

# DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA

A Project of the National Cancer Registry Programme  
(Indian Council of Medical Research)  
Supported by the World Health Organisation

NCRP  
2001-2002  
R971



**First All India Report — 2001-2002**

*Mapping Patterns of Cancer*

**Volume I**



# **DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA**

**First All India Report: 2001-2002**

*Information Technology in Medicine –  
Measuring Burden of Disease*

**Volume I**



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# DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA

**A Project of the National Cancer Registry Programme  
(Indian Council of Medical Research)  
Supported by the World Health Organization**



## **First All India Report: 2001-2002**

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*Cover: Districtwise Map of the Distribution of Breast Cancer in Females.*

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# FOREWORD

Measuring accurate estimates of the burden of disease in a developing country is challenging. There are several reasons for this. Some of them have to do with the documentation of medical records and discharge summaries, methods of referral and follow-up and the system of registration and certification of cause of death. Specific disease registers are perhaps the answer.

The Indian Council of Medical Research initiated a network of cancer registries across the country under the National Cancer Registry Programme (NCRP) in 1981. The objective was essentially to generate reliable data on the magnitude and patterns of cancer and undertake epidemiological and cancer control research. The registries mainly cover selected urban centres and one rural pocket. Under the auspices of the World Health Organization a project on "Development of an Atlas of Cancer in India" was commenced in January 2001.

The main emphasis of this report is on patterns and minimum incidence rates of cancer over several districts. The incidence rates on important selected sites of cancer are compared with that of the established population based cancer registries under the NCRP. Summary report on individual centres is also given. Overall, the presentation provides a glimpse of similarities and variation in types of cancer in different regions of India. This comprehensive account is a big step forward in covering more areas not covered by the registries under the NCRP. Continued and sustained active participation by existing and additional newer centres will augment this process.

This report covers data accrued over a two-year period (1 January 2001 to 31 December 2002) and over 100 centres (including the functioning cancer registries) have contributed and collaborated in the project. The unique feature of this exercise has been the practical application of electronic information technology in medicine. Centres have transmitted core information on cancers, through the internet on to a web-site to the Coordinating Unit of NCRP. The report is therefore a singular example of utilising advances in Information Technology for creating a ready database for research. The potential for using the data and the Information Technology system as a tool for research is enormous.

It is hoped that this first nationwide report will serve as a ready reference manual to describe incidence rates and patterns of cancer. The information provided is exhaustive, nonetheless made simple and clear to the average reader and scientist alike. To collate data, make checks on the same, generate tabulations and prepare a timely report, so as to meet international standards is no easy task. The collaborating centres and the Coordinating Unit of NCRP and their staff deserve all the appreciation for the stupendous effort.

The monetary support provided by the WHO - Government of India is gratefully acknowledged.



Prof. N. K. Ganguly,  
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5 April 2004

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There is nothing more difficult to take in hand or more perilous to conduct or more uncertain in its success than to take the lead in the introduction of a new order of things.

*Machiavelli (1469-1527)*  
*Italian Author & Statesman*

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# P R E F A C E

This report on the project on "Development of An Atlas of Cancer in India" is unique in many ways. The internet as a medium of communication has been used to capture data on cancer. Several centers throughout the country have participated in this project and made use of electronic information technology in an extremely effective way. The successful working of this project as evidenced by this report marks an important milestone in gathering disease related information in a coordinated way and gives scope for similar application for other diseases. The concept and design are extremely meaningful as information has been received in a very cost effective way and the results achieved in a remarkably short time. The National Cancer Registry Programme of the Indian Council of Medical Research and its team of collaborators deserve all the praise for the tremendous effort.

Apart from creating a system, the results itself have brought a whole set of new findings which hitherto was unknown. To mention a few-some of the districts in the country have the highest incidence rate in the world of sites of cancer associated with use of tobacco. These include cancer of the mouth in Wardha district of Maharashtra, Kanniyakumari district of Tamil Nadu, in Kollam and Thiruvananthapuram districts of Kerala and in Pondicherry. Aizawl district in Mizoram State has highest incidence rate of Tongue, Hypopharyngeal and Oesophageal cancer in males. Cancer of the Gall Bladder in females has the highest incidence in Chandigarh and in Manipur (Imphal East and West districts). There seems to be a belt of very high incidence penile cancer in North East Tamil Nadu and Pondicherry. Similarly a belt of oral cavity cancer is seen across Gujarat. There are many such fresh findings that have come to light in this exciting scientific report.

This comprehensive document in two volumes opens the door for cancer research in all its dimensions be it administrative and control, basic and laboratory or field and clinic.

30 April 2004



**J.V.R Prasada Rao**  
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# ABOUT THE PROJECT

Cancer is responsible for about 20% of all deaths in the industrialized countries and 10% in the developing ones. The epidemiological and demographic transition is likely to increase the cancer burden in developing countries, including India. Information about the frequency and patterns of cancer is an essential pre-requisite for undertaking cancer control programmes.

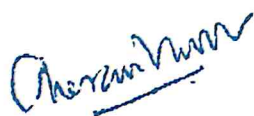
The National Cancer Registry Programme of the Indian Council of Medical Research has a network of population-based cancer registry programmes in India and has been providing information on cancer incidence in India. However, this information has been limited to urban areas. The Government of India and WHO collaborative programme for the biennium 2001-2002 has supported the National Cancer Registry Programme of the ICMR to develop an 'Atlas of Cancer in India'.

This technical report provides an analysis of over 2,00,000 cancer cases in India collected during a two-year period from 105 centres. The district has been taken as a unit to obtain incidence rates of cancer. The minimum age-adjusted incidence rates based on microscopically diagnosed cases have been calculated for the districts. The same has also been calculated for the Population Based Cancer Registries under the National Cancer Registry Programme of India. Besides describing the pattern of cancer in the 82 districts that have minimum rates above the lowest seen in population based registries, the incidence rates of individual specific sites are compared with the incidence rates of the population registries.

Several districts have been found to have very high rates of cancer, which are above that of the highest incidence rates reported elsewhere from the world. These include sites of cancer associated with the use of tobacco, cancer of the stomach, gall bladder and penile cancer, to name a few.

This information that has been generated needs to be used for developing a comprehensive cancer control programme at the district level. The majority of cancers are tobacco related and hence are amenable for primary prevention. We hope that this information will be made available to various categories of personnel who are involved in cancer control activities.

We would like to place on record our appreciation for the National Cancer Registry Programme of the ICMR and all the participating centers for the good work and the successful completion of the project.



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The prime person responsible for the sanction of this project was Dr Ravi Rangachari, then Chief of the Indo-Foreign Cell of ICMR. He was instrumental in making the crucial efforts at the Ministry of Health and the WHO to get the project cleared. Dr Nandakumar expresses his profound gratitude to him. This helpfulness has been sustained, by the present Chief of the Indo-Foreign Cell - Prof S.C. Sehgal and his deputies - Dr Mukesh Kumar and Dr Harpreet Sandhu.

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The Heads of Collaborating Centres, the Principal Investigators, Co-Principal Investigators and other concerned faculty have contributed overwhelmingly towards the success of the project. Their active participation in the workshops and their motivation and tireless efforts in sending data promptly has been of great help in bringing out a timely report. The authors record their appreciation.

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The staff of the Coordinating Unit of NCRP has worked as a team in bringing out this report and the Chief Principal Investigator expresses his gratitude to them. Dr Ramachandra Reddy and Dr Kumaraswamy have taken keen interest in doing the proof reading yet again and we thank them profusely.

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This short report tries to tell how much and what type of cancer is occurring where in at least some parts of the country so as to attempt and seek answers to the more complex questions of the how and why of cancer and what needs to be done.

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# DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA

First All India Report: 2001 - 2002

## Executive Summary

The present account on the project on "Development of an Atlas of Cancer in India" is the First All India Report covering the calendar years 2001 and 2002. Under this project, a cost-effective design and plan using advances in modern electronic information technology, was conceived, to collate and process relevant data on cancer. This was mainly to have an idea of patterns of cancer in several other parts of the country not covered by the registries under the National Cancer Registry Programme (NCRP) of the Indian Council of Medical Research (ICMR). Wherever possible, it was also envisaged to calculate estimates of cancer incidence.

Knowledge of patterns of cancer is important to know what type of cancer is occurring where and if possible how much and to what extent. Only this will provide a background to search answers to questions related to causation of cancer, a baseline for undertaking, monitoring and evaluation of cancer control measures, and an environment for administering optimum care and measuring outcome.

The data that has been collated by the NCRP over the years has shown that over 80-85% of registered cases of cancer has a microscopic diagnosis. Making a microscopic diagnosis of cancer is the domain of the pathologist. Accordingly, the basic principle of working in this study, was to have the department of pathology (in medical colleges and hospitals) as the focal point of capture of information on cancer cases. However, several clinicians working in oncology have actively collaborated.

Accordingly, all medical colleges (both the Principals and Heads of the Departments of Pathology) throughout the country were contacted for their interest to collaborate in the two-year project. Those who responded were supplied with core forms for collecting basic information (mainly patient identification details including area of living, and site and morphology of tumour) and provided guidelines for collecting this information on all malignant cases reported in the department of pathology from 1 January 2001. Visits were made to these potential collaborating centres and on the spot instructions given. During the visits their need for support was assessed and depending on the infrastructure and average number of malignancies reported per annum, facilities for computer and internet connectivity and data collation provided. Intense training workshops in the four regions of the country were held. Principles of cancer registration, data collation, transmission and fundamentals of epidemiology constituted the thrust areas of training at the workshops. The workshops and visits contributed a great deal to the success of the project.

The Internet was identified as the primary communication medium for collecting the data. Internet as a device for data collection on patient information was a unique concept being tried for the first time (in

India and to the best of our knowledge anywhere else in the world) under the project. Collaborating centres were given an individual login-ID and password with detailed instructions on entering the core patient information and steps for onward transmission. The data so transmitted was downloaded periodically at the Coordinating Unit of the NCRP. Data was also received through floppy disks and photocopies of completed forms. Several detailed checks were done on the data so as to meet international standards. Where needed, clarification was sought from individual centres. A variety of duplicate checks to ensure that no case was counted twice were also carried out. Strict inclusion criteria were adopted.

The regular accepted measures by cancer registries for analysis, tabulation and estimation of incidence rates were followed. In all there were a total of 2,17,174 cases for the two-year period (1 January 2001 to 31 December 2002) from 105 centres including the cancer registries under the NCRP and other functioning cancer registries. The district was taken as a unit for calculation of incidence rates. The advantage of using the district as a unit, was that these are reasonably well demarcated geographic areas where the five year age group population is available from the Census of India Publications. Thus the age adjusted incidence rates (that is normally used for calculation and comparison of incidence rates) per 100,000 population were calculated for each district. The district wise incidence rates were compared with the incidence rates of the regular Population Based Cancer Registries (PBCRs) under the NCRP. Since the registry at Barshi is the only rural registry and most of the 593 districts in the country are predominantly rural, the incidence rate at Barshi (36.2 /100,000 in males) was taken as the cut-off level to look at patterns of cancer in different districts. There were 82 districts that had incidence rates above this level. The incidence rates and patterns of the leading sites of cancer in many of these districts revealed several new features.

For all sites of cancer put together, in males, there were ten districts that had incidence rates higher than that of Delhi, which had the highest rate among the PBCRs under NCRP. The corresponding number of districts in females was four. Similarly, in most of the individual anatomical sites of cancer there were several districts for each site that showed higher incidence rates than that of the urban PBCRs for that specific site.

The relatively higher incidence of several sites of cancer especially cancer of the stomach and cancers associated with the use of tobacco in both men and women, in many districts of the North Eastern states were important new features in this report. The high incidence of cancer of the cervix in women and penile cancer in men in the northern districts of Tamil Nadu were remarkable. The cancer registry in Delhi has been recording a high incidence of gall bladder cancer in women. That there could be several other areas with equally or even higher incidence of this cancer in women is notable. The other finding of interest includes the relatively higher incidence of cancer of the thyroid in women from the southern tip of India along the Kerala and Karnataka coasts to Goa. This study has revealed some more though less specific observations for further investigations.

A massive exercise such as this project on developing an atlas for cancer in a vast country like India with varied types of populations, differing literary and socio-economic status has its limitations. First, the coverage of information on cancer cases was far from complete. There were several almost entirely uncovered states like Bihar, U.P., Jharkhand and Chattisgarh and only partial coverage of other states. Even within the specific local area of the collaborating centres, no active effort was made by all centres to

collect information on microscopically diagnosed cancers reported in the neighbourhood hospitals/ laboratories that are not part of the study. The second major limitation was in using minimal age adjusted incidence rates as a surrogate measure of calculating incidence rates. Normally, for a population based cancer registry, cancers diagnosed by means other than microscopic, viz., clinical, radiological, endoscopy, etc are included as a cancer case. In addition, death records are scrutinised for cancer as an underlying or antecedent cause of death. Such cases are matched with incident cases and the unmatched cases are considered as 'Death Certificate Only'. A PBCR includes such cases and all cases together provide numbers for calculation of incidence rates. This study was designed only to collect information on microscopically diagnosed cancers. Despite these limitations, the incidence rates used in this study was found to be a fairly dependable cost effective measure of incidence and patterns of cancer in diverse districts of the country.

Apart from the observance of several new patterns of cancer in many areas, the major outcome of this project has been the successful application of electronic information technology in the field of medicine in an extremely cost-effective way (at approximately Rs 24 per case). If well augmented, it could pave the way for extensive usage and opening the field of health informatics.

Sustained support on a long-term basis with scope for considerable expansion would be required for setting up a composite database through what may be called a National Electronic Surveillance System for Cancer. That then would constitute a sound platform for quality research in cancer in all its dimensions. This could be for observing incidence and patterns across a wide spectrum of populations, evolving analytic studies in molecular epidemiology to seek clues in cancer aetiology, looking at patterns of cancer patient care and survival so as to regulate management and, last but by no means the least for monitoring and evaluation of cancer control measures.

### **Corrigendum**

The estimated population of Villupuram(males) and Thanjavur(males and females) districts of Tamil Nadu State were found to be incorrect. The corrected population figures and therefore the incidence rates of cancer in these two districts (Villupuram, males and Thanjavur, males & females) are given on the web-site ([www.canceratlasindia.org](http://www.canceratlasindia.org)) and the Compact Disc of the report. Readers and Researchers are requested to look up the web-site / Compact Disc for the corrected tables/figures where these two districts are mentioned. The error is regretted.



# Chapter 1

## INTRODUCTION

The cancer registries under the National Cancer Registry Programme (NCRP) have provided since 1982 an idea of the magnitude and patterns of cancer in selected urban centres including one in a rural sector. However, extensive areas remain essentially uncovered and therefore the picture of cancer in several urban centres and rural regions remain largely unknown. India is a vast country with populations having varied cultures, customs and habits. The environment differs and so does dietary practices, and socio-economic status. Important differences exist in the ways of living of the urban and rural populations. Geographic differences in patterns of cancer have already been observed among the different registries under the NCRP. For example, cancer of the gall bladder has a comparatively higher incidence in the population based cancer registries (PBCRs) of Delhi and Bhopal, while cancer of the stomach has been the consistent leading site of cancer among males in Chennai and Bangalore. The incidence rates of some sites of cancer like female breast has shown an increase over the years in some registries, whereas others like cancer of the cervix and oral cavity have recorded a decline. (NCRP, Reports 1985 to 2002).

Therefore, the broad purpose was to develop an atlas of cancer for the whole of India. Setting up of new registries throughout the country as in some Western countries would involve enormous and probably prohibitive cost in establishing and maintaining the same. The data of the NCRP has shown microscopy as the basis of diagnosis in over 80-85% of registered cases of cancer. The basic and critical principle in the working of this project, therefore, was that the Department of Pathology (in medical colleges and hospitals) constituted the nodal point for obtaining data on cancer.

Modern electronic information technology has been used to capture information on cancer cases as and when they are microscopically diagnosed and reported. The collaborating centres transmit the required information (mainly patient identification details including area of living, and site and morphology of tumour) on all malignant cases on-line through a web-site. The project was commenced with the following main objectives:

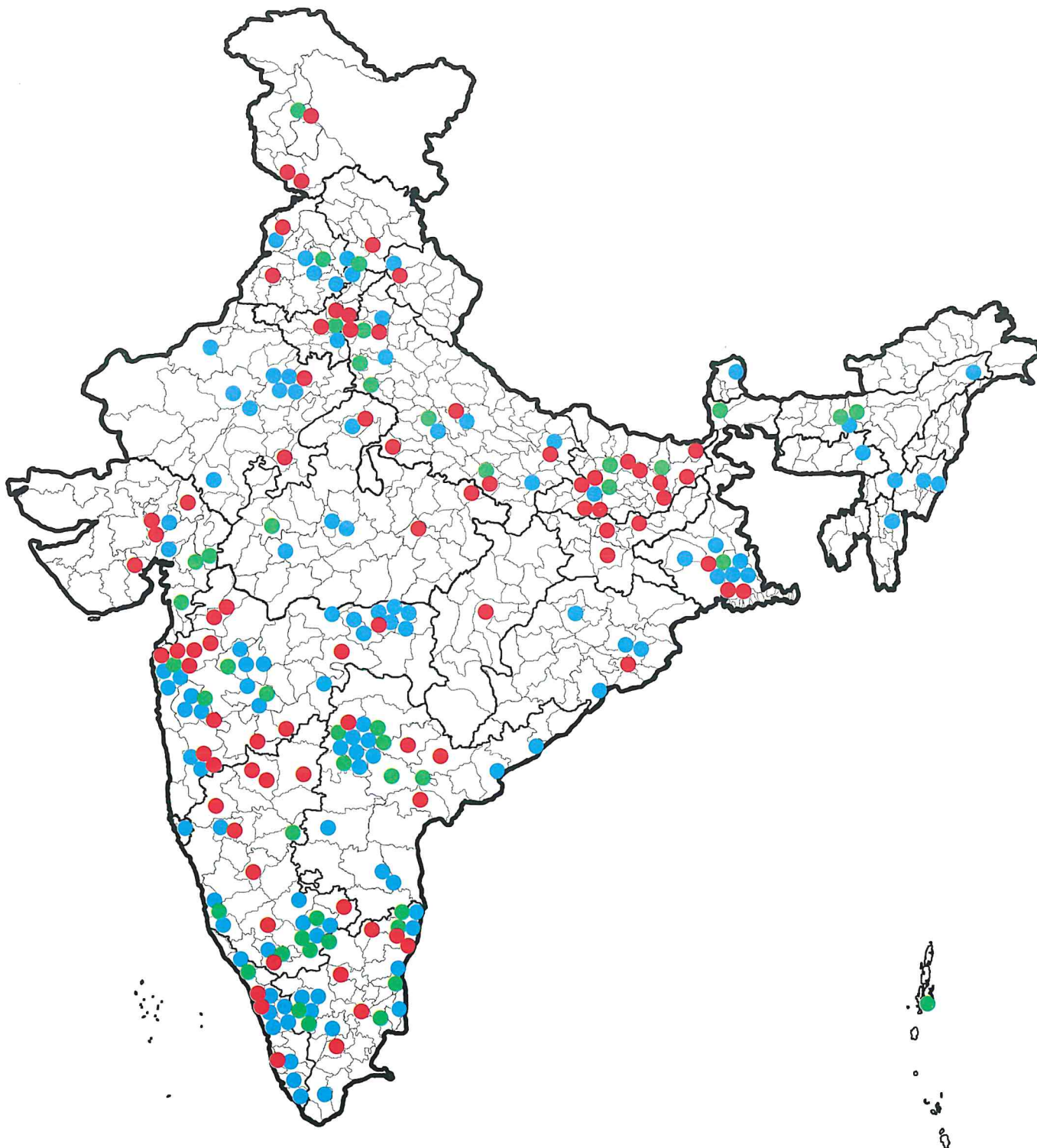
- (i) to obtain an overview of patterns of cancer in different parts of the country;
- (ii) to calculate estimates of cancer incidence wherever feasible.

The overall aim of the study was to get to know the similarities and differences in patterns of cancer across the country in a relatively cost-effective way using recent advances in computer and information technology transmission. Knowing patterns of cancer across the country would provide important leads in undertaking aetiological research, in targeting cancer control measures and in examining clinical outcomes. Certain subsidiary outcomes that emerged out of this exercise were: (a) Strengthening of departments of pathology in medical colleges and other hospitals with personal computers and internet connection; (b) Orientation/training in cancer registration and epidemiology to pathologists as well as other interested clinicians.

Though the thrust of the project was to gear up pathologists to collaborate and contribute, several clinical oncologists have actively collaborated.

A map in Fig. 1.1 shows the location of the Collaborating Centres (●), the Centres Registered (●) and the Centres contacted but not responded (●). There were three centres that have commenced sending data from January 2003. These are shown as collaborating centres giving a total 108 collaborating centres that are currently sending data. All other registered centres are yet to commence sending data of any year.

**FIGURE 1.1 : Map showing Distribution of Collaborating Centres (●), Registered Centres (●) and Centres contacted but not responded (●).**



# Chapter 2

## OVERALL PLAN AND METHODS

### Initial Registration:

An invitation was sent to the Principals of all Medical Colleges (based on the list with the Medical Council of India) with copies to the Head of the Department of Pathology during November-December 2000. Similar letters were also sent to several major hospitals all over India. In all 264 institutions were contacted. A registration form was also sent along with the letter. The form requested institutions to provide information on the following items:

1. Name and address of Institution;
2. Name of Head of Institution;
3. Name and designation of Principal Investigator, Co-Principal Investigator and Faculty-in-charge;
4. Possible method to interview and record residential address of the patient in whom a malignancy has been diagnosed;
5. Number of malignant neoplasms reported per annum by the department of pathology (comprising histopathology, haematology and cytology);
6. Computer facilities, internet and telephone connectivity and access to the same in the institution and in the department of pathology;
7. Budgetary requirement for collation and transmission of core items of patient information;
8. Approval of Head of Institution and Head of the Department of Pathology (or other as the case may be) for participation in the study with respective signatures.

The form also made clear that:

- A. The Principal Investigator will be the main corresponding/contact person for all matters including release of funds and be overall in-charge of the project in the respective institution.
- B. However, a person preferably a junior faculty member on the permanent role had to be identified. This person would be responsible for the day-to-day working of the project. The person so identified should be interested in such work in the project that involves:
  - (i) completion of identifying information, especially residential status of all malignant neoplasms as and when reported in the Department of Pathology;
  - (ii) completion of Topography and Morphology details including coding of such cases;
  - (iii) ensuring that the same was correctly entered on to the computer;
  - (iv) ensuring that the data so entered was regularly transmitted through the net to the Coordinating Unit;
  - (v) replying to queries concerning the data transmitted.

Appropriate training and guidance were to be provided on all of the above.

- C. Nomination of Co-Principal Investigator was Optional.
- D. WHO/ICMR did not accept any responsibility for employing persons on the project.

As soon as the completed registration forms were received, centres were assigned a numerical centre code (according to the order received) and blank printed core forms (Appendix I) supplied to the Principal Investigator. Brief guidelines for completion of the items of patient information were also sent. Centres were asked to commence data collection on all malignant neoplasms reported from 1 January 2001.

### Core Committee

A core committee consisting of the following members was constituted:

1. Dr P.C. Gupta, Senior Research Scientist, Tata Institute of Fundamental Research, Mumbai and member of the Steering and Monitoring Committees of NCRP;
2. Mr P. Gangadharan, Emeritus Scientist, Regional Cancer Centre, Thiruvananthapuram and Hon. Consultant, Natural Background Radiation Registry, Karunagappally, Kerala and Member, Monitoring Committee of NCRP;
3. Dr R.N. Visweswara, Professor of Pathology, Vaidehi Institute of Medical Sciences, Bangalore and Member, Monitoring Committee of NCRP.

The committee with Dr P.C. Gupta as chairperson met on 9 February 2001. The meeting reviewed the response received from the several centres and recommended that visits by the Project-in-charge and at least one of the members of the core committee be made to each of the potential centres. The meeting outlined the objectives of the visit (see below).

In addition, the meeting recommended that preference should be given to pockets where little knowledge is available about cancer patterns. A well formulated "terms and conditions of agreement" with the selected centres needed to be worked out. The scientific validity of the data using minimal incidence rates based on microscopic verification as well as incomplete coverage of the given geographical area was discussed at length.

### Visits to Centres and Agreement on Terms and Conditions

The objectives of the visits were:

- i) to make sure that the items of information provided by the institutions in the registration form broadly conform to what was being sought, in particular with reference to the number of malignancies reported per annum;
- ii) feasibility of the set-up in obtaining accurate and complete information on residential status in "all" cases of malignant neoplasms reported;
- iii) the agreement and cooperation of the Head of the Institution;
- iv) the interest and commitment of the Head of the Department of Pathology and/or Faculty in Charge in taking complete responsibility of the Project;
- v) assessment of existing infrastructure for successfully executing the project and existing computer, internet and telephone facilities;
- vi) facilities at the institution for radiation and other oncology services;
- vii) Details of Budget requirements;
- viii) Continuation of the Project beyond two years;
- ix) Possibility of having the cooperation of other pathologists within the area to provide information on cases reported by them.

Apart from agreeing on budgetary and computer (based on existing facilities and number of malignancies reported annually) support the terms and conditions specifically referred to the timely transmission of required core patient information and the responsible person for such activity.

## Workshops

1. Four Regional/Zonal Workshops were held on the dates and places indicated below:

a)	Southern Zone	11 - 12 May 2001	Bangalore
b)	Western Zone	8 - 9 June 2001	Mumbai
c)	Eastern Zone	15 - 16 June 2001	Kolkata
d)	Northern Zone	14 - 15 September 2001	Lucknow.

These workshops essentially aimed at the following objectives (specific details of which are discussed in the later part of this chapter):

- a) Provide a forum for collaborating centres to present their initial experience towards data collation;
  - b) Give training in basic principles and techniques of cancer registration and coding according to the International Classification of Diseases;
  - c) Importance of contact with patient or close relative/friend in order to obtain reliable and accurate information on permanent place of residence and other identification details;
  - d) Guidelines for correctly completing the various items of patient information in the core proforma;
  - e) Efforts required to get the exact primary anatomical site of tumour in all reported malignant neoplasms;
  - f) The methods of collation of patient information in different settings - government medical colleges and hospitals, private hospitals, cancer centres, pathology laboratories etc.
  - g) Necessity of coverage of other institutions registering and reporting malignant neoplasms in the geographic area;
  - h) An overview of web-site development and on-line transmission of data.
2. A meeting of existing cancer registries in India (both within NCRP and those outside the network) was held on 2 August 2001 - this was mainly to examine how these registries could contribute to this project and vice versa;
  3. Meeting-cum-workshop for centres that could work towards obtaining Cancer Incidence Rates in their geographic area - 26-27 March 2002;
  4. North East Regional Workshop was held on 11 May 2002;
  5. All India Review Meeting cum Workshop was held from 31 July to 2 August 2002.

## Collation of Data by Collaborating Centres

The overall method of data collation that is generally adopted by the centres is presented here. Some specifics could vary between and among centres.

### 1. Identification of a cancer case:

The first step towards collation is identification of the recording of a malignant neoplasm. The method of obtaining this varies in different settings.

*Cancer Centres:* Generally cancer centres in India are referral centres for diagnosed or suspected cancer patients. Therefore, the identifying information is completed for all patients who attend that centre for the first time, regardless of whether a microscopic report of malignancy exists or not. This is made at the time of initial registration by a medical

doctor, trained social worker, post-graduate medical student, nurse or any other trained person. A provisional noting of the diagnosis is made in the core proforma wherever a record/report of diagnosis of malignancy is available. The diagnostic portion is subsequently completed after reviewing the records/reports of the pathology department.

*Medical College Hospitals and other General Hospitals (Government and Private):* Usually, cancers constitute less than 10% of all diseases in a general hospital setting. Therefore, unlike that in the cancer centre the contact with the patient/relative/close friend is taken-up only after a diagnosis of malignancy, is made by the department of pathology. However, centres use different approaches for histo-pathology, haematology and cytology. For the latter two methods of diagnosis, normally, patients personally visit the laboratory for giving blood or bone marrow samples or present themselves for smears to be taken. The chances of the pathologist looking up the patient and the patient's records for details of suspected cancer if any are high. The identifying information in the core proforma is completed for such patients wherein a malignancy is diagnosed or suspected. Whenever a histopathology diagnosis of malignancy is made, the concerned patients are followed back to the in-patient wards and in where the patient is not admitted or discharged, through the concerned physician.

*Pathology Laboratories:* Histopathology specimens are often received at the pathology laboratory and the report collected by one of the close family members or friends of the patient. In these circumstances, identifying the report with a diagnosis of malignancy and contacting the patient's representative for the required identifying information, by the concerned pathologist with the help of his secretarial staff posed little difficulty. However, occasionally in some pathology laboratories, specimens are sent through courier or messengers, by surgeons practising in rural areas to the laboratory in the urban area. In such instances the collaborating pathologist has developed a rapport with the oncologists in the area and the required information is gathered.

## 2. Completion of the Core Proforma

- a) *Identifying Information:* Besides the name of the patient certain additional details like Name of Father, Mother, Spouse and that of Son, Daughter are sought, mainly to help in checking duplicate registrations. The details of address of the permanent place of residence are of paramount importance. The key information is the location (at least at the level of district) for the past year. Therefore the information on duration of stay at the residential address is a guide to confirming that the patient is actually residing at that address and that it is not a temporary place of dwelling for the purpose of treatment. This is the same rule that is followed for cancer registries under the NCRP, in that a cancer patient is taken into the registry, provided he or she has stayed in the geographic area of cancer registry operation for a minimum period of one year.
- b) *Diagnostic Information:* Once a pathological - microscopic diagnosis of cancer has been made, the details of the diagnosis including coding according to the WHO, International Classification of Diseases - Oncology, 3rd edition [ICD-O-3] (WHO, Fritz et al, 2000) is done. The concerned faculty (mostly from the department of pathology or radiotherapy) who is in charge of the project at the respective centre oversees the diagnostic information and coding. Whenever the exact primary site of tumour is unknown, efforts are made to contact the treating clinician to obtain the details of primary site.

## Software Development and Functioning of web-site

The web-site with the following address was launched in January 2002: [canceratlasindia.org](http://canceratlasindia.org) and [cancermappingindia.org](http://cancermappingindia.org).

The data is being received on a day to day basis.

The advances in information technology helped the Cancer Atlas Project identify internet as one of the primary communication medium for collecting the data. Internet as a means of data collection for patient information was a unique concept being tried for the first time in India under the project.

The 'core proforma' for collecting the patient information was hosted on the web-site [www.canceratlasindia.org](http://www.canceratlasindia.org). It was designed to be user friendly and reduce the time taken for data entry. Internet Browser based data entry eliminated the need for software to be installed on every system, the hassles of administration and maintenance.

Care was been taken to code/encrypt the data entered so that the identity or the nature of the data cannot be deciphered by any one except those concerned with the project. Thus, security of data sent over the Internet was implemented at four levels.

A unique username and password for each participating centre ensured authorized data entry.

Once the data is sent over the Internet, encrypting the data is ensured using a 128-bit Secured Socket Layer (SSL) based algorithm. SSL is a protocol for transmitting data over the Internet by using a private key to encrypt data that's transferred over the SSL connection. SSL ensures that the information is sent unchanged only to the specific server, to which, it was planned to send.

A third level of security ensures that once any participating centre enters the data on the proforma (on the web-site) and submits the same, the centre or any user cannot recall that completed proforma to make any changes or alterations of the data so entered. The Coordinating Unit examines the data and makes changes/corrections if any, only in its data base.

The fourth level of security is implemented by storing the data on a Database Server in an encrypted form. The Coordinating Unit periodically downloads this data and the data on the database server hosted on the Internet is deleted, thereby ensuring a comprehensive security mechanism for the data.

The data that is downloaded by the Coordinating Unit is decrypted and stored on a local database on an SQL Server. This data is sanitized and used for off-line checks, analysis, preparation of reports etc.

The Coordinating Unit uses a 'Database Server' and 'analysis stations' connected over a Local Area Network. A Secure Firewall installed in the Coordinating Unit keeps away hackers from accessing any information/data.

The successful working of this concept is reflected, first, in the data that is downloaded on a regular basis for the past two and a half years. Secondly, in the feedback received from the participating centres during the All India Workshop - 95% of the respondents, felt, that the web-site was easy to use and 80% of them have a fairly stable Internet connection.

#### **Transmission of Data:**

Collaborating centres were given an individual login-ID and password with detailed instructions on entering the data. Essentially, the process of data transmission through the web-site "[canceratlasindia.org](http://www.canceratlasindia.org)" involves the following steps:

- a) one set of completed forms as hard copy kept ready;
- b) connecting to the internet;
- c) opening the internet browser;
- d) opening the URL: <http://www.canceratlasindia.org>
- e) typing login ID (user ID) and password;
- f) opening the page with the "Proforma";
- g) transferring all the details from the hard copy of a particular form to the proforma on the web-site
- h) submitting the form

Entry of data on to the proforma on the web-site followed by transmission, is done by the person, authorised to do so by the Principal Investigator of the respective centre. Usually it is done from its own internet connection. If internet connectivity is not available at the department or at the collaborating centre or if the desired speed of

connection is not existing, centres use the public browsing locations.

Data from a few centres is also transmitted through floppy disks or file transfer. Two centres have wholly computerised hospital databases. The information on the core proforma, except the coding according to the ICD-O-3 is readily available on their database. The concerned staff of the project, scrutinize the records for accuracy of diagnosis and code the same. Data of the required variables are copied in a 'file' and the same transmitted periodically, either through e-mail or on a floppy disk. In a couple of other centres, the number of cases reported annually is more than 4000 and the quality of internet connection at these centres is not satisfactory and therefore not cost-effective. An off-line data entry programme has been provided to these centres. These centres enter the data off-line and transmit the same either through e-mail or floppy disk.

A few rural centres do not have ready access to personal computers or internet connection. These centres photocopy the completed forms and send the set of forms at periodic intervals.

The Data Flow Diagram of the functioning of the Website is shown in Fig. 2.1.

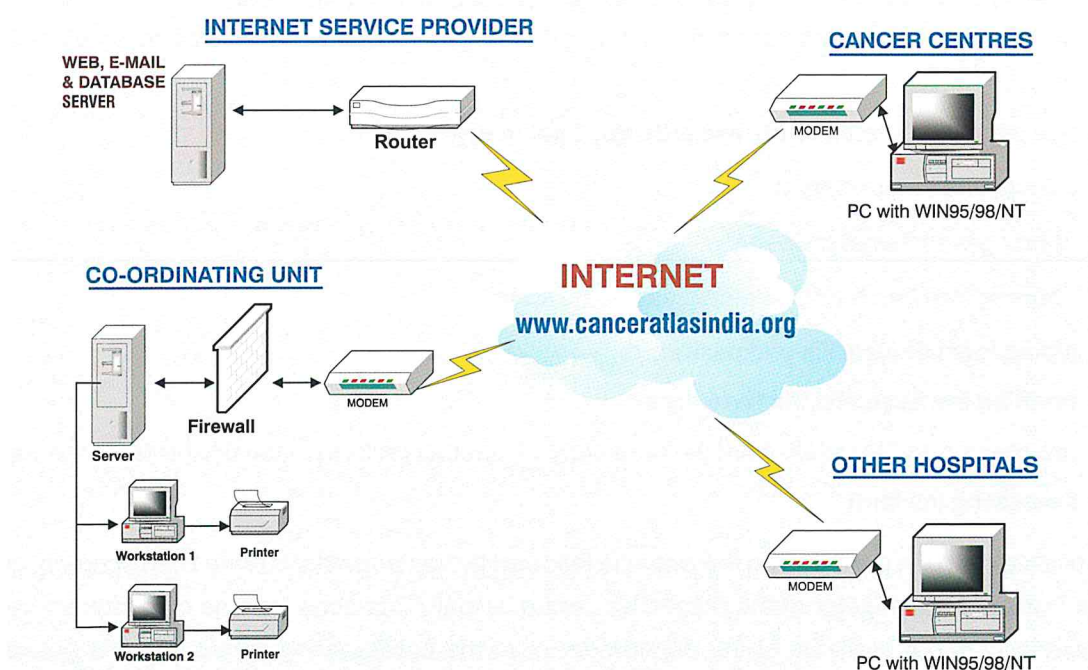
## Checks and Data Processing

The data received through the web-site is downloaded on a weekly basis.

The following checks were done on the data and where needed, clarifications sought from individual centres:

1. For the data already entered on to the computer, checks were done to ensure that the data received had no formatting errors, specifically with reference to registration number, name of patient and date of report;
2. Information on completeness and correctness of information on residential status (at least the District of residence of the patient should be known);
3. Information on completeness and correctness of information on diagnosis was checked and whether coding was done according to ICD-O-3;
4. From steps 1-3 the following cases were excluded/clarifications sought from centres:
  - a) District Unknown;

**FIGURE 2.1 : Data Flow Diagram of the functioning of Website**



- b) Date of report earlier than 1 January 2001;
  - c) Non-microscopic diagnosis of cancer;
  - d) Behaviour code of morphological diagnoses being less than /3;
5. A detailed check programme that was developed in-house was carried out on the data. These included the following:
- A. On Identifying Information
    - a) Postal PINCODE versus District;
    - b) Centre-wise listing of possible duplicate registrations using patient's name, topography site and morphology, age, gender, address and other identifying information, hospital registration and pathology slide number;
    - c) Similar check as in b) within each district
    - d) Date of Report and Registration number
  - B. On Diagnostic Information - an in-house version based on the list of checks furnished by IARC (Parkin et al, 1994) was prepared. It included the following:
    - a) Range check on code - topography and morphology;
    - b) Impossible sex and site (topography) combinations;
    - c) Wrong or unlikely sex and morphology combinations;
    - d) Unlikely age - site combinations;
    - e) Unlikely age - morphology combinations;
    - f) Checks on 63 morphological families for unlikely site and morphology;
6. Further checks on Identifying Information:
- a) Unlikely district distribution of cases in a given centre;
  - b) Unlikely centre distribution of cases in a given district;
  - c) Sorted listing of cases by district code and verification of address and district name with district code for each case;
7. Further checks on Diagnostic Information:
- a) Sorted listing of cases by Topography Site code and verification of topography description and code;
  - b) Sorted listing of cases by Morphology code and verification of morphology description and code;
8. Specific attention to look into, clarify and minimize cases with:
- a) Unknown Primary Site of tumour;
  - b) Ill defined sites;
9. Conversion to both ICD-9 and ICD-10 using SEER and IARC conversion programs and verifying for any inconsistencies;

### Principles in Data Analysis and Presentation of Results

1. The reference manual - Cancer Incidence in Five Continents (Parkin et al, 2002) was used to group neoplasms by site (ICD-10 - WHO ISCD, 1994) and determine leading sites of cancer. There are few finer differences in the definition of some anatomical sites between ICD-9 and ICD-10. Thus oropharynx that was earlier grouped along with tonsil in ICD-9 is now separated in ICD-10. Similarly, rectum has been separated into rectum and anal canal, vagina into vagina and vulva, ovary into ovary and other female genitalia. In the other way round brain and nervous system are now grouped together as brain in ICD-10 and myeloid,

- monocytic and other leukaemias of specified cell types are combined as myeloid leukaemia. Such variance may be kept in mind when relating the rates or charts with earlier NCRP reports.
2. Diagrammatic bar charts with relative proportion (%) of ten leading sites of cancer for each centre that reported at least 200 cases are presented in Chapter 7 (Individual Centre's Data);
  3. Population (Census of India publications) according to five-year age group and gender is available by district. As per the 2001 census results, there are 593 districts in the country. Information on cancer cases also gives the identity of the district for each case. Therefore, the district is taken as a unit for calculation of incidence rates;
  4. The most recent data from established population based cancer registries (PBCR: 1997-1999) is also included, for description and comparison.
  5. All cases are microscopically confirmed; all institutions in the district have not been covered; therefore, the age adjusted incidence rates calculated here are referred as only minimum crude (MCR) and minimum age adjusted incidence rates (MAAR) for districts. (See Discussion).
  6. Most of the centres have contributed data for both the years 2001 and 2002. However, a few centres have provided data only for the year 2001 and a few only for 2002. Accordingly, where the variation in MAAR of districts between each of the years is no more than 10% the average annual MAAR has been taken. Where the variation in MAAR is more than 10% between each of the years the higher MAAR is used.
  7. All districts that have a higher MAAR than that calculated for the most recent PBCR at Barshi (1997-1999) are represented in the salient features on individual districts. PBCR Barshi has the least incidence rates among the registries under NCRP, it is the only rural registry and majority of the districts in the country has predominantly semi-urban or rural population.
  8. The different district-wise maps of India in Chapter 4 (all sites) and Chapter 6 (specific sites) display districts with relatively higher incidence rates in darker shades and those with lower incidence rates in lighter shades of the same colour. A key has also been provided for each map. Besides, there are also areas/districts in grey. These latter areas represent places with paucity of information on cancer cases so much so that no meaningful incidence rates could be calculated.
  9. The following two points were considered in choosing specific anatomical sites of cancer for detailed comparison of incidence rates nationally and internationally (Chapter 6). (i). Those sites where at least 5 districts showed a higher MAAR than the highest MAAR of that site in the PBCRs under NCRP. (ii). A site was also included for description if the MAAR of that site in any district was comparable with the highest incidence rates in the world. Sites of cancer with less than 10 cases, even if they have higher MAARs than that of the highest MAARs in the PBCRs are excluded from the bar charts so as to avoid overestimation or misinterpretation. However, in order to place the facts in right perspective the appropriate shades of colour depending on the MAAR are portrayed for districts in the map, regardless of the numbers of cancers of that site. The latter would also account for districts with small populations and identify potential hot spots of high incidence that could possibly sustain over time.
  10. While presenting the profile of cancers in collaborating centres (Chapter 7), the centres are arranged in the descending order of the number of cancers (for the combined years 2001 and 2002) on which information was provided to the project, after grouping into HBCRs, PBCRs and all other centres.

***Other Definitions, Statistical Terms and Methods used in Calculations of incidence rates are given in Appendix II.***

***The list of Topography sites with ICD-10 code with mode of grouping for determining leading sites of cancers and acronyms used in figures of bar charts is given in Appendix III.***

***The list of States/Union Territories with code (according to Census of India, 2001) and acronyms used in figures of bar charts against names of districts is given in Appendix IV.***

# Chapter 3

## CANCER INCIDENCE AND LEADING SITES OF CANCER IN POPULATION BASED CANCER REGISTRIES

This chapter gives a summary of the incidence rates of leading sites of cancer in the population based cancer registries (PBCRs) both under the NCRP and others.

The PBCRs under the NCRP include those at Bangalore, Barshi, Bhopal, Chennai (Madras), Delhi and Mumbai (Bombay). As an outcome of the cancer atlas project, under the auspices of the NCRP-ICMR, six PBCRs have commenced functioning since January 2003. These are in Aizawl (covering Mizoram state), Dibrugarh (covering Dibrugarh district), Gangtok (covering Sikkim state), Guwahati (covering Kamrup district), Imphal (covering Manipur state) and in Silchar covering Silchar town. A PBCR has also been started at Ahmedabad to cover Ahmedabad rural district but no results are as yet available. The other PBCRs comprise those at Ahmedabad (urban), Ambillikai (rural), Aurangabad (urban), Karunagappally (urban-cum-rural), Kolkata (urban), Nagpur (urban), Pune (urban) and Thiruvananthapuram (urban-cum-rural).

The overall profile consisting of the 'write-up' of the PBCRs/centres with PBCRs, is given in Chapter 7. The incidence rates and bar charts depicting the leading sites of cancer are given below.

### Incidence Rates

Cancer incidence refers to the number of new cases of cancer seen in the population of a defined geographic area over a definite period of time. Usually the rate is calculated per 100,000 population. The period of time is generally for one year and when data is available for more than one calendar year the average annual rates are calculated.

The crude incidence rate refers to the number of new cases of cancer that occur in the total population of that area per year per 100,000 persons. The age adjusted incidence rate of cancer also denoted as the age standardised incidence rate, means that the rate is adjusted to the five-year age population distribution of the world standard population.

The definitions and details of these calculations are given in the Appendix II.

Table 3.1 gives the average annual crude (CR) and age adjusted incidence rates (AAR) per 100,000 population in these PBCRs during the time period indicated in parentheses. Delhi PBCR showed the highest AAR, in both males and females. The registry at Barshi recorded the lowest AAR in both males and females. For the PBCRs under NCRP the period (calendar years), is 1997-99 and for the others 1993-97 (Parkin et. al, 2002) except Kolkata (Sen et al, 2002), where it is 1998-99.

### International Comparisons of AAR

Figure 3.1 gives the international comparison of AAR for all sites in males and females. The figure shows the highest and lowest AAR in all the continents, viz., Africa, Asia, Central and South America, Europe, North America and Oceania (Parkin et al, 2002). Besides, the rates of Indians in Singapore are compared with that of the PBCRs in India.

**Table 3.1 : Average Annual Crude (CR) and Age Adjusted Incidence Rates (AAR) per 100,000 population in Indian PBCRs during the time period indicated in parentheses.**

Registry	Males		Females	
	CR	AAR	CR	AAR
<b>Bangalore</b> (1997-1999)	57.2	92.1	73.6	115.5
<b>Barshi</b> (1997-1999)	36.5	42.8	44.6	52.5
<b>Bhopal</b> (1997-1999)	62.4	117.0	62.0	107.8
<b>Chennai</b> (1997-1999)	88.2	112.3	101.9	124.4
<b>Delhi</b> (1997-1999)	71.4	126.1	85.4	142.0
<b>Mumbai</b> (1997-1999)	69.7	116.8	84.2	126.7
<b>Ahmedabad</b> (1993-1997)	68.8	107.2	56.8	82.9
<b>Karunagappally</b> (1993-1997)	89.2	102.6	72.2	76.0
<b>Kolkata</b> (1998-1999)	82.8	102.1	93.4	114.6
<b>Nagpur</b> (1993-1997)	85.0	118.4	88.3	118.8
<b>Pune</b> (1993-1997)	64.4	103.9	76.8	115.3
<b>Thiruvananthapuram</b> (1993-1997)	73.9	87.8	73.9	81.1

The highest AAR in males was seen among the black population of Detroit, Michigan State, USA, whereas the highest AAR in females was seen in Geneva, Switzerland. In both males and females the highest rates seen in other registries were considerably higher than that observed in the Indian PBCRs. Some of the lowest rates seen in the other registries were also higher. However, the AAR from India was comparable with the AAR of the Indian population of Singapore. Moreover, the picture becomes much different and more meaningful (see Chapter 6) when such comparison of AAR is done for specific anatomical sites.

### Leading Sites of Cancer

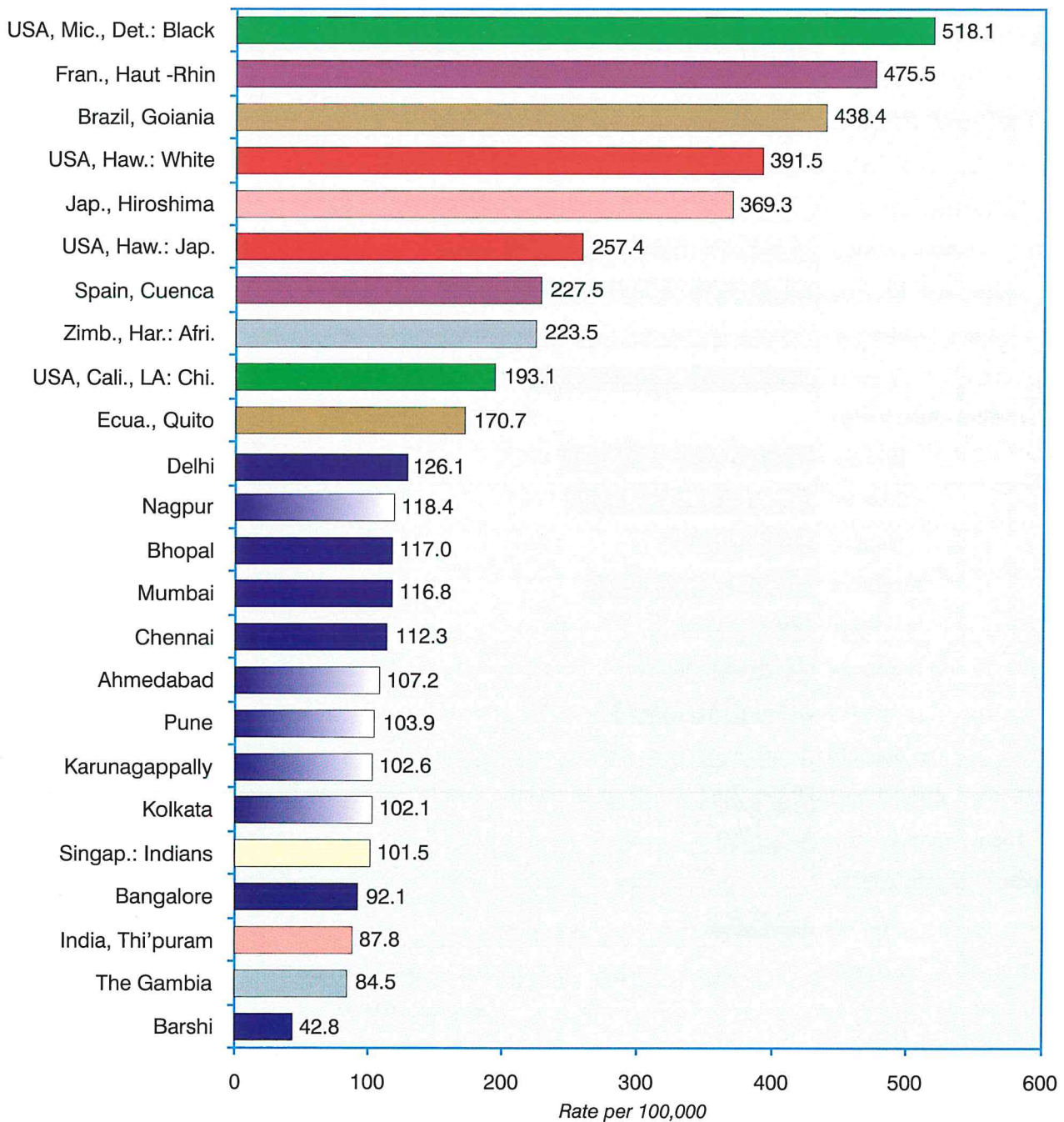
Figure 3.2 gives the bar charts of leading sites of cancer in twelve PBCRs (six under the NCRP and six others) in India.

Among males cancer of the stomach was the leading site of cancer in Bangalore and Chennai. Cancer of the lung was the leading site of cancer in six of the twelve PBCRs. These six PBCRs are Bhopal, Delhi, Mumbai, Ahmedabad, Karunagappally and Kolkata. It was the second leading site of cancer in Chennai and Thiruvananthapuram and the third leading site at Bangalore, Nagpur and Pune. Cancer of the oesophagus was an important leading site of cancer and was the leading site at Nagpur. It was the second or third leading site of cancer at Bangalore, Barshi, Chennai, Mumbai, Ahmedabad, Karunagappally and Pune. Other sites of cancer associated with use of tobacco, viz., tongue, mouth, hypopharynx and larynx are among important leading sites. Besides, cancer of the prostate was the third leading site in Delhi and among the leading sites in Bangalore, Chennai, Mumbai, Ahmedabad, Kolkata and Pune. Non-Hodgkin's lymphoma as a leading site was seen in almost all PBCRs.

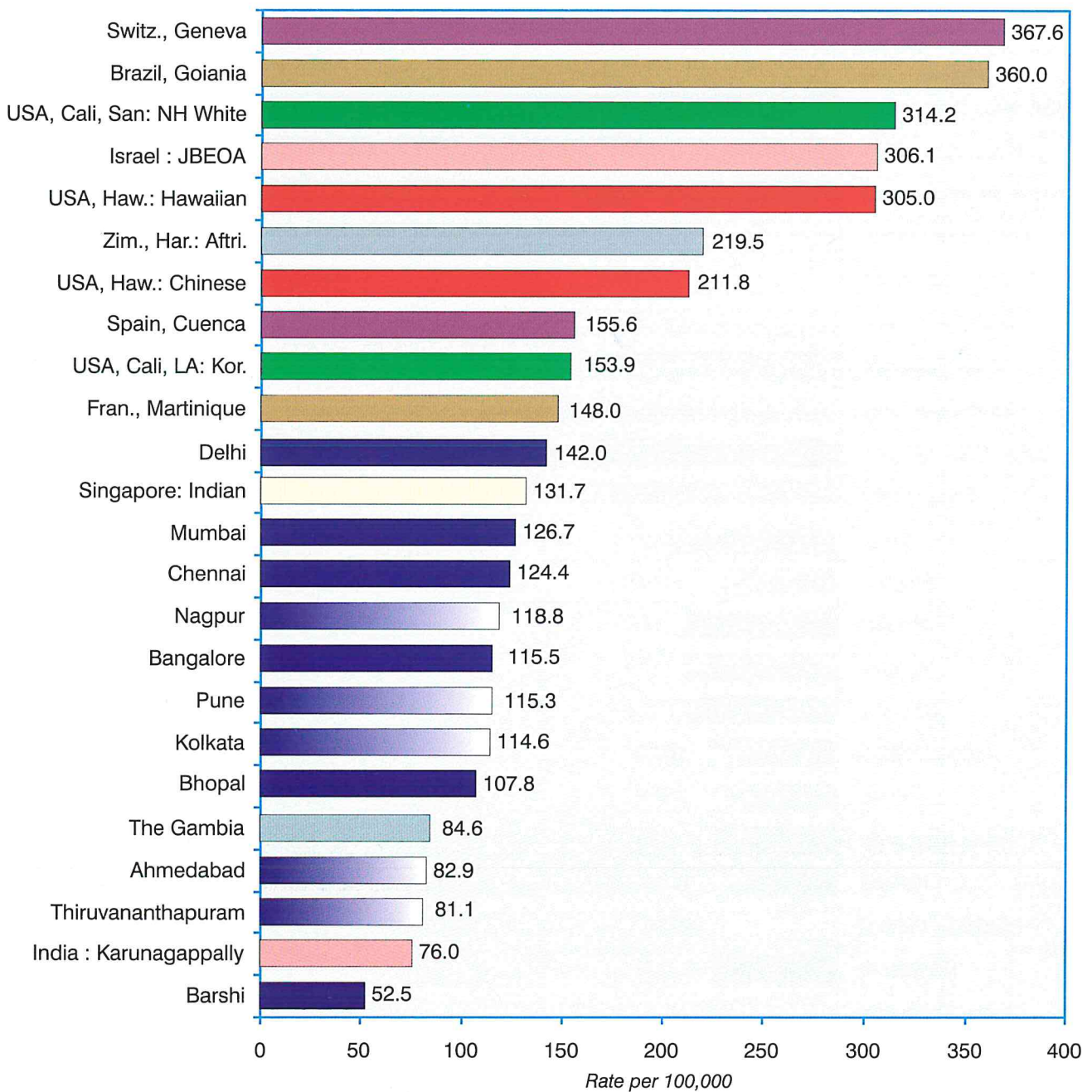
In females, cancer of the breast and cervix were the two leading sites. Cancer of the breast was followed by cancer of the cervix in all the twelve PBCRs except, Barshi and Chennai where cancer of the cervix was followed by cancer of the breast. Among the sites of cancer associated with the use of tobacco, cancer of the mouth, oesophagus and lung were important. The incidence rates of cancer of the oesophagus, in Bangalore females have over the years

paralleled that in males. Cancer of the thyroid was the third leading site in Karunagappally and Thiruvananthapuram. It was also among the ten leading sites in Bangalore, Barshi and Nagpur. Cancer of the gall bladder was the third leading site in Kolkata, fourth in Delhi and sixth in Bhopal. This site of cancer, is not among the ten leading sites of cancer in other PBCRs. Cancer of the ovary was one of five leading sites in all the PBCRs except, Karunagappally where it was the sixth leading site of cancer.

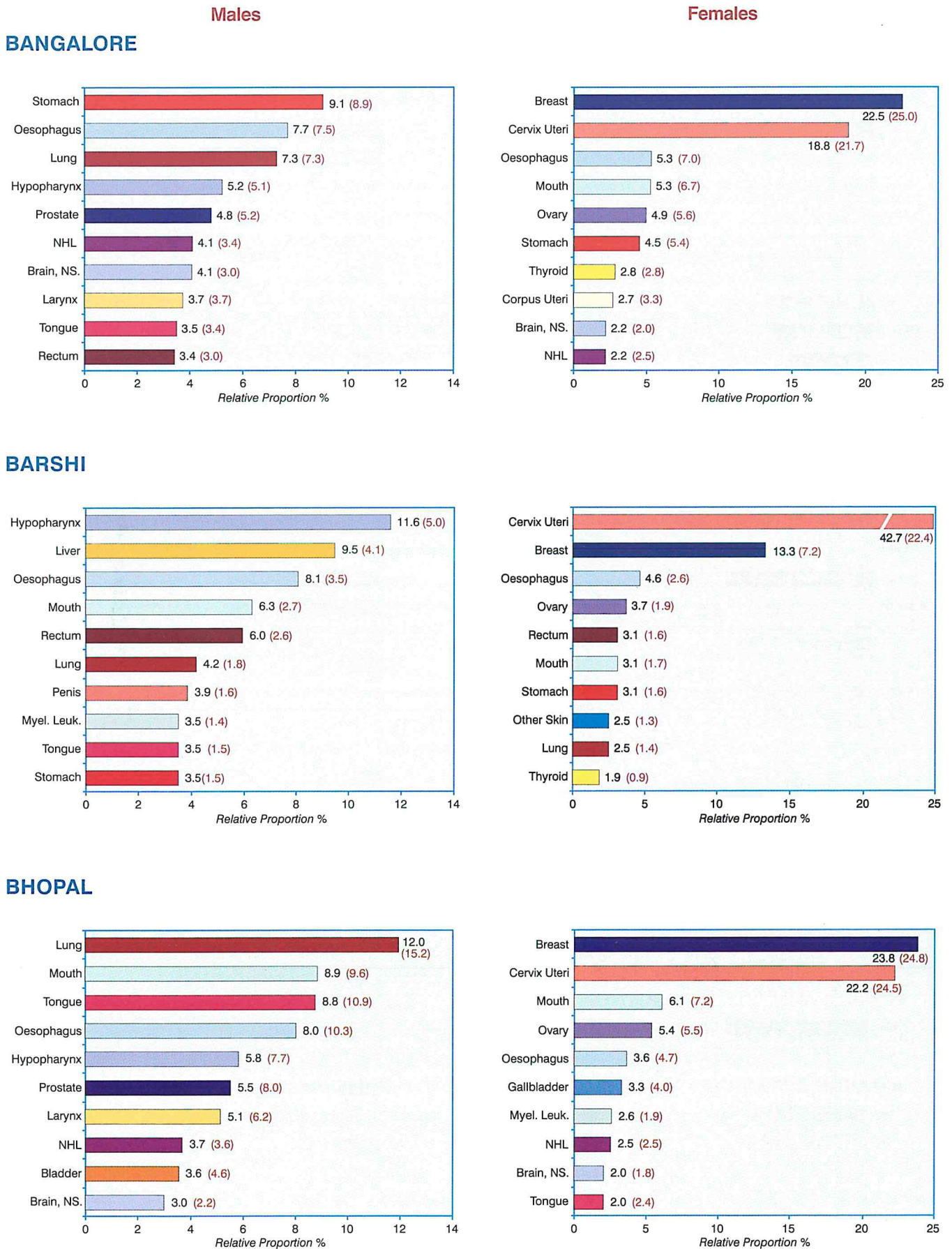
**FIGURE 3.1(a) : International Comparisons of AAR with that of PBCRs in India**  
All Sites (ICD-10:C00-C96) - Males



**FIGURE 3.1(b) : International Comparisons of AAR with that of PBCRs in India**  
*All Sites (ICD-10:C00-C96) - Females*

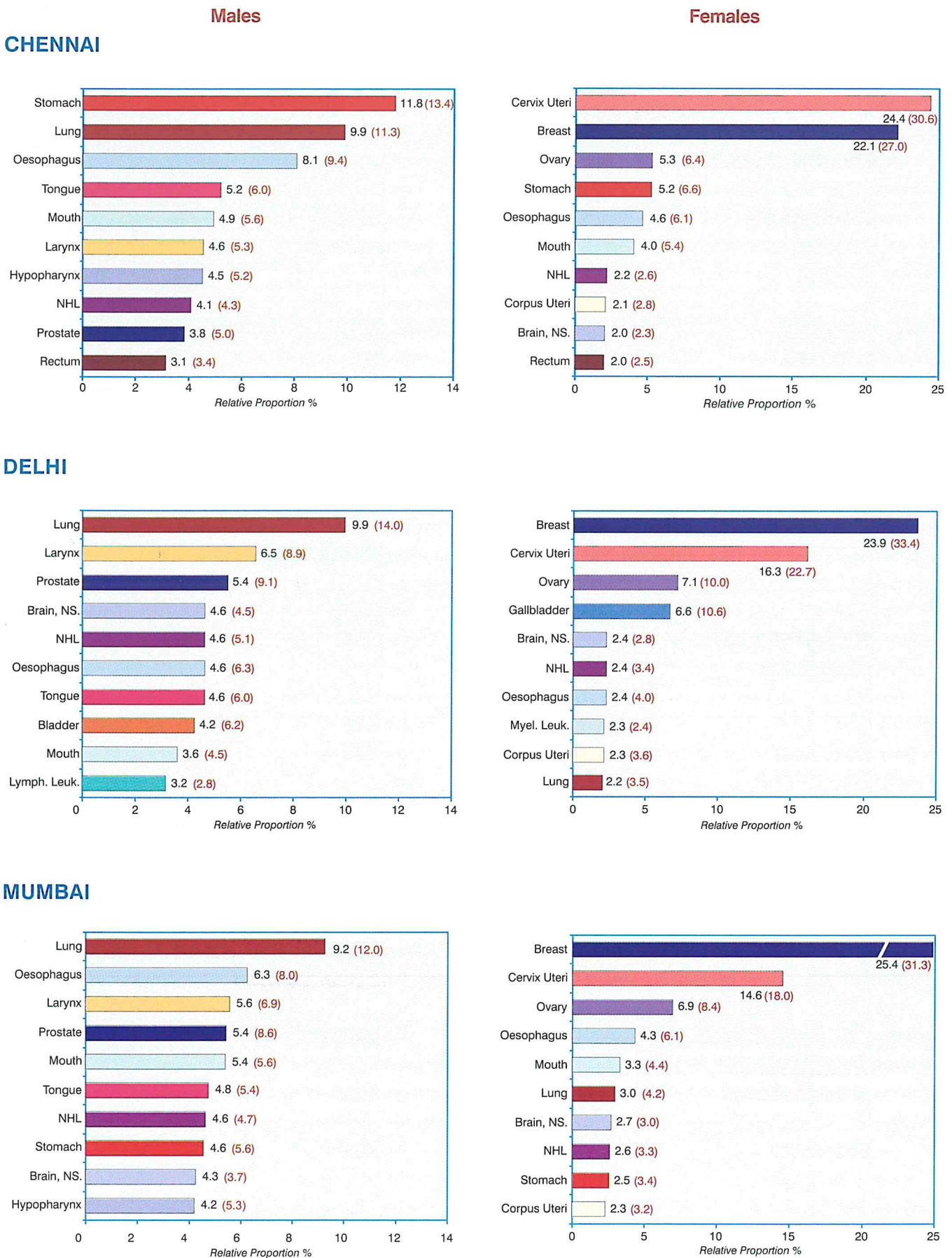


**FIGURE 3.2 : Ten Leading Sites of Cancer in Indian PBCRs**  
*Age Adjusted Incidence Rates given in parentheses*



**FIGURE 3.2 : Ten Leading Sites of Cancer in Indian PBCRs (Contd...)**

Age Adjusted Incidence Rates given in parentheses



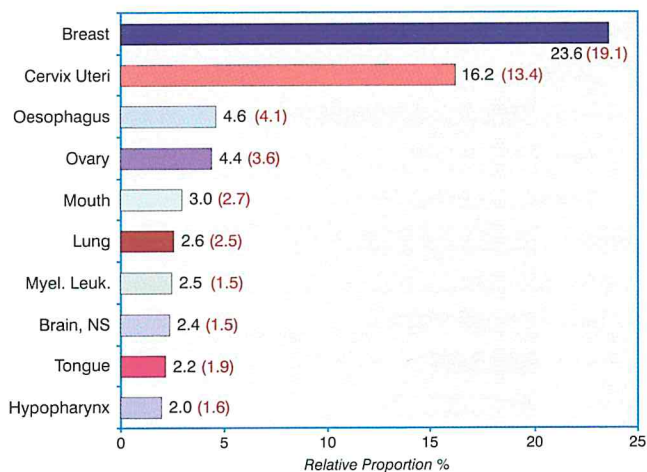
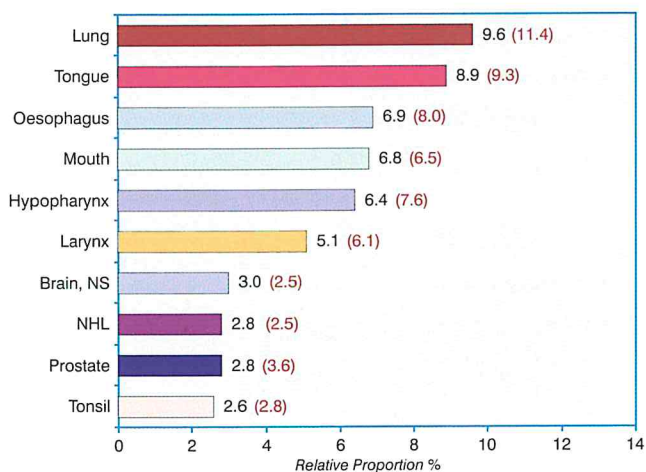
**FIGURE 3.2 : Ten Leading Sites of Cancer in Indian PBCRs (Contd...)**

Age Adjusted Incidence Rates given in parentheses

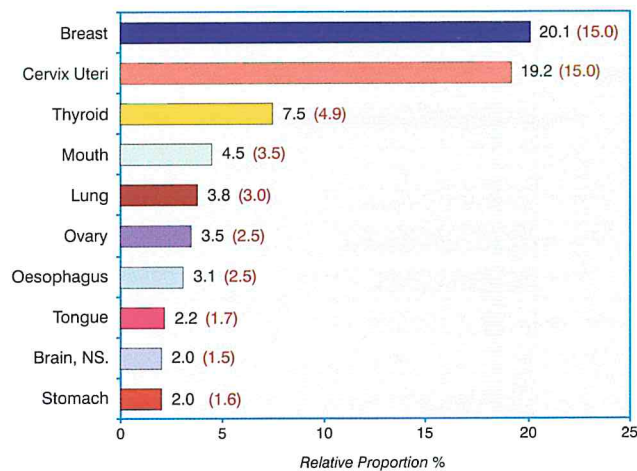
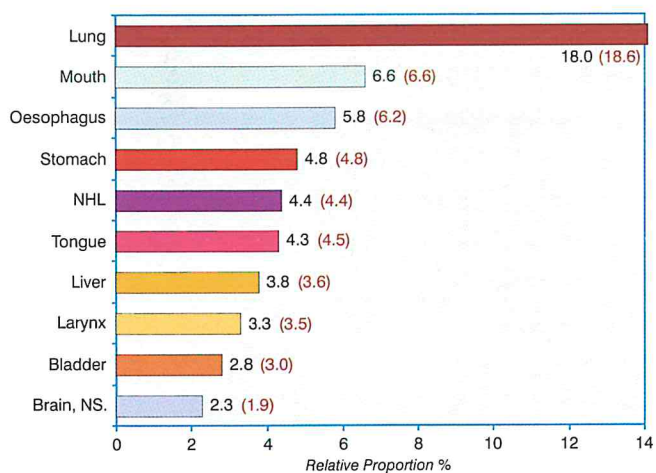
**Males**

**Females**

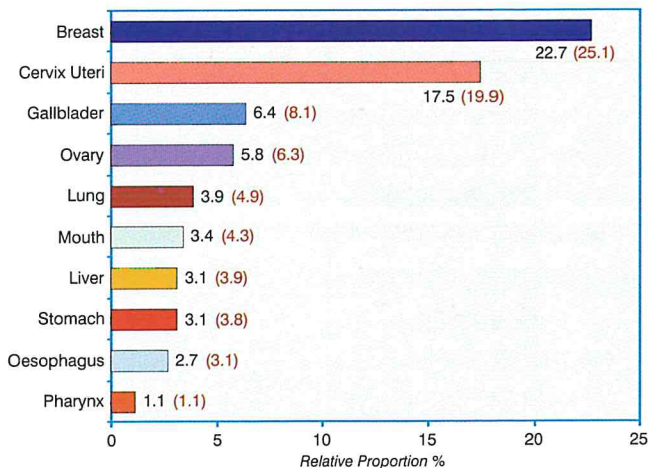
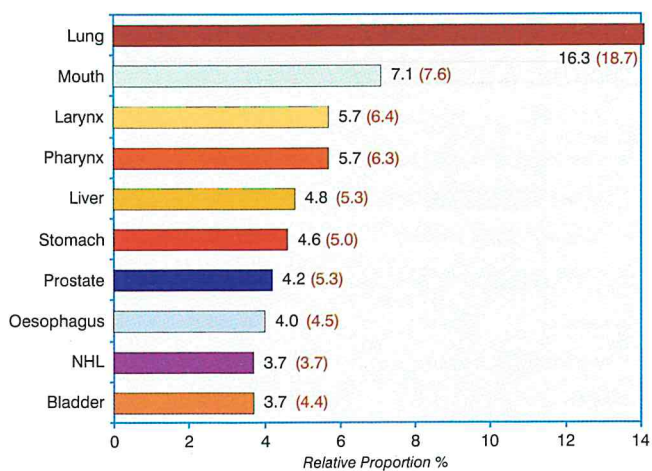
**AHMEDABAD**



**KARUNAGAPPALLY**

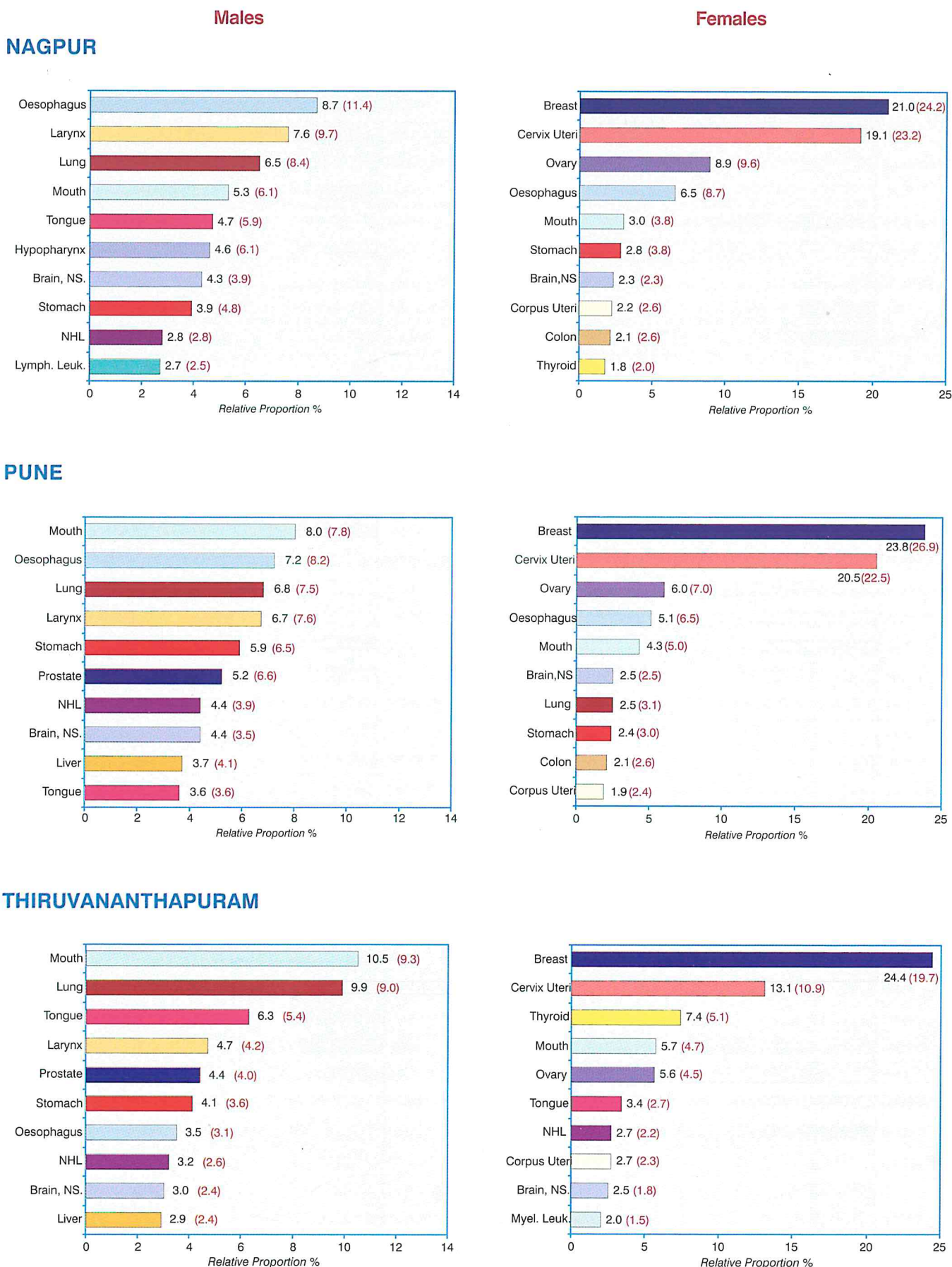


**KOLKATA**



**FIGURE 3.2 : Ten Leading Sites of Cancer in Indian PBCRs (Contd...)**

Age Adjusted Incidence Rates given in parentheses



# Chapter 4

## MINIMUM INCIDENCE RATES OF CANCER [ALL SITES] IN DISTRICTS

The rationale on which minimum incidence rates have been used as a surrogate measure of calculation of incidence has been spelt out in the earlier chapter on 'Overall Plan and Methods' (Chapter 2). The reason for using the district as a unit for such calculation has also been addressed. The vast majority of the 593 districts in the country depict the rural population.

Under the NCRP, the population based cancer registry at Barshi is the only registry as of now, that has given incidence rates representative of the rural population in the country. The most recent incidence rates available for Barshi cancer registry is that of the years 1997-99. The average annual minimum age adjusted incidence rate (MAAR) for Barshi (all sites) for the period 1997-99, is 36.21 and 45.02 per 100,000 for males and females respectively. Thus the MAAR of 36.2 has been used as the cut off level to select districts for observing and comparing cancer patterns.

In all there were 82 districts that had a higher MAAR than 36.2 for at least one of the two years (2001 or 2002) and in either sex. If looked separately for males and females there were 70 and 69 districts above the cut off level in males and females respectively.

Since the incidence rates calculated are the minimum – based on microscopic verification of cancers, the higher of the MAAR between the years 2001 and 2002 has been used in depicting the bar charts and maps in the following pages. For the six PBCRs under the NCRP the latest data available is of the period 1997-99. Therefore the average annual MAAR for this period (1997-99) has been used to calculate the AAR and MAAR for these PBCRs.

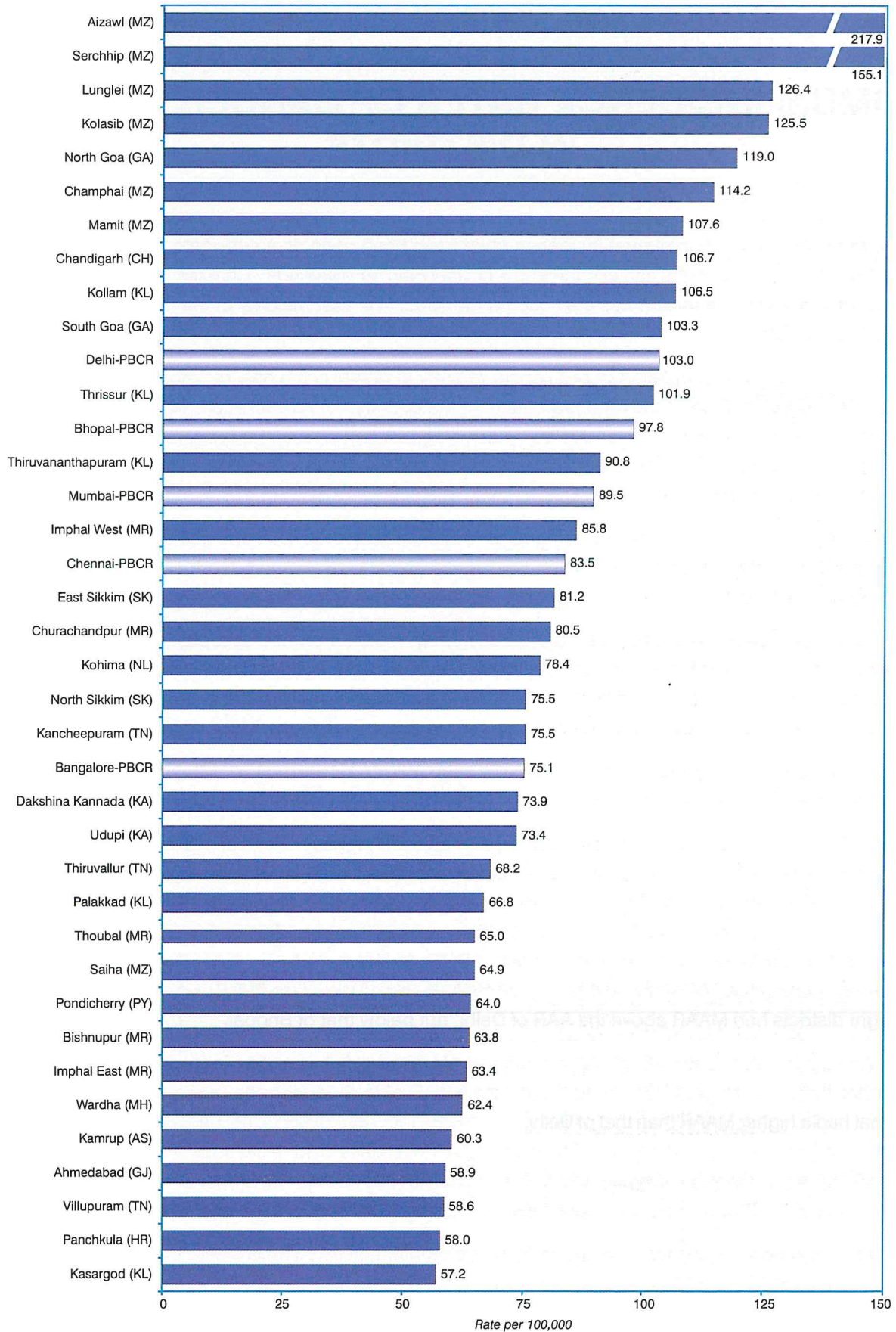
Figure 4.1 shows the bar charts of MAAR in districts with MAAR above 36.2/100,000 for all sites of cancer in males and females. The bars of the six PBCRs under the NCRP are also given. The MAAR is shown against each bar.

**Males:** Among males, in the PBCRs under NCRP, Delhi had the highest MAAR of 103.0/100,000. There were ten districts under the project that had a MAAR higher than that of Delhi, PBCR. Among the urban PBCRs, Bangalore had the lowest MAAR of 75.1 per 100,000. There were eight districts that were above this MAAR but below that of Delhi PBCR. The remaining fifty-one districts listed had MAAR lower than the urban PBCRs but above that of the rural PBCR at Barshi. The highest AAR in males among the urban PBCRs for the period was also in Delhi (126.1/100,000). There were three districts that had MAAR above this. The lowest AAR among the urban PBCRs was 92.1/100,000 in Bangalore PBCR.

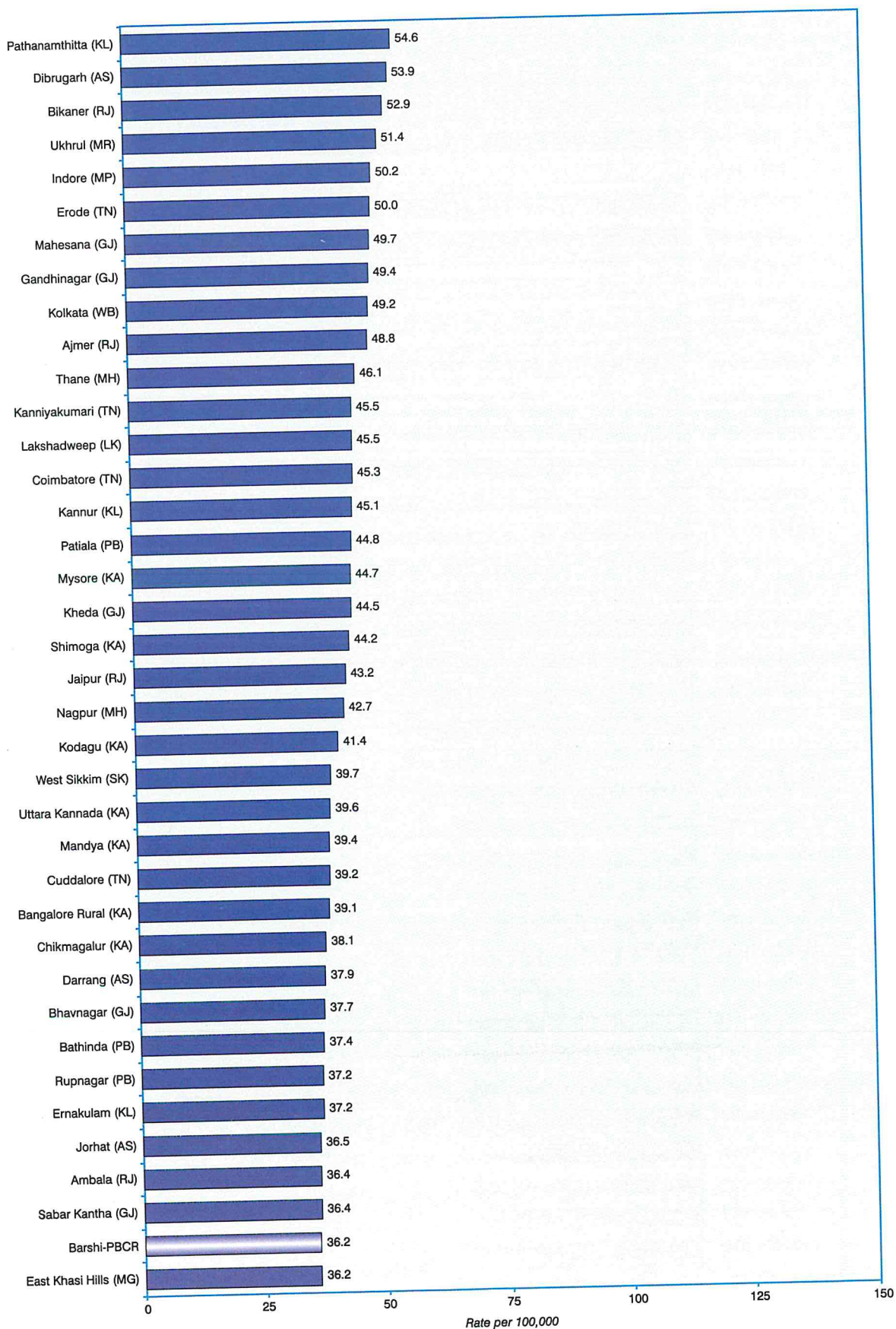
**Females:** Among females, Delhi PBCR had the highest MAAR of 113.9/100,000. There were four districts that had MAAR higher than this. Bhopal PBCR had the lowest MAAR of 94.0 among the urban PBCRs. There were three districts that had a higher MAAR than that of Bhopal. There were forty-four districts that had a MAAR above that of Barshi PBCR, which in females was 45.0/100,000. The highest AAR in females among the urban PBCRs for the period was in Delhi (142.0/100,000). There were three districts that had MAAR above this. The lowest AAR among the urban PBCRs was 107.8/100,000 in Bhopal, PBCR. At least three districts had MAAR above the AAR of Bhopal.

Figure 4.2 shows the district-wise map of India highlighting these districts where the MAAR is above 36.2 per 100,000 in males and 45.0 per 100,000 for females. Districts with rates less than that indicated are given lighter shades. Based on the stated analogy, this map essentially gives a picture of the breadth of coverage, of information on cancer cases under this project.

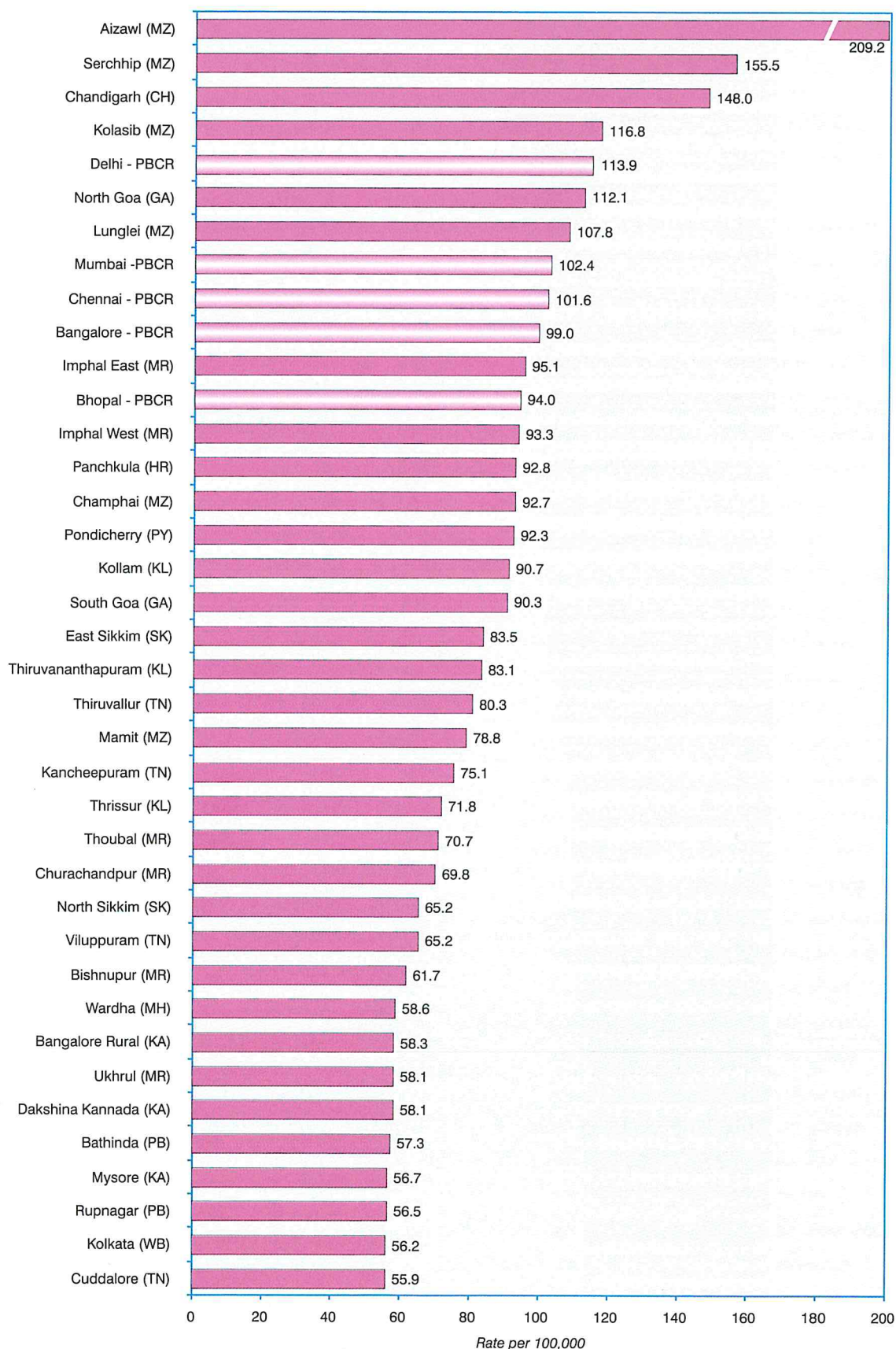
**FIGURE 4.1(a) : Districtwise Comparisons of MAAR with that of PBCRs under NCRP**  
*All Sites (ICD-10:C00-C96) - Males*



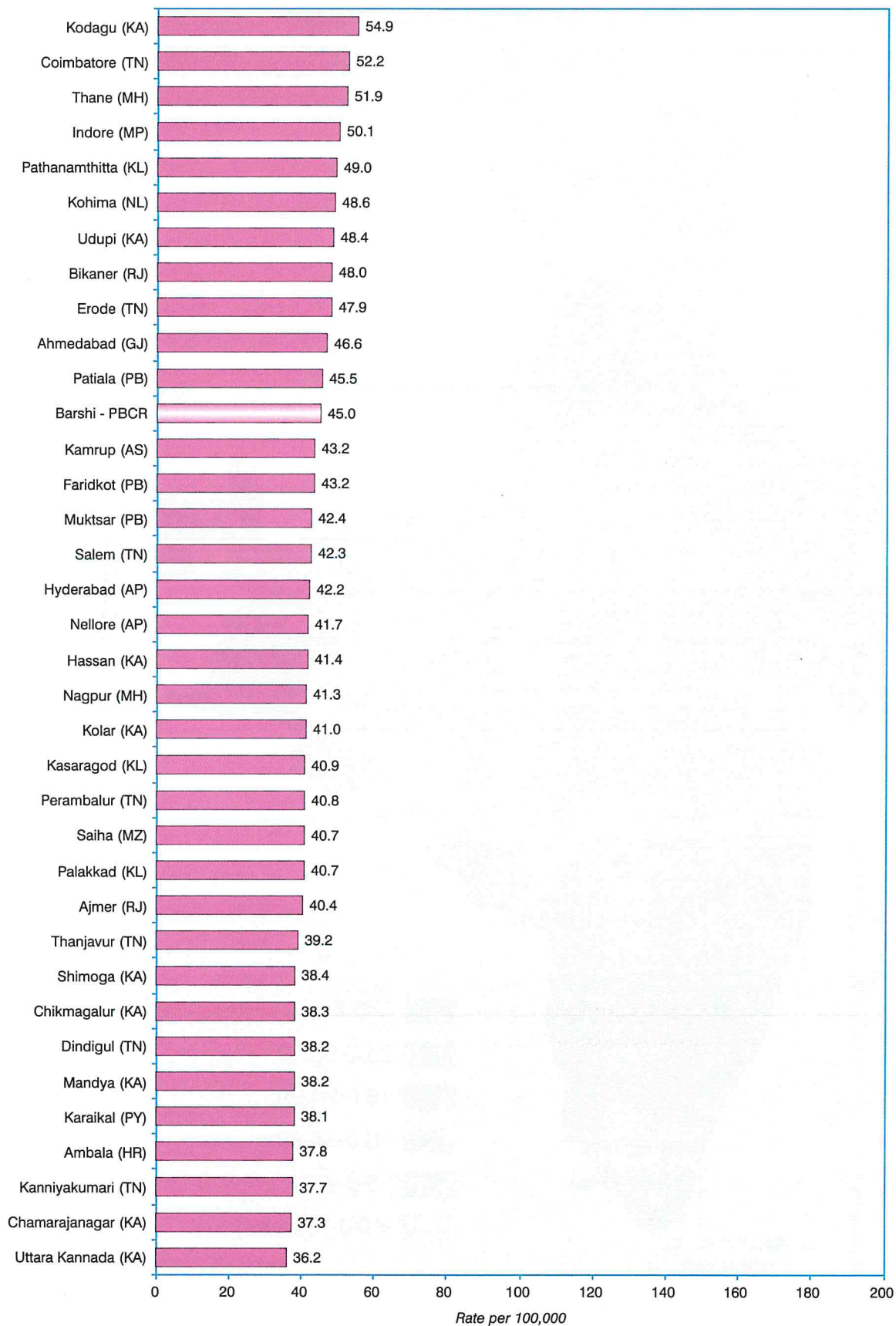
**FIGURE 4.1(a) : Districtwise Comparisons of MAAR with that of PBCRs under NCRP**  
*All Sites (ICD-10:C00-C96) - Males - (Contd...)*



**FIGURE 4.1 (b) : Districtwise Comparisons of MAAR with that of PBCRs under NCRP**  
*All Sites (ICD-10:C00-C96) - Females*

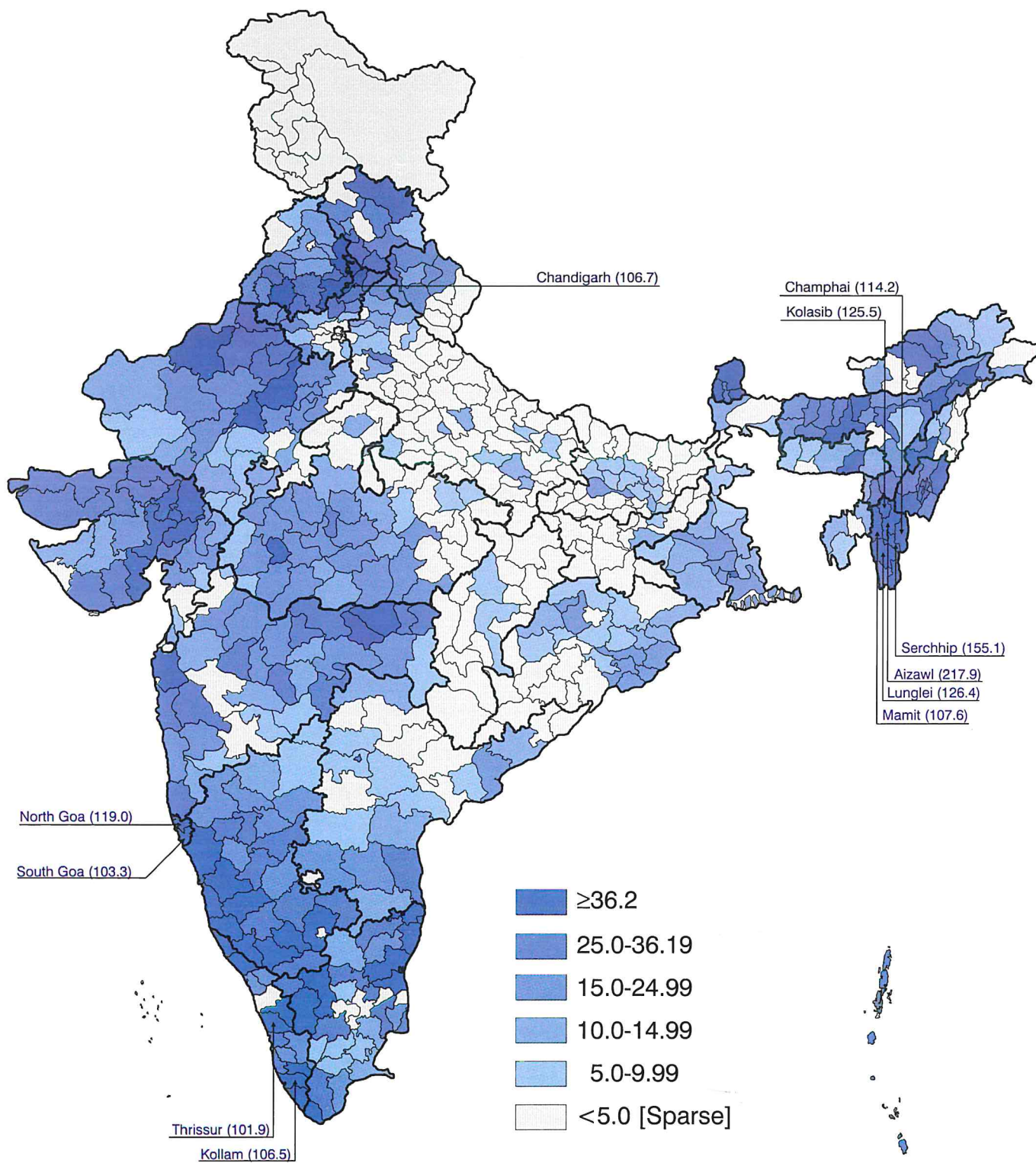


**FIGURE 4.1 (b) : Districtwise Comparisons of MAAR with that of PBCRs under NCRP**  
*All Sites (ICD-10:C00-C96) - Females - (Contd...)*



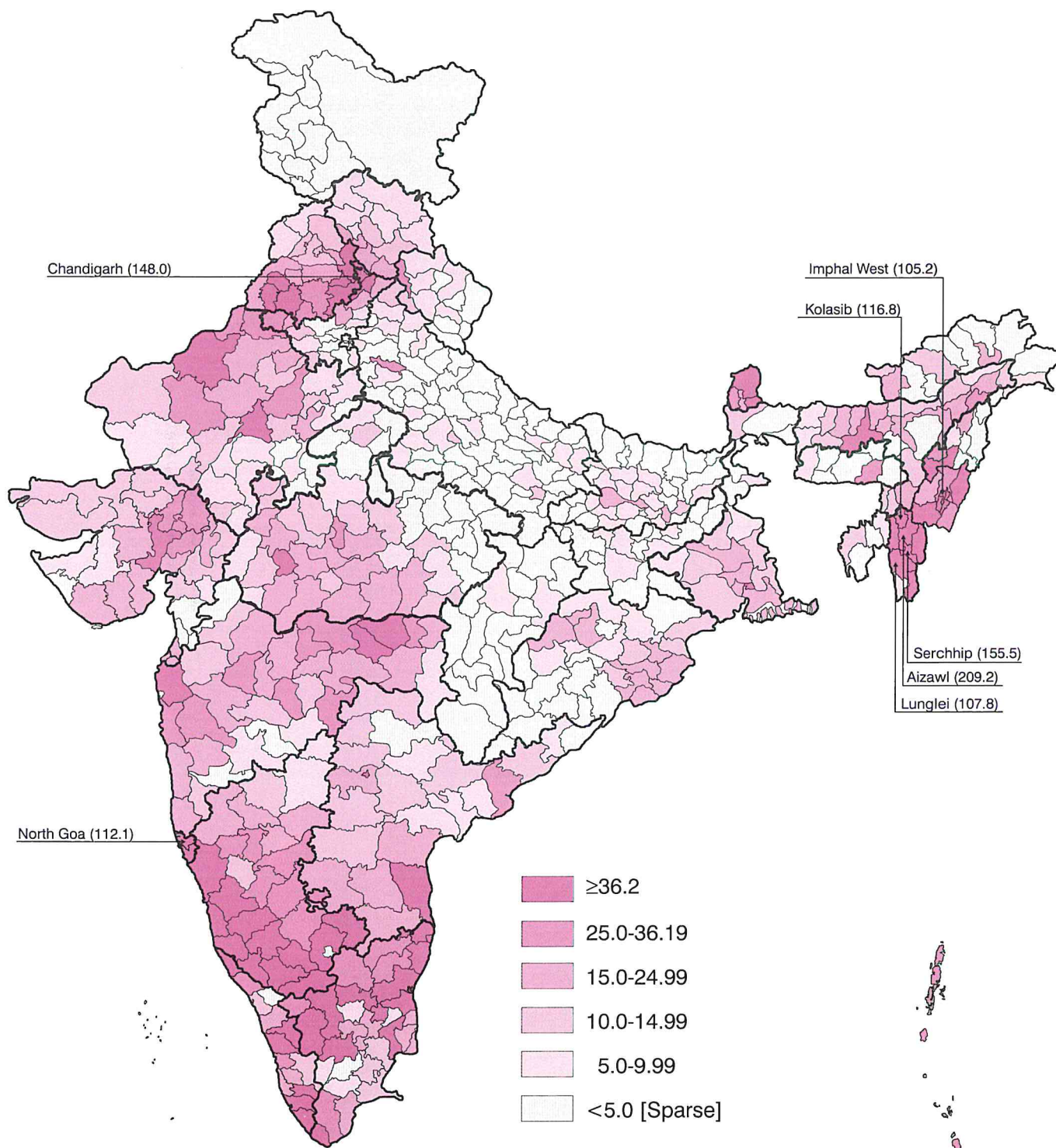
**FIGURE 4.2(a) : Districtwise Distribution of MAAR**

*All Sites (ICD-10:C00-C96) - Males*



**FIGURE 4.2(b) : Districtwise Distribution of MAAR**

*All Sites (ICD-10:C00-C96) - Females*





# Chapter 5

## Distribution and Patterns of Cancer in Selected Districts

### Format of Presentation

This chapter provides a summary of cancer patterns in the 82 selected districts. The basis of selection of the districts as mentioned earlier, is the annual average MAAR of Barshi PBCR for the years 1997-99. This is 36.2/100,000 in males and 45.1/100,000 in females. The lower value of 36.2 has been used as the cut-off level.

The following format has been used to describe the districts. At the first level the grouping is under four broad regions. These are North-East and East, South, West and North. Within each region, the descending order of the MAAR, of the districts, has been followed to arrange states and districts therein.

Whenever a state has had three or more districts fitting into the above criteria a map of the state highlighting these districts is provided.

Each district's description consists of three tables. One with a profile of the district (2001 census), giving the area in sq. kms., decadal growth rate (1991-2001), literacy rate, sex-ratio and population density per sq. km. The second table gives the centre-wise distribution of the cancers from that respective district. This table provides a picture of the referral patterns of cancers in that district. The third table gives by gender, the estimated population, the number of cancers (all sites), the Minimum Crude, Age Adjusted and Truncated Incidence Rate per 100,000 persons. The items in this table are provided for the calendar years 2001 and/or 2002 as the case may be.

A map of India highlights the State or Union territory under which the district appears. A map of the State or Union Territory highlights the position of the district within the State/Union Territory. Another figure gives separately for males and females, the bar charts of the ten leading sites of cancer based on relative proportions with the MAAR of each of these sites indicated in parentheses.

The maps on the official website of the Census of India (Census of India Publications, 2001) was used for boundaries of the state and for the districts within each state.

The tables are provided for all 82 districts. The figures are omitted for about 25 districts where the numbers of leading sites of cancer get into single digits.

***The list of Topography sites with ICD-10 code with mode of grouping for determining leading sites of cancers and acronyms used in figures of bar charts is given in Appendix III.***

## STATES IN THE NORTH-EAST AND EASTERN REGION

There were 23 districts in this region that had MAAR above 36.2/100,000.

### MIZORAM STATE

Figure 5(A) gives the Map of India highlighting Mizoram State and Figure 5(B) gives the Map of Mizoram State highlighting the Districts where the MAAR was above 36.2 /100,000. These were: Aizawl, Serchip, Lunglei, Kolasib, Champhai, Mamit and Saiha.

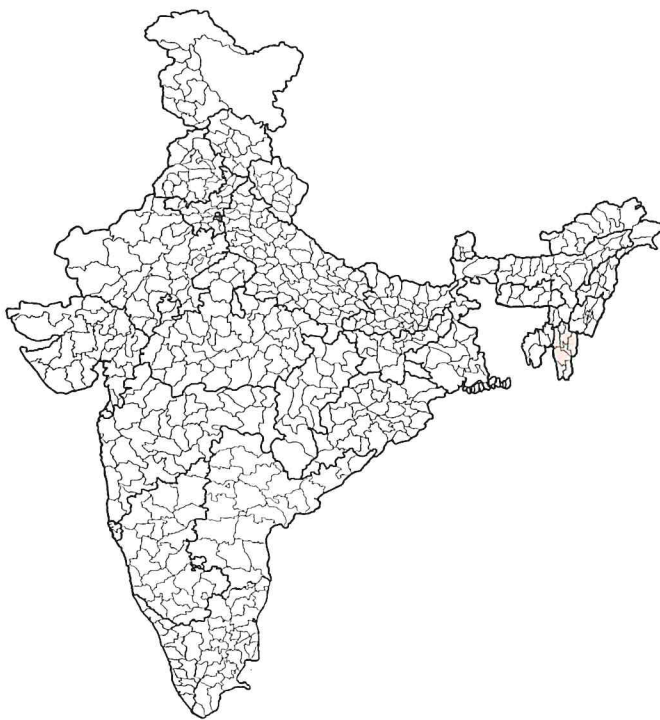


FIGURE 5(A): Map of India highlighting Mizoram State

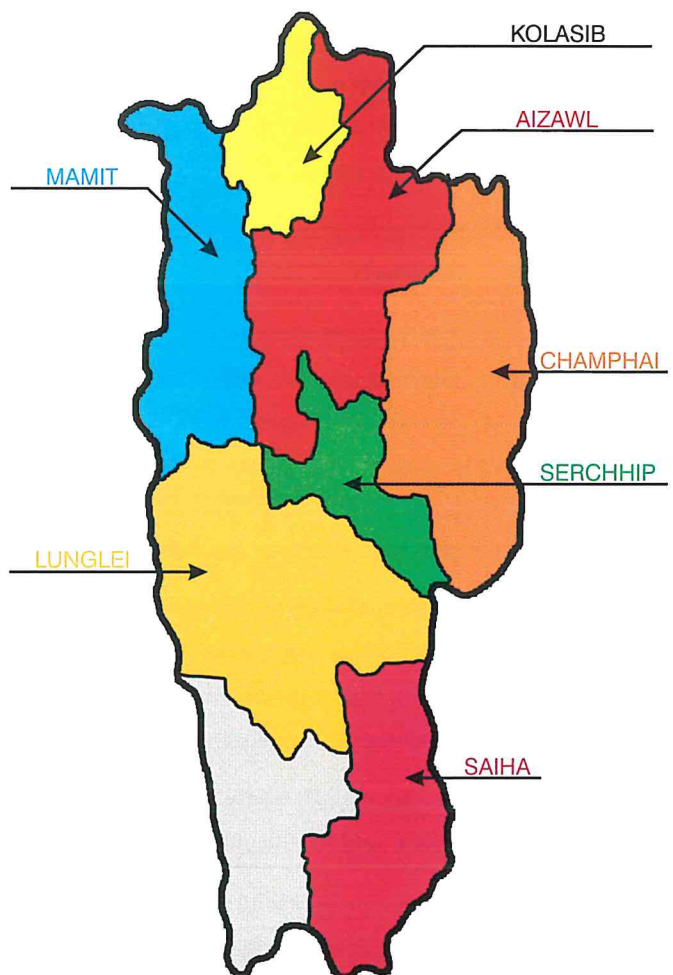


FIGURE 5(B): Map of Mizoram State highlighting the districts with MAAR above 36.2 per 100,000

## Aizawl District

Stomach was the leading site of cancer followed by oesophagus in males. The two sites constituted one-third of all cancers in males. These two sites were followed by cancer of the lung and hypopharynx - two tobacco related cancers (TRC). Cancer of the stomach was also the third leading site of cancer in females only preceded by cancers of the cervix uteri and breast. Cancer of the stomach constituted 11% of all cancers in females. Cancer of the lung in females followed stomach as the leading site of cancer [Fig. 5.1 (c)]. Civil Hospital Aizawl is the only cancer treatment facility in the region and accounted for 75-80% of all cancers. Some patients use the Dr B.B. Borooah Cancer Hospital at Guwahati and others the Tata Memorial Centre at Mumbai. [Table 5.1 (b)]

Overall Aizawl district has had considerably higher incidence rates in both males and females than the age adjusted incidence rates (not minimum incidence rates) of the PBCRs anywhere in India. This is again reflected in the individual sites of cancer. Besides Aizawl males reported the highest incidence rates of cancer of the tongue and hypopharynx in the world.

## Other Districts - Mizoram State

### *Males*

As in Aizawl district, cancer of the stomach was the leading site of cancer among males in the other six districts (Serchhip, Lunglei, Kolasib, Champhai, Mamit and Saiha) where the MAAR for all sites of cancer exceeded 36.2/100,000. This site of cancer constituted 25-41% of all cancers in males in these districts. The TRCs, cancer of the nasopharynx (which is now categorised as a TRC) and non-Hodgkin's lymphoma were the other leading sites of cancer in males that were seen more or less uniformly across these six districts.

### *Females*

Cancer of the stomach was an important leading site of cancer in these districts in women as well. In fact, it was the leading site of cancer among women in Serchhip and Lunglei. It was the second leading site in Kolasib, Champhai and Saiha. Cancer of the cervix was the leading site in Champhai and cancer of the breast in Mamit. In Kolasib, the order of the first four leading sites of cancer, was: lung, stomach, cervix and breast. Cancer of the nasopharynx was among the ten leading sites of cancer in all these districts except Saiha.

## 5.1. AIZAWL DISTRICT, Mizoram State

(Code 1503)

**TABLE 5.1(a) : Profile of Aizawl District (2001 Census)**

Area (in sq. kms.)	3,576.3
Decadal Growth Rate (1991-2001)	39.24%
Literacy Rate	
Males	97.20%
Females	96.06%
Sex Ratio (females per 1000 males)	954
Density (persons per sq. km)	95



FIGURE 5.1 (a) : Map of India highlighting Mizoram State

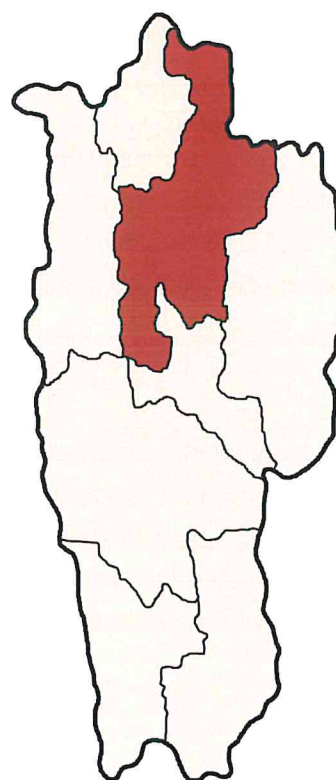


FIGURE 5.1 (b) : Map of Mizoram State highlighting Aizawl District

**TABLE 5.1(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Civil Hospital, Aizawl (130)	286	92.0	321	76.6	607	83.2
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	73	17.4	73	10.0
HBCR - Mumbai (1008)	21	6.8	25	6.0	46	6.3
All Other Centres	4	1.3	0	0.0	4	0.5
<b>Total Cancers</b>	<b>311</b>	<b>100.0</b>	<b>419</b>	<b>100.0</b>	<b>730</b>	<b>100.0</b>

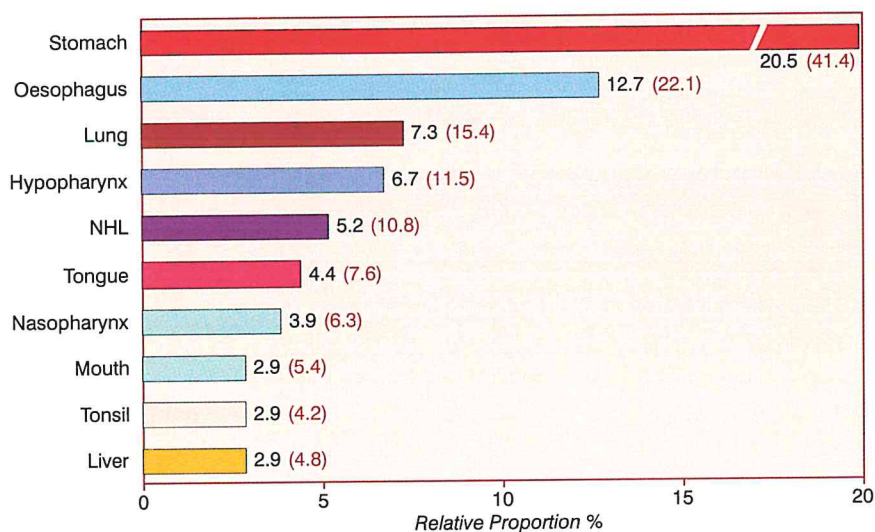
**TABLE 5.1(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,71,572	1,63,764	1,76,635	1,68,901	3,48,207	3,32,665
Total Cancers (All sites)	164	147	222	197	386	344
Min. Crude IR	95.6	89.8	125.7	116.6	110.9	103.4
Min. Age Adjusted IR	159.4	148.4	217.9	209.2	189.1	179.3
Min. Truncated IR	289.2	290.6	390.9	406.6	340.9	349.6

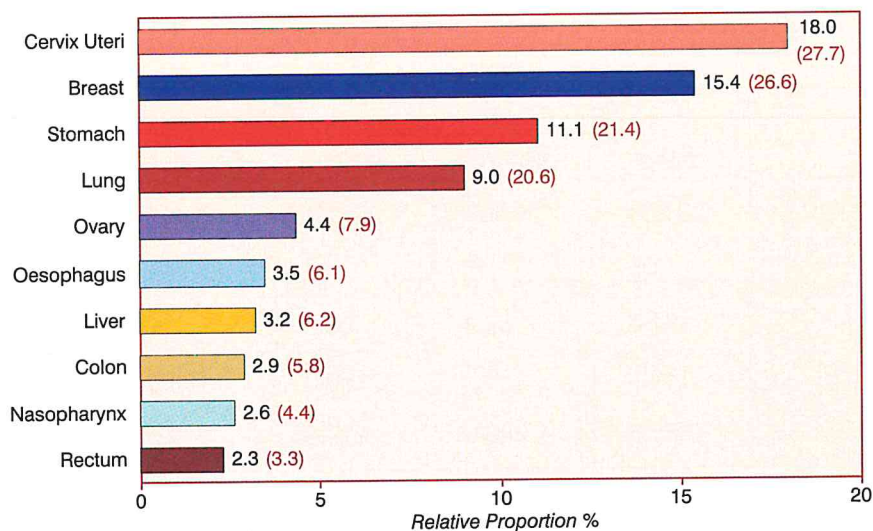
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.1(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.2. SERCHHIP DISTRICT, Mizoram State

(Code 1505)

**TABLE 5.2(a) : Profile of Serchhip District (2001 Census)**

Area (in sq. kms.)	1,421.6
Decadal Growth Rate (1991-2001)	18.45%
Literacy Rate	
Males	97.24%
Females	95.02%
Sex Ratio (females per 1000 males)	953
Density (persons per sq. km)	39

**TABLE 5.2(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	40	100.0	42	87.5	82	93.2
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	6	12.5	6	6.8
<b>Total Cancers</b>	<b>40</b>	<b>100.0</b>	<b>48</b>	<b>100.0</b>	<b>88</b>	<b>100.0</b>

**TABLE 5.2(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	28,260	26,949	28,884	27,582	57,144	54,531
Total Cancers (All sites)	23	17	24	24	47	41
Min. Crude IR	81.4	63.1	83.1	87.0	82.2	75.2
Min. Age Adjusted IR	155.1	113.4	153.9	155.5	154.5	134.7
Min. Truncated IR	285.3	243.6	217.6	261.5	251.1	252.6

Min. = Minimum IR = Incidence Rate / 100,000

## 5.3. LUNGLEI DISTRICT, Mizoram State

(Code 1506)

**TABLE 5.3(a) : Profile of Lunglei District (2001 Census)**

Area (in sq. kms.)	4,538.0
Decadal Growth Rate (1991-2001)	23.10%
Literacy Rate	
Males	87.36%
Females	80.74%
Sex Ratio (females per 1000 males)	922
Density (persons per sq. km)	30

**TABLE 5.3(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	47	94.0	78	83.0	125	86.8
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	14	14.9	14	9.7
HBCR - Mumbai (1008)	3	6.0	2	2.1	5	3.5
<b>Total Cancers</b>	<b>50</b>	<b>100.0</b>	<b>94</b>	<b>100.0</b>	<b>144</b>	<b>100.0</b>

**TABLE 5.3(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	71,168	65,566	72,459	66,828	1,43,627	1,32,394
Total Cancers (All sites)	29	21	52	42	81	63
Min. Crude IR	40.8	32.0	71.8	62.9	56.4	47.6
Min. Age Adjusted IR	66.3	52.3	126.4	107.8	96.6	80.3
Min. Truncated IR	125.1	138.7	240.6	155.1	183.3	147.0

Min. = Minimum IR = Incidence Rate / 100,000

## 5.4. KOLASIB DISTRICT, Mizoram State

(Code 1502)

**TABLE 5.4(a) : Profile of Kolasib District (2001 Census)**

Area (in sq. kms.)	1,382.5
Decadal Growth Rate (1991-2001)	36.01%
Literacy Rate	
Males	91.50%
Females	89.37%
Sex Ratio (females per 1000 males)	913
Density (persons per sq. km)	44

**TABLE 5.4(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	41	100.0	42	97.7	83	98.8
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	1	2.3	1	1.2
<b>Total Cancers</b>	<b>41</b>	<b>100.0</b>	<b>43</b>	<b>100.0</b>	<b>84</b>	<b>100.0</b>

**TABLE 5.4(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	31,666	28,948	32,358	29,616	64,024	58,564
Total Cancers (All sites)	22	19	23	20	45	39
Min. Crude IR	69.5	65.6	71.1	67.5	70.3	66.6
Min. Age Adjusted IR	125.5	116.8	123.7	115.4	124.6	116.1
Min. Truncated IR	178.9	262.7	291.1	192.0	235.6	227.0

Min. = Minimum IR = Incidence Rate / 100,000

## 5.5. CHAMPHAI DISTRICT, Mizoram State

(Code 1504)

**TABLE 5.5(a) : Profile of Champhai District (2001 Census)**

Area (in sq. kms.)	3,185.8
Decadal Growth Rate (1991-2001)	29.77%
Literacy Rate	
Males	94.00%
Females	89.64%
Sex Ratio (females per 1000 males)	955
Density (persons per sq. km)	32

**TABLE 5.5(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	46	100.0	56	90.3	102	94.4
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	5	8.1	5	4.6
HBCR - Mumbai (1008)	0	0.0	1	1.6	1	0.9
<b>Total Cancers</b>	<b>46</b>	<b>100.0</b>	<b>62</b>	<b>100.0</b>	<b>108</b>	<b>100.0</b>

**TABLE 5.5(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	51,531	49,266	52,657	50,432	1,04,188	99,698
Total Cancers (All sites)	29	17	35	27	64	44
Min. Crude IR	56.3	34.5	66.5	53.5	61.4	44.1
Min. Age Adjusted IR	108.7	61.4	114.2	92.7	111.5	77.2
Min. Truncated IR	162.4	120.5	278.4	203.2	221.0	162.3

Min. = Minimum IR = Incidence Rate / 100,000

## 5.6. MAMIT DISTRICT, Mizoram State

(Code 1501)

**TABLE 5.6(a) : Profile of Mamit District (2001 Census)**

Area (in sq. kms.)	3,025.8
Decadal Growth Rate (1991-2001)	20.07%
Literacy Rate	
Males	84.04%
Females	75.66%
Sex Ratio (females per 1000 males)	902
Density (persons per sq. km)	21

**TABLE 5.6(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	32	100.0	25	75.8	57	87.7
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	8	24.2	8	12.3
<b>Total Cancers</b>	<b>32</b>	<b>100.0</b>	<b>33</b>	<b>100.0</b>	<b>65</b>	<b>100.0</b>

**TABLE 5.6(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	32,549	29,389	33,256	30,082	65,805	59,471
Total Cancers (All sites)	21	11	18	15	39	26
Min. Crude IR	64.5	37.4	54.1	49.9	59.3	43.7
Min. Age Adjusted IR	107.6	66.2	100.5	78.8	104.0	72.6
Min. Truncated IR	186.2	129.2	146.1	218.1	165.9	174.2

Min. = Minimum IR = Incidence Rate / 100,000

## 5.7. SAIHA DISTRICT, Mizoram State

(Code 1508)

**TABLE 5.7(a) : Profile of Saiha District (2001 Census)**

Area (in sq. kms.)	1,399.9
Decadal Growth Rate (1991-2001)	33.16%
Literacy Rate	
Males	86.28%
Females	78.39%
Sex Ratio (females per 1000 males)	954
Density (persons per sq. km)	43

**TABLE 5.7(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Civil Hospital, Aizawl (130)	14	93.3	15	93.8	29	93.5
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	1	6.3	1	3.2
HBCR - Mumbai (1008)	1	6.7	0	0.0	1	3.2
<b>Total Cancers</b>	<b>15</b>	<b>100.0</b>	<b>16</b>	<b>100.0</b>	<b>31</b>	<b>100.0</b>

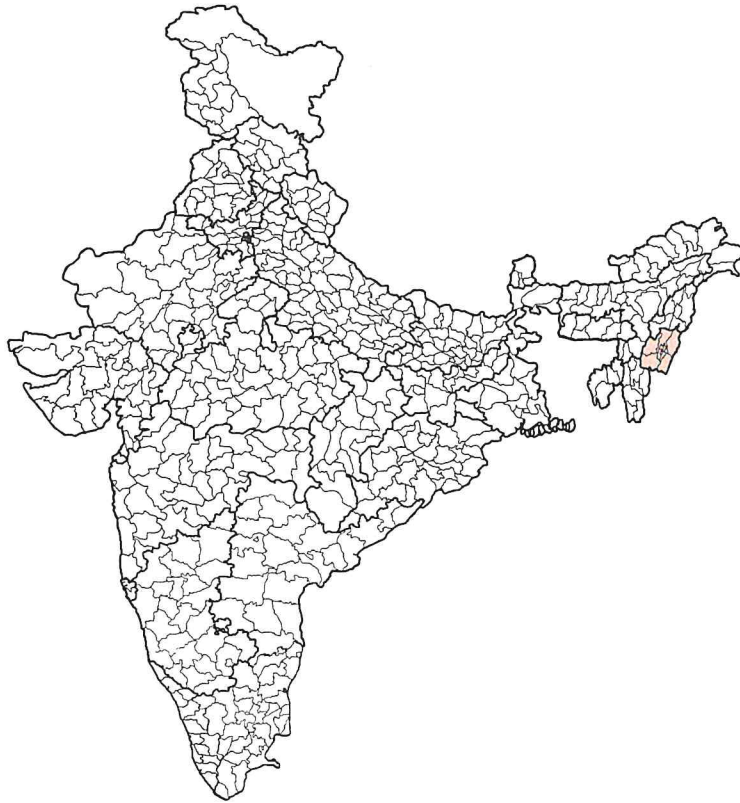
**TABLE 5.7(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	31,114	29,711	31,880	30,478	62,994	60,189
Total Cancers (All sites)	11	4	9	7	20	11
Min. Crude IR	35.4	13.5	28.2	23.0	31.7	18.3
Min. Age Adjusted IR	64.9	17.0	62.9	40.7	63.9	29.0
Min. Truncated IR	162.0	11.5	94.4	89.8	127.8	51.1

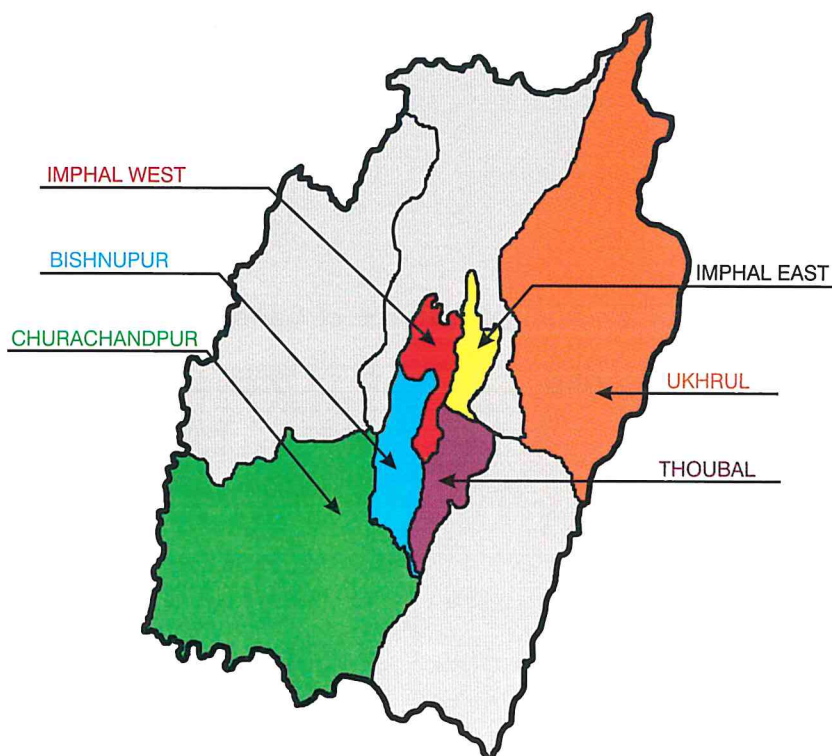
Min. = Minimum IR = Incidence Rate / 100,000

**MANIPUR STATE**

Figure 5(C) gives the Map of India highlighting Manipur State and Figure 5(D) gives the Map of Manipur State highlighting the Districts where the MAAR was above 36.2 /100,000. These were: Churchandpur, Thoubal, Bishnupur and Ukhrol.



**FIGURE 5(C): Map of India highlighting Manipur State**



**FIGURE 5(D) : Map of Manipur State highlighting the districts with MAAR above 36.2 per 100,000**

### Imphal West District

Cancer of the lung followed by stomach and nasopharynx were the leading sites of cancer in males. Cancer of the lung accounted for almost one-fourth (23.6%) of all cancers in males. In females also lung was second only to breast as the leading site constituting 13.4% of all cancers in females. [Fig. 5.8(c)].

### Imphal East District

The picture in Imphal East district was similar to that in Imphal West. In males cancer of the lung and stomach were the first and second leading sites of cancer. In females cancer of the lung was not as frequent as in Imphal West. Cancer of the thyroid was the third leading site of cancer preceded only by cancer of the breast and cervix. [Fig. 5.9(c)].

### Other Districts - Manipur State

The other four districts in Manipur that have been tabulated for incidence rates of cancer are Churachandpur, Thoubal, Bishnupur and Ukhul.

#### *Males*

Cancer of the lung was the most common among the leading sites of cancer in men. Cancer of the stomach and non-Hodgkin's lymphoma were the other leading sites. In Churachandpur cancer of the stomach constituted 26.8% of all cancers in men. In Ukhul cancer of the nasopharynx was the leading site comprising 21.6% of all cancers in males. This site of cancer was also among the ten leading sites in the other three districts. Cancer of the liver was also seen among the top ten cancers. Cancer of the penis was the fifth leading site in Bishnupur.

#### *Females*

Cancer of the breast was the leading site of cancer in Thoubal and Ukhul and cancer of the cervix was the most frequent site in Bishnupur. As in males, cancer of the stomach and lung were among first five leading sites in these four districts, just like it was seen in the east and west districts of Imphal. Important among the other leading sites were cancer of the thyroid and gall bladder.

## 5.8. IMPHAL WEST DISTRICT, Manipur State

(Code 1406)

**TABLE 5.8(a) : Profile of Imphal West District  
(2001 Census)**

Area (in sq. kms.)	519.0
Decadal Growth Rate (1991-2001)	15.42%
Literacy Rate	
Males	89.10%
Females	72.24%
Sex Ratio (females per 1000 males)	1,007
Density (persons per sq. km)	847



FIGURE 5.8(a) : Map of India highlighting Manipur State

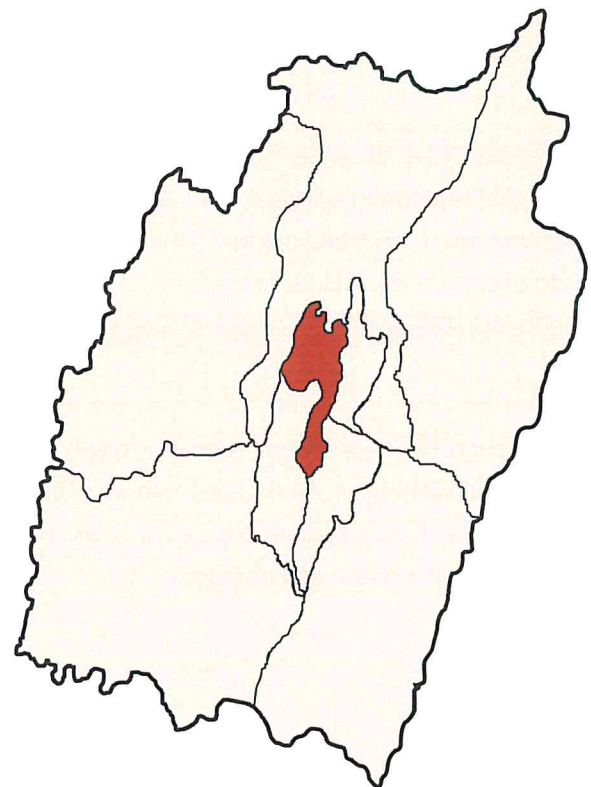


FIGURE 5.8(b) : Map of Manipur State highlighting Imphal West District

**TABLE 5.8(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
RIMS, Imphal (48)	256	99.2	205	94.0	461	96.8
Dr. B B Cancer Institute, Guwahati (49)	0	0.0	8	3.7	8	1.7
HBCR - Mumbai (1008)	1	0.4	5	2.3	6	1.3
All Other Centres	1	0.4	0	0.0	1	0.2
<b>Total Cancers</b>	<b>258</b>	<b>100.0</b>	<b>218</b>	<b>100.0</b>	<b>476</b>	<b>100.0</b>

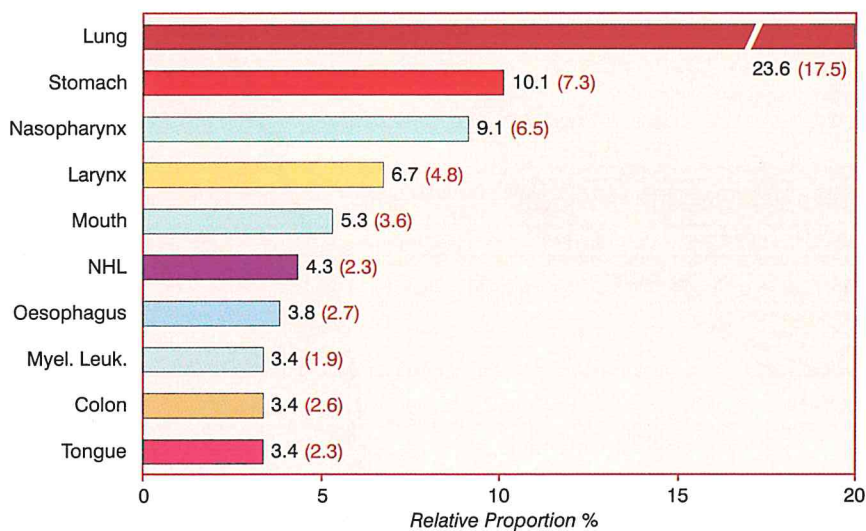
**TABLE 5.8(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	2,19,267	2,19,640	2,20,450	2,21,759	4,39,717	4,41,399
Total Cancers (All sites)	125	133	83	135	208	268
Min. Crude IR	57.0	60.6	37.7	60.9	47.3	60.7
Min. Age Adjusted IR	85.8	93.3	54.4	89.6	70.1	91.4
Min. Truncated IR	128.4	187.5	90.8	160.6	109.6	174.0

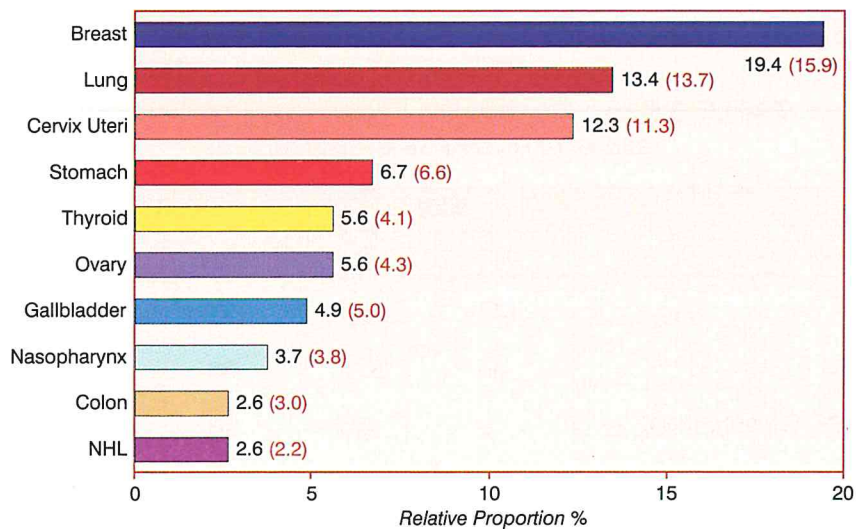
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.8(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.9. IMPHAL EAST DISTRICT, Manipur State

(Code 1407)

**TABLE 5.9(a) : Profile of Imphal East District  
(2001 Census)**

Area (in sq. kms.)	709.0
Decadal Growth Rate (1991-2001)	19.16%
Literacy Rate	
Males	86.44%
Females	66.30%
Sex Ratio (females per 1000 males)	992
Density (persons per sq. km)	555



FIGURE 5.9(a) : Map of India highlighting Manipur State

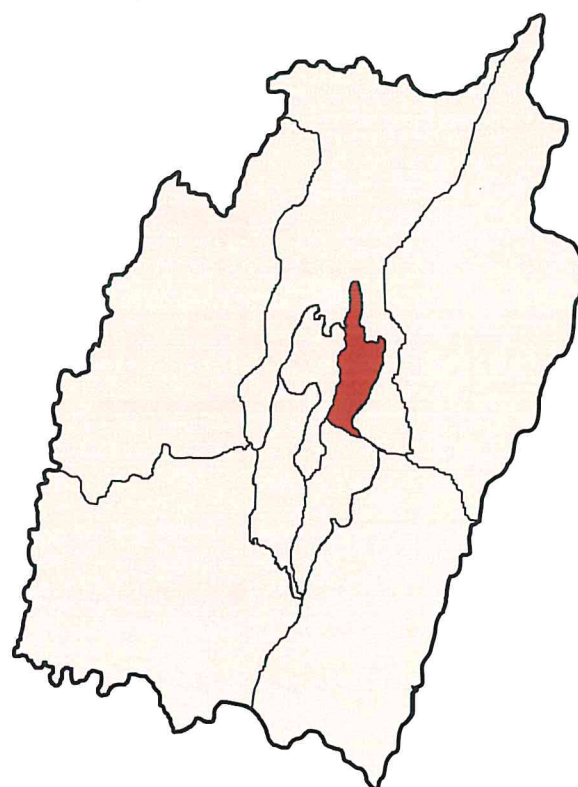


FIGURE 5.9(b) : Map of Manipur State highlighting Imphal East District

**TABLE 5.9(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
RIMS, Imphal (48)	172	78.5	91	61.9	263	71.9
HBCR - Mumbai (1008)	45	20.5	35	23.8	80	21.9
Dr. B B Cancer Institute, Guwahati (49)	0	0.0	16	10.9	16	4.4
All Other Centres	2	0.9	5	3.4	7	1.9
<b>Total Cancers</b>	<b>219</b>	<b>100.0</b>	<b>147</b>	<b>100.0</b>	<b>366</b>	<b>100.0</b>

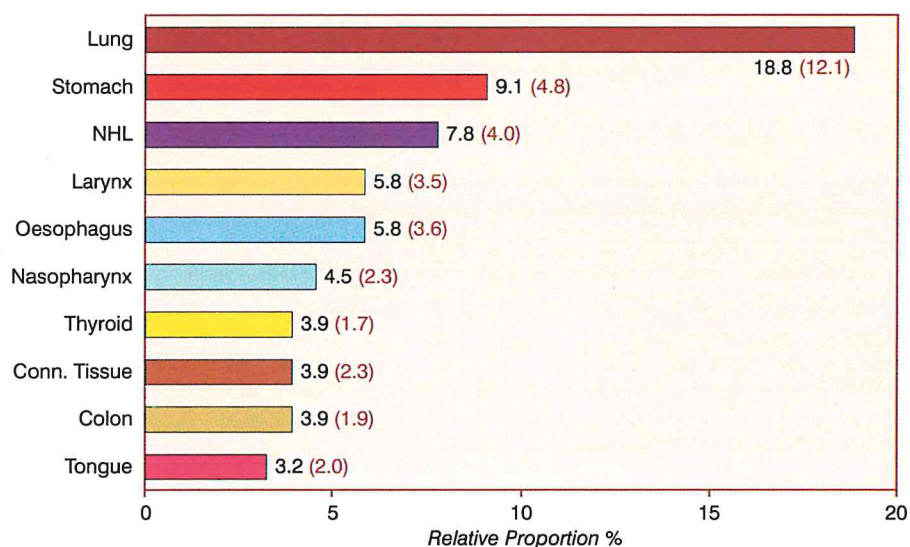
**TABLE 5.9(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,94,445	1,94,775	1,95,492	1,96,653	3,89,937	3,91,428
Total Cancers (All sites)	90	129	64	83	154	212
Min. Crude IR	46.3	66.2	32.7	42.2	39.5	54.2
Min. Age Adjusted IR	63.4	95.1	49.3	59.5	56.3	77.2
Min. Truncated IR	97.2	190.7	96.5	119.2	96.9	154.8

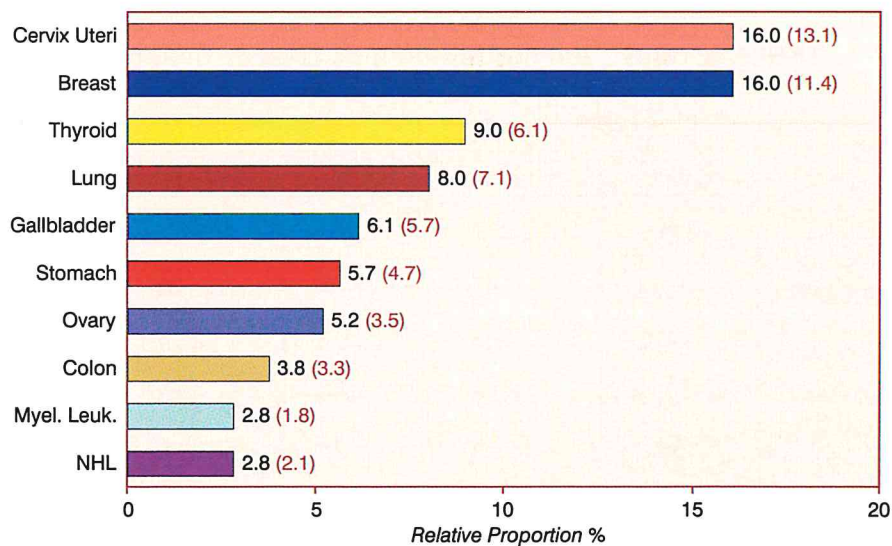
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.9(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.10. CHURCHANDPUR DISTRICT, Manipur State

(Code 1403)

**TABLE 5.10(a) : Profile of Churhandpur District  
(2001 Census)**

Area (in sq. kms.)	4,570.0
Decadal Growth Rate (1991-2001)	29.81%
Literacy Rate	
Males	84.98%
Females	64.40%
Sex Ratio (females per 1000 males)	993
Density (persons per sq. km)	50

**TABLE 5.10(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
RIMS, Imphal (48)	107	97.3	56	94.9	163	96.4
HBCR - Mumbai (1008)	3	2.7	2	3.4	5	3.0
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	1	1.7	1	0.6
<b>Total Cancers</b>	<b>110</b>	<b>100.0</b>	<b>59</b>	<b>100.0</b>	<b>169</b>	<b>100.0</b>

**TABLE 5.10(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,14,490	1,13,937	1,16,812	1,16,805	2,31,302	2,30,742
Total Cancers (All sites)	63	47	34	25	97	72
Min. Crude IR	55.0	41.3	29.1	21.4	41.9	31.2
Min. Age Adjusted IR	80.5	69.8	45.2	33.3	62.7	51.3
Min. Truncated IR	158.2	111.6	79.6	61.8	118.5	86.4

Min. = Minimum IR = Incidence Rate / 100,000

## 5.11. THOUBAL DISTRICT, Manipur State

(Code 1405)

**TABLE 5.11(a) : Profile of Thoubal District (2001 Census)**

Area (in sq. kms.)	514.0
Decadal Growth Rate (1991-2001)	24.62%
Literacy Rate	
Males	80.50%
Females	55.34%
Sex Ratio (females per 1000 males)	998
Density (persons per sq. km)	713

**TABLE 5.11(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
RIMS, Imphal (48)	152	98.1	133	88.7	285	93.4
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	12	8.0	12	3.9
HBCR - Mumbai (1008)	3	1.9	5	3.3	8	2.6
<b>Total Cancers</b>	<b>155</b>	<b>100.0</b>	<b>150</b>	<b>100.0</b>	<b>305</b>	<b>100.0</b>

**TABLE 5.11(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,81,459	1,81,531	1,84,892	1,85,226	3,66,351	3,66,757
Total Cancers (All sites)	76	79	67	83	143	162
Min. Crude IR	41.9	43.5	36.2	44.8	39.0	44.2
Min. Age Adjusted IR	65.0	67.6	56.6	70.7	60.8	69.2
Min. Truncated IR	122.3	136.1	89.5	136.7	105.6	136.5

Min. = Minimum IR = Incidence Rate / 100,000

## 5.12. BISHNUPUR DISTRICT, Manipur State

(Code 1404)

**TABLE 5.12(a) : Profile of Bishnupur District  
(2001 Census)**

Area (in sq. kms.)	496.0
Decadal Growth Rate (1991-2001)	13.90%
Literacy Rate	
Males	82.25%
Females	61.09%
Sex Ratio (females per 1000 males)	1,004
Density (persons per sq. km)	415

**TABLE 5.12(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
RIMS, Imphal (48)	88	100.0	74	88.1	162	94.2
HBCR - Mumbai (1008)	0	0.0	7	8.3	7	4.1
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	3	3.6	3	1.7
<b>Total Cancers</b>	<b>88</b>	<b>100.0</b>	<b>84</b>	<b>100.0</b>	<b>172</b>	<b>100.0</b>

**TABLE 5.12(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,02,003	1,02,670	1,03,145	1,03,998	2,05,148	2,06,668
Total Cancers (All sites)	44	44	49	35	93	79
Min. Crude IR	43.1	42.9	47.5	33.7	45.3	38.2
Min. Age Adjusted IR	61.5	61.7	63.8	47.3	62.7	54.4
Min. Truncated IR	99.8	156.4	117.1	113.7	108.5	135.2

Min. = Minimum IR = Incidence Rate / 100,000

## 5.13. UKHRUL DISTRICT, Manipur State

(Code 1408)

**TABLE 5.13(a) : Profile of Ukhrul District (2001 Census)**

Area (in sq. kms.)	4,544.0
Decadal Growth Rate (1991-2001)	28.98%
Literacy Rate	
Males	75.40%
Females	61.91%
Sex Ratio (females per 1000 males)	920
Density (persons per sq. km)	31

**TABLE 5.13(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
RIMS, Imphal (48)	54	98.2	39	86.7	93	93.0
HBCR - Mumbai (1008)	1	1.8	4	8.9	5	5.0
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	2	4.4	2	2.0
<b>Total Cancers</b>	<b>55</b>	<b>100.0</b>	<b>45</b>	<b>100.0</b>	<b>100</b>	<b>100.0</b>

**TABLE 5.13(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	72,987	67,385	74,500	68,989	1,47,487	1,36,374
Total Cancers (All sites)	28	27	23	22	51	49
Min. Crude IR	38.4	40.1	30.9	31.9	34.6	35.9
Min. Age Adjusted IR	51.4	58.1	43.1	45.5	47.2	51.7
Min. Truncated IR	103.3	141.5	78.6	94.9	90.8	117.9

Min. = Minimum IR = Incidence Rate / 100,000

## SIKKIM STATE

Figure 5(E) gives the Map of India highlighting Sikkim State and Figure 5(F) gives the Map of Sikkim State highlighting the Districts where the MAAR was above 36.2 /100,000.

Three of the four districts in Sikkim, viz., East, North and West met the criteria for tabulating the incidence rates, though the numbers of cancers were small, especially in the North and West districts. East and North Sikkim showed a similar pattern of cancer. Among males, cancer of the stomach was followed by cancer of liver and oesophagus, in these two districts. In West Sikkim cancer of the oesophagus was the leading site followed by cancer of the nasopharynx and stomach. In females in East Sikkim, cancer of the cervix uteri was followed by cancer of the oesophagus and breast. Female cancers in the other two districts were in too small numbers to decipher the leading sites of cancer.

## NAGALAND STATE

Kohima was the only district in Nagaland State that had MAAR in both males and females higher than 36.2/100,000. This district has data only for the year 2001 and mainly from the Babina Diagnostic Centre in Imphal.

Cancer of the stomach was the leading site of cancer in both males and females constituting 38.7% and 17.5% of all cancers in males and females respectively. Cancer of the nasopharynx was the second leading site of cancer in males and the third leading site in females. Cancer of the breast was the second leading site in women and thyroid the fourth leading site.

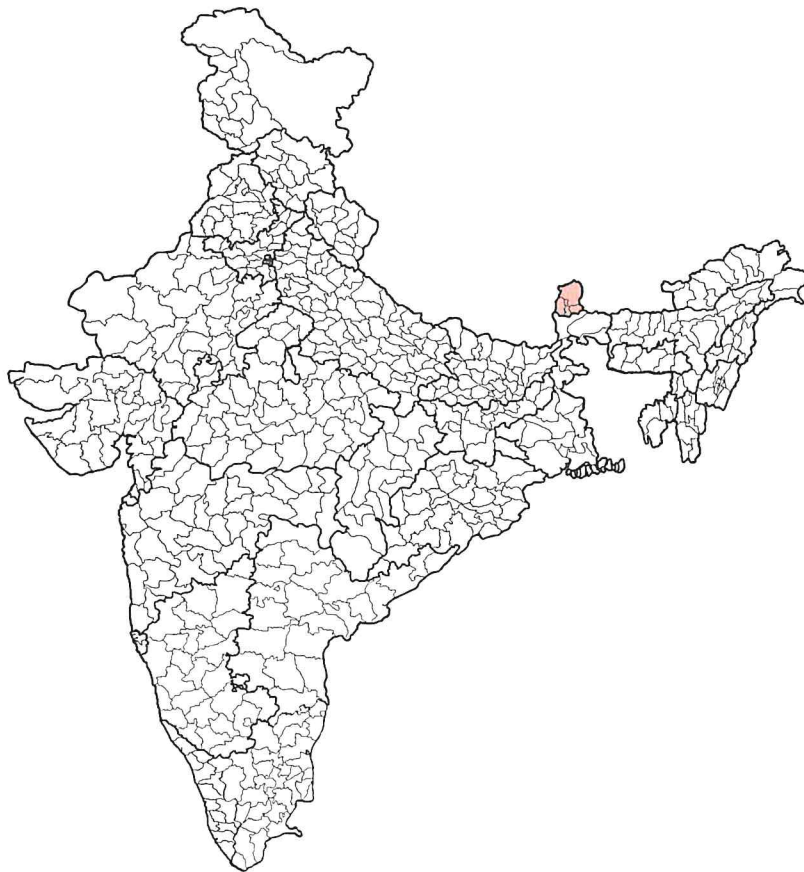


FIGURE 5(E): Map of India highlighting Sikkim State

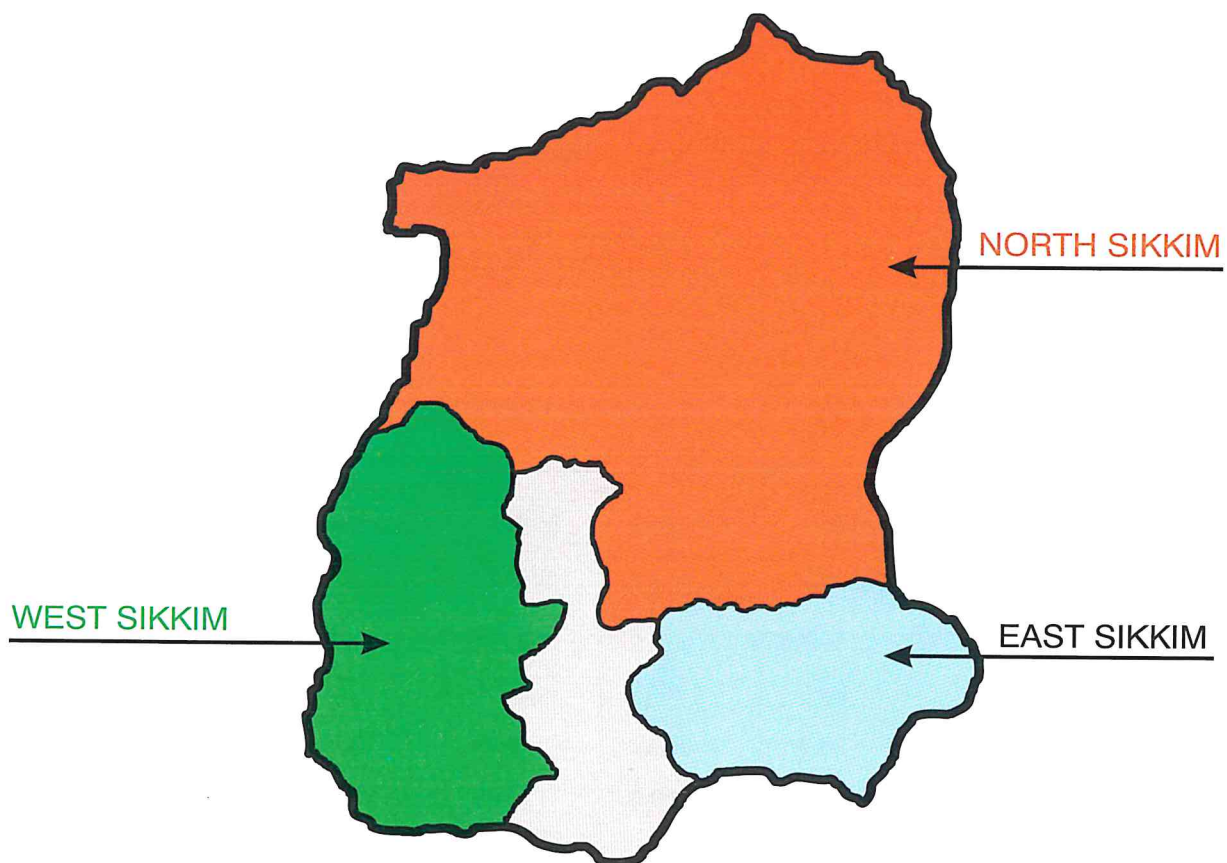


FIGURE 5(F): Map of Sikkim State highlighting the districts with MAAR above 36.2 per 100,000

## 5.14. EAST SIKKIM DISTRICT, Sikkim State

(Code 1104)

**TABLE 5.14(a) : Profile of East Sikkim District  
(2001 Census)**

Area (in sq. kms.)	954.0
Decadal Growth Rate (1991-2001)	37.17%
Literacy Rate	
Males	82.05%
Females	67.74%
Sex Ratio (females per 1000 males)	844
Density (persons per sq. km)	257

**TABLE 5.14(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Sir TN Memorial Hospital, Gangtok (129)	59	77.6	81	86.2	140	82.4
CCWH, Kolkata (105)	10	13.2	11	11.7	21	12.4
HBCR - Mumbai (1008)	7	9.2	0	0.0	7	4.1
All Other Centres	0	0.0	2	2.1	2	1.2
<b>Total Cancers</b>	<b>76</b>	<b>100.0</b>	<b>94</b>	<b>100.0</b>	<b>170</b>	<b>100.0</b>

**TABLE 5.14(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	1,32,137	1,11,558	1,35,763	1,14,478	2,67,900	2,26,036
Total Cancers (All sites)	29	47	51	43	80	90
Min. Crude IR	22.0	42.1	37.6	37.6	29.9	39.8
Min. Age Adjusted IR	36.4	82.2	81.2	83.5	59.1	82.8
Min. Truncated IR	64.3	168.0	94.3	154.2	79.3	161.0

Min. = Minimum IR = Incidence Rate / 100,000

## 5.15. NORTH SIKKIM DISTRICT, Sikkim State

(Code 1101)

**TABLE 5.15(a) : Profile of North Sikkim District  
(2001 Census)**

Area (in sq. kms.)	4,226.0
Decadal Growth Rate (1991-2001)	31.32%
Literacy Rate	
Males	77.32%
Females	57.65%
Sex Ratio (females per 1000 males)	752
Density (persons per sq. km)	10

**TABLE 5.15(b) : Centrewise Distribution of Cancers  
Number (#) and Relative Proportion (%)**

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Sir TN Memorial Hospital, Gangtok (129)	8	88.9	7	46.7	15	62.5
PBCR - Delhi (1011)	0	0.0	7	46.7	7	29.2
CCWH, Kolkata (105)	1	11.1	1	6.7	2	8.3
<b>Total Cancers</b>	<b>9</b>	<b>100.0</b>	<b>15</b>	<b>100.0</b>	<b>24</b>	<b>100.0</b>

**TABLE 5.15(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	23,486	17,586	24,114	17,930	47,600	35,516
Total Cancers (All sites)	7	2	9	6	16	8
Min. Crude IR	29.8	11.4	37.3	33.5	33.6	22.5
Min. Age Adjusted IR	57.3	26.3	75.5	65.1	66.5	45.9
Min. Truncated IR	144.8	84.8	92.5	210.2	118.3	148.0

Min. = Minimum IR = Incidence Rate / 100,000

## 5.16. WEST SIKKIM DISTRICT, Sikkim State

(Code 1102)

**TABLE 5.16(a) : Profile of West Sikkim District  
(2001 Census)**

Area (in sq. kms.)	1,166.0
Decadal Growth Rate (1991-2001)	25.48%
Literacy Rate	
Males	67.21%
Females	50.75%
Sex Ratio (females per 1000 males)	930
Density (persons per sq. km)	106

**TABLE 5.16(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Sir TN Memorial Hospital, Gangtok (129)	21	91.3	15	88.2	36	90.0
CCWH, Kolkata (105)	2	8.7	2	11.8	4	10.0
<b>Total Cancers</b>	<b>23</b>	<b>100.0</b>	<b>17</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>

**TABLE 5.16(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	63,040	58,770	64,274	59,995	1,27,314	1,18,765
Total Cancers (All sites)	15	8	8	9	23	17
Min. Crude IR	23.8	13.6	12.5	15.0	18.1	14.3
Min. Age Adjusted IR	39.7	18.0	14.5	32.2	27.0	25.2
Min. Truncated IR	70.8	36.3	37.7	61.5	54.1	49.0

Min. = Minimum IR = Incidence Rate / 100,000

## 5.17. KOHIMA DISTRICT, Nagaland State (Code 1307)

**TABLE 5.17(a) : Profile of Kohima District (2001 Census)**

Area (in sq. kms.)	3,114.0
Decadal Growth Rate (1991-2001)	49.96%
Literacy Rate	
Males	81.44%
Females	66.64%
Sex Ratio (females per 1000 males)	944
Density (persons per sq. km)	101

**TABLE 5.17(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Babina Diagnostic Centre, Imphal (112)	94	92.2	0	0.0	94	77.0
Dr. BB Cancer Institute, Guwahati (49)	0	0.0	14	70.0	14	11.5
HBCR - Mumbai (1008)	6	5.9	5	25.0	11	9.0
HBCR - Dibrugarh (1003)	2	2.0	0	0.0	2	1.6
PBCR - Delhi (1011)	0	0.0	1	5.0	1	0.8
<b>Total Cancers</b>	<b>102</b>	<b>100.0</b>	<b>20</b>	<b>100.0</b>	<b>122</b>	<b>100.0</b>

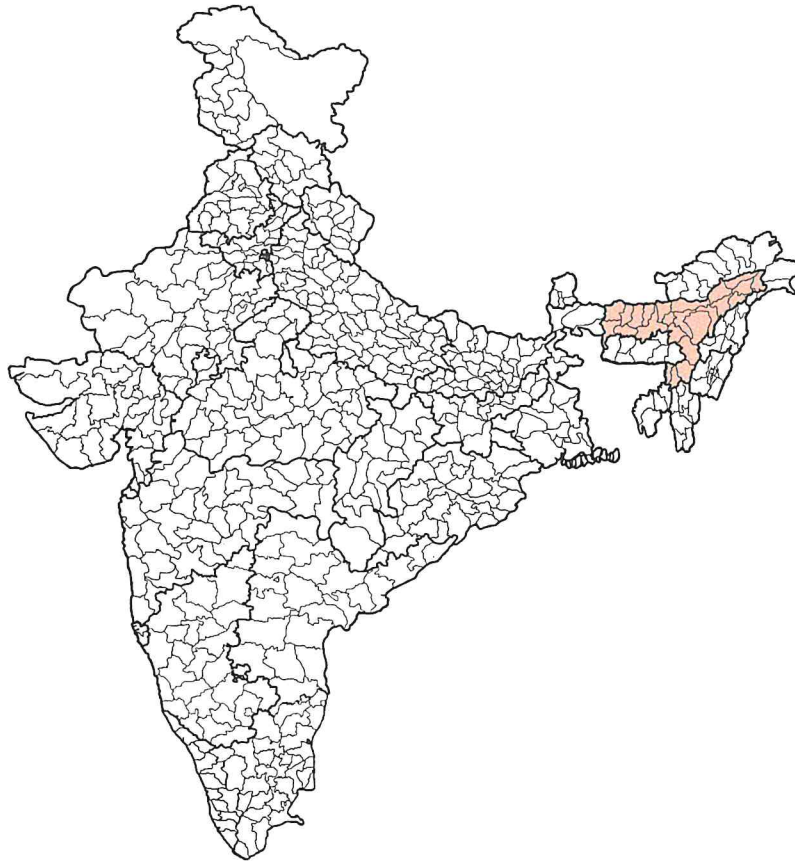
**TABLE 5.17(c) : Salient features of Cancer Incidence (2002)**

Year	Males	Females
Estimated Population	1,61,840	1,52,895
Total Cancers (All sites)	62	40
Min. Crude IR	38.3	26.2
Min. Age Adjusted IR	78.4	48.6
Min. Truncated IR	143.4	119.5

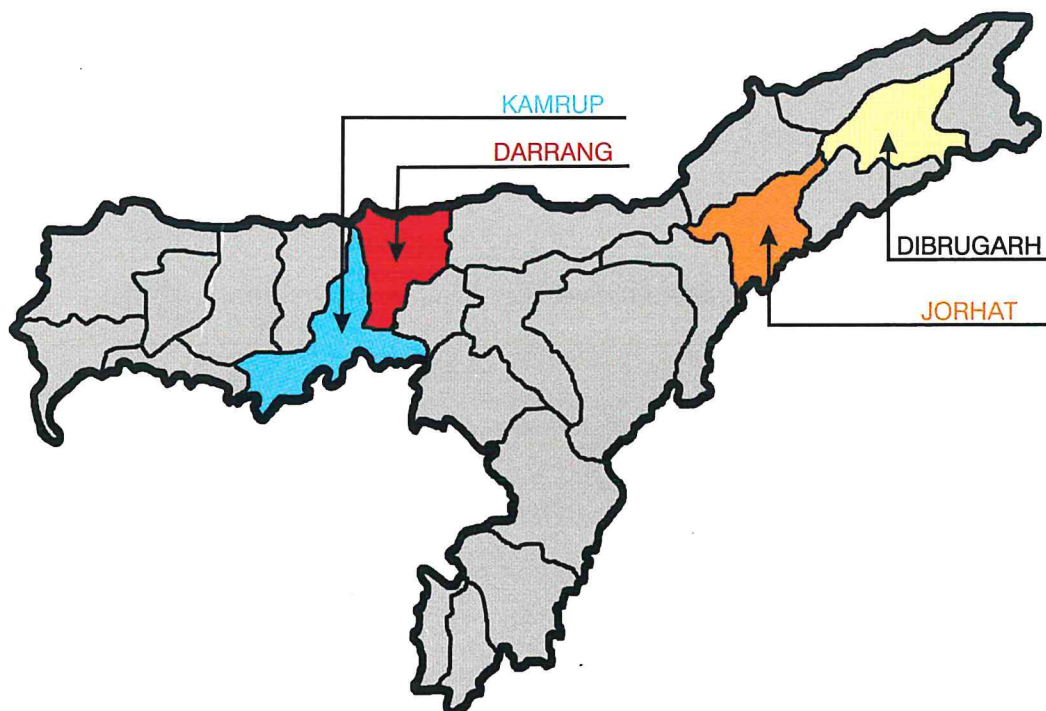
Min. = Minimum IR = Incidence Rate / 100,000

**ASSAM STATE**

Figure 5(G) gives the Map of India highlighting Assam State and Figure 5(H) gives the Map of Assam State highlighting the Districts where the MAAR was above 36.2 /100,000. These were: Kamrup, Dibrugarh, Darrang and Jorhat.



**FIGURE 5(G) : Map of India highlighting Assam State**



**FIGURE 5(H) : Map of Assam State highlighting the districts with MAAR above 36.2 per 100,000**

**Kamrup District:** The first eight leading sites of cancer among males in Kamrup district were sites of cancer associated with use of tobacco. These, in the order of the leading sites were: oesophagus, hypopharynx, mouth, lung, tongue, oropharynx, larynx and tonsil. They accounted for 64.3% of all cancers in males. Among females, cancers of the breast and cervix, were followed by that of oesophagus, mouth and ovary. [Fig. 5.18(c)]. The Dr. Borooah Cancer Institute, Guwahati was the main source accounting for over three fourths of all cancers reported from this district. [Table 5.18(b)].

**Dibrugarh District:** Eight of the ten leading sites of cancer in males were those sites associated with use of tobacco, with cancer of the hypopharynx being the leading site accounting for nearly twenty percent (19.9%) of all cancers in males. Cancer of the stomach and rectum were the other cancers that were among the top ten leading sites of cancer in males in this district. In females cancer of the cervix was followed by cancer of the oesophagus, mouth and breast. [Fig. 5.19(c)].

**Darrang District :** As in Kamrup, Darrang district also showed that the first eight leading sites (oesophagus, hypopharynx, tonsil, tongue, mouth larynx, lung and pharynx unspecified) were those shown to be associated with use of tobacco. In females also cancer of the oesophagus is the leading site (not seen in data elsewhere in India) accounting for 25.3% of all cancers in females. Cancer of the breast and cervix followed this site of cancer as the leading sites. Over 90% of cancers from this district were reported from Dr B. Borooah Cancer Institute at Guwahati. [Fig. 5.20(c)].

**Jorhat District:** As in the above three districts in Assam the TRCs comprised eight of the ten leading sites of cancer in males. Like in Dibrugarh, hypopharynx, oesophagus and mouth in that order, were the first three leading sites in males. Cancer of the rectum and cancer of the stomach were respectively, the fourth and sixth leading sites of cancer. In females, cancer of the breast was the leading site and included 24.2% of all cancers in females. This site of cancer was followed by cancer of oesophagus and cervix.

## MEGHALAYA STATE

East Khasi Hills was the only district in Meghalaya State that had sufficient numbers and rates to describe the patterns of cancer. Cancer of the oesophagus was the leading site of cancer in both males and females comprising 26.4% and 32.1% of all cancers respectively. In males, this site of cancer was followed by cancer of the hypopharynx and stomach. In females, cancer of the cervix and breast were second and third followed by cancer of the stomach.

## WEST BENGAL STATE

### Kolkata District

Kolkata district that constitutes part of the city of Kolkata had lung as the leading site of cancer in males. The next five leading sites were also those associated with the use of tobacco, viz., mouth, tongue, hypopharynx, larynx and oesophagus. In females, cancer of the breast and cervix were the first two leading sites of cancer followed by that of gall bladder.[Fig. 5.23(c)]. Chittaranjan National Cancer Institute and Cancer Centre and Welfare Home, Kolkata accounted for 80-85% of cancers from Kolkata district. [Table 5.23(b)]

## OTHER EASTERN STATES

There were several participating centres in the State of Orissa, and some centres in Bihar as well, but the incidence rates derived were not sufficient to provide a description on reliable patterns of cancer in any of the districts under these states. There were no participating centres from the newer States of Jharkhand and Chattisgarh.

## 5.18. KAMRUP DISTRICT, Assam State

(Code 1806)

**TABLE 5.18(a) : Profile of Kamrup District (2001 Census)**

Area (in sq. kms.)	4,345.0
Decadal Growth Rate (1991-2001)	25.75%
Literacy Rate	
Males	81.24%
Females	67.31%
Sex Ratio (females per 1000 males)	894
Density (persons per sq. km)	579

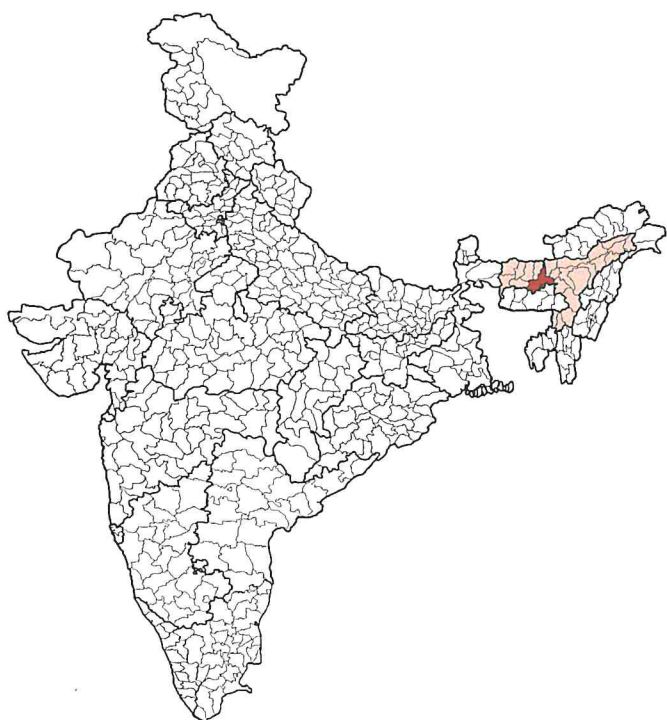


FIGURE 5.18(a) : Map of India highlighting Assam State

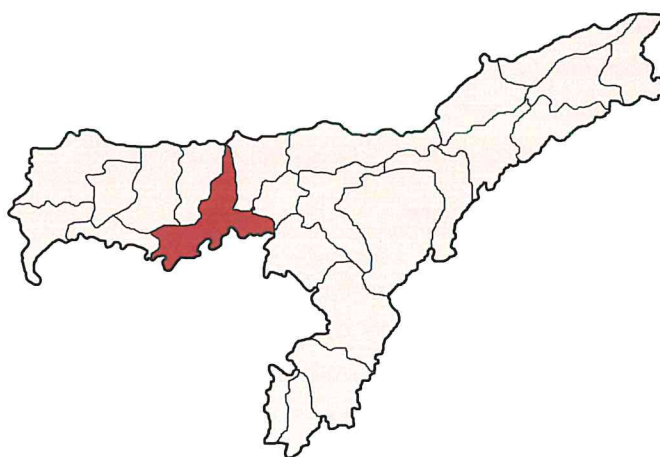


FIGURE 5.18(b) : Map of Assam State highlighting Kamrup District

**TABLE 5.18(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Dr. B B Cancer Institute, Guwahati (49)	468	73.5	591	77.2	1059	75.5
HBCR - Mumbai (1008)	114	17.9	106	13.8	220	15.7
HBCR - Chennai (1009)	34	5.3	43	5.6	77	5.5
PBCR - Mumbai (1002)	15	2.4	6	0.8	21	1.5
All Other Centres	6	0.9	20	2.6	26	1.9
<b>Total Cancers</b>	<b>637</b>	<b>100.0</b>	<b>766</b>	<b>100.0</b>	<b>1403</b>	<b>100.0</b>

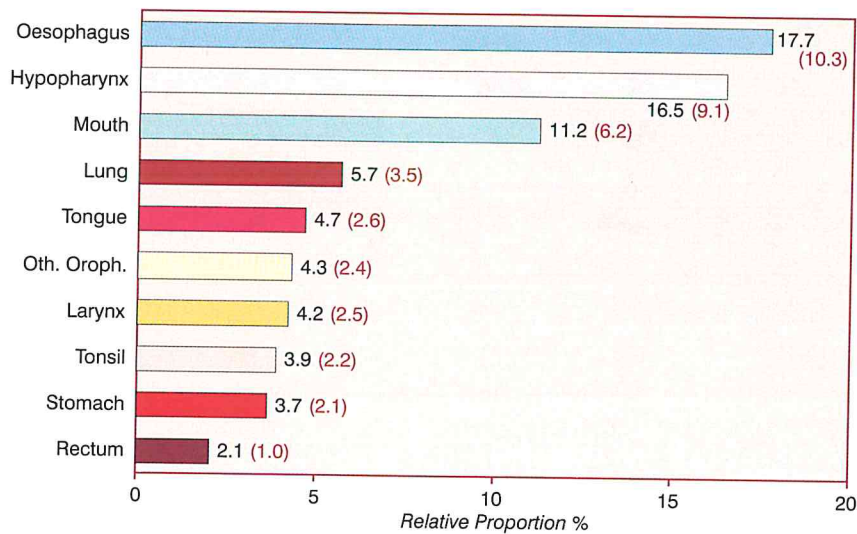
**TABLE 5.18(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	13,29,536	11,90,153	13,55,706	12,15,227	26,85,242	24,05,380
Total Cancers (All sites)	404	233	471	295	875	528
Min. Crude IR	30.4	19.6	34.7	24.3	32.6	22.0
Min. Age Adjusted IR	50.4	33.3	60.3	43.3	55.4	38.3
Min. Truncated IR	105.5	76.9	119.3	95.0	112.3	86.3

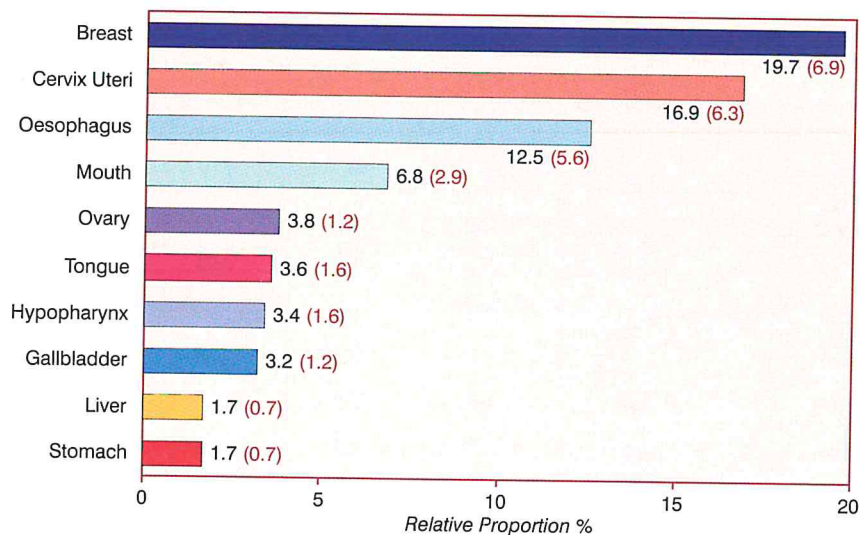
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.18(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



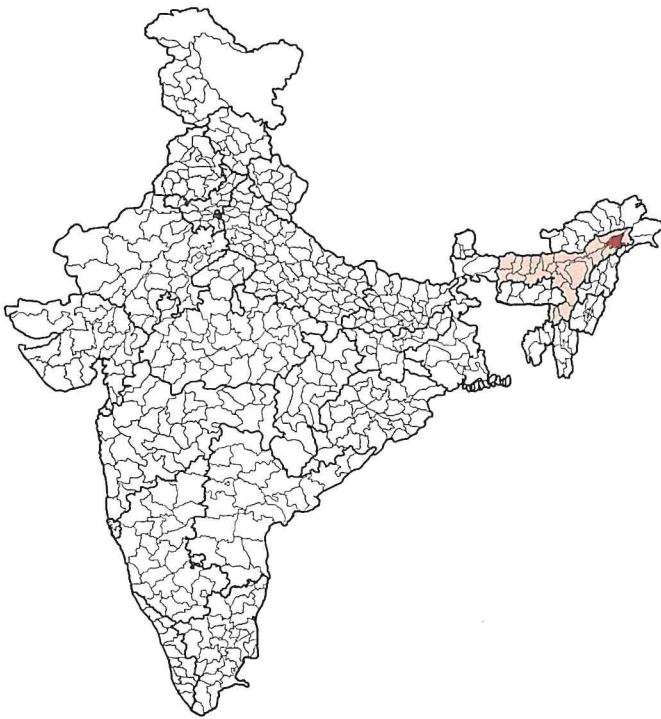
### Females



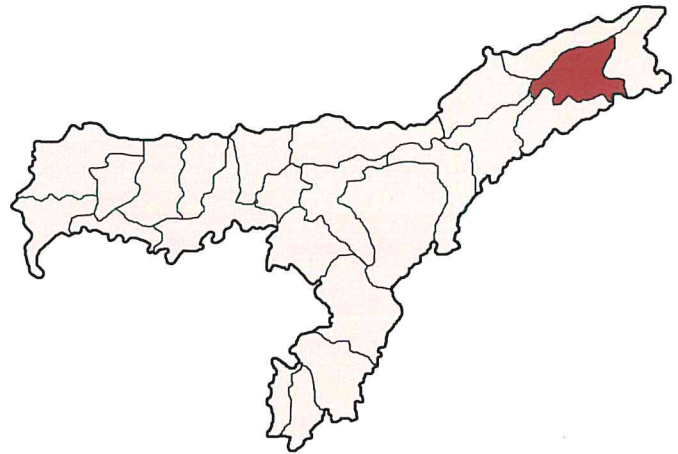
## 5.19. DIBRUGARH DISTRICT, Assam State (Code 1815)

**TABLE 5.19(a) : Profile of Dibrugarh District (2001 Census)**

Area (in sq. kms.)	3,381.0
Decadal Growth Rate (1991-2001)	12.43%
Literacy Rate	
Males	79.58%
Females	62.10%
Sex Ratio (females per 1000 males)	923
Density (persons per sq. km)	347



**FIGURE 5.19(a) : Map of India highlighting Assam State**



**FIGURE 5.19(b) : Map of Assam State highlighting Dibrugarh District**

**TABLE 5.19(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
HBCR - Dibrugarh (1003)	222	79.9	0	0.0	222	61.8
HBCR - Mumbai (1008)	31	11.2	49	60.5	80	22.3
Dr. BB Cancer Institute, Guwahati (49)	13	4.7	13	16.0	26	7.2
PBCR - Mumbai (1002)	7	2.5	5	6.2	12	3.3
CCWH, Kolkata (105)	2	0.7	7	8.6	9	2.5
PBCR - Chennai (1004)	0	0.0	4	4.9	4	1.1
All Other Centres	3	1.1	3	3.7	6	1.7
<b>Total Cancers</b>	<b>278</b>	<b>100.0</b>	<b>81</b>	<b>100.0</b>	<b>359</b>	<b>100.0</b>

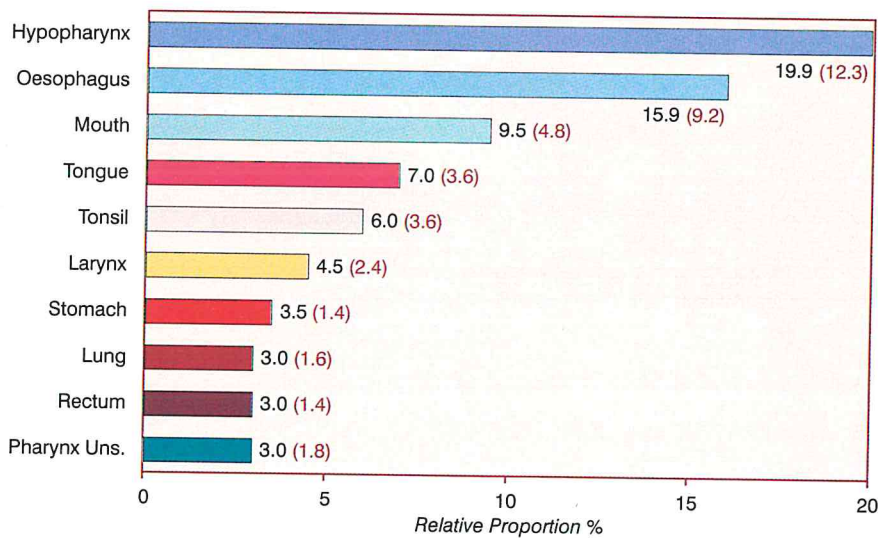
**TABLE 5.19(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	6,08,061	5,61,870	6,14,247	5,68,576	12,22,308	11,30,446
Total Cancers (All sites)	201	77	57	24	258	101
Min. Crude IR	33.1	13.7	9.3	4.2	21.1	8.9
Min. Age Adjusted IR	53.9	24.3	15.0	7.6	34.4	15.9
Min. Truncated IR	107.1	49.4	31.0	13.6	68.8	31.3

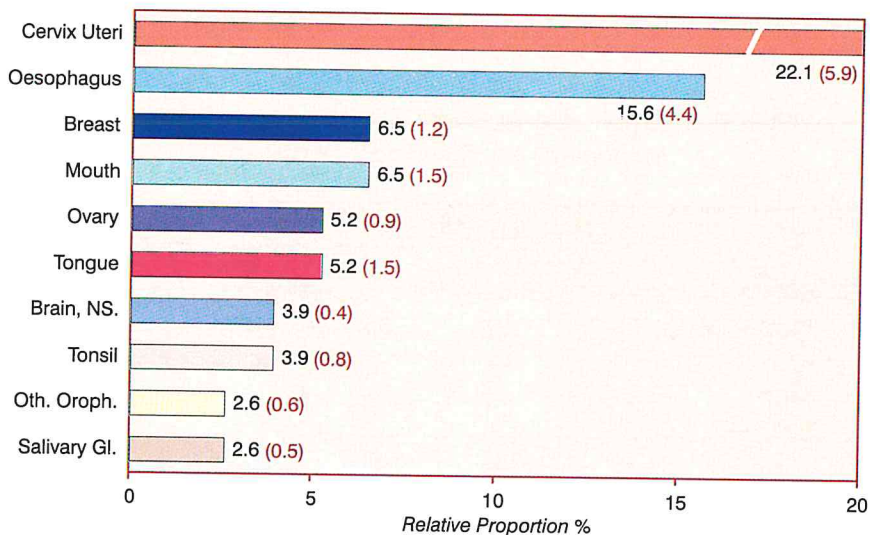
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.19(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**

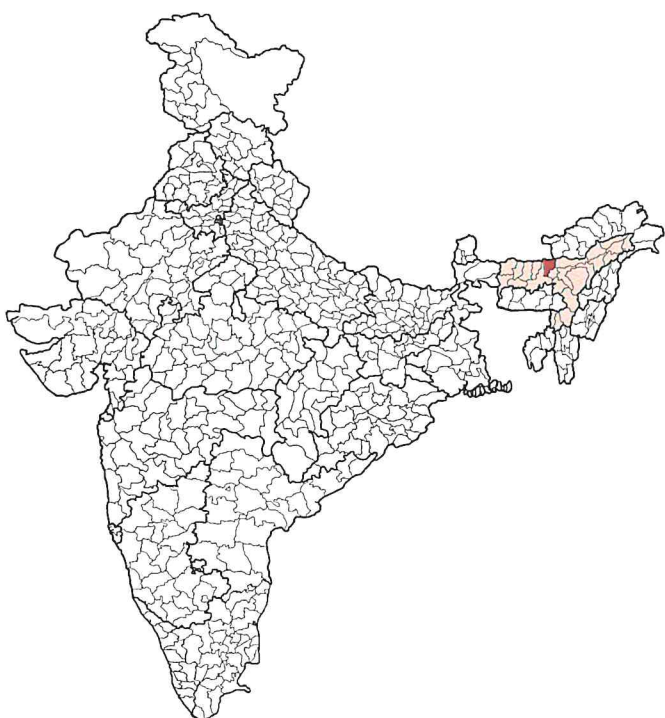


## 5.20. DARRANG DISTRICT, Assam State

(Code 1808)

**TABLE 5.20(a) : Profile of Darrang District (2001 Census)**

Area (in sq. kms.)	3,481.0
Decadal Growth Rate (1991-2001)	15.79%
Literacy Rate	
Males	64.32%
Females	46.95%
Sex Ratio (females per 1000 males)	943
Density (persons per sq. km)	432



**FIGURE 5.20(a) : Map of India highlighting Assam State**



**FIGURE 5.20(b) : Map of Assam State highlighting Darrang District**

**TABLE 5.20(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
Dr. BB Cancer Institute, Guwahati (49)	197	95.2	253	94.8	450	94.9
HBCR - Mumbai (1008)	9	4.3	8	3.0	17	3.6
All Other Centres	1	0.5	3	1.1	4	0.8
<b>Total Cancers</b>	<b>207</b>	<b>100.0</b>	<b>267</b>	<b>100.0</b>	<b>474</b>	<b>100.0</b>

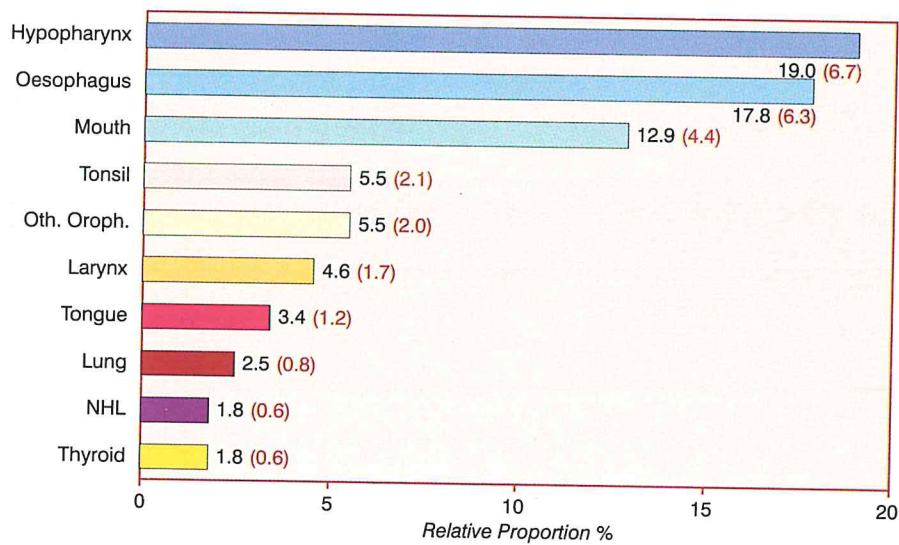
**TABLE 5.20(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	7,75,842	7,31,955	7,86,195	7,42,069	15,62,037	14,74,024
Total Cancers (All sites)	142	65	184	83	326	148
Min. Crude IR	18.3	8.9	23.4	11.2	20.9	10.0
Min. Age Adjusted IR	30.2	16.9	37.9	21.4	34.1	19.2
Min. Truncated IR	61.5	40.2	79.4	52.3	70.5	46.3

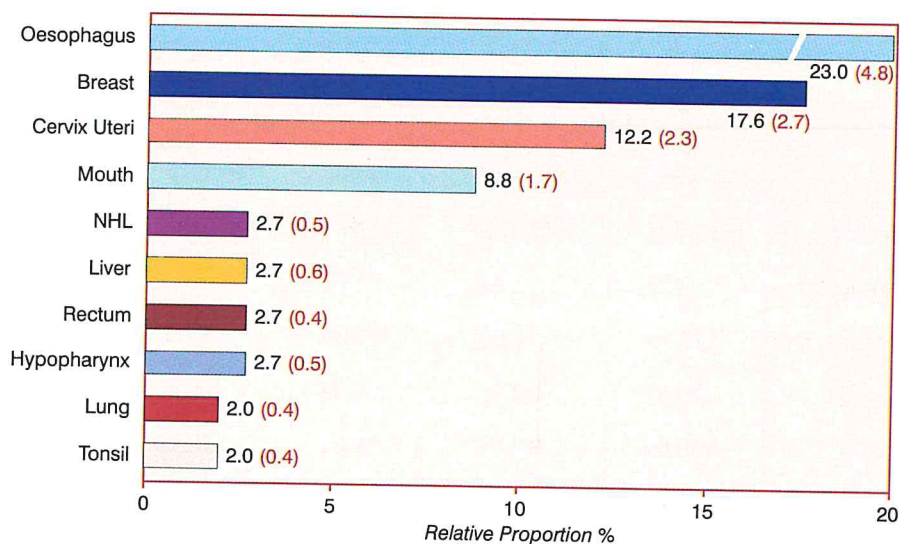
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.20(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.21. JORHAT DISTRICT, Assam State

(Code 1817)

**TABLE 5.21(a) : Profile of Jorhat District (2001 Census)**

Area (in sq. kms.)	2,851.0
Decadal Growth Rate (1991-2001)	15.84%
Literacy Rate	
Males	82.76%
Females	72.54%
Sex Ratio (females per 1000 males)	903
Density (persons per sq. km)	354

**TABLE 5.21(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Dr. BB Cancer Institute, Guwahati (49)	53	28.8	64	67.4	117	41.9
HBCR - Dibrugarh (1003)	97	52.7	0	0.0	97	34.8
HBCR - Mumbai (1008)	26	14.1	21	22.1	47	16.8
HBCR - Chennai (1009)	3	1.6	3	3.2	6	2.2
PBCR - Mumbai (1002)	3	1.6	2	2.1	5	1.8
CCWH, Kolkata (105)	1	0.5	2	2.1	3	1.1
All Other Centres	1	0.5	3	3.2	4	1.4
<b>Total Cancers</b>	<b>184</b>	<b>100.0</b>	<b>95</b>	<b>100.0</b>	<b>279</b>	<b>100.0</b>

**TABLE 5.21(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	5,30,431	4,79,159	5,37,871	4,85,462	10,68,302	9,64,621
Total Cancers (All sites)	127	57	61	34	188	91
Min. Crude IR	23.94	11.90	11.34	7.00	17.60	9.43
Min. Age Adjusted IR	36.47	20.31	18.26	12.55	27.30	16.40
Min. Truncated IR	76.93	47.93	31.81	20.75	54.28	34.17

Min. = Minimum IR = Incidence Rate / 100,000

## 5.22. EAST KHASI HILLS DISTRICT, Meghalaya State

(Code 1706)

**TABLE 5.22(a) : Profile of East Khasi Hills District  
(2001 Census)**

Area (in sq. kms.)	2,820.0
Decadal Growth Rate (1991-2001)	22.88%
Literacy Rate	
Males	78.12%
Females	75.82%
Sex Ratio (females per 1000 males)	984
Density (persons per sq. km)	234

**TABLE 5.22(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Dr. BB Cancer Institute, Guwahati (49)	21	17.1	77	73.3	98	43.0
Babina Diagnostic Centre, Imphal (112)	74	60.2	0	0.0	74	32.5
HBCR - Mumbai (1008)	16	13.0	17	16.2	33	14.5
CCWH, Kolkata (105)	8	6.5	4	3.8	12	5.3
PBCR - Chennai (1004)	0	0.0	3	2.9	3	1.3
All Other Centres	4	3.3	4	3.8	8	3.5
<b>Total Cancers</b>	<b>123</b>	<b>100.0</b>	<b>105</b>	<b>100.0</b>	<b>228</b>	<b>100.0</b>

**TABLE 5.22(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	3,32,321	3,27,161	3,39,262	3,34,698	6,71,583	6,61,859
Total Cancers (All sites)	71	52	73	32	144	84
Min. Crude IR	21.4	15.9	21.5	9.6	21.4	12.7
Min. Age Adjusted IR	35.5	26.0	36.2	17.4	35.8	21.7
Min. Truncated IR	71.7	53.4	73.5	39.7	72.6	46.4

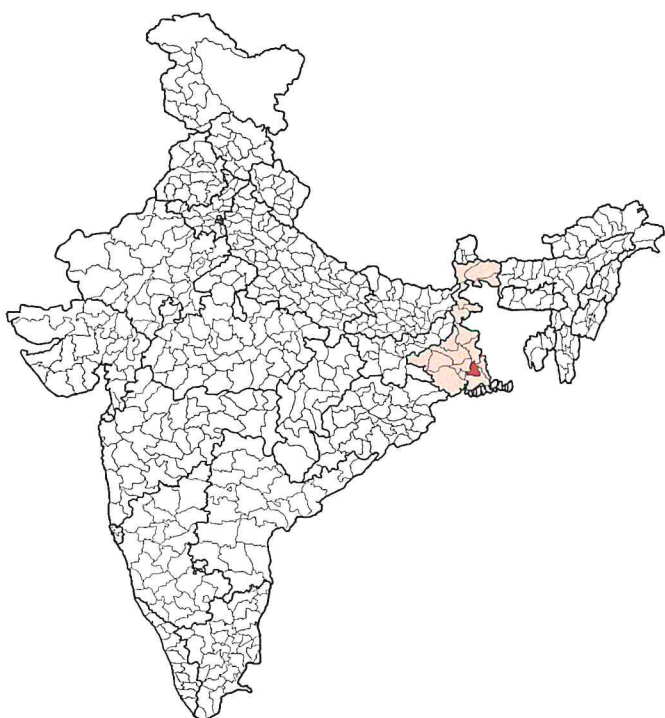
Min. = Minimum IR = Incidence Rate / 100,000

## 5.23. KOLKATA DISTRICT, West Bengal State

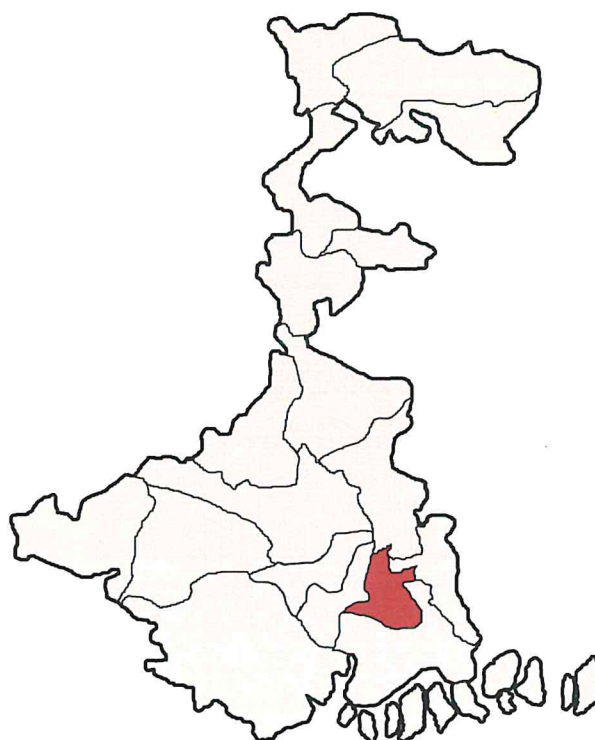
(Code 1917)

**TABLE 5.23(a) : Profile of Kolkata District (2001 Census)**

Area (in sq. kms.)	185
Decadal Growth Rate (1991-2001)	4.11%
Literacy Rate	
Males	84.07%
Females	77.95%
Sex Ratio (females per 1000 males)	828
Density (persons per sq. km)	24,760



**FIGURE 5.23(a) : Map of India highlighting West Bengal State**



**FIGURE 5.23(b) : Map of West Bengal State highlighting Kolkata District**

**TABLE 5.23(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
CNCI, Kolkata (65)	744	39.5	986	50.5	1730	45.1
Cancer Centre Welfare Home, Kolkata (105)	796	42.2	650	33.3	1446	37.7
HBCR - Mumbai (1008)	207	11.0	232	11.9	439	11.4
PBCR - Mumbai (1002)	118	6.3	61	3.1	179	4.7
All Other Centres	20	1.1	24	1.2	44	1.1
<b>Total Cancers</b>	<b>1885</b>	<b>100.0</b>	<b>1953</b>	<b>100.0</b>	<b>3838</b>	<b>100.0</b>

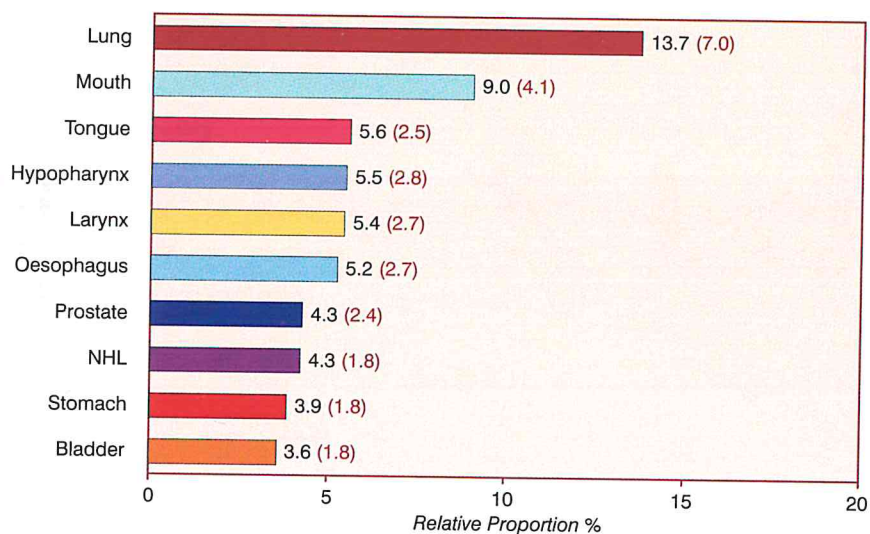
**TABLE 5.23(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	25,00,721	20,72,278	25,06,774	20,84,242	50,07,495	41,56,520
Total Cancers (All sites)	941	944	990	963	1931	1907
Min. Crude IR	37.6	45.6	39.5	46.2	38.6	45.9
Min. Age Adjusted IR	45.6	54.9	49.2	56.2	47.4	55.6
Min. Truncated IR	78.1	121.4	78.5	122.9	78.2	122.4

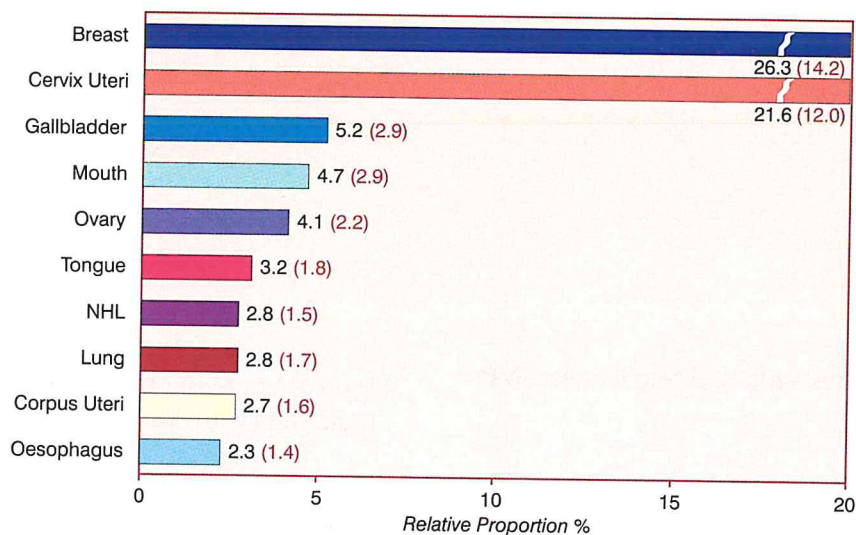
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.23(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## STATES AND U.T. IN THE SOUTHERN REGION

In all there were 35 districts in the southern states and Union Territory (U.T.) comprising, Kerala, Pondicherry, Tamil Nadu, Karnataka and Andhra Pradesh that had MAAR above the level of 36.2/100,000.

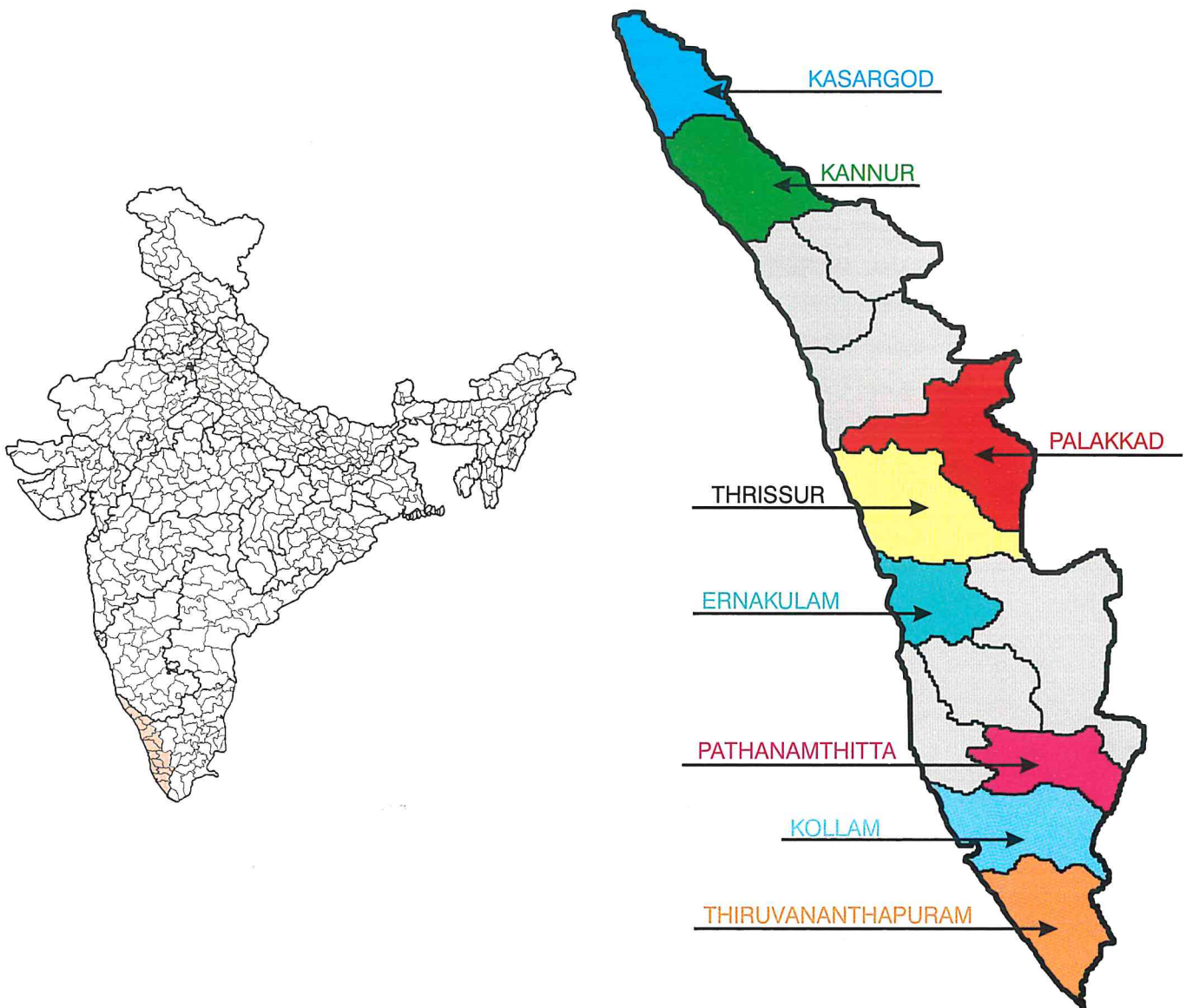


Figure 5(I) : Map of India highlighting Kerala State

Figure 5(J) : Map of Kerala State highlighting the districts with MAAR above 36.2 per 100,000

## KERALA STATE

Figure 5(I) gives the Map of India highlighting Kerala State and Figure 5(J) gives the Map of Kerala State highlighting the Districts where the MAAR was above 36.2 /100,000.

Eight of the fourteen districts of this state provided data for which detailed description of leading sites is given. These eight districts highlighted in the map and in the descending order of MAAR were: Kollam, Thrissur, Thiruvananthapuram, Palakkad, Kasaragod, Pathanamthitta, Kannur and Ernakulam.

*Leading Sites of Cancer in Males:* Among males cancer of the lung was the leading site in all the districts except Thiruvananthapuram where it very closely followed mouth and was the second leading site of cancer. Cancer of the lung constituted 12-14% of all cancers in males in these districts. Other sites of cancer (mouth, oesophagus, tongue, larynx) associated with use of tobacco dominated the leading sites in all the districts. However, cancer of the stomach was the second leading site of cancer in the northern districts of Thrissur, Palakkad and Kannur. In Kasaragod and Ernakulam, cancer of the stomach was the fourth and seventh leading site respectively. Non-Hodgkin's Lymphoma was also an important leading site of cancer in these two districts being second in Ernakulam and third in Kasaragod.

*Leading Sites of Cancer in Females:* Among females cancer of the breast was the leading site in all the districts with the proportion relative to all sites of cancer varying from 22.2% in Kasaragod to 35.4% in Ernakulam. Next only to cancer of the breast, cancer of the thyroid was the second most frequent cancer in women in Kannur and Ernakulam, third leading site in Thiruvananthapuram, and fourth leading site in Thrissur, Pathanamthitta and Kasaragod.

*Centre-wise Distribution of Cancers:* The Regional Cancer Centre at Thiruvananthapuram is a major referral centre for most of these districts. A vast proportion of cancers from the districts of Thrissur and Palakkad have been reported from Amala Cancer Hospital at Thrissur, Government Medical College and Sudharma Laboratory there.

**In males, in Thiruvananthapuram district some of the highest incidence rate in the world of cancer of the mouth was seen. There also seems to be a belt of Thyroid cancer in females in the coastal districts of Kerala, extending along the west coast on to Karnataka and Goa.**

## 5.24. KOLLAM DISTRICT, Kerala State

(Code 3213)

**TABLE 5.24(a) : Profile of Kollam District (2001 Census)**

Area (in sq. kms.)	2,491.0
Decadal Growth Rate (1991-2001)	7.33%
Literacy Rate	
Males	94.63%
Females	88.60%
Sex Ratio (females per 1000 males)	1070
Density (persons per sq. km)	1037



FIGURE 5.24(a) : Map of India highlighting Kerala State

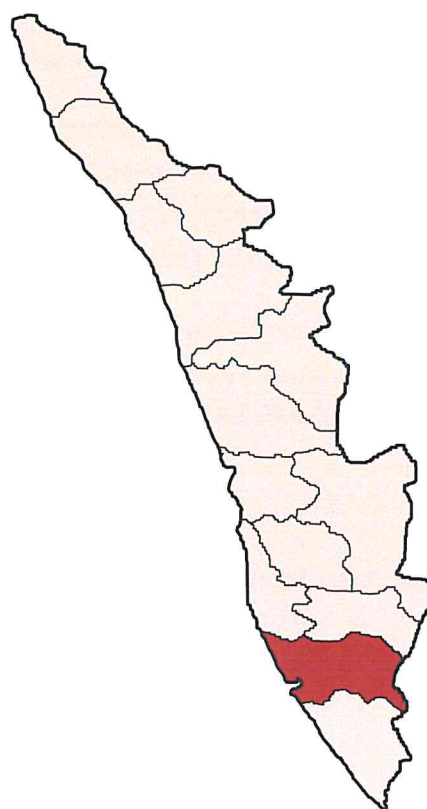


FIGURE 5.24(b) : Map of Kerala State highlighting Kollam District

**TABLE 5.24(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
HBCR -Thiruvananthapuram (1006)	1494	76.7	1823	84.2	3317	80.6
NBRR, Karunagappally (201)	443	22.8	333	15.4	776	18.9
All Other Centres	10	0.5	10	0.5	20	0.5
<b>Total Cancers</b>	<b>1947</b>	<b>100.0</b>	<b>2166</b>	<b>100.0</b>	<b>4113</b>	<b>100.0</b>

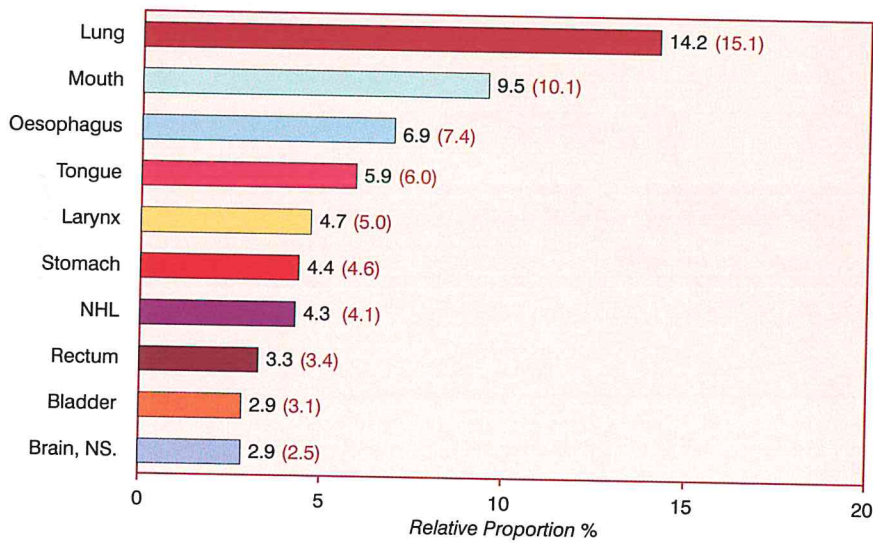
**TABLE 5.24(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	12,46,990	13,34,732	12,53,543	13,45,764	25,00,533	26,80,496
Total Cancers (All sites)	1,012	935	1,096	1,070	2,108	2,005
Min. Crude IR	81.2	70.1	87.4	79.5	84.3	74.8
Min. Age Adjusted IR	98.4	79.8	106.5	90.7	102.4	85.3
Min. Truncated IR	184.3	169.9	186.1	191.6	185.1	181.0

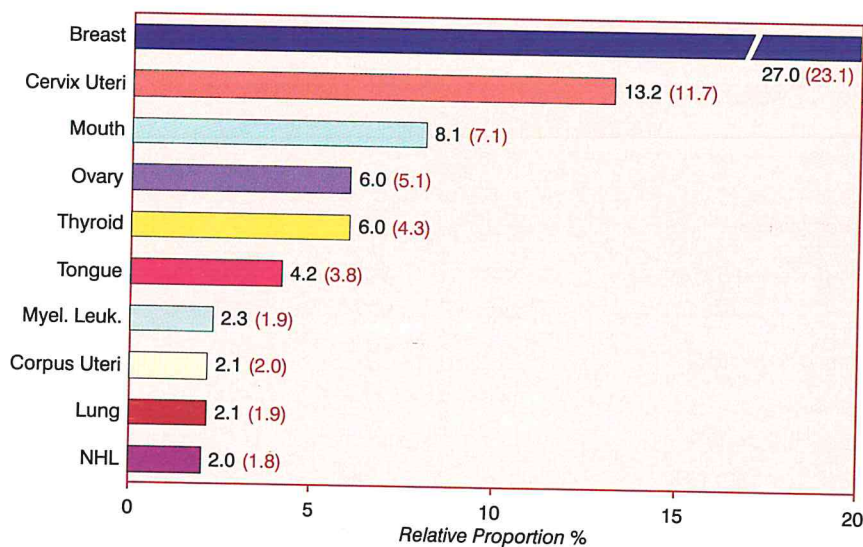
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.24(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.25. THRISSUR DISTRICT, Kerala State

(Code 3207)

**TABLE 5.25(a) : Profile of Thrissur District (2001 Census)**

Area (in sq. kms.)	3,032.0
Decadal Growth Rate (1991-2001)	8.70%
Literacy Rate	
Males	95.47%
Females	89.94%
Sex Ratio (females per 1000 males)	1092
Density (persons per sq. km)	981



FIGURE 5.25(a) : Map of India highlighting Kerala State

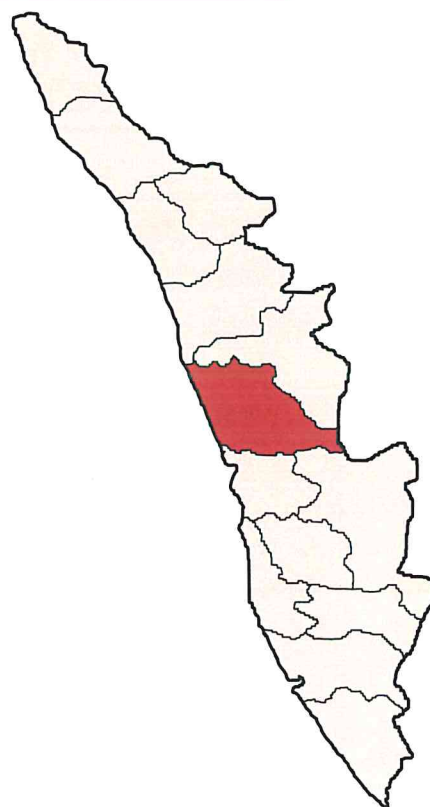


FIGURE 5.25(b) : Map of Kerala State highlighting Thrissur District

**TABLE 5.25(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
Amala Cancer Hospital, Thrissur (96)	768	36.8	710	30.8	1478	33.6
Government Medical College, Trichur (53)	762	36.5	696	30.2	1458	33.2
HBCR - Thiruvananthapuram (1006)	349	16.7	442	19.2	791	18.0
Sudharama Laboratory (92)	174	8.3	242	10.5	416	9.5
Elite Mission Hospital, Thrissur (98)	0	0.0	116	5.0	116	2.6
The Polyclinic Pvt. Ltd., Thrissur (99)	0	0.0	63	2.7	63	1.4
All Other Centres	35	1.7	39	1.7	74	1.7
<b>Total Cancers</b>	<b>2088</b>	<b>100.0</b>	<b>2308</b>	<b>100.0</b>	<b>4396</b>	<b>100.0</b>

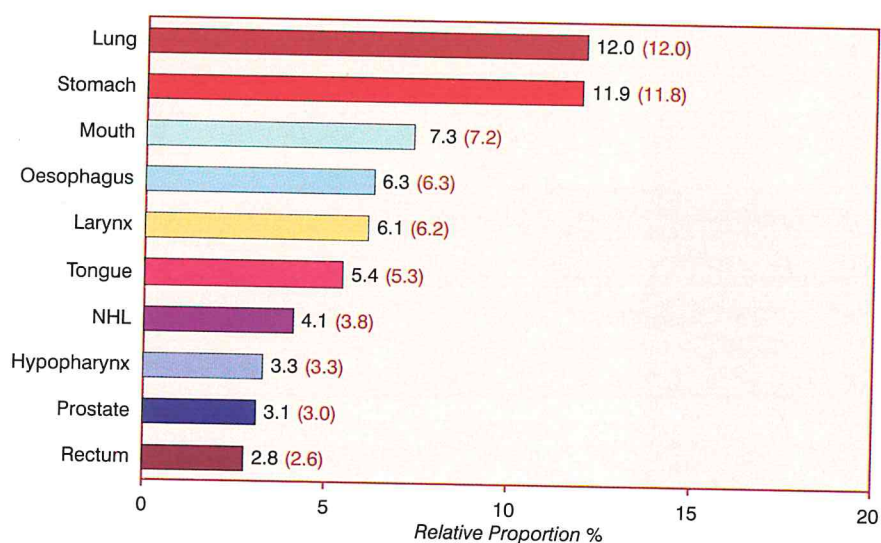
**TABLE 5.25(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	14,21,869	15,51,737	14,32,768	15,64,557	28,54,637	31,16,294
Total Cancers (All sites)	1,110	978	1,246	1,062	2,356	2,040
Min. Crude IR	78.1	63.0	87.0	67.9	82.5	65.5
Min. Age Adjusted IR	91.9	67.7	101.9	71.8	97.0	69.8
Min. Truncated IR	168.4	148.7	182.1	156.5	175.4	152.8

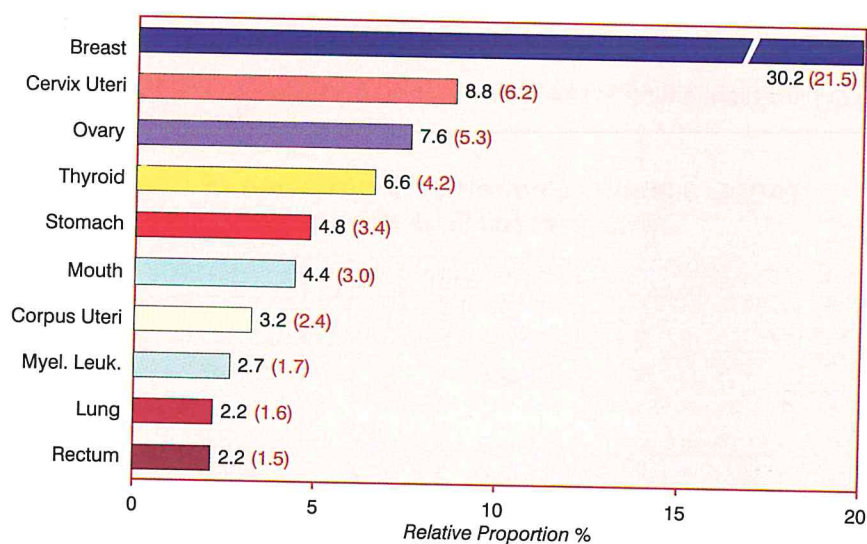
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.25(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.26. THIRUVANANTHAPURAM DISTRICT, Kerala State (Code 3214)

<b>TABLE 5.26(a) : Profile of Thiruvananthapuram District (2001 Census)</b>	
Area (in sq. kms.)	2,192.0
Decadal Growth Rate (1991-2001)	9.78%
Literacy Rate	
Males	92.68%
Females	86.26%
Sex Ratio (females per 1000 males)	1058
Density (persons per sq. km)	1476

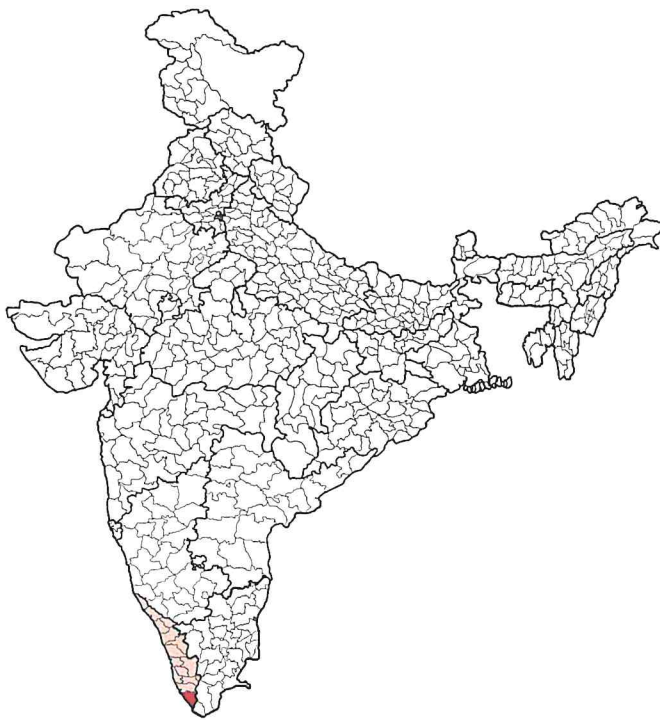


FIGURE 5.26(a) : Map of India highlighting Kerala State

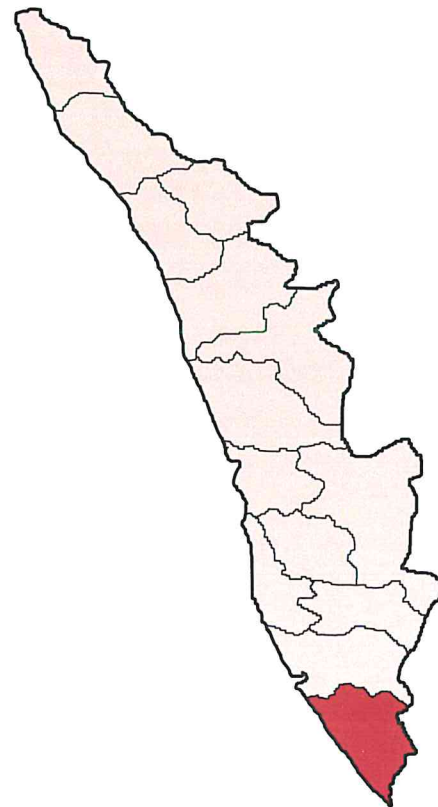


FIGURE 5.26(b) : Map of Kerala State highlighting Thiruvananthapuram District

**TABLE 5.26(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year <b>Centre</b> (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
HBCR - Thiruvananthapuram (1006)	1805	99.5	2333	99.5	4138	99.5
All Other Centres	7	0.5	12	0.5	19	0.5
<b>Total Cancers</b>	<b>1812</b>	<b>100.0</b>	<b>2345</b>	<b>100.0</b>	<b>4157</b>	<b>100.0</b>

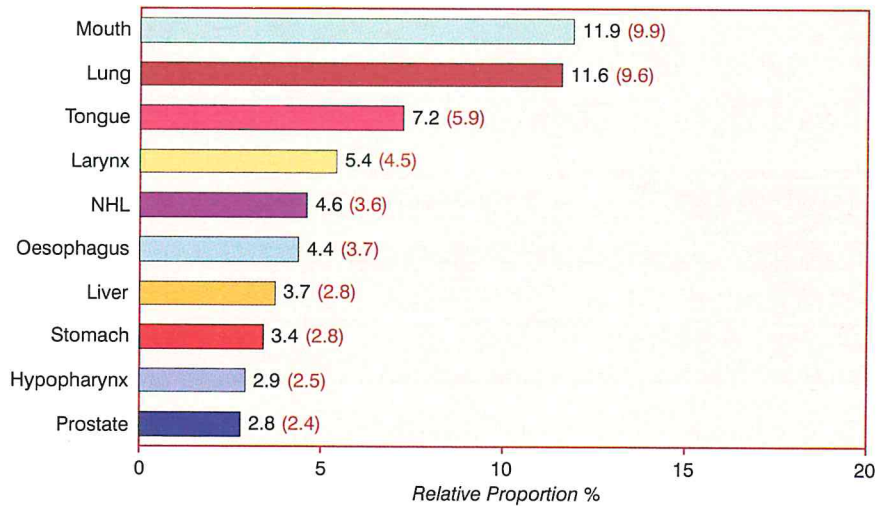
**TABLE 5.26(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	15,72,374	16,65,349	15,84,724	16,81,732	31,57,098	33,47,081
Total Cancers (All sites)	862	950	1,142	1,203	2,004	2,153
Min. Crude IR	54.8	57.1	72.1	71.5	63.5	64.3
Min. Age Adjusted IR	69.3	65.4	90.8	83.1	80.1	74.3
Min. Truncated IR	127.5	136.8	164.8	176.4	146.6	156.6

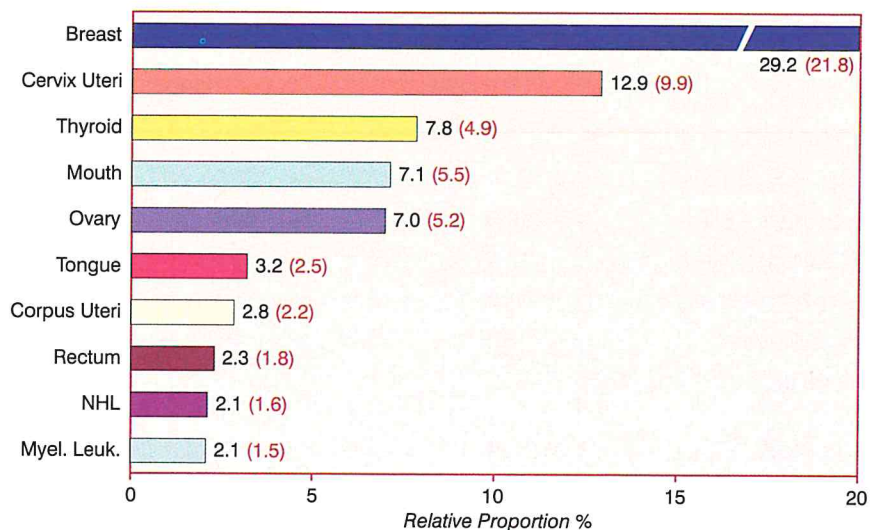
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.26(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.27. PALAKKAD DISTRICT, Kerala State

(Code 3206)

**TABLE 5.27(a) : Profile of Palakkad District (2001 Census)**

Area (in sq. kms.)	4,480.0
Decadal Growth Rate (1991-2001)	9.86%
Literacy Rate	
Males	89.73%
Females	79.31%
Sex Ratio (females per 1000 males)	1068
Density (persons per sq. km)	584

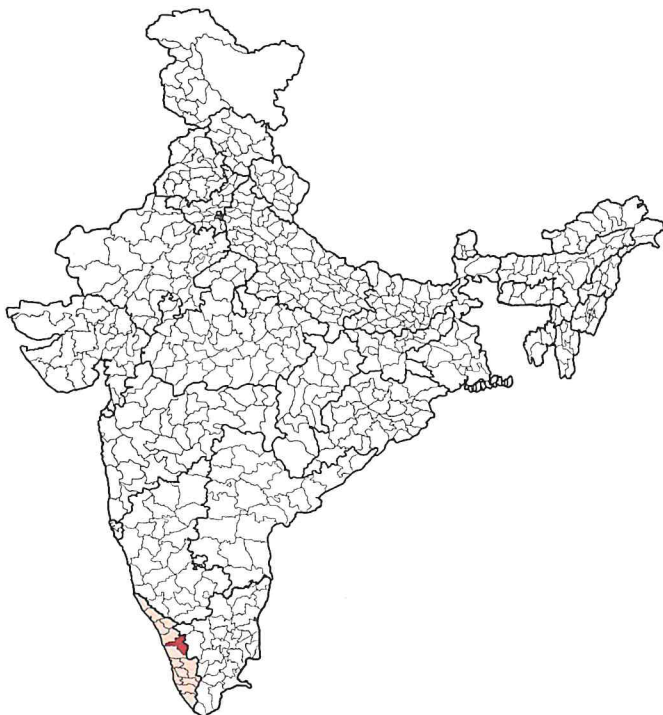


FIGURE 5.27(a) : Map of India highlighting Kerala State

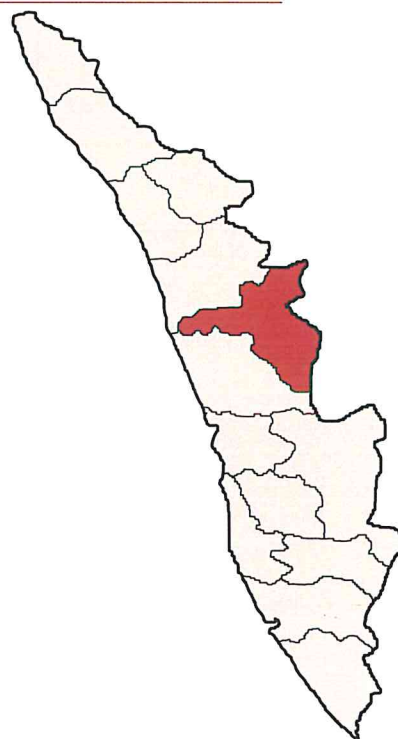


FIGURE 5.27(b) : Map of Kerala State highlighting Palakkad District

**TABLE 5.27(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Amala Cancer Hospital, Thrissur (96)	274	27.3	335	28.6	609	28.0
HBCR - Thiruvananthapuram (1006)	259	25.8	326	27.8	585	26.9
Government Medical College, Thrissur (53)	293	29.2	287	24.5	580	26.9
Sudharama Laboratory, Thrissur (92)	66	6.6	67	5.7	133	6.1
GKNM Hospital, Coimbatore (54)	63	6.3	52	4.4	115	5.3
Sai Subramanian Pathology Lab, CBE (91)	11	1.1	19	1.6	30	1.4
HBCR - Chennai (1009)	11	1.1	18	1.5	29	1.3
PSG Institute, Coimbatore (1)	11	1.1	16	1.4	27	1.2
All Other Centres	17	1.7	53	4.5	70	3.2
<b>Total Cancers</b>	<b>1005</b>	<b>100.0</b>	<b>1173</b>	<b>100.0</b>	<b>2178</b>	<b>100.0</b>

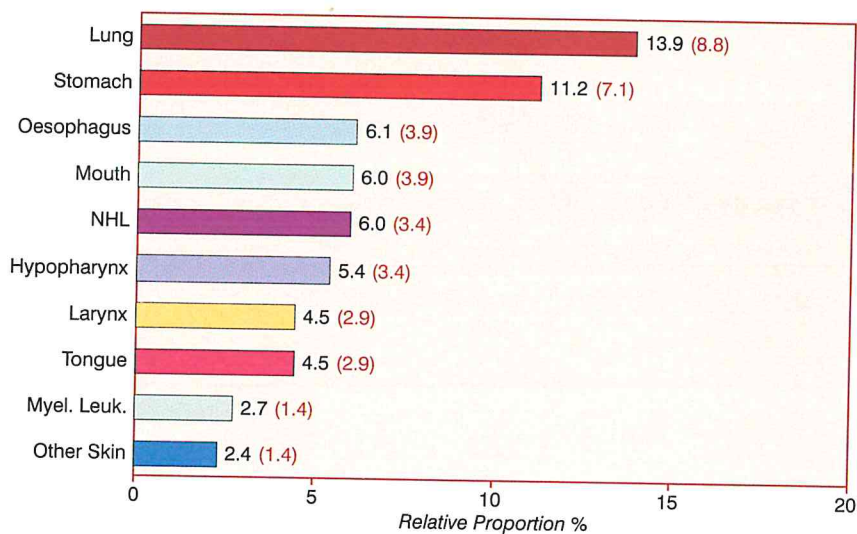
**TABLE 5.27(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	12,68,284	13,54,295	12,79,467	13,67,153	25,47,751	27,21,448
Total Cancers (All sites)	576	429	699	474	1275	903
Min. Crude IR	45.4	31.7	54.6	34.7	50.0	33.2
Min. Age Adjusted IR	56.1	37.1	66.8	40.7	61.5	38.9
Min. Truncated IR	110.6	82.3	121.9	93.5	116.0	87.9

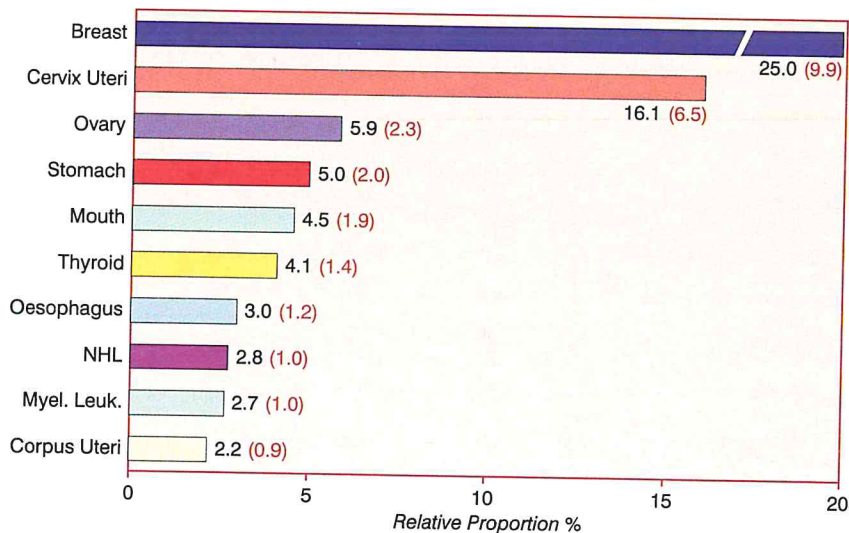
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.27(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.28. KASARAGOD DISTRICT, Kerala State

(Code 3201)

**TABLE 5.28(a) : Profile of Kasaragod District (2001 Census)**

Area (in sq. kms.)	1,992.0
Decadal Growth Rate (1991-2001)	12.30%
Literacy Rate	
Males	90.84%
Females	79.80%
Sex Ratio (females per 1000 males)	1047
Density (persons per sq. km)	604



**FIGURE 5.28(a) : Map of India highlighting Kerala State**



**FIGURE 5.28(b) : Map of Kerala State highlighting Kasaragod District**

**TABLE 5.28(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Kasturba Medical College, Mangalore (3)	228	68.9	309	72.0	537	70.7
Kasturba Medical College, Manipal (77)	54	16.3	49	11.4	103	13.6
HBCR - Thiruvananthapuram (1006)	30	9.1	61	14.2	91	12.0
HBCR - Bangalore (1007)	8	2.4	0	0.0	8	1.1
Amala Cancer Hospital, Thrissur (96)	6	1.8	2	0.5	8	1.1
All Other Centres	5	1.5	8	1.9	13	1.7
<b>Total Cancers</b>	<b>331</b>	<b>100.0</b>	<b>429</b>	<b>100.0</b>	<b>760</b>	<b>100.0</b>

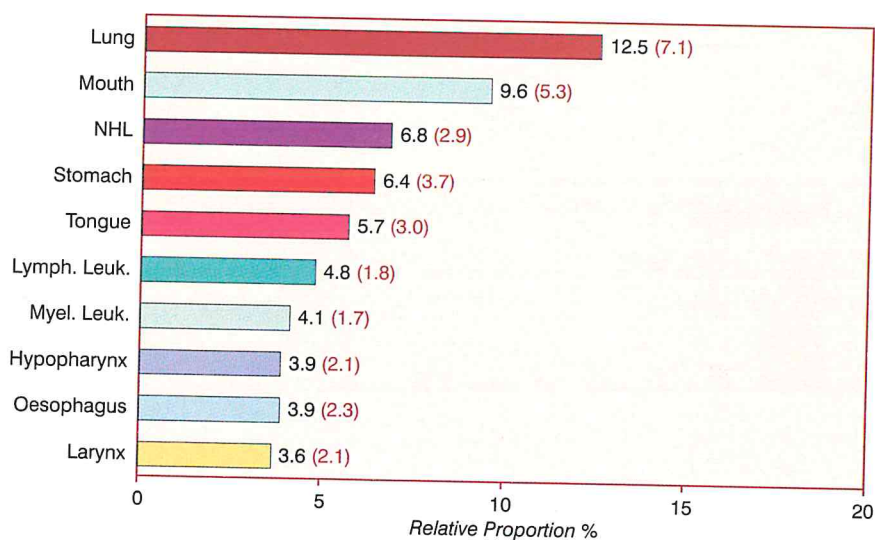
**TABLE 5.28(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	5,88,466	6,16,699	5,94,345	6,23,963	11,82,811	12,40,662
Total Cancers (All sites)	198	133	242	187	440	320
Min. Crude IR	33.7	21.6	40.7	30.0	37.2	25.8
Min. Age Adjusted IR	46.3	29.1	57.2	40.9	51.8	35.0
Min. Truncated IR	87.1	61.1	98.1	96.7	92.8	78.9

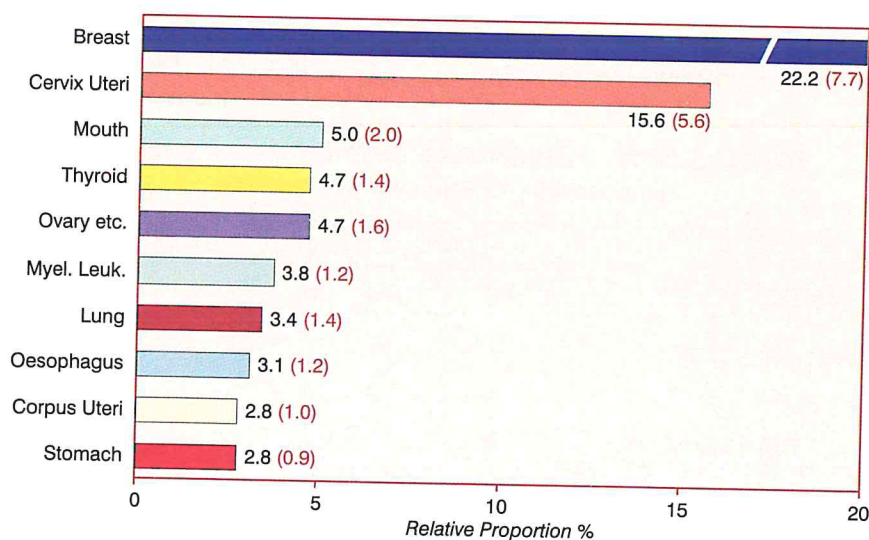
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.28(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.29. PATHANAMTHITTA DISTRICT, Kerala State

(Code 3212)

**TABLE 5.29(a) : Profile of Pathanamthitta District  
(2001 Census)**

Area (in sq. kms.)	2,637.0
Decadal Growth Rate (1991-2001)	3.72%
Literacy Rate	
Males	96.62%
Females	93.71%
Sex Ratio (females per 1000 males)	1094
Density (persons per sq. km)	467

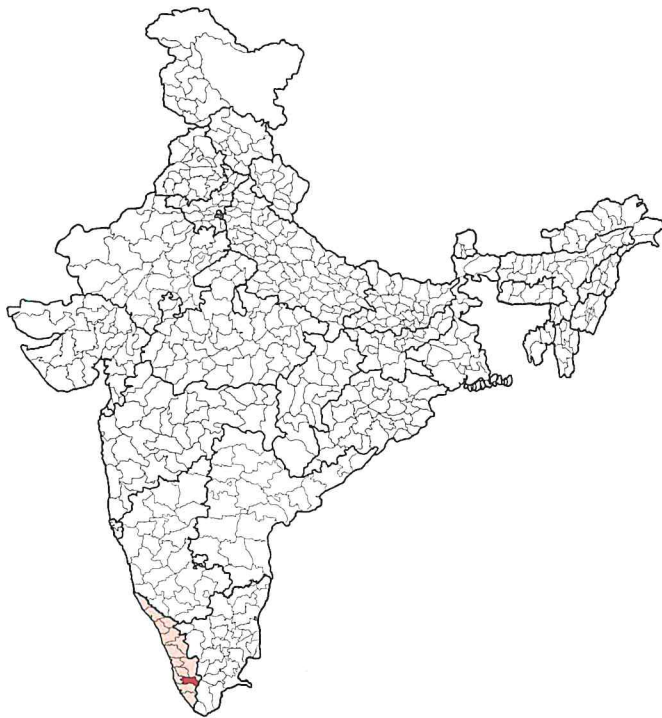


FIGURE 5.29(a) : Map of India highlighting Kerala State

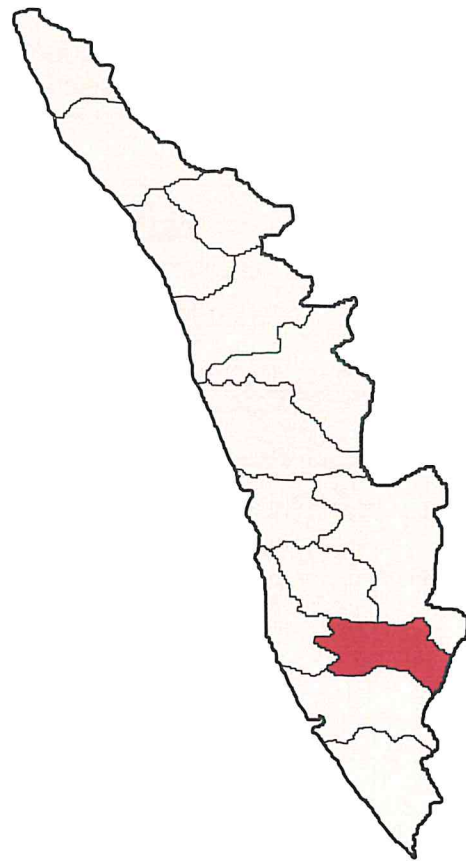


FIGURE 5.29(b) : Map of Kerala State highlighting Pathanamthitta District

**TABLE 5.29(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
HBCR - Thiruvananthapuram (1006)	537	96.1	635	97.2	1172	96.7
HBCR - Mumbai (1008)	14	2.5	8	1.2	22	1.8
All Other Centres	8	1.4	10	1.5	18	1.5
<b>Total Cancers</b>	<b>559</b>	<b>100.0</b>	<b>653</b>	<b>100.0</b>	<b>1212</b>	<b>100.0</b>

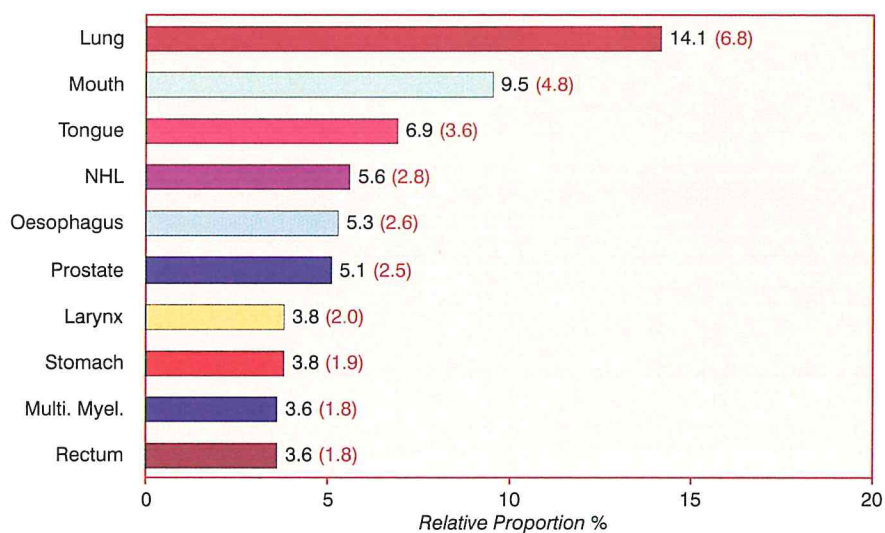
**TABLE 5.29(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	5,86,959	6,42,755	5,88,134	6,45,878	11,75,093	12,88,633
Total Cancers (All sites)	276	283	332	321	608	604
Min. Crude IR	47.0	44.0	56.5	49.7	51.7	46.9
Min. Age Adjusted IR	46.7	44.8	54.6	49.0	50.7	46.9
Min. Truncated IR	81.2	103.0	95.7	105.0	88.4	104.2

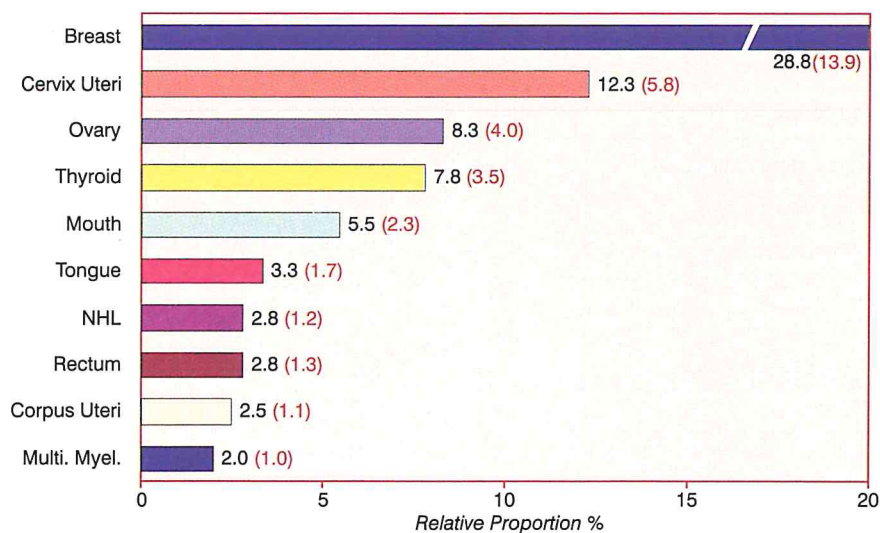
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.29(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.30. KANNUR DISTRICT, Kerala State

(Code 3202)

**TABLE 5.30 (a) : Profile of Kannur District (2001 Census)**

Area (in sq. kms.)	2,966.0
Decadal Growth Rate (1991-2001)	7.13%
Literacy Rate	
Males	96.38%
Females	89.57%
Sex Ratio (females per 1000 males)	1090
Density (persons per sq. km)	813



**FIGURE 5.30(a) : Map of India highlighting Kerala State**



**FIGURE 5.30 (b) : Map of Kerala State highlighting Kannur District**

**TABLE 5.30(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Kasturba Medical College, Manipal (77)	289	42.2	216	32.0	505	37.2
HBCR - Thiruvananthapuram (1006)	210	30.7	248	36.8	458	33.7
Kasturba Medical College, Mangalore (3)	92	13.4	104	15.4	196	14.4
Amala Cancer Hospital, Thrissur (96)	28	4.1	27	4.0	55	4.0
HBCR - Chennai (1009)	28	4.1	26	3.9	54	4.0
Sudharama Laboratory, Thrissur (92)	4	0.6	37	5.5	41	3.0
HBCR - Bangalore (1007)	18	2.6	0	0.0	18	1.3
HBCR - Mumbai (1008)	6	0.9	8	1.2	14	1.0
All Other Centres	10	1.5	8	1.2	18	1.3
<b>Total Cancers</b>	<b>685</b>	<b>100.0</b>	<b>674</b>	<b>100.0</b>	<b>1359</b>	<b>100.0</b>

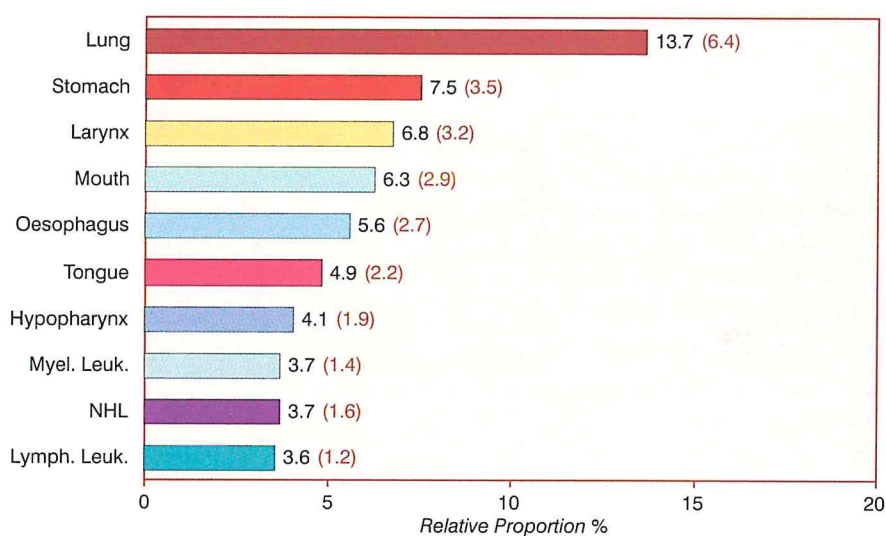
**TABLE 5.30(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	11,54,704	12,60,540	11,60,221	12,71,054	23,14,925	25,31,594
Total Cancers (All sites)	401	284	381	293	782	577
Min. Crude IR	34.7	22.5	32.8	23.1	33.8	22.8
Min. Age Adjusted IR	45.1	26.4	42.9	26.8	44.0	26.6
Min. Truncated IR	79.3	57.5	78.0	55.6	78.7	56.6

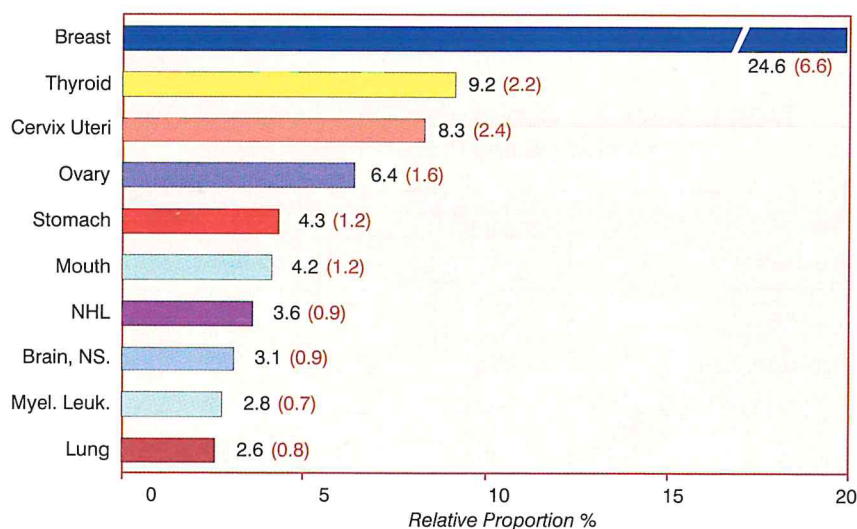
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.30(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.31. ERNAKULAM DISTRICT, Kerala State

(Code 3208)

**TABLE 5.31(a) : Profile of Ernakulam District  
(2001 Census)**

Area (in sq. kms.)	2,950.0
Decadal Growth Rate (1991-2001)	9.09%
Literacy Rate	
Males	95.95%
Females	90.96%
Sex Ratio (females per 1000 males)	1017
Density (persons per sq. km)	1050



FIGURE 5.31(a) : Map of India highlighting Kerala State

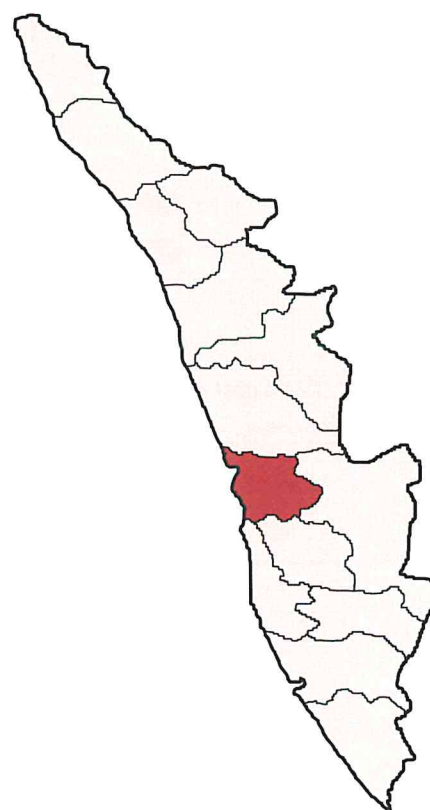


FIGURE 5.31(b) : Map of Kerala State highlighting Ernakulam District

**TABLE 5.31(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
HBCR - Thiruvananthapuram (1006)	559	71.2	689	73.1	1248	72.3
Amala Cancer Hospital, Thrissur (96)	153	19.5	165	17.5	318	18.4
Government Medical College, Thrissur (53)	42	5.3	47	5.0	89	5.2
HBCR - Mumbai (1008)	10	1.3	19	2.0	29	1.7
All Other Centres	21	2.7	22	2.3	43	2.5
<b>Total Cancers</b>	<b>785</b>	<b>100.0</b>	<b>942</b>	<b>100.0</b>	<b>1727</b>	<b>100.0</b>

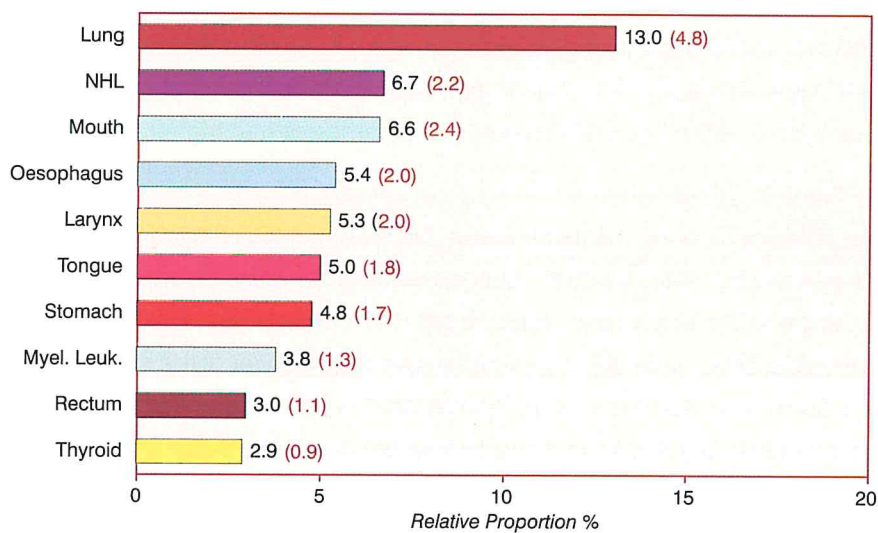
**TABLE 5.31(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	15,36,567	15,62,119	15,49,254	15,77,448	30,85,821	31,39,567
Total Cancers (All sites)	431	354	490	452	921	806
Min. Crude IR	28.1	22.7	31.6	28.7	29.9	25.7
Min. Age Adjusted IR	32.9	24.3	37.2	31.0	35.1	27.7
Min. Truncated IR	67.3	53.0	74.8	69.8	71.6	61.7

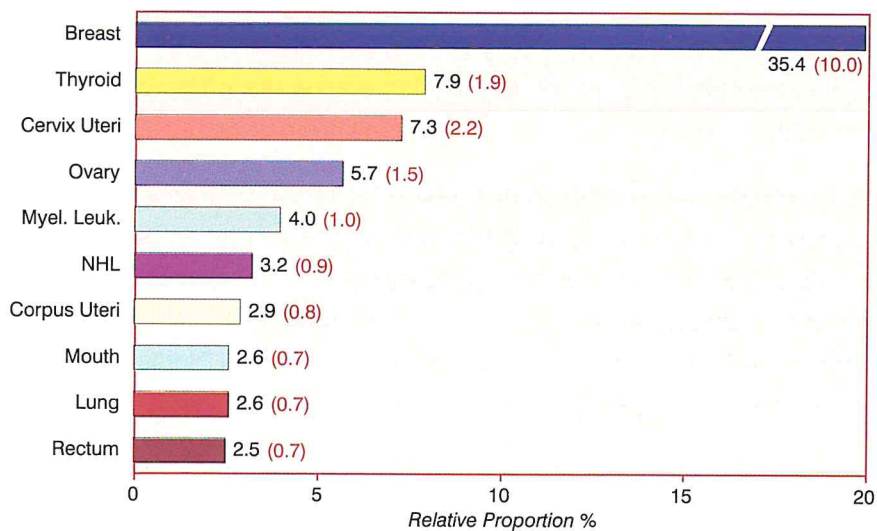
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.31(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## UNION TERRITORY OF PONDICHERRY & TAMIL NADU STATE

Figure 5(K) gives the Map of India highlighting Pondicherry & Tamil Nadu State and Figure 5(L) gives the Map of both States highlighting the Districts where the MAAR was above 36.2 /100,000.

### Pondicherry District

The main Pondicherry district showed that in males, cancer of the mouth was the leading site of cancer constituting 14% of all cancers in that sex. Cancer of the mouth, was followed by tongue, larynx, stomach and oesophagus as the leading sites of cancer in this district. Cancer of the penis as the sixth leading site of cancer was an important finding. Among females, cancer of the cervix accounted for 40% of all cancers with a comparatively high MAAR of 35.9/100,000. [Fig. 5.32(c)]. Around 80% of cases reported from this district were registered at the premier institute in Pondicherry - JIPMER. The hospital and population based registry at Chennai accounted for the remainder. [Table 5.32(b)].

Karaikal district in the Union Territory of Pondicherry showed that cancer of stomach and hypopharynx were the leading sites in males followed by cancer of the mouth. In females, cancer of the cervix comprised 37.7% of all cancers followed by cancer of the breast, ovary and mouth.

### TAMIL NADU STATE

There were eleven districts for which the cancer patterns could be described in this state. These districts in the descending order of MAAR were: Thiruvallur, Kancheepuram, Villupuram, Cuddalore, Coimbatore, Erode, Kanniyakumari, Salem, Perambalur, Thanjavur and Dindigul. Of these all but Perambalur had higher MAAR than 36.2/100,000 and at least 400 cases.

*Leading Sites of Cancer in Males:* Among males cancer of the stomach was the leading site of cancer in Thiruvallur, constituting 14.7% of all cancers in males. It was the second leading site in the districts of Kancheepuram, Villupuram, Cuddalore and Erode. Cancer of the lung was the leading site in Kancheepuram, the second leading site in Thiruvallur and the third leading site in Coimbatore and Kanniyakumari districts. Cancer of the mouth was the leading site in five districts, viz., Villupuram, Cuddalore, Kanniyakumari, Salem and Thanjavur. Cancer of the oesophagus was the leading site in Coimbatore, Erode and Dindigul. Like in Pondicherry, cancer of the penis is an important leading site in the districts of Villupuram (third leading site) and in Cuddalore (fourth leading site).

*Leading Sites of Cancer in Females:* Cancer of the cervix is the leading site of cancer among women in all the districts except, Coimbatore and Kanniyakumari. In these two districts cancer breast is the leading site. Cancer cervix and breast are the first two leading sites in all the districts. Cancer of the oesophagus is the third leading site in Coimbatore and Erode districts and the fourth leading site in Dindigul district. Cancer of the thyroid is the third leading site in Kanniyakumari district and is the eighth in Coimbatore and ninth leading site in Thanjavur district. It is not seen among the ten leading sites in the other districts.

*Centre-wise Distribution of Cancers:* The drainage of the cases to the various centres is in conformity with the geography of the districts and the location of the regional cancer centres and cancer treatment facilities in the area. Thus the cases from northern districts of Thiruvallur and Kancheepuram are referred to sources of registration under the Chennai PBCR. Cases from the districts of Cuddalore and Villupuram are mainly referred to JIPMER, Pondicherry. The institutions in Coimbatore cater to the cases from the districts of Coimbatore, Salem and Dindigul. The Regional Cancer Centre at Thiruvananthapuram sees the majority of patients from Kanniyakumari district.

In Perambalur district cancer of the stomach was the leading site of cancer in males followed by cancer of the mouth. In women cancer of the cervix was the leading site constituting 58.5% of cancers in women. This site of cancer was followed by cancer of the breast and stomach.

The data showed that Pondicherry district had some of the highest incidence rates of Mouth cancer among males in the world.

FIGURE 5(K) : Map of India highlighting Pondicherry & Tamil Nadu State

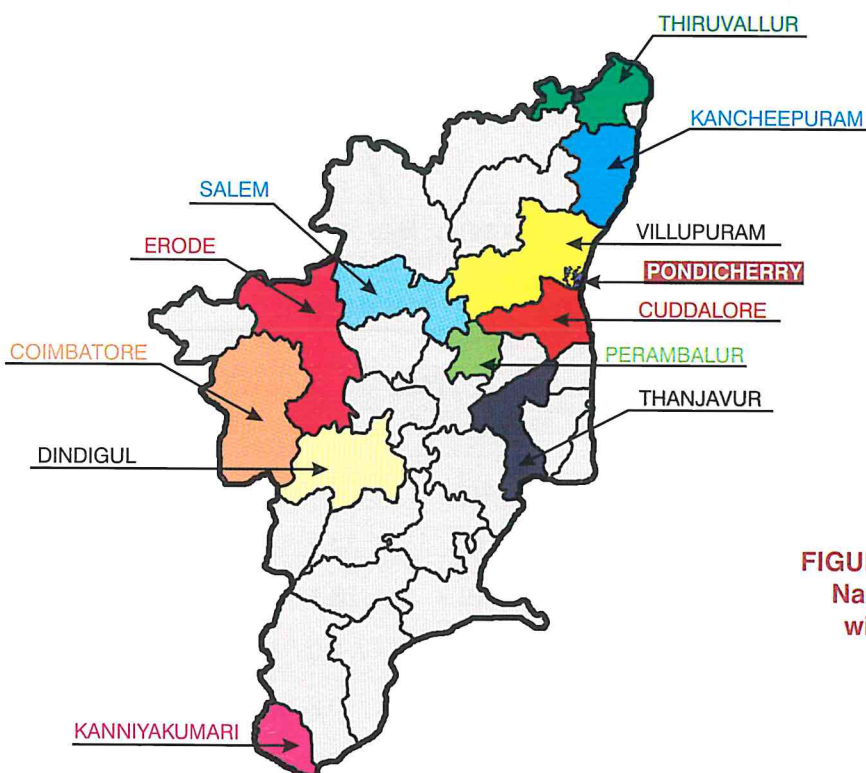
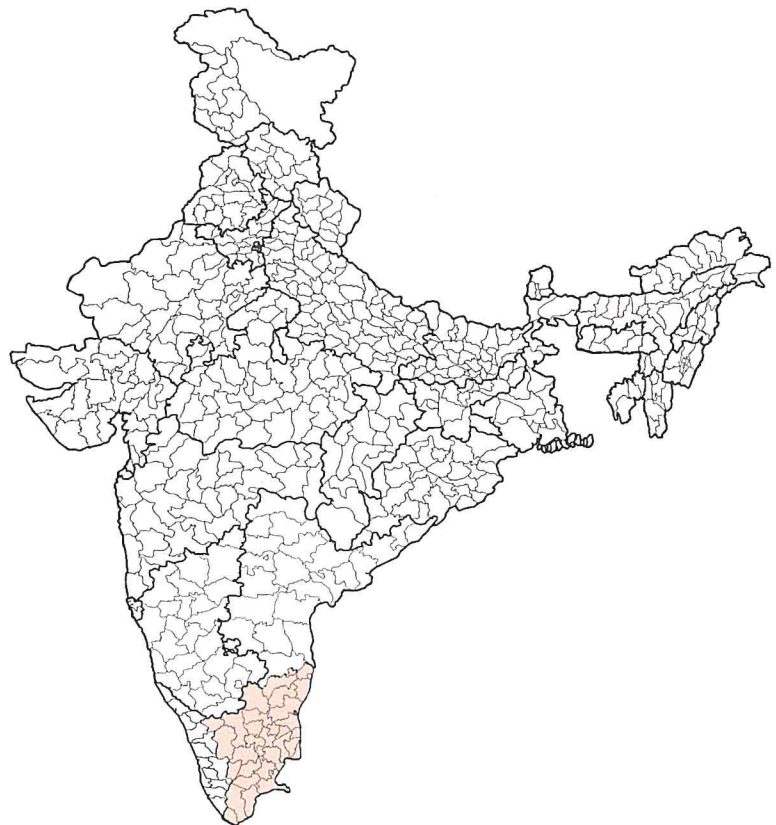


FIGURE 5(L) : Map of Pondicherry & Tamil Nadu State highlighting the districts with MAAR above 36.2 per 100,000

## 5.32. PONDICHERRY DISTRICT, Pondicherry [U.T.]

(Code 3402)

**TABLE 5.23(a) : Profile of Pondicherry District  
(2001 Census)**

Area (in sq. kms.)	290.0
Decadal Growth Rate (1991-2001)	20.82%
Literacy Rate	
Males	88.72%
Females	73.04%
Sex Ratio (females per 1000 males)	990
Density (persons per sq. km)	2534

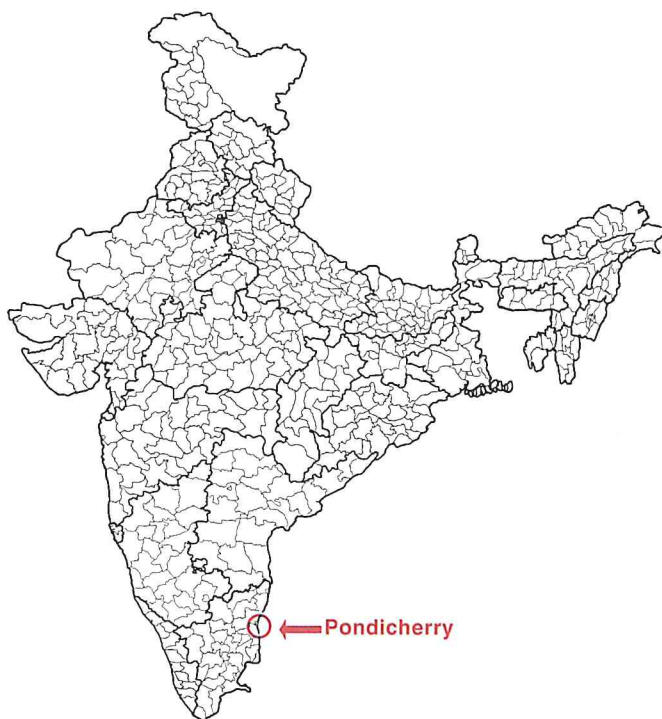


FIGURE 5.32(a) : Map of India highlighting Pondicherry

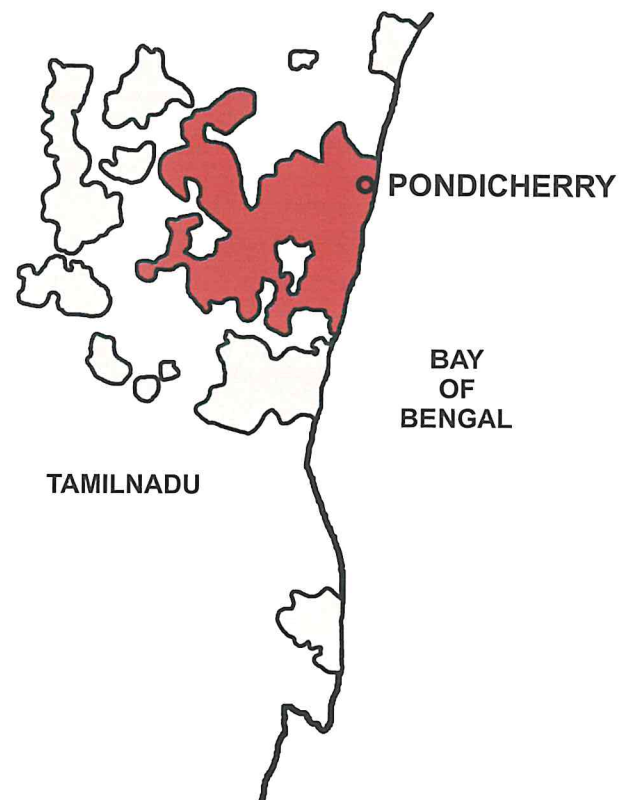


FIGURE 5.32(b) : Map of Pondicherry highlighting Pondicherry District

**TABLE 5.32(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
JIPMER, Pondicherry (104)	352	87.1	324	79.2	676	83.1
HBCR - Chennai (1009)	28	6.9	63	15.4	91	11.2
PBCR - Chennai (1004)	0	0.0	21	5.1	21	2.6
Vinayaka Missions MC, Karaikal (74)	16	4.0	0	0.0	16	2.0
All Other Centres	8	2.0	1	0.2	9	1.1
<b>Total Cancers</b>	<b>404</b>	<b>100.0</b>	<b>409</b>	<b>100.0</b>	<b>813</b>	<b>100.0</b>

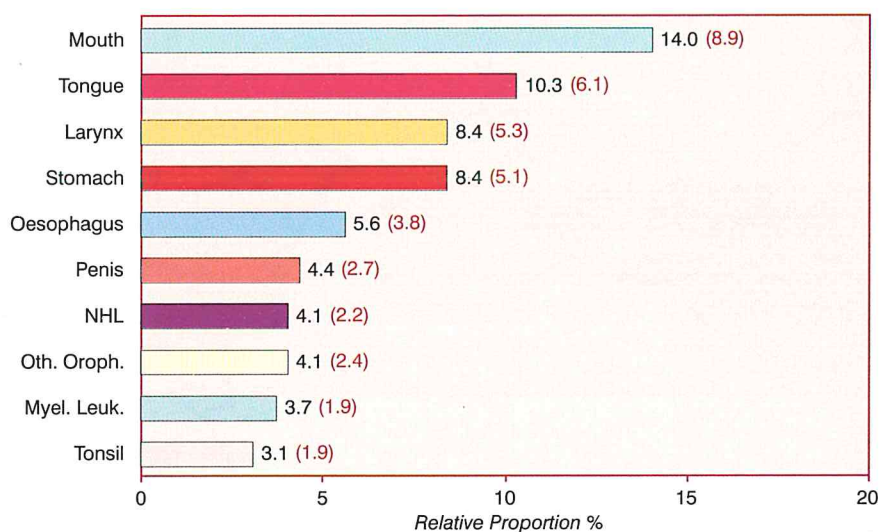
**TABLE 5.32(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	3,69,897	3,66,764	3,75,829	3,73,439	7,45,726	7,40,203
Total Cancers (All sites)	146	258	175	234	321	492
Min. Crude IR	39.5	70.4	46.6	62.7	43.1	66.5
Min. Age Adjusted IR	53.2	92.3	64.0	81.5	58.7	86.9
Min. Truncated IR	111.2	216.3	116.0	175.6	113.7	195.8

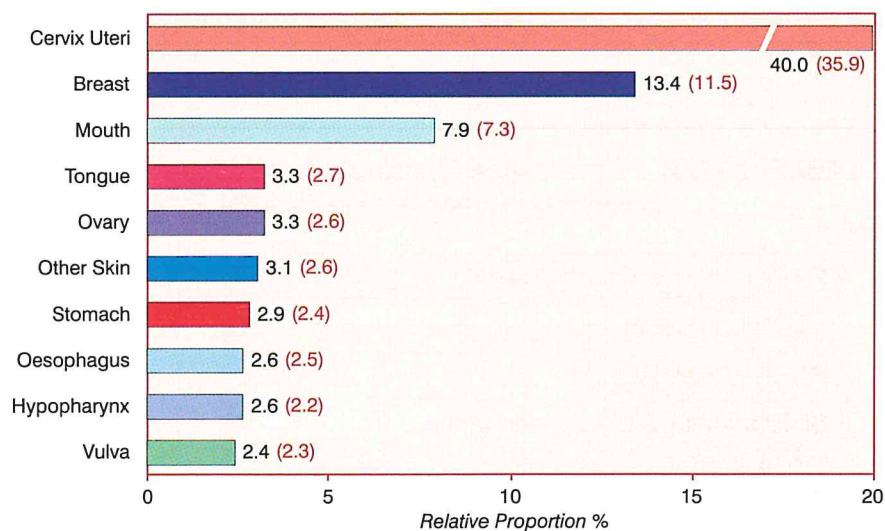
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.32(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.33. THIRUVALLUR DISTRICT, Tamil Nadu State

(Code 3301)

**TABLE 5.33(a) : Profile of Thiruvallur District**  
(2001 Census)

Area (in sq. kms.)	3,424.0
Decadal Growth Rate (1991-2001)	22.35%
Literacy Rate	
Males	84.62%
Females	68.23%
Sex Ratio (females per 1000 males)	970
Density (persons per sq. km)	800

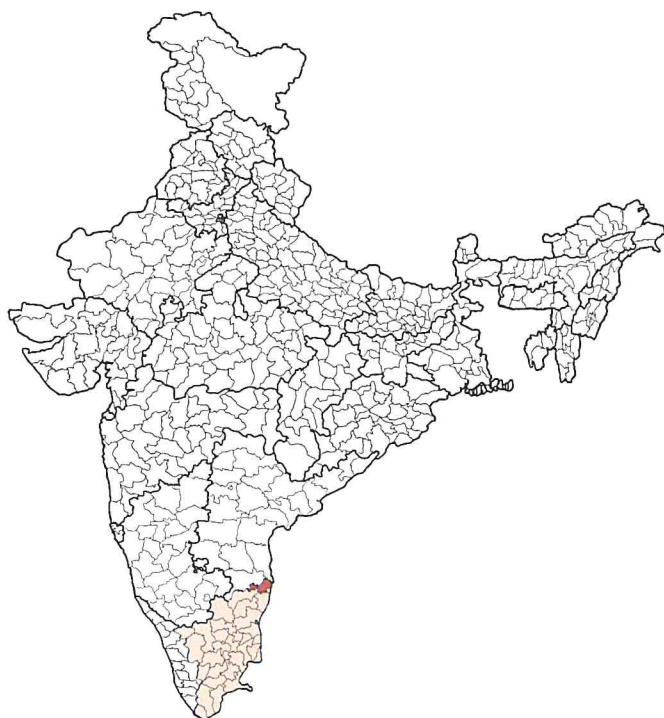


FIGURE 5.33(a) : Map of India highlighting Tamil Nadu State



FIGURE 5.33(b) : Map of Tamil Nadu State highlighting Thiruvallur District

**TABLE 5.33(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
PBCR - Chennai (1004)	1268	78.2
HBCR - Chennai (1009)	332	20.5
Sri Ramachandra MC, Chennai (88)	17	1.0
All Other Centres	4	0.2
<b>Total Cancers</b>	<b>1621</b>	<b>100.0</b>

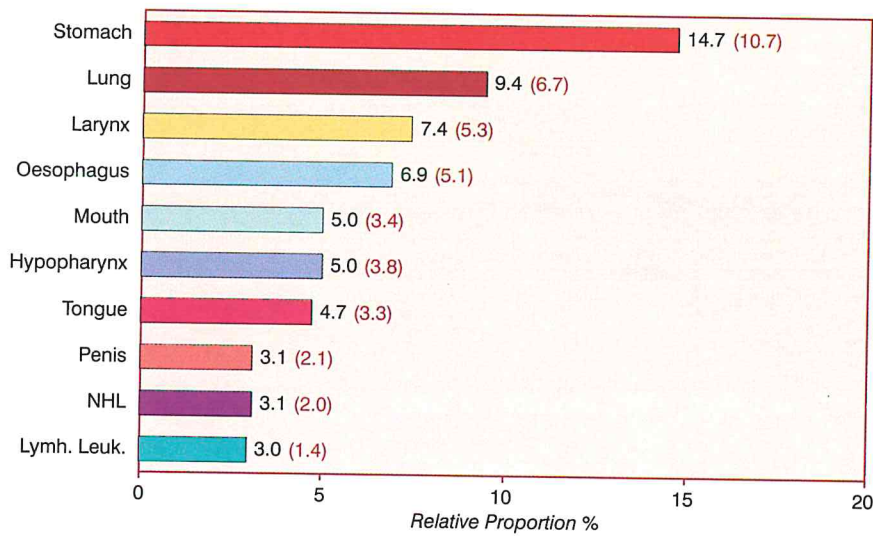
**TABLE 5.33(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	14,19,827	13,71,818
Total Cancers (All sites)	742	879
Min. Crude IR	52.3	64.1
Min. Age Adjusted IR	68.2	80.3
Min. Truncated IR	138.4	197.4

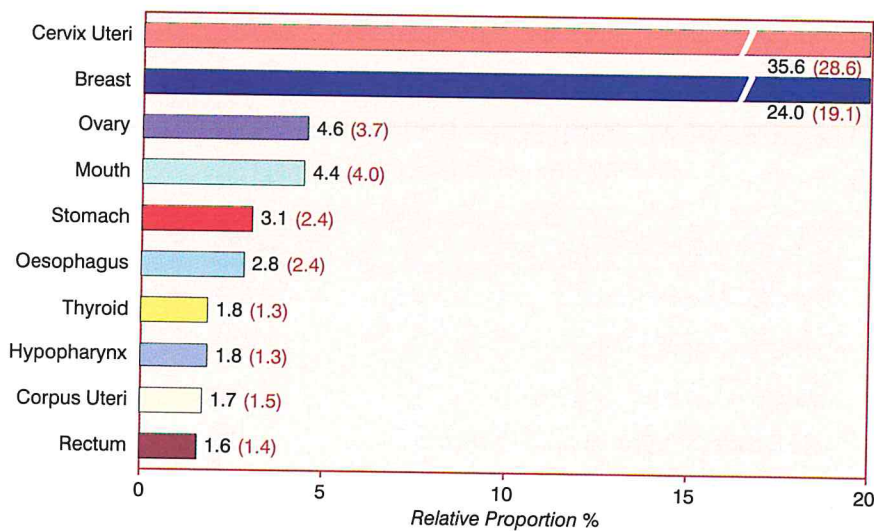
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.33(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.34. KANCHEEPURAM DISTRICT, Tamil Nadu State

(Code 3303)

**TABLE 5.34(a) : Profile of Kancheepuram District (2001 Census)**

Area (in sq. kms.)	4,433.0
Decadal Growth Rate (1991-2001)	18.84%
Literacy Rate	
Males	84.82%
Females	70.21%
Sex Ratio (females per 1000 males)	972
Density (persons per sq. km)	647



FIGURE 5.34(a) : Map of India highlighting Tamil Nadu State

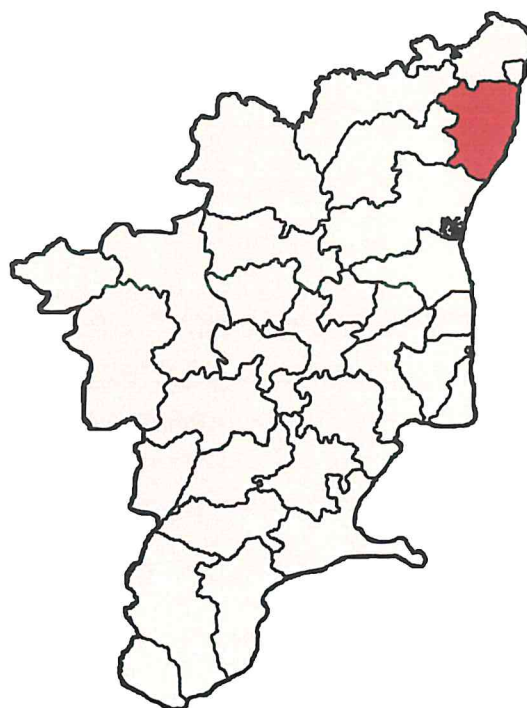


FIGURE 5.34(b) : Map of Tamil Nadu State highlighting Kancheepuram District

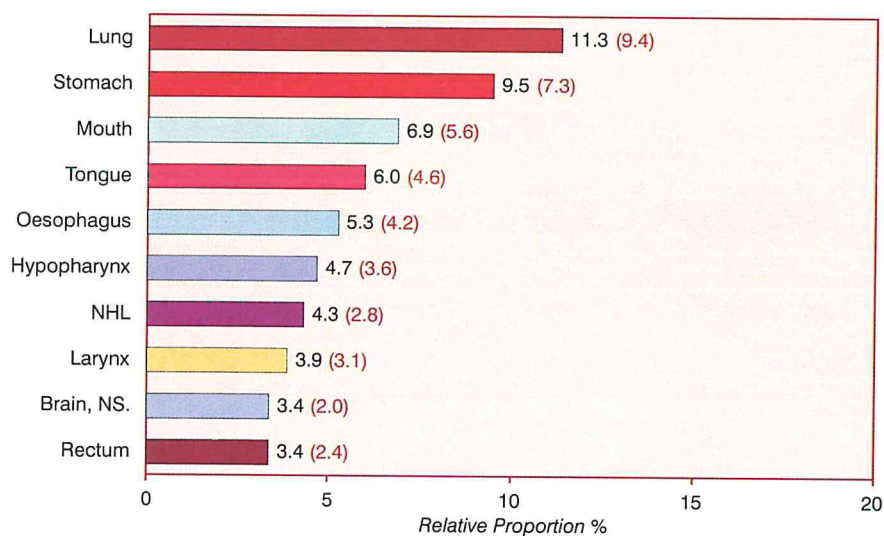
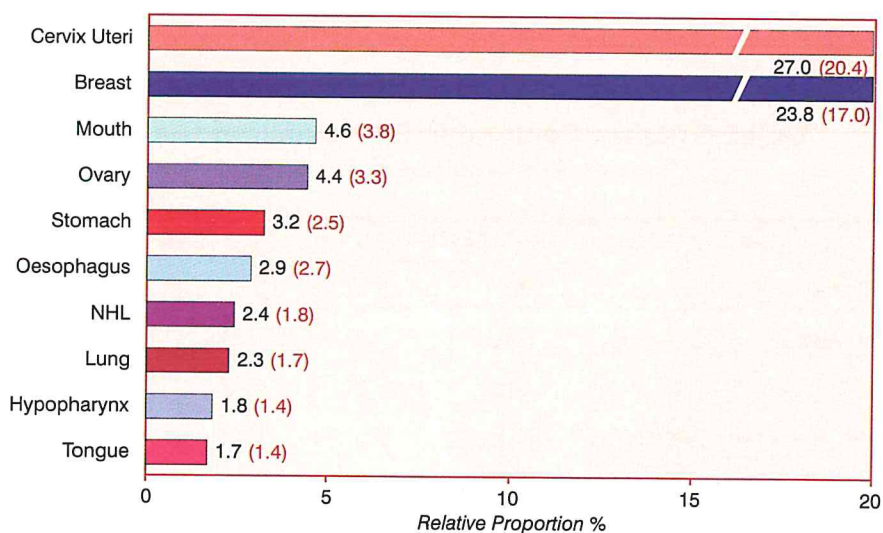
**TABLE 5.34(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
PBCR - Chennai (1004)	1237	71.8
HBCR - Chennai (1009)	448	26.0
JIPMER, Pondicherry (104)	14	0.8
Sri Ramachandra MC, Chennai (88)	18	1.0
All Other Centres	6	0.3
<b>Total Cancers</b>	<b>1723</b>	<b>100.0</b>

**TABLE 5.34(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	14,86,491	14,53,907
Total Cancers (All sites)	856	867
Min. Crude IR	57.6	59.6
Min. Age Adjusted IR	75.5	75.1
Min. Truncated IR	139.5	174.9

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.34(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.35. VILLUPURAM DISTRICT, Tamil Nadu State

(Code 3307)

**TABLE 5.35(a) : Profile of Villupuram District  
(2001 Census)**

Area (in sq. kms.)	7,250.0
Decadal Growth Rate (1991-2001)	6.83%
Literacy Rate	
Males	76.02%
Females	53.16%
Sex Ratio (females per 1000 males)	983
Density (persons per sq. km)	406



FIGURE 5.35(a) : Map of India highlighting Tamil Nadu State

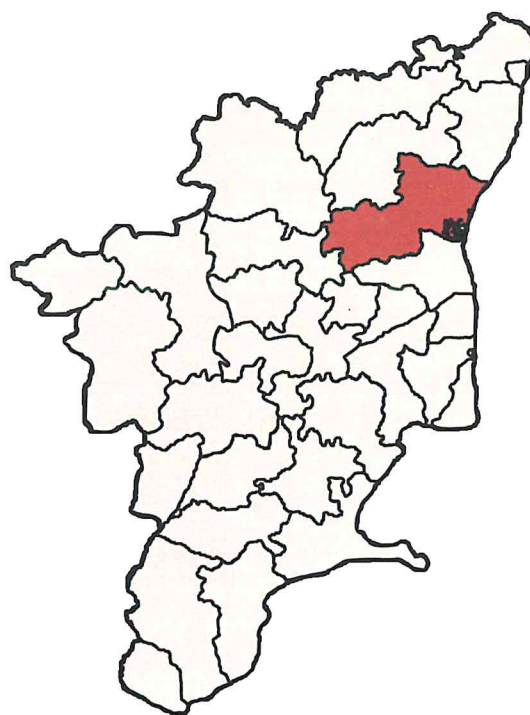


FIGURE 5.35(b) : Map of Tamil Nadu State highlighting Villupuram District

**TABLE 5.35(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
JIPMER, Pondicherry (104)	685	83.5	739	54.1	1424	65.2
HBCR - Chennai (1009)	119	14.5	279	20.4	398	18.2
PBCR - Chennai (1004)	0	0.0	336	24.6	336	15.4
All Other Centres	16	2.0	11	0.8	27	1.2
<b>Total Cancers</b>	<b>820</b>	<b>100.0</b>	<b>1365</b>	<b>100.0</b>	<b>2185</b>	<b>100.0</b>

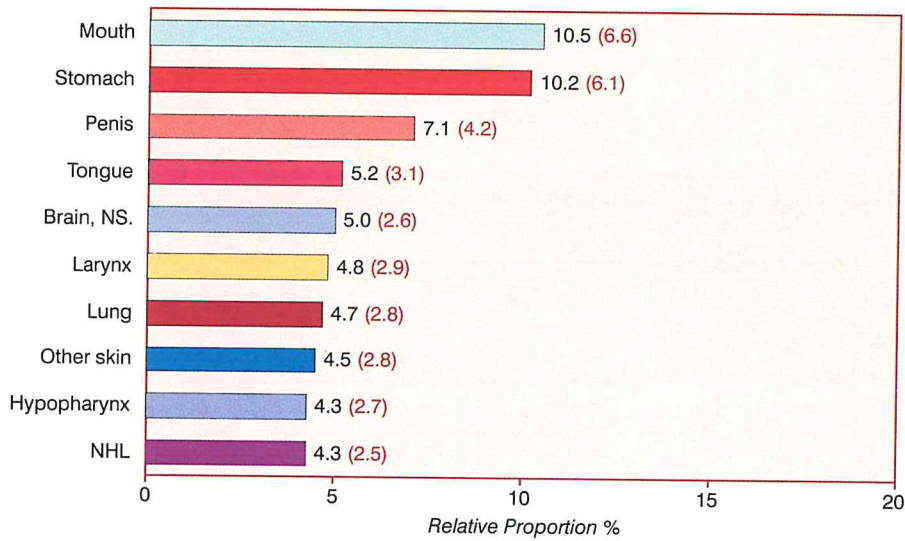
**TABLE 5.35(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	15,18,032	14,73,020	16,38,622	15,29,968	31,56,654	30,02,988
Total Cancers (All sites)	308	512	580	785	888	1,297
Min. Crude IR	20.3	34.8	35.4	51.3	28.1	43.2
Min. Age Adjusted IR	24.8	44.4	42.8	65.2	34.2	55.0
Min. Truncated IR	43.5	104.9	87.4	148.4	66.2	127.2

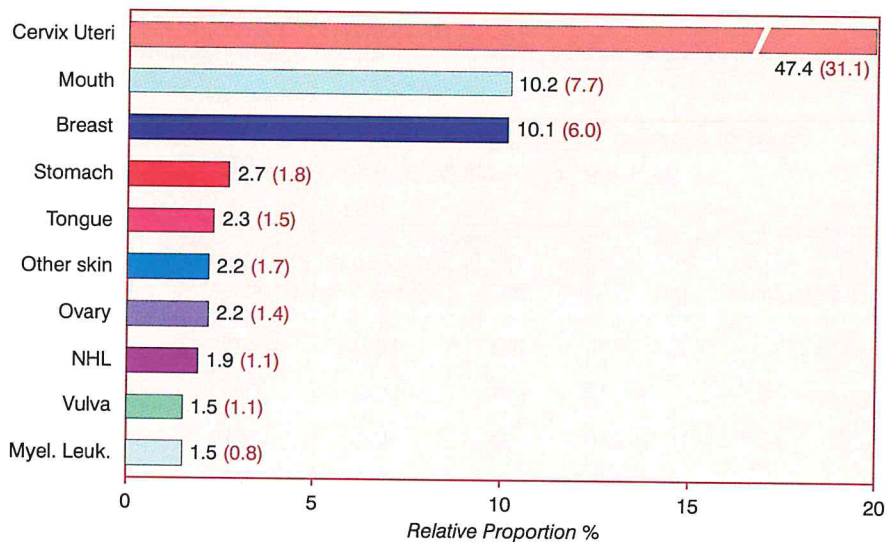
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.35(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.36. CUDDALORE DISTRICT, Tamil Nadu State

(Code 3318)

**TABLE 5.36(a) : Profile of Cuddalore District  
(2001 Census)**

Area (in sq. kms.)	3,645.0
Decadal Growth Rate (1991-2001)	7.43%
Literacy Rate	
Males	82.76%
Females	60.86%
Sex Ratio (females per 1000 males)	985
Density (persons per sq. km)	626



FIGURE 5.36(a) : Map of India highlighting Tamil Nadu State

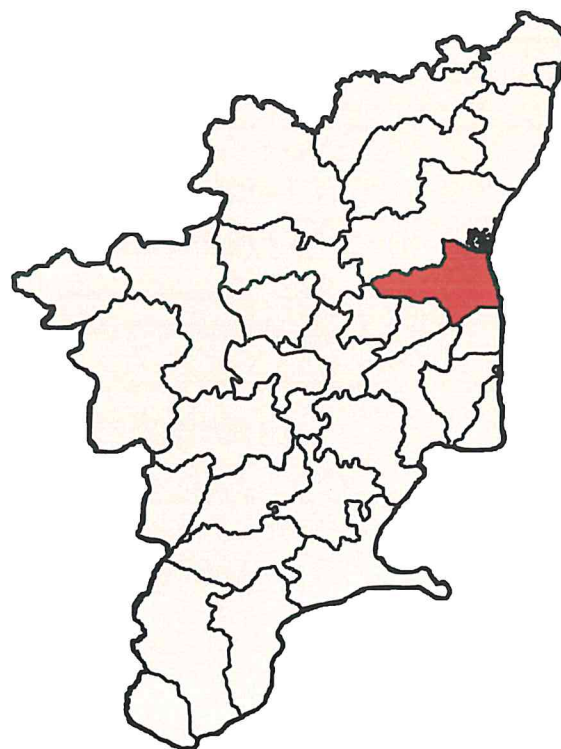


FIGURE 5.36(b) : Map of Tamil Nadu State highlighting Cuddalore District

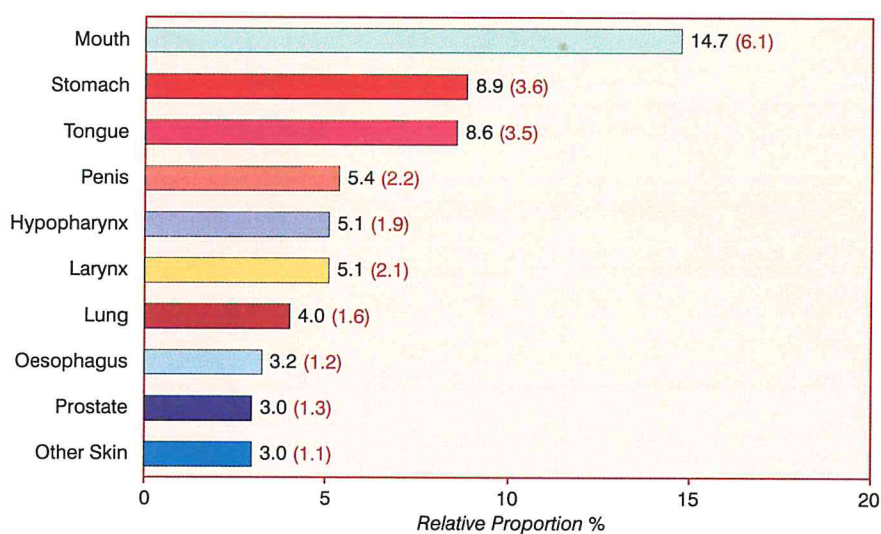
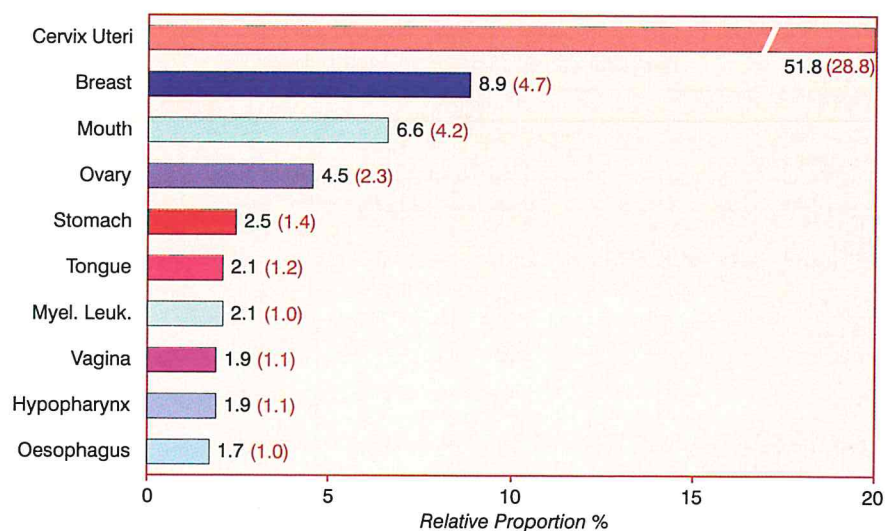
**TABLE 5.36(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
JIPMER, Pondicherry (104)	499	75.0	524	58.0	1023	65.2
HBCR - Chennai (1009)	152	22.9	248	27.4	400	25.5
PBCR - Chennai (1004)	0	0.0	125	13.8	125	8.0
All Other Centres	14	2.1	7	0.8	21	1.3
<b>Total Cancers</b>	<b>665</b>	<b>100.0</b>	<b>904</b>	<b>100.0</b>	<b>1569</b>	<b>100.0</b>

**TABLE 5.36(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	11,57,771	11,42,164	12,00,560	11,85,602	23,58,331	23,27,766
Total Cancers (All sites)	205	460	373	531	578	991
Min. Crude IR	17.7	40.3	31.1	44.8	24.5	42.6
Min. Age Adjusted IR	22.0	50.3	39.2	55.9	30.7	53.2
Min. Truncated IR	39.6	123.5	68.3	134.5	54.1	128.8

Min. = Minimum IR = Incidence Rate / 100,000

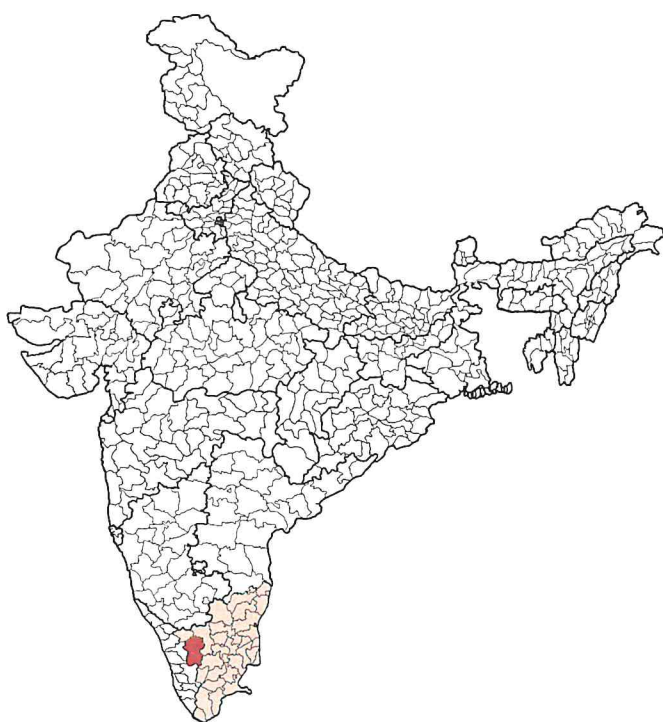
**FIGURE 5.36(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.37. COIMBATORE DISTRICT, Tamil Nadu State

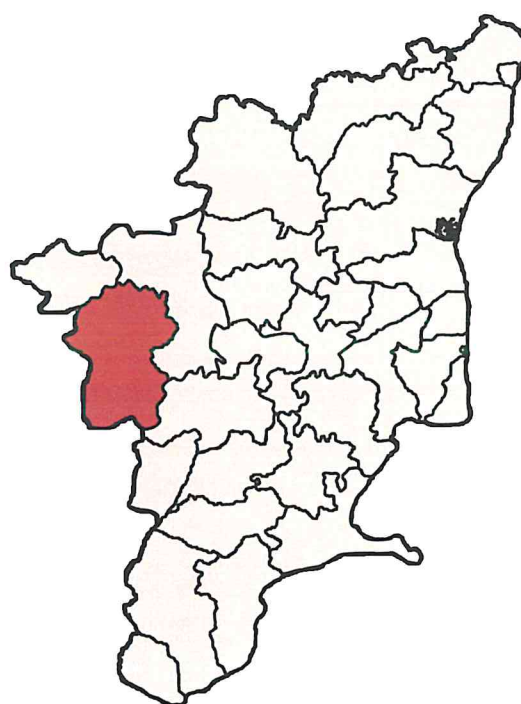
(Code 3312)

**TABLE 5.37(a) : Profile of Coimbatore District  
(2001 Census)**

Area (in sq. kms.)	7,469.0
Decadal Growth Rate (1991-2001)	20.40%
Literacy Rate	
Males	83.82%
Females	69.80%
Sex Ratio (females per 1000 males)	959
Density (persons per sq. km)	566



**FIGURE 5.37(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.37(b) : Map of Tamil Nadu State highlighting Coimbatore District**

**TABLE 5.37(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
GKNM Hospital, Coimbatore (54)	841	56.9	845	46.7	1686	51.3
Sai Subramanian Pathology Lab, CBE (91)	261	17.7	452	25.0	713	21.8
PSG Institute, Coimbatore (1)	258	17.5	242	13.4	500	15.2
HBCR - Chennai (1009)	66	4.5	90	5.0	156	4.7
PBCR - Chennai (1004)	0	0.0	114	6.3	114	3.5
Amala Cancer Hospital, Thrissur (96)	11	0.7	30	1.7	41	1.2
All Other Centres	40	2.7	37	2.0	77	2.3
<b>Total Cancers</b>	<b>1477</b>	<b>100.0</b>	<b>1810</b>	<b>100.0</b>	<b>3287</b>	<b>100.0</b>

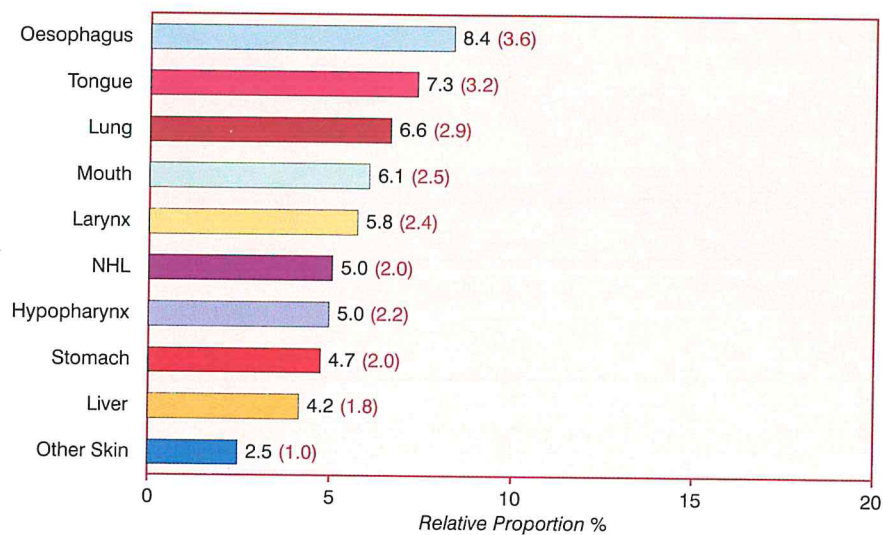
**TABLE 5.37(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	21,59,383	20,71,196	21,95,136	21,06,707	43,54,519	41,77,903
Total Cancers (All sites)	704	773	862	948	1,566	1,721
Min. Crude IR	32.8	37.3	39.3	45.0	36.0	41.2
Min. Age Adjusted IR	38.1	42.4	45.3	52.2	41.7	47.3
Min. Truncated IR	63.2	89.0	75.6	105.8	69.7	97.6

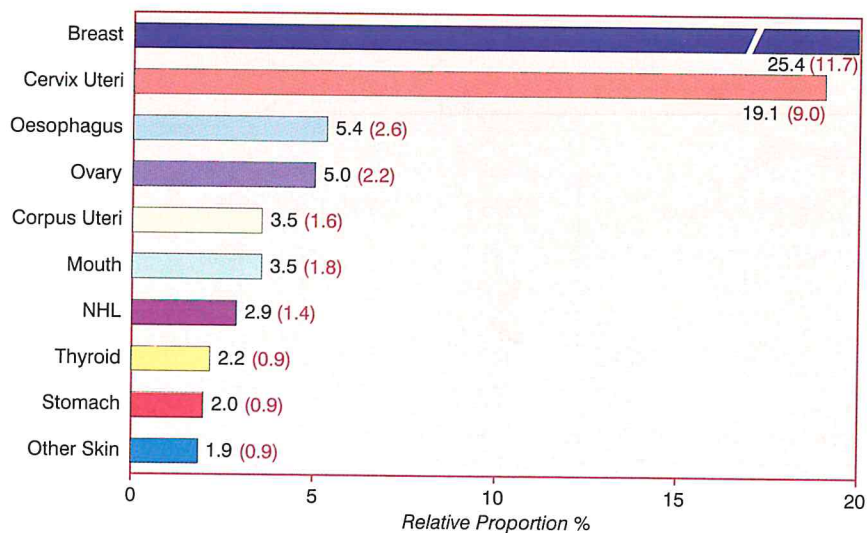
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.37(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

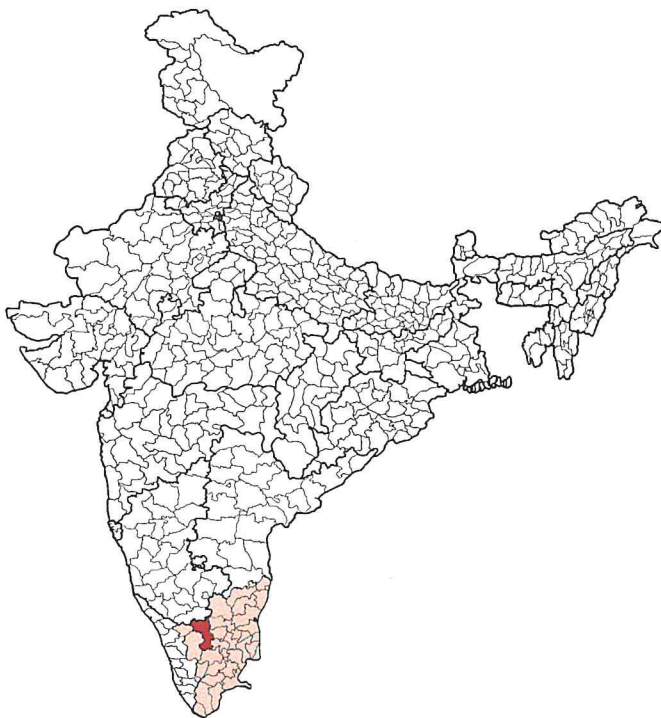


## 5.38. ERODE DISTRICT, Tamil Nadu State

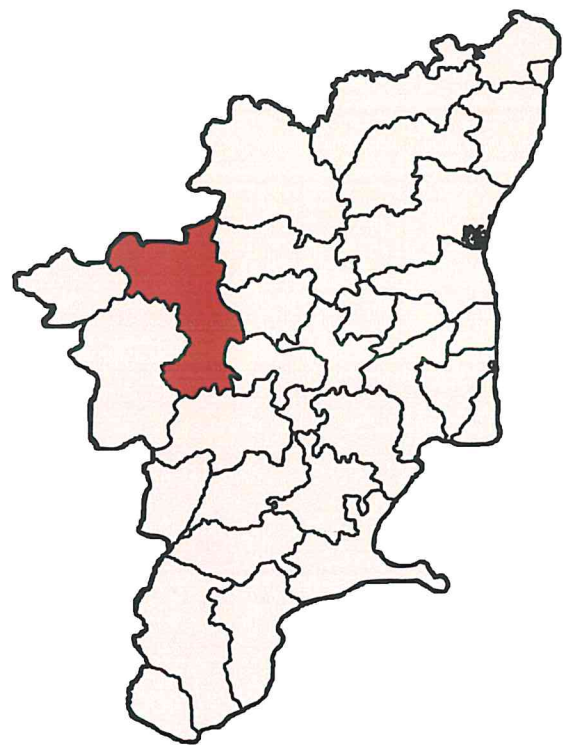
(Code 3310)

**TABLE 5.38(a) : Profile of Erode District (2001 Census)**

Area (in sq. kms.)	8,209.0
Decadal Growth Rate (1991-2001)	10.94%
Literacy Rate	
Males	75.49%
Females	55.26%
Sex Ratio (females per 1000 males)	971
Density (persons per sq. km)	314



**FIGURE 5.38(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.38(b) : Map of Tamil Nadu State highlighting Erode District**

**TABLE 5.38(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Sai Subramanian Lab, Coimbatore (91)	356	37.2	556	45.1	912	41.6
GKNM Hospital, Coimbatore (54)	428	44.7	421	34.1	849	38.7
HBCR - Chennai (1009)	61	6.4	90	7.3	151	6.9
JIPMER, Pondicherry (104)	53	5.5	57	4.6	110	5.0
PSG Institute, Coimbatore (1)	38	4.0	33	2.7	71	3.2
PBCR - Chennai (1004)	0	0.0	70	5.7	70	3.2
All Other Centres	21	2.2	7	0.6	28	1.3
<b>Total Cancers</b>	<b>957</b>	<b>100.0</b>	<b>1234</b>	<b>100.0</b>	<b>2191</b>	<b>100.0</b>

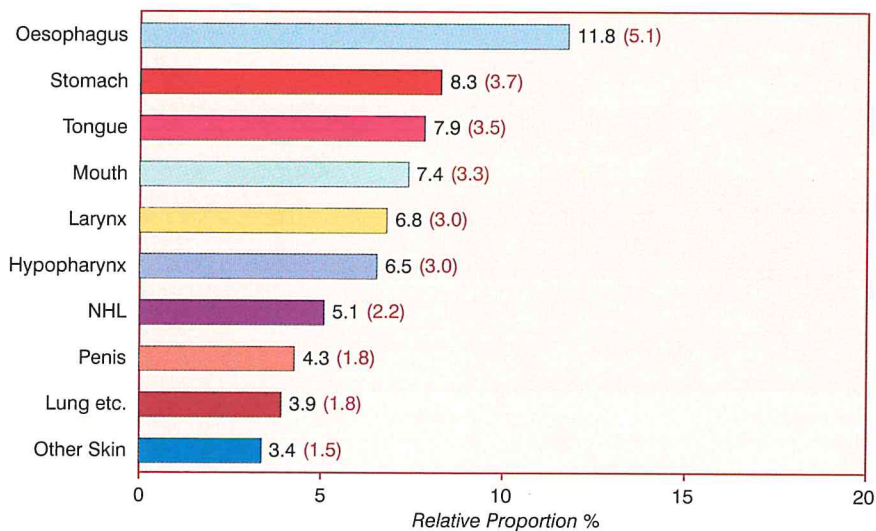
**TABLE 5.38(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	13,03,035	12,66,309	13,15,041	12,79,538	26,18,076	25,45,847
Total Cancers (All sites)	479	478	642	592	1,121	1,070
Min. Crude IR	36.8	37.8	48.8	46.3	42.8	42.0
Min. Age Adjusted IR	37.8	38.8	50.0	47.9	43.9	43.4
Min. Truncated IR	75.2	90.4	89.6	108.3	82.5	99.6

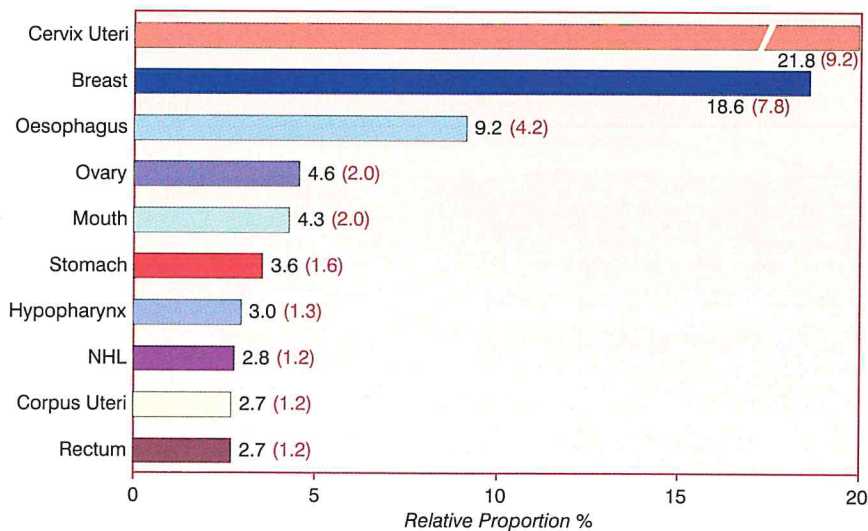
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.38(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

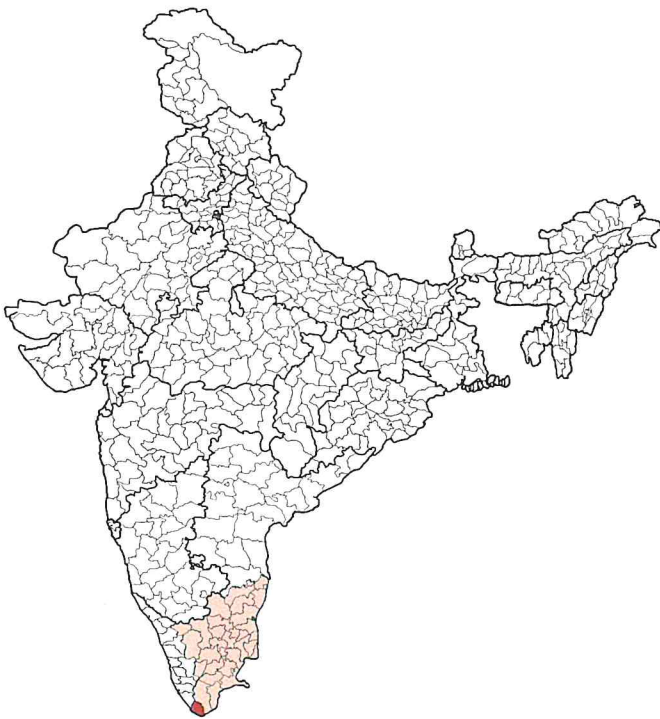


## 5.39. KANNIYAKUMARI DISTRICT, Tamil Nadu State

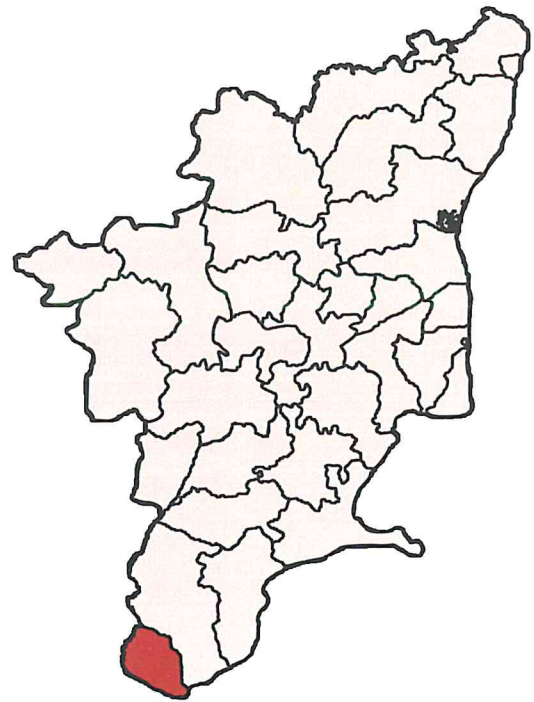
(Code 3330)

**TABLE 5.39(a) : Profile of Kanniyakumari District  
(2001 Census)**

Area (in sq. kms.)	1,684.0
Decadal Growth Rate (1991-2001)	4.34%
Literacy Rate	
Males	90.88%
Females	85.38%
Sex Ratio (females per 1000 males)	1013
Density (persons per sq. km)	992



**FIGURE 5.39(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.39(b) : Map of Tamil Nadu State highlighting Kanniyakumari District**

**TABLE 5.39(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
HBCR -Thiruvananthapuram (1006)	409	91.3	528	88.9	937	89.9
Tirunelveli Medical College, Tirunelveli (24)	18	4.0	20	3.4	38	3.6
HBCR - Chennai (1009)	12	2.7	21	3.5	33	3.2
PBCR - Chennai (1004)	0	0.0	21	3.5	21	2.0
All Other Centres	9	2.0	4	0.7	13	1.2
<b>Total Cancers</b>	<b>448</b>	<b>100.0</b>	<b>594</b>	<b>100.0</b>	<b>1042</b>	<b>100.0</b>

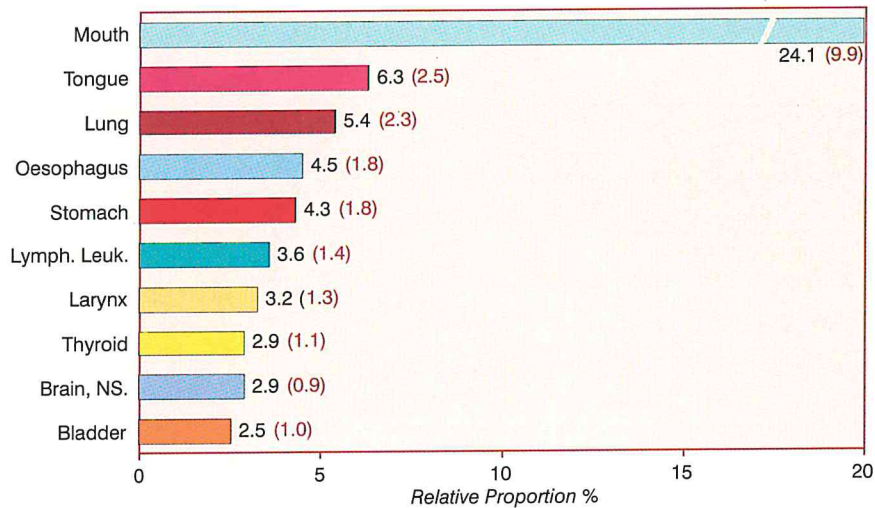
**TABLE 5.39(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	8,28,589	8,39,691	8,31,146	8,44,044	16,59,735	16,83,735
Total Cancers (All sites)	233	215	322	272	555	487
Min. Crude IR	28.1	25.6	38.7	32.2	33.4	28.9
Min. Age Adjusted IR	33.3	29.6	45.6	37.8	39.5	33.7
Min. Truncated IR	71.6	67.1	93.6	89.1	82.5	77.9

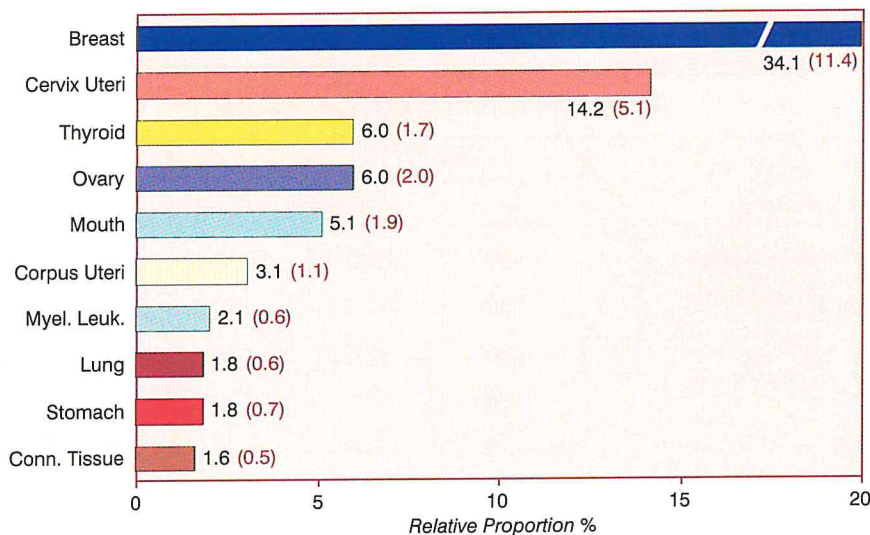
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.39(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

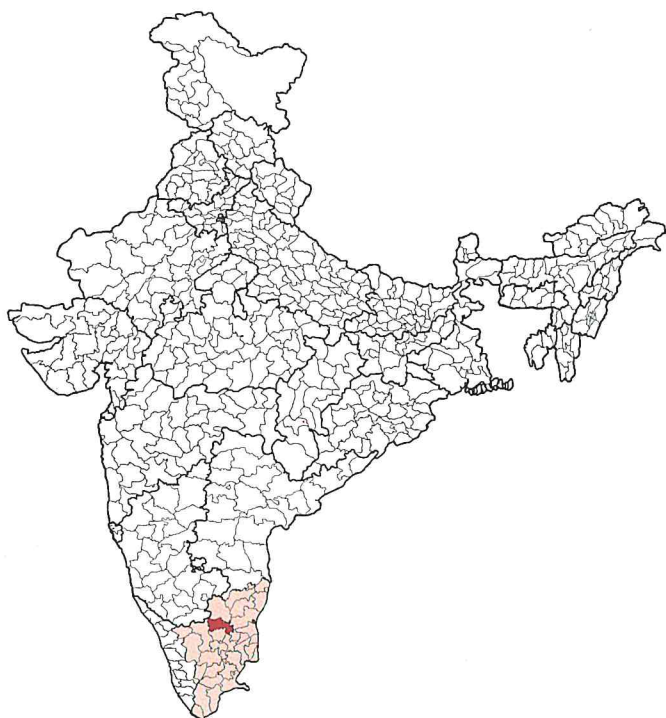


## 5.40. SALEM DISTRICT, Tamil Nadu State

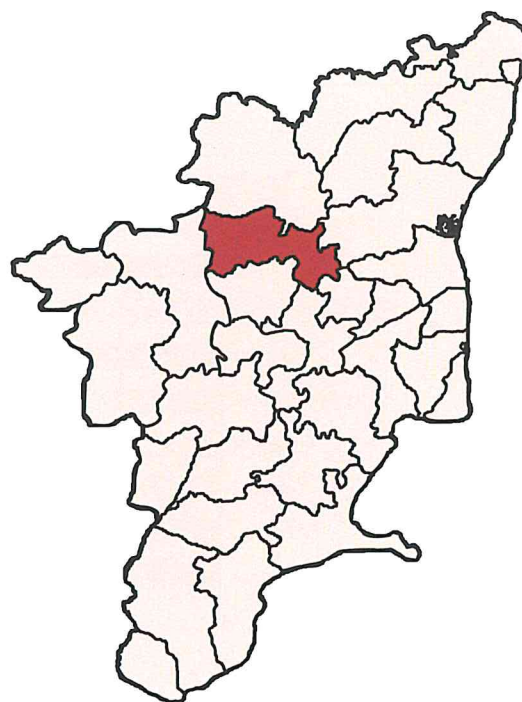
(Code 3308)

**TABLE 5.40(a) : Profile of Salem District (2001 Census)**

Area (in sq. kms.)	5,219.6
Decadal Growth Rate (1991-2001)	16.28%
Literacy Rate	
Males	75.25%
Females	55.61%
Sex Ratio (females per 1000 males)	929
Density (persons per sq. km)	573



**FIGURE 5.40(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.40(b) : Map of Tamil Nadu State highlighting Salem District**

**TABLE 5.40(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
Sai Subramanian Pathology Lab (91)	196	28.8	249	25.9	445	27.1
HBCR - Chennai (1009)	188	27.6	183	19.1	371	22.6
JIPMER (104)	150	22.0	188	19.6	338	20.6
GKNM Hospital (54)	124	18.2	120	12.5	244	14.9
PBCR - Chennai (1004)	0	0.0	206	21.5	206	12.6
All Other Centres	23	3.4	14	1.5	37	2.3
<b>Total Cancers</b>	<b>681</b>	<b>100.0</b>	<b>960</b>	<b>100.0</b>	<b>1641</b>	<b>100.0</b>

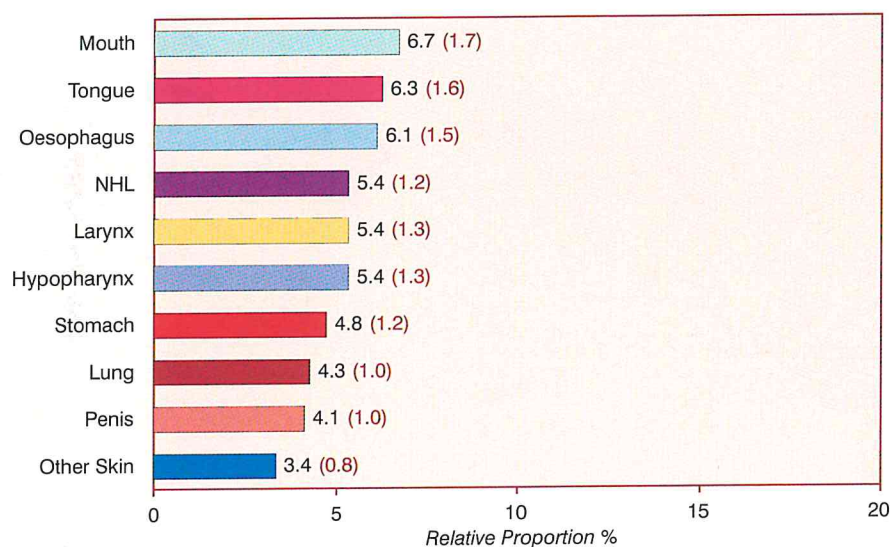
**TABLE 5.40(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	15,46,867	14,39,580	15,67,057	14,59,230	31,13,924	28,98,810
Total Cancers (All sites)	265	416	388	572	653	988
Min. Crude IR	17.1	28.9	24.8	39.2	21.0	34.1
Min. Age Adjusted IR	19.4	31.7	28.1	42.3	23.8	37.0
Min. Truncated IR	38.9	69.7	51.1	99.2	45.3	84.6

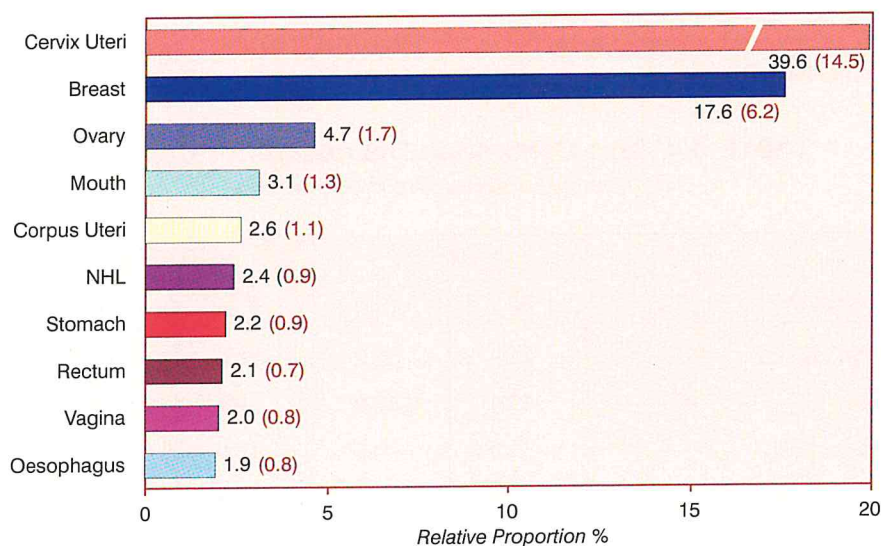
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.40(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

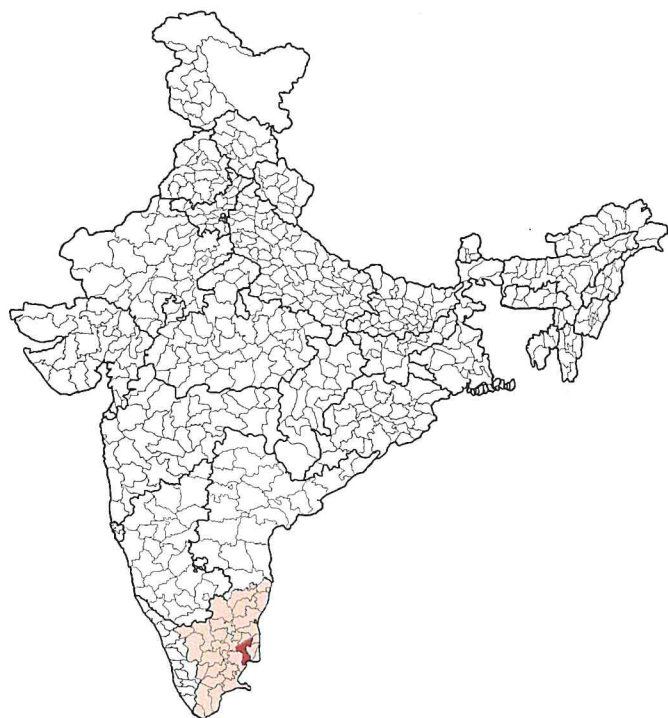


## 5.41. THANJAVUR DISTRICT, Tamil Nadu State

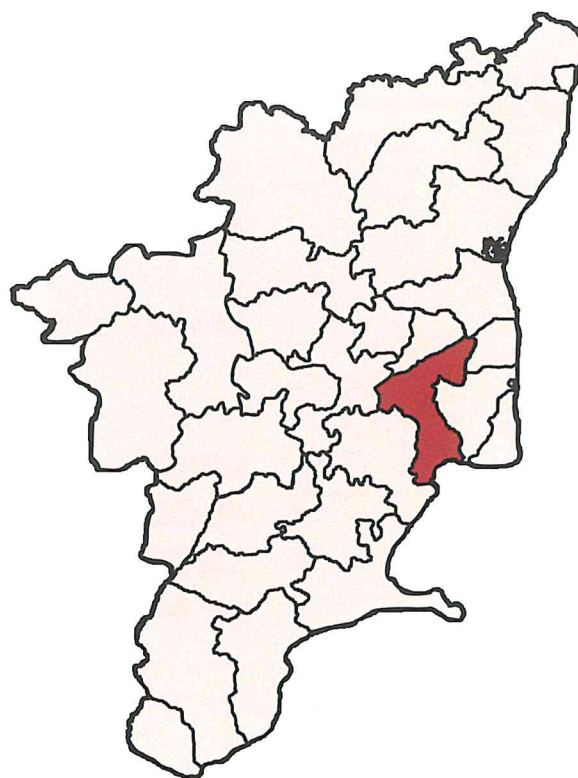
(Code 3321)

**TABLE 5.41(a) : Profile of Thanjavur District (2001 Census)**

Area (in sq. kms.)	3,396.0
Decadal Growth Rate (1991-2001)	7.38%
Literacy Rate	
Males	85.45%
Females	66.95%
Sex Ratio (females per 1000 males)	1020
Density (persons per sq. km)	649



**FIGURE 5.41(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.41(b) : Map of Tamil Nadu State highlighting Thanjavur District**

**TABLE 5.41(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
JIPMER, Pondicherry (104)	202	52.2	241	43.5	443	47.1
HBCR - Chennai (1009)	178	46.0	123	22.2	301	32.0
PBCR - Chennai (1004)	0	0.0	181	32.7	181	19.2
All Other Centres	7	1.8	9	1.6	16	1.7
<b>Total Cancers</b>	<b>387</b>	<b>100.0</b>	<b>554</b>	<b>100.0</b>	<b>941</b>	<b>100.0</b>

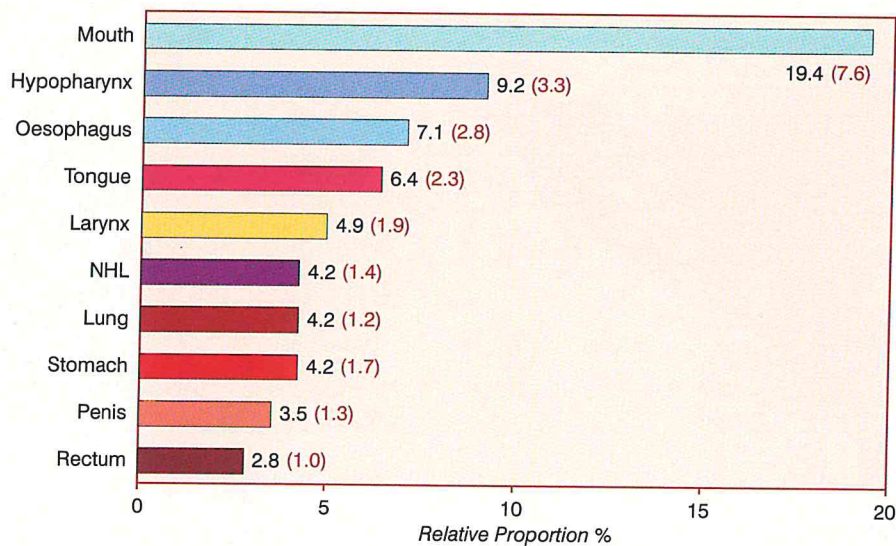
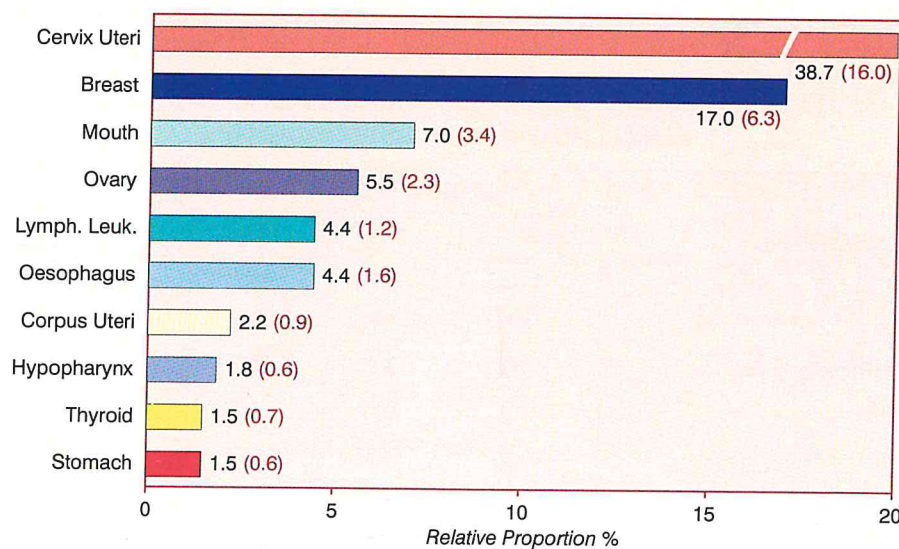
**TABLE 5.41(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	10,91,409	11,16,229	11,14,376	11,46,111	22,05,785	22,62,340
Total Cancers (All sites)	179	208	283	271	462	479
Min. Crude IR	16.4	18.6	25.3	23.3	20.9	21.0
Min. Age Adjusted IR	20.2	25.6	31.1	31.6	25.7	28.7
Min. Truncated IR	44.1	63.0	66.9	74.0	55.6	68.6

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.41(c) : Ten Leading Sites of Cancer (2002)**

(Minimum Age Adjusted Incidence Rates given in parentheses)

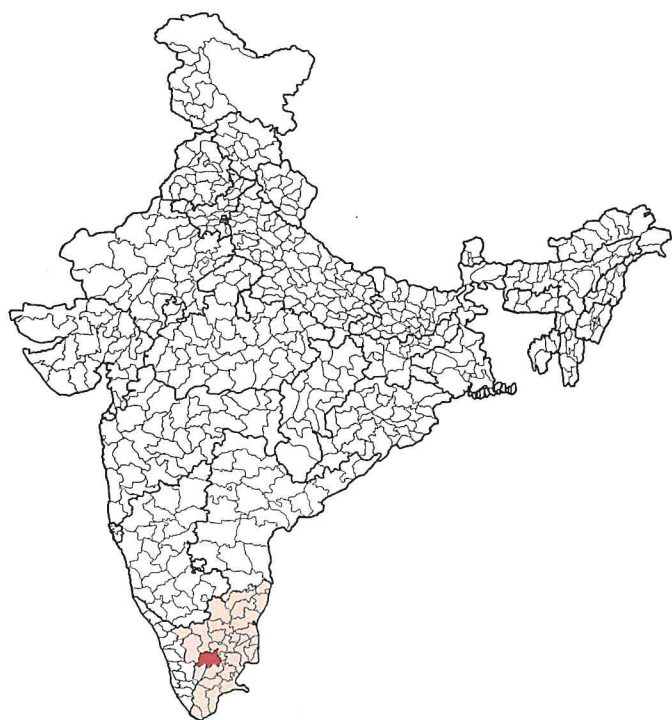
**Males****Females**

## 5.42. DINDIGUL DISTRICT, Tamil Nadu State

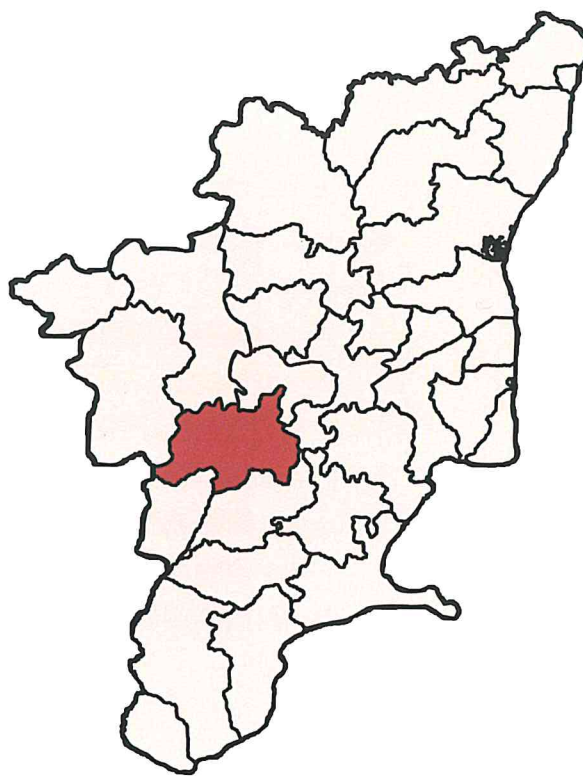
(Code 3313)

**TABLE 5.42(a) : Profile of Dindigul District (2001 Census)**

Area (in sq. kms.)	6,058.0
Decadal Growth Rate (1991-2001)	8.99%
Literacy Rate	
Males	80.29%
Females	59.30%
Sex Ratio (females per 1000 males)	986
Density (persons per sq. km)	317



**FIGURE 5.42(a) : Map of India highlighting Tamil Nadu State**



**FIGURE 5.42(b) : Map of Tamil Nadu State highlighting Dindigul District**

**TABLE 5.42(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
PBCR - Ambilikai (205)	413	78.2	402	73.2	815	75.7
HBCR - Chennai (1009)	61	11.6	55	10.0	116	10.8
GKNM Hospital, Coimbatore (54)	40	7.6	37	6.7	77	7.1
PBCR - Chennai (1004)	0	0.0	35	6.4	35	3.2
JIPMER - Pondicherry (104)	5	0.9	11	2.0	16	1.5
All Other Centres	9	1.7	9	1.6	18	1.7
<b>Total Cancers</b>	<b>528</b>	<b>100.0</b>	<b>549</b>	<b>100.0</b>	<b>1077</b>	<b>100.0</b>

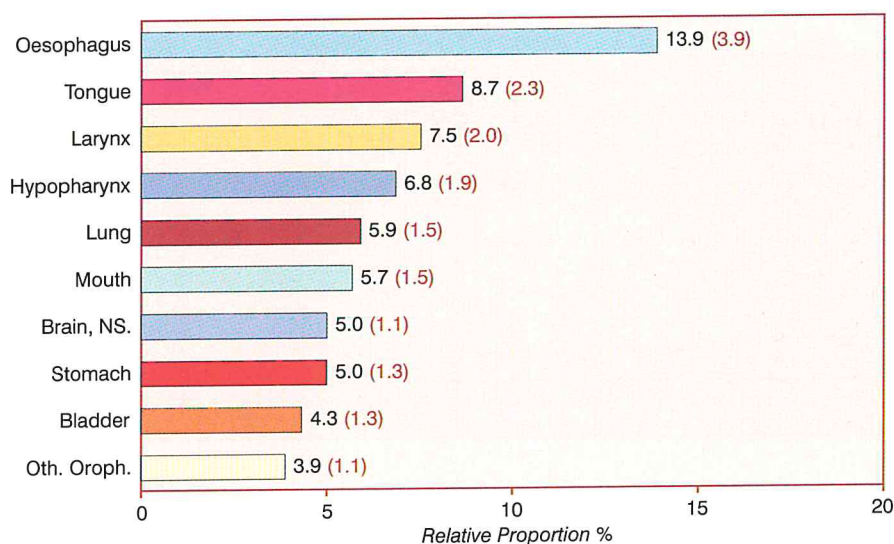
**TABLE 5.42(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	9,61,713	9,49,682	9,69,202	9,57,926	19,30,915	19,07,608
Total Cancers (All sites)	225	303	214	335	439	638
Min. Crude IR	23.4	31.9	22.1	35.0	22.7	33.5
Min. Age Adjusted IR	27.2	35.7	25.2	38.2	26.2	37.0
Min. Truncated IR	60.2	90.7	47.7	96.4	53.8	93.5

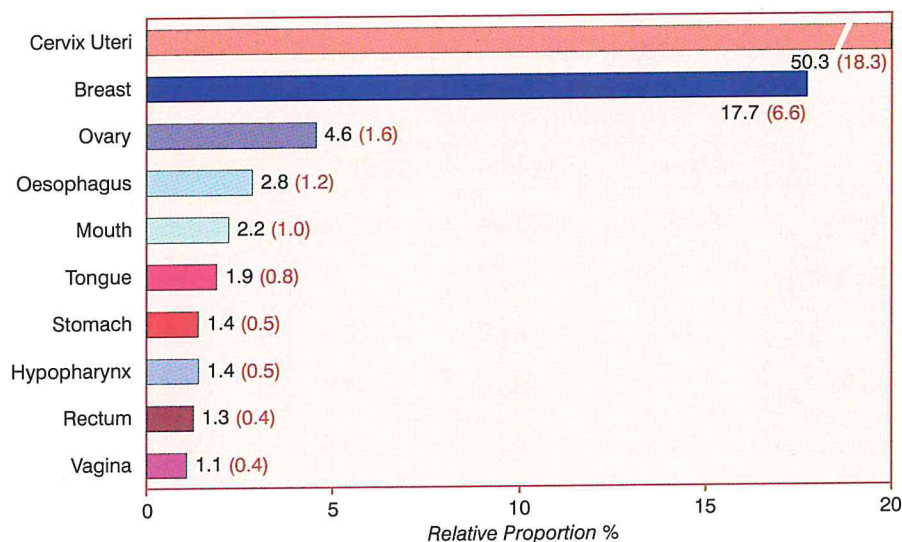
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.42(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.43. KARAIKAL DISTRICT, Pondicherry [U.T] (Code 3404)

**TABLE 5.43(a) : Profile of Karaikal District (2001 Census)**

Area (in sq. kms.)	161.0
Decadal Growth Rate (1991-2001)	17.11%
Literacy Rate	
Males	89.69%
Females	74.99%
Sex Ratio (females per 1000 males)	1,023
Density (persons per sq. km)	1,060

**TABLE 5.43(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
JIPMER, Pondicherry (104)	24	52.2	27	55.1	51	53.7
Vinayaka Missions MC, Karaikal (74)	21	45.7	6	12.2	27	28.4
HBCR - Chennai (1009)	1	2.2	15	30.6	16	16.8
PBCR - Chennai (1004)	0	0.0	1	2.0	1	1.1
<b>Total Cancers</b>	<b>46</b>	<b>100.0</b>	<b>49</b>	<b>100.0</b>	<b>95</b>	<b>100.0</b>

**TABLE 5.43(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	84,607	86,594	85,776	87,896	1,70,383	1,74,490
Total Cancers (All sites)	19	27	23	26	42	53
Min. Crude IR	22.5	31.2	26.8	29.6	24.7	30.4
Min. Age Adjusted IR	30.3	38.1	32.0	34.8	31.1	36.5
Min. Truncated IR	33.1	86.9	64.0	93.3	48.6	90.1

Min. = Minimum IR = Incidence Rate / 100,000

## 5.44. PERAMBALUR DISTRICT, Tamil Nadu State

(Code 3316)

**TABLE 5.44(a) : Profile of Perambalur District  
(2001 Census)**

Area (in sq. kms.)	1,750.8
Decadal Growth Rate (1991-2001)	7.97%
Literacy Rate	
Males	77.68%
Females	54.26%
Sex Ratio (females per 1000 males)	1,007
Density (persons per sq. km)	278

**TABLE 5.44(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
JIPMER, Pondicherry (104)	70	80.5	75	44.9	145	57.1
HBCR - Chennai (1009)	16	18.4	48	28.7	64	25.2
PBCR - Chennai (1004)	0	0.0	40	24.0	40	15.7
All Other Centres	1	1.1	4	2.4	5	2.0
<b>Total Cancers</b>	<b>87</b>	<b>100.0</b>	<b>167</b>	<b>100.0</b>	<b>254</b>	<b>100.0</b>

**TABLE 5.44(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	2,44,748	2,47,118
Total Cancers (All sites)	73	94
Min. Crude IR	29.8	38.0
Min. Age Adjusted IR	32.4	40.9
Min. Truncated IR	66.9	106.8

Min. = Minimum IR = Incidence Rate / 100,000

## STATES OF KARNATAKA & ANDHRA PRADESH

### KARNATAKA STATE:

Figure 5(M) gives the Map of India highlighting Karnataka State and Figure 5(N) gives the Map of Karnataka State highlighting the Districts where the MAAR was above 36.2 /100,000.

There were 12 districts in Karnataka that had a MAAR higher than 36.2/100,000. These 12 districts in the descending order of their MAAR were: Dakshina Kannada, Udupi, Bangalore Rural, Mysore, Kodagu, Shimoga, Hassan, Kolar, Uttara Kannada, Mandya, Chikmagalur and Chamrajanagar.

*Leading Sites of Cancer in Males:* Cancer of the oesophagus was the leading site in six of the districts constituting from 8.9% of cancers in Mandya to almost 15% of cancers in males in Chikmagalur. Cancer of the stomach was the second leading site of cancer in Udupi and Shimoga districts, the third leading site in Kolar district and the fourth leading site in Dakshina Kannada, Mysore and Chikmagalur. The Bangalore Urban PBCR has been recording cancer stomach as the leading site of cancer for almost the past 20 years. However, the Bangalore rural district shows stomach as the fifth leading site of cancer. Cancer of the lung was the second leading site in Dakshina Kannada, Mysore, Hassan and Mandya. All in all, apart from cancer stomach the tobacco related cancers predominate in the ten leading sites. Cancer of the prostate figures in the ten leading sites in Dakshina Kannada and Udupi but not in others.

*Leading Sites of Cancer in Females:* In all the districts, except Dakshina Kannada (where cancer breast is followed by cancer cervix) cancer cervix was the leading site followed by cancer breast. Cancer of the thyroid gland was the third leading site in Dakshina Kannada and this site, figures as one of ten leading sites in all the districts except Chikmagalur.

*Centre-wise Distribution of Cancers:* Kasturba Medical College Hospitals at Mangalore and Manipal were the main referral centres for the districts of Dakshina Kannada and Udupi and also partly to the patients from the districts of Uttara Kannada, Chikmagalur, Shimoga and Hassan. The Bangalore HBCR at Kidwai Memorial Institute of Oncology catered to patients from several of the districts including Bangalore Rural, Shimoga, Hassan, Kolar, Mandya and Chikmagalur. The Bharat Institute of Oncology, Mysore was the main referral centre for Mysore district and partly for Hassan district. The Karnatak Cancer Therapy & Research Institute, Hubli was the main centre for patients from Uttara Kannada district.

Kodagu district is one of the smaller districts of Karnataka. The data is available for only 2001 and the numbers are small, but the MAARs were above 36.2/100,000. The TRCs (tongue, mouth, hypopharynx, pharynx etc.) were among the leading sites in males. In females, cancer of the cervix accounted for 35.1% of all cancers in that sex. This was followed by cancer of the mouth, breast, ovary and thyroid.

In Chamrajanagar district also the TRCs dominated the leading sites in males. Cancer of the oesophagus, hypopharynx and larynx were the first three leading sites of cancer. Among females, cancer of the cervix accounted for 42.3% of all cancers followed by cancer breast, oesophagus and ovary.

### ANDHRA PRADESH STATE:

**Hyderabad District :** While several centres in Hyderabad have collaborated in the project, a couple of major centres though registered in the project, were unable to provide information on cancer cases. Also, unlike many other urban metropolis, Hyderabad has not had the benefit of having a PBCR either under the NCRP or otherwise. Because of these reasons, in contrast to other districts, the patterns of cancer for Hyderabad district have to be viewed with some caution.

Among males cancer of the stomach was the leading site of cancer followed by mouth, lung and NHL. In females cancer breast was the leading site but both cancer breast and cervix had almost identical MAAR. They accounted for 26% and 25% respectively, of all cancers in women. [Fig. 5.57(c)]. Apollo Hospitals and MNJ Institute of Oncology were the top two referral centres for the cancer patients from Hyderabad district. [Table 5.57(b)].

**Nellore District:** Cancer of the stomach was again the leading site of cancer in males in Nellore district. This was followed by four sites of cancer associated with use of tobacco - lung, hypopharynx, mouth and larynx. Unlike in Hyderabad, cancer of the cervix was the predominant leading site of cancer in women. It constituted 41.8% of all cancers in women. [Fig. 5.58(c)]. The HBCR and PBCR at Cancer Institute, Chennai were largely responsible for deciphering the pattern of cancer in this district. [Table 5.58(b)].

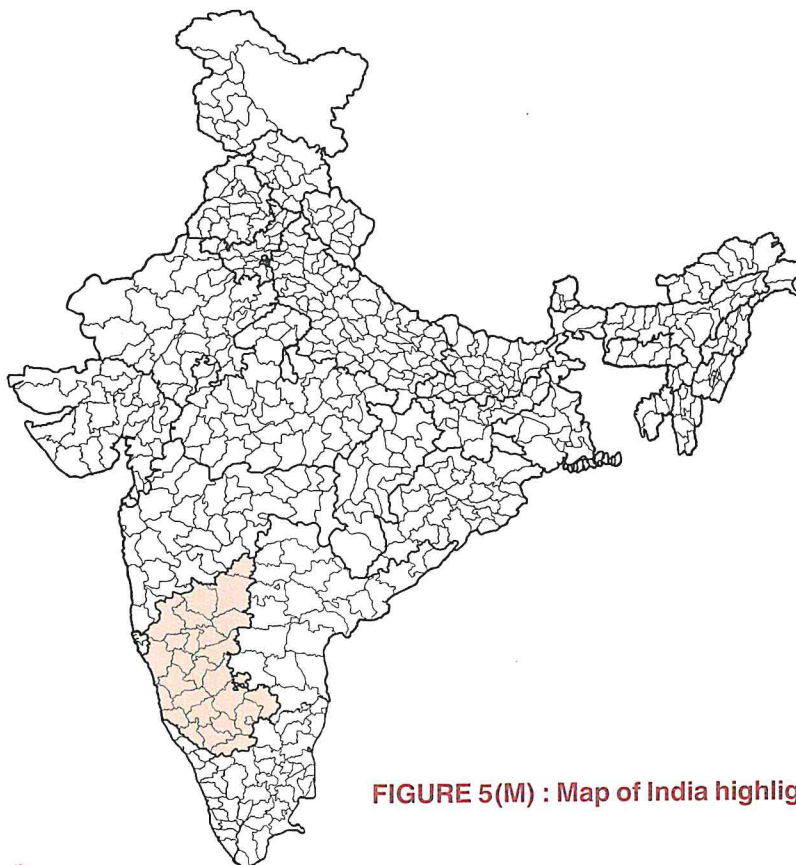


FIGURE 5(M) : Map of India highlighting Karnataka State

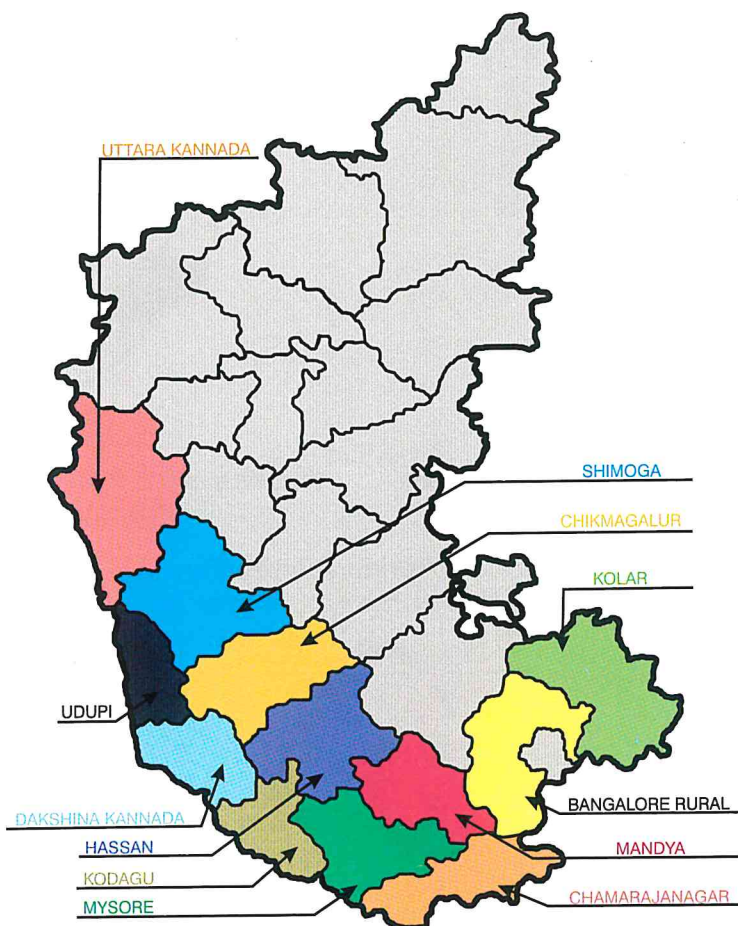


FIGURE 5(N) : Map of Karnataka State highlighting the districts with MAAR above 36.2 per 100,000

## 5.45. DAKSHINA KANNADA DISTRICT, Karnataka State (Code 2924)

**TABLE 5.45(a) : Profile of Dakshina Kannada District  
(2001 Census)**

Area (in sq. kms.)	4,560.0
Decadal Growth Rate (1991-2001)	14.51%
Literacy Rate	
Males	89.74%
Females	77.39%
Sex Ratio (females per 1000 males)	1023
Density (persons per sq. km)	416

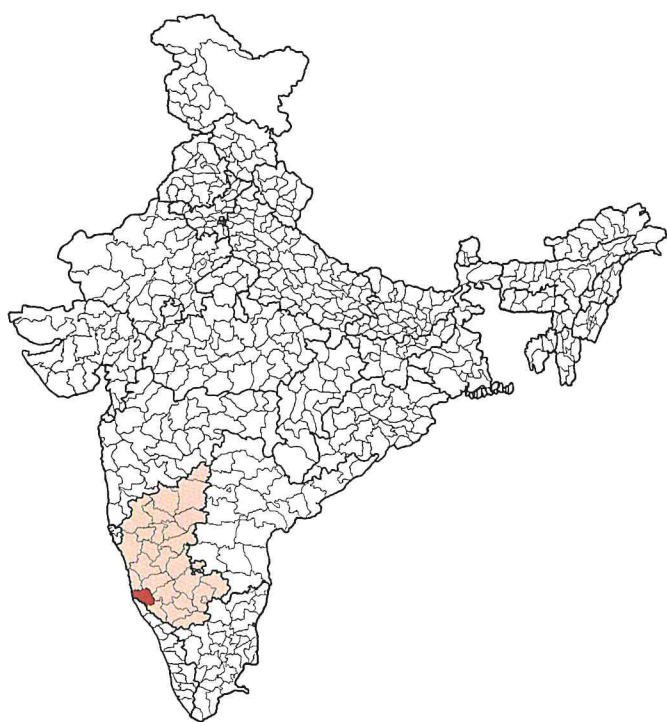


FIGURE 5.45(a) : Map of India highlighting Karnataka State

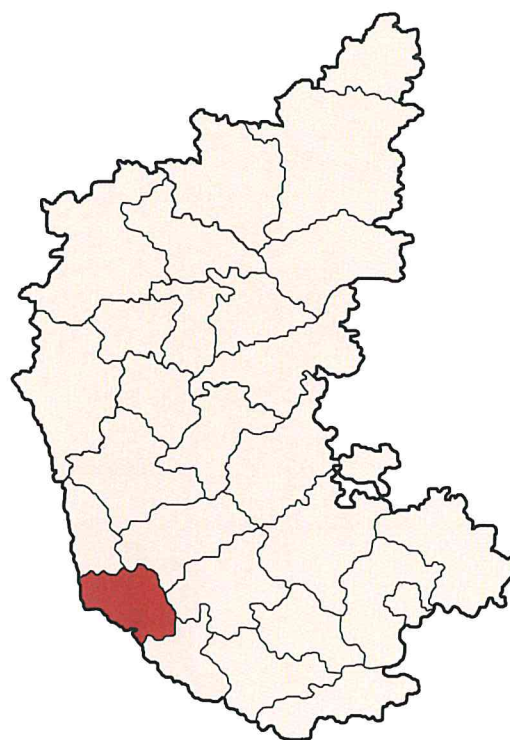


FIGURE 5.45(b) : Map of Karnataka State highlighting Dakshina Kannada District

**TABLE 5.45(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Kasturba Medical College, Mangalore (3)	537	84.0	874	89.7	1411	87.5
Kasturba Medical College, Manipal (77)	47	7.4	57	5.9	104	6.4
HBCR - Mumbai (1008)	31	4.9	35	3.6	66	4.1
All Other Centres	24	3.8	8	0.8	32	2.0
<b>Total Cancers</b>	<b>639</b>	<b>100.0</b>	<b>974</b>	<b>100.0</b>	<b>1613</b>	<b>100.0</b>

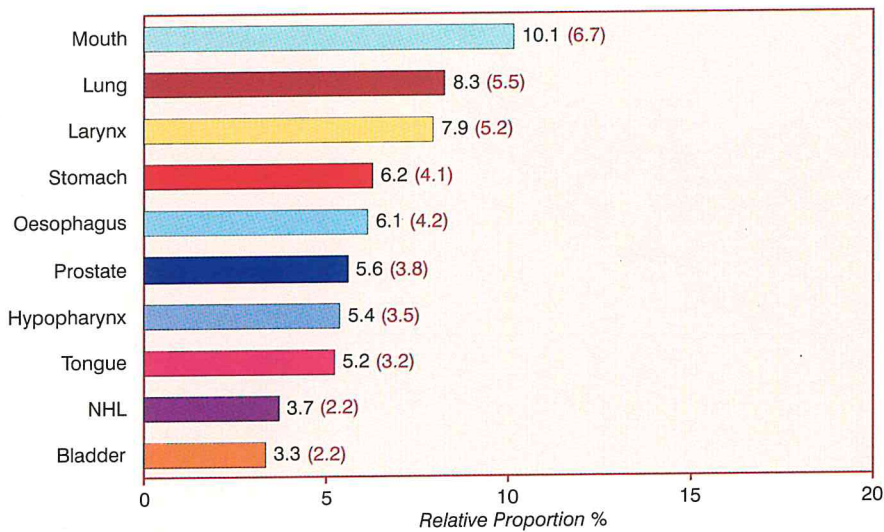
**TABLE 5.45(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	9,34,398	9,56,484	9,44,487	9,66,247	18,78,885	19,22,731
Total Cancers (All sites)	368	271	529	445	897	716
Min. Crude IR	39.4	28.3	56.0	46.1	47.7	37.2
Min. Age Adjusted IR	52.0	36.0	73.9	58.1	63.0	47.1
Min. Truncated IR	97.9	81.4	144.7	130.1	121.0	106.0

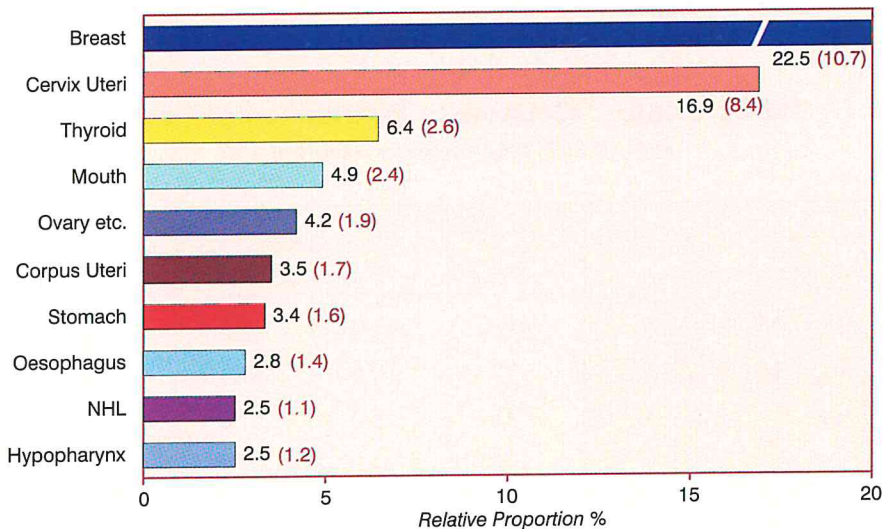
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.45(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.46. UDUPI DISTRICT, Karnataka State

(Code 2916)

**TABLE 5.46(a) : Profile of Udupi District (2001 Census)**

Area (in sq. kms.)	3,880.0
Decadal Growth Rate (1991-2001)	6.88%
Literacy Rate	
Males	86.59%
Females	74.02%
Sex Ratio (females per 1000 males)	1127
Density (persons per sq. km)	286

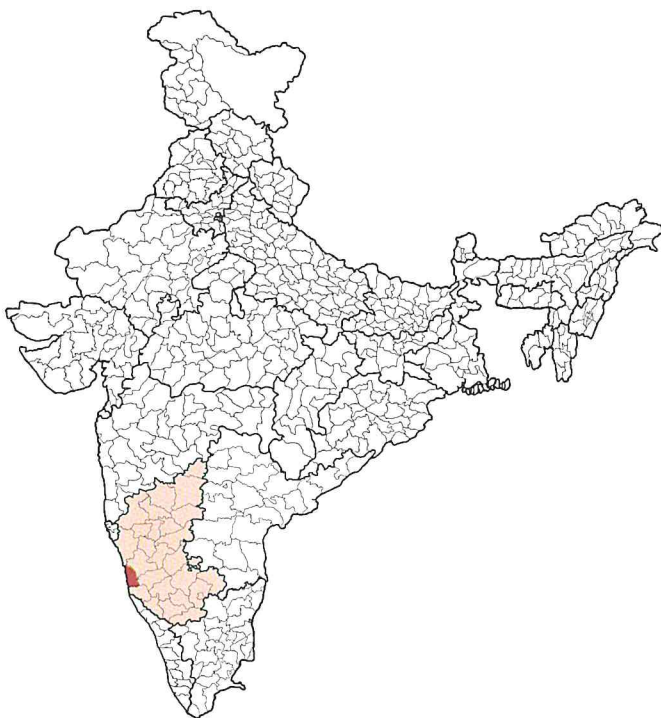


FIGURE 5.46(a) : Map of India highlighting Karnataka State

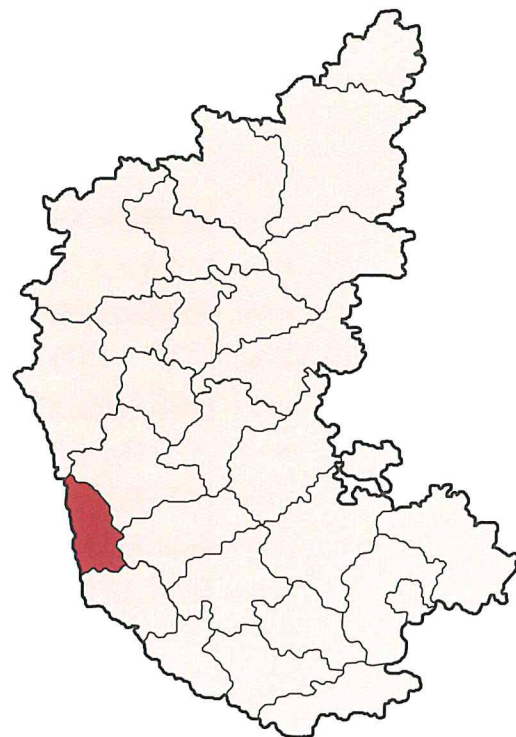


FIGURE 5.46(b) : Map of Karnataka State highlighting Udupi District

**TABLE 5.46(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Kasturba Medical College, Manipal (77)	416	81.9	392	80.3	808	81.1
Kasturba Medical College, Mangalore (3)	77	15.2	94	19.3	171	17.2
HBCR - Bangalore (1007)	15	3.0	0	0.0	15	1.5
All Other Centres	0	0.0	2	0.4	2	0.2
<b>Total Cancers</b>	<b>508</b>	<b>100.0</b>	<b>488</b>	<b>100.0</b>	<b>996</b>	<b>100.0</b>

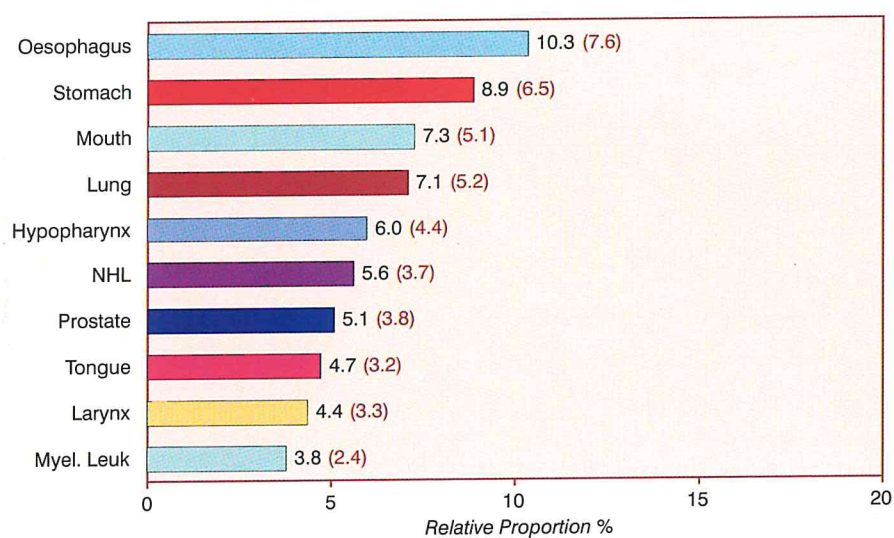
**TABLE 5.46(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	5,19,554	5,86,568	5,24,645	5,92,584	10,44,199	11,79,152
Total Cancers (All sites)	291	217	260	228	551	445
Min. Crude IR	56.0	37.0	49.6	38.5	52.8	37.7
Min. Age Adjusted IR	73.4	45.9	65.4	48.4	69.4	47.2
Min. Truncated IR	140.8	99.9	120.7	103.5	130.7	101.7

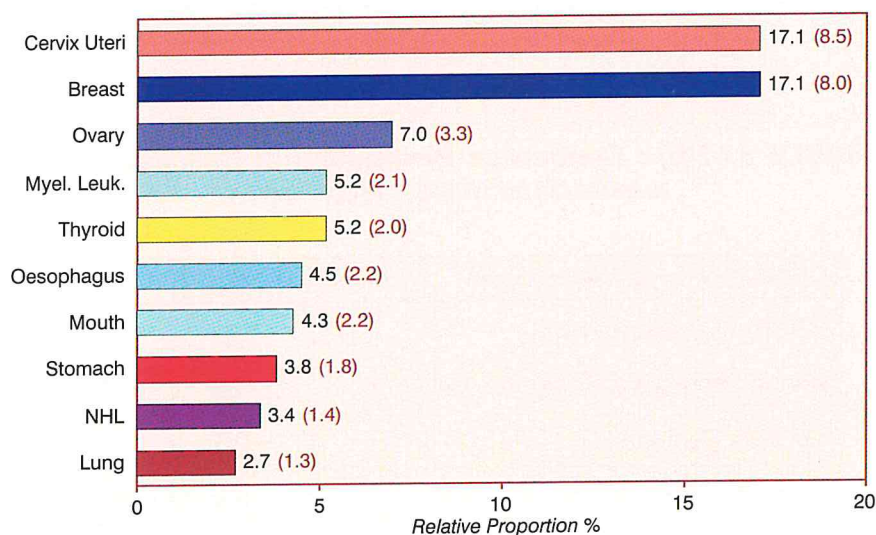
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.46(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.47. BANGALORE RURAL DISTRICT, Karnataka State

(Code 2921)

**TABLE 5.47(a) : Profile of Bangalore Rural District  
(2001 Census)**

Area (in sq. kms.)	5,815.0
Decadal Growth Rate (1991-2001)	12.21%
Literacy Rate	
Males	74.43%
Females	55.12%
Sex Ratio (females per 1000 males)	953
Density (persons per sq. km)	323

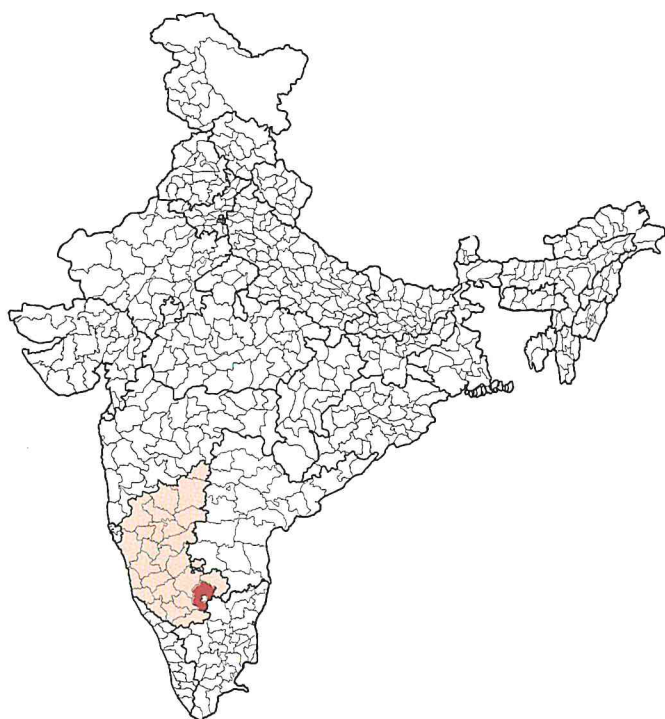


FIGURE 5.47(a) : Map of India highlighting Karnataka State

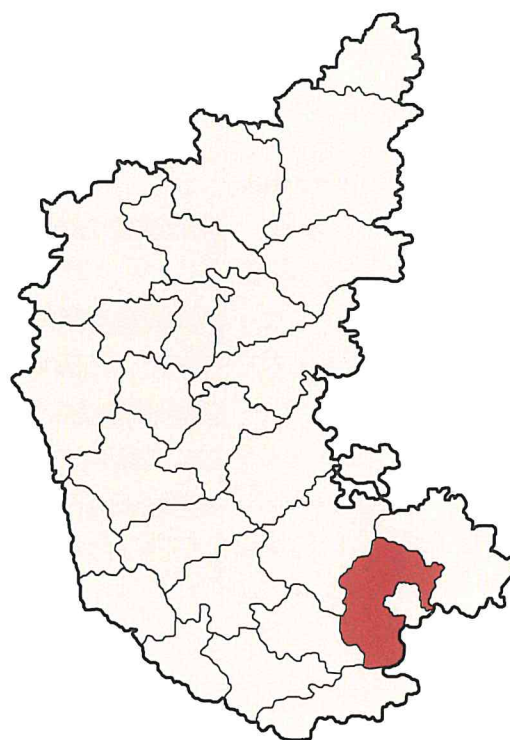


FIGURE 5.47(b) : Map of Karnataka State highlighting Bangalore Rural District

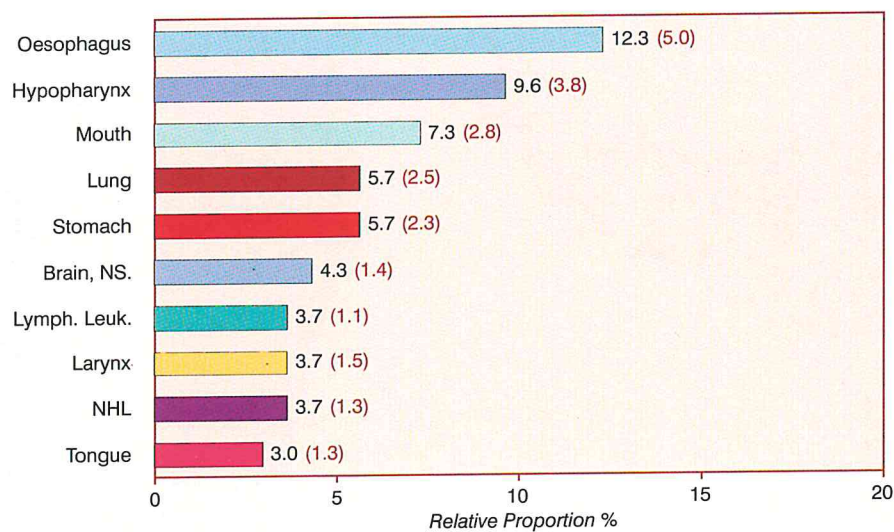
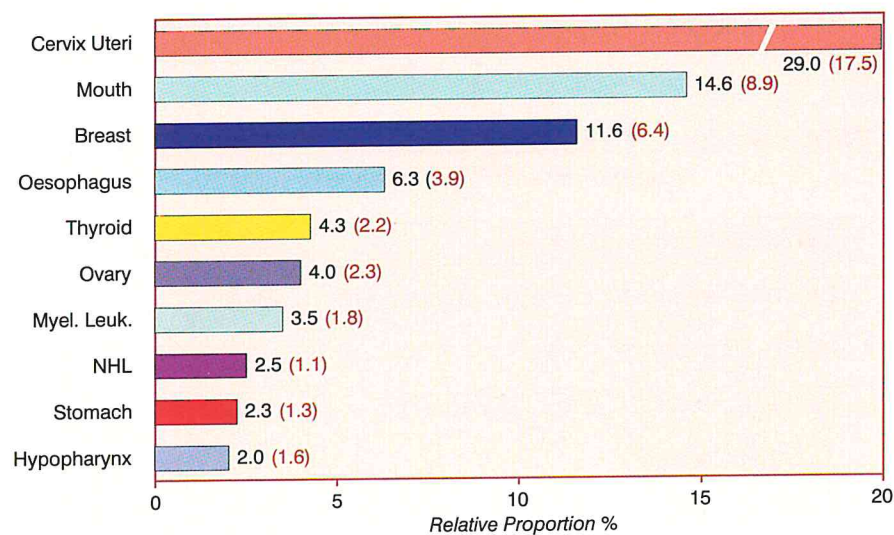
**TABLE 5.47(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Bangalore (1007)	669	95.8
Anand Laboratory, Bangalore (59)	26	3.7
All Other Centres	3	0.4
<b>Total Cancers</b>	<b>698</b>	<b>100.0</b>

**TABLE 5.47(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	9,57,807	9,13,285
Total Cancers (All sites)	301	397
Min. Crude IR	31.4	43.5
Min. Age Adjusted IR	39.1	58.3
Min. Truncated IR	68.9	130.2

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.47(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.48. MYSORE DISTRICT, Karnataka State

(Code 2926)

**TABLE 5.48(a) : Profile of Mysore District (2001 Census)**

Area (in sq. kms.)	6,854.0
Decadal Growth Rate (1991-2001)	15.04%
Literacy Rate	
Males	71.30%
Females	55.81%
Sex Ratio (females per 1000 males)	965
Density (persons per sq. km)	383

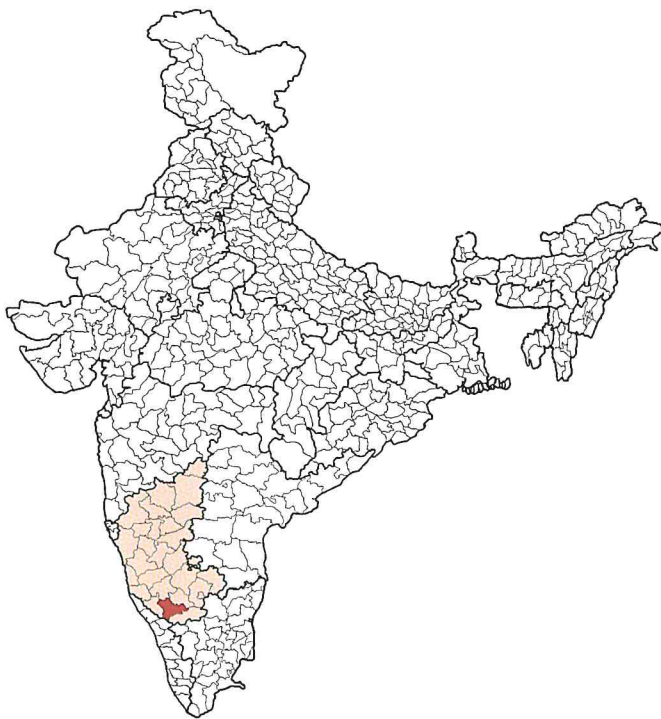


FIGURE 5.48(a) : Map of India highlighting Karnataka State

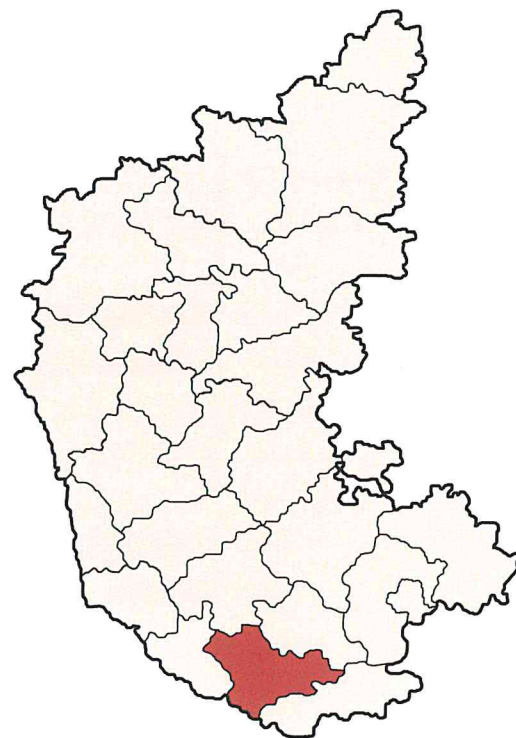


FIGURE 5.48(b) : Map of Karnataka State highlighting Mysore District

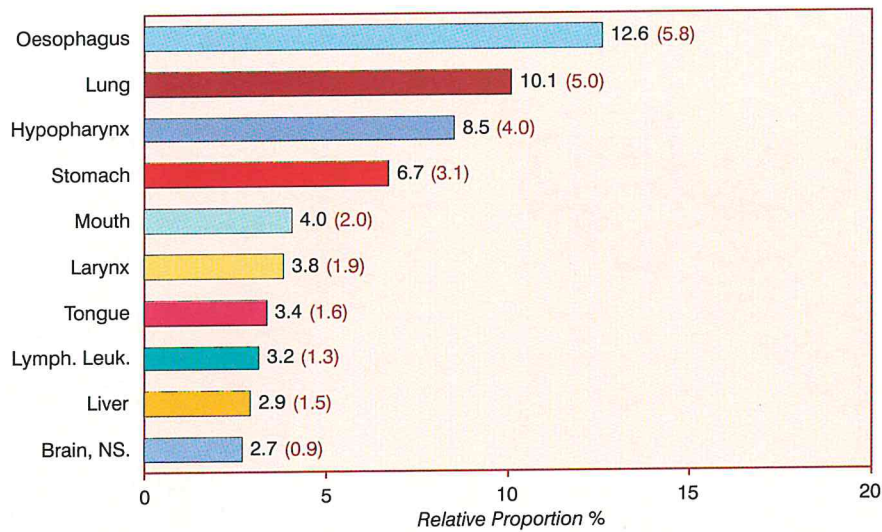
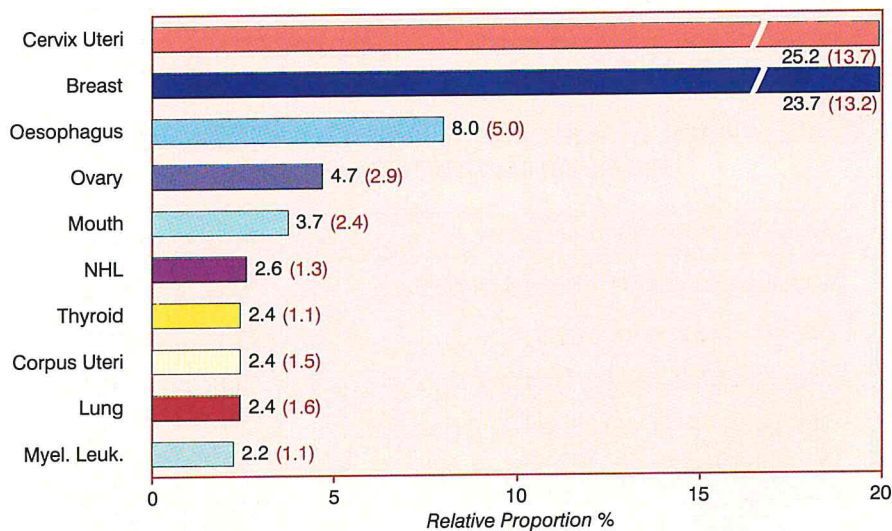
**TABLE 5.48(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Bharath Institute of Oncology, Mysore (135)	648	66.1
HBCR - Bangalore (1007)	317	32.3
Kasturba Medical College, Manipal (77)	6	0.6
All Other Centres	10	1.0
<b>Total Cancers</b>	<b>981</b>	<b>100.0</b>

**TABLE 5.48(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	13,32,931	12,87,596
Total Cancers (All sites)	445	536
Min. Crude IR	33.4	41.6
Min. Age Adjusted IR	44.7	56.7
Min. Truncated IR	69.5	125.8

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.48(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.49. SHIMOGA DISTRICT, Karnataka State

(Code 2915)

**TABLE 5.49(a) : Profile of Shimoga District (2001 Census)**

Area (in sq. kms.)	8,477.0
Decadal Growth Rate (1991-2001)	12.90%
Literacy Rate	
Males	82.32%
Females	67.24%
Sex Ratio (females per 1000 males)	977
Density (persons per sq. km)	193

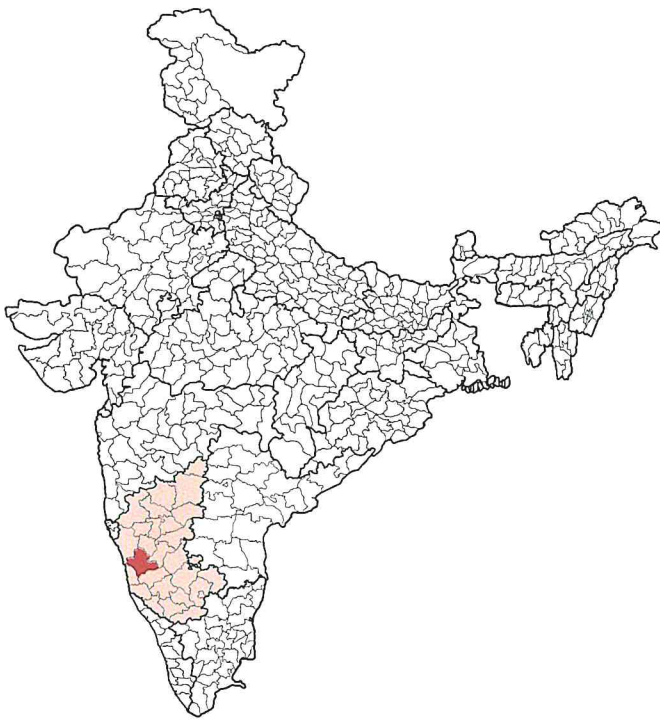


FIGURE 5.49(a) : Map of India highlighting Karnataka State

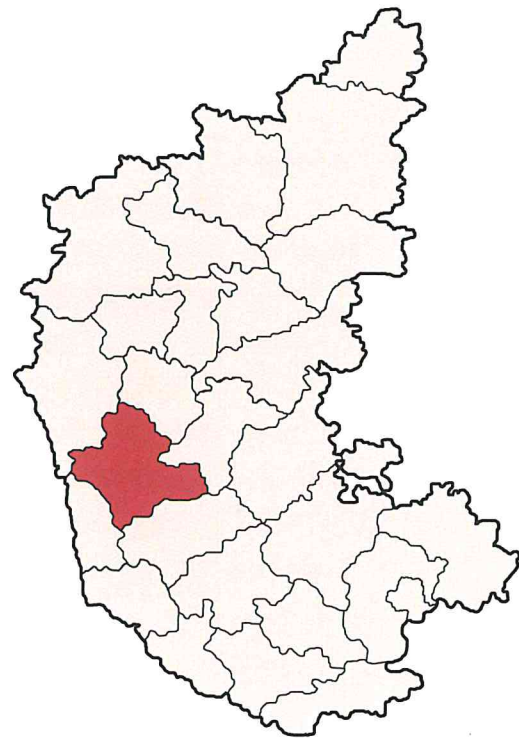


Fig. 5.49(b) : Map of Karnataka State highlighting Shimoga District

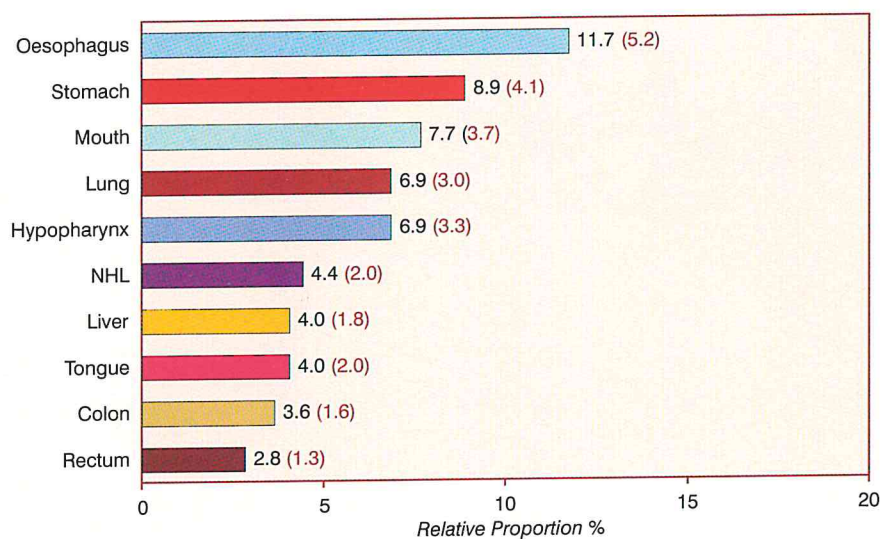
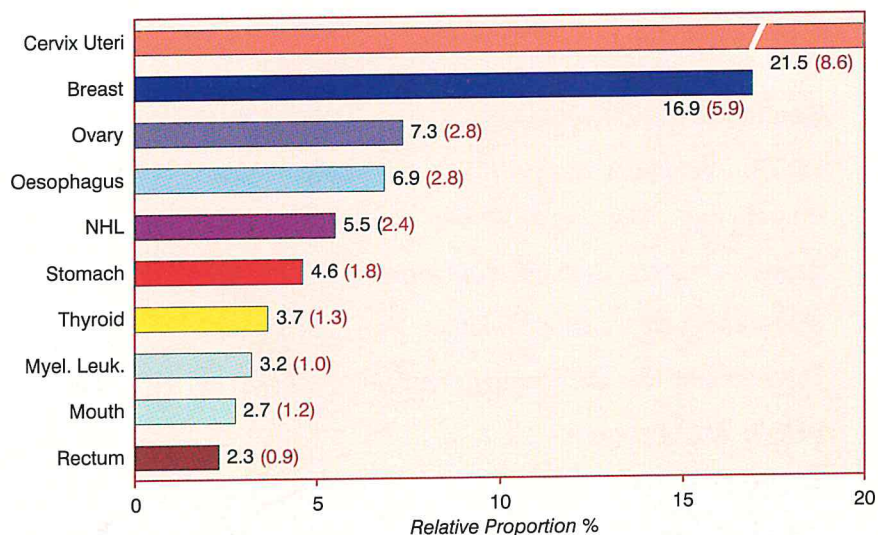
**TABLE 5.49(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Kasturba Medical College, Manipal (77)	203	43.5
HBCR - Bangalore (1007)	223	47.8
The Karnatak Cancer Therapy, Hubli (15)	30	6.4
Kasturba Medical College, Mangalore (3)	3	0.6
All Other Centres	8	1.7
<b>Total Cancers</b>	<b>467</b>	<b>100.0</b>

**TABLE 5.49(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	8,31,623	8,11,604
Total Cancers (All sites)	248	219
Min. Crude IR	29.8	27.0
Min. Age Adjusted IR	44.2	38.4
Min. Truncated IR	67.1	95.0

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.49(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.50. HASSAN DISTRICT, Karnataka State

(Code 2923)

**TABLE 5.50(a) : Profile of Hassan District (2001 Census)**

Area (in sq. kms.)	6,814.0
Decadal Growth Rate (1991-2001)	9.66%
Literacy Rate	
Males	78.29%
Females	59.32%
Sex Ratio (females per 1000 males)	1,005
Density (persons per sq. km)	253

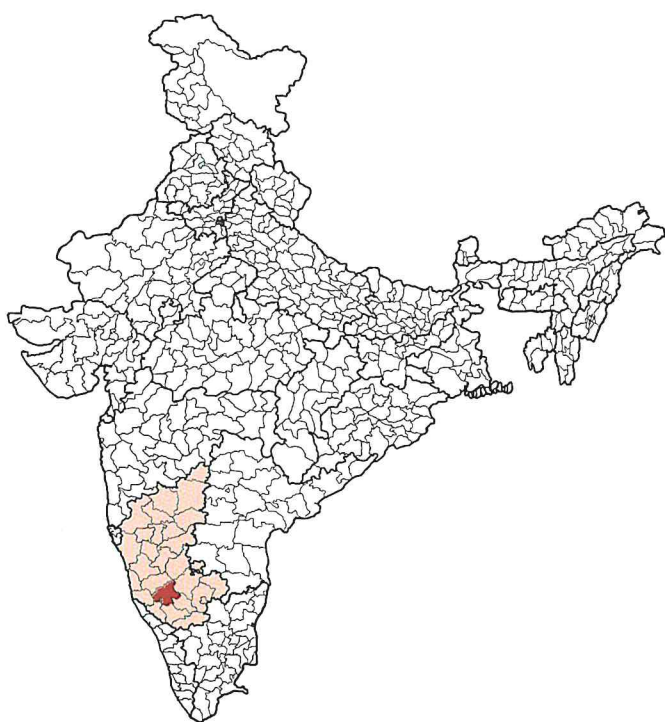


FIGURE 5.50(a) : Map of India highlighting Karnataka State

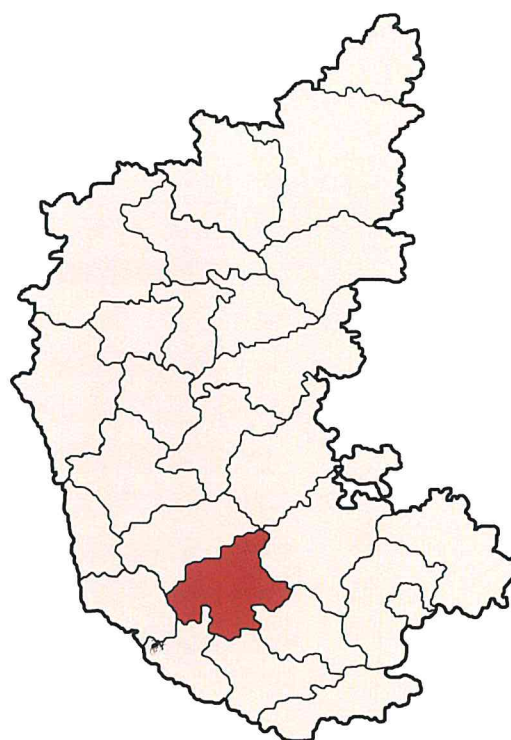


FIGURE 5.50(b) : Map of Karnataka State highlighting Hassan District

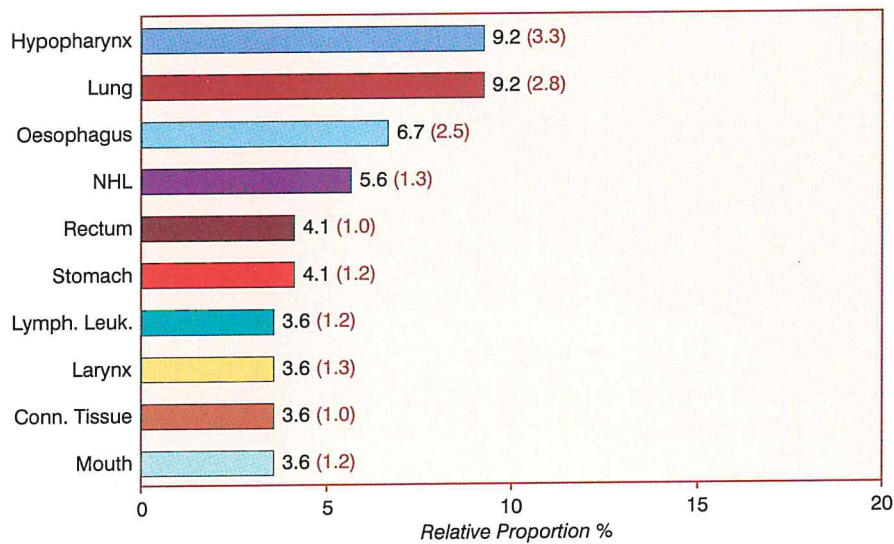
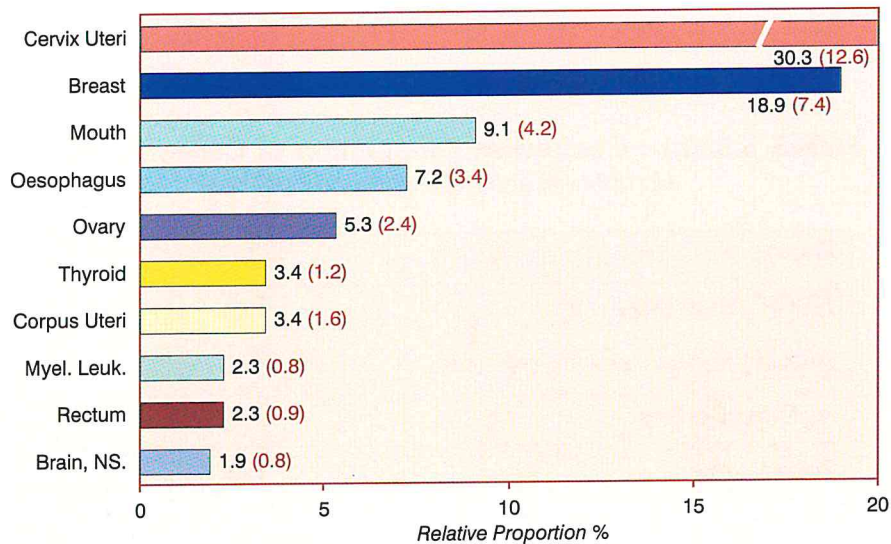
**TABLE 5.50(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Bangalore (1007)	316	68.8
Bharath Inst. of Oncology, Mysore (135)	115	25.1
Kasturba Medical College, Mangalore (3)	11	2.4
Kasturba Medical College, Manipal (77)	12	2.6
The Karnatak Cancer Therapy, Hubli (15)	1	0.2
HBCR - Mumbai (1008)	2	0.4
All Other Centres	2	0.4
<b>Total Cancers</b>	<b>459</b>	<b>100.0</b>

**TABLE 5.50(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	8,55,074	8,59,677
Total Cancers (All sites)	195	264
Min. Crude IR	22.8	30.7
Min. Age Adjusted IR	30.4	41.4
Min. Truncated IR	57.3	97.9

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.50(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.51. KOLAR DISTRICT, Karnataka State

(Code 2919)

**TABLE 5.51(a) : Profile of Kolar District (2001 Census)**

Area (in sq. kms.)	8,223.0
Decadal Growth Rate (1991-2001)	13.83%
Literacy Rate	
Males	73.14%
Females	52.81%
Sex Ratio (females per 1000 males)	970
Density (persons per sq. km)	307

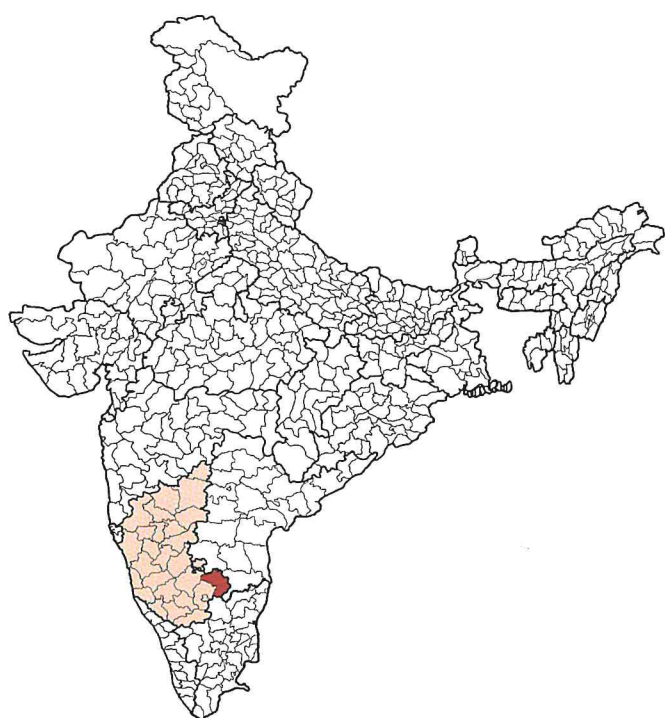


FIGURE 5.51(a) : Map of India highlighting Karnataka State

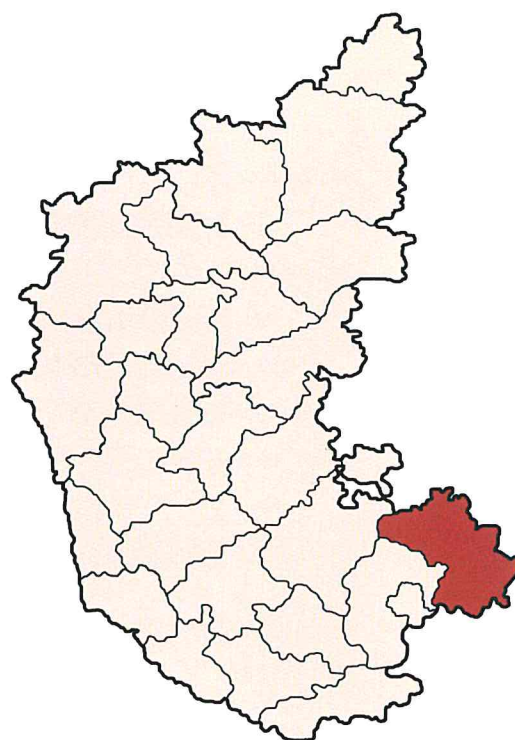


FIGURE 5.51(b) : Map of Karnataka State highlighting Kolar District

**TABLE 5.51(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Bangalore (1007)	630	94.9
Anand Laboratory, Bangalore (59)	22	3.3
All Other Centres	12	1.8
<b>Total Cancers</b>	<b>664</b>	<b>100.0</b>

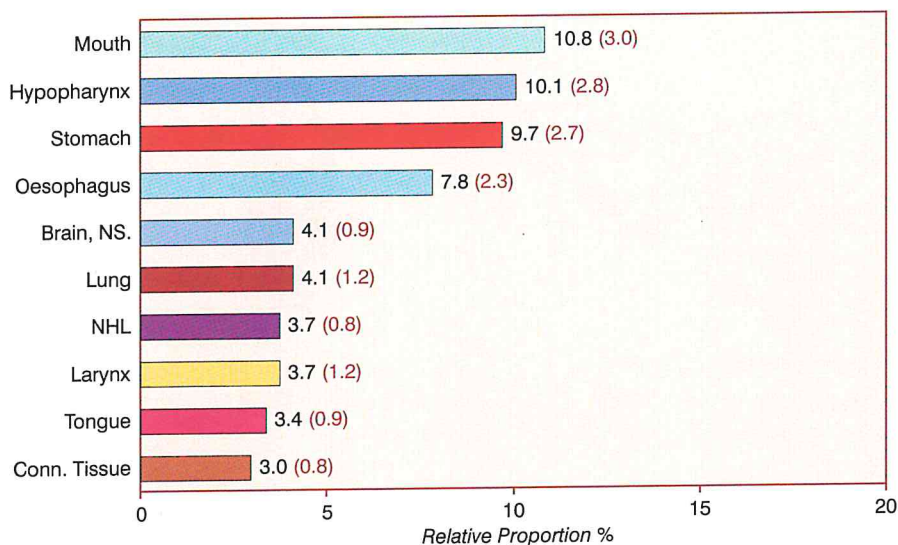
**TABLE 5.51(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	12,79,851	12,42,506
Total Cancers (All sites)	268	396
Min. Crude IR	20.9	31.9
Min. Age Adjusted IR	26.6	41.0
Min. Truncated IR	53.1	100.0

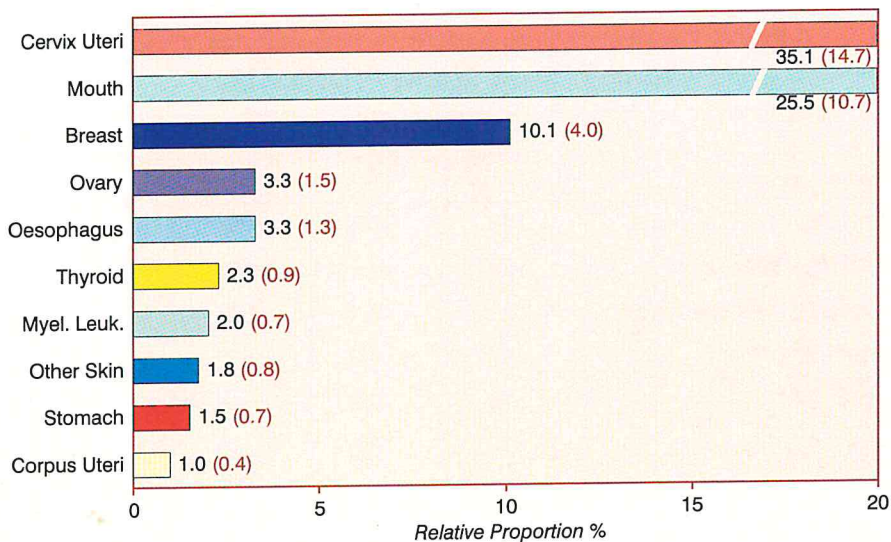
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.51(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.52. UTTARA KANNADA DISTRICT, Karnataka State

(Code 2910)

**TABLE 5.52(a) : Profile of Uttara Kannada District (2001 Census)**

Area (in sq. kms.)	10,291.0
Decadal Growth Rate (1991-2001)	10.90%
Literacy Rate	
Males	84.48%
Females	68.48%
Sex Ratio (females per 1000 males)	970
Density (persons per sq. km)	132

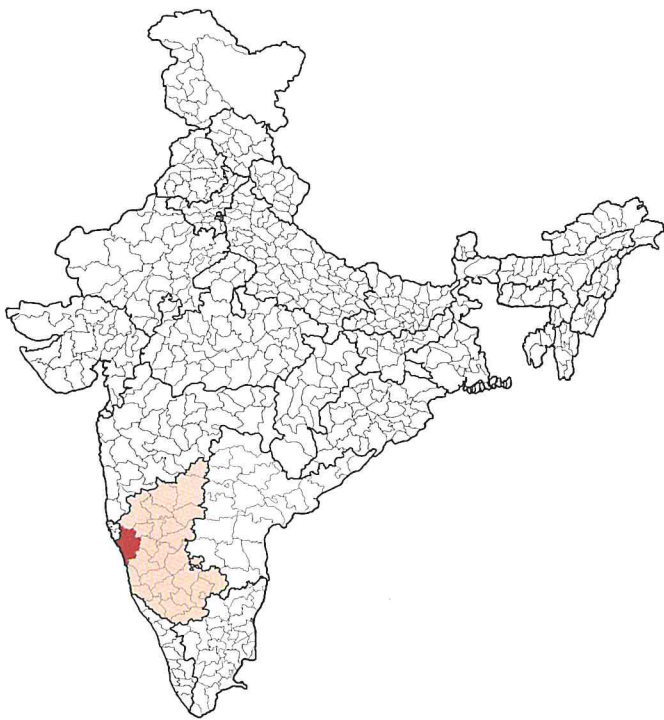


FIGURE 5.52(a) : Map of India highlighting Karnataka State

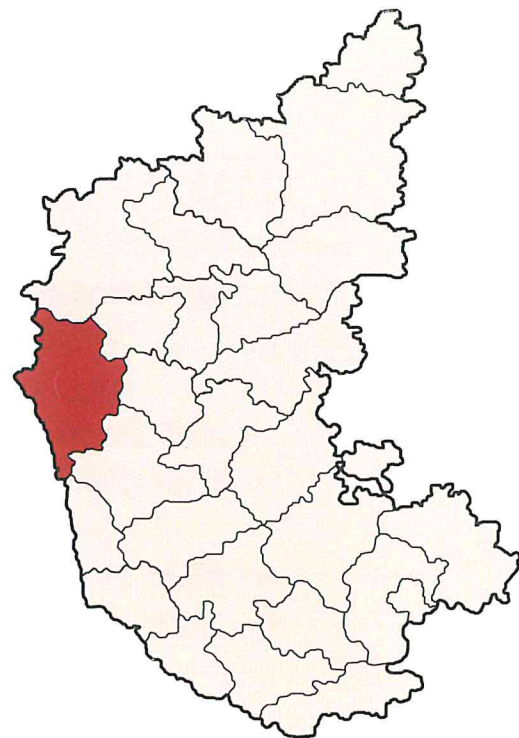


FIGURE 5.52(b) : Map of Karnataka State highlighting Uttara Kannada District

**TABLE 5.52(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The Karnatak Cancer Therapy, Hubli (15)	143	37.5	163	44.3	306	40.9
Kasturba Medical College, Manipal (77)	155	40.7	118	32.1	273	36.4
Kasturba Medical College, Mangalore (3)	31	8.1	37	10.1	68	9.1
Goa Medical College, Goa (100)	7	1.8	32	8.7	39	5.2
HBCR - Mumbai (1008)	15	3.9	15	4.1	30	4.0
HBCR - Bangalore (1007)	26	6.8	0	0.0	26	3.5
All Other Centres	4	1.0	3	0.8	7	0.9
<b>Total Cancers</b>	<b>381</b>	<b>100.0</b>	<b>368</b>	<b>100.0</b>	<b>749</b>	<b>100.0</b>

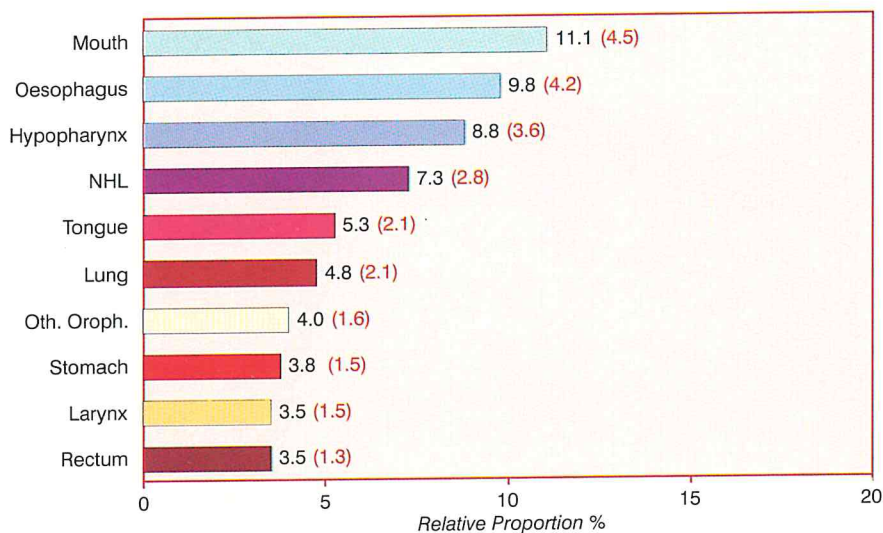
**TABLE 5.52(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	6,85,762	6,65,865	6,92,355	6,72,503	13,78,117	13,38,368
Total Cancers (All sites)	202	179	196	172	398	351
Min. Crude IR	29.5	26.9	28.3	25.6	28.9	26.2
Min. Age Adjusted IR	39.6	36.2	39.6	32.1	39.6	34.7
Min. Truncated IR	81.1	85.3	67.6	78.7	74.6	82.1

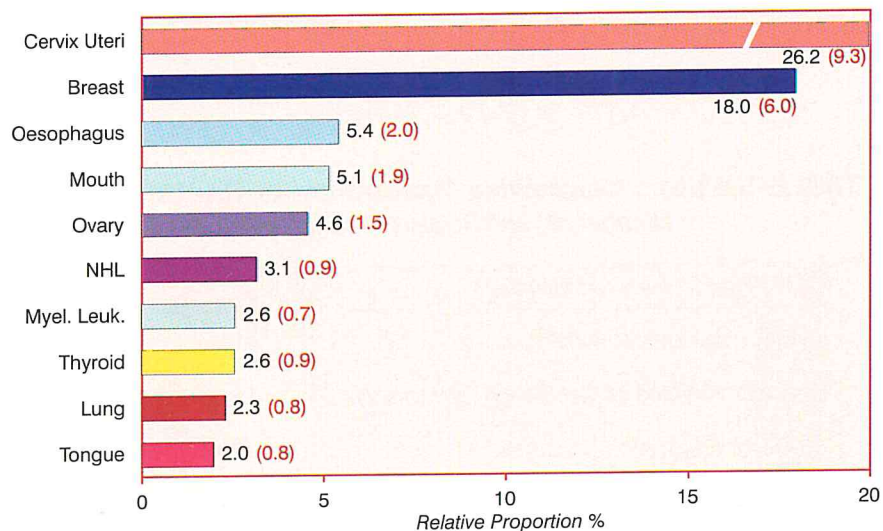
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.52(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
*(Minimum Age Adjusted Incidence Rates given in parentheses)*

**Males**



**Females**



## 5.53. MANDYA DISTRICT, Karnataka State

(Code 2922)

**TABLE 5.53(a) : Profile of Mandya District (2001 Census)**

Area (in sq. kms.)	4,961.0
Decadal Growth Rate (1991-2001)	7.14%
Literacy Rate	
Males	70.71%
Females	51.62%
Sex Ratio (females per 1000 males)	985
Density (persons per sq. km)	355

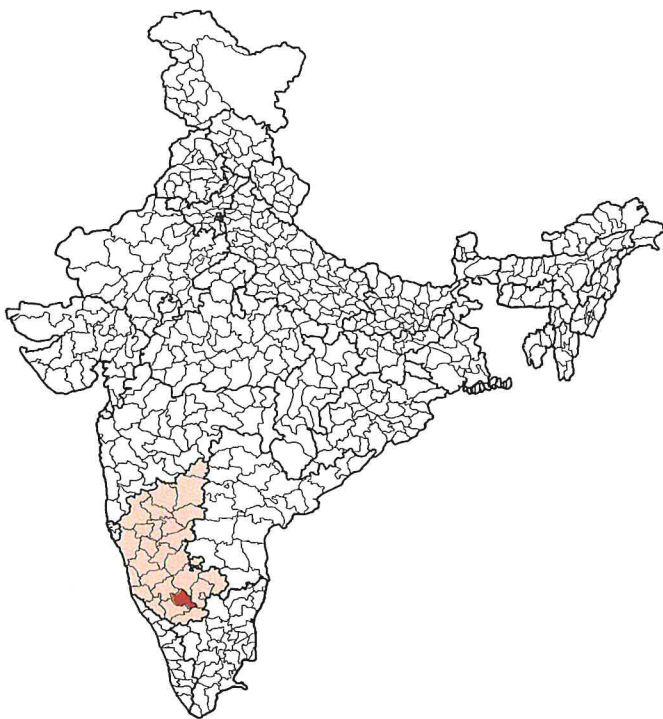


FIGURE 5.53(a) : Map of India highlighting Karnataka State

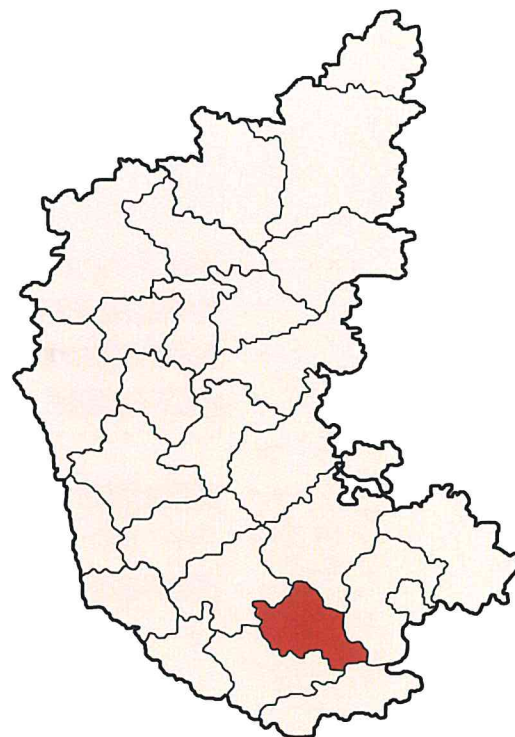


FIGURE 5.53(b) : Map of Karnataka State highlighting Mandya District

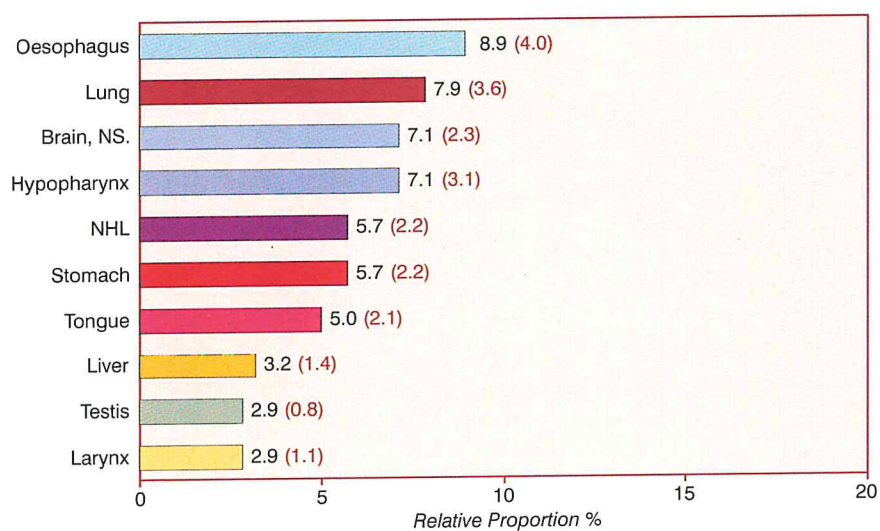
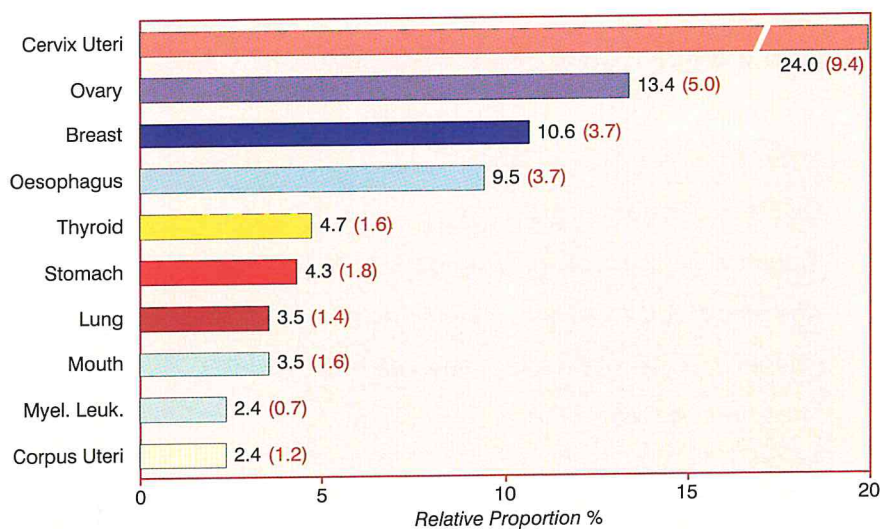
**TABLE 5.53(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Bangalore (1007)	413	77.3
Bharath Institute of Oncology, Mysore (135)	111	20.8
All Other Centres	10	1.9
<b>Total Cancers</b>	<b>534</b>	<b>100.0</b>

**TABLE 5.53(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	8,85,888	8,73,997
Total Cancers (All sites)	280	254
Min. Crude IR	31.6	29.1
Min. Age Adjusted IR	39.4	38.2
Min. Truncated IR	75.4	77.2

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.53(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.54. CHIKMAGALUR DISTRICT, Karnataka State

(Code 2917)

**TABLE 5.54(a) : Profile of Chikmagalur District  
(2001 Census)**

Area (in sq. kms.)	7,201.0
Decadal Growth Rate (1991-2001)	11.98%
Literacy Rate	
Males	80.68%
Females	64.47%
Sex Ratio (females per 1000 males)	984
Density (persons per sq. km)	158

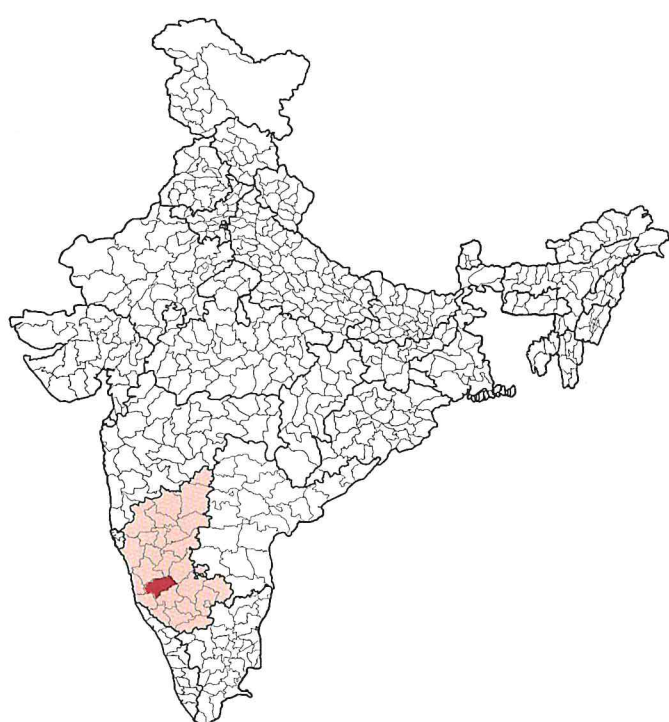


FIGURE 5.54(a) : Map of India highlighting Karnataka State

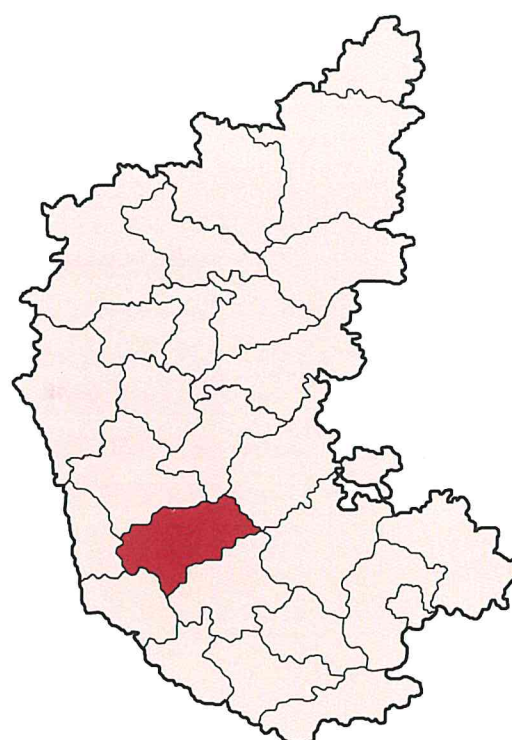


FIGURE 5.54(b) : Map of Karnataka State highlighting Chikmagalur District

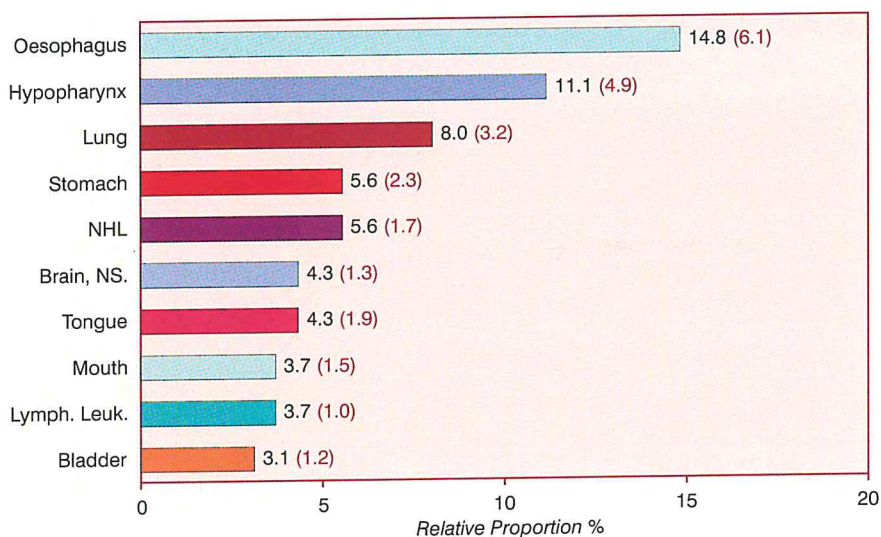
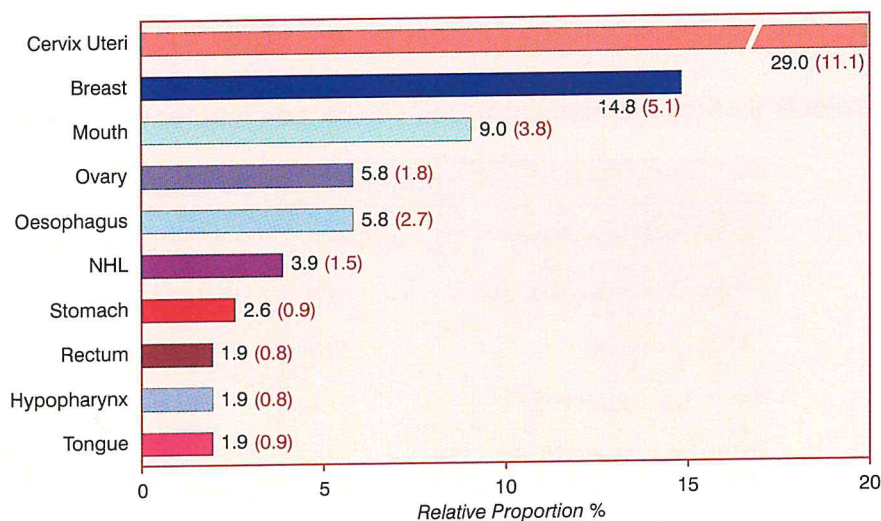
**TABLE 5.54(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Bangalore (1007)	173	54.6
Kasturba Medical College, Manipal (77)	90	28.4
Kasturba Medical College, Mangalore (3)	24	7.6
Bharath Institute of Oncology, Mysore (135)	27	8.5
The Karnatak Cancer Therapy, Hubli (15)	2	0.6
All Other Centres	1	0.3
<b>Total Cancers</b>	<b>317</b>	<b>100.0</b>

**TABLE 5.54(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	5,71,900	5,63,519
Total Cancers (All sites)	162	155
Min. Crude IR	28.3	27.5
Min. Age Adjusted IR	38.1	38.3
Min. Truncated IR	67.3	89.0

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.54(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.55. KODAGU DISTRICT, Karnataka State (Code 2925)

**TABLE 5.55(a) : Profile of Kodagu District (2001 Census)**

Area (in sq. kms.)	4,102.0
Decadal Growth Rate (1991-2001)	11.64%
Literacy Rate	
Males	83.80%
Females	72.53%
Sex Ratio (females per 1000 males)	996
Density (persons per sq. km)	133

**TABLE 5.55(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Bharath Insti. of Oncology, Mysore (135)	97	49.7
HBCR - Bangalore (1007)	68	34.9
Kasturba Medical College, Mangalore (3)	17	8.7
Kasturba Medical College, Manipal (77)	11	5.6
All Other Centres	2	1.0
<b>Total Cancers</b>	<b>195</b>	<b>100.0</b>

**TABLE 5.55(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	2,73,092	2,72,173
Total Cancers (All sites)	84	111
Min. Crude IR	30.8	40.8
Min. Age Adjusted IR	41.4	54.9
Min. Truncated IR	78.7	115.9

Min. = Minimum IR = Incidence Rate / 100,000

## 5.56. CHAMARAJANAGAR DISTRICT, Karnataka State

(Code 2927)

**TABLE 5.56(a) : Profile of Chamarajanagar District (2001 Census)**

Area (in sq. kms.)	5,101.0
Decadal Growth Rate (1991-2001)	9.16%
Literacy Rate	
Males	59.25%
Females	43.02%
Sex Ratio (females per 1000 males)	968
Density (persons per sq. km)	383

**TABLE 5.56(b) : Centrewise Distribution of Cancers (2001)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Bharath Insti. of Oncology, Mysore (135)	134	52.8
HBCR - Bangalore (1007)	120	47.2
All Other Centres	0	0.0
<b>Total Cancers</b>	<b>254</b>	<b>100.0</b>

**TABLE 5.56(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	4,81,586	4,66,547
Total Cancers (All sites)	124	130
Min. Crude IR	25.4	27.4
Min. Age Adjusted IR	34.0	37.3
Min. Truncated IR	60.7	89.7

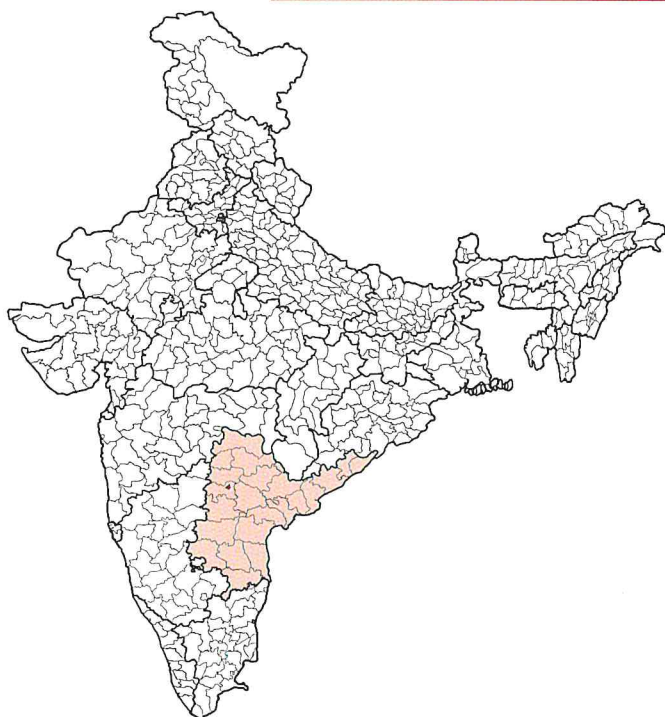
Min. = Minimum IR = Incidence Rate / 100,000

## 5.57. HYDERABAD DISTRICT, Andhra Pradesh State

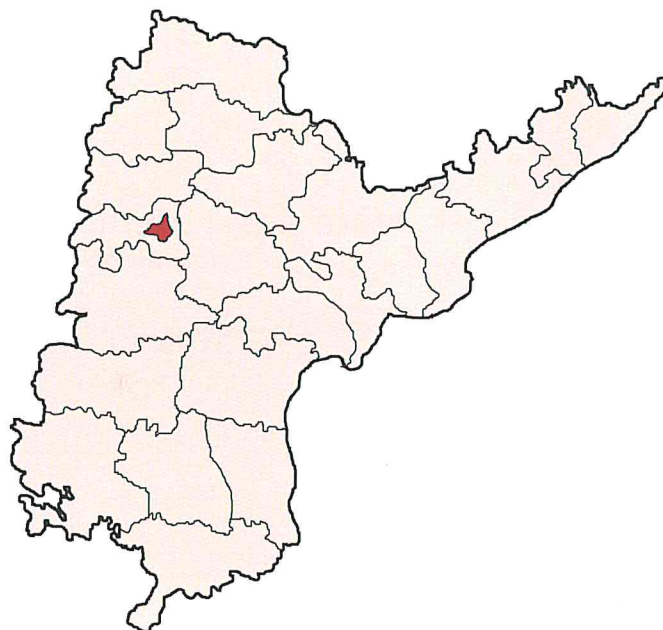
(Code 2805)

**TABLE 5.57(a) : Profile of Hyderabad District  
(2001 Census)**

Area (in sq. kms.)	217.0
Decadal Growth Rate (1991-2001)	17.18%
Literacy Rate	
Males	84.11%
Females	73.67%
Sex Ratio (females per 1000 males)	945
Density (persons per sq. km)	6,988



**FIGURE 5.57(a) : Map of India highlighting Andhra Pradesh State**



**FIGURE 5.57(b) : Map of Andhra Pradesh State highlighting Hyderabad District**

**TABLE 5.57(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Apollo Hospitals, Hyderabad (43)	325	38.7	253	36.5	578	37.7
MNJ Institute of Oncology, Hyderabad (57)	217	25.9	149	21.5	366	23.9
Gandhi Medical College, Hyderabad (13)	80	9.5	114	16.5	194	12.7
NPL, Hyderabad (89)	73	8.7	104	15.0	177	11.6
HBCR - Mumbai (1008)	47	5.6	38	5.5	85	5.5
NIN - Hyderabad (200)	51	6.1	1	0.1	52	3.4
HBCR - Chennai (1009)	15	1.8	9	1.3	24	1.6
IACI, Hyderabad (78)	12	1.4	7	1.0	19	1.2
All Other Centres	19	2.3	18	2.6	37	2.4
<b>Total Cancers</b>	<b>839</b>	<b>100.0</b>	<b>693</b>	<b>100.0</b>	<b>1532</b>	<b>100.0</b>

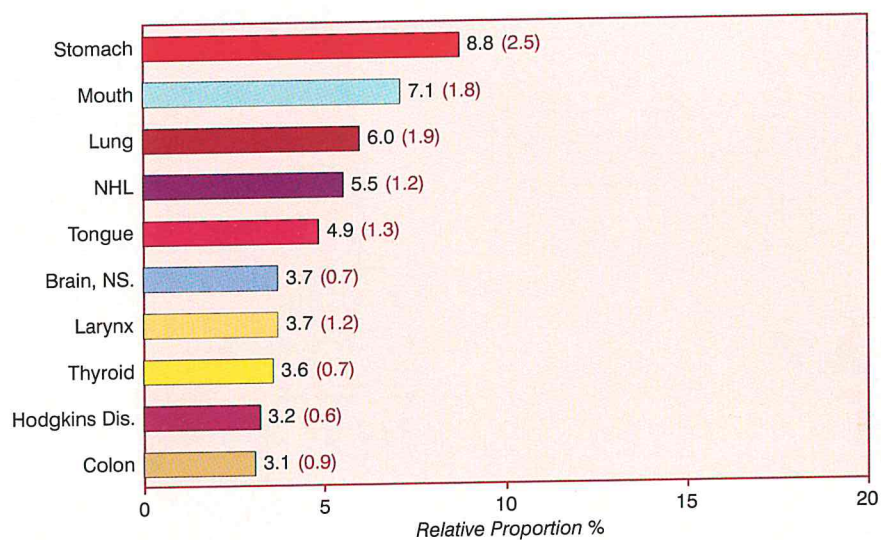
**TABLE 5.57(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	18,89,469	17,85,964	19,16,039	18,13,194	38,05,508	35,99,158
Total Cancers (All sites)	347	492	270	423	617	915
Min. Crude IR	18.4	27.6	14.1	23.3	16.2	25.4
Min. Age Adjusted IR	28.8	42.2	24.4	36.5	26.6	39.3
Min. Truncated IR	49.4	91.1	38.4	75.4	44.0	83.5

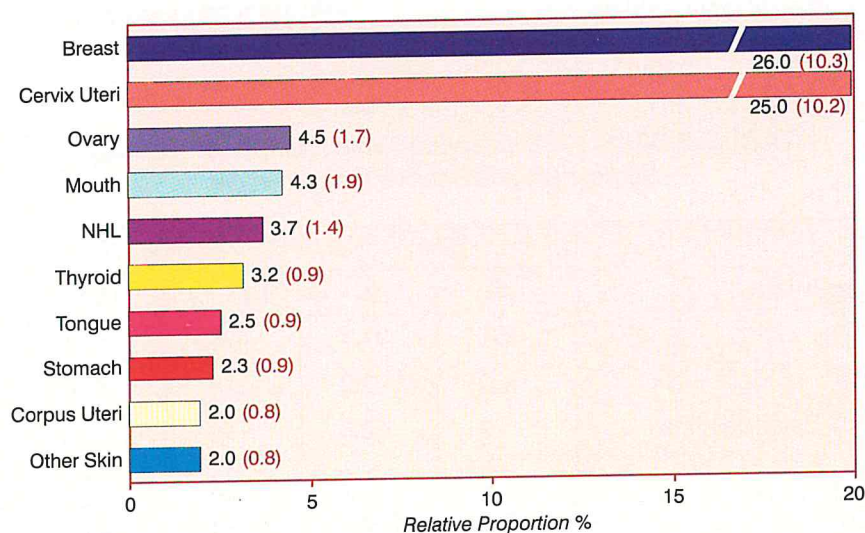
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.57(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



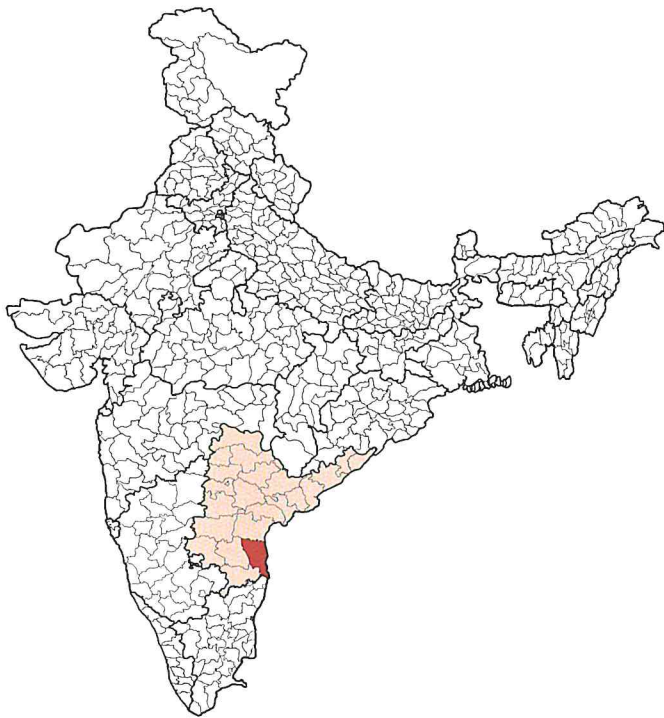
### Females



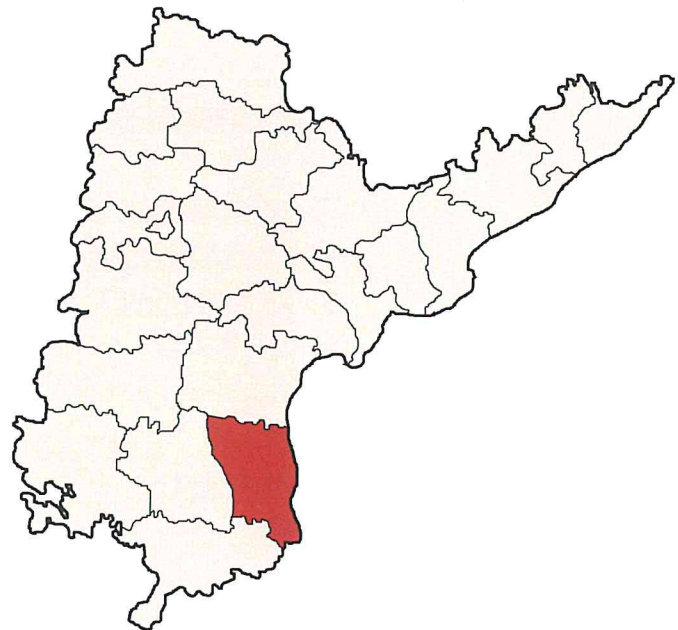
## 5.58. NELLORE DISTRICT, Andhra Pradesh State (Code 2819)

**TABLE 5.58(a) : Profile of Nellore District (2001 Census)**

Area (in sq. kms.)	13,076.0
Decadal Growth Rate (1991-2001)	11.18%
Literacy Rate	
Males	74.45%
Females	57.24%
Sex Ratio (females per 1000 males)	983
Density (persons per sq. km)	203



**FIGURE 5.58(a) : Map of India highlighting Andhra Pradesh State**



**FIGURE 5.58(b) : Map of Andhra Pradesh State highlighting Nellore District**

**TABLE 5.58(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
HBCR - Chennai (1009)	401	91.1	496	67.1	897	76.1
PBCR - Chennai (1004)	0	0.0	213	28.8	213	18.1
SV Institute of Medical Sciences (132)	9	2.0	19	2.6	28	2.4
All Other Centres	30	6.8	11	1.5	41	3.5
<b>Total Cancers</b>	<b>440</b>	<b>100.0</b>	<b>739</b>	<b>100.0</b>	<b>1179</b>	<b>100.0</b>

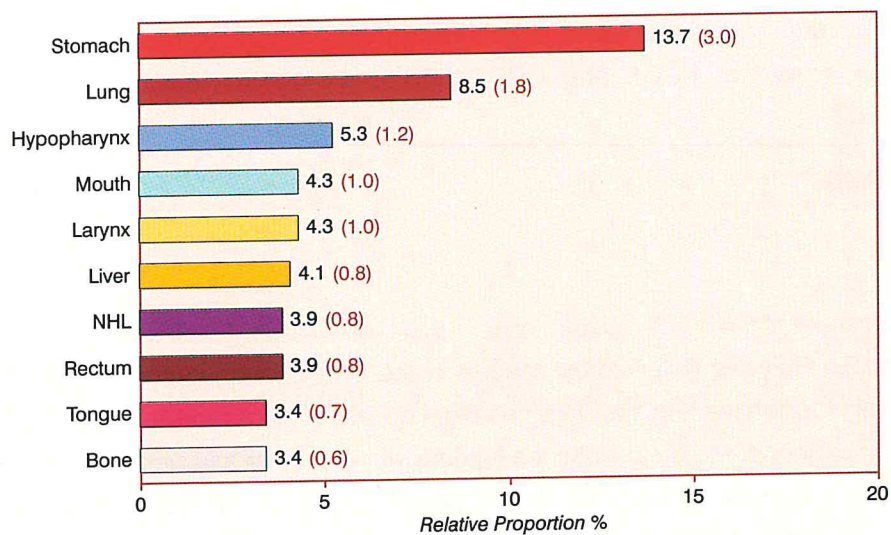
**TABLE 5.58(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	13,41,949	13,19,349	13,55,193	13,32,771	26,97,142	26,52,120
Total Cancers (All sites)	156	284	282	457	438	741
Min. Crude IR	11.6	21.5	20.8	34.3	16.2	27.9
Min. Age Adjusted IR	14.9	26.3	26.4	41.7	20.7	34.0
Min. Truncated IR	30.8	65.2	46.0	93.4	38.5	79.1

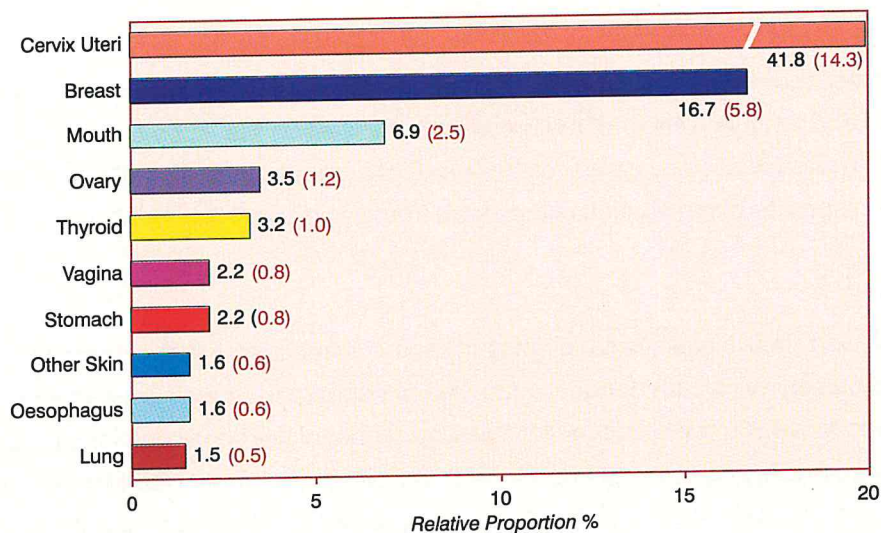
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.58(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## STATES AND U.T. IN THE WESTERN REGION

### STATES OF GOA & MAHARASHTRA

Figure 5(O) gives the Map of India highlighting Goa & Maharashtra States and Figure 5(P) gives the Map of both State highlighting the Districts where the MAAR was above 36.2 /100,000.

#### GOA STATE

Goa State comprises two districts - North and South and both districts had MAAR much higher than 36.2/100,00 and in fact comparable or higher than that of the urban PBCRs under the NCRP. The leading sites of cancer in both the districts were almost the same. In males, cancer of the lung followed by cancer oesophagus were the leading sites. Cancer of the stomach was the third leading site in South Goa. Among females cancer of the breast was almost twice the proportion of cervical cancers in both districts. Cancer thyroid was the third leading site in South Goa, whereas this was fifth most important site in North Goa. Cancer of the rectum was the fourth leading site in women in North Goa and the seventh leading site in South Goa. In both districts this is higher in rank than that seen in corresponding males. [Figs. 5.59(c) & 5.60(c)]. Goa Medical College accounted for around 80% of the cases in either district, the remainder being registered at PBCR and HBCR, Mumbai and Kasturba Medical College, Manipal. [Tables 5.59(b) & 5.60(b)].

#### MAHARASHTRA STATE

##### Wardha District

Among males, cancer of the mouth accounted for 18.8% of all cancers with a MAAR of 10.5/100,000 and was the leading site of cancer. This was, followed by, cancers of the lung, oesophagus and non-Hodgkin's Lymphoma. Cancer of the penis was the fifth leading site. This has been consistently observed during both the years 2001 and 2002. Among females, cancer of the breast was the leading site of cancer followed by cancer of the cervix, ovary, mouth, oesophagus and lung. Like penile cancer in males, cancer of the lung in females was consistently seen as a leading site in both the calendar years. [Fig. 5.61 (c)]. Mahatma Gandhi Institute of Medical Sciences accounted for the majority of the cancers reported from this district. [Table 5.61 (b)].

##### Thane District

Cancer of the mouth constituted 9.1% of all cancers in males and was the leading site, followed by cancer of the Brain NS, larynx, lung and tongue. Cancer of the breast was the leading site in females forming over a quarter of all cancers in women. This was followed by cancer of the cervix, ovary and mouth. [Fig. 5.62(c)]. The HBCR and PBCR, Mumbai were the main sources of registration of the cases from this district. [Table 5.62(b)].

##### Nagpur District

The first five leading sites in males were all sites of cancer associated with the use of tobacco. Larynx was the leading site followed closely by mouth, lung, tongue and oesophagus. In women, cancer of the breast was the leading site accounting for 26.6% of all cancers, followed by cancer of the cervix that formed 22.4% of all cancers in women. Cancer of the mouth was also common in women - being the fourth leading site of cancer in that sex. [Fig. 5.63(c)]. The Government Medical College, Nagpur accounted for the majority of the cases registered in this district. [Table 5.63(b)].

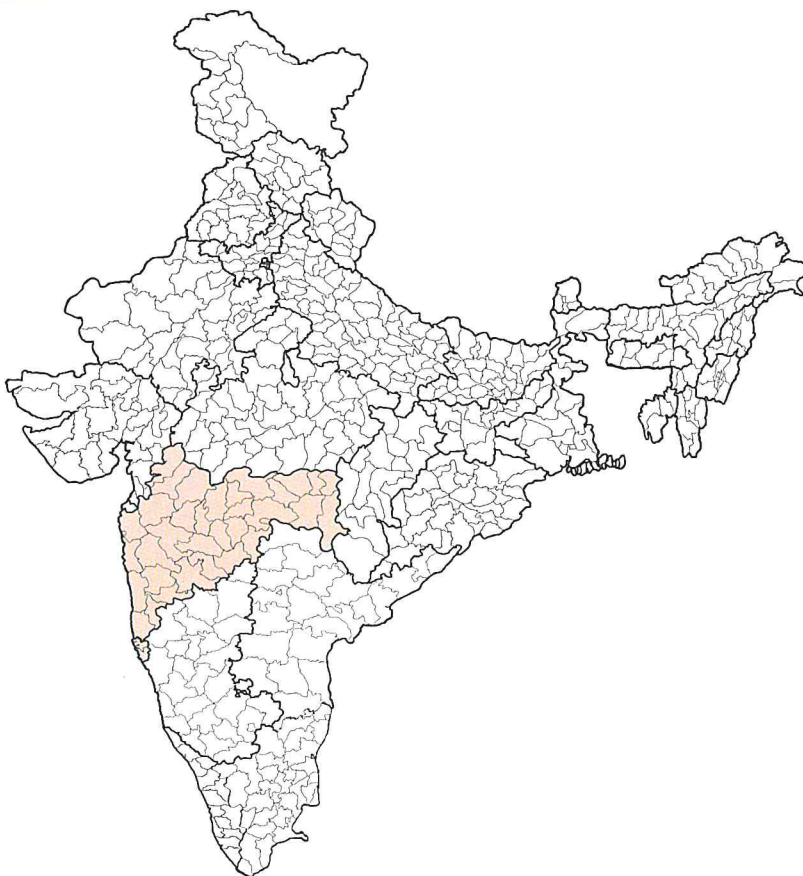


FIGURE 5(O) : Map of India highlighting Goa & Maharashtra States

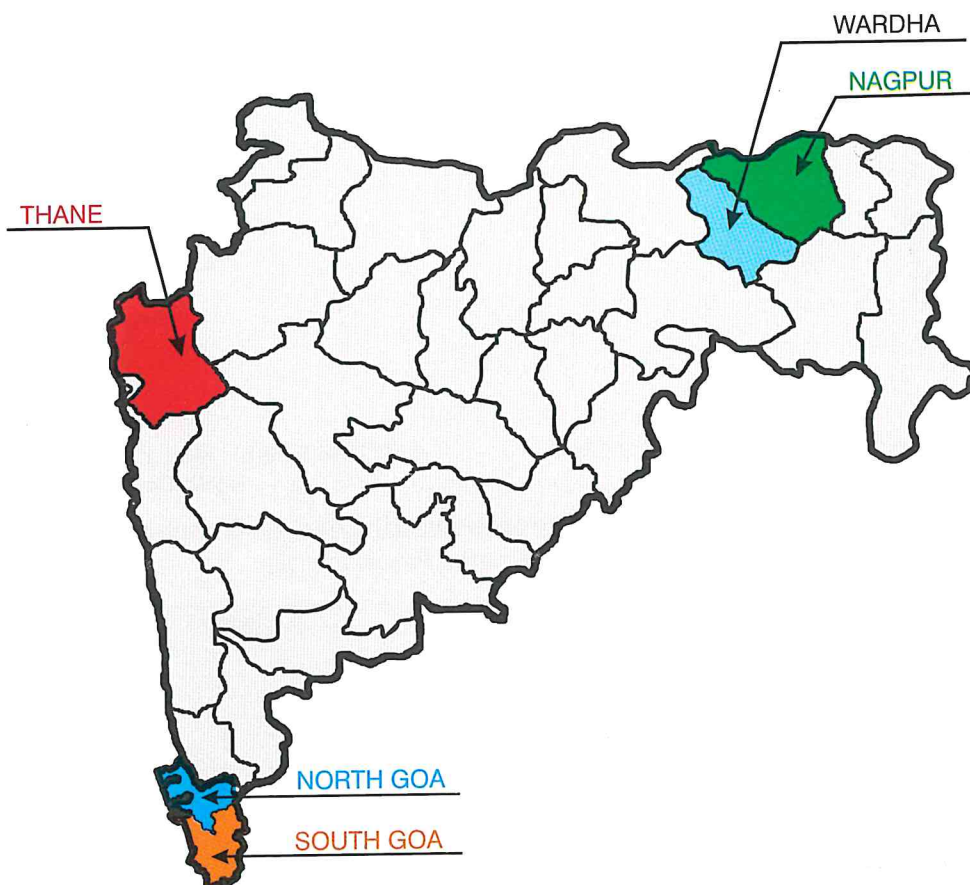


FIGURE 5(P) : Map of Goa & Maharashtra States highlighting the districts with MAAR above 36.2 per 100,000

## 5.59. NORTH GOA DISTRICT, Goa State

(Code 3001)

**TABLE 5.59(a) : Profile of North Goa District  
(2001 Census)**

Area (in sq. kms.)	1,736.0
Decadal Growth Rate (1991-2001)	13.93%
Literacy Rate	
Males	90.63%
Females	77.29%
Sex Ratio (females per 1000 males)	951
Density (persons per sq. km)	436

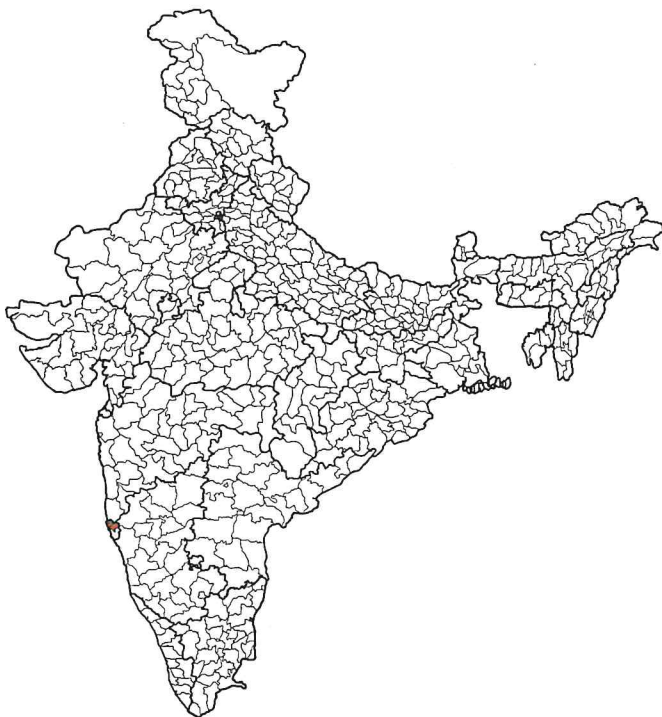


FIGURE 5.59(a) : Map of India highlighting Goa State

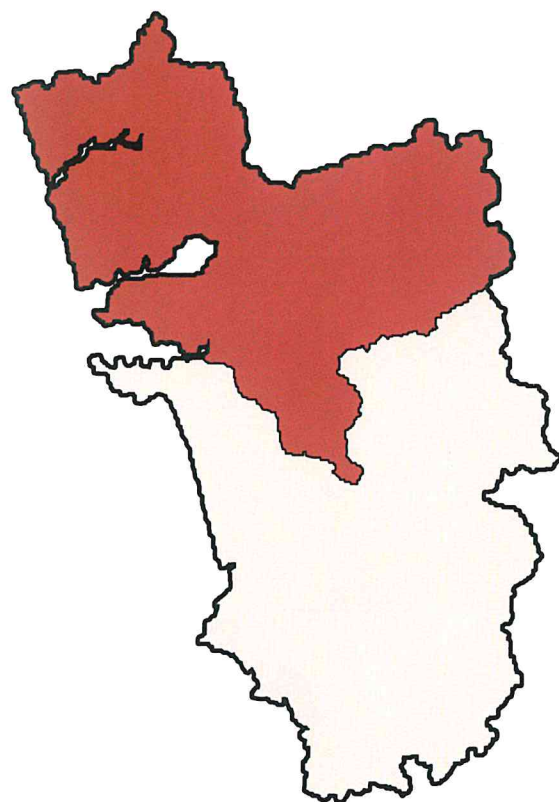


FIGURE 5.59(b) : Map of Goa State highlighting North Goa District

**TABLE 5.59(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Goa Medical College, Goa (100)	461	83.2	614	88.5	1075	86.1
HBCR - Mumbai (1008)	51	9.2	56	8.1	107	8.6
PBCR - Mumbai (1002)	19	3.4	11	1.6	30	2.4
Kasturba Medical College, Manipal (77)	14	2.5	6	0.9	20	1.6
All Other Centres	9	1.6	7	1.0	16	1.3
<b>Total Cancers</b>	<b>554</b>	<b>100.0</b>	<b>694</b>	<b>100.0</b>	<b>1248</b>	<b>100.0</b>

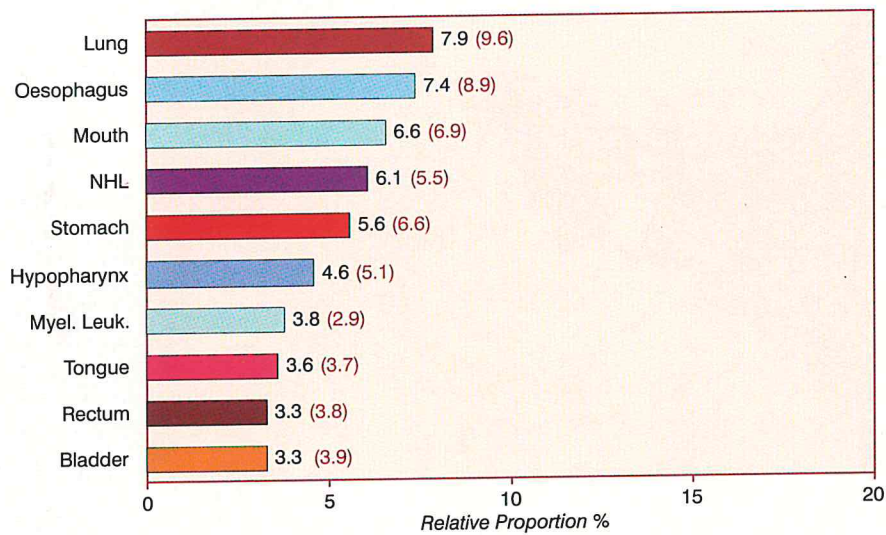
**TABLE 5.59(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	3,88,567	3,69,455	3,93,492	3,73,946	7,82,059	7,43,401
Total Cancers (All sites)	271	283	336	358	607	641
Min. Crude IR	69.7	76.6	85.4	95.7	77.6	86.2
Min. Age Adjusted IR	95.1	87.9	119.0	112.2	107.1	100.1
Min. Truncated IR	180.6	199.9	237.9	242.1	209.5	220.8

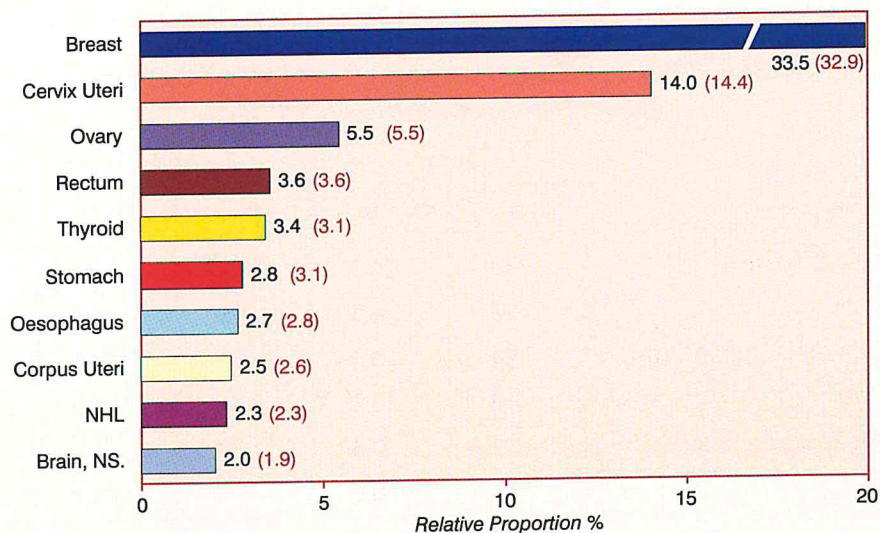
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.59(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.60. SOUTH GOA DISTRICT, Goa State

(Code 3002)

**TABLE 5.60(a) : Profile of South Goa District  
(2001 Census)**

Area (in sq. kms.)	1,966.0
Decadal Growth Rate (1991-2001)	16.16%
Literacy Rate	
Males	86.58%
Females	73.22%
Sex Ratio (females per 1000 males)	972
Density (persons per sq. km)	298



FIGURE 5.60(a) : Map of India highlighting Goa State

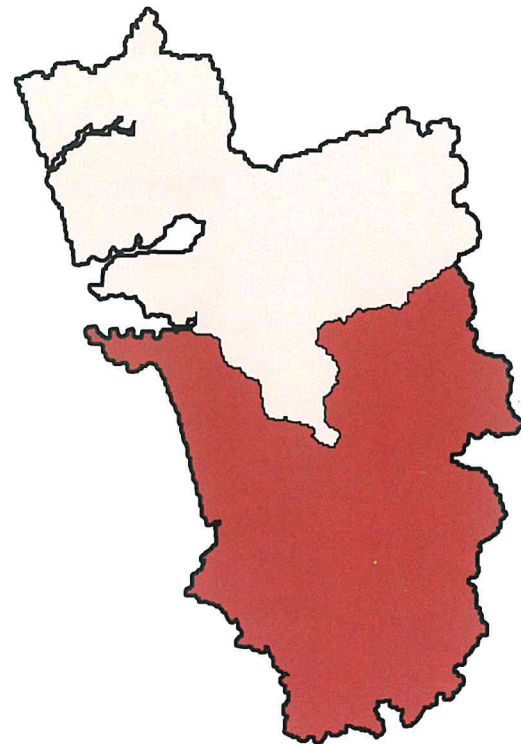


FIGURE 5.60(b) : Map of Goa State highlighting South Goa

**TABLE 5.60(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
Goa Medical College, Goa (100)	379	84.8	311	79.9	690	82.5
HBCR - Mumbai (1008)	37	8.3	55	14.1	92	11.0
Kasturba Medical College, Manipal (77)	24	5.4	12	3.1	36	4.3
PBCR - Mumbai (1002)	4	0.9	4	1.0	8	1.0
The Karnatak Cancer Therapy, Hubli (15)	2	0.4	6	1.5	8	1.0
All Other Centres	1	0.2	1	0.4	2	0.2
<b>Total Cancers</b>	<b>447</b>	<b>100.0</b>	<b>389</b>	<b>100.0</b>	<b>836</b>	<b>100.0</b>

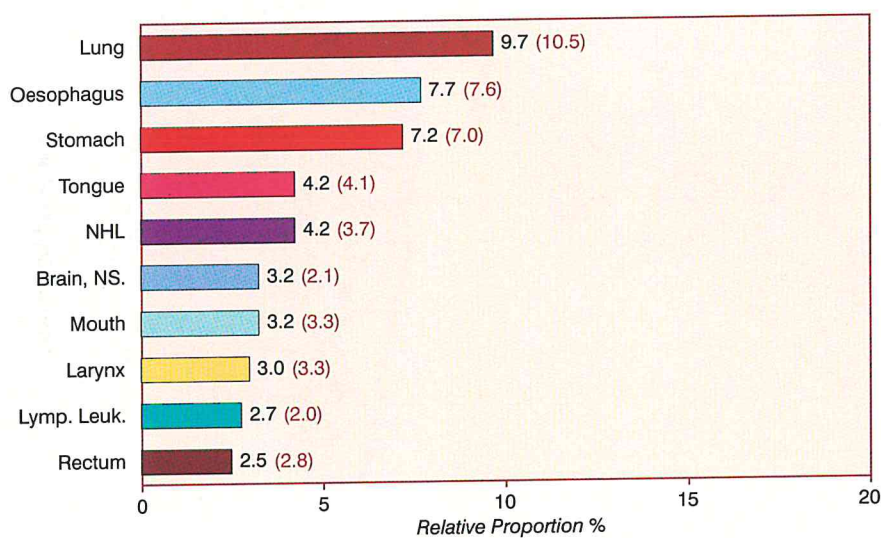
**TABLE 5.60(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	2,98,101	2,89,743	3,02,215	2,93,752	6,00,316	5,83,495
Total Cancers (All sites)	220	227	183	206	403	433
Min. Crude IR	73.8	78.4	60.6	70.1	67.1	74.2
Min. Age Adjusted IR	103.3	90.3	85.6	85.9	94.4	88.1
Min. Truncated IR	202.2	195.3	146.5	186.4	174.2	190.9

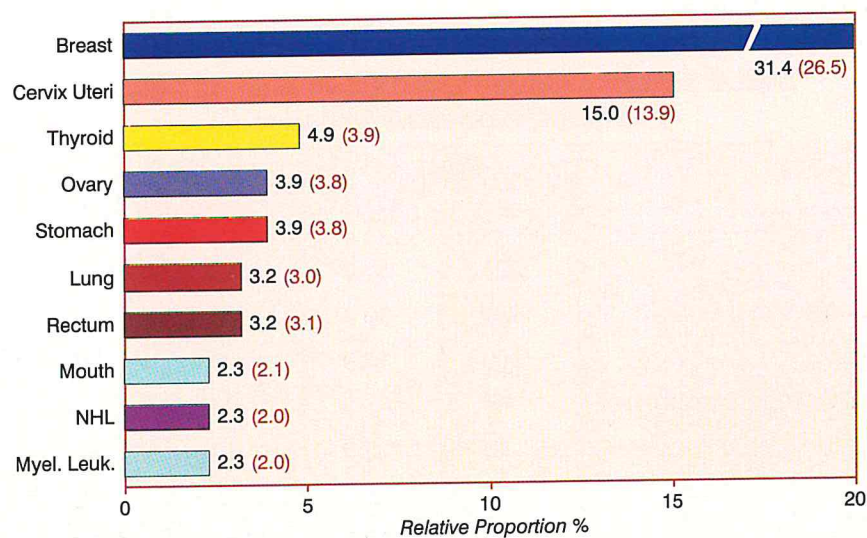
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.60(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

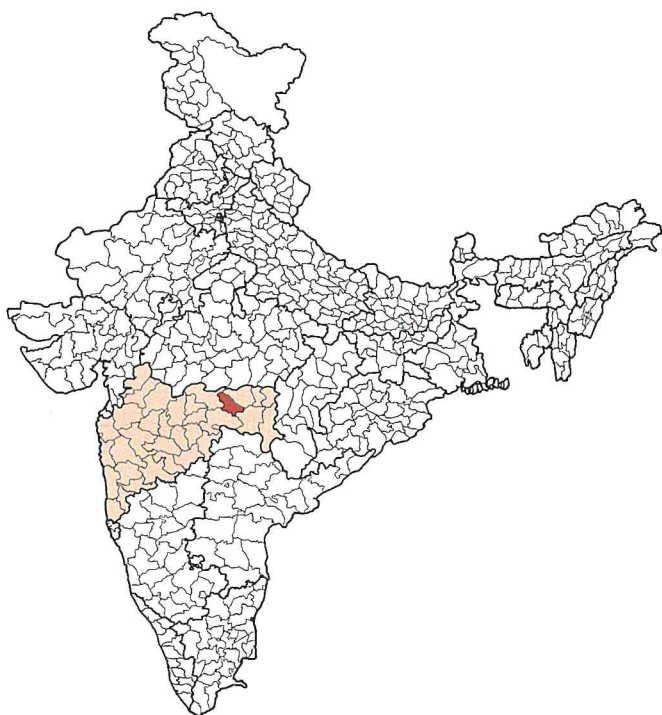


## 5.61. WARDHA DISTRICT, Maharashtra State

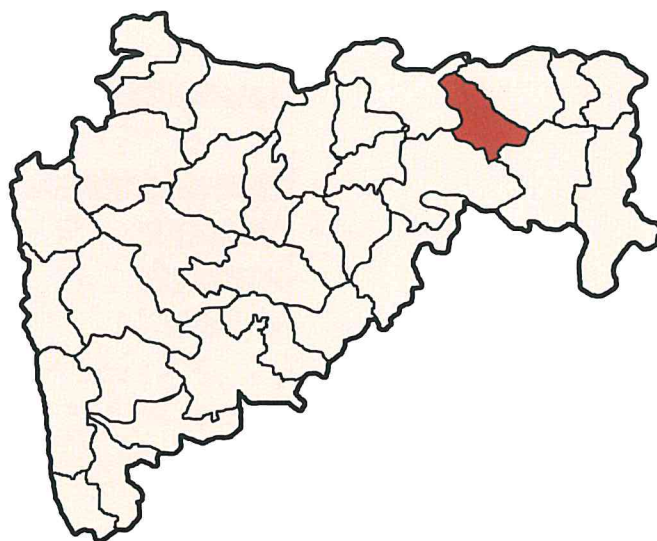
(Code 2708)

**TABLE 5.61(a) : Profile of Wardha District (2001 Census)**

Area (in sq. kms.)	6,309.0
Decadal Growth Rate (1991-2001)	15.30%
Literacy Rate	
Males	87.70%
Females	72.80%
Sex Ratio (females per 1000 males)	936
Density (persons per sq. km)	195



**FIGURE 5.61(a) : Map of India highlighting Maharashtra State**



**FIGURE 5.61(b) : Map of Maharashtra State highlighting Wardha District**

**TABLE 5.61(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre</b> (with code in parentheses)						
MGIMS, Wardha (18)	263	41.7	516	90.7	779	65.0
JN Medical College, Wardha (51)	191	30.4	0	0.0	191	15.9
Nagpur, PBCR, ICS (203)	100	15.9	0	0.0	100	8.3
Government Medical College, Nagpur (50)	47	7.5	36	6.3	83	6.9
HBCR - Mumbai (1008)	18	2.9	10	1.8	28	2.3
All Other Centres	10	1.6	7	1.2	17	1.5
<b>Total Cancers</b>	<b>629</b>	<b>100.0</b>	<b>569</b>	<b>100.0</b>	<b>1198</b>	<b>100.0</b>

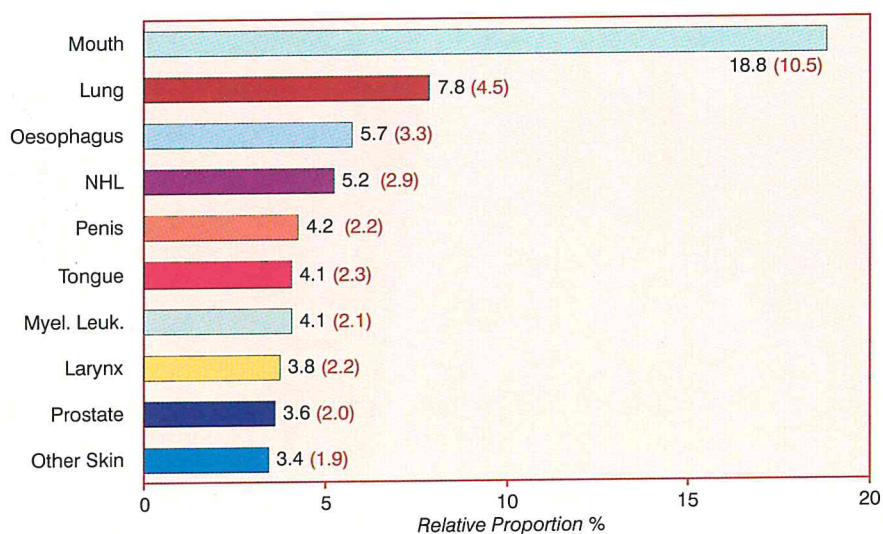
**TABLE 5.61(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	6,36,462	5,95,302	6,44,963	6,03,056	12,81,425	11,98,358
Total Cancers (All sites)	340	289	272	297	612	586
Min. Crude IR	53.4	48.6	42.2	49.3	47.8	48.9
Min. Age Adjusted IR	62.4	57.5	48.2	58.6	55.3	58.1
Min. Truncated IR	116.0	116.8	84.2	119.1	100.2	118.2

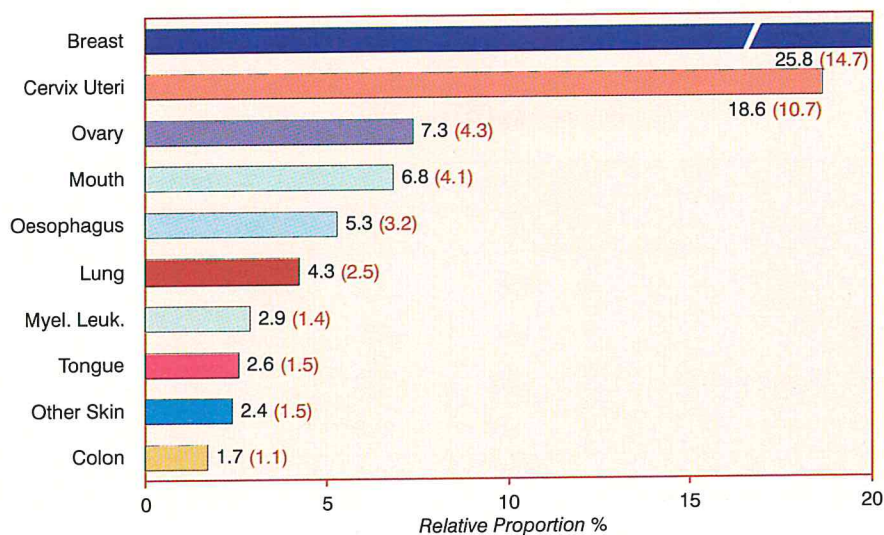
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.61(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

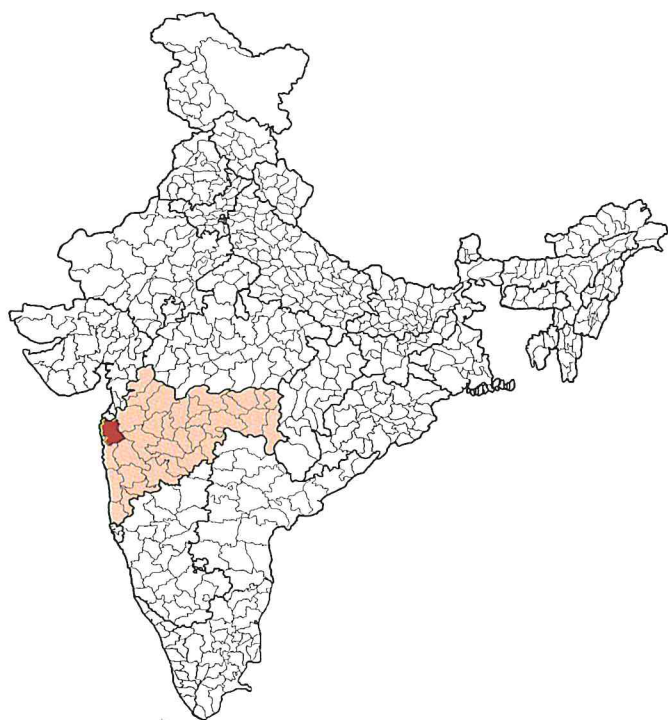


## 5.62. THANE DISTRICT, Maharashtra State

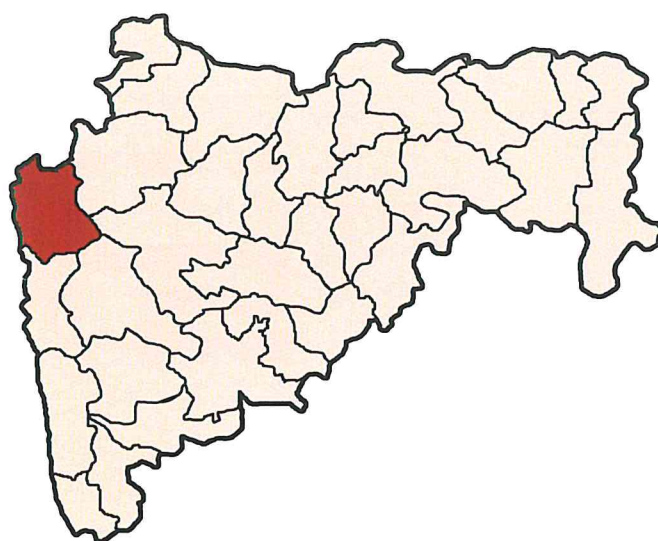
(Code 2721)

**TABLE 5.62(a) : Profile of Thane District (2001 Census)**

Area (in sq. kms.)	9,558.0
Decadal Growth Rate (1991-2001)	54.86%
Literacy Rate	
Males	86.06%
Females	75.00%
Sex Ratio (females per 1000 males)	857
Density (persons per sq. km)	850



**FIGURE 5.62(a) : Map of India highlighting Maharashtra State**



**FIGURE 5.62(b) : Map of Maharashtra State highlighting Thane District**

**TABLE 5.62(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
HBCR - Mumbai (1008)	1356	54.2	1341	59.3	2697	56.6
PBCR - Mumbai (1002)	1107	44.2	859	38.0	1966	41.3
Topiwala National MC, Mumbai (31)	26	1.0	57	2.5	83	1.7
All Other Centres	16	0.6	3	0.1	19	0.4
<b>Total Cancers</b>	<b>2505</b>	<b>100.0</b>	<b>2260</b>	<b>100.0</b>	<b>4765</b>	<b>100.0</b>

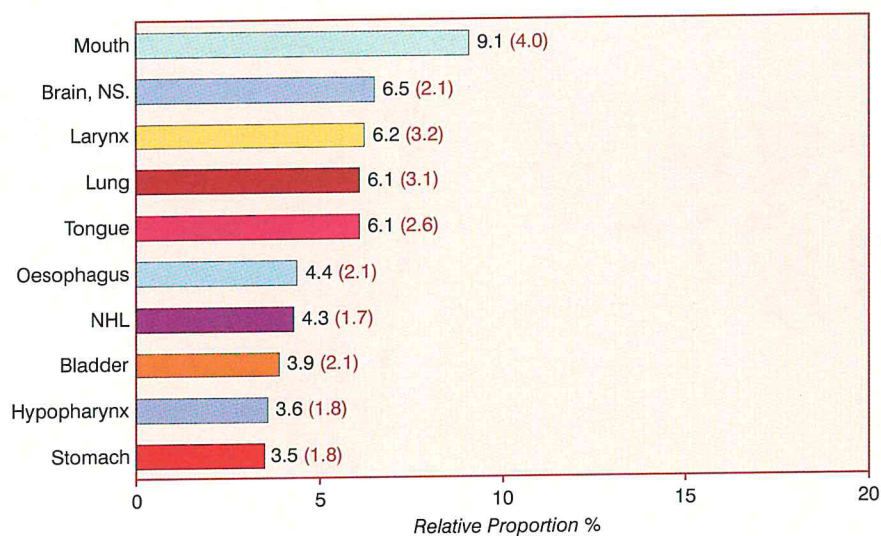
**TABLE 5.62(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	44,03,548	37,71,470	45,61,075	39,00,175	89,64,623	76,71,645
Total Cancers (All sites)	1,216	1,289	1,094	1,166	2,310	2,455
Min. Crude IR	27.6	34.2	24.0	29.9	25.8	32.0
Min. Age Adjusted IR	46.1	51.9	41.5	46.3	43.8	49.1
Min. Truncated IR	84.8	121.3	70.9	107.7	77.3	113.9

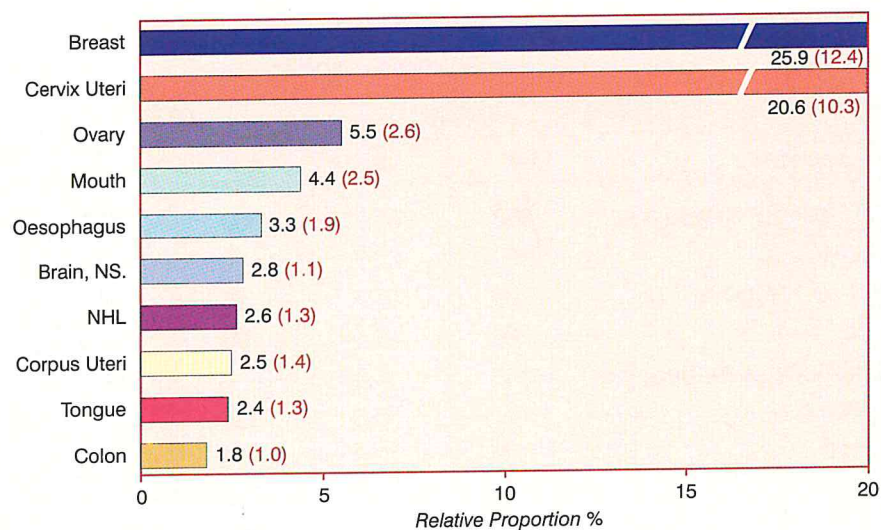
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.62(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

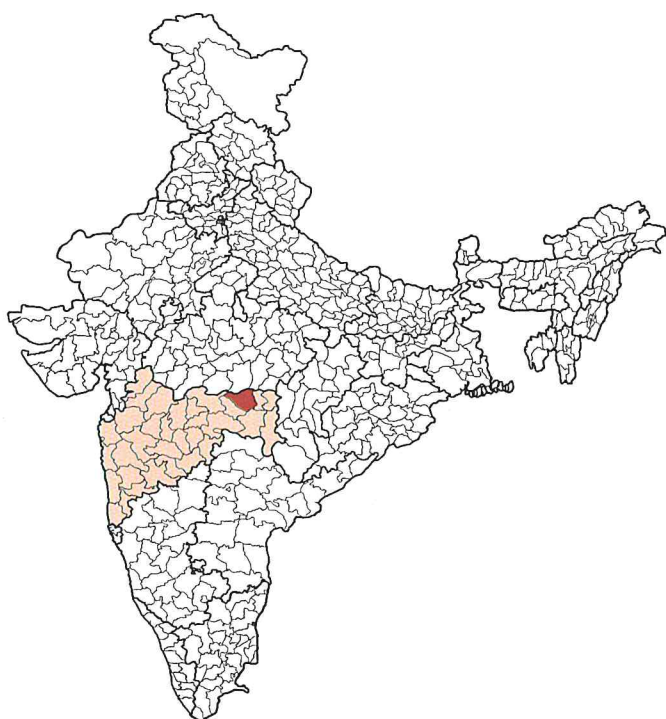


## 5.63. NAGPUR DISTRICT, Maharashtra State

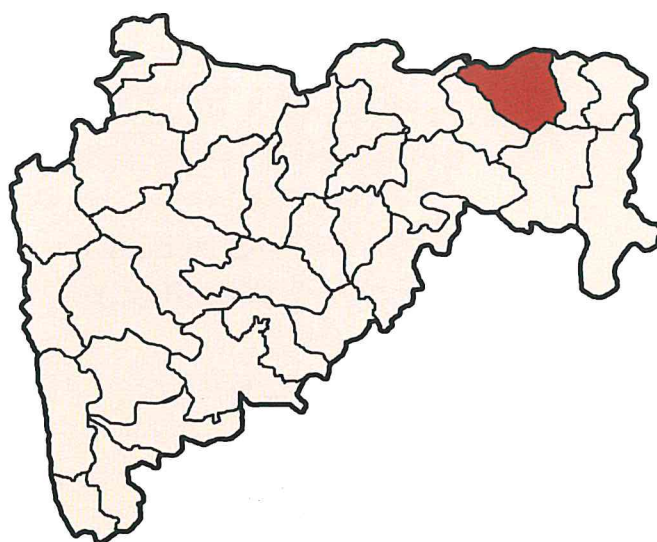
(Code 2709)

**TABLE 5.63(a) : Profile of Nagpur District (2001 Census)**

Area (in sq. kms.)	9,802.0
Decadal Growth Rate (1991-2001)	23.25%
Literacy Rate	
Males	90.25%
Females	77.65%
Sex Ratio (females per 1000 males)	933
Density (persons per sq. km)	413



**FIGURE 5.63(a) : Map of India highlighting Maharashtra State**



**FIGURE 5.63(b) : Map of Maharashtra State highlighting Nagpur District**

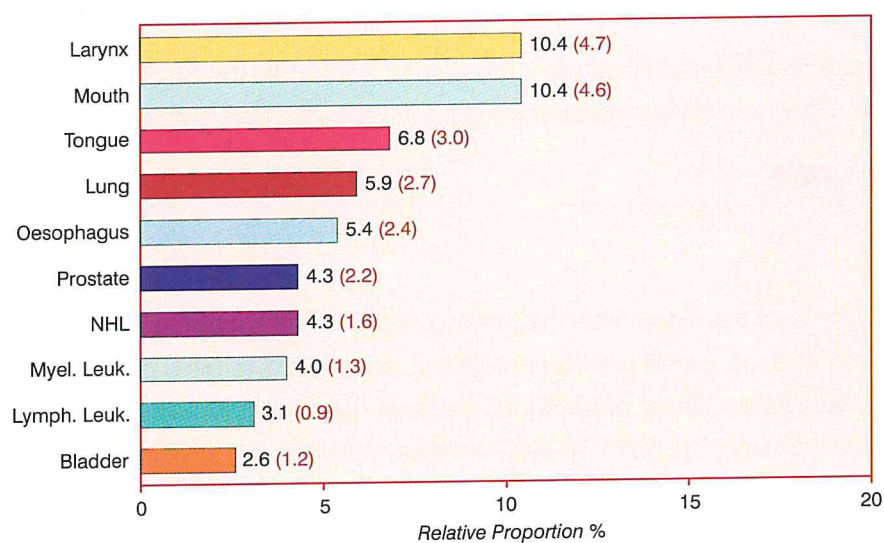
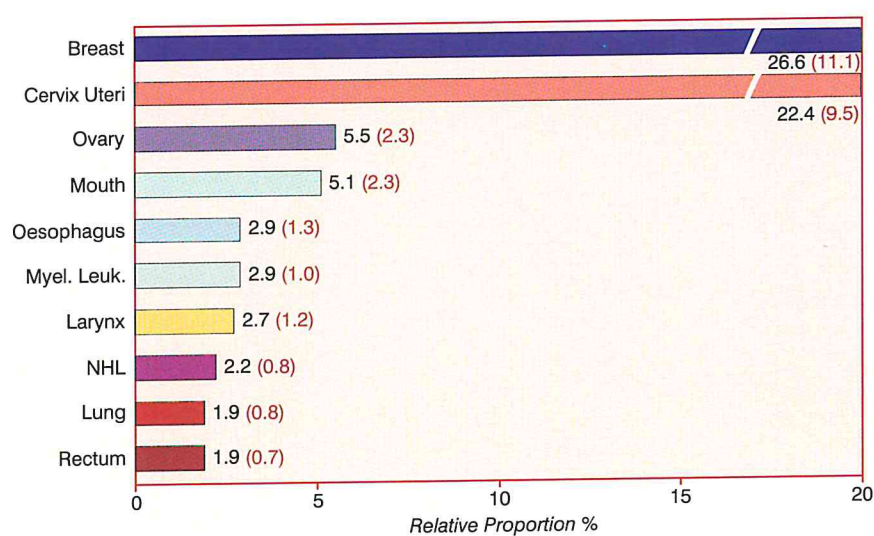
**TABLE 5.63(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
Government Medical College, Nagpur (50)	688	52.7	639	72.4	1327	60.6
Nagpur, PBCR, ICS (203)	361	27.7	0	0.0	361	16.5
Dr. Ravi's Pathology Lab., Nagpur (110)	74	5.7	95	10.8	169	7.7
HBCR - Mumbai (1008)	66	5.1	90	10.2	156	7.2
Indira Gandhi Medical College, Nagpur (10)	58	4.4	0	0.0	58	2.6
City Pathology Lab, Nagpur (126)	11	0.8	36	4.1	47	2.1
PBCR - Mumbai (1002)	30	2.3	5	0.6	35	1.6
All Other Centres	17	1.3	18	2.0	35	1.6
<b>Total Cancers</b>	<b>1305</b>	<b>100.0</b>	<b>883</b>	<b>100.0</b>	<b>2188</b>	<b>100.0</b>

**TABLE 5.63(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	21,00,896	19,62,546	21,39,270	20,00,350	42,40,166	39,62,896
Total Cancers (All sites)	681	624	449	434	1,130	1,058
Min. Crude IR	32.4	31.8	21.0	21.7	26.7	26.7
Min. Age Adjusted IR	42.7	41.3	28.5	28.6	35.5	34.9
Min. Truncated IR	75.6	95.6	52.9	62.4	64.5	79.3

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.63(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## STATES OF GUJARAT & MADHYA PRADESH

### GUJARAT STATE

Figure 5(Q) gives the Map of India highlighting Gujarat State and Figure 5(R) gives the Map of Gujarat State highlighting the Districts where the MAAR was above 36.2 /100,000.

There were 6 districts in Gujarat that had a MAAR higher than 36.2/100,000. These 6 districts in the descending order of their MAAR were: Ahmedabad, Mahesana, Gandhinagar, Kheda, Bhavnagar and Sabarkantha.

*Leading Sites of Cancer in Males:* Cancer of the tongue was the leading site in five of the six districts. The district of Bhavnagar had tongue as the second leading site of cancer, only preceded by cancer of the mouth. Cancer of the lung was the second or third leading site except Kheda district where it was the fifth leading site of cancer. Cancers of the hypopharynx, oesophagus and larynx were the other sites of cancer (all tobacco related cancers) that were important leading sites.

*Leading Sites of Cancer in Females:* Among females, cancer of the breast was the leading site followed by cancer cervix in Ahmedabad and Bhavnagar. In the remaining four districts cancer of the cervix was followed by cancer of the breast as the leading site. Cancers of the mouth, oesophagus, hypopharynx and even lung were important leading sites of cancer in women.

The Gujarat Cancer and Research Institute, Ahmedabad accounted for the majority of the cases falling in the districts of Gujarat. The HBCR and PBCR, Mumbai were the other centres the registered cases from the districts.

### MADHYA PRADESH STATE

#### Indore District

Among males, cancer of the mouth was the leading site followed by cancer of the lung, tongue, larynx and oesophagus. Among females, cancer of the breast was the leading site forming 23.5% of all cancers in that sex, followed by cancer of the cervix. Cancer of the mouth, oesophagus, tongue and lung also fell within the first ten leading sites of cancer in women. [Fig. 5.70(c)]. MGM Medical College, Indore was the main centre responsible for the cases registered in this district. [Table 5.70(b)].

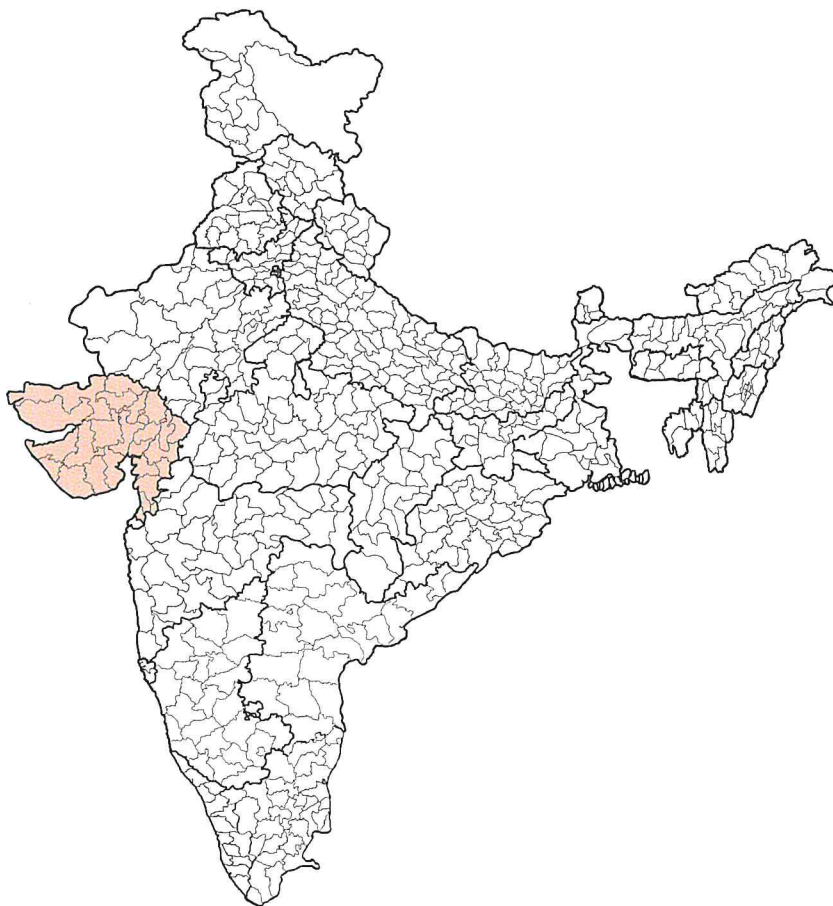


FIGURE 5(Q) : Map of India highlighting Gujarat State

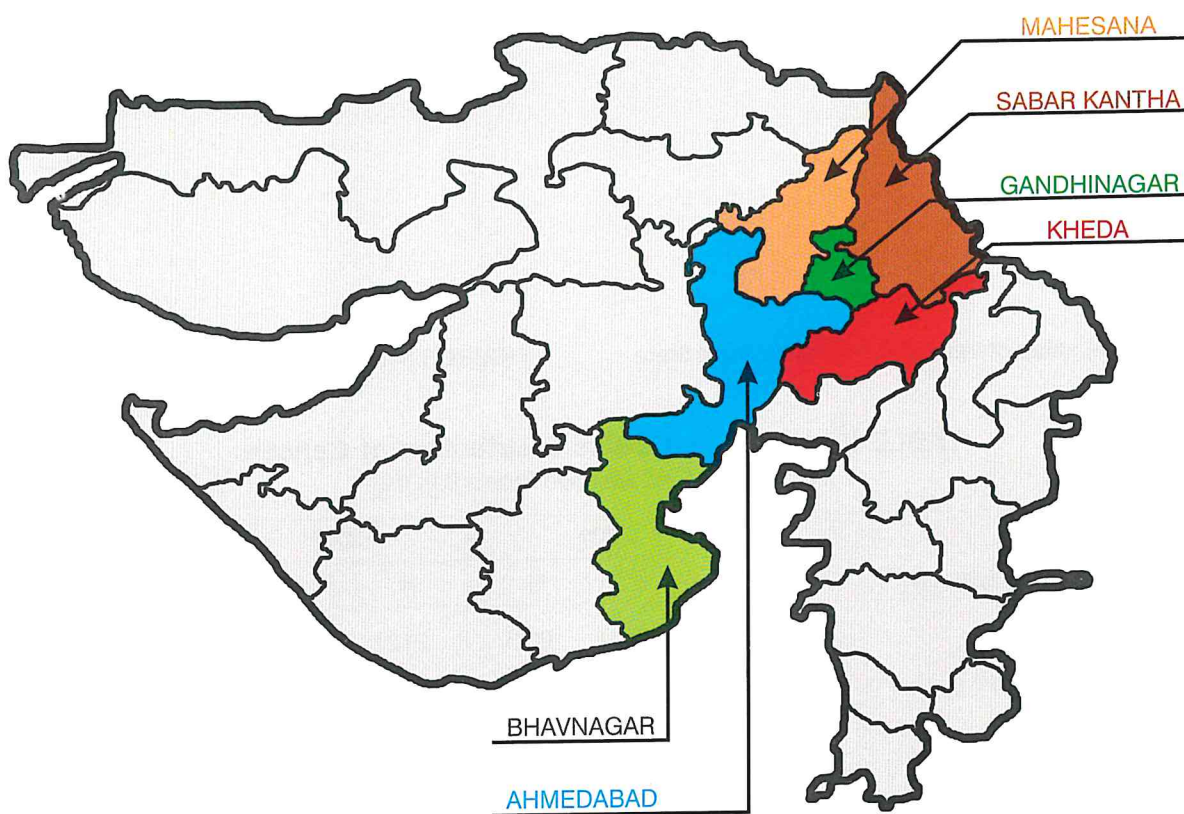


FIGURE 5(R) : Map of Gujarat State highlighting the districts with MAAR above 36.2 per 100,000

## 5.64. AHMEDABAD DISTRICT, Gujarat State

(Code 2407)

**TABLE 5.64(a) : Profile of Ahmedabad District  
(2001 Census)**

Area (in sq. kms.)	8,086.8
Decadal Growth Rate (1991-2001)	26.61%
Literacy Rate	
Males	87.81%
Females	71.12%
Sex Ratio (females per 1000 males)	892
Density (persons per sq. km)	718

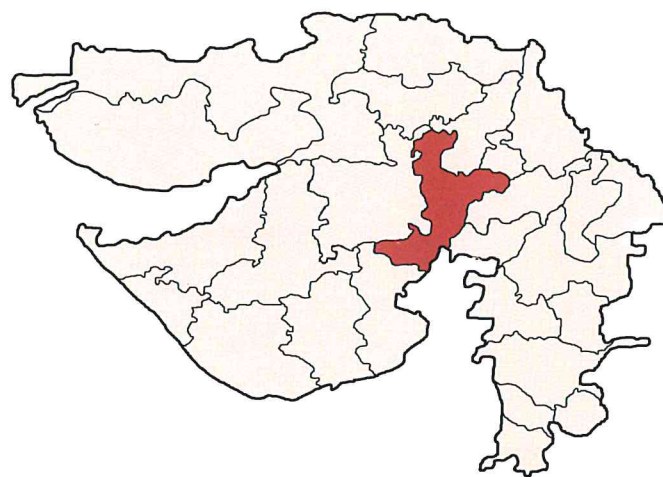


FIGURE 5.64(a) : Map of India highlighting Gujarat State

FIGURE 5.64(b) : Map of Gujarat State highlighting Ahmedabad District

**TABLE 5.64(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The GCRI (63)	1774	96.5	2121	97.6	3895	97.1
HBCR - Mumbai (1008)	31	1.7	29	1.3	60	1.5
PBCR - Mumbai (1002)	28	1.5	21	1.0	49	1.2
All Other Centres	6	0.3	2	0.1	8	0.2
<b>Total Cancers</b>	<b>1839</b>	<b>100.0</b>	<b>2173</b>	<b>100.0</b>	<b>4012</b>	<b>100.0</b>

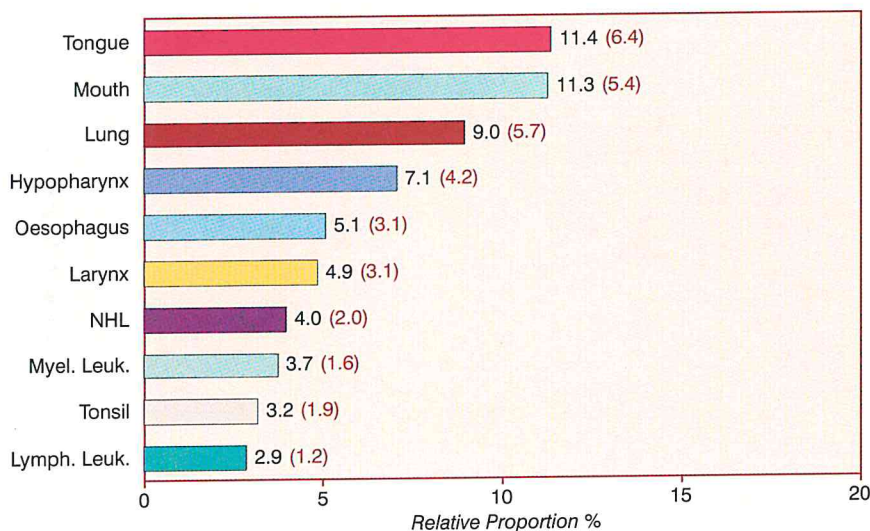
**TABLE 5.64(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	30,76,180	27,44,633	31,30,094	27,91,015	62,06,274	55,35,648
Total Cancers (All sites)	1,029	810	1,249	924	2,278	1,734
Min. Crude IR	33.5	29.5	39.9	33.1	36.7	31.3
Min. Age Adjusted IR	50.3	41.6	58.9	46.6	54.6	44.1
Min. Truncated IR	92.8	85.1	111.7	99.9	102.4	92.2

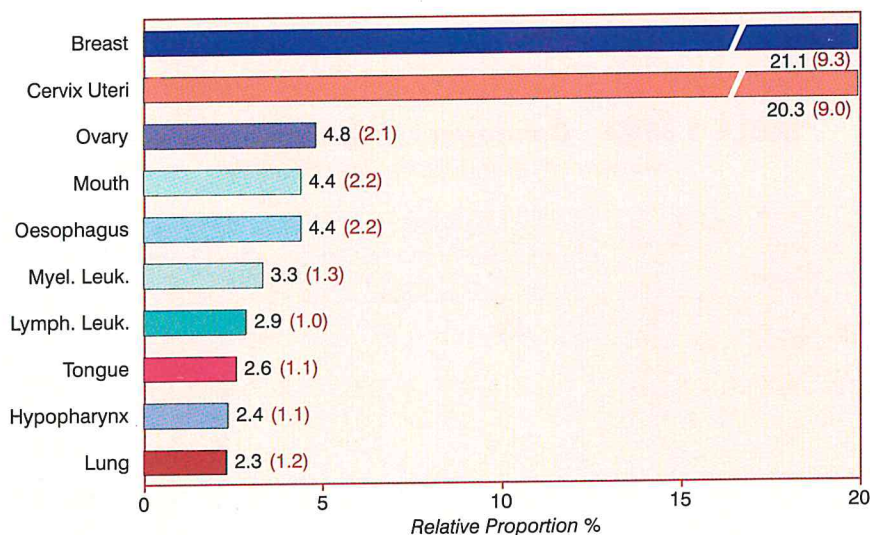
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.64(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.65. MAHESANA DISTRICT, Gujarat State

(Code 2404)

**TABLE 5.65(a) : Profile of Mahesana District  
(2001 Census)**

Area (in sq. kms.)	4,382.8
Decadal Growth Rate (1991-2001)	12.04%
Literacy Rate	
Males	86.52%
Females	63.96%
Sex Ratio (females per 1000 males)	926
Density (persons per sq. km)	419

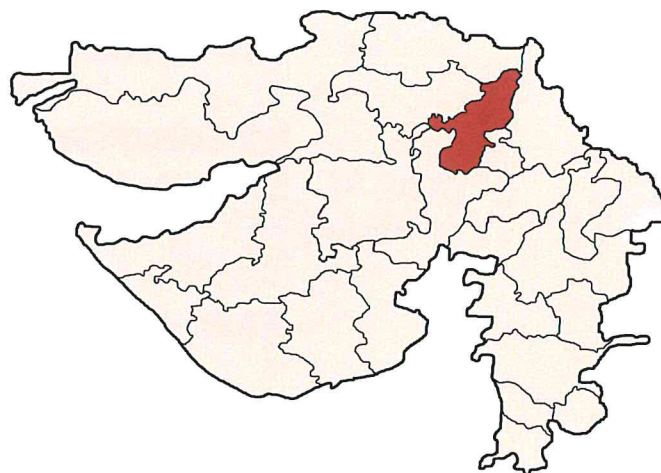


FIGURE 5.65(a) : Map of India highlighting Gujarat State

FIGURE 5.65(b) : Map of Gujarat State highlighting Mahesana District

**TABLE 5.65(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The GCRI, Ahmedabad (63)	434	97.7	505	98.4	939	98.1
HBCR - Mumbai (1008)	4	0.9	6	1.2	10	1.0
All Other Centres	6	1.4	2	0.4	8	0.8
<b>Total Cancers</b>	<b>444</b>	<b>100.0</b>	<b>513</b>	<b>100.0</b>	<b>957</b>	<b>100.0</b>

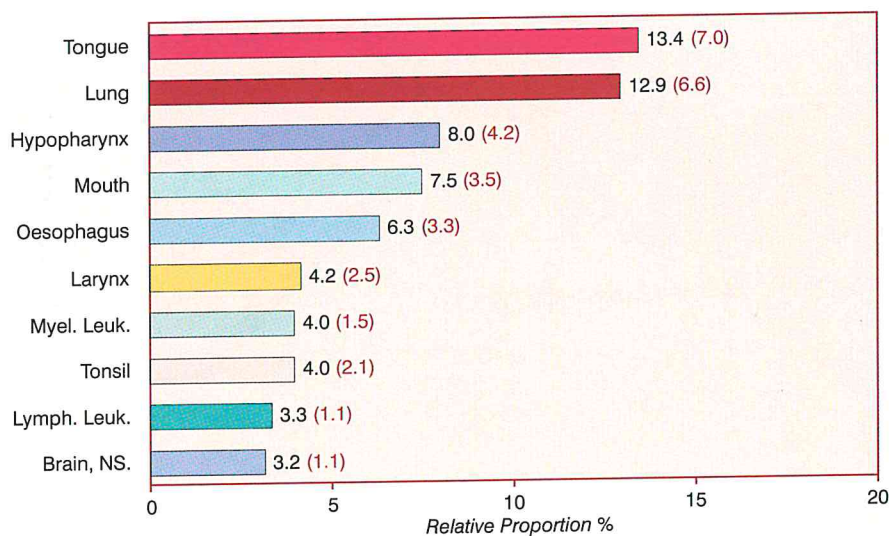
**TABLE 5.65(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	9,45,519	8,78,336	9,48,784	8,84,494	18,94,303	17,62,830
Total Cancers (All sites)	294	150	309	204	603	354
Min. Crude IR	31.1	17.1	32.6	23.1	31.8	20.1
Min. Age Adjusted IR	46.4	21.8	49.7	30.1	48.1	26.0
Min. Truncated IR	100.9	50.3	95.0	67.0	97.5	58.5

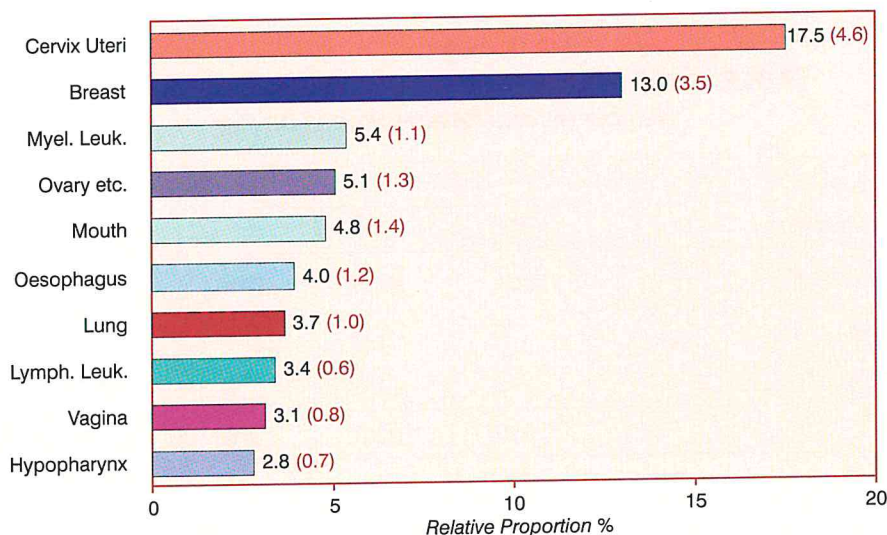
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.65(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.66. GANDHINAGAR DISTRICT, Gujarat State

(Code 2406)

**TABLE 5.66(a) : Profile of Gandhinagar District  
(2001 Census)**

Area (in sq. kms.)	2,163.4
Decadal Growth Rate (1991-2001)	23.88%
Literacy Rate	
Males	87.92%
Females	64.85%
Sex Ratio (females per 1000 males)	911
Density (persons per sq. km)	617

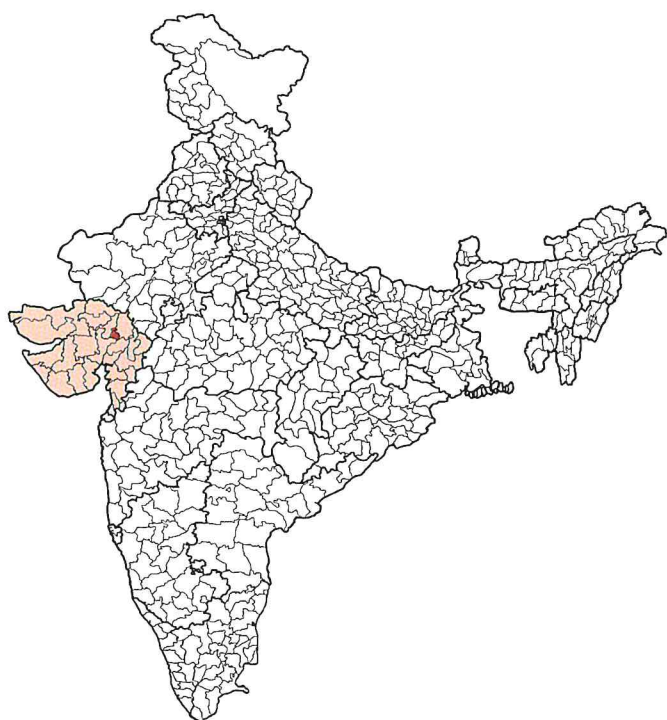


FIGURE 5.66(a) : Map of India highlighting Gujarat State

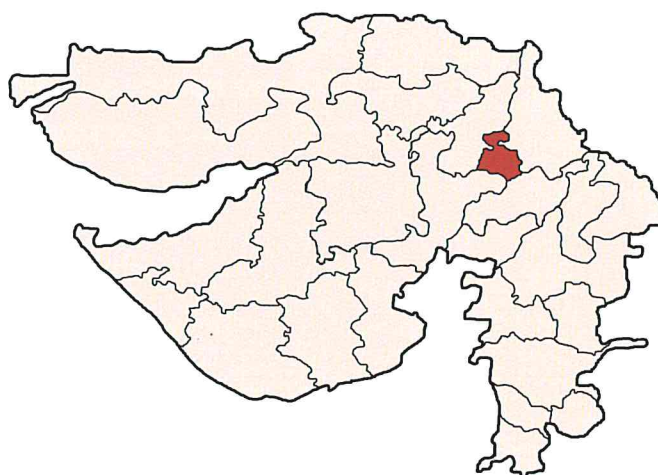


FIGURE 5.66(b) : Map of Gujarat State highlighting Gandhinagar District

**TABLE 5.66(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Centre (with code in parentheses)						
The GCRI, Ahmedabad (63)	309	96.6	374	99.5	683	98.1
PBCR - Mumbai (1002)	6	1.9	2	0.5	8	1.1
HBCR - Mumbai (1008)	5	1.6	0	0.0	5	0.7
<b>Total Cancers</b>	<b>320</b>	<b>100.0</b>	<b>376</b>	<b>100.0</b>	<b>696</b>	<b>100.0</b>

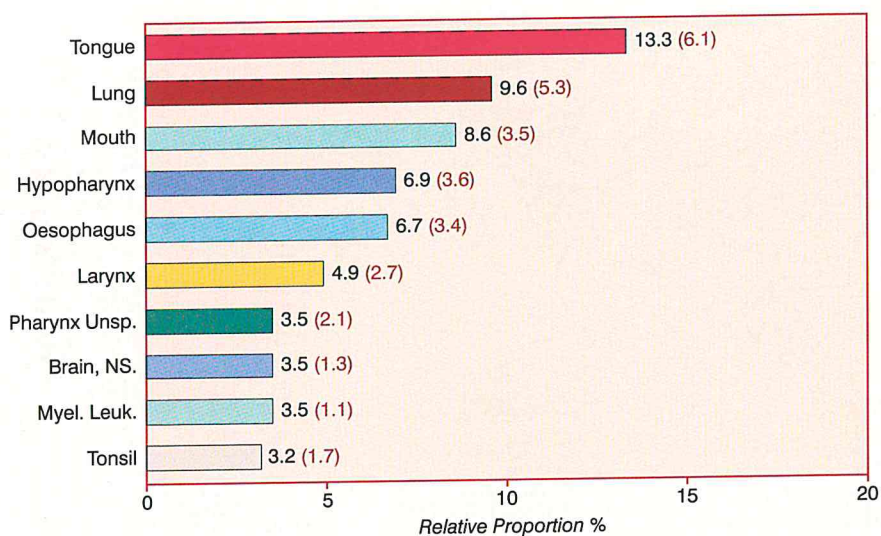
**TABLE 5.66(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	7,08,658	6,46,062	7,56,755	6,89,805	14,65,413	13,35,867
Total Cancers (All sites)	185	135	221	155	406	290
Min. Crude IR	26.1	20.9	29.2	22.5	27.7	21.7
Min. Age Adjusted IR	43.6	30.5	49.4	34.3	46.6	32.5
Min. Truncated IR	75.0	68.3	94.0	73.3	85.0	70.7

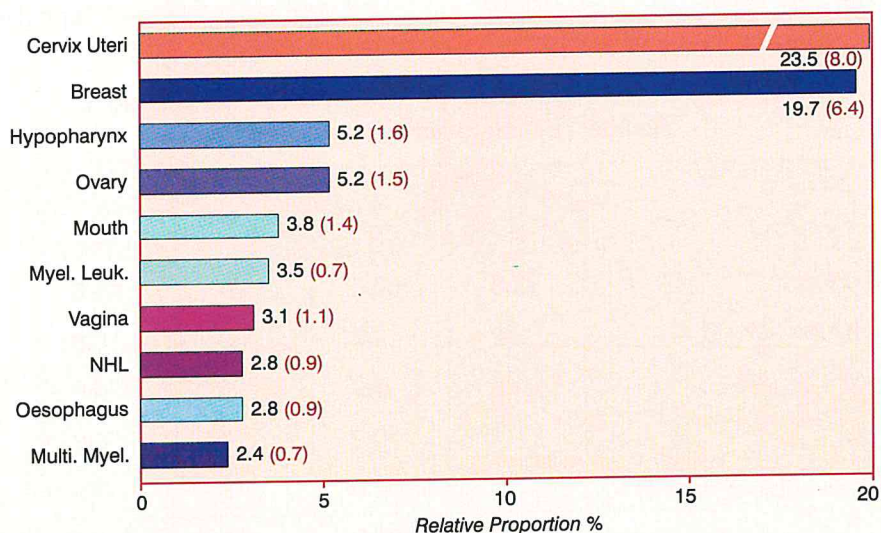
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.66(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.67. KHEDA DISTRICT, Gujarat State

(Code 2416)

**TABLE 5.67(a) : Profile of Kheda District (2001 Census)**

Area (in sq. kms.)	4,218.8
Decadal Growth Rate (1991-2001)	13.24%
Literacy Rate	
Males	86.58%
Females	57.77%
Sex Ratio (females per 1000 males)	922
Density (persons per sq. km)	480



FIGURE 5.67(a) : Map of India highlighting Gujarat State

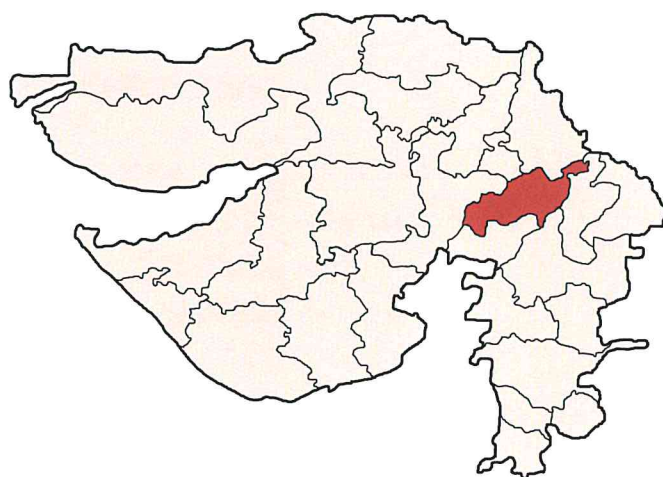


FIGURE 5.67(b) : Map of Gujarat State highlighting Kheda District

**TABLE 5.67(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The GCRI, Ahmedabad (63)	433	90.0	481	91.6	914	90.9
Pramukhswami MC, Karamsad (26)	42	8.7	33	6.3	75	7.5
HBCR - Mumbai (1008)	5	1.0	5	1.0	10	1.0
PBCR - Mumbai (1002)	1	0.2	3	0.6	4	0.4
Government Medical College, Nanded (37)	0	0.0	3	0.6	3	0.3
<b>Total Cancers</b>	<b>481</b>	<b>100.0</b>	<b>525</b>	<b>100.0</b>	<b>1006</b>	<b>100.0</b>

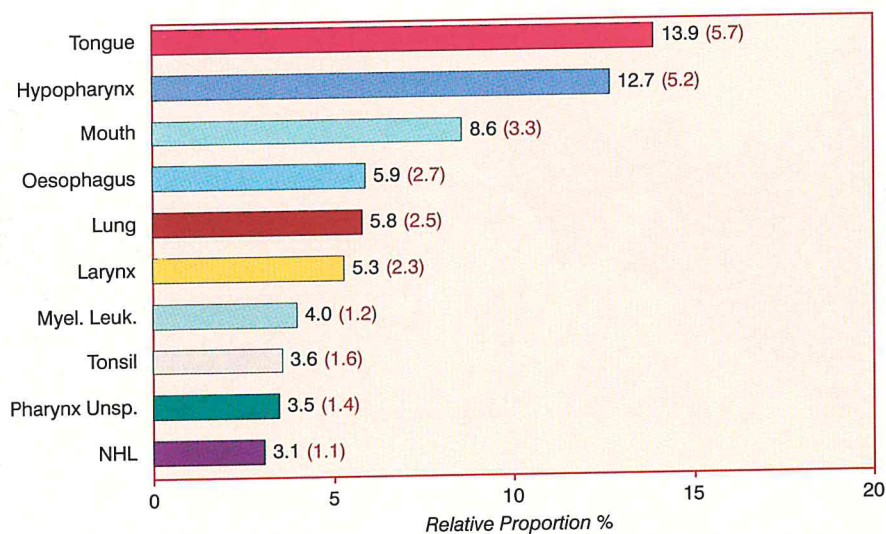
**TABLE 5.67(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	10,51,638	9,69,797	10,63,607	9,80,632	21,15,245	19,50,429
Total Cancers (All sites)	265	216	341	184	606	400
Min. Crude IR	25.2	22.3	32.1	18.8	28.7	20.5
Min. Age Adjusted IR	34.6	28.6	44.5	24.7	39.6	26.6
Min. Truncated IR	69.2	67.3	90.0	63.5	79.6	65.4

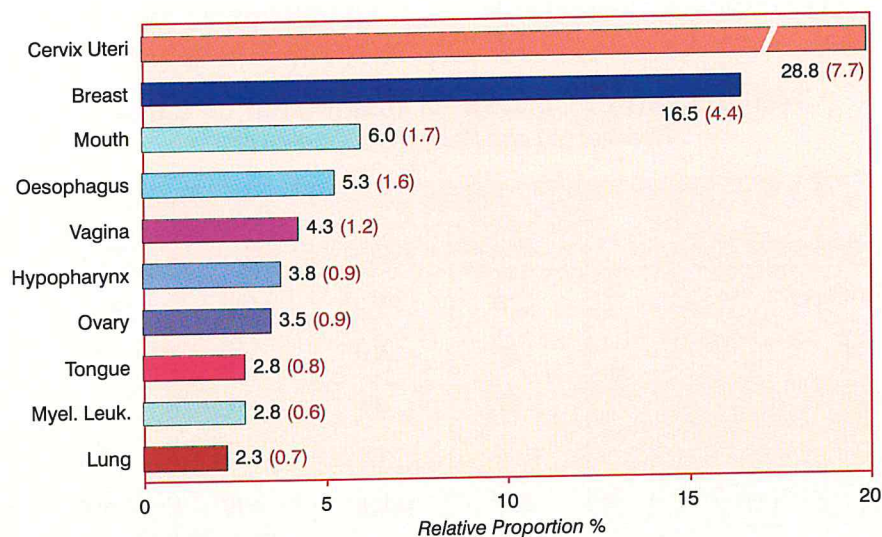
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.67(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.68. BHAVNAGAR DISTRICT, Gujarat State

(Code 2414)

**TABLE 5.68(a) : Profile of Bhavnagar District  
(2001 Census)**

Area (in sq. kms.)	9,980.9
Decadal Growth Rate (1991-2001)	19.29%
Literacy Rate	
Males	78.83%
Females	54.46%
Sex Ratio (females per 1000 males)	936
Density (persons per sq. km)	247



FIGURE 5.68(a) : Map of India highlighting Gujarat State

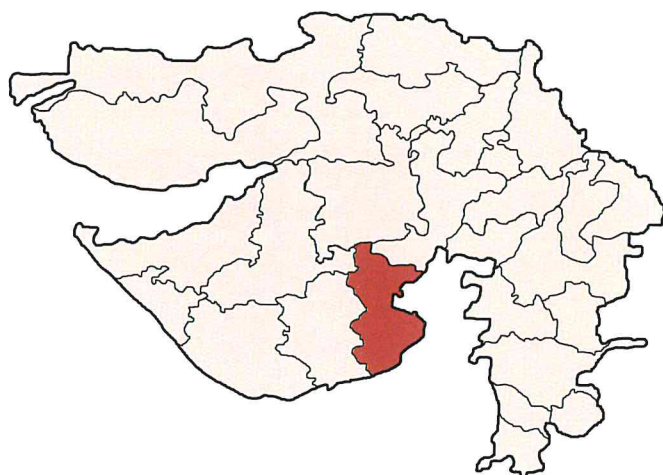


FIGURE 5.68(b) : Map of Gujarat State highlighting Bhavnagar District

**TABLE 5.68(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The GCRI, Ahmedabad (63)	378	90.2	458	92.7	836	91.6
HBCR - Mumbai (1008)	20	4.8	23	4.7	43	4.7
PBCR - Mumbai (1002)	17	4.1	11	2.2	28	3.1
All Other Centres	4	1.0	2	0.4	6	0.7
<b>Total Cancers</b>	<b>419</b>	<b>100.0</b>	<b>494</b>	<b>100.0</b>	<b>913</b>	<b>100.0</b>

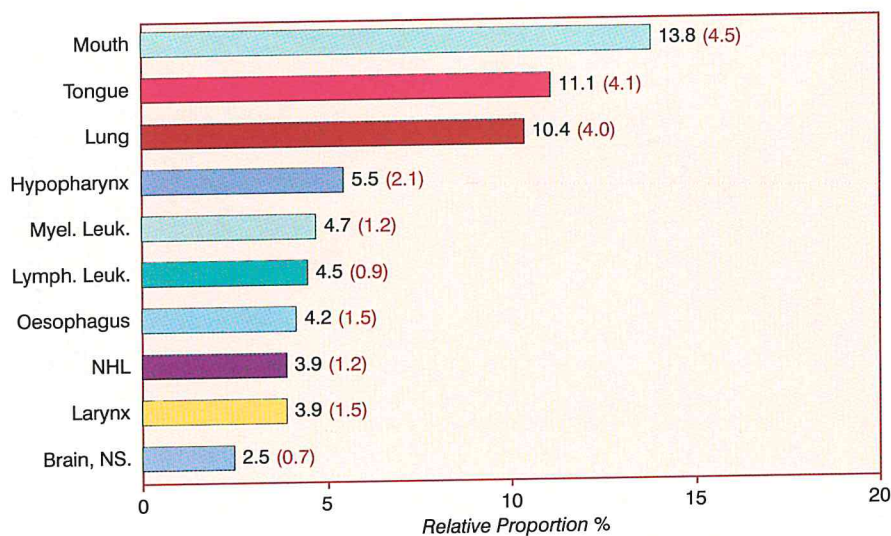
**TABLE 5.68(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	12,68,686	11,88,874	12,78,565	11,96,601	25,47,251	23,85,475
Total Cancers (All sites)	259	160	337	157	596	317
Min. Crude IR	20.4	13.5	26.4	13.1	23.4	13.3
Min. Age Adjusted IR	29.5	18.5	37.7	17.3	33.6	17.9
Min. Truncated IR	57.6	42.5	79.5	39.9	68.9	41.2

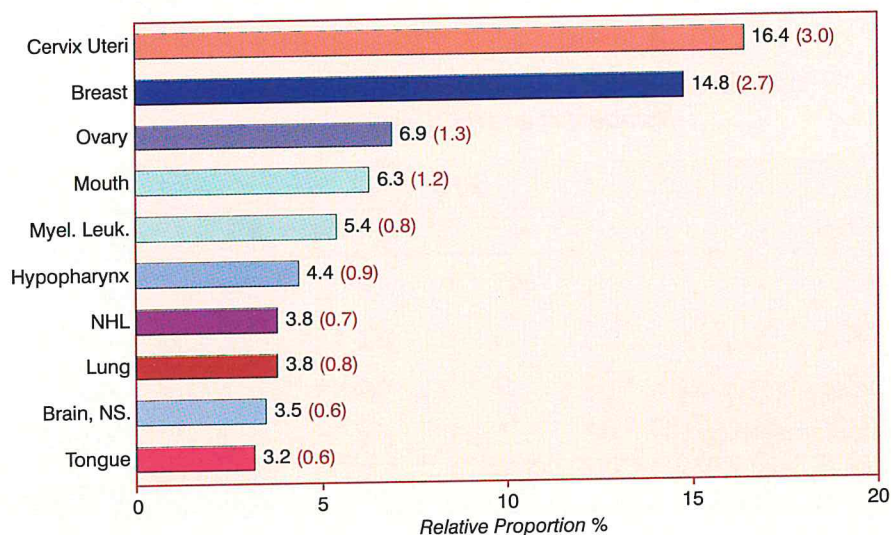
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.68(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.69. SABARKANTHA DISTRICT, Gujarat State

(Code 2405)

**TABLE 5.69(a) : Profile of Sabarkantha District  
(2001 Census)**

Area (in sq. kms.)	7,390.0
Decadal Growth Rate (1991-2001)	18.30%
Literacy Rate	
Males	81.19%
Females	52.85%
Sex Ratio (females per 1000 males)	948
Density (persons per sq. km)	282



FIGURE 5.69(a) : Map of India highlighting Gujarat State

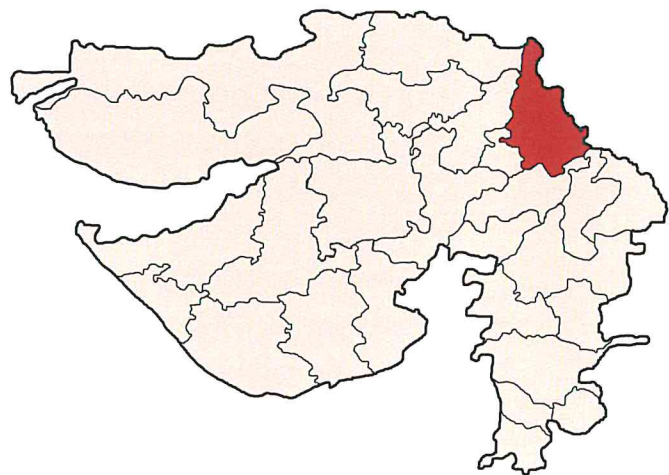


FIGURE 5.69(b) : Map of Gujarat State highlighting Sabarkantha District

**TABLE 5.69(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
The GCRI, Ahmedabad (63)	421	98.6	499	99.4	920	99.0
HBCR - Mumbai (1008)	3	0.7	2	0.4	5	0.5
PBCR - Mumbai (1002)	2	0.5	1	0.2	3	0.3
Pramukhswami MC, Karamsad (26)	1	0.2	0	0.0	1	0.1
<b>Total Cancers</b>	<b>427</b>	<b>100.0</b>	<b>502</b>	<b>100.0</b>	<b>929</b>	<b>100.0</b>

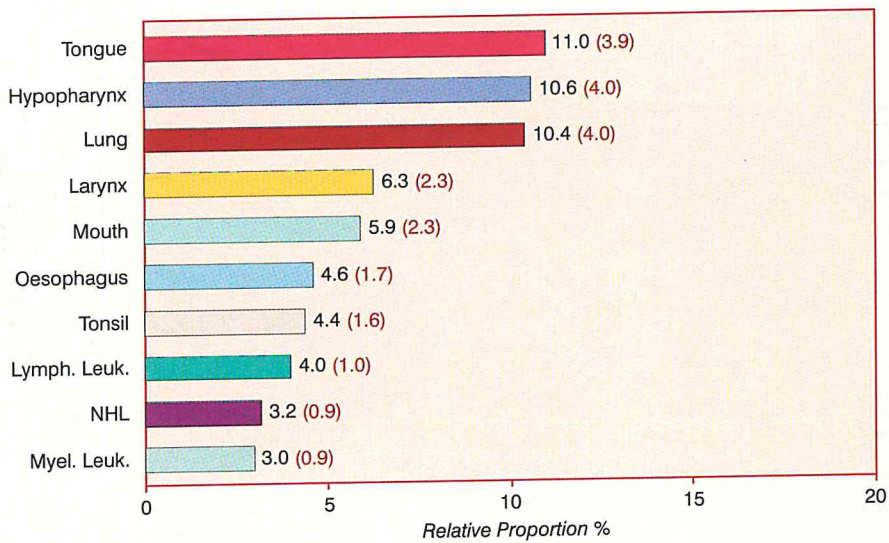
**TABLE 5.69(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	10,67,256	10,11,637	10,84,483	10,26,409	21,51,739	20,38,046
Total Cancers (All sites)	245	182	282	220	527	402
Min. Crude IR	23.0	18.0	26.0	21.4	24.5	19.7
Min. Age Adjusted IR	33.1	23.5	36.4	27.3	34.8	25.4
Min. Truncated IR	65.9	57.0	75.8	71.1	70.8	63.8

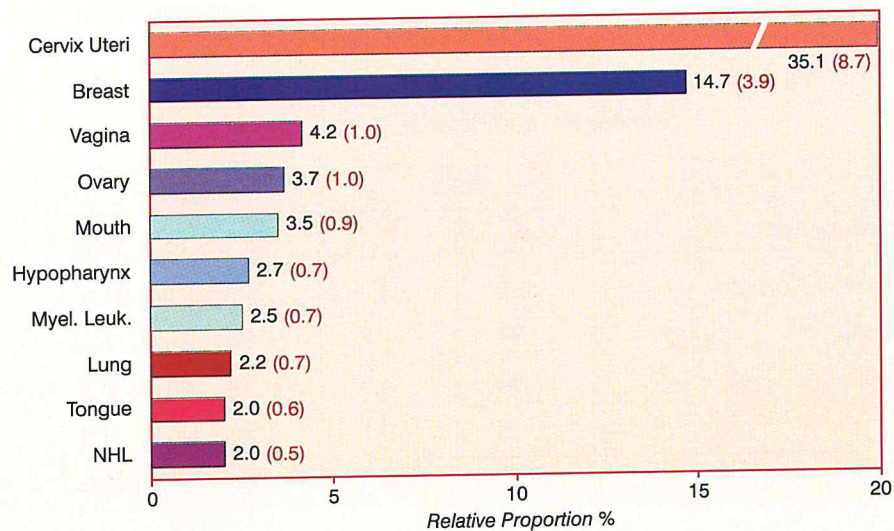
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.69(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females

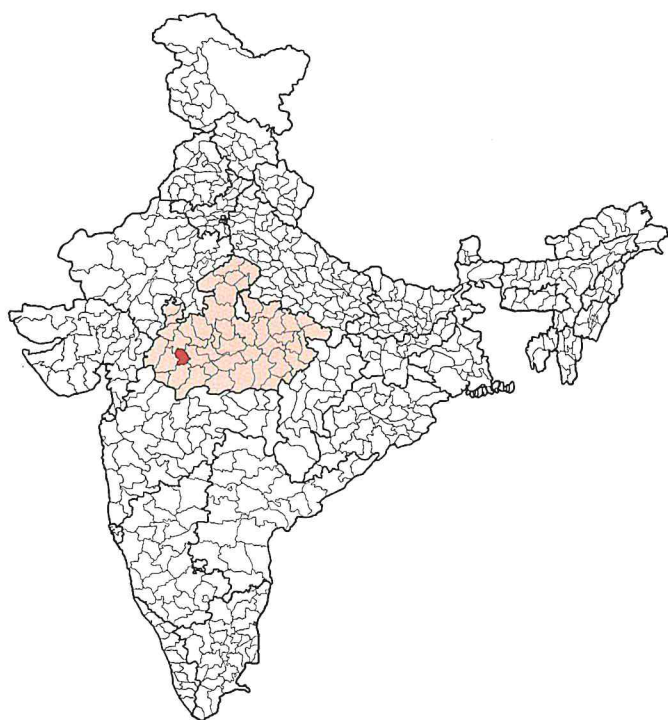


## 5.70. INDORE DISTRICT, Madhya Pradesh State

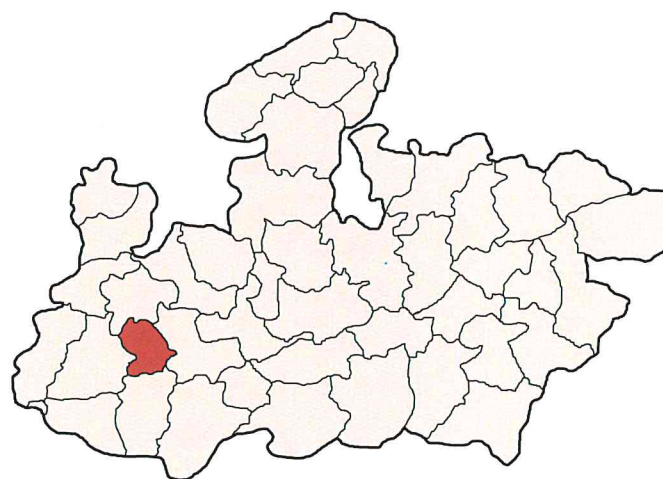
(Code 2326)

**TABLE 5.70(a) : Profile of Indore District (2001 Census)**

Area (in sq. kms.)	3,898.0
Decadal Growth Rate (1991-2001)	40.82%
Literacy Rate	
Males	84.71%
Females	63.96%
Sex Ratio (females per 1000 males)	911
Density (persons per sq. km)	663



**FIGURE 5.70(a) : Map of India highlighting Madhya Pradesh State**



**FIGURE 5.70(b) : Map of Madhya Pradesh State highlighting Indore District**

**TABLE 5.70(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
MGM Medical College, Indore (28)	601	83.2	798	87.9	1399	85.8
HBCR - Mumbai (1008)	84	11.6	70	7.7	154	9.4
PBCR - Mumbai (1002)	32	4.4	19	2.1	51	3.1
All Other Centres	5	0.7	21	2.3	26	1.6
<b>Total Cancers</b>	<b>722</b>	<b>100.0</b>	<b>908</b>	<b>100.0</b>	<b>1630</b>	<b>100.0</b>

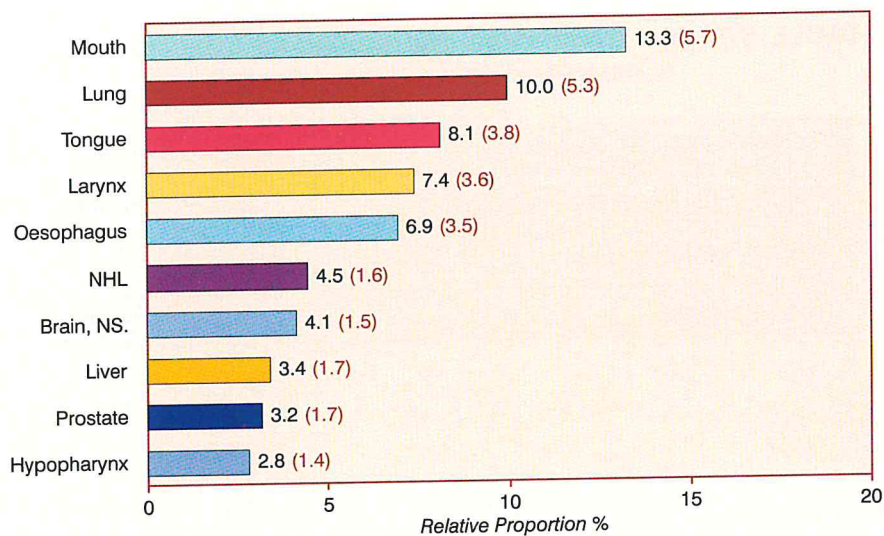
**TABLE 5.70(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	13,32,496	12,17,941	13,70,495	12,53,153	27,02,991	24,71,094
Total Cancers (All sites)	383	339	469	439	852	778
Min. Crude IR	28.7	27.8	34.2	35.0	31.5	31.5
Min. Age Adjusted IR	42.3	40.6	50.2	50.1	46.3	45.4
Min. Truncated IR	74.5	84.1	92.1	111.2	83.5	98.0

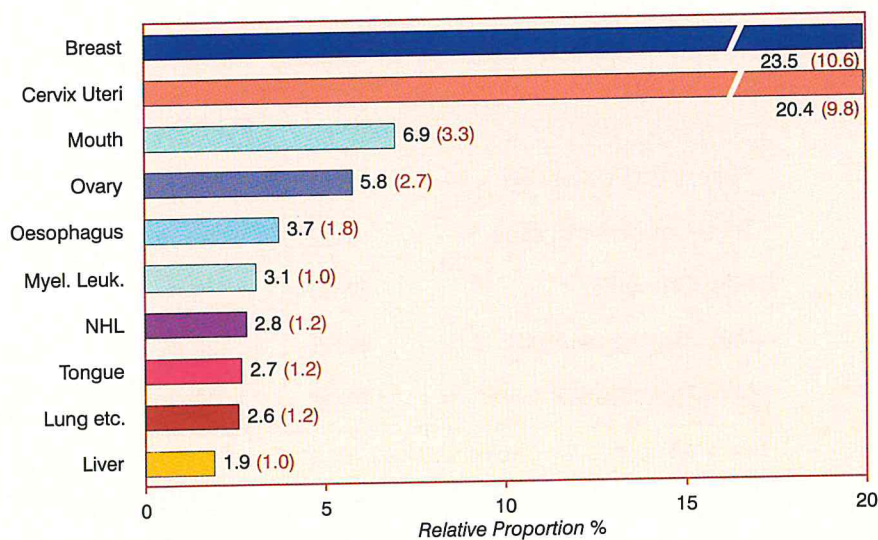
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.70(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

### Males



### Females



## 5.71. LAKSHADWEEP

(Code 3101)

**TABLE 5.71(a) : Profile of Lakshadweep (2001 Census)**

Area (in sq. kms.)	32.0
Decadal Growth Rate (1991-2001)	17.19%
Literacy Rate	
Males	93.15%
Females	81.56%
Sex Ratio (females per 1000 males)	947
Density (persons per sq. km)	1,894

**TABLE 5.71(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
HBCR - Thiruvananthapuram (1006)	16	100.0
HBCR - Mumbai (1008)	0	0.0
<b>Total Cancers</b>	<b>16</b>	<b>100.0</b>

**TABLE 5.71(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	31,644	29,987
Total Cancers (All sites)	12	4
Min. Crude IR	37.90	13.30
Min. Age Adjusted IR	45.50	20.00
Min. Truncated IR	130.22	28.91

Min. = Minimum IR = Incidence Rate / 100,000

## STATES AND U.T. IN THE NORTHERN REGION

### UNION TERRITORY OF CHANDIGARH

Cancer of the lung was the leading site of cancer in males followed by non-Hodgkin's Lymphoma, cancer of the prostate, urinary bladder and kidney. *The leading sites observed here are slightly different from that seen in other parts of the country where cancers of sites associated with use of tobacco are predominant among the first five leading sites.* Cancer of the breast is the leading site of cancer in women with a MAAR of 39.5/100,000, which is higher than the AAR of this site of cancer seen in any of the PBCRs under the NCRP. Cancer of the cervix followed cancer of the breast as the second leading site of cancer. Cancer of the gall bladder is the fourth leading site of cancer with a MAAR of 6.4/100,000. [Fig. 5.72(c)]. The sister departments of histo-pathology and cytology at the PGIMER at Chandigarh accounted for most of the cases seen in this union territory. [Table 5.72(b)].

### HARYANA STATE

The summary table of cancer incidence is tabulated for Panchkula and Ambala districts in this state.

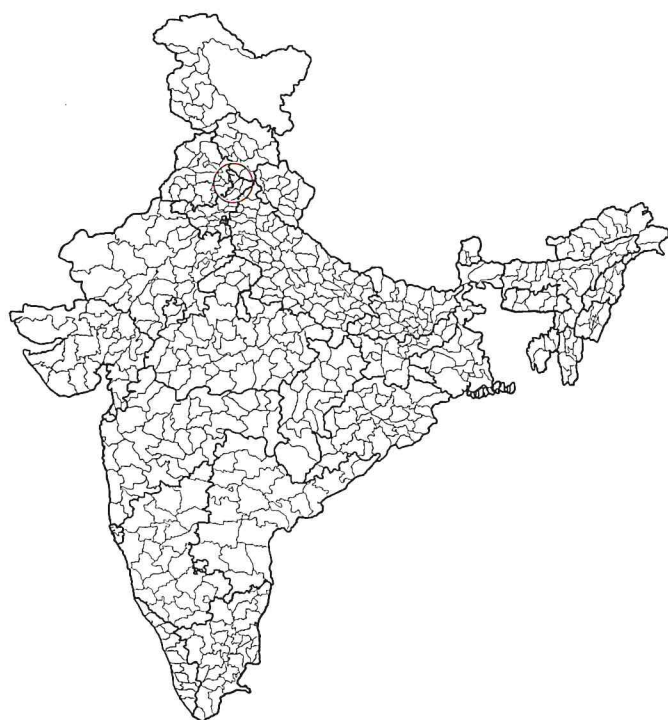
In both districts cancers of sites associated with use of tobacco, like, tongue, lung, larynx, oesophagus and urinary bladder were among the leading sites. The other sites of cancer that were part of the ten leading sites were, non-Hodgkin's lymphoma, cancer of the prostate and penis. In women, cancer of the breast was the most common in both districts accounting for 35% and 27.7% of cancers in women, respectively in Panchkula and Ambala. Cancer of the cervix followed cancer of the breast in these two districts, as the leading sites of cancer. Cancer of the gall bladder was the eighth leading site in Panchkula and ninth leading site of cancer in Ambala. [Figs. 5.73(c) & 5.74(c)].

## 5.72. UNION TERRITORY OF CHANDIGARH

(Code 0401)

**TABLE 5.72(a) : Profile of Chandigarh (2001 Census)**

Area (in sq. kms.)	114.0
Decadal Growth Rate (1991-2001)	40.33%
Literacy Rate	
Males	85.65%
Females	76.65%
Sex Ratio (females per 1000 males)	773
Density (persons per sq. km)	7903



**FIGURE 5.72(a) : Map of India highlighting Union Territory of Chandigarh**

**FIGURE 5.72(b) : Map of Union Territory of Chandigarh**

**TABLE 5.72(b) : Centrewise Distribution of Cancers**

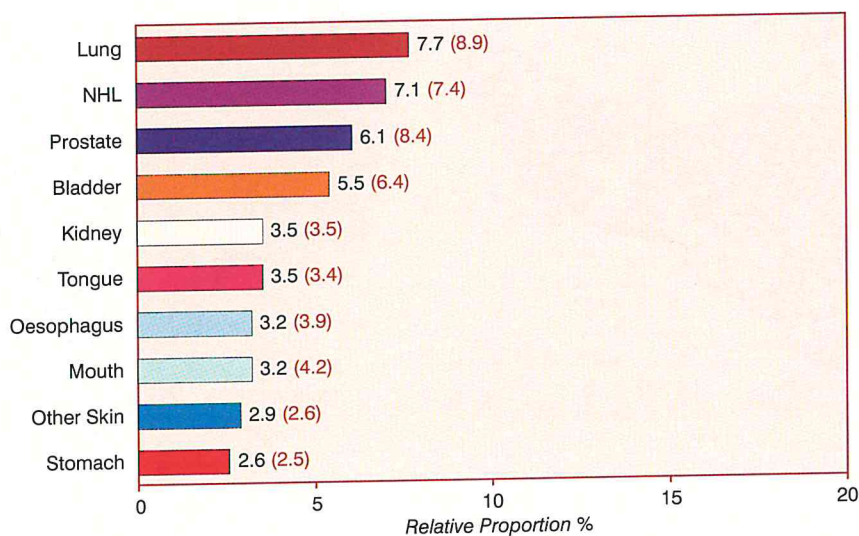
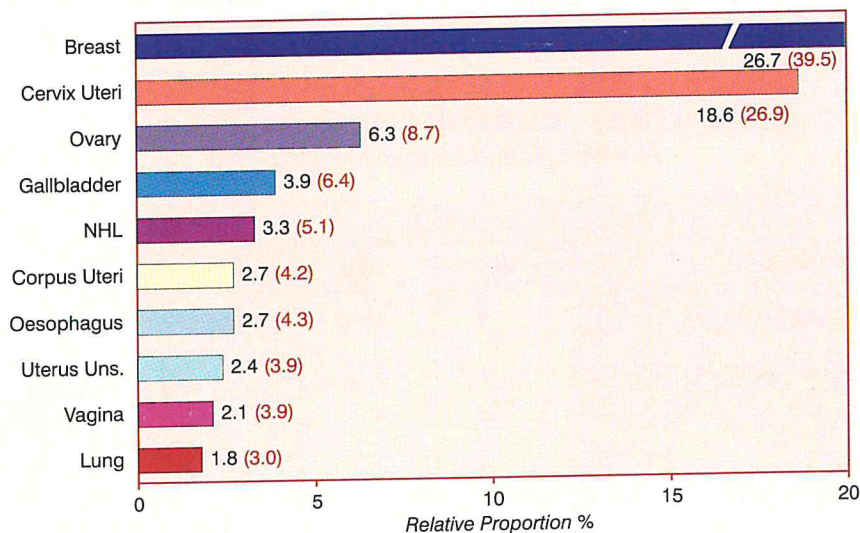
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Centre (with code in parentheses)						
PGIMR (Cytology), Chandigarh (76)	54	48.2	389	60.2	443	58.4
PGIMR (Histopathology), Chandigarh (111)	39	34.8	237	36.7	276	36.4
HBCR - Mumbai (1008)	16	14.3	9	1.4	25	3.3
All Other Centres	3	2.7	11	1.7	14	1.8
<b>Total Cancers</b>	<b>112</b>	<b>100.0</b>	<b>646</b>	<b>100.0</b>	<b>758</b>	<b>100.0</b>

**TABLE 5.72(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	5,23,707	4,03,491
Total Cancers (All sites)	312	333
Min. Crude IR	59.6	82.5
Min. Age Adjusted IR	106.7	148.0
Min. Truncated IR	154.7	317.9

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.72(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.73. PANCHKULA DISTRICT, Haryana State

(Code 0601)

**TABLE 5.73(a) : Profile of Panchkula District  
(2001 Census)**

Area (in sq. kms.)	898.0
Decadal Growth Rate (1991-2001)	51.16%
Literacy Rate	
Males	82.74%
Females	68.98%
Sex Ratio (females per 1000 males)	823
Density (persons per sq. km)	523



FIGURE 5.73(a) : Map of India highlighting Haryana State

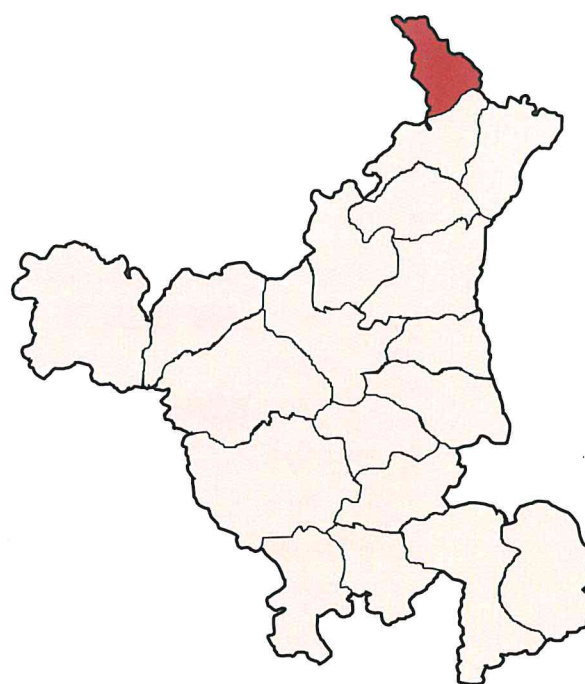


FIGURE 5.73(b) : Map of Haryana State highlighting Panchkula District

**TABLE 5.73(b) : Centrewise Distribution of Cancers**

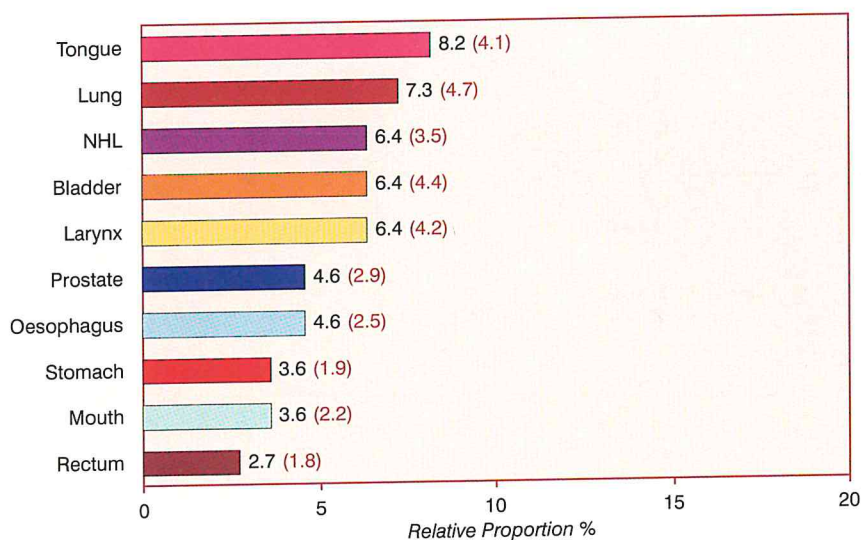
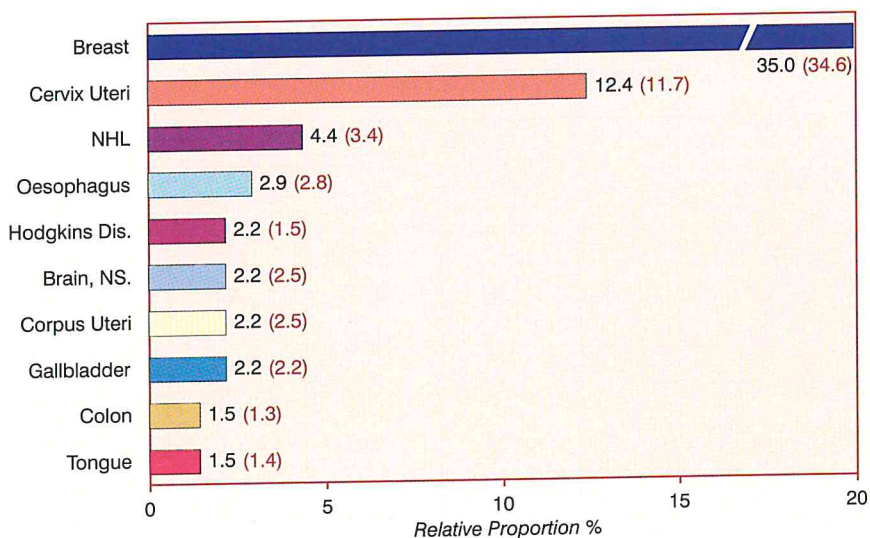
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
PGIMR (Cytology), Chandigarh (76)	4	30.8	131	53.0	135	51.9
PGIMR (Histopathology), Chandigarh (111)	4	30.8	113	45.7	117	45.0
HBCR - Mumbai (1008)	3	23.1	1	0.4	4	1.5
All Other Centres	2	15.4	2	0.8	4	1.5
<b>Total Cancers</b>	<b>13</b>	<b>100.0</b>	<b>247</b>	<b>100.0</b>	<b>260</b>	<b>100.0</b>

**TABLE 5.73(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	2,65,598	2,17,789
Total Cancers (All sites)	110	137
Min. Crude IR	41.4	62.9
Min. Age Adjusted IR	58.0	92.9
Min. Truncated IR	132.1	237.9

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.73(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.74. AMBALA DISTRICT, Haryana State

(Code 0602)

**TABLE 5.74(a) : Profile of Ambala District (2001 Census)**

Area (in sq. kms.)	1,574.0
Decadal Growth Rate (1991-2001)	25.69%
Literacy Rate	
Males	83.01%
Females	68.48%
Sex Ratio (females per 1000 males)	869
Density (persons per sq. km)	644

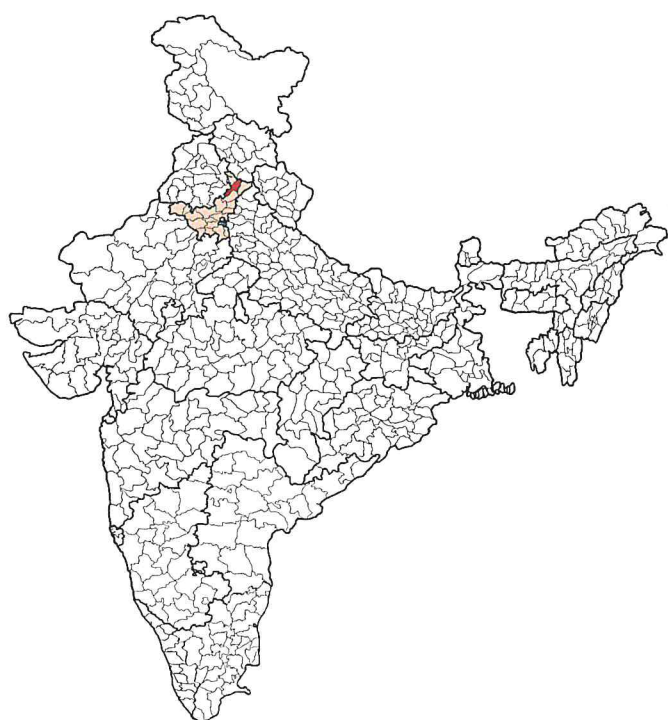


FIGURE 5.74(a) : Map of India highlighting Haryana State

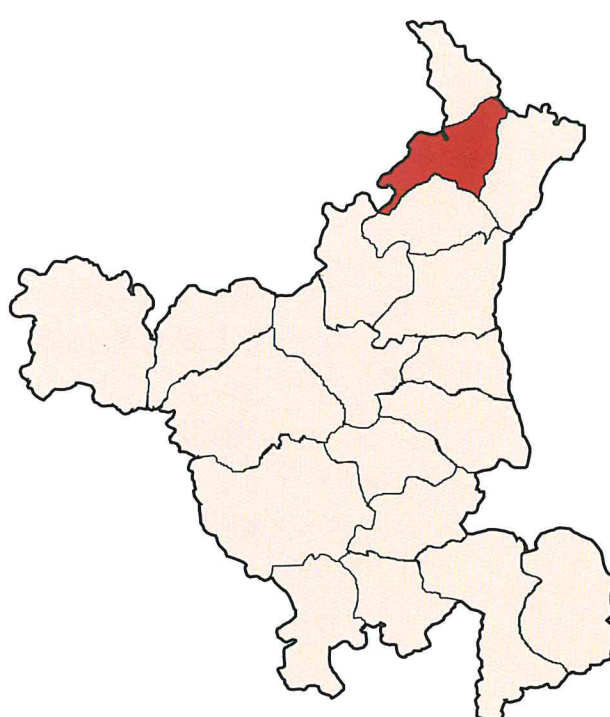


FIGURE 5.74(b) : Map of Haryana State highlighting Ambala District

**TABLE 5.74(b) : Centrewise Distribution of Cancers**

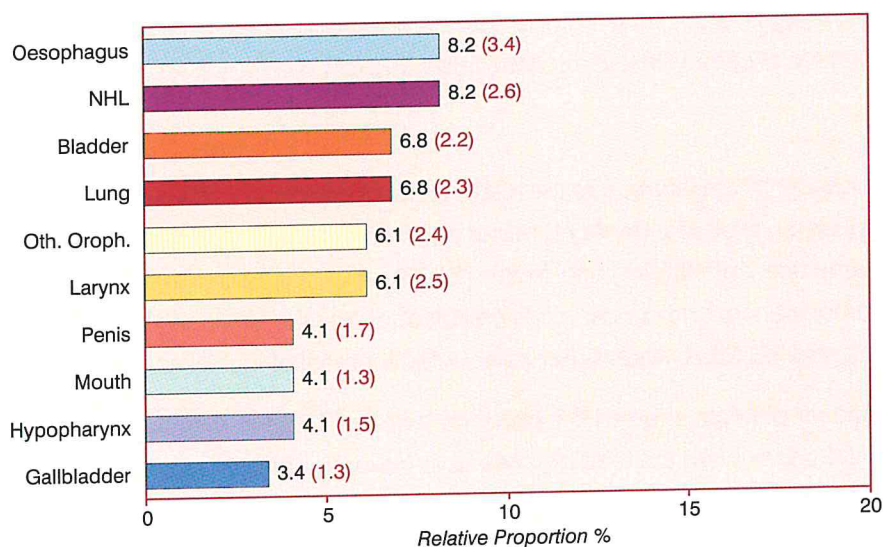
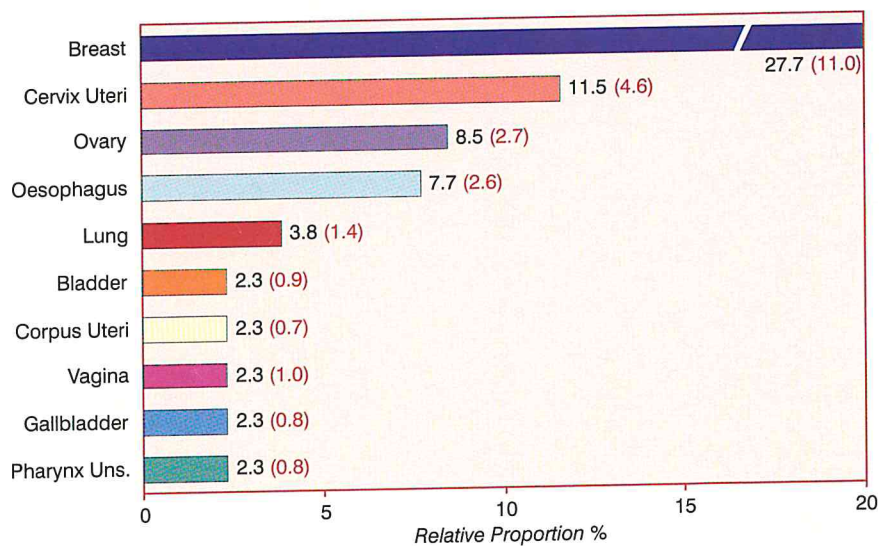
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
PGIMR (Histopathology), Chandigarh (111)	7	17.9	138	49.8	145	45.9
PGIMR (Cytology), Chandigarh (76)	19	48.7	111	40.1	130	41.2
Government Medical College, Patiala (75)	5	12.8	9	3.2	14	4.4
Acharya Tulsi RCC, Bikaner (87)	3	7.7	8	2.9	11	3.5
MD Oswal Cancer Centre, Ludhiana (2)	1	2.6	6	2.2	7	2.2
All Other Centres	4	10.3	5	1.8	9	2.8
<b>Total Cancers</b>	<b>39</b>	<b>100.0</b>	<b>277</b>	<b>100.0</b>	<b>316</b>	<b>100.0</b>

**TABLE 5.74(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	5,59,733	4,83,881
Total Cancers (All sites)	147	130
Min. Crude IR	26.3	26.9
Min. Age Adjusted IR	36.4	37.8
Min. Truncated IR	62.2	98.8

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.74(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## PUNJAB STATE

Figure 5(S) gives the Map of India highlighting Punjab State and Figure 5(T) gives the Map of Punjab State highlighting the Districts where the MAAR was above 36.2/100,000. These districts in descending order of MAAR were Bathinda, Rupnagar, Patiala, Faridkot and Muktsar.

### Bathinda District

Cancer of the oesophagus, followed by cancers of the mouth and tongue were the first three leading sites of cancer in males. The myeloid and lymphoid leukaemias were next followed by cancer of the prostate and urinary bladder. Cancer of the breast was the leading site in females, closely followed by cancer of the cervix. Myeloid leukaemia was the fourth leading site and cancer of the gall bladder was the sixth leading site in women. [Fig. 5.75(c)]. The sources of referral for this district included the Acharya Tulsi Regional Cancer Centre at Bikaner, the Government Medical College at Patiala and PGIMER at Chandigarh. [Table 5.75(c)].

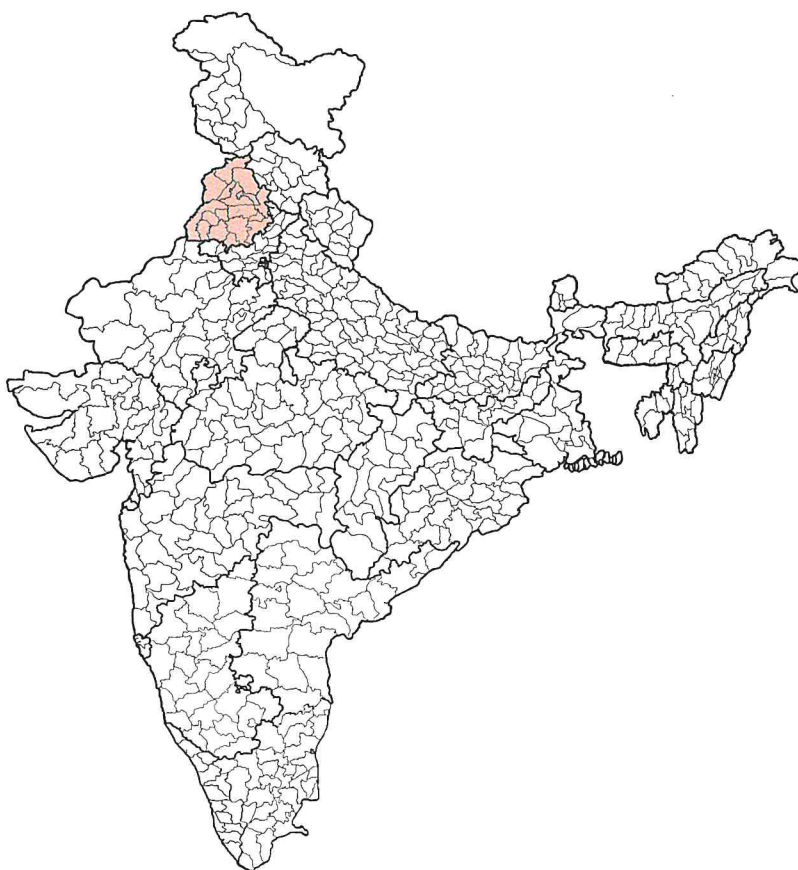
### Rupnagar District

Cancer of the larynx followed by non-Hodgkin's Lymphoma and cancer of the urinary bladder were the first three leading sites of cancer. Other tobacco related cancers - oesophagus, mouth and hypopharynx were the next three leading sites. In females, cancer of the breast was the leading site closely followed by cancer of the cervix and ovary. Cancer of the oesophagus, mouth and lung were also among ten leading sites of cancer in women. [Fig. 5.76(c)]. PGIMER was the major referral centre for this district. [Table 5.76(c)].

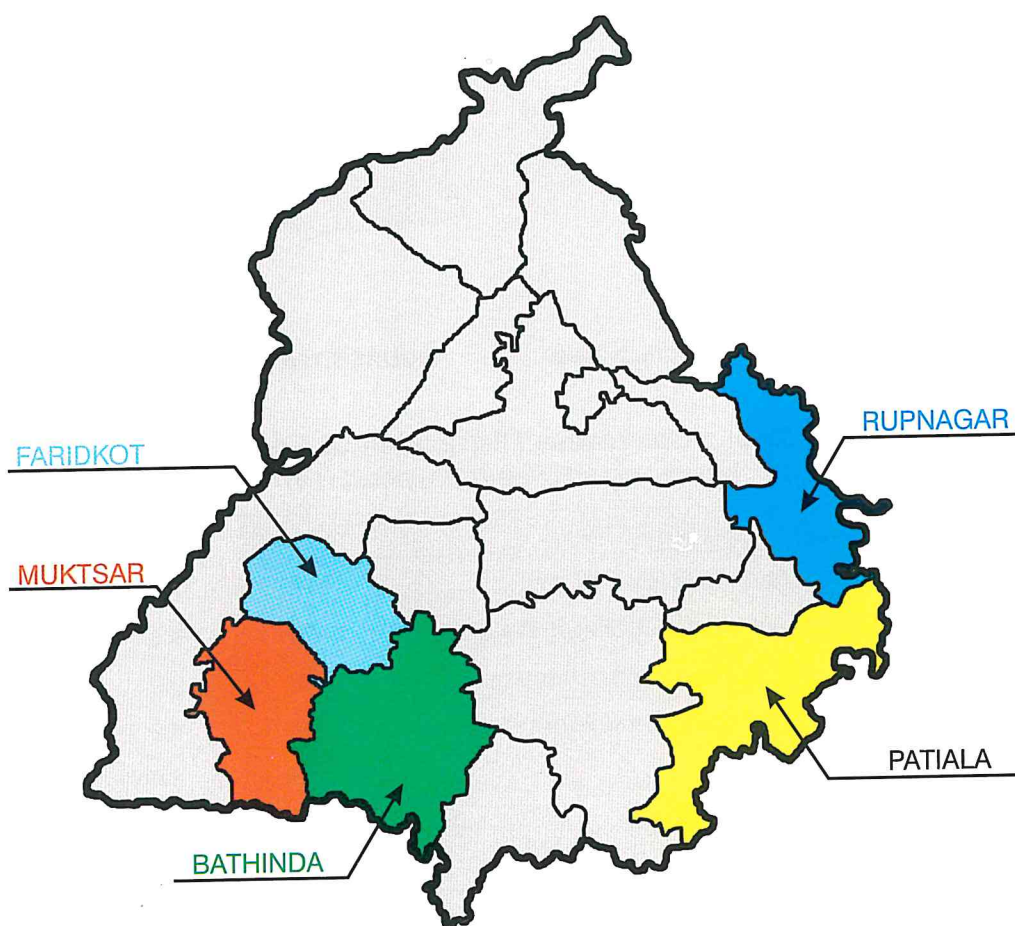
### Patiala District

As in Rupnagar, cancer of the larynx was the leading site of cancer in Patiala district as well. This was followed by cancer of the oesophagus, prostate, urinary bladder and non-Hodgkin's Lymphoma. Among females, cancer of the breast was the leading site, constituting one-fourth (24.7%) of all cancers in that sex. Cancer of the oesophagus was the third most common cancer and cancer of the gall bladder was the fifth leading site. [Fig. 5.77(c)]. Government Medical College, Patiala and PGIMER, Chandigarh accounted for most of the cases from this district. [Table 5.77(c)].

Faridkot and Muktsar districts showed the predominance of TRCs in males. In females, cancer of the breast followed by cancer of the cervix were the leading sites accounting for almost exactly 28 and 20 percent of cancers respectively in both the districts.



**FIGURE 5(S) : Map of India highlighting Punjab State**



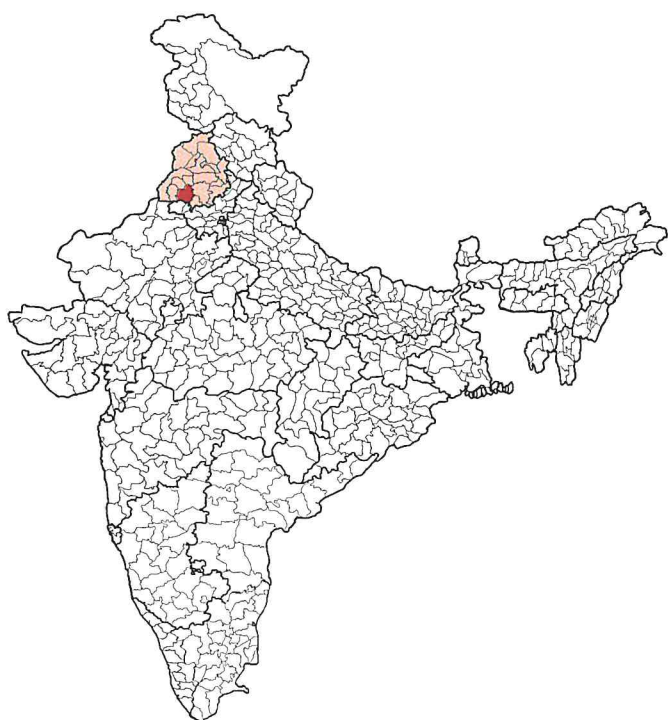
**FIGURE 5(T) : Map of Punjab State highlighting the districts with MAAR above 36.2 per 100,000**

## 5.75. BATHINDA DISTRICT, Punjab State

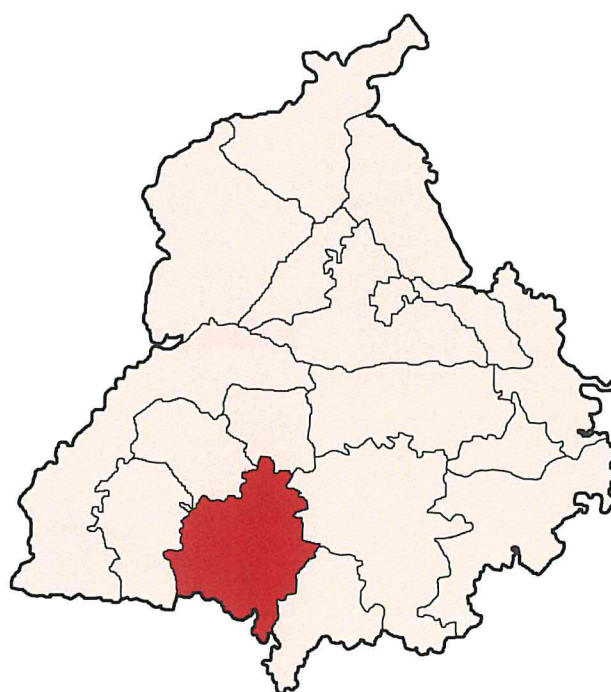
(Code 0314)

**TABLE 5.75(a) : Profile of Bathinda District (2001 Census)**

Area (in sq. kms.)	3,382.0
Decadal Growth Rate (1991-2001)	19.89%
Literacy Rate	
Males	68.31%
Females	53.76%
Sex Ratio (females per 1000 males)	865
Density (persons per sq. km)	349



**FIGURE 5.75(a) : Map of India highlighting Punjab State**



**FIGURE 5.75(b) : Map of Punjab State highlighting Bathinda District**

**TABLE 5.75(b) : Centrewise Distribution of Cancers (2002)**

Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Acharya Tulsi RCC, Bikaner (87)	328	77.4
Government Medical College, Patiala (75)	29	6.8
PGIMR (Histopathology), Chandigarh (111)	22	5.2
PGIMR (Cytology), Chandigarh (76)	18	4.2
MDOCT, Ludhiana (2)	17	4.0
HBCR - Mumbai (1008)	1	0.2
PBCR - Delhi (1011)	7	1.7
All Other Centres	2	0.5
<b>Total Cancers</b>	<b>424</b>	<b>100.0</b>

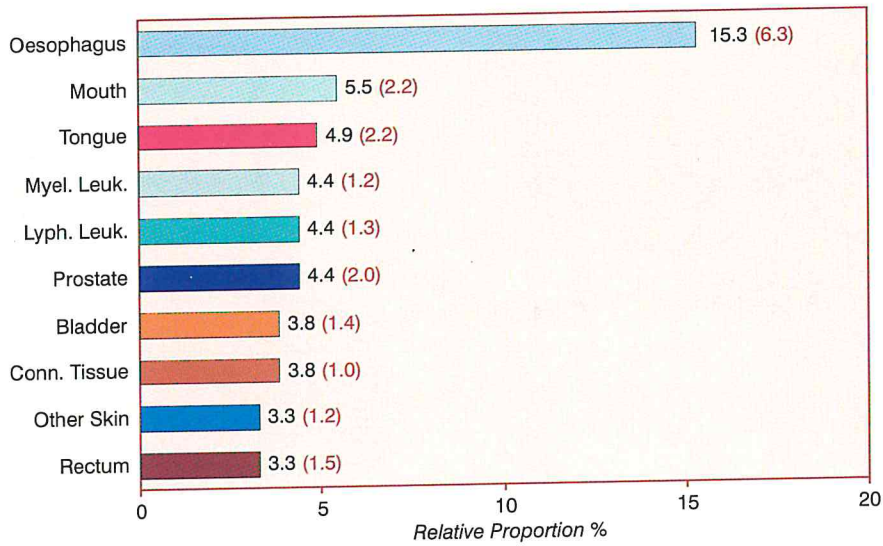
**TABLE 5.75(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	6,44,732	5,57,651
Total Cancers (All sites)	183	241
Min. Crude IR	28.4	43.2
Min. Age Adjusted IR	37.4	57.3
Min. Truncated IR	37.2	131.7

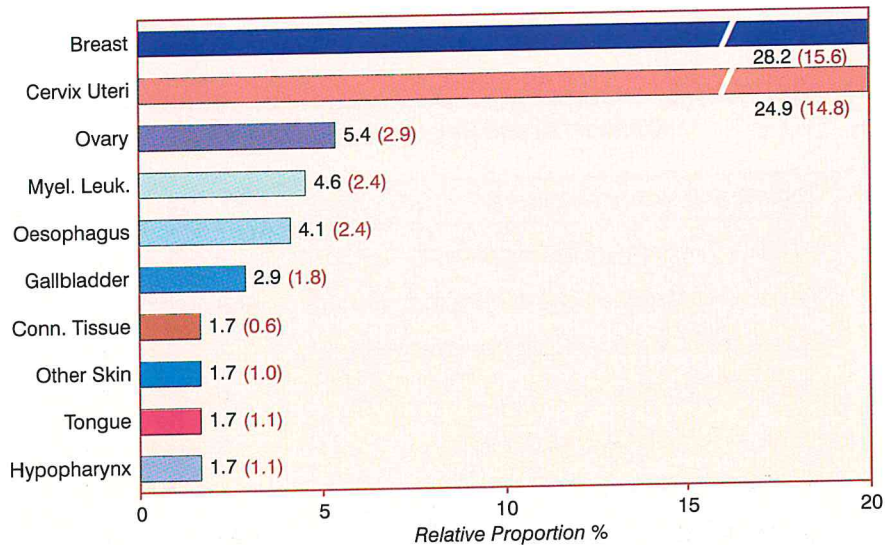
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.75(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**

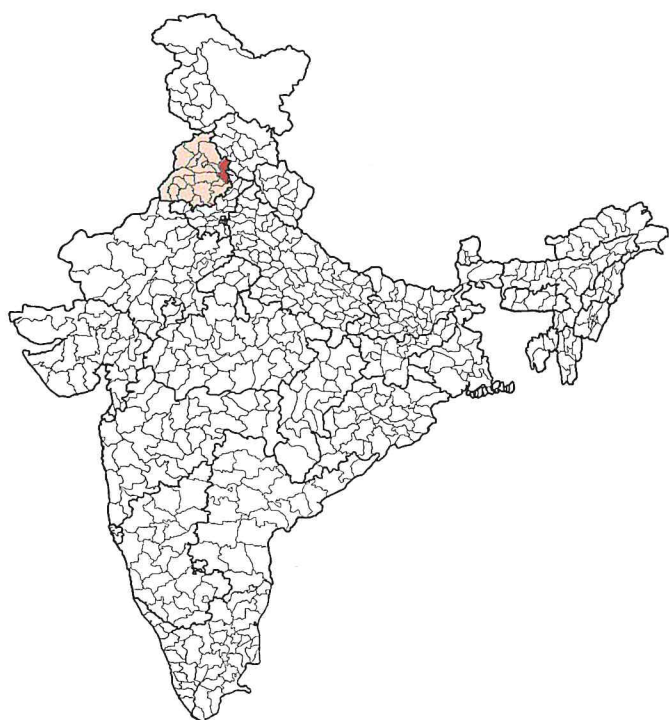


## 5.76. RUPNAGAR DISTRICT, Punjab State

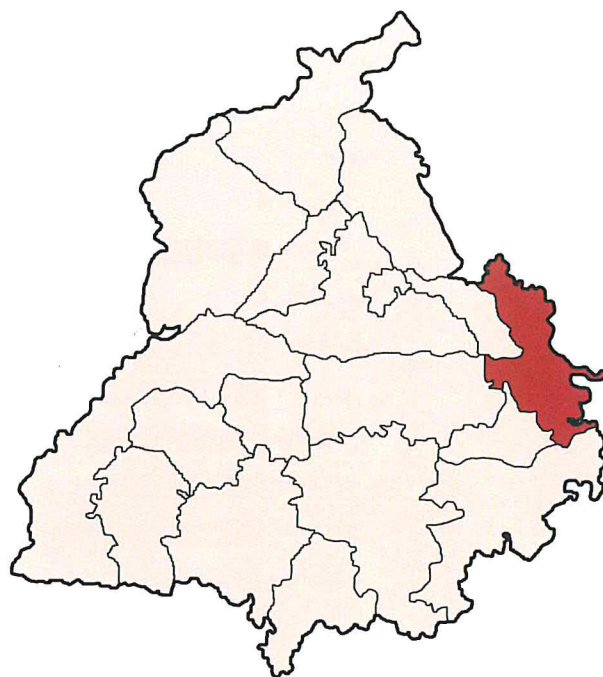
(Code 0307)

**TABLE 5.76(a) : Profile of Rupnagar District (2001 Census)**

Area (in sq. kms.)	2,056.0
Decadal Growth Rate (1991-2001)	23.39%
Literacy Rate	
Males	84.43%
Females	71.74%
Sex Ratio (females per 1000 males)	870
Density (persons per sq. km)	540



**FIGURE 5.76(a) : Map of India highlighting Punjab State**



**FIGURE 5.76(b) : Map of Punjab State highlighting Rupnagar District**

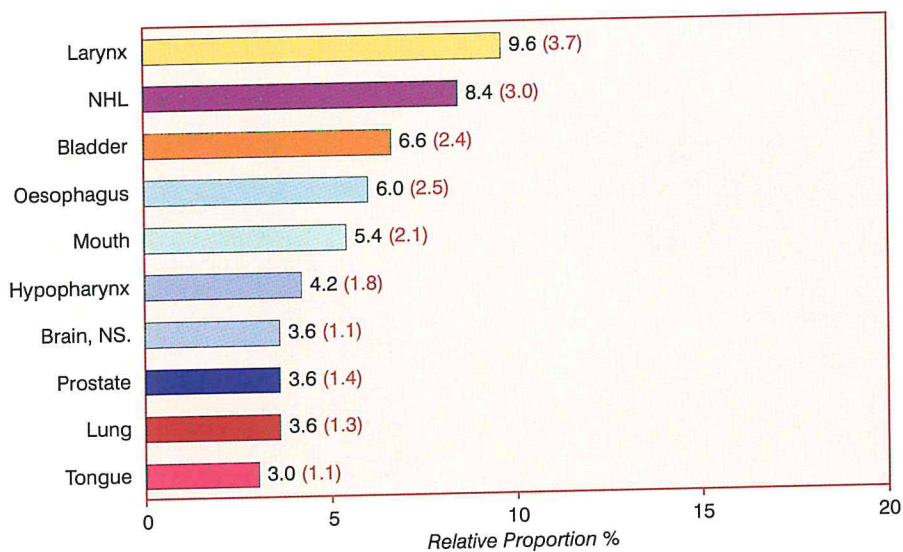
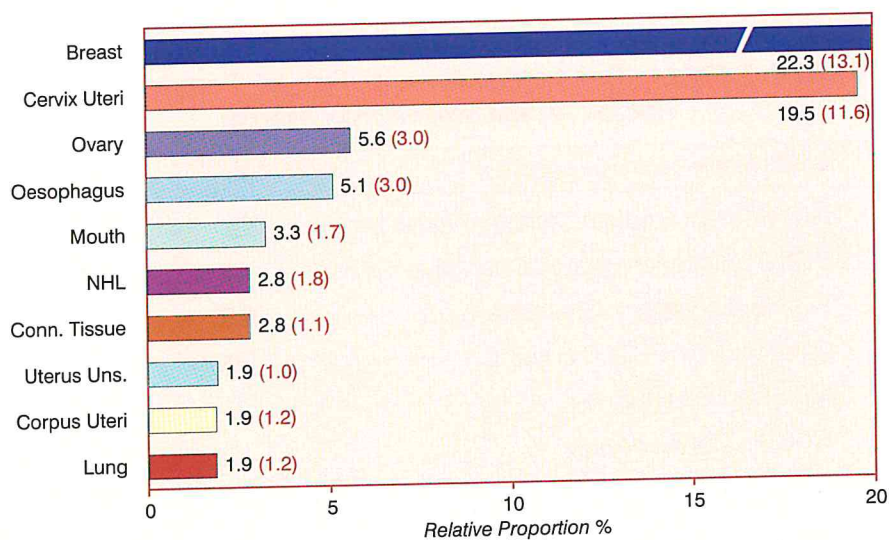
**TABLE 5.76(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
PGIMR (Cytology), Chandigarh (76)	192	50.4
PGIMR (Histopathology), Chandigarh (111)	168	44.1
Government Medical College, Patiala (75)	9	2.4
MDOCT, Ludhiana (2)	8	2.1
Acharya Tulsi RCC, Bikaner (87)	3	0.8
All Other Centres	1	0.3
<b>Total Cancers</b>	<b>381</b>	<b>100.0</b>

**TABLE 5.76(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	6,05,164	5,25,993
Total Cancers (All sites)	166	215
Min. Crude IR	27.4	40.9
Min. Age Adjusted IR	37.2	56.5
Min. Truncated IR	71.3	127.0

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.76(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.77. PATIALA DISTRICT, Punjab State

(Code 317)

**TABLE 5.77(a) : Profile of Patiala District (2001 Census)**

Area (in sq. kms.)	3,627.0
Decadal Growth Rate (1991-2001)	20.31%
Literacy Rate	
Males	76.13%
Females	62.94%
Sex Ratio (females per 1000 males)	864
Density (persons per sq. km)	507



FIGURE 5.77(a) : Map of India highlighting Punjab State

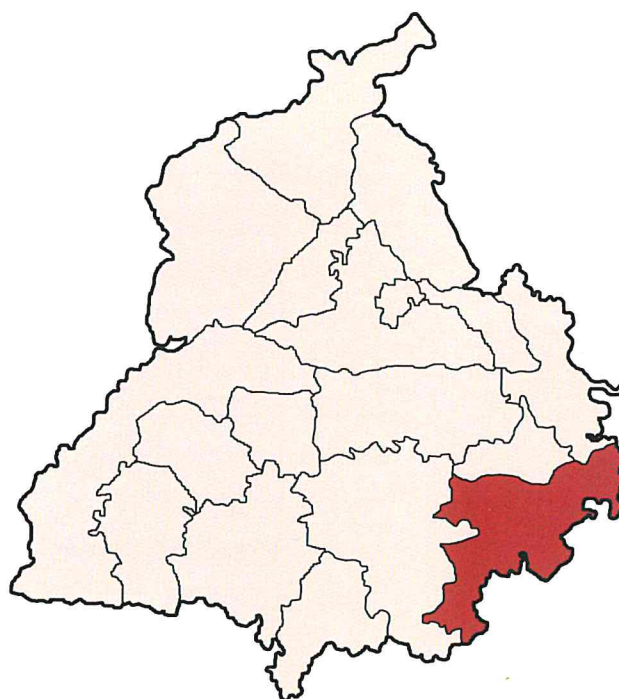


FIGURE 5.77(b) : Map of Punjab State highlighting Patiala District

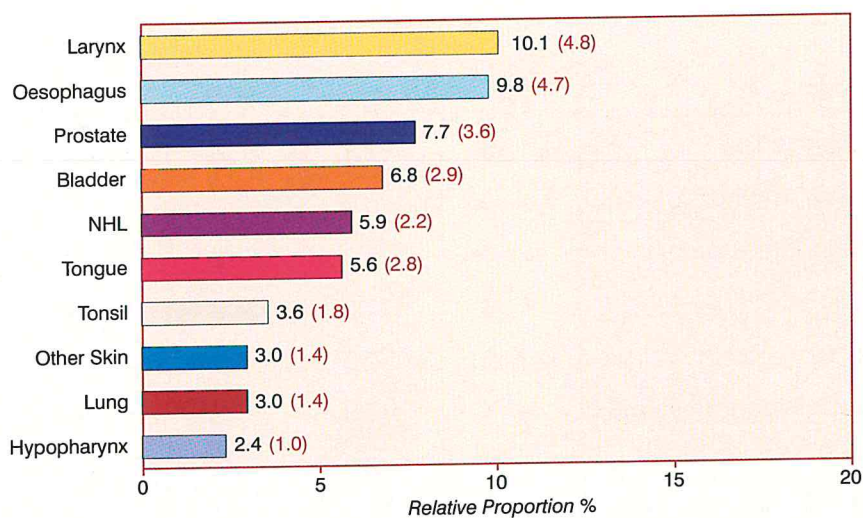
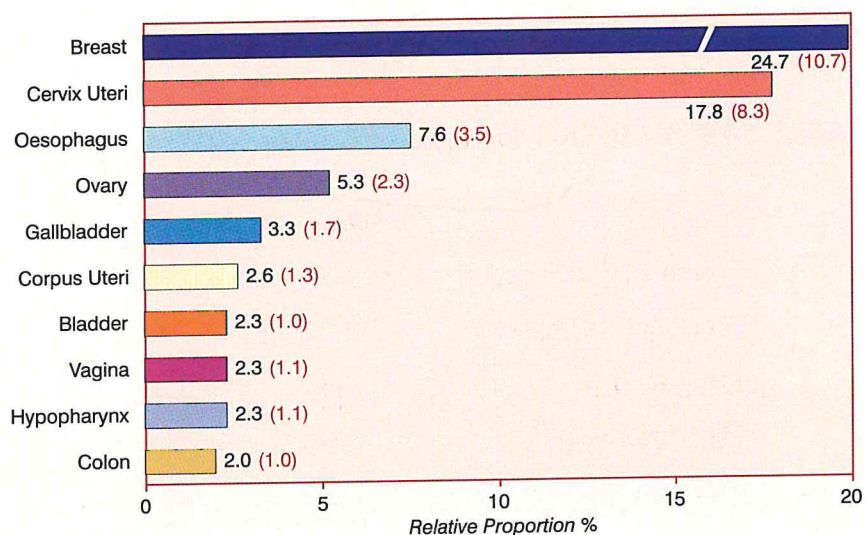
**TABLE 5.77(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Government Medical College, Patiala (75)	327	51.0
PGIMR (Histopathology), Chandigarh (111)	147	22.9
PGIMR (Cytology), Chandigarh (76)	105	16.4
Acharya Tulsi RCC, Bikaner (87)	33	5.1
MDOCT, Ludhiana (2)	21	3.3
HBCR - Mumbai (1008)	5	0.8
All Other Centres	3	0.5
<b>Total Cancers</b>	<b>641</b>	<b>100.0</b>

**TABLE 5.77(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	10,05,579	9,04,651
Total Cancers (All sites)	337	304
Min. Crude IR	33.5	33.6
Min. Age Adjusted IR	44.8	45.6
Min. Truncated IR	80.1	107.3

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.77(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.78. FARIDKOT DISTRICT, Punjab State

(Code 313)

**TABLE 5.78(a) : Profile of Faridkot District (2001 Census)**

Area (in sq. kms.)	1,469
Decadal Growth Rate (1991-2001)	21.42%
Literacy Rate	
Males	68.92%
Females	57.09%
Sex Ratio (females per 1000 males)	881
Density (persons per sq. km)	376

**TABLE 5.78(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Acharya Tulsi RCC, Bikaner (87)	13	68.4	115	79.9	128	78.5
PGIMR (Histopathology), Chandigarh (111)	0	0.0	9	6.3	9	5.5
MDO Cancer Treatment, Ludhiana (2)	0	0.0	8	5.6	8	4.9
HBCR - Mumbai (1008)	3	15.8	2	1.4	5	3.1
PGIMR, Chandigarh (76)	0	0.0	5	3.5	5	3.1
Government Medical College, Patiala (75)	1	5.3	3	2.1	4	2.5
PBCR - Delhi (1011)	0	0.0	2	1.4	2	1.2
All Other Centres	2	10.5	0	0.0	2	1.2
<b>Total Cancers</b>	<b>19</b>	<b>100.0</b>	<b>144</b>	<b>100.0</b>	<b>163</b>	<b>100.0</b>

**TABLE 5.78(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	2,98,093	2,62,943
Total Cancers (All sites)	59	85
Min. Crude IR	19.8	32.3
Min. Age Adjusted IR	28.1	43.2
Min. Truncated IR	67.6	105.1

Min. = Minimum IR = Incidence Rate / 100,000

## 5.79. MUKTSAR DISTRICT, Punjab State

(Code 312)

**TABLE 5.79(a) : Profile of Muktsar District (2001 Census)**

Area (in sq. kms.)	2,615.0
Decadal Growth Rate (1991-2001)	18.68%
Literacy Rate	
Males	65.94%
Females	50.59%
Sex Ratio (females per 1000 males)	886
Density (persons per sq. km)	297

**TABLE 5.79(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year Centre (with code in parentheses)	2001		2002		2001 - 2002	
	#	%	#	%	#	%
Acharya Tulsi RCC, Bikaner (87)	27	90.0	166	86.9	193	87.3
PGIMR (Histopathology), Chandigarh (111)	0	0.0	8	4.2	8	3.6
Government Medical College, Patiala (75)	1	3.3	6	3.1	7	3.2
MDO Cancer Treatment, Ludhiana (2)	0	0.0	7	3.7	7	3.2
PGIMR (Cytology), Chandigarh (76)	1	3.3	4	2.1	5	2.3
BM Cancer Centre, Jaipur (60)	1	3.3	0	0.0	1	0.5
<b>Total Cancers</b>	<b>30</b>	<b>100.0</b>	<b>191</b>	<b>100.0</b>	<b>221</b>	<b>100.0</b>

**TABLE 5.79(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	4,18,040	3,70,786
Total Cancers (All sites)	72	119
Min. Crude IR	17.2	32.1
Min. Age Adjusted IR	24.0	42.4
Min. Truncated IR	45.2	99.5

Min. = Minimum IR = Incidence Rate / 100,000

## RAJASTHAN STATE

Figure 5(U) gives the Map of India highlighting Rajasthan State and Figure 5(V) gives the Map of Rajasthan State highlighting the Districts where the MAAR was above 36.2 /100,000. These districts in descending order of MAAR were Bikaner, Ajmer and Jaipur.

### Bikaner District

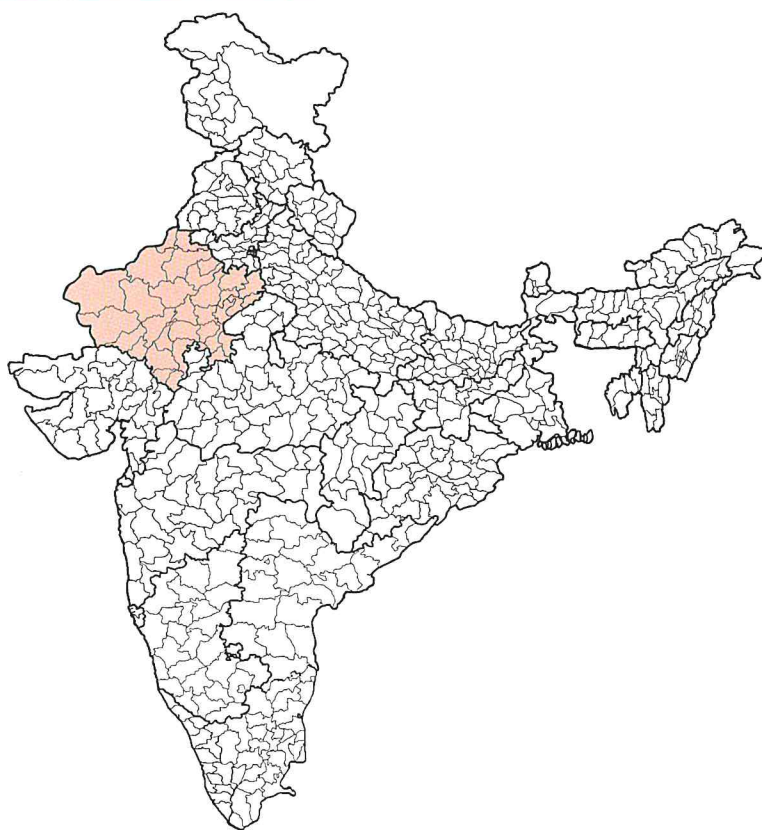
As in Jaipur district, cancer of the lung, oesophagus, mouth and tongue were the four leading sites of cancer in that order in males. In females cancer of the breast was the most common followed by cancer of the cervix and oesophagus. Cancer of the gall bladder was the fifth leading site of cancer in women. [Fig. 5.80(c)]. Majority of the cancers from this district was registered at the Acharya Tulsi Regional Cancer Centre at Bikaner. [Table 5.80(b)].

### Ajmer District

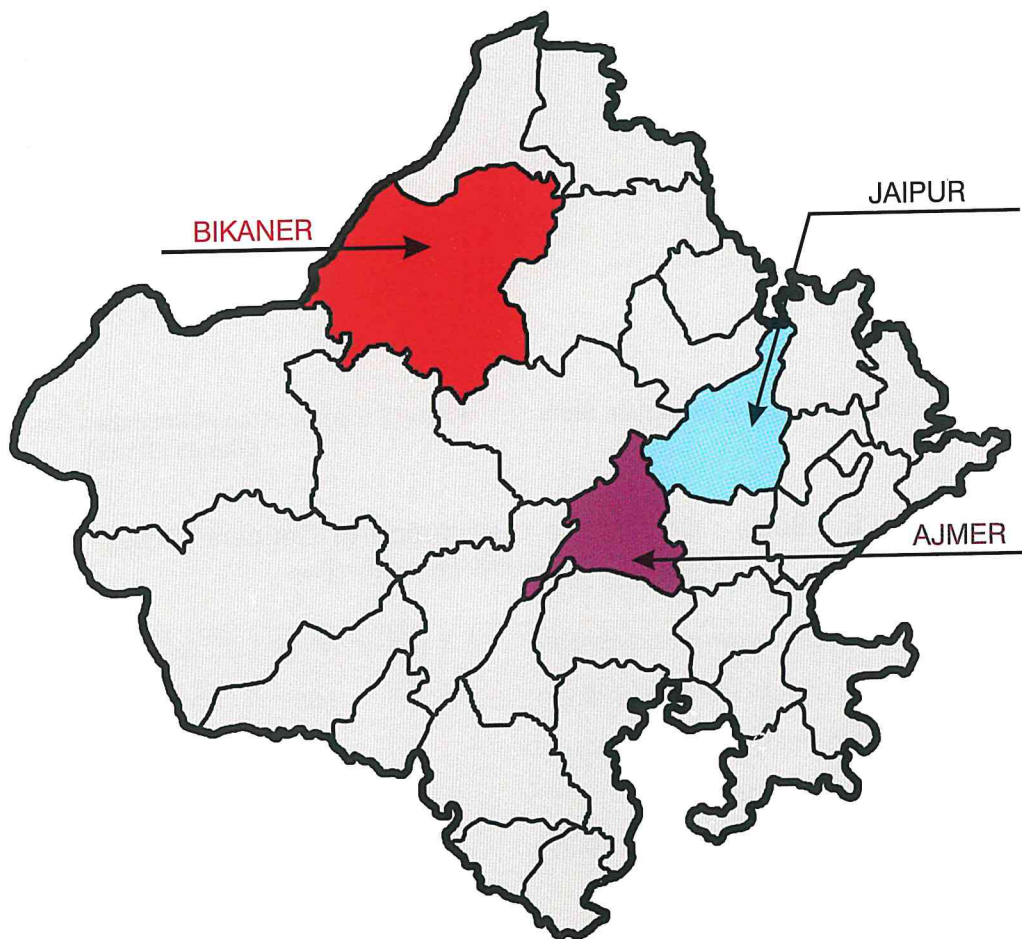
The first five leading sites of cancer in males were once again tobacco related cancers, viz., tongue, hypopharynx, larynx, mouth and oesophagus. Cancer of the prostate was the sixth leading site. Among females cancers of the breast and cervix were seen in equal proportion and almost identical MAAR. Cancer of the oesophagus and tongue were the fourth and fifth leading sites of cancer. Cancer of the gall bladder was the ninth leading site. [Fig. 5.81(c)]. Over 80% of cases from this district were seen at JLN Medical College, Ajmer and about 8% of cases at SDM Hospital, Jaipur. [Table 5.81(b)].

### Jaipur District

The first four leading sites of cancer in males, in this district of Rajasthan were tobacco related cancers - lung, tongue, mouth and oesophagus. This was followed by cancer of the prostate, as the fifth leading site of cancer. In females cancer of the breast was the leading site followed by cancer of the cervix. [Fig. 5.82(c)]. Majority of the cancers in this district were registered at SDM Hospital, SMS Medical College and Bhagwan Mahaveer Cancer Centre all at Jaipur. [Table 5.82(b)].



**FIGURE 5(U) : Map of India highlighting Rajasthan State**



**FIGURE 5(V) : Map of Rajasthan State highlighting the districts with MAAR above 36.2 per 100,000**

## 5.80. BIKANER DISTRICT, Rajasthan State

(Code 0803)

**TABLE 5.80(a) : Profile of Bikaner District (2001 Census)**

Area (in sq. kms.)	27,284.0
Decadal Growth Rate (1991-2001)	38.18%
Literacy Rate	
Males	70.78%
Females	42.55%
Sex Ratio (females per 1000 males)	889
Density (persons per sq. km)	61

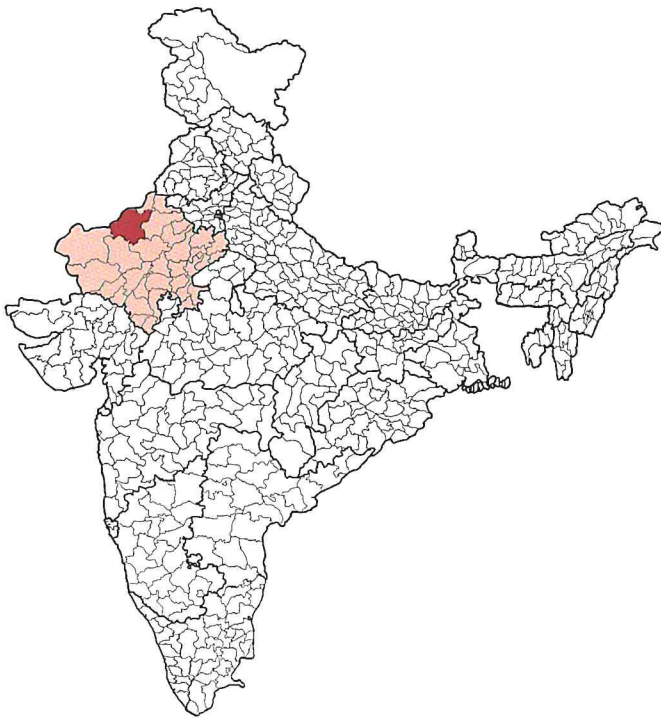


FIGURE 5.80(a) : Map of India highlighting Rajasthan State

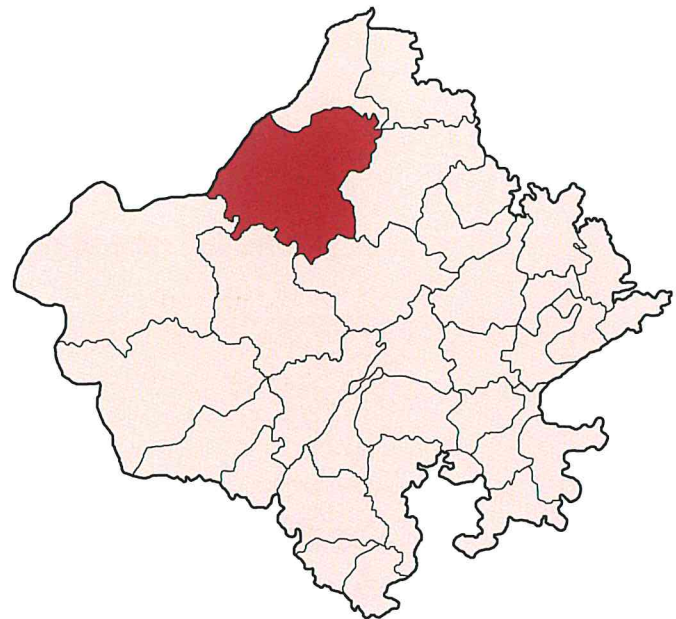


FIGURE 5.80(b) : Map of Rajasthan State highlighting Bikaner District

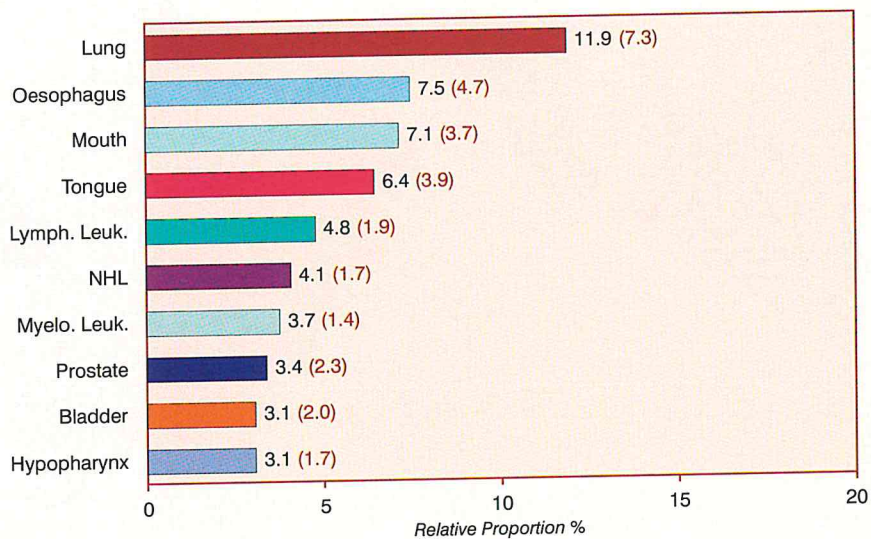
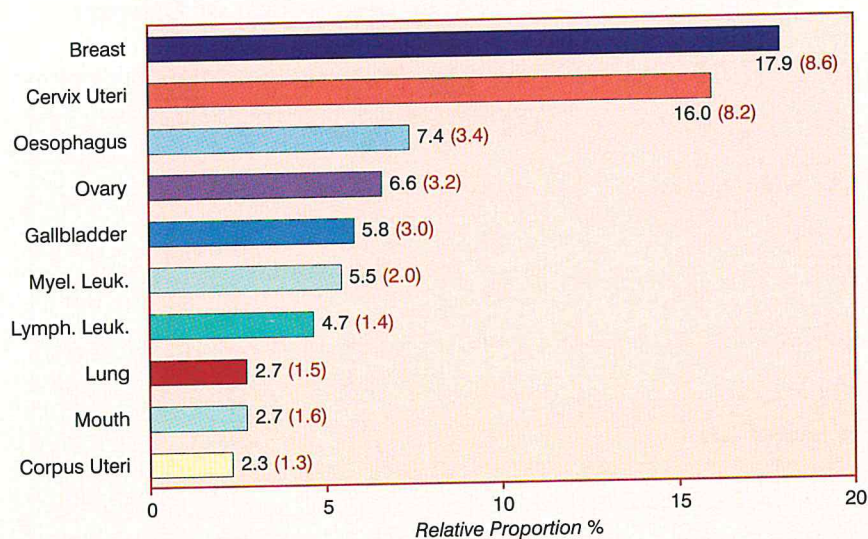
**TABLE 5.80(b) : Centrewise Distribution of Cancers (2002)**  
Number (#) and Relative Proportion (%)

Centre (with code in parentheses)	#	%
Acharya Tulsi RCC, Bikaner (87)	505	91.5
SD Memorial Hospital, Jaipur (68)	18	3.3
HBCR - Mumbai (1008)	13	2.4
SMS Medical College, Jaipur (23)	6	1.1
PBCR - Mumbai (1002)	4	0.7
All Other Centres	6	1.1
<b>Total Cancers</b>	<b>552</b>	<b>100.0</b>

**TABLE 5.80(c) : Salient features of Cancer Incidence (2002)**

	Males	Females
Estimated Population	9,13,379	8,13,931
Total Cancers (All sites)	295	257
Min. Crude IR	32.3	31.6
Min. Age Adjusted IR	52.9	48.0
Min. Truncated IR	89.6	100.6

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.80(c) : Ten Leading Sites of Cancer (2002)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**

## 5.81. AJMER DISTRICT, Rajasthan State

(Code 0821)

**TABLE 5.81(a) : Profile of Ajmer District (2001 Census)**

Area (in sq. kms.)	8,481.0
Decadal Growth Rate (1991-2001)	26.10%
Literacy Rate	
Males	79.96%
Females	49.10%
Sex Ratio (females per 1000 males)	932
Density (persons per sq. km)	257



FIGURE 5.81(a) : Map of India highlighting Rajasthan State

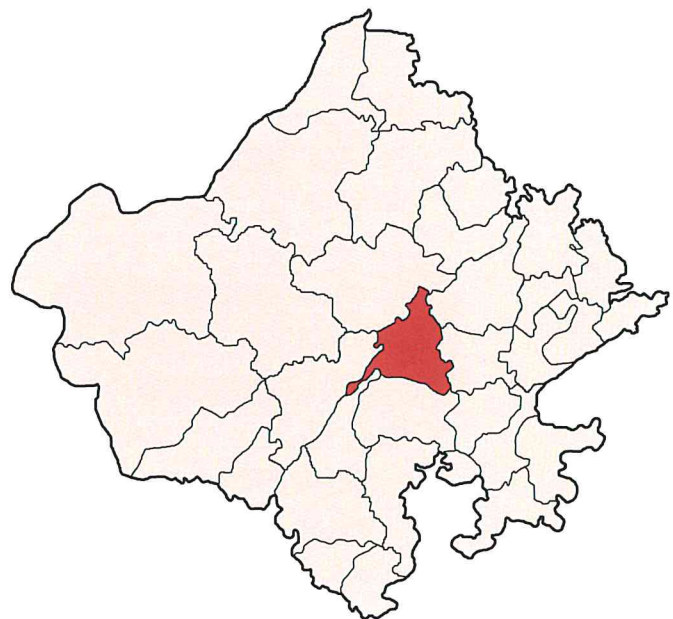


FIGURE 5.81(b) : Map of Rajasthan State highlighting Ajmer District

**TABLE 5.81(b) : Centrewise Distribution of Cancers**

Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
J.L.N. Medical College, Ajmer (64)	540	77.4	572	81.3	1112	79.3
SDM Hospital, Jaipur (68)	50	7.2	59	8.4	109	7.8
HBCR - Mumbai (1008)	35	5.0	27	3.8	62	4.4
BM Cancer Centre, Jaipur (60)	45	6.4	3	0.4	48	3.4
The GCRI, Ahmedabad (63)	13	1.9	11	1.6	24	1.7
SMS Medical College, Jaipur (23)	5	0.7	12	1.7	17	1.2
All Other Centres	10	1.4	20	2.8	30	2.1
<b>Total Cancers</b>	<b>698</b>	<b>100.0</b>	<b>704</b>	<b>100.0</b>	<b>1402</b>	<b>100.0</b>

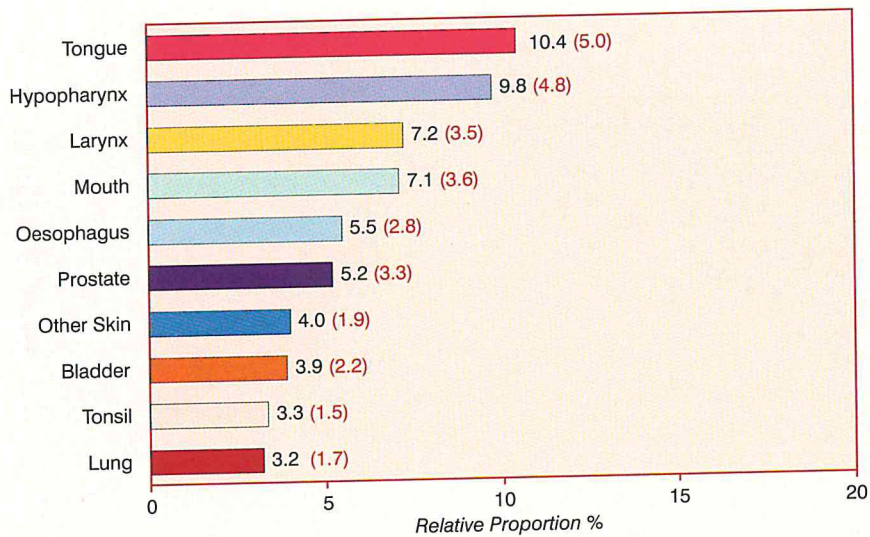
**TABLE 5.81(c) : Salient features of Cancer Incidence**

Year	2001		2002		2001 - 2002	
	Males	Females	Males	Females	Males	Females
Estimated Population	11,31,557	10,56,366	11,54,201	10,78,697	22,85,758	21,35,063
Total Cancers (All sites)	388	310	360	344	748	654
Min. Crude IR	34.3	29.4	31.2	31.9	32.7	30.6
Min. Age Adjusted IR	48.8	36.2	46.3	40.4	47.5	38.3
Min. Truncated IR	84.6	79.5	72.9	93.3	78.6	86.6

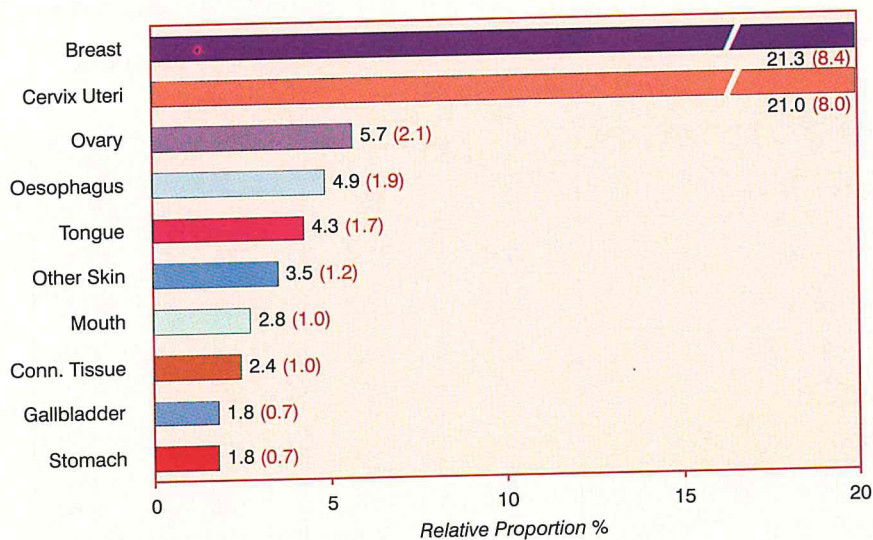
Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.81(c) : Ten Leading Sites of Cancer (2001 - 2002)**  
 (Minimum Age Adjusted Incidence Rates given in parentheses)

**Males**



**Females**



## 5.82. JAIPUR DISTRICT, Rajasthan State

(Code 0812)

**TABLE 5.82(a) : Profile of Jaipur District (2001 Census)**

Area (in sq. kms.)	11,143.0
Decadal Growth Rate (1991-2001)	35.10%
Literacy Rate	
Males	83.58%
Females	56.18%
Sex Ratio (females per 1000 males)	897
Density (persons per sq. km)	471



FIGURE 5.82(a) : Map of India highlighting Rajasthan State



FIGURE 5.82(b) : Map of Rajasthan State highlighting Jaipur District

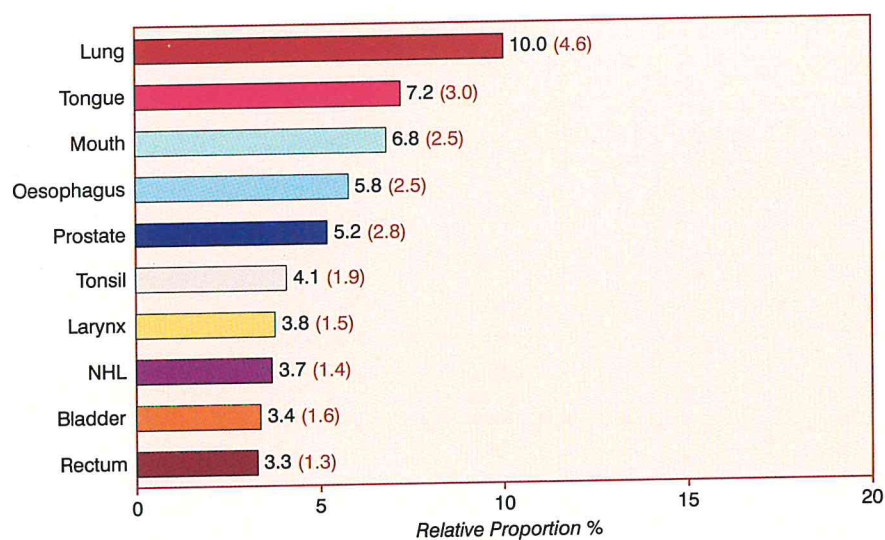
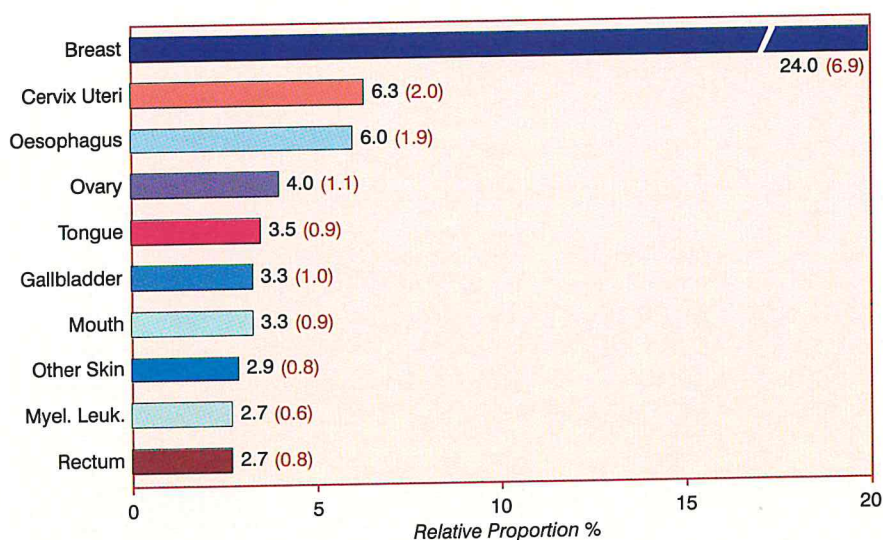
**TABLE 5.82(b) : Centrewise Distribution of Cancers**  
Number (#) and Relative Proportion (%)

Year	2001		2002		2001 - 2002	
	#	%	#	%	#	%
<b>Centre (with code in parentheses)</b>						
SDMH, Jaipur (68)	729	61.4	828	39.1	1557	47.1
SMS Medical College, Jaipur (23)	85	7.2	1093	51.7	1178	35.7
BM Cancer Centre, Jaipur (60)	281	23.7	39	1.8	320	9.7
HBCR - Mumbai (1008)	44	3.7	49	2.3	93	2.8
PBCR - Mumbai (1002)	31	2.6	33	1.6	64	1.9
All Other Centres	18	1.5	74	3.5	92	2.8
<b>Total Cancers</b>	<b>1188</b>	<b>100.0</b>	<b>2116</b>	<b>100.0</b>	<b>3304</b>	<b>100.0</b>

**TABLE 5.82(c) : Salient features of Cancer Incidence (2001)**

	Males	Females
Estimated Population	27,84,109	25,00,281
Total Cancers (All sites)	708	480
Min. Crude IR	25.4	19.2
Min. Age Adjusted IR	41.4	28.3
Min. Truncated IR	68.6	60.1

Min. = Minimum IR = Incidence Rate / 100,000

**FIGURE 5.82(c) : Ten Leading Sites of Cancer (2001)**  
(Minimum Age Adjusted Incidence Rates given in parentheses)**Males****Females**



# Chapter 6

## SUMMARY OF SPECIFIC SITES OF CANCER

The following pages provide a summary of some statistical and scientific details on specific sites of cancer. The sites are as per the International Statistical Classification of Diseases (WHO: ICD-10, 1994), and not grouped by system, mainly because of easy comparability of incidence rates with cancer registries throughout the world.

In giving an account of the individual sites (according to ICD-10) of cancer in this chapter, in general, the succeeding guidelines have been followed for selecting the specific sites: Those sites where at least five districts showed a higher or comparable MAAR with the highest MAAR of that site in the PBCRs under NCRP. A site is also included for description if the MAAR of that site in any district is comparable with the highest incidence rates in the world. Sites of cancer with less than ten cases, even if they have higher MAARs than that of the highest MAARs in the PBCRs are excluded from the bar charts so as to avoid overestimation or misinterpretation. However, in order to place the facts in right perspective the appropriate shades of colour depending on the MAAR are portrayed for districts regardless of the numbers of cancers of that site (except for oropharynx, because of numerous [55] districts). The latter would also account for districts with small populations and identify potential hot spots of high incidence that could possibly sustain over time. The bar charts and map that impart a pictorial representation are in themselves self-explanatory. Thus, only brief textual description is provided.

Two bar charts and an incidence rate graded and colour shaded district-wise map of India form the basis of the textual description. The first bar chart gives the comparison of the age adjusted incidence rates per 100,000 persons (AAR) of the specific site of cancer in registries in the continents of the world. The reference manual is Cancer Incidence in Five Continents (Parkin et al, 2002). The highest and lowest AAR (average annual of 1993-97) in each of these continents is compared with corresponding AAR (average annual of 1997-99) in the six Population Based Cancer Registries (PBCRs) under the NCRP (blue bars). Since Indians in Singapore have somewhat similar rates the bar chart depicting the AAR for Indians from that registry is also included. The second bar chart gives the comparison of the minimum age adjusted incidence rates per 100,000 persons (MAAR) of the specific site of cancer. The comparison is made between the first 30 districts in India in the order from the highest MAAR for the said site of cancer and the MAAR (average annual of 1997-99) of that site in the PBCRs under the NCRP. A map of India with the 593 districts displayed as units is also portrayed. Depending on the MAAR (higher of MAAR between 2001-2002) of that site for a given district, graded shading, of each of the districts is done. The higher the MAAR the darker the shade. Where data is sparse gray shading is done. Districts with MAAR higher than or comparable with the highest MAAR amongst the PBCRs are labelled (with values of MAARs in parentheses).

The time periods or the calendar years referred for giving the AAR and the MAAR are indicated above in parentheses. These show variation, but are the latest data that are available. It may be noted that in the preceding chapter (Chapter 5), the average annual rates for the years 2001 and 2002 has been used in most districts for depicting leading sites of cancer, as that is more appropriate for expressing the relative proportions of the common sites.

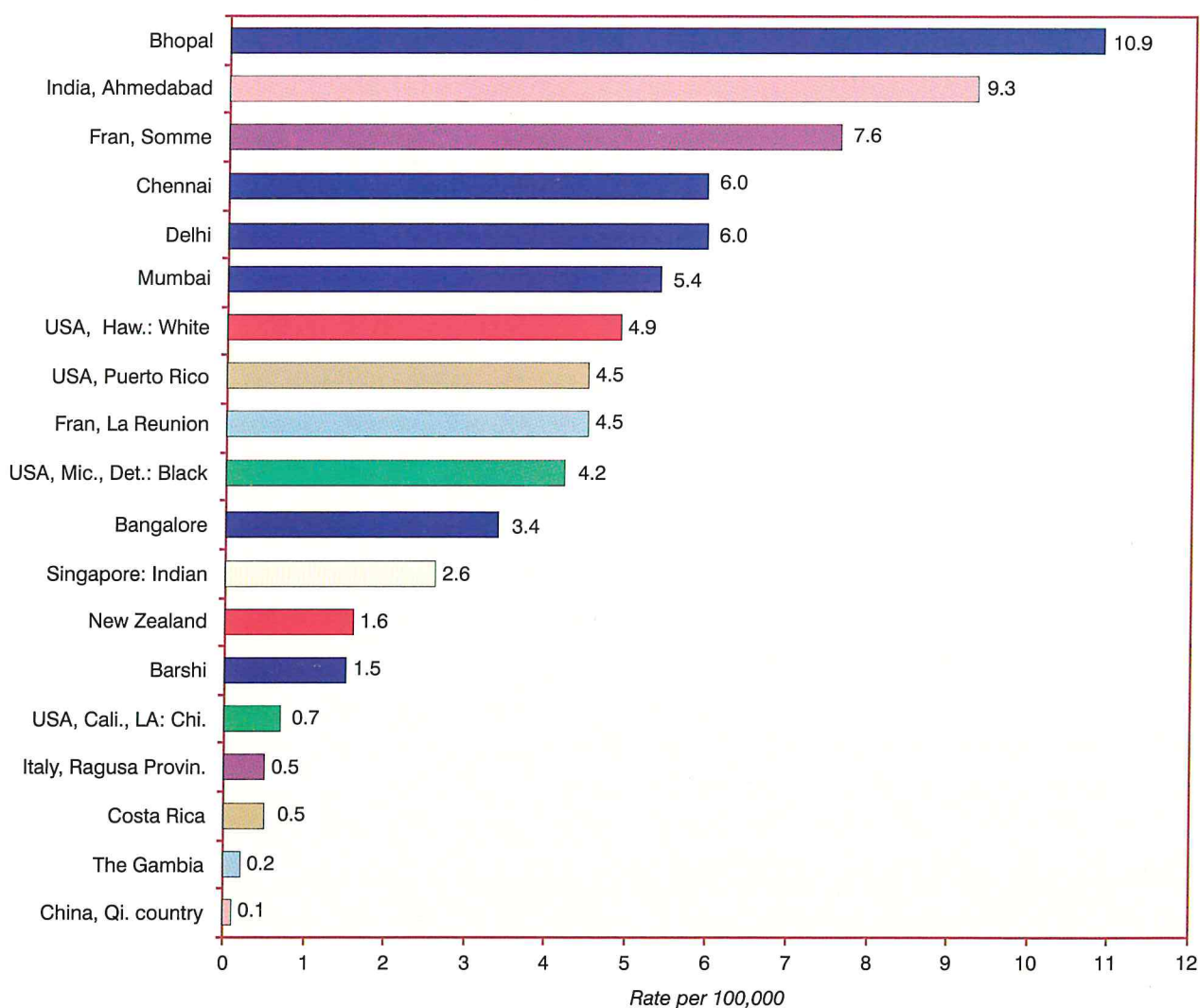
***The list of Topography sites with ICD-10 code with mode of grouping for determining leading sites of cancers and acronyms used in figures of bar charts is given in Appendix III.***

***The list of States/Union Territories with code (according to Census of India, 2001) and acronyms used in figures of bar charts against names of districts is given in Appendix IV.***

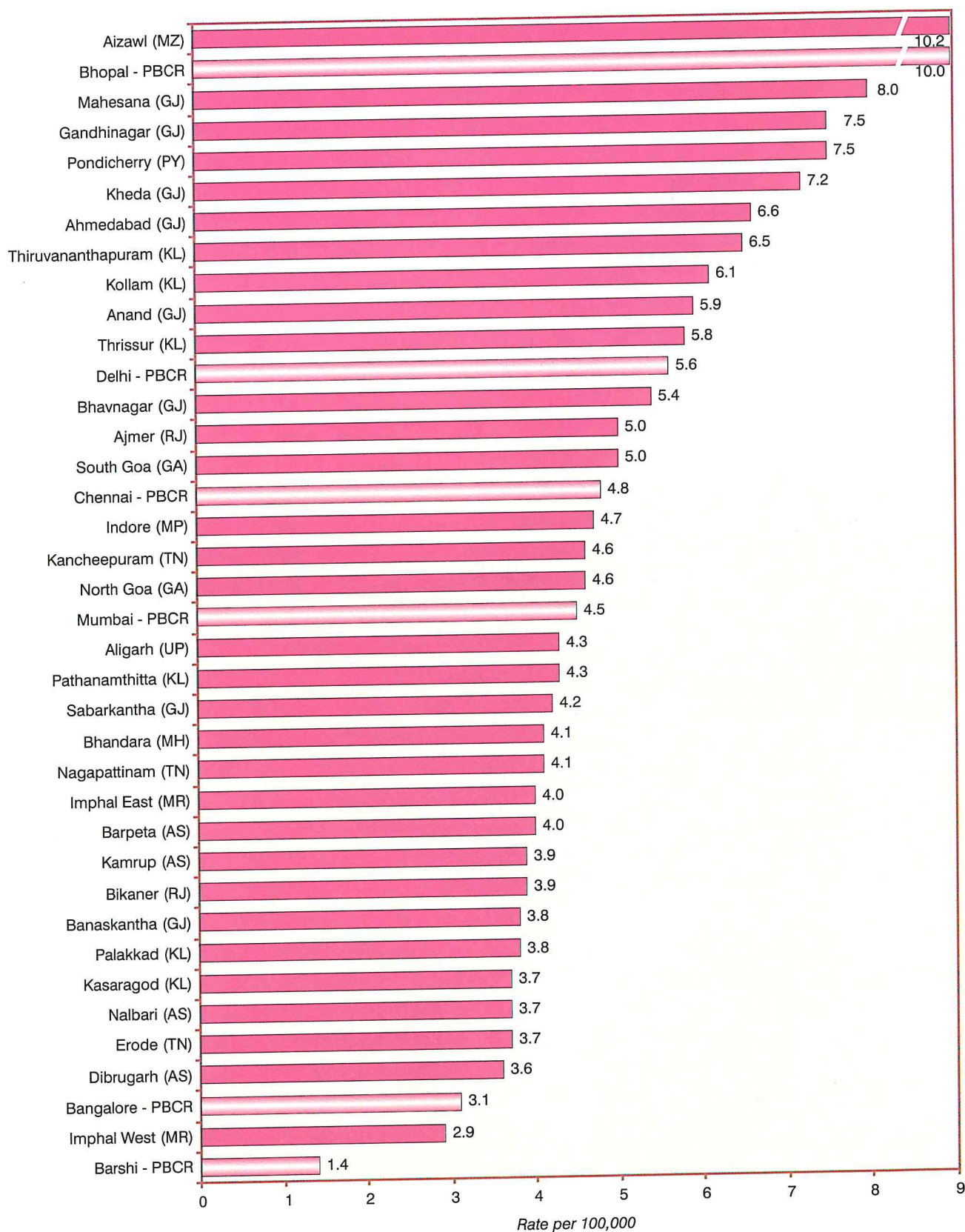
## 6.1. TONGUE (ICD-10 : C01-C02) – MALES

According to Cancer Incidence in V Continents - Vol. VIII (Parkin et al 2002) [Fig. 6.1(a)], Bhopal, PBCR has the highest AAR of 10.9 of cancer of the tongue in the world. Ahmedabad urban registry has also a high AAR of 9.3/100,000. The other urban PBCRs of India have AARs between 3.4 and 6.0. The values of the MAAR of the urban PBCRs shown in Fig 6.1(b) are not too different in this site of cancer, as proportion of microscopic confirmation of tongue cancer is fairly high. The district of Aizawl in Mizoram State, has a slightly higher MAAR compared to Bhopal, PBCR. There are several districts throughout the country that have a higher MAAR compared to the urban PBCRs. Of particular importance seems to be the State of Gujarat - several districts (Mahesana, Gandhinagar, Kheda, Ahmedabad, Anand, Bhavnagar, Sabarkantha and Banaskantha) show high incidence rates of tongue cancer.

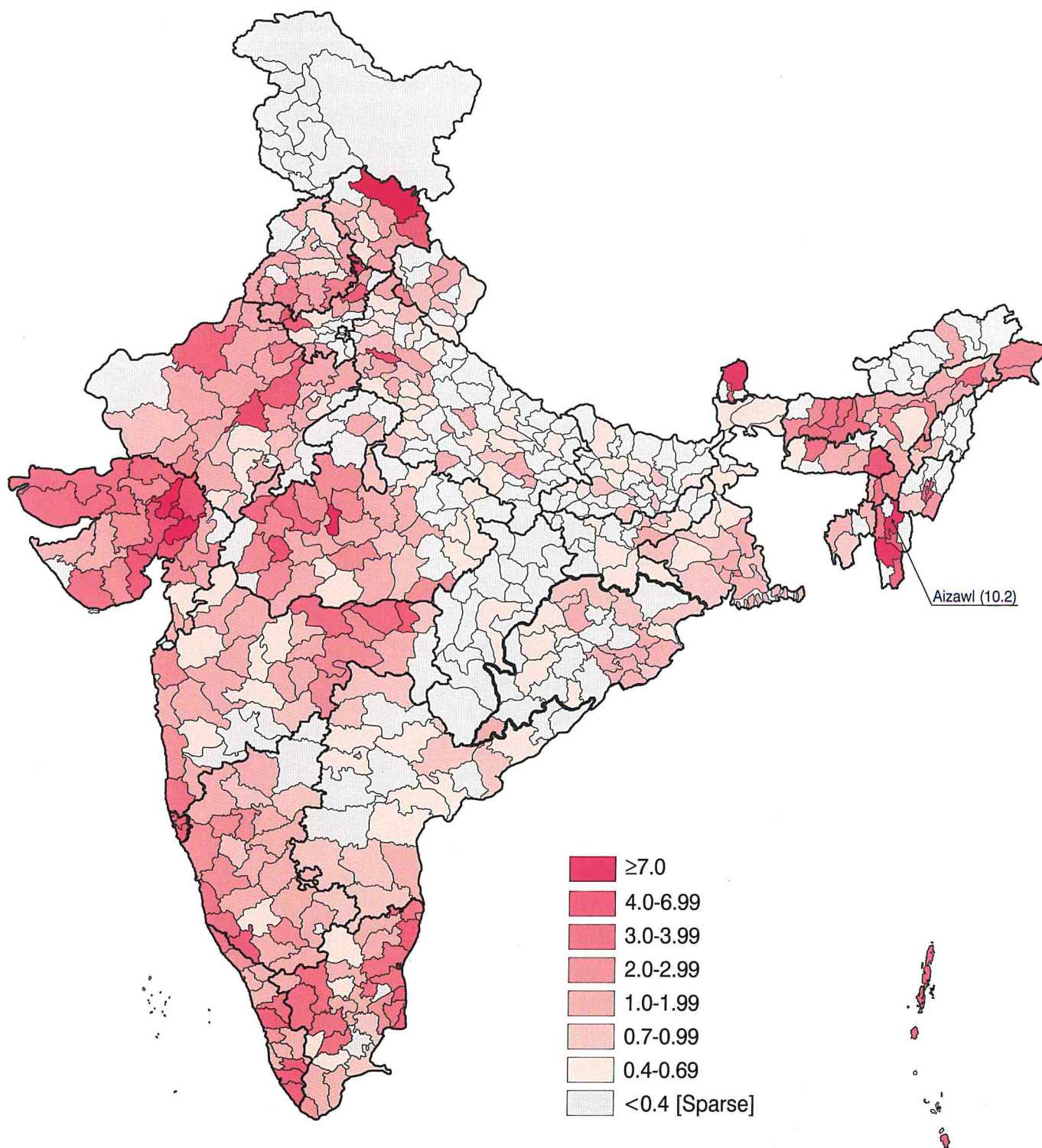
**FIGURE 6.1(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Tongue (ICD-10 : C01 - C02) - Males**



**FIGURE 6.1(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Tongue (ICD-10 : C01 - C02) - Males**



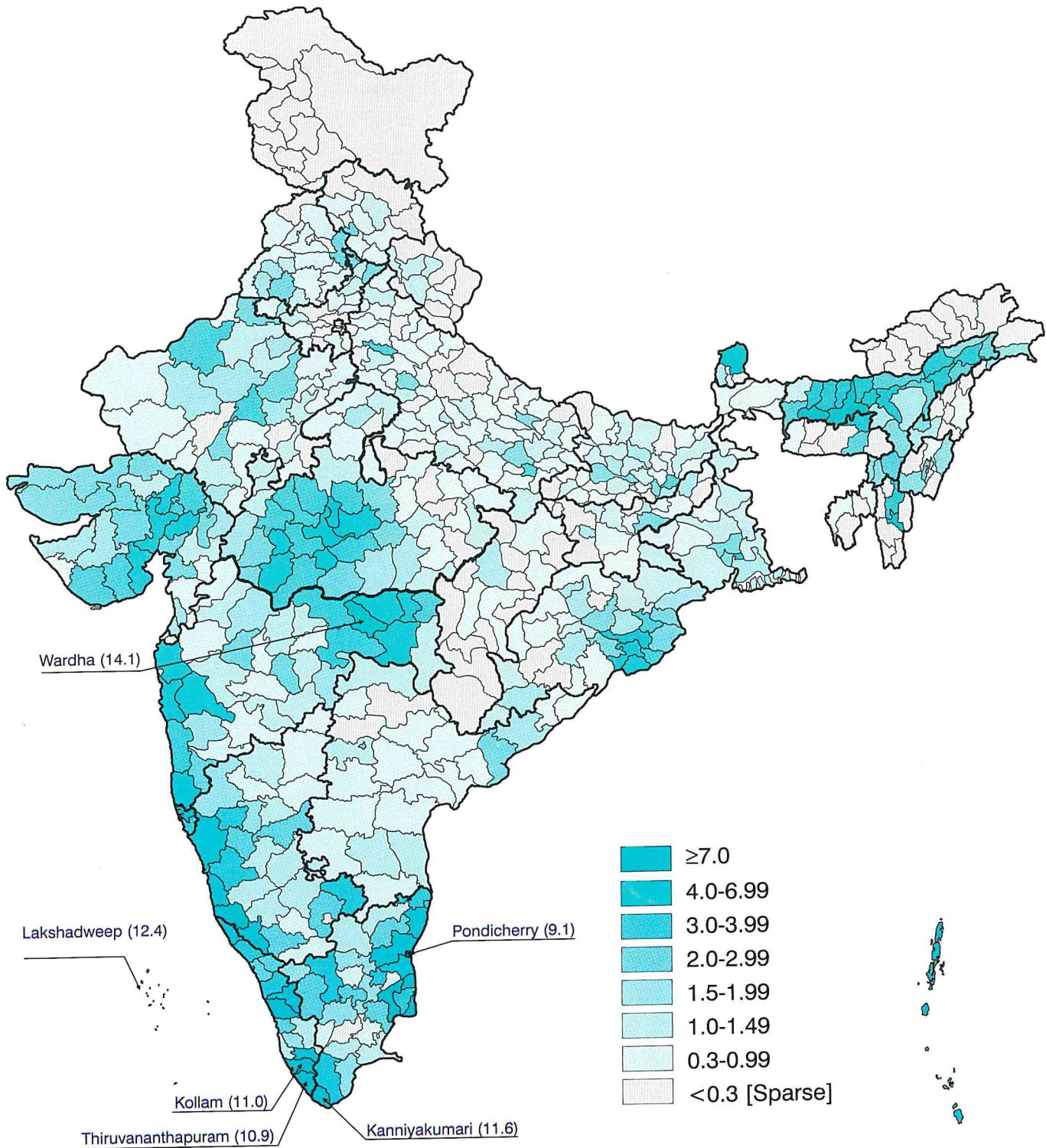
**MAP 6.1 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Tongue (ICD-10 : C01 - C02) 2001 - 2002 - Males**



## 6.2. MOUTH (ICD-10 : C03-C06) – MALES

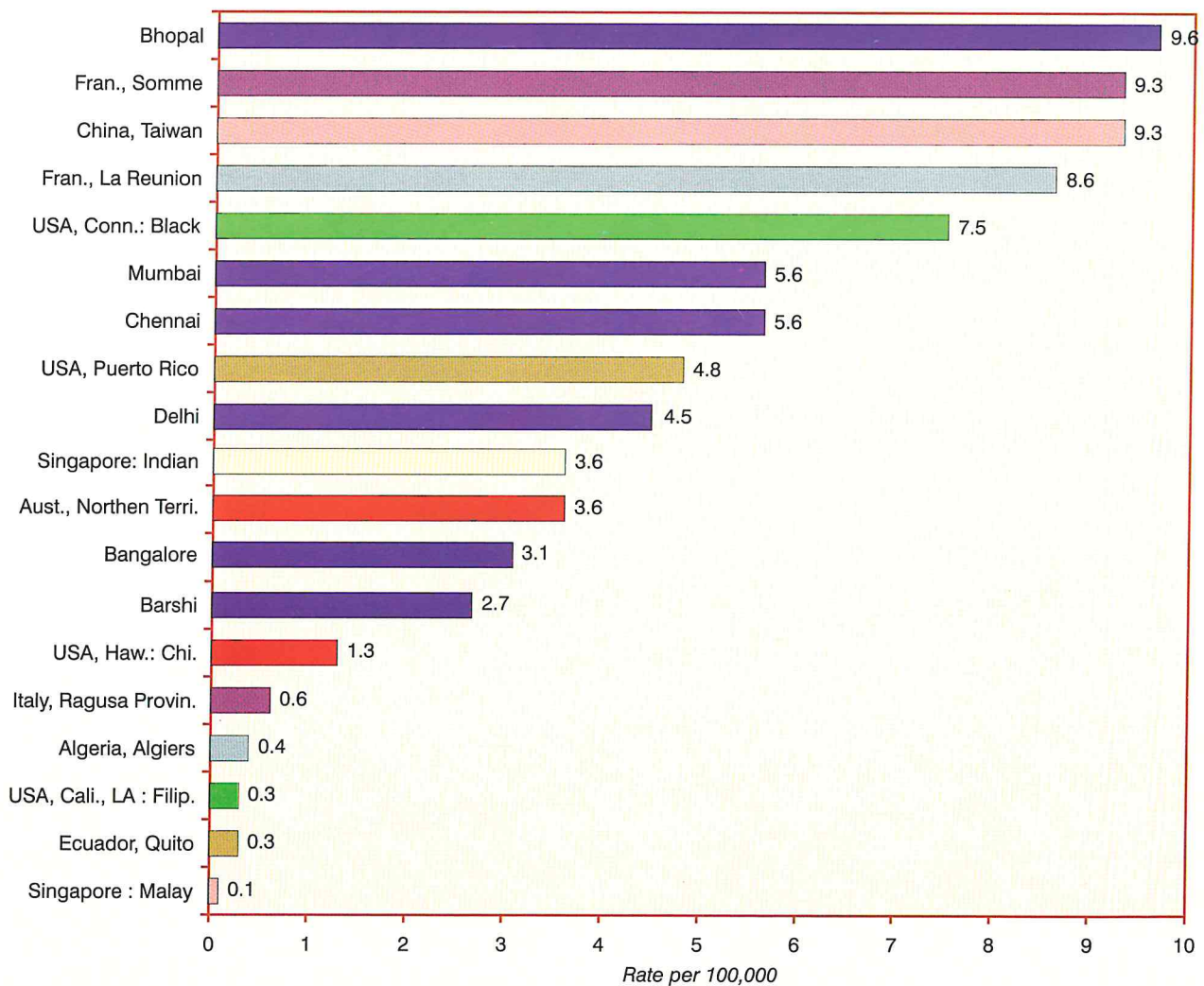
Again Bhopal, PBCR has the highest AAR of 9.6/100,000 in the world (Parkin et al, 2002). The AAR in other PBCRs varies from 2.7 in Barshi to 5.6 in Mumbai and Chennai [Fig. 6.2(a)]. The MAAR for Bhopal PBCR is 8.6. There

**MAP 6.2 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Mouth (ICD-10 : C03 - C06) 2001 - 2002 – Males**

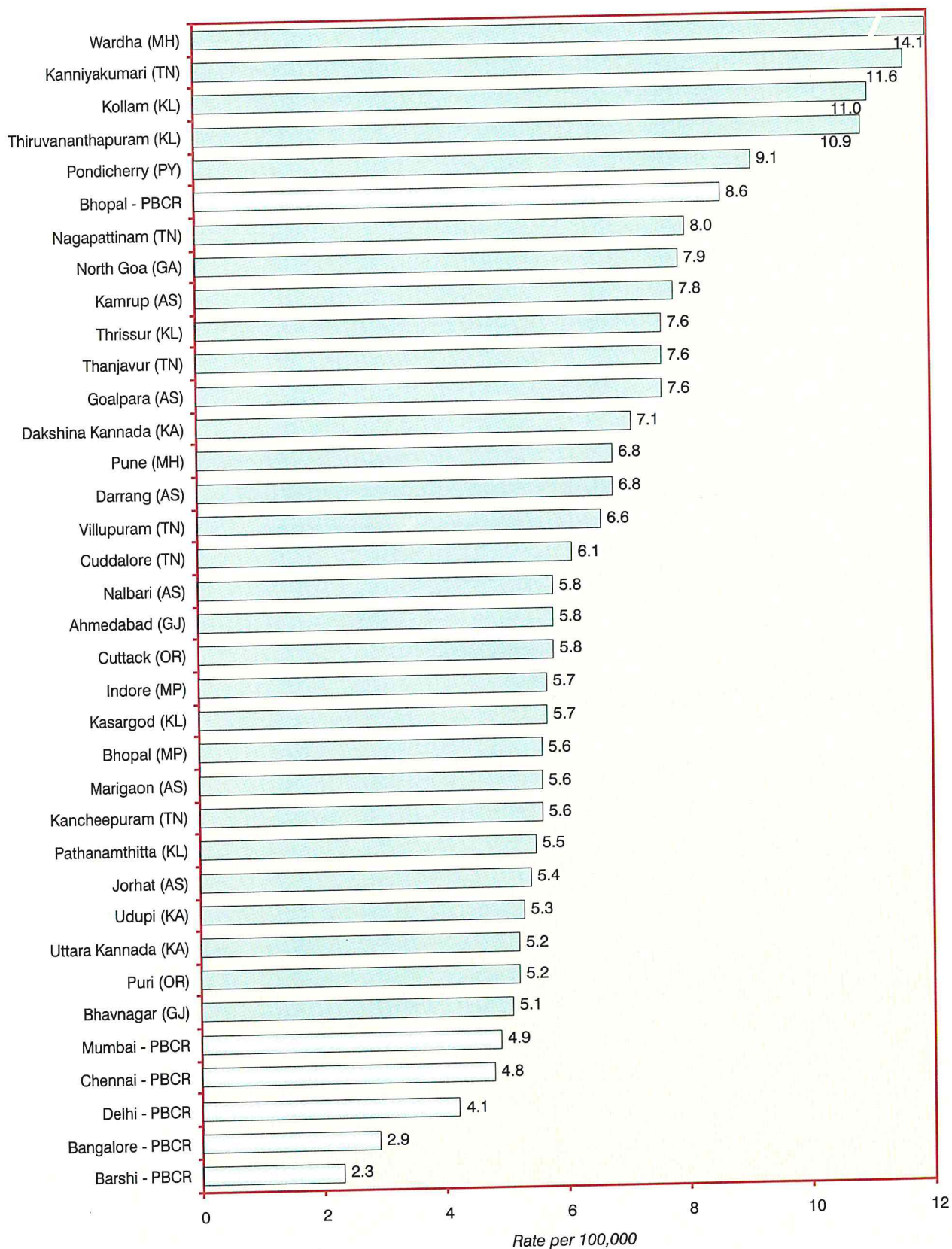


were five districts that had a higher MAAR than that of Bhopal, PBCR. Wardha district in Maharashtra State had a MAAR of 14.1, which is 47% higher than the AAR of Bhopal. Of the other four districts that had a higher MAAR than Bhopal, one is in Tamil Nadu State, one in Pondicherry and two in Kerala State. At least thirty other districts across the country had a higher MAAR than that of the other PBCRs. Other than several districts in Tamil Nadu State, districts in Assam State (Kamrup, Goalpara, Darrang, Nalbari, Marigaon, Jorhat) showed a high MAAR.

**FIGURE 6.2(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Mouth (ICD-10 : C03 - C06) – Males**



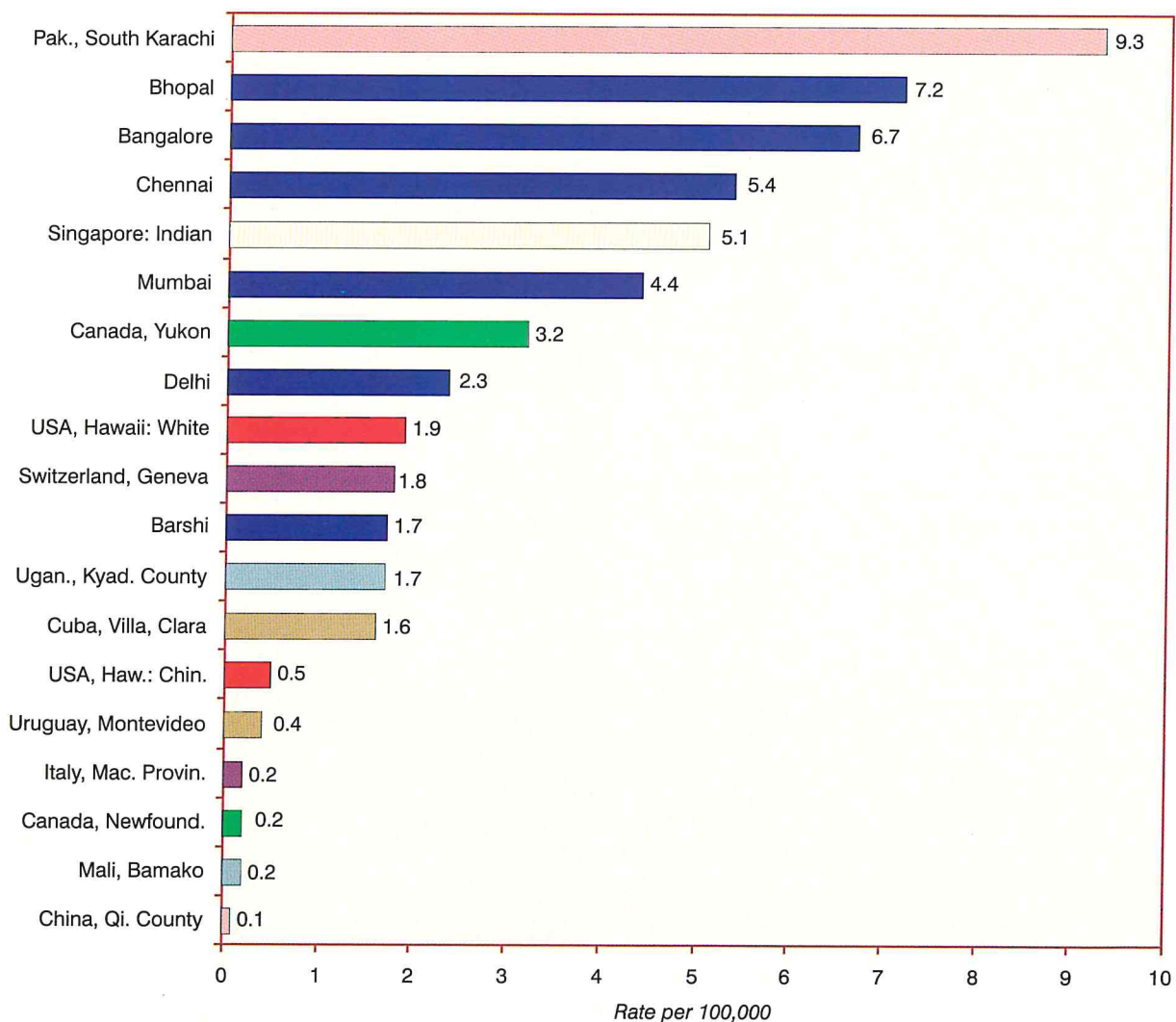
**FIGURE 6.2(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Mouth (ICD-10 : C03 - C06) – Males**



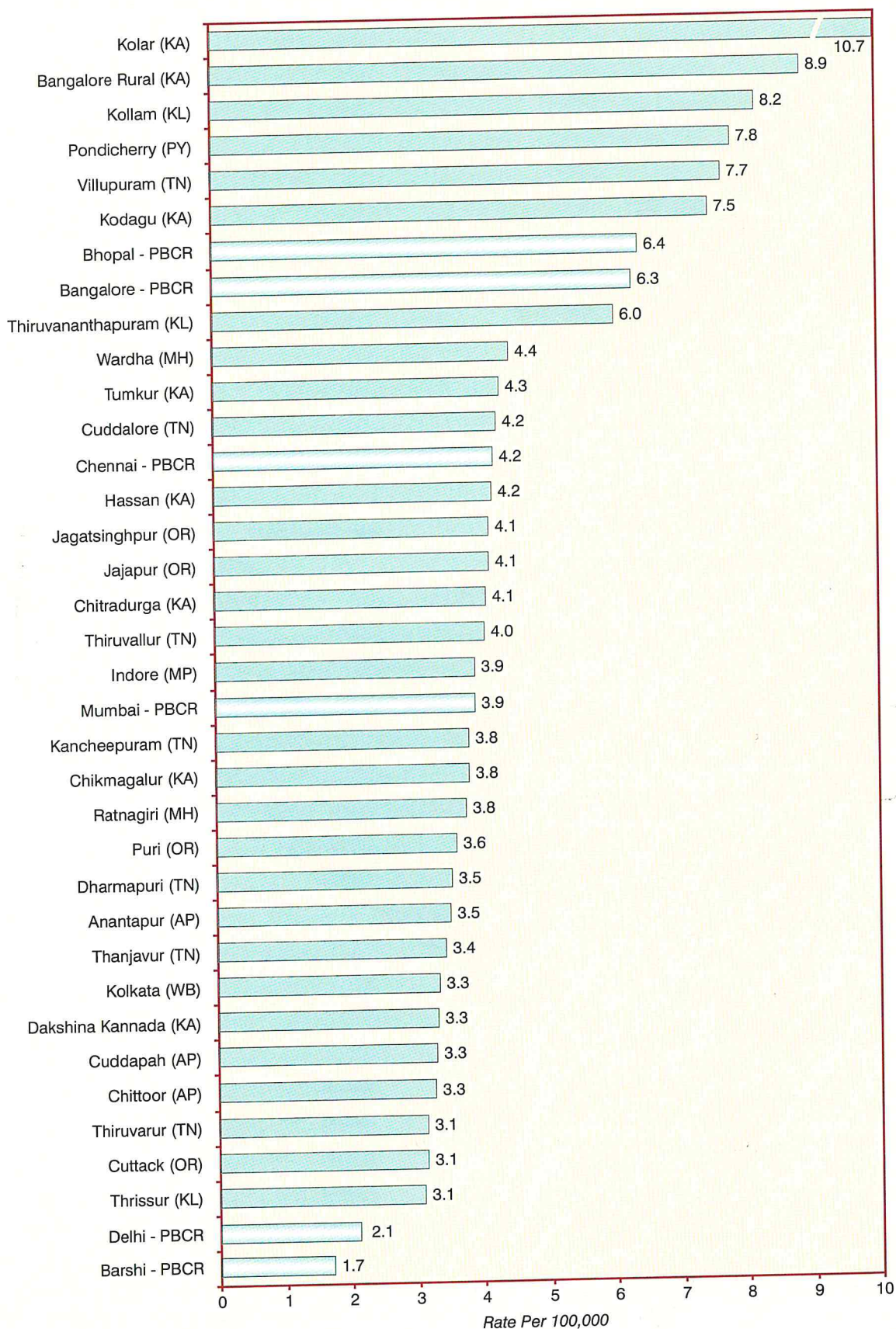
### 6.3. MOUTH (ICD-10 : C03-C06) – FEMALES

South Karachi in Pakistan has the highest AAR of mouth cancer in females (Parkin et al, 2002). Bhopal and Bangalore PBCR have comparable AARs [Fig. 6.3(a)]. The MAAR of Kolar district (10.7) in Karnataka State is even above the AAR of South Karachi. Women in Bangalore Rural and Kodagu districts in Karnataka State, Kollam and Thiruvananthapuram districts in Kerala State, Villupuram in Tamil Nadu State and Pondicherry had all high MAAR comparable with the highest in the world.

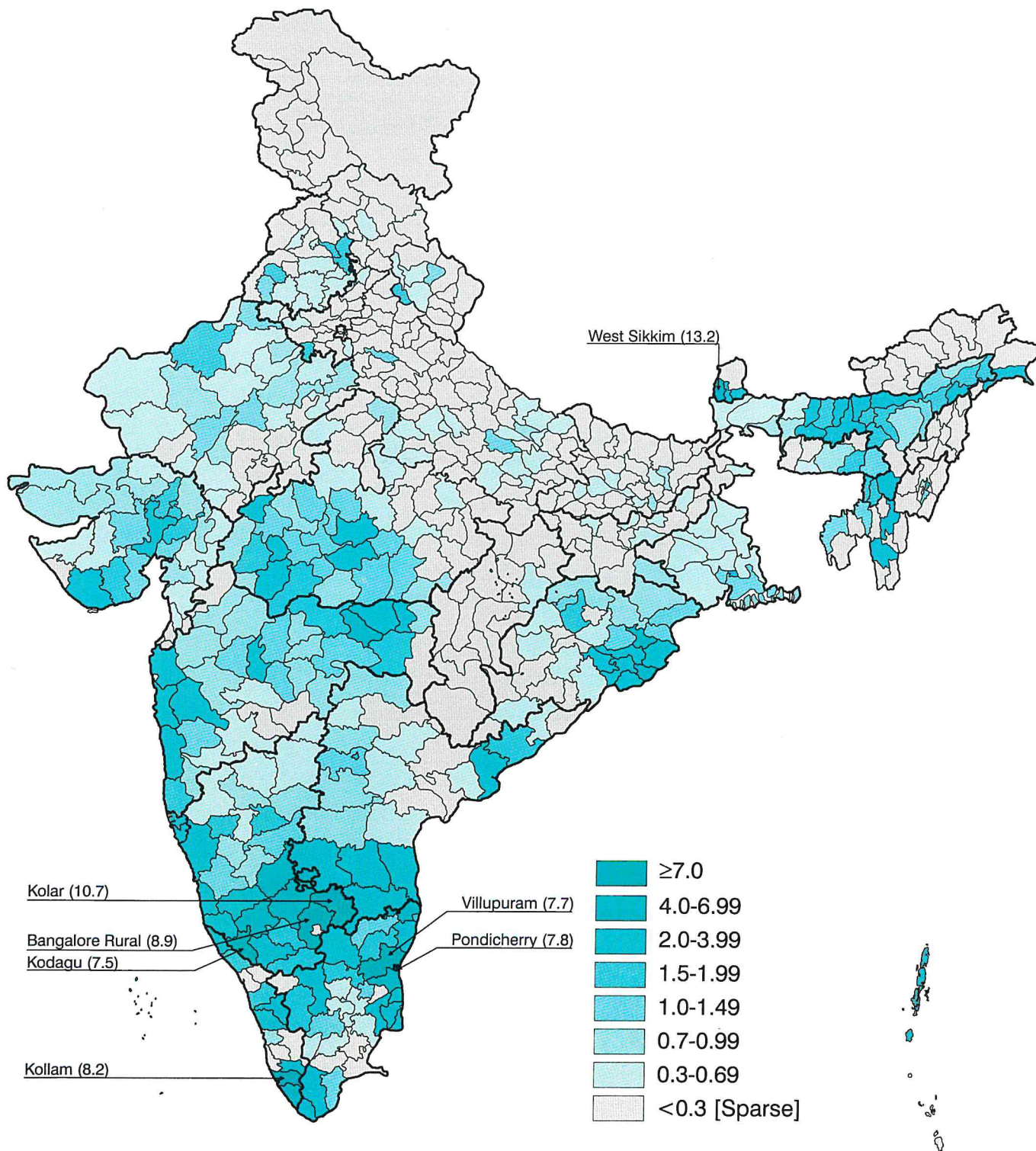
**FIGURE 6.3(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Mouth (ICD-10 : C03 - C06) – Females**



**FIGURE 6.3(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Mouth (ICD-10 : C03 - C06) – Females**



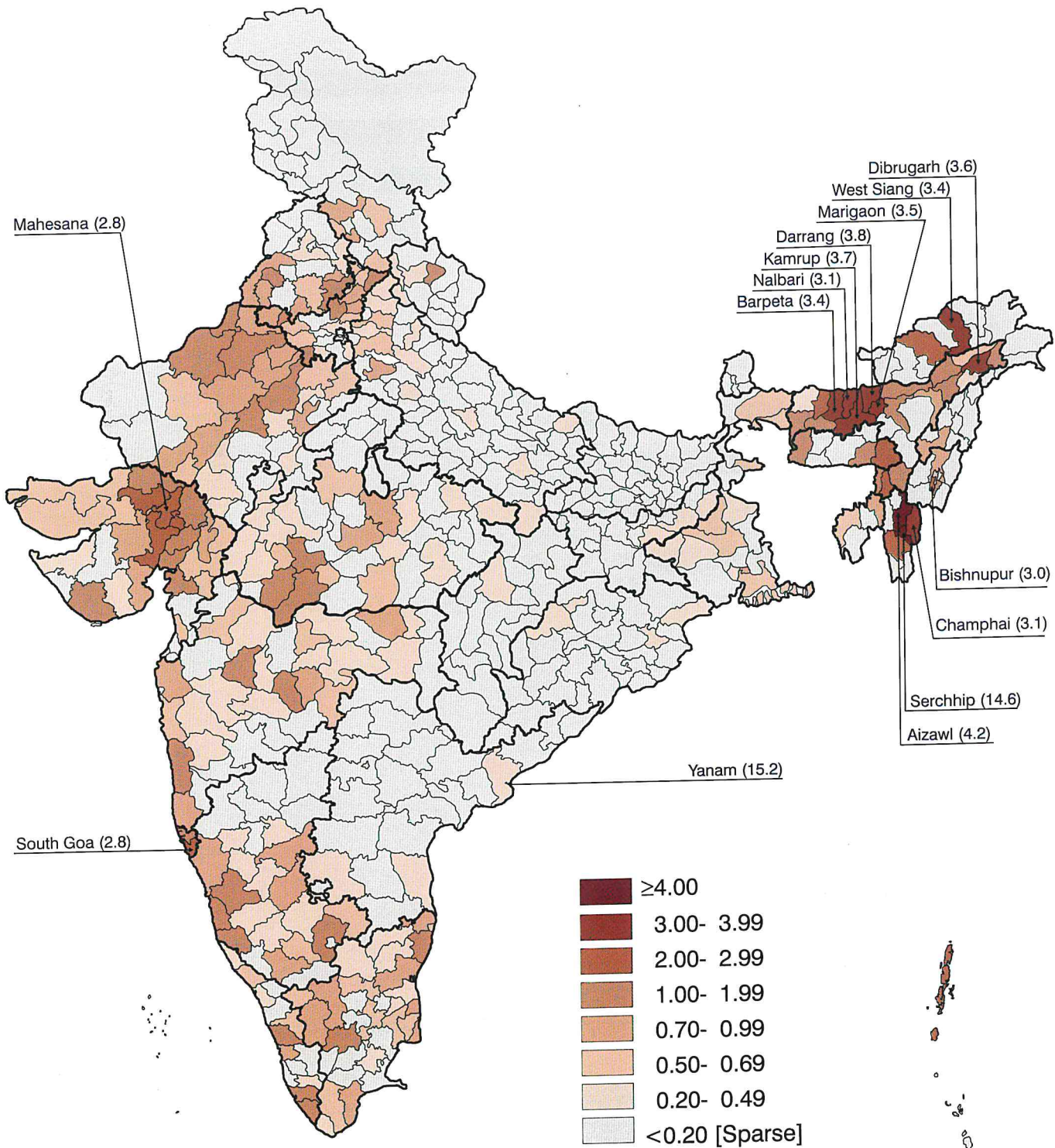
**MAP 6.3 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Mouth (ICD-10 : C03 - C06) 2001 - 2002 – Females**



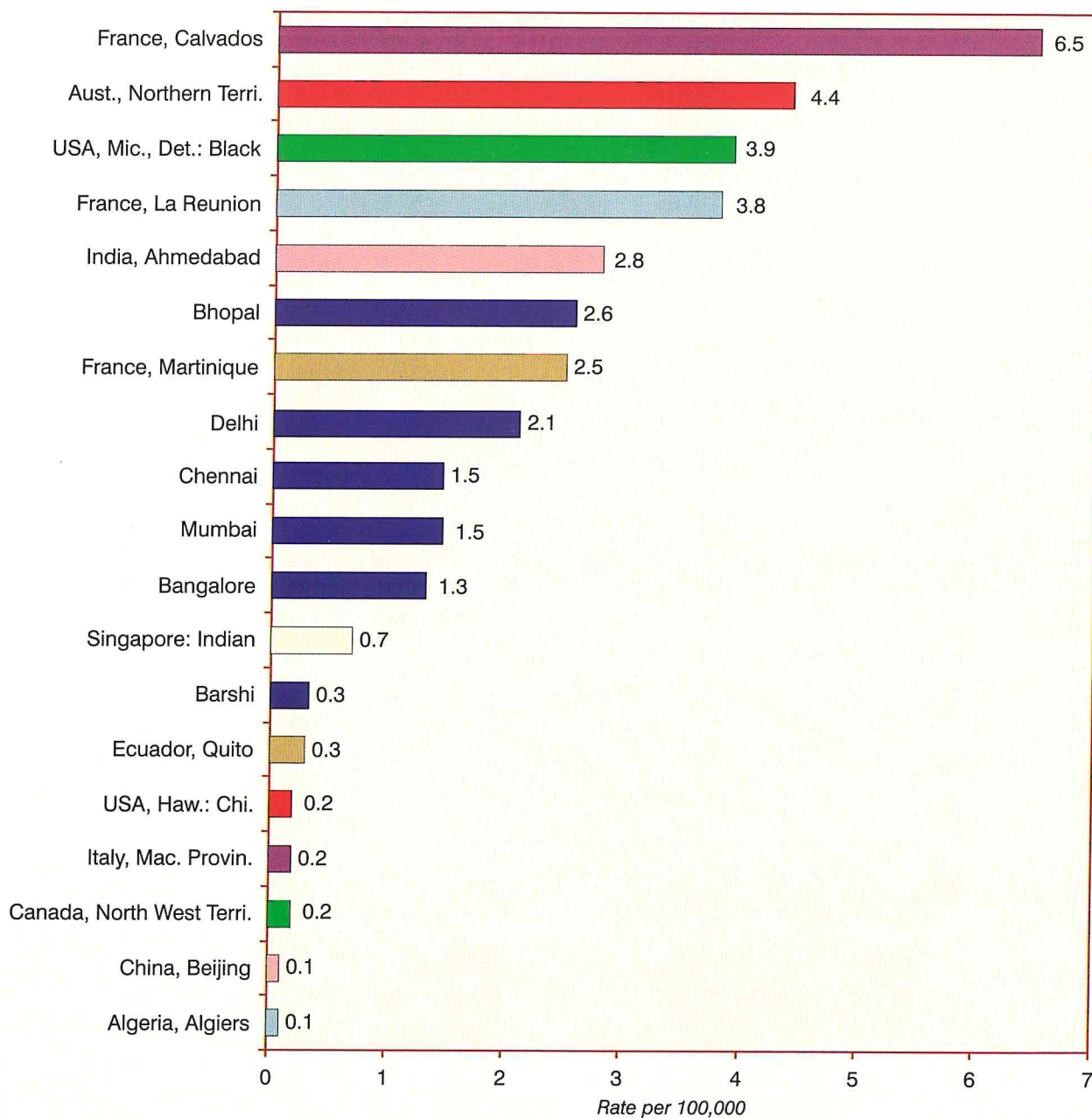
## 6.4. TONSIL (ICD-10 : C09) – MALES

At least five districts in Assam State and one in Gujarat State had higher MAAR than that of Bhopal PBCR which has the highest MMAR among the PBCRs. Most of the other districts that had MAAR comparable with that of the PBCRs were from the states of Assam, Gujarat and Rajasthan.

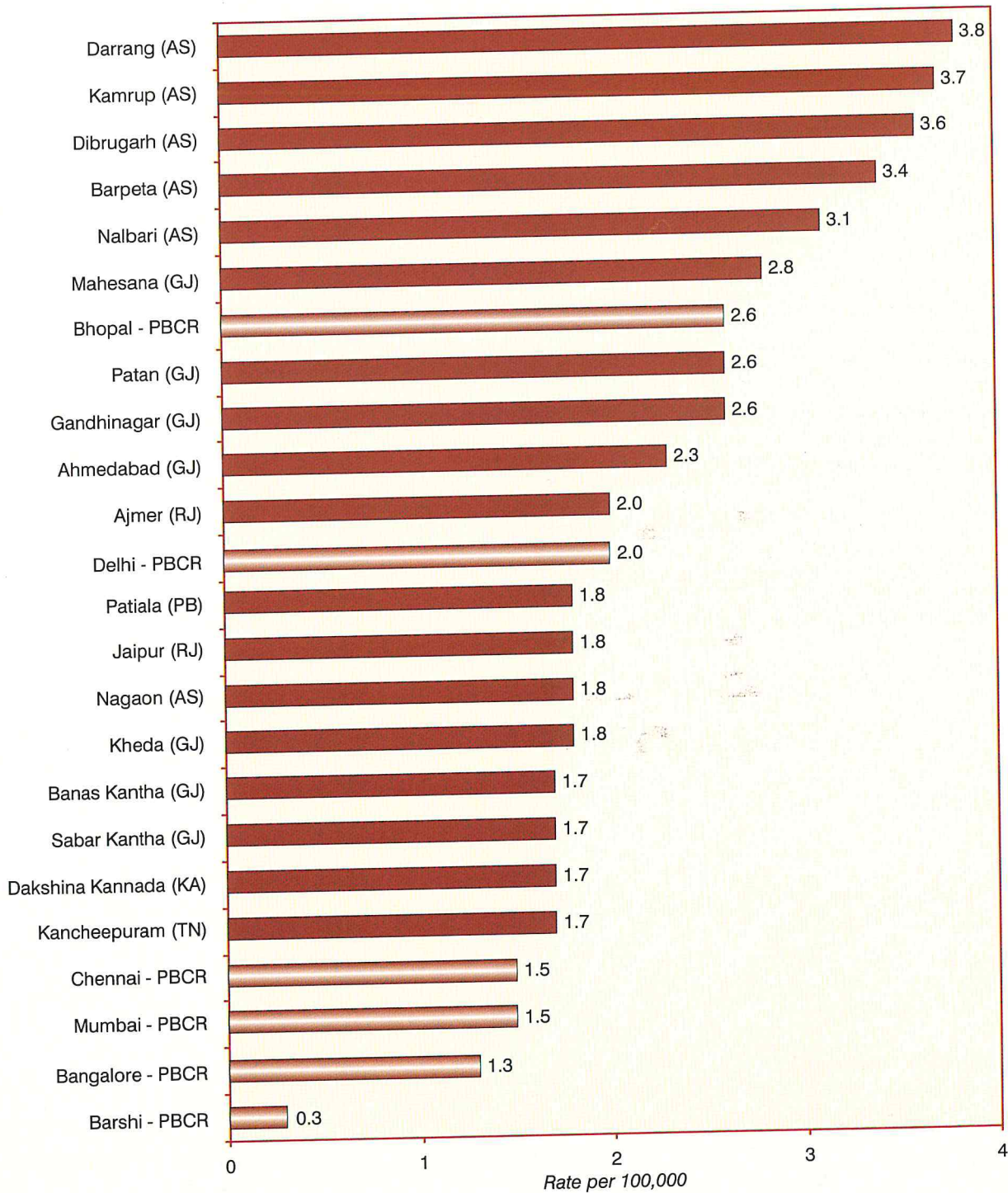
**MAP 6.4 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Tonsil (ICD-10 : C09) 2001 - 2002 – Males**



**FIGURE 6.4(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Tonsil (ICD-10 : C09) – Males**



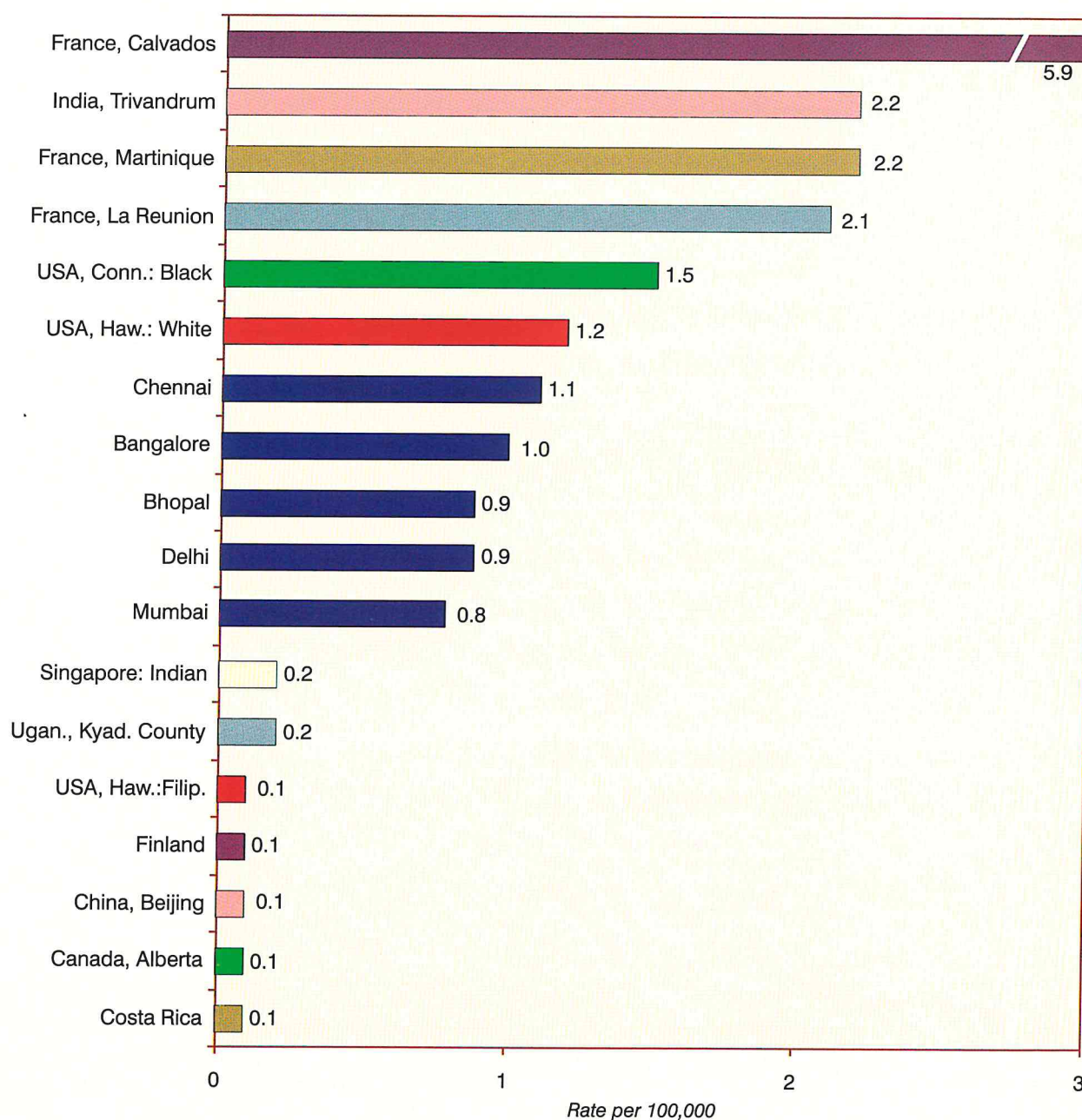
**FIGURE 6.4(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Tonsil (ICD-10 : C09) – Males**



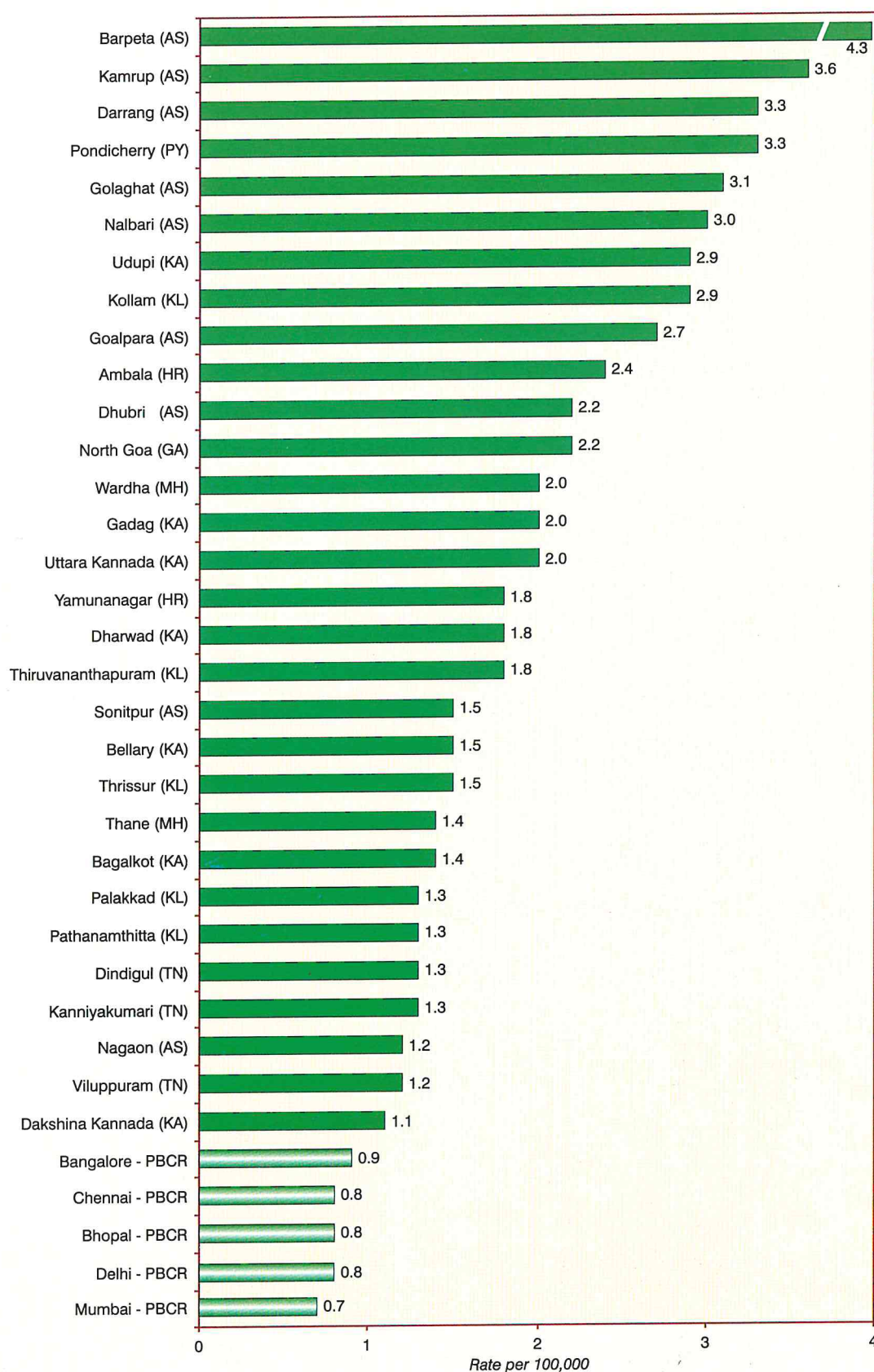
## 6.5. OROPHARYNX (ICD-10 : C10) – MALES

This site of cancer had by far the maximum number of districts (30) that had MAARs above the highest MAAR among the PBCRs [Fig. 6.5(b)]. These districts were mainly in Assam State, the west coast from Mumbai to the southern tip of the country and northern districts of Karnataka State. There were twentyfive other districts where the MAAR was above the highest MAAR of the PBCRs but these districts reported less than ten cases. Because of too many districts only the thirty districts with more than ten cases are labelled in this map of oropharynx [Map 6.5].

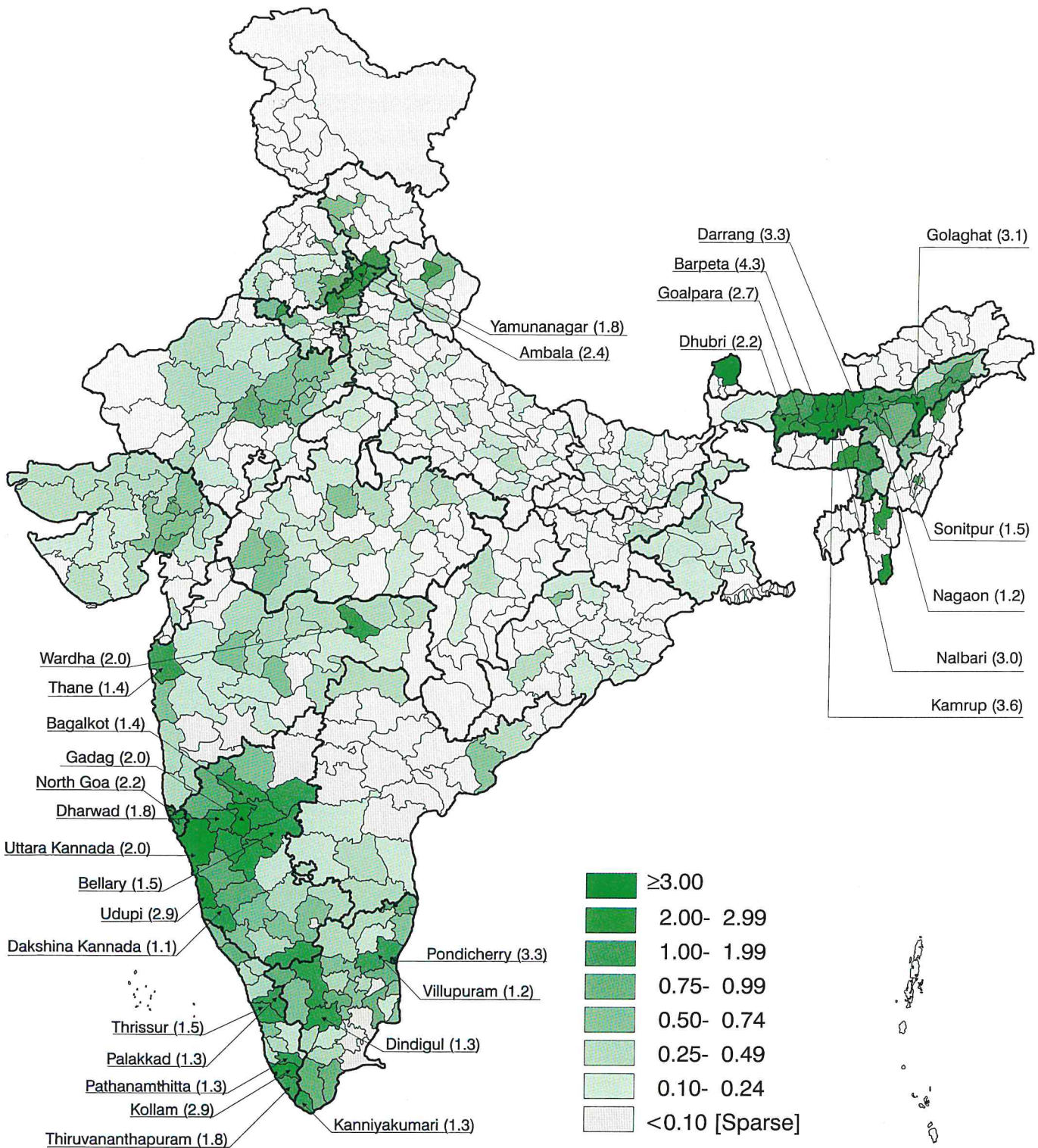
**FIGURE 6.5(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oropharynx (ICD-10 : C10)– Males**



**FIGURE 6.5(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oropharynx (ICD-10 : C10)- Males**



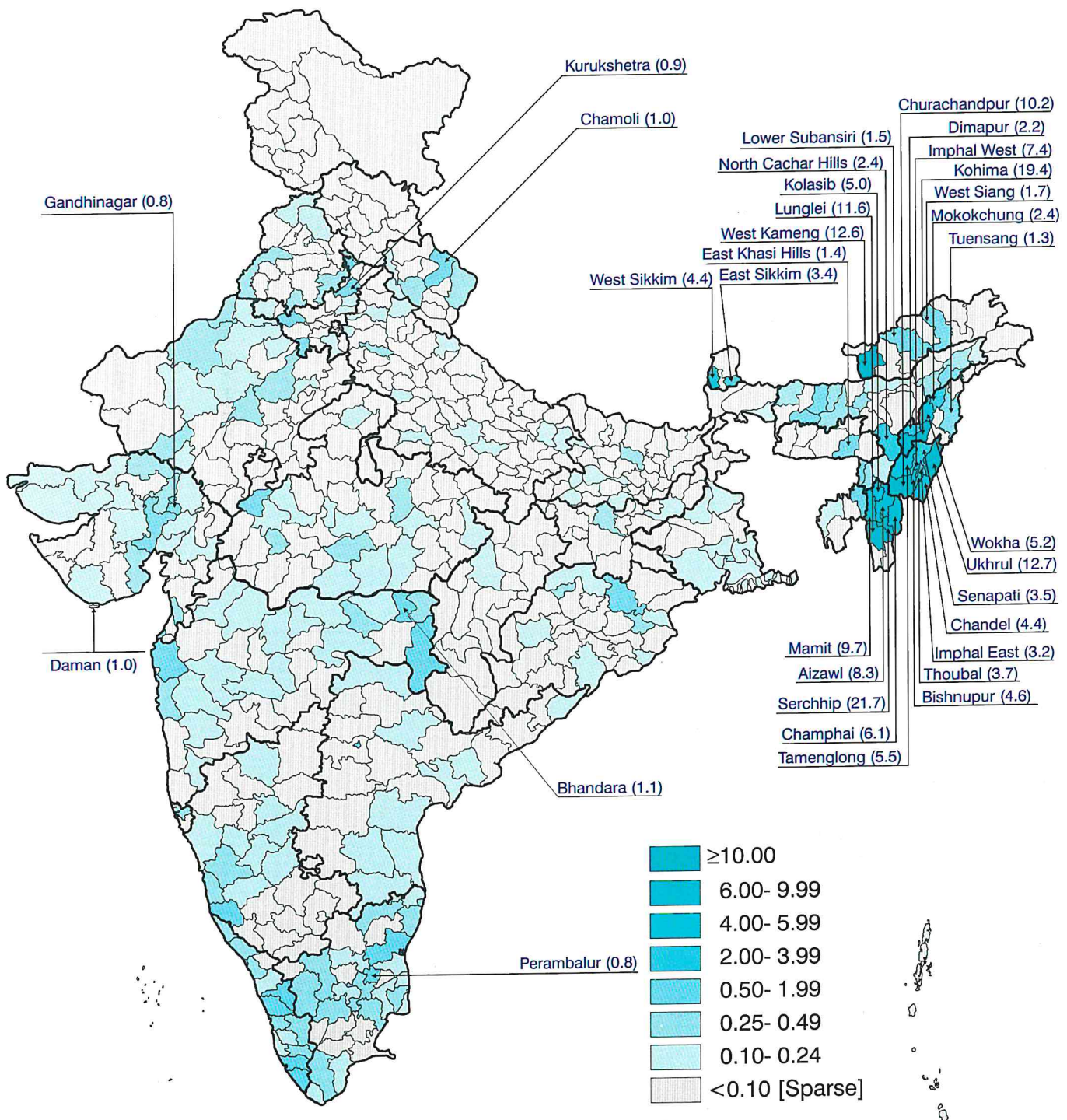
**MAP 6.5 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Oropharynx (ICD-10 : C10) 2001 - 2002 – Males**



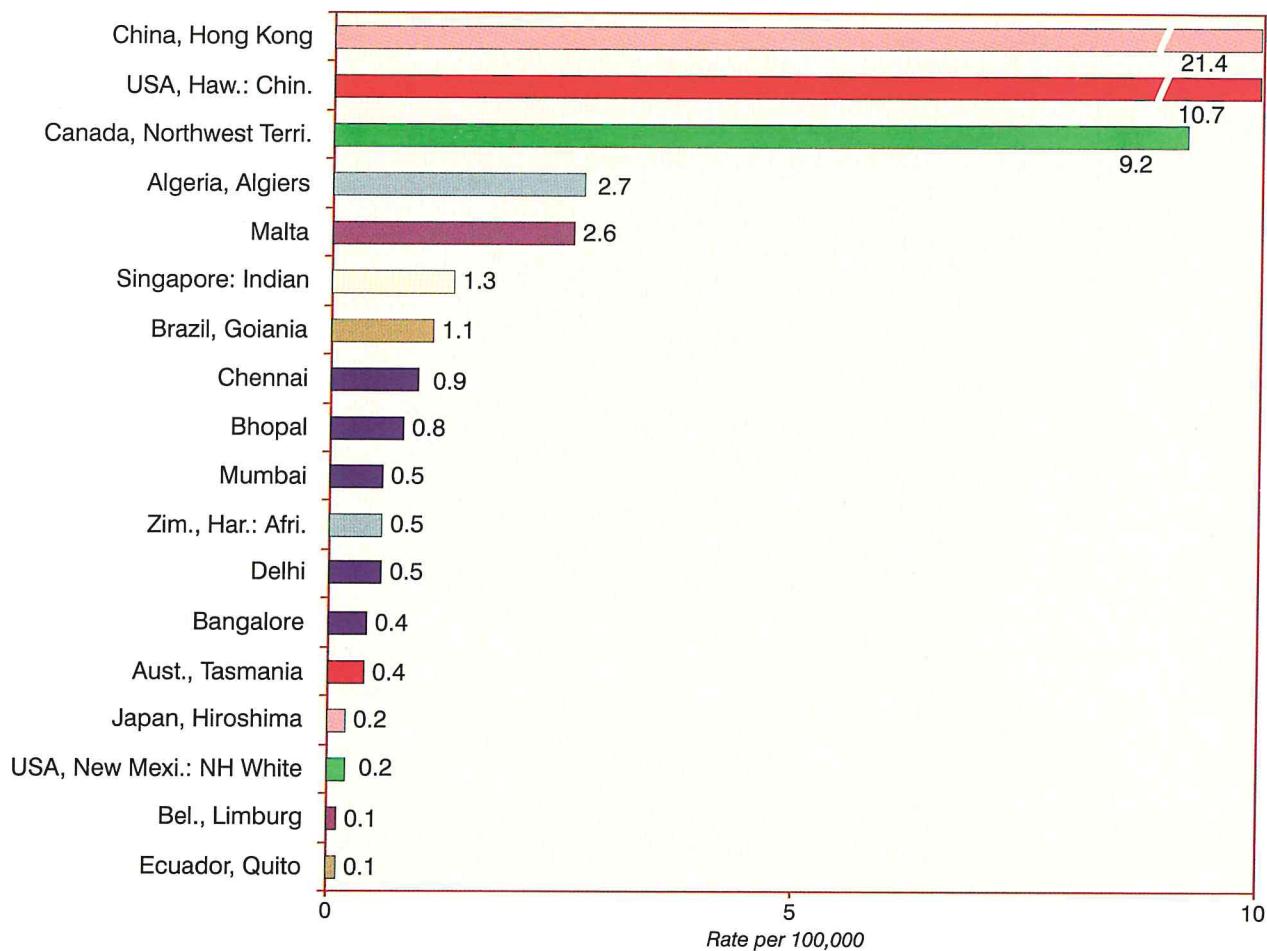
## 6.6. NASOPHARYNX (ICD-10 : C11) – MALES

Kohima district in Nagaland State recorded a MAAR of 19.4/100,000, which is close to the highest incidence rate recorded in the world. Imphal West district in Manipur State also recorded a high MAAR of 7.4/100,000. Several other districts in the states of Mizoram and Manipur recorded high MAARs in both males and females but numbers of cancers were less than ten.

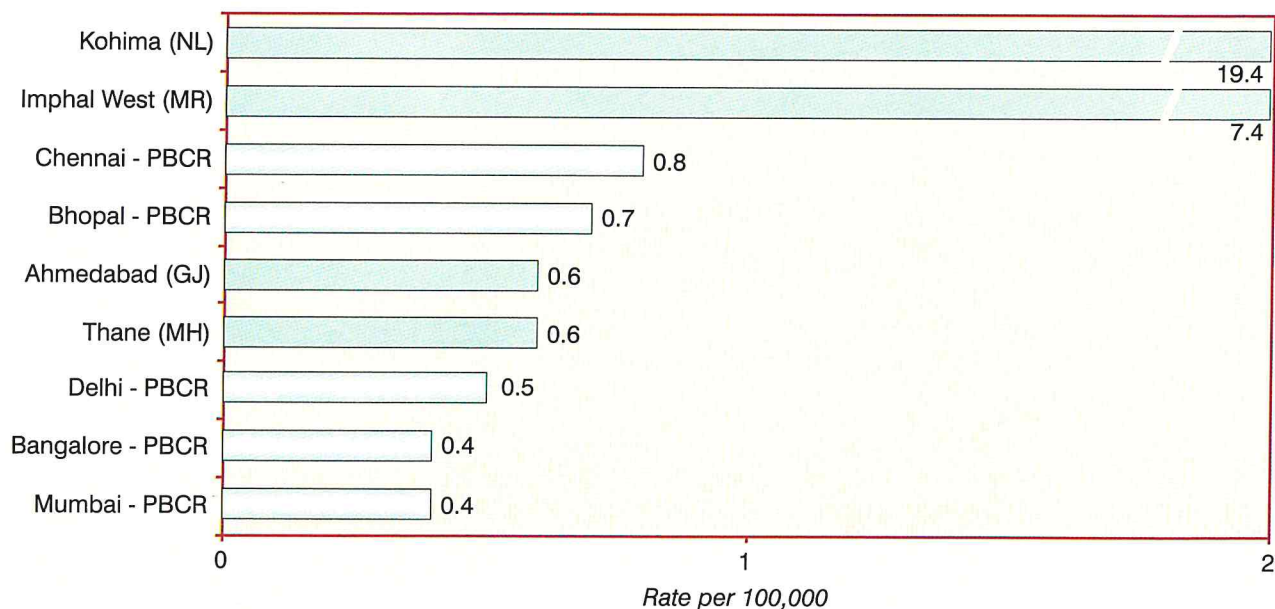
**MAP 6.6 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Nasopharynx (ICD-10 : C11) 2001 - 2002 – Males**



**FIGURE 6.6(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Nasopharynx (ICD-10 : C11) – Males**



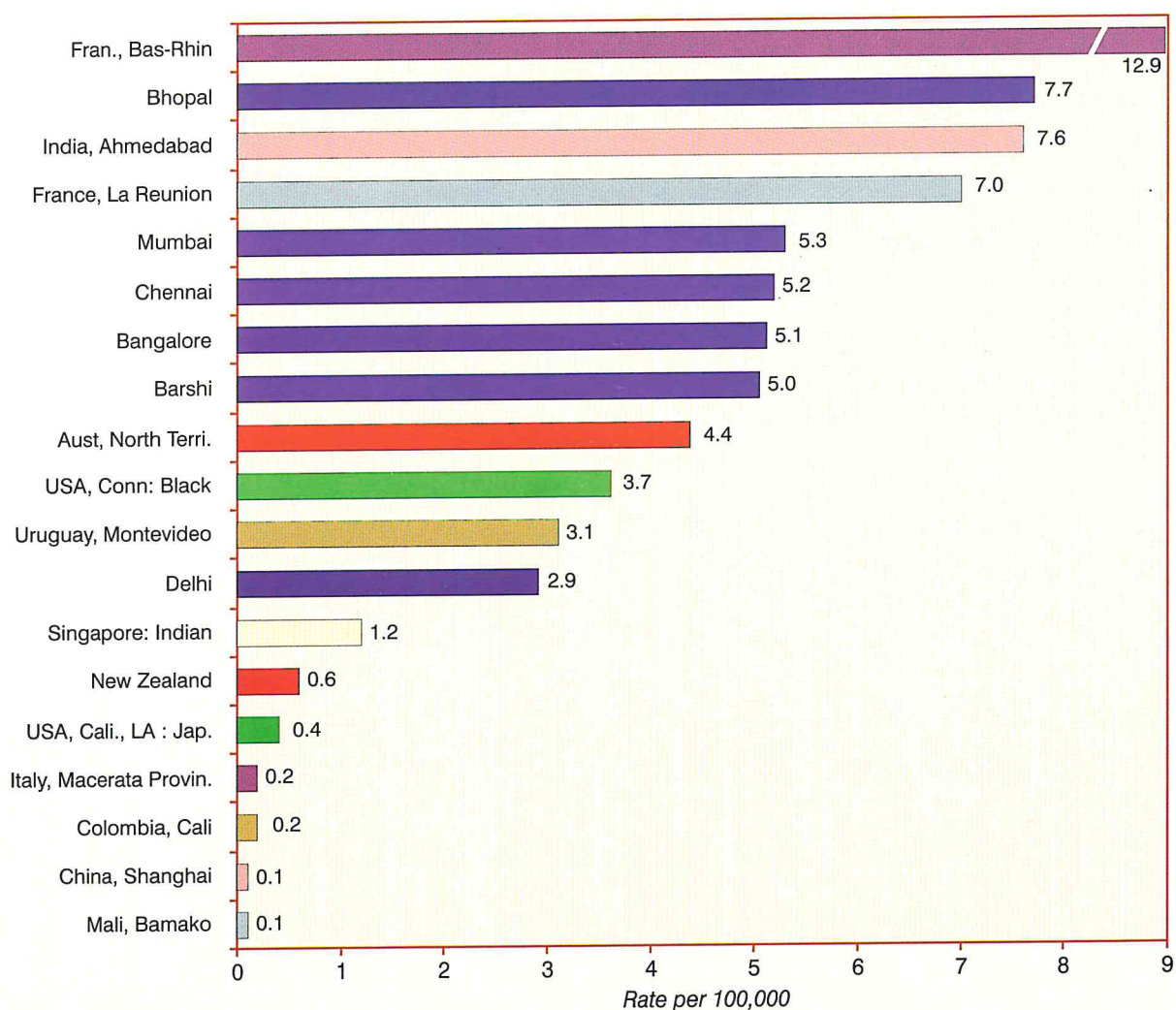
**FIGURE 6.6(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Nasopharynx (ICD-10 : C11) – Males**



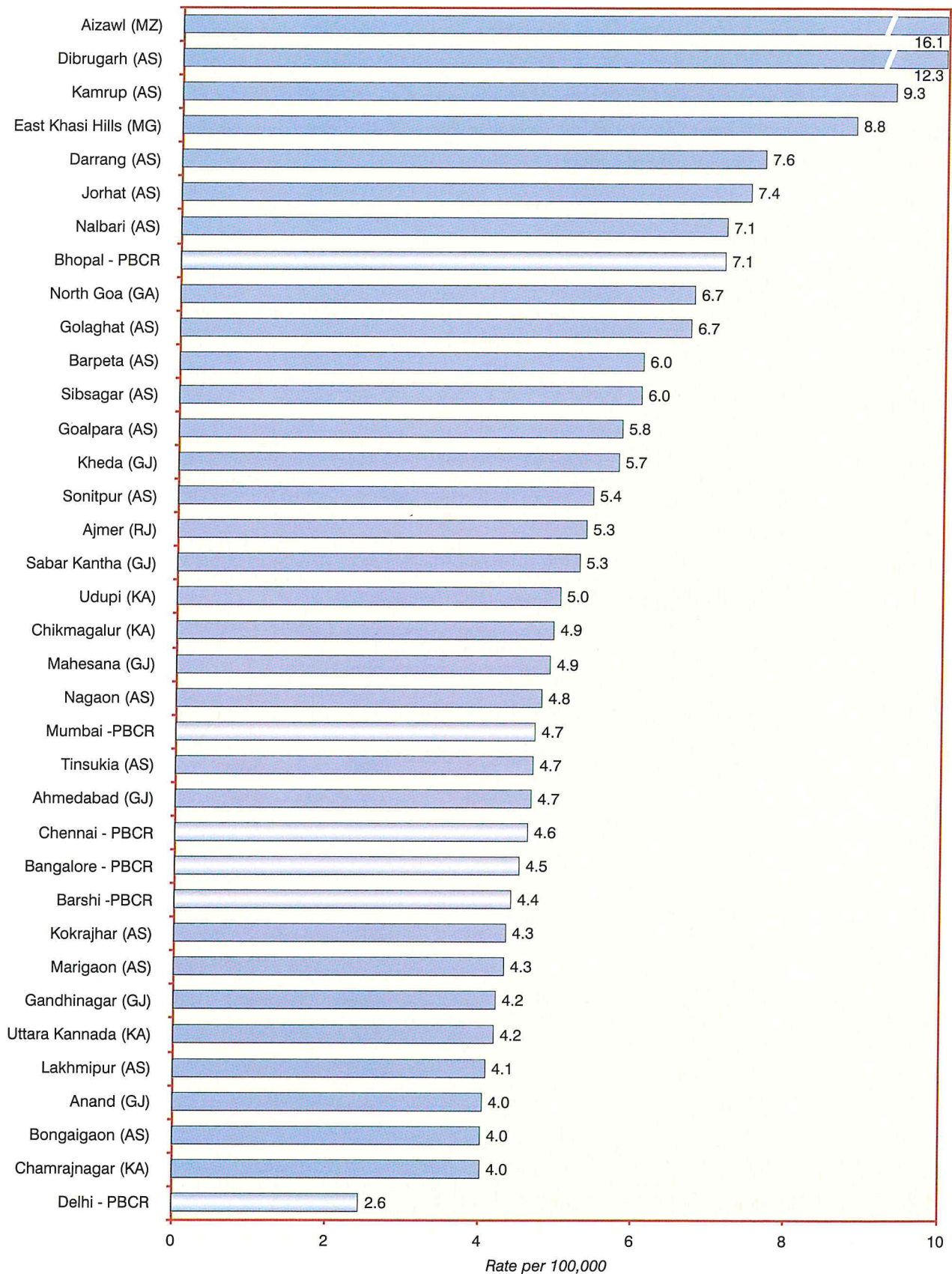
## 6.7. HYPOPHARYNX (ICD-10 : C12-C13) – MALES

The Bas-Rhin registry in France has reported the highest AAR of 12.9/100,000 (Parkin et al, 2002). Among the PBCRs, the AAR of cancer of the hypopharynx is high in Bhopal and Ahmedabad Urban PBCR [Fig. 6.7(a)]. The bar charts in Figure 6.7(b) show that Aizawl has a higher MAAR than the AAR of Bas-Rhin. Besides, many districts of Assam State (Dibrugarh, Kamrup, Darrang, Jorhat, Nalbari, Golaghat, Barpeta, Sibsagar, Goalpara to name a few) prominently stand out in the leading rates for this site of cancer.

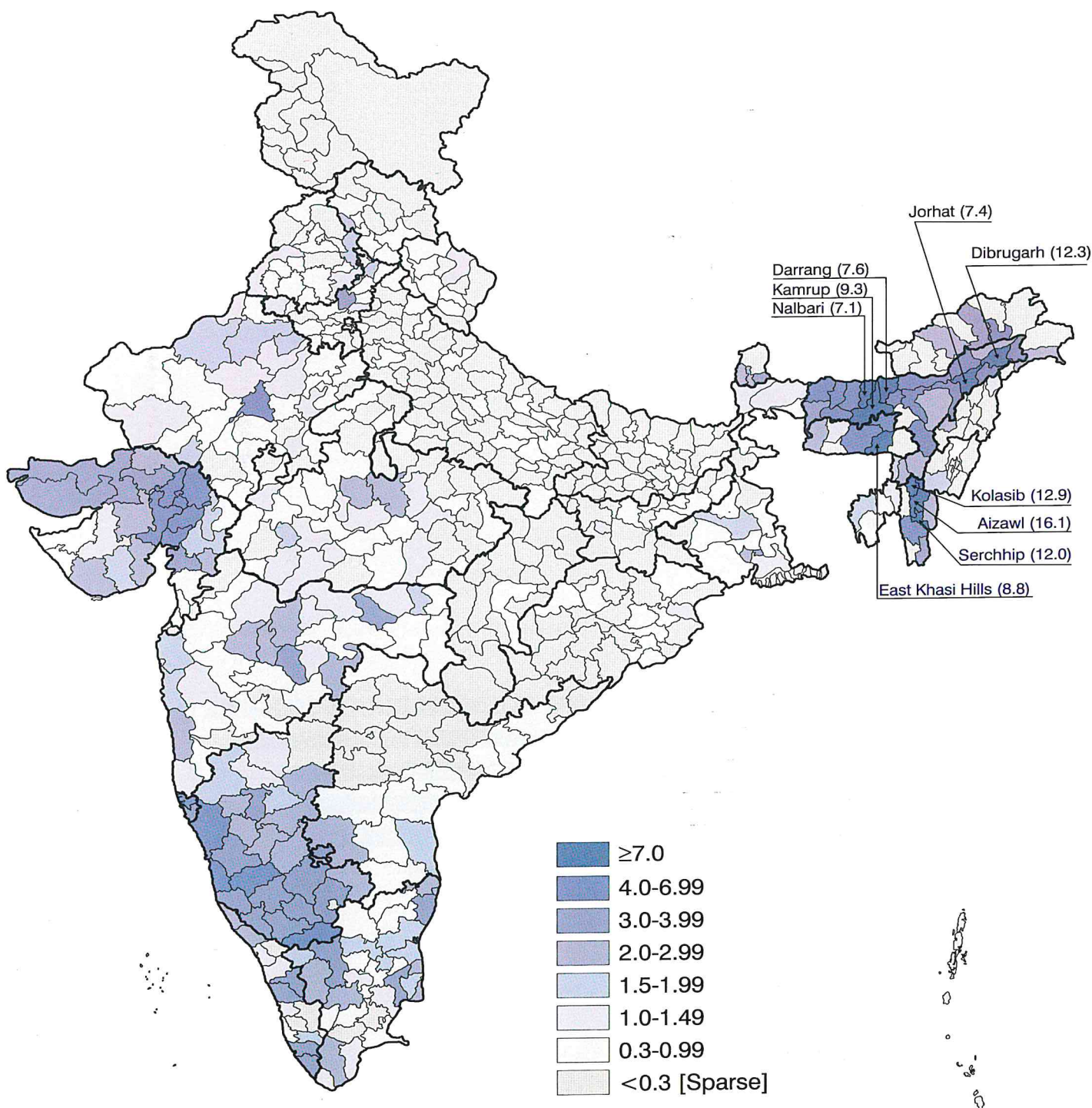
**FIGURE 6.7(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Hypopharynx (ICD-10 : C12 - C13) – Males**



**FIGURE 6.7(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Hypopharynx (ICD-10 : C12 - C13) – Males**



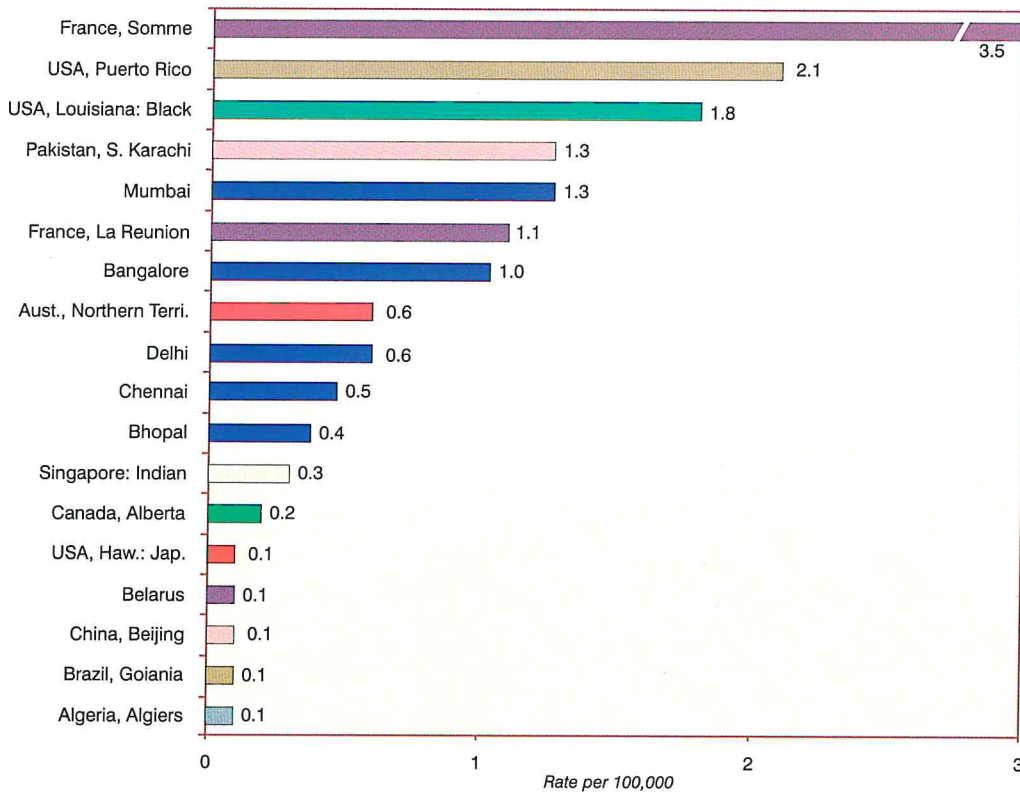
**MAP 6.7 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Hypopharynx (ICD-10 : C12 - C13) 2001 - 2002 – Males**



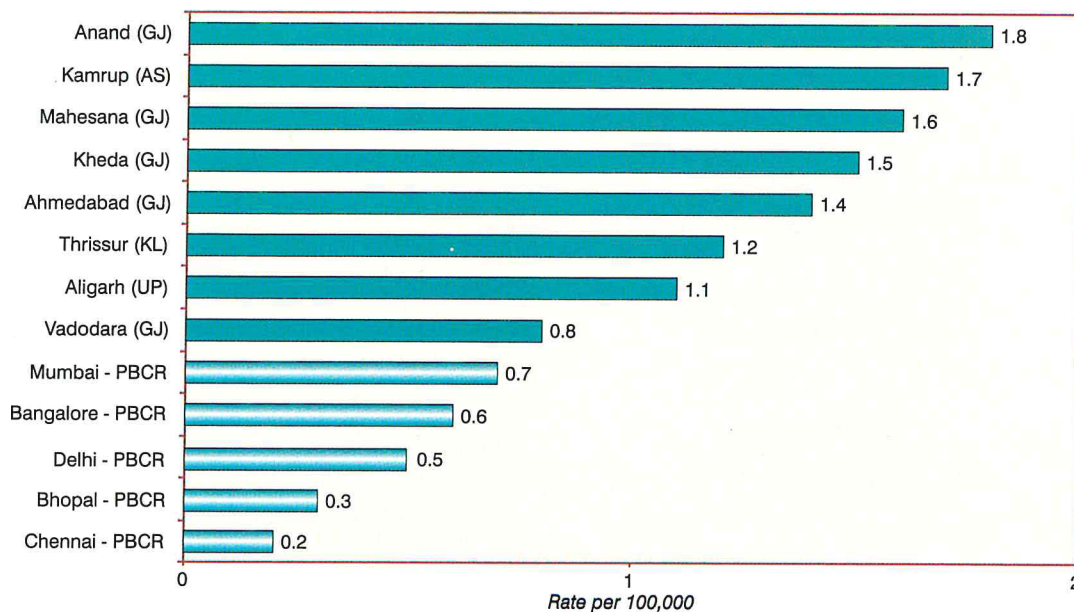
## 6.8. PHARYNX (ICD-10 : C14) – MALES

Of the eight districts that had MAAR higher than the highest MAAR in Mumbai PBCR five were in Gujarat State [Fig. 6.8(b)].

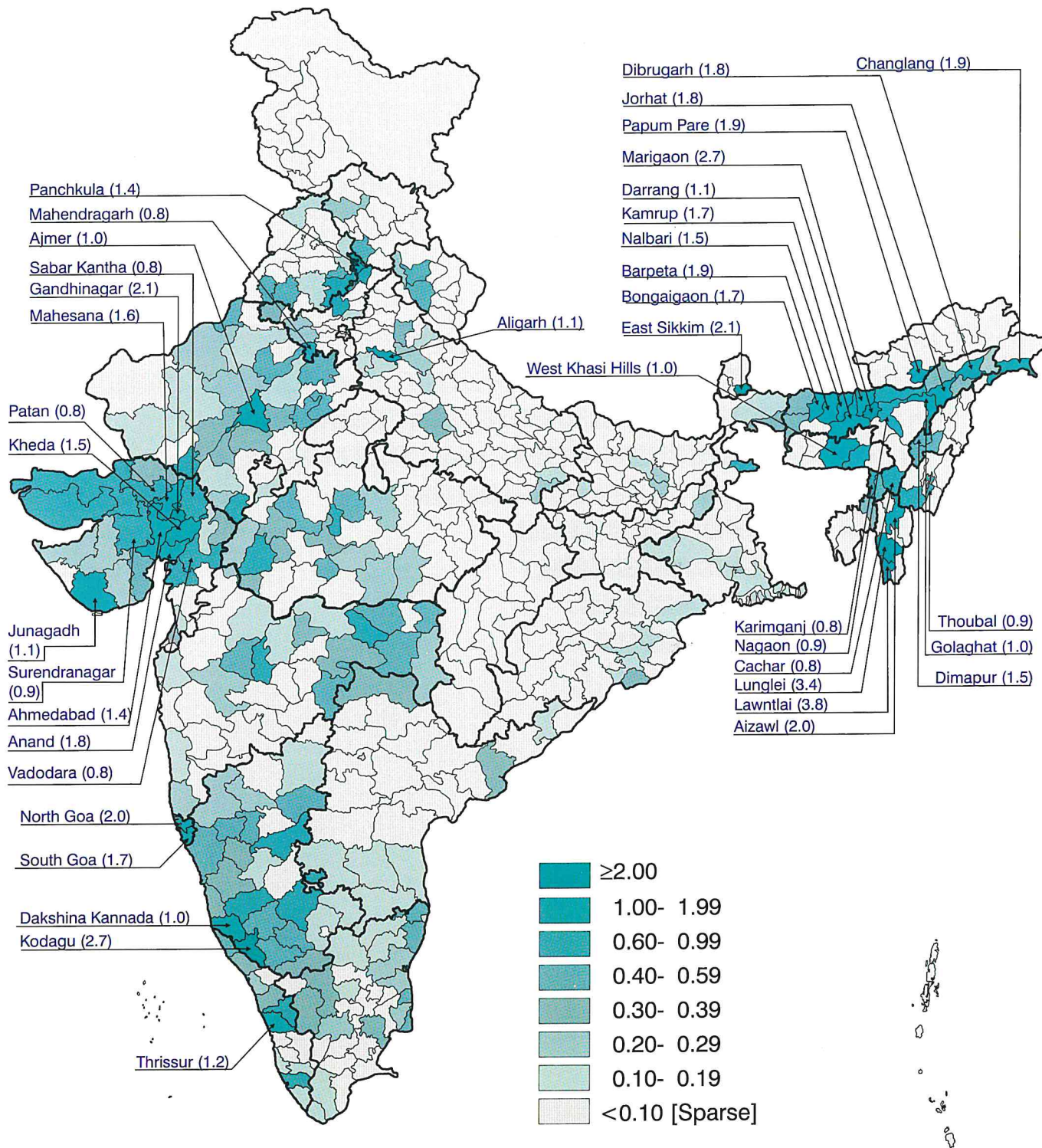
**FIGURE 6.8(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Pharynx (ICD-10 : C14) – Males**



**FIGURE 6.8(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Pharynx (ICD-10 : C14) – Males**



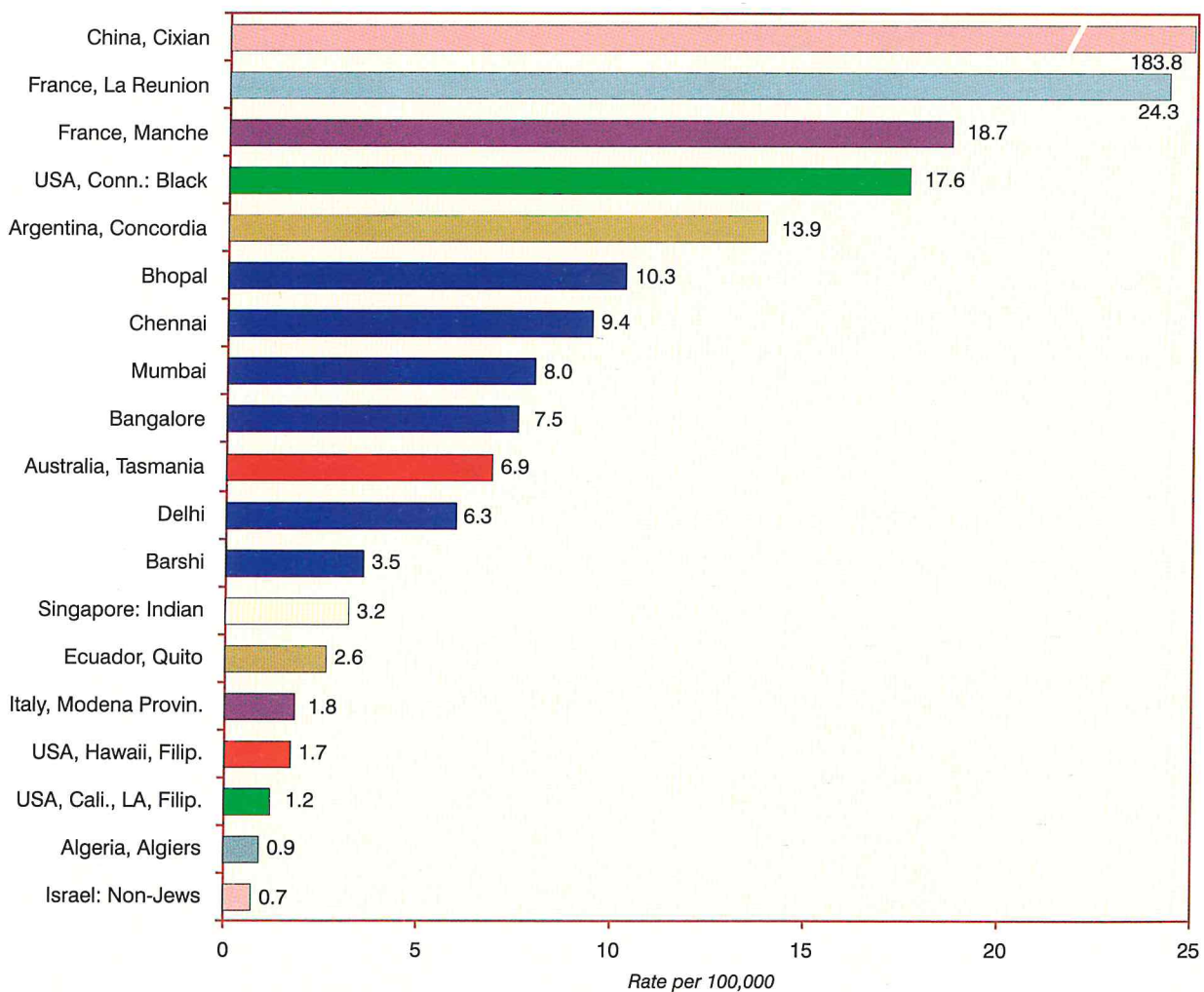
**MAP 6.8 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Pharynx (ICD-10 : C14) 2001 - 2002 – Males**



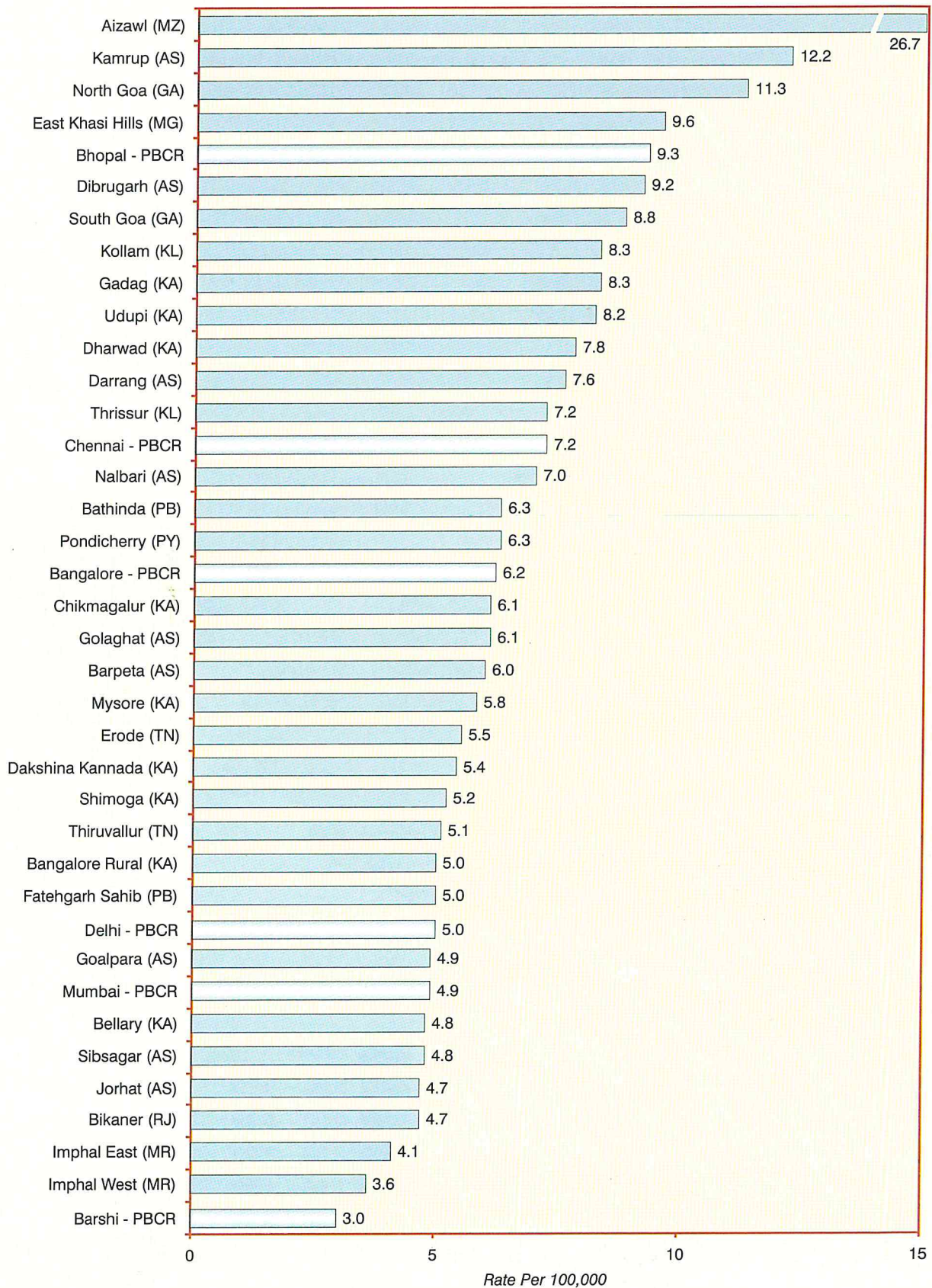
## 6.9. OESOPHAGUS (ICD-10 : C15) – MALES

Other than Cixian in China, La-Reunion in France has the highest AAR of 24.3/100,000 [Fig. 6.9(a)] (Parkin et al, 2002). The urban PBCRs other than Delhi have AARs varying from 7.5 to 10.3/100,000. The district-wise comparison of MAAR [Fig. 6.9(b)] showed that Aizawl has a higher MAAR than the AAR of La-Reunion and several districts especially in Assam and Karnataka States have MAAR comparable with the rates in the urban PBCRs. The districts of North and South Goa also had high MAARs.

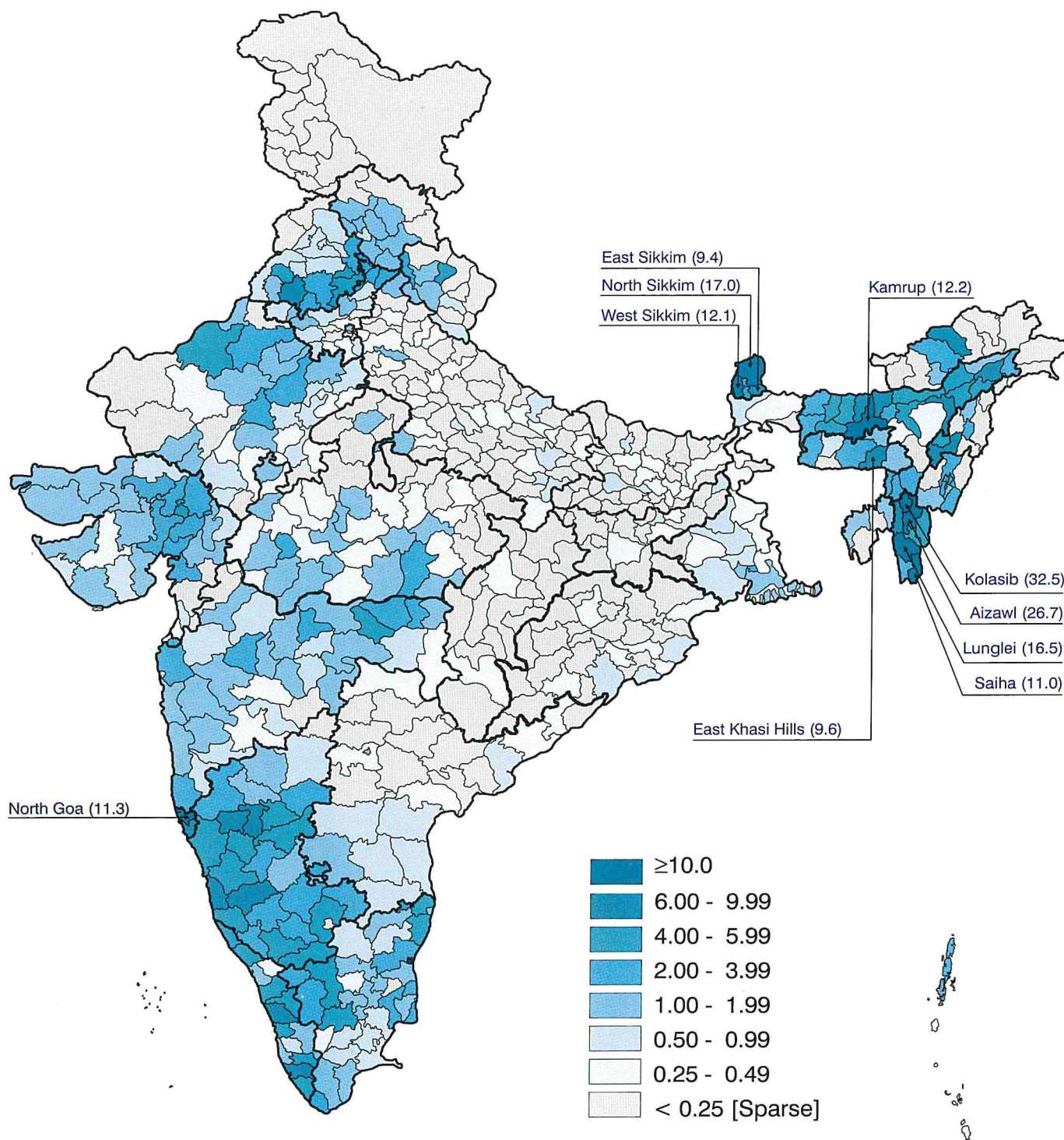
**FIGURE 6.9(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oesophagus (ICD-10 : C15) – Males**



**FIGURE 6.9(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oesophagus (ICD-10 : C15) – Males**



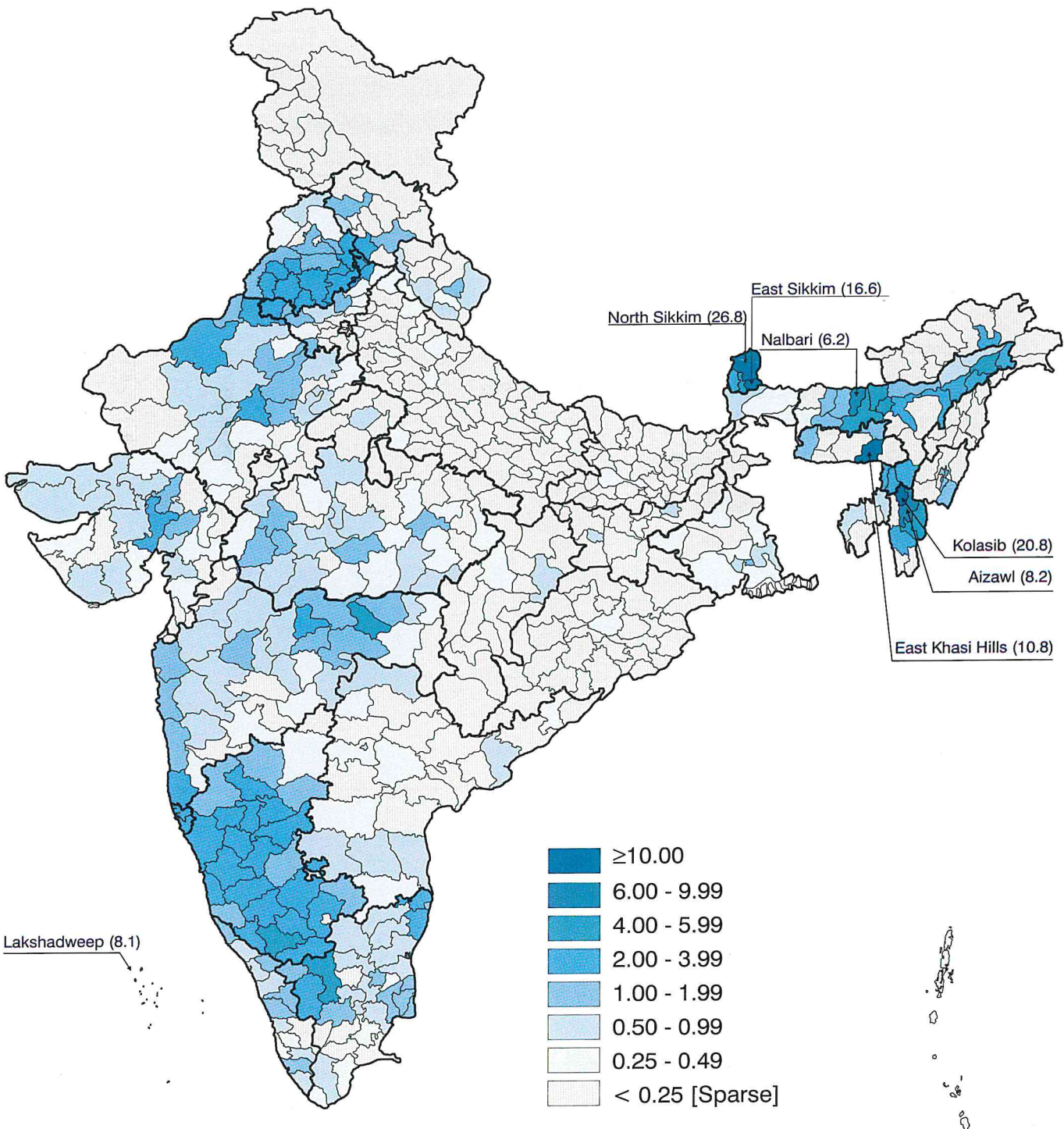
**MAP 6.9 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Oesophagus (ICD-10 : C15) 2001 - 2002 – Males**



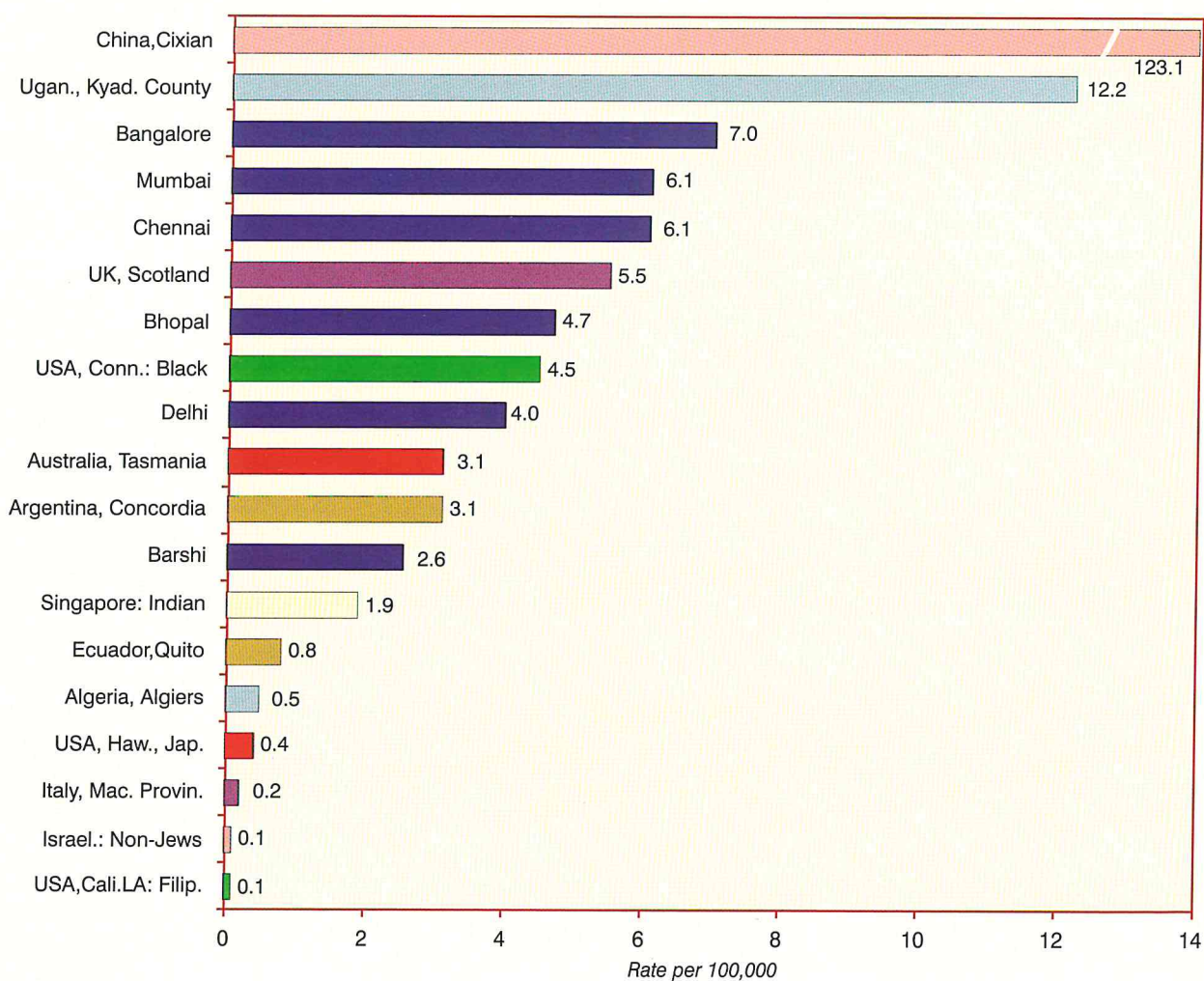
## 6.10. OESOPHAGUS (ICD-10 : C15) – FEMALES

Bangalore, Mumbai and Chennai showed similar AARs [Fig. 6.10(a)]. However, the MAAR in East Khasi Hills (10.8) in Meghalaya is at least 54% higher than the AAR of Bangalore. Nalbari, Kamrup, Darrang and Dibrugarh in Assam State had high rates.

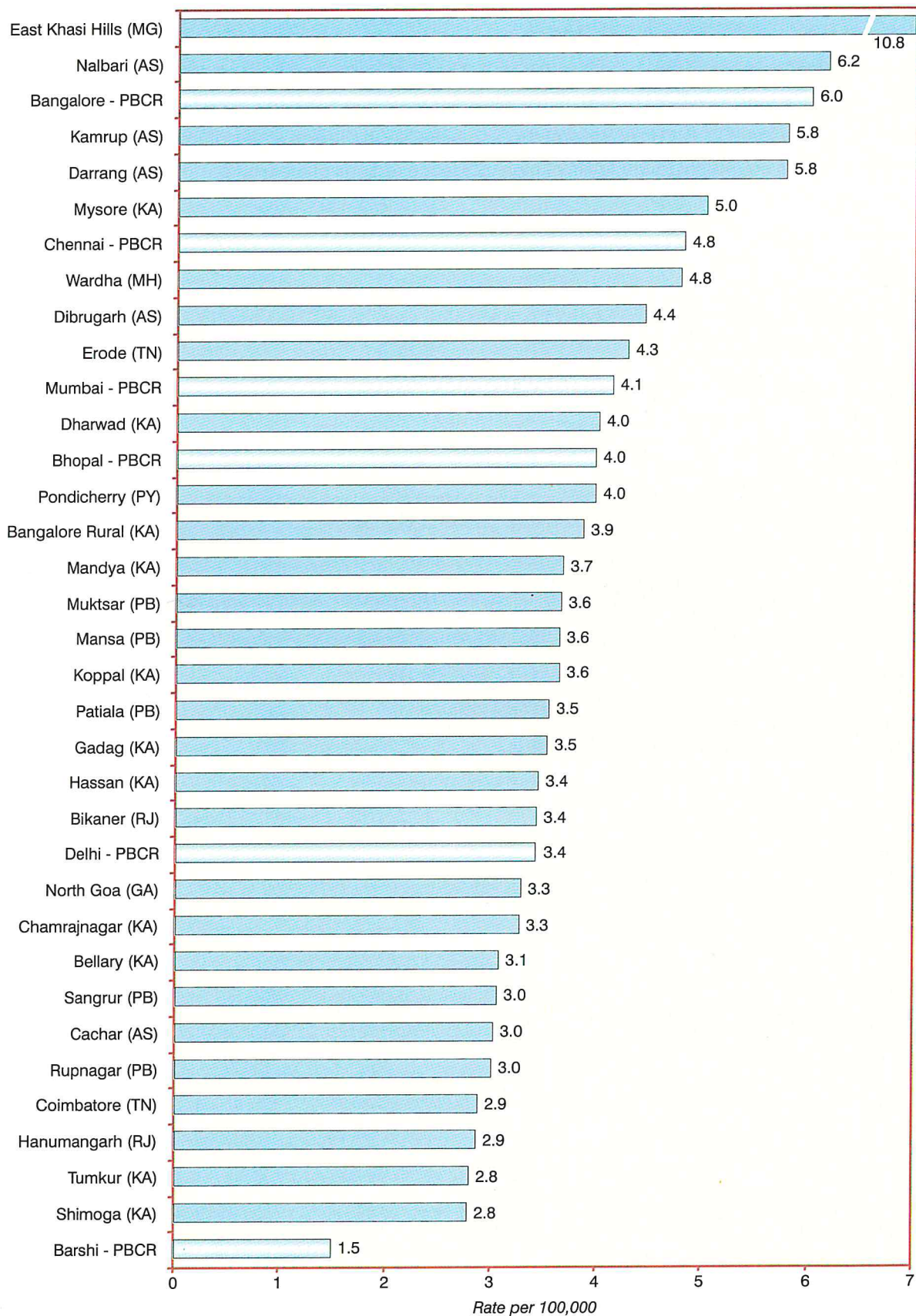
**MAP 6.10 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Oesophagus (ICD-10 : C15) 2001 - 2002 – Females**



**FIGURE 6.10(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oesophagus (ICD-10 : C15) – Females**



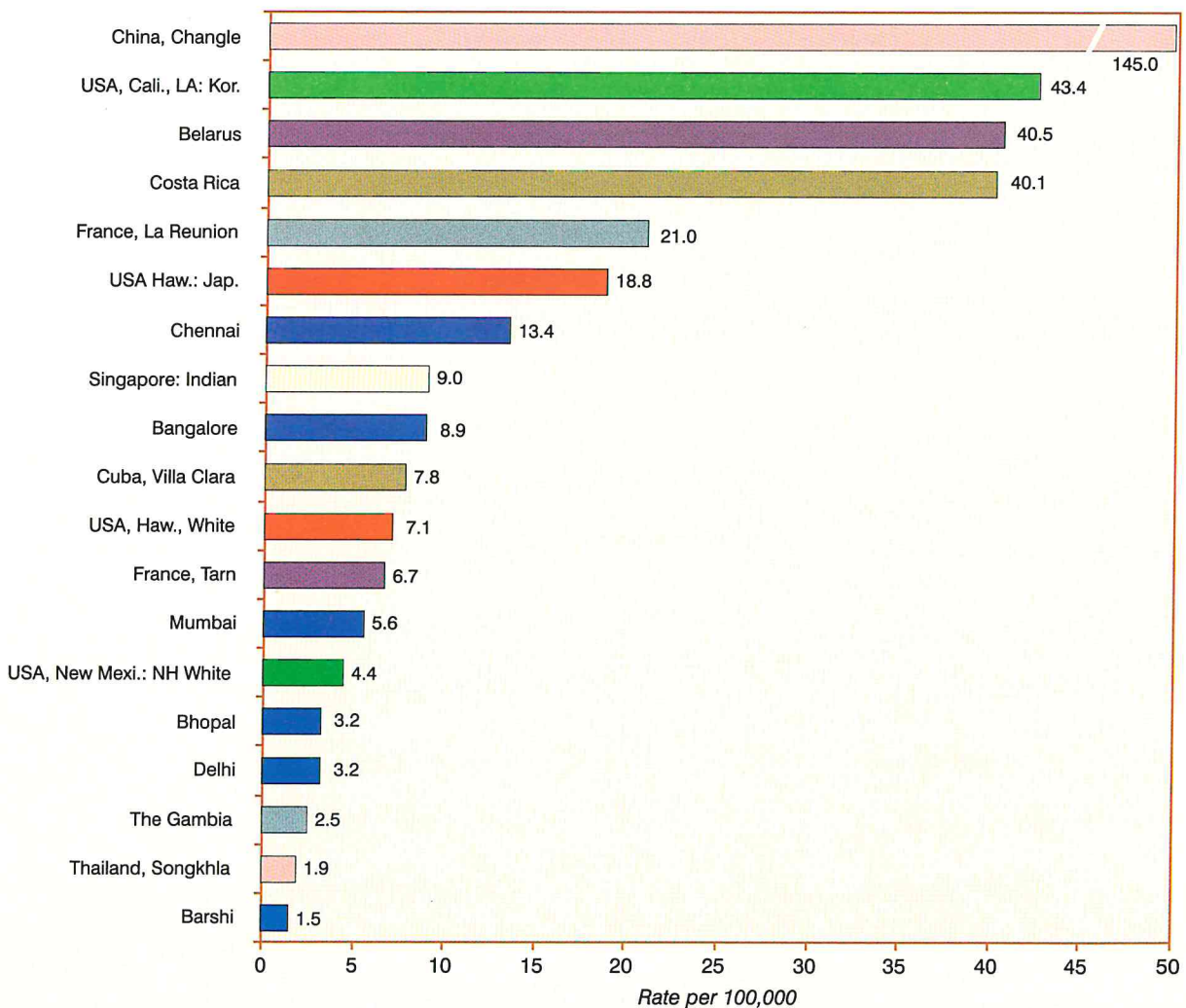
**FIGURE 6.10(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Oesophagus (ICD-10 : C15) – Females**



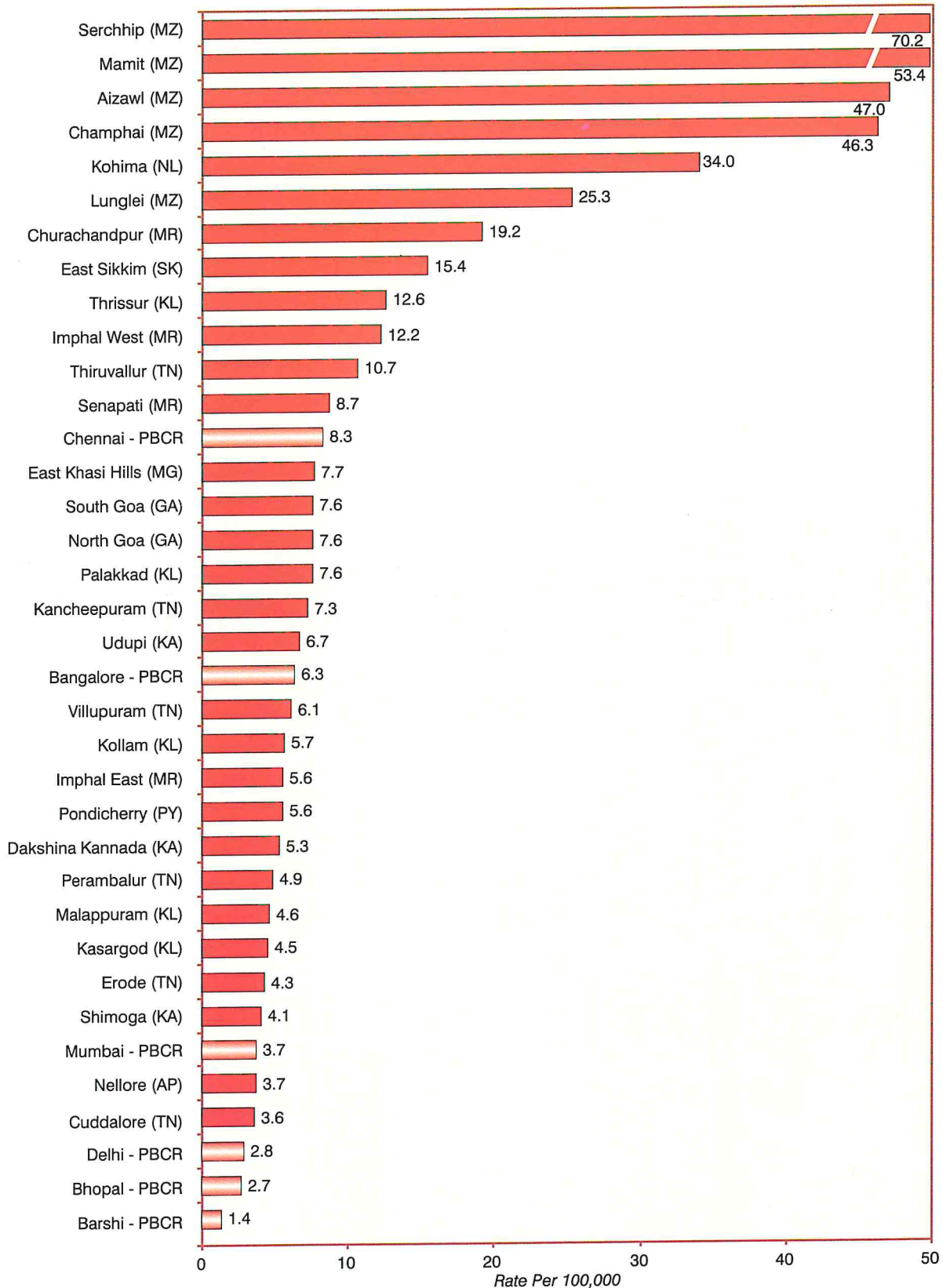
## 6.11. STOMACH (ICD-10 : C16) – MALES

Among males Chennai and Bangalore PBCRs have had cancer stomach as the leading site of cancer since the commencement of the NCRP in 1982. But the AARs in these urban areas have been much lower than that seen in Japan or in other high incidence areas of the world [Fig. 6.11 (a)]. The districtwise comparison of MAARs with that of Chennai and Bangalore showed that the district of Serchhip in Mizoram State had eight and a half times higher rate of stomach cancer than that of Chennai [Fig. 6.11 (b)]. Several districts in the North Eastern states of Mizoram, Nagaland, Manipur and Sikkim had MAARs equivalent to the AARs of high incidence regions of the world.

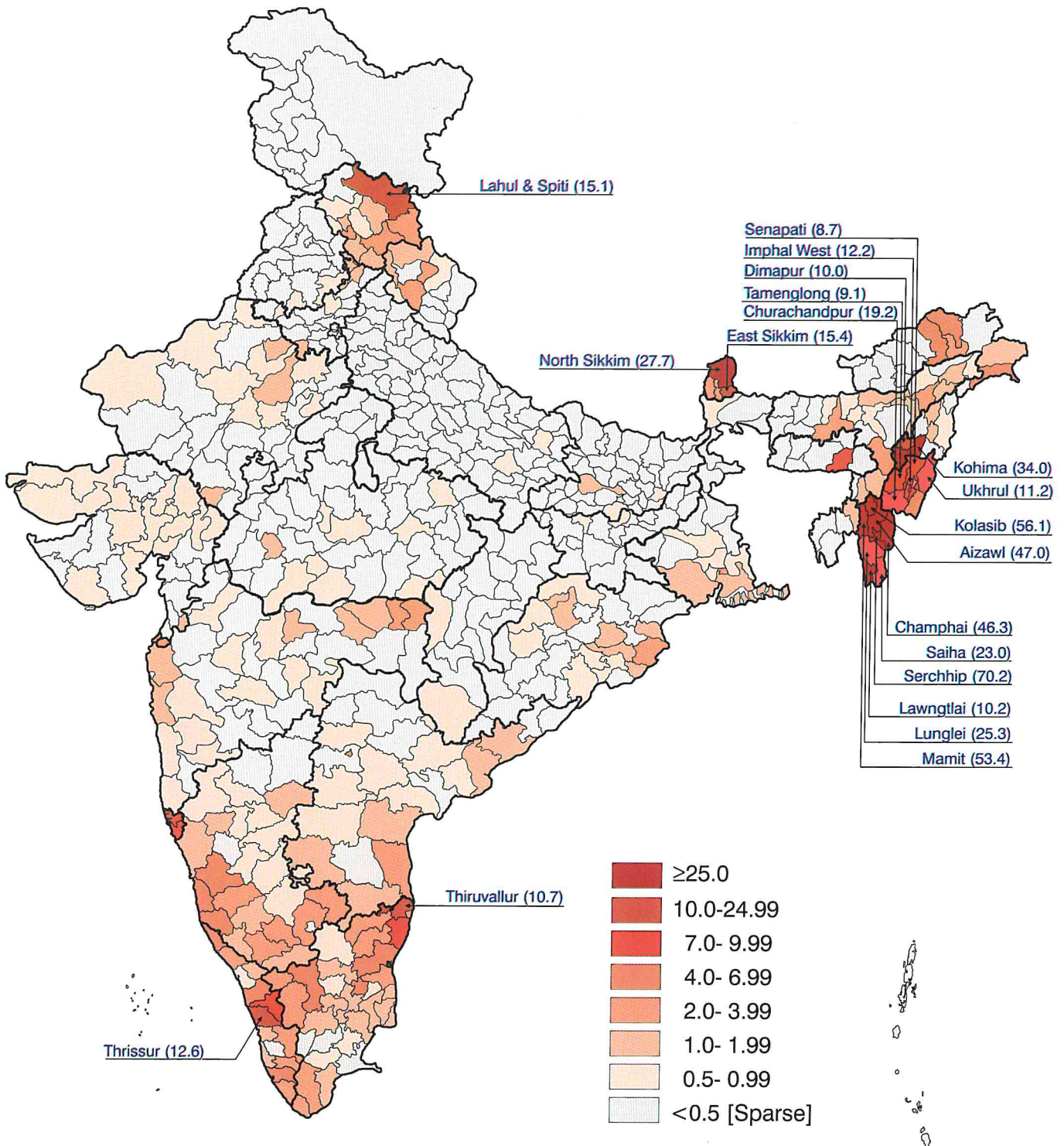
**FIGURE 6.11(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Stomach (ICD-10 : C16) – Males**



**FIGURE 6.11(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Stomach (ICD-10 : C16) – Males**



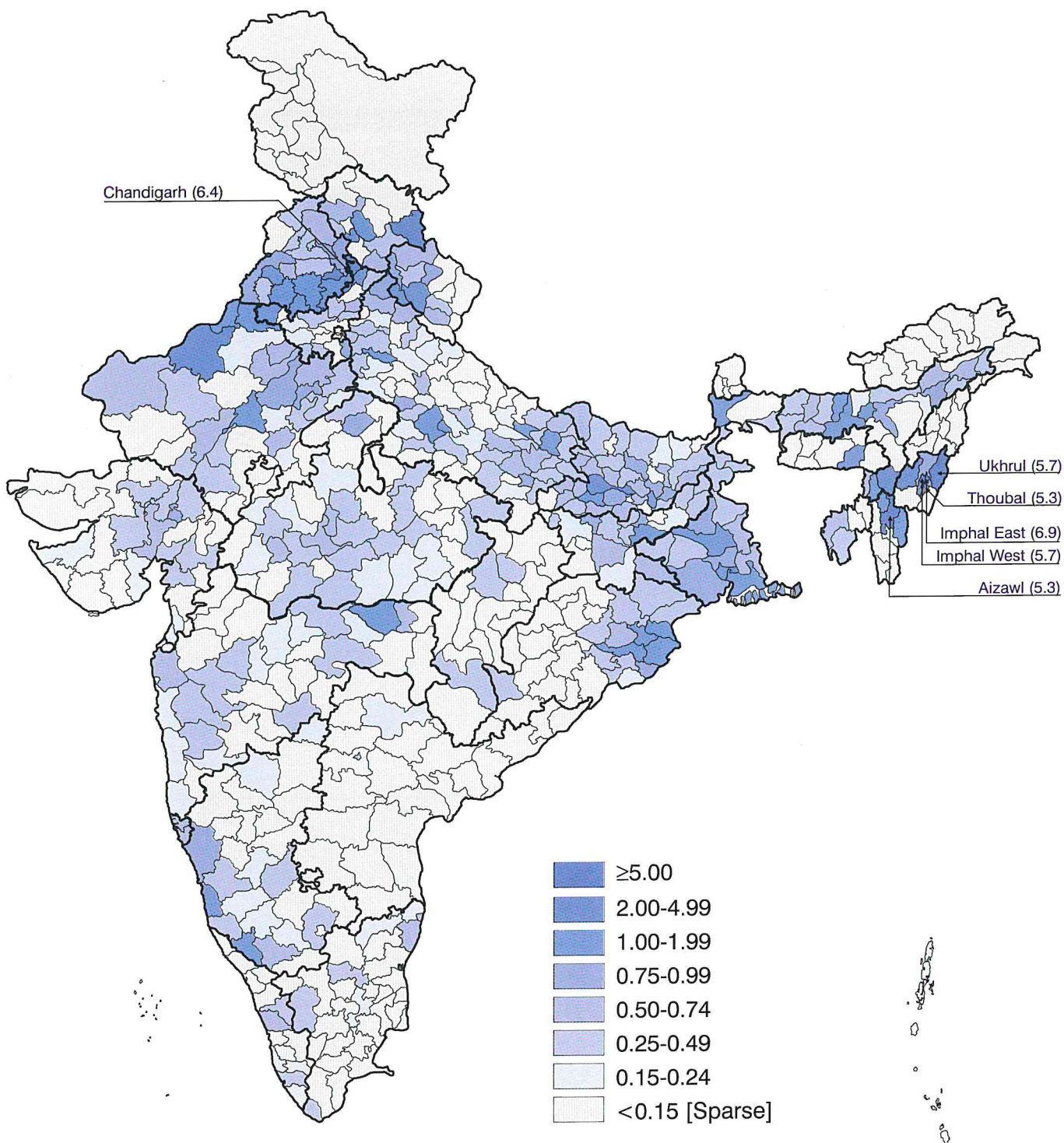
**MAP 6.11 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Stomach (ICD-10 : C16) 2001 - 2002 – Males**



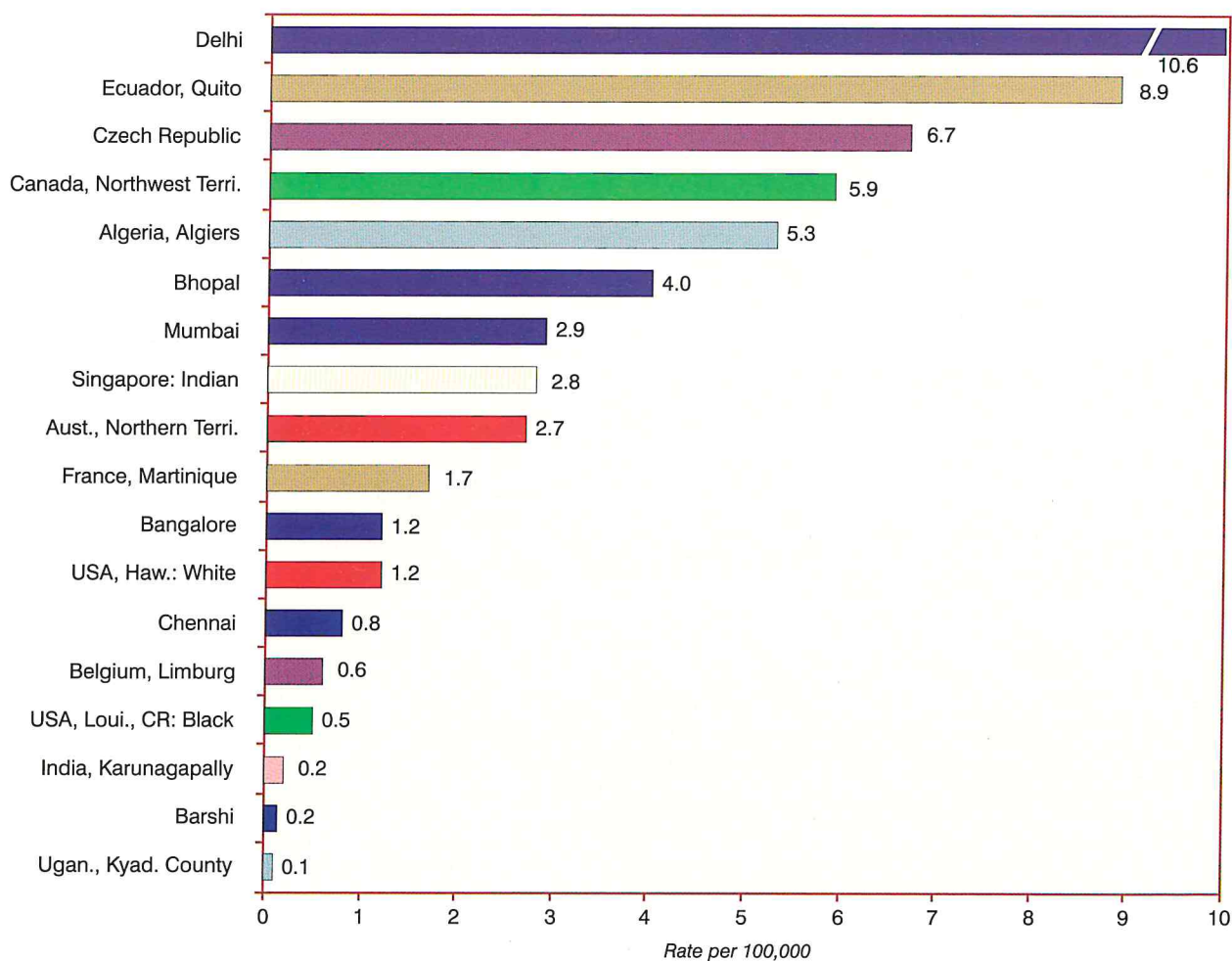
## 6.12. GALL BLADDER (ICD-10 : C23-C24) - FEMALES

Delhi females show the highest incidence rate (AAR: 10.6/100,000) of gall bladder cancer in the world [Fig. 6.12(a)] (Parkin et al, 2002). However, the bar charts of district-wise comparison showed that Imphal East and West districts of Mizoram State and the Union Territory of Chandigarh had comparable MAAR with that of Delhi [Fig. 6.12(b)].

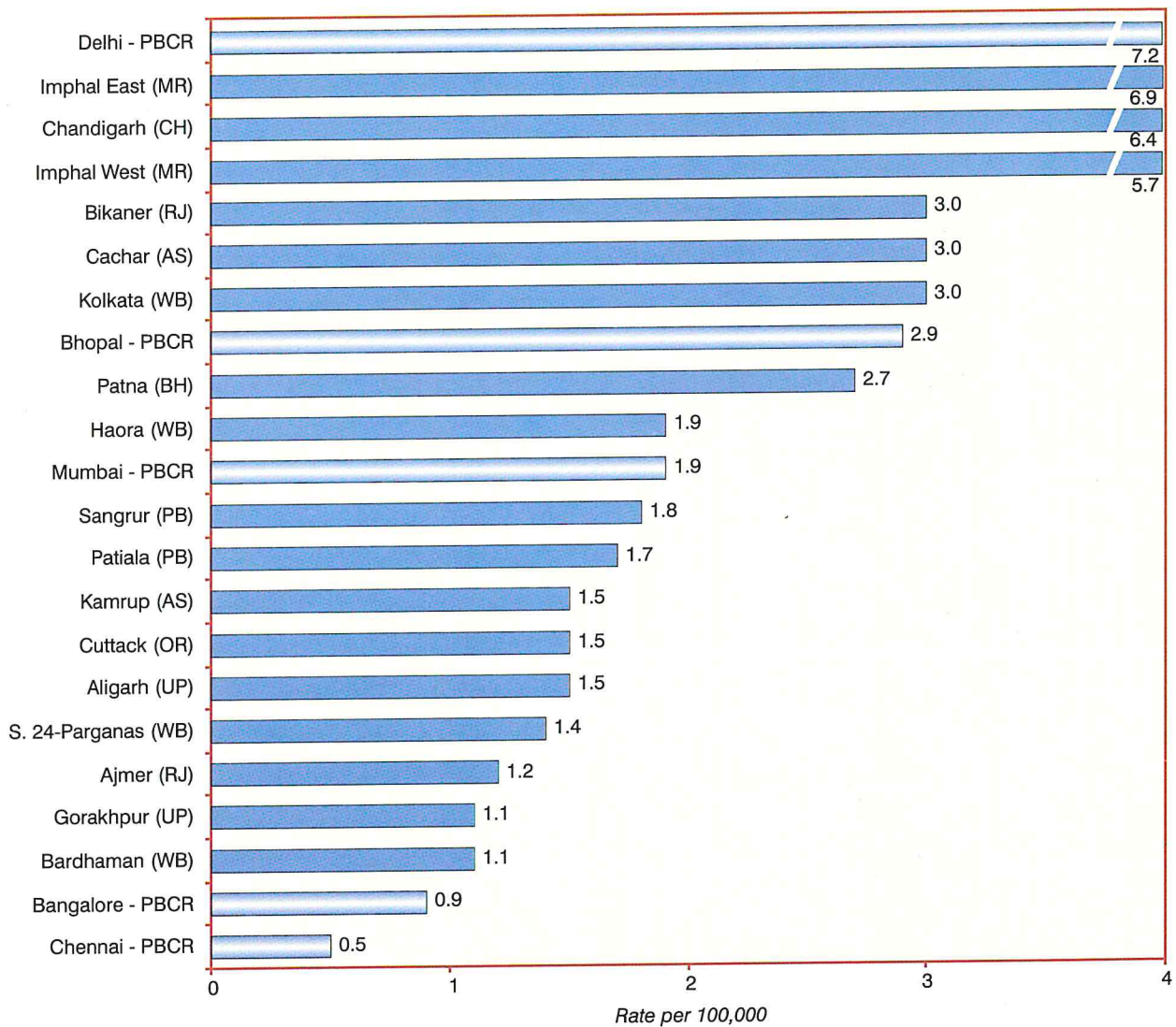
**MAP 6.12 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Gall Bladder (ICD-10 : C23 - C24) 2001 - 2002 – Females**



**FIGURE 6.12(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Gall Bladder (ICD-10 : C23 - C24) – Females**



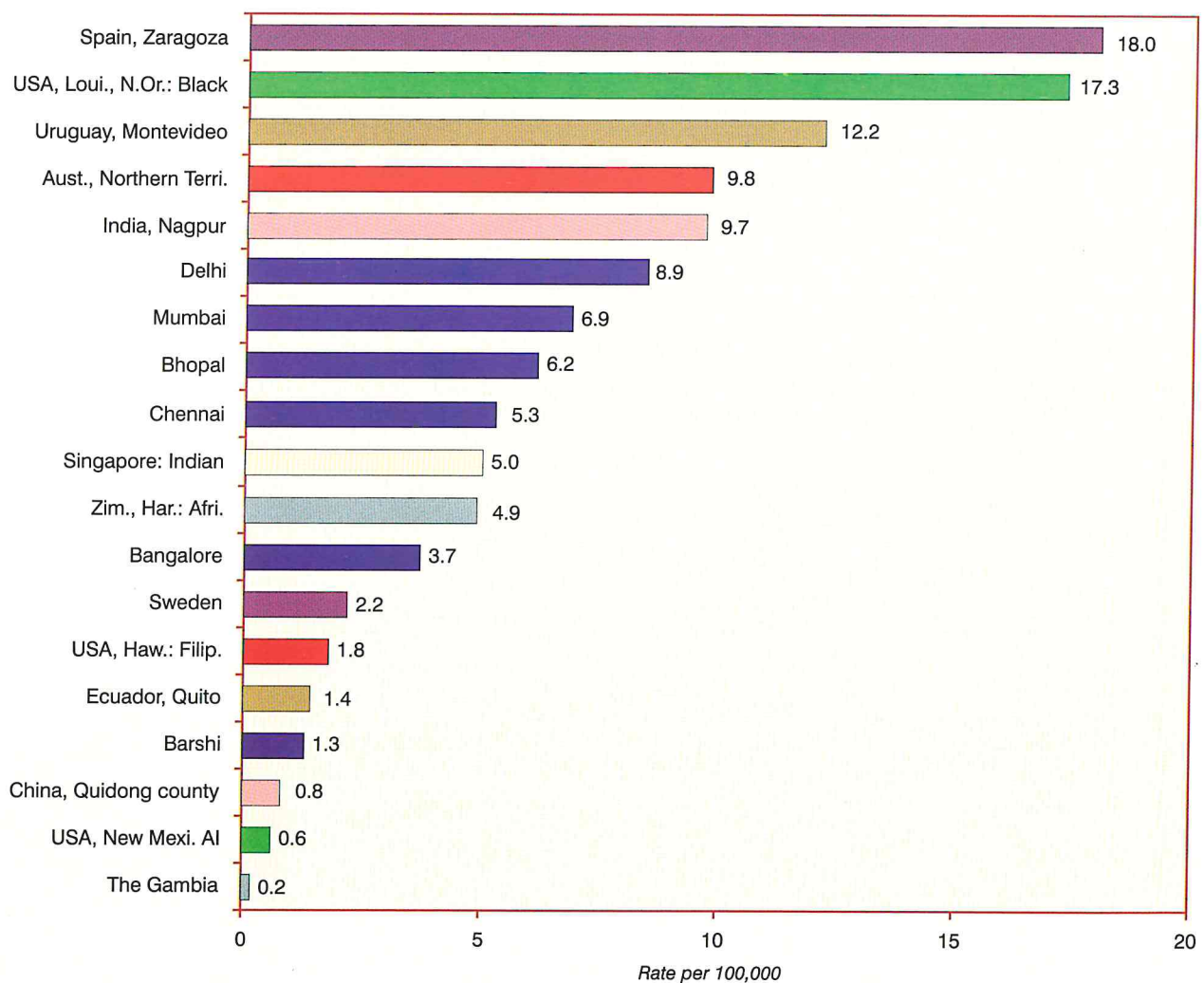
**FIGURE 6.12(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Gall Bladder (ICD-10 : C23 - C24) – Females**



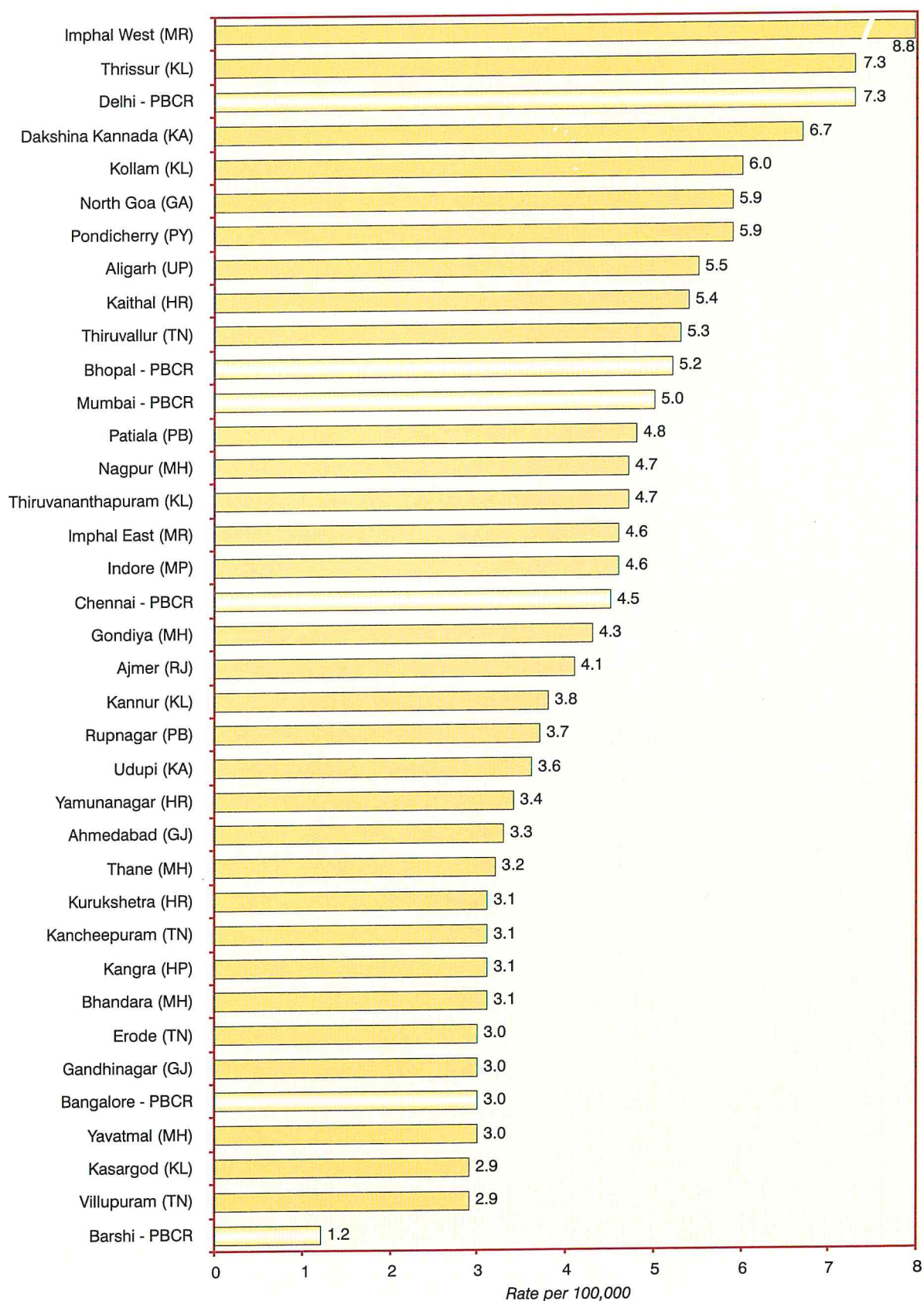
## 6.13. LARYNX (ICD-10 : C32) – MALES

Among the PBCRs in India Nagpur registry shows a high AAR of 9.7/100,000 [Fig. 6.13(a)]. The rates (AARs or MAARs) in three urban PBCRs at Delhi, Bhopal and Mumbai were comparable [Fig. 6.13(b)]. The district-wise comparison showed that at least nine districts had comparable rates with these three urban PBCRs.

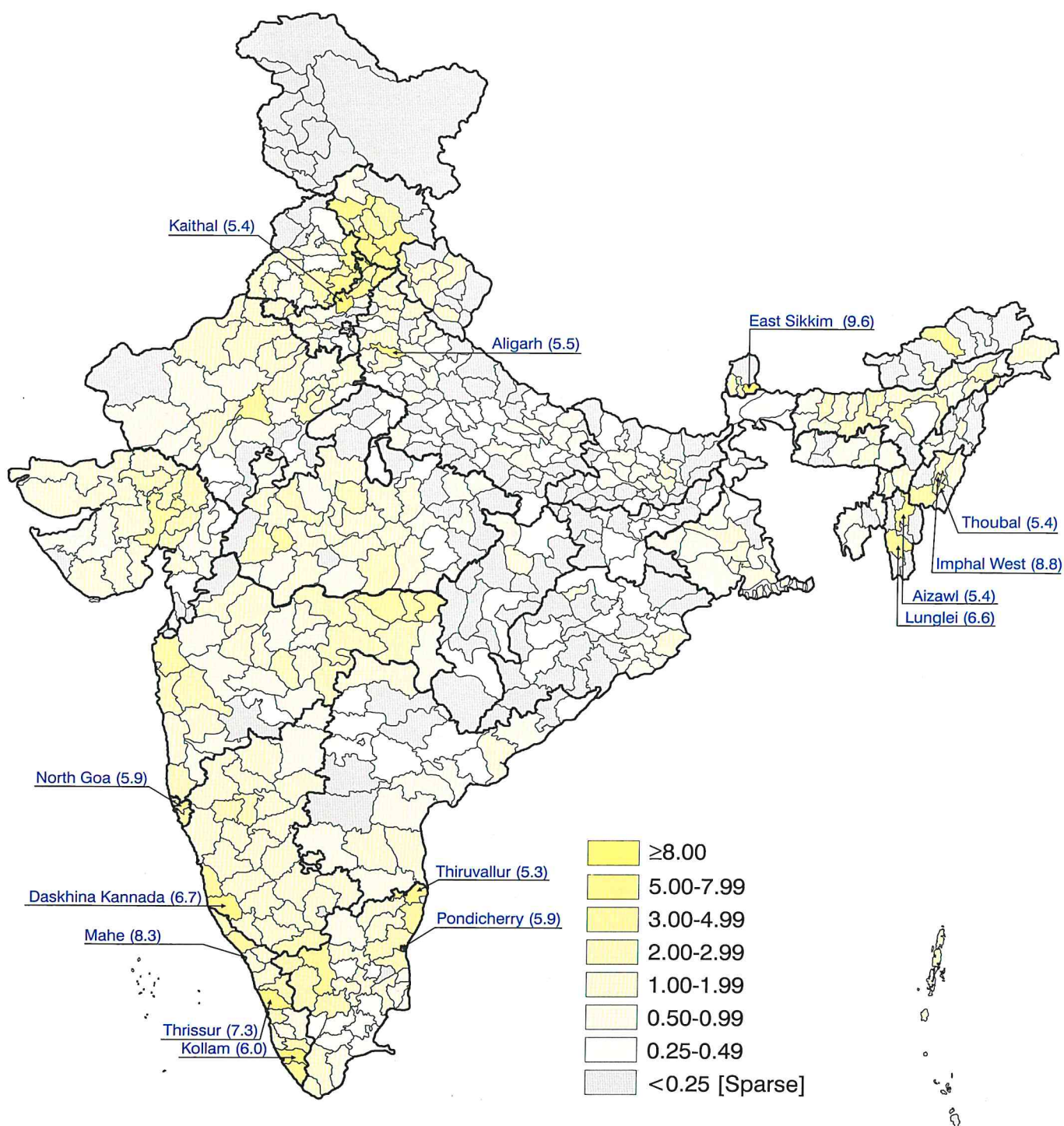
**FIGURE 6.13(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Larynx (ICD-10 : C32) – Males**



**FIGURE 6.13(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Larynx (ICD-10 : C32) – Males**



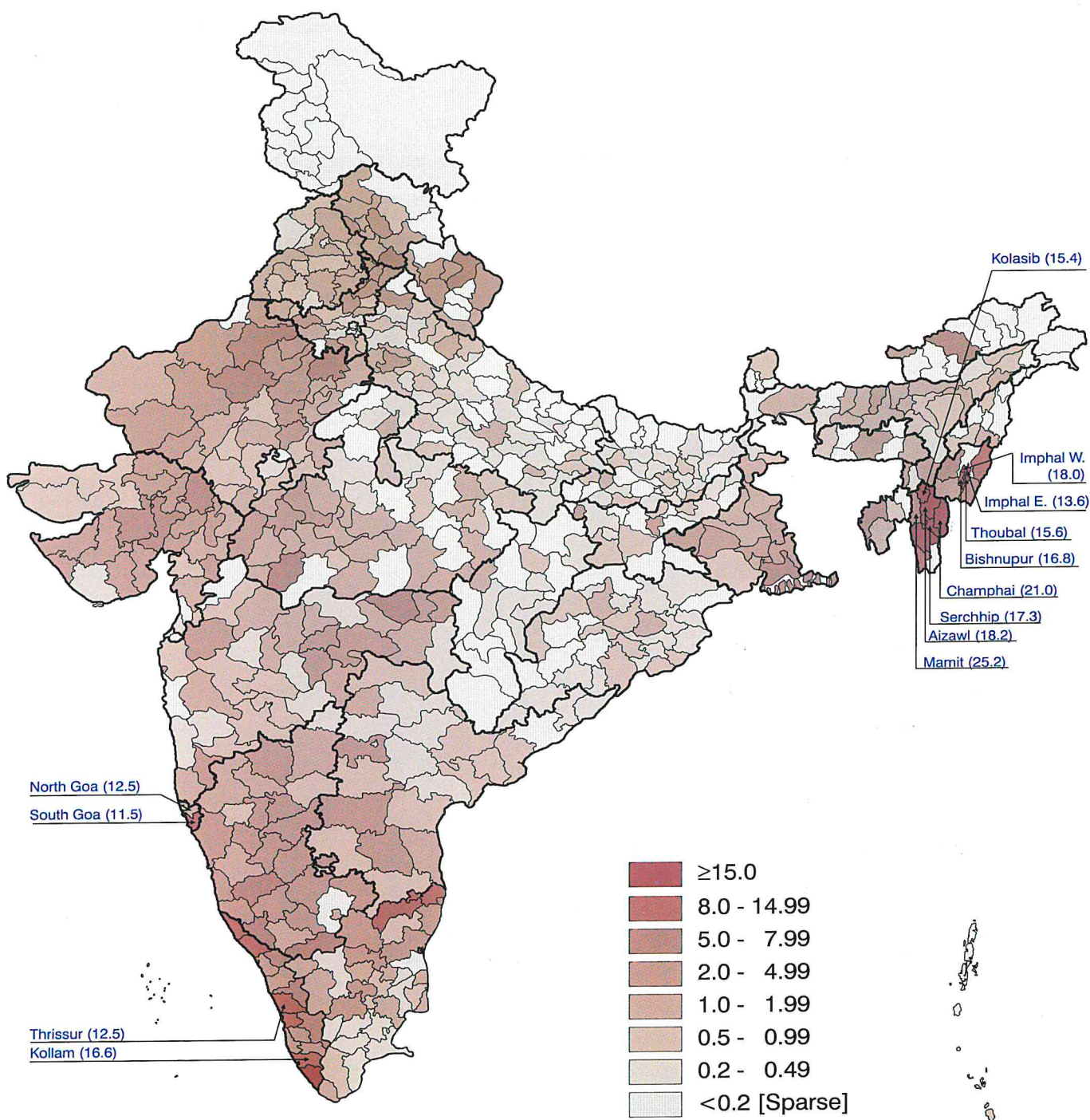
**MAP 6.13 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000  
Larynx (ICD-10 : C32) 2001 - 2002 – Males**



## 6.14. LUNG (ICD-10 : C33-C34) – MALES

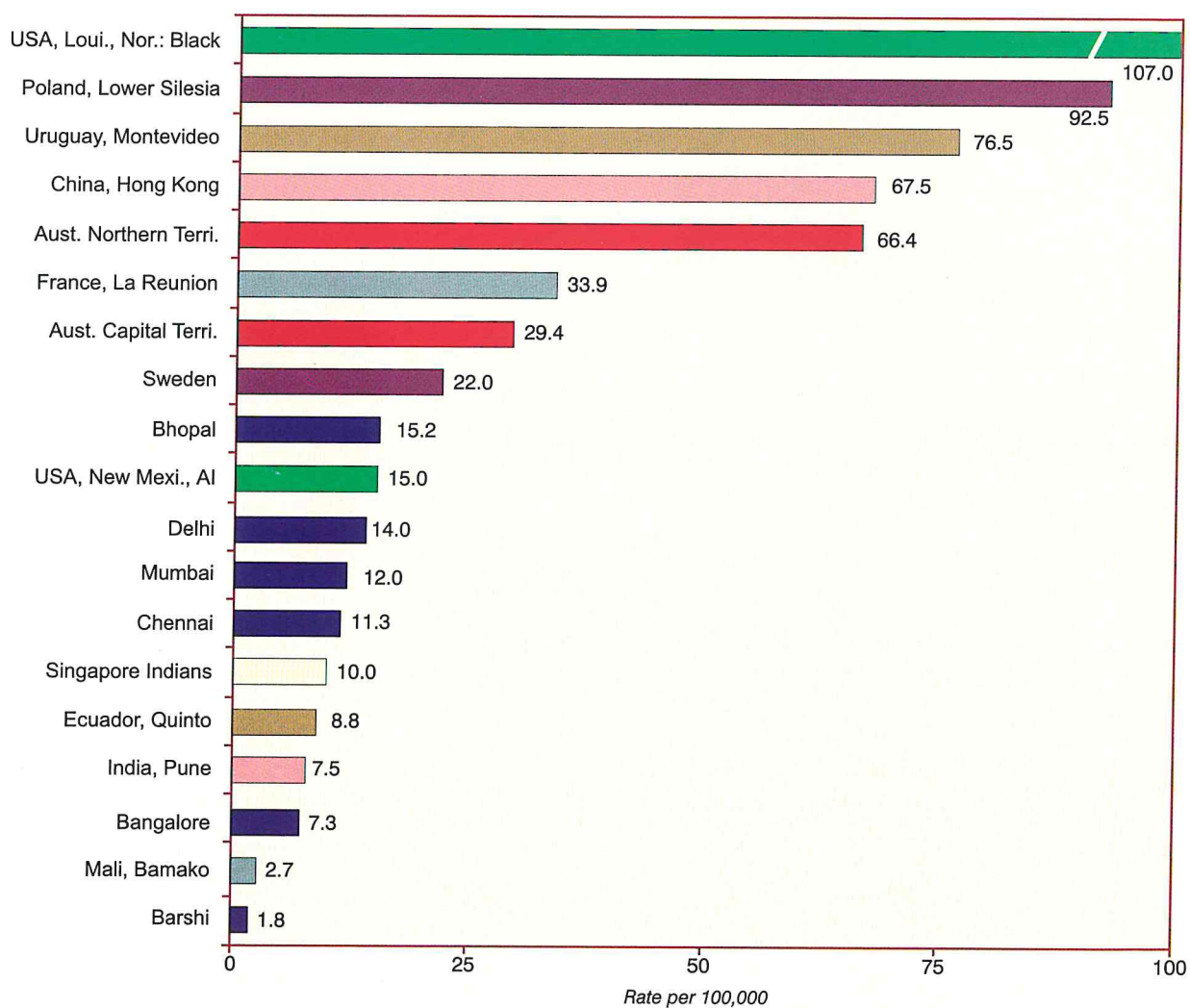
The incidence rates of lung cancer in the PBCRs in India are at least as of now much lower than the registries elsewhere in the world with the highest rates [Fig. 6.14(a)]. However, the district-wise bar charts revealed that Aizawl in

**MAP 6.14 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Lung (ICD-10 : C33 - C34) 2001 - 2002 – Males**

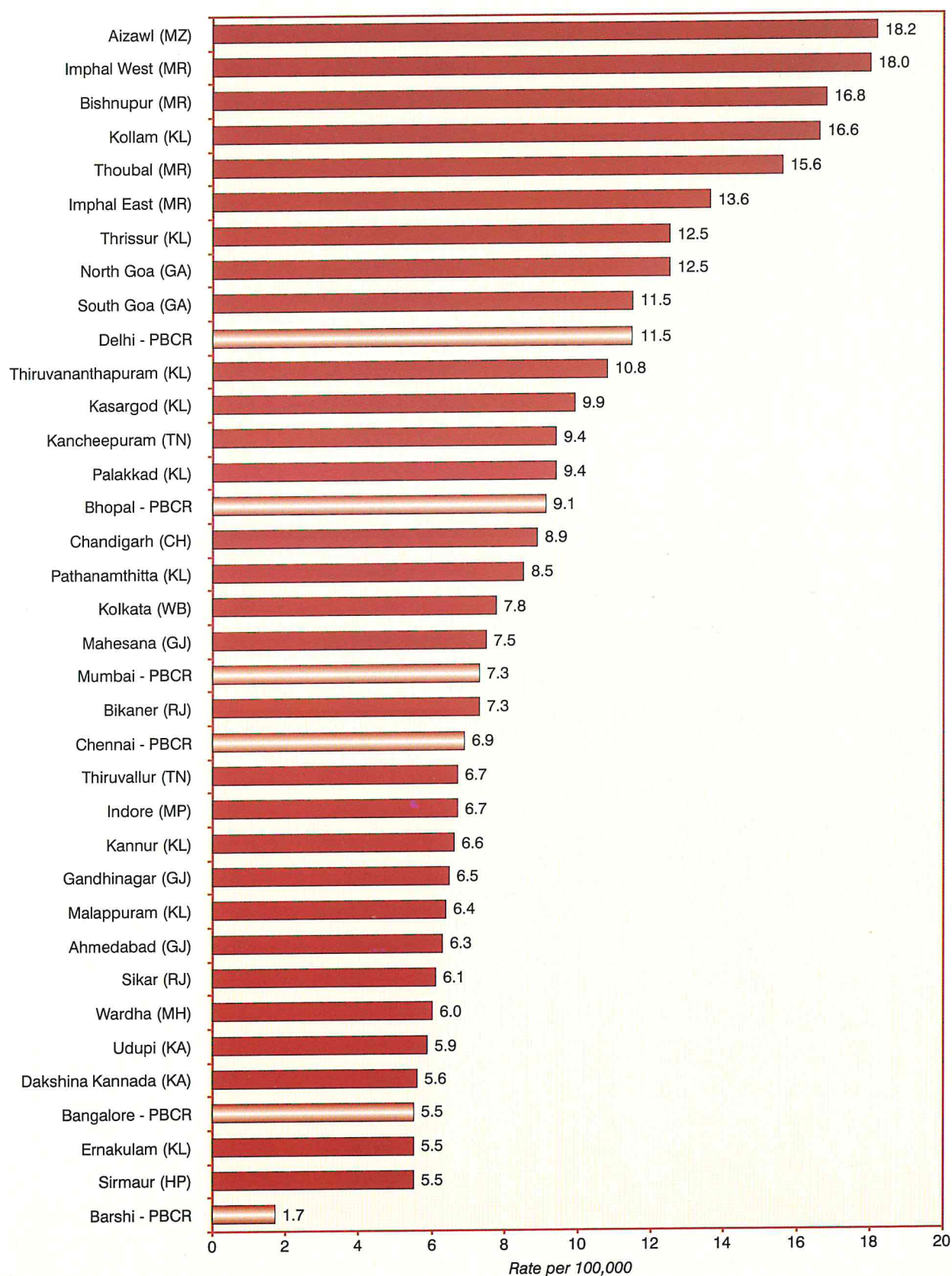


Mizoram State and Imphal West in Manipur State, had 1½ times the MAAR of the highest urban PBCR - Delhi. Further at least nine other districts had MAARs higher or comparable with that of Delhi [Fig. 6.14(b)].

**FIGURE 6.14(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Lung (ICD-10 : C33 - C34) – Males**



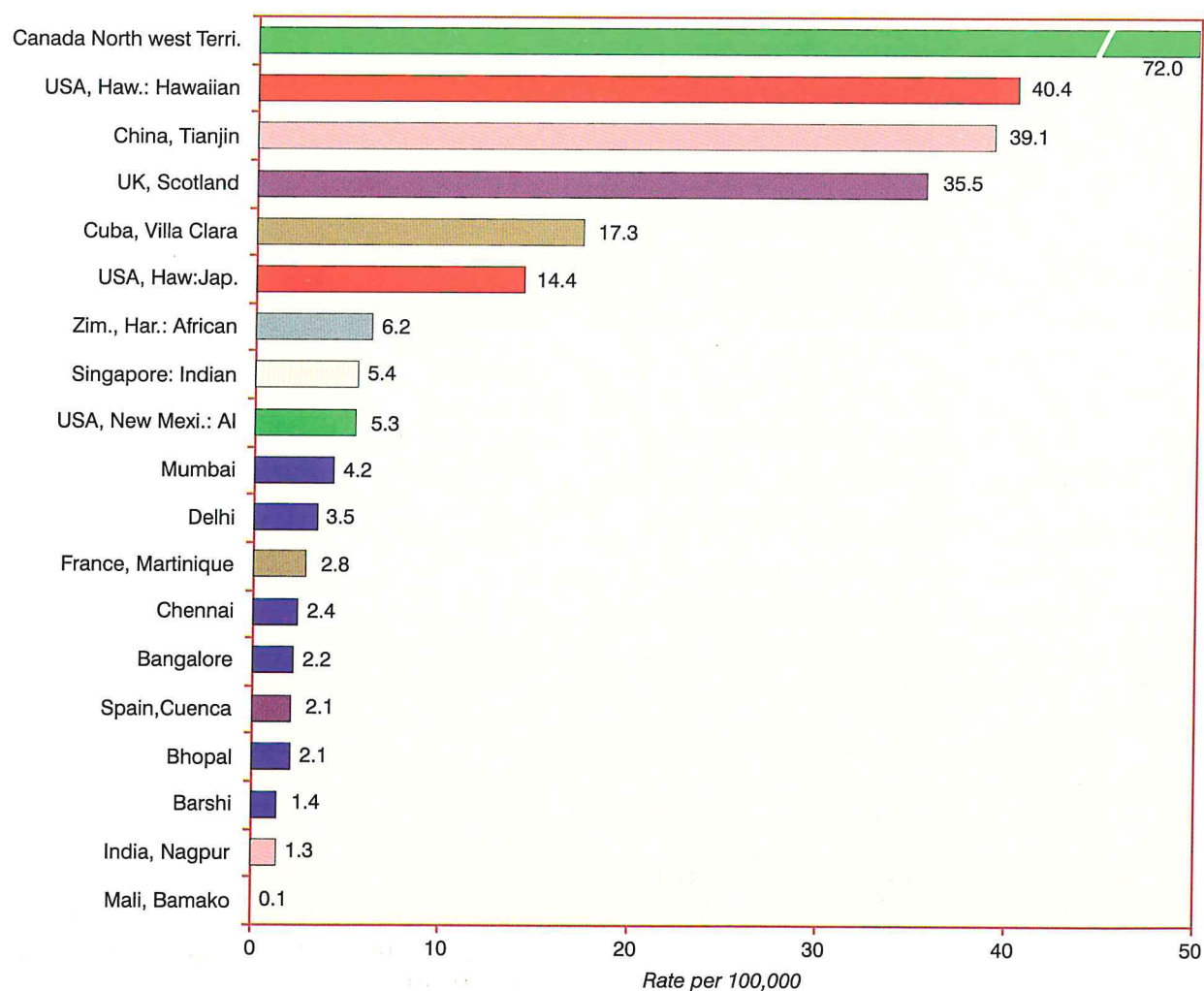
**FIGURE 6.14(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Lung (ICD-10 : C33 - C34) – Males**



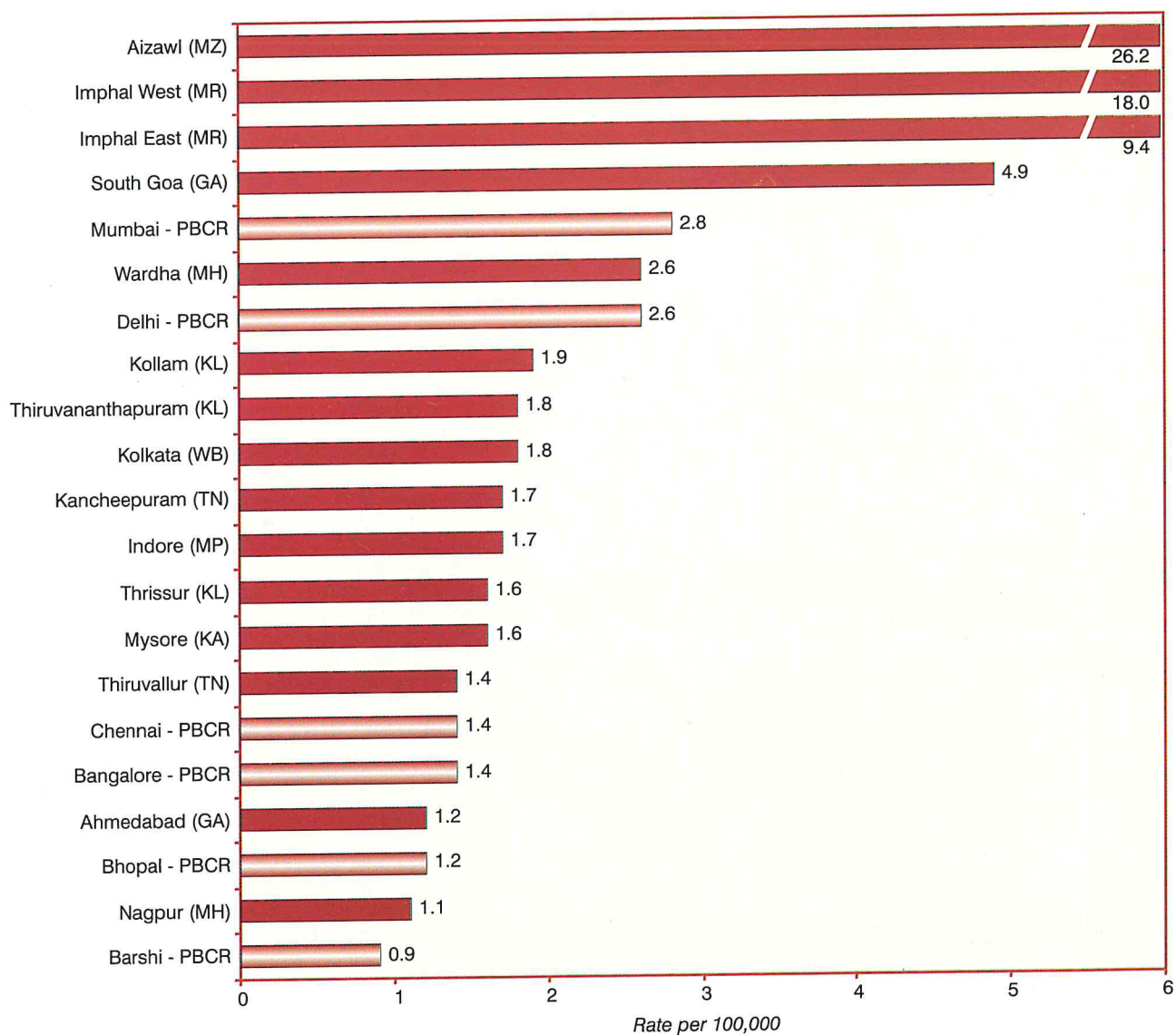
## 6.15. LUNG (ICD-10 : C33-C34) – FEMALES

Except in Mumbai PBCR, cancer of the lung in females has not been a leading site of cancer in women in the PBCRs under NCRP. Even the rate (AAR of 4.2/100,000) in Mumbai is lower than that seen in Indians in Singapore and in other women in areas of high incidence in the world [Fig. 6.15(a)]. Observation of the MAARs in the districts showed that Aizawl women had almost ten times the MAAR of women in Mumbai [Fig. 6.15(b)]. Imphal West and East in Mizoram State and South Goa had much higher MAARs than that seen in Mumbai.

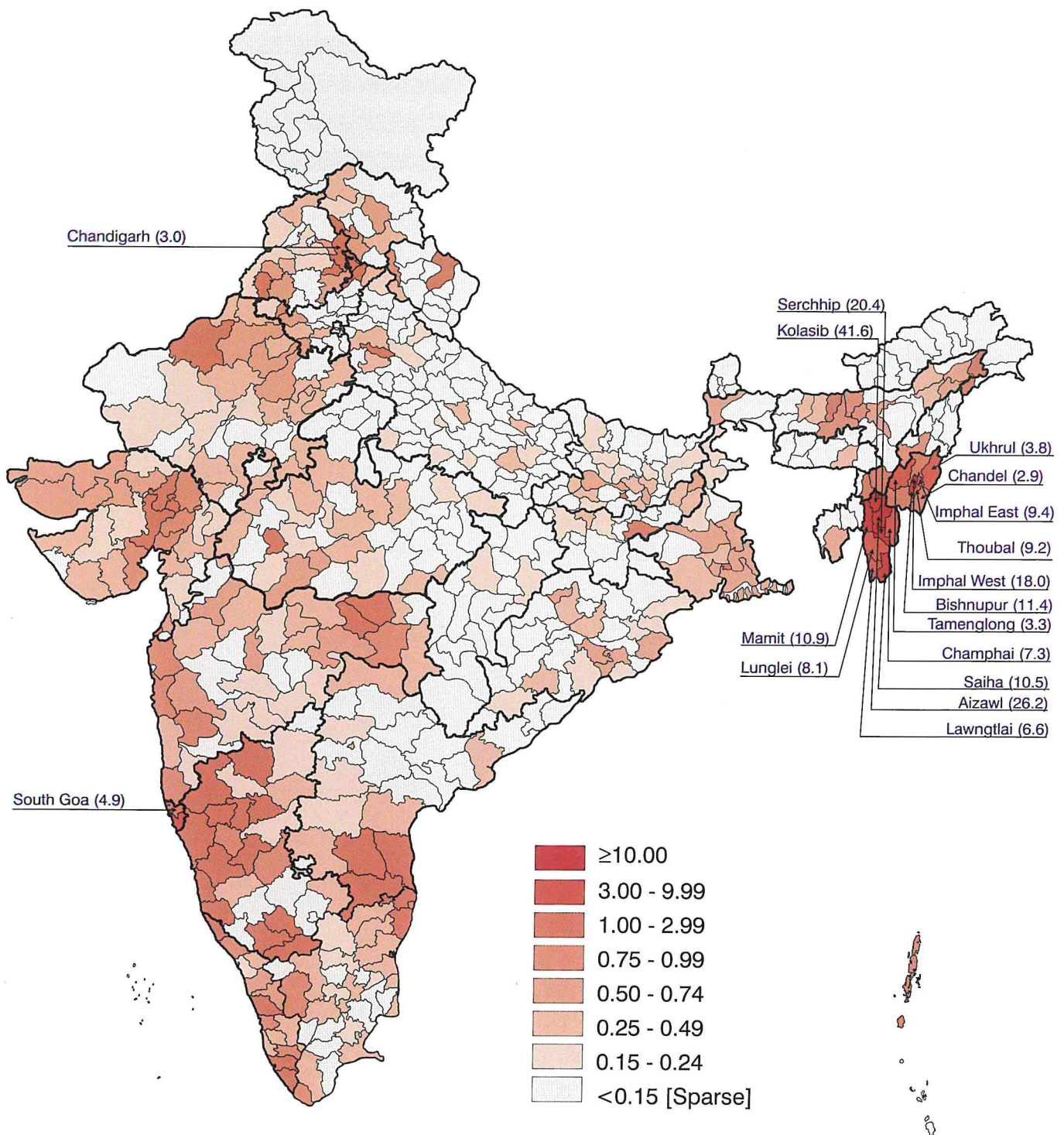
**FIGURE 6.15(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Lung (ICD-10 : C33 - C34) – Females**



**FIGURE 6.15(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Lung (ICD-10 : C33 - C34) – Females**



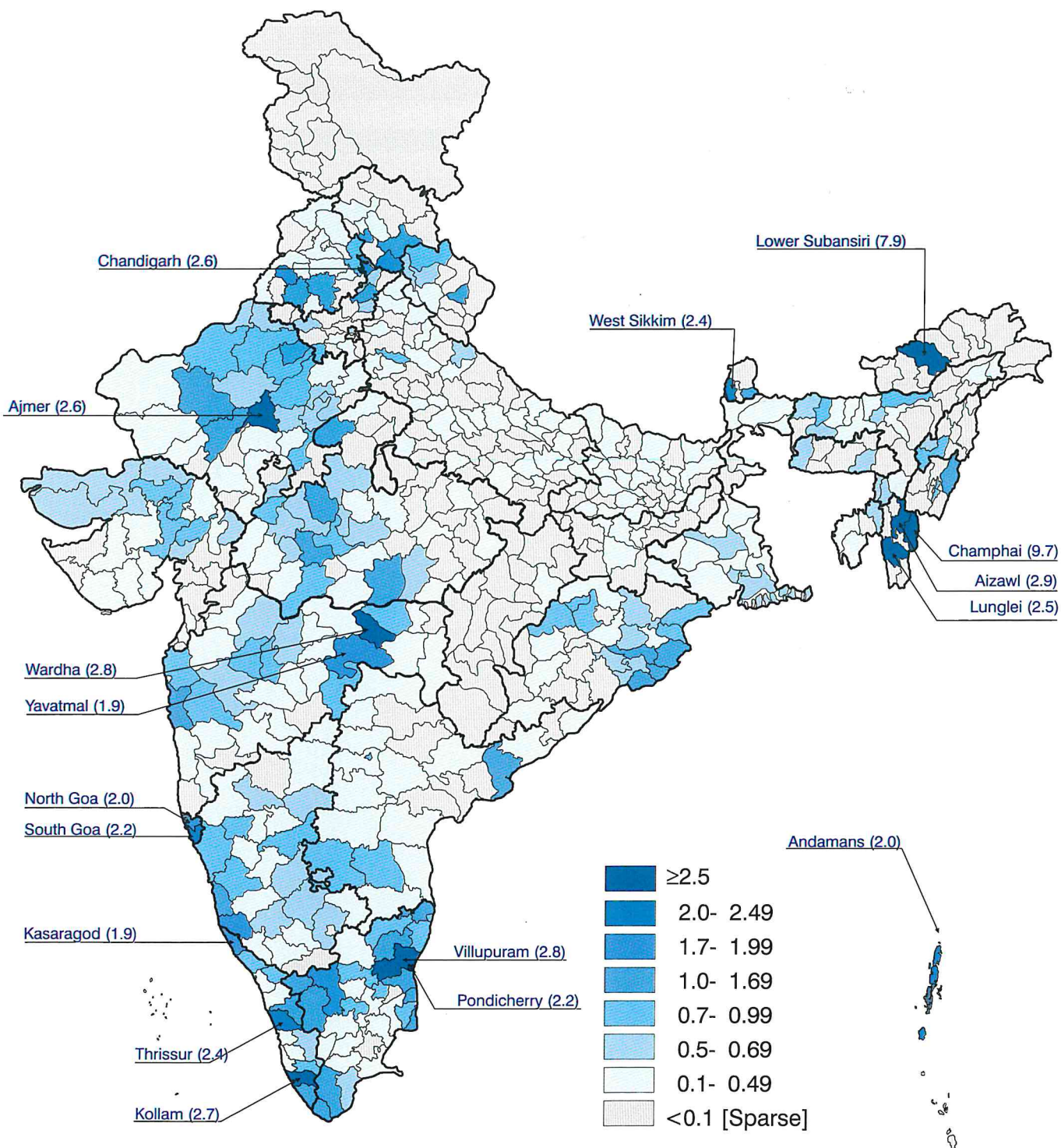
**MAP 6.15 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Lung (ICD-10 : C33 - C34) 2001 - 2002 – Females**



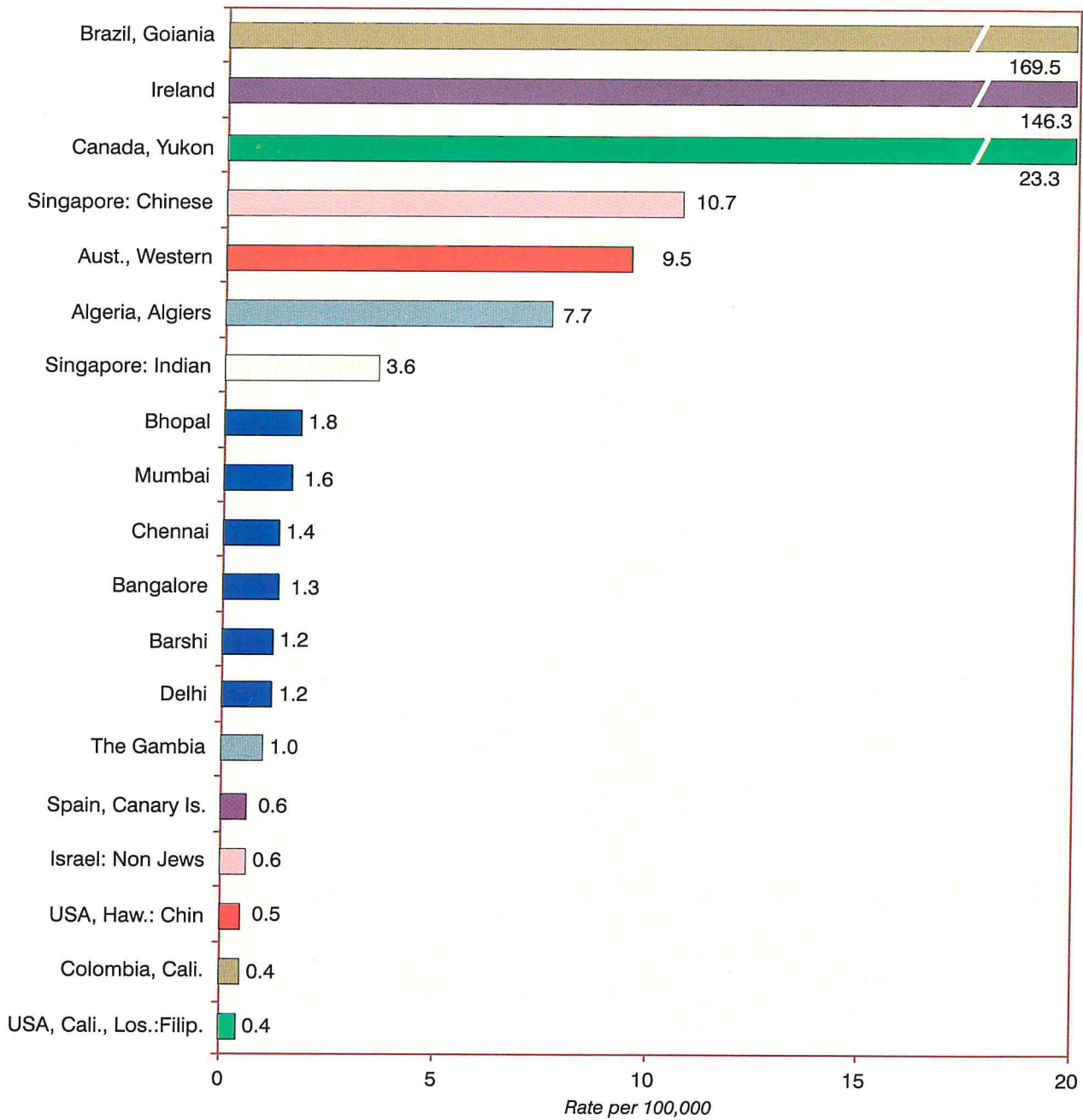
## 6.16. OTHER SKIN (ICD-10 : C44) – MALES

There was a relatively higher incidence of these cancers in some of the districts of Rajasthan (Ajmer), Kerala (Thrissur) and Tamil Nadu (Villupuram) states in both males and females. [Fig. 6.16(b) & Fig. 6.17(b) ].

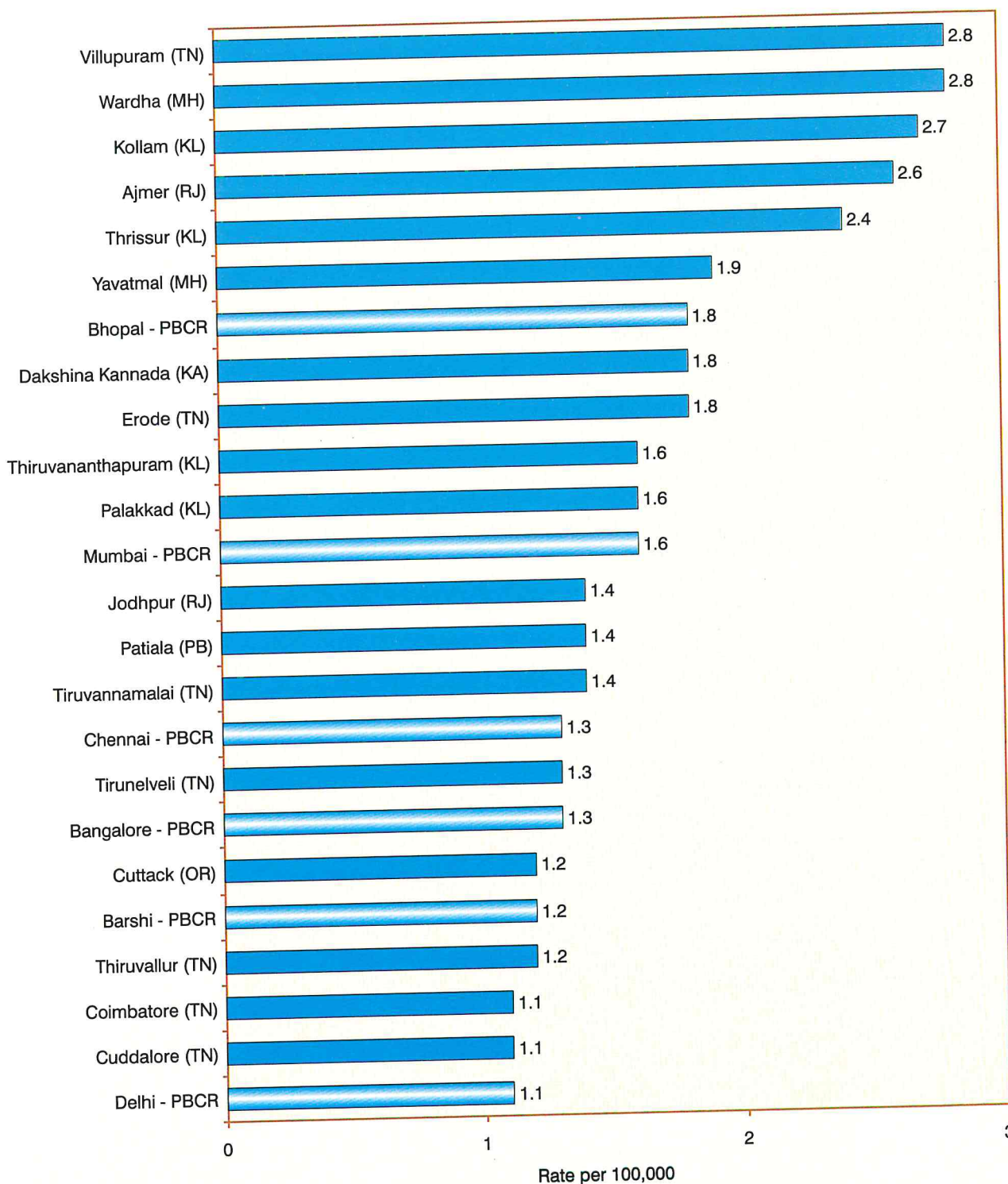
**MAP 6.16 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Other Skin (ICD-10 : C44) 2001 - 2002 – Males**



**FIGURE 6.16(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Other Skin (ICD-10 : C44) – Males**

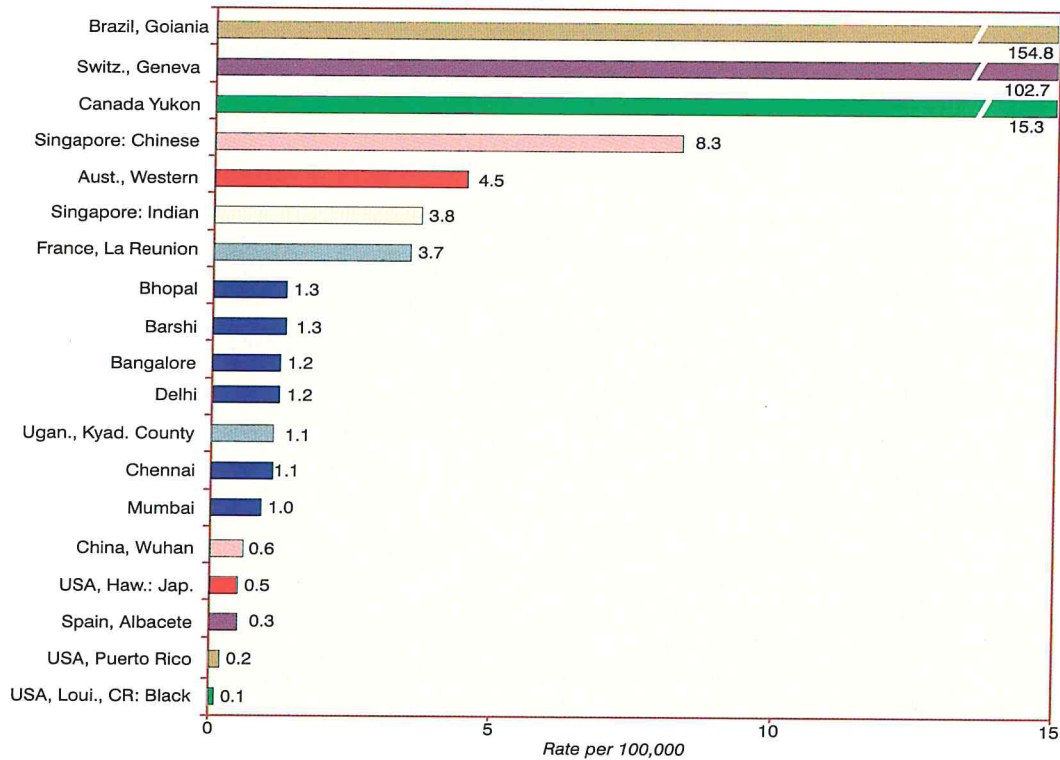


**FIGURE 6.16(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Other Skin (ICD-10 : C44) – Males**

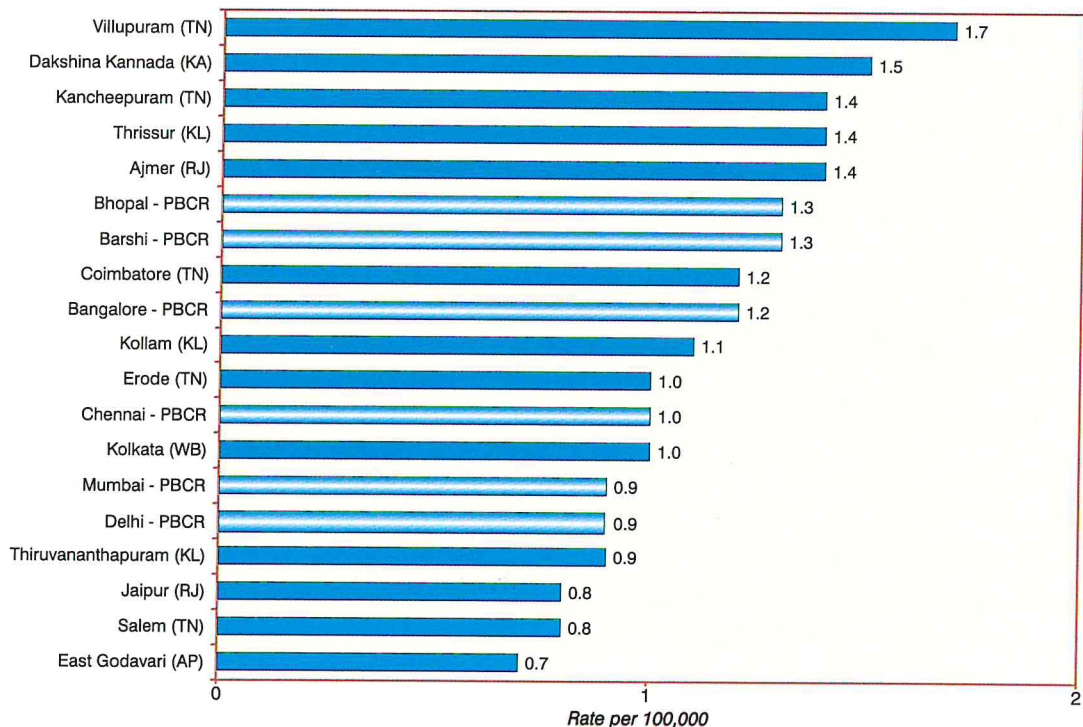


## 6.17. OTHER SKIN (ICD-10 : C44) – FEMALES

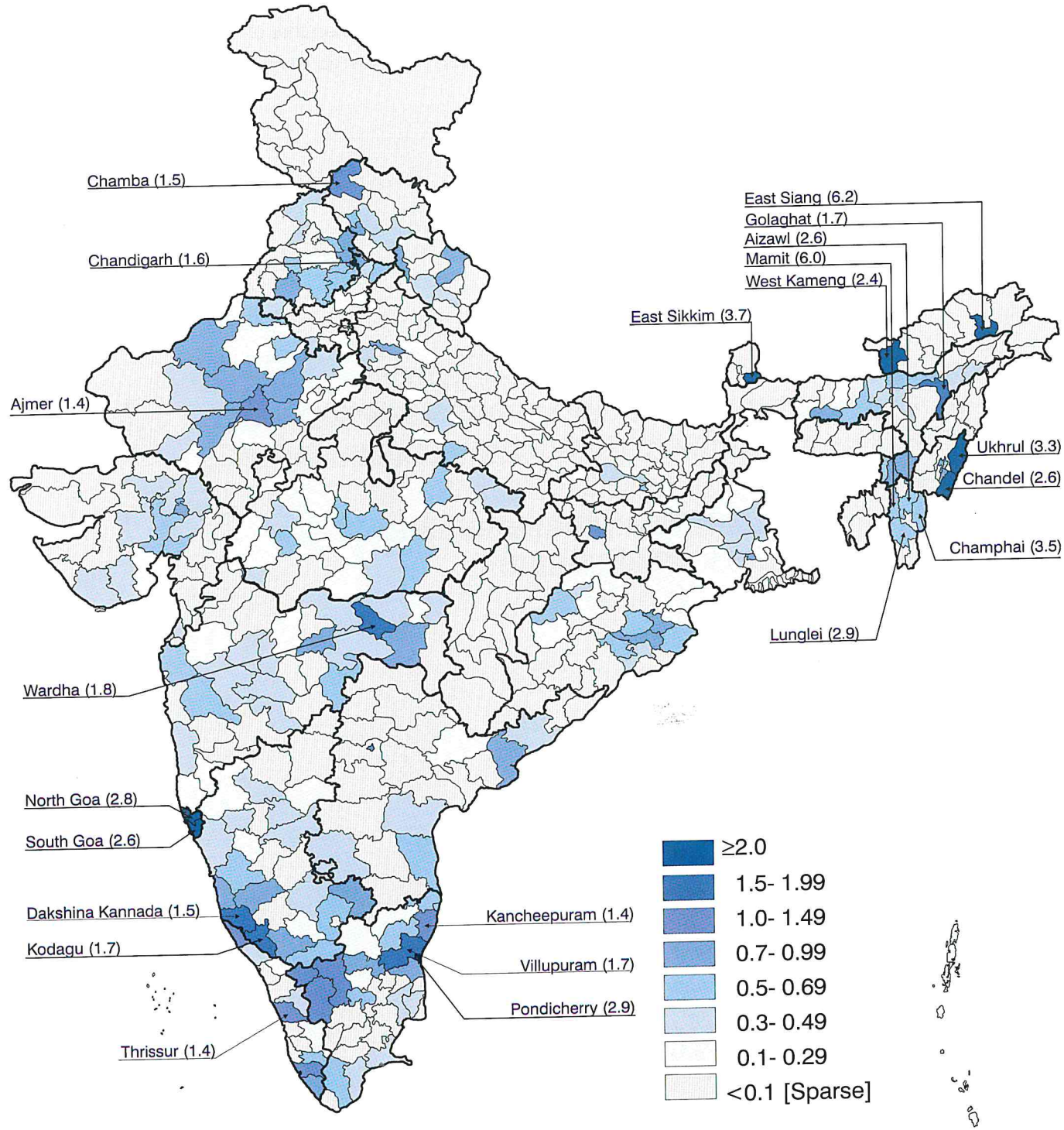
**FIGURE 6.17(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Other Skin (ICD-10 : C44) – Females**



**FIGURE 6.17(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Other Skin (ICD-10 : C44) – Females**



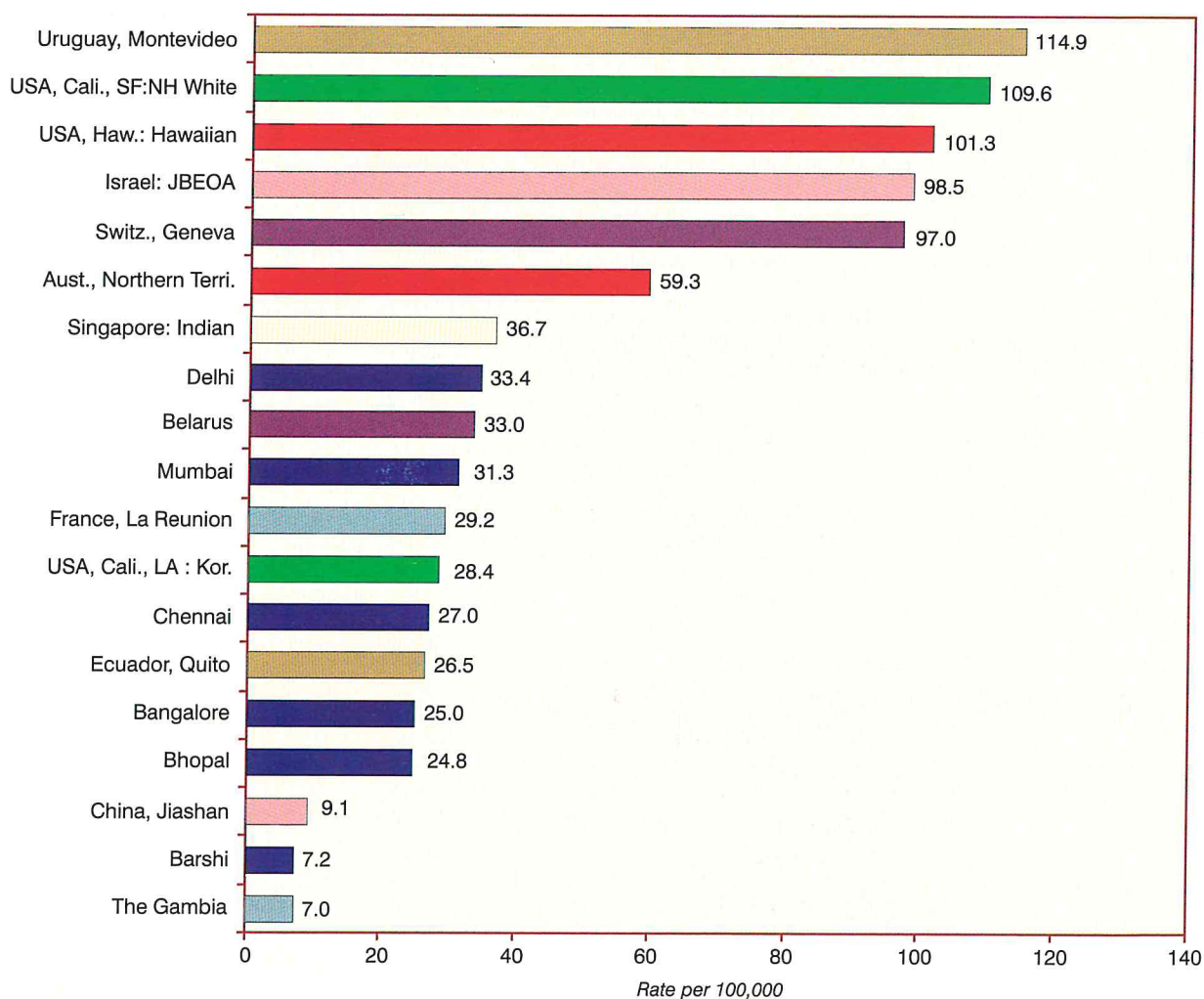
**MAP 6.17 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000  
Other Skin (ICD-10 : C44) 2001 - 2002 – Females**



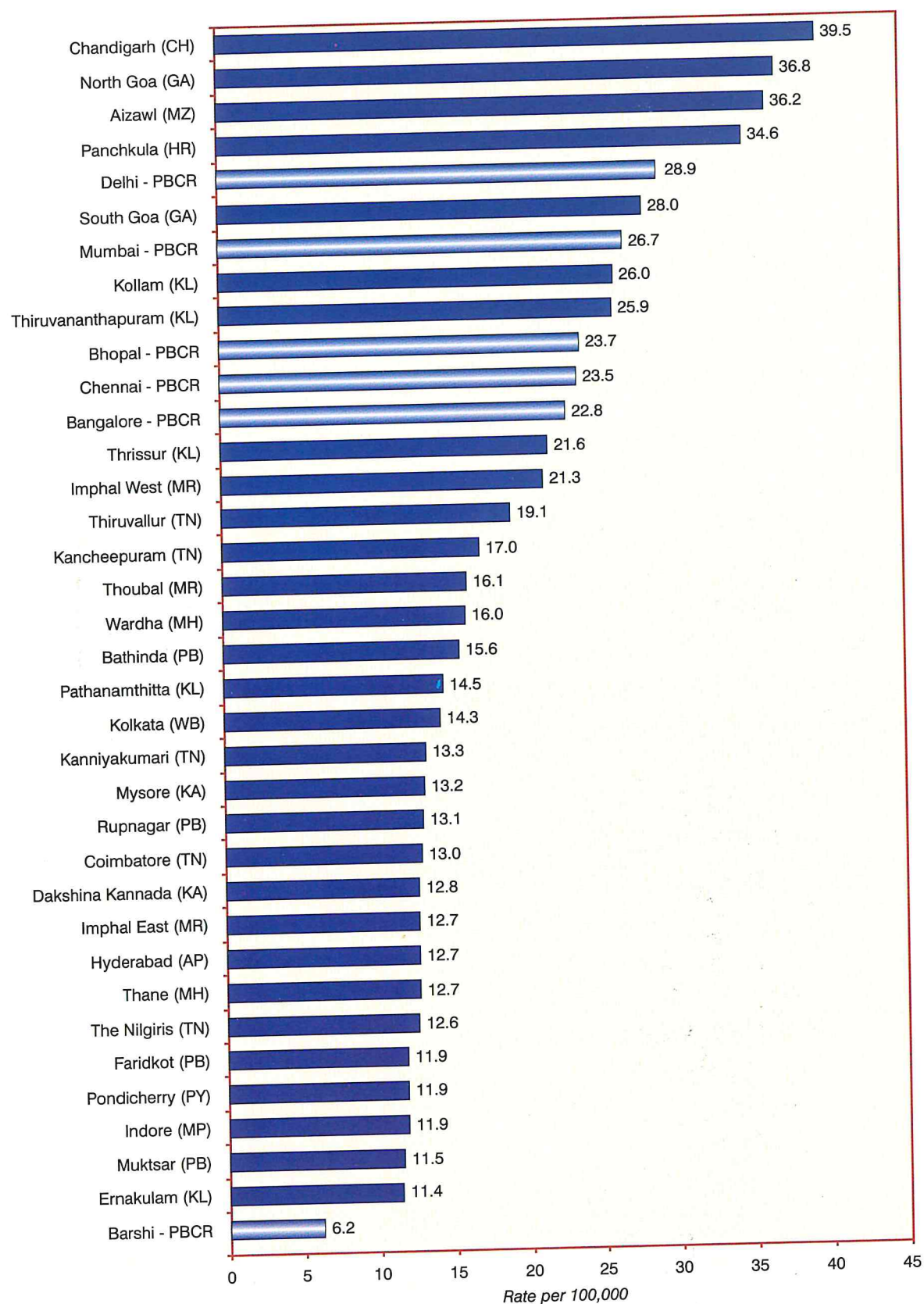
## 6.18. BREAST (ICD-10 : C50) – FEMALES

Cancer of the breast has replaced cancer of the cervix as the leading site of cancer in all urban PBCRs, except Chennai and the AARs of this site of cancer have also been on the rise. Nonetheless, the AARs in several western countries are much higher than that seen in the Indian registries. Among the Indian PBCRs, Delhi had the highest AAR of breast cancer [Fig. 6.18(a)]. Fig 6.18(b) shows that at least four districts led by Chandigarh (followed by North Goa, Aizawl in Mizoram State and Panchkula in Haryana State) had higher MAAR than that of Delhi. The rates were also comparable in three districts (Kollam, Thiruvananthapuram, Thrissur) in Kerala State and in the district of South Goa.

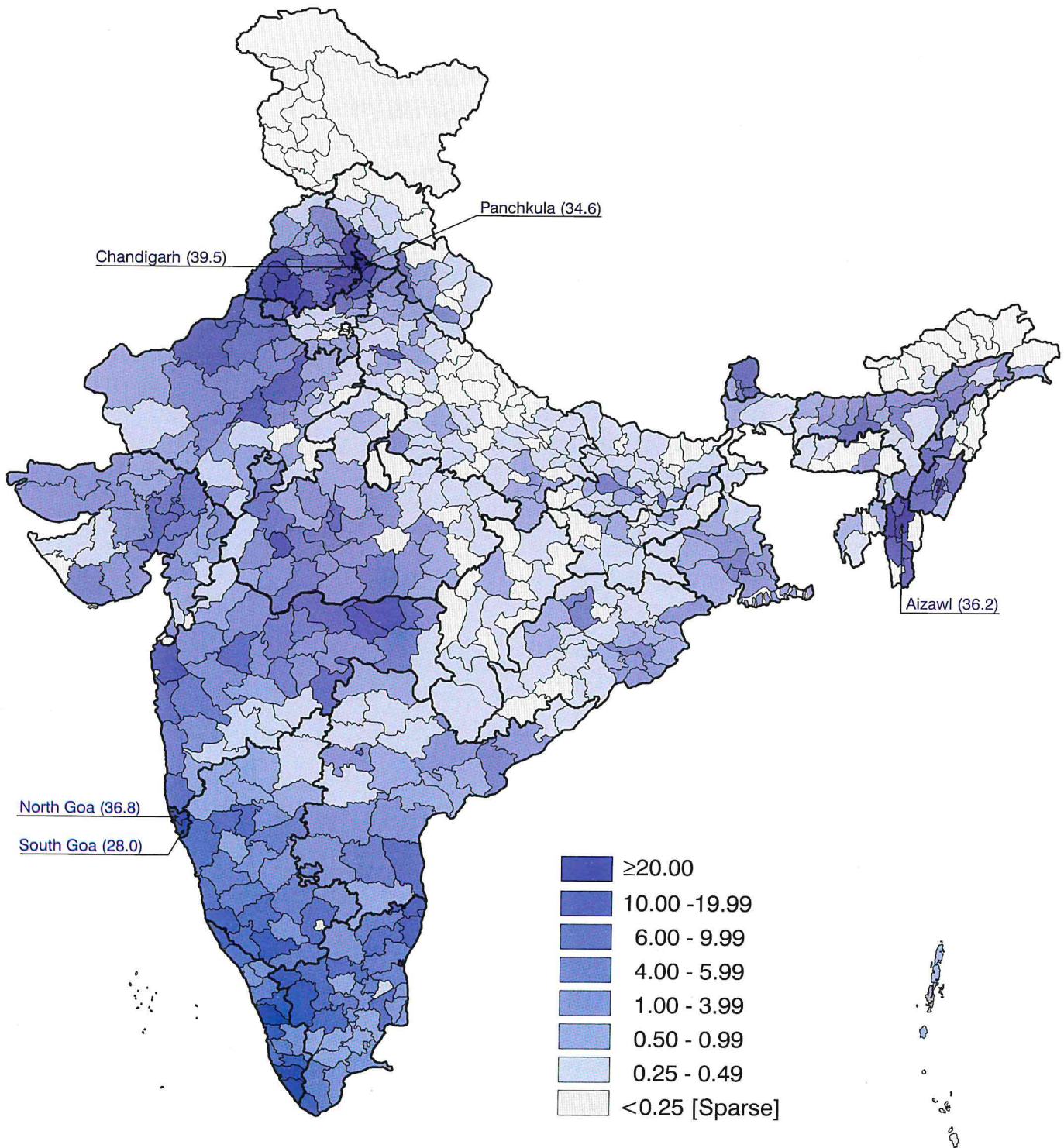
**FIGURE 6.18(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Breast (ICD-10 : C50) – Females**



**FIGURE 6.18(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Breast (ICD-10 : C50) – Females**



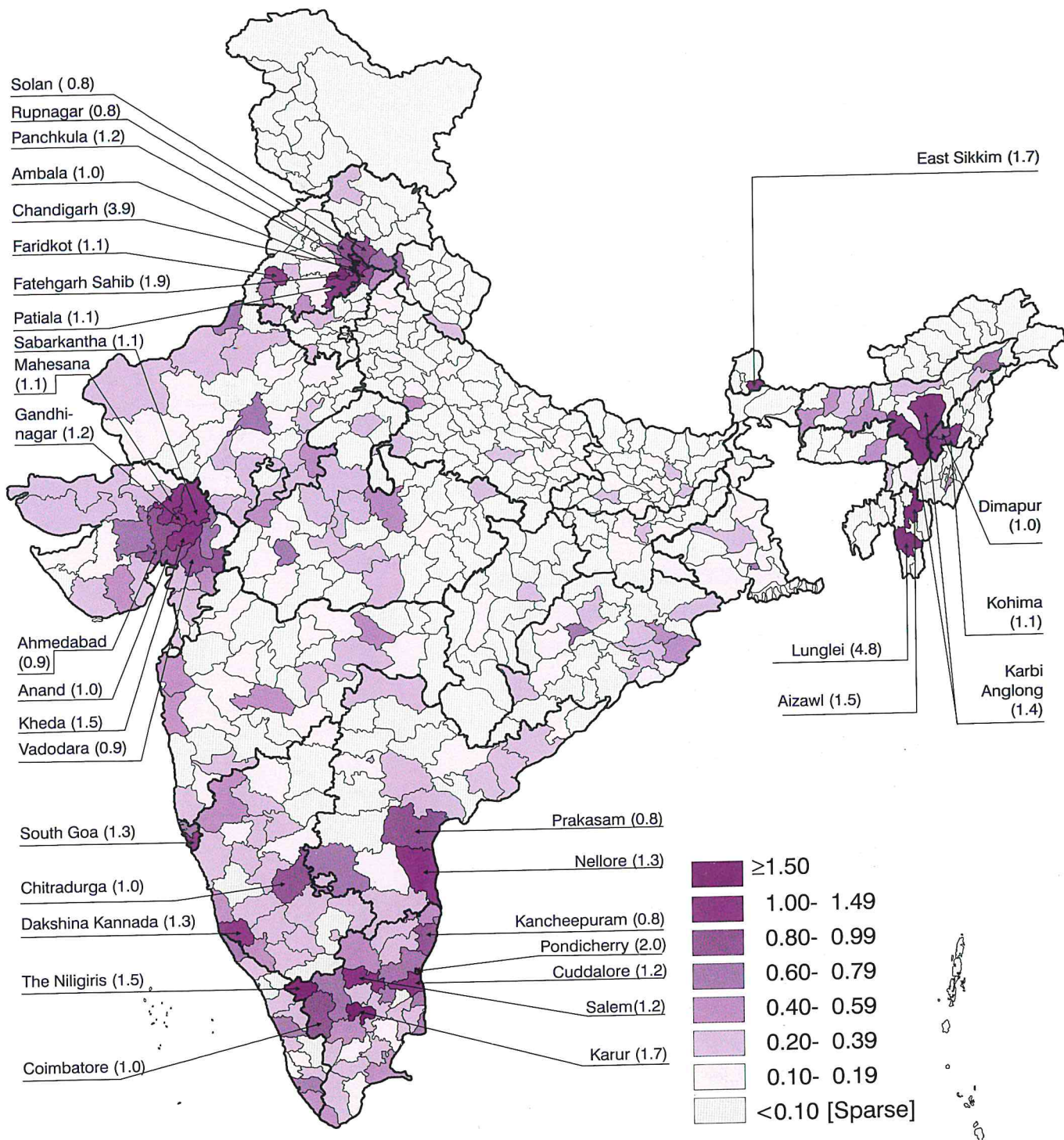
**MAP 6.18 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Breast (ICD-10 : C50) 2001 - 2002 – Females**



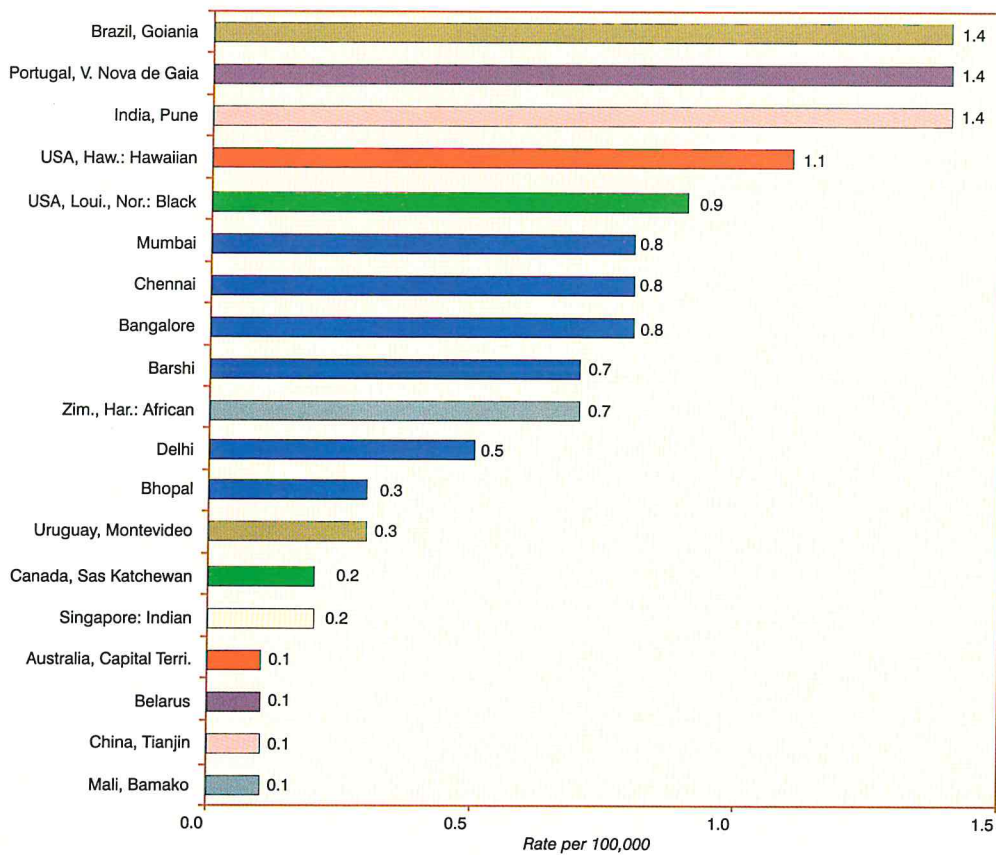
## 6.19. VAGINA (ICD-10 : C52)

In three districts each in Gujarat and Tamil Nadu states and in Nellore district of Andhra Pradesh State, the incidence of cancer of the vagina was relatively high. [Fig. 6.19(b)].

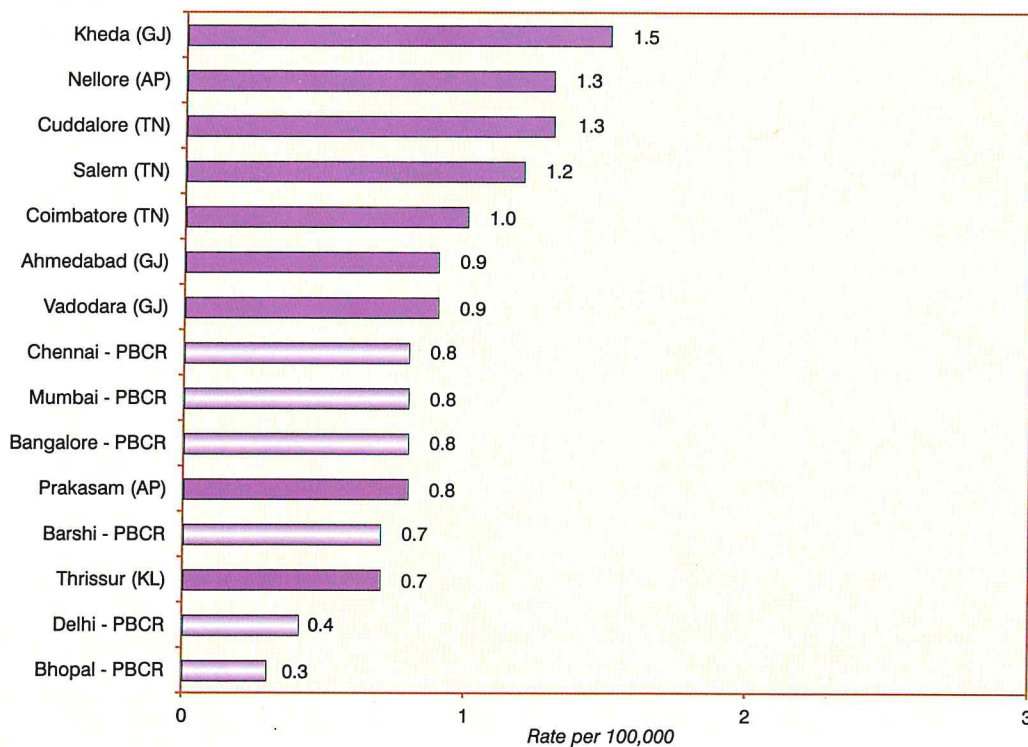
**MAP 6.19 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Vagina (ICD-10 : C52) 2001 - 2002**



**FIGURE 6.19(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Vagina (ICD-10 : C52)**



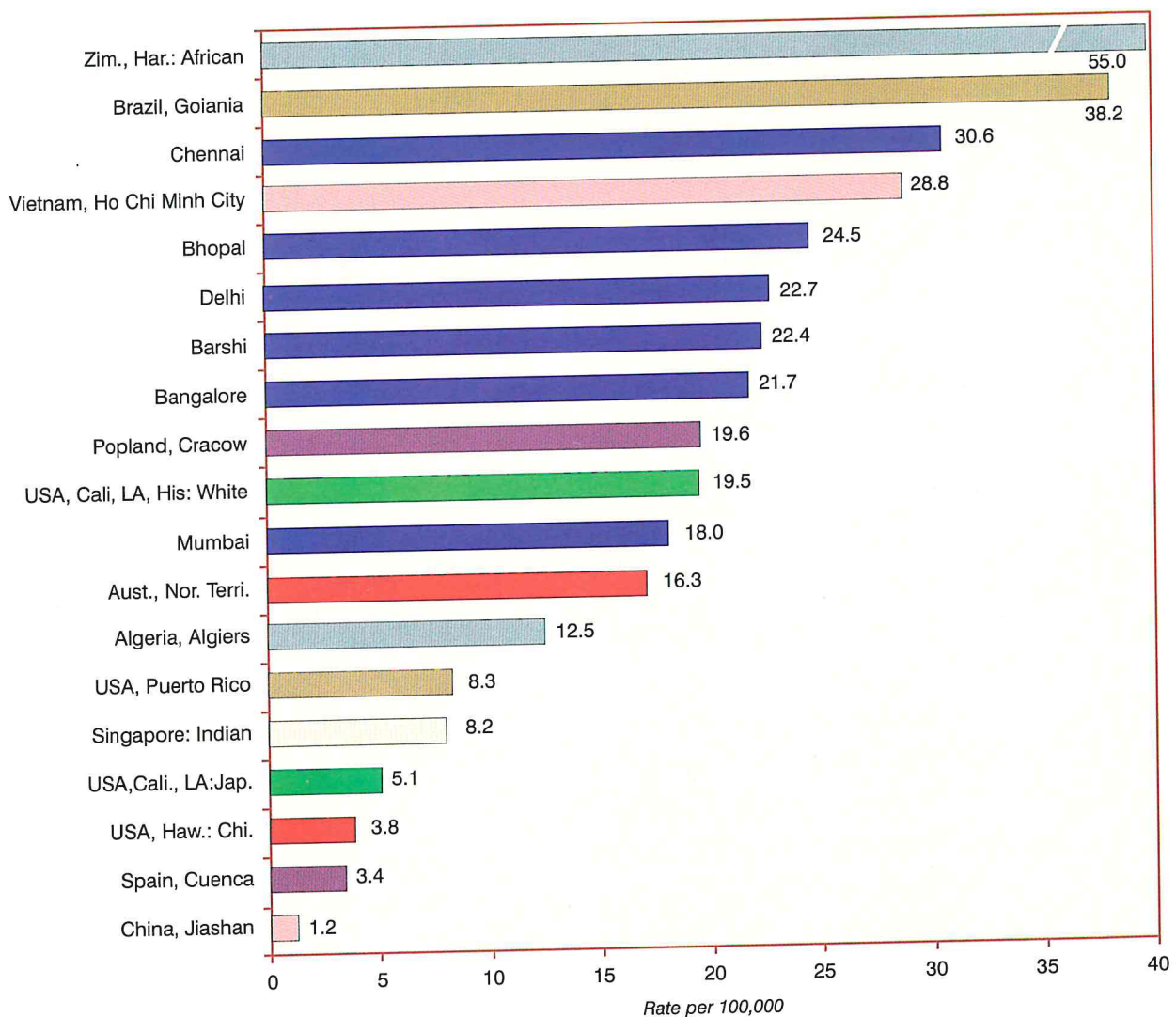
**FIGURE 6.19(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Vagina (ICD-10 : C52)**



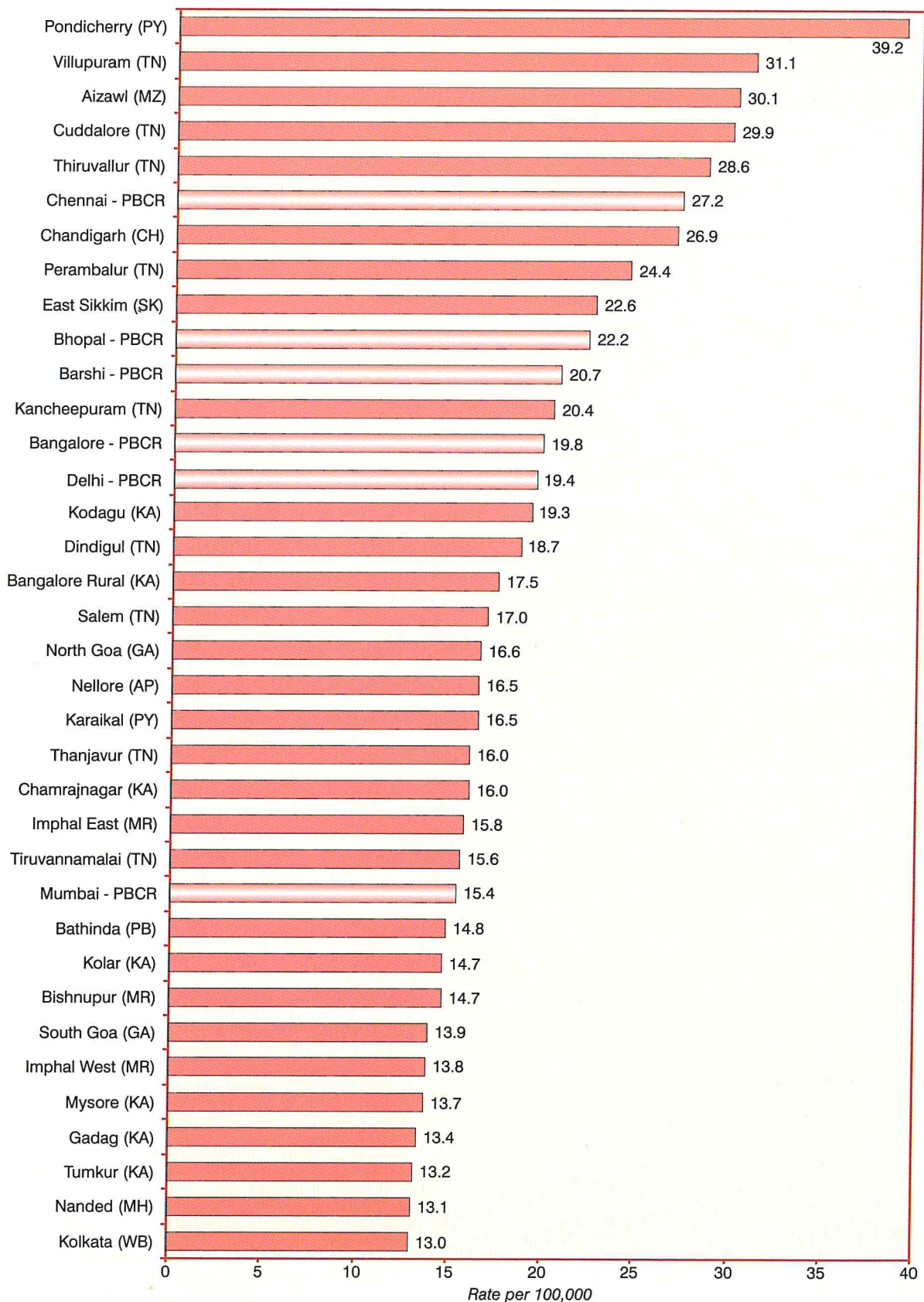
## 6.20. CERVIX UTERI (ICD-10 : C53)

Chennai PBCR has had the highest incidence rate of cervical cancer among the Indian PBCRs. This AAR is somewhat lower than that seen in the registries in Africa and Brazil [Fig. 6.20(a)] (Parkin et al, 2002). The district-wise MAARs indicate a belt of high incidence rates even higher than that in Chennai PBCR, in the North Eastern districts of Tamil Nadu State including Pondicherry which had the highest MAAR of 39.2/100,000 [Fig. 6.20(b)].

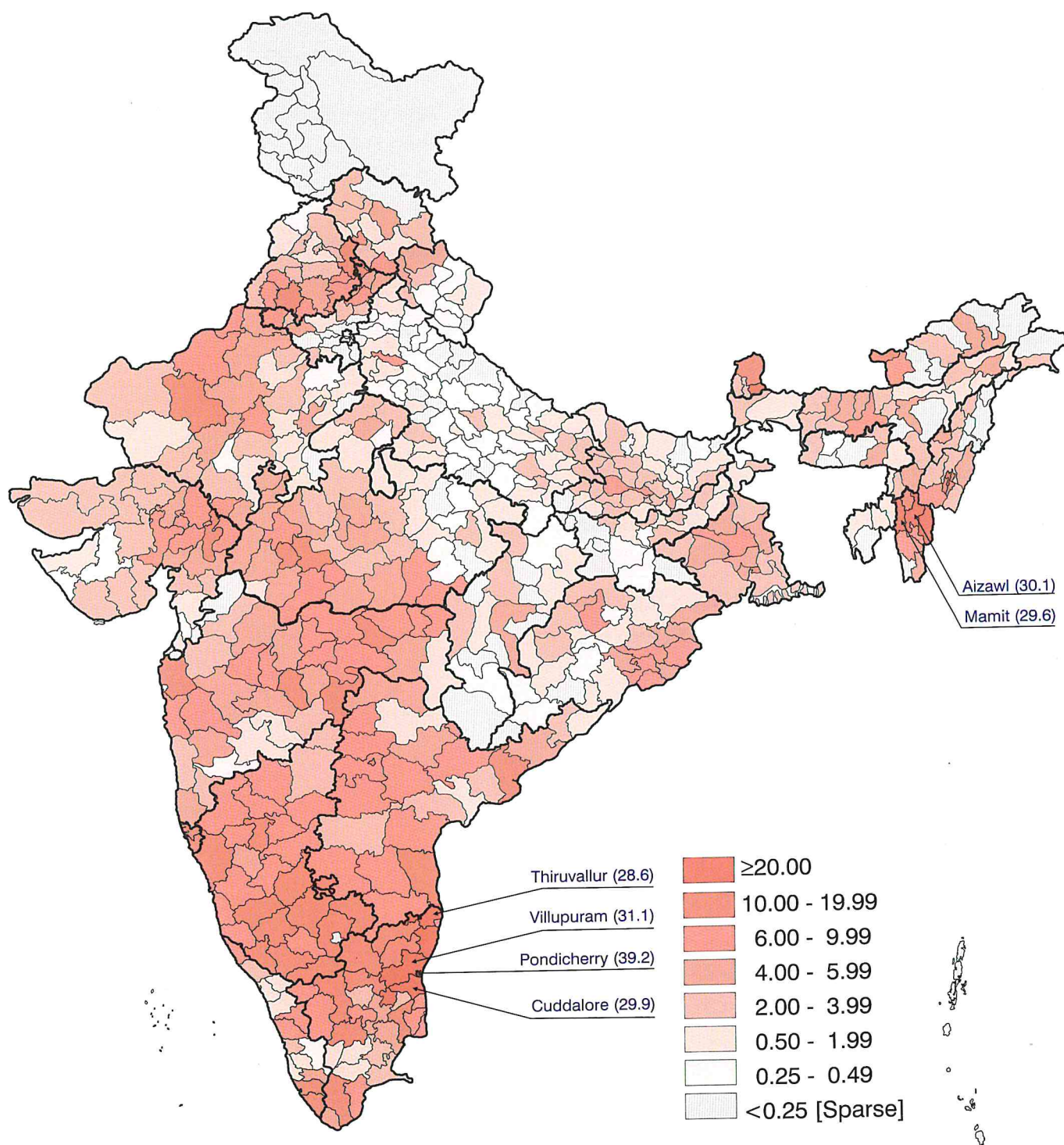
**FIGURE 6.20(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Cervix Uteri (ICD-10 : C53)**



**FIGURE 6.20(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Cervix Uteri (ICD-10 : C53)**



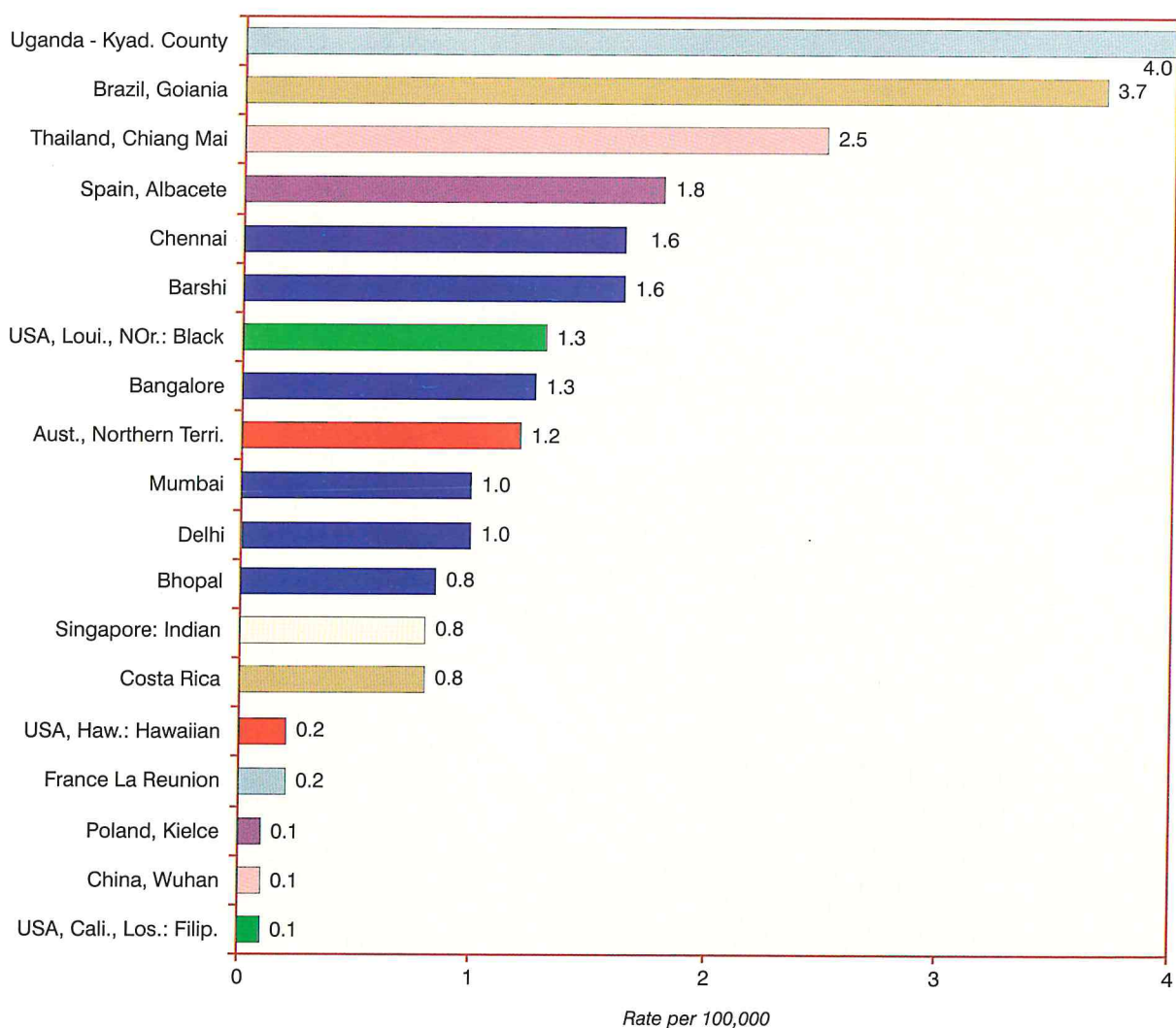
**MAP 6.20 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000  
Cervix Uteri (ICD-10 : C53) 2001 - 2002**



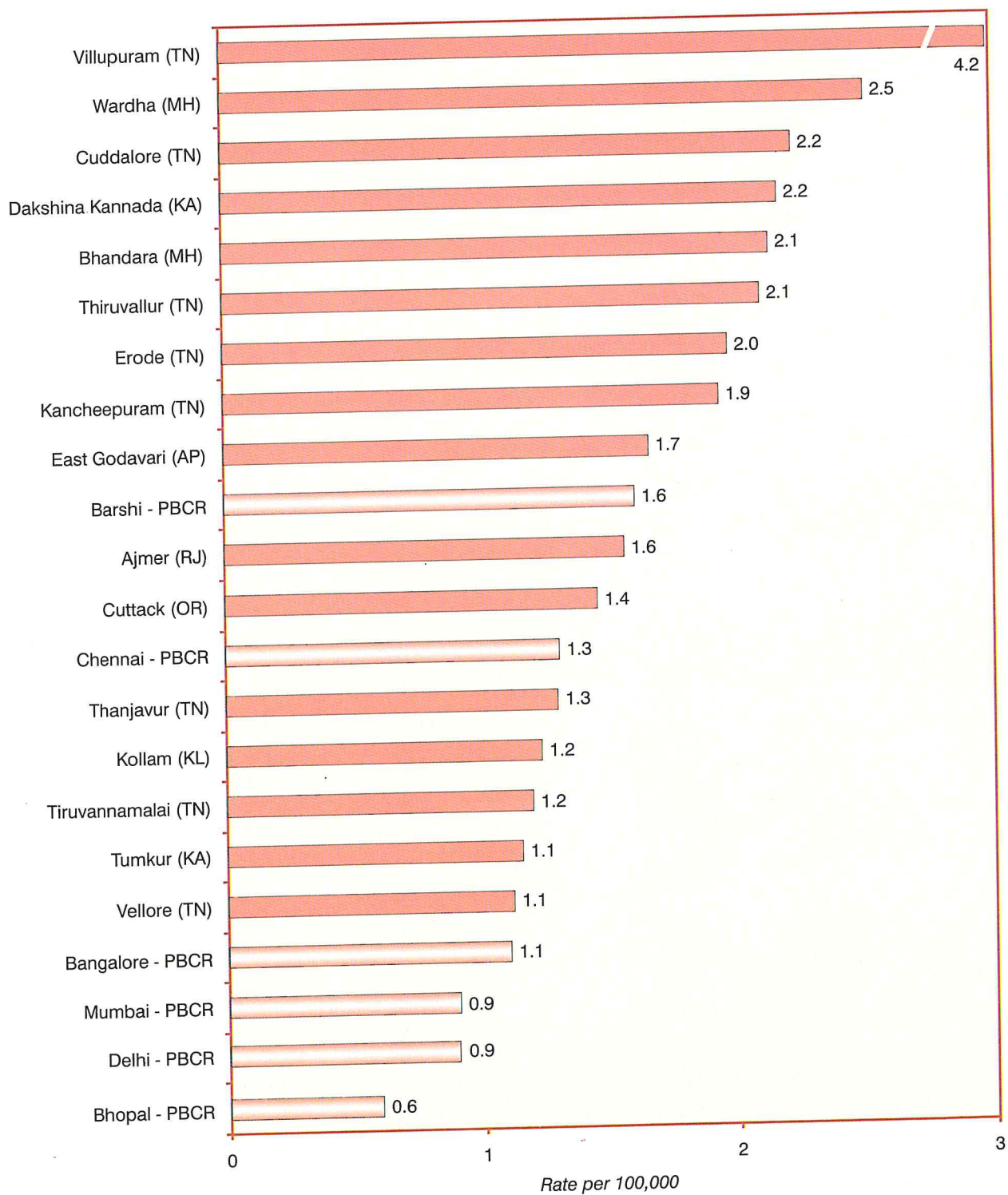
## 6.21. PENIS (ICD-10 : C60)

In the Indian PBCRs penile cancer has been high in Chennai and Barshi but lower than the highest AAR of 4.0/100,000 in Kyadondo in Uganda - Africa [Fig. 6.21 (a)] (Parkin et al, 2002). Like for cancer cervix a concentration of high incidence penile cancer is seen in the north eastern districts of Tamil Nadu State and Villupuram district had a MAAR of 3.1.

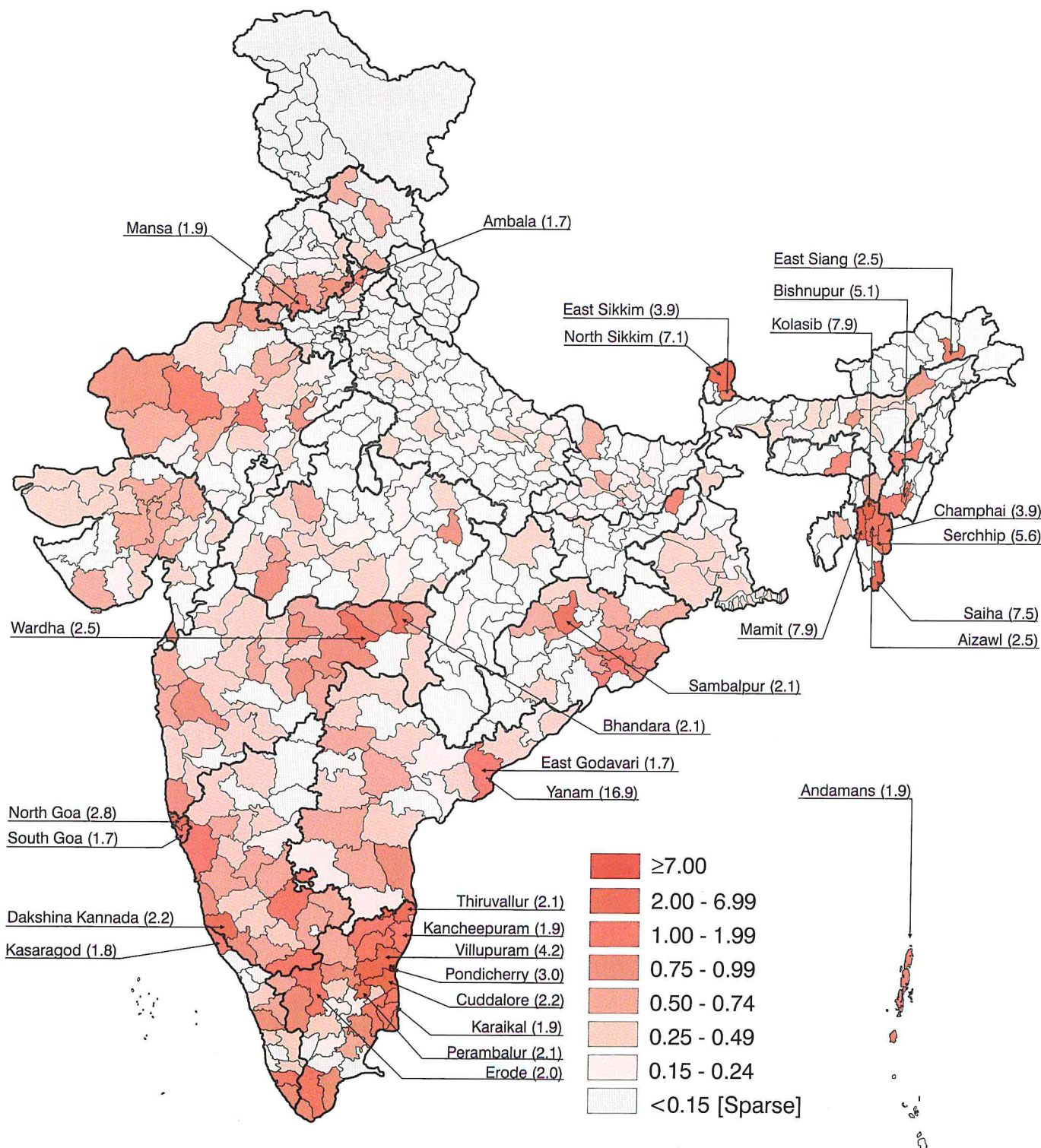
**FIGURE 6.21(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Penis (ICD-10 : C60)**



**FIGURE 6.21(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Penis (ICD-10 : C60)**



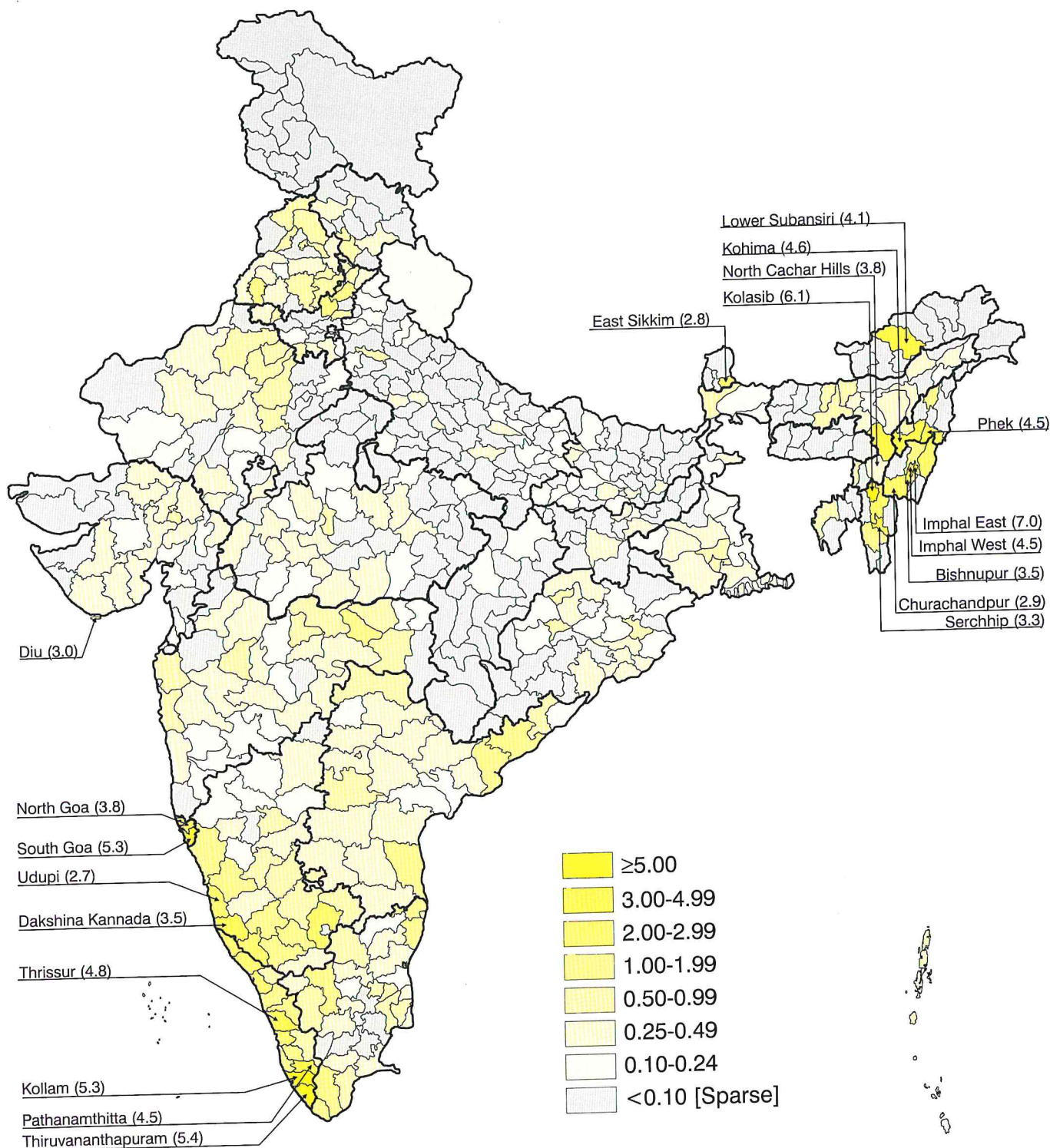
**MAP 6.21 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Penis (ICD-10 : C60) 2001 - 2002**



## 6.22. THYROID (ICD-10 : C73) - FEMALES

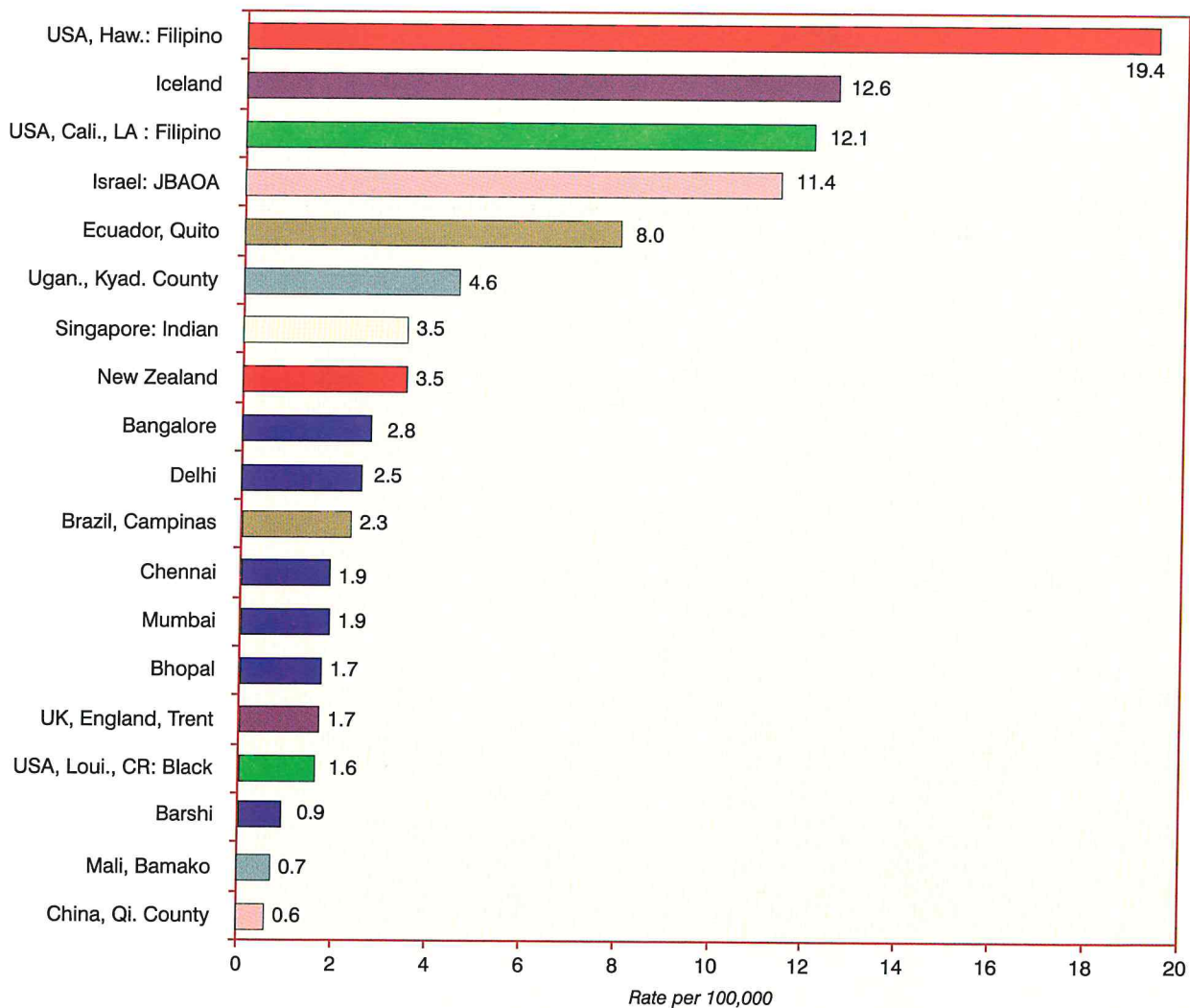
Of the PBCRs under NCRP, Bangalore PBCR has shown the highest AAR of cancer of the thyroid [Fig 6.22(a)]. The PBCR at Thiruvananthapuram has shown a high incidence of cancer of the thyroid where it was the third leading site

**MAP 6.22 : Districtwise Minimum Age Adjusted Incidence Rate Per 100,000 Thyroid (ICD-10 : C73) 2001 - 2002 – Females**

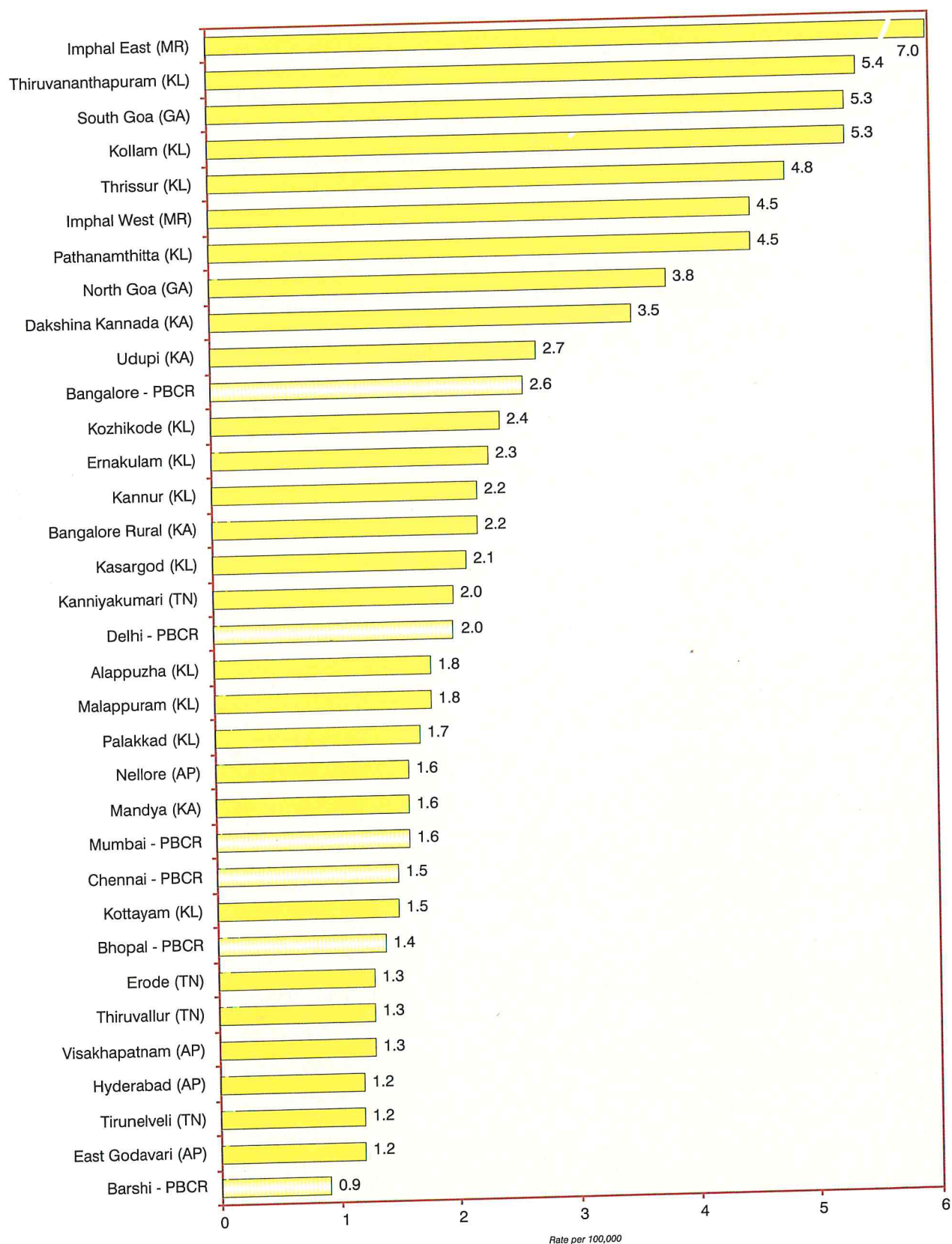


of cancer in women in that registry (Chapter 3 - Fig. 3.2). Similarly, the district-wise distribution shows a considerably higher MAAR than that of Bangalore. There seems to be a belt of high incidence from the southern tip of the country - Kanniyakumari in Tamil Nadu State along the coast of Kerala and Karnataka states extending on to South Goa [Fig. 6.22(b)].

**FIGURE 6.22(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Thyroid (ICD-10 : C73) – Females**



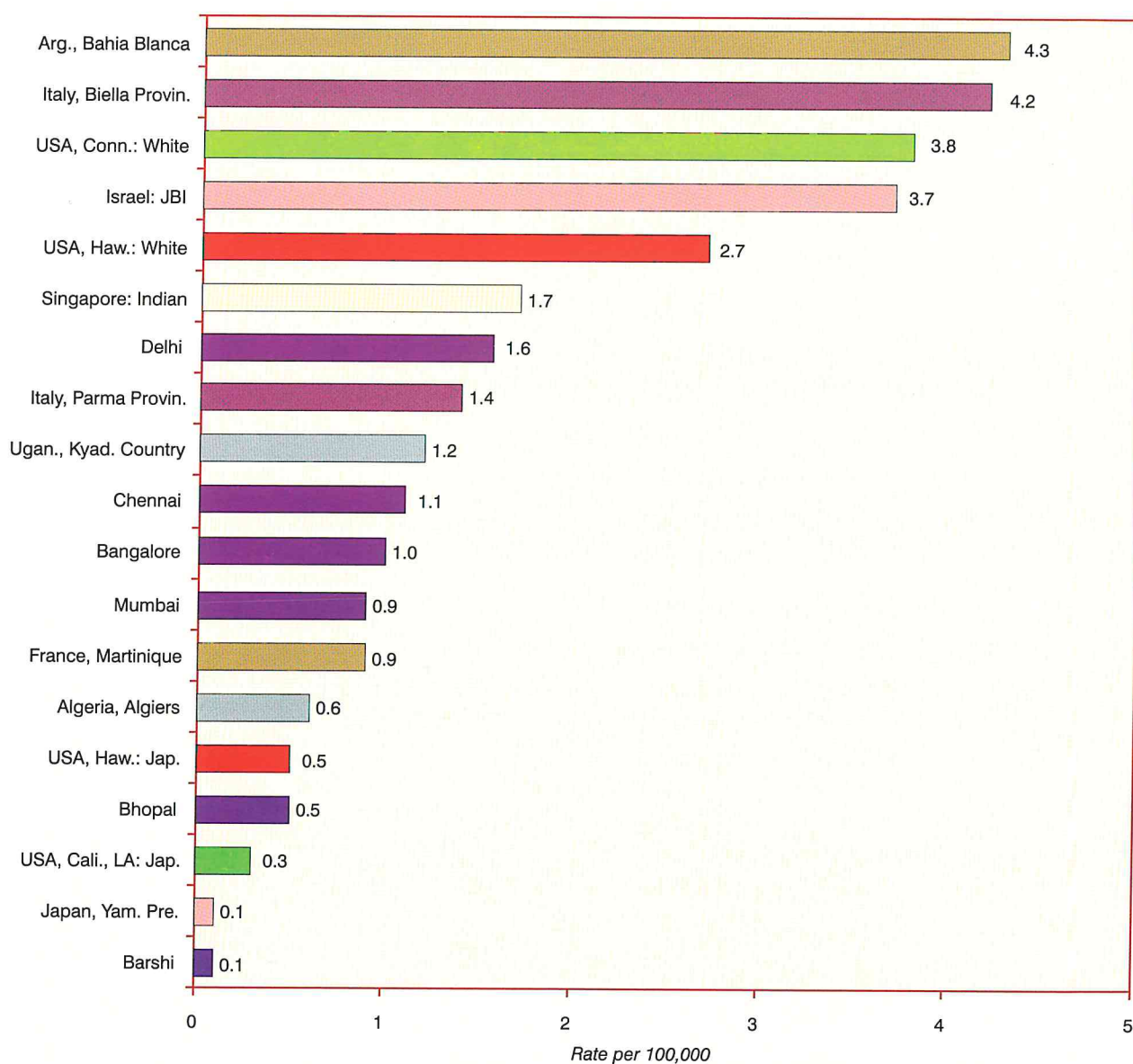
**FIGURE 6.22(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Thyroid (ICD-10 : C73) – Females**



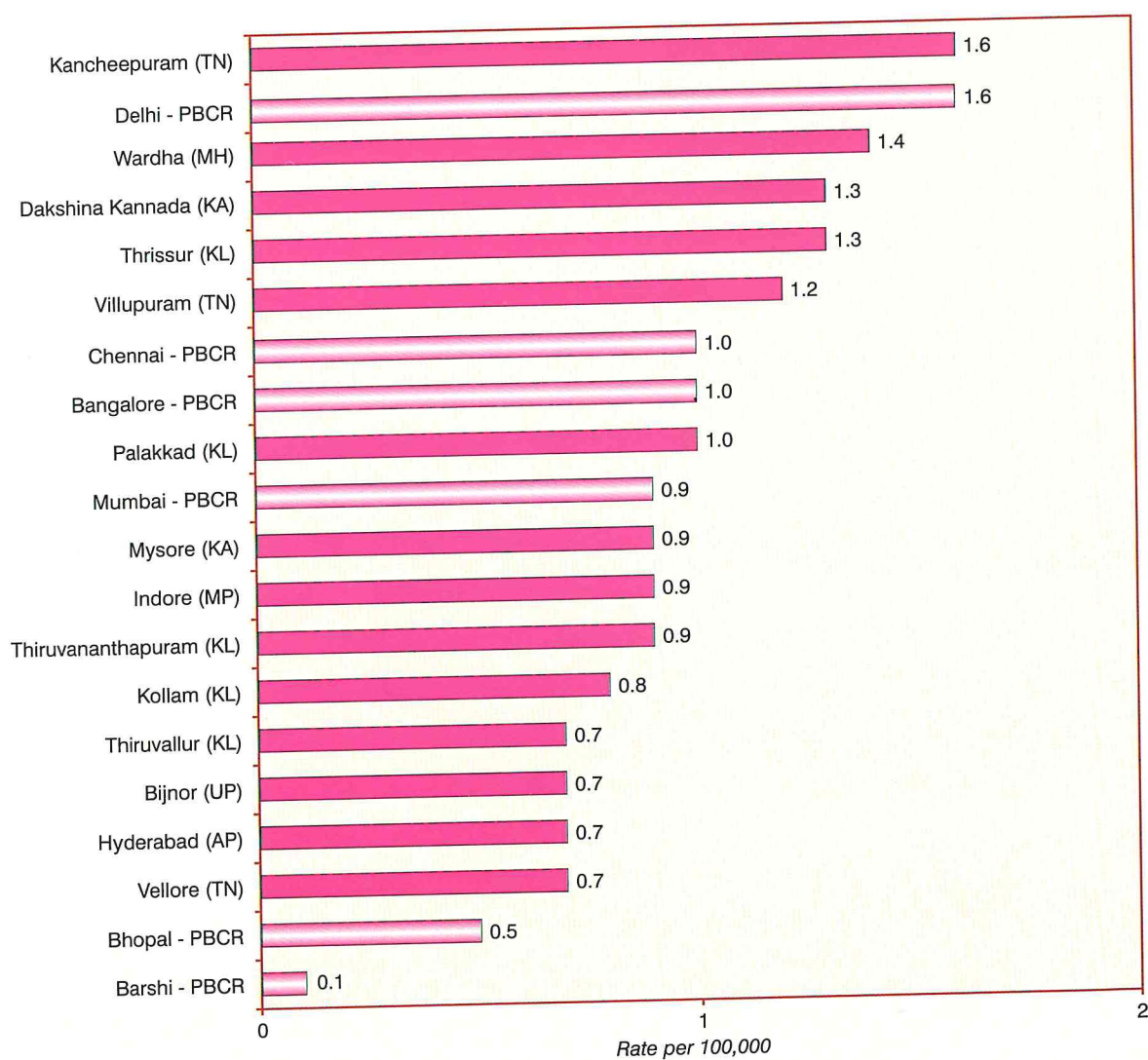
## 6.23. HODGKIN'S DISEASE (ICD-10 : C81) - MALES

Hodgkin's Disease showed a marginally higher MAAR in some districts without any geographical predominance. [Fig. 6.23(b)].

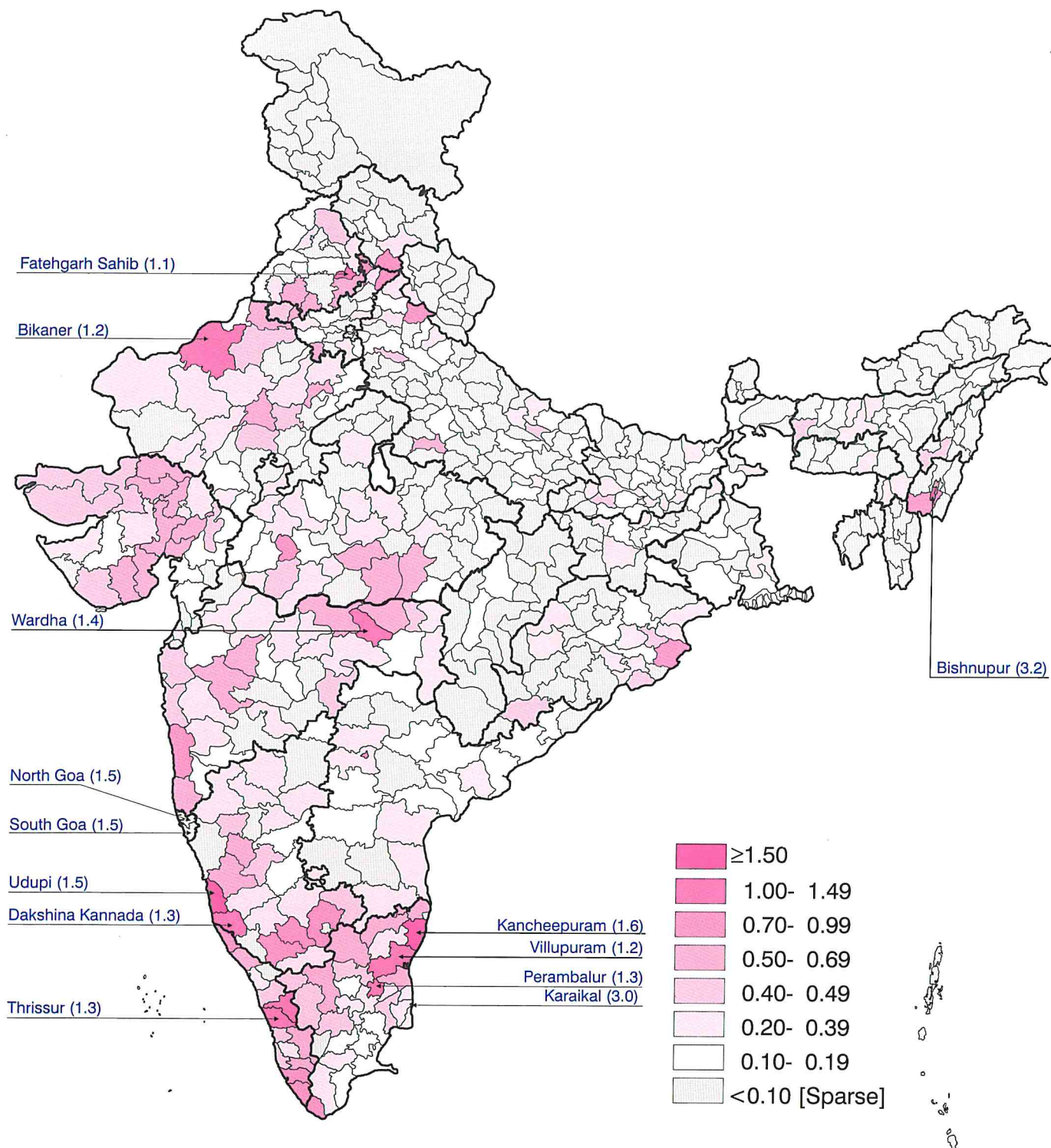
**FIGURE 6.23(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Hodgkin's Disease (ICD-10 : C81) – Males**



**FIGURE 6.23(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Hodgkin's Disease (ICD-10 : C81) – Males**



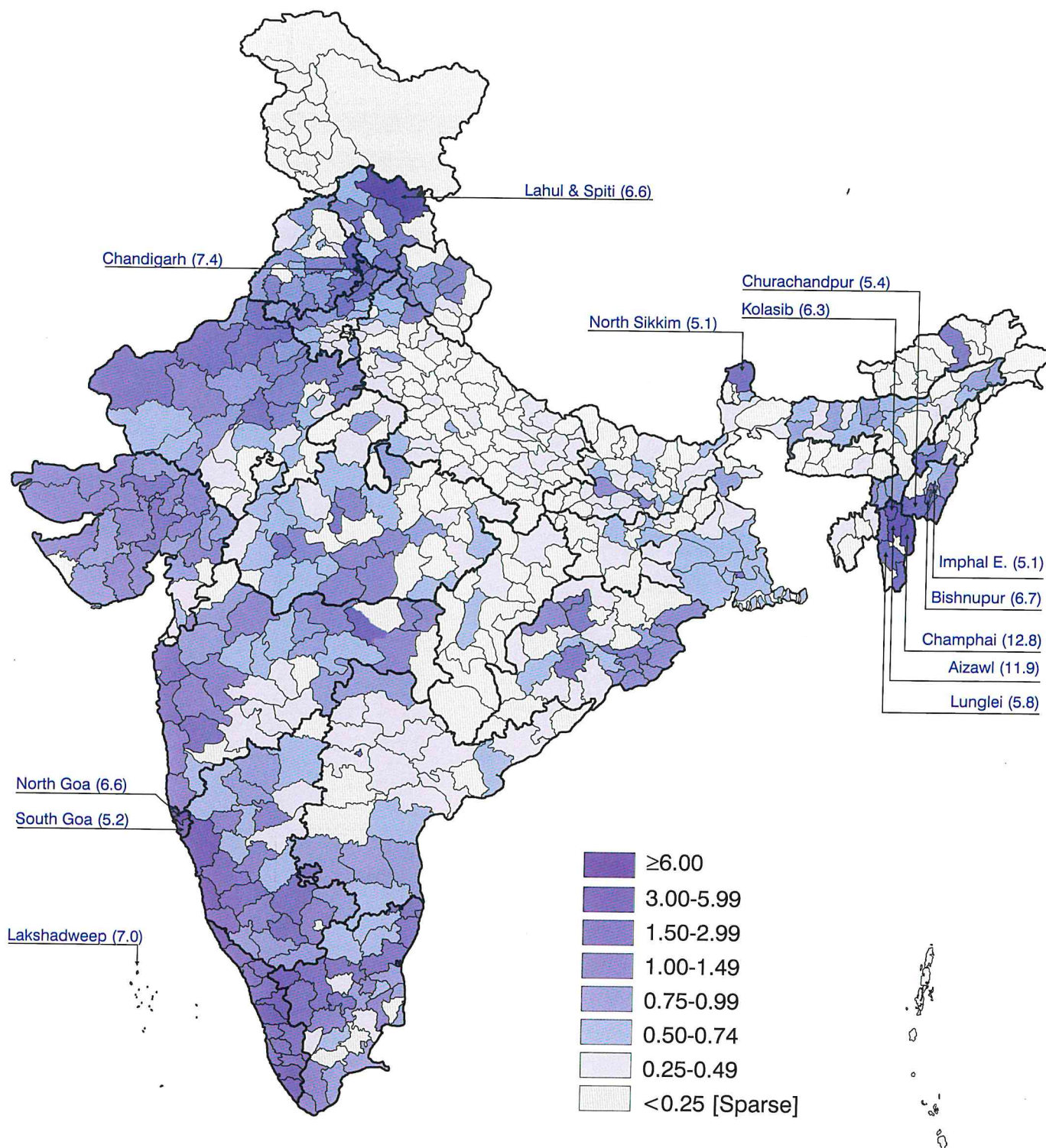
**MAP 6.23 :Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Hodgkin's Disease (ICD-10 : C81) 2001 - 2002 – Males**



## 6.24. NON-HODGKIN'S LYMPHOMA (ICD-10 : C82-C85, C96) - MALES

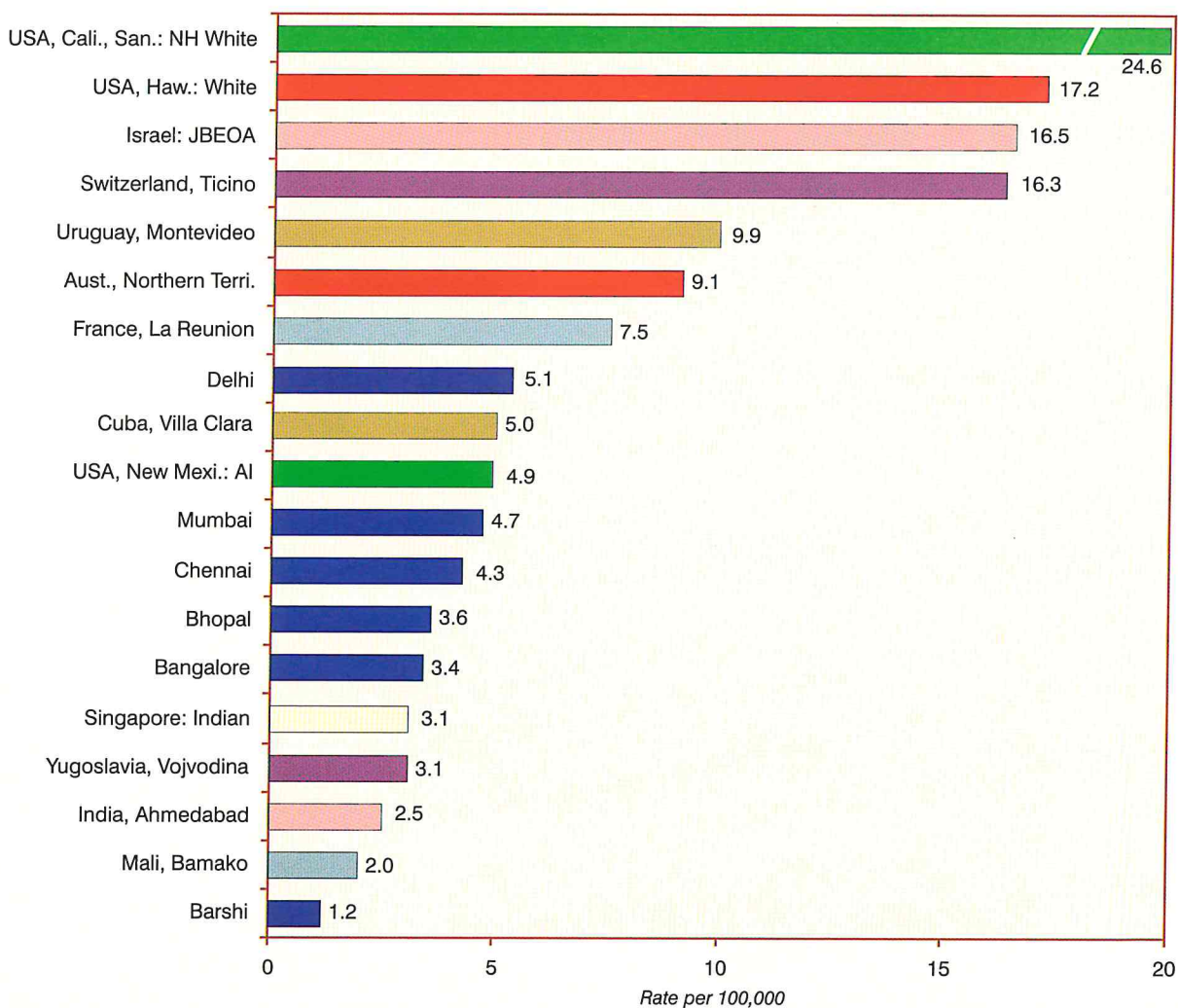
Non-Hodgkin's Lymphoma (NHL) has been an important leading site of cancer in the urban PBCRs, though the rates are somewhat lower than the highest rates of the world. Among Indian PBCRs Delhi had the highest rate of

**MAP 6.24 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000  
NHL (ICD-10 : C82-C85,C96) 2001 - 2002 - Males**

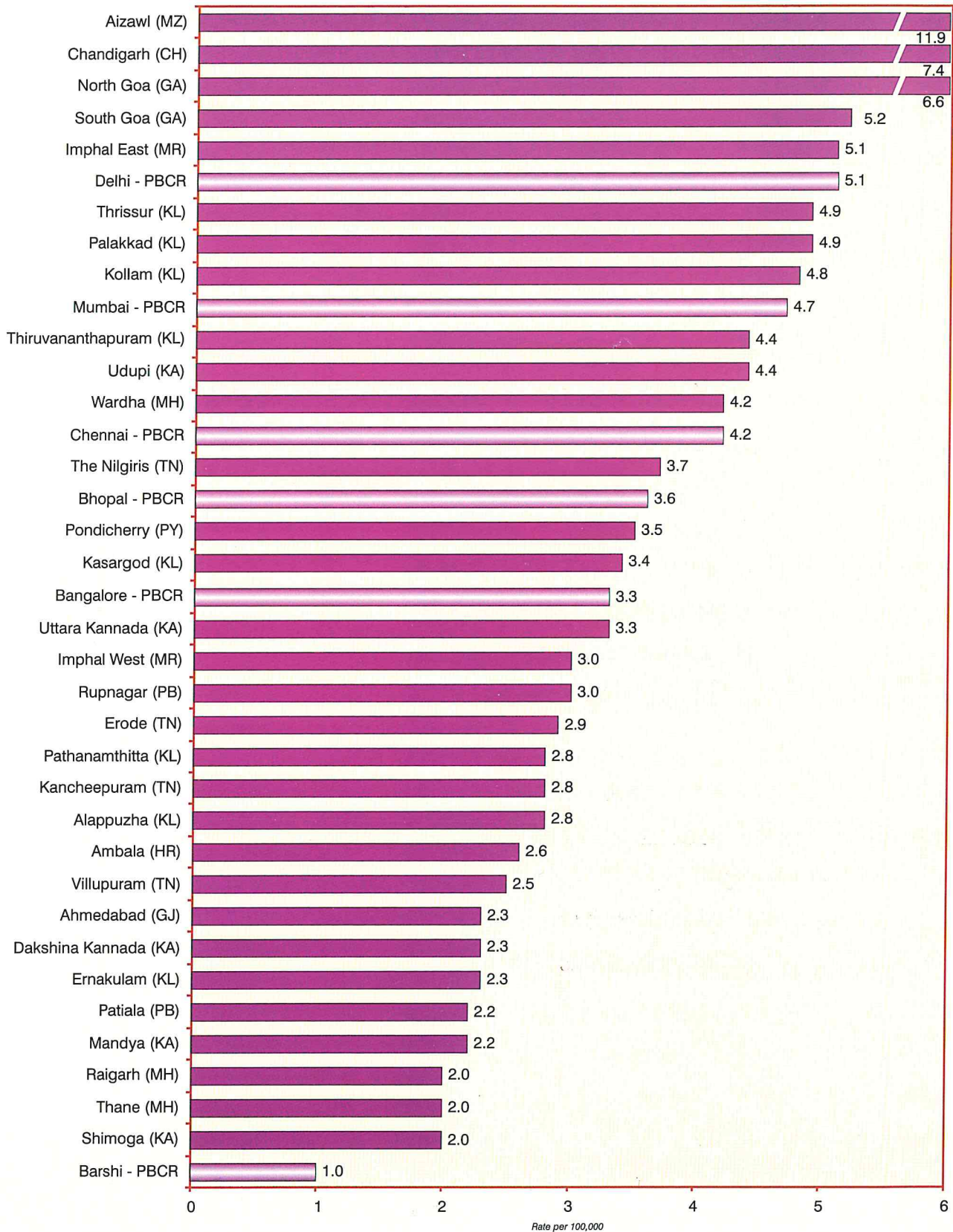


5.1/100,000. Mumbai and Chennai have had similar rates followed by Bhopal and Bangalore [Fig. 6.24(a)]. Since the basis of diagnosis of this site of cancer is microscopy (except in rare instances) there is little difference between the AAR and MAARs. The district-wise distribution showed that five districts had MAARs higher than that of Delhi [Fig. 6.24(b)] and at least nine other districts had rates comparable with the urban PBCRs.

**FIGURE 6.24(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — NHL (ICD-10 : C82-C85,C96) – Males**



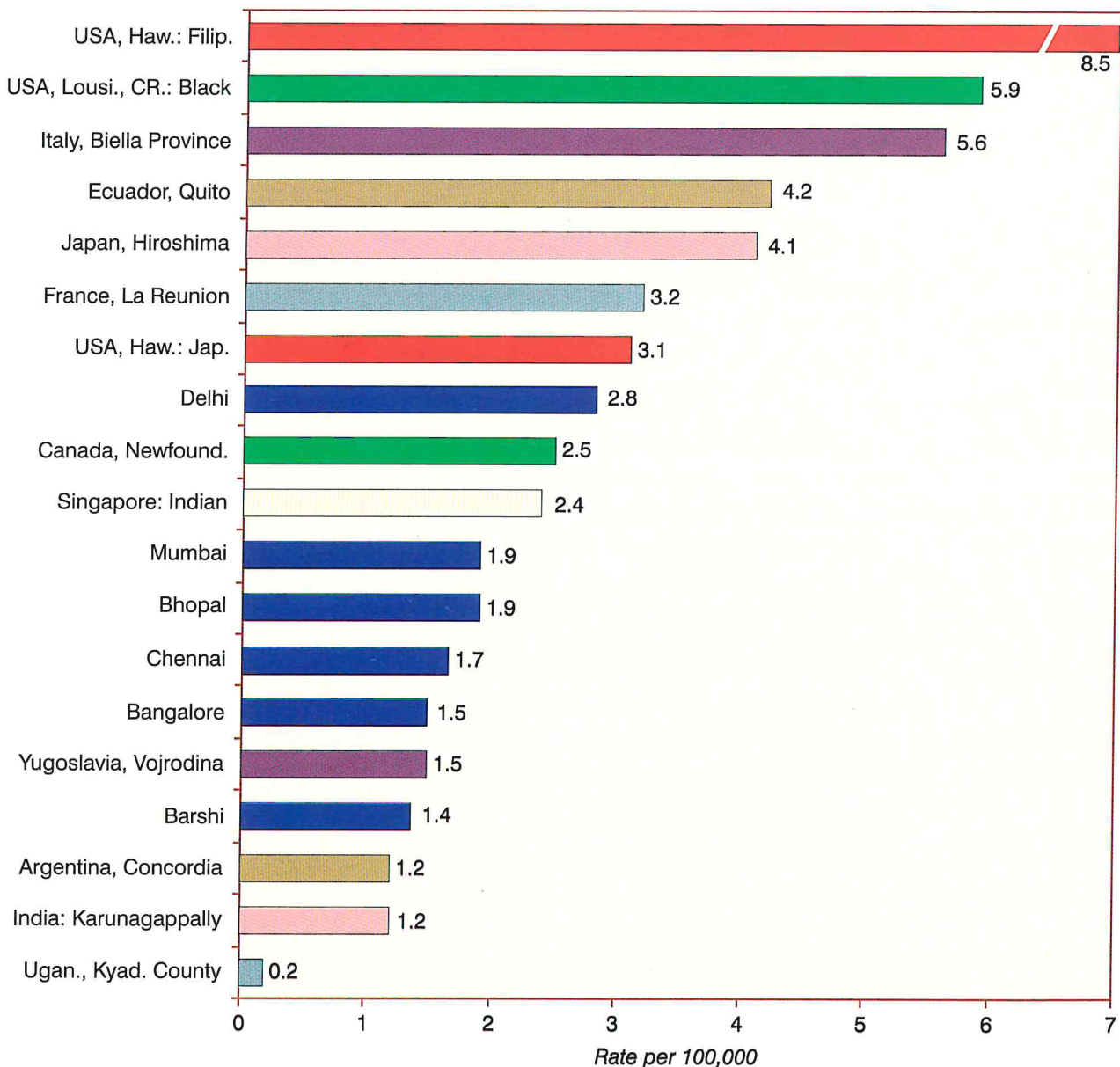
**FIGURE 6.24(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — NHL (ICD-10 : C82-C85,C96) – Males**



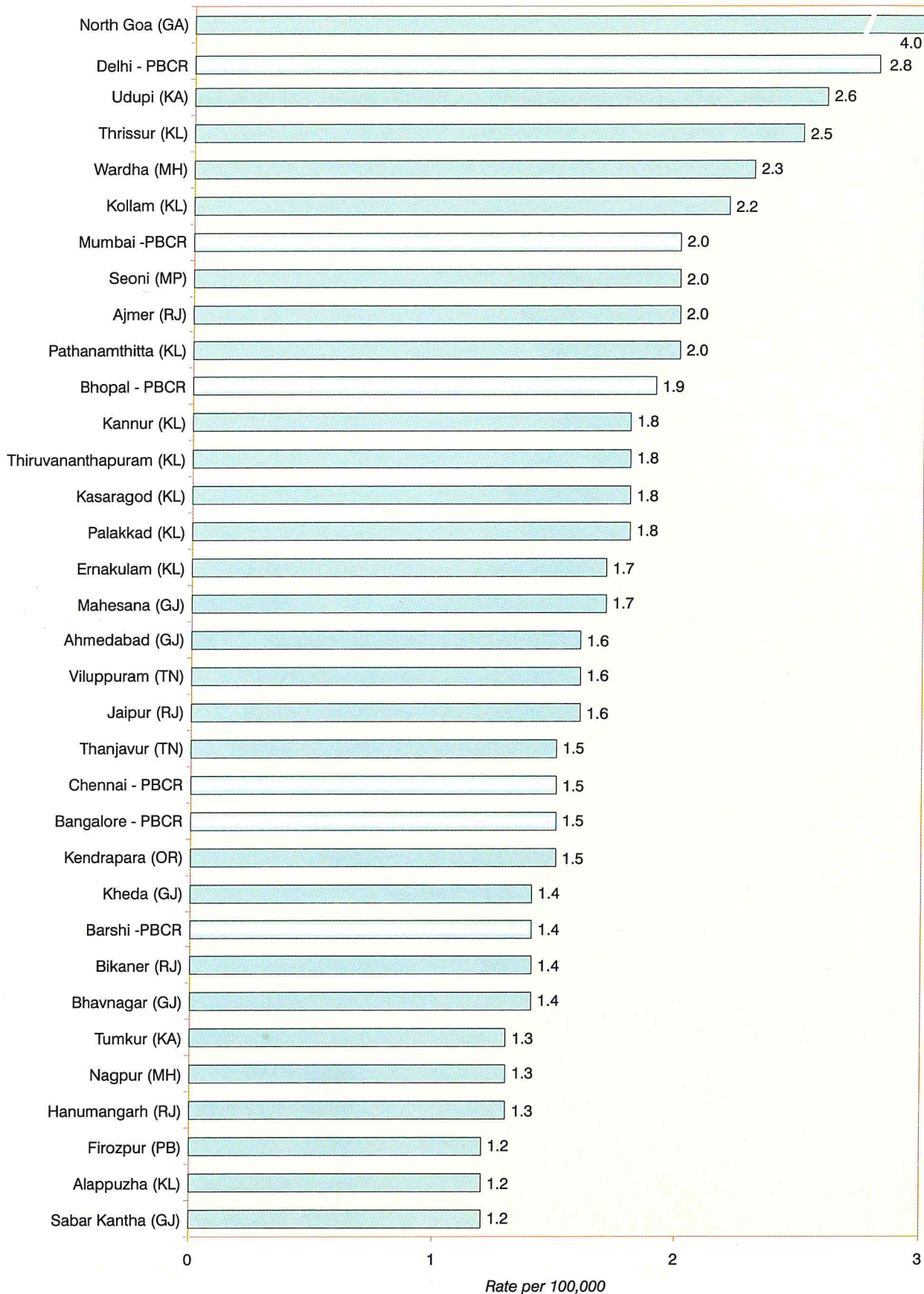
## 6.25. MYELOID LEUKAEMIA (ICD-10 : C92-94) - MALES

Myeloid leukaemia showed a relatively higher MAAR than that seen in PBCRs with concentration of higher MAARs in Manipur and Mizoram states and the south west coast in both sexes. [Fig 6.25(b) & Fig 6.26(b)] The number of cases were too small for classifying into acute and chronic myeloid leukaemia.

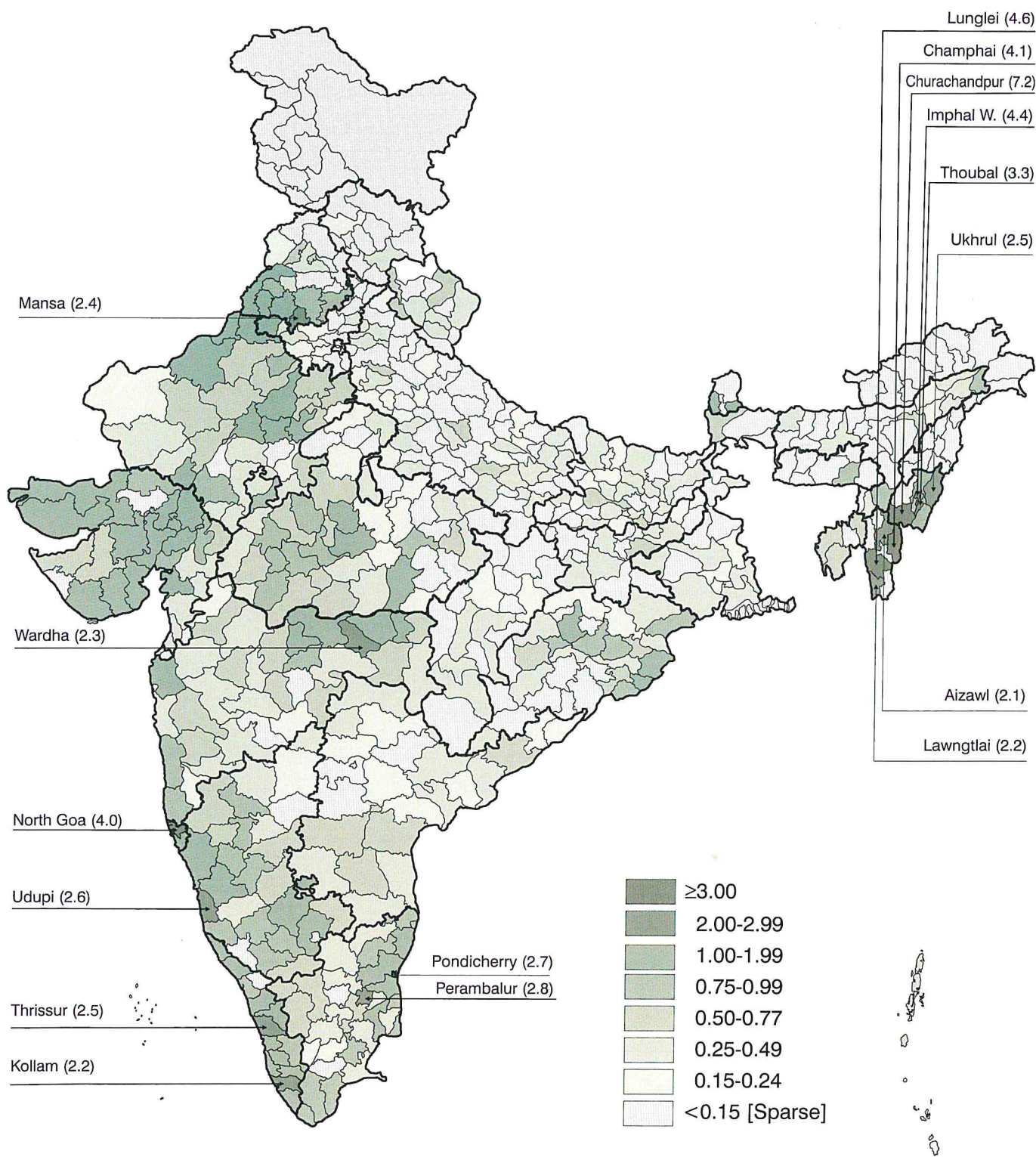
**FIGURE 6.25(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Myeloid Leukaemia (ICD-10 : C92-94) – Males**



**FIGURE 6.25(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Myeloid Leukaemia (ICD-10 : C92-94) – Males**

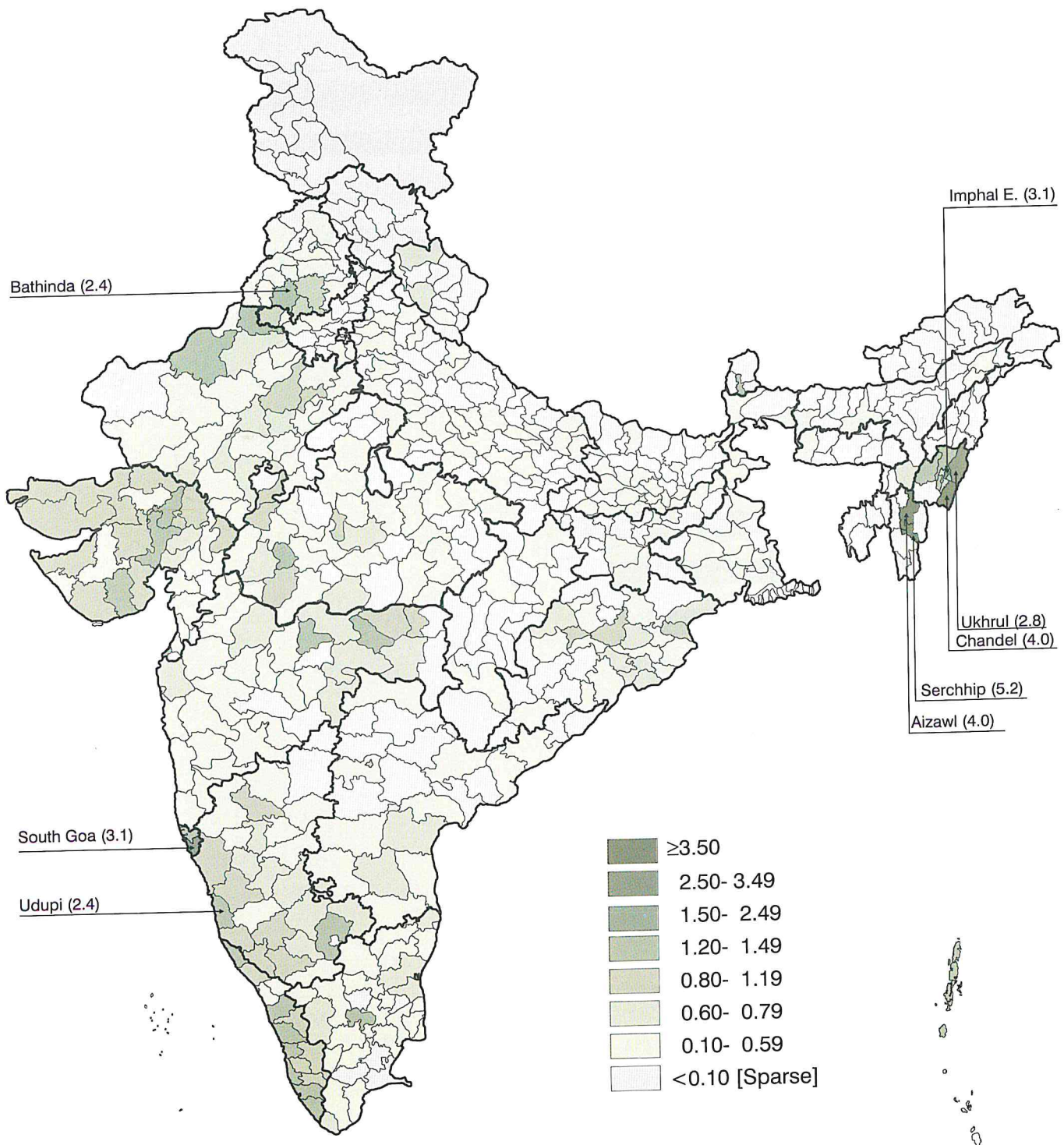


**MAP 6.25 :Districtwise Minimum Age Adjusted Incidence Rates Per 100,000 Myeloid Leukaemia (ICD-10 : C92-94) 2001 - 2002 – Males**

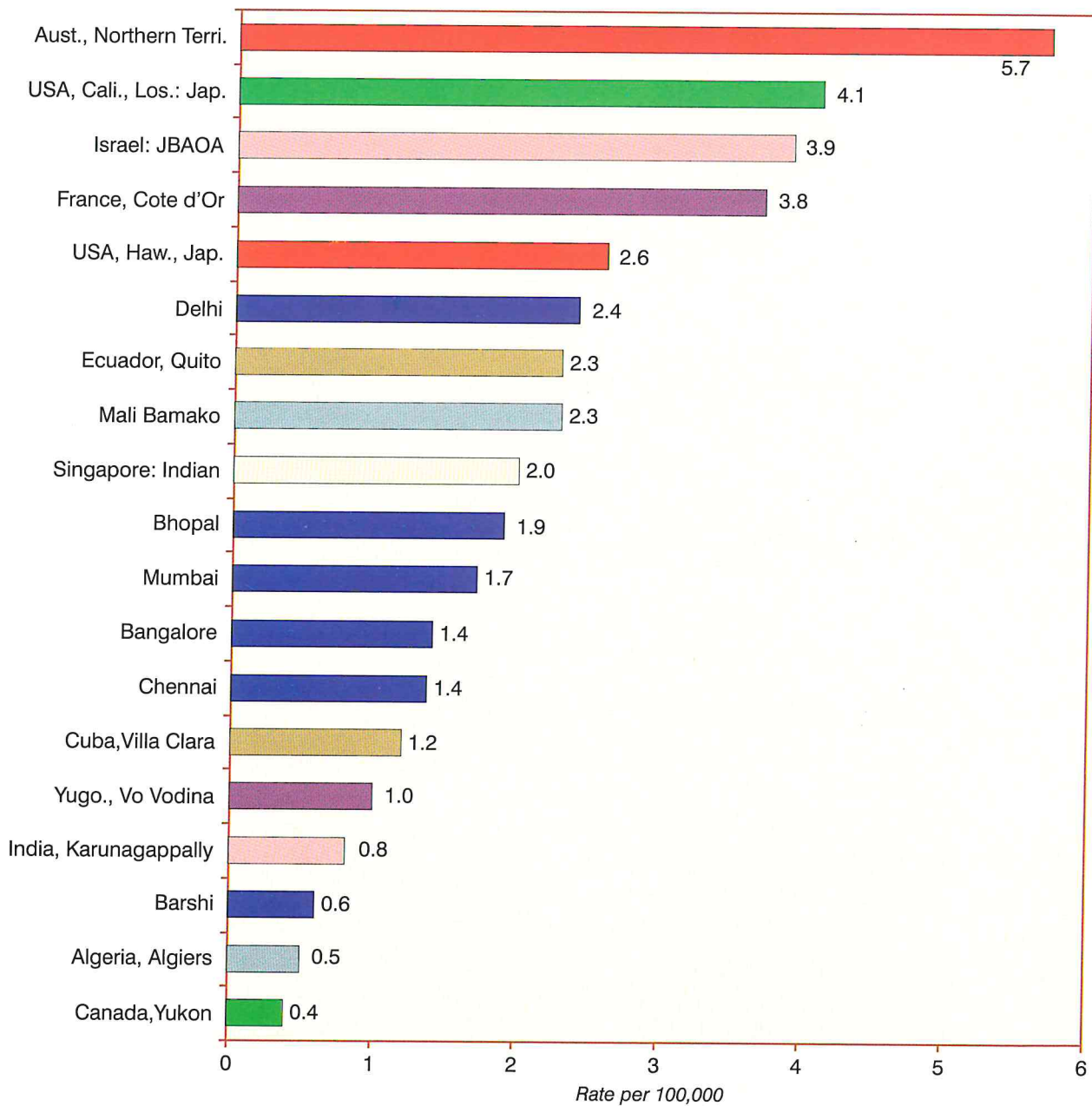


## 6.26. MYELOID LEUKAEMIA (ICD-10 : C92-94) - FEMALES

MAP 6.26 : Districtwise Minimum Age Adjusted Incidence Rates Per 100,000  
Myeloid Leukaemia (ICD-10 : C92-94) 2001 - 2002 - Females



**FIGURE 6.26(a) : International Comparisons of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Myeloid Leukaemia (ICD-10 : C92-94) – Females**



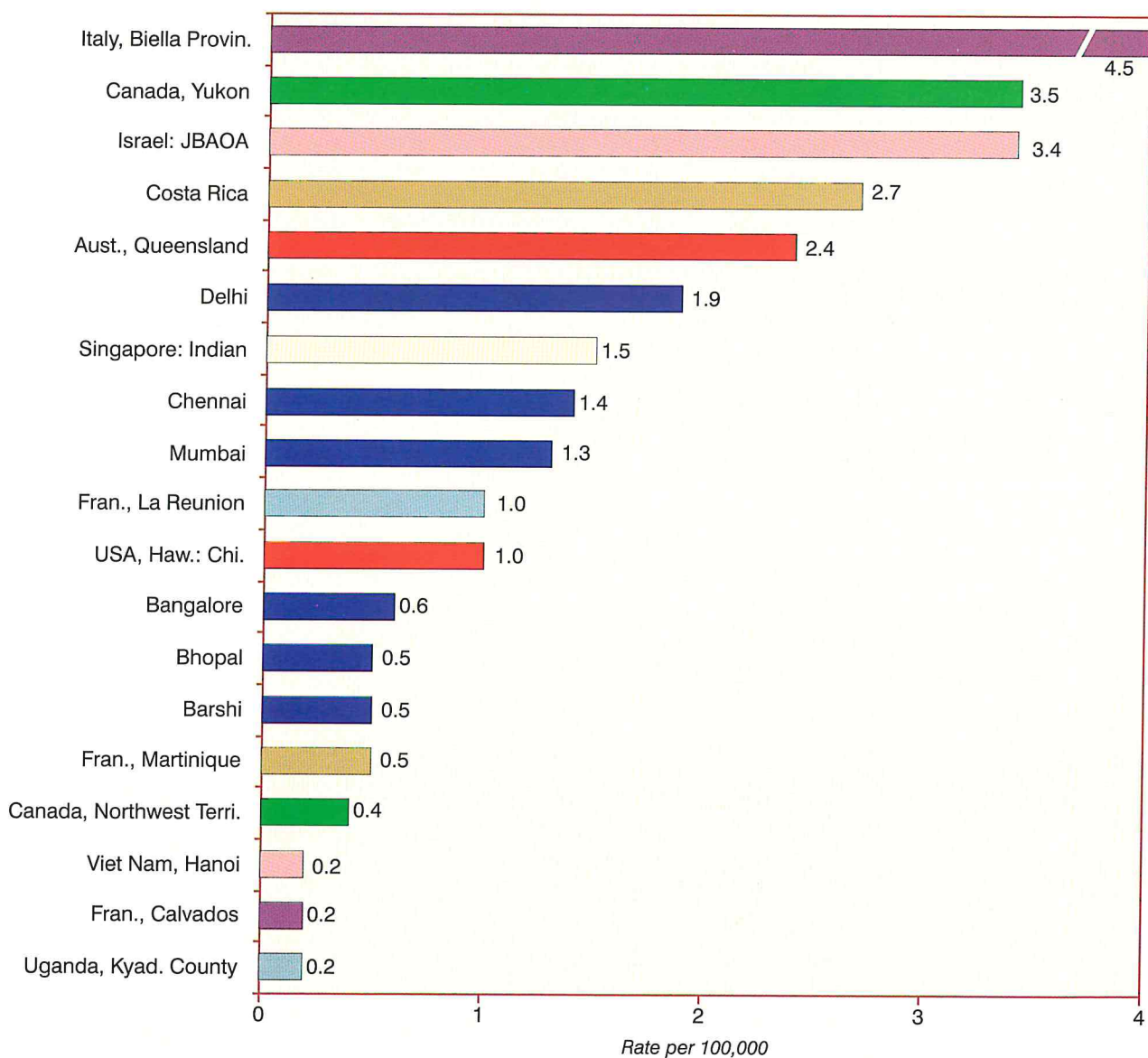
**FIGURE 6.26(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Myeloid Leukaemia (ICD-10 : C92-94) – Females**



## 6.27. ACUTE LYMPHATIC LEUKAEMIA (ICD-10 : C91.0) - MALES

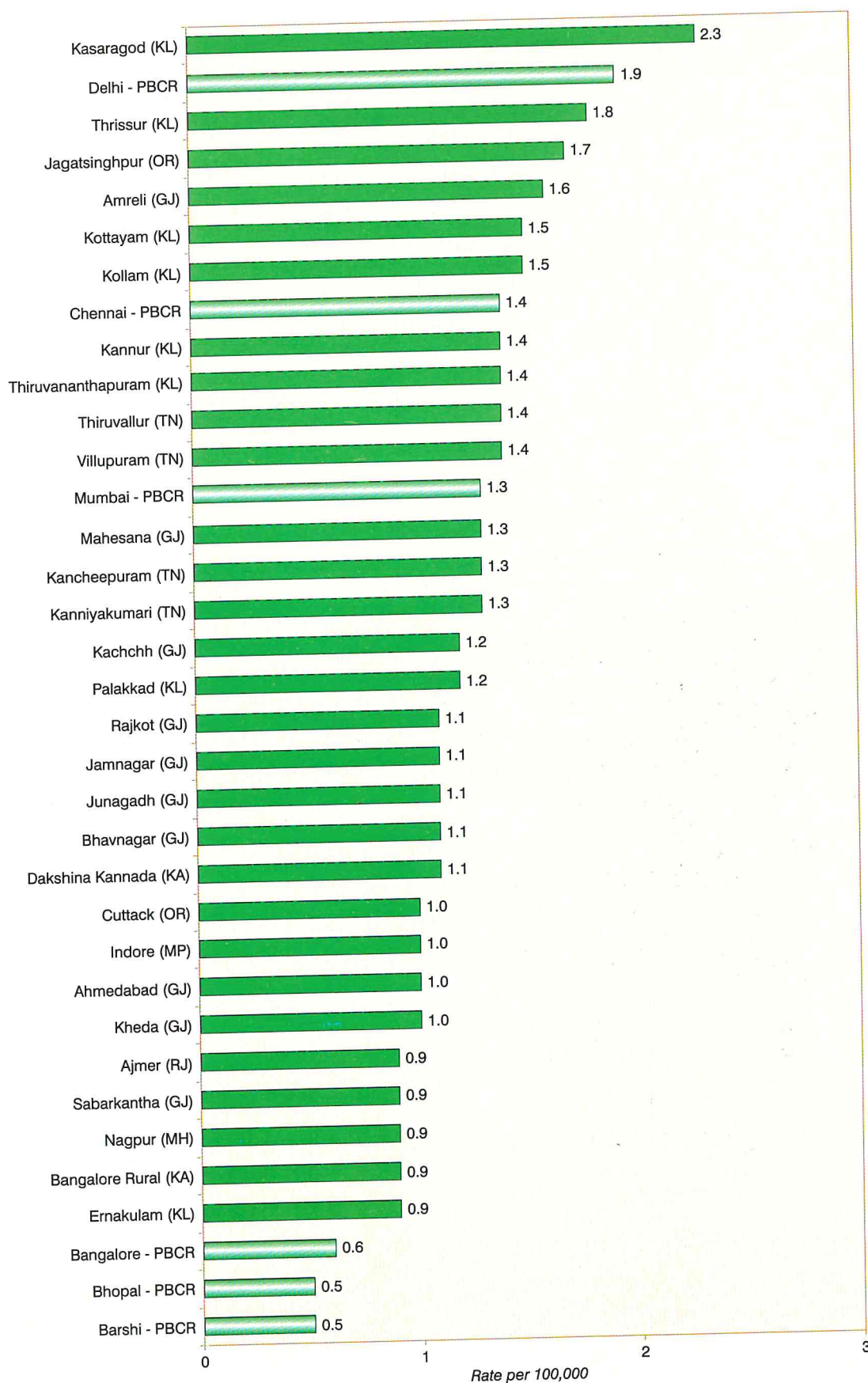
Kasaragod district in Kerala state had a higher MAAR than that of Delhi PBCR. [Fig. 6.27(b)].

**FIGURE 6.27(a) : International Comparisons\* of Age Adjusted Incidence Rates with that of PBCRs under NCRP — Acute Lymphatic Leukaemia (ICD-10 : C910) – Males**

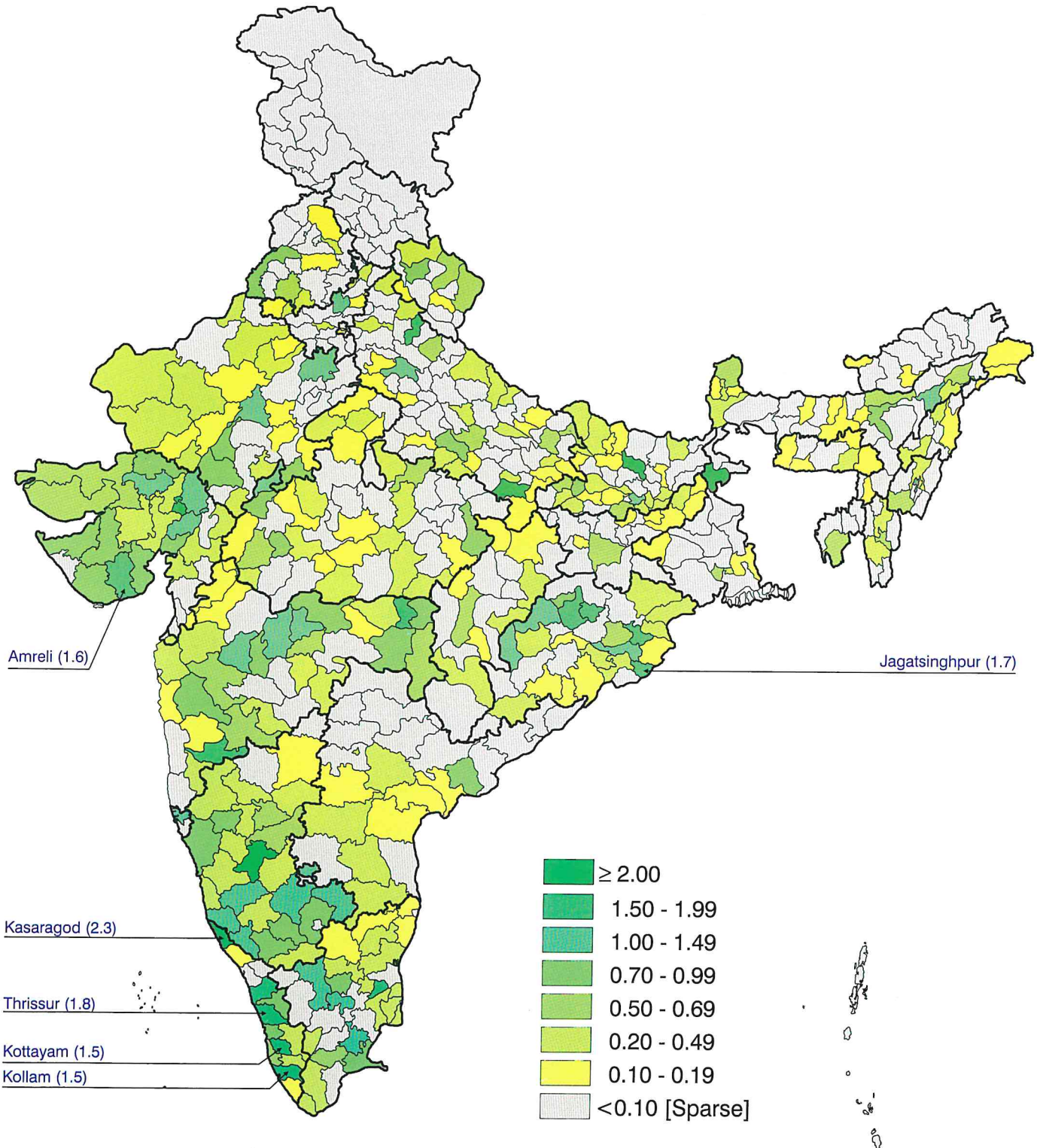


\*Data obtained through personal communication from Dr. D.M. Parkin.

**FIGURE 6.27(b) : Districtwise Comparisons of Minimum Age Adjusted Incidence Rates with that of PBCRs under NCRP — Acute Lymphatic Leukaemia (ICD-10 : C910) – Males**



**MAP 6.27 :Districtwise Minimum Age Adjusted Incidence Rates Per 100,000  
Acute Lymphatic Leukaemia (ICD-10 : C91.0) 2001 - 2002 – Males**



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**Oesophagus - Males:** The urban PBCRs have AARs varying from 6.3 to 10.3/100,000. The district-wise comparison of MAAR showed that Aizawl had a higher MAAR (26.7/100,000). Several districts especially in Assam and Karnataka State had MAAR comparable with the rates in the urban PBCRs. The districts of North and South Goa also had high MAARs.

**Stomach - Males:** Among males, Chennai and Bangalore PBCRs have had cancer stomach as the leading site of cancer since the commencement of the NCRP in 1982. But the AARs in these urban areas have been much lower than that seen in Japan or in other high incidence areas of the world. The district wise comparison of MAARs with that of Chennai and Bangalore showed that the district of Serchhip in Mizoram State had eight and a half times higher rate of stomach cancer than that of Chennai. Several districts in the North Eastern states of Mizoram, Nagaland, Manipur and Sikkim had MAARs equivalent to the AARs of high incidence regions of the world.

**Gall Bladder - Females:** Delhi females have shown a high incidence rate (AAR: 10.6/100,000) of cancer of the gall bladder. The district-wise comparison showed that Imphal East and West districts of Mizoram State and the Union Territory of Chandigarh had comparable incidence rates.

**Lung - Males:** The district-wise figures revealed that Aizawl in Mizoram State and Imphal West in Manipur State, had 1½ times the MAAR of the highest urban PBCR - Delhi (11.5/100,000). Further nine other districts had MAARs higher than the MAAR of Delhi.

**Lung - Females:** Except in Mumbai PBCR, cancer of the lung in females has not been a leading site of cancer in women, in the PBCRs under NCRP. Even the rate (AAR of 4.2/100,000) in Mumbai is lower than that seen in Indians in Singapore and in other women in areas of high incidence in the world. Observation of the MAARs in the districts showed that Aizawl women had almost ten times (26.2 compared to 2.8/100,000) the MAAR of women in Mumbai. Imphal West and East in Mizoram State and South Goa had much higher MAARs than that seen in Mumbai.

**Breast - Females:** Cancer of the breast has been replacing cancer of the cervix as the leading site of cancer in all urban PBCRs, except Chennai and the AARs of this site of cancer have also been on the rise. Among the Indian PBCRs, Delhi has the highest AAR of breast cancer. At least four districts led by Chandigarh (followed by North Goa, Aizawl in Mizoram State and Panchkula in Haryana State) had higher MAAR than that of Delhi. The rates were also similar in South Goa and three districts (Kollam, Thiruvananthapuram, Thrissur) in Kerala State.

**Cervix Uteri:** Chennai PBCR has had the highest incidence rate of cervical cancer among the Indian PBCRs. The district-wise MAARs indicate a region of high incidence rates even higher than Chennai in the North Eastern districts of Tamil Nadu State including Pondicherry which had the highest MAAR of 39.2/100,000.

**Penis:** In the Indian PBCRs penile cancer has been high in Chennai and Barshi. A high incidence of penile cancer was seen in the north eastern districts of Tamil Nadu and Villupuram district had a high MAAR of 3.1/100,000.

**Thyroid - Females:** Of the PBCRs under NCRP, Bangalore PBCR has shown the highest AAR of cancer of the thyroid. The PBCR at Thiruvananthapuram has shown a high incidence of cancer of the thyroid where it is the third leading site of cancer. Similarly, the district-wise distribution showed a higher MAAR in Thiruvananthapuram district, with a belt of high incidence right from the southern tip of the country - Kanniyakumari in Tamil Nadu State along the coast of the States of Kerala and Karnataka extending on to South Goa.

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The information on cancer cases obtainable from a specified district and the calculation of incidence rates (in this instance the MAAR of at least 36.2/100,000) to be usable or workable for measuring and depicting patterns of cancer in that district depends on a number of factors. The availability and accessibility of nearby facilities for cancer diagnosis and treatment is the most important. The participation in this project of centre or centres is crucial. If there is just one comprehensive centre in a region and that centre collaborates in the project then the chances of receiving information on almost all cancer cases in those districts is high. This becomes reflected in the MAAR. All the eleven cancer registries under the NCRP and the other Hospital and Population Based Cancer Registries (not as yet under the NCRP network) have contributed to the project. Since nearly all of these registries are located at established regional cancer centres the districts served by them are suitably represented. In addition, centres like the Tata Memorial Centre, Mumbai and Cancer Institute, Chennai draw patients from several other parts of the country. On the other hand, if there are several cancer diagnosis and treatment facilities in a particular area and only some of the centres are collaborating in the project, then the chances of the information on cancers giving practicable MAAR are slim. The literacy and the general health awareness of the population are among other factors that could contribute to the extent of coverage of data on cancers.

In all there were 82 districts that had incidence rates (MAAR) higher than 36.2/100,000 for at least one of the two years (2001 or 2002) and in either sex. Of the six PBCRs under NCRP, in males, Delhi PBCR had the highest MAAR of 103.0/100,000 for all sites (ICD-10: C00-C96) of cancer. There were ten districts under the project that had a MAAR higher than that of Delhi. These included six districts in Mizoram State, one in the state of Kerala, North and South Goa, and Chandigarh. Among the urban PBCRs, Bangalore had the lowest MAAR of 75.1 per 100,000. There were eight districts that were above this MAAR but below that of Delhi, PBCR. The remaining fifty-one districts listed had MAAR lower than the urban PBCRs but above that of the rural PBCR at Barshi. Among females, Delhi PBCR had the highest MAAR of 113.9/100,000. There were four districts that had MAAR higher than this. These were in Mizoram State (three districts) and Chandigarh. Among the urban PBCRs, Bhopal PBCR had the lowest MAAR of 94.0/100,000. There were three districts that had a higher MAAR than that of Bhopal. There were forty-four districts that had a MAAR above that of Barshi PBCR, which in females was 45.0/100,000.

Chapter 6 furnishes a summary of important specific sites of cancer. It is the key chapter that presents the essential results and outcome of this project. It acts as a ready reckoner, for comparison of the MAARs of the districts with that of the PBCRs and of international and national AARs as well. Highlights of some sites are given below.

*Tongue - Males:* Bhopal, PBCR has an AAR of 10.9 and Ahmedabad urban registry has also a high AAR of 9.3/100,00. The district of Aizawl in Mizoram State, has a slightly higher MAAR compared to Bhopal, PBCR. There are several districts throughout the country that have a higher MAAR compared to the urban PBCRs. Of particular importance seems to be the State of Gujarat. Several districts (Mahesana, Gandhinagar, Kheda, Ahmedabad, Anand, Bhavnagar, Sabarkantha and Banaskantha) show high incidence rates of tongue cancer.

*Mouth - Males:* Again Bhopal, PBCR has a high AAR of 9.6/100,000. There were five districts that had a higher MAAR than that of Bhopal, PBCR. Wardha district in Maharashtra State has a MAAR of 14.1. Of the other four districts that had a higher MAAR than Bhopal, two were in Tamil Nadu State and two in Kerala State. At least twenty-six other districts across the country had a higher MAAR than that of the other PBCRs. Other than several districts in Tamil Nadu State, many districts in Assam State (Kamrup, Goalpara, Darrang, Nalbari, Marigaon, Jorhat) showed a high MAAR.

*Hypopharynx - Males:* Among the PBCRs the AAR of cancer of the hypopharynx is high in Bhopal and Ahmedabad urban PBCR. Aizawl district in Mizoram State had a higher MAAR (16.1/100,000). Besides, numerous districts in Assam State (Dibrugarh, Kamrup, Darrang, Jorhat, Nalbari, Golaghat, Barpeta, Sibsagar, Goalpara to name a few) had high incidence rates.

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# DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA

First All India Report: 2001 - 2002

## Discussion

The Indian Council of Medical Research (ICMR) initiated a network of cancer registries under the National Cancer Registry Programme (NCRP) in 1981 and data collection commenced in these registries from 1st January 1982. Since then, the registries have provided information on incidence and patterns of cancer that in terms of quality and validity meet international standards. This is evidenced by the fact that the data from the population based cancer registries under the NCRP has been continuously published in successive volumes of the World Health Organization (WHO) publication - Cancer Incidence in Five Continents (Muir et al, 1987; Parkin et al, 1992, 1997, 2002). This volume is published every five years by the International Agency for Research on Cancer - the cancer research arm of the WHO. Data on childhood cancer and cancer occurrence in developing countries have also appeared in the Agency's publications (Parkin et al, 1988; Sankarnaryanan et al, 1998). The NCRP, itself has been bringing out its own annual and consolidated reports since 1982 (NCRP Reports, 1985... 2002). The preparation for the 1999-2000 report is underway. Besides, the registries under NCRP there are eight population based cancer registries with funds met from other sources. The data of some of these registries has also been published in Cancer Incidence in Five Continents.

Thus, in India, for cancer, and perhaps for only this disease, we have a systematic programme of data collation so as to have reliable incidence and mortality rates, thereby laying a foundation for scientific research - whether that research be epidemiological, basic, clinical or in cancer control. However, India being a vast country, extensive areas need to be covered. The NCRP cancer registries cover selected urban centres and just one rural pocket. The other population cancer registries also cover essentially urban centres except for parts of two districts in Kerala State and part of one district in Tamil Nadu State. Consequently, the patterns of cancer in several urban centres and rural regions remain largely unknown. Setting up of new registries throughout the country as in some Western countries would involve enormous cost in establishing and maintaining the same.

Therefore, under this project, a cost-effective design and plan using advances in modern electronic information technology, was conceived, to collate and process relevant data on cancer so as to fulfill the objectives of:

- i) obtaining an overview of patterns of cancer in different parts of the country; and,
- ii) calculating estimates of cancer incidence wherever feasible.

The data of the NCRP shows that 80-85% of registered cases of cancer has microscopy as the basis of diagnosis. Modern electronic information technology needed to be harnessed in a cost-effective way. Thus the department of pathology and pathologist became the focal point of data capture and the internet was identified as the primary communication medium for data acquisition and transmission. Internet as a tool for data collection on patient information was a unique concept being tried for the first time (in India and to the best of our knowledge anywhere else in the world) under the project.

A user friendly 'core proforma' for collecting the patient information was hosted on the web-site [www.canceratlasindia.org](http://www.canceratlasindia.org). Internet Browser based data entry eliminated the need for software to be installed on every system and the hassles of administration and maintenance. Collaborating centres were given an

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individual login-ID and password with detailed instructions on entering the core patient information. Care was taken to code/encrypt the data entered so that the identity or the nature of the data could not be deciphered by any one except those concerned with the project. This ensured confidentiality of patient information and security of data transmitted. The collaborating centres transmitted the required information (mainly patient identification details including area of living, and site and morphology of tumour) on all malignant cases reported by the department of pathology.

The successful working of this concept was reflected, first, in the data that was and is downloaded on a regular basis for the past two and a half years. The core data of approximately 1200-1500 cancer cases is received every week. Secondly, in the feedback received from the participating centres during the All India Workshop - 95% of the respondents, felt, that the web-site was easy to use and 80% of them had a fairly stable Internet connection. Thirdly, because most of the collaborating centres were able to transmit the required information as soon as a diagnosis was made, this report of 2001-2002 could be brought out fairly early (comparable to international standards). In due course the experience should enable us to provide the main tables of incidence rates and report soon after the end of the calendar year and then on-line. The fact that through this project, one could receive, analyse and provide the 2001-02 report in early 2004 posed problems for comparison, since international rates on a global basis were available only for 1993-97, and the rates of the PBCRs under NCRP were for the years 1997-99. However, from the epidemiological stand-point and knowing that incidence rates of cancer take several years before showing significant variations in time trends, these differences are unlikely to have notable impact in the interpretation of geographic patterns of cancer.

The data received through the web-site was downloaded periodically at the Coordinating Unit of the NCRP and the details of checks carried out have been described earlier (Chapter 2). Based on the above, a total of 2,17,174 microscopically diagnosed cancers for the two year period (1 January 2001 to 31 December 2002) from 105 centres across the country was taken up for analysis. The centres included the cancer registries under the NCRP and other functioning cancer registries. A condensed profile with tabular and graphic presentation of cancer patterns in these 105 centres is given in Chapter 7. This report is the culmination of sustained interest and efforts made by these participating centres.

The reference manual - Cancer Incidence in Five Continents (Parkin et al, 2002) was used to group neoplasms by site (WHO, ICD-10, 1994), calculate incidence rates and determine leading sites of cancer. The Census of India publications gives the population according to five-year age group and gender by district. As per the 2001 census results, there were 593 districts in the country. Information on cancer cases also gives the name of the district for each case, apart from age, gender, site and type of cancer.

Cancer incidence is generally expressed as age-adjusted or age standardized (according to world population) incidence rate per 100,000 persons. Therefore, the district was taken as a unit for calculation of incidence rates, with one difference. Unlike the regular age adjusted incidence rates (AAR) used in PBCRs throughout the world, minimum age adjusted incidence rates (MAAR) based on microscopically diagnosed cancers of the districts is used here.

The most recent data (1997-99) from the established population based cancer registries (PBCR) is included for description and comparison. The MAAR of cancer (for microscopically diagnosed cases) in these PBCRs was also calculated so as to have a benchmark for analysis, and, as a baseline for comparison with the MAAR of the districts. Under the NCRP, the population based cancer registry at Barshi is the only registry as of now, that has given incidence rates representative of the rural population in the country. Majority of the districts in the country has predominantly semi-urban or rural population. The MAAR for Barshi (all sites) for the period 1997-99, is 36.21 and 45.02 per 100,000 for males and females respectively. Thus the MAAR of 36.2 has been used as the cut off level to select districts for observing and compare cancer incidence and patterns. In all there were 82 districts that had a MAAR higher than 36.2/100,000 for at least one of the two years (2001 or 2002) and in either sex.

**DEVELOPMENT OF  
AN ATLAS OF CANCER IN INDIA**  
**First All India Report: 2001-2002**

**Discussion and Appendices**

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## Limitations of the Report

A massive exercise such as this project on developing an atlas for cancer in a vast country like India with varied types of populations, differing literary and socioeconomic status has its limitations.

*Coverage:* The coverage of the 35 states and union territories of the nation is far from complete. In several states such as UP, Bihar, Jharkand, Chattisgarh etc. there were hardly any districts where there was information on cancer cases based on which the patterns could be described. Even in some of the comparatively 'better covered' states the cancer patterns could not be characterized in several districts in each of these states. In brief, in only 82 of the 593 districts, a picture of the incidence and pattern of cancer could be provided. This is one of the main reasons why this project needs continuity.

*Measurement based on Minimal or Microscopic Age Adjusted Incidence Rates:* The fact that only Minimal Age Adjusted Incidence Rates (MAAR) in exchange for the standard Age Adjusted Incidence Rates (AAR) was provided is the other major limitation. Thus, no active effort could be made to get the cases of cancer diagnosed through means other than microscopic. This would have required lot more resources and involvement of several additional clinical departments and personnel therein in each collaborating institution. The advantages of using MAAR are that core information on microscopically confirmed cases can be obtained from a single source within a hospital and therefore with minimal cost and effort. Moreover, microscopy is the basis of diagnosis and treatment of cancer. The other advantage of a pathology based approach was the chances of including prevalent cases are less likely. In a population based approach, there are more chances of including old cases especially in the first year of operation. Obtaining details of cancer cases diagnosed through other means requires scrutiny of records in multiple departments, critical review of the same by a medical person or a trained tumour registrar, with at times further clarification from the treating clinician before arriving at a final diagnosis of cancer. All this involves, especially in the Indian set-up, considerable time, effort, cost and expertise. Cancer registries under the NCRP as in registries elsewhere in the world include cases with cancer as a diagnosis on the death certificates that are not matched with registered incident cases. Such cases are categorised as cases diagnosed through 'Death Certificate Only' (DCO). Collation of mortality data and identifying mortality records with cancer as an antecedent or associated cause is a major exercise of population based cancer registries. The second factor in providing only MAAR was incomplete coverage of the specific geographic area. Unlike the working of PBCRs, no systematic attempt was made to actively visit every diagnostic and treatment centre in the region to record all diagnosed/treated cancers. Therefore, while the MAAR provides a ready and quick assessment of the burden of cancer it is an underestimate of the actual incidence of cancer in that specific population or geographic area.

*All in all, the incidence rates provided are truly minimal. But what makes this information valid whether for scientific or administrative purposes?*

First and 'fortunately' in our country for the disease - cancer, an established network of cancer registries (under the NCRP and others) is functioning for over 20 years. These registries have established over the years, not only sound functioning, but also provided consistent internationally accepted incidence rates and patterns of cancer albeit in few centres. Thus, a baseline data is available for ready comparison. Second, the system of registration and certification of cause of death in our country does not help in providing reliable cancer specific mortality rates to assess incidence or patterns of cancer in the country. Third, the medical information (as represented by the patient medical records) in most institutions in our country are inadequate to provide information on disease, especially on a population basis. Hence the need for special efforts to create and develop a system of specific disease registers - whether for research, administration or disease control. A scheme that will sustain and furnish the required information for all of the aforementioned reasons is essential.

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## Cost

Advances in electronic information technology have to be harnessed to deliver quality and complete valid data. The project was extremely cost-effective. The amount spent per cancer case under the PBCRs of the ICMR is on the average Rs 350 for the urban areas and Rs 4,500 for the rural registry. Under this Project the cost per case worked out to approximately Rs 24.

After all, in this study the MAAR was found to be a fairly dependable cost effective measure of incidence and patterns of cancer in diverse districts of the country. Since several parts show minimum incidence rates higher than that observed in the established registries there appears a need for a pragmatic appraisal of the utility and validity of MAARs in the Indian context.

## Future Scope of the Project

The advent of Information Technology (IT) has had its impact in several fields. In a developing country like India, its reach in the health sector has been visible in components of diagnostic reports and as part of patient management tools, especially in the private sector. The diffusion of IT has, however, been negligible in gathering health information or consolidating existing information to either influence health care delivery or foster health informatics as an instrument towards disease control or research.

The reasonably successful outcome of this project opens the doors for manifold possibilities. Some of those, which are of direct relevance to this study, are outlined below.

### A. *On-line dynamic generation of Incidence Rates*

During the next few months a plan has been drawn to make available the basic incidence tables and map dynamically on the web-site. The completeness and validity of this information would of-course depend on the speed and promptness with which centres transmit data.

### B. *Increase Coverage - Establishing Descriptive Cancer Epidemiology*

1. More areas and States especially in the North, East and West have to be covered. There are 593 districts in the country and comparable incidence rates and patterns could be estimated in only 82 districts leaving vast portions uncovered;
2. Some of the states and union territories have the scope of having a cancer map to cover the entire state with additional yet minimal efforts;
3. Verification and stability of incidence rates so determined in the existing districts;
4. Derivation of more localized incidence rates at the tehsil/taluk levels;
5. Institute full fledged Population Based Cancer Registries in identified areas;

### C. *Based on the findings of this study a variety of Analytic Epidemiological studies with laboratory component can be done in the respective areas*

### D. *Pathological Studies*

If pathology is the basis of diagnosis of cancer the pathologist has been the basis of the success of this project. Therefore, for the pathologist, there are several uses and extended uses of this project with specific use of the web. Apart from have a ready analysis of cancers by type and morphology, the canceratlasindia web-site could be well utilised for exhibiting microphotographs of unusual cancer cases or diagnostic problems or for standardisation of morphological diagnosis. The website could also be used to study morphological patterns as related to prognosis and such studies could be undertaken relatively easily in collaboration with several institutions.

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*E. Patterns of Cancer Patient Care and Survival*

The concept of using a web-site for gathering information and the internet as a medium of transmission has also found application in the study on "Patterns of Cancer Patient Care and Survival" for specific sites of cancer.

*F. Cancer Control and Health Services Research*

The cancer registry is central to any rational programme on control of cancer (Muir C.S.1985). So the cancer data through the cancer atlas could act as critical baseline information for monitoring and evaluation of cancer control programmes.

*G. Initiation and Development of the new field of Health Informatics with specific reference to cancer and cancer research*

**Conclusion**

One may emphasize that this is the first outcome of a two-year activity using a hitherto untried methodology. Consistency of methods and continuity over time, are essential components that need to be maintained.

*In conclusion three essential features stand out:*

1. The results presented throw a whole new set of cancer incidence and patterns demonstrating the immense potential of the system and the numerous possibilities for cancer research and control. It has identified hot spots of high incidence, recognised belts of geographic areas with specific types of cancer and discerned likely zones for establishing population based cancer registries.
2. The project was extremely cost-effective.
3. The concept of using web-based design and approach with on-line transmission of cancer data has worked - a major advance for using Information Technology in Medicine - Measuring Disease Burden and Health Informatics.

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# Appendix I

## DEVELOPMENT OF AN ATLAS OF CANCER IN INDIA

A Project of the NCRP - ICMR Supported by the WHO

### Core Proforma

1. NAME OF PARTICIPATING CENTRE: \_\_\_\_\_ CENTRE CODE:   
Name of Other Institution (if from other source) \_\_\_\_\_

2. REGISTRATION NUMBER:.....   
3. HOSPITAL REGISTRATION NUMBER:.....

4. FULL NAME OF PATIENT: \_\_\_\_\_

5. AGE (in years):.....  GENDER: (Tick ✓ one) Male  Female

6. NAME OF FATHER: \_\_\_\_\_ NAME OF MOTHER: \_\_\_\_\_  
NAME(S) OF SON(S): \_\_\_\_\_

7. NAME OF HUSBAND/WIFE: \_\_\_\_\_  
NAME(S) OF DAUGHTER(S): \_\_\_\_\_

8. PLACE OF RESIDENCE:

<b>Permanent Address</b>	
<u>Urban Areas (Towns/Cities)</u>	<u>Non-urban/Rural Areas</u>
House No: _____	Name of Gram Panchayat/Village, etc: _____
Road/Street Name: _____	_____
Area/Locality: _____	Name of Sub-Unit of District (Taluk/Tehsil/Other): _____
Town/City: _____	_____
Name of District (IN CAPITALS): _____	
Postal Pin Code.....	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Duration of Stay (in years) at Permanent Address.....	<input type="text"/> <input type="text"/>
Telephone No (if any): _____	
Local Address (if any, for non-resident patients) - record below as per details above	

9. Relationship of Respondent (regarding Information on Items 1-8 above) to Patient? (Tick ✓ one)

- (1) Self (Patient)
- (2) Family Member
- (3) Friend
- (4) Others (specify)

10. TYPE OF MICROSCOPIC SLIDE (Tick ✓ one)

- (1) Histopathology
- (2) Blood Smear
- (3) Bone Marrow Smear
- (4) Cytology Smear
- (5) FNAC Smear
- (6) Other

PATHOLOGY / SLIDE NO(S).

11. ANATOMICAL SITE OF SPECIMEN/BIOPSY/SMEAR: \_\_\_\_\_

12. COMPLETE PATHOLOGICAL DIAGNOSIS

Primary Site of Tumour - Topography: \_\_\_\_\_  
(include sub-site if any)

Morphological Diagnosis: \_\_\_\_\_

13. CODING ACCORDING TO ICD-O-3

PRIMARY SITE OF TUMOR - TOPOGRAPHY:..... 

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PRIMARY HISTOLOGY - MORPHOLOGY:..... 

--	--	--	--	--	--

*If morphology is that of metastasis mention Primary Site above and*

SECONDARY SITE OF TUMOUR (SITE OF BIOPSY/SMEAR):..... 

--	--	--	--

MORPHOLOGY OF METASTASES:..... 

--	--	--	--	--	--

*If the morphology diagnosis is only that of metastatic site, mention the Primary Site as taken by the treating clinician either through discussion or from case record*

14. DATE OF REPORT:..... 

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*If there is an earlier report of malignancy in the same patient mention that date as well or attach another form*

15. NAME OF PERSON COMPLETING FORM (IN CAPITALS): \_\_\_\_\_

16. Signature: \_\_\_\_\_ Date:..... 

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# Appendix II

## Definitions, Statistical terms and Methods used in Calculations

**Cancer Case:** All neoplasms with a behaviour code of '3' as defined by the International Classification of Diseases – Oncology, (Third edition, WHO, 2000) are considered reportable and therefore registered.

**Age-Group:** The age groups used for estimating populations as well as grouping cancer cases is as per the WHO guidelines which is 0-4, 5-9, 10-14....75+. According to the same definition the age group 0-14 constitutes childhood cancer.

**Incidence:** Cancer incidence denotes new cases diagnosed in a defined population in a specified time period. For this report all cancer cases diagnosed from 1 January 2001 to 31 December 2002 in the different geographic areas covered by the different districts are included.

**Rates:** Rates for cancer are always expressed per 100,000 population. For childhood cancer this may be expressed as per one million, but the latter is not used in this report.

**Crude Incidence Rate (CR):** This refers to the rate obtained by division of the total number of cancer cases by the corresponding estimated population (mid-year) for that respective geographic area and multiplying by 100,000.

$$CR = \frac{\text{New cases of cancer of a particular year}}{\text{Estimated population of the same year}} \times 100,000$$

**Age Specific Rate (ASpR):** This refers to the rate obtained by division of the total number of cancer cases by the corresponding estimated population in that age group and sex/site/geographic area/time period and multiplying by 100,000.

$$ASpR = \frac{\text{New cases of cancer of a particular year in the given age group}}{\text{Estimated population of the same year for the given age group}} \times 100,000$$

**Age Adjusted or Age Standardised Rate (AAR):** Most cancers increase to occur as age increases. Therefore the higher the proportion of older population the higher the number of cancers. Most developed and western countries have a higher proportion of older population. So in order to make rates of cancer comparable between developed and developing countries a world standard population that takes this into account is used to arrive at age adjusted or age standardised rates. The world standard population approximates the proportional age distribution of the world. The AAR in this report is calculated according to the direct method (Boyle and Parkin, 1991) by obtaining the age specific rates and applying these rates to the standard population in that age group.

$$AAR = \frac{\sum_{i=1}^A a_i w_i}{\sum_{i=1}^A w_i} \quad \text{where:}$$

$a_i$  is the age specific rate (ASpR) in age class  $i$ ;  
 $w_i$  is the standard population in age class  $i$ ;  
 $A$  represents the number of age intervals.

Or expressed in more simpler terms thus:

$$AAR = \frac{\sum (\text{ASpR}) \times (\text{No. of persons in Std. world population in that 5 yr. age group})}{100,000}$$

## Census and Population Estimation

The five year age group populations of 1991 and Total Population of 2001 census have been used in this report to calculate the estimates of population for the years 2001 and 2002.

The major source of information for population analysis is census data. The term census is often used to denote population counts of all kinds. A census is an enumeration at a specified time of individuals inhabiting a specified area, during which particulars are collected regarding age, sex, marital status, occupation, religion etc. In most countries of the world, population census is undertaken generally at ten year intervals. In India, the census count was taken hitherto as of sunrise on 1st March every year.

The fundamental deficiency of the census method is that it is impossible to get intercensal years information. As population is liable to change every instant due to birth, death, immigration and emigration, the population at any given time period can only be obtained as an estimate. Population estimation is possible for the year which falls in between two-census dates (i.e.) atleast two census information should be known. Most annual rates are computed by using the population estimate referring to 1st July (Mid-Year Population).

Each census data has age distribution starting from 0-4, 5-9,..... ANS. The ANS is the column where age not specified. While estimating population ANS is also estimated, but for calculating rates such as CR and AAR, ANS is completely omitted.

We have different methods for making population estimates of which most commonly used method is Arithmetic Progression method.

### Increase in 10 year = Census Population 2001 — Census Population 1991

In this method it is assumed that the population increases or decreases by a constant figure year to year, between any two census years. This assumption however need not be correct. Nevertheless, the method has simplicity and the estimates have been checked by actual surveys to be reasonably correct.

Here we use the method, which is similar to Arithmetic Progression method. The difference between the population figures of the two census gives the total increase of the population in ten years. Assuming the same relative proportion of five-year age group of census 1991 population to 2001, we estimate five-year age group for 2001. Then dividing the product of the difference value between census 2001 and 1991 and estimated five-year age group of 2001 by 100 gives the 10-year increase for each specific age group.

$$\text{10 year increase in 1991 census} = \frac{\text{Relative proportion of 1991 for each specific age group} \times (\text{Census Population of 2001} - \text{Census Population of 1991})}{100}$$

From 10-year increase, 4-month increase in population can be obtained by multiplying with 4/120.

$$\text{4 month increase} = \text{10 year increase} \times (4/120)$$

Then the addition of 10 year and 4 month increase to census 1991 population gives the mid-year 2001 population.

$$\text{Mid-year 2001 estimated population} = \text{Census 1991} + \frac{\text{10 yr increase in population}}{100} + \frac{\text{4 month increase in population}}{100}$$

Similarly 16-month increase in population is obtained by multiplying 16/120 to 10 year increase population.

$$\text{16 month increase} = \text{10 year increase} \times (16/120)$$

The addition of 10 year and 16 month increase population to census 1991 gives the mid-year 2002 population.

$$\text{Mid-year 2002 estimated population} = \text{Census 1991} + \frac{\text{10 yr increase in population}}{100} + \frac{\text{16 month increase in population}}{100}$$

Assuming that this annual and monthly change occurs uniformly, we calculate the growth of the population from the last census to the time when the estimate is required. This method can also be used to estimate the population of any year after the last census.

## Appendix III

**List of Topography sites with ICD-10 code with mode of grouping for determining leading sites of cancers and acronyms used in figures of bar charts.**

Site Code (ICD-10)	Topography Site Name	Grouped Name	Acronym
C00	Malignant neoplasm of lip	Lip	Lip
C01	Malignant neoplasm of base of tongue	Tongue	Tongue
C02	Malignant neoplasm of Other and unspecified parts of tongue		
C03	Malignant neoplasm of gum	Mouth	Mouth
C04	Malignant neoplasm of floor of mouth		
C05	Malignant neoplasm of palate		
C06	Malignant neoplasm of other and unspecified parts of mouth		
C07	Malignant neoplasm of parotid gland	Salivary glands	Salivary Gl.
C08	Malignant neoplasm of other and unspecified major salivary glands		
C09	Malignant neoplasm of tonsils	Tonsils	Tonsil
C10	Malignant neoplasm of oropharynx	Other Oropharynx	Oth. Oroph.
C11	Malignant neoplasm of nasopharynx	Nasopharynx	Nasopharynx
C12	Malignant neoplasm of pyriform sinus	Hypopharynx	Hypopharynx
C13	Malignant neoplasm of hypopharynx		
C14	Malignant neoplasm of other and ill-defined sites in the lip, oral cavity and pharynx	Pharynx unspecified	Pharynx Uns.
C15	Malignant neoplasm of oesophagus	Oesophagus	Oesophagus
C16	Malignant neoplasm of stomach	Stomach	Stomach
C17	Malignant neoplasm of small intestine	Small Intestine	Small Intestine
C18	Malignant neoplasm of colon	Colon	Colon
C19	Malignant neoplasm of rectosigmoid junction	Rectum	Rectum
C20	Malignant neoplasm of rectum		
C21	Malignant neoplasm of anus and anal canal	Anus etc	Anus
C22	Malignant neoplasm of liver and intrahepatic bile ducts	Liver	Liver
C23	Malignant neoplasm of gallbladder	Gallbladder etc	Gallbladder
C24	Malignant neoplasm of other and unspecified parts of biliary tract		
C25	Malignant neoplasm of pancreas	Pancreas	Pancreas
C26	Malignant neoplasm of other and ill defined digestive organs	Others & Unspecified	O&U
C30	Malignant neoplasm of nasal cavity and middle ear	Nose, Sinuses etc	Nose
C31	Malignant neoplasm of accessory sinuses		
C32	Malignant neoplasm of larynx	Larynx	Larynx
C33	Malignant neoplasm of trachea	Lung etc	Lung
C34	Malignant neoplasm of bronchus and lung		
C37	Malignant neoplasm of thymus	Other thoracic organs	Oth. Tho. Org
C38	Malignant neoplasm of heart, mediastinum and pleura		
C39	Malignant neoplasm of other and ill-defined sites in the respiratory system and introthoracic organs	Others & Unspecified	O&U
C40	Malignant neoplasm of bone and articular cartilages of limbs	Bone	Bone
C41	Malignant neoplasm of bone and articular cartilages of other and unspecified sites		
C43	Malignant melanoma of skin	Melanoma of skin	Melanoma of skin

Site Code (ICD-10)	Topography Site Name	Grouped Name	Acronym
C44	Other malignant neoplasms of skin	Other skin	Other skin
C45	Mesothelioma	Mesothelioma	Mesothelioma
C46	Kaposi sarcoma	Kaposi sarcoma	Kaposi sarcoma
C47	Malignant neoplasm of of peripheral nerves and autonomic nervous system	Connective and soft tissue	Conn. Tissue
C49	Malignant neoplasm of other connective and soft tissue		
C48	Malignant neoplasm of retroperitoneum and peritoneum	Others & Unspecified	O&U
C50	Malignant neoplasm of breast	Breast	Breast
C51	Malignant neoplasm of vulva	Vulva	Vulva
C52	Malignant neoplasm of vagina	Vagina	Vagina
C53	Malignant neoplasm of cervix uteri	Cervix Uteri	Cervix Uteri
C54	Malignant neoplasm of corpus uteri	Corpus Uteri	Corpus Uteri
C55	Malignant neoplasm of uterus, part unspecified	Uterus unspecified	Uterus Uns.
C56	Malignant neoplasm of ovary	Ovary	Ovary
C57	Malignant neoplasm of other and unspecified female genital organs	Other female genital organs	Oth. Fem. Gen.
C58	Malignant neoplasm of placenta	Placenta	Placenta
C60	Malignant neoplasm of penis	Penis	Penis
C61	Malignant neoplasm of prostate	Prostate	Prostate
C62	Malignant neoplasm of testis	Testis	Testis
C63	Malignant neoplasm of other and unspecified male genital organs	Other male genital organs	Oth. Male Org.
C64	Malignant neoplasm of kidney, except renal pelvis	Kidney	Kidney
C65	Malignant neoplasm of renal pelvis	Renal pelvis	Renal Pelvis
C66	Malignant neoplasm of ureter	Ureter	Ureter
C67	Malignant neoplasm of bladder	Bladder	Bladder
C68	Malignant neoplasm of other and unspecified urinary organs	Other urinary organs	Oth. Uri. Org.
C69	Malignant neoplasm of eye and adnexa	Eye	Eye
C70	Malignant neoplasm of meninges	Brain, Nervous system etc	Brain, NS.
C71	Malignant neoplasm of brain		
C72	Malignant neoplasm of spinal cord, cranial nerves and other parts		
C73	Malignant neoplasm of thyroid gland	Thyroid	Thyroid
C74	Malignant neoplasm of adrenal gland	Adrenal gland	Adrenal Gland
C75	Malignant neoplasm of other endocrine glands and related structures	Other endocrine	Oth. Endocrine
C76	Malignant neoplasm of other and ill -defined sites	Others & Unspecified	O&U
C81	Hodgkin's disease	Hodgkin's disease	Hodgkins Dis.
C82	Follicular (nodular) non-Hodgkin's lymphoma	Non-Hodgkin's lymphoma	NHL
C83	Diffuse non-Hodgkin's lymphoma		
C84	Peripheral and cutaneous T-cell lymphomas		
C85	Other and unspecified types of non-Hodgkin's lymphoma		
C96	Other and unspecified Malignant neoplasms of lymphoid, haematopoietic and related issue		
C88	Malignant immunoproliferative diseases	Immunoproliferative diseases	Imm. Dis.
C90	Multiple myeloma and malignant plasma cell neoplasms	Multiple myeloma	Multi. Myel.
C91	Lymphoid leukaemia	Lymphoid leukaemia	Lymph. Leuk.
C92	Myeloid leukaemia	Myeloid leukaemia	Myel. Leuk.
C93	Monocytic leukaemia		
C94	Other leukaemias of specified cell type		
C95	Leukaemia of unspecified cell type	Leukaemia unspecified	Leuk. Uns.

## Appendix IV

**List of States/Union Territories with code (according to Census of India, 2001) and acronyms used in figures of bar charts against names of districts.**

State Code	Name of State/Union Territory*	Acronym
1	Jammu & Kashmir	JK
2	Himachal Pradesh	HP
3	Punjab	PB
4	Chandigarh *	CH
5	Uttaranchal	UL
6	Haryana	HR
7	Delhi *	DL
8	Rajasthan	RJ
9	Uttar Pradesh	UP
10	Bihar	BH
11	Sikkim	SK
12	Arunachal Pradesh	AR
13	Nagaland	NL
14	Manipur	MR
15	Mizoram	MZ
16	Tripura	TR
17	Meghalaya	MG
18	Assam	AS

State Code	Name of State/Union Territory*	Acronym
19	West Bengal	WB
20	Jharkhand	JH
21	Orissa	OR
22	Chhatisgarh	CG
23	Madhya Pradesh	MP
24	Gujarat	GJ
25	Daman & Diu *	DD
26	Dadra & Nagar Haveli *	DN
27	Maharashtra	MH
28	Andhra Pradesh	AP
29	Karnataka	KA
30	Goa	GA
31	Lakshadweep *	LK
32	Kerala	KL
33	Tamil Nadu	TN
34	Pondicherry *	PY
35	Andaman & Nicobar Islands *	AN

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Dakshina Kannada (2924)	112	Palakkad (3206)	74
Darrang (1808)	60	Panchkula (601)	170
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B.J. Medical College, Pune (42)	388
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Dr. B. Borooah Cancer Institute, Guwahati (49)	312
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Sri Guru Ramadas Institute of Medical Sciences & Research, Amritsar (73)	438
Sri Ramachandra Medical College & Research Institute, Chennai (88)	428
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Sri Venkateswara Institute of Medical Sciences, Tirupati (132)	422
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