

# CANCER OF THE REPRODUCTIVE ORGANS IN COSTA RICA<sup>1</sup>

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*Costa Rican death and hospital discharge statistics relating to cancer of the reproductive organs are analyzed for the period 1956-1969. The analysis focuses on secular and geographic variations and compares the situation found in Costa Rica with circumstances reported in other countries.*

## Introduction

In Costa Rica, as in many parts of the world where the average citizen is young and resources are limited, relatively little attention has been given to available statistical data on cancer. Other pressing health needs have received priority attention, and the few studies dealing with cancer have revealed only some outlines of a picture which is still far from complete.

General cancer mortality figures for Costa Rica are found in the Pan American Health Organization's general comparative analysis of mortality from all causes, which is published every four years and which includes all Western Hemisphere countries. This publication lists Costa Rica among those nations showing the highest age-adjusted cancer mortality rates (21). Cancer mortality data are also contained in the regular publications of the Office of Vital Statistics of Costa Rica (3), and in a review of

3,000 autopsies made by Mena in 1964 (14). In addition, the high mortality attributed to stomach cancer in Costa Rica prompted Strong, *et al.* to make a special study of that subject in 1967 (23).

A general description of cancer distribution in Costa Rica by Moya de Madrigal—broken down by site, sex, and age—was completed in 1969 (19). This work was statistical in nature and gave special attention to the problems involved in collecting, classifying, and adjusting the available data. Its main purpose was to compile all cancer data available and to tabulate and present these data in a comprehensive report. The results showed that the incidence of deaths attributed to cancer in Costa Rica rose from 2.4 per cent of the total registered deaths in 1927 to 10.4 per cent in 1967. These data were later used (for administrative purposes only) in planning facilities for cancer patients in Costa Rica. No attempt was made to explore relationships or associations between particular characteristics of the population and the reported trends.

A more recent comprehensive study of cancer epidemiology in Costa Rica by Moya de Madrigal was completed in 1972 (20). This analyzed secular and geographic variations of cancer incidence by site, sex, and age using mortality and hospital discharge data. The study also compared Costa Rica's cancer mortality rates with those reported in 24 other countries.

<sup>1</sup>Also appearing in Spanish in the *Boletín de la Oficina Sanitaria Panamericana*. For a related work on cancer in Costa Rica, see L. M. de Madrigal, "Cancer of the alimentary tract in Costa Rica," *Bull Pan Am Health Org* 8 (2): 150-164, 1974.

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These studies demonstrate that cancer in Costa Rica is an important cause of morbidity and death. They also indicate that in comparison with other countries, overall cancer mortality rates in Costa Rica are high among males and very high among females. Most of this high mortality is caused by stomach (19) and uterine cancer; in comparison to 24 countries studied by Segi, *et al.* in 1968 (22), Costa Rica was found to have the third-highest death rate from stomach cancer and the highest from uterine cancer.

The present article examines epidemiologic features of cancer of the reproductive organs in Costa Rica, primarily with regard to geographic and secular variations, using mortality and hospital discharge data. Only data on cancer of the reproductive organs are included here; additional papers dealing with other parts of the body have already appeared (17) or will be presented later.

## Materials and Methods

The mortality data used here were obtained from death certificates filed according to law with the Statistics and Census Bureau of Costa Rica. The morbidity data were procured from individual discharge reports sent by each hospital to the Hospital Statistics Department of the Bureau of Medical and Social Welfare. This latter report is legally required of all public and private hospitals delivering medical care in Costa Rica, and is a major source of morbidity data. Information about the population at risk was obtained from publications of the Statistics and Census Bureau (3, 4); the country's two most recent ten-year censuses were used to estimate the approximate population at risk in each province (5, 6).

An initial analysis was made of deaths and hospital discharges attributed to cancer of the reproductive organs in Costa Rica from 1956 to 1969. The direct method of age adjustment was used to adjust the morbidity and death rates obtained for each sex over two-year periods, employing the so-called "world population"

used by Segi and Kurihara (22) as the standard. The main purpose here was to determine secular trends, using both mortality and hospital discharge data. A comparison was also made between mortality rates in Costa Rica and in the countries dealt with in Segi and Kurihara (22). In addition, a search for geographic variations within Costa Rica was carried out. This was accomplished by comparing provincial mortality and hospital discharge rates attributed to cancer of the reproductive organs with the same rates from the nation as a whole.

## Results

Cancer of the reproductive organs was the reported cause of 17 per cent of the cancer deaths and 30 per cent of the cancer-related hospital discharges in Costa Rica during the 14-year period studied. Only cancer of the alimentary tract (17) was responsible for more deaths and hospitalizations.

Cancers of the breast, uterus, and prostate accounted for most of the mortality and hospital discharges reported. The incidence of cancer in other reproductive organs was extremely low among both men and women, and no time trends were observed; therefore, no data on these other cancer sites are presented here. Similarly, data on breast cancer in males are not included, since only eight deaths and 20 hospital discharges were attributed to this cause during the 14-year period covered.

Among women, cancer of the cervix uteri accounted for 12 per cent of the cancer deaths and 32 per cent of the cancer-related hospital discharges reported. However, no effort has been made to subdivide data according to sites within the uterus, because a considerable number of the cancer deaths and hospitalizations cited were attributed to cancer of the uterus at unspecified sites.

Figure 1 provides a comparison of death rates in Costa Rica from cancer of the breast, prostate, and uterus in 1964-1965, as compared to mortality from these causes in 24 other countries. It reveals that Costa Rica had among the lowest reported rates of breast and prostate

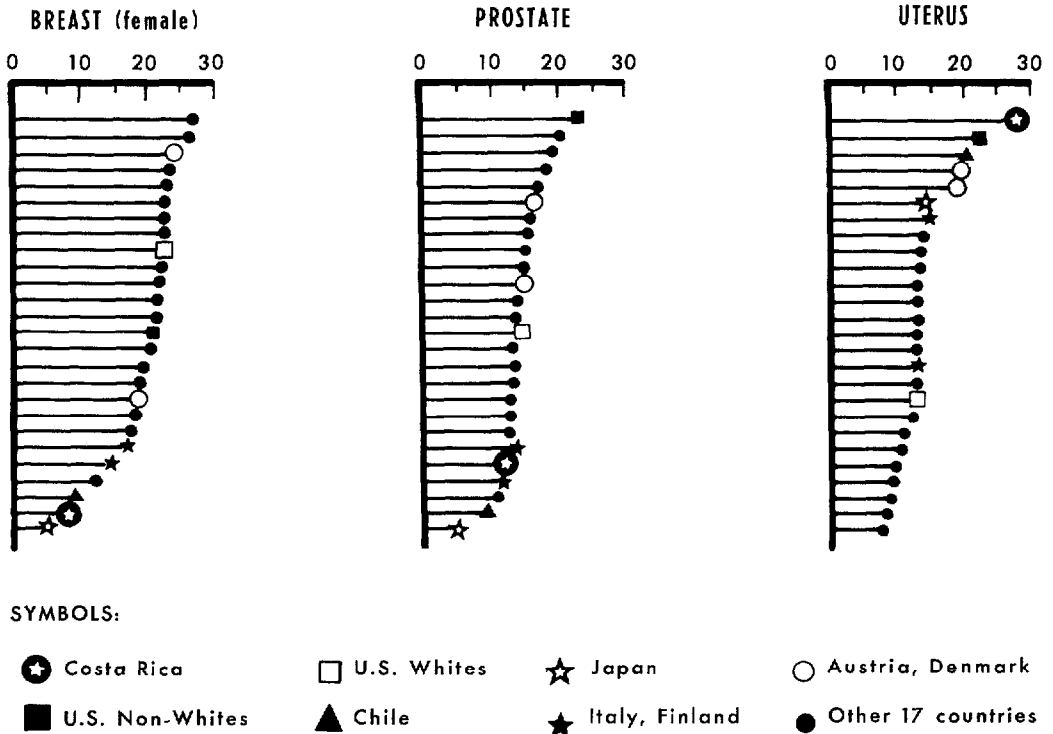


FIGURE 1—Comparison of age-adjusted death rates per 100,000 for cancer of the breast, uterus, and prostate in Costa Rica and 24 other countries, 1964-1965.

cancer. Chile, Finland, Italy, and Japan also showed low mortality from both types, while mortality from breast cancer was low in Portugal and mortality from prostate cancer was low in Israel. In contrast with this picture, Costa Rica had the highest reported death rate from cancer of the uterus, followed by the United States (nonwhite population), Austria, Chile, Denmark, and Japan.

Table 1 shows age-adjusted two-year rates for deaths and hospital discharge attributed to each of the three types of cancer in Costa Rica from 1956 through 1969. These figures indicate that breast cancer mortality, prostate cancer morbidity, and prostate cancer mortality all rose during this period. Although the rate of hospital discharges related to breast cancer remained fairly constant for the entire period, this discharge rate was still over twice as great as the rate of breast cancer mortality in 1969.

With regard to prostate cancer, a slight rise was noted in the ratio of hospital discharges to deaths. While both morbidity and mortality from uterine cancer appeared consistently high, there was evidence of a decline in both these rates during the last four years covered. Overall, the ratio of hospital discharges to deaths from uterine cancer was about three to one during the fourteen-year period covered.

Table 2 provides a different view of this data, grouping it into four and five-year segments and dividing it according to age groups. Both the hospital discharge and the mortality data clearly show three trends over time: a rise in breast cancer among those 45 and over; a decline in prostate cancer in the 45-64 age group; and a rise in prostate cancer among those over 64. Regarding uterine cancer, the data show declining mortality and hospital discharge rates among those 25-64, and stable

TABLE 1—Annual age-adjusted death and hospital discharge rates for cancer of the reproductive organs in Costa Rica, per 100,000 inhabitants, in 1956-1969.

Years	Death rates			Hospital discharge rates			Ratio of discharges to deaths		
	Breast cancer <sup>a</sup>	Uterine cancer <sup>b</sup>	Prostate cancer	Breast cancer <sup>a</sup>	Uterine cancer <sup>b</sup>	Prostate cancer	Breast cancer <sup>a</sup>	Uterine cancer <sup>b</sup>	Prostate cancer
1956-1957	6.8	28.0	9.3	19.0	84.7	12.8	2.8	3.0	1.4
1958-1959	7.4	26.8	9.3	22.2	81.5	13.7	3.0	3.0	1.5
1960-1961	8.2	27.5	7.8	21.9	78.3	13.6	2.7	2.8	1.7
1962-1963	8.6	30.3	9.7	16.1	76.9	16.4	1.9	2.5	1.7
1964-1965 <sup>c</sup>	8.0	25.7	9.9	21.0	82.7	19.0	2.6	3.2	1.9
1966-1967	8.3	25.4	9.2	22.7	77.5	21.9	2.7	3.0	2.4
1968-1969	9.2	22.0	11.0	21.2	62.2	24.4	2.3	2.8	2.2

<sup>a</sup>Data for female population only.

<sup>b</sup>Cancers of all parts of the uterus are included in these data.

<sup>c</sup>Rates for this period are shown graphically in Figure 1.

mortality with increasing morbidity among those 65 and over.

Table 3 shows the geographic distribution of breast, prostate, and uterine cancer by means of standardized ratios. These ratios, formed through division of provincial rates by the comparable rates for the whole nation, show relatively high rates of breast cancer mortality in the provinces of Heredia and San José and high hospital discharge rates involving breast cancer in both provinces, with the exception of 1961-1965 discharges in Heredia. The lowest rates of breast cancer were registered in Guanacaste and Puntarenas on the Pacific Coast; in

addition, a decline in breast cancer rates over time was observed for the Province of Cartago.

Prostate cancer was found to produce relatively high rates of death in Heredia and Limón, and relatively low mortality in Guanacaste and Puntarenas. In Limón, prostate cancer morbidity appeared over twice as high as in any other province.

Uterine cancer appears to have produced slightly higher mortality in Puntarenas and San José than in the other provinces, especially in 1966-1969, and in Puntarenas the rate clearly appeared to rise during the years studied. The provinces of Alajuela and Guanacaste generally

TABLE 2—Annual age-specific death and hospital discharge rates for cancer of the reproductive organs in Costa Rica, per 100,000, in 1956-1969.

Cancer site	Age group	Mortality per 100,000			Hospital discharges per 100,000		
		1956-60	1961-65	1966-69	1956-60	1961-65	1966-69
Breast <sup>a</sup>	15-24 years	-	-	-	1.2	0.3	0.6
	25-44 "	3.6	4.8	3.8	17.6	16.9	12.5
	45-64 "	18.8	20.3	23.6	58.9	52.8	69.2
	65 and over	42.9	43.6	46.9	75.4	64.9	77.4
Uterus <sup>b</sup>	15-24 years	0.8	1.0	0.7	2.6	2.1	2.3
	25-44 "	13.7	17.4	13.8	101.1	80.4	64.0
	45-64 "	81.8	81.9	59.8	220.2	234.8	190.1
	65 and over	116.2	124.4	123.1	179.1	208.0	233.6
Prostate	15-24 years	-	-	-	-	-	-
	25-44 "	0.3	0.1	0.5	0.2	0.1	0.9
	45-64 "	8.1	7.3	5.2	18.1	15.7	17.6
	65 and over	107.0	113.4	129.7	140.5	200.0	279.9

<sup>a</sup>Data for female population only.

<sup>b</sup>Cancers of all parts of the uterus are included in these data.

TABLE 3—Standardized ratios of provincial vs. national mortality and hospital discharge rates for cancer of the reproductive organs in Costa Rica (1956-1969).

Cancer site	Region and province	Deaths			Hospital discharges			
		1956-60	1961-65	1966-69	1956-60	1961-65	1966-69	
	Costa Rica	100	100	100	100	100	100	
Breast <sup>a</sup>	Central	San José	153	126	126	122	132	130
		Alajuela	71	116	97	115	103	95
		Cartago	125	91	64	100	80	87
		Heredia	133	113	141	100	82	106
	Pacific	Guanacaste	45	50	38	30	63	65
		Puntarenas	50	37	51	42	42	68
	Atlantic	Limón	117	53	128	139	114	43
Uterus <sup>b</sup>	Central	San José	114	95	116	110	96	93
		Alajuela	96	88	83	84	92	88
		Cartago	98	131	79	68	78	86
		Heredia	129	109	105	109	70	100
	Pacific	Guanacaste	40	75	66	85	103	91
		Puntarenas	95	100	122	112	144	155
	Atlantic	Limón	82	138	100	134	175	154
Prostate	Central	San José	118	109	102	101	110	86
		Alajuela	84	88	105	79	73	95
		Cartago	93	138	97	29	64	53
		Heredia	124	130	161	127	105	84
	Pacific	Guanacaste	52	20	35	92	62	52
		Puntarenas	70	64	66	57	35	77
	Atlantic	Limón	137	155	148	296	305	246

<sup>a</sup>Data for female population only.

<sup>b</sup>Including all parts of the uterus.

showed the lowest uterine cancer mortality. Rates of hospital discharges involving cancer of the uterus were highest in Puntarenas and Limón, and lowest in Alajuela and Cartago. A decline over time was observed in San José Province, and an increase was evident in Puntarenas. In general, however, the range of variation in uterine cancer among the seven provinces was small, and larger differences observed between the mountainous and Pacific Coast zones for stomach and other forms of cancer (17, 20) were not apparent.

## Discussion

A considerable variety of comparative methods have been used in the present study to assure that the conclusions arrived at will be as sound as possible. Nevertheless, this does not mean that all biases in the data have been eliminated. Almost by definition, most health-

related data are distorted to some extent. For this reason, only major variations have been considered in the foregoing presentation of results.

The use of hospital discharge information as a source of morbidity data does not permit us to obtain a true measure of either incidence or prevalence as these are traditionally defined. However, in the absence of a nationwide cancer registry or special incidence surveys, such data do permit us to estimate the magnitude of the problem posed by cancer of the reproductive organs. This particular source of data has previously been used in Chile to measure what Moroder, *et al.* termed "prevalence." For a number of compelling reasons, we have not used the same term in referring to the morbidity indices presented here.

At the same time, existence of mortality data have allowed us to examine cancer death rates in Costa Rica in terms of cancer mortality

in other countries. In turn, comparison of these mortality data with the hospital discharge information has reinforced some findings, opened others to question, and pointed up the need for special epidemiologic studies of cancer in Costa Rica.

With regard to cancer of the reproductive organs, the most important finding concerns the high incidence of uterine cancer in Costa Rica. Previous reports by Moya de Madrigal (19, 20) have shown it to be the most frequent site of cancer among Costa Rican women in the 25-64 age group, and the second most frequent among women 15 to 24 and over 64. In fact, even if both sexes and all ages are combined, cancer of the uterus is still the second most frequent cancer site in Costa Rica, exceeded only by the stomach. Comparison of uterine cancer rates in Costa Rica with rates in other countries, such as the comparison provided in Figure 1, also point up the nation's high rate of uterine cancer. Such comparisons of mortality are limited to cancer of the uterus in general, because the portion of the uterus affected is not specified for varying proportions of the deaths reported in each country. However, the cervix uteri is known to be the most frequent site of uterine cancer (9), and for that reason most epidemiologic studies have been done on cervical cancer.

The epidemiologic characteristics of cervical cancer are quite different from those of other uterine cancers; for instance, Kaiser, *et al.* (9) showed in 1958 that cervical cancer tends to occur earlier in life than cancer of the body of the uterus. Most studies suggest that populations with late average ages of first marriage and first coitus, a low remarriage rate, and a high rate of male circumcision tend to have low rates of cervical cancer (24). In addition, studies have shown that some factors associated with early first coitus and marital instability (illegitimate births, syphilis, multiple sexual partners, and prostitution) are also associated with a high frequency of cervical cancer (11). This is consistent with the higher incidence of cervical cancer observed among poor socioeconomic groups (24), where these factors are more

common. It also agrees with results from Iowa (Haenszel, *et al.*, 8), Oklahoma (Assal, *et al.*, 1) and Denmark (Clemmensen, *et al.*, 2) showing higher rates in urban areas than in rural ones, and with a finding by Kaiser, *et al.* (9) indicating that the highest rates tend to occur in the poorest sections of cities.

The results from the present study show that the highest standardized ratios for uterine cancer were found in the provinces of Puntarenas and San José, while the lowest were found in Alajuela, Cartago, and Guanacaste. Most of the Puntarenas population is concentrated in the seaports along the Pacific Coast (in the towns of Golfito, Puntarenas, and Quepos), and the San José population is concentrated mainly in the capital city (San José) and the surrounding metropolitan area. The people of Alajuela, Cartago, and Guanacaste are primarily involved in agriculture and cattle breeding, and most live in rural communities.

The first clear evidence that cancer of the uterus and cancer of the breast tend to have an opposite selectivity with respect to marital status was presented in 1842 by Rigoni Stern in Verona, and was later reported by Kaiser, *et al.* (9) in 1958. Many studies have since substantiated the observation that the risk of developing mammary carcinoma is inversely related to fertility (MacMahon, 13). Thus, an inverse relationship between mortality from breast cancer and mortality from cervical cancer, such as the one observed in Costa Rica, is to be expected.<sup>5</sup>

As evidence of Costa Rica's high birth rate, there were 216.3 births per 1,000 women in the 15-44 age group every year during the period 1961-1965. Theoretically, this high fertility could have largely accounted for the high rates of cervical cancer and the low rates of breast cancer reported. However, a breakdown by province shows that the birth rates were lowest in San José, Heredia, and Alajuela, and were highest in Guanacaste, Puntarenas, and Limón (see Table 4). Except for the case of Limón,

<sup>5</sup>For related information on breast cancer causes and trends, see page 259.

TABLE 4—Annual Costa Rican birth rates per 1,000 women in the 15-44 year age group, by province, in 1956-1969.

Province	1956-60	1961-65	1966-69
Costa Rica	239.7	216.3	197.5
Alajuela	243.9	251.8	201.9
Cartago	268.9	253.6	211.3
Guanacaste	299.2	313.1	253.3
Heredia	215.2	207.8	168.9
Puntarenas	297.1	284.1	251.8
Limón	268.5	270.3	256.7
San José	199.6	215.5	162.3

Sources: References 1, 3, and 10.

these birth rates coincide nicely with the observed geographic distribution of breast cancer; but they are not consistent with the observed distribution of uterine cancer in any province except Puntarenas.

These findings suggest that other factors besides fertility could be influencing the geographic distribution of uterine cancer in Costa Rica. Nevertheless, the noted decline in uterine cancer and the increase in breast cancer over the last four years studied could relate to the lower birth rate observed in this period (see Table 4). Also, the relatively low rates of breast and uterine cancer found in Guanacaste Province are likely to have resulted from a com-

parative lack of medical care in this region and an unusually large proportion of young people in the female population.

Twenty years ago, Dorn, *et al.* (7) reported an increased incidence of prostate cancer among the very old in the United States. This and subsequent reports (1, 10) showed higher prostate cancer mortality among nonwhites than among whites, indicated no significant change in urban versus rural mortality rates, and suggested an association with sexual practices and socioeconomic status.

The present study indicates that Costa Rica has a lower incidence of prostate cancer than most other countries; but the mortality and hospital discharge rates are increasing, a decline among those under 65 is more than matched by a rise among those 65 and over, and Limón Province has shown a marked rise compared to other parts of the country.

Former studies by Moya de Madrigal (19, 20) showed the prostate to be the second most common site of cancer in Costa Rican males over 65, exceeded only by the stomach. Since most of the nonwhite population of the United States is black, and most of Costa Rica's black population lives in Limón, the results cited appear consistent with the forementioned findings obtained from studies of prostate cancer in the United States.

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#### SUMMARY

This article analyzes deaths and hospital discharges involving cancer of the reproductive organs in Costa Rica during the period

1956-1969. The focus is on breast, prostate, and uterine cancer, since these three types account for virtually all of the known cases.

It is noted that while rates of breast and prostate cancer are very low in Costa Rica, very high rates of uterine cancer have been reported. There appears to be an opportunity for reducing these excessive rates, which have a particularly strong impact on those 45 and over, through special health programs.

The analysis also shows a six-year decline in mortality and hospital discharge rates for cancer of the cervix uteri. This progressive decline in cervical cancer, together with a rise in breast

cancer, runs parallel to a decline in fertility rates during the same period.

The observed rates of prostate cancer were very low, but a progressive rise was noted among those 65 and over. Both this time trend and the observed geographic distribution of prostate cancer in Costa Rica are in conformity with general epidemiologic features of prostate cancer described by studies made in the United States.

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