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Transforming cancer care in emerging economies: India's AI innovation

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ABSTRACT

Cancer remains a major public health challenge across BRICS member countries. Together, these countries represent more than 40% of the global population and account for approximately 9.0 million new cancer cases and 4.66 million cancer deaths. This review aims to summarize cancer epidemiology across the 11 BRICS member countries, with emphasis on breast and ovarian cancers, describe India's cancer-control and digital-health architecture, and assess the evidence and translational potential of iOncology.ai. Cancer patterns and access to screening, early diagnosis, and specialist oncology care vary across member countries. Breast cancer is among the leading malignancies affecting women and is the leading female cancer in most BRICS countries. Ovarian cancer is less common but is frequently diagnosed at advanced stages and is associated with poor outcomes. In India, cancer-control activities are delivered through the National Health Mission, the National Programme for Prevention and Control of Non-Communicable Diseases, and complementary surveillance, population-based screening, tertiary-care, and financial-protection mechanisms. The Viksit Bharat 2047 vision and Digital India programme provide a policy context for digital health development, including the Ayushman Bharat Digital Mission. Within this ecosystem, iOncology.ai is an national artificial-intelligence platform undergoing pilot-stage clinical validation and implementation evaluation. The review also identifies priorities for collaborative digital oncology in the context of India's BRICS Chairship in 2026.

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Introduction

Cancer is a generic term for a large group of diseases characterized by abnormal cells that grow beyond their usual boundaries, invade adjoining tissues, and may spread to distant organs; metastasis is a major cause of cancer-related mortality. The Indian Council of Medical Research defines cancer as the uncontrolled and uncoordinated growth of body cells that invade surrounding normal tissues and can spread to distant organs if not checked in time^{1,2}. Despite substantial advances in prevention, screening, diagnosis, molecular characterization, and treatment, cancer remains one of the leading causes of mortality worldwide [1]. International Agency for Research on Cancer estimated 20.64 million new cancer cases and 9.76 million cancer-related deaths globally in 2024, with age-standardized incidence and mortality rates of 194.9 and 87.8 per 100,000 population, respectively³. Lung cancer was the most commonly diagnosed cancer globally (approximately 2.64 million cases; 12.8%), followed by breast cancer (2.43 million; 11.8%) and colorectal cancer (2.04 million; 9.9%)[2]. The global cancer burden is projected to rise to approximately 34.4 million new cases annually by 2050, driven largely by population ageing and growth, together with urbanization, environmental exposures, and changing lifestyle-related risk factors⁴ [2]. The author-generated visualization based on publicly available International Agency for Research on Cancer “Cancer Tomorrow / GLOBOCAN 2024” data illustrate the projected increase in incidence and mortality between 2024 and 2050 for both sexes (Figure 1)⁵.

Low- and middle-income countries (LMIC), including several BRICS member countries, are expected to bear a disproportionate share of this increase due to persistent disparities in cancer prevention, organized screening, early diagnosis, and access to quality oncology services [2, 3]. Although improvements in cancer prevention, screening, and treatment have contributed to better outcomes in many settings, the overall disease burden continues to increase across LMIC because of demographic transition, population ageing,

¹ Cancer. Accessed 04.08.2026. <https://www.who.int/news-room/fact-sheets/detail/cancer>

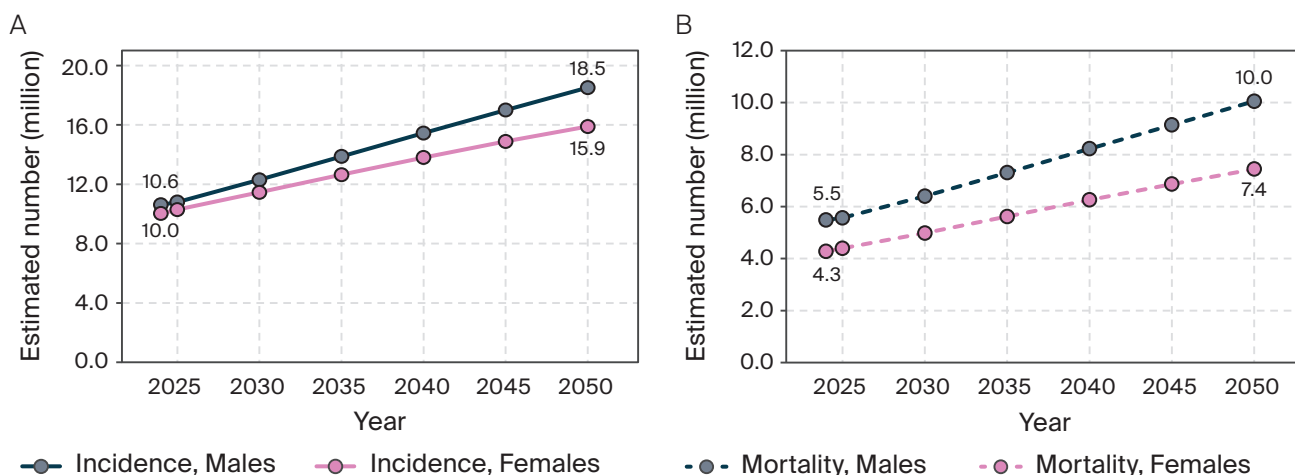
² ICMR – National Institute of Cancer Prevention and Research. Ministry of Health and Family Welfare, Government of India. FAQs. Accessed 13.08.2026. <https://cancerindia.org.in/faqs/>

³ Cancer today. Globocan 2024. Accessed 06.08.2026. <https://gco.iarc.who.int/media/globocan/factsheets/populations/900-world-fact-sheet.pdf>

⁴ Estimated number of new cases from 2024 to 2050, Both sexes, age [0-85+]. All cancers. World. Accessed 04.08.2026. <https://gco.iarc.who.int/tomorrow/en/dataviz/isotype>

⁵ Predictions of the future cancer incidence and mortality burden worldwide up to 2050. Accessed 13.08.2026. <https://gco.iarc.who.int/tomorrow>

FIG. 1. Projected global cancer burden, 2024–2050



Note: A – Incidence; B – Mortality. Author-generated visualization based on publicly available data from the International Agency for Research on Cancer, Global Cancer Observatory, Cancer Tomorrow, GLOBOCAN 2024.

urbanization, and changing lifestyle patterns [2, 4]. Healthcare systems in these countries continue to face multiple constraints, including limited access to organized screening programmes, delayed diagnosis, inadequate pathology and molecular diagnostic infrastructure, shortages of trained oncology specialists, restricted availability of advanced cancer therapies, and insufficient survivorship and palliative care services [2]. LMIC face a double burden of disease, with non-communicable diseases, including cancer, rising rapidly alongside continued morbidity and mortality from infectious diseases. The absolute number of patients diagnosed with cancer annually in LMIC is growing rapidly. By 2030, approximately three-quarters of all cancer deaths will occur in LMIC, with one in eight people experiencing a cancer diagnosis in their lifetime [5]. Most of the increase in the global cancer burden over the next 50 years will come from LMIC (400% in low-income countries, 168% in middle-income countries, 85% in HIC and 53% in very HIC) due to population growth, increasing life expectancy, growing urbanization, and lifestyle changes [2–4, 6].

Recent GLOBOCAN 2024 country profiles demonstrate substantial heterogeneity in cancer burden across the 11 BRICS member countries [2, 7], while BRICS-focused comparative studies have also examined economic burden and trends in cancer incidence, mortality, and disability-adjusted life years [7, 8]. However, to our knowledge, no review identified in the present search has integrated the current 11-member BRICS cancer burden based on GLOBOCAN 2024 with India's cancer-control architecture, digital-health ecosystem, and the emerging iOncology.ai platform. This review's novelty lies in bringing these epidemiological, health-system, digital-health, and national artificial intelligence (AI) components together within a single BRICS-focused framework. Accordingly, this review aims to summarize cancer epidemiology across the 11 BRICS member countries, with particular emphasis on breast and ovarian cancers, describe India's cancer-control and digital-health architecture, assess the evidence and translational potential of iOncology.ai and identify priorities for collaborative digital oncology across BRICS.

A targeted narrative literature search was conducted and updated through 22 August 2026. PubMed/MEDLINE and Google Scholar were

searched using combinations of the terms “cancer,” “breast cancer,” “ovarian cancer,” “BRICS,” “India,” “GLOBOCAN,” “NP-NCD,” “ABDM,” “digital health,” “artificial intelligence,” and “iOncology.ai.” We considered peer-reviewed original studies, reviews, and relevant implementation literature. Authoritative epidemiological and programme-related information was additionally obtained from International Agency for Research on Cancer/Global Cancer Observatory, the World Health Organization, the Ministry of Health and Family Welfare, Indian Council of Medical Research – National Centre for Disease Informatics and Research, National Health Authority, the Ministry of Electronics and Information Technology / Digital India, Press Information Bureau, Parliament of India, and relevant government portals. No lower publication-date restriction was applied; priority was given to recent authoritative sources, while older foundational references were retained where relevant. Sources were selected for relevance, authority, and retrievability.

Cancer epidemiology and digital health opportunities across BRICS nations

The BRICS countries collectively represent more than 48.5% of the world’s population and account for a substantial proportion of the worldwide cancer burden. Population ageing, urbanization, industrialization, environmental exposures, and lifestyle transitions have accelerated the epidemiological shift toward non-communicable diseases, making cancer a major public health and socioeconomic challenge across the region. Owing to their large populations, China and India contribute the highest absolute numbers of cancer cases and cancer-related deaths within the BRICS bloc⁶ [9]. The GLOBOCAN 2024 estimates demonstrate considerable heterogeneity in cancer incidence and mortality among BRICS countries, reflecting differences in demographic structure, risk-factor profiles, health-system capacity, screening practices, and access to diagnosis and treatment. Breast cancer is the leading cancer among women in Brazil, Russia, India, and South Africa, while lung cancer is the leading cancer among women in China. Among men, prostate cancer is the leading cancer in Brazil and South Africa, lung cancer in Russia and China, and lip and oral cavity cancer in India⁷.

Based on the GLOBOCAN 2024 country fact sheets, the cancer burden across the 11 BRICS member countries varies substantially in both magnitude and epidemiological profile. According to GLOBOCAN 2024 data, the 11 BRICS nations collectively represent a major portion of the global cancer burden, both in terms of new diagnoses and mortality. China contributes the largest absolute burden, with approximately 5.15 million new cases and 2.58 million deaths⁸, followed by India with 1.56 million cases and 0.90 million deaths⁹. However, absolute burden does not correspond directly to age-standardized rates. Russia has the highest age-standardized incidence rate among the 11 countries (243.4 per 100,000)¹⁰, followed by Brazil (211.1)¹¹ and China (207.7)¹², whereas India has

⁶ Incidence and Mortality, Both sexes, in 2024. All cancers. Accessed 06.08.2026. https://gco.iarc.who.int/today/en/dataviz/tables?types=0_1&mode=population&key=total&sort_by=value1&populations=156_356_643_710_76

⁷ Population Factsheets. Accessed 06.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations>

⁸ Cancer Today. China. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/156/china>

⁹ Cancer Today. India. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/356/india>

¹⁰ Cancer Today. Russian Federation. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/643/russian-federation>

¹¹ Cancer Today. Brazil. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/76/brazil>

¹² Cancer Today. China. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/156/china>

a substantially lower one (104.1)¹³ despite its much larger absolute burden. Age-standardized mortality similarly varies considerably, ranging from 106.7 per 100,000 in Russia and 92.2 in Iran to 60.4 in India, 59.4 in Ethiopia, and 44.7 in Saudi Arabia¹⁴. These differences illustrate the considerable heterogeneity in cancer risk, demographic structure, disease profile, detection, and survival across the BRICS group. The following charts show substantial variation by country and sex in age-standardized incidence rate in 2024 across BRICS member countries (Figure 2).

Cancer also imposes a substantial economic burden across the BRICS countries through premature mortality and associated productivity losses. Pearce et al. estimated that premature cancer mortality resulted in approximately USD 46.3 billion in productivity losses across Brazil, the Russian Federation, India, China and South Africa in 2012, equivalent to 0.33% of their combined gross domestic product [8]. China accounted for the largest absolute productivity loss (USD 28 billion), while South Africa had the highest productivity loss per cancer death (USD 101,000) [8]. A more recent comparative analysis by Nath et al. compared cancer incidence, mortality, and disability-adjusted life years across the five original BRICS countries and projected future increases in cancer cases and deaths, with the largest percentage increases anticipated in South Africa and India [7]. These findings underscore the importance of strengthening cancer prevention, early detection, and timely access to effective treatment.

The site-specific cancer profiles further demonstrate this heterogeneity. Breast cancer is the leading cancer among women in the overwhelming majority of the BRICS countries, including Brazil, Russia, India, Egypt, Ethiopia, Iran, Saudi Arabia, the United Arab Emirates, Indonesia and South Africa¹⁵. In India, breast cancer accounts for 237,231 new cases (30.4% of female cancers), while in China, lung cancer ranks first among women, followed by thyroid and breast cancer. In several African and Middle Eastern members, infection-related and regionally prevalent cancers remain prominent: cervical cancer is the second most common cancer among women in South Africa and Ethiopia, while liver cancer is the leading cancer overall in Egypt and among Egyptian men. Conversely, China has a particularly prominent burden of lung cancer, which is the leading cancer overall and the leading cancer among both men and women. Indonesia shows a mixed profile, with breast cancer leading among women and lung cancer leading among men, with lung cancer ranking after breast cancer overall. The findings therefore indicate that BRICS does not represent a homogeneous cancer epidemiological setting; rather, it encompasses diverse cancer profiles across member countries. This diversity supports the rationale for country-adapted prevention and screening strategies, while creating opportunities for BRICS-wide collaboration in cancer surveillance, digital health, AI-enabled early detection, data interoperability, and precision oncology.

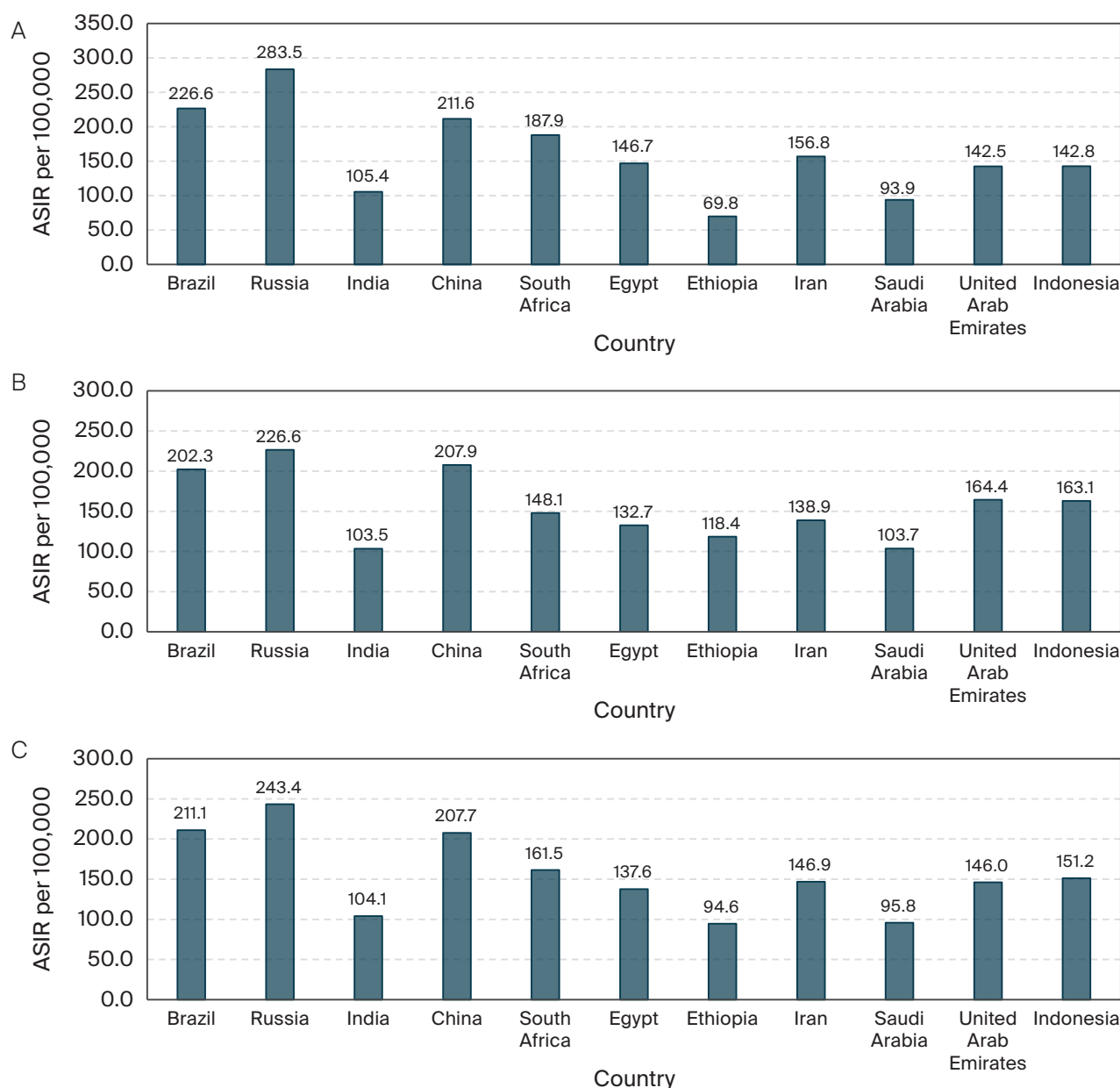
India is experiencing a sustained cancer burden in the context of demographic transition, increasing life expectancy, urbanization, and the growing burden of non-communicable diseases. The GLOBOCAN 2024 estimates indicate that India recorded 1,562,581 new cancer cases and 901,828 cancer-related deaths in 2024. The cumulative risk of developing cancer before the age of 75 years was estimated at 11.2%. Among Indian women, breast cancer was the leading malignancy, accounting for 237,231 new cases (30.4% of all female cancers), while

¹³ Cancer Today. India. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/356/india>

¹⁴ Population Factsheets. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations>

¹⁵ Incidence, Females, in 2024. Accessed 06.08.2026. https://gco.iarc.who.int/today/en/dataviz/tables?types=0&mode=cancer&key=total&sort_by=value1&populations=156_231_356_360_364_643_682_710_76_784_818&group_populations=1&multiple_populations=1&sexes=2

FIG. 2. Age-standardized cancer incidence rates across 11 BRICS member countries



Note: A – Cancer incidence ASIR in BRICS countries – males; B – Cancer incidence ASIR in BRICS countries – females; C – Cancer incidence ASIR in BRICS countries – both sexes. ASIR – Age-standardized incidence rates.

ovarian cancer accounted for 45,566 new cases (5.8%)¹⁶. Based on GLOBOCAN 2024 estimates, India ranked third globally in the absolute number of new cancer cases, after China and the United States¹⁷. GLOBOCAN projections estimate that the annual number of incident cancer cases in India will increase to approximately 2.33 million by 2040, a nearly 49% increase from 2024 estimates^{18,19}. These projections

¹⁶ Cancer Today. India. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/356/india>

¹⁷ Age-Standardized Rate (World) per 100 000, Incidence, Both sexes, in 2024. All cancers. Continents. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/dataviz/bars?mode=population>

¹⁸ Cancer Today. India. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/356/india>

¹⁹ Estimated number of new cases from 2024 to 2040, Both sexes, age [0-85+]. All cancers. World. Accessed 06.08.2026. https://gco.iarc.who.int/tomorrow/en/dataviz/isotype?group_cancers=1&multiple_cancers=1&populations=900&single_unit=1000000&years=2040

indicate the need for scalable approaches that can improve cancer prevention, facilitate earlier diagnosis, and support precision oncology. These epidemiological trends emphasize the importance of strengthening population-based screening programmes and highlight the need for innovative approaches to strengthen cancer prevention, diagnosis, treatment planning, and the continuum of cancer care.

The epidemiological profile of breast and ovarian cancers varies considerably across BRICS member countries, reflecting differences in population size, demographic characteristics, risk-factor distribution, healthcare infrastructure, and access to cancer screening, diagnosis, and treatment. China and India account for the largest absolute numbers of breast and ovarian cancer cases, mostly because of their large populations^{20,21}; however, age-standardized incidence and mortality rates vary substantially across the 11 member countries. For example, the highest absolute burden does not necessarily correspond to the highest age-standardized rates, highlighting important differences in population structure and cancer risk across the region. Table 1 presents a comparative overview of female breast and ovarian cancer incidence, mortality, age-standardized incidence rate, and age-standardized mortality rate across BRICS member countries, providing the epidemiological context for the subsequent analysis.

In India, rapid demographic transition, increasing life expectancy, urbanization, changing reproductive patterns, and lifestyle-associated risk factors have contributed to the increasing burden of breast cancer and other cancers²² [6]. National initiatives, including the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) and Ayushman Bharat, have expanded programme capacity for cancer screening, referral and treatment-related financial protection [10]. At the same time, the National Cancer Registry Programme contributes surveillance data for cancer-control

Table 1. Comparative burden of female breast and ovarian cancer in BRICS member countries (GLOBOCAN 2024 Estimates)

Country	New female breast cancer cases	Female breast cancer deaths	Breast cancer ASIR (per 100k)	Breast cancer ASMR (per 100k)	New ovarian cancer cases	Ovarian cancer deaths	Ovarian cancer ASIR (per 100k)	Ovarian cancer ASMR (per 100k)
Brazil	90,307	23,152	58.6	14.2	8,999	5,037	5.8	3.1
Russia	75,047	20,491	53.8	12.3	15,275	8,014	11.8	5.1
India	237,231	96,100	31.2	12.7	45,566	28,782	6.0	3.8
China	375,808	73,030	34.0	5.7	61,947	32,516	5.6	2.5
South Africa	13,338	5,377	37.5	14.7	1,361	1,039	3.8	2.9
Egypt	26,052	9,717	48.3	18.3	2,981	1,914	5.6	3.7
Ethiopia	18,840	8,812	40.8	20.0	1,544	1,085	3.7	2.7
Iran	21,304	9,400	38.1	17.0	2,763	1,915	5.1	3.5
Saudi Arabia	3,865	1,022	35.7	10.1	293	176	2.8	1.8
United Arab Emirates	1,774	482	59.2	17.5	141	86	4.8	3.2
Indonesia	93,236	38,012	55.8	22.7	17,492	11,681	10.6	7.0

Note: ASIR – age-standardized incidence rate; ASMR – age-standardized mortality rate.

²⁰ Cancer Today. China. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/156/china>

²¹ Cancer Today. India. Accessed 13.08.2026. <https://gco.iarc.who.int/today/en/fact-sheets-populations/356/india>

²² Ibid.

planning [10]. However, substantial disparities remain between urban and rural populations in access to cancer detection and care. These disparities, together with other socioeconomic and health-system barriers, contribute to delayed diagnosis, and a considerable proportion of patients continue to present with advanced-stage disease, which is associated with poorer survival, increased treatment costs, and greater socioeconomic burden [3, 6, 11]. Continued improvements in early diagnosis, referral pathways, integrated cancer care, and digital health infrastructure are therefore required to improve patient outcomes within the national healthcare system.

AI is increasingly being explored in oncology for image interpretation, digital pathology, risk stratification, clinical decision support, tele-oncology, and personalized cancer management [12–21]. These applications may support diagnostic workflows, specialist decision-making, and access to oncology expertise, particularly in resource-constrained settings [12–21]. Within the broader BRICS context, such digital-health developments may create opportunities for collaboration in cancer surveillance, digital pathology, health-data interoperability, multicentre research, and capacity building. iOncology.ai, developed through collaboration between the All India Institute of Medical Sciences (AIIMS), New Delhi, and the Centre for Development of Advanced Computing, Pune, with support from the Ministry of Electronics and Information Technology, Government of India, represents one such emerging national research and technology-development initiative [22].

National Health Programme architecture for cancer control in India

India has developed an integrated national framework for cancer prevention, early detection, diagnosis, treatment, rehabilitation, and palliative care through the National Health Mission [23]. The programme follows a continuum-of-care approach that is designed to link population-based screening, strengthened healthcare infrastructure, financial protection mechanisms, affordable access to medicines, digital health systems, and community-based awareness initiatives [23]. The NP-NCD serves as the principal platform for delivering cancer prevention, screening, referral, and management services across different levels of healthcare²³. Complementary initiatives, including Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)²⁴, the Strengthening of Tertiary Cancer Care Facilities Scheme, the Pradhan Mantri Bhartiya Janaushadhi Pariyojana, Affordable Medicines and Reliable Implants for Treatment (AMRIT) Pharmacies, and the National Non-Communicable Diseases Data (NCD) Portal, collectively expand access to cancer screening, diagnosis, treatment, and follow-up care nationwide^{25,26}.

Cancer surveillance and data systems

Reliable surveillance is central to cancer control. The National Cancer Registry Programme, coordinated by the Indian Council of Medical Research with support from the National Centre for Disease Informatics and Research, draws on Population-Based Cancer Registries and Hospital-Based Cancer Registries to estimate cancer incidence, monitor trends, and describe clinical and treatment patterns [24]. Cancer

²³ NCD – National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). Accessed 05.08.2026. <https://nhmmizoram.org/page/348>

²⁴ Towards Universal Healthcare. Accessed 05.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2185049®=3&lang=2>

²⁵ Update on Availability of Cancer Care Centres. Accessed 05.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2286948&lang=1®=48>

²⁶ Affordable and Accessible Healthcare for All. Accessed 05.08.2026. <https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NotId=154668&lang=1®=1>

mortality information is complemented by the Medical Certification of Cause of Death scheme under the Civil Registration System²⁷, while programme-level screening and treatment activities are monitored through the National NCD Portal^{28,29}. Together, these systems provide complementary evidence for cancer-control planning and evaluation. Integration with the Ayushman Bharat Digital Mission (ABDM) may further improve health-data interoperability and information exchange across the healthcare system [25] (Table 2).

Population-based prevention and early detection

Population-based screening for breast, oral, and cervical cancers is implemented across all districts through Comprehensive Primary Health Care delivered by Ayushman Arogya Mandirs under the National Health Mission, Government of India [10, 26]. Individuals aged 30 years and above are targeted for population-based screening for common non-communicable diseases, including selected cancers³⁰. Trained Accredited Social Health Activists and Auxiliary Nurse Midwives facilitate screening, referral, follow-up, and treatment adherence, strengthening continuity of care at the community level³¹ [26]. As of March 2026, more than 184,000 Ayushman Arogya Mandirs were operational across the country, providing preventive, promotive, and screening services³². The expansion of the NP-NCD infrastructure across district and community health centre levels is summarised in Table 3³³.

Cancer screening and management through the National Non-Communicable Diseases Portal

The National NCD Portal supports programme-level recording and monitoring of screening, diagnosis, treatment, and follow-up for major non-communicable diseases, including oral, breast, and cervical cancers [27]. By consolidating routine service data across different levels of the public health system, the Portal supports monitoring of programme coverage, referral coordination, continuity of care, and programme

Table 2. Major cancer surveillance and data systems in India

Surveillance system	Nodal agency	Primary purpose
National Cancer Registry Program	ICMR-NCDIR	National cancer incidence, prevalence, survival and trend analysis
Population-Based Cancer Registries	ICMR-NCDIR	Population-level estimates of cancer burden and trends
Hospital-Based Cancer Registries	ICMR-NCDIR	Clinical characteristics, treatment patterns and patient outcomes
Medical Certification of Cause of Death	Office of Registrar General of India	Cancer mortality statistics and cause-specific mortality
National NCD Portal	MoHFW	Digital monitoring of cancer screening, diagnosis, treatment and follow-up
Ayushman Bharat Digital Mission	MoHFW / National Health Authority	Interoperable digital health records and integration of cancer data systems

Note: ICMR-NCDIR – Indian Council of Medical Research – National Centre for Disease Informatics and Research; MoHFW – The Ministry of Health and Family Welfare; NCD – non-communicable disease.

²⁷ Medical Certification of Cause of Death Report 2024. Accessed 07.08.2026. <https://censusindia.gov.in/nada/index.php/catalog/47157>

²⁸ NCD – National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). Accessed 06.08.2026. <https://nhmmizoram.org/page/348>

²⁹ Steps taken to use AI in Cancer Screening. Accessed 07.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2244526®=48&lang=2>

³⁰ Ministry of Health and Family Welfare. Annual report 2025-26. Accessed 07.08.2026. <https://www.mohfw-dohfw.gov.in/static/uploads/2026/06/cb5989724e38171c770da36265e9161a.pdf>

³¹ Ibid.

³² India's Transformation into a Global Health Powerhouse. Accessed 07.08.2026. <https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NotId=157599®=3&lang=2>

³³ NCD – National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). Accessed 06.08.2026. <https://nhmmizoram.org/page/348>

Table 3. The National Programme for Prevention and Control of Non-Communicable Diseases Healthcare Infrastructure in India

Type of healthcare facility	Number reported	Status
District NCD Clinics	770	Set up at district level
Community Health Centre NCD Clinics	6,410	Set up at Community Health Centre level
Cardiac Care Units	233	Set up
District Day Care Cancer Centres – cumulative total	372	Set up
Functional District Day Care Cancer Centres	364	Reported as functional
Additional District Day Care Cancer Centres approved for FY 2025–26	297	Approved under National Health Mission

Note: The figures reflect different reporting categories and periods. The 372 District Day Care Cancer Centres (DCCCs) represent the cumulative number reported as established, whereas the Ministry of Health and Family Welfare Annual Report 2025–26 separately reports 364 functional DCCCs and 297 additional DCCCs approved during FY 2025–26. These figures are not additive. FY – financial year; NCD – non-communicable disease.

review^{34, 35}. More than 500 million beneficiaries have been recorded on the National NCD Portal under the NP-NCD, and disease-wise screening, diagnosis, and treatment data illustrate the scale of service delivery (Table 4)³⁶.

The Strengthening of Tertiary Cancer Care Facilities Scheme

To address the increasing cancer burden, the Government of India has implemented the Strengthening of Tertiary Care Cancer Facilities Scheme to expand specialized oncology services across the country. The scheme supports State Cancer Institutes and Tertiary Cancer Care Centres through one-time central assistance of up to INR 1.2 billion and INR 450 million, respectively, generally under a 60:40 Centre–State cost-sharing arrangement, modified to 90:10 for North-Eastern and Himalayan states³⁷. Nineteen State Cancer Institutes and 20 Tertiary Cancer Care Centres have been approved, of which 15 State Cancer Institutes and 18 Tertiary Cancer Care Centres were reported as functional and providing patient-care services in the Ministry of Health and Family Welfare Annual Report 2025–26, thereby contributing to regional tertiary cancer-care capacity³⁸. This tertiary-care network is complemented by Tata Memorial Centre institutions, the AIIMS network, the National Cancer Institute, Jhajjar, Chittaranjan National Cancer Institute, Kolkata,

Table 4. Population-based screening and management under National Non-Communicable Diseases Portal

Clinical condition	Total screened	Diagnosed	Registered and put on treatment
Hypertension	389,574,840	51,347,549	47,489,354
Diabetes	387,715,539	34,562,655	28,374,805
Oral Cancer	328,067,132	187,939	176,866
Breast Cancer	172,113,785	41,386	61,742*
Cervical Cancer	102,093,675	90,291	97,085*

Note: * – figures are reproduced as reported by the Ministry of Health and Family Welfare from the National Non-Communicable Diseases Portal and represent aggregate programme indicators. For breast and cervical cancers, some cases diagnosed at tertiary centres were not entered in the Portal at diagnosis; patient-level linkage between diagnosis and treatment categories is not reported.

³⁴ NCD – National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD). Accessed 06.08.2026. <https://nhmmizoram.org/page/348>

³⁵ Steps taken to use AI in Cancer Screening. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2244526®=48&lang=2>

³⁶ Update on progress achieved under NPCDCS. Accessed 13.08.2026. <https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=2152535&lang=2®=48>.

³⁷ Update on Availability of Cancer Care Centres. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2286948®=48&lang=2>

³⁸ Ministry of Health and Family Welfare. Annual report 2025–26. Accessed 07.08.2026. <https://www.mohfw-dohfw.gov.in/static/uploads/2026/06/cb5989724e38171c770da36265e9161a.pdf>

and other public-sector cancer centres³⁹. During 2025–26, approval of 297 additional District Day Care Cancer Centres further reflected efforts to decentralize cancer-treatment services and improve access closer to patients' residences⁴⁰.

Financial protection and affordable cancer care

To reduce the financial burden on patients, the Ministry of Health and Family Welfare has developed a comprehensive pathway for financial protection, generic drug distribution, and the expansion of tertiary care infrastructure. These complementary mechanisms operate at different levels of the cancer-care pathway, combining insurance-based financial protection, targeted financial assistance, access to affordable medicines, and strengthened public-sector treatment capacity.

Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana

The AB-PMJAY, a cashless publicly funded health assurance scheme started in 2018, is covering up to INR 500 thousand per family per year for secondary and tertiary hospitalization through empanelled public and private hospitals, targeting the bottom 40% of the population and already helping over 120 million vulnerable families and more than 8.6 million senior citizens⁴¹. AB-PMJAY covers comprehensive oncology services, including diagnostics, surgical oncology, chemotherapy, and radiotherapy, thereby providing financial protection against eligible hospitalization costs⁴².

The Pradhan Mantri Bhartiya Janaushadhi Pariyojana

The scheme aims to improve access to quality generic medicines, surgical items, and consumables at substantially lower prices through Jan Aushadhi Kendras. The availability of several oncology and supportive care medicines through this network can help reduce out-of-pocket medication costs, particularly for patients requiring prolonged or repeated cancer treatment⁴³.

AMRIT pharmacies

AMRIT pharmacies provide medicines, implants, and selected medical consumables at discounted prices, particularly through government healthcare institutions. Availability of anticancer medicines and supportive therapies at is intended to improve treatment affordability for patients undergoing prolonged oncology care. As of November 2025, more than 255 AMRIT pharmacies were operational, and programme data reported that more than 68.5 million patients had been served, with cumulative estimated savings of approximately INR 84 billion⁴⁴.

National pharmaceutical pricing authority

This agency regulates the ceiling prices of essential oncology drugs under the Drugs (Prices Control) Order. Through price control of medicines, including several essential medicines used in cancer treatment, and by

³⁹ Update on Availability of Cancer Care Centres. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2286948®=48&lang=2>

⁴⁰ Ministry of Health and Family Welfare. Annual report 2025-26. Accessed 07.08.2026. <https://www.mohfw-dohfw.gov.in/static/uploads/2026/06/cb5989724e38171c770da36265e9161a.pdf>

⁴¹ Towards Universal Healthcare. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2185049®=3&lang=2>

⁴² Ibid.

⁴³ Pradhan Mantri Bhartiya Janaushadhi Pariyojana' (PMBJP). Accessed 13.08.2026. <https://pharma-dept.gov.in/sites/default/files/Website%20updatation%202022%20PMBJP-1.pdf>

⁴⁴ Union Health Minister Shri J P Nadda Inaugurates Amrit Pharmacy's 10th Anniversary, Announces Nationwide Expansion. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2190300&lang=2®=3>

monitoring compliance, The National Pharmaceutical Pricing Authority seeks to improve medicine affordability while monitoring availability and compliance with statutory price controls. It fixes ceiling prices for scheduled formulations, monitors drug shortages, and enforces price controls; as of 18 December 2025, ceiling prices were effective for 131 anticancer formulations, generating estimated annual savings of about INR 2.9434 billion for patients⁴⁵.

The Health Minister's Cancer Patient Fund

The Health Minister's Cancer Patient Fund is a component of the umbrella Rashtriya Arogya Nidhi scheme. It provides one-time financial assistance of up to INR 1.5 million to poor cancer patients living below the poverty line for specialized treatment at designated government hospitals and Regional Cancer Centers, covering chemotherapy, radiation therapy, malignant tumor surgeries, and bone marrow transplants. The Rashtriya Arogya Nidhi and its specialized components provide an additional layer of financial protection for patients facing high treatment costs, complementing health insurance and other affordable-medicine initiatives^{46,47,48}.

The Pradhan Mantri Swasthya Suraksha Yojana

The Pradhan Mantri Swasthya Suraksha Yojana aims to reduce regional disparities in access to affordable tertiary healthcare by establishing new AIIMS and upgrading existing Government Medical Colleges and Institutions. As of August 2025, 22 new AIIMS had been approved, with undergraduate courses started in 19 of them. In addition, 75 medical college upgradation projects had been approved under Pradhan Mantri Swasthya Suraksha Yojana, of which 71 Super Specialty Block projects had been completed. These institutions are equipped with advanced oncology, radiotherapy, and surgical facilities, expanding access to evidence-based care in the public sector⁴⁹.

The National Cancer Institute, Jhajjar

The National Cancer Institute at the AIIMS Jhajjar campus represents a major expansion of public-sector tertiary oncology capacity in India. The 710-bed institute provides multidisciplinary services encompassing surgical, medical, and radiation oncology, nuclear medicine, anaesthesia, and palliative care, together with molecular diagnostics and translational research facilities. Beyond specialized cancer treatment, the National Cancer Institute contributes to oncology research, training, human-resource development, and referral care within the national cancer-control system. As a publicly funded tertiary cancer centre, it also supports access to cancer care through subsidized services, thereby complementing broader national efforts to improve the affordability and accessibility of specialized oncology care⁵⁰.

⁴⁵ Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India. Annual Report 2025–26. Accessed 13.08.2026. <https://pharma-dept.gov.in/sites/default/files/Annual%20Report%202025-26.pdf>

⁴⁶ Ministry of Health and Family Welfare. Annual report 2025–26. Accessed 07.08.2026. <https://www.mohfw-dohfw.gov.in/static/uploads/2026/06/cb5989724e38171c770da36265e9161a.pdf>

⁴⁷ Steps taken to assist cancer patients under Rashtriya Arogya Nidhi (RAN). Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2154159®=48&lang=2>

⁴⁸ Rashtriya Arogya Nidhi. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1524808®=48&lang=2>

⁴⁹ Ministry of Health and Family Welfare. Annual report 2025–26. Accessed 07.08.2026. <https://www.mohfw-dohfw.gov.in/static/uploads/2026/06/cb5989724e38171c770da36265e9161a.pdf>

⁵⁰ National Cancer Institute at Jhajjar dedicated to the nation as part of AIIMS, New Delhi. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1566423®=48&lang=2>

State-level cancer care initiatives

Since health is primarily a State subject, State Governments and Union Territories complement national programmes such as the NP-NCD and the AB-PMJAY by adapting financial protection, referral pathways, and cancer treatment services to State-specific needs. The combined Central-State framework is important for supporting geographical access, reducing out-of-pocket expenditure, strengthening financial protection, expanding cancer treatment infrastructure, improving early detection, and ensuring access to a comprehensive continuum of cancer care, particularly for vulnerable and underserved populations (Table 5)⁵¹ [28–35].

Prevention, awareness, and continuum of care

Primary prevention remains an integral component of India's national cancer control strategy. Human papillomavirus vaccination is being implemented through designated public health facilities for eligible 14-year-old girls as part of India's cervical cancer prevention strategy⁵². The National Programme for Palliative Care complements curative oncology services by integrating pain management, symptom control, psychosocial support, and end-of-life care into district and tertiary healthcare facilities⁵³. Public awareness is promoted through National Cancer Awareness Day (November 7), community outreach programmes, and health-promotion activities⁵⁴. Broader lifestyle interventions are supported through national

Table 5. State-level schemes providing financial protection for cancer care

State	Scheme	Financial assistance / cancer-care component
Kerala	Karunya Arogya Suraksha Padhathi	Provides cashless tertiary treatment up to INR 500 thousand per family per financial year through empanelled public and private hospitals, fully covering clinical oncology. Kerala also has the Karunya Benevolent Fund, which provides additional financial assistance to eligible beneficiaries
Tamil Nadu	Chief Minister's Comprehensive Health Insurance Scheme	Provides cashless financial protection of up to INR 500 thousand per family, annually, for eligible families for specified secondary and tertiary healthcare procedures. Cancer treatment is among the tertiary-care services covered under the scheme
West Bengal	Swasthya Sathi	Provides state-funded, cashless health assurance coverage of up to INR 500 thousand per family per annum for secondary and tertiary hospitalization. The scheme also provides financial protection for cancer treatment, although out-of-pocket expenditure may persist
Odisha	Gopabandhu Jan Arogya Yojana (Formerly Biju Swasthya Kalyan Yojana)	Operates as an integrated health-assurance model merged with Ayushman Bharat Pradhan Mantri Jan Arogya Yojana. It offers cashless tertiary healthcare packages up to INR 500 thousand for male and up to INR 1 million for female beneficiaries, including specialized oncology procedures
Andhra Pradesh	Dr. NTR Vaidya Seva / Aarogyasri Health Scheme	Provides universal, end-to-end cashless healthcare coverage up to INR 2.5 million per family annually for major diseases and surgical interventions. This includes extensive coverage for staging diagnostics, chemotherapy, and tumor resections.
Telangana	Rajiv Aarogyasri	Provides cashless financial assistance for major illnesses, including cancer treatment, to eligible economically disadvantaged families through empanelled hospitals
Karnataka	Ayushman Bharat-Arogya Karnataka	Employs an integrated state-central co-referral framework providing up to INR 500 thousand for tertiary healthcare. It features structured oncology packages accessible across public institutions and empanelled private super-specialty hospitals
Gujarat	Mukhyamantri Amrutam / Pradhan Mantri Jan Arogya Yojana – Mukhyamantri Amrutam	Provides cashless financial coverage of up to INR 500 thousand per family per year for secondary and tertiary healthcare, including specified oncology services and cancer treatment packages, to eligible families
Rajasthan	Mukhyamantri Ayushman Arogya Yojana	Provides cashless health coverage/financial protection up to INR 2.5 million for eligible beneficiaries for hospitalization and a broad range of specialized healthcare services

Note: NTR - Nandamuri Taraka Rama Rao.

⁵¹ Odisha becomes the 34th state to implement Ayushman Bharat Pradhan Mantri Jan Arogya Yojana scheme. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2092541®=48&lang=2>

⁵² Update on HPV Vaccination Programme and Cervical Cancer Prevention. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2286947&lang=1®=3>

⁵³ Ibid.

⁵⁴ National Cancer Awareness Day 2025. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2187212&lang=2®=48>

initiatives such as the Eat Right India Movement, Safe and Nutritious Food Initiative, Aaj Se Thoda Kam Campaign, and the Fit India Movement, which encourage healthy dietary practices, regular physical activity, obesity prevention, and reduction of modifiable risk factors associated with cancer and other non-communicable diseases [36].

Emerging need for artificial intelligence in cancer care

Although national programmes have substantially expanded cancer prevention, screening, treatment, and financial protection, the increasing burden and growing complexity of oncology care require technologies that improve efficiency across the cancer care pathway. AI has emerged as an important tool for supporting image interpretation, standardized pathology reporting, clinical decision support, risk stratification, and integration of longitudinal patient records. In India, the India AI Mission provides a national framework for the responsible development and deployment of AI through investments in computing infrastructure, foundational models, innovation, and workforce development. The programme seeks to improve accessibility of advanced digital technologies across the healthcare system, including district-level facilities, while promoting ethical, safe, and evidence-based implementation. An allocation of INR 103.72 billion⁵⁵ has been approved to strengthen domestic AI infrastructure and accelerate application development across multiple sectors, including healthcare. These developments may create an enabling ecosystem for developing and evaluating AI-enabled platforms into cancer prevention, diagnosis, treatment planning, and health system [12–19, 37, 38].

The Viksit Bharat 2047 and digital health transformation: a vision for technology-driven healthcare

Within the Viksit Bharat 2047 vision India as a developed nation by the centenary of its independence, with universal health coverage, technological innovation, and digital transformation have emerged as important priorities for healthcare development. The vision emphasizes creating a resilient and equitable health system by expanding digital health infrastructure, improving access to quality healthcare services, and responsibly adopting AI and data-driven technologies. Particular emphasis is placed on preventive healthcare, early diagnosis, management of non-communicable diseases, and integrating digital solutions into routine clinical practice to improve healthcare delivery, patient outcomes, and health-system performance [25, 38, 39].

The Digital India programme has provided the technological foundation for this transformation by expanding digital infrastructure, strengthening e-governance, improving nationwide connectivity, and promoting technology-enabled public services. In healthcare, these initiatives have accelerated the adoption of telemedicine, electronic health records, cloud computing, big data analytics, the Internet of Medical Things, and AI across clinical and public health settings. Wider availability of these technologies has supported expanded access to healthcare services, facilitated information exchange, and reduced barriers to specialist consultation, particularly in rural and underserved regions where shortages of trained healthcare professionals and diagnostic facilities continue to affect timely diagnosis and treatment [25, 37, 38, 40, 41].

⁵⁵ Cabinet Approves Ambitious India AI Mission to Strengthen the AI Innovation Ecosystem. Accessed 13.08.2026. <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2012355®=48&lang=2>

The digital infrastructure established through the Digital India programme has also enabled the implementation of national digital health initiatives, most notably the ABDM. The ABDM provides a secure, standards-based, and interoperable framework for digital health by facilitating unique health identities, longitudinal electronic health records, consent-based health information exchange, and standardized communication among healthcare providers, diagnostic laboratories, pharmacies, insurers, and public health agencies. This framework supports continuity of care by enabling secure data sharing, reducing duplication of diagnostic investigations, and providing individuals with greater control over their health information. The interoperable architecture of ABDM also creates an enabling environment for supporting the integration of advanced digital technologies, including AI-assisted diagnostics, digital pathology, telemedicine, clinical decision-support systems, and population health analytics, thereby supporting evidence-informed clinical practice and health-system planning [25, 38, 40].

AI is increasingly influencing multiple components of healthcare, including disease surveillance, population-level risk assessment, healthcare resource planning, and evidence-based public health decision-making. Integration of clinical, imaging, molecular, and population-level data enables predictive modelling, improves diagnostic workflows, and supports more individualized patient management. In oncology, advances in digital pathology, telepathology, tele-oncology, AI-assisted image analysis, molecular diagnostics, and predictive analytics are expanding the capabilities of cancer screening, diagnosis, treatment planning, and longitudinal follow-up. These technologies are particularly relevant in resource-constrained settings, where digital platforms can extend specialist expertise beyond tertiary cancer centres and support improved access to multidisciplinary oncology services [13–21, 37, 38].

iOncology.ai: aligning with the Viksit Bharat 2047 and the Digital India

iOncology.ai is an emerging national, AI / machine learning enabled oncology platform intended to support cancer-related data integration, research, and clinical decision-support functions within India's evolving digital-health environment (Figure 3)⁵⁶ [22]. Its development is consistent with the broader policy direction of the Viksit Bharat 2047, the Digital India, and the ABDM, which emphasize digital transformation, interoperability, and responsible use of emerging technologies in healthcare [25, 38, 39]. The platform is developed through a collaboration between the AIIMS, New Delhi, and the Centre for Development of Advanced Computing, Pune, with support from the Ministry of Electronics and Information Technology [22]. Its design emphasizes interoperability with electronic-health-record workflows and potential compatibility with ABDM-aligned health-information exchange; these should be regarded as implementation objectives rather than evidence of routine clinical integration [25].

iOncology.ai uses curated Indian clinical, radiological, histopathological datasets and is intended to support the integration of additional patient-level information, including genetic data and is currently being evaluated in research mode [22]. The platform's intended applications include early cancer detection, risk stratification, treatment support, multidisciplinary review, and longitudinal data management. Comparable AI / machine

⁵⁶ Ministry of Electronics and Information Technology, Government of India. Annual report 2024–25. Accessed 13.08.2026. <https://www.meity.gov.in/static/uploads/2024/12/10fcadec462c330211502fed3d24ea83.pdf>

FIG. 3. Web Interface: iOncology.ai



learning approaches have demonstrated potential in medical imaging and computational pathology [14, 20, 21], but translation into routine clinical care requires prospective validation, workflow evaluation, assessment of generalizability, and continued performance monitoring [15, 17, 18]. The currently identified sources describe the platform and its development [22]; however, peer-reviewed evidence establishing the diagnostic accuracy, clinical utility, or effectiveness of iOncology.ai has not yet been identified, and this is still in progress.

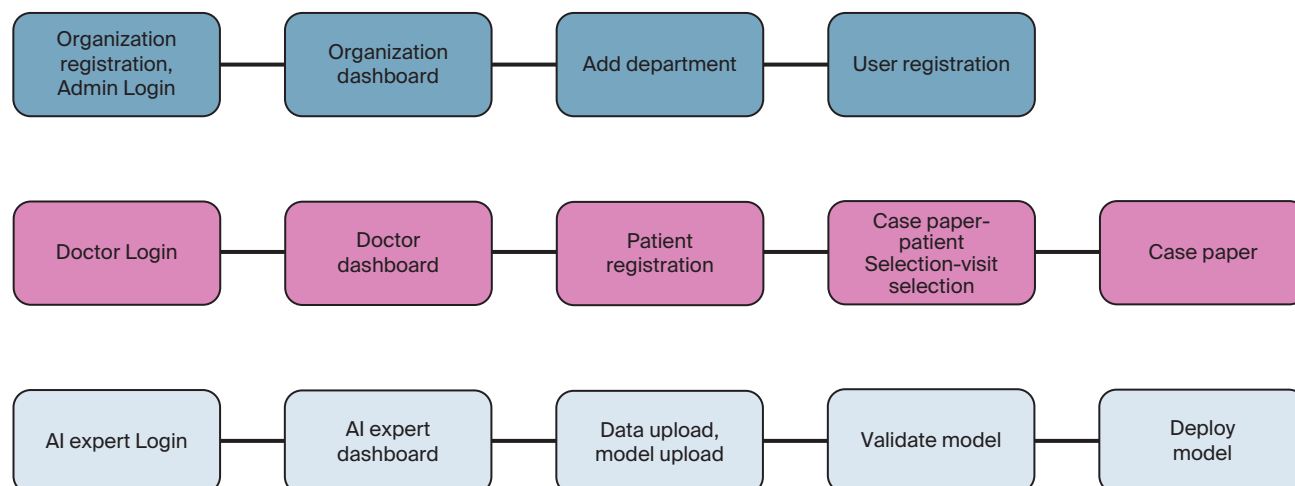
Accordingly, iOncology.ai should currently be regarded as a research and technology-development platform with potential for future clinical translation, rather than as a clinically validated AI system (Figure 4) [22]. Its potential contribution to precision oncology, cancer surveillance, and collaborative research remains to be established through rigorous prospective multicentre validation and implementation studies evaluating clinical utility, safety, interoperability, and generalizability before wider clinical deployment [15, 17, 18, 22].

In the context of India's BRICS Chairship (2026), experience gained through national digital-health platforms such as iOncology.ai may inform future collaboration in cancer surveillance, digital pathology, interoperable digital oncology, multicentre research, harmonization of health-data standards, and capacity building [22]. Such collaboration could also support the development and evaluation of AI applications using locally representative clinical datasets. Any cross-country application would require appropriate governance, privacy protection, interoperability standards, and context-specific clinical validation [42, 43].

Limitations and future research directions

This review integrates epidemiological, programme-related, digital-health, and AI-related evidence rather than applying a systematic-review or meta-analytic design. It draws on heterogeneous sources, including GLOBOCAN estimates, cancer-registry data, government reports, programme statistics, and peer-reviewed literature, which differ

FIG. 4. Workflow of iOncology.ai



Note: Illustrating the user interface for patient registration, clinical data management, AI-assisted image analysis, and decision-support functions. AI – artificial intelligence.

in reporting periods, definitions, and methods. The review gives greater attention to India and to breast and ovarian cancers than to other cancer sites and BRICS health systems, which may limit broader generalizability. In addition, no formal risk-of-bias assessment was undertaken. Evidence specifically concerning iOncology.ai currently derives mainly from project and institutional descriptions, and the present review did not identify peer-reviewed evidence establishing its clinical effectiveness [22].

Future research should include prospective multicentre studies evaluating iOncology.ai for diagnostic performance, calibration, safety, subgroup performance, generalizability, workflow impact, and clinical utility before routine clinical deployment. Health-economic and implementation studies should assess cost-effectiveness, usability, interoperability with ABDM-compatible systems, and performance in resource-constrained settings. At the BRICS level, future research could examine harmonized oncology-data standards, governance frameworks, and collaborative or federated approaches using locally representative datasets. Comparative studies and future reviews may also extend the present analysis to additional cancer sites and emerging national digital-oncology initiatives.

Conclusion

Cancer remains a growing public health challenge across BRICS member countries, with breast and ovarian cancers contributing substantially to the cancer burden among women. India's national cancer control architecture encompasses surveillance, population-based screening, financial protection, and service delivery under the National Health Mission and the NP-NCD, alongside an evolving digital-health infrastructure under the ABDM. Within the broader context of the Viksit Bharat 2047 and India's digital-health transformation, iOncology.ai represents an emerging national research and technology-development initiative that may support future evaluation of AI-assisted oncology workflows, particularly in resource-constrained settings. Its diagnostic performance, clinical utility, and effectiveness remain to be established through rigorous prospective multicentre validation.

In the arena of BRICS collaboration, iOncology.ai and similar national platforms may offer a framework for exploring interoperable digital oncology, collaborative multicentre research, harmonized health-data standards, and the development and evaluation of AI approaches using locally representative datasets. Such experience may also be relevant to other resource-constrained and low- and middle-income settings. Realizing the full potential of these platforms will depend on evidence of diagnostic performance, clinical utility, safety, cost-effectiveness, interoperability, appropriate governance, and context-specific clinical validation. India's BRICS Chairship in 2026 provides an opportunity to encourage collaborative research and responsible digital-health innovation while maintaining an evidence-based approach to clinical translation across the Global South.

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