Research Article

Epidemiology of Cervix Uteri Cancer in Saudi Arabia from 2004 to 2017

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Abstract

Objectives: This study investigates the epidemiological pattern of Cervix Uteri cancer (CUC) throughout all administrative regions of Saudi Arabia. It examines the frequency number and percentage of diagnosed cases, the age-specific incidence rate (AIR), the crude incidence rate (CIR), and the age-standardized incidence rate (ASIR) stratified by age group, year of diagnosis, and regions.

Methods: A retrospective descriptive epidemiological investigation of all CUC cases documented in the Saudi Cancer Registry (SCR) between 2004 and 2017 was performed. Statistical Package for the Social Sciences, version 20.0, was utilized to analyze the data using descriptive statistics and the Kruskal-Wallis test (SPSS).

Results: In total, 1,451 CUC-diagnosed cases were reported to the SCR between January 2004 and December 2017. Northern, Eastern, and Tabuk regions had the highest ASIR of CUC among Saudi women (2.2, 2.0, and 2.0 per 100,000 women). In contrast, among Saudi women, Jazan had the lowest overall ASIR of CUC (0.7 per 100,000 women, respectively).

Conclusion: The ASIRs of CUC in Saudi Arabia decreased slightly from 2004 to 2017. The Northern, Eastern, and Tabuk regions of Saudi Arabia had the highest ASIR of CUC among Saudi women, while women in Jazan, Saudi Arabia, were proven to be the least affected by CUC.

Keywords: cancer epidemiology; cervix uteri cancer; incidence rate; oncology; Saudi cancer registry.

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INTRODUCTION

Cervix Uteri carcinoma (CUC) remains a prevalent form of gynecological cancer across the globe, ranking fourth among women and fifteenth among all cancers.[1,2] Annually, over 500,000 new cases of CUC are detected, resulting in roughly 250,000 deaths.[1] In the United States, CUC accounts for roughly 0.7% of newly diagnosed cancer cases annually, with an estimated 14,100 new cases and 4,280 deaths projected by the American Cancer Society in 2022.[3] Typically, CUC is diagnosed in women in their seventies, with an average age of 61. The incidence of CUC is twice as high in Black women compared to White women, and the prognosis for Black women with CUC is worse. In the past two decades, the mortality rates for CUC have risen by more than 100%.[4,5]

The most significant risk factor for CUC is infection with Human Papillomavirus (HPV). HPV is a sexually transmitted virus that can be transmitted through skin-to-skin contact, particularly during sexual activity, hand-to-genital organ touch, and oral sex.[6,7] Women who become infected with HPV are at a higher risk of developing CUC, especially if they have other risk factors such as having many children, smoking tobacco, and using oral contraceptives.[8]

According to the projections made by the International Agency for Cancer Research (IARC), the incidence and mortality rates of CUC among women in Saudi Arabia were estimated to be 1.6 and 2.1 per 100,000 women, respectively, in the year 2020. These rates are notably lower than the rates observed in other Arabian Gulf nations such as Oman, the United Arab Emirates, Qatar, and Bahrain, where the incidence rates were found

to be 6.4, 6.2, 4.1, and 3.9 per 100,000 women, respectively.[9]

The main goals of this study were to evaluate and characterize the prevalence of CUC among women in Saudi Arabia. To achieve these objectives, the study examined the crude incidence rate (CIR) and age-standardized incidence rate (ASIR), which were then categorized based on the year of diagnosis, geographical area, and age group. As a result, we plan to perform observational descriptive epidemiological research on CUC, analyzing the temporal and spatial distribution of cases documented in the Saudi Cancer Registry (SCR) between 2004 and 2017.

METHODS

The present study aims to perform a comprehensive descriptive epidemiological analysis of all cases of CUC reported in Saudi Arabia between 2004 and 2017. The study includes data from all regions of the country and seeks to identify trends and patterns in the incidence rates of CUC during the specified time frame. The incidence rates of CUC in Saudi Arabia are readily available through the Saudi Cancer Registry (SCR) reports, which are published annually by the Ministry of Health. Therefore, ethical approval was not required for this retrospective observational study as the data was obtained from a publicly accessible source. The SCR was established in 1992 and serves as a population-based cancer registry, collecting data on cancer cases diagnosed and treated in Saudi Arabia. It is worth noting that the first report on cancer in Saudi Arabia was published in 2001, with subsequent reports published annually. However, the most accurate report on cancer in Saudi Arabia was published at the beginning of 2004, providing a reliable baseline for the present study. Furthermore, the most recent data available through the SCR was collected in 2017, providing a comprehensive view of the epidemiological status of CUC in Saudi Arabia during the study period.

The Saudi Cancer Registry (SCR) has been publishing reports on the epidemiological patterns of cancer in Saudi Arabia since 2001. These reports provide information on the frequency and percentage of cancer cases, as well as the age-standardized and crude incidence rates (ASIR and CIR), stratified by Saudi Arabian provinces, age group, and years of diagnosis. Full reports covering the period from 2004 to 2017 are currently available for 13 administrative regions. These reports cover a period of fourteen years. In order to provide a descriptive epidemiology of CUC in Saudi women, these reports were used to undertake critical data collection on all of the information extracted from the SCR.

Data analysis was carried out using version 20.0 of the Statistical Package for the Social Sciences (SPSS). The descriptive epidemiological analysis involved computing the overall percentage, age-specific incidence rate (ASR), crude incidence rate (CIR), and age-standardized incidence rate (ASIR) by age group, geographical region, and year of diagnosis. The Kruskal-Wallis test was employed. to investigate the variation in CIR and ASIR of CUC across different regions in Saudi Arabia.

RESULTS

Between January 2004 and December 2017, the SCR reported 1451 cases of CUC, accounting for an average percentage of 2.0% of all cancer cases. The analysis revealed a slight increase in cases over the 14-year period. The age group 45-49 years showed the highest number of cases with 210 (14.5% of all cases), followed by the age group 50-54 years with 198 cases (13.6% of all cases), while the age group 40-44 years also had a considerable number of cases, with 187 cases (12.9% of all cases). The incidence of CUC was low among women under the age of 30, with only 30 cases (5% of all cases). It can also be noted that among Saudi women, the overall number and percentage of CUC cases between 2004 and 2017 was 104 (2.0% of all cancer cases).

The overall age-specific incidence rate of CUC from 2004 to 2017, expressed per 100,000 female population, was calculated from the SCR. The data reveals that the overall age-specific incidence rate of CUC was very low among women aged 0-24 years, with rates ranging from 0 to 0.2 per 100,000 women. The overall age-specific incidence rate increased steadily from the age of 30 years, with the highest rates observed in women aged 70 years and above, with rates ranging from 6.5 to 6.7 per 100,000 women. The highest rate was observed in the age group 70-74 years, with a rate of 6.6 per 100,000 women.

According to Figure 1, the CIR of CUC in Saudi Arabia was found to fluctuate over the study period from 2004 to 2017. The peak incidence rate was observed in the year 2012, with 1.4 cases per 100,000 women, while the lowest rate was observed in 2006 and 2010, with 0.9 cases

per 100,000 women. The mean and median CIR were calculated to be 1.1 cases per 100,000 women, indicating a relatively stable incidence rate of CUC over the study period. The standard deviation (SD) was 0.14, indicating a relatively low degree of variability in the data. However, the overall CIR of CUC among Saudi women was 1.1 (95% CI: 1.0 to 1.2) per 100,000 women between 2004 and 2017.

Figure 1

Year	CIR
2004	1.1
2005	1.1
2006	0.9
2007	1.2
2008	1.0
2009	1.1
2010	0.9
2011	1.2
2012	1.4
2013	1.0
2014	1.2
2015	1.0
2016	1.1
2017	1.3
Mean	1.1
Median	1.1
SD	0.14
95 % CI : Mean	1.0 - 1.2

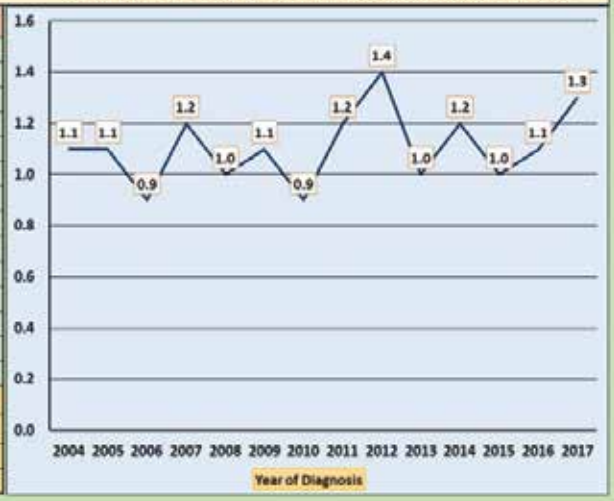

Figure 1. Incidence rate (Crude) of Cervix Uteri Cancer cases among Saudi women from 2004 to 2017

The overall CIR of CUC per 100,000 women in different regions of Saudi Arabia from 2004 to 2017 in shown in Figure 2. The incidence rate varied between regions, with the highest rate in the Eastern region at 1.5 cases per 100,000 women, followed by Tabuk and the Northern region, with rates of 1.3 cases per 100,000 women. The Kruskal-Wallis test for non-normally distributed data revealed statistically significant differences between these locations and other regions of Saudi Arabia, $X^2(12,N=181) = 48.705$, $P < 0.001$). In contrast, the lowest incidence rate was in Jazan, with only 0.5 cases per 100,000 women.

Figure 2

Regions	
Asir	0.7
Baha	0.8
Jazan	0.5
Madinah	0.9
Hail	0.7
Qassim	0.7
Riyadh	0.8
Makkah	1.0
Najran	0.7
Jouf	0.7
Tabuk	1.3
Eastern Region	1.5
Northern Region	1.3

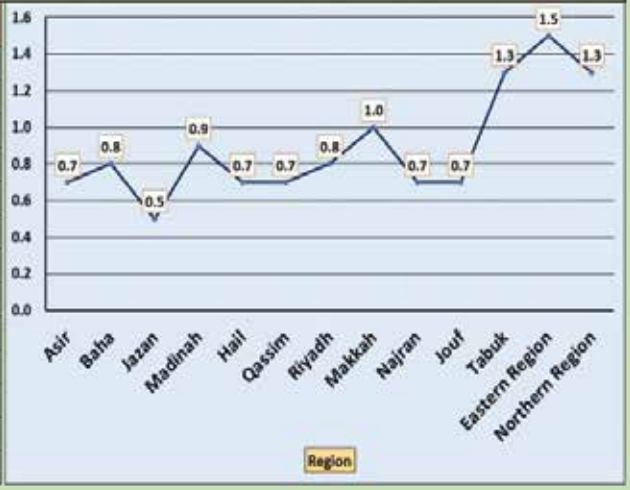

Figure 2. Overall incidence rate (Crude) of Cervix Uteri Cancer cases among Saudi women by region from 2004 to 2017

The ASIR of CUC cases among female Saudis, stratified by year of diagnosis from 2004 to 2017 per 100,000 people, was observed from the SCR (Figure 3). The Age Standardized Incidence Rate (ASIR) of Cervix Uteri Cancer per 100,000 women in Saudi Arabia from 2004 to 2017. Similarly, the ASIR has fluctuated over the years, with a peak of 2.1 cases per 100,000 women in 2012 and a low of 1.3 cases per 100,000 women in 2015. The mean and median ASIR were 1.7 cases per 100,000 women, indicating a relatively stable incidence rate of CUC over the study period after adjusting for age differences among populations. The standard deviation was 0.23, suggesting that the ASIR values were distributed around the mean. However, the overall ASIR of CUC among Saudi women was 1.7 (95% CI: 1.5 to 1.8) per 100,000 women between 2004 and 2017.

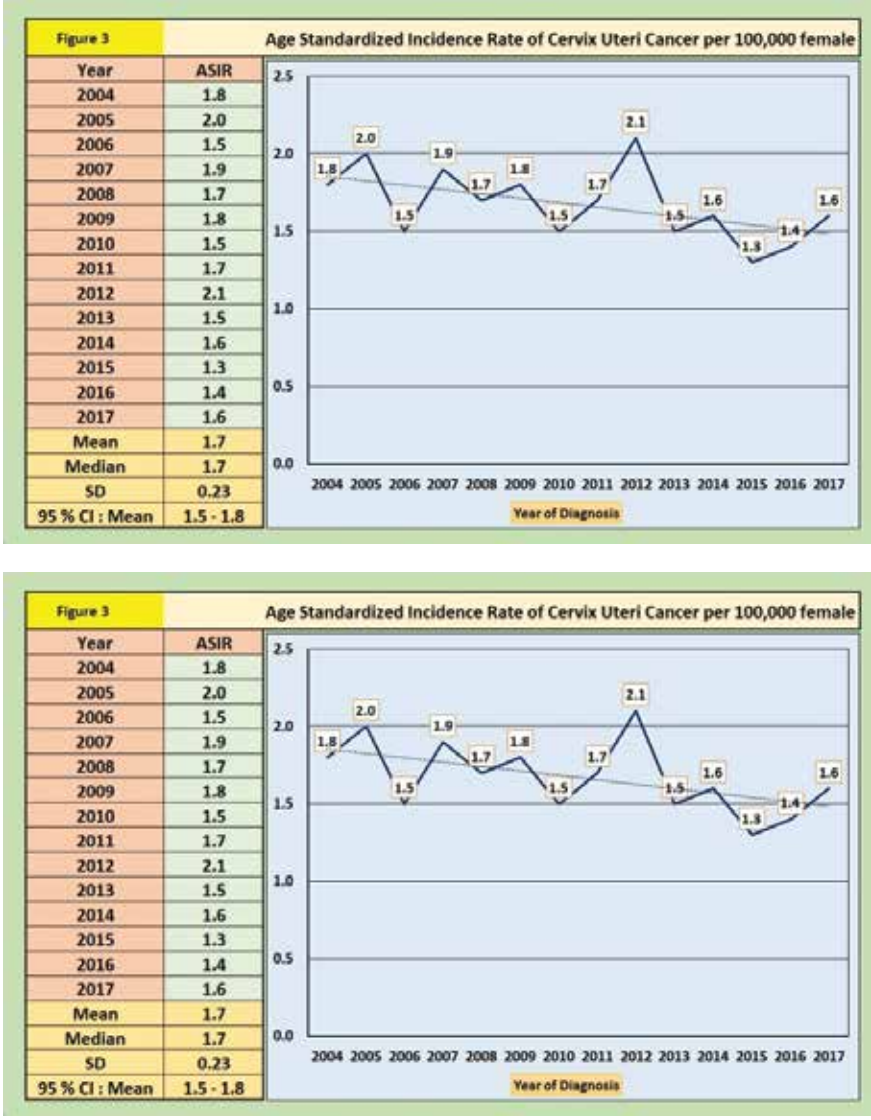

Figure 3
Age Standardized Incidence Rate of Cervix Uteri Cancer per 100,000 female
Year
ASIR
2004 1.8
2005 2.0
2006 1.5
2007 1.9
2008 1.7
2009 1.8
2010 1.5
2011 1.7
2012 2.1
2013 1.5
2014 1.6
2015 1.3
2016 1.4
2017 1.6
Mean 1.7
Median 1.7
SD 0.23
95 % CI : Mean 1.5 - 1.8
2.5
2.0
1.5
1.0
0.5
0.0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Year of Diagnosis

Figure 3. Incidence rate (age-standardised) of Cervix Uteri Cancer cases among Saudi women from 2004 to 2017

Figure 4 represents the overall ASIR of CUC per 100,000 women in different regions of Saudi Arabia from 2004 to 2017. The ASIR was calculated to adjust for the effect of age distribution on the incidence rate of CUC in different regions. The highest ASIR was observed in the Northern region and the Eastern region, with rates of 2.2 and 2.0 cases per 100,000 women, respectively. Similarly, the region of Tabuk had a relatively high ASIR of 2.0 cases per 100,000 women. On the other hand, the lowest ASIR was found in Jazan, with only 0.7 cases per 100,000 women. The mean and median ASIR were 1.4 and 1.3 cases per 100,000 women, respectively. The Kruskal-Wallis test indicated statistically significant differences in the ASIR of CUC between the regions, $X^2(12,N=180) =41.927$, $P < 0.001$).

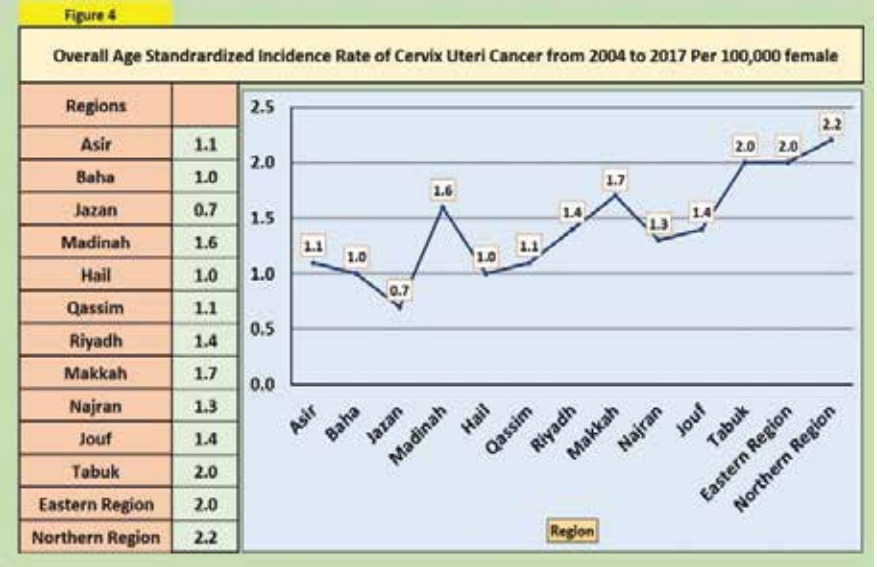

Figure 4. Incidence rate (age-standardised) of Cervix Uteri Cancer cases among Saudi women by region from 2004 to 2017

DISCUSSION

The present study had the objective of investigating the CIR and ASIR of CUC in Saudi Arabia from 2004 to 2017. To the best of our knowledge, this is the first descriptive epidemiological research that analysed the spatial and temporal distribution of CUC among women in all administrative regions of Saudi Arabia, based on the PubMed database. This study aimed to provide an overview of the CUC trend in the country and contribute to the knowledge of the relevance of the disease in Saudi Arabia.

This study sheds light on the incidence of CUC among Saudi women between 2004 and 2017, with an average of 104 cases diagnosed during this period. The findings indicate that while CUC is not a common cancer in Saudi Arabia, it disproportionately affects women aged 45-49 and older, who account for the majority of cases and have a higher incidence rate compared to younger women. This finding is consistent with earlier research that found the highest prevalence of CUC among women aged >65, with rates being much higher among older black women.[10] However, a study reported an unexpected increase in the incidence of CUC among 20–24-year-old women in England, with rates jumping from 2.7 per 100,000 in 2012 to 4.6 per 100,000 in 2014. This abrupt increase has raised concerns that it may be related to the cessation of cervical screening among 20–24-year-old women.[11]

The incidence rates of CUC have been declining in many countries, including Saudi Arabia and the United States. In Saudi Arabia, the ASIR of CUC among Saudi women has dropped steadily from 2004 to 2017. Similarly, in the United States, the incidence rates of CUC have decreased gradually from 2004 to 2019.[12] While the decline in CUC incidence rates is encouraging, there is still a need for effective screening programs that can help detect and treat cases of pre-cancer before they progress to cancer. The screening program should aim to screen the largest possible proportion of women targeted by the national program and ensure appropriate management for all those who have a positive or abnormal test result. This approach can potentially decrease the incidence of CUC by detecting and treating pre-cancerous lesions, ultimately reducing the burden of CUC. Additionally, screening can detect CUC in women at an early stage when the cancer can still be successfully treated.[13]

Our results reveal that between 2004 and 2017, Saudi women in the Northern, Eastern, and Tabuk regions had the highest overall ASIRs for CUC. This shows that Saudi women residing in these places may be highly exposed to HPV, the leading risk factor for CUC. Therefore, the Saudi Arabian government, represented by the Ministry of Health, may concentrate its screening efforts on these regions. In contrast, Saudi women in Jazan were least affected by CUC, indicating that they were more exposed to CUC protective factor than women in other regions. Nonetheless, a case-control study should be done in the Northern, Eastern, and Tabuk regions to determine the probable risk factors that contribute to the rise in

ASIR of CUC among Saudi women. Additionally, it is necessary to explore the protective factors of CUC in the Jazan region that contributed to the disease's decreased prevalence.

CUC is a significant public health issue in many countries, including those in the Arabian Gulf. Our study shows that in Saudi Arabia, the estimated ASIR for CUC among Saudi women in 2020 was 2.8% per 100,000 women, which is lower than in other countries in the region. This is encouraging news, indicating that preventive measures may have a positive impact on reducing the incidence of CUC in the country. Interestingly, our study also found that Oman and the United Arab Emirates had the highest ASIR rate of CUC among women in the Arabian Gulf, at 6.4 and 6.2 per 100,000 women, respectively. This is almost 2.3 times greater than the rate in Saudi Arabia.

Similarly, these two countries also had the greatest ASMR of CUC among women in the region, at 4.2 and 3.9 per 100,000 women, accounting for approximately 2.5 times greater than Saudi Arabia. These findings highlight the need for targeted efforts to prevent and control CUC in these countries.

The findings of this study also highlight the significantly lower burden of CUC among Saudi women compared to other African countries, such as Eswatini, Malawi, Zambia, and Tanzania. These countries had ASIRs of 84.6, 67.9, 65.5, and 62.5 per 100,000 women, respectively, which were 22 to 30 times greater than the overall ASIR of CUC in Saudi Arabia.9 While the reasons for these differences are not entirely clear, they may be attributed to differences in the prevalence of risk factors such as HPV infection, screening practices, and access to healthcare. It is important for policymakers and healthcare providers in Saudi Arabia to continue efforts to improve CUC screening and prevention programs, particularly in high-risk populations. Further research is also needed to better understand the factors contributing to the relatively low burden of CUC in Saudi Arabia compared to other countries in the region and globally.

Finally, this study provides valuable insights into the incidence of CUC in various regions of Saudi Arabia and offers a foundation for future research to investigate the potential risk and protective factors associated with CUC among Saudi women. However, it is important to note that descriptive epidemiological studies like this one have inherent limitations, such as the lack of a control group and the inability to establish causal relationships between risk factors and the incidence of CUC. Additionally, the study was unable to calculate the overall mortality rates of CUC due to missing data on CUC-related deaths in the SCR. Future studies that address these limitations and employ more robust study designs are needed to provide a more comprehensive understanding of the epidemiology of CUC in Saudi Arabia.

CONCLUSION

This study revealed a slight decrease in the ASIRs of CUC among Saudi women. The regions of Northern, Eastern, and Tabuk had the highest CUC ASIRs, while Jazan had the lowest rates. Compared to other countries in the Arabian Gulf, Saudi Arabia has the lowest CUC ASIR. This suggests that the Ministry of Health in Saudi Arabia could focus its screening efforts on these high-risk regions. However, to gain a more comprehensive understanding of the potential risk and protective factors associated with CUC in Saudi Arabia, further epidemiological research is required. These findings can serve as a foundation for future studies aimed at reducing the incidence and mortality rates of CUC in Saudi Arabia.

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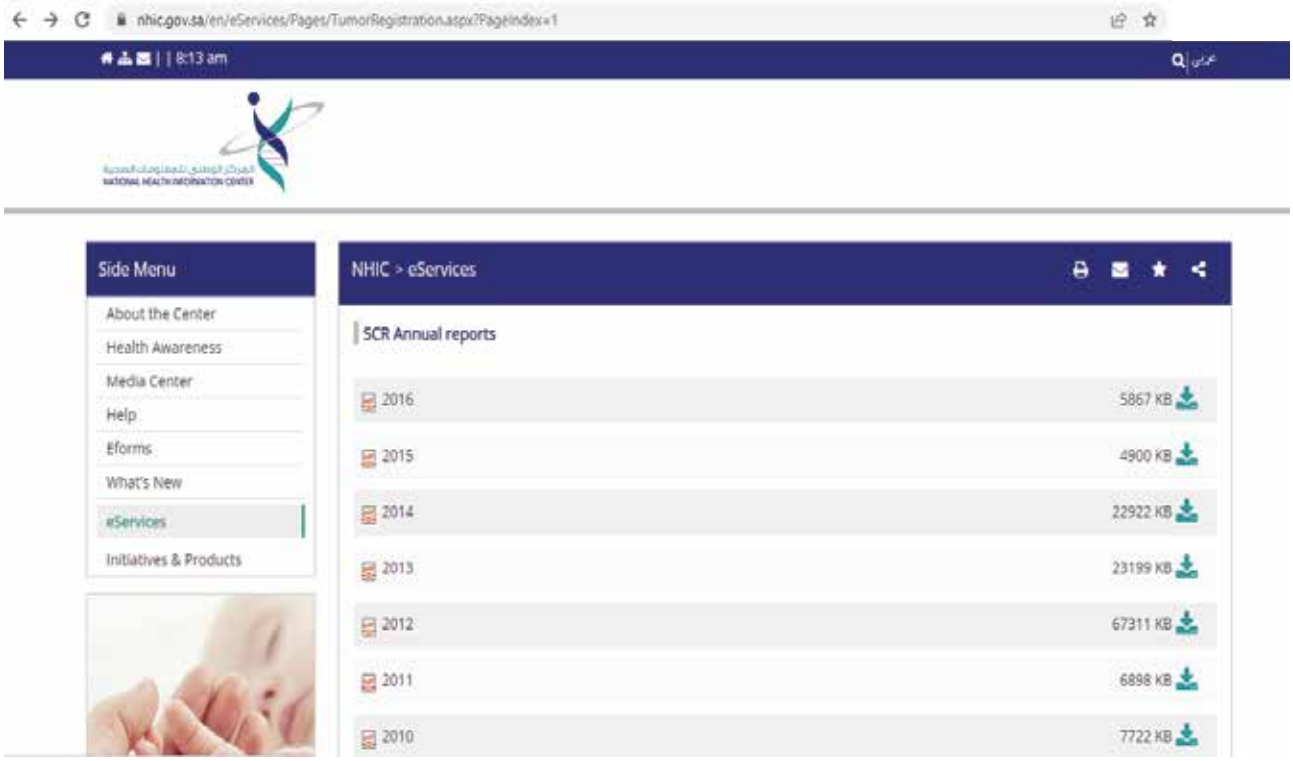

Figure legends

Figure 1: Incidence rate (Crude) of Cervix Uteri Cancer cases among Saudi women from 2004 to 2017.
Figure 2: Incidence rate (Crude) of Cervix Uteri Cancer cases among Saudi women by region from 2004 to 2017.
Figure 3: Incidence rate (age-standardised) of Cervix Uteri Cancer cases among Saudi women from 2004 to 2017.
Figure 4: Incidence rate (age-standardised) of Cervix Uteri Cancer cases among Saudi women by region from 2004 to 2017.