Chapter 12

Cancer survival in Barshi, India, 1993–2000

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Abstract

The rural cancer registry of Barshi, Paranda and Bhum, was the first of its kind in India and was established in 1987. Registration of cases is carried out entirely by active methods. Data on survival from 15 cancer sites or types registered during 1993–2000 are reported in this study. Follow-up has been carried out predominantly by active methods, with median follow-up time ranging between 2–49 months for different cancers. The proportion of histologically verified diagnosis for various cancers ranged between 73–98%; death certificates only (DCOs) comprised 0–2%; 98–100% of total registered cases were included for survival analysis. Complete follow-up at five years ranged between 96–100% for different cancers. The 5-year age-standardized relative survival rates for selected cancers were non-melanoma skin (86%), penis (63%), breast (61%), cervix (32%), mouth (23%), hypopharynx (11%) and oesophagus (4%). The 5-year relative survival by age group did not display any particular pattern. Five-year relative survival trend between 1988–1992 and 1993–2000 showed a marked decrease for cancers of the tongue, hypopharynx, stomach, rectum, larynx, lung and penis; but a notable increase for breast and non-Hodgkin lymphoma.

Rural cancer registry: Barshi, Paranda and Bhum

The rural cancer registry of Barshi, Paranda and Bhum, is the first of its kind in India. It was established in 1987 at the Nargis Dutt Memorial Cancer Hospital, Barshi, in Maharashtra state. Data from the registry were published in the IARC publication *Cancer Incidence in Five Continents in volume VII* [1]. Cancer registration is entirely done by active methods. It is different from the registration practices of urban registries in that it relies heavily on interaction with the village community, health camps and other interventions apart from data collection from different medical institutions catering to the population [1,2]. The registry covers an area of 3713 km^2 and caters to a predominantly rural population of about 0.5 million in 2001 with a sex ratio of 926 females to 1000 males. The average annual age-standardized incidence rate is 44 per 100 000 among males and 52 per 100 000 among females with a lifetime cumulative risk of one in 16 of developing cancer for both sexes in the period 1999–2001 [3]. The top ranking cancers among males are hypopharynx followed by penis and oesophagus. Among females, the order is cervix, breast and oral cavity.

The registry contributed data on survival from cancer of the cervix registered in 1988–1992 for the first volume of the IARC publication on *Cancer Survival in Developing Countries* [4]. Data on survival from 15 cancer sites or types registered during 1993–2000 are reported in this second volume.

Data quality indices (Table 1)

The proportion of cases with histological confirmation of cancer diagnosis in this series is 87%, varying between 98% for myeloid leukaemia and cancer of the penis and 73% for cancer of the stomach. The proportion of cases registered as death certificates only (DCOs) is <1%, ranging between 0% for most cancers and 2% in liver/lung cancers. There are no cases without any follow-up. The exclusion of cases from the survival analysis ranged between none for most cancers and 2% for cancers of oesophagus, liver and lung. Thus, 98–100% of the total cases registered are included in the estimation of the survival probability.

Outcome of follow-up (Table 2)

Follow-up has been carried out predominantly by active methods. These included abstraction of cancer mortality information from hospitals and village death records. The abstracted data are first matched with the incident cancer database. The follow-up information for the unmatched incident cases is then obtained through postal enquiries and house visits.

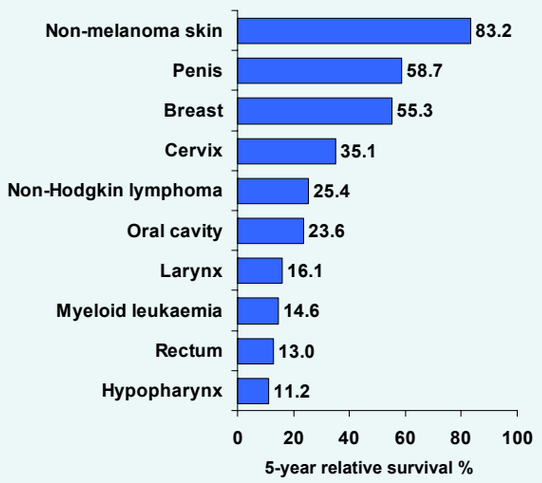
The closing date of follow-up was 31st December 2003. The median follow-up (in months) ranged between 1.6 for liver cancer to 49.2 for cancer of non-melanoma skin. Complete follow-up at five years from the incidence date ranged between 96-100%. The losses to follow-up are very minimal and have occurred at varying intervals of time ranging from <1 year to >5 years.

Survival statistics

All ages and both sexes together (Table 3)

Non-melanoma skin cancer had the highest 5-year relative survival (83%), while none survived that period with liver cancer. The highest survival among head and neck cancers was observed in oral cavity (24%) followed by hypopharynx (11%) and tongue (10%). For the gastrointestinal tract cancers, the order is rectum (13%), stomach (6%) and oesophagus (5%). The survival figure for non-Hodgkin lymphoma is 25% and myeloid leukaemia is 15%.

Figure 1a. Top ten cancers (ranked by survival), Barshi, India, 1993–2000

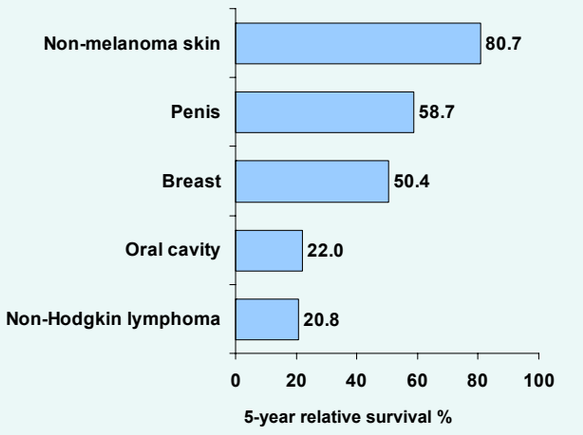


The 5-year age-standardized relative survival (ASRS) probability for all ages together is lesser than the corresponding unadjusted for a majority of cancers. The 5-year ASRS (0–74 years of age) is observed to be higher than the corresponding ASRS (all ages) with a few exceptions.

Sex
Male (Table 4a)

The 5-year relative survival was the highest for non-melanoma skin cancer (81%) followed by penis (59%). Survival from cancers of the hypopharynx and larynx was noticeably higher among males than females.

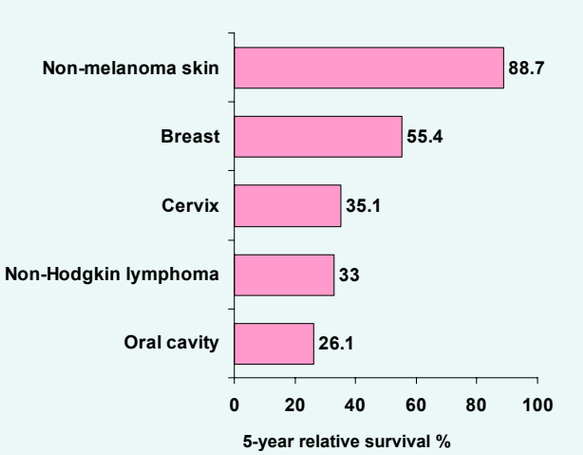
Figure 1b. Top five cancers (ranked by survival), Male, Barshi, India, 1993–2000



Female (Table 4a)

The top-ranking cancers in terms of 5-year relative survival were non-melanoma skin (89%), breast (55%), cervix (35%) and non-Hodgkin lymphoma (33%). Survival was markedly higher among females than males for cancers of the tongue, oesophagus and stomach, and non-Hodgkin lymphoma.

Figure 1c. Top five cancers (ranked by survival), Female, Barshi, India, 1993–2000



Age group (Table 4b)

The 5-year relative survival by age group does not display any particular pattern. This may be due to scanty number of cases in many age groups for most cancers.

Survival trend (Table 5)

The data on trends in survival are available for 15 cancer sites covering 13 years in two time periods between 1988–1992 [4] and 1993–2000. The completeness of follow-up at 5 years from incidence date was between 98–100% in both periods. The absolute difference in 5-year relative survival between 1988–1992 and 1993–2000 showed a marked decrease for cancers of tongue, hypopharynx, stomach, rectum, larynx, lung and penis. A notable increase in 5-year relative survival was seen in female breast cancer and non-Hodgkin lymphoma. In the rest, there has been little change.

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Table 1. Data quality indices - Proportion of histologically verified and death certificate only cases, number and proportion of included and excluded cases by site: Barshi, India, 1993–2000 cases followed-up until 2003

Site	ICD-10	Total registered	%		Excluded cases					Included cases	
			HV	DCO	DCO	Follow-up	Others	Total	%	No.	%
Tongue	C01-02	47	87.2	0.0	0	0	0	0	0.0	47	100.0
Oral cavity	C03-06	55	94.5	0.0	0	0	0	0	0.0	55	100.0
Hypopharynx	C12-13	80	92.5	0.0	0	0	0	0	0.0	80	100.0
Oesophagus	C15	99	82.8	1.0	1	0	1	2	2.0	97	98.0
Stomach	C16	45	73.3	0.0	0	0	0	0	0.0	45	100.0
Rectum	C19-20	49	91.8	0.0	0	0	0	0	0.0	49	100.0
Liver	C22	48	83.3	2.1	1	0	0	1	2.1	47	97.9
Larynx	C32	33	87.9	0.0	0	0	0	0	0.0	33	100.0
Lung	C33-34	48	81.3	2.1	1	0	0	1	2.1	47	97.9
Other skin	C44	39	97.4	0.0	0	0	0	0	0.0	39	100.0
Breast	C50	124	91.1	0.0	0	0	0	0	0.0	124	100.0
Cervix	C53	407	94.8	0.0	0	0	1	1	0.2	406	99.8
Penis	C60	43	97.7	0.0	0	0	0	0	0.0	43	100.0
Non-Hodgkin lymphoma	C82-85+C96	36	91.7	0.0	0	0	0	0	0.0	36	100.0
Myeloid leukaemia	C92-94	40	97.5	0.0	0	0	0	0	0.0	40	100.0

HV: histologically verified; DCO: death certificate only

Table 2. Number and proportion of cases with complete/incomplete follow-up (in years) and median follow-up (in months) by site: Barshi, India, 1993–2000 cases followed-up until 2003

Site	ICD-10	Cases included	Complete FU		Incomplete FU: lost to FU						% with complete FU at 5 years	Median FU (in months)
			Alive/dead at end of FU				% lost to FU: years from diagnosis					
			No.	%	No.	%	< 1	1-3	3-5	> 5		
Tongue	C01-02	47	47	100.0	0	0.0	0.0	0.0	0.0	0.0	100.0	9.5
Oral cavity	C03-06	55	53	96.4	2	3.6	0.0	1.8	1.8	0.0	96.4	10.1
Hypopharynx	C12-13	80	79	98.8	1	1.3	0.0	0.0	1.3	0.0	98.8	7.5
Oesophagus	C15	97	96	99.0	1	1.0	0.0	0.0	0.0	1.0	100.0	3.9
Stomach	C16	45	43	95.6	2	4.4	2.2	0.0	2.2	0.0	95.6	2.8
Rectum	C19-20	49	48	98.0	1	2.0	2.0	0.0	0.0	0.0	98.0	9.4
Liver	C22	47	47	100.0	0	0.0	0.0	0.0	0.0	0.0	100.0	1.6
Larynx	C32	33	32	97.0	1	3.0	3.0	0.0	0.0	0.0	97.0	12.1
Lung	C33-34	47	45	95.7	2	4.3	2.1	2.1	0.0	0.0	95.7	3.4
Other skin	C44	39	39	100.0	0	0.0	0.0	0.0	0.0	0.0	100.0	49.2
Breast	C50	124	119	96.0	5	4.0	0.0	0.0	3.2	0.8	96.8	41.4
Cervix	C53	406	403	99.3	3	0.7	0.2	0.0	0.2	0.2	99.5	24.4
Penis	C60	43	42	97.7	1	2.3	0.0	0.0	2.3	0.0	97.7	38.3
Non-Hodgkin lymphoma	C82-85+C96	36	36	100.0	0	0.0	0.0	0.0	0.0	0.0	100.0	9.8
Myeloid leukaemia	C92-94	40	40	100.0	0	0.0	0.0	0.0	0.0	0.0	100.0	4.0

FU: follow-up

Table 3. Comparison of 1-, 3- and 5-year absolute and relative survival and 5-year age-standardized relative survival by site: Barshi, India, 1993–2000 cases followed-up until 2003

Site	ICD-10	Cases included	% Absolute survival			% Relative survival			% ASRS at 5-years	
			1-year	3-year	5-year	1-year	3-year	5-year	all ages	0-74 years
Tongue	C01-02	47	46.8	8.5	8.5	48.5	9.5	9.9	10.4	11.8
Oral cavity	C03-06	55	45.5	30.6	21.7	46.7	32.4	23.6	22.9	26.1
Hypopharynx	C12-13	80	32.5	11.3	8.4	34.1	13.1	11.2	11.0	10.0
Oesophagus	C15	97	19.6	4.1	4.1	20.4	4.7	5.2	4.2	5.3
Stomach	C16	45	16.9	4.8	4.8	17.4	5.5	6.5	6.5	6.0
Rectum	C19-20	49	46.4	16.9	11.2	47.8	18.4	13.0	9.2	14.7
Liver	C22	47	2.1	0.0	0.0	2.2	0.0	0.0	0.0	0.0
Larynx	C32	33	53.8	19.0	12.7	56.6	22.3	16.1	12.7	15.7
Lung	C33-34	47	18.3	4.6	4.6	19.0	5.2	5.2	3.8	5.3
Other skin	C44	39	87.2	71.8	65.0	91.2	83.3	83.2	86.2	75.3
Breast	C50	124	81.5	55.6	49.2	83.3	59.6	55.3	61.4	52.7
Cervix	C53	406	70.7	38.3	32.2	72.0	40.4	35.1	32.1	35.7
Penis	C60	43	81.4	51.2	44.7	85.6	59.9	58.7	63.1	64.1
Non-Hodgkin lymphoma	C82-85+C96	36	41.7	27.8	22.2	42.5	30.0	25.4	24.1	25.9
Myeloid leukaemia	C92-94	40	37.5	27.5	13.6	37.9	28.5	14.6	19.5	19.5

ASRS: age-standardized relative survival

Table 4a. Site-wise number of cases, 5-year absolute and relative survival by sex: Barshi, India, 1993–2000 cases followed-up until 2003

Site	ICD-10	Cases included	Male			Female		
			% 5-year survival			% 5-year survival		
			No.	Abs	Rel	No.	Abs	Rel
Tongue	C01-02	47	33	3.0	3.7	14	21.4	23.4
Oral cavity	C03-06	55	35	20.1	22.0	20	24.2	26.1
Hypopharynx	C12-13	80	71	9.7	13.0	9	0.0	0.0
Oesophagus	C15	97	57	0.0	0.0	40	10.0	12.8
Stomach	C16	45	28	0.0	0.0	17	11.8	16.0
Rectum	C19-20	49	32	9.5	11.3	17	14.1	15.7
Liver	C22	47	44	0.0	0.0	3	0.0	0.0
Larynx	C32	33	28	15.1	19.0	5	0.0	0.0
Lung	C33-34	47	31	3.6	3.9	16		
Other skin	C44	39	23	60.9	80.7	16	72.3	88.7
Breast	C50	124	3	33.3	50.4	121	49.6	55.4
Cervix	C53	406				406	32.2	35.1
Penis	C60	43	43	44.7	58.7			
Non-Hodgkin lymphoma	C82-85+C96	36	26	17.9	20.8	10	30.0	33.0
Myeloid leukaemia	C92-94	40	28	12.9	14.0	12	16.7	17.2

Abs: absolute survival; Rel: relative survival

Table 4b. Site-wise number of cases and relative survival by age group: Barshi, India, 1993–2000 cases followed-up until 2003

Site	ICD-10	Cases included	Number of cases by age group					Relative survival by age group				
								% 5-year survival				
			< 45	45-54	55-64	65-74	> 75	< 45	45-54	55-64	65-74	> 75
Tongue	C01-02	47	7	6	18	15	1	14.5	17.5	13.1	0.0	0.0
Oral cavity	C03-06	55	17	13	11	10	4	28.2	22.0	51.0	0.0	0.0
Hypopharynx	C12-13	80	9	8	22	31	10	11.4	13.2	5.3	13.8	19.4
Oesophagus	C15	97	7	16	32	32	10	0.0	6.6		8.7	0.0
Stomach	C16	45	8	7	14	13	3	0.0	0.0		11.6	
Rectum	C19-20	49	14	10	10	11	4	0.0	42.8	0.0	21.8	0.0
Liver	C22	47	2	10	18	11	6	0.0	0.0	0.0	0.0	0.0
Larynx	C32	33	7	5	6	9	6	29.4	29.9	0.0	16.4	0.0
Lung	C33-34	47	8	10	10	12	7	15.3	0.0	0.0		0.0
Other skin	C44	39	5	5	13	11	5	40.8	84.6	78.7	91.7	116.7
Breast	C50	124	26	42	29	22	5	42.4	61.3	40.3	75.1	116.7
Cervix	C53	406	109	106	115	67	9	37.9	37.0	40.4	19.7	0.0
Penis	C60	43	8	3	10	16	6	51.2	106.3	46.0	62.8	64.3
Non-Hodgkin lymphoma	C82-85+C96	36	14	7	8	7	0	29.1		42.0	13.4	
Myeloid leukaemia	C92-94	40	23	10	3	4	0	12.3	7.1	79.8	0.0	

Table 5. Comparison of 5-year absolute and relative survival of cases diagnosed between 1988–1992 and 1993–2000, Barshi, India

Site	ICD-10	% 5-year absolute survival		% 5-year relative survival	
		1988–1992	1993–2000	1988–1992	1993–2000
Tongue	C01-02	13.6	8.5	26.4	9.9
Oral cavity	C03-06	18.7	21.7	28.1	23.6
Hypopharynx	C12-13	19.9	8.4	40.1	11.2
Oesophagus	C15	6.3	4.1	11.3	5.2
Stomach	C16	13.3	4.8	16.9	6.5
Rectum	C19-20	17.3	11.2	24.0	13.0
Liver	C22	5.0	0.0	6.4	0.0
Larynx	C32	19.6	12.7	36.1	16.1
Lung	C33-34	14.3	4.6	20.1	5.2
Other skin	C44	52.4	65.0	88.3	83.2
Breast	C50	32.4	49.2	45.1	55.3
Cervix	C53	28.4	32.2	37.3	35.1
Penis	C60	46.7	44.7	73.8	58.7
Non-Hodgkin lymphoma	C82-85+C96	8.9	22.2	11.2	25.4
Myeloid leukaemia	C92-94	6.7	13.6	7.5	14.6