

Cancer: Current scenario, intervention strategies and projections for 2015

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The term cancer refers to a group of diseases which share similar characteristics. Cancer can affect all living cells in the body, at all ages and in both genders. The causation is multifactorial and the disease process differs at different sites. Tobacco is the single most important identified risk factor for cancer. A host of other environmental exposures, certain infections as well as genetic predisposition play an important role in carcinogenesis. Diagnostic work-up, treatment methods and outcome of treatment are not uniform for all cancers. Advanced technology is required in many situations and ongoing research initiatives might lead to better understanding of the disease and its control.

The control of cancer requires the effective implementation of knowledge derived from more than two decades of successful research. It is now known that over one-third of cancers are preventable, and one-third potentially curable provided they are diagnosed early in their course. The quality of life of patients with incurable disease can be improved with palliative care.

A rational concept to put science into practice has to be formulated to counter this disease. In cancer, even with limited resources, an impact can be achieved if the right priorities and strategies are established and implemented.

The carcinogenic agents that people breathe, eat, drink and are otherwise exposed to, largely determine the occurrence of the disease. Personal habits such as the use of tobacco play a key role; people develop such habits in response to the social circumstances of life. Thus, the social origin of lifestyle must be considered in cancer prevention.

The high rates of cervical and breast cancers have created a higher cancer burden in women than men and hence these diseases are of major societal and familial consequence.

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Current scenario

India has a National Cancer Control Programme which was established in 1975–76. This has contributed to the development of Regional Cancer Centres (RCCs), oncology wings in medical colleges and support for purchase of teletherapy machines. The District Cancer Control Programme was initiated but did not result in sustainable and productive activity. Leading cancer sites in various cancer registry areas are shown in Fig. 1.

The present scenario is summarized as follows:

Cancer prevention

There is no uniform cancer prevention strategy for the entire country. Awareness programmes have been undertaken in a few places, but there is no uniform standardized information, education and communication (IEC) strategy for cancer prevention. There is no education on risk factors, early warning signals and their management. Cancer screening is not practised in an organized fashion in any part of India. There are sporadic attempts at opportunistic interventions and small-scale research studies for field interventions.

Infrastructure for diagnosis

Diagnostic infrastructure in the country is limited. There are many districts in the country which do not have a pathologist and pathology/cytology services, which are crucial for diagnosing cancer.

Financial and geographic constraints, and lack of manpower have contributed to the urban concentration of facilities. An unestimated number of cancers diagnosed in the population are not treated. Untreated patients are likely to demand more resources from society.

Cancer treatment

Treatment facilities are also mostly limited to urban areas of the country. There are no uniform protocols for manage-

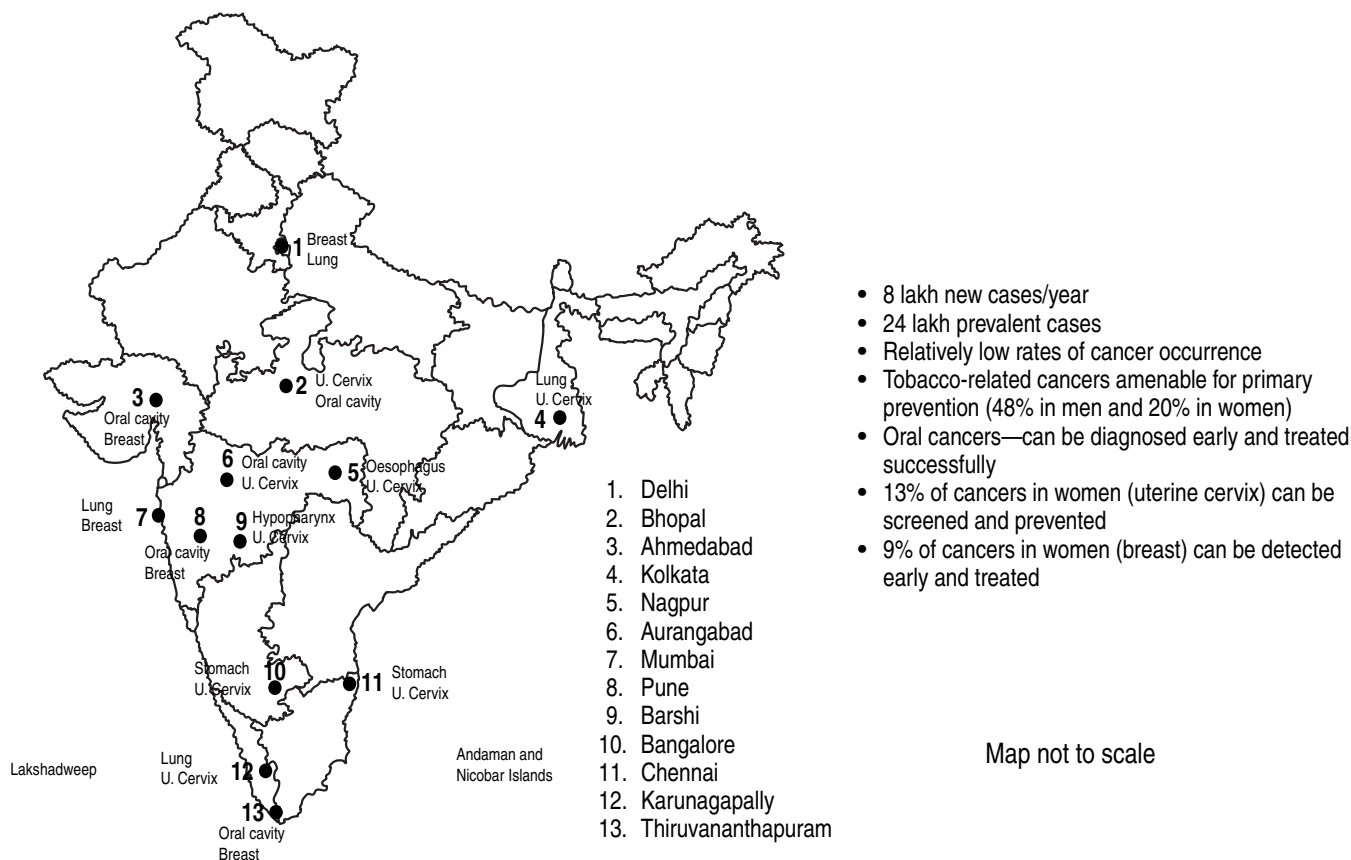


Fig. 1 India: Cancer pattern

ment, and the availability and affordability of cancer treatment shows wide disparities.

The majority of patients with cancer present to a cancer treatment centre in late stages of the disease (80% are advanced) and this adds to the already high morbidity, mortality and expenditure.

Treatment results are about 20% less than what is observed for similar conditions in more developed countries, mostly due to late diagnosis and inappropriate treatment.

Paediatric cancers are highly curable but this has not been achieved in India due to lack of access to quality care and lack of support systems.

Pain relief and palliative care

Oral morphine is the mainstay for cancer pain relief and is still not widely available in the country. There is a serious limitation of manpower for providing palliative care.

Finances

The funds for the cancer programme are mainly from the Government and needs to be augmented. Private initiatives are few and are unlikely to cater to a large population across different socioeconomic strata, as it is often not a financially viable venture.

Coordination

All elements of cancer control, from surveillance to palliative care, are not linked and coordinated.

Strategies for cancer control

A number of strategies can be considered for the control of cancer. An activity should only be introduced if data that strongly support its effectiveness are available, either from research programmes or cancer control programmes elsewhere.

Prevention

At least 30% of the future cancer burden is potentially preventable by tobacco control. Spread of tobacco addiction, promoted by commercial interests in the world, is responsible for the lung cancer epidemic that is already taking hundreds of thousands of lives annually; unless checked, cigarettes will in the next decade cause more than 1 crore deaths from cancer.

Action is also possible on dietary modification. Evidence that excessive fat in the diet may induce some cancers and that whole grains, vegetables and fruits are protective has accumulated in recent years. The same diet that lowers the risk of cardiovascular disease may inhibit the development of diet-associated cancers.

Table 1. Risk factors for cancer

Factor or factor class	Percentage of cancer deaths in the age group of 35–64 years caused by various factors
	Best estimate
Tobacco	30–40
Alcohol	3–10
Diet	Not known
Reproductive and sexual behaviour	10
Occupation	6–8
Pollution	2
Industrial products	1
Medicines and medical procedures	1
Geophysical factors	3

Excessive alcohol consumption increases the risk of cancers of the oral cavity, pharynx and oesophagus; it is also strongly associated with cancer of the liver.

Infections with certain viruses are associated with cancer; for example, liver cancer and the hepatitis B virus, and cancer of the cervix and the human papillomavirus. Hepatitis B vaccination can be undertaken in regions where the prevalence of chronic carriers exceeds 10%. Table 1 gives the risk factors for deaths due to cancer.

Early detection

If cancer can be detected early, treatment may be curative. One means to that end is educating people regarding early signs of the disease: lumps, sores that do not heal promptly, abnormal bleeding, and persistent indigestion or hoarseness. Medical attention should be sought when these occur. Early diagnosis of cancers that are curable if detected early (cervix, breast, mouth) can be promoted in India using public education and training of primary health care workers.

A second approach to early cancer detection is through population screening; namely, the identification of people with asymptomatic disease by applying simple tests. Cancer screening should be applied only when its effectiveness has been demonstrated; programmes should be introduced only when there is adequate manpower to perform the tests, with mechanisms to achieve adequate population coverage, facilities for diagnosis, treatment and follow-up of individuals with abnormal test results, and when the extent of disease in the population justifies the effort and cost. Currently, screening can only be advocated for cancers of the cervix and breast. It is important that such programmes concentrate on those at greatest risk of invasive cancer, for cervix cancer women aged 35–60 years, for breast cancer women aged 40 years or more (but for mammography programmes those aged 50–69 years).

Table 2. Curable cancers for which treatment is justifiable

Cancer	Load (%)	Primary modality
Childhood cancer	5	CT/S/RT
Breast	20	S/RT/CT/HT
Cervix	18	RT/S
Oral	11	RT/S
Gestational trophoblastic disease	1	CT
Germ cell tumours	3	CT/S
Colon	7	S/CT
Osteosarcoma	2	CT/S
Soft tissue sarcomas	2	S/RT
Central nervous system	2	S/RT
Total	71	

CT: chemotherapy; S: surgery; RT: radiotherapy; HT: hormone therapy

Treatment

The primary objectives of cancer treatment are cure, prolongation of useful life and improvement in the quality of survival. Mechanisms should be set up to decide on guidelines for integrating treatment resources with early diagnosis and screening programmes, and for providing therapeutic standards for the most important cancers in India.

Care for cancer patients typically starts with recognition or suspicion of the disease by the patient and primary health care worker. Specialized services for diagnosis and treatment, and referral, if appropriate, to a centre for cancer treatment comprise the next element of the system. Curative treatment involves surgery, radiation, chemotherapy, hormone therapy or some combination of these modalities. For some kinds of cancer, including those affecting the uterine corpus, testis, melanoma and female breast, state-of-the-art therapy yields a 75% or greater 5-year survival rate. On the other hand, survival for patients with cancers of pancreas, liver, stomach and lung is less than 15%. Though simple forms of cancer treatment have to be provided at a conservative level in medical colleges and district level hospitals, the high technology required for some forms of cancer therapy heighten the desirability of concentrating such treatment in a few places in the country. Table 2 lists the curable cancers in India.

Major reliance on treatment as a cancer control strategy, however, favours an expensive and narrow approach to the problem. High technology for cancer treatment imposes a heavy financial investment, tends to select patients inequitably, and detracts from appropriate emphasis on prevention. In the developing as well as developed world, focus on treatment as the main thrust against cancer is a poor strategy.

Palliative care

Having a good quality of life is a highly significant aim for patients with cancer, whether or not cure is possible. Cancer pain relief and palliative care are important and integral parts of cancer care. Relatively simple and inexpensive treatment to control pain should be available throughout the country as a priority. Palliative therapy and care, including symptom control and pain relief, will be important for years to come, especially in developing countries, because of the large number of patients for whom curative therapy is not possible. Guidelines for cancer pain relief have been produced and are available from the World Health Organization (WHO). Actions to ensure the availability of oral morphine through amendment of regulations that might inhibit the use of oral morphine for cancer pain relief, and training of health professionals in palliative care, are critical.

Interventions

Primary prevention

- The most useful prevention strategy is reduction in tobacco consumption (all forms). Currently about 50% of cancers in men and 20% of cancers in women are related to tobacco use. These cancers can be prevented to a large extent through a comprehensive tobacco control programme which will include awareness, education, legislation, community participation and tobacco cessation services.
- A healthy lifestyle, which includes eating plenty of fruits and vegetables, avoidance of alcohol and adequate physical activity, is protective for many of the non-communicable diseases including cardiovascular disease and diabetes, and can be considered as part of the overall health promotion programmes.
- Cancers related to infectious agents such as human papillomavirus and hepatitis B virus can be prevented through vaccination strategies.

Screening

- Screening is the application of a relatively simple and inexpensive test to asymptomatic subjects to classify them as being likely or unlikely to have cancer. A screening test in itself will not prevent cancer; it needs to be followed up through a systematic approach.
- Opportunistic screening or case finding can be attempted, but may not result in significant reduction in the incidence of cancer in a population as the coverage will be poor. However, it might help to increase the awareness and produce the human resources needed for future programmes, which include population-based screening in an organized manner with proper mechanisms for call-recall and quality control.

- At present, cytology-based Papanicolaou smear screening is the only proven strategy for cervical cancer and this can be undertaken in areas which are covered by cancer registries. Alternative strategies are being researched and might prove beneficial in certain settings.
- At present, mammography as a screening tool is not applicable to India. Breast cancer awareness can be propagated along with provision for fine-needle aspiration cytology, pathology services and surgical interventions. Once-a-year clinical breast examination can be made feasible for women above the age of 40 years, which can be carried out by general practitioners or trained health workers.
- Cancers in accessible parts of the body like the oral cavity may be detected at an early stage or even in a precancerous stage through simple inspection and examination, which can be practised by a trained health care worker.
- Self-examination of the oral cavity (MSE) and breast (BSE) can be useful methods and each can be propagated widely as a strategy.

Early detection, diagnosis and treatment/referral chain

- Cancer detection and diagnostic facilities have to be made available at medical colleges and district-level hospitals if they are to be accessible, and a clear referral chain should be established to ensure that those who require further treatment are referred to higher-care centres such as RCCs.
- Medical colleges should have provision for the management of all early common cancers.
- Dedicated centres need to be established for the management of paediatric cancers.
- RCCs should be equipped for comprehensive cancer control, treatment and research.

Palliative care

- Oral morphine has to be made available at the district level throughout the country. Various categories of health professionals need to be trained in the WHO step-ladder approach to pain management.
- Palliative care should be treated as an integral part of cancer management.

Figure 2 depicts the appropriate course and mix of curative and palliative care services and the relative positions of the two approaches.

Surveillance and monitoring

- The cancer registry programme has to be expanded and be made the monitoring component of the cancer control programme.
- At least 50% of the population has to be made aware

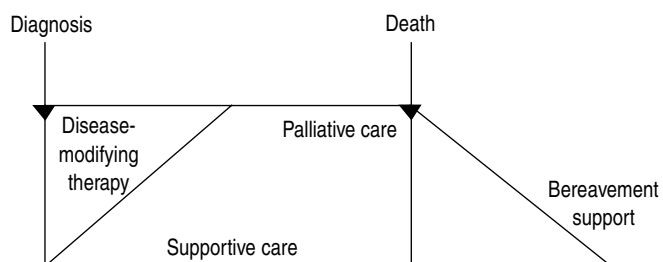


Fig. 2 The relationship between disease-modifying therapy, supportive care and palliative care

of the disease, its risk factors, prevention potential and curability.

- Paramedical personnel and field-level health workers have to be trained for providing awareness, documentation and ensuring compliance to referral and treatment.
- A comprehensive tobacco control programme must be implemented to reduce the prevalence of tobacco use by 10% from the current levels.

Vision 2015

- Affordable and accessible diagnostic, therapeutic and palliative care services should be made available in India.
- Tobacco control has to be strengthened and the present status of women and children as non-users of tobacco should be sustained at any cost.

Key components

Infrastructure and human resources

- Early detection of oral, breast and cervical cancers will have to be made possible through oncology wings in medical colleges and District Cancer Centres through augmentation of infrastructure and capacity enhancement.
- 300 more teletherapy machines will have to be made available in the country, taking into consideration the geographic gaps in the present distribution. Machines should be chosen in such a way that they are environmentally acceptable and recurring costs are minimal (a combination of cobalt and low-energy accelerators and simple brachy therapy [BT] equipment can be selected for this).
- Dedicated paediatric cancer treatment facilities will have to be established in all States.
- 1200 radiographers, 600 radiation oncologists and 300 radiation physicists will have to be made available; 300 surgeons and 300 physicians will need to be given re-orientation training in surgical and medical oncology.
- 2400 nurses, 600 doctors and pharmacists trained in pain relief and palliative care will have to be made available.
- Medical and surgical oncology training to be augmented and drug therapy for curable cancers including paediatric cases made available in all RCCs.

Drugs

- An essential drugs list of cancer chemotherapeutic drugs will have to be prepared and availability of all drugs in the essential list ensured. Protocol-based chemotherapy should be made available.
- Oral morphine will have to be made available in all districts of the country.

Surveillance and monitoring

- All RCCs should have two population-based registries, one covering the urban area and one for the rural area.

Community participation

- Community participation in the cancer programme can be ensured by having development committees for District Cancer Centres and oncology wings in medical colleges with people's representatives, religious leaders, teachers, etc.

Non-governmental organizations (NGOs) and civil society

- NGOs and civil society initiatives will have to be promoted and linked to cancer diagnostic and treatment centres.

Linkages

- Linkages with the Reproductive and Child Health Programme, National AIDS Control Programme, Nutrition Programme and Hepatitis B Control Programme will have to be established.

Finances

- Alternate sources of financing will have to be explored.

Channels for delivery of services

- RCCs/oncology wing of medical colleges/District Cancer Centres will have to be responsible for the delivery of all cancer-related services. Medical colleges will need to be restructured to enable oncology wings to function with more objectivity.
- All services at the district level will have to be provided by the District Cancer Centre—a charitable society spearheaded by the district administration. The district administration will thus become responsible for providing all services related to cancer in the community.

Estimate of cancer burden for 2004 and projection for 2015

Estimation of the incidence rate of cancer for the entire country in the year 2004 was done by selecting registries on the basis of data quality and location; selecting the

same time window, say 1997–98 as the mid-period; representation of urban and rural registries as available and taking their average (Tables 3 and 4).

Estimation of the population at risk of developing cancer was done by the exponential growth rate method, and using data from the Census of 1991 and 2001.

Estimation of the death rate for cancer was done by using mortality data of the Chennai and Mumbai registries only, based on data quality.

Estimation of prevalence was done by assuming the average duration of disease as 2.5 years.

Estimation of the cancer incidence for the entire country in the year 2015 is done by assuming a constant rate without any change as done for the year 2004 (Tables 5 and 6). The only difference will be in the estimated number of incident cases. Trend data in incidence rate have not been used for reasons of instability.

Estimation of the population at risk of developing cancer was done by the exponential growth rate method and using data from the Census of 1991 and 2001.

Estimation of the death rate of cancer cases by the same method as in 2004.

Estimation of the prevalence was done by the same method as in 2004.

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Table 3. Cancer incidence, prevalence and mortality: Estimate for India, 2004

	Male	Female	M+F
<i>Incidence, all ages</i>			
CIR/10 ⁵	66.2	81.6	73.6
ASR/10 ⁵	95.1	112.1	104.2
Cumulative risk (0–74 years)	One in 9	One in 8	One in 9
Incident cases	374,506	432,174	806,680
Prevalent cases	936,265	1,080,435	2,016,700
<i>Incidence, 35–64 years</i>			
CIR/10 ⁵	119.5	176.5	153.7
ASR/10 ⁵	155.1	234.3	202.6
<i>Mortality</i>			
CMR/10 ⁵	51.8	46.4	49.1
Deaths	293,219	245,638	538,858

CIR: crude incidence rate; ASR: age standardized rate; CMR: crude mortality rate

Table 4. Common cancers in India, 2004

Site of cancer	Incident cases (%)	CIR/10 ⁵		ASR/10 ⁵		Ratio at risk 0–74 years
		All ages	35–64 years	All ages	35–64 years	
<i>Males</i>						
Oral cavity*	40,700 (10.9)	7.2	17.6	10.3	21.5	1:81
Lung	34,983 (09.3)	6.2	9.8	9.4	15.2	1:85
Pharynx†	31,716 (08.5)	5.6	11.6	8.3	14.4	1:99
Oesophagus	24,729 (06.6)	4.4	9.7	6.6	11.9	1:123
Stomach	22,222 (05.9)	3.9	7.9	5.8	9.9	1:137
<i>Females</i>						
Cervix	112,609 (26.1)	21.3	57.4	28.5	70.7	1:32
Breast	90,723 (21.0)	17.1	39.7	22.8	53.1	1:40
Ovary	24,246 (05.6)	4.6	9.8	6.2	13.2	1:144
Oral cavity*	22,741 (05.3)	4.3	9.7	6.5	12.8	1:20
Oesophagus	17,220 (04.0)	3.3	6.8	5.0	8.7	1:163

CIR: crude incidence rate; ASR: age standardized rate

*Oral cavity includes lip, tongue, gum, floor of the mouth, cheek and palate

†Pharynx includes oro-, naso- and hypopharynx

Table 5. Cancer incidence, prevalence and mortality: Estimate for India, 2015

	Male	Female	M+F
<i>Incidence, all ages</i>			
CIR/10 ⁵	66.2	81.6	73.6
ASR/10 ⁵	95.1	112.1	104.2
Cumulative risk (0–74 years)	One in 9	One in 8	One in 9
Incident cases	461,681	536,772	998,453
Prevalent cases	1,154,203	1,341,930	2,496,133
<i>Incidence, 35–64 years</i>			
CIR/10 ⁵	119.5	176.5	153.7
ASR/10 ⁵	155.1	334.3	202.6
<i>Mortality</i>			
CMR/10 ⁵	51.8	46.4	49.1
Deaths	361,474	305,000	666,563

CIR: crude incidence rate; ASR: age standardized rate; CMR: crude mortality rate

Table 6. Common cancers in India, 2015

Site of cancer	Incident cases (%)	CIR/10 ⁵		ASR/10 ⁵		Ratio at risk
		All ages	35–64 years	All ages	35–64 years	0–74 years
<i>Males</i>						
Oral cavity*	50,174 (10.9)	7.2	17.6	10.3	21.5	1:81
Lung	43,126 (09.3)	6.2	9.8	9.4	15.2	1:85
Pharynx†	39,098 (08.5)	5.6	11.6	8.3	14.4	1:99
Oesophagus	30,485 (06.6)	4.4	9.7	6.6	11.9	1:123
Stomach	27,395 (05.9)	3.9	7.9	5.8	9.9	1:137
<i>Females</i>						
Cervix	139,864 (26.1)	21.3	57.4	28.5	70.7	1:32
Breast	112,680 (21.0)	17.1	39.7	22.8	53.1	1:40
Ovary	30,114 (05.6)	4.6	9.8	6.2	13.2	1:144
Oral cavity*	28,245 (05.3)	4.3	9.7	6.5	12.8	1:120
Oesophagus	21,388 (04.0)	3.3	6.8	5.0	8.7	1:163

CIR: crude incidence rate; ASR: age standardized rate

*Oral cavity includes lip, tongue, gum, floor of the mouth, cheek and palate

†Pharynx includes oro-, naso- and hypopharynx