



2021 / 2025

# MARYLAND

## COMPREHENSIVE CANCER CONTROL PLAN



# INTRODUCTION

It is my pleasure to introduce the 2021-2025 Maryland Comprehensive Cancer Control Plan. Cancer is a disease that affects the lives of many people in Maryland and is the second leading cause of death in our state and in the nation. The newly updated 2021-2025 Maryland Comprehensive Cancer Control Plan offers an opportunity to work together by continuing to increase our efforts to reduce cancer risk, detect cancer early, improve treatment, and enhance survivorship.

This plan is a framework for action and collaboration. It serves as a guide for health professionals, who are involved in planning, directing, implementing, evaluating, or performing research on cancer control in Maryland. It is also a resource for all Marylanders (individuals, health care providers, communities, and organizations) on cancer control topics. The updated plan presents content in cross-cutting sections and topics, with a focus on goals, objectives, and strategies. The purpose of the plan is to encourage collaboration and cohesiveness among stakeholders as they work toward reducing the burden of cancer in Maryland.

Representatives from the Maryland Department of Health, Maryland Cancer Collaborative, Maryland State Council on Cancer Control, and cancer survivors and other experts in the state contributed to updating the plan. Collectively, the goals, objectives, and strategies are far-reaching and complex, and no one organization can carry out all these activities.

Rather, the plan is a call to action to encourage individuals or organizations involved in any aspect of cancer control to address one or more of the objectives, and to apply the appropriate strategies and resources as opportunities arise.

It is only through the collaborative efforts of stakeholders across the state that we will succeed in this fight against cancer. We look forward to your participation and continued dedication to reducing the burden of cancer in Maryland.

Sincerely,

**Robert R. Neall**

*Secretary*  
Maryland Department of Health

**Niharika Khanna, MD**

*Chair*  
Maryland Cancer Collaborative

**Kevin Cullen, MD**

*Chair*  
Maryland State Council on Cancer Control



## DEDICATION

This Cancer Plan is dedicated to all the courageous Marylanders and their families who fight or have fought a battle against cancer. The Maryland Comprehensive Cancer Control Plan serves as a tribute to your valiant efforts.



# MARYLAND COMPREHENSIVE CANCER CONTROL PLAN

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2021 - 2025

Prepared by:

**Brian Mattingly**

*Director*

Comprehensive Cancer Control Program

**Erica Smith, MS**

*Deputy Director*

Center for Cancer Prevention and Control

**Pamela Williams, MHA**

*Bureau Director*

Cancer and Chronic Disease Bureau

**Ken Lin Tai, MD, MPH**

*Director*

Center for Cancer Prevention and Control

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The updated 2021-2025 Maryland Comprehensive Cancer Control Plan represents a collaborative effort involving individuals and organizations from across the state of Maryland, including many members of the Maryland Cancer Collaborative. Cancer Plan contributors donated their time, expertise, and experience, and sincere thanks must go to those individuals who helped to draft sections of the Cancer Plan, as well as to those who reviewed drafts and provided feedback to the Maryland Department of Health Center for Cancer Prevention and Control. A list of individuals who contributed to the development of this updated Cancer Plan can be found on the following pages.

In addition, various offices within the Maryland Department of Health contributed staff expertise and resources during the Cancer Plan updating process, including:

- Center for Cancer Prevention and Control
- Center for Tobacco Prevention and Control
- Center for Chronic Disease Prevention and Control
- Environmental Health Bureau
- Infectious Disease Prevention and Health Services Bureau

The collaborative efforts exerted in this process were integral to updating the Cancer Plan. This same collaboration will continue to be vital as we work to implement the strategies of the Cancer Plan and to impact the burden of cancer in Maryland.

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# CONTRIBUTORS

**CLEMENT A. ADEBAMOWO, BM, CHB, SCD, FWACS, FACS**

*Assistant Director of Population Science and Director for Global Health Cancer Research*  
Greenebaum Comprehensive Cancer Center  
Institute of Human Virology  
University of Maryland School of Medicine

---

**CINDY CARTER**

*Executive Director*  
Cancer Support Foundation

---

**DAWN BERKOWITZ, MPH, CHES**

*Director*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health

---

**GEOFF COLEMAN, MD, MHA**

*Chief Medical Director*  
Montgomery Hospice and Prince George's Hospice

---

**ALANNA BIBLOW, MPH, CHES**

*Project Coordinator*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health

---

**JOCELYN COLLINS**

*Maryland and Washington, D.C. Government Relations Director*  
American Cancer Society Cancer Action Network

---

**CHRISTINE BOYD, MPH**

*Overdose Data to Action Program Manager*  
*Office of the Deputy Secretary, Public Health Services*  
Maryland Department of Health

---

**KATHLEEN CONNORS-JURAS**

*Cancer Control Strategic Partnerships Manager*  
American Cancer Society

---

**OTIS W. BRAWLEY, MD, MACP, FASCO, FACE**

*Bloomberg Distinguished Professor of Oncology and Epidemiology*  
Johns Hopkins University

---

**DONNA COSTA, MA, MHS**

*Oncology Outreach Manager*  
University of Maryland, St. Joseph Medical Center

---

**JOSEPH BRODINE, MD, MPH**

*Preventive Medicine Resident*  
Johns Hopkins University  
*Family Medicine Resident*  
Franklin Square

---

**CARLO DICLEMENTE, PH.D.**

*Emeritus Professor of Psychology*  
University of Maryland  
Baltimore County, MD Quit

---

**XUEFANG CAO, PHD**

*Co-Leader of the Tumor Immunology and Immunotherapy Program*  
University of Maryland School of Medicine

---

**CINDY DOMINGO**

*Direct Services Lead*  
Cancer Screening Programs Unit  
Maryland Center for Cancer Prevention and Control  
Maryland Department of Health

**JOANNE EBNER, RN, BSN, TTS**

*Supervisor*  
Cancer Prevention/Nicotine Dependence  
Anne Arundel Medical Center  
DeCesaris Cancer Center

---

**MARIA GERONIMO, MBA, MSN, RN**

*Thoracic Program Coordinator*  
Anne Arundel Medical Center

---

**KIRA EYRING**

*Cancer Control Strategic Partnerships Manager*  
American Cancer Society

---

**SARAH GIERHART, MS**

*Senior Epidemiologist*  
Maryland Center for Cancer Prevention and Control  
Maryland Department of Health

---

**CARMI WASHINGTON FLOOD**

*Chief, Office of Faith-Based and Community Partnerships*  
Infectious Disease Prevention and Health Services Bureau  
Maryland Department of Health

---

**SHILPA GOPINATH, MPH**

*Public Health Applications for Student Experience Intern (Spring 2020)*  
Johns Hopkins Bloomberg School of Public Health

---

**PATRICIA FORD, RN, MPH**

*Volunteer*  
Leukemia and Lymphoma Society

---

**DONNA GUGEL, MHS**

*Director*  
Maryland Prevention and Health Promotion Administration  
Maryland Department of Health

---

**SUZI FORD**

*Cancer Control Strategic Partnerships Manager*  
American Cancer Society

---

**JENNIFER HAYES, MED, MPH**

*Senior Epidemiologist*  
Maryland Cancer Registry  
Maryland Department of Health

---

**NANCY FORLIFER**

*Director Community Wellness*  
UPMC Western Maryland

---

**HOLLY HAYMAN, DNP, RN**

*Director of Clinical Services*  
Compass Regional Hospice and The Hope and Healing Center

---

**PEGGY FUNK, CAE**

*Executive Director*  
Hospice and Palliative Care Network of Maryland

---

**KATHY HOWELL, CMI**

*Medical Interpreter/Cultural Consultant*  
KMH Interpreting, Translation and Cultural Consulting

---

**PAUL GALONSKY, MPA**

*Quality Improvement Specialist*  
Maryland Center for Cancer Prevention and Control  
Maryland Department of Health

---

**NIKARDI JALLAH, MPH**

*Epidemiologist*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health

---



**MARY JOSEPH, RN, BC, CPHQ**

*Project Manager*  
Primary Care Coalition

---

**THUY NGUYEN, MPH**

*Health Educator*  
Cancer Screening Programs Unit  
Maryland Center for Cancer Prevention and Control  
Maryland Department of Health

---

**NORMA KANAREK, PHD, MPH**

*Associate Professor*  
Johns Hopkins Schools of Public Health and Medicine

---

**SADIE PETERS, MD, MHS**

*Medical Director*  
Maryland Center for Population Health Initiatives  
Maryland Department of Health

---

**NIHARIKA KHANNA, MD, MBBS, DGO**

*Professor of Family and Community Medicine*  
University of Maryland School of Medicine

---

**ELIZABETH A. PLATZ, SCD, MPH**

*Professor*  
Johns Hopkins Bloomberg School of  
Public Health and Sidney Kimmel Comprehensive  
Cancer Center at Johns Hopkins

---

**BEN KOSEWSKI, MS, MBA**

*Executive Director, Cancer Services*  
UPMC Western Maryland

---

**ALYSON PRINCE, RN, BSN**

*Doctor of Nursing Practice Candidate*  
*(Spring 2020)*  
University of Maryland School of Nursing

---

**TORI LEWITT**

*Oncology Outreach Program Manager*  
University of Maryland  
St. Joseph Medical Center Cancer Institute

---

**DAVID QUINN, MPH**

*Program Coordinator*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health

---

**ANN MITCHELL**

*President & Chief Executive Officer*  
Montgomery Hospice & Prince George's Hospice

---

**RESHMA ROY, MPH**

*Project Director*  
University of Maryland, Baltimore County, MD Quit

---

**CLIFFORD S. MITCHELL, MS, MD, MPH**

*Director, Maryland Environmental Health Bureau*  
Maryland Department of Health

---

**KIMBERLY STERN, MHA, CTR**

*Program Manager, Maryland Cancer Registry*  
Maryland Department of Health

---

**DANA MONCRIEF, MHS, CHES**

*Chief, Statewide Public Health Initiatives*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health

**CORNELIA STRONGE, RN, BSN, CHPN**

*Vice President Strategic Development*  
Montgomery Hospice & Prince George's Hospice

**ROSA VILLOCH-SANTIAGO**

*Cancer Control Strategic Partnerships Manager*  
American Cancer Society

**JAMES ZABORA, SCD, MSW**

*Director, Outreach & Engagement*  
Johns Hopkins University School of Medicine

**SARA WOLFE, MS**

*Chief, Cessation and Health Systems Initiatives*  
Maryland Center for Tobacco Prevention and Control  
Maryland Department of Health





# WHAT IS THE MARYLAND CANCER COLLABORATIVE?

The Maryland Cancer Collaborative (MCC) is a statewide coalition of volunteers who implement the Maryland Comprehensive Cancer Control Plan. The goals of the MCC are:

- To work with individuals and organizations to implement the Maryland Comprehensive Cancer Control Plan, and
- To bring together existing groups and new partners to collaborate on a common goal: reduce the burden of cancer in Maryland.

## MARYLAND CANCER COLLABORATIVE STRUCTURE

Members of the MCC choose priority objectives and strategies from the Cancer Plan and form workgroups that meet regularly to implement projects in support of those priorities. Examples of current and past MCC workgroups include a Survivorship Workgroup, a Palliative Care Workgroup, a Tobacco Control Workgroup, and a Worksite Wellness Workgroup. The MCC is led by a Steering Committee that is comprised of workgroup chairs.

## ANYONE WHO IS INTERESTED CAN JOIN THE COLLABORATIVE!

Membership is open to individuals and organizations who are interested in taking action to reduce the burden of cancer in Maryland. Benefits of membership include:

- Collaboration to increase impact and maximize resources,
- Regular updates on cancer control activities,
- Access to educational resources, training opportunities, job openings, and grant opportunities, and
- Opportunities to shape MCC activities.

Members agree to:

- Take specific action to implement the Cancer Plan,
- Participate in meetings regularly,
- Contribute to MCC activities, including donating time, funding, expertise, meeting space, educational materials, mailing support, student volunteers, etc., and
- Abide by MCC policies and procedures.

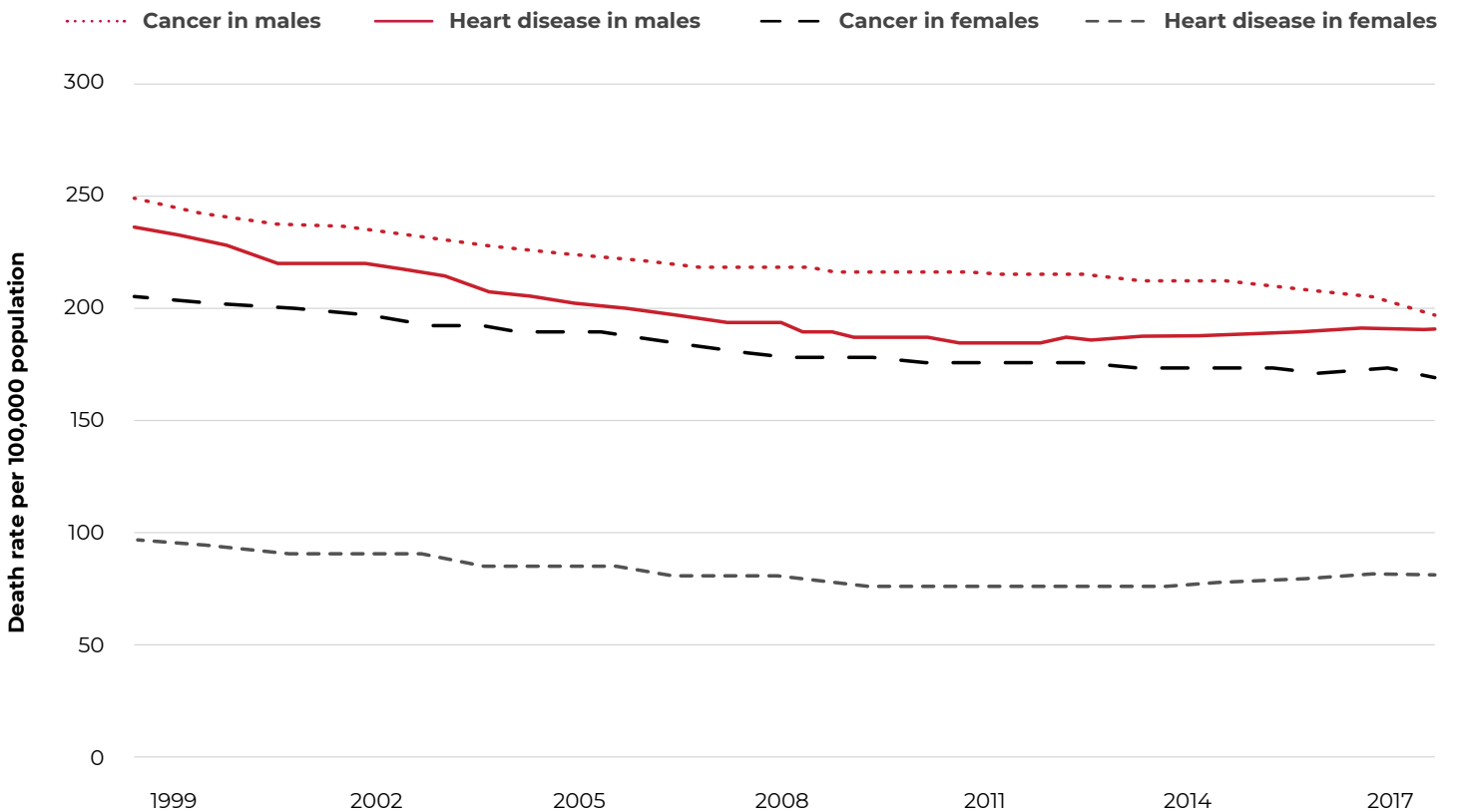
To learn more about the MCC, or to access the membership agreement form to join, visit the MCC website at [phpa.health.maryland.gov/cancer/cancerplan/Pages/collaborative.aspx](http://phpa.health.maryland.gov/cancer/cancerplan/Pages/collaborative.aspx).

You may also visit the MCC on Facebook at [www.facebook.com/marylandcancercollaborative](https://www.facebook.com/marylandcancercollaborative) to learn more!

# WHAT IS THE MARYLAND COMPREHENSIVE CANCER CONTROL PLAN?

Cancer is a disease that affects everyone in Maryland. Each year, more than 31,000 Marylanders are diagnosed with invasive cancer, and countless family members, friends, and co-workers support these patients through their journeys. While the death rate from cancer in the United States has steadily declined since its peak in 1991, cancer continues to be the second leading cause of death in the United States and in Maryland, behind heart disease.<sup>1</sup> For both males and females ages 45 to 64 years old, cancer is the leading cause of death (Figure 1).<sup>2</sup> Cancer is a significant public health problem, and for the benefit of Marylanders, is a focus of statewide public health efforts.

**Figure 1.** Death rates for cancer and heart disease among adults ages 45-64, by sex: United States, 1999-2017



Source: Curtin SC. Trends in Cancer and Heart Disease Death Rates Among Adults Aged 45-64: United States, 1999-2017. National Vital Statistics Reports; vol 68 no 5. Hyattsville, MD: National Center for Health Statistics. 2019.

Comprehensive cancer control is a strategic approach to cancer control that involves communities and partners working together, combining resources, and coordinating efforts to maximize impact in controlling cancer, including:

- Reducing risk,
- Detecting cancers early,
- Improving treatment, and
- Enhancing survivorship.

The Centers for Disease Control and Prevention (CDC) provides support to the 50 states, the District of Columbia, eight tribal groups, and seven U.S. Associated Pacific Islands/territories for a Comprehensive Cancer Control Program. One of the roles of the program is to create and promote a Comprehensive Cancer Control Plan.

## WHAT IS THE PURPOSE OF THE MARYLAND COMPREHENSIVE CANCER CONTROL PLAN?

The Maryland Comprehensive Cancer Control Plan (Cancer Plan) serves as a guide for professionals who are involved in planning, directing, implementing, evaluating, or performing research on cancer control in Maryland. It is also a resource for all Marylanders (individuals and families, health care providers, communities, and organizations) on cancer control topics.

## HOW WAS THE CANCER PLAN DEVELOPED?

The Cancer Plan represents the coordinated efforts of the Maryland Department of Health (MDH) as well as 49 public and private stakeholders from across the state. MDH used the 2016-2020 Cancer Plan as a starting point for revisions, and development of the 2021-2025 Maryland Comprehensive Cancer Control Plan occurred in phases:

1. MDH engaged subject matter experts to review and update the 2016-2020 Cancer Plan,
2. The updated Cancer Plan was presented to partner stakeholders who reviewed and provided feedback,
3. MDH incorporated partner feedback,
4. The revised Cancer Plan was presented to partner stakeholders for additional comments, and
5. MDH finalized the Cancer Plan in the fall of 2020.

The 2021-2025 Cancer Plan continues to focus on goals, objectives, and strategies to promote implementation, and provides consolidated, cross-cutting content and topic areas.


Objectives in the Cancer Plan are specific, measurable, attainable, relevant, time-bound (SMART) and based on available data sources. Most objectives are relevant to multiple cancer sites. Strategies in the Cancer Plan are updated from the 2016-2020 Cancer Plan or based on recent evidence, and when possible, they focus on policy, systems, and environmental changes to impact populations versus individuals.

## WHO SHOULD USE THE CANCER PLAN?

The Cancer Plan is intended for use by all cancer control professionals throughout the state, including health care providers; public health professionals; academics; representatives of community, nonprofit, and advocacy organizations; volunteers; and others. The goals, objectives, and strategies can be tailored to many settings to help guide cancer control activities.

Additionally, the MCC, a statewide coalition of volunteers and organizations that work to implement the Cancer Plan, will review the objectives and strategies, and select priority projects to work on in the coming years.


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Most objectives are relevant to multiple cancer sites. Strategies in the Cancer Plan are updated from the 2016-2020 Cancer Plan or based on recent evidence, and when possible, they focus on policy, systems, and environmental changes to impact populations versus individuals.

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## WHAT CAN YOU DO?

Implement, implement, implement! The Cancer Plan's goal is to encourage collaboration and cohesiveness among stakeholders as they work toward reducing the burden of cancer in Maryland. Collectively, the goals, objectives, and strategies are far-reaching and complex, and no single organization can carry out all these activities. Rather, the Cancer Plan is a call to action to encourage individuals or organizations involved in any aspect of cancer control to address one or more of the objectives, and to apply the appropriate strategies and resources as opportunities arise. Examples of what stakeholders can do to reduce the burden of cancer in Maryland include:

### Individuals and Families

- Educate yourself and read the Cancer Plan!
- Take action to reduce your risk of getting cancer (see Section 1).
- Talk to your health care provider about cancer screenings that are right for you.
- Support cancer-related organizations and efforts in the community.
- Advocate for policies that support cancer control.
- Share and take advantage of resources that are available to support cancer survivors.

- Report cancer cases, as directed by Maryland law, to the Maryland Cancer Registry.
- Advocate for policies that support cancer control.
- Share resources that are available to support cancer survivors.

### Academic and Other Cancer Researchers

- Use the Cancer Plan as a guide when selecting and planning cancer control research efforts.
- Distribute research findings, for which support is sufficient, widely to other cancer control stakeholders in Maryland.
- Share resources that are available to support cancer survivors.

### Local Health Departments and Community Organizations

- Use the Cancer Plan as a guide when selecting and planning cancer control initiatives and research efforts.
- Promote wellness initiatives and events that promote preventive behaviors and offer early detection opportunities.
- Advocate for policies, programs, and funding that support cancer control.
- Share resources that are available to support cancer survivors.

### Health Care Providers

- Be aware of the comprehensive cancer control planning efforts in Maryland.
- Educate patients about preventive behaviors, early detection, clinical trials, and survivorship resources.
- Participate in community cancer control efforts and work toward the elimination of disparities in underserved populations.

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**The Cancer Plan's goal is to encourage collaboration and cohesiveness among stakeholders as they work toward reducing the burden of cancer in Maryland.**

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# KEY TERMS AND ACRONYMS USED IN THE CANCER PLAN

Several cancer and surveillance terms are used throughout the Cancer Plan. Acronyms are also used to refer to various organizations, departments, offices, programs, and data collection and surveillance systems. A list of the most commonly used terms is provided below; please refer to the chart on page 19 for acronym references.

## Age-Adjustment

Age is the most important risk factor for the incidence of most cancers. Cancer rates derived from populations that differ in underlying age structure are not comparable. Age-adjustment is a statistical technique that allows for the comparison of rates among populations having different age distributions by weighting the age-specific rates in each population to one standard population.

## Age-Specific Rate

The total number of events occurring in a specified age or age group in a definitive geographic region (state, county, etc.) divided by the total population of the same age or age group in the same geographic region during a specified time period, usually one year.

## Cancer

A collection of diseases that involve the division and growth of abnormal cells forming a tumor. These can invade and spread into surrounding tissues. Cancers are malignant tumors.

## Carcinogen

Any substance that has been shown to cause cancer.

## Health Care Provider

A health professional who delivers health care services. Providers may include doctors (internists, family physicians, pediatricians, surgeons, and specialists), nurse practitioners, physician assistants, dentists, and others.

## Incidence

The number of newly diagnosed cases during a specific time period. Cancer incidence rates in the Cancer Plan are the number of cases diagnosed per 100,000 population and reported for one year (2016) or as the average annual incidence rate for several aggregated years (usually 2012 through 2016).





## In situ

In its original place. When cancer is “in situ,” abnormal cells are found only in the place where they first formed. They have not invaded and spread. If left untreated, this form of cancer can become invasive.

## Malignant

A tumor that has the ability to invade and destroy nearby tissue and spread to other parts of the body.

## Morbidity

A disease or the incidence of disease within a population. Morbidity also refers to adverse effects caused by a disease or a treatment.

## Mortality

The number of deaths during a specific time period. Cancer mortality rates in the Cancer Plan are the number of deaths per 100,000 population and are reported for one year (2016) or as the average annual rate for several aggregated years (usually 2012 through 2016).

## Primary Prevention

Action taken to decrease the chance of getting a disease or condition. Primary prevention of cancer includes avoiding risk factors (such as smoking, obesity, lack of exercise, radiation exposure, sun and ultraviolet radiation exposure), increasing protective factors (such as getting regular physical activity, staying at a healthy weight, having a healthy diet, getting vaccinated against cancer-causing viruses), and having early pre-cancers removed before they become invasive.

## Rate

An estimate of the burden of a given disease on a defined population in a specified period of time. A crude rate is calculated by dividing the number of cases or deaths by the population at risk during a given time period. Cancer incidence and mortality rates are usually presented per 100,000 population during a defined time period. All rates in the Cancer Plan are either age-specific or age-adjusted using the method described above.



## Risk Factor

Something that may increase the chance of developing disease. Examples of risk factors for cancer include age, a family history of certain cancers, use of tobacco products, certain eating habits, obesity, lack of exercise, exposure to the sun or other radiation, exposure to other cancer-causing agents at work or at home, and certain genetic changes.

## Screening

A test to look for cancer before symptoms are present. Screening involves the use of a variety of tests and tools to look for cancer or pre-cancer, such as mammograms to screen for breast cancer and colonoscopies to screen for colorectal cancer and/or polyps.

## Stage

The extent of a cancer in the body. Staging is usually based on the size of the tumor, whether lymph nodes contain cancer, and whether the cancer has spread from the original site to other parts of the body such as the lungs, liver, bones, or brain. The stage at diagnosis information used in the Cancer Plan is based on the SEER Summary Stage Guidelines:

- **In situ:** The cancerous cells have not invaded the tissue basement membranes. In situ cancers are not considered malignant (with the exception of bladder cancers) and are not included in incidence rate calculations.
- **Localized:** The tumor is confined to the organ of origin.

- **Regional:** The tumor has spread to adjacent organs or tissue. Regional lymph nodes may also be involved.
- **Distant:** The tumor has spread beyond the adjacent organs or tissues. Distant lymph nodes, organs, and/or tissues may also be involved.
- **Unstaged:** The stage of disease at diagnosis was unable to be classified or was not reported to the Maryland Cancer Registry.

## Survivor

An individual living with, through, or beyond cancer from the moment of diagnosis through the rest of life.

## Survival Rate

The percentage of people in a study or treatment group who are alive for a given period of time after diagnosis. The Cancer Plan generally presents five-year survival rates.

## Tumor

A mass of tissue that results from the abnormal division of cells. Tumors may be benign (not cancer) or malignant (cancer).



<b>ACA</b>	Affordable Care Act
<b>ACIP</b>	Advisory Committee on Immunization Practices
<b>ACS</b>	American Cancer Society
<b>ASCO</b>	American Society of Clinical Oncology
<b>BRFSS</b>	Behavioral Risk Factor Surveillance System
<b>CDC</b>	Centers for Disease Control and Prevention
<b>CDC WONDER</b>	CDC Wide-Ranging Online Data for Epidemiologic Research
<b>CoC</b>	American College of Surgeons Commission on Cancer
<b>CRF</b>	Cigarette Restitution Fund
<b>EPA</b>	Environmental Protection Agency
<b>FDA</b>	Food and Drug Administration
<b>HP 2020</b>	Healthy People 2020
<b>MCR</b>	Maryland Cancer Registry
<b>MDE</b>	Maryland Department of the Environment
<b>MDH</b>	Maryland Department of Health
<b>NCCN</b>	National Comprehensive Cancer Network
<b>NCHS</b>	CDC's National Center for Health Statistics
<b>NCI</b>	National Cancer Institute
<b>NIS</b>	National Immunization Survey
<b>SNAP &amp; SNAP-Ed</b>	Supplemental Nutrition Assistance Program & SNAP Education
<b>USDA</b>	United States Department of Agriculture
<b>USPSTF</b>	United States Preventive Services Task Force
<b>US SEER &amp; SEER*Stat</b>	NCI's Surveillance, Epidemiology, and End Results Program & SEER Statistical Software
<b>YRBS/YTS</b>	Youth Risk Behavior Survey/Youth Tobacco Survey

# SURVEILLANCE AND CANCER DATA USED IN THE CANCER PLAN

Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health data, essential to the planning, implementation, and evaluation of public health practice, and closely integrated with the dissemination of these data to those who need to know.<sup>3</sup> Cancer surveillance includes the collection of data on the occurrence of cancer (incidence), cancer deaths (mortality), risk factors for the development of cancer (e.g. smoking, overweight, ultraviolet radiation exposure), cancer screening behaviors (e.g. the use of mammography, colonoscopy, and Pap and/or human papillomavirus (HPV) tests), and diagnostic and treatment services. A well-functioning cancer surveillance system transforms complete, timely, and high-quality data into information that is easily accessible to those who use it to prevent and control the disease.

In Maryland, there are several programs and surveys that collect, store, and disseminate data related to cancer, and these sources are referenced throughout the Cancer Plan. The main sources of state-level cancer data are summarized below, with additional data sources available online at [phpa.health.maryland.gov/cancer/Pages/surv\\_data-reports.aspx](http://phpa.health.maryland.gov/cancer/Pages/surv_data-reports.aspx).



## MARYLAND CANCER REGISTRY (MCR)

MDH manages the MCR, which collects and maintains confidential data on all reportable cancers diagnosed or treated in Maryland residents. Within six months after a diagnosis of invasive and in situ cancer (excluding basal and squamous skin cancer of non-genital sites), information about the individual and the cancer must be reported to the MCR by hospitals, radiation therapy centers, ambulatory care centers, laboratories, and/or physicians. Cases among Maryland residents diagnosed or treated outside of Maryland are reported through interstate data exchange agreements with 47 other registries.



## CDC WONDER

CDC WONDER is an online, menu-driven system that makes CDC information resources available to public health professionals and the public at large. It permits access to statistical research data published by CDC, as well as reference materials, reports, and guidelines on health-related topics. For this Cancer Plan, data on both national and Maryland-specific mortality rates across all types of cancers were obtained through this system.



## BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS)

MDH conducts a statewide BRFSS survey each year, which collects data from adults age 18 and older on many health-related risk factors, the use of preventive services, and prevalence of chronic diseases, including cancer. BRFSS collects data on tobacco use, nutritional habits, cancer screening behaviors, cancer survivorship, and many other topics related to cancer.



## YOUTH RISK BEHAVIOR SURVEY/YOUTH TOBACCO SURVEY (YRBS/YTS)

MDH conducts the YRBS/YTS, which is a combination of the YRBS and the previous YTS. The YRBS/YTS collects data on a broad range of youth tobacco and other risk behaviors among both middle and high school youth from randomly selected schools and classrooms across the state.

Cancer data can be used to support population-based research, which can identify trends and drive progress in cancer prevention, detection, diagnosis, treatment, and quality of life. Enhanced research into cancer risk factors, etiology, outcomes, and knowledge, attitudes, and behaviors of the public and of providers is needed. Section 2 further discusses the importance of cancer research.



# SPECIAL TOPICS IN CANCER CONTROL

There are some topics in cancer control that span the cancer continuum and affect patients at all points of the cancer journey. In particular, access to health care and cancer disparities are two areas that present opportunities and challenges for patients, public health professionals, and health care providers across the continuum. These two topics are highlighted below and are mentioned throughout the Cancer Plan.

## ACCESS TO HEALTH CARE

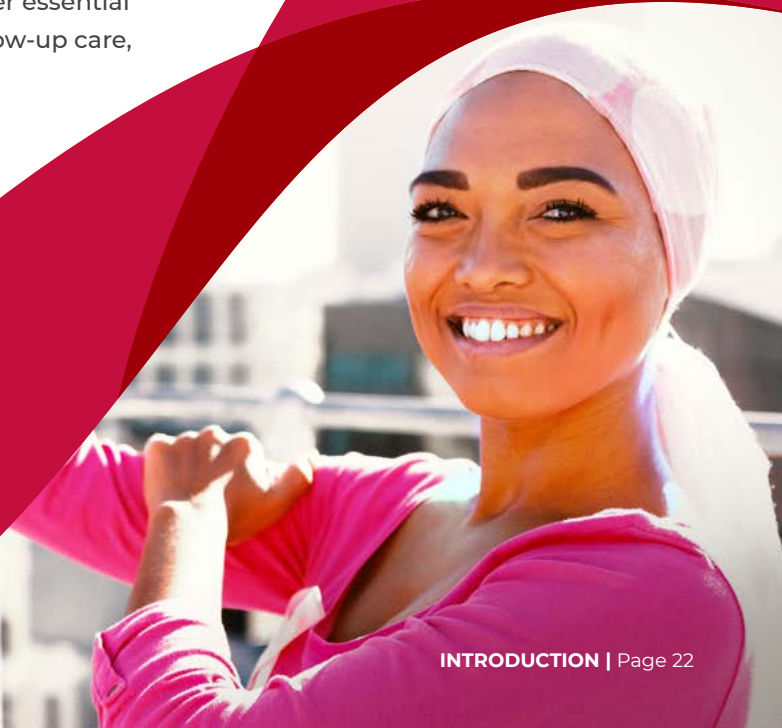
Health insurance coverage helps patients access affordable, quality health care. Lack of adequate coverage makes it difficult for people to get the health care they need and, when they do get care, they can be faced with large medical bills. Uninsured people are:

- More likely to have poor health status,
- Less likely to receive medical care,
- More likely to be diagnosed later, and
- More likely to die prematurely.<sup>4</sup>

Access to health care is vitally important for optimal cancer prevention, early detection, and treatment. Uninsured cancer patients are at greater risk to be diagnosed with a relatively more advanced, late-stage cancer due to delays in cancer diagnosis.<sup>5</sup> The uninsured are also at increased risk of financial hardship from cancer treatment.<sup>6</sup>

In 2010, the Patient Protection and Affordable Care Act (ACA) put into place comprehensive health insurance reforms, including several notable provisions that make cancer prevention, screening, diagnosis, and treatment more accessible. These include:

- Expanding Medicaid eligibility for adults,
- Establishing health insurance marketplaces for individuals and small businesses to purchase health insurance plans,
- Requiring health insurance plans in marketplaces to cover essential benefits, including cancer screening, treatment, and follow-up care,



- Prohibiting insurers from refusing to provide health insurance coverage based on a pre-existing condition,
- Offering tax credits to low- and moderate-income families and small businesses to make health insurance more affordable, and
- Making many recommended preventive services available at no cost through most plans.

Maryland's health insurance marketplace, Maryland Health Connection, became operational in 2013 and open enrollment is available each fall, with enrollment available at other times of the year under certain circumstances. In 2019, nearly 157,000 Marylanders were enrolled in a private health plan through the Maryland Health Connection.<sup>7</sup> In addition, in 2019 more than 200,000 people qualified for the expanded Medicaid program, the government insurance for low-income people, helping reduce the number of uninsured people in the state to about 6%.<sup>8,9</sup> See the Maryland Health Connection website for details: [www.marylandhealthconnection.gov](http://www.marylandhealthconnection.gov).

Many newly insured Marylanders may not be aware of the cancer prevention and screening services that are available through their health insurance plan, or of the importance of these services. Health care systems and medical providers are in a strong position to ensure that patients are informed about and take advantage of health insurance benefits by discussing United States Preventive Services Task Force (USPSTF) guidelines with patients and recommending appropriate services.

Preventive services, including cancer preventive services and screenings with a USPSTF A or B recommendation, are now available at no cost through most health insurance plans. These recommendations are included throughout the Cancer Plan, both in the narrative content of each section and in the strategies. The complete list of USPSTF A and B recommendations is available online: [www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations](http://www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations). All health insurance plans differ, and patients should contact their insurer for details about coverage and out-of-pocket costs including co-payments, deductibles, and coinsurance.



# CANCER DISPARITIES

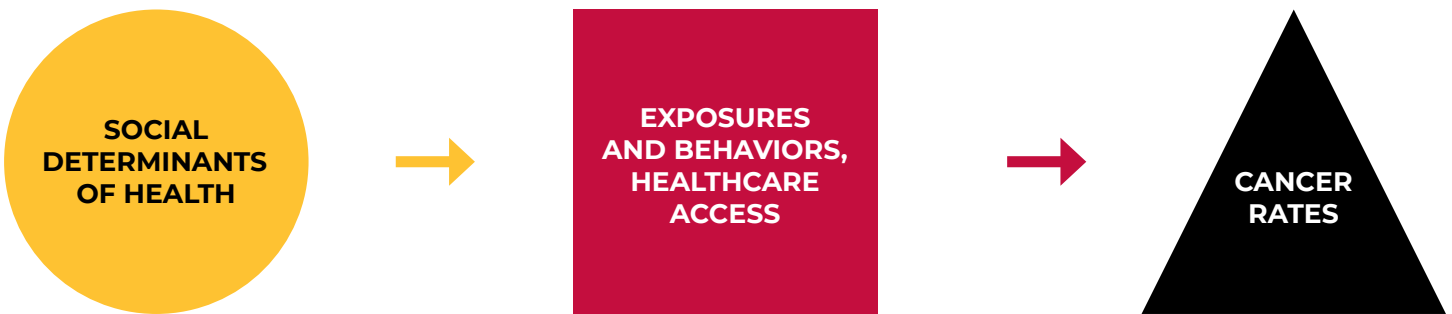
Healthy People 2020 (HP 2020) defines health disparities as “a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion.”<sup>10</sup> Although not all differences in cancer rates represent disparities as defined by HP 2020, cancer data suggest that Maryland residents in many of these population groups (defined by socioeconomic status, race or ethnicity, geographic location, or sexual orientation) do not have the same opportunities as other populations

to make choices that allow them to live long, healthy lives. These population groups face obstacles that prevent them from accessing and receiving effective health services including health promotion, disease prevention, early detection, and high-quality medical treatment and, as such, are faced with poorer health outcomes.

## Social Determinants of Health

HP 2020 states that social determinants of health are conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.<sup>11</sup> Simply put, differences in social determinants of health influence an individual's unhealthy exposures and behaviors, and can lead to disproportionate rates of cancer across a population (Figure 2). Evidence suggests that social determinants of health play a far more pivotal role contributing toward health disparities than biological factors.<sup>12</sup>

Figure 2. Pathway of Social Determinants of Health





The Prevention Institute’s Health Equity and Prevention Primer lists four general social determinants of health: Place, Social, Health Care Services, and Equitable Opportunity.<sup>13</sup> These determinants can influence individual exposures and behaviors that can lead to an increase in cancer incidence and mortality.

**Place** refers to the physical environment that surrounds an individual throughout their life (where they live, work, and play), and includes exposure to water and air pollution (e.g. airborne particulates) and unsafe streets, as well as access to healthy fruits and vegetables (e.g. farmer’s markets) and affordable and safe housing (e.g. homes free of radon exposure).

**Social** is the social and cultural environment of a community and includes familial norms (e.g. cigarette smoking), religion, and trust among neighbors and social networks.

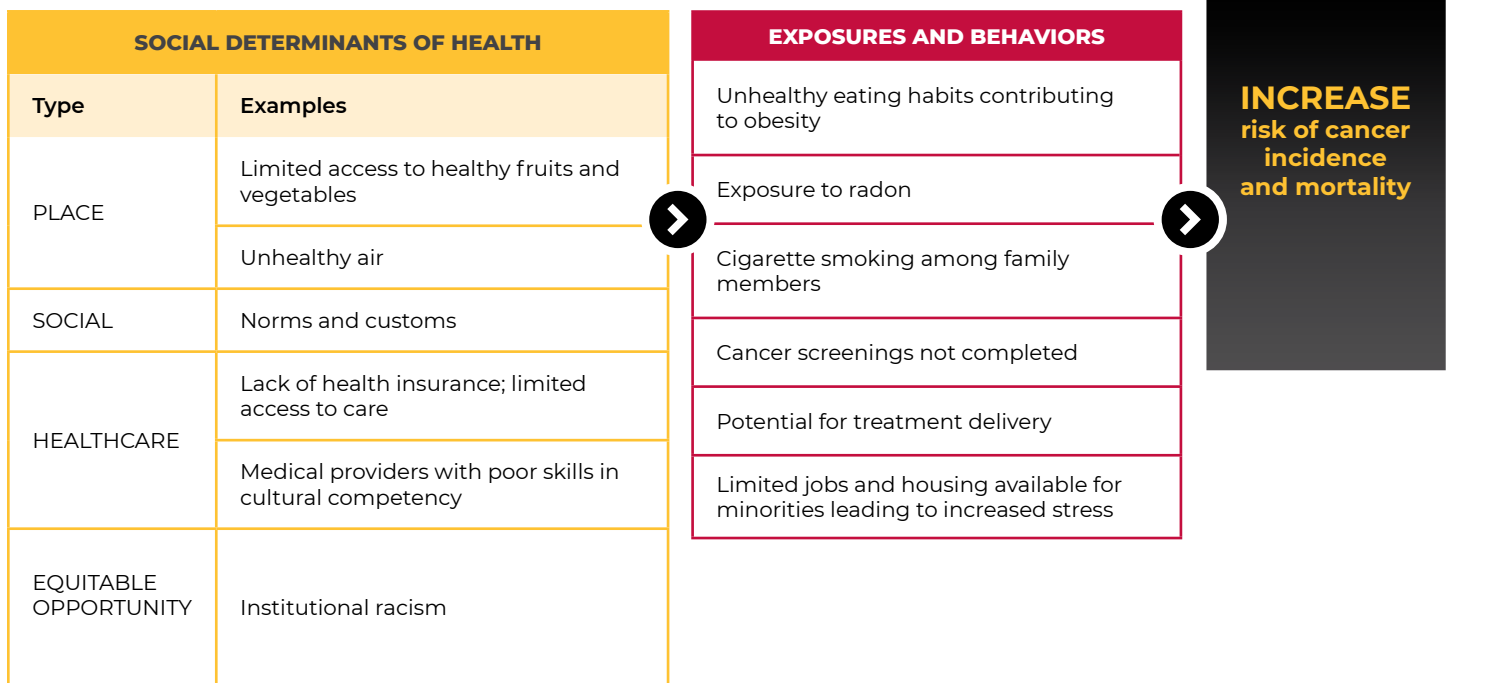
**Equitable Opportunity** refers to the distribution of opportunity and resources in a community, and includes racial injustice, unemployment, and educational opportunities.

**Health Care Services** are factors that ensure high-quality, linguistically, and culturally appropriate services for all communities and include access to high-quality cancer screenings and culturally competent interactions with health care providers\*.

\*Unconscious or unintentional bias on the part of health care providers and public health professionals can impact communication with patients, care provided, and ultimately patient outcomes. Providers may intentionally or unintentionally have and communicate different expectations for patients in disadvantaged populations (defined by race, ethnicity, income, education, etc.), which in turn, may influence patient expectations and/or behavior and lead to health disparities.<sup>14</sup>

Table 1 provides specific examples of each social determinant of health with precipitating unhealthy exposures and behaviors.

**Table 1.** Example of social determinants of health and precipitating unhealthy exposure and behaviors



## Cancer Disparities in Maryland

Disparities in cancer incidence, mortality, and screening rates are experienced across many population groups in Maryland, including racial and ethnic minorities; individuals living in Baltimore City, rural, and other geographic areas of the state; and the uninsured. See Section 2 of the Cancer Plan for data on differences and/or disparities in cancer rates. While the availability of data for cancer disparities by language, disabilities, and sexual orientation is not consistently available in Maryland, studies done nationally and in other states have shown that they exist.<sup>15,16,17</sup>

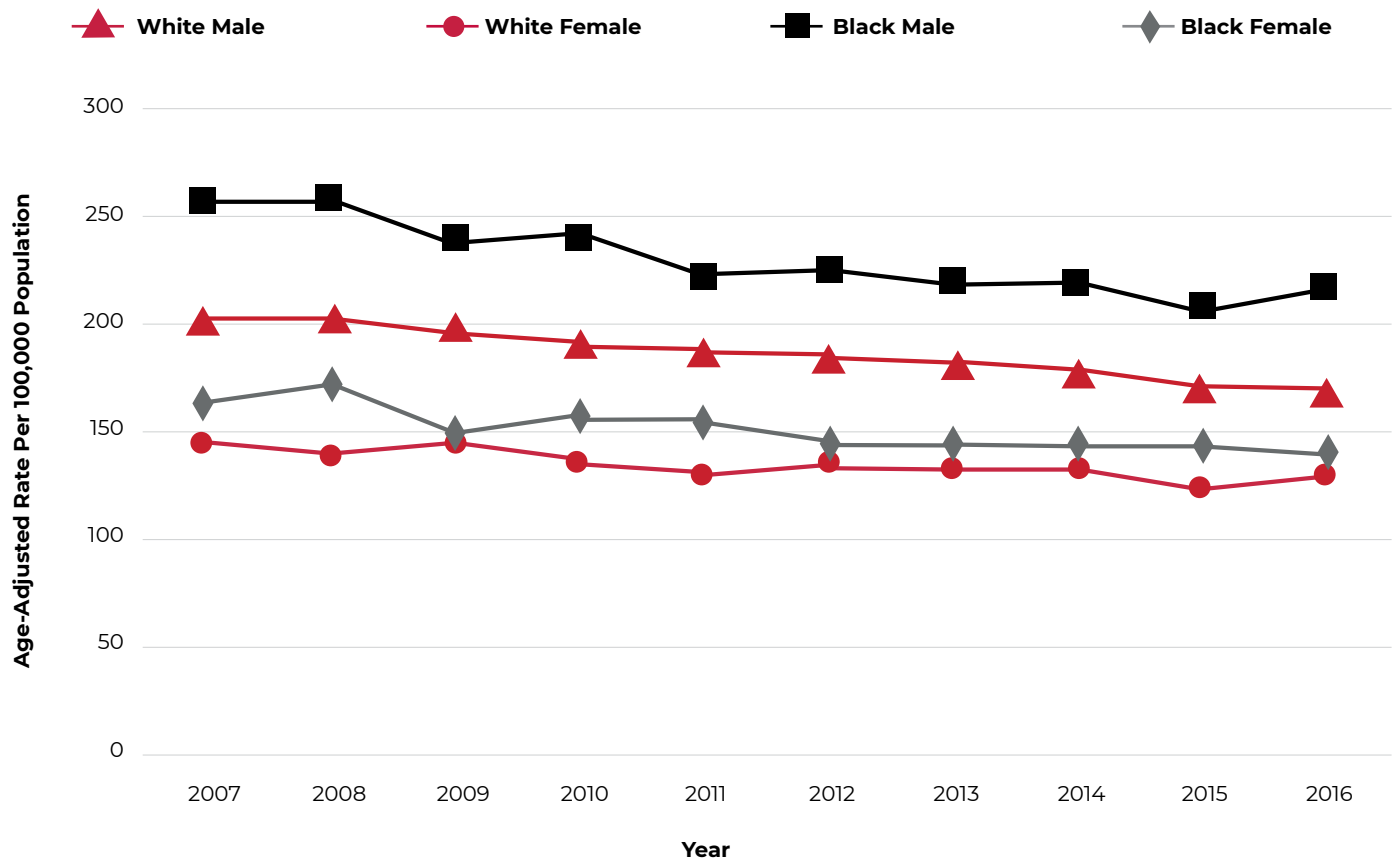
### *Race and ethnicity*

Racial and ethnic minorities are more likely to be socioeconomically disadvantaged, suffer from racial injustice, live in substandard housing, and have less access to high-quality health care. In Maryland, as of 2018, racial and ethnic minorities represented 43.8% of the population. It is estimated that the Black or African American population made up 29.8% of the total population; the Asian population made up 6.2%; the American Indian and Alaska Native population made up 0.3%; the Native Hawaiian and Other Pacific Islander population made up 0.1%; and the Hispanic population made up 9.8%.<sup>18</sup>

- 59% of individuals living below the poverty line are minorities in Maryland.<sup>19</sup>
- Black men and women had higher cancer mortality rates than their White counterparts from 2007 to 2016, and Black men continued to have the highest overall cancer mortality rate among both sexes and racial groups over the last ten years in Maryland (Figure 3). This figure also demonstrates a difference in mortality rates between men and women, with men having higher cancer incidence and mortality rates, although this may not represent a disparity as defined by HP 2020.
- Blacks or African Americans in Maryland had the highest overall cancer incidence and mortality rate of any racial or ethnic group, including White, during the period 2012 to 2016 (Table 2).\*



**Figure 3.** All Sites Cancer Mortality Rates by Race and Sex in Maryland, 2007-2016



Source: CDC WONDER, NCHS Compressed Mortality Files, 2007-2016

\*Table 2 suggests lower cancer incidence and mortality rates among other minority populations; however, this may be at least partially an indication of difficulties with accurate data collection among these populations, rather than an indication of health status.

**Table 2.** Maryland Cancer Incidence and Mortality by Race and Ethnicity, 2012-2016

YEAR 2012-2016		
	Overall Incidence	Overall Mortality
White	453.6	158.6
Black	437.6	179.4
Hispanic/Latino	288.3	75.1
Asian	265.2	86.7
A I/A N	206.2	61.8

Rates are per 100,000 and age-adjusted to the 2000 US standard population.

Source: Maryland Cancer Registry 2012-2016; NCHS Compressed Mortality File in CDC WONDER, 2012-2016

## *Geographic location*

In Baltimore City, an urban, densely populated region, the cancer mortality rate is 33% higher than other parts of the state.<sup>20</sup> Similarly, much of Maryland's rural population also suffers from cancer mortality rates that are higher than the state average.<sup>21</sup> There are likely many underlying differences between geographic areas that lead to disparities in cancer rates, such as the prevalence of poverty in these areas.

## *Health insurance coverage*

A higher proportion of Marylanders with health insurance report being up to date with recommended screenings for colorectal, breast, and cervical cancer compared to those without health insurance.<sup>22</sup>

## **Populations of Concern for Cancer Disparities**

In the past, the subject of racial disparities has focused on racial/ethnic differences in outcome—especially Black-White disparities. There is differential access to health promotion, disease prevention, early detection, and high-quality medical treatment by race, resulting in poorer outcomes.

There is increasing understanding that other groups are also medically underserved and suffer poorer outcomes. Unfortunately, existing databases do not demonstrate these disparities as clearly. Rural Marylanders have greater difficulty accessing health care, both preventive and therapeutic, most often due to distances that must be traveled to see a health care provider. Some of this disparity is also driven by socioeconomic deprivation and issues with cost and affordability of health care.<sup>23</sup>

The lesbian, gay, bisexual, transsexual, queer and questioning (LGBTQ) community, also referred to as sexual minorities, is another group that is medically underserved and suffers disparities in health outcomes.<sup>24</sup> Sexual minorities represent between 3 to 12% of the adult U.S. population.<sup>25</sup> They span all races, ethnicities, ages, socioeconomic statuses, and regions of the United States.

There is insufficient data on sexual minorities in national databases and registries recognized by HP 2020.<sup>26</sup> Sexual minorities, however, do appear to have a higher prevalence of smoking, alcohol use, and obesity. These are factors that increase risk of cancer and are areas in which public health and health care providers might focus. Pregnancy reduces the risk of breast cancer, and there are some data to suggest that lesbians are at higher risk of breast cancer due to a higher likelihood of having never given birth.<sup>27</sup>



Surveys show that many sexual minorities underutilize and delay seeking health care. This is often related to concerns about discrimination and stigma.<sup>28,29,30</sup> The common perception of a barrier to health care access demonstrates the need for culturally competent health care providers and welcoming health care systems. Indeed, health care providers need to focus on providing a safe environment for LGBTQ-friendly services.

By some estimates, as many as one in five U.S. adults has a physical disability.<sup>31</sup> Disabilities in mobility and cognition are the most common. Persons with disabilities also experience significant disparities in cancer outcomes. Disparities in receipt of care (preventive and therapeutic) have been noted.<sup>32,33</sup> The causes include access barriers such as transportation, as well as the perception of prejudice on the part of provider. Again, the health care provider having cultural competence and providing a safe, welcoming environment are important.


Immigrants are also at an increased risk for some cancers because of risk factors they are exposed to in their countries of origin, as well as potential language and cultural barriers to cancer screening.<sup>34</sup> Additionally, health issues and potentially carcinogenic exposures (including sun and pesticide exposure) in the migrant worker population in Maryland are an emerging public health concern.

## Interventions and Promising Practices to Eliminate Cancer Disparities

Literature suggests that any efforts to reduce or eliminate cancer disparities without addressing social issues such as poverty, culture, and social injustice are unlikely to be successful.<sup>35,36</sup> Important factors for the success of interventions to eliminate cancer disparities include:

- Conducting a needs assessment to define specific areas of concentration prior to implementing an intervention.
- Data collection, analysis, and reporting that identifies and tracks results for disadvantaged subpopulations.
- Using intensive recruitment and follow-up methods, specifically targeting disadvantaged populations.
- Ensuring community commitment and input, and full involvement in planning from community members, leaders, and stakeholders.
- Educating community members, leaders, and stakeholders on how to advocate for interventions, programs, and policies.
- Ensuring that the intervention is culturally competent by assuring the use of culturally competent intervention staff and educational materials.
- Ensuring adequate diversity of the intervention staff and workforce.
- Employing the use of multidisciplinary teams and multiple strategies.
- Deploying intervention elements that seek to mitigate the harmful effects of adverse social determinants of health. Community Health Worker interventions are particularly promising for this purpose.
- Providing resources that allow the intervention to be sustainable.


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The opportunities presented by health care access and the challenges around cancer disparities are addressed throughout the Cancer Plan. In particular, Section 2 takes a closer look at disparities in cancer incidence, mortality, and screening rates in Maryland.

The remaining content of the Cancer Plan is divided into three sections based on areas along the cancer continuum: primary prevention of cancer; high burden cancers in Maryland; and survivorship, palliative care, and hospice care. As you read through the Cancer Plan, be mindful of opportunities to incorporate objectives and strategies into your work or life!

SECTION 1

# PRIMARY PREVENTION OF CANCER



# PRIMARY PREVENTION OF CANCER

Primary prevention is action taken to decrease the chance of getting a disease or condition. Cancer prevention continues to be a priority in Maryland for public health practitioners and health care providers. This section focuses on risk factors where healthy behaviors may prevent or lower the risk of cancer.

One's risk for developing and dying from cancer may be reduced by maintaining a healthy weight (eating a healthy diet and being physically active), preventing or stopping tobacco use, getting vaccinated to prevent certain types of cancer, limiting alcohol use, and avoiding excessive exposure to ultraviolet rays from the sun and tanning beds.<sup>37</sup> Table 3 summarizes estimates of the proportion of cancer deaths attributable to various risk factors, many of which are modifiable.

**Table 3.** Proportion of Cancer Cases Attributable to Potentially Modifiable Risk Factors in the U.S.

RISK FACTOR	ESTIMATE
Cigarette Smoking	19.0%
Excess Body Weight	7.8%
Alcohol	5.6%
UV Radiation	4.7%
Physical Inactivity	2.9%
Low Fruit/Vegetable Intake	1.9%
HPV Infection	1.8%

Source: Islami F, Goding Sauer A, Miller KD, Siegel RL, Fedewa SA, et. al. Proportion and Number of Cancer Cases and Deaths Attributable to Potentially Modifiable Risk Factors in the United States. *CA Cancer J Clin* 2018 Jan;68(1):31-54.

## TOBACCO USE

Tobacco use remains the number one cause of preventable death and disease in the U.S. Nearly 40 million U.S. adults still smoke cigarettes, and about 4.7 million middle and high school students use at least one tobacco product, including e-cigarettes, placing their health at risk.<sup>38,39</sup> Each year, nearly half a million Americans die prematurely of smoking or exposure to secondhand smoke.<sup>40</sup> Another 16 million live with a serious illness caused by smoking.<sup>41</sup> The U.S. Surgeon General's 2014 Report on the Health Consequences of Smoking links tobacco use to Type 2 diabetes, rheumatoid arthritis, respiratory and cardiovascular diseases, stroke, and more than 15 different types of cancers, including cancer of the oral cavity and pharynx, larynx, liver, lung, bronchus, trachea, stomach, colon, rectum, cervix, esophagus, bladder, kidney, pancreas, and blood.<sup>42</sup>

Approximately 30% of all cancer deaths in the U.S. are attributable to smoking, and nearly 90% of lung cancer deaths among men and 80% of lung cancer deaths among women are due to smoking.<sup>43,44</sup> Lung and bronchus cancers are the leading causes of cancer deaths in both men and women in Maryland, responsible for nearly 13,500 deaths from 2012 to 2016.<sup>45</sup> Furthermore, there are important disparities in tobacco-related cancers. Despite lower smoking rates, Black and African American adults in Maryland die from lung and bronchus cancer at similar rates to White adults.<sup>46</sup> This disparity may be in part due to high menthol cigarette use in African American communities, as well as access to care issues.



Quitting tobacco use can dramatically decrease the risk of tobacco-related cancers.<sup>47</sup> Increasing both the number of Maryland residents who have never smoked a cigarette (or used other tobacco products — such as cigars, chew, snuff, snus, pipe) and the number of tobacco users who quit and remain tobacco-free reduces avoidable death and suffering due to tobacco-related diseases. For those diagnosed with cancer, treating tobacco use leads to improvement in cancer treatment outcomes, as well as decreased recurrence.<sup>48</sup> The National Comprehensive Cancer Network (NCCN) recommends rigorous tobacco treatment plans for all tobacco users diagnosed with cancer as smoking relapse is common.<sup>49</sup>

Implementation of evidence-based tobacco prevention and control strategies, along with enhanced strategies to support tobacco treatment, will help achieve a major reduction in tobacco-related death and disease in Maryland.<sup>50,51</sup>

## ESCALATION IN YOUTH TOBACCO USE

In the 2018-2019 school year (referred to as 2018 data), 27.4% of Maryland youth — about 65,000 youth — reported current tobacco product use, including e-cigarette, or electronic smoking device (ESD) use.\* ESDs were by far the most popular tobacco product (23.0%), followed by cigars (6.0%), cigarettes (5.0%), and smokeless tobacco (4.6%). Although youth use of cigarettes and cigars decreased significantly from 2000 to 2018, ESD use has increased dramatically, reversing nearly two decades of progress.

In 2018, the U.S. Surgeon General called the surge in ESD use among youth an epidemic, with national data showing a 78% increase in current youth use between 2017 and 2018. Maryland saw youth ESD use increase at a similar rate — 72.9% between 2016 and 2018. The high level of nicotine content in most of these products, coupled with known and unknown effects of chemicals and other ingredients inhaled, makes ESD use a public health concern. The human brain is not fully developed until 25 to 26 years of age. Introducing nicotine, which is highly addictive, can negatively impact development, including areas of the brain that control learning, mood, attention, and impulse control.<sup>52</sup> The American Lung Association states that inhaling the aerosols from ESDs can cause lung disease and irreversible lung damage due to lung exposure to inhaled toxins.<sup>53</sup> Furthermore, youth who use ESD products are more likely to smoke cigarettes or become addicted to other drugs, as nicotine primes the young brain for addiction.



Although youth use of cigarettes and cigars decreased significantly from 2000 to 2018, ESD use has increased dramatically, reversing nearly two decades of progress.




An estimated 7,000 or more kid-friendly fruit and candy ESD flavors (often referred to as “e-liquid” or “e-juice”) make these products extremely attractive to youth. More than 95% of youth who used an ESD in 2018 used a flavoring other than tobacco flavor. Cigars and little cigarillos are also available in a variety of attractive flavors, and these products are sold in single or small packs that are accessible to price-sensitive youth. A common misperception is that ESDs, as well as cigars and smokeless tobacco products, are less harmful; however, they are just as addictive as cigarettes. ESDs release a chemical aerosol (not water vapor) which can include nicotine, acetone, carcinogens, and ultrafine particles that should not be inhaled into the lungs.

*\* ESDs refer to electronic products, such as vapes, vape pens, electronic nicotine delivery systems (ENDS), and other pod-based, disposable, and refillable devices.*


## YOUTH PERCEPTIONS OF TOBACCO USE

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...the number of tobacco users who quit and remain tobacco-free reduces avoidable death and suffering due to tobacco-related diseases

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MDH measures youth attitudes toward tobacco use in the YRBS/YTS through two questions: “Do you think young people who smoke have more friends?” and “Do you think smoking makes young people ‘look cool’ or ‘fit in’?” Both indicators have been tracked since 2000 and show a dangerous trend, with Maryland high school youth increasingly reporting “yes” to both questions. Among youth who smoke, the belief that smoking helps youth “fit in” or “look cool” increased by 70.3% since 2000; similarly, the belief that smokers have more friends than nonsmokers increased by 62.6% since 2000. Of particular concern, among youth who do not smoke, the belief that smoking helps youth “fit in” or “look cool” increased by 86.7% from 2000 to 2019, and the belief that smokers have more friends than nonsmokers increased by 99.5% since 2000. The abundance of flavors, “techy” design, and youthful targeted marketing practices of the industry, coupled with a lack of awareness regarding the nicotine content of these products, likely aided in contributing to the skyrocketing popularity of ESDs as well as positive perceptions of tobacco use.

## YOUTH ACCESS TO TOBACCO PRODUCTS

Federal law requires Maryland retailers to ask for photo identification and verify customer age for everyone who appears to be under 27 years of age.<sup>54</sup> In 2018, nearly 61.4% of high school students reported that they were not asked for photo identification when attempting to purchase cigarettes from a tobacco retailer during the past 30 days. Tobacco retailers that did not ask for photo identification were two times more likely to illegally sell cigarettes to youth. A new law raising the minimum legal sales age for tobacco products from 18 to 21 years of age, “Tobacco 21,” took effect on October 1, 2019 and aims to reduce youth access to tobacco and ESD products by delaying the age of experimentation – few smokers start after age 21 – as well as reducing the likelihood of sharing tobacco products through peer networks and keeping tobacco products out of schools.

## DECLINE IN OVERALL ADULT TOBACCO USE

More than 865,000 Maryland adults currently use tobacco and ESD products, with cigarettes more popular than any other tobacco product type: cigarettes (12.5%), cigars (4.6%), ESDs (4.3%), smokeless tobacco (2.0%), and other tobacco products, such as pipes, bidis, kreteks, and hookahs (1.4%).<sup>55</sup> However, there has been a substantial decrease in current cigarette smoking by Maryland adults since 2011 (19.1% to 12.5%, respectively) and more adults are reporting never being a smoker; between 2011 and 2018, there was a 9% increase in Maryland adults who reported never being a cigarette smoker (58.3% to 64.0%, respectively).

In 2018, the majority of current smokers in Maryland wanted to quit, with 60.8% having stopped smoking for one day or longer because they were trying to quit.<sup>56</sup> An average of 8 to 11 quit attempts are needed to permanently quit smoking.<sup>57</sup> Clinical Practice Guidelines published in *Treating Tobacco Use and Dependence: 2008 Update* identify a list of ten recommendations for providers, insurers, and health systems to aid their clients in ending tobacco dependence; these include access to a Quitline, medications, counseling, and tobacco treatment programs.<sup>58</sup>

Maryland tobacco users who want to quit have several resources to assist them, including the Maryland Tobacco Quitline (1-800-QUIT-NOW), cessation efforts through local health departments, counseling from a health professional or insurance program, and/or Food and Drug Administration (FDA)-approved smoking tobacco treatment aids (non-nicotine prescription medication, such as bupropion, and/or nicotine replacement therapy (NRT)). In 2018, 42.7% of Maryland adults reported getting help to quit smoking via the Quitline, a tobacco cessation/treatment program, counseling, or medications during their most recent quit attempt.<sup>59</sup>

## EXPOSURE TO SECONDHAND SMOKE

Exposure to secondhand smoke (smoke emitted from burning tobacco products and smoke that has been exhaled by a smoker) and/or thirdhand smoke (residual nicotine and other chemicals left on indoor surfaces by tobacco smoke) can occur at home, in the car, or in other indoor locations. There is no risk-free exposure to secondhand smoke; secondhand smoke contains over 50 carcinogens and 7,000 chemicals and causes premature death and disease in youth and adults who do not smoke.<sup>60</sup> Several initiatives, including Maryland's Clean Indoor Air Act and efforts to promote voluntary smoke-free homes, have significantly reduced involuntary indoor exposure to secondhand smoke among nonsmokers. Currently, 75.4% of youth and 87.5% of adults report not being exposed to secondhand smoke indoors.<sup>61,62</sup> Similarly, voluntary smoking bans in homes and cars have become more common in Maryland.

Exposure to secondhand smoke affects individuals across the life span, from fetal development through adulthood. Smoking during pregnancy is harmful to both women and babies because nicotine can travel across the placenta of a pregnant woman and cause spontaneous abortion, pregnancy complications, premature birth, low birth weight, sudden infant death syndrome (SIDS), as well as delayed behavioral, physical, and cognitive development.<sup>63</sup> The Maryland Tobacco Quitline offers free support to pregnant women to help them quit and stay smoke-free during pregnancy and after giving birth.

# YOUTH AND ADULT TOBACCO-RELATED HEALTH DISPARITIES

Although Maryland has achieved significant declines in tobacco use and initiation, these declines have not reached all population groups and geographic regions equitably. Tobacco-related disparities that impact both youth and adults are defined as differences that exist among populations with regard to patterns, prevention, and treatment of tobacco use; the risk, incidence, morbidity, mortality, and burden of tobacco-related illness; capacity, infrastructure, and access to resources; and secondhand smoke exposure.

Populations in Maryland who experience tobacco-related health disparities include residents in rural communities, racial and ethnic minorities, those with mental health or substance-related disorders (behavioral health conditions), individuals with mental or physical disabilities, members of the LGBTQ community, and those with lower socioeconomic status. In 2018, the lower the annual household income or educational attainment, the higher the prevalence of smoking cigarettes or using tobacco products; adults without a high school diploma were three times more likely to be current tobacco users than adults with a college degree (28.4% and 8.9%, respectively); similarly, adults that earn less than \$15,000 annually were two times more likely to be tobacco users than those earning more than \$75,000 annually (29.4% and 14.2%, respectively).<sup>64</sup> About one-third (34.8%) of adults receiving mental health services smoke cigarettes, compared to nearly 70% of adults receiving substance use disorder services. For adults receiving both services, roughly 67% report smoking. These numbers are dramatically higher than the 2018 Maryland overall adult smoking rate of 12.5%.

Specific to sexual orientation, adults who are bisexual (37.3%) or gay/lesbian (29.7%) are more likely to be current tobacco product users, compared to heterosexual adults (18.1%).<sup>65</sup> Lesbian or gay youth are three times more likely to be cigarette, cigar, or smokeless tobacco users than heterosexual youth.<sup>66</sup> Similar differences in tobacco use exist among transgender youth. Youth identifying as transgender are two times more likely to be current tobacco users compared to cisgender youth (52.7% and 26.7%, respectively).<sup>67</sup> Disparities also exist in the aforementioned cancer mortality rates between Black and White individuals. Implementing evidence-based strategies and interventions to reduce tobacco-related disparities is an urgent priority.

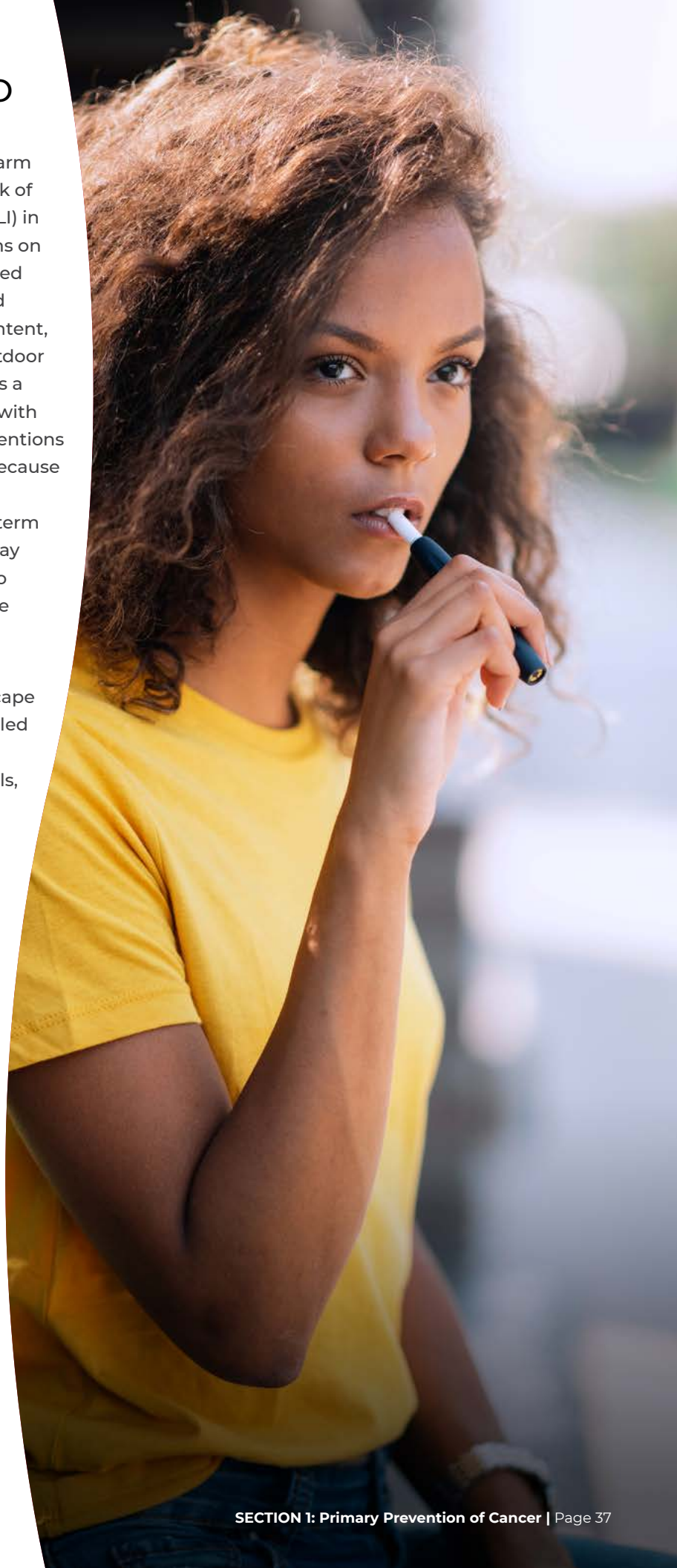
## FUTURE TOPICS IN TOBACCO CONTROL

Increased levels of ESD use by youth continue to alarm public health officials, particularly with the outbreak of e-cigarette and vaping-associated lung injury (EVALI) in 2019. Several states responded with emergency bans on flavored ESDs and other tobacco products. Continued attention must be focused on availability of flavored products, disclosure of ingredients and nicotine content, marketing and promotion, cost, and indoor and outdoor locations that permit use of ESDs. Moreover, there is a gap in research regarding methods to assist youth with quitting ESD use. Counseling and behavioral interventions are recommended for youth addicted to nicotine because NRT is not approved for individuals under age 18.<sup>68</sup> Surveillance and research into the short- and long-term health effects of vaping products is ongoing and may inform future policy and programmatic initiatives to assist youth with quitting ESDs and to prevent more youth from becoming addicted to nicotine.

Also important to the future tobacco control landscape is the emergence of a new category of products called heat-not-burn devices. Like ESDs, these devices produce an aerosol that contains nicotine, chemicals, additives, and flavorings; however, this is generated by heating tobacco, not liquid nicotine. Although the FDA granted marketing authority for the IQOS brand of heat-not-burn devices, the agency emphasized this does not equate with FDA approval and there is no safe tobacco product.

Finally, achieving equity in tobacco prevention and control is a state and national priority. Equity can be achieved by focusing efforts on decreasing the prevalence of tobacco use and secondhand smoke exposure and improving access to tobacco control resources among populations experiencing racial and ethnic disparities and those with greater tobacco-related health and economic burdens, including behavioral health conditions and disabilities, the LGBTQ community, those with lower socioeconomic status, and others.<sup>69</sup>

Other burning organic materials such as marijuana exists. Currently, there are no evidence-based guidelines for measuring marijuana use. As marijuana use increases with law changes, this needs to be evaluated further.



# HEALTHY WEIGHT, NUTRITION, AND PHYSICAL ACTIVITY

An estimated 18% of cancer cases are attributable to the combined effects of excess body weight, alcohol consumption, physical inactivity, and an unhealthy diet.<sup>70</sup> Cancer risk may be reduced through adherence to nutrition and physical-activity behavior guidelines.<sup>71</sup>

## OVERWEIGHT AND OBESITY

Excess body fat and obesity can increase the risk of certain cancers and is a major health concern in the U.S. Scientific evidence has established clear associations between being overweight or obese and the leading causes of morbidity and mortality in the U.S., including cardiovascular disease, cancer, and diabetes.<sup>72</sup> Obesity results from an energy imbalance, meaning too many calories taken in or too few calories expended in physical activity.


The most common tool to measure overweight and obesity is the Body Mass Index (BMI), which is calculated using height and weight. The CDC adult and youth BMI calculators can be found at the following website: [www.cdc.gov/healthyweight/assessing/bmi](http://www.cdc.gov/healthyweight/assessing/bmi).

Adults with a BMI between 25 and 29.9 kg/m<sup>2</sup> are considered overweight, and adults with a BMI of 30 kg/m<sup>2</sup> or higher are considered obese. BMI scores are measured in percentiles by age and sex in children age two through adolescence.<sup>73</sup> A child with a BMI above the 95th percentile for age and sex is considered obese. A child with a BMI between the 85th and 95th percentile is considered overweight.<sup>74</sup>

Being overweight or obese is associated with increased risk of developing cancers of the breast (in postmenopausal women), colon, endometrium, esophagus, and kidney. Evidence also indicates obesity increases risk for cancers of the gallbladder, prostate, ovary, pancreas, thyroid, and cervix, and for multiple myeloma and Hodgkin lymphoma.<sup>75</sup>

Children and young adults are especially vulnerable to the effects of obesity and being overweight, as the period of childhood and growth into adolescence and early adulthood may present a cumulative risk for later adult-onset cancers.<sup>76</sup> Interventions to promote healthy weight and healthy behaviors during these ages are critical.


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An estimated 18% of cancer cases are attributable to the combined effects of excess body weight, alcohol consumption, physical inactivity, and an unhealthy diet.

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## NUTRITION

Healthy nutrition habits are important for obesity prevention. Obesity is associated with an increased risk of certain cancers. Consumption of fruits and non-starchy vegetables is often promoted for general health and wellbeing, as well as prevention of obesity, diabetes, and cardiovascular disease. People whose diets are rich in plant-based foods have a lower risk of getting certain cancers including mouth, pharynx, larynx, esophagus, stomach, and lung cancer.<sup>77</sup> Foods high in dietary fiber are recommended for obesity prevention and may play a role in cancer risk reduction. Some studies have found that consumption of red meat, processed meat, and salt is associated with a higher risk of certain cancers, including colorectal and stomach.<sup>78</sup>

The U.S. Department of Agriculture (USDA) 2015-2020 Dietary Guidelines recommend dietary patterns that are rich in vegetables, fruit, whole grains, seafood, legumes, and nuts; moderate in low- and non-fat dairy products and alcohol (among adults); lower in red and processed meat; and low in sugar-sweetened foods and beverages and refined grains.<sup>79</sup>

Additionally, these dietary recommendations align with recommendations from other groups, including the American Institute for Cancer Research and the American Heart Association.<sup>80</sup>

According to the CDC, in 2017, 34.3% of Maryland adults reported consuming fruits less than one time daily and 18.3% of Maryland adults reported consuming vegetables less than one time daily.<sup>81</sup> About 46.3% of Maryland adolescents reported consuming fruits or 100% fruit juice less than one time daily, and 42.3% of Maryland adolescents reported consuming vegetables less than one time daily.<sup>82</sup>

Breastfeeding can also result in cancer prevention. Breastfeeding for a minimum of six months is recommended to reduce the risk of future obesity for the infant, and obesity prevention is important as obesity later in life is associated with an increased risk of certain cancers.<sup>83</sup> An additional benefit of breastfeeding is that it reduces the risk of developing breast cancer in the mother, and may provide greater protection against aggressive types of breast tumors.<sup>84</sup>



## PHYSICAL ACTIVITY

Physical activity is an important determinant of overall health and specifically of cancer risk since physical activity can help maintain a healthy weight and reduce obesity. Evidence supports the role of physical activity in the prevention and reduced risk of many types of cancer including colon, breast, lung, pancreatic, renal, gastric, and endometrial cancers.<sup>85,86,87,88</sup> Additionally, sedentary time, or time spent not engaged in physical movement, is linked with an increased risk of cancer incidence and mortality.<sup>89,90</sup>

Physical activity includes any bodily movement that is done as a part of daily life, including working, playing, exercising, running errands, and recreational activities. Physical activity can be aerobic (e.g. walking, swimming, and biking), muscle-strengthening (e.g. gardening and carrying heavy loads like groceries), and bone-strengthening (e.g. jumping rope and running), and physical activity can also involve balance and flexibility activities or exercises.<sup>91</sup>

Individual recommendations for physical activity are important in cancer prevention and can easily be implemented through lifestyle changes. Physical activity is safe for most people and essential for healthy aging.<sup>92</sup> Preexisting medical conditions, disability, or limitations related to aging should be considered when recommending a physical activity program, but almost everyone can be active in some way.<sup>93</sup>

According to data from 2018, almost one quarter (22.9%) of Marylanders age 18 years and older reported engaging in no physical activity other than their regular job in the past 30 days. Men had slightly lower physical inactivity (20.5%) compared to women (25.1%), and people ages 18 to 44 years had lower physical inactivity (19.0%) compared to adults 45 to 64 (24.3%) and those older than 65 (30.8%). Those with a college education or more were the least sedentary (13.3%).<sup>94</sup>

According to 2017 Maryland BRFSS data, 50.6% of Maryland adults engage in regular (150+ minutes a week or vigorous equivalent) physical activity each week. A higher proportion of men achieved moderate or vigorous activity levels at 52.9% compared to women at 48.5%, and 52.6% of those age 18-29 years achieved moderate or vigorous activity levels compared to all other age groups.





# ALCOHOL CONSUMPTION

Alcohol intake is associated with an increased risk of developing oral (cancer of the lip, oral cavity, and oropharynx), pharynx, larynx, breast, esophagus, liver, and/or colorectal cancer.<sup>95</sup> General guidelines advise no more than one drink per day for women and two drinks for men; however, women who drink even a glass or two of alcohol daily have a higher risk of breast cancer.<sup>96,97</sup>

Youth who engage in heavy, episodic drinking are more likely to experience alcohol dependence and multiple dependence episodes in life.<sup>98</sup> Tobacco use in combination with excessive drinking appears to promote higher rates of oral and head and neck cancers.<sup>99</sup> Researchers are investigating the exact mechanism connecting alcohol consumption and cancer/tumor growth as well as potential methods of risk reduction, including the relationship of the B-vitamin folate to alcohol and colon and breast cancer associations.<sup>100</sup> As light-to-moderate amounts of alcohol consumption can also have beneficial health effects on heart disease prevention, health care providers should discuss the risks and benefits of alcohol consumption with patients and the importance of limiting intake.

# INFECTIONS AND CANCER PREVENTION VACCINES

Infectious agents have been estimated to cause 15% of all cancer cases globally.<sup>101</sup> Infectious agents that have been linked to various types of cancer include HPV, hepatitis B and C, Epstein-Barr virus, and *Helicobacter pylori*.<sup>102</sup>

Cancer vaccines can be preventive (prophylactic) vaccines, which prevent the development of cancer in healthy people, or treatment vaccines, which treat cancer that has already developed by boosting the body's immune system against that cancer. Preventive vaccines are currently used to prevent the development of cervical, genital, and anal cancer (caused by the HPV) and hepatocellular carcinoma (caused by the hepatitis B virus).<sup>103</sup>

# VACCINES TO PREVENT HUMAN PAPILLOMAVIRUS INFECTION

Over 100 HPV types have been identified, with infection from at least 14 types linked to cancer.<sup>104,105</sup> HPV types 16 and 18 are responsible for approximately 66% of all cervical cancer cases, and HPV infection (mainly with HPV type 16 and 18) is thought to cause 90% of anal cancers; 71% of oropharyngeal cancers; and 71% of vulvar, vaginal, or penile cancers.<sup>106,107,108,109</sup>

Vaccination is an important public health measure to lower the risk of most cervical, genital, and anal cancers that are caused by HPV. As of 2015, there are three HPV vaccines that are currently approved by the FDA: Gardasil® (Merck, 4vHPV), Cervarix® (GlaxoSmithKline, 2vHPV), and Gardasil 9® (Merck, 9vHPV). All three vaccines protect against HPV types 16 and 18, and it is recommended that HPV vaccines are given as a series of two or three shots.<sup>110</sup>

As of June 2019, the Advisory Committee on Immunization Practices (ACIP) recommendations for HPV vaccination are:

- Females age 11 or 12 years: routine vaccination with 9vHPV, 4vHPV, or 2vHPV
- Males age 11 or 12 years: routine vaccination with 9vHPV or 4vHPV
- Vaccination of females age 13 to 26 years and males age 13 to 26 years who were not vaccinated previously
- “Catch up” vaccines should be given to all people through age 26 who are not adequately vaccinated<sup>111</sup>



There are some higher-risk populations for which vaccination is recommended if they have not been previously vaccinated or have not completed the two- or three-dose series. These include men who have sex with men (vaccination through age 26 years) and immunocompromised persons (including those with HIV infection). ACIP recommends HPV vaccination based on shared clinical decision-making for individuals ages 27 through 45 years who are not adequately vaccinated. HPV vaccines are not licensed for use in adults older than age 45 years. In 2018, an estimated 25.3% of Maryland teenagers ages 13 to 17 years had not received any doses of the HPV vaccination.

**Table 4.** Maryland and National HPV Vaccination Coverage, Teens Aged 13-17 Years, 2018<sup>112,113</sup>

MARYLAND AND NATIONAL HPV VACCINATION COVERAGE, TEENS AGED 13-17 YEARS, 2018				
		Maryland	US National (Range)	HP 2020 Target
<b>Girls</b>	≥1 dose	76.4%	69.9% (68.1%-71.6%)	80.0%
	≥3 doses	45.3%	37.9% (38.0%-39.8%)	80.0%
	Up to date	60.9%	53.7% (51.8%-55.6%)	80.0%
<b>Boys</b>	≥1 dose	73.1%	66.3% (64.6% - 68.0%)	80.0%
	≥ 3 doses	39.3%	32.1% (30.3%-33.3%)	80.0%
	Up to date	55.4%	48.7% (46.8% – 50.6%)	80.0%

Gender disparities in HPV vaccination coverage are seen in Maryland as evidenced by 2018 data.<sup>114,115</sup> As shown in the table above, vaccination completion rates for boys are lower than for girls.

Some of the key barriers to HPV vaccination among U.S. adolescents include:<sup>116</sup>

- Knowledge gap and lack of information among parents and health care professionals,
- Financial concerns on the part of parents and health care professionals,
- Parents' attitudes and concerns regarding the vaccine,
- Distrust of the health care system,
- Lack of awareness and lack of perceived benefit or need to vaccinate males,
- Not receiving a health care professional's recommendation for the vaccine,
- Little contact with the medical system, and
- Being unaware of or forgetting about the need for additional doses.

Health care providers play an important role in increasing the HPV vaccination rates, as physician recommendation is often the strongest predictor of HPV vaccination among teenagers.<sup>117,118,119</sup>





## VACCINE TO PREVENT HEPATITIS B INFECTION

Hepatocellular carcinoma is the most common form of liver cancer in adults.<sup>120</sup> Chronic infection with the hepatitis B virus (HBV) or hepatitis C virus (HCV) is a major risk factor for hepatocellular carcinoma.<sup>121</sup> Although there are currently no vaccines available against HCV, a vaccine against HBV has been available since 1982. The most important strategy to prevent HBV-related hepatocellular carcinoma is HBV vaccination, and immunizing individuals against HBV has been linked to the decrease in the incidence of hepatocellular carcinoma.<sup>122,123,124</sup>

The HBV vaccine is typically given to infants as three or four shots over a six-month period. In Maryland, HBV vaccination is included in the state's list of school immunization requirements.<sup>125</sup> Unvaccinated adults who are at risk for HBV infection should also be vaccinated, including those who are at risk by sexual exposure, injection drug users, developmentally disabled persons in long-term care facilities, and those at risk by occupational exposure.<sup>126</sup>

Vaccine recommendations and immunization schedules are available online from the CDC: [www.cdc.gov/vaccines/schedules](http://www.cdc.gov/vaccines/schedules).

## SCREENING FOR HEPATITIS C INFECTION

Hepatitis C is a liver disease that results from infection with HCV.<sup>127</sup> HCV can cause liver damage, cirrhosis, and liver cancer in some people. Adults born during 1945 through 1965 are more likely to be infected; 75% of adults with HCV were born during this timeframe.<sup>128</sup> However, early diagnosis and treatment can help prevent liver damage, cirrhosis, and liver cancer. The USPSTF recommends a one-time screening for HCV for adults born between 1945 through 1965.<sup>129</sup>

# FAMILY HISTORY OF CANCER

Individuals with a family history of certain types of cancer may have an increased risk for cancer.<sup>130</sup> For individuals at a higher risk for cancer due to family history, certain interventions or recommendations such as cancer chemoprevention to reduce risk (see below for information about chemoprevention) or screening test intervals may be different than those for the general population. For those at high risk because of family history, identifying pre-cancerous changes to diagnose cancer at the earliest stage is an important action to reducing risk and illness from cancer (see Section 2 of the Cancer Plan for cancer screening recommendations). The CDC recommends that individuals talk with their family members about family health history, write the information down, and update it from time to time so that it can be shared with health care providers.<sup>131</sup>

## CANCER CHEMOPREVENTION FOR HIGH RISK POPULATIONS

Cancer chemoprevention is the use of various compounds, such as drugs or dietary derivatives, to inhibit, delay, or reverse cancer progression.<sup>132</sup> Chemoprevention is usually recommended in people who have a higher risk of developing cancer.<sup>133</sup>

Although many compounds have been tested for their cancer prevention potential, only a few have demonstrated efficacy and received regulatory

approval.<sup>134,135</sup> Among women at increased risk to develop breast cancer (determined as five-year predicted risk for breast cancer of 1.7% or more calculated by the modified Gail model), taking the drug Tamoxifen or raloxifene has been proven to reduce the risk for invasive breast cancer.<sup>136</sup> In 2019, the USPSTF recommends that clinicians offer to prescribe risk-reducing medications, such as tamoxifen, raloxifene, or aromatase inhibitors, to women who are at increased risk for breast cancer and at low risk for adverse medication effects.<sup>137</sup>

The use of chemoprevention agents as a tool in cancer prevention holds promise and is an area of continued research and expanding evidence.<sup>138</sup> Future Cancer Plan updates may address chemoprevention recommendations more in-depth as the discovery and approval of more agents increases its important role in cancer prevention. Patients who are interested in learning more about chemoprevention should speak with their health care provider.

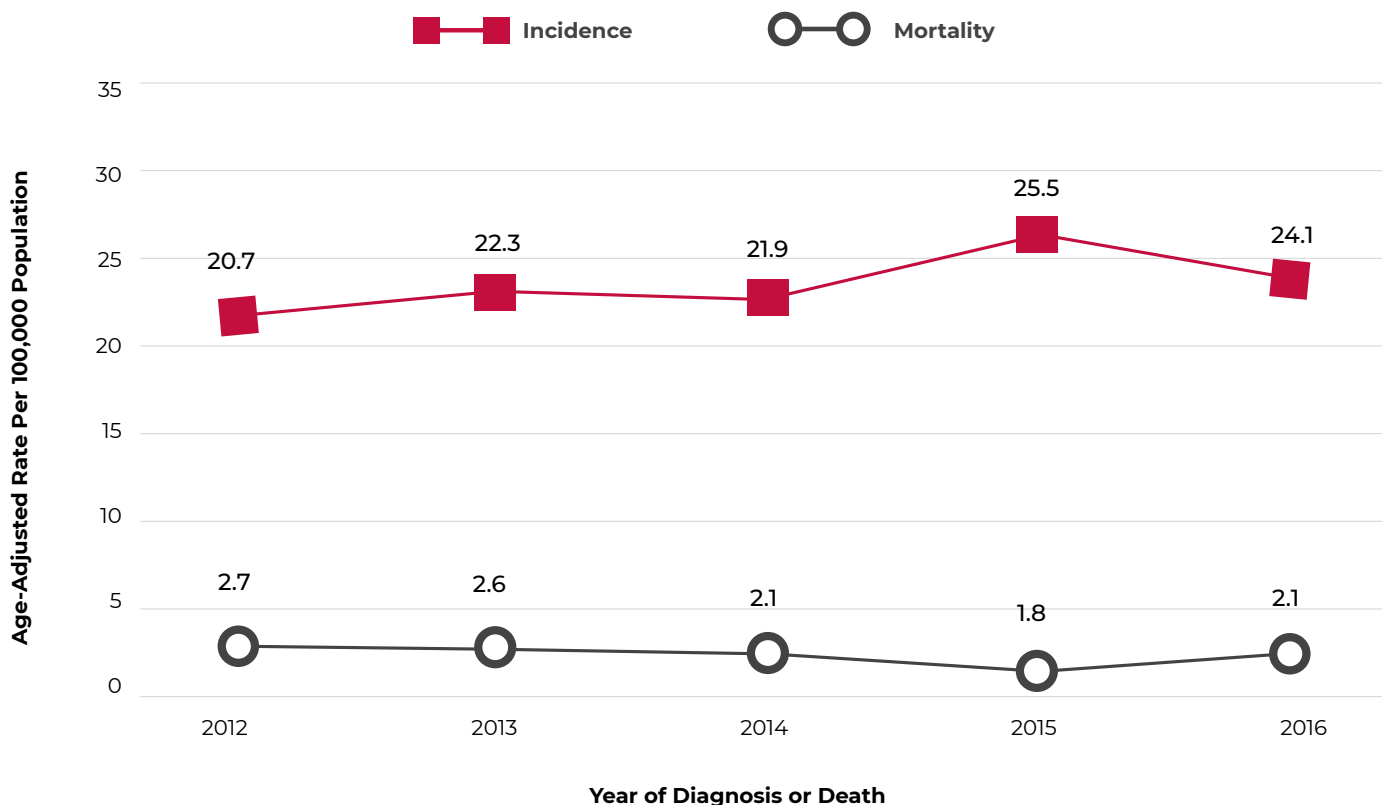
## ULTRAVIOLET RADIATION EXPOSURE

Skin cancer is the most commonly diagnosed cancer in the United States. There are three major types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. The majority of skin cancers are basal or squamous cell carcinomas. Basal and squamous cell carcinomas are not reportable to the MCR.



Melanoma is less common but is the deadliest form of skin cancer and is reportable to the MCR. The national mortality rate for melanoma is low compared to other cancers at 2.5 deaths per 100,000 individuals.<sup>139</sup> Melanoma mortality rates in Maryland are also significantly lower than in most states, with Maryland ranking 44th in the country for melanoma mortality at a rate of 2.1 deaths per 100,000 persons in 2016.<sup>140</sup>

**Figure 4.** Melanoma Incidence and Mortality Rates by Year of Diagnosis or Death, Maryland, 2012-2016



Source: Maryland Cancer Registry; NCHS Compressed Mortality File in CDC WONDER, 2012-2016

Ultraviolet radiation exposure has been identified as a risk factor for skin cancer. Ultraviolet radiation is commonly divided into three bands: UVA, UVB, and UVC. UVC is completely absorbed in the atmosphere before reaching the earth's surface. The rays of UVB are shorter and are the primary cause of tanning and sunburn. The longer rays of UVA penetrate the skin more deeply and contribute to wrinkling of the skin as well as tanning. Besides sunburn, skin cancer, and wrinkling, other negative effects of ultraviolet radiation include cataracts, macular degeneration, and immune system depression.<sup>141</sup>

There is solid evidence that exposure to sun and other forms of ultraviolet radiation, including artificial sources such as tanning beds, is associated with increased risk of basal and squamous cell carcinomas. There is also solid evidence that exposure to ultraviolet radiation increases the risk of melanoma, especially if the exposures occur before age 24. The USPSTF recommends fair-skinned youth ages 10 to 24 should minimize their exposure to ultraviolet radiation to reduce their risk of melanoma.<sup>142</sup>

Artificial tanning has also been shown to increase incidence of skin cancers, including melanoma. Some research has also shown that tanning bed use is associated with an increased risk of early-onset melanoma.<sup>143</sup> The International Agency for

Research on Cancer has listed tanning beds as known carcinogens.<sup>144</sup> Due to the increased risk for minors, as of October 1, 2019, it is unlawful for any Maryland tanning facility operator to allow anyone under the age of 18 to use their artificial sunlight or tanning devices.<sup>145</sup>

To reduce the risk of skin cancer, it is generally recommended that individuals reduce their exposure to ultraviolet radiation by practicing the following sun-safe behaviors: avoid direct sunlight between the hours of 10 a.m. and 4 p.m., wear sun-protective clothing including a wide-brimmed hat and sunglasses when exposed to sunlight, and apply a broad-spectrum sunscreen with a sun-protection factor (SPF) of 15 or higher 30 minutes before going outside and reapply sunscreen every two hours while outdoors.<sup>146</sup> Individuals are also advised to avoid exposure to artificial sources of ultraviolet light (e.g. indoor tanning), and newborns should always be protected from direct sunlight.<sup>147</sup>

Education efforts are important to promote sun-safe behaviors. Special populations to target include those in occupations requiring outdoor exposure, children and adolescents, school educators, and medical providers. Public policy efforts to support sun-safe behavior are also valuable, including regulation enforcement of youth access to indoor tanning facilities.



# ENVIRONMENTAL/ OCCUPATIONAL ISSUES AND CANCER

The relationship between cancer and environmental and occupational factors is complex; some factors are well-known causes of cancer while others are more speculative. Exposure to potential cancer-causing agents can be through multiple pathways, each with different effects. Cancer-causing agents can enter the body through inhalation, absorption through direct contact with the body or skin, or ingestion (taken in by mouth). In addition, our understanding of cancer causation is generally based on models or observations of only one chemical or physical hazard at a time, and we have much less understanding of the complex interactions and risks that arise from exposure to multiple hazards over a person's lifetime.

Two important principles underlie much of the current discussion of occupational and environmental cancer. First, the precautionary principle\* is often promoted to minimize exposures, meaning that if there is a reasonable concern that a threat exists, precautionary measures to reduce the risk should be taken, even if there is uncertainty about the exact nature or magnitude of the risk. Second, the concept of environmental justice focuses on the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal is achieved when everyone enjoys the same degree of protection from environmental hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.<sup>148</sup>

This section outlines the links that are known between environmental and occupational exposures and cancer. Additionally, this chapter highlights the roles of cancer surveillance and research for improved understanding, prevention, and management of occupational and environmentally related cancers.

**\*Precautionary Principle:** *When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. (1998 Wingspread Consensus Statement on the Precautionary Principle)*





# OCCUPATIONAL HAZARDS

Occupational hazards, as defined for the purposes of this Cancer Plan, are exposures received at the workplace that increase an individual's risk of developing cancer. Workers are often exposed to chemicals in higher concentrations than are typically found in other environments. Various state and federal regulations and agencies exist to control and/or limit those exposures. Examples of occupational exposures include:

- Silica (associated with lung cancer),
- Asbestos (associated with lung cancer and mesothelioma), and
- Ultraviolet radiation from the sun (outdoor work associated with skin cancer).

There have been considerable improvements in the control of many occupational hazards, but exposures to carcinogens (cancer-causing agents) still occur in many industries. According to the CDC, fewer than 2% of chemicals manufactured or processed in the U.S. have been tested for carcinogenicity (ability to cause cancer), and it is estimated that 3% to 6% of worldwide cancers (and 45,000-91,000 new cases in the U.S. annually) are caused by occupational exposures.<sup>149</sup> However, some studies suggest that significant racial disparities exist, with higher rates of cancer in non-Whites than in Whites. Though the reasons for these disparities are not completely clear, differences in exposures are thought to account for at least some of the observed differences.<sup>150</sup>

Patterns of employment have changed, but there is still a need for surveillance for occupational cancer, as well as collection and analysis of information about both current and former employment as potential risk factors. More information regarding occupational cancers is available online from the CDC: <https://www.cdc.gov/niosh/topics/cancer/>.





## OUTDOOR AIR POLLUTION

Air pollution is a complex mixture of chemicals, many of which are known or suspected carcinogens from a variety of sources. The cancer risk from airborne chemicals in the environment is low compared to other types of exposures. Even so, public health practitioners remain concerned about air quality due to the number of people exposed to air pollutants and because individuals may be exposed to poor air quality for their entire lifespan.

Most hazardous air pollutants (HAPs) are produced by mobile sources (e.g. vehicles) and stationary sources (e.g. factories). It is difficult to calculate the risks associated with individual chemical hazards in the air, so risks are estimated using models such as the EPA National-Scale Air Toxics Assessment. However, these are only estimates, and there is a need for more detailed monitoring in certain areas of Maryland (including the Eastern and Western regions). The Maryland Department of the Environment (MDE) released the “Clean Air Progress in Maryland 2019 Progress Report” which outlines Maryland’s continuing focus on improving air quality as well as major accomplishments in air quality improvement. The report is published annually and available online at: [mde.maryland.gov/programs/Air/Pages/AirQualityReports.aspx](https://mde.maryland.gov/programs/Air/Pages/AirQualityReports.aspx).

Additionally, the American Lung Association grades Maryland counties on air quality, including disparities in air quality across Maryland counties, at: [www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2019-full.pdf](https://www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2019-full.pdf).

## WATERBORNE EXPOSURES

Water sources can contain contaminants that occur naturally, are man-made, or are formed when water is disinfected to make it suitable for drinking. Water quality standards are in place to protect Maryland surface waters (lakes and streams), and public drinking water systems are regulated under the Safe Drinking Water Act. While public drinking water systems are monitored by utilities for a range of contaminants, each private well owner is responsible for the safety of his or her own well water, once the well is approved. For more information on keeping private well water safe, see the MDE’s “Well Wise” page at: [mde.state.md.us/programs/Water/Water\\_Supply/Pages/Be\\_Well\\_Wise.aspx](https://mde.state.md.us/programs/Water/Water_Supply/Pages/Be_Well_Wise.aspx).

## FOODBORNE HAZARDS

The sources of carcinogens in food may be naturally occurring (such as toxins from fungi, called mycotoxins) or related to human activity (such as those produced by industry, agricultural practices, food cooking methods, food additives, and food preservation). Only a limited number of chemicals in food can be assessed for their cancer-causing potential because the biological activity of extremely low concentrations of these chemicals in food is not calculable with our current level of knowledge. However, technology continues to improve, allowing the detection of ever smaller concentrations of chemicals in food. The FDA is responsible for the protection of processed foods, produce, imported foods, and milk and dairy products. The Food Quality Protection Act of 1996 enacted a strict standard regarding pesticide chemical residues in foods and requires that the administrator must determine “that there is a reasonable certainty that no harm will result from aggregate exposure to pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information” (Title 4, Section 408, 21 U.S.C. 346a).

Some contaminants found in water can accumulate in fish and may pose risks to people who eat fish on a regular basis. Fish consumption advisories recommend how often certain fish can be eaten so that health risks are minimized. The MDE issues fish and shellfish consumption advisories for people who eat Maryland fish on a regular basis. Advisories, an interactive map, and current recommendations for women, children, and the general population regarding Maryland seafood consumption can be found at: [mde.maryland.gov/programs/Marylander/fishandshellfish/Pages/fishconsumptionadvisory.aspx](https://mde.maryland.gov/programs/Marylander/fishandshellfish/Pages/fishconsumptionadvisory.aspx).

Information on store-bought fish is available from the EPA at: [www.epa.gov/choose-fish-and-shellfish-wisely/fish-and-shellfish-advisories-and-safe-eating-guidelines](https://www.epa.gov/choose-fish-and-shellfish-wisely/fish-and-shellfish-advisories-and-safe-eating-guidelines), and the FDA at: [www.fda.gov/food/consumers/advice-about-eating-fish](https://www.fda.gov/food/consumers/advice-about-eating-fish).



# PHYSICAL AGENTS

Physical agents that are carcinogens include radiation (such as radon, ultraviolet radiation from sun exposure and tanning beds, and personal radiation from medical imaging technologies) and particles such as asbestos.

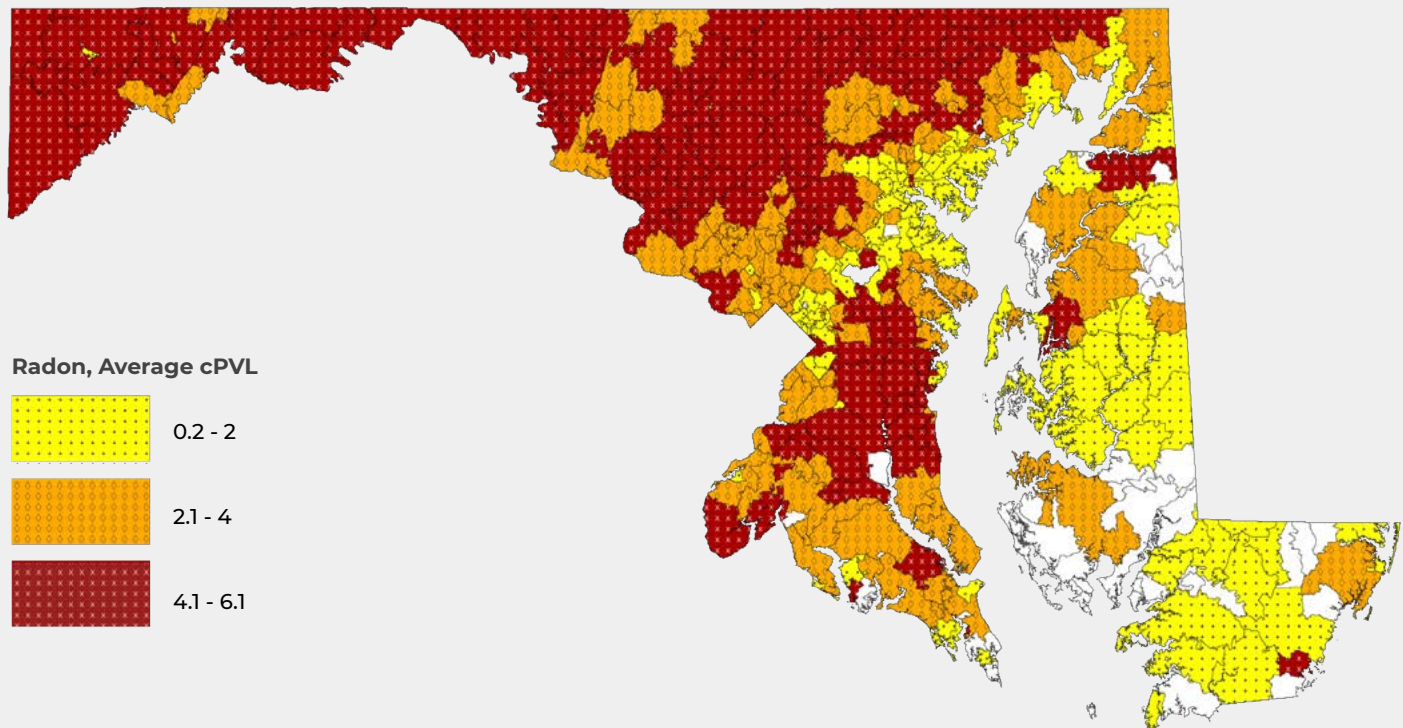
## Radon

Radon is a naturally occurring invisible, odorless gas that forms from the radioactive decay of uranium and radium. These radioactive elements are found throughout the Earth's crust in rock formations. In Maryland, radon concentrations are generally higher in the middle and western parts of the State, compared with the Eastern Shore, due to differences in geology. However, radon can be found in all parts of the State.

Radon concentrations cannot be predicted by where you live or when your home was built. Radon can come through cracks and gaps in buildings and homes, particularly in the foundations. This means that two homes side by side may have different levels of radon due to different openings in their foundations. To see an interactive map of radon concentrations in Maryland, go to: [phpa.health.maryland.gov/OEHFP/EH/Pages/Radon.aspx](http://phpa.health.maryland.gov/OEHFP/EH/Pages/Radon.aspx).

This map does not predict radon levels in individual homes. The only way to determine radon levels in your home is to purchase a radon testing kit. Place the testing kit on the lowest level of the home (basement or crawl space) near any breaks in the foundation. If increased radon is found, a simple ventilation system can be placed in the basement to remove the radon from the home.

Figure 5. Maryland: 2005-2016 Average Radon Measurements By ZIP Code



Because radon comes naturally from the earth, people are always exposed to it. However, being exposed to higher levels over a long period can increase a person's risk of lung cancer. Radon is the second leading preventable cause of lung cancer after smoking and is the biggest preventable risk factor for lung cancer in non-smokers. Since radon exposure is preventable, it is recommended that everyone test their homes for radon every few years. For more information on how to protect a home from radon, go to: [www.cdc.gov/nceh/features/protect-home-radon/index.html](http://www.cdc.gov/nceh/features/protect-home-radon/index.html).

## Ultraviolet Radiation

Ultraviolet radiation is a known carcinogen. There is increasing concern about cancers related to ultraviolet radiation including sun exposure and tanning beds, including melanoma and basal and squamous cell carcinomas. See the Ultraviolet Radiation Exposure section on earlier pages for more information on ultraviolet radiation and prevention methods.

## Indoor Air Quality

Indoor air quality is influenced by sources both in and around the home. Potential indoor sources of carcinogens include building materials, furniture, household cleaning products, and sources of combustion gases such as wood stoves and fireplaces. In addition, environmental tobacco smoke and naturally occurring radon are two important carcinogens that can be present in the indoor environment.

## Data Sources, Analytical Methods, and Research

Research and data collection are essential for understanding and reducing cancer from exposure to carcinogens in the environment and workplace. Use of cancer surveillance data for evaluating environmental causation or association is challenging for a number of reasons:

- Cancer is usually caused by more than one factor, including a combination of genetics, environment, and personal lifestyle factors,
- Cancer often has a long latency period,
- In the MCR, people with a diagnosis of cancer are identified by their address at diagnosis, which may be different than where they lived when they were exposed to a chemical or physical agent that contributed to their risk of cancer,
- The MCR does not often have information on where people have worked,
- Chemical exposures have often occurred at work, but occupational information is often missing,
- Personal risk factors such as tobacco use and body mass are often missing, and
- Some cancers are often diagnosed in an outpatient setting, particularly skin cancer and urologic cancers, which limits reporting of these cancers to state registries.

# GOAL 1: PRIMARY PREVENTION

## INCREASING CANCER PREVENTION BEHAVIORS IN MARYLAND: TOBACCO USE AND EXPOSURE OBJECTIVES

**OBJECTIVE 1: By 2025, reduce the prevalence of current cigarette smoking\* among adults to 11.9%. (2018 Baseline: 12.5%)**

**Target Setting Method:** 5% reduction

**Source:** BRFSS

\*Targets for other tobacco products are not included because prevalence of use among adults is very low.

### Strategies

1. Support and implement CDC-recommended evidence-based interventions that reduce tobacco use and increase the demand for cessation, including:<sup>151</sup>
  - a. Explore an increase in the price of tobacco products, including ESDs,
  - b. Enact comprehensive tobacco-free policies, including ESDs,
  - c. Fund mass media campaigns, and
  - d. Make tobacco cessation and treatment services fully accessible to tobacco users.
2. Increase tobacco use prevention education and the provision and expansion of tobacco cessation and treatment resources in colleges and universities, with a focus on reducing e-cigarette use.
3. Educate vulnerable populations, such as the LGBTQ communities and those with mental health and substance use disorders, through health communications efforts, including mass-reach media, to change social norms about tobacco use (including ESDs) and to promote evidence-based tobacco cessation and treatment services including the Maryland Tobacco Quitline, local health department-funded resources, and available Medicaid benefits.
4. Cultivate and maintain new and existing partnerships to enhance tobacco cessation and treatment outreach among vulnerable populations.
5. Maintain capacity for the Maryland Tobacco Quitline, including access to phone, web, and text-based counseling and the provision of nicotine replacement therapy.
6. Educate and increase engagement of health care providers to promote cessation and provide tobacco treatment resources, following USPSTF guidelines.
  - a. Conduct targeted outreach to specialists with high-risk populations, including behavioral health providers, pediatricians, pulmonologists, radiologists, oncologists, and primary care providers.
  - b. Work with health systems to expand utilization of evidence-based tobacco cessation and treatment methods, including inpatient tobacco treatment counseling, referrals to the Maryland Tobacco Quitline, and nicotine replacement therapy.
  - c. Educate health care providers about the dangers of menthol found in tobacco products, particularly the detrimental impact to Black and African American communities.
7. Increase behaviors that prevent cancer and decrease behaviors that increase cancer risk.
8. Explore and promote HIPAA-compliant telehealth options for tobacco cessation.
9. Partner with health insurance and human resource organizations to communicate and promote cessation information and resources among adults.
10. Increase referrals for tobacco cessation support to LGBTQ communities.
11. Educate high school and college students on vaping through health communications efforts, including media to change social norms about vaping.
12. Reduce menthol use, particularly among Black and African American populations.

**OBJECTIVE 2: By 2025, reduce the prevalence of tobacco use+ among high school and middle school youth as measured by YRBS/YTS\* to reach the following targets:**

**High School Youth:**

- Cigarette use: 4.8% (2018 Baseline: 5.0%)
- Cigar use: 5.7% (2018 Baseline: 6.0%)
- Smokeless tobacco use (chewing tobacco or snuff): 4.4% (2018 Baseline: 4.6%)
- Electronic Smoking Devices (ESDs): 21.9% (2018 Baseline: 23.0%)
- Any type of tobacco (cigarettes, cigars, smokeless tobacco, or ESDs): 26.0% (2018 Baseline: 27.4%)

**Target Setting Method:** 5% reduction  
**Source:** YRBS/YTS

*\*YRBS/YTS collects data on tobacco use in the past month.*

+The term tobacco product is now inclusive of electronic smoking devices, such as e-cigarettes, vapes, pod-based devices like Juul, etc.

**Middle School Youth:**

- Cigarettes: 1.0% (2018 Baseline: 1.1%)
- Smokeless Tobacco (chewing tobacco or snuff): 2.1% (2018 Baseline: 2.2%)
- Cigars: 1.7% (2018 Baseline: 1.8%)
- ESDs: 5.6% (2018 Baseline: 5.9%)
- Any type of tobacco (cigarettes, cigars, smokeless tobacco, or ESDs): 8.6% (2018 Baseline: 9.0%)

**Target Setting Method:** 5% reduction  
**Source:** YRBS/YTS

## Strategies

1. Support and implement CDC-recommended evidence-based interventions that reduce tobacco use and increase the demand for cessation, including:<sup>152</sup>
  - a. Explore and increase in the price of tobacco products, including ESDs,
  - b. Enact comprehensive tobacco-free policies, including ESDs,
  - c. Fund mass media campaigns, and
  - d. Make tobacco cessation and treatment services fully accessible to tobacco users.
2. Maintain capacity for the Maryland Tobacco Quitline for residents age 13 and older; increase youth engagement with evidence-based tobacco treatment programs including in school settings.
3. Support reduction in youth access to tobacco products.
  - a. Increase tobacco retailer education and compliance checks to enhance statewide and local enforcement of Maryland's restrictions on the sale of tobacco products to youth under 21 years of age.
  - b. Build community capacity to adopt state and local policies that restrict the sale, advertising, and promotion of tobacco products, including reducing overall prevalence of tobacco retail licenses, eliminating flavored tobacco products, reducing availability of retail tobacco sales in close proximity to schools, and maintaining retailer accountability through license suspension and revocation for repeat violators.
4. Partner with priority youth/young adult groups, community-based organizations, and colleges/universities to identify new strategies to reduce youth initiation among target populations.
5. Implement evidence-based, mass-reach health communications interventions to prevent initiation and encourage tobacco-free norms among vulnerable youth populations.
6. Partner with schools to determine alternatives to suspension and provide effective tobacco cessation treatment options for students addicted to nicotine.
7. Educate and increase engagement of health care providers to promote cessation and provide tobacco treatment resources.

**OBJECTIVE 3: By 2025, reduce the prevalence of tobacco use among Maryland adults who have a depressive disorder as measured by BRFSS to 28.7%. (2018 Baseline: 30.2%)**

**Target Setting Method:** 5% reduction  
**Source:** BRFSS

## Strategies

1. Develop Behavioral Health Toolkits for Behavioral Health providers.
2. Encourage providers to screen for tobacco use in all adults with depressive disorders and refer for appropriate treatment.

**OBJECTIVE 4: By 2025, reduce exposure of high school youth to secondhand smoke as measured by YRBS/YTS\* to 23.4%. (2018 Baseline: 24.6%)**

**Target Setting Method:** 5% reduction  
**Source:** YRBS/YTS

*\*YRBS/YTS collects data on students who were in the same room with someone who was smoking cigarettes on one or more of the past seven days.*

## Strategies

1. Promote tobacco-free policies that protect against involuntary smoke and aerosol exposure without exemptions, including in multi-unit housing, parks, beaches, college campuses, recreational venues, and others.
2. Implement mass-reach health communications to increase awareness about the health hazards of second and thirdhand smoke and aerosol exposure, as well as tobacco litter; and encourage voluntary adoption of smoke-free rules in all households.
3. Promote health equity and healthy childhood experiences by educating families with infants and young children about the dangers of secondhand smoke and the importance of smoke-free households, as well as increasing availability of tobacco cessation and treatment resources and supporting tobacco-free norms.

*The above strategies are intended to reduce youth exposure to secondhand smoke but will ultimately benefit adults as well.*

**OBJECTIVE 5: By 2025, reduce tobacco use rates in the LGBTQ community to 28.4%. (2018 Baseline: 29.9%)**

**Target Setting Method:** 5% reduction  
**Source:** BRFSS

## Strategies

1. Increase referrals for smoking cessation support for LGBTQ communities.
2. Decrease smoking rates among LGBTQ communities by referring current smokers to LGBTQ-affirming smoking cessation services.



# HEALTHY WEIGHT, NUTRITION, AND PHYSICAL ACTIVITY OBJECTIVES

**OBJECTIVE 6: By 2025, reduce the proportion of Marylanders who are overweight/obese to meet the following targets:**

- a. Adults age 18 years and older: 63.2% (2018 Baseline: 66.5%)
- b. High school youth: 27.1% (2018 Baseline: 28.5%)

**Target Setting Method:** 5% reduction

**Source:** BRFSS; YRBS/YTS

## Strategies

1. Strengthen healthier food access and sales in retail venues and community venues through increased availability, improving pricing, placement, and promotion.
2. Implement food and beverage guidelines including sodium standards (i.e. food service guidelines for cafeterias and vending) in public institutions, worksites, child care settings, schools, community venues, and other key locations such as hospitals.
3. Ensure that patients age six years and older are screened for obesity and offered or referred to behavioral interventions.
4. Implement evidence-based school and youth community programs that promote healthy weight.
5. Increase access to healthy foods and beverages in schools.
6. Provide more health education for all ages/populations. Examples of health education topics include meal prep, grocery shopping, and increasing exercise options.
7. Ensure the Accessibility and Accommodations toolkit on Disability and Health is inclusive in state and community-based health promotion programs for people living with a disability.
8. Increase health care providers' awareness to screen for obesity in children and adolescents and offer or refer them to comprehensive intensive behavioral interventions to promote improvements in weight status.
9. Increase health care providers' awareness to offer or refer adults with a Body Mass Index (BMI) of 30 or higher to intensive, multicomponent behavioral interventions.
10. Implement food and beverage guidelines including sodium and sugar standards.
11. Implement strategies for increasing physical activity.

**OBJECTIVE 7A: By 2025, increase the proportion of Marylanders who consume fruits/fruit juices daily to reach the following targets:**

- a. Adults age 18 years and older: 36.0% (2017 Baseline: 34.3%)
- b. High school youth: 48.6% (2018 Baseline: 46.3%)

**Target Setting Method:** 5% increase

**Source:** BRFSS; YRBS/YTS

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**OBJECTIVE 7B: By 2025, increase the proportion of Marylanders who consume vegetables daily to reach the following targets:**

- a. Adults ages 18 years and older: 19.2% (2017 Baseline: 18.3%)
- b. High school youth: 44.4% (2018 Baseline: 42.3%)

**Target Setting Method:** 5% increase

**Source:** BRFSS; YRBS/YTS

## Strategies

1. Support policies and implement programs that provide access to fruits and vegetables, including providing financing initiatives for grocery stores in food deserts (through the Maryland Department of Housing and Community Development), increasing access to farmers' markets, and supporting farm-to-school initiatives.
2. Implement nutrition education programming (such as Market to Mealtime or SNAP-ED) in the community setting to provide education about general nutrition as well as the purchasing, preparation, and service of fruits and vegetables.
3. Create partnerships with the food and/or restaurant industry to support healthy eating initiatives in restaurants (including fast food restaurants) that focus on offering affordable fruit and vegetable menu options.
4. Implement school policies and practices that create a supportive nutrition environment, including establishing standards for all competitive foods; prohibit advertising of unhealthy foods; promote healthy foods in schools, including those sold and served within school meal programs and other venues.
5. Promote maximum implementation and utilization of subsidized food programs for students.
6. Offer more farmers' markets and education about eating fruits and new fruits.
7. Increase access to affordable, fresh vegetables.
8. Implement community gardens in schools and make it trendy.
9. Create partnerships with community grocers to offer incentives for providing fresh vegetables in the community.
10. Make vegetables trendy through influencer marketing and social media.

**OBJECTIVE 8: By 2025, promote physical activity among Maryland adults age 18 years and older:**

- a. Reduce the proportion of adults who engage in no leisure-time physical activity to 21.8%. (2018 Baseline: 22.8%)
- b. Increase the proportion of adults who engage in moderate physical activity for at least 150 minutes or vigorous physical activity for at least 75 minutes per week or an equivalent combination to 53.1%. (2017 Baseline: 50.6%)

**Target Setting Method:** 5% change

**Source:** BRFSS

## Strategies

1. Strengthen community promotion of physical activity through signage, worksite policies, social support, infrastructure improvements, and joint-use agreements to allow for use of safe facilities.
2. Develop and/or implement transportation and community plans that promote walking and other methods of active transport.
3. Increase access to physical activity programs for all ages (e.g., access to gyms, education classes).
4. Promote access to physical activity programs for older adults.
5. Promote personal objectives for exercise (e.g., 60 minutes a day).

**OBJECTIVE 9: By 2025, increase the proportion of Maryland youth who meet the federal physical activity guidelines (60 minutes daily) for aerobic physical activity to reach the following targets:**

- a. High school youth: 20.4% (2018 Baseline: 19.4%)
- b. Middle school youth: 29.9% (2018 Baseline: 28.5%)

**Target Setting Method:** 5% increase

**Source:** YRBS/YTS

## Strategies

1. Implement and evaluate quality, comprehensive physical education and physical activity programs in kindergarten through grade 12 schools.
2. Promote the adoption of physical activity in early child care and education.
3. Implement and evaluate comprehensive physical activity programs in the community.
4. Decrease proportion of Maryland youth who play video or computer games or use a computer three or more hours per day.
5. Implement diverse group and individual physical activities for youth and not just competitive sports.
6. Develop a personal activity message for youth to incorporate in schools through partnership with the Maryland State Department of Education.

# ALCOHOL CONSUMPTION OBJECTIVE

**OBJECTIVE 10: By 2025, reduce drinking among Maryland adults to reach the following targets:**

- a. Chronic drinking (up to 2 drinks per day for men, up to one drink per day for women per National Institute on Alcohol Abuse and Alcoholism guidelines): 4.0% (2018 Baseline: 4.2%)
- b. Binge drinking (5 or more drinks for men and 4 or more drinks for women on a single occasion on at least one day in the past month): 12.9% (2018 Baseline: 13.6%)

**Target Setting Method:** 5% reduction

**Source:** BRFSS

## Strategies

1. Increase awareness of alcohol use as a cancer risk factor among Maryland residents by pooling resources from public health agencies, the health care system, non-traditional partners such as local substance abuse prevention programs, organizations working on alcohol issues (e.g. Mothers Against Drunk Driving), faith-based and community organizations, schools, law enforcement agencies, workplaces, and businesses.
2. Work with health care providers to promote awareness of alcohol as a cancer risk factor and to promote alcohol misuse screening and brief behavioral counseling interventions via traditional (face-to-face) or electronic means.
3. Develop a resource list for individuals and families who need help.
4. Promoting resources and coverage through employers and universities to promote changes in problem behavior.
5. Provide education in schools and through community-based programs.
6. Promote more strategies for schools and provide school health messaging to youth, as well as screening.
7. Develop strategies to reduce alcohol use as incentives for fundraising efforts.

# CANCER VACCINES OBJECTIVE

**OBJECTIVE 11 : By 2025, increase youth HPV vaccine coverage rates to reach the following targets:**

- a. Girls age 13-17 that are up to date on HPV vaccination to 63.9% (2018 Baseline: 60.9%)
- b. Boys age 13-17 that are up to date on HPV vaccination to 58.2% (2018 Baseline: 55.4%)

**Target Setting Method:** 5% increase

**Source:** National Immunization Survey-Teen, ACIP

## Strategies

1. Increase awareness of HPV infection as a cancer risk factor among Maryland residents.
2. Educate health care providers, particularly pediatricians, on the importance of making a strong and timely HPV vaccination recommendation, with a focus on cancer prevention.
3. Encourage cancer experts and leaders to provide peer education to immunization providers about cancer prevention and the role of the HPV vaccine.
4. Educate parents and/or guardians about the availability and importance of HPV vaccination for adolescent girls and boys, with a focus on cancer prevention.
5. Implement systems changes within health care practices to:
  - a. Check teenage patients' vaccination status and offer all indicated vaccines at each visit,
  - b. Schedule the next HPV vaccination dose before the end of the current appointment, and
  - c. Utilize reminder and recall strategies.
6. Increase HPV awareness in school settings.
7. Reduce the disparity between boys and girls being up to date on HPV vaccination.

# ULTRAVIOLET RADIATION EXPOSURE OBJECTIVE

**OBJECTIVE 12: By 2025, increase the proportion of Maryland adults age 18 years and older who always or almost always use at least one sun protective measure as measured by BRFSS to 69.3%. (2016 Baseline: 66.0%)**

**Target Setting Method:** 5% increase  
**Source:** BRFSS

## Strategies

1. Encourage the development of sun-safe environments including building-covered, shaded structures and implementing signage at public beaches and parks reminding people to wear sunscreen.
2. Educate the public about sun-safe behaviors and the dangers of ultraviolet radiation and skin cancer early detection. Use media outlets such as websites, print, radio, television public service announcements, billboards, and press releases.
3. Develop programs encouraging sun-safe behaviors for outdoor workers.
4. Promote/integrate the use of sun safety educational curricula in elementary and middle schools.
5. Support school policies that permit students to bring and apply sunscreen.
6. Ensure that children, adolescents, and young adults ages 10 to 24 years old who have fair skin are counseled by health care providers about minimizing their exposure to ultraviolet radiation.
7. Promote the awareness of the harm of tanning booths.

# RADON OBJECTIVE

**OBJECTIVE 13: By 2025, improve availability of and access to information and resources to reduce radon exposure in Maryland.**

## Strategies

1. Reduce radon exposure in Maryland through outreach, education about testing and remediation, and other strategies.
2. Increase public awareness about the relationship between indoor radon exposure and lung cancer.
3. Reduce radon exposure in new and existing construction by requiring radon risk reduction in building codes.
4. Increase capacity of health care providers and staff to ask about radon testing in the home and provide educational and testing resources.
5. Develop a partnership with targeted counties that are at high risk for radon.

# ENVIRONMENTAL AND OCCUPATIONAL EXPOSURES OBJECTIVE

**OBJECTIVE 14: By 2025, improve availability of and public access to information about environmental and occupational exposures.**

## Strategies

1. Utilizing the Environmental Public Health Tracking platform or other tools, improve access to locally relevant data on exposures, public health impacts, vulnerabilities, and cumulative exposure/environmental justice considerations.
2. Establish a partnership between state agencies and academia to develop a state strategy for routine collaboration to translate current and/or new understanding about environmental carcinogens into education and outreach aimed at improving the public understanding of relationship between exposures and associated health outcomes.
3. Increase public awareness about exposure to environmental carcinogens.

SECTION 2

# HIGH BURDEN CANCERS IN MARYLAND





# HIGH-BURDEN CANCERS IN MARYLAND

Improvement in the prevention, early detection, and treatment of many types of cancer has led to a decline in cancer incidence and mortality rates in Maryland and the nation.<sup>153</sup> Despite these declines, the cancer burden remains large when measured by human suffering, loss of life, loss of quality of life, and expenditures for medical care. Section 2 examines the current cancer burden in Maryland to identify priority cancers and effective interventions to reduce cancer incidence, mortality, and disparities.

## PRIORITY CANCERS IN MARYLAND

### INCIDENCE

Every year more than 31,000 Marylanders are diagnosed with invasive cancer (excluding basal and squamous cell skin cancer). The 2016 age-adjusted cancer incidence rate for Maryland is 443.6 cancer cases per 100,000, which is statistically significantly higher than the 2016 U.S. cancer incidence rate of 424.1 (Table 5). The age-adjusted incidence rate for all cancer sites among Blacks in Maryland remained below the incidence rate for Whites, continuing the trend since 2011.

**Table 5.** Overall Cancer Incidence and Mortality by Sex and Race in Maryland and the United States, 2016

INCIDENCE					
	Total	Males	Females	Whites	Blacks
Maryland New Cases	31,079	15,307	15,765	21,021	8,307
Maryland Incidence Rate	443.6	481.6	419.1	453.0	430.4
US SEER Rate	424.1	458.4	402.1	432.7	434.3

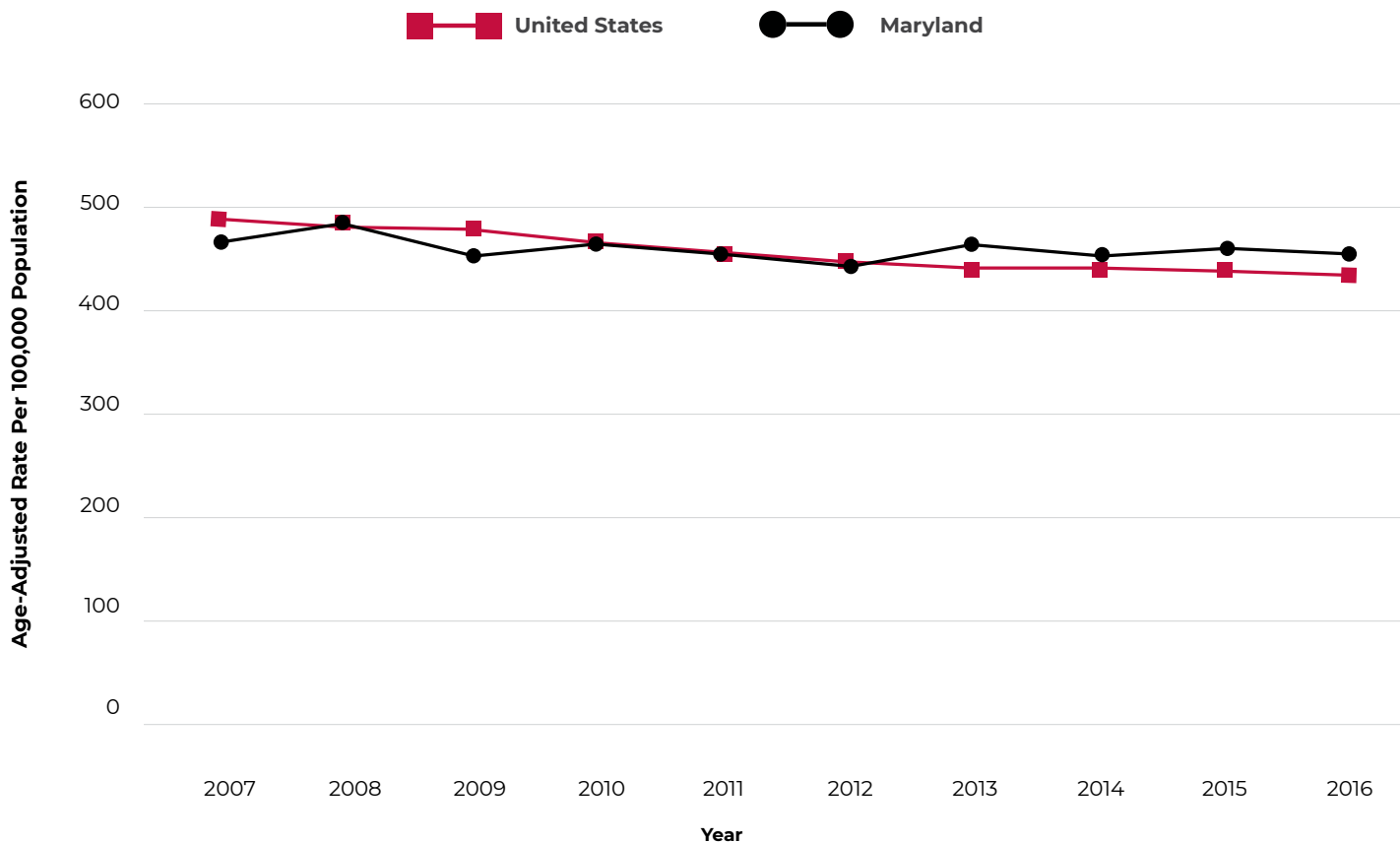
MORTALITY					
	Total	Males	Females	Whites	Blacks
Maryland Deaths	10,911	5,472	5,439	7,392	3,174
Maryland Mortality Rate	156.5	183.2	138.4	154.7	176.2
US Mortality Rate	155.9	185.9	134.0	156.7	178.2

Rates are per 100,000 population and are age-adjusted to the 2000 US standard population

Sources: Maryland Cancer Registry, 2016  
 NCI SEER\*Stat (U.S. SEER 18 rates)  
 NCHS Compressed Mortality File in CDC WONDER

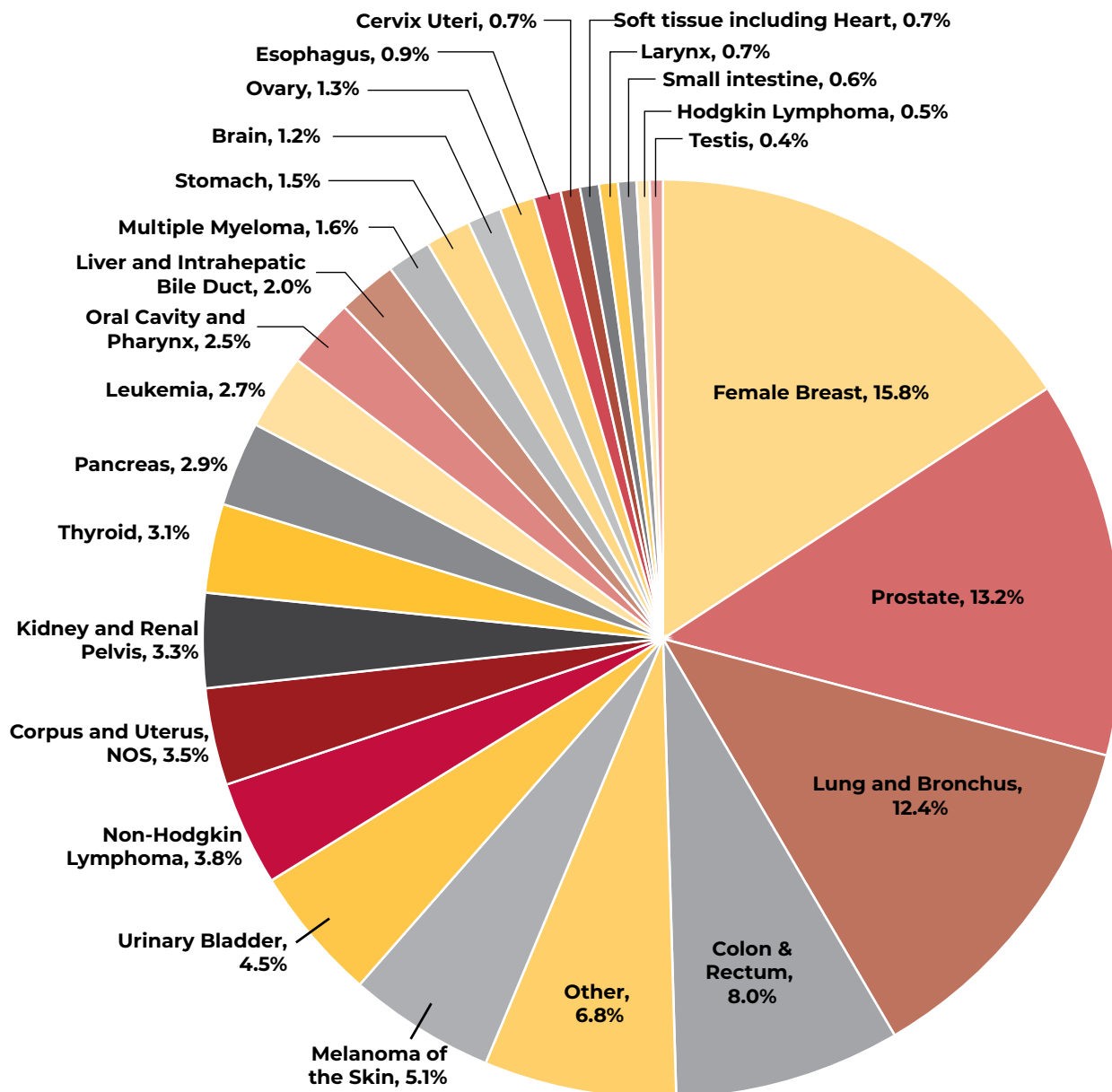
The overall cancer incidence rate in Maryland has decreased 2.6% since 2007, down from 455.3 cases per 100,000 to 443.6 per 100,000 in 2016 (Figure 6). Changes in cancer incidence can be the result of many factors such as prevention and screening efforts, changes in screening recommendations (e.g. changes in screening recommendations for breast and prostate cancer), and changes in public health funding. Overall, cancer incidence increases with age, with 80% of all cancers diagnosed in people 55 years of age and older.<sup>154</sup>

**Figure 6.** All Sites Cancer Incidence Rates Maryland and United States, 2007-2016



Sources: Maryland Cancer Registry, 2007-2016  
 NCI SEER\*Stat (U.S. SEER 18 rates)

**Figure 7.** Percent of All Incident Cancer Cases by Type of Cancer in Maryland, 2012-2016



\*NOS is defined as Not Otherwise Specified;  
Source: Maryland Cancer Registry, 2012-2016

Cancer is classified according to the organ or tissue that is the site of the tumor and the type of cells that have become cancerous. The most commonly diagnosed cancers among Marylanders are female breast (15.8%), prostate (13.2%), lung and bronchus (12.4%), and colon and rectum (8.0%) cancers.<sup>155</sup> Combined, these four cancers comprise almost half of all cancers diagnosed in the state (Figure 7). Among Maryland men, cancers of the prostate, lung and bronchus, and colon and rectum comprise 47.6% of all newly diagnosed cancers. Among Maryland women, cancers of the breast, lung and bronchus, and colon and rectum comprise 51.3% of all newly diagnosed cancer cases (Table 6).

**Table 6.** Ten Leading Cancer Incident Sites by Sex in Maryland, 2012-2016

MEN	73,511	WOMEN	76,270
Prostate	26.9%	Female Breast	31.0%
Lung and Bronchus	12.5%	Lung and Bronchus	12.4%
Colon and Rectum	8.2%	Colon and Rectum	7.9%
Urinary Bladder	7.0%	Corpus and Uterus, NOS*	6.9%
Melanoma of the Skin	6.1%	Thyroid	4.7%
Kidney and Renal Pelvis	4.2%	Melanoma of the Skin	4.0%
Non-Hodgkin Lymphoma	4.1%	Non-Hodgkin Lymphoma	3.5%
Oral Cavity and Pharynx	3.6%	Pancreas	2.8%
Leukemia	3.0%	Ovary	2.6%
Pancreas	3.0%	Kidney and Renal Pelvis	2.5%

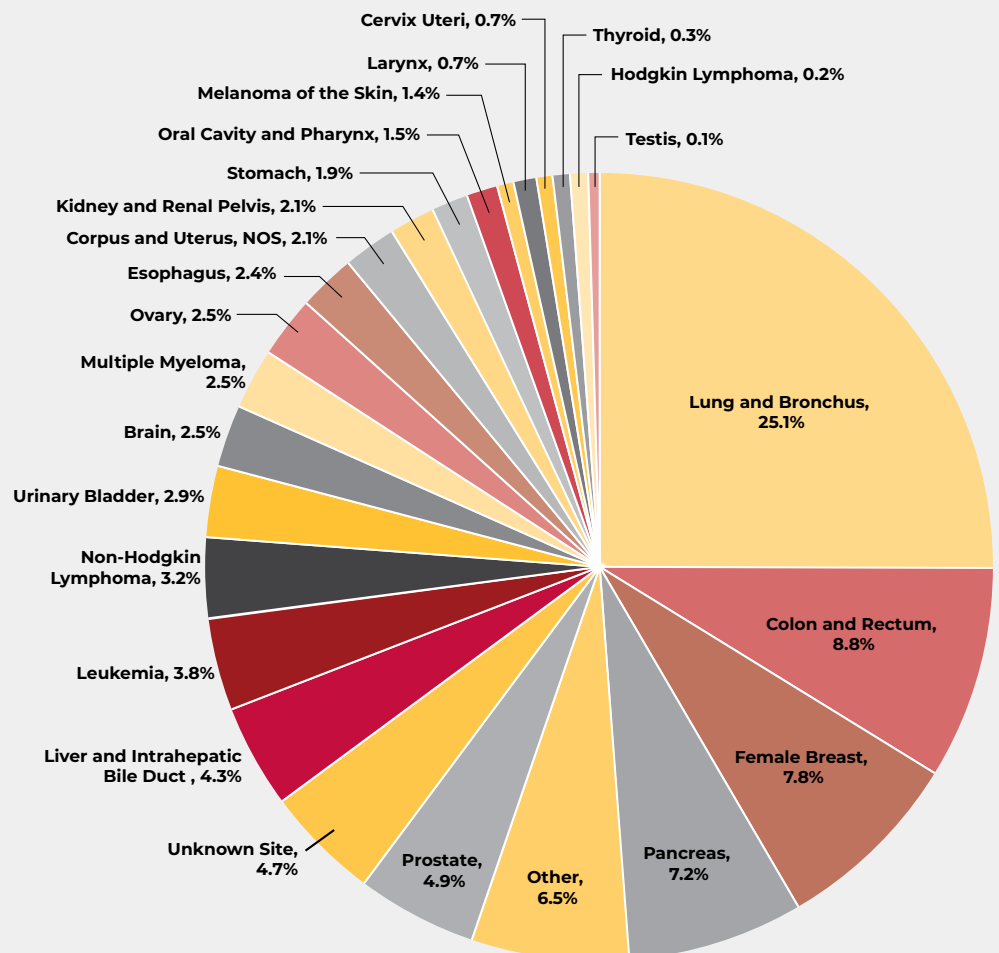
\*NOS defined as Not Otherwise Specified;  
Source: Maryland Cancer Registry, 2012-2016

## MORTALITY

More than 10,000 Marylanders die from cancer each year. Maryland's age-adjusted overall cancer mortality rate of 156.5 deaths per 100,000 in 2016 was similar than the 2016 U.S. cancer mortality rate of 155.9. Maryland's rank in overall cancer mortality has been steadily improving compared to other states and the District of Columbia. For the period 1989-1993, Maryland had the third highest cancer mortality rate in the nation. This rate decreased over the following years to the 11th highest cancer mortality rate for 1996-2000. For the period 2012-2016, Maryland improved to having the 32nd highest cancer mortality rate in the nation.<sup>156</sup>

\*NOS is defined as Not Otherwise Specified;  
Source: NCHS Compressed Mortality File in CDC WONDER, 2012-2016

**Figure 8.** Percent of All Cancer Deaths by Type of Cancer in Maryland, 2012-2016



For the five-year period from 2012 to 2016, lung cancer was the leading cause of cancer deaths, accounting for more than one quarter (25.1%) of all cancer deaths in Maryland (Figure 8). Colorectal cancer followed, accounting for 8.8% of all cancer deaths in the state. Female breast cancer accounted for 7.8%, pancreatic cancer for 7.2%, and prostate cancer for 4.9% of all cancer deaths in the state. Collectively, these five cancers accounted for 53.7% of all deaths due to cancer in Maryland.

Table 7 shows the ten leading causes of cancer death among men and women in Maryland. Cancer mortality in both men and women is similar, with the distinction of prostate cancer causing the second largest proportion of cancer deaths in men while female breast cancer causes the second largest proportion of cancer deaths in women.

**Table 7.** Ten Leading Cancer Mortality Sites by Sex in Maryland 2012-2016

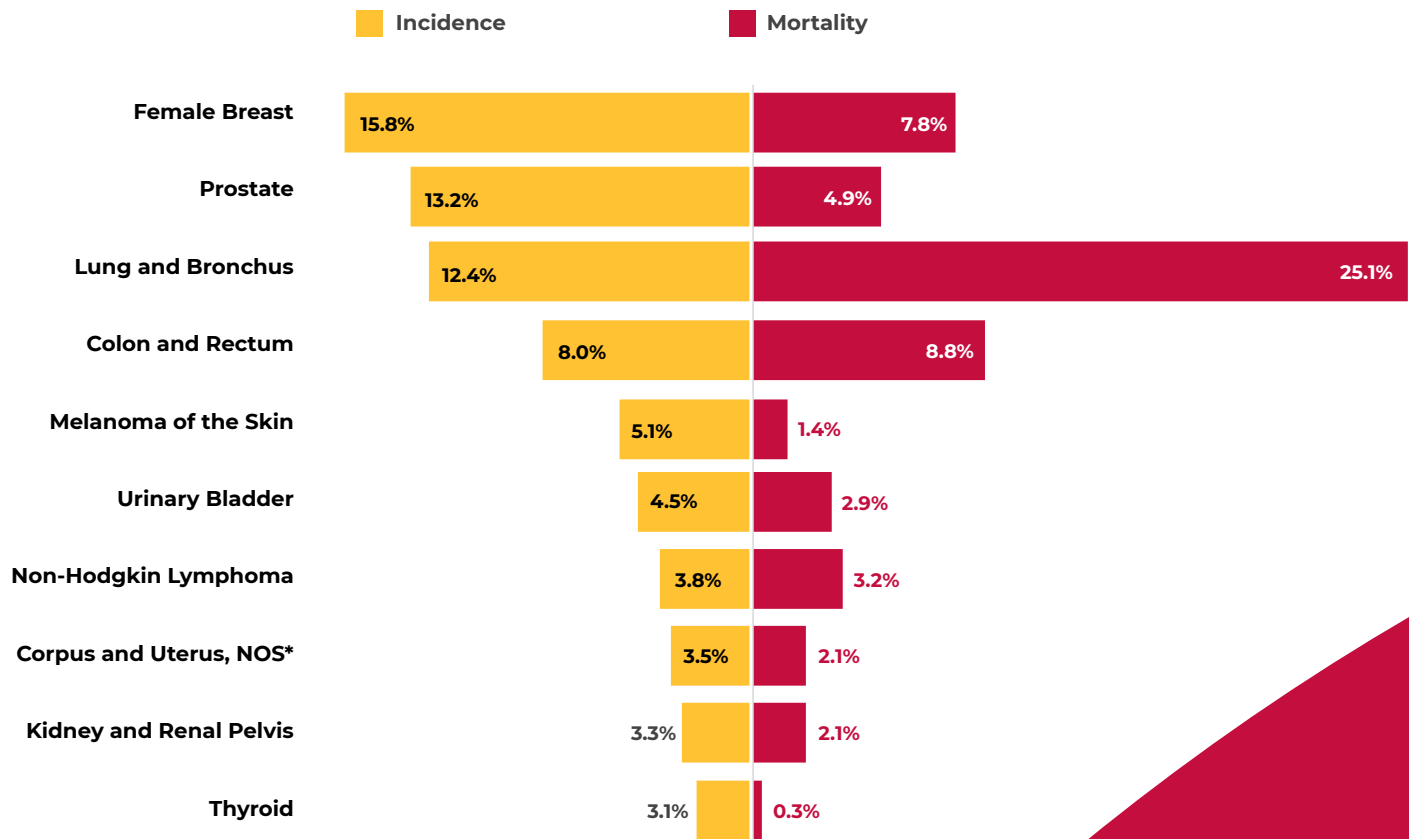
<b>MEN</b>	<b>73,511</b>	<b>WOMEN</b>	<b>76,270</b>
Lung and Bronchus	25.8%	Lung and Bronchus	24.4%
Prostate	9.6%	Female Breast	15.8%
Colon and Rectum	9.0%	Colon and Rectum	8.6%
Pancreas	7.3%	Pancreas	7.1%
Liver and Intrahepatic Bile Duct	5.8%	Ovary	5.0%
Leukemia	4.3%	Corpus and Uterus, NOS*	4.2%
Urinary Bladder	4.0%	Leukemia	3.3%
Esophagus	3.7%	Non-Hodgkin Lymphoma	2.9%
Non-Hodgkin Lymphoma	3.5%	Liver and Intrahepatic Bile Duct	2.8%
Kidney and Renal Pelvis	2.8%	Multiple Myeloma	2.5%

\*NOS defined as Not Otherwise Specified

Source: NCHS Compressed Mortality File in CDC WONDER, 2012-2016

The cancer types that contribute to the highest number of new cases (incidence) do not necessarily contribute to the same proportion of cancer deaths (mortality). Figure 9 represents the ten cancer types with the highest incidence in Maryland and their corresponding mortality proportions from 2012 to 2016. Although lung and bronchus cancer only makes up 12.4% of the cancers diagnosed in Maryland, it causes more than 25.1% of cancer deaths. Prostate cancer, the second leading type of cancer diagnosed in Maryland, only caused 4.9% of deaths from cancer from 2012 to 2016.

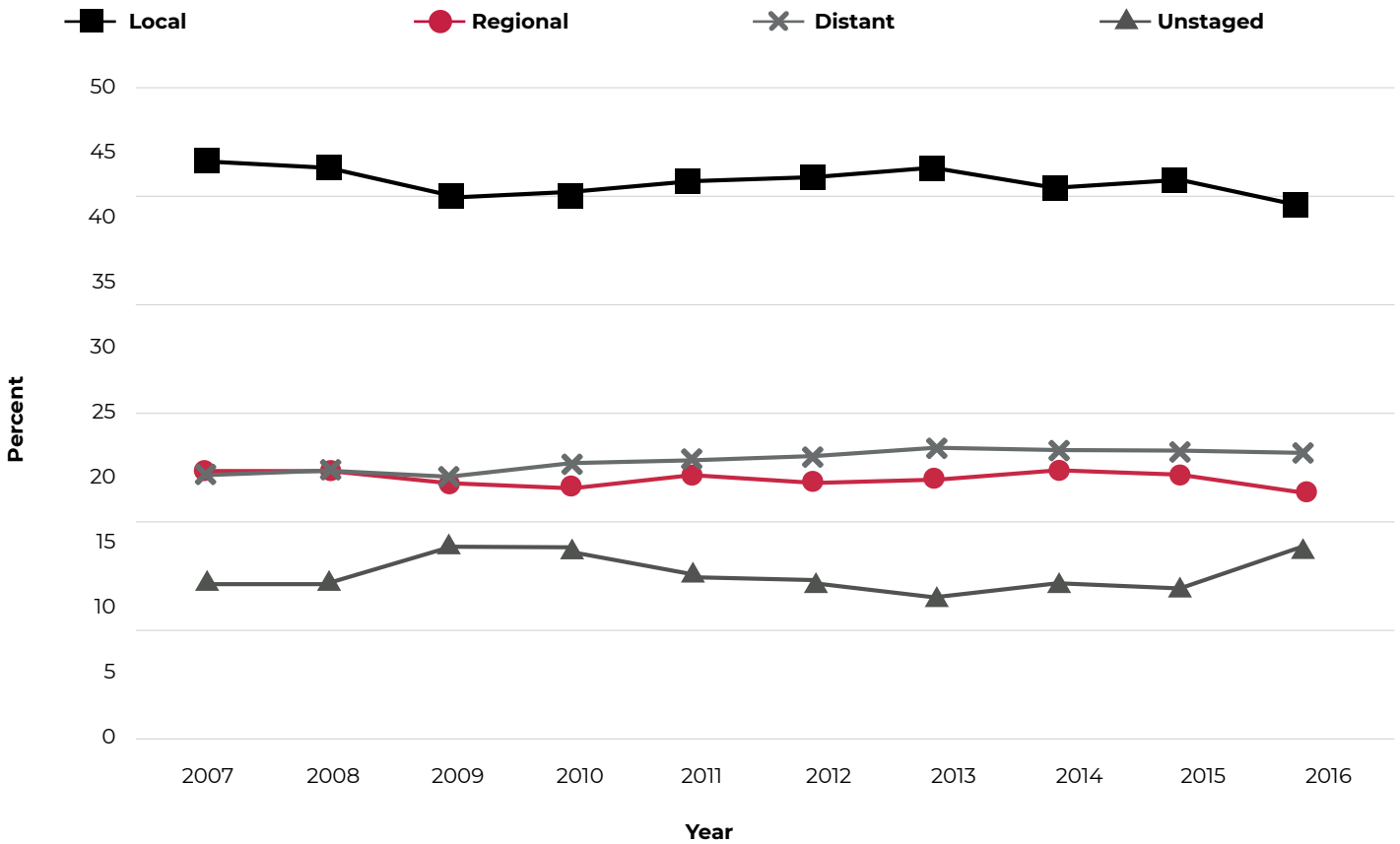
**Figure 9.** Percentage of Incidence Cancer Cases and Cancer Deaths by Type in Maryland, 2012-2016



\*NOS is defined as Not Otherwise Specified  
 Sources: Maryland Cancer Registry;  
 NCHS Compressed Mortality File in CDC WONDER, 2012-2016

Cancer mortality is often linked with cancer stage, which refers to the extent of the cancer including tumor size and whether the cancer has spread to surrounding tissues or other areas of the body. Cancer stage ranges from local (cancer cells are confined to the original organ site) to distant (advanced cancer that has spread to other areas of the body). In general, for most cancer types, patients who are diagnosed with local stage disease have a higher five-year survival rate (likelihood of living for at least five years after a diagnosis) than patients who are diagnosed with advanced disease.<sup>157</sup> Cancer staging data in Maryland from 2007 through 2016 are presented below in Figure 10.

**Figure 10.** All Cancer Sites by Stage at Diagnosis in Maryland, 2007-2016



Source: Maryland Cancer Registry, 2007-2016

# TARGETED CANCERS

The Maryland Cigarette Restitution Fund (CRF) Cancer Prevention, Education, Screening, and Treatment Program has targeted seven cancers for public health intervention in Maryland. These cancers are categorized as all having a high burden in Maryland, modifiable risk factors, and/or effective screening tests for early detection. The seven targeted cancers are breast, cervical, colorectal, lung, oral, prostate, and skin cancer (melanoma). Local health departments are funded by CRF to address one or more of the targeted cancers, and since funding became available in 2001, most have chosen to use funding to screen for colorectal cancer. Current incidence and mortality data on the seven targeted cancers are presented below.

**Table 8.** Incidence and Mortality Rates for Maryland and U.S., 2012-2016

	MD Incidence Rates	U.S. Incidence Rates	MD Mortality Rates	U.S. Mortality Rates
Cervical	6.3	7.4	1.9	2.3
Colorectal	36.1	38.8	14.1	14.2
Female Breast	130.1	126.0	22.2	20.6
Lung	55.6	53.4	40.1	41.9
Oral	10.8	11.3	2.4	2.5
Prostate	120.3	106.8	20.1	19.2
Skin	23.0	23.2	2.2	2.5

Rates are per 100,000 population and are age-adjusted to the 2000 US standard population

Sources: Maryland Cancer Registry, 2012-2016 ;NCI SEER\*Stat (U.S. SEER 18 rates); NCHS Compressed Mortality File in CDC WONDER





Although the Cancer Plan focuses on the seven CRF-targeted cancers described on the previous page, efforts can be undertaken to raise awareness of other cancers such as bladder cancer, blood cancers, uterine cancer, thyroid cancer, kidney and renal cancer, liver cancer, etc. More information about the seven targeted cancers as well as many other types of cancer is available from the National Cancer Institute (NCI) and the American Cancer Society (ACS):

- NCI: [www.cancer.gov/cancertopics/types/alphabet](http://www.cancer.gov/cancertopics/types/alphabet)
- ACS: [www.cancer.org/cancer/index](http://www.cancer.org/cancer/index)

## SCREENING

Cancer screening involves the use of a variety of tests and tools to look for cancer in asymptomatic individuals. Tools may include clinical examination, x-rays, laboratory analysis, endoscopic procedures, or a combination of procedures. For certain cancers, screening tests can provide early detection of pre-cancerous or cancerous changes, which allows for prompt treatment and a greater likelihood for cancer prevention or cure. Early detection is the best way to reduce mortality from these cancers.

The specific screening guidelines depend upon the type of cancer and the recommending organization. There are several organizations that release cancer screening guidelines, including the ACS, NCI, and the National Comprehensive Cancer Network (NCCN). The USPSTF is an independent, volunteer panel of national experts in prevention and evidence-based medicine that sets evidence-based recommendations about clinical preventive services such as screenings, counseling services, and preventive medications. Recommendations are based on a rigorous review of existing peer-reviewed evidence. Under the Affordable Care Act, screening tests that are recommended by the USPSTF are required to be a covered service under an individual's health insurance plan. USPSTF-recommended screening tests and other preventive health services can be viewed online at: [www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations](http://www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations).

Table 9 includes the current USPSTF screening recommendations for the general population for the seven targeted cancers, with additional recommendations from other organizations included as noted. Screening guidelines, however, may vary for special populations, depending on the assessed risk of an individual. This risk is based on many factors including an individual's health and family history, individual health behaviors, age, and current medical condition.



**Table 9.** Targeted Cancers - Screening Recommendations Based on USPSTF Guidance (As of September 2020)

CANCER TYPE	GENERAL SCREENING POPULATION	SCREENING TEST AND FREQUENCY OF SCREENING	ADDITIONAL RECOMMENDATIONS OR NOTES
Female Breast	Women age 50 to 74 years	Mammogram, every 2 years	USPSTF published January 2016
Cervical	Women age 21 to 65 years Women age 65+ who have had adequate prior cervical cancer screening and are not otherwise at high risk for cervical cancer should not be tested	Women ages 21 to 29: Pap test alone, every 3 years Women ages 30 to 65: Pap test alone, every 3 years; or hrHPV test alone, every 5 years; or cotesting (Pap and hrHPV), every 5 years	USPSTF published August 2018 The USPSTF recommends against screening for cervical cancer in women who have had a hysterectomy with removal of the cervix and do not have a history of a high-grade precancerous lesion (i.e., cervical intraepithelial neoplasia [CIN] grade 2 or 3) or cervical cancer.
Colorectal	Adults age 50 to 75 years	The risks and benefits of different screening methods vary.	USPSTF published June 2016 The decision to screen for colorectal cancer in adults aged 76 to 85 years should be an individual one, taking into account the patient's overall health and prior screening history.
Lung	Adults age 55 to 80 years with a 30 pack-year smoking history and currently smoke or have quit within the past 15 years	Low-dose Computed Tomography, annually	USPSTF published September 2014 Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.
Oral	Insufficient Evidence to Recommend	N/A	USPSTF published November 2013 September 2017 – ADA* recommends that dentists look for signs of cancer while performing routine exams in all patients
Prostate	For men age 55 to 69 years, the decision to be screened for prostate cancer should be an individual one The USPSTF recommends against screening for prostate cancer in men 70 years and older	N/A	USPSTF published May 2018 2018 – AUA** recommends shared decision-making for men age 55 to 69 years, and individualized decisions regarding screening for men younger than age 55 at higher risk
Skin	Insufficient Evidence to Recommend	N/A	USPSTF published July 2016 The USPSTF recommends counseling young adults, adolescents, children, and parents of young children about minimizing exposure to ultraviolet radiation for persons age 6 months to 24 years with fair skin types.

\*American Dental Association, [www.ada.org/en/publications/ada-news/2017-archive/september/ada-develops-guideline-for-evaluating-potentially-malignant-disorders-in-the-oral-cavity](http://www.ada.org/en/publications/ada-news/2017-archive/september/ada-develops-guideline-for-evaluating-potentially-malignant-disorders-in-the-oral-cavity)

\*\*American Urological Association, [www.auanet.org/guidelines/prostate-cancer-early-detection-guideline](http://www.auanet.org/guidelines/prostate-cancer-early-detection-guideline)

The Maryland BRFSS is an annual, statewide health survey administered to adults ages 18 and older that focuses on behavioral risk factors, preventive health measures, and health care access. The BRFSS includes questions that measure the proportion of Maryland residents who are up to date with recommended cancer screening exams. Table 10 shows the most recent Maryland BRFSS data for each of the recommended screening exams. Skin cancer screening is not currently recommended by the USPSTF and there are no questions included in the BRFSS that measure the proportion of Marylanders that have received that screening.

**Table 10.** Percentage of Maryland Adults Screened for Cancer by Type, Maryland BRFSS, 2018

CANCER	MEASURE	PERCENTAGE OF MARYLAND ADULTS
Female Breast	Women age 50 to 74 years who have had a mammogram within the past 2 years	81.2%
Cervical	Women age 21 to 65 years, with an intact cervix, who have had a Pap test within the past 3 years	81.3%
Colorectal	Adults age 50 to 75 years who have had a colonoscopy in the past 10 years, sigmoidoscopy in the past 5 years and blood stool test in the past 3 years, or blood stool test within the past year	72.5%
Lung <sup>^</sup>	Adults age 55 to 80 years of age who have had a 30 pack-year history of smoking and are a current smoker, or have quit within the last 15 years	6.7%
Oral <sup>*</sup>	Adults age 18 years and older who had an oral cancer screening exam in the past year	21.6%
Prostate	Men ages 55 to 69 who have discussed the advantages and disadvantages of the prostate-specific antigen (PSA) test with their health care provider	55.7%

<sup>^</sup>American Lung Association, 2018

<sup>\*</sup>Maryland BRFSS, 2016

## DISPARITIES IN CANCER INCIDENCE, MORTALITY, AND SCREENING RATES

In Maryland, data indicate that the burden of cancer is not distributed equally across different races and ethnicities, sexes and genders, and geographic locations. Differences are seen in incidence and mortality rates, screening rates, and stage at diagnosis, and many of these differences can likely be classified as health disparities that are linked with social, economic, and/or environmental disadvantage. The Cancer Plan Introduction discusses cancer disparities more in-depth, including factors that are thought to play a role in disparities and social determinants of health.

The charts and maps on the following pages display statistically significant differences in cancer incidence and mortality (2012-2016) and screening rates (2018) for the seven targeted cancers. Among the targeted cancers, significant racial, ethnic, and/or sex differences are seen in the incidence and mortality rates for cervical, colorectal, female breast, lung, oral, and prostate cancers, and in screening rates for female breast, colorectal, and cervical cancers. Although the Cancer Plan focuses on differences between racial and ethnic groups and between males and females, differences and cancer disparities may also occur by other factors such as age, disability, educational status, etc.



**Table 11.** Significant Health Disparities in Cancer by Race and Sex, Maryland, 2012–2016 (p < 0.05)

CANCER TYPE	INCIDENCE RATES	MORTALITY RATES	RATE DIAGNOSED IN REGIONAL OR DISTANT STAGE**
Cervix	White: 6.0 Black: 6.9	White: 1.6 Black: 2.8	*
Colon and Rectum	White: 34.9 Black: 39.7	White: 13.2 Black: 17.9  Male: 16.9 Female: 11.9	*
Female Breast	*	White: 20.7 Black: 27.5	White: 31.4% Black: 39.7%
Lung	White: 58.4 Black: 53.8	Male: 48.3 Female: 34.2	Male: 72.1% Female: 68.4%
Oral	White: 12.1 Black: 8.1	Male: 3.7 Female: 1.4	Male: 69.7% Female: 47.8%
Prostate	White: 102.3 Black: 180.4	White: 16.5 Black: 36.7	White: 15.4% Black: 14.2%

\* Significant differences between race and sex do not exist.

\*\* Percentage of cancers diagnosed in regional or distant stages; applied to incidence rates

Rates are per 100,000 and are age-adjusted to 2000 US Standard Population

Sources: Maryland Cancer Registry; NCHS Compressed Mortality File in CDC WONDER, 2012-2016

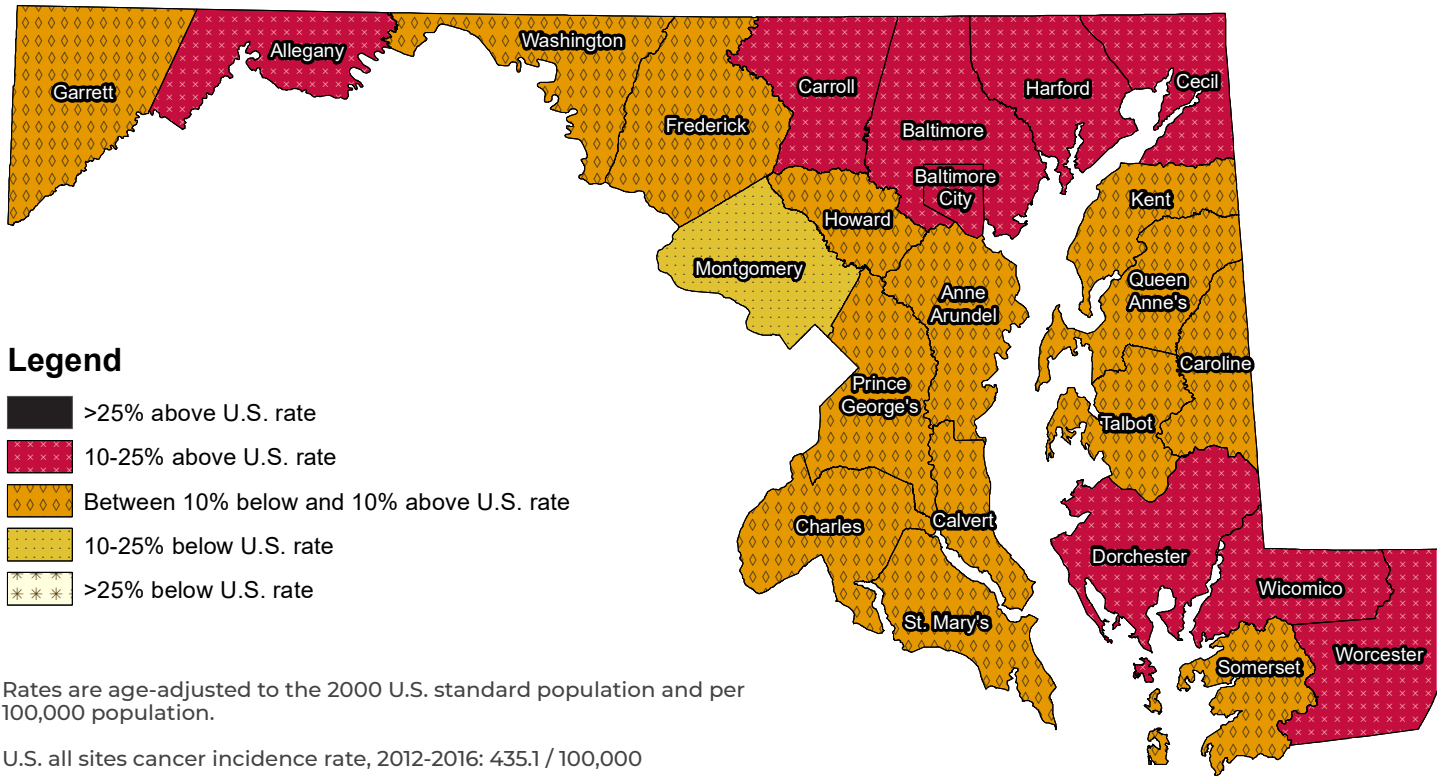
**Table 12.** Significant Differences and/or Disparities in Cancer Screening

SCREENING TYPE	BRFSS QUESTION	PERCENT RESPONDENTS	SUMMARY OF HEALTH DISPARITIES*
Female Breast	Females in Maryland ages 50 to 74 years of age who have received a mammogram in the past two years.	Black: 87.5% White: 78.5%	Exists between: Black vs. White
Colon and Rectum	Percentage aged 50 to 75 years who have had a blood stool test in the past year, sigmoidoscopy in the past 5 years and blood stool test in the past 3 years, or a colonoscopy in the past 10 years.	Black: 76.1% White: 73.1% Asian: 63.7%	Exists between: Black vs. Asian
Cervical	Percentage of women aged 21 to 65 years who have not had a hysterectomy and have had a Pap test in the past 3 years.	Black: 83.8% White: 81.9% Asian: 70.0%	Exists between: Black vs. Asian

Source: Maryland BRFSS 2018

\*Differences in screening rates are presented with the higher rate first.

**Figure 11.** Maryland All Sites Cancer Incidence Rates by Geographical Area: Comparison to US Rate, 2012-2016



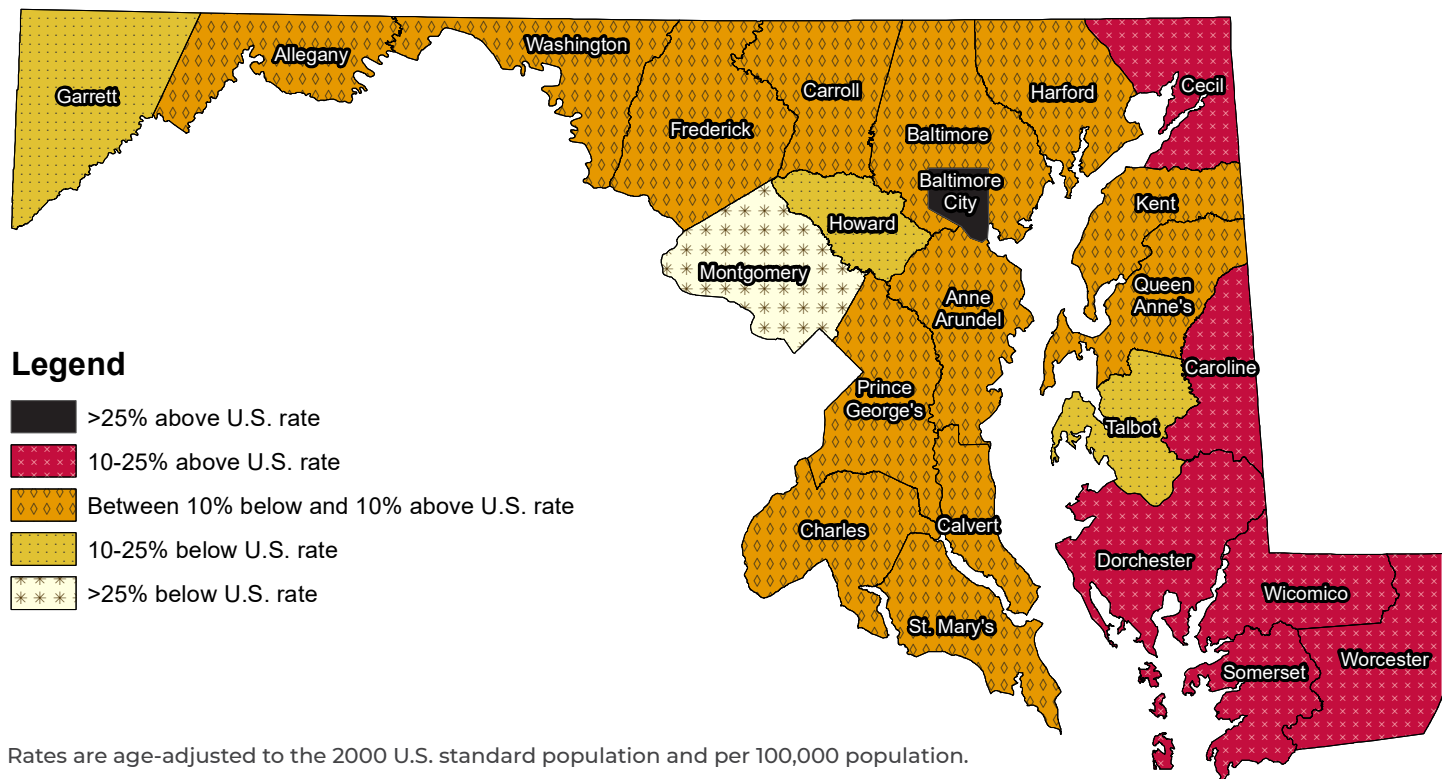
Rates are age-adjusted to the 2000 U.S. standard population and per 100,000 population.

U.S. all sites cancer incidence rate, 2012-2016: 435.1 / 100,000

Maryland all sites cancer incidence rate, 2012-2016: 443.9 / 100,000

Sources: Maryland Cancer Registry; U.S. SEER, SEER\*Stat Database

**Figure 12.** Maryland All Sites Cancer Mortality Rates by Geographical Area: Comparison to US Rate, 2012-2016



Rates are age-adjusted to the 2000 U.S. standard population and per 100,000 population.

U.S. all sites cancer mortality rate, 2012-2016: 161.0 / 100,000

Maryland all sites cancer mortality rate, 2012-2016: 160.3 / 100,000

Sources: NCHS Compressed Mortality File in CDC WONDER; U.S. SEER, Cancer Statistics Review

Although disparities in the incidence and mortality of certain cancers have declined, some disparities continue to persist over time. Additional data on cancer disparities for the seven CRF-targeted cancers are available in annual MDH Cancer Reports, which include incidence and mortality disparities by race over time, as well as additional maps displaying county-level disparities. The reports are published online at: [pha.health.maryland.gov/cancer/Pages/surv\\_data-reports.aspx](http://pha.health.maryland.gov/cancer/Pages/surv_data-reports.aspx).

## CHILDHOOD CANCER

Childhood cancer remains a challenge in Maryland and nationwide. Early diagnosis is difficult because symptoms are similar to those of more common childhood diseases.<sup>158</sup> Mortality rates for childhood cancer have declined over the past four decades thanks to improvements in treatment and high rates of participation in clinical trials; however, cancer remains the second leading cause of death among children ages 1 to 14.<sup>159</sup>

From 2012 to 2016, there were 1,316 cases of cancer diagnosed in Maryland children younger than 20 (Table 13). An estimated 11,060 U.S. children ages 0 to 14 will be diagnosed with cancer in the U.S. in 2019 and 1,190 cancer deaths are expected to occur among children.<sup>160</sup> The two most frequently diagnosed cancers in U.S. children are leukemia (28% of all childhood cancers) and brain and other central nervous system tumors (26%).

**Table 13.** Number of Cancer Cases in Children by Site and by Age in Maryland 2012-2016

	< 1 YEAR	1-4 YEARS	5-9 YEARS	10-14 YEARS	15-19 YEARS
<b>All Sites</b>	91	306	222	250	447
<b>Oral Cavity and Pharynx</b>	0	<6	<6	6	15
<b>Digestive System</b>	11	10	<6	11	29
<b>Bones and Joints</b>	<6	0	8	26	26
<b>Soft Tissue including Heart</b>	13	20	13	18	25
<b>Melanoma of the Skin</b>	0	<6	<6	<6	20
<b>Ovary</b>	0	0	<6	<6	14
<b>Testis</b>	<6	<6	0	<6	27
<b>Kidney and Renal Pelvis</b>	<6	25	15	<6	<6
<b>Eye and Orbit</b>	10	21	<6	<6	<6
<b>Brain</b>	10	52	60	48	38
<b>Thyroid</b>	0	0	<6	11	57
<b>Other Endocrine including Thymus</b>	6	16	<6	<6	<6
<b>Hodgkin Lymphoma</b>	0	<6	11	20	73
<b>Non-Hodgkin Lymphoma</b>	<6	8	14	19	33
<b>Acute Lymphocytic Leukemia</b>	<6	100	49	31	26
<b>Chronic Lymphocytic Leukemia</b>	0	<6	0	0	0
<b>Acute Myeloid Leukemia</b>	0	<6	0	0	0
<b>Chronic Myeloid Leukemia</b>	0	<6	<6	<6	6

<6=Case count of 1-5 are suppressed per MDH/MCR Data Use Policy.

Source: Maryland Cancer Registry, 2012-2016



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Screening tests can detect cancers early when they are most treatable, and the promotion of cancer prevention and routine screening is crucial in the fight against cancer.

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Experts recommend that children with cancer be treated at medical centers with multidisciplinary teams that specialize in childhood cancer.<sup>161</sup> Pediatric cancer centers offer treatment protocols for most types of cancer that occur in children and adolescents, as well as the opportunity to participate in clinical trials.

Childhood cancer survival rates have improved over the past 30 years due to new and improved treatments; however, rates vary depending on cancer type, cancer stage, patient age, and other characteristics. Additionally, many of the late effects of treatment may not become apparent until adulthood. Late effects of childhood cancer treatment may include: second cancers; health problems of the heart and blood vessels, central nervous system, digestive system, respiratory system, thyroid/pituitary glands, bones and joints, kidneys, and bladder; obesity; infertility and other health problems of the reproductive system; hearing and/or vision difficulties; and psychosocial issues.<sup>162</sup>

The Children's Oncology Group (COG) has developed long-term follow-up guidelines for survivors of childhood cancers, which are available online at [www.survivorshipguidelines.org](http://www.survivorshipguidelines.org).

## CROSS-CUTTING TOPICS

Many cancer cases can be prevented through changes in lifestyle and the preventive measures that are outlined in Section 1. Screening tests can detect cancers early when they are most treatable, and the promotion of cancer prevention and routine screening is crucial in the fight against cancer. However, prevention and early detection are not the only components of a comprehensive effort to reduce cancer incidence, mortality, and disparities. This section discusses several cross-cutting topics in cancer control, including patient navigation, patient education, provider education, quality monitoring and improvement, cancer genetics, immunotherapy, personalized medicine, and research and clinical trials. These topics present various opportunities and strategies for health care providers, health systems, public health entities, community organizations, insurers, and the public to implement to reduce the burden of cancer in Maryland.

## PATIENT NAVIGATION

The complexity of the health care system often presents patients with many challenges and barriers in obtaining appropriate and timely care. Since the concept of patient navigation was first introduced by Harold P. Freeman in 1990, patient navigation has emerged as an effective, evidence-based strategy to increase access to information, resources, and care by addressing individual patient-level barriers. Patient navigation includes any type of service that assists an individual in overcoming obstacles from screening to treatment, as well as coping with challenges during survivorship.

Patient navigation shares many characteristics with other models of patient assistance, such as case management, but there are some differences. The principles of case management including case identification, identifying barriers to care, developing individual plans to overcome barriers, and tracking over time are undoubtedly a part of patient navigation. However, patient navigation tends to focus on one health condition and tends to track patients until completion of a finite set of health services, instead of long-term follow up.<sup>163</sup>

Those who work in cancer patient navigation are often trained, culturally competent health care professionals who work with patients, families, health care providers, and the health care system to ensure cancer patients' needs are appropriately and effectively addressed. Patient navigators may be nurses, social workers, community health workers, or the lay public. Their role includes helping patients to overcome health system barriers, providing health education about cancer across the cancer continuum from prevention to survivorship, addressing patient barriers to cancer care, and providing psychosocial support.<sup>164</sup> Those who work in patient navigation may coordinate medical appointments, maintain telephone contact between patients and health care providers, arrange transportation to and from medical services, assist with completing forms and obtaining documentation, and much more.



Patient navigation has proved to be an effective intervention in promoting screening and achieving timely diagnosis and treatment of cancer, and numerous studies have demonstrated its benefits.<sup>165</sup> A study in 2014 examining the Cancer Prevention Treatment Demonstration (CPTD) Screening Trial revealed that patient navigation was effective in increasing colorectal cancer screening among older African American adults in Baltimore City.<sup>166</sup> Another study that also looked at the CPTD showed that patient navigation was effective for participants' breast cancer screening adherence among African American Medicare beneficiaries in Baltimore City, particularly for women who were not up to date on their screening at the time of enrollment.<sup>167</sup> Patient navigation also reduces health disparities, increases patients' satisfaction with medical treatment and care, increases patients' access to care, and improves timely cancer care.<sup>168,169</sup> Other studies have provided evidence of the efficacy of patient navigation in improving screening rates for cervical, colorectal, and prostate cancer; the improvement in the rate of adherence to screening ranges from 10.8% to 17.1% when patient navigation is compared to a control group.<sup>170</sup>

The Guide to Community Preventive Services (The Community Guide) recommends several strategies to improve screening rates for breast, cervical, and colorectal cancers that can involve patient navigation. These include client reminders for recommended screenings (breast, cervical, and colorectal), one-on-one education about the benefits of and ways to overcome barriers to cancer screening (breast, cervical, and colorectal), and reducing structural barriers for patients by eliminating or simplifying administrative procedures and other obstacles (breast and colorectal).

To support patient navigation in Maryland, MDH facilitates a statewide Maryland Patient Navigation Network (PNN). The PNN brings together individuals from public and private organizations who navigate patients through cancer care or who are interested in patient navigation, and provides opportunities for networking, sharing resources, and training. Members work across all areas of the cancer continuum including prevention, early detection, treatment, and survivorship. The PNN provides training opportunities, including webinars and conferences, to improve the practice of patient navigation and ultimately patient outcomes.

## PATIENT-LEVEL EDUCATION

Opportunities for patient-level education exist at all stages of the cancer continuum. Educating individuals about the importance of healthy behaviors to prevent cancer, screenings to detect cancer early, and adherence to cancer treatment plans is crucial to improve survivorship and patient outcomes, and to reduce disparities. Education is equally important for individuals who utilize the health care system and for those who do not.

Education provides a method for addressing the fears and misconceptions that individuals may have about cancer as it relates to their personal health and wellbeing. Individuals and family members may not fully understand their cancer risk or the value in seeking screening and treatment services, which can prevent them from accessing services early when cancer is most treatable. For those who are unaccustomed to the health care system, providing appropriate resources and information can help them to make informed decisions about getting screened and completing recommended follow up and treatment.

Research indicates that lack of a provider recommendation is a main reason why eligible adults do not get screened for colorectal cancer.<sup>171</sup> Educating patients about and recommending appropriate cancer screenings is an example of how providers can increase screening rates and improve outcomes. The Community Guide recommends one-on-one education about cancer screening and the use of small media (e.g. videos, brochures, and newsletters) to increase screening rates of breast, cervical, and colorectal cancer.

Increasing public awareness of cancer risk factors, screening, and survivorship is also important. Studies have shown that the stigma associated with lung cancer influences medical help seeking behavior for lung cancer symptoms.<sup>172,173</sup> The ACS and American Lung Association recommend increased public education efforts to raise awareness about the factors (beyond smoking) that can lead to lung cancer and that lung cancer can strike non-smokers as well as former smokers who quit many years ago.<sup>174,175</sup>

## HEALTH CARE PROVIDER EDUCATION

Health care providers are often trusted sources of information and present an opportunity to improve patient knowledge and health status. However, lack of consistent messaging among providers; lack of provider knowledge about best practices; and communication, language, and cultural barriers may prevent optimal cancer care.

Primary care providers are an essential audience to target with health care provider educational efforts. The American Society of Clinical Oncologists (ASCO) estimates that by 2025, the demand for oncology services will increase by more than 40%, while the number of oncologists will only increase by 28%.<sup>176</sup> Complicating matters further, reports from survivors show they would prefer to receive continuing care from oncologists because their primary care provider lacks knowledge of their treatment.<sup>177</sup> To bridge this gap, coordinating with and transitioning post-treatment patient care to primary care providers will become increasingly important to allow oncologists to focus on patients receiving active treatment.<sup>178</sup>

In a survey of 659 graduating medical students in the U.S., 23% had never observed a skin cancer examination and 43% had never examined a patient for skin cancer.<sup>179</sup> Another survey conducted at the Boston University School of Medicine found that 52% of fourth-year medical students rated themselves as unskilled in skin cancer examinations.<sup>180</sup> This deficit of skin cancer knowledge was also apparent in a survey of family practitioners; more than 50% of those surveyed stated that they lacked the confidence to recognize melanoma.<sup>181</sup> Studies on oral cancer knowledge and practices among family physicians and nurse practitioners in Maryland and among dentists and primary care physicians in Massachusetts have also indicated a need for increased provider education on oral cancer prevention and early detection.<sup>182,183,184</sup>

Enhanced efforts to educate providers in the areas of cancer prevention, risk assessment, screening, and post-treatment survivorship may help to improve patient outcomes. Information can be delivered through live or web-based continuing medical education (CME) opportunities and can also be disseminated by medical professional associations/organizations to members through newsletters and other publications. Education can be targeted to various types of health care providers including primary care physicians, advanced practitioners, nurses, social workers, and specialty physicians.

Evidence suggests that a lack of cultural competence contributes to disparities in health care and can lead to misunderstandings and poorer health outcomes. Findings from a web-based breast cancer cultural competency course for primary care providers in Montgomery County, Maryland indicate that there was an increase in awareness of breast cancer knowledge and disparities, and the importance of cultural competence.<sup>185</sup> Web-based educational opportunities and video conferencing are promising practices to expand access to educational opportunities to providers, especially those in rural areas.

## QUALITY MONITORING AND IMPROVEMENT

Quality monitoring and improvement ensures that standards of quality are met through the use of a deliberate and defined process that is focused on activities to improve population health. It refers to a continuous and ongoing effort to achieve measurable improvements in the efficiency, effectiveness, performance, accountability, outcomes, and other indicators of quality services or processes that achieve equity and improve the health of a community.<sup>186</sup>

Within comprehensive cancer control efforts, there are numerous opportunities for quality monitoring and improvement. These include data collection and analysis, evaluation of clinical performance measures and outcomes, development and implementation of evidence-based clinical practice guideline recommendations, and the standard practice of process and quality improvement activities.



Examples of quality monitoring and improvement activities include:

### **Public health entities and/or cancer researchers**

Data collection using quantitative and qualitative methods, assessment of data, and utilization of data assessment are the cornerstones of quality monitoring and improvement in cancer control. Efforts in quality monitoring and improvement include using existing surveillance data on cancer incidence, mortality, risk factors for the development of cancer, screening behaviors, and diagnostic and treatment services to identify potential areas for intervention.

### **Health care systems**

The use of quality performance measures and outcomes by hospitals, provider groups, and managed care systems is effective for monitoring and improving the quality of care in cancer screening, diagnosis, treatment, and survivorship. Clinical performance measures include both processes of care and outcomes of care. Absence or poor quality of cancer screening programs, limited access to health care services, and lack of functional referral systems negatively impact outcomes in cancer screening, diagnosis, and treatment.

### **Medical professional associations/ organizations**

The development, implementation, and evaluation of evidence-based clinical practice guideline recommendations by local and national organizations ensures an ongoing high level of cancer care. Educating and encouraging members to adhere to practice guidelines is an effective way to improve the quality of cancer screening, diagnosis, and patient-centered care and treatment services.

### **Health care providers**

Practice-level efforts to monitor and improve quality are equally important and may include assessing cancer screening rates among the patient population to identify missed opportunities and areas for improvement. By continuously utilizing process and quality improvement methods such as the Plan Do Study Act model, health care providers (including private providers, community health clinics, and hospitals) are able to objectively review their current processes and procedures for potential areas of improvement. Once an improvement is put into place, the provider uses data to determine the success of the change, alters the practice as needed, and then moves on to examine another relevant process or procedure. In this way, the health care provider is able to more efficiently reach desired outcomes of care. Electronic health records can be a useful tool in the evaluation of practice-level data.

The Community Guide recommends quality monitoring and improvement through provider assessment and feedback interventions to improve breast, cervical, and colorectal cancer screening rates within the patient population. These interventions evaluate provider performance related to cancer screening and provide performance feedback.

Proactive quality monitoring in cancer control identifies areas that may require improvement to ensure that quality processes are implemented, which can lead to improved patient health outcomes including both process outcomes (e.g., eligible patients are referred for recommended cancer screenings) and health outcomes (e.g., decreased cancer mortality).

## CANCER GENETICS

The expanding knowledge base in the field of cancer genetics has improved our understanding of genetic variants and their role in the development of cancer.<sup>187</sup> Gene variants are changes that occur in the DNA sequence of genes. They may occur in the germline — alterations in the DNA of egg or sperm cells that become incorporated into the DNA of every cell in the body, germline mutations are passed on from parents to offspring — or in somatic cells — alterations in DNA that occur after conception and can occur in any cell in the body except sperm and egg cells and are not passed on to offspring. Variants may be benign (harmless), likely benign, of uncertain significance, likely pathogenic, or pathogenic (disease-causing) leading to increased risk of diseases such as cancer.<sup>188</sup>



More recently, application of genomic sequencing technology has increased knowledge about "the ecological community of commensal, symbiotic, and pathogenic microorganisms that literally share our body space," collectively referred to as the microbiome.<sup>189</sup> The microbiome is part of human genomic inheritance, and we are learning more about the role of the microbiome in different body surfaces and their role in cancer development, treatment, and outcomes.<sup>190</sup>

## Hereditary Cancers

Inherited genetic variants can increase a person's risk of developing certain types of cancers, and they account for 5% to 10% of all cancers.<sup>191</sup> Cancers that occur because of inherited variants are called hereditary or inherited cancers. Features of inherited cancers include:<sup>192</sup>

- Multiple primary tumors in the same organ or in different organs in the same person,
- Bilateral or multifocal primary tumors (cancers in both organs in a set of paired organs),
- Age at diagnosis that is younger than usual,
- Multiple first-degree relatives with tumors of the same site,
- Unusual cases of specific types of cancer (e.g. male breast cancer),
- Presence of birth defects that are known to be associated with inherited cancer,
- Membership of a racial or ethnic group known to be at increased risk of certain cancer susceptibility syndromes,
- Cancer in several family members across generations,
- Rare cancers (e.g. duodenal cancer, epithelial ovarian, fallopian tube, or primary peritoneal cancer), and
- Uncommon cancer histology (e.g. Medullary thyroid cancer).





Genetic variants have been linked to more than 50 hereditary cancer syndromes, including the syndromes listed in the table below.<sup>193,194</sup>

**Table 14.** Examples of Hereditary Cancer Syndromes

HEREDITARY CANCER SYNDROME	ASSOCIATED CANCERS	GENE VARIANT(S)
Hereditary breast cancer and ovarian cancer syndrome	Breast (male and female), ovarian, pancreatic, prostate	BRCA1, BRCA2
Li-Fraumeni syndrome	Breast, brain, adrenocortical, osteosarcoma, chondrosarcoma, rhabdomyosarcoma, leukemia, lymphoma	TP53
Hereditary nonpolyposis colorectal cancer (Lynch syndrome)	Colorectal, endometrial, ovarian, stomach, hepatobiliary, urinary tract, small intestine, brain/central nervous system	MLH1, MSH2, MSH6, PMS2, EPCAM
Familial Adenomatous Polyposis	Colorectal, hepatoblastoma, small intestine, brain, thyroid	APC
Von-Hippel Lindau syndrome	Kidney	VHL

## Risk Assessment and Genetic Testing

Identification of individuals and families at increased risk for inherited cancers allows health care professionals to refer them for genetic counseling, risk assessment, and consideration of genetic testing as appropriate. Cancer risk assessment is a consultative service that includes clinical assessment, genetic testing when appropriate, and risk management recommendations delivered in the context of one or more genetic counseling sessions.<sup>195</sup> Genetic testing is used to identify specific inherited variants in an individual's chromosomes, genes, or proteins, and can help confirm or rule out whether a condition is the result of an inherited syndrome.

The American College of Medical Genetics and Genomics (ACMG) and the National Society of Genetic Counselors (NSGC) have published and regularly update a comprehensive set of indications for cancer predisposition assessment.<sup>196,197</sup> Individuals positive for any of the ACMG/NSGC criteria should be referred for genetic counseling, and if indicated, genetic testing.

If an individual is determined to be at increased risk of developing cancer, specific interventions

may be recommended to reduce the individual's risk. For example, bilateral prophylactic (preventive) mastectomy can be performed in women with a BRCA1 or BRCA2 gene variant.<sup>198</sup> For individuals carrying the hereditary nonpolyposis colorectal cancer gene variant, surveillance for colorectal cancer may be initiated earlier or performed more frequently.<sup>199</sup> Knowledge about a cancer-predisposing variant may also benefit the family members of the individual who was tested. One study performed on parents who received BRCA1/2 testing found that a significant proportion of parents shared their test results with their children.<sup>200</sup> Maintenance of family health was cited as a key reason why tested parents chose to disclose their genetic information to their children.<sup>201</sup>

For individuals who are found to have a genetic variant that increases their cancer risk, the Genetic Information Nondiscrimination Act (GINA) is a federal law that protects from genetic discrimination in health insurance and employment. For more information about GINA, visit [www.ginahelp.org](http://www.ginahelp.org).

Under Maryland law, a covered entity or business associate of a covered entity under HIPAA can advertise CLIA-certified laboratory genetic testing, such as diagnostic laboratory tests performed for the purpose of screening, diagnosing, managing, or treating a condition or disease, and ancestry testing related to parental lineage and ethnicity.<sup>202</sup> Significant concerns remain about the specificity, sensitivity, predictive values, ethical, and legal issues raised by “Direct to Consumer” genetic tests.<sup>203,204</sup> Requiring individuals to go through a health care provider enables patients to have the opportunity to discuss the benefits and limitations of genetic testing with a qualified professional.<sup>205</sup>

To optimize the benefits of genetic testing, the ASCO recommends that genetic testing for cancer susceptibility be offered only when the following three criteria are met:<sup>206,207</sup>

- The individual tested has a personal or family history suggestive of genetic cancer susceptibility,
- The genetic test can be adequately interpreted, and
- The test results have accepted clinical utility.

It is also recommended that genetic testing be conducted in the setting of pre- and post-test counseling, and that these services be provided by experienced health care professionals.<sup>208</sup>



## Sporadic Cancers

Sporadic cancers contain many acquired genetic variants, some of which reveal basic biological processes gone awry that are required for cancer initiation and progression.<sup>209,210</sup> An acquired genetic variant, also known as sporadic or spontaneous variant, is a mutation that occurs due to changes to an individual's genes, usually in a specific tissue or organ, over the course of his or her lifetime. Unlike inherited mutations, they are not passed on from one generation to another. These mutations can be due to errors during the cell division process, or by environmental elements that can damage a cell's DNA, such as radiation or tobacco exposure.

Testing cancers for somatic variation is increasingly done to: inform prognosis, detect actionable variants for targeted therapeutics, and identify germline variants.<sup>211</sup> These tests can be done by sequencing the entire genome of the tumor (Whole Genome Sequencing – WGS), sequencing only the protein coding region of the cancer genome (Whole Exome Sequencing – WES), or sequencing only specific regions of interest (Targeted Sequencing).

## Epigenetics, Liquid Biopsy, and Precision Oncology

The genes in human cells can change in ways that modify the expression and function of the genetic material (e.g. by addition of methyl groups). These changes, which include DNA methylation, histone modifications, and non-coding RNAs, are collectively referred to as epigenetic changes. They can drive and characterize cancers. Different patterns of epigenetic changes can be used to detect cancers.<sup>212</sup> Epigenetic markers are one of the main targets of an emerging field in cancer diagnostics that is based on the use of circulating DNA sequences for stratification of patients, the monitoring of their response to treatment, and the opportunity for early intervention independent of detection by imaging modalities or clinical symptoms.<sup>213</sup> This and other technologies are driving the emerging field of Precision Oncology, in which cancer care and prevention are driven by multiple strands of genomic data.<sup>214</sup>

## Microbiomes and Cancer

Next generation sequencing technologies (NGS) have made it possible to generate comprehensive views of the microbial ecosystems of body surfaces and cavities. The trillions of bacteria that inhabit these sites exist in symbiotic relationship with the host, but these can go awry leading to inflammatory states and cancers. Cancers of the stomach, esophagus, and colon have been associated with specific microbiome patterns or bacteria. Microbiomes may also influence efficacy and response to cancer treatment as well as the pattern of side effects.<sup>215,216</sup>

## Familial Cancers

Familial cancers are cancers that may occur in multiple members of the same family, but usually do not display features seen in hereditary cancers. In these cases, there is typically a cluster of cancers within a family at a rate that is higher than that expected by chance alone. Familial cancers may be due to multiple factors, including a combination of genetic variants, shared environmental exposures, or lifestyle risk factors. In these families, close relatives of the individual with cancer may have a modestly increased risk of developing the same cancer. Genetic testing is usually not beneficial in assessing cancer risk in this situation, although family members of the affected individual may need earlier or more frequent cancer screenings.<sup>217</sup>

Identification of individuals and family members with cancer predisposing genetic variants is important because these individuals may benefit from potentially life-saving clinical interventions. It is key that Marylanders are aware of their family history of cancer and share that information with their health care providers.

# IMMUNOTHERAPY

Research and clinical trials continue to lead to advances in cancer treatment and care. In 2015, for example, clinical trials showed that immunotherapy can improve outcomes for difficult-to-treat cancers, including advanced lung, kidney, bladder, and head and neck cancers and Hodgkin lymphoma.<sup>218</sup> Immunotherapy was declared the ASCO's Advance of the Year in 2016 and was also the main focus in 2017 and 2018.<sup>219</sup>

Immunotherapy, also called biologic therapy, is a type of cancer treatment that uses a patient's own immune system to help fight cancer. The immune system is made up of white blood cells, tissues, and organs of the lymphatic system that fight infections and other diseases.<sup>220</sup> Immunotherapies may work against cancer in different ways. Some immunotherapies mark cancer cells to help the immune system find and destroy them.<sup>221</sup> Other immunotherapies help stimulate the immune system to fight the cancer.<sup>222</sup>

Types of immunotherapy include:<sup>223,224</sup>

- Checkpoint inhibitors, which help the immune system recognize and attack cancer cells by releasing the “brakes” off the immune system;
- Adoptive cell transfer (e.g., CAR T-cell therapy), which is a treatment that takes T cells from the tumor, grows the T cells that are most active against the cancer in a lab, and then gives them back to the patient intravenously;
- Monoclonal antibodies, which are immune system proteins produced in a lab and used to attack a very specific part of a cancer cell;
- Treatment vaccines, which encourage the immune system to attack cancer cells;
- Cytokines, which are proteins made by the body and used to boost the immune system; and
- BCG, or Bacillus Calmette-Guérin, which is a weakened form of bacteria that causes tuberculosis but can be used as immunotherapy to treat bladder cancer.



# PERSONALIZED MEDICINE

Personalized medicine refers to medical care that is based on the patient's genes and specific disease. Genes are the information that tells cells in the body how to grow and develop. Many cancers affect or involve specific genes, and personalized cancer medicine comes from the study of human genes and the genes of different cancers. These studies have helped researchers design more effective treatments. In addition, this genetic information has been used to develop tests for cancer and ways to prevent cancer.<sup>225</sup>

Before personalized medicine, people with the same cancer received the same treatment. Over time, doctors noticed that treatments worked better for some patients than others. Researchers found genetic differences in people and their cancers, and these differences helped to explain why cancers responded differently to the same treatment.<sup>226</sup>

Types of Personalized Medicine include:<sup>227,228</sup>

- Targeted Therapy, which uses drugs or other substances that block the growth and spread of cancer by interfering with specific molecules that are involved in the growth, progression, and spread of cancer, and
- Pharmacogenomics, which studies how genetic variations influence drug efficacy and toxicity.

# RESEARCH AND CLINICAL TRIALS

Cancer research drives progress in the areas of cancer prevention, detection, diagnosis, treatment, and quality of life. Cancer research activities include laboratory research, population or epidemiological research, clinical practice, and clinical research. There is also growing interest in translational research, which “transforms scientific discoveries arising from laboratory, clinical or population studies into clinically relevant applications to improve health by reducing disease incidence, morbidity and mortality.”<sup>229</sup>

As a result of research and clinical trials findings, the field of cancer control is continually evolving. As emerging technologies and knowledge related to cancer early detection and treatment change, the Cancer Plan will be reviewed and updated.

## Current Research Facilities in Maryland

Across the state of Maryland, cancer research is conducted at various universities, research institutions, and medical facilities, with the support of federal, state, and private funding. Maryland is also home to two nationally recognized cancer research institutions. The NCI has awarded the NCI-Designated Comprehensive Cancer Center honor to the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins University, Baltimore and to the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center in Baltimore.<sup>230</sup> This designation is reserved for institutions that are recognized by the NCI for the depth and breadth of their research in each of three major areas (i.e., laboratory, clinical, and population-based research), as well as substantial transdisciplinary research that bridges these scientific areas.<sup>231</sup> The NCI cancer research facility is also located in Maryland.

## Clinical Trials

Clinical trials are research studies in which human volunteers help researchers test the safety and effectiveness of new medical interventions. Cancer clinical trials are used to explore new ways to prevent, detect, diagnose, or treat cancers. Participants of clinical trials have the opportunity to access new treatments that are not available to the public, receive expert medical care, and contribute to the advancement of medical research.

## Types of Clinical Trials

There are several types of cancer clinical trials:<sup>232</sup>

- **Treatment trials** are used to test the effectiveness of new treatments or new ways of using current treatments.
- **Prevention trials** are used to test new interventions that may lower the risk of developing certain types of cancer.
- **Screening trials** are used to test new ways of finding cancer in its early stages.
- **Quality of life/supportive care/palliative care trials** are used to study new ways of improving the comfort and quality of life of cancer patients and cancer survivors, especially those who have side effects from cancer or its treatment.



## Clinical Trial Participation Rates and Disparities

Despite the benefits of clinical trials, the number of adult cancer patients in clinical trials is extremely low, at approximately 3% of adult cancer patients.<sup>233</sup> In comparison, more than 60% of children with cancer participate in clinical trials.<sup>234</sup> In Maryland, only 5% of adult cancer patients reported participation in a clinical trial as part of their cancer treatment.<sup>235</sup>

Populations that remain underrepresented in clinical trials include minorities, older adults, and people living in rural areas.<sup>236,237,238,239,240</sup> Although African Americans have the highest overall cancer mortality rate and highest incidence rates for some specific cancer sites, from 2017 to 2019 less than 5% of participants enrolled in FDA cancer clinical trials that led to approval of a new drug were African Americans.<sup>241,242,243,244</sup> Populations that are accrued onto clinical trials at a higher rate in Maryland include pediatric and adolescent age groups, White patients, females (for sex-specific tumors), and patients with private health insurance.<sup>245</sup> Adequate representation from all affected populations is needed to enable researchers to learn about potential differences among population groups and to ensure generalizability of the trial results.

There are many reasons for low cancer clinical trial participation rates. Health care provider lack of awareness, referral, or encouragement have been cited as reasons for low patient participation rates.<sup>246,247</sup> Lack of patient awareness is also a key problem.<sup>248,249</sup> In an online survey conducted in 2018 on behalf of the ASCO, 63% of cancer patients reported that they were not sure if they were eligible for any clinical trials, and more than half of these non-participants would have been interested if they had known they were eligible.<sup>250</sup> Other reasons shared include patients' fear or mistrust, cost barriers, practical issues (transportation, time off from work), cultural differences, and language or literacy barriers.<sup>251,252</sup> Maryland law requires health insurers, nonprofit health service plans, and health maintenance organizations to cover specified patient costs that are incurred as a result of prevention, early detection, and treatment studies on cancer.<sup>253,254</sup> More information on the availability of clinical trials can be found on the NCI Clinical Trials website, located at [www.cancer.gov/clinicaltrials/search](http://www.cancer.gov/clinicaltrials/search).



# HIGH-BURDEN CANCER GOALS, OBJECTIVES, AND STRATEGIES

GOAL: REDUCE THE BURDEN OF CANCER IN MARYLAND.

**OBJECTIVE 1: By 2025, reduce age-adjusted cancer incidence rates\* to reach the following targets:**

## Maryland

- All Cancer Sites: 426.2 per 100,000 (2016 Baseline: 443.6 per 100,000)
- Cervical: 6.1 per 100,000 (2016 Baseline: 6.5 per 100,000)
- Colorectal: 28.6 per 100,000 (2016 Baseline: 35.4 per 100,000)
- Female Breast: Not greater than 128.9 per 100,000 (2016 Baseline: 128.9 per 100,000)
- Lung: 44.9 per 100,000 (2016 Baseline: 54.0 per 100,000)
- Melanoma (Skin): Not greater than 24.1 per 100,000 (2016 Baseline: 24.1 per 100,000)
- Oral: Not greater than 10.8 per 100,000 (2016 Baseline: 10.8 per 100,000)
- Prostate: Not greater than 124.6 per 100,000 (2016 Baseline: 124.6 per 100,000)

**Target Setting Method:** Trend Analysis<sup>^</sup>

**Source:** NCI SEER\*Stat (U.S. SEER 18 rates)  
Maryland Cancer Registry

\*The Cancer Plan focuses on reducing the incidence of cancers having a high burden in Maryland, and/or modifiable risk factors, and/or effective screening tests for early detection; however, efforts can be undertaken to raise awareness of other cancers, such as bladder cancer, blood cancers, uterine cancer, thyroid cancer, kidney and renal cancer, etc.

<sup>^</sup>Targets are set using trend analysis that does not take into account external factors such as changes in screening recommendations, changes in public health cancer program funding, etc. These external factors may shift trends and result in targets not being met.



**OBJECTIVE 2: By 2025, reduce age-adjusted cancer mortality\* rates to reach the following targets:**

## Maryland

- All Cancer Sites: 127.1 per 100,000 (2016 Baseline: 156.5 per 100,000)
- Cervical: 1.3 per 100,000 (2016 Baseline: 2.0 per 100,000)
- Colorectal: 9.5 per 100,000 (2016 Baseline: 13.8 per 100,000)
- Female Breast: 17.8 per 100,000 (2016 Baseline: 21.3 per 100,000)
- Lung: 23.3 per 100,000 (2016 Baseline: 37.5 per 100,000)
- Melanoma: 1.5 per 100,000 (2016 Baseline: 2.1 per 100,000)
- Oral: 2.6 per 100,000 (2016 Baseline: 3.0 per 100,000)
- Prostate: Not greater than 20.6 per 100,000 (2016 Baseline: 20.6 per 100,000)

**Target Setting Method:** Trend Analysis<sup>^</sup>

**Source:** NCI SEER\*Stat (U.S. SEER 18 rates); NCHS Compressed Mortality File in CDC WONDER, 2012-2016

\*The Cancer Plan focuses on reducing the mortality of cancers having a high burden in Maryland, and/or modifiable risk factors, and/or effective screening tests for early detection; however, efforts can be undertaken to raise awareness of other cancers, such as bladder cancer, blood cancers, uterine cancer, thyroid cancer, kidney and renal cancer, etc.

<sup>^</sup>Targets are set using trend analysis that does not take into account external factors such as changes in screening recommendations, changes in public health cancer program funding, etc. These external factors may shift trends and result in targets not being met.

**OBJECTIVE 3:\* By 2025, increase cancer screening rates to reach the following targets:**

*Cervical: Increase the proportion of women ages 21 to 65 who have had a Pap test in the past three years per USPSTF recommendations.*

- 93.0% of Maryland women ages 21 to 65 (2018 Baseline: 81.3%)

**Target Setting Method:** HP 2020 Target  
**Source:** Maryland BRFSS

*Colorectal: Increase the proportion of adults ages 50 to 75 who have had a blood stool test in the past year, sigmoidoscopy in the past 5 years and blood stool test in the past 3 years, or a colonoscopy in the past 10 years.*

- 80.0% of Maryland adults ages 50 to 75 (2018 Baseline: 72.5%)

**Target Setting Method:** National Colorectal Cancer Roundtable Goal  
**Source:** Maryland BRFSS

*Female Breast: Increase the percentage of women ages 50 to 74 who have had a mammogram in the past 2 years per USPSTF recommendations.*

- 85.3% of Maryland women ages 50 to 74 (2018 Baseline: 81.2%)

**Target Setting Method:** 5% increase  
**Source:** Maryland BRFSS

*Oral<sup>^</sup>: Increase the proportion of adults age 18 and older who have had an oral cancer exam in the past year.*

- 22.7% of Maryland adults age 18 and above (2016 Baseline: 21.6%)

**Target Setting Method:** 5% increase  
**Source:** Maryland BRFSS

*Prostate<sup>^</sup>: Increase the proportion of men ages 55 to 69 who have discussed the advantages and disadvantages of the prostate-specific antigen (PSA) test to screen for prostate cancer with their health care provider.*

- 58.5% of Maryland men ages 55 to 69 (2018 Baseline: 55.7%)

**Target Setting Method:** 5% increase  
**Source:** Maryland BRFSS

*Lung: Increase the proportion of high-risk adults (ages 50 to 80 years of age who have had a 30-pack-year history of smoking and are a current smoker, or have quit within the last 15 years) screened for lung cancer.*

- 7.4% of Maryland adults at high-risk for lung cancer (2018 Baseline: 6.7%)

**Target Setting Method:** 10% increase  
**Source:** American Lung Association, State Data

\*Screening targets are set only for priority cancers for which there are screening recommendations and available BRFSS baseline data. As of publication, there were no recommendations or available data for skin cancer screening.

<sup>^</sup>These screenings are not recommended by the USPSTF; objectives are based on recommendations from American Dental Association for oral cancer, and American Urological Association for prostate cancer.

**OBJECTIVE 4. By 2025, reduce disparities\* in cancer incidence and mortality to reach the following targets:**

*Incidence (age-adjusted):*

*All Cancers*

Ensure that each jurisdiction-level 5-year cancer incidence rate is no more than 10% above the U.S. 5-year cancer incidence rate. (Refer to the map on page 78 for baseline jurisdiction-level cancer incidence rates.)

*Breast*

Ensure that the difference in the breast cancer incidence rates between Whites and Blacks is 4.0 or lower. (2016 Baseline: 4.4 difference between rates [White: 127.4 per 100,000; Black: 131.8 per 100,000])

*Cervical*

Ensure that the difference in the cervical cancer incidence rates between Whites and Blacks is 0.3 or lower. (2016 Baseline: 0.4 difference between rates [White: 6.3 per 100,000; Black: 6.7 per 100,000])

*Colon and Rectum*

Ensure that the difference in the colorectal cancer incidence rates between Whites and Blacks is 1.0 or lower. (2016 Baseline: 1.1 difference between rates [White: 35.2 per 100,000; Black: 36.3 per 100,000])

**Target Setting Method:** Reduce disparities by 10%  
**Source:** Maryland Cancer Registry

*Mortality (age-adjusted):*

*All Cancers*

Ensure that each jurisdiction-level 5-year cancer mortality rate is no more than 10% above the U.S. 5-year cancer mortality rate. (Refer to the map on page 79 for baseline jurisdiction-level cancer mortality rates.)

*Cervical*

Ensure that the difference in the cervical cancer mortality rates between Whites and Blacks is 1.0 or lower. (2016 Baseline: 1.1 difference between rates [White: 1.7 per 100,000; Black: 2.8 per 100,000])

*Lung*

Ensure that the difference in the lung cancer mortality rates between Whites and Blacks is 1.4 or lower. (2016 Baseline: 1.6 difference between rates [White: 39.3 per 100,000; Black: 37.7 per 100,000])

*Oral*

Ensure that the difference in the oral cancer mortality rates between Whites and Blacks is 0.6 or lower. (2016 Baseline: 0.7 difference between rates [White: 2.9 per 100,000; Black: 3.6 per 100,000])

**Target Setting Method:** Reduce disparities by 10%  
**Source:** NCHS Compressed Mortality File in CDC WONDER, 2012-2016

\*Targets based on disparities that were statistically significant in Maryland using 2016 data, however, it is important to reduce rates of all cancers in all racial and ethnic groups.

## Strategies

- Maintain or increase public health funding for cancer screening, diagnosis, and treatment for low-income and uninsured Marylanders.
- Plan and develop standard operating procedures to maintain cancer prevention and control activities during a state of emergency to ensure timely cancer screening, diagnosis, and treatment.

## *Barriers to Care and Patient Navigation*

- Reduce structural barriers to cancer screening and diagnostic work-up, such as modifying hours of service and offering services in alternative settings.
- Encourage employers to provide employees with paid time off at work for cancer screening appointments, or to provide free or subsidized cancer screenings onsite.
- Utilize targeted client reminders to encourage screening.
- Adopt culturally sensitive patient navigation and/or community health worker programs in health care provider settings to increase access to screening and diagnostic services, and to improve treatment adherence.
- Encourage payers to reimburse for patient navigation, including navigation conducted by community health workers.
- Encourage patient navigation professionals to join and support the Maryland Patient Navigation Network.
- Support hospitals and cancer centers in conducting community health needs assessments and encourage sharing of results.
- Leverage technology and innovative practice models, such as telemedicine and visiting consultants, to improve patient access and better connect primary care and other health care providers to cancer specialists.

## *Cancer Disparities*

- Implement innovative methods to identify hard-to-reach, underserved populations.
- Increase community engagement in targeted outreach and education about cancer to minority and other underserved populations by utilizing faith-based, community, and civic/social/service organizations.
- Ensure cultural, financial, and geographic access and provide information to underserved populations on how to access health care and supportive services.
- Ensure that information provided is age-, literacy-, and culturally appropriate; collaborate with those who represent minority and other underserved populations to help design, implement, and evaluate culturally appropriate and effective education and outreach strategies and messages.
- Increase diversity in the health care, research, and community health worker workforces to represent populations being served; use innovative means to recruit students from underserved populations, such as developing internships and/or shadow programs for high school students and educating high school and college students on available incentives such as student loan forgiveness.
- Work through professional medical associations/organizations and schools of medicine, nursing, dentistry, etc. to build health care provider cultural and linguistic competency and understanding of health disparities and unintentional bias.
- Encourage medical specialists and oncologists to practice (permanently or traveling) in rural and underserved areas in Maryland by offering incentives such as student loan repayment and tax incentives.
- Continue to enhance surveillance of cancer disparities among vulnerable populations, including disparities by race, ethnicity, geography, income, education level, and disability status.

## *Education*

- Provide targeted, culturally, and linguistically sensitive educational information to the public about cancer and about health insurance options available through the Maryland Health Connection, and prevention services covered by insurance options.
- Utilize one-on-one education and small media to provide culturally sensitive information to patients about cancer screening.
- Use media outlets such as websites and social media outlets; print, radio, and television public service announcements; billboards; and press releases to provide public health messages related to cancer.
- Provide continuing education opportunities for primary care providers, dentists, and other health care providers in cancer prevention and early detection, diagnosis and treatment guidelines, and post-treatment patient management. Utilize web-based methods, health care provider meetings and conferences, seminars, grand rounds, and/or other opportunities.
- Educate family members around the importance of sharing person and family health history with relatives.
- Educate people on cancer risk factors, including lifestyle factors such as tobacco use, physical inactivity, and obesity.
- Educate providers and medical professionals on the rising incidence of colorectal cancer in adults under 50 years old.

## *Quality Monitoring and Improvement*

- Develop methods to measure health care provider adherence and non-adherence to screening, diagnosis, and treatment standards and national guidelines.
- Develop and utilize tools that allow for aggregate-level data monitoring in health care provider offices (e.g. electronic health record systems).

Encourage health care providers and systems to use tools to monitor amount of time to diagnosis and/or treatment, and adherence to treatment plans.

- Promote the use of systems-level process and quality improvement activities among health care providers to optimize adherence to national guidelines for screening, and times to diagnosis and treatment.
- Encourage complete reporting to the MCR from hospitals, freestanding facilities, medical providers, and other health care providers.

## *Cancer Genetics*

- Work through professional medical associations/ organizations to distribute cancer risk assessment tools and USPSTF recommendations regarding risk assessment, genetic counseling, and genetic testing.
- Educate the public on the relationship between family history, inherited genetic variants, cancer risk, and the importance of genetic counseling prior to genetic testing.
- Utilize telemedicine to increase access to genetic counselors and programs.

## *Research and Clinical Trials*

- Maintain or increase funding for basic, clinical, population, and translational research.
- Provide culturally sensitive education to patients and providers about clinical trials and research to increase patient awareness, engagement, and participation.
- Encourage collaboration among hospitals and cancer centers to increase patient access to and participation in clinical trials.
- Implement systems changes to reduce barriers to clinical trials and ensure equitable access for low-income or uninsured patients, to increase diversity in patient participation.

SECTION 3

CANCER SURVIVORSHIP,  
PALLIATIVE CARE, AND  
HOSPICE CARE



# CANCER SURVIVORSHIP, PALLIATIVE CARE, AND HOSPICE CARE

The term “cancer survivor” refers to someone living with, through, or beyond cancer from the moment of diagnosis through the rest of life. This includes patients who are being treated for cancer, who are free of cancer, and who live with cancer as a chronic disease, undergoing continued treatment and surveillance. The term “co-survivor” refers to friends, family members, and caregivers who share in the experience of caring for a person with cancer.

The effects that a cancer diagnosis have on a person do not end with the completion of cancer treatment. Individuals who are cancer-free once treatment ends face a variety of challenges as they transition back into their pre-cancer-diagnosis routines. Individuals whose treatment is not successful or who have advanced disease face significant end-of-life challenges and decisions. This section explores these issues as they relate to cancer survivorship, the need for palliative care for patients during and after treatment, and the supports offered by hospice care at the end of life.



# SURVIVORSHIP

The ACS estimates that in 2019 there were nearly 17 million cancer survivors in the United States.<sup>255</sup> In Maryland, approximately 31,000 individuals are diagnosed with cancer each year, and in 2017, 6.8% of Maryland adults reported that they were cancer survivors.<sup>256,257</sup> People are living longer after a cancer diagnosis than in the past thanks to improvements in doctors' ability to find cancer earlier, diagnose cancer more accurately, and treat cancer more effectively. About two out of every three people diagnosed with cancer are expected to live at least five years after diagnosis.<sup>258</sup>

Cancer survivors and their co-survivors face an array of difficulties and needs related to their diagnosis and treatment. These challenges and needs extend beyond treatment side effects and may include:

- **Access to care, information, and resources** (e.g. access to health care providers and specialists, diagnosis and treatment options, management of side effects, fertility preservation, resources for the patient and co-survivors),
- **Psychosocial issues** (e.g. emotions such as fear, anger, depression, optimism and hope, uncertainty; changes in sexuality and intimate relationships; spiritual issues),
- **Financial issues** (e.g. insurance/cost of treatment; issues at work such as time off, child and/or elder care during treatment; household bills), and
- **Long-term survivorship** (e.g. cognitive deficiencies, healthy lifestyle choices, secondary cancers, ongoing treatment side effects such as pain and fatigue, fertility treatments).





## ACCESS TO CARE, INFORMATION, AND RESOURCES

Accessing lifesaving and evidence-based cancer care is a major concern to newly diagnosed cancer survivors and their co-survivors. This includes access to state-of-the-art treatment and specialists, management of symptoms and treatment side effects (palliative care), fertility preservation, clinical trials, immunotherapy, and resources and services to help the patient and their co-survivors. Approximately 70% of all newly diagnosed cancer patients in the United States are treated at a facility accredited by the American College of Surgeons' Commission on Cancer (CoC), which accredits programs that meet comprehensive standards of care intended to improve survival and quality of life for cancer patients.<sup>259</sup> Patients can access CoC-accredited centers throughout Maryland with accredited centers located in about two-thirds of the counties in the state; a list of CoC accredited centers is available online at: [www.facs.org/search/cancer-programs](http://www.facs.org/search/cancer-programs).

Patient navigation can play an important role in helping cancer patients and their co-survivors access care and resources, coordinate appointments, and understand information related to their diagnosis so the patient can make informed decisions. Refer to Section 2 of the Cancer Plan for more information about the benefits of patient navigation.

In 2017, 98.8% of cancer survivors in Maryland had some form of health care coverage, and among survivors, health insurance status did not differ significantly by any demographic characteristic. Cancer survivors in Maryland were significantly more likely than persons without a cancer history to have at least one health care provider (92.7% compared to 83.9%, respectively) and to have had a routine physical checkup in the past year (87.9% compared to 73.2%, respectively).<sup>260</sup> The ACA and the Maryland Health Benefit Exchange (MHBE) have expanded access to health insurance for individuals with and without cancer, and have allowed cancer patients to

gain insurance coverage without being denied due to their diagnosis. Continued education and outreach to uninsured and underinsured cancer survivors about insurance options that are available through the MHBE will ensure that even more survivors have access to high quality care.

## PSYCHOSOCIAL ISSUES

Cancer survivors and their co-survivors deal with many emotions and stresses that could be alleviated with the help of psychosocial support services, which have been shown to improve quality of life for cancer survivors.<sup>261</sup> Support services that may help to alleviate patient concerns include support groups for patients and co-survivors, mental health counseling, peer support networks, and patient education events or conferences. These types of support services can help cancer survivors and their co-survivors to cope with changes in relationships, sexuality, body image and other physical changes; emotions such as depression, anger, and fear; and the cognitive effects of treatment.

However, patients are often reluctant to communicate psychological concerns to their health care providers, and the stigma associated with seeking and receiving counseling is one of the most common barriers to accessing mental-health services.<sup>262</sup> It is important for health care providers to inform cancer patients and their co-survivors that psychological distress is common, and to provide information and referrals to available support services. The NCCN promotes guidelines for psychosocial distress in oncology practice, but many oncologists are not familiar with the NCCN guidelines; efforts to disseminate NCCN distress screening guidelines more widely may improve recognition and treatment of psychosocial distress in cancer patients.<sup>263</sup> As of 2019, CoC accredited cancer centers are required to develop and implement a process to integrate and monitor on-site psychosocial distress screening and referral for the provision of psychosocial care; however, it is estimated that only 47% to 73% of eligible patients are being screened.<sup>264</sup>

## FINANCIAL ISSUES

The ACS estimates that the number of new cases of cancer will increase to 21.6 million worldwide in 2030.<sup>265</sup> The cancer-related health care costs are projected to increase from \$290 billion to \$458 billion worldwide.<sup>266</sup> Between 2010 and 2020, the cost of cancer care in the United States is projected to increase by 27%, from \$124.6 billion to \$157.8 billion, based only on U.S. population growth.<sup>267</sup>

The high costs associated with cancer treatment do not just impact the uninsured; even survivors and their co-survivors with quality health insurance can be devastated by out-of-pocket treatment-related expenses such as co-payments, deductibles, coinsurance, transportation costs, child and elder care during appointments, homecare expenses, special food or equipment, and time off from work for treatment. Basic living expenses such as rent or mortgage payments, utilities, and food can become a financial burden on top of mounting treatment-related costs. Additionally, for some cancers, health insurance may not always cover a health care provider's recommended treatment regimen. Many survivors need services that are not considered to be a part of their treatment, including mental health care, fertility preservation or treatment, physical or occupational therapy, and integrative medicine.

The financial impact of a cancer diagnosis can be significant, and research has shown that about one-third of adult survivors go into debt.<sup>268</sup> Health care providers and patient navigators should assess and discuss the financial needs of all patients and co-survivors, and link them with financial resources and counseling when indicated.

Cancer survivors and their co-survivors may also face many issues related to employment. Disability, time off from work, and accommodations upon returning to work may present challenges. Some survivors may face discrimination from employers or co-workers related to misconceptions about their cancer prognosis or productivity. It is important for cancer survivors and their co-survivors to be educated about their employment rights and resources.





## LONG-TERM SURVIVORSHIP

The transition from active treatment to long-term survivorship can be challenging for patients, and it is important for health care providers to be aware of potential long-term issues as well as resources and support available to help patients and their co-survivors adjust to life after cancer. Patients and co-survivors may continue to deal with issues related to their diagnosis years after treatment has ended, and sometimes through the rest of life. These may include cognitive deficiencies, pain, cancer recurrence, secondary cancers, effects of treatment on other areas of health (heart or liver problems, osteoporosis, etc.), and fertility problems, among others. Compared to individuals who have never had cancer, in 2017 a higher proportion of cancer survivors in Maryland reported that their physical health was “not good” on all 30 of the last 30 days.<sup>269</sup>

In fall of 2020 the American College of Surgeons CoC released 2020 CoC accreditation standards. Implementation of the new standards began in January 2020 and continue through 2021 for Phase-In standards. As part of these Phase-In standards, survivorship care plans are no longer mandatory. Section 4.8 calls for the institutions to establish a Survivorship Program, combining elements of the prior Survivorship Care Plan standard and recommendations from CoC and other member organizations. This new standard requires accredited organizations to establish a Survivorship Program under the guidance of the cancer committee. The appointed program coordinator and team will offer a slate of services such as treatment summaries, survivorship care plans, screening for recurrence and new cancers, rehabilitation services, support groups, psychological services, formalized referrals, or financial support services.<sup>270</sup> This standard is intended to encompass all the survivorship care needs during and after treatment for the growing population of survivors. The CoC Optimal Resources for Cancer Care 2020 Standards can be found online at: [www.facs.org/-/media/files/quality-programs/cancer/coc/optimal\\_resources\\_for\\_cancer\\_care\\_2020\\_standards.ashx](http://www.facs.org/-/media/files/quality-programs/cancer/coc/optimal_resources_for_cancer_care_2020_standards.ashx).

For organizations that provide Survivorship Care Plans as part of their Survivorship Program, the ASCO recommends that all Survivorship Care Plans include the following elements:<sup>27</sup>

**1. A Record of Care, covering all care received and important disease characteristics:**

- Diagnostic tests and results
- Tumor characteristics
- Dates of treatment initiation and completion
- Surgery, chemotherapy, radiotherapy, immunotherapy, transplant, hormonal therapy, gene or other therapies provided
- Side effects experienced
- Full contact information on treating institutions and key individual providers

**2. Standards of Care, including a written follow-up care plan for the future:**

- The likely course of recovery from treatment toxicities and the need for ongoing health maintenance/adjuvant therapy
- Recommended cancer screenings and other periodic testing, the schedule on which they should be performed, and who should provide them
- Information on possible late- and long-term effects of treatment and symptoms
- Information on possible signs of recurrence and second tumors
- Information on the possible effects of cancer on marital/partner relationship, sexual functioning, work, and parenting, and the potential future need for psychosocial support
- Information on the potential insurance, employment, and financial consequences of cancer and, as necessary, referral to counseling, legal aid, and financial assistance
- Specific recommendations for healthy behaviors\* (e.g., diet, exercise, healthy weight, sunscreen use, virus protection, smoking cessation, osteoporosis prevention)
- Recommendations on whether first-degree relatives should be informed about increased risk, and as appropriate, information on genetic counseling and testing
- As appropriate, information on known effective chemoprevention strategies for secondary prevention
- Referrals to specific follow-up care providers, support groups, and/or the patient's primary care provider
- A listing of cancer-related resources and information (internet-based sources and telephone listings for major cancer support organizations)

Long-term monitoring and support are especially important for survivors of childhood cancers as late effects are commonly experienced in adulthood. Childhood cancer survivors are at risk, to some degree, for several possible late- and long-term effects of their cancer treatment. The risks for each child depend on a number of factors, such as the type of cancer, the specific cancer treatments used, the doses of cancer treatment, and the child's age at the time of treatment. Some of the possible late effects of cancer treatment include:<sup>272</sup>

- Heart or lung problems (due to certain chemotherapy drugs or radiation therapy to the chest area),
- Slowed or delayed growth and development (in the bones or overall),
- Changes in sexual development and ability to have children,
- Learning problems, and
- Increased risk of other cancers later in life.

The Children's Oncology Group (COG) has developed long-term follow-up guidelines for survivors of childhood cancers, which are available online at [www-survivorshipguidelines.org](http://www-survivorshipguidelines.org).

*\*For more information about healthy behaviors, see Section 1 of the Cancer Plan. Smoking cessation is especially important for cancer survivors, as smoking may reduce the effectiveness of treatment and increase the likelihood of a second cancer.<sup>273</sup>*



## CANCER SELF-MANAGEMENT EDUCATION

Cancer self-management education (SME) programs are designed to help people affected by cancer identify ways to reduce stress, manage pain, relax, and feel better.<sup>274</sup> Patients who are taught techniques to self-manage the effects of their cancer diagnosis are better able to: deal with problems such as fatigue, pain, poor sleep, and living with uncertainty; participate in appropriate exercise activities and make smart nutrition choices; make decisions about treatment and complementary therapies; communicate with family, friends, and health professionals; and manage personal relationships.<sup>275</sup> More information about self-management for cancer patients is available online at: [www.selfmanagementresource.com/programs/small-group/cancer-thriving-and-surviving](http://www.selfmanagementresource.com/programs/small-group/cancer-thriving-and-surviving).

## ADVANCED CARE PLANNING

Advance care planning is a new component of the 2021-2025 Maryland Comprehensive Cancer Control Plan. Advance care planning is the process whereby individuals communicate their wishes for future care with their health care providers and surrogate decision-makers while they are still able to do so. Typically, advance care planning includes the completion of an advance directive form to document preferences for future health care as well as the identification of a health care agent (surrogate decision-maker). Maryland residents can use any advance directive form they wish, including those created by faith-based groups, estate planners and lawyers, as well as forms created and stored online (electronic advance directives) – all of which can also be personalized, as needed. Over the last several years, Maryland has prioritized expanding access to electronic advance directives, which can be retrieved by health care providers at the point of care.

Increasingly, advance care planning is viewed as a public health issue, given its potential to prevent

unnecessary suffering and to support an individual's health care decisions and preferences.<sup>276</sup> A 2010 survey in Maryland showed more than 60% of residents 18 and older want their end-of-life wishes to be respected, however, only a third had completed advance directives.<sup>277</sup> Adults over age 65 were more likely to have completed advance directives than younger adults (18 to 64 years of age). Additionally, twice as many White residents had completed an advance directive than Black residents (43% compared to 23%, respectively). Of those who had an advance directive, the primary motivation for creating one was a personal medical condition or a diagnosis to one's self or a family/friend (41%). Those without advance directives identified lack of familiarity with them/awareness (27%), being too young or healthy to need one (14%), or uncertainty of the process for adopting one (11%) as reasons for not having one.

Professional oncology organizations have long emphasized early advance care planning as a critical component of optimal palliative care, as reflected in the NCCN guidelines as early as 2001.<sup>278</sup> Similarly, the ASCO has endorsed early advance-care planning as far back as 1998, with a continued emphasis on more recent statements.<sup>279,280</sup> However, studies in oncology settings show delays in advance care planning discussions are common due to concerns about causing distress and taking away hope.<sup>281,282</sup> One study reported that oncologists documented advance care planning discussions with just 27% of their patients.<sup>283</sup> Furthermore, research suggests there are particular challenges and considerations with advance care planning in people with cancer, including a need for greater involvement of family supports in the advance care planning process.<sup>284</sup>

Data on the utilization of advance directives by Maryland residents with cancer is not readily available. As a result, significant foundational work is needed to establish a baseline of advance directive awareness and uptake among Marylanders with cancer to set measurable objectives in the future.

# PALLIATIVE CARE

Palliative care is specialized medical care for people with serious illnesses, including, but not limited to, cancer. It promotes quality of life by preventing, treating, and relieving pain and suffering and other negative effects of illness. Palliative care offers comprehensive care and support (physical, emotional, social, and spiritual) including treatment of pain and other symptoms; relief from worry, anxiety, and depression; close communication about care; well-coordinated care during illness transitions; support for co-survivors; and a sense of safety in the health care system. It can be offered to patients of all ages as well as co-survivors, at all stages of a serious illness. **It is not limited to the end of life** – this is the primary distinction between palliative care and hospice care, which will be discussed later in Section 3.

Palliative care is generally provided by a multidisciplinary team of care providers including nurses, social workers, chaplains, physicians, mid-level providers, and other specialty providers, and can be given at the same time as curative treatment. It can be delivered in hospital settings either through consultations or inpatient palliative care units, as well as in outpatient settings, nursing homes, assisted living facilities, at home, and in hospice facilities.

The benefits of palliative care to both patients and hospitals have been well documented:

- Specialized palliative care has been found to improve patient outcomes, including decreasing pain and other symptoms and relieving anxiety.<sup>285</sup>
- In a study of patients with metastatic non-small-cell lung cancer, early palliative care resulted in improvement in quality of life, less-aggressive care at the end of life, and longer survival.<sup>286</sup>
- When palliative care is provided, research has shown that the quality of care is maintained or improves.<sup>287</sup>
- Randomized trials have found that palliative care is associated with a decrease in the number of hospitalizations and intensive care unit days.<sup>288</sup>
- Palliative care for terminal patients is often less costly than usual care or care in other units.<sup>289</sup> Costs for the last hospital days are reduced by 25% to 50%.<sup>290</sup>
- Palliative care increases the use of hospice about ten-fold, which leads to fewer readmissions and better care. Hospice saves more than \$2,500 per person.<sup>291</sup>

As the U.S. population ages and the number of cancer survivors continues to rise, the demand for palliative care has also increased. Palliative care is appropriate for many disease diagnoses, but it is especially important for cancer patients and co-survivors given the physical and emotional impacts of treatment. The ASCO recommends that combined standard oncology care and palliative care should be considered early in the course of illness for any patient with metastatic cancer and/or high symptom burden. As of 2015, CoC-accredited cancer centers are required to either have onsite palliative care services or have them available to patients by referral.

The Center to Advance Palliative Care and the National Palliative Care Research Center grade states on access to palliative care. In the most recent Report Card (2019), Maryland received an “A” for 95% of hospitals reporting availability of palliative care services.<sup>292</sup> Research has shown that the most common barriers to offering palliative care in Maryland hospitals are lack of knowledge about palliative care among patients and families, lack of physician endorsement/support, and limited budget for palliative care. Additionally, community-based palliative care programs continue to grow to provide services and resources to patients in the home setting. There is a need in the state to increase awareness about palliative care and to implement supporting mechanisms to enhance information sharing among hospitals and palliative care providers (e.g., conferences, formalized networks).<sup>293</sup>

## PAIN MANAGEMENT

Pain management is one aspect of palliative care. Chronic pain is a significant issue among cancer patients, with up to 50% continuing to have pain after curative therapy. During active cancer treatment and in advanced disease states, tumors cause the most pain. However, post-treatment survivors are affected more by pain related to surgery, chemotherapy, or radiation therapy than by cancer-related pain.<sup>294</sup>

Cancer pain can be managed effectively for most patients, however, both patients and health care providers face challenges related to pain management:

### Patient Issues

- Patients and their co-survivors should be educated about pain control and empowered to advocate for effective pain management.
- Patients can face barriers in accessing opioid pain medications including insufficiently stocked pharmacies. Access to opioid pain medications may vary by geographic location.

### Health Care Provider Issues

- Clinicians should understand pain as a symptom and disease process, as well as pain assessment.
- Clinicians should be educated about addiction as well as state laws concerning controlled substances.



# HOSPICE CARE

Hospice care provides medical, psychological, and spiritual support to patients and co-survivors at the end of life when a cure is no longer possible. Hospice care focuses on enhancing quality of life by controlling pain and managing other symptoms.<sup>295</sup>

Hospice care is delivered by a team of health care professionals including physicians, nurses, hospice aides, social workers, therapists, clergy or other bereavement counselors, and trained volunteers. Hospice care is most often provided in the patient's home, but it can be provided in a variety of settings, including hospice units in hospitals or freestanding hospice centers, hospice care in nursing homes and other long-term care facilities, residential hospices, and in-home hospice. Hospice services are available to patients of any age, race, or illness, and are covered under Medicare, Medicaid, most private insurance plans, and other managed care organizations.<sup>296</sup>

Hospice care is similar to palliative care, as both focus on enhancing quality of life and managing symptoms. The main difference is timing: palliative care can be offered at any point during cancer treatment along with curative treatment, but hospice care is provided at the end of life, generally during the last six months of life.<sup>297</sup>

Although hospice care can offer many benefits to cancer patients, such as lower rates of hospitalization, intensive care unit admissions, and invasive procedures at the end of life, it is generally underused.<sup>298</sup> Some of the patient-level barriers to receiving hospice care include the belief that hospice means giving up hope, overestimation of survival, preference for life-sustaining treatment, and lack of knowledge of hospice.<sup>299,300</sup> Health care provider-level barriers include difficulty accurately predicting life expectancy and fear that hospice referral may be interpreted as a professional failure, among others.<sup>301,302</sup> Further, there are disparities in the use of hospice care, with minority patients using hospice disproportionately less than White patients.<sup>303</sup> Education directed toward the community, cancer survivors, and co-survivors about hospice care and insurance coverage is an important step in overcoming barriers.



# CANCER SURVIVORSHIP GOALS, OBJECTIVES, AND STRATEGIES

**GOAL: INCREASE THE QUALITY OF LIFE OF CANCER SURVIVORS IN MARYLAND.**

**OBJECTIVE 1. By 2025, increase the proportion of cancer survivors who report that during the past 30 days, poor physical or mental health did not keep them from doing usual activities on any days to 70.6%. (2017 Baseline: 64.2%)**

**Target Setting Method:** 10% increase  
**Source:** BRFSS

## Strategies

- Educate patients upon diagnosis about the availability of support and survivorship groups.
- Utilize patient navigators to link cancer survivors with available resources, including financial resources and insurance options available through the Maryland Health Benefit Exchange (MHBE).
- Offer self-management workshops to cancer survivors.
- Educate cancer survivors about the importance of healthy behaviors to reduce cancer recurrence risk (see section 1).
- Promote an annual awareness campaign around National Cancer Survivors Day to educate cancer survivors, the general public, policymakers, media, and health care providers about the needs of cancer survivors (including access to care, psychosocial needs, long-term survivorship, financial issues, and palliative care/pain management).
- Implement systems changes to ensure that all newly diagnosed patients receive a copy of the Maryland Cancer Collaborative's Guide to Cancer Survivorship Care and Resources for Cancer Patients.

**OBJECTIVE 2. By 2025, increase the proportion of cancer survivors who report that their pain is currently under control to 75.5%. (2017 Baseline: 68.6%)**

**Target Setting Method:** 10% increase  
**Source:** BRFSS

## Strategies

- Improve the assessment and treatment of pain and other symptom management by including pain assessments at each follow-up visit.
- Increase clinician education and awareness of pain management and assessment by providing seminars, grand rounds, and other opportunities for education at cancer centers.
- Collaborate with pharmacies and policymakers to ensure that pain medicine is adequately stocked in all communities.
- Ensure that pain medicine coverage policies are easily accessible to patients considering health plans available through the MHBE.
- Increase educational opportunities for physicians to increase understanding and knowledge of palliative care and how to refer patients to a palliative care team.
- Provide targeted, culturally and linguistically sensitive palliative care educational information to patients and caregivers.



**OBJECTIVE 3. By 2025, increase the proportion of cancer survivors who report receiving a written summary of all cancer treatments received and written instructions about where to return or who to see for routine cancer check-ups after completing treatment to 46.8%. (2017 Baseline: 42.5%)**

**Target Setting Method:** 10% increase

**Source:** BRFSS

## Strategies

- Promote the use of survivorship care plans in standard practice by health care providers.
- Provide professional education to Primary Care Providers regarding use of Survivorship Care Plans.
- Increase awareness about care plans, including the Institute of Medicine recommended elements, among health care providers and cancer survivors.
- Promote systems changes to integrate survivor care plans into systems of care (e.g. using electronic medical records to populate care plans).

**OBJECTIVE 4: By 2025, obtain data on the number of Marylanders with cancer who have completed an advanced directive that is accessible by health care providers.**

## Strategies

- Convene a workgroup to develop a systematic approach to assess data trends on advance directive usage among Marylanders with cancer. Data sources may include Maryland BRFSS, Electronic Health Records, CRISP, Maryland Health Care Commission's State Recognition Program for electronic advance directive services, among others.
- Establish a plan to collect Maryland-level data on the number of residents with cancer who have completed an advanced directive that is accessible by health care providers.
- Implement a standardized process to collect ongoing data on the number of Marylanders with cancer who have completed an advanced directive that is accessible by health care providers.

## **Strategies**

- Partner with Maryland cancer support networks and coalitions to determine effective strategies to support advance care planning among cancer survivors.
- Educate health care providers on having culturally sensitive advance care planning discussions, including the sharing of key documents, with all newly diagnosed Marylanders with cancer.
- Support dissemination of the Maryland Advance Directive Information Sheet to cancer centers, providers, support groups, and other partners.
- Implement systems changes to support the use of electronic advance directives.
- Offer advance care planning workshops to Marylanders with cancer in diverse settings.
- Provide targeted, culturally and linguistically sensitive advance care planning educational information to patients and caregivers.



**OBJECTIVE 6. Through 2025, ensure continued access to palliative care services for cancer patients by maintaining Maryland’s “A” grade on the Center to Advance Palliative Care Report Card.**

## **Strategies**

- Develop an awareness campaign to educate Maryland citizens about palliative care.
- Educate primary care providers and health care providers in hospital-based settings about the availability, application/referral process for palliative care services, and benefits of palliative care services for cancer patients in active treatment.
- Support mechanisms that bring together palliative care professionals to share best practices, such as professional networks and conferences.
- Support the development of minimum standards for palliative care programs in Maryland hospitals with greater than 50 beds.

**OBJECTIVE 7. By 2025, develop and implement a process to expand the collection of Maryland-level data on hospice utilization by cancer patients to include average length of stay, location of death, and demographic information such as race, sex, and age.**

- Create partnerships to develop and implement a plan to collect cancer patient hospice utilization data. Partners may include the Maryland BRFSS, the Hospice and Palliative Care Network of Maryland, and the National Hospice and Palliative Care Organization, among others.

**OBJECTIVE 8: By 2025, improve statewide surveillance of sexual and gender minority (SGM) population, including health risks.**

- Include the CDC Optional Module on Sexual Orientation and Gender Identity in the Maryland BRFSS to collect data that identify health risk behaviors of SGM individuals, including cancer survivors.
- Improve cancer surveillance by collecting and analyzing data as appropriate to establish cancer risks, monitor cancer survivorship, and promote health equity among Maryland’s SGM populations.

# APPENDIX: DATA SOURCES AND CONSIDERATIONS

## SOURCES OF MARYLAND DATA

The Maryland-specific data used in the Cancer Plan were supplied by the Maryland Department of Health (MDH), including the Maryland Cancer Registry (MCR) and the Maryland Behavioral Risk Factor Surveillance System (BRFSS), and the National Center for Health Statistics (data in CDC WONDER).

### MARYLAND CANCER REGISTRY

Cancer incidence and stage data were provided by the MCR in the MDH Center for Cancer Prevention and Control, [phpa.health.maryland.gov/cancer/Pages/mcr\\_home.aspx](http://phpa.health.maryland.gov/cancer/Pages/mcr_home.aspx). The MCR acknowledges the State of Maryland, the Maryland Cigarette Restitution Fund (CRF), and the National Program of Cancer Registries at the Centers for Disease Control and Prevention (CDC) for the funds that support the collection and availability of the cancer data and analysis.

The MCR is a computerized data system that registers all new cases of reportable cancers (excluding non-genital squamous cell or basal cell carcinoma) diagnosed or treated in Maryland. The Maryland cancer reporting law and regulations mandate the collection of cancer information from facilities that are licensed in Maryland, including hospitals, radiation therapy centers, diagnostic laboratories, freestanding ambulatory care facilities, surgical centers, and physicians whose non-hospitalized cancer patients are not otherwise reported. The MCR also participates in data exchange agreements with many states including the neighboring states of Delaware, Pennsylvania, Virginia, West Virginia, and the District of Columbia. Information on Maryland residents diagnosed or treated for cancer in these states is included in this plan.

### MARYLAND BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

The Maryland BRFSS is an annual telephone survey conducted on a random sample of Maryland adult residents and is part of CDC's national BRFSS. This survey, managed by the MDH Prevention and Health Promotion Administration provided cancer risk behavior (e.g., adult tobacco use, sun exposure, diet, physical activity) and cancer screening information used in the Cancer Plan. Maryland data can be accessed online at: [ibis.health.maryland.gov/](http://ibis.health.maryland.gov/). Both Maryland and state-aggregated national data on health risk behavior can also be obtained from the CDC BRFSS website at: [www.cdc.gov/brfss](http://www.cdc.gov/brfss).

As measures for cancer-related behaviors (e.g. screening tests) and the recommendations for their use change, questions in the BRFSS that measure screening and other health behaviors are updated to reflect these modifications. Data are weighted to the age of the Maryland population in that year but are not age-adjusted to the year 2000 U.S. standard population.

### MARYLAND YOUTH RISK BEHAVIOR SURVEY/YOUTH TOBACCO SURVEY

The Maryland YRBS/YTS collects data from middle and high school youth on several priority health risk behaviors as well as behaviors that support health. In 2013, the Maryland YRBS was combined with the former Maryland YTS, resulting in a combined survey. Published reports are available on the MDH website at: [phpa.health.maryland.gov/ccdpc/Reports/Pages/YRBS-Main.aspx](http://phpa.health.maryland.gov/ccdpc/Reports/Pages/YRBS-Main.aspx).

# SOURCES OF NATIONAL DATA

National statistics cited in this plan were obtained from the CDC, the American Cancer Society (ACS), National Center for Health Statistics (NCHS), and the National Cancer Institute (NCI).

## SURVEILLANCE, EPIDEMIOLOGY, AND END RESULTS PROGRAM (SEER)

The Surveillance, Epidemiology, and End Results (SEER) Program, managed by the National Cancer Institute, is an authoritative source of information on cancer incidence, stage, and survival in the U.S. The SEER Program, which began in 1973, collects, analyzes, and publishes cancer incidence and survival data from population-based cancer registries participating in the program. Since 2000, SEER incidence data have been collected from 20 SEER registries throughout the U.S. (SEER 18 registry database) and are estimated to represent approximately 27.8% of the U.S. population. The SEER database represents cancer incidence in the U.S. population with regard to race, ethnicity, age, sex, poverty, and education, and by collecting data on epidemiologically significant population subgroups.

SEER 18 incidence data are used in the Cancer Plan for comparisons with the most recent Maryland data (2012-2016) because they provide the broadest population coverage that is currently available. All SEER 18 rates were obtained from SEER\*Stat (version 8.3.6), a statistical software tool for the analysis of SEER and other cancer-related databases. Further information about SEER can also be found on the website at [www.seer.cancer.gov](http://www.seer.cancer.gov).





## NATIONAL CENTER FOR HEALTH STATISTICS

U.S. mortality rates presented in this plan were obtained from the NCHS Compressed Mortality Files in the CDC Wide-Ranging Online Data for Epidemiologic Research (WONDER) system, a national web-based data source, available at [wonder.cdc.gov/](http://wonder.cdc.gov/).

## HEALTHY PEOPLE 2020

Healthy People (HP) 2020 is a collaboration of local and national governmental agencies and private organizations that have developed prevention-oriented national objectives to improve the health of Americans. The HP initiative is under the Office of Disease Prevention and Health Promotion at the U.S. Department of Health and Human Services (DHHS). There are 42 focus areas and over 1,200 specific objectives in HP 2020. For cancer prevention, the overarching HP 2020 goal is to “reduce the number of new cases, as well as the illness, disability, and death caused by cancer.” To achieve this goal, measurable objectives related to cancer screening and cancer risk behaviors were established, each with a specific quantitative target. Further information about HP 2020 can be found at: [www.healthypeople.gov](http://www.healthypeople.gov).

In the Cancer Plan, quantitative HP 2020 targets, where available, are compared to Maryland data related to cancer risk behaviors (e.g., smoking, sun exposure) and adherence to cancer screening recommendations. Specifically, HP 2020 targets are compared to data from the Maryland BRFSS.

## CDC BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

The national counterpart to Maryland’s BRFSS system is operated by the CDC’s National Center for Chronic Disease Prevention and Health Promotion. National statistics on behavioral health risks, as well as select individual state data may be accessed at [www.cdc.gov/brfss](http://www.cdc.gov/brfss).

## NATIONAL CANCER INSTITUTE PHYSICIAN DATA QUERY (PDQ)

This source provides information for health professionals and the public on various aspects of cancer control such as prevention, screening, treatment, genetics, and clinical trials. The information is reviewed by a scientific editorial board and is updated as new research becomes available. Each statement listed in the PDQ is based on current knowledge as defined by the most recent literature using established levels of evidence. More information about NCI’s PDQ can be accessed at [www.cancer.gov/publications/pdq](http://www.cancer.gov/publications/pdq).

## DATA CONSIDERATIONS

### DATA CONFIDENTIALITY

MDH regards all data received, processed, and reported to and by the MCR as confidential. Data are secured from unauthorized access and disclosure. The MCR manages and releases cancer information in accordance with the laws and regulations established by the state of Maryland as set forth in the Code of Maryland Regulations, COMAR 10.14.01 (Cancer Registry) and Health-General Article, § 18-203 and § 18-204, Annotated Code of Maryland. To ensure patient confidentiality and to comply with the MCR Data Use Manual and Procedures, cells with counts of 1-5 cases are suppressed and presented as “<6.”

Mortality data in the Cancer Plan, obtained from NCHS Compressed Mortality Files in CDC WONDER, comply with data use restrictions stipulated by both CDC and NCHS.

## SEX

Sex was reported to the MCR as of 2012 as (a) male, (b) female, (c) other (hermaphrodite), (d) transsexual, and (e) not stated/unknown. The totals shown in the count for number of cancer cases may not equal the sum of males and females because of cases in these other gender categories.

## RATE ANALYSIS AND THE YEAR 2000 U.S. POPULATION STANDARD

Age-adjustment, also called age-standardization, is one of the tools used as a control for the different and changing age distributions of the population in states, counties, etc., and to enable meaningful comparisons of vital rates over time. Federal agencies have adopted the year 2000 U.S. standard population as the new standard for age-adjusting incidence and mortality rates, beginning in data year 1999. Incidence and mortality rates in the Cancer Plan were calculated and age-adjusted using the 2000 U.S. population as the standard population. Additional information on age-adjustment can be found at [www.cdc.gov/nchs/data/statnt/statnt20.pdf](http://www.cdc.gov/nchs/data/statnt/statnt20.pdf).

## STATISTICAL SIGNIFICANCE

Statistical significance, as cited in the Cancer Plan, was determined by performing Z-test calculations using p-value < 0.05 to determine significance unless otherwise noted.

## RACIAL AND ETHNIC MINORITY POPULATIONS

The 1997 update of Directive 15 of the Federal Office of Management and Budget defined a minimum list of categories for racial and ethnic data collection. In that system of categorization, persons are classified as of Hispanic or Latino ethnicity or not (without regard to race), and then classified into one or more of the following racial categories (without regard to Hispanic ethnicity): Black or African American; Asian; Native Hawaiian or Other Pacific Islander; American Indian or Alaska Native; or White. In Maryland, the Native Hawaiian or Other Pacific Islander category comprises only 0.1% of the population and is combined with Asian in a category of Asian and Pacific Islander for reporting purposes (which was the categorization before 1997).

In the Cancer Plan, generally only Black and White rates are shown because other racial and ethnic populations in Maryland are not large enough to provide reliable data estimates and rates. "Black" is used to represent African American in tables and figures where space limitations exist.

## HEALTHY PEOPLE 2020 OBJECTIVES

HP 2020 objectives are generally age-adjusted to the year 2000 U.S. standard population.

## DATA YEARS

Significant efforts were made toward consistency of data years reported throughout the Cancer Plan. Age-adjusted incidence and mortality statistics are reported through 2016, which is the most recent data year available at the time of writing.

Behavioral risk factor data from the BRFSS are reported for the most recent year available at the time of writing, or for several different years in order to establish a trend over time. The most recent data year available for behavioral risk factor data varies from topic to topic, based on which survey questions were asked in various years.

## AGE-ADJUSTED INCIDENCE AND MORTALITY RATES

To ensure that race-specific rates align with all race rates, a population weighted average was used to estimate all race rates. A best fit (least squares) linear regression forecast function (Excel) was used to estimate the 2020 population using U.S. Census Bureau yearly population estimates for Maryland, and a proportion of the total was determined for each race- and sex-specific category. This 2020 population proportion was then applied to each race-specific rate and these values were added to obtain the all race age-adjusted rate.

## TARGET SETTING FOR SMART OBJECTIVES

The majority of objectives in the Cancer Plan include specific data targets to be met by year 2025. The methods below were used to develop the targets, with a few exceptions noted.

1. Targets under objectives to decrease incidence or mortality: 2025 rates were projected using the Microsoft Excel. Known Maryland data values were used to predict a future value for the year 2025 using linear regression. The projected value was graphed by adding a linear trendline (in Excel) to the known data points, then extending the line forward to the year 2025. Incidence and mortality projections are based on Maryland age-adjusted rates for the 10-year period from 2007 to 2016, with the exception of prostate cancer. Prostate cancer incidence and mortality trends declined from 2007 to 2011 but increased from 2012 to 2016; projections are based on Maryland age-adjusted rates for the 5-year period of 2012 to 2016.

## Notes:

- a. This linear method of projecting based on actual data does not take into account demographic, screening, or funding factors that may influence the trend through 2025.
  - b. Some of the 2025 incidence and mortality projections using this method were higher than the baseline incidence rate; because these projections were not in the direction desired to control cancer, the targets are described as “not greater than” the 2016 baseline.
2. Targets under the objective to decrease disparities in cancer incidence and mortality: For each (CRF-target) cancer with statistically significant disparities between White and Black rates at baseline (2016), the target was set to reduce this disparity by 10% by 2025.
  3. Targets under objectives with behavioral and risk factor projections: Target-setting methods are noted under individual objectives and are based on HP 2020 objectives, goals/targets of MDH, CDC-funded programs, and the National Colorectal Cancer Roundtable. For behavior and risk factor projections where: 1) the Maryland baseline already exceeded the HP 2020 objective, 2) HP 2020 objectives do not exist, or 3) the HP 2020 data source is not available at the state-level, the Cancer Plan target was determined using the HP 2020 target-setting method of increasing or decreasing the baseline by 5-10% of the baseline percentage.



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