RESEARCH ARTICLE

Projection of Cancer Incident Cases for India -Till 2026

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Abstract

Projection of cancer incidence is essential for planning cancer control actions, health care and allocation of resources. Here we project the cancer burden at the National and State level to understand the magnitude of cancer problem for the various calendar years from 2011 to 2026 at 5-yearly intervals. The age, sex and site-wise cancer incidence data along with populations covered by the registries were obtained from the report of National Cancer Registry Programme published by Indian Council of Medical Research for the period 2001-2004. Pooled age sex specific cancer incidence rates were obtained by taking weighted averages of these seventeen registries with respective registry populations as weights. The pooled incidence rates were assumed to represent the country's incidence rates. Populations of the country according to age and sex exposed to the risk of development of cancer in different calendar years were obtained from the report of Registrar General of India providing population projections for the country for the years from 2001 to 2026. Population forecasts were combined with the pooled incidence rates to estimate the projected number of cancer cases by age, sex and site of cancer at various 5-yearly periods Viz. 2011, 2016, 2021 and 2026. The projections were carried out for the various leading sites as well as for 'all sites' of cancer. In India, in 2011, nearly 1,193,000 new cancer cases were estimated; a higher load among females (603,500) than males (589,800) was noted. It is estimated that the total number of new cases in males will increased from 0.589 million in 2011 to 0.934 million by the year 2026. In females the new cases of cancer increased from 0.603 to 0.935 million. Three top most occurring cancers namely those of tobacco related cancers in both sexes, breast and cervical cancers in women account for over 50 to 60 percent of all cancers. When adjustments for increasing tobacco habits and increasing trends in many cancers are made, the estimates may further increase. The leading sites of cancers in males are lung, oesophagus, larynx, mouth, tongue and in females breast and cervix uteri. The main factors contributing to high burden of cancer over the years are increase in the population size as well as increase in proportion of elderly population, urbanization, and globalization. The cancer incidence results show an urgent need for strengthening and augmenting the existing diagnostic/treatment facilities, which are inadequate even to tackle the present load.

Keywords: Cancer incidence - projection - magnitude of cancer - India

Asian Pac J Cancer Prev, **14 (7)**, 4379-4386

Introduction

Nearly 12.7 million new cancer cases (12,661 thousand cases-Males 6,617 and Females 6,044) and 7.6 million cancer deaths (7,564 thousand cases-Males 4,219 and Females 3,345) occurred in 2008 worldwide. In India, 0.95 million new cancer cases (948 thousand cases, Males -430 thousand cases, Females -518 thousand cases) and 0.63 million cancer deaths (633 thousand cases, Males-321 thousand, Females-312 thousand) occurred (Globocan, 2008; IARC, 2010). Cancer incidence will continue to grow in the country in the future as a result of increase in life expectancy , increase in the proportion of elderly population, size of population and due to absence of any mass screening programmes in the country. Rising longevity, alterations in lifestyles, urbanization, globalization and progressive control of communicable diseases has led to emergence of cancer and other non-communicable diseases as an important health problem. In India, the life expectancy at birth has steadily risen from 45years in 1971 to 63.4 years in 2002, indicating a shift in demographic profile (SRS, 2002-2006). It is estimated that life expectancy of Indian population will increase from 68years to 71years by 2011-2015 to 2021- 2025 (MOH and FW, 2011). The population of India on 1st March 2011 was 1,210.2 million as per the provisional population totals of (Census of India, 2011) compared to a total of 1028.7 million in 2001.

Due to such changes in age structure, population would face an increase in incidence of cancers and some other non-communicable diseases, which have a higher chance of occurrence among elderly. The major environmental risk factors for cancer are carcinogen and co-carcinogen exposure in tobacco, insufficient exercise and above all an unhealthy diet. What we eat or do not eat is exceedingly important in determining what cancers or other chronic

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disease we may suffer from (Moore, 2009). At present, for India as a whole the magnitude of the cancer incidence projections by site and sex based on scientific methods was available till the year 2016 (Murthy et al., 2008) and 2020 (Takiar et al., 2010). However, no such projections are available for future based on data from several Indian registries. A precise knowledge about the magnitude of the cancer problem, present as well as for future would help health policy planners to evolve and implement cancer facilities in the country. The present study estimates load of Cancer incidence at the country as well as state levels for quin-quennial (every five years) years from 2011 to 2026 for all sites of cancer as well as for some of the leading cancer sites reported by the population based cancer registries.

Materials and Methods

The data on the occurrence of cancer in India is available from the population-based cancer registries established in various parts of the country. Although the area and population covered by these registries is small, it gives a fair idea of the extent of the cancer problem in the country. A network of 26 Population Based Cancer Registries (PBCR) is functioning under the National Cancer Registry Programme (NCRP) of the Indian Council of Medical Research (ICMR) based on 3 year report of PBCR 2006-2008 (NCRP, 2010). They are located at Bangalore, Bhopal, Chennai (earlier known as Madras), Delhi, Mumbai (earlier known as Bombay), Kolkata (earlier known as Calcutta) and a rural registry at Barshi (Maharashtra), Ahmedabad rural registry, Ahmedabad Urban registry (Gujarat), Pune, Aurangabad, Nagpur , Wardha , Thiruvananthapuram, Kollam (Kerala) and eleven in the northeastern region.

The age, sex and site-wise cancer incidence data along with populations covered by the registries were obtained from the report of National Cancer Registry Programme published by Indian Council of Medical Research for the period 2001-2004 (NCRP, 2006). In this study, the data on Cancer Incidence of 17 Population based registries viz. Bangalore, Chennai, Delhi, Mumbai(Bombay), Bhopal, Barshi from period 2001-2003, six North Eastern Registries i.e Dibrugarh, Kamrup, Silchar, Imphal, Mizoram, Sikkim (2003-2004), Nagpur, Pune, Aurangabad (2001), Ahmedabad rural (2004) and Thiruvananthapuram for the period 2001-2002 were obtained. The number of cancer cases by site, sex and five- year age group for each of the registries were obtained by multiplying the age-specific-incidence rates with the respective populations. In order to obtain number of cases per year, the number of cases thus obtained was divided by the time period for particular registries. The respective number of cases thus obtained through above step, were summed-up for all the registries to get the total number of cases in each five- year age group by site and sex. The number of cancer incident cases per year by age, sex and site were estimated and combined with the data of 17 registries. Thus, it represented the data for 17 registries located in different parts of the country. The populations by sex in the respective five- year age groups of all the above registries were added-up to obtain the total population covered by all the 17 registries. The pooled age and sex wise specific incidence rates based on the 17 registries were obtained by dividing the respective number of cases with the corresponding pooled population in each of the five-year age group by sex.

Population exposed to risk

Population of the country as well as various 15 major states of the country, according to age and sex exposed to the risk at different quin-quennial years from 2011 to 2026 were obtained from the report of population projections carried out for the country for the years 2001 to 2026 based on Census of India 2001 by the Registrar General of India. (Registrar General of India, 2006).

Estimation of load of cancer

The respective age and sex- specific pooled incidence rates by site of 17 registries were multiplied with the corresponding projected age and sex specific population figures to estimate the projected number of cases by age, sex and site of cancer at various 5 year intervals Viz. 2011, 2016, 2021 and 2026. The number of new cases of cancer for site "s" (N^s) in a particular year was estimated using the relationship $N=\sum_n P_x * {}_nI_x$, where ${}_nP_x$ represents the projected population in the x to $x+n$ age group for a particular year and ${}_nI_x$ being the pooled incidence rate of cancer by site in the same age group for a particular site. The projections have been carried out for the various selected sites of cancer and tobacco related sites taken together. Estimation of incidence has been done both at the national level as well as for 15 major states of India which covers 95% of the countries population.

Assumptions: The projection of number of persons developing cancer have been done with the following assumption: *i)* rates obtained from these 17 Population Based Cancer registries represent country's incidence rate as well as for the various states of the country and; *ii)* age-specific cancer incidence rates for the latest available year will remain unchanged over next 15 years.

Results

According to the projections based on total fertility rates, the total estimated population of India for the years 2011, 2016, 2021 and 2026 (as of Ist June of the year) would be 1192, 1268, 1339 and 1399 million respectively (Table 1) (Registrar General of India, 2006). It may be noted that the proportion of Indian population in the age above 40 years, which is more prone to cancer, will increase from 28% in 2011 to 35.7% by 2026. In terms of absolute numbers there will be a massive increase of the population in the age group of 40-59 years from 236 million to 326 million from 2011 to 2026 (27.6%). Similarly, the population of elderly (60+ years) will increase from 98 million to 173 million (43.4%) in 2026.

The pooled age specific incidence rate of cancer of all sites is presented in Table 2. It can be observed that the age-specific rates of cancers increase substantially after the age group of 40 years. It can also be noted the life expectancy at birth for the Indian population crossed 40

Table 1. Projected Population (in 000's) of India for Quin-Quennial Years from 2011-2026

Year	Gender	Age Group (Years)							
		0-4	5-14	15-29	30-44	45-59	60-69	>70	Total
2011	Males	60745	121410	179839	123418	83765	28684	19454	617315
	Females	54133	110653	161882	119710	78478	28118	22214	575188
	Total	114878	232063	341721	243128	162243	56802	41668	1192503
2016	Males	60353	119825	185729	138714	94435	35365	22746	657167
	Females	53748	106364	169860	129487	92347	33618	26368	611792
	Total	114101	226189	355589	268201	186782	68983	49114	1268959
2021	Males	58951	119496	182630	158466	103945	43068	27527	694083
	Females	52465	105994	166480	143586	104485	41474	31177	645661
	Total	111416	225490	349110	302052	208430	84542	58704	1339744
2026	Males	55328	117896	178818	174137	114374	50453	34169	725175
	Females	49257	104524	161149	157423	113751	50633	37927	674664
	Total	104585	222420	339967	331560	228125	101086	72096	1399839

*Source: Registrar General of India (2006)

years after 1961. Thus, it can be said that cancer started appearing as a health problem in the country after 1961.

The estimated number of new cancer cases for "all sites" by sex is presented in Table 3. The results reveal that an estimated 1,193,426 (1.19 million) persons developed cancer during the year 2011. The estimates of cancer incidence would increase to 1,869,983 (1.87 million) by the year 2026. New cancer cases in female are higher as compared to males at all time periods. Further estimation of new cancer cases, by major states of India, reveals that burden is very high, in those states which are highly populous.

Among males, Lung cancer is the leading cancer site in India with the estimated 62,650 (0.063 million) new cases in 2011.The next leading cancer site is Oesophagus, contributing to 43,617 cases (0.043 million) followed by 42,701 cases of Prostrate (0.043 million) then by 37,007 cases of Stomach (0.037 million) and 35,235 cases of Larynx (0.035 million). Lung cancer cases would rise from 62,650 cases (0.063 million) to 103,360 (1.03 million) cases in males, followed by Prostrate contributing about 74,171 (0.074 million) cases in 2026. Next comes Oesophagus with 70,736 (0.071 million) cases. Stomach cancer occupies fourth position with total of 60,065 cases

Table 2. Pooled Age-Specific, Crude and Age Standardized Cancer Incidence Rates per 100,000

Age group (Years)	Males	Females
0-4	11.06	7.65
5-9	10.41	5.93
10-14	9.25	6.58
15-19	10.83	8.30
20-24	11.50	11.92
25-29	14.51	20.63
30-34	22.52	38.67
35-39	35.24	70.92
40-44	65.81	128.79
45-49	104.43	189.37
50-54	190.19	274.92
55-59	277.03	314.67
60-64	395.40	377.98
65-69	499.24	398.61
>70	1153.10	780.90
CR	79.86	85.65
ASR	117.44	115.77

*A crude rate (CR) is calculated by dividing the number of new cancers or cancer deaths observed during a given time period by the corresponding number of person years in the population at risk. For cancer, the result is usually expressed as an annual rate per 100,000 persons at risk. (http://globocan.iarc.fr/glossary.htm). An age-standardised rate (ASR) is a summary measure of the rate that a population would have if it had a standard age structure. The ASR is a weighted mean of the age-specific rates; the weights are taken from population distribution of the *standard population* (http://globocan.iarc.fr/glossary.htm)

Table 3. Projected Annual Number of New Cancer Cases in Males and Females During Quinquennial Years, 2011-2026

Year:	2011		2016		2021		2026	
Country/states	Males	Females	Males	Females	Males	Females	Males	Females
India	589866	603560	684918	702151	799957	811688	934268	935715
Haryana	12474	11925	14445	13975	17076	16382	20441	19278
Delhi	8551	7658	10999	9598	14169	11931	18062	14730
Rajasthan	29502	31161	34623	36640	40655	42709	47813	49751
Uttar Pradesh	89484	85032	102751	99830	118373	116264	136900	135436
Bihar	44146	42209	51454	49903	59537	58205	68690	67600
Assam	13277	13230	15680	15731	18660	18590	22174	21848
West Bengal	47109	47019	55584	55055	65607	64046	77044	74058
Orissa	21460	22470	24445	25870	28097	29692	32476	34047
Madhya Pradesh	31537	32405	36663	37792	42982	43822	50710	50896
Gujarat	29301	31375	35164	36840	42249	42891	50544	49705
Maharashtra	59609	61900	68360	70539	79773	80356	93919	91966
Andhra Pradesh	43872	48161	50868	55905	59296	64274	68980	73450
Karnataka	31340	33769	36603	39252	42818	45335	49935	52047
Kerala	21735	25520	24616	28682	28175	32168	32225	35894
Tamil Nadu	42097	44148	47780	50470	50468	57253	61483	64323
NE excl Assam	6509	6395	7812	7688	9369	9181	11174	10907

Table 4. Projected Number of Annual New Cancer Cases in India During Quinquennial Years by Site in Males and Female, 2011-2026

Site Name	ICD10 code	Year 2011	2016	2021	2026
Male:					
Tongue	C01-02	31672	36935	43127	50200
Mouth	C03-06	32553	37923	44180	51189
Tonsil, oropharynx	C9-10	14868	17359	20272	23633
Hypo pharynx	C12-13	25317	29691	34960	41117
Oesophagus	C15	43617	51143	60186	70736
Stomach	C16	37007	43398	51111	60065
Colon	C18	16085	18733	21974	25794
Rectum, Anus	C19-21	20181	23520	27593	32398
Liver	C22	20568	24046	28357	33467
Gallbladder etc.	C23-24	11981	13998	16424	19274
Pancreas	C25	10630	12474	14712	17328
Larynx	C32	35235	41421	48920	57675
Lung etc.	C33-34	62650	73772	87400	103360
Conn. and Soft Tissue	C47+C49	8203	9259	10460	11783
Penis	C60	6816	7920	9256	10839
Prostate	C61	42701	50379	60805	74171
Testis	C62	4105	4562	5023	5436
Kidney,renal pelvis	C64-65	10799	12454	14443	16738
Ureter,bladder,ur.orgns	C66-68	24091	28342	33713	40178
Brain, Nervous System	C70-72	19944	22384	25106	28029
Thyroid	C73	5644	6478	7412	8428
Hodgkins Disease	C81	6956	7568	8235	8932
NHL	C82-85,C96	25940	29677	34108	39175
Multiple Myeloma	C90	9328	10934	12893	15210
Lymphoid Leuk.	C91	10998	11699	12516	13384
Myeloid Leukaemia	C92-94	13057	14646	16407	18324
All TRC No.	276316	323979	381440	448276	934268
Female:					
Tongue	C01-02	10560	12437	14537	16925
Mouth	C03-06	23108	27235	31971	37533
Hypopharynx	C12-13	6536	7663	8933	10431
Oesophagus	C15	29059	34293	40330	47508
Stomach	C16	18960	22270	26062	30530
Colon	C18	12754	15012	17528	20449
Rectum, Anus	C19-21	13294	15556	18112	21053
Liver	C22	9665	11343	13277	15607
Gallbladder etc.	C23-24	19109	22439	26203	30563
Pancreas	C25	7470	8798	10327	12211
Larynx	C32	4894	5764	6770	7954
Lung etc.	C33-34	21590	25496	30051	35436
Bone	C40-41	5182	5697	6259	6885
Conn. and Soft Tissue	C47+C49	6589	7495	8444	9435
Breast	C50	153297	178337	205538	235490
Vulva, Vagina	C51-52	5986	7043	8253	9689
Cervix Uteri	C53	96156	112048	129493	148813
Corpus Uteri	C54	14940	17624	20672	24028
Uterus Unspecified	C55	5106	5991	6981	8115
Ovary etc.	C56	39485	45761	52544	60080
Kidney, renal pelvis	C64-65	5174	5913	6726	7637
Ureter, bladder, ur.orgns	C66-68	5808	6848	8079	9577
Brain, Nervous System	C70-72	12275	13734	15285	16938
Thyroid	C73	12410	14172	16045	18039
Hodgkins Disease	C81	3510	3895	4293	4734
NHL	C82-85,C96	16793	19462	22468	25989
Multiple Myeloma	C90	6201	7316	8617	10157
Lymphoid Leuk.	C91	6051	6480	6976	7523
Myeloid Leukaemia	C92-94	9720	10930	12209	13608
All Sites	All	603560	702151	811688	935715

(0.06 million) and then Larynx contributing to 57,675 (0.058 million) cases in 2026 (Table 4). It may be seen that all the leading sites shown in table have revealed an increase of nearly 39 percent during the 15years time period as a result of change in age structure and size of population.

Nearly 41.3 percent of cancers seen in Indian females are accounted by cancer of breast and cervix alone. The estimates of breast cancer incidence would increase from 153,297 cases (0.153 million) to 235,490 (0.235 million) cases during 2011 to 2026. Similarly, cancer of cervix cases would rise from 96,156 cases (0.096 million) to 148,813 (0.148 million) cases. Third to sixth leading positions among females are occupied by cancers of ovary, oesophagus, mouth and lung respectively (Table 4).

Table 5 shows the projected number of Tobacco Related Cancers (TRC) cancer incidence in males and females. The sites of cancers included amongst TRC's were lip, tongue, mouth, pharynx, oesophagus, larynx, lung and urinary bladder. Selection of these sites as TRC is based on the NCRP report (NCRP, 2005). The estimated number of new TRC cases in males would rise from 276,316 cases (0.276 million) in 2011 to 448,276 cases (0.448 million) in 2026. TRC accounted for nearly, 46-48% of all cancers seen amongst men. However, in females TRC account for 16-18 percent of cancers. When both sexes are considered, the incidence due to TRC's would rise from 383,407 cases (0.383 million) to 622,502 (0.623 million) cases.

Table 6 shows projected number of cancer incident cases in India by broader age group. The estimated cancer cases are increasing from younger age group to an older age group from 2011 to 2026.

Discussion

It is well known that life styles, age composition of the population and total population size are determinants of cancer magnitude. These factors gradually changed in the developed world; as a result cancer has become one of the greater killer diseases. Several models have been attempted in the developed countries to predict the cancer situation in the years to come by using registry data. The precision of the estimates is made more accurate by taking into account the ecological data.

As per the indices of burden of cancer in 2004 the number of cases of cancer in males are 0.390 million and in females 0.428 million in India (ICMR, 2006). The new cancer cases in India were estimated to be 0.95 million in 2008 out of which 0.430 million cases were in Males and 0.518 million in Females (Globocan 2008, IARC 2010).

The new cancer cases estimated for the year 2001 was 0.92 million based on the data of 3 population based registries for the period 1982-84 (Murthy et al., 1990). Considering the data of ten Population based cancer Registries of India the estimated new cancer cases in 2001 were 566 thousand (Yeole,1997). Based on the data published in Volume VIII of cancer incidence in 5 continents for the period 1993-97 of 9 population based registries and 3 other population based registries for the period 1997-1998 ,the annual new cancer cases estimated

Table 5. Projected Number of Tobacco Related New Cancer Cases at National Level During Quinquennial Years by Site from 2011 to 2026

Site Name	Males (Years)				Females (Years)			
	2011	2016	2021	2026	2011	2016	2021	2026
Lip	1826	2128	2485	2899	1371	1608	1872	2191
Tongue	31672	36935	43127	50200	10560	12437	14537	16925
Mouth	32553	37923	44180	51189	23108	27235	31971	37533
Tonsil,oropharynx	14868	17359	20272	23633	2652	3113	3644	4247
Hypopharynx	25317	29691	34960	41117	6536	7663	8933	10431
Pharynx Unspecified	4487	5264	6197	7289	1512	1769	2061	2423
Oesophagus	43617	51143	60186	70736	29059	34293	40330	47508
Larynx	35235	41421	48920	57675	4894	5764	6770	7954
Lung etc.	62650	73772	87400	103360	21590	25496	30051	35436
Ureter,bladder,urn.orgns	24091	28342	33713	40178	5808	6848	8079	9577
All TRC No.	276316	323979	381440	448276	107091	126226	148249	174226
All TRC %	46.8	47.3	47.7	48.0	16.8	17.0	17.3	17.6
All sites	589866	684918	799957	934268	636929	741074	856817	988135

Table 6. Projected Number of Cancer Incident Cases in India During Quinquennial Years by Broader Age Group from 2011to 2026

Year	Age group					
	0-4	5-14	15-29	30-44	45-59	>60
2011	10857	18859	43245	141188	346774	632503
2016	10784	18430	45805	153777	404891	753380
2021	10531	18374	45404	170195	456420	910721
2026	9885	18121	44155	189621	499578	1108624

were 797,657; 919,417; 1,058,980 and 1,219,649 for the year 2001, 2006, 2011 and 2016 respectively (Murthy et al., 2008). According to another study based on 2001-2006 data of Population Based Registry (Takiar et al.,2010), the estimates of new cancer cases for all sites in 2010, 2015 and 2020 are 979,787; 1,060,889 and 1,148,758 respectively. Out of the total estimates, new cancer cases for Indian Males are 462,408; 497,081 and 534,353 for the years 2010, 2015 and 2020. Estimates of new cancer cases for Indian Females are 517,378; 563,808 and 614,404.

The results of our study showed a progressive increase in incidence of cancer cases. In 2011, 2016, 2021 and 2026 there were 1,193,426; 1,387,068; 1,611,645 and 1,869,983 respectively. Our findings are slightly on the higher than those reported by other authors (Murthy et al., 2008; Takiar et al., 2010). Assuming the average duration of survival of a cancer patient to be 3 years, it can be said that at any point of time during 2016 there would be nearly 4 million cancer cases in the country (Dhar et al., 2006). The incidence of cancer is increasing every year and this is attributed to changes in lifestyle, improper dietary habits and increase in Life expectancy. Our projection has shown increase in incidence of cancer for all sites as a result of change in size and composition of population. In India the first three leading cancer sites are breast, cervix and lung (Satyanarayana and Asthana, 2008). The results obtained are similar in our study where cancer of breast and cervix are leading sites among females and lung cancer among males. Also the incidence of leading cancer cases in women such as breast, cervical, ovary etc., is increasing from 2011 to 2026. Our study shows 50% of cancers in women are of breast, cervical, ovary and corpus uteri. About 50-60% of all cancers among women in India are related to four organs Cervix, Breast, Corpus Uteri and Ovaries (Uma Devi, 2009). Another study stated amongst females, cancers of breast, cervix and ovary contribute about 50% of total incidence (Kurkure and Yeole, 2006). Breast cancer is the most common cancer diagnosed in women. Over the years the incidence of breast cancer in India has steadily increased and as many as 100,000 new patients are detected every year (Thun and Jemal, 2003; Yip et al., 2006). India does not have mass screening programs for any of the cancers such as breast, cervical and oral cancers in India.

The rising trends in breast cancer might be associated with a shift towards more westernized life style among the urban population (Notani, 2001). The possible reasons for high breast cancer incidence in women could be early age at menarche, late age at first birth, nulliparity, late age at menopause, dietary factors (Reddy, 2004). In another study, nulliparous women had a 2.2 fold higher risk than parous women for breast cancer (Rao et al., 1994). Young women who smoke or who have regular long term exposure to second hand smokers have an increased risk of developing premenopausal breast cancer (Battorff et al., 2010). The evidence that lactation protects against breast cancer and alcoholic drinks are a cause of breast cancer at all ages is convincing (American Institute for Cancer Research, 2007). Intake of high protein foods, particularly red meat and fried meat has been associated with increase in breast cancer incidence. Fruits and vegetable consumption are probably associated with reduced breast cancer (Lima et al., 2008). Alcohol consumption increases the risk of breast cancer (Anstey and Cheurbin, 2010; Tamimi et al., 2005). A cohort study in Finland (Gastrin et al.,1994) and a case control study in Canada (Harvey et al.,1997) suggested Breast self Examination to be beneficial (reduction in breast cancer mortality) at all ages. Regarding secondary prevention, Breast Self Examination may be the most effective approach in much of Asia, if only to improve awareness and early presentation at hospital when symptoms are detected (Moore and Sobue, 2010).

Improvement in the living standard of women has resulted in a reduction in the incidence of cervical cancer. Early age at first intercourse, multiple sexual partners,

poor sexual hygiene, repeated child birth etc. are some of the reproductive risk factors for cervical cancer. Regular cervical cytology examination (Pap smear) by all women who have initiated sexual activity can prevent the occurrence of cervical cancer (Takiar et al., 2010).Unlike most other types of cancer, cervical cancer is preventable when precursor lesions are detected and treated. In India, to date, there is no organized cervical cancer screening program. Hence, a large proportion of these cancer cases present in advance stages at the time of diagnosis, when cure is not possible (Mishra et al., 2011). Launching community based low intensity cervical screening in combination with awareness campaign and monitoring system should be the priority of the cervical cancer control program (Basu and Chowdhury, 2009).

In order to plan and develop control measures for non-communicable diseases an accurate estimation of disease load is essential. Studies on health projections provide an indication of the strong interest shown by scientific and public-health communities in the definition and quantification of scenarios of future health (Murray and Lopez, 1997).

In the developing countries when society is undergoing a rapid change in life styles the problems are more complex due to population growth. The consumption of cigarettes/ tobacco is increasing rapidly in both sexes worldwide. This would lead to large increases in the incidence of lung cancer. Lung cancer incidence was strongly related to the amount of bidis smoked a day, duration of smoking and age at starting smoking (Jayalekshmy et al., 2008). One third of male cancers are attributable to Tobacco smoking (WHO 2010). As per our study, TRC accounted to 46.8% of all cancers in males in 2011. Compared to other developed countries, smoking rate is still high in many Asian countries. The prevalence is over 50% in Korea, China and India and around 40% in Malaysia, Indonesia, Japan, Philippines, Bangladesh etc. The lowest level is shown in Singapore (Yoo et al., 2006).

In order to plan and develop cancer control actions, an accurate estimation of cancer incidence load is essential. Unlike in developed countries we are handicapped because of paucity of essential data to be utilized for making projections with a better degree of precision. Authentic data on cancer incidence for different regions is available only from 1982 when the Indian Council of Medical Research initiated National Cancer Registry Programme. In addition to this, a few of the cancer centers started their own population based registries. These registries routinely undertake various exercises to ensure that the data they collect and process is of high quality. A thorough check of data is also done before tabulation. It has been reported that the data collected by the Indian population- based registries are both complete and reliable (NCRP, 2001; Parkin et al., 2002).

The present estimates have been based on the data of 2001-2004 from 17 population based registries only (out of 21 registries functioning at the time of study in 2009). Detailed published data needed for the present exercise were not available from the four registries Viz: Ambilikai, Karunagapally, Ahmedabad urban and Kolkatta. The present projections carried out have not made any adjustments for possible increase in the tobacco habit. The percentage of men and women aged 15-19 using any kind of Tobacco in India are 57% and 10.8% respectively (NHFS-3, 2005-06). Increasing tobacco smoking might lead to increase in incidence of lung cancer. Tobacco is the most widely used harmful product and the main avoidable cause of cancer (Shin et al., 2012). However, the present estimates (without consideration of possible increase in risk factors) do indicate that existing treatment facilities need to be substantially increased to combat this deadly disease.

Even, if the age specific cancer incidence rates remain unchanged, large increase in absolute number of cancer cases in the next one and half decade of the present century is already programmed due to aging of population in the developing countries. With the increasing longevity, the proportion of Indian population in the cancer age will increase substantially. It is envisaged that in years to come cancer morbidity and cancer mortality would rise disproportionately to population increase and therefore strengthening/augmenting the existing diagnostic/ management facilities, palliative care made available to cancer patients along with primary prevention of tobacco related cancers should be initiated as early as possible. This approach would help in early detection and linked reduction of mortality, but is not likely to reduce the incidence.

Prevention of cancers through reduction of tobacco use should be an important strategy of National cancer Control Programme of India. Organized Cancer screening facilities should also be initiated so that leading cancer sites like breast, Cervix and oral can be detected at early stages or at pre-cancerous stage. High numbers of cancers of lung, prostate, ovary, esophagus, stomach, gallbladder (in certain areas) indicate need for augmented research efforts to identify effective screening tools. Incorporating screening activities into peripheral health infrastructure would effectively change the shift of clinical staging to left when less extensive surgical procedures could be attempted. Establishment of cancer diagnostic facilities, adequate treatment guidelines, pain relief and palliative care that can effectively be carried out at different levels (district hospitals, specialized hospitals, medical colleges etc.) would also help in reduction of mortality due to cancer. Increasing trends in cancer incidence have also been noted for several cancers such as Colon and Rectum, Gallbladder, Lung, Ovary, Prostate, Brain, Leukemia's (Murthy, 2006) etc. This has an important implication for public health. However, in the present exercise, no efforts have been made to incorporate the effects of changing trends or dietary practices. Over the next two decades it is expected that there will be a substantial increase in the incidence of cancers because of increasing longevity, migration from rural to urban, inadequate physical activity, greater exposure to environmental carcinogens due to industrialization, pollution, use of fossil fuels, wide variety of chemical agents in the industry, agriculture and continued use of tobacco.

With an estimated 1.19 million cases in 2011 and 1.86 million cases in 2026, Cancer appears to be a significant public health problem in India. The present estimates

may indicate that the people are not yet fully aware of the risk factors/their associated life style or behavior related factors leading to probable increasing figures for this disease. In short, reduction of cancer morbidity by 2026 would be an unrealistic goal, unless drastic measures are taken for its holistic control. Reduction of mortality through early detection/down staging could be still be-expected to a limited extent. For prevention of Cancer, Cancer Education is an important strategy for people to understand the risk factor associated with cancer and further to recognize early signs of cancer by screening and seek prompt medical attention for symptoms.

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