.[22] From 2011 to 2016, smoking rates significantly declined among adults with poor mental health from 32.6% (2011) to 26.0% (2016) and among adults with good mental health from 16.1% (2011) to 12.6% (2016) (Figure 4, BRFSS 2011-2016).[22]



Health Insurance

Smoking rates declined significantly among adults who do not have any health insurance between 2011 and 2016 from 26.5% (2011) to 17.4% (2016). Smoking rates also declined among those who do have health insurance, from 16.8% (2011) to 13.9% (2016).[22] However, the smoking rate among adults insured by Medicaid (24.1%) is significantly higher than among adults who are either not insured (16.6%), have private health insurance (11.8%), or are insured by Medicare (10.8%).[16] Rates of decline between 2011 and 2016 are unavailable as insurance categories used in the BRFSS have changed over time, and direct comparison is not possible.

Disability Status

BRFSS participants are categorized as having any disability if they report having at least one type of disability based on Department of Health and Human Services definition for data reporting (self-care, independent living, cognitive, mobility, hearing, vision). Currently, the smoking rate among adults having some type of disability (20.1%) is significantly higher than the smoking rate among adults living without disability (12.4%).[23] Rates of decline between 2011 and 2016 are unavailable because the definition of living with disability used in the BRFSS has changed over time, and direct comparison is not possible.

DISPARITIES AND SOCIAL DETERMINANTS

Smoking rates are highest among adults with poor mental health (26.0%), individuals who are unemployed (25.5%), individuals covered by Medicaid (24.1%), individuals who report living with disability (20.1%), individuals with an annual household income of less than $25,000 (19.8%) and those with less than a high school education (19.2%).[23] Although smoking rates among these populations continue to be higher than the general adult population, NYS's comprehensive smoke-free air law, including the highest state cigarette excise tax in the country and media campaigns, have been shown to increase quit attempts among smokers across diverse sociodemographic groups. The efforts have resulted in rate reductions among these disparate groups, and NYS continues to implement interventions to reach and assist populations at high risk for smoking and other tobacco use.

Social determinants of health, i.e., the conditions in which people live, learn, work and play, directly contribute to tobacco-related health disparities in NYS. Adults who have lower levels of educational attainment, who are unemployed, or who live at, near or below the US federal poverty level are considered to have low socioeconomic status (SES).[24]

Adult smokers with low SES smoke longer and suffer more from tobacco-related morbidity than do people with higher incomes and levels of education.[25] The risk of lung cancer is higher among low SES groups, and low SES populations are more likely to suffer the harmful health consequences of secondhand smoke exposure.[7, 26-28]

Tobacco companies spend over $500,000 a day in NYS marketing their deadly products, targeting low income communities with a higher concentration of tobacco retailers found in poorer neighborhoods.[1,29-31] Point of sale marketing and price promotions and discounts that appeal to price-sensitive populations contribute to the normalization of tobacco use that promotes tobacco initiation among youth and decreases cessation success in adults.[32,33]

Most residents of multi-unit housing in NYS do not smoke, and most want to live in smoke-free buildings.[34] Yet, because there is no safe level of exposure to secondhand smoke exposure and no way to prevent smoke from seeping between homes in multiunit residences, 38% of nonsmoking adults in NYS who live in multiunit buildings report exposure to tobacco smoke in their private dwellings.[1,35] Nationally, over 30% of adult residents who live in federally funded public housing authorities (PHAs) smoke, more than twice the rate of the general adult population.[36] Compared to nonsmokers, smokers who live in PHAs report more adverse health outcomes, including fair or poor health, COPD, disability, asthma, serious psychological distress and more sick days from work.[36] Nearly 70% of all adult smokers, regardless of income level and place of residence, want to quit, and an increasing percentage of smokers living in multiunit buildings support restricting tobacco use in their buildings.[37,38]

The smoking rate of NYS Medicaid enrollees is significantly higher compared with uninsured adults or those covered by private insurance or Medicare.[16] The NYS Medicaid comprehensive smoking cessation benefit covers evidence-based tobacco dependence treatments, namely counseling and FDA-approved medications, however more than half of Medicaid members surveyed who smoke were unaware of the benefit; most where skeptical that treatment could help them quit and would choose to quit on their own as their preferred method; and only about a fifth surveyed said they would talk to their doctor for quit assistance even though they believed them to be credible sources of information.[12,39,40] Targeted media campaigns aim to increase awareness of the benefit and the percentage of Medicaid members who ask for and receive evidence-based treatment to increase their cessation rates, decrease tobacco use, and ultimately, decrease tobacco-related health disparities.

References

[1] U.S. Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.

[2] U.S. Department of Health and Human Services. How Tobacco Smoke Causes Disease: What It Means to You. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.

[3] Centers for Disease Control and Prevention. QuickStats: Number of Deaths from 10 Leading Causes—National Vital Statistics System, United States, 2010. Morbidity and Mortality Weekly Report 2013:62(08);155.

[4] National Institute on Drug Abuse. Research Report Series: Is Nicotine Addictive? Bethesda (MD): National Institutes of Health, National Institute on Drug Abuse, 2012.
[5] American Society of Addiction Medicine. Public Policy Statement on Nicotine Addiction and Tobacco. Chevy Chase (MD): American Society of Addiction Medicine, 2008.
[6] Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual Causes of Death in the United States. JAMA: Journal of the American Medical Association 2004;291(10):1238–45.
[7] Centers for Disease Control and Prevention. Vital Signs: Disparities in Nonsmokers' Exposure to Secondhand Smoke—United States, 1999–2012. Morbidity and Mortality Weekly Report 2015;64(4):103–8.
[8] U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2012.
[9] New York State Department of Health. Health Data NY. Youth Tobacco Survey: Beginning 2000.
[10] U.S. Department of Health and Human Services. *E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.
[11] Centers for Disease Control and Prevention. Quitting Smoking Among Adults—United States, 2000–2015. Morbidity and Mortality Weekly Report 2017;65(52):1457-64.
[12] Fiore MC, Jaén CR, Baker TB, et al. *Treating Tobacco Use and Dependence: 2008 Update—Clinical Practice Guidelines*. Rockville (MD): U.S. Department of Health and Human Services, Public Health Service, Agency for Healthcare Research and Quality, 2008.
[13] New York State Department of Health. Youth Cigarette Use at All-Time Low, ENDS Use Doubles. StatShot March 2017; Vol. 10, No. 1.
[14] Ji-Yeun Park, Dong-Chul Seo, Hsien-Chang Lin, E-Cigarette Use and Intention to Initiate or Quit Smoking Among US Youths. American Journal of Public Health 106, no. 4 (April 1, 2016): pp. 672-678, doi: 10.2105/AJPH.2015.302994
[15] Soneji S, Barrington-Trimis JL, Wills, TA, et al. Association Between Initial Use of e-Cigarettes and Subsequent Cigarette Smoking Among Adolescents and Young Adults - A Systematic Review and Meta-analysis. JAMA Pediatr. 2017 Aug 1; 171(8): 788–797. doi:10.1001/jamapediatrics.2017.1488
[16] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2015.
[17] Estimated smoking-attributable morbidity in NYS calculated from estimated smoking-attributable morbidity in the U.S. sourced from The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014, and the annual smoking-attributable deaths in NYS statistic sourced from Best Practices for Comprehensive Tobacco Control Programs — 2014. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health and Health, 2014.
[18] New York State Department of Health. New York Adult Tobacco Survey, 2016.
[19] Centers for Disease Control and Prevention. *Best Practices for Comprehensive Tobacco Control Programs — 2014*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.
[20] Armour BS, Finkelstein EA, Fiebelkorn IC. State-level Medicaid expenditures attributable to smoking. Prev Chronic Dis 2009;6(3).
[21] Campaign for Tobacco-Free Kids. The Toll of Tobacco in New York. 2017.
[22] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011-2016.
[23] Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2016.
[24] Garrett BE, Dube SR, Trosclair A, Caraballo RS, Pechacek TF. Cigarette Smoking—United States, 1965-2008. Morbidity and Mortality Weekly Report Supplements 2011; 60(01):109-13.
[25] Siahpush M, Singh GH, Jones PR, Timsina LR. Racial/Ethnic and Socioeconomic Variations in Duration of Smoking: Results from 2003, 2006 and 2007 Tobacco Use Supplement of the Current Population Survey. Journal of Public Health 2009;32(2):210-8.
[26] Campaign for Tobacco-Free Kids. Tobacco and Socioeconomic Status. Washington, D.C.: Campaign for Tobacco-Free Kids, 2015.
[27] Singh GK, Williams SD, Siahpush M, Mulhollen A. Socioeconomic, Rural-Urban, and Racial Inequalities In US Cancer Mortality: Part I—All Cancers and Lung Cancer and Part II—Colorectal, Prostate, Breast, and Cervical Cancers. Journal of Cancer Epidemiology 2011; doi.org/10.1155/2011/107497
[28] Clegg LX, Reichman ME, Miller BA, Hankey BF, Singh GK, Lin YD, et al. Impact of Socioeconomic Status on Cancer Incidence and Stage at Diagnosis: Selected Findings from the Surveillance, Epidemiology, and End Results: National Longitudinal Mortality Study. Cancer Causes and Control 2009;20(4).

[29] Federal Trade Commission. Federal Trade Commission Cigarette Report for 2014. Washington: Federal Trade Commission, 2016; Federal Trade Commission. Federal Trade Commission Smokeless Tobacco Report for 2014. Washington: Federal Trade Commission, 2016.

[30] Campaign for Tobacco-Free Kids. Toll of Tobacco in the United States. The Toll of Tobacco in New York, 2017.

[31] U.S. National Cancer Institute. *A Socioecological Approach to Addressing Tobacco-Related Health Disparities. National Cancer Institute Tobacco Control Monograph 22*. NIH Publication No. 17-CA-8035A. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2017.

[32] Brown-Johnson CG, England LJ, Glantz SA, Ling PM. Tobacco Industry Marketing to Low Socioeconomic Status Women in the USA. Tobacco Control. Published online first: 2014 Jan 21, doi:10/1136/tobaccocontrol-2013-051224

[33] Public Health and Tobacco Policy Center. Tobacco Disparities: Evidence Supports Policy Change. Public Health Advocacy Institute at Northeastern University School of Law. January 2017.

[34] King BA, Cummings KM, Mahoney MC, Juster HR, Hyland AJ. Multiunit housing residents' experiences and attitudes toward smoke-free policies. Nicotine & Tobacco Research, 12(6). doi: 10.1093/ntr/ntq053,2010

[35] New York State Department of Health. New York Adult Tobacco Survey, 2014.

[36] Helms VE, King BA, Ashley PJ. Cigarette smoking and adverse health outcomes among adults receiving federal housing assistance. Preventive Medicine 99(2017)171-177.

[37] Centers for Disease Control and Prevention. Quitting Smoking Among Adults - United States, 2001-2010. Morbidity and Mortality Weekly Report, 2011:60(44), pp. 1513-1516.

[38] New York State Department of Health. New York Adult Tobacco Survey, 2012-2014.

[39] RTI International. (2013). Medicaid Recipient Study.

[40] Dixon Schwabl (2011). New York State Tobacco Control Smoking Cessation Centers: Ad Testing Research Report.

Health of Women, Infants and Children

Contributing Causes of Health Challenges

"Improving the well-being of mothers, infants, and children is an important public health goal for the United States. Their well-being determines the health of the next generation and can help predict future public health challenges for families, communities, and the health care system." - Healthy People 2020

BACKGROUND

The health of women, infants, children, and their families is fundamental to overall population health. Promoting their health as a Prevention Agenda priority aligns directly with the Maternal and Child Health Services Block Grant (Title V) Program, the core federal and state public health program for promoting maternal and child health.[1]

The mission of Title V is to improve the health and well-being of the nation's mothers, infants, children and youth, including children and youth with special health care needs, and their families. States are required to develop an MCH State Action Plan (SAP) that includes state priorities and objectives, as well as strategies to achieve those objectives. Priorities address six MCH population health domains: maternal and women's health, perinatal and infant health, child health, adolescent health, children with special health care needs, and cross-cutting life course. Annually, states are required to conduct a needs assessment process, obtain public input, and report progress on the Title V MCH SAP, including both National Performance and Outcome Measures and State Performance Measures. The New York State (NYS) SAP 2016-2020 provides a comprehensive approach to address the needs of New York's women, children and families.

Current NYS Title V SAP priorities include:

- Reduce maternal mortality and morbidity.
- Reduce infant mortality and morbidity.
- Support and enhance children's and adolescents' social-emotional development and relationships.
- Increase supports to address the special needs of children and youth.
- Increase use of primary and preventive health care services across the life course.
- Promote oral health and reduce tooth decay across the life course.
- Promote supports and opportunities that foster healthy home and community environments.
- Reduce racial, ethnic, economic and geographic disparities and promote health equity.

Addressing the significant needs of NYS's families requires strong partnerships and collaboration on the state and community level. These partnerships are at the heart of the Prevention Agenda, which provides further opportunity to support the efforts of NYS's Title V program. Therefore, the Prevention Agenda 2019-2024 is aligned with the strategies and outcomes in NYS's Title V MCH SAP.[2]

Mirroring NYS's Title V MCH SAP, this Prevention Agenda priority focuses on specific health outcomes for women of reproductive age, infants, children, and adolescents. It is important to recognize these outcomes in the context of a life course perspective. Promoting healthy development, behaviors, and relationships early in life and during critical periods lays the groundwork for health promotion and disease prevention throughout the lifespan. Supporting the health and wellness of all women is essential to their current and lifelong well-being, regardless of their sexual or gender identity, pregnancy history, or future reproductive plans.
The evolving emphasis of the Prevention Agenda's effort to promote healthy women, infants, and children highlights three population domains, or focus areas: 1) maternal and women's health; 2) perinatal and infant health; and 3) child and adolescent health. These areas were updated from the Prevention Agenda 2013-2018

to align directly with the national Title V framework and NYS's Title V SAP, to ensure consistency and synergize efforts related to both plans.

The New York State Department of Health (NYSDOH) identified key health outcomes and relevant indicators for each of these three focus areas through extensive statewide needs assessments using population health data, published literature, federal reporting requirements, and stakeholder input. Core data indicators established for the 2013-18 Prevention Agenda, and subsequently expanded for the 2016-2020 Title V MCH SAP, are tracked to monitor progress related to these key outcomes. These indicators are shown in Tables 1-3.

Maternal and child health (MCH) encompasses a broad scope of health issues, behaviors, prevention approaches, and service systems. MCH seeks to promote the health and well-being of women, infants, children, adolescents, and their families – with special concern for disadvantaged and vulnerable populations, including children with special health care needs. MCH focuses on individuals and populations, on health promotion and prevention, and on family-centered systems of care in communities. A deep commitment to promoting health equity and eliminating racial, ethnic, economic, and other disparities is a cornerstone of MCH.

The field of MCH embraces a life course perspective to promote health and prevent disease across the lifespan. A life course perspective emphasizes broad social, economic, and environmental factors as underlying causes of persistent inequalities in health across population groups. It recognizes the impact of risk and protective factors on health – both during critical periods of development (such as during fetal development and early childhood), as well as the cumulative impact of exposures and experiences over time.[3] See *Determinants* below for further discussion of the life course perspective related to MCH health outcomes.

As a framework for action, life course focuses on strengthening supports to mitigate risk factors, build resiliency, and optimize health and developmental trajectories over the lifespan and even across generations.[3] Public health efforts to promote the health of women, infants, and children over the life course must include strategies that engage and support individuals, families, and providers across different settings and sectors. Reducing dramatic and persistent disparities in key health outcomes requires a dedicated focus on addressing social determinants of health, including support for safe and nurturing home and community environments, and explicit attention to achieving health equity. NYSDOH collaborates with many internal and external partners to implement evidence-based and promising strategies to achieve these cross-cutting priorities.

The health of women, infants, and children is integral to other priorities addressed by the Prevention Agenda. Thus, information presented for this priority should be viewed in conjunction with, not separately from, other chapters of this assessment.

BURDEN AND DATA TRENDS

NYS tracks data indicators related to the health of women, infants, and children as part of the 2013-18 Prevention Agenda[4] and the 2016-20 Maternal and Child Health (MCH) Title V State Action Plan.[5] The sections below present a snapshot of current measures for each of the three focus areas, with a brief discussion of status, trends and other pertinent data. Some measures also relate to other Prevention Agenda priority areas.

Maternal and Women's Health

Supporting the health of women before, during, and beyond pregnancy is fundamental to improving the health of women and their families.[6] More than half (51.4%) of NYS residents are female, including more than 4 million women of reproductive age (defined as 15-44 or 18-44 years of age depending on the data source).[7] In 2015, 337,031 pregnancies were documented in NYS,[8] and 235,964 infants were born.[9] Nearly half of all

pregnancies in the United States (US) are unplanned, which underscores the importance of promoting women's health across the lifespan, regardless of pregnancy intentions.[10]

Nine out of ten (90%) of NYS women ages 18-44 years reported in 2016 that they are in good or better health.[11] However, women in this age group also report a variety of health conditions and health risk behaviors, including: overweight and obesity (46%), physical inactivity (26%), depression (14%), binge drinking (20%), tobacco use (13%), asthma (11%), high blood pressure (9%), and diabetes (3%) – all of which may have important implications for women's own health and the outcome of potential future pregnancies.[11]

Table 1: Core Maternal and Women's Health Tracking Measures for NYS

Measure	Target [a] (Year)	Indicator Data for NYS (Year)	Data Source [b]
Percentage of women ages 18-44 with a past year preventive medical visit	79.4 (2020)	73.3 (2016)	BRFSS
Percentage of women ages 18-64 with health insurance	100 (2018)	92.9 (2016)	US Census Bureau
Percentage of women ages 18-44 who report ever talking with a health care provider about ways to prepare for a healthy pregnancy	39.2 (2020)	35.3 (2014)	BRFSS
Percentage of unintended pregnancies among live births	23.8 (2018)	23.7 (2015)	Vital Statistics
Adolescent pregnancy rate per 1,000 females ages 15-17 years	25.6 (2018)	17.0 (2014)	Vital Statistics
Percentage of live births that occur within 24 months of a previous pregnancy	17.0 (2018)	19.1 (2015)	Vital Statistics
Percentage of births with early (1st trimester) prenatal care	79.2 (2020)	80.3 (2015)	Vital Statistics
Percentage of women who had a dental visit for teeth cleaning during pregnancy	57.6 (2020)	51.7 (2015)	PRAMS
Percentage of women who report that a doctor, nurse, or other health care worker asked at their postpartum checkup if they were feeling down or depressed	78.0 (2020)	76.1 (2016)	PRAMS
Rate of infants born with neonatal abstinence syndrome per 1,000 hospital deliveries [c]	5.2 (2020)	5.8 (2014)	HCUP-SID
Percentage of non-medically indicated deliveries at 37-38 weeks gestation among singleton deliveries with no pre-existing conditions	4.8 (2020)	1.0 (2016)	CMS Hospital Compare
Percentage of births that are preterm (<37 weeks gestation)[c]	8.4 (2020)	8.7 (2015)	Vital Statistics
Rate of severe maternal morbidity per 10,000 delivery hospitalizations	202.9 (2020)	214.9 (2014)	HCUP-SID
Maternal mortality rate per 100,000 live births	16.1 (2020)	19.2 (2012-16)	Vital Statistics

[a] Targets are for years 2020 (2016-20 MCH Action Plan) and 2018 (2013-18 Prevention Agenda).

[b] Data sources: Behavioral Risk Factor Surveillance System (BRFSS); Pregnancy Risk Assessment Monitoring System (PRAMS); Healthcare Cost and Utilization Project - State Inpatient Database (HCUP-SID); Centers for Medicaid and Medicare Services (CMS) Hospital Compare

[c] Measure also included under Perinatal and Infant Health

Use of preventive health care services among women of reproductive age ranged from 70.0 to 72.9% from 2011-2014, declined to 68.4% in 2015, and then increased to 73.3% in 2016.[5, 11] Health insurance enrollment among women in NYS increased from 87% in 2008 to 91.9% in 2015.[4] Despite increasing national attention to the importance of preconception care, only 35.3% of reproductive age women in NYS reported that a healthcare provider had ever talked with them about ways to prepare for a healthy pregnancy and baby.[5, 11] This low percentage underscores the need for more emphasis on preconception care, especially among women with known serious medical conditions and psychosocial risk factors. Since over 70% of women report having a preventive medical visit in the past year, these visits represent a key opportunity for physicians to discuss pregnancy intentions with all patients, take steps to ensure use of effective contraception for women who do not wish to become pregnant in the immediate future, and address health risks with women who are contemplating pregnancy.[12]

Unintended pregnancy rates declined from 28.4% of live births in 2008 to 23.7% in 2015, and adolescent pregnancy rates declined dramatically from 33.3 per 1,000 females in 2008 to 17.0 per 1,000 in 2014.[4] Use of effective contraception is a key factor in pregnancy planning and prevention. An analysis of 2015 BRFSS data found that more than 25% of sexually active women of childbearing age took no steps to avoid pregnancy the last time they had sex, although only 8% reported wanting a pregnancy at the time.[13] Use of effective contraceptive methods among women at NYS-funded family planning clinics increased from 54.7% of clients in 2009 to 70.4% in 2014 and 70.7% in 2015. Although effective contraceptive use overall declined slightly to 68.4% of clients in 2016, the percent of clients using highly effective contraceptive methods (IUDs or implants) increased steadily over the same time period, from 16.2% in 2014 to 19.4% in 2015 and then to 20.3% in 2016.[14] In contrast, the percent of closely-spaced births (i.e., second or subsequent births occurring within 24 months of a previous pregnancy) increased slightly from 18.5% in 2008 to 19.1% in 2015.[4] Short interpregnancy intervals are associated with a higher risk for adverse birth outcomes, such as preterm birth.[15]

The percentage of births with early (1st trimester) prenatal care did not change significantly from 2009 to 2012, then increased from 74.5% in 2012 to 80.3% in 2015.[5] The percentage of women with a dental visit during pregnancy increased from 50.2% in 2012 to 54.9% in 2013 and then declined to 51.7% in 2015. Given the year-to-year variation, data for additional years are needed to assess trends in this measure.[5]

Social and behavioral risk factors among pregnant women continue to be a concern. Among women who gave birth in NYS in 2015: 6.8% indicated that they smoked during pregnancy; 8.3% drank alcohol during pregnancy; 2.0% experienced physical abuse by a husband or partner in the 12 months prior to pregnancy (1.7% experienced abuse during pregnancy); and 8.6% experienced traumatic stress (defined as being homeless, going to jail or having a partner go to jail, or someone close to them having a problem with drinking or drugs) in the year prior to pregnancy.[16] Use of opioids during pregnancy has increased dramatically in recent years. The rate of infants born with neonatal abstinence syndrome per 1,000 delivery hospitalizations rose from 2.63 per 1,000 deliveries in 2008 to 5.84 per 1,000 in 2014, a relative increase of 122%.[5]

Preterm birth rates in NYS increased from 2001 to 2006 and then declined steadily in NYS since 2007, to the most recent low of 8.7% in 2015.[4,5] Early-term births (37-38 weeks gestation) followed similar patterns, declining to a low of 24.8% in 2012 and remaining steady around 25% through 2015.[5] Early elective deliveries without medical indication declined dramatically from 4.8% of births in 2013-14 to 1.0% in 2016, consistent with coordinated efforts to address this practice.[5] See *Perinatal and Infant Health* section for additional detail on infant birth outcomes.

Maternal mortality, defined as the death of a woman while pregnant or within six weeks of the end of a pregnancy from causes related to or aggravated by her pregnancy, is a devastating outcome with a dramatic impact on families and communities. The state's maternal mortality rate decreased from 19.9 maternal deaths per 100,000 births in 2005-2009 to 19.2 per 100,000 in 2012-2016 (note that data reported are 5-year rolling averages).[5] Based on a review of deaths from 2012-2013, the leading causes of maternal death in NYS are embolism, hemorrhage, infection, cardiac disorders, and hypertension.[17] Severe or "near miss" maternal morbidity – defined as serious complications of pregnancy that are potentially life threatening for the mother if not identified, monitored, or treated efficiently and appropriately – occurs approximately 100 times more frequently than maternal deaths. The rate of severe maternal morbidity increased from 147.2 per 10,000 delivery hospitalizations in 2008 to 214.9 per 10,000 delivery hospitalizations in 2014.[5]

Maternal depression is the most common morbidity among postpartum women, affecting 10-20% of women during or within 12 months of pregnancy, with implications for the well-being of the entire family.[18] PRAMS data for 2016 show that approximately 76% of women report being asked by a health care provider about depression symptoms at a postpartum checkup. Because this was a new PRAMS survey question beginning in 2016 there are no comparable historic trend data available, and the 2016 data will serve as a baseline for future years. However, a previous project to assess and improve prenatal care for women enrolled in Medicaid who gave birth in 2009 and 2014, respectively, demonstrated an increase in screening for maternal depression among the cohorts of patients and providers sampled.[19, 20] More efforts are needed to promote screening and strengthen supports and services for women who screen positive for depression.

Perinatal and Infant Health

Perinatal health refers to the period immediately before and after birth. Most experts define the perinatal period as starting in the 20th or 28th week of gestation (pregnancy), depending on which definition is referenced, and continuing through 7-28 days after birth. These early weeks are an important period for addressing the health of both mothers and infants. Key perinatal and infant outcomes such as preterm birth, low birth weight, and infant mortality are connected inextricably with maternal health outcomes discussed under *Maternal and Women's Health* above.

Infancy—the period beginning at birth and continuing through the first year of life—is a time of rapid physical, cognitive, social, and emotional development. Guidelines for health care during infancy encompass many opportunities for health promotion and preventive health care including immunizations, developmental and other screenings, and anticipatory guidance and education for parents and caregivers.[21] Common questions and concerns of new parents include infant feeding, sleep, development, discipline, and parental stress.[22] Special health care needs, including developmental disabilities or delays, may be identified at birth or later in infancy through newborn screening programs and ongoing primary medical care.

Table 2: Core Perinatal & Infant Health Tracking Measures for NYS			
Measure	**Target [a] (Year)**	**Most Recent Indicator for NYS (Year)**	**Data Source [b]**
Percentage of births that are preterm (<37 weeks gestation) [c]	8.4 (2020)	8.7 (2015)	Vital Statistics
Infant mortality rates (birth to <1 year) per 1,000 live births	4.0 (2020)	4.6 (2015)	Vital Statistics
Perinatal mortality rates (28 weeks gestation to < 7 days) per 1,000 live births	5.5 (2020)	5.2 (2015)	Vital Statistics
Neonatal mortality rates (birth to <28 days) per 1,000 live births	3.3 (2020)	3.2 (2015)	Vital Statistics
Post-neonatal mortality rates (28 days to < 1 year) per 1,000 live births	1.3 (2020)	1.5 (2015	Vital Statistics
Preterm-related mortality rate per 100,000 live births	174.8 (2020)	168.2 (2015)	Vital Statistics
Sudden Unexpected Infant Death (SUID) mortality rate per 1,000 live births	0.3 (2020)	0.6 (2015)	Vital Statistics
Percentage of infants placed to sleep on their backs	67.1 (2020)	73.9 (2015)	PRAMS
Percentage of very low birth weight (VLBW) infants born in a hospital with a Level III or higher Neonatal Intensive Care Unit (NICU)	94 (2020)	92.3 (2014)	Vital Statistics
Rate of infants born with neonatal abstinence syndrome (NAS) per 1,000 delivery hospitalizations [c]	5.2 (2020)	5.8 (2014)	HCUP-SID
Percentage of infants exclusively breastfed in the hospital	48.1 (2018)	44.3 (2015)	Vital Statistics
Percentage of children ages 0-15 months who have the recommended number of preventive ("well baby") visits in government-sponsored health insurance programs	91.3 (2018)	80.2 (2015)	NYSDOH Office of Quality & Patient Safety
Percentage of infants who receive a follow-up hearing screening after failing initial screening	50 (2020)	31.2 (2015)	Early Hearing Detection & Intervention Program data
Percentage of children ages 9-35 months whose parents report they have had a developmental screening using a parent-completed screening tool [d]	18.4 (2020)	17.5 (2016)	NSCH

[a] Targets are for years 2020 (2016-20 MCH Action Plan) and 2018 (2013-18 Prevention Agenda)

[b] Data sources: Pregnancy Risk Assessment Monitoring System (PRAMS); Healthcare Cost and Utilization Project – State Inpatient Database (HCUP-SID); National Survey of Children's Health (NSCH)

[c] Measure also included under Maternal and Women's Health

[d] Measure also included under Child and Adolescent Health

Infant mortality, defined as the death of an infant within the first year of life, is a fundamental indicator of the health of a nation, state, or community. It often is used as the defining measure of not only infant health, but of how well a nation or society cares for its most vulnerable members. While infant mortality rates in the US have declined dramatically over the last century, the US ranks poorly in comparison to other industrialized countries.[23] Moreover, there are dramatic and persistent racial and socioeconomic disparities in infant mortality rates in the US, reflecting systemic social inequalities. New York's infant mortality rate declined

from 5.8 deaths per 1,000 live births in 2005 to 4.6 deaths per 1,000 live births in 2015, surpassing the Healthy People 2020 goal of 6.0 per 1000.[5,24]

The leading causes of infant deaths nationally and in NYS are preterm birth and other conditions or complications related to pregnancy, congenital anomalies (birth defects), unintentional injuries, sudden unexpected infant death (SUID), and heart disease. These five causes account for nearly 80% of infant deaths annually in NYS.[24]

Infant mortality is classified further as neonatal mortality (death of an infant within the first 28 days of life) and post-neonatal mortality (death from age 28 days to one year of life). Approximately 70% of all infant deaths occur in the neonatal period. NYS neonatal mortality rates peaked at 4.2 deaths per 1,000 live births in 2004 and declined to 3.2 deaths in 2015, mirroring declines in preterm birth rates and preterm-related mortality.[5] Post-neonatal mortality rates in NYS remained steady around 1.6 deaths per 1,000 live births over the last decade and then declined to 1.5 deaths per 1,000 births in 2015, while Sudden Unexplained Infant Death (SUID)-related mortality rates, including Sudden Infant Death Syndrome (SIDS), also declined.[5]

Perinatal mortality rates encompass fetal deaths (pregnancy loss prior to delivery, often referred to as "stillbirths") and early infant deaths, and usually are measured as deaths from 28 weeks gestation to less than 7 days after birth. While fetal mortality rates are comparable to infant mortality rates, there has been less attention to fetal mortality, and it is less well understood than infant mortality.[25]

Much of the success in reducing infant mortality rates in the US has been attributed to improving survival of very small and preterm infants. Since 2009, 90% of very low birthweight (VLBW) infants born in NYS were delivered in hospitals that have Level III-IV neonatal intensive care units, with a corresponding decline in VLBW mortality rates.[5] See the companion *Maternal and Women's Health* section for additional data on preterm birth and low birth weight.

Congenital anomalies/malformations (birth defects) remain among the leading causes of death for infants. Babies born with birth defects have a greater chance of illnesses and long-term disabilities than those who do not. Data from NYS's Congenital Malformations Registry indicate that approximately 14,500 infants with birth defects were reported annually from 2010 to 2012, representing 6% of live births.[26]

Virtually all infants born in NYS are screened for heritable disorders, and 97% of those with positive screening results received timely follow up.[27] Among babies born in NYS in 2016, 97.1% were screened for hearing - which has increased markedly from 90.4% of infants born in 2014 and 84.4% of infants born in 2013.[28] Among NYS babies enrolled in Medicaid, 80% received the recommended number of well-baby visits in the first year of life, compared to 93% of commercially-insured infants.[29]

As noted under *Maternal and Women's Health* above, the nationwide epidemic of opioid use has adversely impacted perinatal and infant health. One measure of harm is the dramatic increase in cases of neonatal abstinence syndrome (NAS) – a drug withdrawal syndrome that occurs in infants exposed to opioids in utero.[30] The proportion of NYS infants born with neonatal abstinence syndrome rose from 2.63 per 1,000 deliveries in 2008 to 5.84 per 1,000 in 2014.[5] From 2012 to 2014, an average of nearly 230,000 infants in NYS were diagnosed with NAS annually.[31]

The American Academy of Pediatrics and other experts recommend exclusive breastfeeding for the first six months of life, with continued breastfeeding until one year of age, or longer, as complementary foods are introduced.[32] Breastfeeding has numerous well-documented health benefits for both mothers and infants, which extend well beyond infancy to health outcomes later in life such as diabetes, obesity, and cancer. In

NYS, most mothers initiate breastfeeding with their newborn infants, but far too many breastfed infants receive formula supplementation by the time they leave the hospital. In the months following hospital discharge, breastfeeding rates continue to drop off, especially for exclusive breastfeeding. In 2015, 87.6% of NYS infants initiated breastfeeding, yet only 44.8% were fed exclusively breast milk in the hospital.[4] Using separate survey data for infants born in 2013, 55.8% of babies were breastfeeding at age 6 months, but only 19.7% were exclusively breastfed.[33] For additional information on breastfeeding, see the *Breastfeeding* section in the *Prevent Chronic Disease* chapter of this report.

Child and Adolescent Health

Making health a priority for children and youth lays the groundwork for optimal health across their lifespan and for future generations. During this critical time of rapid growth and development, children can build a strong foundation for healthy behaviors and relationships. Many medical conditions affecting adults have roots in childhood. Health promotion and prevention are the cornerstone of efforts to support children's health. Nurturing children's development at all ages, identifying and addressing risk factors early, promoting healthy behaviors and relationships, and optimizing management of any chronic health conditions can prevent premature death or disability and enable young people to reach their full potential.

Table 3: Core Child & Adolescent Health Tracking Measures for NYS

Measure	Target [a] (Year)	Most Recent NYS Indicator (Year)	Data Source [b]
Child mortality rate, ages 1-9 years, per 100,000 population	14.3 (2020)	13.1 (2016)	NYS Vital Statistics
Child and adolescent mortality rate, ages 10-19 years, per 100,000 population	20.4 (2020)	22.8 (2016)	NYS Vital Statistics
Suicide mortality rate, ages 15-19 years, per 100,000 population	4.7 (2020)	5.0 (2014-16)	NYS Vital Statistics
Percentage of children, ages 0 through 17 years, in excellent or very good health	93.8 (2020)	89.3 (2016)	NSCH
Percentage of children (age under 19 years) with health insurance	100 (2018)	97.4 (2015)	US Census Bureau
Percentage of children ages 3-6 years who have the recommended number of preventive ("well child") visits in government-sponsored health insurance programs	91.3 (2018)	83.9 (2015)	NYSDOH Office of Quality & Patient Safety
Percentage of adolescents, ages 12-17 years, with a preventive medical visit in the past year	83.2 (2020)	79.2 (2016)	NSCH
Percentage of children ages 9-35 months who received a developmental screening using a parent-completed screening tool in the past year [c]	18.4 (2020)	17.5 (2016)	NSCH
Percentage of children and adolescents ages 1-17 years who had one or more preventive dental visits in the past year	81.0 (2020)	77.6 (2016)	NSCH
Percent of adolescents with special health care needs ages 12-17 years who received services necessary to make transitions to adult health care	16.1 (2020)	15.3 (2016)	NSCH
Percent of adolescents without special health care needs ages 12-17 years who received services necessary to make transitions to adult health care	12.9 (2020)	12.3 (2016)	NSCH
Percentage of children ages 6-11 years who were reported by their parents to be physically active at least 60 minutes per day in the past week	24.0 (2020)	22.9 (2016)	NSCH

Table 3: Core Child & Adolescent Health Tracking Measures for NYS			
Measure	**Target [a] (Year)**	**Most Recent NYS Indicator (Year)**	**Data Source [b]**
Percentage of children ages 12-17 years who were reported by their parents to be physically active at least 60 minutes per day in the past week	19.2 (2020)	18.3 (2016)	NSCH
Percentage of children ages 1-17 who had decayed teeth or cavities in the past year	8.0 (2020	8.4 (2016)	NSCH
Percentage of children ages 2-4 years in WIC who are obese (sex-specific BMI-for-age 95th percentile or higher)	14.3 (2020)	14.3 (2014)	WIC Program Data
Percentage of children and teens ages 10-17 who are obese (sex-specific BMI-for-age 95th percentile or higher)	14.1 (2020)	14.8 (2016)	NSCH
Percent of children, ages 3-17 years, with a mental/behavioral condition who received treatment or counseling	47.6 (2020)	45.3 (2016)	NSCH
Percentage of adolescents in grades 9-12 who felt sad or hopeless for two or more weeks in a row in the past year	21.6 (2020)	28.6 (2015)	YRBS
Percentage of children with special health care needs (CSHCN), ages 0-17 years, who receive care in a well-functioning system	11.6 (2020)	11.0 (2016)	NSCH
Percentage of families participating in the Early Intervention Program who meet the state's standard for the NY Impact on Family Scale	66.5 (2020)	61.6 (2015-16)	Early Intervention NY Family Survey
Percentage of children and adolescents who live in supportive neighborhoods	52.6 (2020)	50.1 (2016)	NSCH
Percentage of children and adolescents who live in a safe neighborhood	60.1 (2020)	57.2 (2016)	NSCH
Percentage of NY residents served by community water systems that have optimally fluoridated water	77.0 (2020)	71.1 (2017)	CDC Water Fluoridated Reporting System

[a] Targets are for years 2020 (2016-20 MCH Action Plan) and 2018 (2013-18 Prevention Agenda)
[b] Data sources: National Survey of Children's Health (NSCH); Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); Youth Risk Behavior Survey (YRBS)
[c] Measure also included in Perinatal/Infant Health

The mortality rate for children ages 1-9 years declined from 15.9 per 100,000 population in 2009 to 13.1 in 2016, a drop of nearly 18%.[5, 34] Leading causes of death among children in this age group include injuries and accidents, cancer, congenital malformations, homicide, and heart disease, together accounting for nearly 60% of all deaths in 2015. Hospitalizations for non-fatal injuries in this age group declined from 436 per 100,000 in 2003 to 239 in 2014, a drop of 45% in 11 years.

Over the same period, the mortality rate for youth ages 10-19 years declined from 30 per 100,000 in 2009 to 22.8 per 100,000 in 2016.[34] Leading causes of death among this age group include injuries and accidents, suicide, homicide, cancer, and congenital malformations, together accounting for 72% of all deaths in 2015.[34] The suicide mortality rate for youth ages 15-19 years increased from 3.7 per 100,000 population in 2006 to 5.0 per 100,000 in 2016, with consistently higher rates outside of New York City.[5, 35]
Many of the measures tracked for child and adolescent health come from the National Survey of Children's Health (NSCH), which asks a representative sample of parents in every state a unique array of questions about their child's health, development, health care, special health needs, and family and community factors.[36] Because of recent changes in the survey methodology, current (2016) data cannot be compared to previous years. Thus, while no historic trend data are available, the 2016 data will serve as a baseline for future years.

The 2016 NSCH found that nearly nine in ten children ages 0-17 years in NYS are in excellent or very good health.[5, 36] Nearly 97% of children had health insurance at the time of the survey,[36] which is similar to insurance coverage data reported through the US Census Bureau as shown in Table 3. The percentage of children with health insurance has increased steadily for the past decade.[5] However, only 72% of parent respondents reported that their child had continuous health insurance coverage for the past 12 months that was adequate to meet his or her needs, and nearly 8% of families reported that they had problems paying for a child's medical bills.[36]

Parents reported that 86% of children ages 0-5 years, 87% of children ages 6-11 years, and 79% of teens ages 12-17 years, respectively, had a preventive medical visit (check-up) in the past year.[36] These estimates are similar to published quality reports for children enrolled in government-sponsored (Medicaid and Child Health Plus) managed care plans in NYS, which show improvements in these measures since 2010.[4, 29] Only 13% of parents indicated that their child ages 12-17 years had received services necessary to make a transition to adult health care, though more than 60% of families reported that their teen had a chance to speak with a doctor or health care provider privately (without a parent or another adult in the room) at their last check-up, which is one important element of transition support.[5, 36]

Children with special health care needs (CSHCN) are those who have, or are at increased risk for, a chronic physical, developmental, behavioral, or emotional condition and require health and related services of a type or amount beyond that which is required by most children generally.[37] Special health care needs may require specialty medical services and/or ongoing use of prescription drugs, and may be associated with functional impairments for children. An estimated 18% of NYS children ages 0-17 years have one or more special health care needs, increasing from 7% of children ages 0-5 years to 24% of children ages 6-17 years.[36]

Among children with any health condition, 6.5% reported that the condition(s) consistently affected their daily activities a great deal, and another 39.6% reported that their conditions affected their daily activities moderately and some of the time.[36] CSHCN were as likely as those without special needs to have health insurance, but more likely to report that their insurance was not adequate to meet their needs and that their family had problems paying for medical bills.[36] Parents reported that 73.4% of children ages 0-17 who needed care coordination services received effective care coordination services, but only 11% of CSHCN said that they received care in a well-functioning system.[5] The percentage of parents who reported that their teen child received services necessary to make a transition to adult health care was somewhat higher for youth with special health care needs (15.3%) compared to youth without special health care needs (12.3%).[5, 36] Over 6% of CSHCN families reported that their child was not able to obtain needed health care in the last year, compared to less than 1% of children without special health care needs.[36]

These survey results are consistent with additional input received directly from NYS parents and providers as part of ongoing public health efforts to improve service systems for CSHCN and their families. Both parents and providers emphasized the fragmentation of services for CSHCN, the complexity of accessing the myriad of services needed, and disparities in care – with some families getting what they need and others "going without." Parents are seeking better information about their child's diagnosis and service systems, and they want more connections to other families who have had similar experiences.[2] Nearly 62% of families participating in the state's Early Intervention Program (EIP) met the state's standard for family impact scale in 2015-16.[5] As a core public health program serving children ages birth to three with developmental delays/disabilities and their families, the EIP has prioritized family engagement and support as an area for improvement.[38]

Early identification of special health needs is key to optimal management and supporting children's development (see *Perinatal and Infant* Health above for information about newborn bloodspot and hearing screenings). The American Academy of Pediatrics recommends routine developmental screening for all children as part of ongoing well-child care.[39] In 2016, only 17.5% of parents of NYS children ages 9 months to 5 years reported that they received a standardized developmental screening using a parent-completed screening tool, compared to 30.4% nationally.[5,36] Additionally, only 28.2% of NYS parents reported that their child's doctor or health care provider asked if they had any concerns about their child's learning, development or behavior for children ages 0-5 years, compared to 34% nationally.[36] Based on parent responses, approximately 6% of NYS children ages 3-17 years currently have a developmental delay, with 2.5% reporting a current diagnosis of Autism or Autism Spectrum Disorder.[5,36]

Oral (dental) health is another critical aspect of children's health that can affect their physical, social, and emotional health. National Health and Nutrition Examination Survey (NHANES) data for 2011–2014 found that 13.7% of children ages 2–8 years had untreated dental caries (cavities) in their primary teeth (baby teeth). The prevalence of untreated dental caries in primary teeth increased with age, from 10.9% of children ages 2–5 years to 17.4% of children ages 6–8 years.[40] Parents reported that 8.4% of children ages 1-17 years have decayed teeth or cavities in the past year, and 3.1% described the condition of their child's teeth as "fair or poor."[5,36] Nearly 78% reported that their child ages 1-17 years had at least one preventive dental visit (dental check-up, dental cleaning, dental sealants, or fluoride treatments) in the past year.[5,36] Despite community water fluoridation being hailed as one of the most effective population health interventions, only 71% of NYS residents served by community water systems have optimally fluoridated water.[5]

Childhood and adult overweight and obesity have reached epidemic proportions in NYS and across the nation. In NYS, 14.3% of children ages 2-4 years enrolled in the WIC program are obese based on their age- and sex-specific body mass index (BMI) percentile.[5,41] Estimates for older children vary by data source, with 13.1% of teens in grades 9-12 and 14.8% of children and teens ages 10-17 years, respectively, meeting the definition of obesity based on BMI-for-age percentiles.[5,36,42] Fewer than one-quarter (22.9%) of children ages 6-11 years, and only 18.3% of teens ages 12-17 years, are physically active for at least 60 minutes daily.[5] The chapter on *Chronic Diseases* has more information about obesity among children and adults in NYS.

There is increasing recognition of the importance of social emotional development for lifelong health and well-being, including a greater understanding of the long-term impacts of childhood trauma and adverse childhood experiences (ACEs). This recognition has led to a growing emphasis on interventions that promote positive development, build resiliency, and support safe, stable, and nurturing relationships and environments for children and youth. NSCH questions designed to capture information about children's emotional and mental health indicate that 59% of NYS children ages 6 months to 5 years of age and 45% of children ages 6-17 years, respectively, are "flourishing" or thriving.[36] Parents reported that 30% of NYS children ages 0-17 years had one ACE and 15% had two or more ACEs, such as the death or incarceration of a parent, witnessing or being a victim of violence, or living with someone with mental health, drug or alcohol problems. The prevalence of having one or more ACEs increased with age, from 38.7% of children ages 0-5 years to 49.3% of those ages 12-17 years.[36] See *Determinants* below for further discussion of ACEs.

Parents report that 7% of NYS children ages 3-17 years have current anxiety problems, 1.1% have depression, 5.7% have other mental health conditions, and 6.5% have behavioral or conduct problems (these conditions may overlap).[36] Parents report that 21% of children ages 6-17 years have been bullied by other children, while 6% say their child has bullied others.[36] Approximately 10.1% of all NY children ages 3-17 years have received treatment or counseling from a mental health professional during the past year, but among those children with a mental/behavioral condition, fewer than half (45.2%) received treatment or counseling.[36] Among youth in grades 9-12 responding to the Youth Risk Behavior Survey, 28.6% reported feeling sad or hopeless for two

or more weeks in a row in the past year.[5] See *Mental Health and Mental Health/Substance Use* chapter for further information on mental and emotional health.

DISPARITIES

Promoting health equity is an overarching priority of NYS's Title V program, as well as the Prevention Agenda. Data analyses conducted as part of the comprehensive 5-year needs assessment for the Title V/MCH Program in NYS reveal marked racial, ethnic, economic, geographic, and other disparities across MCH outcomes. Additional, updated analyses are needed to track these disparities and to assess the impact of public health efforts to promote health equity. In addition, while each of these factors alone may impact health, it is important to recognize the significant overlap and intersecting relationships between factors, which may be more difficult to measure.[43]

There are dramatic racial and ethnic disparities for maternal and women's health measures in NYS, which are especially marked for black/African American women. In 2014, adolescent pregnancy rates were 5.3 times higher among black non-Hispanic adolescent girls, and 4.7 times higher among Hispanic teens, compared with white non-Hispanic teens, although the magnitude of these disparities has narrowed slightly since 2008.[4] In 2014, black women were 2.2 times, and Hispanic women 1.7 times, more likely than white women to have an unintended pregnancy, and the magnitude of these disparities has gotten wider since 2008.[4]

Both black and Hispanic women using NYS-funded Family Planning services in 2014 were less likely than white women to report use of effective contraception.[14] White women are more likely to start prenatal care early and to receive an adequate number of prenatal care visits, compared to black and Hispanic women.[5,44] Only 68% of black women received early prenatal care compared to nearly 85% of Non-Hispanic white women. Compared to white non-Hispanic women, preterm birth rates in NYS for 2015 were 1.65 times higher among black non-Hispanic women and 1.29 times higher among Hispanic women—disparities that have not changed significantly since 2008.[4]

Racial disparities in maternal mortality are especially dramatic. From 2013 to 2015, black non-Hispanic women in NYS were nearly five times more likely to experience a pregnancy-related death than white women. The statewide black to white mortality ratio was 4.8 to 1 in 2005-2007 and 3.2 to 1 in 2011-2013.[4] Similar disparities exist for severe maternal morbidity, with white Non-Hispanic women experiencing the lowest odds for severe maternal morbidity at delivery.[45] The one exception was that black and white Non-Hispanic mothers with vaginal deliveries had similar experiences. Increased risk for maternal mortality among black women persists even when controlling for socioeconomic status.[46] The alarmingly high rates of maternal death among Black women have received widespread attention as a national and international crisis, including heightened attention and calls for action in NYS.[47,48]

Similar racial and ethnic disparities exist for infant birth outcomes. The ratio of black-to-white low birth weight rates among Non-Hispanics was 1.9 in 2015 and increased from the ratio of 1.8 in 2014. Despite ongoing efforts to address this disparity, NYS infant mortality rates continue to be about two times higher among black infants compared to white infants.[44] Black infants are less likely to be breastfed and be placed on their backs to sleep.[45] In contrast, rates of neonatal abstinence syndrome are highest among non-Hispanic white infants.[45] Rates of drug-related discharges for newborns have increased across all racial and ethnic groups.[45]

Birth indicators for Asian/Pacific Islander women and infants vary. While selected indicators (early prenatal care and low birth weight rates) for Asian/Pacific Islanders are somewhere between white and black or Hispanic rates, other key indicators including preterm birth, infant mortality and teen pregnancy rates were similar or better than rates for white women and infants.[44]

Racial and ethnic disparities persist in older children. The mortality rate for children ages 1 to 4 years was highest among non-Hispanic black male children. Among adolescents, mortality rates were lowest for Hispanic teens and highest for black teens. However, suicide rates, specifically, were highest among non-Hispanic white teens and lowest among non-Hispanic Asian/Pacific Islanders.[45]

Disparities based on other factors, including socioeconomic status, gender, and geography, have also been noted for various MCH outcomes. Unintended pregnancy (among live births) is 1.79 times higher among women enrolled in Medicaid compared to non-Medicaid,[4] and the percentage of women receiving early prenatal care increases with education level and private insurance coverage.[4] Preterm birth rates are higher for women on Medicaid and for those who are teens or greater than age 35. Infant mortality rates historically have been higher among women with lower educational attainment, Medicaid or no insurance, unmarried status, and maternal age either under 20 or over 40 years.[49] Infant mortality rates are also higher for male infants. Infants born to women who have lower income and fewer years of educational attainment are less likely to be breastfed and be placed on their backs to sleep.[45] Children from families in the lowest income bracket (<100% federal poverty level) are more likely to report having special health care needs than those at the highest income levels.[36]

While several key birth outcomes were higher in New York City (NYC) compared to the rest of the state before 2015, these differences have narrowed and, in some cases, reversed. The black-to-white ratio in maternal mortality in NYC decreased from 12.2 in 2007-2009 to 3.4 in 2013-2015. This decrease in the black-to-white ratio reflects an increase in the maternal mortality rate among white women while the rate remained stable among black women. Outside NYC, the black-to-white ratio peaked in 2013-2015 at 3.9 to 1. In 2015, rates of early prenatal care and preterm birth were virtually the same in NYC compared to rest of the state, and infant mortality rates in NYC were lower, at 4.1 per 1,000 live births in NYC compared to 5.0 per 1,000 births in the rest of state. Mortality rates for children ages 0-9 and 10-19 years, respectively, were the same in NYC and rest of state.[15] However, rates of adolescent pregnancy and maternal mortality remained higher in NYC.[45] Any breastfeeding was higher in NYC, while exclusive breastfeeding during delivery hospitalization was higher outside NYC.[45] The rate of NAS was higher outside of NYC and in non-metropolitan areas.[45]

Significant disparities exist in oral health as well. The 2015 NYS PRAMS survey found that 55.4% of non-Hispanic white pregnant women had their teeth cleaned during pregnancy, compared to 46.7% of non-Hispanic black, 49.3% Hispanic, and 45.6% non-Hispanic other races.[16] In the 2011-14 NHANES surveys, the prevalence of untreated dental caries was higher in Hispanic (19.4%) and non-Hispanic black children (19.3%) compared with non-Hispanic white children (9.5%).[40] Disparities in access to dental care continue to be an issue, especially for low income communities. Over 2 million people in NYS reside in a federally designated dental health professional shortage area (DHPSA).[50] Twenty NYS counties are designated entirely as Low Income or Medicaid-Eligible DHPSA, with another 9 counties having a portion of the county designated. While 71.6% of people on public water systems receive optimally fluoridated water, a disparity exists between NYC (100%) and the rest of the State (47.8%).[5] NYS's 3rd Grade Survey 2009-2011 revealed significant disparities between low- and high-income children regarding caries experience, untreated caries, and sealants.[51]

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

The health outcomes detailed in the *Burden and Data Trends* section are complex conditions that reflect myriad risk and protective factors, operating over the life course and even across generations. Periodic reviews of scientific literature reveal many individual-level risk factors for MCH health outcomes, including genetic, medical, behavioral, psychosocial, interpersonal relationship, and sociodemographic risks.[23,25,52,53] For example, publications about preterm birth and infant mortality commonly cite multiple risk factors such as pre-existing maternal health conditions, short or longer inter-pregnancy intervals, inadequate or late prenatal

care, complications of pregnancy, maternal alcohol and drug use, chronic stress, interpersonal violence, specific parenting practices (such as sleep position and pacifier use), lack of social support, race, and family income.[23,25]

While these kinds of individual and demographic risk factors are important in addressing MCH outcomes, they do not fully explain or account for observed disparities. The focus within MCH and overall public health increasingly is on addressing social determinants of health – the conditions in which people are born, grow, live, work, and age.[54] Social factors such as food insecurity, homelessness, employment conditions, poverty, adverse neighborhood environments, inadequate health care, lack of educational opportunities, social exclusion, racism, and gender-based inequities are important forces that influence MCH outcomes, both directly and through their impact on other individual risk factors.[23,25,54,55] For example, a multi-country systematic review by Kim and Saada in 2013 examined social determinants of infant mortality and birth outcomes in western developed countries. They found that income inequality, social policies such as maternal leave, and socioeconomic status of neighborhoods are important determinants.[56]

A life course approach to health recognizes that early experiences and exposures during critical periods of development (such as in utero or early childhood) may "program" a person's future health and development, including a woman's reproductive health. In addition, the accumulation of adverse experiences and toxic stress over one's life course – a concept called "weathering" – may further impact lifelong health and development. Stress and immune system responses can affect biological functions, while also influencing health risk behaviors and healthcare utilization.[3,46] This life course lens may help further explain persistent disparities in key MCH outcomes such as preterm birth, infant mortality, and maternal mortality.[3,25,46] There is growing recognition that persistent disparities in maternal and infant mortality are due in part to chronic, toxic stress related to pervasive and systemic racism in the US.[25,46,47]

Embedded within a life course model is attention to the impact of ACEs. An extensive body of long-term research has demonstrated that adverse experiences during childhood – such as having a parent addicted to alcohol or drugs or in prison, witnessing family or neighborhood violence, and experiencing abuse or neglect – can have significant effects on long-term health and well-being.[57,58] Early exposure to multiple ACEs is associated with a wide range of chronic health conditions and health risk behaviors later in life, including tobacco and alcohol abuse, high blood pressure, heart disease, cancer, diabetes, depression, and suicide.[58,59]

While the body of research describing the impacts of ACEs on adult health is large and growing, knowledge about how ACEs affect reproductive health and birth outcomes is more limited, highlighting the need for more research in this area. Studies have demonstrated that adverse experiences during a woman's own childhood are associated with increased risk for unplanned and adolescent pregnancy, fetal death, preterm birth, and low birth weight, as well as perinatal depression later in her life.[60-64]

Additionally, while most of the ACEs research has focused on the impact on health outcomes later in adulthood, a growing body of research also highlights the more immediate impact of adverse experiences on children and teens. Individual studies have identified significant associations between prior or concurrent adverse experiences and a variety of physical, developmental, behavioral, and mental health problems and conditions.[65-68] These experiences are also associated with decreased language, literacy, and math skills; social-behavioral problems among kindergarteners;[69] chronic school absenteeism in school-age children;[70] and increased risk for attempted suicide during childhood or adolescence.[71]

At the same time, a life course approach recognizes that health pathways are changeable, and that protective factors can improve health and support healthy development throughout the lifespan.[3,46] Protective factors may include individual resiliency and health-promoting behaviors such as physical activity,

avoidance/cessation of smoking, or use of preventive health care services. External factors in families, neighborhoods, and communities also can be protective. These include nurturing parenting practices and family routines, strong and positive relationships, high quality child care and education, and adoption of trauma-informed care practices. Social policies such as affordable comprehensive health insurance, access to effective contraception, paid family leave, and regionalized systems of maternal health care can influence health and development across the lifespan as well.

An increased focus on the life course and social determinants of health is consistent with input received from families (including parents and youth) and service providers as part of the 2015 needs assessment for the NYS Maternal and Child Health State Action Plan, as well as the input recently received in 2017-18 for the Title V MCH SAP update and Prevention Agenda. Stakeholders continue to identify a number of factors that influence their use of health care: health insurance coverage, accessibility of health care, provider diversity and cultural competence, transportation, stigma and confidentiality concerns, language barriers, cost, inability to take time off from work, and competing life responsibilities.[2,38,45] In addition, stakeholders noted lack of social support, unsafe neighborhoods, lack of affordable housing, limited access to affordable, healthy food, and lack of opportunities for physical activity as key barriers to good health. They called for increased capacity and access to an array of services including primary care, mental health and substance abuse treatment, home visiting, breastfeeding classes and support groups, and parenting education to better understand child development and strengthen parenting skills. Families of CSHCN continue to emphasize a need for information, access to comprehensive health care to meet the needs of their children, and social supports.

Finally, stakeholders emphasized involving community partners to better understand gaps and barriers on the local level, as communities need to "own" the process and solutions to facilitate realistic, sustainable improvements.[2] Strong collaborative partnerships with community stakeholders are at the heart of Title V, as well as the Prevention Agenda, and are key to success in improving the health and well-being of all New Yorkers.

References

[1] Title V Maternal and Child Health Services Block Grant Program, January 2018. Available at: www.mchb.hrsa.gov/maternal-child-health-initiatives/title-v-maternal-and-child-health-services-block-grant-program

[2] New York State Department of Health. Title V 2019 Application/ 2017 Annual Report (submitted July 2018). To be available at: https://www.health.ny.gov/community/infants_children/maternal_and_child_health_services/

[3] U.S. Department of Health and Human Services, HRSA, MCH Bureau. Rethinking MCH: The Life Course Model as Organizing Framework Concept Paper, November 2010. Version 1.1. Available at: https://www.hrsa.gov/sites/default/files/ourstories/mchb75th/images/rethinkingmch.pdf

[4] New York State Department of Health. New York State Prevention Agenda Dashboard. Available at: https://webbi1.health.ny.gov/SASStoredProcess/guest?_program=/EBI/PHIG/apps/dashboard/pa_dashboard&p=sh

[5] New York State Department of Health. New York State Maternal and Child Health Dashboard (under development). To be available at: https://www.health.ny.gov

[6] Maternal and Child Health Bureau. Health Resources and Services Administration. Maternal/Women's Health. May 2018. Available at: https://mchb.hrsa.gov/maternal-child-health-topics/maternal-and-womens-health

[7] U.S. Census Bureau. U.S. Department of Commerce. 2017 Quick Facts: New York. Available at: https://www.census.gov/quickfacts/NY

[8] New York State Department of Health. Vital Statistics of New York State 2015. Available at: https://www.health.ny.gov/statistics/vital_statistics/2015/table04.htm

[9] New York State Department of Health. Vital Statistics of New York State 2015. Available at: https://www.health.ny.gov/statistics/vital_statistics/2015/table26.htm

[10] Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008-2011. *NEJM*. March 3, 2016; 374:843-852.

[11] New York State Department of Health. Behavioral Risk Factor Surveillance System, 2014-2016 (unpublished data).

[12] Graham L. CDC Releases Guidelines on Improving Preconception Health Care. *AmFamPhysician.* 2006 Dec 1;74(11):1967-1970. Retrieved from https://www.aafp.org/afp/2006/1201/p1967.html

[13] New York State Department of Health (unpublished data analysis). Behavioral Risk Factor Surveillance System, 2015.

[14] New York State Department of Health Family Planning Program Data, 2009-2016 (unpublished data).

[15] Conde-Aguedelo A, Rosas-Bermudez A, Kafury-Goeta AC. Birth spacing and risk of adverse perinatal outcomes: a meta-analysis. JAMA 295(15):1809-23. 2006.

[16] New York State Department of Health. Pregnancy Risk Assessment Monitoring System 2015-2016. Provisional data provided by Public Health Information Group, final data will be available at: https://www.health.ny.gov/statistics/prams/

[17] New York State Department of Health. New York State Maternal Mortality Review Report 2012-2013. August 2017. Available at: https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2012-2013.pdf

[18] New York State Department of Health. Maternal Depression: Information for Health Care Providers 2018. Available at: https://www.health.ny.gov/community/pregnancy/health_care/perinatal/maternal_depression/providers/

[19] New York State Department of Health. Office of Quality and Patient Safety. Medicaid Perinatal Care Study March 2013. Available at: https://www.health.ny.gov/health_care/medicaid/standards/prenatal_care/docs/perinatal_care_study.pdf

[20] New York State Department of Health. Office of Quality and Patient Safety. Medicaid Standards - Postpartum Services 2014 Cohort1 (unpublished data).

[21] American Academy of Pediatrics Committee on Practice and Ambulatory Bright Futures Periodicity Schedule Workgroup. 2017 Recommendations for Preventive Pediatric Health Care. *Pediatrics.* 2017;139(4):e20170254. Available at: http://pediatrics.aappublications.org/content/early/2017/02/15/peds.2017-0254

[22] Porter N, Ispa JM. Mother's online message board questions about parenting and toddlers. *Journal of Advanced Nursing.* March 2013;69(3),559–568.

[23] Report of the Secretary's Advisory Committee on Infant Mortality (SACIM): Recommendations for Department of Health and Human Services (HHS) Action and Framework for a National Strategy. January 2013. Available at: http://www.hrsa.gov/advisorycommittees/mchbadvisory/InfantMortality/About/natlstrategyrecommendations.pdf

[24] New York State Department of Health. Vital Statistics of New York State 2013-5. Available at: https://www.health.ny.gov/statistics/vital_statistics/

[25] Kotch JB. Maternal and Child Health: Programs, Problems, and Policy in Public Health, Third edition. 2013. Jones & Bartlett Learning, LLC.

[26] New York State Department of Health. Congenital Malformations Registry, 2010-2012 (unpublished data)

[27] New York State Department of Health. Newborn Screening Program. https://www.wadsworth.org/programs/newborn/screening

[28] Centers for Disease Control and Prevention, Early Hearing Detection and Intervention Program, New York State data. Available at: https://www.cdc.gov/ncbddd/hearingloss/ehdi-data.html

[29] New York State Department of Health. eQARR Online Managed Care Report 2017. Available at: https://www.health.ny.gov/health_care/managed_care/reports/eqarr/

[30] Centers for Disease Control and Prevention. CDC Grand Rounds: Public Health Strategies to Prevent Neonatal Abstinence Syndrome. March 10, 2017. MMWR 66(9):242-245.

[31] New York State Department of Health. Statewide Planning and Cooperative System. Neonatal abstinence syndrome rate per 1,000 newborn discharges (any diagnosis). 2012-2014. Available at: https://www.health.ny.gov/statistics/opioid/data/h14.htm

[32] American Academy of Pediatrics Section on Breastfeeding. Breastfeeding and the Use of Human Milk. Pediatrics 2012;129(3). Available at: http://pediatrics.aappublications.org/content/129/3/e827.full.html

[33] Centers for Disease Control and Prevention. Breastfeeding Report Card. Progressing Toward National Breastfeeding Goals. United States, 2016. Available at: https://www.cdc.gov/breastfeeding/pdf/2016breastfeedingreportcard.pdf

[34] New York State Department of Health. New York State Community Health Indicator Reports - Child and Adolescent Health Indicators. Available at: https://www.health.ny.gov/statistics/chac/indicators/cah.htm

[35] New York State Department of Health. Suicide mortality rate per 100,000 - Aged 15-19 years. Available at; https://www.health.ny.gov/statistics/chac/mortality/d25.htm

[36] Data Resource Center for Child and Adolescent Health. National Survey of Children's Health. Available at: http://childhealthdata.org/learn/NSCH

[37] McPherson M, Arango P, Fox H, et al. A new definition of children with special health care needs. *Pediatrics.* 1998;102(1):137–139.

[38] New York State Department of Health. Early Intervention Program - Information for Families. Available at: https://www.health.ny.gov/community/infants_children/early_intervention/families.htm

[39] American Academy of Pediatrics. Bright Futures: Guidelines for Health Supervision of Infants, Children, Adolescents, 4th edition. Available at: https://brightfutures.aap.org/materials-and-tools/guidelines-and-pocket-guide/Pages/default.aspx

[40] CDC/NCHS. National Health and Nutrition Examination Survey Data. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2011–2014. https://www.cdc.gov/nchs/nhanes.htm.

[41] New York State Department of Health. Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Unpublished data.
[42] Centers for Disease Control and Prevention. Adolescent and School Health. Available at: https://www.cdc.gov/healthyyouth/data/topics/npao.htm
[43] Bauer GR. Incorporating intersectionality theory into population health research methodology: challenges and the potential to advance health equity. Social Science & Medicine 2014;110:10-7.
[44] New York State Department of Health. New York State Health Indicators by Race/Ethnicity, 2012-2014. Available at: https://www.health.ny.gov/statistics/community/minority/county/newyorkstate.htm
[45] New York State Department of Health. Maternal and Child Health Services (Title V) Block Grant 2016 Application/2014 Annual Report. Available at: https://www.health.ny.gov/community/infants_children/maternal_and_child_health_services/
[46] Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. Matern Child Health J. 2003 Mar;7(1):13-30.
[47] Villarosa L (April 11 2-18) Why America's Black Mothers and Babies are in a Life-or-Death Crisis. The New York Times Magazine.
[48] Press Release: Governor Cuomo Announces Comprehensive Initiative to Target Maternal Mortality and Reduce Racial Disparities in Outcomes, April 23, 2018
[49] Wang T, Schoen LD and Milnik T. New York State Department of Health Office of Quality and Patient Safety, Bureau of Vital Statistics. Infant Mortality in New York State, 2002-2012. Available at: https://www.health.ny.gov/statistics/vital_statistics/docs/infant_mortality_report_nys_2002-2012.pdf
[50] Health Resources and Services Administration Health Center Program. 2016 Health Center Profile – Health Center Program Grantee Data, New York State. Available at: https://bphc.hrsa.gov/uds/datacenter.aspx?q=d&year=2015&state=NY#glist
[51] New York State Department of Health. New York State Community Health Indicator Reports – Oral Health Indicators. Available at: https://www.health.ny.gov/statistics/chac/indicators/ora.htm
[52] Centers for Disease Control and Prevention. Facts About Developmental Disabilities. Available at: https://www.cdc.gov/ncbddd/developmentaldisabilities/facts.html
[53] Centers for Disease Control and Prevention. Violence Prevention. Suicide: Risk and Protective Factors. Available at: https://www.cdc.gov/violenceprevention/suicide/riskprotectivefactors.html
[54] World Health Organization. About social determinants of health. Available at: http://www.who.int/social_determinants/sdh_definition/en/
[55] Lorch SA, Enlow E. The role of social determinants in explaining racial/ethnic disparities in perinatal outcomes. Pediatr Res. 2016 Jan;79(1-2):141-7. Epub 2015 Oct 14.
[56] Kim D, Saada A. The social determinants of infant mortality and birth outcomes in Western developed nations: a cross-country systematic review**.** Int J Environ Res Public Health. 2013 Jun 5;10(6):2296-335.
[57] Centers for Disease Control and Prevention. Adverse Childhood Experiences (ACEs). Available at: https://www.cdc.gov/violenceprevention/acestudy/index.html
[58] Felitti and Anda (2008) The Relationship of Adverse Childhood Experiences to Adult Health, Well-Being, Social Function, and Healthcare. In Lanius et al (Eds) *The Hidden Epidemic: The Impact of Early Life Trauma on Health and Disease* (pp 77-88). New York: Cambridge University Press.
[59] Felitti, V., Anda, R., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V. et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. AJPM 1998. 14, 245-257. doi:10.1016/S0749-3797(98)00017-8).
[60] Smith M, Gotman N, Yonkers K. Early childhood adversity and pregnancy outcomes. Maternal Child Health J 2016; 20:790-98.
[61] McDonnell CG, Valentino K. Intergenerational effects on childhood trauma: evaluating pathways among maternal ACEs, perinatal depressive symptoms, and infant outcomes. Child Maltreatment 2016.
[62] Christiaens I, Hegadoren K, Olson D. Adverse childhood experiences are associated with spontaneous preterm birth: a case-control study. BMC Medicine 2015; 13:124. 2015
[63] Bellis MA, Lowey H, Lackenby N, et al. Adverse childhood experiences: retrospective study to determine their impact on adult health behaviors and health outcomes in a UK population. J Public Health 2004 March;36(1):81-91.
[64] Hillis SD, Anda RF, Dube SR, Felitti VJ, Marchbanks PA, Marks JS. The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. Pediatrics 2004s; 113(2):320-7.
[65] Bright MA, Thompson LA. Association of Adverse Childhood Experiences with Co-occurring health conditions in early childhood. JDBP 2018. 39(10):37-45.
[66] Kerker BD, Zhang J, Nadeem E, Stein RE, Hurlburt MS, Heneghan A, Landsverk J, McCue Horwitz S. Adverse childhood experiences and mental health, chronic medical conditions, and development in young children. Academic Pediatrics 2015; 15(5):510-7.
[67] Jiminez ME, Wade R Jr, Schwartz-Soicher O, Lin Y, Reichman NE. Adverse childhood experiences and ADHD diagnosis at age 9 years in a national urban sample. Academic Pediatrics 2017; 17(4):356-61.
[68] Luby JL, Barch D, Whalen D, Tillman R, Belden A. Association between early life adversity and risk for poor emotional and physical heath in adolescence: a putative mechanistic neurodevelopmental pathway. JAMA Pediatrics 2017; 1171(12):1168-75.

[69] Jiminez ME, Wade R, Lin Y, Morrow LM, Reichman NE. Adverse experiences in early childhood and kindergarten outcomes. Pediatrics 2016;137(2): e20151839.

[70] Stempel H, Cox-Martin M, Bronsert M, Dickinson LM, Allison MA. Chronic school absenteeism and the role of adverse childhood experiences. Academic Pediatrics 2017; 17(8):837-43.

[71] Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. JAMA 2001;286(24):3089-96.

Mental Health & Substance Use Disorders

Contributing Causes of Health Challenges

BACKGROUND

Positive mental health and well-being, allows people to realize their full potential, cope with the stresses of life, work productively, and make meaningful contributions to their communities.[1] Mental, emotional, and behavioral (MEB) disorders, such as depression, conduct disorder, and substance use disorder, impose a significant burden on individuals, their families, and communities. Implementing best-practice programs and policies aimed at decreasing risks and increasing strengths can reduce new cases of MEB disorders and significantly improve the quality of life for people across their lifespan.[2]

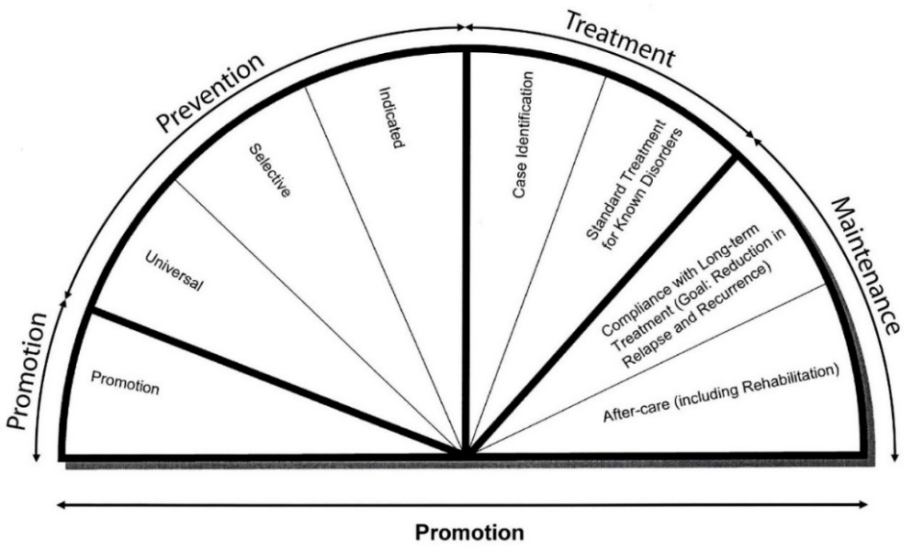


Figure 1: Institute of Medicine Mental Emotional Behavioral Intervention

In 2009, the Institute of Medicine modified the MEB Intervention Spectrum,[2] identifying Promotion and Prevention as unique and connected segments. Previously, Promotion was a subgroup under Prevention. Evidence indicates that promotion of positive aspects of MEB health and well-being is effective in reducing MEB disorders. Promoting mental health and well-being can serve as a foundation for both prevention and treatment of disorders. Mental health is more than the absence of mental illness. A person can have a mental illness but still experience mental well-being, such as attending college and enjoying reciprocal relationships. Conversely, a person can be free of a diagnosed mental illness, but still experience mental distress such as struggling to cope with a difficult life situation.[3]

MEB disorder prevention should be addressed at three levels: (1) universal populations targeted without regard to risk level as part of primary prevention, such as all middle school students or all adults in a community center; (2) selected populations that are members of subgroups with elevated levels of risk factors, such as people who have experienced trauma; and (3) indicated populations that demonstrate elevated risk levels and initial symptoms of the disorder, though they currently do not meet criteria in the Diagnostic and Statistical Manual of Mental Disorders, such as children with early problem behaviors and adults who exhibit depressive symptoms.[2]

BURDEN AND DATA TRENDS

The Global Burden of Disease study assigned a single disability number—disability-adjusted life years or DALY score—to each of 291 conditions and injuries.[4] The DALY score combines years of life lost to premature mortality and years lost to disability attributable to each condition. The scores found that MEBs have a significant impact on mortality and disability. In 2010, major depressive disorder ranked #5 in terms of DALY burden in the United States (US), with anxiety disorders #13, and schizophrenia #27.[4] Brain disorders, including mental, neurological, and substance use disorders, account for the greatest number of DALYs in the US, representing nearly 20% of disability from all causes. [5]

The Substance Abuse and Mental Health Services Administration estimated that national expenditures for mental health care were $147 billion in 2009. Combining this figure with updated projections of lost earnings and public disability insurance payments associated with mental illness, the financial cost of mental disorders was at least $467 billion in the US in 2012.[6] The annual economic cost of misuse of prescription drugs, illicit drugs, and alcohol is estimated at $442 billion.[7]

Human development is interlinked with well-being, and psychological well-being plays a key role. The American Human Development Index is a composite measure of three other indices that measure health (life expectancy), education, and per capita income.[8] The impetus for developing the Index was to measure the value of life and society, not only financial productivity. Using data from the 2013-2014 Census, the Human Development Index for the US is 5.06. The Index for NYS is 5.66, which puts it in the top fifth of state rankings and higher than the national average.

Measuring human development is complex. For example, the Index does not reflect, in depth, the quality of an educational degree or unequal distribution of income, and indicators such as life expectancy take a long time to change. These factors influence well-being, and enhancing well-being in turn promotes human development. Hence, it is important to gather other information about opportunity, gender equity, and social equity across the lifespan.[9]

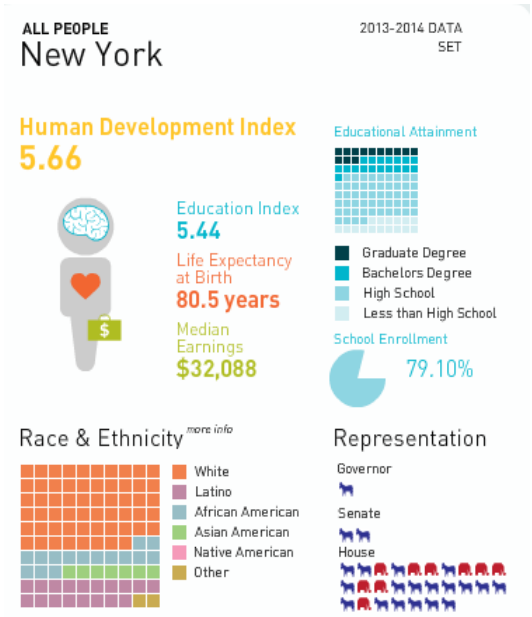


Figure 2: New York State Human Development Index, 2013-2014

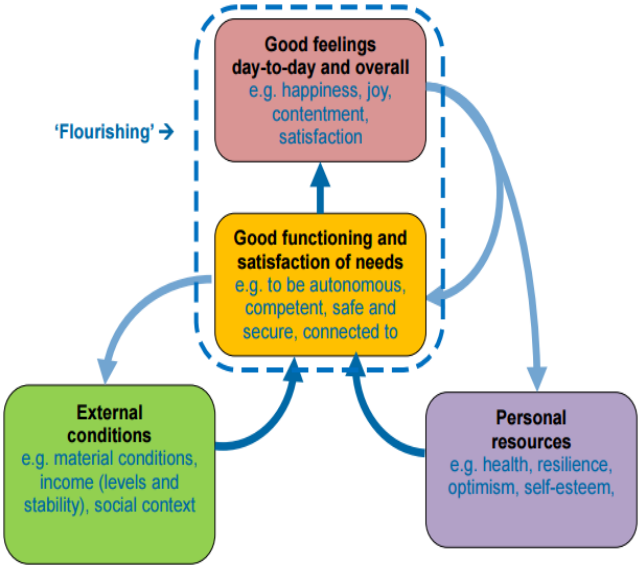


Figure 3: New Economics Foundation Dynamic Model of Well-Being

WELL-BEING

Well-being is a relative and dynamic state where one maximizes his or her physical, mental, and social functioning in the context of supportive environments to live a full, satisfying, and productive life. [10,11]

The components of well-being are illustrated in the New Economics Foundation Dynamic Model of Well-Being[10] (Figure 3). A complex interaction of forces contributes to overall well-being. *External conditions* include material factors, income, and social context. *Personal resources* include an individual's approach to life, and how they respond and interact with the external world. Together, external and personal resources influence an individual's functioning and satisfaction of needs. Optimal functioning can improve external conditions, such as income, and contributes to greater satisfaction with life. These improvements can also increase personal resources.

A snapshot of External Conditions is captured in the Opportunity Index, an annual composite measure using data related to 16 indicators from the US Census Bureau's American Community Survey that is jointly developed by the Measure of America of the Social Science Research Council and Opportunity Nation.[11] The Index focuses on factors that foster opportunity across three dimensions: Economy, Education, and Community. It is designed to help identify concrete solutions to lagging

conditions for opportunity and economic mobility." It is measured on a scale of zero to 100, where 100 represents maximum opportunity.

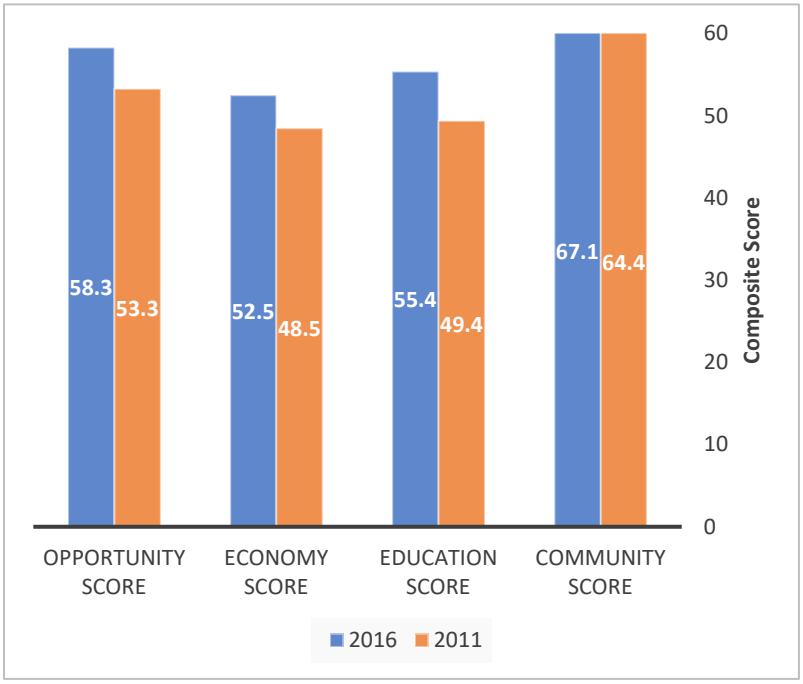


Figure 4: New York Opportunity Index Scores 2016 and 2011 Measure of America

Opportunities in NYS improved between 2011 and 2016 (Figure 4). The composite Opportunity Index for NYS in 2016 was 58.3,[12] which was 18th in the nation that year and higher than its ranking of 22 in 2011. Another measure of external conditions is the number of high-poverty neighborhoods, which have been increasing across the country. High-poverty neighborhoods are more likely to experience unemployment, underperforming schools, social isolation, and limited access to opportunity.[13] In recent years, poverty has become more concentrated, with one in four black poor and nearly one in six Hispanic poor living in neighborhoods where 40% or more live in poverty, compared to one in 13 of the white poor. Children are more likely to reside in high-poverty neighborhoods than adults.

While concentration of poverty is often associated with large metropolitan areas, the phenomenon of concentrated poverty has grown fastest in small- to mid-size metropolitan areas. For example, 11% of all children under age nine, or 226,359 children in NYS, live in deep poverty, which is defined as a family income below 50% of the federal poverty level. The counties with the highest percentage of children under age six in deep poverty are Bronx (22%), Oswego (19%), Montgomery (18%), Franklin (17%) and Oneida (17%).[14] Cities with the highest poverty are Rochester (32%), Syracuse (32%), Buffalo (33%), Albany (23%) and New York City (19%).[15]

Another measure of well-being is the Gallup-Healthways Index, a measure of subjective well-being based on telephone survey responses about five elements of well-being: purpose, social, financial, community, and physical. On a scale of zero to 100, a higher score represents greater well-being. In 2016, NYS ranked 33rd among 50 states in the Gallup-Healthways Index. NYS scored highest in the Physical metrics, mediocre in the Social and Financial metrics, and lowest in metrics related to Purpose and Community.[16]

Many people experiencing poor well-being and MEB disorders contend with lack of empathy, prejudice, discrimination, and policies that limit their opportunities. Promoting community support and social acceptance increases well-being. Stigma and prejudice may be reduced by multi-faceted interventions that include education, media campaigns, personal contacts, peer services, protest and advocacy, and policy and legislative changes.[17,18] Interventions that promote well-being use similar approaches to those for prejudice and bias.

MENTAL AND SUBSTANCE USE DISORDERS

One in four US adults currently has a mental illness, and nearly half of all adults will develop at least one mental disorder or illness in their lifetime.[19] Substance Use Disorder is considered an MEB condition. The National Survey on Drug Use and Health (NDUH) estimates show that more than 1.3 million New Yorkers suffer from a substance use disorder.[20] Neonatal abstinence syndrome (NAS) is one consequence of substance use disorders.

NAS is a group of conditions experienced by some newborns who are exposed to substances in the womb. Incidence of NAS has tripled over the last 15 years, from 1.5 births per 1,000 in 1999 to 6 per 1,000 hospital births in 2013, due in large part to the greater use of opioids.[21]

An effective approach to preventing MEB conditions seeks to integrate well-being with prevention and better treatment. Recommended approaches create protective environments; promote connectedness and optimism; foster inclusion in communities; encourage meaningful engagement in learning and work; and teach coping and problem-solving skills. Strategies include identifying and supporting at-risk individuals by training and supporting primary care providers and their staff; and offering psychosocial and pharmacological treatments, aftercare, harm reduction, and crisis services.[15,22,23]

Underage Alcohol Use and Excessive Alcohol Consumption by Adults

According to the National Institute on Drug Abuse, nearly 90% of addictions begin before age 18. Alcohol is the most-often identified gateway drug by people who misuse other substances such as heroin and prescription drugs.[24] Fortunately, the percentage of youth reporting use of alcohol has decreased since 2009 (see Figure 5). A similar trend has been found for binge drinking. A recent national study[25] documented that frequent binge drinking, defined as having at least two occasions of drinking five or more drinks in a row over the past two weeks, dropped from 1991 to 2015. Drinking rates are decreasing faster among boys and people in higher income brackets, but not among members of lower socioeconomic groups, African-Americans, and girls.

The US Centers for Disease Control and Prevention (CDC) has concluded that "binge drinking is the most common, costly, and deadly pattern of excessive alcohol use in the United States."[26] Binge drinking is defined by the National Institute on Alcohol Abuse and Alcoholism as "a pattern of drinking that brings a person's blood alcohol concentration to 0.08 grams percent or above. This typically happens when men consume five or more drinks or women consume four or more drinks in about two hours."[31] Binge drinking is a public health concern because it is associated with negative consequences such as alcohol poisoning, violence, automobile accidents, falls, sexually transmitted diseases, and sexual assaults.

Percent of adolescents (youth in grades 9-12) reporting use of alcohol on at least one day for the past 30 days, 2017 YRBS

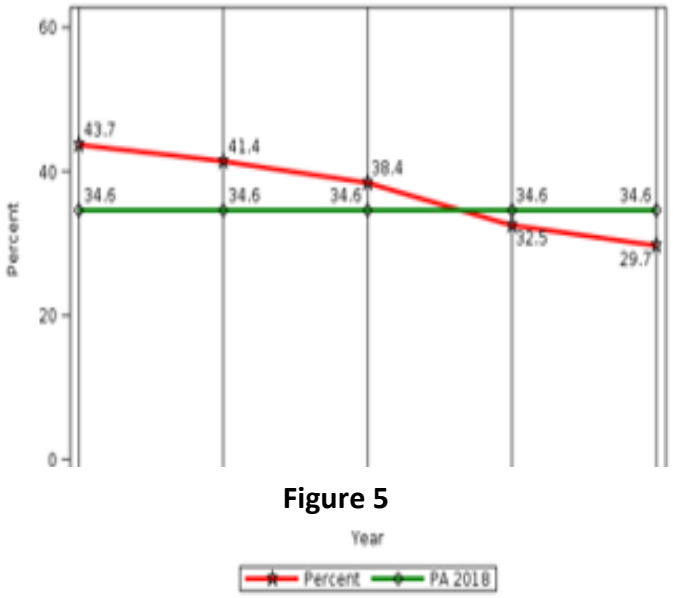


Figure 5

Source: Youth Risk Behavior Surveillance System data as of January 2017

In NYS, the percentage of adults who report binge drinking has not changed (Figure 6). Nationally, problem alcohol use among adults aged 50 and older is increasing.[27] Between 2005-2006 and 2013-2014, there was a 19.2% increase in past-month binge drinking and a 23.3% increase in alcohol use disorders among older adults nationally.[31] Results from the 2015 National Survey on Drug Use and Health[28] estimated that 6.8% of New Yorkers aged 18 and over, or slightly more than 1 million adults, have an alcohol use disorder. This percentage is slightly higher than both the national rate of 6.5% and the northeastern US rate of 6.7%.[32]

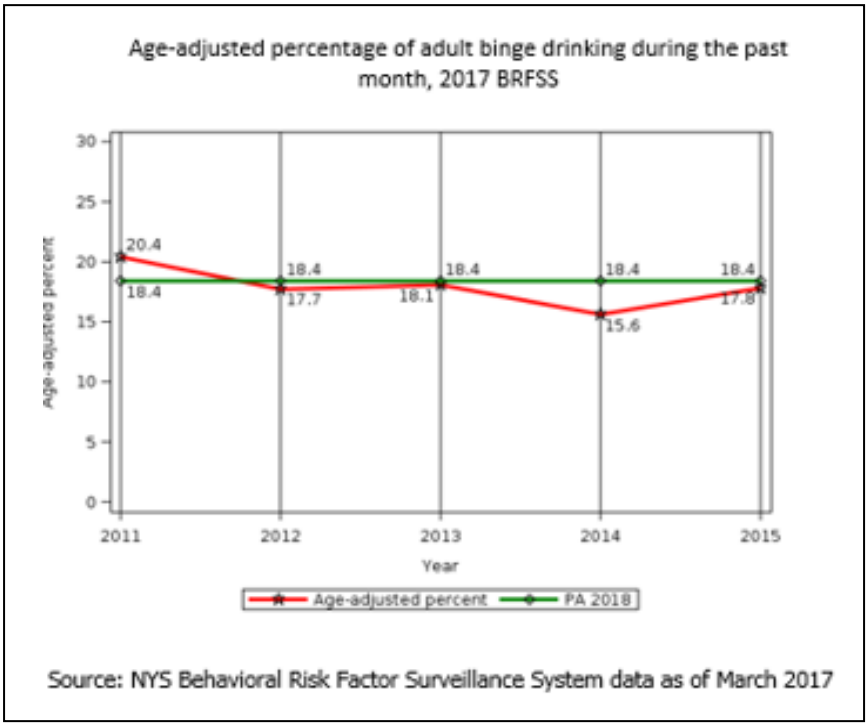


Figure 6

Factors that raise the risk for alcohol use disorder are being Hispanic, male, a smoker or illicit drug user, and reporting past-year depression or mental health treatment. While the percent of older women engaged in binge drinking is lower than that of men, the rate of binge drinking increased more rapidly among women than men from 2005 to 2014.[29] Preventing adolescents from using alcohol and other substances, and supporting conditions or attributes that mitigate the risk factors associated with substance use are key strategies that can be used to prevent alcohol misuse.

Marijuana Use Among Youth

Based on the Youth Risk Factor Surveillance System (YRBS)[30], the percentage of youth who used marijuana one or more times in the past 30 days remained steady from 1997 to 2013, then declined in 2015 (Figure 7). These findings are consistent with results from the National Survey on Drug Use and Health.[31] Marijuana use among persons over 18 years of age has increased dramatically.

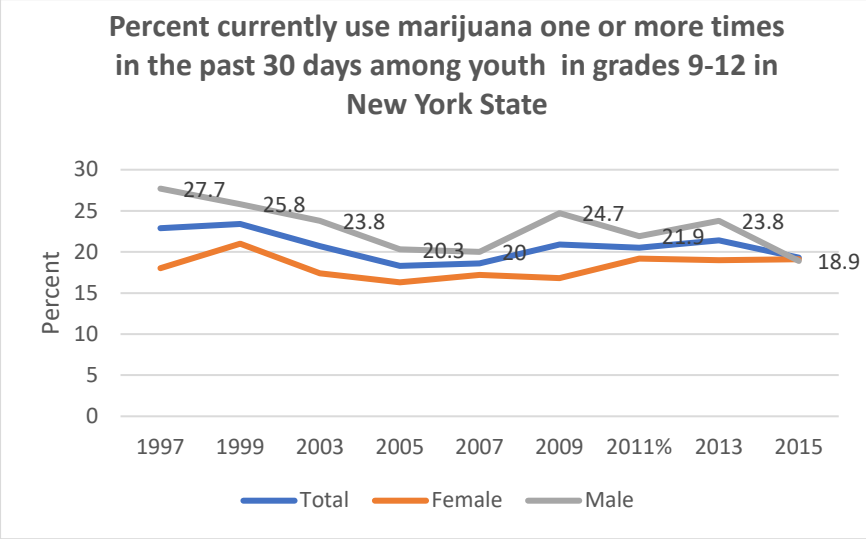


Figure 7
Source: YRBS, 1997-2015

Opioid misuse and deaths

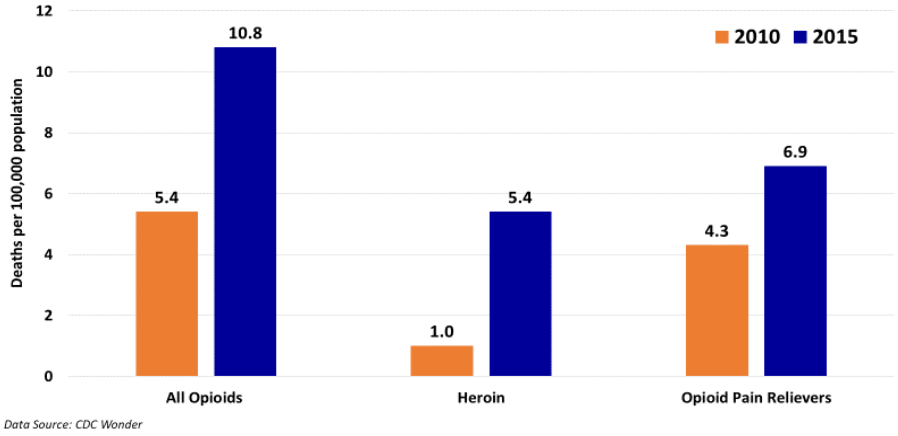
NYS, like the rest of the country, is experiencing an opioid epidemic. In 2015, there were 2,166 opioid-related overdose deaths, or 10.9 deaths per 100,000 population (Table 1). In 2016, there were 3,048 opioid overdose hospitalizations and 8,444 visits to emergency departments. The number of NYS residents admitted to treatment programs is also indicative of the high opioid burden across the state. In 2016, there were 66,450 New Yorkers (336.5 per 100,000) admitted to OASAS-certified treatment programs for opioids.[32]

Magnitude of the opioid burden

Indicators	New York State Total	Crude rate per 100,000
Opioid-related overdose deaths (2015)-CDC wonder	2,166	10.9
Opioid overdose hospitalizations (2016)	3,048	15.4
Opioid overdose ED visits (2016)	8,444	42.8
Unique patients admitted to OASAS-certified treatment programs for opioids (2016)	66,450	336.5

Source: Opioid-related Data in New York State[36]

Table 1: Magnitude of the Opioid Burden



As seen in Figure 8, the age-adjusted rate of opioid overdose deaths per 100,000 population in NYS doubled from 2010 (5.4) to 2015 (10.8). The age-adjusted rate of heroin deaths increased fivefold, from 1.0 in 2010 to 5.4 in 2015. The age-adjusted rate of opioid pain reliever deaths per 100,000 over the same period was substantially higher than for heroin, though the increase was smaller.

Figure 8: Age-adjusted rates of all opioid, heroin, and opioid pain reliever overdose deaths in New York State, 2010 and 2015

The top graph in Figure 9 shows the trend in the rate of all opioid overdose deaths per 100,000 population by gender, as well as the total rate for males and females combined from 2010 to 2015. The rate of all opioid overdose deaths per 100,000 population in NYS has been consistently higher for males than females, and rates for both groups have been steadily increasing. The rate for males was 16.0 in 2015, compared to 5.7 for females.

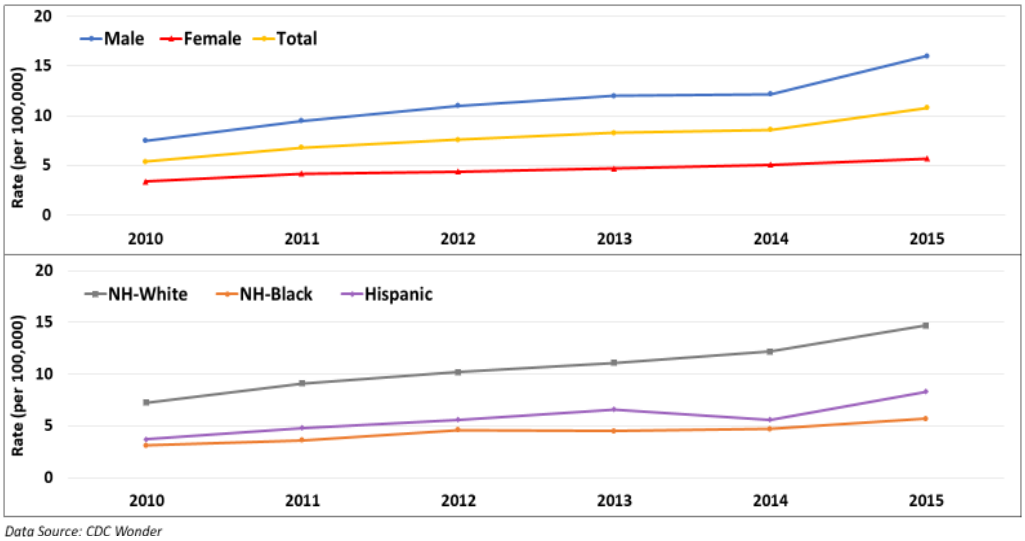


Figure 9: Age-adjusted rates of opioid overdose deaths by gender and race/ethnicity, New York State, 2010-2015

The lower graph in Figure 9 shows the rates for all opioid overdose deaths per 100,000 population for selected racial/ethnic groups from 2010 to 2015. While the overall trend is upward, there was a decrease in the rate for Hispanics in 2014. Non-Hispanic whites had the highest rate of all opioid overdose deaths of 14.7 per 100,000 in 2015. This rate is nearly double the rate for the same group in 2010 (7.3) and nearly double the rates for non-Hispanic blacks (5.7) and Hispanics (8.3) in 2015.

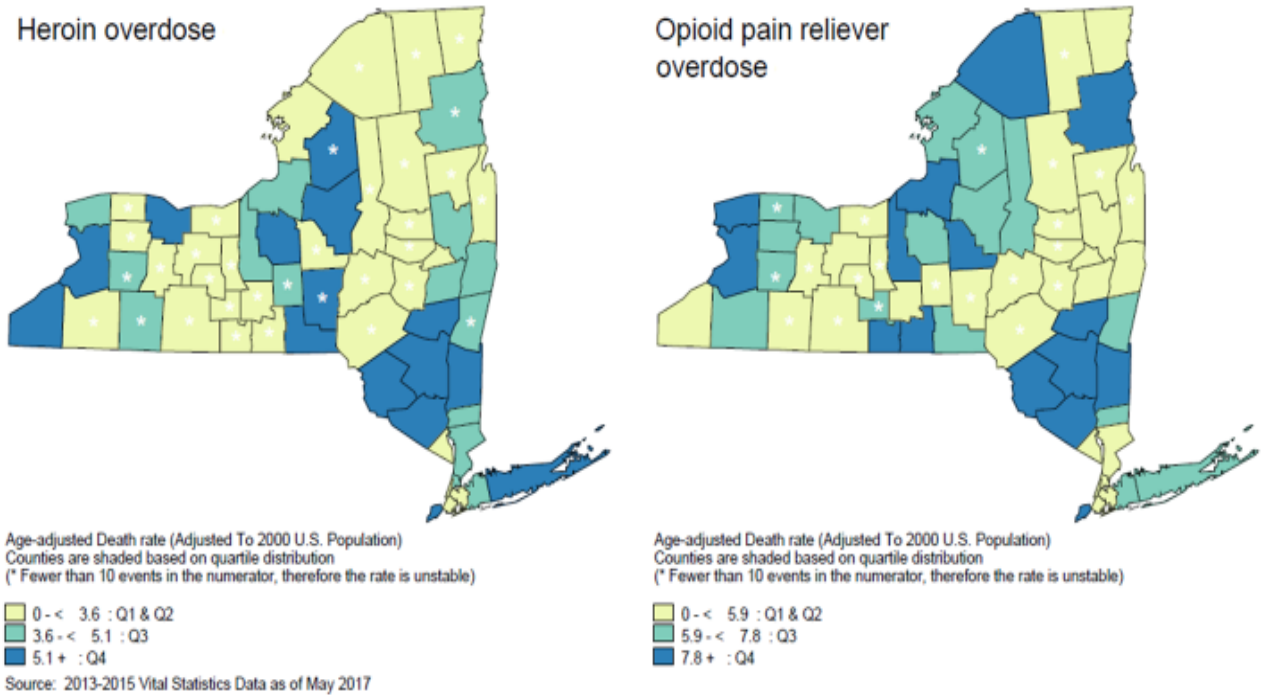


Figure 10: Age-adjusted rates of overdose deaths involving heroin and opioid pain relievers per 100,000 population by county, New York State, 2013-2015

Overall, both heroin and opioid pain reliever overdose death rates were higher in the Mid-Hudson Region compared with the rest of the state in 2013-2015. As seen on the left in Figure 10, the rates for heroin overdose deaths were particularly high in Western New York, especially in Erie and Chautauqua counties, and in parts of the Tug Hill Seaway, the Southern Tier, and Central New York regions. Rates of overdose death involving opioid pain relievers – shown on the right – were higher in Essex, St. Lawrence, and Niagara counties, as well as in parts of Central New York and the Finger Lakes Region. Richmond County in NYC had rates in the highest quartiles for both heroin and opioid pain reliever overdose deaths.

Data Source: NYSDOH, SPARCS
**2015 data excludes due to the transition from ICD-9-CM to ICD-10-CM on October 1, 2015*

Figure 11: Hospitalization rates from heroin-related overdose per 100,000 population by region and age group, New York State, 2010-2016

Between 2010 and 2016, the rates of hospitalization for heroin-related overdoses increased more than threefold across NYS, nearly double for New York City, and more than fourfold for the rest of the state. The trends by age group varied by region. During 2016, adults aged 45-64 years had the highest rate of hospitalization due to heroin-related overdose (9.4 per 100,000) in NYC, and the second highest rate in the rest of the state (4.4 per 100,000). However, individuals ages 18 to 44 had the highest hospitalization rate for heroin overdose (16.3 per 100,000) in the rest of the state. Residents aged 65 and older had higher rates of heroin-related overdose hospitalization in NYC (3.5 per 100,000) compared to the rest of the state (0.7 per 100,000).

Prescription opioid use is a predictor of heroin use for many people.[33] Four out of five heroin users had previously used non-medical prescription pain relievers. However, only 3.6% of those who use non-medical prescription pain relievers initiated heroin use within five years.[34] Relapse to opioid use is common and a major cause of mortality. People who inject drugs are at increased risk of bloodborne illnesses due to the sharing of potentially-contaminated injection equipment. Availability of cheaper illicit street drugs such as fentanyl makes controlling access to opioids difficult and shifts attention to addressing underlying causes for demand.

There is strong correlation between self-harm behaviors and traumatic experiences, particularly adverse childhood experiences, which in turn are linked to nearly all health and social conditions.[35] To effectively address the opioid crisis, naloxone should be administered when an overdose occurs. Individuals with substance use disorders should be connected to treatment programs. The underlying issues related to trauma and MEB health can be addressed using a trauma- and resilience-informed approach.[37] The approach focuses on understanding causes of trauma and teaches practices that promote key principles including organizational safety, trustworthiness, transparency, cultural sensitivity, collaboration, and empowerment. These actions promote organizational change in health and behavioral healthcare settings, and other settings, which in turn promotes resilience in staff and patients. These practices prevent exposure to trauma, promoting resilience in groups at risk, and help those with a substance use disorder recover and return to productive lives.

Psychostimulant misuse and deaths

Misuse of cocaine and other stimulants such as methamphetamine contributes to adverse health outcomes. Heart failure associated with methamphetamine (meth) use has risen from 1.7 in 2005 to 8.0 percent in 2015 among the VA heart failure patients.[36] Non-medical use of prescription stimulants among college students is higher and is often associated with alcohol use disorder and binge drinking.[37] A recent study found that while opioids were the largest contributor to overdose deaths in non-Hispanic whites, cocaine was the largest contributor among non-Hispanic black men and women, who die from cocaine overdoses almost as often as white people die from prescription opioid overdoses. The increase in cocaine use was most pronounced for older black men, aged 50 years or older, and black women, 45 years and older.[38]

Adverse childhood experiences and resilience

Adverse Childhood Experiences (ACEs) are an underlying factor in drug misuse and overdoses, suicides, mental health disorders, and chronic diseases. In a ground-breaking ACEs study by the CDC and Kaiser Permanente covering the period from 1995 to 1997,[39] adult volunteers in an obesity clinic were asked about ten types of childhood trauma. They were asked about physical abuse, verbal abuse, sexual abuse, physical neglect, emotional neglect, substance use in the household, domestic violence, a family member in jail, a family member diagnosed with a mental illness, and the disappearance of a parent through divorce, death or abandonment. Each type of trauma counts as one. For example, a person who experienced physical abuse, has one alcoholic parent, and a mother who was beaten up, has an ACE score of three. Their findings showed that ACEs are common among their study respondents, tended to co-occur, and had a cumulative effect. Compared to an ACE score of zero, those having four or more ACEs were seven times more likely to have alcohol use disorders, twice as likely to be diagnosed with cancer, and four times more likely to have emphysema. Effects of ACEs may negatively affect a person's life as an adult and could have intergenerational effects. As the number of ACEs increases, the ACE score goes up and the risk of health and social problems rises dramatically. Adults and children who experience ACEs leading to severe trauma can learn to address their adverse experiences and strengthen resiliency.[40]

Data collected by the 2016 NYS Behavioral Risk Factor Surveillance System (BRFSS)[41] show that ACEs are common in New York adults (Figure 12). Six out of 10 adults (59.3%) reported having experienced at least one ACE. ACEs reported most often are emotional abuse (24.6%), parental separation (23%) and substance abuse in the home (22.2%). ACEs are higher among women, Hispanics and multiracial groups. ACE scores of 3 and over are higher among lesbian-gay-bisexual-transgender (LGBT) individuals, people with incomes $15,000 or less, and are lower for those who graduated from college or technical school. Adults in households with children are more likely to have reported ACEs than households that had no children. Participants who reported three or more ACEs are six times more likely to be depressed; four times more likely to report HIV risk behaviors; three times more likely to have arthritis or be current smokers; and twice as likely to be obese, to have ever had asthma, or to report binge drinking.

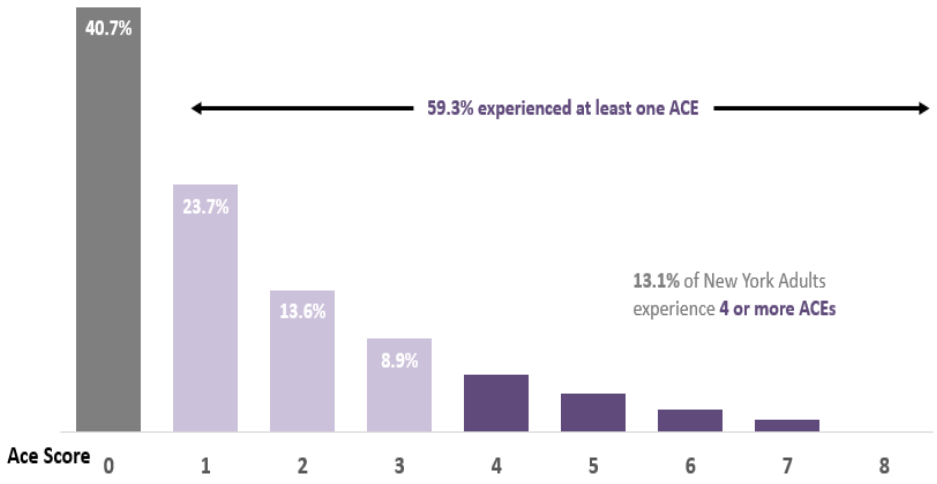


Figure 12: Prevalence of ACEs in New York State, 2016 BRFSS

ACEs occur in clusters. Physical abuse, emotional abuse, domestic violence and substance use were more likely to occur together as a cluster of conditions. Reporting of incarceration as part of ACEs was highly correlated with substance abuse and mental illness in the home.

Major depressive disorders

In 2016, an estimated 6.7% of US adults 18 and older, and 12.6% of adolescents aged 12-17 had at least one major depressive episode with severe impairment. The prevalence of depressive episodes was higher among females and among those reporting two or more races. For adults, the prevalence was highest among individuals aged 18-25.[42] Meta-analyses suggest that 22-38% of major depressive episodes can be prevented[43] and the results of randomized controlled trials have shown that the incidence of major depressive episodes can be significantly reduced.

Suicides

The number of suicides in NYS has increased by 32% in the past decade.[44,45] As seen in Figure 13, the age-adjusted suicide rate in 2015 was 7.9 suicides for every 100,000 New Yorkers, which is much higher than the Prevention Agenda 2018 target of 5.9 suicide deaths per 100,000. In 2014, the most prevalent means of suicide were firearms (37%), suffocation (28%), and poisoning (17%). Groups at highest risk of suicide are youth, middle-aged men, the elderly, individuals in the justice system, and veterans and active military members.

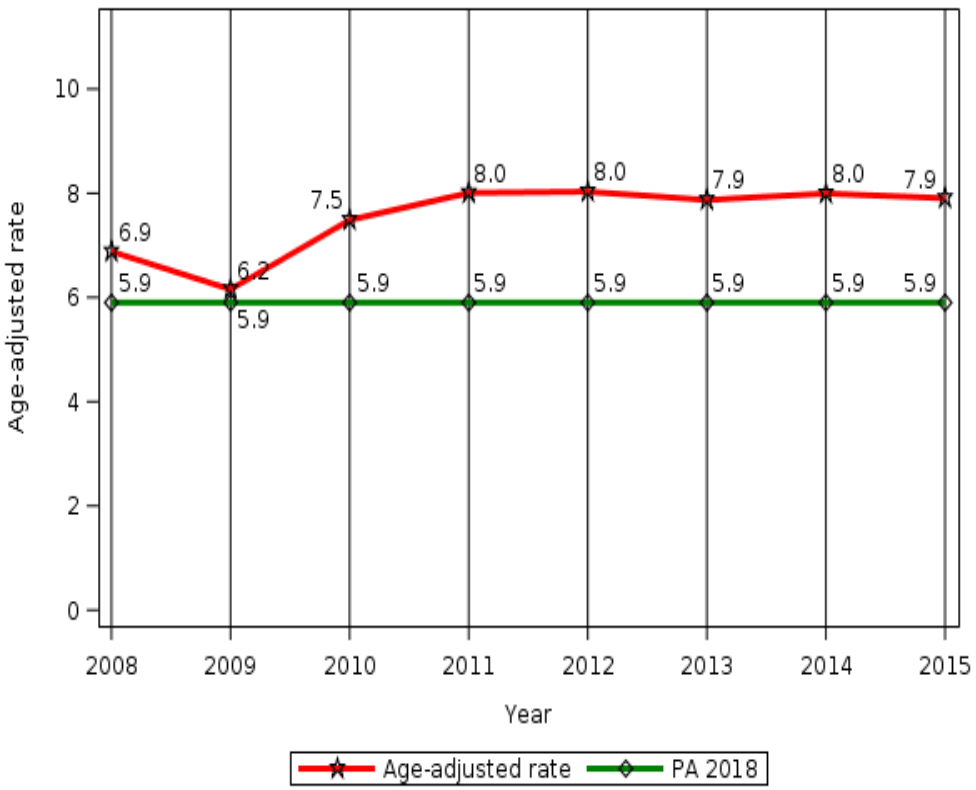


Figure 13: Age-adjusted suicide rate per 100,000 population, New York State Bureau of Biometrics

Tobacco use among adults who report poor mental health

The prevalence of smoking among NYS adults reporting poor mental health is twice as high as the rate of smoking among those who do not report poor mental health, a difference that is statistically significant.[21] From 2011 to 2016, smoking rates significantly declined among adults with poor mental health, from 32.6% to 26.0%, and among adults with good mental health, from 16.1% to 12.6% (Figure 14).[21] BRFSS respondents are categorized as having poor mental health if they reported experiencing problems with stress, depression or emotional issues on at least 14 of the last 30 days.

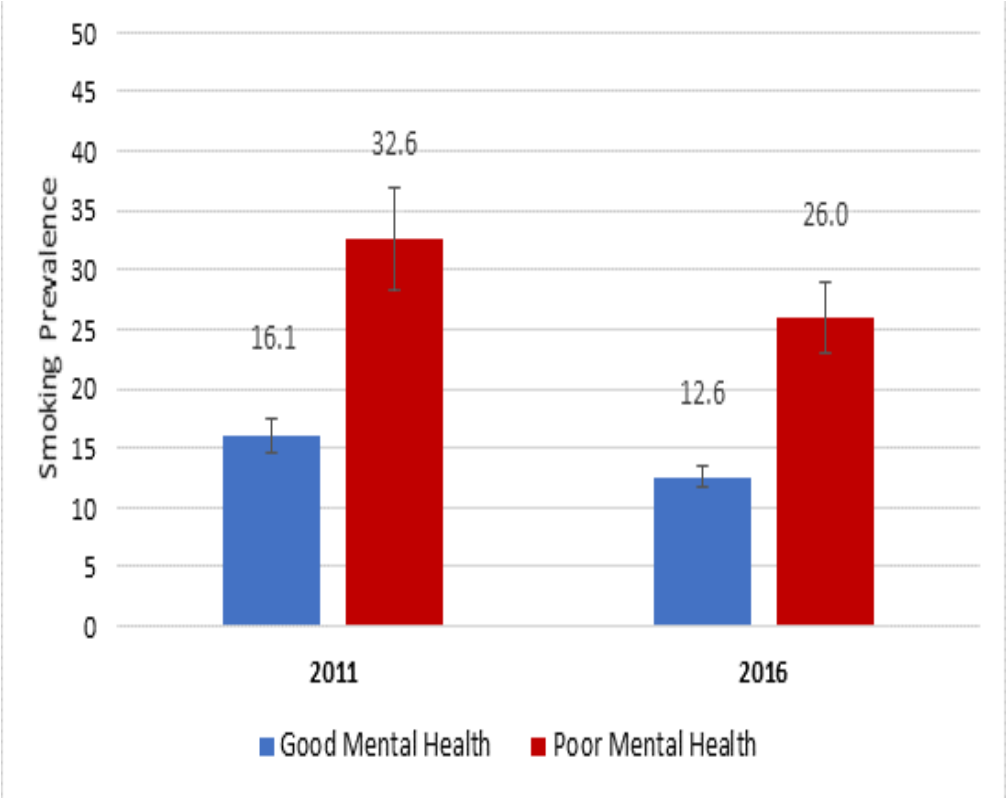


Figure 14: Smoking Prevalence by Self-Reported Mental Health Status, 2011 and 2016, New York State BRFSS

CAPACITY AND INFRASTRUCTURE

In February 2017, to assess the perception of capacity, the NYS Department of Health (NYSDOH), OASAS and the Office of Mental Health surveyed local health departments, hospitals, local government units, and partners about their capacity in five domains: alignment, collaboration, evidence-based practice, using data to guide programs, and training. In Figure 15, the goal is to reach the outermost green circle. Capacity is perceived to be highest when they are towards the goal—the outermost edge of the circle—and lowest when toward the center of the circle. Most regions scored themselves in mid-range for purpose and collaboration, and were more likely to score being at the lowest capacity for gathering data and information to track progress of their actions, and use of evidence-based approaches. This is illustrated by more "yellow" lines towards the center of the circle. Survey respondents identified integration of mental health promotion, tracking progress, and integrating mental emotional behavioral into current approaches as their top three training needs.

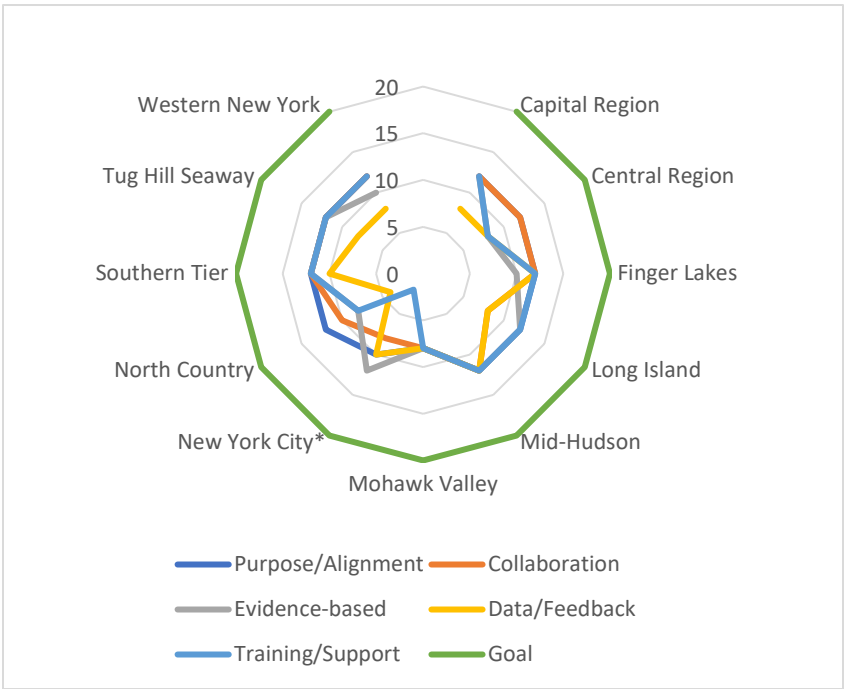


Figure 15: Perception of Capacity by Region, February 2017

NYSDOH staff conducted an in-depth review of Community Health Improvement Plans and Community Service Plans submitted by local health departments and hospitals in December 2016. Reviewers found that collaboration was a strength in the plans submitted, while opportunities for improvement included understanding and integrating well-being interventions; tracking progress, especially by including intermediate measures as well as input and output measures; and addressing ACEs while offering technical support on trauma and resilience-informed approaches. The top three technical support needs identified through the survey were consistent with those identified through reviews of reports submitted by local health departments and hospitals. In sum, the lack of adequate capacity and infrastructure is a significant burden for communities, impacting their ability to address MEB well-being and prevent disorders.

DISPARITIES

Disparities are discussed below based on the Intervention Spectrum for well-being (Figure 1 on the first page), and specific mental and substance use disorders.

Well-being: Well-being and the burden of MEB disorders are driven partly by policies that influence power, money, and resources. These influences relate to the basic rights of individuals and their opportunities such as food security and education; environmental factors such as housing; and societal influences such as social capital and inclusion in power-sharing. To promote equity, it is important to address these at both individual and societal levels.[35]

Social determinants of mental health, including discrimination, adverse early life experiences, and food insecurity, often overlap with social determinants of physical health.[40] Strengthening psychological resources can positively affect social determinants of mental health.[12] Researchers from Chapman University, Harvard School of Public Health and University of Wisconsin studied the relationship between optimism and social mobility.[46] They found greater levels of optimism among individuals who are socially advantaged, e.g., those without minority status who had more education, higher occupational classes and prestige, and larger incomes. The highest optimism and satisfaction levels were evident among those with a college education. However, positive affect, which is defined as joy, alertness, and interest, was not associated with educational attainment. Dispositional optimism, which is not routinely assessed in surveillance studies, could possibly be promoted through population health strategies. The researchers found a four-point spread in optimism for the highest versus lowest levels of participant education, which translated into a 16% reduced risk of myocardial infarction and a 30% reduced risk of heart disease-related mortality.[50]

Substance Use Disorders: National surveys show variations by ethnicity in the reported prevalence of drinking, alcohol use disorders, alcohol problems and treatments used.[47] Whites and Native Americans have a greater prevalence of alcohol use disorders compared to other ethnic groups. However, once alcohol dependence occurs, blacks and Hispanics experience higher rates of recurrent or persistent dependence than whites.

Native Americans and Hispanics are more likely to report high-risk drinking than other ethnic minorities. The highest rates of alcohol and substance use disorders occur among youth transitioning into adulthood. Binge drinking is increasing among adults ages 50 and older in both men and women. Men are more likely than women to report illegal drug use. Although whites make up most of the drug users who use injectable drugs, blacks are more likely to inject drugs.[48]

Populations such as LGBT individuals are estimated to have high rates of alcohol consumption, substance use disorders, and mental disorders such as anxiety, depression, and suicidal thoughts.[49]

Young people (ages 12 to 24 years) in rural areas have higher past-month alcohol use than those in metropolitan areas, according to a 2014 survey,[51] though binge drinking was lower.

Non-medical prescription opioid misuse is a growing public health problem that is concentrated in areas with large rural populations.[50] The high rates of opioid misuse in these communities are the result of a combination of factors, including high rates of prescribing, loss of jobs, and pressures to conform. Young adults moving out of the area to seek new opportunities often indicates a depressed environment, creating greater vulnerability to drug use among those who stay. People who are homeless, involved with the criminal justice system, and those involved with the military all have higher risks for mental, emotional, and behavioral disorders.

Adverse Childhood Experiences: Across all groups, black and Hispanic children are exposed to more adverse experiences than white children. Among children of born to US parents, family income has a larger impact on exposure than race or ethnicity. Among children of immigrant parents, there are few racial/ethnic differences in exposure to ACEs and the effect of income is not consistent. The levels of ACEs vary by demographics, adult socioeconomic status, health behaviors, and psychosocial resources. Early-onset chronic illness is influenced by ACEs levels. When examined by income, children in families below the federal poverty level were five times more likely to experience four or more ACES. However, some adverse experiences such as mental illnesses, domestic violence, neighborhood violence, and drug and alcohol problems all showed high prevalence – about 10% across all but the highest income group (e.g., greater than 400% of the federal poverty level). Prevalence of ACEs was highest in adults through the lifespan for those also reporting low psychosocial assets, such as social support and positive outlook.[51]

Suicides: The prevalence of suicide in NYS varied by race/ethnicity, age and gender. Three-quarters of suicides were by men, although women are more likely to attempt suicide.[52] High-risk groups for suicide include youth ages 15-24, men ages 45-64, the elderly, individuals in the justice system, veterans and active military.[27]

Smoking among people with poor mental health: In NYS, the prevalence of smoking among adults reporting poor mental health is twice as high as the rate of smoking among those who do not report poor mental health.[14] Smoking has been associated with a range of mental disorders including schizophrenia, anxiety disorders and depression. Across the US, smoking rates were highest among those with substance use disorders, adults with affective disorders such as depression and bipolar disorders, and adults with anxiety disorders.[53]

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Figure 12 shows selected risk and protective factors based on scientific studies. [54] The figure incorporates aspects of MEB health, including substance use disorders. Risk factors include individual temperament, family dysfunction, lack of connectedness, emotional trauma, and discrimination. Protective factors include having an easy-going temperament, supportive parenting, positive school climate, resilience, involvement of a caring adult and access to support services. Eliminating risk factors and strengthening protective factors has a positive effect on promoting well-being and reducing mental and substance use disorders.

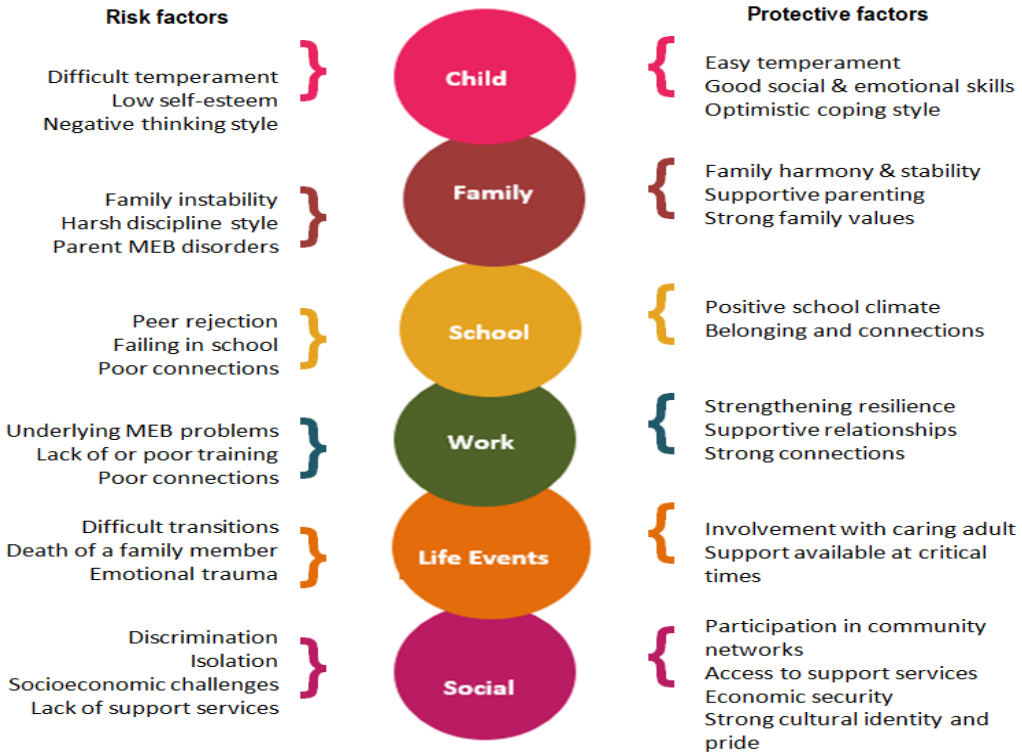


Figure 16. Risk and protective factors that promote wellbeing and reduce mental, emotional behavioral disorders

Assets and challenges

In 2016, to better understand capacity needs, NYSDOH conducted a survey of local partners working on MEB health in the state. The results of the survey and a review of comprehensive plans submitted by local health departments and hospitals identified key strengths and opportunities in communities to promote MEB health and prevent disorders. The strengths include:

1. **Recognition of the importance of MEB health as a public health issue:** Forty-six counties and New York City identified promoting mental health and preventing substance use disorders as a community priority. The number of counties that recognized MEB health as a priority has increased 62% since 2012.
2. **Diverse partners collaborating on mental health and substance use disorder issues:** Typically, partners include local health departments, hospitals, local governmental units, federally-qualified health care centers, community-based organizations, and schools.
3. **Interest in promoting well-being and integrating MEB into current interventions:** Local partners expressed interest in learning how to integrate MEB health promotion and prevention into current interventions.

The opportunities include:

1. **Articulating tangible MEB health promotion and well-being approaches:** Review of the plans submitted by local health departments and hospitals found that practitioners did not often distinguish between risk reduction strategies and approaches that strengthened assets in the community, families, and individuals. Yet, most communities interested in this topic did try to identify specific interventions and outcomes related to MEB promotion and disorder prevention that could be implemented locally. Greater use of such approaches would increase if counties were offered a menu of evidence-based and best-practice interventions, and specific methods for tracking progress.

2. **Adapting best practice interventions and tracking progress:** Most practitioners who responded to a 2016 survey prioritized the need for technical support in adapting best-practice interventions for MEB health, and methods for tracking their progress. Timely guidance on appropriate ways to track intermediate measures of progress would enable local action.

3. **Identifying opportunities to integrate into existing interventions:** Local practitioners understand the importance of integrating MEB health with other priorities such as chronic disease prevention and treatment. This is an invaluable opportunity to partner with local communities to better understand and track integration of MEB into current activities.

4. **Integrating capacity and infrastructure into well-being and Prevention Agenda goals:** Capacity and infrastructure are cross-cutting issues and can be considered as part of other preventions efforts.

In conclusion, promoting mental health, preventing both mental illnesses and disorders, and preventing substance use disorders are key public health priorities for every segment of the population. Approaches must balance positive mental health and anti-stigma approaches to reduce the incidence and burden of these illnesses and disorders in the NYS population.

References

[1] Office of the Surgeon General. National Prevention Strategy. Mental and Emotional Wellbeing. https://www.surgeongeneral.gov/priorities/prevention/strategy/mental-emotional-well-being.pdf

[2] National Research Council and Institute of Medicine. Preventing Mental, Emotional and Behavioral Disorders Among Young People: Progress and Possibilities, 2009. Washington, DC: The National Academies Press. Available online: https://www.nap.edu/catalog.php?record_id=12480 Accessed November 9, 2017.

[3] Canadian Mental Health Association. Mental Health Promotion. https://cmha.ca/public-policy/mental-health-promotion/

[4] US Burden of Disease Collaborators. The state of US health, 1990-2010. Burden of diseases, injuries, and risk factors. JAMA. 2013 Aug 14;310(6):591-608.

[5] National Institute of Mental Health. US Leading Categories of Disease/Disorders. http://www.nimh.nih.gov/health/statistics/disability/us-leading-categories-of-diseases-disorders.shtml

[6] Estimates updated from: Insel TR Assessing the economic costs of serious mental illness Am J Psychiatry2008 Jun;165(6):663-5doi: 10.1176/appi.ajp.2008.08030366.

[7] Surgeon General's Report on Alcohol, Drugs and Health, 2016. https://addiction.surgeongeneral.gov/executive-summary

[8] Measure of America of the Social Sciences Research Group. Mapping the Measure of America. http://www.measureofamerica.org/maps/

[9] Al-Hilani H. HDI as a measure of human development: A better index than the income approach. IOSR Journal of Business and Management. ISSN: 2278-487X Volume 2, Issue 5 (July-Aug. 2012), PP 24-28. http://iosrjournals.org/iosr-jbm/papers/vol2-issue5/D0252428.pdf

[10] UK Government Office of Science. Foresight. Mental Capital and Wellbeing: Making the most of ourselves in the 21st century. Final Project Report. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292450/mental-capital-wellbeing-report.pdf.

[11] Opportunity Index. How opportunity measures up in your community. Data $ Scoring.

[12] Opportunity Index, New York State, 2016.

[13] Jargowsky P. Issue Brief: The Architecture of Segregation – Civil Unrest, the Concentration of Poverty and Public Policy. The Century Foundation. 2015.

[14] Smith S, Granja MR, Nguyen U. (2017) New York State Profile of Young Children in Deep Poverty. New York: National Center for Children in Poverty, Mailman School of Public Health, Columbia University.

[15] American Community Survey i-Year Estimates, Poverty Status in the past 12 months. https://b5.caspio.com/dp.asp?AppKey=39083000200c2c71ac6a4b21a027

[16] Gallup-Sharecare Wellbeing Index. Gallup and Healthways Release 2016 State Rankings http://www.index.com/2017-state-rankings

[17] SAMHSA. Words Matter by Marla Hendrikson. May 2016. https://blog.samhsa.gov/2016/05/16/words-matter/#.Wi_rRPBKthE

[18] The National Academies Press. Ending Discrimination Against People with Mental and Substance Abuse Disorders. The Evidence for Stigma Change. 2016. National Academies Press. https://www.nap.edu/read/23442/chapter/1#ii

[19] CDC. CDC Report: Mental Illness Surveillance among adults in the United States. https://www.cdc.gov/mentalhealthsurveillance/fact_sheet.html

[20] SAMHSA. National Survey on Drug Use. Selected Drug Use, Perceptions of Great Risk, Past Year Substance Use Disorder and Treatment, and Past Year Mental Health Measures in the United States, by Age Group: Estimated Numbers (in Thousands), Annual Averages Based on 2015-2016 NSDUHs. https://www.samhsa.gov/data/sites/default/files/NSDUHsaeSpecificStates2016A/NSDUHsaeSpecificStates2016.htm

[21] Centers for Disease Control and Prevention. MMWR. Incidence of Neonatal Abstinence Syndrome – 28 States, 1999-2013. August 12, 2016. 65(31):799-802.

[22] Caine ED, Reed J, Hindman J, Quinlan K. Comprehensive, integrated approaches to suicide prevention: practical guidance. Injury Prevention. Doi:10.1136/injuryprev-2017-042366.

[23] Shim R, Koplan C, Langheim FJP, Manseau MW, Powers RA, Compton MT. The Social Determinants of Mental Health: An Overview and Call to Action. Psychiatric Annals. 2014; 44(1):22-26 https://doi.org/10.3928/00485713-20140108-04

[24] American Addiction Centers. The Real GatewayDrug. https://americanaddictioncenters.org/the-real-gateway-drug/

[25] Jang JB, Patrick ME, Keyes KM, et al. Frequent Binge Drinking Among US Adolescents, 1991 to 2015. Pediatrics. 2017;139(6):e20164023

[26] Centers for Disease Control and Prevention. Fact Sheets – Binge Drinking. https://www.cdc.gov/alcohol/fact-sheets/binge-drinking.htm

[27] Han BH, Moore AA, Sherman S, Keyes KM, Palamar JJ. Demographic trends in binge alcohol use and alcohol use disorders among older adults in the United States, 2005-2014. Drug and Alcohol Dependence. https://www.sciencedirect.com/science/article/pii/S0376871616309978?via%3Dihub

[28] SAMHSA, Behavioral Health Barometer New York, Volume 4. https://store.samhsa.gov/shin/content//SMA17-BAROUS-16/SMA17-BAROUS-16-NY.pdf

[29] Han BH, Moore AA, Sherman S, Keyes KM, Palamar JJ. Demographic trends of binge alcohol use and alcohol use disorders among older adults in the United State, 2005-2014. Drug and Alcohol Dependence. 2017; 170: 198-207. http://www.drugandalcoholdependence.com/article/S0376-8716(16)30997-8/pdf

[30] YRBS. Trend in the Prevalence of Marijuana, Cocaine, and Other Illegal Drug Use National YRBD: 1991-2015. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/trends/2015_us_drug_trend_yrbs.pdf

[31] National Survey on Drug Use and Health. Population Data. https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health

[32] New York State Department of Health. Opioid-related Data in New York State. https://www.health.ny.gov/statistics/opioid/

[33] Pradip et al. Associations of Nonmedical Pain Reliever Use and Initiation of Heroin Use in the US Center for Behavioral Health Statistics and Quality Data Review. SAMHSA (2013) http://www.samhsa.gov/data/2k13/DataReview/DR006/nonmedical-pain-reliever-use-2013.htm

[34] Hildegard, Chen, and Warner, "Drug-Poisoning Deaths Involving Heroin: United States 2000-2013." National Center for Health Statistics Data Brief. 2015:190:1-8.

[35] Campaign for Trauma-Informed Policy and Practice. Policy Brief – Trauma Informed Approaches Need to be Part of a Comprehensive Strategy for Addressing the Opioid Epidemic, June 2017 No. 1 https://publichealth.gwu.edu/sites/default/files/downloads/Redstone-Center/CTIPP_OPB_final.pdf

[36] American Heart Association. Heart Failure in Methamphetamine Users: Could This Be the Next Epidemic Among Vets?

[37] Stimulant Misuse among College Students – Meeting the Challenge. http://publichealth.hsc.wvu.edu/media/4254/college_stimulant_misuse.pdf

[38] Shiels MS, Freedman ND, Thomas D, De Gonzalez AB. Trends in UD Drug Overdose Deaths in Non-Hispanic Black, Hispanic and Non-Hispanic White Persons, 2000-2015. Annals of Internal Medicine. pp. 1-3; December 5, 2017.

[39] Fellitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, Koss MP, Marks JS. Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study. American Journal of Preventive Medicine. 1998; 14(4): 245-258. http://www.ajpmonline.org/article/S0749-3797(98)00017-8/pdf

[40] Center for Collective Wisdom. Trauma and Resiliency: A Systems Change Approach. E Emerging Lessons and Potential Strategies from the Los Angeles County Trauma and Resiliency-Informed Systems Change Initiative. 2017. http://www.first5la.org/files/Trauma.pdf

[41] New York State Department of Health. 2016 BRFSS. https://health.data.ny.gov/w/7kmq-z6s7/fbc6-cypp?cur=3sSMLFzDUnd&from=root

[42] National Institute of Mental Health. Major Depression. https://www.nimh.nih.gov/health/statistics/major-depression.shtml#part_155033

[43] Muñoz RF, Beardslee WR, Leykin Y. Major depression can be prevented. American Psychology. 2012: May-Jun;67(4):285-95. doi: 10.1037/a0027666. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4533896/

[44] New York State Office of Mental Health. 1,700 Too Many. New York State's Suicide Prevention Plan 2016-17. https://www.omh.ny.gov/omhweb/resources/publications/suicde-prevention-plan.pdf

[45] CDC MMWR. QuickStats: Age-Adjusted Suicide rates, by State – United States, 2012. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6345a10.htm

[46] Boehm JK, Chen Y, William DR, Rytt C, Kubzansky LD. Unequally distributed psychological assets: Are There Social Disparities in Optimism, Life Satisfaction, and Positive Affect?.PLoS One 10(2): e0118066, doi:10.137/journal.pone.0118066.

[47] National Institute on Alcohol Abuse and Alcoholism. Chartier K, Caetano R. Ethnicity and Health Disparities in Alcohol Research. https://pubs.niaaa.nih.gov/publications/arh40/152-160.htm

[48] Cooper H, Friedman SR, Templaski B, Friedman R, Keem M. Racial/ethnic disparities in injection drug use in large US metropolitan areas. Ann Epidemiol. 2005 May;15(5):326-34. https://www.ncbi.nlm.nih.gov/pubmed/15840545

[49] SAMHSA. Other Specific Populations. https://www.samhsa.gov/specific-populations/other

[50] Keyes KM, Cerda M, Brady JE, Havens JR, Falea S. Understanding the Rural–Urban Differences in Nonmedical Prescription Opioid Use and Abuse in the United States. Am J Public Health. 2014 February; 104(2): e52–e59.

[51] Nurius PS, Green S, Logan_Greene P, Longhi D, Song C. Stress pathways to health equalities: Embedding ACEs within social and behavioral contexts. Int Public Health J. Author manuscript; available in PMC 2016 Jun 3.

[52] Tsirigotis K, Gruszczyzynski W, Tsingotis M. Gender differentiation in methods of suicide attempts. Medical Science Monitor. 2011; 17(8): PH65-PH70.

[53] Lawrence D, Mitrou F, Zubrick SR, Smoking and mental illness: results from population surveys in Australia and the United States. BMC Public Health. Health20099:285 https://doi.org/10.1186/1471-2458-9-285 https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-9-285

[54] Adapted from Australian Primary Schools Mental Health Initiative. Kids Matter: How Mental Health Difficulties Affect Children. https://www.kidsmatter.edu.au/sites/default/files/public/KMP_C4_CMHD_HowMentalHealthDifficultiesAffectChildren.pdf

Healthy Environment

Contributing Causes of Health Challenges

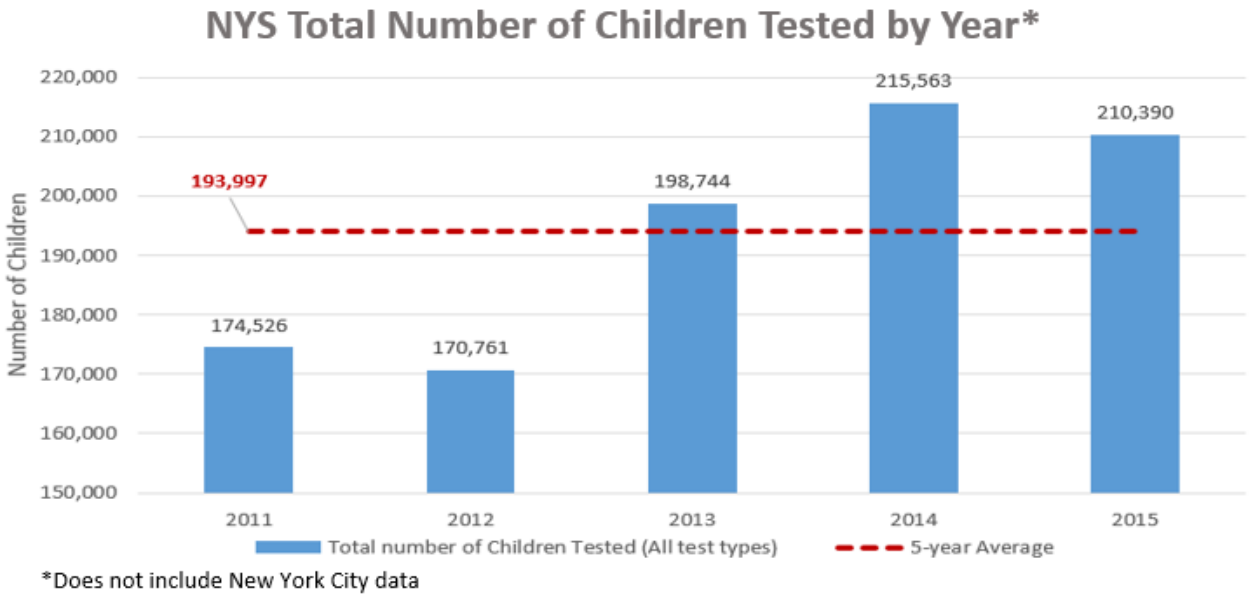
BACKGROUND

Lead is among the most common environmental toxins for young children in NYS. Children are most often exposed to lead by eating paint chips or dirt that is contaminated with lead. In 2015, 2,172 children were diagnosed with lead poisoning (BLL ≥ 10 micrograms-per-deciliter (µg/dL))[1], which causes learning disabilities, anemia, and growth problems.[2] Children exposed to lead may have difficulty paying attention and may become aggressive. Elimination of childhood lead poisoning is essential to improving the lives of NYS children, especially those in low-income families who are disproportionately affected. NYS has made significant progress toward reducing the incidence and severity of childhood lead poisoning, but it remains a serious public health problem.

Because damage from lead poisoning cannot be reversed, it is critical that children be protected from lead exposure before they become lead poisoned. Routine blood lead testing helps identify children early, and it is essential to ensure coordination of follow-up services to minimize harmful effects and prevent further lead exposure. Healthcare providers are required under NYS Public Health Law Title 10 of Article 13 and NYCRR Title X, Part 67 to test all children for lead at or around age one and again around age two. Providers are also required to assess all children ages 6-72 months at least once annually for lead exposure, and perform blood lead testing of all children found to be at risk based on those assessments.

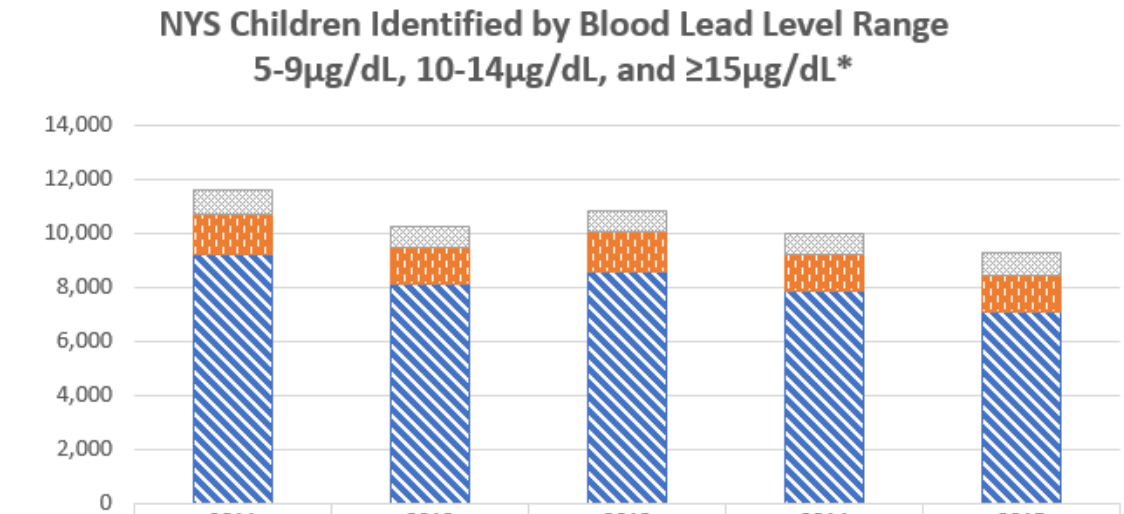
BURDEN AND DATA TRENDS

The percentage of children 6 years or younger tested for lead increased from 2011 to 2015 (see chart below). The subsequent chart depicts blood lead testing results over five years, not including New York City data, which shows that the number of children with exposure to lead has declined.



*Does not include New York City data

Data accessed from LeadWeb April 2016. All test types (confirmed and unconfirmed); all children < 18 years.



	2011	2012	2013	2014	2015
BLL 15+	901	807	779	816	836
BLL 10-14	1476	1355	1466	1354	1336
BLL 5-9	9248	8114	8606	7839	7128

*Does not include New York City Data
Data accessed from LeadWeb April 2016. All test types (confirmed and unconfirmed); all children < 18 years.

According to a 2009 study,[3] every dollar invested nationally in lead paint hazard control results in a return of $17-$221, or a net savings of $181-$269 billion. The accrued financial benefits are derived from higher lifetime earnings, increased tax revenue, lower healthcare costs, lower direct costs for crime, and reduced need for special education.

DISPARITIES

Over time, childhood lead poisoning has steadily declined across the nation. Bans on lead in residential house paint, gasoline, food cans, and consumer products have led to significant reductions in the rates of lead exposure across all populations. However, findings from the National Health and Nutrition Examination Surveys (NHANES) continue to show that lead exposure disproportionately affects low income families and non-Hispanic black children.[4]

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Children living in older housing, families in poverty, refugee populations and non-Hispanic black children are at greatest risk of childhood lead poisoning. Children living in geographic areas with an elevated incidence of childhood lead exposure are most at risk. Many children with high blood lead levels are also disproportionately affected by other environmental issues in their communities.

CHALLENGES

Compared to other states, NYS bears an especially heavy burden from childhood lead poisoning, with low-income families and families living in older, poorly maintained housing affected disproportionately. U.S. Census data[5] show NYS has the highest number (3,303,770) and the highest percentage (43%) of homes at risk for childhood lead exposure. Recognizing that there is no safe blood lead level in children, the Centers for Disease Control and Prevention (CDC) recommends the use of a reference value for lead poisoning which is currently 5 µg/dL, but it may be set at a lower amount depending on the next recommendation set forth by the CDC Lead Advisory Council. Many local health departments are actively taking public health actions at lower blood lead values, significantly increasing the number of children needing care coordination services and additional resources. Examples of these public health actions include mailing of lead poisoning prevention and nutrition educational materials to the child's parent or guardian, or referral to a Childhood Lead Poisoning Primary Prevention Program for an environmental investigation.

ASSETS

- **The Lead and Copper Rule** requires public water systems to monitor for lead in drinking water and to reduce the corrosivity of water if it exceeds an action level of 15 parts per billion.
- **The Lead Poisoning Prevention Program** is funded statewide and promotes childhood blood lead testing, laboratory reporting of results, care coordination, and environmental intervention for elevated blood lead levels in a child.
- **The Childhood Lead Poisoning Primary Prevention Program** uses a housing-based approach to prevention. Funding is used for environmental housing inspections in high incidence geographic areas identified in 15 counties.
- **The Healthy Neighborhoods Program** seeks to reduce the burden of housing-related illness and injuries through a holistic, healthy homes approach. This program includes lead poisoning prevention.
- **The Lead Testing of School Drinking Water** law became effective September 6th, 2016. It requires that all NYS schools test for lead from all water outlets and report their results to the NYSDOH. If the water from any outlet exceeds the specified action level, the outlet must be taken out of service until corrective actions can be applied. The school must also provide public notification of its testing results.
- **The Lead Service Line Replacement Program** provides municipalities with grant funds to facilitate the replacement of residential lead water service lines (from the municipal water main to the residence) in the highest risk areas of the state.
- **Regional Lead Resource Centers** are three regional hospitals that maintain and provide expertise on the medical treatment of children who are identified with very high blood lead levels. The Regional Lead Resource Centers provide lead poisoning prevention education directly to primary care providers and families within their region. They also provide consultation to the primary care providers of lead poisoned children and direct services to intervene in childhood lead exposure.
- **The Adult Occupational Health Lead Poisoning Program** tracks elevated blood lead levels in adults and provides occupational intervention and exposure risk assessment to workers and pregnant women who have been exposed to lead.

References

[1] NYS Department of Health LeadWeb Database. Data accessed April 2016.

[2] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Public Health Statement for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

[3] Gould E. Childhood lead poisoning: Conservative estimates of the social and economic benefits of lead hazard control. *Env Health Perspect*. 2009 July;117(7):1162-1167.

[4] Raymond. J., Wheeler. W., Brown. M.J. (2014). *Morbidity and Mortality Weekly Report.* Lead Screening and Prevalence of Blood Lead Levels in Children Aged 1-2 Years – Child Blood Lead Surveillance System, United States, 2002-2010 and National Health and Nutrition Examination Survey, United States, 1999-2010. Atlanta, GA: Centers for Disease Control and Prevention.

[5] U.S. Census Data for 2000

BACKGROUND

Radon is a naturally occurring radioactive gas that comes from the radioactive decay of uranium in soil, rock, and groundwater. It has no color, odor, or taste. It emits ionizing radiation during its radioactive decay to several radioactive isotopes known as radon decay products.

Radon is found all over the United States (US). It gets into the indoor air primarily from soil under homes and other buildings. Radon is a known human lung carcinogen and the largest source of radiation exposure. Most inhaled radon is rapidly exhaled, but the inhaled decay products readily deposit in the lungs, where they irradiate sensitive cells in the airways and increase the risk of lung cancer.

BURDEN AND DATA TRENDS

Radon is responsible for about 21,000 lung cancer deaths in the US every year. As many as 20% of the people who die from lung cancer in the US every year have never smoked or used any other form of tobacco. Radon is the number one cause of lung cancer among non-smokers, according to US EPA estimates, causing about 2,900 deaths. [1, 2, 3] Overall, radon is the second leading cause of lung cancer.

Forty of 62 counties in NYS are considered "high-risk" radon counties (see map on the next page). This means that the average indoor basement-level radon concentration is greater than the EPA's action level of 4 pCi/L.[4] These counties are high risk, mostly due to their underlying geology. The Reading Prong, which underlies northern Pennsylvania and southern NYS, is characterized by elevated concentrations of uranium, the decay of which produces radon gas.

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Everyone is exposed to radon, including residents in the New York City metropolitan area. Radon concentration varies based on a number of factors, including home construction, type of heating and ventilation, and geology. This is why the concentration of radon can vary widely from home to home in the same area and why testing is recommended.

A smoker who is also exposed to radon has a much higher risk of lung cancer. For example, if 1,000 people who smoked were exposed to radon at a level of 20 pCi/L, about 260 people could get lung cancer. The risk of cancer from radon exposure is 250 times greater than the risk of drowning.[6]

People can protect themselves from radon exposure by testing their homes for radon. These tests are inexpensive and easy. A test kit can be purchased from the NYSDOH, County Health Department, or hardware stores. The test kit can then be sent to a company approved through the State's Environmental Laboratory Approval Program. If the results indicate that the home has elevated levels of radon, a radon reduction system can be installed by a certified radon mitigation contractor. These systems can reduce radon levels in the home by up to 99%. Additionally, new homes can be built with radon-resistant features.[4]

Figure 1: New York State counties at high risk for radon exposure – basement.

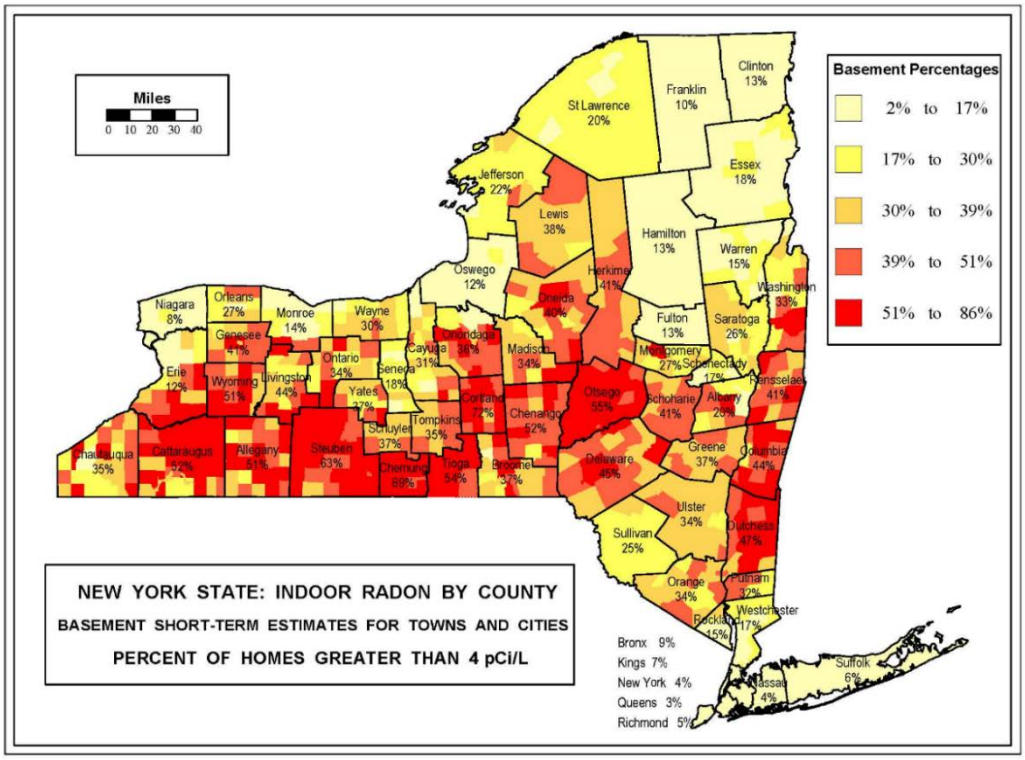
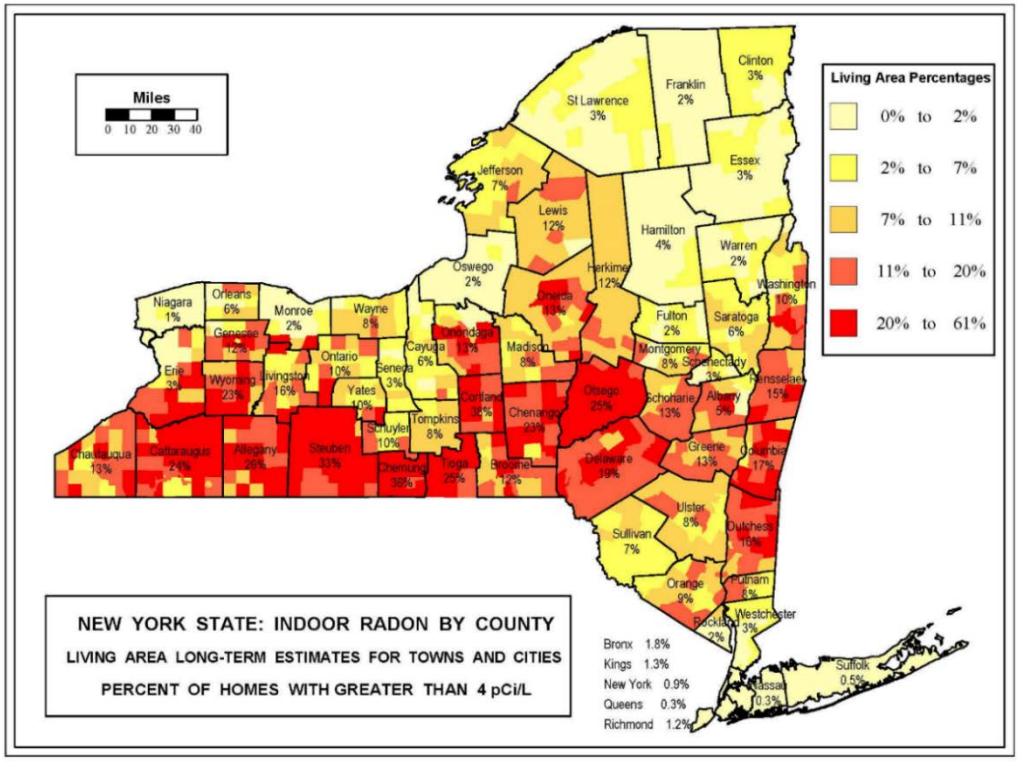


Figure 2: New York State counties at high risk for radon exposure - living area.



CHALLENGES

NYS currently has no laws that require radon testing or mitigation of elevated radon levels except as part of a hazard assessment for daycare facilities. In addition, NYS does not require certification or licensure of radon testers or mitigators, which allows untrained individuals to test for radon and install mitigation systems.

New homes can be built with radon resistant features. Radon Control Methods are currently described in an optional Appendix F of the 2006 International Residential Code, but Appendix F has not been adopted into the NYS Residential Building Code. Currently, only two towns in NYS (Lima and Caledonia in Livingston County) require homes to be built as radon-resistant.

Efforts to engage physicians to promote awareness of radon risks to their patients and to encourage radon testing have not been effective, probably because of other demands on physician time.

ASSETS

The NYSDOH has maintained a Radon Outreach and Education Program funded through the EPA's State Indoor Radon Grants (SIRG) Program for nearly 30 years. The program includes:

- Free and low-cost radon detection kits
- Grants to high risk counties (currently, 12 counties participate)
- A radon testing database that includes results for more than 176,000 radon tests
- A radon hotline and shared mailbox where members of the public can request technical assistance addressing their radon concerns
- Maintenance of a radon website (www.health.ny.gov/radon) which includes:
    - Radon publications and other information materials
    - Radon maps showing radon potential by town, county, and zip code
    - Lists of certified radon testers and mitigators
    - Information on radon risk for physicians

References

[1] Environmental Protection Agency. June 2003. EPA Assessment of Risks from Radon in Homes. Office of Radiation and Indoor Air. EPA 402-R-03-003. https://www.epa.gov/radiation/epa-assessment-risks-radon-homes

[2] National Research Council. 1999. Health Effects of Exposure to Radon (BEIR VI). https://www.nap.edu/read/5499/chapter/1

[3] World Health Organization. 2009. WHO Handbook on Indoor Radon: A Public Health Perspective. http://www.who.int/ionizing_radiation/env/9789241547673/en/

[4] NYS Department of Health. Protect Your Family from Radon: A Guide for New York State Residents. 2015. Publication 3168. https://www.health.ny.gov/publications/3168/

[5] American Cancer Society. https://www.cancer.org/

[6] EPA 2016. US Environmental Protection Agency. A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon. https://www.epa.gov/radon/citizens-guide-radon-guide-protecting-yourself-and-your-family-radon

BACKGROUND

Each year, one in six Americans gets sick from eating contaminated food. The Centers for Disease Control and Prevention (CDC) defines a foodborne disease outbreak as an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food.[1] This definition is also used by the New York State Department of Health (NYSDOH), which divides foodborne disease outbreaks into six etiology categories: bacterial, viral, chemical, parasitic, multiple and unknown. Foodborne disease outbreaks can be prevented by the control or elimination of hazards.

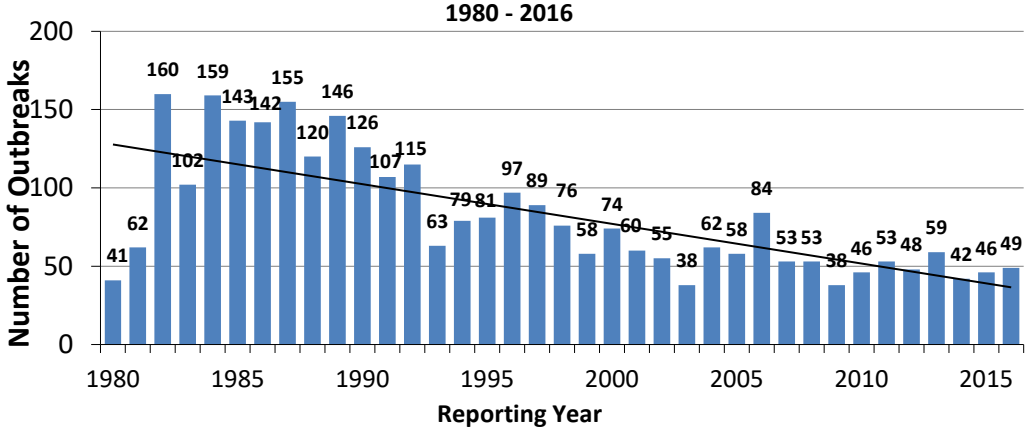
BURDEN AND DATA TRENDS

Reported foodborne disease outbreaks represent a small portion of the total burden of foodborne illness. The CDC estimates that, in the United States (US), 47.8 million illnesses, 127,800 hospitalizations and 3,000 deaths are attributed to the consumption of contaminated food annually.[2] Of these, approximately 38.4 million illnesses, 78,900 hospitalizations, and 1,700 deaths are attributed to unspecified agents.[2] Depending on the model used, the average cost per case of foodborne illness is $1,068 - $1,626 and the total annual cost of illness is $51.0 - $77.7 billion.[3]

The collection of data about foodborne disease outbreaks in New York State (NYS) began in 1980. From 1980 to 2016, there were 3,039 identified foodborne disease outbreaks. On average, there were 82 foodborne disease outbreaks, 1,734 associated illnesses, 61 hospitalizations, and 2 deaths annually.

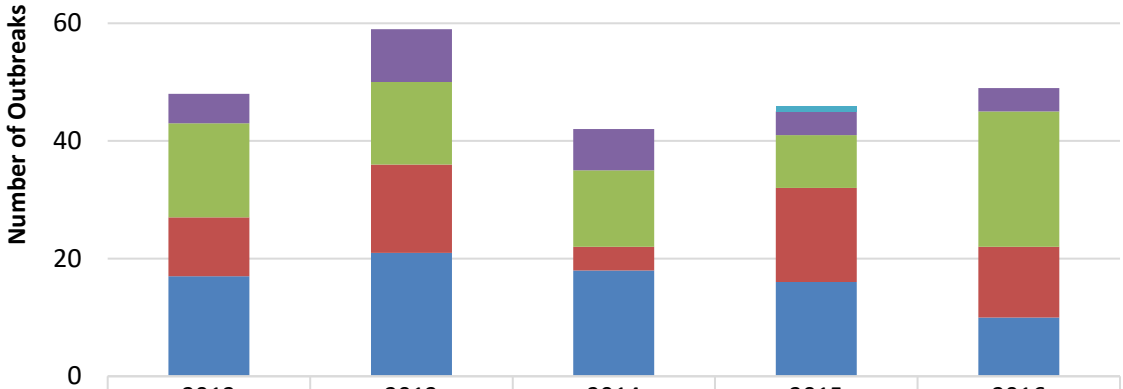
From 1980 to 2016, there has been a decline in the annual number of outbreaks in NYS (Figure 1). This decline may be attributed to a multitude of factors including, but not limited to, NYS prohibition of bare hand contact with ready-to-eat foods in 1992,[4] and changes to food safety practices at the national level (e.g., the US Food and Drug Administration (FDA) National Shellfish Sanitation Program,[5] FDA's Egg Safety Rule[6]). These improvements in food safety practices and the implementation of food safety policies are driven by the reporting of and investigation into foodborne disease outbreaks.

Figure 1: Number of Foodborne Disease Outbreaks, NYS, 1980 - 2016



From 2012 to 2016, there were 57 outbreaks of unknown etiology, accounting for 23.4% of all outbreaks during that time (Figure 2). Over the previous 5-year period, outbreaks of unknown etiology accounted for 25.9% of outbreaks, so agent detection has improved slightly in the past five years. Outbreaks of unknown etiology are of particular concern because the inability to identify an outbreak etiology can hinder efforts to implement appropriate control measures and prevent additional illnesses from occurring.

Figure 2: NYS Foodborne Disease Outbreak Etiology, 2012-2016



	2012	2013	2014	2015	2016
Parasitic	0	0	0	1	0
Chemical	5	9	7	4	4
Viral	16	14	13	9	23
Unknown	10	15	4	16	12
Bacterial	17	21	18	16	10

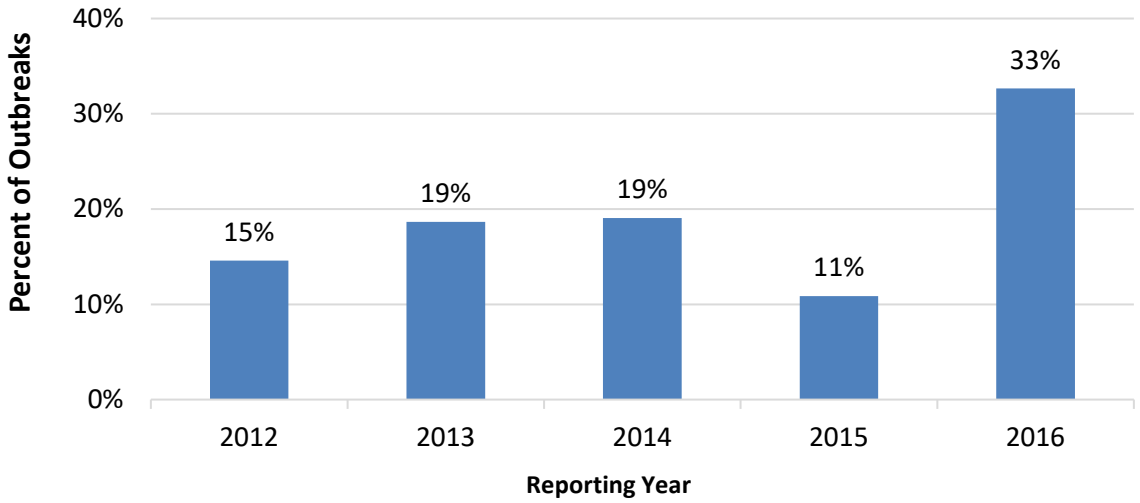
Reporting Year

There were 244 foodborne disease outbreaks identified from 2012 to 2016. Of these outbreaks, 132 (54.1%) identified one or more contributing factors during the outbreak investigation. Contributing factors are the circumstances that lead to the occurrence of the outbreak,[7] and one outbreak may have multiple contributing factors. Among outbreaks where one or more contributing factors were identified, the most commonly cited factors were: an infected person (35.6%), contaminated ingredients (32.6%), and a natural toxicant (21.2%).

Between 2012 and 2016, infected persons were identified as a contributing factor in 47 (19.3%) foodborne disease outbreaks (Figure 3 on next page), which increased from the previous 5-year period in which infected persons were identified as a contributing factor in 38 out of 243 (15.6%) foodborne disease outbreaks. In 1992, legislation banning bare hand contact with ready-to-eat foods was implemented to reduce the number of illnesses caused by sick food workers. While this piece of legislation was paramount in addressing the transmission of illnesses from food workers, improved education and guidance are still needed.

Good food safety practices and policies that address transmission from an infected person are a realistic control measure that can be implemented by Food Service Establishments (FSEs). While FSEs may be unable to prevent outbreaks that occur from contaminated ingredients, the implementation and enforcement of good food safety practices could better control outbreaks associated with ill food handlers.

Figure 3: NYS Percentage of Foodborne Disease Outbreaks Attributed to Infected Persons, 2012-2016



DISPARITIES

All state residents and visitors may be affected by foodborne illness, regardless of their age, race, sex, geographic location, or socioeconomic background.

CHALLENGES

Identification of agents, contributing factors, and implicated food vehicles varies between outbreaks. Causes of variation may include the level of cooperation from complainants of ill persons; time elapsed between symptom onset and reporting of illness; cooperation of implicated establishment and/or staff; availability of patient specimens; ability to detect a pathogen in a specimen/sample; ability to collect environmental or food samples; or an individual or group's decision to report an illness.

ASSETS

NYSDOH investigates all foodborne disease outbreaks. The primary goals of outbreak investigations are to: (1) stop the outbreak(s) to prevent more people from becoming ill; (2) identify contributing factor(s), causative agent(s) and implicated food vehicle(s); and (3) inform the NYSDOH's prioritization of food service inspection efforts to help prevent future outbreaks. Grant funding provided by federal partners provides staffing, training, and supplies to improve outbreak investigations and prevent future outbreaks across NYS.

References

[1] Centers for Disease Control and Prevention. Guide to confirming an etiology in foodborne disease outbreak. Retrieved November 21, 2017, from https://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html

[2] Scallan E, Griffin PM, Angulo FJ, Tauxe RV, Hoekstra RM. Foodborne illness acquired in the United States—unspecified agents. *Emerg Infect Dis*, 2011; 17(1):16-22.

[3] Scharff R. Economic burden from health losses due to food borne illness in the United States. *J Food Prot,* 2012; 75(1):123-31.

[4] NYS Department of Health. *Use of Hands in Preparation of Ready-to-Eat Foods*. Retrieved June 27, 2018, from https://www.health.ny.gov/publications/3138/

[5] US Food and Drug Administration. National Shellfish Sanitation Program (NSSP). Retrieved June 27, 2018, from https://www.fda.gov/food/guidanceregulation/federalstatefoodprograms/ucm2006754.htm

[6] US Food and Drug Administration. Eggs Guidance Documents & Regulatory Information. Retrieved June 27, 2018, from https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Eggs/default.htm

[7] Bryan F, Guzewich J, Todd E. Surveillance of foodborne disease III. Summary and presentation of data on vehicles and contributory factors; their value and limitations. *J Food Prot,* 1997;60(6):701-714.

BACKGROUND

Injuries – both unintentional and intentional – are a leading cause of death and disability among all age groups in New York State (NYS). They are the leading cause of death for New Yorkers ages 1-44 years. More than 8,000 New Yorkers die every year due to an injury (Table 1), but injury-related deaths are only a fraction of the consequences. Other consequences of non-fatal injuries range from temporary pain and inconvenience to long-term disability, chronic pain, and a diminished quality of life. Hospital treatment and rehabilitation services are often needed. Injuries are consistently among the leading causes of hospitalization and emergency department (ED) visits for New Yorkers of all ages. Table 1 shows that more than 157,000 individuals are injured severely enough to require hospitalization annually, and another 1.5 million injured New Yorkers are treated and released from EDs each year.

An injury results from any external cause that damages cells and organs, whether unintentional or intentional. Injuries are often preventable events. Injuries may also affect loved ones who provide care for an injured person. This caregiving can result in stress, time away from work and, sometimes, lost income. The economic impact of injuries includes the costs associated with medical treatment but also lost wages and accompanying fringe benefits as a result of an inability to perform one's daily responsibilities. In 2010, the estimated lifetime economic impact of all injuries in the US exceeded $586 billion.[1]

The NYS Department of Health (NYSDOH) works to reduce the burden of injuries through surveillance and programs such as traffic safety, fall prevention, and traumatic brain injury prevention.

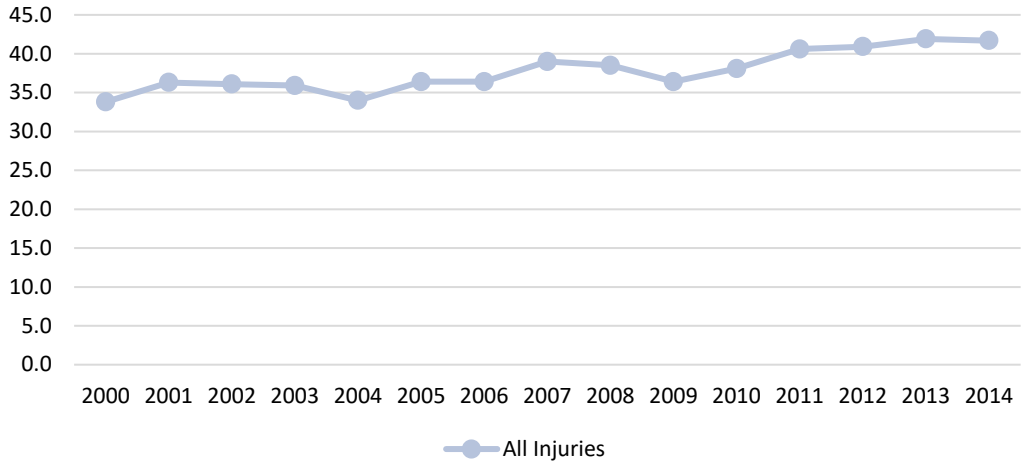
BURDEN AND DATA TRENDS

The overall rates of injury-related deaths and hospitalizations have been increasing since 2000. There were 40.4 injury-related deaths and 785.9 hospitalizations per 100,000 people in 2014 compared to 33.8 injury-related deaths and 707.5 hospitalizations per 100,000 people in 2000 (Figures 1 and 2). Injury-related ED visits were increasing from 2005 to 2012, however, these rates have dropped slightly in more recent years (Figure 3).

The leading causes of injury deaths, hospitalizations and/or ED visits are shown in Tables 1-3. These include falls and motor vehicle injuries to vehicle occupants, pedestrians, bicyclists and motorcyclists. 'Poisoning/overdose' events have become a leading cause of injury deaths and a major contributor to hospitalizations and ED visits primarily due to the opioid epidemic (see Chapter XX for more information about opioids). Additionally, the number of suicides and self-harm injuries have increased (see Chapter YY for more information on these issues).

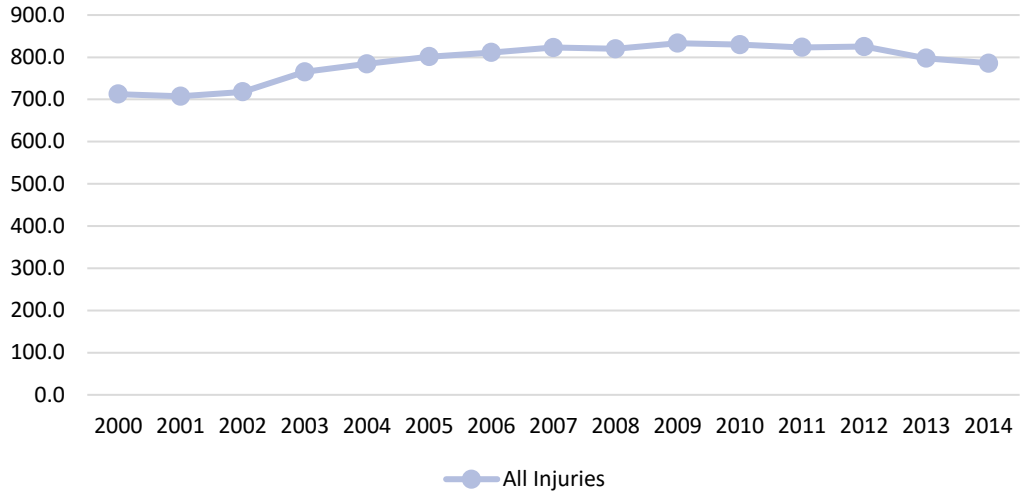
The cost associated with hospitalizations and ED visits attributed to injuries is nearly $10.0 billion annually (Table 4).

Figure 1: Number of Injury-related Deaths per 100,000 NYS Residents, 2000-2014



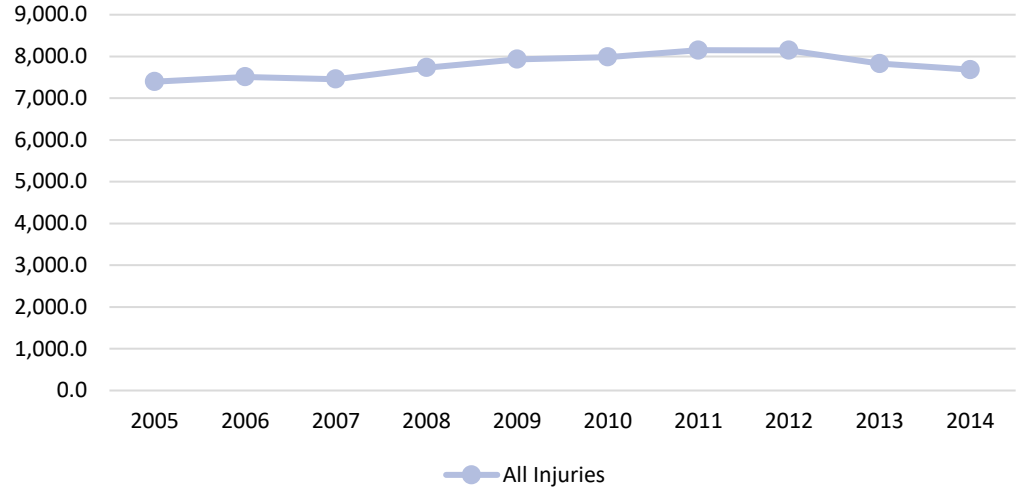
Source: NYSDOH Vital Statistics

Figure 2: Number of Injury-related Hospitalizations per 100,000 NYS Residents, 2000-2014



Source: SPARCS

Figure 3: Number of Injury-related Emergency Department Visits per 100,000 NYS Residents, 2005-2014



Source: SPARCS

Table 1: Number of Deaths Due to Injuries for Top Five Leading Causes by Age Group, NYS Residents, Annual Average 2012-2014

Age Groups	Rank				
	1	2	3	4	5
<1	Suffocation (28)	Homicide (10)	*	*	*
1-4	Homicide (17)	Suffocation (7)	Fire / Flame (5)	MVT^, Pedestrian (4)	Fall (3)
5-9	Homicide (7)	Fire / Flame (6)	MVT^, Unspecified (5)	MVT^, Pedestrian (4)	*
10-14	Suicide (14)	MVT^, Pedestrian (7)	Homicide (5)	MVT^, Pedal Cyclist (4)	Fire / Flame (3)
15-19	Suicide (65)	Homicide (55)	MVT^, Occupant (29)	Poisoning (27)	MVT^, Unspecified (18)
20-24	Poisoning/Overdose (154)	Homicide (138)	Suicide (115)	MVT^, Unspecified (47)	MVT^, Occupant (41)
25-44	Poisoning/Overdose (780)	Suicide (491)	Homicide (268)	MVT^, Unspecified (81)	MVT^, Occupant (70)
45-64	Poisoning/Overdose (839)	Suicide (673)	Fall (179)	Homicide (122)	MVT^, Pedestrian (98)
65+	Fall (1,133)	Suicide (276)	Unspecified (179)	Suffocation (146)	MVT^, Pedestrian (101)

MVT^ = Motor Vehicle Traffic *Data based on frequencies less than six are not reported.

Source: NYSDOH Vital Statistics

Table 2: Hospitalizations Due to Injuries, Top Five Leading Causes by Age Group, NYS Residents, Yearly Average 2012- 2014

Age Groups	Rank				
	1	2	3	4	5
<1	Fall (337)	Hot Object / Scald (117)	Assault (82)	Unspecified (75)	Poisoning (45)
1-4	Fall (805)	Poisoning (402)	Hot Object / Scald (395)	Natural/Environmental (255)	Struck By, Against (100)
5-9	Fall (804)	Natural/Environmental (161)	MVT^, Pedestrian (431)	Struck By, Against (107)	Hot Object / Scald (86)
10-14	Fall (650)	Self-Inflicted (431)	Struck by / Against (221)	MVT^, Pedestrian (184)	Assault (122)
15-19	Self-Inflicted (1,432)	Assault (830)	Fall (658)	MVT^, Occupant (463)	Struck By, Against (303)
20-24	Self-Inflicted (1,363)	Assault (1,348)	Fall (820)	MVT^, Occupant (772)	Poisoning (521)
25-44	Fall (4,873)	Self-Inflicted (3,899)	Assault (3,142)	Poisoning (2,293)	MVT^, Occupant (1,652)
45-64	Fall (14,975)	Poisoning/ Overdose (3,986)	Self-Inflicted (2,920)	Unspecified (2594)	MVT^, Occupant (1,612)
65+	Fall (52,416)	Unspecified (4,610)	Poisoning/ Overdose (2,044)	MVT^, Occupant (1,532)	Natural/Environmental (1,065)

MVT^ = Motor Vehicle Traffic

Source: SPARCS

Table 3: Number of Emergency Department Visits Due to Injuries for Top Five Leading Causes by Age Group, NYS Residents, Annual Average 2012-2014

Age Groups	Rank				
	1	2	3	4	5
<1	Fall (7,234)	Struck by, Against (1,272)	Unspecified (874)	Natural/Environmental (734)	MVT^, Occupant (517)
1-4	Fall (43,438)	Struck by, Against (15,322)	Natural/Environmental (9,490)	Unspecified (5,869)	Cut / Pierce (4,015)
5-9	Fall (31,578)	Struck by, Against (17,796)	Natural / Environmental (6,952)	Cut / Pierce (5,087)	Unspecified (4,658)
10-14	Fall (29,860)	Struck by, Against (27,171)	Overexertion (11,355)	Unspecified (6,366)	Cut / Pierce (5,871)
15-19	Struck by, Against (26,339)	Fall (22,644)	Overexertion (14,627)	Assault (11,730)	MVT^, Occupant (9,919)
20-24	Fall (22,992)	Struck by, Against (18,123)	Assault (16,062)	MVT^, Occupant (15,603)	Cut / Pierce (14,455)
25-44	Fall (80,620)	Struck by, Against (46,461)	Overexertion (46,333)	Cut / Pierce (42,060)	MVT^, Occupant (41,030)
45-64	Fall (98,755)	Overexertion (29,052)	Struck by, Against (28,848)	Unspecified (28,714)	Cut / Pierce (27,034)
65+	Fall (105,980)	Unspecified (13,724)	Struck by, Against (9,764)	MVT^, Occupant (8,209)	Cut / Pierce (7,934)

MVT^ = Motor Vehicle Traffic

Source: SPARCS

Table 4: Mean Charges and Total Charges for all Injuries New York State Residents, 2012-2014

	Hospitalizations	ED Visits
Mean Charge per Hospitalization or ED Visit	$44,253	$1,916
Mean One Year Total Hospitalization or ED Visit Charges	$6,983,658,547	$2,969,187,731

Source: NYSDOH Vital Statistics, SPARCS

DISPARITIES

Age, gender and race/ethnicity contribute to the disparities that exist within the rates of injury-related deaths, hospitalizations and ED visits.

***Age*:**

The highest rates of injury-related deaths and hospitalizations are for people aged 65 and older, whereas the highest rate of ED visits is for children aged 1-4 years. Among children, the highest rates of injury-related death and hospitalization are for those less than one year old (Table 5).

***Gender*:**
Males are twice as likely as females to die of an injury and males have a higher rate of hospitalizations and ED visits resulting from an injury (Table 5). However, females have a slightly higher rate of unintentional injuries, primarily fall-related injuries for females that are 65 years of age or older (data not shown).

***Race/Ethnicity*:**
White non-Hispanic and black non-Hispanic residents have the highest numbers and rates of injury deaths and hospitalizations. For ED visits, black non-Hispanic and American Indian/Alaskan Native non-Hispanic have the highest rates of unintentional injuries. When examining homicides/assaults, black non-Hispanic residents are over ten times more likely to die due to homicide than white non-Hispanic residents, and Hispanic residents are four times more likely to die than white non-Hispanic residents. The rates of hospitalization and ED visits due to assaults are similar, with black non-Hispanic residents, Native American/Alaskan Native non-Hispanic residents, and Hispanic residents having the three highest injury rates (Table 5). For suicide/self-harm, white non-Hispanic residents had the highest rates for suicide and self-harm hospitalizations, and black non-Hispanic residents had the highest emergency department rates (data not shown).

Table 5: Number of Injury-related Hospitalizations and Emergency Department Visits, New York State Residents, 2012-2014

	Deaths		Hospitalizations		ED Visits	
	Mean Annual Frequency	Rate per 100,000	Mean Annual Frequency	Rate per 100,000	Mean Annual Frequency	Rate per 100,000
All Injury Total	8,149	41.5	157,812	802.9	1,549,875	7,885.0
Unintentional Injury	5,471	27.8	130,883	665.9	1,399,517	7,120.1
Intentional Injury	2,297	11.7	18,252	92.9	99,321	505.3
Assault/Homicide	660	3.4	7,531	38.3	87,418	444.7
Self-Inflicted/Suicide	1,637	8.3	10,685	54.4	10,910	55.5
Undetermined Intent	381	1.9	6,225	31.7	14,801	75.3
Work-Related (Ages 15+) Rate is per 100,000 FTE Workers	207	2.4	3,290	38.5	100,745	1,178.6
Age Group (years)						
0<1	84	35.0	913	382.5	14,072	5,894.7
1-4	62	6.6	2,658	283.8	106,256	11,347.1
5-9	30	2.6	1,925	167.7	89,966	7,836.6
10-14	51	4.3	2,585	219.1	112,684	9,550.6
15-19	251	19.6	5,528	430.7	134,167	10,453
20-24	606	42.0	7,369	510.8	149,089	10,334.3
25-44	2,149	40.4	25,607	480.9	434,645	8,162.0
45-64	2,515	47.7	38,583	731.8	327,847	6,218.6
65+	2,397	84.7	72,643	2,567.5	181,149	6,402.4

	Deaths		Hospitalizations		ED Visits	
	Mean Annual Frequency	Rate per 100,000	Mean Annual Frequency	Rate per 100,000	Mean Annual Frequency	Rate per 100,000
Gender						
Male	5,545	58.2	78,557	823.8	816,188	8,559.4
Female	2,604	25.7	79,252	783.1	733,656	7,249.3
Unknown	0	n/a	3	n/a	31	n/a
Race/Ethnicity						
White non-Hispanic	5,594	49.2	93,992	827.4	770,976	6,786.7
Black non-Hispanic	1,143	38.5	22,089	743.2	295,517	9,942.5
Asian Pacific Islander non-Hispanic	279	17.0	2,421	147.8	23,419	1426.4
American Indian/Alaskan Native non-Hispanic	21.7	30.6	301	424.9	5,070	7,148.6
Hispanic	978	27.1	13,261	367.3	179,927	4,983.0
Other/Unknown	134	n/a	25,747	n/a	274,966	n/a
Traumatic Brain Injury (%)*	28%		12%		9%	

*Percentage of all injury hospitalizations and deaths that included a traumatic brain injury indicating an increased severity of the injury.

Source: NYSDOH Vital Statistics, SPARCS

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Different populations are at greater risk for certain injuries than others. The hazards facing a teen driver, for instance, are not the same as those for an older driver. Likewise, the risks of falling are different for an elderly adult than they are for a young child. Because injuries and violence are caused by a wide variety of external causes, such as motor vehicle crashes, falls, overdoses, assaults, and self-harm, there is not one set of risk and protective factors that would cover them all. In addition, risk and protective factors can change as a person ages. Injury prevention outreach materials and programs developed by the NYSDOH are tailored to specific populations.

CHALLENGES

Many people consider injuries to be unavoidable accidents and a natural part of life, however, most injures are predictable and preventable. This perception creates a challenge in obtaining the resources necessary to develop and deliver effective outreach programs.

ASSETS

- Federal funding to support opioid overdose prevention, motor vehicle safety, falls prevention among older adults, prevention of child abuse and neglect, sexual and intimate partner violence, homicides, and suicide surveillance.
- The NYSDOH also works to establish a strong statewide injury and violence prevention infrastructure by hosting the Injury Community Implementation Group twice a year. This workgroup is a partnership of public and private stakeholders with an interest in making a strong injury infrastructure and reducing the burden of injury in NYS.
- The NYSDOH has developed the "Injury Prevention: An Injury Action Plan for New York State, 2012-2020." This document is a blueprint for state and local action to reduce injuries occurring among New Yorkers.
- Policy is also an important strategy for improving public health, including the reduction of injury-related morbidity and mortality. New York has several examples of progressive injury control legislation including:
    - a primary enforcement seat belt law, which covers all riders in the front seat, and riders under age 16 in the backseat. According to the CDC, primary laws typically result in higher rates of seat belt use than secondary seat belt laws, which allow officers to give seat belt tickets only if they have already pulled the driver over for another reason;
    - child passenger safety laws, which requires an appropriate child restraint system while riding in a motor vehicle for all children until they reach their 8th birthday, and Leandra's Law, which establishes a new Class E felony related to driving while intoxicated with a child under 16 in the vehicle and requires that all individuals convicted of misdemeanor and felony DWI offenses install and maintain ignition interlock device; as well as
    - a universal motorcycle helmet law and bicycle helmet legislation that requires a helmet for those 14 and under.

References

[1] Centers for Disease Control and Prevention. National Center for Injury Prevention and Control
Source: NCHS Vital Statistics System for numbers of deaths. NEISS All Injury Program operated by the U.S. Consumer Product Safety Commission (CPSC) for numbers of nonfatal injuries. Pacific Institute for Research and Evaluation (PIRE), Calverton, MD for unit cost estimates. Available at: https://wisqars.cdc.gov:8443/costT/cost_Part1_Intro.jsp

[2] New York State Department of Health. Bureau of Occupational Health and Injury Prevention. "Injury Prevention: An Injury Action Plan for New York State, 2012-2020." Available at:
https://www.health.ny.gov/prevention/injury_prevention/docs/injury_state_plan.pdf

Legionella

BACKGROUND

Legionella, the type of bacteria that causes Legionnaires' disease and Pontiac fever, is part of the normal microbial population in freshwater environments worldwide. Its ability to thrive in biofilms of built water systems, affinity for thermally-modified water and resistance to chlorine levels found in potable water supplies have contributed to the emergence and increase of Legionnaires' disease in the United States (US) and many other countries.[1] Legionella are particularly well suited to infecting alveolar macrophage cells in human lungs.[2]

The term 'legionellosis' refers to both Legionnaires' disease, a severe atypical pneumonia with a 10% average mortality rate, and to Pontiac fever, a milder, non-fatal upper respiratory infection that resembles acute influenza. Individuals become exposed to Legionella by inhaling aerosolized droplets containing the bacteria or by aspirating contaminated water while drinking.

Environmental conditions make people in the northeastern US more prone to legionellosis than other parts of the country. In 2015, a large outbreak in the Bronx resulted in 138 cases and 16 deaths. Weather conditions have been implicated in the increased occurrence of legionellosis[3], but there are multiple water exposures in the community that can contribute to ongoing, sporadic disease.

BURDEN AND DATA TRENDS

Legionnaires' disease accounts for approximately 3-8% of community-acquired pneumonia cases. It is estimated that between 8,000 and 18,000 cases occur each year in the US, although only 5% are diagnosed and reported. Most cases (> 80%) are sporadic. Clusters and outbreaks occur when two or more people become ill in the same place at approximately the same time.

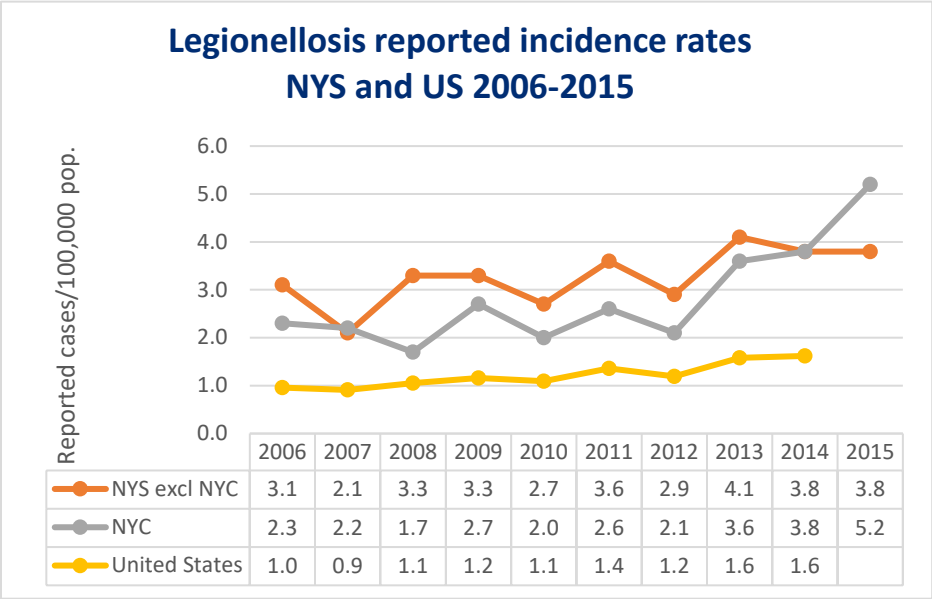
Legionellosis is a growing concern both regionally and nationally. Reported cases in the US quadrupled between 2000 and 2014.[4] Currently, more than 700 cases of Legionnaires' disease and Pontiac Fever are reported each year in New York State (NYS), including New York City (NYC) (Table 1).[5]

Table 1: Legionellosis Cases and Case Rate per 100,000 in NYS

Legionellosis Cases and Case Rate per 100,000 population in New York (data from public website)												
	Year											
	2011		2012		2013		2014		2015		2016	
	Number	Rate per 100,000	Number	Rate per 100,000	Number	Rate per 100,000	Number	Rate per 100,000	Number	Rate per 100,000	Number	Rate per 100,000
NYS Excl.NYC	400	3.6	325	2.9	457	4.1	422	3.8	433	3.8	463	4.1
NYC	216	2.6	177	2.1	301	3.6	225	2.7	438	5.2	269	3.1
Total	616	3.2	502	2.6	758	3.9	647	3.3	871	4.4	732	3.7

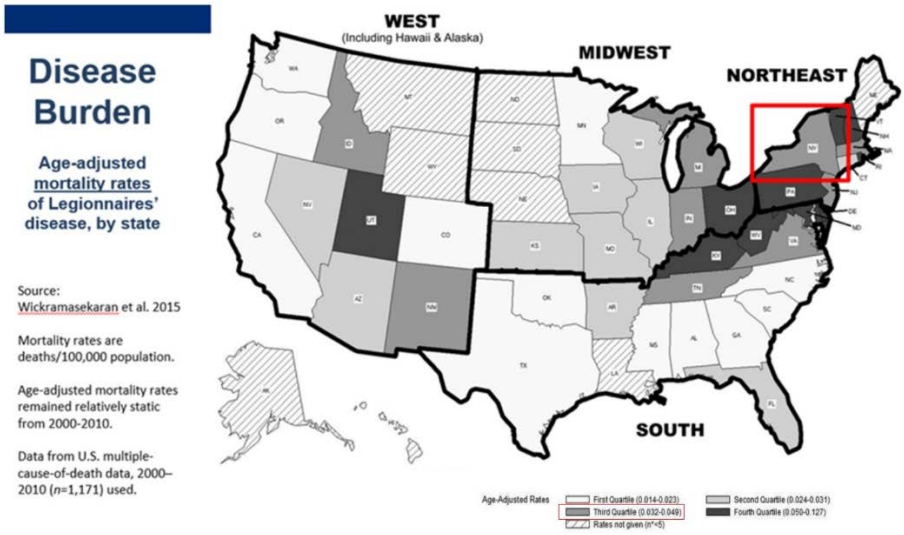
Incidence rates over this time were higher in NYS compared with the national average (Figure 1). This increase may be due to local conditions such as climate and weather, as well as New York's more active surveillance practices. While the northeastern region of the US has the highest incidence rates in the country, NYS's mortality rate is lower than that of neighboring states, suggesting that New York has better overall surveillance and/or treatment/medical care for infected residents (Figure 2).

Figure 1: Legionellosis reported incidence rates in NYS and US, 2006-2015



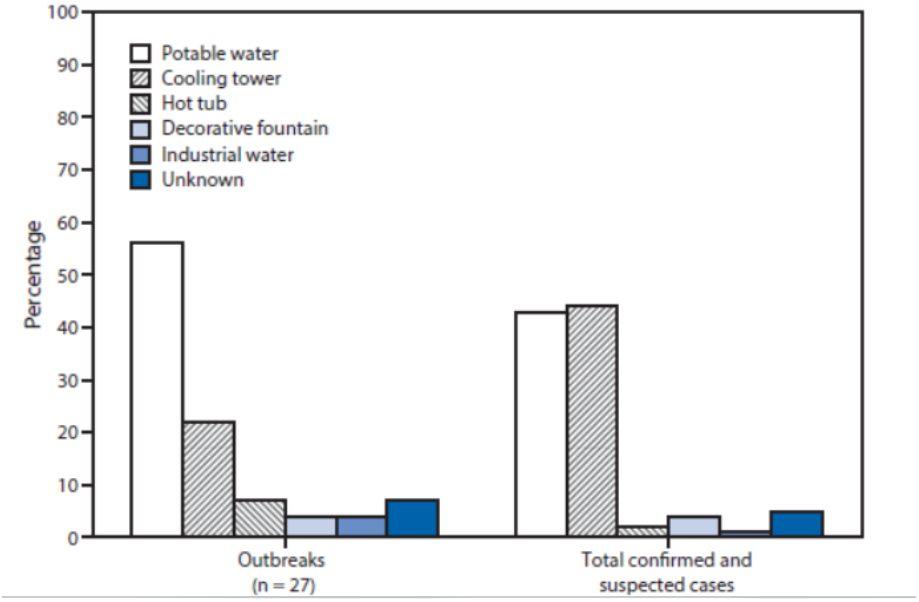
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NYS excl NYC	3.1	2.1	3.3	3.3	2.7	3.6	2.9	4.1	3.8	3.8
NYC	2.3	2.2	1.7	2.7	2.0	2.6	2.1	3.6	3.8	5.2
United States	1.0	0.9	1.1	1.2	1.1	1.4	1.2	1.6	1.6	

Figure 2: Age-adjusted mortality rates of Legionnaires' disease, by state, 2000-2010[6]



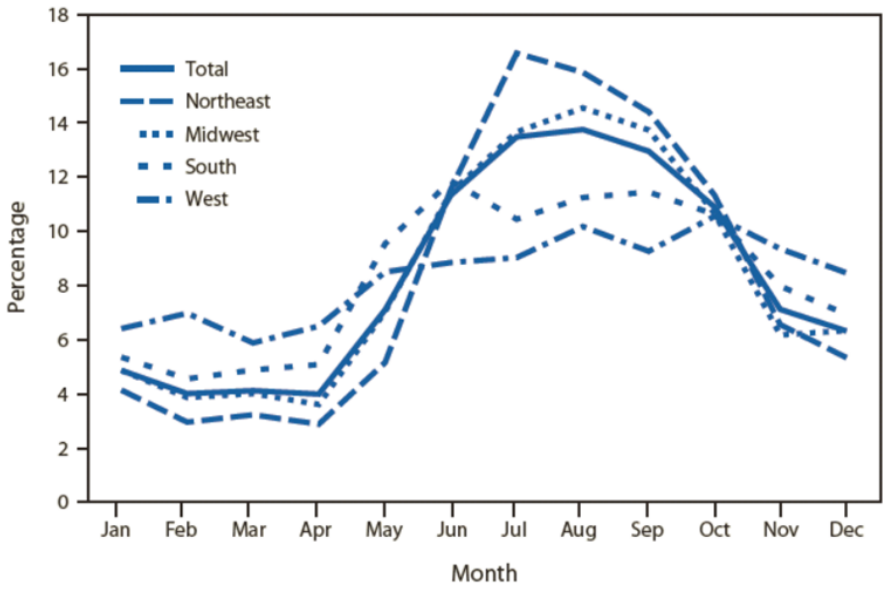
The main sources of human Legionella exposure are potable water, cooling towers and other waterborne exposures (Figure 3). While the largest number of outbreaks is associated with potable water, cooling tower events actually result in a larger number of cases within a designated outbreak (e.g., the 2015 outbreak in the Bronx resulting in 138 cases and 16 deaths). Most cases associated with potable water occur in hospitals and nursing homes with a relatively small number of cases (one to three).

Figure 3: Percentage of outbreaks and cases of Legionnaires' disease, by environmental source — North America, 2000–2014[7]



Legionellosis incidence follows seasonal patterns, with the majority of cases in the Northeast occurring between June and October (Figure 4).[7] The high rates in the warm weather correlates with the recently observed pattern of *Legionella* sampling results exceeding 1,000 colony forming units per milliliter in cooling towers in the summer in NYS (Figure 5). Many seasonal cooling towers are sampled during the months when maximum exceedances are observed, which may account for some of the coincident maximum disease occurrence. However, half of the >10,000 cooling towers registered with the State are used year-round so there may be additional variables affecting the increased incidence of Legionellosis during warm weather.

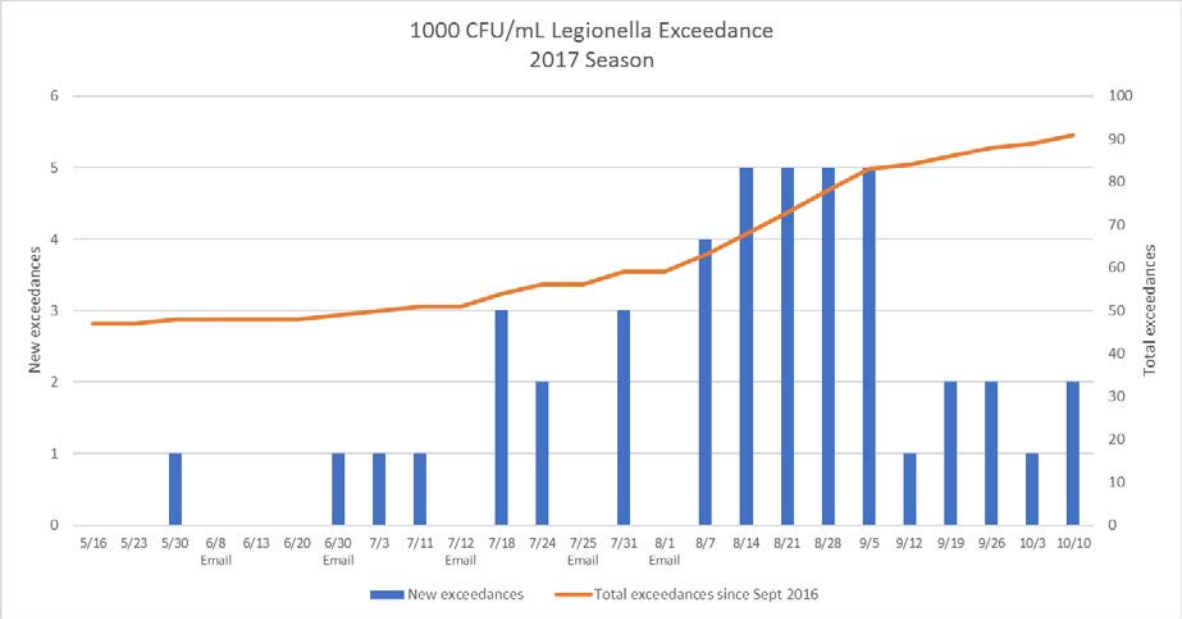
Figure 4: Annual average percentage of legionellosis cases occurring annually, by month and U.S. Census region, 2000-2009[8]



* *Northeast:* Connecticut, Maine, Massachusetts, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania; *Midwest:* Indiana, Illinois, Michigan, Ohio, Iowa, Nebraska, Kansas, North Dakota, Minnesota, and Missouri; *South:* Delaware, District of Columbia, Florida, South Carolina, West Virginia, Kentucky, Louisiana, Oklahoma, and Texas; *West:* Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington.

Alternate Text: The figure above shows the average percentage of legionellosis cases occurring in the United States annually, by month and U.S. Census region during 2000-2009. Cases tended to occur in the summer and early fall, with the June-October period accounting for 62% of the cases reported each year.

Figure 5: *Legionella* exceedances in cooling towers reported to NYSDOH during the 2017 cooling season



DISPARITIES

Key disparities that are recognized among legionellosis cases are:

- Men have a higher incidence of legionellosis than women, with men accounting for 63% of cases in the U.S.[9]
- Older adults are more vulnerable to infection. In 2016, the incidence rate among adults age 60 and over was more than twice that of those aged 50-59 (12.3/100,000 population vs. 5.2/100,000 population).[10]
- Nationally, whites account for 64% of cases and blacks for 15% of cases (18% of cases are of unknown race).[11]

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Most healthy individuals do not become infected with *Legionella* when they have been exposed; only 5-10% of those exposed become ill. People at higher risk of getting sick after being exposed include those 50 years of age or older; current or former smokers; those with a chronic lung disease (like chronic obstructive pulmonary disease or emphysema); those with a weakened immune system from diseases such as cancer, diabetes, or kidney failure; and those who take drugs that suppress (weaken) the immune system (such as after a transplant operation, chemotherapy, or corticosteroid treatment). These risk factors make individuals in hospitals and nursing homes particularly vulnerable to *Legionella*. Healthcare-associated outbreaks of legionellosis currently account for 57% of cases and 85% of fatalities in the US, with potable water systems being the most frequent source of exposure.[12]

CHALLENGES

- Performing outbreak and cluster investigations is challenging due to the need to consider multiple points of exposure and the impact of weather conditions and water system interruptions during legionellosis investigations. Cooling towers, as well as other possible environmental sources such as public water features and common water sources in public settings (e.g., decorative fountains, grocery store produce misters and car washes), need to be considered.
- Guidance issued by other agencies including the Center for Medicare and Medicaid Services (CMS) and the Centers for Disease Prevention and Control is not aligned with state and local rules, including recently-passed regulations related to cooling towers (Subpart 4-1).
- Implementation of the cooling tower regulations (Subpart 4-1) may present a challenge at the local level (e.g., local health departments) due to lack of funds and personnel resources.

ASSETS

- NYS was the first state to implement comprehensive regulations addressing *Legionella* and has the most extensive state requirements for cooling towers and healthcare facilities in the country.[13] In 2016, New York State implemented 10NYCRR Part 4, Protection Against *Legionella*, a regulation to help reduce the burden of disease in the state. The new regulation is divided into two sections: Subpart 4-1, which regulates the operation of cooling towers (cooling towers, evaporative coolers and condensers), and Subpart 4-2, which regulates the potable water systems in general hospitals and residential health care facilities (e.g., nursing homes). In addition, NYSDOH released a Health Advisory that notified regulated healthcare facilities in the state of the requirements of Subpart 4-2 and what actions they needed to take for implementation and ongoing notification.[14]
- CMS recently issued a memorandum requiring surveyors in nursing homes, hospitals, and critical access hospitals to ensure that these facilities are protecting patients from Legionnaires' disease and other waterborne pathogens. NYSDOH offered webinars for health system surveyors to assist them in this task.

References

[1] Parr A, Whitney EA, Berkelman RL. 2015. Legionellosis on the rise: A review of guidelines for prevention in the United States. *Journal of Public Health Management Practice*, 21(5): E17-E26.

[2] Molmeret, M, Horn M, Wagner M, Santic M and Kwaik YA. 2005. Amoebae as training grounds for intracellular bacterial pathogens. *Applied and environmental microbiology*, 71(1): 20-28.

[3] Whitney BD, Dziewulski D, Codru N, Backenson B, Hildago C, Smith G, Karr J, Burzlaff K, Zansky S. Cloudy with a chance of *Legionella*. 2014 Council of State and Territorial Epidemiologists, Annual ConferenceJune 22-26, 2014. https://cste.confex.com/cste/2014/webprogram/Paper3592.html

[4] CDC. Legionnaires' Disease. http://www.cdc.gov/vitalsigns/legionnaires/.

[5] NYSDOH. Communicable disease annual reports and Related Information. https://www.health.ny.gov/statistics/diseases/communicable/. Accessed 11/15/17.

[6] Wickramasekaran RN, Sorvillo F, Kuo T. 2015. Legionnaires' disease and associated comorbid conditions as causes of death in the US, 2000–2010. *Public Health Reports*, 130(3:, 222-229.

[7] CDC. Vital Signs: Deficiencies in environmental control identified in outbreaks of Legionnaires'dDisease — North America, 2000–2014. *MMWR*, 65(22):576-584.

[8] CDC. Legionellosis – United States, 2000-2009. *MMWR*, 60(32):1083-1086.

[9] CDC. Legionellosis – United States, 2000-2009. *MMWR*, 60(32):1083-1086.

[10] NYSDOH. Communicable disease annual reports and related information. https://www.health.ny.gov/statistics/diseases/communicable/. Accessed 11/15/17.

[11] NYSDOH. Communicable disease annual reports and related information. https://www.health.ny.gov/statistics/diseases/communicable/. Accessed 11/15/17.

[12] Garrison LL, Kunz J, Cooley L, Moore M, Lucas C, Schrag S., Whitney C. 2016. Vital signs: Deficiencies in environmental control identified in outbreaks of Legionnaires' disease—North America, 2000–2014. *American Journal of Transplantation*, 16(10): 3049-3058.

[13] Additional information on the regulation and available resources can be found on NYSDOH website: https://www.health.ny.gov/environmental/water/drinking/legionella/index.htm

[14] NYSDOH, Health advisory, regulation for the protection against *Legionella*, August 12, 2016. http://www.nyshfa.org/files/2014/06/Final-HCF-Memo-Legionella-Reg-8.12.16.pdf .

Water Quality

BACKGROUND

Maintaining high quality drinking water that meets health and safety standards is essential to protecting the public's health. In cooperation with local health departments, the New York State Department of Health (NYSDOH) regulates the operation, design, and quality of public water supplies, ensures water sources are protected adequately, and provides financial and technical assistance to public water suppliers.

About 95% of New Yorkers receive water from a public water supply system. These systems include large municipal systems such as New York City's water supply (serving more than 9 million people), privately owned companies providing water to municipalities, schools with their own water supply, and small businesses (e.g., restaurants) with private wells in rural areas serving water to their customers. In all, New York State has more than 9,100 public water systems (Table 1).

Table 1: Public Water Systems by System Type

Water System Type	No. of Systems	Population Served
Community	2,859	18,213,927
Transient Non-Community	5,579	2,823,017
Non-Transient Non-Community	717	286,769
TOTALS	**9,155**	**21,323,713**

Source: Safe Drinking Water Information System

Roughly 2,800 public water systems are defined as community water systems, which serve a residential population of more than 18 million people year-round. More than 700 public water systems are non-transient, non-community water systems which have their own water supply and collectively serve more than 280,000 people for more than six months in an occupational, academic, or therapeutic setting (e.g., factories, schools, hospitals) rather than a residential setting. Another 5,500 systems are transient, non-community water systems, such as those in restaurants, campgrounds or gas stations, which have their own water systems and provide water to nearly 3 million people.

BURDEN AND DATA TRENDS

According to the U.S. Environmental Protection Agency (EPA), outdated and deteriorated drinking water infrastructure poses a fundamental long-term threat to drinking water safety. In many communities, the cost of needed infrastructure repair and upgrade often far exceeds the water systems operating budget. Infrastructure is needed to address compliance with changing state and federal regulations and there are water infrastructure systems in NYS that are more than 100 years old, well past the typical 40- to 50-year life expectancy of these systems.

DISPARITIES

The lack of investment in drinking water infrastructure in economically stressed and disadvantaged communities impacts the ability of the drinking water system to continue providing high quality drinking water. These communities may also lack the technical and/or managerial capacity needed to continue providing high quality drinking water to their residents.

CHALLENGES

Aging Public Water Infrastructure: The most recent needs assessment completed by NYSDOH in 2008 identified a conservative cost estimate of repairing, replacing and updating New York State's drinking water infrastructure at $38.7 billion over the next 20 years.[3] While there are funding programs available to assist with drinking water infrastructure improvements, the level of funding needs to be increased to meet the significant demands for required improvements. Additionally, appropriately trained professionals are needed in both the private and government sectors to handle the increased workload of addressing aging public water infrastructure in the state.

Terrorism and Natural Disaster: The events of September 11, 2001, Hurricane Irene, Tropical Storm Lee, Super Storm Sandy, and cyberattacks on municipal computer systems have increased awareness of vulnerabilities of drinking water systems to intentional acts of terrorism and natural disasters. Aging drinking water infrastructure and unprotected control systems become more susceptible to failure, particularly during extreme circumstances. The enhancement of security and emergency preparedness is essential to maintaining a reliable supply and delivery of safe drinking water. Efforts to improve prevention and preparedness for acts of terrorism or natural disasters to mitigate catastrophic events are being addressed through requirements for vulnerability assessments. These assessments include the evaluation of the potential impact of climate change. Of concern are the increases in extreme weather such as the events identified above, but also smaller, localized events such as microbursts. These events have led to flooding and promotion of harmful algal blooms, which have and will continue to impair drinking water sources.

Emerging Contaminants: In recent years there have been several significant drinking water contamination events that have drawn attention to water quality, including harmful algal bloom toxin (Toledo, Ohio), a chemical spill (West Virginia), lead contamination (Flint, Michigan) and perfluorooctanoic acid (PFOA) contamination (Hoosick Falls, New York). These drinking water quality events have heightened concern about drinking water quality and the potential for additional drinking water contaminants that are not routinely monitored for because there are no regulations for the contaminant. Fortunately, there are now many more efforts to monitor and evaluate drinking water quality. Understanding potential sources of contamination and treatment options for unregulated contaminants in drinking water is an additional strain on human resources and funds needed for infrastructure.

Water Operators and Professionals: The water industry, specifically NYS water utilities, are contending with an aging workforce and facing the retirement of a significant number of experienced water operators. Replacing them with trained and qualified replacements is a major challenge. Additionally, more professionals in the field of drinking water quality are needed to handle the necessary infrastructure improvements, security enhancements and emergency preparedness.

ASSETS

Two major funding programs in NYS assist communities with needed drinking water infrastructure improvements:

- **The Drinking Water State Revolving Fund (DWSRF)** is primarily a loan program with some limited grants. Since its inception in 1996, the NYS DWSRF program has received $1.5 billion including $1.23 billion in federal funds through the US EPA capitalization grants and $265 million in state funds from the 1996 New York State Clean Water/Clean Air Bond Act. With this $1.5 billion investment, the New York State DWSRF has executed approximately $5.76 billion in financings including $3.81 billion in long-term and short-term loans, $1.60 billion in DWSRF loan refinancing and $350 million in grants to disadvantaged communities. This tremendous level of investment has been achieved through the efficient management of the program, leveraging of program funds, and recycling of repayments and interest earnings. These financing mechanisms have assisted 416 public water systems in protecting public health by making drinking water system infrastructure projects more affordable for residents throughout the state. The New York State DWSRF continues to be the national leader in providing DWSRF assistance to public water systems.
- **The Water Infrastructure Improvement Act (WIIA) Grant Program** provides state grants to municipalities for drinking water and waste water infrastructure projects. With the revision to the Act in 2017, approximately $1 billion in grants are now being provided over five state fiscal years for both drinking water and waste water infrastructure projects. The WIIA grants are limited to the lesser of 60% of the total project cost or $3 million. Since the program's inception in 2015, NYS has awarded $220.4 million in grants for 135 drinking water infrastructure projects totaling $535.5 million. Ninety-three of the projects are seeking $235.5 million in DWSRF loan financing for the non-WIIA grant funded portions of their projects.

Additional assets include:

- **The Emerging Contaminants Monitoring Act and the Drinking Water Quality Council** were enacted in 2017 through establishment of Public Health Law Sections 1112 and 1113, respectively. This was part of several measures designed to maintain and improve the quality of New York's drinking water supplies. Section 1112 requires the Department to implement an emerging contaminant monitoring program for all community and non-community non-transient public water systems. Section 1113 establishes the Drinking Water Quality Council (DWQC). One of the main purposes of the DWQC is to make recommendations to the Department about which emerging contaminants should be in the monitoring program required by Section 1112. The DWQC is also required to provide recommendations when a drinking water quality standard, known as a Maximum Contaminant Level, should be developed for an emerging contaminant. The DWQC is standing at the forefront of the State's efforts to protect public health from threats posed by emerging contaminants. The council will address some of the most technically challenging aspects of environmental health and drinking water regulation.
- **The Clean Water Infrastructure Act (CWIA)** provides $2.5 billion in funds to deal with water quality. This act provides monies for protection of ambient waters and drinking water. In particular, $1 billion is dedicated to the Water Infrastructure Improvement Act of 2017 (WIIA), described above. So far there have been three rounds of WIIA awards for a total of more than $200 million in drinking water system infrastructure at 135 different public water systems. The CWIA also provided $20 million for a lead service line replacement program that is currently in progress, and $10 million for information technology upgrades including development of a public web-site integrating drinking water quality and ambient water quality data, and over $100 million for source water protection.

References

[1] EPA, 2006. The Multiple Barrier Approach to Public Health Protection. EPA Office of Water 816-K-06-005.

[2] Cutler D, Miller G. The role of public health improvements in health advances: the 20th century United States. National Bureau of Economic Research. Working Paper 10511. Cambridge, MA, USA. 2004. Available at; http://www.nber.org/papers/w10511.pdf

[3] NYSDOH, 2008. Drinking Water Infrastructure Needs of New York State. Available at: http://www.health.ny.gov/environmental/water/drinking/docs/infrastructure needs.pdf

BACKGROUND

In the United States (US), 4,821 workers died from traumatic occupational injuries in 2014[1] which was the highest annual total recorded since 2008.[2] Another 49,000 deaths are attributed to work-related diseases each year.[3] In 2014, the overall fatal work injury rate for the US was 3.4 fatal injuries per 100,000 full-time equivalent workers.

In addition, approximately three million private-sector workers had a nonfatal occupational injury or illness. Of those workers, over half were transferred, restricted, or took time away from work.[4] An estimated 2.7 million workers were treated in emergency departments (ED) for occupational injuries in 2014, and approximately 113,000 were hospitalized.[5]

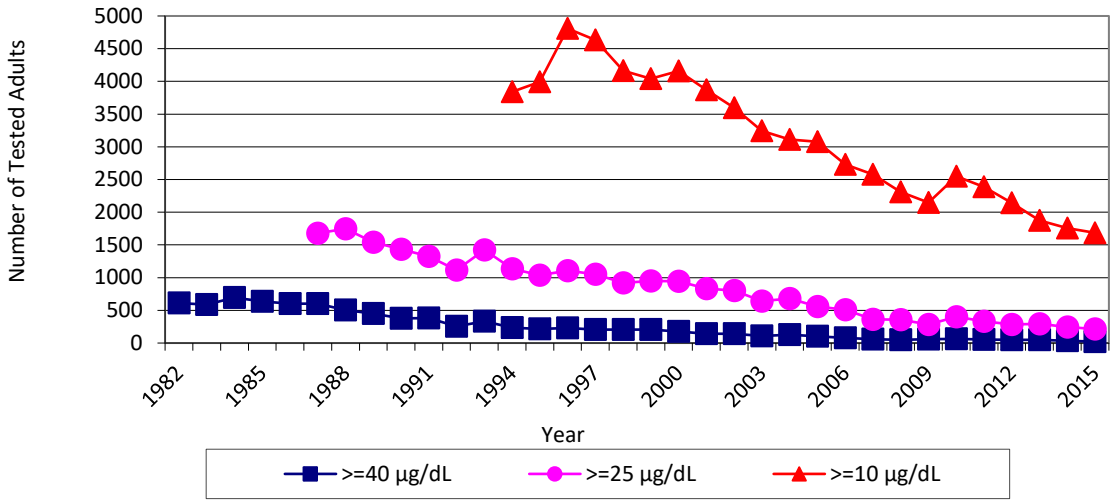
Workplace injuries and illness can be prevented by controlling or eliminating hazards. Occupational health surveillance provides information on where, how, and why workers get sick or hurt on the job. This information is used to improve worker health and safety through appropriate prevention activities.

BURDEN AND DATA TRENDS

Heavy Metals Registry

Between 2010 and 2015, 5,815 adults (16 years and older) residing or employed in New York State (NYS) were reported to the Heavy Metals Registry with elevated blood lead levels (BLL) which are defined as a BLL greater than or equal to 10 µg/dL. There was a steady decrease in the number of elevated blood lead levels reported to the Registry from the mid-1990's until 2010 when a slight increase was observed (Figure 1). This increase in reporting was temporary, however. After 2010, the proportion of adults with elevated blood lead levels reported to the Registry decreased.

Figure 1. Number of Tested Adults Reported to the Heavy Metals Registry for Lead, by Year and Blood Lead Level

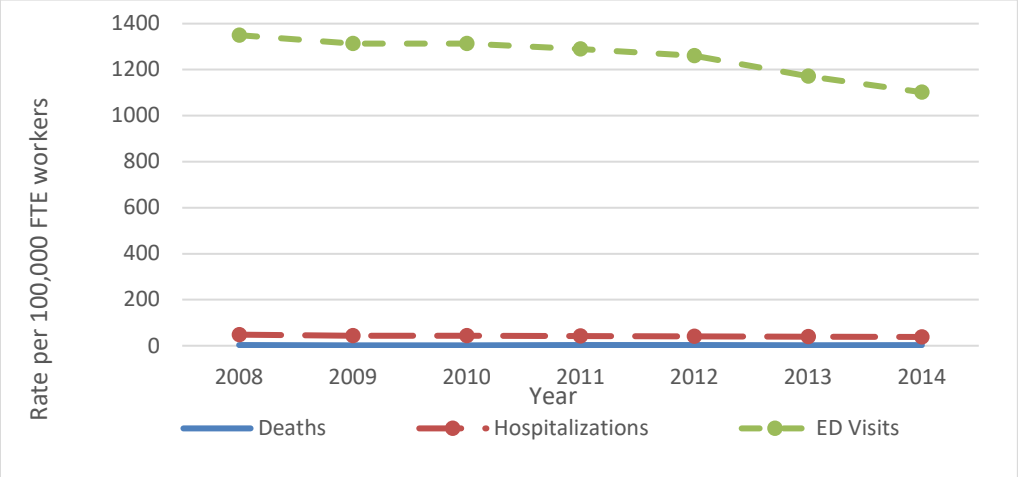


Work-Related Hospitalizations and Fatal Work-Related Injuries

There were approximately 8,946,000 people employed in NYS during 2014.[6] Of these workers, 213,300 had a recordable nonfatal occupational injury and/or illness (3.1 affected per 100 full-time workers), with 119,500 of those involving days away from work, job transfer, or restriction (1.7 affected per 100 full-time workers).[7]

Work-related injuries and illnesses are costly. The National Safety Council estimated the average economic cost of fatal and nonfatal injuries to be about $6.4 billion in NYS during 2015[8]. Another $2.3 billion in economic costs resulted from the time spent investigating and reporting injuries, giving first aid, production slowdowns, training of replacement workers, and the extra cost of overtime for uninjured workers.[8] Some types of workers have no workers compensation coverage, including clergy, self-employed, part-time domestic workers, and farm workers. Those covered by other workers compensation systems, including public school teachers, aides, police officers, firefighters and sanitation workers in New York City (NYC), are not covered by NYS workers compensation but by independent carriers. As a result, we do not know whether their injuries are work-related.

Figure 2: Incidence of Work-Related Injuries, Deaths, Hospitalizations, and Emergency Department (ED) Visits New York State Workers (aged 15+), 2008-2014



Source: SPARCS and CFOI

Occupational Health Clinic Network

Between 2006 and 2015, more than 30,000 new patients made almost 120,000 visits to the NYS Occupational Health Clinic Network (OHCN). A higher percentage of patients seen at the OHCN were employed in public administration (35%), services industry (26%), and manufacturing (10%), compared to the entire NYS workforce. Patients were primarily seen for diseases of the musculoskeletal system, respiratory system, and injuries and poisonings.

DISPARITIES

Heavy Metals Registry

Although there have been substantial reductions in adult BLLs in NYS residents overall, some populations continue to have higher rates of BLL. For example, the Hispanic population still has almost double the rate of elevated BLLs compared to other groups (Figure 3). The proportion of workers with BLLs of 25 µg/dL or greater was also higher for foreign-born workers than for US born workers (Figure 4).

Figure 3: Incidence of Blood Lead Levels ≥ 25 µg/dL per 100,000 NYS Residents who are Employed, by Ethnicity and Year, 2005-2015

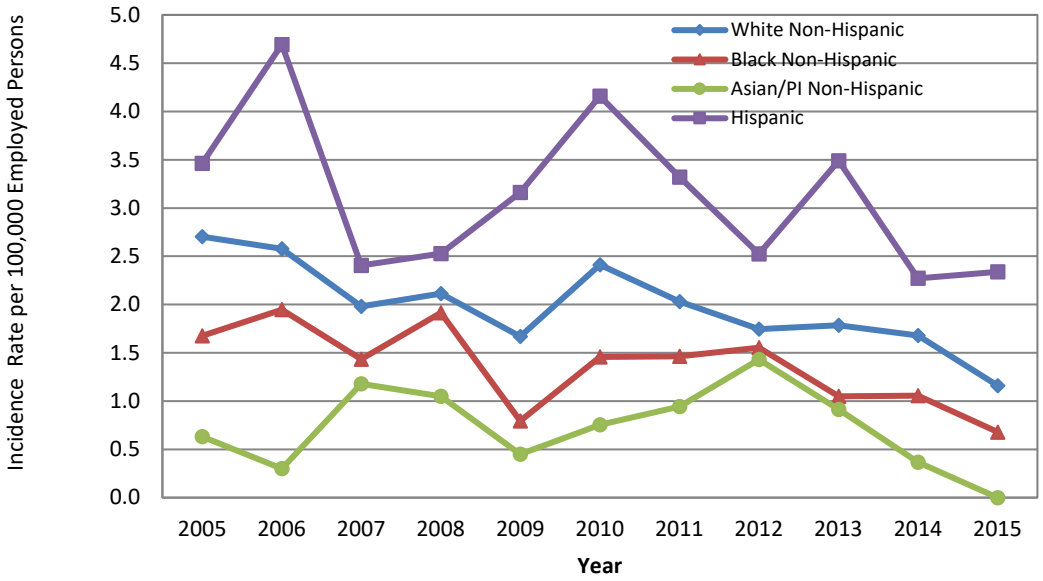
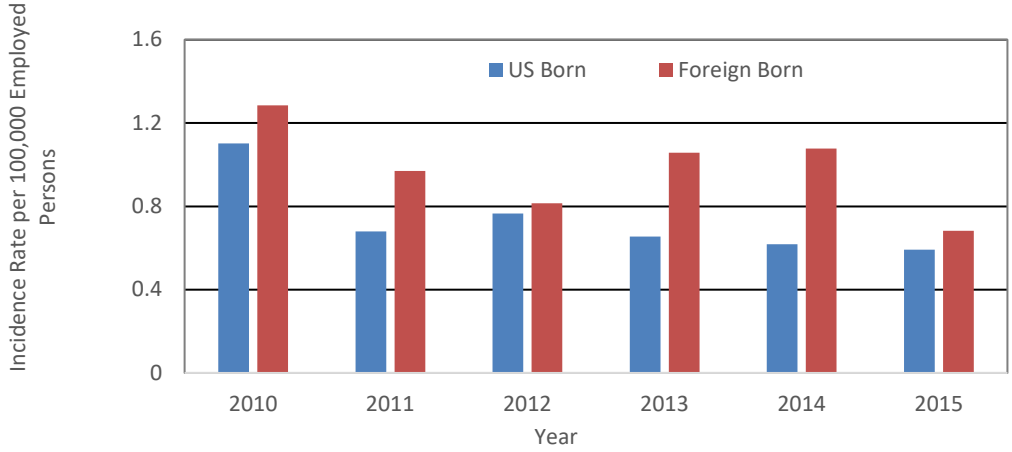


Figure 4: Incidence Rate of Blood Lead Levels ≥ 25 µg/dL, per 100,000 NYS Residents who are Employed, by Country of Origin and Year, 2010-2015



Variations in Work-Related Hospitalizations and Fatal Work-Related Injuries

- Geographic: During the period 2012-2014, outside NYC, work-related hospitalization rates varied from a low of 11.9 per 100,000 workers in Clinton County to a high of 88.8 per 100,000 workers in Chautauqua County. The rates in NYC were relatively low, with an overall rate of 36.8 per 100,000 workers (data not shown).
- Gender: During the period 2012-2014, males had more than eight times the rate of fatal work-related injuries, as compared with females, even though approximately 47% of the workforce is female. Males were also 2.9 times more likely to be hospitalized (Table 1) and 1.5 times more likely to visit an emergency department due to a work-related injury (Table 2).

- Race and Ethnicity: Hispanics had the highest rates of fatal occupational injuries (Table 1) and work-related hospitalizations (Table 2), even though they accounted for only about 16% of the workforce during 2012-2014. (Table 2). Black non-Hispanics had the highest rates of work-related emergency room visits (Table 3).
- Age: During the period 2012-2014, the rates of work-related deaths and hospitalizations (Table 1 and 2) were highest for workers aged 65 years and older. The death rate for older workers in New York has worsened over the past few years while the overall rate of work fatalities improved statewide. In 2011, there were 21 deaths of workers 65 and older in New York and in 2014, there were 39 deaths. This increase may be due to an increase in the number of older individuals working past the traditional retirement age of 65. The rate of emergency department visits was highest for teen workers 15-19 years of age (Table 3).

Table 1: Number and Rate of Work-Related Deaths for NYS Workers, 2012-2014

Deaths		
Characteristics	**Mean Annual Frequency**	**Rate per 100,000 FTE Workers**
Total	207	2.4
Age Group		
15-19	0	n/a
20-24	12	1.8
25-44	72	1.9
45-64	86	2.5
65+	35	9.0
Gender		
Male	193	4.1
Female	14	0.4
Unknown	0	n/a
Race/Ethnicity		
White, Non-Hispanic	137	2.6
Black, Non-Hispanic	18	1.7
Native American	0	n/a
Asian/Pacific Islander	11	1.4
Hispanic	40	3

Source: SPARCS

Table 2: Number of Work-Related Hospitalizations for NYS Workers, 2012-2014

Hospitalizations		
Characteristics	**Mean Annual Frequency**	**Rate per 100,000 FTE Workers**
Total	3,290	38.5
Age Group		
15-19	45	33.7
20-24	219	33.1
25-44	1,256	32.4
45-64	1,478	42.2
65+	292	75.4
Gender		
Male	2,583	54.6
Female	708	18.5
Unknown	0	n/a
Race/Ethnicity		
White, Non-Hispanic	1,670	31.7
Black, Non-Hispanic	340	31.8
Native American	7	41.9
Asian/Pacific Islander	117	13.9
Hispanic	698	52.9

Source: SPAR

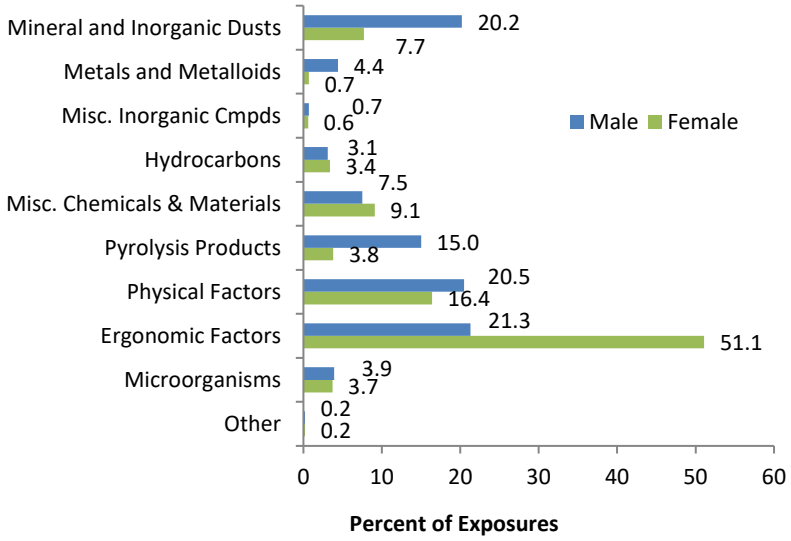
Table 3: Number of Work-Related Emergency Department Visits, NYS Workers, 2012-2014

Emergency Department Visits		
Characteristics	**Mean Annual Frequency**	**Rate per 100,000 FTE Workers**
Total	100,745	1,178.6
Age Group		
15-19	2,843	2,126.1
20-24	11,671	1,762.2
25-44	49,880	1,288.6
45-64	33,965	969.5
65+	2,286	590.5
Gender		
Male	65,532	1,384.3
Female	35,209	920.8
Unknown	3	n/a
Race/Ethnicity		
White, Non-Hispanic	57,338	1,087.2
Black, Non-Hispanic	15,262	1,427.6
Native American	201	1,205.3
Asian/Pacific Islander	1,918	239.1
Hispanic	14,513	1,099.0
Unknown	11,598	n/a

Occupational Health Clinic Network

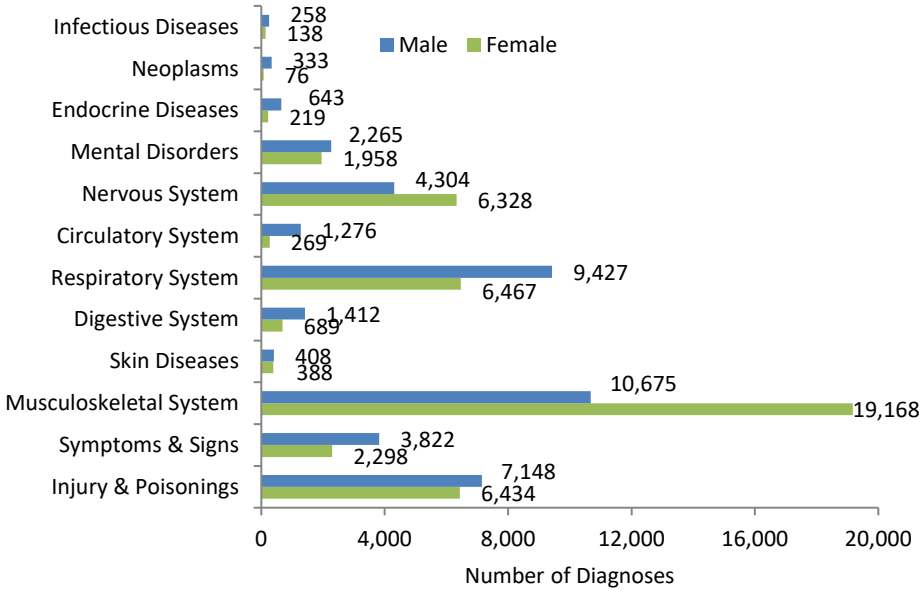
Among patients seen at the OHCN, approximately one-third of exposures were related to ergonomic factors, including keyboard use and repetitive motion. The next largest groups of exposures included physical factors such as heat, cold, and radiation (18%) and mineral/inorganic dusts, including asbestos, silica, and non-specified dusts (15%). The most prevalent exposures among females were ergonomic factors, physical factors, and exposure to miscellaneous chemicals and materials, while the most prevalent exposures among males were mineral and inorganic dusts, ergonomic factors, and physical factors (Figure 5).

Figure 5: Percent of NYS OHCN Exposures, by Exposure Category and Sex 2006-2015



Both males and females were seen at the OHCN primarily for diseases of the musculoskeletal and respiratory systems, followed by injuries and poisonings and nervous system diseases (Figure 6).

Figure 6: Number of Diagnoses in NYS OHCN Patients, by Main ICD-9Diagnostic Categories and Sex, 2006-2015



DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Heavy Metals Registry

Lead toxicity can affect every organ system, but the most sensitive target is the nervous system. Among adults, symptoms may include reduced visual motor performance, slower reaction time, fatigue, forgetfulness, decreased libido, depression and mood changes, diminished cognitive performance, irritability and lethargy.[9] Many studies have shown a strong association between lead exposure and kidney dysfunction.[9] Recent research indicates that chronic low-dose exposures (less than 20 µg/dL) may contribute to high blood pressure.[10] Adults can be exposed to lead dust or fumes through jobs or hobbies. They can also be exposed during renovation or remodeling activities. If an adult is reported to the Heavy Metals Registry (HMR) with an elevated BLL, staff will follow up to help determine the sources of exposure, and information will be provided to exposed individuals and employers on reducing hazards and eliminating exposures.

Work-Related Hospitalizations and Fatal Work-Related Injuries

Overall, the most common causes of work-related injury hospitalizations and ED visits during 2012-2014 were falls, being struck by/against something in the workplace and machinery (Table 4-5), although the hospitalization rate varied by age group. Work-related deaths were primarily due to transportation incidents across all age groups, followed by falls, being struck by/against and violence by other person, which also varied across age groups (Table 6). More than 50% of falls occurred among workers aged 50 and older. Lack of safety training and exposure to physical and chemical hazards on the job are also risk factors for falls and other work-related injuries. On the other hand, these work-related injuries can be prevented with adequate and routine training of employees; the wearing of appropriate personal protective equipment; and the establishment of efficient administrative and work practice controls by the employer.

Table 4: Leading Causes of Work-Related Hospitalizations, by Age Group, NYS Workers, Yearly Average 2012-2014

Age Group	Rank		
	1	2	3
15-19	Falls (9)	Hot Object/Scald (7)	Struck by/Against (7)
20-24	Falls (50)	Hot Object/Scald (23)	Struck by/Against (22)
25-44	Falls (398)	Struck by/Against (113)	Machinery (100)
45-64	Falls (658)	Struck by/Against (118)	Machinery (88)
65+	Falls (189)	Transportation Incident	Unspecified (14)
Total (15+)	Falls (1,304)	Struck by/Against (269)	Machinery (217)

Source: SPARCS

Table 5: Leading Causes of Work-Related Emergency Department Visits, by Age Group, NYS Workers, Yearly Average 2012-2014

Age Group	Rank		
	1	2	3
15-19	Cut/Pierce (803)	Struck by/Against (425)	Falls (343)
20-24	Cut/Pierce (2,872)	Struck by/Against (1,799)	Over exertion (1,422)
25-44	Cut/Pierce (8,201)	Falls (7,997)	Over exertion (7.924)
45-64	Fall (8,883)	Over exertion (4,904)	Struck by/Against (4,854)
65+	Fall (1,034)	Struck by/Against (280)	Cut/Pierce (231)
Total (15+)	Fall (19,637)	Cut/Pierce (16,451)	Over exertion (14,649)

Source: SPARCS

Table 6: Leading Causes of Work-Related Deaths, by Age Group, NYS Workers, Yearly Average 2012-2014

Age Group	Rank		
	1	2	3
15-19	Transportation Incident *	Falls *	Falls *
20-24	Transportation Incident *	Struck by/against *	Violence by other persons *
25-44	Transportation Incident (22)	Violence by other persons (17)	Struck by/against (12)
45-64	Transportation Incident (32)	Falls (19)	Struck by/against (16)
65+	Transportation Incident (12)	Falls (7)	Violence by other persons (8)
Total (15+)	Transportation Incident (68)	Violence by other persons (39)	Falls (44)

*Data based on frequencies less than six are not reported. **Source: CFOI**

Occupational Health Clinic Network

OHCN clinicians should continue to screen their patient populations for health effects from specific exposures, including exposures to lead, asbestos, and silica. They should also screen patients for respiratory disease exposures, and the impact of exposure to noise. The physical and ergonomic factors responsible for repetitive-stress disorders should be monitored as well.

CHALLENGES

- Addressing the needs of the changing workforce and nature of workplace hazards is an ongoing challenge. OHCN clinicians need to be aware of newly-identified workplace hazards and provide appropriate care based on their current knowledge of occupational health issues. A greater emphasis is needed on low-income workers, immigrant populations and high-risk female workers. Outreach should also be conducted to aging workers regarding prevention information.
- Occupation and industry information is not currently included in electronic health records and hospitalization data, making it difficult to conduct surveillance of occupational illnesses. Inclusion of these variables would allow more targeted analyses to identify whether certain occupations are at high risk for specific health outcomes.
- With the aging of the population, the burden of falls is expected to rise dramatically. The number of work-related hospitalizations and deaths due to falls occur among the oldest age group, yet there are few programs targeting fall prevention for workers of all ages with additional emphasis on older workers

ASSETS

- The OHCN is unique in the US as a partially-funded, public health-based network offering clinical and preventative occupational disease services. Since 1988, it has contributed to maintaining a healthy workforce in NYS. Utilizing a public health approach, regional clinics in the network diagnose and treat occupational diseases, and help improve the state's work settings. The clinics also assist in meeting the Prevention Agenda goal of reducing occupational injuries and illnesses.
- The Bureau for Occupational Health and Injury Prevention receives funding from the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health to conduct surveillance of work-related injuries, illnesses, fatalities and exposures, including adult blood lead levels, occupational respiratory disease, and traumatic work-related injuries.

References

[1] US Department of Labor, Bureau of Labor Statistics. Workplace injuries and illnesses – 2014 . Washington, DC: US Department of Labor; 2014. Available at https://www.bls.gov/news.release/pdf/cfoi.pdf

[2] Bureau of Labor Statistics (BLS). Census for Fatal Occupational Injuries (CFOI)- Current and Revised Data-2008. 2010a. Available at: http://www.bls.gov/iif/oshcfoi1.htm.

[3] Steenland K, Burnett C, Lalich N, Ward E, Hurrell Dying for work: the magnitude of US mortality from selected causes of death associated with occupation. Am J Ind Med 2003;43:461-82.

[4] US Department of Labor, Bureau of Labor Statistics. Workplace injuries and illnesses – 2014 . Washington, DC: US Department of Labor; 2014. Available https://www.bls.gov/news.release/archives/osh_10292015.pdf

[5] Centers for Disease Control and Prevention. Workers Memorial Day – April 28, 2014. MMWR 2016;65(15):389.

[6] Geographic Profile of Employment and Unemployment, 2014 - U.S. Department of Labor and Labor Statistics. Available at https://www.bls.gov/opub/gp/pdf/gp14full.pdf

[7] US Department of Labor, Bureau of Labor Statistics. State Occupational Injuries, Illnesses and Fatalities – 2014. Washington, DC: US Department of Labor; 2014. Available at https://www.bls.gov/iif/oshstate.htm

[8] National Safety Council. Estimating the Cost of Unintentional Injuries 2015. Available at https://www.nsc.org/Portals/0/Documents/NSCDocuments_Corporate/estimating-costs.pdf

[9] ATSDR. Toxicological Profile for Lead. August 2007. CAS#7439-92-1. Available at: http://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=96&tid=22

[10] Kosnett MJ, Wedeen RP, Rothenberg SJ, Hipkins KL, et al. Recommendations for medical management of adult lead exposure. Environ Health Perspect 2007;115:463- 471.

Communicable Diseases

Contributing Causes of Health Challenges

BACKGROUND

Antibiotic resistance occurs when antibiotics no longer work against bacteria that cause infections. Antibiotics can be lifesaving, but bacteria are becoming more resistant to treatment. Antibiotic resistance is part of a broader threat called antimicrobial resistance (AR), which is resistance to medicines used to treat all types of infections, including those caused by bacteria, parasites, and fungi. AR has been found in all regions of the world, and newly discovered strains continue to emerge and spread.

Factors such as increased globalization, poor infection control in hospitals and clinics, overprescribing of antibiotics, and unnecessary antibiotic use in agriculture are increasing the global threat of AR. The spread of AR is evident in the discovery of the *mcr*-1 gene, which confers resistance to colistin, an antibiotic of last resort. The gene was initially identified in China in 2015, but has since been identified in more than 20 countries, including the United States (US). It has been found in humans, food, animals, and environmental samples.

Infections acquired in the healthcare setting, both those with or without resistance, can lead to significant illness and death. Since 2005, New York State Public Health Law § 2819 has required acute care hospitals to report selected hospital-acquired infections (HAIs) to the New York State Department of Health (NYSDOH). Reporting these infections allows NYSDOH to determine which hospitals need help implementing practices to decrease infection rates, and it enables hospitals themselves to identify areas for potential improvement. Additionally, people can use publicly reported infection rates to help them make decisions about where to seek medical care.

BURDEN AND DATA TRENDS

Healthcare-Associated Infections

HAIs of concern at the national level include multi-drug resistant organisms (MDROs), central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), surgical site infections (SSIs), and ventilator-associated conditions. According to the CDC, approximately one of every 25 hospital inpatients had at least one HAI in 2011, and approximately 11% of those patients died during their hospitalization.[1] Many HAIs are preventable. According to the most recent CDC progress report, national CLABSI rates decreased 50% between 2008 and 2014, SSI rates decreased 17% between 2008 and 2014, methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia rates decreased 13% between 2011 and 2014, and *Clostridium difficile* infection rates decreased 8% between 2011 and 2014.[2] Despite these positive trends, efforts are still necessary to prevent HAIs and decrease risk of infection from MDROs in healthcare settings.

Antibiotic Resistance

The Centers for Disease Control and Prevention (CDC) estimate that each year in the US at least two million people become infected with AR bacteria and at least 23,000 people die as a direct result of these infections.[3] Pathogens designated as an urgent threat by the National Action Plan for Combating Antibiotic-Resistant Bacteria,[4] include *Clostridium difficile (C. difficile or C. diff),* carbapenem-resistant *Enterobacteriaceae* (CRE), and *Neisseria gonorrhoeae (N. gonorrhoeae). C. difficile* infection is often associated with antibiotic use and leads to an estimated 14,000 deaths per year. CRE bacteria are resistant to nearly all antibiotics, including carbapenems, an antibiotic class of last resort. CDC estimates that 9,000 cases of CRE, with an estimated 600 deaths, occur annually in the US *N. gonorrhoeae* has developed resistance to nearly all antibiotics used for gonorrhea treatment. Of the 820,000 cases of gonorrhea that occur annually in the US, 30% have resistance

(246,000 cases). In 2016, *N. gonorrhoeae* resistant to the last effective class of antibiotics was identified in Hawaii.

Pathogens designated as a serious threat include MRSA, multidrug-resistant *tuberculosis* (MDR-TB), and resistant *Candida.* CDC estimates that more than 80,000 invasive infections and more than 11,285 related deaths occur annually due to MRSA. From 2011-2015, 10% of TB cases were isoniazid-resistant. Of these, 1.4% were MDR-TB, and 15 were identified as extensively drug-resistant (XDR-TB).[5] *C. auris* is an emerging multidrug-resistant yeast associated with high mortality. Some *C. auris* infections are resistant to the three major classes of antifungals, severely limiting treatment options.

NYS Healthcare-Associated Infections

According to the most recent data, NYS hospitals reported 10,205 HAIs in 2016 and observed improvement in most of the indicators (Table 1).

Type of infection	Number of infections	Infection rate	Change between 2015 and 2016
Hospital-onset Clostridium difficile infections (CDIs) among inpatients	6,939	6.6/10,000 patient days	improved 12%
Surgical site infections (SSIs) following			
Colon surgery	981	5.0/100 procedures	improved 11%
Hip replacement or revision surgery	261	0.8/100 procedures	improved 20%
Abdominal hysterectomy surgery	207	1.1/100 procedures	improved 7%
Coronary artery bypass graft (CABG)-chest site	171	1.6/100 procedures	improved 15%
Central line-associated bloodstream infections (CLABSIs)	1,399	1.0/1,000 line days	improved 10%
Hospital onset carbapenem-resistant Klebsiella, E. coli, and Enterobacter (CRE) bloodstream infections (BSIs)	247	0.22/10,000 patient days	worsened 9%

Table 1: **Hospital-acquired infections in New York State, 2016**

Emerging Multidrug-Resistant Organisms Recently Identified in NYS

- *Multi-Drug Resistant Tuberculosis (MDR-TB)*

  From 2013-2015, there were 27 cases of MDR-TB (1% of 2,425 TB cases) and one extensively drug-resistant tuberculosis (XDR-TB) case in NYS. Resistance to all TB drugs is monitored and the percentage of TB cases exhibiting resistance is on the rise.
- *Plasmid-Mediated Colistin Resistance (mcr)*

  In June 2016, NYSDOH identified the first *mcr-1* gene in *Escherichia coli (E. coli)* bacteria found in a human in the US after a CDC advisory alerted facilities to *mcr*-1.[6]
- *Candida auris (C. auris)*

  C. auris is an emerging multidrug-resistant yeast that has caused severe illness in hospitalized patients and is resistant to multiple antifungal drugs, making treatment difficult. Additionally, *C. auris* can persist on surfaces and spread between patients in healthcare facilities. Following a CDC national advisory, C. auris was identified in a laboratory sample saved from May 2013.[7] In November 2016, an investigation of the first seven reported *C. auris* cases in the US was published, including three cases

from NYS.[8] As of May 5, 2018, NYS has identified 163 clinical cases of *C. auris* (in individuals who were ill and had *C. auris* detected during their clinical care) and 192 screening cases (in individuals who were not ill from *C. auris* and were tested specifically for *C. auris* as part of a public health investigation) for a total of 355 cases.

Antimicrobial Resistance in Healthcare-Associated Infections in NYS

- *C. difficile* infections are a common adverse effect of antibiotic use. More than 20,000 cases of *C. difficile* were identified by NYS hospitals in 2015. Forty percent of the cases were associated with medical care during hospital stays, while others were identified in an emergency department or soon after a hospital admission. These infections may have caused an estimated 1,120 deaths.
- NYS hospitals reported approximately 2,200 MRSA bloodstream infections, resulting in an estimated 450 deaths.
- A small group (15%) of hospitals voluntarily reported vancomycin-resistant enterococci (VRE) infections. When this percentage is extrapolated to the entire state, these infections may have caused an estimated 140 deaths in 2015.
- Approximately 3,600 CRE cases were reported by NYS hospitals in 2015. Eleven percent of the cases were bloodstream infections, resulting in about 130 deaths. The overall prevalence rate was highest in the New York City area (Figure 1).
- A small group (17%) of hospitals voluntarily reported multi-drug resistant *Acinetobacter* infections. When this percentage is extrapolated to the entire state, these infections may have caused an estimated 50 deaths in 2015.[9]

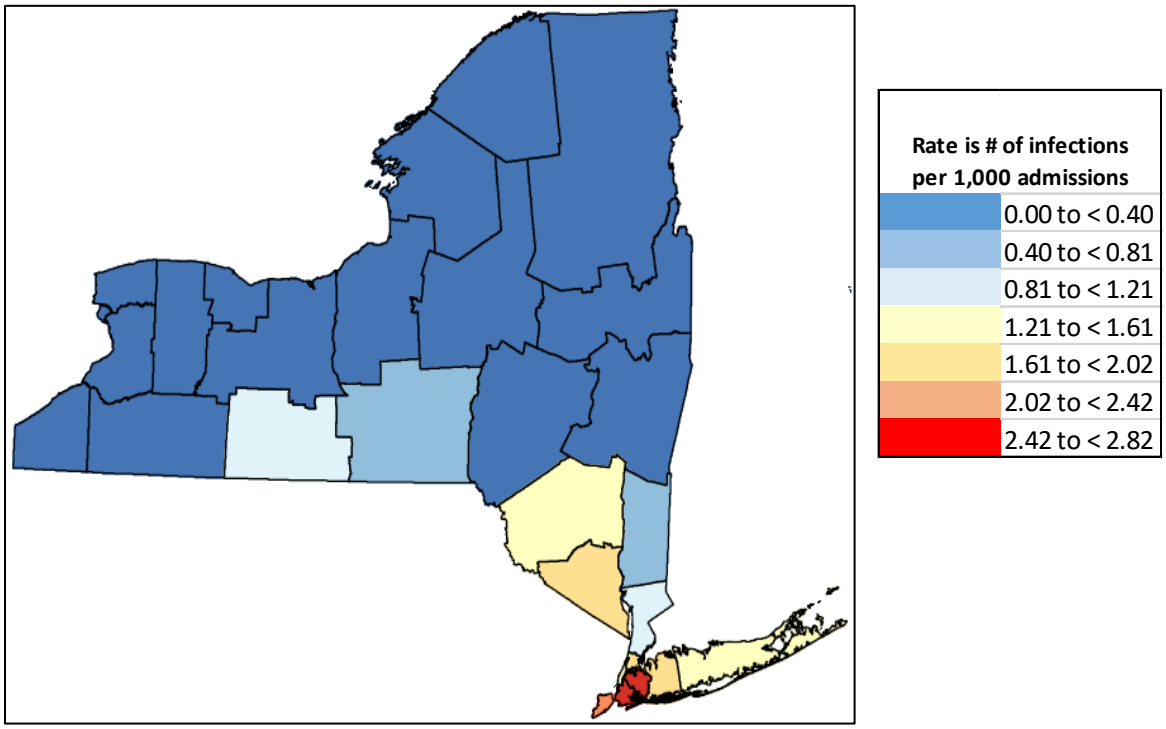


Figure 1: NYS CRE Overall Inpatient Prevalence Rate 2015

DISPARITIES

Age

AR disproportionately affects those with significant healthcare exposure and those residing in long-term care facilities, often impacting New Yorkers over age 65 years. Aggressive efforts to prevent the development and spread of resistant organisms in healthcare settings are essential for healthy aging in NYS.

Geography

There are geographic disparities in that CRE is highly endemic in the New York City metropolitan area but much less common elsewhere in the state (Figure 1). Geographic variation has also been identified through analysis of inappropriate antibiotic prescribing, with higher rates of potentially avoidable prescribing found in rural regions (Figure 2).

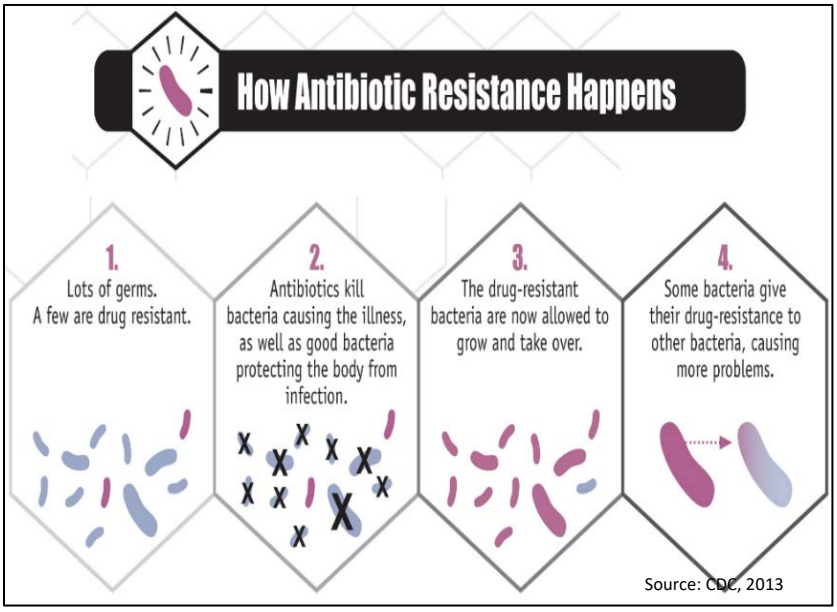
Race, Ethnicity, Income and Education

Rates of hospital-acquired infections and MDROs are not tracked by race or ethnicity. By definition, hospital-acquired infections affect hospitalized persons; therefore, populations with less access to quality outpatient health care that would help them avoid hospitalization might be at greater risk. Further research and enhanced surveillance are required to enhance our understanding of racial, ethnic, income, and education disparities as they relate to HAIs and AR in NYS.

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Two important preventable causes of AR are inappropriate antibiotic prescribing (antibiotic prescribing when not necessary such as for viral infections) and inappropriate antibiotic usage (antibiotic use without a healthcare provider's guidance). AR can also result from inappropriate use of antibiotics in animals or agriculture.

Because antibiotics don't work against infections caused by viruses, the use of antibiotics for these infections, such as the common cold, the flu, bronchitis, most coughs, and most sore throats, can increase the risk of AR. Also, antibiotics kill beneficial bacteria in the gut, allowing more harmful bacteria, such as *C. difficile*, to grow in their place. Taking antibiotics increases the risk of getting a resistant infection later. Consequently, AR bacteria can then spread and become more prevalent in the community.



CHALLENGES

Hospital-based programs dedicated to improving antibiotic use, commonly called Antibiotic Stewardship Programs (ASPs), aim to optimize antibiotic prescribing and decrease the development of resistance. Despite studies revealing the importance of ASPs, only 58% of the 175 hospitals that participated in the NYS HAI Reporting Program in 2015 had an ASP that meets the seven core elements of hospital ASPs set forth by the CDC.[10]

Antibiotic data can be used to decrease inappropriate prescribing. An analysis of 2013 NYS Medicaid data revealed significant avoidable prescribing and wide variation in the use of potentially avoidable outpatient antibiotics for acute upper respiratory conditions (Figure 2). Historically, interventions to control MDROs and *C. difficile* are independently initiated and implemented by individual healthcare facilities. These efforts have proven ineffective in controlling the inter-facility spread of pathogens. Therefore, a coordinated approach involving acute care hospitals, long-term care facilities, and public health departments is needed to combat AR. Public health departments track and alert healthcare facilities to antibiotic resistant germs coming from other facilities and to outbreaks in the area (Figure 3).

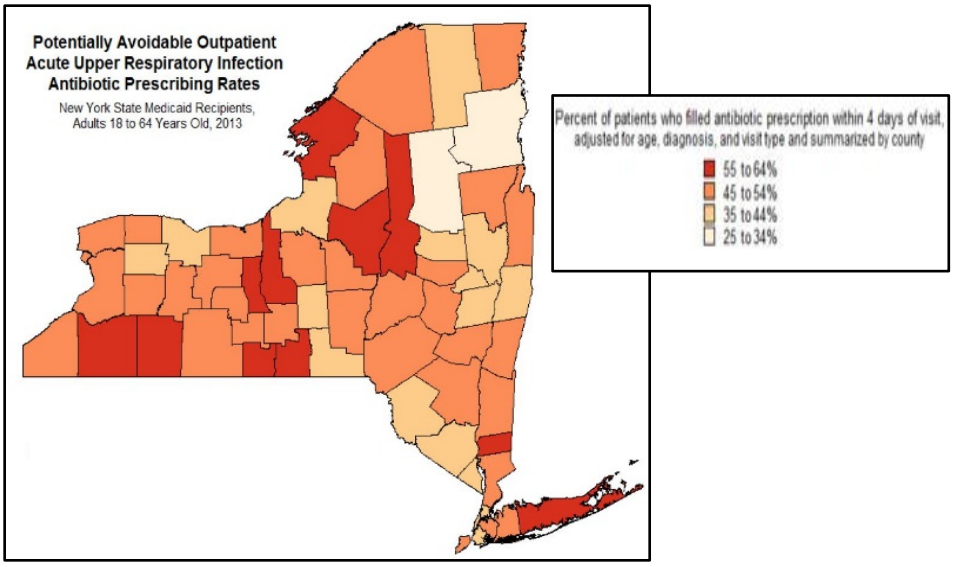


Figure 2: Potentially Avoidable Outpatient Acute Upper Respiratory Infection Antibiotic Prescribing Rates in NYS Medicaid Recipients, Adults 18-64 years old, 2013.

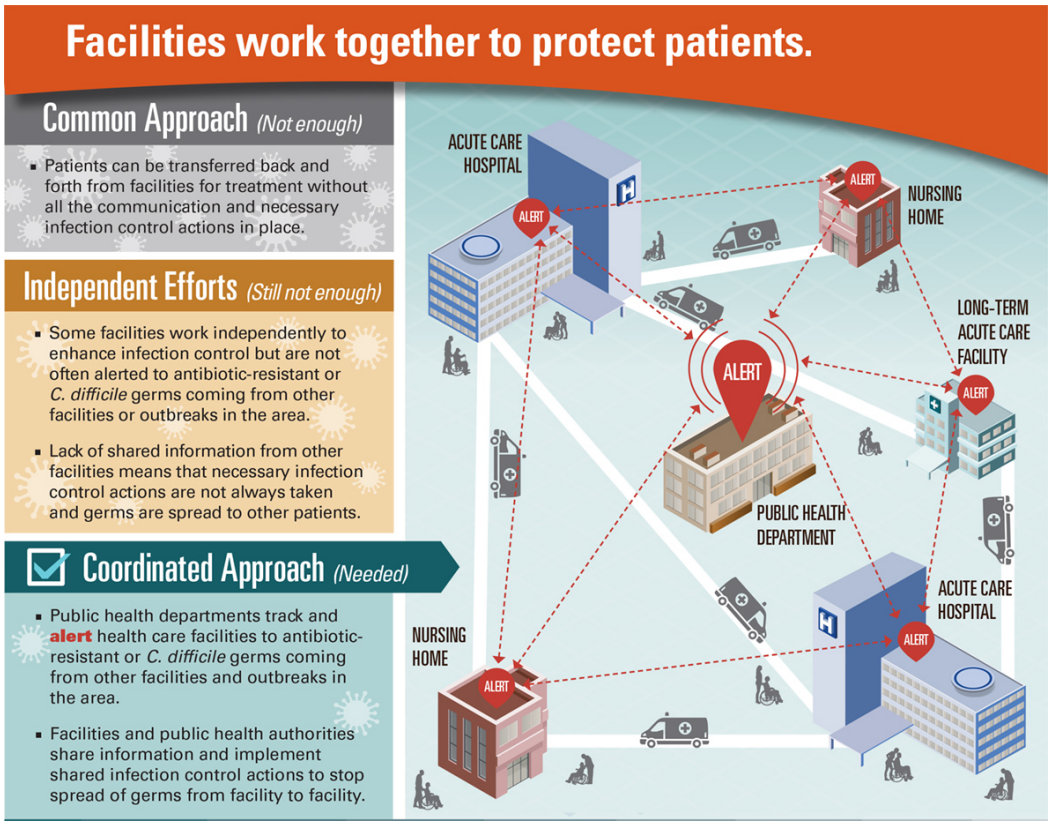


Figure 3

A CDC study used mathematical models to measure the impact of a coordinated approach compared to independent facility efforts to reduce the incidence of CRE. [11] One model estimated different rates of spread of CRE over five years within a simulated network of ten healthcare facilities with patient sharing. Results showed that using a coordinated approach led to an 81% reduction in CRE acquisition, compared to the baseline period when no augmented intervention was used, and a 74% reduction compared to independent efforts (i.e., augmented efforts implemented independently at individual facilities) (Figure 4).

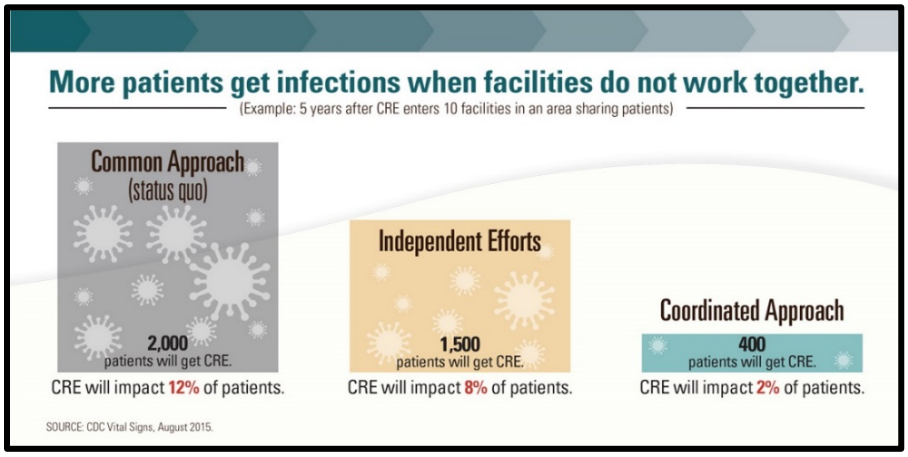


Figure 4: The impact of a coordinated approach on rates of carbapenem-resistant Enterobacteriaceae (CRE).

ASSETS

The NYSDOH has been at the forefront of advances in the surveillance, prevention, and control of HAIs and AR, including the following activities:

- The NYS AR Prevention and Control Task Force sets priorities, enhances coordination of AR activities, and develops a NYS AR Prevention and Control Roadmap.
- Long-term care facility infection prevention projects, including the *Collaboration to Launch Antibiotic Stewardship Programs (CLASP),* in NYS long-term care facilities provide education and supportive tools to enhance ASPs in these facilities.
- CRE surveillance and prevention projects combat the spread of CRE in healthcare facilities through education and enhanced surveillance.
- Healthcare-associated infection projects in 2013-2018, including three collaborative projects led by academic centers throughout the state, address MDROs and *C. difficile* prevention and control among a group of healthcare facilities.
- The Gonococcal Isolate Surveillance Project (GISP), a sentinel surveillance project, monitors trends in antimicrobial susceptibility of *N. gonorrhoeae* in NYS.
- The NYS Emerging Infections Program (EIP), in collaboration with the CDC and the University of Rochester, performs enhanced surveillance and special studies of select pathogens, including pathogens with antibiotic resistance.
- The NYS "Be Antibiotics Aware Program" (formerly the "Get Smart Program") a public health outreach campaign sponsored by the CDC provides education and supportive tools to enhance optimal antibiotic use.
- The National Antimicrobial Resistance Monitoring System (NARMS) for Enteric Bacteria, a collaboration among state and local health departments, CDC, US Food and Drug Administration, and US Department of Agriculture, tracks changes in the antimicrobial susceptibility of certain enteric (intestinal) bacteria found in ill people, retail meats, and food animals.

- NYS has a strong HAI program to track HAIs, audit reporting, and assist hospitals as they work to improve HAI rates.

In addition to these special programs, NYSDOH routinely responds to outbreaks of disease-resistant organisms in healthcare facilities and communities. The NYSDOH also prevents and controls illnesses which may be resistant such as TB, sexually transmitted infections, and vaccine-preventable diseases. With $1.8 million in federal funding, the NYSDOH Wadsworth Center serves as one of seven regional laboratories in the CDC's AR Lab Network (ARLN).[12,13] For further information on NYSDOH efforts to combat AR, refer to the NYSDOH AR webpage at: www.health.ny.gov/antibioticresistance.

Numerous other organizations, partners, and stakeholders in NYS are engaged in activities to prevent and control HAIs and AR. The College of Agriculture and Life Sciences and Veterinary College at Cornell University has several research and outreach efforts related to AR across the food chain. In addition, healthcare systems in NYS have been actively engaged in activities to reduce HAIs and AR within their facilities. Hospital and nursing home associations have promoted numerous efforts to reduce HAIs and MDROs in facilities. Local health departments have initiated or collaborated on multiple projects to reduce AR in their jurisdictions. As the many initiatives demonstrate, combatting HAIs and AR requires efforts from multiple healthcare organizations on several fronts.

References

[1] Magill SS, Edwards JR, Bamberg W, et al. (2014) Multistate point-prevalence survey of healthcare-associated infections. New England Journal of Medicine; 370:1198-208.

[2] 2014 National and State Healthcare Associated Infections Progress Report. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, March 2016. (www.cdc.gov/hai/progress-report/index.html).

[3] Antibiotic resistance threats in the United States, 2013. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, April 2013. (www.cdc.gov/drugresistance/threat-report-2013/).

[4] National action plan for combating antibiotic-resistant bacteria. Washington, DC: The White House, March 2015. (https://obamawhitehouse.archives.gov/sites/default/files/docs/national_action_plan_for_combating_antibotic-resistant_bacteria.pdf).

[5] Reported tuberculosis in the United States, 2015. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, November 2016. (https://www.cdc.gov/tb/statistics/reports/2015/pdfs/2015_Surveillance_Report_FullReport.pdf).

[6] Alert to U.S. healthcare facilities: First *mcr-1* gene in *E. coli* bacteria found in a human in the United States. Atlanta, GA: US Department of Health and Human Services Centers for Disease Control and Prevention, June 2016. (www.emergency.cdc.gov/han/han00390.asp).

[7] Clinical alert to U.S. healthcare facilities – June 2016: Global emergence of invasive infections caused by the multidrug-resistant yeast *Candida auris.* Atlanta, GA: US Department of Health and Human Services Centers for Disease Control and Prevention, June 2016. (www.cdc.gov/fungal/diseases/candidiasis/candida-auris-alert.html).

[8]Vallabhaneni S, Kallen A, Tsay S, et al. Investigation of the first seven reported cases of *Candida auris,* a globally emerging invasive, multidrug-resistant fungus — United States, May 2013–August 2016. Morb Mortal Wkly Rep 2016;65:1234–1237. (https://www.cdc.gov/mmwr/volumes/65/wr/mm6544e1.htm).

[9] Hospital-Acquired Infections (HAI) in New York State, 2015. Part 2: Technical Report. Albany, NY: The New York State Department of Health, March 2017. (https://www.health.ny.gov/statistics/facilities/hospital/hospital_acquired_infections/2015/docs/hospital_acquired_infection_p2.pdf).

[10] Davey P, Brown E, Charani E, et al. Interventions to improve antibiotic prescribing practices for hospital inpatients. The Cochrane database of systematic reviews. 2013;4:CD003543.

[11] Slayton RB, Toth D, Lee BY, et al. Vital Signs: estimated effects of a coordinated approach for action to reduce antibiotic-resistant infections in health care facilities – United States. Morb Mortal Wkly Rep 2015;64:826. (www.cdc.gov/mmwr/preview/mmwrhtml/mm6430a4.htm?s_cid=mm6430a4_w).

[12]Press release: NYSDOH Wadsworth Center is one of only seven in the US designated by CDC as antimicrobial resistance (AR) regional laboratories. Albany, NY: The New York State Department of Health, August 2016. (www.health.ny.gov/press/releases/2016/2016-08-03_wadsworth_ar_regional_laboratory.htm).

[13] Centers for Disease Control and Prevention Antimicrobial Resistance (AR) Lab Network Webpage: www.cdc.gov/drugresistance/solutions-initiative/ar-lab-networks.html. Accessed January 26, 2017.

BACKGROUND

HIV/AIDS and sexually transmitted diseases (STDs) continue to be significant public health concerns. New York State (NYS) remains at the epicenter of the HIV epidemic in the United States (US), with more people living with HIV/AIDS than in any other state. By the end of 2016, approximately 123,600 New Yorkers were living with HIV/AIDS, with 2,881 new diagnoses of HIV infection that year.[1] The 141,000 new STD cases reported to the NYS Department of Health (NYSDOH) in 2016 comprised over 50% of all communicable diseases reported statewide.[2]

The same behaviors and community characteristics associated with HIV also place individuals and communities at risk for STDs and the hepatitis C virus (HCV). HCV infection is a major public health problem, causing substantial morbidity and mortality, including cirrhosis and liver cancer. It remains the leading cause of liver transplants in the US. Approximately 20% of people living with HIV in the US are co-infected with HCV. Most people with HCV are unaware they are infected. Nationally, HCV mortality rates have been rising for at least the last decade and, in 2013, the number of HCV-related deaths exceeded that of the combined total of 60 other nationally notifiable infectious diseases, including HIV, tuberculosis and pneumococcal disease.[3] The majority of HCV occurs among people who inject drugs (PWID).

If a person living with HIV has an STD, HIV is more likely to be passed to a partner during sex. Likewise, having an STD increases the risk of an HIV-negative person being infected with HIV if exposed to the virus. Epidemiological data increasingly point to HIV, STDs, and HCV as "syndemics," which are infections occurring in similar groups of persons with associated risk behaviors. Notably, in the US in 2010, the leading cause of death among people with HIV was liver disease from co-infection with HCV.[4]

BURDEN AND DATA TRENDS

HIV

The Centers for Disease Control and Prevention (CDC) estimates that 1.1 million people in the US are living with HIV infection, with 15% unaware of their status.[5] There are 40,000 Americans newly diagnosed with HIV each year. Almost 17,000 people with HIV died in 2014. The number of people newly diagnosed with HIV infection in NYS continues to decrease. In 2016, there were 2,881 new HIV diagnoses in NYS, a 9% decrease from 2015 (3,163) and a 16% decrease from 2014 (3,448).

Importantly, decreases were found across groups of people impacted the most by HIV. For example, new diagnoses fell 12% between 2015 and 2016 (from 1,804 to 1,580) among gay, bisexual, and other men who have sex with men (MSM), the second straight annual decrease after years of little change. Decreases were realized among every age group, with the largest decrease of 20% among young people aged 20-24 (505 to 406 new diagnoses). HIV in communities of color was down significantly as well. Decreases occurred among black non-Hispanics (7%), Hispanics (11%), and persons with multi-racial backgrounds (23%).

Characteristics of New Yorkers living with HIV infection have not changed. At the end of 2016, 71% were male. Most (56%) had a diagnosis of AIDS. Almost three-quarters were at least 40 years of age, with 20% aged 60 years or older. The racial/ethnic distribution was 20% white, 40% black, 32% Hispanic, 1.6% Asian/Pacific Islander, 0.1% Native American and 5.6% representing more than one racial group. Multiple risks were

identified: 41% MSM, 12% PWID, 3.4% MSM and PWID, 28.5% heterosexual, 13% unknown risk, 2% pediatric risk, and 0.2% blood product exposure. The prevalence of HIV/AIDS is highest in people over the age of 40, who make up about three-quarters of all people living with diagnosed HIV. As the HIV epidemic continues to evolve, tailoring services to aging populations will be critical.

The NYS epidemic has changed dramatically over the past two decades for two population subgroups that had been strongly affected by the epidemic (Figure 1) early on. Mother-to-child transmission (MTCT) of HIV has been nearly eliminated; its rate in 2016 was less than 1%, which meets one of CDC's criteria for elimination. The second CDC criterion is less than one baby born with HIV per 100,000 births, which NYS came very close to meeting in 2016, with 0.85 cases per 100,000 births. For the first time since the beginning of the epidemic, there were no cases of HIV transmission from mother to child in NYS for an 18-month period between 2014 and 2016.

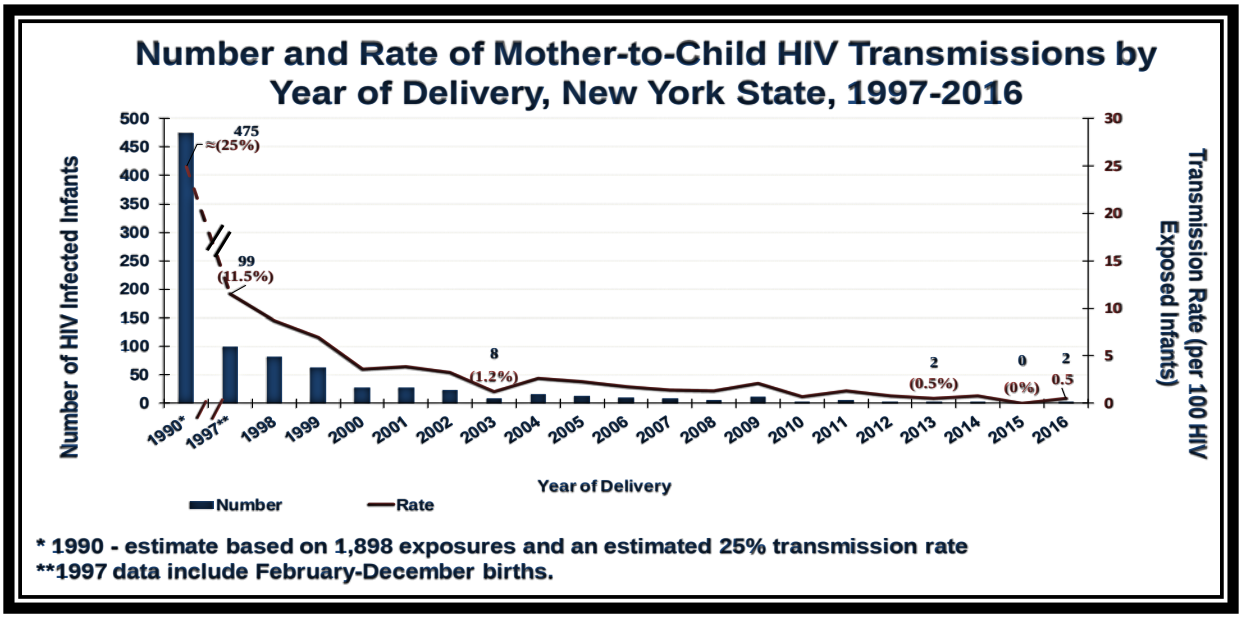


Figure 1

SOURCE: NYS HIV/AIDS surveillance data are from the NYSDOH AIDS Institute Bureau of HIV/AIDS Epidemiology

In the late 1980s and early 1990s, most HIV infections in NYS were contracted by injection drug use. In 1992, the Commissioner of Health was given regulatory authority to approve syringe exchange programs (SEPs). In 2000, the Expanded Syringe Access Program (ESAP) was established, augmenting harm reduction efforts for PWIDs by expanding syringe-furnishing capabilities to pharmacies and provision of syringes by healthcare professionals, while establishing safe sharps disposal programs throughout the state. More recently, a peer-delivered syringe exchange model was implemented statewide after documented success as a pilot program. In addition, a new State law added explicit language to penal law so a person participating in the SEP or ESAP is not criminally liable for possessing syringes and drug residue in or on syringes.

Currently, 23 SEPs furnish nearly 3 million sterile syringes annually, and more than 3,200 entities are ESAP-registered providers. There has been a dramatic reduction in the proportion of PWIDs (includes PWID and PWID/MSM) among new cases, from 54% of new AIDS cases in 1992 to 5% in 2016.

STDs

The US is experiencing an alarming increase in STDs. NYS is no different. This trend has the potential to undercut many of the successes in reducing HIV incidence, as STDs facilitate transmission of HIV and vice versa. Chlamydia trachomatis (CT) continues to be the most common reportable communicable disease in NYS with 109,549 cases, a 6% increase from 2015 and the highest number of cases since CT became reportable in 2000. The highest rates were among women 20-24 years of age, followed by women 15-19 years of age.

Gonorrhea cases increased 13% from 2015 to 2016, to 29,048 reported cases. The rate increase among males was higher than females (20% compared to 1%), and rates were highest for those under age 30 for both genders.

Early syphilis cases (primary, secondary and early latent) continued to increase in 2016 with an overall increase of 24% compared to 2015. Cases among men accounted for 94% of total cases with 86% of male cases reported among MSM. Although men accounted for the vast majority of cases, there was an 87% increase of primary and secondary syphilis compared to 2015. In 2016, 13 cases of congenital syphilis were reported statewide, an 8% increase compared to 2015.

STDs, including but not limited to Chlamydia, gonorrhea and syphilis, significantly impact the health of NYS citizens, pose a substantial economic burden and contribute to reproductive health problems, such as infertility, pelvic inflammatory disease, and ectopic pregnancy. More than half of new STDs reported each year are among individuals aged 15-24 years. The state and nation alike must redouble efforts to ensure that a robust policy and programmatic response is in place to counter increasing STD rates.

CDC reported 1,598,354 Chlamydia cases in the US in 2016.[6] The rate of 497.3 cases per 100,000 population is an increase of 4.7% over the 475.0 rate reported in 2015. In 2016, NYS had the 12th highest rate (552.8 Chlamydia cases per 100,000) among all states.[7]

Gonorrhea is the second most commonly reported notifiable disease in the US, with 468,514 cases reported nationwide in 2016 (145.8 cases per 100,000 population), a 19% increase over the 2009 rate.[8] NYS ranked 22nd nationally with a rate of 146.5 per 100,000 population.

NYS ranked fifth among states in 2016 in case rates for primary and secondary syphilis per 100,000 population.[9] The US rate was 8.7 cases per 100,000 population with 27,814 cases reported, the highest rate since 1993. Table 1 shows the 2010 STD reported case rates and their geographic distribution.

	NYC	Rest of State	NYS
Chlamydia	780.3	400.3	567.1
Gonorrhea	211.9	95.2	148.8
Syphilis (1° and 2°)	21.3	5.1	12.6

Table 1: *Chlamydia*, *Gonorrhea* and *Syphilis* (primary and secondary) age adjusted rates (per 100,000 population) in NYS, 2016
Source: NYS STD Surveillance Data are from the NYSDOH AIDS Institute Bureau of STD Prevention and Epidemiology

While the rates of Chlamydia, gonorrhea and syphilis in NYS, excluding New York City (NYC), are lower than the national average, some areas have among the highest rates of gonorrhea and chlamydia in the nation. In addition, these three diseases represent only a fraction of the burden of STDs. Some common STDs, such as human papillomavirus (HPV) and herpes simplex virus, are not required to be reported.

HCV

The opioid epidemic, nationally and in NYS, is fueling the increase in new HCV infections. New data released from CDC show that, in the last five years, the number of new HCV infections reported to CDC has nearly tripled, reaching a 15-year high. There were 850 new cases reported in 2010 and 2,436 new cases reported in 2015. The greatest increases, and the highest overall number of cases, were among young people ages 20-29, with injection drug use as the primary route of transmission.[10]

Since 2001, a total of 254,295 chronic HCV cases have been reported in NYS. In 2016, there were 8,280 total HCV cases reported in NYS, excluding NYC (8,082 chronic HCV cases and 198 acute HCV cases).[11] Rates of HCV are highest in Central and Western NY. In 2016, there were 11,847 chronic HCV cases reported in NYC.

During 2016, in NYS, excluding NYC, 57% of the new acute cases were among persons aged 20-29, and 59% of female HCV cases were among women of child-bearing age. Injection drug use (IDU) was the most commonly reported risk factor among all HCV cases (72% of those with available risk factor information). IDU is especially common among younger people living with HCV (91% of cases < 30 years of age).[12]

DISPARITIES

Considerable variation occurs in the geographic distribution of HIV and STDs. The HIV and syphilis epidemics are concentrated in NYC although the burden is gradually shifting to communities outside of NYC (rest of state, or "ROS"). In 2016, about 27% of new HIV infections were diagnosed in ROS residents, a proportion that has gradually risen from 22% in 2010. For 2016, the distribution of STD cases reported in NYC compared to the ROS remained relatively stable, with 60%, 66%, and 78% of Chlamydia, gonorrhea, and primary syphilis cases, respectively, diagnosed in NYC.

More work remains to ensure every population benefits from the declines seen in new HIV infections. For example, new diagnoses increased by 30% among Asian/Pacific Islanders between 2015 and 2016 (99 to 129). New diagnoses decreased 11% among males between 2015 and 2016 (2,523 to 2,253), but only 2% among females (640 to 628). There were 80 new diagnoses among transgender persons, slightly above the 2010 – 2015 average of 77. By region, NYC saw the steepest decline in new diagnoses, falling 12% (2,392 to 2,116) compared to areas outside of NYC, where there was almost no change (771 to 765).

In 2016, reported cases of Chlamydia, gonorrhea and syphilis increased for the third year in a row. The highest rates of infection in NYS continued to be seen in young people, blacks, and gay, bisexual and other MSM.

DETERMINANTS OF RISK AND PROTECTIVE FACTORS

HIV, STDs, and HCV are preventable conditions, yet they continue to disproportionately impact certain communities, including people of color, young people, people who are gay, bisexual, and transgender, and people living in economically challenged areas. Lack of widespread awareness about sexual health and STD prevention options have resulted in higher rates of STDs, especially Chlamydia and syphilis. While NYS has had tremendous success preventing new cases of HIV attributed to injection drug use by expanding access to syringes, the current opioid epidemic among young people has resulted in a rise in HCV. HIV pre-exposure prophylaxis (PrEP) is effective at preventing new cases of HIV; however, many individuals who may benefit from this prevention option remain unaware of PrEP or experience barriers to accessing it.

When communities have access to safe, affordable housing, livable wage employment, healthcare services and accurate information about HIV/STDs/HCV, the likelihood of infection decreases significantly. Disseminating scientifically-accurate sexual health information in low literacy format is critical for stemming

the tide of new infections. Ensuring access to HIV treatment helps to protect the health of people living with HIV and prevents new cases, making access to HIV medical care especially important. Access to SEPs, including peer-delivered syringe exchange and expanded syringe access through pharmacies, is critical to reducing injecting-related infections. Educating communities about how to overcome potential barriers to accessing PrEP and continued widespread access to male and female condoms are essential protective factors for reducing new infections and promoting health.

CHALLENGES

Late HIV/Concurrent HIV/AIDS Diagnosis

In NYS, 19% of all people newly diagnosed with HIV were diagnosed with AIDS at the same time. These people are considered to have a "late" diagnosis of HIV infection. Ensuring that every HIV infection is diagnosed quickly, so the individual can initiate HIV therapy immediately is essential to curbing transmission and improving health outcomes. It is critical to conduct targeted outreach and make testing, care, and services more accessible to individuals who are being diagnosed and entering care late in the course of their infection.

Linkage to Care

Evidence shows that immediate initiation of antiretroviral therapy upon HIV diagnosis improves clinical outcomes and reduces mortality. Using data reported to the NYS HIV surveillance system, NYSDOH found that 75% of newly-diagnosed HIV cases were linked to care within 30 days of their diagnosis in NYS, suggesting that the other 25% of cases may not have received the benefit of immediate initiation of antiretroviral therapy. Ensuring that every newly-diagnosed person in NYS can access HIV medication and medical care immediately upon diagnosis is an important public health priority.

Workforce

The healthcare workforce faces numerous challenges including the increasing complexity of managing anti-retroviral therapy; a declining number of experienced HIV providers, particularly in upstate and rural areas of NYS; a dearth of young practitioners choosing to specialize in HIV; decreased financial reimbursement for HIV care; and changing healthcare delivery models. Unfortunately, many primary care clinicians continue to be reluctant to take a sexual history or discuss sexual health with their patients, further limiting the availability of effective HIV and STD prevention interventions, screening, and care.

Opioid Crisis

NYS is experiencing a dynamic public health threat – the opioid crisis. In 2015, there were 2,754 confirmed drug overdose deaths in New York.[13] The nature of the crisis is evolving quickly. Local and state experts have identified social and environmental conditions which have contributed to the crisis, such as New Yorkers' ease of access to illicit drugs, changes in injection practices, and inequitable access to harm reduction and drug treatment services in some regions. Equally concerning is a growing number of young people who use and inject drugs and the threat of mother-to-child transmission of HCV among women who use drugs. An uncertain drug supply contaminated with fentanyl and fentanyl analogues magnifies the unpredictability of the epidemic.[14]

HCV

Elimination of HCV is possible in the era of direct-acting antivirals; however, many challenges remain. To achieve HCV elimination in NYS, effective models of HCV service delivery to those disproportionately impacted by HCV (e.g., PWID) are needed. These models include enhanced HCV prevention services targeting young PWID living in suburban and rural areas, and new innovative HCV care and treatment models, such as co-locating medication assisted treatment (e.g., buprenorphine) and HCV treatment at harm reduction programs.

ASSETS

Community Involvement

Over the years, the NYSDOH AIDS Institute and its partners have developed a statewide infrastructure that relies upon community providers, government agencies and other organizations to lead in the fight against HIV/AIDS. The NYSDOH AIDS Institute seeks and supports community and consumer consultation and input on efforts to address HIV/AIDS, STDs, HCV, PWIDs, and LGBT health, and stigma. Individuals and organizations continue to generously share their knowledge, expertise, and perspectives. Community input informs both policy and program development and has been integral to the state's Ending the Epidemic initiative, which aims to ensure that New York achieves the first-ever decrease in HIV prevalence by the end of 2020.

References

[1] Unless otherwise noted, all NYS HIV/AIDS Surveillance data are from the NYSDOH AIDS Institute Bureau of HIV/AIDS Epidemiology.

[2] Unless otherwise noted, all NYS STD Surveillance Data are from the NYSDOH AIDS Institute Bureau of Sexually Transmitted Diseases Prevention and Epidemiology.

[3] Ly KN, Hughes, EM, Jiles RB, Holmberg SD. Rising Mortality Associated with Hepatitis C Virus in the United States, 2003-2013. CID (2016) May 15; 62(10):1287-1288.

[4] Ly KN, Xing J, Klevens RM, Jiles RB, Ward JW, Holmberg SD. The increasing burden of mortality from viral hepatitis in the United States between 1999 and 2007. *Ann Intern Med* 2012, 156: 271-278.

[5] Centers for Disease Control and Prevention. https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-22-2.pdf

[6] Centers for Disease Control and Prevention. https://www.cdc.gov/std/stats16/chlamydia.htm. Accessed 11/8/17.

[7] Centers for Disease Control and Prevention. https://www.cdc.gov/std/stats16/chlamydia.htm. Accessed 11/8/17.

[8] Centers for Disease Control and Prevention. https://www.cdc.gov/std/stats16/Gonorrhea.htm. Accessed 11/18/17.

[9] Centers for Disease Control and Prevention. https://www.cdc.gov/std/stats16/tables/26.htm. Accessed 11/18/17.

[10] Centers for Disease Control and Prevention. (2017). Surveillance for Viral Hepatitis — United States, 2015. Available at https://www.cdc.gov/hepatitis/statistics/2015surveillance/commentary.htm.

[11] NYS DOH. Communicable Disease Electronic Surveillance System as of August 2017.

[12] NYC DOHMH, Bureau of Communicable Disease, Viral Hepatitis Program. Data as of May 2017.

[13] New York State Department of Health (April 2017). New York State – County Opioid Quarterly Report. https://www.health.ny.gov/statistics/opioid/data/pdf/nys_apr17.pdf

[14] Salaman, M. (June 16, 2017). Study: Opioid drug users trying, but failing, to avoid Fentanyl. HealthDay News. Accessed 9/5/17 from https://www.upi.com/Health_News/2017/06/16/Study-Opioid-drug-users-trying-but-failing-to-aoid-Fentanyl/7641497625502/.

BACKGROUND

The reduction of vaccine-preventable diseases is an extremely important public health goal achieved through immunization. Although vaccine-preventable disease (VPD) rates are low in New York State (NYS) and in the United States (US), the prevalence of certain diseases is beginning to increase due to pockets of under-immunization and global travel.

BURDEN AND DATA TRENDS

In 2016 in NYS, there were three cases of tetanus, 968 cases of pertussis, one case of measles, 386 cases of mumps, and four cases of Haemophilus influenza type B (Hib) among children five years of age or younger.[1] During the 2016-2017 influenza season, 64,720 positive influenza laboratory results, 12,912 hospitalizations due to influenza and eight pediatric deaths due to influenza were reported to New York State Department of Health (NYSDOH).[2]

Children

In NYS, immunization rates for children between 19 and 35 months of age who met the 4:3:1:3:3:1:4 (4 DTaP, 3 polio, 1 MMR, 3 *Haemophilus influenzae* type b, 3 Hepatitis B, 1 varicella and 4 pneumococcal conjugate) benchmark are measured as part of the National Immunization Survey (NIS). According to NIS data, 4:3:1:3:3:1:4 immunization rates in 2016 for NYS were 72.3% compared to 70.7% for the US (see Figure 1 below)[3].

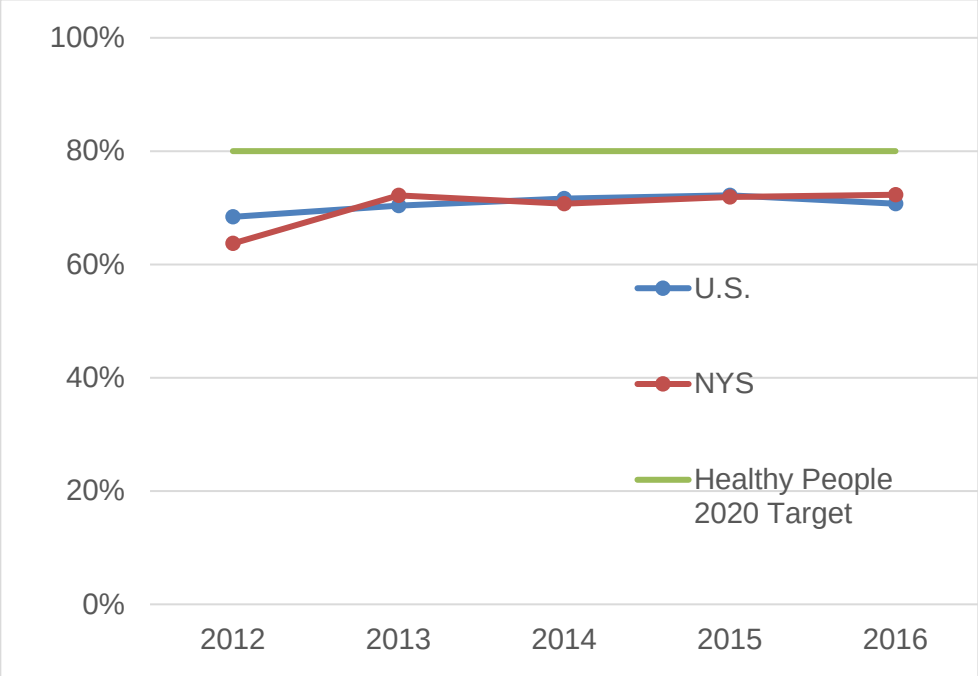


Figure 1: 4:3:1:3:3:1:4 Immunization Coverage Among Children 19-35 Months, NIS, 2012-2016

Adolescent

The National Immunization Survey-Teen (NIS-Teen) annually assesses immunization coverage among adolescents 13 through 17 years of age. According to 2016 NIS-Teen data, 91.1% of NYS adolescents had received a dose of Tdap vaccine compared to 88.0% for the US as a whole; 89.2% had received at least one dose of meningococcal-ACWY (MenACWY) vaccine compared to 82.2% for the US; 71.5% had received at least one dose of human papillomavirus (HPV) vaccine compared with 60.4% for the US; and 55.7% had received all recommended doses of HPV vaccine compared with 43.4% for the US. (see Figure 2 below)[4].

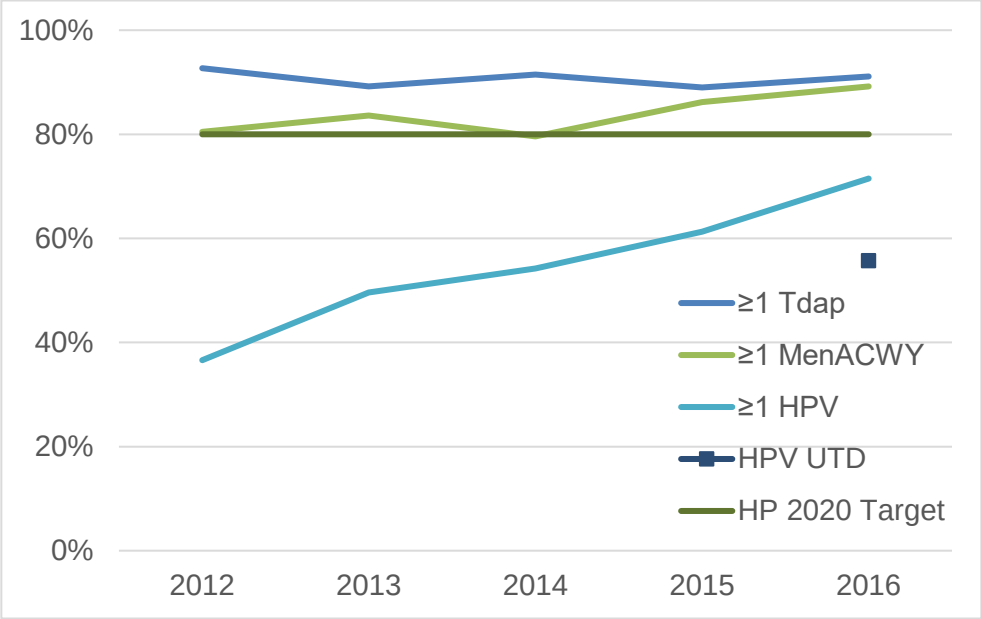


Figure 2: NYS Adolescent Immunization Coverage, NIS-Teen, 2012-2016

Adults

The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest, ongoing telephone health survey system, tracking health conditions and risk behaviors in the US yearly since 1984. According to 2016 and 2017 BRFSS data, 45.6% of NYS adults aged 18 years and older received the influenza vaccine during the 2016-17 influenza season[5] (see Figure 3). The percentage of NYS adults aged 65 years and older who had ever received the pneumococcal vaccine in 2016 was 69.3% [6] (see Figure 4).

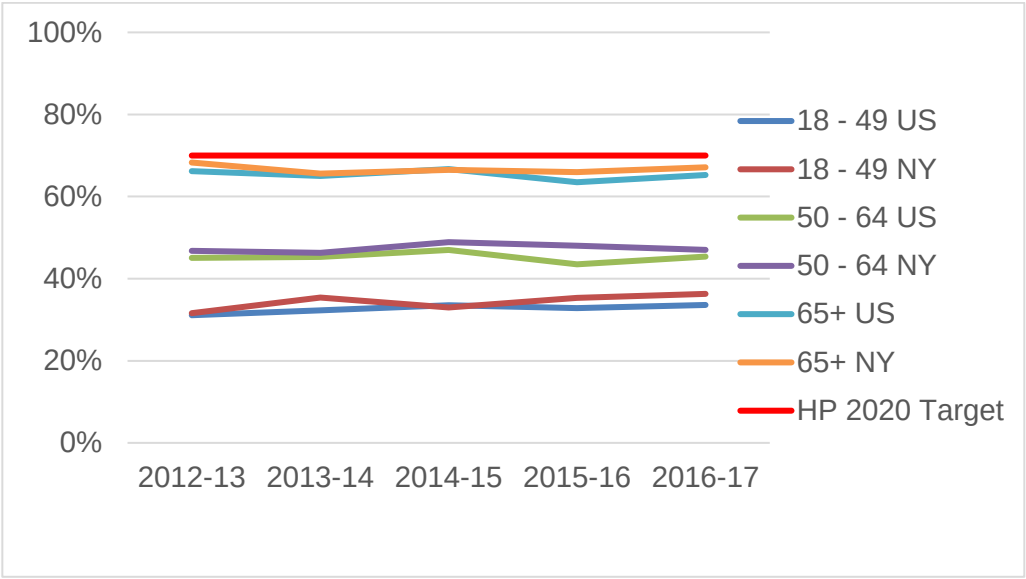


Figure 3: Adult Influenza Vaccination Coverage, BRFSS, 2012-13 through 2016-17

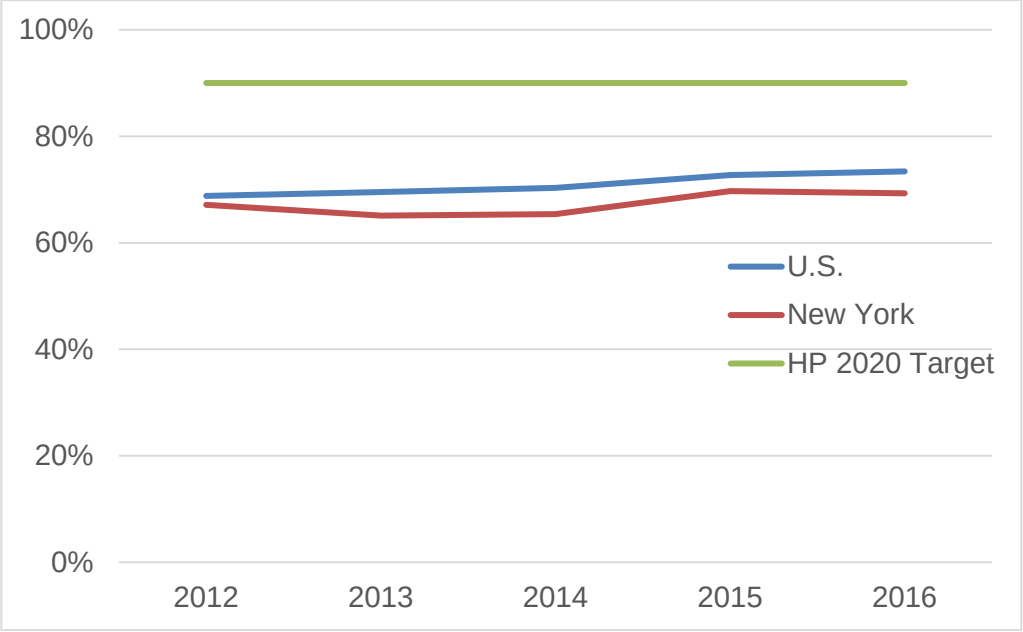


Figure 4: Adults 65+ years who have ever had a pneumococcal vaccination, BRFSS, 2012-2016

DISPARITIES

Surveillance data are sufficient to identify variation in the proportion of NYS residents receiving recommended immunizations for some population groups and geographic areas, as summarized below.

Age

While NYS childhood and adolescent immunization coverage rates are relatively high, NYS adult immunization coverage rates lag well below Healthy People 2020 targets. Less than half of all NYS adults receive the influenza vaccine each year. Influenza vaccine coverage rates are lowest among younger and middle-aged adults: 36.3% for NYS adults aged 18 through 49 years during the 2016-17 influenza season, 47.0% for NYS adults aged 50 through 64 years and 67.1% for NYS adults aged 65 years and older[5] (see Figure 3). In addition, NYS adult influenza and pneumococcal vaccination rates have not statistically significantly increased from 2012 to 2016[5,6].

Geography

Variation in immunization rates exists among children, as evidenced by the range in percentages of school children fully immunized with all doses of vaccine required for school in 2016-2017 (e.g., from a low of 86% in Yates County to a high of 99% in Chemung and Jefferson counties). The overall 2016-2017 complete school immunization coverage rate was 94%.[7]

Race and Ethnicity

Although not statistically significant, influenza vaccination coverage among persons age 6 months and older was lower among black non-Hispanic New Yorkers (46.1% ± 4.8%) compared to white non-Hispanic and Hispanic New Yorkers (50.2% ±1.7% and 49.9% ± 3.7%, respectively).[5] While racial disparities in early childhood vaccination coverage have been described nationally,[8] the percentage of black non-Hispanic NYS children who met the 4:3:1:3:3:1:4 benchmark in 2016 (69.3% ± 13.2%) was similar to that of white non-Hispanic (68.5% ± 6.4%) and Hispanic (78.9% ± 8.4%) children.[3] In contrast, complete HPV vaccination coverage among NYS white non-Hispanic adolescents (44.6% ± 6.2%) in 2016 was statistically significantly lower than among NYS black non-Hispanic (61.3% ± 12.5%) and Hispanic (73.7% ± 8.8%) adolescents.[4]

Income and Education

Although not statistically significant, 2016 NYS 4:3:1:3:3:1:4 vaccination coverage was lower for children living below the federal poverty level (66.9% ± 8.5%) compared with those living at or above the poverty level (76.6% ± 4.9%).[3] In contrast, 1-dose and complete HPV vaccination coverage were statistically significantly higher among NYS adolescents living below the federal poverty level (86.0% ± 6.0% and 67.7% ± 9.1%, respectively) compared with those living at or above the poverty level (66.8% ± 5.0% and 51.1% ± 5.4%) in 2016.[4]

DETERMINANTS OF HEALTH: RISK AND PROTECTIVE FACTORS

Protective Factors

Vaccination provides the best protection from a number of serious, and sometimes deadly vaccine preventable diseases (VPDs). It is important for children and adults to be up-to-date with all recommended vaccinations. High immunization coverage in the population protects those who cannot get vaccinated, including those who are too young or who have a medical contraindication to vaccination. An increase in the number of unvaccinated people in a community increases the risk of disease transmission. In addition, practicing and promoting personal preventive actions such as frequent hand washing, covering coughs and sneezes, refraining from sharing cups or water bottles or other personal items, can reduce the spread of infection. Active disease surveillance, early detection of individuals with a VPD, and implementing timely control measures can reduce disease spread.

Risk Factors

Infants, older adults, and people with a weakened immune system or certain medical conditions are at increased risk for VPDs and associated complications. They may not develop a strong immune response to vaccination and immunity wanes with age. Certain occupations (healthcare, childcare, etc.) and lifestyle factors (IV drug use, having multiple sexual partners, men who have sex with men, living in crowded settings) increase the risk of exposure to VPDs. Global travel can bring disease from other countries to New York State and risk exposure to susceptible residents.

CHALLENGES

Medical/Religious Exemptions

While NYS school immunization coverage rates remain high overall, statewide religious exemption rates have increased by an average of 0.05 percentage points per year, from 0.49% in the 2012-2013 school year to 0.71% in the 2016-2017 school year. In contrast, rates of medical exemptions have remained relatively stable. An increase in the number of exemptions from school mandates in NYS poses a risk to the population as whole. While the rate of exemption claims remains low overall, the county-by-county variation is of concern, ranging from a low of 0.08% in the Bronx to a high of 10.91% in Yates County in the 2016-2017 school year.[7]

Vaccine Safety Misinformation

Much media attention has focused on unfounded claims of vaccine harm, with less attention to scientifically accurate studies of vaccine safety. Lacking the full range of information, some parents delay or skip vaccinations, and VPDs have re-emerged with deadly results. The NYSDOH continues to reiterate through many communication channels that the recommended vaccination schedule is the best schedule to follow when vaccinating persons of all ages.

Lack of Awareness of Adult Immunizations

Despite ongoing educational efforts, many adults remain unaware of their personal risk of VPDs or of the availability of vaccinations to prevent them. The lack of awareness is compounded by a perception that immunizations are intended for children, a lack of recommendations for adult immunization from their healthcare provider, and missed opportunities to vaccinate older adults during acute or chronic care visits.

ASSETS

Vaccines for Children (VFC) Program

The New York State Vaccines for Children (NYS VFC) Program is a federally-funded program that provides vaccines at no cost to eligible children. Vaccines are distributed to private physicians' offices and public health clinics enrolled as VFC providers. The VFC Program reduces financial barriers and improves immunization rates for eligible children.

School Immunization Requirements

New York State has strong school immunization requirements, defined in Public Health Law and regulations for students, from daycare through college. These requirements ensure that students have high immunization rates and are protected from most VPDs.

New York State Immunization Information System (NYSIIS)

In NYS, all healthcare providers are required to report immunizations administered to persons under 19 years of age, along with their immunization history, to the New York State immunization registry, NYSIIS. Providers are also recommended to report immunizations given to adults to NYSIIS. The registry provides a complete, accurate, secure, real-time immunization record that is easily accessible and promotes public health.

State and Local VPD Surveillance and Control

A strong public health infrastructure, at the local and state levels, provides effective VPD surveillance and control activities that reduce the spread of disease.

References

[1] New York State Department of Health. (2016). 2016 Communicable Disease Annual Reports. Available at https://www.health.ny.gov/statistics/diseases/communicable/2016/. (Accessed January 8, 2018)

[2] New York State Department of Health. (2017). NYSDOH Flu Monitoring – Week ending May 20, 2017. Available at https://www.health.ny.gov/diseases/communicable/influenza/surveillance/2016-2017/archive/. (Accessed January 8, 2018)

[3] Centers for Disease Control and Prevention. (2017). Child Vax View Interactive!. Available at https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/7-series/trend/index.html. (Accessed January 12, 2018)

[4] Centers for Disease Control and Prevention. (2017). TeenVaxView Interactive!. Available at https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/index.html . (Accessed January 12, 2018)

[5] Centers for Disease Control and Prevention. (2017). Influenza vaccination coverage estimates for persons 6 months and older by State, HHS Region, and the United States, National Immunization Survey-Flu (NIS-Flu) and Behavioral Risk Factor Surveillance System (BRFSS), 2010-11 through 2016-17 influenza seasons. https://www.cdc.gov/flu/fluvaxview/reportshtml/trends/index.html. (Accessed January 12, 2018)

[6] Centers for Disease Control and Prevention. (2017). *Behavioral Risk Factor Surveillance System*. Available at https://www.cdc.gov/brfss/brfssprevalence/index.html . (Accessed January 12, 2018)

[7] New York State School Immunization Assessment Survey [Unpublished data]. (2017). Albany, NY: New York State Department of Health.

[8] Hill HA, Elam-Evans LD, Yankey D, Singleton JA, Kang Y. Vaccination coverage among children aged 19-35 months – United States, 2016. MMWR Morb Mortal Wkly Rep 2017; 66:1171-1177. DOI: http://dx.doi.org/10.15585/mmwr.mm6643a3