

Trends in Obesity-Related Cancers in New York State, 2004-2018

Introduction

This report describes recent trends in obesity-related cancers in New York State and is patterned after a similar nationwide analysis conducted by the Centers for Disease Control and Prevention (CDC) and published in *Morbidity and Mortality Weekly Report* (Steele et al. 2017). Obesity remains a significant public health concern. A telephone survey conducted in 2019 found that 36.1% of adults in New York State have overweight (body mass index (BMI) 25.0-29.9 kg/m²) and 27.1% have obesity (BMI ≥30) (New York State Department of Health 2021). The International Agency for Research on Cancer (IARC) has identified 13 cancers where there is sufficient evidence for an association between body fatness and cancer (Lauby-Secretan et al. 2016). These include postmenopausal breast cancer, cancers of the colon and rectum, kidney, endometrium (corpus uteri), thyroid, pancreas, liver, ovary, gallbladder, and gastric cardia, multiple myeloma, meningioma, and adenocarcinoma of the esophagus.

Results

Between 2014 and 2018, an average of 44,574 people per year in New York State were diagnosed with an overweight- or obesity-related cancer (Table 1). This represents 39% of the 114,167 cancers diagnosed each year (54% of the 57,554 cancers among women and 24% of the 56,614 cancers among men). The overweight- and obesity-related cancer incidence rate was much higher among women (239.0 per 100,000 population) than among men (124.7 per 100,000), largely because of the inclusion of the female-specific sites of endometrial, ovarian, and postmenopausal female breast cancers and the absence of any male-specific sites. Overweight- and obesity-related cancer incidence rates increased sharply with age and 89% of the total number of cases were seen among persons 50 years of age and above. The rates also varied by race/ethnicity, with higher incidence among non-Hispanic blacks and non-Hispanic whites than among non-Hispanics of other races and Hispanics. Rates were moderately higher in New York State excluding New York City than in New York City.

Table 2 presents the cancer rates for each of the obesity-related cancers for two time periods (2004-2008 and 2014-2018) along with the trend from 2004 to 2018. To calculate the trend, Joinpoint regression was used to describe the average annual percent change (AAPC) of the cancer rate over the 15-year period (National Cancer Institute 2021).

The rates of the various obesity-related cancers vary considerably, from 0.1 per 100,000 for meningioma to 38.1 for colorectal cancer in the 2014-2018 period. Breast cancer rates are much higher still, over 350, though the numbers are not directly comparable as the at-risk population is restricted to those 50 years of age and older. Combining the obesity-related cancers together yields an age-adjusted rate of 186.2 per 100,000 for the 2014-2018 period, a rate that was statistically lower compared to the 2004-2008 period. This rate was heavily influenced by the large decrease in colorectal cancer over the period.

Table 1 Average annual count and age-adjusted or age-specific rates¹ of overweight- and obesity-related invasive cancer cases,² by selected characteristics, New York State, 2014-2018.

Characteristic	Total			Males			Females		
	Count	Rate	(95% CI)	Count	Rate	(95% CI)	Count	Rate	(95% CI)
Total	44,574	186.2	(185.4-187.0)	13,313	124.7	(123.8-125.7)	31,261	239.0	(237.8-240.2)
Age Group (years)									
<20	179	3.8	(3.5-4.0)	56	2.3	(2.0-2.6)	123	5.3	(4.9-5.8)
20-49	4,506	60.2	(59.4-61.0)	1,538	42.2	(41.3-43.2)	2,968	77.7	(76.5-79.0)
50-64	16,369	405.8	(403.0-408.6)	4,655	238.2	(235.1-241.3)	11,714	560.9	(556.4-565.6)
65-74	12,190	714.6	(708.9-720.3)	3,706	476.7	(469.8-483.7)	8,484	913.4	(904.7-922.2)
≥75	11,330	841.2	(834.2-848.3)	3,358	636.8	(627.2-646.6)	7,972	979.1	(969.3-989.0)
Race/ethnicity³									
NH white	30,367	193.5	(192.5-194.5)	9,067	126.7	(125.5-128.0)	21,299	253.6	(252.0-255.2)
NH black	6,175	192.1	(190.0-194.3)	1,757	135.0	(132.1-138.0)	4,418	232.9	(229.8-236.1)
NH other	2,873	151.7	(149.2-154.3)	929	107.6	(104.5-110.9)	1,944	190.4	(186.6-194.3)
Hispanic	4,886	156.2	(154.2-158.2)	1,483	111.1	(108.5-113.8)	3,404	193.0	(190.0-195.9)
Region⁴									
NYC	17,285	182.2	(181.0-183.5)	5,065	123.1	(121.6-124.7)	12,220	230.2	(228.4-232.1)
NYS excl. NYC	27,285	188.8	(187.8-189.9)	8,248	125.7	(124.4-126.9)	19,038	245.2	(243.5-246.8)

¹ Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population except for the age-specific rates. Cancer data are from the New York State Cancer Registry as of November, 220.

² Overweight- and obesity-related cancers include adenocarcinoma of the esophagus; cancers of the breast [in postmenopausal women], colon and rectum, endometrium, gallbladder, gastric cardia, kidney, liver, ovary, pancreas, and thyroid; meningioma; and multiple myeloma.

³ Race/ethnicity totals do not add to state totals because of a small number of cases for whom the race/ethnicity could not be determined.

⁴ Region totals do not add to state totals because of a small number of cases for whom the region could not be determined.

NH: non-Hispanic

NYS excl. NYC: New York State excluding New York City

Because screening for colorectal cancer can reduce colorectal cancer incidence through the detection and removal of precancerous polyps, trends with and without colorectal cancer were analyzed. When colorectal cancer is removed, and the other twelve sites are considered together, then there was a marked average annual increase of 0.5% from 2004 to 2018. In comparison, rates for non-obesity-related cancers decreased by 0.5% per year, though this decrease is not statistically significant.

This suggests that the obesity epidemic is being reflected in higher cancer rates for the obesity-related sites, and indeed it may be understating them, given that the relative importance of obesity to each obesity-related cancer site varies considerably. Thyroid and ovarian cancer have an increased risk of just 1% per kg/m² increase in body mass index, while for endometrium the figure is 8% and for adenocarcinoma of the esophagus, 9%, as shown in the righthand-most column of Table 2. These figures

Table 2 Age-adjusted incidence rates¹ of overweight- and obesity-related invasive cancer, average annual percent changes,² and estimated percent increase in cancer risk associated with change in BMI,³ by cancer site and sex, New York, 2004-2018.

Cancer site	2004-2008			2014-2018			AAPC ²	% Increase in risk per unit BMI
	% of cases	Rate	(95%CI)	% of cases	Rate	(95%CI)		
Breast (postmenopausal women)	28	336.7(333.9-339.5)		30	351.4(348.7-354.1)		0.4*	2
Colon and rectum	26	49.7 (49.2-50.1)		20	38.1 (37.8-38.5)		-2.5*	2
Male		57.5 (56.8-58.2)			43.9 (43.3-44.4)		-2.6*	
Female		43.9 (43.4-44.5)			33.5 (33.0-33.9)		-2.6*	
Kidney (renal cell)	8	14.6 (14.4-14.9)		8	15.8 (15.6-16.0)		0.9*	5
Male		20.7 (20.2-21.1)			22.3 (21.9-22.7)		0.9*	
Female		9.9 (9.6-10.2)			10.3 (10.1-10.6)		0.5*	
Endometrium (corpus uteris)	9	29.5 (29.1-30.0)		9	31.8 (31.4-32.3)		0.8*	8
Thyroid	7	13.8 (13.6-14.1)		9	19.4 (19.2-19.7)		3.5*	1
Male		7.0 (6.8-7.2)			10.2 (9.9-10.5)		3.8*	
Female		20.2 (19.8-20.6)			28.2 (27.7-28.7)		3.4*	
Pancreas	7	13.2 (12.9-13.4)		8	14.3 (14.1-14.5)		0.9*	2
Male		14.8 (14.5-15.2)			16.3 (16.0-16.7)		0.9*	
Female		11.8 (11.6-12.1)			12.7 (12.4-13.0)		0.8*	
Multiple myeloma	4	6.7 (6.5-6.9)		4	7.9 (7.8-8.1)		1.1*	2
Male		8.1 (7.8-8.4)			9.7 (9.4-9.9)		1.1	
Female		5.7 (5.5-5.9)			6.6 (6.4-6.8)		1.0*	
Liver	4	7.1 (6.9-7.2)		4	7.4 (7.2-7.5)		0.1	5
Male		11.7 (11.4-12.0)			12.2 (11.9-12.5)		-0.4	
Female		3.3 (3.1-3.4)			3.3 (3.2-3.5)		-0.2	
Ovary	4	13.6 (13.3-13.9)		3	11.7 (11.4-11.9)		-1.5*	1
Adenocarcinoma of the esophagus	2	2.8 (2.7-2.9)		1	2.7 (2.6-2.8)		-0.4	9
Male		5.4 (5.1-5.6)			5.0 (4.8-5.2)		-0.5	
Female		0.9 (0.9-1.0)			0.9 (0.8-0.9)		-0.6	
Gastric cardia	1	2.3 (2.2-2.4)		1	2.4 (2.3-2.5)		0.2	4
Male		4.0 (3.8-4.2)			4.0 (3.8-4.2)		0.0	
Female		1.1 (1.0-1.1)			1.1 (1.0-1.2)		-0.3	
Gallbladder	1	1.5 (1.5-1.6)		1	1.4 (1.4-1.5)		-0.7*	5
Male		1.2 (1.1-1.3)			1.1 (1.0-1.2)		-0.8	
Female		1.8 (1.7-1.9)			1.8 (1.7-1.9)		-0.5	
Meningioma	<1	0.2 (0.2-0.2)		<1	0.1 (0.1-0.1)		-5.5*	4
Male		0.2 (0.1-0.2)			0.1 (0.1-0.1)		-3.9*	
Female		0.2 (0.2-0.2)			0.1 (0.1-0.1)		-6.2*	
All obesity-related cancers	100	187.9(187.0-188.7)		100	186.2(185.4-187.0)		-0.1	—
All obesity-related cancers except colorectal cancer	—	138.2(137.5-138.9)		—	148.1(147.4-148.8)		0.5*	—
Cancers not related to obesity	—	321.1(320.0-322.2)		—	296.9(295.8-297.9)		-0.5	—

¹ Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population except for the age-specific rates. Cancer data are from the New York State Cancer Registry as of November 2020.

² Average annual percent changes (AAPCs) calculated using Joinpoint regression (National Cancer Institute 2021).

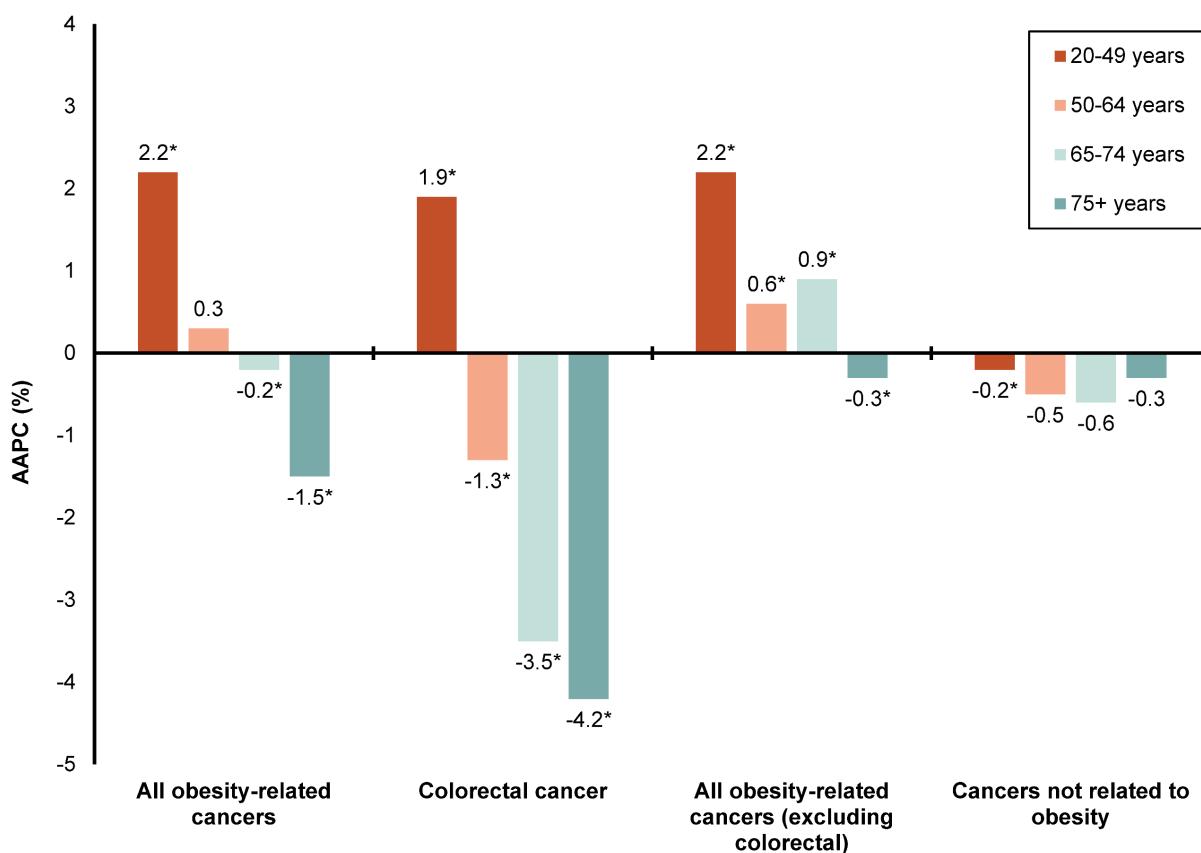
³ Percent increase in risk associated with increase in BMI as reported in Steele et al. (2017).

* Indicates that the AAPC is significantly different from zero at $\alpha=0.05$ level.

mean that the difference in risk between a person near the high end of the normal BMI range (BMI of 24) and the low end of the obese range (BMI of 30, for a difference of 6 kg/m²) is merely 6% for thyroid and ovarian cancer but 54% for adenocarcinoma of the esophagus. A case could be made that the sites with higher obesity-related risks should be given more weight in calculating the obesity-related cancer trend.

Many researchers have noted relatively higher increases in obesity-related cancers in younger age groups (Sung et al. 2019). This has been widely posited as evidence of a cohort effect related to obesity, as the obesity epidemic has been concentrated in younger age groups (Centers for Disease Control and Prevention 2021). The data from New York generally support this observation (Figure 1). For all obesity-related cancers, rates have declined steeply in the over 75 age group, declined modestly in the 65-74 age group, increased modestly in the 50-64 age group, and increased substantially in the 20-49 age group. However, when colorectal cancer is excluded, rates have increased in all age groups except the over 75 age group in recent years, with the largest annual percentage increase in the 20-49 age group.

Figure 1 Average annual percentage change¹ in overweight- and obesity-related cancer incidence rates² among adults by age group, New York State, 2004-2018.



¹ Average annual percent changes (AAPCs) calculated using Joinpoint regression (National Cancer Institute 2021).

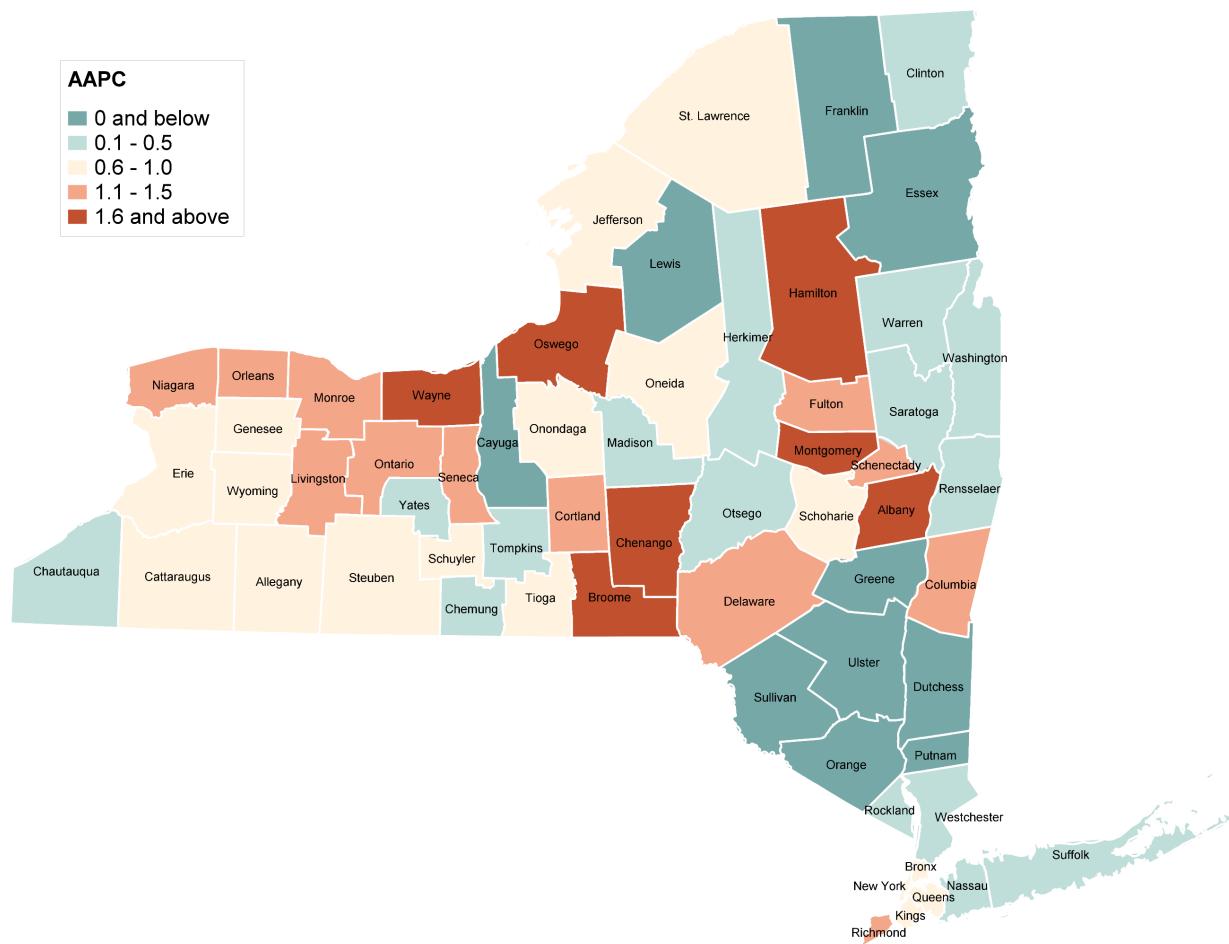
² Cancer data are from the New York State Cancer Registry as of November 2020.

* Indicates that the AAPC is significantly different from zero at $\alpha=0.05$ level.

Colorectal cancer rates decreased in all age groups except the 20-49 age-group, which saw a large annual percent increase.

The long-term trends in obesity-related cancers excluding colorectal by county are shown in Figure 2. Out of 62 counties in New York State, 52 counties saw an increase in rates between 2004 and 2018, though the increase in rates over time was only statistically significant in 14 counties. Across the state, there was a marked AAPC of 0.5%.

Figure 2 County map of the average annual percentage change (AAPC, %) in overweight- and obesity-related cancers excluding colorectal, 2004-2018.



- *The increase in obesity-related cancers was statistically significant in the following counties: Albany, Broome, Chenango, Kings, Niagara, Oneida, Onondaga, Ontario, Oswego, Queens, Richmond, Schenectady, Tioga, and Wayne.*
- *There were no counties with a statistically significant decrease.*

Another way to appreciate the role of a risk factor for disease is to calculate its population attributable fraction (PAF), which is an idealized estimate of the fraction of cases that would be expected to disappear in the absence of a particular risk factor. Since risk factors interact with each other in complex ways, it is impossible to estimate this cleanly, but the estimate is still useful as a general approximation of the contributory role of a specific risk factor. While these were not calculated for this report, values reported in a recent article based on all cancer cases (excluding non-melanoma skin cancers) among adults 30 years or older diagnosed from 2011 through 2015 in the United States are informative (Islami et al. 2019). The attributable fraction due to excess body weight was estimated as 4.5% in men and 9.6% in women for New York State (Table 3). For both men and women in New York State, the PAF values were lowest for colorectal cancer (4.5% and 4.7%), and highest for liver and gallbladder cancers (46.2% and 50.5%).

Table 3 Estimated proportion of incident cancer cases in New York State attributable to excess body weight in adults aged ≥30 years diagnosed from 2011 to 2015, by sex and cancer site (Islami et al. 2019)

Cancer Site	Men		Women		Men and Women	
	PAF, %	(95%CI)	PAF, %	(95%CI)	PAF, %	(95%CI)
All cancers	4.5	(4.2-4.8)	9.6	(9.1-10.1)	7.1	(6.8-7.4)
Breast			9.6	(8.5-10.7)		
Colorectum	4.5	(3.4-5.5)	4.7	(3.6-5.7)	4.6	(3.8-5.3)
Kidney, renal pelvis	28.0	(24.4-31.6)	30.4	(26.3-34.8)	28.8	(26.0-31.7)
Corpus uteri			48.2	(44.6-51.6)		
Thyroid	9.2	(7.0-11.9)	9.6	(6.6-12.4)	9.5	(7.1-11.7)
Pancreas	14.8	(11.5-18.4)	15.8	(12.1-19.3)	15.3	(12.6-17.9)
Multiple myeloma	9.9	(6.7-13.1)	10.6	(6.8-14.0)	10.1	(7.7-12.5)
Liver, gallbladder	46.2	(39.8-53.2)	50.5	(42.5-57.8)	47.6	(42.4-53.2)
Ovary			9.2	(7.4-10.9)		
Esophagus	31.8	(28.4-35.4)	20.6	(17.7-23.6)	29.0	(26.4-31.8)
Stomach	19.4	(15.6-22.7)	9.7	(7.9-11.4)	15.6	(13.3-17.7)

NYSDOH initiatives

Prevention Agenda 2019-2024

The New York State Prevention Agenda 2019-2024, released in 2019, sets goals to improve the health of New Yorkers in five priority areas and to reduce health disparities (New York State Department of Health 2019). One priority area is preventing chronic diseases, and two focus areas within this priority are 1) improving healthy eating and food security, and 2) increasing physical activity, with the same overarching goal of reducing obesity and risk of chronic disease.

The specific aims for the focus area of healthy eating and food security include 1) increasing access to healthy and affordable foods and beverages; 2) increasing skills and knowledge to support healthy food

and beverage choices; and 3) increasing food security. Objectives in this focus area call for reducing the percentage of children and adults who are obese, decreasing the percentage of adults who consume one or more sugary drinks per day, and decreasing the percentage of adults who consume less than one fruit and less than one vegetable per day.

The specific goals for the focus area of physical activity are 1) improving community environments that support active transportation and recreational physical activity for people of all ages and abilities; 2) promoting school, child care, and worksite environments that support physical activity for people of all ages and abilities; and 3) increasing access, for people of all ages and abilities, to safe indoor and/or outdoor places for physical activity. Objectives in this focus area call for reducing the percentage of children and adults who are obese, increasing the percentage of adults age 18 years and older who participate in leisure-time physical activity, increasing the percentage of adults who meet the aerobic and muscle strengthening physical activity guidelines, increasing the percentage of adults age 18 and over who walk or bike to get from one place to another, and increasing the percentage of high school students who were physically active for a total of at least 60 minutes/day on all 7 days.

The Prevention Agenda acknowledges the necessary role of multiple sectors in accomplishing these objectives. Sectors within which activities can be conducted to reduce illness, disability and deaths related to obesity include the health care delivery system; employers, businesses and unions; the media; academic institutions; community-based health and human service agencies; governmental and non-governmental public health agencies; policy makers and elected officials; community members; and philanthropic organizations.

Obesity Prevention Programs and Activities

The New York State Department of Health works with many partners and contractors to develop and implement a range of obesity prevention programs in community, child care, school and health care settings:

- *Creating Healthy Schools and Communities* program funds local organizations across the state to implement a coordinated, multi-sector effort to increase demand for and access to healthy, affordable foods and opportunities for daily physical activity in high-need school districts and their associated communities, focusing on changing policies and environments that support the creation of healthier schools and communities.
- *Creating Breastfeeding Friendly Communities* program funds local organizations to increase breastfeeding initiation, exclusivity and duration by advancing broad-based policy, system and environmental changes that protect and promote breastfeeding within community settings, businesses, child care and healthcare providers.
- In the health care sector, NYSDOH awards the *Breastfeeding Friendly Practices* designation to pediatric, family, and obstetric/gynecologic provider practices that have improved their outpatient practices' breastfeeding policies and procedures.

- The *Hunger Prevention and Nutrition Assistance Program (HPNAP)* provides funding to 45 contractors that support approximately 2,600 emergency food programs in the provision of nutritious food to those in need throughout New York State. HPNAP policies assure that healthy foods, such as fresh produce, low-fat milk and whole grain cereals are available through eight regional food banks, food pantries, soup kitchens and shelters supported by HPNAP. HPNAP supported food banks implement the Just Say Yes to Fruits and Vegetables initiative (JSY) and conduct nutrition education workshops, food demonstrations and policy, systems and environmental strategies to improve access to healthier foods and physical activity and reduce consumption of sugary beverages. JSY helps to ensure low-income families in New York eat nutritious foods, make the most of their food budgets and prepare foods safely. Workshops provide practical nutrition information using USDA approved lesson plans, recipes and cooking demonstrations focusing on fruits and vegetables and low-fat ingredients.
- The *NYS Special Supplemental Nutrition Program for Women, Infants and Children (WIC)* provides breastfeeding support, nutrition counseling, health education, health care referrals, referrals to other services, and nutritious foods to approximately 370,000 women, infants, and children each month through 88 local providers (hospitals, local health departments and community-based organizations) at 400 service sites. The fundamental purpose of the program is to ensure the health and well-being of income eligible families with young children. WIC provides individually tailored food prescriptions issued to each participant for specific types and brands of foods that meet strict nutrition requirements. These food benefits, valued at over \$300 million annually, can be redeemed at more than 2,800 authorized retail food vendors across the state. NYSDOH has developed initiatives that assist WIC participants in achieving healthier lifestyles and contribute to decreasing overweight and obesity.
- The *NYSDOH Child and Adult Care Food Program (CACFP)* provides reimbursement to child care and day care programs that serve nutritious meals and snacks to children and adults in care. The CACFP's Meal Pattern was implemented to establish nutrition requirements that align more closely with the *Dietary Guidelines for Americans* and with recommendations for preventing overweight and obesity in early childhood. The Eat Well Play Hard in Child Care Settings program is a nutrition education and obesity prevention intervention for CACFP-participating child care centers serving low-income children and their families.
- NYSDOH is funded by the Centers for Disease Prevention and Control (CDC) to conduct activities as part of the *State Physical Activity and Nutrition (SPAN)* Program. Throughout the five-year project period, which began September 30, 2018, SPAN will collaborate with internal and external partners, drawing upon their expertise to inform and scale evidence-based programs using a systems-based approach to sustainably increase food service guidelines, increase community-based care supporting the continuity of breastfeeding (including workplace compliance with both federal and state lactation accommodation laws), increase physical activity through active transport connecting everyday destinations, and implement standards for nutrition and physical activity into statewide

early care and education (ECE) quality improvement rating systems and professional development opportunities.

- *Social marketing and out of home media campaigns* throughout New York State to encourage healthy lifestyle changes such as decreasing consumption of sugar-sweetened beverages and promoting water as the beverage of choice, and encouraging families to engage in regular physical activity. The multi-modal campaigns featured advertisements on TV, radio, social media, billboards, buses, subways and shopping malls, aimed at young, low-income men (18-34 years of age) and families of African American or Hispanic descent.
- The *iChoose600® Media Campaign* was developed to increase consumer awareness about calories in chain restaurants and to provide consumers with guidance on selecting meals within daily calorie recommendations.
- For more information about these initiatives, please visit
https://www.health.ny.gov/prevention/obesity/prevention_activities/

Comprehensive Cancer Control Plan

The New York State Comprehensive Cancer Control Plan 2018-2023 was created as a guide to identify and address the cancer burden in New York State (New York State Cancer Consortium 2018). The Plan was developed by the New York State Cancer Consortium, a statewide network of individuals and organizations from the public and private sectors that collaborate to reduce the human and economic burden of cancer in New York. NYSDOH is a major partner in the Consortium.

Focused on the health outcomes of cancer, the Plan includes measurable objectives, suggested strategies, and evidence-based and evidence-informed interventions and best and promising practices in seven priority areas spanning the cancer continuum. These priority areas include cancer-related health equity, health promotion and cancer prevention, early detection, treatment, palliative care, survivorship, and the healthcare workforce. The health promotion and cancer prevention priority area includes specific goals for the prevention of obesity and risk factors for obesity through suggested strategies including 1) promote policies and initiatives that increase opportunities for physical activity; 2) promote policies and initiatives that increase access to affordable, nutritious foods; 3) promote health plan coverage of medical nutrition therapy and lifestyle change programs (e.g., diabetes prevention programs) that help individuals eat healthier and get more physical activity; and 4) promote and support primary care practices to screen patients on their nutritional and physical activity needs and make appropriate referrals to community-based resources.

Conclusion

The burden of obesity-related cancer in the population is high and growing, even as rates of other cancers collectively trend downward, and the upward trend is more pronounced among persons under age 50, even though this age group represents a small proportion of the total cancers. The overall decrease in colorectal cancer incidence reflects the success of colorectal cancer screening, and the

increase in colorectal cancer incidence in the 20-49 age group underscores the importance of initiating screening at age 45. All of these findings are consistent with the national picture (Steele et al. 2017) and logically follow from increases in the U.S. overweight and obesity rates in recent decades. In order to stem this trend, comprehensive cancer control strategies must continue to include components to promote healthy weight.

References

- Centers for Disease Control and Prevention. 2021. Prevalence of overweight, obesity, and extreme obesity among adults aged 20 and over: United States, 1960–1962 through 2017–2018. Accessed September 1, 2021. Available at <https://www.cdc.gov/nchs/data/hestat/obesity-adult-17-18/obesity-adult.htm>.
- Islami F, Sauer AG, Gapstur SM, Jemal A. Proportion of Cancer Cases Attributable to Excess Body Weight by US State, 2011-2015. *JAMA Oncology* 2019; 5(3): 384-392.
- Lauby-Secretan B, Scoccianti C, Loomis D, Grosse Y, Bianchini F, Straif K; International Agency for Research on Cancer Handbook Working Group. Body fatness and cancer—viewpoint of the IARC Working Group. *New England Journal of Medicine* 2016; 375(8):794–798.
- National Cancer Institute, Division of Cancer Control and Population Sciences. Surveillance Research Program. 2021. Joinpoint trend analysis software. On line: <https://surveillance.cancer.gov/joinpoint>.
- New York State Department of Health. 2019. Prevention Agenda 2019-2024: New York State’s Health Improvement Plan. Accessed September 1, 2019. Available at https://www.health.ny.gov/prevention/prevention_agenda/2019-2024/.
- New York State Cancer Consortium. 2018. New York State Comprehensive Cancer Control Plan 2018-2023. Accessed September 1, 2019. Available at https://www.health.ny.gov/diseases/cancer/consortium/docs/2018-2023_comp_cancer_control_plan.pdf.
- New York State Department of Health. 2021. BRFSS Brief Number 2021-05: Overweight and Obesity, New York State Adults, 2019. Accessed on September 1, 2021. Available at https://www.health.ny.gov/statistics/brfss/reports/docs/2021-05_brfss_overweight_and_obesity.pdf.
- Sung H, Siegel RL, Rosenberg PS, Jemal A. Emerging cancer trends among young adults in the USA: analysis of a population-based cancer registry. *The Lancet: Public Health* 2019; 4(3):e137-e147.
- Steele CB, Thomas CC, Henley SJ, Massetti GM, Galuska DA, Agurs-Collins T, Puckett M, Richardson LC. Trends in incidence of cancers associated with overweight and obesity – United States, 2005-2014. *Morbidity and Mortality Weekly Report* 2017; 66: 1052-1058.