Epidemiology of cancer in the Republic of Kiribati

Abstract: Little is known about cancer epidemiology in Kiribati. Between November 1998 and December 1999, trained medical record abstractors visited 8 Micronesian jurisdictions including the Republic of Kiribati to review all available medical records in order to describe the epidemiology of cancer in Micronesia and to better understand the cancer data and control systems in each entity. The Republic of Kiribati has identified many prevalent preventable cancers. The lack of a robust cancer data tracking and surveillance system, as well as the lack of resources to institute a technologically and medically sustainable cancer control system was apparent. The implementation or existence of a national comprehensive cancer control strategic plan would facilitate greater identification, prevention, and treatment of cancer patients. The health sector and Government of Kiribati are working towards this end. *Key Words:* Medically underserved area, needs assessment, oncology services, Pacific Islanders, quality of health care, health services research

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Introduction

The Republic of Kiribati is composed of three coral island groups located on both sides of the equator in the central Pacific, with a total landmass of 811 square kilometers. Independence from the United Kingdom was established in 1979.

Tarawa, the capital, is located at 1 25 N, 173 00 E[1] and had 43% of the Republic's population in the 2000 Census[2]. The terrain of Kiribati is low-lying; most islands are less than two kilometers wide and less than two meters above sea level[3]. The predominant exported natural land resource was phosphate, which was mined extensively until 1979[1]. Currently, copra production, seaweed farming, and fishing have now replaced the exhausted phosphate supplies as local business opportunities[3]. Public health issues include pollution via lagoon latrines and open pit dumping that hastens contamination of ground water sources[1]. Scarcity of fresh water is a major constraint to development[3]. In 2000, only about 47% of the population was provided with safe drinking water[4].

The census of 1995 showed the population of Kiribati to be 77,658 inhabitants[5]. A July 2003 estimate of the population was 99,549[1]. This fieldwork was conducted in 1999, at which time the population, using the 1995 census and the 2003 estimate, was thought to be approximately 88,600. Over 98% of the population is of Micronesian ancestry[5]. In 2003, the gender ratio estimate was 0.99 males to every female[1]. Many males work abroad on foreign fishing vessels, possibly accounting for a large number of female-headed households[3,6]. The median age of the population was 19.7 years in 2002. Age distribution estimates in 2003 suggested that adults 65 years of age or older made up 3.3% of the population, and children 0-14 years of age accounted for 39.7% of the population[1].

Estimates (1988) of gross domestic product (GDP) by sector were: industry 7%, agriculture 30%, and services 63%[1]. Kiribati's 1998 per capita GDP was US $488, making it one of the lowest in the Pacific[3]. In 2002, the GDP per capita in 2001 international dollars was $1,671, the total health expenditure per capita was $143, and the total health expenditure as a percentage of GDP was 8.6%[7]. In comparison, the United States GDP per capita in 2001 was $35,182 (international dollars), the total health expenditure per capita was $4,887, and the total health expenditure as a percentage of GDP was 13.9%[8].

The great distance between the islands and the dispersion of the population across many atolls makes health care delivery difficult. The domestic air and sea transportation are not uniform and can be infrequent[3, 9]. Kiribati has one general public health hospital and 24 public health dispensaries[10]. Tungaru Central Hospital (TCH) is located in South Tarawa. As of October 1999, there were 11 expatriate physicians and 15 indigenous physicians working in South Tarawa; 3 out of the 15 national physicians were retired. In addition, there were approximately 191 nurses and 41 medical assistants working in the republic[10]. The World Health Organization (WHO) estimates of health personnel in

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1998 were 29.6 physicians and 235.8 nurses per 100,000 people[11].

Challenges in providing health care in Kiribati are exacerbated by the fact that many trained and qualified indigenous personnel, such as doctors, medical assistants, and nurses, leave the islands for work abroad where better job opportunities exist. The government has recently enacted a system whereby all trained personnel must serve the country for the same number of years for which they received government support of their overseas training. Two major strategies of the Ministry of Health and Family Planning addressing these issues are the Ministry's insistence on strengthening the system of primary health care and its push for integrating western and traditional medical care[4, 12].

National health status indicators, such as mortality and fertility rates[2], indicate that Kiribati's health is improving. Communicable diseases remain a significant source of illness, including viral forms of liver disease. Increased life expectancies and chronic diseases are increasing as with other Pacific countries facing the epidemiologic transition from communicable diseases to chronic diseases. Hypertension, diabetes and smoking are prevalent in Kiribati. In 1999, the 4 leading causes of mortality per 100,000 population were described by the Ministry of Health to be: diseases of the circulatory system (15.96), infectious and parasitic diseases (14.82), diseases of the digestive system (11.40), and diseases of the respiratory system (6.84)[4]. Fully 28.5 per 100,000 deaths were from "undefined conditions[4]," illustrating limited access to diagnostic services and health care in this nation.

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With respect to cancer in Kiribati, data is scarce. In 2000, the Ministry of Health and Family Planning reported 20 deaths from cancer (6 cervical cancers; 4 liver cancers; 1 lip, oral cavity or pharyngeal cancer; 1 leukemia; and 8 of unknown type) to the World Health Organization[10]. Through funding by the Marshall Islands Nuclear Claims Tribunal and with the cooperation of the Republic of Kiribati Ministry of Health and Family Planning, data collection was conducted in March 1998 and March 1999 to better understand the epidemiology of cancer and cancer data systems in Kiribati. The goal of this paper is to more fully describe the cancer epidemiology and the cancer control system in the Republic of Kiribati.

Methods

For this project, we reviewed a variety of primary source documents for data on cancer, including death records, hospital medical records, pathology reports, and logbooks. For cancer cases, we abstracted data on: home island, date of birth, age, sex, occupation, country of birth, race, smoking, beetle nut chewing, alcohol use, kava use, date of diagnosis, date of admission, interval between symptoms and treatment, histology, body site, stage of cancer, aim of treatment, type of treatment, date of death, age of death, and cause of death.

Tungaru Central Hospital (TCH) was built in 1990. Medical records prior to 1990 were stored in an unknown location. The records were not accessible and were reported as "probably lost" at the time of the review. At the TCH Office of Statistics in March 1998, a computer search was performed for patients diagnosed at admission with breast cancer, lung cancer, leukemia, and aplastic anemia. Codes from the Ninth Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-9) were used to search the computer databases. This search was undertaken to better understand the robustness of the codification and recording of data. The computer search yielded a list of 15 individuals. Upon cross referencing the computer records with hospital records, it was found that there were discrepancies in over 50% of fields under study.

A more comprehensive list of cancer patients was obtained from a file of pathology reports located in the hospital laboratory. The pathology reports were from out-of-country medical sites, largely from pathology laboratories in Australia. At the time, the oldest pathology report available was dated September 11, 1989, and the most current was March 1999. Among the cancer records searched in Kiribati, the pathology records were the most complete. The pathology reports from the hospital laboratory were cross-referenced with another set of pathology reports kept in the surgical theater.

The computer-generated list from TCH was combined with the list of patients from both sets of pathology reports. The combined list was submitted to the hospital medical records department. The hospital charts of all identified cancer cases were then pulled to examine the aforementioned relevant fields of study.

A computerized list of patients who died from cancer could not be produced at the TCH Office of Statistics in 1999 when data was collected. According to hospital staff, death certificates (DC) should be filed in the hospital charts, but this procedure was not consistently followed. In addition, DCs were not kept in a central location. The Ministry of Environment and Social Development; Civil Registration

Office; and the Registrar of Births, Deaths, and Marriages had a few computerized records, but the causes of death were non-specific, and all were recorded in the I-Kiribati language. The Chief Statistician and the Registrar both agreed that records on deaths were more complete at the TCH.

To gather information on the cancer control system in Kiribati, researchers interviewed key health personnel from different sectors: laboratory, radiology, medical staff, public health, and health administration to better understand the availability and utility of health-based cancer prevention, diagnostic, and treatment services in Kiribati.

Data on cancer cases were entered into a Microsoft Excel database and analyzed with SPSS 11.5 for Windows. The measurements reported are annualized, site-specific, period prevalence for existing cancer cases documented during the period of concern. The period is defined as the years during which data were available. Included in the numerator were (1) persons diagnosed with cancer during the period (incident cases), and (2) persons who were diagnosed with cancer prior to the period who either died during the period or who were still alive at the end of the period (prevalent cases at the start of the period). The denominator included the total population from census data available for a year close to the mid-point of the period. The period prevalence measurements were annualized by dividing by the number of years for which data were collected. We used this method because of the small numbers of cases in any single year and the necessary information needed to calculate incidence was not available. Period prevalence was deemed to be the best descriptive form for the data in this situation.

Table 1. Description of cancer patient population in Kiribati

Characteristic	% of population
Sex (n=237)	
Male	39.4
Female	60.6
10-year age groups (n=136)	
0-10	10.3
11-20	5.9
21-30	11.8
31-40	14.7
41-50	23.5
51-60	15.4
61-70	16.2
71-86	2.2
Time between symptoms and treatment (n=45)	
0-30 days	33.3
31-60 days	13.3
61-90 days	20.0
91-120 days	6.7
121-365 days	8.9
>1 year	17.8

Results

Cancer epidemiology

At TCH, 237 cases of cancer were treated between 1989 and 1999. More of the cancer cases occurred in females (144 females and 93 males), and almost a quarter of cancer cases were in people aged 41 to 50 years old. Ethnicity was recorded in 235 of the 237 cases, 99.6% were I-Kiribati and 0.4% was Tuvaluan. Diagnostic criteria were listed for 209 cancer cases. The diagnostic method consisted of the following: histology 79.9%, clinical impression 11%, radiology 4.3%, cytology or hematology 3.3%, biochemical or immunochemical test 1%, and exploratory surgery 0.5%. One person had two types of primary cancers, and the rest had one site of origin of cancer. Death certificate data were only found for 10 patients, and death was documented in only 18 of the cases. The number of site-specific cancers was too few to calculate reliable site-specific mortality estimates.

The most common primary cancers by site were: breast (13.5% of cases); gastrointestinal (13.5%); skin (6.8%); oral (6.3%); cervix (5.9%); and lung (5.9%). There were 4.6% individuals with abdominal cancers from an unknown source of primary lesion, and 1.3% with unknown source of primary lesion. For the 93 male cases which listed a primary site, these included: gastrointestinal (23.7%), skin (11.8%), lung (10.8%), and lymph (6.5%). Among the 142 female cases with documentation of a primary cancer site, these included: breast (22.5%), uterus (15.5%), cervix (9.9%), and ovary (7.7%).

Unadjusted period prevalences are listed in Table 2. Cancers stratified by age are presented for the entire population in Table 3.

Ninety of the 237 cases had their home island listed as Tarawa (17.8%), followed by Tabiteuea (13.3%), Butaritari (10%), Nikunau (8.9%), and Abaiang (7.8%). Of all the cancer cases, only 1 case listed a home island outside of Kiribati. With respect to other risk factors documented in the medical records of all cancer patients at TCH, 8 cases had documentation of status of alcohol use, and only 14 cases had a documented status of tobacco use. At the time of data collection, kava and beetle nut were not in common use among the I-Kiribati. No cancer patients listed these factors. Occupation was recorded for only 6 of the 237 cases.

Of the 237 cases, 64 biopsy specimens were taken, 75% were from the primary site of the cancer, 6.3% were from a

Table 2. Unadjusted Period Prevalence for total Kiribati population

Body site	Number cases n=237	Prevalence (/yr/1,000,000)*
Breast	32	37.3
Gastrointestinal	32	37.3
Uterus	22	25.6
Skin	16	18.6
Hematological	15	17.5
Oral	15	17.5
Lung	14	16.3
Cervix	14	16.3
Ovary	11	12.8
Abdomen; primary unknown	11	12.8
Eye	10	11.7
MSK	8	9.3
Lymph	7	8.2
Other	7	8.2
Thyroid	6	7.0
Liver	4	4.7
Uncertain benign or malignant	4	4.7
Unknown primary site	3	3.5
Prostate	2	2.3
ENT	2	2.3
Urinary tract	1	1.2
Testes	1	1.2

** Period prevalence (per year, per 1,000,000 people) = 100,000 X [(Number of cancers by body site/population at mid-point during time period)/time period]*

Note: Data was from 1989 to 1999. Therefore the population used in the calculations above was approximately 78,000 in 1994

site of metastasis. There was uncertainty whether the biopsy was from a primary or metastatic site in 6.3% of cases. In 12.5% of the 64 biopsy specimens, it was not clear whether the biopsy was from a benign or malignant lesion. With respect to histological grading amongst the biopsied cases, 5.5% were well differentiated, 8% were moderately differentiated, 10.5% were poorly differentiated, 3.8% were undifferentiated or anaplastic, 0.8% were "high grade," and 71.4% had no grade or differentiation determined. Twenty eight of the 64 biopsy cases had stage of disease documented: 3.6% had localized disease, 28.6% had regional or lymph node involvement, and 50% had remote or diffuse metastasis.

Treatment information was documented for 51 cancer cases. Among these, 39.2% had surgery, 3.9% had chemotherapy, 2% had "IV," 37.3% had no treatment, 15.7% had "other treatment" such as a blood transfusion, and 2% were treated for tuberculosis.

Cancer control system

What was recorded in the health statistics office and the medical records was instructive about the nature of the cancer control system. The fact that the cancer data collected prior to 1999 were reported as inaccessible illustrates problems with the cancer data system.

We talked to several individuals about the cancer control system in Kiribati. We learned that a robust method for screening common cancers was not available. There was no mammogram or regular colon cancer screening program in place. Cervical cancer screening was being done but its outreach and efficacy were limited. Diagnostic modalities such as biopsies and CT scans were only available through referrals outside of Kiribati, and this contributed to the finding that 79% of the cancer cases were diagnosed by clinical impression.

Since most of the patients at TCH are from the outer islands, it is probable that most will not be able to go to Tarawa unless they are very ill or symptomatic. Thus, by the time a cancer patient presents to TCH, the cancer is probably at an advanced stage. This finding was not surprising given that the majority of cancers diagnosed in Kiribati were less differentiated and often metastatic at the time of diagnosis.

Cancer treatment, whether palliative or definitive, also was very limited. Surgery is readily available on Kiribati, but chemotherapy and radiotherapy are not. The most frequent cancer treatments are either surgery or no treatment.

Discussion

The results of the study are informative about the cancer control system in general and the cancer information system in Kiribati between 1990 and 1999.

As with most health and human resource-challenged nations of the Pacific, the health information system of Kiribati was under development. There was no defined cancer registry functioning at the time of the visit. Particular cancer data were housed in several different areas of the health system including the laboratory, medical records, surgical theatre, and vital statistics. The computerized system in the TCH Office of Statistics was not able to generate a comprehensive list of those who died from cancer. Many pertinent parameters relating to those who had been diagnosed with cancer were not recorded or differed from what was in the medical record.

Table 3. Cancer cases in Kiribati, stratified by age groups

	Age Group (years)							
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-84
Number of cases/age group	14	8	16	20	32	21	22	3
Body Site								
Musculoskeletal	0	0	0	1	0	0	1	0
Breast	0	2	4	4	11	4	3	0
Cervix	0	0	0	6	1	1	1	0
Eye	2	0	0	0	1	0	2	0
Gastrointestinal	0	0	0	1	5	4	3	1
Hematological	8	2	1	1	0	0	2	0
Liver	0	0	0	2	0	0	0	0
Lung	1	0	0	0	5	1	6	1
Lymph	0	1	1	0	1	0	0	0
Oral	0	0	0	2	4	1	0	0
Ovary	0	0	0	0	0	1	0	0
Prostate	0	0	0	0	0	0	1	1
Skin	0	1	0	0	2	2	1	0
Thyroid	0	0	2	2	0	1	1	0
Uterus	0	1	5	0	1	2	0	0
Other	1	0	0	1	1	1	0	0
Abdomen; primary Unknown	0	1	1	0	0	0	1	0
Uncertain benign or Malignant	2	0	1	0	0	0	0	0

In the medical charts, basic demographic information and information on cancer risk factors, such as occupation, home island, and whether the person smoked, were not recorded. Notably, out of all 237 cases of cancer, only 29% had a birth year documented, and 26% had a full birth date documented; 45% were missing this basic information. Age information is often crucial when deciding when to initiate or end cancer recommended screenings. Clearly, the ascertainment of cancer cases was incomplete. Development of a systematic cancer registry and data collection system, with the use of standardized coding of diseases, would facilitate the generation of statistics on various indicators of health. A complete history and physical exam upon admission to the hospital are also important. All relevant information about the patient should be recorded in the chart so that future medical workers looking at the chart will be able to provide quality care more efficiently.

The types of cancer that were prevalent—gastrointestinal, breast, cervical and lung—are often preventable cancers. Gastrointestinal, breast and cervical cancers are also treatable in their early stages. In this regard, a strong cancer screening and prevention program could be instrumental in affecting the cancer morbidity and mortality in Kiribati.

The difficulties of screening and treating cancer in a resource-poor setting were evident. Lack of patient access to levels of health care, where a correct and timely diagnosis could be made, is an issue recognized by the Kiribati Government and Health Ministry.

The purpose of this study was to better understand the cancer epidemiology and the comprehensive cancer control system in Kiribati. It is hoped that officials at the Ministry of Health and Family Planning will be able to utilize this information in a descriptive and comparative fashion to develop their cancer data base and cancer control efforts. Improvements in cancer education, screening, diagnosis and treatment will require planning and resource allocation. Additionally stakeholders, including political, administrative, health care providers, and community members will need to work together to ensure a practical and sustainable system. The Kiribati Health Services and government are working toward this end.

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He pono ka pakiko mamua o ka ho ʻokelakela wale aku.

Better to be economical than too liberal.

Hawaiian proverb