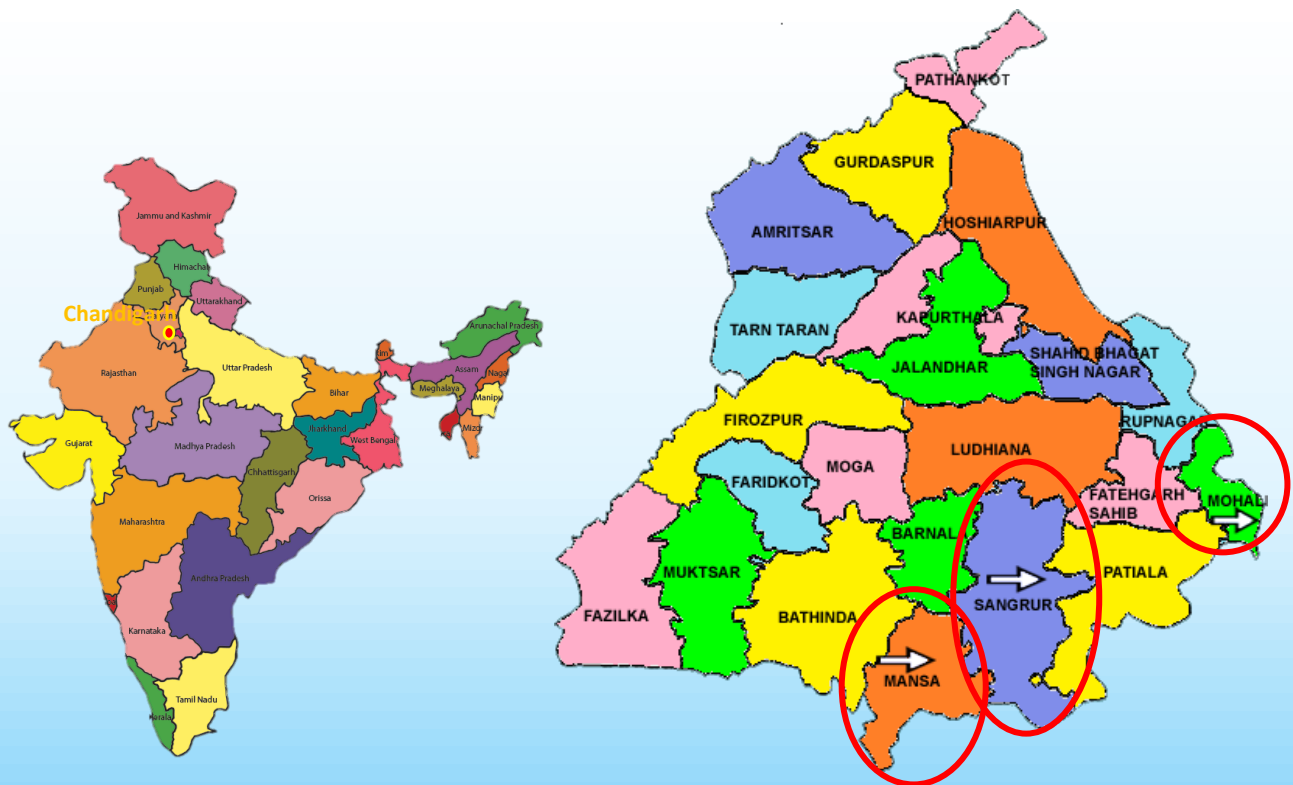


Population-Based Cancer Registries at Chandigarh and SAS Nagar, Sangrur, Mansa Districts Punjab State, India

Cancer Burden in Chandigarh and Punjab State Report: 2017 – 2018



Punjab state, India

A collaborative project of

Centre for Cancer Epidemiology (CCE) – ACTREC, Mumbai, India

Homi Bhabha Cancer Hospital (HBCH), Sangrur, Punjab, India

Homi Bhabha Cancer Hospital & Research Centre (HBCH&RC), Mullanpur, Punjab, India

Tata Memorial Centre (TMC), Mumbai, India

Homi Bhabha National Institute (HBNI), Mumbai, India

Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

Department of Health and Family Welfare, Government of Punjab State, India

Director of Health Services, Chandigarh, India

Cancer registry Principal Investigator, Co-Principal Investigators, and Co-investigators

Tata Memorial Centre (TMC), Mumbai

Name	Role	Designation
Dr. Rajendra Badwe	Principal Investigator	Director
Dr. Rajesh Dikshit	Co-Investigator	Director, CCE
Dr. Pankaj Chaturvedi	Co-Investigator	Deputy Director, CCE
Dr. JV Divatia	Co-Investigator	Director, HBCH& RC, Punjab
Dr. Ashish Gulia	Co-Investigator	Dy. Director, HBCH& RC, Punjab
Dr. Prathamesh Pai	Co-Investigator	Officer-In-Charge, HBCH & RC, Mullanpur
Dr. Atul Budukh	Co-Principal Investigator	Professor Epidemiology

Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh

Name	Role	Designation
Prof. Vivek Lal	Steering Committee Chairman (May 2022 onwards)	Director
Dr. Surjit Singh	Steering Committee Chairman (Nov 2021 to May 2022)	Ex-Director
Dr. Jagat Ram	Steering Committee Chairman (Mar 2017 to Oct 2021)	Ex-Director
Dr. JS Thakur	Principal Investigator	Professor
Dr. Rakesh Kapoor	Co- Investigator	Professor
Dr. Pankaj Malhotra	Co-Investigator	Professor
Dr. SPS Bhatia	Co-Investigator	Lecturer
Dr. Pankaj Arora	Co-Investigator	Assistant Professor

Department of Health and Family Welfare, Punjab

Name	Role	Designation
Dr. Parminder Kaur	Co-Investigator	Civil Surgeon Sangrur
Dr. Harinder Kumar Sharma	Co-Investigator	Civil Surgeon Mansa
Dr. Jai Singh	Co-Investigator	Civil Surgeon SAS Nagar

Homi Bhabha Cancer Hospital (HBCH), Sangrur

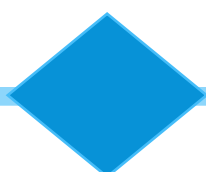
Name	Designation
Dr. Tapas Dora	Professor – Radiotherapy
Dr. Sankalp Sancheti	Professor - Pathology
Dr. Debashish Chaudhary	Professor – Surgical Oncology
Dr. Rahatdeep Singh Brar	Professor & Head, Dept. of Radiodiagnosis
Dr. Anshul Singla	Associate Professor Head and Neck Surgery
Dr. Alok Kumar Goel	Associate Professor – Medical Oncology
Dr. Shweta Tahlan	Senior Resident Gynaec Oncologist
Mr. Prithviraj Kadam	Project Manager

Technical staff from Centre for Cancer Epidemiology (CCE), Mumbai

Name	Designation
Mrs. Sonali Bagal	Research Co-ordinator

Population-based cancer registry staff

Registry	Staff name
Chandigarh	Mrs. Pratibha Saxena, Mr. Manoj Kumar, Mr. Ravinder Singh and Mr. Vijay Kumar
SAS Nagar	Mr. Randeep Singh, Mr. Ashok Kumar and Mr. Rajinder Singh
Sangrur	Ms. Divya Singh, Mr. Lakhwinder Singh, Mr. Amarjeet Singh, Mr. Charanjit Singh, Mr. Sandeep Singh, and Mr. Deepak Saini
Mansa	Mr. Sanjeev Kumar, Mrs. Gurpreet Kaur, and Mrs. Kirna Kaur



Steering committee members

Name	Role
Prof. Vivek Lal (6 th May 2022 onwards) Director, PGIMER, Chandigarh	Chairman
Dr. Rajendra Badwe Director, TMC, Mumbai	Member
Dr. Subhash C. Varma Professor and Head of Internal Medicine, PGIMER, Chandigarh	Member
Dr. Arvind Rajwanshi Professor and Head of Cytology and Gynaecological Pathology, PGIMER, Chandigarh	Member
Dr. Sushmita Ghoshal Professor and Head of Radiotherapy, PGIMER, Chandigarh	Member
Dr. Rajesh Dikshit Director, CCE-TMC, Mumbai	Member
Dr. J S Thakur Professor, School of Public Health, PGIMER, Chandigarh	Member
Dr. Atul Budukh Professor Epidemiology, TMC, Mumbai	Member

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Chandigarh and SAS Nagar PBCR

Office Address:

Population Based Cancer Registry, Chandigarh and SAS Nagar
Room No. 0005, Department of Community Medicine and School of Public Health,
PGIMER, Chandigarh – 160 012

Contact:

Landline Number: 0172-2755219 Email - jsthakur64@gmail.com, pbcr.pgimh@gmail.com

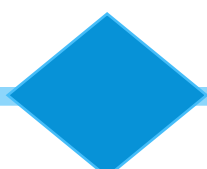
Sangrur and Mansa PBCR

Office Address:

Population Based Cancer Registry, Sangrur District
Homi Bhabha Cancer Hospital,
Civil Hospital Campus, Sangrur – 148 001
Punjab State, India

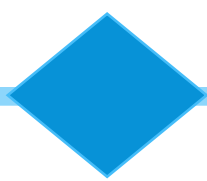
Contact:

Mobile Number: 09920863069 Email - atul.budukh@gmail.com, budukham@tmc.gov.in



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Executive summary

- The objective of the population-based cancer registry project is to measure the burden of cancer in Chandigarh (urban), SAS Nagar (semi urban), Sangrur (rural), and Mansa (rural) districts. Cancer registries are the foundation for the cancer control programme.
- These cancer registries cover 5.1 million population. The staff of the cancer registries collects the cancer case data by visiting all the hospitals/ diagnostic centres as well as interacting with the community representative.
- 1 in 10 males in Chandigarh is at risk of developing cancer, compared to 1 in 11 in SAS Nagar, 1 in 12 in Sangrur and 1 in 15 in Mansa district.
- 1 in 8 females is at risk of developing cancer in Chandigarh, compared to 1 in 10 in SAS Nagar, 1 in 11 in Sangrur and 1 in 12 in Mansa district.
- The all-site cancer incidence rates for both sex from rural registries are lower than in urban registries and it is statistically significant.
- Lung, prostate, oesophagus, and urinary bladder are leading cancer sites among males in urban and semi-urban areas; however, liver, prostate, and oesophagus cancers are the leading in rural areas.
- Breast cancer incidence rates are lower in rural registries as compared to urban and semi-urban registries; however, the cervix uteri cancer incidence rates are higher in rural registries as compared to urban registries.
- Oesophagus cancer is four times higher among females in rural registries as compared to urban registries.
- The prostate cancer burden is low in rural registries as compared to urban registries.
- Tobacco-related cancer burden is high in males as compared to females.
- Due to the early detection programme organized in the Sangrur areas. The more than 40% cervix cancer and 50% breast cancer cases has been detected at early stage. The treatment compliance is more than 90%.
- Most of the cancer cases attend the hospital at the advanced stage of the disease. It is recommended to start the early detection services for breast, cervix, and oral cancer in this population.

1. Background

Population-based cancer registries (PBCRs) are essential to estimate the true cancer burden in the population. In the year 2013, Tata Memorial Centre (TMC) an autonomous unit of Department of Atomic Energy (DAE), Government of India in collaboration with Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Government of Punjab started the population-based cancer registries in urban, semi-urban and rural populations to know the cancer burden and trends over the period in these areas. These PBCRs cover 5.1 million population. The data have been collected from Chandigarh Union Territory (UT) and three districts in Punjab viz; SAS Nagar, Mansa and Sangrur.

The information presented in this report pertains to all cancer cases registered within four registries mentioned above in the year 2017 – 2018.

2. Population covered

The Mansa and Sangrur registries are rural, SAS Nagar registry is a semi-urban registry whereas Chandigarh is predominantly urban. Population covered by these registries is mentioned in table 1.

Table 1: Estimated average population distribution among selected districts across rural and urban areas: 2017 – 2018 ⁽¹⁾

PBCR	Population covered (in million) *	Rural Area (%)	Urban Area (%)
Chandigarh	1.2	2%	98%
SAS Nagar	1.3	45%	55%
Sangrur	1.8	69%	31%
Mansa	0.8	79%	21%

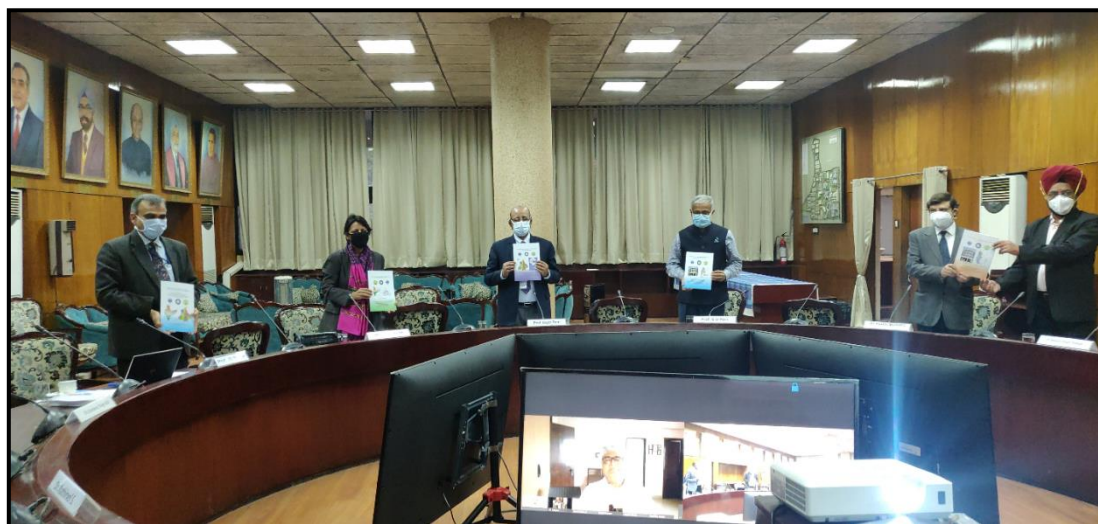
* Estimated population-based on ratio method using 2001 and 2011 census population

3. Release of third annual report of cancer registries

The third annual report of population-based cancer registry of Chandigarh and Punjab State was released on 28th November 2020 by Mrs. Vini Mahajan, Ex-Principal Secretary – Government of Punjab state, India, in the presence of Director Dr. Jagat Ram, PGIMER and Dr. RA Badwe, Dr. JS Thakur, Dr. Rajesh Dikshit, and Dr. Atul Budukh along with other dignitaries.

Amidst the COVID-19 situation Dr. RA Badwe, Director TMC Mumbai and his team joined the meeting virtually. While releasing the report, Dr. RA Badwe mentioned that cancer registries serve to be an extremely important tool in gauging the enemy i.e., cancer. For planning cancer control activities cancer registries are essentials. There is need for making cancer as a notifiable disease across the country. Further, he briefed about the magnitude and types of the cancers, geographical variations and infrastructure required for managing specific cancers. Mrs. Vini Mahajan has appreciated the work done by TMC, Mumbai and PGIMER, Chandigarh for providing valuable data on cancer burden in different parts of Punjab. She assured that Punjab government provide all the support to the cancer registries.

The report release provided a key recommendation of organizing an Early Detection Program in these registry areas.



Third annual report (2015-2016) released by Mrs. Vini Mahajan, Dr. Jagat Ram, Dr. RA Badwe (virtually), Dr. JS Thakur and Dr. Rajesh Dikshit (virtually) along with other dignitaries

4. Area covered

The area covered by the registry is presented in the figure 1 to 4.

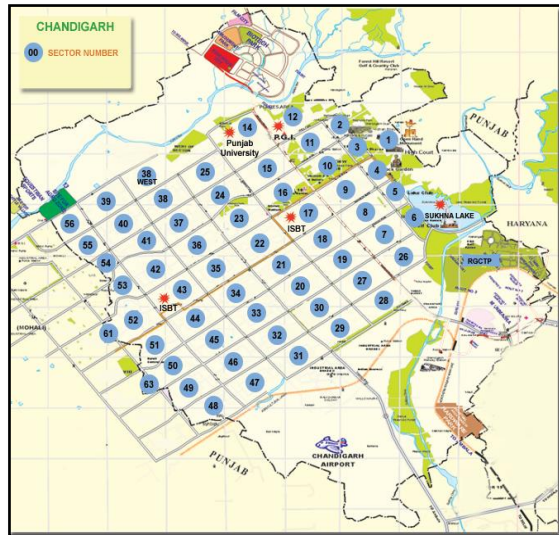


Figure 1: Chandigarh UT

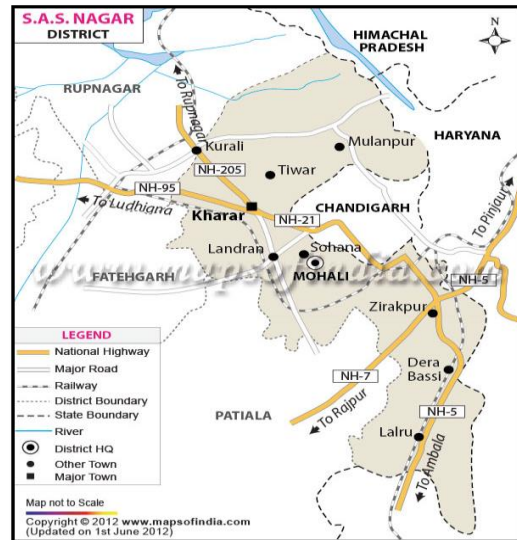


Figure 2: SAS Nagar District

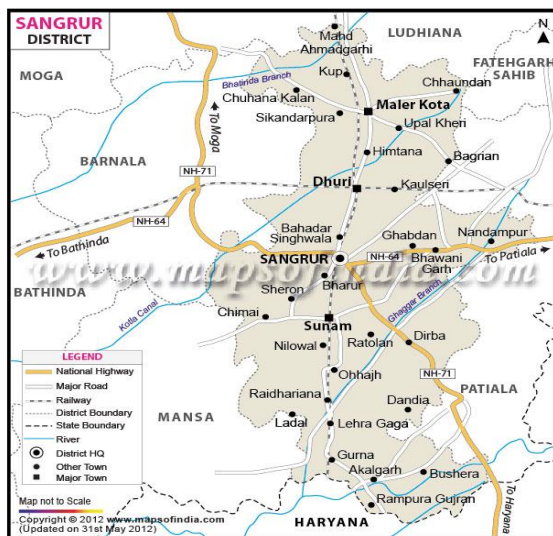


Figure 3: Sangrur District

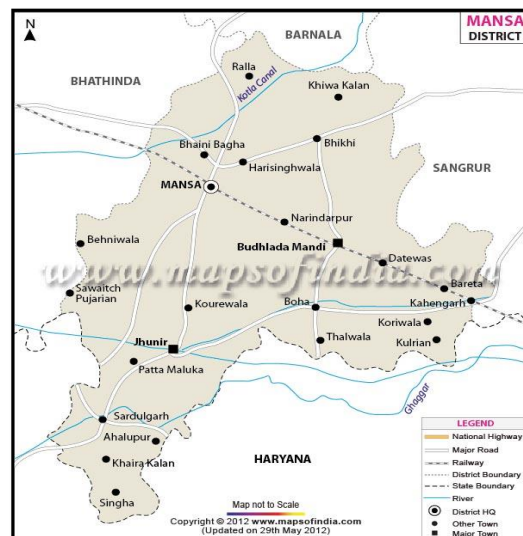


Figure 4: Mansa District

5. Cancer incidence and mortality

The incidence and mortality rates by sex reported for Chandigarh, SAS Nagar, Sangrur, and Mansa cancer registries are presented in table 2 and 3 and figures 5 and 6.

Globally, the COVID-19 pandemic has affected the day to day activities of human beings. Due to strict lockdown in the country from 24th March 2020 to 31st May 2020. After lockdown period there was continuous COVID wave and due to several restriction, the registry work was badly hampered.

Table 2: Population covered, incidence cases registered and incidence rate by sex: (2017-2018)

	Chandigarh	SAS Nagar	Sangrur	Mansa
Male				
Average population covered	664641	664164	952368	440450
Number of cases registered	936	844	1323	554
AAR per 100,000 *	91.1	79.2	73.3	59.5
Cumulative risk of getting the disease (0-74 age group)	10.5% (1 in 10)	9.5% (1 in 11)	8.6% (1 in 12)	6.8% (1 in 15)
Female				
Average population covered	557105	602596	841833	390171
Number of cases registered	931	932	1355	605
AAR per 100,000 *	97.3	91.9	79.7	68.6
Cumulative risk of getting the disease (0-74 age group)	11.9% (1 in 8)	10.5% (1 in 10)	9.0% (1 in 11)	8.1% (1 in 12)

*AAR: Age-adjusted rate per 100,000 population

Table 3: Population covered, mortality due to cancer and death rate by sex: (2017-2018)

	Chandigarh	SAS Nagar	Sangrur	Mansa
Male				
Average population covered	664641	664164	952368	440450
Number of deaths registered	623	556	1028	405
AAR per 100,000 *	62.3	53.8	56.8	43.6
Cumulative risk of death due to disease (0-74 age group)	7.4% (1 in 14)	6.7% (1 in 15)	6.7% (1 in 15)	5.0% (1 in 20)
Female				
Average population covered	557105	602596	841833	390171
Number of deaths registered	487	419	879	416
AAR per 100,000 *	51.9	41.9	52.1	46.5
Cumulative risk of death due to disease (0-74 age group)	6.2% (1 in 16)	5.0% (1 in 20)	6.1% (1 in 16)	5.5% (1 in 18)

*AAR: Age-adjusted rate per 100,000 population

Figure 5: Cancer incidence rate by sex (2017-2018)

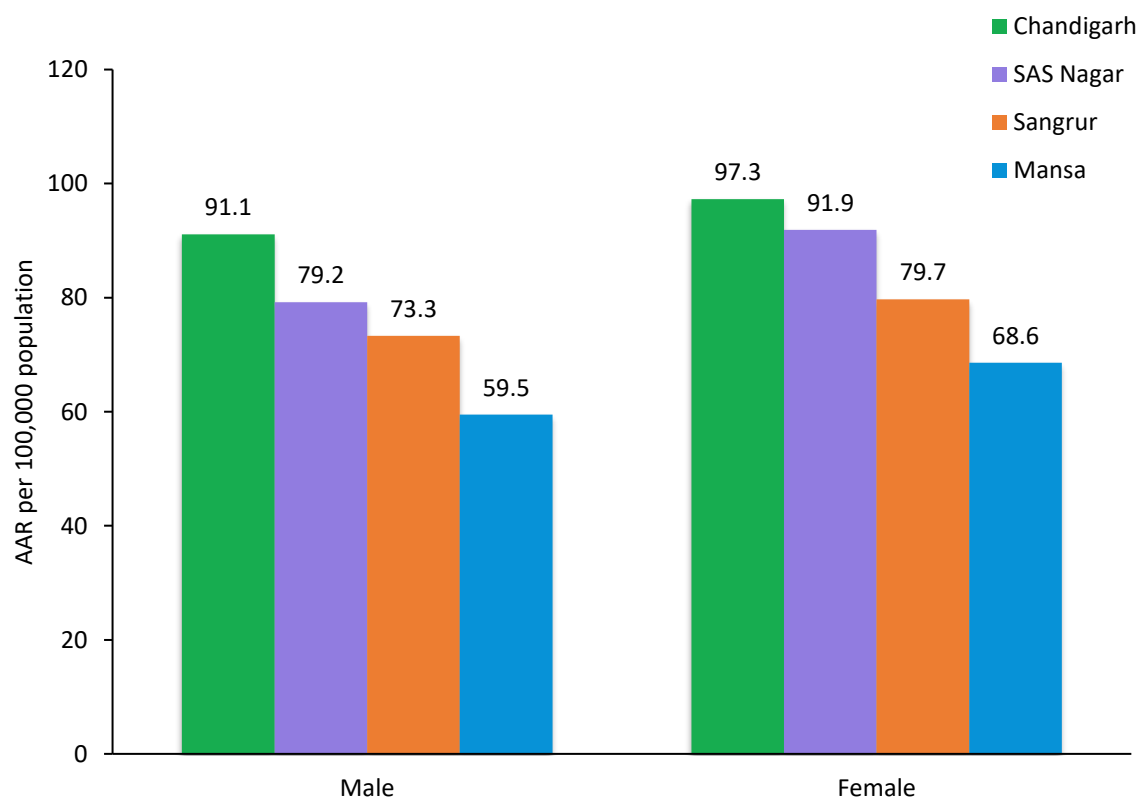
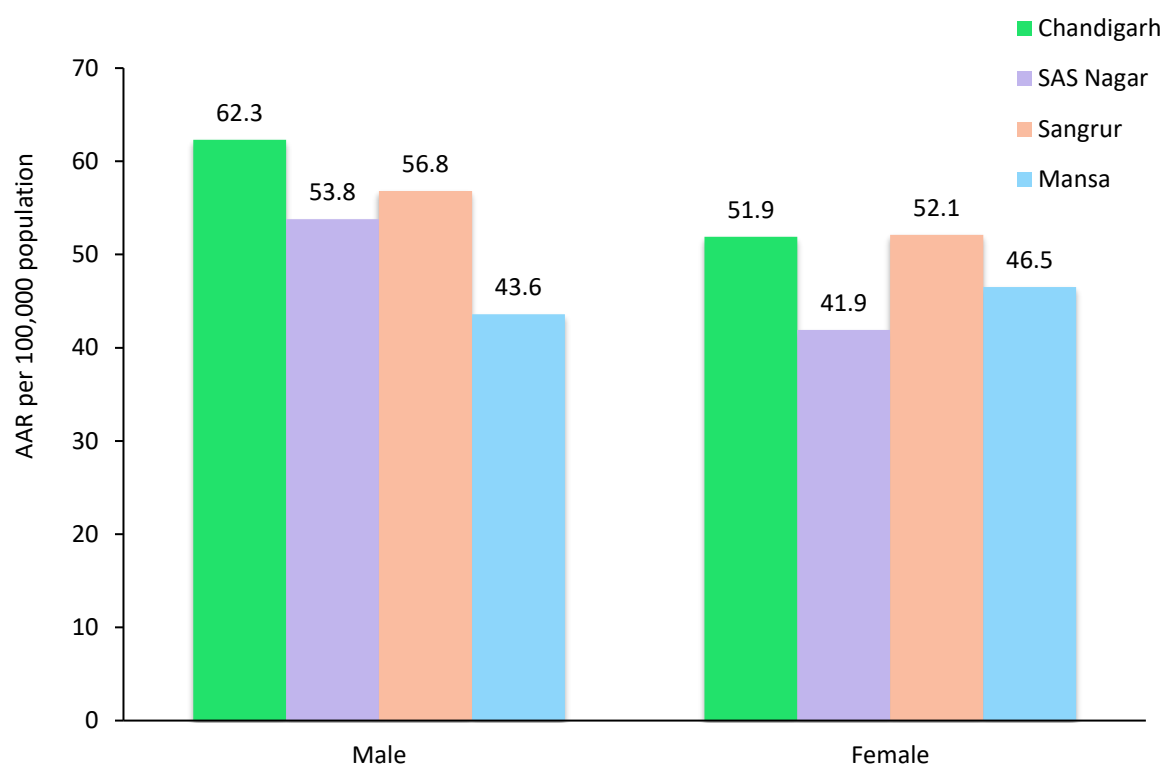


Figure 6: Cancer mortality rate by sex (2017-2018)



6. Leading cancer sites

The leading cancer sites by sex for Chandigarh, SAS Nagar, Sangrur and Mansa cancer registries are presented in figure 7 to 14.

Figure 7: Leading cancer sites in Chandigarh – Males (2017-2018)

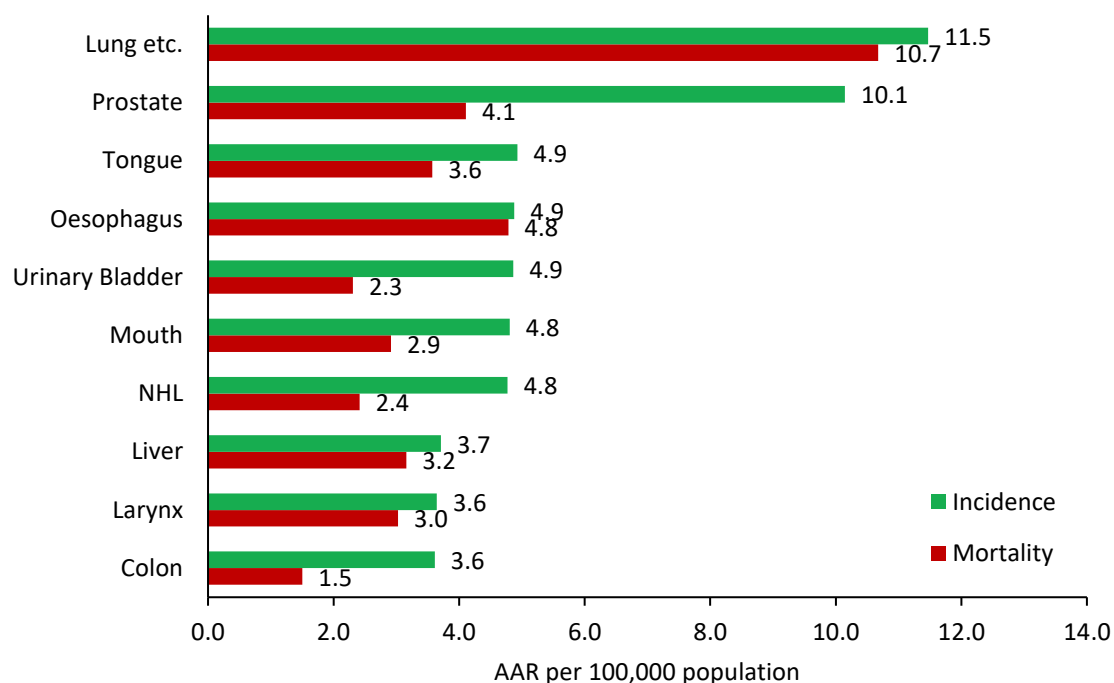


Figure 8: Leading cancer sites in Chandigarh – Females (2017-2018)

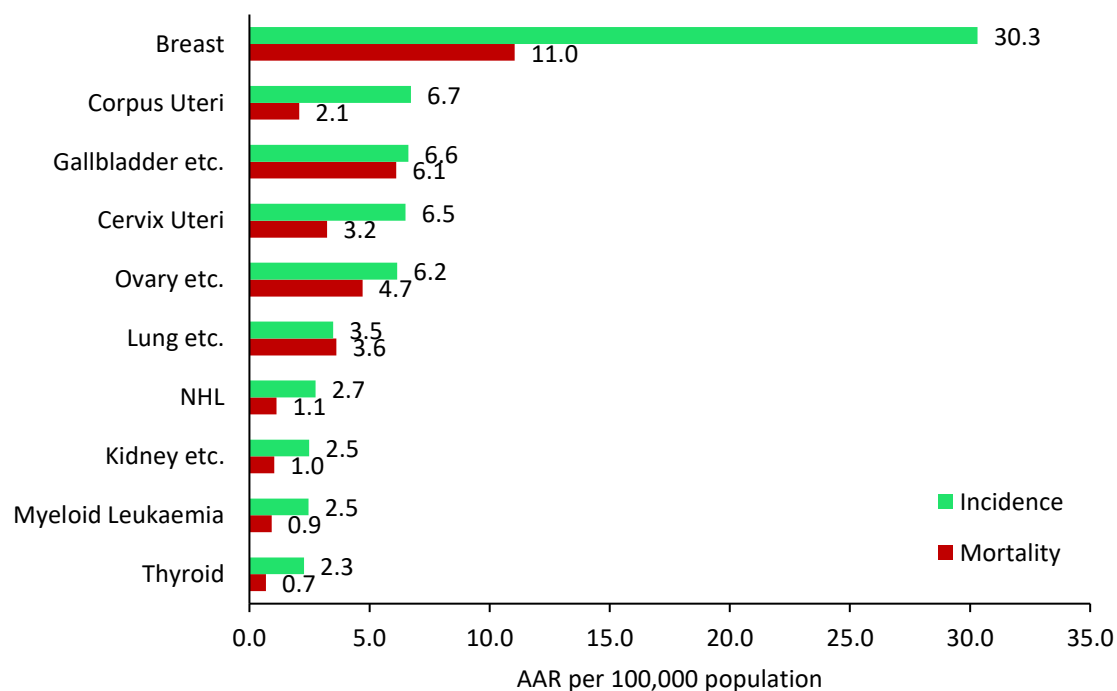


Figure 9: Leading cancer sites in SAS Nagar – Males (2017-2018)

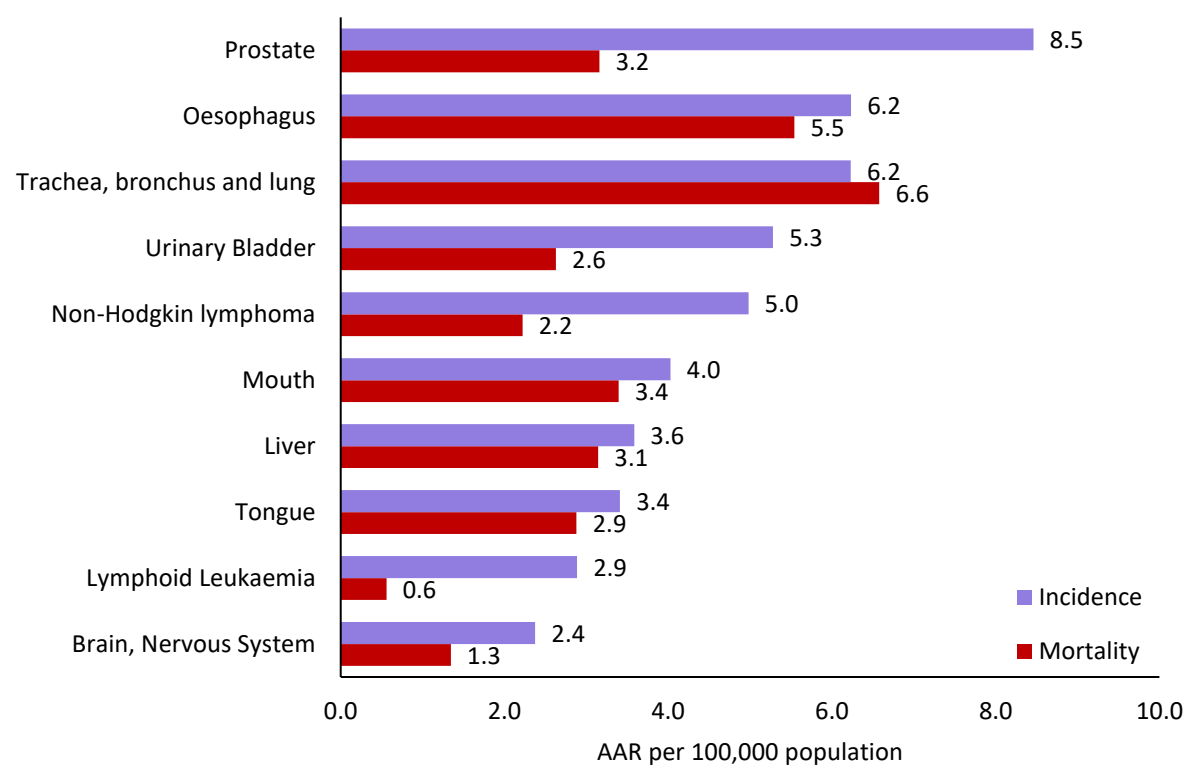


Figure 10: Leading cancer sites in SAS Nagar – Females (2017-2018)

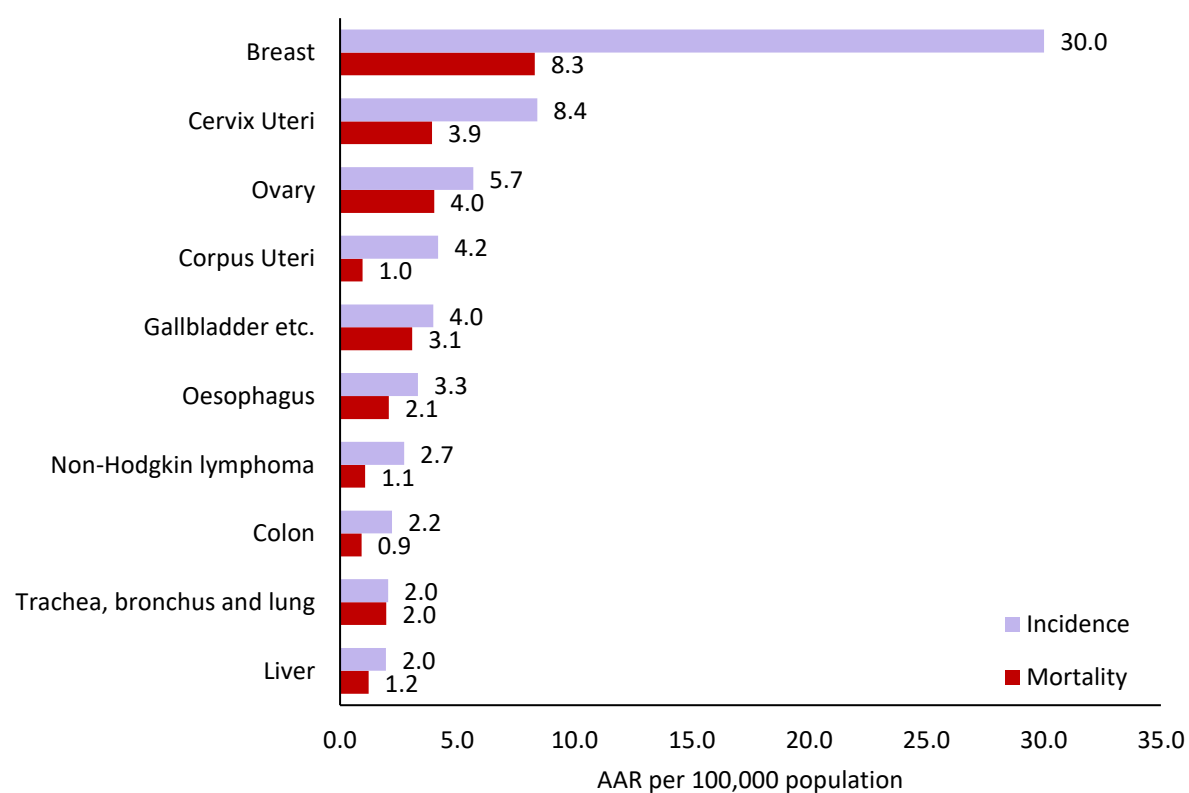


Figure 11: Leading cancer sites in Sangrur – Males (2017-2018)

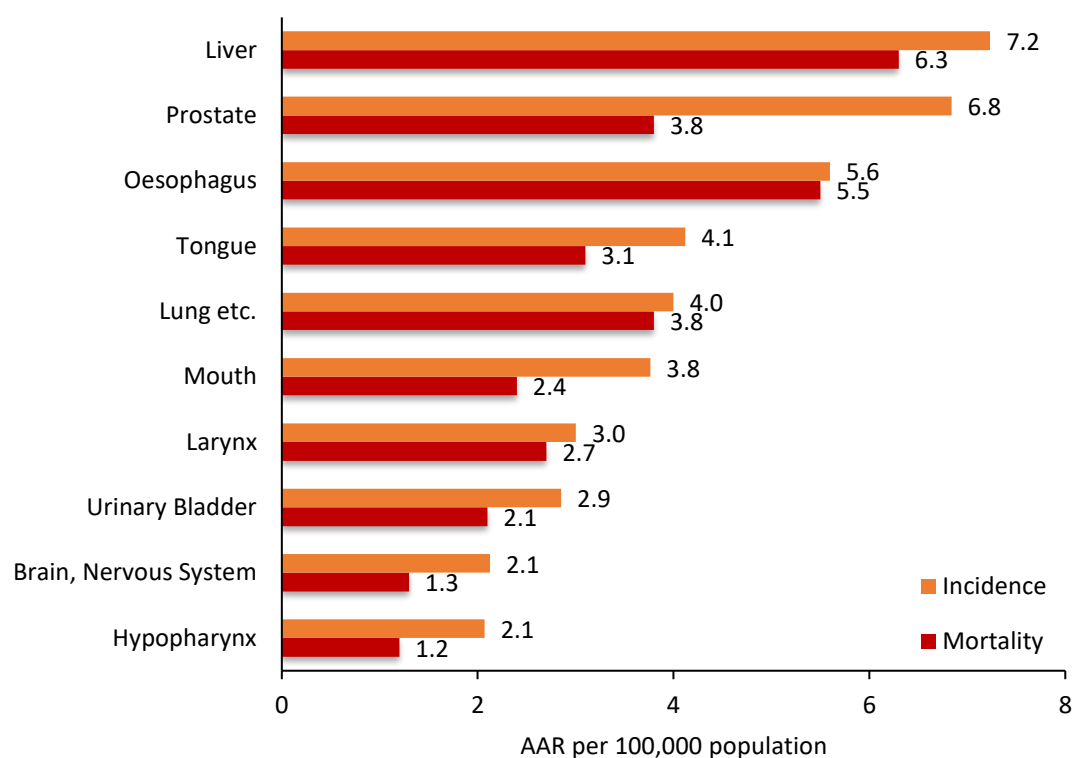


Figure 12: Leading cancer sites in Sangrur – Females (2017-2018)

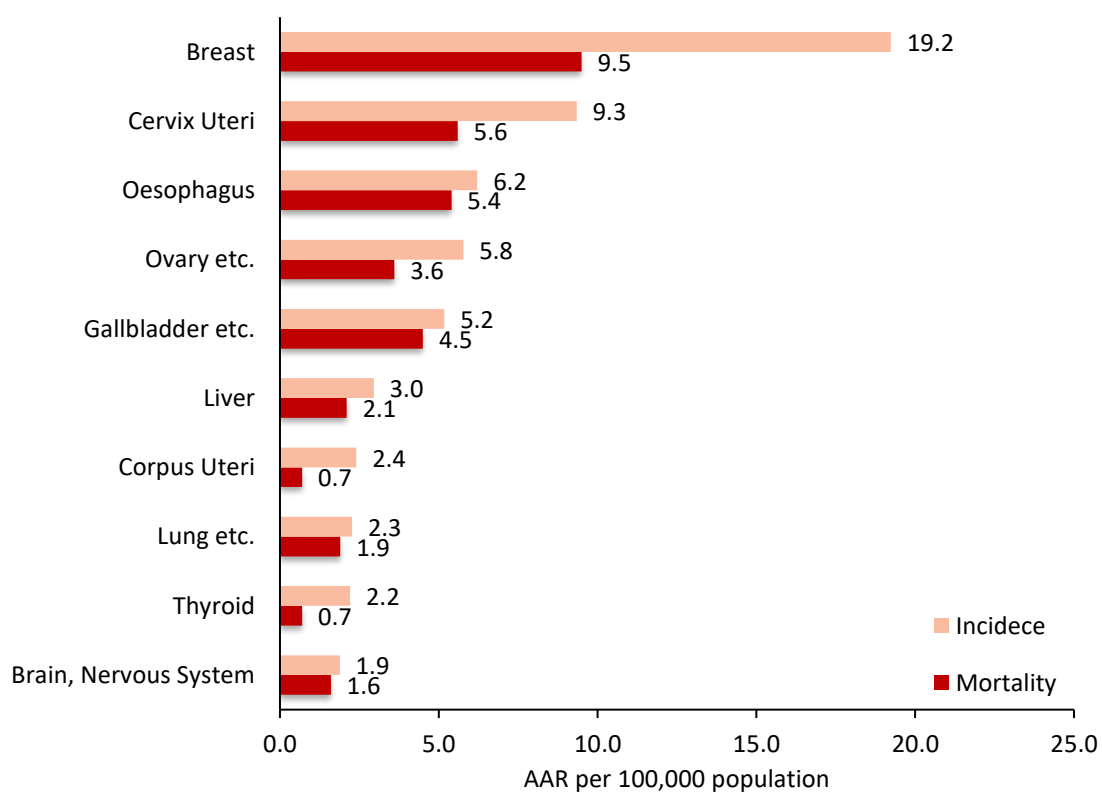


Figure 13: Leading cancer sites in Mansa – Males (2017-2018)

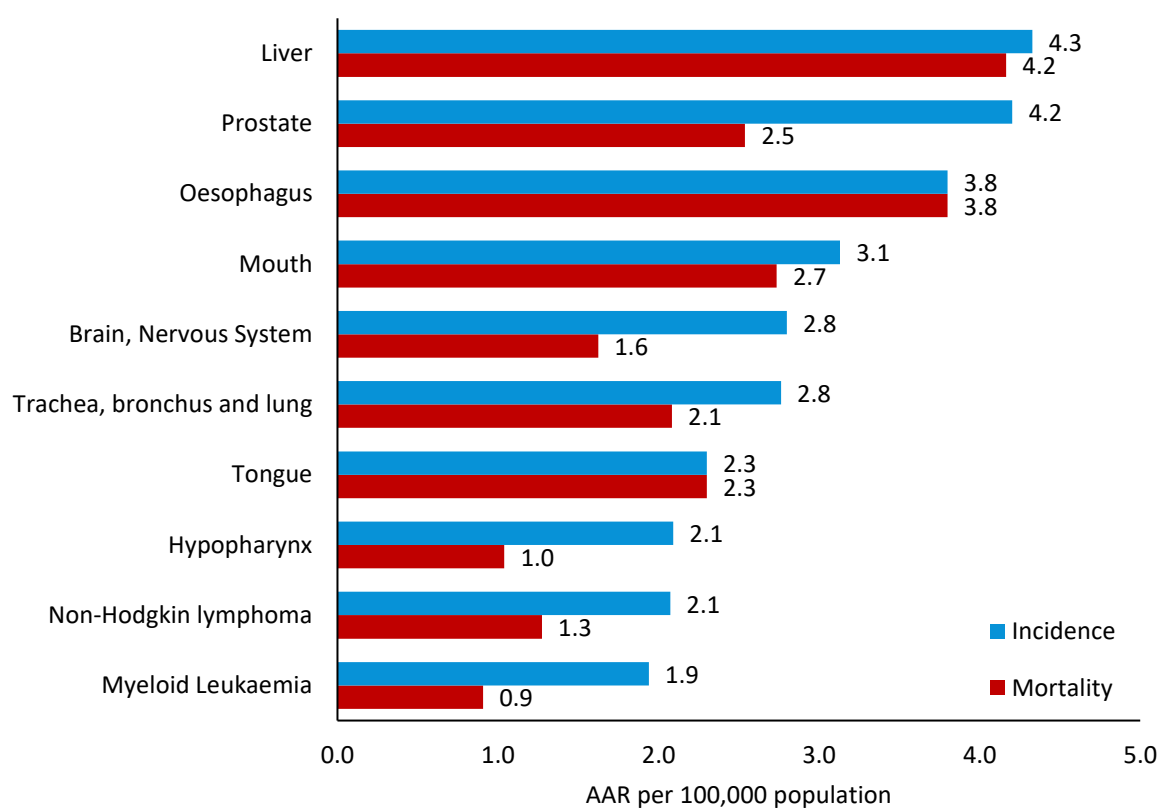
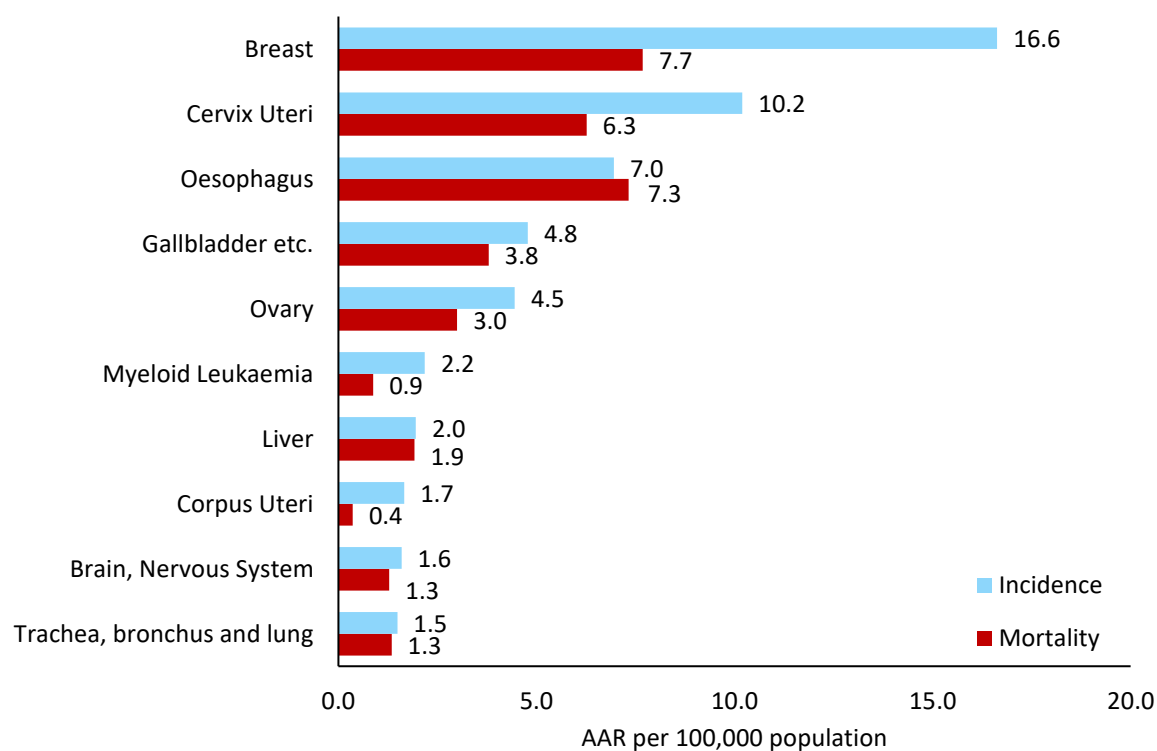


Figure 14: Leading cancer sites in Mansa – Females (2017-2018)



7. Tobacco-related cancer

Tobacco use has detrimental effects on health and is one of the major cause of non-communicable diseases. The anatomical sites are included to calculate the tobacco-related cancer burden based on the guidelines of International Agency for Research on Cancer (IARC), World Health Organization (WHO). Lip (C00), tongue (C01-C02), mouth (C03-C06), pharynx (C10, C12-C14), oesophagus (C15), larynx (C32), lung (C33-C34) and urinary bladder (C67) are associated with tobacco use.

As per the registry data, in male the tobacco-related cancer burden is 40.8%, 37.0%, 35.4%, 31.9% respectively in Chandigarh, SAS Nagar, Sangrur, and Mansa registries. While in female, it is 8.7%, 11.8%, 14.6%, and 15.9% respectively in Chandigarh, SAS Nagar, Sangrur, and Mansa registries. The esophagus, lung, mouth, and urinary bladder are the predominant cancers reported by the registry. As compared to males the tobacco-related cancer burden is lower in females. The details are presented by sex in table 4 and 5.

Table 4: Tobacco-related cancer burden in male: 2017-2018

Registry	Number	%	CR	AAR	TR
Chandigarh	382	40.8	28.7	37.3	64.0
SAS Nagar	312	37.0	23.5	30.3	60.7
Sangrur	469	35.4	24.6	26.5	57.6
Mansa	177	31.9	20.1	18.7	37.6

Table 5: Tobacco-related cancer burden in female: 2017-2018

Registry	Number	%	CR	AAR	TR
Chandigarh	81	8.7	7.3	8.9	15.4
SAS Nagar	110	11.8	9.1	10.9	22.8
Sangrur	198	14.6	11.8	11.8	25.1
Mansa	96	15.9	12.3	10.7	19.6

8. Cancer patterns in paediatric age-group (0-14)

In the year 2018-2019, the age-adjusted incidence for boys is 90.0, 42.1, 53.8, and 100.6 per million in Chandigarh, SAS Nagar, Sangrur, and Mansa registry respectively. While for girls it is 38.6, 35.3, 44.5, and 20.4 per million in Chandigarh, SAS Nagar, Sangrur, and Mansa registry respectively. However, under-reporting was observed for girl cancer cases in all the registries. Cancer incidence by sex for paediatric age-group is mentioned in figure 15. Leading cancer sites are mentioned below in table 6 and 7.

Figure 15: Cancer incidence by sex in paediatric age-group: 2017-2018

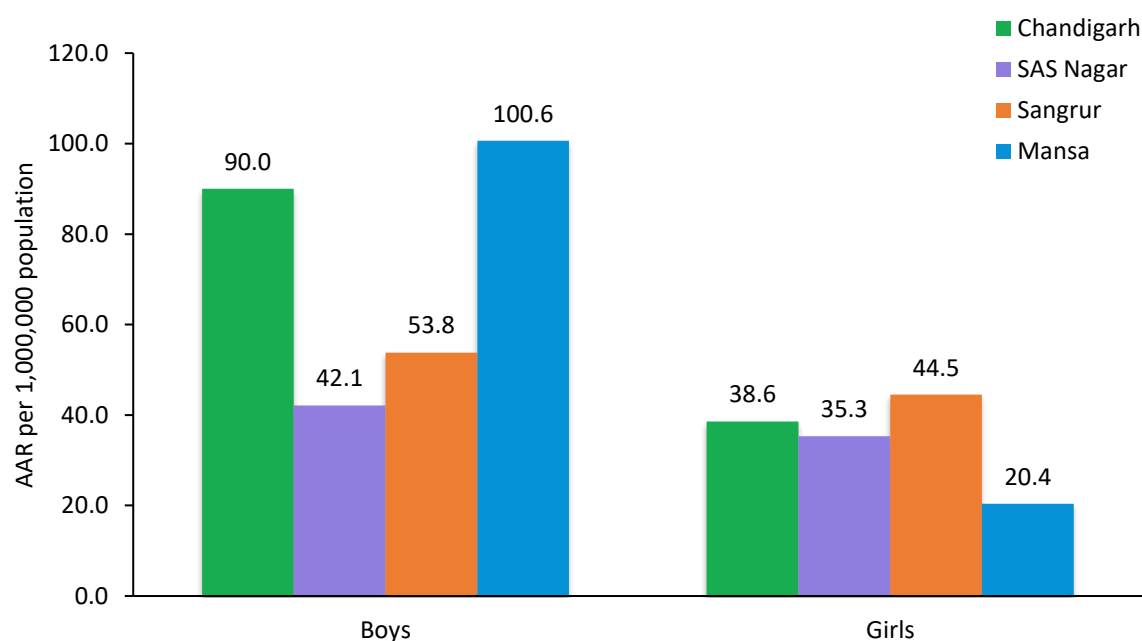


Table 6: Cancer burden in boys (0-14 years): 2017-2018

Chandigarh	SAS Nagar	Sangrur	Mansa
Lymphoid leukaemia (22.3)	Lymphoid leukaemia (13.3)	Lymphoid leukaemia (17.1)	Leukaemia unspecified (18.6)
Non-hodgkin lymphoma (14.8)	Conn. & soft tissue (6.4)	Leukaemia unspecified (10.2)	Hodgkin's disease (15.5)
Myeloid leukaemia (14.3)	Bone (5.6)	Brain, NS (8.0)	Brain, NS (15.5)
Eye (11.7)	Leukaemia unspecified (5.3)	Conn. & soft tissue (4.1)	Eye (13.3)
Hodgkin's disease (9.5)	Myeloid leukaemia (4.3)	Adrenal gland (2.6)	Lymphoid leukaemia (11.9)

AAR per 1,000,000 population

Table 7: Cancer burden in girls (0-14 years): 2017-2018

Chandigarh	SAS Nagar	Sangrur	Mansa*
Eye (13.0)	Lymphoid leukaemia (14.0)	Brain, NS (12.2)	Brain, NS (20.4)
Lymphoid leukaemia (9.3)	Myeloid leukaemia (7.7)	Bone (5.9)	
Bone (8.1)	Brain, NS (5.1)	Leukaemia unspecified (5.0)	
Other and unspecified (4.7)	Conn. & soft tissue (3.9)	Lymphoid leukaemia (5.0)	
Myeloid leukaemia (3.5)	Kidney etc. (2.5)	Conn. & soft tissue (3.1)	

AAR per 1,000,000 population

*** under reporting in Mansa cancer registry**

9. Cancer pattern in urban and rural areas

The Chandigarh and SAS Nagar are urban registries while Sangrur and Mansa are rural. We have observed the difference in the cancer incidence rate in urban and rural areas.

As compared to Chandigarh, the male all site cancer incidence rates are 20% lower in Sangrur district (RR 0.80, 95% CI 0.71 – 0.91) as well it is 35% lower in Mansa district (RR 0.65, 95% CI 0.56 – 0.76). While in female it is 18% lower in Sangrur district (RR 0.82, 95% CI 0.72 – 0.93) as well it is 29% lower in Mansa district (RR 0.71, 95% CI 0.61 – 0.82). **The all site cancer incidence rates in both sex from rural registries are lower than urban registries and it is statistically significant.**

Burden of oesophageal cancer among males in Sangrur is 14% higher than the Chandigarh registry (RR 1.14, 95% CI 0.71 – 1.85). However, it is 22% lower in Mansa registry (RR 0.78, 95% CI 0.42 – 1.44) which is not statistically significant. In females, we have noted burden of oesophageal cancer in Sangrur is 3.9 times higher than the Chandigarh registry (RR 3.88, 95% CI 2.11 – 7.11). For Mansa it is 4.4 times higher than Chandigarh (RR 4.38, 95% CI 2.05 – 9.35). The difference in incidence of oesophagus cancer in females in rural and urban area is highly significant.

The prostate cancer burden is 33% lower in Sangrur district as compared to Chandigarh registry (RR 0.67, 95% CI 0.45 – 1.02) and it is 58% lower in Mansa registry (RR 0.42, 95% CI 0.25 – 0.70). The prostate cancer incidence rates are lower in rural registries as compared to Chandigarh registry.

Similarly, a 65% lower rate was noted for lung cancer among male in Sangrur registry as compared to Chandigarh registry (RR 0.35, 95% CI 0.22 – 0.56). Similar, observation was noted for Mansa registry, with a 76% lower rate than the Chandigarh registry (RR 0.24, 95% CI 0.14 – 0.43) and it is statistically significant.

For breast cancer burden in Sangrur, it is 37% lower than Chandigarh district (RR 0.63, 95% CI 0.50 – 0.81) while for Mansa it is 45% lower than Chandigarh district (RR 0.55, 95% CI 0.41 – 0.73) and both the findings are statistically significant.

Cervical cancer burden in Sangrur, it is 1.4 times higher than Chandigarh district (RR 1.43, 95% CI 0.95 – 2.15) while for Mansa it is 1.6 times higher than Chandigarh district (RR 1.57, 95% CI 0.98 – 2.51); however, the results are not statistically significant.

The difference in the cancer burden and patterns in the rural and urban area may be due to different lifestyles, food habits, education levels, and access to the diagnostic and treatment facilities. In this period due to COVID-19 pandemic we have limited access to medical records

in the urban areas, we may have missed the cases in urban area. The comparison of rural and urban incidence rates is presented in table 8 and 9.

Table 8: Comparison of rural/urban incidence rate in male: 2017 – 2018

ICD-10	Cancer site	Registry	Chandigarh (AAR)	Rural (AAR)	Rate ratio	95% CI
	All site	Sangrur	91.1	73.3	0.80	0.71-0.91
		Mansa	91.1	59.5	0.65	0.56-0.76
C15	Oesophagus	Sangrur	4.9	5.6	1.14	0.71-1.85
		Mansa	4.9	3.8	0.78	0.42-1.44
C61	Prostate	Sangrur	10.1	6.8	0.67	0.45-1.02
		Mansa	10.1	4.2	0.42	0.25-0.70
C33-C34	Lung	Sangrur	11.5	4.0	0.35	0.22-0.56
		Mansa	11.5	2.8	0.24	0.14-0.43

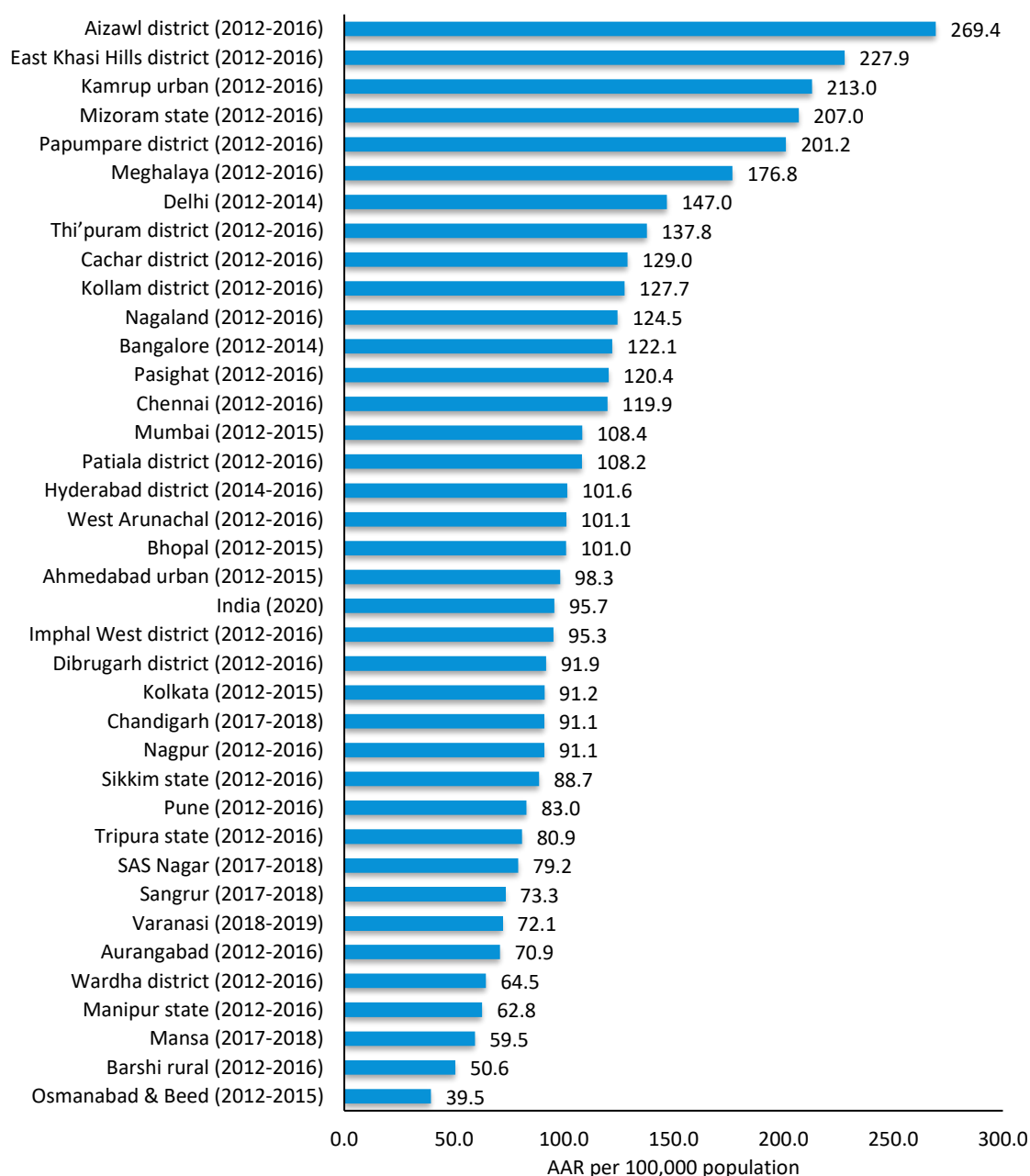
Table 9: Comparison of rural/urban incidence rate in female: 2017 – 2018

ICD-10	Cancer site	Registry	Chandigarh (AAR)	Rural (AAR)	Rate ratio	95% CI
	All site	Sangrur	97.3	79.7	0.82	0.72-0.93
		Mansa	97.3	68.6	0.71	0.61-0.82
C15	Oesophagus	Sangrur	1.6	6.2	3.88	2.11-7.11
		Mansa	1.6	7.0	4.38	2.05-9.35
C50	Breast	Sangrur	30.3	19.2	0.63	0.50-0.81
		Mansa	30.3	16.6	0.55	0.41-0.73
C53	Corpus uteri	Sangrur	6.7	2.4	0.36	0.19-0.68
		Mansa	6.7	1.7	0.25	0.12-0.55
C53	Cervix uteri	Sangrur	6.5	9.3	1.43	0.95-2.15
		Mansa	6.5	10.2	1.57	0.98-2.51

10. Comparison of cancer incidence rate with other Indian registries

The Chandigarh and SAS Nagar rates are low as compared to the national average as well as lower than rates of Delhi and Mumbai registry. Sangrur rates are in comparison with Varanasi registry while Mansa rates are in comparison with the Wardha registry. Age adjusted incidence rate for all cancer sites for both sexes for the year 2017-2018 is compared with other Indian PBCRs in the figures 16 and 17.

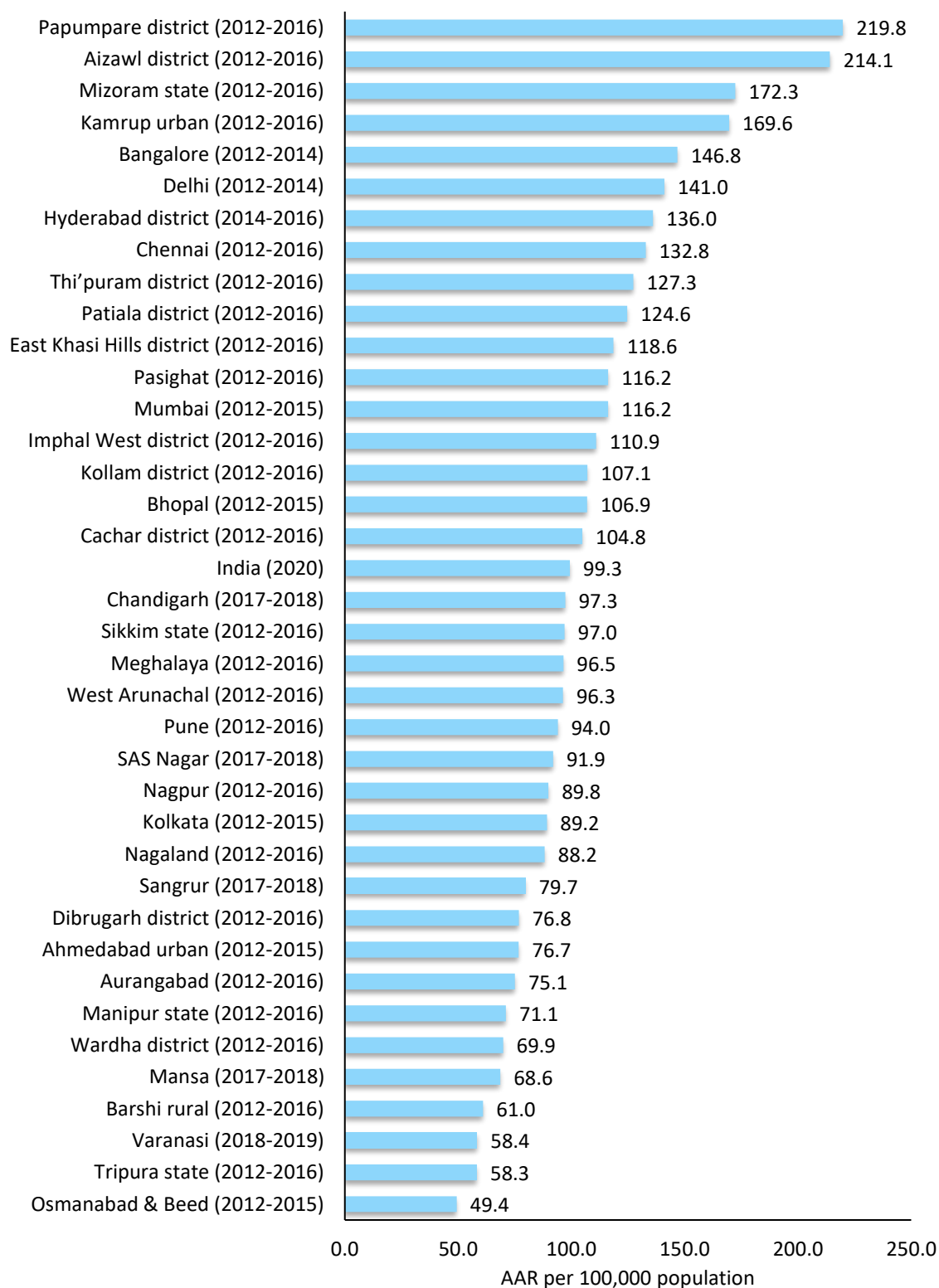
Figure 16: Age-adjusted incidence rate of all cancer sites in males



(References: 2-7)

All site cancer incidence rates in females for Chandigarh and SAS Nagar registry rates are lower as compared to Mumbai and Delhi registry and Sangrur and Mansa rates are lower than the national average, however they are higher as compared to the rates of Varanasi and Barshi registry.

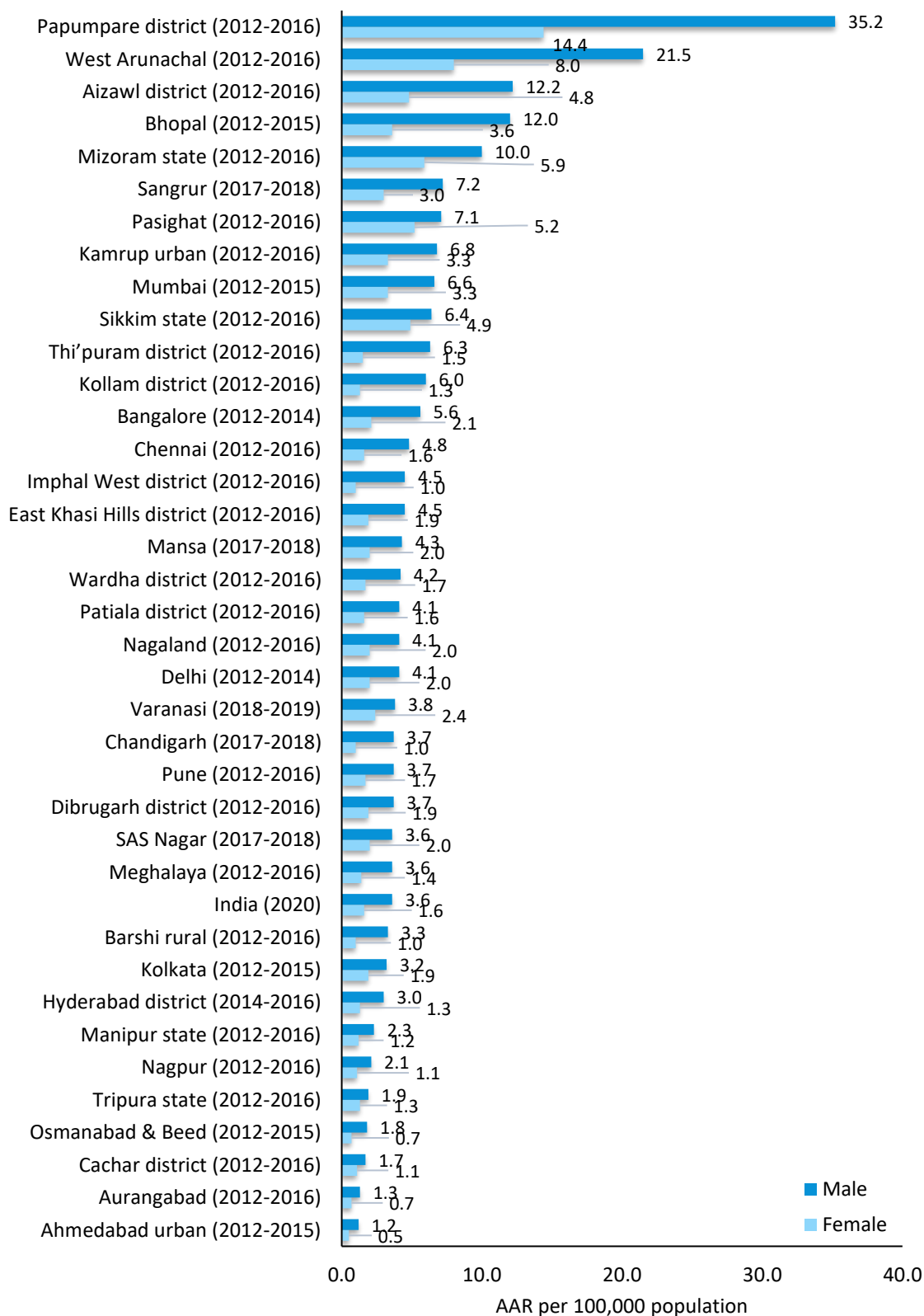
Figure 17: Age-adjusted incidence rate of all cancer sites in females



(References: 2-7)

The liver cancer rates are slightly higher in Sangrur and Mansa district as compared to other registries. This is attributed to improvements in the diagnostic facilities in these districts. Comparison of liver cancer rate is shown in figure 18.

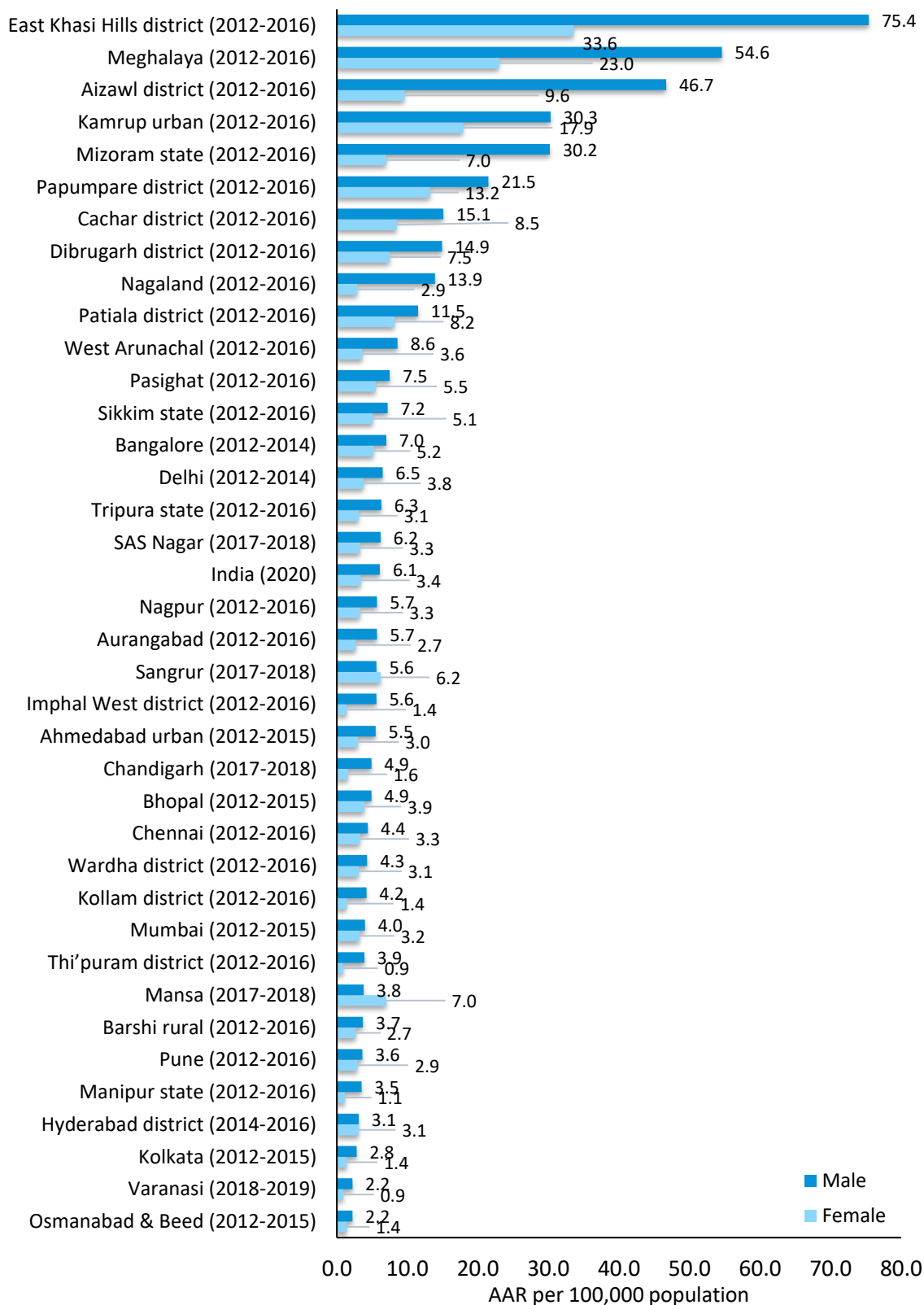
Figure 18: Age-adjusted incidence rate of liver cancer



(References: 2-7)

Oesophagus cancer incidence rates in females of Mansa cancer registry is higher than Chandigarh and SAS Nagar registry. Comparison of oesophagus cancer rate is shown in figure 19.

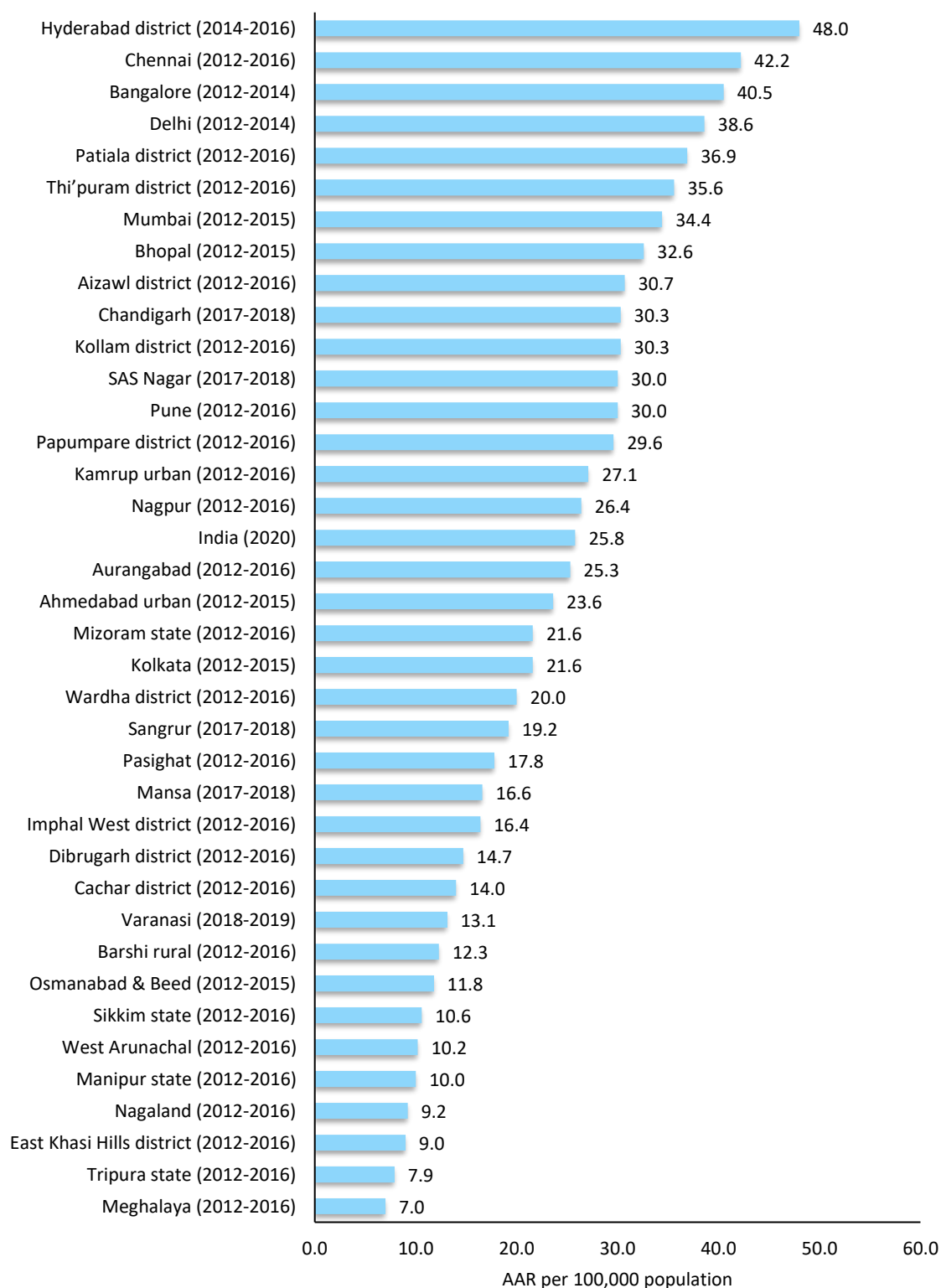
Figure 19: Age-adjusted incidence rate of oesophagus cancer



(References: 2-7)

Breast cancer rates for Chandigarh and SAS Nagar are lower as compared to Delhi, Chennai and Mumbai. While for Sangrur registry the rate is in comparison with the Wardha registry while rate of Mansa registry is lower than the Sangrur registry. The comparison of breast cancer rate is shown in figure 20.

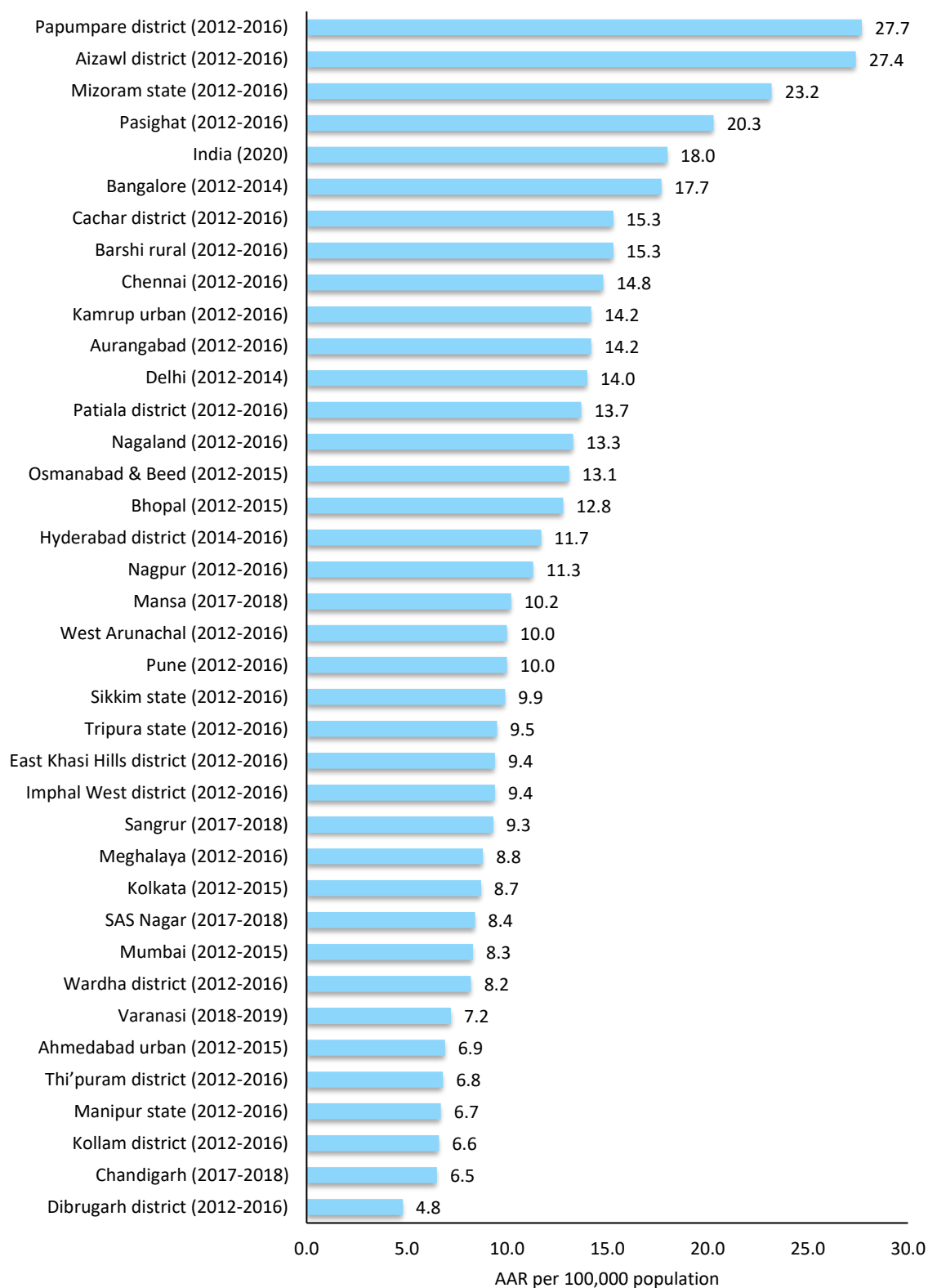
Figure 20: Age-adjusted incidence rate of breast cancer



(References: 2-7)

For cervical cancer, the Barshi rural registry rate is higher than Sangrur and Mansa registry. While rates for Chandigarh and SAS Nagar are lower as compared Mumbai. The comparison of cervical cancer rate is shown in figure 21.

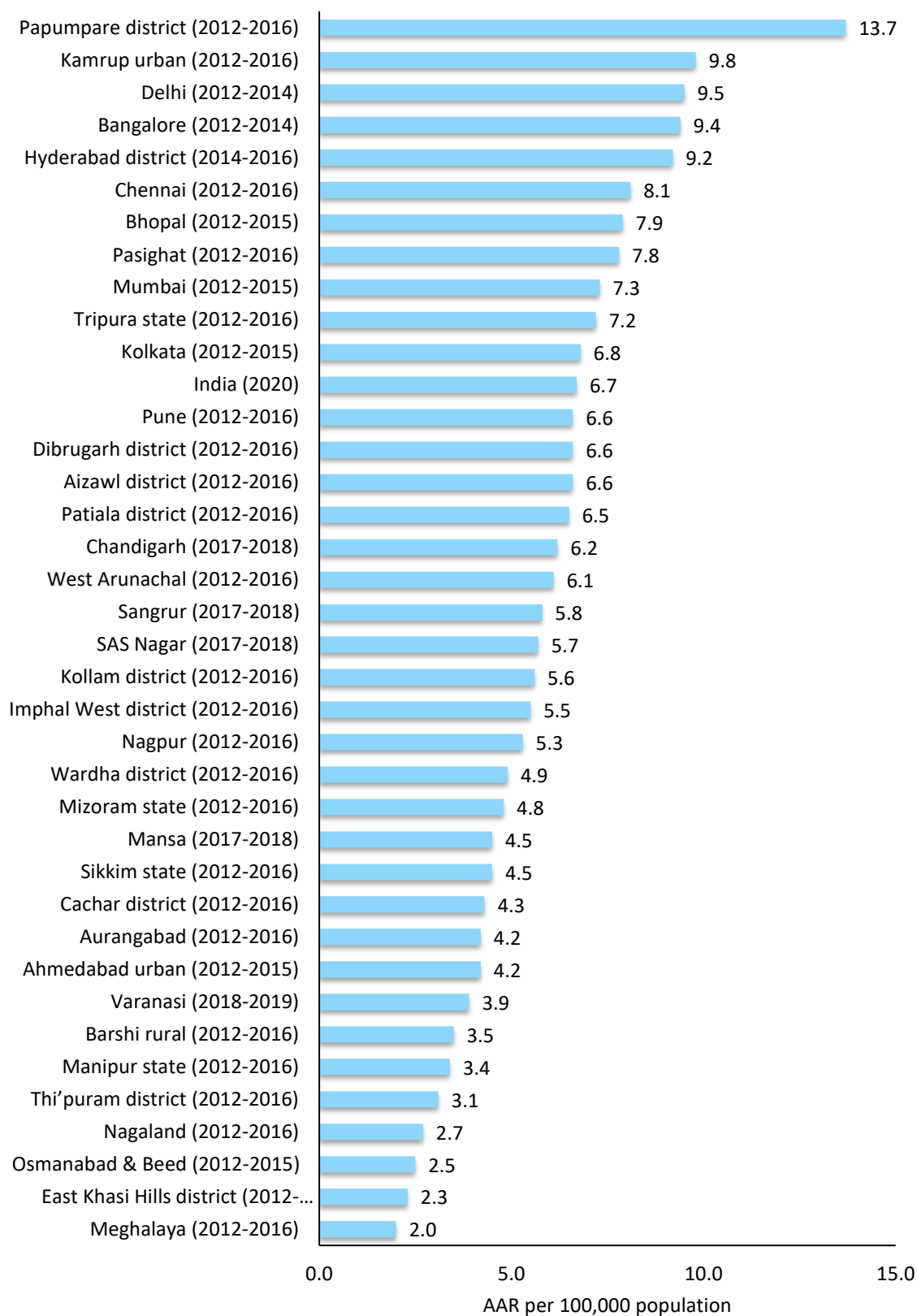
Figure 21: Age-adjusted incidence rate of cervical cancer



(References: 2-7)

Ovarian cancer rates for Chandigarh and SAS Nagar are lower as compared to Delhi, Chennai and Mumbai. The comparison of ovarian cancer rate is shown in figure 22.

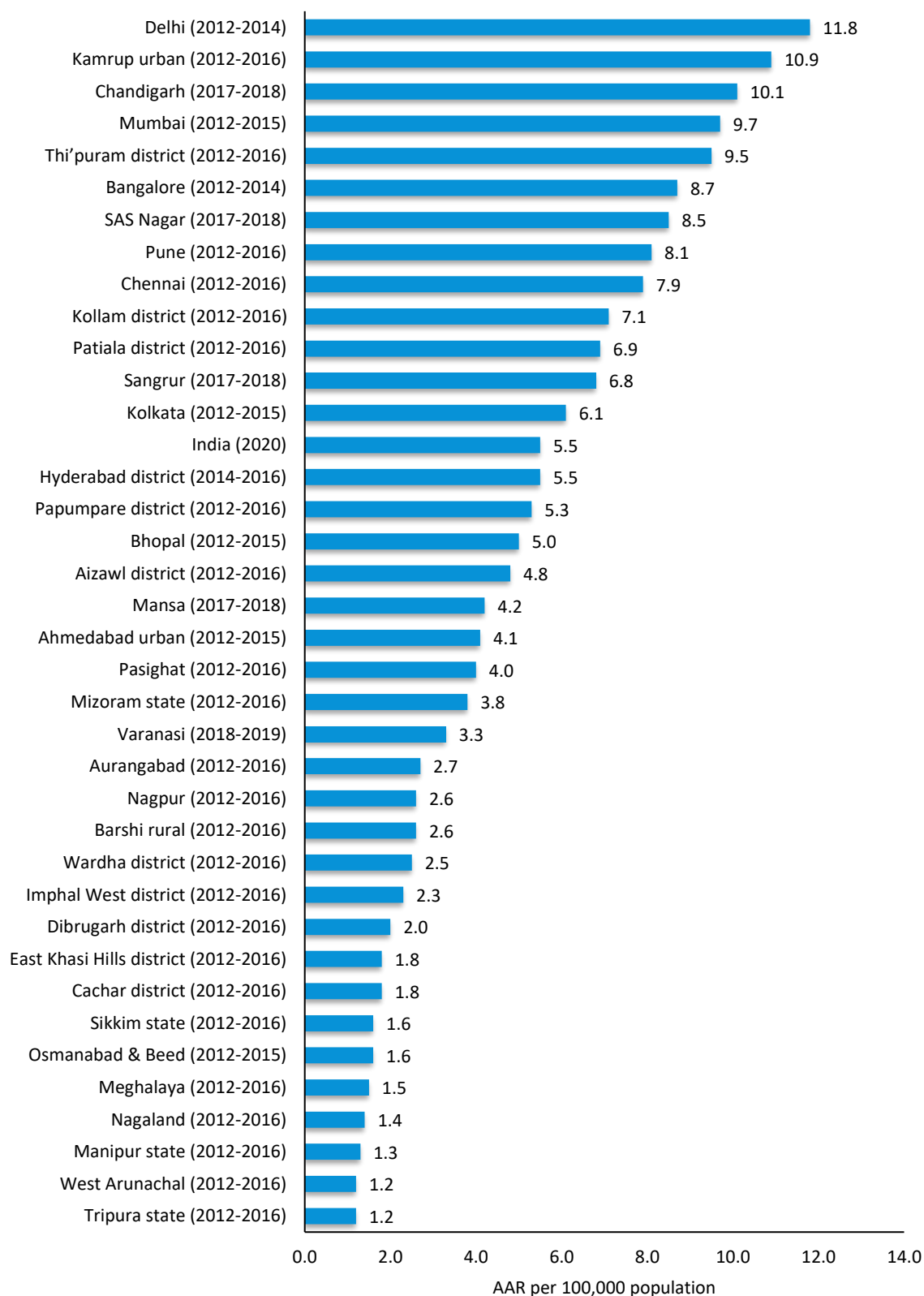
Figure 22: Age-adjusted incidence rate of ovarian cancer



(References: 2-7)

Prostate cancer rates for Sangrur, SAS Nagar and Chandigarh is higher than the national average however it is lower than Delhi. The comparison of prostate cancer rate is shown in figure 23.

Figure 23: Age-adjusted incidence rate of prostate cancer



(References: 2-7)

11. Cancer survival studies undertaken

Sangrur cancer registry has undertaken survival studies of leading cancer sites of oesophagus, breast, cervix and prostate cancer for period 2013-2018. The cases were followed up by house visits and telephone contacts and we have followed status available as on 31st December 2021.

The Chandigarh, SAS Nagar and Mansa registries has also been collecting survival data on the leading cancer sites which has been in progress. The survival data for Chandigarh, SAS Nagar and Mansa will be released soon.

Out of 579 total oesophagus cancer cases 40 (6.9%) patients are alive while 535 (92.4%) are dead. Out of 895 breast cancer cases, 480 (53.6%) patients are alive while 403 (45.0%) are dead. Similarly, out of 453 cervix uteri cancer cases, 157 (34.7%) patients are alive while 281 (62.0%) patients are dead. Out of total 271 prostate cancer cases, 86 (31.7%) patients are alive while 184 (67.9%) patients are dead.

The five-year observed survival was 9.3% for oesophagus, 57.8% for breast, 39.8% for cervix uteri and 30.3% for prostate cancer. The follow up status and survival is presented in table 10 and 11.

Table 10: Cancer cases registered in the period 2013-2018 and their follow up status

Cancer Site	No. of cases (2013-2018)	Follow up status as on 31 st December, 2021					
		Alive		Death		Migrated/ lost to follow up	
		No.	%	No.	%	No.	%
Oesophagus	579	40	6.9	535	92.4	4	0.7
Breast	895	480	53.6	403	45.0	12	1.3
Cervix uteri	453	157	34.7	281	62.0	15	3.3
Prostate	271	86	31.7	184	67.9	1	0.4

Table 11: Year-wise observed and relative survival

Cancer site	Observed Survival			Relative Survival		
	1 Year	3 Years	5 Years	1 Year	3 Years	5 Years
Oesophagus	35.8%	13.4%	8.6%	36.6%	14.2%	9.3%
Breast	86.0%	62.8%	54.4%	87.0%	65.0%	57.8%
Cervix uteri	80.7%	47.1%	37.6%	81.8%	48.9%	39.8%
Prostate	66.7%	35.1%	25.0%	69.4%	39.8%	30.3%

12. Early detection program for oral, breast and cervical cancer in Sangrur, Punjab

In the 2013-2014 annual report of the Sangrur population-based cancer registry, it was recommended to start the cancer prevention programme in Sangrur district. Based on this recommendation, we have started an early detection programme for Oral, Breast and Cervical Cancer in Sangrur district of Punjab State. In this programme, we are providing intensive health education on the risk factors, preventive measures of the disease, and easy access to diagnosis and treatment to the symptomatic or likely cases. An observation of the effectiveness of the interventions in the early detection and prevention of oral, breast and cervical cancer will be monitored by Sangrur cancer registry.

We expect that breast, oral, and cervical cancer cases will be detected at an early stage and most of the cases will complete the treatment. The programme is monitored by the population-based cancer registry Sangrur. In this programme, we have selected the staff locally and they have been given training by the faculty of HBCH, Sangrur and TMC, Mumbai.

Number of people screened and confirmed diagnosis:

More than 2,600 participants attended the detection clinic organized at the doorstep of the population as well as at HBCH Sangrur. Out of these, 434 were attended for oral screening, 95 screen positive cases were diagnosed. We have diagnosed 36 leukoplakia, 2 mild dysplasia during oral screening and 4 CIN I and 2 CIN II precancerous cases get diagnosed in cervical screening. As of today, 11 oral cancer, 38 breast cancer and 12 cervical cancer cases are diagnosed. Moreover, out of 61 oral, breast and cervical cancer cases 53 (87%) cancer patient have completed treatment and are under follow-up at Homi Bhabha Cancer Hospital (HBCH), Sangrur. The 58% cervix cancer and 69% breast cancer cases has been detected at early stage. The population covered, number of cases attended for the detection, screen positive and cancer cases detected ad treated is presented in table 12.

Table 12: The number of cases attended for the examination, screen positive and cancer cases detected and treated

	Oral	Breast	Cervix uteri
Total population covered	177968	85319	85319
Symptomatic and Self attended for examination	434	758	1486
Total screen positive	95 (21.9%)	144 (19.0%)	180 (12.1%)
Cancer cases detected	11	38	12
Treatment completion and Under follow up	7 (63.6%)	35 (92.1%)	11 (91.7%)

We have conducted 43 school education programme and 82 cancer detection camps in the period 2019 to July 2022. The details about the cancer awareness programme and the cancer detection camps conducted in Sangrur district is mentioned in the table.

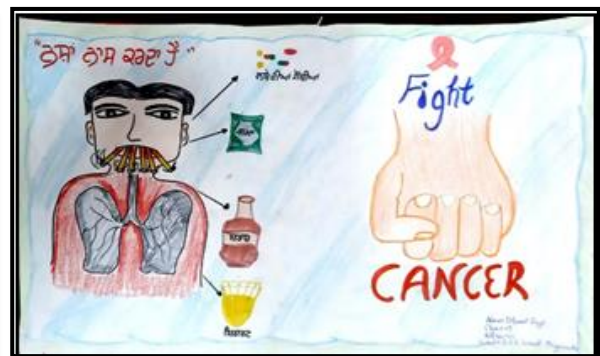
Table 13: Cancer awareness meetings in schools

Sr. no.	School/ College Name	Number of students /Participants
1	Govt. High Sec. School, Bhatiwala Kalan	150
2	Govt. Sen. Sec. School, Sakrodi	150
3	Govt. Prim & Sec. School, Rampura	70
4	Govt. Sen. Sec. School, Jhaneri	65
5	Govt. Sen. Sec. School, Batriana	70
6	Govt. Sen. Sec. School, Phaguwala	55
7	Govt. Sen. Sec. School, Akberpur	50
8	Govt. Girls School, Sangrur	200
9	Khalsa School, Sangrur	80
10	Prem Sabha Sen. Sec. School, Sangrur	200
11	Prem Sabha Shishu Niketan School, Sangrur	90
12	Arya Samaj School, Sangrur	60
13	Gurnam Singh Public School, Sangrur	160
14	Govt High School, Mangwal	60
15	Vasant Valley Public School, Sangrur	70
16	Govt. Sen. Sec. Smart School, Sangrur (Cancer Walk)	2500
17	Little Flower Convent School, Sangrur	70
18	Govt. Elementary School, Badbar	80
19	Sant Baba Attar Singh Govt Polytechnic College, Badbar	90
20	Govt. Sen Sec School, Banarsi	65
21	SPS School, Sangrur	100
23	Golden Earth School Sangrur	100
24	Ranbir College Sangrur	80
27	Govt. Sen. Sec. School, Channo	40
29	Sangrur w-08 Raj High Sen. Sec school (Oral)	150
30	Primary Govt School Alorakh	100
31	Primary Govt School Balad kalan	100
32	Primary Govt School Bakhopir	150
33	Govt Sen Sec School Kakra	70
34	Primary Govt School Rai Singh Wala	25
35	Gove Sen Sec School Bhawanigarh Girls	150
36	Govt Sen Sec School Bhawanigarh boys	50
37	Govt Boys School Bhawanigarh	60
38	Diet College Sangrur	150
39	Sunrise Public School Sangrur	70
40	Alpine School Bhawanigarh	150
41	Guru Tegh Bahadur School Bhawanigarh	70
42	Heritage School Bhawanigarh	50
43	Thomas School Bhawanigarh	60
Total		6,060

Table 14: Cancer detection camp was organised in the villages and Sangrur urban area

Sangrur And Bhawanigarh Urban Area					
1	Sangrur Ward -1	16	Sangrur Ward -16	31	Bhawanigarh Ward-2
2	Sangrur Ward -2	17	Sangrur Ward -17	32	Bhawanigarh Ward-3
3	Sangrur Ward -3	18	Sangrur Ward -18	33	Bhawanigarh Ward-4
4	Sangrur Ward -4	19	Sangrur Ward -19	34	Bhawanigarh Ward-5
5	Sangrur Ward -5	20	Sangrur Ward -20	35	Bhawanigarh Ward-6
6	Sangrur Ward -6	21	Sangrur Ward -21	36	Bhawanigarh Ward-7
7	Sangrur Ward -7	22	Sangrur Ward -22	37	Bhawanigarh Ward-8
8	Sangrur Ward -8	23	Sangrur Ward -23	38	Bhawanigarh Ward-9
9	Sangrur Ward -9	24	Sangrur Ward -24	39	Bhawanigarh Ward-10
10	Sangrur Ward -10	25	Sangrur Ward -25	40	Bhawanigarh Ward-11
11	Sangrur Ward -11	26	Sangrur Ward -26	41	Bhawanigarh Ward-12
12	Sangrur Ward -12	27	Sangrur Ward -27	42	Bhawanigarh Ward-13
13	Sangrur Ward -13	28	Sangrur Ward -28	43	Bhawanigarh Ward-14
14	Sangrur Ward -14	29	Sangrur Ward -29	44	Bhawanigarh Ward-15
15	Sangrur Ward -15	30	Bhawanigarh Ward-1		
Bhawanigarh Rural Area					
1	Nadampur	21	Mehsampur	41	Dialgarh
2	Nakte	22	Kheri Chandwan	42	Aloarkh
3	Mattran	23	Gehlan	43	Sajuma
4	Hardipura	24	Ditupura	44	Akbarpur
5	Balial	25	Ghamad Singh Wala	45	Phaguwala
6	Retgarh	26	Sangatpura	46	Rampura
7	Bhatiwal Khurd	27	Fatehgarh Bhadson	47	Roshanwala
8	Rajpura	28	Panwan	48	Bharo
9	Masani	29	Bhatiwal Kalan	49	Dehlewal
10	Munshiwal	30	Channo	50	Bimbari
11	Phuman Wal	31	Lakhewal	51	Bimbar
12	Shahpur	32	Bharaj	52	Noorpura
13	Majhi	33	Balad Kalan	53	Batriana
14	Majha	34	Balad Khurd	54	Jhaneri
15	Bakhtra	35	Balad Kothi	55	Bakhopir
16	Bakhtri	36	Turi	56	Gharachon
17	Jalan	37	Harkishanpura	57	Sanghreri
18	Santokhpura	38	Rai Singh Wala	58	Kapial
19	Rasulpur Chhana	39	Kakra	59	Bijalpur
20	Nandgarh (Thaman Singh Wala)	40	Sakrodi	60	Nandgarh

Moreover, after the health talk, we have conducted drawing competition for the school children. Students are encouraged to draw a picture which gives the message of cancer prevention. Students were cherished with prizes and certificates.



Detection clinic in the village/ ward:



Health education in the villages



Thermal screening before screening



Counselling to participants before the screening



Registration for camp



Oral screening by surgeon



Free medicine distribution



Six-month follow-up of screen positive patient

13. Achievement

The Sangrur and Mansa cancer registries data has been utilized by IARC/WHO in Globocan 2018 and Globocan 2020 to estimate the cancer burden in India.



14. Training given to other registries staff

Chandigarh and Punjab cancer registries has conducted following training program for the staff of cancer registries from Uttar Pradesh, Bihar, Punjab and Maharashtra. The details of the training programme conducted is mentioned in table 15.

Table 15: Cancer registry training programme organized by Chandigarh and Sangrur registries

Sr. no.	Registry	Date	Number of participants
1	Population-based cancer registry Varanasi District, Uttar Pradesh, India	6 Jul – 19 Jul 2017	3
2	Population-based cancer registry Varanasi District, Uttar Pradesh, India	23 Jan – 28 Jan 2019	2
3	Population-based cancer registry Muzaffarpur, Bihar, India	23 Jan – 28 Jan 2019	1
4	Bathinda cancer registry (AIIMS, Bathinda)	11 Jan – 12 Jan 2022	2
5	Population-based cancer registry Muzaffarpur, Bihar, India	26 Feb – 6 Mar 2022	3
6	Population-based cancer registry Ratnagiri District, Maharashtra, India	26 Feb – 6 Mar 2022	2
7	Population-based cancer registry Sindhudurg District, Maharashtra, India	26 Feb – 6 Mar 2022	2

15. Scientific paper/poster presentation at the IACR 2021



We have presented following scientific posters virtually in the International Association of Cancer Registries (IACR), meeting was conducted from 12th to 14th October 2021.

- 1. CHILDHOOD CANCER CASES REPORTED FROM POPULATION BASED CANCER REGISTRY SANGRUR, PUNJAB STATE, INDIA**
Prithviraj Kadam, Atul Budukh, JS Thakur, Alok Goel, Pankaj Malhotra, Tapas Dora, Sankalp Sancheti, Debashish Chaudhary, Rakesh Kapoor, Rajesh Dikshit
- 2. CLINICAL PATTERNS OF ORAL CANCER CASES REGISTERED AT THE HOSPITAL BASED CANCER REGISTRY, SANGRUR, INDIA**
Anshul Singla, Debashish Chaudhary, Tapas Dora, Alok Kumar Goel, Sankalp Sancheti, Kuldeep Singh Chauhan, Prithviraj Kadam, Atul Budukh, Pankaj Chaturvedi, Rajesh Dixit, Rakesh Kapoor
- 3. CLINICAL PATTERNS OF OESOPHAGUS CANCER CASES AT THE HOSPITAL BASED CANCER REGISTRY, SANGRUR, PUNJAB STATE, INDIA**
Tapas Dora, Alok Kumar Goel, Debashish Chaudhary, Sankalp Sancheti, Akash Sali, Kuldeep Singh Chauhan, Kiran Arora, Prithviraj Kadam, Atul Budukh, Pankaj Chaturvedi, Rajesh Dikshit, Rakesh Kapoor
- 4. PATTERNS OF BREAST CANCER CASES REGISTERED AT THE HOSPITAL BASED CANCER REGISTRY IN YEAR 2018, SANGRUR, INDIA**
Debashish Chaudhary, Atul Budukh, Sankalp Sancheti, Tapas Dora, Prithviraj Kadam, Kuldeep Singh, Kiran Arora, Pankaj Chaturvedi, RA Badwe
- 5. DUAL PRIMARY CASES REGISTERED AT THE HOSPITAL BASED CANCER REGISTRY, SANGRUR, PUNJAB STATE, INDIA**
Sankalp Sancheti, Debashish Chaudhary, Anshul Singla, Tapas Dora, Alok Kumar Goel, Kiran Arora, Kuldeep Singh Chauhan, Shraddha Shinde, Prithviraj Kadam, Atul Budukh, Pankaj Chaturvedi, Rajesh Dixit, Rakesh Kapoor
- 6. TREATMENT COMPLIANCE TO THE PEDIATRIC CANCER CASES, OUR EXPERIENCE FROM RURAL CANCER CENTRE, SANGRUR, PUNJAB STATE, INDIA**
Alok Kumar Goel, Sankalp Sancheti, Tapas Dora, Akash Sali, Anshul Singla, Kuldeep Singh Chauhan, Kiran Arora, Prithviraj Kadam, Atul Budukh, Pankaj Chaturvedi, Rajesh Dikshit, Rakesh Kapoor

16. Publications

1. Chandigarh Population Based Cancer Registry Report: 2013 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
2. SAS Nagar Population Based Cancer Registry Report: 2013 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
3. Sangrur Population Based Cancer Registry Report: 2013 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
4. Mansa Population Based Cancer Registry Report: 2013 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
5. Chandigarh Population Based Cancer Registry Report: 2014 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
6. SAS Nagar Population Based Cancer Registry Report: 2014 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
7. Sangrur Population Based Cancer Registry Report: 2014 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
8. Mansa Population Based Cancer Registry Report: 2014 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
9. Chandigarh Population Based Cancer Registry Report: 2015-16 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
10. SAS Nagar Population Based Cancer Registry Report: 2015-16 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
11. Sangrur Population Based Cancer Registry Report: 2015-16 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
12. Mansa Population Based Cancer Registry Report: 2015-16 – Tata Memorial Centre, Mumbai and Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
13. Population Based Cancer Registries at Chandigarh and SAS Nagar, Sangrur, Mansa Districts of Punjab, state (2013-16)

14. Budukh A, Dikshit R, Thakur JS, Kadam P, Dora T, Sancheti S, et al. Linkage of cancer registration with cancer treatment in predominantly rural district: A model from Sangrur district, Punjab state, India. *Int J Non-Commun Dis* 2018;3:56-9
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16. Prabhat Jha, Dinesh Kumar, Rajesh Dikshit, Atul Budukh, Rehana Begum, Prabha Sati et.al. Automated versus physician assignment of cause of death for verbal autopsies: randomized trial of 9374 deaths in 117 villages in India: *BMC Medicine* (2019) 17:116
17. Budukh Atul M, Chaudhary Debashish, Sancheti Sankalp, Dora Tapas, Kumar Goel Alok, Singla Anshul, Sali Akash, Shinde Shraddha, Singh Chauhan Kuldeep, Kadam Prithviraj, Mohammad Raza, Kapoor Rakesh, Chaturvedi Pankaj, Dikshit Rajesh P, Badwe Rajendra A (2021) Determinants of completion of cancer directed treatment: an experience from a rural cancer centre, Sangrur, Punjab state, India *ecancer* 15 1313.
18. Bhatia A, Victora CG, Beckfield J, Budukh A, Krieger N. "Registries are not only a tool for data collection, they are for action": Cancer registration and gaps in data for health equity in six population-based registries in India. *Int J Cancer*. 2020 Nov 13. doi: 10.1002/ijc.33391.
19. Chakravarti Priyal, Maheshwari Amita, Tahlan Shweta, Kadam Prithviraj, Bagal Sonali, Gore Suvarna, Panse Nandkumar, Deodhar Kedar, Chaturvedi Pankaj, Dikshit Rajesh, Budukh Atul (2022) Diagnostic accuracy of menstrual blood for human papillomavirus detection in cervical cancer screening: a systematic review *ecancer* 16 1427. DOI: <https://doi.org/10.3332/ecancer.2022.1427>
20. Hospital Based Cancer Registry – Annual Report 2017: Homi Bhabha Cancer Hospital, Sangrur, Punjab State, India, Tata Memorial Centre, Mumbai, India
21. Hospital Based Cancer Registry – Annual Report 2018: Homi Bhabha Cancer Hospital, Sangrur, Punjab State, India, Tata Memorial Centre, Mumbai, India

17. Highlights

- The objective of the cancer registry project is to measure the cancer burden in Chandigarh, SAS Nagar, Sangrur and Mansa districts.
- Cancer registry staff collects the cancer cases information by visiting different hospitals as well by interacting with the community representatives
- In the year 2017-18, the incidence rate reported by Chandigarh PBCR was 91.1 and 97.3 per 100,000 in males and females respectively. Similarly, SAS Nagar reported 79.2 and 91.9 in males and females respectively. These rates are lower as compared to the registries of Mumbai, Delhi, Chennai and Bangalore.
- Similarly, the incidence rate of Sangrur PBCR was 73.3 and 79.7 per 100,000 population respectively in males and females. However, it is 59.5 among males and 68.6 among females in Mansa cancer registries. These rates are higher as compared to Barshi registry and it is lower than Mumbai, Delhi, Chennai and Bangalore.
- As compared to Chandigarh, the male all site cancer incidence rates are 20% lower in Sangrur district (RR 0.80, 95% CI 0.71 – 0.91) as well it is 35% lower in Mansa district (RR 0.65, 95% CI 0.56 – 0.76). While in female it is 18% lower in Sangrur district (RR 0.82, 95% CI 0.72 – 0.93) as well it is 29% lower in Mansa district (RR 0.71, 95% CI 0.61 – 0.82). **The all site cancer incidence rates in both sex from rural registries are lower than urban registries and it statistically significant.**
- 1 in 10 males is at risk of developing cancer in Chandigarh; whereas, in SAS Nagar it is 1 in 11, 1 in 12 in Sangrur and 1 in 15 in Mansa district.
- 1 in 8 females is at risk of developing cancer in Chandigarh; whereas, in SAS Nagar it is 1 in 10, 1 in 11 Sangrur and it is 1 in 12 in Mansa districts.
- 1 in 14 males is at risk of dying due to cancer in Chandigarh; while in SAS Nagar it is 1 in 15 Sangrur district and 1 in 20 in the Mansa district.
- 1 in 16 females is at risk of dying due to cancer in Chandigarh, 1 in 20 in SAS Nagar, 1 in 16 in Sangrur and 1 in 18 in Mansa district accordingly.
- Lung, prostate, oesophagus and bladder cancers are the leading cancer sites in males as per Chandigarh and SAS Nagar registry data.
- Liver, prostate and oesophagus cancers are the leading cancer sites in males as per Sangrur and Mansa registry data.

- Female breast cancer is the most predominant cancer reported by Chandigarh, SAS Nagar, Sangrur, and Mansa population-based cancer registries.
- Female breast cancer incidence rate of Chandigarh and SAS Nagar is 30.0 per 100,000 population which is in comparison with other urban cities of India.
- Burden of oesophageal cancer among males in Sangrur is 14% higher than the Chandigarh registry (RR 1.14, 95% CI 0.71 – 1.85). However, it is 22% lower in Mansa registry (RR 0.78, 95% CI 0.42 – 1.44) which is not statistically significant.
- In females, we have noted burden of oesophageal cancer in Sangrur is 3.9 times higher than the Chandigarh registry (RR 3.88, 95% CI 2.11 – 7.11). For Mansa it is 4.4 times higher than Chandigarh (RR 4.38, 95% CI 2.05 – 9.35). The difference in incidence of oesophagus cancer in females in rural and urban area is highly significant.
- The prostate cancer burden is 33% lower in Sangrur district as compared to Chandigarh registry (RR 0.67, 95% CI 0.45 – 1.02) and it is 58% lower in Mansa registry (RR 0.42, 95% CI 0.25 – 0.70). The prostate cancer incidence rates are lower in rural registries as compared to Chandigarh registry.
- Similarly, a 65% lower rate was noted for lung cancer among male in Sangrur registry as compared to Chandigarh registry (RR 0.35, 95% CI 0.22 – 0.56). Similar, observation was noted for Mansa registry, with a 76% lower rate than the Chandigarh registry (RR 0.24, 95% CI 0.14 – 0.43) and it is statistically significant.
- For breast cancer burden in Sangrur, it is 37% lower than Chandigarh district (RR 0.63, 95% CI 0.50 – 0.81) while for Mansa it is 45% lower than Chandigarh district (RR 0.55, 95% CI 0.41 – 0.73) and both the findings are statistically significant.
- 1 in 26 females is at risk of getting breast cancer in Chandigarh, 1 in 30 in SAS Nagar, 1 in 47 in Sangrur and 1 in 53 in the Mansa district.
- Cervical cancer burden in Sangrur, it is 1.4 times higher than Chandigarh district (RR 1.43, 95% CI 0.95 – 2.15) while for Mansa it is 1.6 times higher than Chandigarh district (RR 1.57, 95% CI 0.98 – 2.51); however, the results are not statistically significant.
- Cervix uteri cancer is the second leading cancer site followed by breast cancer in Sangrur, Mansa and SAS Nagar registries.
- Gall bladder cancer is one of the top five leading cancer sites in females in all the cancer registries (Age-adjusted incidence rate is 6.6 in Chandigarh, 4.0 in SAS Nagar, 5.2 in Sangrur and 4.8 in Mansa per 100,000 population).

- Most of the cancer cases from rural and urban areas are diagnosed at the advanced stage of the disease.
- As per survival studies from Sangrur cancer registries the five-year relative survival of oesophagus cancer is 9.3%, breast 57.8%, cervix uteri 39.5 and prostate cancer 30.3%.
- Due to various government health scheme there is improvement in the treatment compliance of the cancer patients.
- Tata Memorial Centre, Mumbai – an autonomous unit of the Department of Atomic Energy, Government of India with the support of the Government of Punjab has started the Homi Bhabha Cancer Hospital (HBCH) in Sangrur district. The hospital started functioning in January 2015.
- The HBCH has surgical, radiotherapy, and medical oncology facilities. Until now, more than 10000 cancer patients have been treated. The hospital is listed in the government-sponsored scheme “Mukhmantri Punjab Cancer Rahat Kosh Scheme” & AYUSHMAN Bharat – Sarb Sehat Vima Yojana (AB-SSBY) for cancer treatment.
- Based on the recommendation of the cancer registry report, we have started an early detection program for breast, cervix uteri and oral cancer in Sangrur area. Tata Memorial Centre is playing important role in cancer control of Punjab state by providing quality treatment as well training the government officials for cancer prevention activities.
- To raise awareness regarding cancer, we have visited more than 45,000 houses covering 1.7 lakhs population. We have conducted 82 cancer detection camps at the door step of the villages.
- We diagnosed 36 leukoplakia, 2 mild dysplasia during early detection program for oral cancer similarly 4 CIN I and 2 CIN II precancerous cases were diagnosed during cervical screening.
- As of today, 11 oral cancer, 38 breast cancer and 12 cervical cancer cases are diagnosed. Moreover, out of 61 oral, breast and cervical cancer cases 53 (87%) cancer patient have completed treatment and are under follow-up at Homi Bhabha Cancer Hospital, Sangrur.
- Due to improvement in the infrastructure there is improved cancer registration.
- COVID-19 pandemic has badly affected the cancer registry activities.
- The registry data has been used by IARC/WHO to project the cancer burden of India.

- Due to improvement in the infrastructure in Mullanpur and Sangrur, the cancer care services will be effectively implemented in future.
- Tata Memorial Centre is playing important role in cancer control of Punjab state by providing quality treatment as well training the government officials for cancer prevention activities.
- The cancer registry has published 6 research papers in National and International Journals.
- The registry data was presented at the International Association of cancer registries meeting organized by IACR/IARC/WHO, France.

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Department of Health and Family Welfare, Punjab

Shri Chetan Singh Jourmagra, Health Minister
Sh. Anurag Agarwal, IAS Principal Secretary, Health & FW

Dr. Avneet Kaur Director, Health & Family Welfare

Dr. Rita Bharadwaj Director, Health Services Family Welfare

Dr. GB Singh, Ex-State Nodal Officer, NPCDCS, In- charge Cancer Control Cell, Punjab

Tata Memorial Hospital, Mumbai

Dr. CS Pramesh, Director

Dr. Banavli S, Director – Academics

Dr. Shailesh Shrikhande, Dy Director TMH

Dr. Siddhartha Laskar, Dy Director – Academics

Mr. Anil Sathe, CAO – TMC

Mr. T. Anbumani, Project Consultant

Mr. Suryakant Mohapatra, JCFA – TMC

Mr. Benny George, HRD Officer

Mr. Chandrakant Shetty, Jr AO

Mrs. Anagha Kadam, AAO

Mrs. Varsha Patil, Stenographer

Advanced Centre for Treatment, Research and Education in Cancer, Kharghar, Navi Mumbai

Dr. Sudeep Gupta, Director

Dr. Navin Khattri, Dy. Director, CRC- ACTREC

Dr. Prasanna Venkatraman, Dy Director, CRI- ACTREC

Mrs. Kusum Pednekar, Jr. PO, CCE

Mr. Suryakant Shedge, Asst Accts Officer, CCE

Homi Bhabha Cancer Hospital and Research Center, Mullapur & Sangrur

Mr. Balchandra Nijasure, Dy AO HBCH & RC

Dr. Jasmin Kaur, AMS, Mullanpur

Dr. Jasjit Singh, AMS, Sangrur

Dr. Dimple Kalra, Administrator

Mr. Mihir Panda, AAO

Mr. Keshav Sharma, Dy. Account Officer

Mr. Manbir Punia, Scientific Officer, 'C'-IT

Mr. Rahul Dev Dwivedi, Scientific Officer, 'C'-IT

Mr. Nitin Chautale, Purchase Officer

Mr. Darshan Singh, Store Incharge

Mr. Manohar Parathe, SO

Post Graduate Institute of Medical Education and Research, Chandigarh

Dr. Pratibha D. Singhi, Professor & Head, Advanced Paediatric Centre (APC)

Dr. Ranjana W. Minz, Professor & Head, Department of Immunopathology

Dr. R. K. Vasishta, Professor & Head, Department of Histopathology

Dr. A. K. Gupta, Medical Superintendent-cum-Professor & Head, Department of Hospital Administration

Dr. N. Khandelwal, Professor & Head, Department of Radio Diagnosis & Imaging

Mr. Kartikeyan, Sr. MRO, Central Registration

Department (CRD)
Ms. C. Uma Rani, Sr. MRO, Central
Registration Department (CRD)
Dr. Kathirvel S, Assistant Professor,
Department of Community Medicine and
School of Public Health
Dr. Ravneet Kaur, Ex Assistant Professor,
Department of Community Medicine and
School of Public Health
Dr. S.P.S. Bhatia, Ex -Lecturer, Department of
Biostatistics

District Sangrur

Ms. Narinder Kaur Bharaj, MLA

Sangrur District Administration

Mr. Jatinder Jorwal, IAS Deputy Commissioner
Mr. Rajesh Tripathi, ADC

Malerkotla District Administration

Sh.Sanyam Agarwal, IAS Deputy Commissioner

Mukh Mantri Cancer Rahat Kosh Scheme, Chandigarh

Dr. GB Singh, Assistant, Director
Dr. Paramveer Singh, Assistant, Director
Sh. Jasvir Singh Bains, Sr. Asst. cum State
Program Coordinator
Sh. Harpreet Singh, System Analyst

Civil Hospital, Sangrur

Dr. Upasna, District Epidemiology Unit
Dr. Baljit Singh, SMO
Mrs. Parneet Kaur, Consultant, Fluorosis
Mr. Deepak Bansal, Superintendent
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Ex-Dr. Jagmohan, MD Medicine
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Dr. Dinesh Kumar (M.S ENT)
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Dr. Navdeep Arora (MD)
Dr. Paramvir Singh Kalair, Paediatrician
Dr. Parveen Marken, Paediatrician

Dr. Ramanbir Kaur, Gynaecologist
Dr. Amandeep Kaur, Gynaecologist
Dr. Vikas Dhir, MD (Medicine) PCMS- 1
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Mrs. RimiKour, Microbiologist
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Sh. T. Benith, IAS, ADC

Civil Hospital, District Mansa

Dr. Ranjit Singh Rai, Deputy Medical
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Dr. Jaswinder Singh, District Health Officer
Dr. Ruby, SMO, Mansa
Sh. Santosh Kumar Bharti, Dist. Epidemiologist
Dr. Arshdeep Singh, Dist. Epidemiologist
Dr. Kanwalpreet Brar, MD Pathologist
Dr. Babita Rani, MD Pathologist
DR. Sushank Sood, Eye Specialist
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Dr. Rashmi Garg, Gynecologist
Dr. Baljeet Kaur, Gynecologist
Dr. Navneet Kaur, Gynecologist
Dr. Pankaj, (MD)
Dr. Hardeep Sharma, SMO-Khiala Kalan
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Sh. Harbansh Lal, BEE-Budhlada
Sh. Tirlok Singh, BEE-Sardulgarh
Mrs. Ranjit Kaur, Clerk

Ms. Tanu Bala, Data Entry Operator

Acharya Tulsi Regional Cancer Treatment & Research Institute, Bikaner

Dr. MR Bardia, Director

Dr. H.S Kumar, H.O.D Radiotherapy

Mr. Pravin Soni, D.O.P

Mr. Pradeep Bhardwaj (L.D.C)

Baba farid University of Health Science (BFUHS), Faridkot

Dr. Prof. Raj Bahadur, Vice Chancellor

Guru Gobind Singh Medical College & Hospital, Faridkot

Dr. Rajeev Sharma, Principal

Dr. Pardeep Garg, Prof & Head Radiotherapy

Dr. Shilekh Mittal, Prof. MS

Sh. Rajeev Grover, Medical College Superintendent

Sh. Padampal Maini, Medical Record Officer

Sh. Sarbjeet Singh, Software Developer Officer

Mohandai Oswal Cancer Hospital, Ludhiana

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Dr. Yogesh Guaba, Dept. of general Surgery and Surgical oncology

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Dr. Pamela Alice Jeyaraj Prof & Head, Dept. of Radiation Oncology

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Deep Hospital, Ludhiana

Dr. Amit Kumar Dhiman, Director- Oncology and Haematology Services

Mediways Hospital Ludhiana

Dr. Satish Jain, Director

ESIC Hospital Ludhiana

Dr. Bhairavi Deshmukh, MS

Dr. Meenu Salaria, CMO NFSG

Life Line Hospital, Ludhiana

Dr. Vibha Maheswari

Government Medical College and Hospital, Sector 32, Chandigarh

Dr. Atul Sachdeva, Former Director Principal

Dr. Awadesh Kumar Pandey, Professor & Head, Department of Radiotherapy

Dr. Sonia Puri, Ass. Prof. Dep. of Community Medicine

Dr. Uma Handa, Prof & Head, Dep. of Pathology

Dr. A.K. Janmeja, Former Medical Superintendent

Dr. Ravi Gupta, Professor & Head, Department of Orthopaedics cum Medical Superintendent

Mr. Suraj, Social Worker, HBCR

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Chandigarh**

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Dr. Ravinder Bansal, Surgeon

Grewal Nursing Home, Sangrur

Dr. Suman Grewal, Gynaecologist

Yash Hospital, Sangrur

Dr. Yashpal Singh, MBBS, MS (ENT)

Sibia Health care, Sangrur

Dr. Prabhjot Singh Sibia, Surgeon

Singla Surgical Hospital, Sangrur

Dr. K.G Singla, Surgeon

Dr. Renu Singla, MBBS, DGO

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Medicine & Radiology

AP Sharma Hospital Sunam

Dr. A.P Sharma, MD

Rajiv Singla Hospital Sunam

Dr. Rajiv Singla, Surgery specialist

Dr. Renu Singla, MBBS Physician

Vinayak Hospital Sunam

Dr. Simpy Jindal, Gynaecologists

Dr. Rajiv Jindal, surgery specialist

Vishwas Hospital Sunam

Dr. Sangeeta Sharma, Gynaecologists

Jyoti Ultra Sound Sunam

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Veenugopal Clinic, Sunam

Dr. Pragya, Dermatologist

Dr. Atul Gupta, Radiologist

Advance Path Lab Sunam

Dr. Geetanjali, Pathologist

Onco Path Lab, Patiala

Dr. Aditi Arora, MD Pathologist

Dr. Lal Path Lab, Patiala

Dr. Saloni, Incharge

Star Path Lab, Patiala

Mrs. Kanu Goel, Pathologist

Dr. Dinesh Path Lab, Patiala

Dr. Dinesh Ahluwalia, Pathologist

Ashok Path Lab, Patiala

Dr. Ashok Kumar, Pathologist

Modern Path Lab, Patiala

Dr. Himanshu Gupta

Delta MRI & CT Scan Centre, Patiala

Dr. Jatin

ESS ELL Diagnostics Centre, Patiala

Dr. Mitesh Goyal

Government Dental College, Patiala

Dr. Jeevan Lata, Principal

Dr. Harinder Gupta, MDS

Columbia Asia Hospital, Patiala

Mr. Gurkirat Singh, Director

Dr. Simica Tuli, CMS

Mr. Kulwant Singh

Patiala Surgical Centre, Patiala

Dr. Ajmer Singh

Dr. Gurpreet Singh

Dr. Sukhpreet Singh

Amar Hospital, Patiala

Dr. Amanjot Singh,

Dr. Jaskarn Singh Sra, DMS

Dr. Gurpreet Kaur Bahia Pathology

Department

Mr. Jagdish, Histo Dept

District Administration, Patiala

Dr. Raju Dhir, Civil Surgeon

Dr. Vikas Goel, Assistant Civil Surgeon

Rajindra Medical Hospital/ Govt. Medical College, Patiala

Dr. Harnam Singh Rekhi, MS

Dr. Raja Parmjeet Singh, Head of RT

Department

Dr. Ramesh K. Kundal, MD

Dr. D.J.S Walia

Dr. Anubha

Dr. Sanjeev Bhagta

Mrs Anisshain, LT

Mr. Rajinder Kumar, Chief Pharmacist

Sh. Pawan Kumar, Data Entry Operator

Monika Path Lab, Bathinda

Dr. Monika, Pathologist

Mr. Gurpreet Singh, DEO

Mittal Path Lab, Bathinda

Dr. Anita Mittal, Pathologist

Advanced Cancer Diagnostic Treatment & Research Centre, Bathinda

Dr. M. K. Mahajan, Ex-Director

Dr. Deepak Arora, Incharge

Prof. (Dr.) Darshan Singh Sidhu, Registrar

Adesh Hospital, Bathinda

Dr. Avtar Singh Bansal, Medical

Superintendent

Dr. Gurkirat Singh, Asst. Professor

Civil Hospital, Bhatinda

Dr. Balwant Singh, CMO

Dr. Maninderpal, SMO

Dr. Vandana Middha, Oncologist

Dr. Richa Garg, Pathologist

Ms. Indu Gupta, DEO

Max Hospital, Bathinda

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Sh. Varinder Singh, Sr. MRT

Punjab Cancer Care Hospital, Bathinda

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Al Hayat Hospital, Malerkotla

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Hazrat Haleema Hospital, Malerkotla

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Tata Memorial Centre, Mumbai



Centre for Cancer Epidemiology, ACTREC, Navi Mumbai



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Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh

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