
RESEARCH COMMUNICATION

An Assessment of Cancer Incidence Patterns in Parsi and Non Parsi Populations, Greater Mumbai

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Summary

The Mumbai Cancer Registry has been in operation since 1964 and reliable morbidity and mortality data on cancer have been obtained for the first time in India, from a precisely outlined population. An attempt has been made to examine the differences noticed in the site-specific cancer risk, between two groups of people living in this area-the Parsi and non Parsi population of Mumbai.

For this study, data has been utilized, collected by Mumbai Cancer Registry for the latest five years. For comparison between Parsi and non Parsi populations, crude and age-adjusted rates have been used.

The overall age-adjusted rates for the Parsi's were found to be lower than those for the non Parsi populations and more noticeably their site-specific risks seem to differ radically from the non Parsi pattern. Cancers of the buccal cavity, pharynx, larynx, oesophagus and cervix uteri which are frequently seen in the non Parsi population, are less commonly observed in the Parsi community. On the other hand the Parsi rates are higher at site such as the female breast, endometrium, lymphomas and leukaemias.

The observed site-specific contrast are believed to be due to differences present in the habits, customs and economic status of the two groups.

Keywords: Epidemiological study - ethnic groups - Parsi population - primary site - incidence rates.

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Introduction

Greater Mumbai is a cosmopolitan with a population of approximately 10 million persons, drawn from every state in the Indian union. This urban centre thus represents a true cross-section of the heterogeneous peoples of the country (Census of India; 1991). Thinly dispersed in this city, a tiny community known as the Parsis had made significant contributions for beyond its small numbers would perhaps seem to warrant, making this city the "Urbs primers in India". The Parsis are distinguished by religious, demographic and socio-economic factors and even though living in the same geographical environment, present striking differences from others in the relative frequencies of cancer noted at various sites. A critical appraisal of this situation was thus considered promising, in order to ascertain whether or not this apparent

differences could be ascribed to recognizable variations in habits, customs and socio-economic conditions of these people. With this aim an attempt has been made to investigate the true state of affairs in this small community in Greater Mumbai and if possible, to define the magnitude and nature of the variations observed.

Historical Background of the Parsis

The Parsis are in fact the sole surviving group of Persian Zoroastrians, who fled their homeland to escape religious persecution by the invading Muslims who finally overpowered the weakened Persian Empire by the middle of the 7th century A.D. These refugees wandered away from Persia in large numbers for almost a century, but only a small group is known to have settled along the west coast of India.

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What happened to the rest is a mystery. In their pursuit for a better way of life, the Parsis soon moved once again southward from their early rural settlements along the Gujarat post and finally settled in Mumbai city in large numbers.

The community is highly inbred and approximately 2-3rd of its members, out of total world population of 1,20,000 still reside in the Greater Mumbai area. The economic status, literacy rate and various habits and customs of this people appeared to be at variance with those other communities residing alongside. This small group is unusually enlightened enterprising, prosperous and westernized (Jussawalla DJ, 1975; Jussawalla DJ et al., 1988).

All through the years the Parsis maintained cordial relations with other local communities, but to preserve their solidarity and existence as a community, rigid norms of social and religious behavior were prescribed and followed. As a general rule, the Parsis are required to refrain from smoking on religious grounds, marriages are undertaken almost exclusively within the communal fold and proselytization, the conversion of non Parsis to the Zoroastrian faith, is also totally prohibited.

Demographic Characteristics of Mumbai

Mumbai, a densely populated urban metropolis on the west coast of India, occupies an area of 437.7 square kilometers and is the smallest administrative district in the Maharashtra State. It is situated between latitudes 18°54' and 19°18' North and longitudes 70°47' and 73°00' East.

In India a population census is undertaken every ten years, the last one being taken in 2001. The population count of Bombay at the 2001 Census (on 1st March) was 11,914,398 persons (55.2% males, 44.8% females) with a sex ratio of 811 females per 1000 males and a density of 19,760 inhabitants per km², confirming the fact that it is the most heavily populated district in the Maharashtra State.

The decennial growth rate per 100 of the population between 1991 and 2001 was of the order of 2.02% percent. The literacy rate was found to be 87%.

Cancer was found to have caused about 5% of all deaths in the metropolis, and was the 7th leading cause of death. The crude mortality rates of cancer for all sites were 38.9 and 36.3 per 100,000 for males and females respectively. The leading causes of death in males were tuberculosis and heart diseases and in females pneumonia and obstetric and perinatal mortality (Bombay Municipal Corporation, 1994).

Cancer Registration in Mumbai

The Mumbai registry today, covers more than 100 hospitals and private nursing homes in the metropolitan area. Staff members personally visit the wards of the co-operating hospitals regularly, to interview all identified cancer patients and also those under investigation. The record files maintained by the various departments of these hospitals (pathology, haematology, radiology) and the

various specialised surgical and medical wards, are also examined. Supplementary information is gleaned from the death records maintained by the Vital Statistics Division of the Bombay Municipal Corporation.

The coding system devised by the World Health Organisation using code numbers 140-208 as published in the manual of the 'International Classification of Diseases, Injuries and Causes of Death' (9th Revision of 1977) is utilized (World Health Organisation, 1977). The International Classification of Diseases for Oncology (1976) (ICD-0) is used for coding the histology (World Health Organisation, 1976).

Materials and Methods

For this study, data has been utilized, collected by Mumbai Cancer Registry for the latest 5 years, that is, 1993-97. The data collected by Mumbai Cancer Registry has been shown complete and reliable (Yeole BB et al., 1988; National Cancer Registry Programme (NCRP), 2000). Reliability indices of our data are, more than 82% are having microscopic confirmation, only 6% are DCO's and mortality/morbidity ratio is 52% (Indian Cancer Society, 1999). Population estimates are reliable as they are adjusted for migrants. For comparison between Parsi and non Parsi populations crude rate and age adjusted rates (world) have been used for the period 1993 to 97. For studying changes in incidence, from 1965 to 1995, the age-adjusted incidence rates are compared for most prominent sites for each sex in Parsi as well as in non Parsi populations.

Results

Number of cancer incidence cases and crude, age-adjusted, truncated and cumulative incidence rates are compared for Parsis and non Parsis by sex in Table 1. Crude rates shows Parsis have very high incidence than non Parsis in both the sexes. Crude rates also shows female preponderance but the difference in the rate is much higher in Parsis. When comparisons are made on age-adjusted rates, reverse situation is noticed. In Parsis, age-adjusted rate for females is very high as compared to that of males, while in non Parsi population, the rates are of the same order in both the sexes. This is purely due to the difference in the age composition of Parsi and non Parsi populations (Fig. 1).

Age-specific cancer incidence rates per 100,000 population for Parsis and non Parsis for Greater Mumbai for the period 1993 to 97 are presented in Fig. 2. Incidence rates tend to follow the general pattern of increase with age for both the populations. In Parsis female rates are higher at all the ages. In non Parsis, female rates are higher for age-groups 30-54 only.

Age-adjusted cancer incidence rates for Parsi and non Parsi population by site-group and sex are compared in Fig. 3. Notable high incidence of cancer for site-groups involving buccal cavity and pharynx, digestive organs, respiratory system and genital organs are noted in non Parsi population

Table 1. Number of Cancer Incidence Cases and Various Rates per 100,000 Population by Sex in Greater Mumbai, 1993-97

Characteristics	Parsis		Non Parsis	
	Male	Female	Male	Female
Incidence cases	288	419	20379	19220
Population(in 1000s)	44	37	5763	4862
Crude rate	129.9	224.9	70.7	79.6
Age adjusted rate	70.6	120.2	119.9	120.8
Truncated rate	100.0	185.3	171.1	227.0
Cumulative rate	14	8	7	7

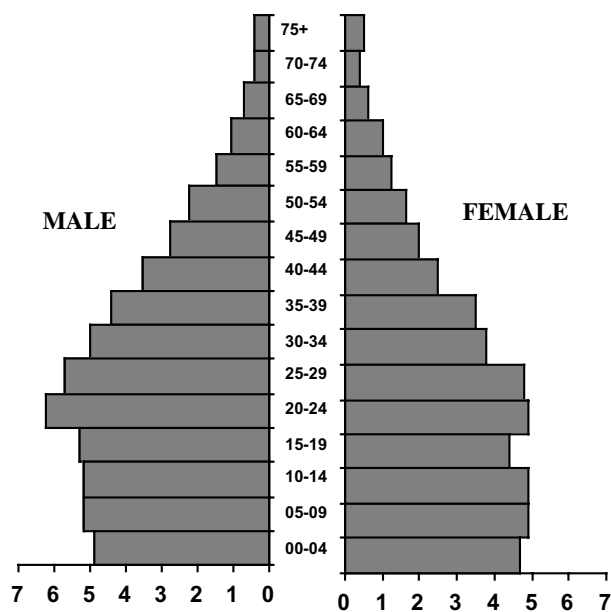
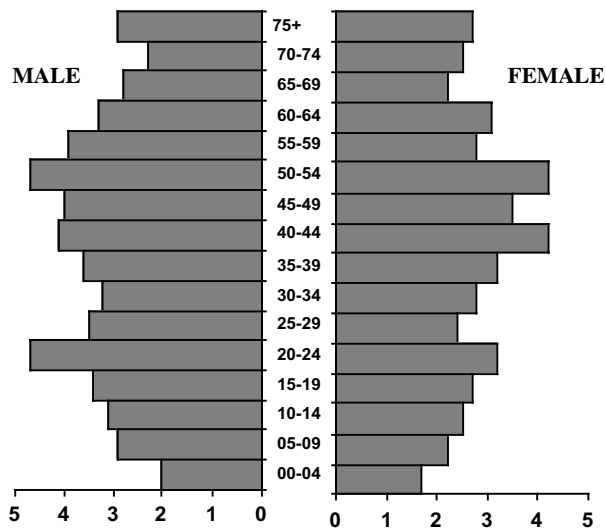


Figure 1. Population Pyramids for Parsi and non Parsis Greater Mumbai, 1995

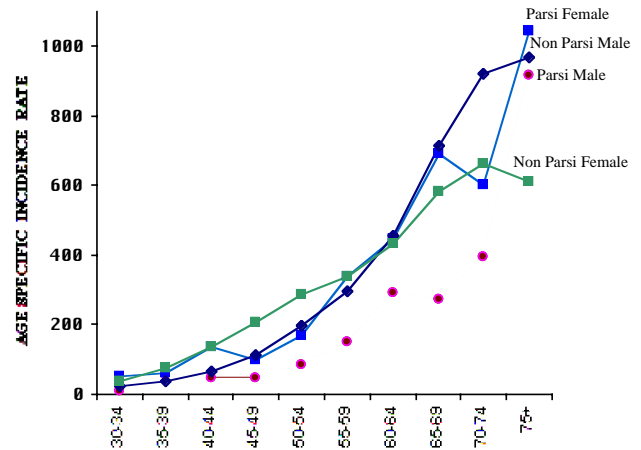


Figure 2. Age Specific Cancer Incidence Rate per 100,000 Population for Parsis and non Parsis, Greater Mumbai, 1993-97

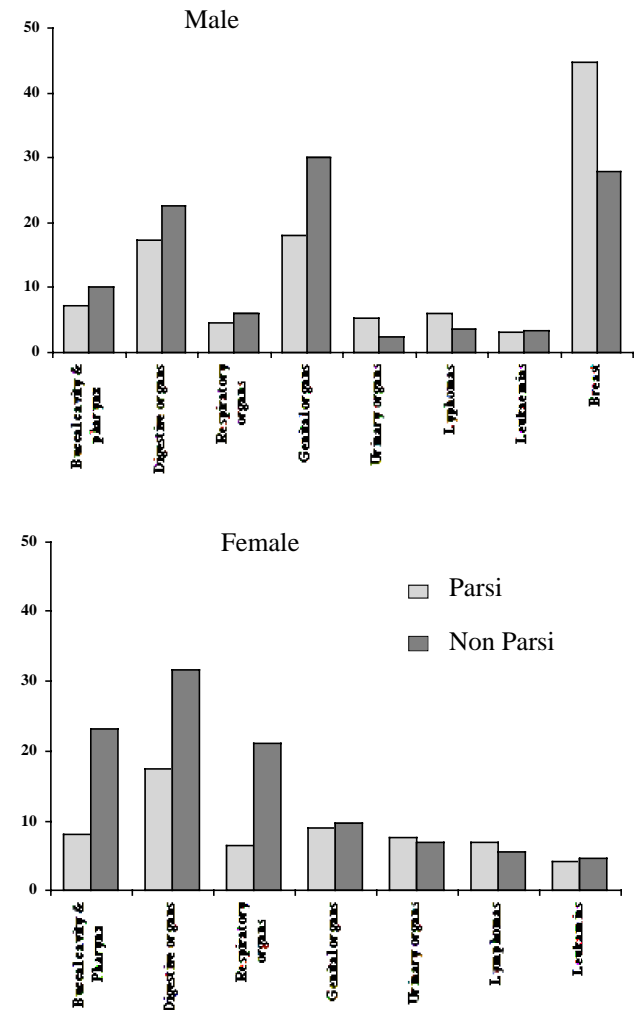


Figure 3. Comparison of Age Adjusted Cancer Incidence Rates for Parsi and non Parsi Populations by Site Group and Sex, Greater Mumbai, 1993-97

as compared to that of Parsi population in both the sexes, but reverse situation is observed for cancer site-group involving urinary organs, lymphomas and leukaemias, but difference is small in incidence rates between two populations.

Leading cancer sites by sex for both the populations are presented in Fig. 4. Lymphoma occupies first rank in Parsi males while it ranks eight in non Parsi males; while lung occupies first rank in non Parsi males fourth in Parsi males. Oesophagus ranks second in non Parsi males while it does not occupy any ranking of non Parsi males. Breast occupies first rank in both the female population. Cervix ranks second in non Parsi women while it ranks fourth in Parsi women.

Major Anatomical Sites

Oral Cavity & Pharynx

Oral cavity and pharynx are the commonest sites affected by cancer in non Parsi population and display very high age adjusted rates when compared with the rates of other countries. Parsis on the other hand presents much lower rates for this site group. The incidence of oral cancer is higher than pharyngeal cancers in both Parsis as well as in non Parsi population.

Very low incidence of nasopharyngeal cancers are

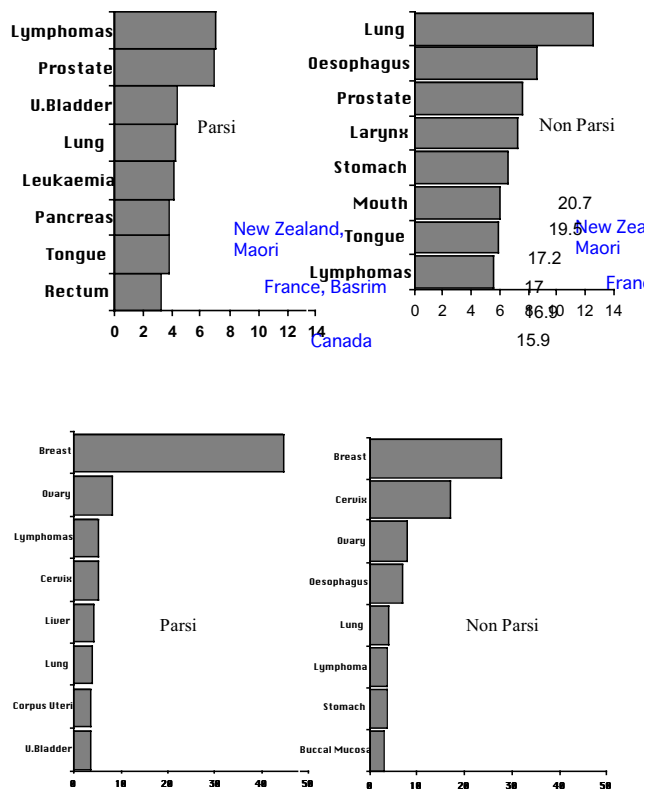


Figure 4. Leading Cancers by Age Adjusted Rate in Parsi and non Parsi Populations, Greater Mumbai, Male and Females, 1993-97

observed in non Parsi population. Surprisingly not a single case of nasopharyngeal cancer is registered during the 5 year period in either sex amongst Parsis. Tongue is the most frequently involved site in both the sexes of both the populations. Male preponderance is seen at all sites in this anatomical site group amongst Parsis and non Parsis.

Digestive Organs

In non Parsi population in both the sexes oesophagus is clearly the most frequently involved viscus; while in Parsis, pancreas in male and liver in females are most vulnerable sites. The rates for stomach, colon and rectum reveals quite lower risks in Parsi and non Parsi population when compared with other countries. Through out the world there is a preponderance of intestinal cancer in women, but non Parsi population of Mumbai presents very atypical sex ratio, greatly in favor of male.

The Respiratory System

The age adjusted rate for laryngeal cancers in non Parsi population are the highest recorded when compared internationally. Even at this high risk site, the Parsis present a much lower incidence rate. Even though lung is the most commonest site for men in non Parsi population, is relatively infrequent when compared internationally. Parsi men reveal only 1/3rd rate of non Parsi men but women present somewhat similar rates for oesophageal cancer.

Breast

The breast is the commonest site involved by cancer in both female populations. Parsi women surprisingly present an adjusted rate 1.6 times higher than that of non Parsi population.

Female Genital Organs

The cervix is the second commonest site in non Parsi women but its incidence is very low in Parsi women. That is 1/4th of the rate recorded for non Parsi population. Cancer of the corpus uteri on the other hand is common in Parsis, the incidence being twice that observed in non Parsis. The incidence of ovarian cancers is some what similar in both the populations.

Male Genital Organs

The rates for prostate cancer are somewhat similar in both the populations. The rates for testicular cancers are much higher in Parsis when compared with non Parsis. The exact reverse situation is noticed for penile cancer.

Change in Incidence Pattern

To study the change in incidence patterns from the period 1965 to 1995 the age adjusted incidence rates in Parsi and non Parsi populations for most prominent sites by sex are compared (Table 2). The rates for the year 1965 has been taken from earlier study (Jussawalla DJ et al., 1970).

As far as total cancers are concerned, the rates for both the sexes in non Parsis and males in Parsi population show

Table 2. Age Adjusted Incidence Rates for Parsi and Non Parsi Population in 1965 and 1995 for Major Sites, by Sex, Greater Mumbai

Site	Sex	Non Parsi			Parsi		
		1965	1995	Trend	1965	1995	Trend
All Sites	M	139.5	119.9	D*	96.1	70.6	D*
	F	131.1	120.8	D*	115.3	120.2	C
Tongue	M	14.0	5.9	D*	2.1	3.1	I*
	F	3.7	2.3	D*	1.5	3.0	I*
Mouth	M	6.5	6.0	C	1.6	1.4	C
	F	5.9	3.3	D*	1.6	2.8	I*
Pharynx	M	16.0	10.6	D*	2.2	2.6	C
	F	4.4	2.9	D*	0.5	0.5	C
Oesophagus	M	13.0	8.7	D*	3.7	2.6	D*
	F	11.3	6.6	D*	3.4	1.8	D*
Stomach	M	10.0	6.6	D*	8.5	2.8	D*
	F	6.5	3.4	D*	5.6	2.2	D*
Colon	M	4.2	3.5	C	2.7	3.2	C
	F	3.8	3.0	C	4.8	3.2	D*
Rectum	M	4.3	3.3	C	3.6	1.7	D*
	F	3.5	2.4	C	2.7	1.9	D*
Larynx	M	13.8	7.2	D*	4.5	2.2	D*
	F	3.8	1.2	D*	1.0	0.5	D*
Lung	M	13.3	12.6	C	6.8	4.2	D*
	F	3.7	3.7	C	5.0	3.9	C
Breast	F	20.4	28.0	I*	34.8	44.6	I*
Cervix	F	24.7	17.1	E*	8.1	5.0	D*
Corpus Uteri	F	1.4	2.8	I*	3.4	3.7	C
Prostate	M	9.2	7.5	C	9.2	6.9	D*
Lymphomas	M	3.8	4.5	C	7.2	7.0	C
	F	2.0	3.7	I*	5.1	6.1	C
Leukaemias	M	3.0	4.5	I*	6.8	4.1	D*
	F	2.5	3.4	I*	4.5	3.2	C

statistically significant decrease. In Parsi females, the rates show slight increase in Parsi females which is not statistically significant. In non Parsi populations, cancers of tongue, pharynx, oesophagus and larynx have registered a decline in incidence, while cancers of breast, endometrium, ovary, lymphomas and leukaemias showed increase in incidence. Cancers like mouth, colon, rectum, lung and prostate did not show any significant change. In Parsi population, cancers of stomach, rectum, larynx, lung and cervix show decrease in incidence while cancers of tongue, mouth and breast showed increase during the same period. The incidence of cancers of pharynx, endometrium, ovary and lymphomas remain constant.

Discussion

Certain specific sites are less commonly affected by cancer in the Parsis, in contrast with the non Parsi experience, such as the buccal cavity, pharynx, larynx, oesophagus and cervix uteri. On the other hand the Parsi rates are higher in the pancreas, bladder, nervous system, breast and corpus uteri.

This different site-patterns were believed to be due to the variations observed in habits, customs and economic status in this small group. Speculations made to explain the high cancer risk at certain site in the Parsis include late marriage, infrequent breast feeding and low fertility.

Moderate smoking and minimal tobacco-chewing, in association with a relatively high socio-economic status and westernized dietary and living habits were other factors found to be at variance with the situation observed in other communities living along side in Mumbai.

In the absence of any convincing evidence of the importance of major genetic factors in the etiology of cancer, it does not seem likely that they play any significant role in the observed differences in cancer incidence amongst various communities living side by side in one geographical area. It would appear more realistic to conjecture that differences noted in various environmental factors, personal habits and communal customs between the various sections of a population might explain some of the variation observed in the relative cancer risk.

It has been observed that the trends observed in cancers of the tongue, pharynx, oesophagus and lung in Parsi and non Parsi males are consistent with the observed pattern in the light of prevalent tobacco habits in workers in Mumbai city (Notani PN et al., 1977; Yeole BB et al., 1993; Jayant K et al., 1987). Evaluation of breast cancer incidence trends in the light of proven etiological factors suggests that the increase in breast cancer incidence in Parsi as well as in non Parsis is related to a gradual decrease in the proportion of women having a first child before 20 years of age and to an increase in the proportion of never married women (Yeole BB et al., 1990). Decline in cervical cancer incidence has been explained as a cohort effect, indicating that it was due to an upward shift in age at marriage in the younger cohort (Yeole BB et al., 1989). The increase in incidence of leukaemias and lymphomas may be reflection of improvement in diagnosis facilities.

In order to identify etiological factors that may be involved in a segment of the selected population, such as that of Mumbai, case-control studies of the Parsi community with its unusual site patterns of risk should be undertaken. This study may help in establishing the differences, if any, in a number of factors, such as age at marriage, breast feeding habits, number of pregnancies, smoking and chewing addictions, level of nutrition, personnel hygiene, economic level, etc. As the Parsis, luckily, happened to be concentrated in the Mumbai area, these investigations seems to be easy and feasible.

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