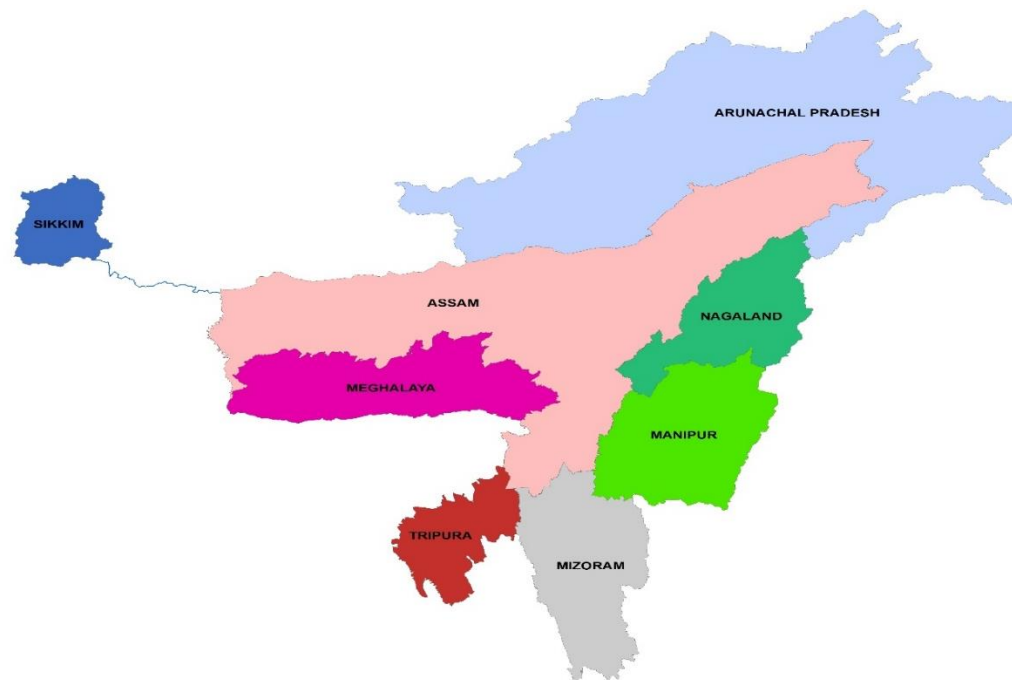




## Chapter 1: Cancer Profile of North-East India

### 1.1 The North East Region



The North eastern region of India comprises eight states: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura.



## 1.2 Number of Cancers cases - Reporting years: 2012 - 2016

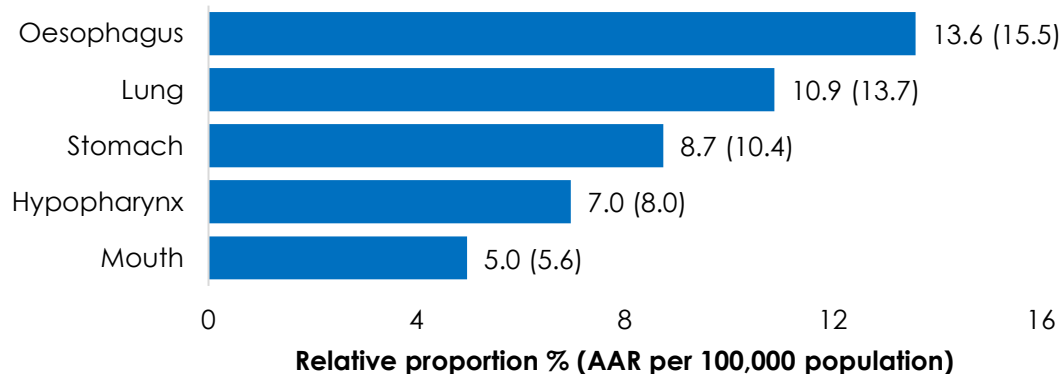
Population Based Cancer Registry	Number of cancer cases registered		
	Males	Females	Total
<b>Assam</b>			
Cachar district	4663	3943	8606
Dibrugarh district	2535	2238	4773
Kamrup urban	6223	4790	11013
<b>Manipur state</b>	3702	4500	8202
<b>Mizoram state</b>	4323	3736	8059
<b>Sikkim state</b>	1172	1131	2303
<b>Meghalaya</b>	4688	2832	7520
<b>Tripura state</b>	6559	4914	11473
<b>Nagaland</b>	1403	992	2395
<b>Arunachal Pradesh</b>			
West Arunachal	1222	1171	2393
Pasighat	321	303	624
<b>Total cancer cases</b>	<b>36811</b>	<b>30550</b>	<b>67361</b>

A total of 67,361 cancer cases have been reported from 11 PBCRs of 8 states from 2012-2016. Tripura PBCR (11,473 cancer cases) reported the highest number of cancers followed by Kamrup urban (11,013 cancer cases).

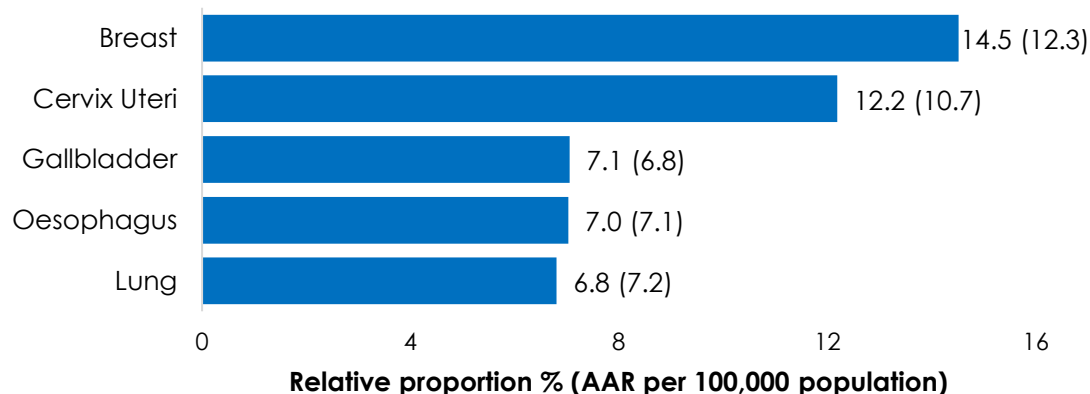


### 1.3 Leading cancer sites: pooled results for NER

#### Males



#### Females

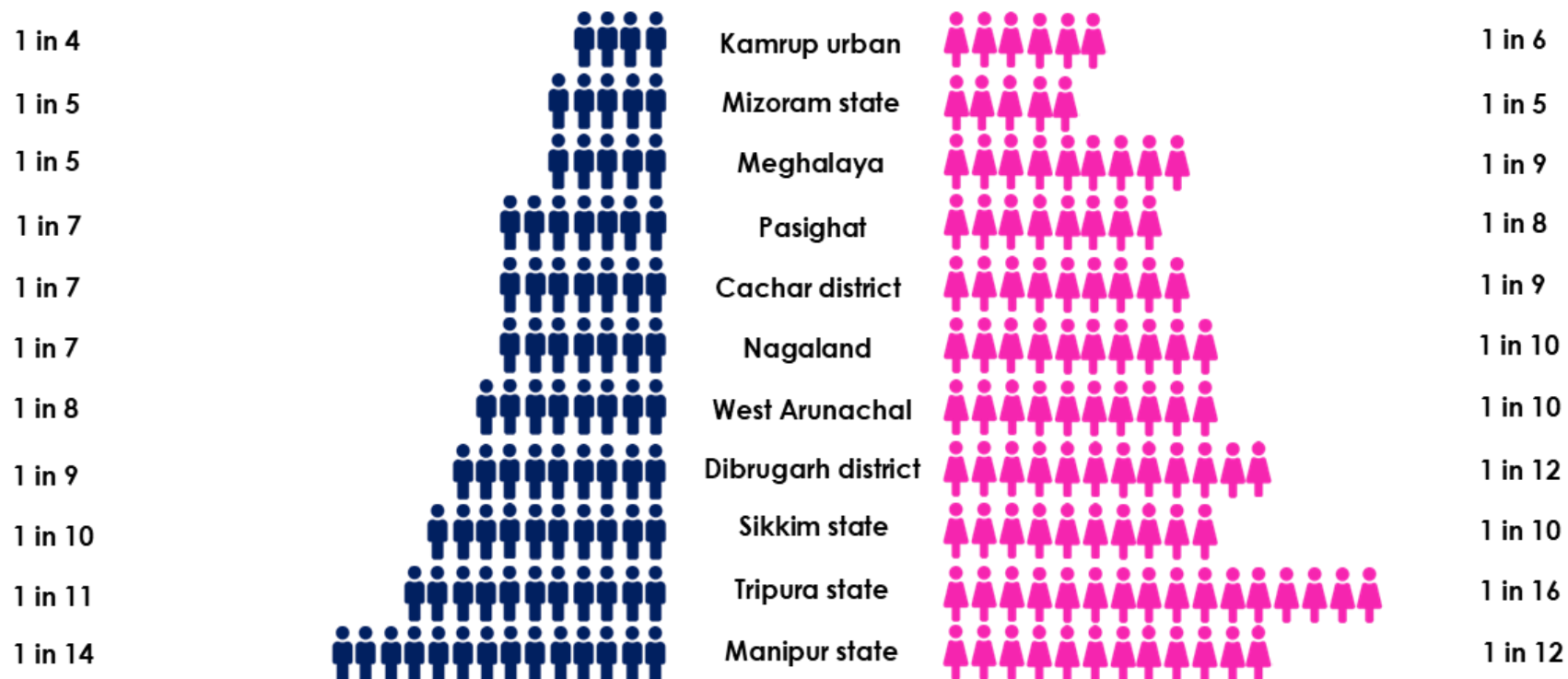


Across North East Region, the proportion of oesophageal cancer (13.6%) is highest among males, followed by lung cancer (10.9%) and stomach cancer (8.7%). In females, the breast is the leading cancer site (14.5%) followed by cervix uteri (12.2 %) and gall bladder (7.1%).





### 1.4 (a) Probability of One in Number of persons developing cancer in 0-74 years of age – All sites of cancer



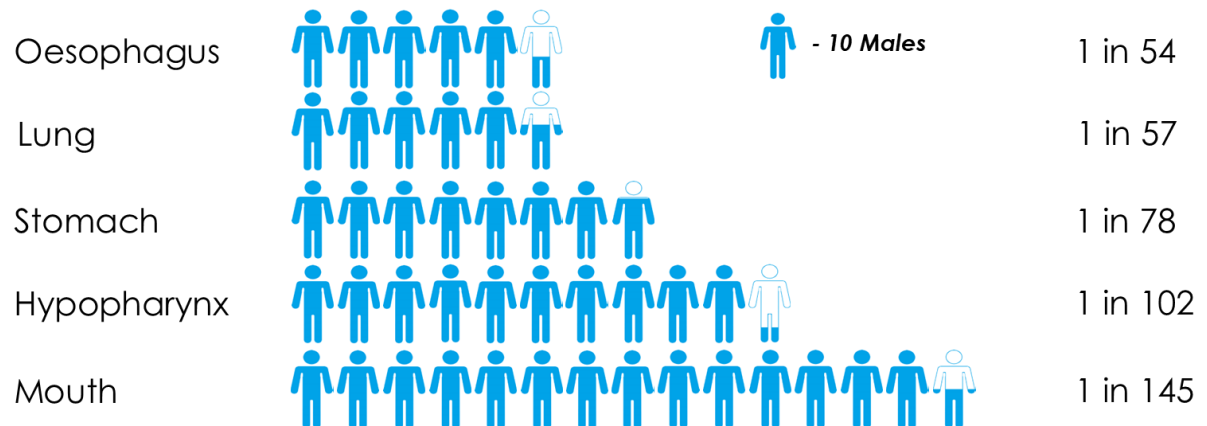
The probability of developing any type of cancer over a lifetime is found to be highest in Kamrup urban (1 in every 4 males and 1 in every 6 females) followed by Mizoram state (1 in every 5 males and 1 in every 5 females) and Meghalaya (1 in every 5 males and 1 in every 9 females).





### 1.4 (b) Probability of One in Number of persons developing cancer in 0-74 years of age – Leading sites of cancer according to pooled analysis

#### Males



#### Females



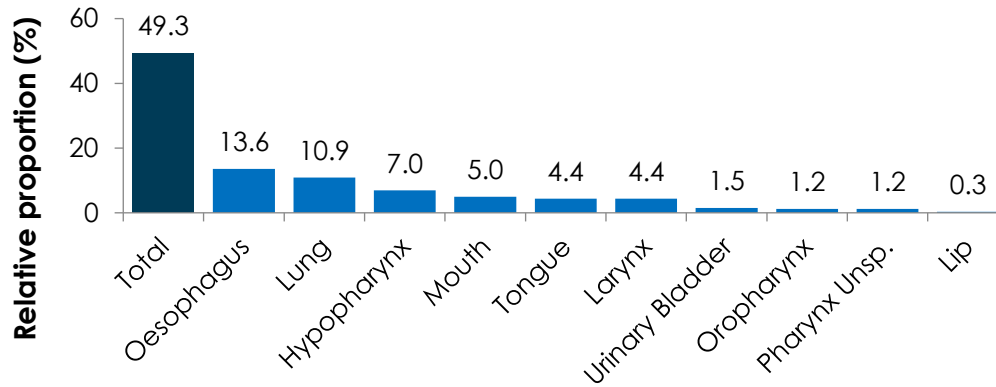
In relation to cancer sites, in males, the probability of developing oesophageal cancer (1 in every 54 males) is highest followed by lung cancer (1 in every 57 males) and stomach cancer (1 in every 78 males). In females, the probability of developing breast cancer (1 in every 76 females) is the highest followed by cancer of cervix uteri (1 in every 86 female) and lung cancer (1 in every 109 females).



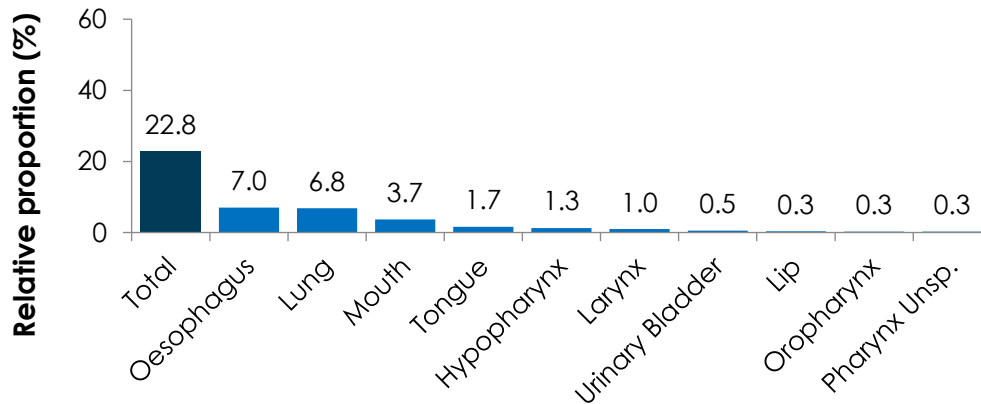


### 1.5 Relative Proportion (%) of Cancer Sites Associated with the Use of Tobacco

#### Males



#### Females

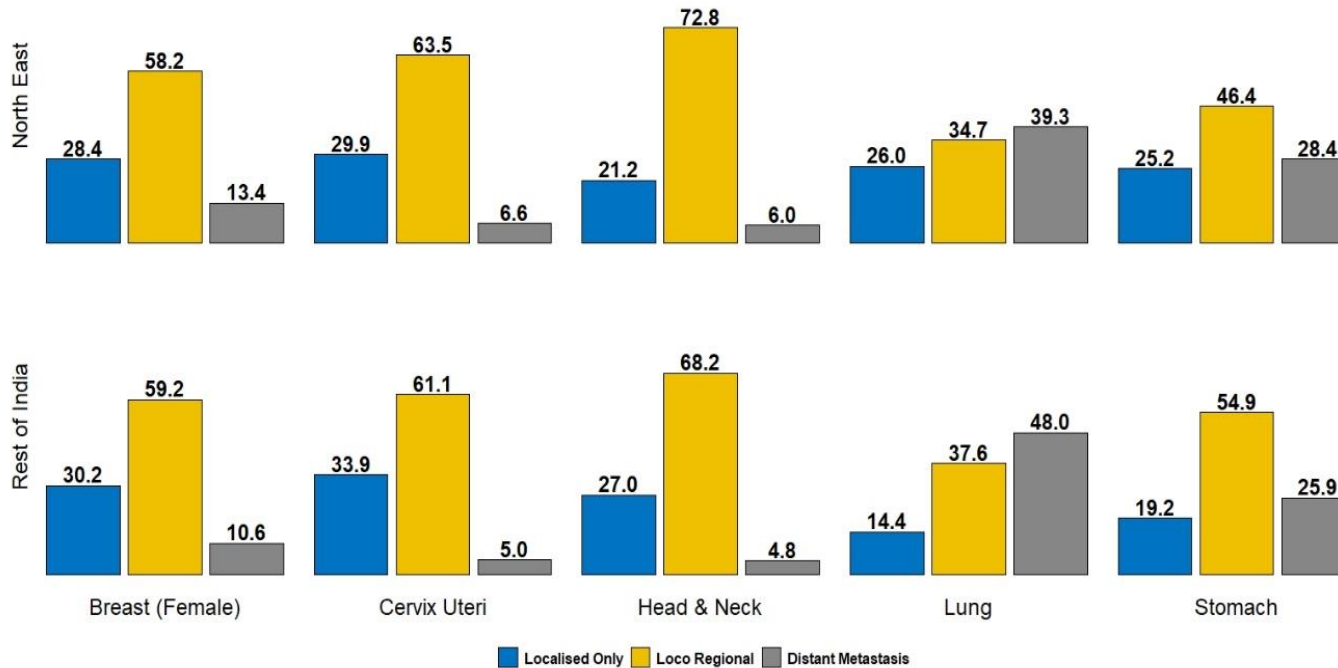


Nearly half (49.3%) of cancers in males and close to one-fourth (22.8 %) in females are tobacco use related sites. Among these, oesophagus (13.6% in males; 7.0 % in females) followed by lung (10.9% in males; 6.8% in females) constitute the leading sites.





### 1.6 Clinical extent of disease at the time of diagnosis for selected anatomic sites - HBCR



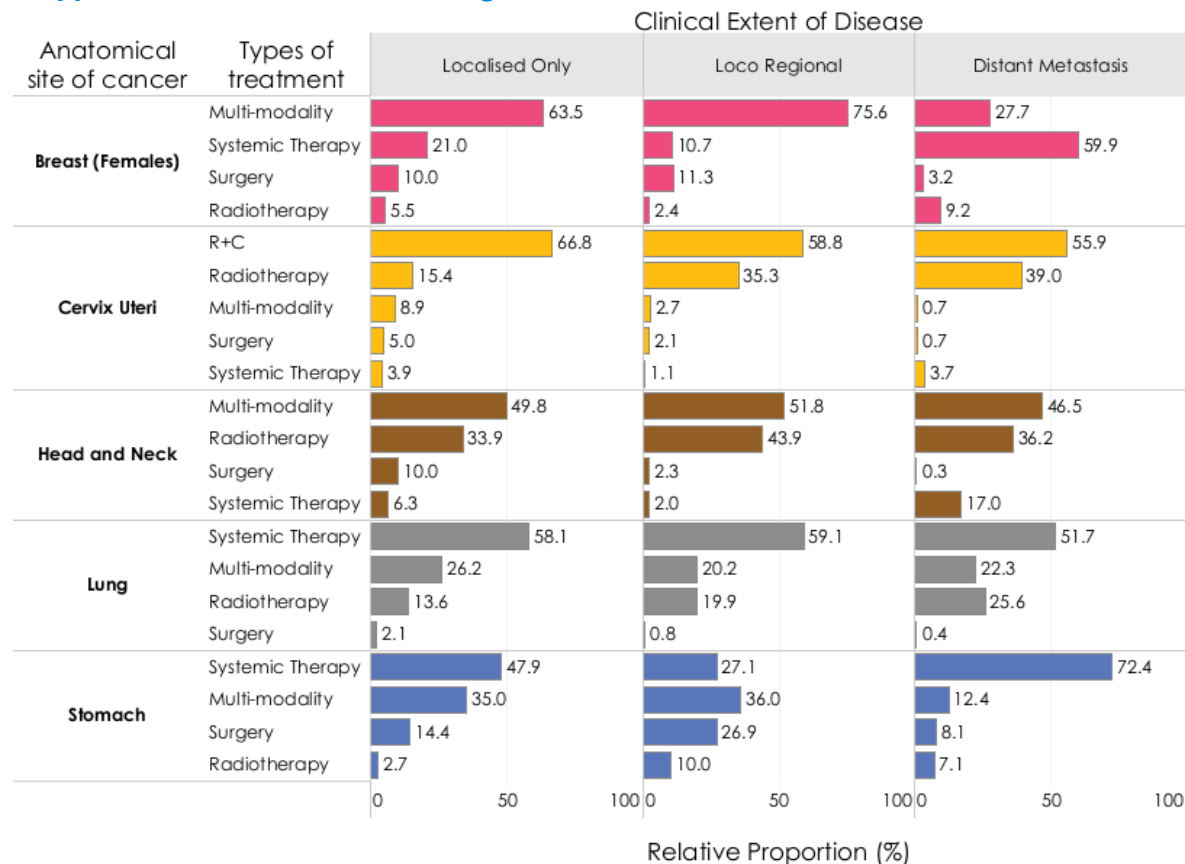
Cases only treated at the reporting institution.

The proportion of cancers diagnosed at the stage of distant metastasis is higher for head & neck cancer (72.8%), followed by cancer of cervix uteri (63.5%), breast cancer (58.2%), and stomach cancer (46.4%). For lung cancer, 39.3% and 34.7% of cases are reported to be at loco-regional and distant metastasis stages, respectively, at the time of diagnosis. Only one-fourth of cancer cases are reported at a localised stage at the time of diagnosis for breast cancer (28.4%), cancer of cervix uteri (29.9%), head & neck (21.2%), lung (26.0%) and stomach (25.2%).





### 1.7 Relative Proportion of types of treatment according to clinical extent of disease for selected Anatomical sites – HBCR



\*Multimodality treatment: combines more than one treatment method (surgery, radiotherapy, systemic therapy)

\*\*Systemic therapy: Comprised of chemotherapy, immunotherapy or targeted therapy

Cases only treated at the reporting institution

Over half of the breast cancer patients with localised and loco-regional disease extent have received multimodality treatment, whereas more than half of patients with distant metastatic disease received systemic therapy. Among cervical cancer patients, more than half of them have received a combination of radiotherapy and chemotherapy, irrespective of the disease stage. Multimodality treatment constitutes the treatment modality for about half of the head and neck cancer patients for all stages. In patients with lung and stomach cancer, systemic therapy is the primary treatment mode for localized and distant metastasis stages.

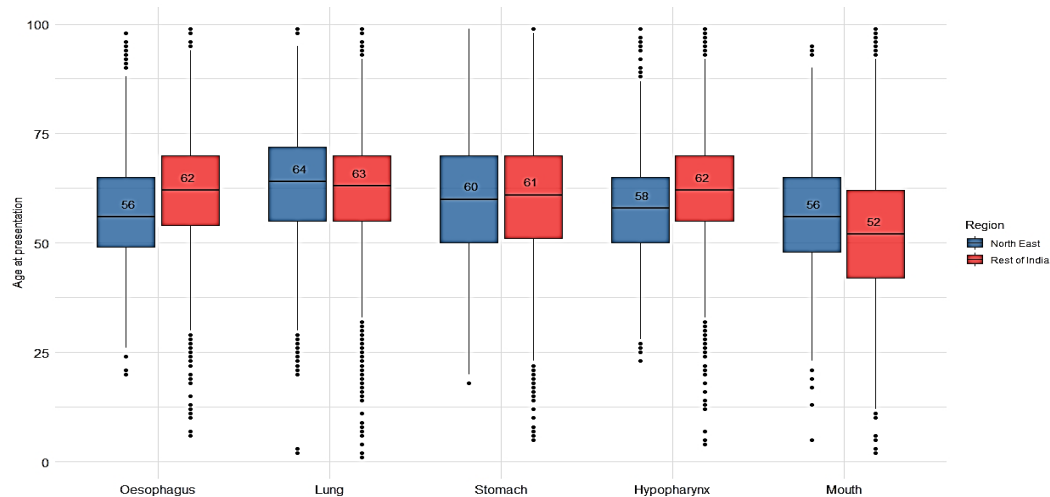




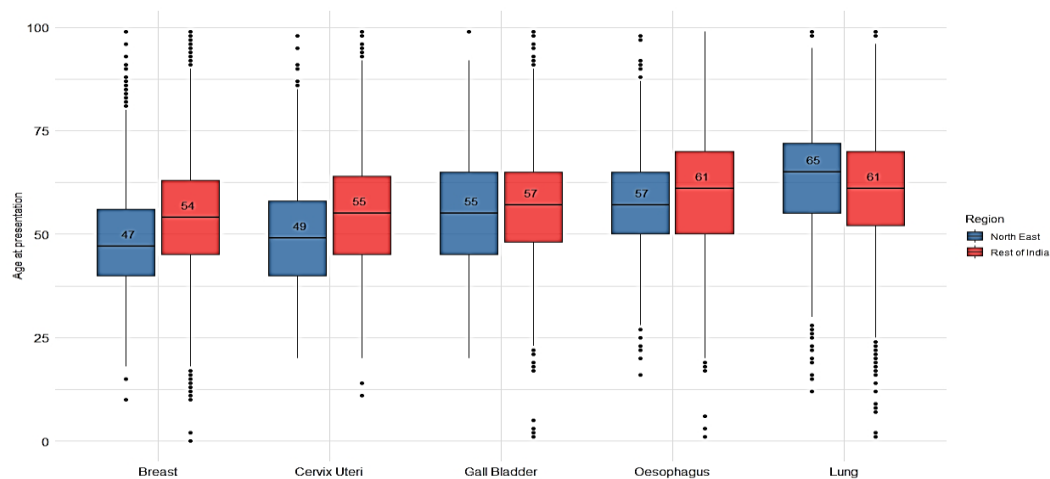


### 1.8 Median age at cancer diagnosis: North-East Region (NER) vs Rest of India

#### Males



#### Females



The median age at diagnosis in males is found to be less in NER compared to rest of India, for oesophageal cancer (56 years in NER; 62 years in rest of India) and cancer of hypopharynx (58 years in NER; 62 years in rest of India). In females, the median age at diagnosis was less in top four leading cancer sites except lung (Breast: 47 years in NER & 54 years in rest of India, cervix uteri: 49 years in NER & 56 years in rest of India, gall bladder: 56 years in NER & 57 years in rest of India, oesophagus: 57 years in NER & 61 years in rest of India).





### 1.9 Age-Specific Incidence Rate- All sites (0 to 75+) according to registry and gender

#### Males

	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
<b>Manipur state</b>	5.1	4.2	3.7	5.7	5.3	8.1	17.4	23.0	38.3	54.0	109.6	165.1	230.2	381.9	490.9	466.1
<b>Imphal West district</b>	6.9	8.5	5.5	12.1	10.5	15.6	25.2	46.1	47.2	75.4	140.6	226.4	317.6	593.7	798.9	787.6
<b>Mizoram state</b>	9.2	5.8	7.8	6.9	9.6	13.8	28.5	63.2	153.8	260.7	474.2	668.6	794.2	1106.9	1289.3	1527.7
<b>Aizawl district</b>	15.9	8.4	15.5	10.3	11.9	19.2	37.5	87.7	198.5	345.3	664.9	893.0	1091.3	1396.6	1466.4	1894.5
<b>Sikkim state</b>	4.0	6.6	1.2	5.2	8.1	9.4	18.7	26.1	46.2	90.0	135.5	234.9	371.5	473.3	666.6	808.0
<b>Tripura state</b>	6.1	3.7	3.5	5.8	5.1	7.7	17.9	23.3	50.4	97.0	167.1	272.2	393.7	432.8	489.1	446.2
<b>West Arunachal</b>	5.5	2.0	5.0	5.8	13.5	19.5	26.2	47.0	76.3	160.5	263.0	322.5	472.2	500.9	581.8	322.4
<b>Papumpare district</b>	10.5	1.9	11.3	8.0	24.0	43.2	60.0	94.5	105.8	263.3	520.2	523.4	1019.3	1022.6	1368.2	773.2
<b>Meghalaya</b>	2.0	2.7	3.3	4.8	6.8	13.2	33.2	99.5	205.4	376.8	523.8	600.7	713.6	720.5	843.5	691.4
<b>East Khasi Hills district</b>	3.3	2.3	2.7	3.7	6.8	13.5	46.5	130.9	259.3	483.8	688.9	737.0	923.5	953.3	1177.2	840.4
<b>Nagaland</b>	2.5	4.6	2.8	9.1	9.5	22.1	34.8	49.4	98.9	183.7	311.6	411.3	435.5	654.2	773.4	677.3
<b>Pasighat</b>	10.9	5.7	2.2	9.8	24.1	13.7	52.7	50.1	72.4	215.3	255.3	318.2	465.3	610.4	761.6	668.0
<b>Cachar district</b>	7.0	6.1	5.7	6.1	9.6	19.1	30.1	56.2	93.4	186.2	284.6	417.2	531.9	679.6	785.1	698.5
<b>Dibrugarh district</b>	3.9	3.8	4.6	4.3	8.7	10.1	16.8	45.4	50.3	131.8	193.6	243.8	381.0	541.4	594.1	565.7
<b>Kamrup urban</b>	7.2	7.4	10.0	11.9	15.5	24.3	34.5	74.5	132.4	238.9	396.9	686.9	780.8	1220.3	1477.0	1633.5

#### Females

	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
<b>Manipur state</b>	5.1	3.3	3.8	6.0	12.1	16.1	37.1	54.2	78.4	104.1	153.8	189.5	267.3	342.8	404.6	313.6
<b>Imphal West district</b>	11.8	9.7	4.9	15.2	29.1	28.5	61.0	83.0	131.9	173.2	220.4	254.4	423.5	501.0	574.6	524.8
<b>Mizoram state</b>	6.6	5.6	6.8	7.8	15.2	26.7	57.3	129.0	218.8	228.0	396.8	460.3	607.2	841.0	1026.9	997.1
<b>Aizawl district</b>	12.2	3.2	12.6	6.7	18.4	29.3	61.8	148.9	275.3	278.3	494.3	564.6	689.7	1022.6	1298.1	1470.3
<b>Sikkim state</b>	8.5	3.8	5.0	5.3	11.6	23.9	41.6	67.0	94.2	168.4	220.0	250.0	338.3	418.4	558.4	565.5
<b>Tripura state</b>	3.7	2.6	3.2	4.5	6.4	14.8	28.6	49.6	70.3	122.1	150.4	201.4	233.9	211.6	225.3	156.9
<b>West Arunachal</b>	5.2	1.2	3.5	4.9	17.1	26.8	41.6	79.9	117.7	185.7	299.4	301.6	420.6	276.3	368.2	312.5
<b>Papumpare district</b>	4.4	1.9	3.0	5.8	40.0	37.3	92.0	168.3	218.0	353.1	675.0	749.9	1164.7	661.8	977.9	623.4
<b>Meghalaya</b>	1.4	1.2	1.1	2.7	6.2	14.5	27.8	53.5	112.8	170.5	268.3	318.1	400.1	400.9	478.6	429.5
<b>East Khasi Hills district</b>	1.1	2.0	0.4	2.9	6.7	12.8	30.9	58.2	127.9	186.3	336.3	379.9	520.5	541.5	593.4	564.2
<b>Nagaland</b>	3.1	2.1	1.5	4.4	9.7	23.3	47.0	95.6	130.7	182.4	251.7	256.3	316.4	351.5	337.0	215.9
<b>Pasighat</b>	0.0	3.0	2.2	4.9	22.7	28.6	85.8	108.9	193.9	252.4	373.3	364.3	353.7	405.2	383.0	274.9
<b>Cachar district</b>	2.6	2.8	3.6	3.9	17.1	34.8	62.2	138.4	178.9	237.3	289.5	309.8	311.5	362.6	324.2	282.8
<b>Dibrugarh district</b>	2.6	2.0	1.2	2.7	11.2	18.0	40.2	69.5	107.6	177.0	217.0	248.3	272.3	297.3	296.1	172.4
<b>Kamrup urban</b>	6.6	7.5	5.3	15.2	16.2	41.9	57.4	108.2	160.6	282.9	416.5	532.3	605.9	796.7	943.5	796.7

The age-specific incidence rate in males is highest in the age group of 70 to 74 years in most places except for Mizoram, Aizawl district, Sikkim, and Kamrup urban, where the rate is highest in the 75+ age group. In females, the highest incidence is observed in 60-64 years in West Arunachal, Papumpare district and Tripura, while Sikkim and Aizawl district report the highest incidence rates





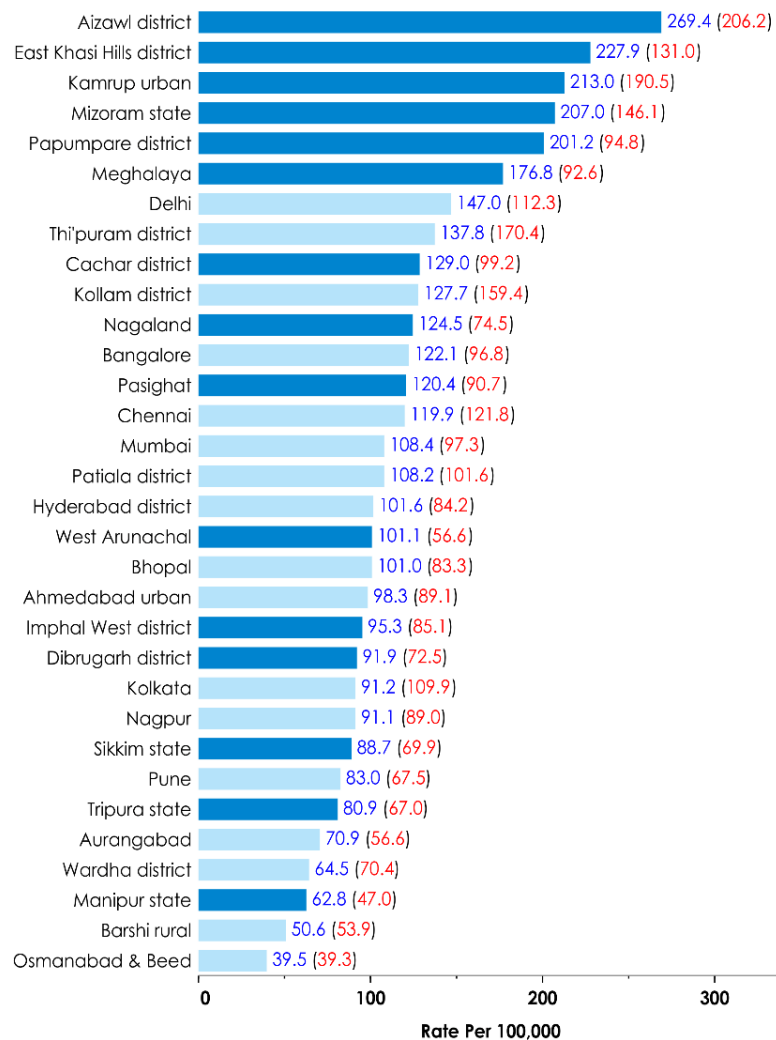
in the 75+ year age group. Nagaland, Pasighat, Cachar and Dibrugarh record the highest incidence in 65-69 years age group. In the remaining places, the highest age-specific incidence rate is observed in the 70-74-year age group. With regard to gender difference in the age-specific incidence rates, the ASpR was significantly higher in males in the age groups of 50-74 years in Mizoram, Tripura, West Arunachal, Nagaland, Cachar, Dibrugarh and Kamrup. The ASpR was also significantly higher in males in the age groups of 75 plus years in Mizoram, Sikkim, Tripura, West Arunachal, Nagaland, Pasighat, Cachar, Dibrugarh and Kamrup. In Meghalaya, the ASpR was high in males in all the age groups. In Manipur, the ASpR was significantly less in males in the 25-49- and 50-74-years age group.

### 1.10 Comparison of Age adjusted Incidence rates (AAR) for all cancers across North-East India

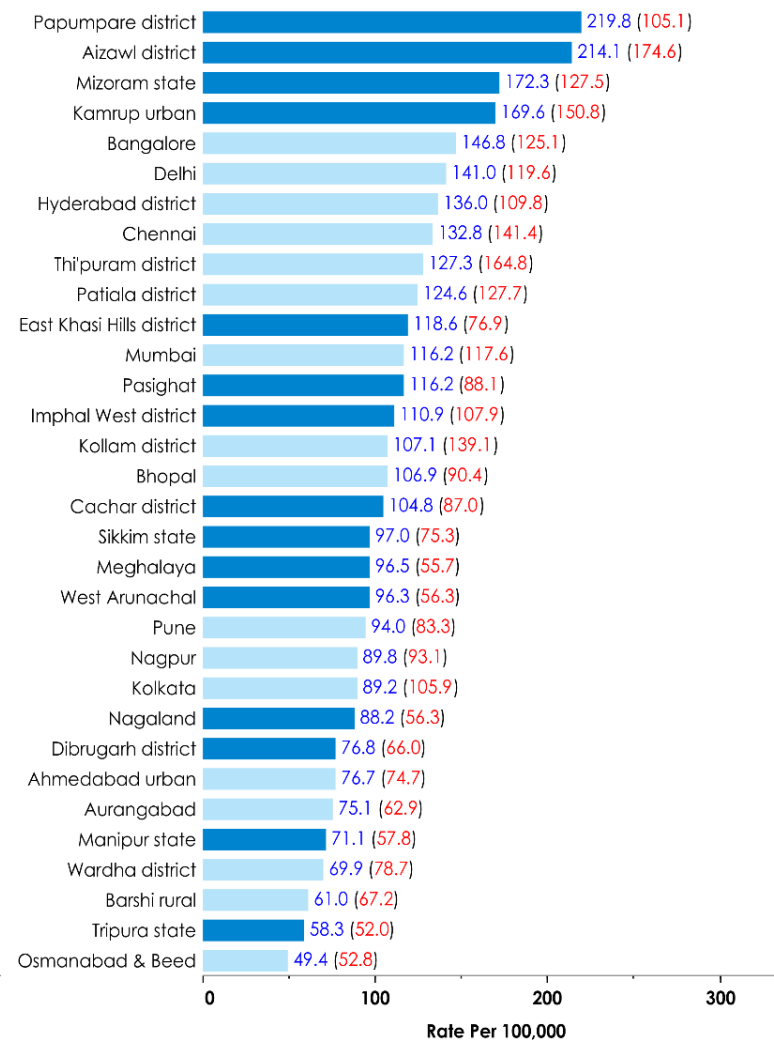
The age adjusted incidence rate for all cancer sites is the highest among males in Aizawl district (269.4 per 100,000 population) and females in Papumpare district in Arunachal Pradesh (219.8 per 100,000 population). East Khasi hills district in Meghalaya reports the highest AAR for cancer of the tongue (males), mouth (females), oropharynx (males), hypopharynx (males), oesophagus (males and females) and larynx (males and females). In Kamrup urban, the highest AAR has been observed for cancer of the oropharynx (females), hypopharynx (females) and gall bladder (both genders). The AAR for cancer of the nasopharynx is seen to be the most in both genders in Nagaland. Papumpare district also records the steepest AAR rates for cancer of the stomach (males), liver (both genders), cervix uteri, ovary and thyroid. The AAR for stomach (males), colon, colorectal and lung cancer in both genders is at a maximal value in Aizawl district. In females, the AAR is the most for Non-Hodgkins Lymphoma in Imphal West district and brain cancer in Sikkim state.



### All Sites - Males



### All Sites - Females

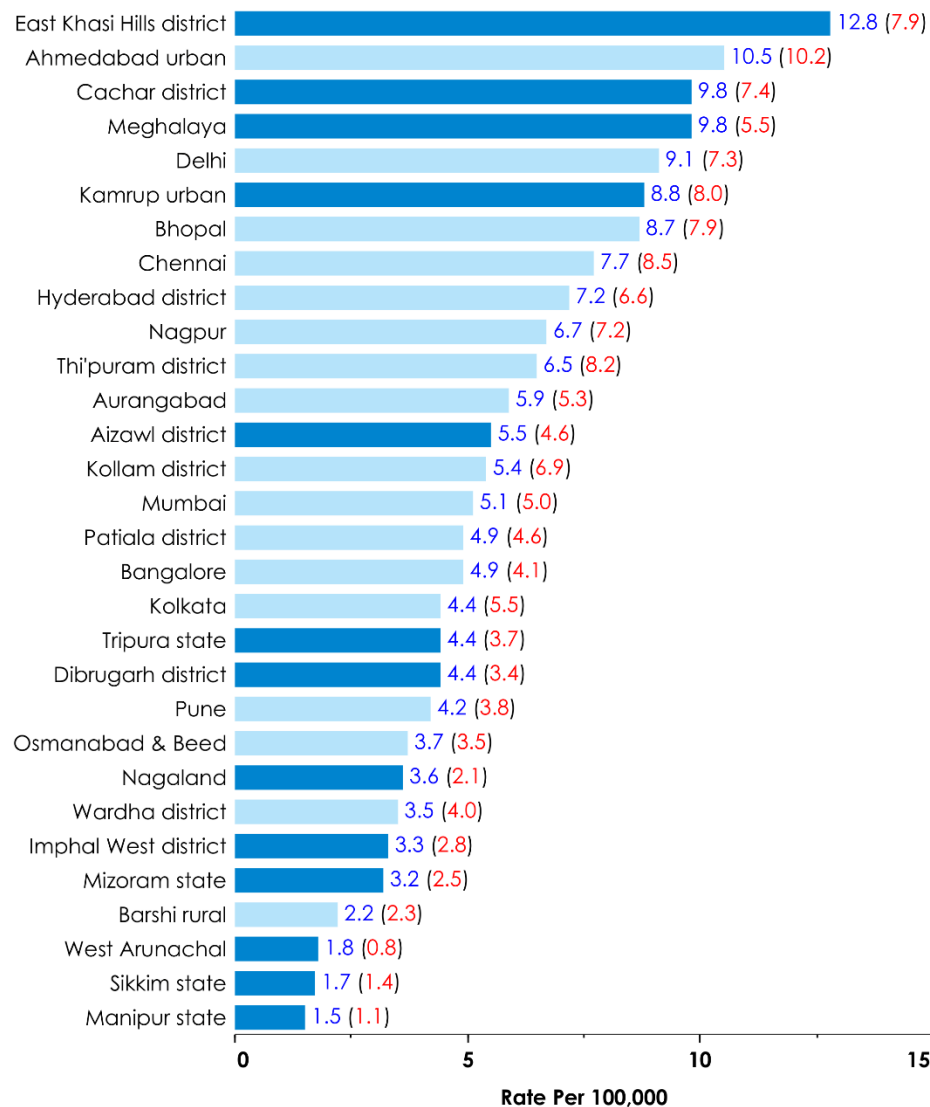


AAR (CR) ■ North-East India ■ Rest of India

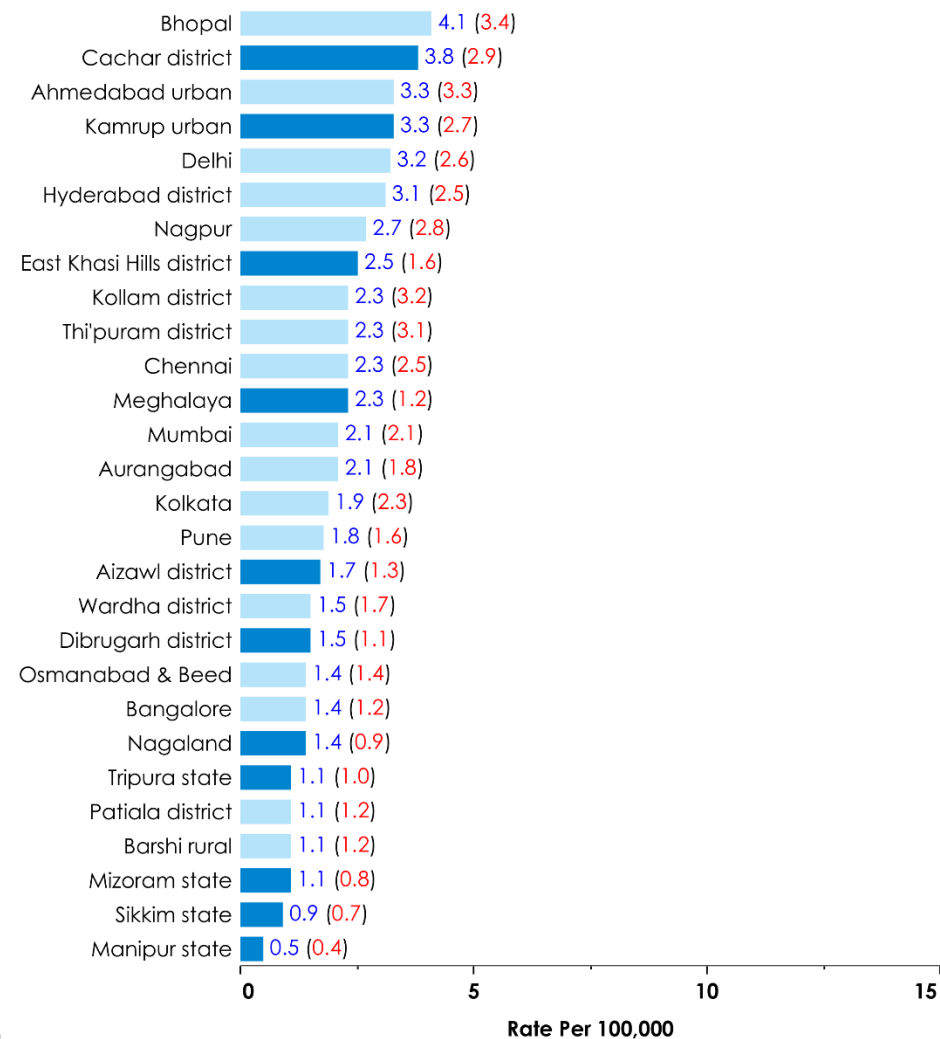




### Tongue - Males



### Tongue - Females

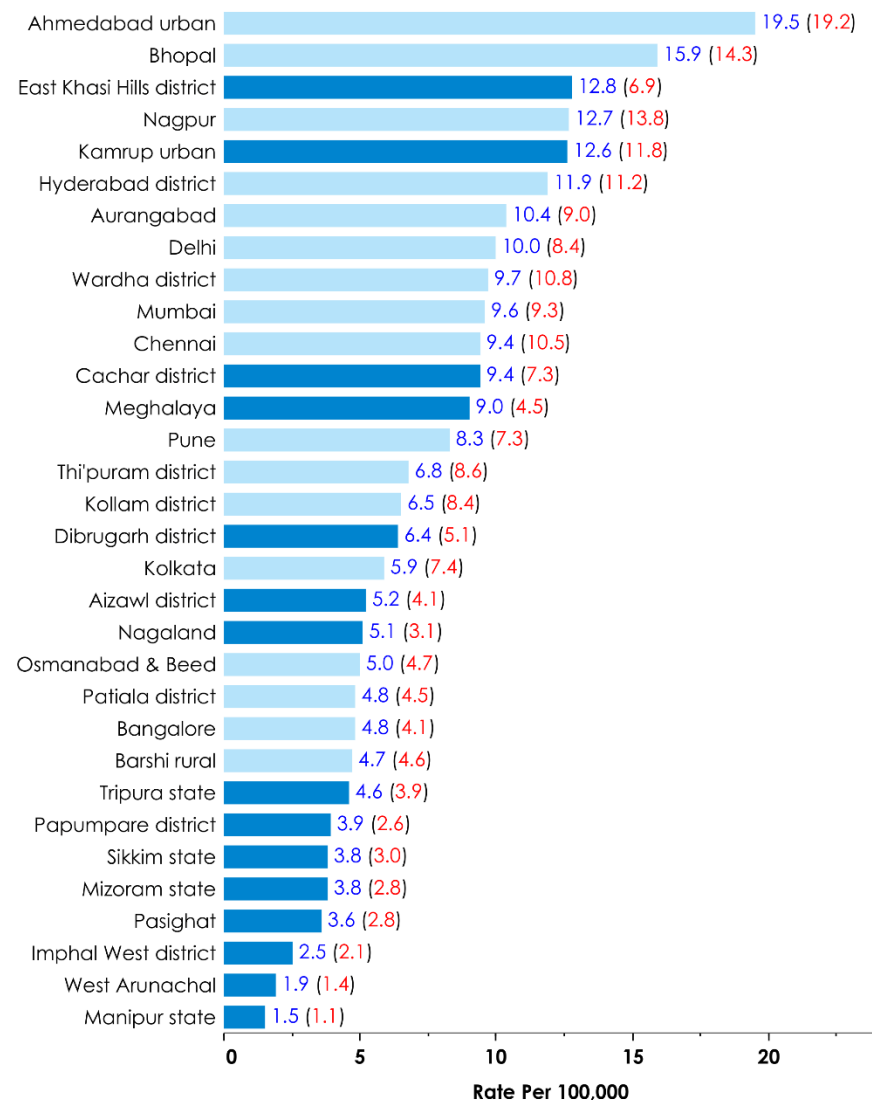


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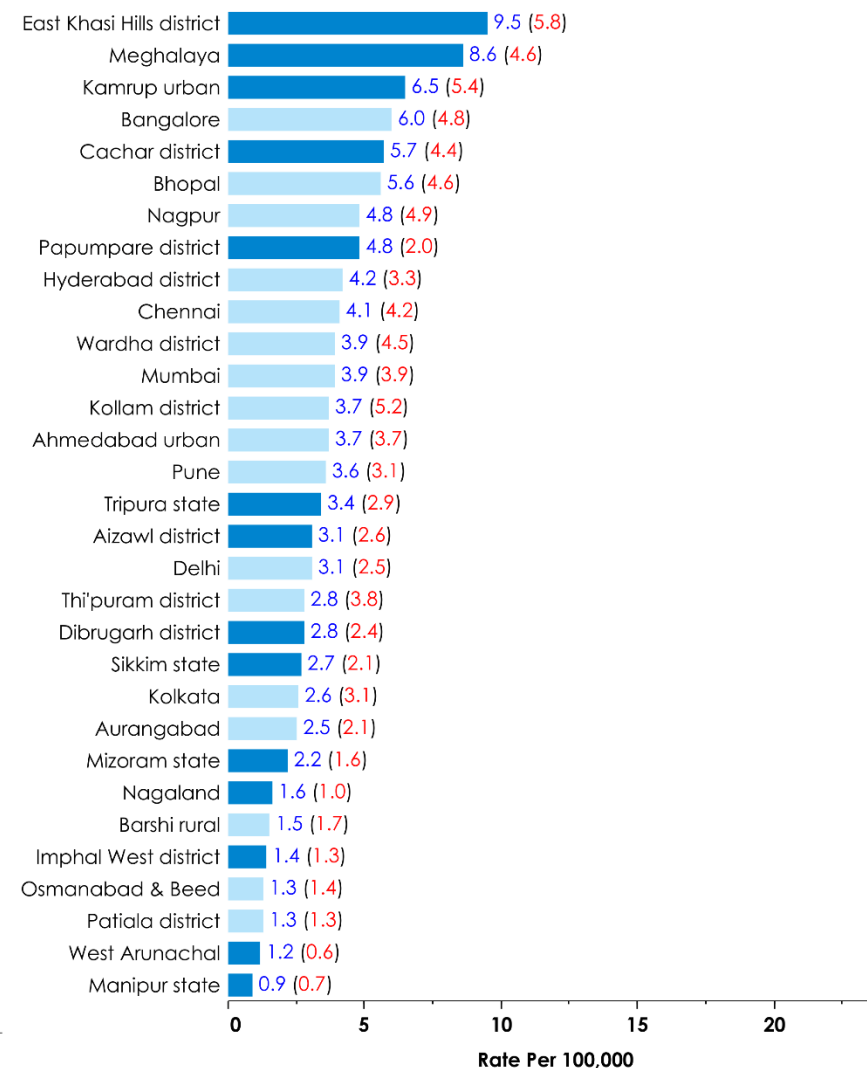




### Mouth - Males



### Mouth - Females

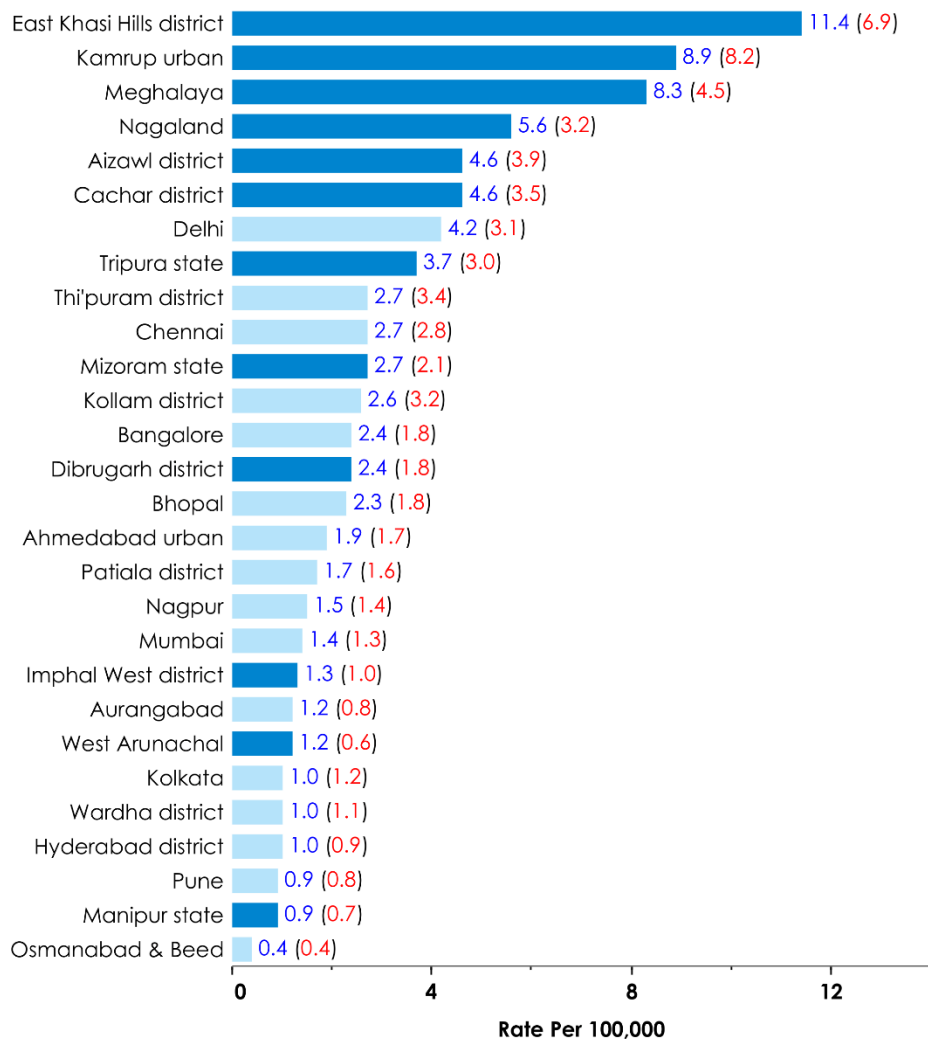


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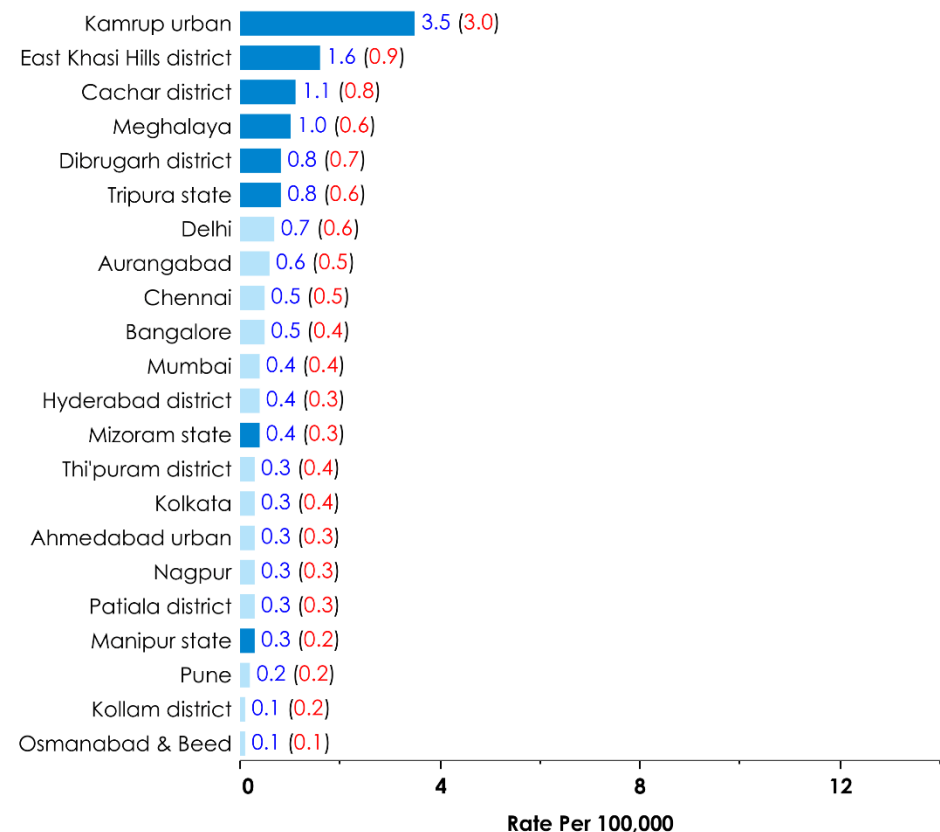




### Oropharynx - Males



### Oropharynx - Females

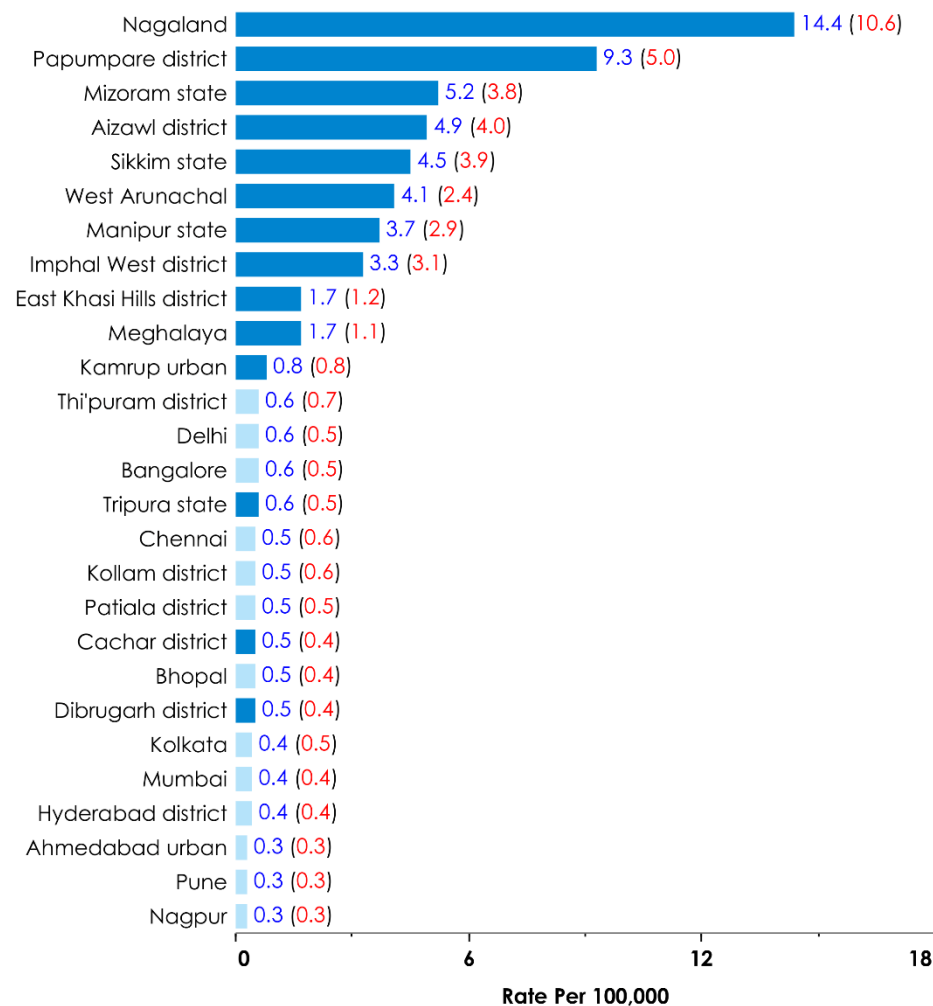


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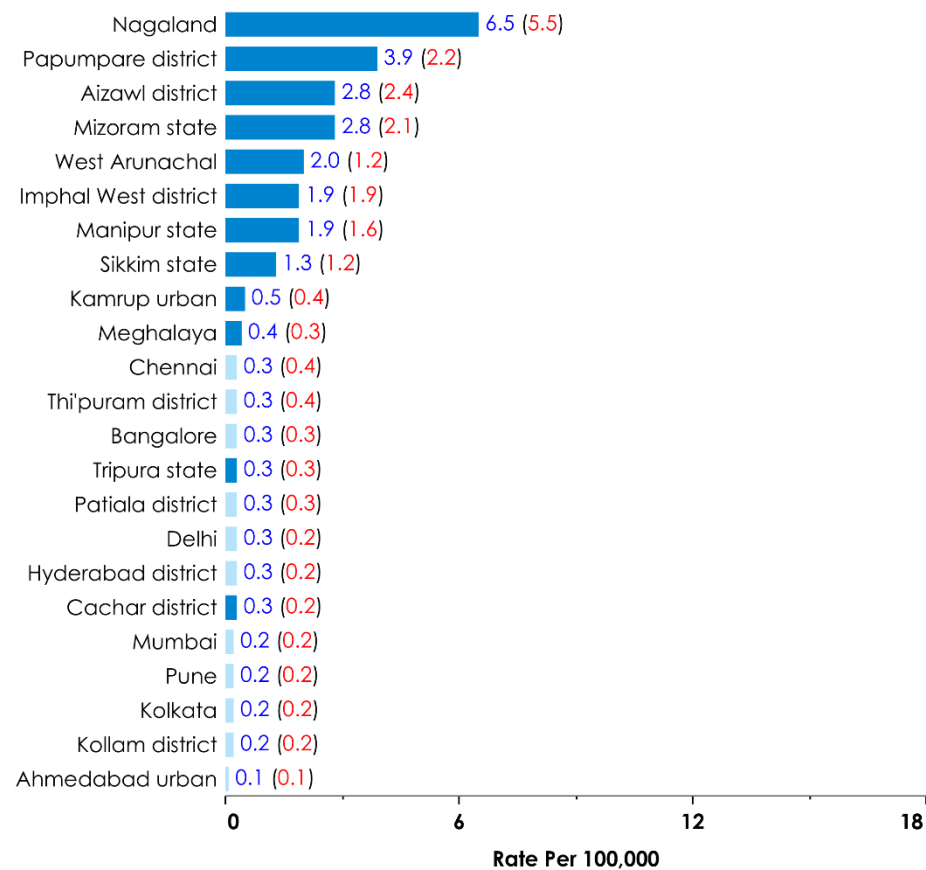




### Nasopharynx - Males



### Nasopharynx - Females



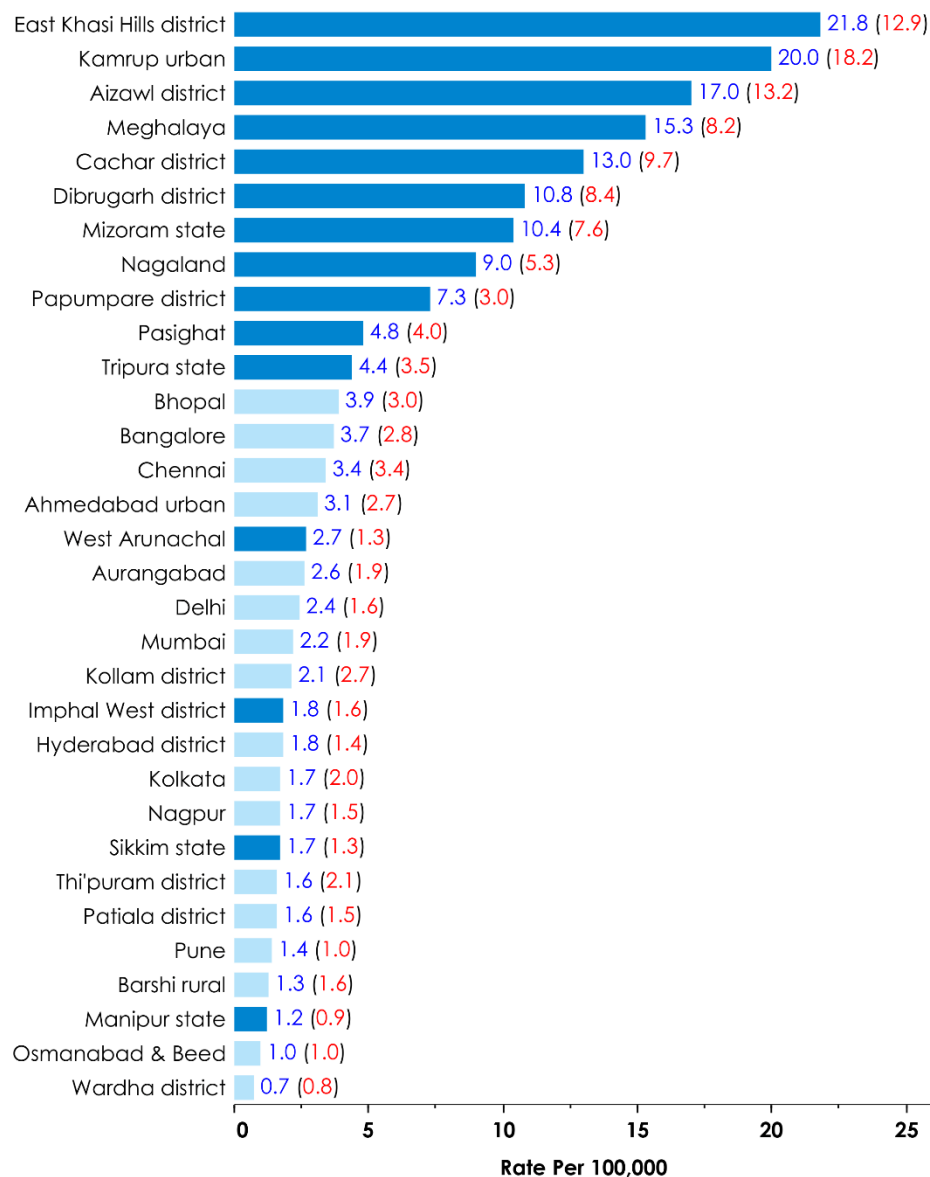
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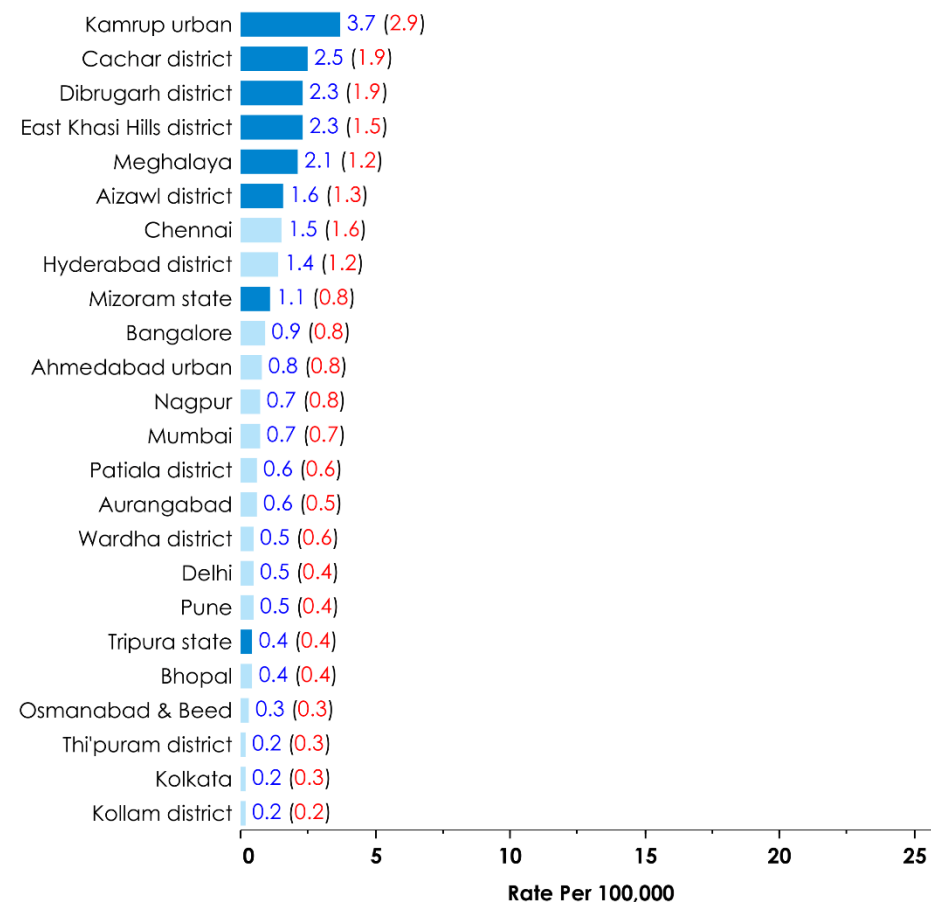




### Hypopharynx - Males



### Hypopharynx - Females

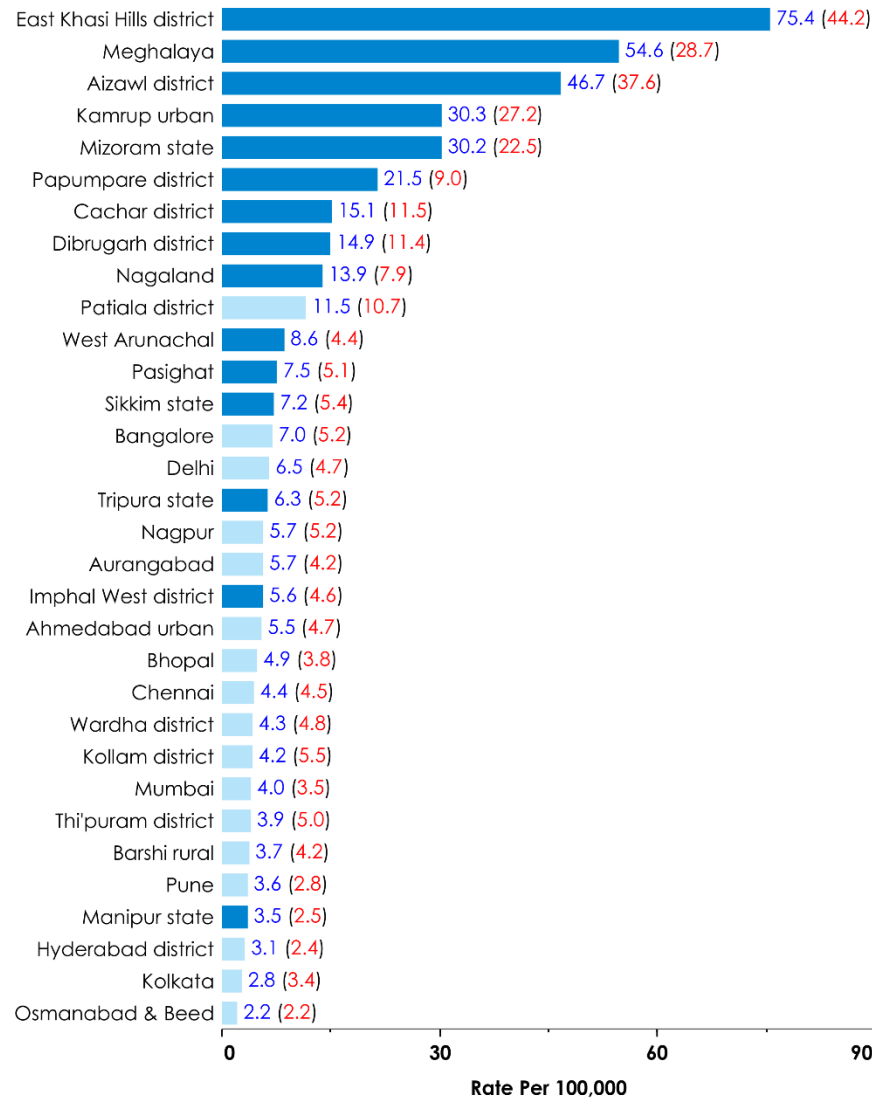


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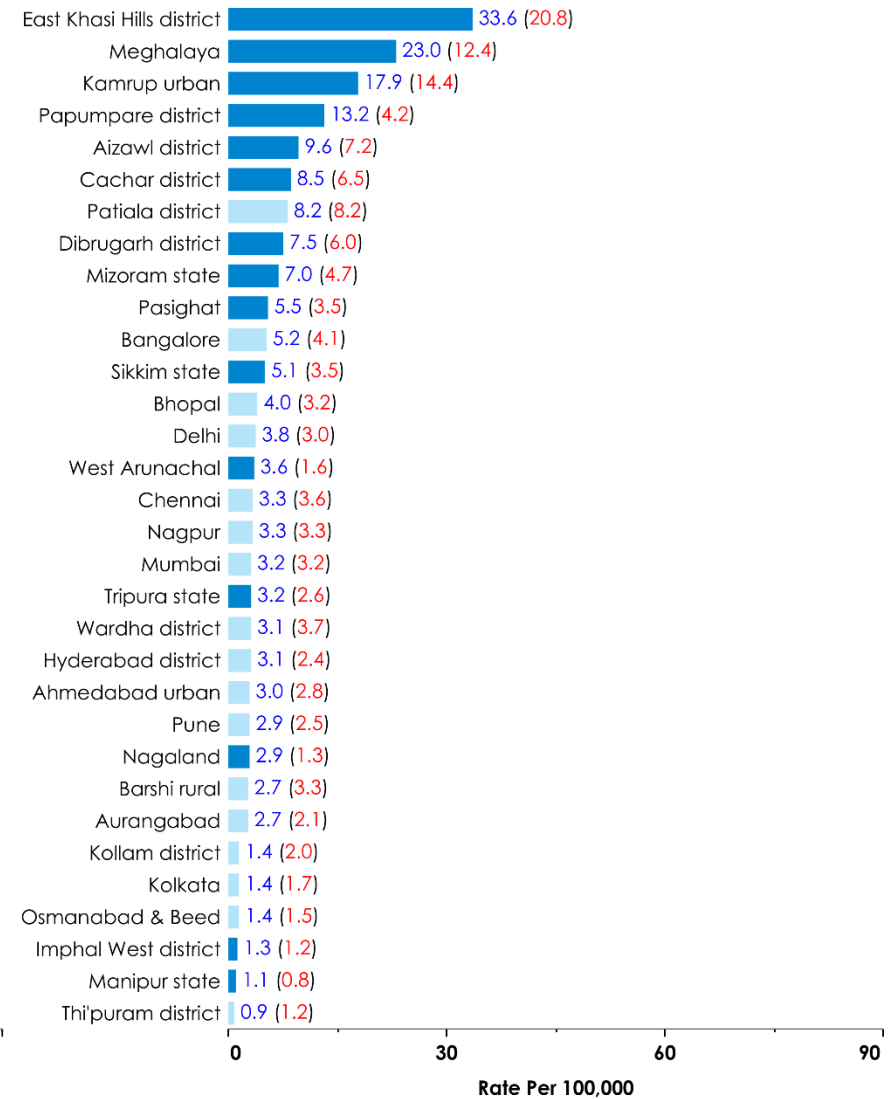




### Oesophagus - Males



### Oesophagus - Females

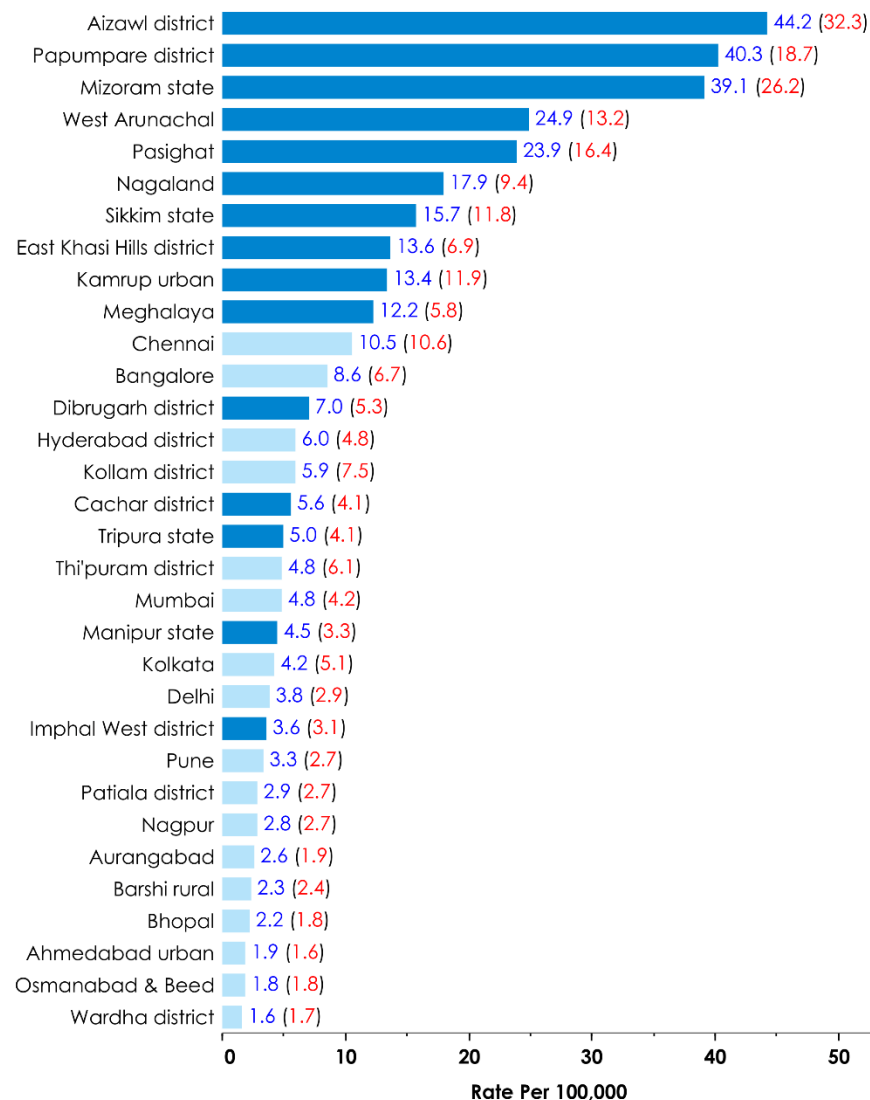


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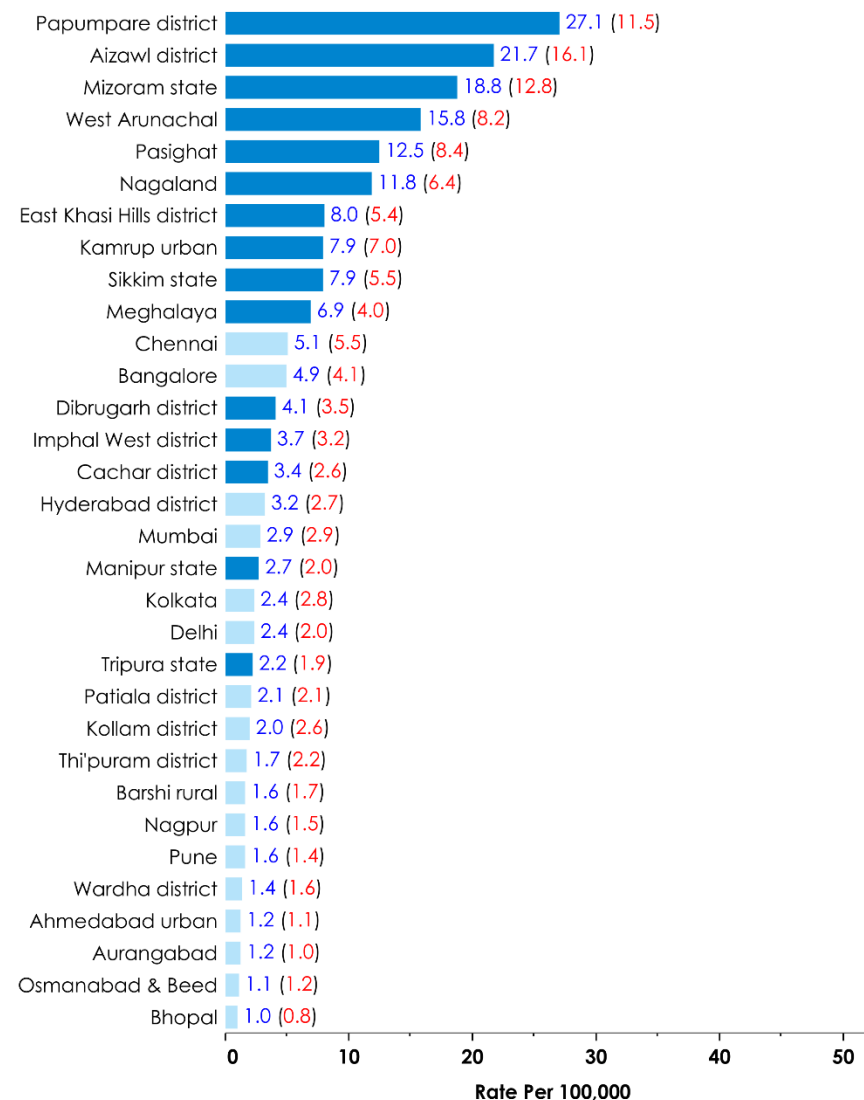




### Stomach - Males



### Stomach - Females

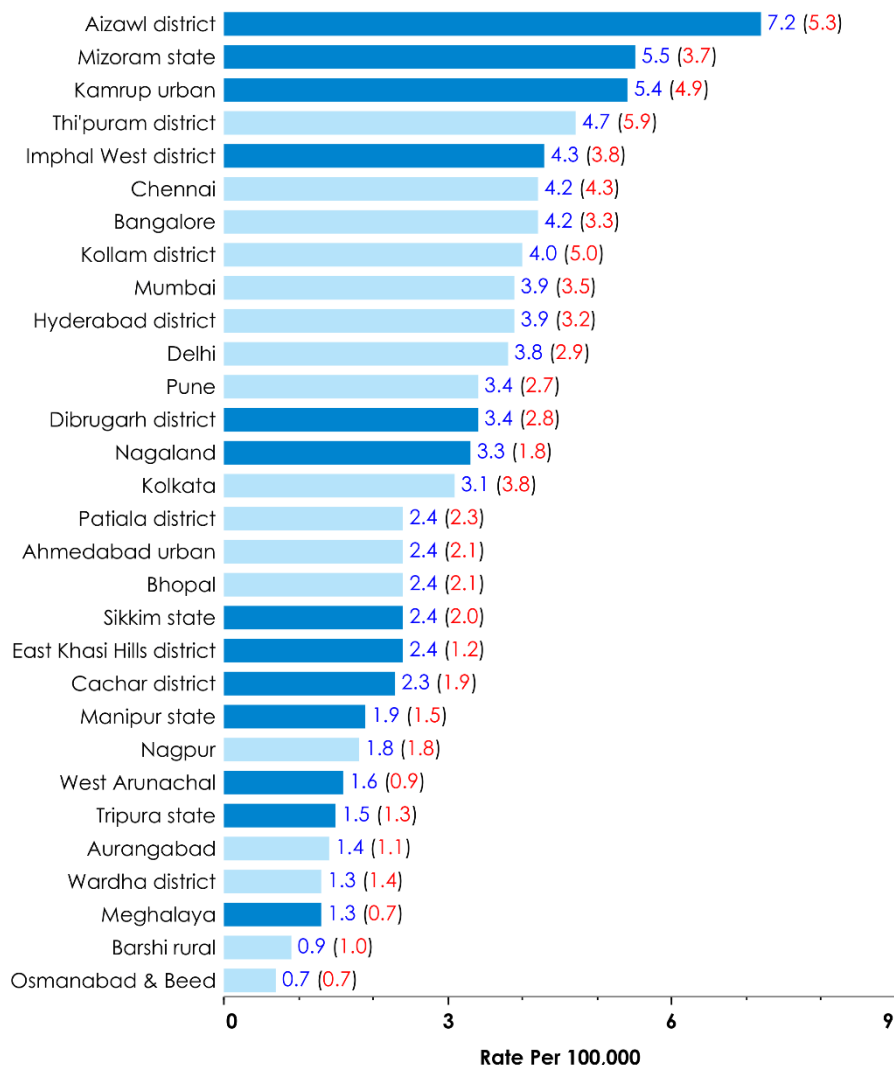


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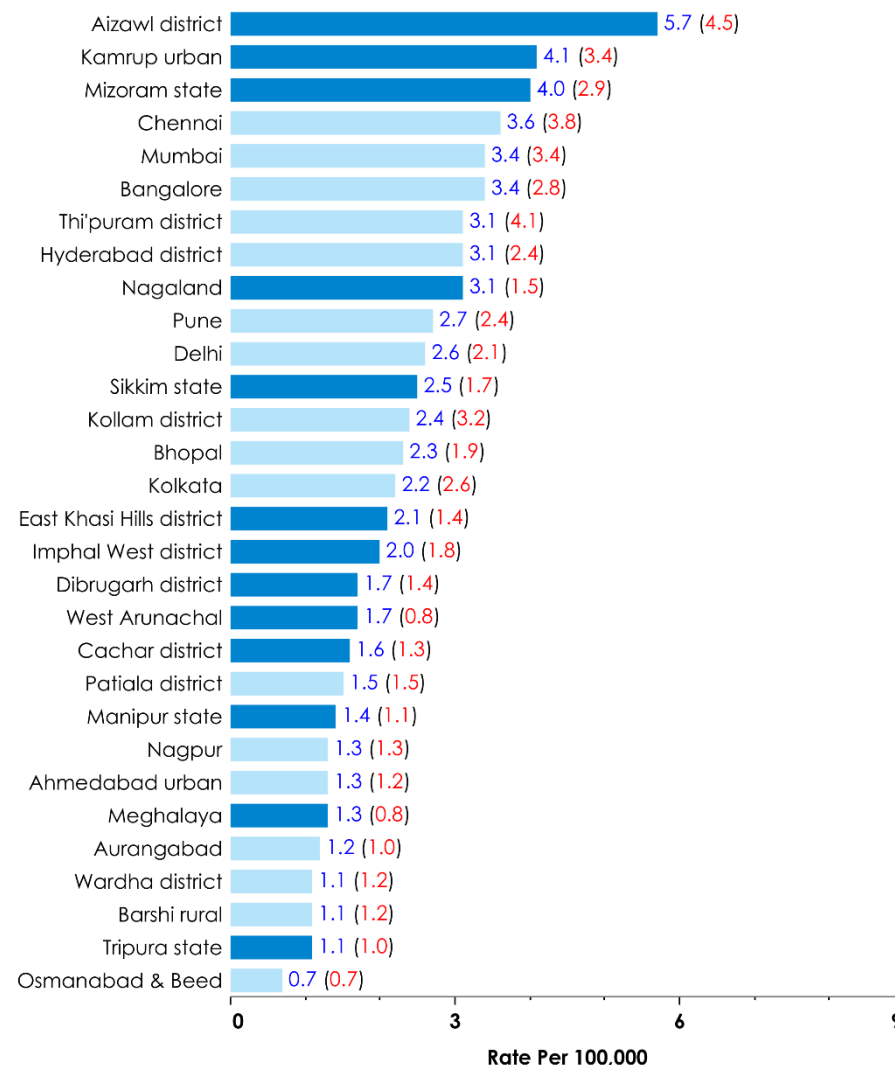




### Colon - Males



### Colon - Females

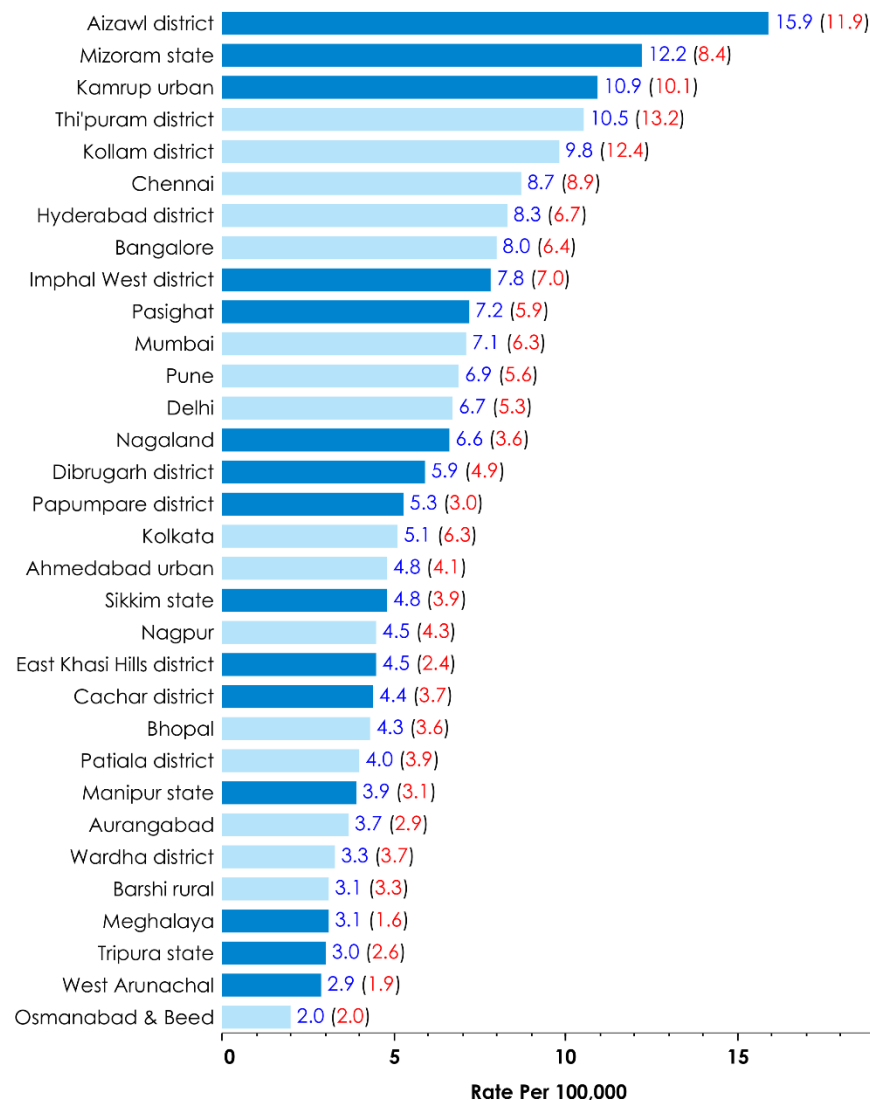


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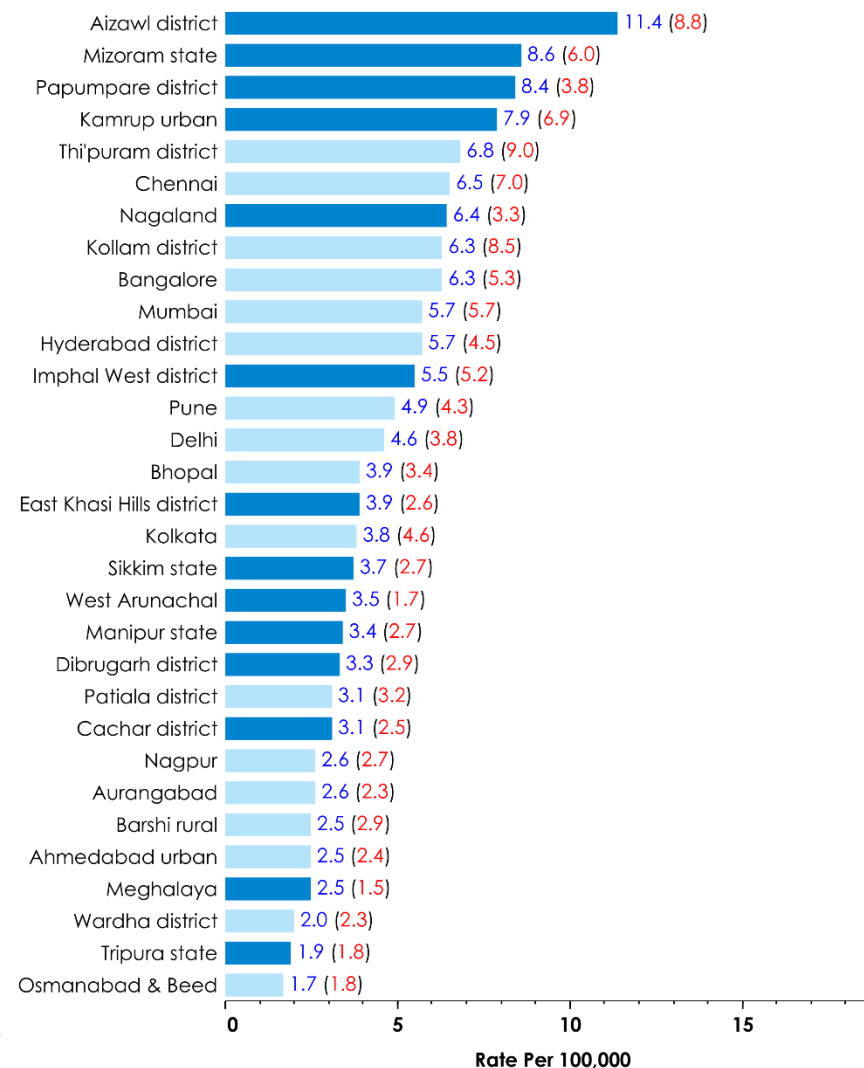




### Colorectal - Males



### Colorectal - Females

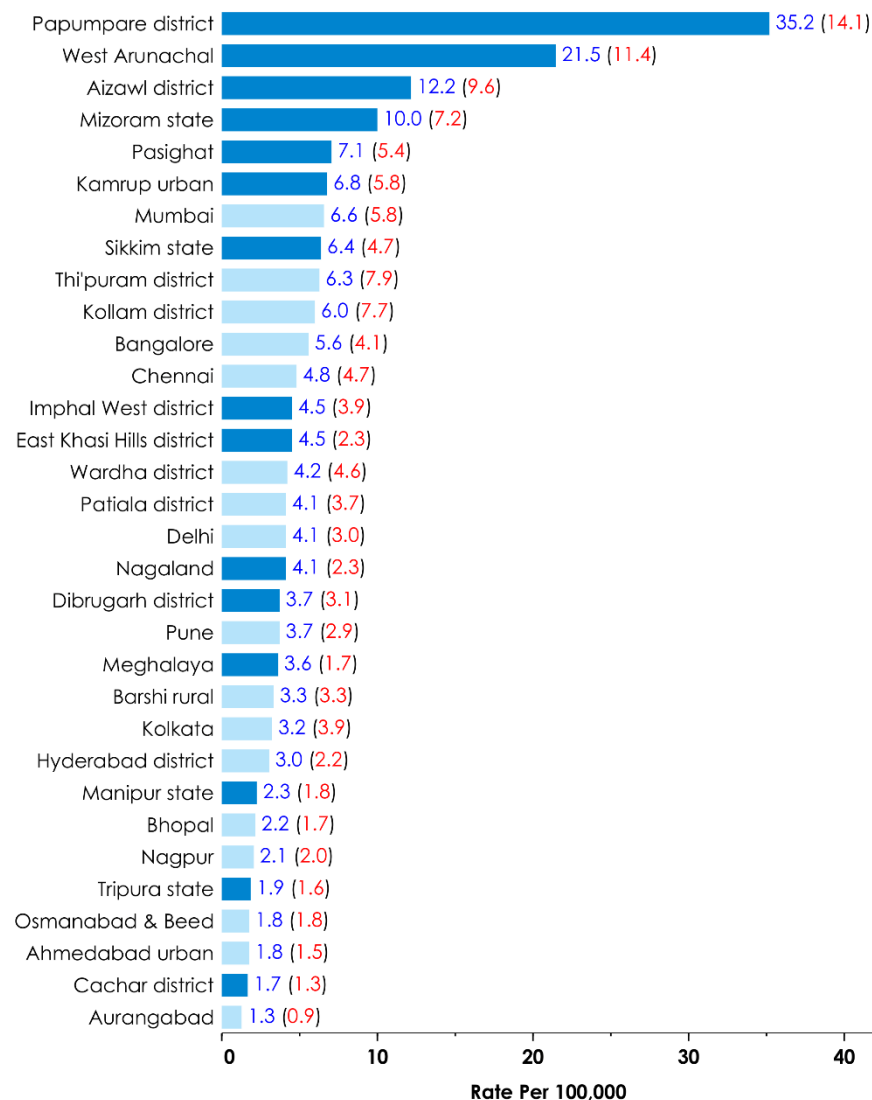


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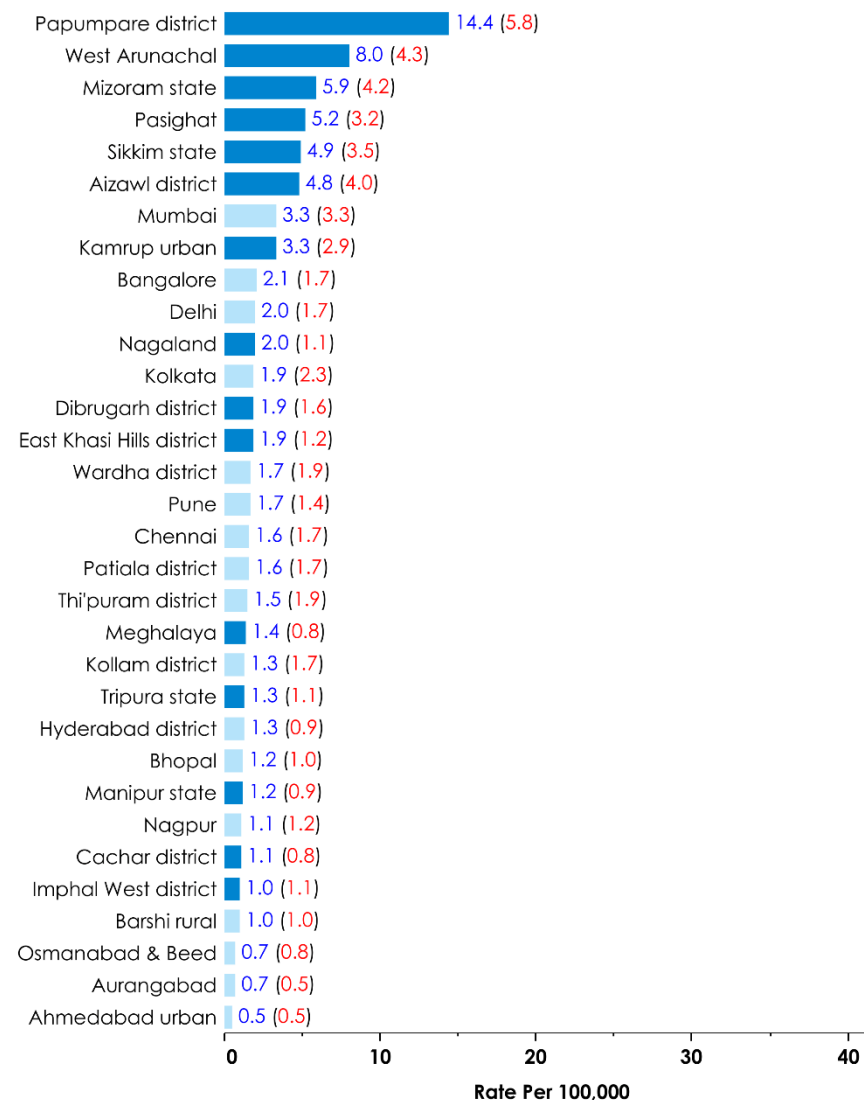




### Liver - Males



### Liver - Females

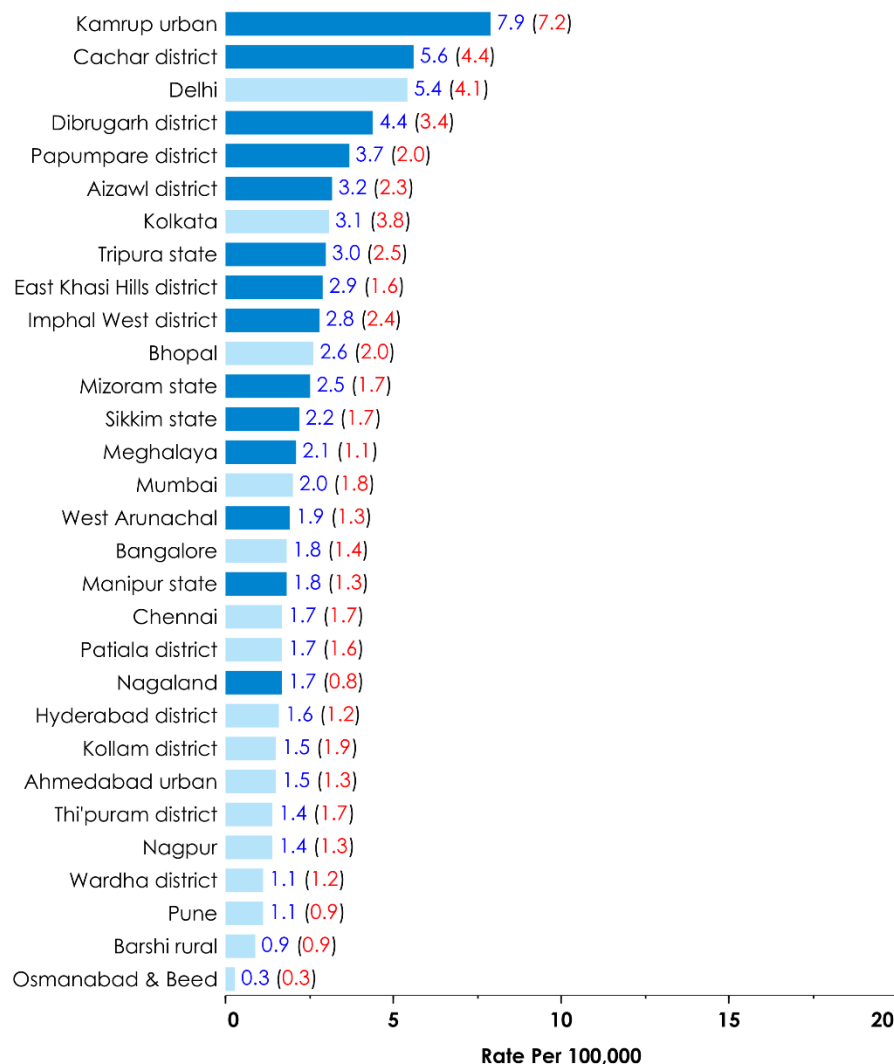


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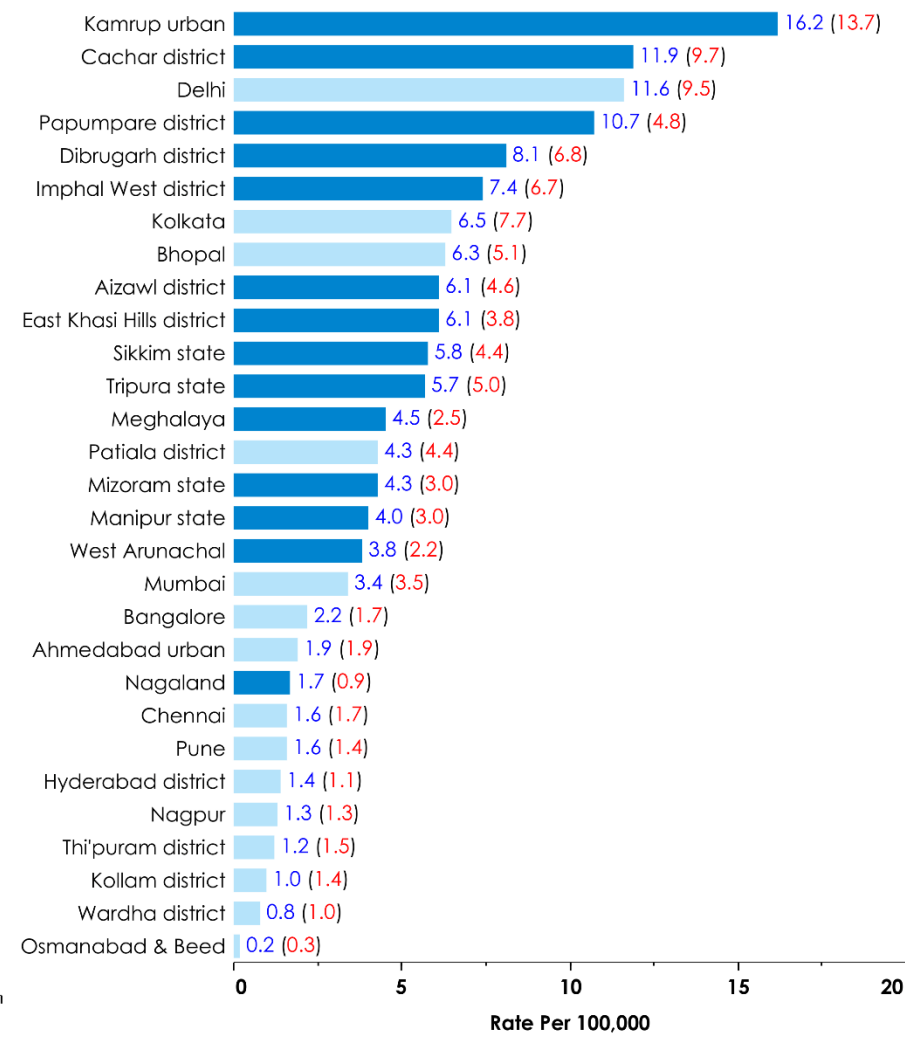




### Gall Bladder - Males



### Gall Bladder - Females

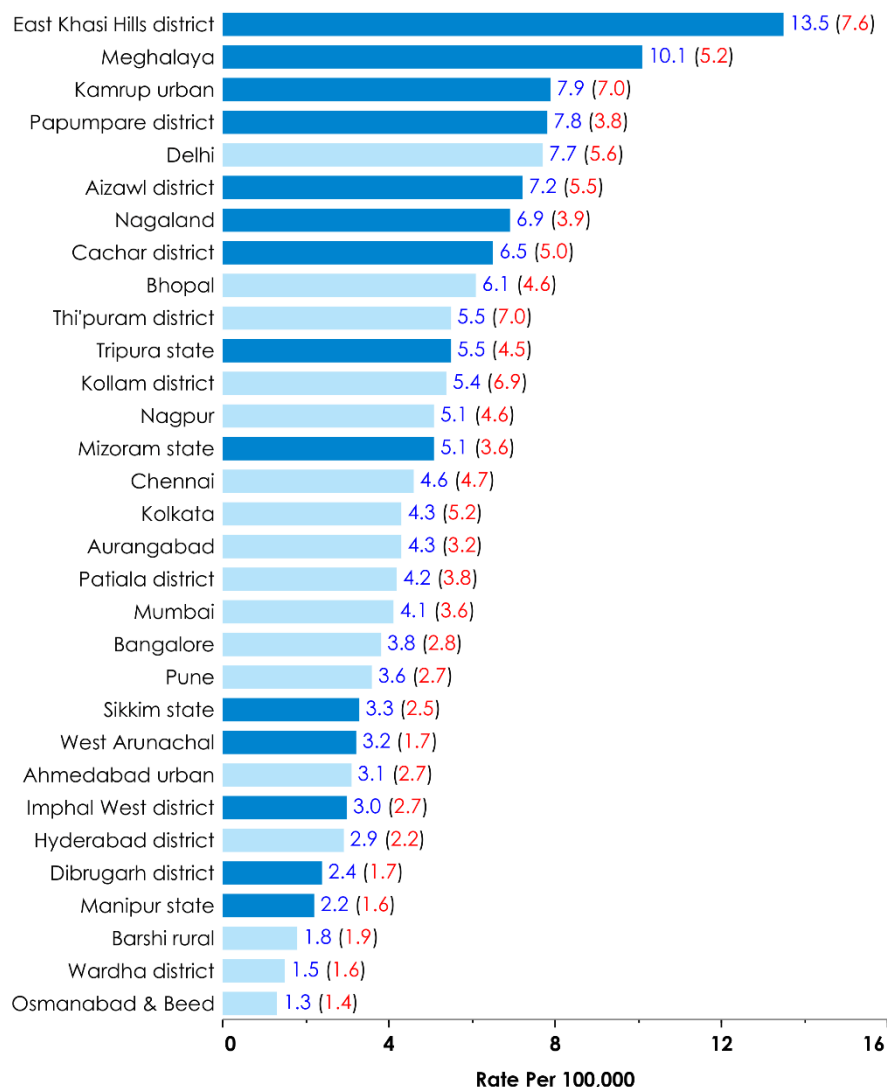


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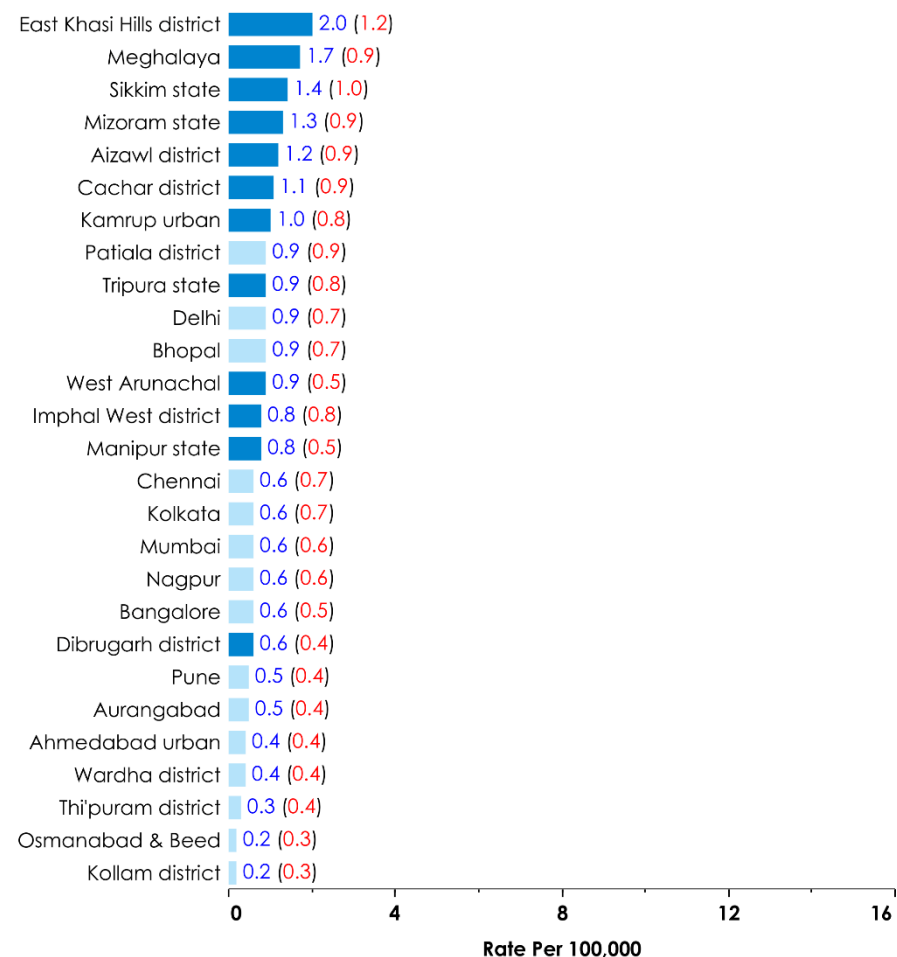




### Larynx - Males



### Larynx - Females



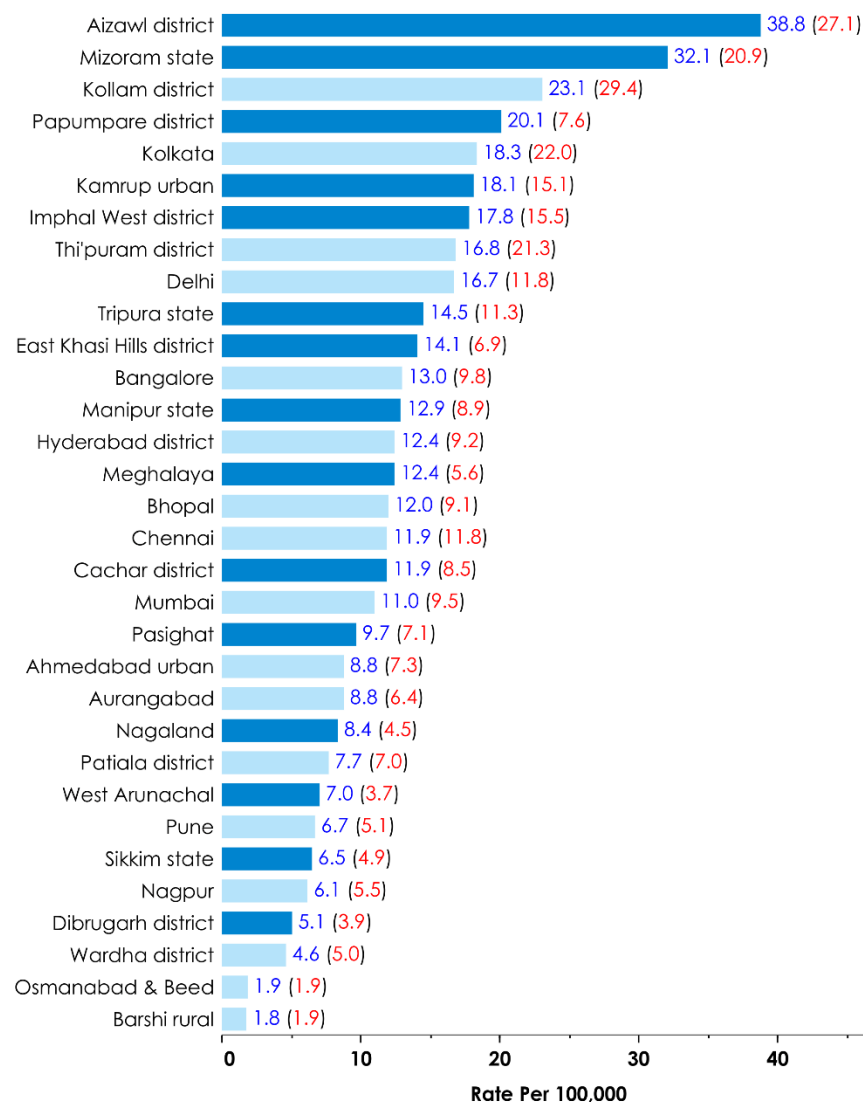
AAR (CR) ■ North-East India ■ Rest of India



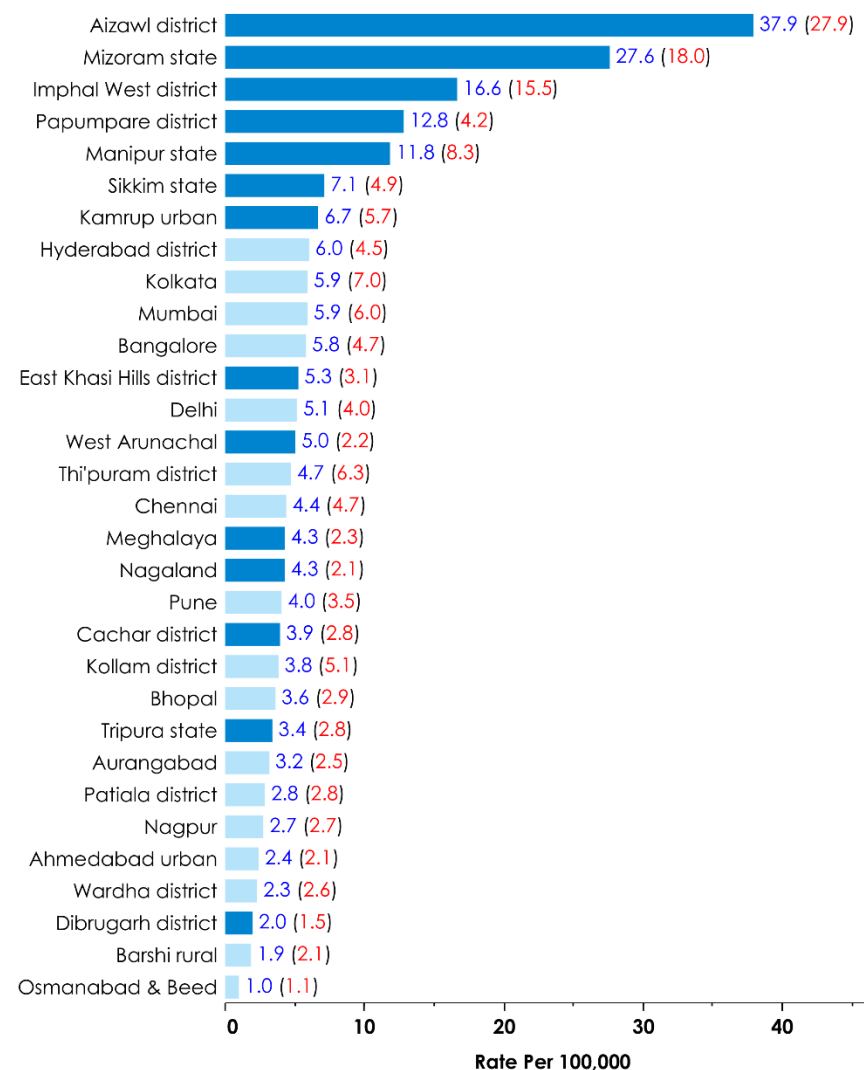




### Lung - Males



### Lung - Females

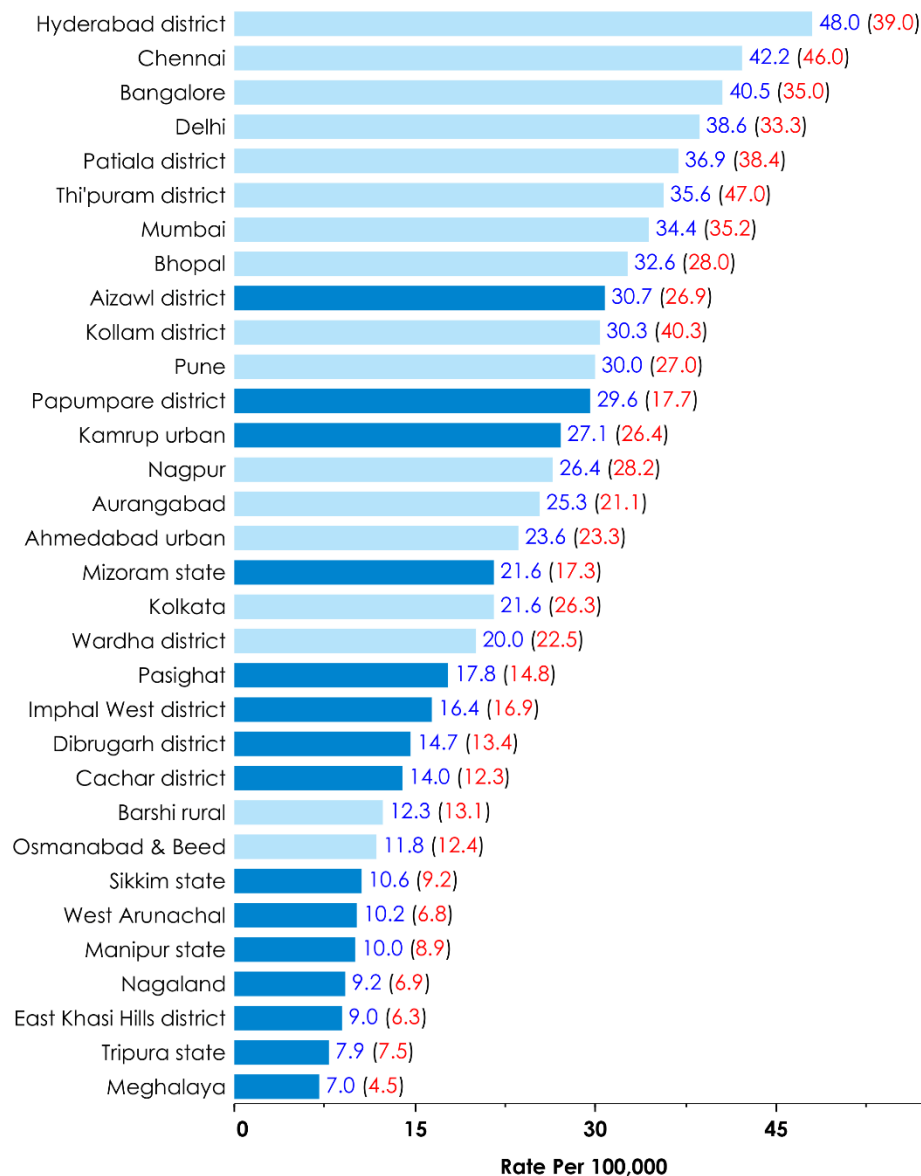


AAR (CR) ■ North-East India ■ Rest of India

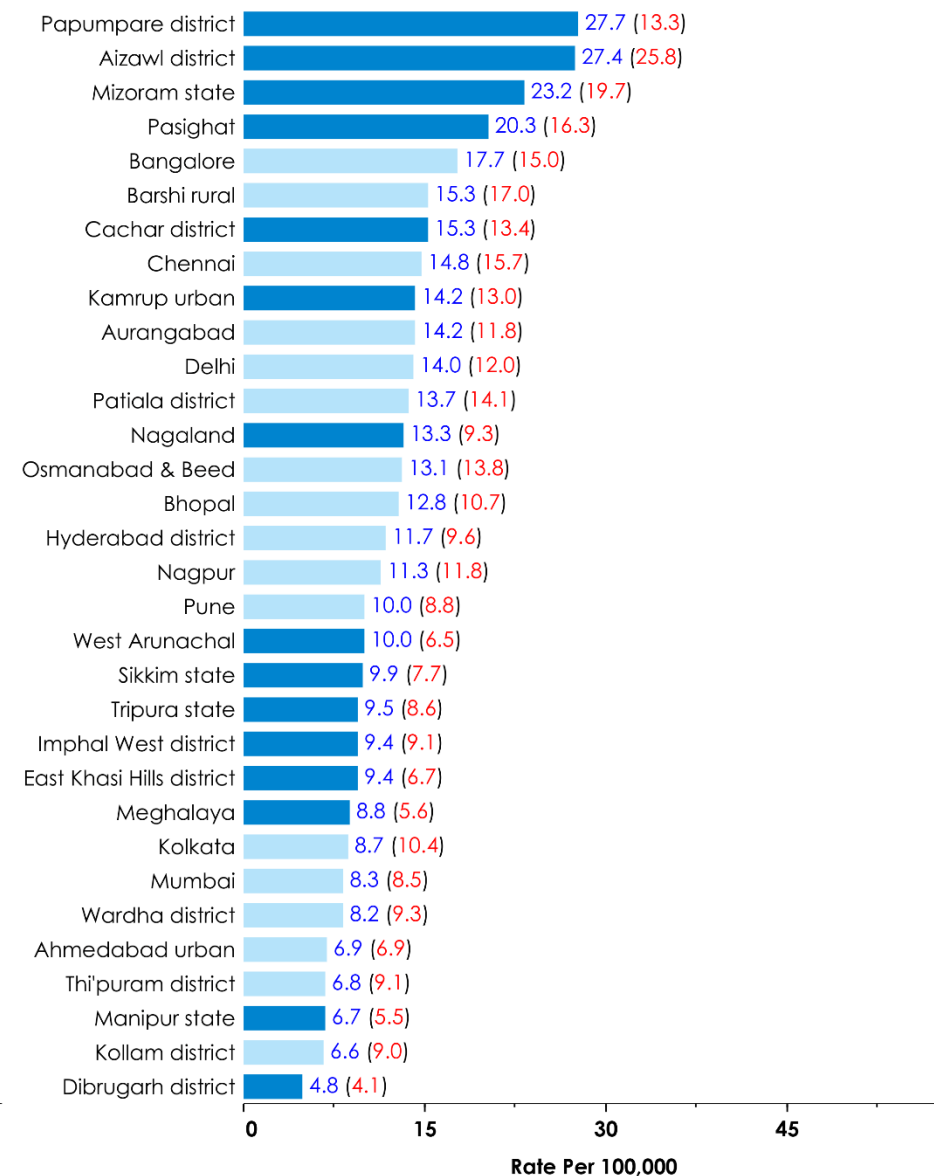




### Breast - Females



### Cervix Uteri

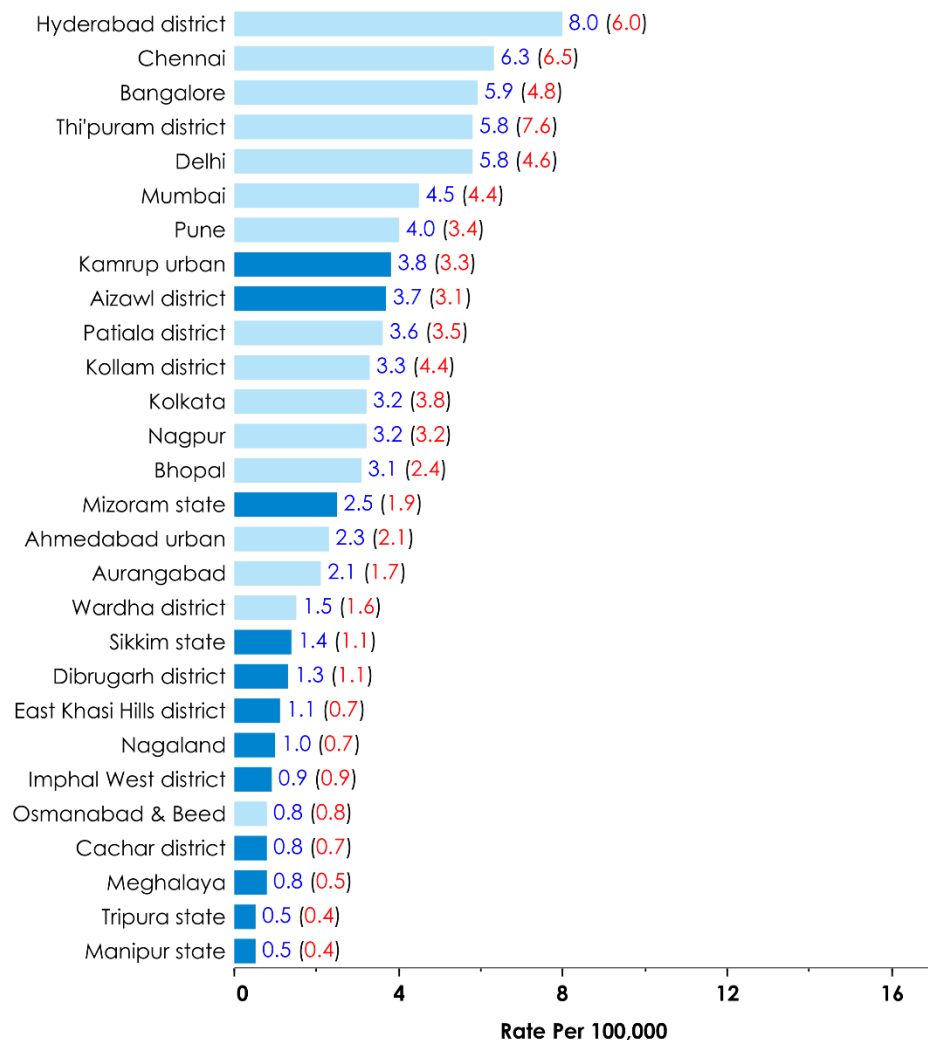


AAR (CR) ■ North-East India ■ Rest of India

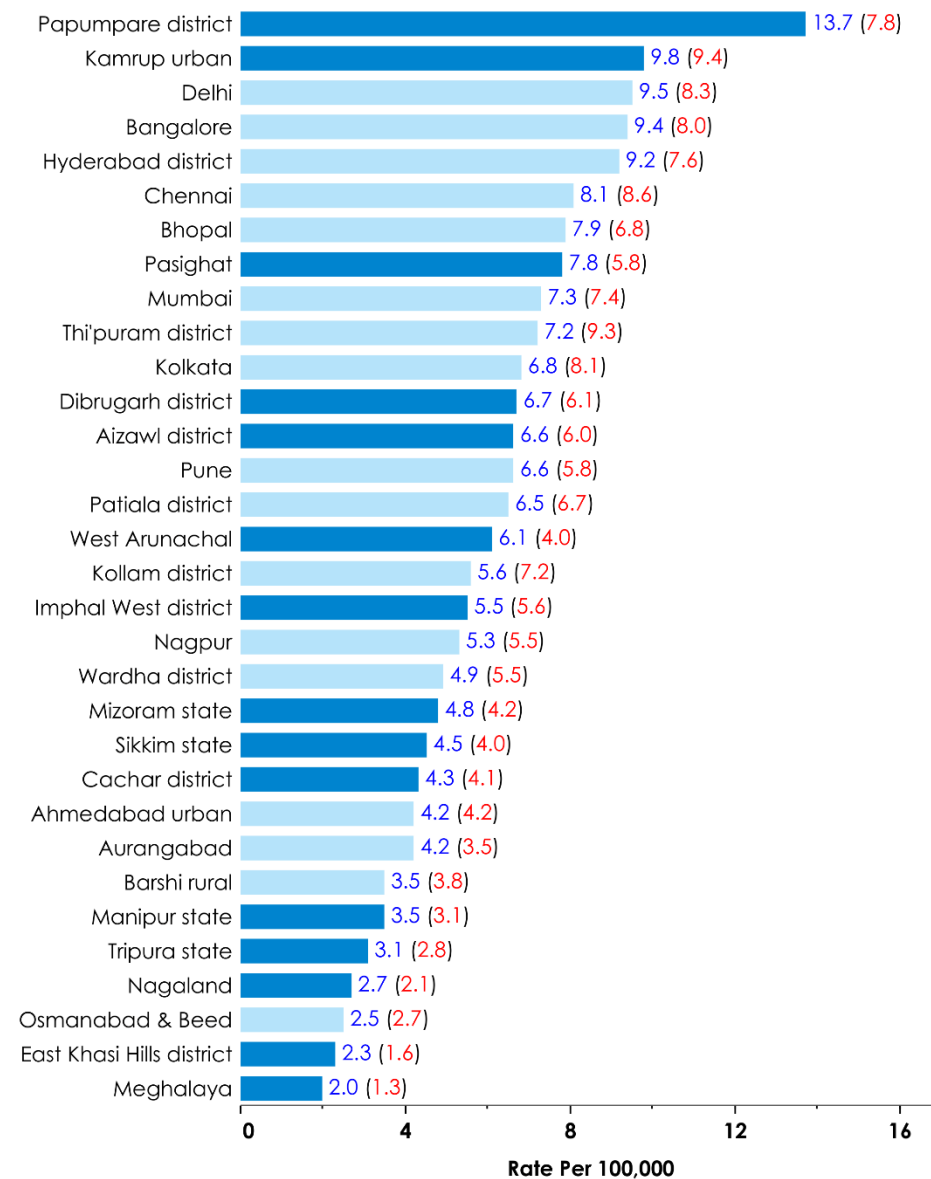




### Corpus Uteri



### Ovary

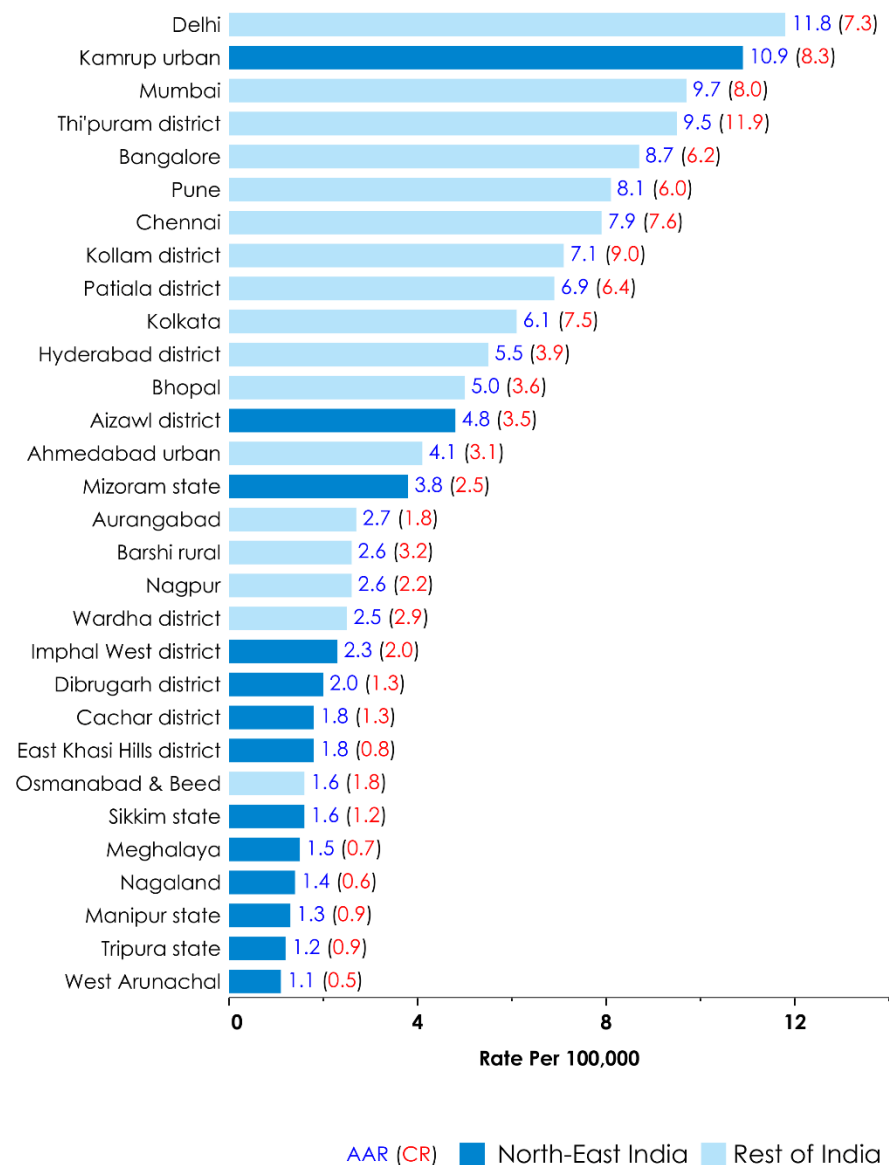


AAR (CR) ■ North-East India ■ Rest of India



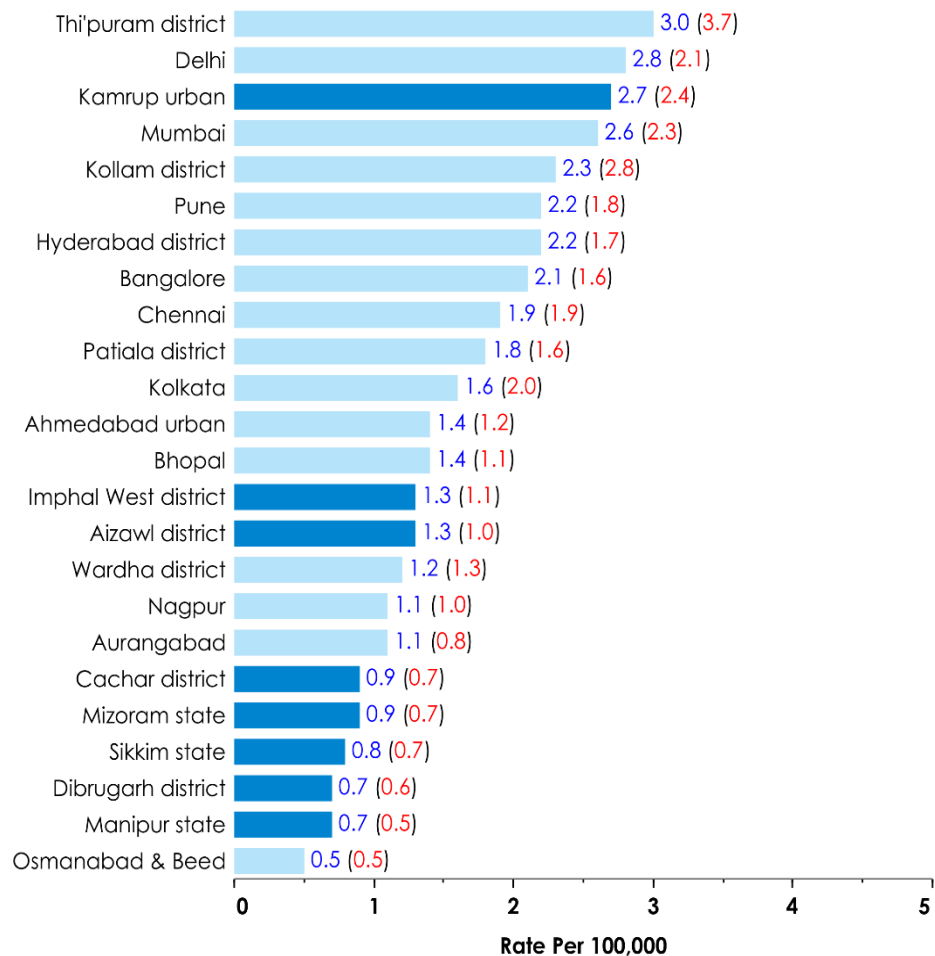


### Prostate

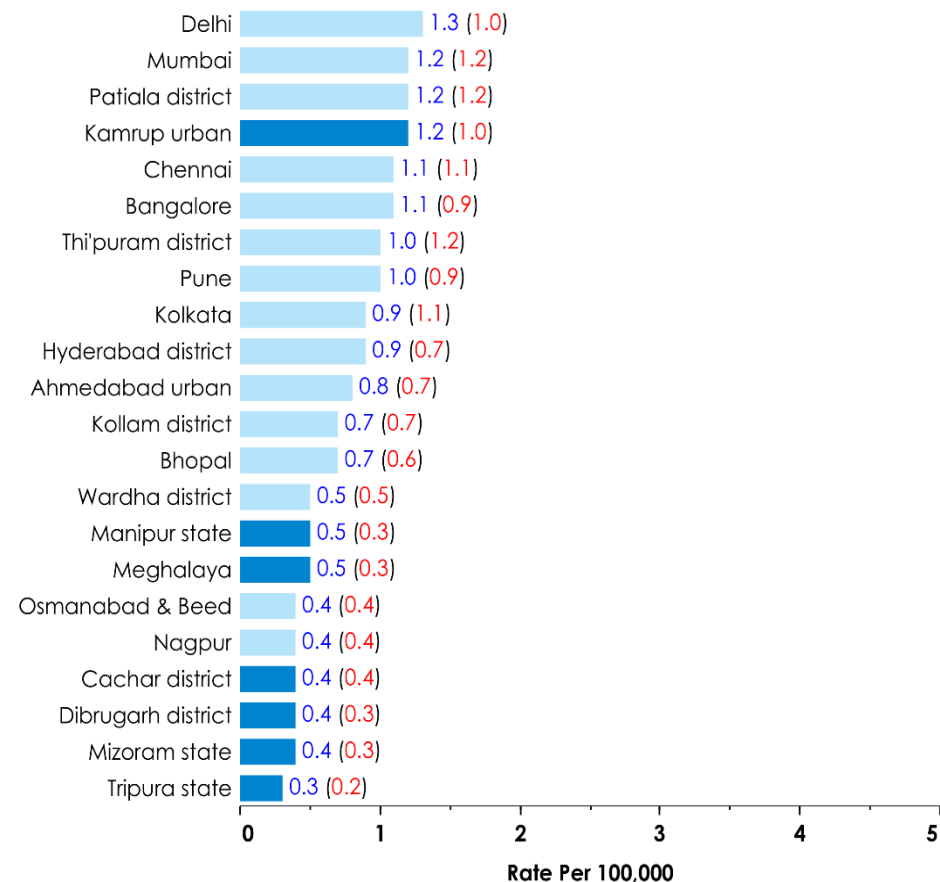




### Kidney - Males



### Kidney - Females

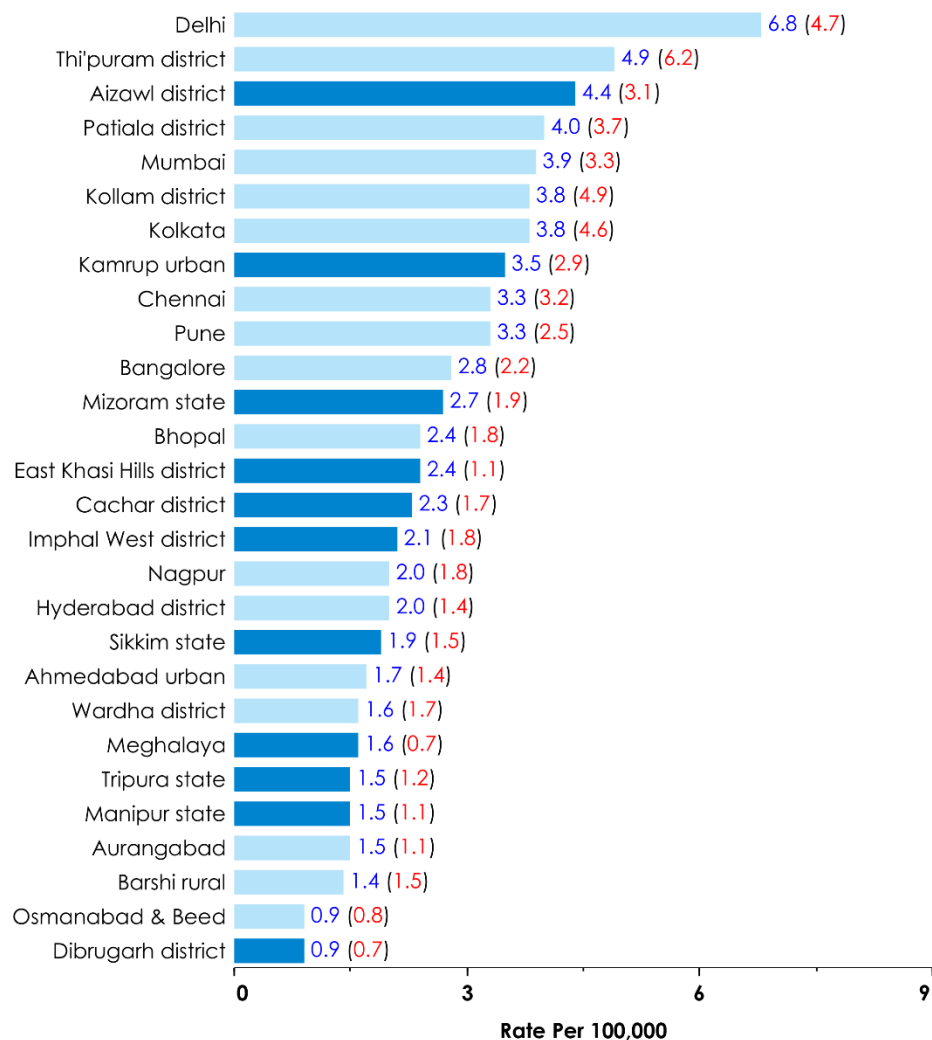


AAR (CR) ■ North-East India ■ Rest of India

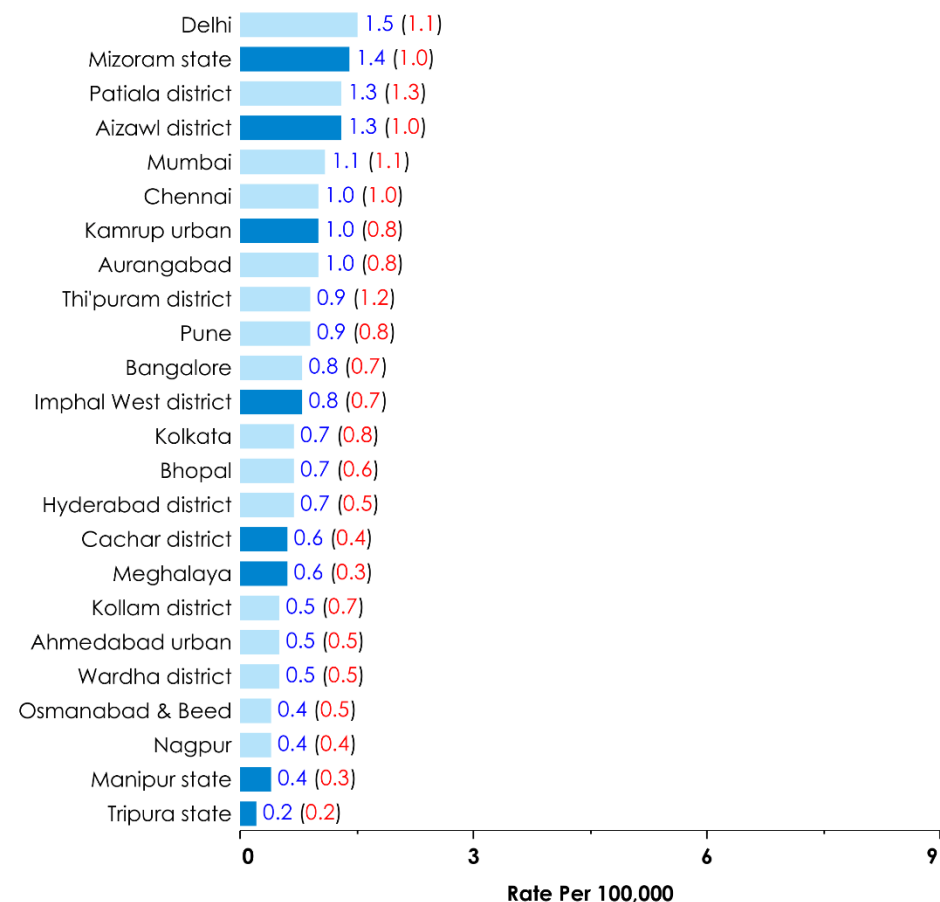




### Urinary Bladder - Males



### Urinary Bladder - Females

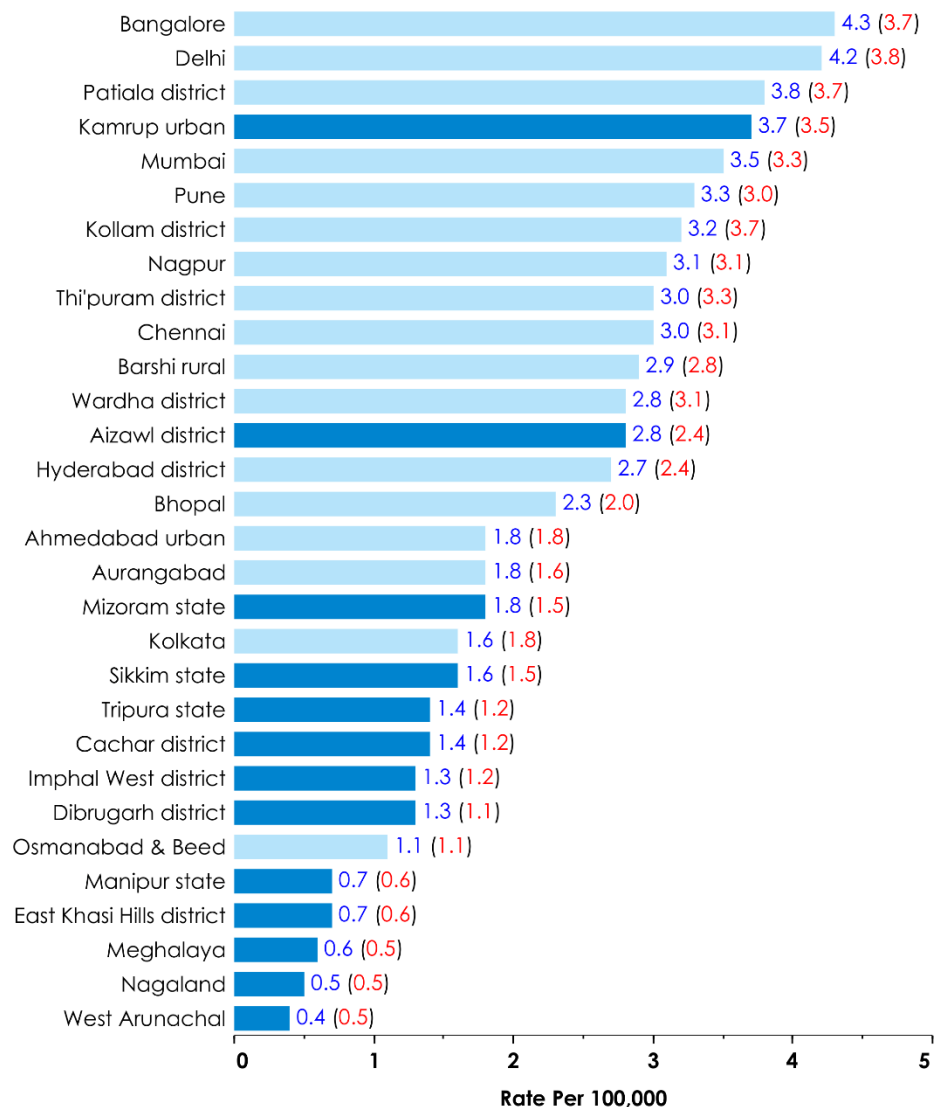


AAR (CR) ■ North-East India ■ Rest of India

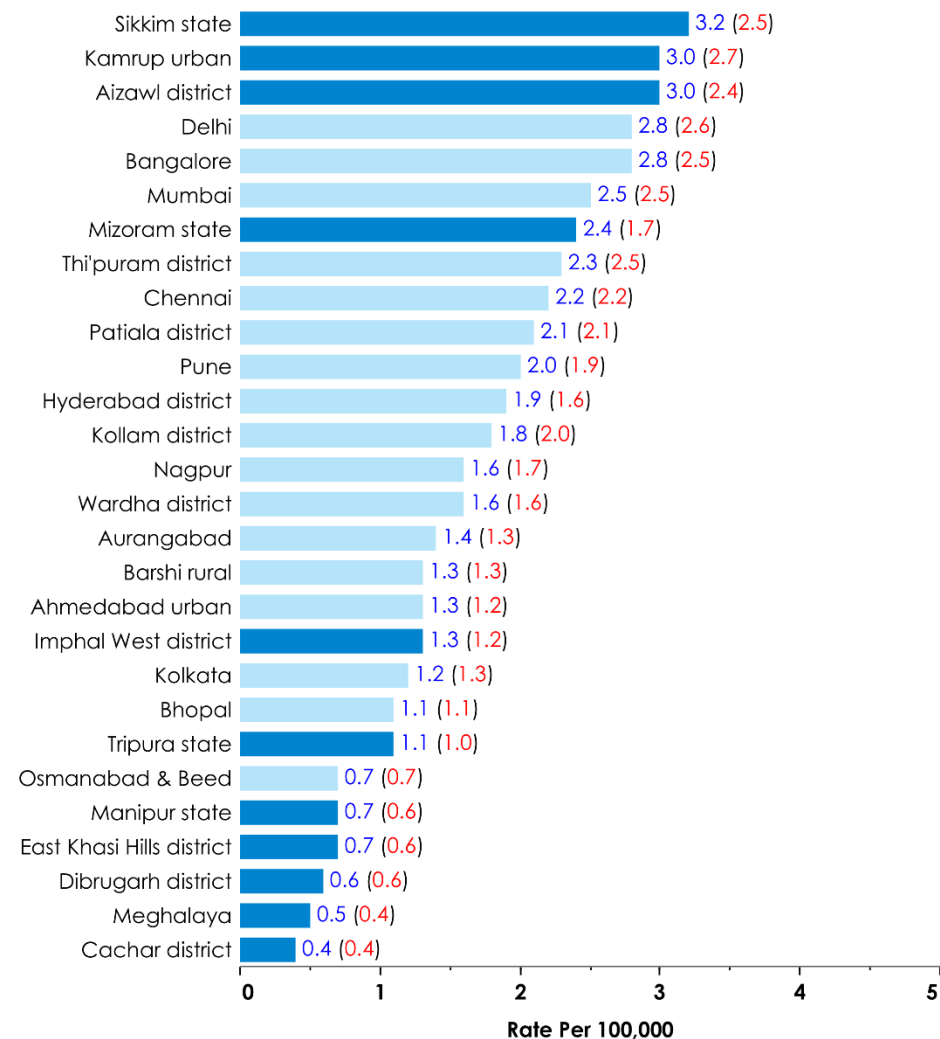




### Brain, NS - Males



### Brain, NS - Females

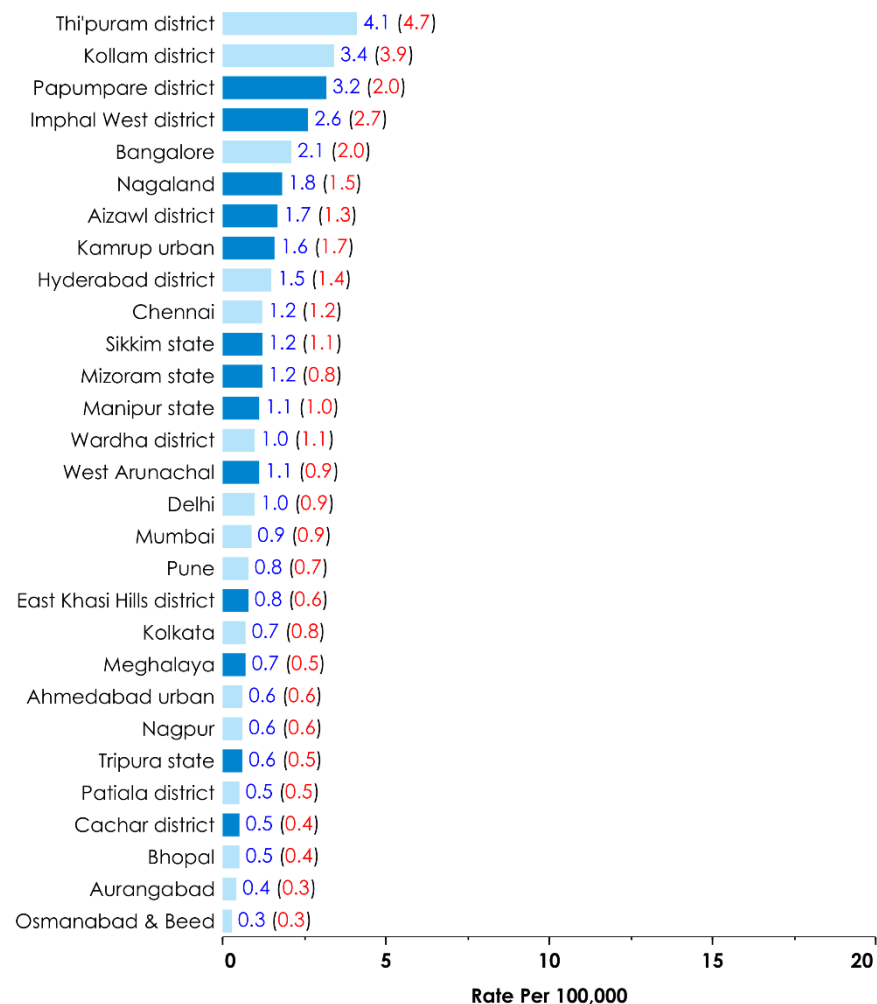


AAR (CR) ■ North-East India ■ Rest of India

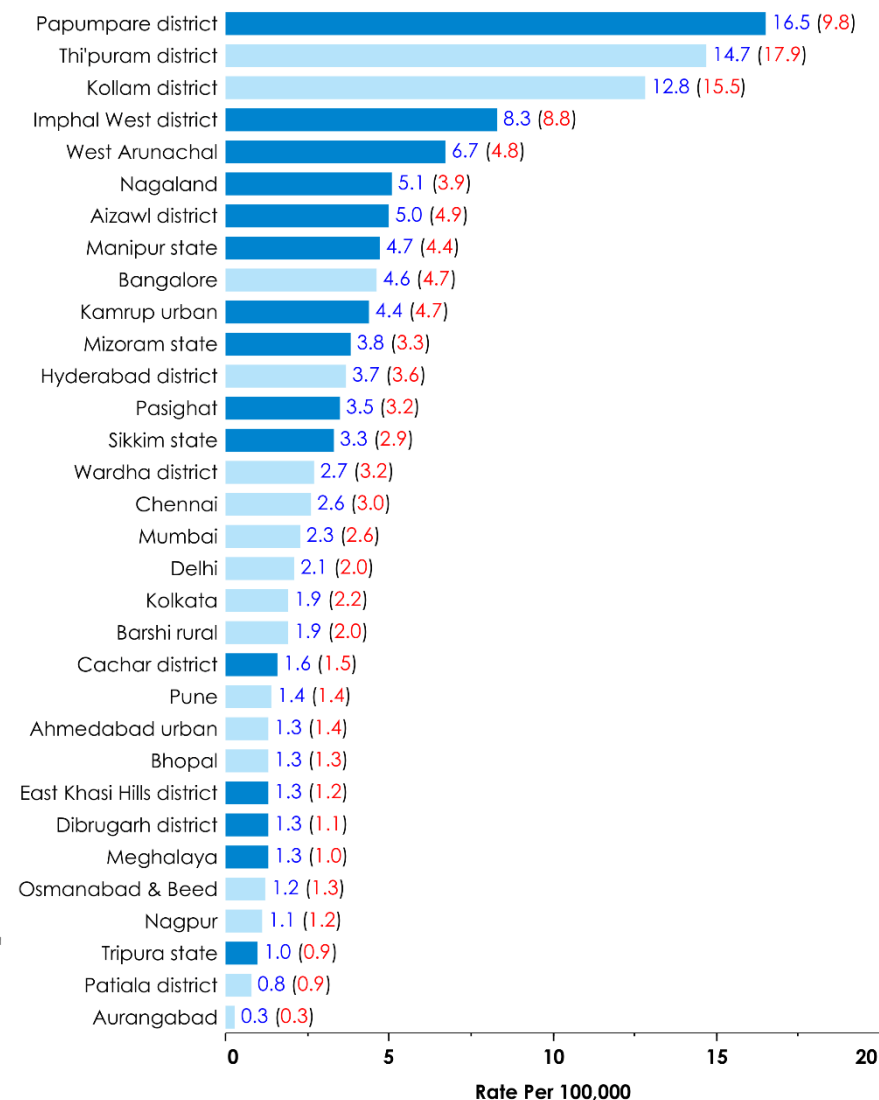




### Thyroid - Males



### Thyroid - Females



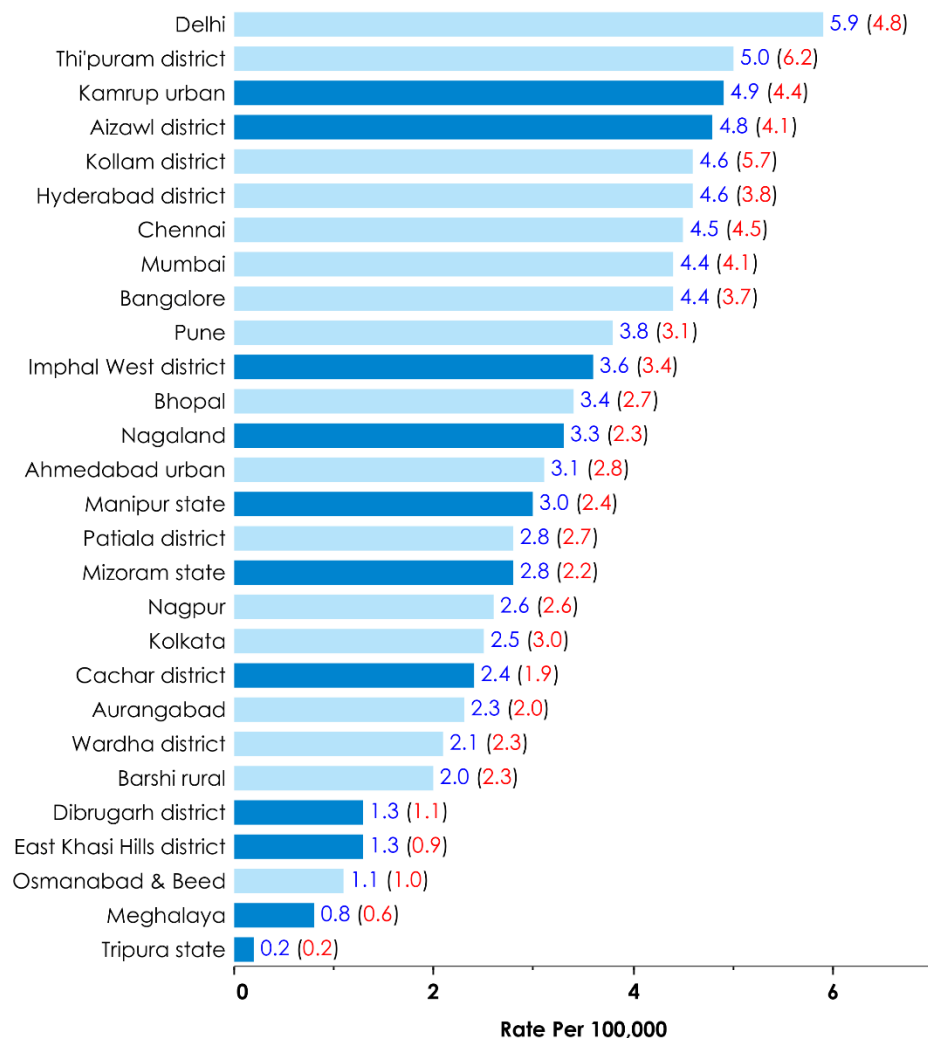
AAR (CR) ■ North-East India ■ Rest of India



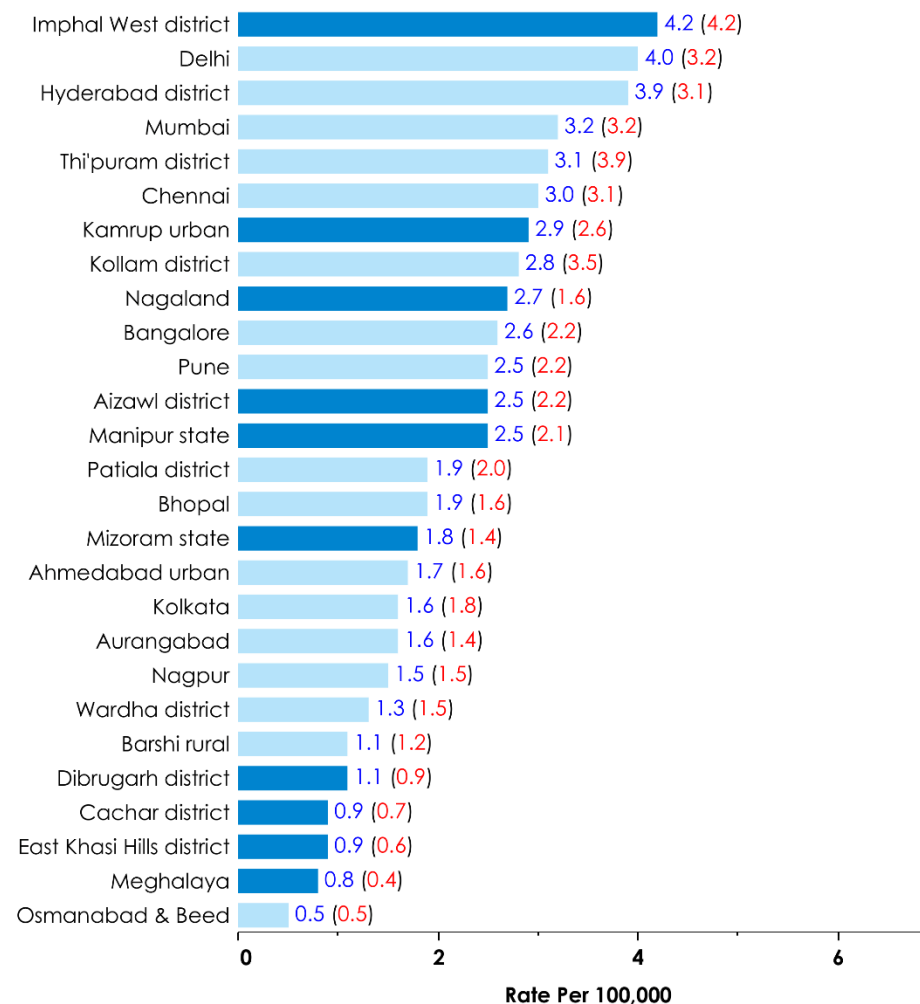




### NHL - Males



### NHL - Females



AAR (CR) ■ North-East India ■ Rest of India





### 1.11 Place of availing cancer directed treatment according to state

State of Residence	Within NER		Outside NER		Total
	Number	%	Number	%	Number
Arunachal Pradesh	950	86.8	144	13.2	1094
Assam	53287	94.9	2842	5.1	56129
Manipur	3647	83.6	713	16.4	4360
Meghalaya	1202	87.2	176	12.8	1378
Mizoram	2946	93.5	206	6.5	3152
Nagaland	725	41.9	1004	58.1	1729
Sikkim	9	4.7	184	95.3	193
Tripura	6594	93.1	489	6.9	7083

The proportion of cancer patients who sought treatment outside NER is reported to be more for Sikkim (95.3%) and Nagaland (58.1%), whereas the proportion for the same is less for Assam (5.1%), Mizoram (6.5%) and Tripura (6.9%).



## 1.12 Projected number of incidence cases by Anatomical Sites of Cancer in North East for year 2020 and 2025

Site Name	Males		Females		Total	
	2020	2025	2020	2025	2020	2025
<b>All Sites</b>	<b>27503</b>	<b>30985</b>	<b>22814</b>	<b>26146</b>	<b>50317</b>	<b>57131</b>
Tongue	1386	1563	477	548	1863	2111
Mouth	1658	1866	919	1056	2577	2922
Hypopharynx	2455	2767	423	480	2878	3247
Oesophagus	3870	4351	1915	2193	5785	6544
Stomach	1935	2180	1152	1330	3087	3510
Colon	671	752	456	522	1127	1274
Rectum	657	743	449	517	1106	1260
Liver	850	954	445	513	1295	1467
Gall Bladder	992	1115	2027	2310	3019	3425
Pancreas	259	295	172	200	431	495
Larynx	1136	1279	184	214	1320	1493
Lung	2385	2687	1028	1184	3413	3871
Breast	55	68	3619	4126	3674	4194



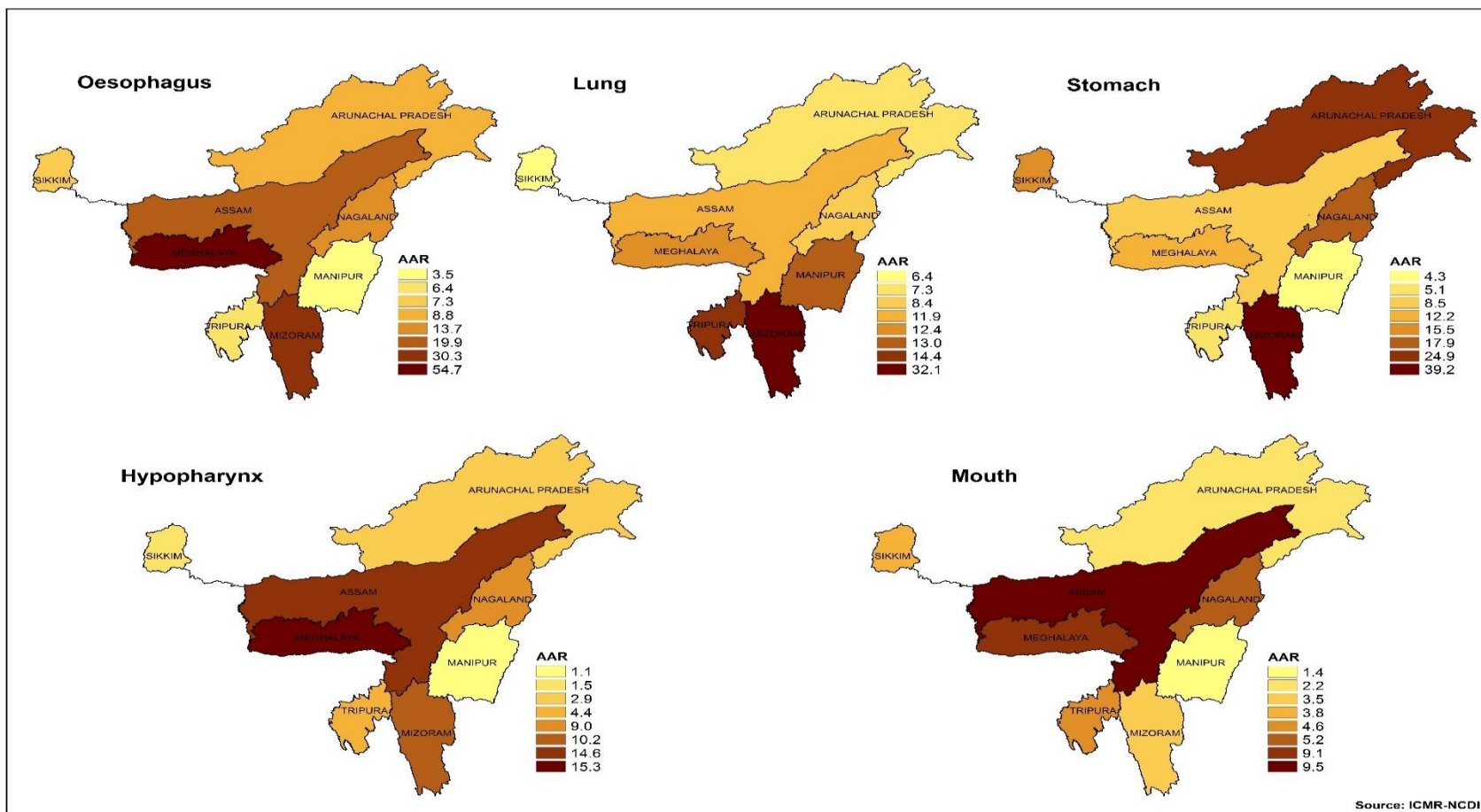
Site Name	Males		Females		Total	
	2020	2025	2020	2025	2020	2025
<b>Cervix Uteri</b>	-	-	2559	2936	2559	2936
<b>Corpus Uteri</b>	-	-	328	377	328	377
<b>Ovary</b>	-	-	1323	1506	1323	1506
<b>Prostate</b>	675	762	-	-	675	762
<b>Kidney</b>	245	280	114	132	359	412
<b>Urinary Bladder</b>	398	448	110	131	508	579
<b>Brain, NS</b>	389	435	252	284	641	719
<b>Thyroid</b>	192	228	639	731	831	959
<b>NHL</b>	528	590	310	360	838	950
<b>Lymphoid Leukemia</b>	211	232	89	102	300	334
<b>Myeloid Leukemia</b>	290	319	249	285	539	604

The projected number of cancer cases for 2020 was calculated to be 50317 (27503 in males and 22814 in females). The projected number of cancer cases for the year 2025, is estimated to be 57131 (30985 in males and 26146 in females). Among males, cancers of the oesophagus (4351) and among females, breast cancer (4126) are estimated to be the highest by 2025. The likely increase in total number of cancer cases will be 13.5% by 2025.



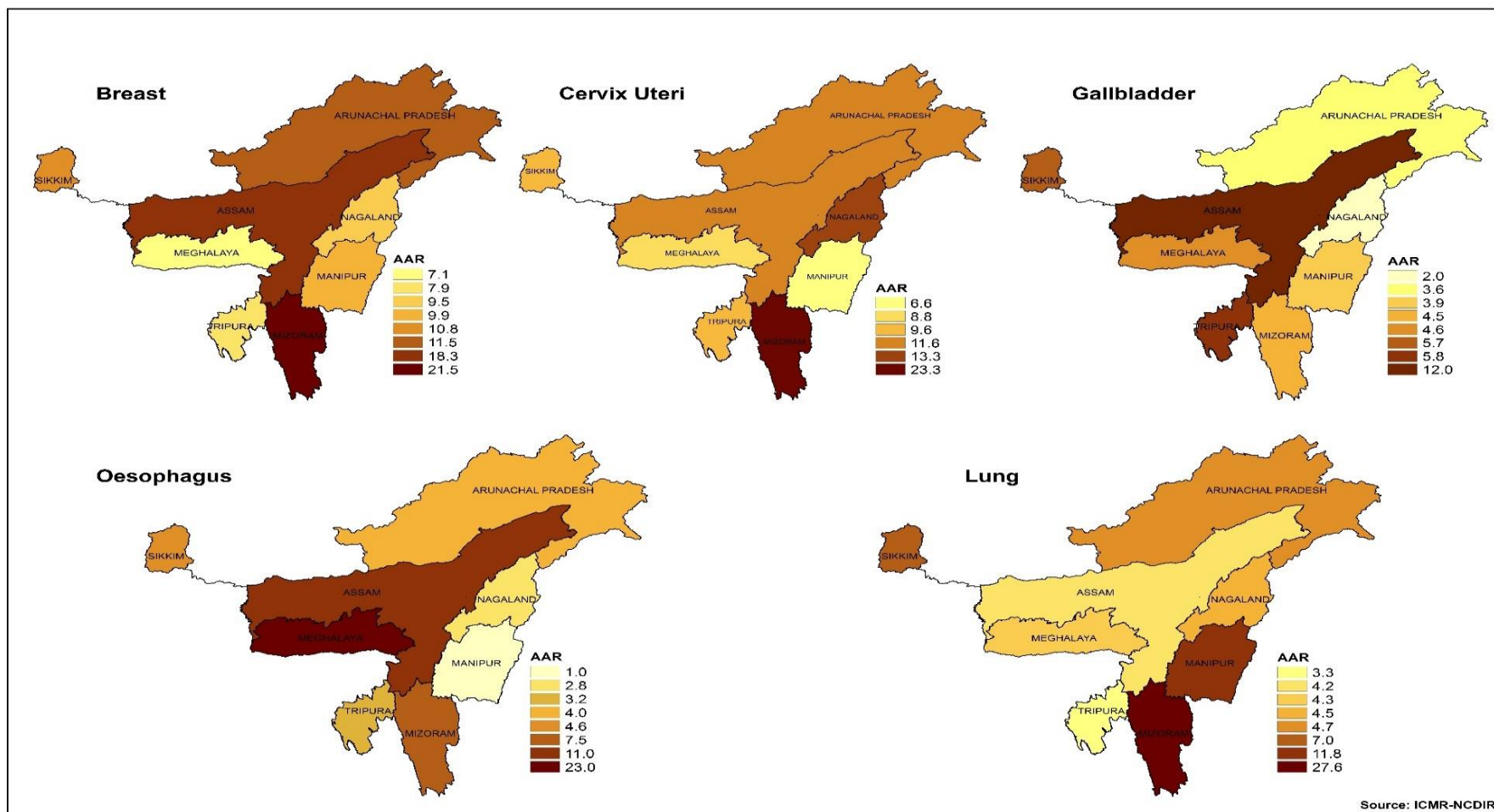
### 1.13 Projected Age adjusted Incidence Rate (AAR) for NER states for the leading sites of cancer - 2020

Males





### Females



The projected AARs for 2020, in males is highest for oesophageal cancer in the state of Meghalaya (54.7 per 100,000) and in females it is highest for breast cancer in the state of Mizoram.

