



arizona melanoma profile | 2017

Arizona Cancer

PREVENTION & CONTROL

More People Will Live Longer



Arizona Melanoma Profile

2017

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ARIZONA DEPARTMENT
OF HEALTH SERVICES

**Arizona
Cancer**

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This report is the result of a coordinated effort by the Arizona Department of Health Services (ADHS) Cancer Prevention and Control Programs (Arizona Cancer Registry, HealthCheck Programs, and Arizona Cancer Control Program). The Arizona Cancer Prevention and Control Program serves as a leading resource for cancer information in Arizona. The goal is to develop a consistent message on the state of cancer in Arizona by providing current, reliable, and meaningful information on a regular basis. This publication is part of a series of documents intended to inform stakeholders, providers, and community members about cancer in Arizona. All of the documents produced to date can be found on the [Arizona Cancer Prevention and Control Program's website](#).

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What is Melanoma?

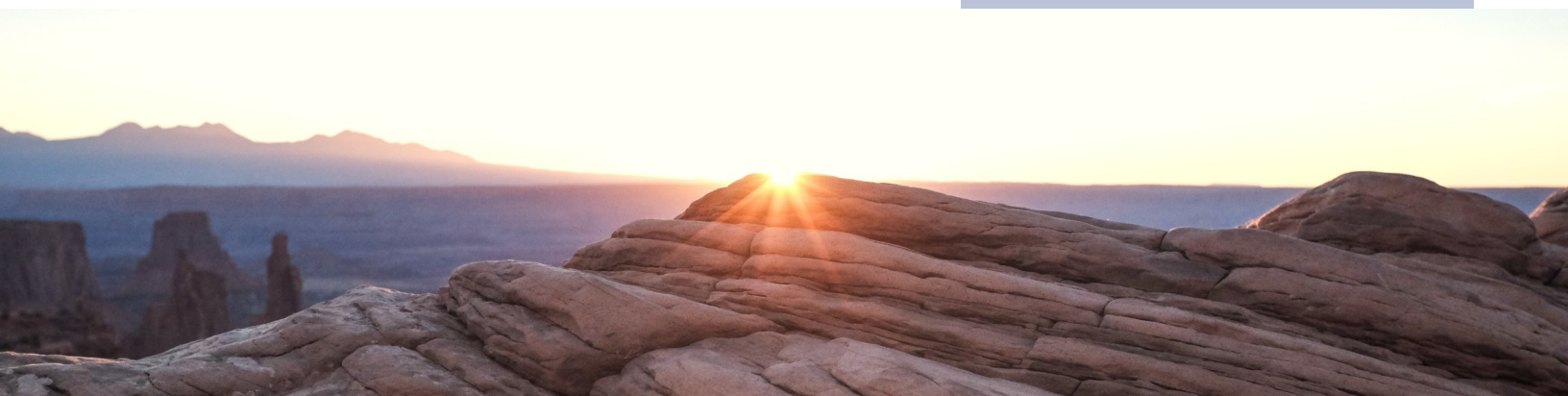
Melanoma is a cancer that occurs most often in the skin, although it can occur in any body site that has melanocytes (5% of melanoma cases in Arizona do not occur in the skin). Melanomas develop from melanocytes—cells that make the brown pigment in the skin. Most melanomas appear brown or black. Some melanomas don't create the brown pigment and appear pink, tan, or white. Among Arizonans, melanoma was the sixth most common cancer diagnosed from 2009-2014.

What is the Risk of Melanoma?

Most cases of melanoma occur in Whites. According to the American Cancer Society (ACS), melanoma is 20 times more common in Whites than Blacks. The lifetime risk of a melanoma diagnosis is about 1 in 40 for Whites, 1 in 200 for Hispanics, and 1 in 1,000 for Blacks. In 2017, the ACS has projected that 9,730 people will die from melanoma in the United States (6,380 males and 3,350 females). Melanoma rates for both incidence and mortality is increasing. The lifetime risk of invasive melanoma increased from 1 in 58 to 1 in 54 from 2009 to 2016. The lifetime risk of in situ melanoma has increased from 1 in 78 to 1 in 58 from 2009 to 2016.

RISK FACTORS:

- Ultraviolet (UV) radiation from the sun or tanning beds
- Persons with 30 or more moles (10% higher lifetime melanoma risk)
- Persons with light hair, light eyes or who burn or freckle easily
- Age - most melanoma occurs in older people
- Sex – males have a higher risk of melanoma overall and females have a higher risk when younger than age 50 years
- Personal history of melanoma
- Family history of melanoma, breast, or pancreatic cancer



¹ American Cancer Society. (2016, May 20). What is Melanoma Skin Cancer?. Retrieved April 24, 2017, from <https://www.cancer.org/cancer/melanoma-skin-cancer/about/what-is-melanoma.html>.

² American Cancer Society. (2016, May 20). Cancer, Risk Factors, and Prevention. Retrieved April 24, 2017, from <https://www.cancer.org/cancer/melanoma-skin-cancer/about/what-is-melanoma.html>.

³ Glazer, A. M., MD, Winkelman, R. R., DO, & Farberg, A. S., MD. (2016, December 21). Analysis of Trends in US Melanoma Incidence and Mortality. Retrieved April 24, 2017, from <http://jamanetwork.com/journals/jamadermatology/article-abstract/2593033>.

⁴ American Cancer Society. (2016, May 20). Cancer, Risk Factors, and Prevention. Retrieved April 24, 2017, from <https://www.cancer.org/cancer/melanoma-skin-cancer/about/what-is-melanoma.html>.

Arizona Cancer Registry (ACR) Data

The data section analyzes reports to the ACR of cutaneous *in situ* and invasive melanoma among Arizona residents. The review of incidence and mortality of melanoma includes rates, survival information, demographic, tumor specific, and staging variables.

The Arizona age adjusted rate for invasive melanoma cases increased from 18.2 to 21.6 cases per 100,000 persons between years 2009 and 2014. Reported invasive melanoma cases among Arizona residents increased from 1,212 cases in 2009 to 1,690 cases in 2014. This 39 percent gain in invasive cases resulted from efforts of the Arizona Melanoma Task Force to increase reporting of melanoma cases to the ACR. It was not due the result of increasing incidence. Please see the description of the Melanoma Task Force that follows.

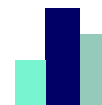
Arizona Melanoma Task Force

The Arizona Melanoma Task Force formed in 2011 to determine whether the decrease in Arizona melanoma incidence rates was real or due to under-reported cases. Its membership includes the Arizona Cancer Registry, community dermatologists and dermatopathologists, the Arizona Skin Cancer Institute at the Arizona Cancer Center, Arizona SunWise Program, American Cancer Society, Arizona Department of Health Services (ADHS), and a community member.

The Arizona Melanoma Task Force conducted a pilot study of melanoma cases diagnosed in 2009 from 15 dermatology practices. The study showed that 72% of the cases were not reported to the Arizona Cancer Registry. The Arizona Melanoma Task Force identified barriers and developed strategies to improve melanoma reporting by physicians in Arizona. After the pilot study was completed, the Arizona Melanoma Task Force focused its energy into supporting physician reporting of melanoma.

In 2011, the first year of data after the completion of the pilot study, there is a transition to more melanoma cases reported by physicians than from other sources. Physician reporting has become more robust with each successive year as reports from physicians are crucial for accurately tracking melanoma in Arizona. Physician reporting of melanoma cases, as the figures in this report show, is essential to complete melanoma reporting in Arizona. The continued increase in melanoma rates and counts is due as much to more complete reporting by physicians in Arizona as an increase in the diagnosis of melanoma among Arizona residents.





Arizona Melanoma Task Force Members

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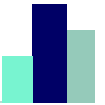
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The treatment for melanoma is highly variable and based on the stage of the disease at presentation. Early stage cancer (Stage I, II) can be cured with surgery alone but late stage cancer (Stage III and IV) requires medical therapies to control or prevent the progression of disease.

Stage I and II melanomas grow into the skin without spread to other sites. Melanomas that grow less than 2mm in depth into the skin are considered stage I, while tumors that grow deeper than 2mm into the skin are considered Stage II. The treatment for these tumors is excision. However, the deeper a tumor grows into the skin, the higher the risk there is for spread to lymph nodes or beyond.

Stage I/II

Current practice standards recommend that melanomas which grow deeper than 1.0mm into the skin, should undergo evaluation of the closest draining lymph nodes to assess for spread of disease - as the risk of lymph node involvement is approximately 10% (although many clinicians utilize a depth of 0.75mm for the minimum depth – with a risk of lymph node involvement of around 6-8%). The mechanism to assess lymph node involvement is through a process called a sentinel lymph node biopsy. The sentinel lymph node is the first draining lymph node to which melanoma might spread. Thus, for any patient that presents with a tumor warranting a sentinel lymph node biopsy, the surgeon will remove the melanoma and remove the sentinel lymph node during the same surgery. If the node does not contain cancer, then the patient is considered to have Stage I or II disease and is placed into surveillance.





Stage III

If a patient has melanoma spread to the lymph nodes, the patient is considered to have at least Stage III disease. These patients must undergo a full workup to check for spread of disease to distant sites - this consists of cross-sectional imaging (such as a CT scan, PET scan, and/or MRI). If imaging does not identify distant disease, the patient is considered Stage III and is still a candidate for further surgery to eradicate any melanoma in the remaining lymph nodes. As there are multiple lymphatic channels between the lymph nodes, once the melanoma has reached one node, the rest of the lymph nodes should be excised given the risk of disease in the remaining lymph nodes. The more lymph nodes involved, the worse the outcome is for the patient.

After the lymph nodes are removed, it is then the goal of medical therapy to try to prevent the melanoma from recurring. Thus, certain medications are used in an adjuvant setting (adjuvant = after surgery) for 1 to 3 years to decrease the risk of melanoma recurrence. This therapy is called immunotherapy. Once the treatment regimen has been completed, the patient will then be placed into surveillance and monitored for recurrent disease.

Stage IV

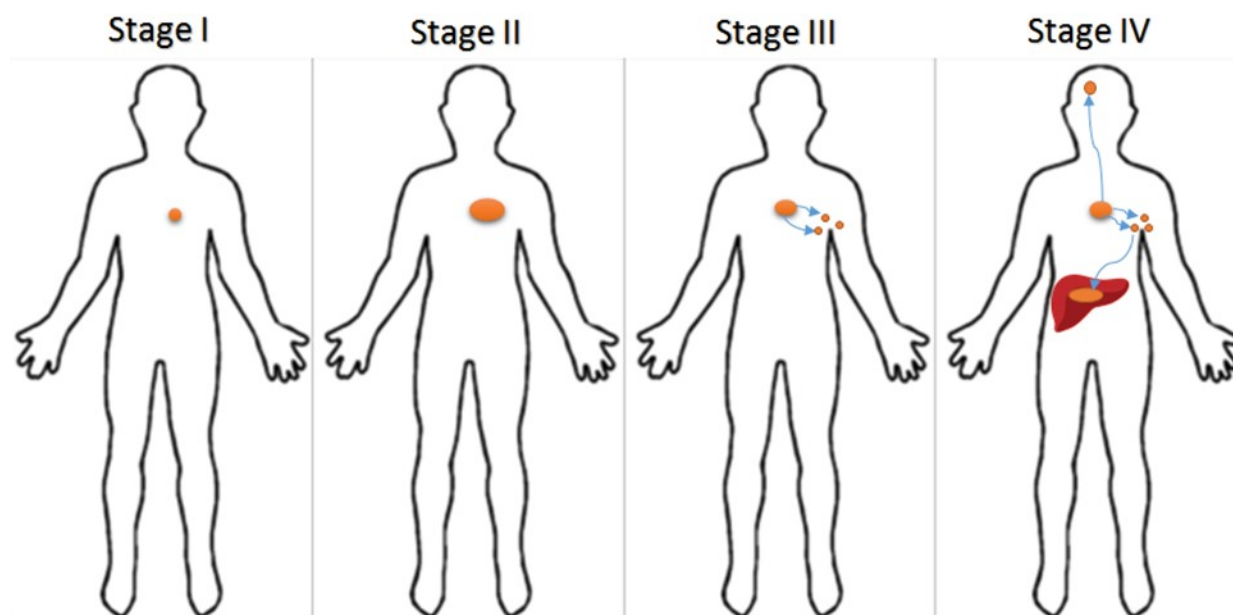
Finally, if the tumor has spread to distant organs, the goals of therapy are: 1) to prevent the tumor from spreading, and 2) to shrink the tumor as much as possible. The first line of treatment will depend on the genetic makeup of the melanoma. Approximately 50% of melanomas contain a mutation in the BRAF gene. If the tumor harbors this mutation, there is a specific drug used to target this mutation.

However, if the melanoma does not have this mutation, then the first line of therapy is considered immunotherapy – therapy that causes the immune cells to remain active and fight the melanoma. There are many clinical trials evaluating new drugs as well as investigating combined therapies (using multiple drugs during treatment to affect different pathways for tumor development and growth). These newer classes of drugs have significantly impacted the way clinicians treat Stage IV melanoma and have allowed patients to live longer than previously seen. Only if the melanoma is not responsive to immunotherapy would conventional chemotherapy even be considered.

Radiation Therapy

Radiation therapy is also utilized in the treatment of melanoma. Instances when radiation might be used as a part of the treatment include: 1) Treatment after surgery for a certain sub-type of melanoma that has a high risk of local recurrence, 2) In Stage III melanoma - extension of disease outside of the lymph nodes into the surrounding tissue or multiple involved lymph nodes, or 3) Spread of disease to the brain or other sensitive organs where surgery may not be an option.

While therapies vary based on the stage of the melanoma at presentation, it is important to discuss with your clinician the treatment strategy and what to expect at each stage of the disease. A multidisciplinary review is important for certain stages and presentations of melanoma, as Surgical Therapy, Radiation Therapy, and Medical Therapy could all play important roles in the treatment of the disease.



Melanoma Policy in Arizona, Brian Hummell

A bill (HB2134) was introduced that would allow children to bring and use sunscreen at school, daycare, or camp for personal use. Some school districts and child-centered programs prohibit or restrict the use of over the counter drugs, and because the FDA regulates sunscreen, some view sunscreen as an OTC. The bill was amended to simply impact the possession and use by an individual. It had passed both the House and Senate in different forms, but passed again in the House and was signed by the Governor on April 26.

A bill (HB2194) that would have restricted minors from using indoor tanning devices was introduced for the fourth time in five years. Unlike previous years, the bill was assigned and earned a hearing in the House Health Committee where it passed. It also passed the full House by a vote of 39-19 with 2 not voting. The bill was assigned to two committees in the Senate, but did not receive a hearing in either committee.

Figure 1: In Situ and Invasive Melanoma Case Counts, 1995-2014

In the last 20 years the count of reported melanoma cases for both in situ and invasive cases has risen steadily. Invasive case counts increased from 1995 to 2003 (12.5% per year), and then fell from 2003 to 2008 (20% per year). With the increases in physician reporting, melanoma reported cases have risen steadily from 2008 to 2014 (16.7% per year). Among in situ cases similar trends are seen as with invasive cases. In situ case counts rose from 1995 to 2003, fell between 2003 and 2008, and rose again between 2009 and 2014.

As mentioned in the introduction, the work of the Arizona Melanoma Task Force has helped drive increased physician reporting. The increase in reporting has led to melanoma becoming the 5th leading diagnosed cancer in Arizona among males and 7th diagnosed cancer among females in 2014.

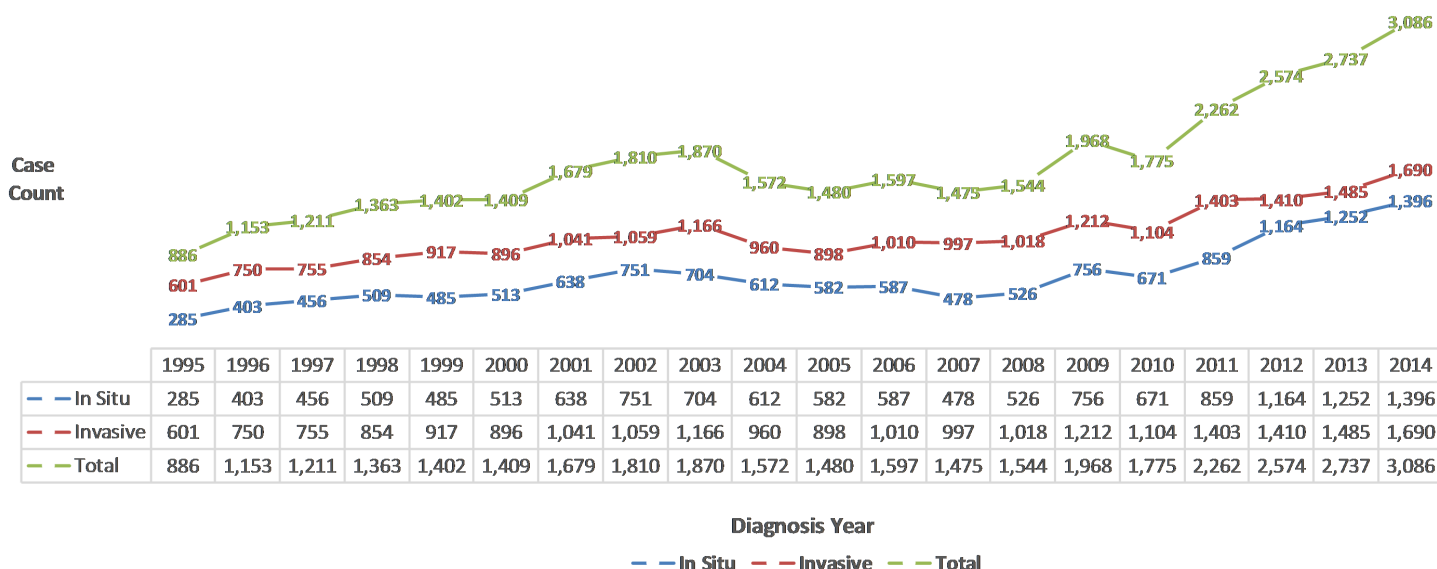
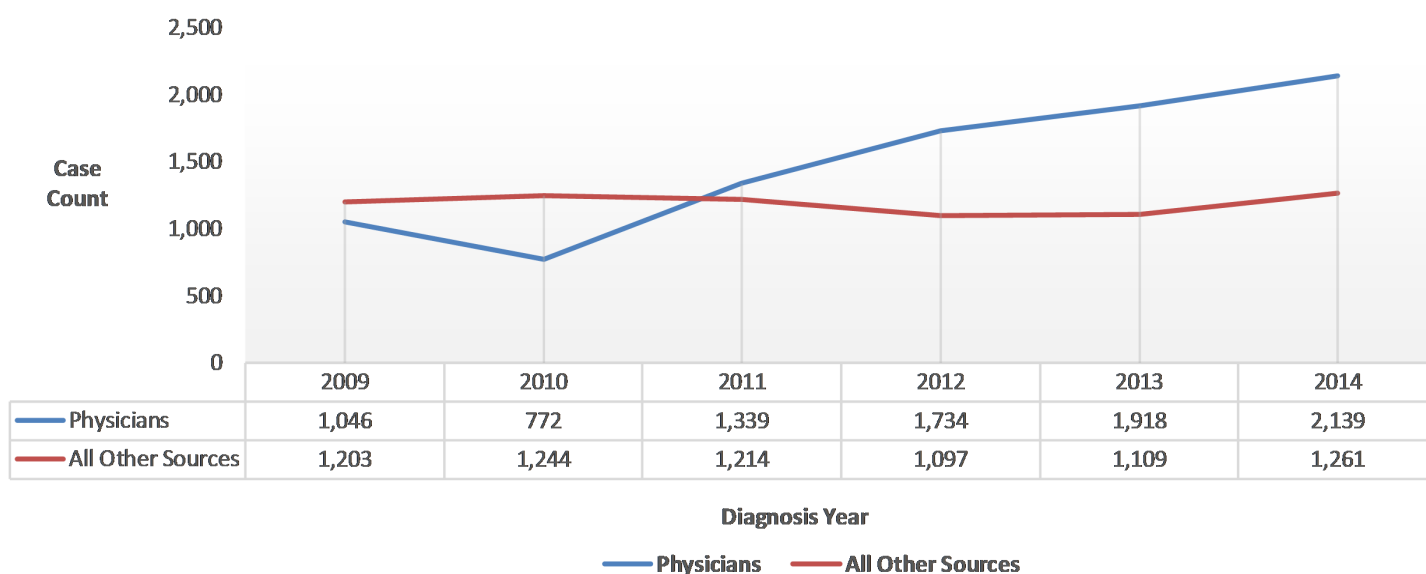


Figure 2: A Comparison of the Reporting Source - Physician Case Reports and All Other Sources of Case Reports In Situ and Invasive Melanoma by Diagnosis Year, 2009-2014

Melanoma case reports from physicians more than doubled from 1,046 cases in 2009 to 2,139 cases in 2014. Reports from all other sources increased less than 5 percent between 2009 and 2014. These gains are the result of the effective leadership the Melanoma Task Force has provided to support melanoma case reporting; the increases in physician reporting are painting a more accurate picture of melanoma in Arizona.



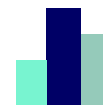
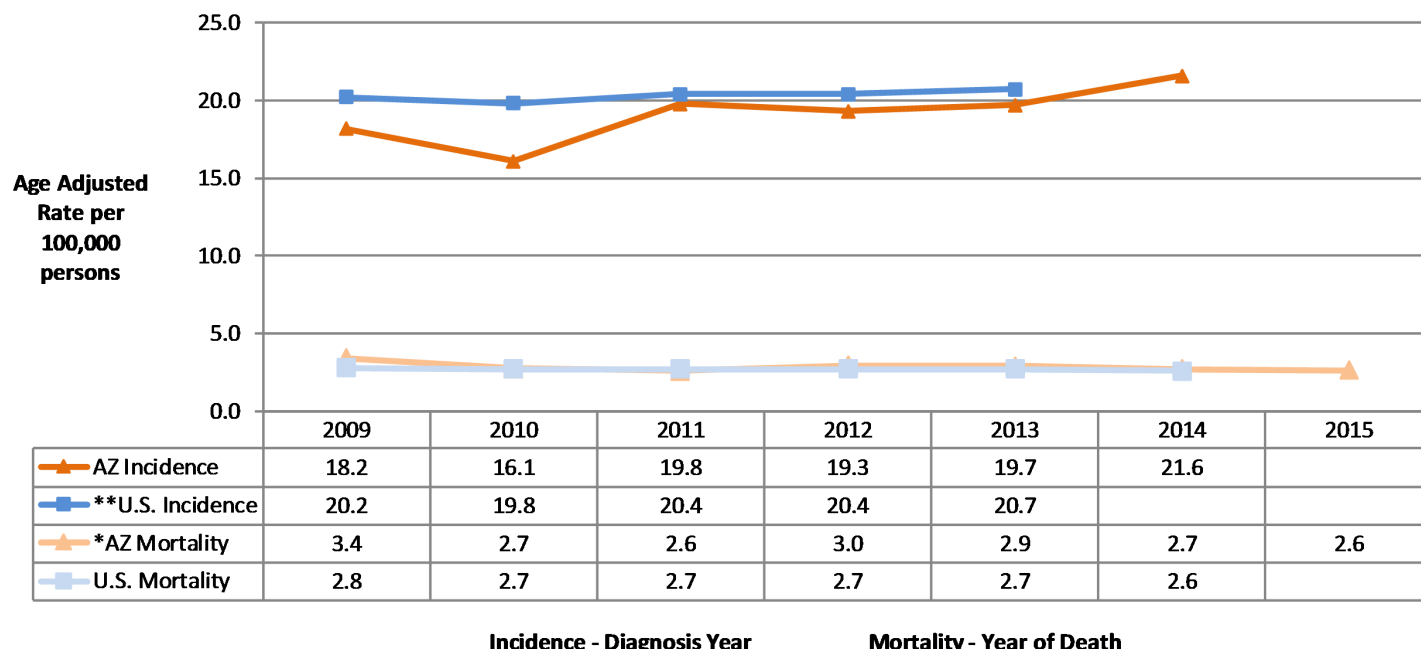


Figure 3: Comparison of Arizona* and U.S.** Invasive Melanoma Incidence (2009-2014) and Mortality (2009-2015)
Age Adjusted Rates by Diagnosis Year

- ⇒ Incidence – The Arizona age adjusted rate of invasive melanoma has increased 19% from 18.2 (2009) to 21.6 (2014) cases per 100,000 persons. The U.S. age adjusted rate of invasive melanoma has increased slightly 2% from 20.2 (2009) to 20.7 (2013). The Arizona rate appears to have a trajectory that will surpass the U.S. rate in 2014 because of increased physician reporting of melanoma cases.
- ⇒ Mortality – The Arizona age adjusted melanoma mortality rate has decreased 24% from 3.4 (2009) to 2.6 (2015) cases per 100,000 persons. The U.S. age adjusted melanoma mortality rate has slightly decreased 7% from 2.8 (2009) to 2.6 (2014) cases per 100,000 persons.



Incidence - Diagnosis Year

Mortality - Year of Death

*For Arizona Mortality: Arizona Department of Health Services, Population Health and Vital Statistics. (2017). Arizona Health Status and Vital Statistics 2015 Annual Report. Phoenix, AZ: Arizona Department of Health Services. Retrieved March 28, 2017, from <http://pub.azdhs.gov/health-stats/report/ahs/ahs2015/index.php>

**For U.S. Incidence: United States Cancer Statistics: 1999 - 2013 Incidence, WONDER Online Database. United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2016. Accessed at <http://wonder.cdc.gov/cancer-v2013.html> on March 28, 2017.
For U.S. Mortality: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEERStat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2014) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released December 2016. Underlying mortality data provided by NCHS (www.cdc.gov/nchs). Accessed on April 4, 2017.

Note: U.S. mortality data is not available for the 2015 year.

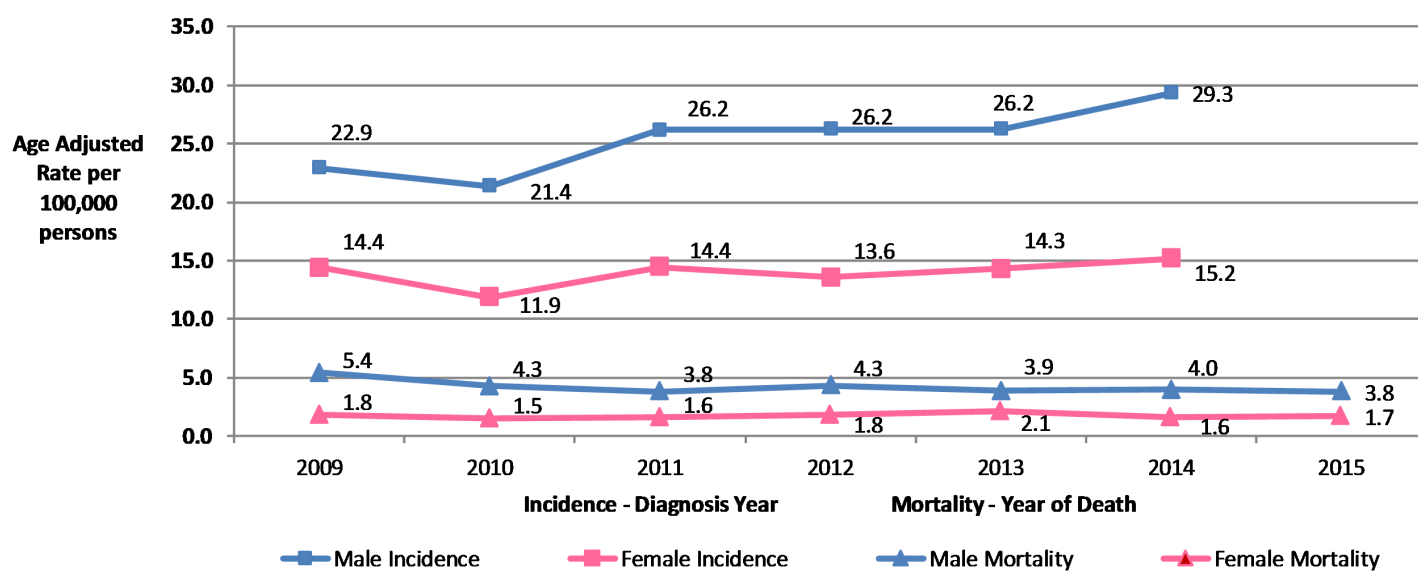
U.S. incidence data is not available for the years 2014 and 2015.

Arizona incidence data is not available for the 2015 year.

Figure 4: Invasive Melanoma Incidence (2009-2014) and Mortality* (2009-2015) Age Adjusted Rates by Sex

Incidence: The age adjusted rate of invasive melanoma has increased 28% for males from 22.9 (2009) to 29.3 (2014) cases per 100,000 males. The age adjusted rate of invasive melanoma has increased slightly for females (6%) for the same time period.

Mortality: Males are more likely to die from melanoma than females for the years 2009-2015 as the age adjusted melanoma mortality rate for the combined years is 2.5 times higher for males than females (4.2 to 1.7 cases per 100,000 persons). The age adjusted melanoma mortality rate among males has decreased 30% from 5.4 (2009) to 3.8 (2015) cases per 100,000 males. The age adjusted rate of invasive melanoma has decreased slightly for females (6%) for the same time period.

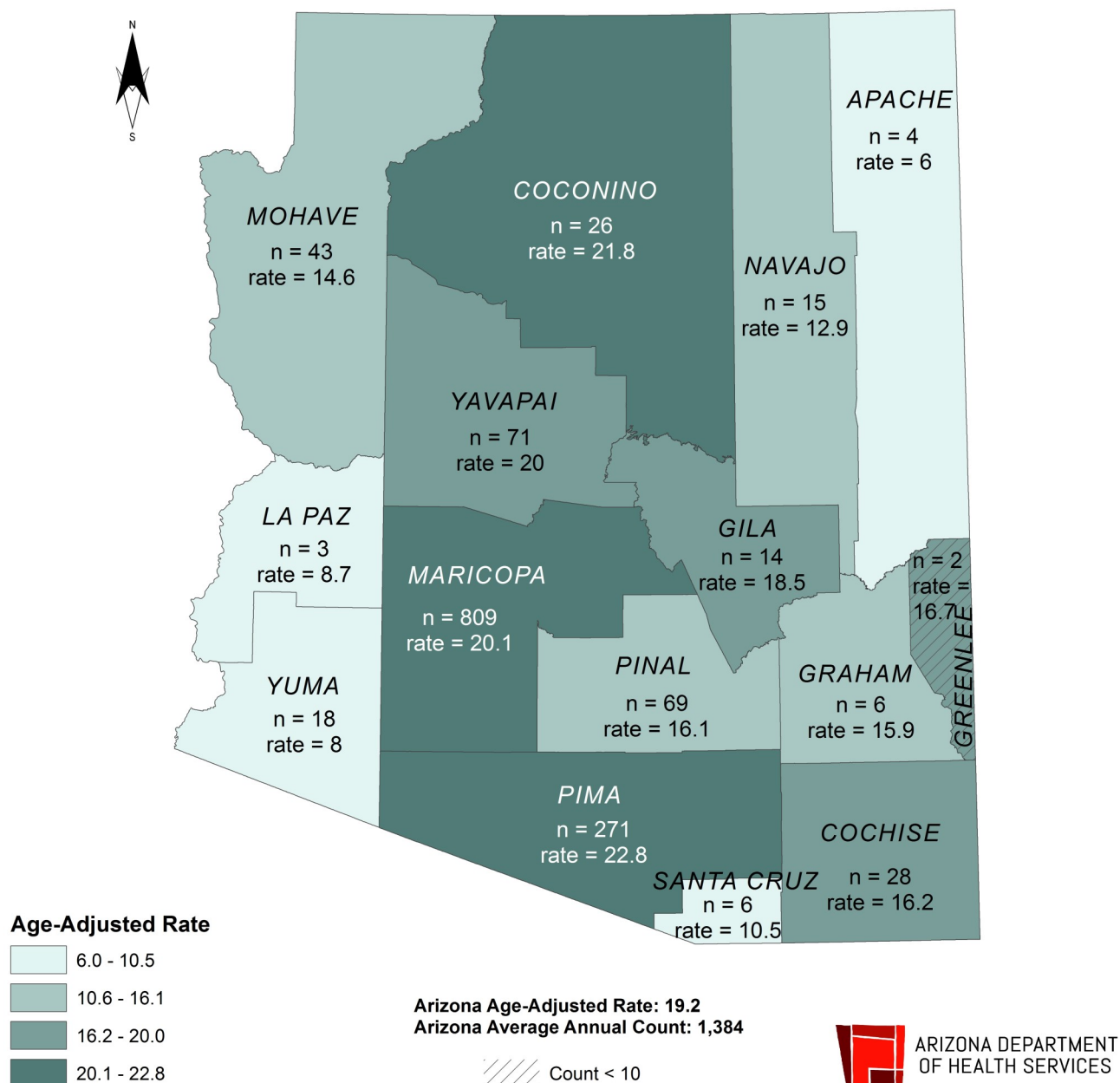


*Arizona Department of Health Services, Population Health and Vital Statistics. (2017). Arizona Health Status and Vital Statistics 2015 Annual Report. Phoenix, AZ: Arizona Department of Health Services. Retrieved March 28, 2017, from <http://pub.azdhs.gov/health-stats/report/ahs/ahs2015/index.php>.

Note: 5 cases with an unknown sex are excluded from the incidence rate.
Incidence data is not available for the 2015 year.

Figure 5: Arizona Invasive Melanoma Average Annual Counts* and Age Adjusted Rates, 2009-2014

In the years 2009-2014 the highest age adjusted melanoma incidence rates are found in Pima and Coconino counties (22.8 and 21.8 cases per 100,000 persons). Apache and Yuma counties had the lowest rates of melanoma (6.0 and 8.0 cases per 100,000 persons). The average number of invasive melanoma cases diagnosed each year 2009-2014, not including Maricopa County (809) and Pima County (271), ranged from 2 in Greenlee County to 71 in Yavapai County.



*Case counts (n) represent the average number of cases reported per year for the years 2009-2014.

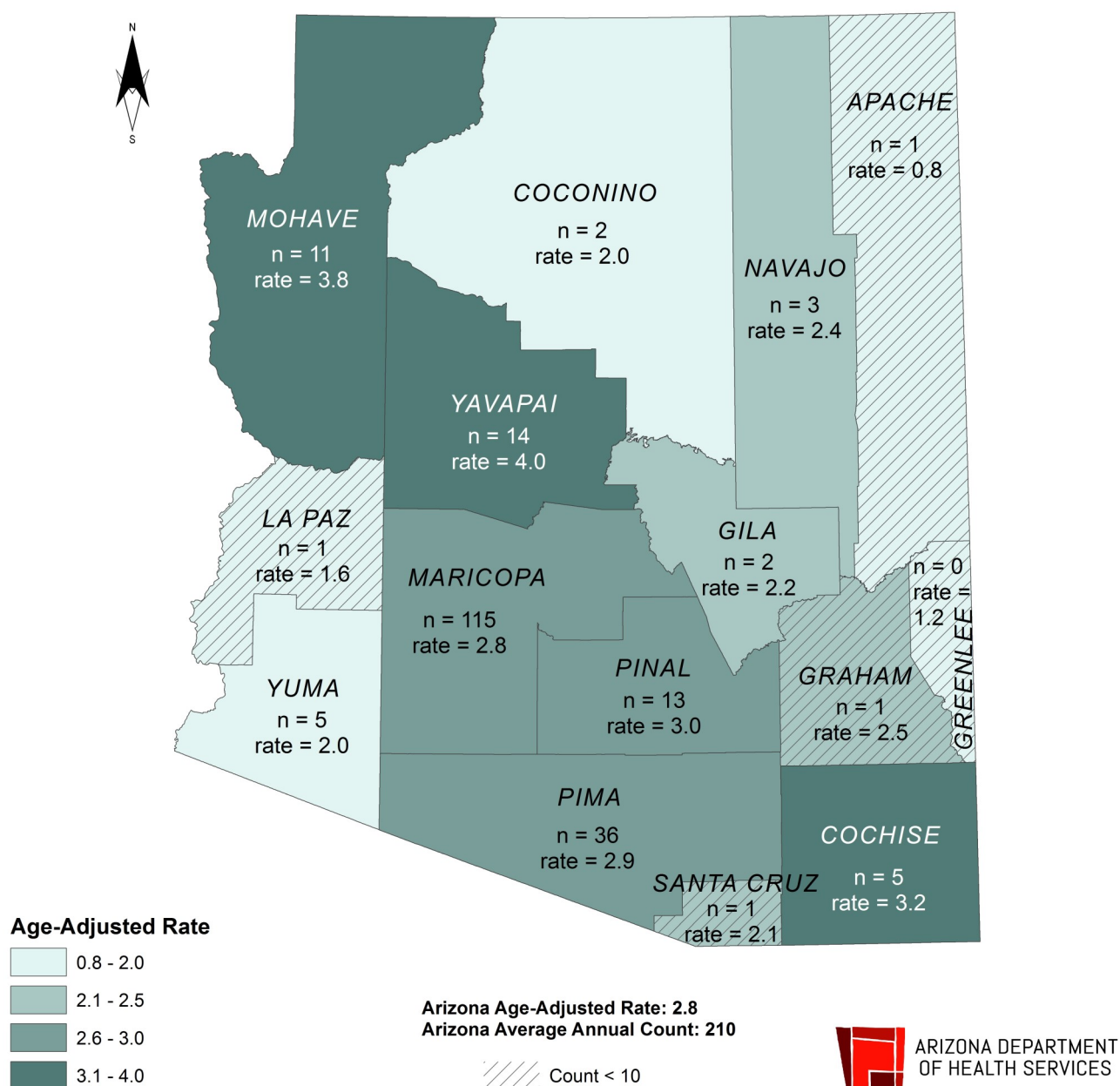
Note: The total count of each county Average Annual Count may not be equal to the Arizona count due to rounding.

Hashed counties have total count of less than 10 cases. Therefore, rates are highly unstable and should be used with caution.

1 case in all years combined had an unknown county.

Figure 6: Arizona Melanoma Mortality Average Annual Counts* and Age Adjusted Rates, 2009-2015

In the years 2009-2015 the highest age adjusted melanoma mortality rates are found in Yavapai and Mohave counties (4.0 and 3.8 cases per 100,000 people respectively). Coconino and Yuma counties had the lowest rates of melanoma among counties with greater than 10 cases for all years combined (2.0 cases per 100,000 people in both counties). Although Apache, Greenlee, and La Paz counties had the lowest rates, low case counts of less than 10 cases made their rates highly unstable and they should be used with caution.



*Case counts (n) represent the average number of cases reported per year for the years 2009-2014.

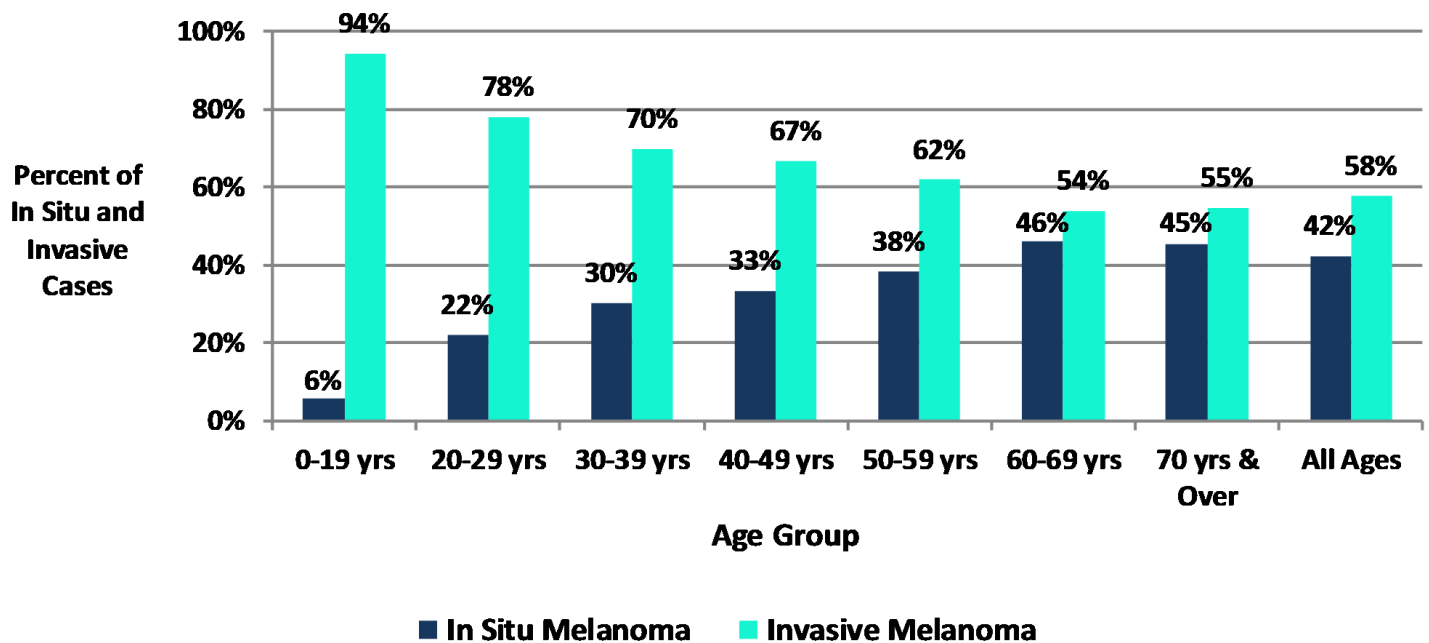
Note: The total count of each county Average Annual Count may not be equal to the Arizona count due to rounding.

Hashed counties have total counts of less than 10 cases. Therefore, rates are highly unstable and should be used with caution.

2 case in all years combined had an unknown county.

Figure 7: In Situ and Invasive Melanoma Percent by Age Group, 2009-2014

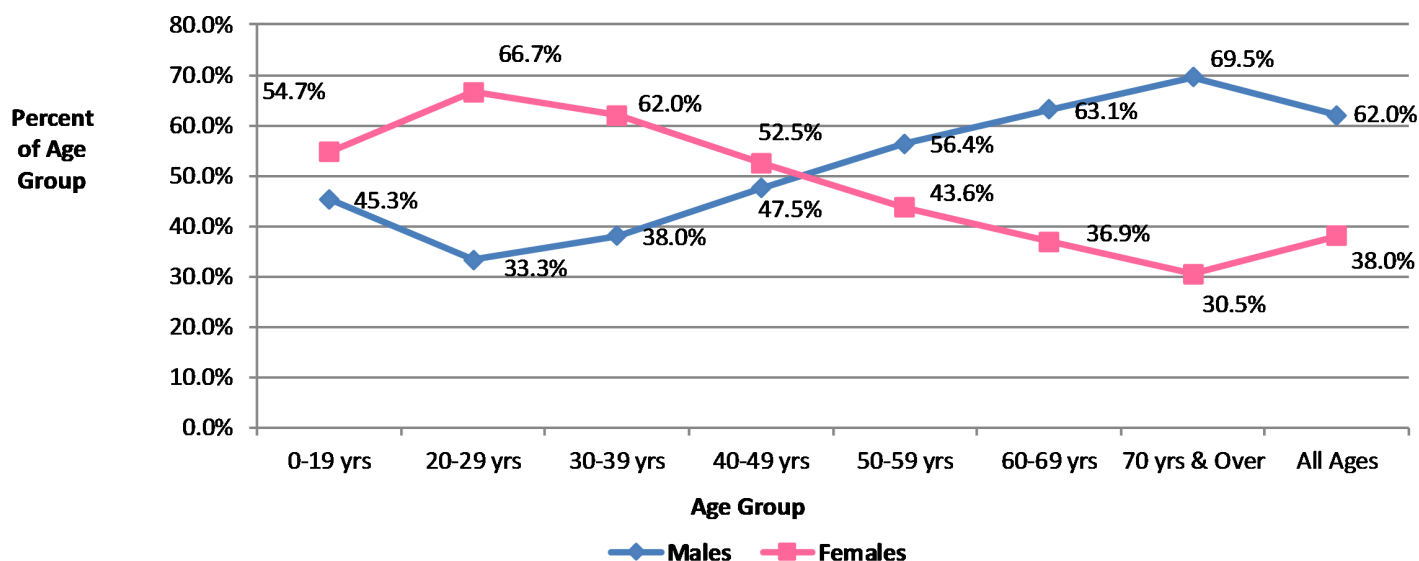
Younger age groups are more likely to be diagnosed with invasive rather than in situ melanoma. Melanoma in children (0-19 years) is invasive in 94 percent of cases and persons 20-29 years are diagnosed with invasive melanoma in 78 percent of cases. The percentage of invasive melanoma cases gradually drops to a low of 54 percent of cases for persons 60-69 years.



Note: 8 cases with an unknown age are excluded.

Figure 8: In Situ and Invasive Melanoma Cases by Sex by Percent of Age Group, 2009-2014

Age at diagnosis of melanoma differs between males and females. When all age groups are combined most cases of melanoma occur in males. However, between the ages of 20 and 50 years, more cases of melanoma are diagnosed in females. After the age of 50 years most cases of melanoma are diagnosed in males. Almost 1 in 5 melanoma cases among women occur between the ages of 20 and 50 years. In men only 1 in 10 cases occur in the 20 to 50 year age groups. Among females the median age at diagnosis is 64 years, while among males the median age at diagnosis is 69 years.



Note: 8 cases with an unknown age and 5 cases with an unknown sex are excluded.

Figure 9: Melanoma Mortality by Sex and Percent of Age Group, 2009-2015

In most age groups, male mortality exceeds female mortality percentage 2 to 1. Among persons 30 to 39 years of age, the percent of male mortality is higher than female mortality (58% to 42%). However, deaths among persons 40-49 years is almost evenly split (51% vs. 49%) between males and females.

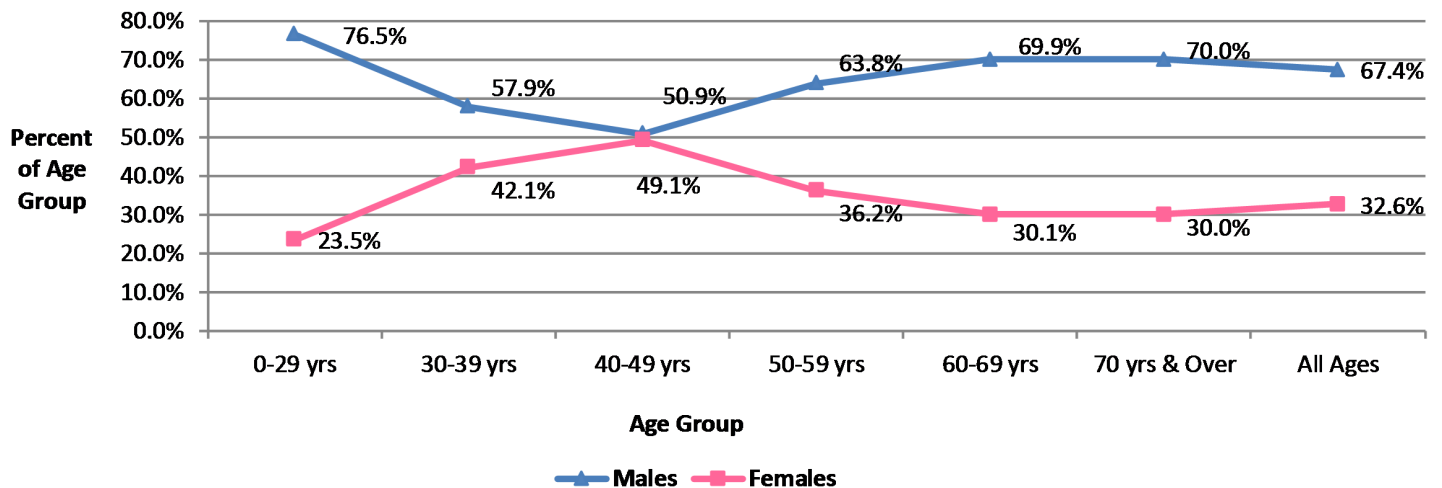
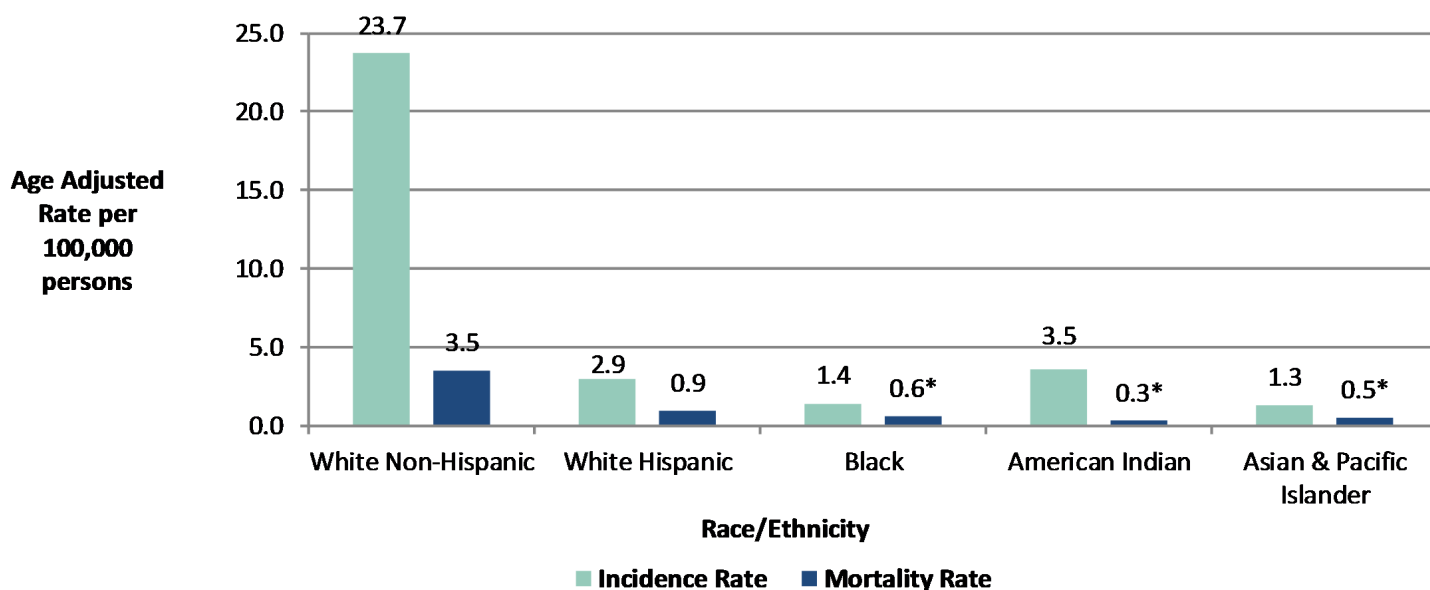


Figure 10: Invasive Melanoma Incidence (2009-2014) and Mortality (2009-2015)
Age Adjusted Rates by Race/Ethnicity

Incidence: Cases with a White Non-Hispanic race/ethnicity have the highest melanoma age adjusted rate of all race/ethnicity groups (23.7 cases per 100,000 persons). All other race/ethnicity groups range between 1.3 and 3.5 cases per 100,000 persons.

Mortality: White Non-Hispanics have the highest age adjusted mortality rates of all race/ethnicity groups (3.5 cases per 100,000 persons) for the years 2009-2015. The White Hispanic mortality rate was much lower (0.9 cases per 100,000 persons). All the other race/ethnicity groups had too few cases to calculate a meaningful age adjusted rate.



*Age adjusted rate for race/ethnicity groups with less than 10 cases for all years combined should be used with caution as the rates are highly unstable.

Note: Incidence: 566 Incidence Cases (6.8%) had an unknown or other race/ethnicity and are excluded.

Mortality: 6 Cases (0.4%) had an unknown or other race/ethnicity and are excluded.

Figure II: Histology Percent of Invasive Melanoma Cases, 2009-2014

More than half (55.1%) of all invasive melanoma are diagnosed with a histology of Melanoma Not Otherwise Specified (NOS). Superficial Spreading Melanoma (25.3%) is the second leading histology followed by Lentigo Maligna Melanoma (9.6% of cases).

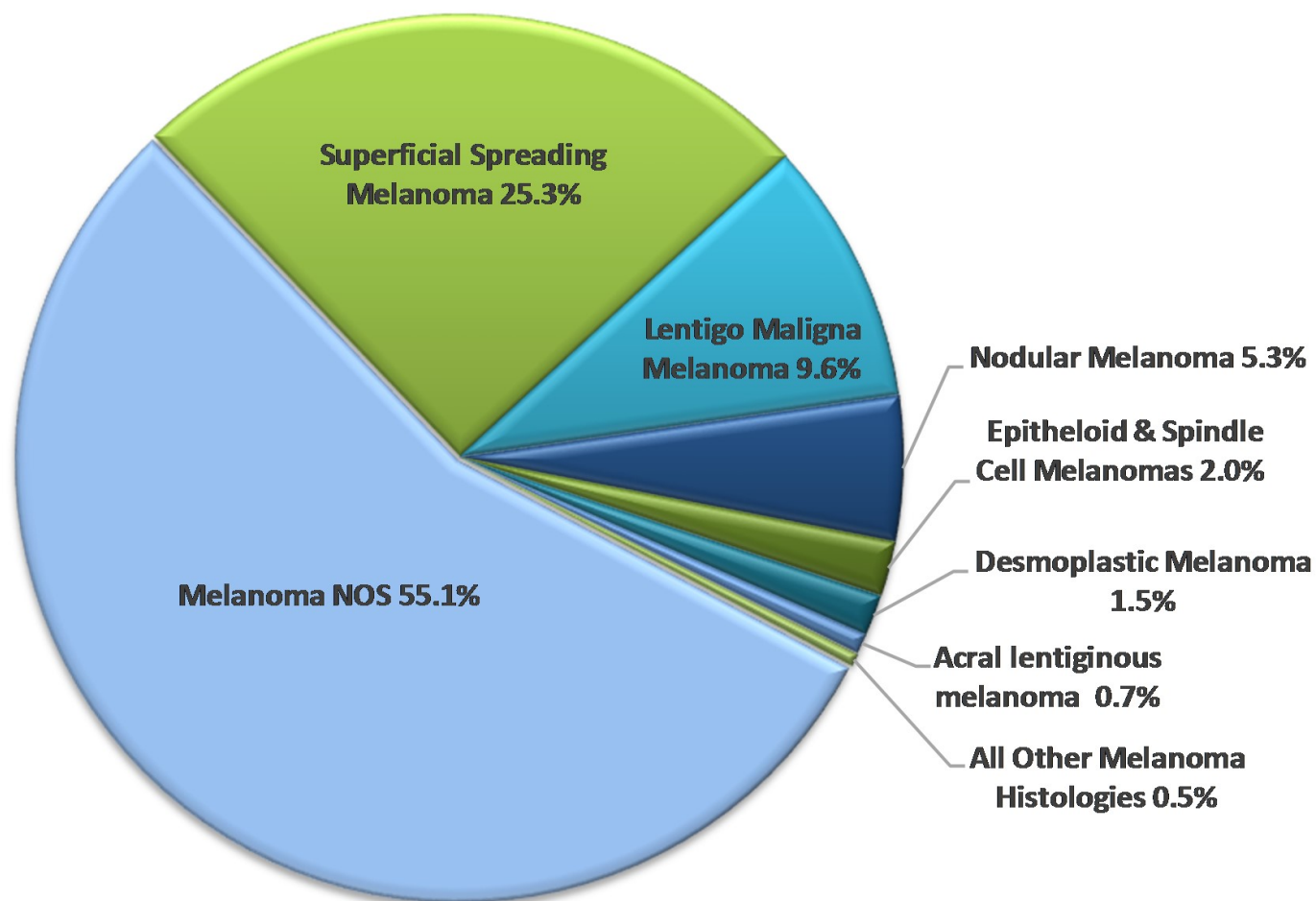
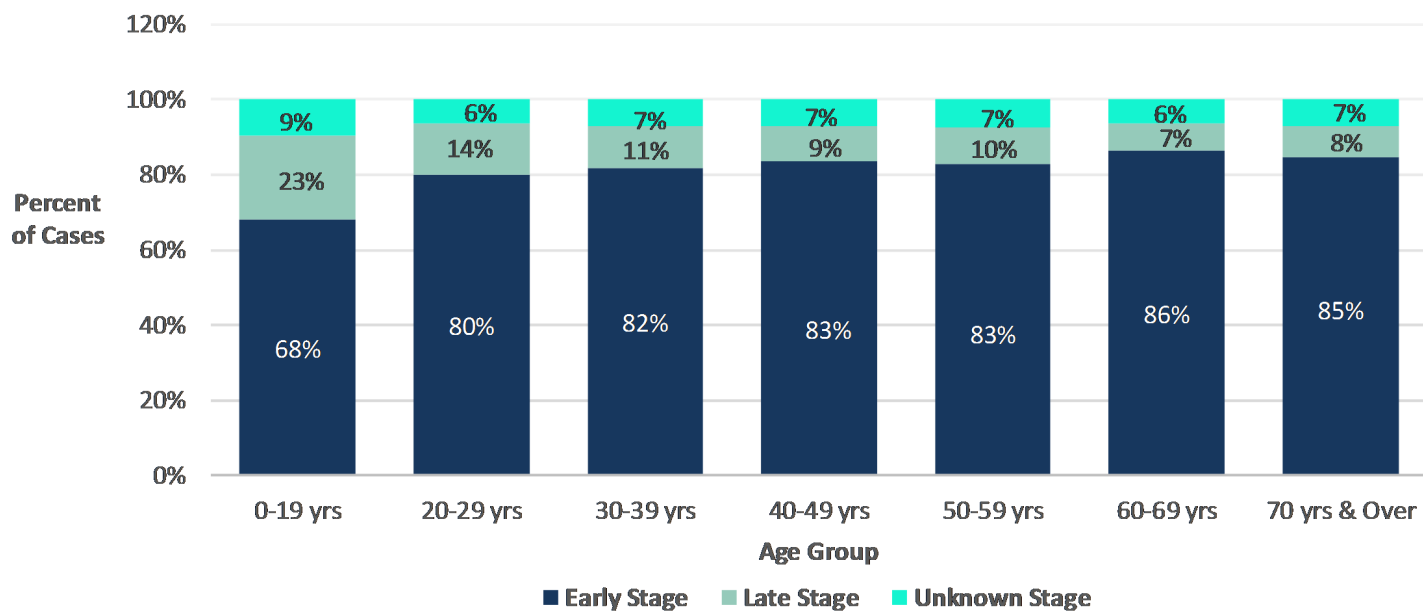


Fig 12: Melanoma Percent of Early/Late Stage by Age Group, 2009-2014

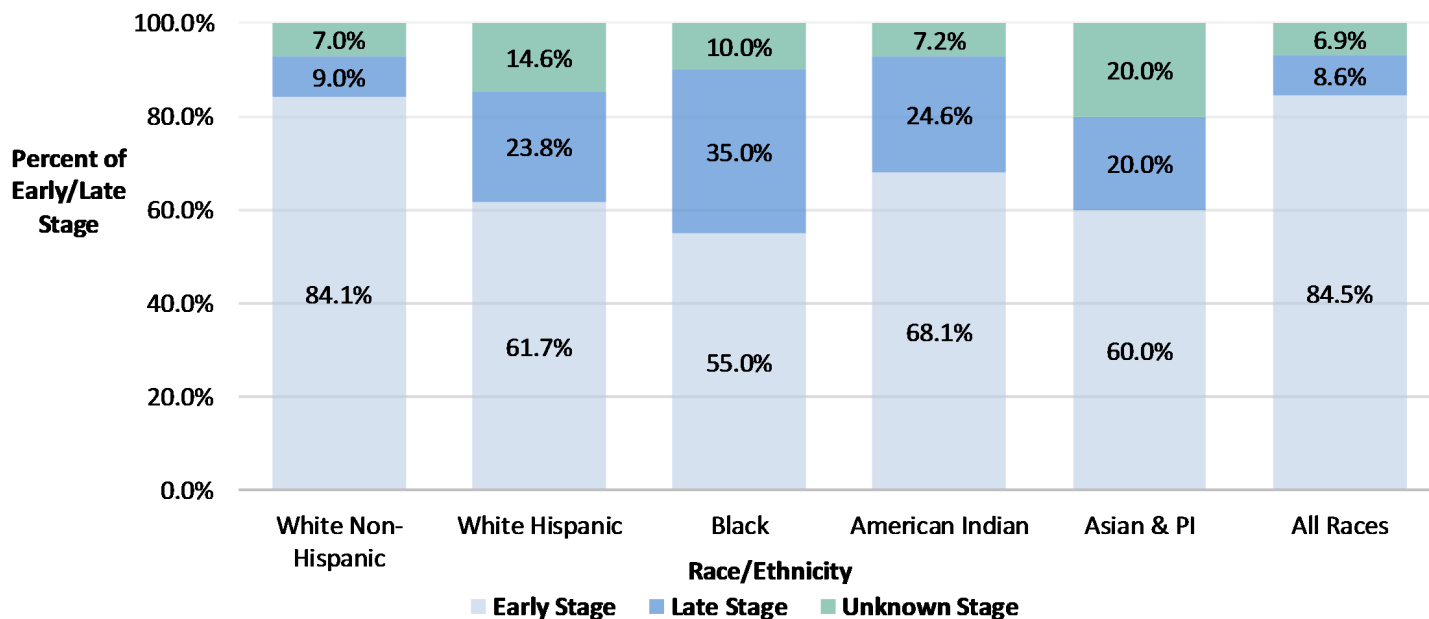
The youngest age groups have the highest proportion of cases with a late stage diagnosis. Children 0-19 years have 23 percent of cases with late stage and persons 20-29 years have 14 percent of their cases in a late stage. All other age groups have between 7 and 11 percent of melanoma cases diagnosed in a late stage.



Note: Early Stage = in situ and local Stage; Late Stage = regional and distant using Derived SEER Summary Stage 2000. Total percentage of stage for each age group may not equal 100% due to rounding.

Figure 13: Melanoma Early/Late Stage by Race/Ethnicity, 2009-2014

Cases with a Black race/ethnicity have the greatest proportion of cases diagnosed in late stage (35%) between 2009 and 2014. They were followed by an American Indian (24.6%) and White Hispanic (23.8%) with a late stage diagnosis.

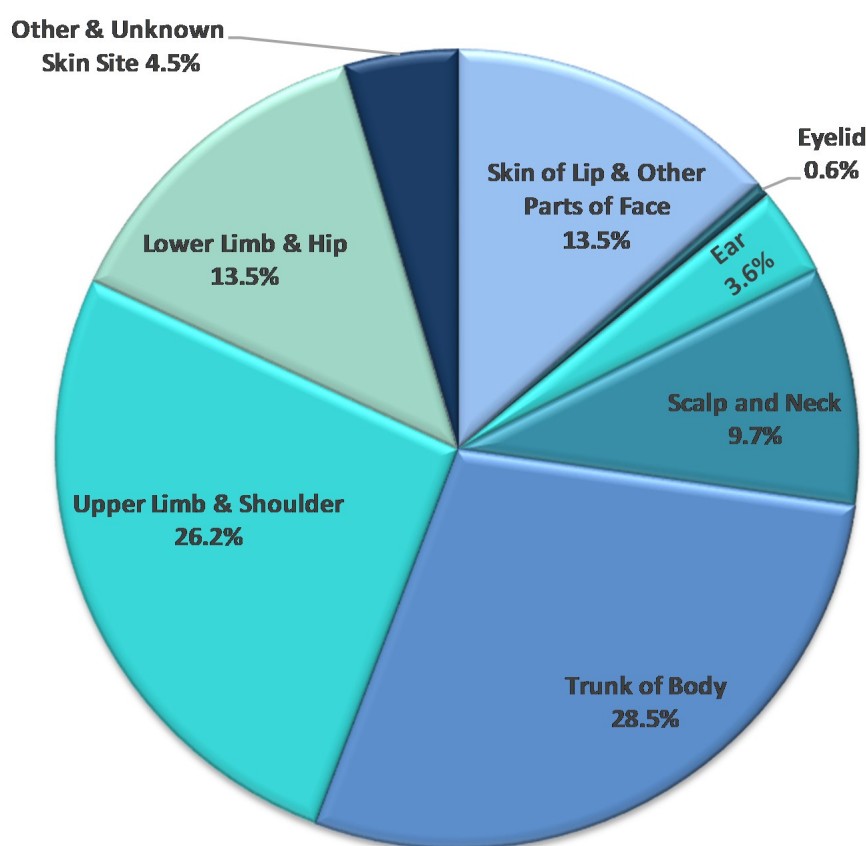


Note: Early Stage = in situ and local stage; Late Stage = regional and distant using Derived SEER Summary Stage 2000. Total percentage of stage for each race/ethnicity may not equal 100% due to rounding.

Figure 14: In Situ and Invasive Melanoma Percent of Case Count by Skin Site, 2009-2014

More cases of melanoma are diagnosed on the trunk of the body (28.5%) than other skin sites. The upper limb and shoulder site follow closely behind at 26.2% of cases diagnosed with melanoma. The fewest cases of all skin sites are diagnosed on the eyelid (0.6%) and the ears (3.6%).

There is a greater chance of a person developing melanoma on the left side of the body compared to the right side. Melanoma that occurred in the eyelid, ear, upper limb & shoulder, and lower limb & hip were more often diagnosed on the left side of the body in greater than 50 percent of cases.



Note: Total percentage of each skin site combined may not equal 100% due to rounding.

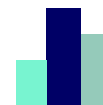
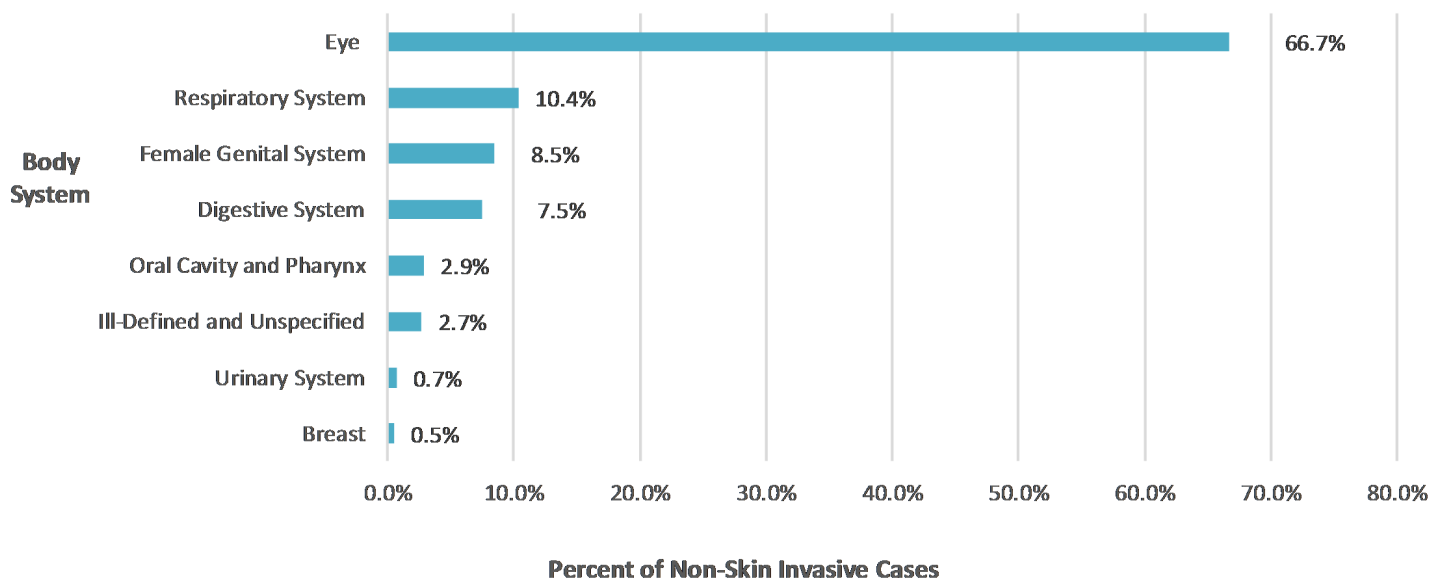


Figure 15: Non-Skin Invasive Melanoma Percent of Cases by Body System, 2009-2014

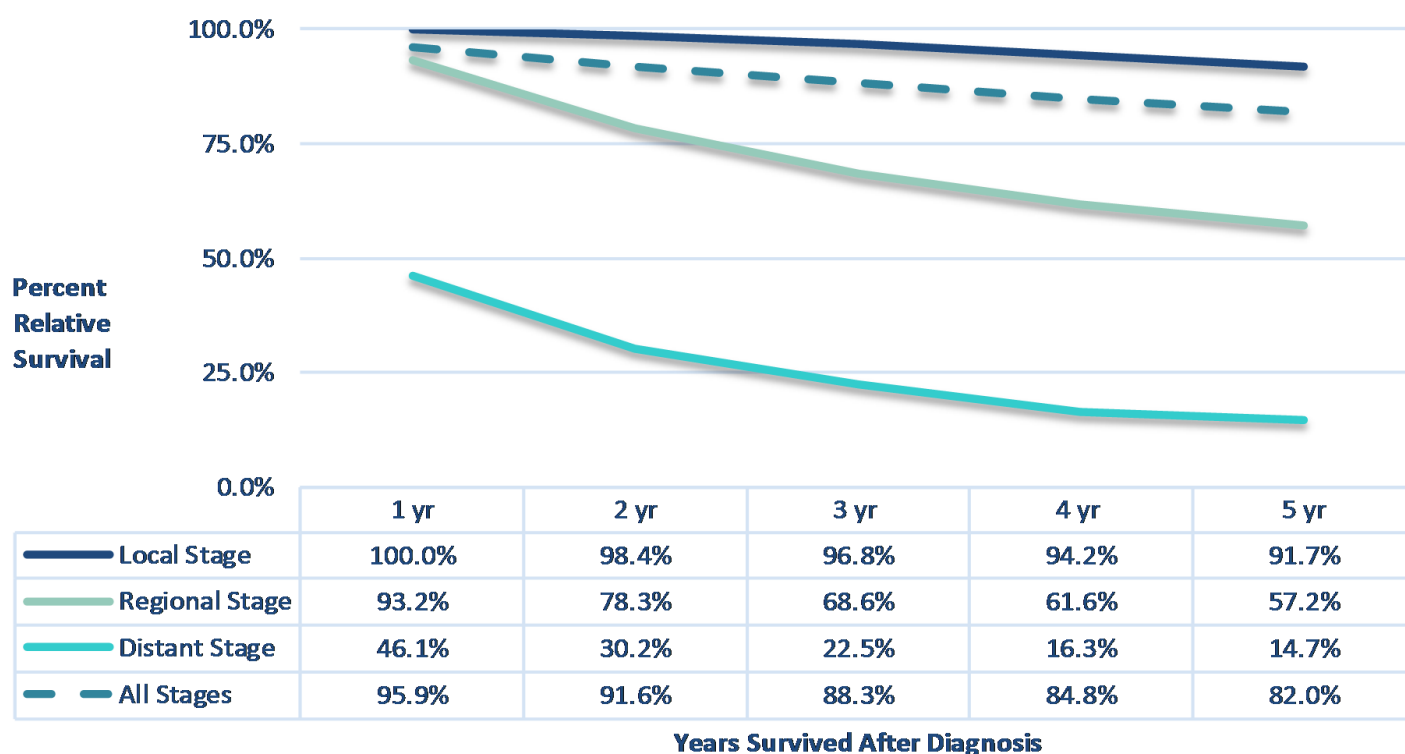
Most melanoma develops in the skin. However about 5 percent of melanoma cases develop in non-skin sites. This graph contains information about melanoma in non-skin sites. From 2009-2014, 2 of every 3 cases (66.7%) of non-skin melanoma occurred in the eye. Another 10.4% of non-skin melanoma developed in the respiratory system, 8.5% in the female genital system and 7.5% in the digestive system.



Note: This graph only analyzes melanoma that occurs in Non-Skin body systems.
Total percentage for all body systems combined may not equal 100% due to rounding.

Figure 16: Five Year Relative Survival of Invasive Melanoma by SEER Summary Stage, 1995-2011

Stage of disease at diagnosis impacts the length of survival of persons with invasive melanoma. Persons diagnosed with a local stage had a 91.7 percent relative five year survival rate. Persons diagnosed with a distant stage had a five year relative survival rate of 14.7 percent.

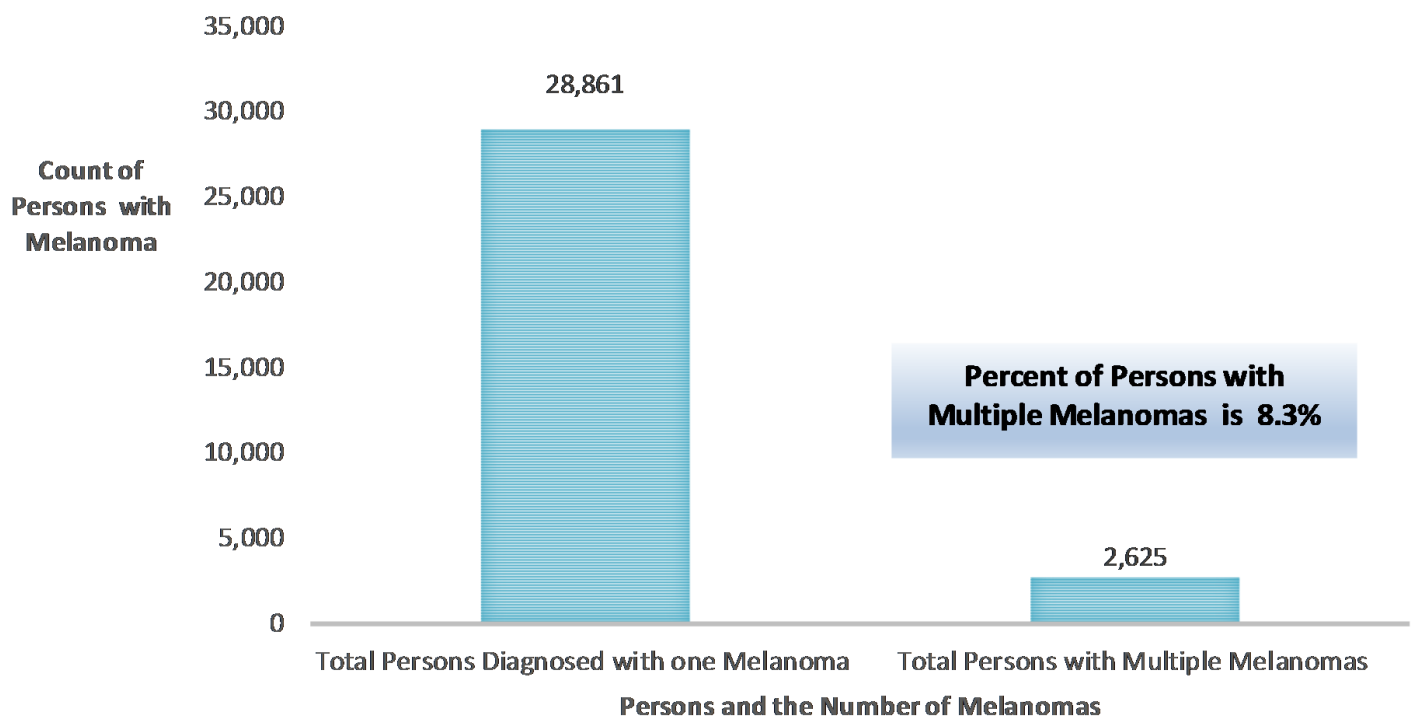


Note: SEER Summary Stage categorizes cancer based on how far the cancer has spread. It is categorized into local, regional, and distant stages. The SEER Summary Stage for this graph combines staging from directly coded SEER Summary Stage 1977 and SEER Summary Stage 2000 with the Collaborative Staging System Derived SEER Summary Stage 2000 to calculate SEER Summary Stage counts used in the survival analysis.



Figure 17: Number of Persons Diagnosed With One Melanoma and Multiple Melanomas In Situ and Invasive Melanoma, 1995-2014

A total of 31,486 persons (28,861 with one melanoma and 2,625 persons with multiple melanomas) were reported to the Arizona Cancer Registry (ACR) with melanoma between 1995 and 2014. The ACR found that 8.3% of the cases had multiple melanoma primaries. However, persons diagnosed with another melanoma primary while living outside of Arizona are not included in the Arizona case counts.



Note: The ACR relies on hospitals and physicians to provide information on all cases diagnosed in Arizona. Persons diagnosed with another melanoma primary while living outside of Arizona may not be included in Arizona case counts.

Arizona Cancer Registry (ACR) Data Section

This section includes cases diagnosed from the years 2009 through 2014. Survival analysis data uses cases diagnosed from 1995 through 2011. The data for this section were retrieved from the ACR database on March 27, 2017. This section includes both in situ and invasive melanoma cases for analyzing incidence and mortality data using a variety of counts, rates and percentage calculations. The ACR data section uses demographic variables (e.g., age and sex) to evaluate tumor specific variables (e.g., histology) and staging variables (e.g., Derived SEER Summary Stage 2000 and Early/Late stage). Only invasive cases were included when creating age adjusted rates for analysis. This section uses the Surveillance, Epidemiology, and End Results (SEER) program definitions of the cases by cancer type.

Data Sources

The data for the ACR section is from the Arizona Cancer Registry (ACR). The ACR is a population based surveillance system that is designed to collect, manage and analyze information on incidence, survival, and mortality of Arizona residents diagnosed with cancer. Cancer is mandated to be reported to the ACR according to Arizona Revised Statute §36-133. Cancer cases are received from hospitals, clinics, pathology labs, and physicians. Mortality Data is from the Arizona Department of Health Services' Population Health and Vital Statistics in the Bureau of Public Health Statistics.

Analysis Criteria

Residence at Diagnosis

The residency of cases at the time of diagnosis was grouped by county and by Arizona residents. Non-Arizona residents were excluded in the analysis.

Age at Diagnosis

Age groups were divided into seven age groups for analysis of Behavior (in situ and invasive) by Age, Sex by Age, Early/Late Stage by Age. These age groups were 0-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, 60-69 years, and 70 years and older. For analysis of diagnosis year by age group, case counts for the 0-19 years and 20-29 years age groups were combined to create a 0-29 year age group reducing the number of age groups to six.

Race/Ethnicity

Race/Ethnicity is identified from the physician's notations and the medical record that generally contains information concerning a person's race and ethnicity. Death records are another source used to identify race. American Indian race is also identified through linkage with Indian Health Service (IHS) data. The linkage identifies cases that may be misclassified as another race. Race/Ethnicity definitions used in the ACR data section are; White non-Hispanic, White Hispanic, Black, American Indian, and Asian & Pacific Islander. Incidence rates were divided into two ethnicity categories: Hispanic and non-Hispanic. For the ACR data section, all cases with an unknown ethnicity were considered non-Hispanic.

Primary Site and Histologic Type

Primary site and histologic type were classified according to the International Classification of Diseases for Oncology, Third Edition (a.k.a. ICD-O-3).

Behavior (In Situ and Invasive)

Behavior code: The fifth digit of the morphology code that indicates the growth pattern of a tumor, and whether or not it is invasive. In situ definition is as follows: No penetration of the basement membrane of the tissue of origin. Invasive definition is as follows: A malignant tumor that has invaded the basement membrane of the tissue of origin.

SEER Summary Stage

For this analysis, years 2009-2014, the Derived Summary Stage 2000 as identified by the Collaborative Staging System was used as the Source of the SEER Summary Stage for all graphs analyzing stage except the survival graph.

The survival graph aggregates counts from SEER Summary Stage over 17 years of data that incorporates three different SEER Summary Stage systems used during this period. These Summary Staging Systems were:

SEER Summary Stage 1977 (cases diagnosed 1995-2000 and directly coded)

SEER Summary Stage 2000 (cases diagnosed 2001-2003 and directly coded)

Collaborative Staging System Derived SEER Summary Stage 2000 (cases diagnosed 2004-2011 and coded from derived values).

SEER Summary Stage coding is as follows:

Local - cancer cells limited to the organ of origin.

Regional - cases have cancer cells extending to adjacent tissue or lymph nodes that are located in the same region as the organ of origin.

Distant stage - cancer cells travel beyond adjacent tissue to distant organs or lymph nodes that are beyond the regional area.

Early/Late Stage

Early/Late Stage uses the Collaborative Staging System Derived SEER Summary Stage 2000 to reclassify stage into three groups: Early Stage - in situ and local stage combined, Late Stage - regional and distant stage combined, and unknown stage. For the ACR data section Derived SEER Summary Stage 2000 is used.

Reporting Source

Reporting source identifies the type of facility reporting the case. All physicians and clinic cases were identified as Physician Cases and All Other Sources include hospital, pathology lab, death certificate, and cases reported from out of state central registries.

Incidence Counts

Incidence counts were the number of cases diagnosed with cutaneous melanoma from years 2009 through 2014. More than one cancer case may be reported for an individual. This “one-to-many” relationship results in a higher number of cancer cases than individual persons recorded in the registry. Certain demographic variables may be unknown for some cases. Therefore comparing total numbers between different figures may not yield equal numbers. Additionally, the totals for all categories within a figure may not equal the state total.

Average Counts and Rates

The ACR data section contains figures that average six years of data to produce an average annual count. When doing so, each averaged number is calculated separately, and rounded to a whole number. Due to rounding the total rounded value may not equal the total of two individually calculated numbers in that category.

Age-Adjusted Incidence and Mortality

Age-adjustment is a process used to compare incidence and mortality rates over time or among geographic areas or populations that have different age distributions. Because most disease rates increase with increasing age, age-adjustment eliminates the confounding effect of age when comparing rates. Beginning with the 1999 data year, federal agencies and the Arizona Cancer Registry have adopted the year 2000 projected U.S. population as the new standard for age-adjusting incidence. All incidence rates were adjusted using the 2000 U.S. standard population by the direct method, and were presented as number of cancers per 100,000 persons.

Mortality Data Criteria

Cancer mortality rates were calculated on counts of cancer deaths that meet all of the following criteria:

- ⇒ The cancer death occurs to an Arizona resident
- ⇒ The primary cause of death is coded C00 to C97 using ICD-I0
- ⇒ The case is reported to the Arizona Office of Vital Records
- ⇒ The primary cause of death is classified according to the International Classification of Diseases, Injuries and Causes of Death, Tenth Revision, 1992.

U.S. Mortality

U.S. mortality was accessed from Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER Stat Database: Mortality - All COD, Aggregated with State, Total U.S. (1969-2014) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released December 2016. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

Relative Survival Rate

Relative survival is the proportion of a population that has melanoma that is expected to survive as compared to the cancer free population. It is adjusted for age group, as the percent of the population that is expected to survive decreases with age.

Population Denominators

The population numbers used for analysis in this report were taken from United States Census Bureau and modified by SEER. The SEER program applied a race/ethnicity bridge to the population numbers previous to the year 2000 to more accurately estimate the number of minorities in years previous to the 2000 census. New intercensal estimates were developed to reflect the actual yearly changes in populations based on the 2010 census. These changes lowered the expected population for Arizona in each year as population projections used in the past had over-estimated the state and county populations. These new populations slightly increase the rate of cancer. The ACR chose to use these population numbers for calculating age-adjusted rates in order to be comparable with other state and national cancer data.



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