

Epidemiological Profile of Cancer in Manipur, India: Incidence, Risk Factors, Survival, and Health Care Indicators.

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Abstract

Background: Cancer is a major public health challenge in Manipur, a northeastern state of India with one of the country's highest cancer burdens. This study describes the epidemiological profile of cancer in Manipur, including incidence, risk factors, survival, childhood cancer, and cancer-care indicators, using the latest data from the NCRP (National Cancer Registry Programme). **Methods:** A descriptive analysis was conducted using the ICMR-NINE Manipur Cancer Burden Profile 2026, which is based on PBCR (Population-Based Cancer Registry) and HBCR (Hospital-Based Cancer Registry) data. Adult cancer incidence (2015–2019), childhood cancer incidence, cumulative risk, age-standardized relative survival, DALYs (Disability-Adjusted Life Years), risk factor prevalence, screening coverage, and health infrastructure indicators were analyzed. Projected new cancer cases for 2026 and 2030 were also reviewed. **Results:** During 2015–2019, the average annual adult cancer cases were 809 in males and 980 in females, with crude incidence rates of 78.3 and 92.8 per 100,000, respectively. The lifetime cumulative risk of developing cancer before age 75 was 1 in 13 for males and 1 in 12 for females. Lung cancer was the leading cancer among males, whereas breast cancer was the most common among females. Tobacco-related cancers accounted for 59.9% of male and 40.4% of female cancers. Childhood cancer incidence averaged 24 cases annually in both boys and girls, with incidence rates of 35.7 and 37.0 per million, respectively. Five-year age-standardized relative survival was 47.9% for breast cancer, 43.6% for cervical cancer, and 20.9% for oral cancer. The projected adult cancer cases are expected to increase from 2,379 cases in 2026 to 2,650 cases by 2030. Despite available cancer-care infrastructure, screening uptake remains low, with cervical (2.1%), breast (1.6%), and oral (1.0%) screening among women. **Conclusion:** Manipur faces a substantial and increasing cancer burden characterized by high tobacco-related cancers, gender-specific cancer patterns, low screening coverage, and modest survival outcomes. Strengthening tobacco control, expanding early detection, improving survival through timely treatment, and enhancing cancer-care services are essential to reduce the state's future cancer burden.

Keywords: Manipur, Cancer Burden, Cancer Incidence, Tobacco-Related Cancer, Survival, Cancer Care Indicators, NCRP, ICMR-NINE.



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INTRODUCTION

Cancer is one of the leading causes of morbidity and mortality worldwide, and its burden continues to increase because of population ageing, urbanization, and changing patterns of exposure to modifiable risk factors such as tobacco use, alcohol consumption, unhealthy diet, and physical inactivity.[1]

In India, cancer has become a major public health challenge, with considerable geographic variation in its incidence, mortality, and survival patterns. Since 1981, systematic cancer surveillance has been undertaken through the NCRP (National Cancer Registry Programme), which collects standardized information through PBCRs (Population-Based

Cancer Registries) and HBCRs (Hospital-Based Cancer Registries) to support cancer control planning and policy development.[2]

Among the northeastern states, Manipur exhibits a distinctive epidemiological profile characterized by a relatively high burden of lung, oral cavity, nasopharyngeal, cervical, and other tobacco-related cancers. These variations are influenced by the combined effects of lifestyle practices, environmental exposures, and regional population characteristics, making the state an important setting for epidemiological assessment.[3]

The high prevalence of tobacco consumption remains a major contributor to the cancer burden in Manipur, where both smoked and smokeless tobacco are widely used and are strongly associated with several cancers affecting the oral cavity, respiratory tract, and upper digestive tract.[4] Recent NCRP estimates indicate that the lifetime risk of developing cancer before 75 years of age is approximately one in thirteen for males and one in twelve for females in Manipur, reflecting a substantial population-level disease burden.

Although national programmes have expanded cancer screening and healthcare services, the utilization of screening for cervical, breast, and oral cancers remains low in Manipur, which may contribute to delayed diagnosis and poorer outcomes for many patients. Furthermore, survival outcomes differ across cancer types, emphasizing the importance of early detection, timely diagnosis, and equitable access to treatment.

AIMS AND OBJECTIVES

This study aims to describe the epidemiological profile of cancer in Manipur by examining cancer incidence, major risk factors, survival patterns, and healthcare indicators to provide evidence that can support region-specific prevention and cancer control strategies.

MATERIALS AND METHODS

Study Design

This study was a descriptive, retrospective secondary-data analysis conducted using cancer burden indicators reported in the Cancer Burden Profile 2026: Manipur, published by the Indian Council of Medical Research–National Institute of Non-Communicable Disease Epidemiology (ICMR-NINE) under the Ministry of Health and Family Welfare, Government of India.

Inclusion and Exclusion Criteria

The study included all publicly available cancer-related information pertaining to Manipur reported in the ICMR-NINE Manipur Cancer Burden Profile 2026, including adult and childhood cancer indicators, PBCR (Population-Based Cancer Registry) and HBCR (Hospital-Based Cancer Registry) information, projected cancer cases for 2026 and 2030, survival estimates, clinical extent of disease, DALYs (Disability-Adjusted Life Years), cancer-related risk factors, screening indicators, and healthcare infrastructure. Data not specific to Manipur, unpublished registry records, raw individual-level NCRP datasets, and information from other states or sources not incorporated into the official factsheet were excluded from the analysis.

Data Collection Tools and Procedure

Data were collected using a structured data extraction framework developed by the investigators to systematically compile information from the ICMR-NINE Manipur Cancer Burden Profile 2026. The report was reviewed section by section, and relevant information on cancer incidence, cumulative risk, leading cancer sites, projected cancer burden, age-specific incidence, tobacco-related cancers, five-year age-standardised relative survival, clinical extent of disease, DALYs, cancer-related risk factors, screening coverage, and healthcare infrastructure was extracted into the framework.

Statistical Analysis

Data were analysed using descriptive statistical methods. The reported cancer burden indicators from the Manipur Cancer Burden Profile 2026 were summarised as frequencies, percentages, crude incidence rates, age-standardised incidence rates (where reported), mortality estimates, prevalence, and survival indicators. Sex-wise, district-wise, and cancer site-specific distributions were presented using tables and figures to facilitate comparison of the reported estimates. As the study was based exclusively on aggregated secondary data, no individual-level dataset was available for analysis.

RESULTS

Table 1 illustrates the cancer registration infrastructure in Manipur. The state has a single PBCR with complete population coverage and two hospital-based cancer registries, indicating statewide surveillance of cancer occurrence. The registry network demonstrates comprehensive statewide coverage through the Regional Institute of Medical Sciences, Imphal, supported by multiple reporting sources and mandatory cancer notification.

Table 1. Cancer Registry Characteristics in Manipur

Indicator	Finding
Population-Based Cancer Registry	RIMS, Imphal
Year established	2005
Geographic coverage	Entire Manipur
Area covered	22,327 km ²
PBCR population coverage	100%
Number of PBCR sources	24
Hospital-Based Cancer Registries	2
Cancer notification	Since 2017
Urban population	29.2%
Rural population	70.8%

Table 2 presents the overall burden of adult cancer and identifies the five most common cancer sites among males and females during 2015–2019.

Table 2. Adult Cancer Burden and Leading Cancer Sites (2015–2019)

A. Adult Cancer Burden				
Indicator	Males	Females		
Annual average new cases	809	980		
Relative proportion	45.2%	54.8%		
Crude incidence rate (per 100,000)	78.3	92.8		
B. Five Leading Cancer Sites				
Rank	Males	Proportion	Females	Proportion
1	Lung	19.0%	Breast	16.1%
2	Colorectum	8.6%	Lung	14.3%
3	Stomach	7.4%	Cervix uteri	9.4%
4	Nasopharynx	6.3%	Thyroid	7.1%
5	Oral cavity	5.7%	Colorectum	5.9%

Females accounted for a larger proportion of newly diagnosed adult cancers than males. Lung cancer predominated among males, whereas breast cancer was the leading malignancy among females.

Table 3 summarises future projections of cancer burden together with the reported lifetime risk of cancer and age-related incidence patterns.

Table 3. Projected Cancer Burden, Cumulative Risk and Age-Specific Incidence

A. Estimated Adult Cancer Cases			
Year	Males	Females	Total
2026	1,057	1,322	2,379
2030	1,175	1,475	2,650
B. Cumulative Risk and Age Pattern			
Indicator	Finding		
Lifetime risk (males)	1 in 13		
Lifetime risk (females)	1 in 12		
Age-specific incidence	Highest in the 70–74-year age group		

The projected number of new adult cancer cases is expected to increase by approximately 11.4% between 2026 and 2030. Cancer incidence rose steadily with advancing age, reaching its highest level among individuals aged 70–74 years.

Table 4 presents the contribution of tobacco-related cancers and the reported five-year age-standardised relative survival for selected cancers.

Table 4. Tobacco-Related Cancer Burden and Five-Year Relative Survival

A. Tobacco-Related Cancer Burden		
Indicator	Males	Females
Total tobacco-related cancers	59.9%	40.4%
Lung	32%	36%
Stomach	12%	9%
Nasopharynx	11%	7%
Oesophagus	8%	—

Citation: Kumar LD, Laishram R, Laishram S, Singh HS, Mutum R, Gatpos SG. Epidemiological profile of cancer in Manipur, India: incidence, risk factors, survival, and health care indicators. *Int. J. Med.*, 2026;8(9):1167-1173.

Larynx	6%	—
Cervix uteri	—	23%
Liver	—	4%
B. Five-Year Age-Standardised Relative Survival		
Cancer site	Survival (%)	
Oral cancer	47.9	
Cervical cancer	43.6	
Breast cancer	20.9	

Tobacco-related cancers represented a substantial proportion of all cancers, particularly among males. Among the three cancers with available survival estimates, oral cancer showed the highest five-year survival, whereas breast cancer had the lowest reported survival.

Table 5 summarises childhood cancer incidence, projected childhood cancer cases and the reported distribution of disease extent at presentation for selected adult cancers.

Table 5. Childhood Cancer Burden and Clinical Profile

A. Childhood Cancer Burden			
Indicator	Boys	Girls	
Annual average new cases	24	24	
Incidence (per million)	35.7	37.0	
B. Estimated Childhood Cancer Cases			
Year	Boys	Girls	Total
2026	28	32	60
2030	33	36	69
C. Clinical Extent of Disease at Presentation (HBCR, 2020–2022)			
Cancer site	Main pattern observed		
Head and neck	Predominantly locoregional disease		
Oral	Majority locoregional disease		
Lung	High proportion of distant metastasis		
Stomach	Advanced-stage presentation common		
Breast	Mostly localised or locoregional		
Cervix uteri	Mainly localised and locoregional		
Prostate	Distant metastasis common		

Childhood cancer incidence was nearly identical between boys and girls. Clinical presentation varied by cancer site, with lung and prostate cancers frequently presenting with distant metastasis, whereas breast and cervical cancers more commonly presented with localised or locoregional disease.

Table 6 summarises the demographic profile of Manipur together with the reported DALYs and major cancer-related behavioural and metabolic risk factors.

Table 6. Population Characteristics, DALYs and Cancer-Related Risk Factors

A. Population Characteristics and DALYs		
Indicator	Value	
Total population	2,855,794	
Males	1,438,586	
Females	1,417,208	
Sex ratio	985 females/1,000 males	
Population aged ≥60 years	7.0%	
Overall literacy	76.9%	
DALYs (both sexes)	1,156	
DALYs (males)	1,069	
DALYs (females)	1,244	
B. Cancer-Related Risk Factors		
Risk factor	Males	Females
Tobacco use	58.1%	43.1%
Alcohol use	37.5%	0.9%
Overweight/obesity	30.3%	34.1%
Hypertension	33.2%	23.0%
Raised blood glucose	16.5%	13.6%

Citation: Kumar LD, Laishram R, Laishram S, Singh HS, Mutum R, Gatpos SG. Epidemiological profile of cancer in Manipur, India: incidence, risk factors, survival, and health care indicators. *Int. J. Med.*, 2026;8(9):1167-1173.

The state had a predominantly rural population with relatively high literacy. Tobacco use remained widespread, particularly among males, while females showed a slightly higher prevalence of overweight and obesity. The age-standardised DALY burden was higher among females than males.

Table 7 summarises the availability of cancer-care infrastructure and the uptake of population-based cancer screening services in Manipur.

Table 7. Cancer Screening and Health Infrastructure

A. Health Infrastructure	
Indicator	Value
Sub-centres/HWC-SCs	416
Primary Health Centres/HWCs	95
Community Health Centres	17
District hospitals	7
Medical colleges	4
Regional Cancer Centre	RIMS, Imphal
Palliative care centres	2
HBV vaccination coverage	80.0%
B. Cancer Screening Uptake	
Screening indicator	Proportion
Women – Cervical screening	2.1%
Women – Breast examination	1.6%
Women – Oral examination	1.0%
Men – Oral examination	0.8%

The state possesses an established healthcare network that includes a Regional Cancer Centre and multiple tiers of government health facilities. Despite this infrastructure, the uptake of cancer screening services remained very low across all recommended screening programmes

DISCUSSION

The present study provides a descriptive overview of the cancer burden in Manipur using the ICMR–National Institute of NCD Epidemiology (NINE) Cancer Burden Profile 2026, which is primarily based on NCRP (National Cancer Registry Programme) data.

Adult Cancer Burden and Leading Cancer Sites

The present study observed that females contributed a larger share of adult cancer cases than males, with an annual average of 980 cases (54.8%) compared with 809 cases (45.2%) among males. The crude incidence rate was 92.8 per 100,000 among females and 78.3 per 100,000 among males. These findings are broadly consistent with the nationwide NCRP analysis conducted by the National Cancer Registry Programme Investigator Group (Mathur et al., 2025), which estimated 781,277 female and 780,822 male cancer cases in India during 2024, with crude incidence rates of 113.3 per 100,000 among females and 107.4 per 100,000 among males.^[2] Although the national incidence rates were higher than those observed in Manipur, both studies demonstrate a relatively greater cancer burden among women, largely driven by breast and cervical cancers.

Lung cancer was the leading malignancy among males in the present study, accounting for 19.0% of cases, whereas breast cancer was the leading cancer among females (16.1%), followed by lung (14.3%) and cervical cancer (9.4%). Mathur et al. (2025) similarly reported that lung cancer remained one of the leading cancers among men across several northeastern registries, while breast and cervical cancers consistently ranked among the most common cancers in Indian women.^[2] However, the national report identified oral cavity and prostate cancers as major contributors among Indian men overall, highlighting the distinct regional cancer profile of Manipur, where stomach and nasopharyngeal cancers remain relatively prominent.

Age-Related Cancer Burden

The present study projects that adult cancer cases in Manipur will increase from 2,379 cases in 2026 to 2,650 cases in 2030, representing an approximate 11.4% increase. This projected increase aligns with the national projections reported by Mathur et al. (2025), who estimated approximately 1.56 million new cancer cases in India during 2024 and anticipated continued growth due to population ageing and changing exposure to cancer risk factors.^[2] The similarity in projected trends suggests that Manipur is likely to experience the same demographic and epidemiological transition observed nationally.

The present study also reported a cumulative lifetime risk of developing cancer of approximately 1 in 13 males and 1 in 12 females before 75 years of age. Mathur et al. (2025) reported that the overall lifetime cancer risk in India was approximately 11%, or about 1 in 9 individuals, while several northeastern populations such as Mizoram demonstrated substantially higher lifetime risks.^[2] Although Manipur's estimated lifetime risk is somewhat lower than the highest-risk northeastern regions, it remains comparatively elevated within the Indian context.

Age-specific incidence in the present study increased sharply after middle age, reaching its highest level in the 70–74-year age group. A similar age-related pattern was reported by the NCRP analysis, reflecting cumulative exposure to carcinogens, age-associated genetic alterations, and declining immune surveillance among older adults.^[2]

Tobacco-Related Cancers and Associated Risk Factors

One of the most important findings of the present study was the exceptionally high proportion of tobacco-related cancers, accounting for 59.9% of male cancers and 40.4% of female cancers. Lung cancer contributed 32% of tobacco-related cancers among males and 36% among females, while cervical cancer represented 23% of tobacco-related cancers among women. These findings are supported by the IARC Working Group (2004), which recognised cancers of the lung, oral cavity, oesophagus, stomach, liver, and cervix among the major malignancies causally associated with tobacco exposure.^[5]

The exceptionally high burden of tobacco-related cancers is further explained by the behavioural risk profile observed in Manipur. The present study documented current tobacco use among 58.1% of men and 43.1% of women, together with alcohol use among 37.5% of These values correspond closely with NFHS-5 Manipur (2019–21), which reported similarly high levels of tobacco consumption compared with many other Indian states.^[6] The coexistence of widespread tobacco use and a large proportion of tobacco-related cancers underscores tobacco control as one of the most effective strategies for reducing the future cancer burden in Manipur.

Survival and Clinical Extent of Disease

The present study reported five-year age-standardised relative survival estimates of 47.9% for oral cancer, 43.6% for cervical cancer, and 20.9% for breast cancer. These findings are consistent with the population-based survival studies conducted by Sathishkumar et al. across NCRP registries. Their oral cancer study reported substantial geographic disparities in survival across India, while their cervical cancer study demonstrated considerable regional variation in five-year survival outcomes.^[7,8] Similarly, Sathishkumar et al. (2024) highlighted marked differences in breast cancer survival across Indian registries, suggesting that delayed diagnosis and unequal access to treatment continue to influence outcomes.^[9]

Childhood Cancer, DALYs, Screening and Health Infrastructure

Childhood cancers contributed relatively few absolute cases in the present study, with 24 annual cases among both boys and girls, although projected childhood cases are expected to increase from 60 cases in 2026 to 69 cases in 2030. The present study also reported an age-standardised cancer burden of 1,156 DALYs per 100,000 population, with a higher burden among females (1,244) than males (1,069).

These observations agree with Kulothungan et al. (2022), who demonstrated that cancers contribute substantially to years of life lost and years lived with disability across India.^[10] The higher female DALY burden in Manipur may reflect the combined impact of breast and cervical cancers, which frequently affect women during economically productive years.

CONCLUSION

This descriptive analysis highlights that cancer remains a major public health challenge in Manipur, with a substantial burden across both adult and childhood populations and an expected increase in new cancer cases in the coming years. Women experience a higher overall cancer incidence than men, while tobacco-related cancers account for a large proportion of cancers, particularly among males, reflecting the influence of modifiable risk factors such as tobacco use. The findings also indicate considerable variation in survival across major cancer types and reveal that many cancers present at advanced stages, underscoring the need for earlier diagnosis. Despite the presence of a statewide Population-Based Cancer Registry and dedicated cancer care services, screening uptake for common cancers remains very low. Strengthening tobacco-control measures, expanding population-based screening, promoting early detection, improving timely access to diagnosis and treatment, and enhancing palliative care services are essential to reducing the future cancer burden in Manipur and improving patient outcomes.

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