RESEARCH COMMUNICATION

Population-based Survival from Cancers of Breast, Cervix and Ovary in Women in Mumbai, India

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Abstract

Background: Breast, cervix and ovarian cancers contribute more than 45% of the total in women in Mumbai and survival proportions for these neoplasms are very high in most developed populations in the World. The authors here report and discuss the population-based survival for these cancers in Mumbai, India.

Methods: Follow-up information on 4865 cancers of breast, cervix and ovary, registered in the Mumbai Population Based Cancer Registry for the period 1992-1994 was obtained by a variety of methods, including matching with death certificates from the Mumbai vital statistics registration system, postal/telephone enquiries, home visits and scrutiny of medical records. The survival for each case was determined as the duration between the date of diagnosis and date of death, date of loss to follow-up or the closing date of the study (December 31st, 1999). Cumulative observed and relative survival was calculated by the Hakulinen Method. For comparison of results with other populations, age-standardized relative survival (ASRS) was calculated by directly standardizing age specific relative survival to the specific age distributions of the estimated global incidence of major cancers in 1985. The log rank test was used in univariate analysis to identify the potentially important prognostic variables. The variables showing statistical significance in univariate analysis were introduced stepwise into a Cox Regression model to identify the independent predictors of survival.

Results: The 5-year relative survival rates were 46.2% for breast, 47.7% for the cervix and 25.4% for the ovary. Higher survival was observed for those younger than 35 years for all these three sites. For each, survival declined with advancing age. Single patients who remained unmarried had better survival. For all sites Muslims had a better and Christians a lower survival as compared to Hindus. Education did not appear to be of significance. Survival decreased rapidly with advancing clinical extent of disease for all sites. With localized cancer, 5-year rates ranged from 54.7% to 69.3%, for regional spread 20.4% to 41.6% and distant metastasis not a single site recorded more than 5%. On multivariate analysis, age and extent of disease emerged as independent predictors of survival for all the sites.

Conclusion: All the sites included in the study demonstrated moderate survival rates with significant variation. Comparison with other populations revealed lower survival rates as compared to developed countries, particularly for breast and ovary. In Indian populations survival proportions did not show much variation for these cancers. Early detection and treatment are clearly important factors to reduce the mortality from these cancers.

Key Words: Survival - Prognosis - Breast - Cervix - Ovary - Socio-economic status - Stage - Extent of Disease

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Introduction

Breast cancer is the most common malignancy affecting women more than 1050000 new cancer cases occurred world wide annually with nearly 580000 cases occurring in developing countries. Cervical cancers is the second most common cancer in women world wide with more than 470000 new cases per year, more than 80% occur in developing countries. About 190000 new cases from ovarian cancers are estimated to occur annually world wide, mostly in developed countries (Ferlay et al., 2001).

It has been well documented that the frequencies of cancers of the breast, cervix and ovary are influenced by reproductive factors. There is a certain similarity in the etiology of cancers of the breast and ovary and somewhat reverse for cancer of the cervix.

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In Greater Mumbai, cancers of breast, cervix and ovary accounts 46.5% of total female cancers (Kavarana et al., 2003). In Greater Mumbai population, it has been shown that there has been increasing trend in age adjusted incidence rates for breast and ovarian cancers (Yeole et al., 1990; Kavarana et al., 2003) and decreasing trend for cervical cancers (Yeole et al., 1989; Kavarana et al., 2003).

To estimate the population based survival proportions for these cancers, the data registered for the years 1990 to 1994 in Greater Mumbai has been utilized. A total of 5440 subjects with these cancers were registered during 1992-94 contributing 46.5% in females of total cancers. Survival data for these cancers are available mostly for developed countries. Recently survival data for these cancers for some developing countries are published (Sankaranarayanan et al., 1998). In this paper, an attempt has been made to estimate the population based survival proportions for these cancers in Mumbai-Indian population and compared this study with those other populations. For these sites, survival rates are fouind to be always higher for the populations of developed countries with the populations of developing countries (Miller et al., 1993; Berrino et al., 1999).

Materials and Methods

The Mumbai (Bombay) Cancer Registry, the first population-based registry in India, was established in 1963. It registers all incident cases occurring in the resident population of Mumbai (currently 11 million). The registration system is active whereby the registry staff visit more than 150 data sources (hospitals, clinic, nursing homes and laboratories) in Mumbai and surrounding areas where cases are likely to be diagnosed and/or treated to identify to collect required data on all cancer cases (Kavrana et al., 2003). Data from death certificates mentioning "cancer" or "tumor" are obtained from Mumbai Municipal Corporation. Internal quality control measures are regularly applied to ensure the completeness and reliability of collected data. It has been shown that the quality of Mumbai Cancer Registry data is reliable and complete (Yeole and Jussawalla 1988). It has been also shown that there has been a substantial improvement in reliability and completeness of Mumbai Cancer Registry data from 1964 to 1997 (Yeole 2001).

A total of 5440 subjects with the cancers of breast, cervix and ovary were registered in Greater Mumbai during 1992-94. Of these cases (78.9%) were diagnosed microscopically, (16.5%) were diagnosed by clinical investigations and (4.6%) were registered on the basis of information available on death certificates only (DCO). DCO cases are excluded from the final analysis as date of incidence and date of death are assumed to be the same for this cases and hence the survival for these cases will be Zero. Finally n=4865 cases were considered for further analysis. Data on religion, education, marital status, age at diagnosis, incidence date, histology, and clinical extent of disease were available from the records of the registry.

The cases in the study were matched against death certificates mentioning "cancer" or "tumor" as the cause of death for the period 1992-99 from the Mumbai Municipal Corporation. For unmatched cases, enquiries about the status of their current health, letters were sent, accompanied by envelopes with postage paid for replies, the few patients with telephones were called with enquires. For those cases in which no information was obtained after theses efforts, home visits were made by social workers employed by the registry. For patients who could not be traced by house visits, case records from reporting hospitals, if available, were scrutinized to determine the date of patient's last visit to a clinic.

The survival of each case was determined by the time difference (in days) between the date of incidence (index date) and date of death, date of last follow-up, are or closing date of follow-up (December 31st, 1999). The date of diagnosis was the first date consultation with a doctor when the diagnosis of cancer was made, the date of first admission at a hospital for cancer, or the date of diagnosis of invasive cancer on a pathology report. Cumulative observed and relative survival probabilities were calculated using the method described by Hakulinen method (Hakulinen et al., 1982; Hakulinen et al., 1988) To calculate observed survival, death from any cause was considered failure, and the subjects who were last to follow-up prior to the closing date as well as those known to be alive on closing date were censored on those dates relative survival, which indicates the excess risk of dieing from the disease was calculated as a ratio of the observed survival to expected survival in a group of people in the general population similar to the diseased group with respect to age, sex, and calendar period of observation. The expected survival was calculated based on a life table constructed from mortality from all causes of death in Mumbai (Bombay Municipal Corporation 1990)

To compare the results of the study with those for other populations, age standardized relative survival (ASR) was calculated for the entire group of the patients and for the age group 0-74 only, by directly standardizing (ASR's) to the specific age distributions of the estimated global incidence of a major cancers in 1985 (Sankarnarayan et al 1998). The log rank test was used in a univariate analysis to identify the potentially important prognostic variables. The variables that showed statistical significance in univariate analysis were introduced stepwise into a Cox regression model to identify the independent predictors of the survival (Cox et al 1972).

Results

Complete follow-up details for five year's after the incidence date was available for 89.4% of included cases (n=4865), and the rest were lost to follow up during the first five years after the index date. Observed and relative survival rates at 1,3,5 years from diagnosis for cancers of breast, cervix and ovary are given in Table 1. The lowest relative survival was observed for patients with ovarian cancers (25.4%) and the highest survival was observed for cervical

cancer (47.7%). The 5-year relative survival for breast cancer was (48.6%) (Table 1, Fig. 1).

Higher was observed for those younger than 35 years than for other age groups for all three cancers (Table 2). For each cancer survival declined with advancing age. The lowest ASRs for those ages 0-74 years were observed for cancer of the ovary (25.0%) and higher for the breast (48.6%) (Table 2).

Single patients who remained unmarried had better survival rates than others except for the breast cancer. Muslims had a better survival and Christians had poor survival as compare to that of for Hindus for all the sites, where as education did show increasing trend in survival with increase in education level for all the sites (Table 3).

Information on clinical extent was available in about 90% cases for these sites. The percentage localized stage comprised about 35% for breast 30% for ovary and 20% for cervix. The percentage for regional spread was maximum of 63.7% for cervix and only 10.3 for ovary. Percentage for distant metastases were recorded highest for ovarian cancer (46.0%) followed by breast (10.0%) and cervix (5.6%). Survival decreased rapidly with advancing clinical extent of disease for all the sites. Survival for localized cancer ranged from 54.7 % to 69.7%. But it ranged from 29.4% to 41.4% for regionally spread disease at different sites and not more than 5% for any site with distant metastasis (Fig. 2, 3 and 4).

In univariate analysis survival differences reached statistical significance for age, education and extent of disease for all the sites. Survival difference did not reached statistical significance only in marital status. Radiation therapy for ovarian cancer, surgery for breast and cervical cancer showed better survival than other modalities (Table 3). The differences in survival by treatments was a reflection of the clinical extent of disease based on which different modalities might have been chosen for treatment. Survival by selected socio-economic indicators, such as sex, age,

Table 1. Observed and Relative Survival by Site for Cancers of Breast, Cervix and Ovary, Greater Mumbai, 1992-94

Site	Number	Observed Survival (%)			Relative Survival (%)		
		1 Year	3 Year	5 Year	1 Year	3 Year	5 Year
Breast	2516	76.0	51.5	41.8	77.5	54.7	46.2
Cervix	1620	77.0	55.9	44.0	78.2	58.7	47.7
Ovary	729	51.0	27.5	23.3	51.9	29.0	25.4

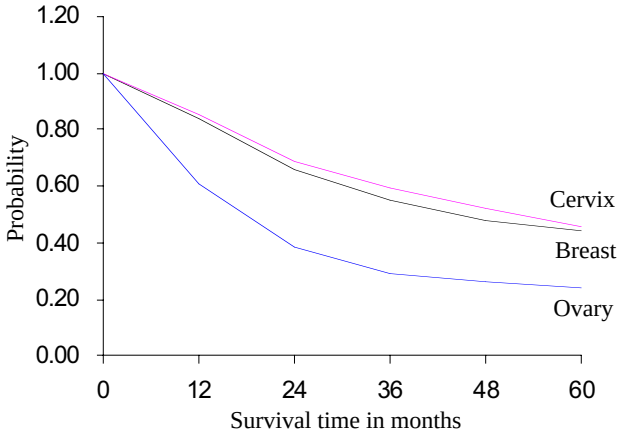

Figure 1. Probability of Survival from Breast, Cervix and Ovary in Mumbai, India

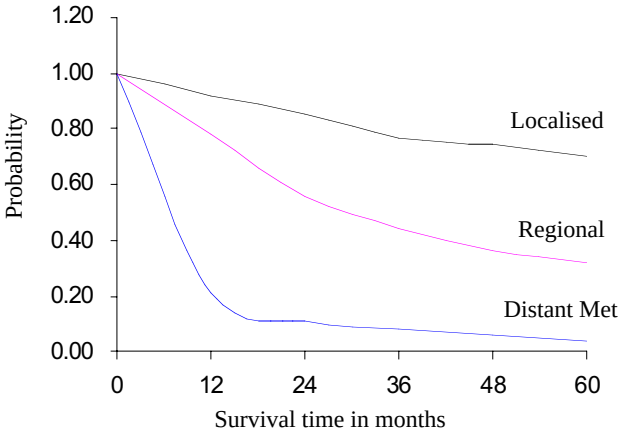

Figure 2. Survival from breast cancer by clinical extent of disease, Mumbai, India

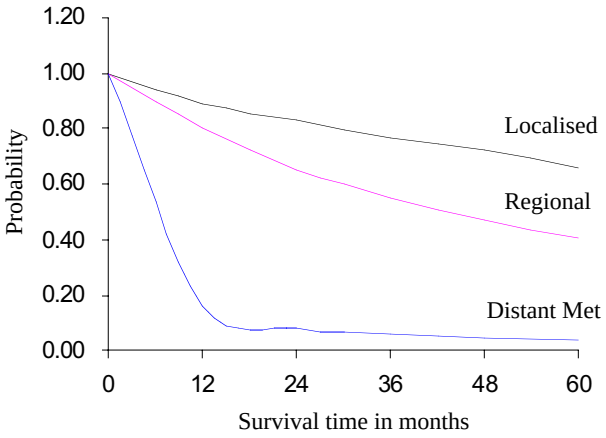

Figure 3. Survival from Cervical Cancer by Clinical Extent of Disease, Mumbai, India

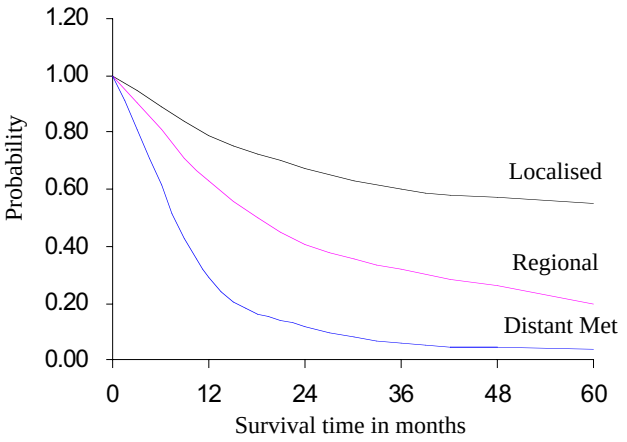

Figure 4. Survival from Ovarian Cancer by Clinical Extent of Disease, Mumbai, India

Table 2. Five Year Relative Survival for Cancers of Breast, Cervix and Ovary Greater Mumbai, 1992-94

Site	5 year relative survival (%) by age group						5 year ASR (%)	
	<35	35-44	45-54	55-64	65-74	75+	All ages	0-74
Breast	55.2	51.7	47.2	34.9	32.6	46.5	44.8	48.6
Cervix	74.7	64.1	49.4	26.3	20.8	48.0	45.5	48.1
Ovary	50.0	24.6	28.1	13.8	5.7	12.7	20.1	22.0

marital status, education and religion; and clinical variables such as extent of disease and treatment for each site are studied separately.

Independent predictors of survival from breast, cervix and ovarian cancer are presented in Tables 4, 5 and 6 respectively. On multivariate analysis, age, education and extent of disease were emerged as independent predictors of survival for all these cancers. Women aged 75 and above had a 2.56 times for breast, 8.54 times for cervix and 2.82 times for ovary, higher risk of death as compared to the age less than 35 years. Patients with distant metastasis had a 10.6 times for breast, 12.9 times for cervix and 4.7 times for ovary, higher risk of death than localized disease. Educated patients having gone to the college had 40% less risk of death for all these cancers as compared to those with illiterate women. Marital status did not show any difference in the risk of death for all these cancers. Patents treated by surgery for breast and cervical cancer, by chemotherapy for ovarian

Table 3. Five Year Survival Rates for Cancers of Breast, Cervix and Ovary Greater Mumbai, 1992-94

Variable	Breast			Cervix			Ovary		
	No	Sur%	p-value	No	Sur%	p-value	No	Sur%	p-value
Total	2516	41.8		1620	44.0		729	23.3	
Age			<.0001			<.0001			<.0001
<35	208	54.5		118	73.5		106	49.5	
35-44	562	50.6		391	62.8		145	24.1	
45-54	723	44.9		509	47.1		193	26.7	
55-64	552	38.3		363	24.2		172	12.7	
65-74	342	37.0		184	17.7		85	4.8	
75+	129	15.3		55	16.3		28	4.2	
Marital Status			<.0001			<.0001			<.0001
Single	108	44.8		14	58.7		78	43.2	
Married	2031	48.7		1224	48.7		537	21.5	
Widowed	337	27.5		371	28.7		103	15.4	
Oth./Unk	40	50.4		11	20.4		11	5.6	
Religion			0.1987			0.0805			0.6850
Hindu	1734	42.1		1261	44.8		536	21.8	
Muslim	390	43.6		182	50.0		104	29.2	
Christian	217	42.3		62	20.4		49	18.6	
Others	24	35.8		15	39.3		5	40.0	
Education			<.0001			<.0001			<.0001
None	318	32.8		576	45.1		109	24.2	
<=5 yrs	207	38.2		174	41.5		57	27.3	
6-12 yrs	551	43.9		173	50.3		116	26.8	
>12 yrs	206	60.0		17	50.5		43	53.3	
Unknown	1234	40.9		680	42.0		404	18.1	
Extent of Disease			<.0001			<.0001			<.0001
Localized	885	69.7		325	66.3		227	54.7	
Regional	1207	31.6		1032	41.4		75	20.4	
Dist Met.	253	4.0		90	3.6		335	4.6	
Unknown	171	9.7		173	33.5		92	21.8	
Treatment			<.0001			<.0001			<.0001
Surgery	1094	51.7		238	68.2		165	35.1	
Radiotherapy	64	22.7		680	40.7		9	44.4	
Chemotherapy	120	28.5		14	35.7		126	23.8	
Combined	762	39.2		209	47.9		129	25.3	
Others	72	29.1		81	30.4		36	5.9	
Unknown	404	30.3		378	37.0		264	16.9	

Table 4. Independent Predictors of Survival for Breast Cancer in Greater Mumbai, 1992-94

Factor	Univariate	Multivariate	
		Treatment included	Treatment not included
	(HR 95 %CI)	(HR 95% CI)	(HR 95% CI)
Age group			
<=34[a]	1.00	1.00	1.00
35-44	1.17(0.92-1.48)	1.08(0.85-1.37)	1.04(0.82-1.32)
45-54	1.40(1.12-1.76)*	1.29(1.03-1.62)*	1.25(1.01-1.58)*
55-64	1.66(1.31-2.09)*	1.62(1.28-2.06)*	1.52(1.20-1.93)*
65-74	2.20(1.73-2.80)*	1.87(1.46-2.40)*	1.83(1.43-2.34)*
75+	3.22(2.43-4.27)*	2.56(1.90-2.46)*	2.62(1.95-3.53)*
Extent of Disease			
Localized[a]	1.00	1.00	1.00
Regional spread	2.93(2.55-3.67)*	3.17(2.75-3.66)*	3.00(2.61-3.45)*
Distant Metastasis	12.67(10.59-15.19)*	10.64(8.81-12.81)*	12.23(10.21-14.65)*
Unknown	3.07(2.42-3.91)*	2.95(2.31-3.76)*	3.01(2.36-3.84)*
Marital Status			
Single[a]	1.00	1.00	1.00
Married	0.98(0.75-1.28)	1.01(0.77-1.32)	0.99(0.76-1.30)
Widowed	1.52(1.14-2.73)*	1.70(0.86-1.59)	1.16(0.85-1.56)
Oth./Unk	0.87(0.51-1.48)	0.73(0.53-1.26)	0.77(0.45-1.31)
Education			
None[a]	1.00	1.00	1.00
<=5 yrs	0.87(0.69-1.08)	0.84(0.67-1.05)	0.88(0.70-1.10)
6-12 yrs	0.73(0.60-0.87)*	0.79(0.66-0.96)*	0.79(0.66-0.96)*
>12 yrs	0.45(0.36-0.60)*	0.57(0.43-0.74)*	0.56(0.43-0.73)*
Unknown	0.88(0.74-1.02)	0.87(0.74-1.03)	0.89(0.75-1.05)
Treatment			
Surgery[a]	1.00	1.00	
Radiotherapy	2.12(1.56-2.88)*	1.48(1.09-2.02)*	
Chemotherapy	2.02(1.60-2.57)*	1.31(1.03-1.69)*	
Combined	1.44(1.27-1.69)*	1.24(1.09-1.42)*	
Others	2.06(1.54-2.75)*	1.64(1.22-2.21)*	
Unknown	2.36(2.04-2.74)*	2.18(1.87-2.54)*	

HR =Hazard Ratio CI =Confidence Interval a =Reference Category * <0.05

cancer have better survival than treated by other modalities (Tables 4, 5 and 6).

Discussion

The problem in determining the vital status of registered patients of specified intervals after diagnosis are manifold in developing countries due to inadequate death registration system, lack of national and regional population registries, routine linkage mechanisms and inadequately developed clinical follow-up systems in hospitals. Even though death registration is reportedly more than 95% complete in Mumbai (Annual report 1990, Gupta and Ramarao 1973). Documentation of cause of death is in adequate and far from satisfactory. Since adequate follow-up information on death is a major prerequisite to obtain precise estimates of survival, additional active follow-up procedures were employed. In present study out of 4865 cases 2180 (44.8%) were matched with death certificates from Municipal Corporation, from remaining cases follow-up status was determined for patients 1560 (32.1%) by either from telephone or postal enquiries and for patients 685 (14.1%) by making visits, and remaining 440 (9.0%) patients were lost to follow-up.

The overall five year relative survival from breast cancer (46.2%) and from cervical cancer (47.7%) are of the same order but much more higher as compared to ovarian cancer (24.4%).

Decreasing survival with advancing age was observed in each site and remain significant after adjusting for clinical extent and treatment for all the three sites. Survival reports from most populations in USA (Miller B A et al) Europe (Berrino 1991), Australia (Supramaniam et al 1999) and some populations in developing countries (Sankarnarayan et al 1998), do not suggest any marked differences across age groups in survival.

The survival differences that persisted for marital status and education are more likely to be related to socio-economic factors associated with personal habits and comorbidity. The impact of socio-economic differences in survival has been documented elsewhere (Kogevinas et al 1990, Mackillop et al 1997).

Our results clearly indicate the importance of clinical extent of disease in the prognosis of cancer. Since data collected from many data sources and there are qualitative differences in investigative capabilities and documentation across different sources, population based cancer registries

are at a disadvantage in obtaining detailed and accurate clinico pathological staging information for the majority of cases. Documentation of clinical staging for many cancer sites remains less than satisfactory in many regions of the world in spite of international efforts to promote uniform cancer staging systems (Hermanek et al 1997). We were able to obtain some information from the records in the clinical spread of disease for 90% of breast, cervix and ovary. Localized "cancers" in our study refer to tumor limited to particular that cancer without known spread to the lymph nodes are adjacent tissues; regional disease indicates the presence of invasion of surrounding tissues and /or involvement of the lymph nodes; and distant metastasis implies spread of distant organs. Although this categorization is rather simple and is not based on the explicit descriptions of clinical invasion of cancer at diagnosis, the survival according to these categories (Tables 4, 5 and 6) predicted the prognosis the reasonably well.

The selection of appropriate treatment for a specific cancer depends on a number of variables including tumor sites, clinical stage, nutritional status, concomitant health, patient preference and the established effects of different treatments. For small primary cancers without regional spread, wide surgical excision alone or curative radiotherapy by branchy therapy and/or external beam alone is considered. Although functional and cosmetics results are better following radiotherapy, local control rates are generally better with primary surgery. However, local recurrence after radiotherapy may be successfully treated with surgery. For more extensive tumors with loco regional spread, combinations of both modalities with or without chemotherapy are generally used. Chemotherapy is mostly investigational, and it's use has not been shown to improve long term survival in clinical trials. However tobacco and alcohol, both risk factors for all these three cancers may compromise radical treatment due to their association with other illness.

There are no focused and sustained early detection efforts for cancer in Mumbai, are for the matter in the state of Maharashtra or the whole of India, even though there are periodic efforts in health awareness programs and opportunistic detection facilities. However diagnostic and therapeutic services for cancer are reasonably well developed in Mumbai as indicated by the wide spread facilities for surgery and radiotherapy. Surgical facilities are available in many hospitals in both public and private sectors.

Table 5. Independent Predictors of Survival for Cervical Cancer in Greater Mumbai, 1992-94

Factor	Univariate	Multivariate	
		Treatment included	Treatment not included
	(HR 95 %CI)	(HR 95% CI)	(HR 95% CI)
Age group			
<=34[a]	1.00	1.00	1.00
35-44	1.52(1.05-2.22)*	1.59(1.09-2.34)*	1.54(1.05-2.25)*
45-54	2.46(1.71-3.54)*	2.41(1.67-3.49)*	2.39(1.65-3.46)*
55-64	4.03(2.85-5.81)*	4.03(2.77-5.87)*	3.91(2.69-5.68)*
65-74	4.95(3.84-7.25)*	4.62(3.12-6.83)*	4.53(3.07-6.17)*
75+	7.13(4.57-11.13)*	8.54(5.38-13.57)*	8.02(5.06-12.17)*
Extent of Disease			
Localized[a]	1.00	1.00	1.00
Regional spread	2.15(1.76-2.62)*	2.24(1.82-2.77)*	2.24(1.83-2.74)*
Distant Metastatis	13.02(9.79-17.3)*	12.91(9.54-17.46)*	14.05(10.48-18.80)*
Unknown	3.12(2.34-4.18)*	2.76(2.05-3.72)*	3.10(3.32-4.16)*
Marital Status			
Single[a]	1.00	1.00	1.00
Married	1.45(0.60-3.49)	0.84(0.34-2.07)	0.81(0.33-1.99)
Widowed	2.34(0.97-5.67)	0.95(0.38-2.35)	0.94(0.38-2.33)
Oth./Unk	2.59(0.91-1.52)	0.99(0.32-3.07)	1.15(0.37-3.58)
Education			
None[a]	1.00	1.00	1.00
<=5 yrs	1.08(0.87-1.37)	1.31(1.04-1.65)*	1.21(0.96-1.52)
6-12 yrs	0.88(0.69-1.11)	1.05(0.82-1.35)	1.01(0.79-1.29)
>12 yrs	0.85(0.42-1.71)	1.27(0.62-2.61)	1.19(0.58-2.44)
Unknown	1.11(0.96-1.29)	1.13(0.96-1.34)	1.15(0.98-1.36)
Treatment			
Surgery[a]	1.00	1.00	
Radiotherapy	2.15(1.68-2.75)*	1.36(1.05-1.76)*	
Chemotherapy	2.51(1.26-5.2)*	2.49(1.24-4.29)*	
Combined	1.80(1.34-2.41)*	1.45(1.07-1.96)*	
Others	3.74(2.65-5.30)*	2.17(1.51-3.12)*	
Unknown	2.79(2.15-3.16)*	2.06(1.58-2.68)*	

HR =Hazard Ratio CI =Confidence Interval a =Reference Category * <0.05

Table 6. Independent Predictors of Survival for Ovarian Cancer in Greater Mumbai, 1992-94

Factor	Univariate	Multivariate	
		Treatment included	Treatment not included
	(HR 95 %CI)	(HR 95% CI)	(HR 95% CI)
Age group			
<=34[a]	1.00	1.00	1.00
35-44	1.88(1.35-2.60)*	1.37(0.94-2.02)	1.29(0.88-1.88)
45-54	1.78(1.29-2.45)*	1.44(0.99-2.09)	1.36(0.93-1.97)
55-64	2.58(1.88-3.54)*	1.58(1.08-2.31)*	1.55(1.06-2.27)*
65-74	3.78(2.66-5.36)*	2.24(1.48-3.40)*	2.26(1.40-3.42)*
75+	4.63(2.87-7.46)*	2.82(1.66-4.81)*	2.76(1.62-4.69)*
Extent of Disease			
Localized[a]	1.00	1.00	1.00
Regional spread	2.29(1.66-3.17)*	2.17(1.56-3.03)*	2.05(1.48-2.85)*
Distant Metastatis	4.98(3.94-6.29)*	4.67(3.66-5.96)*	4.64(3.65-5.91)*
Unknown	2.69(1.93-3.76)*	2.39(1.70-3.36)*	2.50(1.79-3.52)*
Marital Status			
Single[a]	1.00	1.00	1.00
Married	1.78(1.29-2.44)*	1.03(0.17-1.51)	1.03(0.71-1.51)
Widowed	2.33(1.61-3.82)*	1.08(0.69-1.67)	1.17(0.75-1.83)
Oth./Unk	1.64(0.83-3.27)	1.15(0.56-2.34)	1.12(0.55-2.28)
Education			
None[a]	1.00	1.00	1.00
<=5 yrs	0.87(0.58-1.27)	1.03(0.70-1.53)	0.95(0.64-1.41)
6-12 yrs	0.82(0.60-1.40)	0.81(0.59-1.12)	0.82(0.59-1.13)
>12 yrs	0.40(0.24-0.66)*	0.60(0.36-1.01)	0.53(0.31-0.88)*
Unknown	1.18(0.92-1.51)	1.11(0.85-1.46)	1.14(0.87-1.49)
Treatment			
Surgery[a]	1.00	1.00	
Radiotherapy	0.76(0.31-1.87)	1.19(0.48-2.96)	
Chemotherapy	1.27(0.95-1.69)	1.14(0.85-1.54)	
Combined	1.08(0.80-1.42)	0.89(0.66-1.19)	
Others	2.64(1.78-3.92)*	1.70(1.13-2.54)*	
Unknown	1.91(1.50-2.41)*	1.65(1.30-2.11)*	

HR =Hazard Ratio CI =Confidence Interval a =Reference Category * =<0.05

Radiotherapy and cancer chemotherapy services are provided by more than 15 hospitals.

Five-year age standardized relative survival in the 0-74 year age group for breast, cervix and ovarian cancers in selected populations are presented in Table 7. Survival for all these three cancers is reported higher for Shanghai population in Asia and Sweden and Finland in Europe when compared to other populations. Survival for ovarian cancer in Mumbai is lowest among all the populations listed in the Table 8. The survival for breast and cervix is somewhat similar in Indian populations. Cuba, Chingmai-Thailand and all European countries reported higher survival for these.

Table 7. Five Year Age Standardized Relative Survival Proportions in the Age Group 0-74 for Selected Populations for Breast, Cervix and Ovary

Population/Country	Period	Breast	Cervix	Ovary
Mumbai, India	1992-94	48.6	45.0	20.1
Chennai, India	1984-89	48.4	56.7	-
Banglore, India	1982-89	44.1	39.9	-
Qidong, China	1982-91	55.7	42.0	-
Shanghai,China	1988-91	72.7	61.9	45.0
Chiang Mai, Thailand	1983-92	62.7	64.9	39.3
Khonkein, Thailand	1985-92	47.0	55.4	33.6
Cuba	1988-89	57.9	54.3	41.9
England	1985-89	67.0	65.0	31.0
Finland	1985-89	79.0	55.0	38.0
Sweden	1985-89	81.0	71.0	45.0
Europe	1985-89	73.0	62.0	35.0

Source for data other than Mumbai (Berberrino et al., 1999; Sankaranarayanan et al., 1998)

Cancers of breast, cervix and ovary are characterized with increasing age at diagnosis. For all these cancers the largest survival difference is between youngest age class and the next class. Since stage at diagnosis and surgical treatment are the main prognostic factors for all these cancers. It would seen that elderly patients more often presents at advanced stage of disease or with contradiction to exclusive surgery than younger patients. (Faivre et al 1998, Gatta et al 1998).

Two possible explanations for the general patterns are that the natural history of disease has more influence than therapy in determining outcome among older patients, or that older patients are treated less frequently and less intensively than younger patients. Advanced age at diagnosis is often associated with late tumor stage and comorbidity,

which can contradict the application of potentially curative therapy (Bergman et al 1992, Havlik 1992), leading to less favorable and more homogeneous outcomes in the own. By contrast, younger patients are generally in better health and their disease may be at an earlier stage, so that more aggressive and effective therapies can be applied.

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