

Assessment of Burden of Non-Communicable Diseases

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Cancer

Globally, the burden of new cases in 2000 was estimated to be 10.1 million representing a 20% incidence over the previous decade with 53% occurring in the developing world. Similarly 56% of the estimated deaths from cancer occur in the developing world. This is projected by the WHO to dramatically increase to 20 million by 2020 with 70% in the developing world with access to only 5% of the global resources.

Aging population is the single most important factor for cancer development. Recently there has been remarkable growth of the elderly population throughout the world. More than half of the world's elderly people are in the developing countries. In India 6.5% of the total population is represented by older persons (60 yrs and above). In some developed countries; 15% or more of the population is aged (65 yrs or more) with Sweden being the oldest in the world, with elderly people comprising 18% of its population. In India only 3.4% of the population is 65 yrs and older but they still total 30 million. The increase in life expectancy will also lead to increase in number of cancer cases.

Risk factors

It is evident that most common cancers are largely preventable. Tobacco use still remains the most important risk factor and poses the greatest challenge. Cancer of the lung, mouth and pharynx and, to an extent, oesophagus is all associated with tobacco-use. The cancers of these sites are preventable with reduction of morbidity and mortality. Primary prevention with implementation of tobacco control strategies is therefore possible.

Adequate and balanced dietary practices, and changes in preservation and storage practices of food have prevented cancers of the stomach and oesophagus. The role of chronic infection with hepatitis B virus in liver is well established. The hepatitis C virus has role in the etiology of liver cancer. The hepatitis B vaccine, against chronic hepatitis leading to liver cancer became

available in 1982. The use of the vaccine has reduced the number of liver substantially in areas of sub-Saharan Africa and eastern Asia including China. A third potential vaccine under investigation is against *Helicobacter pylori* – the role of which is significant enough to justify research for a vaccine.

Apart from the known risk factors Human Papilloma Virus (HPV) has now been established as the sexually transmitted agent responsible for initiating cancer cervix large number of cases in the developing world. Primary prevention by awareness, education regarding healthy lifestyle and sexual practices is feasible and has been proven to be effective.

There is also optimism that the number of cervical cancer cases could ultimately be reduced by introduction of human papilloma virus vaccine. Several vaccines are undergoing trials. Its cost would, however, be a crucial factor in determining the extent of usage in developing countries.

Despite many risk factors associated with the development of breast cancer, barely 50% of cases are accounted for by these known factors. This is one site, which is not amenable to primary prevention as none of the risk factors are easily modifiable to prevent the disease.

Observations and results

The estimates of burden of disease due to cancer have been made based on data of population based cancer registries of ICMR. The pooled data of six population based cancer registries – Bangalore, Barshi, Bhopal, Chennai, Delhi and Mumbai was used in estimating indices of burden of disease. The six population based cancer registries cover a population of 34 million, that is, 18.4 million males and 15.6 million females. The tables on incidence rates, cancer (site specific) mortality rates, fatality rates are given in Appendix A. Among males,

high incidence rates were reported for tobacco-related cancers.

According to the Report on collaborative approach on Tobacco, National Centre for Chronic Disease Prevention and Promotion – USA, 2004, the following cancer sites are considered as tobacco related :

SITE	ICD-9
Lip	140
Tongue	141
Alveolus	143
Floor of mouth	144
Other mouth cancers	145
Oropharynx	146
Hypopharynx	148
Other pharynx	149
Oesophagus	150
Larynx	161
Lung	162
Urinary bladder	188

Tobacco related cancers constitute 40.43 % of all cancers in males (Table 26). Among females, high incidence rates were reported for breast cancer (20.01 / 100,000), cervix (14.42 / 100,000), ovary (5.6 / 100,000) which together accounted for 59 % of all cancers in women (Table A22).

Burden of disease

The DISMOD analysis and the estimation of DALYs for cancer (site specific) are given in Appendix B. A summary of burden of disease due to cancer in India is given in table 23. The number of cases of cancer in 2004 is expected to be 8.2 lakh. The number of cancer cases among males is estimated as 3.9 lakh, and among females as 4.3 lakh. The number of deaths, and number of DALYs attributable to site specific cancers and all cancers in males and females are given in tables 17 and 18 respectively.

Projection of burden of disease due to cancer in India for the year 2004 is given in table 19. The total number of DALYs due to cancer in India in the year 2004 is estimated as 58.97 lakh. This estimate is low as compared to the estimate of 85.59 lakh DALYs reported by WHO Burden of Disease Study (2000). This could be due to differences in cancer mortality rates used in the two studies.

Cancer mortality

The cancer specific mortality rates as derived from MCCD data (1998) are 32.2 per lakh for males and 30.0 per lakh for females. These rates compare well with the mortality rates due to cancer reported by Mumbai Registry (35.0 per lakh for males and 37.9 per lakh for females), and Barshi Registry (34.4 per lakh for males and 32.2 per lakh for females). The cancer mortality rates in Chennai Registry are higher (47.9 per lakh for males and 42.2 per lakh for females), while cancer mortality rates are lower than 20 per lakh for all other registries. The pooled estimates for data of all six population based registries are 25.19 per lakh for males and 23.52 per lakh for females. The cancer specific mortality rates as per Cancer Registry Data and MCCD data are comparable to some extent in spite of adopting quite different approaches. The MCCD data yields cancer deaths as percentage of total deaths to be 3.0% for males and 3.4% for females and Survey of Cause of Death (SCD) – Rural reports cancer deaths as percentage of total deaths as 4.3%.

It is seen from the comparisons given above that while the cancer mortality from three different sources – Cancer Registry data, MCCD data, SCD-rural data are comparable. The present study has used the mortality rates obtained by pooling the data of all six population based registries. However, If we use the cancer mortality rates reported by Chennai Registry (which are highest cancer mortality rates in India), the estimates of DALYs due to cancer will become comparable to the figures reported by WHO Burden of disease study.

Table 16. Cancer mortality rates (per 100,000) in India in 1998.

<i>Population based cancer registry</i>	<i>Males</i>	<i>Females</i>
Bangalore	19	17.4
Barshi [@]	34.4	32.2
Bhopal	12.1	8.3
Chennai	47.9	42.2
Delhi	16.2	14.8
Mumbai	35	37.9
All Registries	25.19	23.52
Medical Certification of Causes of Death - 1998	32.2 (3.0)	30.0 (3.44)
Survey of Causes of Death-1997	4.3% (Males and females)	

[@] Rural cancer registry.

Figures in parenthesis indicate cancer deaths as percentage of total deaths

Table 17. Burden of Cancers in India in 1998 (Males)

<i>Cancer Site</i>	<i>Incidence per 100,000</i>	<i>No. of Deaths</i>	<i>YLL per 100,000</i>	<i>DALY per 100,000</i>	<i>Total DALYs</i>
Mouth and oropharynx	12.4	16,832	37.1	97.0	471,970
Oesophagus	4.6	6,840	14.0	25.5	124,047
Stomach	3.2	7,762	14.9	24.3	118,180
Colon and rectum	3.2	5,756	13.1	19.0	92,660
Liver	3.5	5,691	12.5	15.5	75,336
Pancreas	0.6	2,407	4.9	6.8	33,404
Trachea, bronchus And lung	15.6	12,927	26.1	27.8	135,023
Breast	0.2	52	0.1	0.1	491
Bladder cancer	1.7	2,781	4.0	8.5	41,283
Leukaemia	2.2	8,308	35.0	38.8	210,019
Prostate	3.5	4,677	5.5	11.8	57,396
Lymphomas and multiple myeloma	3.2	7,660	22.2	28.1	136,728
Melanoma and other skin	1.1	725	1.5	3.8	18,615
Other cancers	-	40,105	-	737,280	-
Total (All cancers)	71.00	122,523	-	22,52,432	-

Table 18. Burden of Cancer in India in 1998 (Females)

<i>Cancer site</i>	<i>Incidence per 100,000</i>	<i>No. of deaths</i>	<i>YLL per 100,000</i>	<i>DALYs per 100,000</i>	<i>Total DALYs</i>
Mouth and oropharynx	5.1	6,223	15.5	30.6	148,121
Oesophagus	3.4	6,178	13.4	20.7	100,278
Stomach	2.5	6,142	15.4	22.1	106,891
Colon and rectum	2.7	4,424	10.7	17.7	85,383
Liver	0.7	2,364	4.7	5.5	26,497
Pancreas	0.7	1,383	3	5.1	24,632
Trachea, bronchus and lung	3.8	3,742	8.1	8.5	40,944
Breast	20.8	21,570	61.3	167.0	807,397
Cervix uteri	15.4	13,395	36	81.0	391,828
Ovary	6.9	7,592	20.5	40.5	206,191
Bladder	0.7	654	1.1	3.1	15,046
Leukaemia	0.8	6,281	27.2	28.2	143,400
Lymphomas and multiple myeloma	2.7	5,075	14.8	19.3	93,504
Melanoma and other skin	1.2	618	1.7	4.5	21,527
Corpus uteri	2.5	2,814	6.7	12.0	57,803
Other cancers	-	25,240	-	-	697,362
Total (all cancers)	83.16	113,696	-	-	3,141,335

Table 19. Indices of Burden of Cancers in 2004

<i>Indices</i>	<i>Males</i>	<i>Females</i>
Population (in thousands)	550,404	515,354
No. of cases of Cancer	390,809	428,545
No. of Deaths	138,622	121,192
No. of YLLs	13,96,508	16,17,787
No. of DALYs	25,48,392	33,48,444

Table 20. Site-specific cancer burden for 2004

<i>Site</i>	<i>Total DALYs</i>	
	<i>Males</i>	<i>Females</i>
Mouth and oropharynx	516448	163132
Oesophagus	135737	110441
Stomach	129317	117724
Colon and rectum	101392	94036
Liver	82436	29182
Pancreas	36552	27128
Trachea, bronchus and lung	147747	45094
Melanoma and other skin	20369	23709
Breast	537	8,89,224
Prostate	62805	-
Bladder	45173	16571
Lymphomas and multiple myeloma	149613	1,02,980
Leukaemia	2,29,811	1,57,933
Cervix uteri	-	4,31,538
Corpus uteri	-	63661
Ovary	-	227088

Figure 5. No. of DALYs (in lakhs) due to cancer in males in India (2004)

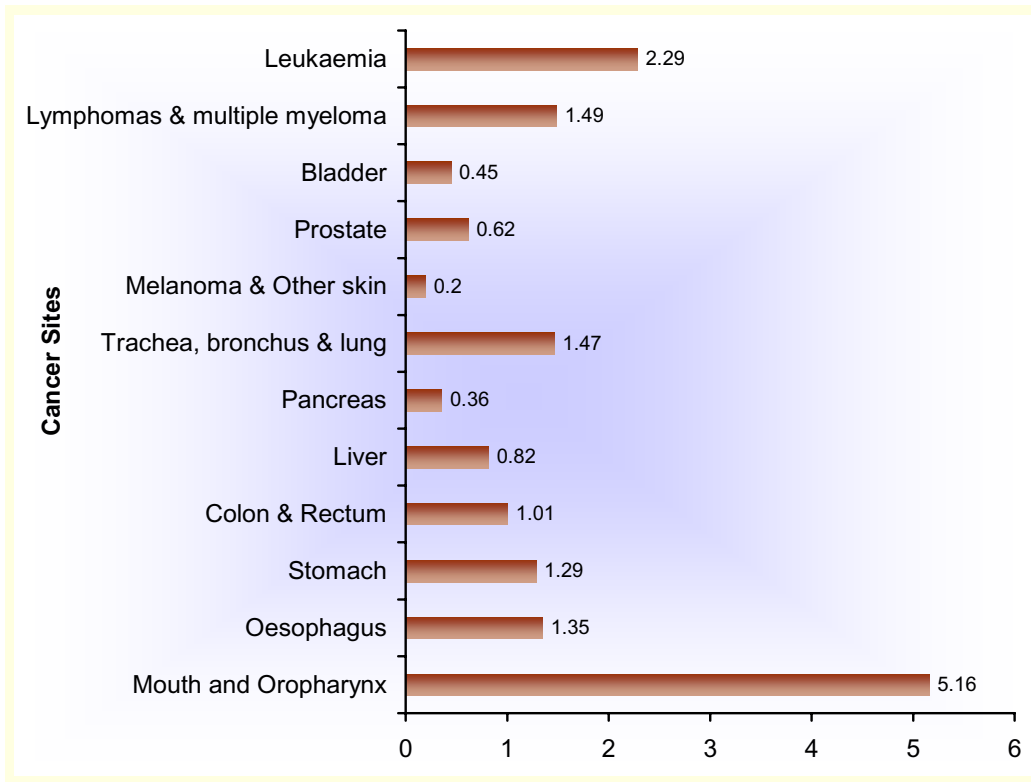


Figure 6. No. of DALYs (in lakhs) due to cancer in females in India (2004)

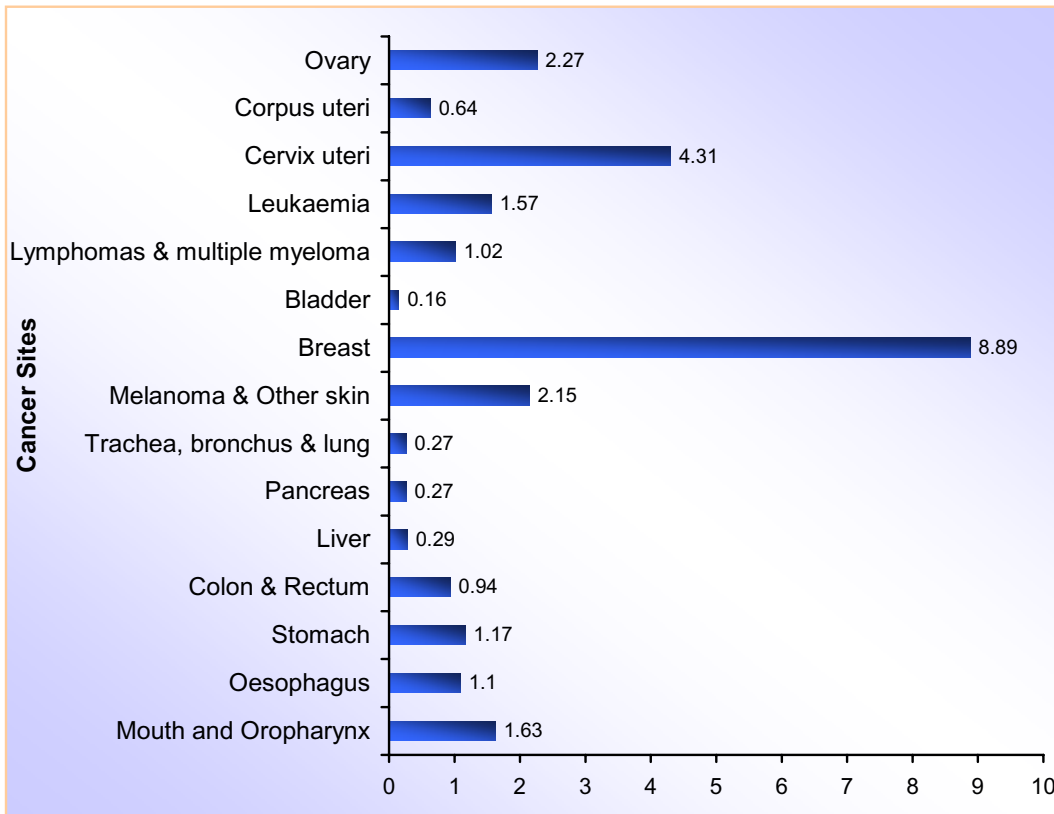


Table 21. DALYs attributed to Cancer (site-wise) according to WHO Burden of Disease Study (2000) and present study (2004)

Cancer Site	WHO-BOD study,2000 No. of DALYs	Present study 2004 No. of DALYs
Mouth and oropharynx	1,095,190	679580
Oesophagus	596,593	246178
Stomach	376,571	247041
Colon and rectum	303,024	195428
Liver	330,692	111618
Pancreas	111,317	63680
Trachea, bronchus and lung	1,102,419	192841
Melanoma and other skin	22,084	44078
Breast	646,034	889761
Cervix uteri	933,489	431538
Corpus uteri	22,401	63661
Ovary	170,861	227088
Prostate	165,280	62805
Bladder	242,094	61744
Lymphomas and multiple myeloma	1,012,055	252593
Leukaemia	679,205	387744
Other malignant neoplasms	614,183	-
Other neoplasms	235,178	-
Total (all cancers)	8,658,669	