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RECEIVED 14 August 2025

REVISED 15 December 2025

ACCEPTED 22 December 2025

PUBLISHED 15 January 2026

## CITATION

Apolo CJ, Almeida SV, García MF, Yu Y and  
Alexander-León HA (2026) Survival and  
socioeconomic factors in patients with  
cervical cancer undergoing palliative care: a  
retrospective cohort study.  
*Front. Cancer Control Soc.* 3:1656863.  
doi: 10.3389/fcacs.2025.1656863

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# Survival and socioeconomic factors in patients with cervical cancer undergoing palliative care: a retrospective cohort study

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**Introduction:** Social determinants of health influence outcomes in cervical cancer. This study aimed to characterize the socioeconomic factors affecting survival in patients with cervical cancer receiving palliative care.

**Material and methods:** We conducted a retrospective cohort study of 368 women who attended social work services at an oncology hospital in Quito, Ecuador, between 2017 and 2021. Descriptive statistics, bivariate analysis, Kaplan-Meier survival curves, and Cox regression models were applied.

**Results:** The median age was 52.5 years (IQR 45–65), with 46.5% identifying as mestizo and 46.5% as indigenous. Most patients (80.4%) had incomes below the basic salary, and the proportion of married individuals declined from 53.3% to 38.9% upon transition to palliative care. The average stay in palliative care was 46 days. Tertiary education was associated with a higher mortality risk (adjusted HR: 3.16; 95% CI: 1.51–6.60;  $p = 0.002$ ). In contrast, having children was linked to lower mortality risk (one child: HR 0.56; 95% CI: 0.31–0.99;  $p = 0.046$ ; two or more children: HR 0.47; 95% CI: 0.27–0.82). Patients with middle income had reduced mortality risk (HR: 0.71; 95% CI: 0.53–0.97;  $p = 0.032$ ). No significant differences in survival were observed based on ethnicity or province of residence.

**Conclusion:** Survival among cervical cancer patients in palliative care is short. Socioeconomic factors—particularly education, income, and family structure—significantly influence mortality. Integrating social support into cancer care is essential to improve health outcomes and equity in this population.

## KEYWORDS

educational status, neoplasms, palliative care, socioeconomic factors, uterine cervical neoplasms

## 1 Introduction

Worldwide, cervical cancer is the fourth most common cancer in women; approximately 604,000 new cases were diagnosed in 2020, and 342,000 women died from the disease (1). Ecuador has an incidence rate of 16 cases per 100,000 women, placing it in an intermediate position compared to other countries (2). The mortality risk from this cause is 8.2 cases per 100,000 women (2).

Ecuador is a country with a population of more than 18 million inhabitants, mostly female (100.6 women for every 100 men), where life expectancy at birth is 77.6 years (3). It has a Ten-Year Health Plan (2022–2031) whose main objective is to reduce inequalities and inequities in effective, universal and free access to the right to health, through an intersectoral and comprehensive approach to the social and environmental determinants of health (3, 4).

In developing countries, similar to Ecuador, a significant number of patients with cervical cancer are diagnosed in advanced stages of the disease, likely influenced by social determinants of health, both at the individual and collective levels. This limits treatment options to symptomatic and palliative approaches (5).

The World Health Organization (WHO) has launched a Global Initiative to expand preventive, screening, and treatment interventions to eradicate cervical cancer as a public health problem in the twenty-first century. However, the lack of public awareness about this disease is related to the lack of access to health programs promoted by national and international organizations aimed at its detection and prevention. Therefore, it has been considered a disease associated with sociodemographic contexts of poverty (6).

In Ecuador, with the support of the Pan American Health Organization, an HPV vaccination campaign was carried out in 2024 to cover approximately 595,000 girls and boys, in coordination with the Ministry of Public Health and the Ministry of Education, to achieve 90% vaccination coverage in girls (9–14 years old) and boys (9 years old) against HPV (7). This was the first time that boys were included in the immunization campaign, marking an important milestone in preventive health. In Ecuador, the HPV vaccine was included in the national vaccination schedule since 2014 for girls between 9 and 11 years old (8). In 2017, the National Strategy for Cancer Control was launched in Ecuador by the MSP, which includes among the prioritized neoplasia screening activities, screening in women aged 21–65 with Pap smears every 3 years, in women aged 30 to 65 and if possible, screening with cytology and molecular tests for HPV DNA every 5 years (9).

Regarding secondary prevention through screening tests, the MSP has established several campaigns, such as those carried out in March 2023 with the free provision of Pap smears at the Luz Elena Arismendi Pediatric Gynecology and Obstetrics Hospital of Nueva Aurora and genotyping at the Enrique Garcés General Hospital (10, 11).

Approximately 60% of cervical cancer cases are diagnosed at advanced stages, contributing significantly to the high morbidity and mortality rates in women from resource-limited settings (12). In Quito, the Ecuadorian capital, between 2015 and 2019, more than half (52%) of cervical cancer cases were diagnosed at stages III (26%) and IV (26%) (13). In Latin America, various barriers, such as a lack of education, lead to feelings of shame when it comes to detecting this type of cancer. Furthermore, in this context, there are difficulties in accessing vaccination and carrying out regular screening tests (14).

The focus is exclusively on improving detection and treatment, which has led to data from local and national registries and medical records containing very little information on sociodemographic data. This highlights the need for targeted interventions that address socioeconomic disparities to improve access to cervical cancer screening and treatment, thereby reducing the disease burden in vulnerable populations (6, 15, 16). The present study

aims to provide an overview of the relationship between survival and sociodemographic variables in women with cervical cancer receiving palliative care at the SOLCA Cancer Hospital in Quito during the study period.

The SOLCA-Quito Oncology Hospital is a specialized hospital serving as a local and regional referral center for cancer care. Located in Quito, the Ecuadorian capital, it has more than seven decades of experience in the management of oncological pathologies, treating patients referred from both the public and private healthcare systems (17).

## 2 Materials and methods

### 2.1 Study design

Retrospective cohort study of an anonymized prospective database (“Registro Cuidados Paliativos Trabajo Social” in REDCap—SOLCA Quito), following the guidelines of the STROBE declaration (Strengthening the Reporting of Observational studies in Epidemiology), for observational studies in epidemiology (18).

### 2.2 Data collection and participants

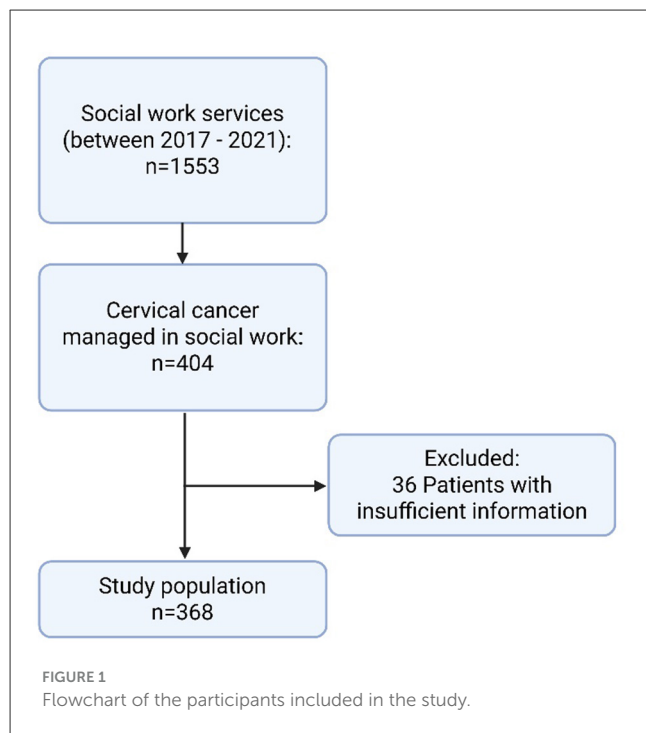
The sample selection was carried out through non-random consecutive sampling considering patients with cervical cancer in Palliative Care who attended the Social Work consultation at the SOLCA Oncology Hospital—Quito during the period from January 2017 to December 2021. The study was approved by the Human Research Ethics Committee with the code (2024-015).

### 2.3 Inclusion and exclusion criteria

Women diagnosed with advanced cervical cancer, over 18 years of age, referred for palliative care were included, and patients with incomplete data were excluded. Figure 1 shows the patient flowchart during the study period.

### 2.4 Variables

The primary outcome variable focused on survival (used to examine the time series to the event (19), in this case the time to death). In addition, a series of additional important variables were considered, including demographic factors such as age, ethnicity [referring to cultural factors such as language, religion, gastronomy, ancestry and nationality shared by specific communities or groups (20)], educational attainment (highest level of education achieved), type of health insurance, place of residence, religion, family structure, family income [based on unified basic wages received at the time of entry into the study, referred to as the wage that covers at least the basic needs of the worker and his or her family (21)], and marital status, occupational status both at the time of cervical cancer diagnosis and at the time of transfer to palliative care. Also included were the dates of diagnosis, transfer to palliative care (date on which care by the palliative care service began), and death, as well as the place of death. Although several socioeconomic



factors were considered, not all social determinants of health were addressed in the present study.

## 2.5 Statistical analysis

Data were summarized using the mean ( $\pm$ standard deviation [SD]) and median (interquartile range [IQR]) for quantitative characteristics according to their distribution and relative and absolute frequencies for qualitative variables.

Differences between death before and after 30 days of transfer to palliative care [cut-off selected based on previous literature (22)] and the characteristics of interest were calculated using the chi-square test, the Mann–Whitney *U*-test, and the Student *t*-test, as appropriate. For analytical tests, an alpha error level of 5% or less ( $p < 0.05$ ) was established as significant, with a confidence interval set at 95%.

Kaplan–Meier curves were used to represent survival, and the log-rank test was used to compare survival distributions in both groups. A multivariate Cox proportional hazards regression model was then fitted to assess the association between the main exposure and time to death, with time origin defined as the date of transition to palliative care. The model was adjusted for the following *a priori* selected sociodemographic covariates: ethnicity, educational level, marital status at the time of transition to palliative care, occupation, province of residence, number of children, household income, and place of death. Data analysis was performed using R software.

## 3 Results

A total of 368 patients participated, with a median age of 52.5 years (IQR 45–65) (Figure 1). 69.84% of the patients had completed

primary education, and 80.71% identified themselves as Catholic. The predominant ethnicities were mestizo and indigenous, with an equal percentage of 46.47%. Most participants had incomes below the basic salary (80.43%), and 44.29% lived with their partners and children, and 68.48% had three or more children. Most patients were referred by the Ministry of Public Health (86.96%) (Table 1).

The analysis of the association of socioeconomic variables with survival in patients with cervical cancer in Quito, Ecuador, is presented in Table 1. Although most of the variables evaluated did not show statistically significant associations, some important differences were observed. Income level was associated with survival ( $p < 0.05$ ). Likewise, age group and marital status showed significant associations with survival ( $p < 0.001$ ). Marital status at the time of transition to palliative care also showed a significant difference ( $p < 0.05$ ), with a change in the proportion of married patients (38.86%). Occupation at diagnosis was also significantly associated with survival ( $p < 0.05$ ), with similar groups in terms of those employed and those not employed (Table 2).

### 3.1 Marital status

The marital status of the women in the study was predominantly married (196, 53.26%), in a common-law union (95, 25.82%), single (6, 1.63%), and separated (6, 1.63%). Upon entering palliative care, only 143 (38.86%) were still married, while 98 (26.63%) remained in a common-law union, with a significant difference. In addition, 34 women (9.24%) separated, 38 (10.33%) became single, and 34 (9.24%) were widowed, with a significant difference (see Supplementary materials).

### 3.2 Survival

In the study population, the median time from referral to palliative care to death was 45 days (IQR 14–122.5), and from diagnosis to referral to palliative care was 420 days (IQR 203–707.5). No significant differences in survival were found based on ethnicity, education level, or marital status (Figure 2).

Cox regression analysis using the nested model with an epidemiological approach indicated that ethnicity, marital status, occupation, and province of residence were not significantly associated with mortality in patients with cervical cancer receiving palliative care. However, a higher educational level, especially tertiary education, was associated with a higher risk of mortality (adjusted HR: 3.16; 95% CI: 1.51–6.60;  $p = 0.002$ ). On the other hand, having children appears to be a protective factor, since patients with one or more children have a lower risk of mortality compared to those without children (adjusted HR for one child: 0.56; 95% CI: 0.31–0.99;  $p = 0.046$ ; adjusted HR for two or more children: 0.47; 95% CI: 0.27–0.82;  $p = 0.008$ ). Furthermore, patients with middle-income income had a lower risk of mortality compared with those with low incomes (adjusted HR: 0.71; 95% CI: 0.53–0.97;  $p = 0.032$ ). Finally, the place of death did not show a significant association with mortality (Table 3).

TABLE 1 General characteristics of the study population (N = 368).

Variables	Total population (N = 368)	Survival in palliative care		p-value (X <sup>2</sup> )
		≤30 days (n = 151)	>30 days (n = 217)	
Age, years (median [IQR])	52.50 (45.00–65.00)	51.00 (45.00–63.00)	54.00 (45.00–67.00)	0.229*
<b>Ethnicity (n [%])</b>				
Mestizo	171 (46.47)	68 (45.03)	103 (47.4)	0.819
Indigenous	171 (46.47)	71 (47.02)	100 (46.08)	
Black	26 (7.07)	12 (7.95)	14 (6.45)	
<b>Type of insurance (n [%])</b>				
MSP	320 (86.96)	131 (86.75)	189 (87.10)	1,000
IESS	43 (11.68)	18 (11.92)	25 (11.52)	
ISSPOL	4 (1.09)	2 (1.32)	2 (0.92)	
ISSFA	1 (0.27)	0 (0)	1 (0.46)	
<b>Marital status at the time of diagnosis (n [%])</b>				
Married	196 (53.26)	82 (54.30)	114 (52.53)	0.072
Domestic partnership	95 (25.82)	35 (23.18)	60 (27.65)	
Single	38 (10.33)	19 (12.58)	19 (8.76)	
Widow	30 (8.15)	8 (5.30)	22 (10.14)	
Separate	6 (1.63)	5 (3.31)	1 (0.46)	
Divorced	3 (0.82)	2 (1.32)	1 (0.46)	
<b>Marital status at entry to palliative care (n [%])</b>				
Married	143 (38.86)	60 (39.74)	83 (38.25)	0.285
Separate	98 (26.63)	41 (27.15)	57 (26.27)	
Single	38 (10.33)	19 (12.58)	19 (8.76)	
Domestic partnership	34 (9.24)	10 (6.62)	24 (11.06)	
Widow	34 (9.24)	10 (6.62)	24 (11.06)	
Divorced	21 (5.71)	11 (7.28)	10 (4.61)	
<b>Education level (n [%])</b>				
Elementary school	257 (69.84)	97 (64.24)	160 (73.73)	0.010
High school	50 (13.59)	26 (17.22)	24 (11.06)	
None	47 (12.77)	17 (11.26)	30 (13.82)	
College or university	11 (2.99)	9 (5.96)	2 (0.92)	
Graduate School	3 (0.82)	2 (1.32)	1 (0.46)	
Employed at the time of diagnosis (n [%])	187 (50.82)	87 (57.62)	100 (46.08)	0.034
Head of household (n [%])	125 (33.97)	58 (38.41)	67 (30.88)	0.146
<b>Religion (n [%])</b>				
Catholic	297 (80.71)	124 (82.12)	173 (79.72)	0.365
Evangelical	66 (17.93)	27 (17.88)	39 (17.97)	
Jehovah's Witness	1 (0.27)	0 (0)	1 (0.46)	
None of the above	4 (1.09)	0 (0)	4 (1.84)	
<b>Province of residence (n [%])</b>				
Saw	304 (82.61)	131 (86.75)	173 (79.72)	0.202
Coast	50 (13.59)	15 (9.93)	35 (16.13)	

(Continued)

TABLE 1 (Continued)

Variables	Total population (N = 368)	Survival in palliative care		p-value (X <sup>2</sup> )
		≤30 days (n = 151)	>30 days (n = 217)	
East	14 (3.80)	5 (3.31)	9 (4.15)	
<b>Household structure (n [%])</b>				
Lives with his own family (spouse and children)	163 (44.29)	65 (43.05)	98	0.393
He lives with his own children.	142 (38.59)	56 (37.09)	86 (39.63)	
He lives with his parents and his own children.	23 (6.25)	11 (7.28)	12 (5.53)	
He lives alone	15 (4.08)	8 (5.30)	7 (3.23)	
Lives alone with his spouse	10 (2.72)	2 (1.32)	8 (3.69)	
He lives alone with his parents	9 (2.45)	6 (3.97)	3 (1.38)	
He lives alone with his siblings.	5 (1.36)	3 (1.99)	2 (0.92)	
Lives with adoptive parents or legal guardian.	1 (0.27)	0 (0)	1 (0.46)	
<b>Number of children (n [%])</b>				
≥3	252 (68.48)	91 (60.26)	161 (74.19)	0.006
1–2	100 (27.17)	49 (32.45)	51 (23.50)	
None	16 (4.35)	11 (7.28)	5 (2.30)	
<b>Household income level (n [%])</b>				
Low (less than a unified basic salary)	296 (80.43)	125 (82.78)	171 (78.80)	0.131
Medium (between one and two unified basic salaries)	58 (15.76)	18 (11.92)	40 (18.43)	
High (three or more unified basic salaries)	14 (3.80)	8 (5.30)	6 (2.76)	
<b>Place of death (n [%])</b>				
Home	296 (70.43)	110 (72.85)	186 (85.71)	<0.001
SOLCA Hospital	50 (13.59)	33 (21.85)	17 (7.83)	
Other Hospital	22 (5.98)	8 (5.30)	14 (6.45)	

\*Mann–Whitney U-test. IESS, Ecuadorian Social Security Institute; ISSFA, Social Security Institute of the Armed Forces; ISSPOL, Social Security Institute of the National Police; MSP, Ministry of Public Health; IQR, Interquartile Range; SOLCA, Sociedad de Lucha Contra el Cáncer.

## 4 Discussion

Although racial and ethnic disparities in cervical cancer incidence and mortality have been widely documented globally, our study suggests that, in this Ecuadorian palliative care cohort, socioeconomic and demographic factors, such as educational level, income, and parity, may play a more prominent role in shaping survival outcomes than ethnicity itself. These findings highlight the importance of addressing social determinants of health when designing care and support strategies for women with advanced cervical cancer.

According to the results obtained, although factors such as ethnicity, marital status, and province of residence do not significantly influence mortality in patients with cervical cancer in palliative care, educational levels appear to be an important risk indicator. Contrary to the well-established protective effect of higher education on health outcomes globally, our study found that women with tertiary or higher education had a significantly higher risk of mortality (aHR: 3.16; 95% CI: 1.51–6.60). This counterintuitive finding may be explained by several

context-specific factors. First, patients with higher education in our cohort were more frequently diagnosed at advanced stages (III–IV), possibly due to delayed help-seeking behavior. In Ecuador, women with higher socioeconomic status, often correlated with education, may initially consult private providers where diagnostic pathways for cancer are fragmented or lack integration with public screening programs, leading to delays in definitive diagnosis and referral to specialized oncology centers. In contrast, women from lower-income backgrounds are typically channeled directly through the MSP system, where cervical cancer screening and referral protocols are more standardized, albeit resource-constrained.

Second, our data suggest that tertiary-educated patients had a higher burden of comorbidities. While higher education generally improves health literacy, it may also increase awareness of prognosis in advanced disease, potentially influencing decisions to forgo aggressive treatments or transition earlier to palliative care, though this requires further qualitative exploration.

Importantly, the small number of highly educated women in our sample limits generalizability and may reflect selection bias, as this group is underrepresented in public hospitals in Ecuador.

**TABLE 2** Socioeconomic variables in patients with cervical cancer in palliative care and their association with survival from entry to palliative care until death (*N* = 368).

Variable	Total <i>N</i> = 368 [ <i>n</i> (%)]	<i>p</i> -value*
<b>Education</b>		0.183
Without Education	304 (82.61)	
With Education	64 (17.39)	
<b>Ethnicity</b>		0.361
Indigenous	171 (46.47)	
Mestizo	171 (46.47)	
Black	26 (7.07)	
<b>Income</b>		0.045
Low	296 (80.43)	
Medium to High	72 (19.57)	
<b>Number of Children</b>		0.102
3 or More	252 (68.48)	
1–2	100 (27.17)	
Has no children	16 (4.35)	
<b>Age Group (years)</b>		<0.001
21–30	9 (2.45)	
31–40	50 (13.59)	
41–50	104 (28.26)	
51–60	75 (20.38)	
61–70	60 (16.30)	
>70	70 (19.02)	
<b>Convention Class</b>		0.364
MSP	320 (86.96)	
IESS	43 (11.68)	
ISSPOL	4 (1.09)	
ISSFA	1 (0.27)	
<b>Marital status at cervical cancer diagnosis</b>		<0.001
Married	196 (53.26)	
Free Union	95 (25.82)	
Single	38 (10.33)	
Widower	30 (8.15)	
Separate	6 (1.63)	
Divorced	3 (0.82)	
<b>Marital status upon transfer to palliative care</b>		0.002
Married	143 (38.86)	
Separate	98 (26.63)	
Single	38 (10.33)	
Free Union	34 (9.24)	

(Continued)

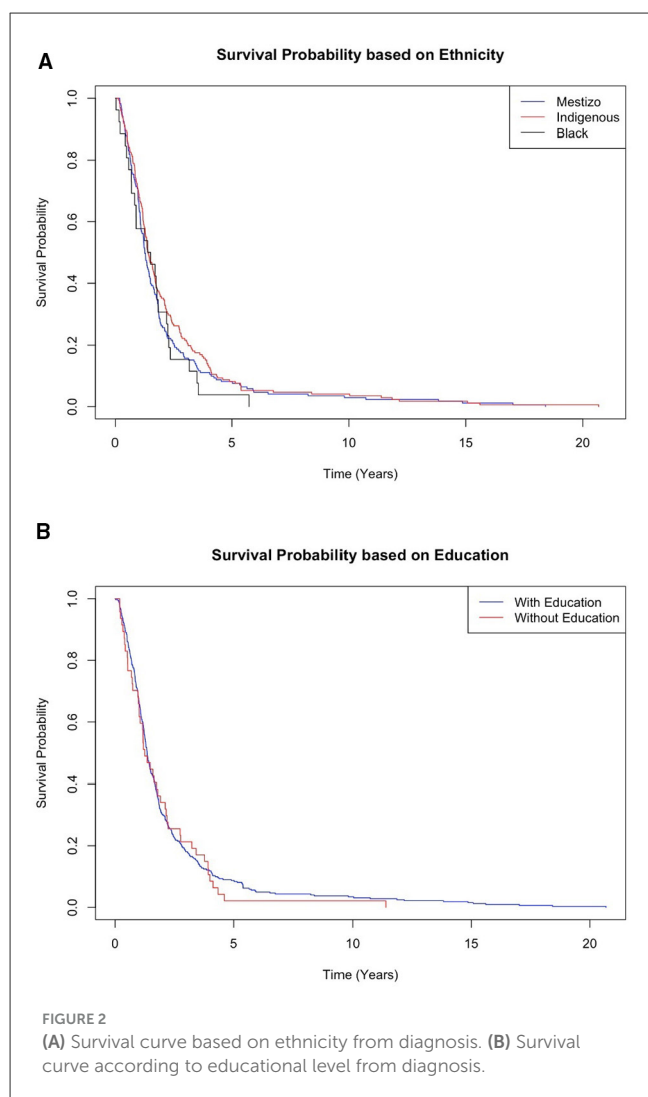
**TABLE 2** (Continued)

Variable	Total <i>N</i> = 368 [ <i>n</i> (%)]	<i>p</i> -value*
Widower	34 (9.24)	
Divorced	21 (5.71)	
<b>Province of residence</b>		0.210
Saw	304 (82.61)	
Coast	50 (13.59)	
East	14 (3.80)	
<b>Occupation at the date of diagnosis</b>		0.026
Yeah	187 (50.82)	
No	181 (49.18)	
<b>Female head of household</b>		0.111
No	243 (66.03)	
Yeah	125 (33.97)	
<b>Religion</b>		0.578
Catholic	297 (80.71)	
Evangelical	66 (17.93)	
Jehovah's Witness	1 (0.27)	
None	4 (1.09)	
<b>Family structure</b>		0.250
Lives with Family (Partner and Children)	163 (44.29)	
Lives with Children	142 (38.59)	
Lives with parents and children	23 (6.25)	
He lives alone	15 (4.08)	
Lives with a partner	10 (2.72)	
Lives with parents	9 (2.45)	
Lives with siblings	5 (1.36)	
Lives with in-laws	1 (0.27)	
<b>Place of death</b>		0.266
Home	296 (80.43)	
SOLCA Hospital	50 (13.59)	
Other Hospital	22 (5.98)	

\*Log Rank Test. IESE, Ecuadorian Social Security Institute; ISSFA, Social Security Institute of the Armed Forces; ISSPOL, Social Security Institute of the National Police; MSP, Ministry of Public Health; SOLCA, Sociedad de Lucha Contra el Cáncer.

Nevertheless, this finding underscores that the relationship between education and cancer outcomes is not uniform across health systems and may be modified by access pathways, cultural norms, and care fragmentation, particularly in mixed public-private systems like Ecuador's.

Furthermore, having children is associated with a lower risk of mortality, which could reflect a protective psychosocial factor that improves patients' quality of life. Income also influences mortality risk, with those with average income experiencing better outcomes compared to low-income patients.



One of the main findings is that we did not find a significant difference between mestizos and indigenous people in terms of survival in patients from the diagnosis of cervical cancer to the transfer to palliative care and from palliative care to death (23), it may be related to other barriers in vulnerable populations such as lack of knowledge, stigmatization, cultural beliefs and values, religion and lack of resources as limitations to undergo cervical cancer screening prevention (24–27). In the United States, cervical squamous cell carcinoma incidence is higher among African-American and Hispanic women than among non-Hispanic white women (28).

In our cohort, a pattern of reduced partner involvement or support was observed around the time of transition to palliative care, a phenomenon consistent with findings from Fugmann et al.'s systematic review, which reported an increased risk of relationship dissolution among women with cervical cancer. This could be attributed to various factors associated with advanced stages of the disease, such as changes in sexuality, including vaginal shortening and narrowing, dyspareunia, and sexual concerns. Furthermore, patients face increased demands for end-of-life care (29, 30). These changes in sexual life also represent a significant challenge for these patients' male partners (29–32).

The time to initiate palliative care in patients with cervical cancer was approximately 2 years, suggesting that these patients were in advanced stages of the disease. This finding is consistent with data reported from the SOLCA Quito National Tumor Registry, which indicates late diagnosis, with approximately 52% of cases in stages III and IV cervical cancer, implying that these patients require highly specialized treatments. Furthermore, disparities in access to medical care and screening may contribute to differences in cancer stage at diagnosis (33).

The average age of most patients was 50 years; however, 19% of the study population was 71 years or older, which is consistent with studies showing changes in the age at which cervical cancer is diagnosed over the years. According to population data from Ecuador, the proportion of women aged 70 years or older is 6.3% (544,197 women) (34). Considering that the recommended age to stop screening for this cancer varies between 50 and 70 years worldwide, it is necessary to reflect on the possibility of modifying these indications (35, 36). Cervical screening in women around 50 years of age is essential to reduce mortality from cervical cancer in later life. Furthermore, participation in screening programs can significantly influence the reduction of mortality risk (37).

Socioeconomic disparities influence both the incidence and mortality of cervical cancer. In our study, most patients had limited financial means, evidenced by incomes equivalent to a basic food basket. A systematic review found that women from lower socioeconomic levels have worse survival rates, which is consistent with our findings (38). Our study also revealed that most patients were referred by the Ministry of Public Health (MSP), with no private care patients registered, which could be related to the high costs of specialized treatments for advanced cancer.

On the other hand, patients who had more children had higher survival rates, and we believe this is because they were able to provide care to the mother during her final stages and offer her emotional support, which could positively influence the improvement in survival (39, 40). Furthermore, the quality of women's relationships has been shown to be important for their health.

Most patients died at home, which correlates with several studies indicating that cancer patients' preference to die at home is influenced by factors such as family support, quality of home care, and the match between patient and family preferences (41–44). However, few centers in Ecuador provide this care, making the implementation of home-based palliative care, provided by a specialized team, necessary. This is essential to improve patients' quality of life, maximize the use of health resources, and support caregivers, all while respecting the patient's preference to receive care in their home environment (45–47).

In Ecuador, human papillomavirus (HPV) vaccination began in 2014, and HPV genotyping and vaccination for men have recently been implemented in May 2024 (48). The government and non-governmental organizations have worked together to raise awareness about cervical cancer and its early detection. However, strategic decisions will not completely eliminate the barriers to early detection and the low rate of cervical cancer diagnosis in vulnerable populations. It is equally crucial to understand the knowledge gaps, as well as the attitudes, beliefs, educational, and cultural obstacles faced by these groups.

**TABLE 3** Hazard Ratios for mortality according to socioeconomic variables in patients with cervical cancer in palliative care (from entry to palliative care) ( $N = 368$ ).

Variable	Category	Unadjusted HR (95% CI)	p-value	Adjusted* HR (95% CI)	p-value
Ethnicity	Mestizo (Reference)	–	–	–	–
	Black	1.04 (0.67–1.59)	0.873	0.93 (0.59–1.45)	0.742
	Indigenous	0.93 (0.75–1.16)	0.536	0.97 (0.78–1.22)	0.811
Level of Education	Uneducated/Illiterate (Reference)	–	–	–	–
	Primary	1.11 (0.81–1.54)	0.508	1.08 (0.78–1.51)	0.636
	Secondary	1.45 (0.96–2.17)	0.076	1.35 (0.87–2.10)	0.181
	Third level	3.54 (1.81–6.91)	0.001	3.16 (1.51–6.60)	0.002
	Fourth level	2.13 (0.51–8.82)	0.296	2.50 (0.52–12.14)	0.255
Marital status	Married (Reference)	–	–	–	–
	Divorced	1.41 (0.89–2.24)	0.140	1.11 (0.66–1.85)	0.697
	Separate	0.89 (0.69–1.16)	0.393	0.82 (0.62–1.10)	0.192
	Single	1.21 (0.85–1.74)	0.291	0.95 (0.64–1.41)	0.788
	Free Union	0.72 (0.49–1.06)	0.098	0.71 (0.47–1.06)	0.096
	Widower	1.03 (0.71–1.50)	0.874	1.14 (0.77–1.69)	0.509
Occupation at diagnosis	Busy (Reference)	–	–	–	–
	Not occupied	0.87 (0.71–1.07)	0.187	0.86 (0.68–1.09)	0.223
Province of Residence	Sierra (Reference)	–	–	–	–
	Coast	0.96 (0.71–1.30)	0.794	1.01 (0.73–1.40)	0.941
	East	0.90 (0.53–1.54)	0.708	0.89 (0.51–1.57)	0.688
Number of Children	None (Reference)	–	–	–	–
	1 child	0.53 (0.31–0.91)	0.021	0.56 (0.31–0.99)	0.046
	2 or more children	0.42 (0.25–0.70)	0.001	0.47 (0.27–0.82)	0.008
Family Economic Income	Low income (Reference)	–	–	–	–
	Media resources	0.79 (0.59–1.05)	0.108	0.71 (0.53–0.97)	0.032
	Good resources/> 3 basic salaries	1.25 (0.71–2.17)	0.438	0.79 (0.40–1.55)	0.492
Place of Death	SOLCA Hospital (Reference)	–	–	–	–
	Other hospital	0.68 (0.41–1.14)	0.144	0.60 (0.35–1.02)	0.059
	Home	0.86 (0.62–1.19)	0.359	0.84 (0.59–1.19)	0.334

CI, Confidence Interval; HR, Hazard ratio; SOLCA, Sociedad de Lucha Contra el Cáncer. \*Adjustment variables: ethnicity, educational level, marital status at the time of transition to palliative care, occupation, province of residence, number of children, income, place of death.

In Ecuador, access to palliative care has been improving in recent years, with the creation of the National Palliative Care Policy in 2022 and the approval of the Organic Law on Palliative Care in October 2024 (49, 50).

Our findings underscore the critical role of socioeconomic determinants, particularly income level, educational attainment, and family support, in shaping survival outcomes among women with cervical cancer receiving palliative care in Ecuador. These insights carry direct implications for the National Cervical Cancer Control Program and the recently established National Palliative Care Policy. First, the observed association between low income and poorer survival highlights the urgent need to strengthen financial protection mechanisms and ensure equitable access to timely diagnosis and treatment, especially for women from

vulnerable socioeconomic backgrounds. Second, the protective effect of having children suggests that family-centered care models should be integrated into palliative services, leveraging informal caregiving networks while providing them with formal training and psychosocial support. Third, given that most patients were diagnosed at advanced stages and referred late to palliative care, the program should prioritize strategies to reduce diagnostic delays, such as community-based screening outreach, culturally sensitive health education, and the integration of palliative care earlier in the disease trajectory. Finally, the high proportion of patients dying at home, coupled with the limited availability of home-based palliative services, calls for the rapid scaling up of community palliative care teams, as envisioned in the Organic Law on Palliative Care (2024). Implementing these evidence-informed actions could significantly

improve equity, quality of life, and survival for women with cervical cancer in Ecuador.

Our study has several limitations that should be considered when interpreting the findings. First, the retrospective design and single-center setting, restricted to a public hospital in Pichincha province, introduce selection bias and limit the external validity of our results. The sample predominantly included women referred by the MSP, with no representation from private healthcare sectors, which may skew the cohort toward lower-income populations and underrepresent women with different socioeconomic profiles or access pathways. More importantly, this geographic and institutional constraint restricts our ability to capture the full heterogeneity of social determinants of cervical cancer across Ecuador's diverse regions, including Indigenous communities in the Amazon, Afro-Ecuadorian populations on the coast, and rural highland groups, each of which faces distinct structural, cultural, and systemic barriers to prevention, diagnosis, and palliative care. Consequently, while our findings offer valuable insights into the role of income, education, and family support in one urban context, they may not fully reflect the complex interplay of social determinants operating in other sociocultural or geographic settings within the country.

## Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

## Ethics statement

The studies involving humans were approved by Comité de Ética de Investigación en Seres Humanos (CEISH)—Hospital San Francisco, Quito, Ecuador. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

## Author contributions

CA: Investigation, Conceptualization, Writing – original draft, Supervision, Writing – review & editing, Validation, Project administration, Data curation, Visualization, Methodology. SA: Writing – original draft, Project administration, Conceptualization, Writing – review & editing, Methodology, Investigation. MG: Writing – review & editing, Visualization, Formal analysis, Software, Conceptualization, Methodology, Supervision, Data curation, Investigation, Resources. YL: Conceptualization,

Investigation, Formal analysis, Software, Data curation, Writing – original draft. HA–L: Investigation, Software, Writing – review & editing, Writing – original draft, Supervision, Visualization, Data curation, Validation, Resources, Methodology, Formal analysis, Project administration.

## Funding

The author(s) declared that financial support was not received for this work and/or its publication.

## Acknowledgments

We acknowledge SOLCA Núcleo de Quito for their support in the development of this study.

## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The author(s) declared that generative AI was not used in the creation of this manuscript.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcacs.2025.1656863/full#supplementary-material>

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