

## India needs a resilient cancer program

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### ABSTRACT

**Background:** We analyzed the trends for two important cancers affecting females, breast cancer and cervical cancer, using the Indian cancer registry data and correlated the findings with selected relevant sociodemographic and behavioral indicators. **Methods:** We examined National Family Health Survey data for the respective states in which registries are located, on relevant indicators like multiparity, early childbearing, cervical examination, multiple sexual partners/high-risk sexual behavior, and HIV prevalence (for cervical cancer), multiparity, early childbearing, duration of breastfeeding, overweight, alcohol use, and clinical breast examination (for breast cancer). We used Global Adult Tobacco Survey smoking data. **Results:** The top four positions in cancer cervix were all in registries from northeast India with a higher proportion of multiparous women ( $\geq 3$  births; around 40%), whereas three major metros in the south and the national capital of Delhi, all with a relatively low proportion of multiparous women (11–25%) topped the chart for breast cancer. Overweight/obesity was higher in states with a higher incidence of breast cancer (23.3–31%) compared to states with a lower incidence (12.2–16%). No clear patterns emerged with regard to alcohol consumption, duration of breastfeeding or clinical breast examination. **Conclusion:** The shift in the childbearing age group explains the increasing breast cancer rates in urban areas, whereas the persisting higher rate of multiparity explains higher cervical cancer rates especially in underserved states in the northeast. India needs to invest in transforming its cancer control program to be a more resilient one with a focus on screening and prevention.

**Keywords:** Breast cancer, cancer, cervical cancer, COVID-19, India, multiparity, pandemic, resilient health system, screening, social determinants

### Background

India's four-decade old National Cancer Registry Program (NCRP) started with three Population Based Cancer Registries (PBCR), currently has 36 PBCRs and 236 Hospital Based Cancer Registries. India released its latest report with data for the years 2012–16.<sup>[1]</sup> The 28 PBCRs (with a total of

32 locations) covered in this report represent 10% of Indian population [100.89 Million] covering 18 states, ranging from 139,534 (Pasighat, Arunachal Pradesh) to 17.31 million in Delhi. Until a century ago, India's cancer burden was low, primarily due to the short life expectancy.<sup>[2]</sup> However, cancer mortality doubled in India in the last 16 years and is a leading cause for adult mortality.<sup>[3]</sup> Various reports and surveys have shown different rates and patterns<sup>[4]</sup> due to the differences in measurement, differences in diagnosis due to variation in service availability, and reliance on self-reporting.<sup>[5]</sup> However, cancer is reported more among females across all reports. Though crude incidence rates increased in last 16 years, age-standardized incidence rates remain the same.<sup>[1]</sup>

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Two female cancers, the breast and cervical cancers need special mention. India account for one third of global deaths due to cervical cancer which is largely preventable through human papillomavirus (HPV) vaccine, detectable through pap smear and treatable through early diagnosis.<sup>[6]</sup> Introduction of HPV vaccine met with controversies allegedly linking some deaths in the earlier days of the trial to the vaccine.<sup>[7]</sup> Though the decreasing trend of cervix cancer in recent years is encouraging, this should not discourage uptake of HPV vaccine, as the changing sexual practices may lead to a resurgence of cases as it happened in china.<sup>[8]</sup> Recently, some of the state governments decided to introduce the vaccine, though the central government still remain uncommitted. The vaccine can potentially avert 70,000 deaths to cervical cancer.<sup>[9]</sup> Cancer has huge economic implications disproportionately affecting the poorer households.<sup>[6]</sup>

### Methods

We analyzed the trends for two important cancers affecting females, breast cancer and cervical cancer using the data from India's NCRP and correlated the findings with selected relevant indicators from the last round of National Health and Family welfare survey (Demographic and Health Survey for India)<sup>[10]</sup> and latest Global Adult Tobacco survey (GATS).<sup>[11]</sup> We examined National Family Health Survey data for the respective states in which registries are located, on relevant indicators like multiparity, early child bearing, cervical examination, multiple sexual partners/high risk sexual behavior, and HIV prevalence (for cervical cancer), multiparity, early child bearing, duration of breast feeding, overweight, alcohol use, and clinical breast examination (for breast cancer). We used GATS smoking data.

### Results

Overall, breast cancer incidence is increasing in India and is the leading female cancer in 20 of the 28 registries. Although cervical cancer is decreasing, it is still among the leading two cancers in all but six registries. Cervical cancer incidence ranged from 27.7/100,000 (age adjusted rate, AAR) in Papumpare to 4.8/100,000 in Dibrugarh, both located in the north east regions of India. Age-adjusted incidence of breast cancer ranged from 48.5/100,000 in Hyderabad in the south to 9.5/100,000 in Tripura in the north east. The top four positions in cancer cervix were all in registries from north east India with higher proportion of multiparous women ( $\geq 3$  births; around 40%), whereas three major metros in south and the national capital of Delhi, all with relatively low proportion of multiparous women (11–25%) topped the chart for breast cancer.

There was a 10% point difference in the multiparity rates between the registries in the top two and bottom two cancer cervix rates. [Figure 1] However, Bangalore had the fifth highest cancer cervix rates and third highest cancer breast rates. Female smoking rates were higher in those areas with higher rates of cervical cancer (5.4–14.3%), compared to 0.2–0.8% for registries with lower rates of cervical cancer, with the exception

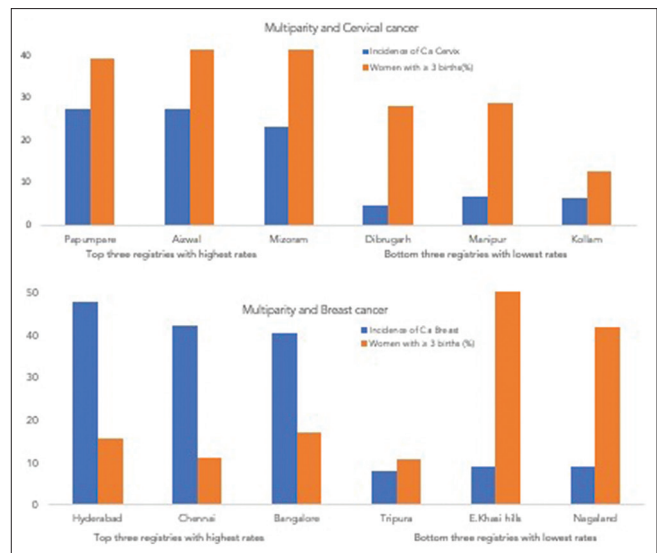


Figure 1: Multiparity and cervical and breast cancers

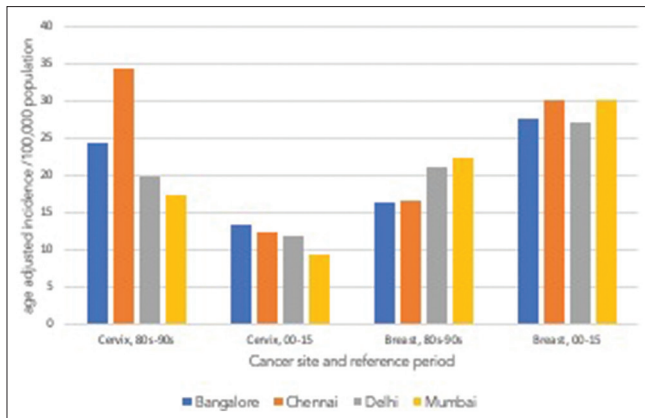
of Manipur (6%).<sup>[11]</sup> No clear patterns emerged for cervical examination or HIV prevalence.

All the four sites with lowest cancer breast incidence had very high multiparity rates (40–50%), except Tripura which despite one of the lowest multiparity rates (11%), recorded a low AAR of 7.9 per 100,000, probably attributable to distinctively very long duration of breast feeding ( $\geq 37$  months) and low prevalence of overweight/obesity (12.2%) among all the sites. Otherwise, there was no pattern of correlation between duration of breast feeding and breast cancer incidence for other locations. Overweight/obesity was higher in states with higher incidence of breast cancer (23.3–31%) compared to states with lower incidence (12.2–16%). No clear patterns emerged with regard to alcohol consumption or clinical breast examination. In the last 25 years, the relative incidence of cancer cervix and cancer breast changed markedly [Figure 2]. Changes in age-specific fertility rates (ASFRs) show a steady increase in ASFR in 30 years and above age groups across the urban areas in the country which may be indicative of an increasing trend of cancer breast and decreasing trend of cervical cancer in urban registries.

India has the sixth highest breast cancer rates in Asia and the tenth highest in the world compared to other population registries. India has the highest cervical cancer rate in Asia and fourth highest in the world. At the time of diagnosis, 10% of breast cancer cases in India are already having distant metastasis, whereas for cancer cervix it is 5%. Among breast cancer patients 16.7% were illiterate compared to 39% among cancer cervix patients, whereas 39% of breast cancer patients had at least primary schooling compared to 27% among cervical cancer patients.

### Discussion

With the increase in the prevalence of cancer in India, many cancer care centers have been established in urban areas while



**Figure 2:** Trends in cervical and breast cancers across four major metropolitan cities of India

there continues to be a dearth for cancer care in the rural areas. This is in spite of the fact that rural India contributes to nearly 50% of the cancer prevalence with 70% of the Indian population residing in rural areas.<sup>[12]</sup> Among the tertiary level cancer care facilities available in India in 2020, 40% of the top ten institutes are found to belong to the public sector in major metropolitan cities of India, whereas 60% of them are private.<sup>[13]</sup> Regional Cancer Centers (RCCs) that operate with funding of the Government of India and the respective state governments are the main hospitals where cancer is treated.<sup>[14]</sup> These centers usually cater to a number of districts in a designated region, cutting across state borders. There are presently 27 such centers. RCCs have radiotherapy, medical and surgical oncology departments, and multiple subspecialty departments. Many medical colleges also have facilities for cancer treatment, but largely limited to surgery and radiotherapy. India decided to establish its first national cancer institute (NCI) modeled after the US NCI in 2015.<sup>[15]</sup> At the peripheral level, cancer control is mostly limited to health education, early detection, training, and palliative care, whereas in some states district hospitals have radiotherapy units.<sup>[16,17]</sup>

India's population-based cancer registry program shows an increasing burden of female cancers, with an emerging rural-urban difference between cervical and breast cancer rates. Cancer breast is expected to be the most common site of cancer in 2025 followed by cancer lung and mouth. Shift in the childbearing age group explains the increasing breast cancer rates in urban areas, whereas persisting higher rate of multiparity explains higher cervical cancer rates especially in underserved states in the north east. Very low uptake rates of clinical examination of cervix and breast is a concern. However, modifiable risk factors including smoking and overweight have a bigger role in the emerging pattern.

We suggest three policy propositions to make India's cancer control program more resilient. First, we should focus more on primary prevention of cancer. This requires increasing investment in prevention of exposure to modifiable risk factors

common for various cancers. One of the most visible attempts so far has been the efforts to reduce smoking, but it is time to proportionately increase awareness around diet, exercise, stress, alcohol, and exposure to pollution as modifiable risk factors of cancers. It is also vital that we expand and strengthen our immunization program by encouraging hepatitis and HPV vaccination uptake. All these need multifaceted interventions by national and state governments, industries and employers, and communities besides individuals. Cancer control program can play a critical role in coordinating these efforts.

Second, India needs to rationalize budgeting for cancer program, facilitating treatment at district level. Decentralized cancer care is possible for a large proportion of patients, provided we adequately decentralize diagnostic services and effectively pool public and private sector resources. Ayushman Bharat Pradhan Mantri Jan Arogya Yojana and similar state level health insurance mechanisms should identify and encourage public and private facilities at district level to diagnose cancer early and treat them early, so that we can decrease the financial and resource burden associated with late diagnosis and treatment.

Third, the country should invest in focused cancer research and development. We should undertake appropriate research in Indian context with a primary aim to reduce incidence, increase early diagnosis, and facilitate affordable care. Our private sector should be encouraged to develop cheaper diagnostic tools. We need to manufacture anti-cancer drugs and other consumables required for cancer care at low cost.

A resilient cancer health-care system focusing more on prevention, early diagnosis, and treatment at an early stage is more relevant than ever as we face the COVID-19 pandemic.<sup>[18]</sup> This is especially applicable in resource poor countries like India. With routine healthcare and preventive programs like cancer screening getting disrupted due to COVID-19 pandemic and as we anticipate such pandemics in future, India needs to invest in transforming its cancer control program to be a more resilient one with focus on screening, prevention, and decentralized and early diagnosis and treatment.

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## Conflicts of interest

There are no conflicts of interest.

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