GUAM
CANCER FACTS AND FIGURES
2008-2012

A Community Collaborative Effort

APRIL 2015

MARCH 2015

Good data underpins effective cancer control.

In Guam, cancer contributes significantly to premature death, ill health and the socio-economic burden arising from chronic disease. The 2nd Guam Cancer Facts and Figures, covering data for the years 2008-2012, is evidence of the sustained commitment from the various cancer prevention and control stakeholders within our community to combat a major cause of premature mortality in our island using data-driven strategies and approaches.

This report provides data on cancer mortality, incidence, its socio-demographic correlates and its risk factors. Building on the 1st Cancer Facts and Figures (2003-2007), we now have sufficient data to examine trends and to determine which areas in cancer prevention and control stand out as service and resource priorities. The next step is to translate these data into action, through both policies and programs, to reverse the growing burden of cancer in Guam.

The Department of Public Health and Social Services Guam Comprehensive Cancer Control Program will continue to work closely with the University of Guam Cancer Registry, the Guam Comprehensive Cancer Control Coalition, the Guam Noncommunicable Disease Consortium, and other community stakeholders to fully utilize these data to guide policy and program decisions in a strategic approach to cancer control and prevention.

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Reliable cancer data is pivotal to improving cancer health outcomes.

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This publication is the result of a multi-partnership effort of the various data stakeholders in Guam. Dr. Robert Haddock and Ms. Renata Bordallo of the Guam Cancer Registry provided incidence and mortality data. Risk factor prevalence data were taken from the Guam Behavioral Risk Factor Surveillance System (BRFSS), administered by DPHSS, and the Guam Youth Risk Surveillance System (YRBSS) administered by the Guam Department of Education (GDOE). Data on the cost of cancer derived from a study led by Dr. Juanito Zuasula and the DRAT. Dr. Annette M. David (Health Partners, LLC) served as the lead writer for the report, while Ms. Angelina Mummert coordinated data collation. Ms. Rose Zabala, Mr. Lawrence Alam and the DPHSS Guam Comprehensive Cancer Control Program provided project support. The publication was funded by the Office of Minority Health Resource Center. The various individuals who contributed to this report include the following:

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Introduction and Approach

Cancer remains a major health and socio-economic challenge for Guam.

Working in partnership over the past decade, the cancer prevention and control stakeholders have consolidated their efforts through the Guam Comprehensive Cancer Control Coalition in prioritizing and implementing key strategies and actions to reduce cancer gaps and enhance prevention and treatment services for the island community. The coalition oversaw the implementation of the first Guam Comprehensive Cancer Control Plan (2008-2012) and its evaluation, and completed the development and launch of the 2nd plan for the years 2013-2017. Data was a critical element informing the selection of priority action areas and sustained data collection remains the cornerstone for assessing progress.

The first Guam Cancer Facts and Figures report was published in June 2009, covering cancer registry data for the periods 1998-2002 and 2003-2007. Data for these two time periods remain the same in this report. Cancer registry data for 2008-2012 was recently released, and comprises the major portion of this report. In addition, data on cancer risk prevalence from the BRFSS and YRBSS, and cancer costs from a study commissioned by the DRAT, supplemented the information in this publication.

In this document, cancer rates represent the number of new cases of cancer per 100,000 population (incidence) or the number of cancer deaths per 100,000 population (mortality) for a given time period. Using a set number of people as the denominator enables comparisons with other populations, regardless of actual population size. Guam has a young population, and cancer tends to occur with greater likelihood among older persons. Thus, Guam cancer rates were age adjusted to the US 2000 standard population; this permits more valid comparisons between Guam and the US. Because the numbers of cancer cases per year in Guam are small, the incidence and mortality data is aggregated into 5-year periods for better statistical vigor. At the present time, some of the 2012 Cancer Registry data remain preliminary; thus it is possible that some revisions to the data in this report will be done once the final 2012 registry data are available.

This publication is intended for a broad community audience. Therefore, an intentional attempt has been made to present the statistics in a user-friendly manner, explaining technical terms and using layman's language. It is anticipated that this report will provide useful insights and information for community members interested in learning about cancer in Guam, as well as students, researchers, cancer prevention and treatment service providers, program planners and health policy makers. Making these data broadly available to these audiences ensures that decisions regarding cancer resource allocation, service and workforce development and infrastructure investments can be guided by local evidence and current information.

Ultimately, data drive cancer health outcomes. Thus, this publication is meant to complement the vision, mission, goals and strategic objectives of the current Guam Comprehensive Cancer Control Plan 2013-2017.

Guam's Vision

"The people of Guam will be cancer free, embracing a healthy lifestyle and living in a healthy environment."

Guam's Cancer Mission:

"Reduce cancer incidence and mortality on Guam through collaboration of private and public stakeholders."

Cancer in Guam: an Overview

IS CANCER STILL AN ISSUE FOR OUR COMMUNITY?

Undoubtedly, cancer continues to present a formidable health burden to Guam's people. Of the top ten causes of death in Guam, cancer ranks second, accounting for 18.5%, or nearly one in every five of all deaths in 2011 (Table 1).

Table 1. Top Ten Causes of Death, Guam: 2011

Rank	Cause of Death	Number of Deaths	Percent of all Deaths
1	Diseases of the Heart	253	30
2	**Malignant neoplasms**	**156**	**18.5**
3	Cerebrovascular disease and stroke	53	6.3
4	Diabetes Mellitus	48	5.7
5	Accidents	37	4.4
	Motor vehicle accidents	17	2.0
	Other accidents	20	2.4
6	Septicemia	29	3.4
7	Suicide	28	3.3
8	Chronic lower respiratory disease	22	2.6
9	Influenza and pneumonia	19	2.3
10	Chronic liver diseases and cirrhosis	18	2.1
11	**All Others**	**142**	**16.9**
	Total deaths	**842**	**100.0**

Source: Death Certificates, Office of Vital Statistics, Guam Department of Public Health & Social Services; National Center for Health Statistics.

Data indicate that the cancer burden is rising. Both cancer incidence (new cancer cases) and mortality (cancer deaths) have increased over the 3 time-periods for cancer data collection: 1998-2002, 2003-2007, and 2008-2012 (Table 1). Between 2008-2012, 1904 new cases of cancer were diagnosed, and 736 people died of cancer. Thus, cancer incidence increased by 20% and cancer deaths increased by 2.6% from the previous 5-year period (Table 2 and Figure 1). On average, this translates to 1 new case of cancer diagnosed each day, and 1 person dying of cancer every 2.5 days.

In the United States, the rate of cancer incidence has been declining since 1998 and cancer mortality likewise continues to drop. In contrast, here in Guam, cancer incidence increased successively over the 3 time periods, and mortality has not decreased. Clearly, cancer remains a priority health issue for the Guam community.

On average, in Guam 1 person is diagnosed with cancer each day, and 1 person dies of cancer every 2.5 days.

Table 2. Cancer incidence and mortality trends, Guam: 1998-2002, 2003-2007, 2008-2012

GUAM CANCER INCIDENCE, 5-YEAR PERIODS			
	1998-2002	2003-2007	2008-2012
New Cases	1333	1580	1904
Crude Annual Rate	171.1**	186.3**	239.0
Age-Adjusted Rate *	272.0**	276.9**	325.1
GUAM CANCER MORTALITY, 5-YEAR PERIODS			
	1998-2002	2003-2007	2008-2012
Cancer Deaths	653	717	736
Crude Annual Rate	84.5	85.0	92.4
Age-Adjusted Rate *	^	132.9	136.7

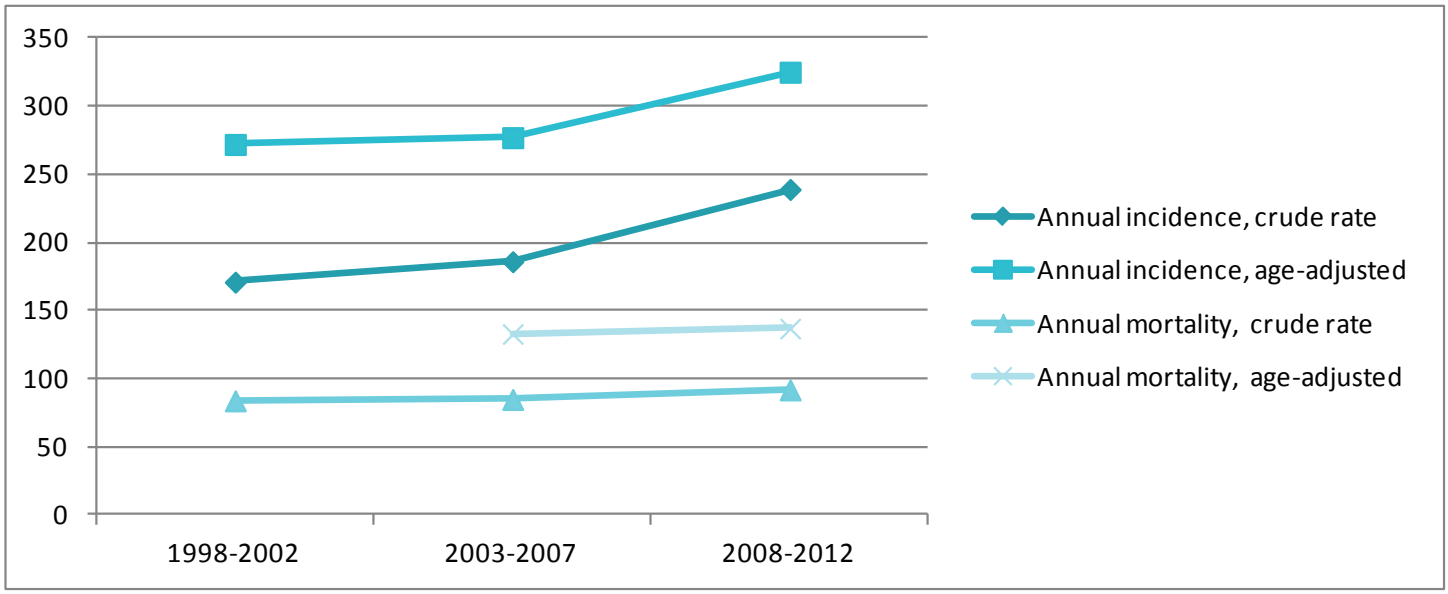
*Standardized to the U.S. Standard 2000 Population

** Calculations include only cases for which age at diagnosis or death is known; for 1998-2002 and 2003-2007, there were 10 cases with no age data

^Not available

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Figure 1. Trends in cancer incidence and mortality, Guam: 1998-2002, 2003-2007, 2008-2012



Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014. Age adjustment is to the US 2000 standard population.

WHAT IS THE COST OF CANCER IN GUAM?

The Guam Comprehensive Cancer Control Coalition's DRAT commissioned an analysis of the cost of cancer using data from the DPHSS Bureau of Health Financing Medicaid-MIP Program. From 2007 to 2011, there were a total of 44,179 individual medical records for cancer diagnostic and therapeutic services. Ninety-five percent of these services were obtained in Guam, and the remaining 5% were procured from off-island service providers.

The 5-year actual cost of direct medical services amounted to $20,570,387. The 5-year total cost of on-island medical services was $13,252,090. Of this, $7,251,844 was utilized for outpatient visits, while inpatient services cost $6,000,246. The 5-year off-island medical services totaled $7,318,297, covering mostly hospital admissions for further diagnostic work-up and or therapy. These figures represent an underestimate of the direct costs of cancer, since Medicaid-MIP recipients made up less than 30% of the total Guam population in 2011. Furthermore, the study did not address the indirect costs of cancer, including productivity losses and the cost of premature mortality. Hence, the actual cost of cancer to the Guam community is likely to be much higher. The continued rise in cancer incidence also foretells an increasing economic burden in the future.

Unlike the rest of the United States, where cancer incidence and mortality are declining, in Guam new cancer cases and deaths from cancer continue to rise. This foretells an increasing economic burden from cancer in Guam's future.

The Guam Comprehensive Cancer Control Coalition

WHICH CANCERS ARE MOST COMMON IN GUAM?

The most common cancer sites that comprise the majority of Guam's cancer cases and deaths are listed in Table 3. Five cancer sites - breast, colon and rectum, liver, lung and bronchus, and prostate – account for over 56% of new cancer cases and 61% of all cancer deaths. The relative contribution of breast and liver cancer to overall cancer incidence increased in 2008-2012 compared to 2003-2007, while the relative contribution of lung and bronchus and prostate cancer diminished. The proportion of total cancer deaths due to liver cancer increased in 2008-2012, while the relative contributions of breast, colon and rectum, and prostate cancer to overall cancer mortality decreased (Table 4).

Table 3. Top ten cancer cases and deaths, selected cancer sites, Guam: 2008-2012

	Cancer Sites	Incidence Counts (New Cases)	Percent of Total Cancer Incidence		Cancer Sites	Mortality Counts (Death)	Percent of Total Cancer Mortality
1	Breast (Female)	292	15.3%	1	Lung and Bronchus	213	28.9%
2	Lung and Bronchus	281	14.8%	2	Liver	81	11.0%
3	Prostate	201	10.6%	3	Colon and Rectum	78	10.6%
4	Colon, Rectum & Anus	190	10.0%	4	Prostate	40	5.4%
5	Cervix	130	6.8%	5	Breast (Female)	37	5.0%
6	Liver	105	5.5%	6	Leukemia	35	4.8%
7	Thyroid	86	4.5%	7	Non-Hodgkin Lymphoma	26	3.5%
8	Uterus	70	3.7%	8	Pancreas	24	3.3%
9	Leukemia	68	3.6%	9	Stomach	21	2.9%
10	Non-Hodgkin Lymphoma	55	2.9%	10	Nasopharynx	19	2.6%
	Other Cancer Sites	426	22.3%		Other Cancer Sites	162	22.0%
	All New Cancer Cases	**1904**	**100.0%**		**All Cancer Deaths**	**736**	**100.00%**

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Table 4. New cancer cases and deaths, selected cancer sites, Guam: 2003-2007, 2008-2012

Cancer Sites	Incidence Counts (New Cases)		Percentage of Total Cancer Incidence		Mortality Counts (Death)		Percentage of Total Cancer Mortality	
	2003-2007	2008-2012	2003-2007	2008-2012	2003-2007	2008-2012	2003-2007	2008-2012
Breast (Female)	202	292	12.8%	15.3%	57	37	7.9%	5.0%
Colon and Rectum (includes Anus)	165	190	10.4%	10.0%	82	78	11.4%	10.6%
Liver	66	105	4.2%	5.5%	50	81	6.9%	11.0%
Lung and Bronchus	272	281	17.2%	14.8%	206	213	28.6%	28.9%
Prostate	223	201	14.1%	10.6%	59	40	8.2%	5.4%
Other Cancer Sites	652	835	41.3%	43.8%	266	287	36.9%	39.0%
All Sites	1,580	1904	100.0%	100.0%	720	736	100.0%	100.0%

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

5 cancers account for majority of Guam's cancer burden:

- Breast cancer
- Cancer of the colon and rectum
- Liver cancer
- Lung and bronchus cancer
- Prostate cancer

Coalition members promoting the 2014 U.S. Preventive Services Taskforce Guidelines

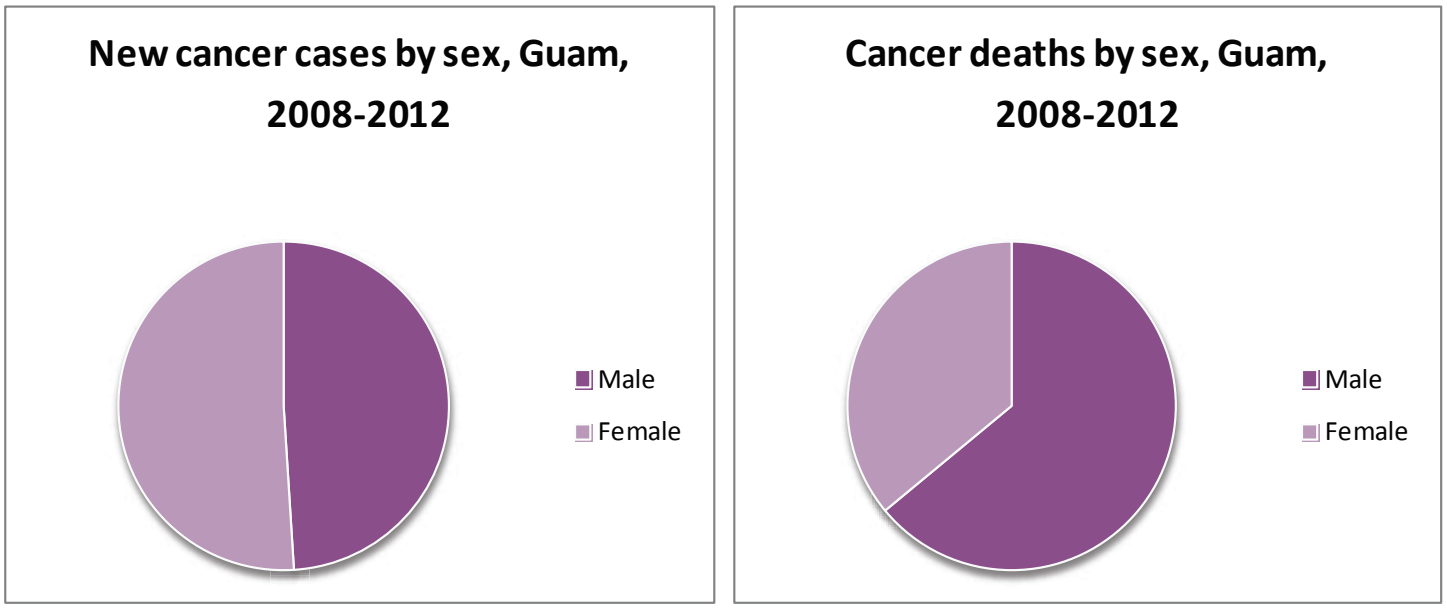
Who gets cancer in Guam? The Demographics of Cancer

Cancer can occur at any age, although more than 3 out of every 4 cancers occur in people over the age of 55. In the United States, nearly half of all men and a little more than one-third of all women will have cancer during their lifetimes. People of all racial or ethnic groups can get cancer. However, disparities exist across sex, age and race or ethnicity, and social determinants can impact tremendously upon cancer risk.

CANCER AND SEX

From 2008 to 2012, 1,904 Guam residents were diagnosed with cancer and 736 lost their lives to cancer. The number of new cancer cases was about the same for men and women (931 new cases in males vs. 973 cases in females); however more cancer deaths occurred among men (470 deaths in males vs. 266 deaths in females). The cancer incidence rate for men was only slightly higher than that for women (346 per 100,000 vs. 313 per 100,000), but the cancer mortality rate was nearly double (182 per 100,000 vs. 95 per 100,000) (Figure 2 and Table 5).

Figure 2. New cancer cases and deaths by sex, Guam: 2008-2012



Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.
Note: 2010 Guam population numbers are from U.S. 2010 Census.

Table 5. Cancer incidence and mortality rates by sex, Guam: 2008 – 2012

INCIDENCE		MORTALITY	
Incidence Rate per 100,000 Population		Mortality Rate per 100,000 Population	
Females	Males	Females	Males
312.64	345.55	95.16	182.45

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.
Note: 2010 Guam Population numbers are from U.S. 2010 Census

The cancer profiles of the sexes in Guam differ in regards to the cancer sites most frequently involved. With new cancer cases, prostate cancer is the most frequently reported site for men, while breast and cervical cancers predominate for women. Cancers of the lung and bronchus and colon and rectum are common cancer diagnoses for both men and women (Figure 6).

Regardless of sex, lung cancer remains the most frequent cause of cancer death. Tobacco use is the biggest known risk factor for lung cancer. Thus, cancer mortality data highlight the critical importance of further reducing tobacco use among Guam's people. Because second hand smoke also raises cancer risk, interventions to curb tobacco use will protect not only the tobacco users, but also all others who would have been exposed to tobacco smoke.

Cancers of the colon and rectum, and liver, also rank high among the causes of cancer death for both men and women. Regular screening can often find colorectal cancer early, when it is most likely to be curable. Therefore, to reduce cancer mortality in Guam, scaling up screening for colorectal cancer is crucial. Worldwide, the most common risk factor for liver cancer is chronic (long-term) infection with hepatitis B virus (HBV) or hepatitis C virus (HCV). Universal vaccination against hepatitis B and prevention of hepatitis C through safe sex, avoiding illegal intravenous drug use and the use of sterile needles when getting tattoos are essential to reducing liver cancer incidence and mortality. Lastly, it should be pointed out that smoking, alcohol use and obesity also contribute to cancers of the colon and rectum, and liver. Thus tobacco and alcohol control and obesity prevention should be cornerstones of the effort to reduce Guam's cancer burden.

**Regardless of sex, lung cancer remains the most frequent cause of cancer death.
Cancers of the colon and rectum, and liver, also rank high among the causes of cancer death for both men and women.**

Table 6. Ten top sites of new cancer cases by sex, Guam: 2008-2012

	Males				Females		
	Cancer Sites	Incidence Counts (New Cases)	Percentage of Male Cancer Incidence		Cancer Sites	Incidence Counts (New Cases)	Percentage of Female Cancer Incidence
1	Prostate	201	21.6%	1	Breast	292	30.0%
2	Lung and Bronchus	193	20.7%	2	Cervix (includes in situ)	130	13.4%
3	Colon, Rectum & Anus	115	12.4%	3	Lung and Bronchus	88	9.0%
4	Liver	90	9.7%	4	Colon, Rectum & Anus	75	7.7%
5	Leukemia	36	3.9%	5	Thyroid	74	7.6%
6	Urinary Bladder	29	3.1%	6	Uterus	70	7.2%
7	Kidney and Ureter	28	3.0%	7	Leukemia	32	3.3%
8	Non-Hodgkin Lymphoma	27	2.9%	8	Non-Hodgkin Lymphoma	28	2.9%
9	Oral Cavity	25	2.7%	9	Ovary	26	2.7%
9	Nasopharynx	25	2.7%	10	Stomach	19	2.0%
10	Stomach	21	2.3%				
	Other Cancer Sites	141	15.1%		Other Cancer Sites	139	14.3%
	All Male Cancer Cases	**931**	**100.0%**		**All Female Cancer Cases**	**973**	**100.0%**

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

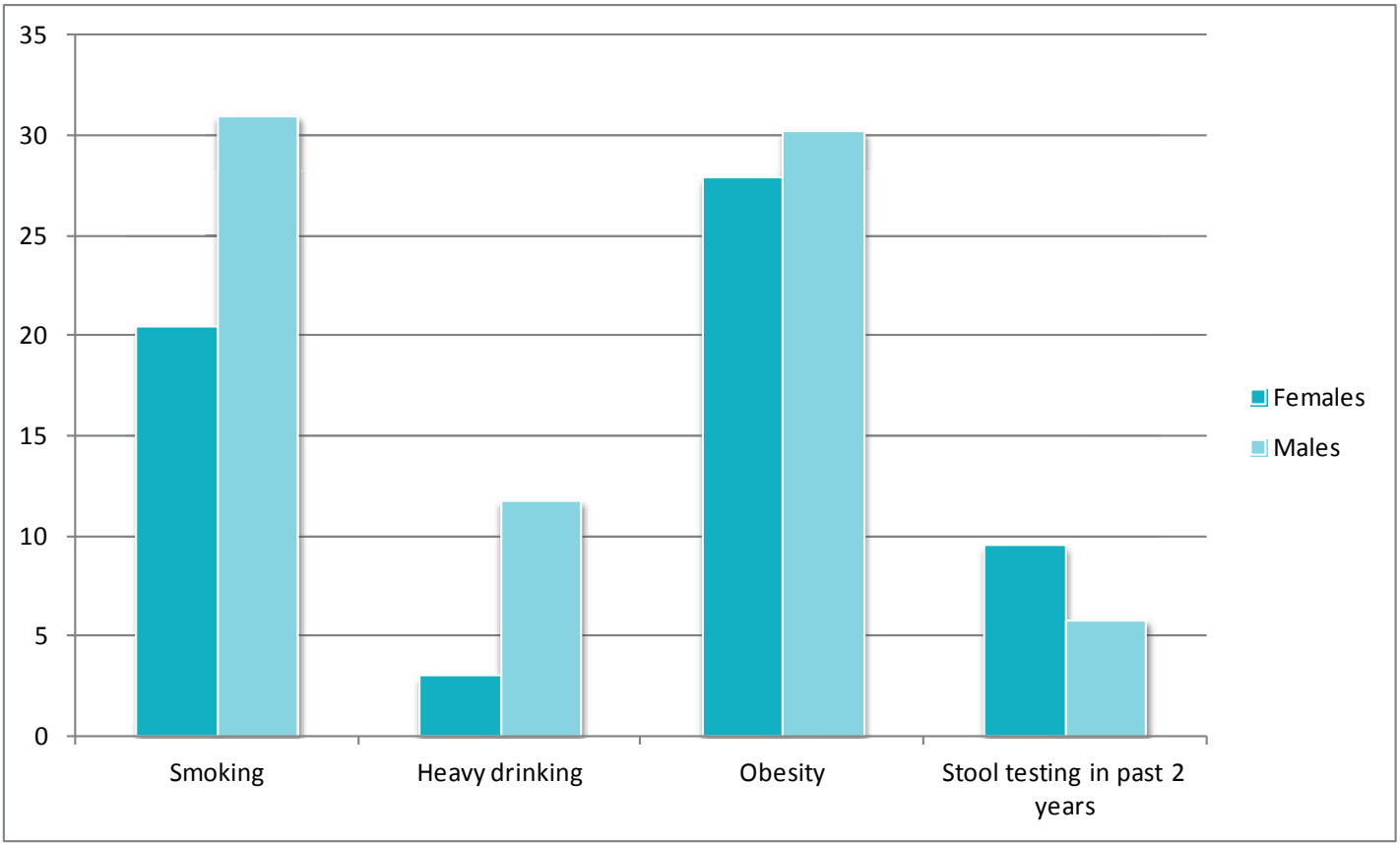
Table 7. Ten top causes of cancer deaths by sex, Guam: 2008-2012

	Males				Females		
	Cancer Sites	Mortality Counts (Death)	Percentage of Male Cancer Mortality		Cancer Sites	Mortality Counts (Death)	Percentage of Female Cancer Mortality
1	Lung and Bronchus	141	30.0%	1	Lung and Bronchus	72	27.1%
2	Liver	67	14.3%	2	Breast	37	13.9%
3	Colon, Rectum & Anus	50	10.6%	3	Colon, Rectum & Anus	28	10.5%
4	Prostate	40	8.5%	4	Liver	14	5.3%
5	Leukemia	21	4.5%	4	Uterus	14	5.3%
6	Non-Hodgkin Lymphoma	18	3.8%	4	Leukemia	14	5.3%
7	Oral Cavity	15	3.2%	5	Pancreas	9	3.4%
7	Pancreas	15	3.2%	5	(Invasive) Cervix	9	3.4%
8	Nasopharynx	13	2.8%	6	Stomach	8	3.0%
8	Stomach	13	2.8%	6	Non-Hodgkin Lymphoma	8	3.0%
9	Esophagus	11	2.3%	7	Ovary	7	2.6%
9	Kidney and Ureter	11	2.3%	8	Nasopharynx	6	2.3%
10	Urinary Bladder	10	2.1%	9	Other Digestive	5	1.9%
				10	Brain	4	1.5%
				10	Multiple Myeloma	4	1.5%
	Other Cancer Sites	45	9.6%		Other Cancer Sites	27	10.2%
	All Male Cancer Deaths	**470**	**100.0%**		**All Female Cancer Deaths**	**266**	**100.0%**

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Why are men in Guam more likely to die from cancer? This requires further investigation, but the available data indicate that men have a higher prevalence of the risk factors that increase cancer risk (Figure 3). Specifically, in Guam, men are more likely than women to smoke, be heavy alcohol drinkers, and be obese. Men are also less likely to have had a blood stool test within the past 2 years, which is a screening test for colorectal cancer. What is currently unknown is whether men are more likely to be diagnosed at a later stage of cancer and/or are less likely to seek medical care once cancer has been diagnosed.

Figure 3. Cancer risk factor prevalence by sex, Guam: 2012

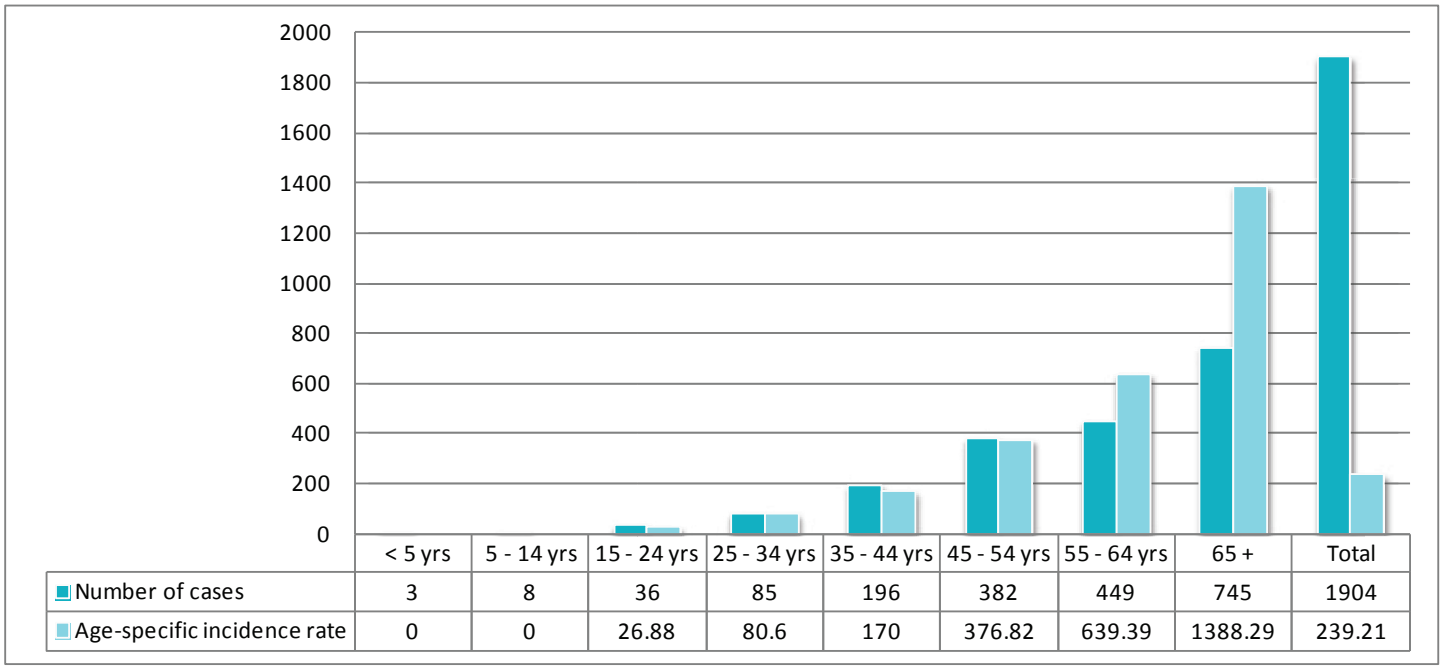


Source: Guam Department of Public Health and Social Services, Behavioral Risk Factor Surveillance System, 2012.

CANCER AND AGE

Cancers can occur at any age, but the risk of developing cancer increases with age. Cancer isn't common in children or young people. In Guam, from 2008-2012, less than 1% of new cancer cases were diagnosed in children under 15 years of age, and less than 2% of new cases occurred in adolescents and young adults aged 15 to 24 years. As expected, cancer incidence increased with increasing age (Figure 4).

Figure 4. Cancer cases and incidence by age group, Guam: 2008-2012



	< 5 yrs	5 - 14 yrs	15 - 24 yrs	25 - 34 yrs	35 - 44 yrs	45 - 54 yrs	55 - 64 yrs	65 +	Total
Number of cases	3	8	36	85	196	382	449	745	1904
Age-specific incidence rate	0	0	26.88	80.6	170	376.82	639.39	1388.29	239.21

Sources: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014; 2010 Guam Census.
Note: Incidence rates are per 100,000 persons in the age-specific category.

CANCER IN CHILDREN AND YOUNG ADULTS

According to the American Cancer Society, the types of cancers that develop in children are often different from the types that develop in adults. Leukemia, brain and central nervous system cancers and lymphomas are among the most common types of childhood cancer. In Guam, there were 11 new cases of cancer diagnosed in children below 15 years of age from 2008-2012. Nearly half were leukemia, one quarter were cancers of the brain and the remaining quarter were lymphomas (Table 8). During the same period, there were 6 cancer deaths among children under 15 years of age.

Among adolescents and young adults, nearly half (47%) of all new cases were cervical cancer "in situ," followed by leukemia (14%) and cancers of the colon and rectum (11%). Four cancer deaths were recorded within this age group, accounting for 0.5% of all cancer deaths in Guam (Table 9).

Table 8. Cancer incidence and mortality in children aged 0-14 years, Guam: 2008-2012

Cancer Sites	Incidence (New Cases)	Percent of Total	Cancer Sites	Mortality (Deaths)	Percent of Total
Leukemia	5	45.5%	Leukemia	3	50.0%
Brain	3	27.3%	Brain	2	33.3%
Non-Hodgkin's Lymphoma	2	18.2%	Non-Hodgkin's Lymphoma	1	16.7%
Hodgkin's Lymphoma	1	9.0%			
All Sites	**11**	**100.0%**	**All Sites**	**6**	**100.0%**

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

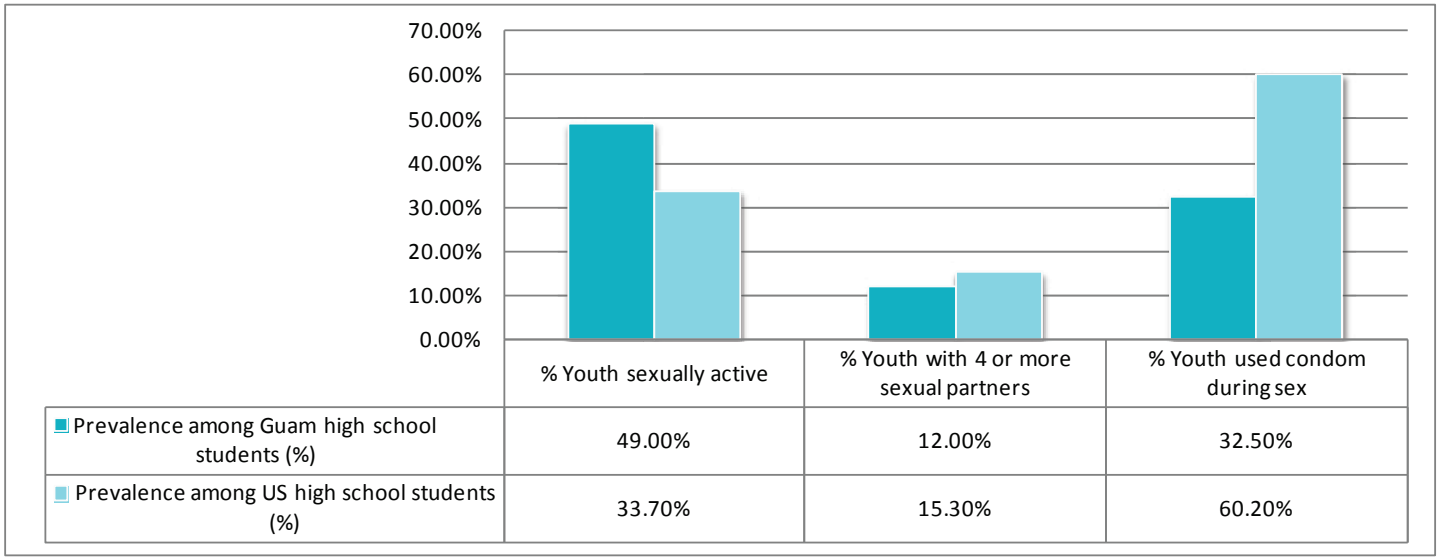
Table 9. Cancer incidence and mortality in adolescents and young adults aged 15-24 years, Guam: 2008-2012

Cancer Sites	Incidence (New Cases)	Percent of Total	Cancer Sites	Mortality (Deaths)	Percent of Total
Cervix (All CIN III "In situ")	17	47.2%	Leukemia	2	50.0%
Leukemia	5	13.9%	Non-Hodgkin's Lymphoma	1	25.0%
Colon and Rectum	4	11.1%	Brain	1	25.0%
Testes	2	5.6%			
Thyroid	2	5.6%			
Stomach	1	2.8%			
Bones and Joints	1	2.8%			
Urinary Bladder	1	2.8%			
Brain	1	2.8%			
Non-Hodgkin's Lymphoma	1	2.8%			
Unknown Primary Site	1	2.8%			
All Sites	**36**	**100.0%**	**All Sites**	**4**	**100.0%**

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

The small number of cases makes it challenging to draw conclusions regarding the cancer profile of adolescents and young adults in Guam. Nonetheless, the high proportion of cervical cancer among those 15-24 years old correlates with data on sexual activity and unsafe sex among high school students. Guam high school students are more likely to be sexually active and less likely to use condoms during sex than their US counterparts, and 1 in 8 have had 4 or more sexual partners (Figure 5). The diagnosis of colon and rectal cancer in 4 of these young people deserves further scrutiny.

Figure 5. Prevalence of risk factors for cervical cancer among high school students, Guam vs. USA: 2011



	% Youth sexually active	% Youth with 4 or more sexual partners	% Youth used condom during sex
Prevalence among Guam high school students (%)	49.00%	12.00%	32.50%
Prevalence among US high school students (%)	33.70%	15.30%	60.20%

Source: Guam Department of Education, Youth Risk Behavior Surveillance System, as reported in David AM, on behalf of the Guam CHA Planning Team and Community Stakeholders. Guam Community Health Assessment. Mangilao, Guam: Guam Department of Public Health and Social Services, 2014.

During 2008-2012, < 1% of new cancer cases were diagnosed in children under 15 years. Less than 2% of new cases occurred in adolescents and young adults aged 15 to 24 years.

Preventing Childhood Obesity through the Crossfit Kids (FUNctional FITness) Afterschool Program

CANCER AND ETHNICITY

The most striking cancer disparities in Guam emerge when data are disaggregated for ethnicity (Tables 10 and 11). Because of the small number of cases for some of the cancer sites per ethnic group, caution is required when interpreting variation across time. Some of the noteworthy disparities in relation to cancer incidence include the following:

- Guam residents, regardless of ethnicity, have higher incidence rates for cancers of the nasopharynx and liver than the US population.
- Chamorros have an incidence rate of nasopharyngeal cancer that is nearly 20 times that of the US population.
- Micronesians have a liver cancer incidence rate that is 4 times that of the US, and the rate for Chamorros is over 3 times the US rate.
- Lung cancer incidence is double the US rate for Micronesians living in Guam.
- The incidence of cervical cancer is 6 times higher in Micronesians and over 3 times higher for Chamorros and Caucasians living in Guam than the US population.
- Uterine cancer incidence is about 2.5 times higher in Micronesians as compared to Chamorros and to the US population.
- Breast cancer incidence is lower in all ethnic groups in Guam except for Caucasians, whose rate is equal that of the US population.

Some of the most striking disparities in relation to cancer mortality include the following:

- Micronesians, Caucasians living in Guam and Chamorros have higher cancer mortality rates overall as compared to the US population.
- In contrast, Filipinos have the lowest cancer mortality rates, regardless of site.
- Chamorros are more likely to die from cancers of the mouth and pharynx, nasopharynx, stomach, colon, rectum, anus and uterus than other ethnic groups.
- Micronesians have markedly higher mortality rates for cancers of the lung and bronchus, liver, non-Hodgkin's lymphoma and leukemia.
- Chamorros have a mortality rate from nasopharyngeal cancer that is 27 times the US rate, and a mortality rate from mouth and pharyngeal cancer that is 4 times the US rate.
- Micronesians, Chamorros and other Asians in Guam have higher liver mortality rates than the US. The liver cancer mortality rate for Micronesians in Guam is nearly 5 times higher than the US rate.
- Chamorros and Micronesians have significantly higher mortality rates from lung and bronchus cancer than the US population. The lung cancer mortality rate of Micronesians is more than double the US rate.
- Caucasian females in Guam have a mortality rate from breast cancer that is nearly double the rate of Chamorro females and females in the US, although their incidence rate is comparable to the US. (Note: total number of cases among Caucasian women is small, so caution is needed in interpreting these data).
- Chamorros and Micronesians in Guam have elevated mortality rates from leukemia compared to the US population. The mortality rate from leukemia for Micronesians is almost double the US rate.
- Micronesians in Guam also have a mortality rate from non-Hodgkin lymphoma that is about 2.5 times higher than the US rate.

Table 10. Comparison of Guam and U.S. mean annual age-adjusted cancer incidence rates1, by ethnicity2: 1998-2002, 2003-2007, 2008-2012

CANCER SITE	CHAMORRO	FILIPINO	MICRONESIAN	ASIAN	CAUCASIAN	TOTAL U.S.[3]
ALL CANCERS						
1998-2002	406.8	215.7	401.5	149.7	585.4	479.5
2003-2007	395.7	218.6	598.3	408.1	531.2	458.4
2008-2012	384.5	206.0	414.7	199.6	365.1	456.7
Mouth & Pharynx						
1998-2002	24.4	9.9	6.3	6.9	9.6	10.7
2003-2007	18.0	2.7	29.4	6.2	26.7	10.3
2008-2012	17.9	6.3	11.9	1.8	8.6	11.1
Nasopharynx						
1998-2002	13.9	5.1	0.0	5.4	0.0	0.6
2003-2007	8.6	1.4	4.2	2.8	7.0	0.6
2008-2012	9.8	2.7	6.3	1.8	1.6	0.5
Esophagus						
1998-2002	4.6	2.3	4.4	0.0	10.1	4.9
2003-2007	4.3	1.1	2.0	5.5	15.4	4.9
2008-2012	3.7	0.0	3.1	3.6	0.0	4.6
Stomach						
1998-2002	10.5	4.0	9.0	18.1	10.1	7.4
2003-2007	6.0	2.1	9.2	24.4	7.0	6.7
2008-2012	13.2	1.8	27.4	9.8	11.8	6.8
Colon-Rectum-Anus						
1998-2002	44.3	37.1	4.1	26.3	91.4	55.5
2003-2007	44.8	21.9	19.8	73.7	54.7	48.3
2008-2012	39.4	27.8	23.4	27.8	30.3	42.8
Pancreas						
1998-2002	12.4	1.7	4.1	12.5	17.6	11.1
2003-2007	8.8	3.0	0.0	17.4	16.3	11.3
2008-2012	1.8	3.1	13.1	4.1	9.4	12.2
Liver						
1998-2002	13.2	9.6	39.4	10.7	4.0	5.2
2003-2007	17.0	5.1	38.2	9.7	26.1	5.8
2008-2012	23.1	9.0	28.0	8.5	13.4	7.3
Lung & bronchus						
1998-2002	75.4	35.6	111.5	25.8	89.6	70.2
2003-2007	88.4	34.0	174.7	77.3	85.3	67.7
2008-2012	70.6	28.0	128.7	35.5	59.2	63.1
Breast (Female)						
1998-2002	115.9	60.7	35.0	63.0	148.6	131.0
2003-2007	100.6	66.0	62.4	108.4	58.5	117.7
2008-2012	97.2	76.7	41.9	48.4	120.3	120.3

CANCER SITE	CHAMORRO	FILIPINO	MICRONESIAN	ASIAN	CAUCASIAN	TOTAL U.S.[3]
Cervix						
1998-2002	16.2	8.4	27.4	8.5	9.6	9.6
2003-2007	11.6	5.5	21.1	14.5	10.5	8.1
2008-2012	24.8	5.2	43.2	17.4	24.4	7.6
Uterus						
1998-2002	31.6	4.8	16.0	0.0	0.0	23.8
2003-2007	34.4	6.8	4.3	5.2	17.7	25.4
2008-2012	25.9	16.9	66.9	5.0	4.7	25.2
Prostate						
1998-2002	103.9	46.1	78.4	32.3	88.1	168.4
2003-2007	114.8	91.8	259.3	41.7	188.3	142.4
2008-2012	106.2	60.0	53.6	36.9	78.4	131.1
Urinary Bladder						
1998-2002	6.0	3.9	0.0	9.9	15.1	21.9
2003-2007	4.8	3.6	0.0	7.0	18.1	21.1
2008-2012	7.4	4.1	3.4	12.5	21.7	20.6
Thyroid						
1998-2002	6.2	7.5	39.4	14.4	33.8	7.3
2003-2007	7.0	12.4	34.9	16.9	5.6	10.1
2008-2012	11.4	11.0	9.7	14.9	2.0	13.5
Non-Hodgkin Lymphoma						
1998-2002	7.0	8.4	6.6	4.9	7.9	18.9
2003-2007	11.0	8.1	9.3	14.0	25.1	18.9
2008-2012	11.2	7.4	17.2	1.3	21.3	19.2
Leukemia						
1998-2002	11.0	4.7	6.3	5.0	17.7	12.8
2003-2007	9.5	6.8	0.0	0.0	18.7	11.6
2008-2012	10.8	7.1	16.1	8.3	13.8	13.2

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014

Notes:

1 Cases per 100,000 persons of the specified population. Guam population figures were provided by the Bureau of Statistics and Plans, Office of the Governor of Guam.

2 "Chamorro" ethnicity includes all Chamorros residing on Guam, including those who originally migrated from CNMI. "Micronesian" includes persons from the Commonwealth of the Northern Mariana Islands of Carolinian or other-than-Chamorro descent, and persons of Federated States of Micronesia, Republic of the Marshall Islands, or Republic of Belau ancestry.

3 U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2005 Incidence and Mortality Web-based Report, Atlanta. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. US 2010 Rates from US Cancer Statistics http://apps.nccd.cdc.gov/uscs/cancersbyraceandethnicity.aspx#

Table 11. Comparison of Guam mean annual age-adjusted cancer mortality rates1 for selected sites by ethnicity2 for 2008-2012 with the 2010 US aggregate age-adjusted cancer mortality rates

CANCER SITE	CHAMORRO		FILIPINO		MICRONESIAN		ASIAN		CAUCASIAN		TOTAL U.S.[3]
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	2010 Rate
ALL CANCERS	402	185.16	143	74.22	80	276.46	43	93.40	63	205.07	171.8
Mouth & Pharynx^	22	10.36	2	*	2	*	0	*	3	*	2.5
Nasopharynx	13	5.43	4	*	1	*	0	*	1	*	0.2
Esophagus	8	3.40	0	*	1	*	3	*	0	*	4.3
Stomach	13	5.76	2	*	2	*	2	*	1	*	3.4
Colon-Rectum-Anus	46	20.75	21	10.84	4	*	3	*	3	*	15.7
Pancreas	9	3.84	8	4.16	2	*	1	*	3	*	11.0
Liver	47	18.22	11	5.59	11	23.51	7	15.49	4	*	5.9
Lung & Bronchus	119	58.21	36	18.66	24	105.94	18	38.31	16	51.35	47.4
Breast (Female)	25	20.83	2	*	2	*	3	*	5	40.74	21.9
Cervix	4	*	1	*	4	*	0	*	0	*	2.3
Uterus	8	6.48	2	*	3	*	1	*	0	*	4.5
Prostate	20	24.07	14	15.45	1	*	1	*	4	*	21.8
Urinary Bladder	5	2.50	1	*	0	*	1	*	4	*	4.4
Thyroid	3	*	1	*	2	*	0	*	0	*	0.5
Non-Hodgkin Lymphoma	9	4.36	8	4.16	6	16.45	0	*	4	*	6.1
Leukemia	19	9.18	9	4.87	6	13.07	0	*	1	*	6.9

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014

Notes:

All rates are age-adjusted to the 2000 U.S. Standard Population.

1 Cases per 100,000 persons of the specified population. Guam population figures were provided by the Bureau of Statistics and Plans, Office of the Governor of Guam.

2 "Chamorro" ethnicity includes all Chamorros residing on Guam, including those who originally migrated from CNMI. "Micronesian" includes persons from the Commonwealth of the Northern Mariana Islands of Carolinian or other-than-Chamorro descent, and persons of Federated States of Micronesia, Republic of the Marshall Islands, or Republic of Belau ancestry.

3 United States Cancer Statistics, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. http://apps.nccd.cdc.gov/uscs/cancersbyraceandethnicity.aspx

*Rates are suppressed if fewer than five (5) cases were recorded in the cancer site category.

^ Mouth & Pharynx: Includes Nasopharynx; Nasopharynx also reported separately.

Common Cancers in Guam and Their Risk Factors

LUNG CANCER

Lung cancer is the number one cause of cancer deaths in both men and women worldwide, in the US and in Guam. From 2008-2012, lung cancer accounted for 15% of new cancer cases in Guam, but it was responsible for nearly one-third of all cancer deaths (Table 12). Unless efforts to curb tobacco use are intensified, lung cancer will continue to predominate as the most lethal cancer in our community.

Table 12. Incidence and mortality from cancer of the lung and bronchus, Guam: 2008-2012

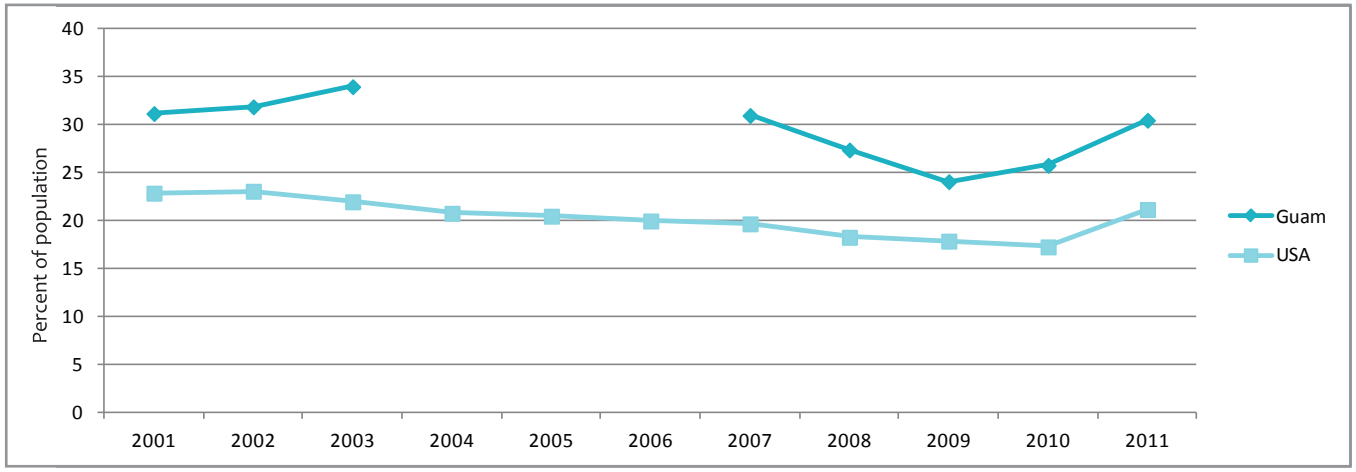
	Count	% of Total Cancer
Incidence (New Cases)	281	14.76%
Mortality (Deaths)	213	28.94%

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Tobacco use is the principal risk factor for lung cancer. In the United States, cigarette smoking is linked to about 90% of lung cancers. Other risk factors include exposure to tobacco smoke, radon, asbestos, arsenic, chromium, diesel exhaust and silica. For several of the environmental risk factors, smoking compounds the risk of developing lung cancer.

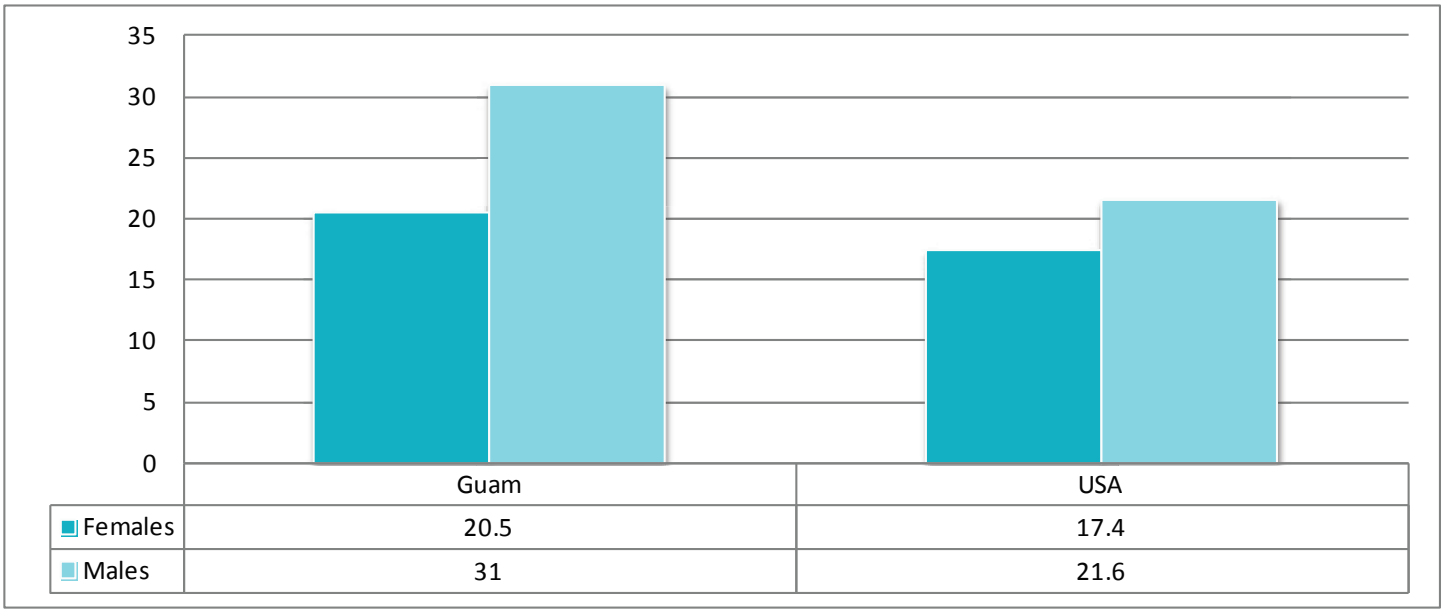
Lung cancer amounted to 21% of new cancer cases for men in Guam, and 9% of new cancer cases in women. However, lung cancer accounted for 30% of male cancer deaths and 27% of female cancer deaths (Tables 6 and 7). Tobacco use likely constituted the largest risk factor; despite recent declines in smoking, Guam adults still have some of the highest rates of smoking among all US States and Territories (Figure 6). Moreover, women in Guam smoke as much as men in the US (Figure 7).

Figure 6. Smoking prevalence, adults, Guam vs. USA: 2001-2011



Source: Guam Department of Public Health and Social Services, Behavioral Risk Factor Surveillance System, 2001-2011.

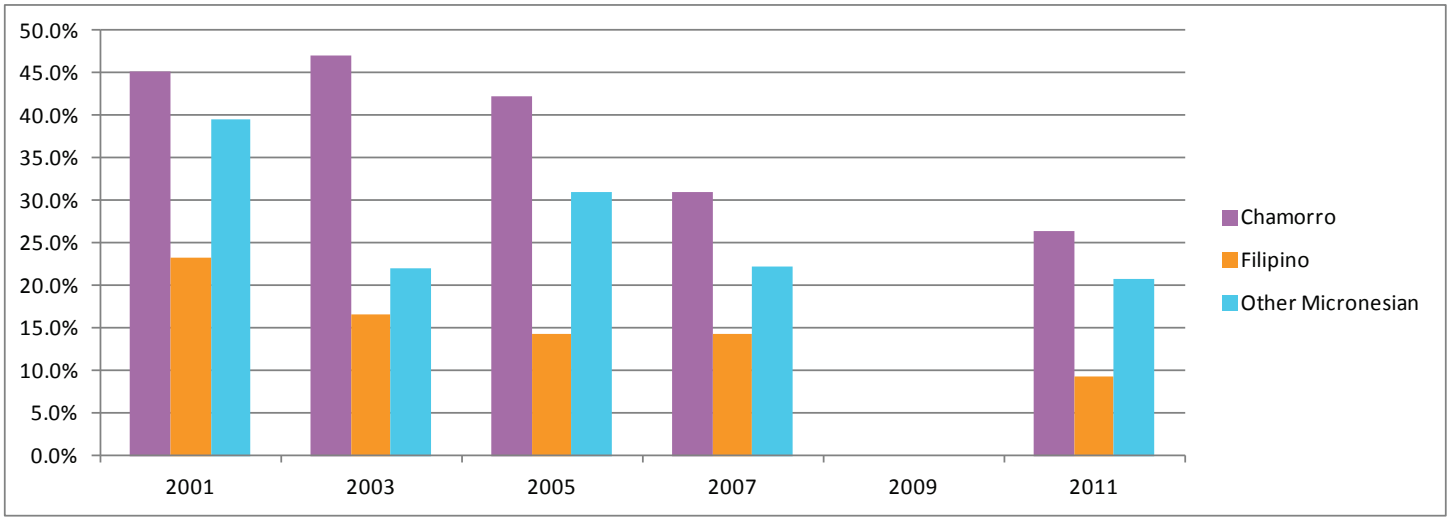
Figure 7. Current smoking, adults, by sex, Guam vs. USA: 2012



Source: Guam Department of Public Health and Social Services, Behavioral Risk Factor Surveillance System, 2012.

The incidence of cancer of the lung and bronchus is highest among Micronesians. Micronesians living in Guam have more than double the incidence rate of the US population (Table 10). Micronesians also have the highest mortality rate from lung and bronchus cancer, followed by Chamorros (Table 11). Micronesians and Chamorros also have the highest rates of smoking and other tobacco use (Figure 8).

Figure 8. Current smoking, high school students by ethnicity, Guam: 2001-2011



Source: Guam Department of Education, Youth Risk Behavior Surveillance System, as reported in David AM, on behalf of the Guam CHA Planning Team and Community Stakeholders. Guam Community Health Assessment. Mangilao, Guam: Guam Department of Public Health and Social Services, 2014.

PROSTATE CANCER

Other than skin cancer, prostate cancer is the most common cancer in American men. About 1 man in 7 will be diagnosed with prostate cancer during his lifetime. Prostate cancer occurs mainly in older men. About 6 cases in 10 are diagnosed in men aged 65 or older, and it is rare before age 40. Prostate cancer can be a serious disease, but most men diagnosed with prostate cancer do not die from it. Early diagnosis and treatment are crucial for survival.

Prostate cancer was the most common cancer diagnosed in men in Guam from 2008-2012, accounting for 1 out of every 5 new cancer cases. It ranked 4th for cancer mortality, contributing 8.5% of cancer deaths among men (Tables 6 and 7). Chamorro men have the highest incidence of prostate cancer, with a rate that is double that of Filipinos and Micronesians. Men aged 40 years and older in Guam are less likely to have had prostate cancer screening through a blood test within the past 2 years than men in the US (19.9% vs. 45.2%). Scaling up outreach to increase screening rates for prostate cancer in Guam, with a focus on Chamorro men, will be essential to reduce the mortality from this type of cancer.

BREAST CANCER

Breast cancer is the most common cancer among American women, with the exception of skin cancers. About 1 in 8 (12%) women in the US will develop invasive breast cancer during their lifetime. Death rates from breast cancer have been declining nationwide since about 1989, with larger decreases in women younger than 50. These decreases are believed to be the result of earlier detection through screening and increased awareness, as well as improved treatment.

In Guam, breast cancer accounts for 30% of new cancer cases among women, and 14% of cancer mortality. Caucasian women living in Guam have the highest incidence of breast cancer, followed by Chamorro women (Table 10). Caucasian women have double the mortality rate from breast cancer compared to Chamorro women and women in the US (Table 11).

In 2012, 72% of Guam women aged 50 years and over had a mammogram within the past 2 years. This rate is comparable to that of US women.

COLON AND RECTUM CANCER

Colorectal cancer is the third most common cancer found in men and women in the US. Overall, the lifetime risk of developing colorectal cancer is about 1 in 20. Nationwide, the death rate from colorectal cancer has been going down for more than 20 years.

Colorectal cancer is the 4th most common cancer in Guam, and the 3rd most deadly. From 2008-2012, it accounted for about 10% of new cancer cases, and 11% of cancer deaths (Table 13). Unlike the incidence rates of other cancers, where ethnic disparities are apparent, colorectal cancer appears to be uniformly distributed across ethnic groups (Table 10). However, the death rate from colorectal cancer is twice as high in Chamorros as compared to Filipinos (Table 11).

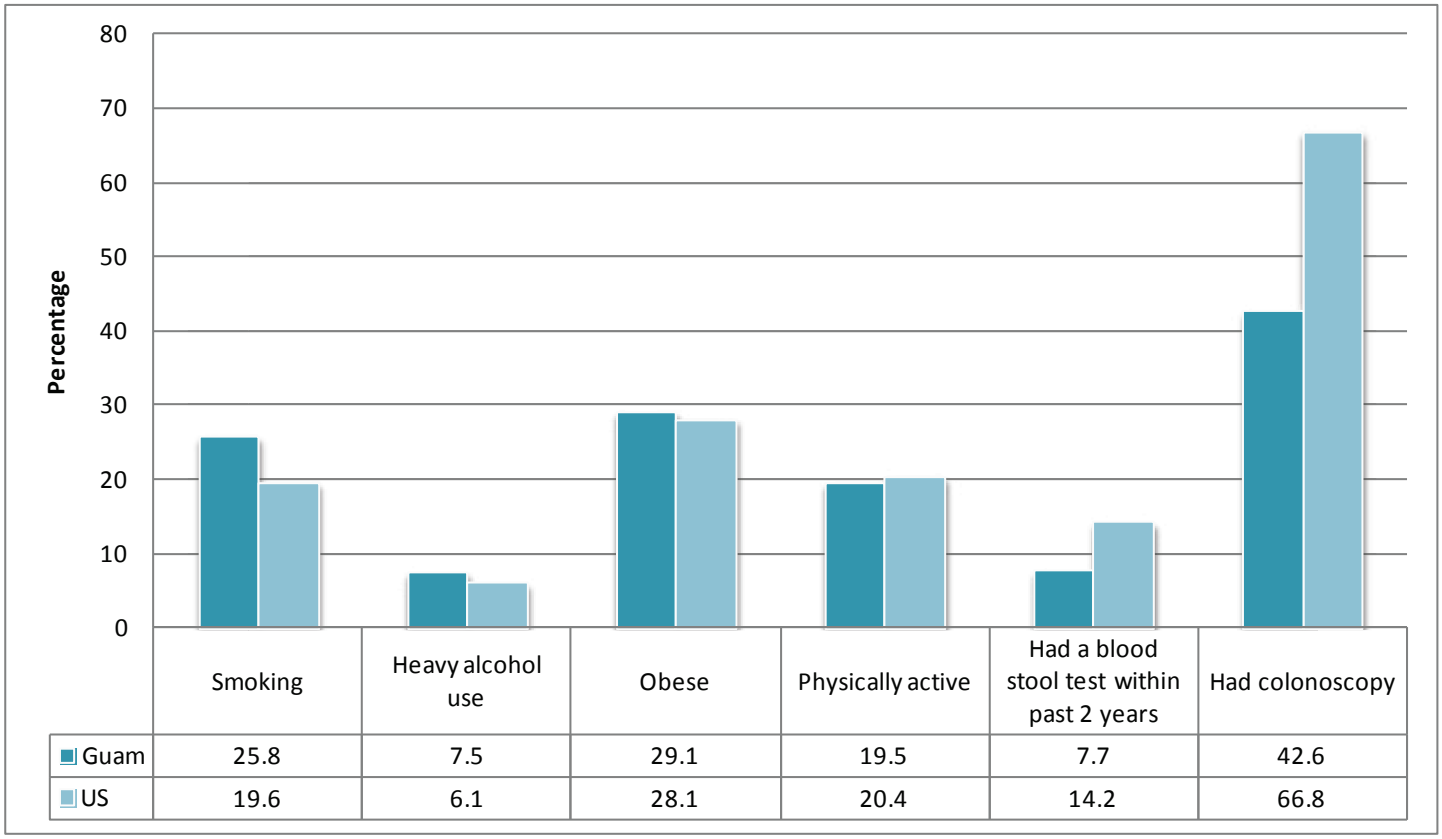
Overweight and obesity, physical inactivity, smoking and heavy alcohol use are risk factors associated with colorectal cancer. If diagnosed early, and treated appropriately, the chances for survival are good. People in Guam have similar rates of heavy alcohol use, obesity and physical inactivity as the US population, but they smoke more and are less likely to have had a screening test for colorectal cancer (Figure 9). Data from 2010 indicate that Chamorros were half as likely as Caucasians to have had a screening colonoscopy/sigmoidoscopy (40.5% vs. 72.2%), which may account for the higher mortality among Chamorros.

Table 13. Incidence and mortality from colorectal cancer, Guam: 2008-2012

	Count	% of Total Cancer
Incidence (New Cases)	190	9.98%
Mortality (Deaths)	78	10.60%

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Table 13. Incidence and mortality from colorectal cancer, Guam: 2008-2012



	Smoking	Heavy alcohol use	Obese	Physically active	Had a blood stool test within past 2 years	Had colonoscopy
Guam	25.8	7.5	29.1	19.5	7.7	42.6
US	19.6	6.1	28.1	20.4	14.2	66.8

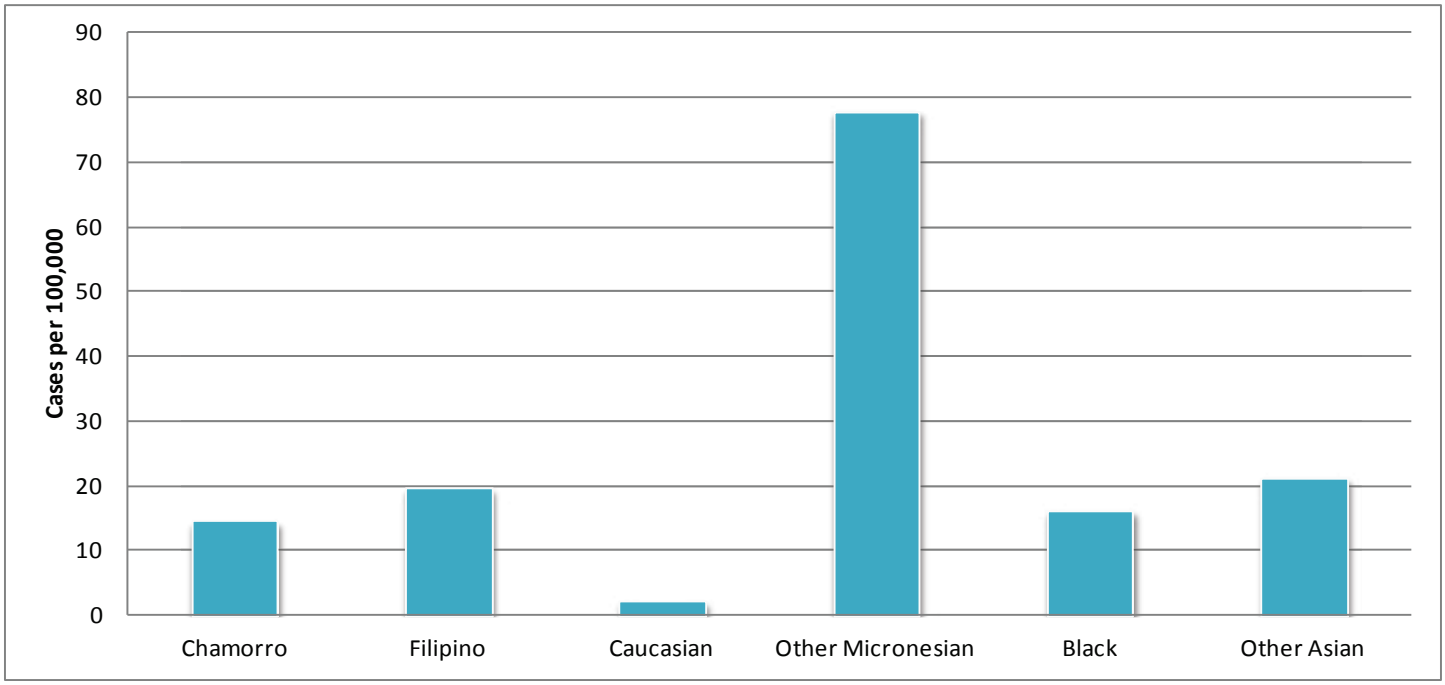
Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

LIVER CANCER

Liver cancer has risen in rank from being the 5th cause of cancer death in Guam in 2003-2007, to being the 2nd in 2008-2012. Previously, liver cancer accounted for 7% of cancer deaths; however, in 2008-2012, it comprised 11% of all cancer deaths. In 2008-2012, Guam had a liver cancer incidence rate (age-adjusted rate = 16.72 per 100,000) that was more than double the US rate (7.3 per 100,000). The mortality rate from live cancer in Guam (age-adjusted rate = 13.13 per 100,000) was also more than twice the US rate (5.9 per 100,000). The liver cancer mortality rate for Micronesians in Guam was nearly 5 times higher than the US rate.

Asian Americans and Pacific Islanders, in general, have the highest rates of liver cancer. Other factors that increase risk include heavy alcohol use, chronic hepatitis B or C infection, cirrhosis, obesity, type 2 diabetes, smoking, steroid use and specific environmental exposures and inherited conditions. Smoking is higher in Guam, but obesity, heavy alcohol use and diabetes prevalence are similar to the US. The incidence of hepatitis B infection in Guam is markedly higher than the US (41.3 per 100,000 vs. 0.9 per 100,000 in 2012). Micronesians have the highest incidence of hepatitis B, which may explain the significantly elevated liver cancer mortality among this ethnic group (Figure 10). Likewise, hepatitis C incidence in 2012 was 38.2 cases per 100,000, compared to 0.3 cases per 100,000 in the US. The heroin epidemic of 1970s and 1980s in Guam, associated with the Vietnam War, resulted in the growth of IV drug users in the island. The aging of this population is likely a factor in the increase in hepatitis C cases in Guam. Expanding hepatitis B immunization efforts, and scaling up outreach for hepatitis B and C prevention need to be incorporated into Guam's cancer prevention and control strategies. Infants born in Guam are now routinely vaccinated against hepatitis B, which may lead to lower incidence rates of liver cancer in the future.

Figure 10. Hepatitis B incidence, by ethnicity, Guam: 2008-2011



Source: DPHSS data, 2008-2011 as reported in David AM, on behalf of the Guam CHA Planning Team and Community Stakeholders. Guam Community Health Assessment. Mangilao, Guam: Guam Department of Public Health and Social Services, 2014.

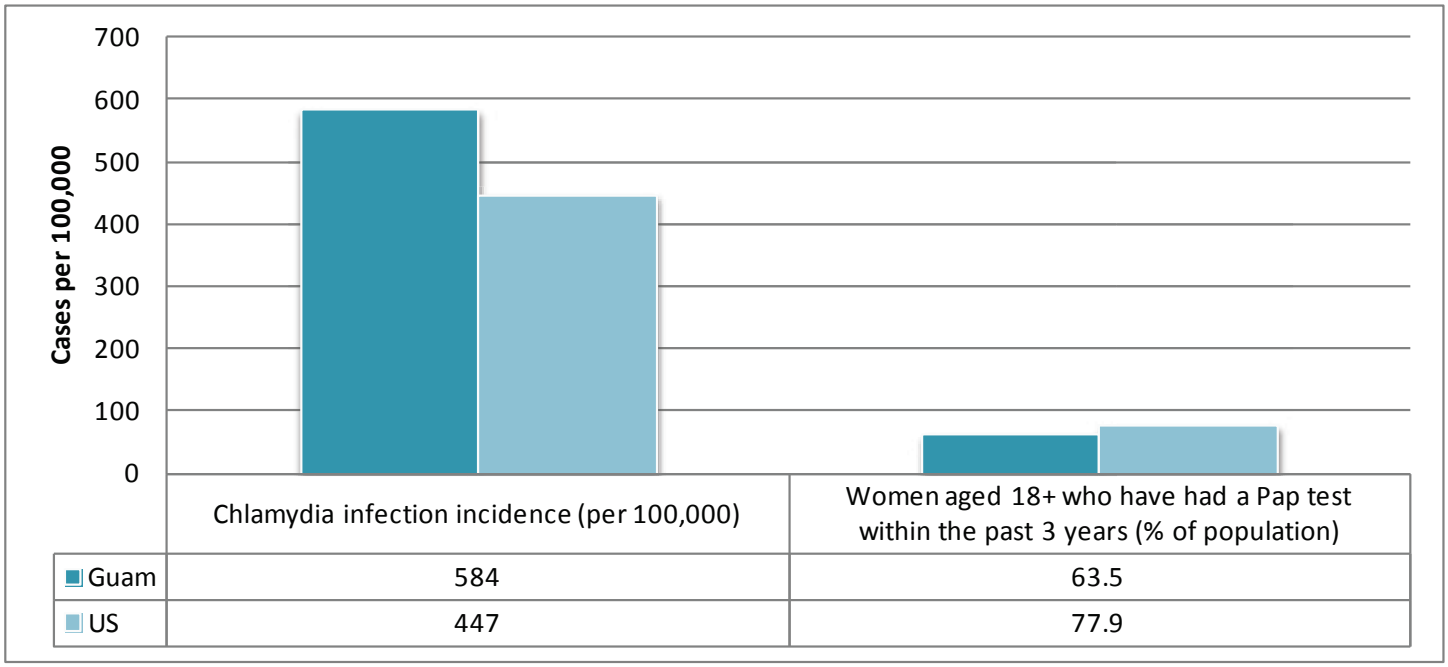
CERVICAL CANCER

At one point in time, cervical cancer was one of the most common causes of cancer death for American women. With increased use of the Pap test, over the last 30 years, the cervical cancer death rate has gone down nationally by more than 50%. Cervical cancer can often be found early, and sometimes even prevented entirely, by having regular Pap and HPV tests. If detected early, cervical cancer is one of the most successfully treatable cancers.

The incidence rate (age-adjusted to the US 2000 standard population) of cervical cancer in Guam is 35.8 per 100,000. In contrast, the US cervical cancer incidence rate is 7.6 per 100,000. Mortality rates are similar, with 2.5 per 100,000 for Guam vs. 2.3 per 100,000 for the US. Micronesians residing in Guam have the highest incidence of cervical cancer (42.4 per 100,000), followed by Chamorros (25.1 per 100,000) and Caucasians (24.4 per 100,000). Risk factors for cervical cancer include infection with human papilloma virus (HPV), smoking, immunosuppression, chlamydia infection, poor nutrition and overweight/obesity, and long-term use of oral contraceptives or intrauterine devices.

Data from Guam's YRBSS indicate that Guam youth are at high risk for sexually transmitted infections such as HPV and chlamydia (Figure 5). Infectious disease surveillance data demonstrate higher incidence for chlamydia in Guam, and lower rates of Pap test screening (Figure 11). Further expanding prevention efforts through HPV vaccination and promotion of safe sex practices, and early diagnosis through regular screening using Pap tests are necessary to reduce Guam's cervical cancer burden.

Figure 11. Cervical cancer risk factor and screening prevalence, Guam vs. US: 2012-2013



	Chlamydia infection incidence (per 100,000)	Women aged 18+ who have had a Pap test within the past 3 years (% of population)
Guam	584	63.5
US	447	77.9

Sources: Guam Department of Public Health and Social Services, Annual Summary of Notifiable Diseases, Guam-2013,July 2014; BRFSS, 2012.

Annexes

ANNEX 1. CANCER INCIDENCE AND MORTALITY COUNTS AND RATES, BY SEX, GUAM: 2008-2012

	INCIDENCE					MORTALITY				
	Female Rate	Total Female Cases	Male Rate	Total Male Cases	Total Cases	Female Rate	Total Female Cases	Male Rate	Total Male Cases	Total Cases
All Sites	**312.64**	**973**	**345.55**	**931**	**1904**	**95.16**	**266**	**182.45**	**470**	**736**
Oral Cavity^	2.83	8	8.88	25	33	*	2	5.83	15	17
Nasopharynx	4.10	13	7.40	25	38	2.16	6	4.31	13	19
Esophagus	*	1	4.56	14	15	*	1	3.77	11	12
Stomach	7.26	19	8.08	21	40	2.95	8	5.08	13	21
Small Intestine	*	1	*	1	2	*	0	*	1	1
Colon	16.88	51	31.91	86	137	8.40	24	16.10	41	65
Rectum	7.21	20	9.90	27	47	*	4	3.27	9	13
Anus	*	4	*	2	6	*	0	*	0	0
Liver	4.71	15	29.14	90	105	4.80	14	21.73	67	81
Gallbladder	2.19	7	*	2	9	*	3	*	1	4
Pancreas	2.93	10	6.07	16	26	3.04	9	5.82	15	24
Other Digestive	3.42	9	*	1	10	2.04	5	*	3	8
Larynx	*	2	*	3	5	*	2	*	2	4
Lung and Bronchus	31.12	88	76.22	193	281	26.37	72	57.51	141	213
Other Respiratory	*	0	*	2	2	*	0	*	0	0
Heart and Adjacent	*	0	*	0	0	*	0	*	0	0
Bones and Joints	*	3	1.45	5	8	*	0	*	1	1
Skin	3.19	10	7.09	18	28	*	2	2.77	6	8
Soft Tissues	*	3	2.02	7	10	*	0	*	1	1
Breast	93.53	292	-	0	292	12.96	37	-	0	37
Cervix^^	35.80	130	-	0	130	2.46	9	-	0	9
Uterus	22.14	70	-	0	70	4.92	14	-	0	14
Ovary	8.10	26	-	0	26	2.55	7	-	0	7
Other Fem. Genital	*	3	-	0	3	*	0	-	0	0
Prostate	-	0	82.13	201	201	-	0	18.14	40	40
Testes	-	0	1.71	7	7	-	0	*	1	1
Other Male Genital	-	0	*	3	3	-	0	*	0	0
Urinary Bladder	3.28	9	10.82	29	38	*	1	4.29	10	11
Kidney and Ureter	2.48	6	10.35	28	34	*	2	4.53	11	13
Eye and Orbit	*	1	*	0	1	*	0	*	0	0
Brain	2.73	9	2.99	10	19	*	4	1.99	7	11

	INCIDENCE					MORTALITY				
	Female Rate	Total Female Cases	Male Rate	Total Male Cases	Total Cases	Female Rate	Total Female Cases	Male Rate	Total Male Cases	Total Cases
Other C.N.S.	1.91	6	*	4	10	*	3	*	1	4
Thyroid	21.68	74	6.07	12	86	*	3	*	3	6
Other Endocrine	*	4	*	1	5	*	0	*	1	1
Lymph Nodes	*	0	*	1	1	*	0	*	0	0
Hodgkin Lymphoma	*	0	2.01	7	7	*	1	*	1	2
Non-Hodgkin Lymphoma	9.41	28	10.12	27	55	2.41	8	7.57	18	26
Multiple Myeloma	2.48	6	2.78	7	13	*	4	*	4	8
Leukemia	11.45	32	13.14	36	68	5.03	14	8.36	21	35
Other or Ill-defined & Unknown	4.64	13	6.29	20	33	2.73	7	4.03	12	19

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Notes:

Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. Standard Population.
^ Oral Cavity counts and rates do not include Nasopharynx, which is reported separately.
^^Cervical Cancer Incidence counts and rates include in-situ and CIN III (mortality is invasive only).
*Rates are suppressed if fewer than five (5) cases were reported in a specific category.
"-" Not applicable

ANNEX 2. CANCER INCIDENCE AND MORTALITY RATES, GUAM: 2008-2012

	INCIDENCE RATES				MORTALITY RATES			
	Total New Cases	Crude Rate 2010 Guam Population	Adjusted to U.S. 2000 Standard Population	Adjusted to WHO Standard Population	Total Cancer Deaths	Crude Rate 2010 Guam Population	Adjusted to U.S. 2000 Standard Population	Adjusted to WHO Standard Population
All Sites	**1904**	**238.96**	**325.08**	**227.34**	**736**	**92.37**	**136.73**	**89.69**
Oral Cavity^	33	4.14	5.78	3.98	17	2.13	3.28	2.06
Nasopharynx	38	4.77	5.74	4.29	19	2.38	3.21	2.23
Esophagus	15	1.88	2.36	1.76	12	1.51	2.06	1.44
Stomach	40	5.02	7.67	4.94	21	2.64	3.97	2.57
Small Intestine	2	*	*	*	1	*	*	*
Colon	137	17.19	23.95	16.47	65	8.16	12.07	7.93
Rectum	47	5.90	8.50	5.66	13	1.63	2.30	1.57
Anus	6	0.75	1.21	0.74	0	*	*	*
Liver	105	13.18	16.72	12.21	81	10.17	13.13	9.49
Gallbladder	9	1.13	1.36	1.06	4	*	*	*
Pancreas	26	3.26	4.41	3.08	24	3.01	4.37	2.89
Other Digestive	10	1.26	1.92	1.23	8	1.00	1.67	1.00
Larynx	5	0.63	0.76	0.57	4	*	*	*
Lung and Bronchus	281	35.27	52.51	34.21	213	26.73	41.08	26.17
Other Respiratory	2	*	*	*	0	*	*	*
Heart and Adjacent	0	*	*	*	0	*	*	*
Bones and Joints	8	1.00	1.12	0.96	1	*	*	*
Skin	28	3.51	5.00	3.35	8	1.00	2.01	1.16
Soft Tissues	10	1.26	1.51	1.18	1	*	*	*
Breast	292	75.07	93.53	67.58	37	9.51	12.96	8.65
Cervix	130	33.42	35.80	31.24	9	2.31	2.46	2.10
Uterus	70	18.00	22.14	16.22	14	3.60	4.92	3.28
Ovary	26	6.68	8.10	5.98	7	1.80	2.55	1.64
Other Fem. Genital	3	*	*	*	0	*	*	*
Prostate	201	19.28	82.13	51.85	40	9.81	18.14	10.75
Testes	7	1.72	1.71	1.62	1	*	*	*
Other Male Genital	3	*	*	*	0	*	*	*
Urinary Bladder	38	4.77	6.92	4.60	11	1.38	2.27	1.37
Kidney and Ureter	34	4.27	6.29	4.12	13	1.63	2.51	1.61
Eye and Orbit	1	*	*	*	0	*	*	*
Brain	19	2.38	2.87	2.32	11	1.38	1.70	1.34

	INCIDENCE RATES				MORTALITY RATES			
	Total New Cases	Crude Rate 2010 Guam Population	Adjusted to U.S. 2000 Standard Population	Adjusted to WHO Standard Population	Total Cancer Deaths	Crude Rate 2010 Guam Population	Adjusted to U.S. 2000 Standard Population	Adjusted to WHO Standard Population
Other C.N.S.	10	1.26	1.72	1.20	4	*	*	*
Thyroid	86	10.79	12.68	9.84	6	0.75	1.10	0.72
Other Endocrine	5	0.63	0.97	0.61	1	*	*	*
Lymph Nodes	1	*	*	*	0	*	*	*
Hodgkin Lymphoma	7	0.88	1.01	0.84	2	*	*	*
Non-Hodgkin Lymphoma	55	6.90	9.94	6.79	26	3.26	4.82	3.19
Multiple Myeloma	13	1.63	2.65	1.61	8	1.00	1.78	1.02
Leukemia	68	8.53	12.28	8.50	35	4.39	6.60	4.42
Other or Ill-defined & Unknown	33	4.14	5.52	3.92	19	2.38	3.40	2.31

Source: University of Guam, Cancer Research Center of Guam, Guam Cancer Registry, September 15, 2014.

Notes:

Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. Standard Population and the World Health Organization (WHO) Standard Population.

*Rates are suppressed if fewer than five (5) cases were reported in a specific category.

^ Oral Cavity counts and rates do not include Nasopharynx, which is reported separately.

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