

CHAPTER 6

DIET AND PHYSICAL ACTIVITY

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DIET AND PHYSICAL ACTIVITY

Maintenance of a nutritious diet, healthy weight, physical activity, and avoidance of alcoholic beverages may prevent as much as a third of all cancers (Figure 6.1).¹ Healthy diet, physical activity, and maintenance of healthy weight are also important for preventing other common chronic diseases such as heart disease, stroke, and diabetes. Most people find it very difficult to make substantial changes in their diets and activity levels. Parents also find it difficult to foster good dietary and activity habits in their children. Marylanders would be healthier in general and could experience a reduction in the notably high rates of cancers of the breast, prostate, and colorectum if even relatively small changes in eating and activity habits could be made and sustained.

This chapter will:

- describe the major diet and physical activity factors that contribute to high cancer rates in Maryland;
- discuss the individual and societal factors that contribute to the prevalence of these problems in Maryland; and
- propose objectives and strategies to reduce the occurrence of cancer in Maryland's citizens.

Diet and Physical Activity Factors Contributing to High Cancer Rates in Maryland

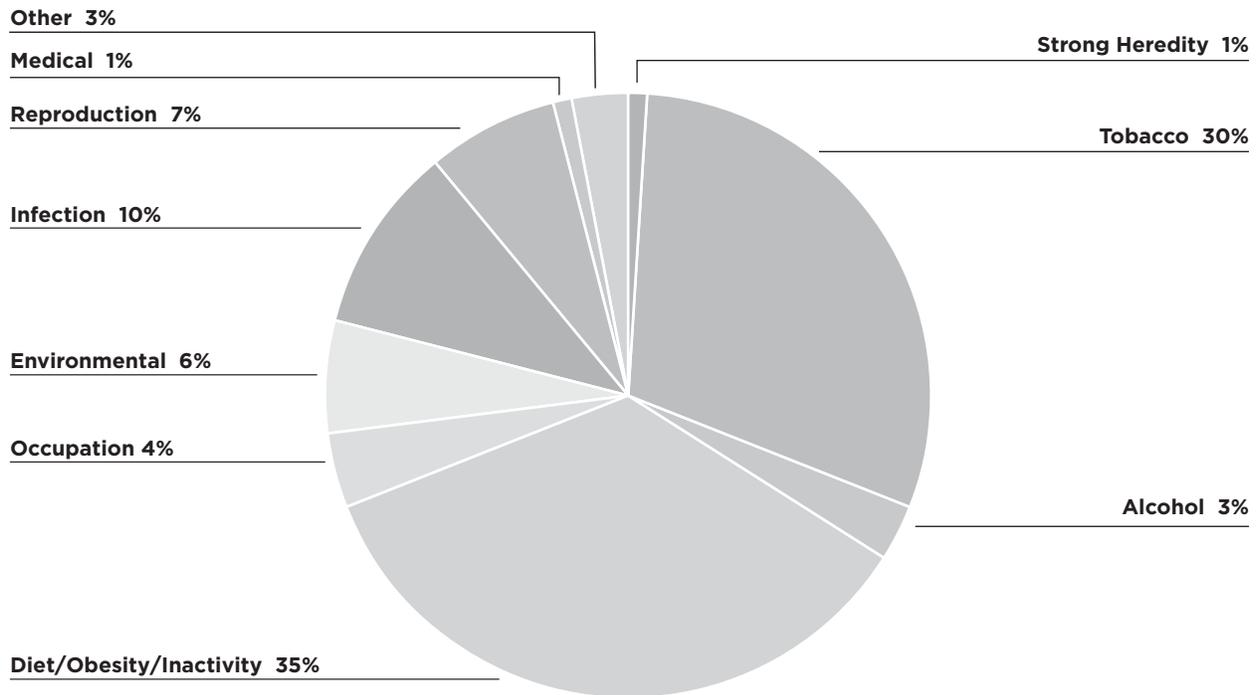
The following factors are likely contributors to Maryland's high cancer rates:

- Energy imbalance due to:
 - the consumption of too many calories
 - being overweight or obese
 - being physically inactive
- Suboptimal diet, including:
 - eating too few fruits and vegetables
 - eating too much red meat and processed meat
- Alcohol intake

These factors are important for four reasons:

- The scientific evidence supports them as major risk factors for cancer in general and for organ-specific cancers that are common in Maryland.
- Guidelines from governmental and national organizations, such as the American Cancer Society (ACS) and the American Institute for Cancer Research

Figure 6.1
Proportion of Cancer Risk That is Attributable to Certain Exposures
in Developed Countries



Source: Adapted from Doll R, Peto R. The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *J Natl Cancer Inst* 1981 Jun;66(6):1191-308.

(AICR), target these problems.

- The prevalence of these risk factors is high in Maryland. (Prevalence refers to the percentage of a population that is affected with a particular risk factor at a given time.)
- These risk factors are modifiable, making them targets for prevention as well as intervention.

Studies have shown that nutrition and physical activity influence cancer risk for several organs.^{2,3} Nutrition and physical activity are modifiable risk factors. In Maryland, 23,267 new cancer cases were diagnosed and 10,096 deaths were due to cancer in 1999.⁴ The most common among these are cancers of the lung and bronchus, colon and rectum, breast, and prostate. The incidence of, and mortality from, cancer is higher in Maryland compared to the United States for the period 1995–1999 (Table 6.1).

Energy Imbalance: Overweight, Obesity, and Physical Inactivity

Energy imbalance, that is, consuming too much energy (calories) for a person's body size and activity level, is difficult to measure directly in populations. The net effect of energy imbalance is weight gain in the form of fat. Body weight is not the best measure of energy imbalance; body mass index (BMI) is used as a surrogate measure.

BMI is body weight in kilograms divided by the square of height in meters. The chart shown in Figure 6.2 can be used to determine BMI. For example, a woman 5 feet 4 inches tall weighing 150 pounds has a BMI of 25.7 kg/m². Widely used guidelines classify adults with a BMI of 25.0–29.9 kg/m² as overweight. Adults with a BMI of 30.0 kg/m² or more are classified as obese. Adults with a BMI of 25 kg/m² or above are at increased risk of overweight- and obesity-associated disease.⁵ In children, the definition of high BMI is age and sex specific. According to the U.S. Centers for Disease Control and Prevention, a child whose BMI is

Table 6.1
Incidence Rates for Selected Cancers in Maryland and the United States, 1995-1999

	All cancers		Colorectum		Breast	Prostate
	Male	Female	Male	Female	Female	Male
Maryland	610.7	442.2	69.7	52.0	141.7	189.3
U.S. SEER data	562.6	424.1	65.1	47.6	136.7	168.9

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.
 Source: Annual Cancer Report, CRF, DHMH, 2002 (Maryland rates); American Cancer Society, Cancer Facts & Figures, 2003 (U.S. rates).

above the 95th percentile for age is overweight.⁶ A child whose BMI is between the 85th and 95th percentile is at risk for becoming overweight. BMI is not a perfect measure of how fat, or adipose, a person is. For example, people who are very muscular may have a higher BMI. However, for most Marylanders higher BMI is a useful indicator of overweight and obesity.

Another anthropometric measure used to indicate energy imbalance and risk for overweight- and obesity-associated disease is waist circumference. Waist circumference over 40 inches in men and over 35 inches in women indicates increased risk of disease.

The prevalence of overweight and obesity has risen very rapidly in the U.S. and Maryland over the past decades. In 1990, 12% of Marylanders were considered to be obese. That prevalence increased to almost 20% in 2001.⁷ Obesity may increase the risk of cancer in general, and cancer of many common sites.⁸

Another component of energy imbalance is low activity levels. Regular physical activity is essential to prevent weight gain and to support weight loss. It has been estimated that 30 to 60 minutes of physical activity daily could reduce the risk of colon, breast, uterus, and prostate cancer by 20% to 40%.⁹ Based on review of epidemiological evidence, several organizations have developed recommendations for physical activity for adults and children. A report from the Institute of Medicine recommends one hour of moderately intense physical activity daily for adults to maintain energy balance.¹⁰ Specifically for cancer, the American Cancer Society (ACS) recommends 30 minutes or more of moderate activity at least five days per week for adults. For children ACS recommends 60 minutes or more of moderate activity (such as walking briskly) to vigorous activity (such as running) at least five days per week.¹¹ The ACS also indicates that for adults, 45 minutes or more may help to further decrease the risk of colon and breast

cancers. Regular physical exercise is of particular importance to limit the growing prevalence of obesity among children. The increase in obesity in children is in part due to decreased opportunities for exercise at home because of television and computer use and in school because of reduced frequency of physical education classes.¹²

Suboptimal Diet

The typical American diet in recent years has shifted to larger portion sizes with greater intake of processed and fast foods and animal-based proteins such as meats and dairy, and limited intake of fruits and vegetables. In this chapter, “diet” refers to the types and amounts of foods that a person eats rather than “being on a diet.” The current American dietary pattern is not optimal for reducing cancer risk. This chapter targets two aspects of suboptimal diet: low intake of fruits and vegetables and high intake of red meat and processed meat.

Intake of Fruits and Vegetables

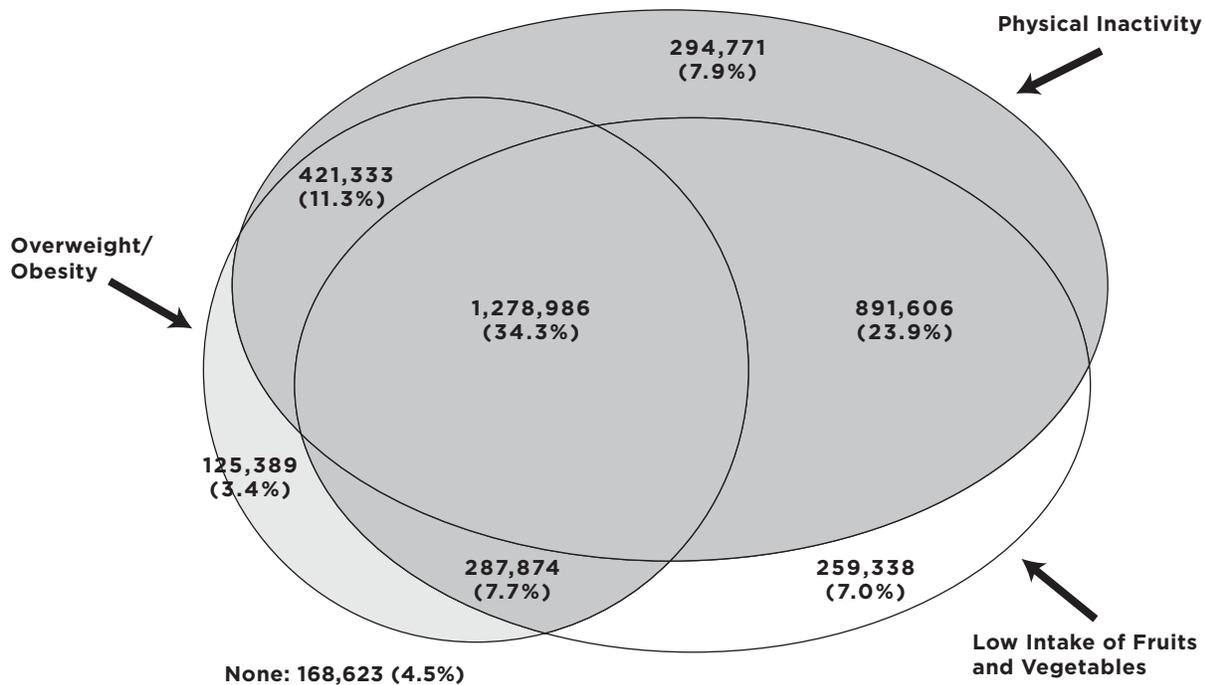
The consumption of higher amounts of fruits and vegetables (e.g., five or more servings per day) has been associated with a lower risk of lung, oral, esophageal, stomach, or colon cancer in many epidemiological studies.^{13,14} Fruits and vegetables contain a wide array of vitamins, minerals, and antioxidants. Antioxidants reduce highly reactive oxygen-containing molecules that our bodies make themselves or to which we are exposed through the environment. Some antioxidants, like carotenoids, impart the spectrum of colors to fruits and vegetables. For example, tomatoes are red because they contain the carotenoid lycopene and carrots are orange because they contain the carotenoids alpha- and beta-carotene. Other nutrients important for good health are found in leafy green vegetables, like folic acid in spinach. Consumption of a variety of brightly colored fruits and vegetables will increase the range of antioxidant types and other essential nutrients that are ingested. Many research studies have examined which of these vitamins and minerals in fruits and vegetables

**Figure 6.2
Body Mass Index (BMI) Chart**

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height	Weight (in pounds)																
4'10" (58")	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
4'11" (59")	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
5' (60")	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
5'1" (61")	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
5'2" (62")	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
5'3" (63")	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
5'4" (64")	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
5'5" (65")	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
5'6" (66")	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
5'7" (67")	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
5'8" (68")	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
5'9" (69")	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
5'10" (70")	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
5'11" (71")	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
6' (72")	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
6'1" (73")	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
6'2" (74")	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
6'3" (75")	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279

Source: National Institutes of Health, National Heart, Lung, and Blood Institute (NHLBI). Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: the Evidence Report. NIH Publication No. 98-4083. September 1998.

Figure 6.3
Low Intake of Fruits and Vegetables, Physical Inactivity, and Overweight/Obesity:
Weighted Percentages for Maryland Adults 18 Years and Older



Source: Maryland BRFSS, 2000.

are especially effective in reducing cancer risk. Observational studies suggest that those who consume higher amounts of vitamin C, beta-carotene, lycopene, selenium, and folic acid in their diets have a lower risk of cancer than those who consume lesser amounts. When some of these nutrients have been tested in clinical trials in which people were randomized to receive a supplement that contained a high amount of one specific nutrient, some findings have been disappointing,¹⁵ but other times interesting leads have emerged. For example, vitamin E and selenium are now being tested in SELECT, a very large clinical trial, to determine if they prevent prostate cancer.¹⁶ Taking all of the evidence together, consuming the recommended number of daily servings of fruit and vegetables of five or more is important for good health in general and may reduce cancer risk. Potatoes (e.g., baked potatoes, french fries, potato salad), which have a low content of desired nutrients but a high content of starch, should not be included as a fruit or vegetable when counting the number of servings of fruits and vegetables that are consumed. Some people at higher risk of cancer or who are unable to meet the recommended daily intake of certain nutrients from diet alone might consider talking to their doctor about whether they should take multi-

vitamins or single supplements.

Intake of Red Meat and Processed Meats

The consumption of red meat (such as beef) and processed meat (such as luncheon meats) have been associated with an increased risk of colorectal, prostate, and pancreatic cancer.^{17,18} For example, in a large U.S. cohort study, men who consumed red meat as a main dish at least five times per week had a three and a half-fold higher risk of colorectal cancer compared to men who never ate red meat as a main dish.¹⁹ The reasons for an association between red meat consumption and cancer risk are not fully understood, but several hypotheses have been suggested, including the high fat content of these foods. Heterocyclic aromatic amines, which are produced in meat cooked at high temperatures (grilling, barbecuing, and oven-broiling), have been shown to be carcinogenic in animal models, but results in humans are contradictory.²⁰ Nitrites in processed meats, which are added for preservation or improvement of color and taste, can be transformed into carcinogenic N-nitroso compounds by bacteria in the colon,²¹ which can interact with and damage DNA in colon cells, possibly causing tumors.²² At this point, these are only hypotheses. Diet may be improved by

replacement of some servings of red meat and processed meat with other protein sources such as tofu and other soy products and legumes (beans).

Alcohol Consumption

Alcohol consumption is a risk factor for cancers of the mouth, pharynx, larynx, esophagus, and liver, and may increase the risk of cancers of the colon, rectum, and breast.²³ Concurrent alcohol use magnifies the effects of tobacco on the risk for cancers of the upper digestive tract.²⁴ The International Agency for Research on Cancer has estimated that 75% of all cancers of the upper digestive tract are attributable to smoking and alcohol use.²⁵ Chronic, excessive alcohol consumption can cause liver cirrhosis, which increases the risk of liver cancer. In addition to these well-known associations, the risk of breast cancer appears to be increased in women who drink alcohol, even one alcoholic drink per day.²⁶ Although alcohol drinking clearly increases the risk of certain cancers, several population surveys indicate that moderate intake of alcohol may reduce the risk of cardiovascular events.²⁷ Nevertheless, the American Heart Association does not recommend the addition of alcohol as a cardioprotective substance, citing serious adverse consequences of alcohol intake including hypertension, liver damage, increased risk for breast cancer, physical abuse, and vehicular accidents.²⁸ Both the American Cancer Society and the American Heart Association recommend that those who do not currently drink alcoholic beverages should not start drinking, and those who do drink should limit their consumption.^{29,30}

Prevalence of Risk Factors in Maryland

The primary source of information regarding the prevalence of health risk factors for U.S. and Maryland adults is the Behavioral Risk Factor Surveillance System

(BRFSS). Data on overweight and obesity, physical activity, fruit and vegetable consumption, and alcoholic beverage consumption, but not red meat or processed meat, is collected in the BRFSS. Unless otherwise stated, the statistics in this section are from the Maryland BRFSS.³¹ Similar information for adolescents is available for the U.S. population as a whole, but not for Maryland adolescents specifically; instead we present data from the CDC's Youth Risk Behavioral Surveillance System (YRBSS) for adolescents in the United States.

The prevalence of risk factors such as overweight and obesity, physical inactivity, and low intake of fruits and vegetables is very high in Maryland and this prevalence is often found in overlapping populations. Figure 6.3 illustrates where low intake of fruits and vegetables, physical inactivity, and overweight/obesity are found either alone or in combination with the other factors. Only 4.5% of the Maryland population age 18 years and older lack all three of these risk factors. About 18.3% had a single risk factor, with physical inactivity being the most common of the three risk factors (7.9%). 34.3% of the population had all three risk factors, while the remainder exhibited two of the risk factors. The combination of low intake of fruits and vegetables plus physical inactivity was the most frequent clustering of two risk factors (23.9%).

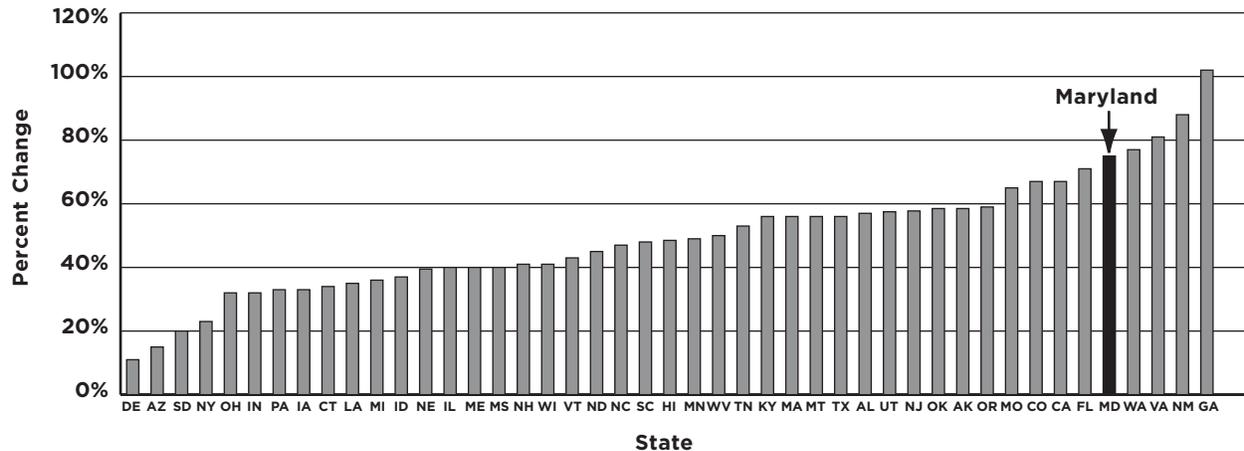
Table 6.2 indicates the prevalence of healthy diet and physical activity factors among Maryland adults from 1996 to 2000. The percent of Marylanders at a healthy weight appears to be declining steadily, going from 48.2% in 1996 to 43.3% in 2000. Overall, the prevalence of regular or sustained physical activity and consumption of fruits and vegetables appear to be increasing. However, these trends show inconsistent increases over time, with the most recent prevalence statistic available (2000) being less than the prevalence of these behaviors in 1998.

Table 6.2
Prevalence of Healthy Weight, Physical Activity, and Adequate Consumption of Fruits and Vegetables Among Maryland Adults, 1996, 1998, 2000

	1996	1998	2000
Healthy weight ($18.5 \leq \text{BMI} \leq 24.9$)	48.2	44.5	43.3
Regular or sustained physical activity	13.3	25.8	22.3
Consumption of five or more fruits and vegetables per day	24.7	30.1	27.4

Source: Maryland BRFSS, 1996–2000.

Figure 6.4
Percent Change in Prevalence of Obesity in Adults, 1991 to 1998



No information available for AR, DC, KS, NV, RI, or WY.

Data source: Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991-1998. JAMA. 1999 Oct 27;282(16):1519-22.

Overweight and Obesity

The prevalence of overweight and obesity among Marylanders has been increasing steadily over the last 10 years as indicated by the BRFSS. From 1990 to 2000, the prevalence of overweight increased from 31% to 36% and the prevalence of obesity in Maryland nearly doubled, increasing from 12% to 20% (Figure 6.5). Between 1991 and 1998, Maryland had one of the largest percent increases in obesity of all states (Figure 6.4). In 2001, almost 20% of Maryland adults were obese (BMI of 30 kg/m² or greater) and more than 37% were overweight (BMI of 25–29.9 kg/m²). Western Maryland, Baltimore City, Prince George’s County, and parts of the Eastern Shore have more than 20% of their residents classified as obese. The prevalence of overweight and obesity in Maryland is fairly similar to national rates. For the time period 1996 to 2001, 55% of Marylanders were either overweight or obese. In 2000, about 57% of Americans were overweight or obese.³²

The prevalence of overweight and obesity increases with age. In Maryland in 2001, 15.6% of those 18–24 years of age were obese. The prevalence of obesity gradually increases with age, with 27% of those 55–64 being obese. The same trend is seen in prevalence of overweight in Maryland. Approximately 21% of those 18–24 years of age were overweight in 2001, and this increased to 36.3% in those 25–34 and 44.9% of those 65–74. About 65% of those 65–74 years of age are either overweight or obese.

Physical Inactivity

Nationally, the median proportion of the population with no regular or sustained physical activity was 78% in 2000.³³ Maryland’s rate is very similar to the nation’s, also having about 78% of its population reporting no regular or sustained physical activity in 2000. The proportion of Marylanders reporting no regular or sustained physical activity was higher among women than men and higher among blacks than whites in 2000. In addition, the prevalence of physical inactivity was higher among persons with less than a high school diploma and persons with a family income of less than \$15,000.

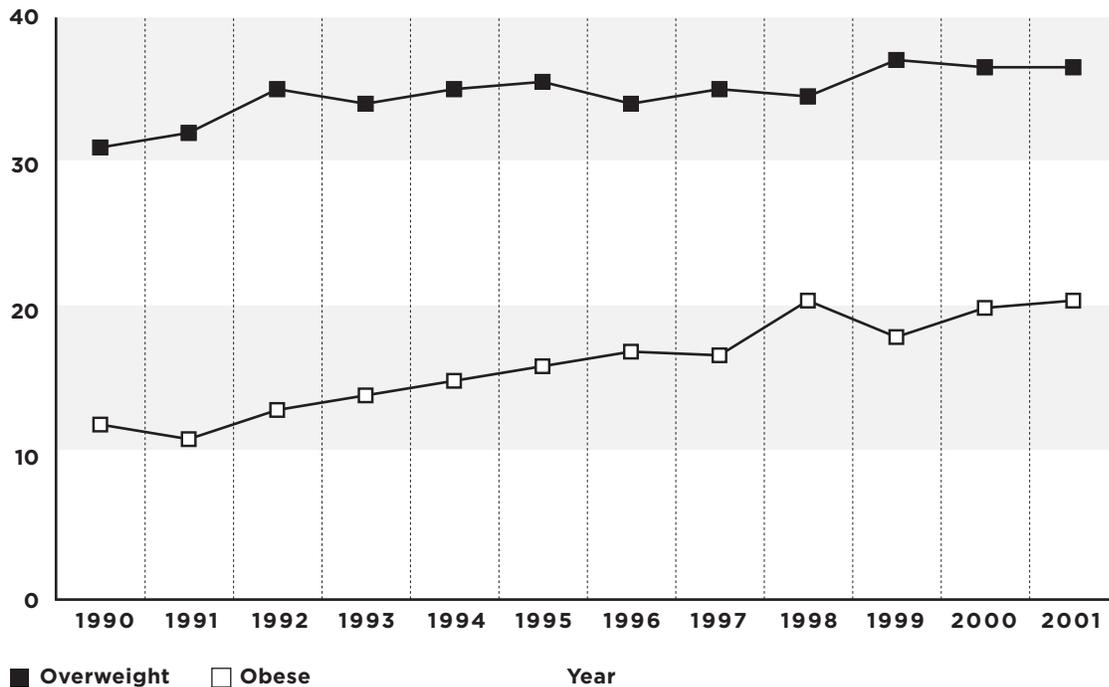
Inadequate Consumption of Fruits and Vegetables

In 2000, 27.4% of Maryland adults reported eating five or more servings of fruits and vegetables per day. This is slightly better than the U.S. as a whole; nationally, 23.1% of the population reported eating five or more servings of fruits and vegetables per day in 2000.³⁴ The age group with the lowest proportion consuming five or more servings of fruits and vegetables per day were adults ages 25–34. The proportion of Maryland adults who reported eating five or more servings of fruits and vegetables per day gradually increases with ages 35 and older.

Alcohol Consumption

In Maryland in 1999, 56% of adult men and 73.5% of

Figure 6.5
Prevalence of Overweight and Obesity in Maryland, 1990–2001



Data source: CDC BRFSS.
 All respondents 18 and older gave weight and height. This information was used to calculate BMI.
 BMI 25 to 29.9 is defined as overweight and 30 or greater is defined as obese.

women reported that they never drank alcohol, or drank alcohol less than once a week. Nearly 72% of blacks reported that they never or rarely drank alcohol during this same year, compared with 62% of whites and 60.5% of Hispanics. Never or rarely (less than once a week) drinking alcohol is more prevalent among individuals with lower educational attainment and lower income. Thus, drinking alcohol once a week or more is more prevalent among more highly educated, higher income-earning Marylanders.

Prevalence of Risk Factors Among Youth

Very little information is available regarding the prevalence of risk factors among Maryland youth because Maryland does not participate in the CDC's Youth Risk Behavior Surveillance System (YRBSS). Nationally, 10% of adolescents were overweight in 2000, and another 14% were at risk for becoming overweight.³⁵ Also, 74% of U.S. adolescents did not participate in moderate physical activity on five or more days of the week.³⁶ In addition, a very large proportion of American adolescents (79%) ate less than five servings of fruits and vegetables per day during the preceding

seven days.³⁷ Because Maryland is very similar to the nation regarding the prevalence of these risk factors among adults, there is reason to believe that the prevalence of overweight and obesity, physical inactivity, and low intake of fruits and vegetables among Maryland youth are comparable to those nationwide, and therefore are cause for concern.

Disparities

In Maryland, diet- and activity-related risk factors other than alcohol consumption are more likely to occur among minorities and in low-income and less educated populations. This suggests the need for targeted interventions for these populations.

For example, the prevalence of overweight and obesity is higher among blacks than whites. In addition, blacks, persons with less than a high school diploma, and persons with an income of less than \$15,000 are less likely to be active than whites, persons who are college graduates, and persons who have an income of greater than \$75,000. These trends are similar for inadequate consumption of fruits and vegetables.

Summary of Prevalence of Risk Factors

The prevalence of overweight and obesity, physical inactivity, and inadequate consumption of fruits and vegetables is very high among Marylanders. More than 34% of Maryland adults exhibit all three of these risk factors. There is considerable need to address the epidemic of obesity and related risk factors as part of the effort to reduce the burden of cancer in Maryland. Individuals should weigh the risks and benefits of alcohol consumption with their physician's guidance.

Individual and Societal Factors Contributing to the Prevalence of Diet and Physical Activity Risk Factors in Maryland

The problems of overweight and obesity, inactivity, low intake of fruits and vegetables, and high intake of red and processed meat are multifactorial and may stem from behaviors, inaccurate or missing information, and other perceived and actual barriers. There are numerous sources of influence on these factors (Figure 6.6) ranging from individuals, their families, and their neighborhoods through government, health institutions, and other institutions. What follow are several examples of factors contributing to unhealthy diet and physical inactivity, some of which are societal, others of which are more individual in nature. Fortunately, many of these contributing factors are targets for intervention at many points in their trajectory of influence.

Individuals, Families, and Communities

Individuals and families may lack adequate knowledge about the benefits of a healthful diet and physical activity on cancer risk. In addition, a lack of financial resources may limit options for the preparation of healthy meals. Communities may lack safe sidewalks and bicycle paths, lessening the chance that individuals and families will walk and bicycle to work, to run errands, or for leisure-time outings.

One major barrier to increased physical activity appears to be the public's need for convenience and avoidance of strenuous activity. Escalators and elevators have replaced the need to take stairs. Parking lots are located close to workplaces. Work is often desk-

bound with little chance of physical activity. Television, video, and computer games tend to occupy much of leisure time. Transportation is nearly always achieved by personal automobile or some form of mass transit; one survey indicated that only 3.7% of Americans commute to work by bicycle or walking.³⁸

On the positive side, individuals, families, and communities can be a powerful force for effecting change. Neighbors can join together to demand sidewalks and playgrounds in their neighborhoods. In addition to advocating for safe, alternative means for transportation, families can bring their concerns to local school health advisory councils. Here families can advocate for school health education on nutrition and physical activity, daily physical education, and increasing healthy choices in school meals and vending machines.

Institutions Other than Health-Related

Food Purveyors

Fast foods are designed to be appealing to the palate. At the same time, they are calorie-dense, low in fruits and vegetables, and high in red and processed meats. Offering larger portions for a relatively small increase in cost to the consumer allows retailers to maximize profits since the increase in production cost is minimal.

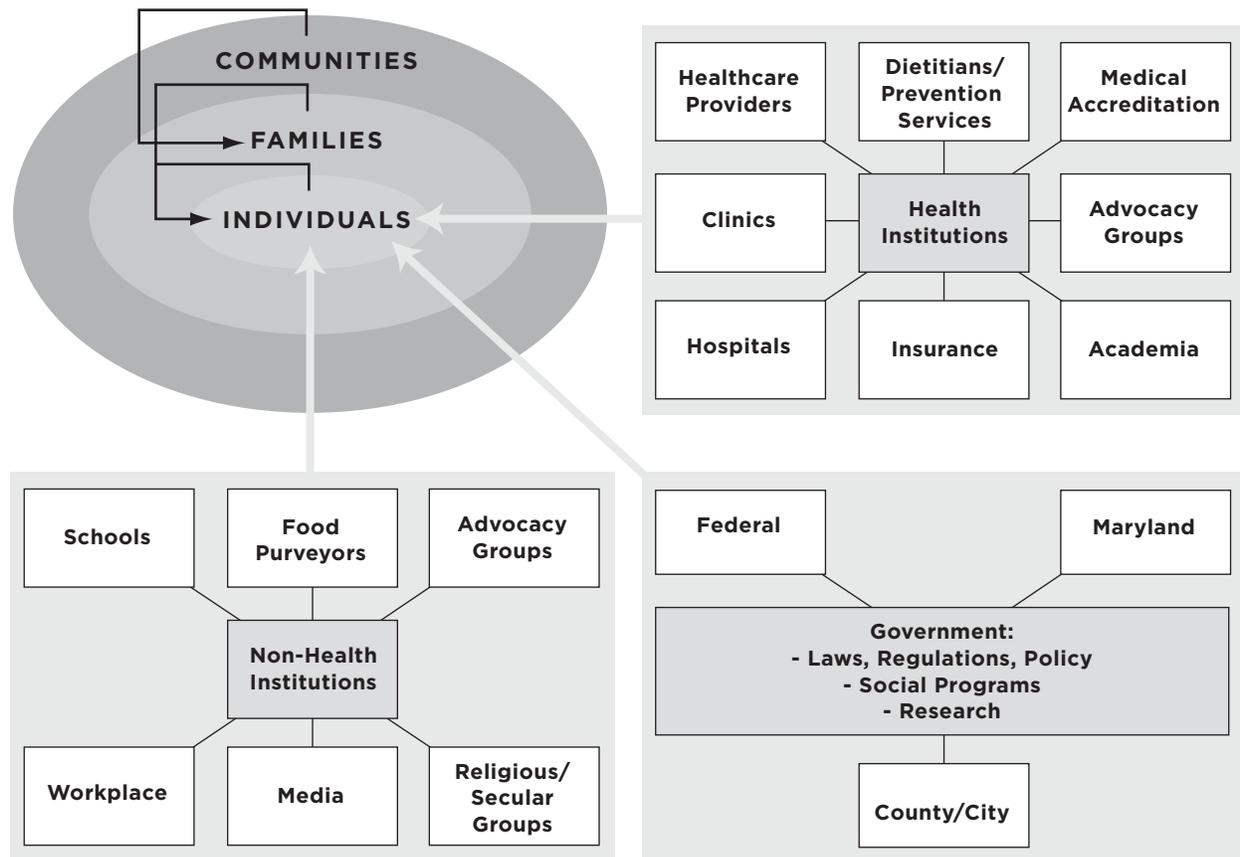
Nationwide there has been a dramatic increase in the consumption of food prepared away from home. In 1970 about 34% of the food dollar was spent on food eaten away from home. This increased to 47% by the late 1990s.³⁹ When Americans eat out, the portion size tends to be much larger than necessary to satisfy nutrient and energy needs. One recent survey concluded, "the sizes of current marketplace foods almost universally exceed the sizes of those offered in the past."⁴⁰

Schools

Schools contribute to the problems of obesity, inactivity, and suboptimal diet because of the limited frequency of physical education classes, inconsistent nutrition education, the availability of high-calorie, low-nutrient density foods and beverages in campus vending machines, and possibly suboptimal school lunches (in particular, a la carte items).

The decrease in activity among youth may be due in part to fewer hours spent in school-based physical education. Between 1991 and 1995, nationwide daily attendance in physical education classes for children in grades 9–12 decreased from 41.6% to 25.4%.

Figure 6.6
Sources of Influence on Diet and Physical Activity



Source: Developed by the Diet and Physical Activity Committee of the Maryland Comprehensive Cancer Control Plan.

However, on a positive note, from 1995 to 2001 the percent of students enrolled in a daily physical education class increased from 25.4% to 32.2%.⁴¹

Physical education curricula vary widely by state and even by local district. Maryland law requires that an instructional program in physical education be in place *each year* for all students in grades K–8. However, for grades 9–12, the requirement is much less stringent; each local school system must offer a physical education program that will enable students to meet graduation requirements and to select physical education electives.⁴² The Maryland physical education program should provide “individualized, developmentally appropriate, and personally challenging” instruction that also “provides for the diversity of student needs, abilities, and interests.”⁴³ While these provisions are admirable, they are somewhat irrelevant given that only 1/2 credit of physical education is required to graduate from a public school in Maryland.⁴⁴

Health education requirements for Maryland youth

attending public schools are similar to those for physical education. For grades K–8, each local school system must provide an instructional program in comprehensive health education each year for students in all grades.⁴⁵ However, for grades 9–12, the health education requirement is similarly less stringent; school systems must only provide health education to allow students to meet graduation requirements and select electives.⁴⁶ Again, only 1/2 credit of health education is needed for graduation.⁴⁷ Content requirements for health education are not specified in Maryland law, only that the health education instructional program be “comprehensive” in nature.⁴⁸ Generally, nutrition education is included in the comprehensive health education program, although the degree that nutrition education is taught in the classroom varies with the teacher’s experience and background. Teachers are given class plans, resources, and workshops to encourage nutrition instruction. The Maryland State Department of Education (MSDE) School and Community Nutrition Programs Branch trains teachers to encourage healthy behaviors. Team Nutrition

Grants are given to school programs to use for nutrition resources and encourages the involvement of the community, parents, health educators, and school administrators.

Because schools are a primary source of information for children and adolescents, educators can play a critical role in providing students with valuable messages in the classroom on the benefits of diet and physical activity in avoiding cancer. Students can then convey what they have learned to their families. Educators could provide brief, grade-appropriate education sessions on: What is cancer? What are its causes? How does healthy eating and physical activity reduce risk? Field trips to the produce section of supermarkets and development of school vegetable gardens could broaden students' exposure to healthy food options.

MSDE administers food and nutrition programs according to federal law and the implementing regulations.⁴⁹ In addition, Maryland has developed a policy on the availability of competitive foods and foods of minimal nutritional value in schools. Competitive food sales and vending machines are not to operate from 12 midnight through the last lunch period at each school.⁵⁰ Unfortunately, this policy is often found unenforced by MSDE school meals reviewers. More stringent means of enforcement are required for such policies, in addition to the development of alternative sources of revenue for schools to compensate for revenues otherwise provided by vendors.

Given the alarmingly high rates of overweight and obesity, low rates of physical activity, and general poor nutrition among America's youth, there is a significant need to target children with interventions designed to decrease the prevalence of these risk factors. Children spend a significant proportion of their time in school; thus, school curricula and food availability within schools likely have a large impact on the health of children.

Workplaces

Workplaces may contribute to the problems of obesity, inactivity, and suboptimal diet when there is a lack of activity breaks, a lack of employee wellness programs, and a lack of healthy food at work-related meetings and functions. However, by creating a culture favorable to physical activity and healthy eating, workplaces can improve the quality of life of their employees and reduce costs associated with employee illness.

Over 130 million Americans are in the workforce and employees spend the majority of their day at work.⁵¹

Much of the time workers are sedentary due in part to technological advances that have reduced the need for physical labor. In addition, the food and beverage selections in cafeterias and vending machines, as well as those served at meetings or events, often do not balance more healthful with less healthful options. Because physical inactivity and poor dietary practices or choices are the reality at most worksites, employers and providers could incorporate health promotion initiatives and environmental changes to improve the health of employees while also reducing costs.

According to the Wellness Councils of America, employers can take "aggressive action toward reducing health care utilization and containing costs by taking on a health promotion program."⁵² Policies and programs targeting healthful eating, physical activity, and weight loss or maintenance strategies are integral components of such wellness or health promotion initiatives. Research finds notable clinical and cost outcomes from employee wellness or health promotion programming, including lower health care costs, reduced absenteeism, reduced employee turnover, and increased productivity.^{53,54,55,56} More specifically, an analysis of 10 major studies found that the cost/benefit ratio of worksite health promotion programs ranged from 1:2.05 to 1:5.96, on average.⁵⁷ Worksite fitness programs, in particular, are associated with lower health care costs as well as improved health-related fitness.^{58,59} Employers adopting health promotion programming can also benefit from an improved public image, higher employee recruitment and retention, and improved employee morale.^{60,61} In summary, employers and providers can send a powerful message to employees and the community by not only promoting a healthful lifestyle, but by providing opportunities for these behaviors to be adopted and maintained through health promotion programming and environmental changes.

Health Institutions

Hospitals and Other Health Care Facilities

Even institutions that provide health care contribute to the problems of obesity and suboptimal diet. Many hospitals now have on-site fast food venues; even if they do not offer fast food, the foods and beverages available in health care facilities can be limited and prohibit consumers and employees, including health care providers, from making healthful and balanced choices.

Health Care Providers and Health Insurance Agencies

In the modern world of managed care, health care

providers may not have the time to discuss with their patients the benefits of maintaining a healthy weight, diet, and level of physical activity, despite the overwhelming prevalence of obesity and co-morbidities related to obesity.⁶² Nutrition counseling that includes encouragement of physical activity can be helpful in the promotion of a healthy diet and lifestyle.^{63,64} However, the U.S. Preventive Services Task Force (USPSTF) has concluded that “there is insufficient evidence to recommend for or against routine behavioral counseling to promote a healthy diet in unselected patients in primary care settings.”⁶⁵ Conversely, the USPSTF *does* recommend “intensive behavioral dietary counseling for adult patients with hyperlipidemia and other known risk factors for cardiovascular and diet-related chronic disease.”⁶⁶ However, preventive services, including nutrition counseling, are costly. Reimbursement for nutrition therapy exists with private health insurance plans on a limited basis and Medicare coverage for preventative nutrition and activity does not exist. Inadequate provider reimbursement for these preventive services may limit the referral of patients who would benefit from such services and those referred for these services may choose not to use those services for financial reasons.

On the positive side, health care providers wield much influence with patients, as they are the most trusted sources of information on healthful life choices for some populations. Patients look to their providers for guidance and often view them as role models. With expanded and more extensive reimbursement options, health care providers and their clients may be more likely to utilize the services of nutrition and exercise professionals to improve their own health, diet, and lifestyle. Health care providers utilizing and promoting these services via referrals can provide a positive image that their clients can observe, as they change their own habits and lifestyles.

Academia

Academia is an important influence on these issues because it can generate new research on the problems at hand. There is no systematic collection of information on the knowledge, attitudes, and beliefs of Maryland residents regarding the relationship of diet and physical activity to the prevention of cancer. In addition, if Maryland continues to decline to participate in the national Youth Risk Behavior Surveillance System, the state should consider an alternative method of obtaining information from children and youth similar to the YRBSS. At minimum, the survey

should measure diet, physical activity, height, and weight among children and youth, as well as their knowledge, attitudes, and beliefs regarding healthy diet and activity levels in relation to good health. State policymakers may then use this information to develop a state plan for diet and physical activity that would establish goals, objectives, and timelines for changes that would provide optimal nutrition and physical activity for Maryland residents.

Surveys administered to adults that cover the following topics and questions would greatly benefit the development of effective public policy:

- What is the average citizen’s opinion regarding diet and cancer? What is her/his view of the nature of that relationship? Is food seen as a source of environmental contamination that causes cancer or a source of nutrients that have protective qualities?
- Have individuals’ care providers discussed diet and physical activity as protective?
- What are the knowledge levels, attitudes, and beliefs about diet and physical activity and cancer among health professionals? Do providers know that diet and physical activity may reduce the risk of cancer? How often do they speak to their patients about this?
- What are the barriers to counseling patients about diet and physical activity, such as time, reimbursement, or beliefs that such counseling would be futile?

Interventionists

Interventions are efforts that impact the problems of obesity, inactivity, and suboptimal diet. Interventionists may work in any of the sources of influence and their interventions may be applied at the individual or societal level. Interventionists cannot be effective if they do not know the barriers to healthy eating and activity and if they are not aware of the knowledge levels, attitudes, and beliefs of citizens and providers about prevention of cancer through healthy diet and activity. Thus, the surveys described above are vitally important.

Government

Federal, state, and local governments have a major influence on the health and well-being of Maryland residents by mandating laws, regulations, and policies. These laws, regulations, and policies influence (both directly and indirectly) individuals, families, communi-

ties, and health care and other institutions. At all levels the government executes social programs, some of which provide food and health care. Along with academia and non-profit cancer research groups, governments conduct research on the role of obesity, inactivity, suboptimal diet, and alcohol use on risk of cancer.

For example, government is uniquely positioned to positively influence school curricula on nutrition and physical activity and on the nutrition labeling on prepared foods purchased in the grocery store and in fast-food establishments.

Current Efforts

Fortunately, there are several statewide programs designed to improve the nutrition and physical activity habits of Marylanders. “5 A Day for Better Health” is part of a national public-private partnership between government and industry, designed to increase Americans’ intake of fruits and vegetables to five or more servings a day by the year 2010. “5 A Day” informs consumers that eating fruits and vegetables can improve health and reduce the risk of cancer and other diseases, including heart disease, hypertension, diabetes, and macular degeneration. The Maryland Department of Health & Mental Hygiene (DHMH) is licensed by the National Cancer Institute to participate in the “5 A Day for Better Health” program. Maryland “5 A Day” efforts include a variety of educational and training activities and maintenance of partnerships, such as with the Maryland Department of Agriculture, which enable seniors and low-income families to purchase fruits and vegetables at reduced costs. These activities are implemented in schools, day care centers, work-sites, grocery stores, community sites, and even smoking cessation programs.

The ACS provides a variety of programs, tools, and technical assistance to aid Marylanders in eating right, being active, and maintaining a healthy weight. For example, “Body and Soul: A Celebration of Healthy Living” targets African-American church congregations. The goal of the program is to increase daily fruit and vegetable consumption to reduce cancer and other disease risks. “Active for Life” is a flexible 10-week worksite program that encourages employees to participate in moderate physical activity through goal setting, teamwork, and incentives. Based on the “Stages of Change Theory,” employees learn new skills and gain social support as they reach for their personal physical activity goal.

While not intended specifically for cancer prevention, the American Heart Association supports public policies designed to increase physical activity and maintain healthy weight among citizens, including the following recommendations:

- Ensure the incorporation of physical activity as a major component of appropriate disease prevention and health promotion efforts in state and federal agencies.
- Mandate appropriate, quality, school-site physical activity programs that comply with American Heart Association recommended guidelines.
- Encourage worksite physical activity programs.
- Seek opportunities to highlight the importance of physical activity in transportation policy.
- Advocate for “livable communities” and how they promote physical activity.
- Support and encourage quality physical activity and nutrition programs and policies to treat and prevent obesity.

A variety of other nutrition and activity resources exist but may not be implemented widely in Maryland. Efforts should be made to make citizens more aware of existing programs and resources in Maryland. In addition to the efforts mentioned above, a list of resources available in Maryland can be found at http://www.marylandcancerplan.org/diet_resources.html.

Healthy People 2010

Objectives⁶⁷

The following are select Healthy People 2010 objectives related to diet and physical activity:

Objective:

Increase the proportion of adults who are at a healthy weight to 60%.

The U.S. Baseline: 42% of adults aged 20 years and older were at a healthy weight (defined as a BMI of 18.5–25kg/m²) in 1988–1994 (age-adjusted to the year 2000 standard population).

Objective:

Increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for at least 30 minutes per day to 30%.

The U.S. Baseline: 15% of adults aged 18 years and older engaged in moderate physical activity for at least 30 minutes five or more days per week in 1997 (age-adjusted to the year 2000 standard population).

Objective:

Increase the proportion of persons aged two years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables, to 50%.

The U.S. Baseline: 3% of persons aged two years and older consumed at least three daily servings of vegetables, with at least one-third of these servings being dark green or orange vegetables, in 1994–1996 (age-adjusted to the year 2000 standard population).

Objective:

Increase the proportion of persons aged two years and older who consume at least two daily servings of fruit to 75%.

The U.S. Baseline: 28% of persons aged two years and older consumed at least two daily servings of fruit in 1994–1996 (age-adjusted to the year 2000 standard population).



Diet and Physical Activity Goals, Objectives, and Strategies

Goal:

Reduce the burden of cancer in Maryland through the promotion of healthy diet, healthy weight, and physical activity as a means of cancer prevention.

Targets for Change

These measurable objectives represent modest, population-based targets. It is important to note that continued lowering of BMI within the normal range, increasing physical activity, and increasing consumption of fruits and vegetables will likely reduce cancer risk even further.

1. By 2008, increase the percent of Marylanders with a BMI in the normal range (18.5 to 24.9 kg/m²) to 50%.

The Maryland baseline was 43.3% in 2000.

Source: BRFSS.

2. By 2008, increase the percent of Marylanders participating in regular and sustained physical activity.

The Maryland baseline was 22% in 2000.

Source: BRFSS.

3. By 2008, increase the percent of Marylanders consuming 5 or more servings of fruits and vegetables per day to 33%.

The Maryland baseline was 27.4% in 2000.

Source: BRFSS.

Objective 1:

Increase awareness of and demonstrate healthy eating and physical activity patterns among Maryland families and communities.

Strategies:

1. Identify and implement existing effective programs for intervention to improve healthy eating and physical activity targeted to youth, young adults, adults, and health care providers. Where gaps exist, design and implement programs based on knowledge, attitudes, and beliefs surveys.

2. Convey simple and culturally appropriate messages, including but not limited to content such as:

What does a healthful plate of food look like?

What is a healthful portion size?

What to choose when eating out?

What counts as a serving of fruits and vegetables?

What counts as physical activity?

How does healthy eating and physical activity reduce cancer risk?

3. Develop and implement programs that result in healthy diet, healthy weight, and healthy physical activity with an emphasis on children, youth, and their families.

4. Develop information for use by local advocates to help persuade local boards of education to provide optimal school meals and physical activity for school and after-school programs.



5. Support communities in grassroots advocacy for activities such as access to healthy food in schools and neighborhoods, development of sidewalks and trails for biking and hiking, monitoring upkeep of playgrounds and parks, the addition of safety and lighting features to outdoor recreational areas, and the addition of nutrient labeling for fast foods and restaurant menus.
6. Promote farmers' markets, school and community gardens, and Community Supported Agriculture.
7. Promote healthy eating and physical activity through community groups such as the ACS's "Body and Soul" program within African-American churches.
8. Work with food purveyors to open and maintain grocery stores in urban settings.
9. Enhance links among existing food programs, including WIC and 5 A Day with local farmers' markets.
10. Dedicate funding and resources to enhance and create new sidewalks, trails, playgrounds, and parks and add lighting and safety features to these areas.
11. Allow public access to school tracks, courts, gymnasiums, and other recreational facilities.
12. Build a partnership among planning agencies, parks and recreation departments, and health departments to educate the planning agencies on the health benefits of physical activity and the importance of walking/bicycle trails.

Objective 2:

Increase the prevalence of healthy diet, healthy weight, and physical activity among Maryland youth.

Strategies:

1. Evaluate the effectiveness of existing Maryland laws pertaining to primary and secondary physical education and comprehensive health education.
2. Mandate specific and consistent objectives for nutrition and physical activity education in grades K–12.
3. Compile a comprehensive list of existing nutrition-related curricula and enhance educators' access to these curricula; seek foundation support for curricula implementation.
4. Support the inclusion of questions pertaining to nutrition and physical activity on required Maryland assessment exams.
5. Promote interdisciplinary learning experiences to improve diet and exercise such as field trips to the produce section of supermarkets, development of school gardens, and stretch or dance breaks during the school day outside of standard physical education.
6. Provide grade-appropriate brief education sessions on topics such as: What is cancer? What are its causes? And how does healthy eating and physical activity reduce risk?
7. Provide healthy snacks and improved physical activity in after-school programs.
8. Provide a greater choice of activities in physical education classes, including noncompetitive and lifelong activities, such as walking, aerobics, and swimming, and tailor activities to students' fitness level.



9. Ensure that school meals and snacks reflect the education students are receiving about nutrition and associated risk factors.
10. Support school health councils in the evaluation of school meals and policy initiatives.
11. Enforce school policies on access to and regulation of vending machines. Advocate for the availability of healthier options in school vending machines, such as 100% fruit juices, water, and fruits and vegetables, and encourage the use of alternative methods for fundraising.

Objective 3:

Increase access to a healthy diet and physical activity at Maryland workplaces.

Strategies:

1. Encourage employers to adopt health promotion programs and policies, including paid release time for physical activity during the workday, provision of on-site exercise facilities and activities, organization of workplace competitions such as stair climbing and running or walking teams, use of stairwell prompts, and gym membership subsidies.
2. Educate workplace events planners to offer healthy food and activity breaks during meetings and other events. Disseminate the American Cancer Society's "Meeting Well Tool."
3. Provide state tax incentives for employers to incorporate employee wellness programs.

Objective 4:

Increase the number of health care providers offering preventive nutrition and physical activity services.

Strategies:

1. Expand health care provider training regarding the connection among energy imbalance, suboptimal diet, alcohol intake, and cancer.
2. Establish and increase provider reimbursement for nutrition and physical activity counseling targeting high-risk patients within all payor systems in Maryland.
3. Create and establish guidance and assessment tools for use in all health care settings for the promotion of physical activity and healthy eating.
4. Educate providers about their importance as role models for patients, and provide incentives for them to adopt healthy diet and activity habits.

Objective 5:

Engage the public with appropriate health messages related to nutrition, obesity, physical activity, and cancer via the media.

Strategies:

1. Create or enhance local public service campaigns about the importance of healthy eating and physical activity in the prevention of cancer.
2. Create a news article series about nutrition, activity, and links to disease.
3. Pitch information about existing programs, campaigns, and specific events to news outlets in the hope of gaining media coverage.
4. Promote existing community, statewide, and national nutrition and/or physical fitness days to both local and statewide news outlets.

**Objective 6:**

Increase scientific knowledge regarding the relationship among nutrition, physical activity, and cancer.

Strategies:

1. Continue to encourage research on nutrition and physical activity in relation to cancer; continuously examine evidence in an effort to determine when evidence is strong enough to merit intervention.
2. Continue to encourage behavioral and economic research on targeted individual and societal interventions for suboptimal diet, obesity, and physical inactivity.
3. Educate the public about the need for etiologic research on nutrition, obesity, and physical activity and cancer.

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