RESEARCH ARTICLE

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Assessment and Projections of the Burden of Lip and Oral Cancer among Indian Men

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Abstract

Introduction: The oral cavity includes the lips, buccal mucosa, teeth, gingiva, anterior two third of the tongue, the floor of the mouth, and hard palate. Comprehensive data on the burden of oral cancer are lacking at the national and state levels. Therefore, analysing the changing trend in oral cancer in India over the last three decades fills a significant gap. **Methods:** In this study, the number of new cancer cases, the population at risk, and the crude incidence rate were extracted from the GBD 2019 data. We used the Joinpoint regression to assess the trends in age-adjusted incidence rates per 100,000 population for lip ad oral cancer among men in India from 1990 to 2019 and we used the cancer registry data for the projection of the cancer incidence for all the states, union territories, and India every five years from 2026 to 2036 for lip and oral cancer among men. **Results:** The estimate of lip and oral cancer cases among Indian men will be 131,414 in 2026, will increase to 147,488 during 2031, and will increase to 163,224 during 2036. **Conclusion:** The present study estimates the lip and oral cancer cases, which will help for planning purpose of cancer screening facilities for early detection, awareness of cancer, modifying lifestyle, reduction in tobacco use, and establishment of adequate treatment guidelines that can effectively be carried out at different levels (district hospitals, teaching hospitals, specialized hospitals, etc.) would also help in the reduction of mortality due to oral cancer as well as the burden of oral cancer.

Keywords: Future projections- lip and oral cancer- incidence- India

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Introduction

Oral cancer is a disease of antiquity. Oral cancer is described in the surgical treatise Sushruta Samhita, which was written in Sanskrit in Indian culture. Its propensity for spreading locally and impacting nearby structures creates deformity, hampers function, and causes physical and psychological distress, lowering the quality of life. Cancers significantly act in individual and social levels and cause a wide network of physical, mental, familial and social problems [1].

The oral cavity includes the lips, buccal mucosa, teeth, gingiva, anterior two third of the tongue, the floor of the mouth, and hard palate. Tongue, lips, and mouth cancer is referred to as oral cancer. This case definition is accepted and supports the report of oral cavity cancers by the World Health Organization, the International Agency for Research and Cancer, and the International Classification of Diseases (ICD) coding scheme [2].

The International Agency for Research on Cancer (IARC) has unveiled Global Cancer Statistics 2018, a comprehensive analysis of the current state of cancer around the world [3]. According to a recent study, nearly 2.0% of cancer incidence and 1.9% of cancer deaths worldwide were due to oral cancer [3]. Estimates from GLOBOCAN 2020 demonstrate regional differences in oral cancer incidence rates especially in Southern Asian countries like India, Srilanka, Nepal etc. According to a recent study in Nepal, Lung cancer was the most common cancer in men in Nepal, followed by lip/oral cavity, stomach and colorectal cancers [4]. And also in Srilanka among adults of 35-64 years, cancer mortality increased over 1950-2005 and had become the second leading cause of death among female aged 35-64 years in 2002-2006 [5]. Neoplasms were the second leading cause of hospital death in 2012 in Srilanka [6].

Oral cancer ranks amongst the three most common cancers in India and in some areas accounts for almost 40% of total cancer deaths [7]. In India, 20 per 100000 population are affected by oral cancer, which accounts for about 30% of all types of cancer [8]. Approximately 70,000 new cases and more than 48,000 oral cancer-related deaths occur yearly [9]. In most regions of India, oral cancer is the second most common malignancy diagnosed in men, accounting for up to 20% of cancers, and the fourth most common in women [10].

Plenty of etiological factors contribute to India's high rate of mouth cancer. Oral cancer is commonly caused by

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tobacco consumption, whether it be smokeless tobacco or smoking, as well as alcohol consumption [11]. Based on the TMN classification, 48% of the oral cancer cases were present in the later stages. Estimates indicate that 57% of men and 11% of women between 15- 49 years of age use some form of tobacco [12]. More than 90% of OC cases report using tobacco products [13]. The increase of oral cancer incidence is attributed to the aging population and lifestyle factors such as tobacco use and alcohol consumption [14].

However, there is a significant research gap in understanding the epidemiology of lip and oral cancer among Indian men. There is a lack of reliable data on the incidence and prevalence of lip and oral cancer in India, particularly in rural areas. Therefore, an analysis of the changing trend in oral cancer in India over the last three decades fills a significant gap and can help to inform oral health researchers and public health policymakers in India to focus more attention on oral cancer. Since clear-cut knowledge about the magnitude of the oral cancer crisis is needed for the present and future to help health policy planners evolve and implement cancer facilities in the country. In this study, we showed a) the trends in incidence rates per 100,000 population for oral cancer among men in India from 1990 to 2019, b) the projection of the cancer incidence for all the states, union territories, and India for every five years from 2026 to 2036 for lip and oral cancer among men in India.

Materials and Methods

Data sources

The data for this study were obtained from the 2019 Global Burden of Disease (GBD), Injuries, and Risk Factor study. For the first time, GBD 2019 provided a detailed update on fertility and migration and an independent population estimate for each of the 204 countries and territories in the world. GBD 2019 features significant data additions and upgrades, including methodological refinements.

The aetiological code used in GBD 2019 was based on the International Classification of Disease (ICD) formulated by the WHO, which is the current standard in the world and the most exhaustive cause list [15]. The definition of oral cancer in GBD 2019 consisted of codes C00-C08 (lip and oral cavity cancer) in ICD10. Specific coding by oral cancer type can be found in full detail in the GBD 2019 literature. We extracted the number of new cancer cases, the population at risk, and the crude incidence rate from the GBD 2019 data.

Trends in Incidence rates

First, the age adjusted incidence rate per 100,000 population was calculated by direct standardization. World standard population proposed by Segi and modified by Doll et al. was used for standardization.

The Joinpoint Regression Program is software developed by the United States (US) National Cancer Institute (NCI) to perform trend analysis for the incidence and mortality rates. It has been previously used to assess the trend of several other cancers, such as gastric cancer and esophageal cancer. The annual percent change (APC) using joinpoint regression was used to examine the age adjusted rates (AARs) during the study period. The best fitting point called "joinpoint" where a statistically significant change occurs was identified by joinpoint analysis. Furthermore, the trends between the joinpoints can be assessed using this analysis. The grid search method was used for fitting the segmented line regression and hence to determine the best fit for each model. Significance was tested using Monte Carlo permutation method. $P < 0.05$ was considered as statistically significant.

Joinpoint regression model of the natural log transformed rates, with a maximum number of three joinpoints, was used to calculate the APC, which was used to determine whether the incidence rate of breast cancer in the model differs from the null hypothesis. 95% confidence interval (CI) for each APC was calculated to determine the statistical significance of APC in each segment. The magnitude and direction of recent trends were determined using average APC (AAPC) with 95% CI.

Projection of cancer incidence

The incidence rates were taken from Population-Based Cancer Registries (PBCRs), and the projected population from the 'report of the technical group on population projections constituted by the National Commission on population, the office of the registrar general and census commissioner, India'. The latest PBCR report for 2012-14 contained 32 PBCRS (including recently established Mansa, SAS Nagar, Sangrur, and Chandigarh registries), which was covered after more than 30 years journey of the National Cancer Registry Programme (NCRP). These PBCRS are running in 16 states and two union territories. The population covered by these registries is less than 15% of India's total population.

Estimation of pooled rate

The annual incidence data of all registries located in different parts of the country were combined to get the annual number of cancer cases. The annual populations of all registries by age and sex in the respective five-year age groups were added up to obtain the total population for all the registries. The pooled age-specific incidence rates of cancer by site, age, and sex for all registries were obtained by dividing the respective pooled number by pooled population.

The population of the country and states

The population of the country and for various states of the country, according to age and sex by different quinquennial years from 2026 to 2036, were obtained from the report of population projections carried out for the country for the years 2011 to 2036 based on the Census of India 2011, by the Registrar General of India [16].

Estimation of cancer cases

The respective age and sex-specific pooled incidence rates by site based on all registries were multiplied by the corresponding projected age and sex-specific population figures to estimate the projected number of cancer cases by age, sex, and site for different calendar years 2026,

2031, and 2036. The number of cancer for site "s" (N) in a particular year was estimated using the relationship

$$N=\sum nPx * nIx$$

Where *nPx* represents the projected population in the *x* to *x+n* age group for a particular year and nIx being the pooled incidence rate of cancer by site in the same age group for a particular site.

Estimating cases has been done at the national level and for various states of India.

Assumptions

The projection of the number of cancer has been made with the following assumption:

These population-based cancer registries provide rates that reflect national averages as well as rates for individual states;

Age-specific cancer incidence rates for the latest available year will remain the same over the next 15 years.

Results

During the last 30 years, 1990-2019, the number of new cancer cases, population at risk, crude estimate, age-adjusted incidence rates and modelled age-adjusted incidence rates for lip and oral cancer were shown (Table 1a). In modelled age-adjusted incidence rate the final model for the age groups 0-49, 50-69 and 70+ were 3, 2 and 2 joinpoints respectively. And those joinpoints have indicated that the annual percent change (APC) is significantly different from zero at the alpha (0.05 level). See for the variation in the rates according to age-adjusted incidence rate was first computed by the successive age intervals (0-49, 50-69, and 70+ years) from 0 through age 95+ for GBD data during the last three decades (1990-2019) of India (Figure 1a, Figure 1b, Figure 1c). Age-adjusted lip and oral cancer incidence rates have significantly increased (APC +0.71) during 1990-2004 and (APC +2.65) 2004-2012 in the age interval 0-49 years among men. After 2012, the changes were insignificant (Figure 1a). But for the age interval 50-59, age-adjusted lip and oral cancer incidence rates have significantly decreased (APC -1.56) during 1997-2004 and significantly increased (APC +0.73) during 2004-2019 among men (Figure 1b). And the age group 70+, age-adjusted lip and oral cancer incidence rates have significantly increased (APC +0.71) during 1990-2002 and significantly decreased (APC -1.67) during 2002-2011 among men. After 2011, the changes were insignificant (Figure 1c). Hence, based on the age-adjusted incidence rate, the age intervals were divided into 0-49, 50-69, and 70+ years to see for the variations if any. Analysis of the trend in age-adjusted incidence rates of lip and oral cancer showed a significant change in different age groups among men.

Projection of cancer cases

According to the projections based on total fertility rates, it showed the dynamic of population changing age structure among men in India from 2026-2036. In 2026, the projected population of men will be increased with increasing in age groups and in the age groups 25-29 years, it will be highest and after that it will decreased with increasing in age groups. But for 2031 and 2036, it will be the age groups 30-34 years and 35-39 years with

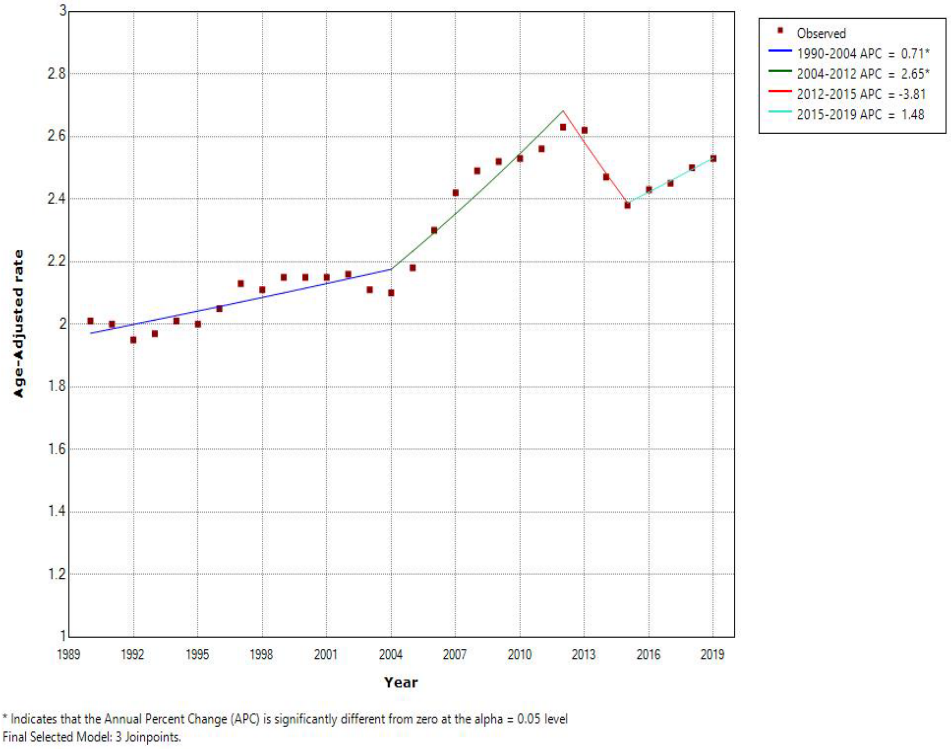

Figure 1a. Age-adjusted Incidence Rates per 100,000 Population among Men for Lip and Oral Cancer for 0-49 Age Group with APC Using Joinpoint Regression in India, 1990-2019

Table 1a. Number of Cases, Population at Risk, Crude Estimate and Age-adjusted Incidence Rates per 100,000 Population among Men for Lip and Oral Cancer by Broad Age Groups with Modeled Age-adjusted Incidence Rate in India, 1990-2019

Year	Age Groups														
	0-49					50-69					70+				
	Number of Cases	Population at risk	Crude estimate	Age-Adjusted Incidence rate	Modeled age-adjusted Incidence rate	Number of Cases	Population at risk	Crude estimate	Age-Adjusted Incidence rate	Modeled age-adjusted Incidence rate	Number of Cases	Population at risk	Crude esti-mate	Age-Adjusted Incidence rate	Modeled age-adjust-ed Incidence rate
1990	7289	390691841	3.35	2.01	1.97	15050	46558047	32.32	5.39	5.28	4379	8085863	54.15	3.44	3.40
1991	7429	397701387	3.35	2.00	1.99	15477	47748078	32.41	5.39	5.31	4537	8357115	54.29	3.44	3.43
1992	7436	404936278	3.29	1.95	2.00	15538	48832334	31.82	5.28	5.34	4617	8635716	53.47	3.40	3.45
1993	7689	412338428	3.33	1.97	2.01	16005	49866393	32.10	5.30	5.38	4842	8948147	54.11	3.45	3.47
1994	8049	419908771	3.41	2.01	2.03	16554	50850736	32.55	5.36	5.41	5080	9303828	54.60	3.48	3.50
1995	8194	427649261	3.39	2.00	2.04	16624	51783801	32.10	5.28	5.44	5225	9712427	53.79	3.45	3.52
1996	8582	435565951	3.47	2.05	2.06	17342	52635681	32.95	5.40	5.47	5567	10169349	54.75	3.52	3.55
1997	9154	443432131	3.62	2.13	2.07	18616	53561081	34.76	5.70	5.51	6132	10631071	57.68	3.70	3.57
1998	9357	451380298	3.61	2.11	2.09	18698	54399143	34.37	5.63	5.54*	6416	11103474	57.78	3.72	3.60
1999	9822	459411712	3.70	2.15	2.10	18156	55210574	32.88	5.39	5.45	6412	11620196	55.18	3.58	3.62
2000	10061	467582997	3.69	2.15	2.12	18190	55953009	32.51	5.32	5.37	6787	12166111	55.79	3.63	3.65
2001	10260	475058399	3.68	2.15	2.13	18600	57459725	32.37	5.31	5.29	7212	12700839	56.78	3.70	3.68
2002	10521	482586696	3.69	2.16	2.15	18950	59006239	32.12	5.28	5.20	7483	13253112	56.46	3.69	3.70*
2003	10531	490204469	3.61	2.11	2.16	19217	60631378	31.69	5.22	5.12	7579	13813481	54.87	3.59	3.64
2004	10756	497857822	3.61	2.10	2.18*	18607	62383905	29.83	4.91	5.04*	7456	14414180	51.72	3.41	3.58
2005	11420	505432980	3.76	2.18	2.23	19437	64296106	30.23	4.99	5.08	7986	15037907	53.11	3.51	3.52
2006	12284	512874938	3.96	2.30	2.29	20183	66327497	30.43	5.02	5.12	8323	15639475	53.22	3.51	3.46
2007	13174	520132181	4.16	2.42	2.35	21361	68451716	31.21	5.14	5.16	8587	16249196	52.85	3.50	3.40
2008	13903	527172936	4.30	2.49	2.42	22405	70661892	31.71	5.22	5.19	9007	16862429	53.41	3.53	3.35
2009	14365	533994967	4.37	2.52	2.48	23580	72962335	32.32	5.32	5.23	8903	17521606	50.81	3.34	3.29
2010	14694	540588251	4.39	2.53	2.55	24836	75329796	32.97	5.44	5.27	8828	18278039	48.30	3.15	3.23
2011	15176	546905473	4.45	2.56	2.61	25756	77738469	33.13	5.46	5.31	9127	19092883	47.80	3.06	3.18*
2012	15907	552955267	4.58	2.63	2.68*	26566	80212738	33.12	5.45	5.35	9586	19898997	48.18	3.06	3.20
2013	16146	558787627	4.57	2.62	2.58	26701	82760489	32.26	5.30	5.39	10554	20679852	51.03	3.35	3.23
2014	15554	564438774	4.32	2.47	2.48	27192	85369722	31.85	5.23	5.43	10929	21443514	50.97	3.44	3.25
2015	15287	569883214	4.18	2.38	2.39*	29260	87954320	33.27	5.47	5.47	11015	22295183	49.40	3.27	3.28
2016	15940	575017879	4.28	2.43	2.42	30690	90545852	33.89	5.56	5.51	11603	23244623	49.92	3.22	3.30
2017	16387	579736018	4.33	2.45	2.46	31334	93129421	33.65	5.52	5.55	12290	24355354	50.46	3.23	3.32
2018	17106	584013426	4.46	2.50	2.49	32454	95860185	33.86	5.55	5.59	13218	25436955	51.96	3.37	3.35
2019	17697	587991740	4.55	2.53	2.53	33793	98735264	34.23	5.61	5.63	13908	26459102.89	52.56	3.40	3.37

*, indicates the jointpoint location where the Annual Percent Change (APC) is significantly different from zero at the alpha= 0.05 level

highest population among men in India. And the total estimated men population of India for the years 2026, 2031, and 2326 (as of 1st March of the year) would be 732075, 758146, and 779701, respectively (Table 2a) [17].

The estimate of lip and oral cancer cases among Indian men will be 131414 in 2026, will increase to 147488 during 2031, and will increase to 163224 during 2036. The estimated numbers of lip and oral cancer cases among males by age group in India are provided in Table 2b, which shows that the number of cases is highest among 55-59 years in 2026, but in 2031 & 2036, it will be highest among 60-64 years.

The estimated numbers of cancer cases among men in various Indian states are provided in Table 2c, which shows that Uttar Pradesh has the highest burden of oral cancer cases, followed by Bihar and West Bengal in 2026. Still, in 2031 & 2036 West Bengal will be the 2nd highest oral cancer population among men. Lakshadweep has

Table 2a. Projected Population (in 000's) of Indian Men for Quin-Quennial Years from 2026-2036

Age-Groups	2026	2031	2036
00-04 Years	56,943	53,431	50,519
05-09 Years	59,652	56,553	53,185
10-14 Years	62,068	59,500	56,512
15-19 Years	61,038	61,878	59,432
20-24 Years	64,463	60,719	61,671
25-29 Years	66,201	63,970	60,367
30-34 Years	62,271	65,561	63,466
35-39 Years	55,840	61,499	64,879
40-44 Years	49,144	54,936	60,631
45-49 Years	43,374	48,049	53,839
50-54 Years	38,803	41,968	46,615
55-59 Years	33,466	36,980	40,135
60-64 Years	26,934	31,158	34,600
65-69 Years	19,954	24,126	28,119
70+ Years	31,924	37,818	45,731
Total	732,075	758,146	779,701

Table 2b. Projected Annual Cases of lip and oral Cancer among Men during Quin-quennial Years, 2026-2036 by Age-groups

Age-Groups	2026	2031	2036
00-04 Years	33	31	29
05-09 Years	23	22	21
10-14 Years	68	65	62
15-19 Years	163	165	159
20-24 Years	723	681	692
25-29 Years	2,424	2,342	2,210
30-34 Years	7,320	7,606	7,363
35-39 Years	11,628	12,807	13,511
40-44 Years	14,799	16,790	18,258
45-49 Years	15,959	17,679	19,810
50-54 Years	17,885	19,344	21,486
55-59 Years	18,006	19,896	21,594
60-64 Years	17,880	20,684	23,262
65-69 Years	14,237	17,214	20,063
70+	10,265	12,160	14,705
Total	131,414	147,488	163,224

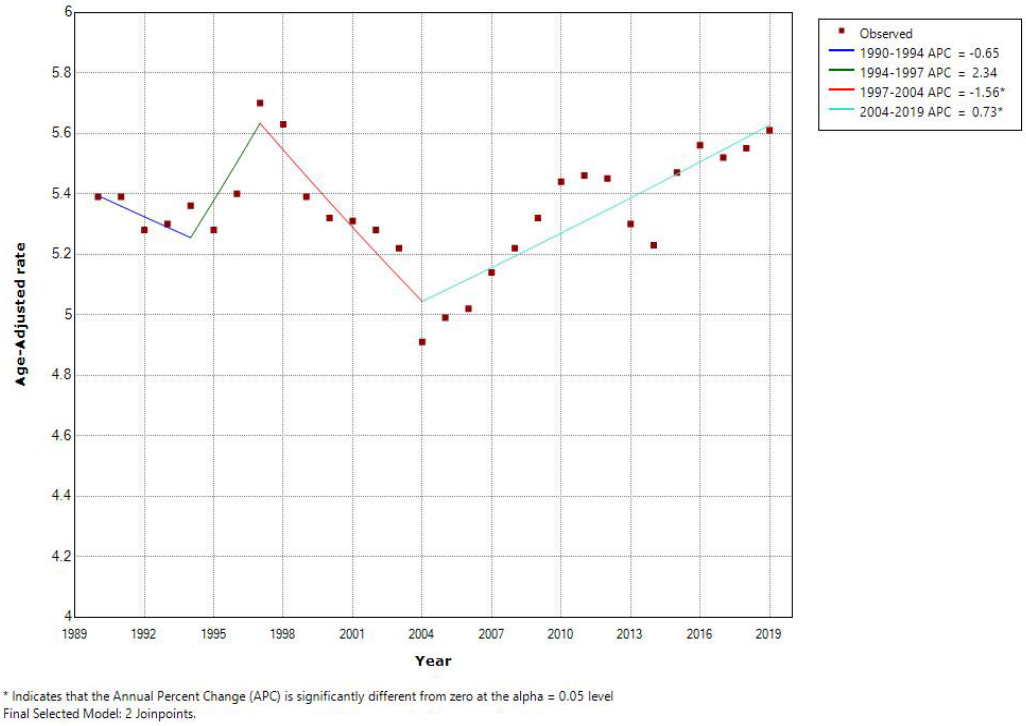

Figure 1b. Age-adjusted Incidence Rates per 100,000 Population among Men for Lip and Oral Cancer for 50-69 Age Group with APC Using Joinpoint Regression in India, 1990-2019

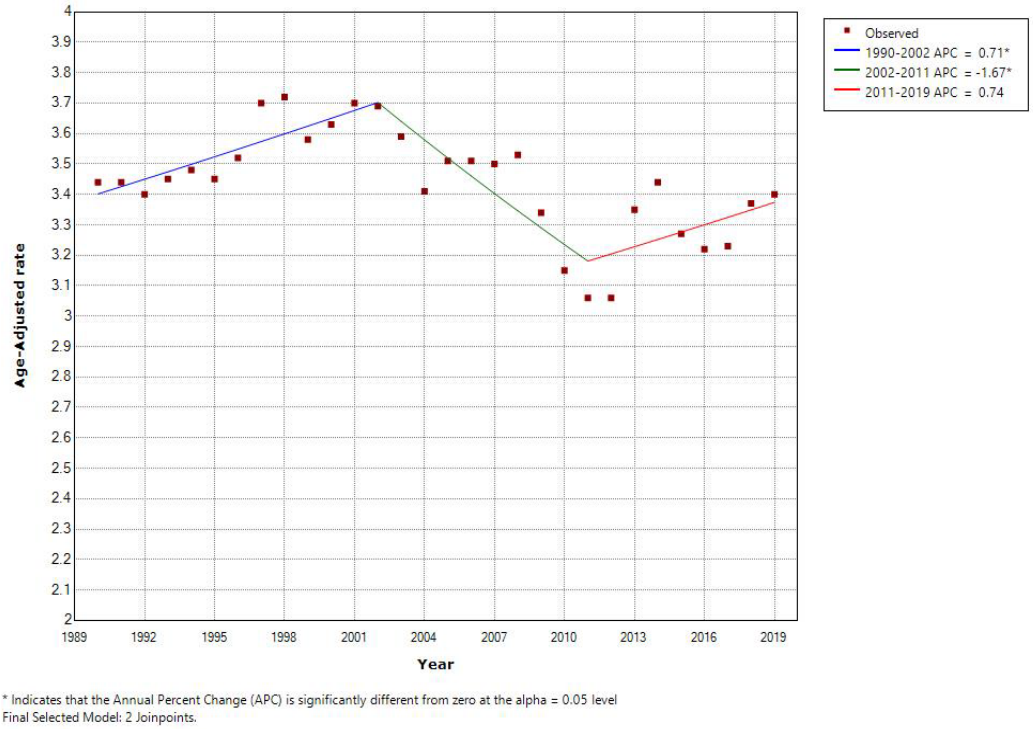

Figure 1c. Age-adjusted Incidence Rates per 100,000 Population among Men for Lip and Oral Cancer for 70+ age Group with APC using Joinpoint Regression in India, 1990-2019

Table 2c. Projected Cases of Lip and Oral Cancer in India among Men during Quin-quennial Years (2026-36) by States

States	2026	2031	2036
Andaman & Nicobar Islands	64	72	79
AP	5,858	7,546	8,244
Arunachal Pradesh	208	257	287
Assam	2,967	3,694	4,090
Bihar	16,041	11,162	12,680
Chandigarh	147	165	183
Chhattisgarh	1,658	1,859	2,057
Dadra & Nagar Haveli	29	33	36
Delhi	2,095	2,776	3,066
Goa	171	192	212
Gujarat	3,837	4,302	4,761
Haryana	2,893	3,620	3,751
Himachal Pradesh	801	901	953
Jammu & Kashmir	1,357	1,546	1,742
Jharkhand	6,244	7,444	8,247
Karnataka	5,389	6,042	6,686
Kerala	4,222	5,734	5,238
Ladakh	30	34	36
Lakshadweep	9	10	11
MP	5,809	6,514	7,208
Maharashtra	8,180	9,160	10,136
Manipur	208	257	287
Meghalaya	208	257	287
Mizoram	208	257	287
Nagaland	208	257	287
Odisha	7,462	8,366	9,258
Puducherry	265	297	329
Punjab	4,354	5,732	6,083
Rajasthan	6,114	7,627	8,632
Sikkim	1,457	1,798	2,012
TN	6,854	7,685	9,041
Telangana	3,635	3,762	4,699
Tripura	208	257	287
UP	19,393	23,787	25,780
Uttarakhand	1,076	1,232	1,393
West Bengal	11,755	12,856	14,857
India	131,414	147,488	163,224

the lowest burden of oral cancer cases in 2026 followed by Dadra & Nagar Haveli and Ladakh and continue till 2036 (Table 2c).

Discussion

Oral cancer is classified as cancer of the lips, mouth, and tongue. According to GLOBOCAN 2020 estimates, the incidence of oral cancer among men was the highest (16.2%) in India. In the present study, we showed the incidence rates for oral cancer in India from 1990 to 2019, as well as an estimation of the cancer incidence for all the states, union territories, and India every five years from 2026 to 2036 for lip and oral cancer (Figure 2a).

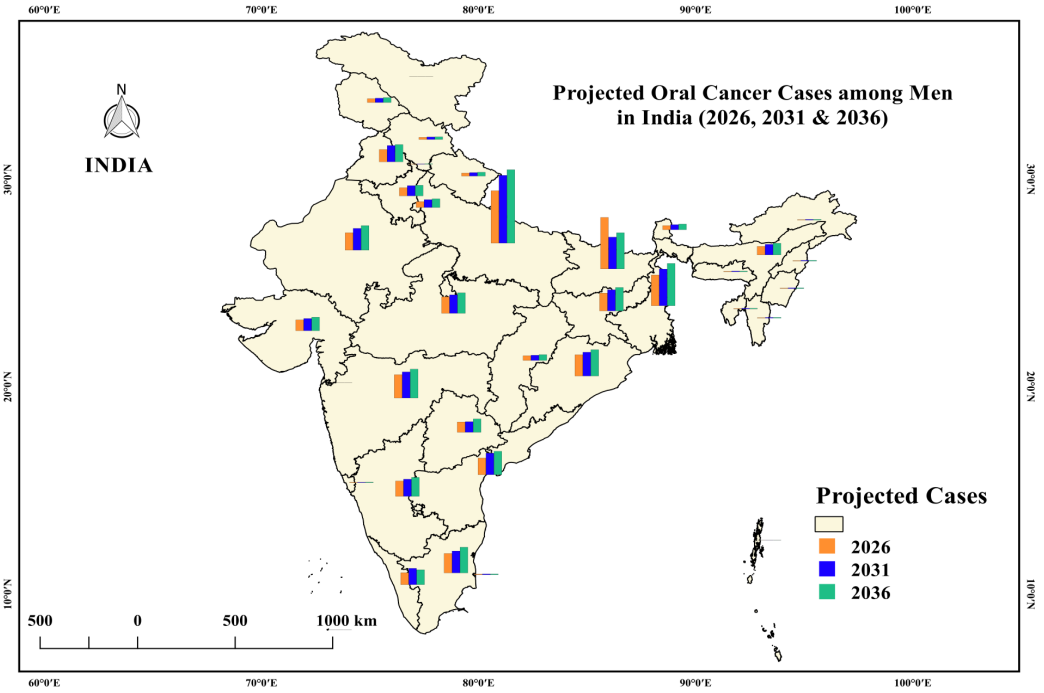

Figure 2a. Comparison of Projected Lip and Oral Cancer Cases among Indian Men in 2026, 2031 & 2036

Many studies [18] suggest that head and neck cancer, particularly oral cancer, is increasing in young adults internationally. After a steady decline since the turn of the 20th century, oral cancer incidence rates in the UK and US are now rising, particularly in women [19].

India doesn't have a national-level cancer registry. Because of this, they estimated the federal burden of cancer as highly challenging. In terms of context, there have been numerous prior attempts to estimate the national load using deceptive techniques and procedures. To project the burden of cancer in communities using the existing cancer registry data, some researchers in the developed world have employed age period and cohort models [20], which is not feasible in India due to the lack of data in detail. The present study also used the linear regression method to assess the trend and projection of rates.

In the case of a single period and single registry, however, available rates were assumed to apply for 2026-2036. Several registries in the same state or union territory were considered for a single period, and the pooled rate was considered and thought to remain the same over the study period. For the rest of the Indian states and union territories, where the registry was unavailable, D'souza has taken age sex-specific pooled incidence rates by sites of 17 registries and assumed them to be identical for India and its states. However, this study had taken 32 registries to project the burden of cancer for the country as a whole.

For the states and union territories where a registry was not available, the nearest possible registries had been taken into account under certain assumptions as discussed in the assumption section and assumed to be the same for the respective states or union territories and further applied appropriate methods and techniques to project the cancer incidence rates at 2026, 2031 and 2036. Additionally, these rates were multiplied by the corresponding state's or union territories' population, which was obtained from the report of the technical group on population projections constituted by the National Commission on population, the office of the registrar general and census commissioner, India' to arrive with an appropriate number of cancer cases [16].

This study on oral cancer projection among men in India indicates the number of cancer cases for 2026, 2031, and 2036 is 131414, 147488, and 163224, respectively. The increase in cancer cases is not only because of the rise in population size but also due to continued efforts of the government to control communicable diseases and the resultant rise in life expectancy [21].

One of the significant causes of cancer is tobacco, which is related to 24.4-65.2% of cancer among men in India [22]. Among tobacco users, chewing is more prevalent than smoking in many parts of the country [23], resulting in an additional burden of oral cancer. Some areas like East Khasi Hills district of Meghalaya contribute relatively high proportion with nearly three and half of the cancers among men. Excluding the northeast region, the percentage of highest tobacco-related cancers (TRCS) is in Ahmadabad urban PBCR for men (56.3%) [22].

In conclusion, between 1990 and 2010, the burden of oral cancer in India rapidly increased, accompanied by significant age differences, which made preventing and controlling oral cancer more difficult in India. The disease burden of oral cancer and the trends in its occurrence varied greatly from state to state.

The present study estimates the lip and oral cancer cases, which will help for planning purpose of cancer screening facilities for early detection, awareness of cancer, modifying lifestyle, reduction in tobacco use, and establishment of adequate treatment guidelines that

can effectively be carried out at different levels (district hospitals, teaching hospitals, specialized hospitals, etc.) would also help in the reduction of mortality due to oral cancer as well as the burden of oral cancer.

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Ethics approval and consent to participate

Since it is secondary data and is available in the Public domain for free on the NFHS- 5 - IIPS website. There is no need for ethical clearance.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contribution Statement

All authors contributed equally in this study.

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References

1. Janbabaee g, nadi-ghara a, afshari m, moghadam sr, ashrafi my, et al (2021). Forecasting the incidence of breast, colorectal and bladder cancers in north of iran using time series models; comparing bayesian, arima and bootstrap approaches. Asian pacific journal of environment and cancer, 4(1), 3–7.
2. Jack a, percy c, sobin l, whelan s (2000). International classification of diseases for oncology: Icd-o. World health organization.
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: Globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394-424. https://doi.org/10.3322/caac.21492.
4. Shrestha g, neupane p, lamichhane n, acharya b, siwakoti b, subedi k, et al. Cancer incidence in nepal: A three-year trend analysis 2013-2015. Asian pac j cancer care. 2020;5(3):145-50. Https://doi.Org/10.31557/apjcc.2020.5.3.145-150.
5. Vithana C, Linhart C, Taylor R, Morrell S, Azim S. Trends in sri lankan cause-specific adult mortality 1950-2006. BMC Public Health. 2014;14:644. https://doi.org/10.1186/1471-2458-14-644.
6. Vithana pvsc, dheerasinghe dsaf, handagiripathira hmi, alahapperuma s, nilaweera i, et al (2021). Sri lankan patterns of female cancers: Incidence and mortality over 1995-2010. Asian pacific journal of cancer care, 6(1), 27–3.
7. Khandekar sp, bagdey ps, tiwari rr (2006). Oral cancer and some epidemiological factors: A hospital based study. Indian journal of community medicine, 31(3), 157.
8. Sankaranarayanan R, Ramadas K, Thomas G, Muwonge R, Thara S, Mathew B, et al. Effect of screening on oral cancer mortality in kerala, india: A cluster-randomised controlled trial. Lancet. 2005;365(9475):1927-33. https://doi.org/10.1016/s0140-6736(05)66658-5.
9. Elango JK, Sundaram KR, Gangadharan P, Subhas P, Peter S, Pulayath C, et al. Factors affecting oral cancer awareness in a high-risk population in india. Asian Pac J Cancer Prev. 2009;10(4):627-30.
10. Sherin N, Simi T, Shameena P, Sudha S. Changing trends in oral cancer. Indian J Cancer. 2008;45(3):93-6. https://doi.org/10.4103/0019-509x.44063.
11. Mallath MK, Taylor DG, Badwe RA, Rath GK, Shanta V, Pramesh CS, et al. The growing burden of cancer in india: Epidemiology and social context. Lancet Oncol. 2014;15(6):e205-12. https://doi.org/10.1016/s1470-2045(14)70115-9.
12. Coelho KR. Challenges of the oral cancer burden in india. J Cancer Epidemiol. 2012;2012:701932. https://doi.org/10.1155/2012/701932.
13. Krishna Rao SV, Mejia G, Roberts-Thomson K, Logan R. Epidemiology of oral cancer in asia in the past decade--an update (2000-2012). Asian Pac J Cancer Prev. 2013;14(10):5567-77. https://doi.org/10.7314/apjcp.2013.14.10.5567.
14. Sankaranarayanan R. Oral cancer in india: An epidemiologic and clinical review. Oral Surg Oral Med Oral Pathol. 1990;69(3):325-30. https://doi.org/10.1016/0030-4220(90)90294-3.
15. Aniskevich A, Shimanskaya I, Boiko I, Golubovskaya T, Golparian D, Stanislavova I, et al. Antimicrobial resistance in neisseria gonorrhoeae isolates and gonorrhoea treatment in the republic of belarus, eastern europe, 2009-2019. BMC Infect Dis. 2021;21(1):520. https://doi.org/10.1186/s12879-021-06184-7.
16. National Commission on Population. Population Projections for India and States 2011-2036: Report of the Technical Group on Population Projections. National Commission on Population, Ministry of Health & Family Welfare; 2020.
17. Registrar General I. Census of India 2011: provisional population totals-India data sheet. Office of the Registrar General Census Commissioner, India. Indian Census Bureau. 2011;2.
18. Macfarlane GJ, Boyle P, Scully C. Oral cancer in scotland: Changing incidence and mortality. Bmj. 1992;305(6862):1121-3. https://doi.org/10.1136/bmj.305.6862.1121.
19. Shahrour MS. Cancer of the jaw and oral cavity in the syrian arab republic: An epidemiological study. East Mediterr Health J. 2005;11(3):273-86.
20. Verdecchia A, De Angelis G, Capocaccia R. Estimation and projections of cancer prevalence from cancer registry data. Stat Med. 2002;21(22):3511-26. https://doi.org/10.1002/sim.1304.
21. Jang Bahadur P, Murali D. Projections of burden of cancers: A new approach for measuring incidence cases for india and its states – till 2025. J Cancer Policy. 2018;16:57-62. https://doi.org/10.1016/j.jcpo.2018.04.007.
22. Mathur P, Sathishkumar K, Chaturvedi M, Das P, Sudarshan KL, Santhappan S, et al. Cancer statistics, 2020: Report from national cancer registry programme, india. JCO Glob Oncol. 2020;6:1063-75. https://doi.org/10.1200/go.20.00122.
23. Reddy ks, gupta pc (2004). Tobacco control in india. New delhi: Ministry of health and family welfare, government of india, 43–7.