

Chapter 14

Cancer survival in Chennai (Madras), India, 1990–1999

Swaminathan R, Rama R, Nalini S and Shanta V

Abstract

The Madras metropolitan tumour registry was established in 1981, and registration of incident cancer cases is entirely done by active method. Data on survival for 20 cancer sites or types registered during 1990–1999 are reported. Follow-up has been carried out predominantly by active methods with a median follow-up time ranging between 2–28 months for different cancers. The proportion of histologically verified diagnosis for various cancers ranged between 45–100%; death certificates only (DCOs) comprised 0–5%; 68–95% of total registered cases were included for survival analysis. Complete follow-up at five years ranged between 83–96%. The 5-year age-standardized relative survival rates for common cancers were cervix (60%), breast (47%), stomach (8%), oesophagus (9%), lung (6%) and mouth (36%). The 5-year relative survival by age group portrayed either an inverse relationship or fluctuated. A majority of cases were diagnosed with regional spread of disease, and survival decreased with increasing extent of disease. The absolute difference in 5-year relative survival of most cancers diagnosed in 1984–1989 and 1990–1999 ranged between 2–3%, with lesser survival in the latest period in most instances.

Madras metropolitan tumour registry

The population-based cancer registry in Chennai (Madras), known as the Madras metropolitan tumour registry (MMTR), is one of the oldest in India. It was established in 1981 at the Cancer Institute (WIA), a Regional Cancer Centre, where a hospital cancer registry has been established since 1955. MMTR has been contributing data to the quinquennial IARC publication *Cancer Incidence in Five Continents* since volume V [1]. The method of cancer registration is entirely done by active methods [2]. Over 200 sources of registration comprising hospitals in the government and private sectors, nursing homes, pathology laboratories, imaging centres and hospices are visited for data collection. The registry caters to an entirely urban population of about 4.3 million in 2005 with a sex ratio of 940 females to 1000 males. The average annual age-standardized incidence rate is 112 per 100 000 among males and 121 per 100 000 among females, with a lifetime cumulative risk of one in 8 of developing cancer for both sexes in the period 1999–2001 [3]. The top-ranking cancers among males are stomach followed by lung and oesophagus. Among females, the order is cervix, breast and ovary.

The registry contributed data on survival from the top ten cancers in the region and cancers associated with tobacco in the first volume of the IARC publication on

Cancer Survival in Developing Countries [4]. Data on survival from 20 cancer sites or types registered during 1990–1999 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 79%, varying between 99.6% for lymphoid leukaemia and 45% for cancer of the pancreas. The proportion of cases registered as death certificates only (DCOs) was 2%, ranging between 0% in lip cancer and 23% in leukaemia unspecified. The exclusion of cases from the survival analysis was the greatest among unspecified leukaemia (32%) and the least for cancer of the tonsil (5%). Thus, 68–95% 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 mortality information, irrespective of the stated cause of death in the death certificate, from the hospitals and the vital statistics division of Chennai corporation 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 one or more of the following ways: repeated scrutiny of records in the respective sources of registration, postal/telephone enquiries and house visits.

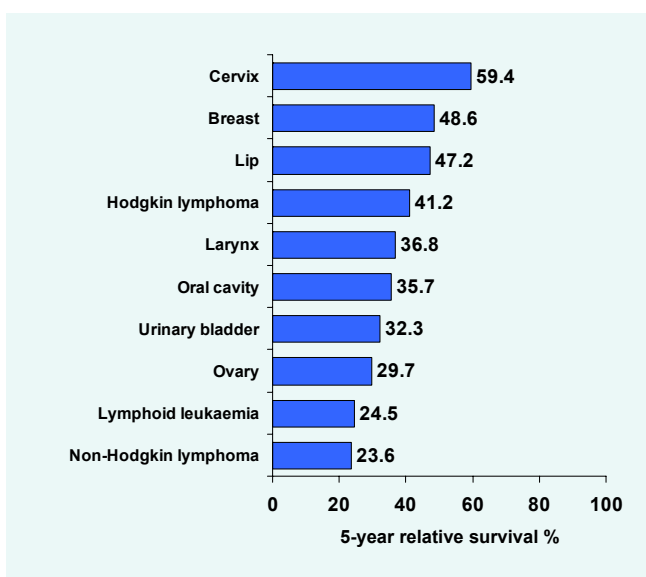
The closing date of follow-up was 31st December 2001. The median follow-up (in months) ranged between 1.5 for unspecified leukaemia to 27.5 for cancer of the cervix. Complete follow-up at five years from the incidence date ranged from 96.3% (cancer of the pancreas) to 79.2% (ovarian cancer). The losses to follow-up generally occurred in the first year of follow-up for a majority of cancers. However, a substantial proportion of cases have been known to be alive for varying periods of time between 1–5 years and more than 5 years. This minimizes the bias in the estimation of survival probability in the respective years.

Survival statistics

All ages and both sexes together (Table 3)

The 5-year relative survival is the highest for lip cancer (47%) and the lowest for cancer of the hypopharynx (15%) among the cancers of the head and neck. Cancers of the stomach, pancreas and oesophagus had the survival figures of 10%, 9% and 8%, respectively. Hodgkin lymphoma had a better survival rate (41%) than non-Hodgkin lymphoma (24%). The survival figures for leukaemias are lymphoid (25%), myeloid (16%) and unspecified (12%).

Figure 1a. Top ten cancers (ranked by survival), Chennai, India, 1990–1999



The 5-year age-standardized relative survival (ASRS) probability for all ages together is less than or similar to the corresponding unadjusted for a majority of

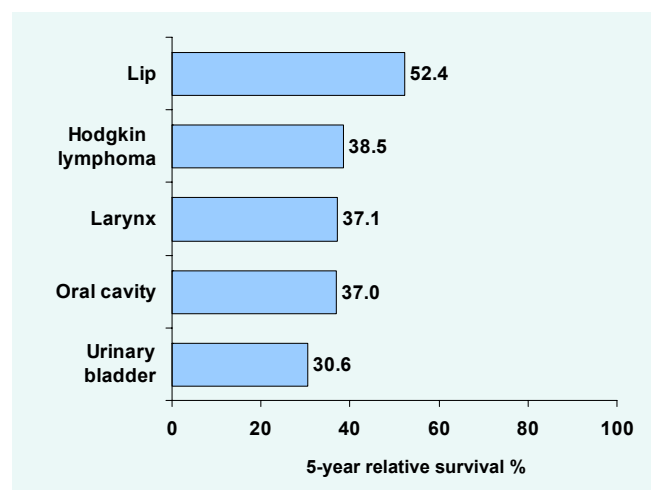
cancers. The 5-year ASRS (0–74 years of age) is observed to be higher than the corresponding ASRS (all ages) with a few exceptions.

Sex

Male (Table 4a)

The 5-year relative survival was the highest for lip cancer (52%) followed in order by Hodgkin lymphoma (38%), larynx and oral cavity (37%). Survival from lip cancer was noticeably higher among males than females (41%).

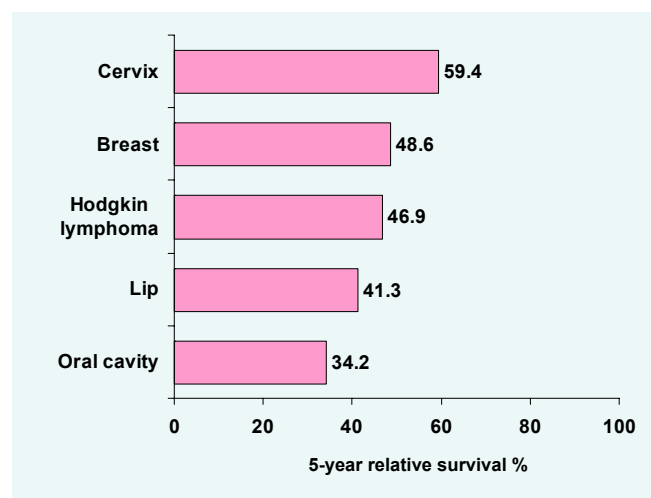
Figure 1b. Top five cancers (ranked by survival), Male, Chennai, India, 1990–1999



Female (Table 4a)

The top ranking cancers on 5-year relative survival are cervix (59%), breast (49%), Hodgkin lymphoma (47%) and lip (41%). The survival is markedly higher among females (32%) than males (14%) for cancer of the tonsil.

Figure 1c. Top five cancers (ranked by survival), Female, Chennai, India, 1990–1999



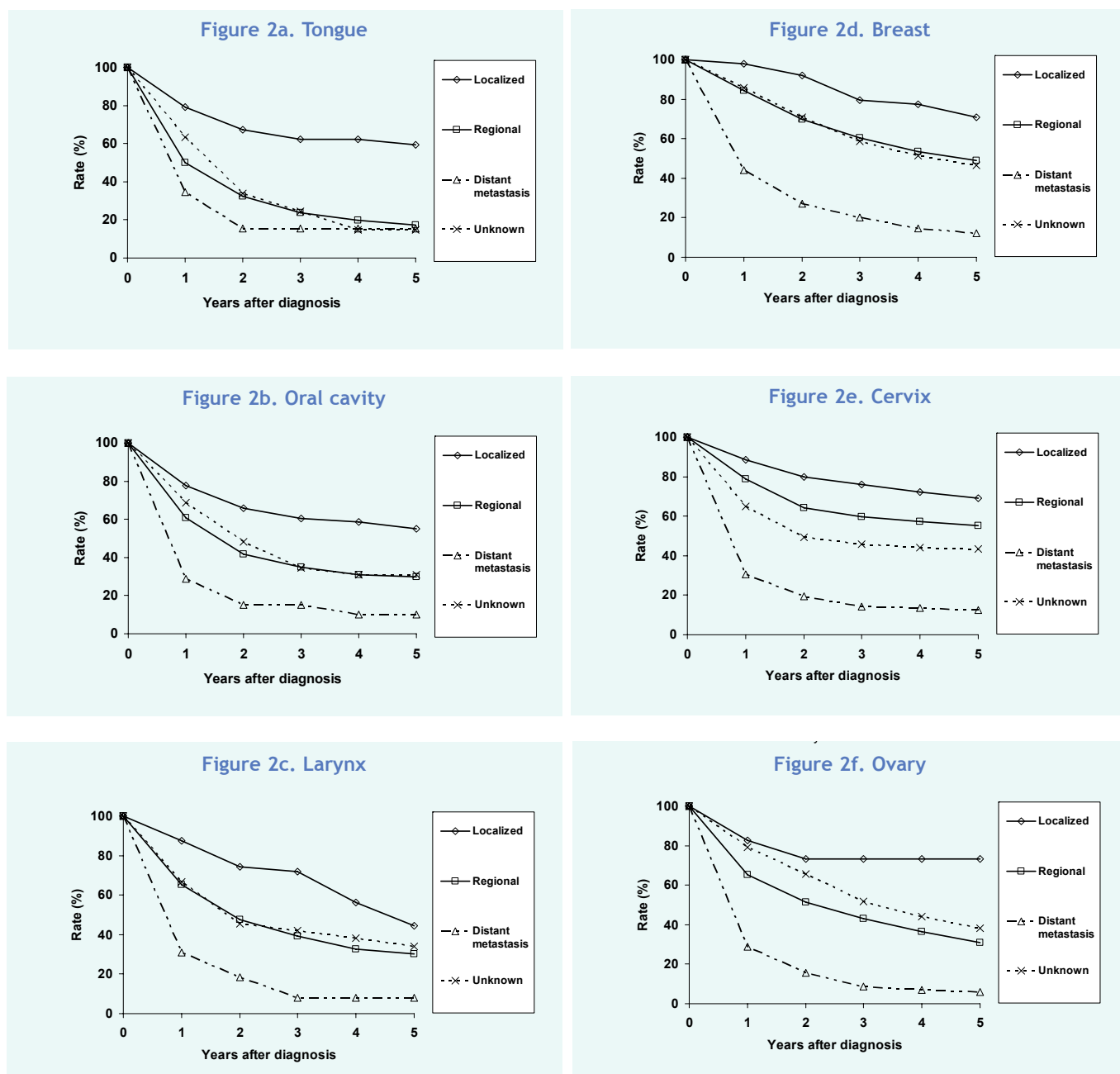
Age group (Table 4b)

The 5-year relative survival by age group portrays an inverse relationship: a decreasing survival with increasing age at diagnosis for cancers of the hypopharynx, stomach, larynx, lung and ovary. In the majority, it is seen to fluctuate, especially with an increase in the age group of 75+ years compared to that of 65–74 years.

Extent of disease (Table 5; Figure 2)

A majority of cases have been diagnosed with a regional spread of disease among all the selected cancers: from 62% (cancer of the ovary) to 89% (oral cavity). Correspondingly, a meagre 1% (ovary) to 7% (larynx) had a localized disease at diagnosis. The highest proportion of cases with distant metastasis at diagnosis is observed for breast cancer (13%). The extent of disease was unknown in 4–18%. The 5-year absolute survival by extent of disease followed the expected pattern: highest for localized cases followed by regional and distant metastasis cases among known categories of extent of disease.

Figure 2. Absolute survival (%) from selected cancers by extent of disease, Chennai, India



Survival trend (Table 6)

The data on trend in survival are available for 17 cancers spanning 16 years in two time periods between 1984–1989 [4] and 1990–1999. The completeness of follow-up at 5 years from incidence date was higher in 1990–1999 than 1984–1989 for a majority of cancers. In the rest, there was not much change. The absolute difference in 5-year relative survival of most cancers diagnosed between 1984–1989 and 1990–1999 ranged 2–3%, with a lesser survival in the latest period in most instances. This may be attributable to the increase in the completeness of follow-up for cases diagnosed in 1990–1999 due to the matching of incident cases with all deaths occurring in the city of Chennai, irrespective of the cause of death, since 1992. A notable increase in survival in 1990–1999 compared to 1984–1989 was observed only for cancer of the urinary bladder.

Acknowledgements

The authors express their sincere thanks to the staff of MMTR and the institutions providing data to MMTR, without which this study would not have become a reality.

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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: Chennai, India, 1990–1999 cases followed-up to 2001

Site	ICD-10	Total registered	%		Excluded cases					Included cases	
			HV	DCO	DCO	Follow-up	Others	Total	%	No.	%
Lip	C00	92	76.1	0.0	0	6	0	6	6.5	86	93.5
Tongue	C01-02	1 073	78.4	1.1	12	73	0	85	7.9	988	92.1
Oral cavity	C03-06	1 776	75.7	0.5	9	105	0	114	6.4	1 662	93.6
Tonsil	C09	262	80.5	0.0	0	12	0	12	4.6	250	95.4
Oropharynx	C10	172	77.9	2.3	4	10	0	14	8.1	158	91.9
Hypopharynx	C12-13	1 087	85.1	0.2	2	68	0	70	6.4	1 017	93.6
Oesophagus	C15	2 243	76.2	2.4	53	174	0	227	10.1	2 016	89.9
Stomach	C16	3 078	65.5	5.0	154	243	0	397	12.9	2 681	87.1
Pancreas	C25	376	44.7	4.0	15	33	0	48	12.8	328	87.2
Larynx	C32	792	84.0	1.4	11	59	0	70	8.8	722	91.2
Lung	C33-34	2 066	63.7	2.8	58	202	0	260	12.6	1 806	87.4
Breast	C50	3 595	85.4	2.0	72	456	0	528	14.7	3 067	85.3
Cervix	C53	4 776	86.3	1.0	50	288	0	338	7.1	4 438	92.9
Ovary	C56	932	70.9	2.4	22	102	0	124	13.3	808	86.7
Urinary bladder	C67	517	79.1	1.5	8	67	0	75	14.5	442	85.5
Hodgkin lymphoma	C81	330	98.8	1.2	4	28	0	32	9.7	298	90.3
Non-Hodgkin lymphoma	C82-85+C96	1 008	98.0	1.7	17	123	0	140	13.9	868	86.1
Lymphoid leukaemia	C91	481	99.6	0.4	2	46	0	48	10.0	433	90.0
Myeloid leukaemia	C92-94	504	99.0	0.8	4	35	0	39	7.7	465	92.3
Leukaemia unspecified	C95	125	76.8	23.2	29	11	0	40	32.0	85	68.0

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: Chennai, India, 1990–1999 cases followed-up to 2001

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		
Lip	C00	86	56	65.1	30	34.9	7.0	2.3	0.0	25.6	90.7	27.3
Tongue	C01-02	988	747	75.6	241	24.4	13.1	2.6	1.2	7.5	83.1	9.8
Oral cavity	C03-06	1 662	1 221	73.5	441	26.5	10.3	2.2	1.8	12.2	85.6	12.9
Tonsil	C09	250	230	92.0	20	8.0	4.8	0.8	0.0	2.4	94.4	10.3
Oropharynx	C10	158	151	95.6	7	4.4	0.6	0.6	0.0	3.2	98.7	11.0
Hypopharynx	C12-13	1 017	892	87.7	125	12.3	9.0	0.7	0.3	2.3	90.0	8.7
Oesophagus	C15	2 016	1 818	90.2	198	9.8	6.7	0.9	0.4	1.8	92.0	6.9
Stomach	C16	2 681	2 397	89.4	284	10.6	7.3	0.9	0.9	1.5	90.9	6.1
Pancreas	C25	328	314	95.7	14	4.3	3.1	0.3	0.3	0.6	96.3	4.3
Larynx	C32	722	598	82.8	124	17.2	6.7	0.8	0.3	9.4	92.2	17.4
Lung	C33-34	1 806	1 619	89.6	187	10.4	8.0	0.7	0.3	1.4	91.1	5.8
Breast	C50	3 067	2 351	76.7	716	23.3	12.4	2.9	2.0	6.0	82.6	26.9
Cervix	C53	4 438	2 752	62.0	1 686	38.0	11.0	3.7	2.5	20.8	82.8	27.5
Ovary	C56	808	625	77.4	183	22.6	14.7	4.6	1.4	1.9	79.2	11.4
Urinary bladder	C67	442	367	83.0	75	17.0	10.9	1.6	0.2	4.3	87.3	11.7
Hodgkin lymphoma	C81	298	245	82.2	53	17.8	6.4	1.7	1.0	8.7	90.9	21.0
Non-Hodgkin lymphoma	C82-85+C96	868	732	84.3	136	15.7	10.9	1.3	0.6	2.9	87.2	9.4
Lymphoid leukaemia	C91	433	372	85.9	61	14.1	2.8	3.2	3.5	4.6	90.5	8.5
Myeloid leukaemia	C92-94	465	400	86.0	65	14.0	8.6	1.3	0.4	3.7	89.7	4.5
Leukaemia unspecified	C95	85	74	87.1	11	12.9	10.5	0.0	0.0	2.4	89.4	1.5

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: Chennai, India, 1990–1999 cases followed-up to 2001

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
Lip	C00	86	74.7	51.1	40.7	77.1	56.0	47.2	47.4	49.0
Tongue	C01-02	988	51.6	25.7	19.4	53.3	28.4	23.0	23.2	23.4
Oral cavity	C03-06	1 662	60.9	35.3	30.5	62.9	38.8	35.7	35.6	36.7
Tonsil	C09	250	43.4	19.7	13.7	45.0	22.1	16.8	17.3	15.6
Oropharynx	C10	158	47.9	23.9	15.3	49.9	26.7	18.4	19.3	20.7
Hypopharynx	C12-13	1 017	43.6	21.0	12.5	44.9	23.1	14.5	13.8	15.0
Oesophagus	C15	2 016	32.1	12.4	6.9	33.2	13.8	8.3	9.3	8.6
Stomach	C16	2 681	34.5	13.2	8.6	35.7	14.6	10.1	8.0	10.3
Pancreas	C25	328	26.6	11.6	7.9	27.5	12.7	9.1	6.9	8.7
Larynx	C32	722	65.6	40.4	30.7	68.0	44.9	36.8	36.0	38.0
Lung	C33-34	1 806	31.9	12.0	6.5	33.0	13.2	7.6	6.4	7.1
Breast	C50	3 067	79.2	54.7	43.7	81.0	58.3	48.6	47.1	47.7
Cervix	C53	4 438	77.0	58.4	54.0	78.4	61.8	59.4	60.2	59.6
Ovary	C56	808	60.3	37.3	27.4	61.4	39.5	29.7	24.9	28.5
Urinary bladder	C67	442	58.2	30.7	23.2	61.2	35.7	29.8	25.7	32.0
Hodgkin lymphoma	C81	298	61.2	46.4	39.4	61.8	47.7	41.1	36.8	37.8
Non-Hodgkin lymphoma	C82-85+C96	868	50.2	30.3	21.6	51.3	32.1	23.6	21.5	23.2
Lymphoid leukaemia	C91	433	41.9	27.8	23.8	42.3	28.4	24.5	13.6	16.4
Myeloid leukaemia	C92-94	465	36.3	21.3	14.7	36.9	22.2	15.8	16.6	14.9
Leukaemia unspecified	C95	85	26.7	17.1	10.9	27.4	17.8	11.6	9.1	11.2

ASRS: age-standardized relative survival

Table 4a. Site-wise number of cases, 5-year absolute and relative survival by sex: Chennai, India, 1990–1999 cases followed-up to 2001

Site	ICD-10	Cases included	Male			Female		
			% 5-year survival			% 5-year survival		
			No.	Abs	Rel	No.	Abs	Rel
Lip	C00	86	47	46.3	52.4	39	34.4	41.3
Tongue	C01-02	988	761	18.1	21.8	227	23.9	26.6
Oral cavity	C03-06	1 662	874	30.9	37.0	788	30.1	34.2
Tonsil	C09	250	213	11.2	14.0	37	27.2	31.6
Oropharynx	C10	158	135	15.9	19.1	23	13.0	15.4
Hypopharynx	C12-13	1 017	757	11.9	14.2	260	14.2	15.6
Oesophagus	C15	2 016	1 229	5.6	7.0	787	9.2	10.5
Stomach	C16	2 681	1 828	8.3	10.0	853	9.2	10.3
Pancreas	C25	328	231	6.8	7.7	97	10.7	12.2
Larynx	C32	722	651	30.8	37.1	71	30.0	33.6
Lung	C33-34	1 806	1 527	6.1	7.2	279	8.7	9.7
Breast	C50	3 067				3 067	43.7	48.6
Cervix	C53	4 438				4 438	54.0	59.4
Ovary	C56	808				808	27.4	29.7
Urinary bladder	C67	442	318	23.2	30.6	124	23.6	27.9
Hodgkin lymphoma	C81	298	213	36.8	38.5	85	45.5	46.9
Non-Hodgkin lymphoma	C82-85+C96	868	558	20.1	22.1	310	24.5	26.3
Lymphoid leukaemia	C91	433	282	23.1	23.9	151	25.3	25.9
Myeloid leukaemia	C92-94	465	262	14.2	15.4	203	15.3	16.2
Leukaemia unspecified	C95	85	50	10.5	11.1	35	11.2	11.9

Abs: absolute survival; Rel: relative survival

Table 4b. Site-wise number of cases and relative survival by age group: Chennai, India, 1990–1999 cases followed-up to 2001

Site	ICD-10	Cases included	Number of cases by age group					Relative survival by age group				
			< 45	45-54	55-64	65-74	> 75	% 5-year survival				
								< 45	45-54	55-64	65-74	> 75
Lip	C00	86	9	28	27	18	4	85.3	52.9	40.8	26.4	48.2
Tongue	C01-02	988	120	269	321	216	62	37.0	25.6	19.3	14.9	28.6
Oral cavity	C03-06	1 662	216	408	577	353	108	48.4	44.6	31.6	25.4	30.5
Tonsil	C09	250	26	67	80	65	12	18.6	16.5	13.0	16.2	48.5
Oropharynx	C10	158	12	44	55	29	18	34.2	18.0	19.9	10.3	14.0
Hypopharynx	C12-13	1 017	172	259	326	200	60	21.2	17.2	13.2	8.9	4.1
Oesophagus	C15	2 016	236	530	689	430	131	11.6	7.1	6.3	10.5	12.0
Stomach	C16	2 681	445	635	848	561	192	16.9	12.5	8.3	6.7	2.3
Pancreas	C25	328	65	83	95	61	24	12.8	15.3	5.1	5.7	
Larynx	C32	722	88	172	262	149	51	64.9	36.4	31.1	33.0	28.1
Lung	C33-34	1 806	230	448	654	386	88	16.5	8.8	5.7	4.1	4.7
Breast	C50	3 067	931	860	696	418	162	58.4	47.0	44.4	37.5	48.4
Cervix	C53	4 438	1 150	1 405	1 235	515	133	63.4	59.9	55.8	58.0	69.4
Ovary	C56	808	270	206	195	116	21	49.3	24.4	18.9	11.6	
Urinary bladder	C67	442	45	77	111	143	66	41.6	30.5	24.2	35.5	15.1
Hodgkin lymphoma	C81	298	228	27	22	14	7	47.0	37.9	12.0	0.0	27.7
Non-Hodgkin lymphoma	C82-85+C96	868	418	139	163	117	31	30.6	20.7	20.6	5.0	6.7
Lymphoid leukaemia	C91	433	379	8	21	20	5	27.5	0.0	7.2	0.0	0.0
Myeloid leukaemia	C92-94	465	279	65	59	52	10	20.9	9.8	8.9	4.6	30.8
Leukaemia unspecified	C95	85	51	7	9	13	5	18.6	0.0	12.9	0.0	0.0

Table 5. Proportion of cases and 5-year absolute survival by extent of disease and site: Chennai, India, 1990–1999

Site	ICD-10	Cases included	% of cases by extent of disease				% 5-year absolute survival			
			Localized	Regional	Dist. met.	Unknown	Localized	Regional	Dist. met.	Unknown
Tongue	C01-02	988	4.4	86.8	2.6	6.2	59.2	17.3	15.4	14.7
Oral cavity	C03-06	1 662	3.5	88.7	2.7	5.0	54.9	30.0	10.0	30.9
Larynx	C32	722	6.6	85.5	3.6	4.3	44.3	30.3	9.2	34.1
Breast	C50	3 067	1.7	67.9	13.0	17.5	70.8	48.9	12.3	46.6
Cervix	C53	4 438	6.4	86.0	3.7	3.9	69.1	55.3	12.4	43.4
Ovary	C56	808	1.5	62.5	19.4	16.6	73.4	30.8	6.0	38.1

Dis. met.: distant metastasis

Table 6. Comparison of 5-year absolute and relative survival of cases diagnosed between 1984–1989 and 1990–1999, Chennai, India

Site	ICD-10	% Complete FU at 5 years		% 5-year absolute survival		% 5-year relative survival	
		1984–1989	1990–1999	1984–1989	1990–1999	1984–1989	1990–1999
Lip	C00	92.3	90.7	40.1	40.7	46.1	47.2
Tongue	C01-02	85.9	83.1	22.7	19.4	25.8	23.0
Oral cavity	C03-06	82.3	85.6	28.8	30.5	32.8	35.7
Oropharynx	C10	80.7	98.7	18.2	15.3	20.9	18.4
Hypopharynx	C12-13	82.7	90.0	15.5	12.5	17.5	14.5
Oesophagus	C15	87.9	92.0	5.6	6.9	6.5	8.3
Stomach	C16	87.7	90.9	6.9	8.6	7.8	10.1
Pancreas	C25	86.4	96.3	4.4	7.9	5.0	9.1
Larynx	C32	84.7	92.2	33.9	30.7	39.0	36.8
Lung	C33-34	86.5	91.1	6.6	6.5	7.5	7.6
Breast	C50	88.3	82.6	45.9	43.7	49.5	48.6
Cervix	C53	84.5	82.8	56.3	54.0	60.0	59.4
Urinary bladder	C67	89.1	87.3	19.1	26.3	22.8	32.3
Hodgkin lymphoma	C81	91.7	90.9	40.2	39.4	40.2	41.1
Non-Hodgkin lymphoma	C82-85+C96	79.9	87.2	19.4	21.6	21.1	23.6
Lymphoid leukaemia	C91	75.2	90.5	24.5	23.8	25.4	24.5
Myeloid leukaemia	C92-94	85.9	89.7	16.0	14.7	17.0	15.8

FU: follow-up