

# Epidemiology of Cancer of the Uterine Cervix in Costa Rica, 1980–1983<sup>1</sup>

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*A study was made of all cervical cancer cases that were entered in Costa Rica's National Register of Tumors for the period 1980–1983. The country's average rates of invasive and in situ cervical cancers in these years were 33.6 and 36.3 cases per 100,000 women, respectively.*

*The incidence of invasive cases varied notably in different geographic regions. The approximate cumulative risk of developing invasive cervical cancer by age 74 was 6.3% for women in certain very high risk areas as compared to 1.4% for those in certain low risk areas. Most of the very high risk areas were relatively inaccessible regions located far from the capital city of San José.*

*These findings suggest that the regional differences in the incidence of invasive cervical cancer resulted from better early detection of cervical cancers and precancerous states in the areas of lower risk. More extensive epidemiologic studies will be needed in order to determine the proper weight to assign such factors as race, promiscuity, socioeconomic level, and customs in the incidence and behavior of this cancer in Costa Rica.*

**R**ates of cancer of the uterine cervix vary considerably in different countries, and within a given country or population they often vary from one community to the next (1). The countries with the highest incidence of cervical cancer include several in Latin America for which good information is available. In Costa Rica, the incidence of invasive cervical cancer is high. Despite the fact that mortality from this cancer has declined over the last 20 years (2), as of the mid-1980s it was still the second cause of cancer deaths among women (3).

However, up to 1980 no epidemiologic studies had been carried out in Costa Rica to identify the groups at greatest

risk, the coverage of early detection programs, or the impact of the health services upon cervical cancer mortality. The work reported here identifies groups at relatively great risk for cervical cancer in Costa Rica, describes the possible impact of early detection in this regard, and compares rates of survival of cervical cancer patients.

## MATERIALS AND METHODS

Our study subjects included 1,052 patients with invasive cancer of the uterine cervix and 1,497 patients with cancer of the cervix in situ, these being all those with new cases of this type of cancer entered in the National Register of Tumors for the period 1980–1983. (Since 1977 the National Register of Tumors has been collecting basic information on all cancer patients in the country, and in 1980 it began storing a copy of the biopsy as well.)

The age-adjusted incidence of invasive

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cervical cancer was calculated relative to the overall population (4), both for Costa Rica and for each canton (province) in which the patients lived. Based on the calculated rates of invasive cervical cancer, regions with different levels of relative risk were established according to the following criteria:

- "Very high" risk areas: cantons with average annual incidences exceeding 50 cases per 100,000 women.
- "High" risk areas: cantons with incidences of 39 to 50 cases per 100,000 women.
- "Moderate" risk areas: cantons with incidences of 20 to 38 cases per 100,000 women.
- "Low" risk areas: cantons with incidences below 20 cases per 100,000 women.

For each of these areas the age-adjusted rate of invasive cervical cancer was calculated, together with the approximate cumulative risk run by women 64 and 74 years of age (4, 5). Also, the rates of invasive cancer were compared with those of cancer in situ by canton and risk area. The relative and observed rates of survival of invasive cervical cancer patients at one, two, and three years were calculated according to the methods of Hakulinen et al. and Ries et al. (6, 7).

The survival analysis excluded 108 cases for which the exact month of the cancer diagnosis was not known. Data on the site of the cancer and histologic diagnosis were included. However, it was not possible to determine the status of the cancer at the time of diagnosis, since that information was not included in the data supplied to the National Register of Tumors.

Multiple regression analysis was used to study possible relationships between certain socioeconomic and health indica-

tors in some of the cantons (infant mortality from diarrhea, availability of certain basic services such as latrines and drinking-water, education, fertility, and per capita income) and the incidences of invasive cervical cancer. These socioeconomic and health indicators were calculated by the National Planning Office (8) for 50 cantons in rural areas. An effort was also made to assess the possible correlation between the incidences of gonorrhea and invasive cervical cancer by canton (9).

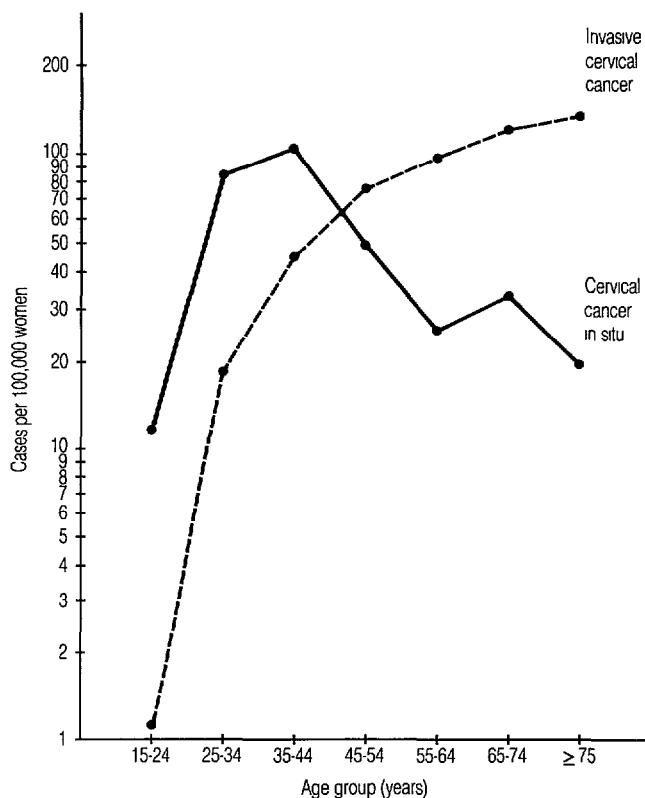
## RESULTS

Costa Rica recorded annual rates of invasive and in situ cervical cancer of 33.6 and 36.3 cases per 100,000 women, respectively, for the period 1980-1983. Age-specific calculations show that cervical cancer in situ attained its highest incidence in the 35-44 age group, while invasive cancer increased progressively with age (Figure 1, Table 1). Also, significant differences were found in cervical cancer incidence by canton.

When the regions of relative risk were grouped together as shown in Figure 2 and studied as new epidemiologic units, it was found that the approximate cumulative risk of developing invasive cervical cancer at 74 years of age was 6.3% in the very high risk areas and 1.4% in the low risk areas (Table 2). That is to say, in the absence of other causes of death, during 74 years of life a woman in the very high risk areas had one chance in 16 of developing invasive cervical cancer, while a woman in the low risk areas had one chance in 71.

Also, as Table 2 indicates, the ratio of invasive cancer incidence to in situ cancer incidence was found to be higher in the areas at greater risk. More specifically, the rates were higher for invasive cancer than for in situ cancer in 91% of the can-

**Figure 1.** Average annual age-specific incidence (cases per 100,000 women) of invasive and in situ cervical cancer in Costa Rica, 1980–1983.

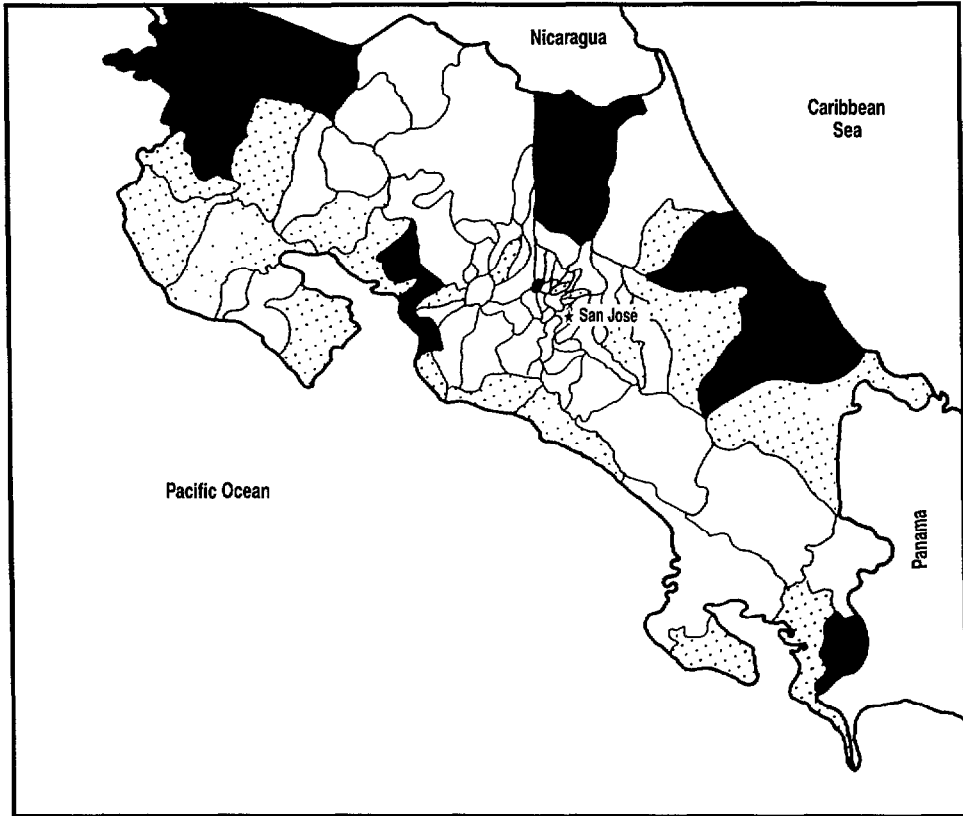


**Table 1.** Average annual incidence of invasive and in situ cervical cancer in Costa Rica, 1980–1983, by age group.




Age group (in years)	Cervical cancer in situ		Invasive cervical cancer	
	No. of cases	Average annual incidence per 100,000 women	No. of cases	Average annual incidence per 100,000 women
15–24	123	11.7	12	1.1
25–34	642	86.3	136	18.3
35–44	464	104.3	203	45.4
45–54	154	48.7	247	77.8
55–64	55	25.7	211	98.5
65–74	42	33.4	155	122.6
≥75	12	19.9	82	136.0
Unknown	5	—	6	—
All ages	1,497	36.3 <sup>a</sup>	1,052	33.6 <sup>a</sup>

<sup>a</sup>Incidence age-adjusted relative to the world population.

**Figure 2.** Geographic distribution by canton of areas of relative risk for invasive cervical cancer in Costa Rica, 1980–1983.



AREAS OF RELATIVE RISK

-  Very high (> 50 cases per 100,000 women per year)
-  High (39-50 cases per 100,000 women per year)
-  Moderate to low (< 39 cases per 100,000 women per year)

tons in the very high risk areas, 47% of those in the high risk areas, 37% of those in the moderate risk areas, and 10% of those in the low risk areas.

Among the patients with invasive cervical cancer, residence in different risk areas was not found to exert a significant influence upon rates of survival (Table 3).

Observed rates of survival and rates of survival relative to people without invasive cervical cancer, broken down by age

group, are shown in Table 4. In both "absolute" (observed) and relative terms, 86% of the patients survived more than one year, 77% more than two years, and 69% more than three. (The survival rate at four years is known only for women diagnosed in 1980, the rate for them being 65.5%.) As may be seen, the survival rate was found to vary considerably with age, being higher among younger women. Because mortality in the general pop-

**Table 2.** The cumulative risk of developing invasive cervical cancer during 64 and 74 years of life in Costa Rica, the average annual incidence of invasive cervical cancer adjusted for the world population's age distribution, and the ratio of invasive cervical cancer cases to cases of cervical cancer in situ, all by area of relative risk (see Figure 2), 1980–1983.

Relative risk	Cases of invasive cervical cancer	Cumulative risk (%)		Adjusted average annual incidence per 100,000 women	Ratio of invasive cases to in situ cases
		0–64 years	0–74 years		
Very high	139	4.2	6.3	58.7	2.0
High	256	2.9	4.5	42.2	0.9
Moderate	518	2.3	3.5	32.2	0.9
Low	59	0.9	1.4	13.0	0.5
Total	972 <sup>a</sup>	2.4	3.6	33.6	0.9

<sup>a</sup>Total does not include all of the 1,052 cases studied because in 80 cases the place of residence was unknown.

**Table 3.** Observed survival rates among 944 patients<sup>a</sup> with invasive cervical cancer residing in different areas of relative risk (see Figure 2), 1980–1983.

Relative risk	No. of deaths	Observed survival rates (%)		
		1 year	2 years	3 years
Very high	62	87	76	66
High	151	84	75	71
Moderate	249	87	78	67
Low	34	81	73	66

<sup>a</sup>Of the 1,052 invasive cervical cancer patients, 108 were excluded because the month of cancer diagnosis was unknown.

ulation increases with age, the relative survival rates were notably higher than the observed survival rates in the 55–64,

65–74, and over 74 age groups, even though the two rates were practically the same in the younger groups listed.

Of the 577 cases for which information was obtained on the site of invasive cancers, 62% were in the endocervix, 23% in the exocervix, and 14% in other areas of the cervix. Of all invasive cancers, 83.4% were carcinomas and 6% were adenocarcinomas.

Regarding possible correlations with other indicators, the distribution of invasive cervical cancer by relative risk areas was found to be associated with childhood mortality from diarrhea ( $r = 0.44$ ,  $p < 0.01$ ) and with the incidence of gonorrhoea ( $r = 0.30$ ,  $p < 0.01$ ). No statistically

**Table 4.** Survival rates among 944 patients<sup>a</sup> with invasive cervical cancer, showing the observed survival rates and the rates relative to people without invasive cervical cancer in Costa Rica, by age group, 1980–1983.

Age group (in years)	Observed survival rate (%)			Relative survival rate (%)		
	1 year	2 years	3 years	1 year	2 years	3 years
15–24	100	100	100	100	100	100
25–34	92	86	77	92	86	77
35–44	90	79	74	90	79	74
45–54	87	80	74	87	80	74
55–64	89	78	72	89	79	73
65–74	78	64	50	80	66	51
≥ 75	67	59	46	74	65	50
All ages	86	77	69	86	77	69

<sup>a</sup>Of the 1,052 invasive cervical cancer patients, 108 were excluded because the month of cancer diagnosis was unknown.

significant correlations were found with availability of such basic services as latrines and drinking-water, with education, with fertility, or with per capita income.

## DISCUSSION AND CONCLUSIONS

Costa Rica has health indexes that are generally similar to those found in the developed countries (10), and its mortality trends for the most frequent cancers are also similar (3). However, the incidence of invasive cervical cancer is very high, as is also the case in some other Latin American countries (11-14).

Costa Rica has no mass programs for early cervical cancer detection. For 20 years the public health institutions have routinely performed the Papanicolaou test on women seeking care from prenatal and family planning programs. Most of these women do not return for a Papanicolaou examination after leaving the programs. Also, there is a group of mainly older women who have never had this examination because such routines did not exist when they were of reproductive age. We have stated previously (15) that this could explain the relatively low death rates from cervical cancer in Costa Rican women under age 55 and the relatively high rates found in older women.

It is noteworthy, especially in view of Costa Rica's small size, that the probability of detecting invasive cervical cancer should vary so much from one area to another and that the ratio of invasive cancer to in situ cancer should be greater in the high-risk areas. These findings suggest that the regional differences in invasive cancer incidence are conditioned by early detection. Since an immediate aim of cervical cancer cytology is to detect preinvasive cases, unequal access to medical care would seem bound to influ-

ence the rates. In general, almost all the cantons with very high or high rates of invasive cervical cancer are located far from the capital and do not enjoy the same health services that are available in the central part of the country. As Jaramillo has previously pointed out, economic and health improvements in Costa Rica have not equally affected all the country's populations (10).

Childhood mortality from diarrhea in different cantons is an indicator of the socioeconomic level and health care in those cantons. The correlation between this factor and rates of invasive cervical cancer by canton was significant, at least with the methodology used. This supports the foregoing assertion that differences in health care and socioeconomic levels in the different cantons could be influencing the incidence of invasive cervical cancer. In addition, the small but significant correlation between the incidences of this type of cancer and of gonorrhea in the cantons suggests that factors favoring gonorrhea could also be affecting the etiology of cervical cancer—a connection has been found on other occasions (16).

We did not observe any significant differences in rates of cervical cancer survival in different areas of Costa Rica. This is probably due to the fact that once the cancer is diagnosed, all women receive essentially the same treatment at central hospitals.

More extensive epidemiologic studies are needed in order to know what relative weight to assign factors such as race, promiscuity, socioeconomic level, and customs in the incidence and behavior of this cancer in Costa Rica. In accordance with our results, it may be significant that the country's two major seaports, most of the black population, and the large banana and African palm plantations are all included within the cantons comprising the areas with the highest rates of inva-

sive cervical cancer. In general, it may be said that the regional differences in the risk of invasive cervical cancer in Costa Rica are probably due mostly to regional differences in health care coverage and the effectiveness of early detection programs. These differences most adversely affect populations whose members are most apt to experience low living standards, promiscuity, and early sexual activity.

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