RESEARCH COMMUNICATIONS

An Assessment of Improvement in Reliability and Completeness of Mumbai Cancer Registry Data from 1964-1997

Balkrishna Bhika Yeole

Abstract

The Mumbai Cancer Registry was established in 1964 with the aim of obtaining reliable morbidity and mortality data from precisely defined urban population. It was first and only such registry for merely two decades functioning in the country. Up to now more than 200,000 cancer cases are registered and with over 100,000 cancer deaths are recorded in data files.

For studying improvements in the Mumbai Cancer Registry data, the data published in consecutive seven volumes (Vol.-II to Vol.-VIII) of "Cancer Incidence of Five Continents published by International Agency on Research on Cancer", Lyon, France have been used. For studying completeness of the data, the indicators 'Proportion of Deaths in Period'; 'Proportion of Death Certificates only' and stability of age incidence rates have been utilized. The indicators 'Proportion of cases registered on histological verification', 'The proportion of cases where age is not known', 'The flattening of age incidence curve' and 'Proportion of other and unspecified neoplasms can throw some light on the quality of data collected by the registry.

There has been notable improvement in percentages of histological verification cases and substantial decrease in the proportion of death certificate alone cases in both the sexes over a period of time. Mortality Incidence ratio remained stable over a period of time in both the sexes. The proportion of cases where age is not known never exceeded 0.020% in either sex, for any site, for any period. The proportion of cases registered as other and unspecified sites, initially was around 8 to 9% then it has been dropped down to 5%. The crude incidence rates for all sites together are stable throughout the period of observation in both the sexes while age adjusted incidence rates show declining trend in both the sexes. There is no change in the pattern of age-specific incidence curves over a period of time in both the sexes.

On examining various indices of reliability and completeness of Mumbai cancer registry data it can be concluded that, the data collected by this registry is quiet complete and reliable. While applying various checks for validity for a period from 1964-66 to 1993-97, it indicates that there is quiet improvement in almost all indices over a period of time in Mumbai cancer registry data.

Key words: cancer registration - histological verification - death certificates cases only - mortality-incidence ratio- crude rate - age-adjusted rate

Asian Pacific J Cancer Prev, **2**, 225-232

Introduction

The Mumbai Cancer Registry was established in 1964 with the aim of obtaining reliable morbidity and mortality data from precisely defined urban population. It was first and only such registry for merely two decades functioning in the country. Up to now more than 200,000 cancer cases are registered and with over 100,000 cancer deaths are recorded in data files. This registry's data has provided a wealth of information for national policy matters and is a rich source available for epidemiological research. In view of this unique situation it is considered worth while to assess whether is there any improvement in the reliability and completeness of the data within the registry itself, over a period of time from 1964-1997 on the basis of several currently recognised indices.

Correspondence to: B.B.Yeole M.Sc., Ph.D., Deputy Director, Bombay Cancer Registry, Indian Cancer Society, 74,Jerbai Wadia Road, Parel, Mumbai 400 012 India. Tel/Fax: 91-22-412 2351 E-mail: bcrics@vsnl.com

Materials and Methods

For studying improvements in the Mumbai Cancer Registry data, the data published in consecutive seven volumes (Vol.-II to Vol.-VIII) of "Cancer Incidence of Five Continents published by International Agency on Research on Cancer", Lyon, France, have been used (Cancer Incidence in Five Continents Vol.-II, III, IV, V, VI, VII).

For studying completeness of the data, the indicators 'Proportion of Deaths in Period'; 'Proportion of Death Certificates only' and stability of age incidence rates have been utilized. The indicators 'Proportion of cases registered on histological verification', 'The proportion of cases where age is not known', 'The flattening of age incidence curve' and 'Proportion of other and unspecified neoplasms' can throw some light on the quality of data collected by the registry.

The index of "Histological Verification" (HV) relates to the proportion of cases registered after microscopic confirmation to the total registered cases. Microscopic confirmation includes cases diagnosed through cytology, histopathology, blood studies and blood films. The index of "Death certification only" (DCO) is defined as the cases registered as a unmatched deaths to the total registered cases. "Deaths in Period" (DIP) refers to the ratio of a number of deaths attributed to a given cancer in a specified period to the number of cancers at the given sites registered during the same period.

Results

Percentage of cases having histological verification by sex for prominent sites for various periods are presented in Table 1. As far as total cancers are concerned there is an improvement in percentages of histological verification in each successive five-year period in both the sexes. In males it has been improved from 58% in 1964-66 to 77% in 1993-97, while in females it has been improved from 57% to 80% during the same period. During the entire period of study there has been no significant increase in improvement in percentages of HV for oral, pharyngeal and laryngeal cancer in both the sexes. Cancers of oesophagus, stomach, lung, lymphomas and leukemias in both the sexes, prostate in males and breast, cervix and ovary in females showed notable increase in percentage of HV in both the sexes from 1964-66 to 1993-97. Most prominent increase of HV was observed for the cancers of oesophagus, stomach, lung and lymphomas in both the sexes. The significant increase in

Table 1. Percentage of Cases with Histological Verification from Prominent Sites by Sex and Period, Greater Mumbai, 1964-1997.

		PERIOD						
SEX	SITE	1964-66	1967-72	1973-77	1978-82	1983-87	1988-92	1993-97
Male	Tongue	80	83	84	81	84	85	84
	Mouth-Other	87	88	88	86	87	87	88
	Hypopharynx	77	88	84	84	83	83	84
	Oesophagus	33	35	46	54	59	62	58
	Stomach	27	37	41	45	60	66	70
	Colo-Rectum	44	48	56	68	69	73	76
	Larynx	69	70	67	62	70	71	72
	Lung	32	32	39	44	59	61	64
	Prostate	36	40	49	58	68	73	72
	Lymphomas	61	75	76	76	86	96	99
	Hodgkin'sDis.	65	78	84	80	90	97	99
	Leukemias	69	74	76	80	90	92	99
	All sites	58	60	63	65	70	75	77
Female	Tongue	75	74	83	76	79	79	85
	Mouth-Other	80	87	86	83	85	80	83
	Hypopharynx	66	74	74	84	86	83	84
	Oesophagus	32	28	47	55	63	60	63
	Stomach	17	26	31	38	53	57	61
	Colo-Rectum	44	54	58	64	65	71	73
	Larynx	66	61	54	54	62	66	67
	Lung	17	32	34	44	50	50	63
	Breast	67	69	69	66	79	81	84
	Cervix	63	75	80	84	83	84	84
	Ovary	57	67	71	71	73	77	77
	Lymphomas	70	73	70	75	83	95	100
	Hodgkin'sDis.	73	74	81	84	86	98	100
	Leukemias	57	68	69	71	72	90	99
	All sites	57	61	64	67	73	76	80

Table 2. Percentage of Cases Registered by Death Certificates Only by Sex and Period, Greater Mumbai, 1964-1997.

SEX	SITE	PERIOD 1964-66	1967-72	1973-77	1978-82	1983-87	1988-92	1993-97
Male	Tongue	7	5	6	9	6	5	6
	Mouth-Other	5	4	6	6	4	2	3
	Hypopharynx	1	1	2	3	2	2	3
	Oesophagus	10	12	17	15	12	14	13
	Stomach	18	23	23	19	13	9	8
	Colo-Rectum	21	19	20	15	8	9	5
	Larynx	13	9	15	19	12	11	11
	Lung	18	20	19	18	12	12	12
	Prostate	29	30	24	14	10	7	9
	Lymphomas	10	9	9	8	5	3	0
	Hodgkin'sDis.	12	6	8	5	4	3	0
	Leukemias	11	12	13	7	11	8	0
	All sites	13	13	14	13	9	8	7
Female	Tongue	10	10	8	15	10	8	4
	Mouth-Other	7	5	7	10	5	9	5
	Hypopharynx	2	2	2	3	2	3	2
	Oesophagus	14	14	19	20	14	17	15
	Stomach	46	38	35	30	20	18	11
	Colo-Rectum	25	22	22	15	12	9	8
	Larynx	19	21	23	35	19	20	13
	Lung	42	33	29	22	20	19	15
	Breast	15	11	13	11	7	6	5
	Cervix	5	5	5	6	5	5	4
	Ovary	16	14	12	12	7	6	5
	Lymphomas	13	12	12	8	6	5	0
	Hodgkin'sDis.	7	13	9	6	6	2	0
	Leukemias	20	19	10	10	9	10	0
	All sites	18	16	16	15	10	9	6

HV was observed for breast cancer from 1983-87 onwards and for lymphomas and leukemias cancer from 1978-82 onwards.

Percentage of cases diagnosed through death certificate only (DCO) by sex for most prominent sites for various periods are presented in Table 2. As far as total cancers are concerned there has been substantial decrease in percentages in DCO cases; in males it has been decrease from 13% in 1964-66 to 7% in 1993-97. The corresponding figures for females are 18% in 1964-66 to 6% in 1993-97. There has been no significant decrease in percentage of DCO's for the sites such as tongue, mouth, hypopharynx, oesophagus, and larynx in both the sexes and cervix for females. While there has been significant improvement in the sites such as stomach, colo-rectal, lung, lymphomas and leukemia's in both the sexes and in breast and ovary in females.

Proportion of deaths in period (DIP) by sex for most prominent sites for the period 1967-72 to 1993-97 are presented in Table 3. There has been no significant change is noted in DIP's for all sites together, in both the sexes over a period of, 1967-72 to 1993-97. The proportion of DIP is around 54 in males and around 50 in females throughout the entire period. Proportion of DIP is very high for the cancers such as having poor prognosis (oesophagus, stomach, lung and leukemia's) in both the sexes while it is very low for the oral and pharyngeal cancers. In females, cancers of ovary and breast reported higher proportion of DIP's than the cervical cancers.

The proportion of cancer cases where age is not known for all cancers together by sex for the period 1973-77 to 1993-97 are presented in Table 4. These figures have been not reported by this registry to the editors of Cancer Incidence of Five Continents for the period 1964-66 and 1967-72. This proportion was never exceeded 0.020% in either sex for any period, as far as all cancers together or any individual site is concerned.

The proportion of cases registered as other and unspecified sites for various periods by sex are presented in Table 5. The category "Primary site unknown" represents the neoplasm's for which a primary site of origin could not be established "Rubrics 195-199" and other and illegal sites within the digestive organs and peritoneum "Rubric 159" and within respiratory system and introthorasic organs "Rubric 165". Initially this proportion was around 8 to 9% for first 15 years period, then it has been dropped down to round about 5% for later 20 years of period.

"The crude and age-adjusted incidence rates" for prominent sites for various five years periods by sex are presented in Table 6 and 7 respectively. The crude incidence rates for all sites together, when compared for various periods

Table 3. Percentage of Deaths in Period for Prominent Sites by Sex and Period, Greater Mumbai, 1967-1997.

SEX	SITE	PERIOD 1967-72	1973-77	1978-82	1983-87	1988-92	1993-97
Male	Tongue	32	38	37	36	38	50
	Mouth-Other	22	24	27	25	26	30
	Hypopharynx	9	11	15	18	28	31
	Oesophagus	62	73	55	70	72	73
	Stomach	84	72	38	53	57	58
	Colo-Rectum	42	46	53	48	45	46
	Larynx	56	65	79	61	59	60
	Lung	79	72	69	65	72	69
	Prostate	62	55	52	46	41	49
	Lymphomas	63	58	53	42	43	46
	Hodgkin'sDis.	54	38	37	26	25	27
	Leukemias	70	64	66	67	68	69
	All sites	58	56	55	51	51	53
Female	Tongue	38	37	44	40	40	45
	Mouth-Other	23	25	38	34	33	49
	Hypopharynx	13	12	20	19	28	31
	Oesophagus	63	66	67	64	72	74
	Stomach	105	90	81	63	67	65
	Colo-Rectum	76	73	59	52	51	54
	Larynx	68	86	101	99	71	75
	Lung	99	85	80	79	82	80
	Breast	44	42	40	36	39	40
	Cervix	25	22	25	25	29	32
	Ovary	63	53	48	52	52	48
	Lymphomas	66	51	46	40	44	49
	Hodgkin'sDis.	57	40	32	34	25	32
	Leukemias	73	70	64	67	80	81
	All sites	56	51	51	47	48	49

they seem to be very stable in both the sexes. The average crude incidence rates is around 70 per 100,000 population But when age-adjusted rates are compared they show decreasing trend. The age-adjusted incidence rates have been declined from 140 to 120 per 100,000 in males and from 131 to 121 per 100,000 in females. Decreasing trend has been noticed in crude as well as in age-adjusted incidence rates for cancers of the tongue, hypopharynx, stomach, larynx and cervix during entire period of observation. While cancers of breast, ovary, and prostate, lymphomas and leukemia's showed increasing trend in crude as well as age-adjusted incidence rates in both the sexes during the same period. Cancers of the mouth, colo-rectal, lung and Hodgkin's disease did not show any significant change in either crude or age-adjusted incidence rates in either sex, from 1964-66 to 1993-97.

Age specific incidence curve for all sites together for various periods for males and females are presented in Figure 1 and Figure 2 respectively. There was no change in the pattern of age-specific incidence curves over a period of time

Table 4. Proportion of Cases Where Age was not Known at Different Periods for All Sites by Sex, Greater Mumbai, 1973-97

Period	MALE Total Cases	MALE Age Not Known Cases	MALE Percent	FEMALE Total Cases	FEMALE Age Not Known Cases	FEMALE Percent
1973-77	11463	15	0.13	8016	10	0.12
1978-82	14828	26	0.17	11656	17	0.14
1983-87	16893	17	0.10	14136	14	0.10
1988-92	18904	30	0.16	16785	27	0.16
1993-97	20668	20	0.10	19601	34	0.15

Table 5. Proportion of Cases Registered as Other and Unspecified Sites by Sex, Greater Mumbai, 1964-97

Period	MALE Total Cases	MALE Cases of Un-specified sites	MALE Percent	FEMALE Total Cases	FEMALE Cases of Un-specified sites	FEMALE Percent
1964-67	5872	516	8.84	3851	365	9.47
1968-72	11112	1026	9.23	7578	679	8.96
1973-77	12990	1107	8.52	9763	857	8.78
1978-82	14828	861	5.81	11772	503	4.27
1983-87	16893	1046	6.91	14136	667	4.72
1988-92	18904	1235	6.53	16785	835	5.00
1993-97	20668	778	3.76	19601	778	4.00

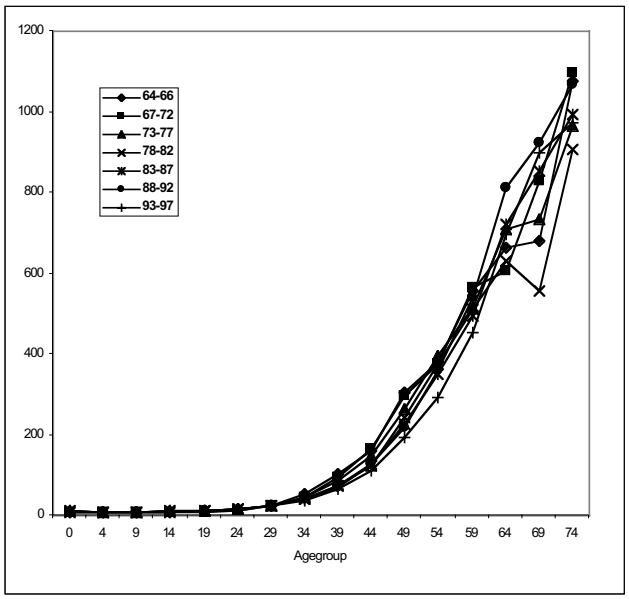

Figure 1. Age-Specific Incidence Curves for All Sites by, Period, Male, Greater Mumbai, 1964-1997

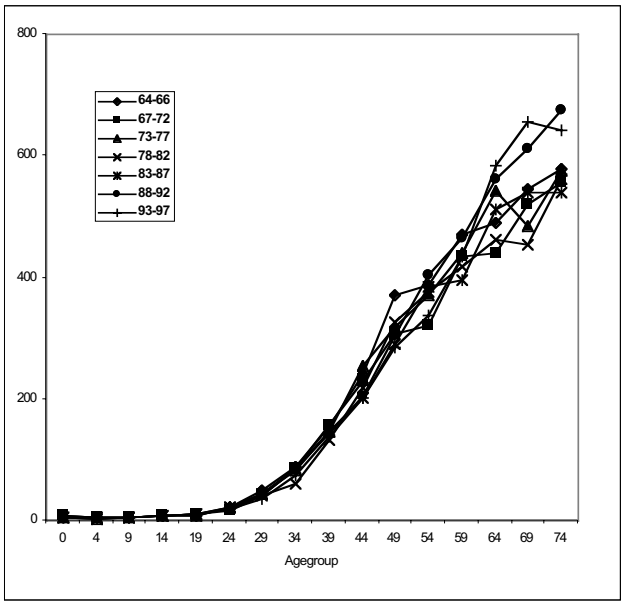

Figure 2. Age-Specific Incidence Curves for All Sites by, Period, Female, Greater Mumbai, 1964-1997

Table 6. Crude Incidence Rates Per 100,000 Population for Prominent Sites by Sex and Period, Greater Mumbai, 1964-1997.

		PERIOD						
SEX	SITE	1964-66	1967-72	1973-77	1978-82	1983-87	1988-92	1993-97
Male	Tongue	7.1	6.3	5.1	4.4	4.0	3.6	3.6
	Mouth-Other	4.1	3.9	3.3	3.3	3.5	3.8	3.8
	Hypopharynx	8.3	4.1	4.1	4.7	4.4	4.4	3.4
	Oesophagus	6.1	6.6	6.5	5.6	5.5	5.3	4.7
	Stomach	4.7	3.9	4.2	3.6	3.7	3.8	3.7
	Colo-Rectum	4.0	3.9	3.6	3.2	3.4	4.0	4.1
	Larynx	6.9	6.5	5.8	4.2	4.5	4.1	3.9
	Lung	6.2	6.1	6.4	6.8	7.0	7.0	6.6
	Prostate	1.9	1.8	1.7	1.8	3.6	2.9	3.3
	Lymphomas	2.4	1.5	2.1	2.0	2.4	2.6	3.3
	Hodgkin'sDis.	0.7	0.8	1.4	1.0	1.0	1.1	0.8
	Leukemias	2.7	2.6	2.5	2.7	3.1	3.2	3.6
	All sites	71.8	68.6	69.2	65.4	68.6	67.7	71.2
Female	Tongue	1.9	1.6	1.9	1.6	1.4	1.3	1.5
	Mouth-Other	3.1	3.0	3.8	2.6	2.5	2.7	2.7
	Hypopharynx	1.2	1.0	1.2	1.2	1.2	1.2	1.1
	Oesophagus	5.1	5.1	5.3	4.8	4.6	4.4	3.9
	Stomach	2.7	2.5	2.5	2.5	2.4	2.1	2.1
	Colo-Rectum	3.0	2.6	2.9	2.5	2.9	3.1	3.4
	Larynx	1.4	1.3	1.3	0.9	0.9	0.7	0.7
	Lung	1.5	1.4	1.9	1.6	1.6	2.0	2.3
	Breast	10.9	11.3	12.1	13.2	15.8	17.7	19.5
	Cervix	14.4	14.3	11.3	12.6	12.9	12.9	11.7
	Ovary	3.2	2.7	4.1	4.1	4.2	4.5	5.6
	Lymphomas	1.1	0.8	1.0	1.1	1.5	1.7	2.2
	Hodgkin'sDis.	0.3	0.4	0.5	0.4	0.4	0.5	0.4
	Leukemias	1.9	2.0	2.2	2.0	2.3	2.4	2.8
	All sites	67.7	65.7	70.4	67.4	72.6	76.4	80.6

Table 7. Age-Adjusted Incidence Rates Per 100,000 Population for Prominent Sites by Sex and Period, Greater Mumbai, 1964-1997.

SEX	SITE	PERIOD 1964-66	1967-72	1973-77	1978-82	1983-87	1988-92	1993-97
Male	Tongue	14.0	12.6	10.2	9.4	7.4	6.5	5.9
	Mouth-Other	6.5	6.7	6.8	6.5	5.9	6.2	5.8
	Hypopharynx	16.0	7.7	8.0	9.9	8.2	8.3	6.0
	Oesophagus	13.0	15.2	15.7	14.7	11.4	10.8	8.6
	Stomach	10.0	9.3	9.7	8.9	7.3	7.7	6.5
	Colo-Rectum	8.4	9.0	8.0	7.9	6.4	7.6	6.8
	Larynx	13.8	13.6	12.9	10.0	8.9	8.2	7.1
	Lung	13.3	13.5	14.2	15.7	14.0	14.5	12.4
	Prostate	6.5	8.0	6.8	8.2	6.9	7.9	7.6
	Lymphomas	2.7	2.4	3.2	3.6	3.7	4.1	4.6
	Hodgkin'sDis.	0.8	1.0	1.7	1.1	1.2	1.3	0.9
	Leukemias	3.0	2.4	3.4	3.9	4.0	4.1	4.5
	All sites	139.5	143.1	143.3	145.0	126.0	131.4	118.8
Female	Tongue	3.7	3.1	4.1	3.4	2.5	2.3	2.3
	Mouth-Other	6.1	5.4	6.8	5.0	4.3	4.6	4.0
	Hypopharynx	4.4	1.8	2.2	2.2	1.9	2.0	1.7
	Oesophagus	11.3	10.8	10.7	10.3	8.4	8.3	6.5
	Stomach	6.5	5.8	6.9	6.0	4.3	3.8	3.4
	Colo-Rectum	3.3	5.9	6.7	5.4	5.1	5.7	5.4
	Larynx	2.8	2.6	2.6	2.0	1.6	1.4	1.2
	Lung	3.7	3.1	4.0	3.5	3.0	3.7	3.7
	Breast	20.4	20.1	21.2	24.1	24.6	28.2	28.6
	Cervix	24.7	23.2	23.3	20.6	19.3	20.2	16.9
	Ovary	6.1	4.8	7.2	7.2	6.5	7.2	8.0
	Lymphomas	1.6	1.3	1.7	2.0	2.3	2.7	3.3
	Hodgkin'sDis.	0.3	0.6	0.8	0.5	0.6	0.6	0.5
	Leukemias	2.5	1.7	2.8	2.6	2.7	3.0	3.5
	All sites	131.1	121.7	130.2	126.0	116.8	126.6	121.0

in both the sexes. The incidence rates showed a continuos increase with age for all the period in both the sexes. When the age specific incidence rates are compared over a period of time it was observed that in males, the rates upto age 34 remained constant, and the rates have been decreased for the age groups 35-59 and there is slight increase in the rates for the ages 60 and above (Figure 1). Somewhat same trend is observed for females also when age specific incidence rates are compared (Figure 2).

Discussion

Greater Mumbai, a densely populated urban metropolis on the West Coast of India, occupies an area of 437.7 sq.kms. And it's smallest administrative district in Maharashtra State. It is situated between latitudes 18o54s and 19o18s North and longitudes 70o47s and 73o00s East. Population of Greater Mumbai as per the 2001 census on 1st March was 11,914,398 (55.2% males, 44.8% females) with sex ratio 811 females per 1,000 males and having a density 19760 inhabitants per sq.km. (Biswas, 2001). Mumbai is an industrial heart of India and has a multilingual population representing every state in the India. This registry today, covers more than 140 hospitals and Nursing Homes in the registration area. To get the required information on cancer patients, staff members personally visits the wards of the co-operating hospitals regularly, to interview all confirmed patients. The record files maintained by the various departments of all cooperating hospitals viz. pathology, haemetology, radiology and the various registers in the specialized in the surgical and medical wards are also examined.

Completeness of registration is the proportion of all incidence cases in the registry population, which has been included in the registry database. Incompleteness is rarely avoidable and in practice no registry can achieve 100%; there will always be some omissions for various reasons (Hilsenback, et al, 1985). It may happen that a cancer case never comes into contact with the medical care system, and so remains undiagnosed. More usually incompleteness is the consequence of some defects in the registry's case finding procedures. It is also expected that "Duplicate Registration" of the same case should be avoided by careful attention to record linkage during the registration process.

The main value of the percentage of cases by histological verification is as an indicator of the validity of the diagnostic information (Parkin et al 1994). In this regard notable improvement in percentage of cases diagnosed through

histological clarification is observed in the registry over a period from 1964-66 to 1993-97 (Table 1). When these percentages are compared internationally, Mumbai figures are somewhat low when compared to with the registries in U.S.A. and high when compared with the registries in Asia (excepts Singapore), Africa and Central and South America (Yeole and Jussawalla, 1988). The lower percentage of HV for Mumbai as compared to US registries may be due to that autopsies are not done as a routine in Mumbai. In our data the percentage of HV for sites such as oesophagus and lung is somewhat low because for this sites radiologic evidence is suppose to be equivalent to HV as far as diagnosis is concerned. In a registry high proportion of cases diagnosed by histology or cytology. Haemetology- higher than might reasonably be expected; suggests that over reliance on the pathology laboratory as source of information and failure to find cases diagnosed by other means.

Death certificates provide an important supplementary source of information on cancer registries. Completeness of registration may be evaluated on the basis of proportion of incidence cancers, which first come to know to be registry's attention via a death certificate mentioning cancer. DCO-% is suggestive of incompleteness. Even this may be interpreted in the light of local circumstances; particularly in developing countries where the quality of death certificates may be very poor. Fortunately death registration system Mumbai is complete and reliable (Gupta & Ramarao, 1973). In Mumbai registry initially the percentage of DCO was 15% and now it is less than 6% (Table 2). This improvement was obtained by increase in number in collaborating hospitals over a period of time. However a low DCO's percentage is no guarantee of completeness, although it could indicate efficient case-finding, it could equally well result from the efficient transfer of death mentioning cancer cases.

Mortality: incidence ratio is an important indicator of completeness, and example of the independent case ascertainment method. When the quality mortality data is good then MI ratio is related to case fatality. However when mortality statistics are of poorer quality (incomplete certification, inaccurate cause of deaths statements). The relationship will be less close. Examination of the MI ratio, taken in conjunction with the average survival rates uses some indication of the completeness of registration. While examining our registry's data over a period of time it can be seen that the MI ratio is quiet stable for all sites together and as well as for most prominent sites in both the sexes over a period from 1964-1997, which may be attributed to the excellent registration system in Mumbai.

The proportion of cases registered for which the age was not known is useful as an indicator of quality of the basic data input. Validity of the recorded age can be evaluated from the percentage of registrations with unknown age. The percentage of cases where the "Age is not known" is quiet low in Mumbai registry, which may be attributed to the active registration system where the information on age is directly obtained from the patient itself.

The high proportion of cases assigned to "Other and unspecified" rubrics generally implies poor diagnostic precision, as evidenced by the low HV percentage observed for this rubrics, or failure to specify the site of the primary cancer in cases diagnosed on the basis of tissue obtained from a metastasis. If a high proportion of the total neoplasm's registered is assigned to this rubrics, it is likely that investigation of the patient was not complete, or that clinicians may be more willing to express doubt, than elsewhere. For Mumbai registry, proportion is at little higher side when compared with the registry's functioning in developed countries, which may be due to fact that while coding primary site, we are applying more demanding criteria for allocation to a specific site and collaborating hospital while supplying data to us are not taking proper care to arrive at a specific diagnosis for this sites

Change in incidence rate over time which are greater than expected and which can not be a scribed to discrepancies in the estimations of pesron-years at risk may well be related to changes in the completeness of case ascertainment. In our registry the stable crude incidence rates over a period of observation in both the sexes indicates that the good index of reliability for a continuing registry. The decrease in age-adjusted rates is clearly due to the change in age structure of the population over a period of time. For some sites there is definite change in incidence over a period of three decades, which may be, changes in exposure factors. In Asia, the increase in breast cancer has been ascribed to a shift towards a more westernized life style. In Mumbai, the change in the age at first birth has been correlated with the increase of breast cancer incidence (Yeole et al 1990). The declining trend in cervical cancer incidence in Mumbai has been attributed to an upward shift in age at marriage (Yeole et al 1989). In Mumbai it has been shown that the incidence of cancers of the tongue, oropharynx and larynx have decreased significantly where as oral cancer remained more or less stable and the incidence of the hypopharynx, oesophagus and lung increased only marginally (Jayant et al 1988, Yeole et al 1993). The decrease in the proportion of bidi-smokers in younger cohorts, which confirms with the observed, declines in the incidence of those cancers for which bidi-smoking is the predominant risk factor.

All cancer registries strive to ensure completeness of coverage. For the computation of rates however they are dependent upon the population estimates derived from other sources. The reliability and precision of such estimates can very wildly. For Greater Mumbai, census figure by age, sex and religion available after every ten years and the population for specific years can be easily estimated by scientific methods. It is unlikely that the accuracy of the incidence rates based on Mumbai registry data affected due to denominator problem.

On examining various indices of reliability and completeness of Mumbai cancer registry data it can be concluded that, the data collected by these registry is quiet complete and reliable. While applying various checks for validity for a period from 1964-66 to 1993-97, it indicates that there is quiet improvement in almost all indices over a

period of time in Mumbai cancer registry data.

References

Biswas SK (2001). Census of India 2001, Provisional Population Totals, Paper I, Series-28, Maharshtra, Director of Census Operations, Maharashtra, Mumbai.

Doll R, Muir C, Waterhouse J (eds.) (1970). Cancer Incidence in Five Continents. Vol.II International Union Against Cancer, Springer-Verlag Berlin-Heidelberg-NewYork.

Gupta RB, Ramarao G (1973). Effect of Elimination of Different Causes of Death on Expectation of Life, 1960-61, *Indian J Med Res*, **61**, 1951-6.

Hilsenbeck SG, Glaefkegs Feiglp, Laneww Golenzerh, Amesc, Dickson C (1985). Quality Control of Cancer Registries. US Department of Health and Human Resources.

Jayant K, Yeole BB (1987). Cancers of the Upper and Respiratory Tracks in Bombay, India, A Study of Incidence over 2 Decades, *British Journal of Cancer*, **56**, 847-52.

Muir C, Waterhouse J, Mack T, Powell J, Whellan S (eds.) (1987). Cancer Incidence in Five Continents. Vol.V IARC Scientific Publication No. 88, Lyon.

Parkin DM, Muir CS, Whelan SL, et al (eds.) (1992). Cancer Incidence in Five Continents. Vol.VI IARC Scientific Publication No. 120, Lyon.

Parkin DM, Chen VW, Ferlay J, et al (1994). Comparability and Quality Control in Cancer Registration, IARC Technical Report No. 19, Lyon.

Parkin DM, Whelan SL, Ferlay J, Raymond L, Young J (eds.) (1997). Cancer Incidence in Five Continents. Vol.VII, IARC Scientific Publication No. 143, Lyon.

Waterhouse J, Muir C, Correa P, Powell J (eds.) (1976). Cancer Incidence in Five Continents. Vol.III IARC Scientific Publication No. 15, Lyon.

Waterhouse J, Muir C, Shanmugaratnan K, Powell J (eds.) (1982). Cancer Incidence in Five Continents. Vol.IV, IARC Scientific Publication No. 42, Lyon.

Yeole BB, Jussawalla DJ (1988). An Assessment of Reliability and Completeness of Bombay Cancer Registry Data. *Indian Journal of Cancer*, **25**, 177-90.

Yeole BB, Jayant K, Jussawalla DJ (1989). Declining in Cervical Cancer Incidence in Bombay, India, 1964-85. *Journal Surg Oncology*, **42**, 257-71.

Yeole BB, Jayant K and Jussawalla DJ (1990). Trends in Breast Cancer incidence in Greater Bombay; An Epidemiological Assessment, Bull. *WHO*, **68**, 245-9.

Yeole BB, Jayant K, Natekar NV, Jussawalla DJ (1993). Trends in Cancers of the Uppers Alimentary and Respiratory Tracks in Women in Bombay, India. *International Journal of Oncology Athens*, **3**, 1015-8.

Personal Profile

Name	:	Yeole Balkrishna Bhika.
Designation	:	Deputy Director and Chief of Mumbai Cancer Registry, Indian Cancer Society.
Qualifications:		M.Sc. (Statistics), Ph.D. (Epidemiology from Tampere University), Finland
Experience	:	7 Years in Demographic Research. 29 Years in Cancer Epidemiological Research.
Publications	:	80 Research Articles published in National & International Cancer Journals, also written 35 Cancer Monographs/ Reports
Conferences	:	Presented papers at more than 50 Cancer conferences / Seminars / Workshops.
Membership	:	Life member - Voting member of 10 National / International Cancer Associations / Committees.
Awards / Fellowships	:	Recipients of 12 National / International Fellowships / Scholarships / Awards. (Last year received a most prestigious "Sandoz Oration Award" For Best Cancer Research Work in 1996-1997, from Government of India.