ORIGINAL RESEARCH ARTICLE

Estimates of Survival and Incidence of Cervical Cancer in Loei Province, Thailand, For 2017-2022: Preliminary Results

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ABSTRACT

Background: Cervical cancer (CC) is a leading cause of cancer-related death among women worldwide, yet regional incidence and survival trends in Thailand are under-documented. This study aimed to estimate the incidence and survival rates of CC in Loei Province, Thailand.

Methodology: This retrospective cohort study analyzed data from 228 CC patients diagnosed between 2017-2022, from the Loei Population-Based Cancer Registry. Survival rates were estimated using the Kaplan-Meier method, while age-standardized incidence rates (ASR) and trends were evaluated using Joinpoint Regression.

Results: The 5-year overall survival rate for CC was 51.1%. The overall age-standardized incidence rate (ASR) was 10.0 per 100,000 person-years. A statistically non-significant decreasing trend was observed during the study period Annual Percent Change (APC) = -0.97%.

Conclusions: The 5-year overall survival for cervical cancer was 51.1%. The decreasing age-standardized incidence rate (ASR) suggests the positive impact of long-standing public health interventions, such as HPV vaccination and screening policies. Continued monitoring of incidence trends and strengthening cancer registry coverage are crucial for enhancing future cancer control programs in Thailand.

Keywords: Cervical cancer, Survival, Cancer registry

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INTRODUCTION

Cervical cancer (CC) is the leading cause of death and is the fourth most common cancer in women worldwide. In 2022, there were an estimated 662,301 new CC cases and 348,874 deaths.[1] Cervical cancer remains a significant public health concern in low- and middle-income countries, which is the most diagnosed cancer and the leading cause of cancer death in most of these countries, mainly found in Africa and Asian region.[2] The leading cause of CC is persistent infection with high-risk types of Human Papillomavirus (HPV), a widespread family of viruses transmitted through sexual contact.[3] In Southeast Asia, CC was the second most common cancer in 2022, with an age-standardized rate (ASR) of 17.4 per 100,000, and the age-standardized mortality rate (ASMR) was 9.5per 100,000.[1]

In a monograph on the status of Cancer in Thailand in 2016-2018, CC was the fifth most common cancer in Thai females. Rojanamatin et al found that the ASR of CC in Thailand was 11.1 per 100,000 population.[4] In Cancer in Thailand (vol. I-IX), the respective ASR of CC in the past since the year 1988-2015 was 18.9, 20.9, 19.7, 24.7, 18.1, 17.7, 16.7, 14.4, and 11.7 per 100,000 population.[5-13] Thus, it can be concluded that the ASR of CC has been decreasing in Thailand.

Reviewing studies on the Average Annual Percent Change (APC) for cervical cancer in Thailand reveals a decreasing trend in several regions. A study in Khon Kaen found a decline after 2008 (APC -8.0%)[14], while in Songkhla, the trend reversed after 2000 (APC -4.7%)[15]. Likewise, northern Thailand experien -ced a decrease with an APC of -2.3%[16].

The World Health Organization (WHO) Director-General has called for global action to eliminate CC. The target incidence rate is ≤4 per 100,000 women worldwide through the triple-intervention strategy of 1) vaccinating 90% of all girls by the age of 15 years, 2) screening 70% of women twice in the age range of 35-45 years, and 3) treating at least 90% of all precancerous lesions detected during screening.[17]

Since 2002, the Thai Ministry of Public Health (MOPH) and the Thai National Health Security Office (NHSO) have implemented a nationwide systematic screening program for women aged 30-60 years with a 5-year interval under a national universal coverage scheme.[18] Currently, Thailand offers three methods for CC screening: 1) cervical cytology, 2) HPV DNA testing, and 3) visual inspection with acetic acid (VIA).[2] The MOPH currently recommends HPV vaccination for girls aged 11-20 years.[19]

Although the national incidence of cervical cancer (CC) in Thailand has been decreasing[4,20], this overall trend may mask regional variations, as province-level data on CC incidence remains limited. Loei Province, an area in upper northeastern Thailand with approximately 640,000 residents, is one such region with no published incidence data. This knowledge gap is particularly noteworthy given the province's current screening landscape. In 2023, local screening data for women aged 30-60 showed a heavy reliance on Pap Smear (76.61% coverage), while HPV DNA test coverage was significantly lower (12.82%), this study aims to study the incidence of CC and survival rate among CC patients in the Loei Province, Thailand. A primary objective was to identify significant prognostic factors, with the hypothesis that variables such as marital status and an early-stage diagnosis are positively associated with patient survival.

METHODOLOGY

Data sources: We conducted an analytical retrospective cohort study. Cervical cancer data were extracted from the Loei Population-Based Cancer Registry (LPBCR) using the Thai Cancer-based Program (TCB) under the National Cancer Institute of Thailand (NCI). Between January 1, 2017, and December 31, 2022, 228 patients were diagnosed using the International Classification of Diseases for Oncology, 3rd edition (ICD-O-3). Code C53.0, C53.1, C53.8, C53.9[21]. Patient information included age, date of birth, year of diagnosis, basis of diagnosis, and histology[22].

The patients were followed up until December 31, 2023, to ascertain their vital status. The status was obtained by linking records from (1) the Mortality Registry of Thailand and the National Statistical Office. The vital status of each patient (alive, dead) included the date last seen and the cause of death.

Population denominators: The Office of the National Economic and Social Development Council provided population denominators for calculations from 2010 to 2040[23]. The period of 2017-2022, the average annual female population was approximately 275,890. The age-adjusted CC incidence was standardized to the world population proposed by Segi (1960) and later modified by Doll (1976)[24,25].

Inclusion criteria: Patients diagnosed by a physician with cervical cancer, recorded in the Loei Population-Based Cancer Registry between January 1, 2017, and December 31, 2022.

Exclusion criteria: Patients diagnosed by a physician with cervical cancer who also had cancer at other sites (multiple primaries).

Statistical analysis

Descriptive epidemiology of study patients: The patient characteristics were summarized using descriptive statistics. Continuous data were analyzed using means, standard deviations, medians, and ranges (minimum and maximum values), whereas categorical variables were analyzed using frequency counts and percentages.

Incidence analysis: Age-standardized rates (ASRs) were calculated for 16 different age groups (0-4, 5-9,

…, 70-74, and 75+). Incidence rates were presented in cases per 100,000 by Segi (1960) and later modified by Doll (1976)[24,25].

Survival analysis: Survival analyses excluded cases if their basis of diagnosis was Death-certificate-only (DCO) or unknown; if they did not contain any follow-up information; or, if they had an unknown vital status. Survival assessments to ascertain their vital status. The status was obtained by linking records from the National Statistics Office in Thailand. The analysis rates were done using Stata release 10 (StataCorp LLC, College Station, TX, USA)[26]. The survival rate was estimated using the Kaplan-Meier method, the survival rate and 95% confidence intervals (CIs) were reported[27].

Trends analysis: We analyzed trends in incidence using the Joinpoint Regression Program version 4.9.1.0 (2023). Joinpoint regression determines the annual percentage change (APC) of incidence rates within each statistically significant trend interval. This technique was developed by the statistical research and application branch of the US National Cancer Institute (NCI). It is used to analyze the patterns in CC incidence rates, identify where a significant change in the linear slope of trends occurs, and determine the APC 95% confidence interval (CI)[28].

Missing data were addressed through a systematic review of the original patient medical records. The research team revisited these charts to abstract and complete any missing information, thereby minimizing potential information bias.

Ethical considerations: This study was approved by the Khon Kaen University Ethics Committee for Human Research (reference no. HE662211).

RESULTS

Descriptive epidemiology and baseline characteristics: A total of 228 cervical cancer (CC) cases were identified in Loei Province between 2017 to 2022 from a cumulative 1,655,342 person-years at risk. The mean age of diagnosis was 53.4 years (S.D. =12.8 years), with a median of 54.0 years (Min-Max: 24-100 years). The age group with the largest number of cases was 55-59 years (n= 41, 18.0%), with the highest number in 2018 (n= 9, 25.7%) and the lowest in 2021 (n= 4, 13.3%). The mean age at the time of diagnosis was high. Cytopathology evidence was primarily used for diagnosis. The most common stage of disease was 'Unknown staging' between 2017 and 2022 (n = 85, 37.3%). The 'Endocervix' was diagnosed site in 2018 (n= 3, 8.6%), 2022 (n= 3, 8.3%), 2017 (n= 3, 7.7%) and 2019 (n= 1, 2.1%). In all other years, the most common site was the 'Cervix uteri' (n=211, 92.5%). Squamous cell carcinoma (SCC) was the most common histological type, whereas the most common histological grade was indeterminate (Table 1 Characteristics of Cervical Cancer in Loei Province from 2017 to 2022).

Survival analysis

Overall observed survival (OS): The 228 patients. The respective 1-, 3-, and 5-year overall observed survival (OS) for cc was 77.5 (95%CI; 71.5-82.4), 61.1 (95%CI; 54.35-67.17) and 51.1 (95%C1; 43.77-58.05). (Figure 1 Kaplan-Meier survival curves overall survival of cervical cancer patients in Loei Province, Thailand between 2017 to 2022.)

Comparison of survival rate differences in cervical cancer patients between 2017 and 2022: Marital status was found that married women had a higher survival rate than single women, with the difference being statistically significant (Log-rank test = 33.4, p-value < 0.001), as shown by Kaplan-Meier survival curve. (Figure 2 Comparison of survival rate differences in cervical cancer patients between 2017 to 2022). Topography classification for cervical cancer patients, which includes Endocervix (C53.0), Exocervix (C53.1), and Cervix uteri (C53.9), showed variations in survival rates. However, these differences were not statistically significant (Log-rank test = 1.1, p-value = 0.573), as shown by Kaplan-Meier survival curve. (Figure 3 Comparison of survival rate differences in cervical cancer patients between 2017 to 2022).

Stage was found patients diagnosed at stage I having a higher survival rate than those diagnosed at stage - IV. The difference was statistically significant (Log-rank test = 59.2, p-value < 0.001), as shown by Kaplan-Meier survival curve. (Figure 4 Comparison of survival rate differences in cervical cancer patients between 2017 to 2022).

Histological types for cervical cancer patients, which includes squamous cell carcinoma, adenocarcinoma, and unspecified or other types, was found not statistically significant (Log-rank test = 1.5, p-value = 0.465), as shown by Kaplan-Meier survival curve. (Figure 5 Comparison of survival rate differences in cervical cancer patients between 2017 to 2022), (Table 2 The 1-, 3-, 5-Year Survival Rate between 2017 to 2022 for CC, by Histological type, Marital status, Stage and Topography at loei Province).

Incidence: The respective ASR per 100,000 for CC in Loei Province from 2017 to 2022 was 9.8, 8.8, 12.6, 11.4, 8.1, and 9.6 respectively. Thus, the overall ASR per 100,000 was 10.0 (95% CI: 9.14, 10.82) (Figure 6 Incidence rates for Cervical Cancer in Loei Province between 2017 to 2022).

The respective ASR per 100,000 for CC in Loei Province from 2017 to 2022 Squamous cell carcinoma was 6.8 (95% CI: 5.95, 7.63), Adenocarcinoma was 1.7 (95% CI: 0.88, 2.56) and Unspecified and Other was 1.5 (95% CI: 0.63, 2.31). (Figure 7 Incidence rates for Cervical Cancer by cell type in Loei Province between 2017 to 2022).

Preliminary estimates of Trends in the incidence of CC: Based on Joinpoint regression analysis, the overall CC incidence decreased between 2017 and 2022 with an annual percent change (APC) of -0.97% (95% CI: -16.79, 16.63) per year.

Table 1: Characteristics of Cervical Cancer in Loei Province between 2017 to 2022

Characteristics	Year of diagnosis						
	2017 N (%)	2018 N (%)	2019 N (%)	2020 N (%)	2021 N (%)	2022 N (%)	2017-2022 N (%)
Age at diagnosis							
20 - 24	1 (2.6)	-	-	1 (2.4)	-	-	2 (0.9)
25 - 29	1 (2.6)	-	1 (2.1)	1 (2.4)	1 (3.3)	-	4 (1.7)
30 - 34	1 (2.6)	1 (2.9)	5 (10.6)	2 (4.9)	2 (6.7)	3 (8.3)	14 (6.1)
35 - 39	2 (5.1)	4 (11.4)	2 (4.4)	4 (9.8)	2 (6.7)	2 (5.6)	16 (7)
40 - 44	2 (5.1)	2 (5.7)	5 (10.6)	3 (7.3)	2 (6.7)	4 (11.1)	18 (7.9)
45 - 49	6 (15.4)	4 (11.4)	3 (6.4)	6 (14.6)	4 (13.3)	3 (8.3)	26 (11.4)
50-54	7 (17.9)	7 (20)	4 (8.5)	8 (19.6)	5 (16.7)	7 (19.4)	38 (16.7)
55 - 59	8 (20.5)	9 (25.7)	8 (17)	7 (17.2)	4 (13.3)	5 (13.9)	41 (18)
60 - 64	5 (12.8)	1 (2.9)	7 (14.9)	6 (14.6)	6 (20)	5 (13.9)	30 (13.2)
65 - 69	3 (7.7)	4 (11.4)	5 (10.6)	1 (2.4)	1 (3.3)	3 (8.3)	17 (7.5)
70 - 74	2 (5.1)	3 (8.6)	4 (8.5)	1 (2.4)	2 (6.7)	2 (5.6)	14 (6.1)
75+	1 (2.6)	-	3 (6.4)	1 (2.4)	1 (3.3)	2 (5.6)	8 (3.5)
Mean (SD)	53.1(11.7)	53.8(10.3)	54.8(14.8)	50.7(11.9)	53.2(12.9)	54.9(14.6)	53.4 (12.8)
Median (Min: Max)	54.0(24:75)	54.0(32:73)	56.0(29:85)	53.0(24:83)	52.5(27:83)	54.0(33:100)	54.0(24:100)
Basis of diagnosis							
History & Physical exam	4 (10.3)	4 (11.4)	3 (6.4)	5 (12.2)	4 (13.3)	2 (5.6)	22 (9.6)
Endoscopy & Radiology	2 (5.1)	3 (8.6)	5 (10.6)	4 (9.8)	-	-	14 (6.1)
Histology of Primary	33 (84.6)	28 (80)	39 (83)	32 (78)	26 (86.7)	34 (94.4)	192 (84.3)
Stage at diagnosis							
Stage I	6 (15.4)	4 (11.4)	5 (10.6)	2 (4.9)	4 (13.3)	8 (22.2)	29 (12.7)
Stage II	7 (17.9)	4 (11.4)	9 (19.2)	6 (14.6)	3 (10)	4 (11.1)	33 (14.5)
Stage III	9 (23.1)	11 (31.4)	7 (14.9)	11 (26.8)	6 (20)	3 (8.4)	47 (20.6)
Stage IV	5 (12.8)	6 (17.2)	8 (17)	4 (9.8)	3 (10)	8 (22.2)	34 (14.9)
Unknown	12 (30.8)	10 (28.6)	18 (38.3)	18 (43.9)	14 (46.7)	13 (36.1)	85 (37.3)
Topography							
Endocervix (C53.0)	3 (7.7)	3 (8.6)	1 (2.1)	-	-	3 (8.3)	10 (4.4)
Exocervix (C53.1)	1 (2.6)	2 (5.7)	1 (2.1)	2 (4.9)	-	1 (2.8)	7 (3.1)
Cervix uteri (C53.9)	35 (89.7)	30 (85.7)	45 (95.8)	39 (95.1)	30 (100)	32 (88.9)	211 (92.5)
Histological type							
Squamous cell carcinoma (8070)	26 (66.7)	23 (65.7)	32 (68.1)	29 (70.7)	19 (63.3)	23 (63.9)	152 (66.7)
Adenocarcinoma (8140)	7 (18)	5 (14.3)	6 (12.8)	4 (9.8)	6 (20)	12 (33.3)	40 (17.5)
Unspecified and Other (8000)	6 (15.3)	7 (20)	9 (19.1)	8 (19.5)	5 (16.7)	1 (2.8)	36 (15.8)
Histological grading							
Well-differentiated	2 (5.7)	2 (7.1)	2 (5.7)	1 (2.6)	3 (10.7)	2 (7.1)	12 (6.3)
Moderately-differentiated	15 (42.9)	4 (14.3)	3 (8.6)	15 (39.5)	6 (21.4)	9 (32.1)	52 (27.1)
Poorly-differentiated	7 (20)	9 (32.1)	7 (20)	4 (10.5)	3 (10.7)	5 (17.9)	35 (18.2)
Undifferentiated	1 (2.8)	1 (3.6)	-	-	-	-	2 (1)
Not stated or not applicable	10 (28.6)	12 (42.9)	23 (65.7)	18 (47.4)	16 (57.2)	12 (42.9)	91 (47.4)

Table 2: The 1-, 3-, 5-Year Survival Rate between 2017 to 2022 for CC, by Histological type, Marital status, Stage and Topography at loei Province

Variable	1-year Survival rate (95%CI)	3-year Survival rate (95% CI)	5-year Survival rate (95% CI)
Histological type			
Squamous cell carcinoma (8070)	78.2 (0.70 - 0.83)	62.0 (0.54 - 0.69)	52.3 (0.43 - 0.60)
Adenocarcinoma (8140)	90.0 (0.75 - 0.96)	61.7 (0.44 - 0.74)	52.4 (0.33 - 0.68)
Unspecified and Other (8000)	60.6 (0.42 - 0.74)	54.8 (0.37 - 0.69)	45.5 (0.28 - 0.61)
Marital status			
Single	44.8 (0.25 - 0.62)	16.3 (0.05 - 0.33)	-
Married	81.5 (0.75 - 0.86)	66.7 (0.59 - 0.72)	56.2 (0.48 - 0.63)
Stage			
Stage I	100.0 (-)	96.4 (0.77 - 0.99)	91.6 (0.69 - 0.97)
Stage II	78.7 (0.60 - 0.89)	62.7 (0.43 - 0.76)	44.5 (0.26 - 0.61)
Stage III	76.6 (0.61 - 0.86)	53.2 (0.38 - 0.66)	40.8 (0.25 - 0.55)
Stage IV	44.1 (0.27 - 0.59)	23.2 (0.10 - 0.38)	10.3 (0.02 - 0.25)
Unknown	83.5 (0.73 - 0.89)	68.7 (0.57 - 0.77)	65.6 (0.54 - 0.74)
Topography			
Endocervix (C53.0)	88.9 (0.43 - 0.98)	66.7 (0.28 - 0.87)	53.3 (0.17 - 0.79)
Exocervix (C53.1)	42.9 (0.09 - 0.73)	42.9 (0.09 - 0.73)	42.9 (0.09 - 0.73)
Cervix uteri (C53.9)	78.2 (0.71 - 0.83)	61.5 (0.54 - 0.67)	51.4 (0.43 - 0.58)

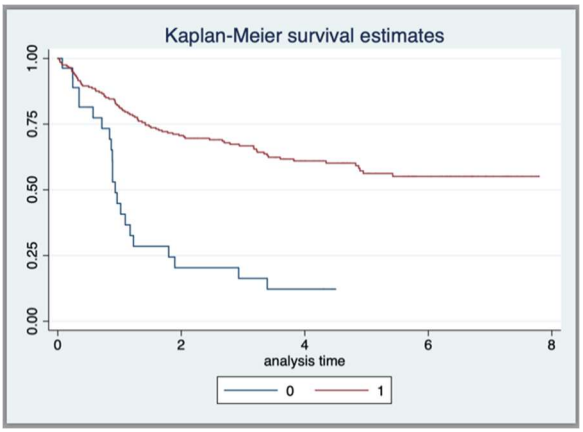

Figure 1: Kaplan-Meier survival curves overall survival of cervical cancer patients in Loei Province, Thailand between 2017 to 2022

DISCUSSION

The current study shows survival, Incidence of CC patients between 2017 to 2022.

Overall Survival of CC patients: The current study showed that the respective 1-, 3-, and 5-year survival rate was 77.5% (95% CI: 71.52 to 82.42%), 61.1 % (95%CI: 54.35 to 67.17), and 51.1% (95%CI: 43.77 to 58.08). This is consistent with the results Ten Years' Survival in Patients with Cervical Cancer and Related Factors in West Azerbaijan Province was estimates of survival rate of six months and one, three, five and seven years were 99%, 96.9%, 85.2%, 73.1% and 57.7%, respectively. The mean (SD) survival time of patients with 95% confidence intervals were 86.31 (6.46) and (98.9, 73.6) months, respectively.[29]

Survival of CC by Marital status: Marital status was found that married women had a higher survival rate than single women (Log-rank test = 33.4, p-value <0.001) is consistent with a large body of literature.[30-32] The protective effect of marriage on cancer prognosis is often attributed to better socioeconomic support, spousal encouragement for seeking medical care, and improved treatment adherence. In the context of our study in Loei, these social support mechanisms may be particularly pronounced. A spouse can play a crucial role in providing transportation to the hospital, emotional support during treatment, and ensuring compliance with follow-up appointments, which are critical factors for better outcomes in a rural or semi-rural healthcare setting.

Survival of CC by histological types: Histological types for cervical cancer patients, which includes squamous cell carcinoma, adenocarcinoma, and unspecified or other types, was found not statistically significant (Log-rank test = 1.5, p-value = 0.465). This finding contrasts with several studies that have reported a poorer prognosis for patients with adenocarcinoma compared to squamous cell carcinoma.[33] A possible explanation for this discrepancy is the limited of our analysis. Our study included a relatively small number of patients with adenocarcinoma and other non-squamous types.

Survival of CC by Stage: Stage was found patients diagnosed at stage 1 having a higher survival rate than those diagnosed at stage 4 The difference was statistically significant (Log-rank test = 59.2, p-value <0.001). This is consistent with established prognostic data worldwide, including statistics from England.[34] However, it is noteworthy that the stage survival rates in Loei cohort appear lower across all stages compared to those reported in high-income countries like England. For instance, the 5-year survival for stage IV cancer in England is around 15%, whereas our overall 5-year survival, which includes all stages, was only 51.1%. This disparity likely highlights the differences in healthcare infrastructure and late diagnosis in Loei.

Joinpoint regression: Joinpoint regression analysis of CC incidence in Loei from 2017 to 2022 showed no clear or statistically significant trend. Although the point estimate for the annual percent change APC= -0.97% (95% CI: -16.79, 16.63) per year. This is consistent with the results for other global trends in CC at the regional and national levels (data from the Global Burden of Disease study 2019) showed a decrease of -0.38% (95% CI: -0.41, -0.34) per year.[35] Additionally, in lower-middle-income countries, the incidence of CC has declined owing to opportunistic screening.[36] The decrease in the incidence of CC could have resulted from organized screening. The screening program in Thailand.

Incidence of CC: The decrease in the incidence of CC could have resulted from organized screening. The screening program in Thailand, which has been in place since 1999, began as a pilot project in Nakhon Phanom (northeast) Province. The CC screening program has also been evaluated.[37] After the organized screening program in Thailand was established in 2005 by the Ministry of Public Health (MOPH) and the National Health Security Office (NHSO), pap smear screening was offered to the entire female population from the fiscal year 2020 to the present. Thailand uses the HPV DNA test for CC screening, a more modern and accurate approach, from the CC screening program between fiscal years 2020 and 2023. Taken together, we found that the rates of CC screening programs in Loei increased by 23.1 %, 36.2 %, 45.7 %, and 47.7 %, respectively.[38] This is consistent with a global study, which found that the methods currently used in screening effectively reduce the incidence and mortality associated with CC.[39] Cervical cancer comprises three main histological subtypes, namely, squamous cell carcinoma, adenocarcinoma and unspecified and other. This is consistent with the results that specified histological subtypes The robust results illustrated that the proportions of SCC, AC, and other specified histological subtypes were 81.41%, 11.35%, and 7.24%, respectively.

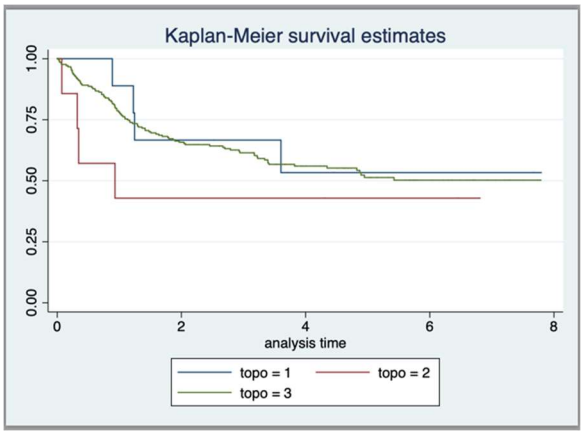

Fig 2

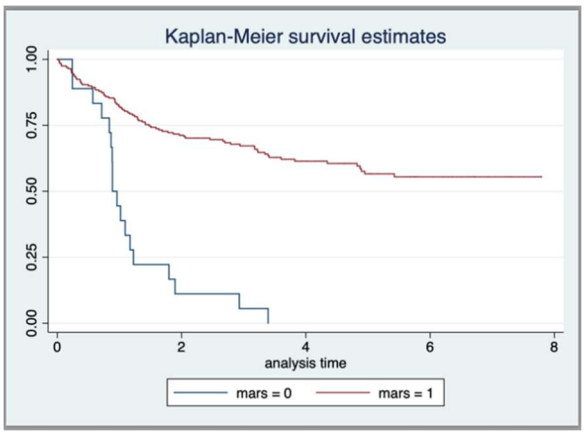

Fig 3

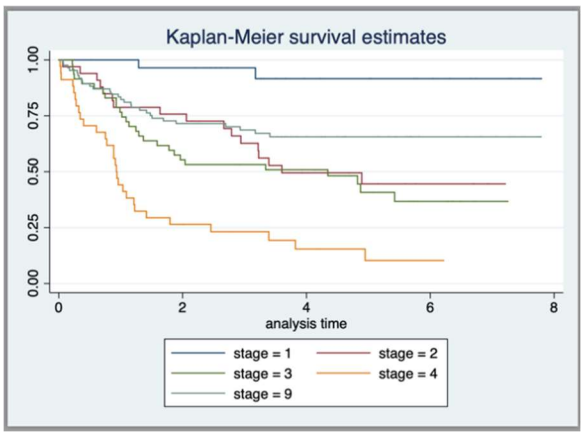

Fig 4

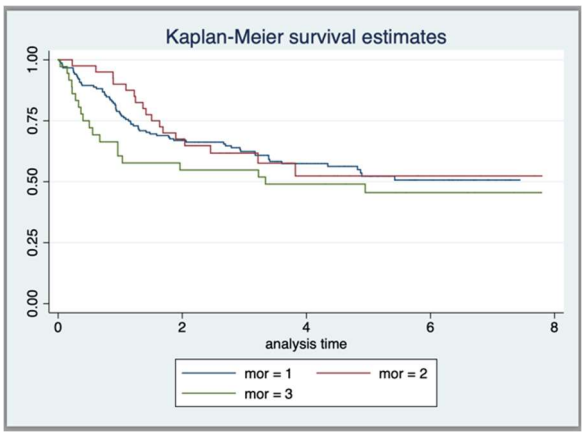

Fig 5

Figure 2-5: Comparison of survival rate differences in cervical cancer patients between 2017 to 2022

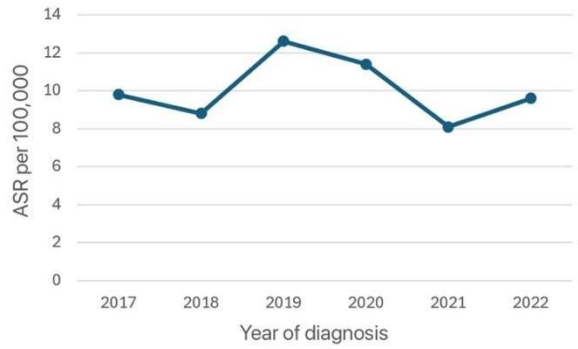

Figure 6: Incidence rates for Cervical Cancer in Loei Province between 2017 to 2022

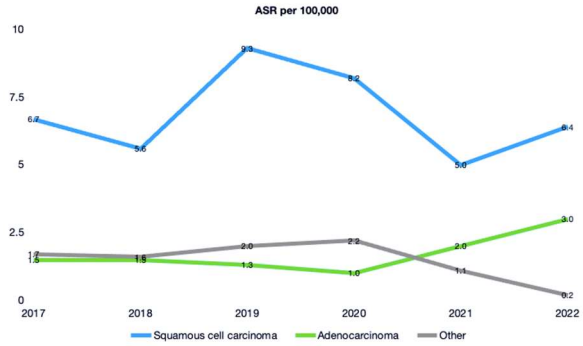

Figure 7: Incidence rates for Cervical Cancer by cell type in Loei Province between 2017 to 2022

The estimated number of cases was 481,807 for SCC (ASR = 9.76 per 100,000 women-years), 67,205 for AC (ASR = 2.75 per 100,000 women-years) and 42,847 for other specified histology (ASR = 0.82 per 100,000 women-years).[40] And a nationwide study in the United States found that the incidence of SCC surpassed that of AC in all age groups.[41]

Vaccination: As seen in industrialized nations, vaccination may reduce the CC burden. Regular CC prevention includes screening and immunization.[42] A pilot study conducted a decade after the immunization program indicated that HPV vaccination reduced cervical cancer in young women.[43] According to a comparative modeling analysis of 78 low-income and lower-middle-income countries, high HPV vaccination rates in girls may eliminate cervical cancer in most LMICs. High-uptake screening accelerates reduction and is critical for eradicating cervical cancer in high-burden countries.[44] The WHO recommends incorporating the HPV vaccination policy into national immunization programs, although cost remains a barrier.[45]

Thailand has not always been able to afford the high price of the HPV vaccine owing to budget limitations.[46] Currently, HPV vaccination is administered to schoolgirls.[47] The Ministry of Health

has an additional HPV vaccination policy called "Quick Win," which encourages women between 11 and 20 years of age to receive HPV vaccinations provided by the government, the target being 1 million vaccine doses within 100 days. There is also a parallel campaign for CC screening programs aged 30-60 years.[19] Thailand's policy shows promise for HPV vaccination implementation and assessment.

To prevent any potential misinterpretation, particularly vis-à-vis the sensitivity of minor alterations in the latter data years when utilizing the Joinpoint model, the 5-year and 10-year Average Annual Percent Change (AAPC) values were provided. These provide a more precise trend description because they represent the mean of the APCs over the last 5-year and 10-year periods.[48]

The findings of this study have significant implications for public health policy and cervical cancer control strategies, particularly in Loei and other similar provincial settings in Thailand. A highly relevant and timely development is the recent nationwide launch of a self-sampling HPV DNA test program in Thailand, which allows women to collect their own samples in private. This approach effectively bypasses many traditional barriers to screening, such as embarrassment, fear of a pelvic exam, time constraints, and the logistical challenges of visiting a clinic. Crucially, this self-sampling strategy is an ideal tool for reaching the vulnerable subgroups identified in our study, such as single, divorced, or widowed women, who may be less likely to engage with conventional clinic-based services.

LIMITATIONS

Validity and coverage of cancer registries.

Validity: Based on our study, we found that the population-based cancer registry still contains incomplete data, possibly due to issues related to data collection, duplication, analysis, and management and budgeting of the cancer registry as a new cancer registry. Regarding the quality and processes involved, efforts are underway to adhere to the same standards as those of the National Cancer Institute. In identifying incomplete data in this study, efforts were made to collect and transmit data back to the population-based cancer registry for system improvements and ongoing data management. However, a comprehensive assessment of the accuracy and completeness of the updated cancer registry has not been conducted. There is a possibility that the data quality of the cancer registry may further improve as a result of these adjustments.[49]

Coverage: Based on our study, we found that the percentage of death certificate-only (%DCO) cases was 0, despite being a newly established cancer registry. This may be partly explained by incomplete collection of death data, as the registry in Loei province did not obtain information directly from death certificates. Nevertheless, data quality was assessed using histopathological examination results, with the percentage of microscopically verified (%MV) cases reaching 84.3%. This level of microscopic verification is generally considered acceptable for cancer registry data. In addition, the Thai Cancer Based (TCB) program routinely checks for accuracy and consistency before disseminating registry data.[49]

The study's observation period of six years (2017-2022) is relatively brief for establishing robust long-term trends. This short timeframe can limit the reliability of the trend analysis, as short-term fluctuations might not reflect the true long-term trajectory. We therefore recommend extending the analysis to a period of 10 years or more in future research to provide a more stable and definitive assessment.

CONCLUSION

This study concludes that the 5-year overall survival for cervical cancer was 51.1%, with a decreasing age-standardized incidence rate (ASR) of 10.0 per 100,000 person-years, as it is associated with the duration of HPV. Period effects impact incidence rates through public health factors such as screening policies, HPV vaccination in Thailand, these have been in place for a long time. Future studies should focus on the extended period of trends in the incidence of CC and emphasize the coverage of cancer registries for CC control programs in this area and throughout Thailand.

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