



SHORT TERM PROJECTION OF FIVE LEADING CANCERS IN MALES: AN EMPIRICAL EVIDENCE FROM HOSPITAL DATA, DIBRUGARH

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ABSTRACT

In terms of cancer incidence, the Northeast region has surpassed all other regions in India. Additionally, this region exhibits a distinctive cancer profile, showing higher incidences of upper digestive tract cancers, including oesophagus, stomach, and hypopharynx, compared to other regions. The present study aims to capture the epidemiology and short-term projections of five leading cancers among males in northeastern region, based on the hospital-based cancer registry data from AMCH, Dibrugarh. Findings from the present study indicate that oesophagus cancer had the highest prevalence among males throughout the period of 2013-2017. Following oesophagus cancer, pyriform sinus, aryepiglottic fold, buccal mucosa, and stomach cancers were the next most prevalent sites in the region. Oesophagus, aryepiglottic fold, and pyriform sinus cancers were particularly prominent among adults aged 35 years and above, while stomach and colon cancers were more common among younger adults. Projections suggest a substantial increase in the incidence of all five cancer sites between 2025 and 2030, with the highest prevalence expected among older adults.

KEYWORDS : Cancer, male, leading sites, projection, Northeast India

INTRODUCTION

Cancer, one of the biggest threats to society, is the second most common cause of death worldwide (Ali et al. 2011). Despite notable strides in treatment and prevention, the global incidence of cancer has continued to rise steadily over the past few decades (Cronin et al. 2022). Numerous emerging challenges, such as rapid urbanization, unhealthy lifestyles, environmental degradation, are driving the increasing cancer burden globally. This impact is most noticeable in middle-to-low socio-economic countries, like India (Kulothungan et al. 2022). Cancer incidence in India reached 1.19 million cases, with a higher occurrence among females in 2011. Projections indicate that by 2026, the number of new cancer cases will rise to 1.86 million, with 934,268 among males and 935,715 among females (D'Souza et al. 2013; Swain et al. 2023). GLOBOCAN 2020 projects that by 2040, India will see 2.1 million new cancer cases, representing more than 50% increase from 2020. Furthermore, one in nine Indians will develop cancer at some point in their lifetime (Ferlay et al. 2020; Satish et al. 2022; Bagal et al. 2023). Among the 10 regions exhibiting high incidence rates, seven pertain to males while four pertain to females are concentrated within the Northeastern states as opposed to mainland India, which further underscores the fact that the Northeastern states of India experience the highest incidence of cancer in comparison to other regions across the nation (Ngaihte et al. 2019). Additionally, this region exhibits a distinctive cancer profile, showing higher incidences of upper digestive tract cancers, including oesophagus, stomach, and hypopharynx, compared to other regions (Mathur et al. 2021). It has been noted that there is a scarcity of published literature on projections of major cancers in males, with research predominantly focusing on female-related cancers in Northeast India (Krishnatreya et al. 2015). Additionally, socio-economic factors, such as cultural beliefs and traditions among various ethnic groups, contribute to delays in the diagnosis and treatment of cancers in male patients. Recognizing the diverse epidemiological profile of male cancers in our population can help identify gender-specific risk factors, patterns, and outcomes, which can differ significantly from those in females. This insight enables the development of targeted prevention, screening, and treatment

strategies, enhancing early detection and survival rates. Furthermore, understanding male-specific cancers, such as prostate and testicular cancer, can improve management and care for men, thereby reducing the overall cancer burden in the population. The present study aims to highlight the epidemiological profile and project the five major cancers among males, based on hospital data of Dibrugarh, Assam.

MATERIALS AND METHODS

Data for the present study is taken from Hospital Based Cancer Registry, Assam Medical College and Hospital, which is among one of the networks of cancer registries across the country commenced by National Cancer Registry Programme (NCPR) under the supervision of Indian Council of Medical Research in 1981. As a result of which, a hospital-based cancer registry started functioning at Assam Medical College & Hospital Dibrugarh, from January 1982. Every cancer patient here is registered prospectively. The demographic profile of each consecutive new patient added to the registry from January 1, 2013, to December 31, 2017, was considered. Patients were categorized by cancer site and type, as well as by gender. The total number of confirmed cancer cases was 1183 in 2013, 1187 in 2014, 1118 in 2015, 1008 in 2016, and 1162 in 2017. Data for male patients were used for statistical analysis.

Univariate and bivariate analysis is done to capture the age distribution of five leading cancer sites among males. After that, multiple linear regression model is used to determine the trend of incidence rates over time.

The linear regression equation is given by-

$$R(t) = \alpha + \beta t$$

$R(t)$ = incidence rate at time t , α = intercept of the regression line

β = slope of the regression line, t = year

After estimating the incidence rate for the three subsequent years 2025, 2030, 2035. The projected number of cases is obtained by -

Projected number of cases for year $C(t) = R(t) \times P(t)$,

Where $R(t)$ is the incidence rate at time t and $P(t)$ is the

projected population for a particular year t

Findings

Table 1 depicts the percentage distribution of top five cancers among males from hospital-based cancer registry data of Dibrugarh, for the period 2013-2017. Findings from Table 1 suggests that, in 2013 the highest numbers of cancer cases were found for oesophagus, followed by aryepiglottic fold, stomach, tongue and buccal mucosa respectively. Findings also captured that, for the entire period of 2013-2017 oesophagus cancer has come with highest prevalence, followed by aryepiglottic fold respectively. Pyriform sinus, buccal mucosa and colon cancers were also among the top five leading cancer sites among males respectively.

Table 1 Percentage Distribution of top five cancer sites in males from 2013-17 in Dibrugarh

Cancer Sites	2013	Cancer Sites	2014	Cancer Sites	2015	Cancer Sites	2016	Cancer Sites	2017
Aryepiglottic fold	13.48	Aryepiglottic fold	7.23	Stomach	5.27	Buccal Mucosa	8.20	Aryepiglottic fold	10.94
Buccal Mucosa	4.49	Colon	4.49	Aryepiglottic fold	8.59	Aryepiglottic fold	10.55	Rectum	7.23
Oesophagus	14.26	Oesophagus	16.60	Buccal Mucosa	4.69	Base of Tongue	3.52	Oesophagus	10.74
Stomach	5.86	Pyriform Sinus	9.38	Oesophagus	14.06	Oesophagus	12.70	Gallbladder	3.32
Tongue	5.66	Stomach	6.05	Pyriform Sinus	7.42	Gallbladder	2.93	Pyriform Sinus	7.23

Findings from Figure 1 depicts the age distribution of five leading cancer sites among males in 2013. Oesophagus, Pyriform sinus, buccal mucosa and tongue cancers are mostly found to be prevalent among the age group of 35-55 respectively. Stomach cancer is prevalent in all the age groups but higher prevalence is captured for those belonging to the age group of 40 and a above.

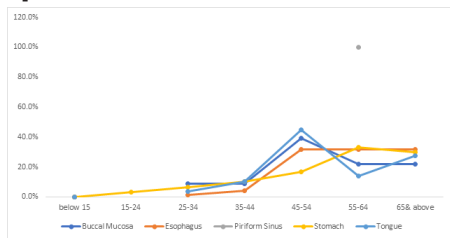


Figure 1 Age distribution of top five cancer sites among males, 2013

Findings from Figure 2 depicts the age distribution of five leading cancer sites among males, in 2014. Oesophagus, Pyriform sinus, and Aryepiglottic fold cancers are mostly found to be prevalent among the age group of 45-65 respectively. Highest prevalence of stomach cancer is found in the age group of 55-64 respectively. However, colon cancer is prevalent among all the age groups with its higher prevalence among the adults only.

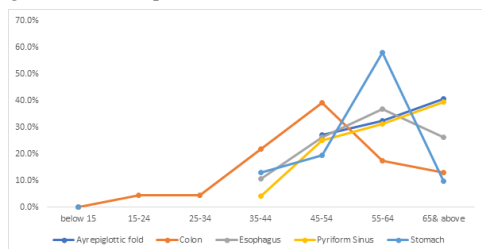


Figure 2 Age distribution of top five cancer sites among males, 2014

Findings from Figure 3 depicts the age distribution of five leading cancer sites among males in 2015. Here all the five leading cancers are found to be prevalent among the people belonging to the age group of 35 and above respectively.

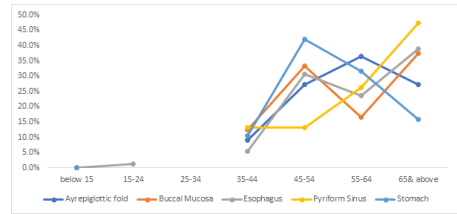


Figure 3 Age distribution of top five cancer sites among males, 2015

Findings from Figure 4 depicts the age distribution of five leading cancer sites among males in 2016. It is seen that; all the sites are found to be more prevalent in the age group of 35 and above. However, gallbladder cancer is prevalent among all the ages and it increases with the increase in age respectively

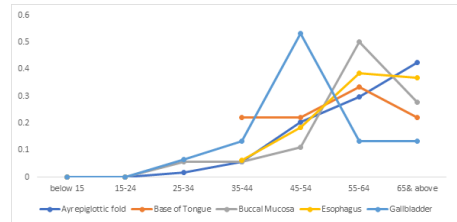


Figure 4 Age distribution of top five cancer sites among males, 2016

Findings from Figure 5 depicts the age distribution of five leading cancer sites among males in 2017. It is seen that; all the sites are found to be more prevalent in the age group of 35-64. However, rectum cancer is found to be more prevalent among the young males belong to the age group of 35-44 respectively.

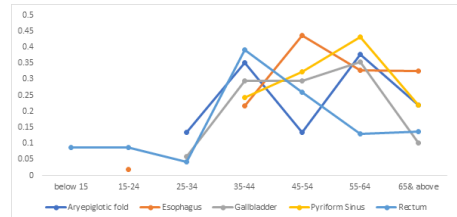


Figure 5 Age distribution of top five cancer sites among males, 2017

Table 2 depicts the projected percentage of top five leading cancers among males for the period 2025-2035 by two broad age groups. It suggests that, all the five cancer sites have shown substantial amount of increase from 2025 to 2030. Mostly, highest prevalence is seen among the older adults as compared to that of adults belonging to the age group of 25-50, with highest prevalence of Oesophagus cancer followed by pyriform sinus. In 2035, the projected percentage of Oesophagus cancer is found to be 24.46% among the adults and around 27.89% among the older adults respectively. However, the same for pyriform sinus is also found to be more than 20% for the entire age groups.

Table 2 Projected percentage of top five cancers among males by age

	Adults (25-50)	Older Adults (50 & above)

Cancer Site	2025	2030	2035	2025	2030	2035
Ayrepiglottic fold	14.61	15.31	16.43	17.88	19.23	22.97
Oesophagus	21.23	22.19	24.46	26.31	27.11	27.89
Pyriform Sinus	18.31	21.32	23.11	20.19	21.21	24.67
Stomach	16.43	18.89	20.22	18.32	19.96	23.41
Buccal Mucosa	10.91	13.46	14.27	15.37	17.17	19.19

CONCLUSION

Understanding male-specific cancers can improve management and care for men, thereby reducing the overall cancer burden in the population. The current study captures the epidemiological profile and short-term projections of the five leading cancers among males in the northeastern part of the country. However, this study is not precisely area-specific, as all patients from any part of the region may get registered under the hospital-based cancer registry at Assam Medical College and Hospital, Dibrugarh. Accurate projections of cancer cases require population data for specific periods. The methodology involved estimating northeast population for the years 2025, 2030, and 2035 by considering the reduction in growth rates by sex. By integrating these population estimates with incidence rates for the corresponding periods, projections of cancer cases in northeast were developed. Findings from the current study suggested that, prevalence of oesophagus cancer among males was at the top of the list over the entire period of 2013-17 respectively. However, pyriform sinus, aryepiglottic fold, buccal mucosa, and stomach cancers were the next most prevalent sites of cancer among males considered region. In addition, oesophagus, aryepiglottic fold and pyriform sinus sites were more prominent among the adults of age 35 years and above. However, stomach cancer and colon cancers were found to be more prominent among the younger adults respectively. The projections reveal a substantial increase in the incidence of all five cancer sites between 2025 and 2030, with the highest prevalence anticipated among older adults. By 2035, oesophagus cancer is projected to account for 24.46% of cases among adults and approximately 27.89% among older adults. Likewise, the prevalence of pyriform sinus cancer is expected to surpass 20% across all age groups.

REFERENCES

1. Ali, I., Wani, W. A., & Saleem, K. (2011). Cancer scenario in India with future perspectives. *Cancer therapy*, 8.

2. Kulothungan, V., Sathishkumar, K., Leburu, S., Ramamoorthy, T., Stephen, S., Basavarajappa, D., ... & Mathur, P. (2022). Burden of cancers in India- estimates of cancer crude incidence, YLLs, YLDs and DALYs for 2021 and 2025 based on National Cancer Registry Program. *BMC cancer*, 22(1), 527.

3. Swain, C. K., Padhee, S., Sahoo, U., Rout, H. S., & Swain, P. K. (2023). Changing patterns of cancer burden among elderly across Indian states: Evidence from the global burden of disease study 1990–2019. *Aging Medicine*, 6(3), 254-263.

4. D'Souza ND, Murthy NS, Aras RY. Projection of cancer incident cases for India - till 2026. *Asian Pac J Cancer Prev*. 2013;14(7):4379-4386

5. Ferlay J, Ervik M, Lam F, et al. *Global Cancer Observatory*. Lyon: International Agency for Research on Cancer; 2020. [07/06/23]

6. Sathishkumar K, Chaturvedi M, Das P, et al. Cancer incidence estimates for 2022 & projection for 2025: result from National Cancer Registry Programme, India. *Indian J Med Res*. 2022;156:598–607

7. Bagal, S., Budukh, A., Thakur, J. S., Dora, T., Qayyumi, B., Khanna, D., ... & Chaturvedi, P. (2023). Head and neck cancer burden in India: an analysis from published data of 37 population-based cancer registries. *ecancer medical science*, 17.

8. Shanker, N., Mathur, P., Das, P., Sathishkumar, K., Shalini, A. M., & Chaturvedi, M. (2021). Cancer scenario in North-East India & need for an appropriate research agenda. *Indian Journal of Medical Research*, 154(1), 27-35.

9. Cronin, K. A., Scott, S., Firth, A. U., Sung, H., Henley, S. J., Sherman, R. L., ... & Jemal, A. (2022). Annual report to the nation on the status of cancer, part 1: National cancer statistics. *Cancer*, 128(24), 4251-4284.

10. Ngaihte, P., Zomawia, E., & Kaushik, I. (2019). Cancer in the NorthEast India: Where we are and what needs to be done?. *Indian journal of public health*, 63(3), 251-253.

11. Krishnatreya, M., Katak, A. C., Sharma, J. D., Nandy, P., Talukdar, A., Gogoi, G., & Hoque, N. (2015). Descriptive epidemiology of common female cancers in the north East India-a hospital based study. *Asian Pacific Journal of Cancer Prevention*, 15(24), 10735-10738.