

## Female Breast and Gynecological Cancers in Aden, Yemen: An Epidemiological Study

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### Abstract

**Introduction:** Cancer of the breast and gynecological organs are the most common female cancers. Despite the growing burden it continues to receive low priority, as a result of lack of awareness about the magnitude of the current and future cancer burden among policy makers. This study aimed to determine the incidence of breast and gynecological cancers among Aden female inhabitants during 2010 and to identify the subgroup at high risk in order to target cancer control and preventive opportunities.

**Methods:** This is an observational descriptive study using routine database and individual files of new cancer cases registered officially at Al-Amal Oncology Unit of Al-Gamhouria Modern General Hospital, Aden, Yemen during the period between January 1st through 31st December 2010. The crude incidence rate (CIR), age-specific incidence rate (ASIR) and world age-standardized incidence rate (ASR) expressed as the number of all new cancer cases per 100,000 female population per year were calculated.

**Results:** A total of 225 new female cancer cases were diagnosed among Aden residents, of which breast cancer was the most common cancer (34.7%) with CIR of 28.1/105, and ASR of 38.0 /105 females. The gynecological cancers accounted for 23.1% of all female cancer cases, distributed into cervix uteri (10.7%) with CIR of 8.7/105 and ASR of 10.8/105; ovarian (9.8%) with CIR of 7.9/105 and ASR 10.5/105 while corpus uterus (2.7%); CIR 5.0/105 and ASR of 6.9/105.

**Conclusion:** Cancers of the breast and gynecological organs are significant health problem in Aden, Yemen. This burden could be substantially reduced through broad and equitable implementation of effective cancer control and preventive interventions including vaccination and tobacco control.

**Keywords:** Cervix Uteri, Corpus Uterus, Incidence, Ovarian, Control.

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## دراسة وبائية لسرطانات الثدي والجهاز التناسلي الأنثوي عند النساء في عدن، اليمن

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### ملخص الدراسة

**المقدمة:** تعتبر السرطانات التي تصيب الثدي والجهاز التناسلي الأنثوي من أكثر أنواع السرطانات شيوعاً بين الإناث. وعلى الرغم من العبء المتزايد، إلا أنها لا تزال تحظى بأولوية منخفضة، وذلك قد يكون نتيجة نقص الوعي بحجم عبء المشكلة الحالي والمستقبلي بين صانعي السياسات والقرارات الصحية. أن الهدف من هذه الدراسة هو تحديد معدلات ونسبة الإصابة بسرطانات الثدي والجهاز التناسلي الأنثوي بين نساء محافظة عدن اليمن خلال عام 2010 وكذلك تحديد الفئات والشريحة السكانية ذات الخطورة الأعلى للإصابة بهذه السرطانات وذلك من أجل زيادة فرص المكافحة والوقائية من المرض.

**المنهجية:** هذه دراسة وصفية قائمة على الملاحظة باستخدام قاعدة بيانات وملفات مرضى سرطان الثدي والجهاز التناسلي الأنثوي الجديدة خلال الفترة ما بين 1 يناير وحتى 31 ديسمبر لعام 2010 والمسجلة في وحدة الأمل لعلاج الأورام في مستشفى الجمهورية الحديث العام، عدن، اليمن. تم حساب معدل الإصابة الخام ومعدل الحدوث المعياري للعمر ومعدل الحدوث حسب العمر معبراً عنه بعدد جميع حالات السرطان الجديدة لكل 100,000 امرأة من السكان سنوياً. وعرضت النتائج باستخدام النسب المئوية.

**النتائج:** تم تسجيل ما مجموعه 225 حالة سرطان جديدة بين النساء المقيمت في محافظة عدن-اليمن. وكان سرطان الثدي هو الأكثر شيوعاً (34.7%) بمعدل إصابة خام بلغ 28.1، ومعدل الحدوث المعياري للعمر 38.0 لكل 100,000 امرأة. وقد بلغ عدد النساء المصابات بسرطانات الجهاز التناسلي 23.1% من جميع حالات السرطان المسجلة بين الإناث، موزعة على النحو التالي: 10.7% سرطان عنق الرحم بمعدل الإصابة الخام بلغ 8.1، ومعدل الحدوث المعياري للعمر 10.8، و9.8% سرطان المبيض بمعدل إصابة خام بلغ 7.9، ومعدل الحدوث المعياري للعمر 10.5، و2.7% سرطان الرحم بمعدل إصابة خام بلغ 5.0، ومعدل الحدوث المعياري للعمر 6.9 لكل 100,000 امرأة.

**الاستنتاج:** يعد سرطان الثدي وسرطانات الجهاز التناسلي الأنثوي أحد أكبر المشكلات الصحية في محافظة عدن-اليمن. وعليه، يمكن تقليل هذا العبء من خلال التنفيذ الواسع والعادل للتدخلات الفعالة لمكافحة السرطان والوقاية منه بما في ذلك التطعيم ومكافحة التبغ.

**الكلمات المفتاحية:** عنق الرحم، الرحم، وقوع الإصابة، المبيض، التحكم.

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## Introduction

**C**ancers of the breast and gynecological organs i.e., cervix uteri, ovarian, corpus uterus, fallopian tube, vagina and vulva as well as choriocarcinoma are an important cause of morbidity and mortality among women and constitute a major public health problem and health burden worldwide [1-5].

Breast cancer is the most commonly diagnosed cancer in women; about one in four of all new cancer cases diagnosed in women worldwide, and it is the leading cause of cancer death in women [2,3]. The major known risk factors for breast cancer include female sex, age, and family history, as well as reproductive factors such as early age at menarche, later menopause, nulliparity, and first childbirth after age 30, all of which are independent risk factors [6,7].

Gynecological cancers include three of the seven most common cancers among women worldwide. Cervix uteri cancer is the 4<sup>th</sup> most commonly diagnosed cancer among women, with corpus uterus and ovarian cancers ranking 5<sup>th</sup> and 7<sup>th</sup>, respectively [3]. The incidence of gynecological cancer is known to be site-specific and each have an individual trend [1,3,5]. Countries in developing regions have the highest incidence of cervix uteri cancer, while more developed countries have lower cervix uteri cancer incidence, with age-standardized incidence rate as low as  $2/10^5$  [3]. Unlike cervix uteri cancer, the age-standardized incidence and mortality rates of corpus uterus and ovarian cancers are highest in more developed countries

and lowest in the developing countries [1,3].

Generally, risk factors for gynecological cancers include behavioral, reproductive, hormonal and genetic factors [5,8-10]. Corpus uterus and ovarian cancer are most often associated with increasing obesity, decreasing parity and other reproductive factors, and estrogen-related exposures [5,7] while cervix uteri cancer is distinct in that chronic infection with the sexually transmitted human papillomavirus (HPV) is necessary, and the disease predominantly affects women in low- and middle-income countries (LMICs) including Yemen [9,10].

In Yemen, fighting against breast and gynecological cancers appears to be one of the major challenges of women reproductive health. This struggle involves the setting up of a cancer registry, increase in cancer risk factors, lack of organized screening, discovery of the disease at advanced stages, incomplete workups for extension and inadequate therapeutic management due to unmet therapeutic means including radiotherapy and chemotherapy [11-15]. All these explain the particular burden and prognosis of breast and gynecological cancers in the country.

To our knowledge, data about female breast and gynecological cancers specific to the population of Aden governorate in the national and international publications are very rare. Therefore, the purpose of this study is to give more information about the incidence rates of breast and gynecological cancers diagnosed among Aden female inhabitants during 2010 and to identify the segments of the women with highest

risk for developing those cancers towards the establishment of a case for a cancer registry, which will help as a database in the design of effective programs and target the prevention/control opportunities to improve the health of the population and reduction of cancer deaths especially among women in Yemen.

## Methods

This was an observational study conducted after the study protocol was approved by the Ethical Committee of the Faculty of Medicine and Health Sciences, University of Aden, Yemen; using routine database and individual patient files registered at Al-Amal Oncology Unit (AOU) in Al-Gamhouria Modern General Hospital, Aden, Yemen, during the period between January 1st and December 31st, 2010.

Aden governorate is the commercial capital of the republic of Yemen with a total area of 6,980 km<sup>2</sup>, and according to the 2004 census, the governorate had a population of 571,777 within the eight districts of the governorate, of which about 277,416 (48.5%) were females [16]. AOU was established in December, 2007 as a branch of the Yemen National Cancer Control Foundation. It is a referral center and any cancer patients who require chemotherapy treatment are predominately transferred to the AOU specially for those who have limited financial resources and are unable to afford the expensive treatments at private hospitals or travel overseas. Thus, as AOU serves as a referral facility for all hospitals in Aden governorate and has the treatment is offered free for cancer patients, therefore, it can be

presumed that all cancer cases in Aden governorate are refereed [13,14].

Once a patient approaches the AOU, a file is commenced that contains all the previous patient's medical reports and sociodemographic factors. Diagnoses of cancer cases were based on clinical, histopathology, and radiological, as appropriate. The information captured in the system includes primary site (topography), date of diagnosis, demographic characteristics age at the time of diagnosis, gender, occupation, marital status, reproductive history and menstrual history. Initially, data were collected and entered into a centrally-created data structure for each district after which the data were cleaned, verified and compiled into single governorate database.

Data entry and analysis were performed using an Excel spreadsheet, Version 2013 (Microsoft Corp., Redmond, Washington, USA) then data were processed by the Statistical Package for Social Science (SPSS) Version 20, IBM incorporation and licensors 1989, 2011 New York USA.

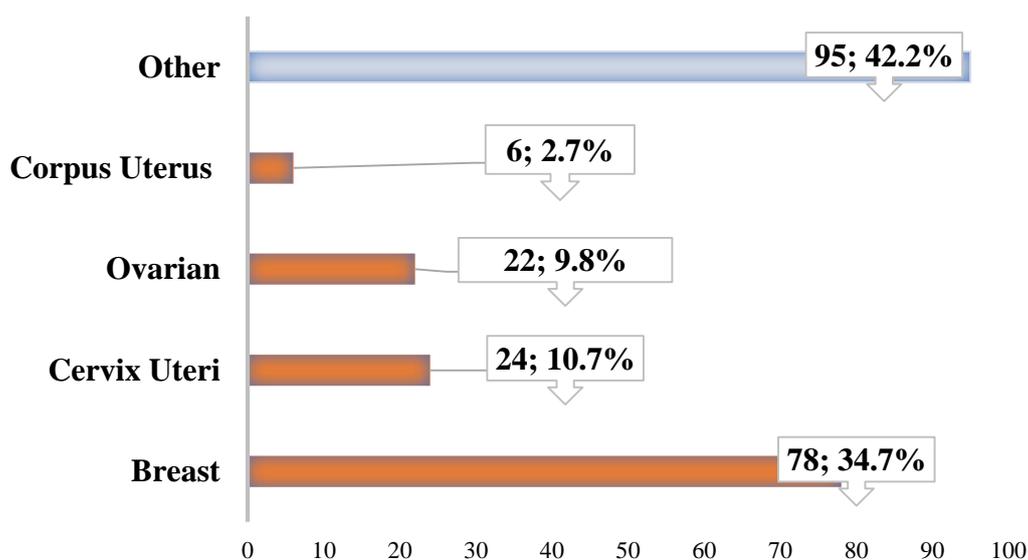
The crude incidence rate (CIR), age-specific incidence rate (ASIR) and age-standardized incidence rate (ASR) per 100,000 female population per year were all calculated. The world standard population was also used for direct standardization to calculate ASR per 100,000 populations [17]. The age category classification based on age groups of five-year intervals was used (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, ≥75). Results were presented in the form of percentages and

proportions. Further, all records were confidentially handled and patients name were coded into numbers to guarantee their property.

## Results

There were 396 new cancer incident cases in Aden governorate reported during the period of the study, of which; 225 cases (56.8%) were females with CIR and ASR for all female cancer sites combined were 81.1 and 113 per 100,000 female population respectively.

Both breast and gynecological cancers accounted for 57.8% of the 225 female new cancer cases incidents in Aden. Breast cancer was the most common cancer among female (34.7%) followed by cancers of gynecological organs (23.1%) of all cancer cases among females, where cancer of cervix uteri was the most common gynecological cancer accounted for (24 cases, 10.7%). Ovarian cancers were the third most common cancer among females (9.8%) while corpus uterus was third reported gynecological cancer (2.7 %) as shown in Figure 1.



**Figure 1:** Female Breast, Cervix Uteri, Ovarian and Corpus Uteri among New Female Cancers Cases, Aden, Yemen, 2010, (n=225)

Breast and gynecological cancers incidence was relatively low in young adult's female aged 15-24 years whereas greater in middle (25-49 years) and old adults (50-74 years) females and the mean age at the time of cancer diagnosis was lower among breast, cervix uteri and ovarian cancers cases than among cases with corpus uterus cancer (47.5; 48.2 and 44.2 years vs. 62.8 years). Most the

cases were married and housewives with negative family history of cancer and normally onset menstrual cycle. However, the majority of breast and cervix uteri cancers cases were nulliparous women whereas the majority of ovarian and corpus uterus cancers cases were multiparous women (Table 1).

**Table 1:** Background Information of Female Breast, Cervix Uteri, Ovarian and Corpus Uterus New Cancers Cases among Female Population, Aden, Yemen, 2010.

Mean Age $\pm$ SD*; (Range) in Year	Cancer Type (n=130)							
	Breast (n =78)		Cervix Uteri (n =24)		Ovarian (n=22)		Corpus Uterus (n =6)	
	No.	%	No.	%	No.	%	No.	%
<b>Age years</b>								
Young Adult (15-24)	02	02.6	0	0.0	02	09.1	0	0.0
Middle Age Adult (25-49)	43	55.1	14	58.3	06	27.3	01	16.7
Old Adult (50-74)	33	42.3	10	41.7	14	63.6	05	83.3
<b>Marital Status</b>								
Married	44	56.4	11	45.8	18	81.8	03	50.0
Single	28	35.9	03	12.5	01	04.6	01	16.7
Divorced/Widow	06	07.7	10	41.7	03	13.6	02	33.3
<b>Occupation</b>								
House Wife	62	79.5	20	83.4	16	72.7	03	50.0
Unemployed/Retired	09	11.5	02	08.3	06	27.3	02	33.3
Employed	07	09.0	02	08.3	0	0.0	01	16.7
<b>Family History of Cancer</b>								
Positive	23	29.4	02	08.3	16	72.7	01	16.7
Negative	55	70.6	22	91.7	06	27.3	05	83.3
<b>Menstrual History</b>								
Early menarche (<12 years)	15	19.2	06	25.0	06	27.3	01	16.7
Late menopause (>45 years)	08	10.2	04	16.7	02	09.1	02	33.3
<b>Parity</b>								
Nulliparous (0 Childbirth)	44	55.3	14	58.3	09	41.0	02	33.3
Multipara ( $\geq$ 1Childbirth)	34	44.7	10	41.7	13	59.0	04	66.7

\*SD Standard deviation for the mean age at the time of cancer diagnosis in years

The CIR and the world ASR for breast, cervix uteri, ovarian, corpus uterus cancers are reported in Table 2. The CIR for breast cancer was 34.7 per 100,000 females with highest

incidence observed in Al-Mansura district with 45.5 per 100,000 females whereas the world ASR was 38.0 per 100,000 females.

**Table 2:** Occurrence, Crude and Age Standardized Incidence Rates/100,000 Female Population for Breast, Cervix Uteri, Ovarian and Corpus Uterus Cancers, Aden, Yemen, 2010 by District of Residency

Characteristic	Cancer Type (n=130)											
	Breast (n =78)			Cervix Uteri (n =24)			Ovarian (n =22)			Corpus Uterus (n =6)		
<b>The Crude Incidence Rate (CIR) per 100,000 female Inhabitants by District</b>												
<b>District</b>	<b>No.</b>	<b>%</b>	<b>CIR</b>	<b>No.</b>	<b>%</b>	<b>CIR</b>	<b>No.</b>	<b>%</b>	<b>CIR</b>	<b>No.</b>	<b>%</b>	<b>CIR</b>
Al-Mansura	24	30.8	45.4	0	0.0	0	05	22.7	09.4	01	16.7	02.1
AshShaikh Outhman	15	19.2	31.2	05	20.9	06.0	01	04.5	03.0	0	0.0	0
Craiter	12	15.4	32.7	04	16.7	10.4	06	27.3	02.1	03	50.0	08.2
Al-Mualla	08	10.3	23.6	02	08.3	23.9	01	04.5	08.0	0	0.0	0
Khur Maksar	06	07.7	27.0	0	0.0	0	01	04.5	04.5	0	0.0	0
Dar Sad	05	06.4	13.3	09	37.5	12.7	03	13.6	12.7	02	33.3	05.4
Al-Tawahi	05	06.4	31.6	02	08.3	10.9	02	09.1	16.3	0	0.0	0
Al-Buraiqeh	03	03.8	09.8	02	08.3	06.5	03	13.6	09.8	0	0.0	0
<b>Aden (Overall)</b>	<b>78</b>	<b>100</b>	<b>28.1</b>	<b>24</b>	<b>100</b>	<b>8.7</b>	<b>22</b>	<b>100</b>	<b>7.9</b>	<b>06</b>	<b>100</b>	<b>5.0</b>
<b>The Age Standardized Incidence Rate (World)</b>												
	38.0			10.8			10.0			6.9		

Overall, the incidence of cancer found to be increasing with age. Breast cancer incidence rate in the age group 20-24 years was 2.6 per 100.000 females with increasing rate toward the peak at 45-49 years and 50-54 years (128.5 and 155.7 per 100.000 females respectively) followed by a steep decrease toward 100.8 per 100.000 females in age group 65-69 years, the peak was repeated in 70-74

(196.9 per 100.000 females). With regards to the gynecological cancers, the maximum incidence was in the age group 65-69 years. In this age group, ranking change in favor of the highest rate for corpus uterus cancer with 196.9 per 100.000 females, followed by ovarian and cervix uteri cancers (134 and 67 per 100.000 females) as illustrated in Table 3.

**Table 3:** Age-Specific Incidence Rate (ASIR)/100,000 Female Population for Breast, Cervix Uteri, Ovarian and Corpus Uterus Cancers, Aden, Yemen, 2010

Characteristic	Cancer Type (n=130)			
	Breast (n =78)	Cervix Uteri (n =24)	Ovarian (n=22)	Corpus Uterus (n=6)
<b>Age Group (years)</b>				
15-19	03.5	0	03.5	0
20-24	02.6	0	02.6	0
25-29	18.5	0	06.2	0
30-34	05.7	0	11.5	0
35-39	43.5	0	07.3	0
40-44	96.9	11.0	06.9	0
45-49	128.5	22.0	32.1	8.0
50-54	103.7	07.0	52.8	0
55-59	155.7	64.0	0	14.0
60-64	112.3	41.0	67.4	0
65-69	100.8	67.0	134.0	196.9
70-74	196.9	34.0	0	0

## Discussion

Breast and gynecological cancers are among the most common cancers in women and hence an important public health issue. Due to the lack of cancer awareness, variable pathology, and dearth of proper screening facilities in most of developing countries including Yemen, most of the cases report at advanced stages, which adversely affecting the prognosis and clinical outcomes [1,14,15]

The reported cancer ASR in our study among females was 113.0 per 100,000 female inhabitants, which is disagrees with rates from other selected registries in the region. For example, it was higher than the reported ASR in Saudi Arabia (39.7); United Arab Emirates (UAE) (45.2) Oman (51.3); Jordan (70.0) and Bahrain (106.3); while less than that reported in Egypt (115.2) in females [18-20]. Aden governorate, in particular, was considered as a

pioneer in providing public health services in Yemen. However recently, there is a noticeable growing trend for private hospitals, health centres, and clinics [11,12]. This growth in health services over the last decades has contributed to the increased reporting of cancer cases.

Incidences of breast cancer exceed all female cancer worldwide [1-4]. In this study breast cancer is the most common cancer of all female cancers registered. Risk factors identified includes: young age, nulliparity, early age at menarche, late age at menopause and positive family history. Several Yemeni studies confirmed that breast cancer is the first cancer in women and Yemeni breast cancer patients are diagnosed at a young age [12-14]. Moreover, the average age at breast cancer presentation in Arabic populations is ten years earlier than in westernized countries [21]. Breast cancers diagnosed in young women usually have more aggressive biological

behaviors and tend to be at a more advanced stage of cancer at diagnosis, with a poorer overall prognosis, among patients compared with those greater than 50 years of age [22]. Thus, according to the risk factors identified we can identify segments of Aden population at high risk for developing breast cancer and suggest prevention and/or control strategies.

In the present study, gynaecological cancers accounted for 23.2% of all cancer cases diagnosed among Aden female inhabitants. This is high figure compared to the locally reported one [15] as well as Kongo [23] and India [24] values.

Cervix uteri cancer was the most frequent gynecological malignancies followed by ovarian cancer and corpus uterus cancer. Similar ranking is reported in most developing countries where well organized screening programmes usually do not exist [2,3,5,23,24]. However, these rankings were inconsistent with those previously reported in Yemen [12,15] and registries of some Middle Eastern countries, such as, UAE, Saudi Arabia and Egypt [18,20], where ovarian cancer come first.

It was documented that the trends in incidence rate of cervix uteri cancer are differ by age and socio-demographic features [2,5,9,15]. No significant trend in the incidence of cervix uteri was observed in those aged less than 40 years while the peak incidence at presentation of cervix uteri cancer was in the 40-49 years' age group. Similar findings are observed in western Asia and Muslim countries [2]. This late diagnosis may occur due to lack of national cancer screening program in Yemen. In addition, there is evidence that cervix

uteri cancer incidence is greater among women of lower classes, those less educated with a larger number of children [2,5,9,15]. Cervix uteri cancer is considered to be among the most preventable cancers because of its slow progression, the availability of screening, and widespread access to the HPV vaccine however, screening levels are low in our general population [2,10]. Thus, in order to increase this, it is necessary to carry out specific health education sessions for men and women to facilitate and improve health care seeking behavior.

Ovarian cancer is an important public health problem especially, as the forms of ovarian cancer are so varied, and each with different biology and prognosis [1,2,5]. Racial and geographic disparities in incidence have stimulated research into epidemiological factors associated with the disease, and studies indicate that the traditional risk factors often cited for ovarian cancers may not be universally applicable [5,24,25]. On the other hand, ovarian cancer is known to be predominantly a disease of older women with incidence rising steeply after the menopause and over 80% of new diagnoses are normally seen in women over the age of 50 years [1,5,25]. The present study, demonstrated a connection between old age and ovarian cancer which is low in women under the age of 40 years, and rises steeply after the fifth decade to reach a peak in the 60- to 69-year-old age group. These findings of old age and the occurrence of ovarian cancer in this study and other studies may be quite important in understanding the epidemiology of the disease [15,24,25]. Advanced stage diagnosis requires long, complex, very aggressive and costly

treatment. Thus, the effective management of ovarian cancer in LMICs including Yemen poses a great challenge [1-3,24,25].

Corpus uterus cancer is commoner in developed countries than in developing countries [1,3]. In the current study, corpus uterus was the third common gynecological cancers reported among Aden female's inhabitant though, reported low CIR and ASR. Low incidences are found in most of Asian and African countries [1,5,15,24,25]. Thus, we can say that our findings are consistent with some previous studies carried out worldwide.

### Conclusion

Findings of the study indicated that cancers of the breast and gynecological organs are significant health problem in Aden, Yemen. This, burden could be substantially reduced through broad and equitable implementation of effective cancer control and preventive interventions including vaccination, tobacco control, etc. Moreover, no large site-specific, population-based epidemiological study has been done so far. These studies need to be done to find out the differences in the epidemiological profile of cancers, and to study the risk factors associated with them. This may also suggest the preventive measures to deal with the increased incidence of cancer in Yemen.

### Disclosure

The authors indicated no potential conflicts of interest.

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