

# The Arizona Comprehensive Cancer Control Plan

*Working Together  
to Reduce Cancer*



This publication is dedicated to Arizonans who have lost their lives to cancer and honors those who have survived. We present this as a testimony to their courage and as a commitment to saving lives in Arizona.

Dear Residents of Arizona,

Cancer remains the second leading cause of death in our state and affects every individual, family, and community. It is with great pleasure that we present the first ever Arizona Cancer Plan. The plan serves as a comprehensive blueprint for action that will guide state cancer control efforts and promote collaborations between public and private agencies. Progress in cancer control and prevention will result from the collective work of a multitude of organizations including government, business, health care, research, and non-profit organizations. Partnerships between agencies will allow organizations to work together toward the common goal of reducing cancer morbidity and mortality among Arizonans.

The goals, objectives, and strategies within this plan are the result of numerous meetings and brainstorming sessions and were written by a group of energetic, compassionate, and dedicated individuals who came together to address cancer throughout the continuum of care: prevention, early detection, diagnosis and treatment, and quality of life. To produce this plan, the Arizona Comprehensive Cancer Control Coalition examined the current cancer burden, identified cancer risk factors, patient needs, and gaps in services, and created goals and objectives that serve as a foundation from which to build. As the needs of our residents change, comprehensive cancer control priorities will be revisited and revised.

We commend the Arizona Comprehensive Cancer Control Coalition for developing this dynamic document that will navigate our state toward a more integrated approach to reducing cancer's impact on our diverse residents. The cancer prevention and control activities in this state are paving the way to a healthier Arizona.

Our health is one of the most important investments we can make for our future. We are thankful to those individuals who volunteered their time and expertise in order to create this road map for change.

Sincerely,



Janet Napolitano  
Governor



Susan Gerard  
Director  
Arizona Department of Health Services

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# ACKNOWLEDGEMENTS

The Arizona Comprehensive Cancer Control Plan was created by a group of diverse, dedicated, and compassionate individuals who volunteered their time and expertise to champion for a more integrated and coordinated approach to cancer. This

document is the result of their experiences, dialogue, debates, and consensus on the most important cancer issues facing our state. Over fifty organizations were involved in this process and over one hundred Arizonans provided their input via community forums, coalition meetings, and committee meetings.

## Special Thanks

The Arizona Comprehensive Cancer Control Steering Committee is comprised of experts in the area of cancer prevention and control. The Steering Committee played a critical role in the formation of the Arizona Comprehensive Cancer Control Plan. Their guidance and foresight were instrumental in the development of this plan. This document would not have been completed without the dedication and

contributions made by the following steering committee members:

**David Alberts, MD** – *Arizona Cancer Center*

**Kate Aurelius** – *Arizona Health Care Cost Containment System (AHCCCS)*

**John W. Craft Jr.\*, MBA** – *American Cancer Society*

**Timothy Flood, MD** – *Arizona Department of Health Services (ADHS)*

**MaryAnn Guerra, MBA** – *Translational Genomics Research Institute (TGen)*

**Ana Maria Lopez, MD, MPH** – *Arizona Cancer Center*

**Jody Pelusi, FNP, PhD** – *Oncology Nursing Society*

**G. Marie Swanson, PhD, MPH** – *University of Arizona College of Public Health*

**Margaret Tate, MS, RD** – *Arizona Department of Health Services*

**James Warneke, MD** – *Arizona Cancer Center, American College of Surgeons*

**Charlton Wilson\***, MD, FACP – *Phoenix Indian*

\*Co-chair of the Steering Committee

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it is the only thing that ever has.”

– Dr. Margaret Mead

## *Medical Center*

The Continuum of Care Committee members and chairs spent countless hours providing the foundation for this Plan. The continued energy and support shown by the members provided the mechanism for which to develop the goals, objectives and strategies. The chairs from each Priority Area Committee showed tremendous strength and resolve in accomplishing their tasks. Their leadership and management skills were integral in this process. Their efforts are recognized and greatly appreciated. A list of committee members is provided at the beginning of each section.

Additional acknowledgement and thanks are extended to the following individuals: Amy Stoll, MS, Sharon Sass, RD and Veronica Perez, MPH for their knowledge of, assistance with, and commitment to the planning process. Virginia Warren, MPA, Chronic Disease Section Manager, Arizona Department of Health Services for her overall guidance with planning efforts; Paran Pordell, MPH, CHES, Centers for Disease Control and Prevention Public Health Advisor, for her expertise and technical assistance with comprehensive cancer control planning efforts as well as writing components of this Plan; Taira Kochar, MPH, Comprehensive Cancer Control Program Manager, Arizona Department of Health Services for coordi-

nating the activities of the planning process and writing components of this plan.

We would also like to thank the following individuals for their help with chapter components:

**Brian Bender, MBA – ADHS**

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**Brian Hasty, MT – ADHS**

**Lisa Hess, PhD – Arizona Cancer Center**

**Mandy Impson, MBA, MSHA – Mayo Clinic Cancer Center**

**Allison Jackson, MS – ADHS**

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**Angie Lorenzo – ADHS**

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**Ross Merritt, MPH – ADHS**

**Norm Petersen, MS – Inter Tribal Council of Arizona**

**Mary Ann Souch – ADHS**

**Wendy Talbot, MPH – HSAG**

**Paul Tatum, MD**

**Shannon Welch – ADHS**

**Georgia Armenta Yee, BSW, CTR – ADHS**

Lastly we would like to thank our Coalition members for their dedication and participation as well as Arizonans throughout the state. Arizona's Comprehensive Cancer Control Plan came to fruition through the work of many whose ideas, experiences, and expertise made this plan a reality.

We wanted to take the opportunity to offer our sincere gratitude to the states that came before us for sharing their experiences, strategies, and perspective through their cancer plans. Their willingness to share



## Arizona Comprehensive Cancer Control Coalition

American Cancer Society  
 Arizona Cancer Center  
 Arizona Department of Health Services  
 Arizona Health Care Cost Containment System  
 Arizona Hematology Oncology  
 Arizona Oncology Associates  
 Arizona Pain Initiative  
 Arizona Public Health Association  
 Arrowhead Hospital  
 Bag It  
 Banner Desert Medical Center  
 Banner Good Samaritan Medical Center  
 Banner Homecare and Hospice  
 Coalition for African American Health and Wellness  
 Cancer Center of Northern Arizona and Sedona  
 Chandler Regional Hospital  
 Cochise County Health Department  
 Community Health Charities of Arizona  
 Gila River Healthcare Corporation  
 Health Choice Arizona  
 Health Services Advisory Group  
 Hospice Family Care  
 Inter Tribal Council of Arizona  
 John C. Lincoln Hospital  
 John C. Lincoln North Mountain Medical Center  
 Kindred Hospital Tucson  
 Maricopa Community Health Center Nogales  
 Maricopa County Department of Public Health  
 Maricopa Integrated Health System  
 Mariposa Community Health Center  
 Mayo Clinic Cancer Center  
 Mountain Park Health Center  
 National Cancer Institute's Cancer Information Service  
 Navajo Area Indian Health Services  
 Navajo Nation Breast and Cervical Cancer Prevention Program  
 Oncology Nursing Society  
 Phoenix Children's Hospital  
 Phoenix Indian Medical Center  
 Progressive Health Care Group  
 Regional Center for Border Health  
 Shade Foundation  
 Southwest Prostate Cancer Foundation  
 St. Joseph's Hospital and Medical Center  
 Sunstone Cancer Support Centers  
 Susan G. Komen Breast Cancer Foundation  
 TGen, Translational Genomics Research Institute  
 The Leukemia and Lymphoma Society  
 The Wellness Community  
 United States Air Force  
 University of Arizona, College of Public Health  
 Virginia G. Piper Cancer Center  
 Well Woman HealthCheck Program  
 Western Regional Community Clinical Oncology Program  
 Yavapai County Community Health Services  
 Yuma Regional Medical Center



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# EXECUTIVE SUMMARY

A group of compassionate, dedicated, and diverse individuals devoted their time, expertise, and efforts for the past two years to develop the Arizona Comprehensive Cancer Control Plan.

**While their organizations and professions may have differed,**

they shared one common and overarching goal: To work together to reduce Arizona's cancer burden.

Like many states across the nation, a need for a more integrated and coordinated method to address cancer seemed necessary in order to decrease cancer's toll on individuals, families, and communities. Instead of researching cancer and providing patient care and public health prevention strategies as stand alone entities, it was time for organizations to band together to change the face of cancer prevention and care. It was necessary to define Arizona's current cancer burden, the state's strengths and gaps with respect to cancer control efforts as well as identify gaps in care, accessibility, education, and services provided and made available to Arizonans.

Combining the strengths and resources of multiple organizations would decrease the likelihood for a

duplication of efforts and would promote a more focused and targeted cancer control initiative.

Arizona cancer statistics mirror those experienced across the nation. Cancer continues to be the second leading cause of death in our state. In Arizona, an estimated 9,920 deaths will occur in 2005 due to cancer. Furthermore, it is estimated that in the same year, 23,880 individuals will receive a cancer diagnosis statewide.

Gaining an understanding from one another's perspectives through a series of coalition and committee meetings allowed organizations and individuals to not only work with one another toward a common goal for the first time, but also strengthened existing collaborations between agencies. A clear plan of action was outlined and the group was charged with an overall responsibility: Create a feasible plan written



Photo courtesy of National Cancer Institute

by Arizonans for Arizonans in order to address the complex, interrelated issues that accompany cancer: its prevention, early detection, diagnosis, treatment, and management. The Centers for Disease Control and Prevention (CDC) defines comprehensive cancer control (CCC) as an “integrated and coordinated approach to reduce the incidence, morbidity, and mortality of cancer through prevention, early detection, treatment, rehabilitation, and palliation.” The Arizona Comprehensive Cancer Control Coalition with guidance from the Steering Committee created the goals, objectives, strategies, and activities outlined in this document.

The Arizona Comprehensive Cancer Control Plan is divided into seven chapters that follow the continuum of care model (Prevention, Early Detection and Screening, Diagnosis and Treatment, Quality of Life, Research) and include chapters on disparities and environmental carcinogens. Each chapter has at least one goal followed by a set of more specific objectives and strategies except the environmental carcinogens chapter, which provides general recommendations. Committees representing each of the continuum of care chapters were formed and members were instrumental in creating this final product that will lay the foundation for implementation efforts. It is the hope of the Arizona Comprehensive Cancer Control Coalition that through collaborative and coordinated efforts, the cancer plan’s goals and objectives will be successfully achieved, thus directly diminishing Arizona’s cancer burden. The goals of the Arizona Comprehensive Cancer Control Plan are:

## **Prevention:**

To reduce the risks for developing cancer among all Arizonans by promoting and engaging in healthy behaviors.

## **Early Detection and Screening:**

To promote, increase, and optimize the appropriate utilization of high quality cancer screening and follow-up services.

## **Diagnosis and Treatment:**

Increase access to appropriate and effective cancer diagnosis and treatment services.

## **Quality of Life:**

Improve quality of life for people impacted and affected by cancer in Arizona.

## **Research:**

**Goal 1:** Promote communication, collaboration, infrastructure, training, and funding among cancer researchers.

**Goal 2:** Improve the accessibility, analysis and evaluation of cancer data as well as promote the use of tissue banking in cancer research.

**Goal 3:** Promote participation in cancer clinical trials in Arizona, specifically among underserved populations.

## **Disparities:**

Reduce cancer disparities among Arizonans.



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# INTRODUCTION

## Cancer Burden in Arizona

In their lifetime one in two men and one in three women will be diagnosed with cancer. Cancer causes 25% of all deaths in the United States. Surpassed only by heart disease, cancer is the second leading cause of death nationwide and will cause an

estimated 570,280 deaths in 2005. Arizona cancer statistics mirror those experienced across the nation. In Arizona, an estimated 9,920 deaths will occur in 2005 due to cancer. The number of individuals in the United States who will be diagnosed with cancer in that same year is estimated to be 1,372,910. Furthermore, it is estimated that in 2005, 23,880 individuals will receive a cancer diagnosis in Arizona.<sup>1</sup>

## Arizona Demographics

Arizona is the second fastest growing state in the country. From 2000-2004, Arizona's population grew by 26.5% while the total population in the

U.S. experienced a 10% increase.<sup>2</sup> In 2004, the U.S. Census Bureau estimated that the total population in Arizona was 5,743,834, of which 2,873,663 are male, and 2,870,171 are female. Although the median age of Arizona residents is 34.1 years, Arizonans aged 65 years and older comprise nearly 13% of the state population, compared to 12% nationwide.<sup>3</sup>

In 2003, an estimated 64.1% of residents were White, non-Hispanic, 25.3% were Hispanic or Latino and 5.2% were American Indian or Alaska Natives. Blacks or African Americans accounted for 3.3% of the total population and Asians and/or Pacific Islanders represented 2.1% of the total population. From 1990 to 2003, there was a 91.1% increase in Arizona's minority population. Since

## Race/Ethnicity Definitions

In October 1997, the Office of Management and Budget (OMB) announced the revised standards for federal data on race and ethnicity. The minimum categories for race are now: American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; and White. Instead of allowing a multiracial category as was originally suggested in public and congressional hearings, the OMB adopted the Interagency Committee's recommendation to allow respondents to select one or more races when they self-identify. With the OMB's approval, the Census 2000 questionnaires also include a sixth racial category: Some Other Race. There are also two minimum categories for ethnicity: Hispanic or Latino and Not Hispanic or Latino. Hispanics and Latinos may be of any race.

The new categories were used by the Census Bureau for the Census 2000 Dress Rehearsal in Spring 1998, and were used on the Census 2000 questionnaire. The new standards are effective immediately for new and revised data collections by federal agencies, and all federal agencies were to adopt these new standards by January 1, 2003. For more information, please visit the following website:  
<http://www.census.gov/population/www/socdemo/race/racefactcb.html>.

We would like to note that specific language has been used to define race and ethnicity within the Arizona Comprehensive Cancer Control Plan. The term "White" refers to the standard data collection category of White, non-Hispanic. As defined by U.S. Census 2000, "White" refers to people having origins in any of the original peoples of Europe, the Middle East, or North Africa. The term "Hispanic" refers to the standard data collection category of White, Hispanic. This includes people of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin. The terms "Black" or "African American" refers to people having origins in any of the Black racial groups of Africa. The terms "Native American," "American Indian", and "Native" refer to the standard data collection category of American Indian and Alaska Native. People having origins in any of the original peoples of North and South America (including Central America), and who maintain tribal affiliation or community attachment are categorized as American Indian and Alaska Native. The term "Asian" refers to people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent. "Native Hawaiian and Other Pacific Islander" refers to people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. The Arizona Comprehensive Cancer Control Coalition recognizes the challenging issue of utilizing labels to describe racial/ethnic groups.

It is difficult to gain a consensus on the preference of categories such as "people of color/minority populations," "American Indian/Native American," Black/African American," "Hispanic/Latino," and "White/Caucasian." We acknowledge that not everyone identifies herself or himself using or applying these categories. As a coalition committed to forwarding health equity, cultural competency, and objectivity, we recognize and respect the importance of cultural differences, especially as distinctions relate to how individuals, families, and communities define or describe themselves. Within the body of our cancer plan, much of the referenced research, behavioral, and cancer data is categorized by race/ethnicity. The Arizona Comprehensive Cancer Control Coalition recognizes that race and ethnicity are created categories with historical roots used to classify people. The aforementioned categories are based on social context and have no biological or genetic basis.

1990, both Asian and Hispanic ethnic groups doubled in size whereas the Black or African American population increased by 68.1% and the American Indian population increased by 43.8%.<sup>4</sup>

There are 15 counties in Arizona, of which six have a population less than 100,000. The largest county, Maricopa, has a total population of 3,389,260 residents while the smallest county, Greenlee, has a population of 7,517 residents.<sup>5</sup> Compared to the estimated U.S. median household income (\$43,527) in 2003, the estimated median household income in Arizona was slightly lower at \$42,062.<sup>6</sup> The three-year average poverty rate from 2001-2003 was 13.9 in Arizona, whereas the

national three-year average poverty rate for the same time period was 12.1.<sup>7</sup>

## Economic Cost of Cancer

Across the nation, cancer's economic burden is staggering. The National Institutes of Health (NIH) estimates that the overall cost for cancer in the year 2004 was \$189.8 billion, of which \$69.4 billion was attributed to direct medical costs, \$16.9 billion was for indirect morbidity costs, and \$103.5 billion was for indirect mortality costs.<sup>8</sup> Based on U.S. Census 2004 population estimates, Arizona's population represents approximately 1.96% of the total U.S. population. Utilizing this percentage of the national annual direct costs attributed to cancer, approxi-

**FIGURE v.1** — Ten Leading Sites of Cancer Deaths by Gender, Average Annual Count, 1999-2001

Male	Female
1. Lung and Bronchus (1408)	1. Lung and Bronchus (1078)
2. *Other, NOS (944)	2. *Other, NOS (934)
3. Prostate (529)	3. Breast (678)
4. Colorectal (446)	4. Colorectal (410)
5. Pancreas (246)	5. Pancreas (235)
6. Lymphoma (207)	6. Lymphoma (178)
7. Bladder, includes in situ (151)	7. Brain (90)
8. Esophagus (143)	8. Uterus (75)
9. Kidney/Renal Pelvis (135)	9. Kidney/Renal Pelvis (75)
10. Stomach (117)	10. Multiple Myeloma (70)

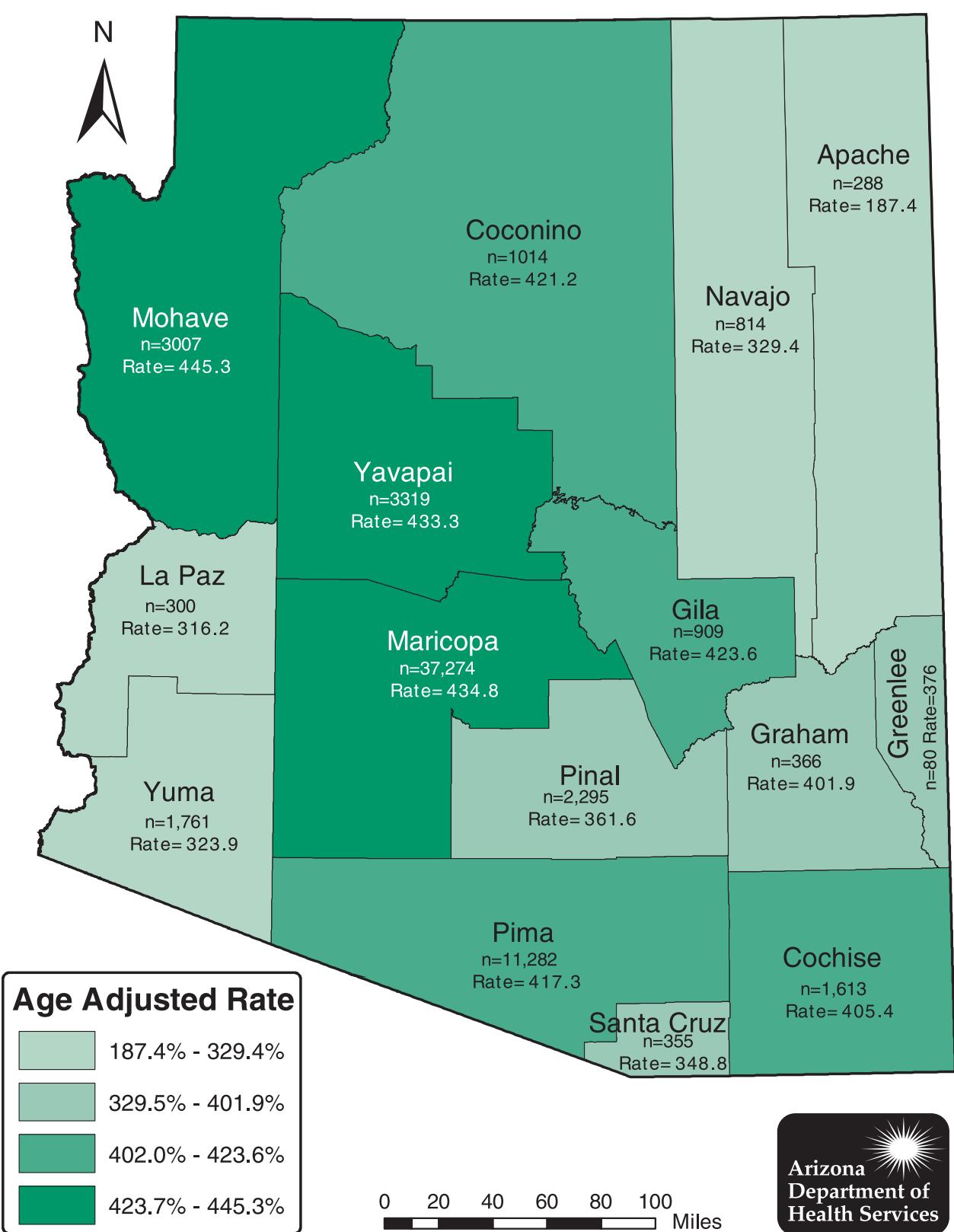
\*Ten Leading Sites in addition to other, NOS.

\*Other, NOS=ill-defined or not otherwise specified.

**Source:** Arizona Department of Health Services. Arizona Cancer Registry, 2005.

**FIGURE** v.2

Average Age-Adjusted Incidence Rates of Malignant Neoplasms  
by County of Residence, Arizona, 1999-2001



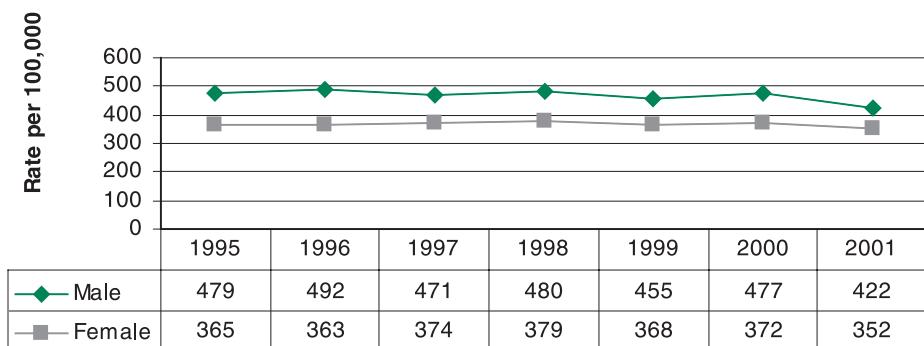
mately \$3.72 billion was spent on cancer in Arizona in 2004, and the total direct medical cost in our state was \$1.36 billion in the same year.

## Cancer Incidence

Cancer incidence is the number of newly diagnosed cases of cancer occurring in a population in a given period of time. Arizona's overall cancer incidence rate in 2001 was 423.5 per 100,000. The average age-adjusted cancer incidence rates from 1999-2001 by County of Residence are shown in Figure v.2. Out of

the 15 counties, Mohave County had the highest incidence rate of malignant neoplasms (445.3/100,000), whereas Apache County had the lowest incidence rate (187.4 per 100,000). When comparing the age-adjusted incidence rates for all cancers among males and females, Arizona males have higher incidence rates than females (497.7 per 100,000 versus 381.4 per 100,000, respectively in 2001). However, from 1995-2001, overall cancer incidence rates have remained relatively stable for both sexes (Figure v.3).

**FIGURE v.3** Age-Adjusted Incidence Rates for All Cancers by Gender and Year, Arizona, 1995-2001



**FIGURE v.4** Age-Adjusted Incidence Rates of Invasive Cancer Cases by Race, Arizona, 2001

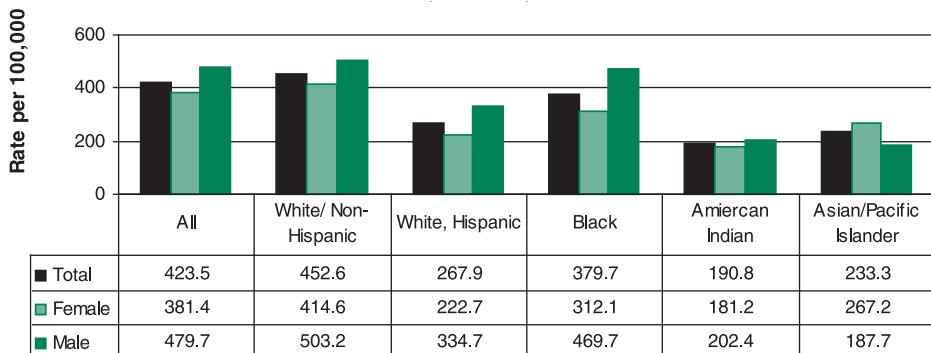


Figure v.4 illustrates the comparison of incidence rates by race/ethnicity in Arizona. White, non-Hispanics have the highest cancer incidence rates at 452.6 per 100,000, while American Indians have the lowest incidence rates of cancer at 190.8 per 100,000. Among males and females, cancer incidence increases with older age. Over 85% of Arizona residents who are diagnosed with cancer are aged 55 years and older. From 1999-2001, 75% of cancer cases occurred among the 60 years and older population (Figure v.6).

Among the leading cancers in Arizona, there is an inverse relationship between survivorship and stage at diagnosis. Once a cancer is diagnosed, the lower the stage (referring to how much the tumor has or has not spread) at the time of diagnosis, the higher the relative survival rates will be. The five-year cancer survival

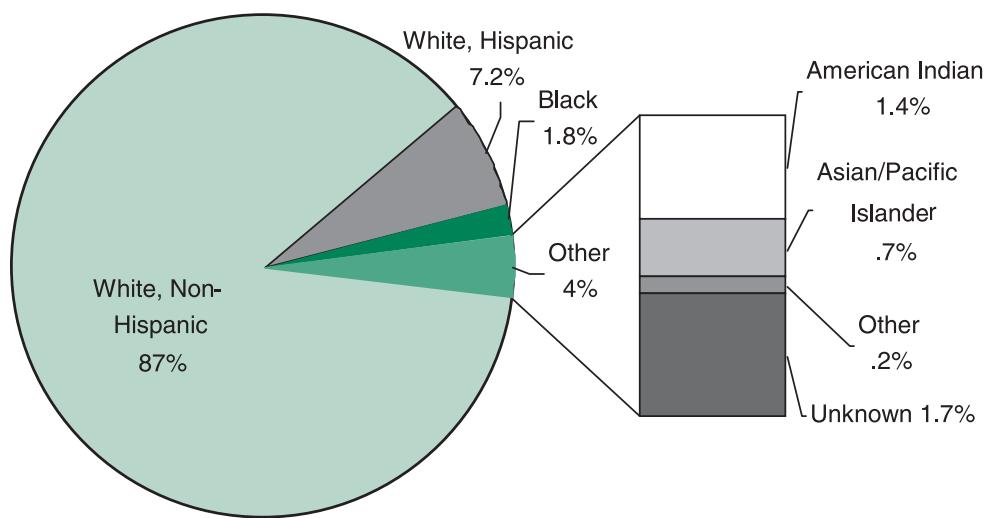
rate is highest among those diagnosed with prostate cancer and lowest among those with lung cancer (Figure v.7).

## Cancer Mortality

Among 45-64 year-olds, cancer (malignant neoplasms) was ranked as the leading cause of death. With respect to all age groups, malignant neoplasms were the second leading cause of death among Arizonans in the same year. From 1995-2000, lung and bronchus, prostate, and colorectal cancers were the top three causes of cancer mortality in Arizona males, while lung and bronchus, breast, and colorectal cancers were the top three in Arizona females.

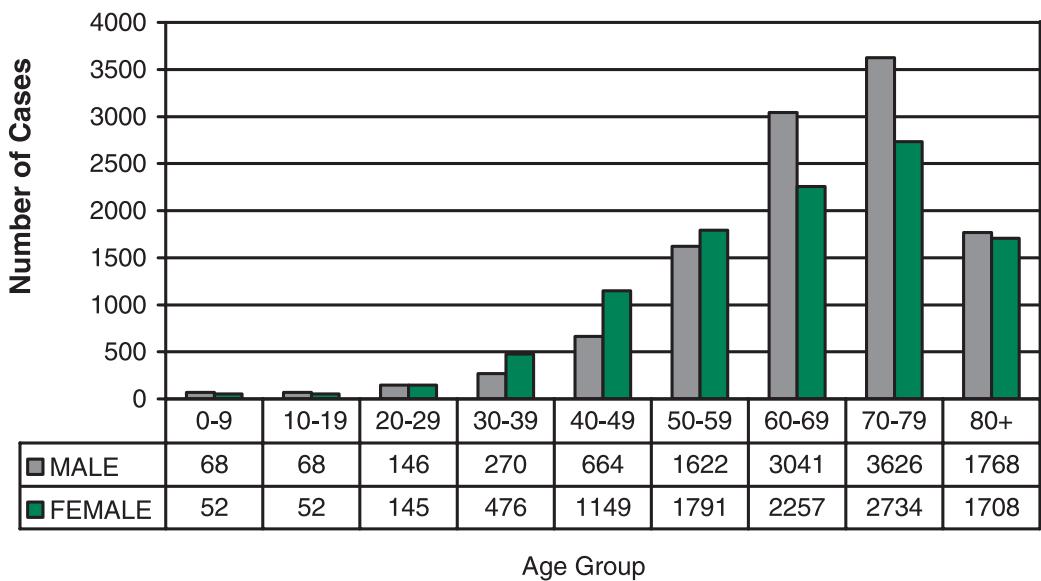
In Arizona, the average age-adjusted cancer mortality rate from 1999-2001 was 173.7/100,000.

**FIGURE v.5** Invasive Cancer Cases By Race/Ethnicity in Arizona, Average Annual Count, 1999-2001

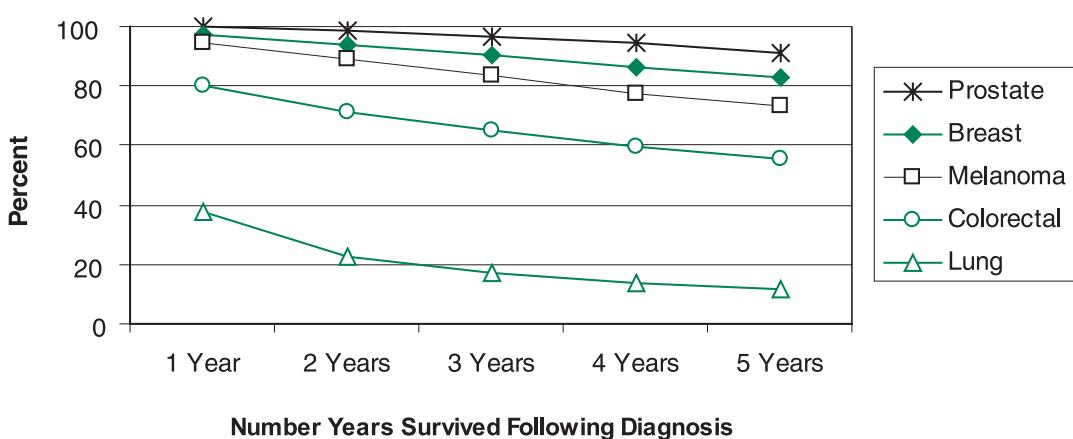


**FIGURE v.6**

Invasive Cancer Cases By Age and Gender in Arizona,  
Average Annual Count, 1999-2001

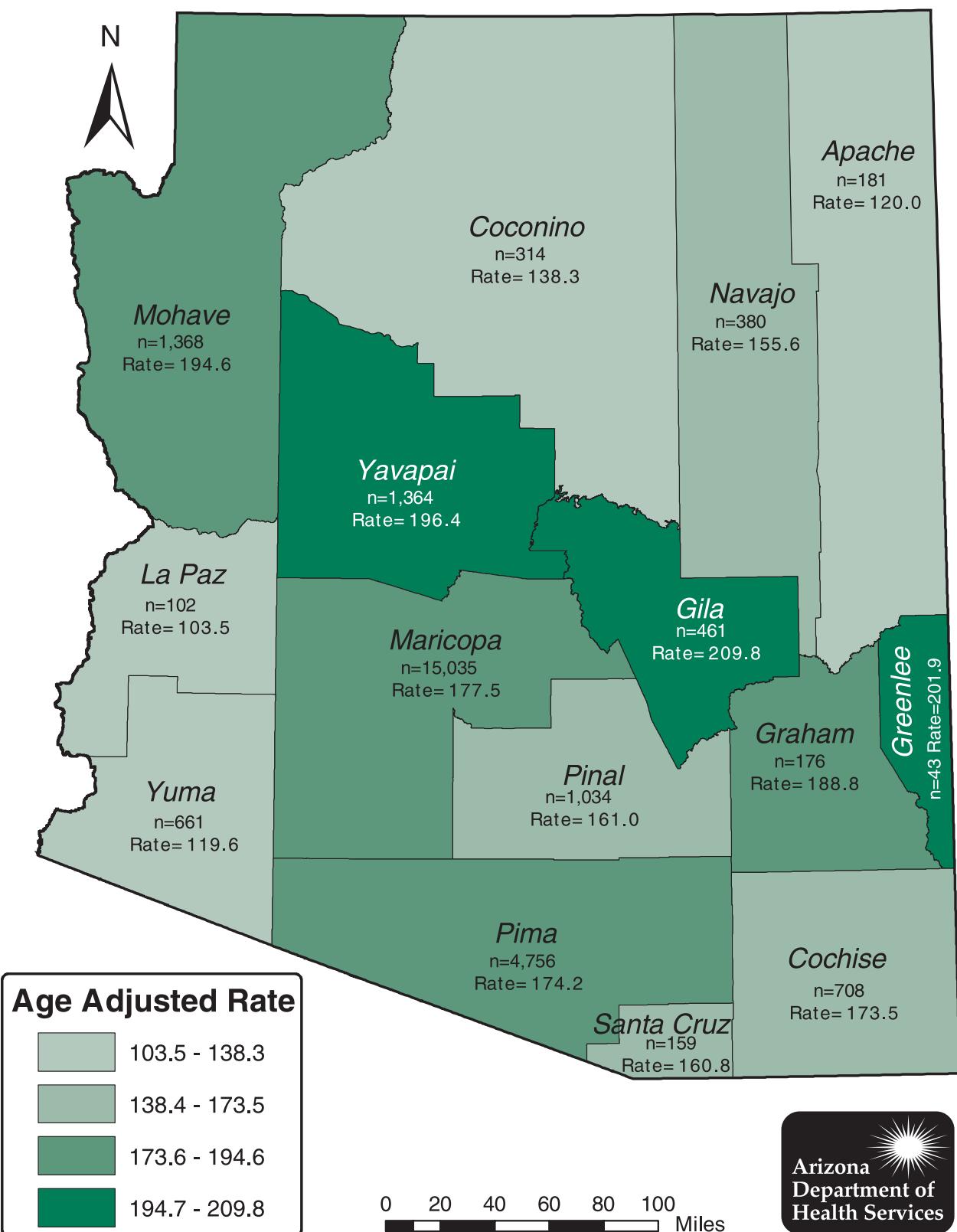
**FIGURE v.7**

Five-Year Percent Cancer Survival, All Stages, 1993-1998



**FIGURE** v.8

Average Annual Age-Adjusted Mortality Rates for Malignant Neoplasms by County of Residence, Arizona, 1999-2001



Although Maricopa County has the highest number of cancer deaths, as demonstrated in Figure v.8, Gila County has the highest cancer death rate (209.8/100,000) and La Paz County has the lowest (103.5/100,000). Broken down further by gender, both male and female age-adjusted mortality rates decreased from 1999-2001.

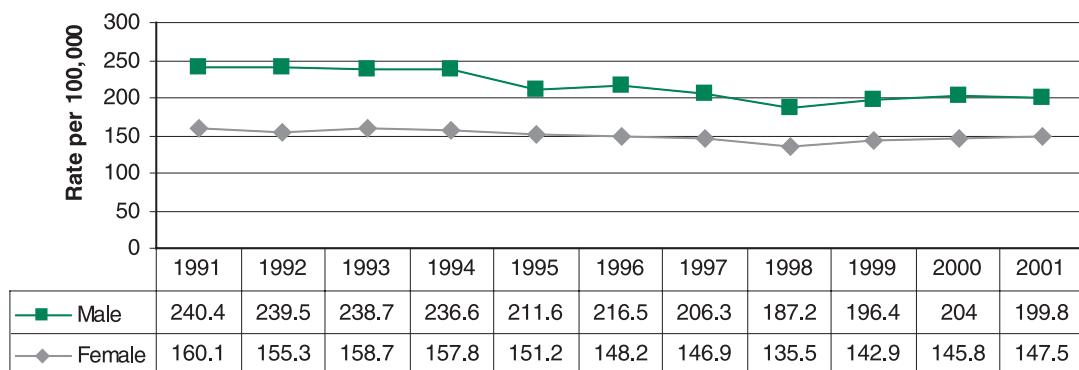
As shown in Figure v.9, male mortality rates ranged from 240.4 in 1991 to 199.8/100,000 in 2001, and female mortality rates ranged from 160.1 to 147.5/100,000 for the same years. Since cancer risk increases with advanced age, mortality average annual counts are highest among Arizonans aged 65-74 years (3741) and second highest among males and females aged 75-84 years (1897), as seen in Figure v.10. With

respect to age-adjusted mortality rates by race/ethnicity and gender, Black males and females experienced the highest cancer mortality rates in Arizona in 2001, followed by White, non-Hispanic males and females (Figure v.11).

## Site-Specific Cancer Statistics

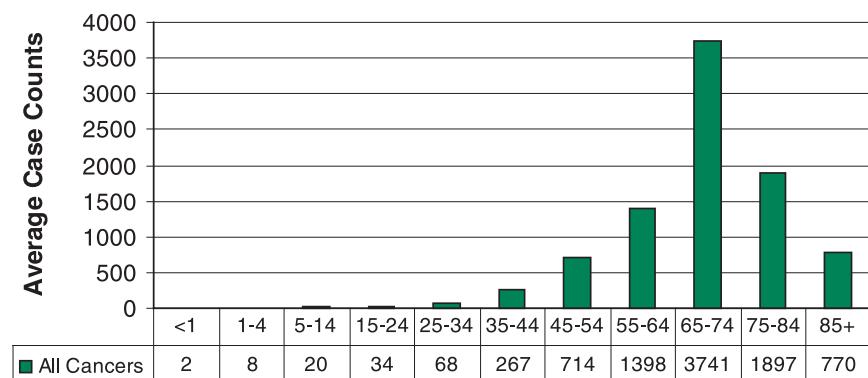
In this section, we set out to provide basic cancer incidence and mortality data for the top cancers faced by Arizonans: Lung and Bronchus, Female Breast, Prostate, Colorectal, and Melanoma. Based on data from 1999-2001, Arizona female lung cancer incidence rates are lower than rates experienced by females nationally. Although U.S. male lung cancer incidence rates have decreased within the same period, Arizona-specific male lung cancer incidence rates are on the

**FIGURE v.9** Age-Adjusted Mortality Rates for All Cancers by Gender and Year, Arizona, 1991-2001

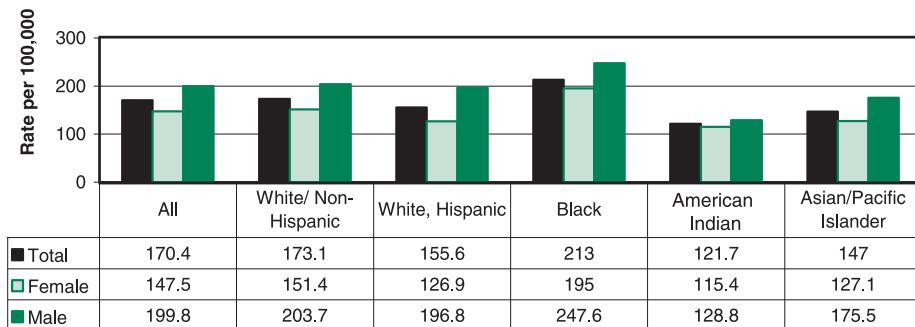


**FIGURE v.10**

Cancer Mortalities By Age Group in Arizona, Average Annual Count, 1999-2001

**FIGURE v.11**

Age-Adjusted Mortality Rates of Malignant Neoplasms (Cancer) by Race/Ethnicity and Gender in Arizona, 2001



rise (Figure v.12). However, U.S. lung cancer incidence rates continue to be higher compared to rates experienced by males in Arizona. Between 1995-2001, lung cancer incidence rates declined (Figure v.13). Within the same time period, lung cancer mortality rates remained somewhat constant until 1999 when the mortality rate peaked at 51% and then experienced a decrease in the remaining two years. With respect to mortality rates by race/ethnicity, Blacks experienced the highest morality rate (57.2%) followed by White, non-Hispanics (51.8%), and Asian/Pacific Islanders (32.7%) (Figure v.14).

From 1999-2001, U.S. breast cancer incidence rates were higher than incidence rates experienced in Arizona (Figure v.15). As demonstrated by Figure v.16, breast cancer mortality rates among Arizona women increased from 1995-2001. Black women suffered from the highest breast cancer mortality rates from 1999-2001 while American Indians experienced the lowest in the same time period when compared to other racial/ethnic groups for which data was available (Figure v.17). Compared to U.S. prostate cancer incidence and mortality rates, Arizona rates are lower (Figure v.18). Figure v.19 illustrates prostate cancer incidence and mortality rates from 1995-2001. While the prostate cancer mortality rates increased, incidence rates declined during the same time period.

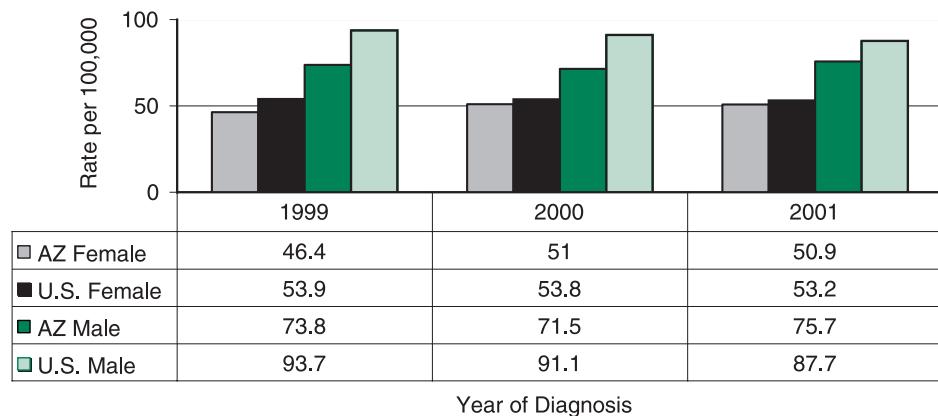
From 1991-2001, Black males had the highest prostate cancer incidence rate followed by White, non-Hispanic, and White Hispanic males (Figure v.20).

In addition, Black males suffered from the highest prostate cancer mortality rates followed by White Hispanic, and White, non-Hispanic males during the same time period. Prostate cancer incidence and mortality rates experienced by Black males in Arizona were similar to nationwide rates. Compared to national colorectal cancer incidence rates for both males and females (1999-2001), state rates are lower (Figure v.21). Colorectal cancer incidence rates for 1995-2001 ranged from 46.6 to 43.1/100,000 while mortality rates ranged from 17.2 to 16.4/100,000 within the same time period (Figure v.22).

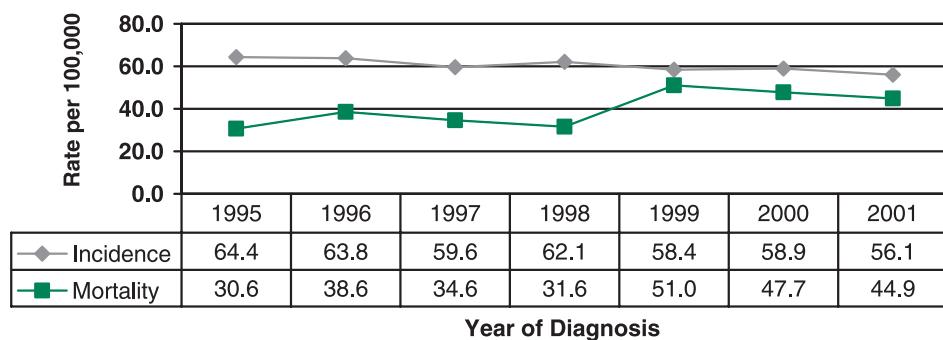
Figure v.23 shows that Blacks experienced the highest colorectal cancer incidence and mortality rates followed by White, non-Hispanics, and White Hispanics based on cancer data compiled from 1999-2001. Melanoma incidence rates ranged from 16.8/100,000 to 17.8/100,000 from 1999-2001, whereas mortality rates ranged from 2.0-2.8 during the same time period (Figure v.19).

**FIGURE v.12**

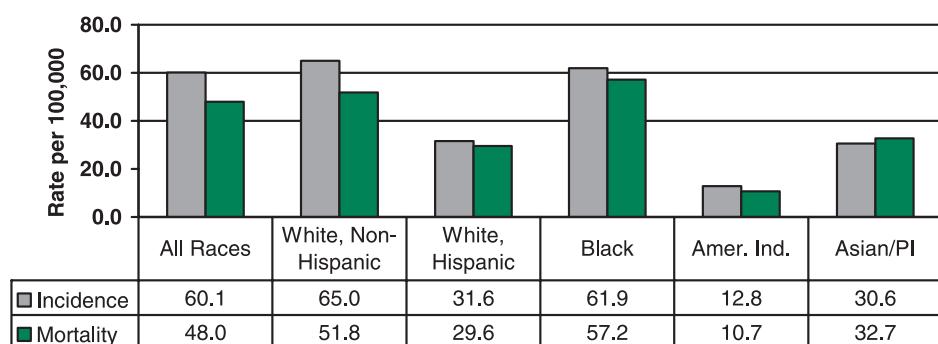
**U.S.\* and Arizona Age-Adjusted Incidence Rates of Lung Cancer by Gender,  
1999-2001** \*CDC National Program of Cancer Registries

**FIGURE v.13**

**Age-Adjusted Incidence and Mortality Rates for Lung Cancer in Arizona,  
1995-2001**

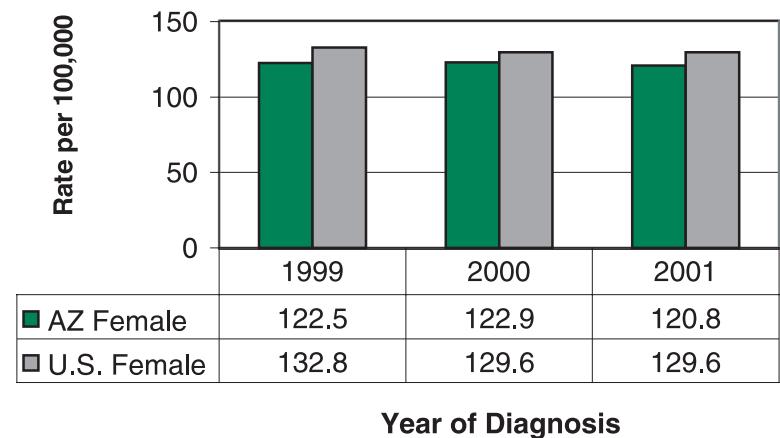
**FIGURE v.14**

**Age-Adjusted Incidence and Mortality Rates for Lung Cancer by  
Race/Ethnicity, 1999-2001**

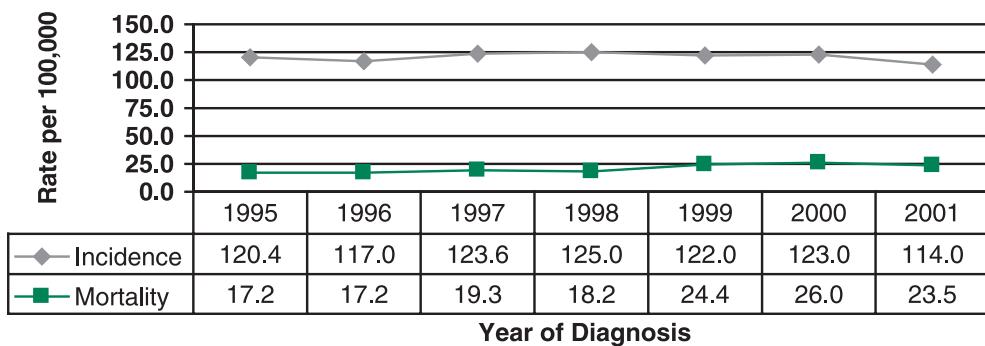


**FIGURE v.15**

U.S.\* and Arizona Female Breast Cancer Counts and Age-Adjusted Incidence Rates, 1999-2001 \*CDC National Program of Cancer Registries

**FIGURE v.16**

Age-Adjusted Incidence and Mortality Rates for Female Breast Cancer in Arizona, 1995-2001

**FIGURE v.17**

Average Annual Age-Adjusted Incidence and Mortality Rates for Female Breast Cancer by Race/Ethnicity, 1999-2001

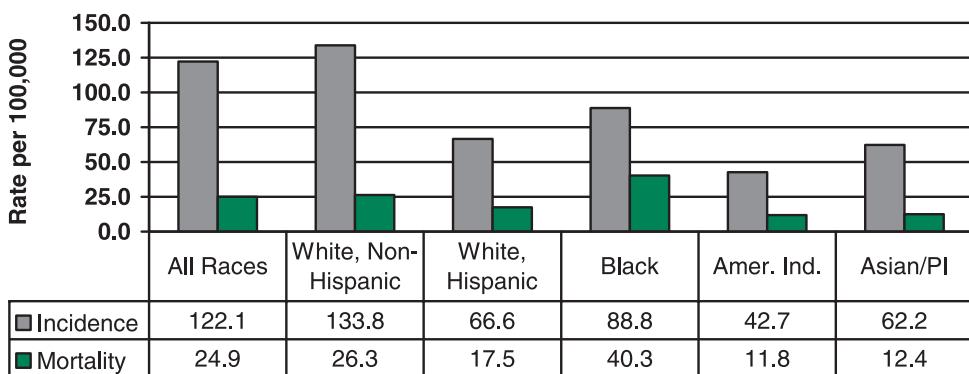


FIGURE v.18

**U.S.\* and Arizona Prostate Cancer Age-Adjusted Incidence and Mortality Rates, 1999-2001** \*CDC National Program of Cancer Registries

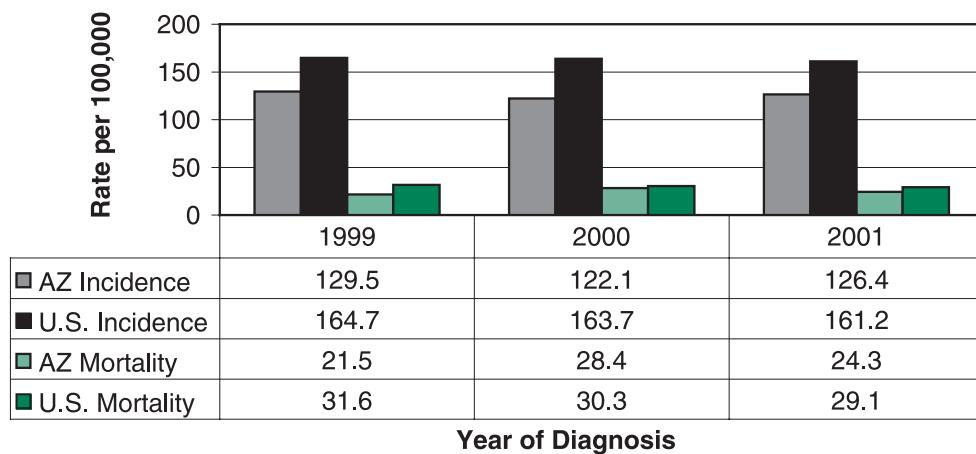


FIGURE v.19

**Age-Adjusted Prostate Incidence and Mortality Rates in Arizona, 1995-2001**

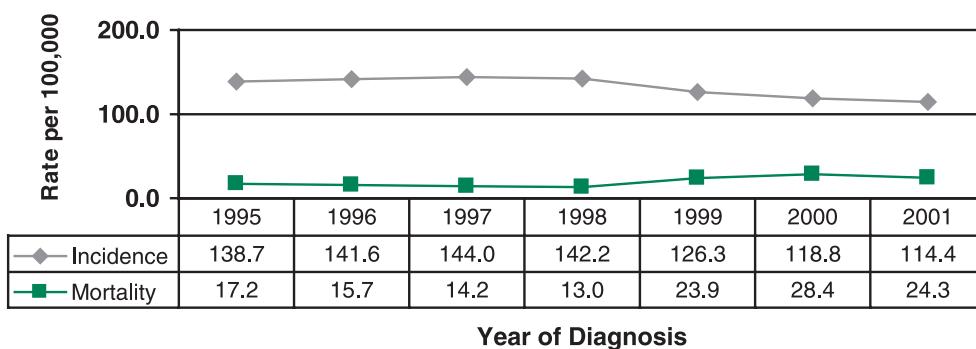
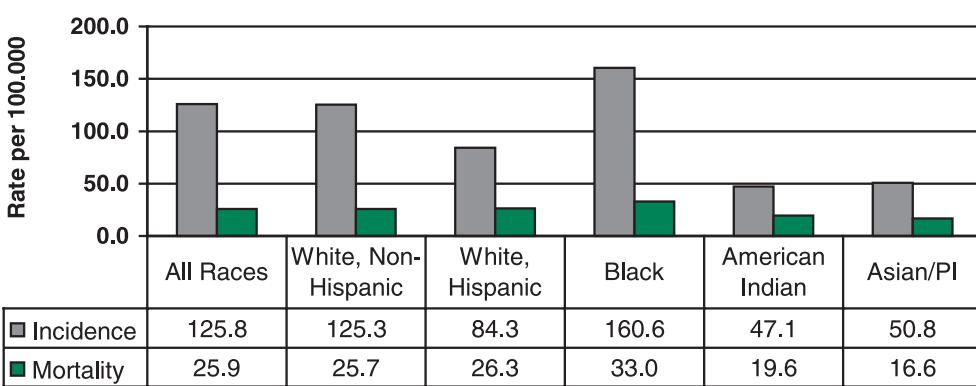


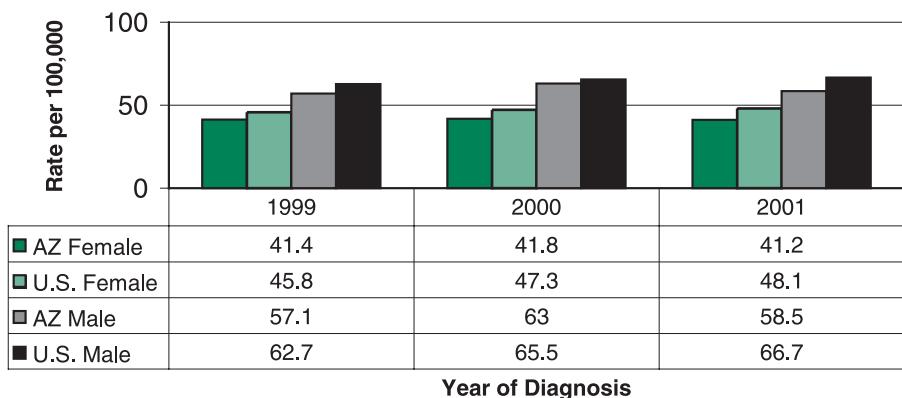
FIGURE v.20

**Age-Adjusted Prostate Incidence and Mortality by Race/Ethnicity, 1999-2001**

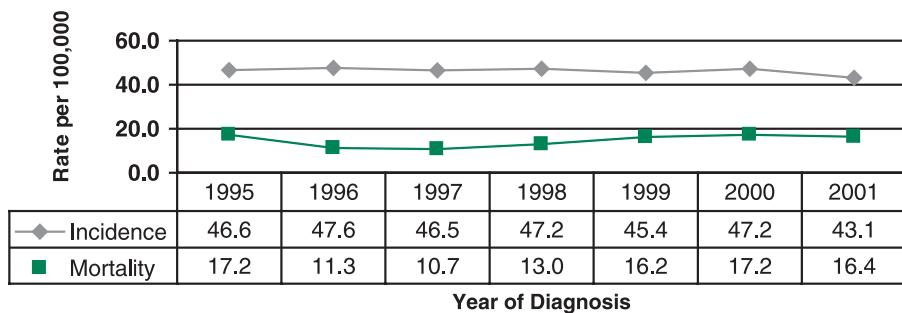


**FIGURE v.21**

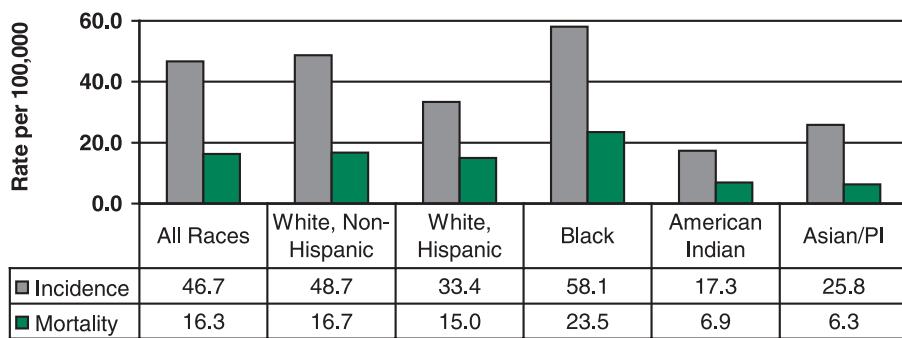
**U.S.\* and Arizona Age-Adjusted Incidence Rates of Colorectal Cancer by Gender, 1999-2001** \*CDC National Program of Cancer Registries

**FIGURE v.22**

**Age-Adjusted Incidence and Mortality Rates of Colorectal Cancer in Arizona, 1995-2001**

**FIGURE v.23**

**Average Annual Age-Adjusted Incidence and Mortality Rates of Colorectal Cancer by Race/Ethnicity, 1999-2001**



## National CCC Perspective

In order to effectively combat cancer, national efforts have focused on a comprehensive approach to reducing the cancer burden. The Centers for Disease Control and Prevention (CDC) defines comprehensive cancer control (CCC) as an “integrated and coordinated approach to reduce the incidence, morbidity, and mortality of cancer through prevention, early detection, treatment, rehabilitation, and palliation”.<sup>9</sup> The basic building blocks of CCC include enhancing infrastructure, mobilizing support, using data and research, building partnerships, assessing/addressing the cancer burden, and conducting evaluation. A comprehensive approach to cancer control entails beginning with the most current and complete data available, which fuels evidence-based decision making at every step of the process. It also includes establishing and strengthening diverse partnerships, engaging in horizontal planning, and evaluating CCC activities and processes.

Using this framework allows programs to maximize their resources, diminishes the likelihood for a duplication of services, and builds momentum for system and policy changes at the state level. This ultimately leads to an enhanced quality of life for individuals as well as reductions in morbidity and mortality from cancer and its health complications. State, tribal, and territorial Comprehensive Cancer

Control Plans usually include the cancer burden as their plan’s foundation plus short and long-term goals and objectives, which are measurable, when possible, as well as proposed strategies to accomplish these objectives. The list of CCC national partners dedicated to forwarding this effort across the country continues to grow and includes American Cancer Society, National Cancer Institute, C-Change, The Intercultural Cancer Council, The North American Association of Central Cancer Registries, Chronic Disease Directors, and the Lance Armstrong Foundation. Working together to fight cancer at the state and national levels will improve health outcomes and eliminate health disparities among diverse populations.

## Comprehensive Cancer Control Planning Efforts

Arizona has demonstrated its commitment to reducing the state’s cancer burden by gathering various stakeholders together to address cancer using a more comprehensive and integrated approach. The Arizona Comprehensive Cancer Control Coalition took charge of the initiative to develop a statewide five-year plan for Arizonans, and spent two years developing this plan. Initially, Arizona was awarded a planning grant in 2003 through a Cooperative Agreement between the Centers for Disease Control and Prevention (CDC) and the Arizona Department of Health Services to establish a comprehensive cancer control program and build capacity to support a statewide effort. The Arizona Department of Health Services serves as the adminis-

trative agency that houses and manages the Comprehensive Cancer Control Program.

The original framework of the Comprehensive Cancer Control effort included the Arizona Comprehensive Cancer Control Coalition, a steering committee, and continuum of care committees. In 2003 the steering committee assisted in identifying five priority areas to address the cancer burden in Arizona. These five areas are based on the continuum of care cancer model and include prevention, early detection and screening, diagnosis and treatment, quality of life (which includes end-of-life and survivorship issues) and research. Five committees were created and charged with identifying successes and challenges, recommending overarching goals and specific objectives, and outlining strategies to accomplish suggested goals and objectives.

From June through November 2004, committees developed and drafted the main components of the Arizona Comprehensive Cancer Control Plan. The writing phase of the cancer plan commenced shortly thereafter (December 2004 - April 2005). The Arizona Comprehensive Cancer Control Plan serves as a blueprint to guide activities targeted at cancer control throughout the state. It is a roadmap for change that will constantly evolve and be revised as the needs of Arizona's diverse communities change. As a testament to Arizona's commitment to cancer control, Senate Concurrent Resolution 1027 was passed in 2004 (Figure v.24).

The state cancer plan is an organic document that was created on behalf of Arizonans, and as cancer priorities change year to year, so will the focus of the coalition's activities and strategies. It is this malleability that will forward the Arizona Comprehensive Cancer Control Coalition towards reducing the state cancer burden by addressing cancer at every step from prevention and early detection to diagnosis, treatment, and survivorship. A variety of private and public organizations were instrumental in forwarding the cancer planning process and making cancer control a priority in our state. It is this dedication that will successfully reduce cancer morbidity and mortality in Arizona and create a more innovative way to address the needs of cancer patients and their families.

**S.C.R. 1027**

Whereas, in the United States, men have a one in two lifetime risk of developing cancer and for women the risk is one in three; and  
Whereas, cancer is the second leading cause of death in Arizona; and  
Whereas, the American Cancer Society estimates that 23,560 Arizonans will be diagnosed with cancer this year and 9,710 will die from this disease; and

Whereas, it is important for Arizona to promote the coordination of cancer control efforts and improve our ability to deliver efficient programs and services to the public; and

Whereas, the Centers for Disease Control recommend that each state address the burden of cancer in their states by writing a comprehensive cancer control plan that coordinates cancer control efforts among public and private stakeholders by 2003 and implement the plan by 2005; and

Whereas, the Centers for Disease Control provide federal funding to states to develop and implement comprehensive cancer control plans; and

Whereas, a comprehensive cancer control plan is based on the public health model of promoting health and preventing disease using risk reduction, screening, treatment, surveillance, public policy and program evaluation; and

Whereas, a comprehensive cancer control plan describes the state's cancer burden, outlines priorities, identifies and addresses the needs of the community in fighting cancer, identifies and addresses gaps in education and services and sets goals to reduce the overall burden of cancer; and

Whereas, a comprehensive cancer control plan will serve as a road map for public and private stakeholders to guide action in cancer control throughout this state and help to avoid a duplication of services; and

Whereas, a successful comprehensive cancer control plan requires a collaboration of organizations dedicated to eliminating cancer, including the state health department, universities, nonprofit organizations, tribal communities and health care providers.

Therefore

Be it resolved by the Senate of the State of Arizona, the House of Representatives concurring:

1. That the Arizona Legislature supports efforts by the Arizona Department of Health Services and other public and private agencies dedicated to eliminating cancer, including universities, nonprofit organizations, tribal communities and health care providers, to develop and adopt a comprehensive cancer control plan for Arizona.
2. That the Department of Health Services submit a copy of the Arizona Comprehensive Cancer Control Plan to the Governor, the President of the Senate and the Speaker of the House of Representatives on or before July 1, 2005.

## Prioritization Process

Comprehensive Cancer Control Program staff met with the Steering Committee to discuss the benefits, rationale, and overall impact of prioritizing the final objectives from each committee in early Spring 2005. A total of eight goals and 44 objectives were drafted by the continuum of care committees. Although all of the aforementioned goals and objectives are equally important a process needed to be instituted that would help the coalition kick-off implementation efforts. By focusing on a handful of priorities that represented the continuum of care, coalition members would have a starting point from which to build upon. Working on the top priorities from each section would afford coalition members the opportunity to focus their collective energies in order to make the biggest impact in the least amount of time.

The top priorities in each section would ultimately spearhead efforts aimed at the remaining objectives. On April 6, 2005 the Arizona Comprehensive Cancer Control Coalition voted on the priorities for the first two years of implementation. Each coalition member had an equal opportunity to vote in that the coalition followed a one-person, one-vote strategy. Coalition members voted on one objective in each of the following categories: Prevention, Early Detection and Screening, Diagnosis and Treatment, Quality of Life, Research and Health Disparities. The following guidelines were used during the prioritization process:

**Significance:** If implemented the objective will have a significant impact on Arizona's cancer burden.

**Feasibility:** If chosen, is the objective realistic and practical? Is the state capable of accomplishing the objective within the first two years of implementation?

**Catalyst for Change:** If implemented, will the objective pave the way for or facilitate the completion of other objectives?

**Resources:** To what extent are organizations willing to participate in implementing CCC objectives? Are there financial or in-kind resources available within the state (existing coalition organizations, private entities, non-traditional partners, etc.) that are already supporting related cancer prevention and control initiatives or are willing to support CCC objectives in the plan?

Votes from each category were tallied and the top three objectives within each category were voted on once again at the coalition meeting in order to select the top objectives for the first two years of implementation. The following 15 objectives were chosen as the Arizona Comprehensive Cancer Control 2005-2007 Priorities:

### **Prevention Goal:**

To reduce the risks for developing cancer among all Arizonans by promoting and engaging in healthy behaviors.

#### **TOBACCO**

**Objective 1.1:** Reduce the prevalence of tobacco use to 16% among all Arizonans by 2010.

## **PHYSICAL ACTIVITY**

**Objective 1.8:** By 2010, collaborate with the Department of Education to increase by 20% the number of schools that offer daily physical activity of at least 30 minutes in duration at a moderate level to students.

## **NUTRITION**

**Objective 1.11:** By 2015, decrease the proportion of children, adolescents, and adults in Arizona who are overweight or obese by 20%.

### ***Early Detection/Screening Goal:***

To promote, increase, and optimize the appropriate utilization of high quality cancer screening and follow-up services.

**Objective 2.1:** Increase the proportion of women aged 40 years and over who have received a mammogram and clinical breast exam within the past year to 70% by 2010.

**Objective 2.3:** For adults aged 50 years and over, increase the proportion of the population who has been screened for colorectal cancer using colonoscopy, sigmoidoscopy, or fecal occult blood test to 50% by 2010.

**Objective 2.8:** Support a capacity building conference promoting collaboration among existing agencies in order to disseminate information about current and developing screening methods and tools by 2010.

### ***Diagnosis and Treatment Goal:***

Increase access to appropriate and effective cancer diagnosis and treatment services.

**Objective 3.1:** By 2007, utilize telemedicine to increase access to state of the art diagnosis and treatment techniques and expertise as well as second opinions and resources.

**Objective 3.2:** By 2008, increase access to quality information and patient navigation sites across the state and identify barriers to access.

### ***Quality of Life Goal:***

Improve quality of life for people impacted and affected by cancer in Arizona.

**Objective 4.1:** Increase access to the comprehensive management of acute, chronic, and delayed effects of cancer and its treatments.

**Objective 4.2:** Create the opportunity for optimal utilization of local, state, and national resources.

**Objective 4.3:** Increase support for health care providers and payers in directing those affected by cancer to quality of life services.

### ***Research Goals and Objectives:***

**Goal 1:** Promote Communication, Collaboration, Infrastructure, Training, and Funding among cancer researchers.

**Objective 5.2:** Establish a clearinghouse/database for cancer researchers to access and use in Arizona.

**Goal 3:** Promote participation in cancer clinical trials in Arizona, specifically among underserved populations.

**Objective 5.8:** Work with Arizona universities that have existing grants and minority programs to provide education and outreach to minority populations about participation in cancer clinical trials.

**Objective 5.11:** Educate the public regarding the importance and relevance of participating in cancer clinical trials.

### **Health Disparities Goal:**

Reduce cancer disparities among Arizonans.

**Objective 6.1:** By Fall 2005, create a health disparities work group that will research and identify current barriers to care as well as draft strategies to reduce inequalities in cancer care.

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\* Please note: All cancer data (unless otherwise specified) was provided by the Arizona Department of Health Services Arizona Cancer Registry.

1



# PREVENTION

## Prevention Committee

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\*Chairs

“To be efficient and effective, we must work with our partners to change the categorical cancer mindset into one comprehensive strategy.”

*—James S. Marks, MD, MPH*

FIGURE 1.1

Research!America: The Arizona Public Health Research Survey

### Research!America

Research!America is the largest alliance of stakeholders from public and private sectors that represent basic, behavioral, biotech, clinical, health services, prevention, public health, and therapeutic research. The Arizona Public Health Research Survey, a telephone survey commissioned by Research!America, was conducted between October and November 2004 among 802 Arizonans aged 18 and older. The survey was conducted in English and Spanish and households were selected based on a computerized random digit dialing process. Support for the survey was provided through a grant from the Robert Wood Johnson Foundation. For more information on Research!America, please visit the following website: [www.researchamerica.org](http://www.researchamerica.org). Some of the Arizona survey findings are provided within this section in an effort to share a few of the health concerns Arizonans highlighted who participated in this research activity.

**Primary Prevention:** With respect to disease prevention efforts, of Arizonans participating in the survey, 52% felt that engaging in physical exercise and maintaining healthy eating habits were associated with prevention. Almost ¾ (74%) felt that refraining from smoking contributed to better overall health. 90% of those polled were in favor of a minimum requirement for physical education in schools and 8 out of 10 supported eliminating sales of unhealthy food in public schools. Over ¾ favored establishing smoke-free environments in all public buildings. Seven out of 10 adults changed their actions based on nutrition and physical activity public service announcements and health education programs.

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**Funding for public health research:** Currently, 1 cent out of every health care dollar is spent on public health research efforts nationwide. Seven out of 10 Arizona residents found this amount to be insufficient and the same number recommended that our nation spend double this amount on public health research. More than 70% of Arizona residents were in favor of increasing funding for public health research by designating a percentage of lottery sales revenues (81%), designating a percent of state tobacco settlement funds (79%), creating a state tax return check-off for voluntary donations to promote public health research (81%), and increasing sales tax on tobacco and alcohol (76 and 73% respectively).

**Cancer and Tobacco Settlement Funds:** Almost all Arizona residents participating in the survey (97%) believed that public health research should focus on cancer. Six out of ten adults also identified cancer screening tests such as mammograms and prostate and colon cancer screening as taking preventive measures. Of Arizona residents participating in the survey, 91% felt that state tobacco settlement money should be spent on programs for the treatment of chronic diseases and 89% felt that these funds should be spent on research to cure and prevent all diseases. A vast majority of Arizonans thought it was important to conduct medical or health research to understand and eliminate diseases including differences in disease and mortality among people with lower incomes and among minority populations.

**Source:** Arizona Residents Speak Out on Public Health Research. Harris Interactive Market Research. A Public Opinion Survey for Research!America 2004.

Primary prevention represents the most beneficial population-based public health approach to reducing morbidity and mortality from cancer. Public health measures that incorporate primary prevention strategies are meant to benefit people at the individual, community, and environmental level.

Primary prevention strategies adopted by individuals and groups focus on actively engaging in risk reduction measures such as regular sunscreen use and abstinence from tobacco use as well as the lifelong adoption of health promoting behaviors. These behaviors include maintaining a healthy weight by eating a well-balanced diet and engaging in regular physical activity.

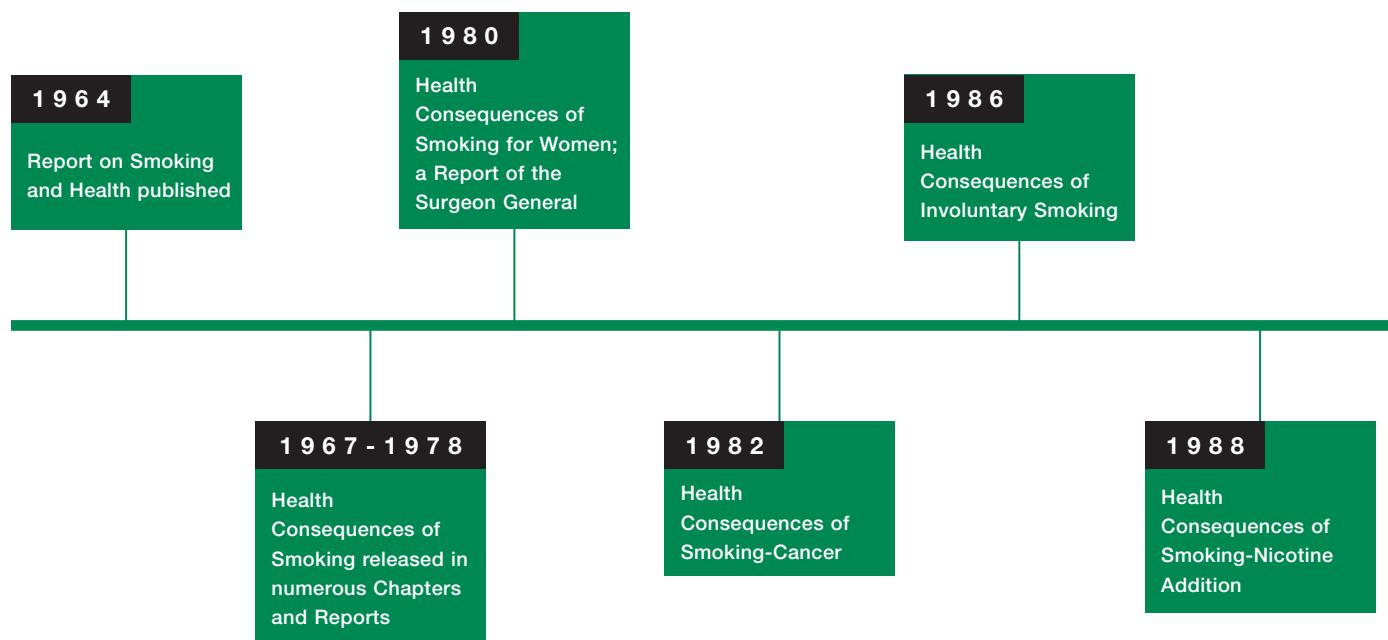
The ultimate goal of primary prevention is to promote health and potentially eliminate disease risk.

Calle and colleagues estimate that 14-20% of all deaths from cancer are attributable to overweight and obesity in U.S. adults age 50 years and older.<sup>1</sup> Cancer risk factors include age, gender, genetic predisposition, exposure to infectious agents and/or environmental carcinogens, and specific lifestyle behaviors. While age, heredity, and gender cannot be altered, changes in lifestyle behaviors are possible as well as limiting exposure to environmental and infectious agents to some extent.

However, preventing cancer from occurring in the first place within our diverse communities continues to be a daunting challenge in this century primarily due to

**FIGURE 1.2** U.S. Surgeon General's Reports on Health Consequences of Smoking: a Timeline

*Smoking remains the leading cause of preventable death and has negative health impacts on people at all stages of life. It harms unborn babies, infants, children, adolescents, adults, and seniors.*



the intricacy of cancer as a disease process. The complexity of the disease coupled with the necessity for researchers to establish strong cause/effect relationships between either individual behaviors or exposures to harmful substances over time and/or degree of risk also fuels much of the uncertainty that remains with respect to preventing, detecting, treating, and curing cancer. In light of this uncertainty, we have made significant progress over the last century.

Nutrition, physical activity, and body weight have been linked to almost 1/3 of all cancer deaths,<sup>2</sup> and tobacco use accounts for at least 30% of all cancer deaths including 87% of all lung cancer deaths.<sup>3-5</sup>

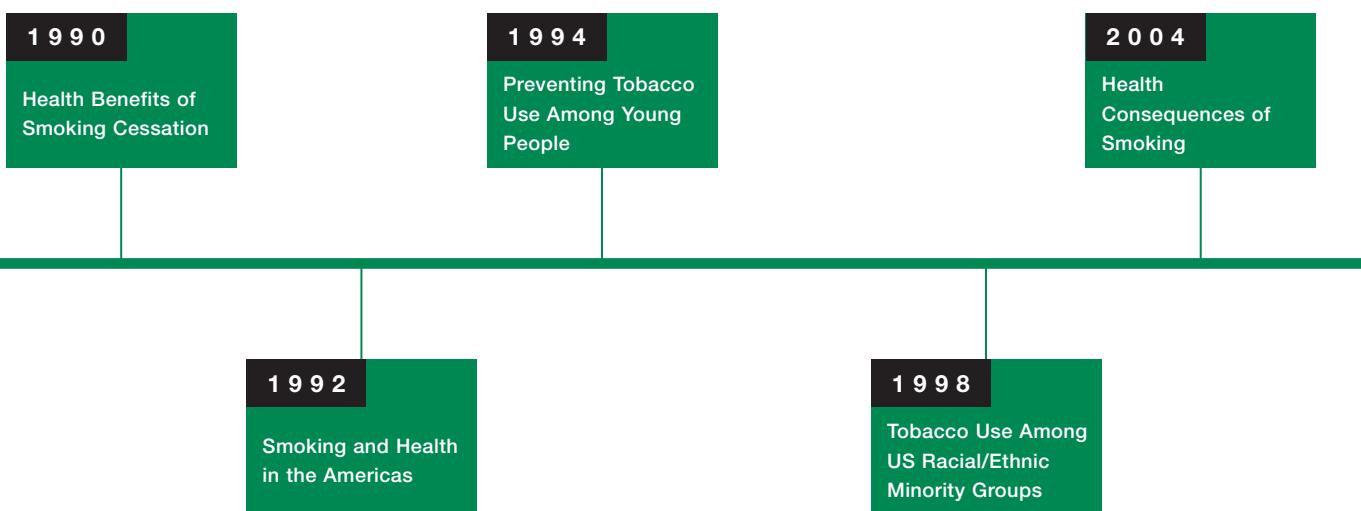
Arizonans can make prevention a priority by refraining from tobacco use, practicing good nutrition

and engaging in regular physical activity. These are modifiable, health promoting practices. Since Arizona's Comprehensive Cancer Control Plan follows the continuum of care model, this section will focus on the major behavior risk factors categorized under primary prevention, which include tobacco use, exposure to environmental tobacco smoke, nutrition, physical activity, obesity, alcohol use, and sun exposure.

## Tobacco Use

Tobacco (*Nicotiana tabacum*) was discovered 18,000 years ago along with potatoes, maize, tomatoes, and chocolate in the Americas. Forty years after the release of the first U.S. Surgeon General's Report, scientific experts point to smoking as the single greatest cause of avoidable mortality and morbidity in

*Source: The Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP). The Health Consequences of Smoking: A Report to the Surgeon General, 2004.*



the U.S. A 2004 U.S. Surgeon General Report identified a multitude of diseases caused by smoking that were not associated with smoking in the past including stomach, uterine cervix, and kidney cancers as well as acute myeloid leukemia. This same report also concluded that “smoking harms nearly every organ of the body, causing many diseases and reducing the health of smokers in general.”<sup>6</sup> A causal relationship has already been established between cigarette smoking and bladder, lung, laryngeal, colon, pancreas, kidney, esophageal, pharyngeal, and oral cancers.

Tobacco use causes more than 440,000 premature deaths per year nationwide, and cigarette smoking kills more individuals than alcohol, car accidents, homicide, AIDS, suicide, and illicit drug use combined.<sup>7</sup> Current smokers who choose to quit are afforded immediate and long-term benefits, reduce their risks for diseases caused by smoking, and improve their general health.<sup>8</sup> A major challenge in the fight against tobacco-related cancers is the fact that nicotine is a highly addictive substance that causes individuals to perpetuate the unhealthy behavior of smoking regardless of the published research documenting tobacco’s detrimental effects on the body. Breaking the cycle of addiction through the promotion of positive behavior change is often a cyclical process. Behavioral change is embedded within public health models such as James Prochaska’s Transtheoretical (Stages of Change) Model, which takes the individual through five stages of change: Precontemplation, contemplation, preparation, action, and maintenance with a possibility for relapse to occur at any phase.<sup>9</sup>

Numerous tobacco cessation programs focus on changing ingrained, habitual behavior, which when used in concert with social marketing that promotes tobacco use as socially unacceptable can prove beneficial. These combined public health strategies/interventions have been successfully implemented in many states throughout the country including California, Arizona, New York, and Utah as part of statewide tobacco prevention and cessation efforts.

## Prevalence of Tobacco Use

According to Arizona Behavioral Risk Factor Surveillance System (BRFSS) data, 20.8% of adults in Arizona reported being current smokers in 2003. 26% of high school students reported using some form of tobacco within the past 30 days and 62% of high school students reported ever using tobacco in their lifetime in 2003 (Youth Tobacco Survey-YTS).

According to the 2003 Youth Risk Behavior Survey (YRBS), 20.9% of high school students reported being current smokers and 58.9% reported ever smoking cigarettes, which includes one or two puffs. 10.9% of high school students reported lifetime daily cigarette use, which is defined as ever smoking one or more cigarettes every day for 30 days. In 2003, 14.5% of middle school students reported using tobacco products within the past 30 days and 41.7% of middle school students reported using some form of tobacco in their lifetime during the same year (YTS).

Smoking prevalence in Arizona has remained steady over the last 12 years varying from 18.5% in 2000 to 23.8% in 1996.<sup>10</sup> The largest increase in smoking prevalence in a single age group between 1999 and

2002 was among 18 to 24 year olds in Arizona. Prevalence among this age group increased from 21% in 1999 to 29% in 2002. A similar significant increase in cigarette smoking among young adults has been reported nationwide.

## **Environmental Tobacco Smoke (ETS)**

Tobacco use is not only a health hazard to the user, but also to those individuals who share the same environmental confines (For example, work, home, car, outdoors). Cigarette smoke contains more than 100 cancer-causing substances. ETS contains many of the toxic agents and carcinogens that are present in mainstream smoke, but in diluted form.<sup>11</sup> ETS or secondhand smoke causes approximately 3,000 lung cancer deaths in non-smokers each year.<sup>12</sup> One study found that non-smoking women who lived with a smoker had an approximately 25% greater chance of developing lung cancer than non-smoking females who lived with a non-smoker.<sup>13</sup> In 1993 the U.S. Environmental Protection Agency categorized ETS as a Group A carcinogen.

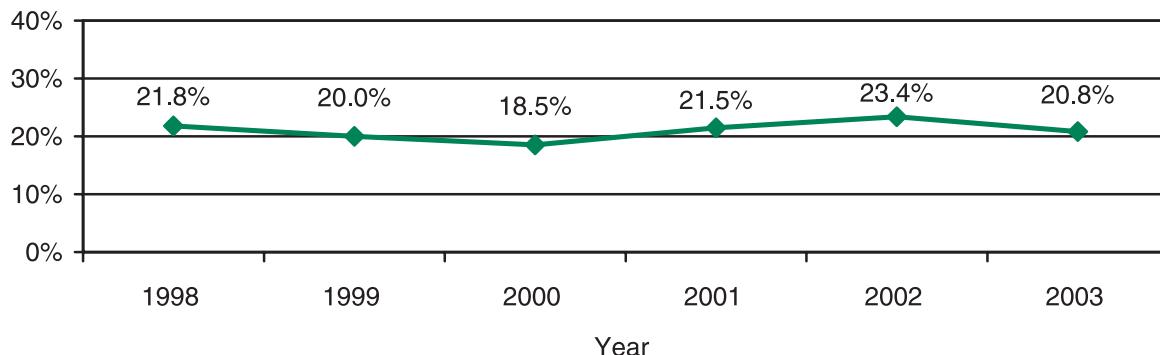
Subsequently, in 2000, the National Institutes of Health (NIH) formally listed secondhand smoke as a known human carcinogen in its 9th Report on Carcinogens. Some Arizona employers address exposure to secondhand smoke via official worksite policies. According to 2002 BRFSS data, over 78% of worksites did not allow smoking in public areas and 86% did not allow smoking in any work area. Efforts to decrease exposure by passing ordinances that ban smoking in public places have been successful in numerous Arizona communities and are gaining public acceptance.

## **Tobacco Use and Disparities**

Because of the large Native American community in Arizona, it is important to recognize the two distinct patterns of tobacco use that occurs among American Indian and Alaska Native people. The first pattern is intermittent, ceremonial use associated with traditional practices and health behaviors. The other is daily, persistent non-ceremonial use, which is associated with addiction to tobacco and its known health effects. Persistent daily tobacco use is more common among

**FIGURE 1.3**

Percentage of Arizona BRFSS respondents who reported that they were current smokers in 1998-2003



some tribal groups and in some regions of the country than in others. Understanding tobacco use patterns can be helpful in discussing tobacco and its consequences with Native people.

Among racial and ethnic groups, American Indians and Alaska Natives are most likely to use cigarettes (41%).<sup>14</sup> By both sex and race or ethnicity, individuals with lower incomes are more likely to smoke than people with higher incomes. Data from the 1997 National Health Interview Survey show that 27.5% of blue-collar smokers smoke 25 or more cigarettes per day compared to 18% of white-collar smokers.<sup>15</sup>

## Smoking and Arizona

Currently, the state tax on a pack of cigarettes is \$1.18 in Arizona, which ranks 10th in the U.S. In 2002,

the state's excise tax increased by 60 cents a pack. Arizona Department of Health Services (ADHS) Tobacco Education and Prevention Program (TEPP) was initiated in 1996 and established as a result of Proposition 200. Proposition 200 raised the state tobacco tax from 18 cents to 58 cents per pack. Arizona utilizes 23% of revenues from the state's cigarette excise tax to fund TEPP, which amounts to approximately \$23 million annually.

TEPP's major components include: county and tribal community programs which provide direct services in the areas of prevention, cessation, and the creation of smoke-free environments; statewide contracts for the creation of smoke-free worksites, health care provider education and training, youth access compliance and enforcement and youth and

FIGURE 1.4

Best Practices for Comprehensive Tobacco Control Programs:  
An Application of CDC's Nine Components

COMPONENTS OF COMPREHENSIVE TOBACCO CONTROL PROGRAMS	ADHS TEPP Strategies
I. COMMUNITY PROGRAMS TO REDUCE TOBACCO USE	Local Projects – community-based prevention, Media/Public Relations campaign
II. CHRONIC DISEASE PROGRAMS TO REDUCE THE BURDEN OF TOBACCO-RELATED DISEASES	AZHealthlinks – worksite wellness programs
III. SCHOOL PROGRAMS	Local Projects – School-based prevention
IV. ENFORCEMENT	AG – Compliance checks; Local projects vendor education
V. STATEWIDE PROGRAMS	Health Care Provider Training, ASHLine – Smokers helpline, AZHealthlinks
VI. COUNTER- MARKETING	ADHS/TEPP Media Campaign
VII. CESSATION PROGRAMS	Local Projects – Class cessation, ASHLine – 1-on-1 telephone smokers support, ASHline.org & Cold Turkey – Web-based programs
VIII. SURVEILLANCE AND EVALUATION	University of AZ evaluation contract
IX. ADMINISTRATION AND MANAGEMENT (CONTRACTS; FISCAL AND PROGRAM MONITORING)	ADHS/TEPP administration

Source: Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Tobacco Information and Prevention. Best Practices for Comprehensive Tobacco Control Programs, 1999; Arizona Department of Health Services. Tobacco Education and Prevention Program (TEPP), 2004.

parent education; and a state-wide health marketing campaign that includes television, radio, and print advertisements and a variety of sports sponsorships. TEPP currently funds 15 county and 10 tribal community-based projects as well as the Inter Tribal Council of Arizona.

## Physical Activity

Physical activity has a positive effect on the body, and benefits the mind. Physical activity is defined as bodily movement produced by the contraction of skeletal muscle that significantly increases energy expenditure.<sup>16</sup> Over the last decade, studies have shown that regular physical activity boosts mood and energy levels and reduces depression.<sup>17,18</sup> Behavioral scientists at Duke University studied 156 adult volunteers as part of the Standard Medical Intervention and Long-term Exercise or SMILE Study and concluded that exercise therapy for individuals suffering from Major Depressive Disorder (MDD) was as effective as standard pharmacotherapy and resulted in significant therapeutic benefit, especially if the physical activity regimen was continued over time.<sup>19</sup>

Physical activity improves health, reduces the risk of acquiring certain cancers, and benefits cancer survivors with respect to reducing depressive symptoms. Engaging in regular physical activity not only allows the body to function more efficiently, but also complements healthy dietary practices because moderate to vigorous exercise allows people to manage, maintain, or lose weight as applicable to the individual. Over the last 14 years, more than 200 population-based studies have linked work, leisure, and

household physical activities to cancer risk. Research investigating a possible relationship between physical activity and cancer has focused largely on cancer of the bowel, endometrium, prostate, testes, lung, and breast.

Numerous studies have demonstrated an inverse dose-response association between physical activity and colon cancer such that physically active individuals experience approximately half the risk compared to persons who remain sedentary.<sup>20-23</sup> It has been proposed that engaging in regular physical activity positively influences insulin, prostaglandin, and bile acid levels in the body and affects the growth and proliferation of cells within the colon as well as boosts immune function.<sup>24-27</sup> These substances may also reduce bowel transit time, which ultimately decreases the duration of contact between cancer causing substances in digestive byproducts (fecal matter) and the colonic mucosa.<sup>28</sup>

Participating in high levels of physical activity throughout the lifespan seems to impart the greatest protection.<sup>29-30</sup> A study of Harvard University alumni males found that men who were moderately active at two assessments were 48% less likely to develop colon cancer than their inactive male counterparts.<sup>31</sup> Furthermore, data from at least two prospective studies pointed out that men and women can lower their colon cancer risk by engaging in moderate physical activity such as brisk walking or stair climbing for an hour daily.<sup>32-33</sup> No significant association has been found between physical activity and decreasing the risk of

developing rectal, lung, or prostate cancer.<sup>34-38</sup>

Physical activity may also have positive effects on the level of endogenous sex hormones in the body, which may have a role in breast and endometrial cancer development. However, confounding factors must also be accounted for as sedentary individuals proposed to be at greater risk for acquiring certain cancers may have a genetic predisposition, have different dietary habits, and use tobacco and/or alcohol.

Engaging in regular physical activity is associated with a reduced risk of breast cancer in premenopausal and postmenopausal women in part because it may decrease the collective exposure to cyclic estrogens and progesterone as well as influence energy balance.<sup>39</sup> A woman's breast cancer risk is largely dependent on the amount of estrogen circulating in her body.<sup>40-41</sup> Some studies have taken the importance of lifelong physical activity one step further by investigating the engagement of regular physical activity in childhood

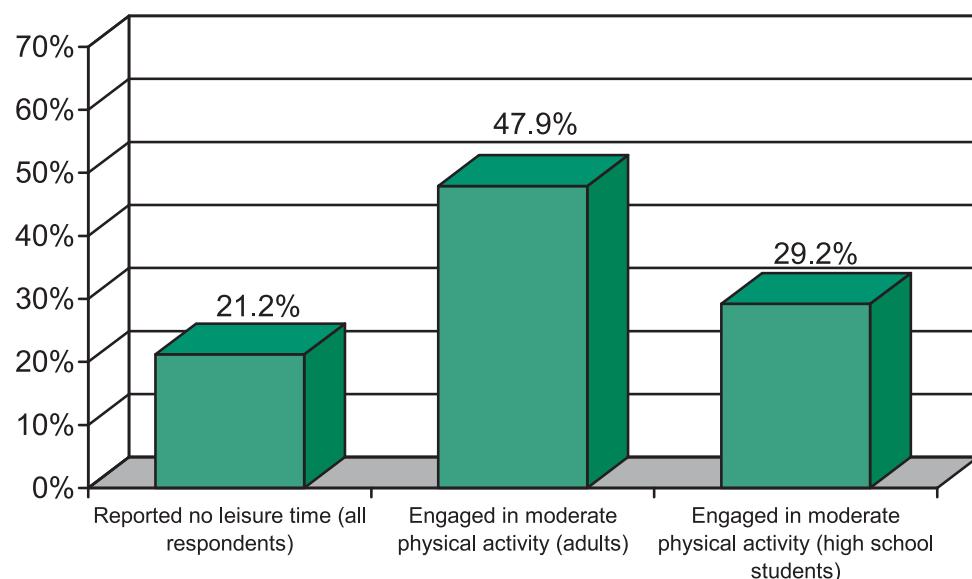
and whether or not it affects breast cancer risk.

Engaging in regular physical activity may result in delayed menarche or a delay in the onset of regular ovulatory menstrual cycles, which may decrease lifelong risk for breast cancer.<sup>42</sup>

## Obesity

If U.S. adults balanced energy input and output more effectively through the practices of eating healthy foods containing less fat, engaging in regular physical activity, and, therefore, maintaining a body mass index (BMI) below 25 throughout their lives, the nation could steer clear of more than 90,000 cancer deaths per year.<sup>43</sup> Obesity is defined as having a BMI greater than or equal to 30.0, while being overweight is defined as having a BMI between 25.0 to 29.9. BMI is defined as weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ).<sup>44</sup> Nearly 59 million adults are obese and close to 9 million young people (ages 6-19) are

**FIGURE 1.5** Percentage of Arizona BRFSS respondents who reported insufficient physical activity\* \*No leisure time includes moderate and vigorous physical activity



considered overweight in the U.S.<sup>45</sup>

Overweight in adolescents and children is defined as having a BMI greater than or equal to the 95th percentile for age and sex based on standardized growth charts.<sup>46</sup> It is harmful to one's health to have excess body fat. Overweight and obesity increases the risk of colon, breast (postmenopausal), endometrial, kidney, and esophageal cancers, and may also be linked to pancreatic, ovarian, and gall bladder cancers.<sup>47-48</sup> Obesity is caused mainly by a combination of lack of exercise or remaining sedentary and the over consumption of high calorie, high fat, low nutrient foods. A Swedish study demonstrated a 33% excess risk of cancer among obese individuals than among non-obese persons.<sup>49</sup> Obesity is not just a national public health crisis, but is also a disquieting concern for Arizonans. According to 2003 BRFSS data, 20.1% of adults in Arizona were obese (BMI >30 kg/m<sup>2</sup>) and 37% of adults in Arizona were overweight (BMI 25.0-

29.9 kg/m<sup>2</sup>). YRBS data indicate that 13.6% of Arizona youth in grades 9-12 were at risk for becoming overweight (>85th percentile but <95th percentile for BMI, by age and sex) and that 10.8% of Arizona youth in grades 9-12 were considered overweight (>95th percentile for BMI, by age and sex).

## Nutrition

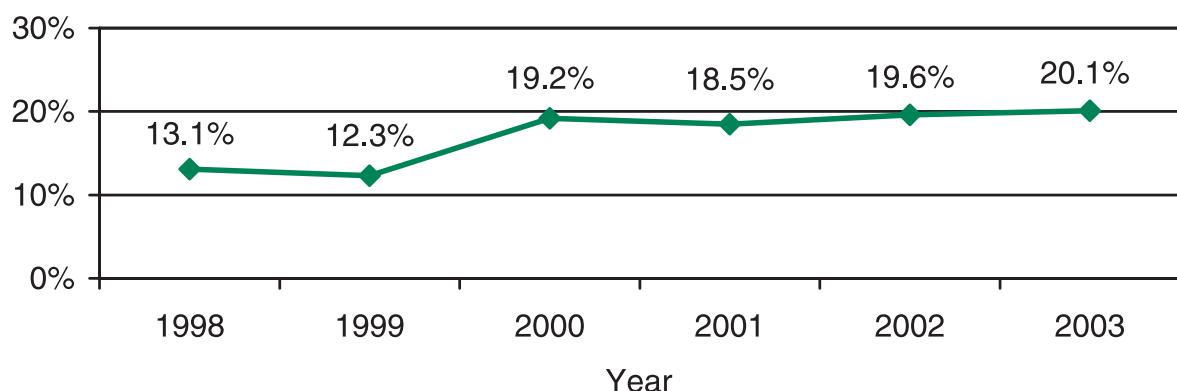
Diets rich in fruits and vegetables may reduce the risk of cancer and other chronic diseases. Fruits and vegetables provide essential vitamins and minerals, fiber, and other substances that are important for good health. Most fruits and vegetables are naturally low in fat and calories and are filling. Over the last three decades, more than 250 epidemiological studies have been conducted worldwide to explore the relationship between fruit and vegetable consumption and cancer risk.

More than 75% of these studies concluded that there

**FIGURE**

**1.6**

Arizona BRFSS respondents who reported weights exceeding BMI limits of obesity



is a significant protective effect of regular fruit and/or vegetable consumption, or that there is a health benefit to at least consuming certain vegetables and/or fruits.<sup>50</sup> The European Prospective Investigation into Cancer and Nutrition (EPIC) Study found that consuming at least 500 grams of fruits and vegetables daily was sufficient to decrease the incidence of gastrointestinal tract cancers by 25%.<sup>51</sup> A variety of hypotheses have been proposed with respect to cancer risk reduction and consumption of fruits and vegetables. Fruits and vegetables contain various vitamins and minerals, antioxidants, dietary fiber, resistant starches, and natural components such as coumarins, flavonoids, isoflavones, isothiacyanates, lignans, and phytosterols.<sup>52</sup>

Not only do fruits and vegetables act as antioxidants, they also contain substances that act to produce anticarcinogens and reduce the capacity of transformed cells to proliferate.<sup>53</sup> Consumption of raw, green leafy, and cruciferous vegetables seems to have a protective

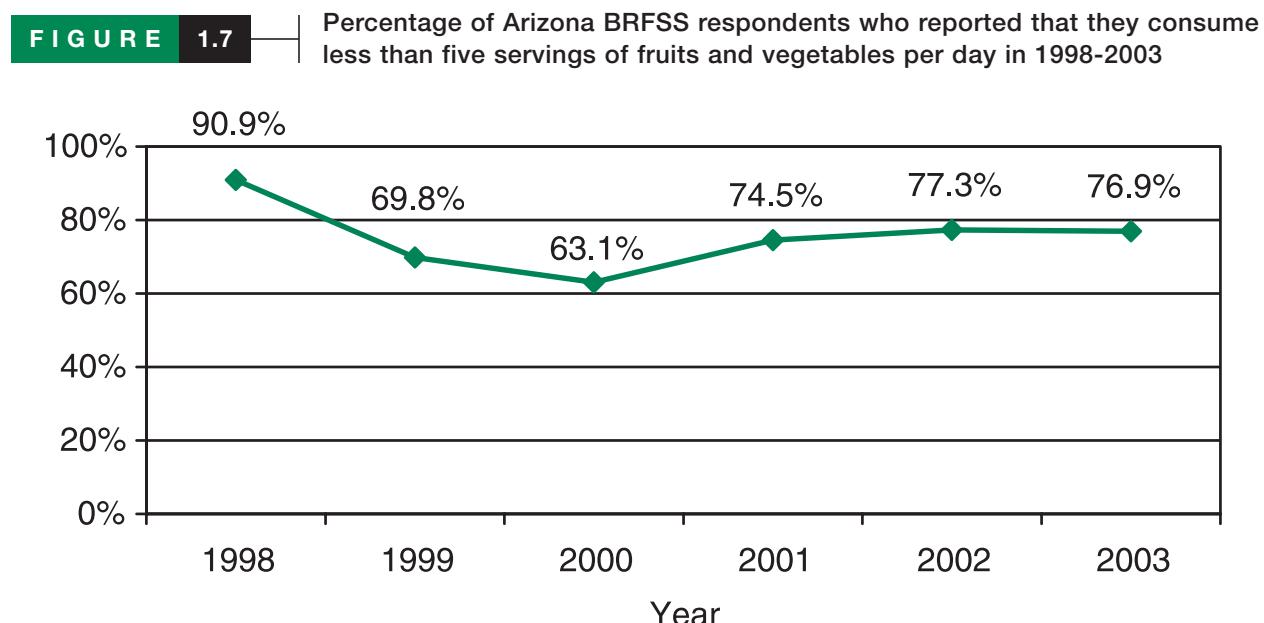
effect in relation to colon cancer risk in men and women.<sup>54</sup> It cannot be denied that Arizonans could benefit from more fruit and vegetable consumption as a step towards practicing good health. According to BRFSS, 22.9% of Arizona adults and 20.4% of adolescents in grades 9-12 consumed five or more servings of fruits and vegetables a day in 2003.

## National

5 A Day for Better Health is a national program and partnership that seeks to increase the number of daily servings of fruits and vegetables Americans eat to five or more. The 5 A Day Program provides easy ways to add more fruits and vegetables into your daily eating patterns. More information about 5 A Day is available at the following website:

<http://www.cdc.gov/nccdphp/dnpa/5ADay/index.htm>.

There is considerable variation among subgroups defined by gender, ethnicity, race, education and income



with respect to fruit and vegetable consumption.

A study conducted by Thompson and colleagues found the level of fruit and vegetable consumption to be lowest among Hispanics, whereas other studies have demonstrated a link between lower income and level of education attained.<sup>55-56</sup> There is an inverse relationship between health and socioeconomic status with respect to diet, which has worsened over the last 50 years.<sup>57</sup>

Grains include wheat, rice, barley, rye, and corn. Wheat bread and brown rice are usually consumed in the whole-grain form and are, therefore, more nutrient-rich than white bread or rice, which is usually processed or refined.<sup>58</sup>

## The Obesity Prevention Program

Established in 2003 through a CDC grant, The ADHS Obesity Prevention Program encompasses two priority areas: nutrition and physical activity. The program is comprised of coalitions and partnerships that were tasked to develop a Nutrition and Physical Activity State Plan by early 2005. Based on the social ecological model, the 5-year action plan includes key objectives that affect Arizonans and approach nutrition and physical activity issues at multiple levels including the physical environment, families, communities, health care, worksites, and schools. The program's main goals are to promote and enable Arizonans to eat smart and engage in active lifestyles, which is evident in their program slogan: Eat Smart. Get Active. Be Healthy. The state plan will serve as a guideline for Arizonans to stay active and practice healthier eating habits for life, which will ultimately reduce the chronic

disease and obesity burdens facing our state.

## Alcohol

Alcohol consumption combined with poor diet and tobacco use exhibits a synergistic effect with respect to promoting numerous negative health outcomes.

Over consumption of alcohol causes alcoholism (alcohol addiction), chronic pancreatitis, liver cirrhosis, alcohol psychosis, hypertension, hemorrhagic stroke, unnecessary accidents and injuries due to impairment, and results in the delivery of low birth weight babies among women who consume alcohol during pregnancy.<sup>40</sup> In 1988, the International Agency for Research on Cancer defined alcohol as a Group A carcinogen as well as an independent risk factor for cancers of the liver and upper aero digestive tract.<sup>59</sup> A glass of wine, bottle of beer, or shot of hard liquor equals one alcoholic beverage. Moderate alcohol consumption is defined as one drink per day for women and two drinks per day for males.

With respect to cancers of the breast, colon, rectum, and aero digestive tract, there is an evident dose-response relationship where even moderate levels of alcohol consumption may slightly increase cancer risk.<sup>60</sup> Cohort and case-control studies worldwide have also concluded that alcohol use increases the risk of mouth, pharyngeal, laryngeal, and esophageal cancers.<sup>61</sup> Nationally, the proportion of current drinkers at each age is highest among non-Hispanic white men, followed by African American males, and Hispanic

men.<sup>62</sup> As far as women are concerned, non-Hispanic white females represent the highest proportion of current drinkers.

According to BRFSS, 5.4% of Arizona adults were at risk for heavy drinking in 2003 defined as exceeding one drink per day for women and two drinks of alcohol for men in 2003. In the same year, BRFSS concluded that 16.6% of Arizona adults drank five or more drinks of alcohol on one occasion. The Youth Risk Behavior Survey (YRBS) concluded that 78.4% of Arizona youth in grades 9-12 have ever had one or more drinks of alcohol and that 50.9% of the same age group drank one or more drinks of alcohol in the 30 days preceding the survey in 2003. An alarming 33.6% of Arizona youth in grades 9-12 drank five or more drinks of alcohol in a row in the 30 days preceding the survey in that same year.

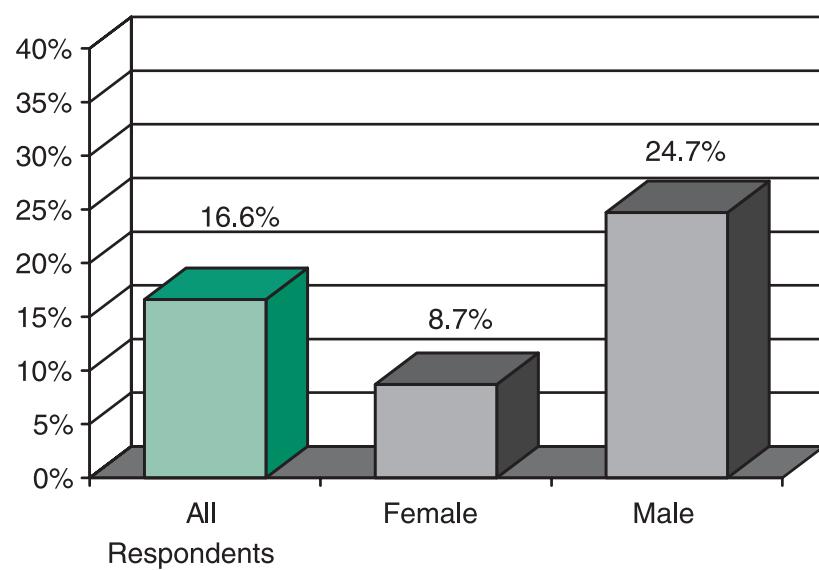
The manner in which alcohol consumption causes cancer is currently unknown. Among hypotheses

proposed to explain alcohol use and increased cancer risk, the following have been documented: (i) alcohol contains carcinogenic chemicals other than ethanol including N-nitrosamines; (ii) alcohol's physical makeup or solvent properties allows other carcinogens like those found in tobacco smoke to be more readily absorbed by the human body; (iii) acetaldehyde, a major metabolite of ethanol, may have a carcinogenic role.<sup>63</sup>

## Sun Safety

Excessive exposure to ultraviolet (UV) radiation from the sun or via artificial means (indoor tanning) without the practice of skin protection causes the majority of skin cancers.<sup>64</sup> UV exposure is associated with at least 1 million cases of basal and squamous cell carcinomas and over 52,000 cases of malignant melanoma each year.<sup>65-66</sup> Prolonged sun exposure not only results in tanned skin, but can result in sunburn,

**FIGURE 1.8** Arizona BRFSS/YRBS respondents who reported binge drinking in the past 30 days



premature aging of the skin, and wrinkles. A Centers for Disease Control and Prevention (CDC) Study noted that 25% of parents did not oblige their children, 12 years and younger, to practice sun protective behaviors, and that the percentage of children who took one or more sun protective measures decreased with age.<sup>67</sup>

The sun is an integral part of Arizona's natural habitat, environment, and livelihood. This makes exposure to the sun unavoidable to some extent. According to BRFSS, 32% of Arizona residents reported being sunburned within the past 12 months. Number of sunburns experienced within 12 months is described below: 29.9% reported being sunburned at least once; 25.9% reported being sunburned twice; and 17.1% reported being sunburned at least 3 times in the last 12 months. 13% of BRFSS respondents reported six or more occasions of being sunburned in the past year.

Promoting sun protective measures at the individual,

community, and institutional level is imperative in order to reduce the risk of skin cancer among Arizonans. Since Arizonans experience sun exposure 365 days out of the year, sun safety will be revisited and described in detail within the environmental chapter of the cancer plan.

## Prevention Goal:

To reduce the risks for developing cancer among all Arizonans by promoting and engaging in healthy behaviors.

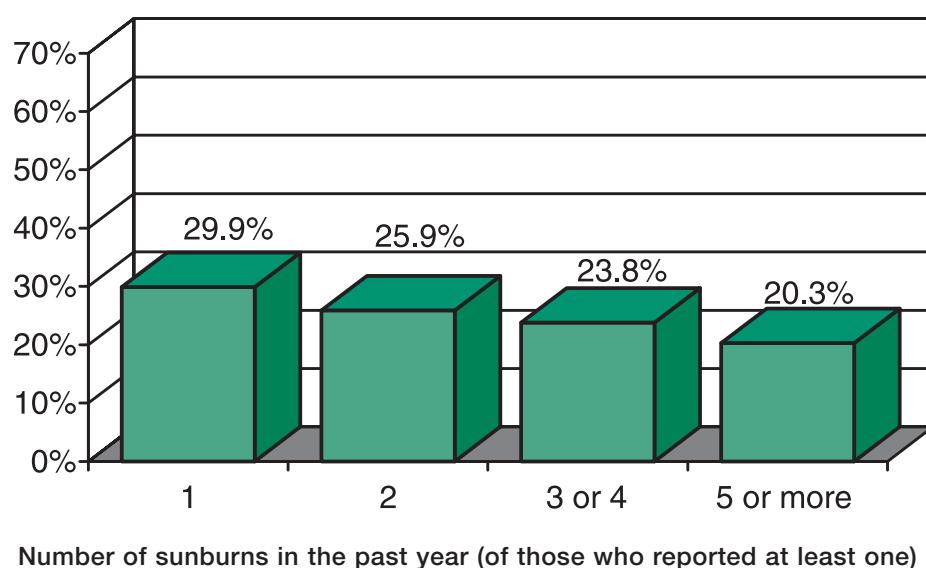
## TOBACCO

**Objective 1.1:** Reduce the prevalence of tobacco use to 16% among all Arizonans by 2010.

*Baseline:* BRFSS 20.8% of adults in Arizona reported being current smokers in 2003.

**Objective 1.2:** By 2010, decrease the percentage of adolescents (grade 9-12) who use any form of tobacco.

**FIGURE 1.9** | Arizona BRFSS respondents reporting at least 1 sunburn in the past year



*Baseline:* YTS 26% of high school students reported using some form of tobacco within the past 30 days in 2003. 62% of high school students reported ever using tobacco in their lifetime in 2003. According to the 2003 YRBS, 20.9% of high school students reported being current smokers and 58.9% reported ever smoking cigarettes, which includes one or two puffs. 10.9% of high school students reported lifetime daily cigarette use, which is defined as ever smoking one or more cigarettes every day for 30 days.

**Objective 1.3:** By 2010, decrease the proportion of middle school students who use tobacco products.

*Baseline:* YTS In 2003, 14.5% of middle school students reported using tobacco products within the past 30 days. 41.7% of middle school students reported using some form of tobacco in their lifetime in 2003.

**Objective 1.4:** By 2010, reduce all Arizonan's exposure to secondhand smoke.

*Baseline:* 2002 BRFSS How many worksites in AZ currently have smoke-free worksite policies?

*Module 14:* 8. Which of the following best describes your place of work official smoking policy for indoor public or common areas, such as lobbies, rest rooms, and lunchrooms? Not allowed in any public areas: 78.7%; Allowed in some public areas: 14.0%; Allowed in all public areas: 1.5%; No official policy: 5.8%.

*Module 14:* 9. Which of the following best describes your place of work's official smoking policy for work areas? Not allowed in any work areas: 86.2%; Allowed in some work areas: 7.7%; Allowed in all work areas: 1.7%; No official policy: 4.4%.

*Strategies:*

1. Increase community awareness about the dangers of tobacco use.

*Activities:*

- a. Encourage health care professionals to inquire about smoking and emphasize inclusion of this information within patient charts.
- b. Expand and fund new school-based education programs aimed at promoting healthier lifestyles (tobacco, physical activity, nutrition and sun safety).
- c. Perform statewide compliance checks on tobacco sales to minors.
- d. Support workforce education on the risks of tobacco use and cessation options.
- e. Promote the establishment of smoke-free worksite policies.
- f. Promote tobacco-free social norms and build community capacity to sustain a tobacco-free Arizona.
- g. Collaborate with ADHS TEPP to ensure that Arizona's tobacco education, outreach, and prevention needs are met and highlight existing statewide resources.
- h. Facilitate and provide training and technical assistance to relevant community based organizations, especially those within rural areas serving

- disparate populations including Spanish language and culturally adapted programs for Hispanics.
- i. Collaborate with Arizona Department of Health Services, American Lung Association, American Heart Association, American Cancer Society, and University of Arizona to address the risks of tobacco use and the benefits of quitting or abstaining from smoking.
  2. Support accessible and effective cessation services (Measure use of QUIT line in the state for baseline).

*Baseline:* Out of 3,738 total clients calling the quitline, (40.3 % were female and 59.6% were male) 36.5% called to inquire about cessation information and referral and 63.5% inquired about counseling (Arizona Smoker's Helpline Client Demographics Report, 2001-02).

A total of 10,325 tobacco cessation clients were served through TEPP during the period July 2000-January 2002 (Arizona Adult Tobacco Cessation Program Mid-year Report, 2002).

*Activities:*

- a. Provide the Medicaid group Arizona Health Care Cost Containment System (AHCCCS) coverage for cessation services that include health education, individual counseling, and drug therapy.
- b. Work with health care systems to promote smoking cessation services as an option covered by health insurance.

- c. Educate students within allied health professions about the need to inform their patients about the health consequences of tobacco use and the availability of cessation options.
3. Advocate for enactment of a law to prohibit smoking in all enclosed public areas and workplaces (including restaurants, malls, office buildings).
4. Identify Best Practices to implement innovative and effective programs that focus on prevention, cessation (e.g.: after care) and environmental tobacco smoke.

*Activities*

- a. Increase the number or percentage of businesses that offer cessation services to their employees.
- b. Increase percentage of businesses that establish and enforce a smoke-free policy at work.

## PHYSICAL ACTIVITY

The Centers for Disease Control and Prevention defines physical activity as any bodily movement produced by skeletal muscles that results in an expenditure of energy.

**Objective 1.5:** Increase the proportion of adults who engage regularly, preferably daily, in moderate or vigorous physical activity, for at least 30 minutes to 52% by 2010.

*Baseline:* 21.2% of Arizonans reported not getting leisure time activity according to 2003 BRFSS. 47.9% of adults engaged in moderate physical activity in 2003.

“Moderate” refers to physical activity at least 30 minutes in length on five or more days of the week. 29.2% of high school students participated in sufficient moderate physical activity (PA that did not make students sweat and breathe hard for greater than or equal to 30 minutes on greater than or equal to five of the seven days (fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors).

**Objective 1.6:** Reduce the proportion of Arizona adults who engage in no physical activity to 20% by 2010.

*Baseline: 2003 BRFSS*

22.6% of adults did not engage in physical activity in the past month in 2002. Only 18.6% of BRFSS respondents met the recommendations for either moderate or vigorous physical activity in 2003 (AZCDSIR). Analysis of BRFSS data indicated that 35.5% of all respondents reported engaging in insufficient moderate or vigorous physical activity for 2003 (AZCDSIR).

*Strategies:*

1. Promote family involvement in physical activity including team sports.
2. Develop, implement, and promote physical activity at worksites as part of an overall healthy lifestyle program.
3. Promote stair use instead of elevator use during work hours.
4. Promote walking at work during lunch as a way to engage in physical activity.
5. Promote Physical Activity Challenge at worksites in order to emphasize the importance of physical

activity.

6. Increase the number of schools that provide access to their physical activity facilities to community members (swimming pool, gym, tennis courts, basketball courts, track) outside of regular school hours (weekends and evenings).

**Objective 1.7:** By 2010, increase the percentage of adolescents who engage in vigorous physical activity to 70%.

*Baseline: YRBS* 66.9% of adolescents (youth in grades 9-12) engaged in vigorous physical activity in 2003.

“Vigorous” refers to physical activity that caused sweating and breathing hard for 20 minutes or more three or more of the seven days before the survey (e.g.: basketball, soccer, running, swimming laps, fast bicycling, or similar aerobic activities).

**Objective 1.8:** By 2010, collaborate with the Department of Education to substantially increase the percentage of schools that offer daily physical activity of at least 30 minutes in duration at a moderate level to students.

*Baseline: YRBS 2003* 27.8% of high school students participated in an insufficient amount of physical activity in 2003. Only 23.2% of high school students attended physical education class daily (five days in an average week when they were in school). 37.9% of high school students were enrolled in PE class on one





Photo courtesy of National Cancer Institute

or more days in an average week when they were in school.

*Strategies:*

1. Emphasize the health benefits gained from participating in regular physical activity and the importance of being active for life.
2. Identify and work to reduce or eliminate barriers to participation in physical activity.

*Activities for both Strategy 1 and 2:*

- a. Educate public and private schools about the importance of incorporating daily physical activity in schools.
- b. Support legislation that increases funding provided to schools for physical activity initiatives, equipment, and structured classes.
- c. Increase the number of schools that provide supervised access to their physical activity facilities (swimming pool, gym, tennis courts, basketball courts, track) to kids outside of regular school hours (weekends and evenings).
- d. Use existing social marketing campaigns (VERB, 5 A Day, etc.) to promote healthy lifestyles.
3. Expand and fund new school-based education programs to encompass a comprehensive healthy lifestyle education component that addresses tobacco, physical activity, nutrition, and sun safety.

*Activities:*

- a. Encourage schools to adopt “model nutrition and physical activity policy.”

- b. Work with Department of Education to establish a mandatory physical education policy in schools.

## NUTRITION

**Objective 1.9:** By 2010, increase the proportion of persons aged two years and older who consume at least two daily servings of fruit and at least three daily servings of vegetables, with at least one-third being dark green or deep yellow vegetables.

*Baseline:* BRFSS 22.9% of adults in Arizona consumed five or more servings of fruits and vegetables a day in 2003.

*YRBS:* 20.4% of Arizona youth in grades 9-12 consumed five or more fruits and vegetables a day in 2003.

*BRFSS:* 9.7% of adults in Arizona consumed carrots once per day in 2003.

*BRFSS:* 23.2% of adults in Arizona consumed green salad once per day in 2003.

**Objective 1.10:** By 2010, increase the proportion of Arizonans who consume an average of 30 grams of dietary fiber daily.

*Baseline:* 96.3% of adults in Arizona consumed less than 30 grams of fiber per day in 1995. Source: Dietary Profile of the State of Arizona, 1995, University of Arizona Prevention Center and the Arizona Department of Health Services.

NOTE: No ongoing source of data is available to measure fiber intake.

**Objective 1.11:** By 2015, decrease the proportion of children, adolescents, and adults in Arizona who are overweight or obese by 20%.

*Baseline: BRFSS*

20.1% of adults in Arizona were obese (BMI >30 kg/m<sup>2</sup>) in 2003.

37% of adults in Arizona were overweight (BMI 25.0-29.9 kg/m<sup>2</sup>) in 2003.

*YRBS:*

13.6% of Arizona youth in grades 9-12 were at risk for becoming overweight (>85th percentile but <95th percentile for BMI, by age and sex).

10.8% of Arizona youth in grades 9-12 were considered overweight (>95th percentile for BMI, by age and sex).

*Strategies:*

#### **5 A Day**

1. Promote daily consumption of five to nine servings of fruits and vegetables to include a wide variety of colorful fruits and vegetables.

*Activities:*

- a. Incorporate 5 A Day common messages and strategies into all chronic disease prevention programs.
- b. Utilize 5 A Day messages and materials in retail grocery stores, primary care programs, schools, social marketing campaigns, worksites, places of

worship, and community settings.

- c. Increase the number of salad bars in schools.
- d. Support fruit and vegetable snack programs for children.
- e. Ensure access to fruits and vegetables through retail grocery stores, farmers markets, school and community gardens, gleaning distribution programs, senior centers, and food assistance programs such as WIC and Food Stamps.

#### **Healthy Eating**

2. Support adoption of dietary practices to reduce cancer risk. The American Cancer Society identifies these key dietary components:
  - Eat a wide variety of healthful foods, with an emphasis on plant sources.
  - Eat five or more servings of a variety of vegetables and fruits each day.
  - Choose whole grains in preference to processed (refined) grains and sugars.
  - Limit consumption of red meats, especially those that are processed or high in fat.
  - Choose foods that help maintain a healthful weight.

*Activities:*

- a. Utilize national dietary guidelines such as those from the American Cancer Society or the Dietary Guidelines for Americans, 2004, in developing primary prevention nutrition messages and programs.
- b. Promote breastfeeding and advocate for worksite policies that support breastfeeding.
- c. Incorporate common nutrition messages that

- support increased daily intake of fruits and vegetables, whole grains, and nonfat or low-fat dairy products into social marketing campaigns and chronic disease prevention programs.
- d. Encourage all schools to adopt the Arizona Healthy School Environment Model Policy that includes the areas of Food Service, Nutrition Education, Food Choices at School, and Physical Activity.
  - e. Promote use of the Centers for Disease Control and Prevention School Health Index in all schools.
  - f. Increase access to healthy foods in schools, worksites, and communities.
  - g. Identify best practices to implement innovative and effective programs across communities that improve dietary habits among Arizonans.
  - h. Utilize the unique diversity of Arizona residents to develop creative efforts to promote healthy eating habits.

### **Obesity Prevention**

- 3. Support partnerships to address the increasing health burdens of overweight and obesity in Arizona.

#### *Activities:*

- a. Participate in the development and implementation of the Arizona State Nutrition and Physical Activity Plan including activities in the priority areas of worksites, health care, physical environments, and schools inclusive of family and

community settings.

- b. Encourage all schools to adopt the Arizona Healthy School Environment Model Policy that includes the areas of Food Service, Nutrition Education, Food Choices at School, and Physical Activity.
- c. Support partnerships to implement insurance incentives for healthy behaviors and to discount insurance rates for companies with wellness programs.
- d. Advocate for insurance reimbursement for the prevention and treatment of overweight and obesity.
- e. Increase research and evaluation on prevention and treatment interventions for overweight and obesity and develop and disseminate best practice guidelines.

### **SUN SAFETY**

**Objective 1.12:** Increase the number of Arizonans who regularly use effective sun protection by 2010.

*Baseline: BRFSS 2003*

32% of Arizona residents reported being sunburned within the past 12 months.

29.9% reported being sunburned at least once; 25.9% reported being sunburned twice; and 17.1% reported being sunburned at least three times in the last 12 months. 13% of respondents reported six or more occasions of being sunburned in the past year.

BRFSS data: One Burn: 29.9%; Two Burns: 25.9%;

Three Burns: 17.1%; Four Burns: 6.7%; Five Burns: 7.3%; Six Plus Burns: 13.0%.

*Strategies:*

1. Increase the number of community-wide educational efforts that emphasize the importance of adopting sun safe behaviors in order to reduce the risks of skin cancer. The following are common sun safe measures:

Avoid the sun between 10:00 a.m. and 4:00 p.m.

Wear sun protective clothing including hats and sunglasses when exposed to sunlight.

Use sunscreen SPF 15 or higher.

Avoid artificial sources of UV light (sunlamps, tanning beds).

*Activities:*

- a. Implement an effective media and public service campaign that promotes sun safety practices.
  - b. Create statewide partnerships to further sun safety education and practice among children and adults including activities that promote sun safe behavior at school, home, and recreational settings.
  - c. Expand and fund new school-based education programs to encompass a comprehensive healthy lifestyle education component that addresses tobacco, physical activity, nutrition, and sun safety.
  - d. Expand number of worksites that provide sunscreen and information.
  - e. Reduce the number of people using tanning booths through a health education campaign.
2. Create shade in areas and for populations most susceptible to prolonged sun exposure.

- a. Increase shade on playgrounds, schools, and daycare centers.
- b. Increase sun protection measures at worksites.
- c. Increase sun protection for outdoor workers such as those working within the parks and recreation, construction fields, and farming.
- d. Increase the number of bus stops with shade protection.

Data source: To be determined.

## ***ALCOHOL***

**Objective 1.13:** By 2010, decrease the proportion of youth and adults who exceed the national dietary guidelines for alcohol consumption (consuming more than one drink per day for women, more than two drinks of alcohol per day for men, and no alcoholic beverage consumption for adolescents and children), (Dietary Guidelines for Americans, 2000).

*Baseline: YRBS*

78.4% of Arizona youth in grades 9-12 have ever had one or more drinks of alcohol.

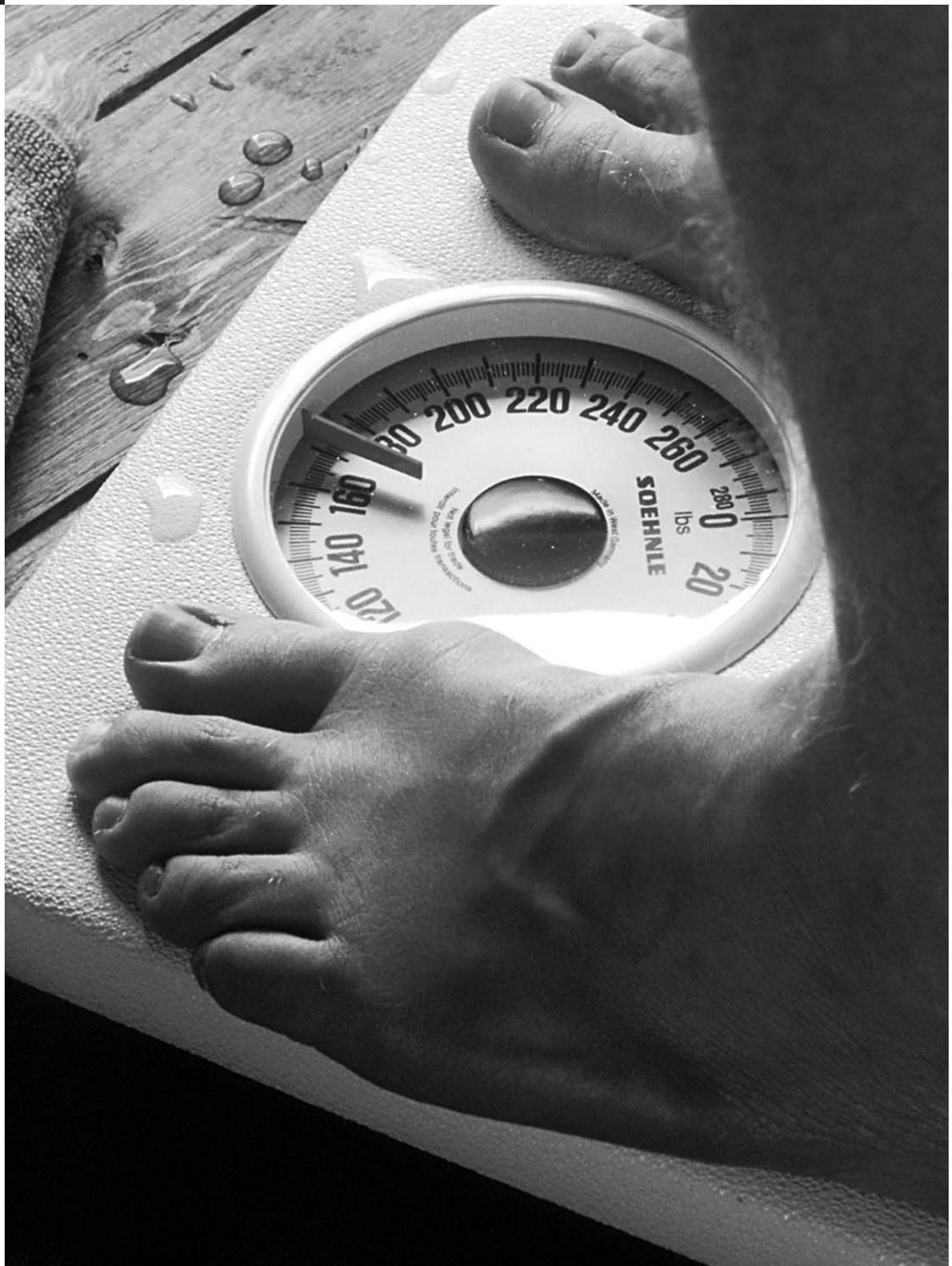
50.9% of Arizona youth in grades 9-12 drank one or more drinks of alcohol in the 30 days preceding the 2003 YRBS survey.

33.6% of Arizona youth in grades 9-12 drank five or more drinks of alcohol in a row in the 30 days preceding the 2003 YRBS survey.

*BRFSS:*

5.4% of Arizona adults were at risk for heavy





drinking in 2003 (exceeded one drink per day for women and two drinks of alcohol for men).

16.6% of Arizona adults drank five or more drinks of alcohol on one occasion in 2003.

*Strategy:*

Awareness of Alcohol Consumption and Cancer Risk

1. Disseminate public education messages about the role of alcohol and cancer risk.

*Activities:*

- a. Educate Arizonans about the relationship between alcohol use and cancer.
- b. Increase awareness of the substance abuse prevention services available through the Arizona Department of Health Services.
- c. Collaborate with organizations such as the Department of Motor Vehicles, Department of Transportation, Mothers Against Drunk Driving, high schools, and community centers to distribute public health and public safety messages regarding the hazards of excessive alcohol use and cancer risk.
- d. Encourage alcohol and tobacco messages in drug promotion efforts such as Drug Free Arizona.
- e. Educate college students on the negative health consequences of binge drinking and chronic alcohol use and increased risk for cancer.
- f. Post signs in bars on the health risks due to excessive alcohol consumption including

increased cancer risk.

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# EARLY DETECTION AND SCREENING

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“Early detection through screening is our best defense against morbidity and mortality from breast and cervical cancers and precancers.”

*—Julie L. Gerberding, MD, MPH*

## Secondary prevention involves screening individuals and populations for cancer in an effort to detect and treat cancer at its earliest possible stage. Finding the disease before symptoms arise allows clinicians to treat cancer before it progresses any

further or metastasizes. Secondary cancer prevention efforts strive to improve population and individual health outcomes, which results in reduced morbidity and mortality within communities.

In order to effectively assess population-based cancer screening, initiatives must obtain current cancer prevalence rates since this data defines the current cancer burden to some extent. If a state's prevalence rate is low for a certain cancer site, more screening tests need to be performed within the population to detect one case of cancer.<sup>1</sup> When assessing whether or not cancer screening is feasible from a public health perspective for a specific cancer site, many issues must be considered.

In Fulfilling the Potential of Cancer Prevention and Early Detection, Curry and colleagues identify the five following areas worth considering when assessing screening efficacy: (1) the burden of suffering, severity of the disease on the human body, and frequency of cancer in the population; (2) reliability and accuracy of a screening test in detecting cancer; (3) how effective early detection efforts are including detecting cancer at its earliest stage; (4) benefits and risks of screening; (5) and the cost.<sup>2</sup> This chapter focuses on the cancer sites for which screening tests are currently available: breast, colorectal, cervical, and prostate. We also include skin and oral cancers within this section since screening for these cancers can be accomplished during a routine physical exam.

We conclude with information on lung and ovarian cancers within this section since these cancers cause substantial morbidity and mortality and advances in screening modalities with respect to these two sites could potentially save lives. There are numerous national and international guidelines on cancer screening, including guidelines from the American College of Surgeons, American Academy of Family Physicians, U.S. Preventive Services Task Force (USPSTF), and the American Cancer Society. The Early Detection/Screening Committee chose to adopt the American Cancer Society Screening Guidelines and referred to these guidelines, which are provided in this chapter, while crafting their goals, objectives, and strategies for the cancer plan.

### Screening and Testing Options for Breast Cancer

Screening tests for breast cancer include clinical breast examination, mammography (x-ray of the breast), and breast self-examination. Genetic testing for breast cancer involves a blood test that looks for mutations within BRCA1 and BRCA2 genes (breast cancer-associated tumor suppressor genes). The first three early detection measures are the most commonly practiced and/or endorsed population-based screening methods nationwide. Testing for genetic mutations is usually an additional tool reserved for women at high risk for breast cancer due to family history of the disease.

## Burden of Breast Cancer

Between 1973 and 1992, breast cancer incidence increased by 34% in the U.S., partly due to more women obtaining mammograms and other screening services throughout the country.<sup>3</sup> If breast cancer is diagnosed early and at a local stage, the five-year survival rate is 97%.<sup>4</sup> Breast cancer is the most frequently diagnosed cancer and the second leading cause of cancer mortality among Arizona females. Nationally, an estimated 211,240 new cases of invasive breast cancer are expected to occur among women in 2005.<sup>5</sup>

Based on cancer data from 1999-2001, 678 Arizona women succumb to breast cancer each year. Between 1999-2001, the breast cancer average age-adjusted mortality rate was 24.9/100,000. Based on data from the same years, approximately 3,295 new cases of invasive breast cancer were diagnosed yearly among women in Arizona. The breast cancer age-adjusted incidence rate was 122.1/100,000 from 1999-2001.

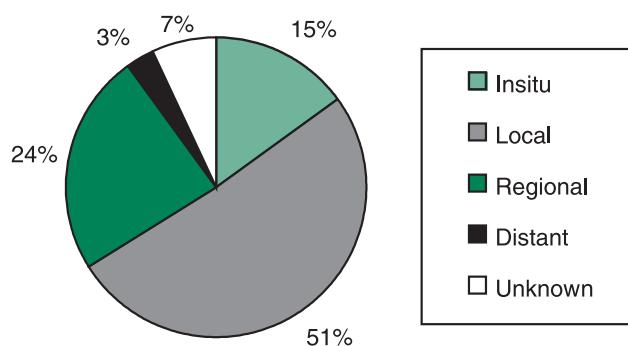
Figure 2.1 illustrates female breast cancer stage at diagnosis percentages for the same time period, and shows that at least half of breast cancer cases were diagnosed in the local stage of disease.

Breast cancer ranks second after lung cancer as the most common cause of death from cancer among women both nationally and in Arizona. From 1999-2001, three-year average case counts for invasive and in situ breast cancers were 3,295 and 669 respectively (Figure 2.2).

## Breast Cancer Screening: A Closer Look

Mammography remains the primary screening tool with respect to breast cancer early detection because this tool has the ability to detect early stage cancer before a tumor can be seen or felt. Breast cancer diagnosis at an early stage allows the patient more autonomy with respect to surgery and treatment options available to them, and also allows the patient and physician to participate equally in treatment decision

**FIGURE 2.1** ━━━━ Female Breast Cancer Cases Percentage by SEER Summary Stage, Average Count, 1999-2001



making. For example, if breast cancer is diagnosed at stage I of the disease, breast-conserving surgery may be an option in addition to very minimal adjuvant therapy in the form of radiation or chemotherapy. Over the last 25 years, the incidence of breast cancer has been on the rise worldwide. According to the National Health Interview Survey, the percentage of women aged 40 years and older obtaining mammograms within the past two years more than doubled from 1987 to 2000.<sup>6</sup>

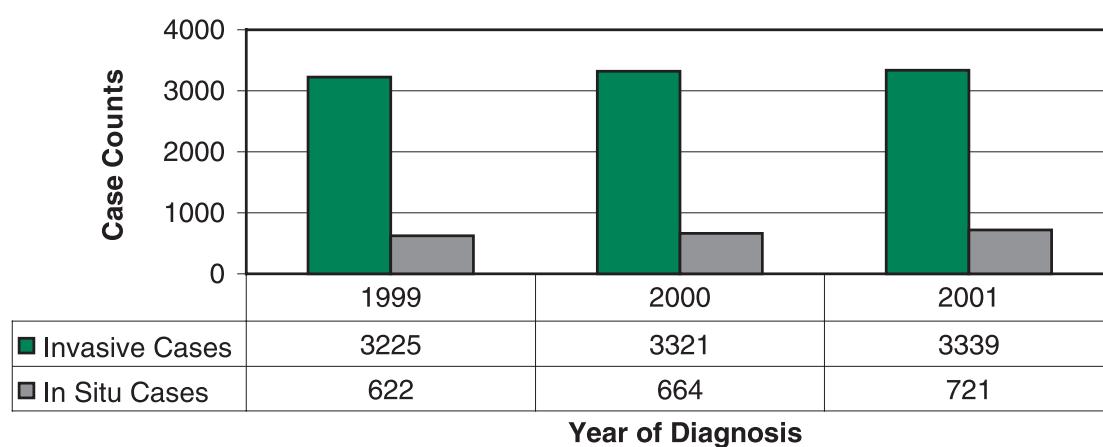
Scientists credit the introduction of tamoxifen and the widespread availability of chemotherapy as reasons for a decrease in breast cancer mortality rates over the last 15 years in North America as opposed to mass mammography screening interventions.<sup>7</sup> This is primarily due to the fact that population-based mammography screening efforts were not made widely available, nor were they standardized worldwide for an immediate change in mortality rates to be attributed solely to mammography practices. Implementing

effective population-based breast cancer screening entails resources, equipment, trained personnel, and usually a social marketing or mass media campaign that advertises the services to target populations.

“Interval” cancers are defined as breast cancers diagnosed after a negative mammography result. Dense breast tissue appears to be a risk factor for this type of cancer.<sup>8</sup> Clinical breast exams and breast self-examination may assist in detection of interval cancers. Between three and 45% of breast cancers missed by mammography may be detected by clinical breast examination.<sup>9</sup> There has been less consistency worldwide in mammography screening detecting breast cancer in women under age 50 years compared to older age groups primarily due to the fact that premenopausal women may have denser breasts and experience faster tumor growth rates due to circulating estrogen levels within their bodies.<sup>10,11</sup>

Eight randomized controlled trials of screening mammography in North America conducted from

**FIGURE 2.2** Counts of Invasive and in Situ Female Breast Cancer in Arizona, 1999-2001



1963-1990 concluded that screening mammography reduced the risk of mortality from breast cancer with relative risk reductions between three and 32% depending on the study.<sup>12</sup> After reviewing the current scientific evidence available with respect to mammography, the International Agency for Research on Cancer (IARC) concluded that mammography screening reduced the risk of mortality from breast cancer among women aged 40-49 years by approximately 19% and by about 35% among 50-69 year old females.<sup>13</sup> The United States Preventive Services Task Force (USPSTF) currently recommends that women aged 40 years and over obtain a mammogram either every year or every two years depending on discussion with their physician as well as individual risk.<sup>14</sup>

The American Cancer Society advocates the following recommendations for breast cancer screening: First, monthly breast self-examination is an option for women beginning in their 20s in order for women to become aware of the way their breasts normally feel and to detect changes such as lumps. Second, clinical breast examination should be part of a routine health exam once every three years in women aged 20-39 years and every year for women aged 40 years and older. Third, yearly mammograms are recommended for women aged 40 years and older. Lastly, women who are at increased risk for breast cancer due to a past breast cancer diagnosis or family history should talk to their physicians about the benefits and limitations of starting mammography screening earlier in life as well as having additional tests or exams to screen for breast cancer.<sup>15</sup>

## Current Breast Cancer Screening Rates and Stage at Diagnosis

According to BRFSS data, 56% of women aged 40 years and over had a clinical breast exam and mammogram within the past year in 2002. In Arizona, over 80% of new breast cancer cases are diagnosed in women aged 50 years and older. The Arizona Health Care Cost Containment System found that approximately 55% of women aged 52-64 years enrolled in Medicaid had a mammogram in 2001.<sup>16</sup> Based on 2002 data, only 25% of women without health insurance received a yearly mammogram and clinical breast exam in the prior year.

Between 1999-2001, as reflected in Figure 2.1, 27% of breast cancers diagnosed were detected in either regional or distant stage of disease (late stage). The Health Services Advisory Group (HSAG), a quality improvement organization that works with federal, state, and private agencies in Arizona, collects and analyzes data, including information from the Center for Medicare and Medicaid Services (CMS). Between April 2002-March 2004, Arizona biennial mammography rates by county ranged from 31.6% (Apache County) to 65.8% (Pima County) with an overall state mammography rate of 59.6%.<sup>17</sup>

## Disparities

Disparities exist and are apparent with respect to breast cancer screening among ethnic groups in Arizona. Hispanic, Asian/Pacific Islander, and American Indian women experience lower screening rates than White, non-Hispanic females.<sup>18</sup> The latter group is screened more often than any other ethnic/racial group. White, non-Hispanic females are also diagnosed with breast cancer more often than any

other racial/ethnic group in Arizona at an incidence rate of 133.8/100,000 from 1999-2001. Based on the data available within the same time frame, age-adjusted incidence and mortality rates are lowest for American Indian and Asian/Pacific Islander women in Arizona.

African American women experience the highest mortality rates from breast cancer (40.3/100,000) in Arizona. According to 2001 census estimates, out of 5.2 million residents, 3% of the population in Arizona is comprised of African Americans.<sup>20</sup> White, non-Hispanic, African American, and Hispanic females suffer from the highest incidence and mortality rates from breast cancer based on 1999-2001 cancer data. Disparities are apparent with respect to age, race/ethnicity, socioeconomic, and health insurance status as well as education level attained and geographic location in Arizona.

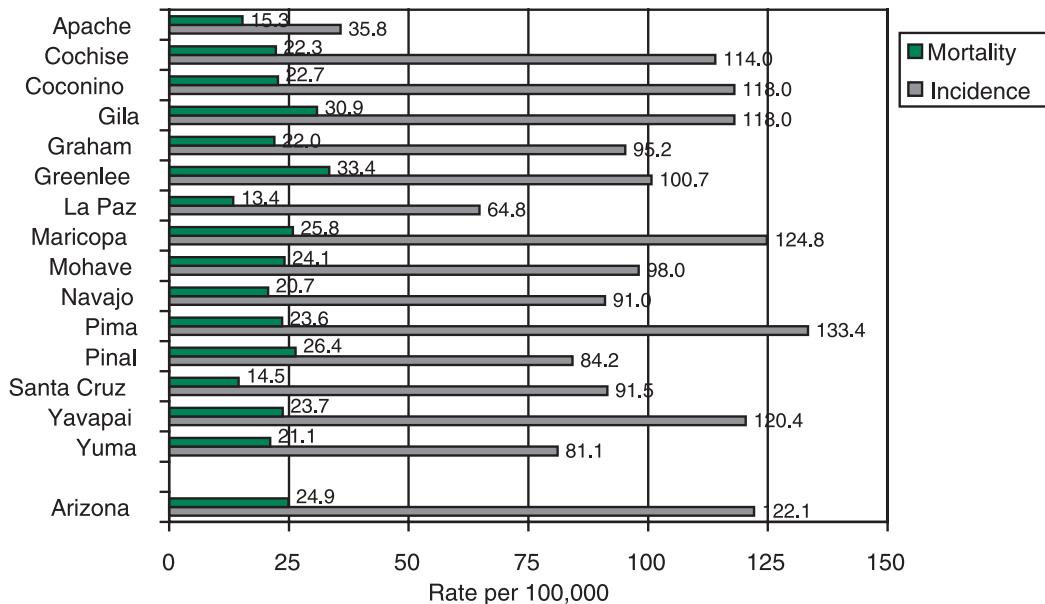
Almost 37% of breast cancers among African American, American Indian, and Hispanic women are

diagnosed in regional or distant stages of disease. As far as geographic disparities are concerned, Gila, La Paz, and Navajo counties have more than 33.4% of their breast cancers diagnosed at late stage. This is probably due to lack of access to screening services within those areas or lack of insurance and time to take out of the day by women to get screened for breast cancer. Pima County has the highest breast cancer incidence rate followed by Maricopa and Yavapai counties (Figure 2.3). With respect to health insurance status, of adults with a low education level, 36% have no health insurance. Lack of health insurance not only influences individual health status, but the health outcomes of the family as well.

## Screening Women: Arizona Programs in Action

Since 1995, Arizona Department of Health Services Well Woman HealthCheck Program has been providing

**FIGURE 2.3** Average Annual Age-Adjusted Incidence and Mortality Rates for Female Breast Cancer by County, 1999-2001



breast and cervical cancer screening and diagnostic services to uninsured or underinsured women in Arizona. To help improve access to screening for breast and cervical cancers among underserved women, Congress passed the Breast and Cervical Cancer Mortality Prevention Act of 1990. Arizona's Well Woman HealthCheck Program is part of a nationwide effort, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP), created in 1991 by the Centers for Disease Control and Prevention (CDC) as a result of the 1990 act's passage. Well Woman HealthCheck is funded by a grant from the Centers for Disease Control and Prevention (CDC) and the state of Arizona.

After federal legislation was passed in 2000 to offer a treatment program for women screened within NBCCEDP, the Arizona State Legislature passed the Breast and Cervical Cancer Treatment Act in 2001 that provides three to one matching funds from the federal government to treat women diagnosed with breast or cervical cancer through the Well Woman HealthCheck Program. Breast and cervical cancer treatment is administered through the Arizona Health Care Cost Containment System (AHCCCS). Census data indicates there are approximately 175,000 women in Arizona who are eligible for breast cancer screening and diagnostics through the Well Woman HealthCheck Program. Last year, the program screened approximately 7,300 women.

## Colorectal Cancer Screening

Screening as a secondary prevention strategy for colorectal cancer not only allows clinicians to detect cancer at an early stage, but may also prevent cancer from occurring through the identification and removal

of pre-malignant colorectal adenomas, some of which can progress to colorectal cancer. Fecal occult blood testing (FOBT), flexible sigmoidoscopy, colonoscopy, and double-contrast barium enema are the approved modalities for screening. A genetic predisposition is recognized in up to 25% of cases of colorectal cancer. There are several rare conditions, accounting for less than 5% of cases of colorectal cancer, in which the predisposition is in the form of a single aberrant gene.<sup>21,22</sup>

Inheritance of one of these genes from either parent is sufficient to lead to the almost inevitable development of colorectal cancer, usually in early adult life. Approximately 20% of colorectal cancer patients report that the disease was previously diagnosed in a first-degree relative (i.e., a parent, sibling or child).<sup>23</sup> The disease is liable to occur at a relatively young age, sometimes before the age of 50 years, in these patients. Colorectal cancer is termed sporadic in the 70-75% of patients without a familial predisposition as described.

Sporadic cases of colorectal cancer are uncommon before the sixth decade.<sup>24</sup> Those at risk for sporadic colorectal cancer are said to be at average risk for the disease, in contrast to those with a familial predisposition, who are at increased risk. The American Cancer Society and other authorities recommend periodic colorectal cancer screening in the entire population aged 50 years and older.<sup>1,18,28,51</sup> Based on National Health Interview Survey data, 39% of adults 50 years and older obtained a fecal occult blood test within the last year or an endoscopic test (flexible sigmoidoscopy or sigmoidoscopy) within the last three years.<sup>25</sup>

## Burden of Colorectal Cancer

Based on data collected between 1999-2001, on average, 2,407 new cases of colorectal cancer are

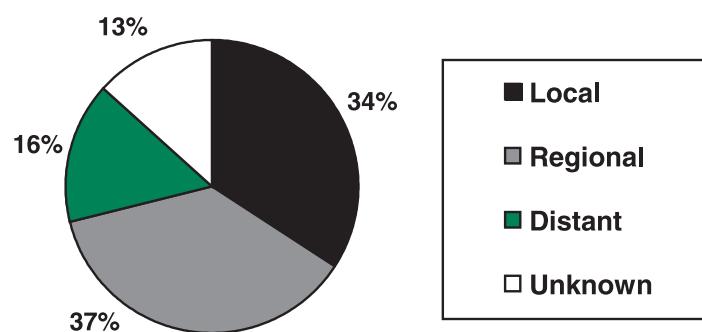
diagnosed each year for an age-adjusted incidence of 46.7/100,000. Approximately 856 Arizonans lose their lives to colorectal cancer each year, which results in an age-adjusted mortality rate of 16.3/100,000 for the same time period. Colorectal cancer is the third leading cause of mortality from cancer in Arizona among men and women, and the second leading cause overall in the combined sexes. Almost 90% of Arizonans diagnosed

with colorectal cancer are aged 55 years and older.

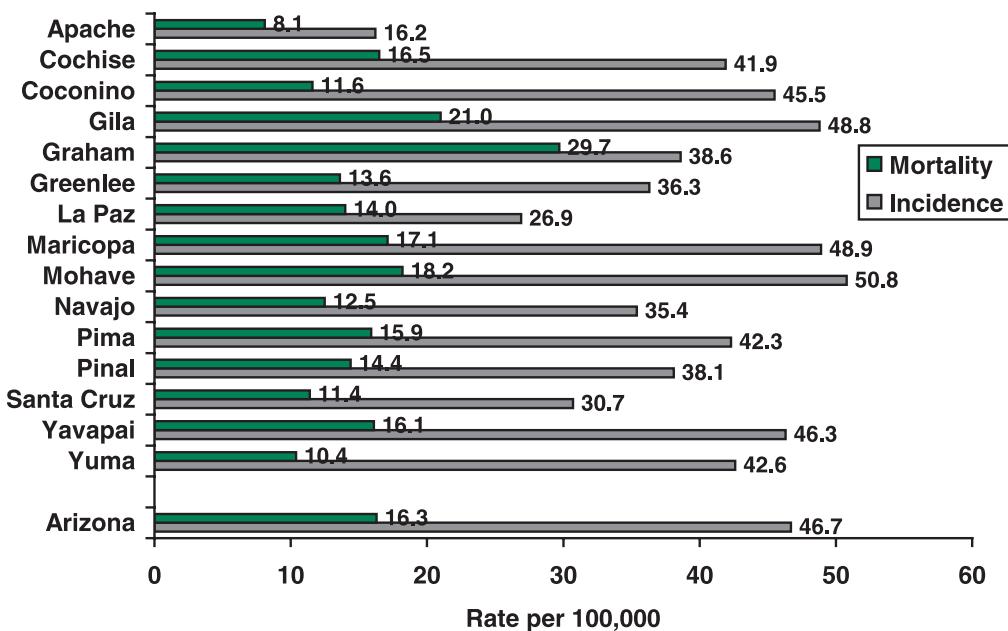
Colorectal cancer accounts for 11% of all new cancer cases in Arizona among men and 11% of all new cases among women making it the third most common type of cancer diagnosed statewide. Figure 2.4 shows staging percentages for colorectal cancer.

## Colorectal Cancer Disparities

**FIGURE 2.4** Colorectal Cancer Average Cases by SEER Summary Stage, 1999-2001



**FIGURE 2.5** Average Annual Age-Adjusted Incidence and Mortality Rates of Colorectal Cancer by County, 1999-2001



There are apparent racial and gender differences regarding colorectal cancer incidence and mortality rates among Arizonans. Statewide colorectal cancer incidence and mortality rates are higher in males than females. African American males suffer from the highest incidence and mortality rates from colorectal cancer in Arizona. White, non-Hispanic males experience the second highest incidence and mortality rates with respect to colorectal cancer.

Based on the most current data available, American Indians experience the lowest incidence, but Asian/Pacific Islanders have the lowest mortality rates from colorectal cancer. Among females, African Americans experience the highest death rates from colorectal cancer followed by White, non-Hispanic and Hispanic females respectively. There are also differences in incidence when age is accounted for in that the majority of new cases in males and females are among those aged 55 years and older. A large percentage of these cases occur among individuals aged 65 years and older.

Geographic disparities also exist with respect to colorectal cancer incidence and mortality. Mohave County has the highest colorectal incidence rate followed by Maricopa and Gila Counties. Graham County experiences the highest mortality rate from colorectal cancer followed by Gila and Mohave Counties (Figure 2.5).

## **Screening Rates and Stage at Diagnosis**

According to 2002 Arizona BRFSS data, 27.1% of adults aged 50 years and older were screened for

colorectal cancer through a fecal occult blood test within the past year and 42% of the same age group received a sigmoidoscopy or colonoscopy within the last five years. Arizonans aged 65 years and older comprised the largest age group who received either screening test in 2002 (30% and 49.8% respectively). Of the adults aged 50 years and older who were screened, only 9.7% of individuals without health insurance received an FOBT and 11.3% of those without health insurance received an endoscopic (colonoscopy or sigmoidoscopy) exam. Adults diagnosed with colorectal cancer experience about a 90% five-year survival if the disease is detected at the localized stage or has not extended beyond the intestinal wall.<sup>26,27</sup>

Less than 50% of Arizonans aged 50 years and older are being screened and diagnosed with colorectal cancer at the local stage. This percentage is lowest in Native Americans (23%), Hispanics (26%), and African Americans (27%). Late stage diagnosis of colorectal cancer is predominant in Coconino, Navajo, and Gila Counties where more than 60% of cases are diagnosed at the regional or distant stages. A nationwide American Cancer Society study found that low educational attainment, lack of access to a usual source of health care, and lack of health insurance were factors associated with underutilization of colorectal cancer screening.<sup>28</sup> Currently, there is no state requirement in Arizona that requires health insurance companies to cover colorectal cancer screening tests.<sup>29</sup>

## **Colorectal Cancer Screening: A Closer Look**

Colorectal cancer screening uptake has lagged behind other secondary prevention efforts such as Pap tests and mammograms partly due to the fact that

increasing evidence supporting a health benefit from screening for colorectal cancer only came to the forefront within the last 10-15 years.<sup>30</sup> Having a multitude of screening choices to decide from for a single cancer site like colorectal cancer could also be another reason why screening rates remain lower compared to other cancer sites. An English study concluded that when physicians recommended more than one screening test for a particular cancer to their patients, individuals took longer to adhere to screening recommendations.<sup>31</sup> Fecal Occult Blood Testing (FOBT) as a colorectal cancer screening measure has been utilized, researched, and evaluated more extensively than any other colorectal cancer screening test worldwide.

FOBT is widely available, easy to administer, and inexpensive. However, specificity of the test is poor and sensitivity, particularly for benign polyps (colorectal adenomas) but even for invasive cancers, is far from optimal. Much of the published experience with FOBT has come from Hemoccult guaiac-based stool tests, which detect the peroxidase activity of heme and other stool peroxidases.<sup>32</sup> The American Cancer Society and other authorities recommend annual FOBT without rehydration.<sup>33,34</sup> All subjects with a positive FOBT should undergo a colorectal structural evaluation. Colonoscopy is the preferred test for this purpose, otherwise double contrast barium enema may be used.

Results from randomized controlled trials indicate that annual or biennial FOBT followed by appropriate investigation for subjects with a positive test may reduce colorectal cancer mortality by 15-30%.<sup>35</sup>

Because of the poor specificity of FOBT, it has been argued that reduced mortality from colorectal cancer in subjects undergoing regular FOBT derives serendipitously from the increased numbers of colonoscopies that are performed, most of them negative and for a false-positive FOBT.<sup>36</sup> Furthermore, in the studies showing the greatest benefit from FOBT, rehydration was applied in most of the tests. It is now categorically recommended that rehydration not be applied because of resulting drastically worsened specificity. This leads to a commensurate increase in the number of structural evaluations that are performed with a negative (normal) outcome.<sup>37</sup>

A 60-cm flexible endoscope is used for screening sigmoidoscopy. Flexible sigmoidoscopy is an office-based procedure, usually performed by primary care physicians or their non-physician assistants without sedation.<sup>38</sup> The major disadvantage of flexible sigmoidoscopy as a screening procedure is that only the rectum and distal portion of the colon are accessed and visualized. However, the presence of distal adenomas or cancers, accessible by flexible sigmoidoscopy, is associated with an increased occurrence of proximal inaccessible lesions.<sup>18</sup> For this reason, total colonoscopy is recommended following diagnosis of adenomas or cancers found by sigmoidoscopy. If this strategy is adopted, the overall sensitivity of flexible sigmoidoscopy for diagnosing colorectal adenomas and cancers is estimated at 70-80%.<sup>38</sup> Case-control studies indicate that mortality from colorectal cancers within reach of the instrument may be reduced by 60-80% as a result of therapy implemented for findings at flexible sigmoidoscopy.<sup>39-40</sup>

Colonoscopy is the criterion standard for diagnosing colorectal adenomas and cancers, and is one of the

recommended primary alternative tools for colorectal cancer screening in average-risk subjects. Bowel preparation is essential before colonoscopy, which is usually performed under intravenous conscious sedation.<sup>41</sup> A major advantage of screening colonoscopy is that most adenomas can be removed or ablated as part of the screening procedure. There have been no randomized controlled trials of colonoscopy but reductions in incidence and mortality of approximately 60% have been estimated for subjects screened in this way.<sup>42</sup> Complications from the procedure and cost are disadvantages of screening colonoscopy.

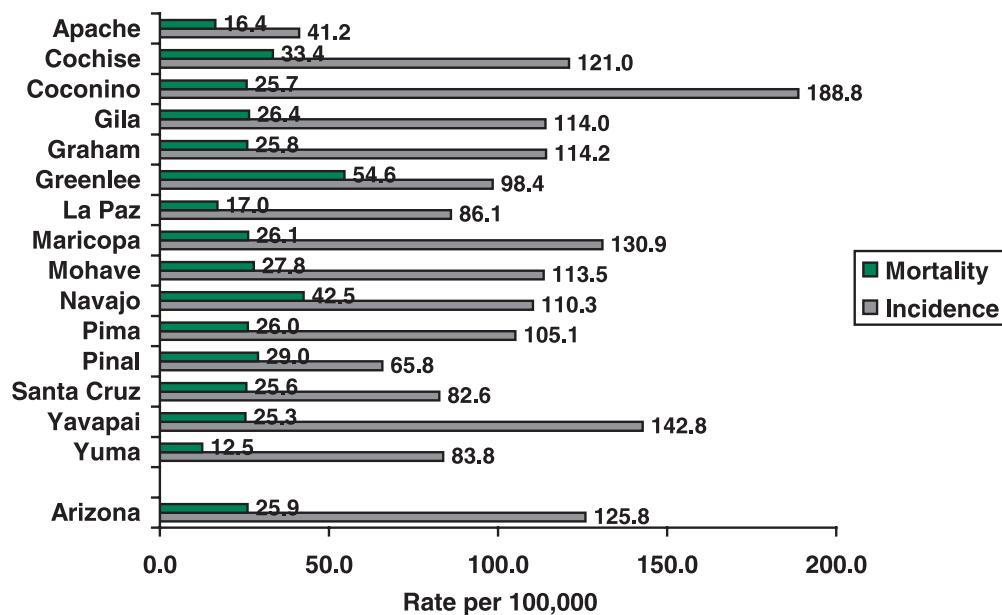
The American Cancer Society (ACS) endorsed the following colorectal cancer screening guidelines in 2005: Beginning at age 50 years, males and females at average risk for the disease should have one of the following: (1) annual FOBT; (2) flexible sigmoidoscopy every five years; (3) combination of annual FOBT and flexible sigmoidoscopy every five years; (4) colonoscopy every 10 years; or (5) double-contrast

barium enema every five years.<sup>43</sup> ACS also recommends that all non-colonoscopy positive screening tests be followed up by colonoscopy and adds that individuals with a family history of colorectal cancer or those with inflammatory bowel disease should consult with their health care practitioner regarding the possible benefit of beginning colorectal cancer screening before age 50.

## Virtual Colonoscopy

Virtual colonoscopy, also known as computed tomography (CT) colonography is a new technique that is currently being evaluated as a tool for colorectal cancer screening. Bowel preparation prior to this specialized form of CT scanning is still required but sensitivity and specificity comparable to the results of screening (optical) colonoscopy have been reported in some studies.<sup>44</sup> With further technical refinements it is possible that virtual colonoscopy without prior bowel preparation will be available within a few years. If

**FIGURE 2.6** Average Annual Age-Adjusted Prostate Incidence and Mortality Rates by County, 1999-2001



comparable sensitivity and specificity without the need for bowel preparation and intravenous sedation could be achieved, virtual colonoscopy would become an attractive alternative to optical colonoscopy. Optical colonoscopy would still be required as a second procedure in subjects diagnosed with polyps or suspected cancers at virtual colonoscopy.

## Prostate Cancer Screening

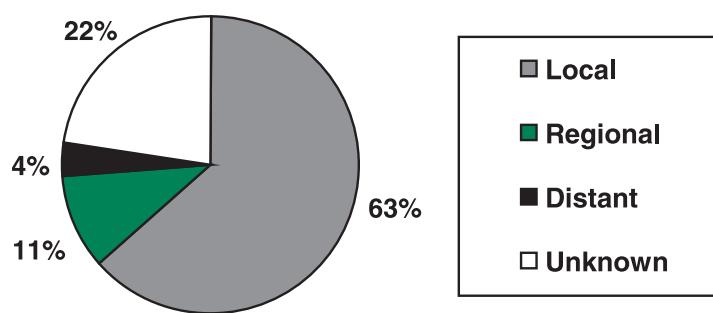
Prostate cancer is the most commonly diagnosed cancer among males nationwide (excluding skin cancer) and the second leading cause of cancer mortality.<sup>45</sup> Prostate cancers typically take many years to develop and risk for the disease increases with age. It is the most commonly diagnosed cancer among men in Arizona. Approximately 3,019 invasive cases of prostate cancer are diagnosed annually in our state.

Based on data compiled from 1999-2001, the average age-adjusted prostate cancer incidence rate for all races/ethnicities is 125.8/100,000. About 529 males die from the disease each year for a state mortality rate of 25.9/100,000 during the same time frame. Approximately 95% of males diagnosed with prostate cancer are aged 55 years or older and 73% of males diagnosed are aged 65 years and older.

In Arizona, African American males have the highest incidence and mortality rates. White, non-Hispanic males and Hispanic males have the second and third highest incidence from prostate cancer. Hispanic and White, non-Hispanic males suffer from the second and third highest death rates from the same disease. Among Hispanic males, prostate cancer is the second leading cause of cancer mortality nationwide.<sup>46</sup> In Arizona, Asian/Pacific Islander males and American Indian males experience the lowest incidence and mortality rates from prostate cancer. Coconino County experiences the highest prostate cancer incidence rates followed by Yavapai and Maricopa Counties (Figure 2.6). However, Greenlee County has the highest mortality rate from prostate cancer followed by Navajo and Cochise Counties.

With regard to prostate cancer screening, the 2000 National Health Interview Survey concluded that almost two-thirds of males discussed the risks and benefits associated with prostate cancer screening with their physicians before getting screened.<sup>47</sup> Results from the survey also demonstrated that 41% of men aged 50 years and older had a PSA test within the last year and that men who had no health insurance or access to care were least likely to benefit from screening.<sup>48</sup> The five-

**FIGURE 2.7** — Average Prostate Cancer Cases by SEER Summary Stage, 1999-2001



year survival rate from prostate cancer is close to 97% if the cancer is diagnosed at a localized stage. Once diagnosed at a distant or regional stage of disease, prostate cancer the five-year survival estimate drops to 34%.<sup>49</sup>

Among Arizonans, 15% of all prostate cancers diagnosed between 1999 and 2001 were detected in the distant or regional stage demonstrating that most prostate cancers are diagnosed at an early stage in Arizona (Figure 2.7). There are geographical and ethnic/racial disparities regarding prostate cancer screening, however. Late stage diagnosis is noted in 22% and 21% of Native American and Hispanic cases respectively. More than 19% of prostate cancer cases in Coconino, Santa Cruz, Graham, and Pima Counties are diagnosed in the distant or regional stage of disease. According to 2002 BRFSS data, 59% of males aged 50 years and older and 67% of males aged 65 years and older received a PSA test within the last year. Of all men screened, 64% were White, non-Hispanic.

The prostate-specific antigen test (PSA) is a screening test used to detect an elevated PSA (a protein) level in the blood. A serum cut-off level of four nanograms/ml is considered a normal PSA level. Research has demonstrated that of males with PSA levels between 4-10 nanograms/ml, 25% are diagnosed with cancer, and 60% of men with PSA levels greater than 10 ng/ml have prostate cancer.<sup>50</sup> However, another 25% of males with PSA levels less than four nanograms/ml are diagnosed with cancer as well, which is partly why prostate cancer screening efficacy is currently under review by numerous organizations to

evaluate PSA test sensitivity and specificity for detecting cancer.

Although many organizations recommend administering the PSA test in concert with a digital rectal exam (DRE) for prostate cancer screening, there is little evidence that DRE reduces the mortality rate from prostate cancer.<sup>51</sup> Research has shown that DRE is unable to detect small, non-palpable tumors.<sup>52</sup> Although expert panels and major medical organizations may disagree on the specific prostate cancer screening recommendations, which largely entails whether or not to screen using the PSA test and DRE, most agree that the decision to screen should be shared between the clinician and individual. Currently, the USPSTF believes that there is insufficient evidence based on the research available to recommend using or abstaining from utilizing PSA and DRE as prostate cancer screening modalities.<sup>53</sup>

The American Urological Association (AUA) encourages physicians to offer males aged 50 years and older who have an anticipated lifespan of 10 or greater years as well as African American males and males with a family history of prostate cancer aged 40 years and older the PSA test in conjunction with DRE. According to AUA, early detection of prostate cancer in males is best accomplished by using DRE and PSA testing.<sup>54</sup> The AUA adds that deciding whether or not to be screened for prostate cancer is a personal decision that should be made by each patient after consulting with his physician and becoming informed of the advantages and disadvantages of early detection and treatment options.<sup>55</sup> The American Cancer Society recommends that PSA and DRE be offered annually to males starting at age 50 years and that males who are

at high risk for prostate cancer including those with first-degree relatives diagnosed with prostate cancer or African American males should begin testing at age 45 years.<sup>56</sup>

Beginning at age 50 years, ACS also encourages all men to talk to their doctors about prostate cancer screening options since early detection may provide them with greatest opportunity for a full recovery from the disease.<sup>57</sup> Ongoing research and clinical trials on prostate cancer screening efficacy is essential in order to make informed public health decisions based on the best scientific evidence available. The National Cancer Institute (NCI) and the U.S. Public Health Service conducted a large-scale clinical trial at 10 screening centers throughout the country between 1992 and 2001 entitled the Prostate, Lung, Colorectal, Ovarian Cancer Screening Trial (PLCO), which included a study that focused on the impact of PSA screening on prostate cancer survival.<sup>58</sup> Large, prospective studies are also being conducted in Canada and Europe on prostate cancer screening so that recommended screening modalities are based on sound evidence and research results.

## Prostate Cancer Activities in Arizona

In response to the growing numbers of men diagnosed with and who succumb to prostate cancer in Arizona, state legislation was passed in 2000 to create a special task force comprised of prostate cancer survivors, researchers, and physicians with the primary goal of investigating ways to increase research and

public awareness about prostate cancer. The Arizona Prostate Cancer Task Force meets four times a year and their main focus areas include: collect research and information on prostate cancer; evaluate the various approaches used by state and local governments to increase public awareness about the prevention and treatment of prostate cancer; recommend ways to increase the number of men screened for prostate cancer; and submit an annual report of its recommendations to the Governor and state government officials.<sup>59</sup> The American Cancer Society's Man to Man Program is a nationwide program available in Arizona that provides prostate cancer survivors a one-to-one visit with prostate cancer patients early in their diagnosis so that information and support gained from this experience will enable patients to make informed decisions with respect to quality of life and treatment options.

Initiated in 1999, the Southwest Prostate Cancer Foundation (SWPCF) is a non-profit organization whose mission is to raise awareness about prostate cancer early detection so that men can avoid a late stage diagnosis of prostate cancer and therefore experience better health outcomes. Advisory members and sponsors include representatives from major public health organizations, religious denominations, government organizations, pharmaceutical companies, and Arizona businesses. Two community events sponsored by SWPCF are the annual celebrity golf classic and the Move It For Dad! 5K run and walk. The events raise awareness about the importance of prostate cancer screening and raise money to support free screening programs, health education, and awareness efforts throughout the state. Arizona US TOO is a prostate cancer support group that works to

**FIGURE 2.8****Screening Guidelines  
For the Early Detection of Cancer in Asymptomatic People**

<b>Site</b>	<b>Recommendation</b>
<b>Breast</b>	<ul style="list-style-type: none"><li>• Yearly mammograms starting at age 40 and continuing for as long as a woman is in good health.</li><li>• Clinical breast exams (CBE) should be part of a periodic health exam, about every three years for women in their 20s and 30s and every year for women 40 and over.</li><li>• Women should report any breast change promptly to their health care providers. Breast self-exam (BSE) is an option for women starting in their 20s.</li><li>• Women at increased risk (e.g., family history, genetic tendency, past breast cancer) should talk with their doctors about the benefits and limitations of starting mammography screening earlier, having additional tests (e.g., breast ultrasound or MRI), or having more frequent exams.</li></ul>
<b>Colon &amp; Rectum</b>	<p>Beginning at age 50, both men and women at average risk for developing colorectal cancer should follow one of these five testing schedules:</p> <ul style="list-style-type: none"><li>• Yearly fecal occult blood test (FOBT)* or fecal immunochemical test (FIT)</li><li>• Flexible sigmoidoscopy every 5 years</li><li>• Yearly FOBT* or FIT plus flexible sigmoidoscopy every 5 years**</li><li>• Double-contrast barium enema every 5 years</li><li>• Colonoscopy every 10 years</li></ul> <p>*For FOBT, the take-home multiple sample method should be used.</p> <p>**The combination of yearly FOBT or FIT plus flexible sigmoidoscopy every 5 years is preferred over either of these options alone.</p>
<b>Prostate</b>	<p>Both the prostate-specific antigen (PSA) blood test and digital rectal examination (DRE) should be offered annually, beginning at age 50, to men who have at least a 10-year life expectancy. Men at high risk (African-American men and men with a strong family of one or more first-degree relatives (father, brothers) diagnosed at an early age) should begin testing at age 45. Men at even higher risk, due to multiple first-degree relatives affected at an early age, could begin testing at age 40. Depending on the results of this initial test, no further testing might be needed until age 45.</p> <p>Information should be provided to all men about what is known and what is uncertain about the benefits and limitations of early detection and treatment of prostate cancer so that they can make an informed decision about testing.</p>

<b>Site</b>	<b>Recommendation</b>
<b>Uterus</b>	<p><b>Cervix:</b> The American Cancer Society recommends:</p> <p>All women should begin cervical cancer screening about 3 years after they begin having vaginal intercourse, but no later than when they are 21 years old. Screening should be done every year with the regular Pap test or every 2 years using the newer liquid-based Pap test.</p> <p>Beginning at age 30, women who have had 3 normal Pap test results in a row may get screened every 2 to 3 years with either the conventional (regular) or liquid-based Pap test. Women who have certain risk factors such as diethylstilbestrol (DES) exposure before birth, HIV infection, or a weakened immune system due to organ transplant, chemotherapy, or chronic steroid use should continue to be screened annually.</p> <p>Another reasonable option for women over 30 is to get screened every 3 years (but not more frequently) with either the conventional or liquid-based Pap test, plus the HPV DNA test.</p> <p>Women 70 years of age or older who have had 3 or more normal Pap tests in a row and no abnormal Pap test results in the last 10 years may choose to stop having cervical cancer screening. Women with a history of cervical cancer, DES exposure before birth, HIV infection or a weakened immune system should continue to have screening as long as they are in good health.</p> <p>Women who have had a total hysterectomy (removal of the uterus and cervix) may also choose to stop having cervical cancer screening, unless the surgery was done as a treatment for cervical cancer or precancer. Women who have had a hysterectomy without removal of the cervix should continue to follow the guidelines above.</p> <p><b>Endometrium:</b> The American Cancer Society recommends that all women should be informed about the risks and symptoms of endometrial cancer, and strongly encouraged to report any unexpected bleeding or spotting to their doctors. For women with or at high risk for hereditary nonpolyposis colon cancer (HNPCC), annual screening should be offered for endometrial cancer with endometrial biopsy beginning at age 35.</p>
<b>Cancer</b>	For individuals undergoing periodic health examinations, a cancer-related checkup should
<b>Related</b>	include health counseling, and, depending on a person's age and gender, might include
<b>Check Up</b>	examinations for cancers of the thyroid, oral cavity, skin, lymph nodes, testes, and ovaries, as well as for some nonmalignant diseases.

SOURCE: American Cancer Society, 2005.

promote awareness and provide information about prostate cancer.

## Cervical Cancer Screening

Cervical cancer incidence and mortality rates significantly declined worldwide over the last 30 years due to the widespread use of the Pap (Papanicolaou) test beginning in 1941, which screens women for abnormal (pre-cancerous and cancerous) cell changes in the cervix. Cervical cancer is one of the most preventable and treatable cancers with a five-year survival of 99% if detected at an early stage.<sup>60</sup> The importance of being screened regularly for cervical cancer cannot be underestimated in that once detected at a regional or distant stage (Stage III or IV), the cervical cancer survival rate is estimated at 10% or less.<sup>61</sup>

Some of the first population-based screening programs that used the Pap smear were initiated in Canada and Europe throughout the 1940s, 1950s, and 1960s.<sup>62</sup>

Infection with oncogenic (high risk) types of human papillomavirus virus (HPV 16 or 18) is associated with aggressive forms of cervical cancer.<sup>63</sup> In addition, HPV DNA can be detected in almost 100% of invasive squamous cervical cancers.<sup>64,65</sup> Major risk factors for HPV infection include having unprotected sex, having sex with multiple partners, and having sex at an early age as well as being coinfected with other sexually transmitted infections such as HIV. Tobacco use has also been associated with cervical dysplasia (abnormal cell growth) and cervical cancer mortality within five years after diagnosis of disease.<sup>66</sup> As a cancer screening tool, the Pap test is fast, reliable, and inexpensive, and can be easily implemented as part of

population-based cervical cancer prevention and early detection initiatives.

The major barrier to cervical cancer prevention is not being screened at all.<sup>67</sup>

Once a woman is screened for cervical cancer using a Pap test, if pre-cancerous or cancerous lesions are found, the clinician may recommend an HPV DNA test, colposcopy, or cervical biopsy in order to make a more definitive diagnosis.

## Cervical Cancer Burden and Screening Practices in Arizona

Approximately 187 women are diagnosed with cervical cancer each year in Arizona and about 58 women die from the disease. Cervical cancer incidence rates are highest among Hispanic and American Indian women in Arizona and cervical cancer deaths are highest among African American and American Indian females. The average annual overall incidence rate from 1995-2000 for cervical cancer was 7.9/100,000 and the overall mortality rate for that same time frame was 2.4/100,000. Based on historical trend data covering 1997-2001, the mortality rate from cervical cancer has declined from approximately 3.8/100,000 to between 2.4-2.6/100,000 currently.

Nationally, the 2001 overall incidence rate for cervical cancer was 8.4/100,000 and the overall mortality rate was 2.7/100,000 based on the 2000 U.S. standard population.<sup>68</sup> Between 1995-2000, Maricopa, Pima, Mohave, Yavapai, and Coconino Counties detected the greatest number of cervical cancer cases. Maricopa, Pima, Yavapai, and Mohave Counties experienced the highest number of deaths from cervical cancer in Arizona. Approximately 82% of cervical cancers are diagnosed in women between the ages of 35-70 years and older.

According to BRFSS data from 2002, 88% of

women aged 18 years and older received a Pap test within the past three years. With respect to ethnicity, 90% of Hispanic women received a Pap test during the same time period, and 88% of White, non-Hispanic women went for Pap testing. The Arizona Health Care Cost Containment System (AHCCCS) that covers the state's Medicaid population measured the percentage of women who were aged 16-64 years in 2001 and found that 51% of these women received Pap tests, a decrease from the percentage of females screened within the last measurement period.<sup>69</sup> Nationally and statewide, women who have health insurance are more likely to be screened for cervical cancer than their counterparts without health insurance. BRFSS data from 2002 exhibits that Arizona women who lacked health insurance coverage had lower Pap test rates (77%) than women with health insurance coverage (88%).

While many studies have focused on race and ethnicity as the primary disparity related to cervical cancer incidence and mortality, the National Health Interview Survey demonstrated that income and education are better predictors of national screening practices than race and ethnicity.<sup>70</sup> However, although a multitude of health care resources are available to women in the U.S. including early detection efforts targeted at cervical cancer early detection and prevention, women in minority, rural, and socioeconomically disadvantaged areas have not been afforded the same benefits from Pap smear screening.<sup>71-73</sup> In Arizona, increased efforts must focus on making Pap tests widely available and accessible regardless of socioeconomic or health insurance status. The Arizona Department of Health Services Well Woman

HealthCheck Program funded by the CDC National Breast and Cervical Cancer Early Detection Program offers cervical cancer screening to low-income, uninsured, and medically underserved women in Arizona. This program emphasizes screening rarely or never screened women for cervical cancer since this group represents the population at most risk for being diagnosed with cervical cancer in a more advanced stage.

The United States Preventive Services Task Force (USPSTF) strongly recommends that women who are sexually active and who have a cervix obtain a Pap test at least every three years, and also recommend that regular testing be discontinued after age 65 years if Pap test results are consistently normal.<sup>74</sup> Women should discuss the frequency necessary to be screened for cervical cancer with their health care provider based on possible symptoms or risk factors that they may be experiencing. The American Cancer Society Guidelines for cervical cancer screening are the following: Screening should begin approximately three years after a woman begins having sexual intercourse, but no later than age 21 years; Pap test should be conducted every year or every two years if utilizing the liquid-based tests; By age 30 years, women with three consecutive normal Pap tests may be screened every two to three years, but this should be decided based on consultation with a woman's physician; Women who are aged 70 years and older with three or more consecutive normal Pap test results over 10 years may choose to stop being screened for cervical cancer; and screening after total hysterectomy (with removal of the cervix) is not necessary unless the surgery took place due to invasive cervical cancer.<sup>75</sup>

Since lack of access to screening and treatment, lack

of awareness about the need to go for regular screening, and cultural barriers are experienced by many women at increased risk for cervical cancer diagnosis, health education and outreach efforts must address these issues in a culturally competent and appropriate manner that draws women into clinics to be tested for cervical cancer and allows women to be comfortable talking about cervical cancer symptoms, risks, and screening with their clinicians.

## Oral Cancer Screening

Oral cancer is responsible for approximately 3% of cancers in men and 2% of cancers in women.<sup>76-77</sup> Male oral cancer incidence rates are two times that of incidence rates in females, and males age 50 years and over are diagnosed most frequently with this disease.<sup>78</sup> Oral cancer can be diagnosed in the lip, tongue, mouth, and throat. Leukoplakias, which are usually white, flat lesions in the lining of the mouth, and erythroplakias, which are red, non-removable lesions in the oral mucosa are two types of oral cancer.<sup>79</sup>

The two most commonly practiced screening methods for oral cancer are visual inspection or physical exam of the mouth, and cytologic examination to look for abnormalities. Dentists and primary care physicians can identify suspicious lesions or abnormalities in the mouth via a routine, physical exam as part of a comprehensive, yearly exam. USPSTF and the Canadian Task Force on Preventive Health Care (CTFPHC) state that although oral cancer screening utilizing the aforementioned modalities may lead to early detection, there is currently insufficient evidence to recommend for or against routine screening for this type of cancer.<sup>80,81</sup> However, both advisory groups support educational efforts aimed at reducing tobacco and alcohol use in order to decrease oral cancer risk.

The American Cancer Society encourages primary care physicians to perform routine oral exams as part of a cancer-related check-up in order to detect oral cancer at the earliest possible stage.<sup>82</sup> For individuals at increased risk for oral cancer, USPSTF recommends a regular dental exam and abstinence from tobacco or alcohol use.<sup>83</sup>

## Skin Cancer Screening

Although organizations including the American Cancer Society and the American Academy of Dermatology (AAD) recommend that physicians periodically screen for skin cancer by conducting a thorough physical examination of the skin, results from randomized trials and case-control studies do not provide sufficient evidence that skin cancer screening reduces morbidity and mortality.<sup>84</sup> Becoming familiar with how the skin looks and feels through regular skin self-exams allows individuals to recognize new growths or changes in the skin's appearance. Limiting sun exposure between 10:00 a.m. and 4:00 p.m., wearing sunscreen, hats, long-sleeved shirts and pants as well as sunglasses are the best protective measures against basal and squamous skin cancers as well as melanoma. Over a million cases of basal or squamous cell cancers occur each year nationwide.<sup>85</sup>

Melanoma is among the top ten of all cancers diagnosed among Arizonans. Numerous studies have demonstrated that patients who have complete skin examinations are 6.4 times more likely to detect a melanoma compared to patients who have partial skin exams.<sup>86</sup> It is estimated that in 2005 melanoma will be diagnosed in over 59,580 people nationwide, most of

whom will be of White, non-Hispanic descent.<sup>87</sup> Melanoma occurs less often than basal or squamous cell cancers, but is the most harmful form of skin cancer in that it causes more than 75% of all deaths from skin cancer. Risk factors for skin cancer include, but are not limited to increasing age, White race, non-Hispanic ethnicity, prior history of skin cancer, multiple or severe sunburns, prolonged sun exposure, and certain types of moles.<sup>88-90</sup>

The American Cancer Society recommends that individuals receive a cancer-related check-up that includes a skin examination at least once every three years if between the ages of 20-40 years and annually for patients aged 40 years and older.<sup>91</sup> ACS also promotes skin self-examination as a preventative and early detection measure. Between 1985-1996, age-adjusted incidence for basal and squamous cell carcinomas was 1302.8/100,000 in males and 647.2/100,000 in females.<sup>92</sup> Since Arizona experiences higher incidence and mortality rates from skin cancer than national rates and exposure to the sun is possible almost 365 days per year, skin cancer screening initiatives may help educate the public on the most commonly diagnosed form of cancer as well as detect skin cancer before it progresses into a more advanced stage. Individuals with a family history of skin cancer or at high risk for skin cancer, especially melanoma, should be referred to a dermatologist for regular skin evaluations.<sup>93-95</sup>

## Screening for Ovarian Cancer

In her lifetime, a woman has a 1 in 70 risk of being diagnosed with ovarian cancer.<sup>96</sup> Ovarian cancer is the most deadly gynecological cancer diagnosed in women, accounting for more deaths than endometrial and cervical cancers combined. Ovarian cancer is responsible for approximately 4% of all cancers among

women and has the next highest incidence rate among gynecological cancers after cancers of the uterine corpus.<sup>97</sup> Ovarian cancer is the sixth most commonly diagnosed cancer among Arizona females.

In 2005, it is estimated that 290 women will lose their lives to ovarian cancer in our state.<sup>98</sup> Ovarian cancer risk increases with age in that 1.4 cases per 100,000 are diagnosed in women under age 40 years, but approximately 45 cases per 100,000 are diagnosed among females over 60 years of age.<sup>99</sup> The efficacy of routine screening in asymptomatic women using pelvic exam, transvaginal (TVU) or abdominal ultrasound, or serum carcinoembryonic antigen (CA-125) has not been widely supported or established. CTFPHC and USPSTF do not recommend routine screening for ovarian cancer.<sup>100,101</sup>

The American Cancer Society recommends that women at high risk or who present with symptoms for ovarian cancer receive a pelvic exam, transvaginal ultrasound, and a blood test for the tumor marker CA-125.<sup>102</sup> They do not recommend routine screening for women at average risk for the disease.

Between 5-10% of individuals diagnosed with ovarian cancer have a significant family history of the disease.<sup>103</sup> Due to extensive ovarian cancer research, site-specific ovarian cancer, familial breast-ovarian cancer syndrome, and cancer familial syndrome (Lynch type II) have been identified. The BRCA1 mutation, which was discovered on chromosome 17 in 1980, has been linked to site-specific ovarian cancer and familial breast-ovarian cancer syndromes.<sup>104,105</sup>

Currently, the CDC funds state initiatives that focus on reducing the burden of ovarian cancer through

health education initiatives, public awareness campaigns, medical record reviews to uncover what types of treatment women have received and studies focused on how women seek medical care for nonspecific symptoms related to ovarian cancer. The National Cancer Institute also conducted the Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial (PLCO) between 1992 and 2001 where female participants were screened for ovarian cancer via transvaginal ultrasound and CA-125 yearly over three and five years respectively.<sup>106</sup>

## Lung Cancer Screening

Lung cancer is the leading cause of mortality from cancer among men and women worldwide. Although lung cancer may arise in a variety of cell types, the most common forms of lung cancer diagnosed are squamous cell carcinoma, adenocarcinoma, and small cell carcinomas that originate within the bronchi, lungs, or trachea. Approximately 28% of all cancer deaths are due to lung cancer.<sup>107</sup> Cigarette smoking causes over 80% of lung cancers in males and between 45-70% of lung cancers among women.<sup>108</sup>

Men are diagnosed with and die from lung cancer more often than women. In Arizona, lung cancer caused 25% of all cancer deaths in women and 31% of cancer deaths in men based on 1995-2000 figures. State lung cancer incidence rates among males is 73.6/100,000 and 49.4/100,000 among females based on data from 1999-2001. The overall lung cancer mortality rate among Arizonans is 48.0/100,000 based on data from the same years.

Disparities exist with respect to being diagnosed

with lung cancer and age, race/ethnic background, socioeconomic status, education, and number of years smoking. Nine out of ten Arizonans who are diagnosed with lung cancer are aged 55 years and older. White, non-Hispanics have the highest lung cancer incidence rates followed by Black and White, Hispanics. With respect to lung cancer mortality rates, Blacks experience the highest lung cancer mortality rates followed by White, non-Hispanics, and Asian/Pacific Islanders.

Maricopa, Pima, and Mohave counties experience the highest count of lung cancer diagnoses as well as deaths in Arizona. Arizonans within the 70-74 year-old age group are diagnosed with lung cancer more often than any other age group. Although it remains to be seen whether screening with current lung cancer screening modalities improves chances of survival in individuals diagnosed with the disease, early detection efforts have focused on analyzing the efficacy and applicability of chest x-ray, sputum sample analysis, and spiral computed tomography (CT). The USPSTF does not endorse sputum cytology or chest x-ray as screening tools to detect lung cancer, but strongly recommends that physicians talk to their patients about the importance of quitting smoking since smoking is the primary risk factor for acquiring lung cancer.<sup>109</sup>

Similarly, the CTFPHC does not recommend using chest x-ray or spiral CT as population-based screening measures to detect lung cancer due to insufficient evidence regarding the effectiveness of these measures.<sup>110</sup> Four prospective, uncontrolled studies in the U.S. and Japan compared spiral CT with chest x-ray in detecting lung cancer using different radiological parameters (multi- or single detector scanner and slice thickness of either 5mm or 10 mm) and came up with varied cancer detection rates.<sup>111</sup> While the U.S. studies

entitled the Early Lung Cancer Action Project (ELCAP) and Mayo Clinic study enrolled former or current smokers, the Japanese studies included participants who never smoked within their study sample. ELCAP also included some individuals who were pre-screened for lung cancer via chest x-ray in the past.

Using spiral CT as the screening tool, the cancer detection rates ranged from 4 per 1,000 individuals screened to 30 per 1,000 individuals screened within the ELCAP study, in which enrollees were older, heavier smokers and at greater risk for lung cancer.<sup>112</sup> All four studies concluded that compared to spiral CT, chest x-ray detected fewer cancers. Although the aforementioned studies lacked a control group, had participants with different demographic characteristics, and did not follow participants long-term, results point to spiral CT as the more promising of the two screening tools with respect to detecting lung cancer. However, screening for lung cancer via spiral CT is expensive, may lead to false-positives or misdiagnosis, and result in unnecessary invasive secondary tests such as bronchoscopy or surgery.<sup>113</sup>

Physicians should discuss the benefits and harms of screening for lung cancer with their patients, especially those at high risk for the disease (family history of lung cancer or current smoker) before deciding on an early detection method.

The National Lung Cancer Screening Trial (NLST) funded by the National Cancer Institute is currently screening asymptomatic individuals at high risk for lung cancer using either spiral CT or chest x-ray in order to conclude whether either screening tool has the potential to reduce lung cancer deaths. Promoting abstinence from tobacco use as well as making tobacco cessation services readily available throughout the U.S.

and providing health insurance reimbursement for these services represent two of the current recommendations endorsed by numerous physicians, advisory boards, and advocacy groups with respect to lung cancer early detection efforts.

## **Early Detection/Screening Goal:**

To promote, increase, and optimize the appropriate utilization of high quality cancer screening and follow-up services.

**Objective 2.1:** Increase the proportion of women aged 40 years and over who have received a mammogram and clinical breast exam within the past year to 70% by 2010.

*Baseline: BRFSS 2002*

56% of women aged 40 years and over who have had a mammogram and clinical breast exam within past year.

*Strategies:*

1. Educate Arizona residents about the known and researched risk factors specific to breast cancer in order to dispel myths and reduce the likelihood of misinformation about breast cancer.
2. Reduce the barriers to screening by collaborating with other women's health initiatives to make breast cancer screening convenient, affordable and accessible.

**Objective 2.2:** Increase prostate cancer screening and follow-up among high-risk populations by 2010 using American Cancer Society Guidelines.

*Baseline: BRFSS 2002*

59% of men age 50 years and over reported having



PSA within the past year.

55% of men age 50 years and over reported having a DRE within the past year.

*Strategy:*

1. Collaborate with existing organizations such as the Southwest Prostate Cancer Foundation and the Arizona Prostate Cancer Task Force to increase awareness of the importance of screening among Arizonans.

**Objective 2.3:** For adults aged 50 years and over, increase the proportion of the population who has been screened for colorectal cancer using colonoscopy, sigmoidoscopy, or fecal occult blood test to 50% by 2010.

*Baseline: BRFSS 2002*

27% of adults 50 years of age and older received a FOBT within the past year.

42% of adults age 50 years of age and older received a sigmoidoscopy or colonoscopy within the past 5 years.

*Strategies:*

1. Develop consistent and clear standardized screening guidelines for colorectal cancer.
2. Support efforts to encourage insurance programs to reimburse for the cost of colorectal cancer screening.
3. Work with policy makers to encourage screening and diagnostic services as benefits covered in existing health care plans

**Objective 2.4:** Increase the proportion of women aged 18 years and over who receive a pap test within the past three years to 95% by 2010.

*Baseline: BRFSS 2002*

88% of adult women 18 years of age and older reported having a pap test within the past three years.

*Strategies:*

1. Support the ongoing implementation of the Well Woman HealthCheck Program.
2. Develop partnerships with non-traditional partners, such as correctional, domestic abuse, homelessness, and mental health systems to promote screening.

**Objective 2.5:** Promote the awareness of the need for total body examination and enhance the ability of health care providers to provide high quality skin cancer screening tests by 2010.

*Strategy:*

1. Promote knowledge and awareness on the importance of conducting skin self-exams.

**Objective 2.6:** By 2010 support the practice by dentists and clinicians to screen for oral cancer as part of a routine dental or medical exam.

**Objective 2.7:** Develop knowledge-based targeted promotional activities by 2008.

*Strategy:*

1. Assemble a team of behavioral scientists to develop the scientific body of knowledge that will lead to effective messages for:
  - i. Screening promotion
  - ii. Smoking cessation
  - iii. Increased physical activity
  - iv. Improved nutrition

**Objective 2.8:** Support a capacity building conference promoting collaboration among existing agencies in order to disseminate information about current and developing screening methods and tools by 2010.

*Strategy:*

1. Convene a planning committee that includes representatives from health insurance companies, health care professionals, hospital systems and other interested parties to discuss current screening practices, standardization of screening guidelines, health insurance reimbursement rates, and new technologies.

## **Early Detection/Screening Overall Strategies:**

1. Promote the use of ACS screening guidelines as the benchmark for cancer screening in Arizona.
2. Educate providers and patients regarding the benefits of screening, the available screening resources and screening benchmarks.
3. Support the development of consistent screening standards across all populations in order to assure quality of care.
4. Develop culturally sensitive interventions to reach at-risk populations including American Indian, African American, and Hispanic populations.
5. Encourage health care providers, clinics, and hospitals to offer expanded hours and provide support for transportation.
6. Promote cancer screening through social marketing campaigns.
7. Improve the level of funding targeting screening programs for all cancers.
8. Work with community based organizations to promote screenings for all cancers.

### *Overall Activities*

- a. Conduct a gap analysis of plan coverage for

- screenings.
- b. Support the development of provider tools facilitating a Well Woman Check and a Well Man Check.

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A black and white photograph capturing two surgeons in the middle of an operation. The surgeon on the left is positioned higher, wearing a surgical mask and cap, and is looking down at the patient. The surgeon on the right is lower, also in full surgical attire, focused on the procedure. Between them, a patient is lying on an operating table, their body partially covered by white surgical drapes. The background is filled with the metallic and reflective surfaces of medical equipment, including overhead lights and a monitor displaying vital signs. The lighting is dramatic, highlighting the intensity of the surgical environment.

3

# DIAGNOSIS AND TREATMENT

## Diagnosis/Treatment Committee

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\*Chair

“Changes in behavior like eliminating tobacco use, in addition to ensuring equal access to quality preventive, screening, diagnostic, and treatment services, could prevent almost half the cancer deaths and eliminate most racial and ethnic disparities in cancer deaths.”

*—Nancy C. Lee, M.D.*

In 2005 it is estimated that 23,880 people living in Arizona will be diagnosed with cancer.<sup>1</sup> The availability, accessibility, and affordability of high quality cancer care are crucial for people

## with cancer. Having access to affordable, state of the art cancer

care is a significant component of comprehensive cancer control efforts. Cancer treatment depends on the type of cancer, tumor size, location, and stage of disease as well as a person's general health status and rationale for decision making.

A team of specialists ranging from surgeons, oncologists, radiologists, nurses, mental health practitioners, nutritionists, and others provide care. Most cancers are treated with surgery, radiation therapy, chemotherapy, hormone therapy, and biotherapy. A single treatment method or a combination of the aforementioned approaches may be employed during cancer-related care. In the United States, total health care expenditures for cancer including hospital stays, nursing home care, drugs, home care, and physician and other professional services was approximately \$69.4 billion in 2004.

This reflects funds spent solely on direct medical expenditures, which is just one piece of the vast economic cancer burden facing our country. Time spent away from work due to cancer-related illness and death leads to a decrease in overall economic productivity not just for the individual, but for family and friends, which shape the indirect costs of illness

estimated at over \$120.4 billion, putting overall cancer costs at over \$189.8 billion.<sup>2</sup> As our population lives longer due to advances in technology, science, and medicine, the number of people treated for cancer will continue to increase, resulting in escalated cancer treatment costs.

## Access to Care

Access to care means ensuring individuals have access to appropriate treatment and services that are delivered in a timely, proficient manner inclusive of open, active communication and shared decisionmaking by the individual and their health care provider. Appropriate treatment and services should be delivered in a culturally sensitive manner across the continuum of care.<sup>3</sup> Some factors that influence access to care include lack of or limited health insurance, cost of care, geographic location, transportation, and cultural and/or language barriers. According to the President's Cancer Panel 2001-2002 report, the major barriers limiting or preventing access to cancer care include: financial barriers, physical barriers that reduce or prevent access, and barriers related to the organization and operation of the health care system.<sup>4</sup>

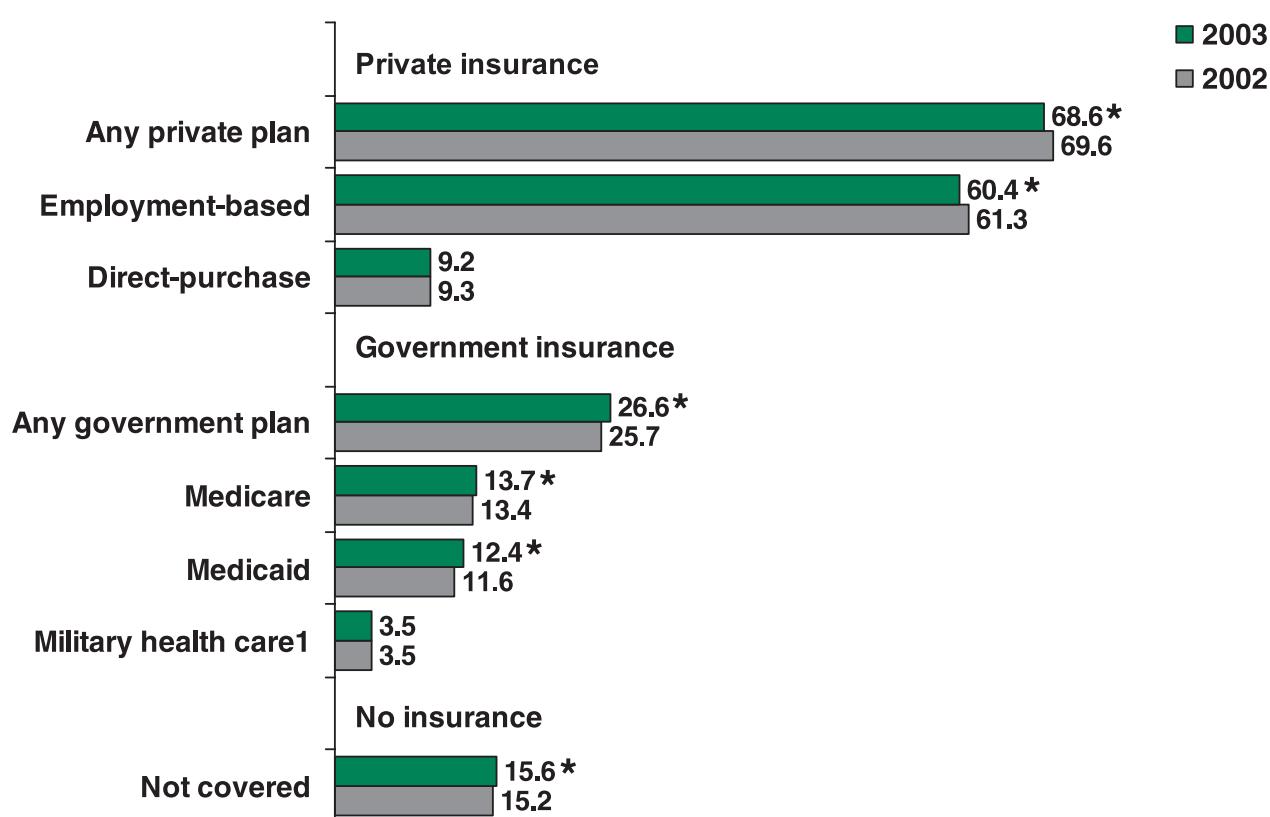
For many individuals, the cost of cancer care and the inability to pay can inhibit access to care and treatment. In 2003, more than 45 million Americans lacked health insurance, which accounts for 15.6% of the population (Figure 3.1).<sup>5</sup> According to Arizona's

2003 BRFS online report, 16.7% of Arizona residents lacked health coverage.<sup>6</sup> Eight out of ten of the uninsured are in working families and the majority of these workers hold jobs that do not provide health coverage. For remaining individuals, employers may offer subsidized coverage, but the cost of coverage or perceived lack of need for health insurance drives

workers to forgo insurance coverage.

According to the Institute of Medicine, uninsured individuals have poorer health status and are more likely to die sooner than those with insurance, resulting in an estimated 18,000 deaths annually in the United States. The uninsured more often do not receive recommended cancer screening services, which thereby

**FIGURE 3.1** Coverage by Type of Health Insurance: 2002 and 2003 (Percent)



\* Statistically different at the 90-percent confidence level.

<sup>1</sup> Military health care includes: CHAMPUS (Comprehensive Health and Medical Plan for Uniformed Services)/Tricare and CHAMPVA (Civilian Health and Medical Program of the Department of Veterans Affairs), as well as care provided by the Department of Veterans Affairs and the military. NOTE: The estimates by type of coverage are not mutually exclusive: people can be covered by more than one type of health insurance during the year.

delays their diagnosis and affects health outcomes. Uninsured patients diagnosed with melanoma, breast, prostate, colorectal, or cervical cancers are more likely to die prematurely than cancer patients who have insurance.<sup>7</sup> In the 2004 Institute of Medicine report on “Insuring America’s Health: Principles and Recommendations” the committee called “on the federal government to take action to achieve universal health insurance and to establish an explicit schedule to reach this goal by 2010”.<sup>8</sup>

As more individuals are being diagnosed with cancer, health insurance status becomes crucial with respect to the cost and accessibility of the most opportune treatment options. The committee also identified the following key principles in assessing coverage proposals to eliminate inequalities in health insurance coverage:

- Health care coverage should be universal
- Health care coverage should be continuous
- Health care coverage should be affordable to individuals and families
- The health insurance strategy should be affordable and sustainable for society
- Health insurance should enhance health and well-being by promoting access to high quality care that is effective, efficient, safe, timely, patient-centered, and equitable.<sup>9</sup>

Underinsured individuals also face numerous barriers to care. At least 31 million non-elderly insured

individuals in the U.S. lack adequate coverage for cancer care costs. In addition to paying monthly premiums, covered services require co-payments as well as deductibles and often coverage is not provided for certain medications or services. Health care providers also face obstacles in providing appropriate and timely care. Many health plans have “gatekeepers” that regulate care by restricting referrals to specialists, limit supportive and rehabilitative care, and refuse patient access to clinical trials. Financial pressures for health care providers such as decreased reimbursement rates and lack of coordination among payers also create hardships for cancer care providers.<sup>10</sup>

Living far from cancer care services and resources represents a significant barrier faced by many individuals including Arizonans. In 2002, it was estimated that 25% of the U.S. population of 281 million live in areas designated as rural, (fewer than 2,500 people per town boundary).<sup>11</sup> Of the 5.6 million people residing in Arizona as of 2003, over 945,000 residents inhabit rural areas. In Arizona, 11 out of 15 counties are considered rural areas.<sup>12</sup>

Cancer care resources and health care personnel are often concentrated within urban areas. Thus, individuals living in rural communities have limited access to cancer care and experience difficulties accessing care and treatment. The lack of public transportation in many rural areas, the costs associated with travel, and the fact that many residents in rural communities lack the resources or flexibility to travel contribute to the difficulties rural inhabitants experience. Recently, telemedicine has provided

geographically isolated areas with an opportunity to access some state-of-the-art cancer care services as well as continuing medical education opportunities. Telemedicine has the potential for reducing certain health care barriers faced by rural populations.<sup>13</sup>

Encouraging new programs that can increase access to appropriate and timely care are Patient Navigator programs. These programs equip patients with information on how to navigate the complex health care system. The National Cancer Institute is currently piloting these programs throughout the country. In these programs, patient navigators work with vulnerable or disadvantaged populations to assist them with obtaining accurate information on issues such as diagnosis and treatment procedures/options, access to services, guidance on financial assistance as well as a host of other information including social support and religious counseling.<sup>14</sup>

## Quality of Care

The National Cancer Institute defines quality of cancer care as the provision of evidence-based, patient-centered services throughout the continuum of care in a timely and technically competent manner that includes good communication, shared decisionmaking, and cultural sensitivity aimed at improving clinical outcomes, including patient survival and health-related quality of life.<sup>15</sup> Quality of health care is measured by the extent that it increases the likelihood of desired health outcomes (e.g.: survival, quality of life) and is consistent with current professional knowledge. Poor quality of health care includes overuse, underuse, and

misuse of tests, medications, and procedures. The consequences of poor quality of care may result in reduced survival and diminished quality of life.

Unfortunately, the highest quality of care is not provided to all Americans equally. The magnitude of the problem is not known, but it is thought to be substantial.<sup>16</sup>

Research in this area focuses on understanding how to measure, monitor, and improve the quality of cancer care. The Cancer Care Quality Measurement Project was developed by the National Cancer Institute in concert with other organizations to identify core process measures for treatment, survivorship, and end-of-life care for the major tumor sites as well as for palliative care.<sup>17</sup> In 2001, the National Cancer Institute established the Cancer Care Outcomes Research and Surveillance Consortium to study treatment patterns and quality of care over time for 10,000 newly diagnosed patients with lung or colorectal cancers. The five-year project will identify and evaluate any differences in cancer treatment and outcomes across the broad range of health care providers and organizations.<sup>18</sup>

## Clinical Trials

Clinical trials provide cancer patients with innovative approaches to disease treatment and afford some patients alternative treatment options or the only option in response to a complex or less common cancer

diagnosis. Clinical trials enable researchers to study, develop, and evaluate new cancer therapies with the hopes of enhancing health outcomes for the entire population. According to the National Cancer Institute, in 2003, less than 5% of all adults diagnosed with cancer participated in clinical trials.<sup>19</sup> Approximately 25,000 cancer patients were enrolled in NCI treatment clinical trials from 1997-2001.

More than half (60%) of all participants were women demonstrating that more women enroll in cancer clinical trials compared to men.<sup>20</sup> A review of patients accrued to NCI sponsored clinical trials from 1998-1999 found the highest observed accrual was in suburban counties, and patients enrolled within clinical trials were significantly less likely to be uninsured and more likely to have Medicare health insurance. Higher levels of clinical trial accruals occurred in geographic areas with higher socioeconomic levels, more oncologists, and a greater number of approved cancer programs. It was also found that African American, Asian American, and Hispanic adults participated in clinical trials at much lower rates than their Caucasian counterparts.<sup>21</sup>

Increasing awareness about the importance of clinical trials to both patients and providers and reducing the barriers related to clinical trial access represent measures that need to be taken in order to provide cancer patients with opportunities for state-of-

the-art treatment.

## Cancer Care in Arizona

Currently, 100 hospitals and hospital-based health systems exist in Arizona. Of those, seven facilities have cancer programs that are approved by the Commission on Cancer (CoC) of the American College of Surgeons (ACOS).<sup>22</sup> The Commission on Cancer sets standards for quality cancer care delivery primarily within hospital settings and assesses clinical compliance with those standards. The standards promote multidisciplinary cooperation with consultation among surgeons, medical radiation oncologists, diagnostic radiologists, pathologists, and cancer specialists. Programs are encouraged to improve their quality of patient care through cancer-related programs in prevention, early diagnosis, pretreatment evaluation, staging, optimal treatment, rehabilitation, surveillance for recurrent disease, support services, and end-of-life care. Approximately 80% of all newly diagnosed cancer patients in the U.S. receive treatment from these CoC approved cancer programs.<sup>23</sup>

In 1981, legislation was passed that created the Arizona Health Care Cost Containment System (AHCCCS), which is the state's Medicaid program. The program was the first statewide Medicaid managed care system in the nation. The program provides medical assistance for individuals and families with limited income. AHCCCS members are able to choose a health plan and a primary care provider and act as gatekeepers for the system, managing all aspects of medical care for the member. In 2003, AHCCCS provided health care coverage to over 963,000 people,

covering 18% of Arizona's total population.<sup>24</sup>

In 2000, the Federal Breast and Cervical Cancer Prevention Treatment Act was passed which allows states to provide treatment to uninsured income-eligible women diagnosed with cancer through the Breast and Cervical Cancer Program in each state. The Arizona Department of Health Services Well Woman HealthCheck Program provides screening for low income, uninsured, or underinsured women for breast and cervical cancer.

In 2001, the Arizona State Legislature passed the Breast and Cervical Treatment Act that provides three to one matching funds from the federal government to treat women diagnosed with breast or cervical cancer through the Well Woman HealthCheck Program. Treatment is administered through the Arizona Health Care Cost Containment System.

In 2000, the Managed Care Accountability Act was passed which requires managed care plans to provide coverage for cancer prescription drugs (off-label drugs), continuity of health care coverage and direct access to specialists. Also in 2000, legislation was enacted requiring managed care plans to cover the routing of patient care costs for individuals enrolled in all phases of clinical trials.

## **Diagnosis and Treatment Goal:**

Increase access to appropriate and effective cancer diagnosis and treatment services.

**Objective 3.1:** By 2007, utilize telemedicine to increase access to state of the art diagnosis and

treatment techniques and expertise as well as second opinions and resources.

*Strategies:*

1. Assess and increase access to telemedicine sites throughout Arizona.
2. Strengthen and maximize links between current telemedicine networks and cancer diagnosis and treatment facilities as well as Primary Care Provider organizations.
3. Develop collaborative partnerships to leverage funding opportunities and create sustainability.
4. Develop and maintain a telemedicine network of participating providers.

**Objective 3.2:** By 2008, increase access to quality information and patient navigation sites across the state and identify barriers to access.

*Strategies:*

1. Make available current regional or local cancer resource directories that provide information on cancer institutions, specialists, providers, research therapies, and support services, including financial.
2. Organize and utilize private sector to provide resources and disseminate information to target populations. (Pharmaceutical companies, business community, prosthesis organizations, support groups, community/service organizations, etc.)
3. Patient Navigation: look at current system in place (American Cancer Society pilot program) and gaps (cultural competency concerns, ease of use, evaluation, access, etc.) while ensuring access to this information through various portals (not simply web-based), and also increasing the number of

- navigators in medically underserved areas.
4. Create Clearinghouse of Cancer information for multilevel use available in web format as well as through a toll free phone line (Use “Arizona Self Help” web-based program (as model and link) as well as other information resources and portals).
  5. Make available information related to age appropriate treatment that is culturally and linguistically suited to target populations.

**Objective 3.3:** By 2010, reduce geographic barriers to care.

*Strategies:*

1. By 2006, conduct a needs assessment on geographic barriers to care that includes:
  - a. Determine the capacity of cancer treatment services by type throughout the state.
  - b. Assess current cancer diagnosis and treatment services and facilities available as related to the needs of vulnerable populations such as immigrant populations, incorporating cultural sensitivity and ability to address language barriers effectively.
  - c. Assess current community programs and gaps in transportation systems.
  - d. Conduct focus groups and community forums to assess patients needs and barriers to care with specific concern to target populations of medically underserved, uninsured, disenfranchised people.
  - e. Define the essential components of a delivery system for cancer care that assures certain basic services are available locally, and more

specialized services are reasonably accessible.

- f. Create transportation assistance programs that address the findings of the needs assessment.
- g. Look at feasibility of funding and starting a pilot project to recruit and provide incentives to bring specialists out to communities.

(For example, have oncologists travel out to underserved areas once per month or every other month for face-to-face contact.)

Research current system of provider-sharing model (providers who share their time).

**Objective 3.4:** By 2010, reduce financial barriers to cancer care.

*Strategies*

1. Assess the availability of insurance coverage for cancer diagnosis and treatment.
2. Encourage health insurance and managed care plans to support prompt access to appropriate cancer treatment, supportive services and clinical trials.
3. Promote reimbursement structures that facilitate access to multiple levels and loci of care, inclusive of all patient needs.
4. Strengthen and formalize utilization of pharmaceutical company drug programs.
5. Develop philanthropic and state wide resources for funding indigent care.
  - a. Check box on taxes: e.g. check this box and you can donate \$10 to the indigent cancer care fund.
  - b. Develop state “Arizona Cares About Cancer”

license plate.

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A black and white photograph of a person jogging or running on a path. The runner is in mid-stride, facing right. The background features a range of mountains under a dark sky. In the upper left corner, there is a bright, circular light source, possibly the moon or a street lamp, casting a glow. The entire scene is rendered in high contrast black and white.

4

# QUALITY OF LIFE

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“Life after cancer  
is all about living.”

*-Lance Armstrong*

The way cancer is prevented, detected, diagnosed, researched, and treated has experienced a transformation over the last half-century. Due to scientific advances and an arsenal of therapies, cancer has redefined itself.

## What was once a fatal disease

has evolved into a curable or manageable chronic disease for many individuals. Improvement in long-term survival has been the result of improvements in screening and early diagnosis and in available therapies for many cancers. The manner in which cancer affects individuals physically, psychologically, and spiritually has not only come to the forefront of research, but has also gained momentum in two areas: issues surrounding quality of life and survivorship.

Quality of life is defined as a general sense of well-being that encompasses multiple dimensions of a person's life, which includes physical, psychological, social, and spiritual well-being as well as financial security.<sup>1</sup> The effect cancer has on an individual and how each person reacts to a cancer diagnosis is unique. The impact of cancer on the quality of life of patients can be complex and should ideally be addressed throughout the disease continuum. The following areas, which have a tremendous impact on the lives of cancer patients, are highlighted within this chapter: complementary and alternative therapies, palliative therapy and care, end-of-life care, and survivorship.

## Complementary and Alternative Therapies

Over the last 30 years, the use of complementary and alternative therapies as part of cancer care has increased in the U.S. A vast number of individuals

especially those faced with chronic and life-threatening illnesses are exploring less conventional approaches to reducing symptoms, side effects, and controlling or curing disease.<sup>2</sup> Explanations for the increase in the use of these therapies has been attributed to dissatisfaction with traditional medicine, the desire of patients to be involved with medical decisionmaking, and the accessibility of information on the Internet.<sup>3</sup> The National Centers for Complementary and Alternative Medicine define complementary and alternative medicine as a group of diverse medical and health care products, practices, and systems that are not part of conventional medicine. In practice, complementary medicine is often used in conjunction with conventional medicine and alternative medicine is used as a different approach to care compared to conventional medicine.

Some common complementary and alternative therapies include acupuncture, vitamins, herbal products, mind/body control interventions such as visualization or relaxation, and manual healing, which includes acupressure healing touch, Reiki, and massage. The variety of therapies included in this category are continually changing and evolving. Therapies are adopted by conventional health care systems when research demonstrates safety and efficacy in their use throughout the healing process.<sup>4</sup>

According to the 2002 National Health Interview Survey, 36% of adults use some form of complementary and alternative therapy. The percentage increases to 62% when megavitamin therapy and prayer specifically targeted at improving health are

**FIGURE 4.1** What are the major types of complementary and alternative medicine?

National Center for Complementary and Alternative Medicine (NCCAM) classifies Complementary and Alternative Medicine (CAM) into five categories, or domains:

- 1. Alternative Medical Systems** Alternative medical systems are built upon complete systems of theory and practice. Often, these systems have evolved apart from and earlier than the conventional medical approach used in the United States. Examples of alternative medical systems that have developed in Western cultures include *Homeopathic Medicine* and *Naturopathic Medicine*. Examples of systems that have developed in non-Western cultures include traditional *Chinese Medicine* and *Ayurveda*.
- 2. Mind-Body Interventions** Mind-body medicine uses a variety of techniques designed to enhance the mind's capacity to affect bodily function and symptoms. Some techniques that were considered CAM in the past have become mainstream (for example, patient support groups and cognitive-behavioral therapy). Other mind-body techniques are still considered CAM, including meditation, prayer, mental healing, and therapies that use creative outlets such as art, music, or dance.
- 3. Biologically Based Therapies** Biologically based therapies in CAM use substances found in nature, such as herbs, foods, and vitamins. Some examples include dietary supplements, herbal products, and the use of other so-called natural but as yet scientifically unproven therapies (for example, using shark cartilage to treat cancer).
- 4. Manipulative and Body-Based Methods** Manipulative and body-based methods in CAM are based on manipulation and/or movement of one or more parts of the body. Some examples include *Chiropractic* or *Osteopathic Manipulation*, and *Massage*.
- 5. Energy Therapies** Energy Therapies involve the use of energy fields. They are of two types:
  - **Biofield therapies** are intended to affect energy fields that purportedly surround and penetrate the human body. The existence of such fields has not yet been scientifically proven. Some forms of energy therapy manipulate biofields by applying pressure and/or manipulating the body by placing the hands in, or through, these fields. Examples include *Qi Gong*, *Reiki*, and *Therapeutic Touch*.
  - **Bioelectromagnetic-based therapies** involve the unconventional use of *electromagnetic fields*, such as pulsed fields, magnetic fields, or alternating-current or direct-current fields.

SOURCE: National Institutes of Health.

National Center for Complementary and Alternative Medicine: [www.nccam.nih.gov](http://www.nccam.nih.gov).

included in the definition complementary and alternative therapies.<sup>5</sup> Clinical trials to study the complementary and alternative therapies for cancer are currently being sponsored by the National Cancer Institute and the National Centers for Complementary and Alternative Medicine. Types of complementary and alternative therapies are outlined in Figure 4.1.

## Palliative Therapy and Care

Palliation is alleviation of pain and other symptoms without curing the underlying disease process.<sup>6</sup> One cannot examine quality of life comprehensively without addressing the roles of palliative care and therapy within the continuum of cancer care. According to the National Cancer Institute, palliative therapy is treatment given to relieve the symptoms and reduce the suffering caused by cancer and other life threatening diseases. Palliative therapies are given together with other cancer treatments, from time of diagnosis, through treatment, survivorship, recurrent or advanced disease, and end-of-life.<sup>7</sup>

Palliative care, otherwise known as supportive care focuses on providing pain management, symptomatic care and other support for patients and their families. This includes providing support for the psychological, spiritual, and social aspects of coping with cancer and incorporating care according to the patients need, values, beliefs, and culture. The aim of palliative care is to improve the quality of life of patients. An interdisciplinary team of physicians, nurses, social workers, chaplains, and other health professionals are involved in providing this care.<sup>8</sup> Palliative care ideally should be provided throughout the continuum of cancer care from diagnosis, through treatment, survivorship, and end-of-life.

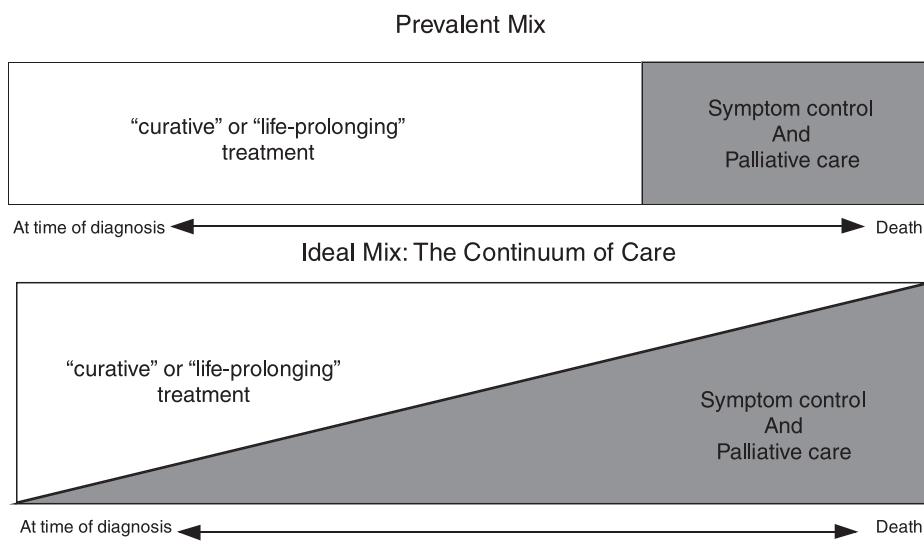
The 2001 Institute of Medicine Report, *Improving Palliative Care for Cancer* identified the following barriers to palliative and end-of-life care:

- The separation of palliative and hospice care from potentially life prolonging treatment within the health care system, which is both influenced by

**FIGURE**

**4.2**

Relationship of “curative” or “life-prolonging” treatment to symptom control and palliative care for cancer



Source: Institute of Medicine: June 2001.

- and affects reimbursement policy;
- Inadequate training of health care personnel in symptom management and other palliative care skills;
  - Inadequate standards of care and lack of accountability in caring for dying patients;
  - Disparities in care, even when available, for African Americans and other ethnic and socioeconomic segments of the population;
  - Lack of information resources for the public dealing with palliative and end-of-life care;
  - Lack of reliable data on the quality of life and the quality of care provided to patients dying from cancer (as well as other chronic diseases); and
  - Low level of public sector investment in palliative and end-of-life care research and training.<sup>9</sup>

In order to improve the quality of life for patients ongoing efforts need to address these barriers found within health care and medical research systems. In 2004, the National Consensus Project for Quality Palliative Care, a collaborative effort of five national palliative care organizations, released the *Clinical Practice Guidelines for Quality Palliative Care*. The purpose for creation of the guidelines was to:

1. Facilitate the development and continuing improvement of clinical palliative care programs providing care to patients and families with life-threatening or debilitating illness.
2. Establish uniformly accepted definitions of the essential elements in palliative care that promote quality, consistency and reliability of these services.
3. Establish national goals for access to quality palliative care.

4. Foster performance measurement and quality improvement initiatives in palliative care services.

5. Foster continuity of palliative care across settings (home, residential care, hospital, hospice).<sup>10</sup>

Identifying barriers and creating guidelines to improve the current state of palliative care in the U.S. are necessary and encouraging developments. However, in order to make palliative care and therapy options more readily available to those who need it most (cancer patients and their families), collaborations between organizations to increase resources for patients and their families, enhancing provider education about palliative therapies and care, and funding research efforts to improve access to palliative therapies are steps that will improve the quality of life of cancer patients and their families.

## End-of-Life

End-of-life care is given during the advanced and terminal stages of an illness. It includes medical and other supportive services for patients and their loved ones. The goal of end-of-life care is to provide maximum comfort and relief from pain and any other symptoms when cure from disease is no longer plausible. While end-of-life care services are increasingly available, many patients and families are not aware of their options.<sup>11</sup> Hospice is a program that provides end-of-life-care at home, in freestanding facilities, or within hospitals. It focuses on providing expert support for the physical, emotional, and spiritual

needs of the patient and their families when illness is no longer curable and when death is expected in six months or less.<sup>12</sup>

According to the National Hospice and Palliative Care Organization, in 2003 there were 3,300 estimated operational hospice programs in the U.S. that served an estimated 950,000 patients. Of these patients, 63% were 75 years of age and older and 81.2% were White non-Hispanic.<sup>13</sup> In 2002, the Robert Wood Johnson Foundation funded *Last Acts*, a survey to determine the state of end-of-life care in the U.S. While the survey found that 70% of Americans would prefer to die at home, only 25% of actual deaths occurred at home nationwide. Over 50% of Americans age 65 years and older die in hospitals but less than 60% of hospitals in the U.S. offer specialized end-of-life services.

In order to provide patients and their families with choices that reinforce and deliver the best quality of life possible with respect to end-of-life care, entities including health care, health insurance, governmental, and non-profit organizations must work together to make end-of-life choices accessible, affordable, and available. Educating health care providers about the services available to their patients is imperative in order to enhance the quality of life experienced by individuals facing the end stage of life due to advanced disease. Conducting more research on how end-of-life care options positively affect the comfort level of patients and their loved ones in addition to advocating for these services within communities may also help make services become more widely funded and available within health and hospital systems.

Patients, their families, and health care providers need to be aware of their role in the decisions that affect end-of-life care. In 1990, Congress passed the Patient Self-Determination Act, which requires

hospitals, nursing homes, home health agencies, Health Maintenance Organizations, and hospices to inform patients of their right to prepare advance directives and make choices about the treatment they receive.<sup>14</sup> Advanced directives are legal documents that allow patients to convey their decisions ahead of time on which medical services should be administered to them during end-of-life care. Advance directives are important because they decrease the chance of confusion that may arise if a patient's wishes or choices are not communicated clearly. Health care providers, patients, and their families should be informed about the importance of advance directives and how these legal documents relate to the care that is received during the end-of-life stage.

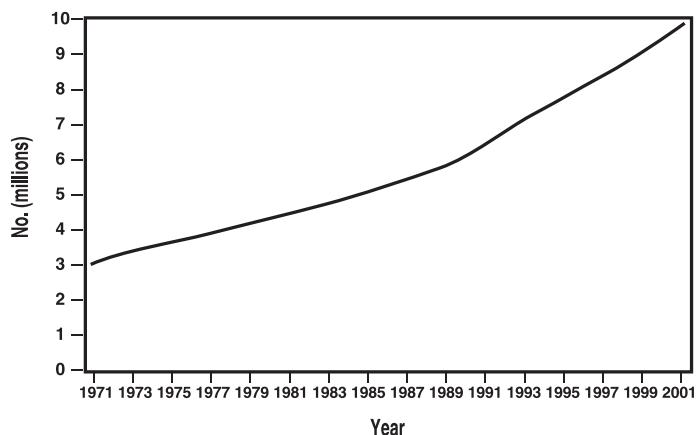
## **Survivorship**

Survivorship as defined by the National Coalition for Cancer Survivorship (NCCS) and the National Cancer Institute is the experience of living with, through, or beyond cancer. It is a continual, ongoing process that begins at the moment of diagnosis and continues for the remainder of life; composed of stages or phases of survival.<sup>15</sup>

According to the *Morbidity and Mortality Weekly Report on Cancer Survivorship – United States, 1971-2001*, there were 9.8 million cancer survivors in the U.S. in 2001. In the last 30 years, the number of people living with cancer increased from 3 million in 1971 to 9.8 million in 2001 nationwide for all cancers combined (Figure 4.3). According to the same report, the percentage of adults that were estimated to be alive five years after diagnosis increased from 50% for those

**FIGURE 4.3**

**Estimated number\* of living persons who have ever received a cancer diagnosis, by year—United States, 1971–2001**



\*Estimated by applying U.S. populations to SEER-9 and historical Connecticut Tumor Registry data and adjusted to represent all cancer survivors. January 1 populations were based on average mid-year population estimates from the U.S. Census Bureau.

Source: Centers for Disease Control and Prevention. Cancer Survivorship – United States, 1971–2001. Morbidity & Mortality Weekly Report. June 2004. 53(24); 526–529.

whose cancer was diagnosed during 1974–1976 to 64% for those whose cancer was diagnosed during 1995–2000. An estimated one out of six people over age 65 years is a cancer survivor.<sup>16</sup> According to the Arizona Cancer Registry, in 2003 there were an estimated 2,826 cancer survivors aged 18 years and older.<sup>17</sup>

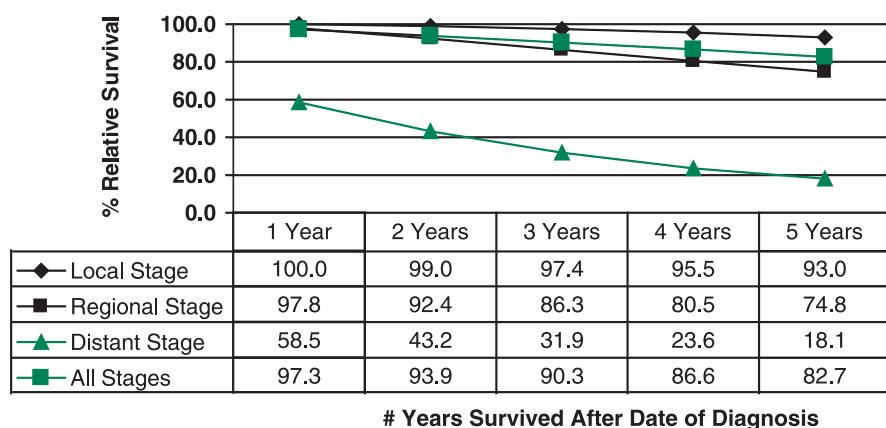
Figures 4.4 through 4.7 illustrate the five-year relative cancer survival percentages for select cancer sites by stage (Breast, Prostate, Colorectal, and Lung). The five-year survival percentage for all stages combined is over

80% for breast and prostate cancer whereas for colorectal cancer it decreases to 55%. In contrast, the lung cancer five-year survival percentage is a stark 11.4% at the five-year mark. A multitude of factors have contributed to the increase in the number of cancer survivors over the past few decades. More widespread and comprehensive prevention efforts, improved detection methods and advances in medical treatment for cancer have increased the number of people surviving cancer today.<sup>18</sup>

Cancer affects individuals and their families in

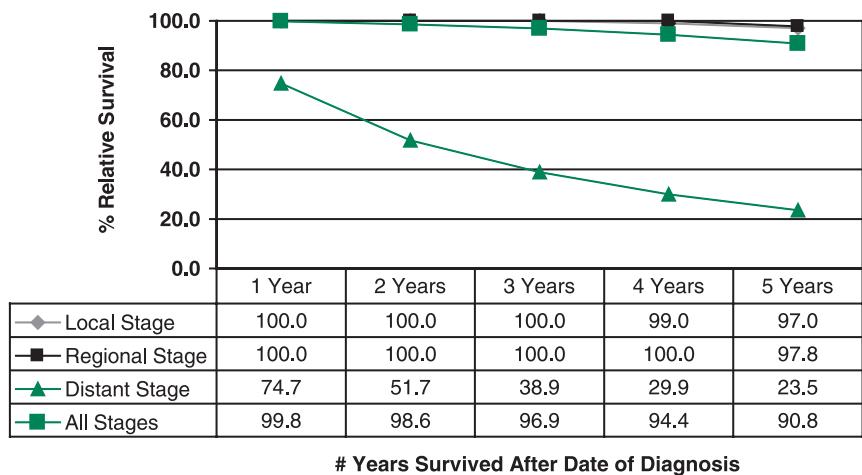
**FIGURE 4.4**

**Five-Year Percent Relative Female Breast Cancer Survival, 1993–1998**

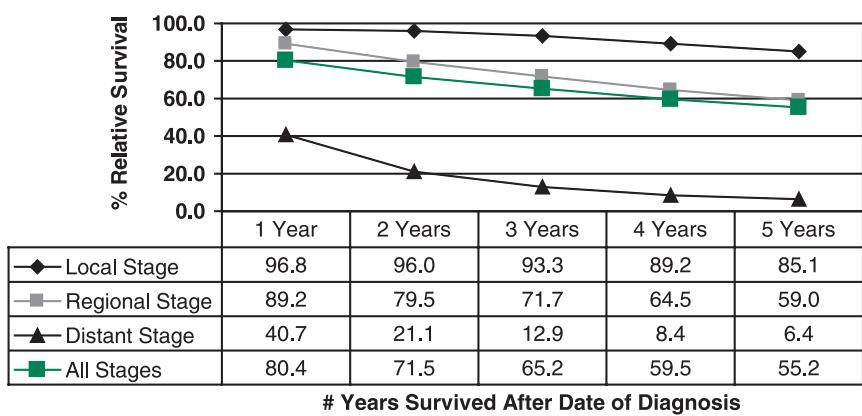


**FIGURE 4.5**

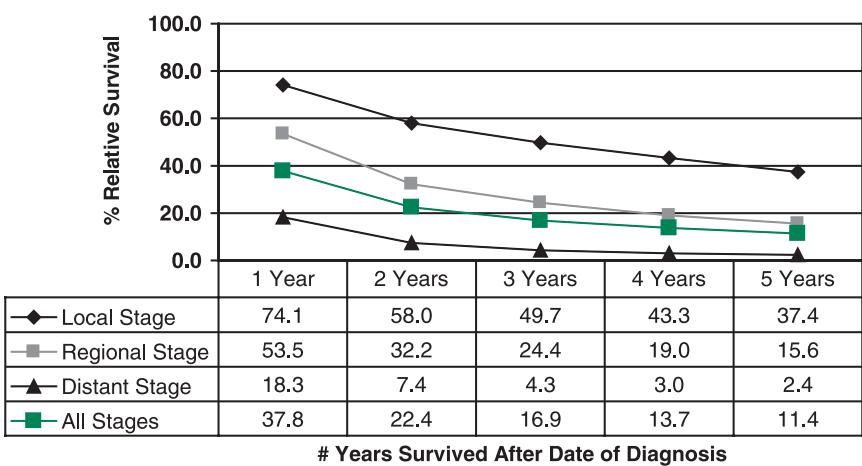
## Five-Year Percent Relative Prostate Cancer Survival, 1993-1998

**FIGURE 4.6**

## Five-Year Percent Relative Colorectal Cancer Survival, 1993-1998

**FIGURE 4.7**

## Five-Year Percent Relative Lung Cancer Survival, 1993-1998



numerous ways. Physical, psychological, social, spiritual, and financial well-being are areas which are affected by a cancer diagnosis. While care for those with active disease is readily available, appropriate care that includes guidelines for long-term follow-up of cancer survivors remains nebulous.

## Physical

Individuals faced with cancer experience numerous physical symptoms including, but not limited to, pain, fatigue, hair loss, weight loss, nausea and other symptoms, which may be specific to the cancer site and treatment administered. These symptoms occur during and after treatment and manifest themselves as either acute or chronic physical problems.<sup>19</sup>

Survivorship concerns worth further investigation in research and practice are the various issues faced by long-term cancer survivors. Physical risks and effects that may occur months to years after completion of treatment includes, but is not limited to:

- Recurrence of disease
- Secondary malignancies
- Functional changes such as fatigue or decreased physical stamina
- Cosmetic changes such as amputations, hair loss and thinning, or excessive weight loss
- System-specific effects that may include:
  - Urologic—nephritis, tubular atrophy, cystitis, and urinary changes
  - Gastrointestinal—transient liver enzyme elevation, bowel changes, adhesions, gastrointestinal obstruction, and hepatic veno-occlusive

disease.

- Sexual/reproductive—sterility, impotence, testicular atrophy, premature menopause, and other reproductive changes
- Musculoskeletal—fractures, muscle atrophy

## Psychological

Fear of recurrence, stress, anger, anxiety, and depression are all psychological issues associated with receiving a cancer diagnosis. Stress and chronic anxiety regarding recurrence and possible mortality from cancer can be debilitating. It hampers the sense of self-possession and empowerment that survivors seek as they try to make sense of their diagnosis and the impact it has on their lives. Stress can lead to other health problems and efforts to reduce and control it should be taken by both the provider and the cancer survivor.<sup>20</sup> While every cancer patient experiences grief and sadness throughout their battle with cancer, clinical depression affects 15% to 25% of cancer patients. Appropriate treatment for depression is warranted due to its impact on an individual's quality of life.<sup>21</sup>

Long term survivors who continue to experience anxiety and fear of recurrence may either obsess about their health and need constant reassurance, or may avoid appropriate follow-up care altogether. Some may also experience a form of post-traumatic stress that needs professional intervention.

## Social

The physical and psychological effects of cancer can directly influence the social well-being of cancer

FIGURE

4.8

## Common Myths about Cancer and Cancer Survivorship

**Common Myth****Facts to Counter Myth**

**Cancer is a disease that only affects older people.**

Although 77% of all cancer cases are diagnosed at age 55 or older, everyone is at risk of developing some form of cancer (ACS, 2003).

**Cancer only affects the person diagnosed with the disease.**

For many years, the focus of cancer diagnosis and treatment was on the person diagnosed with the disease. However, recent advances in our understanding of survivorship have led to the expanded definition of “survivor” to include others touched by this disease, such as families, friends, and caregivers.

**Cancer is the same for everyone.**

Because cancer can occur anywhere in the body, survivors can experience different symptoms depending on the site of their diagnosis. Depending on the site of the initial cancer growth and the stage at diagnosis, the available treatments and resources will vary greatly, such that more services and resources are available to survivors of certain cancers (e.g., breast or leukemia) than for other rarer forms of cancer (e.g., myeloma or laryngeal).

**The need for care of survivors ends once treatment is complete.**

Cancer can be a **chronic disease** that often has long-term effects on a survivor’s life. Although many cancers can now be cured or the growth greatly slowed, the impacts of diagnosis will remain with a survivor for years. Because more survivors are living longer, especially those diagnosed with cancer as a child or young adult, there is a need to address long-term issues of survivorship. These can include ongoing physical, psychological, and other types of issues.

**Diagnosis of cancer means certain death.**

The risk of dying of cancer following diagnosis has steadily decreased over the past several decades. Fewer than half of the people diagnosed with cancer today will die of the disease; in fact, some are completely cured, and many more survive for years because of early diagnosis or treatments that control many types of cancer (ACS, 2004).

*Source: US Department of Health and Human Services. Centers for Disease Control and Prevention. Lance Armstrong Foundation. A National Action Plan for Cancer Survivorship: Advancing Public Health Strategies. 2004*

survivors and their family members. Interactions with family and friends may be decreased or inhibited by the survivors' reluctance to participate in family and social life. The survivor may not share the same concerns or feelings experienced by family or friends, which results in relationships that are less authentic. Difficulties with continuing employment and/or accomplishing daily activities can contribute to a decreased sense of social well-being or self-worth. Employment discrimination or problems seeking employment further complicate financial problems. Insurability remains a major challenge for long-term survivors.

The financial costs incurred by cancer survivors and their families include health care costs associated with the cancer diagnosis, income loss due to limited work, and the inability to access quality care.<sup>22</sup> Financial costs can be devastating and greatly impact the quality of life of both cancer patients and their families.

## Spiritual

The role of spirituality in the lives of cancer survivors can take on many different forms from personal or spiritual beliefs and value systems, and faith to an increased focus on organized religion.<sup>23</sup> Many cancer survivors rely on their spirituality to help them cope with their diagnosis. Research in this arena indicates that patients rely on spirituality and religion to help them deal with physical illnesses. Since finding a renewed faith or stronger connection to religion is part of the coping strategy some individuals utilize when faced with serious illness, many patients desire medical staff to acknowledge or address their specific spiritual and religious needs.

A survey found that 77% of hospital inpatients reported that physicians should take patients' spiritual

needs into consideration, and 37% wanted physicians to address their religious needs more frequently. Ongoing research in this area is focusing on the development of new ways to address and assess spiritual concerns and how these concerns relate to patient quality of life.<sup>24</sup>

The diverse needs of cancer survivors warrant services that can be provided throughout the continuum of cancer care. Encouraging developments nationally have focused on patient navigator programs that provide patients with patient navigators who help patients and their families navigate through the health care system. The National Cancer Institute is currently piloting these programs throughout the country. These programs work with vulnerable or disadvantaged populations in an effort to help them obtain accurate information on a variety of issues such as diagnosis and treatment procedures/options, access to services, guidance on financial assistance as well as a host of other information including social support and religious counseling.<sup>25</sup>

## Programs in Arizona

In Arizona the services available for cancer patients and their families vary throughout the state.

The American Cancer Society provides numerous resources for cancer patients and their families.

- The *I Can Cope* quality of life classes provide information about care giving, medication and treatment options as well as resources to help strengthen the emotional needs of cancer patients and their families.

- The *Reach to Recovery* program provides one-to-one support for women facing breast cancer and for those who have had breast cancer surgery. Breast cancer survivors who have been through cancer diagnosis and treatment themselves provide support and share their experiences.
- The *Man to Man* program offers prostate cancer patients early in their diagnosis support and information to help make informed decisions about the disease. Prostate cancer survivors serve as the volunteers who provide support and information.
- The *Road to Recovery* program offers transportation for patients to/from cancer-related appointments.

Information on cancer treatment options, support programs, and local services are available throughout the state.<sup>26</sup> Examples of a few of the available programs and services in Arizona are listed below.

- Sunstone Cancer Support Centers in Tucson, Arizona, focuses on quality of life, complementary therapy, and spirituality through classes and retreats on its campus as well as through local outreach programs. Services include resource libraries, support groups, and wig loan programs as well as massage, reiki, and horseback riding as therapeutic options for cancer patients.
- The Virginia G. Piper Cancer Center at Scottsdale Healthcare offers a full range of complementary therapies including yoga, tai chi, stress management/relaxation, music therapy, drumming, support groups, meditation, nutrition education, and counseling. Exercise programs are offered with trained exercise physiologists and massage and lymphedema therapies are also available. In addition, the center offers a Mind, Body, Spirit program that provides patients with one-on-one

consultation with a holistic nurse to identify specific therapies for each patient.

- The Wellness Community in Phoenix is a national non-profit organization that provides support, education, and hope to people with cancer and their loved ones. Services provided include professionally led support groups, educational workshops, yoga, homeopathy, and mind/body classes. The Wellness Community provides a home-like setting for people fighting cancer to connect and communicate with one another. Programs are also offered in Spanish and all programs provided are free of charge.
- Bag It! is a non-profit organization partnered with the National Cancer Institute (NCI) that provides bags of information and materials to newly diagnosed cancer patients. By collaborating with surgeons and oncologists within Tucson, Arizona, valuable cancer information is disseminated to patients who need the latest information to help them make informed decisions about their health care options.
- The Komen Foundation supports community-based outreach programs statewide. The foundation funds innovative education, screening and treatment programs targeting the underserved. In 2004, the Phoenix Affiliate provided \$850,000 in grants throughout the state.
- There are many local support organizations such as Bosom Buddies and church-based support groups that provide services for Arizona residents.
- A number of organizations which offer assistance with transportation include:



- Maricopa County Special Transportation Services, which provide transportation to patients who live outside of Phoenix city limits. In order to qualify for this service, you must be 60 years of age and older, disabled, or fall within a certain income bracket.
- Community Forum in Phoenix helps patients obtain transportation resources.
- U.S. Department of Veterans Affairs Medical Center transports veterans throughout Arizona.
- There are a lack of organizations within the state that offer temporary housing and housing assistance for patients and their families. The Department of Housing and Urban Development (HUD) offers subsidized apartment complexes that are available for financially eligible individuals.

There are many barriers to quality of life for cancer survivors in Arizona. Health care providers and patients are unaware of the national and local resources available to them. Programs are not evenly distributed throughout the state and there is a lack of available funding to provide the programs and services needed. Differences in culture and socioeconomic status as well as mistrust of public service organizations and health care providers represent a few of the challenges Arizona faces with respect to improving and expanding quality of life initiatives and services.

## Quality of Life Goal

Improve quality of life for people impacted and affected by cancer in Arizona

**Objective 4.1:** Increase access to the comprehensive management of acute, chronic and delayed effects of cancer and its treatments.

*Strategies:*

1. Develop community-directed education plan for pain treatment options.

*Activity:*

- a. Collaboration with AZ Pain Initiative.
2. Create a plan to increase the awareness about utilization of complementary therapies for symptom management.

*Activities:*

- a. Education of caregivers and consumers.
- b. Collaboration between providers of complementary therapies to widen geographic and programmatic reach.
3. Increase grant funding to support research of quality of life measures and application.

**Objective 4.2:** Create the opportunity for optimal utilization of local, state, and national resources.

*Strategies:*

1. Promote and support the development, funding and utilization of patient navigator programs.
2. Identify the limitations of cancer care and encourage capacity to provide support services.

*Activity:*

- a. Develop and promote a community assessment process to identify gaps in local support services.
3. Identify a coordinator to develop a comprehensive listing of resources, and to develop a strategy for its dissemination.

*Activity:*

- a. Create website, published list, and a PR/Marketing campaign.
4. Encourage the recruitment and development of survivors as advocates, navigators, educators, and resource contacts.

**Objective 4.3:** Increase support for health care

providers and payers in directing those affected by cancer to quality of life services.

*Strategy:*

1. Develop educational primers for presentation to oncologists, registered nurses, American College of Surgeons, medical/nursing students, resident physicians, community leaders, faith based organizations, Health Maintenance Organizations, etc. (“Quality of Life 101”)

**Objective 4.4:** Increase the integration of palliative and hospice care into the overall cancer continuum.

*Strategies:*

1. Raise awareness of payers and providers as to the benefits of palliative and hospice care.
2. Raise awareness of faith-based and social service organizations as to the benefits of palliative and hospice care.

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5

# RESEARCH

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“The greatest strides made in research have led to the understanding that cancer, once a seemingly mysterious and unconquerable foe, is a disease process whose mechanisms can be elucidated and controlled.”

*—Dr. Andrew C. von Eschenbach*

# The power of research is limitless. It fuels progress, uncovers answers, and provides hope for individuals and families touched by cancer. For some, it is the last hope for survival; for others, research results allow primary prevention efforts to be the

first line of defense, which eliminates the disease process from occurring. Globally and locally, a multitude of cancer research is currently taking place. From genetics and nanotechnology to clinical trials and survivorship, cancer research investigates novel ways to study prevention, early detection, diagnosis, treatment, and quality of life in an effort to apply the newly acquired knowledge, skills, and strategies towards improving health and health outcomes within communities.

Principal investigators at state universities and research institutions are driven by their research interests, which are heavily supported through the availability of federal funding and grant dollars. In this way, the investigators drive cancer research in Arizona. This chapter briefly outlines current research efforts in Arizona and describes how substantial research infrastructure, such as improved communication and collaboration between researchers, increased access to data and biological samples, and increased patient participation in clinical trials can facilitate research and accelerate the process of translating scientific discovery into clinical applications.

## Current Research in Arizona

Prior to discussing the goals outlined in this research chapter, it would be helpful to provide an overview of the current research efforts in Arizona. This description is not meant to be a comprehensive list of projects or research institutions, but rather, it is

intended to be a snapshot of Arizona's research, which supports the concept of an improved infrastructure. The following section highlights three categories of research conducted in Arizona and provides one example of a research enterprise in each category. A partial list of institutions participating in cancer research across the state can be found in Appendix A at the end of this chapter.

### ***Clinical Research: The Arizona Cancer Center***

The Arizona Cancer Center is a National Cancer Institute designated Comprehensive Cancer Center within the University of Arizona. The center's research programs are divided into six areas: therapeutic development, cancer imaging and technology, cancer metastasis and signaling, cancer prevention and control, the gastrointestinal cancer program, and molecular genetics. Some of the research currently being conducted at the AZ Cancer Center covers genetics, cancer prevention, early detection, and quality of life concerns.

### ***Basic Research: TGen***

The Translational Genomics Research Institute (TGen) is a non-profit biomedical research institute whose mission is to make and translate genomic discoveries into advances in human health. TGen focuses on several aspects of cancer research including identifying genes associated with cancer, developing

diagnostic tools, and developing drugs to combat cancer. TGen's cancer-specific research includes initiatives that further investigate the complex disease processes within prostate, pancreatic, breast, multiple myeloma, colorectal, melanoma, and hematological cancers as well as brain tumors. Through a multi-disciplinary and multi-faceted approach, TGen expects to make great strides in cancer research and will translate this research into clinical applications that will be useful to patients and physicians.

### ***Special Focus: Pediatric Oncology Research***

Both the Center for Cancer and Blood Disorders at Phoenix Children's Hospital and the Division of Pediatric Hematology/Oncology at the University of Arizona are involved in NCI sponsored, cooperative group clinical therapeutic, biologic, epidemiologic, and quality of life trials through the Children's Oncology Group (COG) and both institutions are members of the Pediatric Bone Marrow Transplant (PBMT) consortium. Both institutions have also collaborated to develop a statewide pediatric Phase I / Phase II clinical research program, which is a member of the national Pediatric Oncology Experimental Therapeutics Investigators Consortium (POETIC). Phoenix Children's Hospital's brain tumor program is a member of the Children's Neuro-Oncology Consortium (CNC) and the hospital is in the early stages of developing a tissue repository and further collaboration with TGen. Pediatric researchers at the University of Arizona are involved in oncogenesis research, translation, developmental therapeutics, and tumor vaccine development.

### **Current Collaborations among Arizona Researchers**

Researchers in Arizona are combining their strengths to make scientific discoveries in the cancers that most affect Arizona's population. Some institutions such as the University of Arizona (UofA) have comprehensive cancer research programs, which include basic research, development of diagnostics, and drug development. Other institutions have a particular technological focus such as Arizona State University's (ASU) Biodesign Institute's expertise in developing diagnostic tools or the Translational Genomics Research Institute's (TGen) experience with advanced genomic technologies and pre-clinical drug development. Finally, some institutions have a focus on a specific cancer type such as Barrow Neurologic Institute's focus on brain cancer.

Institutions like the ones mentioned above are more frequently collaborating with one another to make Arizona a leader in cancer research.

The ability to expand and improve these collaborations will be instrumental in increasing research funding to the State. A significant portion of federal funds are being directed to multi-institutional, multi-disciplinary programs that display an outcome-based model that facilitates and accelerates discovering and commercializing products that improve prevention, detection, and treatment of disease. Continual efforts in collaborative programs supported with a strong infrastructure that enhance all institutions' strengths will allow Arizona to successfully compete for Regional Center grants across a number of areas.

## Research Infrastructure Needed in Arizona

The goals outlined below were set to address research infrastructure needed in Arizona.

### **Goal 1: Promote Communication, collaboration, infrastructure, training, and funding among cancer researchers.**

Researchers in Arizona have proven that they can successfully work together as shown by numerous joint grant applications and publications with authors from various research institutions. However, these collaborations currently must stem from a researcher's own networking skills to find their collaborators.

Researchers in Arizona would benefit from the development of a state-sponsored comprehensive researcher database that includes information about the expertise of individual investigators, institutional interests, and current research projects in different disease areas. Such a database will increase collaboration and allow for better matching of expertise when planning a project, which would again make these groups more successful in the competitive grant process.

Collaborations could also increase through additional scientific symposia. These meetings would allow researchers to share their expertise and research progress and would also provide a venue for face-to-face networking. Although many research institutions have their own scientific meetings (which may or may not be open to external investigators), it would be helpful to promote the opportunity to researchers outside of the sponsor institution to attend these meetings.

Finally, in order for Arizona to have a major impact in cancer research, it must ensure that its research programs can expand and continue. An absolutely

necessary component of this expansion is to ensure that there is adequate training available for those interested in conducting research in Arizona, as well as those already conducting research. For example, Arizona's Universities and Community Colleges have already begun to develop and expand programs to train students in the areas of biotechnology and clinical research because they have recognized there will be an increased need for this expertise as Arizona's bioscience capabilities continue to expand. However, these and related programs must be expanded and additional programs like Technopolis at ASU need to be developed to ensure that there is adequate training in specific areas such as grant writing and commercialization of products developed during research.

### **Goal 2: Improve the accessibility, analysis, and evaluation of cancer data as well as promote the use of tissue banking in cancer research.**

Accurate and comprehensive data and surveillance provides a solid foundation for establishing cancer control efforts throughout our state. Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data. The dissemination of data can be used for measuring the burden of disease, monitoring trends and detecting changes in health practices or behaviors. Cancer incidence, mortality, staging, and risk factors for the development of cancer as well as cancer screening behaviors provide information for planners about populations at greatest risk for developing and dying from cancer.

Cancer data is vital for assessing and addressing the cancer burden because it is used to develop appropriate public health interventions and evaluation of programs



Photo courtesy of National Cancer Institute

designed to prevent and control cancer. Cancer data is also utilized for prioritizing allocation of health resources, developing and evaluating policies, and providing a basis to conduct further epidemiological research. Arizona already has some programs in place that provide this essential data. For example, the Arizona Cancer Registry, the Colorectal Screening and Early Detection Project, and the Arizona Behavioral Risk Factor Surveillance System (BRFSS) complement some of the national surveillance programs such as the Youth Risk Behavior Survey (YRBS) and the Surveillance, Epidemiology, and End Results (SEER) program to track and evaluate various cancer data and trends. However, additional disease-specific registries and other monitoring systems would be instrumental in guiding what research needs to be done as well as identify progress being made.

Another extremely important aspect of biological research is access to samples. Even the most exceptionally planned study often runs into the obstacle of the inability to obtain adequate numbers of the appropriate clinically annotated tissue samples and controls. This limitation sometimes significantly delays the study and can even impact a scientist's ability to complete the project. Several institutions in Arizona have built specialized tissue repositories, such as Sun Health Research Institute's Brain Bank, which provides researchers with the opportunity to obtain samples for a specific research purpose. However, other disease registries and tumor repositories need to be developed to ensure access to other sample types, thus accelerating research outcomes.

### **Goal 3: Promote participation in cancer clinical trials in Arizona, specifically among the underserved populations.**

The end result of translational research is a commercially available product such as a diagnostic test or therapeutic drug. A major step of the translational process is the clinical testing of the product before it is commercialized. To do this, there must be an organized system of recruiting patients and tracking and analyzing the data. Institutions such as the Mayo Clinic, the UofA, and the Western Regional Community Clinical Oncology Program (CCOP) have vast expertise in clinical trials and related programs. However, as research in bioscience expands in Arizona, those programs will need to grow and additional institutions will need to develop the infrastructure to sponsor clinical trials and recruit patients.

A major problem with clinical trials is the adequate recruitment of underserved populations. The American Indian and Hispanic populations in Arizona, for example, should have equal access to participating in clinical trials and more work needs to be done to educate all populations about the benefits of such participation and how they can access these programs across the state. It should be noted that the Arizona Health Science Center houses a number of programs that address cancer in minority populations, including the Hispanic Center of Excellence, the Native American Cancer Research Partnership, and the Special Populations Shared Services of the Arizona Cancer Center.

The following is the current state and federal legislation in place to support cancer research in Arizona. Senate Bill 1213 was passed in 2000 and signed into law that requires managed care companies to cover routine patient care costs associated with

cancer clinical trials. For more information about the statute visit: [www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/20/0105707.htm&Title=20&DocType=ARS](http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/20/0105707.htm&Title=20&DocType=ARS).

## Research Challenges

In the last two years, Arizona has made huge strides to become recognized as a biomedical research hub. The State, as well as city governments and local institutions helped recruit TGen to Phoenix, which was a major first step to this initiative. We are beginning to see that momentum being carried into other areas as well. ASU and the UofA have proven that geographical and historical barriers can be overcome with their announcement of a new joint medical school in downtown Phoenix. ASU and the UofA are also planning to develop two research buildings (currently named ABC1 and ABC2) on the campus near TGen. These buildings will allow for the integration of researchers from ASU and UofA, but also from TGen and other local research institutions. The Biodesign Institute at ASU has also recently moved into their new facilities in Tempe. Such initiatives will strongly support the opportunity for collaborations and expansion of bioscience research. However, as outlined above, significant barriers to a robust, statewide, comprehensive, cancer research effort currently exist.

To illustrate just a few examples:

- Research programs are siloed with insufficient communication between the many programs and institutions.
- Researchers in Arizona lack a formal mechanism (such as an Arizona Researcher Database) to identify potential collaborators in their areas of study.

- There are common barriers, such as the need to access tissue samples, and a cumbersome IRB process for reviewing research protocols.
- Data of the Arizona Cancer Registry is underutilized in the research setting because of a shortage of resources to make it available.
- There is understaffing of cancer registries at the hospital and clinic level.
- Localized, non-melanoma skin cancers are not counted at all at the state level, impeding efforts to document and control this cancer.
- Information about cancer clinical trials is not widely available, especially in underserved populations.

## Conclusion

The goals and objectives outlined below are designed to address these challenges. We believe that once research infrastructure is in place, it will be a catalyst that will benefit research and provide a mechanism for attracting more grant dollars. To achieve this, communication among all groups involved is essential in terms of sharing data and discoveries. In order to share data, the accessibility to these data must be improved and this again is where research infrastructure will make Arizona more competitive for grants and attract research dollars. Researchers can use the comprehensive cancer plan as a guide as they develop their own research agendas, hopefully improving their ability to attract funds.

In conclusion, this chapter outlined current research, touched on the challenges we face and offers the following strategies as potential solutions to some of

the research infrastructure gaps we have in Arizona. By implementing these goals and objectives over the next several years, we can not only accelerate research, but also enhance the utilization of resources that are already in place. Facilitating collaboration and communication among researchers will help accelerate the entire research process, resulting in Arizona conducting expanded research activities and becoming more competitive in the cancer research field.

**Research Theme:** To improve the communication, collaboration, infrastructure, training, and funding of cancer researchers throughout Arizona.

## Research Goals:

**Goal 1:** Promote communication, collaboration, infrastructure, training, and funding among cancer researchers.

**Goal 2:** Improve the accessibility, analysis and evaluation of cancer data, and promote the use of tissue banking in cancer research.

**Goal 3:** Promote participation in cancer clinical trials in Arizona, specifically among underserved populations.

**Goal 1: Promote communication, collaboration, infrastructure, training, and funding among cancer researchers.**

**Objective 5.1:** Host a Research Symposium by Fall, 2005.

*Strategy:*

1. Collaborate with University of Arizona, Flinn Foundation, and other cancer research organizations.

*Activity:*

- a. Two-day event; current research topics; provide a directory of resources/ technologies; provide breakout sessions applicable to all researchers.

**Objective 5.2:** Establish a clearinghouse/database for cancer researchers to access and use in Arizona.

*Strategies:*

1. Improve existing databases and/or link with existing ones to provide researchers with useful information on cancer. (This objective may not be addressed until year 2 of basic implementation).
2. Create a survey for researchers to inquire about their needs in a resource directory and present results of survey at Fall Symposium; obtain feedback from researchers on information that they found most useful and practical.

*Overall Strategies for Training:*

1. Develop, recruit and retain researchers, including graduate students and members of underrepresented groups, to conduct research in Arizona.
2. Encourage universities and other research organizations to coordinate trainings for grant writing and IRB protocol for graduate students, medical students and researchers.
3. Promote recruitment and training of Certified Tumor Registrars (CTR) in Arizona.

*Overall Strategies for Funding:*

1. Enable out-of-state companies and pharmaceutical corporations to support research efforts in Arizona by establishing a research fund or funding mechanism.
2. Encourage existing and potential start-up companies in Arizona to develop cancer-related business plans and grant applications.

3. Review regulations, statutes and policies that impede research activities and the acquisition of research funds, and make recommendations to revise them.

**Goal 2: Improve the accessibility, analysis and evaluation of cancer data as well as promote the use of tissue banking in cancer research.**

**Objective 5.3:** Explore options to establish/enhance a population-based registry to collect/analyze data on skin basal and squamous cell carcinomas.

**Objective 5.4:** Continue to make available annual cancer incidence and mortality data, and risk factor analysis through joint publications of Arizona Cancer Registry, Behavioral Risk Factor Surveillance System, and American Cancer Society.

*Strategies:*

1. Disseminate an annual report to the Arizona State Legislature in an effort to create awareness about cancer and enhance relationships with the legislature.
2. Release the second collaborative annual report by 2007.

**Objective 5.5:** Propose modifications to current datasets if data elements are inconsistent, lack specificity, or are not used. Make recommendations on data that need to be added to increase or create the capacity for important and useful cancer analyses.

**Objective 5.6:** Link Arizona cancer websites and national cancer websites to the Arizona CCC website for public use. Examples include Arizona universities, cancer-related programs within Arizona Department of Health Services, significant non-profit cancer organizations, federal cancer programs, the national cancer clinical trials program.

**Objective 5.7:** Explore options to establish/enhance methods for tissue banking in Arizona for cancer research.

*Strategies:*

1. Collect information on current successful tissue banking efforts for research in cancer and other disease areas.
2. Conduct a focus group or survey for cancer researchers who would need access to tissue banks in order to conduct their research.

**Goal 3: Promote participation in cancer clinical trials in Arizona, specifically among the underserved populations.**

**Objective 5.8:** Work with Arizona Universities who have existing grants and minority programs to provide education and outreach to minority populations about participation in cancer clinical trials.

**Objective 5.9:** Increase the number of cancer clinical trials focusing on cancer prevention and control in high-risk populations with specific cancer types (e.g.: African American males and prostate cancer).

**Objective 5.10:** Identify barriers that inhibit participation in clinical trials within minority populations.

**Objective 5.11:** Educate the public regarding the importance and relevance of participating in cancer clinical trials.

*Strategy:*

1. Collaborate with community-based organizations and community leaders to increase the diversity of patients enrolled in clinical trials.

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6

# DISPARITIES

At the beginning of the 20th century, cancer was among the top 10 leading causes of death along with pneumonia, influenza, tuberculosis, and other infectious diseases. What was once the eighth leading cause of death is now the second cause of mortality throughout the U.S. Cancer affects every individual regardless of gender, race/ethnicity, socioeconomic status, education level, age, or geographic location. The threat of being diagnosed with cancer during one's lifetime does not discriminate.

As one of the most developed, technologically advanced nations in the world, especially within the realms of science and medicine, the U.S. is losing the battle against cancer. Not all individuals are afforded the same medical choices throughout the continuum of cancer care. The uninsured not only lack a regular source of medical care compared to their insured counterparts, but also receive fewer preventive services including mammography and colon cancer screening tests.<sup>1</sup> Across the country, accessible, quality health care is not distributed equally.

The National Cancer Institute (NCI) defines cancer health disparities as differences in the incidence, prevalence, mortality, and burden of cancer and related adverse health conditions that exist among specific population groups in the United States that may be characterized by gender, age, education, income, ethnicity, social class, disability, sexual orientation, or geographic location.<sup>2</sup> In order to examine health disparities within populations, researchers rely on cancer incidence, mortality, and survival rates. Racial and ethnic disparities exist with respect to cancer incidence and mortality across the nation. African Americans are diagnosed with prostate, colorectal, lung and bronchus, oral cavity, cervical, pharyngeal, and stomach cancers more often than whites.<sup>3</sup>

Among males, African Americans experienced the highest overall age-adjusted cancer incidence rates (618.4/100,000) in 2001 followed by whites (536.2/100,000), Hispanics (421.8/100,000), and Asian/Pacific Islanders (328.4/100,000).<sup>4</sup> For women,

“We need to focus on the uninsured and those who suffer from health care disparities that we so inadequately addressed in the past.”

*—Sen. Bill Frist, M.D. (R-Tenn.)*

*Senate majority leader on his priorities  
for the 108th Congress*

whites experienced the highest age-adjusted cancer incidence rates in the same year followed by African Americans, Hispanics, and Asian/Pacific Islanders. Compared with other racial and ethnic groups for which data is available, African Americans experienced the highest risk of acquiring and dying from cancer from 1992 to 1999 in this country.<sup>5</sup> Disparities related to health care delivery, access, utilization, and quality have also been documented as a result of health care studies.<sup>6</sup>

The aforementioned disparities directly influence how an individual navigates through our complex health care system or refrains from obtaining health care altogether, which shapes their health outcomes. More simply stated, it can be the difference between life and death. Promoting the public's health by ensuring that every individual has the opportunity to lead a healthy, safe, and productive life regardless of race, culture, education, geography, insurance status, or income is deeply embedded in forwarding social justice. This chapter will provide a brief overview of some of the disparities experienced throughout the continuum of care in Arizona and nationwide. We close by suggesting general recommendations with the hope of beginning to more comprehensively address cancer disparities in our state. This is merely the beginning. For disparities to be diminished with respect to cancer care, we must first revisit the root causes of poor health.

## Prevention

According to BRFSS 2002 data, more males than females categorize themselves as active smokers and 30% of all smokers are between the ages of 18-24 years. Almost one-third of smokers are categorized within the “other” racial/ethnic category that includes American Indians and Asian/Pacific Islanders. One-quarter are white, 20% are African American, and 18% are of Hispanic descent. More than a third of smokers are aged 25 years and older and do not hold a high school diploma. The above behavioral data suggests that 68% or more of smokers are from minority populations in Arizona.

As far as overweight and obesity are concerned, both behaviors also disproportionately affect minority populations. According to 2003 BRFSS data, 28.5% of Arizona's African Americans are obese followed by 22.3% of Hispanics, 16.9% of whites, and 15.6% of other races/ethnicities, which includes American Indians and Asian/Pacific Islanders. Almost 80% of Arizonans defined as obese based on their body mass index are from minority populations. Overweight individuals in our state follow the same trend in that 46% are African American, 34.6% fall within the other category, 33.2% are Hispanic, and almost 30% are white. If prevention efforts for the two primary risk factors for cancer other than age are to be successful across our state, public health interventions and outreach must stress the importance of healthy eating, physical activity, and tobacco cessation, and must target individuals and communities most troubled by unhealthy, preventable behaviors. Family and

community involvement is key to the success of public health initiatives aimed at reducing overweight and obesity as well as tobacco use.

The incidence rate of breast cancer among Arizona's Native American women is 64% lower than the rate in White, non-Hispanic women.<sup>7</sup> To date, this remarkable disparity has not been explained or explored. In fact, the breast cancer incidence rate in Southwest Indians is as low as that of Japanese women, who are widely cited in research studies as having the lowest breast cancer incidence rates in the world. Researchers have learned very much about how lifestyle factors in Japanese women place them at a relatively low risk for acquiring cancer. Similarly, much knowledge about factors that prevent breast cancer could be learned if Native American (with their historically low rate) women were to be compared to White, non-Hispanic women (with their high rate). This may become even more important if incorporation to Anglo culture somehow worsens the now favorable rate in Native Americans. The challenge is to approach both groups with cultural sensitivity in the forefront of any proposed research project.

## **Early Detection/Screening and Treatment**

Racial/Ethnic disparities exist with respect to early detection of cancer among males and females. Nationwide, compared to white women, older African American women are screened less often for breast cancer even if Medicare reimburses for this service.<sup>8</sup> In general, African American, Hispanic, Native American, and Alaska Native women are more likely to be

diagnosed at regional and distant cancer stages than white and Asian/Pacific Islander women.<sup>9</sup> Research conducted by the American Cancer Society (ACS), The National Cancer Institute (NCI), Surveillance Epidemiology and End Results (SEER) Program, Centers for Disease Control and Prevention (CDC), and the North American Association of Central Cancer Registries (NAACCR) over the last two decades has focused on disparities in cancer incidence, mortality, stage at diagnosis, and survival among various races/ethnicities.

Much of the research conducted on disparities has focused on analyzing differences in care based on race and ethnicity. While overall rates of mammography use among women aged 40 years and older increased to 70% nationally based on National Health Interview Survey figures for 2000, Native American and Alaska Native females, women who lacked health insurance, and immigrant women were screened at more modest percentages (between 39.5-52.4%).<sup>9</sup> Breast cancer is the most frequently diagnosed cancer among Arizona women across all races/ethnicities for which data is available. It is the primary cause of cancer mortality among Native American and Hispanic females, and the second cause of cancer death among White, non-Hispanic, African American, and Asian/Pacific Islanders. Moreover, African American women experience the greatest mortality from breast cancer in our state.

Breast cancer incidence and mortality rates are

lowest among Native American women, but Native Americans are diagnosed at a later stage of disease and experience lower five-year survival rates. Arizonans who lack any form of health insurance coverage are the group least likely to be screened for breast cancer. Hispanic, American Indian, Asian/Pacific Islander, and women categorized within the “other” racial/ethnic category experience lower overall breast cancer screening rates than White, non-Hispanic women. Providing breast cancer screening options for women who live below the federally designated poverty level does not necessarily dictate regular use of screening services as well as screening follow-up.

Cancer screening options, regardless of the site under investigation, must be convenient, inexpensive, and comfortable in order for men and women to assign importance to and comply with recommended tests. Knowing that members of an individual’s community or a family member had a positive experience being screened for cancer also influences individual decision making on whether or not to be screened for cancer. Cultural barriers most frequently identified by women from minority groups include modest cultural values regarding sexuality (Pap tests and mammograms expose body parts which may cause patient embarrassment), discomfort with being seen by a male provider, preference for and comfort with traditional medicine or healing methods, and fear of cancer.<sup>10</sup> Even when researchers control for access-related health care factors, reasons for inequalities in care remain and include overall historical inequities, clinical uncertainty, personal behavior, bias, and the manner in which our

current health care system is organized and functions.<sup>11</sup>

Ethnic/racial disparities are also evident regarding cervical cancer screening practices. Compared to White, non-Hispanic and African American women across the nation, Hispanics experience higher cervical cancer incidence rates.<sup>3</sup> In Arizona, Hispanic and Native American women exhibit the first and second highest cervical cancer incidence rates, but Native American and African American women experience the greatest mortality from this disease. As demonstrated with screening for other cancer sites, individuals without health insurance have the lowest cervical cancer screening rates in the state (77%). Arizonans aged 65 years and older have the next lowest (84%) cervical cancer screening rates.

Nationally, a study conducted by Grady Memorial Hospital in Atlanta, GA found racial/ethnic variability in the cervical cancer treatment afforded to patients.<sup>22</sup> A study by Howell and colleagues not only found variability in treatment recommended and provided to patients, but also disparities related to survival, which were similar to findings from the Grady Memorial Hospital Study.<sup>22-23</sup> Other factors worth further investigation by researchers and clinicians that may influence racial/ethnic inequalities in treatment include poorer health, patients’ refusal of treatment, prevalence of co-existing illnesses, and lack of physician recommendation for treatment.<sup>22,24</sup> Since cervical cancer screening via Pap test has evolved as one of the most

effective tools to detect cancer early or even at a pre-cancerous stage, and also has one of the highest population screening percentages compared with other cancer screening sites among women, equal access to treatment options for those diagnosed with cervical cancer should be made available in order to enhance health outcomes and chances for survival for all women.

In addition to the cancer screening disparities mentioned above, colorectal cancer screening rates among African Americans and Hispanics are significantly lower than rates among whites.<sup>12</sup> Incidence and mortality rates for colorectal cancer are highest among African Americans in Arizona followed by whites. Colorectal cancer is also the third leading cause of cancer mortality among Arizonans. Adults aged 50-64 years with no health insurance coverage experience the lowest rates of fecal occult blood testing within the past year (10%) and sigmoidoscopy or colonoscopy within the last five years (11%) in our state. Based on national access/utilization study results, researchers found that African Americans were less likely than whites with colorectal cancer to obtain a significant colorectal cancer therapeutic procedure,<sup>13</sup> cancer-directed surgery,<sup>13-15</sup> and sphincter-sparing surgery.<sup>15</sup>

With respect to being treated for stage III colon cancer, African Americans were less likely to receive adjuvant therapy or resection for advanced colon cancer than their white counterparts.<sup>16-18</sup> Other research uncovered that Hispanics with colorectal cancer were

less likely to obtain chemotherapy than non-Hispanics.<sup>19</sup> In contrast, data collected from the National Cancer Data Base demonstrated few differences in the type of treatment received based on race/ethnicity, but the same source concluded that Native and African Americans were least likely to be treated for colon cancer than any other racial/ethnic group.<sup>20</sup> A study of patients treated at Veterans Administration (VA) Hospitals where payment and referral issues are less of a barrier to receiving needed care due to an equal access health care system set up, concluded that African Americans and whites undergoing treatment for colorectal cancer received surgical resection, chemotherapy, and radiation therapy at similar rates.<sup>21-22</sup> While these findings are promising, it cannot be denied that equal access facilities still have barriers such as waiting lists for receipt of care, and, as outlined above, most of the studies conducted thus far conclude that racial/ethnic disparities exist among patients receiving colorectal cancer treatment.

With respect to prostate cancer treatment options, in general, African Americans and other minority populations are less likely to receive more costly or cutting edge treatments than whites.<sup>3</sup> However, fewer racial/ethnic differences were found among patients who received prostate cancer treatment in facilities where equal access took precedence. A study analyzing treatment options offered to patients enrolled in the Department of Defense Tumor Registry, an equal access facility, found no statistically significant differences between the prostate cancer treatment choices offered and undergone by whites and African

Americans.<sup>26</sup>

Dignam provides two explanations for existing and ongoing racial/ethnic disparities in cancer treatment that affect outcomes: racial differences in treatment efficacy and the failure of our health care systems to provide appropriate care.<sup>27</sup> In order to reduce disparities related to cancer treatment access and availability, our public health, health care, and public policy entities must work together to come up with strategies to reduce the underlying barriers that enable unequal opportunity to circulate within our communities. These barriers include, but are not limited to geography, lack of health insurance, financial challenges based on socioeconomic status and/or the high cost of cancer care, education, and age.

## Geographic Barriers

The Office of Rural Health Policy (ORHP) was established within the Health Resources and Services Administration (HRSA) in 1987 in an effort to promote enhanced health care service in rural areas. ORHP administers grants nationwide to help improve rural health care systems and access to care, acts as a liaison with national, state, and local rural health organizations, works as a voice for the concerns of rural hospitals, clinics, and other rural health care providers, promotes rural health research, and sponsors a clearinghouse for rural health information.<sup>28</sup>

Approximately 25% of the U.S. population lives in areas designated as rural (e.g.: fewer than 6.6 people

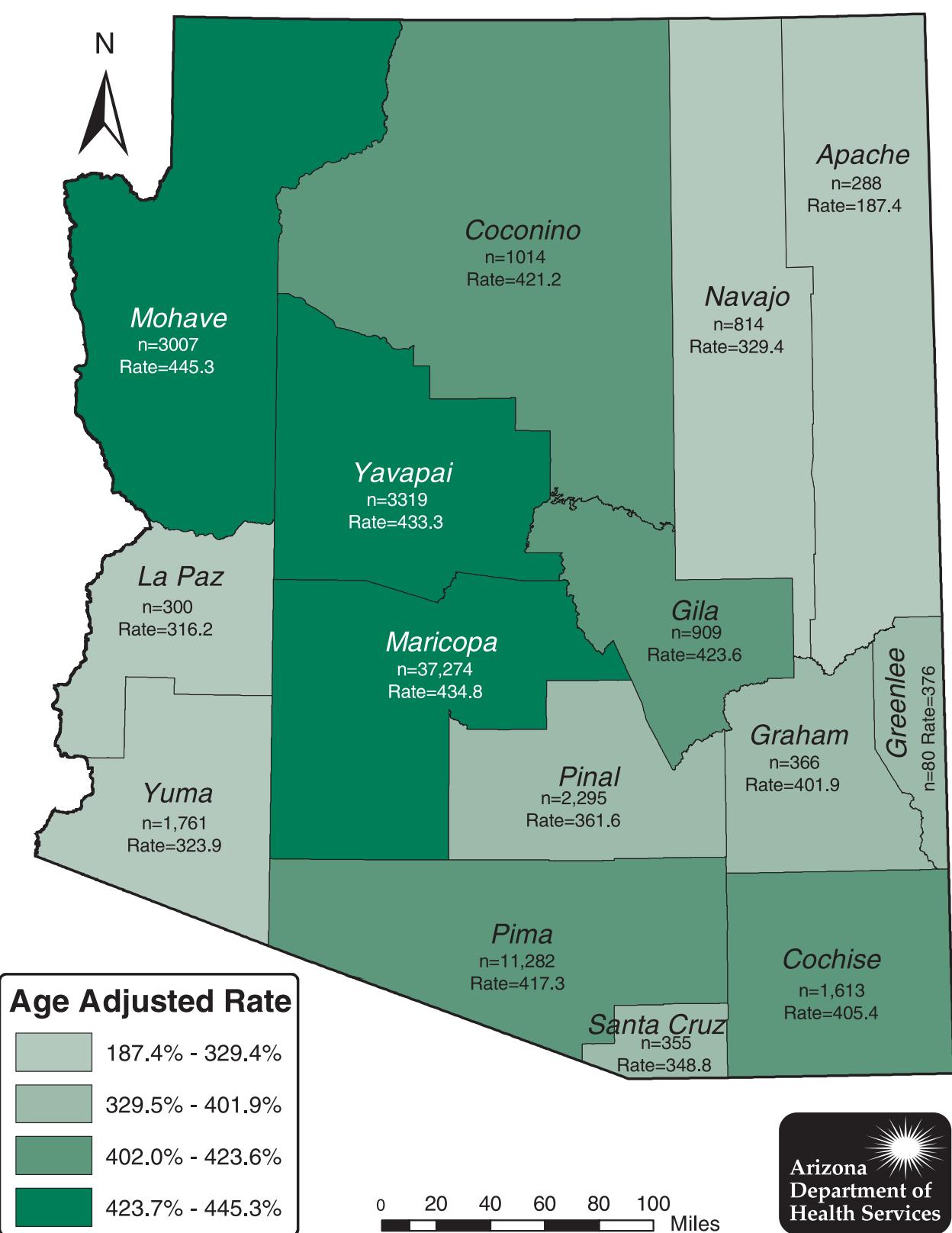
per square mile).<sup>29</sup> Based on 2000 Census data, approximately 11.8% (607,097) of Arizonans live within rural areas.<sup>30</sup> Compared to Arizona's other ten counties, Apache, Graham, Greenlee, La Paz, and Navajo counties have more rural than urban residents.

Some of the issues faced by rural communities include inhabiting a large proportion of residents that are elderly, lack health insurance, public transportation, and access to primary and/or specialized health care. Some rural residents also experience linguistic and cultural barriers and since they live in remote areas, these additional barriers serve to amplify how far removed they are from obtaining quality health care when they need it most. Based on 2001 Arizona population estimates, more than half of individuals residing in Yuma and Santa Cruz Counties were of Hispanic descent, and 43% of Greenlee County residents considered themselves Hispanic.<sup>31</sup> American Indians comprise 5% of Arizona's total population, and the highest percentage of American Indians reside within Apache, Navajo, and Coconino Counties.

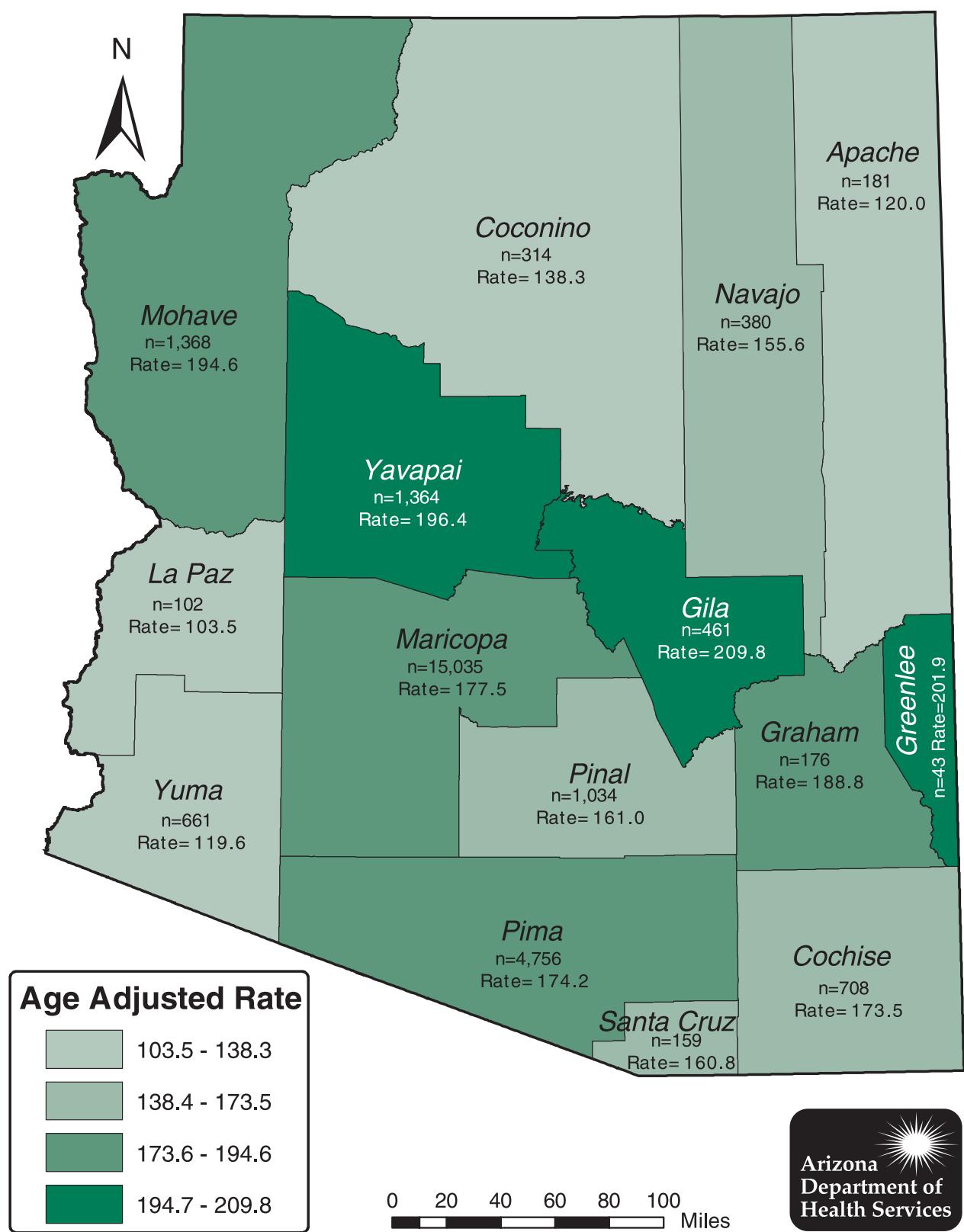
Mohave County has the highest overall cancer incidence at 445.3/100,000 followed by Maricopa and Yavapai Counties at 434.8/100,000 and 433.3/100,000 respectively. Mohave is within the northwestern region of the state bordered by Nevada, California, and Utah. Maricopa County is the largest county and both Maricopa and Yavapai Counties are located closer to the central part of the state. With respect to cancer mortality rates, Gila County residents suffer from the highest cancer mortality rate at 209.8/100,000 followed by Greenlee (201.9/100,000), Yavapai (196.4/100,000),

FIGURE 6.1

Average Age-Adjusted Incidence Rates of Malignant Neoplasms by County of Residence, Arizona, 1999-2001



**FIGURE 6.2** Average Annual Age-Adjusted Mortality Rates for Malignant Neoplasms by County of Residence, Arizona, 1999-2001



and Mohave (194.6/100,000) Counties. According to U.S. Census 2001 estimates, 8,547 individuals lived in Greenlee County, which is the least populated county in the state.<sup>30</sup>

Gila County is located in the central part of the state while Greenlee is located in the southeastern region of the state and bordered by New Mexico. Mohave County is located in the northwestern region of the state. The Counties with the highest cancer incidence and mortality are also far from major cancer diagnosis and treatment centers. Unless residents in these areas have transportation, resources, and time to seek out necessary care such as cancer screening tests, they are left without it. Compared to people living in urban areas, racial and ethnic minority populations who live in rural areas experience less opportune health outcomes for cancer screening.<sup>32</sup>

Traveling physicians and nurses trained in oncology as well as expanded telemedicine efforts may help link remote areas with the resources available in bigger cities and counties in the state and across the country. Central to geographic challenges that inhibit Arizonans from receiving adequate and timely health care are opportunity, access, and affordability. If a resident cannot afford to take the time off of work or away from their family to travel to Phoenix or Tucson to seek access to chemotherapy or surgery, the priority of providing for their family takes precedence over their own health, which is seen most often within immigrant

and minority communities. Including the family within health care decisionmaking and ensuring the individual that their good health will ultimately have a positive influence on their family represents a valuable strategy worth considering when promoting outreach efforts aimed at preventing, detecting, and treating cancer.

## Socioeconomic Status/Financial Barriers

Most of the disparities research conducted thus far focuses on either racial/ethnic differences in health outcomes or the relationship between socioeconomic status (SES) and disparate care. As stated earlier, individuals of lower socioeconomic status who are sometimes from minority populations are less likely to receive breast or colorectal cancer screenings.<sup>33</sup> Currently, no national entity regularly reports or collects data on the link between socioeconomic status (SES) and cancer. SES may be defined solely by education, income, occupation, residence, or a combination of these indicators.<sup>34</sup>

Numerous studies have demonstrated clear relationships between lower socioeconomic status and poor housing, lower economic and educational opportunities, and greater environmental risks, which result in poorer health and shortened survival.<sup>33,35</sup> Minority groups are at greater risk of experiencing less intensive, and at times, inferior care compared to whites.<sup>36</sup>

Based on 1999 data provided by the U.S. Census, 42.9% of Arizona households brought home less than \$35,000 per year, and the median household income

was approximately \$40,500.<sup>37</sup> Almost 14% of Arizona's population lives below the poverty level and our state ranks 13th in the nation for individuals who live below the federal poverty level. The quality of health care afforded to any patient should be based on medical need, risk, and benefit.<sup>38</sup> Unfortunately, the aforementioned criteria are not always used to define quality or equality in cancer care obtained by patients in that those who can afford the best care are often the ones benefiting from the highest quality of care.

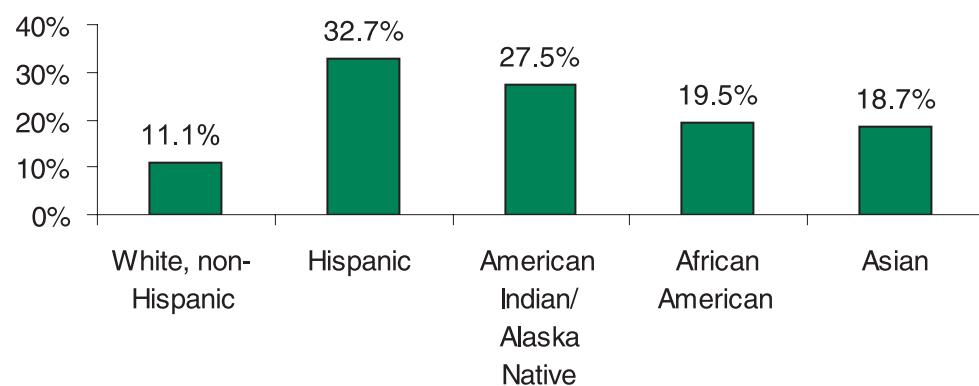
Another financial challenge experienced by individuals and families across the country, especially those with modest incomes, is whether or not health insurance coverage is a realistic, affordable, or attainable option. According to U.S. Census Bureau 2003 estimates, 45 million people did not have health insurance coverage in our country.<sup>39</sup> The uninsured include children, recent immigrants, and men and women who work full-time. Based on a three-year

average covering 2001-2003, 17.3% of Arizonans remained uninsured.<sup>40</sup>

Racial/ethnic disparities in health insurance status are prominent nationwide. Compared to 11.1% of whites, 32.7% of Hispanics lacked health insurance coverage followed by American Indian and Alaska Natives (27.5%), African Americans (19.5%), and Asians (18.7%) in 2003.<sup>41</sup> Individuals who lack health insurance coverage experience life in a world where poorer health outcomes are almost inevitable. Each year, approximately 18,000 people die from treatable diseases due to lack of health insurance coverage.<sup>42</sup>

As we work together to diminish the burden of cancer among all Arizonans, reducing disparities one barrier at a time or addressing numerous barriers collectively will require the concerted effort and attention of health insurance providers, clinicians, researchers, policymakers, community leaders, and public health professionals. Chipping away at the

**FIGURE 6.3** Percentage of Individuals without Health Insurance by Race/Ethnicity. U.S. 2003



multitude of disparities facing our unique and diverse residents as well as identifying the root causes of why disparities occur is a daunting, but obtainable task. Reducing disparities through targeted outreach, public health interventions, and professional cultural competency training represent a few strategies we can implement to begin addressing disparities at different levels. Improving access to state of the art cancer screening and treatment for patients who need it most will not only allow us to realize an equally distributed, accessible, and affordable way for people to take care of themselves, but will also enable our state to make a considerable difference in the way our health care system functions. This will ultimately reduce the cancer morbidity and mortality affecting the individuals, families, and communities that define Arizona.

## **Special Focus: Native Americans and Cancer**

Cancer affects all races/ethnicities that comprise our unique state. Some race/ethnicities are disproportionately affected by certain cancers and also experience higher mortality rates. African Americans suffer from the highest overall cancer mortality rates in Arizona. As described in past chapters, Hispanics also have higher percentages of some cancers compared with other races/ethnicities in our state.

White, non-Hispanics have the highest overall cancer incidence rate and make up approximately 75% of Arizona's total population. The next section highlights the burden of cancer among Native Americans due to the complex geographic, financial,

and health care access challenges they face. We also decided to focus on Native Americans due to the fact that so little is known about prevention and treatment patterns utilized by indigent populations that relate to cancer.

Arizona is home to 21 Native American Tribes. A large number of Native Americans reside within urban areas. Less than 40% of Native Americans reside on federally designated reservations.<sup>43</sup> Cancer is the second leading cause of death among Native Americans. When compared with other racial/ethnic groups, Native Americans have the lowest five-year survival rates for all cancers and have the largest percentage of disseminated, poorly defined cancers.<sup>44</sup> From 1988-1992, the most frequently reported cancer diagnoses among Southwest (New Mexico and Arizona) Native American males were prostate, colorectal, kidney and renal pelvis, lung and bronchus, and liver cancers.<sup>45</sup>

Among Native American females within the same time period, breast cancer was the most frequently diagnosed cancer followed by ovarian, colorectal, gall bladder and corpus uteri cancers. With respect to cancer mortality, prostate cancer was the number one cause of death among Native American males followed by stomach, liver, lung and bronchus, and colorectal cancers from 1988-1992.<sup>46</sup> For Native American women, in the same time frame, gall bladder cancer caused the most cancer deaths followed by breast,

cervical, pancreatic, and ovarian cancers. Based on 1995-2000 data, the top three cancers causing the greatest mortality among Native American males are liver, lung, and prostate.

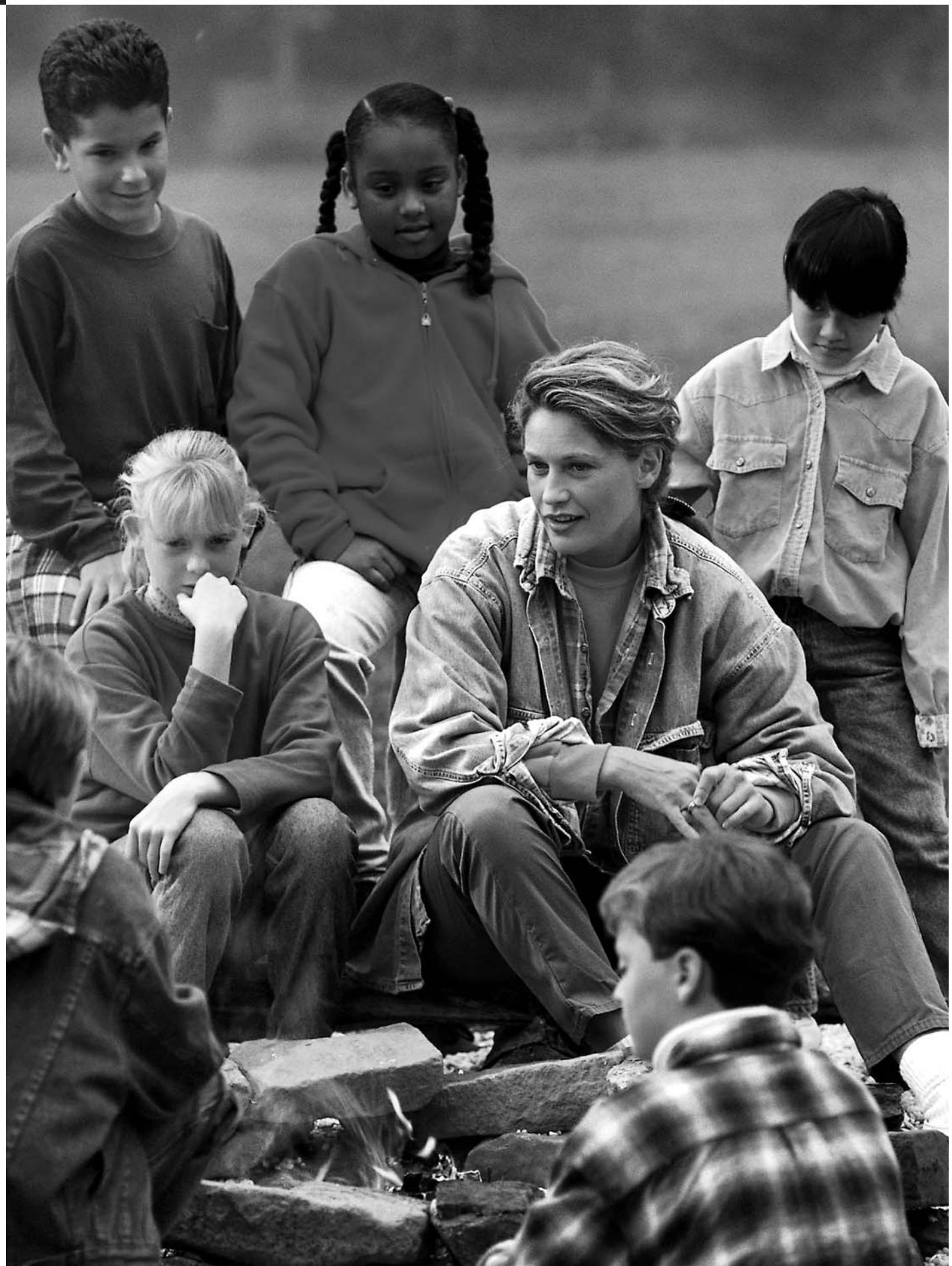
In that same time frame, cancer deaths among Native American women most frequently occurred in the breast, ovary, and liver respectively. One of the major challenges researchers face when analyzing cancer data is miscategorizing or underreporting incidence and mortality rates for ethnicities/races that are considered special populations such as Native Americans, Alaska Natives, and Asian/Pacific Islanders. Cancer data for Native Americans in the state of Arizona is collected, interpreted, and analyzed through special relationships between the Arizona Cancer Registry (ACR) and the New Mexico Tumor Registry (NMTR) as well as the Indian Health Service (IHS). Cancer data collected from Indian Health Service facilities in Arizona is collected and analyzed through the New Mexico SEER data collection system and is then communicated back to the Arizona Cancer Registry.

Cancers identified in Native Americans from non-Indian Health Service facilities are reported directly to the ACR. Periodically, in a three-way match with ACR, NMTR and IHS registration rolls, racial misclassification assessments are made. When appropriate, corrections are applied. While such efforts help improve data and assure quality, there is always the need for continued emphasis on proper data collection and monitoring. Socioeconomic issues are at the forefront of the health care inequalities experienced by Native Americans.

The complex relationship between poverty, education, opportunity, culture, tradition, and social justice further convolutes health outcomes for indigent populations. Thomas Sequist, MD, a Harvard Medical School health care policy research fellow adds that, “even if you wipe away the slate clean of differences in income and education, there would probably be differences in care because of cultural differences and misunderstandings.”<sup>47</sup> In Arizona, the average life expectancy for Native Americans is 55 years compared with 72 years for whites.

The Department of Health and Human Services Indian Health Service (IHS) operates a comprehensive health service delivery system for approximately 1.6 million of the nation’s estimated 2.6 million American Indians and Alaska Natives with a total operating budget of \$3.5 billion.<sup>48</sup>

Urban Indian health care programs account for approximately 2% of the total Indian Health Service (IHS) budget.<sup>49</sup> However, federal funding for IHS is only 60% of what is necessary to provide health services equivalent to what is provided in the rest of the country.<sup>50</sup> Thus, while the IHS is a resource to help address cancer health disparities in this population, it is not sufficient to meet the challenge without involvement of the entire community. Agencies including the Department of Health and Human Services have made eliminating health disparities through the funding of research and new health care centers, equipment, and technology a



priority over the last few years.<sup>51</sup>

For example, in 2003, the Navajo Nation unveiled two new health care facilities in Arizona, one in Red Mesa, and another in Fort Defiance. The Centers for Medicare and Medicaid Services launched a new satellite network in 2003 to provide Medicare and Medicaid information to 57 IHS and tribal health facilities.<sup>52</sup> Biomedical and clinical research is also taking place in the hopes of eliminating health disparities among Native Americans. Continued funding and the promotion of self-determination and self-governance within tribal entities are the overarching sources of moving forward more positive health outcomes for Native American men, women, and children nationwide and within Arizona. Getting back to a healthier, more active lifestyle and providing the infrastructure to support positive behaviors based on the traditions and roots so crucial to Native American identity and pride lies at the center of eliminating health disparities among Arizona's Native American communities.

## **Southwest American Indian Community Cancer Collaborative (SAICN)**

The SAICN was developed by the Inter-Tribal Council of Arizona—the lead agency on a National Cancer Institute proposal, the Phoenix Indian Medical Center and Arizona Cancer Center. The goal of the collaborative is to eliminate cancer health disparities among American Indians by closing the gap between the health needs of the community and cancer prevention and control made possible by a responsive

health delivery and research system. This will be done through support of participatory education, training and policy assessment as well as research programs, all driven by Tribal communities.

In support of this application and potential participation in the grant, SAICN supports applicants by assisting in the implementation of sun safety education for students K-8 through the EPA SunWise program. The Phoenix Indian Medical Center has identified skin cancer as one of the top five cancers among Native Americans in the Phoenix Service Unit Area. About 80% of a person's lifetime exposure to the sun occurs before the age of 18 years. Therefore, educating children about sun protection can reduce skin cancer rates later in life.

## **Disparities Goal**

**Reduce cancer disparities among Arizonans.**

**Objective 7.1:** By Fall 2005, create a health disparities work group that will research and identify current barriers to care as well as draft strategies to reduce inequalities in cancer care.

**Objective 7.2:** By 2006, conduct training on cultural diversity in collaboration with the Intercultural Cancer Council (ICC) in an effort to inform cancer coalition members about current culturally sensitive practices and strategies.

**Objective 7.3:** Increase public awareness about cancer health disparities in Arizona as they relate to prevention, screening, treatment, and quality of

life/survivorship.

**Objective 7.4:** Strengthen data, surveillance, and research efforts as they relate to diverse populations.

*Strategies:*

1. Support ongoing qualitative and quantitative research related to addressing and identifying health disparities.
2. Expand data collection to include more specific ethnicity, socioeconomic, geographic, and linguistic information.
3. Support health care provider efforts at collecting data on tobacco and alcohol use, dietary, exercise, and sleep habits as well as family history of cancer at community health centers within hard to reach areas so that resources, outreach, and care is accessible to individuals with the greatest need.
4. Using the information gained from incorporating strategy 3, publish research on health disparities in an effort to target intervention activities aimed at reducing the cancer burden within underserved populations.

**Objective 7.5:** Increase provider education and training initiatives offered to medical, nursing, public health, and pharmacy students as well as residents in an effort to educate future health care providers about the current disparities in cancer care facing our state.

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# ENVIRONMENTAL CARCINOGENS

Environmental pollutants are contaminants found in the air, water, and soil. The International Agency for Research on Cancer (IARC) classifies over 20 chemicals as human carcinogens (IARC Group 1) including arsenic, asbestos, silica, benzene, chromium, radon, vinyl chloride, and formaldehyde.<sup>1</sup>

Housed within the World Health Organization, IARC coordinates and conducts research on the causes of human cancer and develops scientific strategies for cancer control. According to public health researchers, 1-4% of all cancers in developed countries are due to environmental contaminants.<sup>2</sup> Chemicals classified as known human carcinogens or probable human carcinogens have been identified by IARC, the National Cancer Institute (NCI), The U.S. National Toxicology Program, and the U.S. Environmental Protection Agency (EPA).

For a substance, contaminant, or chemical to be deemed carcinogenic to humans, a dose-response relationship must clearly exist between the questionable substance and the individual. One

challenge researchers face within the cancer community is establishing causality because cancer risk is not only difficult to measure, but other factors may also influence risk of exposure such as concentration of the contaminant within the environment and whether the substance naturally occurs and cannot be avoided. Occupational exposures, location of homes with respect to manufacturing plants or toxic waste dumps, and the possibility of chemicals leaching out of the soil into the water supply represent main environmental health concerns that have been investigated by researchers from various environmental organizations including IARC, EPA, the Agency for Toxic Substances and Disease Registry (ATSDR), and the U.S. National Toxicology Program over the last three decades.

This section will focus on environmental pollutants identified by IARC as either known or probable carcinogens. The rationale for focusing on particular known or possible carcinogens was two-fold. First, we

gathered information about contaminants of concern to Arizonans and obtained input from the Office of Environmental Health within the Arizona Department of Health Services. This included a review of the 1995 Arizona Comparative Environmental Risk Project (ACERP) Report,<sup>3</sup> which was prepared in an effort to focus Arizona's environmental programs on the greatest need and reduce the greatest environmental risks actually facing Arizonans. Second, we looked at contaminants that have been investigated extensively nationwide, could potentially affect large populations due to the route of exposure (air, water, soil), and that may have the greatest impact on the health of Arizona's children and adults.

## Radon

Radon is a naturally occurring odorless, colorless gas that originates from the radioactive decay of uranium and is found nationwide. Elemental uranium is found in rock formations, soil, and ground water beneath homes. Radon gas seeps into building foundations through cracks or holes and accumulates within indoor air. Exposure to radon is primarily through inhalation of indoor air where the gas has accumulated or through inhalation of contaminated water vapor. Approximately 21,000 lung cancer deaths each year are attributed to radon exposure via inhalation of indoor air in the United States.<sup>4</sup>

The average indoor air radon level is about 1.3

picocuries per liter (pCi/L) in the U.S. Smokers are more likely to develop radon-induced lung cancer than non-smokers. The World Health Organization, the National Academy of Sciences, the U.S. Department of Health and Human Services, EPA, and IARC have all classified radon as a known human carcinogen.<sup>5</sup> Most radon that is inhaled is rapidly exhaled by individuals, but inhaled decay products are easily deposited into the lungs where they can irradiate cells within the airways, and ultimately increase lung cancer risk.<sup>6</sup> Several residential epidemiology studies, which are showcased in the 1999 National Academy of Sciences' BEIR VI Report, have found a link between lung cancer and radon exposure in homes and among miners. While occupational miner data provides a solid foundation from which to estimate lung cancer deaths from radon exposure annually, the residential home studies conducted worldwide have produced variable results.<sup>7</sup>

Residential epidemiology studies on radon are complex because of the multitude of factors involved in establishing a dose-response relationship between radon levels and lung cancer risk. Studies such as these are expensive and time consuming to conduct, but the following factors must also be addressed or at least considered: (1) People move to many residences over their lifetime; it is impossible to visit each home and measure radon levels; (2) Older homes are often remodeled or demolished, and if ventilation systems or building materials change, radon levels may change or ease of entry through cracks or holes may become more pronounced; (3) Smoking histories may be overestimated or under-estimated; (4) Genetics, lifestyle,

exposure to other carcinogens, and other factors may play a role in increasing cancer risk along with radon exposure.<sup>8</sup>

Nonetheless, health authorities and environmental researchers concede that there have been ample residential epidemiological studies on radon and lung cancer risk to conclude that homes with measured indoor radon levels above 4.0 pCi/L pose a health risk and that inhabitants within those homes test radon levels within their homes regularly.<sup>9</sup> About 1 out of 20 homes has elevated levels of radon.<sup>10</sup> The Arizona Comparative Environmental Risk Project (ACERP) included a risk assessment for radon as part of their report in 1995. ACERP utilized radon potency factors from the EPA, National Research Council, and the International Commission on Radiological Protection. The report concluded that approximately 250 lung cancer deaths among Arizonans were attributed to indoor radon exposure and that lung cancer risk in smokers was ten times greater than for non-smokers who were exposed to radon.<sup>11</sup>

### ***General Recommendations***

1. Identify homes with high radon levels through home testing.
2. Provide health education materials about the hazard of radon in homes to communities throughout

Arizona.

### **Arsenic**

Arsenic is a naturally occurring element found in water, soil, and geologic formations. The main routes of human exposure to arsenic are via drinking water, food, or inhalation. Arsenic is also used as a pesticide component and wood preserver. The World Health Organization (WHO), the Department of Health & Human Services, and the EPA have determined that inorganic arsenic, the form found within the environment, is a human carcinogen.<sup>12</sup>

In Arizona, exposure to arsenic is largely through the water supply, but individuals may also be exposed to it via contact with soil or wood treated with arsenic. Arsenic is in the water supply throughout the state, but is found within higher concentrations in select regions. EPA lowered the maximum contaminant level (MCL) for arsenic in drinking water from 50 parts per billion (ppb) to 10 parts per billion in 2001.<sup>13</sup> Compliance with this standard will be effective as of January 2006. Several studies have demonstrated an increased risk of lung, skin, bladder, liver, kidney, and prostate cancer.<sup>14</sup>

Arizona Comparative Environmental Risk Project conducted a drinking water assessment as part of the 1995 report and concluded that the main contaminants in the public's drinking water were arsenic and trihalomethanes.<sup>15</sup> Public water supplies are utilized by 95% of Arizona's population. The remaining 5% of the population obtain water from private wells. The environmental report also assessed cancer risk associated with drinking water by utilizing a zero-threshold model, which has the potential to

overestimate risks at very low exposures, but projected no greater than 20 cancers per year to be caused by drinking water contaminants in public water supplies.<sup>16</sup>

ACERP also concluded that public water supplies in Yavapai County, located approximately 100 miles north of Phoenix, had higher levels of arsenic than any other county in the state. In 2003, the Office of Environmental Health within the Arizona Department of Health Services (ADHS) conducted a health consultation with respect to the levels of arsenic in private drinking water wells in New River, Desert Hills, and Cave Creek, which are rural communities located in Northern Maricopa County, Arizona. Approximately 30,000 residents live in Northern Maricopa County. The main source of arsenic in this area originates from rock formations in the New River region as well as the Agua Fria and Cave Creek Basins.

As stated earlier, arsenic from these geologic formations has the ability to leach into the water supply. In 2001, a New River resident contacted the Arizona Department of Health Services (ADHS) Office of Environmental Health to obtain information about arsenic in the water supply. The resident took two water samples and had them tested at a private laboratory, which found high levels of arsenic in the samples. A number of residents contacted ADHS after this incident to obtain information about arsenic. Since private wells are the primary source of drinking water for New River, Cave Creek, and Desert Hills residents and many residents do not test their water for arsenic levels, ADHS initially conducted a private well water sampling program where 21 area wells were tested and

the results were shared with residents at a public meeting in early 2003.

Based on community response and the levels of arsenic found in some of the well water samples, a second exposure investigation was conducted by ADHS staff in 2003. ADHS collected water samples from 83 private wells where the levels of arsenic ranged from <10 to >780 micrograms/L and exceeded the level assigned as the chronic exposure comparison value for children by the Agency for Toxic Substances and Disease Registry (ATSDR), which is 3 micrograms/L. The no-observed-adverse-effect-level (NOAEL), which is the highest exposure dose at which no effect is observed on an animal or human population for chronic exposure to arsenic is 6 micrograms/L. Fifty-eight of the wells (70%) where water samples were collected contained arsenic levels exceeding EPA's new drinking water standard of 10 micrograms/L. Seventeen of the aforementioned wells had very high concentrations of arsenic in the water, which posed a serious health threat for children and adults if the water supply was utilized for household drinking and cooking. Furthermore, four of these wells had arsenic concentrations exceeding 780 micrograms/L.

Well owners with arsenic levels greater than 10 micrograms/L were advised by ADHS to either install a treatment system that effectively removes arsenic, use an alternative source of drinking water, or utilize

bottled water for drinking and cooking purposes.<sup>17</sup> They also recommended that all New River, Desert Hills, and Cave Creek residents test their well water for arsenic if they use the water for drinking and cooking. The private well water sources did not pose a public health threat when the water was used for personal hygiene purposes such as bathing or brushing teeth.<sup>18</sup>

### ***General Recommendations***

1. Increase public awareness about arsenic exposure and health effects.
2. Increase the proportion of homes and workplaces that have tested their well water for arsenic.
3. Promote the use and installation of treatment systems by residents in order to reduce arsenic levels in excess of 10 micrograms/L should the water be used for drinking and cooking.
4. For households with high arsenic levels in the water, use bottled water for drinking and cooking if installation of a treatment system is not feasible.

### **Asbestos**

Asbestos is a group of six different minerals that occur naturally in the environment. Minerals are usually composed of long, thin fibers that resemble fiberglass, but small fibers may result when asbestos is found in the air or water. Asbestos has been used as pipe insulation, in automotive brakes, paper products, textiles, plastics, shingles, wallboard, blown-in insulation, and as part of building materials.<sup>19</sup> Although the federal government refrained from producing most asbestos products by the early 1970s, installation of asbestos-containing products continued through the late

1970s and even into the early 1980s.<sup>20</sup>

Asbestos fibers released in the air during renovations of older buildings pose a significant public health threat because the small fibers or dust particles can be inhaled and trapped within the lungs. Asbestos is classified as a human carcinogen by the EPA and IARC, and long-term exposure causes lung cancer, mesothelioma (cancer of the outer lining of the chest and lung and/or the lining of the abdominal wall), and possibly gastrointestinal cancers.<sup>21,22</sup> ACERP classified asbestos as a relatively low risk issue in their 1995 report. From asbestos exposure in schools (ages 5-18), public buildings, and occupational exposure (between ages 25 and 45) combined, ACERP classified asbestos as a relatively low risk issue and estimated that approximately 3.43 lung cancer and pleural mesothelioma cases may occur in Arizona per year.<sup>23</sup> The cancer risk among cigarette smokers exposed to asbestos is ten times greater than for non-smokers.

### ***General Recommendations***

1. Increase awareness in the community, especially among individuals residing in older, remodeled buildings about the health hazards of long-term asbestos exposure.
2. Promote the use of protective equipment for individuals with possible occupational exposure to

asbestos.

## Uranium

Uranium is found in the environment (air, soil, water) as uranium-234, uranium-235, and uranium-238. The majority of uranium found in geologic formations is uranium-238. Uranium is mainly used for producing nuclear weapons and as a fuel in nuclear power plants. As uranium decays, it releases gamma radiation that can penetrate the body.<sup>24</sup> Rainfall allows uranium-containing soil to travel into rivers and lakes. Mining, milling, and manufacturing activities release uranium into the environment primarily through ground water.<sup>25</sup> Uranium enters the body via ingestion, inhalation, or through cuts in the skin. EPA has established a Maximum Contaminant Level (MCL) for uranium in drinking water at 30 micrograms/L, and 30 picocuries per Liter (pCi/L) for uranium-234 and 238 at mill tailing sites in order to protect ground water.<sup>26</sup> When uranium is mined, it forms sand (mill tailings) that contains thorium and radium. Approximately 350 inactive and abandoned mines exist in Arizona. There are two inactive mill sites on the Navajo reservation. Combined exposure to uranium from weapons testing fallout, uranium mines and mills, radiation from consumer products, and nuclear power plants would result in an estimated 15 cancer deaths in Arizona each year.<sup>27</sup> However, ACERP notes that this estimate relied on risk from high dose exposure.

Uranium mining has been associated with lung cancer risk since the 1930s.<sup>28</sup> Uranium mining sites were located in towns either on or near Navajo Nation

land in Arizona including Cove, Tuba City, and Page.

In 1950, the U.S. Public Health Service began a study of uranium miners in the Colorado Plateau in an effort to investigate any possible link between uranium mining and increased risk of lung cancer due to results from studies conducted in Europe on miners and radiation exposure.<sup>29,30</sup> The U.S. study failed to inform miners of the risks being investigated, which violated the Nuremberg Code.<sup>31</sup>

In the Navajo cohort of the aforementioned study, the death rate from lung cancer was equivalent to the death rate from non-malignant respiratory diseases (includes tuberculosis, pneumonia, emphysema, silicosis).<sup>32</sup> In the early 1960s, the first cases of lung cancer began surfacing in Navajo uranium miners.<sup>33</sup> A study of Navajo miners in 2000 reported that there were 94 lung cancer deaths documented from 1969-1993, 63 of these individuals were uranium miners, and concluded that uranium miners had a relative risk of 28.6 for lung cancer compared to controls.<sup>34</sup> Over the last 50 years, uranium mining and lung cancer risk has been the topic of occupational health studies, environmental risk reports, and social justice movements that have resulted in the passage of federal legislation to compensate families and individuals affected by uranium exposure. ACERP estimates that 305 of 7,468 Arizona cancer deaths in 1993 were occupationally related.<sup>35</sup> Although legislation was passed in 1990 and again in 2000 to compensate families of Navajo miners

who died from lung cancer, many families were provided no compensation. Advocates continue to voice their concerns with respect to worker's rights, social justice, and uranium's health consequences on future generations living on or near abandoned mining sites.

## UV Exposure

The sun is an integral part of Arizona's natural habitat, environment, and livelihood. Sun exposure is possible 365 days out of the year in Arizona, which makes exposure to the sun unavoidable to some extent. Therefore, UV exposure is included in both the prevention and environmental chapters of the cancer plan. Excessive exposure to ultraviolet (UV) radiation from the sun or via artificial means (indoor tanning) without the practice of skin protection causes the majority of skin cancers.<sup>36</sup> Australia experiences a high incidence of skin cancer where new cases of skin cancer are three times more likely than any other type of cancer diagnosis.<sup>37</sup>

Ultraviolet radiation from the sun consists of UVA, UVB, and UVC rays. UVB rays are responsible for the majority of tanning and burning of the skin and wavelengths in this category can initiate cell damage by affecting DNA and altering immune function in the body.<sup>38</sup> In the United States, UV exposure is associated with at least one million cases of basal and squamous cell carcinomas and over 52,000 cases of malignant melanoma each year.<sup>39</sup> Prolonged sun exposure not

only results in tanned skin, but can also lead to sunburn, premature aging of the skin, and wrinkles.

A Centers for Disease Control and Prevention (CDC) Study noted that 25% of parents did not require their children, 12 years old and younger, to practice sun protective behaviors, and that the percentage of children who took one or more sun protective measures decreased with age.<sup>40</sup> Prolonged sun exposure during childhood and adolescence substantially increases lifelong risk for skin cancer, especially melanoma.<sup>41</sup> Basal and squamous cell carcinomas account for about 40% of all cancer diagnoses.<sup>42</sup>

## Burden of Skin Cancer in Arizona

Between 1985-1996, age-adjusted incidence for basal and squamous cell carcinomas was 1302.8/100,000 in males and was 647.2/100,000 in females.<sup>43</sup> As illustrated in Figure 7.1, Arizona experiences a significantly higher skin cancer burden compared to other parts of the U.S. and Canada.

According to BRFSS, 32% of Arizona residents reported being sunburned within the past 12 months. The number of sunburns experienced within 12 months is described below: 29.9% reported being sunburned at least once; 25.9% reported being sunburned twice; and 17.1% reported being sunburned at least three times in the last 12 months. 13% of BRFSS respondents reported six or more occasions of sunburn in the past year. Between 1999-2001, the average annual incidence of melanoma was 17.8/100,000 in Arizona. The American Cancer Society estimates that approximately 1,180 cases of melanoma-specific skin cancers will

occur in 2004.<sup>44</sup> Promoting sun protective measures at the individual, community, and institutional level is imperative in order to reduce the risk of skin cancer among Arizonans. In Arizona, melanoma is the fifth most common type of cancer diagnosed in men and the seventh most common cancer in women. Approximately 120 Arizonans lose their lives to melanoma each year.

## Disparities

Age, gender, and race/ethnicity place some individuals at higher risk than others for acquiring melanoma. Individuals aged 55 years and older are at increased risk for melanoma in Arizona. Men are more likely to develop skin cancer than women. White, non-

Hispanic males and females suffer from the highest death rates from melanoma and have the highest melanoma incidence rates in the state.

## SunWise School Program

In January 2003, ADHS initiated the SunWise Program in elementary schools throughout the state. SunWise is a comprehensive environmental and health education program created by the Environmental Protection Agency (EPA) that offers children and their caregivers valuable information on how to protect themselves from overexposure to the sun. The program uses school-based, classroom-based, and community-based components in an effort to teach children the

**FIGURE 7.1** — Age-adjusted Skin Cancer Incidence (per 100,000) by Gender

	Men			Women		
	SCC	BCC	Melanoma	SCC	BCC	Melanoma
South Eastern Arizona <sup>1</sup>	295.3	1007.5	35.8	121.1	526.1	21.3
USA <sup>2,3</sup>	81	407	18.2	26	212	12.4
Canada <sup>4</sup>	31	120	10.9	17	92	11.7
Australia						
Total <sup>5</sup>	600	1773		228	629	
North Queensland <sup>6</sup>	1332	2058	49.1	755	1195	41.7

BCC- basal cell carcinoma; SCC- squamous cell carcinoma

**SOURCE:** Harris RB, Albert DS, Strategies for skin cancer prevention. The Internal Society of Dermatology. 2004; 43: 243-251.

<sup>1</sup> Harris R., Griffith K, Moon T. Trends in the incidence of non-melanoma skin cancers in Arizona, 1985-1996. *J Am Acad Dermatol* 2001; 45: 528-536.

<sup>2,3</sup> Miller D., Weinstock M. Non melanoma skin cancer in the United States: incidence. *J Am Acad Dermatol* 1994; 30: 774-778.

<sup>4</sup> CANQUES on the WEB. *Surveillance, Ed Results, Epidemiology, SEER Rates, 1992-1996.* <http://seer.cancer.gov/scientificsystems/canques>.

<sup>5</sup> Gallagher R., Ma B., McLean D., et al. Trends in basal cell carcinoma, squamous cell carcinoma, and melanoma of the skin, 1973-1987. *J Am Acad Dermatol* 1990; 23: 413-421.

<sup>6</sup> Staples M., Marks R., Giles G. Trends in the incidence of non melanocytic skin cancer (NMSC) treated in Australia 1985-1995: are primary prevention programs starting to have an effect? *Int J Cancer* 1998; 78: 144-148.

<sup>6</sup> Buettner P., Raasch B. Incidence rates of skin cancer in Townsville, Australia. *Int J Cancer* 1998; 78: 587-593.

importance of adopting sun-safe behaviors for life. Program activities include, but are not limited to teaching children about UV reporting and measurement via the Internet, cross-curricular classroom lessons, teachers and student surveys, hands-on, school-based activities, promotion of community partnerships (assemblies, guest speakers, contests), and evaluation of the program.<sup>25</sup>

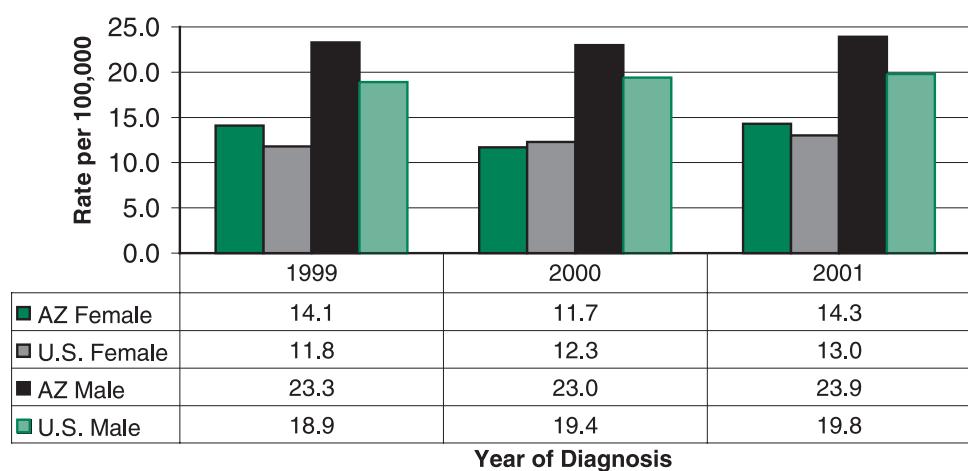
The SunWise Program provides health education materials, classroom instruction curricula, and also encourages schools to provide a sun-safe infrastructure that includes shade structures and the use of sun protective measures such as hats, sunglasses, and sunscreen while children play outdoors. One of the primary partners of the SunWise Program is the SHADE Foundation, which was created in 2002 by Shonda Schilling, wife of former Arizona

Diamondback pitcher Curt Schilling. The SHADE Foundation's primary goal is to educate kids and the community about the importance of incorporating sun-safe behavior as well as educating people about the prevention and early detection of melanoma. The American Cancer Society 2015 nationwide objective with respect to skin cancer is: To increase to 75% the proportion of people of all ages who use at least two or more of the following protective measures: avoid sun between 10:00 a.m. and 4:00 p.m.; wear sun-protective clothing when exposed to sunlight; use sunscreen with SPF 15 or higher; avoid use of tanning booths, tanning beds, or sun lamps.<sup>45</sup>

## Sun Safety

**Objective 1.1:** Increase the number of Arizonans who regularly use effective sun protection by 2010.

**FIGURE 7.2** U.S.\* and Arizona Age-Adjusted Incidence Rates of Melanoma Cancer by Gender, 1999-2001



\*CDC National Program of Cancer Registries

*Baseline: BRFSS 2003*

32% of Arizona residents reported being sunburned within the past 12 months.

29.9% reported being sunburned at least once; 25.9% reported being sunburned twice; and 17.1% reported being sunburned at least three times in the last 12 months. 13% of respondents reported six or more occasions of being sunburned in the past year.

*BRFSS data:* One Burn: 29.9%; Two Burns: 25.9%; Three Burns: 17.1%; Four Burns: 6.7%; Five Burns: 7.3%; Six Plus Burns: 13.0%.

*Strategies:*

1. Increase the number of community-wide educational efforts that emphasize the importance of adopting sun safe behaviors in order to reduce the risks of skin cancer. The following are common sun safe measures:
  - Avoid the sun between 10:00 a.m. and 4:00 p.m.
  - Wear sun protective clothing including hats and sunglasses when exposed to sunlight.
  - Use sunscreen SPF 15 or higher.
  - Avoid artificial sources of UV light (sunlamps, tanning beds).

*Activities:*

- a. Implement an effective media and public service campaign that promotes sun safety practices.
- b. Create statewide partnerships to further sun safety education and practice among children and adults including activities that promote sun safe behavior at school, home, and recreational settings.
- c. Expand and fund new school-based education programs to encompass a comprehensive healthy lifestyle education component that addresses

tobacco, physical activity, nutrition, and sun safety.

- d. Expand number of worksites that provide sunscreen and information.
  - e. Reduce the number of people using tanning booths through a health education campaign.
2. Create shade in areas and for populations most susceptible to prolonged sun exposure.
    - a. Increase shade on playgrounds, schools, and daycare centers.
    - b. Increase sun protection measures at worksites.
    - c. Increase sun protection for outdoor workers such as those working within the parks and recreation, construction fields, and farming.
    - d. Increase the number of bus stops with shade protection.

*Data source:* To be determined.

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A black and white photograph of a woman from the waist up, standing against a dark background. She is wearing a dark blazer over a light-colored top. She is holding a large paper grocery bag filled with various items, including a bunch of flowers, a bottle of water, and some packaged food. Her hands are visible as she holds the bag. She has dark hair and is looking slightly to her right with a neutral expression.

G

# GLOSSARY OF TERMS

**Definitions that appear in this glossary come from the following sources:**

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*Please note: The Quality of Life Committee created their own glossary of terms, which is included within the body of this document.*

**Abdomen:** The part of the body that contains the pancreas, stomach, intestines, liver, gall bladder, and other organs.

**Accuracy:** The degree to which a test measures the true value of the attribute it is testing.

**Adiposity:** The quality or state of being fat: obesity.

**Adjuvant Therapy:** Chemotherapy drugs (including hormones) given after surgery or radiation or both to help prevent the cancer from coming back.

**Age-adjusted Mortality Rate:** A standardizing procedure for rates or measures of association in which the effects of differences in composition for variable(s) among populations being compared have been removed by mathematical procedures. Most often, adjustment is performed on rates. Age is the variable for which adjustment is most often carried out.

**Ambulatory Care:** The use of outpatient facilities—doctors' offices, home care, outpatient hospital clinics, and day-care facilities—to provide medical care without the need for hospitalization. Often refers to any care outside of the hospital.

**Asbestos:** A natural material made up of tiny fibers. If the fibers are inhaled, they can lodge in the lungs and lead to cancer.

**Asymptomatic:** Presenting no signs or symptoms of disease.

**Baseline:** An initial or known value (e.g., Body Mass Index) to which later measurements can be compared.

**Basic Research:** Molecular or cellular level studies.

**Benign:** Non-cancerous tumor.

**Bias:** In general, any factor that distorts the true nature of an event or observation. In clinical investigations, a bias is any systematic factor other than the intervention of interest that affects the magnitude (i.e., tends to increase or decrease) an observed difference in the outcomes of a treatment group and a control group.

**Biopsy:** The removal and microscopic examination of tissue from the living body in order to establish a precise diagnosis.

**Body Mass Index (BMI):** Weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ), and offers an easily obtainable quantification of the relationship between height and weight.

**Bone Marrow:** The soft, spongy tissue in the center of large bones that produces white and red blood cells, and platelets.

**BRCA1:** A gene located on the chromosome 17 that normally helps to restrain cell growth. Inheriting an altered version of BRCA1 predisposes an individual to breast, ovary, and prostate cancer. When this gene is damaged or mutated, a woman is at greater risk of developing breast and/or ovarian cancer compared to women without this mutation.

**BRCA2:** Mutation of this gene, located on chromosome 13, is associated with an increased risk of breast cancer.

**Cancer:** A general term for more than 100 diseases that are characterized by uncontrolled, abnormal growth of cells. Cancer cells can spread locally or through the blood stream and lymphatic system to other parts of the body. All cancers have the capacity to move and form secondary tumors at other sites in the body.

**Carcinogen:** Any substance that is known to cause cancer.

**Carcinoma in situ:** An early stage of development, when the cancer is still confined to one layer of tissue. Cancers diagnosed at this stage are highly curable.

**Case-control Study:** The comparison of individuals with a certain illness (cases) to similar healthy individuals (controls), matched by age, sex, or other factors in order to define risk factors for the illness.

**Cell:** The basic unit of any living organism.

**Cervix:** The lower, narrow end of the uterus that forms a canal between the uterus and vagina.

**Chemoprevention:** The use of natural or laboratory made substances to prevent cancer.

**Chemoprophylaxis:** Drug treatment designed to prevent future occurrences of disease.

**Chemotherapy:** The treatment of disease by means of chemicals that have a specific toxic effect upon the disease producing microorganisms (antibiotics) or that selectively destroy cancerous tissue (anticancer therapy).

**Chromosomes:** Threadlike bodies that carry genetic information. They are found in the nucleus, or center part, of a cell.

**Clinical Trials:** Studies that compare a well-known, or standard treatment with a newly developed treatment. Clinical trials are usually done in three phases. Phase I tests the safety of the treatment on a small number of patients. Phase II assesses the effectiveness of the treatment and usually involves a larger group of people. Phase III provides in-depth information about the effectiveness and safety, by comparing experimental treatment with the standard protocol. Phase III trials generally involve thousands of patients nationwide. Randomized clinical trials, considered the “gold standard” of scientific research, involve study participants who are randomly assigned to different treatment groups and then compared.

**Colon:** The long, coiled, tubelike organ that removes water from digested food. The remaining material, solid waste called stool, moves through the colon to the rectum and leaves the body through the anus.

**Colonoscopy:** An endoscopic (fiberoptic) examination of the large intestine (colon).

**Colorectal:** Related to the colon and/or rectum.

**Community:** The domain of people having current or potential in a defined region.

**Complementary/ and Complementary Alternative Medicine (as defined by the National Center for Alternative Medicine):** A group of diverse medical health care systems, products and practices that are not presently considered to be a part of conventional medicine (Complementary medicine: practiced in conjunction with conventional medicine. Alternative medicine: replaces conventional medicine).

**Computed Tomography:** A special radiographic technique that uses a computer to assimilate multiple x-ray images into a two-dimensional, cross-sectional image. This can reveal many soft-tissue structures not shown by conventional radiography.

**Cytological Screening:** Examination of cells for changes indicative of a disease or risk of disease, for example, Papanicolaou (Pap) test.

**Demography:** The study of populations, especially with reference to size and density, fertility, mortality, growth, age distribution, migration, and vital statistics, and the interaction of all of these with social and economic conditions.

**Diagnosis:** The process of identifying a disease by the signs and symptoms.

**Digital Rectal Exam (DRE):** An exam to detect cancer. A health care provider inserts a lubricated, gloved finger into the rectum and feels for abnormal areas.



**DNA (deoxyribonucleic acid):** The substance of heredity and genetic material of all cells and many viruses that is a polymer of nucleotides. The monomer consists of phosphorylated 2-deoxyribose N-glycosidically linked to one of four bases: adenine, cytosine, guanine, or thymine. The sequence of these bases encodes genetic information.

**Dose-response:** The relation between the dose of a drug or other chemical and the degree of response it produces, as measured by the percentage of the exposed population showing a defined, often quantal, effect.

**Dysplasia:** Abnormal pathological development of cells indicating possibility of malignancy.

**Early Survivorship (ES):** The first stage of the survivorship continuum involving the first years; comprised of two phases: acute and extended

**End of Life:** The final stage of survival as a patient approaches death.

**Environmental Tobacco Smoke (ETS):** Smoke that comes from the burning end of a cigarette and smoke that is inhaled by smokers. Also called second-hand smoke. Inhalng ETS is called involuntarily or passive smoking.

**Epidemiology:** The study of disease incidence and distribution in populations, as well as the relationship between environment and disease. Cancer epidemiology is the study of cancer incidence and distribution in the population and of how physical surroundings, occupational hazards, and personal habits such as tobacco use and diet may contribute to the development of cancer.

**Esophagus:** Muscular tube through which food passes from the throat to the stomach.

**Exercise:** A subset of physical activity that is planned, structured, and repetitive.

**Family:** A group of people who have established an ongoing relationship and commitment through marriage, legal or living arrangements.

**Fecal Occult Blood Test (FOBT):** A test to check for small amounts of hidden blood in the stool.

**Fiber:** The parts of fruits and vegetables that cannot be digested. Also called bulk or roughage.

**Five-year Survival:** A term commonly used as the statistical basis for successful treatment. A patient with cancer is generally considered cured after five or more years without disease recurrence.

**Genetic:** Inherited; having to do with information that is passed from parents to children through DNA in the genes.

**Grade:** A system for classifying cancer cells in terms of how abnormal they appear under a microscope. The grading system provides information about the probable growth rate of the tumor and its tendency to spread. The systems used to grade tumors vary with each type of cancer. Grading plays a role in treatment decisions.

**Hospice Care:** Quality and compassionate care which incorporates a team-oriented approach to medical care, pain management, and emotional and spiritual support tailored to the needs and wishes of a patient facing life-limiting illness or injury.

**Human Papillomavirus (HPV):** More than 100 types of viruses that cause various human warts (as the common warts of the extremities, plantar warts, and genital warts) including some associated with the production of cancer. More than 30 of these papillomaviruses are sexually transmitted and high-risk HPV include types: 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, and 69. HPVs are now recognized as the major cause of cervical cancer.

**Incidence:** The number of new cases of a disease that occur in a population per unit of time. Cancer incidence is the number of new cases of cancer diagnosed each year. Incidence rate is the number of new cases of cancer diagnosed in one year per 100,000 persons in the population. Cancer incidence data in Arizona are maintained by the Arizona Cancer Registry within the Arizona Department of Health Services.

**In situ:** In place; localized and confined to one area.

**Invasive Cancer:** Cancer that has spread beyond the layer of tissue in which it developed. Invasive breast cancer is also called infiltrating cancer or infiltrating carcinoma.

**Magnetic Resonance Imaging (MRI):** An imaging method that uses magnetic fields, radio waves, and a computer to produce a detailed cross-sectional picture of the inside of the body.

**Malignant:** Cancerous.

**Mammogram:** An x-ray of the breast.

**Managed Care:** Any system that manages health care delivery to control costs.

**Melanoma:** Cancer of the cells that produce pigment in the skin. Melanoma usually begins in a mole.

**Metastasis:** The spread of cancer cells to new areas of the body.

**Morbidity:** A diseased condition or state, the incidence of a disease or of all diseases in a population.

**Mortality rate:** Expresses the number of deaths in a unit of population within a prescribed time and may be expressed as crude death rates or as death rates specific for diseases, and, sometimes for age, sex, and other attributes. The numerator is the number of persons dying; the denominator is the total population (usually the mid-year population) in which the deaths occurred. To produce a rate that is a manageable whole number, the fraction is usually multiplied by 1,000 to produce a rate per 1,000, which is called a crude death rate.

**Mutations:** Changes in the way cells function or develop, caused by an inherited genetic defect or an environmental exposure. Such changes may lead to cancer.

**Nulliparity:** Condition of not having given birth to a child.

**Odds Ratio:** A comparison of the presence of a risk factor for disease in a sample of diseased subjects and non-diseased controls.

**Oncology:** The study of diseases that cause cancer.

**Ovaries:** The pair of female reproductive glands in which the ova, or eggs, are formed. The ovaries are located in the lower abdomen, one on each side of the uterus.

**Palliative Care:** Active and compassionate care of chronically and terminally ill patients with an emphasis on the control of pain and symptoms; incorporates an

effort to fulfill physical, emotional, spiritual, social, and cultural needs.

**Pap Smear:** A cytological test developed by the late George N. Papanicolaou for the detection of cervical cancer and changes in the cervix that may lead to cancer.

**Physical Activity:** Any bodily movement produced by skeletal muscles that results in energy expenditure.

**Precancerous:** A term used to describe a condition that may or is likely to become cancer.

**Prevalence:** The number of cases of a disease that are present in a population at a point in time. For example, in the case of smoking prevalence in a population, prevalence is the number of people in that population who are regular smokers.

**Primary Prevention:** Preventing or reducing risks of developing a disease, done through promotion of individual behavior change or at the system level through policy changes. Refraining from tobacco use to prevent lung cancer or utilizing sex education and condom use to reduce sexually transmitted infections, vaccinations, and providing fluoridated water to the public to prevent tooth decay are examples of primary prevention.

**Prostate-Specific Antigen (PSA) Test:** Used to screen for prostate cancer and to monitor treatment by measuring the amount of PSA in the blood. PSA is a protein produced in the bloodstream.

**Quality of Life:** A sense of well-being that is subjectively measured by the enjoyment of the individual affected by cancer and her/his perception of how well

she/he deals with the disease in making meaningful decisions that fulfill emotional, physical, spiritual and social needs.

**Radon:** A radioactive gas that is released by uranium, a substance found in soil and rock. When too much radon is breathed in, it can damage lung cells and lead to lung cancer.

**Rectum:** The 8-10 inches of the large intestine. The rectum stores solid waste until it leaves the body through the anus.

**Reliability:** The consistency of the result when a test is repeated.

**Remission:** The partial or complete disappearance of signs and symptoms of disease.

**Risk Factor:** Something that may increase a person's chances of developing a disease. Some examples are age, obesity, tobacco use, and genetic predisposition.

**Screening:** Early detection of cancer or premalignant disease in persons without signs or symptoms suggestive of the target condition (the type of cancer that the test seeks to detect).

**Secondary Prevention:** Involves identifying disease as early as possible, often before symptoms develop, and treating the disease immediately thereafter. Two examples are mammography for detecting breast cancer or Pap tests for detecting cervical cancer.

**Sensitivity:** The proportion of truly diseased persons in the screened population who are identified as diseased by the screening test. Sensitivity is a measure of the

probability of correctly diagnosing a case, or the probability that any given case will be identified by the test (also called true positive rate).

**Sigmoidoscopy:** A procedure in which a physician or health care provider looks inside the rectum and the lower part of the colon (sigmoid colon) through a flexible lighted tube. The physician may collect samples of tissue or cells for closer examination (also called proctosigmoidoscopy).

**Specificity:** The proportion of persons without disease who correctly test negative. It is a measure of the probability of correctly identifying a non-diseased person with a screening test (also called the true negative rate).

**Spiral Computed Tomography (CT):** A detailed cross-sectional picture of areas inside the body. The images are created by a computer linked to an X-ray machine that scans the body in a spiral path. Also called helical computed tomography.

**Squamous Cells:** Flat cells that look like fish scales; these cells make up most of the epidermis or surface of the skin, the lining of hollow organs, and the digestive and respiratory tract passages.

**Stage:** A distinct phase in the course of a disease. Stages of cancer are typically defined by containment or spread of the tumor: in situ, localized, regional, or distant spread.

**In situ Cancer:** Early stage of cancer that has not penetrated the membrane surrounding the tissue of origin.

**Localized Cancer:** Cancer is confined to the organ of origin.

**Regional Cancer:** Cancer that has extended beyond the primary organ to nearby organs or tissues, or has spread via the lymphatics to regional lymph nodes or both.

**Distant Cancer:** Cancer that has spread from the primary organ to distant organs or distant lymph nodes.

**Stages of Survival:** The different phases of life after a cancer diagnosis (acute, extended, permanent, end of life).

**Acute Stage of Survival:** From diagnosis through initial treatment

**Extended Stage:** An intermediate phase of survival lasting somewhere between 2-5 years after initial treatment. Sometimes described as watchful waiting or remission.

**Permanent Stage:** Long-term survival of 5 years and beyond. Equivalent to cure or sustained remission.

**Surveillance:** Close and continuous observation, screening, and testing of those at risk for a disease.

**Survival:** Average period of time from diagnosis to death.

**Survivorship:** (as defined by the National Coalition for Cancer Survivorship (NCCS) and the Office of Cancer Survivorship at NCI):

The experience of living with, through, or beyond cancer; a continual, ongoing process that begins at the moment of diagnosis and continues for the remainder of life; composed of stages or phases of survival.

**Target:** The goal measure intended to be attained.

**Tertiary Prevention:** Delaying disease progression and providing appropriate supportive and rehabilitative services to minimize morbidity and maximize quality of life, such as rehabilitation from injuries. It includes preventing secondary complications.

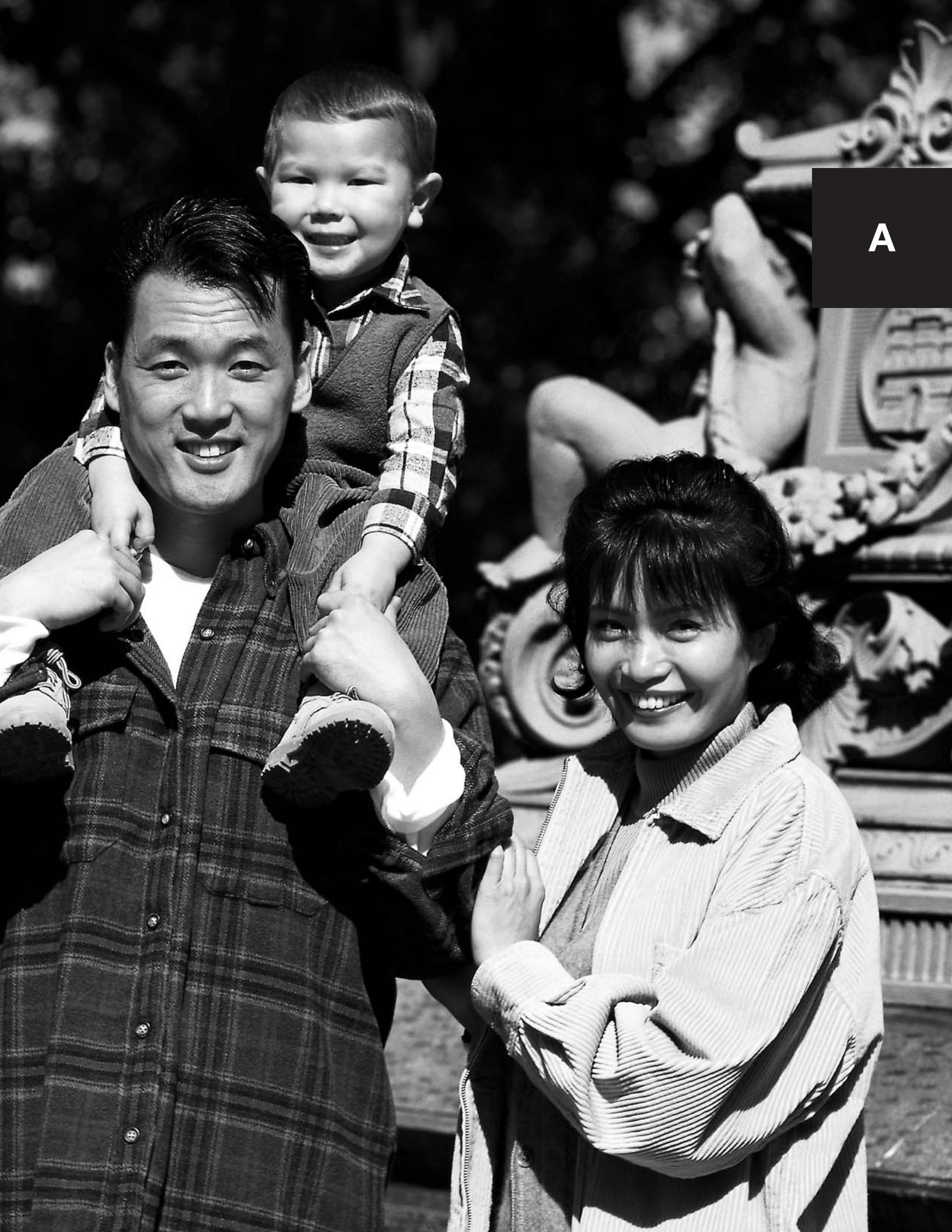
**Tissue:** A group or layer of cells that together perform a specific function.

**Translational Research:** The research needed to move the fruits of research into provider and community practice; also described as moving from lab bench to bedside.

**Tumor:** An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive, also called a neoplasm. Tumors perform no useful body function. They may either be benign (not cancerous) or malignant.

**Ultrasound:** Ultrasound uses high frequency sound waves and their echoes to create a picture of the interior of the body. A microphone-like instrument called a transducer that emits and receives sound waves is passed over the part of the body being examined. The echo patterns are converted by a computer to an image that is viewed on a monitor.

**Years of Potential Life Lost:** The number of potential years of life lost by each cancer death occurring before age 75.



A

# APPENDICES

## **APPENDIX A: Arizona State and National Cancer Data/Surveillance Resources**

### ***The Arizona Cancer Registry (ACR)***

The Arizona Cancer Registry (ACR) housed within the Arizona Department of Health Services is a population-based surveillance system that collects, manages, and analyzes information on the incidence, survival, and mortality of persons having been diagnosed with cancer. In 1988, legislation was passed which mandates the reporting of cancer cases in Arizona. Reporting rules require hospitals, clinics, and physicians to report cases to the ACR. The ACR receives funding from the Centers for Disease Control and Prevention (CDC) National Program of Central Registries (NPCR).

The Cancer Registry is comprised of three sections: Operations, Data, and Training. The Operations section processes incoming case information, assists hospital registries, and performs quality control activities on data collected, to ensure complete and accurate reporting of cancer incidence in the state. The Data section analyzes the incidence, mortality, and survival of people diagnosed with cancer in Arizona. It provides this data to cancer support organizations and

government agencies as well as to researchers, members of the medical community, and the public. The Training section plans and administers a statewide training program for registry staff, reporting facilities including hospital and clinic personnel, and physicians and their staff.

### ***Behavioral Risk Factor Surveillance System (BRFSS)***

The Arizona Behavioral Risk Factor Surveillance System (BRFSS), initiated in 1984, is a federally funded (CDC) telephone survey conducted on a monthly basis of 3,200 randomly selected adult Arizonans to collect data on lifestyle risk factors contributing to the leading causes of death and chronic diseases. Since BRFSS is used nationwide, comparisons can be made to other states as well as the national average. The Arizona BRFSS Annual Report periodically publishes yearly Arizona BRFSS data to provide timely and in depth analysis of chronic disease risk factors. Participants are asked about behavioral topics such as physical activity, nutrition, overweight and obesity, sun safety practices, tobacco use, and cancer early detection/screening as part of the BRFSS.

### **Youth Risk Behavior Survey (YRBS)**

In 1990, the Youth Risk Behavior Survey (YRBS) was developed to monitor priority health risk behaviors that contribute to the leading causes of death, disability, and social problems among youth and adults in the United States. In 2003, the survey was implemented for the first time in Arizona. These behaviors, often established during childhood and early adolescence, include: tobacco use, unhealthy dietary behaviors, inadequate physical activity, alcohol and other drug use, sexual behaviors that contribute to unintended pregnancy and sexually transmitted infections, including HIV infection, and behaviors that contribute to unintentional injuries and violence. The YRBS includes national, state, and local school-based surveys of representative samples of students enrolled in grades 9-12. These surveys are conducted every two years, usually during the spring semester. The national survey, conducted by the Centers for Disease Control and Prevention, provides data representative of high school students in public and private schools throughout the United States. The state and local surveys, conducted by Departments of Health and Education, provide data representative of the state or local school district. In Arizona the survey is administered through the Department of Education.

### **The Surveillance, Epidemiology, and End Results (SEER) Program**

The Surveillance, Epidemiology, and End Results (SEER) Program housed within the National Cancer Institute provides information on cancer incidence and survival in the United States. Since 1973, SEER has been collecting data on cancer cases. The SEER program currently collects and publishes cancer incidence and survival data from 14 population-based cancer registries and three supplemental registries covering approximately 26% of the U.S. population. Information on more than 3 million in situ and invasive cancer cases is included in the SEER database and approximately 170,000 new cases are added each year within the SEER coverage areas. The SEER Registries routinely collect data on patient demographics, primary tumor site, morphology, stage at diagnosis, first course of treatment, and follow-up for vital status. The SEER program is the only comprehensive source of population-based information in the United States that includes stage of cancer at the time of diagnosis and survival rates within each stage. The mortality data reported by SEER are provided by the National Center for Health Statistics.

## APPENDIX B: Health People 2010

Centers for Disease Control and Prevention, National Institutes of Health

### Healthy People 2010, Chapter 3: Cancer

**Goal:** Reduce the number of new cancer cases as well as the illness, disability, and death caused by cancer.

#### HP 2010 Cancer Objectives:

- 3-1: Reduce the overall cancer death rate.
- 3-2: Reduce the lung cancer death rate.
- 3-3: Reduce the breast cancer death rate.
- 3-4: Reduce the death rate from cancer of the uterine cervix.
- 3-5: Reduce the colorectal death rate.
- 3-6: Reduce the oropharyngeal cancer death rate.
- 3-7: Reduce the prostate cancer death rate.
- 3-8: Reduce the rate of melanoma cancer deaths.
- 3-9: Increase the proportion of persons who use at least one of the following protective measures that may reduce the risk of skin cancer: Avoid the sun between 10 a.m. and 4 p.m., wear sun-protective clothing when exposed to sunlight, use sunscreen with a sun-protective factor (SPF) of 15 or higher, and avoid artificial sources of

ultraviolet light.

- 3-10: Increase the proportion of physicians and dentists who counsel their at-risk patients about tobacco use cessation, physical activity, and cancer screening.
- 3-11: Increase the proportion of women who receive a Pap test.
- 3-12: Increase the proportion of adults who receive a colorectal cancer screening examination.
- 3-13: Increase the proportion of women aged 40 years and older who have received a mammogram within the preceding two years.
- 3-14: Increase the number of states that have a statewide population-based cancer registry that captures case information on at least 95% of the expected number of reportable cancers.
- 3-15: Increase the proportion of cancer survivors who are living 5 years or longer after diagnosis.

#### Related Chapters:

- 19- Nutrition and Overweight
- 21- Oral Health
- 27- Tobacco Use

For more information, please see the Healthy People 2010 Cancer Chapter at the link below: [www.healthypeople.gov/document/html/volume1/03Cancer.htm#\\_Toc490540738](http://www.healthypeople.gov/document/html/volume1/03Cancer.htm#_Toc490540738)



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## APPENDIX C

### Arizona Organizations Involved in Cancer Research

Please note: This is by no means an exhaustive list of organizations involved in cancer research, but is included as a resource provided by the AZ CCC Coalition Research Committee.

Arizona Cancer Center (ACC) (of U of A)  
[www.azcc.arizona.edu](http://www.azcc.arizona.edu)

American Cancer Society  
[www.cancer.org](http://www.cancer.org)

Arizona Department of Health Services (ADHS)  
[www.azdhs.gov](http://www.azdhs.gov)

Arizona Research Center  
[www.azresearchcenter.com](http://www.azresearchcenter.com)

Arizona State University (ASU)  
[www.asu.edu](http://www.asu.edu)

Banner Health System  
[www.bannerhealth.com](http://www.bannerhealth.com)

Barrow Neurological Institute (of St. Joseph's)  
[www.thebni.com](http://www.thebni.com)

Bio5 (of U of A)  
<http://bio5.org/>

Biodesign Institute (of ASU)  
[www.biodesign.org](http://www.biodesign.org)

Cancer Center of Northern Arizona (CCNA)  
[www.nahealth.com/pp\\_fmc/dept\\_services/ccna/ccna\\_home.htm](http://www.nahealth.com/pp_fmc/dept_services/ccna/ccna_home.htm)

Children's Oncology Group  
[www.childrensoncologygroup.org](http://www.childrensoncologygroup.org)

Community Clinical Oncology Program (CCOP)  
(Western Regional)  
[www.greaterphoenixccop.com](http://www.greaterphoenixccop.com)

Mayo Clinic-Scottsdale  
[www.mayoclinic.org/scottsdale](http://www.mayoclinic.org/scottsdale)

Northern Arizona University (NAU)  
[www.nau.edu](http://www.nau.edu)

Phoenix Children's Hospital  
[www.phxchildrens.com](http://www.phxchildrens.com)

Scottsdale Healthcare  
[www.shc.org](http://www.shc.org)

St. Joseph's Hospital and Medical Center  
[www.ichosestjoes.com](http://www.ichosestjoes.com)

Sun Health Research Institute  
[www.shri.org](http://www.shri.org)

Translational Genomics Research Institute (TGen)  
[www.tgen.org](http://www.tgen.org)

University of Arizona (U of A)  
[www.arizona.edu](http://www.arizona.edu)

VA Medical Center  
[www.azvfw.org](http://www.azvfw.org)

Virginia C. Piper Cancer Center  
(of Scottsdale Healthcare)  
[www.shc.org](http://www.shc.org)



## APPENDIX D

### Arizona Comprehensive Cancer Control Coalition

#### Special Topic: Research Organizations

\* Please note: This is more in-depth information on just a few of the cancer research organizations. This is not representative of all the research that is taking place in Arizona.

##### The Arizona Cancer Center

The Arizona Cancer Center is a National Cancer Institute-designated Comprehensive Cancer Center within the University of Arizona. The Center's research programs are divided into six programmatic areas: therapeutic development, cancer imaging and technology, cancer metastasis and signaling, cancer prevention and control, gastrointestinal cancer, and molecular genetics. Although a great deal of important research is ongoing, some brief highlights of the research currently being conducted at the Arizona Cancer Center (AZCC) are described below.

Chemoprevention is a primary focus within the AZCC's Cancer Prevention and Control (CPC) Program, with over 10,000 participants at increased risk of breast, cervix, colon, prostate and skin cancer having been enrolled to research trials over the past five years. Among the currently active trials, a large phase III chemoprevention trial of selenium, a dietary supplement, is evaluating if this nutrient is able to reduce adenoma recurrence. Other chemoprevention trials focus on skin cancer. Arizona has the highest rate of skin cancer in the United States. The Arizona Cancer Center conducts skin cancer screening for area residents (squamous and basal cell carcinomas, actinic

keratoses, nevi) regularly. Individuals who are identified to be at high risk of developing skin cancer may qualify for one of the skin cancer chemoprevention studies.

Prostate cancer is an important concern of the AZCC. The prevention program is conducting a series of trials to evaluate ways to prevent prostate cancer. The first of these involves men with high-grade prostatic intraepithelial neoplasia (PIN), testing 200 mcg/day of selenium for its ability to decrease the risk of prostate cancer as the primary endpoint. The second will evaluate lower risk men who have a mildly elevated prostate specific antigen (PSA) level and who have had a biopsy negative for prostate cancer.

A third study evaluates men with biopsy-proven prostate cancer, comparing placebo to 200 and 800 mcg/day of selenium in the form of selenized yeast as a means of slowing the advance of prostate cancer. A fourth study involves men who have had a prostate biopsy positive for prostate cancer; these men will receive selenium between the time of biopsy and that of prostatectomy. In addition to prevention efforts, a large program project grant, funded by the National Cancer Institute, is currently investigating how the modification of the extracellular matrix (ECM) may play a functional role in the progression of prostate cancer. The research team funded by this grant is

working to understand how molecular changes in PIN may affect cancer growth. Through this knowledge, methods to prevent or slow the progression of cancer can begin to be identified.

Cancer screening is another theme of research within the Arizona Cancer Center. A recent study has been activated that is designed to evaluate new screening methods for women at increased genetic risk of ovarian cancer, supported by the Division of Cancer Prevention and the Gynecologic Oncology Group. Other ovarian cancer research is being conducted that evaluates karyometric analysis, a technique that evaluates nuclear abnormalities, as a potential method to be applied to screening technologies. The Hereditary Cancer Risk Database Project is funded by Phoenix Friends of the AZCC, local chapters of Phi Beta Psi, the Joan Cohen Memorial fund, and a grant from Better than Ever to screen, follow and refer those at genetic risk of certain cancers.

The Chronic Disease Screening Among Post-Reproductive Age Women at the U.S.-Mexico Border study prospectively evaluates the efficacy of different models for increasing participation in routine cancer screening programs. Telemedicine, a method to reach Arizona's rural and underserved populations, has long been an important focus of the Cancer Center's screening efforts. One ongoing project evaluates telecolposcopy to colposcopy, and evaluates feasibility issues, as a potential screening tool for rural communities. Juntos en la Salud is a 5-year behavioral and cancer screening project funded by the American Cancer Society, which aims to assess the effectiveness

of improving breast, cervical, and colorectal cancer screening rates and general lifestyle prevention behaviors among low-income Latinas through the development of social support groups with lay health educators.

Other cancer screening research projects include the BvD Study, which evaluates fecal DNA screening as a potential colorectal screening tool, work funded by the Centers for Disease Control and Prevention related to HPV screening among males, and a project related to human papillomavirus (HPV) immune response among males. These latter projects may lead to the development of vaccines to prevent cervical cancer.

The AZCC's Gastrointestinal (GI) Program is among the newest programs at the Center. The GI Program successfully obtained a Specialized Program of Research Excellence (SPORE) grant, which is one of only four such projects in the United States that is funded specifically to prevent and cure GI cancers (cancers of the pancreas, colon and esophagus). A cooperative exchange between laboratory and clinical scientists supports translational research, which means that it moves research from the laboratory bench to the patient's bedside. The GI SPORE approaches its goal of preventing and curing GI cancers by conducting studies in prevention, genetics, and therapeutics. There are five large projects being conducted through the GI SPORE, which also supports a large number of smaller pilot projects.

These projects include studies of genetic variability in precancerous lesions, the ablation of precancerous diagnoses, as well as other mechanistic and basic science projects to understand the biology and genetic changes that take place with GI cancer initiation and progression. These projects are all designed to comprehensively address both the identification of targets as well as the development of therapies for these cancers.

Drug development is an important theme of research, and is centralized in the Therapeutic Development program. This team of researchers has recently developed four molecularly-targeted agents to combat cancer growth. Three of these agents are now in clinical trials. In addition to identifying specific agents, these researchers are also working to identify factors that indicate if a tumor is responding to treatment before the tumor has a chance to grow. The molecular markers of tumor response under investigation include a variety of proteins and methods to label these proteins to determine if cancer cells are dying early in the chemotherapy treatment process.

In the Cancer Metastasis and Signaling program, basic research is being conducted to understand the tumor microenvironment and its effect on cancer metastasis. The environmental effects on cancer cell metastasis and signaling are extremely important, as these findings offer opportunities to interrupt or perhaps predict metastasis. Recent findings in this program range from understanding growth factor or androgen signaling, extracellular matrix signaling, adhesion receptors and down stream signaling pathways, epigenetic gene silencing, and the influence

of the bone microenvironment. Through these basic findings, this program is working to prevent the metastatic spread of cancer.

The Blood and Marrow Transplantation (BMT) Program of the AZCC is committed to developing and improving hematopoietic stem cell-based therapies for adults and children with neoplastic and non-neoplastic diseases. In addition to providing comprehensive, compassionate clinical care, the BMT program is building basic, translational and clinical research activities in stem cell biology, transplantation immunology and pharmacology. Integration of clinical BMT research protocols with those in hematological malignancies provides a "total therapy" approach for each patient.

Current research interests within the BMT Program include novel reduced-intensity preparative regimens for allogeneic BMT, unrelated umbilical cord blood cell transplantation in both adults and children, and the application of autologous T cell-depleted peripheral blood stem cell transplants for autoimmune disorders such as systemic sclerosis (scleroderma) and multiple sclerosis. The AZCC BMT Program is fully accredited by the Foundation for the Accreditation of Cellular Therapy (FACT), indicating that this program has met rigorous standards that assure the provision of quality medical and laboratory practice in hematopoietic stem cell collection, processing and transplantation.

## **Mayo Clinic Cancer Center**

Mayo Clinic is one of only 39 organizations in the United States that have earned the designation as a Comprehensive Cancer Center by the National Cancer Institute (NCI). This designation includes all three Mayo Clinic Cancer Center sites (Scottsdale, AZ; Rochester, MN; Jacksonville, FL). Under the guidelines to attain recognition from NCI as a Comprehensive Cancer Center, Mayo Clinic continues to demonstrate that it conducts worthy research in three major areas: (1) basic science research, (2) clinical research, and (3) cancer prevention, control and population-based research. In addition to having an integrated research program, the NCI recognized Mayo Clinic is an organization that provides outstanding clinical care and service for cancer patients, and offers extensive ancillary cancer-related activities such as outreach, education and information dissemination. Mayo Clinic Cancer Center is the only national, multi-site center with the NCI's Comprehensive Cancer Center designation.

Mayo Clinic is the only medical center in the Phoenix metropolitan area that holds the NCI designation of Comprehensive Cancer Center, and is one of only two NCI-designated cancer centers in the state of Arizona. The majority of Mayo Clinic Cancer Center's outpatient cancer care, cancer research, and cancer education activities in Arizona occur in facilities on Mayo Clinic's Scottsdale campus. When a cancer patient needs to be hospitalized or requires surgery, he or she will be admitted to Mayo Clinic Hospital and cared for by a team of Mayo Clinic physicians and

nurses. Current construction adjacent to the hospital on Mayo Clinic's Phoenix campus will significantly expand the scope of Mayo Clinic's outpatient radiation therapy services, and maximize the integration of other cancer disciplines (e.g., surgery, radiology, etc.).

The needs of cancer patients are typically complex, and very often require the expertise of physicians and scientists from numerous clinical and research disciplines as well as the latest technology such as PET-CT imaging and advanced surgical instruments. It is in this complex arena of patient care that the more than 300 physicians employed by Mayo Clinic in Arizona excel, and that Mayo Clinic's investment in the latest technology is maximized for the benefit of patients. Given its structure as an integrated, multi-specialty academic group practice of medicine, the team approach to care is a hallmark of Mayo Clinic. For example, when a cancer treatment causes a side effect which requires the expertise of a non-cancer physician such as a cardiologist or gastroenterologist, the Mayo Clinic cancer physician can quickly consult with one of his or her colleagues, and the cancer patient's needs are immediately addressed. Furthermore, if the side effect was a previously unknown phenomenon, Mayo Clinic cancer physicians can work with their scientist colleagues to seek ways to prevent or better manage such side effects in the future.

Collectively, Mayo Clinic's cancer physicians and scientists are dedicated to (1) providing comprehensive

care and treatment of cancer patients and improving cancer patients' quality of life; (2) understanding the biology of cancer; discovering new ways to predict, prevent, diagnose and treat cancer; (3) training the next generation of cancer providers and investigators, and (4) contributing to the body of knowledge and educational tools used by patients and their loved ones. Approximately 16,000 new cancer patients seek diagnoses and/or treatment at Mayo Clinic's three facilities each year.

In Arizona, Mayo Clinic physicians provide care to more than 2,200 new patients annually. At any given time, Mayo Clinic has approximately 200 cancer clinical trials open for enrollment. Those trials provide Mayo Clinic cancer patients with access to many of the newest, and hopefully most promising, cancer diagnosis tools, symptom control techniques, and cancer treatment options. Mayo Clinic's geographically diverse locations also provide broad insights into cancer patient care gained by the increased diversity of the populations served.

In Arizona, Mayo Clinic is working collaboratively with several Native American communities to support those communities' priorities relative to raising cancer awareness, providing cancer education, and facilitating access to cancer care among their members. In addition, beginning in late 2004, a Mayo Clinic physician who is board-certified in both medical oncology and hematology is now on-site at Phoenix Indian Medical Center (PIMC) one day per week to provide consultation and on-going care management services to PIMC cancer patients.

Mayo Clinic Cancer Center is striving to advance cancer research and cancer care, based on a thorough understanding of the biology of cancer, and studied application of the latest genomics research findings. Areas of focus include biologically-driven strategies for cancer prevention; technology-driven methods for early detection; more selective and less traumatic therapies; and the alleviation of pain and psychological distress caused by cancer.

Mayo Clinic in Arizona is assembling a renowned team of cancer physicians and investigators. Research activities include major basic science and translational studies in hematological malignancies (cancers of the blood and blood tissues), pancreatic cancer, and neuro-oncology (cancers of the brain and nervous system).

Mayo Clinic Cancer Center in Arizona will continue to grow substantially, in terms of both space and personnel via the recruitment of additional cancer scientists and cancer physicians who are committed to working together to translate scientific discoveries to the care of a patient. Collaborating with scientific partners, such as the Translational Genomics Research Institute (TGen), Arizona State University, and the University of Arizona, Mayo Clinic Cancer Center is committed to multiplying the resources available to Arizonans in the battle against some of the most aggressive and devastating cancers.

#### TGen

Founded in July 2002, the Translational Genomics Research Institute (TGen) is directed by Dr. Jeffrey

Trent, an internationally recognized scientist who envisioned an institute where many of the world's leading scientists and physicians would turn breakthroughs in genetic research into medical advances benefiting patients and their families. Prior to creating TGen, Dr. Trent was the Scientific Director of the National Human Genome Research Institute at the National Institutes of Health (NIH). Based in Phoenix, TGen, a private non-profit research institute, is one of the best-equipped labs for genomics research in the world. Many of the investigators who worked at the NIH with Dr. Trent, as well as other experts in various disciplines, joined him as part of this new biotech initiative in Arizona.

Working with collaborators in the scientific and medical communities, TGen believes it can make a substantial contribution to the efficiency and effectiveness of the translational process. TGen's vision is of a world where an understanding of genomic variation can be rapidly translated to the diagnosis and treatment of disease in a manner tailored to individual patients.

TGen has an end-to-end solution for making discoveries in cancer and other health conditions. TGen leverages information from the Human Genome Project and uses advanced high-throughput technology such as microarray analysis, SNP genotyping, RNA interference (RNAi), bioinformatics, and sequencing to identify genetic abnormalities associated with human

disease. TGen has also developed several unique "accelerators," such as the Molecular Profiling Institute (MPI), the Cancer Drug Development Laboratory (CDDL) and the Center for Translational Drug Development (TD2). These specialized laboratories help move scientific discoveries from the lab bench to the patient.

TGen has developed research programs for several types of cancer, including prostate cancer, breast cancer, melanoma, pancreatic cancer, brain cancer, colorectal cancer, and hematological malignancies. TGen focuses on various aspects of cancer research, including identifying genes associated with cancer, developing diagnostic tools, and developing drugs to combat the disease. The basis for much of this research is to identify the genetic differences between tumors and normal tissue, and explore genetic differences between individuals with and without cancer. These research studies often require the analysis of hundreds, if not thousands, of samples from large families with cancer, as well as sporadic cases. The data obtained from these studies is tremendous. TGen has partnered with ASU and IBM to acquire one of the most powerful supercomputers in the world, which allows TGen to perform analysis on the data to search for relevant genetic variations and genetic signatures between samples.

TGen is already making strides in cancer research. For example, by analyzing samples from numerous large families with prostate cancer, TGen researchers have identified a gene called EphB2 that is associated with the disease. TGen is currently collaborating to create diagnostics for and novel therapeutics against

this deadly disease. In breast cancer, TGen researchers are analyzing the genetic backgrounds of tumors to find a “genetic signature” which will allow physicians to know which tumors will likely progress to metastatic disease and which tumors will respond to therapy, even before the therapy begins. These are just a few examples of how TGen is making discoveries that will allow for earlier detection and improved treatments for cancer.

### **Western Regional Community Clinical Oncology Program**

The mission of the Western Regional Community Clinical Oncology Program (WRCCOP) is to provide state of the art clinical research to the community and its physicians in the treatment of cancer patients and healthy individuals who may be at risk for cancer.

WRCCOP is a non-profit, research organization dedicated to promoting high quality, state-of-the-art cancer treatment in Arizona and Colorado. We are funded by the National Cancer Institute (NCI), the largest branch of the National Institutes of Health. It is our intent to always set forth the highest standard for safety and welfare of our participants. Since 1983 our sole purpose is to understand the causes of cancer, its prevention and treatment. We support the community, local physicians and health care providers by providing information on new treatment options, cancer detection, and prevention.

The Community Clinical Oncology Program was established by the National Cancer Institute (NCI) in

1983 in response to oncologists, trained at large cancer institutes or teaching universities who began to practice in community settings. They wanted to continue to participate in cutting edge medical developments and knew that participation in clinical trials would be mutually beneficial for community physicians and their patients. Since then, CCOPs have become one of the foundation stones of the clinical trials network of the National Cancer Program.

Today the national CCOP program has accomplished the early goals of including community physicians in the research process. The program now includes 4,000 community physicians and 403 community-based hospitals spanning 34 states, the District of Columbia, and Puerto Rico.

Since 1983, more than 98,200 patients participated in treatment trials in addition to the over 77,765 who enrolled in prevention and control trials. Even still it is estimated that only 15% of Americans are aware of clinical trials and less than 5% actually participate in clinical trials.

CCOP not only transfers the latest research findings directly to the community through patient care, but also increases the number of patients and physicians who can participate in clinical trials developed at major research centers. By spreading a large research network through local physicians and hospitals, the program allows scientists to conduct large-scale cancer prevention and control studies that can determine more insight into disease processes and provide information to better combat cancers.

Western Regional Community Clinical Oncology

Program works closely with physicians and hospitals in Arizona and Colorado to provide appropriate cancer research protocols to meet individual needs.

WRCCOPs highly trained staff of registered oncology nurses and clinical research associates coordinate with physicians to provide the cancer patient with information, education, and research guidelines to help potential participants make informed decisions about participation in clinical trials.

WRCCOP physicians are volunteer researchers who provide the cancer patient with appropriate medical intervention to fight the disease. They are approved by the National Cancer Institute (NCI) and by the Food and Drug Administration (FDA) to administer the most advanced anti-cancer drugs and treatments available using clinical trials. Our main office is located at our flagship hospital Banner Good Samaritan Medical Center. For more information regarding clinical trials and those offered at WRCCOP, please visit our website [www.westernccop.com](http://www.westernccop.com) or call (602) 239-2413.

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## The Comprehensive Cancer Control Program

Arizona Department of Health Services

Division of Public Health

Office of Chronic Disease Prevention  
and Nutrition Services

