

Cancer in the Republic of Palau (Belau)

Abstract: This study, funded by the National Cancer Institute, assessed cancer awareness and service needs in the Republic of Belau (Belau) in April 2003. Cancer prevention and control is a concern for Belau, and this country maintains a cancer registry to track cases and outcomes. However, assistance is needed to strengthen and expand existing cancer-related services. Key informants requested help to develop a comprehensive cancer prevention and control program, increase the capacity of professional staff in diagnosing and treating cancer, and improve laboratory and pathology services. **Key Words:** Medically underserved area, needs assessment, oncology services, Pacific Islanders, Palau, quality of health care

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War II, the United Nations formed the Trust Territories of the Pacific Islands (TTPI), of which Belau (erroneously called Palau by Americans) was a member. The TTPI was administered by the United States (US) until 1986, when a Compact of Free Association was signed with the US in 1994. This compact gives Belau full self-governance, although the country still receives defense and financial assistance from the United States¹⁻³.

Introduction

This paper presents findings from an assessment of cancer awareness and needs in Palau (traditional spelling Belau), funded by the National Cancer Institute. This work represents one of the first efforts to identify and prioritize cancer infrastructure needs in this country.

History, geography, and population of the Republic of Belau

Archeological findings suggest that Australonesians migrated to Belau about 4,000 years ago. Europeans came to Belau as early as the 1500s, and the English established a formal relationship with the Belau monarchy in the late 1700s. Later, missionaries were sent by the Spanish. They were supplanted by Germans after the Spanish-German War, and the Japanese occupied the islands from 1912 through World War II. Following World

Belau consists of more than 340 islands, of which only 14 are inhabited. The majority of the islands are volcanic in origin, but some of the small, uninhabited islands are atolls composed of raised limestone. Together, the islands amount to only 189 square miles of land area, however the surrounding sea region of the country is extensive. The country is about 4,450 miles from Honolulu, 720 miles from Guam, 500 miles east of the Philippines, and 1,900 miles south of Japan³.

The inhabited islands include Kayangel, Babeldaob, Koror, Peleliu, Angaur, Sonsorol, Pulo Anna, and Hatohobei. Babeldaob is the largest of the islands, accounting for 80% of the country's total land area, with 153 square miles of forests, grasslands, rivers, waterfalls, wetlands, mangroves, and beaches. Just south of Babeldaob is Koror, the capital of Belau. About 70% of the population resides in Koror, which has a land area of 7.1 square miles. Koror and Babeldaob have roads, and the main road in Babeldaob is being renovated for better vehicle access. Outside of Koror, the main mode of transportation is by boat¹.

The Office of Planning and Statistics conducted the 2000 Census of Population and Housing with assistance from the US Bureau of the Census and Office of Insular Affairs. The population of Belau was 19,129 people in 2000, of which 10,450 (55%) were males and 8,649 (45%) were females (a ratio of 120 males for every 100 females). Population density in most states is low; however, Koror State has a high population density, with 1,900 persons per square mile. Ethnically, 70% of residents are native to Belau, 16% are Filipino, 10% are other Asians, and 4% are of another ethnicity².

In 2000, the median age for Belau-born residents was 30.8 years; about 40% of the population (7,621 residents) was between 25-44 years old and 24% (4,563 persons)

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between 0-14. Residents 65 years old and older account for 5.4% of the population. Population projections by the US Bureau of the Census suggest that the population will increase from 19,626 persons in 2001 to 22,813 in 2025, and that life expectancy at birth will increase from 70.77 years in 2001 to 76.62 years in 2025. Currently, the dependency ratio is 41%. In 2000, the mean number of persons per household was 4.63, and the mean number per family was 4.78. About 60% of households used rainwater as drinking water, and the other 40% drink water from a 50-year old water system, which may pose health risks. More than 60% used electricity, gas, or kerosene as cooking fuel².

According to the 2000 census, 53% of the Belau-born population age 16 years and older were in the labor force. Only 3% of the population earns \$20,000 or more per year, and about 14% earn between \$10,000 to \$19,900 per year. The majority (67%) of the population earned less than \$10,000, including about 20% that survives on less than \$2,900 per annum².

Health care delivery in Belau

The annual allocation for the Ministry of Health (MOH) is about \$5.3 million. The MOH is divided into two bureaus, the Bureau of Hospital and Clinical Services, which operates the Belau National Hospital, and the Bureau of Public Health, which manages all outpatient services, including primary care, oral health, behavioral health, and environmental health. Primary care and community health services are provided through the community health centers and dispensary systems strategically located around Belau. Primary care also is provided by private-practice physicians.

The Belau National Hospital has 82 inpatient beds and provides a full-range of services including: emergency care, pediatrics, labor and delivery, surgery, hemodialysis, physiotherapy, pharmacy, laboratory, and radiology services. In 2001, total admissions were 3,436 patients. Care is subsidized by the government and residents pay a portion based on a sliding fee scale. Patients who need tertiary care or other services not available on Belau may be referred to the Medical Referral Committee, which can approve a request to send them to Honolulu or the Philippines for treatment.

Method

The cancer needs assessment was conducted in Belau in spring 2003 by faculty and residents of the Department of Family Practice and Community Health, John A. Burns

School of Medicine, University of Hawai'i. Information about the health care system and cancer-related services in Belau was obtained through key informant interviews with physicians and public health staff.

Data were gathered from several sources—death records, the Belau cancer registry, the off-island referral logbook, and through key informant interviews. Data on morbidity and mortality are collected and compiled by the Bureau of Public Health. The Bureau of Public Health Data and Statistics has a death certificate database, and deaths are coded using the *International Classification of Diseases*, 9th edition (ICD-9).

The Cancer Registry at Belau Ministry of Health began in 1972, and was formally legislated in 1998. Data from 1990 up to present were maintained on a computer database. Registry data include the age, gender, ethnicity, cancer site, grade/behavior (benign/malignant)/staging of cancer, vital status (dead or alive), cause of death, date of diagnosis, place of diagnosis and confirmation of diagnosis by pathology, treatment of cancer, village/state of origin, use of tobacco, and occupation.

Identified needs were organized in four categories: data; training; equipment and supplies; and services and programs. From these needs, a list of recommendations was developed by the authors. Needs were prioritized and preliminary planning was done by the Pacific Islander delegates of the Cancer Council of the Pacific Islands in the Republic of the Marshall Islands in August 2003. These plans were further refined, and a strategic action plan was developed in November 2003 at a meeting in Pohnpei, FSM.

Findings: mortality and morbidity

Leading causes of death, 1998-2002

For the 5-year period 1998 and 2002, a total of 649 deaths were recorded. Of these, 277 (43%) were coded as death due to cardiac arrest (the stopping of the heart), and another 94 (14%) were coded as death secondary to respiratory arrest (the stopping of the lungs). These two categories accounted for 57% of the total deaths. Because cardiac and respiratory arrests are not standard designations for causes of death, we analyzed death data in two ways, both shown in Table 1. The first column shows cause of death. The second column gives percentages using 649 deaths as the denominator. The third column gives percentages using 278 deaths as the denominator (649 minus the 371 deaths attributed to cardiac or respiratory arrest). Following cardiac and

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Table 1. Leading causes of death in Belau, 1998-2002

Cause of death	N (% of 649 deaths*)	N (% of 278 deaths**)
Cardiac arrest	277 (43%)	
Respiratory arrest	94 (14%)	
Injury	38 (6%)	38 (14%)
Heart disease	36 (6%)	36 (13%)
Cancer	34 (5%)	34 (12%)
Pulmonary disease	20 (3%)	20 (7%)
Stroke	20 (3%)	20 (7%)
Asphyxia	16 (2%)	16 (5%)
Septicemia	15 (2%)	15 (5%)
Drowning	14 (2%)	14 (5%)
Aspiration	11 (2%)	11 (4%)
Liver	9 (1%)	9 (3%)
Kidney	9 (1%)	9 (3%)
GI disorder	7 (1%)	7 (3%)
Pneumonia	6 (1%)	6 (2%)
Malnutrition	3 (<1%)	3 (1%)
Senility	3 (<1%)	3 (1%)
Other	16 (2%)	16 (5%)
Unknown	21 (3%)	21 (8%)

*Total deaths

**Total deaths minus those attributed to cardiac arrest or respiratory arrest

respiratory arrest, the 5 leading causes of death were injury, heart disease, cancer, pulmonary disease, and stroke.

Cancer deaths, 1998-2002

During the 5-year period 1998-2002, 68 individuals died of cancer, 38 men and 30 women. Among women, the top causes of cancer death were cervical cancer, liver cancer, pharyngeal cancer, and breast cancer. Among men, the top causes of cancer death were lung cancer, gastric cancer, prostate cancer, liver cancer, and pancreatic cancer.

Cancer cases, 1997-2001

From the cancer registry, 122 cases of cancer were reported for the 5-year time period 1997 through 2001, 68 in females and 54 in males. The most common cancer was cervical cancer (accounting for 23% of cases), followed by lung cancer (17%), prostate cancer (9%), liver cancer (8%), and breast cancer (6%) (Table 3).

For females, the five most common cancers were cervical cancer (41%), breast cancer (10%), lung cancer (9%), ovarian cancer (4%) and liver cancer (4%). For males, the five most common cancers were lung cancer (28%),

Table 2. Cancer deaths by gender, Belau, 1998-2002

	N (%)
Females	
Cervical	10 (33%)
Liver	3 (10%)
Pharyngeal	3 (10%)
Breast	3 (10%)
Laryngeal	2 (7%)
Uterine	2 (7%)
Lung	1 (3%)
Gastric	1 (3%)
Colorectal	1 (3%)
Ovarian	1 (3%)
Unknown	3 (10%)
Total cases	30 (100%)
Males	
Lung	8 (21%)
Gastric	4 (11%)
Prostate	4 (11%)
Liver	3 (8%)
Pancreas	3 (8%)
Colorectal	2 (5%)
Esophageal	2 (5%)
Lymphoma	2 (5%)
Pharyngeal	1 (3%)
Laryngeal	1 (3%)
Total cases	38 (100%)

Table 3. Cancer cases by type of cancer, Belau, 1997-2001

Cancer site	N (%)
Cervical	28 (23%)
Lung	21 (17%)
Prostate	11 (9%)
Liver	10 (8%)
Breast	7 (5%)
Tongue	4 (3%)
Pancreas	4 (3%)
Ovary	3 (2%)
Brain	3 (2%)
Mouth/parotid	2 (2%)
Colon	2 (2%)
Skin	2 (2%)
Kidney	2 (2%)
Thyroid	2 (2%)
Small intestine	1 (1%)
Anal	1 (1%)
Biliary	1 (1%)
Bone	1 (1%)
Peritoneum	1 (1%)
Soft tissues	1 (1%)
Uterine	1 (1%)
Penile	1 (1%)
Ureter	1 (1%)
Bladder	1 (1%)
Unknown	11 (9%)
Total cases	122 (100%)

Table 4. Cancer cases by type and gender, Belau, 1997-2001

	N (%)
Females	
Cervical	28 (41%)
Breast	7 (10%)
Lung	6 (9%)
Ovarian	3 (4%)
Liver	3 (4%)
Other	21 (31%)
Total cases	68 (100%)
Males	
Lung	15 (28%)
Prostate	11 (20%)
Liver	7 (13%)
Colon	2 (4%)
Brain	2 (4%)
Other	17 (32%)
Total cases	54 (100%)

prostate cancer (20%), liver cancer (13%), colon cancer (4%), and brain cancer (4%).

Findings: cancer-related services

Administration, planning, and data

Health workers on Belau currently are drafting a National Health Plan and, according to key informants, cancer will be one of the priorities. Statistics on health data are currently compiled by the Bureau of Public Health Data and Statistics. There is also a cancer registry, which was established in 1997 and includes data from 1990 to the present.

Public health services

Cancer awareness, outreach and prevention services include breast and cervical cancer screening, prostate cancer screening, thyroid cancer screening, tobacco prevention and other programs. A "National Cancer Prevention and Control Program" is currently under development to provide comprehensive cancer resources and care for all types of cancers. Public health leaders noted the need for a comprehensive alcohol control program.

Breast and Cervical Cancer Screening. Belau's Breast and Cervical Cancer Early Detection Program (BCCEDP) is funded by the Centers for Disease Control and Prevention (CDC). The program was established in 1996 through a 5-year grant, and is now in its second year of a 5-year renewal. The BCCEDP staff members participate in meetings of the National Cancer Institute (NCI), CDC, and the American Cancer Society annually. The BCCEDP sponsors programs in communities throughout Belau. They offer Pap smear testing, clinical breast examinations, mammograms, and ultrasound, and they instruct women on breast self-examinations. Incentives are used during Cancer Awareness Month to encourage women to participate. A health educator provides education throughout the year in all media formats as well as through health fairs, village meetings, and school and community presentations.

Other Cancer Programs. Public Health staff members also screen individuals for thyroid, liver, and prostate cancers.

Tobacco Prevention. The Tobacco Prevention Program, known as STUN (Stop Tobacco Use Now) is in the last year of a 5-year CDC grant. The main goals of the program are to prevent initiation of smoking, encourage cessation of tobacco use, eliminate exposure, and eliminate disparities. Many of the activities are focused on youth, including the Tobacco Free Sports program, which is offered in collaboration with the Ministry of Education and the Palau Soccer Association, and the VIP (Very Important People) program, which utilizes peer educators to put on school presentations. Every Halloween, these youth groups

organize the "Hall of Horrors" to demonstrate the ugly truth about tobacco and alcohol use.

Comprehensive tobacco control legislation has been passed by the legislature. This legislative package includes enforcing those laws that are already in place, such as requiring a license to sell tobacco, prohibiting sales of tobacco to minors directly and through vending machines, and banning smoking in government buildings. Additional legislation will address the issues of advertising, tobacco sponsorships of community events, increased fees/fines, and smoke-free workplaces including all schools, sports complexes, and health care facilities. Presently, the Ministry of Justice, in partnership with the Tobacco Prevention Program and its sister program, the Substance Abuse and Prevention Program, conduct vendor inspections to determine compliance with the laws. The most recent compliance check showed an increase in noncompliance from 36% to 55%. The program now has the support of the Department of Public Safety, and vendors may take the violations more seriously. The program has consulted Pacific Resources for Education and Learning (PREL) to help staff develop presentation skills, and staff received training from the University of Washington in fall 2003.

Nutrition and Physical Activity. In addition to cancer education, nutrition and physical activities are actively promoted. There is a nutritionist on staff who participates in school and community presentations. The health educator has also conducted weight management programs with emphasis on local foods and local types of physical activity (e.g., working in the taro patch). They also sponsor physical activity programs at the Senior Center twice a week.

Medical services

Services related to the diagnosis and treatment of cancer are provided primarily by surgeons, gynecologists, and internists employed by the Ministry of Health. Private-practice family physicians and surgeons also provide cancer-related services. Several surgeons report having received cancer-specific training on mammography reading, stereotactic biopsy, and cancer research.

Screening services for breast and cervical cancers are actively promoted. Screening for prostate and colorectal cancers is performed on individual patients by their physicians. Services available for the diagnosis of cancer include mammography, ultrasound, fluoroscopic studies, chest radiography, CT scans, endoscopic studies, biopsies, and fine-needle aspirations. Many cancer surgeries can be performed. There is no capability of initiating chemotherapy, but maintenance of chemotherapy that has been initiated off-island (e.g., at Tripler Army Medical Center (TAMC) in Honolulu) has been provided for individu-

Table 5. Belau's action plan for three cancer-related priority areas

Objectives	Activities
1. Develop comprehensive cancer control and prevention program	a. Hire program coordinator. b. Form cancer task force. c. Develop protocol and guidelines. d. Produce education materials. e. Develop cancer screening guidelines. f. Develop cancer treatment guidelines. g. Equip office.
2. Expand laboratory services to perform cytology as well as pathology	a. Identify needed services. b. Identify and contract with lab. c. Train lab tech on packaging specimens.
3. Increase capacity of physicians, nurses, lab and radiology technicians	a. Locate training site for personnel. b. Send staff to short-term (6-month) training.

als with breast, lung, colon and liver cancer. Radiation therapy is unavailable. Because Belau residents are not US citizens, they are not eligible for NCI-sponsored trials.

Telemedicine consultation with TAMC began in 1995 and is used regularly. Specialty consultants in the areas of urology, cardiology, pulmonology, endocrinology, ophthalmology, otolaryngology, and reconstructive surgery are available on-island at least once a year and may be specifically consulted for cancer cases if needed. Traditional healing practices are utilized by many patients, and physicians encourage traditional medicine as adjunct therapy.

Off-Island Referrals. In 2002, there were a total of 33 cancer-related referrals to two off-island facilities, TAMC in Hawai'i and St. Luke's Medical Center in the Philippines.

Laboratory and radiology services

The laboratory is able to provide most routine laboratory services. Cancer-related services include prostate-specific antigen (PSA), stool occult blood, and cancer tumor markers. Pap smears and biopsies are sent to laboratories in Hawai'i, with a turnaround time for abnormal results of about a week (normal results often take much longer). Other specimens are sent to TAMC, and one of the private physicians has been utilizing a lab at the University of Santo Tomas in the Philippines that has a turnaround time of less than a week.

The radiology department provides routine x-rays, CT scans, and ultrasound services. Mammograms are performed locally, and read on-island by a radiologist from Guam who visits eight times a year. Suspicious mammograms can be sent to Guam for more timely evaluation.

Non-Governmental Organizations

There are no non-governmental organizations that consistently provide cancer-related services to the community. Occasionally, the local Rotary Club will invite speakers to talk to their members about cancer-related issues, and they have also donated money to assist with cancer education.

National and International Organizations

Physicians participate with organizations such as the World Health Organization, CDC, the Pacific Basin Medical Association, and the Pacific Islands Health Officers Association to address health care issues in the Pacific, including cancer.

Findings: cancer-related needs

Data needs

The capacity of the cancer registry could be expanded by integrating data from all health providers, including private clinics, and by establishing a regular information dissemination system.

Personnel and training needs

Personnel. Belau would benefit from regular services of a radiologist. A Belauan pathologist currently is in residency training in Taiwan and is expected to return in 2006.

Training. Training needs include physician training in cancer prevention and health promotion, cancer treatment, traditional medicine, pain management, and palliative and end-of-life care. Physicians also supported the further refinement of the cancer registry and training in ICD-10 coding. Laboratory staff would benefit from training in specialized laboratory services, including the

preparation and management of specimens. Radiology staff needs training for specialized radiological services resulting in certification. Public health staff needs continuing education to keep abreast of developments in cancer screening and prevention and smoking cessation. They also requested training on data collection and research methods.

Needed equipment and supplies

Allied health, which includes laboratory and radiology, needs a comprehensive management system to assure the availability of reagents, films, other supplies and equipment maintenance.

Needed program and services

The plans for a "National Cancer Prevention and Control Program" would benefit from the development of a network to share ideas and information with other Pacific Islands. New programs that need to be addressed in the plan include home health care and hospice.

Recommendations by the Assessment Team

Based on these findings, the assessment team offered this single recommendation for improving cancer-related services in Belau: Develop a Comprehensive Cancer Control Plan within the proposed National Public Health Plan which would address all types of cancers. This would encompass education, screening, prevention and treatment of cancer.

Prioritizing and setting objectives

Needs were prioritized and preliminary planning was done by the Pacific Islander delegates of the Pacific Cancer Council (subsequently formalized as the Cancer Council of the Pacific Islands) in the Republic of the Marshall Islands in August 2003. These plans were further refined, and a strategic action plan was developed in November 2003 at a meeting in Pohnpei, FSM. This group designated three priority areas:

- *Priority 1:* Develop a comprehensive cancer control and prevention program,
- *Priority 2:* Expand laboratory services to perform cytology as well as pathology, and
- *Priority 3:* Increase capacity of physicians, nurses, and laboratory and radiology technicians.

The group also developed specific objectives for each priority area. A summary of a one-year action plan for Belau was shared with the National Cancer Institute in 2004 and is shown in Table 5.

Conclusions

Cancer prevention and control is a concern for Belau, and this country has established a cancer registry to track cases and outcomes. However, assistance is needed to strengthen and expand existing cancer-related services. Key informants requested help to develop a comprehensive cancer control and prevention program, improve laboratory and pathology services, and increase the capacity of professional staff in diagnosing and treating cancer.

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