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## RESEARCH COMMUNICATION

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# Ethnic Disparities in Cancer Mortality Among Residents of Guam

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### Abstract

Cancer mortality data collected by the Guam Cancer Registry for the period 1998 through 2002 were analyzed by cancer site, age, and ethnicity. Ethnicity and site specific age-adjusted cancer mortality rates for Guam were calculated utilizing Guam 2000 census data, the US 2000 standard population and compared to U.S. 2002 age-adjusted cancer mortality rates. Age-adjusted cancer mortality rates for ethnic populations represented on Guam, except those of leukemia and non-Hodgkins lymphoma, were high in relation to other population groups and higher than U.S. averages. Some highlights include: 1. Chamorros had high age-adjusted mortality rates for mouth and pharynx (247.2 vs. 193.5 U.S.), nasopharynx (9.1 vs. 0.2 U.S.), lung and bronchus (66.9 vs. 54.9 U.S.), colon-rectum-anus (28.6 vs. 19.7 U.S.), breast (32.0 vs. 28.0 U.S.) and prostate cancer (40.9 vs. 27.9 U.S.); 2. Chamorros (6.4 vs. 2.5 U.S.) and Micronesians (6.3) had high and nearly identical age-adjusted mortality rates for cancer of the mouth and pharynx when nasopharyngeal cancers were excluded; 3. Micronesians had the highest mortality rate for liver cancer over all ethnicities documented (43.5 vs. 4.9 U.S.); 4. Asians had the highest mortality rates for pancreatic (12.5 vs. 10.5 U.S.) and cervical cancer (8.5 vs. 2.6 U.S.); 5. Caucasians had the highest mortality rates for leukemia (19.9 vs. 7.5 U.S.) and Non-Hodgkin's lymphoma (17.6 vs. 7.6 U.S.). Suggestions are made for further research on both explaining and ameliorating cancer mortality disparities among ethnic groups on Guam.

**Key Words:** Guam - cancer - ethnic disparities

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### Introduction

The island of Guam, an unincorporated Territory of the United States of America, is located in the western Pacific Ocean at longitude 144-457'E and latitude 13-30'N. Approximately 1,500 miles east of Manila, Philippines, and a similar distance south of Tokyo, Japan, the island is a multicultural community with no ethnic group comprising more than 50% of the population.

Certification of deaths that occur on Guam is probably 100% and all death certificates are completed by an attending physician or a Medical Examiner. Coding of the cause of death information provided on Guam death certificates is performed by the Mortality Medical Classification Branch, National Center for Health Statistics, Research Triangle Park, North Carolina, U.S.A. Records of persons dying in the continental U.S. and Hawaii who have listed Guam as their usual residence are submitted to the Office of Vital Statistics, Guam Department of Public Health and Social Services (GPH), and their statistics are included in the Registry data. Although initiated as a nation-wide measure to prevent

identity theft, the latter procedure also serves to record deaths of persons referred for off-island medical treatment.

A review of data collected from Guam death certificates over the 25-year period 1971-1995 suggested that cancer incidence rates on Guam had, in general, increased during this period. Cancers of the buccal cavity, liver, gallbladder, and pancreas appeared to be particularly frequent on Guam among both sexes while among males cancers of the esophagus and respiratory system were also common. Incidence rates for melanoma, uterine cancer and prostate cancer appeared to be relatively low on Guam over this time period (Haddock and Naval, 1997).

In part as a result of the latter study, the Guam Cancer Registry was officially established by the Guam Legislature within the Guam Public Health (GPH) agency in 1998. There was little support or action until late 2003, when, supported by a grant from the National Cancer Institute of the U.S. National Institutes of Health, the GPH and the University of Guam joined forces to establish the Guam Cancer Registry (GCR) within the Cancer Research Center of Guam. Additional staff enhanced the ability of the registry to collect

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data on new cancer cases by active surveillance of health care providers and to update registry records by periodic contact with cancer survivors.

As used in the present study, the term 'Chamorro' includes only those Chamorros resident on the island of Guam. 'Micronesian' includes persons from the Commonwealth of the Northern Mariana Islands (who may also be ethnically Chamorros), the Federated States of Micronesia (Kosrae, Pohnpei, Chuuk, and Yap States), the Republic of the Marshall Islands, and the Republic of Belau. Persons of Chuukese ethnicity constitute approximately 56 % of the Micronesian category residents on the island of Guam (U.S. Census Bureau, 2002).

## Materials and Methods

Data for the GCR are collected using CanReg4, a software package provided by the International Agency for Research on Cancer, Lyon, France. The current data as of August 2006 were exported to Epi Info6 software for analysis (Dean et al., 1995). Because of Guam's relatively young population, (in the year 2000 approximately 38% of Guam's population was less than 20 years of age compared to 29% of the U.S. population)(U.S. Census Bureau, 2002), age adjustment was considered appropriate when comparing Guam cancer mortality rates to those of the U.S. The U.S. Year 2000 standard population was used for this age-adjustment (Hoyert and Anderson, 2001).

The Guam ethnic population estimates used in this study were provided by Cynthia L. Naval, Office of Planning and Development, Guam Department of Public Health and Social Services, and are based on the 2000 Guam census.

## Results

### *Total cancers*

Chamorros had the highest overall age-adjusted cancer mortality rate at 247.2 cases per 100,000 population, more than 25% higher than the US rate. Caucasians were next at 204.6, and Micronesians were lower than the US rate at 172.9. Both Asians and Filipinos at 94.0 and 93.4 respectively, were more than 50% less than the US rate. The U.S. age-adjusted rate for total cancers for all races was 193.5.

### *Cancers of the mouth and pharynx*

Chamorros had the highest age-adjusted rate of mouth and pharynx cancer at 15.5 per 100,000, almost six times the US rate. The rates among Micronesians at 6.3, Asians at 3.6, and Filipinos at 3.1 were all higher than the US rate. Only Caucasians came in lower at an age-adjusted rate of 2.6 per 100,000. The U.S. age-adjusted rate for all races was 2.7.

### *Nasopharyngeal carcinoma (NPC)*

Guam NPC age-adjusted mortality rates for the entire population are more than 20 times that of U.S. rates for ages

45 through 74. The age-adjusted rate for Chamorro males for the period studied is 12.2 per 100,000 population, or 61 times the U.S. rate for both sexes, the rate for Chamorro females is 5.6 or 28 times the U.S. rate for both sexes. The U.S. age-adjusted rate for all races was 0.2.

### *Cancers of the mouth and pharynx (excluding nasopharyngeal cancer)*

When nasopharyngeal cancers are excluded the rates are highest for Chamorros and Micronesians (6.4 and 6.3 respectively, both groups who practice the chewing of betel nut socially), followed by Caucasians (2.6) and Filipinos (1.2). No cases were recorded for Asians during the period studied. The U.S. age-adjusted rate for all races was 2.5.

### *Cancers of the lung and bronchus*

Ethnicity-specific age-adjusted lung and bronchus cancer rates are highest for Chamorros (66.9 per 100,000 population), followed by Micronesians (53.1), all above the US rate. Caucasians (49.2), Filipino (23.3) and Asians (14.3) were below the US rate. The U.S. age-adjusted rate for all races was 54.9. Although Guam lung cancer death rates are substantially lower than U.S. rates, lung cancer is still the leading cause of cancer mortality on Guam.

### *Pancreatic cancer*

Asians had the highest age-adjusted pancreatic cancer death rate of all the major ethnic groups living on Guam at 12.5 per 100,000 population, just above the US rate. All other races had rates below the US rate, Caucasians at 10.1, Chamorros at 7.9 and Filipinos were low at 1.2 per 100,000. The U.S. age-adjusted rate for all races was 10.5.

### *Liver cancer*

Age-adjusted liver cancer mortality rates were higher than the US rate for all ethnicities except the Caucasians. Rates are highest for the Micronesians (43.5 or almost nine times the US average), followed by the Chamorros (12.1), the Asians (7.2), and the Filipinos (5.0). There were no deaths due to liver cancer recorded for the Caucasians during the study period. The U.S. age-adjusted rate for all races was 4.9.

### *Colon-rectum-anus cancer*

Chamorros had the highest age-adjusted rate of mortality due to colon-rectum-anus cancer at 28.6 per 100,000 with Caucasians next at 22.6, both above the US rate. Lower than the US rate were Filipinos at 15.3 and Asians who had the lowest rate at 12.5. The U.S. age-adjusted rate for all races was 19.7.

### *Breast cancer*

Breast cancer is the leading cause of death due to cancer among women on Guam. Chamorro women have the highest age-adjusted breast cancer mortality rate at 32.0 per 100,000 population, followed by Caucasians 25.9, both above the US rate. Under the US rate were Asian women at 16.1,

**Table 1. Guam Mean Age-Adjusted Cancer Mortality Rates by Ethnicity for the Period 1998-2002<sup>1</sup> and U.S. Age-Adjusted Cancer Mortality Rates for 2002<sup>2</sup>**

Cancer Site	GUAM					U.S.
	CHAMORRO	FILIPINO	MICRONESIAN <sup>3</sup>	ASIAN	CAUCASIAN	ALL RACES
All cancers	247.2	93.4	172.9	94.0	204.6	193.5
Mouth and pharynx	15.5	3.1	6.3	3.6	2.6	2.7
Nasopharynx (NPC)	9.1	1.9	0.0	3.6	0.0	0.2
Mouth and pharynx less NPC	6.4	1.2	6.3	0.0	2.6	2.5
Lung and bronchus	66.9	23.3	53.1	14.3	49.2	54.9
Pancreas	7.9	1.2	0.0	12.5	10.1	10.5
Liver	12.1	5.0	43.5	7.2	0.0	4.9
Colon-rectum-anus	28.6	15.3	0.0	12.5	22.6	19.7
Breast	32.0	5.6	12.3	16.1	25.9	28.0
Cervix	7.5	1.5	0.0	8.5	7.6	2.6
Prostate	40.9	16.7	0.0	18.4	33.6	27.9
Leukemia	6.5	3.8	2.1	1.8	19.9	7.5
Non-Hodgkin's Lymphoma	5.1	3.8	2.1	1.8	17.6	7.6

<sup>1</sup>Guam Cancer Registry, Cancer Research Center of Guam, University of Guam. Data current as of 8/17/2005. <sup>2</sup>Kochanek et al (2004). Deaths: Final data for 2002. National vital statistics reports; vol 53 no 5. National Center for Health Statistics, Hyattsville, Maryland.

<sup>3</sup>'Micronesian' includes persons of Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Republic of the Marshall Islands and Republic of Belau ancestry.

Micronesians at 12.3 and Filipinas at 5.6. The U.S. age-adjusted rate for all races was 28.0.

#### *Cervical cancer*

For the period studied Asian women had the highest age-adjusted mortality rate for cervical cancer (8.5), followed by Caucasian women (7.6), and Chamorro women (7.5), all above the US benchmark. Below the US rate were Filipinas (1.5). No deaths due to cervical cancer were recorded among Micronesian women, generally believed to be an underserved group, during the period studied. The U.S. age-adjusted rate for all races was 2.6.

#### *Prostate cancer*

Chamorro males have the highest age-adjusted rate of prostate cancer at 40.9 per 100,000, followed by Caucasians at 33.6, both above the US rate. Asians at 18.4 and Filipinos at 16.7 were below the US rate. No instances of death due to prostate cancer were recorded among Micronesian residents of Guam during the period studied. The U.S. age-adjusted rate for all races was 27.9.

#### *Leukemia*

Caucasians had the highest age-adjusted rate of death due to leukemia at 19.9 cases per 100,000 population and they were the only group above the US benchmark. Chamorros at 6.5, Filipinos at 3.8, Micronesians at 2.1 and Asians at 1.8 were below the US age-adjusted rate of 7.5.

#### *Non-Hodgkin's lymphoma*

Caucasians had the highest age-adjusted mortality rate due to Non-Hodgkin's lymphoma at 17.6 per 100,000 population and were again the only group above (2.3 times) the US benchmark. Chamorros at 5.1, Filipinos at 3.8, Micronesians at 2.1 and Asians at 1.8 were all below the US rate. The U.S. age-adjusted rate for all races was 7.6.

## **Discussion and Further Research Directions**

Because of the relatively small population numbers dealt with in this study, it is possible that certain of the data presented may not be statistically significant even when aggregated for a 5-year period. However, some broad conclusions may be reached regarding the existence of cancer mortality disparities on Guam. This report may suggest not only areas for fruitful future research but provide information on defined ethnic groups to whom specific cancer awareness programs should be directed.

There have been several hypotheses about particular cancers and the reasons for their high incidence on Guam. For example, an early study which correlated dental examinations for cancer and pre-cancerous lesions and self-reported tobacco, alcohol and betel nut use concluded that the relationship on Guam between betel nut chewing and the risk of developing oral cancer was about the same as that associated with tobacco use (Haddock et al., 1981).

Is Guam's apparent high rate of 'mouth and pharynx' cancer due solely to the very high nasopharyngeal cancer rate? Apparently not, as the rate remains substantially higher than that of the U.S., even when Guam NPC cases are excluded. When nasopharyngeal cancers are excluded the rates are highest for Chamorros and Micronesians, both groups who practice the chewing of betel nut socially, followed by Caucasians, at about the US average, and Filipinos, well below the US average. No cases were recorded for Asians during the period studied.

Nasopharyngeal carcinoma is known to occur with high incidence in certain populations of southern China, southeastern Asia, northern and eastern Africa and American Samoa as well as Guam (Heyman, 2004; Mishra et al., 1996). The epidemiology of NPC is multi-factorial with genetic, infectious, dietary and environmental components (Heyman, 2000; Loh, 2006; Li et al., 2006). The association of NPC

with the Epstein-Barr virus presents the possibility of eventually developing a protective vaccine.

The National Cancer Institute's Center to Reduce Cancer Health Disparities believes that high rates of death due to cervical cancer may be interpreted as one indicator of health system problems such as poor infrastructure, lack of access, lack of culturally competent communication and patient/provider education deficits (Freeman and Wingrove, 2005). In addition to recent developments in the prevention of cervical cancer through vaccination (Riezebos-Brilman, 2006), the appropriateness of current cancer prevention and awareness programs in reaching those women most affected by cervical cancer is clearly in need of reevaluation.

A high prevalence of hepatitis B antigenemia among Micronesians has been documented and the high prevalence of liver cancer among several of the ethnic groups residing on Guam has been speculated to be related to this fact (Withers et al., 1994). If such a relationship exists, the initiation of universal hepatitis B vaccination of Guam newborns in 1991 should eventually result in decreased rates of chronic hepatitis B as well as a decreased incidence of primary liver cancer. These numbers will be closely watched.

A high proportion of Caucasians residing on Guam are associated with U.S. military forces (active duty military, military dependents, civil service employees working on military bases, etc.). It has been suggested that the relatively high rates of leukemia and non-Hodgkin's lymphoma observed among this ethnic group may be related to their participation and exposure to military activities. This hypothesis requires further investigation.

While it is tempting to speculate, these data are based on small numbers and will be reviewed for trend patterns as the Guam Cancer Registry becomes more robust. It is clear that cancer mortality of Guam varies by ethnic group. These data suggest a need for cancer education and outreach tailored to reach specific populations.

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