

# Cancer Among American Indians in New Mexico 2008-2013



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## PREFACE

Annually, state and tribal leaders meet at a two-day summit coordinated by the Indian Affairs Department in accordance with the State Tribal Collaboration Act passed into law in 2009. The first day is structured so that tribal leaders can meet personally with Cabinet Secretaries to share issues and to explore resources and solutions that each agency may be able to provide. At the 2014 summit, five tribal leaders shared concerns for increased cancers observed within their communities. A number of others reached out to the New Mexico Department of Health before and after the summit. As the Tribal Liaison for the Health Department, these requests have led to a strong partnership with the Epidemiology and Response Division tribal epidemiologist, the state cancer registry, and many other staff who have dedicated careers to address the kinds of concerns raised by tribal leaders.

What was clear from these conversations is that cancer always has the face of a loved one, a friend or a family. Cancer is the face of young and old. Cancer touches everyone in the community. Our response is to reach out to one another as all of us are involved in efforts to support its prevention and treatment. While we continue to learn more about cancer and factors that may help us to prevent its various forms, we, in the moment of its diagnosis, reach out to make sense of its presence in our lives.

In response to these concerns, our public health team has developed a protocol for cancer investigations that is shared with our pueblos, tribes and nations in the event that tribal leadership is interested in moving forward on such investigations. The science expressed as tables, frequency, leading cancers, age and race and gender in reports is in service to the larger expression of our humanity—the face of cancer known personally to us in our lives and prayers. The balance of this report are our efforts to have and enjoy better health, to ease the pain and sorrow endured, to triumph and live cancer-free, to each do our part in reducing the burden of diseases that are far too high among our native communities.

**Aiko Allen**  
**Tribal Liaison**  
**New Mexico Department of Health**

## ACKNOWLEDGEMENTS

We would like to thank the New Mexico Tumor Registry, New Mexico Cancer Concerns Workgroup, Navajo Nation Cancer Epidemiology Workgroup, New Mexico Department of Health Office of Tribal Liaison, and the New Mexico Department of Health Community Health Assessment Program for contributions to this report.

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## AMERICAN INDIAN HEALTH IN NEW MEXICO AND CANCER

New Mexico is a state with a large and diverse American Indian population. New Mexico is home to three Apache Nations, 19 Pueblos, part of the Navajo Nation, as well as a large American Indian population living in the urban areas of the state. American Indian health is a priority at the New Mexico Department of Health. Cancer is a leading cause of death among American Indians in New Mexico as well as all racial and ethnic groups in New Mexico and nationwide. This report is intended to be a resource for those interested in data on cancer and American Indians in New Mexico. This report is not intended to be an investigation into specific cancer cases or causes, but rather an epidemiological resource for those interested in statewide data on this topic.

Cancer is a disease that ranks among the top five leading causes of death for almost all racial and ethnic groups in the United States. In New Mexico, these statistics are no different. It is important to present data on cancer so that this disease can be better understood and prevented. Additionally, it is important to understand that cancer is actually many diseases with many possible causes, and thus the prevention and treatment of cancer is very complex. This report presents data describing some known risk factors for cancer, data on the incidence of the leading cancer sites in New Mexico, and data on cancer mortality in New Mexico for American Indians.

## DATA SOURCES

The data presented in this report come from several sources. Those sources are described here.

### Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is a national telephone based survey conducted annually to assess health and health behaviors within the United States. The BRFSS includes landlines and cell phones, and asks U.S. residents about chronic health conditions, health related behaviors and use of preventative services (CDC, n.d.). The cancer screening questions presented in this publication are part of the core BRFSS questionnaire, but are only asked of respondents in even-numbered years in New Mexico. The BRFSS is currently the only statewide survey to gather this type of data in New Mexico.

### Vital Records and Health Statistics

The mortality statistics in this report come from death certificates, which are collected in vital records registries at the state and national level. Data on mortality for New Mexico was provided by the New Mexico Department of Health Bureau of Vital Records and Health Statistics. National data were obtained from the Centers for Disease Control and Prevention (CDC) National Center for Health Statistics, CDC Wonder online database.

### Surveillance, Epidemiology and End Results (SEER) Program

The Surveillance, Epidemiology and End Results (SEER) Program is part of The National Cancer Institute's cancer statistics initiative to reduce the burden of cancer in the United States. SEER gathers reportable cancer information with active and passive surveillance. SEER\*stat, a free, web-based application available for producing statistical analysis on cancer data, was used for incidence and mortality rates in this report. There are no comparisons to national data for cancer incidence statistics in this report, as there are currently only 18 sites that contribute to the publicly available SEER data.

## DATA ANALYSIS AND LIMITATIONS

### Presentation of Data

This report presents data from 2008 to 2012 on cancer incidence and mortality. This time period was chosen because it represents the most current publically available data from the SEER program. For BRFSS data, the most current available year/set of years was used. BRFSS data on cancer risk behaviors were available from 2011-2013. BRFSS data on cancer screening were available for the year 2012.

For the purposes of this report, American Indian/Alaska Native (AIAN) peoples will be referred to as American Indian, Non-Hispanic Whites will be referred to as "White," Hispanic/Latino people of any race will be referred to as "Hispanic." Statewide and national estimates and rates are compared to these racial/ethnic groups. In figures, New Mexico state population totals are referred to as "New Mexico," and United States total population estimates will be referred to as "United States."

### Statistical Methods Used

Percentages and rates seen in this report were calculated using a process called age adjustment. This process was done to make populations with different age distributions comparable on the same scale (NMIBIS, n.d.). Data for behavioral risk factors, incidence and mortality presented in this report were age adjusted to the United States 2000 standard population. Data for screening were presented in crude (non-age-adjusted) rates.

A confidence interval is a parameter that is placed on a statistic (such as a rate or percentage). In general, as a population (or sample) size increases, the confidence interval gets smaller, indicating that the estimate is more stable. Conversely, wider confidence intervals indicate less stable estimates. Estimates calculated from small numbers will have wider confidence intervals (NMIBIS, n.d.).

### Limitations

The data presented in this report are statewide population level data about cancer in American Indians in New Mexico. This report does not present information on relationships between any specific risk factors and cancers. This report is intended to be a resource for those interested learning about and helping to prevent cancer in American Indians in New Mexico.

## REPORT HIGHLIGHTS

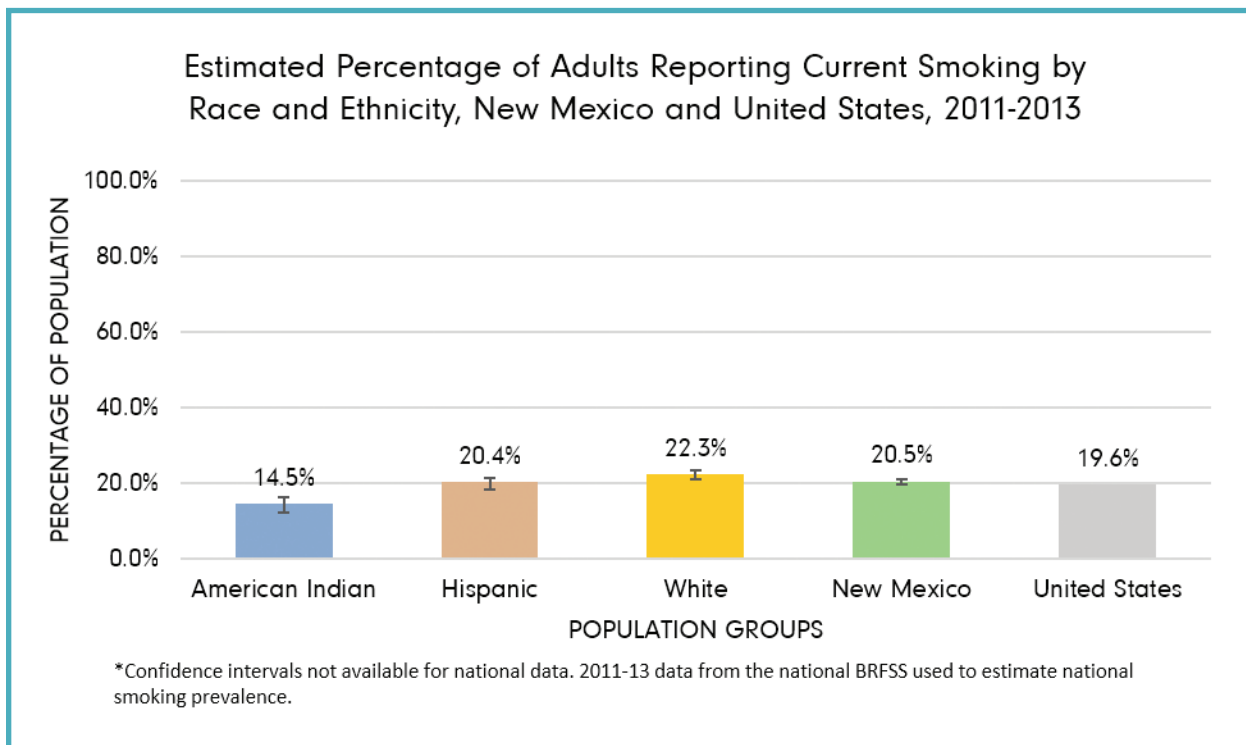
- From 2010 to 2013 a lower percentage (30-35% fewer) of American Indians in New Mexico reported tobacco use when compared to other racial/ethnic groups within the New Mexico BRFSS.
- From 2010 to 2013, 10% to 27% more American Indians in New Mexico reported obesity by BMI when compared to other racial/ethnic groups within the New Mexico BRFSS.
- From 2010 to 2013 a lower percentage (44% fewer) of American Indians in New Mexico reported any alcohol use in the past 30 days when compared to other racial/ethnic groups within the New Mexico BRFSS.
- In 2012 comparable percentages of American Indians in New Mexico reported having received the recommended screening for both cervical cancer (85%) and breast cancer (76%) as other racial/ethnic groups within New Mexico to the New Mexico BRFSS.
- In 2012 lower percentages of American Indians in New Mexico reported having received the recommended screening colorectal cancer (approximately 35% - 43% fewer) than other racial/ethnic groups within the New Mexico BRFSS.
- From 2011-2013 9-19% more American Indians reported having health care coverage when compared to other racial/ethnic groups within the New Mexico BRFSS groups.
- From 2008 to 2012 American Indians in New Mexico had lower rates of breast, prostate and lung cancer, and higher rates of kidney, liver and stomach cancer than other racial/ethnic groups within New Mexico.
- From 1992 to 2012 there were significant decreases in the rates of prostate cancer and an increase in colorectal cancer among American Indian males within New Mexico.
- From 1992 to 2012 there were significant increases for kidney and thyroid cancer for American Indian females.
- From 2008 to 2012 American Indians had more colorectal cancers diagnosed in unknown stages or that were un-staged than other racial/ethnic groups in New Mexico.
- From 2008 to 2012 American Indians had more breast cancers diagnosed in distant stages than other racial/ethnic groups in New Mexico.
- From 2008 to 2012 American Indians had more cervical cancers diagnosed at distant and unknown stages than other racial/ethnic groups in New Mexico.
- From 2008 to 2012 American Indians within New Mexico had significantly higher mortality rates due to stomach and kidney cancers than other racial and ethnic groups within New Mexico.
- From 2008 to 2012 American Indians within New Mexico had significantly lower mortality rates due to lung cancers than other racial and ethnic groups within New Mexico.

## RISK FACTORS

The following section presents information and data on risk factors for certain cancers from scientific literature.

### Percentage of Populations Reporting Current Smoking by Race/Ethnicity in New Mexico, 2011-2013

Research has shown smoking to be strongly associated with several types of cancer, not only cancers of the lung, bronchus and throat. Smoking has also been associated with cancers of the colon and rectum, stomach, pancreas, prostate and others that are not covered in this report, such as cancers of the blood, bladder and cervix (CDC n.d., 2015; Everatt, Viriciute, & Tamosinas, 2015; Frujita et al. 2015). In a 2015 study, smoking was associated with a greater than two-fold increase in all-cause mortality for cancer patients (Yang et al. 2015), and a high association with colorectal cancer mortality (Yang et al. 2015). Data aggregated from the 2011-2013 BRFSS surveys show that American Indians in New Mexico smoke at a rate that is approximately 30-35% lower than other comparison groups in the State of New Mexico, and in the United States overall.



### Percentage of Populations who are Overweight or Obese by Race/Ethnicity in New Mexico, 2011-2013

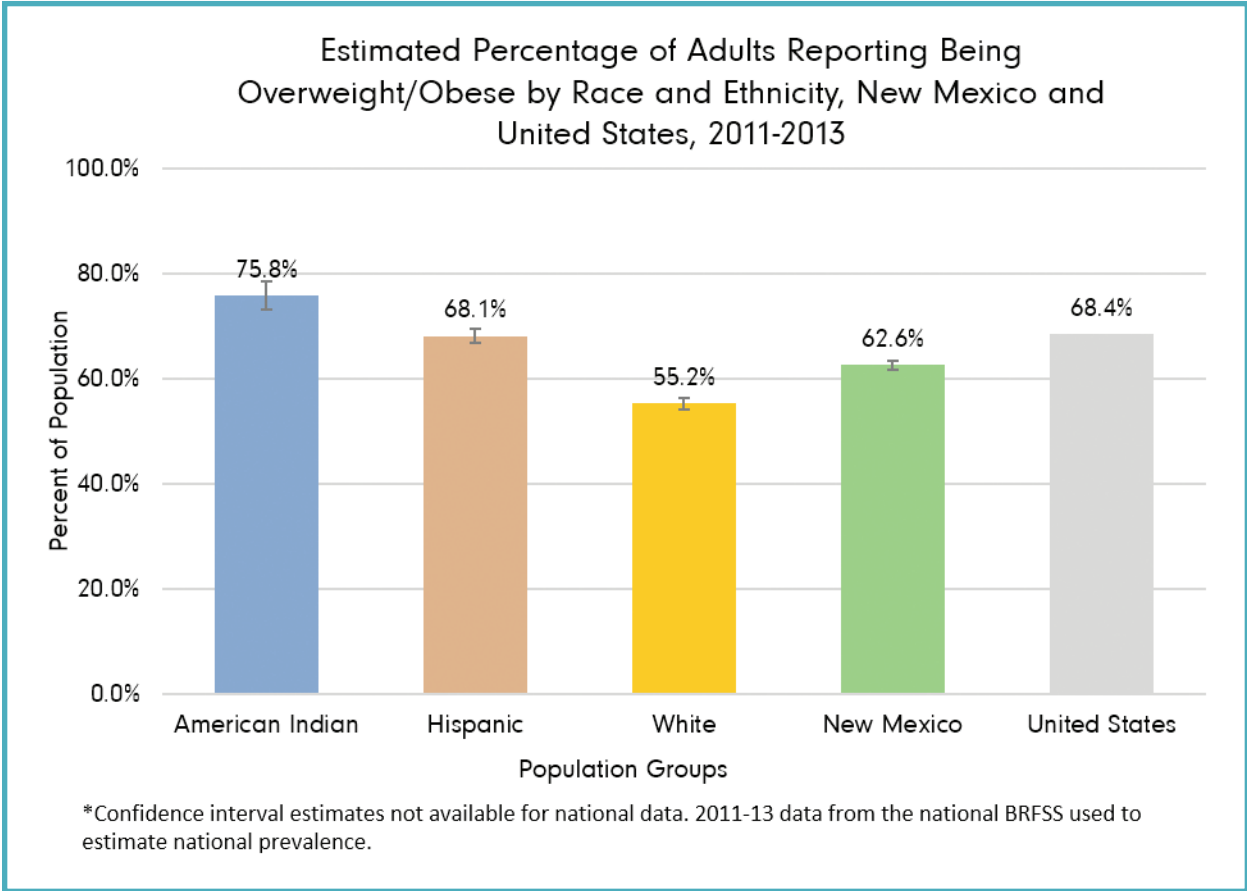
According to the clinical guidelines established by the National Institute of Health (NIH), a person is considered overweight if their body mass index, or BMI is greater than or equal to 25 kg/m<sup>2</sup>, and obese if it is greater than 30 kg/m<sup>2</sup> (NIH, n.d.). Being overweight or obese has been linked to a higher risk for developing cancers of the breast, endometrium, kidney, colon, gallbladder and liver (CDC, n.d.; NIH, n.d.). A study by Bhaskaran and colleagues showed site-specific cancer risk increases for people with a higher BMI:

INCREASED RISK OF CANCER DUE TO OBESITY, BHASKARAN ET AL., 2014.

Site-Specific Cancer	Increased Risk of Cancer
Uterus	1.62
Gallbladder	1.31
Kidney	1.25
Liver	1.19
Cervix	1.10
Colon	1.10
Thyroid	1.09
Leukemia	1.09
Ovary	1.09
Post-menopausal breast	1.05
*Values are associated hazard ratios (p < 0.05)	

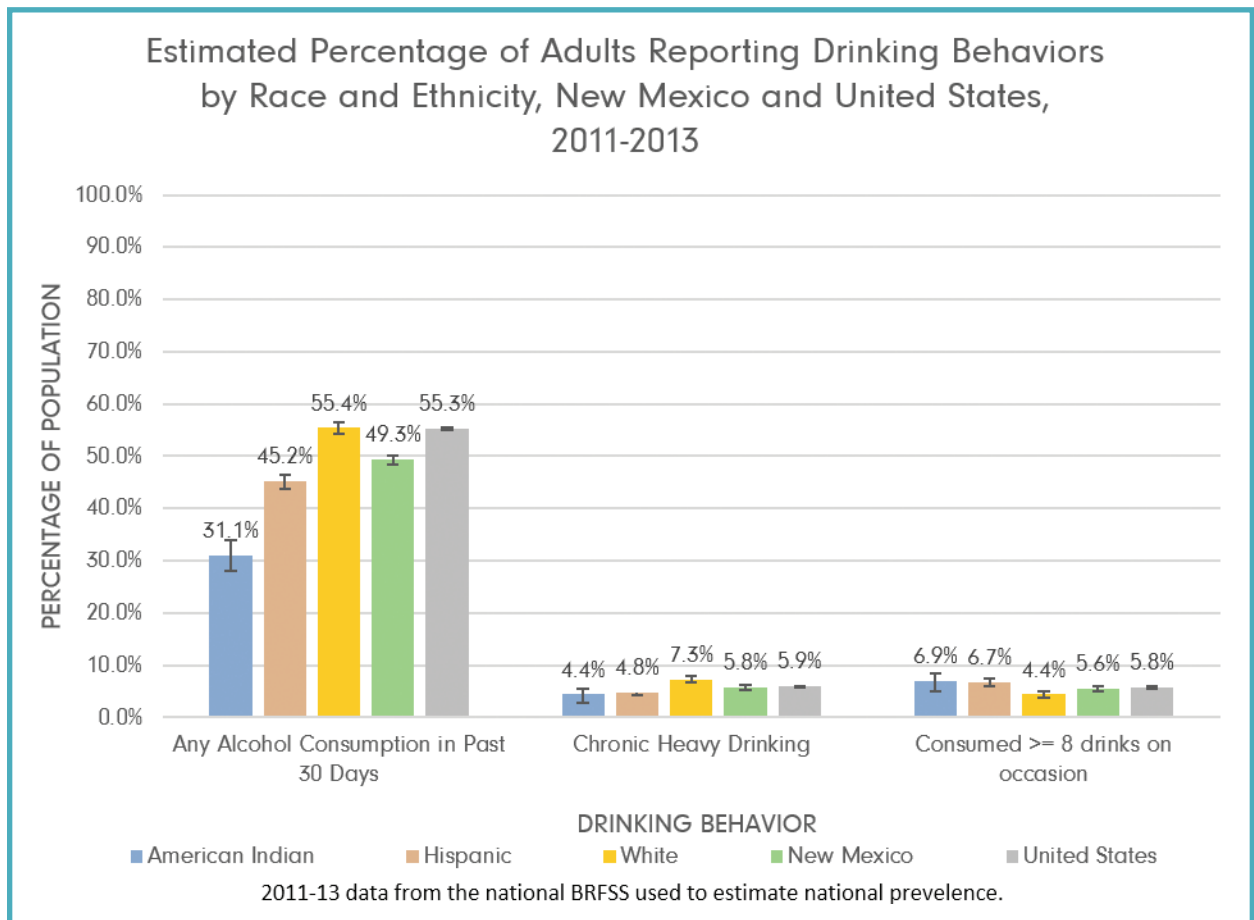


Data from the 2011-2013 BRFSS survey showed that American Indian adults were obese or overweight at a rate 10% - 27% higher when compared to other racial/ethnic groups in New Mexico, and approximately 10% higher when compared to the United States total population.



### Percentage of Populations Reporting Specified Drinking Behaviors in New Mexico, 2011- 2013

Alcohol consumption has been shown to increase the risk for cancers of the colon and rectum, liver, mouth, pharynx and esophagus, and has also been linked to the development of breast cancer in women (CDC, n.d.; Bagnardi et al.). The epidemiology of drinking behavior is complex. Data from the 2011-2013 BRFSS survey showed that American Indians consumed alcohol overall at a rate 32-44% less than other racial/ethnic comparison groups in New Mexico and the United States. Among those who drink, fewer American Indians reported chronic heavy drinking (more than 1 drink a day for women, more than 2 for men) at a rate anywhere from 8-40% less than comparison groups. However, among those who drink alcohol, 36% more American Indians reported drinking 8 or more drinks on during one occasion than other racial/ethnic groups.



A 2014 meta-analysis calculated the following site-specific increased risk for cancers in association with chronic alcohol consumption (Bagnardi et al, 2014):

INCREASED RISK OF CANCER DUE TO ALCOHOL USE, BAGARDI,ET AL., 2014.

Site-Specific Cancer	Increased Risk of Cancer
Oral and Pharyngeal	5.13
Esophageal	4.95
Laryngeal	2.65
Gallbladder	2.64
Liver	2.07
Breast	1.61
Colorectal	1.44
Stomach	1.21
Pancreas	1.19
Lung	1.15
*Values are risk ratios (p < 0.05)	

### Multiple Risk Factors in Conjunction

Smoking tobacco and drinking alcohol are risk behaviors that are often done together. People who drink alcohol are more likely to be smokers than non-drinkers and smokers are more likely to drink than non-smokers (NIH, n.d.). It is important to know that when used together these substances can provide an even greater increase in a person’s risk of developing the cancers mentioned above compared to using either substance alone.

### Pathogens as Contributors to the Development of Cancer

Several viruses are associated with specific cancers. The National Cancer Institute recommends that vaccines be administered to protect against these viruses and prevent these cancers (NCI, n.d.). When a virus enters a host body, it gains control by injecting its own DNA into a cell, compromising the host DNA and making it more vulnerable to becoming cancerous (ACS1). Most of the time, viruses are only contributors to the development of cancer. Not all people who contract these viruses develop cancer.

### The Human Papillomavirus (HPV)

The human papillomavirus (HPV) is a virus that causes 91% of anal cancers, 63% of penile cancers, 72% of oropharyngeal cancers, 75% of vaginal cancers, 69% of vulvar cancers and all cervical cancers (CDC, n.d.). HPV infections are the most common type of sexually transmitted infections in the United States (CDC, n.d.). The HPV test is very similar to a pap test, and is performed at the same time as a pap test. Cells are obtained from the cervix and observed microscopically for presence of the virus. Females who are 30 to 65 years of age can choose to strengthen the results of a pap test by including an HPV test and lengthen the recommended interval of screening for a pap test to every five years, versus every three years (CDC, n.d.). A vaccine is currently available to prevent HPV. Gardasil, the HPV vaccine, is recommended for boys and girls at 11 or 12 years of age.

The vaccine is given in 3 doses (2 months apart, then 6 months apart (CDC, n.d.)). Preventing HPV can help to prevent cervical, vulvar and vaginal cancers in women, penile cancers in men, and anal and oropharyngeal cancers in men and women (CDC, n.d.).

### **Helicobacter Pylori (H. pylori)**

H. pylori is a gram-negative bacterium found in the digestive tract (CDC, n.d.). It is estimated that it can be found in 30-40% of all persons in the United States, and about half of the world population (William & Benjamin, 2007; Wroblewski, Peek & Wilson, 2010). Usually, it is inactive in healthy, young adults, but it can be a risk factor for peptic ulcer disease and gastritis, and is characterized by person-to-person (usually oral-fecal) transmission (CDC, n.d.). There are no recommendations for screening for H. pylori, and treatment is on an individual basis (CDC, n.d.). H. pylori has been labeled a carcinogen because it leads to stomach cancer in about 1-3% of adults who have it, and it is associated with chronic epithelial inflammation (Wroblewski, Peek & Wilson, 2010). While inflammation and lesions are the strongest risk factors for gastric cancer, there are other immune responses and host factors which can contribute to the development of cancer, such as alcohol intake (William & Benjamin, 2007; Wroblewski, Peek & Wilson, 2010).

### **Hepatitis**

Hepatitis is a viral disease which causes chronic inflammation of the liver (CDC, n.d.). There are vaccines available to prevent Hepatitis A (HAV) and Hepatitis B (HBV), but not Hepatitis C. Hepatitis A is a more acute infection and does not become chronic (CDC, n.d.). Hepatitis C can be chronic or acute (CDC, n.d.). Hepatitis B and C can both cause chronic infections that are associated with liver cancer and other serious liver diseases (CDC, n.d.). Approximately 70-85% of all cases of HCV will become chronic (CDC, n.d.). HCV is spread by blood-to-blood transmission, and rarely, sexual encounters or encounters with objects which have come into contact with infected blood (CDC, n.d.). There are currently no screening recommendations for Hepatitis C, however, if a person has engaged in risky behaviors (generally those which involve contact with blood, or those who born before 1975) they should receive a screening test (CDC, n.d.).

### **Other Relevant Pathogens**

The Epstein Barr Virus (EBV), one of eight viruses in the herpes family, is most commonly known for causing mononucleosis (the "kissing disease" (ACS, n.d.)). It infects white blood cells and cannot ever be eradicated from the body, like most other herpes virus infections. It can also increase the risk for Burkitt's lymphoma, Hodgkin lymphoma, stomach cancer and nasopharyngeal carcinoma (ACS1).

Human T-lymphotrophic virus-1 (HTLV-1) has been linked with a type of non-Hodgkin acute lymphocytic leukemia called adult t-cell lymphoma (HTCL-1 (ACS, n.d.)). HTLV-1 is a retrovirus, much like the human immunodeficiency virus, HIV. Retroviruses must undergo an extra transformation inside a host in order to change RNA to DNA (ACS, n.d.), which can disrupt cell processes and lead to cancer (ACS, n.d.).

HIV/AIDS infects certain types of white blood cells known as t-cells, and corrupts the body's immune system. The immune system is responsible for killing newly developed cancer cells, so people with HIV/AIDS are more likely to develop cervical cancer, non-Hodgkin and Hodgkin lymphoma, anal cancers, lung cancer, cancers of the mouth and throat, liver cancer and some types of skin cancer (ACS n.d.; Does, et al., n.d.).

Human herpes virus - 8 (HHV8) is sexually transmitted and spread through blood and saliva. It has been found in almost all patients with Kaposi's sarcoma, a rare type of slow growing blood and lymph cancer. Most people who develop this type of cancer also have another immunity compromising disorder, such as HIV/AIDS (ACS, n.d.).

Merkel cell polyomavirus (MCV) is a very rare virus usually contracted in childhood. It can lead to a type of skin cancer known as Merkel cell carcinoma. Nearly all Merkel cell cancers have been linked to this type of infection. Merkel cells are located at the base of the epidermis, near basal cells (ACS, n.d.).

### Genetic Risk Factors

A very small percentage of cancers are associated with genetics. These cancers account for less than 5% -10% of all cancers (ASC, n.d.). Although some are directly responsible for causing cancer, most genes only increase carrier's risk of developing cancer. These genes tend to contribute to the development of cancer by somehow disrupting the usual or natural cell process. These genes can affect DNA repair, cause inhibition to cell division or cell death, or promote growth of tumors (Does, Johnson & Thiel, 2015). Some common types of cancer known to be associated with genetic markers are: Burkitt's lymphoma, leukemia, retinoblastoma, breast, ovary, pancreatic, prostate and colon cancers, and skin cancer. While genes may cause or lead to the development of a wide variety of cancers, they are rare (ASC, n.d.). Gene testing and therapy are available as a preventative screening option, however, they are only recommended for those individuals with a strong family history of genetic cancers (ASC, n.d.).

### Environmental Risk Factors

Environmental exposures potentially related to cancer can be occupational, or contaminants in building material, water or soil (Boffetta & Nyberg, 2003). Cooking with materials that do not burn "cleanly," such as wood, dung or coal, can cause lung cancers (Boffetta & Nyberg, 2003). Sources of radiation, such as X-rays or radon have been associated with cancer. Radon is a colorless, odorless gas which results from the natural breakdown of uranium (CDC, n.d.). The CDC recommends that individuals purchase radon testing kits for their office or home when their state radon office recommends it, because this gas can cause certain types of cancer, specifically in the pancreas and lungs (CDC, n.d.). Many chemicals can also be carcinogenic (cancer-causing), such as hydrocarbons present in air pollution and chemicals present in occupational settings such as titanium dioxide, asbestos and tar (coal pitch volatiles (CDC, n.d.)). The CDC keeps an updated list of known carcinogenic chemicals for individual reference. The Occupational Safety and Health Administration (OSHA) requires employers to report possible health risks to individuals in these settings, and the Environmental Protection Agency (EPA) is required to report any areas with poor air quality (CDC, n.d.). Several studies have found associations between uranium mining and lung cancer. One such study showed that for Navajo men, underground uranium mining increased the risk of lung cancer by as high as 28.6% (Gilliland, Hunt, Pardilla & Key). This is an occupational exposure that is of special importance to American Indians in New Mexico, as the legacy of uranium mining is of concern for many communities.

### Sun Exposure

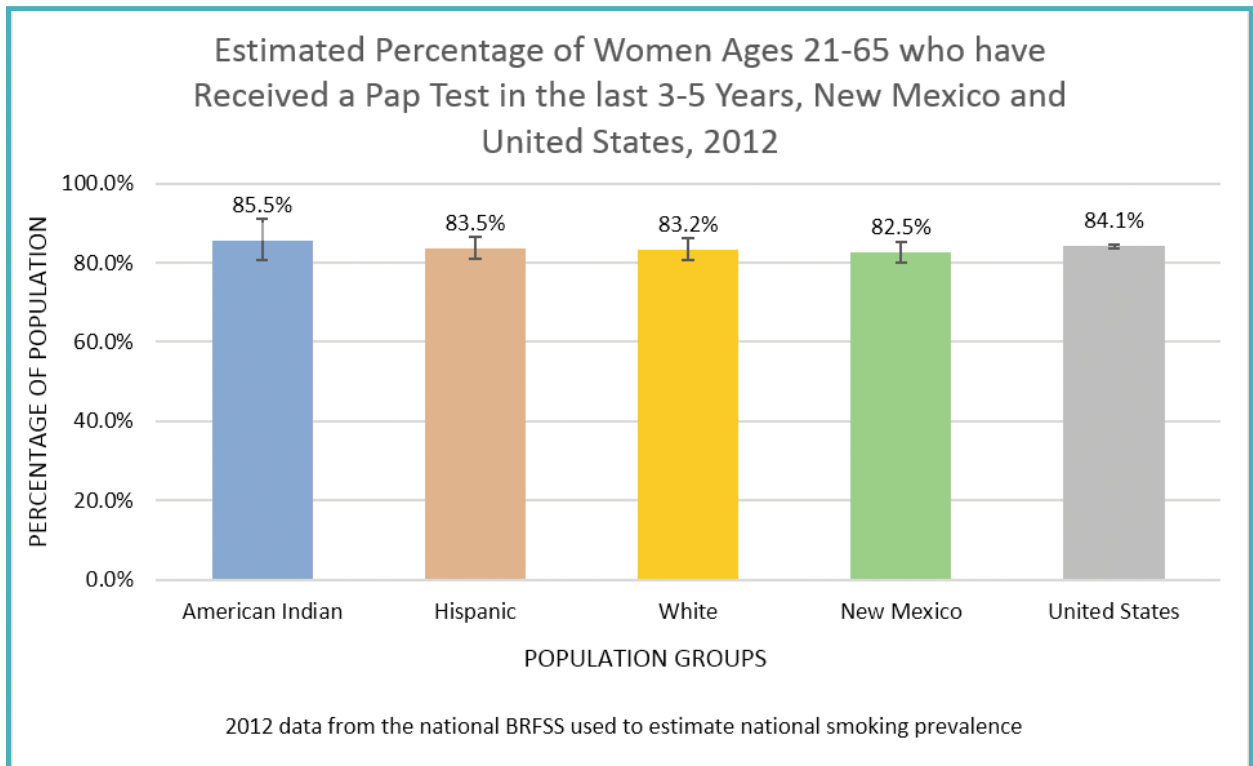
Exposure of skin to rays of ultra violet (UV) light can cause damage to skin cells and DNA, which can inhibit proper reproduction of skin cells and lead to skin cancer. When exposed to sunlight over long periods of time (over 15 minutes) it is recommended that people of all ages make practical use of shade and wear sunscreen products over 15 SPF, protective clothing and eyewear (CDC, n.d.).

## SCREENING AND HEALTHCARE ACCESS

The following data provide the most current statewide estimates on the proportion of the population that is up-to-date with cancer screening recommendations. The cancer screening recommendations used to analyze these data are from the United State Preventive Services Task Force (USPSTF). The USPSTF is an independent, volunteer panel of national experts in prevention and evidence-based medicine. The goal of screening, which involves tests to check for cancer in a person who does not have signs or symptoms of cancer, is to detect cancers earlier and improve patient outcomes (USPSTF, n.d.).

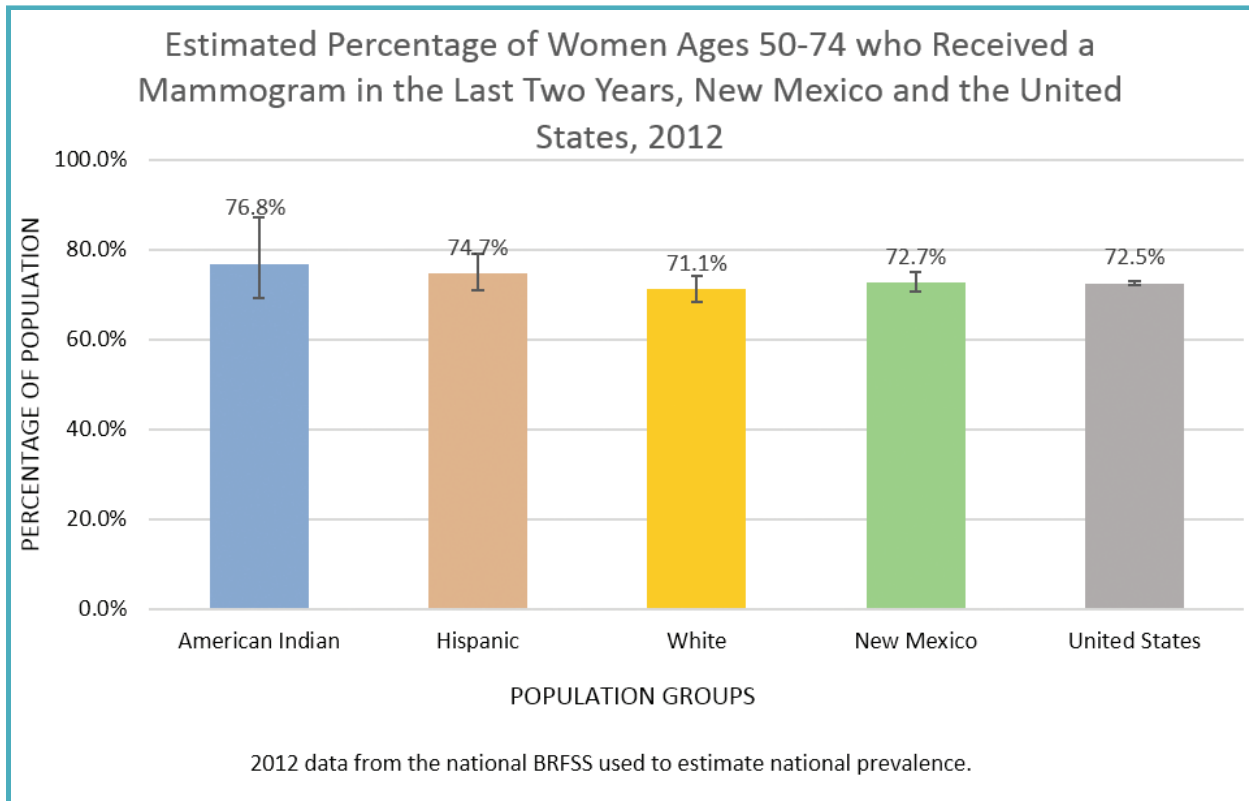
### Percentage of Women Ages 21-65 Who Received a Pap test the Past 3-5 Years, 2012

During a Pap test, cervical cells are collected and analyzed under a microscope to screen for abnormal or precancerous cells (CDC, n.d.). The Pap test is not 100% accurate and can miss about 45% of preclinical cervical cancer cases (CDC, n.d.). Receiving regular, pap tests as recommended can prevent cervical cancer mortality rates by 20-60% (CDC, n.d.). The current USPSTF recommendations state that women ages 21-65 years be screened with a Pap test every three years; but, women ages 30-65 years may lengthen the screening interval to every five years by co-testing with a Pap test and HPV test concurrently. Data from the 2012 BRFSS show that a comparable percentage of American Indian women reported having had up-to-date Pap tests compared to all other racial/ethnic groups within New Mexico and the United States.



**Percentage of Women Ages 50-74 Who Received a Mammogram in the Past Two Years, 2012**

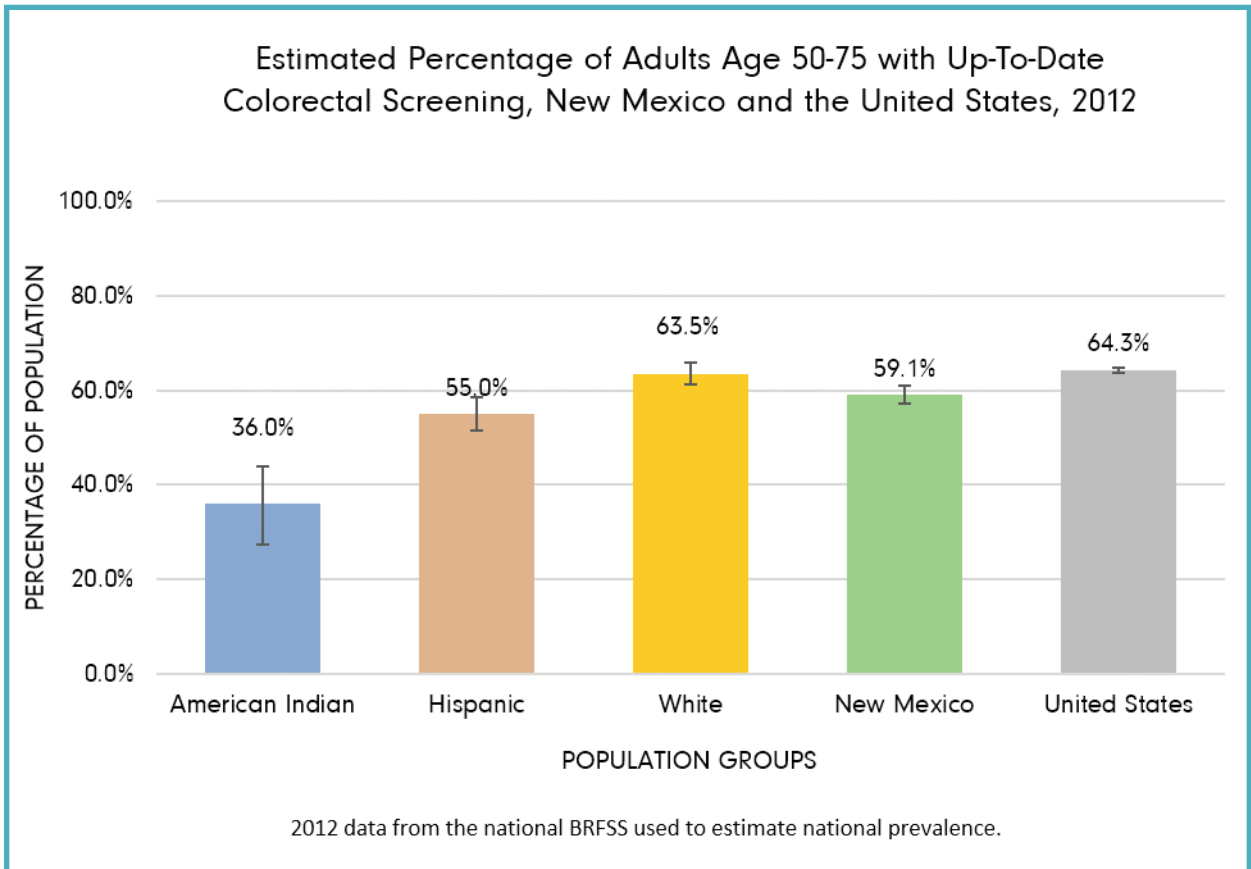
A mammogram is performed by pressing the breast tissue flat against a plate while an X-ray picture is taken from above (CDC, n.d.). This gives the radiologist a clear picture of the density of the breast tissue. Density can indicate fibrosis, abnormalities or tumors of the breast (CDC, n.d.). If dense spots are observed, further tests should be performed to determine if they are malignant cancers (CDC, n.d.). The USPSTF recommends that women ages 50 to 74 have a mammogram every two years. Regular mammograms as recommended can reduce cancer mortality by 20-25% (CDC, n.d.). According to data from the 2012 BRFSS, a comparable percentage of American Indian women received mammograms compared to other racial/ethnic groups in New Mexico and the United States.



### Percentage of Adults Age 50-75 Who Are Up-To-Date with Colorectal Screening Recommendations, 2012

There are several tests available that screen for colorectal cancer. The USPSTF recommendations for colorectal cancer screening include one of the three following options: (1) A high-sensitivity FOBT (guaiac-based FOBT or fecal immunochemical test [FIT]) every year; (2) A colonoscopy every 10 years; or (3) A sigmoidoscopy every 5 years and FOBT every 3 years. The BRFSS does not differentiate between the guaiac-based FOBT and the FIT (NMIBIS2). The FIT is a stool test that detects antibodies associated with cancers (CDC, n.d.). A sigmoidoscopy is performed by injecting a thin, lighted tube with a camera into the rectum to observe polyps or abnormalities (CDC, n.d.). The colonoscopy is very similar to the sigmoidoscopy, but differs because the tube is longer and there is a tool at the end of it that can remove cancerous or precancerous polyps (CDC, n.d.). With regular screening as recommended, colorectal cancer mortality can be reduced by up to 60% (CDC, n.d.).

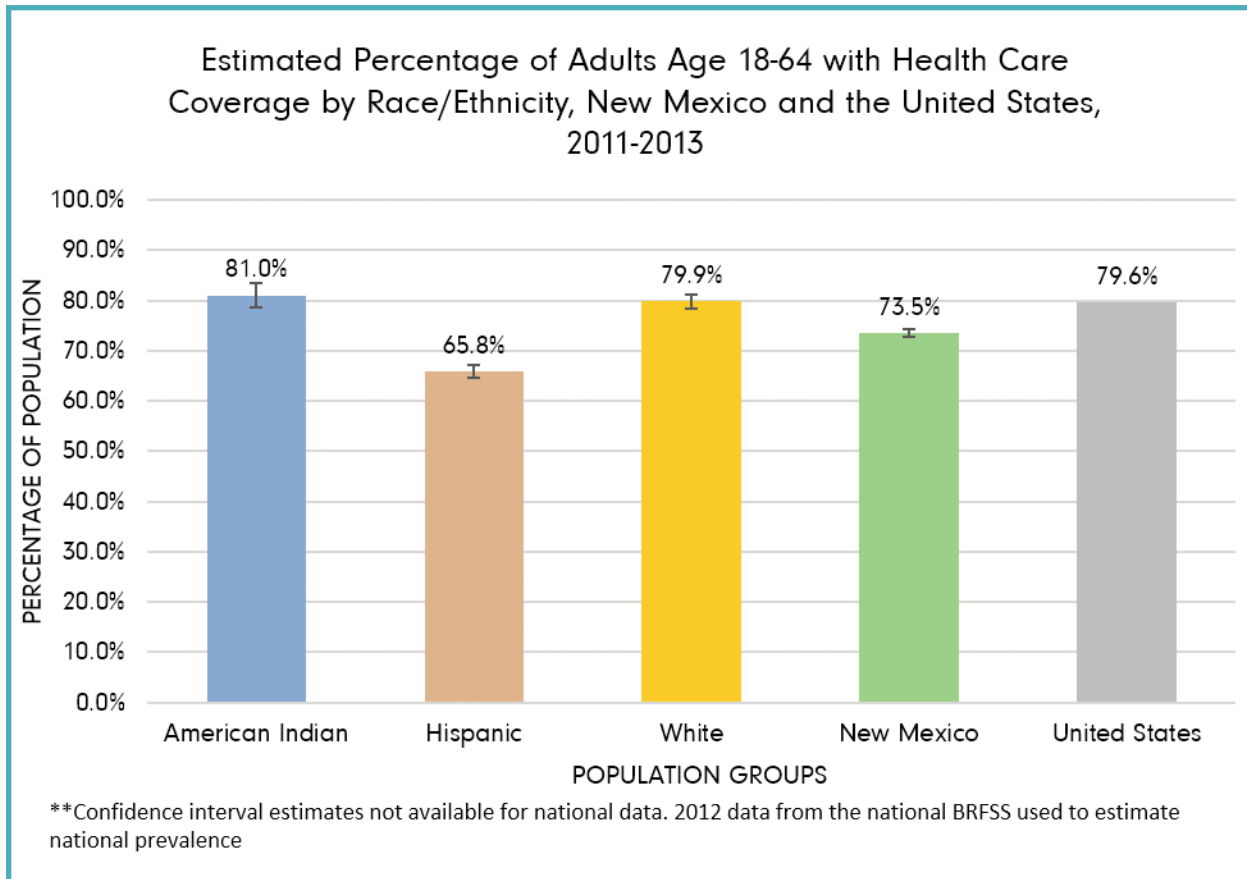
According to data from the 2012 BRFSS, a significantly lower percentage of American Indian adults had reported being up to date with colorectal screening recommendations compared to other racial/ethnic groups in New Mexico and the United States (approximately 35% - 43% lower rates).





### Percentage of Adults Ages 18-64 with Any Health Care Coverage, 2011- 2013

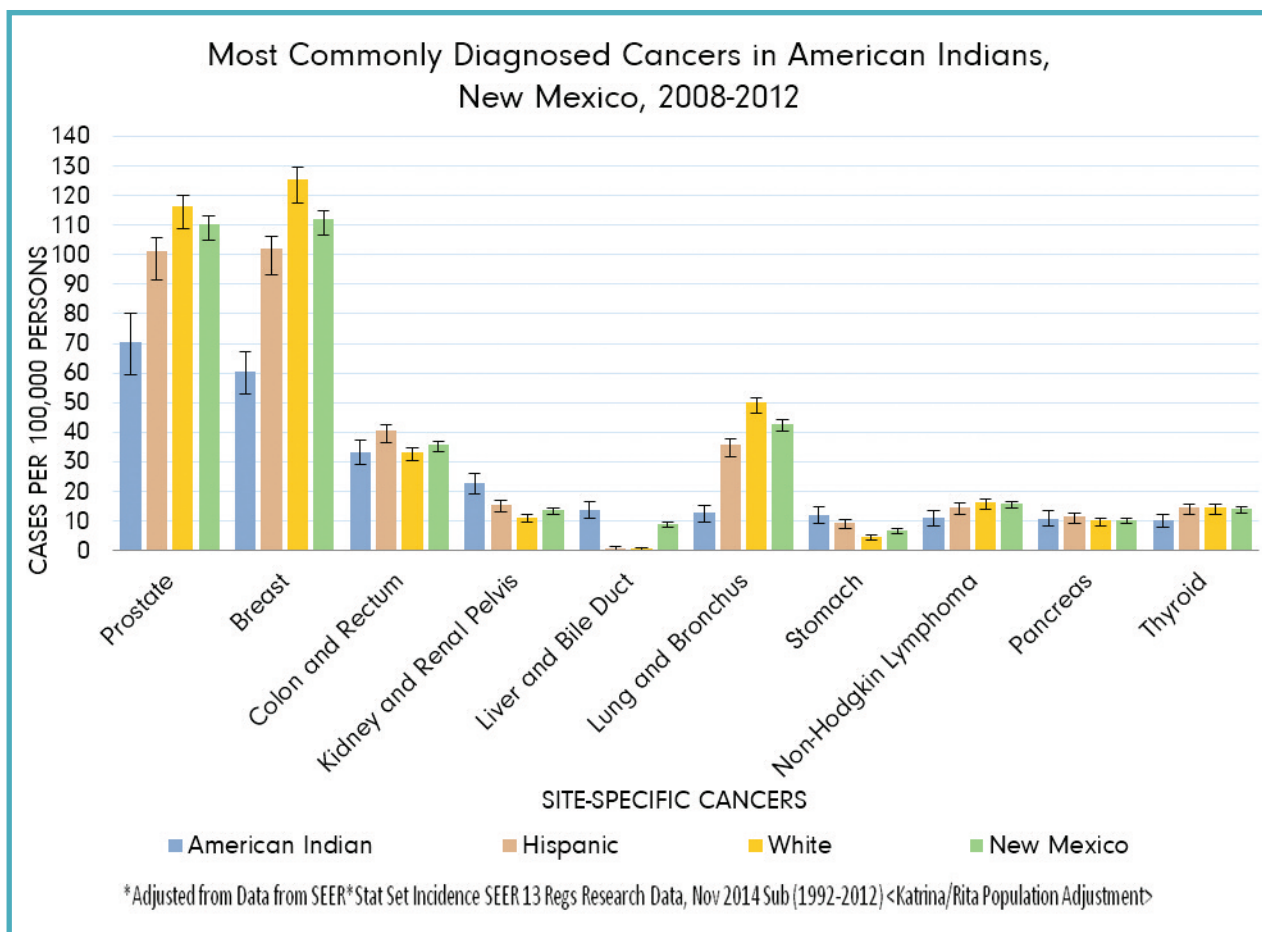
According to data from the 2011-2013 BRFSS, about 80% of American Indian and Alaska Native Adults age 18-64 had some kind of healthcare coverage. This rate of coverage is very similar to the rate for Whites in New Mexico and for the United States as a whole. However, the rate of health care coverage for American Indians or Alaskan Natives was 18.7% higher than the rate reported for Hispanics, and 9% higher than the rate for New Mexico overall. These data do not take into account factors such as distance to/from healthcare facilities and ability to pay co-payments.



## CANCER INCIDENCE

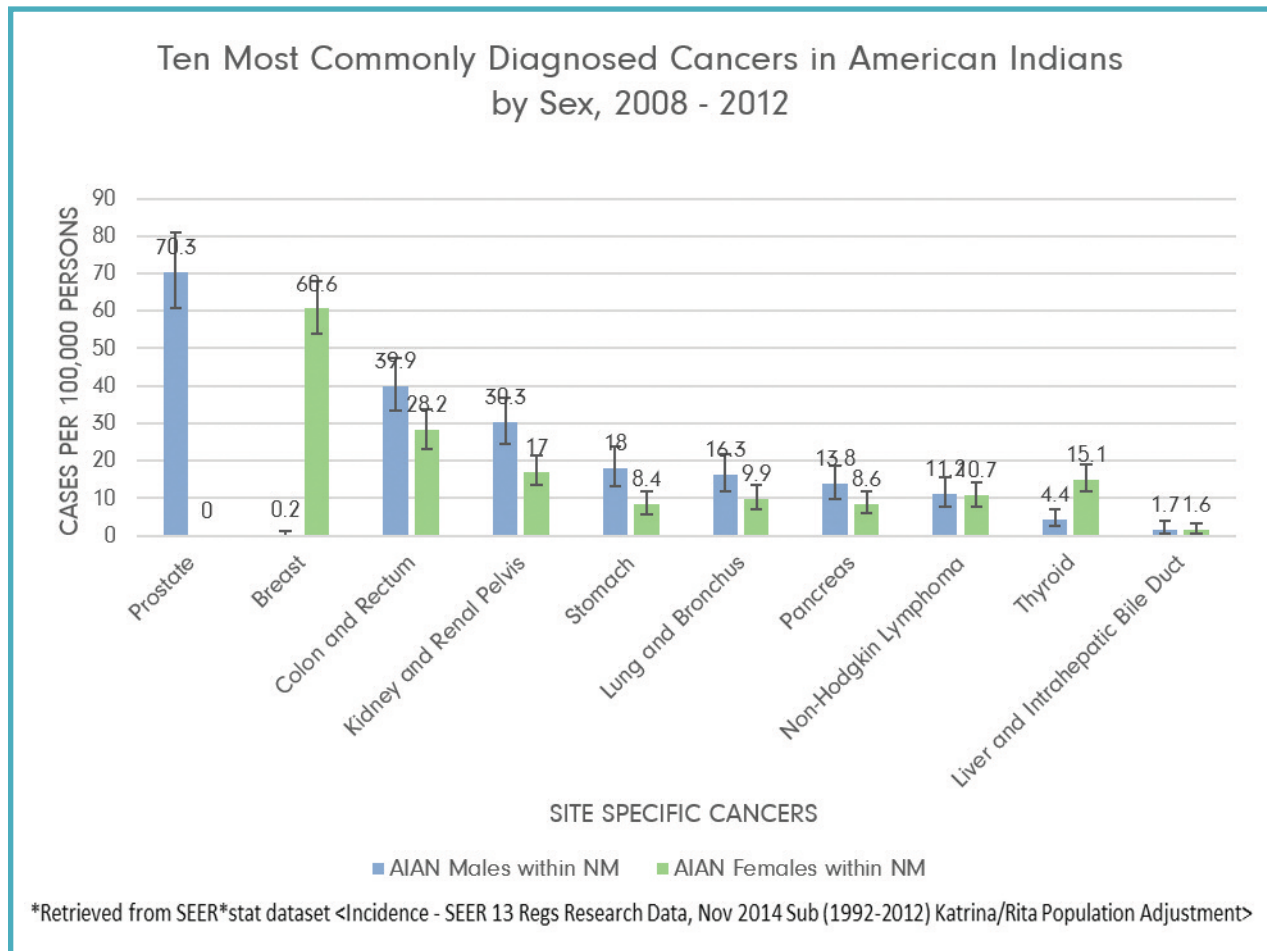
### Top 10 Primary Sites for Cancer in AIAN Populations in New Mexico, 2008-2012

The figure below shows the most commonly diagnosed cancers for the American Indian and Alaska Native populations compared with other racial/ethnic groups within New Mexico. Incidence rates for cancers of the kidney, liver and stomach are comparatively higher in American Indian populations. However, breast, prostate, lung, non-Hodgkin lymphomas and thyroid cancers are lower for American Indians compared to other groups.



### Cancer Incidence by Sex, 2008-2012

Some cancers are sex dependent. This is most apparent in rates of incidence for breast and prostate cancer, but is also notable in thyroid cancer among American Indian women.



### Annual Percent Change for the top 10 Primary Cancer Sites with Comparison Groups, 1992-2012

Annual percent change (APC) rates were calculated and tested for statistical significance in SEER\*stat for the ten most commonly diagnosed cancer sites in American Indians. Significant values are in the table below and are stratified by sex. APC is calculated by fitting a least squares regression line to the natural logarithm of the rates using the calendar year as the regressor variable (SEER, n.d.). Significance testing for APC is equivalent to testing that the regression parameter is equal to zero (SEER, n.d.).

Between 1992 and 2012, when stratified by sex, there was a significant increase of thyroid and kidney cancer in American Indian women. For American Indian men, there was a significant increase in colorectal cancer, but a significant decrease in prostate cancer.

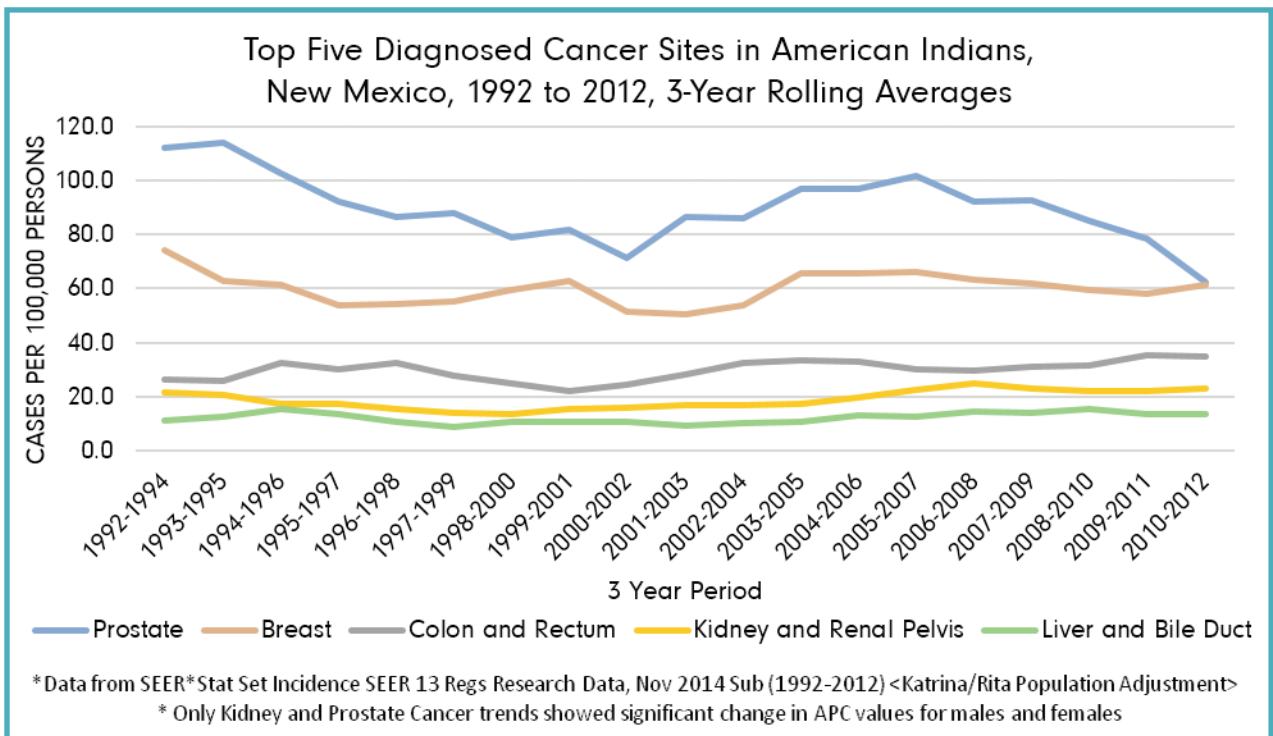
#### STATISTICALLY SIGNIFICANT APC'S FOR CHANGES IN CANCER RATES, 1992-2012

Site Cases per 100,000	Prostate	Thyroid	Kidney	Colon
Males and Females	N/A	4.5*	1.6*	~
Males Only	-1.9*	~	~	1.7*
Females Only	N/A	4.3*	2.7*	~

\* The APC is significantly different from zero ( $p > 0.05$ )  
 ~ statistic could not be calculated

### Trends by Top 5 Primary Cancer Sites with Comparison Groups, 1992-2012

The figure below presents the rates of five most common cancers among American Indian and Alaska Natives over time, from 1992 to 2012 for both males and females.

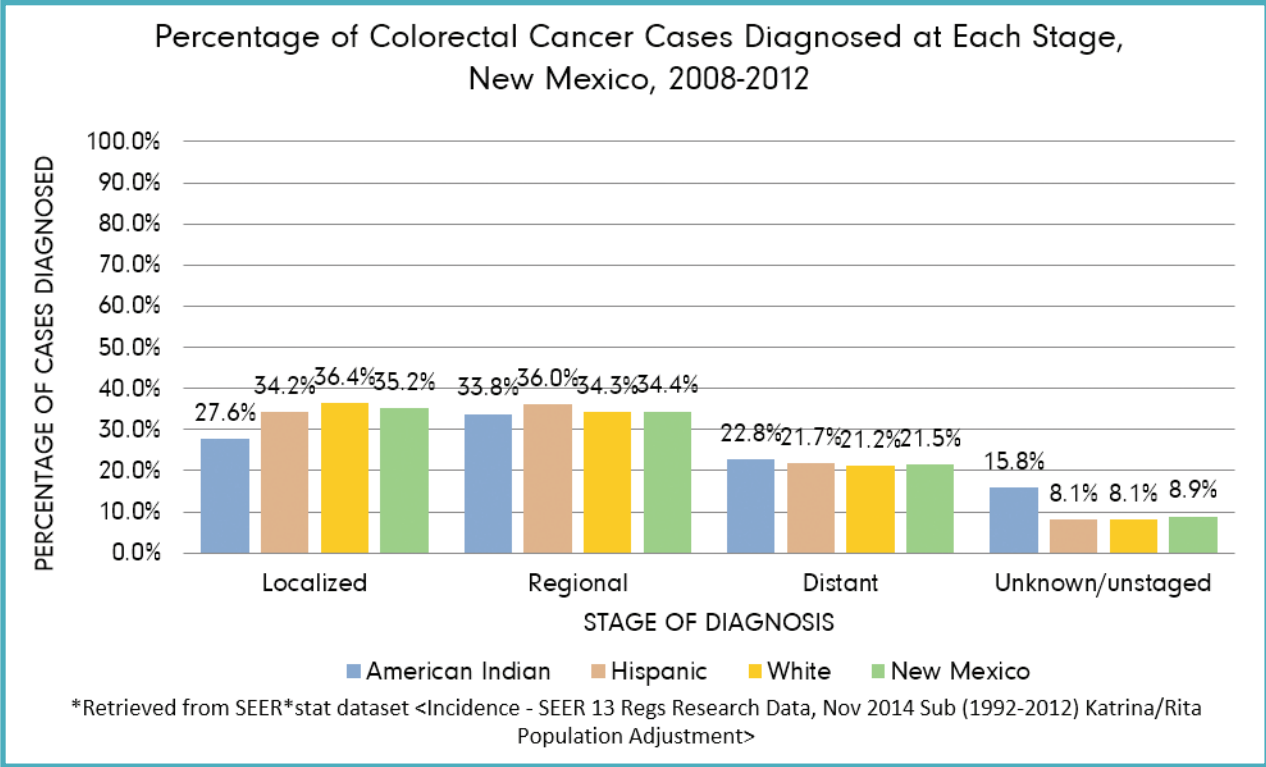


## STAGE AT DIAGNOSIS

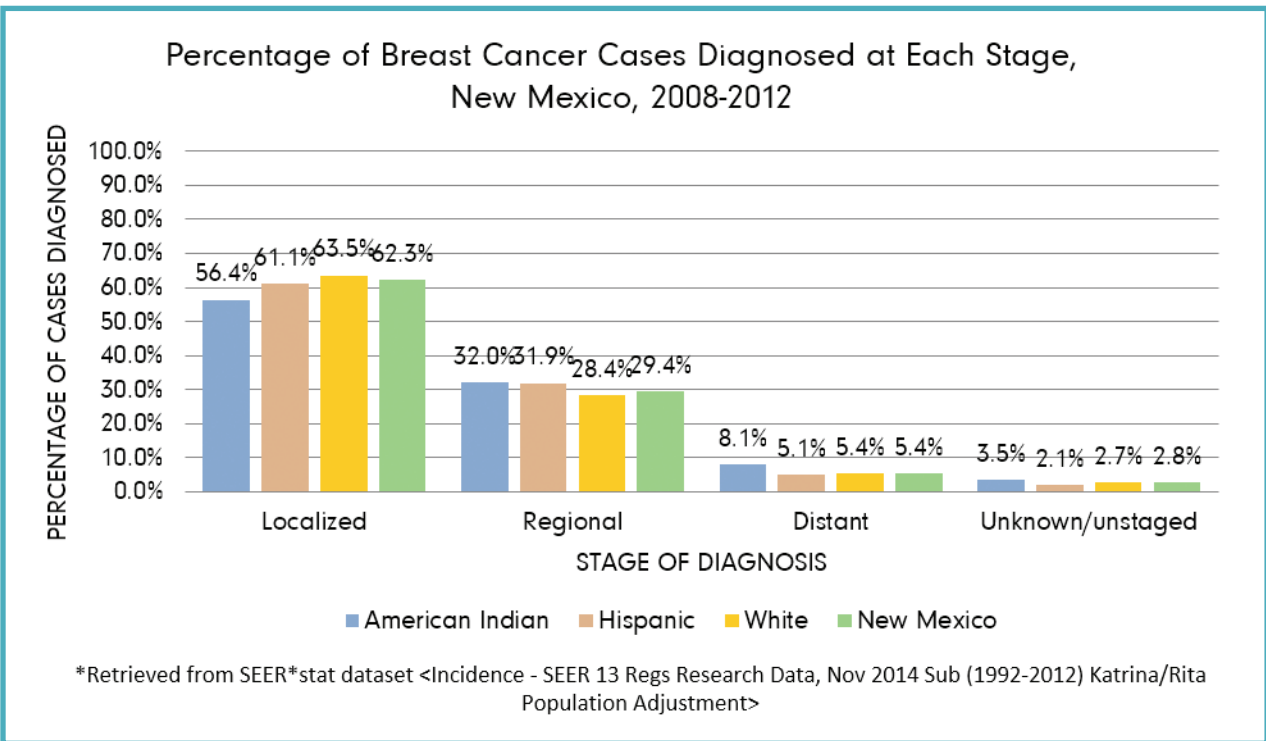
### Top 3 Primary Screened-For Cancer Sites for AIAN People by Stage at Diagnosis Compared to Other Study Populations, 2008-2012

The stage at which a cancer is first detected considers not only the size of the tumor(s), but whether or not the cancer has spread to other parts of the body. While there are many ways to estimate the severity of a cancer, the National Cancer Institute offers a simplified organization of tumors into summary categories referred to as local, regional and distant stages (SEER, n.d.). Summary staging in SEER applies to site-specific cancers, and follows the SEER Summary Stage 2000 Implementation Guidelines (SEER, n.d.). Localized cases have spread no further than the site where the cancer first originated. This category can include some instance of cancer "spread" especially when referring to skin cancer, because this type of cancer can spread without leaving the site of origin (SEER, n.d.). Regional cases are the broadest category for staging. A cancer becomes regional when there are multiple opportunities for spread, by way of blood vessel or lymphatic supply route. The differentiation between localized and regional is necessary because it informs different treatment options. Multiple supply routes cannot always be removed, or treated (SEER, n.d.). Distant cancers are those that have broken away from the primary cancer site by moving to adjacent organs, through lymphatic or blood channels or other fluids in the body (metastases). Liver, lung, brain and bones are common sites for metastasis because they have constant flow of blood from the body (SEER, n.d.). There are several reasons why cancers are staged as unknown or are unstaged. For example, if metastasis has already occurred and the primary site is unknown, the stage is unknown. Also, if there are limited tests for a case-patient there may be little to no evidence of staging, and therefore the case will be categorized as unknown stage. Sometimes it is not known that a person had cancer until they die. These are called death certificate only, and are also not staged (SEER, n.d.).

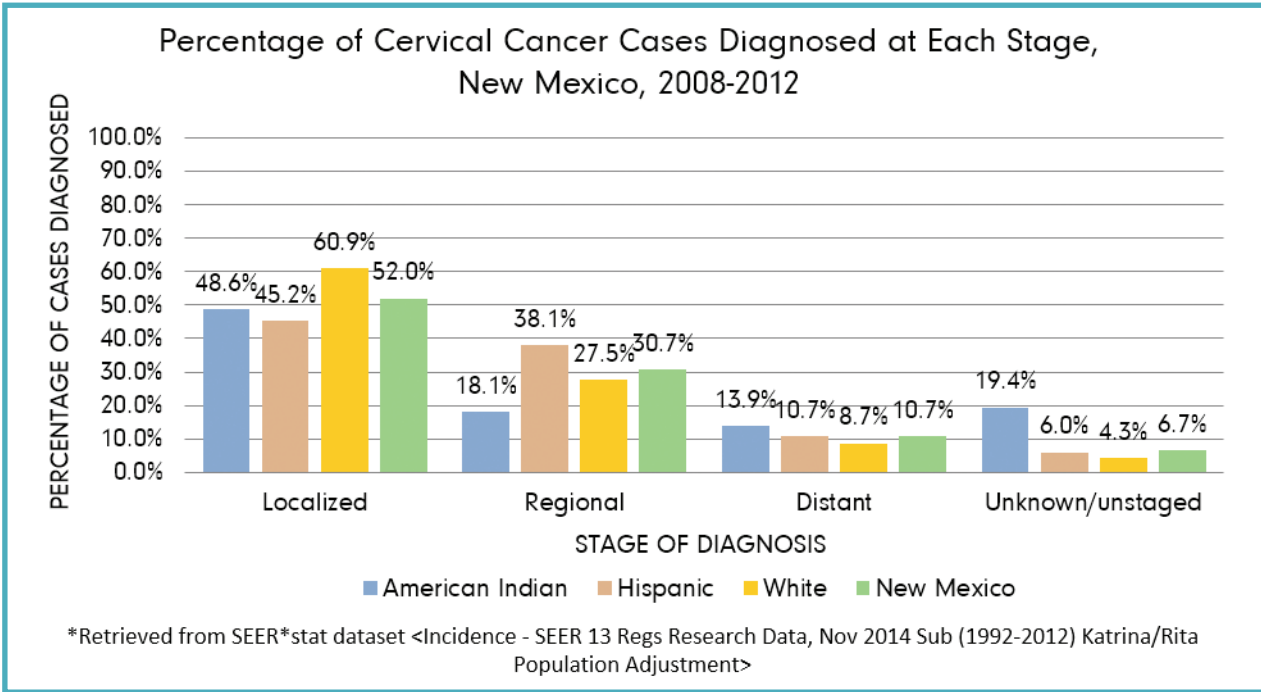
The figures on the following pages present the top three leading causes of cancer in American Indians in New Mexico for which screening is recommended. Screening can detect cancers at earlier stages, and thus increase a patient's chances of surviving a particular cancer.



From 2008 to 2012, higher percentages of colorectal cancers were diagnosed as distant stages or were unknown/unstaged for American Indians than other racial/ethnic comparison groups in New Mexico. Lower percentages of cancers were diagnosed at localized and regional stages for American Indians than other racial/ethnic groups in New Mexico.



From 2008 to 2012, breast cancer diagnosis by stage was relatively similar for all groups, however, there were minor and possibly insignificant differences. American Indians were slightly more likely to be diagnosed at regional, distant or unknown stages than other racial/ethnic groups in New Mexico.



From 2008 to 2012, higher percentages of cervical cancers were diagnosed at distant and unknown stages or were not staged for American Indians than other racial/ethnic groups in New Mexico. Lower percentages of cervical cancer were diagnosed at localized and regional stages for American Indians than other racial/ethnic groups in New Mexico.

## CANCER MORTALITY

### Leading Causes of Death by Race/Ethnicity in New Mexico and in the United States, 2008-2012

From 2008 to 2012 in New Mexico, all cancers combined into one group were the leading cause of death for American Indians, followed by heart disease and unintentional injuries. The all cause cancer mortality rate of 128.7 deaths per 100,000 persons for American Indians was lower than the all cause cancer mortality rates for all comparison groups during this time period.

### TOP 10 LEADING CAUSES OF DEATH FOR AMERICAN INDIANS AND COMPARISON GROUPS, NEW MEXICO AND THE UNITED STATES, 2008 - 2012

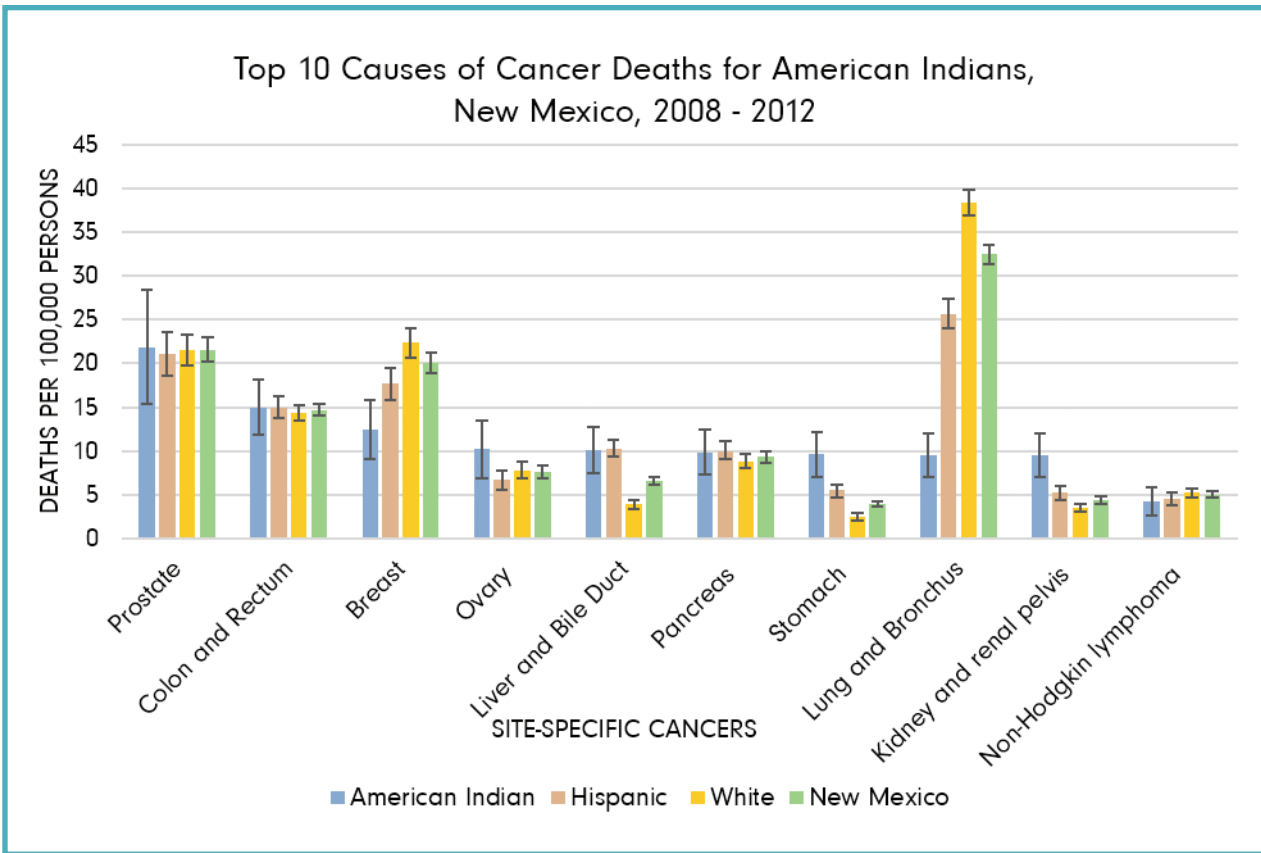
American Indian	Hispanic	White	New Mexico	United States
Malignant Neoplasms (128.7)	Malignant Neoplasms (139.0)	Heart disease (158.6)	Heart disease (150.0)	Heart disease (179.5)
Heart disease (121.8)	Heart disease (137.7)	Malignant Neoplasms (154.5)	Malignant Neoplasms (147.9)	Malignant Neoplasms (171.5)
Unintentional Injuries (100.9)	Unintentional Injuries (60.7)	Unintentional Injuries (56.5)	Unintentional Injuries (62.4)	Chronic lower respiratory diseases (42.7)
Diabetes mellitus (71.5)	Diabetes mellitus (37.8)	Chronic lower respiratory diseases (55.6)	Chronic lower respiratory diseases (45.9)	Cerebrovascular diseases (39.1)
Chronic liver disease and cirrhosis (49.8)	Cerebrovascular diseases (34.7)	Cerebrovascular diseases (33.5)	Cerebrovascular diseases (34.2)	Unintentional Injuries (38.6)
Influenza and pneumonia (36.3)	Chronic lower respiratory diseases (32.9)	Suicide (24.6)	Diabetes mellitus (27.8)	Alzheimer's disease (24.7)
Cerebrovascular diseases (31.1)	Chronic liver disease and cirrhosis (22.4)	Alzheimer's disease (20.3)	Suicide (19.9)	Diabetes mellitus (21.3)
Suicide (24.1)	Kidney Disease (15.8)	Diabetes mellitus (18.3)	Chronic liver disease and cirrhosis (Tie) (18.1)	Influenza and pneumonia (15.9)
Kidney Disease (23.5)	Alzheimer's disease (15.2)	Influenza and pneumonia (13.5)	Alzheimer's disease (Tie) (18.1)	Kidney Disease (14.4)
Septicemia (18.8)	Influenza and pneumonia (14.6)	Chronic liver disease and cirrhosis (11)	Influenza and pneumonia (15.2)	Suicide (12.1)

Source: NMIBIS and CDC Wonder. All deaths rates classified using the NCHS 50 leading Causes of Death  
 \*Death rate per 10,000 Persons is in Parenthesis



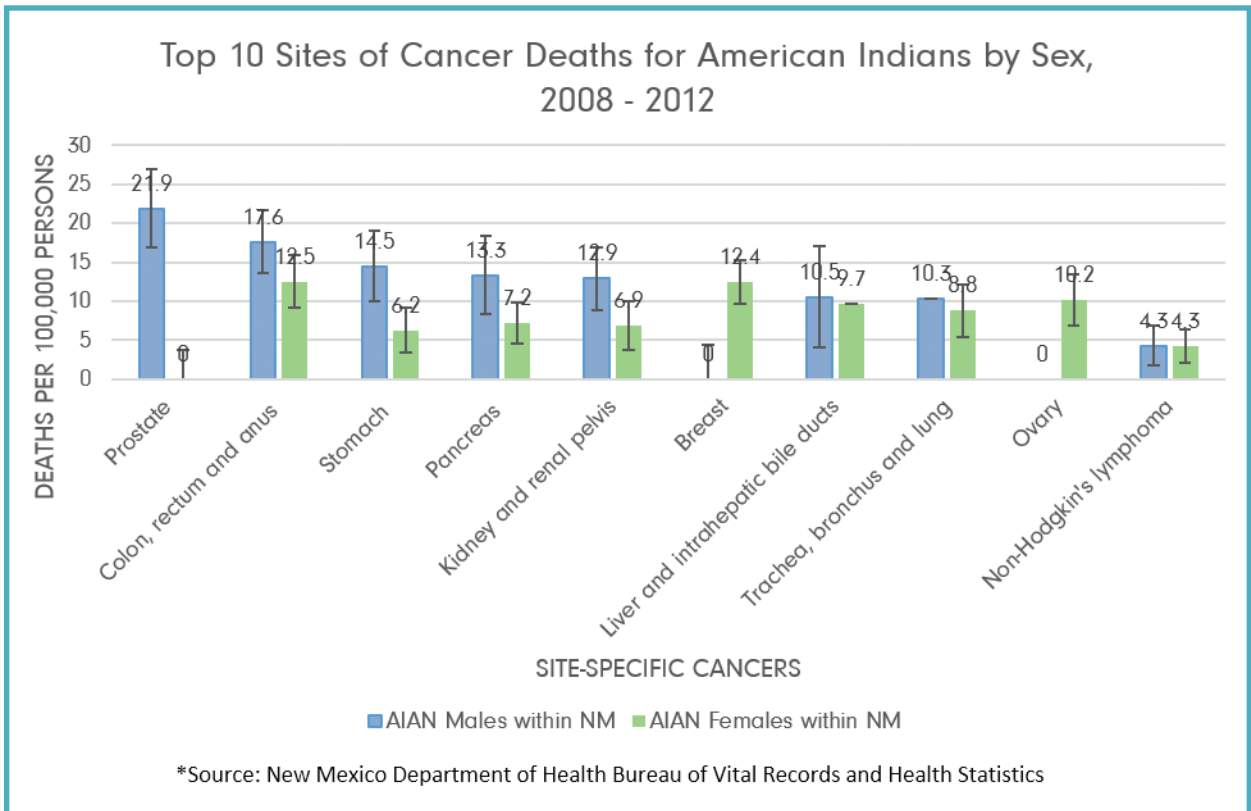
### Leading Causes of Cancer Mortality for Selected Populations in New Mexico, 2008-2012

A diagnosis of cancer does not always lead to a death from that cancer. Some cancers are easier to treat than others, and will therefore have higher rates of survival. Differences in cancer survivability account for differences between the 10 leading primary mortality sites and the 10 leading primary incidence sites presented here. From 2008 to 2012 mortality due to liver, stomach kidney and ovarian cancers in American Indian and Alaska Native people was significantly higher when compared to other racial ethnic groups in New Mexico. During this same time period mortality rates due to cancers of the lung, breast and lymphoma were lower for AIAN people when compared to other racial/ethnic groups within New Mexico.



### Leading Causes of Cancer Mortality by Sex in American Indians in New Mexico

The figure below shows these differences for cancer mortality in American Indians in New Mexico, and are most apparent in breast, ovary and prostate cancer.



### RECOMMENDATIONS

Avoiding risk factors and following the screening recommendations provided by the USPSTF are two well established public health recommendations for the prevention of cancer and increasing the survival of persons who do get cancer. The data presented above suggest that preventing obesity and increasing colorectal cancer screening for American Indians within New Mexico are key recommendations for the prevention of cancer in AIAN persons in New Mexico. Additionally, more focus is needed on the prevention and understanding of stomach, liver and kidney cancers.

It is also important to celebrate and understand the cancer related risk behaviors that were lower in American Indians or Alaskan Natives than other populations, such as tobacco use and chronic or heavy drinking. If a community is resilient against one type of risk behavior, then these ideals can be applied to other risk factors and populations. Understanding resiliency may provide insight in working to prevent cancers among American Indians in New Mexico.

### AIAN Specific Cancer Resources:

- Cancer 101: A Cancer Education and Training Program for American Indians or Alaskan Natives: <https://cancer101curriculum.wordpress.com/cancer-101-aiian-version/>
- Native American Research Corporation: <http://www.natamcancer.org/>
- Spirit of Eagles/Native Circle: <http://www.nativeamericanprograms.net/>
- CDC Occupational Carcinogen List: <http://www.cdc.gov/niosh/topics/cancer/npotocca.html>
- Request for the EPA list of Possible and Probable Carcinogens: <http://www.epa.gov/pesticides/carlist/>
- New Mexico State Radon Office and Resources: <http://www.epa.gov/radon/states/newmexico.html>

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