Inter Tribal Council of Arizona, Inc.

Cancer Surveillance among American Indians in Arizona, Nevada, and Utah

Incidence and Mortality

Tribal Epidemiology Center

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TO: Tribal Leader and Tribal Health Director

FROM: Tribal Epidemiology Center
Inter Tribal Council of Arizona, Inc.
Jamie Ritchey, PhD MPH, Director

RE: *Cancer Surveillance among American Indians in Arizona, Nevada, and Utah: Incidence and Mortality*

On behalf of the Inter Tribal Council of Arizona, Inc. (ITCA) Tribal Epidemiology Center (TEC), I am pleased to present the *Cancer Surveillance among American Indians in Arizona, Nevada, and Utah: Incidence and Mortality* Report.

This surveillance report was prepared in response to cancer concerns among Tribal communities within the Phoenix and Tucson Indian Health Service Areas. The TEC utilized publicly available data from the National Cancer Institute Surveillance Epidemiology and End Results (SEER), the Centers for Disease Control and Prevention National Program for Cancer Registries (NPCR), and the American College of Surgeons National Cancer Data Base (NCDB) to construct the report.

This surveillance report highlights incidence and mortality of various cancer sites among the American Indian population within Arizona, Nevada, and Utah.

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GLOSSARY

Alaska Native – a member or descendant of indigenous peoples of Alaska.

American Indian – a member or descendant of indigenous people of North America; this term is generally used for Native Americans belonging to tribes in all states except Alaska.

Cancer – a term for diseases in which an abnormal growth of cells develops in or on an organ or tissue and has the ability to spread to other parts of the body.

Commission on Cancer (CoC) – accreditation program for cancer programs in the United States that focuses on addressing patient-centered needs of cancer patients though standard-setting, prevention, research, education, and monitoring comprehensive quality care

Contract Health Service (CHS) – Outsourcing of specialized health services that are not currently provided by IHS or a Tribe: services may include but are not limited to medical specialty services, surgeries, and tertiary care. If approved, referrals are paid for by the IHS CHS budget. Funding is limited and restricted to medical priorities and therefore not always available even if an individual qualifies for CHS.

Contract Health Service Delivery Area (CHSDA) – a geographic area that IHS makes Contract Health Services available to members of an identified Indian community who reside in the area.

Count – the number of disease, events, or other health-related occurrences.

Data – items of information expressed as measurements or statistics used to learn more about a disease or risk factor. Data are used for calculations, support of evidence, assessments, and often for decision making.

Ethnicity – relating to cultural factors such as a shared creation narrative, ancestry, language, and beliefs. A social group characterized by ethnic affiliation or distinctiveness. Ethnicity is largely self-identified.

Histology – the study of the microscopic structure of human, animal, and plant tissues.

Incidence rate – the rate at which new cases of disease or health condition occur in a population. The incidence rate is often calculated by the following formula in public health practice:

$$\textit{Incidence rate} = \frac{\text{Number of new cases in specified period}}{\text{Total number of persons at risk during this period}} \times 10^{n}$$

Indian Health Service (IHS) – U.S. Department of Health and Human Services funded agency responsible for providing health services to federally-recognized Tribes of American Indians and Alaska Natives. The IHS provides health services for approximately 1.9 million American Indians and Alaska Natives who belong to 564 federally recognized Tribes in 35 states. The IHS is divided into 12 geographic "Areas" of the United States: Alaska, Albuquerque, Aberdeen, Bemidji, Billings, California, Nashville, Navajo, Oklahoma, Phoenix, Portland, and Tucson.

International Classification of Diseases (ICD) – the arrangement of specific conditions and groups of conditions published periodically by the World Health Organization's international advisers.

International Classification of Diseases – Oncology (ICD-O) – the ICD specific to Oncology classifications.

Lymphocytes – white blood cells that work within the immune system to produce antibodies and attack harmful cells. These cells are important in determining the body's immune response to foreign substances and infectious microorganisms like cancer.

Lymphoma – cancer of the lymphocytes, a type of white blood cell in the immune system.

Metastasis – the process in which cancer spreads from the primary cancer location to another location of the body.

Misclassification – the incorrect assignment of a person, value, or item into a grouping which it should not be assigned.

Mortality rate – the rate at which people in a population are dying in a certain range or period of time. Mortality rate is calculated by the following formula:

$$\textit{Mortality rate} = \frac{\text{Number of deaths during a specified period}}{\text{Population at risk during the specified period}} \times 10^n$$

National Cancer Data Base (**NCDB)** – a Commission on Cancer (C0C) nationwide archive that collects CoC-approved hospital-reported cancer cases which are tracked and analyzed from more than 1,500 programs in the United States and Puerto Rico.

National Program of Cancer Registries (**NPCR)** – collects data on the occurrence of cancer; the type, extent, location of the cancer, and the type of initial treatment.

Oncology – a branch of medicine that focuses on the study, classification, and treatment of tumors; the study of cancer.

Phoenix Service Area – the Phoenix Service Area is one of 12 geographic "Areas" within the Indian Health Service (IHS). The Phoenix Service Area serves the majority of its tri-state "Area" in Arizona, Nevada, and Utah.

Prevalence – the proportion of a population that is found to have a specified condition. This measure is often presented as a percentage, a fraction, or the number of cases per 10,000 or 100,000 people.

$$\textit{Prevalence} = \frac{\text{Number of new and existing cases in specified period}}{\text{Population during the same time period}} \times 10^n$$

Primary Cancer Site – the organ or tissue in which a cancer starts. This is significant to know because it will help determine the best method of treatment options if attempting to remove the cancer before it spreads.

Race – a social construct created to categorize human beings into very broad and generic groupings that are self-selected.

Rate – a measure of how fast a disease is occurring in the population. Rate is usually measured by the following formula:

$$Rate = \frac{\text{Number of events in specified period}}{\text{Total population during the same time period}} \times 10^n$$

Standard population – A set population that is used to standardize age adjusted rates so rates in different populations are comparable.

Statistics – the act of collecting, summarizing, and analyzing data.

Surveillance – systematic (orderly) and continuous collection, analysis and interpretation of data, along with the timely dissemination (distribution) of the results to those who have the right to know so that action can be taken.

Surveillance, Epidemiology, and End Results (SEER) – a program of the National Cancer Institute (NCI) that collects data from cancer registries in the United States. SEER obtains data on incidence, prevalence, and survival from specific geographic areas, and compiles reports on cancer mortality for the entire country.

Survival (cancer) – the proportion of patients alive at a defined point subsequent to the diagnosis of their cancer.

Tucson Service Area – the Tucson Service Area is one of 12 geographic "Areas" within the Indian Health Service (IHS). The Tucson IHS Area provides health care for two Tribes in Southern Arizona: the Tohono O'odham Nation and the Pascua Yaqui Tribe.

STATISTICAL NOTES TABLE

MEASUREMENT NAME	TECHNICAL DEFINITION OF MEASUREMENT	MEASUREMENT PUBLIC HEALTH USE	MEASUREMENT FORMULAS
Crude rate	The simplest rate for a population over a specific time period. The number of new cases of disease that occurred during a specific time period in a population at risk without accounting for the differences in the composition of the population.	A crude rate includes time so this is a measure of disease risk for the population	$\left\langle \frac{\text{Number of cancer cases during a specific time period}}{\text{American Indian population during the same time period}} \times 100{,}000 \right\rangle$
Stratified Rate	A crude rate calculated for a specific subgroup or stratum of people within a population. The stratified rate includes the number of new cases of disease that occurred during a specific time period in a population at risk for each subgroup or stratum of interest without accounting for other differences in the composition of the population	A stratified rate includes time, so this is a measure of disease risk for a specific subgroup in the population (age, race-ethnicity, gender)	$\left\langle \frac{\text{Number of cancer cases within a subgroup during a specific time period}}{\text{American Indian population within a subgroup during the same time period}} \times 100{,}000 \right\rangle$
Age-adjusted Rate	A direct age-adjusted rate is a rate that is calculated to "control" for any differences in the age structure of a population like the US population and American Indian/Alaska Native population.	A age-adjusted rate includes time so this is a measure of disease risk for the population	1. Crude Rate x Standard Population = Expected Cases 2. $\left\langle \frac{\text{Total Expected Cases}}{\text{Total Standard Population}} \times 100{,}000 \right\rangle$
95% Confidence Intervals (CI 95%)	A range of values defined so that there is a 95% probability that the value of the point estimate, or measure is within it	Used to compare two values to determine if they are different (statistically)	For rates $\text{Point estimate} \pm [1.96 \times \text{SE[point estimate]}]$ For matched odds ratios $\text{Log OR} \pm \left[1.96 \times \sqrt{\frac{1}{b} + \frac{1}{c}}\right]$ For standardized mortality ratios (SMR) $\text{SMR} \frac{+}{-} 1.96\left(\frac{\text{SMR}}{\text{Expected cases}}\right)^{1/2}$
Incidence Rate	The number of new cases per population in a given time period	Measure of the risk of developing a new condition within a specified period of time.	$\left\langle \frac{\text{Number of new cancer cases within a subgroup during a specific time period}}{\text{American Indian population within a subgroup during the same time period}} \times 100{,}000 \right\rangle$
Mortality Rate	The number of deaths per population in a given time period	Measure of the risk of death within a specified period of time.	$\left\langle \frac{\text{Number of death within a subgroup during a specific time period}}{\text{American Indian population within a subgroup during the same time period}} \times 100{,}000 \right\rangle$
Incidence Rate Ratios (IRR)		Incidence rate ratios (IRR) determine if racial disparities are observed in the rates of new cases of cancer	$\frac{\text{Incidence Rate for American Indians}}{\text{Incidence Rate for non} - \text{Hispanic Whites}}$ IRR < 1, no disparity IRR > 1, disparity
Mortality Rate Ratios (MRR)		Mortality rate ratios (MRR) were calculated to determine if racial disparities are observed in the mortality rates	$\frac{\text{Mortality Rate for American Indians}}{\text{Mortality Rate for non} - \text{Hispanic Whites}}$ MRR < 1, no disparity MRR > 1, disparity

PURPOSE

The purpose of the *Cancer Surveillance among American Indians in Arizona, Nevada, and Utah* is to address the cancer disparities that are present in the Phoenix and Tucson Indian Health Service Areas. This report focuses on American Indians and Alaska Natives (AI/AN) and cancer in terms of incidence and mortality. This cancer surveillance report demonstrates the current trends in cancer incidence and mortality using publicly available data from three databases.

INTRODUCTION

This is the first publication of the report *Cancer Surveillance among American Indians in Arizona, Nevada, and Utah* by the Inter Tribal Council of Arizona, Inc. (ITCA) Tribal Epidemiology Center (TEC). This report investigates selected cancer surveillance data from three major United States (U.S.) data sources for multiple cancer sites among American Indians and Alaska Natives (AI/ANs) in Arizona, Nevada, and Utah.

The three main cancer surveillance databases analyzed in this report include: Surveillance, Epidemiology and End Results (SEER), the National Program of Cancer Registries (NPCR), and the American College of Surgeons Commission on Cancer's (CoC) National Cancer Data Base (NCDB).

Cancer surveillance data for AI/ANs are used by key Tribal leaders, community health representatives (CHRs), health care providers (e.g., Indian Health Services, and other clinicians and nurses), and researchers to monitor cancer trends, focus cancer prevention efforts, plan programs, allocate resources, and develop public health policies.

Currently, there is a data lag, or a waiting period from when the patient is diagnosed with cancer by the provider to when the patient information is provided to the cancer registries. For SEER, the National Cancer Institute (NCI) estimates a standard delay of 22 months between the patient's cancer diagnosis year and when the patient's information is reported to SEER. SEER receives all of the cancer information annually in November, and the data are released to the public in the following spring. A patient diagnosed in 2009 would be reported to NCI no later than November of 2011 and then the data would be included in reporting in April 2012. Therefore, the most recent cancer estimates are on the average two years older than the current calendar year. Other registries have similar lag times.

The numeric codes used to identify different primary cancer types by the cancer registries are based on the International Classification for Disease for Oncology (ICD-O). ICD-O categorization has changed over time as scientific knowledge of cancer continues to increase. The ICD-O codes for cancer primary site are converted to SEER site group by cancer registry staff. A complete listing of SEER cancer site groups is available on-line at: http://seer.cancer.gov/siterecode/icdo3_d01272003/. Each registry converts ICD-O site codes as needed for the major primary cancer sites under study.

This publication includes age-adjusted incidence and mortality rates for several common cancer sites among AI/ANs from three different states, including Arizona, Nevada, and Utah. Incidence rates tell us about the new cases of disease in a population and the risk of disease. Age-adjusted

incidence rates can be compared across states when data collection methods are similar. Note that not all states participate in both the SEER and NPCR programs, and that participation has changed over time by state registry.

SEER provides an estimate of the age-adjusted incidence and mortality rates from participating registries, and these data should not be interpreted as a complete tally of all cancer cases diagnosed among AI/ANs living in the United States on and off Tribal lands.

SEER data are available for Arizona from 1973 – 2009, although data before 1992 may not be available by American Indian race/ethnicity. The Arizona Cancer Registry provides American Indian data to the New Mexico Tumor Registry. New Mexico then provides both Arizona American Indian and New Mexico cancer case information to SEER for creation of cancer estimates. Nevada participates in the NPCR program as well, but does not contribute data to SEER estimates.

Utah participates in the SEER program, but not in the NPCR program. Both on-line reporting tools and SEER*Stat were used to gather national and state level age-adjusted incidence rate information for Arizona, Nevada, and Utah.

Incidence rate ratios (IRR) were calculated to determine if racial disparities are observed in the rates of new cases of cancer. Age-adjusted incidence rates for AI/ANs were divided by the incidence rate of Non-Hispanic Whites (NHW) to examine potential racial disparities in the rate of new cases of cancer by cancer site in Arizona, Nevada, and Utah.

For additional information regarding state cancer registry participation and data methodology please refer to the Technical Notes section of this document.

Estimated age-adjusted mortality rates per 100,000 are also included for several common cancer sites among AI/ANs from Arizona, Nevada, and Utah. The cancer death information is compiled by the National Center for Health Statistics (NCHS) from death certificates. Arizona, Nevada, and Utah collect both race/ethnicity and Tribal affiliation on the death certificates; although, Tribal affiliation is often left incomplete and is not reported.

Mortality rate ratios (MRR) were calculated to determine if racial disparities are observed in the mortality rates comparing AI/ANs to NHWs in Arizona. Cancer mortality rates for AI/ANs in Nevada and Utah were unavailable due to small case counts (typically less than 20 cases).

Mortality to incidence ratios (MIRs) by cancer site were also constructed. An MIR is an estimate of survival from the cancer. The more fatal the cancer, the closer to 1.0 MIR will become. For example, MIRs for cancers (e.g., liver, pancreas, and lung) that are often diagnosed at later stages due to inadequate screening tools, the MIRs are closer to 1.0. A higher MIR (>1.0) shows that mortality is higher than reported incidence from the disease. MIRs higher than one are a common finding when cancer screening and cancer registries are not firmly established in developing countries.

This report also includes counts and proportions for the American Joint Commission on Cancer (AJCC) cancer stage at diagnosis and treatment information limited to the AI/ANs race/ethnicity from the NCDB. Additional information is available from NCDB, but not publicly.

Currently, most Indian Health Service (IHS) facilities do not treat cancer patients, and patients are referred outside of the IHS system for cancer care. However, few hospitals in Arizona (6%), Nevada (8%), and Utah (10%) are CoC approved hospitals that contribute data to NCDB. NCDB collects data from participating hospitals in an effort to improve quality of cancer care among their patients. For additional information regarding NCDB hospital participation and methodology, please refer to the Technical Notes section of this document.

When comparing cancer statistics, it is important to note that a small number of cases will impact the reliability of cancer trends over time. Statistical significance or the ability to statistically determine if two rates are truly different is heavily influenced by the number of cancer cases. Therefore, statistical significance should be interpreted with caution in this report. Additionally, small changes in rates may have little to no practical importance. Conversely, large changes in rates from year to year should be viewed with suspicion. Large shifts are likely due to changes in reporting, implementation of new screening programs, or small sample sizes for cancer cases.

Due to limited publicly available data, cancer data on American Indians in Nevada were obtained from a report published by the Bureau of Health Statistics, Planning, Epidemiology and Response, Nevada Central Cancer Registry titled Cancer in Nevada: 2005-2009. Cancer rates found in this report were cumulative over a 5-year time period.

This report is organized into nine main sections, and ordered in anticipation of community needs:

- Glossary
- Statistical Notes Table
- Purpose
- Introduction
- Executive Summary
- Analysis Highlights
- Action Items
- Tables and Figures
- Technical Notes

The Analysis Highlights include four sections. The first section focuses on cancers detectable at early stages by screening, including breast, cervical, prostate, and colorectal cancers. The second section includes cancer sites associated with or suspected to be associated with lifestyle factors, including: diet, exercise, tobacco use, and alcohol usage and/or sun exposure. These cancer sites include: lung, oral cavity, pharynx, tongue, liver, kidney/renal pelvis, esophageal, stomach, gallbladder and melanoma. The third section includes blood cancers, including, leukemia, lymphomas, and myelomas. The final section includes cancers of the thyroid and pancreas. Other rarer cancer sites were not included in this report, but additional analyses of rarer cancer sites can be provided to ITCA TEC Tribal partners upon special request for additional information by contacting us directly at: TECinfo@itcaonline.com .

EXECUTIVE SUMMARY

The following summary provides brief key findings found within the cancer surveillance report:

Data Barriers

- Cancer incidence and mortality data were not available for all years
- Arizona, Nevada, and Utah differ in their data collection and reporting methods:
  - Arizona reports cancer to NPCR and SEER
  - Nevada reports cancer cases only to NPCR
  - Utah reports cancer cases only to SEER
- Hospital participation in National Cancer Data Base quality improvement programs appears to be limited

Cancers Detected by Screening

- Breast
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.2. This indicates that although incidence is higher, individuals are not succumbing to breast cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence and mortality rate than NHWs (Table 3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).
- Cervical
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.5. This indicates that individuals are succumbing to cervical cancer at a slightly slower rate than they are being diagnosed (Table 1).
  - In Arizona, AIs and NHWs have a similar incidence rate (Table 2).
  - In Nevada, no data are available for incidence and mortality rates (Table 3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).
- Prostate
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.2. This indicates that although incidence is higher, individuals are not succumbing to prostate cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence than and similar mortality rates to NHWs (Table 3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).
- Colorectal
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.4. This indicates that individuals are succumbing to colorectal cancer at a slightly slower rate than they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate than NHWs (Table 3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).

Cancers Associated with Lifestyle and Environmental Factors

- Lung and Bronchus
  - Nationally, the incidence and mortality rate are similar, which equals a MIR of 1.0. This indicates that individuals are being diagnosed with lung cancer as fast as they are succumbing to the disease (Table 1).
  - In Arizona, AIs have a lower incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence and mortality rate than NHWs (Table 3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).
- Oral
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.2. This indicates that although incidence is higher, individuals are not succumbing to oral cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate than NHWs (Table 3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).
- Liver and Intrahepatic Bile Duct
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.6. This indicates that although incidence is higher, individuals are not succumbing to liver and intrahepatic bile duct cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a higher incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a higher incidence and lower mortality rates compared to NHWs (Table 3).
  - In Utah, AIs have a higher incidence rate than NHW (Table 4).
- Kidney and Renal Pelvis
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.3. This indicates that although incidence rate is higher, individuals are not succumbing to kidney/renal pelvis cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a higher incidence and mortality rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence and higher mortality rates compared to NHWs (Table 3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).
- Esophageal
  - Nationally, the incidence rate is slightly lower than the mortality rate, which equals a MIR of 1.1. This indicates that individuals are succumbing to esophageal cancer faster than they are being diagnosed (Table 1).
  - In Arizona, AIs have a higher incidence and mortality rate than NHWs (Table 2).
  - In Nevada, no data are available for incidence and mortality rates (Table3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).

- Stomach
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.6. This indicates that although incidence rate is higher, individuals are not succumbing to stomach cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a higher incidence and mortality rate than NHWs (Table 2).
  - In Nevada, no data are available for incidence and mortality rates (Table3).
  - In Utah, AIs have a higher incidence rate than NHWs (Table 4).
- Gallbladder
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.7. This indicates that although incidence rate is higher, individuals are not succumbing to gallbladder cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a higher incidence rate than NHWs (Table 2).
  - In Nevada, no data are available for incidence and mortality rates (Table3).
  - In Utah, AIs have a higher incidence rate than NHWs (Table 4).
- Melanoma
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.7. This indicates that although incidence rate is higher, individuals are not succumbing to melanoma as fast as they are being diagnosed (Table 1).
  - In Arizona, no data are available for incidence and mortality rates (Table 2).
  - In Nevada, AIs have a lower incidence rate compared to NHWs (Table3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).

Blood Cancers

- Leukemia
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.5. This indicates that although incidence rate is higher, individuals are not succumbing to leukemia as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence rate than NHWs (Table 2).
  - In Nevada, no data are available for incidence and mortality rates (Table3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).
- Non-Hodgkin's Lymphoma
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.4. This indicates that although incidence rate is higher, individuals are not succumbing to non-Hodgkin's lymphoma as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate than NHWs (Table3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).
- Myeloma
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.7. This indicates that although incidence rate is higher, individuals are not succumbing to myeloma as fast as they are being diagnosed (Table 1).

- In Arizona, AIs have a higher incidence rate than NHWs (Table 2).
- In Nevada, no data are available for incidence and mortality rates (Table3).
- In Utah, AIs have a higher incidence rate than NHWs (Table 4).

Other Cancers

- Thyroid
  - Nationally, the incidence rate is 8.9 per 100,000 (Table 1).
  - In Arizona, AIs have a lower incidence rate than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate than NHWs (Table3).
  - In Utah, AIs and NHWs have a similar incidence rate than NHWs (Table 4).
- Pancreas
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.7. This indicates that although incidence rate is higher, individuals are not succumbing to pancreatic cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have a lower incidence and mortality rates than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate and similar mortality rates compared to NHWs (Table3).
  - In Utah, no data are available for incidence and mortality rates (Table 4).
- Ovary
  - Nationally, the incidence rate is higher than the mortality rate, which equals a MIR of 0.5. This indicates that although incidence rate is higher, individuals are not succumbing to ovarian cancer as fast as they are being diagnosed (Table 1).
  - In Arizona, AIs have higher incidence and mortality rates than NHWs (Table 2).
  - In Nevada, AIs have a lower incidence rate than NHWs (Table3).
  - In Utah, AIs have a lower incidence rate than NHWs (Table 4).

ANALYSIS HIGHLIGHTS [1-5]

Cancers Detected By Screening

Breast

In 2009, the national incidence rate for breast cancer among AI/AN women was reported as 83.9 per 100,000 (95% CI: 73.1-95.7) and the mortality rate was reported as 15.9 (95% CI: 13.1-19.1) per 100,000 (Table 1, Figure 1a). The MIR was similar for AI/AN (0.2) and NHW (0.2) women indicating that a racial disparity was not present.

In 2008, the Arizona breast cancer incidence rate among AI/AN women was reported as 40.3 per 100,000 (95% CI: 30.2-52.7) and in 2009, the mortality rate was reported as 11.7 per 100,000 (95% CI: 6.5-19.3) (Table 2, Figure 2a). The IRR for AI/AN compared to NHW was 0.4 and the MRR was 0.6. This indicates that a racial disparity is not present for breast cancer incidence and mortality in Arizona. Only a small proportion of Arizona hospitals participate in NCDB (6%) and among these hospitals, most AI/AN women were diagnosed at early stages of breast cancer (stages 0-II)(Table 5).

Between 2005 and 2009, the Nevada breast cancer incidence rate among AI/AN women was reported as 24.7 per 100,000 and the mortality rate was reported as 7.7 per 100,000 (Table 3). The IRR for AI/AN compared to NHW was 0.2 and the MRR was 0.6. This indicates that a racial disparity is not present for breast cancer incidence and mortality in Nevada. Only a small proportion of Nevada hospitals participate in NCDB (8%) and among these hospitals, all AI/AN women were diagnosed at early stages of breast cancer (stages 0-II) (Table 5).

In 2009, Utah did not report any cases of breast cancer therefore incidence and mortality rates could not be calculated (Table 4). There were no hospitals in Utah that provide AI/AN breast cancer data to NCDB.

Cervical

In 2009, the national incidence rate for cervical cancer among AI/AN women was reported as 8.7 per 100,000 (95% CI: 5.6-12.9) and the mortality rate was reported as 4.2 per 100,000 (95% CI: 2.9-5.9) (Table 1, Figure 1a). The MIR was higher for AI/AN (0.5) compared to NHW (0.3) indicating a potential racial disparity in cervical cancer rates.

In 2008, the Arizona cervical cancer incidence rate among AI/AN women was reported as 7.4 per 100,000 (95% CI: 2.6-12.2) and in 2009, the mortality rate was not calculated due to cases totaling less than 10 (Table 2, Figure 2a). The IRR for AI/AN women compared to NHW women was 1.0, indicating that incidence was similar between both groups and a racial disparity for cervical cancer is not present in Arizona. Only a small proportion of Arizona hospitals participate in NCDB (6%) and among these hospitals, AI/AN women were diagnosed at early stages of cervical cancer (stages I-II) (Table 5).

Between 2005 and 2009, Nevada did not report any cases of cervical cancer therefore incidence and mortality rates could not be calculated (Table 3). Only a small proportion of Nevada hospitals participate

in NCDB (8%) and among these hospitals, one AI/AN woman was diagnosed at stage III cervical cancer (Table 5).

In 2009, Utah did not report any cases of cervical cancer therefore incidence and mortality rates could not be calculated (Table 4). There were no hospitals in Utah that provide AI/AN cervical cancer data to NCDB.

Prostate

In 2009, the national incidence rate for prostate cancer among AI/AN men was reported as 73.9 per 100,000 (95% CI: 61.8-87.4) and the mortality rate was reported as 16.6 per 100,000 (95% CI: 12.8-21.0) (Table 1, Figure 1a). The MIR was slightly higher for AI/AN (0.2) compared to NHW (0.1) although the MIR is low for both groups.

In 2008, the Arizona prostate cancer incidence rate among AI/AN men was reported as 77.6 per 100,000 (95% CI: 58.9-99.7) and in 2009, the mortality rate was reported as 6.8 per 100,000 (95% CI: 3.4-11.7) (Table 2, Table 2a). The IRR for AI/AN compared to NHW was 0.8 and the MRR was 0.9. This indicates a racial disparity is not present for prostate cancer incidence and mortality in Arizona. Only a small proportion of Arizona hospitals participate in NCDB (6%) and among these hospitals, AI/AN prostate cancer cases were diagnosed at stage II or higher (Table 5).

Between 2005 and 2009, the Nevada prostate cancer incidence rate among AI/AN men was reported as 49.5 per 100,000 and the mortality rate was reported as 23.1 per 100,000 (Table 3). The IRR for AI/AN compared to NHW was 0.4 and the MRR was 1.0. This indicates that a racial disparity is not present for prostate cancer incidence in Nevada. The mortality outcome for AI/AN and NHW were similar. In 2009, NCDB hospitals in Nevada did not report any AI/AN prostate cancer cases. (Table 5).

In 2009, the Utah prostate cancer incidence rate among AI men was reported as 8.4 per 100,000 (95% CI: 1.0-29.5) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/AN compared to NHW was 0.1, indicating a racial disparity is not present for prostate cancer incidence in Utah. There were no hospitals in Utah that provide AI/AN prostate cancer data to NCDB.

Colorectal

In 2009, the national incidence rate for colorectal cancer among AI/ANs was reported as 41.6 per 100,000 (95% CI: 35.6-48.2) and the mortality rate was reported as 16.7 per 100,000 (95% CI: 14.4-19.2) (Table 1, Figure 1a). The MIR was similar for AI/ANs (0.4) and NHWs (0.4) indicating that a racial disparity was not present.

In 2008, the Arizona colorectal cancer incidence rate among AI/ANs was reported as 24.8 per 100,000 (95% CI: 18.3-32.8) and in 2009, the mortality rate was reported as 8.8 per 100,000 (95% CI: 5.3-13.7) (Table 2, Figure 2a). The IRR for AI/ANs compared to NHWs was 0.7 and the MRR was 0.7. This indicates that a racial disparity is not present for colorectal cancer incidence and mortality in Arizona. Among the few Arizona hospitals reporting data to NCDB, only one AI/AN colorectal cancer case was diagnosed later than stage II (Table 5).

Between 2005 and 2009, the Nevada colorectal cancer incidence rate among AI/ANs was reported as 23.8 per 100,000 (Table 3). The incidence rate ratio for AI/ANs compared to NHWs was 0.5, indicating that a racial disparity is not present for colorectal cancer incidence. In 2009, Nevada reported only one AI/AN colorectal cancer case diagnosed at stage IV to NCDB data (Table 5).

In 2009, the Utah colorectal cancer incidence rate among AIs was reported as 15.7 per 100,000 (95% CI: 3.0-44.0) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 0.5 indicating a racial disparity is not present for colorectal cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN cervical cancer data to NCDB.

Cancers Associated With Lifestyle and Environmental Factors

Lung and bronchus

In 2009, the national incidence rate for lung and bronchus cancer among AI/ANs was reported as 38.1 per 100,000 (95% CI: 32.3-44.6) and the mortality rate was reported as 36.6 per 100,000 (33.1-40.2) (Table 1, Figure 1b). The MIR was higher for AI/ANs (1.0) compared to NHWs (0.8), indicating a potential racial disparity in lung and bronchus cancer rates.

In 2008, the Arizona lung and bronchus cancer incidence rate among AI/ANs was reported as 12.9 per 100,000 (95% CI: 8.2-19.1) and in 2009, the mortality rate was reported as 9.9 per 100,000 (95% CI: 6.0-15.2) (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 0.3 and the MRR was 0.2. This indicates that a racial disparity is not present for lung and bronchus cancer incidence and mortality in Arizona. In 2009, among the few Arizona hospitals reporting data to NCDB, four lung cancer cases were diagnosed at stage I, two at stage III and one at stage IV (Table 5).

Between 2005 and 2009, the Nevada lung and bronchus cancer incidence rate among AI/ANs was reported as 34.5 per 100,000 and the mortality rate was reported as 25.3 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.5 and the MRR was 0.5. This indicates that a racial disparity is not present for lung and bronchus cancer incidence and mortality. In 2009, among the few Nevada hospitals reporting data to NCDB, one stage III lung cancer case was reported (Table 5).

In 2009, the Utah lung cancer incidence rate among AI/ANs was reported as 18.9 per 100,000 (95% CI: 3.4-51.9) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 0.7, indicating a racial disparity is not present for lung cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN lung and bronchus cancer data to NCDB.

Oral cavity (including pharynx, tongue)

In 2009, the national incidence rate for oral cancers among AI/ANs was reported as 8.1 per 100,000 (95% CI: 5.8-11.1) and the mortality rate was reported as 1.8 per 100,000 (95% CI: 1.1-2.6) (Table 1, Figure 1b). The MIR was the same for AI/ANs (0.2) compared to NHWs (0.2) for oral cancers indicating that a racial disparity was not present.

In 2008, the Arizona oral cancer incidence rate among AI/ANs was reported as 5.1 per 100,000 (95% CI: 2.4-7.8) and in 2009, the mortality rate was not calculated due to cases totaling less than 10 (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 0.5, indicating that both groups have favorable oral cancer outcomes.

Between 2005 and 2009, the Nevada oral cancer incidence rate among AI/ANs was reported as 4.6 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.4, indicating that a racial disparity in oral cancer incidence was not present.

In 2009, Utah did not report any cases of oral cancer therefore incidence and mortality rates could not be calculated (Table 4). There were no hospitals in Utah that provide AI/AN oral cancer data to NCDB.

Liver and intrahepatic bile duct (IBD)

In 2009, the national incidence rate for liver and IBD cancers among AI/ANs was reported as 14.5 per 100,000 (95% CI: 11.2-18.4) and the mortality rate was reported as 8.7 per 100,000 (95% CI: 7.1-10.5) (Table 1, Figure 1b). The MIR for AI/ANs was 0.6 and 0.8 for NHWs indicating that although higher rates of liver and IBD cancers are observed for AI/ANs, NHWs may have overall worse outcomes.

In 2008, the Arizona the liver and IBD cancer incidence rate among AI/ANs was reported as 8.4 per 100,000 (95% CI: 4.9-13.3) and in 2009, the mortality rate was reported as 9.0 per 100,000 (95% CI: 5.2-14.2) (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 1.5 and the MRR was 1.8. This indicates that a racial disparity is present for liver and IBD cancer incidence and mortality in Arizona.

Between 2005 and 2009, Nevada the liver and IBD cancer incidence rate among AI/ANs was reported as 6.5 per 100,000 and the mortality rate was reported as 3.9 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 1.2 and the MRR was 0.8. This indicates that a racial disparity in liver and IBD cancer exists for incidence, but not for mortality.

In 2009, the Utah liver and IBD cancer incidence rate among AI/ANs was reported as 10.9 per 100,000 (95% CI: 1.0-37.5) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 2.6, indicating a racial disparity is present for liver and IBD cancer incidence and mortality in Utah. No hospitals in Utah provided AI/AN liver and IBD cancer data to NCDB.

Kidney and renal pelvis

In 2009, the national incidence rate for kidney and renal pelvis cancers among AI/ANs was reported as 21.3 per 100,000 (95% CI: 17.2-26.0) and the mortality rate was reported as 6.0 per 100,000 (95%CI: 4.6-7.5) (Table 1, Figure 1b). The MIR was the same for AI/ANs (0.3) and NHWs (0.3) for kidney renal pelvic cancers, which indicates that a racial disparity was not present

In 2008, the Arizona kidney and renal pelvis cancer incidence rate among AI/ANs was reported as 18.3 per 100,000 (95% CI: 13.1-24.8) and the mortality rate was reported as 6.6 per 100,000 (95% CI: 3.6-11.0) (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 1.3 and the MRR was 1.9. This indicates a racial disparity is present for kidney and renal pelvis cancer incidence and mortality in

Arizona. The majority of cases diagnosed at NCDB hospitals (57.2%) were diagnosed at early stages (I-II) (Table 5).

Between 2005 and 2009, the Nevada kidney and renal pelvis cancer incidence rate among AI/ANs was reported as 10.9 per 100,000 and the mortality rate was reported as 5.4 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.8 and the MRR was 1.4. This indicates that a racial disparity is present for kidney and renal pelvis cancer for mortality and not incidence. In 2009, two early stage cases of kidney and renal pelvis cancer were diagnosed at Nevada NCDB hospitals (Table 5).

In 2009, the Utah kidney and renal pelvis cancer incidence rate among AI/ANs was reported as 9.2 per 100,000 (95% CI: 0.9-32.5) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 0.8, indicating a racial disparity is not present for kidney and renal pelvis cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN kidney and renal pelvis cancer data to NCDB.

Esophageal

In 2009, the national incidence rate for esophageal cancers among AI/ANs was reported as 3.1 per 100,000 (95% CI: 1.6-5.3) and the mortality rate was reported as 3.5 per 100,000 (95% CI: 2.5-4.6) (Table 1, Figure 1b). The MIR was higher for AI/ANs (1.1) compared to NHWs (0.9) for esophageal cancer, indicating that there may be a racial disparity in lung cancer rates.

In 2008, the Arizona esophageal cancer incidence rate among AI/ANs was reported as 5.6 per 100,000 (95% CI: 0.8-8.3) and in 2009, the mortality rate was reported as 4.1 per 100,000 (95% CI: 1.9-7.7) (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 1.3 and the MRR was 1.1. This indicates that a racial disparity is present for esophageal cancer incidence and mortality in Arizona.

Between 2005 and 2009, Nevada did not report any cases of esophageal cancer among AI/ANs (Table 3).

In 2009, Utah did not report any cases of esophageal cancer among AI/ANs (Table 4). There were no hospitals in Utah that provided AI/AN esophageal cancer data to NCDB.

Stomach

In 2009, the national incidence rate for stomach cancers among AI/ANs was reported as 9.5 per 100,000 (95% CI: 6.8-12.9) and the mortality rate was reported as 5.8 per 100,000 (95% CI: 4.5-7.3) (Table 1, Figure 1b). The MIR for AI/ANs was 0.6 and 0.5 for NHWs, indicating that there is a racial disparity among AI/ANs for stomach cancers.

In 2008, the Arizona stomach cancer incidence rate among AI/ANs was reported as 12.8 per 100,000 (95% CI: 8.1-19.0) and in 2009, the mortality rate was reported as 6.9 per 100,000 (95% CI: 3.7-11.6) (Table 2, Figure 2b). The IRR for AI/ANs compared to NHWs was 3.0 and the MRR was also 3.0. This indicates that a disparity is present in both groups for stomach cancer incidence and mortality in Arizona.

Between 2005 and 2009, Nevada did not report any cases of stomach cancer among AI/ANs (Table 3).

In 2009, the Utah stomach cancer incidence rate among AI/ANs was reported as 5.9 per 100,000 (95% CI: 0.7-23.6) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 1.4, indicating a racial disparity is present for stomach cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN cancer data to NCDB.

Gallbladder

In 2009, the national incidence rate for gallbladder cancers among AI/ANs was reported as 2.0 per 100,000 (95% CI: 0.9-3.9) and the mortality rate was reported as 1.3 per 100,000 (95% CI: 0.7-2.1) (Table 1, Figure 1b). The MIR for AI/ANs was 0.7 and was 0.5 for NHWs for gallbladder cancers, indicating a potential racial disparity among AI/ANs for gallbladder cancer.

In 2008, the Arizona gallbladder cancer incidence rate among AI/ANs was reported as 4.5 per 100,000 (95% CI: 0.9-8.1) and the mortality rate was not calculated due to cases totaling less than 10 (Table 2). The IRR for AI/ANs compared to NHWs was 2.1, which indicates that a racial disparity is present for gallbladder cancer incidence in Arizona.

Between 2005 and 2009, Nevada did not report any cases of gallbladder cancer among AI/ANs (Table 3).

In 2009, the Utah gallbladder cancer incidence rate among AI/ANs was reported as 4.6 per 100,000 (95% CI: 0.1-23.8) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 5.1, indicating a racial disparity is present for gallbladder cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN gallbladder cancer data to NCDB.

Melanoma

In 2009, the national incidence rate for melanoma among AI/ANs was reported as 4.6 per 100,000 (95% CI: 2.8-6.9) and the mortality rate was reported as 3.3 per 100,000 (95% CI: 2.3-4.5) (Table 1, Figure 1b). The MIR was higher for AI/ANs (0.7) compared to NHWs (0.1) for melanoma indicating a potential racial disparity among AI/ANs.

In 2008 and 2009, Arizona did not report any cases of melanoma therefore incidence and mortality rates could not be calculated (Table 2, Figure 2b).

Between 2005 and 2009, the Nevada melanoma incidence rate among AI/ANs was 4.2 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.2. This indicates that a racial disparity is not present for melanoma incidence in Nevada. In 2009, Nevada diagnosed and reported two early stage cases of melanoma among AI/ANs at NCDB hospitals (Table 5).

In 2009, Utah did not report any cases of melanoma among AI/ANs (Table 4). There were no hospitals in Utah that provided AI/AN melanoma data to NCDB.

Blood Cancers

Leukemia

In 2009, the national incidence rate for leukemia among AI/ANs was reported as 8.2 per 100,000 (95% CI: 5.7-11.3) and the mortality rate was reported as 4.1 per 100,000 (95% CI: 3.1-5.5) (Table 1, Figure 1c). The MIR for AI/ANs was 0.5 and 0.6 for NHWs, indicating that a racial disparity does not exist among AI/ANs for leukemia.

In 2008, the Arizona leukemia incidence rate among AI/ANs was reported as 5.3 per 100,000 (95% CI: 2.8-7.7) and in 2009, the mortality rate was not calculated due to cases totaling less than 10 (Table 2, Figure 2c). The IRR for AI/ANs compared to NHWs was 0.5, which indicates that a racial disparity is not present for leukemia incidence in Arizona.

Between 2005 and 2009, Nevada did not report any cases of leukemia among AI/ANs (Table 3).

In 2009, the Utah leukemia incidence rate among AI/ANs was reported as 7.8 per 100,000 (95% CI: 0.2-34.0) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 0.7, indicating a racial disparity is not present for leukemia in Utah. There were no hospitals in Utah that provided AI/AN leukemia data to NCDB.

Non-Hodgkin's lymphoma

In 2009, the national incidence rate for non-Hodgkin's lymphoma among AI/ANs was reported as 13.6 per 100,000 (95% CI: 10.2-17.6) and the mortality rate was reported as 5.3 per 100,000 (95% CI: 4.0-6.8) (Table 1, Figure 1c). The MIR for AI/ANs was 0.4 and 0.3 for NHWs, indicating that there may be a racial disparity among AI/ANs for non-Hodgkin's lymphoma.

In 2008, the Arizona non-Hodgkin's lymphoma incidence rate among AI/ANs was reported as 9.8 per 100,000 (95% CI: 5.9-15.3) and in 2009, the mortality rate was not calculated due to cases totaling less than 10 (Table 2). The IRR for AI/ANs compared to NHWs was 0.7, which indicates that a racial disparity is not present for non-Hodgkin's lymphoma incidence in Arizona. Only one AI/AN case of non-Hodgkin's lymphoma was diagnosed at an NCDB hospital and it was early stage (Table 5).

Between 2005 and 2009, the Nevada non-Hodgkin's lymphoma incidence rate among AI/ANs was reported as 8.5 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.5. This indicates that a racial disparity is not present for non-Hodgkin's Lymphoma incidence in Nevada. In 2009, Nevada did not report any cases of non-Hodgkin's lymphoma among AI/ANs diagnosed at NCDB hospitals (Table 5).

In 2009, the Utah non-Hodgkin's lymphoma incidence rate among AI/ANs was reported as 6.1 per 100,000 (95% CI: 0.7-24.2) and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 0.3, indicating a racial disparity is not present for non-Hodgkin's lymphoma in Utah. There were no hospitals in Utah that provided AI/AN non-Hodgkin's lymphoma data to NCDB.

Myeloma

In 2009, the national incidence rate for myeloma among AI/ANs was reported as 4.6 per 100,000 (95% CI: 2.7-7.1) and the mortality rate was reported as 3.3 per 100,000 (95% CI: 2.3-4.5) (Table 1, Figure 1c). The MIR was 0.7 for AI/ANs and 0.6 for NHWs, indicating that there is not a large racial disparity among AI/ANs for myeloma.

In 2008, the Arizona myeloma incidence rate among AI/ANs was reported as 5.0 per 100,000 (95% CI: 1.7-8.3) and in 2009, the mortality rate was not calculated due to cases totaling less than 10 (Table 2, Figure 2c). The IRR for AI/ANs compared to NHWs was 1.3, which indicates that a racial disparity is present for myeloma incidence in Arizona.

Between 2005 and 2009, Nevada did not report any cases of myeloma among AI/ANs (Table 3).

In 2009, the Utah myeloma incidence rate among AI/ANs was reported as 11.6 per 100,000 (95% CI: 1.1-38.7), and the mortality rate was not calculated due to cases totaling less than 10 (Table 4). The IRR for AI/ANs compared to NHWs was 2.4, indicating a racial disparity is present for myeloma in Utah. There were no hospitals in Utah that provided AI/AN myeloma data to NCDB.

Other Cancers

Thyroid

In 2009, the national incidence rate for thyroid cancer among AI/ANs was reported as 8.9 per 100,000 (95% CI: 6.5-11.8), and the mortality rate was not calculated due to cases totaling less than 16 (Table 1, Figure 1d).

In 2008, the Arizona thyroid cancer incidence rate among AI/ANs was reported as 6.8 per 100,000 (95% CI: 3.9-11.0) and in 2009, the mortality rate was not calculated due to cases totaling less than 16 (Table 2, Figure 2d). The IRR for AI/ANs compared to NHWs was 0.5, which indicates a racial disparity is not present for thyroid cancer incidence in Arizona.

Between 2005 and 2009, the Nevada thyroid cancer incidence rate among AI/ANs was reported as 13.1 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.5. This indicates that a racial disparity is not present for thyroid cancer incidence in Nevada. In 2009, Nevada did not report or diagnose any cases of thyroid cancer at NCDB hospitals for AI/ANs (Table 5).

In 2009, the Utah thyroid cancer incidence rate among AI/ANs was reported as 20.2 per 100,000 (95% CI: 8.4-42.8) and the mortality rate was not calculated due to cases totaling less than 10 (Table 3). The IRR for AI/ANs compared to NHWs was 1.0, indicating a racial disparity is not present for thyroid cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN thyroid cancer data to NCDB.

Pancreas

In 2009, the national incidence rate for pancreatic cancers among AI/ANs was reported as 10.7 per 100,000 (95% CI: 7.8-14.2) and the mortality rate was reported as 7.3 per 100,000 (95% CI: 5.8-9.0) (Table 1). The MIR for AIs was 0.7 and 0.9 for NHWs, indicating that a racial disparity is not present among AI/ANs for pancreatic cancer.

In 2008, the Arizona pancreatic cancer incidence rate among AI/ANs was reported as 6.2 per 100,000 (95% CI: 2.5-10.0), and in 2009, the mortality rate was reported as 7.4 per 100,000 (95% CI: 4.0-12.2) (Table 2, Figure 2d). The IRR for AI/ANs compared to NHWs was 0.6 and the MRR was 0.8. This indicates that a racial disparity is not present for pancreatic cancer incidence and mortality in Arizona.

Between 2005 and 2009, the Nevada pancreatic cancer incidence rate among AI/ANs was reported as 9.0 per 100,000 and the mortality rate was reported as 10.8 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.8 and the MRR was 1.0. This indicates that a racial disparity in pancreatic cancer incidence is not present in Nevada. The mortality outcome for AI/ANs and NHWs are similar.

In 2009, Utah did not report any cases of pancreatic cancer for AI/ANs (Table 4). There were no hospitals in Utah that provided AI/AN pancreatic cancer data to NCDB.

Ovary

In 2009, the national incidence rate for ovarian cancers among AI/ANs was reported as 13.3 per 100,000 (95% CI: 9.2-18.6) and the mortality rate was reported as 7.3 per 100,000 (95% CI: 5.4-9.6) (Table 1, Figure 1d). The MIR for AI/ANs was 0.5 and 0.6 for NHWs, indicating that a racial disparity does not exist among AI/ANs for ovarian cancer.

In 2008, the Arizona ovarian cancer incidence rate among AI/ANs was reported as 14.7 per 100,000 (95% CI: 9.0-22.7) and in 2009, the mortality rate was reported as 6.3 per 100,000 (95% CI: 3.2-10.9) (Table 2, Figure 2d). The IRR for AI/ANs compared to NHWs was 1.3 and the MRR was 1.6. This indicates a racial disparity is present for ovarian cancer incidence and mortality among AI/AN women in Arizona.

Between 2005 and 2009, the Nevada ovarian cancer incidence rate among AI/ANs was 7.1 per 100,000 (Table 3). The IRR for AI/ANs compared to NHWs was 0.6 indicating a racial disparity is not present for incidence rates in Nevada.

In 2009, the Utah ovarian cancer incidence rate among AI/ANs was reported as 3.1 per 100,000 (95% CI: 0.1-19.6) and the mortality rate was not calculated due to cases totaling less than 10 (Table 3). The IRR for AI/ANs compared to NHWs was 0.6, indicating a racial disparity is not present for ovarian cancer incidence in Utah. There were no hospitals in Utah that provided AI/AN ovarian cancer data to NCDB.

ACTION ITEMS [6-32]

Below are points of action organized by information specifically geared to individuals, tribal communities, tribal health care providers, tribal leaders, and researchers in an effort to prevent, detect, and improve quality of life and survival from cancers. These action items are mostly specific to cancers that have high rates, or show disparities among American Indians in Arizona, Nevada, and Utah, although many action items may apply to several or all cancers in general.

Individuals

- Eat a diet high in fresh fruits and vegetables (organic when possible) and avoid high calorie and high fat diets [8]

- Maintain a healthy weight and be sure to manage diabetes and high blood pressure. These factors are important for many chronic diseases, and may play a role in certain cancers as well [9-10]

- Avoid commercial tobacco use [11]

- Get vaccinated against viruses that cause cancer [12]

    - Infants (0-1 year) should get vaccinated for the hepatitis A &B viruses. If adolescents and adults were not vaccinated for hepatitis A and B, the vaccines can be provided. Hepatitis B is a major cause of liver cancer and can be prevented.[13]

    - AI/AN youngsters (girls and boys 9 – 12 years of age) should get vaccinated for Human Papilloma Virus (HPV) according to the recommended guidelines.[14-15] Cervical and penile cancers are caused by HPV. There are many different kinds of HPV. The HPV vaccine currently can vaccinate against many, but not all, types of HPV. Since AI women are more likely than other women to die from cervical cancer and more AI men are likely to develop penile cancer than Non-Hispanic Whites or Blacks (data not shown) HPV vaccination is particularly important to prevent these cancers among AI/AN groups.

- Get screened[16] for the following cancers according to the current recommended guidelines for:
    - Breast[17]
    - Cervical[18]
    - Colorectal[19]
    - Prostate cancer[20]

Cancer often has no symptoms in the earliest stages when the disease is most treatable. Screening will help detect cancers in earlier stages. Early stages are when cancers are often highly treatable and

recovery from cancer is likely. If you have an abnormal screening test, be sure to follow up per your health care providers' instructions.

Tribal Communities

- Provide access to affordable healthy food choices like fruits, vegetables, lean meats, and low fat options [21-22]
- Provide local cancer support groups for cancer patients and survivors [23]
- Promote cancer awareness activities and campaigns in the community, including conferences, walking and running event [24]
- Promote safe public areas free from commercial tobacco use for exercise and recreation [25]
- Create built environments that allow for healthy lifestyles [26]

Tribal Health Care Providers

- Promote wellness and a healthy lifestyle [27]
- Inform patients regarding necessary vaccinations and promote cancer screening to detect cancer early [12-16]
- Listen to patients concerns regarding cancer and provide education as needed

Tribal Leaders

- Promote the collection of data to support the development of public health codes for a clean environment on tribal lands free of toxins in the water and air [28-29]
- Support tribal health codes for clean air and food on tribal lands
- Promote and support policies that create built environments that allow for healthy lifestyles in tribal communities
- Support funding efforts for cancer screening to detect cancer early, particularly for cancers with a high racial disparity like cervical cancer

Researchers

- Work to improve AI/AN surveillance data with tribes, Indian Health Service, state cancer registries and Tribal Epidemiology Centers

- Use a community based participatory research style that focuses on the research process not just outcomes when working with tribal populations in regards to cancer research questions [30]

- Conduct studies and collect data that focus on improving the quality of care for cancer patients in the South West

- Conduct studies that focus on the association between environmental risk factors (jet fuel, bomb blasts, heavy metal contaminants, radon[31-32], etc.) in the air and water and chronic disease etiology, including cancer

TABLES AND FIGURES

National

Table 1. Age-adjusted SEER Incidence and Mortality Rates per 100,000 by cancer site for American Indian/Alaska Native, 2009 [a,b]

CANCER SITE	IR	95% CI	MR	95% CI	MIR: AIAN	MIR: NHW
Cancers Detected by Screening						
Breast (Female)	83.9	73.1 – 95.7	15.9	13.1 – 19.1	0.2	0.2
Cervix Uteri	8.7	5.6 – 12.9	4.2	2.9 – 5.9	0.5	0.3
Prostate	73.9	61.8 – 87.4	16.6	12.8 – 21.0	0.2	0.1
Colon/Rectum	41.6	35.6 – 48.2	16.7	14.4 – 19.2	0.4	0.4
Cancers Associated with Lifestyle and Environmental Factors						
Lung/Bronchus	38.1	32.3 – 44.6	36.6	33.1 – 40.2	1.0	0.8
Oral Cavity/Pharynx	8.1	5.8 – 11.1	1.8	1.1 – 2.6	0.2	0.2
Liver/IBD	14.5	11.2 – 18.4	8.7	7.1 – 10.5	0.6	0.8
Kidney/Renal Pelvis	21.3	17.2 – 26.0	6.0	4.6 – 7.5	0.3	0.3
Esophagus	3.1	1.6 – 5.3	3.5	2.5 – 4.6	1.1	0.9
Stomach	9.5	6.8 – 12.9	5.8	4.5 – 7.3	0.6	0.5
Gallbladder	2.0	0.9 – 3.9	1.3	0.7 – 2.1	0.7	0.5
Melanoma	4.6	2.8 – 6.9	3.3	2.3 – 4.5	0.7	0.1
Blood Cancers						
Leukemia	8.2	5.7 – 11.3	4.1	3.1 – 5.5	0.5	0.6
Non-Hodgkin Lymphoma	13.6	10.2 – 17.6	5.3	4.0 – 6.8	0.4	0.3
Myeloma	4.6	2.7 – 7.1	3.3	2.3 – 4.5	0.7	0.6
Other Cancers						
Thyroid	8.9	6.5 – 11.8	N/A[c]	N/A[c]	N/A[c]	N/A
Pancreas	10.7	7.8 – 14.2	7.3	5.8 – 9.0	0.7	0.9
Ovary	13.3	9.2 – 18.6	7.3	5.4 – 9.6	0.5	0.6

[a] Age-adjusted to the 2000 U.S. Standard Population; [b] Rates for AI/AN are based on the CHSDA (Contract Health Service Delivery Area) counties
[c] Data not available

Abbreviations:
IR: incidence rate; MR: mortality rate; MIR: mortality incidence ratio; AIAN: American Indian/Alaska Native; NHW: Non-Hispanic White
N/A: Not available; too few cases to calculate rates and ratios; 95% CI: 95% confidence interval

Figure 1a. Age-adjusted SEER incidence and mortality rates per 100,000 by cancers detected by screening for American Indian/Alaska Native, 2009

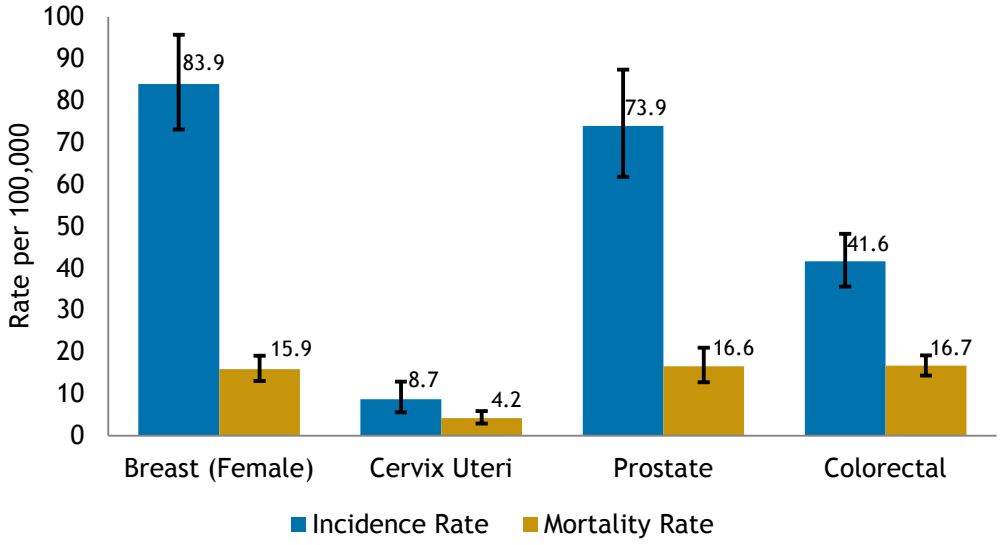


Figure 1b. Age-adjusted SEER incidence and mortality rates per 100,000 by cancers associated with lifestyle and environmental factors for American Indian/Alaska Native, 2009

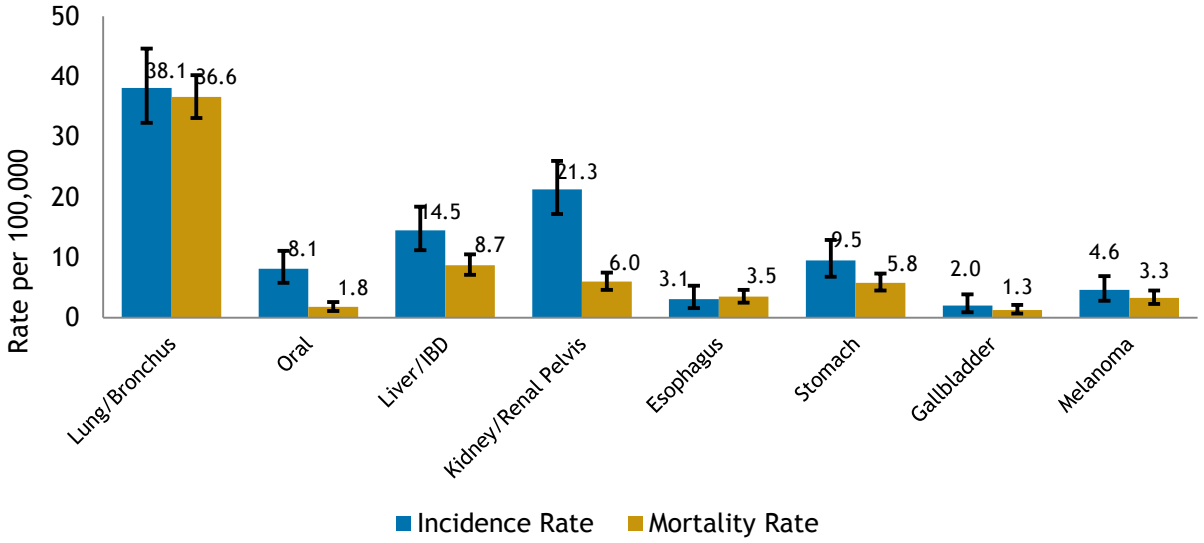


Figure 1c. Age-adjusted SEER incidence and mortality rates per 100,000 by blood cancers for American Indian/Alaska Native, 2009

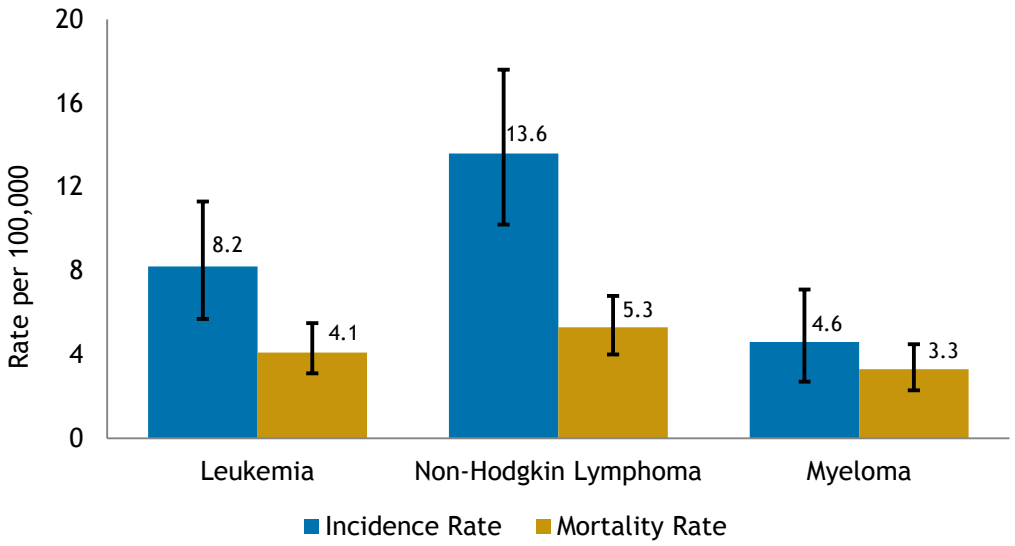
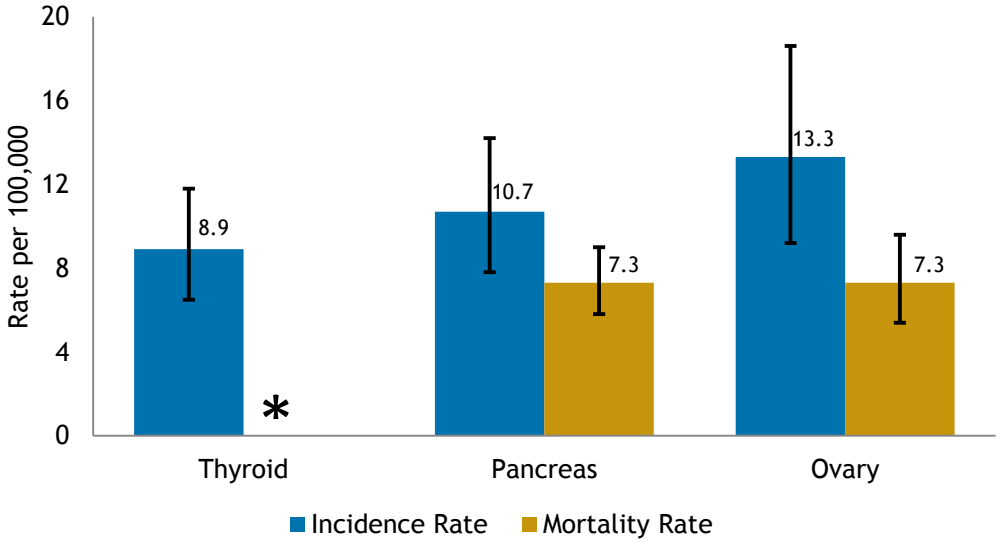


Figure 1d. Age-adjusted SEER incidence and mortality rates per 100,000 by other cancers for American Indian/Alaska Native, 2009



* *Data not available.*

Arizona

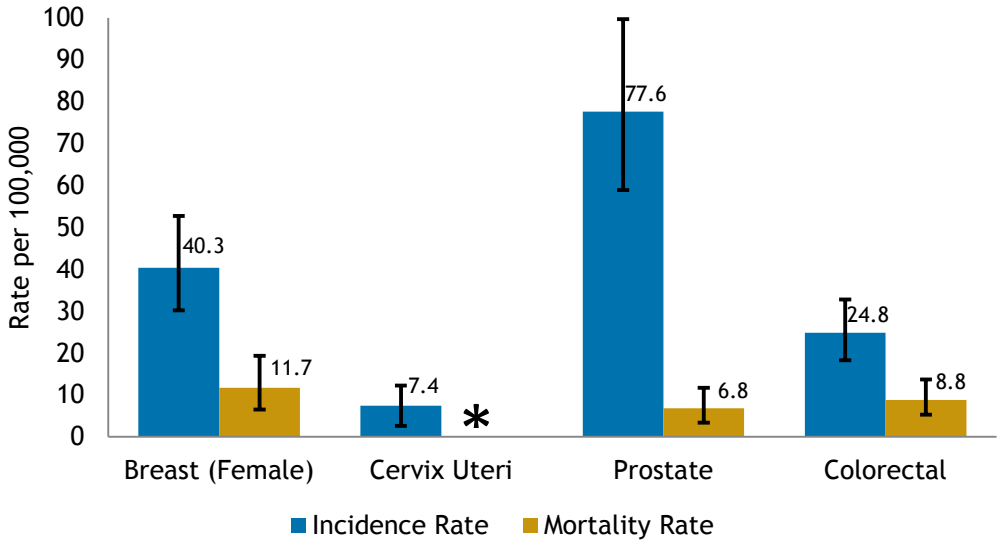
Table 2. Arizona age-adjusted incidence rates (2008) and mortality rates (2009) per 100,000 and rate ratios by cancer site for American Indian/Alaska Native

CANCER SITE	IR	95% CI	IRR AIAN:NHW	MR	95% CI	MRR AIAN:NHW
Cancers Detected by Screening						
Breast (Female)	40.3	30.2 – 52.7	0.4	11.7	6.5 – 19.3	0.6
Cervix Uteri	7.4 [d]	2.6 – 12.2	1.0	N/A [e]	N/A [e]	N/A [e]
Prostate	77.6	58.9 – 99.7	0.8	6.8	3.4 – 11.7	0.9
Colon/Rectum	24.8	18.3 – 32.8	0.7	8.8	5.3 – 13.7	0.7
Cancers Associated with Lifestyle and Environmental Factors						
Lung/Bronchus	12.9	8.2 – 19.1	0.3	9.9	6.0 – 15.2	0.2
Oral Cavity/Pharynx	5.1 [d]	2.4 – 7.8	0.5	N/A [e]	N/A [e]	N/A [e]
Liver/IBD	8.4	4.9 – 13.3	1.5	9.0	5.2 – 14.2	1.8
Kidney/Renal Pelvis	18.3	13.1 – 24.8	1.3	6.6	3.6 – 11.0	1.9
Esophagus	5.6 [d]	0.8 – 8.3	1.3	4.1	1.9 – 7.7	1.1
Stomach	12.8	8.1 – 19.0	3.0	6.9	3.7 – 11.6	3.0
Gallbladder	4.5 [d]	0.9 – 8.1	2.1	N/A [e]	N/A [e]	N/A [e]
Melanoma	N/A [e]	N/A [e]	N/A [e]	N/A [e]	N/A [e]	N/A [e]
Blood Cancers						
Leukemia	5.3 [d]	2.8 – 7.7	0.5	N/A [e]	N/A [e]	N/A [e]
Non-Hodgkin Lymphoma	9.8	5.9 – 15.3	0.7	N/A [e]	N/A [e]	N/A [e]
Myeloma	5.0 [d]	1.7 – 8.3	1.3	N/A [e]	N/A [e]	N/A [e]
Other Cancers						
Thyroid	6.8	3.9 – 11.0	0.5	N/A [e]	N/A [e]	N/A [e]
Pancreas	6.2 [d]	2.5 – 10.0	0.6	7.4	4.0 – 12.2	0.8
Ovary	14.7	9.0 – 22.7	1.3	6.3	3.2 – 10.9	1.6

[a] Age-adjusted to the 2000 U.S. Standard Population; [b] Data from the National Program of Cancer Registries United States Cancer Statistics. http://apps.nccd.cdc.gov/DCPC_INCA/DCPC_INCA.aspx; [c] Data from SEER*Stat 8.0.1. Accessed November 2012; [d] Incidence rates from Arizona Cancer Registry Database Cancer Query for 2008. http://healthdata.az.gov/query/module_selection/azcr/AzCRSelection.html. Accessed October 2012.; [e] Data not available

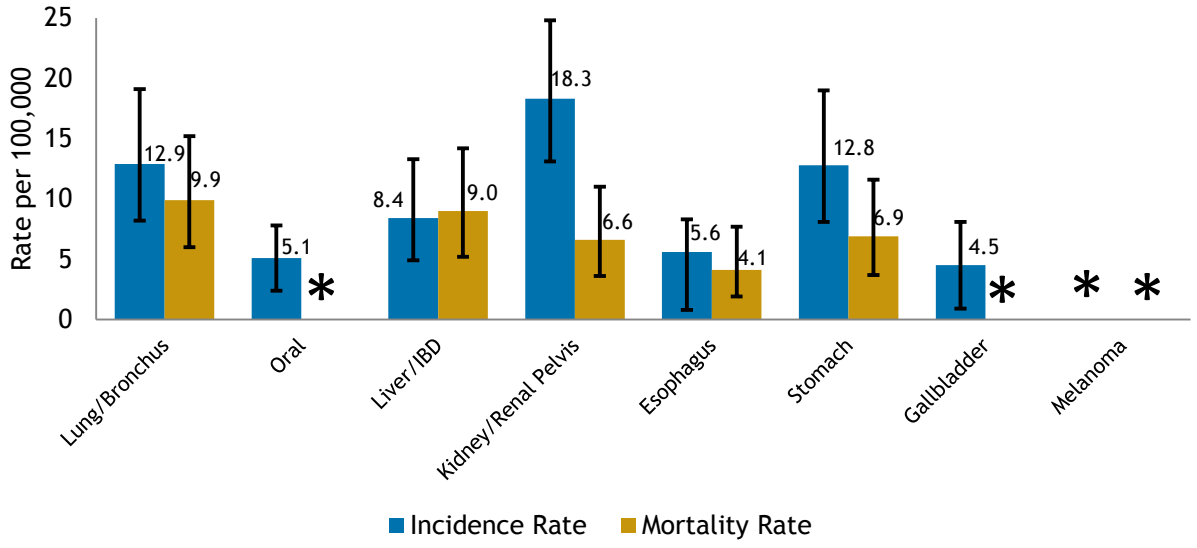
Abbreviations:
IR: incidence rate; IRR: incidence rate ratio; MR: mortality rate; MRR: mortality rate ratio; AIAN: American Indian/Alaska Native; NHW: Non-Hispanic White; N/A: Not available; too few cases to calculate rates and ratios; 95% CI: 95% confidence interval

Figure 2a. Arizona age-adjusted incidence rates (2008) and mortality rates (2009) per 100,000 and rate ratios by cancers detected by screening for American Indian/Alaska Native



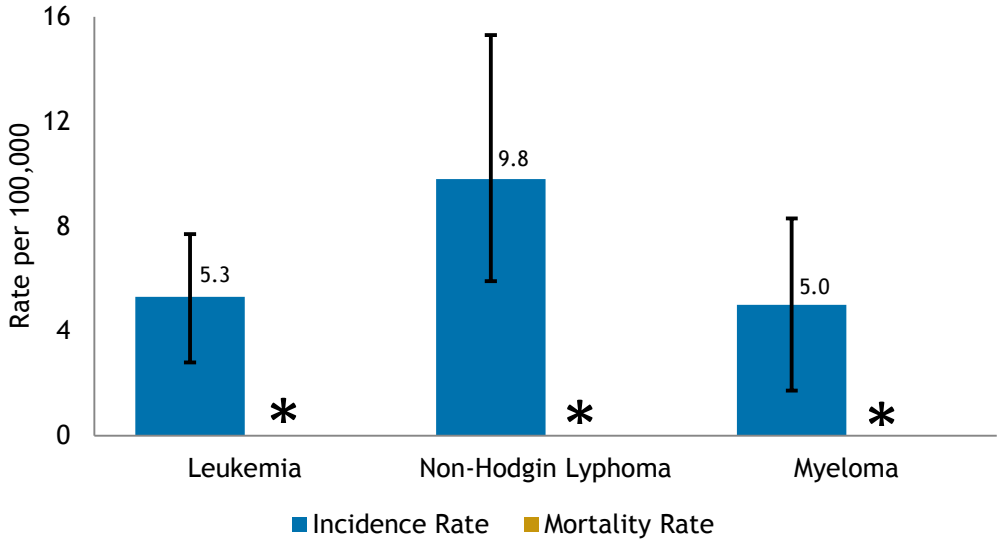
* *Data not available.*

Figure 2b. Cancers Associated with Lifestyle and Environmental Factors



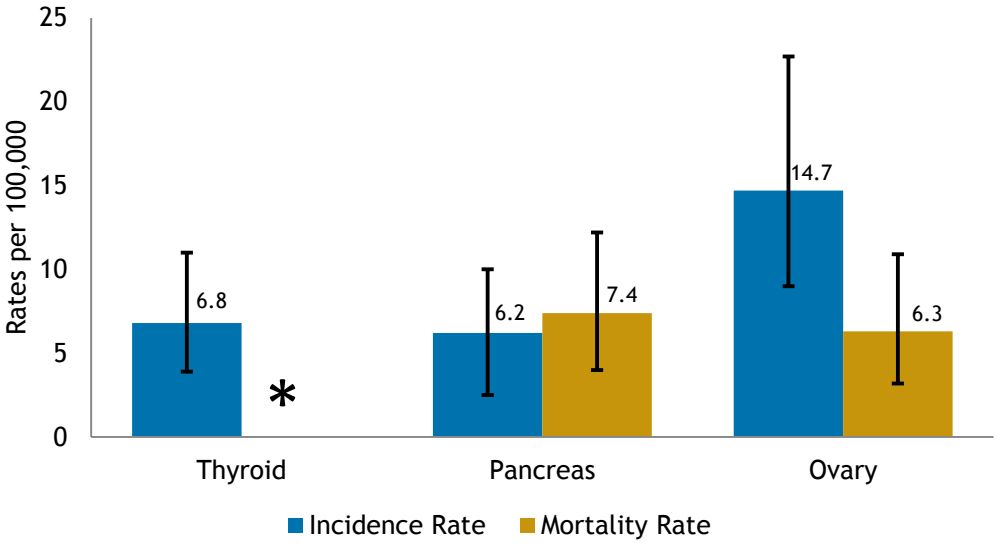
* *Data not available.*

Figure 2c. Arizona age-adjusted incidence rates (2008) and mortality rates (2009) per 100,000 and rate ratios by blood cancers for American Indian/Alaska Native



* *Data not available.*

Figure 2d. Arizona age-adjusted incidence rates (2008) and mortality rates (2009) per 100,000 and rate ratios by other cancers for American Indian/Alaska Native



* *Data not available.*

Nevada

Table 3. Nevada age-adjusted incidence rates and mortality rates per 100,000 and rate ratios by cancer site for American Indian/Alaska Native, 2005-2009 [a,b]

CANCER SITE	IR	IRR AIAN:NHW	MR	MRR AIAN:NHW
Cancers Detected by Screening				
Breast (Female)	24.7	0.2	7.7	0.6
Cervix Uteri	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Prostate	49.5	0.4	23.1	1.0
Colorectal	23.8	0.5	N/A[c]	N/A[c]
Cancers Associated with Lifestyle and Environmental Factors				
Lung/Bronchus	34.5	0.5	25.3	0.5
Oral Cavity/Pharynx	4.6	0.4	[b]	[b]
Liver/IBD	6.5	1.2	3.9	0.8
Kidney/Renal Pelvis	10.9	0.8	5.4	1.4
Esophagus	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Stomach	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Gallbladder	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Melanoma	4.2	0.2	N/A[c]	N/A[c]
Blood Cancers				
Leukemia	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Non-Hodgkin Lymphoma	8.5	0.5	N/A[c]	N/A[c]
Myeloma	N/A[c]	N/A[c]	N/A[c]	N/A[c]
Other Cancers				
Thyroid	13.1	0.5	N/A[c]	N/A[c]
Pancreas	9.0	0.8	10.8	1.0
Ovary	7.1	0.6	N/A[c]	N/A[c]

[a] Age-adjusted to the 2000 U.S. Standard Population; [b] Data are from the *Cancer in Nevada: 2005-2009* Report from the Bureau of Health Statistics, Planning, Epidemiology and Response, Nevada Central Cancer Registry. http://health.nv.gov/PUBLICATIONS/2005-2009_Cancer_in_Nevada.pdf ; [c] Data not available; too few cases to calculate rates and ratios

Abbreviations:
IR: incidence rate; IRR: incidence rate ratio; MR: mortality rate; MRR: mortality rate ratio; AIAN: American Indian/Alaska Native; NHW: Non-Hispanic White; N/A: Not available; too few cases to calculate rates and ratios; 95% CI: 95% confidence interval

Utah

Table 4. Utah age-adjusted incidence rates and mortality rates per 100,000 and rate ratios by cancer site for American Indian/Alaska Native, 2009 [a,b]

CANCER SITE	IR	95% CI [b]	IRR AIAN:NHW
Cancers Detected by Screening			
Breast (Female)	N/A [c,d]	N/A [c,d]	N/A [c,d]
Cervix Uteri	N/A [c,d]	N/A [c,d]	N/A [c,d]
Prostate	8.4	1.0 – 29.5	0.1
Colon/Rectum	15.7	3.0 – 44.0	0.5
Cancers Associated with Lifestyle and Environmental Factors			
Lung/Bronchus	18.9	3.4 – 51.9	0.7
Oral Cavity/Pharynx	N/A [c]	N/A [c]	N/A [c]
Liver/IBD	10.9	1.0 – 37.5	2.6
Kidney/Renal Pelvis	9.2	0.9 – 32.5	0.8
Esophagus	N/A [c]	N/A [c]	N/A [c]
Stomach	5.9	0.7 – 23.6	1.4
Gallbladder	4.6	0.1 – 23.8	5.1
Melanoma	N/A [c]	N/A [c]	N/A [c]
Blood Cancers			
Leukemia	7.8	0.2 – 34.0	0.7
Non-Hodgkin Lymphoma	6.1	0.7 – 24.2	0.3
Myeloma	11.6	1.1 – 38.7	2.4
Other Cancers			
Thyroid	20.2	8.4 – 42.8	1.0
Pancreas	N/A [c]	N/A [c]	N/A [c]
Ovary	3.1	0.1 – 19.6	0.6

[a] Age-adjusted to the 2000 U.S. Standard Population; [b] Data from SEER*Stat 8.0.1. Accessed November 2012.
[c] Data not available; too few cases to calculate rates and ratios; [d] SEER*Stat reported no cases of specific site in 2009; confirmed with Utah Cancer Registry in November 2012.

Abbreviations:
IR: incidence rate; IRR: incidence rate ratio; AIAN: American Indian/Alaska Native; NHW: Non-Hispanic White
N/A: Not available; too few cases to calculate rates and ratios; 95% CI: 95% confidence interval

NCDB

Table 5. American Indian/Alaska Native cancer cases by site at NCDB-participating hospitals, 2009

	ARIZONA (7 HOSPITALS)		NEVADA (5 HOSPITALS)	
CANCER SITE	STAGE	N	STAGE	N
Breast (Female)	0	5	0	2
	I	4	I	3
	II	2	II	1
	III	2	III	.
	IV	.	IV	.
	Unknown	4	Unknown	.
	Total	17	Total	6
Cervix Uteri	I	1	I	.
	II	2	II	.
	III	.	III	1
	IV	.	IV	.
	Total	3	Total	1
Prostate	0	.	0	.
	I	.	I	.
	II	14	II	.
	III	1	III	.
	IV	2	IV	.
	Total	17	Total	.
Colon/Rectum	0	.	0	.
	I	3	I	.
	II	8	II	1
	III	1	III	.
	IV	.	IV	1
	Unknown	1	Unknown	.
	Total	13	Total	2
Lung/Bronchus	0	.	0	.
	I	4	I	.
	II	.	II	.
	III	2	III	1
	IV	1	IV	.
	Unknown	1	Unknown	.
	Total	8	Total	1
Kidney/Renal Pelvis	0	.	0	.
	I	6	I	1
	II	2	II	1
	III	3	III	.
	IV	2	IV	.
	Unknown	1	Unknown	.
	Total	14	Total	2
Non-Hodgkin Lymphoma	I	1	I	.
	II	.	II	.
	III	.	III	.
	IV	.	IV	.
	Total	1	Total	.

Utah was not included due to zero reported cases for AI/AN by cancer sites at NCDB participating hospitals.

TECHNICAL NOTES [33-36]

In this report, statistics are presented from the Surveillance, Epidemiology and End Results (SEER), the National Program of Cancer Registries (NPCR), and the American College of Surgeons Commission on Cancer's (CoC) National Cancer Data Base (NCDB) to describe cancer among American Indians in Arizona, Nevada, and Utah. Each data base collects and analyzes cancer information differently based on the data compiled. Counts, proportions, age-adjusted incidence rates per 100,000, age-adjusted mortality rates per 100,000, and cancer survival estimates are used to describe cancer. This section highlights each surveillance system methodology and strengths and limitations of the data presented within this report.

Cancer Primary Site Coding System

All data sources use the World Health Organization (WHO) International Classification for Disease – Oncology (ICD-O) coding system to numerically code the cancer primary site. More information regarding this coding system is available at: http://www.who.int/classifications/icd/adaptations/oncology/en/. A primary site is the area of the body where the main cancer is first found at diagnosis (e.g., breast, colon, prostate, pancreas, etc.). There have been several revisions to the ICD-O codes over time, particularly as cancer histology for the different primary sites becomes more defined. The current coding manuals and changes over time to the ICD-O codes can be found for the three registries at:

- SEER http://seer.cancer.gov/tools/codingmanuals/historical.html
- NPCR http://www.cdc.gov/cancer/npcr/pdf/btr/ICD-0-3_Listing.pdf
- NCDB http://www.facs.org/cancer/ncdb/implementationguidelines.html

Surveillance, Epidemiology, and End Results (Seer)

The SEER system, maintained by the National Cancer Institute (NCI) and participating registries began in 1973 to estimate national cancer statistics for the U.S. All cancer cases in the US are not compiled in this registry. Estimates are provided by collecting data from SEER registry areas via care cancer care professionals in hospitals, physicians' offices, radiation facilities, freestanding surgical centers, and pathology laboratories. Currently, SEER compiles information from the following registries: Alaska Native Tumor Registry, Arizona Indians, Cherokee Nation, Connecticut, Detroit, Georgia Center for Cancer Statistics with Atlanta, Greater Georgia, Rural Georgia, Greater Bay Area Cancer Registry with San Francisco-Oakland, San Jose-Monterey, Greater California, Hawaii, Iowa, Kentucky, Los Angeles, Louisiana, New Jersey, New Mexico, Seattle-Puget Sound, and Utah.

These registry areas started providing data to SEER to calculate national incidence and mortality cancer estimates at different points in time. In 1980, the American Indian residents of Arizona were added to the SEER project, although data may not be available for all rates on-line prior to 1992. Note that Nevada is not part of the SEER registry system. For a full listing of participating SEER registries, refer to the SEER website at: http://seer.cancer.gov/.

The SEER system is population-based registry, and currently collects information on approximately 28% of the US population. However, SEER estimates that its data coverage among AI/ANs is higher, and captures nearly 43% of the population. From the Arizona Indians registry, all cancer cases reported to SEER are American Indian, and other race/ethnicity groups are not included; but, other race/ethnicity groups can be accessed via the Arizona Cancer Registry. From Utah, about 1.3% of the cancer cases are reported to be American Indian and/or Alaska Natives.

Age-adjusted incidence rates per 100,000 for AI/ANs are estimated by SEER for all cancer sites combined and major cancer sites singly. The 2000 US standard population based on single ages is used for the age-adjustment of rates. Cancer case counts for incidence rates for AI/ANs are based reported numbers from the Contract Health Service Delivery Area (CHSDA) counties. A CHSDA is a geographic area where health services are provided at different facilities at the expense of the Indian Health Service (IHS) for Tribal members who reside within the designated area. This change occurred in response to concerns that using data outside of the CHSDAs produced an underestimate of the true burden of disease due to misclassification of AI populations outside of these areas. The impact of CHSDA use is a more accurate, higher incidence rate for AI/AN populations. SEER incidence data for AI/AN only include cases that are in a CHSDA. It has been estimated that 57% of AI/AN live in CHSDA counties. All of the counties in Arizona and Nevada are CHSDA counties. Two counties in Utah are not CHSDA counties. A listing of CHSDAs is provided at: http://seer.cancer.gov/seerstat/variables/countyattribs/CHSDA.2006.pdf.

Age-adjusted mortality rates per 100,000 for AI/ANs are estimated by SEER for all cancer sites combined and major cancer sites singly. The 2000 US standard population based on single ages is used for the age-adjustment of rates. All deaths in the U.S. by calendar year are received by SEER from the National Center for Health Statistics (NCHS) from death certificates. The International Classification for Disease (ICD) 8 is used for deaths from 1969-1975, ICD-9 for 1978-1998 and ICD-10 for 1999 and later. Denominators for mortality rates for AI/ANs are based reported numbers from the CHSDA counties. The impact of CHSDA use is a more accurate, higher mortality rate for AI/AN populations.

Estimated cancer survival information is also calculated by SEER. Individuals who died from other causes were not included in cancer survival rates. Examining death records, the cause of death may be difficult to ascertain. In the case of cancer, the patient may have died from metastatic cancer rather than from the primary cancer. For more information regarding how SEER determines the cause of death for survival calculations, refer to: http://seer.cancer.gov/causespecific/.

Surveillance, Epidemiology, And End Results (Seer) Seer*Stat Software

The SEER*Stat statistical software provides access to conduct analysis of SEER and other cancer-related data. The software allows users to produce statistics for studying cancer impact within populations throughout the U.S. A data user agreement must be set in place before access to the software is provided. Within SEER Stat, data can be manipulated to calculate frequencies, incidence rates, mortality rates, and survival statistics. The SEER Stat website provides tutorials for users to become more familiar with the software as well as technical assistance via email. For more information regarding SEER Stat, refer to: http://www.seer.cancer.gov/seerstat/.

National Program of Cancer Registries (NPCR)

The NPCR is a Center for Disease Control and Prevention (CDC) effort along with state cancer registries in 45 states, the District of Columbia, Puerto Rico, and the U.S. Pacific Island Jurisdictions. NPCR and SEER together collect all U.S. cancer data. In 1992, Congress passed the Cancer Registries Amendment Act which allowed for systematic data collection administered by CDC. The state cancer registries have six main goals. The first goal is to monitor time trends for cancer sites. The next goal is to describe cancer patterns in specific populations (age, geographic location, race/ethnicity, socio-economic status, etc.). Additionally, the cancer registries function to guide planning and evaluation of cancer control programs. The data can also be used to establish health priorities and can be used for planning and to advance clinical, epidemiologic, and health services research. A final goal is to provide a nation-wide estimate for cancer incidence.

The NPCR system is estimated to vary by year, but recent years represent about 96% of the US cancer cases. However, coverage for AI/AN cancer cases is estimated to be about 57% based on data linkage with Indian Health Service information for the CHSDA counties. Data from NPCR is provided to the Cancer in Five Continents series. Three interactive web-based tools are available for cancer information and a brief discussion of these tools follow in this section.

- ***US Cancer Statistics Incidence and Mortality Web-based Report***

(http://apps.nccd.cdc.gov/uscs/) is jointly produced by NPCR and the North American Association of Central Cancer Registries (NAACCR). Incidence and mortality information are provided by race/ethnicity. Rates by race/ethnicity should be interpreted with caution, since AI/AN data is underreported on death certificates and in cancer records. Efforts to improve race/ethnicity information are available at: http://www.cdc.gov/cancer/npcr/uscs/qa.htm.

- ***State Cancer Facts***

(http://apps.nccd.cdc.gov/StateCancerFacts/) provides age-adjusted incidence and mortality rates and by gender by each state. This information is general and cannot be limited to the AI/AN population in each state, and is therefore not included in this report.

- ***Interactive Cancer Atlas*** (http://apps.nccd.cdc.gov/DCPC_INCA/DCPC_INCA.aspx) includes age-adjusted incidence rates per 100,000 and corresponding 95% confidence intervals for the most common cancers among all states from 1999 – 2008. Registry-specific data quality from state to state will vary. State rankings are also included. Results can be filtered for AI/AN populations.

American College Of Surgeons Commission On Cancer's (Coc) National Cancer Data Base (NCDB)

The National Cancer Data Base is an effort between the American College of Surgeons and the American Cancer Society to collect cancer information among patients at Commission on Cancer (CoC) approved hospitals. NCDB estimates that data is collected on about 70% of all cancer cases and nearly 80% of all

hospitals are CoC approved. NCDB collects more in depth clinical, treatment, cancer staging, and quality improvement information than other cancer registries from the participating hospital.

NCDB hospital participation varies widely by state. Out of 110 hospitals in Arizona from 2000-2009, seven are CoC approved hospitals providing data to the NCDB. In Utah from 2000-2009, there are 49 hospitals, and five are CoC hospitals. And, in Nevada from 2000-2009 there were 43 hospitals and five are NCDB hospitals.

NCDB follows specific data standards. These standards can be reviewed in the Facility Oncology Registry Data Standards (FORDS). The FORDS manual has been through multiple revisions. All FORDS items are currently required to be collected by CoC approved cancer programs. Additional information regarding these standards can be located at: http://www.facs.org/cancer/coc/fordsmanual.html.

The NCDB does produce some basic publicly available information. Additional information may be requested by participating hospitals and researchers. The data requests will be reviewed and it will be determined if additional information can be provided. All data presented in this report is publicly available through the NCDB benchmark reports at:
http://cromwell.facs.org/BMarks/BMPub/Ver10/bm_reports.cfm.

Nevada State Health Division, Department Of Health And Human Services, Cancer In Nevada

The Nevada Central Cancer Registry within the Bureau of Health Statistics, Planning, Epidemiology, and Response publishes an annual report focusing on cancer incidence and mortality. The report uses data based upon diagnosed cancer cases and cancer-related deaths in Nevada. The goal of the NCCR is "to gather comprehensive, timely, and accurate data on the incidence of cancer in Nevada." Additional information can be found at: http://www.health.nv.gov/publications.htm#cancerRpts

Race/Ethnicity Misclassification

It is known that race/ethnicity, particularly among American Indians is often misclassified, or American Indians are considered a different race/ethnicity group. The race/ethnicity misclassification under reports the number of cancer cases among American Indians. The lower number of cases would then lower the incidence rate of cancers among American Indians. To obtain a more accurate estimate of cancer incidence among American Indians, SEER uses CHSDA counties as described. In a recent publication, the NPCR data was also linked to IHS data to improve race/ethnicity information among American Indians. NPCR continues to refine race and ethnicity information. NCDB currently has not investigated misclassification of race/ethnicity among American Indians within the CoC hospital data.

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