

Colorectal cancer in Saudi Arabia: incidence, survival, demographics and implications for national policies

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BACKGROUND AND OBJECTIVES: The national data on colorectal cancer in Saudi Arabia has not been analyzed. The objective of this study is to describe the demographics, incidence and survival rates for colorectal cancer in Saudi Arabia for the period 1994-2010.

DESIGN: Retrospective analysis of the Saudi Cancer Registry data for the period 1994-2010.

SETTING: Data from the Saudi Cancer Registry was analyzed by stage at presentation (local, regional, distal, unknown) and survival rates were calculated using the Kaplan-Meier method.

PATIENTS: From 9889 colorectal cancer cases, a sample of 549 (5.6%) patients was selected and their living status ascertained to assess survival.

RESULTS: Colorectal cancer has been the most common cancer among men and the third commonest among women since 2002 in Saudi Arabia. There has been a slight predominance among men with an average ratio of 116:100 over the years (range: 99:100-132:100). The overall age-standardized rate (ASR) approached a plateau of 9.6/100000 in 2010. The incidence of the disease has been highest in the capital, Riyadh, where it reached 14.5/100000 in 2010. Median age at presentation has been stable at around 60 years (95% confidence Interval (CI): 57-61 years) for men and 55 years (95% CI: 53-58 years) for women. Distant metastasis was diagnosed in 28.4% of patients at the time of presentation and rectal cancer represented 41% of all colorectal cancers diagnosed in 2010. The overall 5-year survival was 44.6% for the period 1994-2004. The ASR for all age groups below 45 years of age was lower than that for the United States.

LIMITATIONS: The study was retrospective with a possibility of bias from inaccurate staging of patients, and inaccurate survival information and patient demographics due to the underdeveloped census system prior to 2001. Survival data for the period 2005-2010 are lacking.

CONCLUSION: Colorectal cancer presents at a younger age in Saudis, especially in women. This has a major implication for decisions about the threshold age for screening. The ASR has increased, but is still much lower than in developed countries. The lower overall 5-year survival compared with developed countries is due to lack of screening, a higher proportion of advanced stage cancer at presentation, lack of specialized care outside the major cities and a higher proportion of rectal cancer cases.

Cancer has become a major burden on the health care systems of many countries. Its treatment demands highly sophisticated expertise and mobilization of huge resources. Cancer also has a great impact on the social and economic lives of affected individuals. Since the first report of the Saudi Cancer

Registry in 1994, the incidence of all cancers, including colorectal, has steadily increased.¹ The aim of this analysis was to describe the demographics, incidence and survival rates for colorectal cancer in Saudi Arabia and delineate the implications for the Saudi population with regard to screening.

METHODS

Data on colorectal cancer for the period 1994-2010 was extracted from the Saudi Cancer Registry. The King Faisal Specialist Hospital and Research Center (KFSHRC) Cancer Registry reports were reviewed for the same period and data related to colorectal cancer was also extracted and analyzed.

When relevant, data on colorectal cancer from the Surveillance, Epidemiology and End-Result Program (SEER) (National Cancer Institute, United States [US]) was compared with that of the Saudi population² using the age-standardized rate (ASR). The standard population used by the Saudi Cancer Registry was the World Standard Population.³ In the period 1994-2004, 113576 cases of cancer of all types were registered in the Saudi Cancer Registry. Out of these, there 9889 colorectal cancer cases. The national identity database system was utilized through Al-Elm Information Security Company, a subsidiary of the Ministry of Interior to ascertain the survival status of the cancer cases utilizing the 10 digit national identity number and the full name of the patient in Arabic. Out of 113 576 cases of all cancers, 5141 cases had complete and accurate registration data that allowed the ascertainment of the survival status. Out of these, 549 cases were colorectal cancer cases as documented by histopa-

thology. Survival period was calculated from the date of diagnosis to the date of death or last follow up. If no follow date was available, then the patient was censored at the date of the Al-Elm Company report which documented an alive status. Kaplan-Meier estimator was utilized to calculate the 5-year overall survival. The incidence, median age at presentation, stage of cancer, survival rate, geographic location and distribution of cancer are presented in the results.

RESULTS AND DISCUSSION

Incidence

The estimated national population of Saudi Arabia is 18 707 576 based on the 2010 census. It has an estimated growth rate of 3.2%.⁴ In 1994, 253 cases of colorectal cancer were reported to the Saudi Cancer Registry¹ while in 2010, 1033 cases were reported (Table 1).⁵ This increase was coupled with a nearly two-fold increase in the ASR from 5.0/100 000 in 1994⁶ to 9.6/100 000 in 2010.⁵ This is much lower than the rate observed in the US for all races, which was 46.3/100 000.² The percentage of colorectal cancer cases of all diagnosed cancers increased two-fold from 4.8% to 10.1% over the same period of 1994-2010 (Table 1, Figure 1).^{5,6} This indicates that the rise in incidence is genuine and not at-

Table 1. Number of new cases of colorectal cancer and all cancers per year among Saudis.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Colorectal cancer	253	282	275	288	297	381	377	458	513	573
Males	144	153	138	151	168	190	197	228	275	320
Females	109	129	137	137	129	191	180	230	238	253
Ratio M:F	132	119	100	110	130	99	109	99	116	126
% of all cancers	4.8	5.6	5.5	5.8	5.2	6.6	6.4	7.6	8.1	8.2
All cancers	5,322	5,052	5,000	4,999	5,754	5,732	5,895	6,004	6,355	6,987

Table 1. (cont.) Number of new cases of colorectal cancer and all cancers per year among Saudis.

Year	2004	2005	2006	2007	2008	2009	2010
Colorectal cancer	672	793	776	868	927	1123	1033
Males	375	452	412	473	487	618	541
Females	297	341	364	395	440	505	492
Ratio M:F	126	133	113	120	111	122	110
% of all cancers	9.0	9.9	9.4	9.6	10.1	11.0	10.1
All cancers	7,502	7,993	8,292	9,066	9,202	10,195	10,230

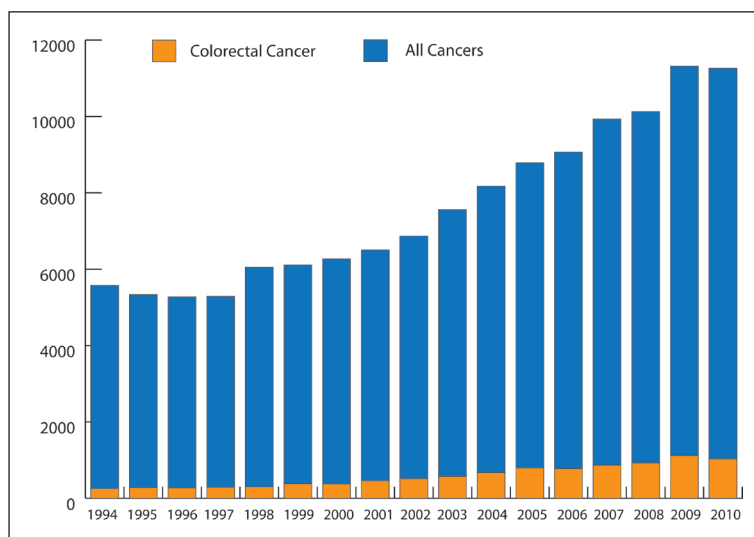


Figure 1. Percentage of colorectal cancers out of all cancers among Saudis.

tributable to better reporting and registration of cancer cases. Life expectancy has increased from 68 years in 1990 to 73 years in 2010.⁷ During the period of 2001-2010, the percentage of individuals older than 45 years of age has tripled from 10.9% to 28.9%.^{9,10} This further indicates that the increase in number of cases reported is attributable to an increase in the size of the older age groups in the Saudi population. This increase is in addition to a real increase in the incidence among those age groups most affected.^{9,10} The increase is most apparent in the age group 65-69 years in which the ASR for colon cancer in men increased from 15.5 to 30.5/100 000 between 2001 and 2010. For women, it increased from 14.7 to 27.2/100 000,^{5,11} about a two-fold increase in both genders.

There was a trend in the last four years for the increase in ASR to slow or approach a plateau at around 9.6/100 000 in 2010 (Table 2) in both men and women (Figure 2). However, the number of new cases reported every year will not plateau as the denominator is expanding due to the natural increase in the older age groups in the Saudi population (Figure 3).

Since 2002, colorectal cancer has ranked as the commonest cancer among men and the third commonest among women with slight predominance

among men compared to women 116:100 (range: 99:100-132:100).^{1,5-12-18} For men and women combined, it is the second commonest cancer in Saudi Arabia. This differs from developed countries where colorectal cancer ranked third among men and second among women.¹⁹ Moreover, it even differs from developing countries where colorectal cancer ranked fourth among men and fifth among women.¹⁹ Saudi men have higher rates of colorectal cancer than men in both developed and developing countries, while in women the rates are similar to those in developed countries over the period 2005-2010.¹⁹

Median age at presentation

Over the period 1994-2010, the median age for the development of colorectal cancer was 60 years (95% CI: 57-61 years) for men and 55 years (95% CI: 53-58 years) for women.⁵ The median age for colorectal cancer for men and women in the US was 68 and 72 years, respectively, during 2004-2010.² Probably, the younger median age at which Saudis are diagnosed compared with Americans is a reflection of a younger Saudi population; 71.1% of the population is younger than 45 years old.⁹ Men in the United States are diagnosed at a younger age than women while in Saudi Arabia they are diagnosed at an older age than women. This is an interesting and consistent finding over the period 1994-2010 that may be attributable to a lower threshold among Saudi women in seeking medical attention.

The younger median age at presentation for Saudis should prompt screening for colorectal cancer at an age earlier than 50 years, which is the standard age for screening recommended in the US.² The ASR for colon cancer in Saudi men in 2010 for the age groups 40-44, 45-49, and 50-54 years was 2.1, 4.9 and 8.2/100 000, respectively. Similarly, the ASR for the same age groups for Saudi women was 5.3, 10.7, 14.2/100 000, respectively. The two-fold increase in the ASR in the age group 45-49 years indirectly indicates that screening should commence at an earlier age, around 45 years for both genders. Screening at the age of 45 years is appropriate for Saudi women who have a median age at presentation of 55 years.

Table 2. Age-standardized rate for the period 2001-2010.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASR (overall)	5.0	5.6	6.6	7.3	8.5	9.2	8.9	8.6	10.5	9.6
ASR (Men)	5.0	5.9	7.3	8.3	9.7	9.7	9.6	9.0	12	9.9
ASR (Women)	5.0	5.3	5.9	6.3	7.2	8.6	8.1	8.2	9.4	9.2

Stages of cancer

The percentage of patients presenting with distant metastasis is high in Saudi Arabia. In 2008, it peaked at 29.2%.¹⁸ In 2010, it was 28.4%.⁵ Over the period 1994-2010 it ranged between 15.6% and 29.2% with the highest percentages reported in the last 10 years. The lower percentages noted in the earlier years are probably due to a lack of accurate radiological staging in the early 1990s. The percentage of patients presenting with distant metastasis in the US has been stable at about 20%,² which is less than in Saudi Arabia over the period 2005-2010. The percentage of localized colorectal cancer in the US for the same period was 39%,² but it was 9.4% for Saudis in 2010, indicating that proportionally more Americans present at an earlier stage,⁵ probably due to colorectal cancer screening in the US, which is lacking in Saudi Arabia. The percentages of regional and unknown stages in Saudis were 36.4% and 25.8% in 2010, respectively.⁵

Survival

In the period 1994-2004, 549 out of 9889 (5.6%) colorectal cancer cases documented in the Saudi Cancer Registry had their deceased-alive status ascertained.

Living status was ascertained through the National Information Center. The estimated overall 5-year survival rate for colorectal cancer for the periods 1994-1999 and 2000-2004 was 44.7% and 44.3%, respectively. It is 44.6% for both time periods combined. The similar rates during the two time periods probably indicates that they accurately reflect the situation in Saudi Arabia prior to 2005. This is corroborated by a report published in 2000, which showed that the 5-year survival rate after curative treatment for rectal cancer for the period 1990-1998 in Saudi was 39%.²⁰ The overall 5-year survival rate in the US for the period 2002-2008 was 65.9%.² The reduced survival of Saudis is probably a reflection of presentation at a later stage of cancer in a country where there is no national program for screening of colorectal cancer. There is also a social taboo on cancer or issues related to the colon and rectum.

The percentage of different stages in the sample of 549 patients were similar to the percentages reported earlier for the entire database: localized 22.2%, regional 47.4%, distant 25.9% and unknown 4.6%.²¹ This gives strength to the survival analysis, as the sample was not skewed towards more advanced cases compared with the large population of Saudi patients with colorectal cancer. The interesting finding is that the 5-year survival rate by stage in Saudi Arabia for local, regional and distant metastasis was 63.3%, 50.2% and 14.7%, respectively,²¹ while in the US for the period 2002-2008, it

was: 89.9%, 69.6%, 11.9%,² respectively. Stage for stage, the 5-year survival rate was higher in the US, indicating another factor at play. Most probably, the quality of care provided to Saudis was lower than that in the US for the period 1994-2004, and was related to the lack of specialized services for management of this type of cancer at all major cities prior to 2005. This conclusion is supported by the comparison of survival data for rectal cancer at KFSHRC compared with other health care facilities in Saudi Arabia as a whole for local and regional disease (Figures 4, 5).

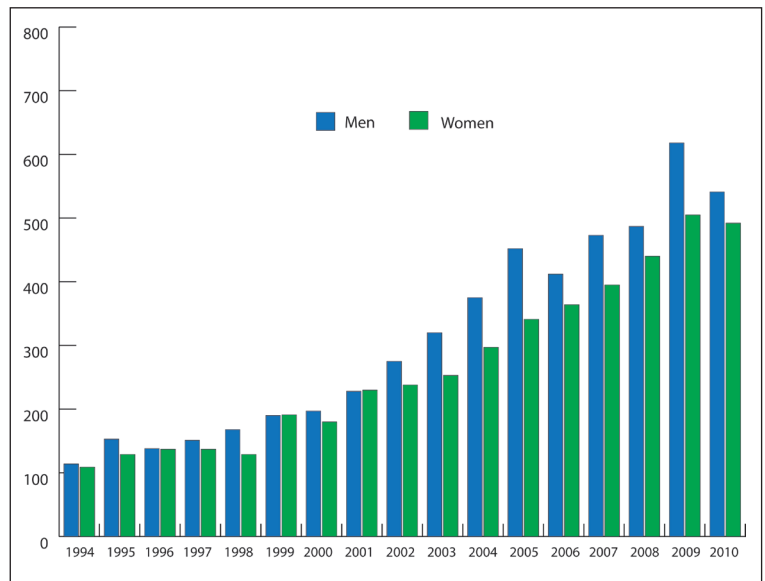


Figure 2. Age-standardized rate in Saudi men and women.

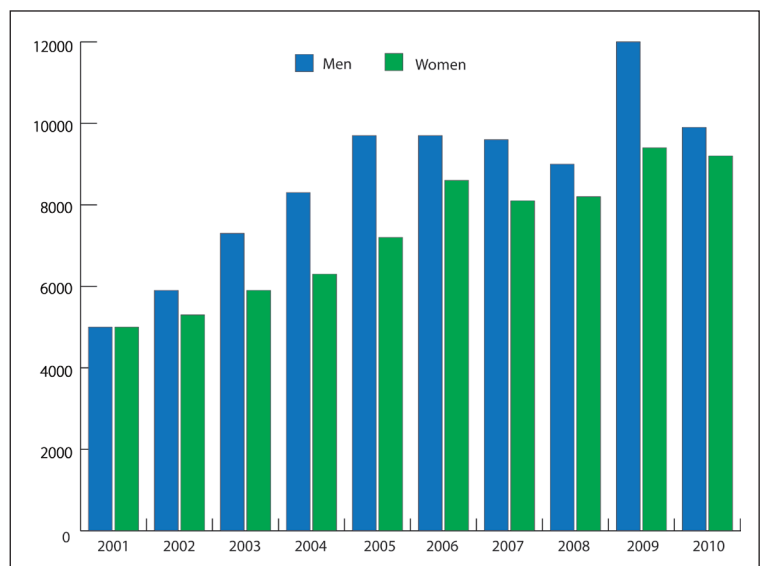


Figure 3. Number of new cases in Saudi men and women.

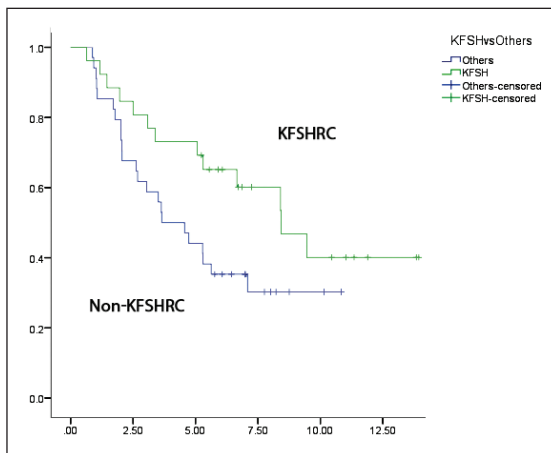


Figure 4. Overall 5-year survival for local stage for King Faisal Specialist Hospital and Research Center compared with other major healthcare institutions in Saudi Arabia.

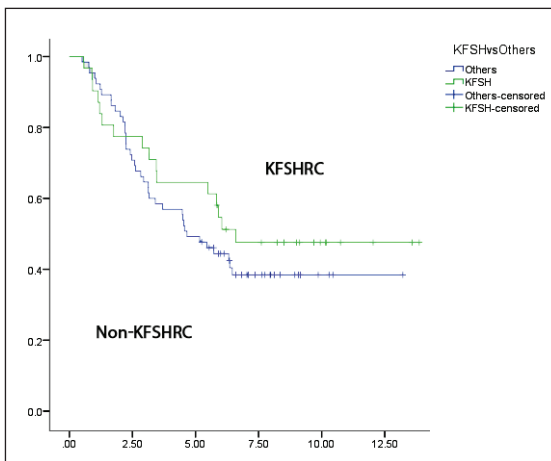


Figure 5. Overall 5-year survival rate for regional stage for King Faisal Specialist Hospital & Research Center compared with other major healthcare institutions in Saudi Arabia.

KFSHRC is a dedicated tertiary center for the treatment of cancer using a multidisciplinary approach and evidence-based strategies for treating mainly rectal cancer cases.²² A sub-analysis of the same sample of 549 cases revealed an overall 5-year survival rate for KFSHRC for regional rectal cancer of 64.8% compared with 49.8% for other Saudi healthcare facilities combined. The survival at KFSHRC is comparable to that of the US, which is 65.9% for the regional stage.² This indicates that patients treated outside of tertiary care centers in Saudi are receiving less quality of care.

In certain cultures women have a lower threshold for seeking medical attention than men. If this is true for Saudi women, then one would expect Saudi women to present earlier in the course of their cancer compared with Saudi men. Ultimately this should translate into better survival data for women compared with men. Indeed this is the case with the 5-year survival for Saudi men being 41% compared with 50.6% for Saudi women²¹ (Figure 6). The 5-year survival rate in the US for those diagnosed in 2002-2008 was 65.9%.² There was no difference between the two genders—65.1% and 64.9% for men and women—respectively.²

Rectal cancer proportion and impact on survival

For the period 1994-2010, rectal cancer comprised 41% of all colorectal cancers (range 42-44%);^{1,5} while in the US, rectal cancer comprised only 28% of all colorectal cancers in 2011.² Rectal cancer is more challenging in terms of treatment and cure compared to colon cancer. In a sub-analysis of all Saudi hospitals excluding KFSHRC, the 5-year survival for colon cancer vs. rectal cancer was 55% and 44.3%, respectively. Rectal cancer has a lower 5-year survival due to the lack of a multidisciplinary approach to treatment at the majority of those other hospitals. Consequently, the higher proportion of rectal cancer among Saudis affects the overall survival.

Geographic distribution

Three major cities of Saudi Arabia have the highest ASR: Riyadh, Mecca and Dammam. Other cities, especially in the South, have lower rates (Figure 7). In Saudi Arabia, when patients are diagnosed with cancer, they tend to seek treatment at major tertiary hospitals in the three major cities since these hospitals have well-developed infrastructures in terms of specialized colorectal surgeons and oncologists. This leads to an artificial inflation of the rates in these three major cities and a decrease in the remote cities, especially in the South. The tumor registry for KFSHRC, which is a major tertiary care center located in the capital Riyadh,

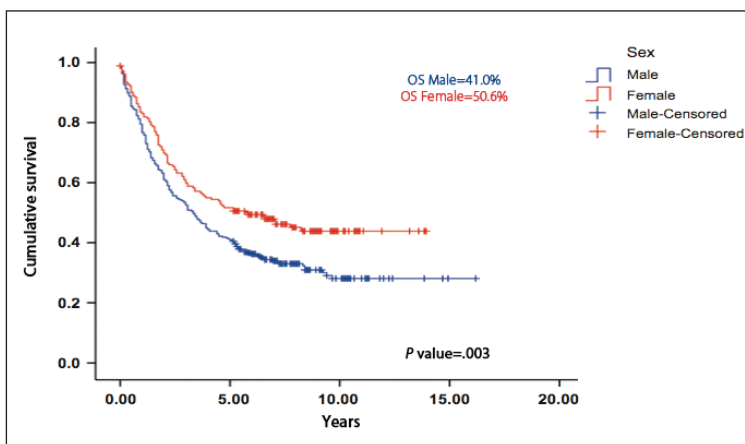


Figure 6. Kaplan-Meier survival curve stratified by gender.

Table 3. Age-standardized rate per 100,000 by age group in Saudi and US [SEER database for the period 2000-2008, Saudi Registry 2007].

Country	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-60
Saudi Arabia	0.6	0.7	1.1	2.5	3.0	8	7.3	15.9
USA	0.5	1.2	2.6	4.9	9.2	17.2	36.2	57

showed that 62.5% of cancer cases treated at the hospital were diagnosed outside Riyadh.²² As more tertiary centers are built in remote cities, their reported rates will increase in the future.

Colorectal cancer in the younger age groups

There is a notion among specialists in Saudi Arabia that colorectal cancer is commoner in the young age groups compared with Western countries, but this is refuted by a comparison of the ASR in Saudi Arabia and the US (Table 3). Age groups younger than 45 years have a lower ASR compared with the same age groups in the US.

LIMITATIONS

This was a retrospective analysis of 15 years of Saudi Cancer Registry data with the possibility of biases stemming from inaccurate staging of patients, inaccurate survival information or difficulties during ascertainment of patient demographics due to an underdeveloped national census system prior to 2001. Survival data for the period 2005-2010 are lacking because the Saudi Cancer Registry does not capture the alive-deceased status. The sample utilized for calculating the survival data might not be powered enough to represent the entire population of colorectal cancer cases housed in the registry.

CONCLUSION

Colorectal cancer presents at a younger age in Saudi Arabia. This may call for lowering the screening age for colorectal cancer to 45 years. The incidence has increased over the past 15 years, but has approached a plateau in more recent years. The ASR is much lower than in the US. Colorectal cancer in the younger Saudi age groups is not more prevalent than in the US. A substantial proportion of patients present at an ad-

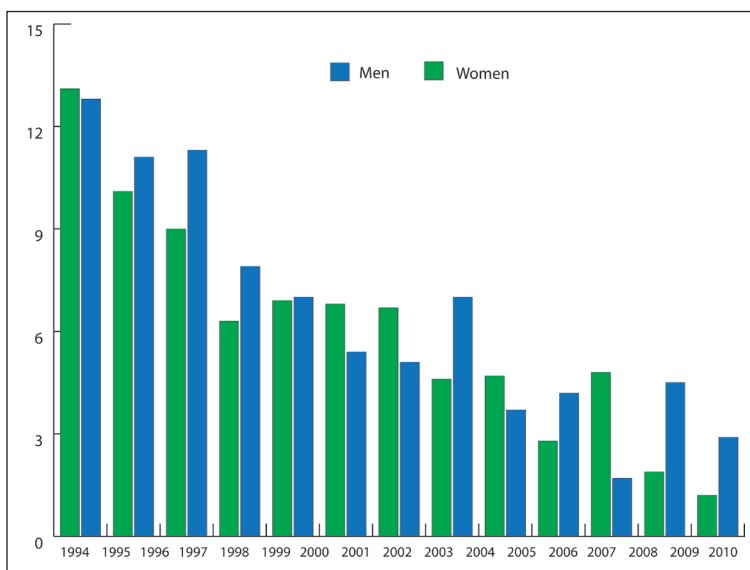


Figure 7. Age-standardized rate in cities of Saudi Arabia.

vanced stage and therefore the 5-year survival rate is lower than in the US. Other factors that may also have lowered survival is the lack of dedicated specialized care along with the fact that rectal cancer represents a higher proportion of all colorectal cancers.

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Conflicts of interest

No potential conflict of interest was reported.

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