



MARYLAND

COMPREHENSIVE
CANCER CONTROL PLAN

2016-2020

[Insert Date]

Dear Maryland Residents,

Cancer is a disease that affects the lives of many people in Maryland; it is the second leading cause of death in our state and in the nation. The newly updated *2016 – 2020 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 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, healthcare providers, communities and organizations) on cancer control topics. The updated plan has a focus on goals, objectives and strategies, and consolidates content into cross-cutting sections and topics. The plan's goal is to encourage collaboration and cohesiveness among stakeholders as they work towards reducing the burden of cancer in Maryland.

Representatives from the Maryland Department of Health and Mental Hygiene, Maryland Cancer Collaborative, Maryland State Council on Cancer Control, cancer survivors, as well as 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 of these activities. Rather, the plan is a call to action to encourage any individual or organization 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 in reducing the burden of cancer in Maryland.

Sincerely,



Van Mitchell
Secretary
Maryland Department of Health and Mental Hygiene



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Stanley Watkins, MD
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his 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.

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In addition, various offices within the Maryland Department of Health and Mental Hygiene contributed staff expertise and resources to the Cancer Plan update process, including:

- Center for Cancer Prevention and Control
- Center for Tobacco Prevention and Control
- Center for Chronic Disease Prevention and Control
- Office of Oral Health
- Maryland WIC (Women, Infants, and Children) Program
- Office of Minority Health and Health Disparities
- Environmental Health 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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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
- 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, Palliative Care Workgroup, Tobacco Control Workgroup, and Worksite Wellness Workgroup. The MCC is led by a Steering Committee that is composed 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
- Opportunity to shape MCC activities

Members agree to:

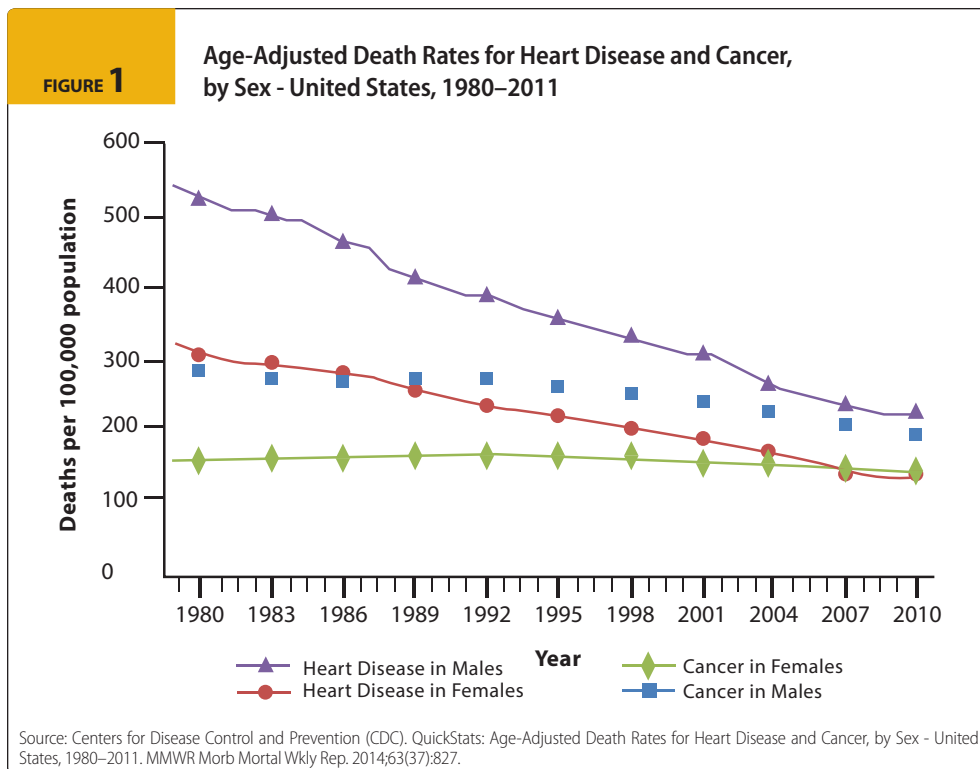
- Take specific action to implement the Cancer Plan
- Participate in meetings regularly
- Contribute to MCC activities, including donating time, funding, expertise, meeting space, educational materials, mailing support, student volunteers, etc.
- Abide by MCC policies and procedures

To learn more about the MCC, or to access the membership agreement form to join, visit the MCC website at <http://goo.gl/OvZMBF>.

You may also visit the MCC on Facebook at www.facebook.com/marylandcancercollaborative to learn more!

INTRODUCTION

Cancer is a disease that affects everyone in Maryland. Each year more than 27,000 Marylanders are diagnosed with invasive cancer, and countless family members, friends, and co-workers support these patients through their journeys. Cancer is currently the second leading cause of death in the United States and in Maryland behind heart disease. However, the U.S. cancer death rate among females surpassed the heart disease death rate in 2009, and if current trends continue cancer will soon become the leading cause of death in men and women both in the U.S. and in Maryland.¹ Cancer is a significant public health problem, and for the benefit of Marylanders should be a focus of statewide public health efforts.



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 cancer control, including:

- Reducing risk
- Detecting cancers early
- Improving treatment
- Enhancing survivorship

The Centers for Disease Control and Prevention (CDC) provides support to the 50 states, the District of Columbia, 7 tribal groups, and 7 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 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, healthcare 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 and Mental Hygiene (DHMH) as well as 83 public and private stakeholders from across the state. DHMH used the 2011–2015 Cancer Plan as a starting point for revisions, and development of the 2016–2020 Maryland Comprehensive Cancer Control Plan occurred in phases:

1. DHMH reviewed, consolidated, and updated the 2011–2015 Cancer Plan;
2. The updated Cancer Plan was presented to partner stakeholders who reviewed and provided feedback;
3. DHMH incorporated partner feedback;
4. The revised Cancer Plan was presented to partner stakeholders for additional comments;
5. DHMH finalized the Cancer Plan in the fall of 2015.

How is the 2016–2020 Cancer Plan different from the 2011–2015 Cancer Plan?

Goals for updating the 2016–2020 Cancer Plan were to shift from a focus on data and background information to a focus on goals, objectives, and strategies to promote implementation, and to shift from site-specific chapters to sections that consolidate cross-cutting content and topic areas. The resulting Cancer Plan is shorter and more focused, and it spans the cancer continuum with

sections dedicated to primary prevention of cancer, high burden cancers, and survivorship issues.

Objectives in the Cancer Plan are specific, measurable, attainable, relevant, and time bound (SMART), and based on available, measurable data sources. Most objectives are relevant to many cancer sites. Strategies in the Cancer Plan are taken from the 2011–2015 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 healthcare 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 Maryland Cancer Collaborative, a statewide coalition of volunteers and organizations who work to implement the Cancer Plan, will review the objectives and strategies and select priority projects to work on in the coming years.

What can you do?

Implement, implement, implement! The Cancer Plan's goal is to encourage collaboration and cohesiveness among stakeholders as they work towards 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 of these activities. Rather, the Cancer Plan is a call to action to encourage any individual or organization 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 are provided on page 12.

Individuals and Families

- Educate yourself, read the Cancer Plan!
- Take action to reduce your risk of getting cancer (see Section 1).
- Talk to your healthcare 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.

Healthcare 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 towards the elimination of disparities in underserved populations.
- 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.

Local Health Departments and Community Organizations

- Use the Cancer Plan as a guide when selecting and planning cancer control 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.

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.

Cancer Terms and Acronyms Used in the Cancer Plan

Several cancer terms and acronyms are used throughout the Cancer Plan. Acronyms are 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 14 for acronym references.

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.

Healthcare Provider:

A health professional who delivers healthcare 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.

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.

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.

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.

Survivor:

An individual who has been diagnosed with cancer, from the moment of diagnosis through the rest of life.

Tumor:

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

ACRONYMS

ACIP	Advisory Committee on Immunization Practices
ASCO	American Society of Clinical Oncology
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CDC WONDER	CDC's Wide-ranging Online Data for Epidemiologic Research
CoC	American College of Surgeons Commission on Cancer
DHMH	Maryland Department of Health and Mental Hygiene
DHMH CCDPC	DHMH Center for Chronic Disease Prevention and Control
DHMH CCPC	DHMH Center for Cancer Prevention and Control
DHMH CRF	DHMH Cigarette Restitution Fund
DHMH CTPC	DHMH Center for Tobacco Prevention and Control
EPA	Environmental Protection Agency (Federal)
FDA	Food and Drug Administration
HP 2020	Healthy People 2020
MCR	Maryland Cancer Registry
MDE	Maryland Department of the Environment
NCCN	National Comprehensive Cancer Network
NCHS	CDC's National Center for Health Statistics
NCI	National Cancer Institute
NIS	National Immunization Survey
SNAP & SNAP-Ed	Supplemental Nutrition Assistance Program; & SNAP Education
USDA	United States Department of Agriculture
USPSTF	United States Preventive Services Task Force
US SEER & SEER*Stat	NCI's Surveillance, Epidemiology, and End Results Program; & SEER Statistical Software
WIC	Women, Infants, and Children Program
YTRBS	Youth Tobacco and Risk Behavior 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, closely integrated with the dissemination of these data to those who need to know and linked to prevention and control.² 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 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 http://phpa.dhmh.maryland.gov/cancer/Pages/surv_data-reports.aspx.

Maryland Cancer Registry (MCR)

DHMH manages the MCR, which collects and maintains confidential data on all reportable cancers diagnosed in people in Maryland. 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 outside Maryland are reported through interstate data exchange agreements with 12 states and the District of Columbia.

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)

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

Youth Tobacco and Risk Behavior Survey (YTRBS)

DHMH and the Maryland State Department of Education (MSDE) conduct the YTRBS, which is a combination of the previous Youth Tobacco Survey and Youth Risk Behavior Survey. The YTRBS collects data on a broad range of youth tobacco and other risk behaviors of 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, healthcare reform and cancer disparities are two areas that present opportunities and challenges for patients, public health professionals, and healthcare providers across the continuum. These two topics are highlighted below and mentioned throughout the Cancer Plan.

Healthcare Reform

On March 23, 2010, President Barack Obama signed the Patient Protection and Affordable Care Act (ACA) into law. The law put into place comprehensive health insurance reforms, including the following several notable provisions that make cancer prevention, screening, diagnosis, and treatment more accessible:

- Expanding Medicaid eligibility for adults;
- Establishing health insurance marketplaces for individuals and small businesses to purchase health insurance plans;
- Requiring health insurance plans in the 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 on October 1, 2013. Open enrollment is available each fall, with enrollment available at other times of the year under certain circumstances. During open enrollment for the 2015 plan year, 289,131 Marylanders enrolled through Maryland Health Connection in either a private health plan or Medicaid.³ See the Maryland Health Connection website for details: www.marylandhealthconnection.gov.

Preventive services, including cancer preventive services and screenings, with a United States Preventive Services Task Force (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. 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 co-insurance.

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. Healthcare 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 USPSTF guidelines with patients and recommending appropriate services.

Although implementation of the ACA has increased access to health insurance and made cancer prevention, screening, diagnosis, and treatment services more accessible to many Marylanders, there are still uninsured and underinsured populations in the state in need of healthcare and targeted outreach and intervention.

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.”⁴ 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 a long, healthy life. 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.⁵ 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). Recent evidence suggests that social determinants of health play a far more pivotal role contributing towards health disparities than biological factors.⁶

The Prevention Institute's Health Equity and Prevention Primer lists four general social determinants of health-- Place, People, Health Care Services, and Equitable Opportunity.⁷

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), access to healthy fruits and vegetables (e.g. farmers' markets), unsafe streets, and affordable and safe housing (e.g. homes free of radon exposure).

People refers to the social and cultural environment of a community and includes familial norms (e.g. cigarette smoking), religion, and trust amongst neighbors and social networks.

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

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

*Unconscious or unintentional bias on the part of healthcare 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.⁸

FIGURE 2

Pathway of Social Determinants of Health



Social determinants of health influence an individual's unhealthy exposures and behaviors and access to care, which can lead to disproportionate rates of cancer across a population.

TABLE 1*

Social Determinants of Health

TYPE	EXAMPLES	EXPOSURE AND BEHAVIORS	Increased risk of cancer incidence and mortality
Place	Limited access to healthy fruits and vegetables; Unhealthy air	Unhealthy eating habits contributing to obesity; Exposure to radon	
People	Norms and customs	Cigarette smoking among family members	
Healthcare	Lack of health insurance, limited access to care; Medical providers with poor skills in cultural competency	Cancer screenings not completed; Potential for treatment delivery	
Equitable Opportunity	Institutional racism	Limited jobs and housing available for minorities leading to increased stress	

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

Cancer Disparities in Maryland

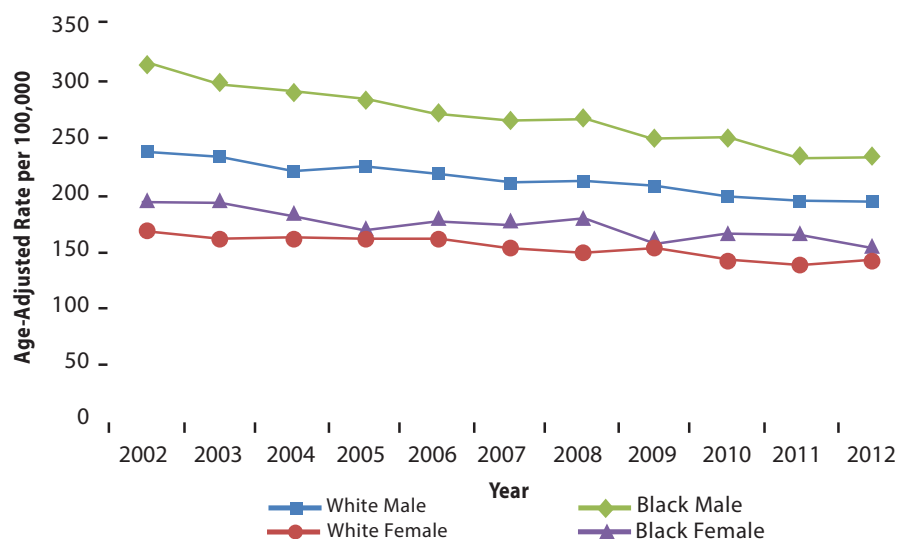
Disparities in cancer incidence, mortality, and screening rates are experienced across many population groups in Maryland including racial and ethnic minorities, individuals living in Baltimore City, rural and other geographic areas of the state, and the uninsured; see Section 2 of the Cancer Plan for 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.^{9, 10, 11}

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 healthcare. In Maryland, as of 2014 racial and ethnic minorities represented 47.4% of the population. It is estimated that the Black or African American population made up 30.3% of the total population; the Asian population made up 6.4%; the American Indian and Alaska Native population made up 0.6%; the Native Hawaiian and Other Pacific Islander population made up 0.1%; and the Hispanic population made up 9.3%.¹²

- Sixty percent of individuals living below the poverty line are minorities.
- Black men and women had higher cancer mortality rates than their White counterparts from 2002 to 2012, 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 mortality rate of any racial or ethnic group including White during the period 2008 to 2012 (Table 2).

FIGURE 3

All Sites Cancer Mortality Rates by Race and Sex in Maryland, 2002-2012



Rates are per 100,000 population and are age-adjusted to the 2000 US standard population.
Source: NCHS Compressed Mortality Files in CDC Wonder.

TABLE 2*

Maryland Cancer Incidence and Mortality By Race and Ethnicity, 2008-2012

RACE/ETHNICITY	OVERALL INCIDENCE	OVERALL MORTALITY
White	450.2	168.9
Black	442.1	194.4
Hispanic Latino	286.4	79.7
Asian	259.5	92.5
American Indian /Alaska Native	265.1	48.5

Rates are per 100,000 and age-adjusted to the 2000 US standard population.
Source: Maryland Cancer Registry, 2012.
NCHS Compressed Mortality File in CDC Wonder

*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.

Geographic Location: in Baltimore City, an urban, densely populated region, the cancer mortality rate is 23% higher than other parts of the state.¹³ Similarly, Maryland's rural population also suffers from cancer mortality rates that are higher than the state average.¹⁴ 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.

factors that they are exposed to from their countries of origin as well as potential language and cultural barriers to cancer screening.¹⁷ 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.

Health Insurance Coverage: a higher proportion of Marylanders with health insurance report being up to date with recommended screening for colorectal, breast, and cervical cancer compared to those without health insurance.¹⁵

Emerging Populations of Concern for Cancer Disparities

Cancer disparities in racial and ethnic minorities have been documented and continue to be investigated, but other population groups also experience poor health outcomes. Lesbian, gay, bisexual, or transgender (LGBT) persons are less likely to have health insurance and more likely to have difficulties accessing healthcare and to experience stigma and discrimination than their heterosexual counterparts. Members of the LGBT population also have a higher prevalence of smoking, and lesbian women are more likely to be overweight or obese and less likely to have had a recent mammogram or Pap test.¹⁶

Immigrants are at an increased risk for some cancers because of risk

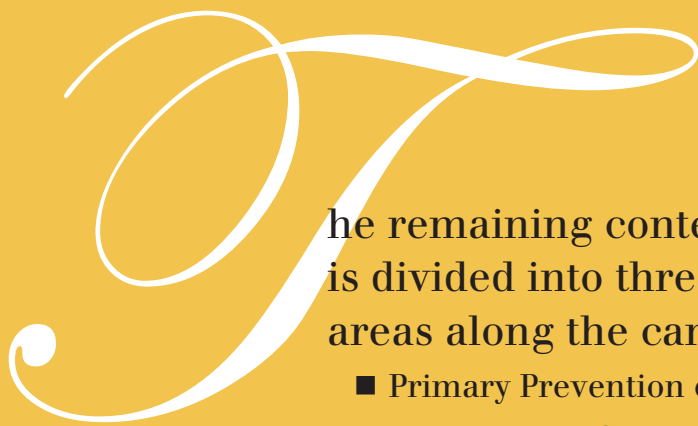
New Interventions and Promising Practices to Eliminate Cancer Disparities

Literature suggests that any efforts to reduce or eliminate cancer disparities without addressing social issues such as poverty, culture, and social injustice are likely to be unsuccessful.^{18, 19, 20} 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 deleterious 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.

The opportunities presented by healthcare reform and the challenges around cancer disparities are addressed throughout the Cancer Plan, and, 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
- 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!

PRIMARY PREVENTION OF CANCER



PRIMARY PREVENTION OF CANCER

Along the cancer spectrum of primary prevention through survivorship, cancer prevention represents a critical area of focus for both public health practitioners and healthcare providers. By reducing cancer risk factors, Marylanders can prevent many types of cancer and cancer survivors can improve their quality of life.

Many factors are associated with an increased risk of cancer. One's risk for developing and dying from cancer may be reduced by maintaining a healthy weight (by eating a healthy diet and being physically active); preventing or stopping tobacco use; getting vaccinated against certain types of cancer; limiting alcohol use; and avoiding excessive exposure to ultraviolet rays from the sun and tanning beds. Table 1.0 summarizes estimates of the proportion of cancer deaths that are attributable to various risk factors, many of which are modifiable. According to the American Cancer Society, approximately 30% of cancer deaths could be avoided if people stopped using tobacco. Additionally, it is estimated that another one-third of cancer deaths may be attributed to poor nutrition, physical inactivity, overweight or obesity, and other lifestyle factors.²¹

Section 1 of the Cancer Plan focuses on key, modifiable risk factors for which healthy behaviors may prevent or lower the risk of cancer.

TABLE 1.0

Estimated Proportion of Cancer Deaths Attributable to Various Risk Factors

RISK FACTOR	COLDITZ, WOLIN, AND GEHLERT ESTIMATE
Tobacco	33%
Adult diet/obesity	25%
Sedentary lifestyle	5%
Occupational factors	5%
Family history of cancer	5%
Viruses/other biologic agents	5%
Reproductive factors	3%
Alcohol	3%
Environmental pollution	2%
Ionizing/ultraviolet radiation	2%
Prescription drugs/medical procedures	1%

Source: Colditz, GA, Wolin KY, Gehlert S. Applying What We Know to Accelerate Cancer Prevention. Sci Transl Med. 2012 Mar 28; 4(127): 127rv4.

Tobacco Use

Tobacco use remains the number one cause of preventable death and disease in the United States. In January 2014, the Office of the Surgeon General released its 32nd report on the dangerous health effects of tobacco use.²² Since the first Surgeon General's report on smoking and health was released in 1964, over 20 million Americans have died prematurely from smoking, and of those, nearly 2.5 million deaths were from exposure to secondhand smoke. More than 480,000 Americans lose their lives each year due to smoking-related diseases, with almost 90% of smokers starting in their teens and many experiencing life-changing effects at a relatively early age. Each year, for every adult who dies prematurely from smoking-related causes, there are more than two youth or young adults who become "replacement smokers" (a new smoker who replaces someone who dies from tobacco use).²² If current trends continue, 5.6 million youth who are currently under the age of 18 will ultimately die prematurely from smoking.²² Data presented in the 2014 Surgeon General's report now link Type 2 diabetes, rheumatoid arthritis, stroke, liver, and colorectal cancers to the already long list of diseases caused by smoking and secondhand smoke.²²

Cigarette smoke contains over 7,000 compounds, and at least 69 are known to cause cancer.²² Cigarette smoking is causally related to cancer of the oral cavity and pharynx, larynx, liver, lung, bronchus, trachea, stomach, colon, rectum, cervix, esophagus, bladder, kidney, pancreas, and blood,²³ along with cardiovascular and respiratory diseases. Approximately 30 percent of all cancer deaths in the U.S. are attributable to smoking, and approximately 90 percent of lung cancer deaths among men and 80 percent of lung cancer deaths among women are due to smoking.^{21,24} Lung cancer is the leading cause of cancer deaths in both men and women in Maryland and is responsible for taking almost 14,000 lives in the state from 2007 to 2011.²⁵ Including tobacco-related cancers of the bronchus and trachea increases the magnitude of the problem that tobacco use presents.

Smoking cessation has been shown to decrease the risk of developing smoking-related cancers.¹⁵ 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, etc.) and the number of tobacco users who quit and continue to stay quit will greatly reduce preventable deaths and suffering from smoking-related diseases. For cancer patients who are also smokers, the National Comprehensive Cancer Network (NCCN) recommends combining pharmacologic therapy and counseling to lead to the best results in smoking cessation, and documenting smoking status in patient health records at regular intervals.²⁶ Together, tobacco use prevention and cessation programs and policies are the primary mechanisms recommended to reduce cancers of the lung, bronchus, and trachea, while reducing premature deaths from other cancers and diseases also attributable to cigarette smoking.

Tobacco Use Among High Risk Populations

Youth Cigarette Smoking, Tobacco Use, and Exposure

Between 2000 and 2013, cigarette smoking among Maryland high school youth younger than 18 years old had decreased by 52.2% with 11.0% of youth having reported smoking a cigarette during the past 30 days in 2013, compared to 23.0% in 2000. However, in 2013, 21 of Maryland's 24 major political subdivisions had high school smoking rates exceeding the state average.²⁷

As the use of cigarettes by youth has decreased since 2000, use of other tobacco products, such as little cigars and cigarillos, has increased. These products come in attractive fruit and candy flavors and are often sold as singles (decreasing the price point), making them attractive, affordable, and accessible to youth. In 2013, cigar smoking by underage high school youth (11.5%) was just as popular as cigarette smoking (11.0%). Among underage tobacco users, 47.9% used more than one type of tobacco product. Underage youth who use cigars are also likely to smoke cigarettes (38.0% of underage youth tobacco users reported smoking both cigars and cigarettes). There has also been a rise in smokeless tobacco use; the use of smokeless tobacco by underage high

school youth increased by 43.8% between 2010 and 2013. Youth smokeless tobacco use rates are three times higher than the use rate of adults. Many people inaccurately believe cigar products and smokeless tobacco products are less harmful, yet they are just as addictive and toxic as cigarettes.²⁷

New and emerging products continue to attract youth. In the U.S., current e-cigarette use tripled among high school students from 2013 to 2014, which offset decreases in cigarette and cigar use during that time period resulting in no change in overall tobacco use.²⁸ Analysis of 2011-2013 National Youth Tobacco Survey data showed that use of e-cigarettes among youth who have never used conventional tobacco products increased from 79,000 to over a quarter million, and in 2014 there were an estimated 2.4 million youth e-cigarette users in total.^{28, 29} Research is underway to determine the potential harms of using e-cigarettes, which may include: exposure to secondhand aerosol and nicotine among children and adolescents, pregnant women, and non-smokers; poisonings; unknown health effects of long-term exposure; glamorizing and renormalizing tobacco use; regular use of nicotine and/or cigarettes in youth or adult non-smokers; and smokers choosing e-cigarettes over proven quit methods.³⁰ In addition, calls to poison control centers nationwide dramatically increased from 2010 to 2014 due to exposure to concentrated liquid nicotine found in e-cigarette cartridges.³¹

Underage youth exposure to secondhand smoke (environmental smoke 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. In addition to the Maryland Clean Indoor Air Act's mandatory smoking ban in almost all indoor public areas, local and state health department tobacco control programs encourage voluntary in-home and in-car prohibitions on smoking to reduce this exposure. Across the country and in Maryland, many multi-unit housing properties (apartment buildings, condos, units with shared walls) are instituting smoke-free policies that may include individual units, balconies, patios, and even

the entire property. Instituting these policies will create a safe home environment, reducing exposure to the harmful chemicals found in secondhand smoke. Since 2000, there has been a significant decrease in the percentage of underage youth who report being exposed to secondhand smoke. In households without a resident smoker, there has also been an increase in youth reporting that they have not been exposed to secondhand smoke.

Youth Perceptions of Tobacco Use²⁷

In the YTRBS, Maryland utilizes two indicators of youth attitudes. The first is based on the question – “Do you think young people who smoke have more friends?” The second is based on the question – “Do you think smoking makes young people ‘look cool’ or ‘fit in’?” Both indicators have been tracked since 2000 and both show an increasingly positive view of tobacco use by underage Maryland public high school youth. Among non-smokers, there has been an increase of over 63% in the proportion of youth who believe that smoking helps a youth to “fit in” or “look cool,” and an 84% increase in the proportion who believe that youth who smoke have more friends. Among smokers, there has been an increase of 46% in the proportion who believe that smoking helps a youth to “fit in” or “look cool,” and a nearly 53% increase in the proportion who believe that youth who smoke have more friends.

Underage Youth Tobacco Purchases²⁷

Persons less than 18 years of age are not permitted to possess (other than in the course of their employment), use, or purchase tobacco products in Maryland, and retailers are not permitted to sell or distribute tobacco products to such persons. Among underage high school smokers, nearly 63% reported that they were not asked for photo identification when attempting to purchase cigarettes from a tobacco retailer during the past 30 days. Asking for photo identification reduces cigarette sales to underage youth. When tobacco retailers request to see photo identification when youth try to buy cigarettes, 33% of underage youth succeed in buying cigarettes; this is in comparison to a 79% success rate when photo identification is not requested.

Adult Cigarette Smoking and Tobacco Use

Most Maryland adults do not smoke or use other tobacco products, and cigarette smoking by Maryland adults has decreased substantially since 2000. Over sixteen percent (16.4%) of Maryland adults reported in 2013 that they currently smoked cigarettes, with 78.7% of these smokers wanting to quit. Smokers' desire to quit smoking was universal - no statistically significant difference was found between racial/ethnic groups, gender, income, or highest educational attainment. Smokers who want to quit have several resources to assist them with quitting, such as Maryland's Tobacco Quitline: 1-800-QUIT-NOW.

Never starting to smoke is increasingly common. According to Maryland BRFSS data, in 2013 more than 61% of Maryland adults report that they have never smoked cigarettes. Decreasing smoking improves health and reduces healthcare costs. Hospital admissions to treat tobacco-related conditions decreased 11.0% between 2000 and 2011, saving more than \$102 million in hospital charges in 2011. For Maryland adults, annual household income is inversely correlated with cigarette smoking—the lower the annual household income, the higher the prevalence of cigarette smoking. Adults whose annual household income was less than \$15,000 had the highest rates of cigarette smoking in 2012 (30.7%), and those whose annual income was \$50,000 or more had the lowest rates of smoking (11.6%). BRFSS respondents with an annual household income of \$75,000 a year or more are significantly more likely to never have smoked cigarettes when compared with households with less annual income. In addition, cigarette smoking is inversely related to educational attainment; that is, the higher the educational level, the lower the prevalence of cigarette smoking. Adults who have four or more years of college are significantly more likely to have never smoked cigarettes, compared with adults with some college or post-high school learning, adults with a high school diploma or GED, or adults without a high school diploma or GED.²⁷

Smoking during pregnancy is harmful to both women and babies, and can lead to miscarriage, pregnancy complications, premature birth, low birth weight, certain birth defects, and Sudden Infant Death Syndrome (SIDS).³² Accurate assessment of the prevalence of tobacco use among pregnant

women in Maryland is challenging, therefore the Cancer Plan does not include a target for reducing smoking during pregnancy. However, the USPSTF recommends that clinicians ask all pregnant women about tobacco use and provide pregnancy-tailored counseling for those who do smoke. The Maryland Tobacco Quitline offers free support to pregnant women through 1-800-QUIT-NOW to help them to quit and stay smoke-free after giving birth.

CDC “Best Practice Recommendations” for Comprehensive Tobacco Use Prevention and Cessation Programs

In 2014, CDC updated and published its evidence-based state-specific recommendations for implementation of comprehensive tobacco use prevention and cessation programs. The CDC *Best Practices for Comprehensive Tobacco Control Programs (2014)*³³ includes five core components: (1) State and Community Interventions, (2) Mass-Reach Health Communication Interventions, (3) Cessation Interventions, (4) Surveillance and Evaluation, and (5) Infrastructure, Administration, and Management. Utilizing these components, Maryland aims to reach the following goals: Prevent initiation among youth and young adults; Promote quitting among adults and youth; Eliminate exposure to secondhand smoke; and Identify and eliminate tobacco-related disparities among population groups.

Included in the Best Practice guidelines are recommended Tobacco Control Program funding levels for Maryland. The recommendations are available online from the CDC at: http://www.cdc.gov/tobacco/stateandcommunity/best_practices/.

Future Topics in Tobacco Control

Electronic nicotine delivery systems represent an area of tobacco control with emerging data on patterns of use and potential harms. As mentioned previously, current e-cigarette use tripled among high school students from 2013 to 2014, and data have shown that use of e-cigarettes among youth who have never used conventional tobacco products is increasing. Research is underway to determine the potential harms of using e-cigarettes, and findings may lead to the development of related strategies in future updates of the Cancer Plan, possibly including the addition of e-cigarettes to Clean Indoor Air Act legislation if data warrant the inclusion. Additional research is being conducted to assess the efficacy of electronic cigarettes as potential harm reduction or cessation products. Updated information about e-cigarettes and other electronic nicotine delivery systems is available online from the FDA at: www.fda.gov/TobaccoProducts.

Although Maryland data are not yet available, national data strongly suggest that smoking rates among the lesbian, gay, bisexual, and transgender population are higher than the general population.¹⁶ As Maryland data become available in the coming years, future updates of the Cancer Plan may provide more information about tobacco disparities in this population.

Healthy Weight, Nutrition, and Physical Activity

It is estimated that approximately one-third of cancer cases that occur in the United States are related to overweight or obesity, physical inactivity, and/or poor nutrition.²¹ Cancer risk may be reduced by maintaining a healthy weight through adherence to nutrition and physical activity behavior guidelines.

Overweight and Obesity

Excess body fat or obesity can increase the risk of certain cancers and is a major health concern in the United States. Scientific evidence has established clear associations between being overweight/obese and the leading causes of morbidity and mortality in the U.S., including cardiovascular disease, cancer, and diabetes.¹⁵ The leading cause of 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: <http://www.cdc.gov/healthyweight/assessing/bmi>.

Adults with a BMI between 25 and 29.9 kg/m² are considered overweight, and adults with a BMI of 30 kg/m² or higher are considered obese.³⁴ BMI scores are measured in percentiles by age and sex in children aged two through adolescence. 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.³⁵

Overweight or obesity are 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's lymphoma.¹⁵ In 2013, it has been estimated that overweight and obesity contributed between 14% and 20% to all cancer-related mortality.³⁶

Children and young adults are especially vulnerable to the effects of obesity and overweight, as the period of childhood and growth into adolescence and early adulthood may present a "cumulative risk" for later adult-onset cancers.³⁷ Interventions to promote healthy weight and healthy behaviors during these ages are critical. Childhood obesity and overweight have not been directly linked to cancer, but children who are obese are more likely to become obese adults.

Breastfeeding plays a role in cancer prevention, related to both obesity prevention in the infant and breast cancer prevention in the mother. 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.³⁸ 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.³⁹

Nutrition

The promotion of healthy nutrition habits is important for obesity prevention, and obesity is associated with an increased risk of certain cancers. Consumption of fruits and nonstarchy vegetables is often promoted for general health and well-being as well as prevention of obesity, diabetes, and cardiovascular disease; and people whose diets are rich in plant foods have a lower risk of getting certain cancers including mouth, pharynx, larynx, esophagus, stomach, and lung cancer.⁴⁰ 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.³⁸

The USDA 2015 Dietary Guidelines Advisory Committee (DGAC) Report recommends 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. Additionally, these dietary recommendations align with recommendations from other groups, including the American Institute for Cancer Research and the American Heart Association.⁴¹

The 2013 CDC State Indicator Report on Fruits and Vegetables provides information on fruit and vegetable consumption in Maryland. According to the report, 36.4% of Maryland adults reported consuming fruits less than one time daily, and 22.8% of Maryland adults reported consuming vegetables less than one time daily. About 38.7% of Maryland adolescents reported consuming fruits less than one time daily, and 38.9% of Maryland adolescents reported consuming vegetables less than one time daily.⁴²

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, prostate, and endometrial cancers.^{43, 44, 45, 46} Additionally, sedentary time, or time spent not engaged in physical movement, is linked with an increased risk of cancer incidence and mortality.⁴⁷

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.⁴⁸

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. Pre-existing 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.⁴⁸ Physical activity is associated with a reduced risk of colon, breast, endometrial, and lung cancer.⁴⁹

According to the 2010 Maryland Cancer Screening and Risk Behaviors Report, almost half (46%) of Marylanders age 18 years and older engage in regular moderate or vigorous physical activity each week. A higher proportion of men achieved moderate or vigorous activity levels at 49% compared to women at 43%, and 55% of those age 18-29 years achieved moderate or vigorous activity levels compared to all other age groups. The proportion of individuals who participated in moderate or vigorous physical activity was highest among those with a college education or more.⁵⁰

Coordinated action to improve nutrition, increase physical activity, and reduce obesity risk factors related to cancer is necessary in Maryland to prevent cancer and reduce the burden of disease in the state.

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.³⁸ 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.^{51,52} Those who begin drinking before age 14 are more likely to experience alcohol dependence and multiple dependence episodes in life.⁵³ Tobacco use in combination with excessive drinking appears to promote higher rates of oral and head and neck cancers.⁵⁴ 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.⁵⁵ As light-to-moderate amounts of alcohol consumption can also have beneficial health effects on heart disease prevention, healthcare providers should discuss the risks and benefits of alcohol consumption with patients along with the importance of limiting intake.

Infections and Cancer Vaccines

According to the NCI, infectious agents have been estimated to cause 18% of all cancer cases globally. Infectious agents that have been linked to various types of cancer include human papillomavirus (HPV), hepatitis B and C, Epstein-Barr virus, and *Helicobacter pylori*.⁵⁶

Cancer vaccines are currently available to prevent cancers caused by certain types of HPV and hepatitis B. Cancer vaccines “boost the body’s natural ability to protect itself, through the immune system, from dangers posed by damaged or abnormal cells such as cancer cells.”⁵⁷ Cancer vaccines can be preventive (or 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 human papillomavirus) and hepatocellular carcinoma (caused by the hepatitis B virus).

Vaccines to Prevent Human Papillomavirus Infection

Over 150^{58,59} HPV types have been identified, with infection from at least a dozen types linked to cancer: HPV types 16 and 18 are responsible for approximately 70% of all cervical cancer cases, and HPV infection (mainly with HPV type 16) causes 95% of anal cancers, 70% of oropharyngeal cancers, 50% of vulvar cancers, and 35% of penile cancers.^{59,60}

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, HPV4), Cervarix® (GlaxoSmithKline, HPV2), and Gardasil 9® (Merck, HPV9). All three vaccines protect against HPV types 16 and 18, and all three vaccines are given as a series of three shots within six months.

As of March 2015, ACIP recommendations for HPV vaccination are:

- Females age 11 or 12 years: routine vaccination with HPV9, HPV4, or HPV2
- Males age 11 or 12 years: routine vaccination with HPV9 or HPV4
- Vaccination of females age 13-26 years and males age 13-21 years who were not vaccinated previously
- Males aged 22 through 26 years may be vaccinated

There are some higher-risk populations for which vaccination is recommended if they have not been previously vaccinated or have not completed the 3-dose series. These include men who have sex with men (vaccination through age 26 years) and immunocompromised persons (including those with HIV infection).

In 2013, there were an estimated 222,337 Maryland teenagers (approximately 5 in 10 girls, and 7 in 10 boys) ages 13-17 years who had not received any doses of the HPV vaccination.⁶¹

Table 1.1 shows HPV vaccination coverage in Maryland compared to U.S. coverage and the Healthy People 2020 target.

TABLE 1.1

Nationwide and Jurisdiction-specific HPV Vaccination Coverage, Teens Aged 13-17 Years, NIS-Teen 2013*

	MARYLAND	US NATIONAL (RANGE)	HP 2020 TARGET
Girls			
≥1 doses	50.0%	57.3% (39.9%-78.4%)	80.0%
3 doses	33.4%	37.6% (20.5%-56.5%)	80.0%
Boys			
≥1 doses	34.2%	34.6% (11.0%-69.3%)	80.0% [†]
3 doses	NA [§]	13.9% (7.3%-43.2%)	80.0% [†]

*CDC. National, Regional, State, and Selected Local Area Vaccination Coverage among Adolescents Aged 13-17 Years: United States, 2013. Morbidity and Mortality Weekly Report (MMWR). July 25, 2014.

§Estimate not reported due to data limitations.

†In April 2014, the federal HP2020 workgroup approved a new HP2020 objective for males.

Source: Centers for Disease Control and Prevention Human Papillomavirus (HPV) Vaccination Report: Maryland Oct 2014.

Some of the key barriers to HPV vaccination among U.S. adolescents include:⁶²

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

Racial disparities in HPV vaccination coverage are seen in Maryland as evidenced by 2013 National Immunization Survey data:

Females ages 13-17 who had received at least one dose:

- White non-Hispanic: 50.0%
- Black non-Hispanic: 39.8%

Males ages 13-17 who had received at least one dose:

- White non-Hispanic: 26.7%
- Black non-Hispanic: 37.8%

Vaccine recommendations and immunization schedules are available online:

ACIP:

<http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>

CDC:

<http://www.cdc.gov/vaccines/schedules>

Healthcare providers play an important role in increasing the HPV vaccination rates, as physician recommendation is often the strongest predictor of HPV vaccination among teenagers.^{62, 63, 64}

Vaccine to Prevent Hepatitis B Infection

Hepatocellular carcinoma is the most common form of liver cancer in adults. Chronic infection with the hepatitis B virus (HBV) or hepatitis C virus (HCV) is a major risk factor for hepatocellular carcinoma. 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.^{65, 66, 67} 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. 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.

Screening for Hepatitis C Infection

Hepatitis C is a liver disease that results from infection with HCV. 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.⁶⁸ However, early diagnosis and treatment can help prevent liver damage, cirrhosis, and liver cancer. The USPSTF recommends one-time screening for HCV for adults born between 1945 through 1965.

Family History of Cancer

Individuals with a family history of certain types of cancer may have an increased risk for cancer.⁶⁹ Certain interventions or recommendations may be different for individuals at a higher risk for cancer due to family history, such as cancer chemoprevention to reduce risk (see below for information about chemoprevention) or different screening test intervals than the general population to identify pre-cancerous changes or to diagnosis cancer at the earliest stage (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 healthcare providers.⁶⁹

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. Chemoprevention is usually recommended in people who have a higher risk of developing cancer.

Although many compounds have been tested for their cancer prevention potential, only a few have demonstrated efficacy and received regulatory approval.⁷⁰ Among women at increased risk to develop breast cancer (determined as 5-year predicted risk for breast cancer of 1.66% 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.⁷¹

Tamoxifen reduces the risk of both invasive breast cancer and non-invasive breast cancer by about 50% and raloxifene reduces these risks by about 40%.⁷²

The use of chemoprevention agents as a tool in cancer prevention holds promise, and is an area of continued research and expanding evidence. Future Cancer Plan updates may address chemoprevention recommendations more in-depth as the discovery and approval of more agents increase its important role in cancer prevention. Patients who are interested in learning more about chemoprevention should speak with their healthcare 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, known as non-melanoma skin cancer (NMSC). According to the most recent study of NMSC occurrence, in 2006 it was estimated that 3.5 million cases of NMSC were diagnosed in the U.S. among 2.2 million people. Melanoma is less common but is the most deadly form of skin cancer. An estimated 73,870 new cases of melanoma will be diagnosed in the U.S. in 2015. However the mortality rate in Maryland is low compared to other cancers at 2.7 deaths per 100,000 individuals (see Section 2 of the Cancer Plan for data on melanoma incidence and mortality), and melanoma accounted for 1.5% of cancer deaths in the state from 2008 through 2012.^{21,73}

Ultraviolet radiation (UVR) exposure has been identified as a risk factor for skin cancer. UVR 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 UVR include cataracts, macular degeneration, and immune system depression.⁷⁴

There is solid evidence that exposure to sun and other UVR, including artificial sources such as tanning beds, is associated with increased risk of NMSC. There is fair evidence that melanoma skin cancer is associated with intermittent acute sun exposure which results in sunburns and that exposure in childhood and adolescence may be more important. Some research has also shown that tanning bed use is associated with an increased risk of early-onset melanoma.⁷⁵

To reduce the risk of skin cancer it is generally recommended that individuals reduce their exposure to UVR by practicing the following sun-safe behaviors: avoiding the sun or seeking shade between the hours of 10 a.m. and 4 p.m.; wearing sun-protective clothing including a wide-brimmed hat and sunglasses when exposed to sunlight; and applying a broad spectrum sunscreen with a sun-protection factor (SPF) of 15 or higher 30 minutes before going outside and every two hours.⁷⁶ Individuals are also advised to avoid exposure to artificial sources of UV light (e.g. indoor tanning).¹⁵

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 of youth access to indoor tanning facilities.

Environmental and Occupational Exposures

The relationship between cancer and environmental and occupational factors is complex; some factors are well-known causes of cancer while others have less definitive, inconclusive associations with cancer. Further, exposure to cancer-causing agents can be through multiple pathways including inhalation (taken in by breathing), absorption (taken in through direct contact with the body), and ingestion (taken in by mouth); and individuals are exposed to these agents over the entire lifespan. For these reasons, the precautionary principle* is sometimes promoted to minimize exposures. This section outlines the current state of knowledge regarding the link between

environmental and occupational hazards and cancer, and highlights the roles cancer surveillance and research contribute to improved understanding, prevention, and management of cancer related to environmental and occupational factors.

*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 outside the workplace. 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)
- 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, and it is estimated that 4% to 10% of U.S. cancers (48,000 incident cases annually) are caused by occupational exposures. 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.⁷⁷

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 is available online from the CDC:

<http://www.cdc.gov/niosh/topics/cancer/default.html>

<http://www.cdc.gov/niosh/topics/chemical.html>.

Outdoor Air Pollution

Air pollution is a complex mixture of chemicals, many of which are known or suspected carcinogens, from a variety of mobile (e.g. vehicles) and stationary (e.g. factories) sources. The relationship between exposure to airborne chemicals and cancer risk is a concern in the field of public health because even if the associated risk of cancer may be low, the number of people exposed to air pollutants is large and people may be exposed to poor air quality for their entire lifespan. Most hazardous air pollutants (HAPs) are produced by mobile sources (vehicles) and stationary sources (factories). It is difficult to calculate the risks associated with individual chemical hazards in 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 the state (including the Eastern and Western regions).

The Maryland Department of the Environment (MDE) released a Clean Air Progress in Maryland 2015 Progress Report on accomplishments in the improvement of air quality. The report is available online at:

<http://www.mde.state.md.us/programs/Air/Documents/GoodNewsReport/GoodNewsReport2015Final.pdf>.

Additionally, the American Lung Association grades Maryland counties on air quality; for findings including disparities in air quality across Maryland counties visit:

<http://www.stateoftheair.org/2015/states/maryland/>.

Waterborne Exposures

Water sources can contain contaminants that occur naturally, are manmade, are formed when water is disinfected to make it suitable for drinking, or which were originally released into the air or soil. Water

quality standards are in place to protect Maryland surface waters, 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.

Some contaminants 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 consumption advisories for people who eat Maryland fish on a regular basis (www.mde.maryland.gov). Some of these advisories are based on the presence of polychlorinated biphenyls (PCBs) in the fish tissue. PCBs are a group of chemicals that are probable carcinogens in humans. Information on commercial store-bought fish is available from the EPA and the FDA. This includes general information about choosing fish to reduce exposure to contaminants.

Foodborne Hazards

The sources of carcinogens in food may be naturally occurring (such as toxins from fungi, called mycotoxins) or are 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 have been adequately 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 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).

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.

The EPA estimates that radon is the most important and preventable risk factor for lung cancer in people who do not smoke, so measuring and eliminating radon is of utmost importance. Radon is an invisible, odorless radioactive gas produced as a decay product of uranium in the ground, and human exposures result when it enters homes through cracks and holes in the foundation. Fortunately, an inexpensive and simple radon test kit can be used to measure radon levels in the home, and elevated radon levels can be rectified through increased ventilation using a radon reduction system.

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 page 31 for more information on ultraviolet radiation and prevention methods.

Household/Personal Exposures

Indoor air quality can be impacted from multiple 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 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 incubation period (latency) from initiation (the starting event) to the development of symptoms and disease.
- In the Maryland Cancer Registry, 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.
- Similarly, the Maryland Cancer Registry does not often have information on where people have worked. Chemical exposures have often occurred at work, but occupational information is often missing in cancer registries.
- Personal risk factors such as tobacco use, body mass index, diet source/composition, water source/intake, exercise, UV exposure, prior screening for cancer, etc., are typically not collected by cancer surveillance systems.
- Some cancers are often diagnosed in an outpatient setting, particularly skin cancer and urologic cancers. This limits the reporting of full data on these cancers to state registries.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 1 – Tobacco Use and Exposure

By 2020, reduce the prevalence of current cigarette smoking among adults to 15.6%.* (2013 baseline 16.4%)

Target Setting Method: 5% reduction per goals of DHMH CTPC
Source: BRFSS

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

Strategies

- Support and implement CDC-recommended evidence-based interventions that reduce tobacco use and increase the demand for tobacco cessation, including:
 - ◆ Explore an increase in the price of tobacco products;
 - ◆ Enact comprehensive smoke-free policies;
 - ◆ Fund mass-media campaigns; and
 - ◆ Make cessation services fully accessible to tobacco users.
- Implement the ten recommendations from the U.S. Department of Health and Human Services Public Health Service Clinical Practice Guidelines on Treating Tobacco Use and Dependence, including but not limited to:
 - ◆ Identify and document tobacco use status and treat every tobacco user;
 - ◆ Offer individual, group, and/or telephone counseling;
 - ◆ Encourage use of effective medications;
 - ◆ Encourage all individuals making a quit attempt to use both counseling and medication; and
 - ◆ Promote use of the Maryland Tobacco Quitline.
- Educate the public about the availability of and promote the use of comprehensive tobacco cessation services. Educate payers about the availability of and encourage referrals to cessation services.
- Educate Maryland hospitals about the importance of and encourage adoption of policies to provide inpatient counseling and treatment for patients who use tobacco.
- Educate Maryland college and university administrators about the importance of and encourage adoption of policies to ensure that campuses are tobacco-free at all times, and that tobacco use by youth and adults is prohibited while they are engaged in all school-related activities.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 2 – Tobacco Use and Exposure

By 2020, reduce the prevalence of tobacco use among high school youth as measured by YTRBS* to reach the following targets:

- Cigarette use: 11.3%
(2013 baseline 11.9%)
- Cigar use: 8%
(2013 baseline 12.5%)
- Smokeless tobacco use
(chewing tobacco or snuff):
6.9%
(2013 baseline 7.4%)
- Any type of tobacco
(cigarettes, cigars, or
smokeless tobacco): 16.1%
(2013 baseline 16.9%)

Target Setting Method: 5% reduction for cigarette use and any type of tobacco per goals of DHMH CTPC (already met HP 2020 target), HP 2020 target for others
Source: YTRBS

*YTRBS collects data on tobacco use in the past month.

Strategies

- Support and implement CDC-recommended evidence-based interventions that reduce tobacco use and increase the demand for tobacco cessation, including:
 - ◆ Explore an increase in the price of tobacco products;
 - ◆ Adopt comprehensive smoke-free policies;
 - ◆ Fund mass-media campaigns; and
 - ◆ Make cessation services fully accessible to tobacco users.
- Increase retailer compliance checks to enhance statewide and local enforcement of Maryland's restrictions on the sale of tobacco products to youth under 18 years of age.
- Strengthen tobacco-licensure laws so repeated violations on the sale of tobacco to minors result in suspension/revocation of licenses to sell tobacco products.
- Adopt state and local policies that restrict the sale, advertising, and promotion of tobacco products.

Objective 3 – Tobacco Use and Exposure

By 2020, reduce exposure of high school youth to secondhand smoke as measured by YTRBS* to 30.1%.
(2013 baseline 31.7%)

Target Setting Method: 5% reduction per goals of DHMH CTPC
Source: YTRBS

*YTRBS collects data on students who were in the same room with someone who was smoking cigarettes on one or more of the past 7 days.

Strategies

- Encourage adoption of policies by property managers, landlords, and home owner associations that prohibit the smoking of tobacco products inside multi-unit housing (including townhouses and rowhouses sharing common walls) in Maryland.
- Increase awareness of the health dangers from secondhand and third-hand smoke, and encourage voluntary adoption of smoke-free rules in all households.

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

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 4 – Healthy Weight, Nutrition, and Physical Activity

By 2020, reduce the proportion of Marylanders who are obese to meet the following targets:

Adults age 18 years and older: 27.5%
(2013 baseline 28.3%)

High school youth: 10.7%
(2013 baseline 11%)

Target Setting Method: 3% reduction per goals of DHMH CCDPC
Source: BRFSS, YTRBS

Strategies

- Strengthen healthier food access and sales in retail venues and community venues through increased availability, improved pricing, placement, and promotion.
- 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.
- Ensure that patients age 6 years and older are screened for obesity and offered or referred to behavioral interventions.
- Implement evidence-based school and youth community programs that promote healthy weight.
- Increase access to healthy foods and beverages in schools.

Objective 5 – Healthy Weight, Nutrition, and Physical Activity

By 2020, increase the proportion of Marylanders who consume fruits and vegetables as measured by BRFSS and YTRBS* to reach the following targets:

- Adults age 18 years and older: 17.6%
(2013 baseline 17.1%)
- High school youth: 20.7%
(2013 baseline 20.1%)

Target Setting Method: 3% increase per goals of DHMH CCDPC
Source: BRFSS, YTRBS

*BRFSS and YTRBS collect data on the number of individuals who consumed fruits and vegetables five or more times per day in the past week.

Strategies

- Initiate and implement programs to promote access to healthy foods for all Marylanders, including food banks, virtual supermarkets, healthy corner stores, use of Electronic Benefits Transfer for WIC & SNAP participants at farmers' markets, the Farmers' Market Nutrition Program, WICs Fruit and Vegetable Check Program, and the Supplemental Nutrition Assistance Program.
- 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 House and Community Development), increasing access to farmers' markets, and supporting farm to school initiatives.
- 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.
- 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.
- 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.
- Promote maximum implementation and utilization of subsidized food programs for students.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 6 – Healthy Weight, Nutrition, and Physical Activity

By 2020, increase the proportion of infants in Maryland who are breastfed to reach the following targets:

- Ever breastfed: 81.9% (2011 baseline 79.8%)
- Breastfeeding at 6 months: 60.6% (2011 baseline 60.1%)
- Breastfeeding at 12 months: 34.1% (2011 baseline 29.4%)

Target Setting Method: HP 2020 targets
Source: NIS

Strategies

- Encourage adoption of Maryland Hospital Breastfeeding Policy Recommendations.
- Ensure that women are counseled during pregnancy and after birth about interventions to promote and support breastfeeding.
- Educate women and families about availability of free breastfeeding support, such as hospital-based support groups and telephone support, La Leche League support, etc.
- Educate the public about the importance of breastfeeding.
- Encourage the development of public environments and communities that are supportive of breastfeeding, including those that provide accommodations for breastfeeding in public places.
- Support policies that promote protections for breastfeeding in public places.
- Support workplace initiatives to encourage continued breastfeeding after return to work.
- Increase awareness and support the implementation of legislation requiring employers with more than 50 employees to provide break time and facilities (other than the restroom) for breast pumping at work. Develop and promote recommendations for model breastfeeding support facilities.

Objective 7 – Healthy Weight, Nutrition, and Physical Activity

By 2020, promote physical activity among Maryland adults age 18 years and older:

- Reduce the proportion of adults who engage in no leisure-time physical activity to 24.0%. (2013 baseline 25.3%)
- 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 50.4%. (2013 baseline 48.0%)

Target Setting Method: 5% reduction or increase per goals of DHMH CCDPC
Source: BRFSS

Strategies

- 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.
- Develop and/or implement transportation and community plans that promote walking and other methods of active transport.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 8 – Healthy Weight, Nutrition, and Physical Activity

By 2020, 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:*

- High school youth: 22.7% (2013 baseline 21.6%)
- Middle school youth: 30.9% (2013 baseline 29.4%)

Target Setting Method: 5% increase per goals of DHMH CCDPC
Source: YTRBS

*Baseline data on physical activity in elementary school youth are not available at the time of publication.

Strategies

- Implement and evaluate quality, comprehensive physical education, and physical activity programs in kindergarten through grade 12 schools.
- Promote the adoption of physical activity in early childcare and education.
- Implement and evaluate comprehensive physical activity programs in the community.

Objective 9 – Alcohol Consumption

By 2020, reduce drinking among Maryland adults* to reach the following targets:

- Chronic drinking (more than 2 drinks per day for men, more than one drink per day for women): 4.7% (2013 baseline 5.2%)
- Binge drinking (5 or more drinks for men and 4 or more drinks for women on a single occasion): 12.8% (2013 baseline 14.2%)

Target Setting Method: 10% reduction
Source: BRFSS

*BRFSS collects data on drinking among adults age 18 years and older.

Strategies

- Increase awareness of alcohol use as a cancer risk factor among Maryland residents by pooling resources from public health agencies, the healthcare 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.
- Work with healthcare 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.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 10 – Cancer Vaccines

By 2020, increase coverage rates for HPV vaccine to reach the following targets*:

- Girls age 13-17 that have received one dose to 80% (2013 baseline 50%)
- Girls age 13-17 that have received three doses to 80% (2013 baseline 33.4%)
- Boys age 13-17 that have received one dose to 80% (2013 baseline 34.2%)

Target Setting Method: HP 2020 Targets
Source: NIS

*Baseline data and HP 2020 target for boys age 13-17 that have received three doses are not available at the time of publication.

Strategies

- Increase awareness of HPV infection as a cancer risk factor among Maryland residents.
- Educate healthcare providers on the importance of making a strong and timely HPV vaccination recommendation, with a focus on cancer prevention.
- Encourage cancer experts and leaders to provide peer education to immunization providers about cancer prevention and the role of HPV vaccine.
- Educate parents and/or guardians about the availability and importance of HPV vaccination for adolescent girls and boys, with a focus on cancer prevention.
- Implement systems changes within healthcare practices to:
 - ◆ Check teenage patients' vaccination status and offer all indicated vaccines at each visit;
 - ◆ Schedule the next HPV vaccination dose before the end of the current appointment; and
 - ◆ Utilize reminder and recall strategies.

GOAL 1

Primary Prevention Goals, Objectives, and Strategies

INCREASE CANCER PREVENTION BEHAVIORS IN MARYLAND

Objective 11 – Ultraviolet Radiation Exposure

By 2020, 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 74.5%. (2012 baseline 67.7%)

Target Setting Method: 10% increase
Source: BRFSS

* BRFSS collects data on the following sun protective measures:

- Limit sun exposure between 10 am and 4 pm
- Use sunscreen with SPF of 15 or higher when outdoors for an hour or more on a sunny day
- Wear a hat with a broad brim when outdoors for an hour or more on a sunny day
- Wear sun-protective clothing when outdoors for an hour or more on a sunny day

Strategies

- 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.
- Educate the public about sun-safe behaviors, the dangers of ultraviolet radiation, and skin cancer early detection. Use media outlets such as Web sites; print, radio, and television PSAs; billboards; and press releases.
- Develop programs encouraging sun-safe behaviors for outdoor workers.
- Promote/integrate the use of sun safety educational curricula in elementary and middle schools.
- Support school policies that permit students to bring and apply sunscreen.
- Ensure that children, adolescents, and young adults ages 10 to 24 years who have fair skin are counseled by healthcare providers about minimizing their exposure to ultraviolet radiation.

Objective 12 – Ultraviolet Radiation Exposure

By 2020, reduce the proportion of high school youth who report using artificial sources of ultraviolet light for tanning to 9.5%. (2013 baseline 10.5%)

Target Setting Method: 10% reduction
Source: YTRBS

Strategies

- Increase awareness of the Maryland law regarding parental consent for minors' use of tanning beds.
- Encourage the implementation of legislation in Maryland that prohibits minors from using tanning beds.

GOAL 2

Primary Prevention Goals, Objectives, and Strategies

REDUCE CANCER INCIDENCE IN MARYLAND BY MINIMIZING EXPOSURES TO KNOWN ENVIRONMENTAL AND OCCUPATIONAL HAZARDS

Objective 1*

By 2020, develop and publish online one state strategy to reduce radon exposure in Maryland.

Strategies

- State agencies, with local governments, the business community, and other stakeholders, shall reduce radon exposure in Maryland through outreach, education about testing and remediation, and other strategies.
- Increase public awareness about the relationship between indoor radon exposure and lung cancer.

Objective 2*

By 2020, improve availability of, and public access to, information about environmental and occupational exposures.

Strategies

- 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.
- 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 relationships between exposures and associated health outcomes.
- Increase public awareness about exposure to environmental carcinogens.

*Baseline data on radon and other environmental exposures in Maryland are not available at the time of publication.

HIGH BURDEN CANCERS IN MARYLAND

2



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.²⁵ 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. The American Cancer Society estimates that in 2015, 30,050 Marylanders will be diagnosed with cancer and 10,470 will die from the disease.²¹ 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 27,000 Marylanders are diagnosed with invasive cancer (excluding basal and squamous cell skin cancer). The 2012 age-adjusted cancer incidence rate for Maryland is 432.1 cancer cases per 100,000, which is similar to the 2012 U.S. cancer incidence rate of 436.7 (Table 2.0). The 2012 overall cancer incidence rates for females and Whites in Maryland were also similar to the corresponding U.S. incidence rates, while the overall cancer incidence rates for males and Blacks in Maryland were significantly lower than the corresponding U.S. incidence rates.

TABLE 2.0

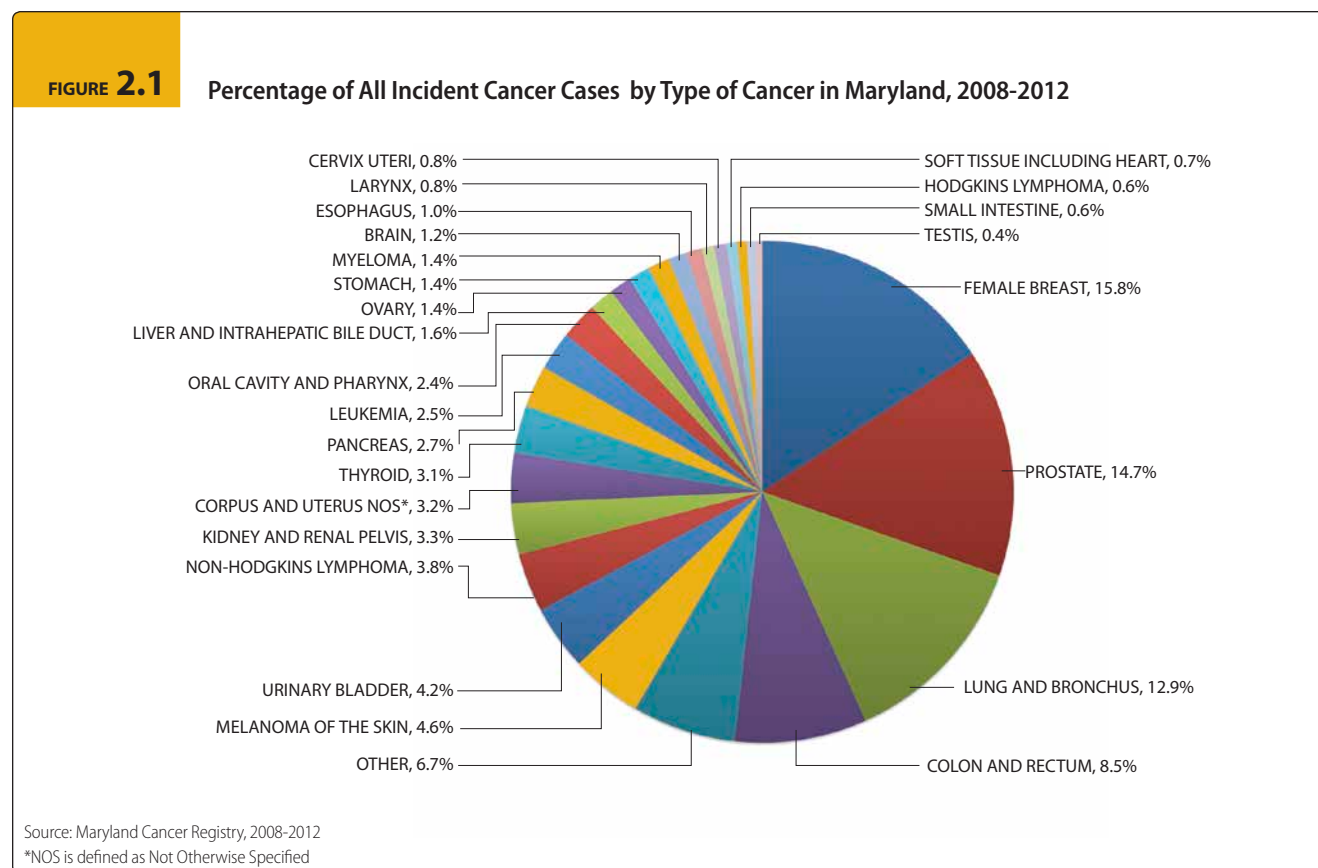
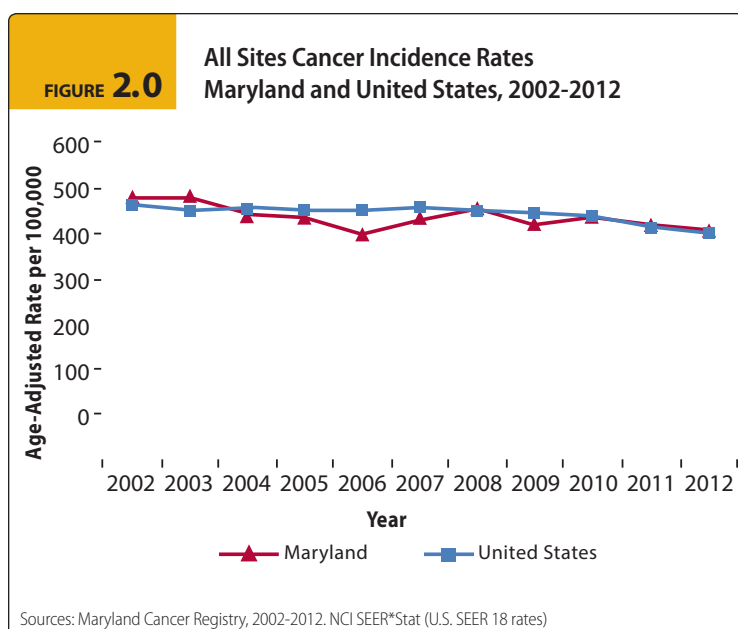
**Overall Cancer Incidence and Mortality
by Sex and Race in Maryland and the United States, 2012**

INCIDENCE	TOTAL	MALES	FEMALES	WHITES	BLACKS
Maryland New Cases	27,962	13,628	14,297	19,508	7,132
Maryland Incidence Rate	432.1	469.4	407.2	440.4	425.9
US SEER Rate	436.7	481.3	406.8	444.3	455.8
MORTALITY	TOTAL	MALES	FEMALES	WHITES	BLACKS
Maryland Deaths	10,525	5,328	5,197	7,391	2,837
Maryland Mortality Rate	165.7	197.3	144.4	164.4	183.4
US Mortality Rate	166.5	200.3	142.1	166.6	193.8

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

Sources: Maryland Cancer Registry, 2012 | NCI SEER*Stat (U.S. SEER 18 rates) | NCHS Compressed Mortality File in CDC Wonder

The overall cancer incidence rate in Maryland has decreased 13% since 2002, down from 495.8 cases per 100,000 to 432.1 per 100,000 in 2012 (Figure 2.0). 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 across all races and both sexes, and about 78% of all cancers are diagnosed in people 55 years of age and older.²⁵



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 (14.7%), lung and bronchus (12.9%), and colon and rectum (8.5%) cancers. Combined, these four cancers comprise over half of all cancers diagnosed in the state (Figure 2.1). Among Maryland men, cancers of the prostate, lung and bronchus, and colon and rectum comprise 50.9% of all newly diagnosed cancers. Among Maryland women, cancers of the breast, lung and bronchus, and colon and rectum comprise 52.5% of all newly diagnosed cancer cases (Figure 2.2).

Mortality

More than 10,000 Marylanders die from cancer each year. Maryland's age-adjusted overall cancer mortality rate of 165.7 deaths per 100,000 in 2012 was lower than the 2012 U.S. cancer mortality rate of 166.5 (Table 2.0). Maryland's rank in overall cancer mortality has been steadily improving compared to other states and the District of Columbia. For the time 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 time period 2008-2012, Maryland improved to having the 29th highest cancer mortality rate in the nation.⁷⁸

FIGURE 2.2

Ten Leading Cancer Incident Sites by Sex in Maryland, 2008-2012

MEN

Prostate	29.4%
Lung and Bronchus	13.0%
Colon and Rectum	8.5%
Urinary Bladder	6.2%
Melanoma of the Skin	5.4%
Non-Hodgkins Lymphoma	4.0%
Kidney and Renal Pelvis	4.0%
Oral Cavity and Pharynx	3.3%
Leukemia	2.8%
Pancreas	2.7%

WOMEN

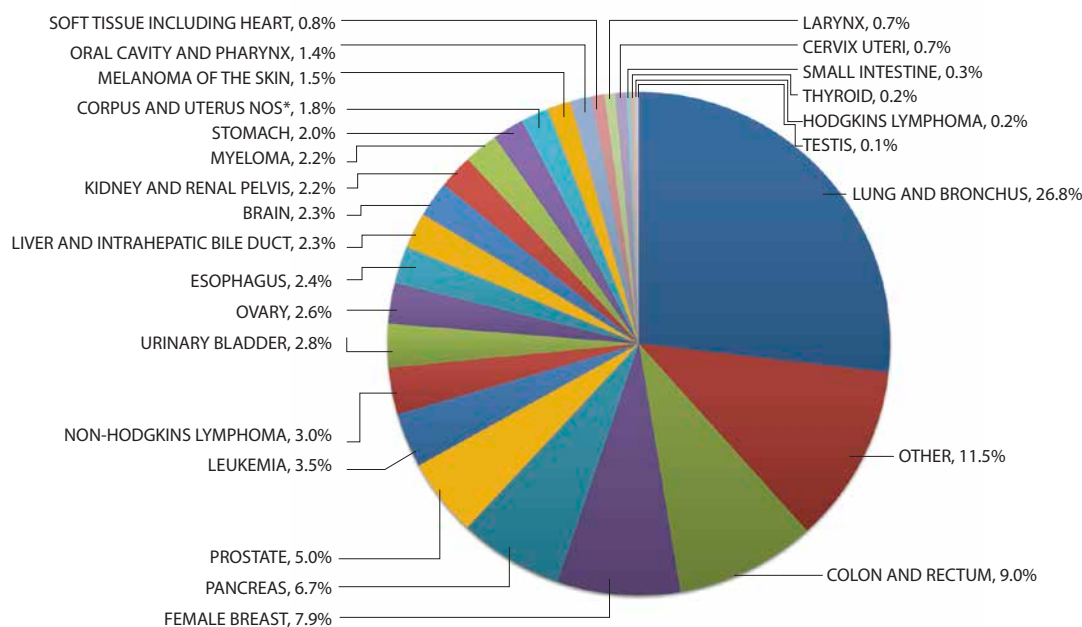
Female Breast	31.4%
Lung and Bronchus	12.7%
Colon and Rectum	8.4%
Corpus and Uterus, NOS*	6.4%
Thyroid	4.6%
Melanoma of the Skin	3.8%
Non-Hodgkins Lymphoma	3.5%
Pancreas	2.7%
Ovary	2.7%
Kidney and Renal Pelvis	2.5%

Source: Maryland Cancer Registry, 2008-2012

*NOS is defined as Not Otherwise Specified

FIGURE 2.3

Percentage of All Mortality Cancer Cases by Type of Cancer in Maryland, 2008-2012

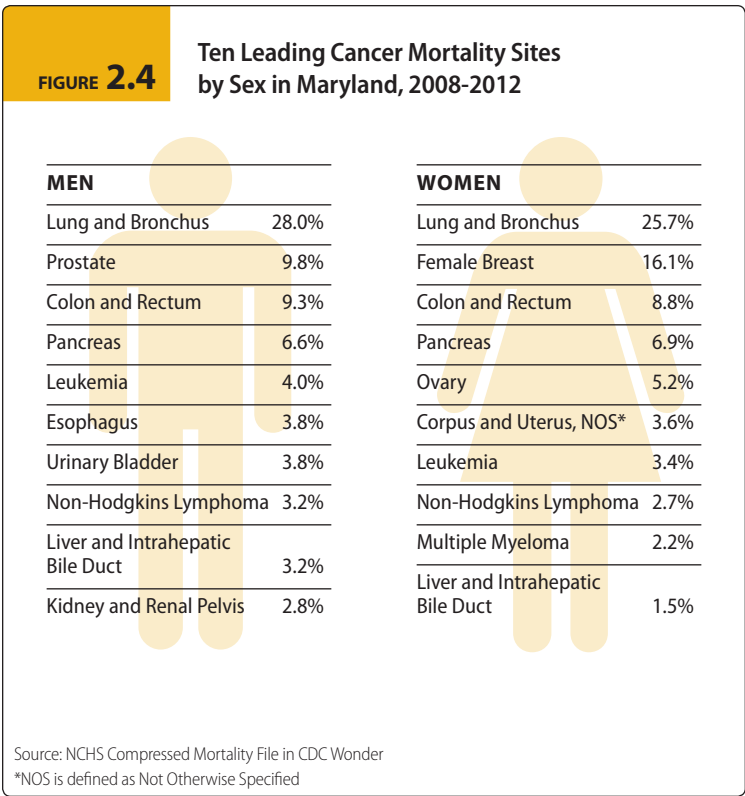


Source: NCHS Compressed Mortality File in CDC Wonder

*NOS is defined as Not Otherwise Specified

For the five-year period 2008-2012, lung cancer was the leading cause of cancer deaths, accounting for more than one quarter (26.8%) of all cancer deaths in Maryland (Figure 2.3). Colorectal cancer (CRC) follows, accounting for 9.0% of all cancer deaths in the state. Female breast cancer accounted for 7.9%, pancreatic cancer for 6.7%, and prostate cancer for 5.0% of all cancer deaths in the state. Collectively, these five cancers accounted for 55.4% of all deaths due to cancer in Maryland.

Figure 2.4 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.

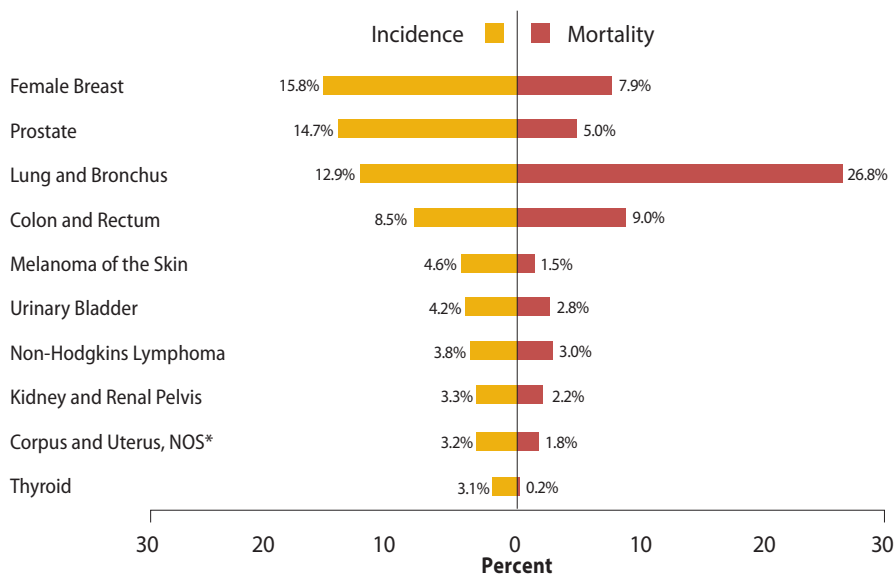


The cancer types that contribute to the highest number of cases (incidence) do not necessarily contribute to the same proportion of cancer deaths (mortality). Figure 2.5 represents the ten cancer types with the highest incidence in Maryland and their corresponding mortality proportions during 2008 to 2012. Although lung and bronchus cancer only makes up 12.9% of the cancers diagnosed in Maryland, it causes 26.8% of cancer deaths. Prostate cancer, the second leading type of cancer diagnosed in Maryland, only caused 5% of deaths from cancer during 2008 to 2012.

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 5-year survival rate (likelihood of living for at least five years after a diagnosis) than patients who are diagnosed with advanced disease.²¹ Cancer staging data in Maryland from 2004 through 2012 are presented in Figure 2.6.

FIGURE 2.5

Percent of Incidence Cancer Cases and Deaths by Type of Cancer in Maryland, 2008-2012

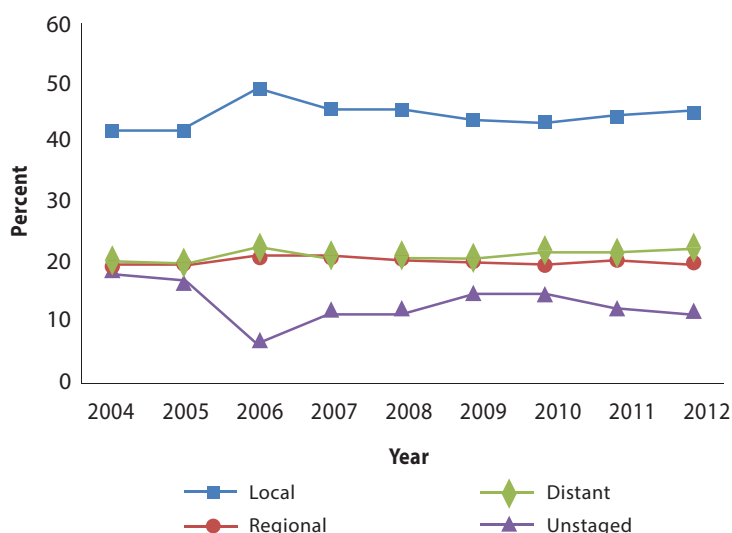


Sources: Maryland Cancer Registry, 2008 - 2012.
NCHS Compressed Mortality File in CDC Wonder

*NOS is defined as Not Otherwise Specified

FIGURE 2.6

All Cancer Sites by Stage of Diagnosis, Maryland, 2004 – 2012



Source: Maryland Cancer Registry, 2004-2012

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, and/or 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.

Although the Cancer Plan focuses on the seven CRF-targeted cancers described above, 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. More information about the seven targeted cancers as well as many other types of cancer is available from the National Cancer Institute and the American Cancer Society:

- National Cancer Institute:
<http://www.cancer.gov/cancertopics/types/alphabetical>
- American Cancer Society:
<http://www.cancer.org/cancer/index>

TABLE 2.1

Incidence and Mortality Rates for Maryland and the United States, 2008 - 2012

	MD Incidence Rates	U.S. Incidence Rates	MD Mortality Rates	U.S. Mortality Rates
Cervical	6.7	7.7	2.2	2.3
Colorectal	38.1	42.4	15.7	15.9
Female Breast	128.1	124.8	23.8	22.0
Lung	58.7	58.7	46.3	47.2
Oral	10.3	11.0	2.3	2.5
Prostate	138.3	137.9	22.5	21.4
Skin	20.9	21.6	2.7	2.7

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

Sources: Maryland Cancer Registry, 2008 - 2012.

NCI SEER*Stat (U.S. SEER 18 rates)

NCHS Compressed Mortality File in CDC Wonder

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 on the type of cancer and the recommending organization. There are several organizations that release cancer screening guidelines, including the American Cancer Society (ACS), the National Cancer Institute (NCI), and the National Comprehensive Cancer Network (NCCN). The U.S. Preventive Services Task Force (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:

<http://www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations>.

Screening guidelines may vary 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 2.2 includes the current USPSTF screening recommendations for the seven targeted cancers, with additional recommendations from other organizations included as noted.

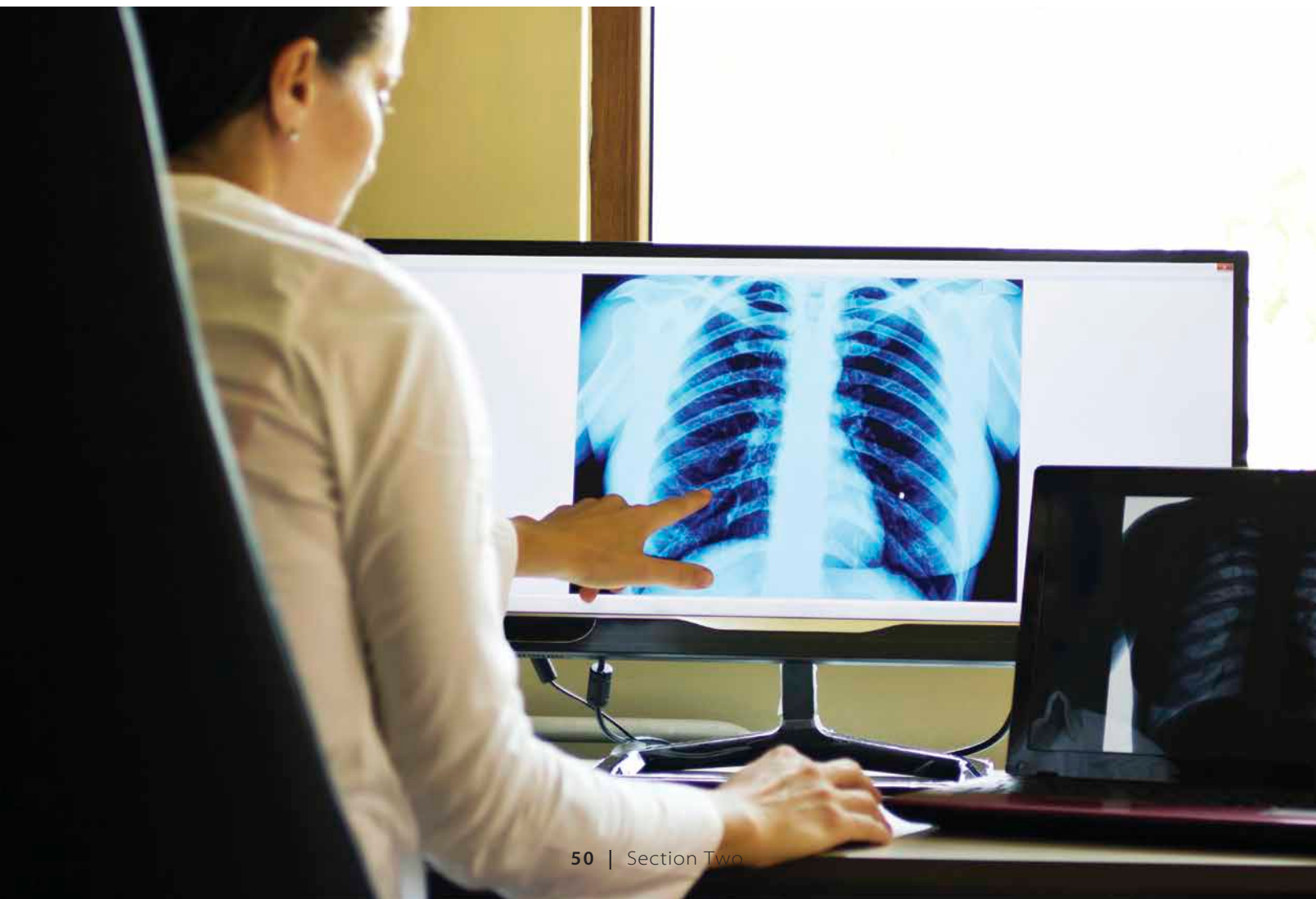


TABLE 2.2

Targeted Cancers - Screening Recommendations

Cancer Type	General Screening Population	Screening Test and Frequency of Screening	Special Screening Population	Screening Test and Frequency of Screening for Special Population	Additional Recommendations or Notes
Female Breast	Women age 50 to 74 years	Mammogram, every 2 years	Women identified as high risk*	Mammogram and MRI, annually	General Population: USPSTF published Nov 2009; ACS recommends yearly mammogram and clinical breast exam for women 40 years and older Special Population: ACS recommendation
Cervical	Women age 21 to 65 years (Pap test only) or Women age 30 to 65 years (Pap test and HPV test)	Pap test, every 3 years or Pap test and HPV test, every 5 years			USPSTF published March 2012; Only screen women with an intact cervix
Colorectal	Adults age 50 to 75 years	Colonoscopy, every 10 years or Sigmoidoscopy, every 5 years or Fecal Occult Blood Test (FOBT), annually			USPSTF published Oct 2008; Persons older than age 75 years may also be screened if there are considerations to support screening after taking into account comorbidities, longevity, and past CRC screening results
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 Dec 2013; 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	USPSTF: Insufficient Evidence to Recommend	N/A			USPSTF published Nov 2013; ADA** recommends that dentists look for signs of cancer while performing routine exams in all patients, particularly those who use tobacco or consume alcohol heavily; ACS recommends oral exams as part of routine cancer-related checkups
Prostate	USPSTF: Recommends Against Prostate Specific Antigen (PSA) Screening	N/A			USPSTF published May 2012; 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	USPSTF: Insufficient Evidence to Recommend	N/A			USPSTF published Feb 2009; USPSTF recommends counseling patients ages 10 to 24 years who have fair skin about minimizing exposure to ultraviolet radiation; ACS recommends skin exams as part of routine cancer-related checkups

*High risk includes women who: have a lifetime risk of breast cancer of 20-25% or greater according to risk assessment tools; have a known BRCA1 or BRCA2 gene mutation; have a first-degree relative with a BRCA1 or BRCA2 gene mutation; had radiation therapy to the chest when they were between the ages of 10 and 30 years; or, have Li-Fraumeni syndrome, Cowden syndrome, or Bannayan-Riley-Ruvalcaba syndrome, or have first-degree relatives with one of these syndromes.

American Dental Association | *American Urological Association

The Maryland Behavioral Risk Factor Surveillance System (BRFSS) is an annual statewide health survey that is administered to adults ages 18 and older, which focuses on behavioral risk factors, preventive health measures, and healthcare access. The BRFSS includes questions that measure the proportion of Maryland residents who are up to date with recommended cancer screening exams. Table 2.3 shows the most recent Maryland BRFSS data from 2012 for each of the recommended screening exams.

TABLE 2.3**Cancer Screening Rates, Maryland, 2012**

CANCER TYPE	MEASURE	PERCENTAGE OF MARYLAND RESIDENTS
Female Breast	Women age 50 to 74 years who have had a mammogram within the past 2 years	84%
Cervical	Women age 21 to 65 years, with an intact cervix, who have had a Pap test within the past 3 years	88%
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	68%
Oral	Adults age 18 years and older who have had an oral cancer screening exam in the past year	24%
Prostate	Men ages 55 to 69 who have discussed the advantages and disadvantages of the prostate-specific antigen (PSA) test with their healthcare provider (Screening not recommended)	35%

Source: Maryland BRFSS 2012

Although lung cancer screening is now recommended by the USPSTF, there are currently no questions included in the BRFSS that measure the proportion of Marylanders that have received that screening. 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.

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 tables and maps on pages 53 - 55 display significant differences in cancer incidence and mortality (2012) and screening rates (2012) for the seven targeted cancers. Among the targeted cancers, significant racial, ethnic, and/or sex and gender differences are seen in the incidence and mortality rates for cervical, colorectal, female breast, lung, 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 2.4

Significant Health Disparities in Cancer by Race and Sex, Maryland, 2008 - 2012

CANCER TYPE	INCIDENCE RATES	MORTALITY RATES	RATE DIAGNOSED IN REGIONAL OR DISTANT STAGE**
Cervix	White: 5.9 Black: 8.0	White: 1.7 Black: 3.3	White: 2.6 Black: 4.2
Colon and Rectum	White: 36.7 Black: 42.4 White Males: 42.3 Black Males: 48.7 White Females: 32.2 Black Females: 38.2	White: 14.0 Black: 20.8 White Males: 17.3 Black Males: 26.3 White Females: 11.5 Black Females: 17.3	White: 19.5 Black: 22.4 White Males: 22.5 Black Males: 25.5 White Females: 17.0 Black Females: 20.4
Female Breast	*	White: 21.8 Black: 30.4	White: 42.2 Black: 50.0
Lung	White: 60.7 Black: 57.3 White Males: 68.0 Black Males: 73.4 White Females: 55.3 Black Females: 47.0	White Males: 56.3 Black Males: 65.0 White Females: 40.8 Black Females: 36.2	White: 42.9 Black: 39.5 White Males: 48.7 Black Males: 50.1 White Females: 38.6 Black Females: 32.8
Oral	White: 11.3 Black: 7.8 White Males: 16.9 Black Males: 12.9 White Females: 6.4 Black Females: 4.1	White: 2.2 Black: 2.8 White Males: 3.3 Black Males: 4.6	White: 6.9 Black: 5.0 White Males: 11.3 Black Males: 8.6 White Females: 3.0 Black Females: 2.3
Prostate	White: 119.3 Black: 196.2	White: 18.4 Black: 42.3	White: 14.5 Black: 23.9

(p < 0.05)

* 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, 2008 – 2012

NCHS Compressed Mortality File in CDC Wonder

TABLE 2.5

Significant Differences and/or Disparities for BRFSS Screening Question

SCREENING TYPE	BRFSS QUESTION	PERCENT RESPONDENTS	SUMMARY OF HEALTH DISPARITIES*
Female Breast	Females in Maryland ages 50 - 74 years who have received a mammogram in the past two years	Black: 89.8% White: 82.4%	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	Female: 70.2% Male: 65.2% White: 69.2% Black: 68.3% Asian: 53.6%	Exists between: Females vs. Males, White 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: 91.6% White: 87.8% Asian: 72.7%	Exists between: Black vs. White & Asian, White vs. Asian

*Differences in screening rates are presented with the higher rate first; for example, if a higher percent of females are up to date with colorectal cancer screening than males, the difference is noted as female rate vs. male rate.

Source: Maryland BRFSS 2012

FIGURE 2.7

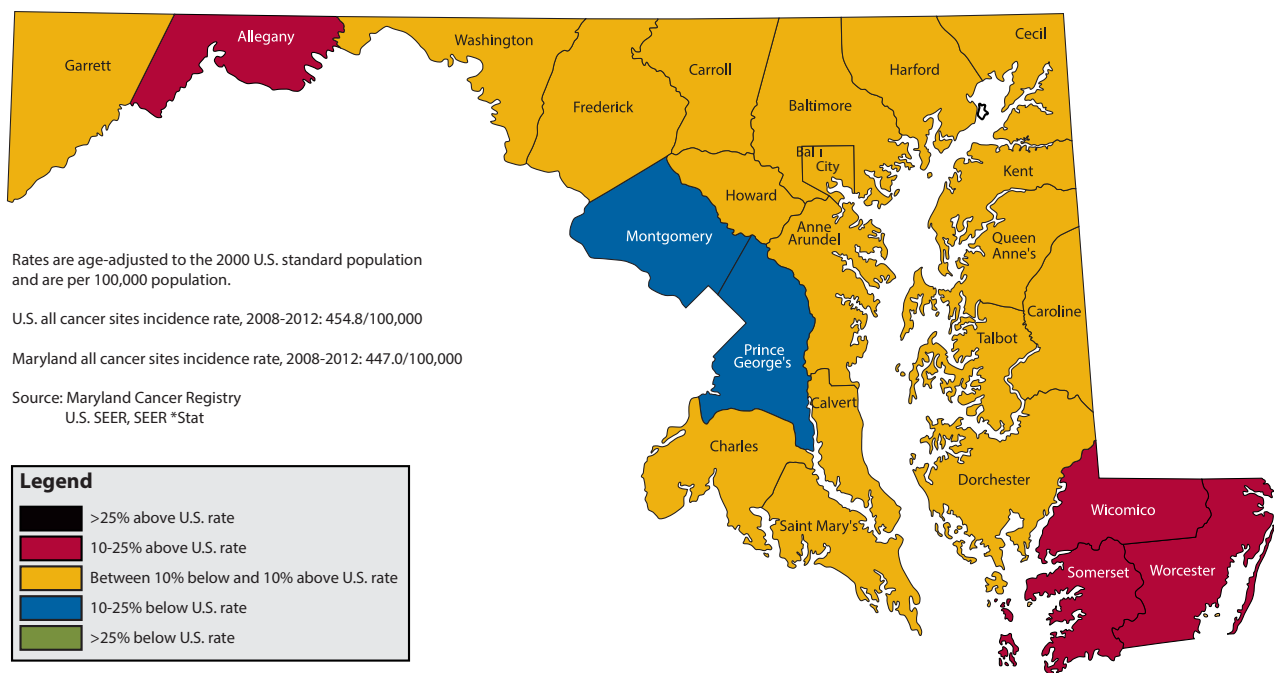
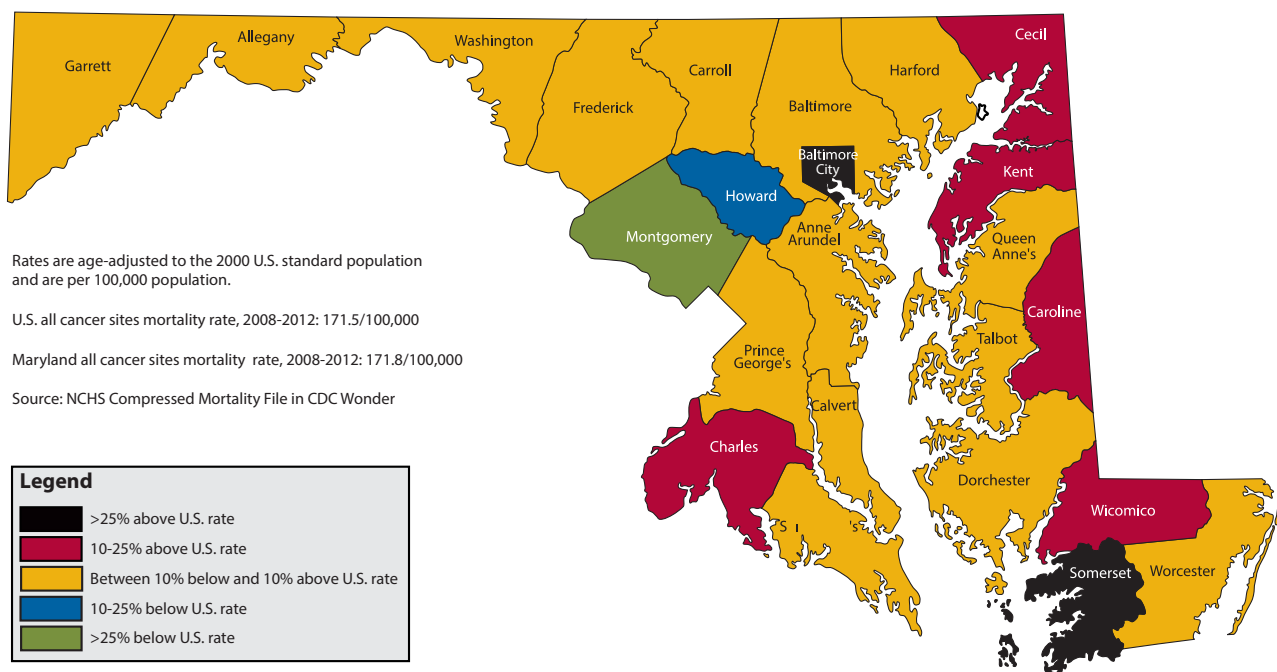
Maryland All Cancer Sites Incidence Rates by Geographical Area:
Comparison to U.S. Rate, 2008 - 2012

FIGURE 2.8**Maryland All Cancer Sites Mortality Rates by Geographical Area:
Comparison to U.S. Rate, 2008 - 2012**

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 DHMH 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: http://phpa.dhmd.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.²¹ 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 0 to 14.²¹

From 2008 to 2012, there were 1,252 cases of cancer diagnosed in Maryland children younger than 20 (Table 2.6). An estimated 10,380 U.S. children ages 0 to 14 will be diagnosed with cancer in the U.S. in 2015, and 1,250 cancer deaths are expected to occur among this same cohort.²¹ The two most frequently diagnosed cancers in U.S. children are leukemia (30% of all childhood cancers) and brain and other central nervous system tumors (26%).

Experts recommend that children with cancer be treated at medical centers with multidisciplinary teams that specialize in childhood cancer.⁷⁹ 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 and patient 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.⁷⁹

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.

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, and research

TABLE 2.6 Number of Cancer Cases in Children by Site and by Age in Maryland, 2008-2012

	<1 YEAR	1-4 YEARS	5-9 YEARS	10-14 YEARS	15-19 YEARS
All Sites	87	295	206	259	405
Oral Cavity and Pharynx	0	<6	<6	9	11
Digestive System	7	11	6	7	16
Bones and Joints	<6	<6	7	25	16
Soft Tissue including Heart	15	17	11	12	19
Melanoma of the Skin	<6	<6	<6	<6	29
Ovary	0	0	<6	<6	7
Testis	<6	<6	<6	<6	26
Kidney and Renal Pelvis	7	31	9	<6	<6
Eye and Orbit	9	11	<6	0	<6
Brain	11	57	49	41	49
Thyroid	0	0	<6	9	46
Other Endocrine including Thymus	6	14	<6	<6	<6
Hodgkins Lymphoma	0	<6	6	31	64
Non-Hodgkins Lymphoma	<6	13	22	27	42
Acute Lymphocytic Leukemia	<6	78	49	38	19
Chronic Lymphocytic Leukemia	0	<6	0	0	0
Acute Myeloid Leukemia	<6	18	9	16	14
Chronic Myeloid Leukemia	<6	<6	<6	<6	<6

<6 = Case counts of 1-5 are suppressed per DHMH/MCR Data Use Policy.
Source: Maryland Cancer Registry, 2008-2012.

and clinical trials. These topics present various opportunities and strategies for healthcare providers, health systems, public health entities, community organizations, insurers, and the general public to implement to reduce the burden of cancer in Maryland.

Patient Navigation

The complexity of the healthcare 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.⁸⁰

Those who work in cancer patient navigation are often trained, culturally competent healthcare professionals who work with patients, families, healthcare providers, and the healthcare 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.⁸⁰ Those who work in patient navigation may coordinate medical appointments, maintain telephone contact between patients and healthcare 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.⁸¹ A study in 2014 examining the Cancer Prevention Treatment Demonstration (CPTD) Screening Trial revealed that patient navigation was effective for increasing colorectal cancer screening among older African American adults in Baltimore City.⁸² Another study that also looked at the CPTD showed that patient navigation was effective for participants' breast cancer screening adherence among Medicare beneficiaries in Baltimore City.⁸³ Patient navigation also reduces health disparities, increases patients' satisfaction with medical treatment and care, increases patients' access to care, and improves timely cancer care.^{84,85} 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.⁸⁰

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, the Department of Health and Mental Hygiene 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 healthcare 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 well-being. 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 healthcare 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.⁸⁶ 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 general 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.^{87,88} The American Cancer Society 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.^{89,90}

Healthcare Provider Education

Healthcare 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 language and cultural barriers may prevent optimal cancer care.

Primary care providers are an essential audience to target with healthcare provider educational efforts. The American Society of Clinical Oncologists estimates that by 2025 the demand for oncology services will increase by over 40%, while the number of oncologists will only increase by 28%.⁹¹ Complicating matters further, survivors report that

they would prefer to receive continuing care from oncologists because their primary care provider lacks knowledge of their treatment.⁹² 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.⁹¹

A 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.⁹³ 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.⁹⁴ Studies on oral cancer knowledge and practices among family physicians and nurse practitioners in Maryland and among dentist and primary care physician oral cancer knowledge, attitudes, and practices in Massachusetts have also indicated a need for increased provider education on oral cancer prevention and early detection.^{95,96,97}

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 healthcare providers including primary care physicians, mid-level providers, nurses, social workers, and specialty physicians.

Evidence suggests that a lack of cultural competence contributes to disparities in healthcare 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.⁹⁸ 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.⁹⁹

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; 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.

Healthcare 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 healthcare 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 ensure 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.

Healthcare 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, healthcare 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 healthcare provider is able to more efficiently reach its 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).¹⁰⁰

Cancer Genetics

The expanding knowledge base in the field of cancer genetics has improved our understanding of genetic mutations and their role in the development of cancer.¹⁰¹ A gene mutation is a change that occurs in the DNA sequence of a gene. Although not all genetic mutations are harmful, some may lead to an increased risk of diseases such as cancer.¹⁰² Genetic mutations are classified as either inherited or acquired mutations.

Hereditary Cancers

Inherited genetic mutations are also known as hereditary or germline mutations, because they can be passed on from one generation to the next. These inherited mutations can increase a person's risk of developing certain types of cancers, and account for 5 to 10% of all cancers.¹⁰² Cancers that occur because of inherited mutations are called hereditary or inherited cancers.

Features of inherited cancers include:¹⁰¹

- Multiple primary tumors in the same organ or in different organs
- Bilateral primary tumors (cancers in both organs in a set of paired organs)
- Age of diagnosis that is younger than usual
- Multiple first-degree relatives with tumors of the same site

Genetic mutations have been linked to more than 50 hereditary cancer syndromes, including the syndromes listed in table 2.7.^{102,103,104,105,106,107,108}

Risk Assessment and Genetic Testing

Identification of individuals and families at increased risk for inherited cancers allows healthcare 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 risk assessment, genetic testing when appropriate,

TABLE 2.7 Hereditary Cancer Syndromes

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

and risk management recommendations delivered through genetic counseling sessions.¹⁰⁹ Genetic testing is used to identify specific inherited mutations 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 USPSTF currently recommends that primary care providers screen women who have family members with breast, ovarian, tubal, or peritoneal cancer to identify a family history that may be associated with an increased risk for the *BRCA1* or *BRCA2* gene mutations. Women with positive screening results should receive genetic counseling and, if indicated, *BRCA* 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 mutation.¹¹⁰ For individuals carrying the hereditary nonpolyposis colorectal cancer gene mutation, surveillance for colorectal

cancer may be initiated earlier or performed more frequently.¹¹¹ Knowledge about a cancer-predisposing mutation 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.¹¹² Maintenance of family health was cited as a key reason why tested parents chose to disclose their genetic information to their children.¹¹³

For individuals who are found to have a genetic mutation 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.

Under Maryland law, genetic testing can only be obtained through a referral from an authorized entity, such as a medical provider. This precludes Direct-to-Consumer genetic testing companies from offering tests to Maryland residents, as consumers are not allowed to order the tests.¹¹⁴ Requiring individuals to go through a healthcare provider enables patients to have the opportunity to discuss the benefits and limitations of genetic testing with a qualified professional.

To optimize the benefits of genetic testing, the American Society of Clinical Oncology recommends that genetic testing for cancer susceptibility be offered only when the following three criteria are met:^{115,116}

- 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 healthcare professionals.¹¹⁶

Sporadic Cancers

Cancers that are attributed to acquired mutations are called sporadic cancers. An acquired genetic mutation, also known as sporadic or spontaneous

mutation, is a mutation that occurs due to changes in 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. The majority of cancer cases are considered sporadic cancers. Testing for inherited or germline DNA changes is generally not beneficial in this situation, although testing for genetic changes in the cancer tumor itself may be considered for targeting treatment therapies. Family members of the affected individual should follow general population screening recommendations.¹¹⁷

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 gene mutations, 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.¹¹⁷

Increasing Awareness of Cancer Genetics Among Marylanders and Healthcare Providers

Identification of individuals and family members with cancer predisposing mutations 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 healthcare providers.

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 the area of 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.”¹¹⁸

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 U.S. National Cancer Institute (NCI) has awarded the NCI-Designated Comprehensive Cancer Center honor to the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins University, and to the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center.¹¹⁹ These designations are reserved for research institutions that are recognized by the NCI for their leadership in multidisciplinary cancer research.¹²⁰ 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. The National Comprehensive Cancer Network (NCCN) has stated that the best management for any cancer patient is in a clinical trial.¹²¹

Types of Clinical Trials

There are five types of cancer clinical trials:¹²²

- 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.
- Diagnostic trials are used to test new ways of diagnosing cancer more accurately.
- Quality of life or supportive care trials are used to study new ways of improving the comfort and quality of life of cancer patients and cancer survivors.

Clinical Trial Participation Rates and Disparities

Despite the benefits of clinical trials, the number of adult cancer patients in clinical trials is extremely low, approximately 3% of adult cancer patients.¹²³ In comparison, more than 60% of children with cancer participate in clinical trials.¹²³ In Maryland, only 9% of adult cancer patients reported participation in a clinical trial as part of their cancer treatment.¹²⁴

Populations that remain underrepresented in clinical trials include minorities, older adults, and people living in rural areas.^{125, 126, 127, 128, 129} Although African Americans have the highest overall cancer mortality rate and highest incidence rates for some specific cancer sites, less than 5% of Marylanders participating in cancer clinical trials are African Americans, and research indicates that the percentage of African American patients accrued into clinical trials may be declining in Maryland.^{124, 130, 131} Populations that are accrued into 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.¹³¹ 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. Healthcare provider lack of awareness, referral, or encouragement have been cited as reasons for low patient participation rates.^{129, 132} Lack of patient awareness is also a key problem.^{132, 133} In a 2000 survey of cancer patients, 85% were unaware of the opportunity to participate in clinical trials.¹³³ Other reasons shared include patients' fear or mistrust, cost barriers, practical issues (transportation, time off from work),

cultural differences, and language or literacy barriers.^{129, 132} Maryland state 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.^{134, 135} More information on the availability of clinical trials can be found on the NCI Clinical Trials website, located at www.cancer.gov/clinicaltrials/search.



GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Objective 1

By 2020, reduce age-adjusted cancer incidence rates* to reach the following targets:

Target Setting Method: Trend Analysis^
Source: NCI SEER*Stat (U.S. SEER 18 rates)
Maryland Cancer Registry, 2002 – 2012

Maryland Incidence Targets

- **All Cancer Sites:** 391.5
(2012 Baseline: 432.1 per 100,000)
- **Cervical:** 4.4 per 100,000
(2012 Baseline: 6.3 per 100,000)
- **Colorectal:** 20.5 per 100,000
(2012 Baseline: 35.8 per 100,000)
- **Female Breast:** 121.2 per 100,000
(2012 Baseline: 125.0 per 100,000)
- **Lung:** 41.6 per 100,000
(2012 Baseline: 56.4 per 100,000)
- **Melanoma (Skin):** Not greater than 20.7 per 100,000
(2012 Baseline: 20.7 per 100,000)
- **Oral:** 9.6 per 100,000
(2012 Baseline: 10.5 per 100,000)
- **Prostate:** 87.3 per 100,000
(2012 Baseline: 112.0 per 100,000)

*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.

^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.

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Objective 2

By 2020, reduce age-adjusted cancer mortality rates* to reach the following targets:

Target Setting Method: Trend Analysis^
Source: NCI SEER*Stat (U.S. SEER 18 rates)
NCHS Compressed Mortality File in CDC Wonder

Maryland Mortality Targets

- **All Cancer Sites:** 135.6 per 100,000
(2012 Baseline: 165.7 per 100,000)
- **Cervical:** 1.7 per 100,000
(2012 Baseline: 2.0 per 100,000)
- **Colorectal:** 9.0 per 100,000
(2012 Baseline: 14.9 per 100,000)
- **Female Breast:** 17.6 per 100,000
(2012 Baseline: 23.7 per 100,000)
- **Lung:** 30.1 per 100,000
(2012 Baseline: 43.5 per 100,000)
- **Melanoma:** 2.6 per 100,000
(2012 Baseline: 2.7 per 100,000)
- **Oral:** 1.8 per 100,000
(2012 Baseline: 2.1 per 100,000)
- **Prostate:** 11.2 per 100,000
(2012 Baseline: 20.4 per 100,000)

*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.

^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.

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Objective 3

By 2020, increase cancer screening rates to reach the following targets:

Source: Maryland BRFSS

Maryland Screening 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% of Maryland women ages 21 to 65
(2012 Baseline: 88.2% of Maryland women ages 21 to 65)
Target Setting Method: HP 2020 Target
- **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% of Maryland adults ages 50 to 75
(2012 Baseline: 67.8% of Maryland adults ages 50 to 75)
Target Setting Method: 80% by 2018 National Colorectal Cancer Roundtable Goal
- **Female Breast: Increase the percentage of women ages 50 to 74 who have had a mammogram in the past 2 years per USPSTF recommendations.**
92.2% of Maryland women ages 50 to 74
(2012 Baseline: 83.8% of Maryland women ages 50 to 74)
Target Setting Method: 10% Increase
- **Oral[^]: Increase the proportion of adults age 18 and older who have had an oral cancer exam in the past year.**
26.7% of Maryland adults age 18 and above
(2012 Baseline: 24.3% of Maryland adults age 18 years and older)
Target Setting Method: 10% Increase
- **Prostate[^]: 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 healthcare provider.**
38.2% of Maryland men ages 55 to 69
(2012 Baseline: 34.7% of Maryland men ages 55 to 69)
Target Setting Method: 10% Increase

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

[^]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.

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Objective 4

By 2020, reduce disparities in cancer incidence and mortality to reach the following targets*:

Target Setting Method: Trend Analysis
Source: Maryland Cancer Registry

**Targets reflect disparities that are statistically significant in Maryland, however it is important to reduce rates of all cancers in all racial and ethnic groups.*

Cancer Disparities 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, or no more than 484.8 per 100,000. (Target represents 10% above the 2020 projected U.S. 5-year incidence rate of 440.7 per 100,000. Refer to the map on page 54 for jurisdiction-level cancer incidence rates.)
- **Cervical**
White: 4.2 per 100,000 (2012 baseline: 5.9 per 100,000)
Black: 4.8 per 100,000 (2012 baseline: 7.6 per 100,000)
- **Colon and Rectum**
White: 20.2 per 100,000 (2012 baseline: 34.5 per 100,000)
Black: 22.6 per 100,000 (2012 baseline: 40.1 per 100,000)
- **Lung**
White: 42.1 per 100,000 (2012 baseline: 58.5 per 100,000)
Black: 39.5 per 100,000 (2012 baseline: 55.9 per 100,000)
- **Oral**
White: Not greater than 11.7 per 100,000 (2012 baseline: 11.7 per 100,000)
Black: 5.5 per 100,000 (2012 baseline: 8.3 per 100,000)
- **Prostate**
White: 68.7 per 100,000 (2012 baseline: 97.5 per 100,000)
Black: 130.9 per 100,000 (2012 baseline: 159.7 per 100,000)

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Objective 4 (continued)

By 2020, reduce disparities in cancer incidence and mortality to reach the following targets*:

Target Setting Method: Trend Analysis
Source: NCHS Compressed Mortality File in CDC Wonder

**Targets reflect disparities that are statistically significant in Maryland, however it is important to reduce rates of all cancers in all racial and ethnic groups.*

Cancer Disparities Targets: 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, or no more than **164.2 per 100,000**. (Target represents 10% above the 2020 projected U.S. 5-year mortality rate of 149.3 per 100,000. Refer to the map on page 55 for jurisdiction-level cancer mortality rates.)
- **Cervical**
White: 1.6 per 100,000 (2012 baseline: 1.6 per 100,000)
Black: 2.0 per 100,000 (2012 baseline: 3.0 per 100,000)
- **Colon and Rectum**
White: 7.4 per 100,000 (2012 baseline: 13.5 per 100,000)
Black: 13.6 per 100,000 (2012 baseline: 20.1 per 100,000)
- **Female Breast**
White: 16.4 per 100,000 (2012 baseline: 23.1 per 100,000)
Black: 19.8 per 100,000 (2012 baseline: 26.5 per 100,000)
- **Oral**
White: 1.7 per 100,000 (2012 baseline: 2.0 per 100,000)
Black: 2.0 per 100,000 (2012 baseline: 2.7 per 100,000)
- **Prostate**
White: 10.0 per 100,000 (2012 baseline: 17.4 per 100,000)
Black: 13.5 per 100,000 (2012 baseline: 35.5 per 100,000)

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Strategies*

- Maintain or increase public health funding for cancer screening, diagnosis, and treatment for low-income and uninsured Marylanders.
- Assess lung cancer screening rates for eligible populations through the Maryland BRFSS.

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 of work for cancer screening appointments.
- Utilize targeted client reminders to encourage screening.
- Adopt culturally sensitive patient navigation and/or community health worker programs in healthcare 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 healthcare 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 healthcare 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 healthcare, research, and community health worker workforces to represent populations being served; use innovative means to recruit students from underserved populations, such as developing internship 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 healthcare 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.

**Strategies apply to all objectives.*

Refer to Section 1: Primary Prevention of Cancer for prevention strategies to reduce the burden of cancer.

GOAL 1

High Burden Cancers Goals, Objectives, and Strategies

REDUCE THE BURDEN OF CANCER IN MARYLAND

Strategies*

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 PSAs; billboards; and press releases to provide public health messages related to cancer.
- Provide continuing education opportunities for primary care providers, dentists, and other healthcare providers in cancer prevention and early detection, diagnosis and treatment guidelines, and post-treatment patient management. Utilize Web-based methods, healthcare provider meetings and conferences, seminars, grand rounds, and/or other opportunities.

Quality Monitoring and Improvement

- Develop methods to measure healthcare 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 healthcare provider offices (e.g. electronic health record systems). Encourage healthcare providers and systems to use tools to monitor amount of time to diagnosis and/or treatment, and adhere to treatment plans.
- Promote the use of systems-level process and quality improvement activities among healthcare providers to optimize adherence to national guidelines for screening, and times to diagnosis and treatment.
- Encourage complete reporting to the Maryland Cancer Registry from hospitals, freestanding facilities, medical providers, and other healthcare 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 mutations, and 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.

**Strategies apply to all objectives.*

Refer to Section 1: Primary Prevention of Cancer for prevention strategies to reduce the burden of cancer.

CANCER SURVIVORSHIP, PALLIATIVE CARE, AND HOSPICE CARE

3



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.

Cancer Survivorship

The American Cancer Society estimates that in 2014 there were nearly 14.5 million cancer survivors in the United States.²¹ In Maryland, approximately 27,000 individuals are diagnosed with cancer each year and in 2011, 8.9% of Maryland adults reported that they were cancer survivors.¹³⁶ 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.¹³⁷

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 healthcare 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 treatment).

Access to Care, Information, and Resources

Accessing life-saving and evidence-based cancer care is a major concern for newly diagnosed cancer survivors and their co-survivors. This includes access to state of the art treatment and specialists, management of treatment side effects (palliative care), fertility preservation, clinical trials, and resources and services to help the patient and their co-survivors. Approximately 71% of all newly diagnosed cancer patients in the United States are treated at a facility that is 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.^{138, 139} 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:

<https://www.facs.org/search/cancer-programs>.

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

In 2011, 92.5% of cancer survivors in Maryland had some form of healthcare 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 healthcare provider (93.9% vs. 84.7%, respectively) and to have had a routine physical checkup in the past year (87.7% vs. 76.9%, respectively).¹³⁶ The Affordable Care Act 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.¹⁴⁰ 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 healthcare providers, and the stigma associated with seeking and receiving counseling is one of the most common barriers to accessing mental health services.¹⁴¹ It is important for healthcare 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 majority of oncologists routinely screen patients for distress; however, only 14.3% report using a distress screening instrument.¹⁴² The National Comprehensive Cancer Network (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 patients.¹⁴² As of 2015, 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.

Financial Issues

The National Institutes of Health estimates that if cancer incidence, survival rates, and costs remain stable, direct cancer care expenditures could reach \$158 billion in 2020, which represents an increase of 27% over 2010 costs of \$124.6 billion.¹⁴³ This estimate does not account for new technologies or increasing medical costs, or indirect costs such as loss of productivity.

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 of 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 healthcare provider's recommended treatment regimen. Many survivors need services that are not considered to be a part of their treatment, including mental healthcare, 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 cancer survivors have a higher likelihood of filing for bankruptcy.¹⁴⁴ Healthcare 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 healthcare 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 2011 a higher proportion of cancer survivors in Maryland reported that their physical health was "not good" on all 30 of the last 30 days.¹³⁶

To help ease the transition from cancer patient to long-term survivor, all patients should be given a Survivorship Care Plan following the completion of treatment. As of 2015, all cancer centers that are accredited by the CoC are required to implement a pilot survivorship care plan process, and by 2019 will be required to provide survivorship care plans to all eligible patients. More information about the CoC survivorship care plan requirement can be found online at: <https://www.facs.org/publications/newsletters/coc-source/special-source/standard33>. Long-term monitoring and support is especially important for survivors of childhood cancers as late effects are commonly experienced in adulthood. Common late effects include problems with growth and development, organ function, reproductive capacity, secondary cancers, and psychosocial issues related to the cancer experience. Research has shown that 60% to more than 90% of childhood cancer survivors develop one or more chronic health conditions, and 20% to 80% experience severe or life-threatening complications during adulthood. The risk of experiencing late effects increases with time.¹⁴⁶

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.

The Institute of Medicine recommends that all Survivorship Care Plans include the following minimum elements:¹⁴⁵

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, transplant, hormonal therapy, gene or other therapies provided
- Psychosocial, nutritional, and other supportive services provided
- Full contact information on treating institutions and key individual providers
- Identification of a key point of contact and coordinator of continuing care

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)

*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.¹⁴⁷

Cancer Self-Management

An emerging area of interest in cancer survivorship is self-management, which refers to a patient's ability to coordinate and manage their health so that they are able to remain active in their lives and relationships.¹⁴⁸ 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. Research on Internet-based cancer self-management workshops as well as in-person chronic disease self-management workshops have demonstrated improved outcomes. These improved outcomes are related to exercise, symptom management of fatigue, pain, and sleep problems, communication with providers, and depression, as well as cost savings related to emergency room visits and hospital utilization.^{148, 149} Self-management presents an opportunity for healthcare providers and community organizations to help ease the transition from treatment to long-term survivorship. More information about self-management for cancer patients is available online at: <http://patienteducation.stanford.edu/programs/cts.html>.

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 healthcare 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, and assisted living facilities, at home, and in hospice facilities.

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

- Specialized palliative care has been found to improve patient outcomes, including decreasing pain and other symptoms and relieving anxiety.¹⁵⁰
- 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.¹⁵¹
- When palliative care is provided, research has shown that the quality of care is maintained or improved.¹⁵²
- Randomized trials have found that palliative care is associated with a decrease in the number of hospitalizations and intensive care unit days.¹⁵²
- Palliative care for terminal patients is often less costly than usual care or care in other units.¹⁵³ Costs for the last hospital days are reduced by 25 to 50%.¹⁵⁴
- Palliative care increases the use of hospice about 10-fold, which leads to fewer readmissions and better care. Hospice saves over \$2,500 per person.¹⁵⁵

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 American Society of Clinical Oncology 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 (2011) Maryland received an “A” for 90% of hospitals reporting availability of palliative care services.¹⁵⁶ 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, 41% of hospitals did not indicate procedures for ensuring timely delivery of palliative care. 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).¹⁵⁷

Pain Management

Pain management is one aspect of palliative care. Chronic pain is a significant issue among cancer patients, with up to 33% 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.¹⁵⁸

Cancer pain can be managed effectively for most patients; however, both patients and healthcare 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 and lack of insurance coverage. Access to opioid pain medications may vary by geographic location.

Healthcare 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.¹⁵⁹

Hospice care is delivered by a team of healthcare professionals including doctors, 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.¹⁶⁰

Hospice care is similar to palliative care; 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.¹⁵⁹

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.¹⁶¹ 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.^{162, 163} Healthcare provider-level barriers include difficulty accurately predicting life expectancy, and fear that hospice referral may be interpreted as a professional failure, among others.^{164, 165} Further, there are disparities in the use of hospice care, with minority patients using hospice disproportionately less than white patients.¹⁶⁶ Education directed towards the community, cancer survivors, and co-survivors about hospice care and insurance coverage is an important step in overcoming barriers.

GOAL 1

INCREASE THE QUALITY OF LIFE OF CANCER SURVIVORS IN MARYLAND

Objective 1

By 2020, 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 76.3%. (2013 baseline 69.4%)

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 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 healthcare 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 2020, increase the proportion of cancer survivors who report that their pain is currently under control to 76.3%. (2013 baseline 69.4%)

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 THE QUALITY OF LIFE OF CANCER SURVIVORS IN MARYLAND

Objective 3

By 2020, 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 whom to see for routine cancer check-ups after completing treatment to 50.2%.
(2013 baseline 45.6%)

Target Setting Method: 10% increase
Source: BRFSS

Strategies

- Promote the use of survivorship care plans in standard practice by healthcare providers.
- Increase awareness about care plans, including the Institute of Medicine recommended elements, among healthcare 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

Through 2020, 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 healthcare 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 5

By 2020, develop and implement a process to collect Maryland-level data on hospice utilization by cancer patients and average length of stay for cancer patients.

Strategies

- 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.

APPENDIX

Data Terms

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.

Incidence Rate

The number of new cases of a given cancer or other event per 100,000 population during a defined time period, usually one year. Cancer incidence rates in the Cancer Plan are reported for one year (2012) or as the average annual incidence rate for several aggregated years (usually 2008 through 2012).

Mortality Rate

The number of deaths per 100,000 population during a defined time period, usually one year. Cancer mortality data in the Cancer Plan are reported for one year (2012) or as the average annual rate for several aggregated years (usually 2008 through 2012).

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.

Stage at Diagnosis

The extent to which a cancer has spread from the organ of origin at the time of diagnosis. The stage 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.

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.

Sources of Maryland Data

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

Maryland Cancer Registry

Cancer incidence and stage data were provided by the Maryland Cancer Registry (MCR) in the Maryland DHMH Center for Cancer Prevention and Control, http://phpa.dhmh.maryland.gov/cancer/Pages/mcr_home.aspx. We acknowledge the state of Maryland, the Maryland Cigarette Restitution Fund, and the National Program of Cancer Registries at the Centers for Disease Control and Prevention 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 neighboring states including 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 Behavioral Risk Factor Surveillance System (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 Maryland DHMH 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 www.marylandbrfss.org. Both Maryland and state-aggregated national data on health risk behavior can also be obtained from the CDC BRFSS Web site at: 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 Tobacco and Risk Behavior Survey

The Maryland Youth Tobacco Risk Behavior Survey (YTRBS) 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 Youth Risk Behavior Survey was combined with the former Maryland Youth Tobacco Survey resulting in a combined YTRBS survey. Published reports are available on the DHMH Web site at: <http://phpa.dhmh.maryland.gov/ccdpc/Reports/Pages/yrbs2013.aspx>.

Sources of National Data

National statistics cited in this plan were obtained from the Centers for Disease Control and Prevention (CDC), the American Cancer Society, 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 26% 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 (2008-2012) because they provide the broadest population coverage that is currently available. All SEER 18 rates were obtained from SEER*Stat (version 8.2.1), a statistical software tool for the analysis of SEER and other cancer-related databases. Further information about SEER can also be found on the Web site www.seer.cancer.gov.

National Center for Health Statistics

U.S. mortality rates presented in this plan were obtained from the National Center for Health Statistics (NCHS) Compressed Mortality Files in the CDC Wide-ranging Online Data for Epidemiologic Research (WONDER) system, a national Web-based data source.

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. 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.

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.

Data Considerations

Data Confidentiality

The Maryland DHMH regards all data received, processed, and reported to and by the Maryland Cancer Registry 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 Maryland Cancer Registry 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 <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 towards consistency of data years reported throughout the Cancer Plan. Age-adjusted incidence and mortality statistics are reported through 2012, 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 2010 to 2014 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 2020. The methods below were used to develop the targets, with a few exceptions noted.

1. Targets under objectives to decrease incidence or mortality: 2020 rates were projected using the Microsoft Excel linear “forecast” function. Known Maryland data values were used to predict a future value for the year 2020 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 2020. Incidence and mortality projections are based on Maryland age-adjusted rates for the 10-year period from 2002-2012.

Notes:

- 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 2020.
- Some of the 2020 oral and melanoma incidence 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 2012 baseline.

2. Targets under the objective to decrease disparities in cancer incidence and mortality: Targets were projected using the linear forecast function described above for each race group.

Note:

- For prostate, lung, and oral incidence targets and colorectal and female breast mortality targets by race: The above method resulted in projected targets that represented an increase in disparity between racial groups and therefore, the target-setting method was modified so that the disparity in 2020 would be no greater than the baseline year (i.e. maintaining the disparity from the baseline year results in an improvement from the current trend). The absolute difference between the age-adjusted rates of the two groups in 2012 was calculated and added to the projected rate in 2020 of the group with the lower projected rate. The resulting value replaced the 2020 projected rate for the group with the higher 2020 projected rate, and the group with the lower 2020 projected rate remained the same.

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 DHMH- and CDC-funded programs when those goals differ from HP 2020 objectives, 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 10% of the baseline percentage.

REFERENCES:

- Centers for Disease Control and Prevention (US). QuickStats: Age-Adjusted Death Rates for Heart Disease and Cancer, by Sex — United States, 1980–2011. *Morb Mortal Wkly Rep MMWR*. 2014;63(37):827.
- Centers for Disease Control and Prevention (US). Lexicon, Definitions, and Conceptual Framework for Public Health Surveillance. *Morb Mortal Wkly Rep MMWR*. 2012;61(suppl 03):10–14.
- Maryland Health Connection. Enrollment Report (Through Feb. 28, 2015). <http://marylandhbe.com/wp-content/uploads/2015/03/03092015-EnrollmentReport.pdf>. Accessed June 16, 2015.
- Disparities. Office of Disease Prevention and Health Promotion. <http://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities>. Accessed June 15, 2015.
- Office of Disease Prevention and Health Promotion. Social Determinants of Health. Healthypeople.gov. <http://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health>. Accessed June 15, 2015.
- Cancer Health Disparities. National Cancer Institute. <http://www.cancer.gov/about-nci/organization/crhd/cancer-health-disparities-fact-sheet>. Accessed February 11, 2016.
- Prevention Institute. Community Factors & How They Influence Health Equity. HEPP Module 3. http://www.preventioninstitute.org/images/stories/Documents/hepp_module_3.pdf. Accessed July 2, 2015.
- van Ryn M, Fu SS. Paved With Good Intentions: Do Public Health and Human Service Providers Contribute to Racial/Ethnic Disparities in Health? *Am J Public Health*. 2003;93(2):248–255.
- McCarthy EP, Ngo LH, Roetzheim RG, et al. Disparities in Breast Cancer Treatment and Survival for Women with Disabilities. *Ann Intern Med*. 2006;145(9):637–645.
- Boehmer U, Miao X, Ozonoff A. Cancer survivorship and sexual orientation. *Cancer*. 2011;117(16):3796–3804. doi:10.1002/cncr.25950.
- Ayanian JZ, Zaslavsky AM, Guadagnoli E, et al. Patients' Perceptions of Quality of Care for Colorectal Cancer by Race, Ethnicity, and Language. *J Clin Oncol*. 2005;23(27):6576–6586. doi:10.1200/JCO.2005.06.102.
- Maryland Department of Planning, June 2015. Table 1A: Annual Estimates of the Resident Population by Race, and Hispanic Origin for Maryland: April 1, 2010 to July 1, 2014. Maryland.gov Department of Planning. http://www.mdp.state.md.us/msdc/Pop_estimate/estimate_10to14/HighlightSection/table1a.pdf. Accessed July 30, 2015.
- Baltimore City Health Department Office of Epidemiologic Services. Baltimore City Health Disparities Report Card 2013. Health Disparities Report Card FINAL. <http://health.baltimorecity.gov/sites/default/files/Health%20Disparities%20Report%20Card%20FINAL%2024-Apr-14.pdf>. Published April 2014.
- The Office of Health Policy and Planning. The Maryland Rural Health Plan. Maryland Department of Health and Mental Hygiene; 2007. http://phpa.dhmh.maryland.gov/opca/docs/DHMH_Rural_Health_Plan_07.pdf.
- Richardson K, Steinberger EK, Groves C, Lewis C. Maryland Cancer Screening and Risk Behaviors Report, 2012. An Analysis of Behavioral Risk Factor Surveillance System Data. Baltimore, MD: Department of Epidemiology and Public Health, University of Maryland School of Medicine, and Center for Cancer Prevention and Control, Maryland Department of Health and Mental Hygiene; 2014. http://phpa.dhmh.maryland.gov/cancer/Shared%20Documents/BRFSS_2012_Final.pdf.
- Ard KL, Makadon HJ. Improving the Health Care of Lesbian, Gay, Bisexual and Transgender (LGBT) People: Understanding and Eliminating Health Disparities. Boston, MA: The National LGBT Health Education Center, The Fenway Institute; Brigham and Women's Hospital; and Harvard Medical School http://www.lgbthealtheducation.org/wp-content/uploads/12-054_LGBTHealtharticle_v3_07-09-12.pdf. Accessed June 12, 2015.
- Juon HS, Choi Y, Kim MT. Cancer screening behaviors among Korean-American women. *Cancer Detect Prev*. 2000;24(6):589–601.
- Ward E, Jemal A, Cokkinides V, et al. Cancer Disparities by Race/Ethnicity and Socioeconomic Status. *CA Cancer J Clin*. 2004;54(2):78–93. doi:10.3322/canjclin.54.2.78.
- Smedley BD, Stith AY, Nelson AR, eds. The Healthcare Environment and its Relation to Disparities. In: *Unequal Treatment. Confronting Racial and Ethnic Disparities in Healthcare*. Washington, D.C.: The National Academies Press; 2003. <http://www.nap.edu/read/12875/chapter/4>.
- National Institutes of Health. Strategic Research Plan and Budget to Reduce and Ultimately Eliminate Health Disparities Volume I; 2002. http://www.nlm.nih.gov/documents/volume1_031003edrev.pdf.
- American Cancer Society. Cancer Facts & Figures 2015. Atlanta; 2015. <http://www.cancer.org/acs/groups/content/@editorial/documents/document/acspc-044552.pdf>.
- U.S. Department of Health and Human Services. The Health Consequences of Smoking—50 Years of Progress A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014. <http://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf>.
- Centers for Disease Control and Prevention Office on Smoking and Health. Smoking and Cancer. http://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/pdfs/fs_smoking_cancer_508.pdf. Accessed March 26, 2015.
- National Cancer Institute. Tobacco. National Cancer Institute. <http://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco>. Accessed March 26, 2015.
- Richardson K, King M, Dwyer DM, Parekh S, Lewis C. 2014 Cancer Report. Cigarette Restitution Fund Program. Cancer Prevention, Education, Screening and Treatment Program. Maryland Department of Health and Mental Hygiene; 2015. http://phpa.dhmh.maryland.gov/cancer/SiteAssets/SitePages/surv_data-reports/2014%20CRF%20Cancer%20Report.pdf.
- National Comprehensive Cancer Network. NCCN Publishes New Guidelines for Smoking Cessation. <http://www.nccn.org/about/news/newsinfo.aspx?NewsID=498>.
- Maryland Department of Health and Mental Hygiene. Monitoring Changing Tobacco Use Behaviors: A Report to the Maryland Governor and the General Assembly, Fiscal Year 2013. Baltimore, MD; 2014. <http://crf.maryland.gov/pdf/HG13-1004-PHPA-Biennial-Tobacco-Study.pdf>.
- Arrazola RA, Singh T, Corey CG, et al. Tobacco Use Among Middle and High School Students — United States, 2011–2014. *Morb Mortal Wkly Rep MMWR*. 2014;63(14):381–385.
- Bunnell RE, Agaku IT, Arrazola R, et al. Intentions to smoke cigarettes among never-smoking U.S. middle and high school electronic cigarette users, National Youth Tobacco Survey, 2011–2013. *Nicotine Tob Res*. August 2014. doi:10.1093/ntr/ntu166.
- England L. Emerging Tobacco Products. Annapolis, MD: Office on Smoking and Health, Centers for Disease Control and Prevention; 2014. http://phpa.dhmh.maryland.gov/cancer/cancerplan/SiteAssets/SitePages/2014%20Cancer%20Conference/England%20Oral%20presentation%20MD%20cancer%20council_11_24.pdf.
- Chatham-Stephens K, Law R, Taylor E, et al. Notes from the Field: Calls to Poison Centers for Exposures to Electronic Cigarettes — United States, September 2010–February 2014. *Morb Mortal Wkly Rep MMWR*. 2014;63(13):292–293.
- Centers for Disease Control and Prevention. Tobacco Use and Pregnancy. <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/tobaccousepregnancy/index.htm>. Accessed June 2, 2015.

33. Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs—2014. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014. http://www.cdc.gov/tobacco/stateandcommunity/best_practices/pdfs/2014/comprehensive.pdf.
34. Masset G, Monsivais P, Maillot M, Darmon N, Drewnowski A. Diet Optimization Methods Can Help Translate Dietary Guidelines into a Cancer Prevention Food Plan. *J Nutr*. 2009;139(8):1541-1548. doi:10.3945/jn.109.104398.
35. Centers for Disease Control and Prevention. About Child & Teen BMI. http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html. Published May 15, 2015. Accessed March 10, 2016.
36. American Cancer Society. Cancer Facts & Figures 2013. Atlanta; 2013. <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-036845.pdf>.
37. Fuemmeler BF, Pendzich MK, Tercyak KP. Weight, Dietary Behavior, and Physical Activity in Childhood and Adolescence: Implications for Adult Cancer Risk. *Obes Facts*. 2009;2(3):179-186. doi:10.1159/000220605.
38. World Cancer Research Fund / American Institute for Cancer Research. Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective. Washington DC: AICR; 2007. http://www.aicr.org/assets/docs/pdf/reports/Second_Expert_Report.pdf.
39. Faupel-Badger JM, Arcaro KF, Balkam JJ, et al. Postpartum remodeling, lactation, and breast cancer risk: summary of a National Cancer Institute-sponsored workshop. *J Natl Cancer Inst*. 2013;105(3):166-174. doi:10.1093/jnci/djs505.
40. National Cancer Institute, NIH, DHHS. Cancer Trends Progress Report. Bethesda, MD; 2015. <http://progressreport.cancer.gov/>. Accessed June 4, 2015.
41. Office of Disease Prevention and Health Promotion. Advisory Report. U.S. Departments of Health and Human Services (HHS) and Agriculture (USDA); 2015. <http://health.gov/dietaryguidelines/2015-scientific-report/>.
42. Centers for Disease Control and Prevention. State Indicator Report on Fruits and Vegetables 2013. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; 2013. <http://www.cdc.gov/nutrition/downloads/State-Indicator-Report-Fruits-Vegetables-2013.pdf>.
43. Patel AV, Rodriguez C, Bernstein L, Chao A, Thun MJ, Calle EE. Obesity, recreational physical activity, and risk of pancreatic cancer in a large U.S. Cohort. *Cancer Epidemiol Biomark Prev Publ Am Assoc Cancer Res Cosponsored Am Soc Prev Oncol*. 2005;14(2):459-466. doi:10.1158/1055-9965.EPI-04-0583.
44. Patel AV, Calle EE, Bernstein L, Wu AH, Thun MJ. Recreational physical activity and risk of postmenopausal breast cancer in a large cohort of US women. *Cancer Causes Control CCC*. 2003;14(6):519-529.
45. McTiernan A. Mechanisms linking physical activity with cancer. *Nat Rev Cancer*. 2008;8(3):205-211. doi:10.1038/nrc2325.
46. Pan SY, DesMeules M. Energy intake, physical activity, energy balance, and cancer: epidemiologic evidence. *Methods Mol Biol Clifton NJ*. 2009;472:191-215. doi:10.1007/978-1-60327-492-0_8.
47. Biswas A, Oh PI, Faulkner GE, et al. Sedentary Time and Its Association With Risk for Disease Incidence, Mortality, and Hospitalization in Adults: A Systematic Review and Meta-analysis. *Sedentary Time and Disease Incidence, Mortality, and Hospitalization*. *Ann Intern Med*. 2015;162(2):123-132. doi:10.7326/M14-1651.
48. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans Summary. Washington, D.C.; 2008. <http://health.gov/paguidelines/guidelines/summary.aspx>.
49. National Cancer Institute, National Institutes of Health. Physical Activity and Cancer. *Cancer.gov*. <http://www.cancer.gov/about-cancer/causes-prevention/risk/obesity/physical-activity-fact-sheet>. Accessed August 6, 2015.
50. Sahlh I, Steinberger E, Groves C, Dwyer D, Lewis C. Maryland Cancer Screening and Risk Behaviors Report, 2010. An Analysis of Behavioral Risk Factor Surveillance System Data. Baltimore, MD: Department of Epidemiology and Public Health, University of Maryland School of Medicine, and Center for Cancer Prevention and Control, Maryland Department of Health and Mental Hygiene; 2012. <http://phhp.dhmm.maryland.gov/cancer/Shared%20Documents/Maryland%20Cancer%20Screening%20and%20Risk%20Behaviors%20Report.%202010.pdf>.
51. Dietary Guidelines Advisory Committee. Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010, to the Secretary of Agriculture and the Secretary of Health and Human Services. Washington, D.C.: U.S. Department of Agriculture, Agricultural Research Service; 2010. http://www.cnpp.usda.gov/sites/default/files/dietary_guidelines_for_americans/2010DGACReport-camera-ready-Jan11-11.pdf.
52. Smith-Warner SA, Spiegelman D, Yaun SS, et al. Alcohol and breast cancer in women: a pooled analysis of cohort studies. *JAMA*. 1998;279(7):535-540.
53. Hingson RW, Heeren T, Winter MR. Age at drinking onset and alcohol dependence: Age at onset, duration, and severity. *Arch Pediatr Adolesc Med*. 2006;160(7):739-746. doi:10.1001/archpedi.160.7.739.
54. Blot WJ, McLaughlin JK, Winn DM, et al. Smoking and drinking in relation to oral and pharyngeal cancer. *Cancer Res*. 1988;48(11):3282-3287.
55. American Cancer Society. Alcohol and Cancer; 2016. <http://www.cancer.org/acs/groups/content/@healthpromotions/documents/document/acsq-017622.pdf>.
56. National Cancer Institute. Cancer Prevention Overview—for health professionals (PDQ®). *Cancer.gov*. http://www.cancer.gov/about-cancer/causes-prevention/hp-prevention-overview-pdq#section/_1. Published February 5, 2016.
57. National Cancer Institute. Cancer Vaccines. *Cancer.gov*. <http://www.cancer.gov/cancertopics/causes-prevention/vaccines-fact-sheet>. Published November 15, 2011.
58. Markowitz LE, Dunne EF, Saraiya M, et al. Human Papillomavirus Vaccination: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morb Mortal Wkly Rep MMWR*. 2014;63(RR05):1-30.
59. HPV and Cancer. National Cancer Institute. <http://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-fact-sheet>. Accessed February 19, 2016.
60. Centers for Disease Control and Prevention. Human Papillomavirus. Epidemiology and Prevention of Vaccine-Preventable Diseases. In: *The Pink Book: Course Textbook - 13th Edition* (2015). 13th ed. Atlanta, GA; 2015. <http://www.cdc.gov/vaccines/pubs/pinkbook/hpv.html>. Accessed February 19, 2016.
61. Centers for Disease Control and Prevention. Human Papillomavirus (HPV) Vaccine Report: Maryland. Working Together to Reach National Goals for HPV Vaccination.; 2014.
62. Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S. Barriers to human papillomavirus vaccination among us adolescents: A systematic review of the literature. *JAMA Pediatr*. 2014;168(1):76-82. doi:10.1001/jamapediatrics.2013.2752.
63. Gargano LM, Herbert NL, Painter JE, et al. Impact of a physician recommendation and parental immunization attitudes on receipt or intention to receive adolescent vaccines. *Hum Vaccines Immunother*. 2013;9(12):2627-2633. doi:10.4161/hv.25823.
64. Reiter PL, McRee A-L, Pepper JK, Gilkey MB, Galbraith KV, Brewer NT. Longitudinal predictors of human papillomavirus vaccination among a national sample of adolescent males. *Am J Public Health*. 2013;103(8):1419-1427. doi:10.2105/AJPH.2012.301189.
65. Lim SG, Mohammed R, Yuen M-F, Kao J-H. Prevention of hepatocellular carcinoma in hepatitis B virus infection. *J Gastroenterol Hepatol*. 2009;24(8):1352-1357. doi:10.1111/j.1440-1746.2009.05985.x.
66. National Cancer Institute. Liver (Hepatocellular) Cancer Prevention—for health professionals (PDQ®). National Cancer Institute. <http://www.cancer.gov/types/liver/hp/liver-prevention-pdq>. Published February 11, 2016.
67. Chang M-H, Chen C-J, Lai M-S, et al. Universal Hepatitis B Vaccination in Taiwan and the Incidence of Hepatocellular Carcinoma in Children. *N Engl J Med*. 1997;336(26):1855-1859. doi:10.1056/NEJM199706263362602.
68. Centers for Disease Control and Prevention. Hepatitis C Testing for Anyone Born During 1945-1965: New CDC Recommendations. *CDC Features*. <http://www.cdc.gov/Features/HepatitisCTesting/>. Published October 1, 2012. Accessed June 3, 2015.
69. Centers for Disease Control and Prevention. Family Health History. Public Health Genomics. <http://www.cdc.gov/genomics/famhistory/>. Published October 30, 2015.

70. Patterson SL, Colbert Maresso K, Hawk E. Cancer chemoprevention: successes and failures. *Clin Chem*. 2013;59(1):94-101. doi:10.1373/clinchem.2012.185389.
71. Nelson HD, Fu R, Griffin JC, Nygren P, Smith MEB, Humphrey L. Systematic review: comparative effectiveness of medications to reduce risk for primary breast cancer. *Ann Intern Med*. 2009;151(10):703-715. W - 226-235. doi:10.7326/0003-4819-151-10-200911170-00147.
72. Medications to Prevent Breast Cancer: Missed Opportunities? Susan G. Komen. <http://www5.komen.org/KomenPerspectives/Medications-to-Prevent-Breast-Cancer--Missed-Opportunities-.html>. Published March 19, 2012. Accessed June 3, 2015.
73. National Center for Health Statistics. Compressed Mortality File, 1999-2014 (machine readable data file and documentation, CD-ROM Series 20, No. 2T) as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Hyattsville, Maryland. 2015.
74. United States Environmental Protection Agency. Air and Radiation 6205J. The Sun, UV, and You. A Guide to SunWise Behavior. Washington, D.C.; 1999. <http://www.energy.wsu.edu/Documents/SUNWISE.pdf>.
75. Cust AE, Armstrong BK, Goumas C, et al. Sunbed use during adolescence and early adulthood is associated with increased risk of early-onset melanoma. *Int J Cancer*. 2011;128(10):2425-2435. doi:10.1002/ijc.25576.
76. Skin Cancer Foundation. Prevention Guidelines. Skin Cancer Foundation. <http://www.skincancer.org/prevention/sun-protection/prevention-guidelines>. Accessed June 10, 2015.
77. Briggs NC, Levine RS, Hall HI, Cosby O, Brann EA, Hennekens CH. Occupational risk factors for selected cancers among African American and White men in the United States. *Am J Public Health*. 2003;93(10):1748-1752.
78. Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA. SEER Cancer Statistics Review, 1975-2011, 1975-2000, 1975-1993. Bethesda, MD: National Cancer Institute; 2015.
79. American Cancer Society. Cancer Facts & Figures 2014. Atlanta; 2015. <http://www.cancer.org/acs/groups/content/@research/documents/webcontent/acspc-042151.pdf>.
80. Wells KJ, Battaglia TA, Dudley DJ, et al. Patient navigation: state of the art or is it science? *Cancer*. 2008;113(8):1999-2010. doi:10.1002/cncr.23815.
81. Freeman HP. Patient Navigation: A Community Based Strategy to Reduce Cancer Disparities. *J Urban Health*. 2006;83(2):139-141. doi:10.1007/s11524-006-9030-0. <http://phpa.dhmdh.maryland.gov/ccdpc/Reports/Pages/yrb2013.aspx>
82. Horne HN, Phelan-Emrick DF, Pollack CE, et al. Effect of patient navigation on colorectal cancer screening in a community-based randomized controlled trial of urban African American adults. *Cancer Causes Control*. 2015;26(2):239-246. doi:10.1007/s10552-014-0505-0.
83. Torres AZ, Phelan DF, Pollack CE, et al. Abstract A85: Distance to mammography facilities modifies the effect of patient navigation on breast cancer screening adherence among female black Medicare beneficiaries in Baltimore City. *Cancer Epidemiol Biomarkers Prev*. 2012;21(10 Supplement):A85-A85. doi:10.1158/1055-9965.DISP12-A85.
84. Post DM, McAlearney AS, Young GS, Krok-Schoen JL, Plascak JJ, Paskett ED. Effects of Patient Navigation on Patient Satisfaction Outcomes. *J Cancer Educ Off J Am Assoc Cancer Educ*. 2015;30(4):728-735. doi:10.1007/s13187-014-0772-1.
85. Freund KM, Battaglia TA, Calhoun E, et al. Impact of Patient Navigation on Timely Cancer Care: The Patient Navigation Research Program. *J Natl Cancer Inst*. 2014;106(6). doi:10.1093/jnci/dju115.
86. Klabunde CN, Vernon SW, Nadel MR, Breen N, Seeff LC, Brown ML. Barriers to colorectal cancer screening: a comparison of reports from primary care physicians and average-risk adults. *Med Care*. 2005;43(9):939-944.
87. Carter-Harris L. Lung cancer stigma as a barrier to medical help-seeking behavior: Practice implications. *J Am Assoc Nurse Pract*. 2015;27(5):240-245. doi:10.1002/2327-6924.12227.
88. Carter-Harris L, Hermann CP, Schreiber J, Weaver MT, Rawl SM. Lung cancer stigma predicts timing of medical help-seeking behavior. *Oncol Nurs Forum*. 2014;41(3):E203-E210. doi:10.1188/14.ONFE203-E210.
89. Westmaas JL. Stigma presents an extra burden for many lung cancer patients. [http://blogs.cancer.org/](http://blogs.cancer.org/.). October 2013. http://blogs.cancer.org/expertvoices/2013/10/28/stigma-presents-an-extra-burden-for-many-lung-cancer-patients/?_ga=1.76461267.771211692.1455209756. Accessed March 12, 2015.
90. American Lung Association. Addressing the Stigma of Lung Cancer. <http://www.lung.org/assets/documents/research/addressing-the-stigma-of-lung-cancer.pdf>. Accessed March 12, 2015.
91. American Society of Clinical Oncology. The State of Cancer Care in America. Alexandria, VA <http://read.uberflip.com/i/275815-cancer-care-in-america-report-2014>.
92. Hudson SV, Miller SM, Hemler J, et al. Adult Cancer Survivors Discuss Follow-up in Primary Care: "Not What I Want, But Maybe What I Need." *Ann Fam Med*. 2012;10(5):418-427. doi:10.1370/afm.1379.
93. Geller AC, Venna S, Prout M, et al. Should the skin cancer examination be taught in medical school? *Arch Dermatol*. 2002;138(9):1201-1203.
94. Stephenson A, From L, Cohen A, Tipping J. Family physicians' knowledge of malignant melanoma. *J Am Acad Dermatol*. 1997;37(6):953-957.
95. Siripanth P, Drury TF, Horowitz AM, Harris RM. Oral cancer knowledge and opinions among Maryland nurse practitioners. *J Public Health Dent*. 2001;61(3):138-144.
96. Canto MT, Horowitz AM, Drury TF, Goodman HS. Maryland family physicians' knowledge, opinions and practices about oral cancer. *Oral Oncol*. 2002;38(5):416-424.
97. Applebaum E, Ruhlen TN, Kronenberg FR, Hayes C, Peters ES. Oral cancer knowledge, attitudes and practices: a survey of dentists and primary care physicians in Massachusetts. *J Am Dent Assoc*. 1939. 2009;140(4):461-467.
98. Palmer RC, Samson R, Triantis M, Mullan ID. Development and evaluation of a web-based breast cancer cultural competency course for primary healthcare providers. *BMC Medical Education*. 2011;11:59.
99. Riley WJ, Moran JW, Corso LC, Beitsch LM, Bialek R, Cofsky A. Defining Quality Improvement in Public Health. *J Public Health Manag Pract*. 2010;16(1). http://journals.lww.com/jphmp/Fulltext/2010/01000/Defining_Quality_Improvement_in_Public_Health.3.aspx.
100. U.S. Department of Health and Human Services. Health Resources and Services Administration. Quality Improvement. HRSA. <http://www.hrsa.gov/quality/toolbox/methodology/qualityimprovement/>.
101. National Cancer Institute. Cancer Genetics Overview—for health professionals (PDQ®). Cancer.gov. <http://www.cancer.gov/about-cancer/causes-prevention/genetics/overview-pdq>.
102. National Cancer Institute. Genetic Testing for Hereditary Cancer Syndromes. Cancer.gov. <http://www.cancer.gov/about-cancer/causes-prevention/genetics/genetic-testing-fact-sheet>. Published April 11, 2013.
103. Thompson D, Easton DF. Breast Cancer Linkage Consortium. Cancer Incidence in BRCA1 mutation carriers. *J Natl Cancer Inst*. 2002;94(18):1358-1365.
104. Levy-Lahad E, Friedman E. Cancer risks among BRCA1 and BRCA2 mutation carriers. *Br J Cancer*. 2007;96(1):11-15. doi:10.1038/sj.bjc.6603535.
105. National Cancer Institute. Division of Cancer Epidemiology & Genetics. Chapter 22: Li-Fraumeni Syndrome, including Li-Fraumeni-Like Syndrome. In: Concise Handbook of Familial Cancer Syndromes, Second Edition Journal of the National Cancer Institute Monographs. Vol 38. Bethesda, MD; 2008:48-50. <http://lfs.cancer.gov/chapter22.html>.
106. Cohen SA, Leininger A. The genetic basis of Lynch syndrome and its implications for clinical practice and risk management. *Appl Clin Genet*. 2014;7:147-158. doi: <http://dx.doi.org/10.2147/TACG.S51483>.
107. National Cancer Institute. Genetics of Colorectal Cancer—for health professionals (PDQ®). Cancer.gov. <http://www.cancer.gov/types/colorectal/hp/colorectal-genetics-pdq#section/all>. Published February 12, 2016.

108. National Cancer Institute. Genetics of Kidney Cancer (Renal Cell Cancer)—for health professionals (PDQ®). Cancer.gov. <http://www.cancer.gov/types/kidney/hp/kidney-genetics-pdq#section/all>. Published January 15, 2016.
109. National Cancer Institute. Cancer Genetics Risk Assessment and Counseling—for health professionals (PDQ®). Cancer.gov. <http://www.cancer.gov/about-cancer/causes-prevention/genetics/risk-assessment-pdq#section/all>. Published February 10, 2016.
110. Nelson HD, Fu R, Goddard K, et al. Risk Assessment, Genetic Counseling, and Genetic Testing for BRCA-Related Cancer: Systematic Review to Update the U.S. Preventive Services Task Force Recommendation. Evidence Synthesis No. 101. AHRQ Publication No. 12-05164-EF-1. Rockville, MD: Agency for Healthcare Research and Quality; 2013.
111. American Cancer Society. American Cancer Society recommendations for colorectal cancer early detection. <http://www.cancer.org/cancer/colonandrectumcancer/moreinformation/colonandrectumcancerearlydetection/colorectal-cancer-early-detection-acs-recommendations>. Published February 1, 2016.
112. Bradbury AR, Patrick-Miller L, Egleston BL, et al. When parents disclose BRCA1/2 test results: their communication and perceptions of offspring response. *Cancer*. 2012;118(13):3417-3425. doi:10.1002/cnrc.26471.
113. Sharff ME, DeMarco TA, Mays D, et al. Parenting through genetic uncertainty: themes in the disclosure of breast cancer risk information to children. *Genet Test Mol Biomark*. 2012;16(5):376-382. doi:10.1089/gtmb.2011.0154.
114. Schleckser K. Physician Participation in Direct-to-Consumer Genetic Testing: Pragmatism or Paternalism? *Harv J Law Technol*. 2013;26(2). <http://jolt.law.harvard.edu/articles/pdf/v26/26HarvJLTech695.pdf>.
115. American Society of Clinical Oncology. American Society of Clinical Oncology policy statement update: genetic testing for cancer susceptibility. *J Clin Oncol Off J Am Soc Clin Oncol*. 2003;21(12):2397-2406. doi:10.1200/JCO.2003.03.189.
116. Robson ME, Storm CD, Weitzel J, Wollins DS, Offit K, American Society of Clinical Oncology. American Society of Clinical Oncology policy statement update: genetic and genomic testing for cancer susceptibility. *J Clin Oncol Off J Am Soc Clin Oncol*. 2010;28(5):893-901. doi:10.1200/JCO.2009.27.0660.
117. Banner MD Anderson Cancer Center. Review of Cancer Genetics. Gilbert, AZ; 2005. https://www.bannerhealth.com/NR/rdonlyres/B834E14C-0057-45BD-AD44-A44DEBC5C997/59210/ReviewofCancerGenetics_09_11.pdf.
118. National Eye Institute (NEI). Translational Research. <https://nei.nih.gov/news/scienceadvances/advances/translationalresearch>. Published December 2011.
119. National Cancer Institute. Find a Cancer Center. Cancer.gov. <http://www.cancer.gov/research/nci-role/cancer-centers/find>.
120. National Cancer Institute. NCI-Designated Cancer Centers. <http://www.cancer.gov/research/nci-role/cancer-centers>.
121. National Comprehensive Cancer Network. NCCN Guidelines. http://www.nccn.org/professionals/physician_gls/f_guidelines.asp.
122. National Cancer Institute. Types of Clinical Trials. <http://www.cancer.gov/about-cancer/treatment/clinical-trials/what-are-trials/types>. Published November 2, 2012.
123. National Cancer Institute. Cancer Clinical Trials. The Basic Workbook.; 2001. https://accrualnet.cancer.gov/sites/accrualnet.cancer.gov/files/BasicWorkbook_m.pdf.
124. Maryland Behavioral Risk Factor Surveillance System. Behavioral Risk Factor Surveillance System, 2013 Results.; 2013. <http://www.marylandbrfss.org>.
125. Stewart JH, Bertoni AG, Staten JL, Levine EA, Gross CP. Participation in surgical oncology clinical trials: gender-, race/ethnicity-, and age-based disparities. *Ann Surg Oncol*. 2007;14(12):3328-3334. doi:10.1245/s10434-007-9500-y.
126. Du W, Gadgeel SM, Simon MS. Predictors of enrollment in lung cancer clinical trials. *Cancer*. 2006;106(2):420-425. doi:10.1002/cnrc.21638.
127. Lewis JH, Kilgore ML, Goldman DP, et al. Participation of patients 65 years of age or older in cancer clinical trials. *J Clin Oncol Off J Am Soc Clin Oncol*. 2003;21(7):1383-1389.
128. Sateren WB, Trimble EL, Abrams J, et al. How sociodemographics, presence of oncology specialists, and hospital cancer programs affect accrual to cancer treatment trials. *J Clin Oncol Off J Am Soc Clin Oncol*. 2002;20(8):2109-2117.
129. Intercultural Cancer Council. Cancer Facts. Cancer Clinical Trials: Participation by Underepresented Populations. <http://nebula.wsimg.com/64c93b678a470518d658f0f17e2857ac?AccessKeyId=4ECD43F4A65F6DBF7F21&disposition=0&alloworigi=1>.
130. Cancer Disparities. In: Maryland Comprehensive Cancer Control Plan; 2011. <http://phpa.dhmdh.maryland.gov/cancer/cancerplan/pdf/MarylandCompCancerControlPlan.zip>.
131. Baquet CR, Ellison GL, Mishra SI. Analysis of Maryland Cancer Patient Participation in NCI Supported Cancer Treatment Clinical Trials. *J Health Care Poor Underserved*. 2009;20(suppl 2):120-134.
132. National Cancer Institute. Cancer Clinical Trials. The In-Depth Program.; 2001. https://accrualnet.cancer.gov/sites/accrualnet.cancer.gov/files/InDepth_Book_m.pdf.
133. Comis RL, Aldigé CR, Stovall EL, Krebs LU, Risher PJ, Taylor HJ. A Quantitative Survey of Public Attitudes towards Cancer Clinical Trials. Coalition of National Cancer Cooperative Groups, Cancer Research Foundation of America, Cancer Leadership Council and Oncology Nursing Society; 2000. <http://www.cancertrials.org/CTHPdf/308-9.pdf>.
134. National Conference of State Legislatures. Clinical trials: What are states doing? <http://www.ncsl.org/research/health/clinical-trials-what-are-states-doing-2010.aspx>. Published September 2010. Accessed January 14, 2015.
135. General Assembly of Maryland. Article - Insurance. Vol \$15-827. <http://mgaleg.maryland.gov/webmg/frmStatutesText.aspx?article=gin§ion=15-827&ext=html&session=2015RS&tab=subjects>.
136. Richardson K, Steinberger EK, Groves C, Lewis C. Maryland Cancer Survivor Report, 2011. Baltimore, MD: Department of Epidemiology and Public Health, University of Maryland School of Medicine, and Center for Cancer Prevention and Control, Maryland Department of Health and Mental Hygiene; 2011. http://phpa.dhmdh.maryland.gov/cancer/SiteAssets/SitePages/surv_data-reports/Maryland_Cancer_Survivor_Report_2011.pdf.
137. Centers for Disease Control and Prevention. Cancer Survivors—United States, 2007. *Morb Mortal Wkly Rep MMWR*. 2011;60(9):269-272.
138. American Cancer Society. Finding Treatment Centers. <http://www.cancer.org/treatment/findingandpayingfortreatment/findingtreatmentcenters/index?sitearea=eto>.
139. American College of Surgeons. Commission on Cancer. <https://www.facs.org/quality-programs/cancer/coc>. Accessed April 6, 2015.
140. Rehse B, Pukrop R. Effects of psychosocial interventions on quality of life in adult cancer patients: meta analysis of 37 published controlled outcome studies. *Patient Educ Couns*. 2003;50(2):179-186.
141. Matthews AK, Corrigan PW, Rutherford JL. Mental illness stigma as a barrier to psychosocial services for cancer patients. *J Natl Compr Cancer Netw JNCCN*. 2003;1(3):375-379.
142. Pirl WF, Muriel A, Hwang V, et al. Screening for psychosocial distress: a national survey of oncologists. *J Support Oncol*. 2007;5(10):499-504.
143. National Institutes of Health. Cancer costs projected to reach at least \$158 billion in 2020. <http://www.nih.gov/news-events/news-releases/cancer-costs-projected-reach-least-158-billion-2020>. Published January 12, 2011.
144. Ramsey S, Blough D, Kirchhoff A, et al. Washington State Cancer Patients Found To Be At Greater Risk For Bankruptcy Than People Without A Cancer Diagnosis. *Health Aff (Millwood)*. May 2013. doi:10.1377/hlthaff.2012.1263.
145. Institute of Medicine of the National Academies. Cancer Survivorship Care Planning; 2005. <http://iom.nationalacademies.org/~media/Files/Report%20Files/2005/From-Cancer-Patient-to-Cancer-Survivor-Lost-in-Transition/factsheetcareplanning.pdf>.
146. National Cancer Institute. Late Effects of Treatment for Childhood Cancer—Health Professional Version (PDQ®). <http://www.cancer.gov/types/childhood-cancers/late-effects-hp-pdq#section/all>. Published February 11, 2016.
147. National Cancer Institute. Smoking in Cancer Care—Health Professional Version (PDQ®). <http://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/smoking-cessation-hp-pdq>. Published June 20, 2014.

148. Stanford Patient Education Research Center. Cancer: Thriving and Surviving Program. <http://patienteducation.stanford.edu/programs/cts.html>.
149. National Council on Aging. Chronic Disease Self-Management Program. Summary of National and State Translational Research Findings. Arlington, VA; 2015. <https://www.ncoa.org/wp-content/uploads/Health-Outcomes-Evaluation-FINAL-DRAFT-022515.pdf>.
150. Higginson IJ, Evans CJ. What is the evidence that palliative care teams improve outcomes for cancer patients and their families? *Cancer J Sudbury Mass*. 2010;16(5):423-435. doi:10.1097/PP0.0b013e3181f684e5.
151. Temel JS, Greer JA, Muzikansky A, et al. Early palliative care for patients with metastatic non-small-cell lung cancer. *N Engl J Med*. 2010;363(8):733-742. doi:10.1056/NEJMoa1000678.
152. Smith TJ, Cassel JB. Cost and non-clinical outcomes of palliative care. *J Pain Symptom Manage*. 2009;38(1):32-44. doi:10.1016/j.jpainsymman.2009.05.001.
153. Simoens S, Kutten B, Keirse E, et al. The costs of treating terminal patients. *J Pain Symptom Manage*. 2010;40(3):436-448. doi:10.1016/j.jpainsymman.2009.12.022.
154. Morrison RS, Dietrich J, Ladwig S, et al. Palliative care consultation teams cut hospital costs for Medicaid beneficiaries. *Health Aff Proj Hope*. 2011;30(3):454-463. doi:10.1377/hlthaff.2010.0929.
155. Kelley AS, Deb P, Du Q, Aldridge Carlson MD, Morrison RS. Hospice enrollment saves money for Medicare and improves care quality across a number of different lengths-of-stay. *Health Aff Proj Hope*. 2013;32(3):552-561. doi:10.1377/hlthaff.2012.0851.
156. Morrison RS, Augustin R, Souvanna P, Meier DE. America's Care of Serious Illness: A State-by-State Report Card on Access to Palliative Care in Our Nation's Hospitals. *J Palliat Med*. 2011;14(10):1094-1096. doi:10.1089/jpm.2011.9634.
157. Gibbs KD Jr, Mahon MM, Truss M, Eyring K. An Assessment of Hospital-Based Palliative Care in Maryland: Infrastructure, Barriers, and Opportunities. *J Pain Symptom Manage*. 49(6):1102-1108. doi:10.1016/j.jpainsymman.2014.12.004.
158. National Cancer Institute. Cancer Pain. National Cancer Institute. <http://www.cancer.gov/about-cancer/treatment/side-effects/pain/pain-hp-pdq#section/all>. Accessed March 30, 2015.
159. National Cancer Institute. Hospice Care. National Cancer Institute. <http://www.cancer.gov/about-cancer/advanced-cancer/care-choices/hospice-fact-sheet>. Accessed March 30, 2015.
160. National Hospice and Palliative Care Organization. Hospice Care. National Hospice and Palliative Care Organization. <http://www.nhpco.org/about/hospice-care>. Accessed March 8, 2016.
161. Obermeyer Z, Makar M, Abujaber S, Dominici F, Block S, Cutler DM. Association between the medicare hospice benefit and health care utilization and costs for patients with poor-prognosis cancer. *JAMA*. 2014;312(18):1888-1896. doi:10.1001/jama.2014.14950.
162. Ford DW, Nietert PJ, Zapka J, Zoller JS, Silvestri GA. Barriers to hospice enrollment among lung cancer patients: a survey of family members and physicians. *Palliat Support Care*. 2008;6(4):357-362. doi:10.1017/S1478951508000564.
163. Casarett D, Van Ness PH, O'Leary JR, Fried TR. Are patient preferences for life-sustaining treatment really a barrier to hospice enrollment for older adults with serious illness? *J Am Geriatr Soc*. 2006;54(3):472-478. doi:10.1111/j.1532-5415.2005.00628.x.
164. Thomas JM, O'Leary JR, Fried TR. Understanding their options: determinants of hospice discussion for older persons with advanced illness. *J Gen Intern Med*. 2009;24(8):923-928. doi:10.1007/s11606-009-1030-9.
165. McGorty EK, Bornstein BH. Barriers to physicians' decisions to discuss hospice: insights gained from the United States hospice model. *J Eval Clin Pract*. 2003;9(3):363-372.
166. Cohen LL. Racial/ethnic disparities in hospice care: a systematic review. *J Palliat Med*. 2008;11(5):763-768. doi:10.1089/jpm.2007.0216.

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