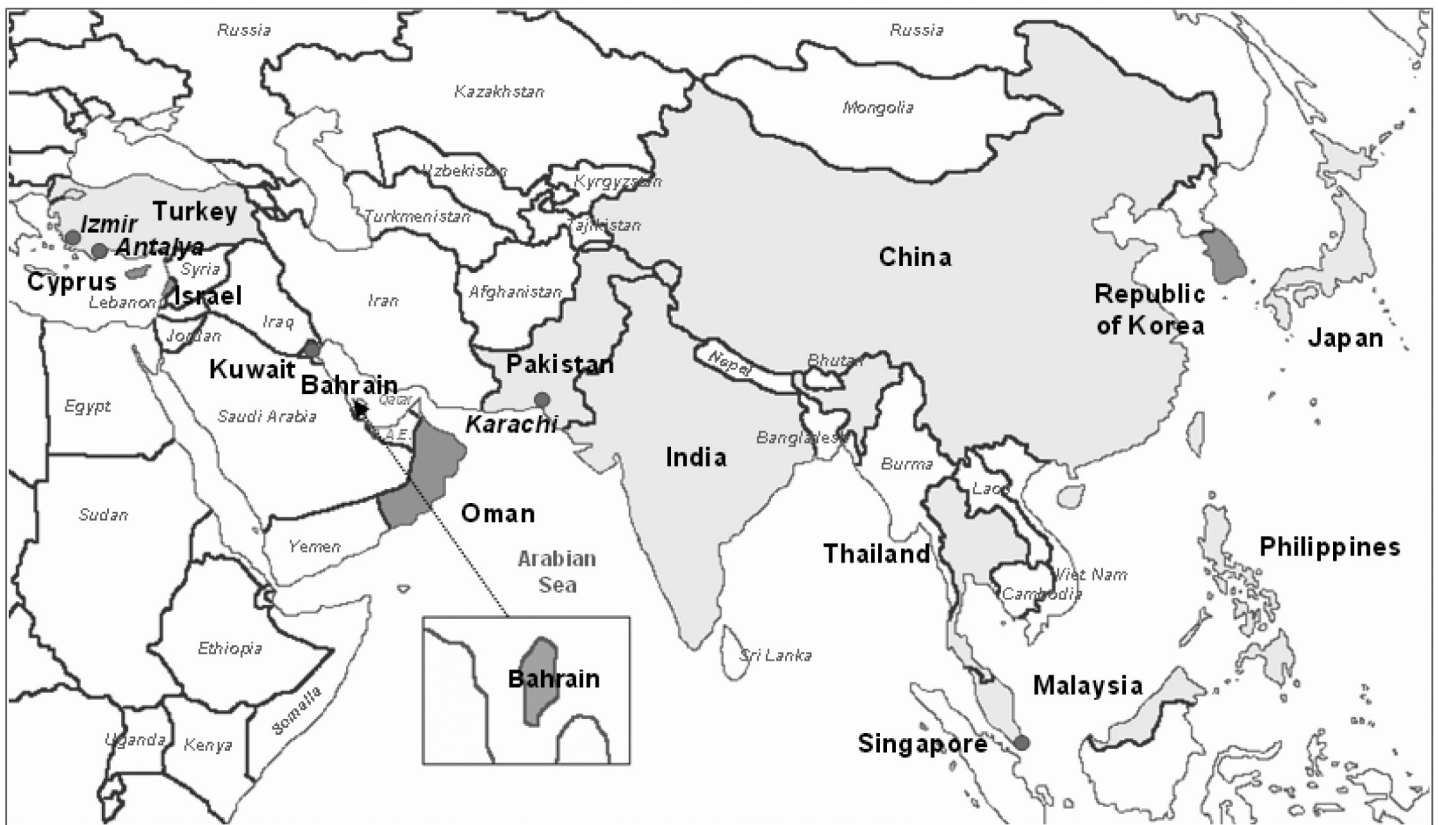
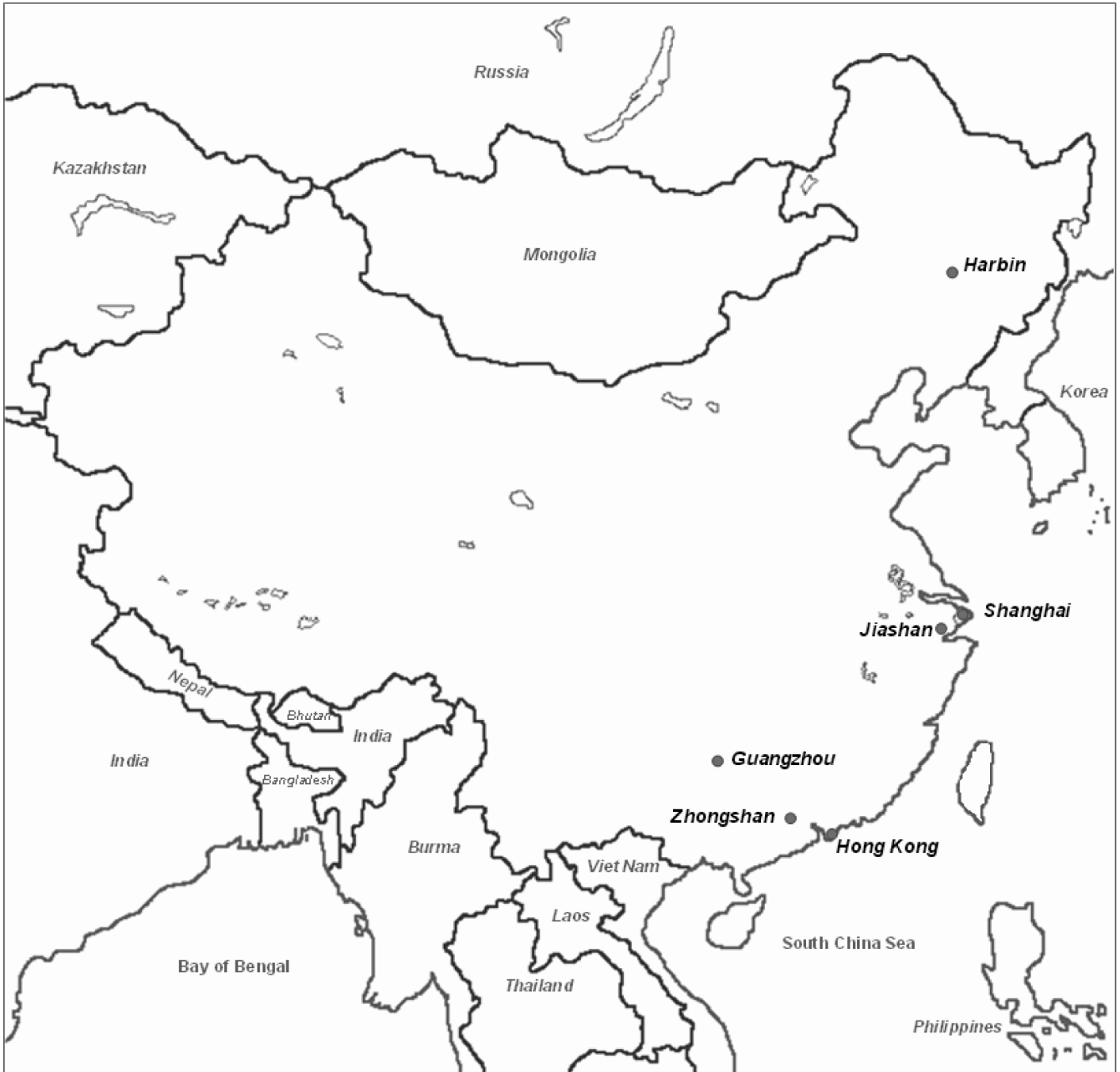


# Asia



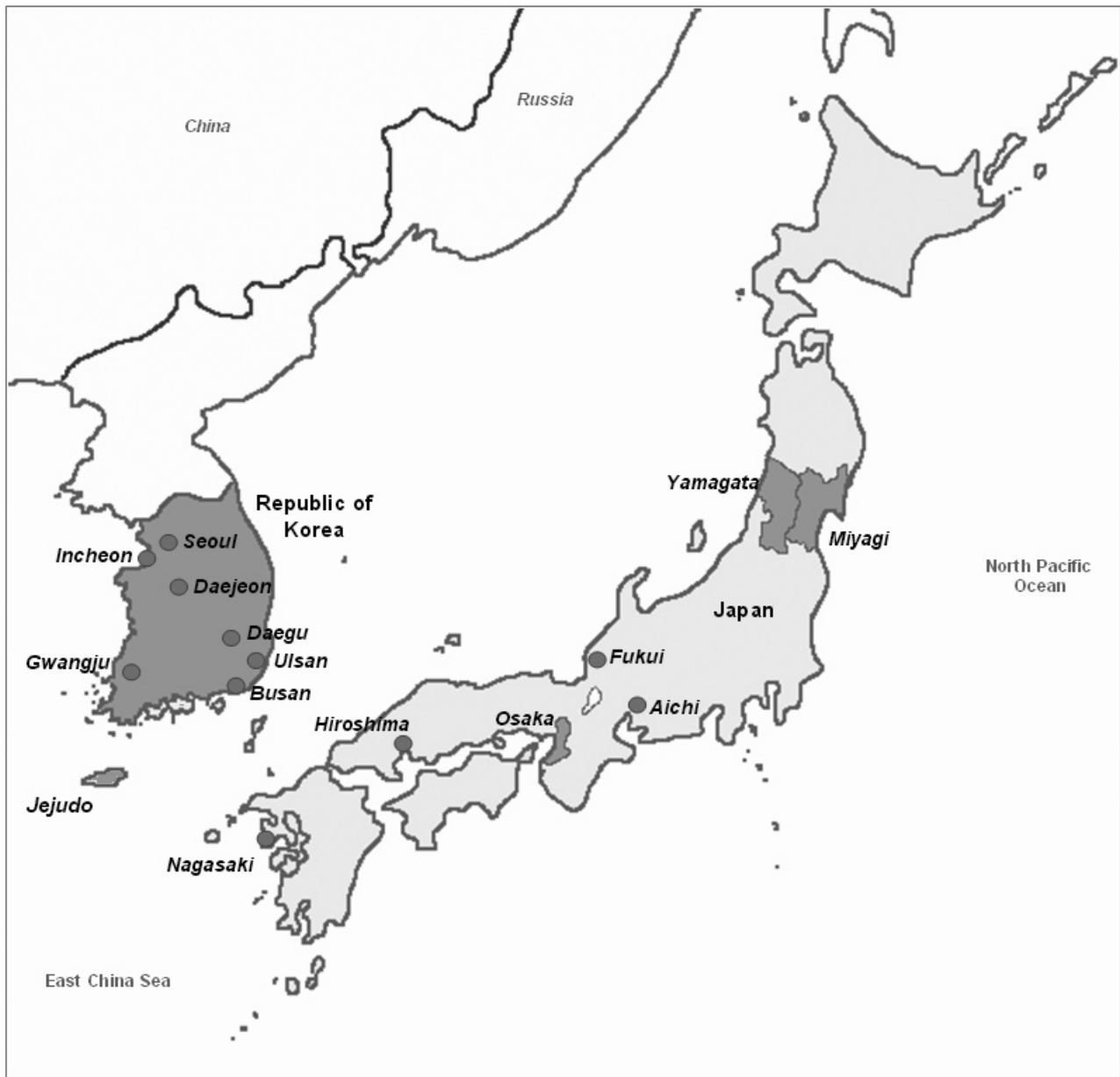
# China



# India



# Japan and Republic of Korea



# South-East Asia



# Bahrain

## Registration area

The Kingdom of Bahrain is located centrally on the southern shores of the Arabian Gulf, and comprises an archipelago with a total area of 717.5 km<sup>2</sup>. Bahrain Island is the largest of these islands, accounting for nearly 83% of the total area of the kingdom and the capital, Manama.

According to the 2001 census, the total population of Bahrain was 650 604 persons of whom 405 667 (62.4%) were Bahraini, and 244 937 non-Bahraini.

The growth rate between the 1991 and 2001 censuses was 2.7% for the total population, 2.5% for the Bahraini and 3.1% for non-Bahraini. The five-year average estimated mid-year population for 1998–2002 was 638 033 of whom 398 455 (62.5%) were Bahraini and 239 578 (37.5%) non-Bahraini. The majority of the non-Bahraini population (69.2%) are males, who form the major part of the workforce. This population is characterised by a very rapid turnover during the year, and their transitional nature could affect the interpretation of cancer occurrence.

## Cancer care facilities

The government provides high-standard comprehensive health care to residents, including public health, primary, secondary and tertiary care services. Primary healthcare is delivered through 22 well-equipped health centres distributed in all geographic regions. Secondary care is provided through the main government hospital, Salmaniya Medical Complex (SMC), recently expanded to house the new Oncology Services Centre equipped with the latest diagnostic and treatment technology including chemotherapy, radiotherapy, immunotherapy and bone marrow transplant.

The Royal Medical Services Hospital of the Bahrain Defense Force (BDF) is the second general secondary hospital, primarily serving Ministry of Defense employees and their families. Secondary care is also provided by six other private hospitals. Together, the government and private hospitals have a capacity of around 2000 beds and ratios of 22 doctors and 50 nurses per 10 000 population.

## Registry structure and methods

The Bahrain Cancer Registry (BCR) is a population-based registry covering all residents in the country. Per ministerial decree 5/1994 cancer became notifiable to the Cancer Registry Office, part of the Medical Review Office of the Ministry of Health. The registry is operated by a part-time epidemiologist and a part-time medical records technician working as a tumour registrar.

Cases are registered as having a malignant disease in the BCR whether microscopically or clinically diagnosed. Personal, clinical and tumour details are collected using

a specially designed registration form, and entered and checked for duplication and consistency using CANREG IV. Coding anatomical sites and morphology of tumours is according to the ICD-O-3.

In addition to passive notification, case finding is enhanced by several approaches. Clinical records of cancer patients admitted to SMC, the main source of cases, are sorted out at the Medical Record Department (MRD) upon discharge and checked for their registration status. The registrar visits the BDF Hospital periodically to review and identify lists of newly diagnosed cases.

The registry also receives regular cancer death notifications from the Birth and Death Registration Office at the Ministry of Health.

Death cases are cross-matched with the registered cases to sort out the unmatched cases, which are then followed back for any information on their malignancy and date of diagnosis. Those with insufficient clinical information or information not indicative of cancer are registered as "Death Certificate Only" (DCO) cases.

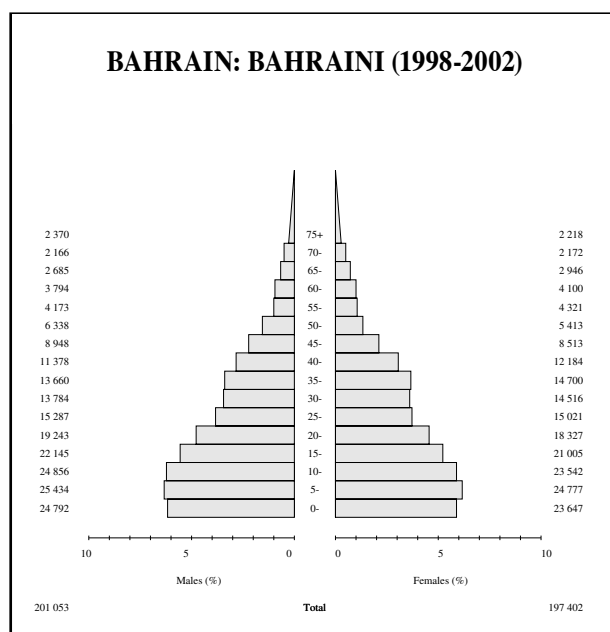
Using the check program, data are examined for duplicate registration as well as for illogical errors in the combinations of variables such as site-sex, site-morphology and age-morphology. Data are also examined for illogical combinations that cannot be captured by CANREG, such as morphology versus basis of diagnosis (e.g. leukaemia), behaviour versus stage codes (for in-situ), basis of diagnosis

versus status codes (for DCO) and morphology versus stage. Cases in which diagnosis was based on histology of metastasis (secondary site) are reviewed to ensure that the depicted site is for the suggested primary tumour.

Missing data on date of birth are replaced by the first two digits of the Central Population Register (CPR) number, which represents the year of birth. In this case the first day of January is designated to complete the full date of birth. Missing data for unknown primary site (PSU) and other variables are sought and recorded when found.

## Interpreting the results

Underreporting is expected especially for patients who might have sought treatment in private hospitals or abroad. However, Bahrain is a small country, and free cancer treatment facilities, especially radiotherapy, are located in one public hospital (SMC) providing good opportunity for capturing cases not known to the registry. Those seeking treatment abroad may eventually come to the SMC for further treatment or follow-up, or will be captured by the national and well established death register. The CANREG software has limitations in morphology descriptions of non-invasive cancer (e.g. *in situ* or non-infiltrating intraductal carcinoma); however, these can be identified by behaviour



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and stage codes. The problems of duplication and unknown age in Bahrain is minimal because of the unique identification number (the CPR number) that is assigned for each resident.

**Use of the data**

The registry produces regular statistical reports that show the distribution of different types of cancer according to age, gender and nationality. These reports are being utilised by health planners and policymakers to address the importance

of cancer problem, allocate resources and to evaluate cancer prevention and control activities.

**Source of population**

Medium projections based on the 2001 census. Central Informatics Organization.

**Multiple primary rules used**

IACR rules (2004) on CI5 IX period.

# China, Guangzhou City

## Registration area

Guangzhou is the largest city in southern part of China, with a population of about 7.25 million and an area of 7434.4 km<sup>2</sup>. It is the capital of Guangdong province and is situated at latitude 22°N and longitude 112°E.

The Guangzhou Cancer Registry covers the population of seven districts (central urban area) within Guangzhou city with an area of 1335.3 km<sup>2</sup>. The population was 3 560 810 in 2000, with people of the Han race making up more than 99%.

## Cancer care facilities

The Cancer Centre in Sun Yat-sen University is one of the largest cancer centres in China. It has more than 1000 beds and employs 1300 people. More than 40% of the cancer patients in Guangzhou are diagnosed and treated in the centre. There are national, provincial, municipal and district hospitals in Guangzhou, which provide radiotherapy, cancer surgery and chemotherapy services for cancer patients.

## Registry structure and methods

The registry is located within the Cancer Center, Sun Yat-sen University and is funded partly by the cancer centre and partly by the Guangzhou Health Bureau. There are 7 registrars in the registry.

Physicians and medical clerks in the hospitals of the registry area are responsible for filling out a report card for each newly diagnosed cancer patient. Each hospital has a special department to collect, check and send the cards to the registry on time. The quality of this work is checked

by the Guangzhou Health Bureau as a part of the medical quality control service in each hospital. The registry staff also periodically goes to review the patient records in all hospitals that are located in registry area in order to control report quality.

The registry staff check, code and file the cards according to year, sex, usual residence, ICD code, etc. Then the registry staff determines whether a patient has already been reported to the registry, so as to avoid duplication.

## Interpreting the results

Guangzhou has a full range of diagnostic facilities, so that it is unlikely that cases referred will be missed.

Screening service for cancer was not operated in Guangzhou in the period 2000–2002. PSA testing is not common in our population, being only carried out in urology departments of some hospitals.

## Use of the data

Cancer incidence and mortality data are provided to the Guangzhou government as a reference for planning projects in cancer prevention and control. The registry has also carried out some epidemiological studies based on the data from Guangzhou.

## Source of population

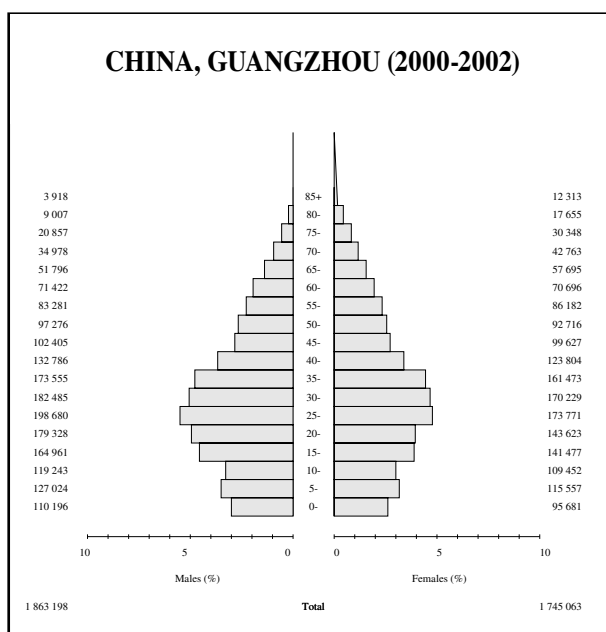
Projections based on 2000 census.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).





# China, Hong Kong

## Registration area

Situated in the south-eastern part of China, Hong Kong is one of the most densely populated places in the world with an average population density of 6,140 persons per km<sup>2</sup>. The population was about 6.78 million in mid-2004. About 93% are Chinese, mostly descendents from people of the Guangdong Province in southern China. Hong Kong Cancer Registry covers the entire population of the area.

## Cancer care facilities

The Hospital Authority (HA) is a statutory body to manage all public hospitals in Hong Kong. Clinical Oncology is a discipline of medicine that manages cancer patients by non-surgical means such as radiotherapy, chemotherapy, biological therapy and palliative care. There are currently six Clinical Oncology centres in the Hospital Authority. A few private hospitals also provide similar services.

## Registry structure and methods

The Registry is an official and professional body for population-based data collection in cancer epidemiology. It is currently run by one statistical analyst and four clerks in the Department of Clinical Oncology of Queen Elizabeth Hospital, Hospital Authority. The director is a specialist in Clinical Oncology who, apart from overseeing operations, provides regular input on the validity of clinical data.

The Registry obtains data through electronic means directly from clinical oncology centres, pathology laboratories and hospital discharge summaries of all public hospitals. For the private sector, the Registry has had a good working relationship with most cancer centres and pathology laboratories over the years. Near-complete coverage can be achieved within the territory. Voluntary notification nowadays contributes very little to the data pool. Death certificates are obtained from the Department of Health.

Cancer notification is by administrative order without a specific law in Hong Kong. The privacy of the cancer patient and the use of the related information are protected by the Government's Personal Data (Privacy) Ordinance. There is no personal contact with cases or patient follow-up by the registry staff.

The Registry evaluates the quality of incoming and output data using both automatic and manual review processes. Histological verification percentage (HV%) is one of the two internationally accepted indicators of data quality in cancer registries, and we achieved over 85% confirmation in recent

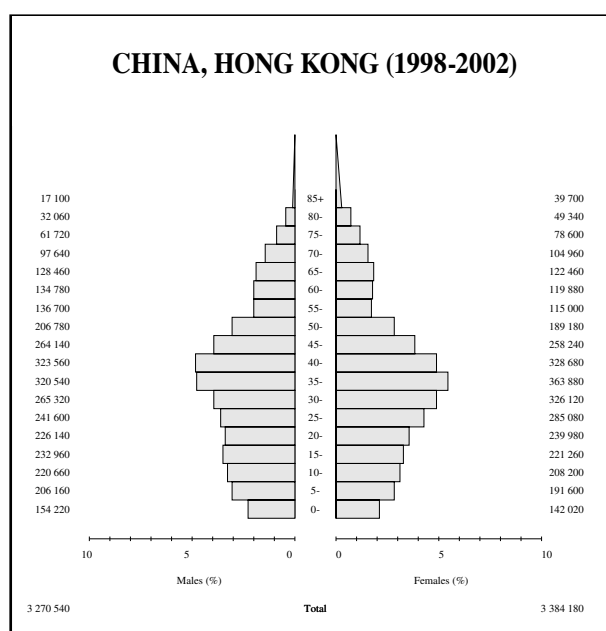
years. Death certificate only percentage (DCO%) is the other indicator. Our completeness in data collection is illustrated by the very low DCO% of 1.5% in 2003 against 7.6% in 1990.

The only organised mass screening programme (by Health authorities) is cervical cancer screening; PSA testing is not common in the population covered.

## Expanding the scope of data collection

Information Technology in Hospital Authority (HA) has contributed significantly to the Registry in recent years. The Registry was linked up with the Electronic Patient Record (ePR) System of HA in 2004. Since then, the registry has been able to collect histological data and staging information more comprehensively and easily.

On the other hand, death data are collected from the Death Registry of the Government. Previously death records other than cancer were not available to the registry because of legislative restrictions. The individual case record obtained was anonymous and without the unique identity number. Therefore survival analysis has not been part of the output of the registry. Since 2000 the death data has been linked with the Registry data, which helps minimise loss of patients to follow-up. The Registry can thus target compilation of a population-based survival analysis in the near future.



## Use of the data

The Registry updates annual reports of cancer incidence and mortality in electronic format on its website. Basic descriptive epidemiological analyses are included. Registry data are routinely used by officials, health professionals, cancer control groups and the public. The data are also extensively used by local researchers for various epidemiological studies.

## Source of population

1998–2000, 2002: Mid-year estimate produced by the Government's Census & Statistics Department.

2001: Population Census data produced by the Government's Census & Statistics Department.

## Multiple primary rules used

Impossible to detect multiple primaries.

## Notes on the data

For this registry, only ICD-9 3 digit categories were available.

# China, Jiashan

## Registration area

Jiashan County is located in the north of Zhejiang province, near Shanghai City. It is at latitude 30° N and longitude 120° E. The area of Jiashan County is about 506.6 km<sup>2</sup>; 14.3% of the county is covered by rivers and lakes. The average annual temperature is around 16° C.

Jiashan County is covered by flatlands with a network of waterways. About 80% of the population lives in rural areas. Population density in the county is 751 persons per km<sup>2</sup>. Agriculture is a major industry, and the main crops are rice, wheat and broad beans. The county once had a serious schistosomiasis epidemic, but the disease was eradicated in 1985.

Cancer accounted for 23.8% of all deaths in 1997.

## Cancer care facilities

There were 24 medical establishments, 1296 medical workers and 1135 hospital beds in the county at the end of 1997.

## Registry structure and methods

A population-based cancer registry was established in Jiashan County in 1987, according to documents of the Jiashan County Government and Health Bureau on reporting cancer incidence and mortality, and mortality from all causes. It is attached to the Jiashan Institute of Cancer Research.

In accordance with Jiashan County Health Bureau regulations, all medical establishments, whether hospital or clinic, must report new cases of cancer diagnosed, including benign tumours of the central nervous system, and cause of death for all diseases.

Physicians in healthcare departments of medical establishments in the county towns are charged with collecting report cards on cancer, which are completed by doctors in each ward and diagnostic service. Doctors of preventive medicine

in the rural area hospitals collect cancer cases in each village and filling in report cards. All the cards are sent to the cancer registry. After receiving the report cards, the doctors in the cancer registry check details by phone or by going to the source. Multiple cards on the same patient are merged, and cards for non-resident patients are removed. Physicians working in the cancer registry visit the medical establishments several times a year and inspect the reporting of cancer cases to assess quality and completeness. A meeting is held at the end of every year, with officers of the county health bureau, to discuss problems encountered in order to improve quality.

In 1991, two computers were purchased. Software for vital statistics and cancer reporting, produced by the Sanitary and Anti-Epidemic Station of Liaoning Province and recommended by the National Cancer Research and Control Office, was adopted.

## Use of the data

Data on cancer incidence, prevalence and mortality by sex, age and site are used in cancer prevention and treatment and for research into etiology.

## Source of population

The sex and age distribution of the population 1998–1999 was estimated by interpolation based the sex and age distributions of the 1990 and 2000 census populations. The sex and age distribution of the population 2001–2002 was estimated by extrapolation based on the sex and age

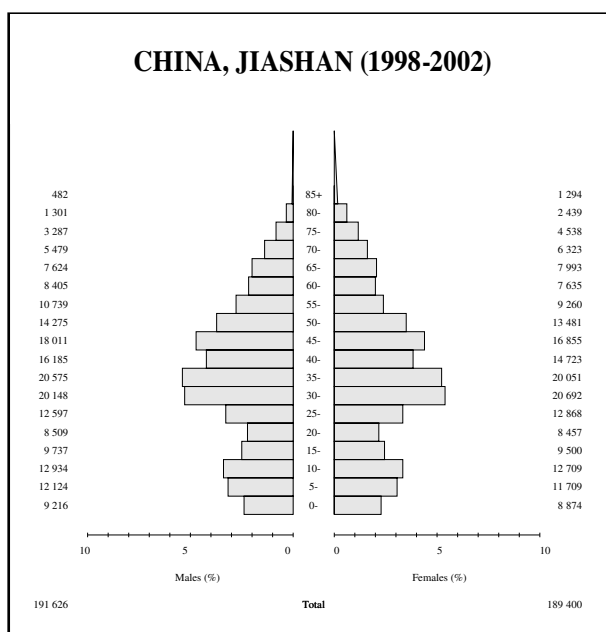
distribution of the 2000 census population.

## Multiple primary rules used

IACR rules (2000).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# China, Nangang District, Harbin City

## Registration area

Nangang district, located in the centre of Harbin, is the largest canton in Harbin and borders on the Daoli, Daowai, Xiangfang, Dongli and Pingfang districts. It lies within longitude 125°42' and 130°10'W, and latitude 44°04' and 46°40'N. It has a temperate zone continent/trade wind climate, with an average monthly rainfall of 38–68mm and average annual humidity of 65%. The total area of the district is 182.87 km<sup>2</sup>, including an urban area of 60 km<sup>2</sup>, which is one third of the total area of Harbin.

The population of Nangang is 1 001 377 persons, of which 90% are Han. The rural/urban breakdown is 61 146 and 940 231 persons respectively.

## Cancer care facilities

The following diagnostic facilities are available in the area: clinical, surgical, pathology, radioactive x-ray, supravital, CT scan, bone marrow aspiration and autopsy. Chemotherapy, radiotherapy, surgery, Chinese medical science and immunization are the treatments available to the community.

## Registry structure and methods

The Harbin cancer registry office was established in 1997, comprising the people of Nangang district, which includes 18 community offices in 3 counties and 1 town. It is located in the chronic faculty of the Nangang disease prevention and control centre, with the supervision of the Nangang board of health. The office is in charge of the registration and reporting of newly acquired malignant tumours and carcinoids of the central nervous system among permanent residents in the district. The administrative obligatory report system is used in the office. The office now has 2 full-time and part-time clerks.

All personnel providing health care at all levels in Harbin are required to complete a report card and submit it to the supervising epidemic prevention station if they diagnose a malignant tumour. Malignant tumour death reports are to be submitted with data on the cause of death.

All healthcare personnel are also required to complete the death report card as well as the medical certificate of death. At present, follow-up visits are limited to tumour death cases, and family doctors in the community health service centre complete the tumour follow-up table. This measure has been in place for three years. The Nangang district includes 1 tumour professional hospital, 6 large polyclinics, and 109 medical units in 23 medium-sized polyclinics. The tumour report cards are catalogued according to administrative

area, pinyin and kinds of diseases and after coordination and elimination; they are coded according to the international disease classification ICD-10 and reserved in the tumour cards tank. Computers manage and analyse the data, and all tasks of the registry office are now computerised.

## Use of the data

Data accumulated through the years have been used in epidemiological research, cancer trend prediction and research on cancer control policies and counter-measures. Since the tumour reporting system was established in 1997, we have accumulated malignant tumour occurrence and death data from 1990 to 2001 in Nangang district.

These data play a vital role in tumour prevention and treatment as well as scientific research, and have been used in 10 articles published in *China Fundamental Medical Care, Public Hygiene and Management of China Public Hygiene*. In the framework of the "Ninety-Five" National Science and Technology Innovation Programme, we have submitted basic and statistical data of tumour registration reports to some relevant faculties. Malignant tumour occurrence and death data from 1990 and 1992 were published in the book *The Occurrence and Death of Malignant Tumor in Experimental Cities in China*.

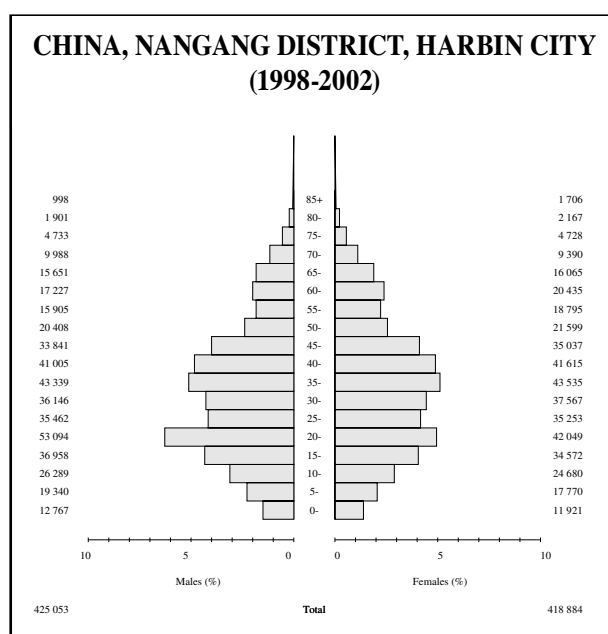
Data on tumour occurrence and death during 1993 and 1997 in Nangang district have

been constantly used by *Malignant Tumor Occurrence and Death* (93-97 volume) of 11 experimental cities around the country; occurrence and death data during 1998 and 2002 have been used in the compiled book of volume. The data are an important component of the project *The Research of Common Malignant Tumor Occurrence, Death and Dangerous Factors Monitoring Method*, which is the product of many years of hard work; it will be of vital importance in future cancer control projects, hygiene projects, hygiene cause planning, and investigations of cancer prevalence.

It is believed that with time, these data can play more important roles. With support from health policy leaders at various levels, and with continued effort from the staff, the Nangang tumour registry office can be expected to achieve greater coverage and completeness, and will contribute richer and more accurate data for cancer prevention and control in the future.

## Multiple primary rules used

Impossible to detect multiple primaries.



# China, Shanghai

## Registration area

Shanghai is situated on the east coast of China at 31°14' N latitude and 121°29' E longitude. The total area of Shanghai Municipality is 6340.5 km<sup>2</sup>. There are about 13.52 million inhabitants in the municipality. The registration area during 1998–2002 covered nine urban districts with an area of about 289.4 km<sup>2</sup> and 6.19 million inhabitants, 99.1% of whom are Han Chinese. Ninety-five percent of the population are non-religious; the other 5% are Buddhists, Taoists, Islamites and Christians. Most of the population is immigrants from all over China, mainly from neighbouring Zhe Jiang and Jiang Su Provinces.

## Cancer care facilities

Shanghai has a 3-level general health care network, including more than 400 hospitals and community health service centres. The first-level facilities are all the community health service centres providing predominantly primary health care. The second-level facilities are the district hospitals, most of which have a Cancer Department. The third-level facilities are all the municipal hospitals and the Shanghai Cancer Hospital. Most of the second- and third-level facilities provide radiotherapy, cancer surgery and chemotherapy services.

## Registry structure and methods

Organisation of the Shanghai Cancer Registry is now based upon a 3-level network of disease prevention and control. The first level is the Registry of Shanghai CDC. The staff of this level consists of 2 senior and 3 junior epidemiologists, 2 statisticians and 1 assistant statistician. The second level consists of CDCs in 19 districts. In each district CDC, 1–2 epidemiologists and 1 assistant are responsible for cancer registration. The third level consists of 207 community health service centres. There are 1–2 workers responsible for home visit and data checking; most of them are community GPs.

Shanghai Cancer Registry is a population-based cancer registry that collects, analyses and disseminates information on cancer incidence, mortality and survival in the Shanghai urban area. The registry was established and started operating in 1963. The registry became essentially population-based by 1972, and complete incidence and mortality data for the urban area in Shanghai Municipality are available from 1973 onward. The registry was operated by the Shanghai Cancer Institute before 2002, when it moved to Shanghai Municipal Centre for Disease Control and Prevention.

All second- and third-level medical facilities (about 170 units) in Shanghai are responsible for notifying all newly diagnosed cancer cases and cases of benign tumours of the central nervous system to the registry. A standardised

notification card, which includes demographic information, cancer site, date and basis of cancer diagnosis, is used for reporting cancer cases. The notifications are sent to the cancer registry and filed according to the name of the patient and administrative district of residence. Home visits are carried out for every case to confirm if the cancer patient is a permanent resident. All patients residing outside the registration area are deleted from the cancer registry.

Data on cancer notification cards are computerised using specially-designed computer software that directly reads Chinese characters. Cards with similar contents are examined by registry staff and duplicates are deleted.

Death certificates for all cancer patients are obtained monthly from the Vital Statistics Section of the Shanghai Municipal Center for Disease Control and Prevention and collated with the file of new cases kept in the registry. If the deceased was not registered prior to death, the registry staff interviews the relatives of the case to obtain information on the hospital where the case was diagnosed and treated, date and basis of cancer diagnosis.

## Interpreting the results

For a long time the Registry collected information on new cancer cases only in the urban area, and in suburban and rural areas of Shanghai collected information only on cancer deaths. The urban area expanded from 159 km<sup>2</sup> to

289 km<sup>2</sup> over the past 30 years, and the population increased from about 5.7 million to 6.3 million.

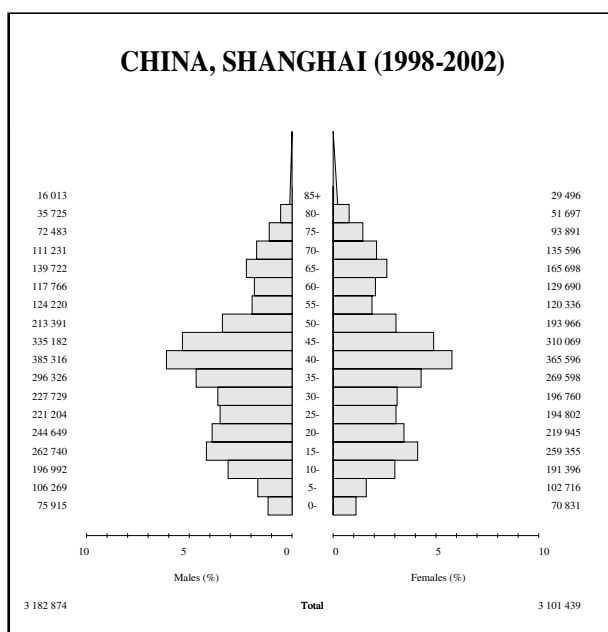
In the past 30 years the number of hospitals responsible for cancer cases increased from 117 to 175 in Shanghai. Shanghai is one of the areas with the highest level of cancer diagnosis and treatment in China. Almost all of the cancer patients in urban area covered by our Registry are diagnosed and treated in those hospitals.

A mass screening programme on cervical cancer with Pap smear examination began in urban Shanghai in the late 1950s. All employed women have a Pap smear every 2 years, provided by local maternal hospitals and paid for by both the government and the employer. Almost all of the hospitals in Shanghai can provide PSA testing when necessary, but there is no mass PSA testing programme screening for prostate cancer.

The anatomic sites of cancer cases were coded using both ICD-9 and ICD-10 from 1998 to 2001 and using only ICD-10 since 2002. The histology and behaviour have been coded using ICD-O-2 since 2002.

## Use of the data

The registry provides a Shanghai Cancer Report annually to the government, institutes and hospitals. The report



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helps to establish cancer prevention plan and policy. The report also provides basic cancer information to support community cancer control and prevention activities, such as community-based cancer patient care services. More than 20 case-control and cohort studies have been conducted in the past 30 years using Shanghai Cancer Registry data.

**Source of population**

1998, 1999: Interpolated by the sex and age distribution of the population of the 1996 and 2000 census data. 2000: census.

2001, 2002: Extrapolated by the sex and age distribution of the population in the 2000 census.

**Multiple primary rules used**

IACR rules (1990).

**Notes on the data**

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation). This registry has the lowest histological verification rate in the monograph.

# China, Zhongshan

## Registration area

Located at the mid-southern part of Canton in the hinterland of the Pearl River delta, the Zhongshan cancer registry covers 1683 km<sup>2</sup> and includes the population of 24 towns and districts. In 2000, the population of Zhongshan was 1 360 302, about 45% of whom lived in urban areas. Most Zhongshan residents practice Buddhism, Daoism, or Christianity.

## Cancer care facilities

The city hygiene bureau, through all kinds of hospitals, clinics and the CDC, provides health care in Zhongshan. Private practitioners are relatively few in the region. Although there are not any independent cancer centres or hospitals in Zhongshan, several large comprehensive hospitals have cancer departments that provide surgery and chemotherapy service for cancer patients. Only the Municipal People's Hospital has radiotherapy facilities, to which all cancer patients in Zhongshan are referred when radiotherapy is necessary. For differing reasons, some cancer patients will go to hospitals of neighbouring cities such as Guangzhou for diagnosis or treatment.

## Registry structure and methods

The Zhongshan cancer registry is affiliated with Zhongshan People's Hospital, and is funded by the hospital and the municipal and provincial health departments. One full-time medical officer and two full-time registrars staff the registry. Each hospital in Zhongshan has a part-time registrar to help collect cancer data and to follow up cancer patients.

Passive and active registration methods are used in Zhongshan cancer registry. The active case finding method is the major means of finding new cancer cases, as more and more doctors do not notify cancer cases on their own initiative.

The registrars identify cancer cases from all possible sources, such as medical record departments, pathology departments, bone marrow test laboratories, radiotherapy departments, the death registry, etc. All cancer data are collected and sent to Zhongshan cancer registry, where an experienced registrar first checks the data to see if it is a duplicate case, is missing any important items or has any logic mistakes. If everything is acceptable, the cancer data are coded and entered on computer for storage and analysis, and the notifying card is stored in the data room. If not, the data are traced back to correct or complete the faulty or missed information.

Arrangements are also made with the hospitals outside the registration area to notify the registry of any resident cancer cases that they diagnosed or treat; they are visited once a year to review these procedures. Data are evaluated according to the IARC and the Cancer Prevention and Treatment Office of China rules.

## Interpreting the results

Theoretically all cancer data should be reported to Zhongshan cancer registry if all cancer patients go to hospitals for diagnosis and treatment. But some patients do not want it known they are ill with cancer, and use a false address or name; these patients are very often missed. Some foreign cancer patients use the local address when asked to provide their place of residence, which results in the cancer patient being mistakenly identified as a native cancer patient.

As Zhongshan is one of the areas with high incidence of and mortality from nasopharyngeal cancer in China, in 1986 we screened more than 42 000 natives aged 25–65 in 16 of 34 towns in Zhongshan using EBV VCA/IGA and EA/IGA immuno-enzyme serological tests; most of them were followed up until 2000.

PSA testing is part of routine hospital checkups, and almost every hospital in Zhongshan provides it.

Before 1990, liver trematode disease, cirrhosis and bile duct cancer were very common in Zhongshan due to special fish breeding methods and the local diet that includes uncooked fish meat. Since then fish breeding methods and the habit of eating uncooked fish meat have changed, and the incidence of those diseases decreased greatly. In recent years, with the progression of industrialisation, urbanisation and heavy transportation,

environmental pollution has worsened, which may influence cancer incidence and mortality in Zhongshan.

## Use of the data

The registry prepares an annual report of cancer incidence, highlighting trends and changes. Some special studies of survival of registered cancer cases (nasopharyngeal and lung cancer) have been carried out, and we are now collaborating with Queen Mary Hospital of Hong Kong to explore new serological screening tests of nasopharyngeal carcinoma. Zhongshan policymakers are paying increased attention to health problems, and refer to our cancer registry data when making health policy.

## Source of population

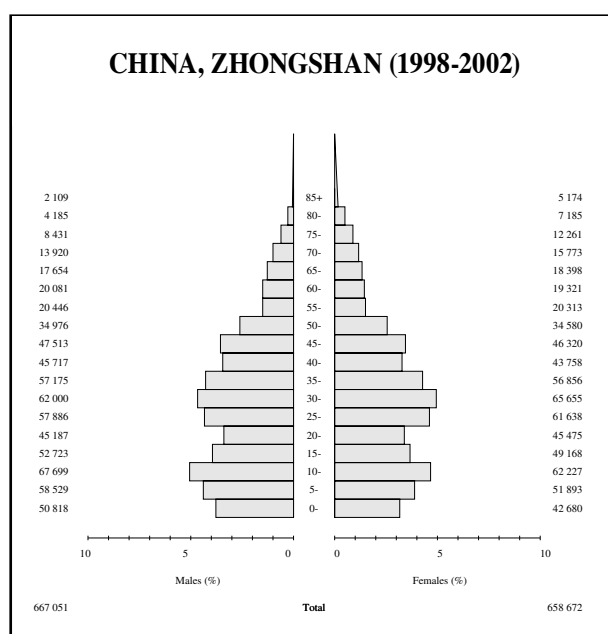
The age group proportion of 2000 was obtained through census. Other population data were estimated accordingly.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# Cyprus

## Registration area

The Cyprus Cancer Registry covers the population of five districts (Nicosia, Limassol, Larnaka, Paphos and Famagusta). The population in the government-controlled areas was 715 100 in 2002.

## Cancer care facilities

General health care in Cyprus is provided by both the Ministry of Health through the district hospitals and the primary health care centres and through the private sector. The Bank of Cyprus Oncology Center, a non-profit organisation funded by the Government provides healthcare services to cancer patients. The services provided at the oncology centre include radiotherapy, chemotherapy and hormonotherapy.

## Registry structure and methods

The Registry is co-funded by the Ministry of Health and the Middle East Cancer Consortium (MECC). Its main offices are located within the Ministry of Health. It comes under the supervision of the Chief Health Officer and it is staffed by three full-time registrars.

The Cyprus Cancer Registry (CyCR) uses active case finding from various sources, mainly (a) general hospitals' in-patient records, and inpatient and outpatient facilities in each district, (b) the bank of Cyprus Oncology Center, (c) the private sector hospitals inpatient and outpatient facilities, (d) pathology laboratories, (e) haematology laboratories and (f) cytology department. The

death registration system is inadequate and incomplete for the time being. A restructuring of the death registration system is currently underway.

The registry staff visits all sources and scrutinises the records kept in the medical records departments and registers of individual departments concerned with diagnosis and treatment of cancers, in order to identify and abstract information on cases of cancer diagnosed by all methods among residents of the registry coverage area. Cancer is not currently a notifiable disease in Cyprus.

## Interpreting the results

Estimation of the completeness and accuracy of data is performed by external quality control group. A breast cancer screening program has been operating since 2003; screening is provided by the Ministry of Health free of charge to all women between the ages of 50–69.

The data provided in Volume IX includes all foreigners registered in the CyCR, which is not the case in our cancer report.

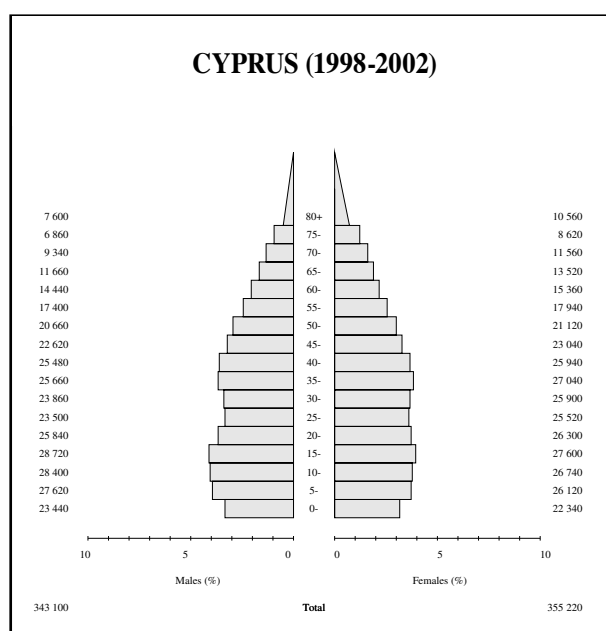
## Use of the data

The Registry prepares a triennial report of cancer incidence, highlighting trends and changes.

## Multiple primary rules used IACR rules (2000)

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# India, Chennai (Madras)

## Registration area

The Madras Metropolitan Tumour Registry (MMTR), a population-based cancer registry, was established at the Cancer Institute (WIA) in 1981 in the network of the National Cancer Registry Programme (NCRP) of Indian Council of Medical Research, New Delhi, to study patterns and trends in cancer incidence and mortality in Chennai City (formerly Madras). Data collection commenced 1<sup>st</sup> January 1982.

The city of Chennai is situated at sea level on the Coromandel coast of peninsular India at latitude 13.04° N and longitude 80.17°E. The MMTR caters to an area of 170 km<sup>2</sup> and a population (entirely urban) of 4.3 million (957 females to 1000 males) as on 1<sup>st</sup> March 2001, constituting 0.4% and 7.0% of the total population of India and the state of Tamil Nadu respectively. The decadal population growth rate during 1991–2001 was 13.07%, and the population density was estimated to be 24 964 persons/km<sup>2</sup>. The literacy rate is 85% (M: 90%; F: 80%) and the predominantly spoken language is Tamil. The majority are Hindus (82%) followed by Muslims (9%) and Christians (8%), with the rest belonging to other religious groups (1%).

## Cancer care facilities

General health care, including cancer diagnostic and treatment facilities, is provided by the government health service, the Cancer Institute (WIA), which is a Regional Cancer Centre in Ministry of Health and Family Welfare, Government of India and supplemented by private practitioners and hospitals. The Radiation Oncology division at the Cancer Institute (WIA) is one of the best equipped centres in India. Radiation facilities are also available in four Government and five private hospitals. Surgical and Chemotherapeutic services are offered in government and private hospitals and nursing homes.

## Registry structure and methods

The MMTR, besides a Principal Investigator, comprises a medical officer, two statisticians, a computer programmer, ten social workers and a data entry operator. Cancer is not a notifiable disease in India; therefore registration of cases is done actively.

The registry continues to enjoy good cooperation from all healthcare facilities in and around Chennai, with more than 225 sources of registration to date: government and private hospitals, nursing homes, clinics, consultants, pathology laboratories, imaging centres and hospices.

The Social Scientists of the registry visit the collaborating hospitals regularly and collect data on cancer by interviewing the cases wherever possible and/or medical records. Deficient medical records are updated via linkage of data collected

from various departments within a hospital for completeness of details.

Mortality information on all deaths occurring in the city, irrespective of the cause of death stated on the death certificate, is collected from the Vital Statistics Division (VSD) of the Corporation of Chennai.

Management of data has been progressively computerised to minimize the manual work, resulting in the enhancement of data quality. Reliability of data and quality of registration are constantly monitored, with emphasis on re-abstraction and coding on a random sample of cases and case finding. Validity checks are done using IARC, NCRP and other in-house developed computer programs.

## Interpreting the results & use of the data

The completeness of registration of cancer cases in MMTR is estimated to be 96%. Cancer information is disseminated by publishing periodic reports and descriptive epidemiological studies on cancer incidence and mortality highlighting the trends and patterns.

MMTR has been the pioneer in many registry-related activities in India: systematic trace-back of death certificate notifications, active follow-up of registered cases, collection of mortality data and survival analysis of top ten cancers.

A new registry known as the Dindigul Ambilikkaai Cancer Registry, covering

a population of 2 million, was started in 2004 to provide reliable data on cancer incidence in rural area and to evaluate the randomised field intervention trial on cervix cancer under the auspices of the International Agency for Research on Cancer, France.

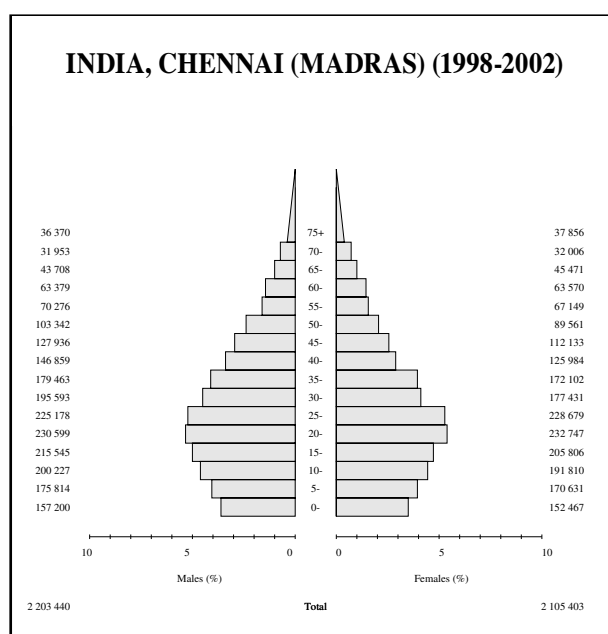
MMTR provides data to the ICMR project on "Development of an Atlas of Cancer in India". It is also involved in a population-screening program on cancers of the cervix, breast and oral cavity that is conducted by the Cancer Institute (WIA) in the neighbourhood.

## Source of population

Estimated for 1998–2000 & projected for 2001 & 2002. Population estimates by five-year age groups according to sex by difference distribution method using exponential growth rate between 1991 & 2001 census populations of Chennai city. Census of India 1991. Socio – Cultural Tables Vol. I Series 23, Tamil Nadu, Part IV A – C Series. Directorate of Census Operations, Tamil Nadu 1997. Census of India 2001. Report and Tables on Age. Tamil Nadu, C–14 Series. Directorate of Census Operations, Tamil Nadu 2005.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.





# India, Karunagapally

## Registration area

The Cancer Registry Karunagapally, India is located in the Kollam District of Kerala, situated around 9° N latitude and 77° E longitude. The area is rural as per census definition; geographically, it is lowlands with backwaters and coastlines. The Registry area covers 212 km<sup>2</sup> (land area 193 km<sup>2</sup>) covering the total taluk of Karunagapally with a population density of over 2000/km<sup>2</sup>. The coastal belt of this taluk is known worldwide for its rich deposits of rare earth mineral sands containing radioactive materials, mainly thorium. About 100 000 people are constantly exposed to this radiation. Population is more or less stable, and the majority are agricultural labourers, fishermen, coir labourers, etc. 99% of the people live in rural areas and 1% in semi-urban area. Births & deaths occurring in the Panchayats are registered in the respective Panchayat offices.

The three major religions are Hindus, Christians and Muslims. The population at the 1991 census was 383 514 (189 647 males and 193 867 females). There has been no change in area or population covered by the registry since its initiation in 1990.

## Cancer care facilities

Health Care Services in Karunagapally taluk is provided mainly by State Health & Family Welfare Department through a Taluk Headquarters Hospital, 12 Primary Health Centres and few sub-centres. There are several Private Hospitals and Medical Practitioners in the area.

Regional Cancer Centre in Thiruvananthapuram located 100 km away and Alappuzha Medical College Hospital 65 km away are the two nearest cancer treatment centres offering cancer care and treatment facilities.

There are no cancer detection facilities or dedicated cancer treatment facilities in the area except cytology detection facilities, pain clinics and supportive clinics offered by the registry with the technical help of Regional Cancer Center, Thiruvananthapuram. There are no added diagnostic facilities like PSA testing in this area, and the only regular screening procedure available was Pap smear screening programs.

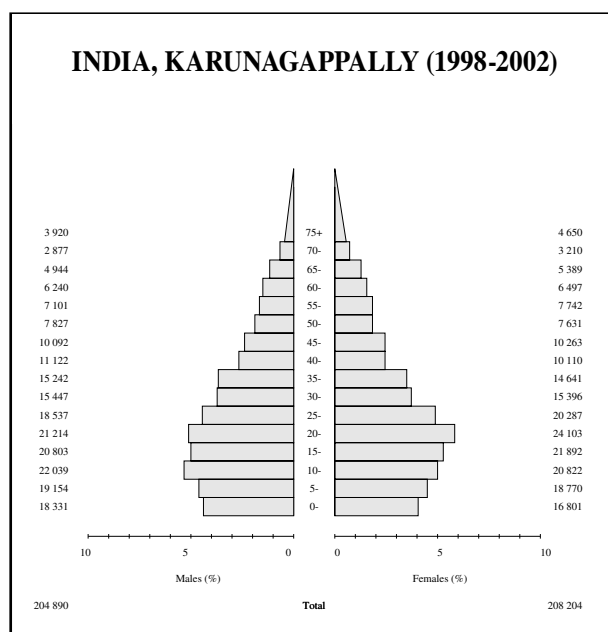
## Registry structure and methods

Regional Cancer Centre, the comprehensive cancer treatment centre of Kerala, started Cancer Registry, Karunagapally as a special purpose registry in 1990. The Registry's main objective is to study cancer occurrence and its relation to the natural radiation present in the sea coast of Karunagapally taluk. The registry office is located in Neendakara. The study and the Registry were initiated in 1990 with the support of Department of Atomic Energy, and since 1999 it has

continued with funding from Health Research Foundation, Japan & Local Area Development fund, Government of Kerala. Registry staff includes one Research Officer from RCC, 6 Field Investigators, 3 Data Processing Assistants and one Statistician.

We adopted active cancer case finding method for Cancer Registration, as cancer is not a notifiable disease here. The field investigators scrutinise medical records of several hospitals to locate cancer cases. More than 60 sources including Regional Cancer Centre, Medical College Hospital Thiruvananthapuram, District Hospital Kollam and Taluk Hospital and other Government hospitals in Karunagapally are visited regularly. Major

private hospitals in the registry area and nearby Kollam town are also visited regularly for case finding. Further, records maintained by Pathological laboratories in Kollam District and Thiruvananthapuram and also of the Vital Statistics division of the local panchayats and Kollam Municipal Corporation are scrutinised to locate cases from the panchayat. Investigators abstract cancer cases diagnosed by all methods among residents of the registry area. Medical Practitioners give details about the cancer cases seen in outpatient clinics. Systematised field visits are done in the registry area to locate these cases. Death registers are available in Vital



Statistics Division of the panchayats but the information is not adequate for scientific purposes. We trace back all the deaths in the community through house visits and obtain relevant information about cause of death etc. Autopsies are extremely rare, restricted to medico-legal cases. The collected data are processed and computerised after duplicate elimination and checked for consistency using a computer programme. Regular evaluatory procedures are done to ensure accuracy of the registry data.

The radiation effects study has progressed from 1999 onwards based on a cohort approach. A radiation cohort with high radiation and a control cohort with low radiation exposure were selected, and the study was pursued with individual dose estimation and special surveys like migration, occupancy, and mortality for in-depth analysis and estimation.

## Interpreting the results

The Registry office has a well-equipped cytology laboratory, and weekly detection clinics are run by the registry in Government Taluk Headquarters Hospital. This increased the microscopically verified percentage of cases. Cancer follow-up clinics, pain & palliative care services, field detection clinics and Pap screening programmes were organised by

the Registry in which doctors from RCC participated. Thus cancer cases diagnosed in this area will not be missed due to intensive casefinding methods including house-to-house visits in the registry area.

**Use of the data**

The main objective of the data is research on the effects of chronic exposure to the natural radiation. Cancer control measures and cancer patient services are developed in the registry area using the registry data. Studies are ongoing for population-based survival and mortality data analysis. The registry annually prepares reports on cancer incidence highlighting trends and changes.

**Source of population**

The Governmental census population data of 1981, 1991 and 2001 were available. The growth rate between 1991 and 2001 in rural Kollam was 7.99%, which was lower than the growth rate between 1981–1991 (10.68%). Age-specific census data of 2001 was not available for Karunagappally Taluk. The 1991–2001 growth rate was applied to each group of 1991 estimated Karunagappally population and using exponential growth rate, the population by age and sex as on July 2000 was obtained.

**Multiple primary rules used**

Impossible to detect multiple primaries.

# India, Mumbai (Bombay)

## Registration area

The Mumbai (Bombay) registry covers the resident population of Greater Mumbai, a densely-populated metropolis on the west coast of India, occupying an area of 437.7 km<sup>2</sup> between latitudes 18–19° N and longitudes 70–71° E. Greater Mumbai is in fact an island joined to the mainland by bridges, and has a warm, humid climate.

The population of Greater Mumbai as per 2001 census (1<sup>st</sup> March) was 11.9 million with a sex ratio of 811 females per 1000 males. It has a density of 2220 inhabitants per km<sup>2</sup>, making it the most populated district in the country. The decennial growth rates of the population between 1991 and 2001 were in the order of 20.2. The literacy rate was found to be 87%.

The city is the industrial heart of India. As a result of continuing immigration it has multi religious and multilingual population representing every state in the Union, approximately 67.4% being Hindus, 18.6% Muslims, 3.7% Christians, 5.2% Neo-Buddhists and 3.7% Jains, 0.5% Parsis and 0.6% Sikhs.

## Cancer care facilities

Municipal Corporation and State Government maintain the majority of hospitals in Mumbai and the major source of the data is the Tata Memorial Center, which is a postgraduate university teaching centre for cancer research. The City has five medical colleges. The diagnosis and treatment of cancer is centralised in certain hospitals. Major cancer surgery is undertaken in all the major hospitals and well-equipped private nursing homes. Facilities for cobalt-60 are available in 9 hospitals, while ultra-voltage deep x-ray therapy is available in 15 hospitals.

A total of about 30 000 hospital beds are available in the registration area. There have been improvements in diagnostic facilities, as new hospitals have immersed with histopathology and imaging facilities in registration areas. Radiotherapy departments have also increased from 2 to 9 hospitals. Chemotherapy is available in many new hospitals.

## Registry structure and methods

The Mumbai cancer registry was established in June 1963 as a unit of the Indian Cancer Society with the aim of obtaining reliable incidence and mortality on cancer from a precisely defined urban population. Compilation of data began in 1964. Until then, no continuing activity on registration of cancer cases in a population had been undertaken in India. The registry started in collaboration with and up to 1975 received financial support from the Biometry branch of the US National Cancer Institute. During 1976–80 the registry received financial support from the Department of Science & Technology, of the Government of India and the Indian Cancer Society. Since 1981–82, the registry has been funded in part by the Indian Council of Medical Research.

The registry staff consists of a Deputy Director who looks after the day-to-day administration, prepares research articles and annual reports, attends National & International conferences etc.; social investigators (12 involved in data collection); research assistants (6 Editing and Coding); two data entry operators; a programmer; an office superintendent and two attendants.

Information is obtained on all cancer patients registered in 160 Government hospitals/institutions and private hospitals/nursing homes in Mumbai who are under the care of a specialist. General Medical Practitioners are not contacted individually as according to local practice. Only specialists assume charge of cancer patients in private hospitals and nursing homes, and even the few patients not admitted for hospital care are at some stage referred to a specialist.

Staff members of the registry visit the wards of all co-operating hospitals at least weekly to personally interview each cancer patient as well as those suspected of having cancer. All files maintained by the various departments of these hospitals are crosschecked individually. Care is taken to prevent duplication of an entry relating to a patient already registered.

With the exception of Tata Memorial Hospital for cancer, hospital outpatient records are not included in the registry files, because of the paucity of clinical details and the lack of specific information on the residential status of patients attending these clinics. Supplementary information is gleaned from the death records maintained by the Municipal Corporation.

The registry records follow-up information for almost all major sites.

Already we have carried out two special studies on the evolution of the completeness and accuracy of the data.

## Interpreting the results

There are no screening programmes underway in the area covered. Tobacco chewing is very prevalent in both sexes. Smoking, particularly bidi, is prevalent in males but almost nil in females.

## Use of the data

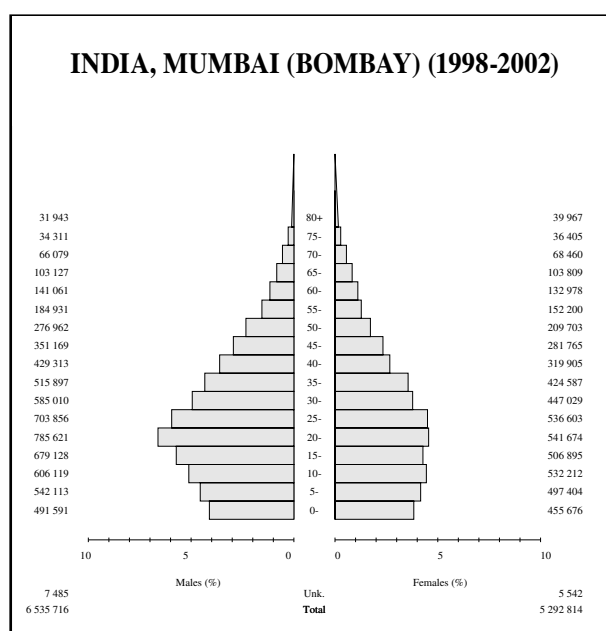
The registry publishes annual reports, and has published numerous journal articles and monographs. The data are also used by public health workers for etiological and cancer control studies. As the oldest registry in the country, the registry is a rich source of data for studying time trends in cancer incidence and mortality.

## Source of population

Estimated using geometric rate of growth between census periods of 1991–2001.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.



# India, Nagpur

## Registration area

Western Maharashtra, Vidarbha, and Marathwada are three geographical divisions of Maharashtra state. Nagpur city is the headquarters of the Vidarbha region. The city of Nagpur is located in the centre of the Indian sub-continent and is linked by air with all parts of the world and by rail and road with all parts of the country. Its configuration presents a unique combination of plateau, plain, hill and dale along the Nag Stream following West-East.

Nagpur city has extremely hot summers and moderately cold winters. The lowest temperature reaches to 3.9°C in January and the maximum reaches 47.8°C in May. The main precipitation occurs during the Monsoon, which begins around mid-June and lasts until mid-October. The average annual rainfall is about 1130mm. Nagpur city receives its water supply from the Ambazari and Gorewara tanks.

Nagpur lies on latitude 21°N and longitude 79°E. Nagpur city covers 236.93 km<sup>2</sup> with a population of 2.05 million (2001 Census). The density of population is 8660 per km<sup>2</sup>, and the population is multi-religious, with 71.4% Hindus, 10.3% Muslims, 1.1% Christians, and 15.4% Neo-Buddhists.

Nagpur city is of historical importance. In mythology the god Ram traversed this region in route to the hermitage of Saint Shrutikrishna. He is supposed to have proposed on the Ramtek Hill, which has the name of Ramgiri, where a very beautiful "Meghdoot" was composed and written by the famous Sanskrit poet Kalidas. Buddhist ruins and archaeological remains show that this region was underdeveloped until the 18<sup>th</sup> century. Although it was ruled by the dynasties such as the Vakataka Rajputs, Rashtrakuts, the Parmars, and the Shails, the semi-aboriginal nomadic Gaolies also occupied it from the 6<sup>th</sup> to 16<sup>th</sup> centuries.

## Cancer care facilities

Information is obtained on all cancer patients registered at the 10 major hospitals and 25 nursing homes in Nagpur, and from the Tata Memorial Hospital and other leading hospitals in Mumbai, as patients from Nagpur go there for treatment because of their excellent facilities. General medical practitioners are not contacted individually. Missed cases are checked via the death records maintained by Nagpur Municipal Corporation.

The 10 major hospitals in Nagpur City and 6 major hospitals in Mumbai contribute data to this registry. In all

of these hospitals histopathology and imaging methods are available. In Nagpur there are two radiotherapy centres, and chemotherapy treatment is available in 5 hospitals.

## Registry structure and methods

The Nagpur Cancer Registry division of the Indian cancer Society became operative on 1<sup>st</sup> January 1980, with the collaborative effort with Nagpur Medical College, with the aim of obtaining reliable incidence and mortality data on cancer from a precisely defined urban population.

Since its inception this registry has been financially supported by Indian Cancer Society, Mumbai. The staff of the registry consists of 4 Social Investigators (registrars are involved in data collection) and one supervisor (who looks after administration and completeness of data collection). Editing, coding and analysis are carried out at the Mumbai Registry Office where 1 coder and 1 DEO are involved.

Data are maintained on registry proformas and on computer files. Duplication of cases is checked via a comprehensive alphabetical index card system and by computer programmes. Data analysis is carried out at the Mumbai Cancer Registry. The registry does not record follow-up information.

## Interpreting the results

There are no screening programmes underway in the area covered. Tobacco chewing is very prevalent in both sexes. Smoking, particularly bidi, is prevalent in males but almost nil in females.

## Use of the data

The registry publishes reports every five years. The State Government also uses the data for district cancer control programs. The data are also used by public health workers for etiological and cancer control studies.

## Source of population

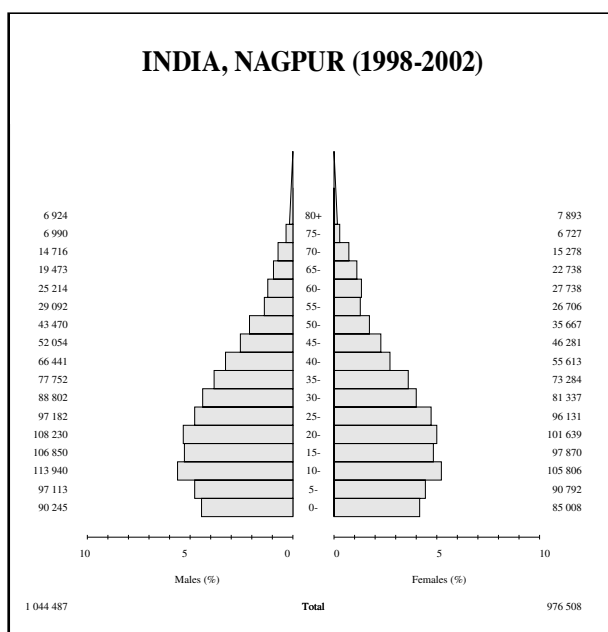
Estimated using geometric rate of growth between census periods of 1991–2001.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# India, New Delhi

## Registration area

Delhi is a densely populated urban metropolis situated between the Himalayas and the Aravalli range in the heart of Indian sub-continent. It lies between 28° 25' and 28° 53' N latitude and 76° 50' and 73° 20' E longitude. It is surrounded on the north, west and south by Haryana and the east by the Uttar Pradesh.

The population census is taken every ten years in India, the last one being in 2001. According to the 2001 census the population in Delhi was 13 850 507 (Males: 7 607 234; Females: 6 243 273). The sex ratio in Delhi is 821 females per 1000 males. The density of population is 9 294 persons per km<sup>2</sup>, versus 6352 persons in 1991.

The total population of Delhi UT as per 2001 census (as on 1 March 2001) was 12 819 761 (Males: 7 030 671; Females: 5 782 090). The sex ratio in Delhi UT Urban was 822 females per 1 000 males.

The total area of NCT of Delhi is 1483 km<sup>2</sup>. Per the 1991 census, its rural and urban composition are 797.66 km<sup>2</sup> and 685.34 km<sup>2</sup> respectively. During Population Census 2001, the area of the NCT of Delhi remained the same at 1483 km<sup>2</sup>. However, its rural-urban composition has undergone change. According to provisional results released by Directorate of Census Operations, Delhi, the rural-urban distribution of the NCT of Delhi is 591.91 km<sup>2</sup> and 891.09 km<sup>2</sup> respectively.

Since the population by age is available for Delhi UT urban areas only, it was therefore suggested that Delhi Registry may be defined for Delhi UT Urban areas only.

## Registry structure and methods

The population-based cancer registry at Institute Rotary Cancer Hospital (IRCH), All India Institute of Medical Sciences (AIIMS), New Delhi was established in January 1986 with the aim of obtaining reliable morbidity and mortality cancer data among the Delhi residents.

The registry collects morbidity and mortality data on cancer patients from 159 major government hospital centres and institutions, more than 250 private hospitals and nursing homes, and the Dept. of Vital Statistics of the Delhi Municipal Corporation, New Delhi Municipal Committee and the Cantonment Board.

Staff working in Population Based Cancer Registry, Delhi, Dr. B.R.A. Institute Rotary Cancer Hospital, All India Institute of Medical Sciences, Ansari Nagar, New Delhi-110 029 are 3 scientists in statistics and medicine, 9 medical social workers, one data entry operator and one lower division clerk.

Although cancer is not a notifiable disease, arrangements have been made with the hospitals outside the registration area to notify the registry of resident cases which are diagnosed and treated in them; they are visited once a month or year to review these procedures. General medical practitioners are not contacted individually, as at one stage or the other almost all cancer patients are referred to specialists. The smaller nursing homes/clinics are contacted by letters and registration about cancer patients being treated by them are recovered on a per forma.

Medical social workers visit various collaborating hospitals and nursing homes and interviews the patients who are either undergoing cancer treatment or being investigated for cancer at radiotherapy department. They also examine the case records maintained by various departments of these hospitals, viz. Pathology, Haematology, Radiology etc. Many patients present at advanced stages of disease, and treatment may commence without waiting for the results of investigations. Therefore even cases diagnosed on the basis of clinical findings alone are also registered. All the information collected is cross-checked for completeness of the data. Sometimes the same patient may register in more than one hospital for treatment, so care has been taken to exclude duplicates.

The death registration system is very inadequate and incomplete;

the cause of death often not mentioned or given as cardio-respiratory arrest. The registry staff visits these sources, where they scrutinise the records kept in medical records departments, and registers of individual departments concerned with the diagnosis and treatment of cancers, to identify and abstract information on cancer, diagnosed by all methods, among residents of registry area. These death records are then matched with the morbidity records. Cases not matching with the records are registered as Death Certificate Only cases (DCOs) in that corresponding year.

All the data collected were coded using ICD-O-1 and ICD-9. Inconsistencies in coding are corrected using quality check programmes. Validity checks are also carried out on all variables,

and records with missing values and impossible codes were checked against the original files and corrected. Finally, a series of checks such as site versus sex and histology, sex versus histology, age, etc., were carried out to detect coding or keying errors.

## Use of the data

The registry regularly prepares annual/biennial reports on cancer morbidity and mortality along with the cancer incidence, highlighting trends and changes. Case-control studies on gall bladder cancer and prostate cancer among the Delhi resident population have also been carried out. Some special studies on patterns of care and survival in breast, cervix and head and neck cancers are ongoing.

## Source of population

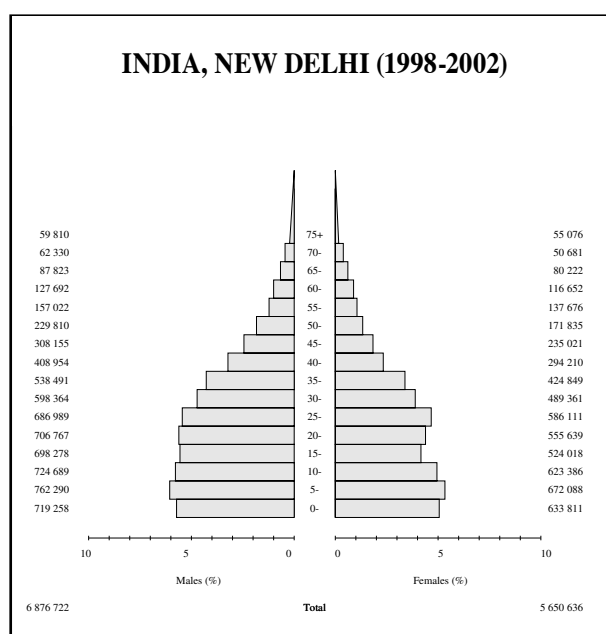
The estimation of population for Delhi UT urban for the years 1998 to 2002 has been done exponential method by taking as a basis a 1981, 1991 and 2001 census figures.

## Multiple primary rules used

ICD-O-1 (1980)

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# India, Poona (Pune)

## Registration area

The Poona (Pune) is a district of Maharashtra lying between 17° & 19° N and 75° E. It has a dry and invigorating climate due to its attitude (487m) above sea level and the prevalence of westerly breezes. Its soil is free from alluvial deposits. The lowest temperature is 9°C in January and maximum reaches 40°C in May. Precipitation occurs primarily during the south-west monsoon, which begins around the middle of June and lasts until mid-October. The average rainfall is about 900mm. Poona city receives its water supply from Khadakwasala dam nearby.

The Poona city agglomeration covers 344.18 km<sup>2</sup> with a population of 3.55 million (2001 Census). The population density in 2001 was 10 330/km<sup>2</sup>, and the area supports a multi-religious group. According to 2001 Census, 79.7% are Hindus, 8.9% Muslims, 2.6% are Christians, 5.8% Neo-Buddhisst, and 2.2% Jains.

Poona city is of great historical importance. It was once the capital of the old Maratha Kingdom of Shivaji and Peshwas. It has been renowned for its educational facilities since the early part of the century. Being the district headquarters, medical and educational facilities are available in abundance, and many industries have been established in the city and its surroundings.

## Cancer care facilities

About 10 000 hospital beds are available in the registry area. The Tata Memorial Center in Mumbai is the only specialised cancer institute in the India, and patients from Poona often seek treatment there. There are 35 major hospitals offering cancer diagnosis and treatment facilities in Poona.

There are 16 major hospitals in Poona City and 6 major hospitals in Mumbai that contribute data to this registry. In Poona and Mumbai hospitals, histopathology and imaging method are available. In Poona city there are 2 radiotherapy centres, and chemotherapy treatment is also available in 9 hospitals. In 1999, a specialised cancer hospital (Inlak Badharani) was established in Poona City.

## Registry structure and methods

The Poona Cancer Registry, a satellite registry of the Mumbai Cancer Registry of Poona, commenced operations on 1 March 1972 as a collaborative effort with the B.J. Medical College and the Sasson hospital at Poona with the aim of obtaining reliable incidence and mortality data on a cancer in a precisely defined urban population. Since then, the Indian Cancer Society has provided financial support.

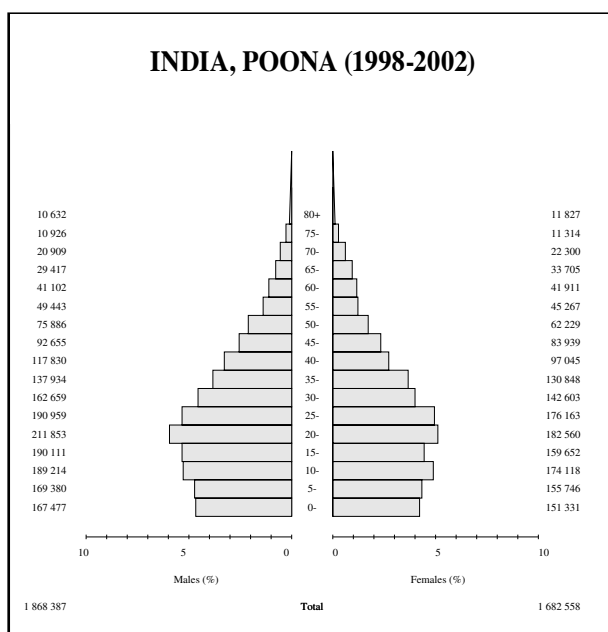
Registry staff includes 3 social investigators for data collection, and a supervisor who looks after administration

and completeness of data collected. Editing, coding, analysis is carried out in the Mumbai Registry's office by 1 coder and 1 DEO.

Information is obtained on all cancer patients attending the 35 hospitals in Poona, and from the Tata Memorial Hospital and other leading hospitals in Mumbai where patients from Poona go for treatment because of the excellent medical facilities there. General medical practitioners are not contacted individually, according to local practice only. Specialists are in charge of cancer patients in private hospitals and nursing homes in Poona City. Even those patients not admitted for hospital care are referred to a specialist by the general practitioners at some stage.

The death records maintained by the Poona Municipal Corporation provide a means for checking on missed cases.

Staff members of the registry visit the wards of all co-operating hospitals at least once a week to personally interview each cancer patient, including those only suspected of having cancer. All files maintained by the various departments of these hospitals are also crosschecked individually. Editing, coding and analysis of data are carried out at Mumbai Cancer Registry. Data are maintained on computer files. Duplicates are sought using computer programs and a comprehensive alphabetical card index. No patient is followed-up directly by the registry staff.



## Interpreting the results

There are no screening programmes underway in the area covered. Tobacco chewing is very prevalent in both sexes. Smoking, particularly bidi, is prevalent in males but almost nil in females.

## Use of the data

A five-year report on cancer incidence and mortality is published regularly, and the seventh in this series is ready for publication. The data have also been used for special studies of cancer epidemiology. We report on extent of disease for all sites, and survival only for breast and cervix. District and state cancer control programmes also use this registry data.

## Source of population

Estimated using geometric rate of growth between census periods of 1991–2001.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).

# India, Trivandrum

## Registration area

Trivandrum registry is situated in Kerala, the most South Western state of India. The health status of Kerala is very advanced, higher than the national average, and is comparable with developed countries. The registry covers both urban and rural population. The estimated urban and rural populations are 568 421 and 589 280 respectively as on 1<sup>st</sup> July 2000 using data from the census of India. The major religion in this part of the population is Hindus (68%), followed by Christians (18%) and Muslims (13%).

## Registry structure and methods

The physical location of the registry is at the Regional Cancer Centre (RCC), Trivandrum. The registry is partially supported by the Finnish Cancer Society, Finland. Four field staff and a data manager work in the registry. The active registration method is used for casefinding by periodic visits to major hospitals, pathology laboratories, and vital statistic offices in the registry area.

The major sources of data for the registry are the Hospital Based Cancer Registry of the RCC, Trivandrum Medical College hospitals (two), and Sree Chitra Thirunal hospital, Trivandrum. All four of these hospitals are located in the same campus. Regional Cancer Centre has excellent diagnostic and treatment facilities. Patients come from all parts of the state of Kerala and from adjoining states.

Annually around 10 000 cancer patients are reported in this hospital. In the medical college hospitals, around 2000 cancer patients are reported annually. Other data sources include a few government and private hospitals, pathology laboratories and radiological diagnostic centres.

Information on cancer death is collected from the vital statistics offices. For personal identification, name, age and address of the deceased are obtained from the above offices. Death certification is mandatory, but cause of death

certification by a medical practitioner is not. Hence it is assumed that cancer deaths are underestimated.

Quality control (QC) procedures: Annually a 10% random sample is selected from all cases, and re-abstractation is made by a senior staff member with the help of medical officers at RCC. Re-abstractation is done using the same procedure adopted for data abstraction, without reference to the original data. QC data is then checked with the original data; the error percentage is less than 5%.

## Interpreting the results

The population at risk was obtained from the decennial census figures. The census data for the year 1991 and 2001 are available by sex and five-year age groups. The populations for urban and rural areas are estimated by using an exponential growth rate method based on 1991 and 2001 census figures (Census of India report 1991 & 2001, Final Population Total, Kerala, India).

Further, an organised oral cancer-screening programme is conducted during the reporting period in some rural populations in the registry area. PSA testing is not common in the population.

As the registry data (more than 80%) are obtained from the hospital-based registry of the RCC, information such as extent of disease, treatment and disease status are available for most patients. Thus the registry data are largely utilised for cancer control evaluation programmes in the state of

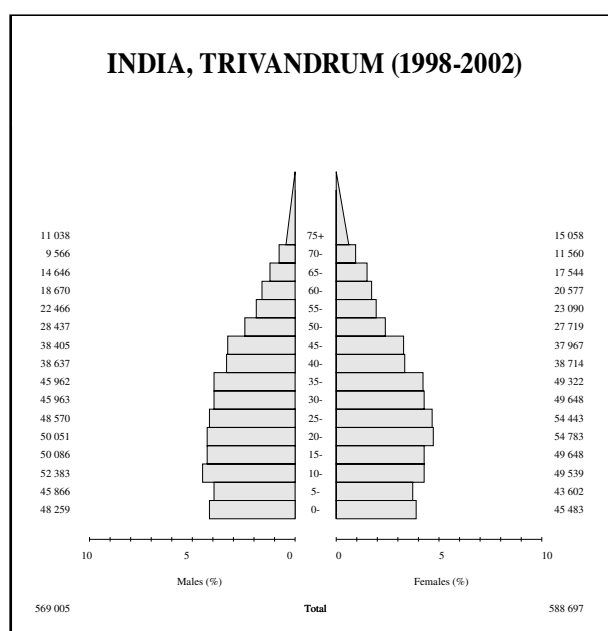
Kerala. The data have also been widely used for a variety of analyses resulting in several scientific publications.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# Israel

## Registration area

Israel is home to a widely diverse population. Of its 7 million people, 76.2% are Jews, 19.5% are Arabs (mostly Muslim) and the remaining 4.3% comprise Druze, Circassians and others not classified by religion. In the Jewish population there are marked differences in incidence based on birthplace: (Europe and America, Asia, Africa, of Israel). The Israeli population is growing rapidly, both by internal and external means. In the late 80s approximately one million (a fifth of the existing population at that time) immigrated to Israel, mostly from the former Soviet Union. The Israeli population is relatively young; 9.9% are 65 years old and above.

## Cancer care facilities

There are 33 public general hospitals and numerous private facilities that diagnose and treat cancer patients, including 18 public oncology institutes and several private facilities. There are 7 radiotherapy institutes with more than 18 linear accelerators and other facilities for treating cancer patients. Radiotherapy institutes distributed throughout the country are accessible to all patients. There are however only 14 active radiotherapists (physicians).

## Registry structure and methods

The Israel National Cancer Registry, established in 1960, is part of the Center for Disease Control at the Ministry of Health of Israel. Reporting has been mandatory since 1982, and all Israeli hospitals (and since the late 1980s, also the private pathology laboratories) report, usually by submitting a copy of the medical documentation. Thus data collection is mostly passive, but when needed, registry staff visit reporting sources to collect data actively.

Reporting sources include pathology, cytology, and haematology laboratories; hospital discharge forms; oncology institutes; death notification from district health offices; and the file of deaths from the Central Bureau of Statistics. Since 2000, through collaboration with the Israeli Hematology Society, all haematologists have been reporting the haematological malignancies that they see.

Beginning in the 1970s, several studies have assessed the registry's completeness, with the latest one based on 1994 data. These studies actively searched for cancer patients in a defined period in major hospitals, and compared the resulting data with the registry file. These studies resulted in estimated completeness rates of >94% (usually >95%) for solid tumours.

All Israeli citizens are given unique identification number (at birth or immigration). This number, used in all contacts with the health system and government departments, prevents duplication of data. The registry annually receives

a file containing all deaths in the country, which it uses to update vital statuses.

Accuracy and completeness of registration at the Israel National Cancer Registry (INCR) is checked regularly, and a systematic review is done every few years. Ongoing monitoring includes monitoring all reporting sources (more than 90) for volume of reporting, continuous colloquium and monitoring changes and by record linkage with specific cancer databases. A 2003 report based on registration in the early 1990s, estimated completeness of solid tumours to be >95% (90% for non-solid tumours). As a result the INCR, together with the Israeli Center for Disease Control and the 4 HMOs operating in Israel, developed a continuous medical

education and training program. In addition, the Israeli Cancer Organization finances 10 clerical positions at various oncology departments for secretaries devoted to registration and notification to the INCR. More than 150 clerks, nurses and physicians have attended these courses to date, and several hundred attended the seminars.

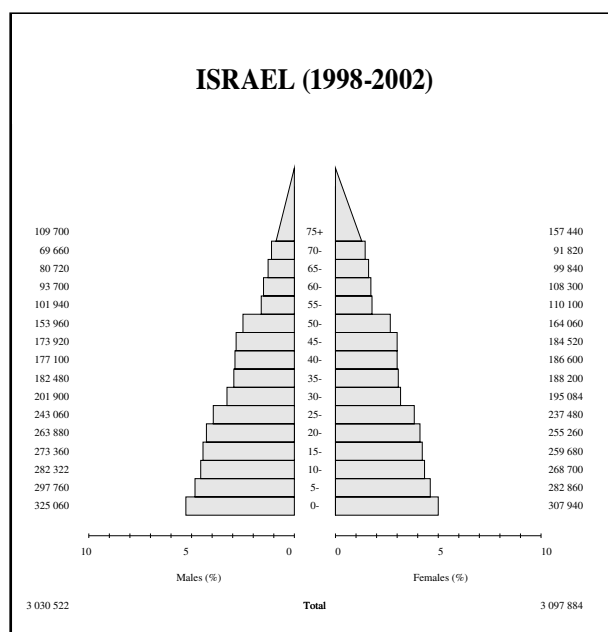
In 2001, the entire database was converted to ICD-O-3. Prior to this change, sites were coded by the ICD-9 and morphology by ICD-O-2. All copies of medical documents are archived (electronically since 1997), and in cases where simple code conversion was not possible, we revised the original documentation and assigned the new code. The database still contains

backups of the former coding.

## Interpreting of the results

The Ministry of Health together with the Israeli Cancer Association and the 4 HMOs operates screening programs for breast and colorectal cancers. Active mammography screening began in late 1996, and all women aged 50–74 receive biennially a personal invitation for screening. Screening for colorectal cancer, which began in 2005, is made by Faecal Occult Blood Tests. The recruitment technique is the same as for mammography and involves active recruiting. Compliance for the mammography screening is about 60%. There is no organised cervical cancer screening due to its low incidence. The INCR collects data on CIN-III that can also serve as an estimation of ad-hoc screening. There is no official recommendation or screening programme for prostate cancer and PSA testing. Survey data show that awareness of PSA screening is relatively high and use of this test is widespread.

There is an elevated risk of radiation-induced malignant brain tumours and benign meningiomas after childhood exposure to ionizing radiation used in the 1950s to treat tinea capitis, almost exclusively affecting the sub-group originating from North African countries. Thyroidal cancer





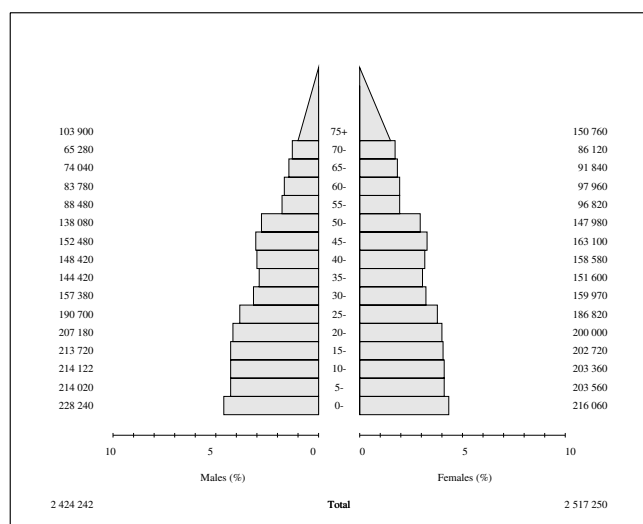
morbidity may be increased in that population as well as in those emigrating from regions in the former Soviet Union affected by the 1986 Chernobyl accident.

#### Use of the data

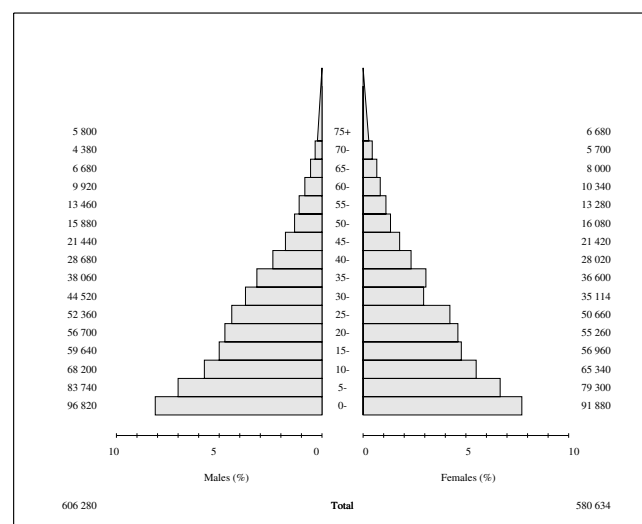
The registry is involved in active cancer research and health planning. Numerous record linkage studies have

been performed locally and internationally. The registry participates in the national council for oncology, the country's policymaking body in the field, collaborates with HMO's helping them build capacity and monitoring abilities, participates in new technologies for screening and treatment implementation, as well as conducting cluster investigations and disseminating information.

**ISRAEL: JEWS (1998-2002)**



**ISRAEL: NON-JEWS (1998-2002)**



#### Source of population

Annual population estimates are published by the Central Bureau of Statistics.

#### Multiple primary rules used

IACR rules (2004) on CI5 IX period.

# Japan, Aichi Prefecture

## Registration area

Aichi Prefecture is located in the approximate centre of Japan, between latitudes 34.5° and 35.2°N and longitudes 136.5° and 137.5°E, and is flanked on the south by the Pacific Ocean. The prefecture spans an area of 5,146 km<sup>2</sup> and has a population of 7.4 million. The altitude ranges from sea level to 1415m. Nagoya, the capital city of Aichi Prefecture, is situated about 350 km west of Tokyo. The annual mean temperature in Nagoya is 15.6 (5.9–19.9 degrees) and annual rainfall is about 1500mm.

The quality of the Aichi Cancer Registry remains modest, mainly due to dependence on voluntary-based operations without legal obligations. During the last 20 years we established a model area, located in the central part of Aichi Prefecture, with good-quality registry data, covering a reasonable population, including both urban and rural areas. The Central Area of Aichi Prefecture consists of 8 cities and one town. The total registration area is 646 km<sup>2</sup>, and the population as of 2000 was 1 060 529. Only 2.1% of the economy is engaged in primary industry; 46.7% is in secondary industry and the remaining 50.5% in tertiary industry.

All of the registered subjects are Japanese. Buddhism is traditionally the dominant religion (more than 90%); however, precise data on religion are not available.

## Cancer care facilities

As in large cities in Japan, every kind of diagnostic/treatment service for cancer is easily available. The costs required are covered by public health insurance in general; there is no limitation for access to each service. Radiotherapy departments are available in large institutions in the area.

## Registry structure and methods

Aichi Cancer Registry was established in 1962 as a population-based cancer registry, the purpose of which was to form an accurate picture of cancer in Aichi Prefecture, in order to control its impact. Initially under the direction of the Aichi Prefecture Department of Health and Public Welfare, all medical institutions in Aichi Prefecture are requested to report incident cancer cases on the basis of the cancer registry outline. The registry has received technical support from the Division of Epidemiology and Prevention, Aichi Cancer Center Research Institute, since 1983, and has been subject to periodic evaluation by the Administration and Guidance Council since 1984.

The registry staff consists of 2 doctors and 3 registrars, and a local government officer for Registry who is also a doctor.

A dramatic overhaul of the registration system has been undertaken with a view to rationalising Aichi Cancer Registry and strengthening its effectiveness. This has been supported by a grant from the Ministry of Health, Labour and Welfare (awarded 1998). The aims of the Revised Cancer Registry System are: 1) to establish a more comprehensive organization, with Aichi Cancer Center as a core institution for cancer research and treatment, and the prefectural public health centres as core facilities for community health services; 2) to promote the installation of a hospital cancer registration system in every relevant medical institution; 3) to provide cancer information and expedite cancer control measures in the community. The new system has been in operation since 1999.

The research group supported by a Grant-in-Aid from the Ministry of Health, Labour and Welfare from 2004 monitors the quality in the registry every year. In 2006, a national standardised database system for regional cancer registry developed by the research group was introduced.

## Interpreting the results

As in other areas in Japan, local governments support stomach, colon, breast, lung and cervix screening. In practice, PSA is commonly available; however,

PSA is not defined as official tool for prostate cancer screening.

## Use of the data

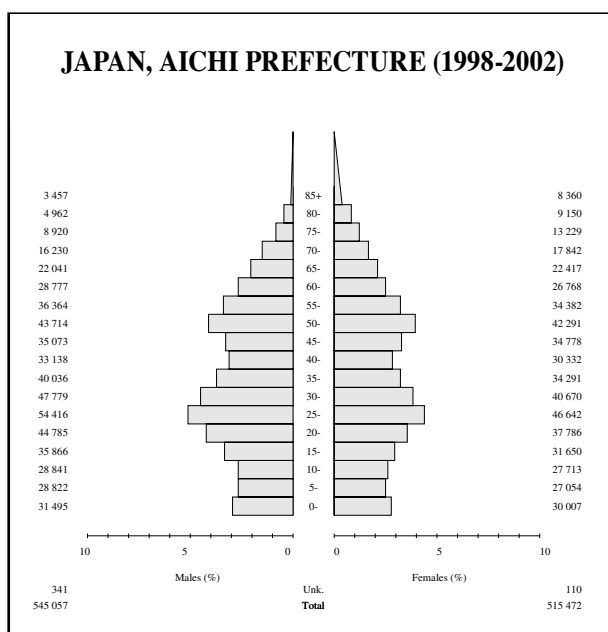
In addition to providing descriptive data on cancer incidence, the data have been used for various epidemiological investigations including cohort studies, case-control studies and evaluation of screening programmes for important cancer sites.

## Source of population

Census data in 2000. The data for 1998 and 1999 were estimated by linear interpolation from 1995–2000 census data, and those for 2001 and 2002 were by linear extrapolation.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.



# Japan, Fukui Prefecture

## Registration area

Fukui Prefecture is located in the centre of Japan, and has a population of about 820 000 people and an area of 4189 km<sup>2</sup>. About 90% of the population lives in urban areas (>10 000 inhabitants); 99% are Buddhist.

## Cancer care facilities

The six main district hospitals provide radiotherapy, cancer surgery and chemotherapy services. Patients suspected to have cancer in the primary and secondary care facilities in the registry area are mostly referred to these six hospitals.

## Registry structure and methods

In 1984, the Fukui Prefectural Government (FPG) decided to start cancer registration on a voluntary basis in order to obtain information about the nature and extent of the cancer problem in Fukui and assist in planning cancer control programs, and entrusted the survey to the Fukui Medical Association (FMA). The registry is located within FPG and is staffed by a part-time registrar and a full-time health worker.

The central registry receives monthly a batch of cancer reports transferred from the FMA and death certificates from the Department. Each data card is checked for consistency, coded and stored on computer files. Questionnaires are sent to physicians who signed death certificates that are unmatched with cancer reports. The data in the questionnaire replies are also stored in the computer file after being checked for logicity. The original

cancer reports and the copies of death certificates mentioning cancer are also stored, living cases being filed by date of birth, dead cases grouped by year of death and filed by date of birth. Multiple primary cancers in the same patient are counted separately.

The research group, supported by a Grant-in-Aid from the Ministry of Health, Labour and Welfare from 2004, monitors quality in the registry.

## Interpreting the results

Organised screening services for stomach, colorectal and cervix are operated. PSA testing is not common.

## Use of the data

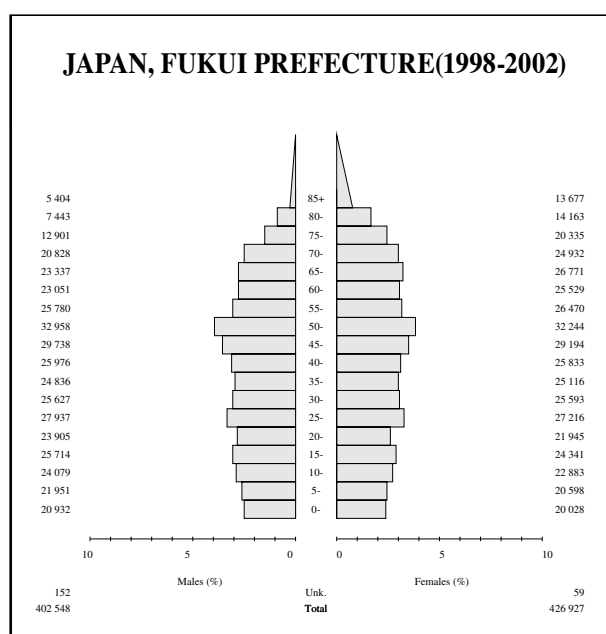
The data are used for geographical analysis in the prefecture and comparison of cancer morbidity with existing cancer registries in Japan. The registry prepares an annual report of cancer incidence, highlighting trends and changes. Some special studies of survival of registered cancer cases (stomach, colorectal and cervix cancer) have been carried out. Policymakers use the cancer registry data for evaluation of screening for gastric cancer and colorectal cancer.

## Source of population

1998, 1999, 2001, 2002 Estimates based on the 1995 and 2000 census data. 2000 census (Vital statistics of Japan).

## Multiple primary rules used

Impossible to detect multiple primaries.



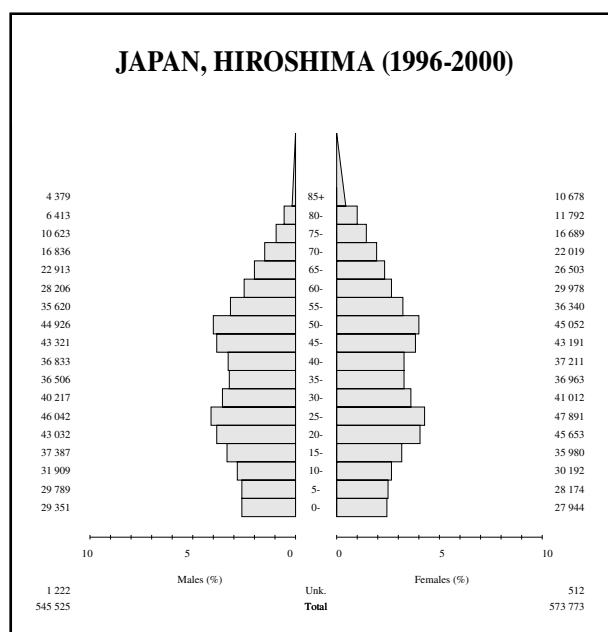
# Japan, Hiroshima

## Registration area

Hiroshima City, the capital of Hiroshima Prefecture, is located in the western part of Japan facing an inland sea. It covers an area of 742 km<sup>2</sup>, from 132°18' to 132°41'E and from 34°17' to 34°36' N, and the altitude ranges from sea level to 890m. The annual mean temperature of the city is 16.1° and the annual rainfall is about 1320mm. Hiroshima City is an administratively defined area that does not completely correspond to the Hiroshima metropolitan area. The latter includes the city itself and its surrounding areas.

As is widely known, Hiroshima City was destroyed by an atomic bombing in 1945. After the war, it developed into the administrative centre of the Chugoku and Shikoku regions. The major industries include shipbuilding, automobile, metalworking, machinery and other manufacturing/production.

The population in 2000 was 1.13 million, comprising mostly Japanese (99%) and very few non-Japanese nationals (1%). The population density was 1518/km<sup>2</sup> in 2000, slightly higher than the 1467 calculated in 1990. The proportion of residents 65 years and over was 14.2% in 2000, compared with 9.8% in 1990. The population is primarily urban; 73% of employees are in the sales trade and service industries, 24% in construction and manufacturing industries and only 1% are engaged in agriculture and related work.



## Cancer care facilities

The number of hospital beds per 100 000 population was 1351 in 2000, and the number of physicians per 100 000 population was 246. Diagnostic and treatment services for cancer are abundant in the area, and cancer patients are treated with radiotherapy in most of the major hospitals. Cancer screenings for stomach, colon, lung, female breast, and cervix uteri are provided in local governments and workplaces as well as private sectors. PSA testing is also widely available.

## Cancer registry and structure

The Hiroshima City Medical Association's Tumor Statistics registry was established in 1957 with technical support from the Atomic Bomb Casualty Commission (ABCC), predecessor of the Radiation Effects Research Foundation (RERF). As of April 2005, the registry has been placed under the auspices of the Hiroshima City government and renamed the Hiroshima City Cancer Registry.

The case-finding and data-collection procedures combine both active and passive approaches. All physicians and hospitals in the city are requested to report tumour cases to the registry. However, the great majority (about 90%) of cases are accessed by means of hospital visits. RERF

field personnel visit the medical record rooms of various departments and services of most large hospitals in the area, and review all hospital records, including clinical records, surgical reports, radiology reports, and cytology, pathology and autopsy reports. Causes of death are also ascertained at that time.

The Hiroshima Prefecture Tissue Registry was started in 1973 under the auspices of the Hiroshima Prefectural Medical Association and has been integrated with the Hiroshima Prefecture Cancer Registry since April 2005, serving as an additional source of information. The Tissue Registry is designed to collect and examine surgically removed tumour tissues; tumours are then classified and tissue slides of malignant tumours are stored. Malignant cases residing in the city and identified through the Tissue Registry are added to the Cancer Registry file.

Cases identified from various hospitals and sources are collated, and data are stored in computerised files. Checking for duplicate entries is performed manually with the assistance of a computer. All cases with possible multiple primary tumours are reviewed; pathology slides from the Tissue Registry are also reviewed, if necessary.

RERF are involved in all of the registries mentioned above, and 16 staff including one medical doctor are employed in the Tumor and Tissue Registry Office.

## Interpreting the results

Since a majority of cases are ascertained by visits to large hospitals, cases missed by not including all area hospitals present a source of concern. However, a previous survey of three medium-sized hospitals not included in the regular data abstraction schedule showed the number of missed cases from medium-sized hospitals to represent less than 1% of the total cancers.

## Use of the data

The objectives are to maintain a source of information on tumours diagnosed in the community and to provide cancer incidence data for studies on the effects of exposure to radiation from the atomic bombing in 1945. This has resulted in a number of large-scale cancer studies in the area.

The incidence data are used for health promotion planning for Hiroshima City.

## Source of population

1996–1999 Estimates based on the 1995 and 2000 census data; 2000 census.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.

# Japan, Miyagi Prefecture

## Registration area

Miyagi prefecture is situated in the northern part of Japan, between latitudes 37° and 39°N and longitudes 140° and 141°E, and is flanked on the east by the Pacific Ocean. Sendai, the capital city of the prefecture, is situated about 350 km north of Tokyo. The annual mean temperature in Sendai is 12.3°C, and the annual rainfall is about 1200mm. The altitude ranges from sea level to 1841m. The total registration area is 7291 km<sup>2</sup>, and the population as of 2000 was 2 365 320, including 10401 foreigners (4515 male and 5886 female). Of the economically active population, 26% is engaged in personal services, 25% in commerce, 15% in industry and 5% in agriculture.

## Registry structure and methods

The Miyagi Prefectural Cancer Registry (formerly Miyagi Cancer Registry, initiated in 1951 by the late Professor Mitsuo Segi at the Department of Public Health, Tohoku University School of Medicine) marked its 47th year since registration was restarted in 1959. The registry has covered the entire prefecture from the beginning. The office has been located in the Miyagi Cancer Society since 1976. Miyagi Prefecture provides grants for cancer registration, and the Miyagi Cancer Society also supports it financially. All the work of the registry is the responsibility of the Registry Committee, comprising representatives of the Miyagi Medical Association, Tohoku University Graduate School of Medicine, Miyagi Prefecture, and the Miyagi Cancer Society. The registry is staffed by a part-time medical doctor, three full-time registrars and three personnel.

In Sendai, cancer diagnostic and treatment services are mainly provided at Tohoku University Hospital and several general hospitals. Provincial areas outside Sendai are divided into nine secondary medical care areas; a few general hospitals provide cancer diagnosis and treatment in

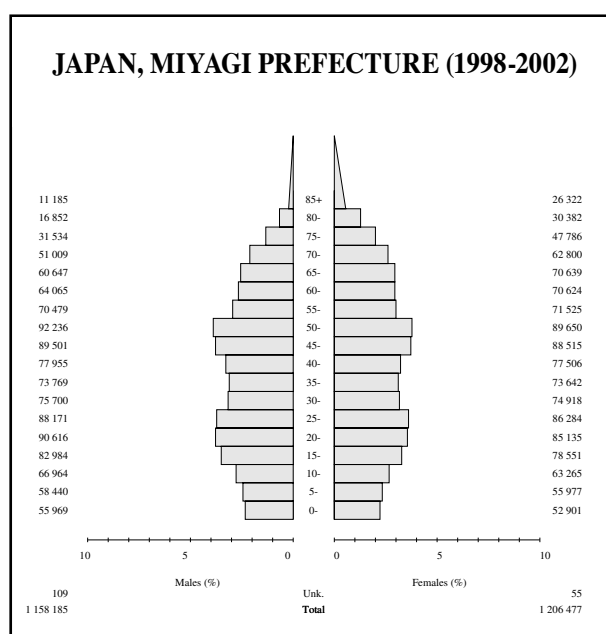
each area. Radiation therapy is available at the university hospital, one cancer centre (Miyagi Cancer Center), and several general hospitals.

Cancer cases are registered from clinics and hospitals (inpatients and outpatients), radiology and pathology departments, autopsy records, mass screening records and death certificates. Reporting by clinics and hospitals is voluntary. About 30% of cases are reported from hospitals and clinics, and 70% abstracted by the registrars at the cancer registry. Multiple primary cancers are counted separately in computing incidence.

All the death certificates of Miyagi Prefecture are collated with the registered cases. Follow-up is passive, with only perusal of all death certificates. Active follow-up of the cases is not currently conducted. Quality of the information recorded is evaluated by the research group supported by a Grant-in-Aid from the Ministry of Health, Labor and Welfare.

## Use of the data

In addition to providing descriptive data on cancer incidence, the data have been used for various epidemiological investigations including evaluation of screening programs for cancers of the stomach, colon, prostate, cervix and breast, and population-based prospective cohort studies of cancer and lifestyle factors (such as smoking, drinking, and diet).



## Source of population

1998, 1999, 2001, 2002 estimates based on the 1995 and 2000 census data. 2000 census. 1995 Population census of Japan vol. 2-2-04.

Miyagi-Ken. 2000 Population census of Japan vol. 2-2-04, Miyagi-Ken.

## Multiple primary rules used

IACR rules (2004) on historical data.

# Japan, Nagasaki Prefecture

## Registration area

The Nagasaki Prefectural Cancer Registry is a community-based cancer registry covering the entire prefecture. Nagasaki prefecture is located on the western end of the Japanese archipelago, comprising 4092 km<sup>2</sup> and 1.52 million people (based on a 2000 National Census). The proportion of non-Japanese citizens is only 0.3% of the total population.

One third of the prefecture's population resides in Nagasaki City, where shipbuilding is one of the primary industries. For the overall prefecture, the combined proportion of service and retail/restaurant industries is over 60% of the total, while the manufacturing industry including shipbuilding comprises 12%. The combined proportion of agriculture, forestry and fishery makes up only 1% of all industries.

Nagasaki Prefecture also contains 55 inhabited islands whose residents comprise 10% of the prefecture's population. This is a primary reason for the difficulty of providing medical care uniformly within the prefecture.

## Cancer care facilities

Nagasaki Prefecture does not have a cancer centre but does have 13 hospitals where more than 100 cancer cases are treated annually. These hospitals are concentrated in Nagasaki city and in the city of Sasebo, and 70% of cancer patients in the prefecture are treated at hospitals in these cities.

Nagasaki Prefecture also has cancer screening facilities, where examinations are conducted for cancers of the stomach, colon, lung, breast and uterus.

## Registry structure and methods

The Department of Epidemiology of the Radiation Effects Research Foundation houses the central registry office of the Nagasaki Prefectural Cancer Registry, which consists of one physician, nine full-time employees, and a few part-time employees.

The Nagasaki Prefectural Cancer Registry collects cancer incidence data mainly by abstraction from clinical records, and three of the full-time staff members are exclusively engaged in visiting hospitals for such abstraction work. Every year these staff members visit 20–30 hospitals (most are hospitals with 200 beds or more) within the prefecture to collect the necessary information. We also make an effort to collect data on pathological diagnoses with support from pathologists. Cases with histological diagnoses comprise more than 80% of the registered cases. Data on cancer cases detected in such screening programs have also been obtained.

The Nagasaki Prefecture government provides data on all deaths within the prefecture, enabling verification of the deaths in the registered cases through matching both data

sets. With respect to cases recorded as cancer, if there are no matched cases among the registered cases, the cases are registered as DCO (death certificate only).

Medical organisations in Japan are not legally required to file notices of cancer cases. As a result, obtaining notification of cancer cases remains difficult, particularly in Nagasaki, since data collection has traditionally depended on medical record abstraction. A Personal Information Protection Law became effective in April 2005. However, the Ministry of Health, Labour and Welfare informed medical organisations that providing cancer registries with incident data would be exempt from application of this law, thus avoiding any decrease in registration rate caused by the law's effects.

For the purpose of preventing errors in coding and entry, varied logical checking functions are utilised at the time of data entry. Also, comparison among the registry cases is conducted once a year to prevent overlapping, with error in such comparison work detected at a rate of about 0.2%.

## Interpreting the results

In 1958 a cancer registry covering Nagasaki city was started, and in 1985 the Nagasaki Prefectural Cancer Registry was initiated, thus covering the entire prefecture. Concerning the effect of the changes of coding rules on incidence, it is conceivable that the incidence of MDS and uterine cervical severe dysplasia have contributed to an increase in incidence because these two

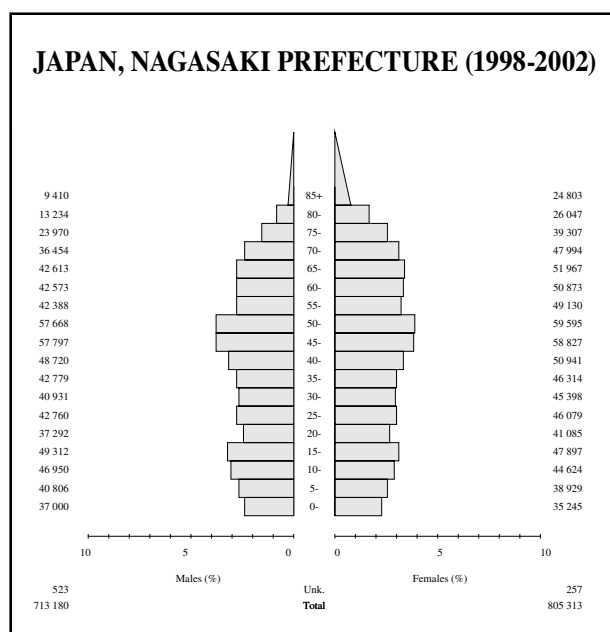
diagnoses are coded as malignancy using ICD-O-3.

Although screening has been conducted for stomach cancer (12.4% participation), colon cancer (16.5%), lung cancer (27.5%), breast cancer (16.9%) and uterus cancer (18.7%), such screening is not obligatory and the participation rates are not very high. Recent changes of note are increased use of mammography in breast cancer screening and change in the eligible age for undergoing uterus cancer screening from 30 years and over to 20 and over. Although PSA testing is commonly utilised, it is still being debated whether the test should be used in cancer screening, and as a result testing remains unorganised.

Many A-bomb survivors still reside in Nagasaki, on which an atomic bomb was dropped in 1945. The effects of A-bomb radiation on cancer incidence remain, but there have been no other reports on environmental or occupational exposure that could affect cancer incidence.

## Use of the data

Every year we compile and announce the incidence, mortality, and survival on cancer in Nagasaki prefecture, and we also participate in a project to estimate nationwide cancer incidence in Japan, providing the project with our data. Our data are often used for research purposes, thus greatly contributing



to the elucidation of association between radiation exposure and cancer incidence. Additionally, the data are frequently utilised in descriptive epidemiology involving ATL/ATLL, which are unique to Nagasaki Prefecture. For government-related purposes, our data is also utilised in the design of medical projects and assessments of cancer screening.

**Source of population**

1998, 1999, 2001, 2002 estimates based on the 1995 and 2000 census data; 2000 census. (Vital statistics of Japan).

**Multiple primary rules used**

IACR rules (2004) on historical data.

# Japan, Osaka Prefecture

## Registration area

Osaka Prefecture is located in the central part of the main island of Japan. The surface area is the second-smallest (1893 km<sup>2</sup>), but its population density is the second highest (4652/km<sup>2</sup>) among all 47 prefectures in Japan. Osaka City is the capital of the Prefecture. The population of Osaka Prefecture was 8.8 million in the 2000 census; 98% were Japanese, 1.5% Koreans, and 0.2% Chinese. Of all workers, 30% are engaged in industry, 68% in commerce, and 0.5% in agriculture.

## Registry structure and methods

The Osaka Cancer Registry (OCR), covering Osaka Prefecture, has been operating in cooperation with the Osaka Prefectural Department of Health and Welfare (OPDHW), the Osaka Medical Association (OMA) and the Osaka Medical Center for Cancer and Cardiovascular Diseases (OMCCD) since 1962. The central registry, located in the Department of Cancer Control and Statistics of the OMCCD, is staffed by 9 regular employees (2 medical doctors, 2 public health nurses, 2 system engineers, 1 operator and 2 clerks) and 7 part-time workers.

The OMA requests that all medical institutions in the Prefecture cooperate with cancer registration, and prepare cancer reports when cancer diagnoses are made. The cancer reports are sent to the OMA, and they are transferred monthly from the OMA to the central registry. Information on death certificates mentioning cancer is also obtained through the OPDHW.

The data are processed in an annual batch via mainframe, although the data processing has changed to an online network with client-server system. Computerised record linkage is used to avoid duplicate registration, distinguish multiple primaries, and identify registered cases who died of cancer and cancer deaths that had not been registered. Computer-produced possible matches are shown and resolved manually through referring to the original reports.

In order to evaluate survival of cancer patients, active follow-up to ascertain vital status has been undertaken progressively. High-quality survival data have been available for patients diagnosed from 1975 except for Osaka City, and all patients diagnosed after 1993 in Osaka Prefecture. Proportion of the lost-follow-ups has been 1-2% at five years after diagnosis.

The OCR has implemented cancer information service programs since 1975. The prognoses of reported patients, as well as cancer statistics of each hospital, are provided at the request of participating hospitals or hospital doctors. The central registry holds an annual conference to report and discuss cancer registration activities, inviting representatives from all large and medium-sized general hospitals and clinical departments of medical university hospitals. Since 1999 software has been developed and distributed to support

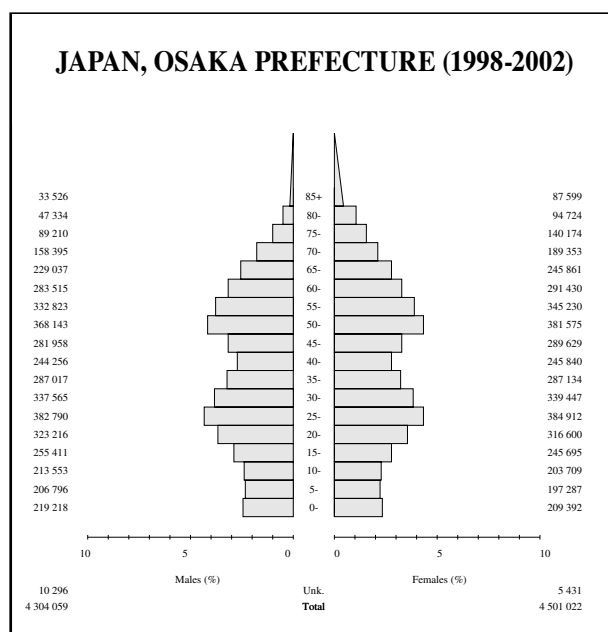
hospital-based cancer registries, and assist in notification of cases to the OCR.

In order to assess accuracy and completeness we have incorporated a data check program compatible with the IARC-CHECK, and routinely used several validity indexes such as DCN/I, DCO/I, I/D and HV/I.

The Osaka Prefecture Privacy Protection Law has been effective since October 1996, while the Prefecture Privacy Protection Council has approved the schemes of OCR as legitimate under the Law. On April 2005 a Privacy Protection Law came into effect in Japan, but informed consent is waived when personal information is needed to improve public health, including submission of cancer data from medical institutions for population-based cancer registries.

## Interpreting the results

According to recommendation of the Japanese Ministry of Health, Labor and Welfare, women over age 30 have been screened for cervical cancer since 1982 (proportion of cases receiving screening was 16.5% in 2001, in Osaka), and for breast cancer since 1987 (11.2%). The population over age 40 has been screened for stomach cancer since 1982 (15.7% in male and 11.8% in female), lung cancer since 1987 (9.2% in male and 6.5% in female) and large bowel cancer since 1992 (11.2% in male and 9.0% in female). The screenings are all opportunistic and the proportions screened remain low in Osaka. PSA testing is not common yet in the population.



## Use of the data

The major objectives of the OCR are (1) to estimate incidence rates, (2) to compute statistics on medical treatment given to cancer patients and (3) to estimate survival for cancer patients. Annual reports including these statistics have been published. Summary statistics of these can be seen on the OMCCD website ([http://www.mc.pref.osaka.jp/ocr\\_e/index.html](http://www.mc.pref.osaka.jp/ocr_e/index.html)). The OCR takes the initiative to conduct epidemiological research, and policymakers use our cancer registry data for planning and evaluation of health services.

## Source of population

2000 census. The data for 1998 and 1999 were estimated by linear interpolation from the 1995 and 2000 census data, and those for 2001 and 2002 were by linear extrapolation. Refs: 2000. Statistics Bureau, Management and Coordination Agency, Government of Japan, 2000 Population Census of Japan, Vol. 2-2-27 Osaka-Prefecture. Tokyo, 2001. 1995. Statistics Bureau, Management and Coordination Agency, Government of Japan, 1995 Population Census of Japan, Vol. 2-2-27 Osaka-Prefecture. Tokyo, 1996.

## Multiple primary rules used

IACR rules (1990).



# Japan, Yamagata Prefecture

## Registration area

The Yamagata prefectural cancer registry covers the entire Prefecture of Yamagata, which is located in northeastern Japan. It lies between latitudes 37° and 39°N and longitudes 139° and 140°E. The total registered area is 9323 km<sup>2</sup>, and over two thirds of the area consists of forests and mountains.

The 2000 census determined the total population of the Yamagata prefecture was 1 244 147 and composed of 99.6% Japanese nationals. Of working adults, 54% are engaged in the sales and service industry, 35% work in construction and manufacturing, and 11% work in agriculture. The population of people who are 65 years and over was 23% in 2000 and 16% in 1990.

## Cancer care facilities

In 2000, Yamagata had 2307 physicians (1.9 per 1000 inhabitants) and 11 336 hospital beds (excluding psychiatric hospitals). The prefecture is divided into 4 healthcare districts. Each district has several core general hospitals, where two thirds of the cancer patients in Yamagata prefecture are diagnosed and treated. Eight of the hospitals have a radiotherapy unit.

## Registry structure and methods

The Yamagata prefectural cancer registry was established in 1974. The prefectural government finances the registry. A full-time medical doctor as the medical supervisor and researcher staffs the registry, and also a full-time and a part-time registered staff member since 2004. Before 2004, it was staffed by a part-time medical doctor and a part-time registered staff member.

Although cancer is not a notifiable disease, the main method of data collection is passive notification. To increase the number of notifications, the registry staff supplements their casefinding with pathology reports from several major general hospitals and request physicians to be notified

about these cases. The registry staff has access to all death certificates with their personal information. A research group supported by the Grant-in-Aid from the Ministry of Health, Labour and Welfare since 2004 monitors quality standards in the registry every year.

In 2005, we performed data cleaning for all registered data in 2005, including converting site and histological codes from ICD-10 and ICD-O-3 to ICD-O-3.

## Interpreting the results

The establishment of three major general hospitals in 1976, 1993 and 2000 likely altered the availability of diagnostic and/or treatment services. Since our establishment in 1974, there has been no serious environmental or occupational exposure that may influence cancer incidence in the population.

Organised screening programs are conducted in Japan (for gastric and cervical cancer since 1961 and for colon, lung and breast cancer since 1987). Screening for breast cancer by mammography was introduced in 2002. The prostate cancer cases diagnosed by opportunistic PSA testing have been increasing in several hospitals recently.

## Use of the data

The registry provides periodic reports on cancer incidence and five-year survival statistics. The regional health authority for planning and

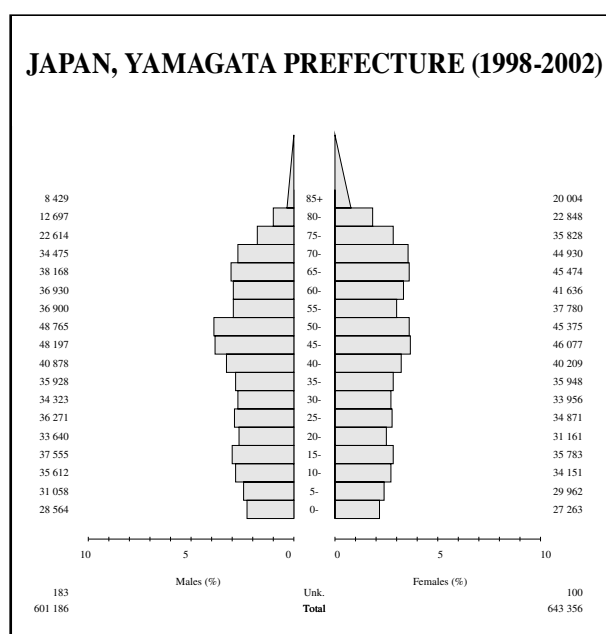
evaluating health services uses the data. The data are also used to estimate cancer incidence in Japan.

## Source of population

1998, 1999, 2001, 2002 estimates based on the 1995 and 2000 census data; 2000 census. (Vital statistics of Japan).

## Multiple primary rules used

Impossible to detect multiple primary.



# Korea

## Registration area

The Republic of Korea (South Korea) occupies the southern portion of the Korean Peninsula. It lies between longitudes 124° and 131°E and latitudes 33° and 38°N, and has an area of 99 500 km<sup>2</sup> including about 3000 islands. South Korea is highly mountainous, and lowlands constitute only 30% of the total area. There are seven cities with provincial status and nine provinces.

The population of the Republic of Korea is 48 million (2005 estimates), which the Central Cancer Registry is supposed to cover. Its population density of 493/km<sup>2</sup> is one of the highest in the world. Annual population growth has dropped steadily from more than 3% in the late 1950s to 0.38% in 2005. Due to rapid urbanisation, 80% of the population is now classified as urban. The population is ageing very quickly: The 2003 population estimate revealed that 8.3% were 65 years old or over; 71% were aged 15–64 years. South Korea is one of the most ethnically homogeneous countries in the world. Most people are ethnically Korean. Buddhism and Christianity are the largest religions in South Korea, but Confucianism, rather a philosophy than a religion, is in many ways more prominent in Korean culture than any organised religion.

In 2004, the economically active population was 23.3 million. Of this figure, 8% were engaged in agriculture, forestry and fishing; 27% in industry; and 65% in services.

## Cancer care facilities

In 2005, there were approximately 1500 hospitals in Korea, 1000 of them, including 29 multidisciplinary cancer treatment units, providing specialised cancer diagnostic and therapeutic services. There were 60 radiology units and 123 specialists nationwide in 2006. In addition, 2500 out of 26 000 private clinics provide general cancer care services.

## Registry structure and methods

The Korea Central Cancer Registry (KCCR) was one of the ambitious projects of the Ministry of Health and Welfare in 1980. Beginning in 1982, 47 general hospitals voluntarily participated in this program. Participating hospitals and registered malignancies increase annually, and 154 of 242 teaching hospitals participated in 2005. The KCCR is composed of a chief, an executive secretary (head of cancer registration), a medical officer, 6 cancer registrars, 6 statisticians, and 11 advisors. In a 2004 workshop for the new cancer registry manual, approximately 300 cancer registrars attended from the hospitals.

The KCCR is responsible for (1) collection, analysis and management of national cancer statistics, (2) technical and financial support of regional cancer registries including

cancer registrar training, (3) analyses and summary of data from the central and regional cancer registries, (4) carrying out administrative tasks related to the registry.

The KCCR established the Korea National Cancer Incidence Data Bases (KNCIDB) by merging the KCCR mother DB and all 8 population-based Regional Cancer Registry databases, the site-specific cancer registry databases (breast, uterus, ovary, oral cavity, liver cancer), the medical record review survey and the cancer mortality database from National Statistics Office. For the medical review survey, a 1999–2003 cancer claims DB from the National Health Insurance Corporation was also used. The dataset was refined further by confirming multiple primaries and removing duplicates with expert help from various fields—clinicians, pathologists and medical recorders.

In an effort to improve the KCCR data quality, data completeness has been evaluated, with a preliminary result as high as 90.3%. We are in the process of evaluating the accuracy of stomach cancer data through abstract-reabstract method, and plan to perform the evaluation on a regular basis for additional types of cancers.

## Interpreting the results

To cover cases diagnosed outside KCCR-affiliated hospitals, we perform an additional medical record review survey and supplement our data with cases from regional registries. Thus

data completeness in areas with regional registries may be different from those without.

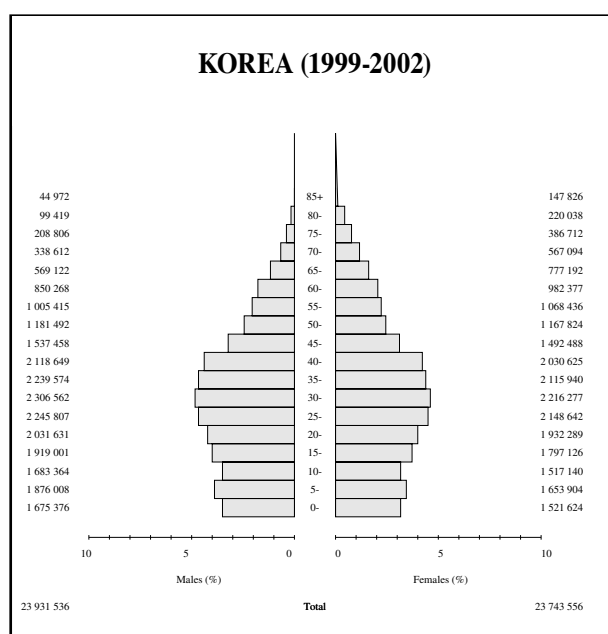
In 2000, most teaching hospitals in Korea could not provide medical service properly at least for 3 months due to a doctors' strike. Delayed diagnosis and reporting of new cases resulted, which could decrease the number of 2000 cases and increase the 2001 cases.

The National Cancer Screening Program (NCSP) was implemented in 1999 and has since expanded its target population and cancers. NCSP provides screening for stomach, liver (high-risk groups only), cervical, breast and colorectal cancer. Opportunistic screening is also common. Annual PSA testing is actively recommended by urologists for men aged over 50. Though there are no official data, most men over 50 have received a PSA test.

Even though the 2003 Cancer Act clearly stated that cancer registration should be performed to know the burden of cancer, privacy protection laws prohibit access to personal information. An amendment to the Cancer Act to allow access is underway.

## Use of the data

The KCCR has released its annual reports since 1983, and published *Cancer Incidence in Korea 1999–2001* in August



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2005 as the first cancer incidence report based on the entire population using KNCIDB. Annual data are published in the official journal of Korean Cancer Association (*Cancer Research and Treatment*). The KCCR provides data without personal information to researchers as well as other government departments for statistical analysis. Registry data are essential to evaluate cancer control programmes in Korea, including the National Cancer Screening Program.

**Source of population**

The population used to calculate cancer incidences is a mid-year population (the population at the 1st of July), but in this report, the modified resident registration population data that is released annually from the Korea NSO was used.

**Multiple primary rules used**

IACR rules (2004) on CI5 IX period.

# Korea, Busan

## Registration area

In 1995, the Busan Cancer Registry (BSCR) was established in cooperation with the Cancer Centres of four University hospitals, and has administratively been supported by the Department of Public Health and Sanitation of Busan City and the Medical Association of Busan. The Korean National Cancer Control Program is responsible for the financial support of the registry, with technical support from the Korea Central Cancer Registry.

The city of Busan is located on the southeastern tip of the Korean Peninsula, between latitudes 34°52' and 35°23' N, and longitudes 128°52' and 129°8' E. The city has an area of 531.17 km<sup>2</sup>. At the 1995 census, the total population of Busan was 3 806 888, of whom 99.6% were Korean.

## Cancer care facilities

In 2005, there were approximately 110 hospitals including teaching and general hospitals (4 university hospitals and 22 general hospitals) in Busan. Because Korea is a one-day life zone for the whole country, every cancer patient can go to other regional hospital if he/she wants.

## Registry structure and methods

The nation-wide, hospital-based Korea Central Cancer Registry (KCCR) was established in 1980 and has been managed by the Ministry of Health and Welfare (MOHW) since then. All inpatient cancer cases are voluntarily notified to the KCCR by the Medical Record Department of about 80% of teaching hospitals.

In 1995, a pilot study was conducted to expand the into a population-based registry of Busan. We found that 72% (67% from hospitals in Busan; 5% from other places) of the total incidental cancer cases could be registered using the KCCR data and the remaining 28% by active registration.

In Busan, there are 26 large hospitals including four university hospitals and additional 80 medium- and small-sized hospitals. Among these, 22 teaching hospitals notify all inpatient cases as well as some of outpatient cases to KCCR.

The KCCR annually gives data to the BSCR on the cancer patients living in Busan at the time of their initial cancer diagnosis. Cases from hospitals in other places are treated similarly. Additional cancer cases from outpatient clinics are identified from the records of the Departments of Anatomical Pathology, Diagnostic Radiology, and Radiation Oncology.

Three part-time medical officers visit 110 hospitals that are currently not notifying cancer patients to the KCCR, and collect the medical records of newly diagnosed cancer patients. They register the cancer cases, which are then scrutinised by Registry faculty members under the supervision of the Registry Director. Death certificates of all cancer patients are obtained annually from the National

Statistical Office (NSO), and are compared with Registry files. If a deceased person were not registered, the Registry staff would obtain the appropriate medical records from the hospital where the case was diagnosed and treated.

We are in the process of evaluating the accuracy of stomach cancer data through abstract-reabstract method, and plan to perform the evaluation regularly for additional types of cancers.

## Interpreting the results

We collected data according to ICD-O-2, but reported in ICD-O-3 format.

In 2000, most teaching hospitals in Korea could not provide medical service properly for at least for 3 months due to a doctors' strike. As a result, diagnosis and reporting of new cases were delayed, which could decrease the number of 2000 cases and increase the cases reported in 2001.

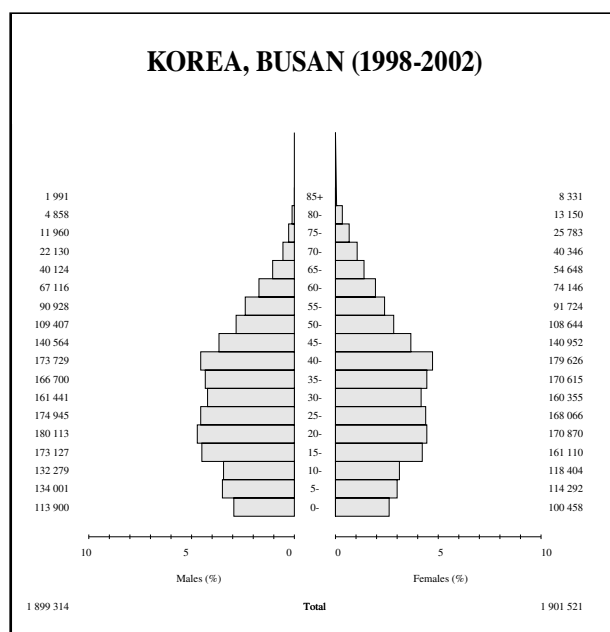
Even though the "Cancer Act" launched in 2003 clearly stated that cancer registration should be performed to know the burden of cancer; the regulations prohibit accessing personal information based on the personal privacy protection law. The amendment of the Cancer Act to allow access for personal information based on the National Statistics Law is underway. Registration of 2003 cancer cases is ongoing.

The Korean Government began implementing the National Cancer Screening Program (NCSP) in 1999 and has since expanded its target population and target cancers. In 2006, NCSP provides cancer screening for 5 major cancers including stomach, liver (only for high-risk groups), cervical, breast and colorectal cancer. Urologists actively recommend annual PSA testing for men aged over 50. There is no available information on the prevalence of the test; however, most men over 50 receive a PSA test.

## Use of the data

The Registry holds an annual conference to report and discuss cancer registration activities in Busan, and invites oncologists from the four University hospitals, representatives of the Association of Anatomical Pathologists and Diagnostic Radiologists, radiation therapists and medical recorders of the Busan hospitals. The President of the Medical Association of Busan and the Chief of the Department of Public Health and Hygiene of Busan City are also invited.

The data are published in an annual report that provides the basic statistics on cancer incidence that may be helpful for evaluating survival of cancer patients. BSCR data, included in the KCCR data, is provided without personal information to researchers as well as other government departments for statistical analysis. The cancer registry data are essential to



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evaluate various cancer control programs in Korea, including the National Cancer Screening Program.

**Source of population**

The population used to calculate cancer incidences is a mid-year population (the population at the 1st of July), but

in this report, the modified resident registration population data that is released annually from the Korea NSO was used.

**Multiple primary rules used**

IACR rules (2004) on CI5 IX period.

# Korea, Daegu

## Registration area

Daegu is an extended metropolitan city in southeastern Korea with a well-defined geographical border surrounded by mountains. It covers an area of 885.56 km<sup>2</sup>. The climate is temperate; it is situated at 128° E and 35° N. The 2000 population was 2 473 990 by 2000 census report. About 6% of the population lives in rural areas. Korea has virtually no ethnic group except Korean, only about 151 000 persons being registered as foreigners nationwide. However, international marriages are increasing rapidly, especially in rural areas. The proportion who had more than junior college education is 18.7%. More than half (52.4%) of Daegu citizens reported practicing a religion in 1995; 33.1% Buddhist, 11.6% Protestant, 6.7% Catholic.

## Cancer care facilities

Medical care for the whole population is covered and provided by the National Health Insurance Plan. Daegu has 16 223 hospital beds in 2002, in 74 hospitals (12 general hospitals, 51 hospitals, 9 dental hospitals, and 2 mental hospitals), of which four are university hospitals and 1274 private clinics. There are 4722 doctors including dentists.

## Registry structure and methods

Daegu Cancer Registry, financially supported by the Ministry of Health & Welfare, has been collecting new cancer cases in Daegu since 1 January 1997. Located in the Dongsan Medical Centre, Keimyung University, the staff consists of two doctors, one medical records administrator and one medical records technician.

Cancer reporting is voluntary in Korea. DCR receives inpatient cases from the medical record technicians responsible for reporting cases to the Central Hospital Cancer Registry (CHCR), and inpatient cases with an address in Daegu treated outside it direct from the CHCR. CHCR has been collecting cancer cases from major member hospitals in Korea since 1980. The staff of the DCR visits every major hospital dealing with diagnosis and treatment of cancer to find and abstract cancer cases from sources other than inpatients, such as pathology, haematology, CT/MRI, nuclear medicine and radiotherapy medical records. The cases from the other sources in hospitals are followed back to the original medical records to check the addresses, unique Resident Registration Number (RRN) and diagnosis date. The staff also visits private pathology laboratories to review pathology reports and sends query letters to physicians who sent their samples to the laboratory to obtain further information.

After checking for duplicates, the database is matched against two external data sources, the official cancer mortality data and insurance claims. Cases not already in the database become Death Certificate Notification (DCN) cases because death certificates do not contain information that makes follow-back possible. Instead, the RRN is used to clear the DCNs. The DCNs were matched with the databases of the seven major hospitals using the RRN to find out and abstract medical

records. Mortality files containing data on all cancer deaths are obtained annually from the Korea National Statistical Office. Cancer cases on insurance claims not matched to DCR data are followed back to the hospitals to confirm the diagnosis. The data are processed using the IARC/IACR CanReg software.

The registry fluctuations in reporting of new cancer cases by institution and source of case-finding are analysed monthly and annually. The registry carries out reabstracting and recoding periodically and uses CanReg to ascertain multiple primaries and DEPeditis to see unusual combinations of various kinds. Conventional medical records are being replaced by EMRs (electronic medical records) including inpatient records in some university hospitals. We are establishing a new system to more efficiently collect computerised incident cases.

## Interpreting the results

There was no change in area or population covered during 1998–2002. The DCR has been using ICD-O-2 for coding since its inception. However, several doctors' strikes happened during 2000, substantially lowering cancer cases diagnosed that year. DCO% is 4.4 (males 4.5, females 4.4).

Organised stomach, breast, cervical, liver and colorectal cancer screening programmes for persons aged more than 40 began in 1999. However, these programmes are not the same as those in developed countries. Some of their costs are just covered by Government subsidies. During 1999–2002, the uptake rate of the screening tests was very low. We do not

collect information on whether a cancer case is diagnosed by the screening or diagnostic tests, so the number of these included in our databases is unknown. PSA testing in Korea is opportunistic; it is usually done as part of Comprehensive Health Checkups but there are no statistics to cite.

## Use of the data

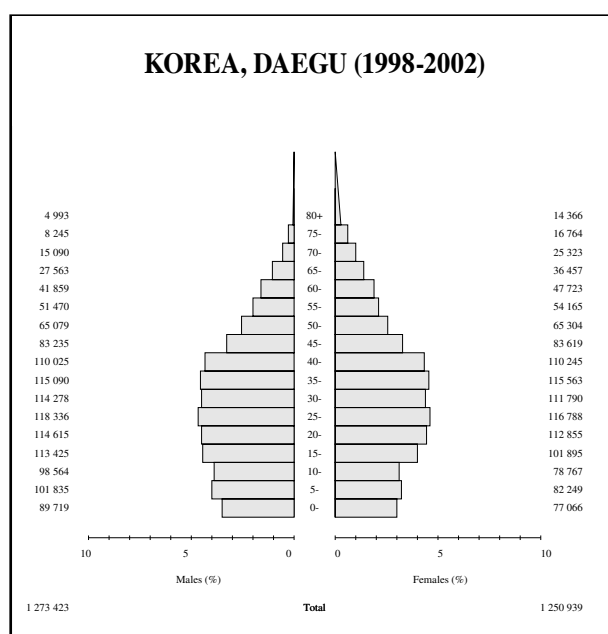
DCR is an incidence registry and is not actively collecting survival data on registered cases. It collects vital status when the information is available, for example from medical records, death certificates or the official cancer mortality data. It does not collect stage of disease. Currently, the registry is being used in "Effects of doctors' walkouts on cancer cases diagnosed in 2000 in Daegu", "Estimation of lifetime and age conditional probabilities of developing cancer", "Survival of gastric cancer patients in the young", and "Changes of cancer stages for major cancers in 1997–2003". We are planning to establish an occupational cancer registry as well as a birth defect registry as ramifications of the DCR.

## Source of population

The estimates of the population-at-risk are based on the 2000 census, making allowance for births, deaths and migration.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.



# Korea, Daejeon

## Registration area

Daejeon is located in the centre of South Korea: 167.3 km from Seoul, 294 km from Busan, and 169 km from Gwangju. The city is located between 127°33'21" and 127°14'54" E longitude, and 36°10'50" through 36°29'47" N latitude. Daejeon is surrounded by four mountains and located along three major rivers; the city originally developed from farms and houses that were on the hillsides and the valleys between them. The three rivers divide the city's five boroughs: Dong-gu and Daedeok-gu are located east of Daejeoncheon; Jung-gu is between Daejeoncheon and Yudeungcheon; Seo-gu is between Yudeungcheon and Gapcheon; and Yuseong-gu is west of Gapcheon.

Daejeon is the fifth among South Korea's largest six cities, including Seoul, Busan, Daegu, Incheon, and Gwangju. Its population is 1 390 510 and it covers an area of 539.83 km<sup>2</sup> at the end of 2000.

The population is mainly of the Asian race (mostly Korean); religions are Buddhism 26.0%, Christianity 20.6%, Catholicism 5.4% the others 1.6% and no religion 46.5%.

## Cancer care facilities

Both public and private sectors provide cancer-related services in this region. General health care in the region is provided by the 9 general hospitals and 20 hospitals (2003). Daejeon cancer registry cooperates with 6 registry hospitals and many non-registry hospitals. There were 4 therapeutic radiology units in 2006.

Also, the Korean government provides the National Cancer Control Programme, mainly related to cancer prevention, screening and supportive-palliative care including National Cancer Screening Program, Terminal Cancer Patient Management, Home-based Cancer Patient Management through National Cancer Center of Korea. Private hospitals provide mainly diagnostic and therapeutic services.

## Registry structure and methods

Cancer is not a notifiable disease in Korea; however the Cancer Act (2003) clearly states that cancer registration must be performed to know the burden of cancer. The Daejeon Cancer Registry (DJCR) is a population-based registration that has been in operation since 1998. The registry is located in Medical School of Chungnam National University. A medical doctor, a full-time registrar and one part-time registrar staff the registry.

The DJCR is responsible for (1) collection, analysis and management of Daejeon cancer statistics; and (2) analyses and summary of data from Daejeon cancer registries. The data sources for the Daejeon cancer incidence database are the DJCR, the KCCR database, the data from additional

medical record review surveys, site-specific cancer registry databases and cancer mortality data for identifying Death Certificate Only (DCO) from the Korea National Statistical Office (KNSO).

In an effort to improve the quality of the KCCR data, an evaluation of data completeness has been conducted, in particular cases diagnosed during 1999–2001 and cases deceased until 2003. We used the flow method developed by Bullard et. al (Br. J Cancer 2000). The flow method is based on the concept that registration is a time-dependent event observed after diagnosis, following a probabilistic approach. The overall 3-year completeness of all cancer was 90.5%, 90.7% in males and 90.3% in females. There were no differences in gender and among different age groups.

We are in the process of evaluating the accuracy of stomach cancer data through abstract-reabstract method, and plan to perform the evaluation on a regular basis for additional types of cancers.

## Interpreting the results

We collected data according to ICD-O-2, but reported in the ICD-O-3 format.

To cover cases diagnosed outside Daejeon hospitals, we performed additional medical record review surveys and also supplemented our data with cases from KCCR.

In 2000, most teaching hospitals in Korea could not provide medical service properly at least for 3 months

due to doctors' strikes regarding separation of prescribing from drug dispensing. As a result, diagnosis as well as reporting of new cases were delayed, which could increase the reported cases in 2001 as the incidence date is the first date of diagnosis on cancer.

Urologists actively recommend PSA testing for men aged over 50 annually. There is no available information on the prevalence of the test; however, most men aged over 50 receive a PSA test once in their lifetime.

## Use of the data

The registry prepares an annual report of cancer incidence, highlighting trends and changes. Some special studies of survival of registered cancer cases will be carried out.

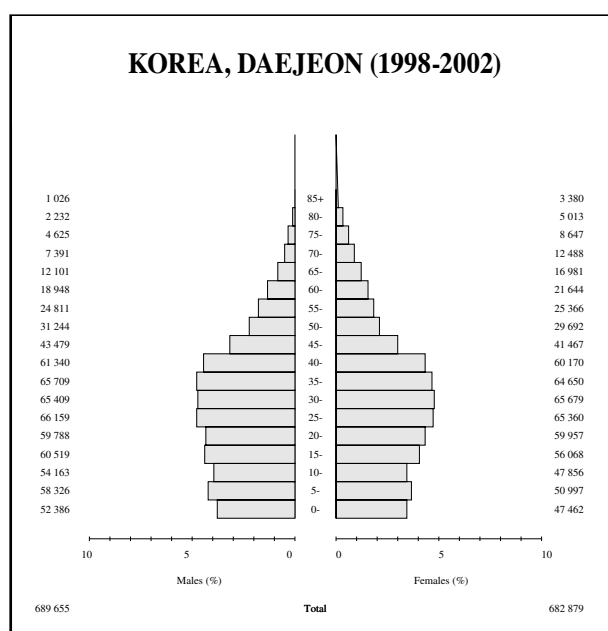
The cancer registry data is essential to evaluate various cancer control programs in Daejeon, Korea including the National Cancer Screening Program.

## Source of population

Census and estimate.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.



# Korea, Gwangju

## Registration area

Gwangju (formerly transliterated into English as Kwangju) has 1.36 million inhabitants and is situated on the southwestern tip of the Korean Peninsula. The city is the economic, educational and cultural centre of essentially rural surrounding provinces. The rapid transition of the Korean economy from agriculture to manufacturing industries during the authoritarian governments during the past 30 years leaves the area to suffer from low income and emigration of working-age population to the more industrialised parts of the country.

The 1980 uprising proclaiming the democratic government—the Gwangju democratization movement—allegedly made the city politically well known.

There are some manufacturing industries including an automobile assembly plant, though the service industries occupy the majority of the city's workforce.

## Cancer care facilities

According to 2002 statistics, the city has 10 general hospitals, 24 hospitals with 7674 hospital beds. Two traditional medicine hospitals also provide palliative services to cancer patients.

## Registry structure and methods

The Gwangju Cancer Registry was established in 1997 after a yearlong feasibility study. The registry is operated by director, part-time medical staff and one or two full-time registrars. The registry has a management committee composed of directors and oncologists of major hospitals and the chief of the Gwangju metropolitan city health department. The committee determines the major direction of the registry activities and cooperates in data collection as well as advocates the registry. There is also a practicum committee composed of hospital medical record keepers to handle the practical details of cancer registration.

The majority of the case information is linked to the Korean Central Cancer Registry (KCCC), which is provided by teaching hospitals throughout the country. The corresponding hospitals in the city provide the data directly to our registry. Data on Gwangju residents registered from hospitals outside of Gwangju city are obtained from KCCC database. The cancer claims data for medical insurance are also used, especially for the non-teaching hospitals. The pathology reports without significant hospital records, outpatient department (OPD) reports and radiation oncology records are also examined for adjuvant information.

The registrar reviews the original information by hospital visit and medical record check. The justified cases are finally

registered. Data obtained from outside sources are reviewed with the collaboration of Korean National Cancer Institute and other regional cancer registries.

Death certificate data are obtained from the Korea National Statistical Office. The death certificate data are then merged and verified with the GCR database, teaching hospital records and cancer claims data. Subsequently, the death certificates, which have no linked information, would be treated as death certificate only (DCO).

Our registry has regularly evaluated the completeness and accuracy of information recorded through record linkages with other registries, routine checks using the IARC tool, and reabstracting of medical records.

The Ministry of Health and Welfare of the Korean government provides financial support.

## Interpreting the results

In Korea, there are five national screening programs for stomach, colorectum, breast, uterine cervix, liver cancer. PSA testing has increased during this period even though it is not involved in routine screening for cancer, and its influence on the prostate cancer incidence is not clear. ICD-O-2 was used for years 1998–2002; for incident cases from 2003, ICD-O-3 has been used.

## Use of the data

The cancer incidence and other statistics contained in the annual report are recognised

as official public data of Gwangju metropolitan city.

Each year the Registry submits the annual report to the City Hall. The City Hall then makes a public announcement of the statistics and distributes copies to the relevant agencies. Local health departments and public health centres use Registry data for planning or evaluation of their health services. We permitted access to our registry database for public health and clinical study, if not conflicting with our confidentiality guidelines.

The Registry has participated in some epidemiological study for regional difference of cancer, such as thyroid cancer.

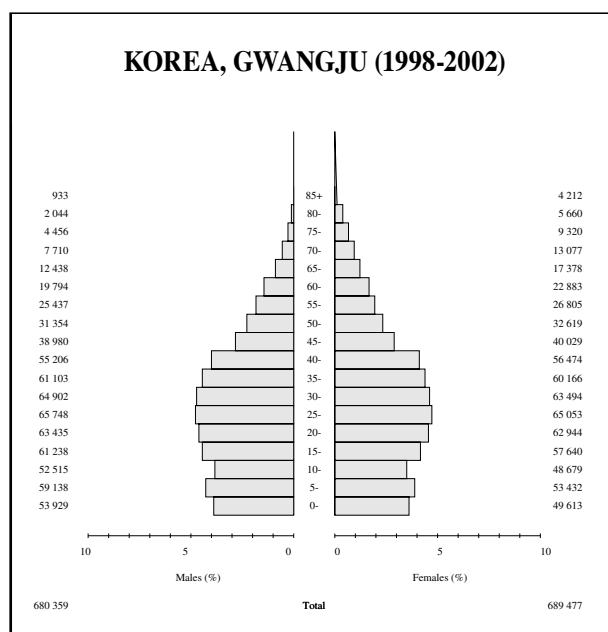
Follow-up for survival of cancer patients and publication of an English version of the annual report are under consideration.

## Source of population

1998, 1999, 2000, 2001, 2002: Registered population; the statistics of registered population (Gwangju city, 1999, 2000, 2001, 2002, 2003).

## Multiple primary rules used

IACR rules (2004) on historical data.





# Korea, Incheon

## Registration area

Incheon is the third largest city in South Korea and is located on the western part of the Korean peninsula with the sea to the west and metropolitan Seoul to the east. It is an industrialized city with a well-established medical delivery infrastructure. The population of the city according to social-ID registration by Statistics of Incheon city was about 2.63 million in December 2005. Most of the population is Korean (98.6%).

## Cancer care facilities

More than 100 medical institutions are in Incheon, and three university hospitals are available in diagnostic and treatment service for cancer. Patients suspected to have cancer in the primary and secondary care facilities are mostly referred to one of the three University hospitals. Two hospitals have all cancer treatment facilities, 10 have chemotherapy, 3 have radiotherapy and 46 have surgery.

## Registry structure and methods

The Incheon Cancer Registry was organized in 1997 by Inha University Hospital in collaboration with the Korean Central Cancer Registry (KCCR) and is incorporated in the International Association of Cancer Registries.

Financial support is provided primarily by KCCR and partly by Inha University Hospital. ICR was composed of 7 members, 5 from Inha University Hospital and 2 from GachunGil hospital.

There are four main sources of cancer registry in ICR. The primary source of the ICR data is the registry files from the KCCR (Korean Central Cancer Registry) at National Medical Center, which are transferred from each regional cancer registries including ICR, allowing ICR to collect cancer cases diagnosed in Incheon as well as outside Incheon. The secondary source was cancer cases registered at non-KCCR hospitals in Incheon. Others come from health insurance documents (medical insurance claims) and death records from the National Statistic Office.

Trained medical record administrators (MRA) review the inpatient and outpatient medical record including pathologic, radiologic and endoscopic reports. To collect the death certificate cases from death records, ICR has applied the public-health personnel with the support of Incheon city

officials, and has performed mail research to identify cancer patients from the hospitals which had identified the patient as having died of cancer.

ICR primarily classifies cancer patients by ICD-O-3 and multiple cancer and other specific classifications in accordance with the KCCR guidelines based on IARC manual. ICR uses its own registration format, which has more mandatory and optional items than KCCR's, and removes duplications and errors from the data by an ICR computer programme.

Follow up information is obtained predominantly by passive methods. These include obtaining cancer mortality information from death certificates in the Vital Statistics section. The mortality data are periodically matched with the incident cancer database using the National Identity number. The vital status of the unmatched incident cases is also ascertained by review of medical records. However, all incident cases for which death information is not forthcoming are presumed to be alive on the last day of the year for which the mortality data are fully utilised for matching.

## Interpreting the results

National cancer screening programs have been applied for cervix and lung cancer. The incidences of prostate cancer have been very low as compared to other developed countries, so the national cancer screening program did not cover PSA test for detection of prostate cancer. Many individual hospitals

employ PSA testing on a case-by-case basis.

## Use of the data

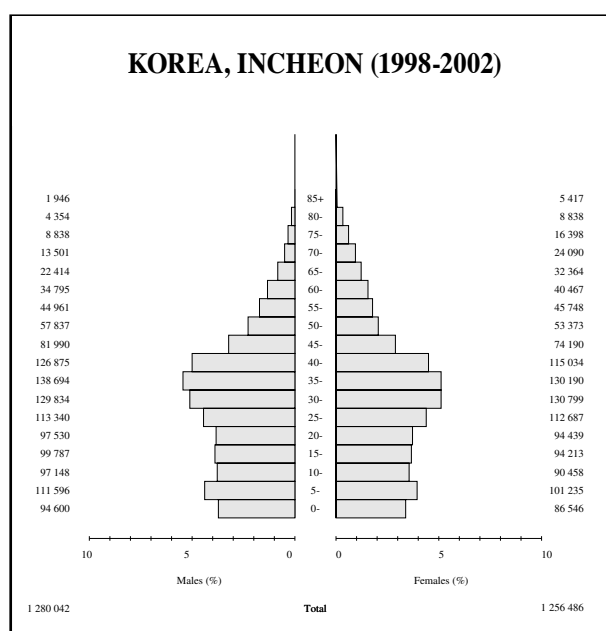
We report the incidence of cancer annually by site, sex and age excluding extent of disease or survival to the government. Policymakers in government use regional cancer registry data, including Incheon Cancer Registry, for developing health services or laws.

## Source of population

1998, 1999 estimated, Annual statistics of Incheon city on Registration of Social Identification. 2000 National Census. 2001, 2002 estimated, Annual statistics of Incheon city on Registration of Social Identification.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.



# Korea, Jeju

## Registration area

The Jeju registry covers the population of Jeju Island, which is situated in the southern part of Korea peninsula, between latitudes 33° and 34° N and longitudes 126° and 126° E, and is the largest island in South Korea with a total area of 1848 Km<sup>2</sup>. The island came into existence 700 to 1200 thousand years ago when lava spewed from a sub-sea volcano and surfaced above the waters. The annual mean temperature reaches 17°C and the annual rainfall is about 1676 mm. It is famous as the “clean island” in Korea because there are no industrial factories giving rise to air and/or environmental pollution.

The population as of 2001 was 546 696. Of the economically active population, 71% is engaged in the service industry, 25% in agriculture including fishing, and 4% in industry.

The religious distribution in residents is as follows: Buddhist 36%, Christian 17%, Confucian 3%, and atheist 44%. Almost all of residents are Korean; the proportion of foreigners is 0.1%. Thus, we exclude events of cancer incidence in foreigners.

## Cancer care facilities

Medical care for the whole population is covered and provided by the National Health Insurance (NHI) Plan. All six hospitals (two general and four private) on the island can diagnose cancer. However, one general and one private hospital among them can treat cancer patients because only these two hospitals have oncologists and cancer treatment facilities including radiotherapy departments. Hospital beds in these hospitals total 1528, approximately 2.8 beds per 1000 residents.

## Registry structure and methods

Jeju Cancer Registry (JCR) has been collecting new cancer cases occurring in Jeju since 1 January 1999. It is located in the Cheju National University College of Medicine (CNUMC). It receives financial support from the Korean National Cancer Control Program, and is administratively supported by the Department of Public Health and Sanitation of Jeju Provincial Government.

The Ministry of Health and Welfare (MOHW) established the nationwide, hospital-based Korea Central Cancer Registry (KCCR) in 1980. According to the KCCR program, the medical records department of nationwide teaching hospitals notifies all in-patient cancer cases voluntarily. In 2000, a pilot study was conducted to expand the pre-existing hospital-based registry into a population-based registry for Jeju. It was found that 78% of the total incidental cancer cases could be registered using the KCCR data and that the remaining 22% could be collected by active registration.

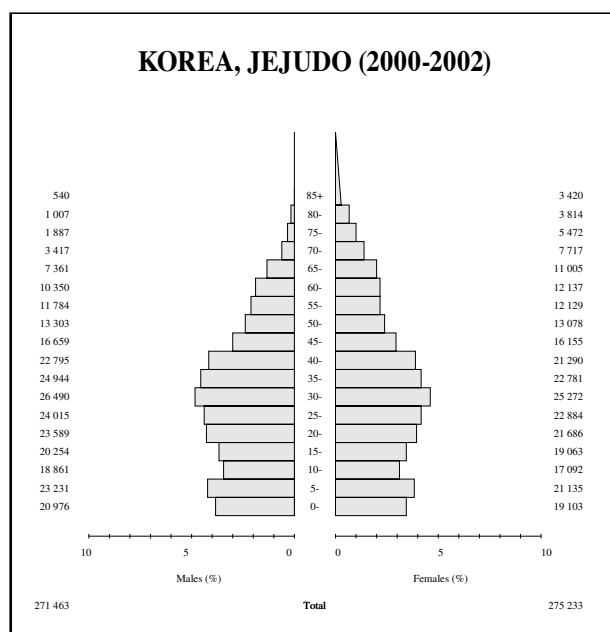
There are two staff in the registry. The chief, taking total responsibility for the operation the registry, has majored in

epidemiology. The other staff member is a medical recorder who visits the regional hospitals that are able to diagnose cancer; reviews medical charts, and gathers information about cancer incidence.

Among the six hospitals in Jeju, two teaching hospitals report all inpatient cancer cases as well as some outpatient cases to KCCR. The KCCR annually offers information to the JCR on the cancer patients with an address in Jeju at the time the initial diagnosis of cancer is made. Another source of registration is an active search by the registrars for cancer patients diagnosed in the non-KCCR registered hospitals in Jeju. The registrar visits these hospitals to review and abstract medical records of potential cancer patients who appear in the list of cancer claims submitted to the NHI. This list also serves as a good source for tracking the identity of cases notified by a death certificate alone.

Death certificates for all cancer patients are obtained annually from the National Statistical Office, and are compared with the file entries of cases in the registry using the unique Resident Registration Number (RRN). The cases not already registered in the databases become Death Certificate Notification (DCN) cases. For the DCNs, the registrar searches and reviews medical records from the six hospitals using RRN.

The JCR evaluates the validity of the registry data with the IARC CHECK program and re-abstracts the medical records to check for errors in the data.



## Interpreting the results

There was no change in area or population covered during the period of 2000–2002. The JCR has been using ICD-O-3 for coding since its inception, and there has been no change in case definition and coding.

The NHI in Korea supports a biennial cancer screening program for all Korean people aged above 40 years, including Jeju residents. The sites covered by the programme are stomach by endoscopy, colon by colonoscopy, breast by mammography, uterine cervix by Pap smear test, and liver by ultrasonography. PSA testing is not common but is feasible as it is not expensive.

## Use of the data

The registry prepares an annual report of cancer incidence, highlighting trends and changes in Jeju, Korea. Some special studies of the utilisation pattern of medical services in the registered cancer cases have been carried out.

## Source of population

Census.

## Multiple primary rules used

Impossible to detect multiple primaries.

# Korea, Seoul

## Registration area

The Seoul Cancer Registry (SCR) covers the population of Seoul Metropolitan city, the capital of the Republic of Korea. The population at the most recent census (2001) was 10 263 336, about 21% of the total population of the country.

The Korean population is very homogeneous, with a very small Chinese minority of around 20 000. Traditional culture is mostly based on Confucianism, while Buddhism (25%) and Christianity (19%) are two of the most vigorous religions.

## Cancer care facilities

Cancer care in the region is provided predominantly by large teaching hospitals and mid-sized hospitals, numbering 63 and 117, respectively, in 2003.

There are also 5948 clinics and 25 community health centres, but cancers are rarely confirmed in these facilities. Patients suspected to have cancer in primary clinics and community health centres are referred to one of the teaching hospitals, except for some elderly patients who decline further medical work-ups. This might cause incomplete registration among the elderly, unless the elderly cases are captured through the death certificates. Ninety-nine percent of cancers occurring in Seoul are treated in Seoul, and about 76% of patients treated in Seoul are from outside the city.

Apart from these facilities, there are 2545 clinics and hospitals practicing traditional oriental medicine. Although most cancer patients resort to western medicine eventually, some patients would only go to these traditional oriental clinics. These patients are not registered to SCR unless they are captured through the death certificates.

## Registry structure and methods

The SCR is located in the Department of Preventive Medicine, Seoul National University College of Medicine, and in the Department of Social and Preventive Medicine, Sungkyunkwan University School of Medicine. It is funded by the Ministry of Health and Welfare. There are two part-time medical officers, one data manager, and four full-time registrars.

The SCR uses several sources of data finding. About 87% of the SCR data are registered through the Korean Central Cancer Registry (KCCR). KCCR is operated by voluntary registration from teaching hospitals throughout the country.

The second source of registration is active case finding by the registrars. The registrars make visits to about 81

mid-sized hospitals to review and abstract medical records of potential cancer patients who made insurance claims for cancer to the Association of Korean Medical Insurance. The insurance claim data also serves as a good source for tracking the identity of cases notified by a death certificate alone.

The third source is the death certificates to find the vital status of the registered cases and to register the Death Certificate Only cases (DCO). Death certificates from the National Statistics Office (NSO) cover all deaths occurring in Korea and include the full National Identity Number issued by the Korean Government to every Korean citizen at birth. The quality of death certificates in Seoul is good, about 98% being certified by medical doctors.

Using both the health insurance data and mortality data further enhances the completeness of the registration.

The SCR evaluates the validity of the registry data with the IARC CHECK program and re-abstracts the medical records to correct the errors in the data.

## Interpreting the results

The size of the population and the number of medical facilities to be covered make it necessary to accept the data from KCCR pre-coded by many medical recorders from each hospital. Although the Association of Medical Recorders continuously instructs its members on cancer registry methods, the process still calls for a constant evaluation of the validity of the

registry data.

Around 1998, opportunistic screening for breast and thyroid cancer started to become popular among women. The rapid increase in thyroid cancer among women could be accounted for by this change in screening rate.

## Uses of the data

The registry produces reports on cancer incidence by sub district in Seoul, Korea. A special study of survival for all cancers has been carried out.

## Source of population

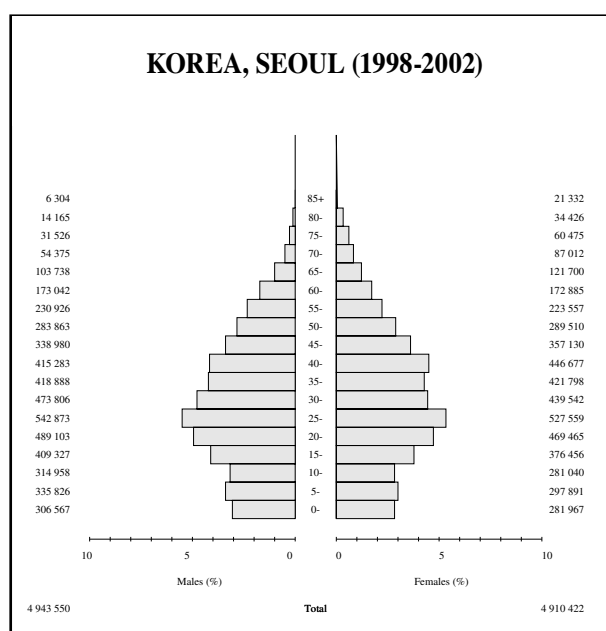
Seoul Population Census : 2000

## Multiple primary rules used

IACR rules (2004) on CI5 IX period

## Acknowledgement

We thank Dr. Jae-Gab Park and Dr. Keun-Young Yoo, the former and current President of National Cancer Center in Korea, for their support to SCR.



# Korea, Ulsan

## Registration area

The Ulsan Cancer Registry (UCR) covers the population of Ulsan metropolitan city in Korea. Ulsan is a representative port city located in southeastern region of Korea. It covers an area of 1056.7 km<sup>2</sup>. The population at the most recent census (2000) was 1 012 110. About 84% of the population (>850,000 inhabitants) lives in urban areas. In general, Korea has virtually no other ethnic group except Korean and only 2318 persons are registered as foreigners in Ulsan.

The annual mean temperature in Ulsan is 14.3° C, and annual rainfall is about 1272 mm.

Ulsan has become a rapidly industrialised city, accounting for 12.2% of the manufacturing industry in Korea. The main industries are the petrochemical, shipbuilding, and automobile industries.

## Cancer care facilities

Medical care for the whole population is covered and provided by the National Health Insurance Plan. In 2004, Ulsan had 7279 hospital beds and 39 hospitals (2 teaching hospitals, 1 general hospital, 23 hospitals, 2 dental hospitals, 3 psychiatric hospitals, 4 sanatorium hospitals, and 4 traditional medicine hospitals), of which one is a university hospital, and 912 private clinics. The university hospital provides cancer surgery, chemotherapy and radiotherapy services.

## Registry structure and methods

The registry is located in the department of occupational and environmental medicine, Ulsan university hospital, and is funded partly by Ministry of Health and Welfare, and partly by the city's health department. Two part-time medical doctors and one full-time registrar staff the registry.

Approximately 79% of the cases are registered from the data files of the Korean Central Cancer Registry (KCCR). The KCCR identifies incidence from cancer cases in Korea through the nationwide hospital-based discharge system. This hospital-based database covers all general hospitals in Korea.

The second source of registration is the list of cancer cases from claims made through the National Health Insurance Corporation.

The third source is the death certificates. The cases not already registered in the UCR database become Death Certificate Notification (DCN) cases. Death certificates from the National Statistics Office (NSO) cover all deaths occurring in Korea and include the unique Resident Registration Number (RRN) issued by the Korean Government to every Korean citizen at birth. The RRN also serves as a good indicator for tracking cases notified by death certificate alone.

In addition to these three major sources, several secondary data sources, such as log files from pathology laboratories and radiotherapy departments, help to identify unregistered cancer patients.

The UCR evaluates the validity of the registry data with the IARC CHECK program and re-abstracts the medical records to check for errors in data. A formal evaluation of the data is done in collaboration with the Korean National Cancer Centre.

## Interpreting the results

There has been no change in area or population covered by the UCR during the period 1999–2002. The UCR has been using ICD-O-2 for coding since its inception, and there has been no change in case definition and coding.

There are 5 cancer screening programs in Korea, namely cervix, breast, prostate, stomach and liver. If prostate cancer is suspected or if symptomatic of BPH, then PSA testing is regularly performed.

## Use of the data

The registry produces annual reports on cancer incidence

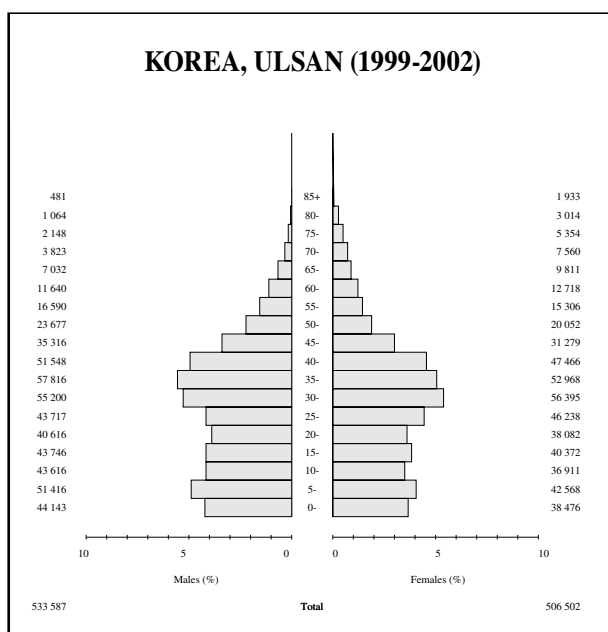
and mortality in Ulsan. The data have been used for several epidemiological studies on primary, secondary and tertiary prevention of cancer. The registry is especially interested in monitoring occupational cancer.

## Source of population

The estimate of the population-at-risk is based on the 2000 census, making allowance for births and deaths, but it was not possible to estimate migration into and out of the registration area.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period



# Kuwait

## Registration area

Kuwait is one of the major oil-producing countries in the Middle East, with a surface area of 17 818 km<sup>2</sup>, and is situated in the northwestern corner of the Arabian Gulf. The mainland is flat sandy desert with a scattering of oases. There are a few rocky hills ranging from 180 to 300m above sea level. Kuwait experiences wide variation in temperature, ranging from an average of 45°C in July to an average of 8°C in January. There is also wide variation in annual rainfall, ranging from as little as 22 mm to 350 mm. This falls almost entirely between November and April.

Kuwait has experienced rapid social and economic development over the past four decades. It is a society undergoing demographic and epidemiological transition. For Kuwaiti nationals, these changes have included important declines in infant mortality (11.4/1000 live births) and improvements in life expectancy (75 years). Kuwait also has one of the highest annual population growth rates in the world (4.5%) and has greatly increased the literacy rate to about 85%.

The total population in 1995 was about 1.88 million: 37% are Kuwaiti nationals and 63% are non-Kuwaitis (expatriates). Expatriates living in Kuwait are a heterogeneous and transitory group representing over 50 countries. However, it is noteworthy that the vast majority (95%) are from Southeast Asian and Arab countries. In 1994, Southeast Asians (from Afghanistan, Bangladesh, India, Iran, Pakistan, Philippines, and Sri Lanka) represented 58% and Arabs (from Egypt, Jordan, Lebanon, and Syria) 37% of the expatriate population. Compared with countries in Europe and North America, Kuwait has a relatively young population structure: about 44% of Kuwaitis and 17% of non-Kuwaitis are aged <15 years.

## Cancer care facilities

For administrative purposes, the country is divided into five health regions: Capital, Hawali, Al-Farwania, Al-Ahmadi, and Al-Jahra. The medical services in each health region comprise a number of primary/family healthcare clinics, which provide general, maternal, child and dental healthcare services, and a general public hospital. Besides these facilities, there are a number of centralised specialist hospitals including Kuwait Cancer Control Centre. The centre was established in 1982 and is the only specialised cancer

treatment hospital in the country. It offers modern facilities for cancer diagnosis, treatment and follow-up.

## Registry structure and methods

The Kuwait Cancer Registry was established in 1971 in the Radiotherapy Department at the Al-Sabah hospital. The initial purpose of the registry was to study the incidence and morphology of cancers in the Kuwaiti population and to use this information as the basis for establishing a comprehensive cancer centre for diagnosis, treatment, follow-up and care of cancer patients. Subsequently, the Kuwait Cancer Control Centre was established in 1982 and the registry became a separate department of the hospital.

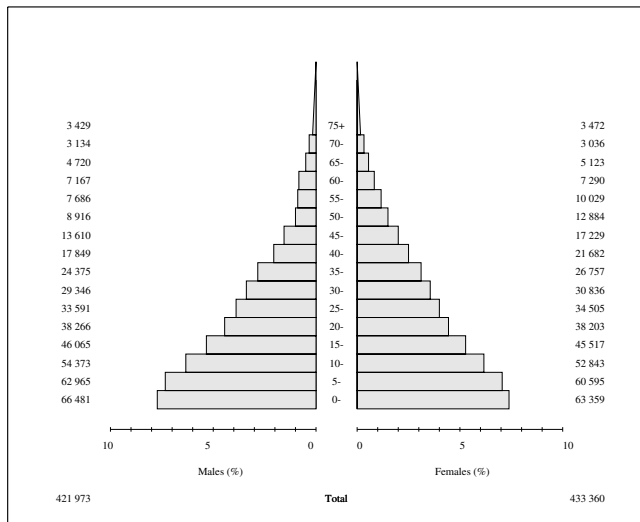
Notification of cancer is compulsory through a Ministerial Decree. Cancer registrations are fairly comprehensive as almost all cases not initially diagnosed or treated at the Kuwait Cancer Control Centre (including those who receive initial treatment at other hospitals or abroad) are ultimately referred to the centre for further treatment or follow-up. The registry maintains a separate alphabetical and numerical index, which includes information such as case note number, name, age, sex, nationality, year of diagnosis, and site. Pathology reports and death certificates are filed numerically by year. All new registrations are checked against these data items to avoid duplication.

The sources of information are: case notes from the Cancer Control Centre and other hospitals; reports from the pathology departments of the Cancer Control Centre and of other hospitals; and mortality data from the Vital and Health Statistics Division of the Ministry of Health. All coding (topography, morphology, TNM classification, etc.) and computerisation of data is done by the registry staff. The registry is staffed by a director, a medical officer and an administrator, two cancer registrars, and one medical records clerk and two computer technicians.

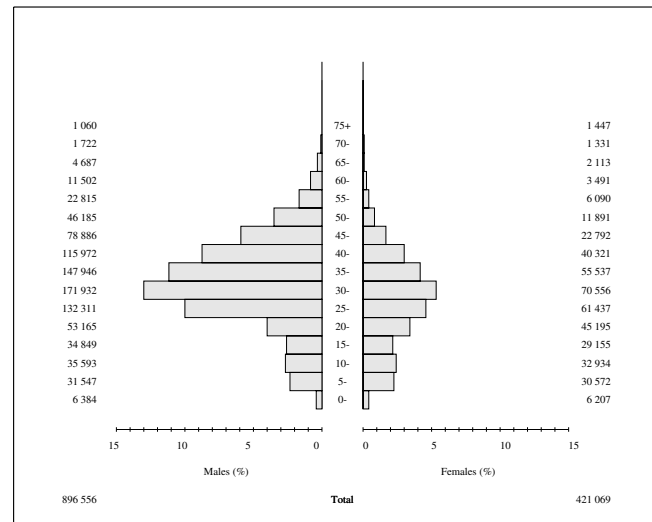
## Use of the data

The data are used for monitoring trends in incidence and in research. They are also used for planning and evaluation of cancer care facilities. The registry is especially interested in monitoring any change in the incidence of cancer that may have occurred following the Gulf War in 1991.

**KUWAIT: KUWAITIS (1998-2002)**



**KUWAIT: NON-KUWAITIS (1998-2002)**



**Source of population**  
2001 estimates.

**Multiple primary rules used**  
Impossible to detect multiple primaries.

# Malaysia, Penang

## Registration area

The Penang Cancer Registry covers the population of 5 districts (Timur Laut, Barat Daya, Seberang Perai Utara, Seberang Perai Tengah and Seberang Perai Selatan) within the state of Penang, in the northwestern part of the Malaysian peninsula. The population at the most recent census (2000) was 1 313 449, with 79.6% of the population living in urban areas. Penang has a higher population density than the rest of the country.

The ethnic composition and socio-economic profile of the Penang population differs from the other states within Malaysia in that Penang has a better economic attainment and higher per-capita income than most other states. It also has a higher proportion of Chinese residents than the rest of the country, with an overall ethnic composition of 53.4% Malays, 26.0% Chinese, 7.6% Indians and 12.9% others (Department of Statistics, 2001). The official religion is Islam.

## Cancer care facilities

Both the private and the public sector, through a network of regional hospitals, provide general health care in the region's district hospitals with and without specialists and a network of primary health centres. In addition there are 11 private hospitals in the state and 426 General practitioners. All modalities of treatment for cancer are available in Penang. However, radiotherapy services are only available at Mount Miriam Hospital and at Pantai Mutiara Hospital. Mount Miriam Hospital is the regional cancer centre for Northern Peninsula Malaysia.

## Registry structure and methods

The registry is located within and funded by the State Health Department. An epidemiologist, nurse, 2 clerical staff and part-time clerical staff (when the need arises) staff the registry. In addition, nurses from each of the districts also assist in active case detection. Strict confidentiality is maintained at all times at the registry.

The Penang Cancer Registry uses both active and passive finding methods. Active case finding and routine checks are done using public and private hospital discharge records, as

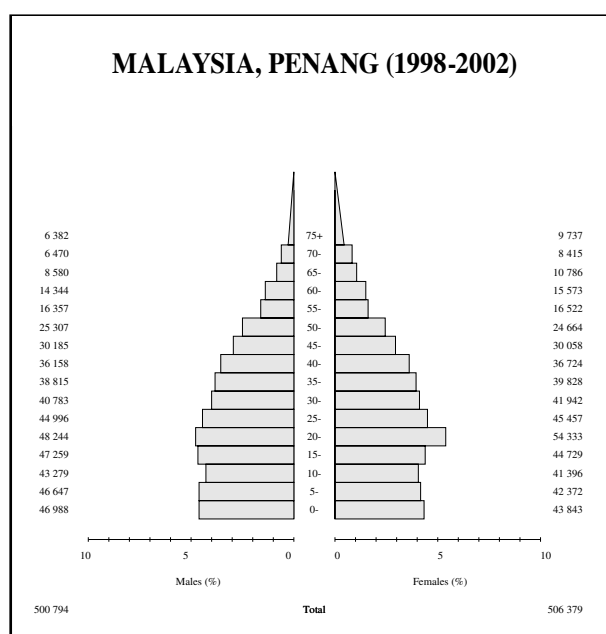
well as pathology record listings from the public and private laboratories, to ensure completeness of data. Registry staff visit the sources of data to extract required information. The registry also relies on other healthcare workers to complete notification forms and forward them to the registry. This is supplemented by case detection from death records supplied by the National Registration Department. All possible sources of data in the State are identified. Arrangements are also made with other hospitals outside the registration area to notify the registry of resident cancer cases that are diagnosed and treated there.

The Cancer Registry Committee and the State Technical Committee evaluate the completeness and accuracy of the information.

## Interpreting the results

It is not possible to estimate how many cancer cases remain undiagnosed. However, Penang's health coverage is very extensive even in the remotest areas, and a full range of diagnostic and treatment facilities are available here, so it is very unlikely that any referred cases will be missed.

Screening services for cervical cancer and a breast self examination programme are routinely carried out by the primary healthcare facilities. Extensive screening services are also provided by the private sector. PSA testing is offered by all the private hospitals for a fee, and in general hospitals only when indicated.



## Use of the data

The registry has prepared annual statistical reports for the years 1994, 1995, 1996 and 1997 as well as two 5-year reports (1994–1998 and 1999–2003). The reports highlight trends and changes. The data are used for planning and evaluation of cancer control programme in the state, and are also used by universities for specific research.

## Source of population

1999: projection from 1991 census. 2000: census. 2001, 2002: projection from 2000 census.

## Multiple primary rules used

IACR rules (1990).

# Malaysia, Sarawak

## Registration area

The Sarawak Cancer Registry is a population-based cancer registry that commenced data collection on 1 January 1996. The registry covers the population of 11 divisions (Kuching, Sri Aman, Sibuan, Kapit, Miri, Limbang, Sarikei, Bintulu and Samarahan, Mukah and Betong Divisions) in the state of Sarawak in Malaysia. The population at the most recent census (2000) was 2 071 506. About 48% of the population lives in urban areas; ethnic composition is 30.0% Iban, 26.7% Chinese, 23.0% Malays, 8.3% Bidayuh, 5.9% other Indigenous, 5.6% Melanau and 0.4% other ethnic Groups

## Cancer care facilities

General health care in Sarawak is provided predominantly by the Sarawak Health Department, through the district hospitals and a network of primary health centres. Private practitioners and hospitals supplement this. Radiotherapy service in Sarawak is only available at the Sarawak General Hospital in Kuching. Patients who require radiotherapy treatment are referred to the Sarawak General Hospital for treatment. Furthermore, as this is the only hospital providing radiotherapy services in the State, the likelihood of cancer patients seeking radiotherapy treatment beyond the catchment area of the registry is minimal.

## Registry structure and methods

The registry is located in the Non-Communicable Diseases Control Section of the Sarawak Health Department, and fully managed and fully funded by the Sarawak Health Department. A full-time medical officer, two full-time registrars and a part-time registrar staff the registry.

Cancer registration is based primarily on voluntary notifications. The registry seeks basic epidemiological and clinical data for all cancers diagnosed in Sarawak since 1 January 1996. The registry receives notifications in a standardised format from all sections of the medical profession in Sarawak. Active case finding and routine checks are made of government and private hospital discharge records as well as pathology record listings from the public and private laboratories to ensure completeness of the data.

This is supplemented by case detection from death records supplied by the National Registration Department.

In order to ascertain high coverage and accuracy of data, the Sarawak Cancer Registry team performs several quality control checks. These include sourcing out missed cases, identifying multiple notifications and inaccurate information and inspecting case notes of discharged cancer patients in all government hospitals in Sarawak. Although cancer is not a notifiable disease, a fair number of registration forms are received from private practitioners.

## Interpreting the results

It is not possible to estimate how many cancer cases remain undiagnosed, but underestimation could occur for elderly subjects in rural areas. Health services in Sarawak have

a full range of diagnostic facilities, so that it is unlikely that cases referred will be missed. Screening service for cervical cancer is ongoing and provided by the primary health centres. While there is increasing interest in PSA testing, it is not routinely done in our population.

## Use of the data

The registry had published the 1996–2000 cancer report highlighting incidence of cancer in Sarawak by gender, age and ethnic group. The data from the cancer registry are being used for planning and evaluation of health services. The registry is currently developing a cancer atlas for Sarawak and analysing cancer survival in Sarawak.

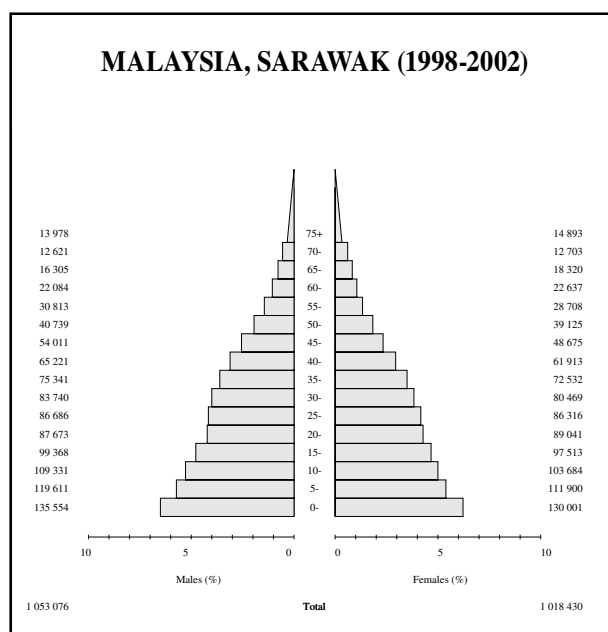
Our registry is currently doing research on the geographical distribution of common cancers in our population, such as nasopharyngeal carcinoma, colorectal cancer, breast cancer and cervical cancer. Preliminary results of the research on the geographical distribution of nasopharyngeal carcinoma in Sarawak were presented as part of the paper "Epidemiology of Nasopharyngeal Cancer in Sarawak", presented at the Beijing IACR Meeting. Our registry is currently working on a proposal for research into screening for nasopharyngeal cancer in Sarawak.

## Source of population

1998, 1999: projection from 1990 census. 2000: census. 2001, 2002: projection from 2000 census.

## Multiple primary rules used

IACR rules (2004) on CI5 IX period.





# Oman

## Registration Area

The Sultanate of Oman is located in the southeastern corner of the Arabian Peninsula. It has a coastal line extending almost 1700 km from the Strait of Hormuz in the north to the borders of the Republic of Yemen in the south and overlooks three seas; the Arabian Gulf the Gulf of Oman and the Arabian Sea. The Sultanate of Oman borders the Kingdom of the Saudi Arabia and United Arab Emirates in the west, the Republic of Yemen in the south, the Strait of Hormuz in the north and the Arabian Sea in the east. There are a number of scattered Omani islands in the Arabian Sea; the most important are Masirah and Al Halaniyat.

The total area of the Sultanate of Oman is approximately 309 500 km<sup>2</sup>, making it the second largest country in the Arabian Peninsula. The Sultanate is composed of varying topographic areas consisting of plains, wadis (dry river beds) and mountains. The most densely populated and agriculturally fertile area is plain overlooking the Gulf of Oman and the Arabian Sea (3% of the total area). The mountain ranges occupy almost 15% of the total land of Oman and are inhabited by about 5% of the population. The remaining area is mainly sand, wadis and desert (about 82% of the total area). The climate differs from one area to another: it is hot and humid in the coastal areas in summer, hot and dry in the interior with exception of higher mountains and southern regions of Dhofar, which enjoy a moderate climate throughout the year.

Based on the 1993 census the estimated Omani population in 1998 was 1 684 850. Based on a second census conducted in 2003, the estimated Omani population in 2004 was 1 802 931. In 2004 about 12% of the population was under 5 years of age and 40% were under 15 years. Only 3.1% of the total Omani population was above the age of 60 years. There were 102 males for every 100 females.

Patients are classified as nationals and non-nationals. However, no data is collected on ethnic background of patients.

## Registry Structure and Methods

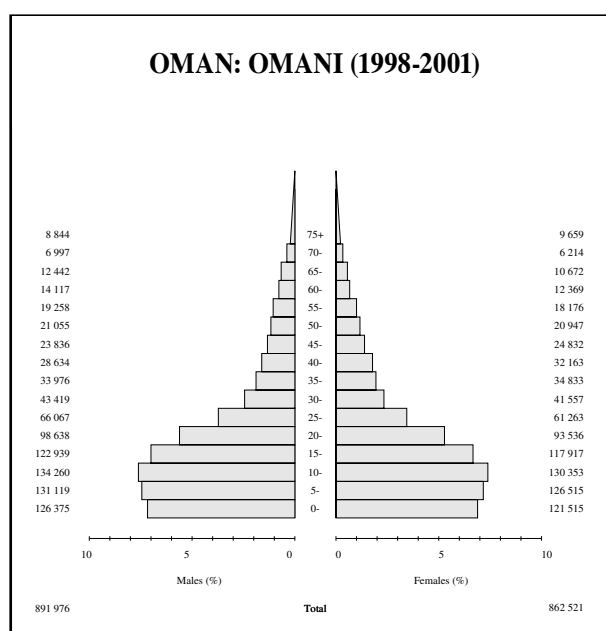
The cancer registry in Oman was established in 1985 in Al Nahdha Hospital as a hospital-based registry. In 1996 it was moved to the Department of Non-Communicable Diseases Control at the Ministry of Health Headquarters. Since then the Oman National Cancer Registry has functioned as a population-based registry covering the entire Sultanate of Oman and is staffed by two part-time epidemiologists and

two full-time cancer registrars. Cancer notification forms were modified and distributed to all regional hospitals and sister institutions for reporting.

Sources of cancer information for the Registry include passive reporting by the diagnosing physicians from different hospitals including University, Police and Armed Forces Hospitals, histopathology and cytology reports from the five main laboratories in the country and the outpatient logbooks and radiotherapy and chemotherapy appointment lists of the Oncology Department at the main tertiary facility, the Royal Hospital. In addition, discharge diagnosis and monthly hospital mortality lists of patients with diagnosis of cancer are obtained from different hospitals in the country.

In December 2004 radiotherapy services became available in Oman in addition to the other modalities of treatment, which already existed. This minimised the number of patients sent abroad for treatment and provided the registry with an extra source of cancer notification. Details of the patients sent abroad for treatment (mainly for radiotherapy) were obtained from the Department of Treatment Abroad and from Tuwam Hospital (main referral hospital for radiotherapy in the neighbouring United Arab Emirates).

Between 1985 and 1997, the registry used Dbase software for data entry. In 1998 the whole database converted to the IARC/IACR CanReg software programme.



## Interpreting the results

Opportunistic screening activities are ongoing for cervical cancer. However there are no organised screening programmes yet. PSA testing is not common in the population.

Smoking is on the increase in Omanis, and many industries are promoted now, both of which could result in an increase in the incidence of cancer.

## Source of population

Data for 1998–2001 are annual projections based on the Cohort Component Technique, using the West UN life table model and based on the 1993 census.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).

# Pakistan, South Karachi

## Registration area

Karachi is the largest city of Pakistan, an Islamic Republic in south central Asia and the capital of Sindh province. Located on coast of the Arabian Sea, at latitude 24° 51' N, longitude 67° 02' S, it is the nation's major commercial and industrial centre as well as the largest seaport. The city covers 591 km<sup>2</sup> while the metropolitan area covers 1450 km<sup>2</sup>. The city of Karachi is divided into 5 districts. The Karachi Cancer Registry (KCR) registers incident cases of the southernmost district of the city. Karachi South has a year-2000 population of 1 723 617; males 928 695 and females 794 922. The population is urban.

Karachi is a multi-ethnic city. The dominant ethnic group in Karachi is the Urdu-speaking Muhajirs; the other large groups include the Sindhis, Balochis, Punjabis, Pashtuns, Kashmiris and Seraikis. There is a refugee population that includes Afghan, Pakhtuns, Tajiks, Hazaras, Uzbeks, and Turkmens. There are also Bengali, Arab, Iranian and African immigrants, and a large community of Zoroastrian-Persian Parsis and Goan Catholic Christians. The linguistic distribution of population was: Urdu-speaking 48.52%; Punjabi 13.94%; Sindhi 7.22%; Pushto 11.42%; Balochi 4.34%; Seraiki 2.11%; others 12.4%. Most inhabitants are Muslim (96.49%), with some Christians (2.35%), Hindus (0.83%) and Qadiani (0.17%).

Karachi South is a sample population of Pakistan, having an equal distribution of the major ethnic groups and all the minority groups of the country.

The population distribution of KS and Pakistan are similar as regards age, gender and religion. The male preponderance reflects the in-migration for work from other regions of Pakistan i.e. Sindh, Baluchistan, NWFP and Punjab. These men are residents of the district, as they spend an entire life in Karachi, going back to their village only during their annual or bi-annual leave.

## Cancer care facilities

Karachi South has 2 provincially administered tertiary care public health hospitals and 1 armed force administered hospital, one with a radiotherapy facility, that provide free to subsidized surgery and diagnosis. The Aga Khan University had 6 diagnostic centres in the district during the reference period. Other private medical facilities provide surgical and diagnostic facilities but provide less-than-optimal quantitative medical oncology or radiotherapy treatment cover, as the tertiary care facilities are also shared by numerous referral cases from across the Province of Sindh. Thus the majority of the cancer patients utilise services outside the district, city or even the country.

## Registry structure and methods

The Karachi Cancer Registry (KCR), the first population-based registry in Pakistan, has been philanthropically funded for 12 years. It has 6 permanent staff members and many

volunteer workers in 2 offices at the Sindh Medical College and Aga Khan University (pathology department).

Data collection is a combination of active search, passive notification, and automated notification. The principal source of information on cancer cases is the diagnostic centres of the Aga Khan University.

The registry has access to death certificates with personal identifiers. This source has limited value as the cause of death registered is non-specific. Cancer is not a notifiable disease and problems of 'confidentiality' are high with major centres, e.g. the Aga Khan University.

## Quality control

The data are classified using ICD-O3 and computerised using a customised version of CanReg-4, with internal checks on the validity of entered data. Manual and computerised validity checks for the cancer data were performed as per IARC and IACR recommendations. This involved factors influencing comparability, i.e. classification and coding. Demographic variables recorded were the hospital patient-number, date of incidence, name, age, sex, address, ethnicity, topography, morphology, grading and staging.

## Interpreting the results

Private sector input has significantly increased and altered the contribution from data sources. Whereas the public health sector contribution

was more in 1995–1997, the private health sector contribution far outweighs the former in the present reference period.

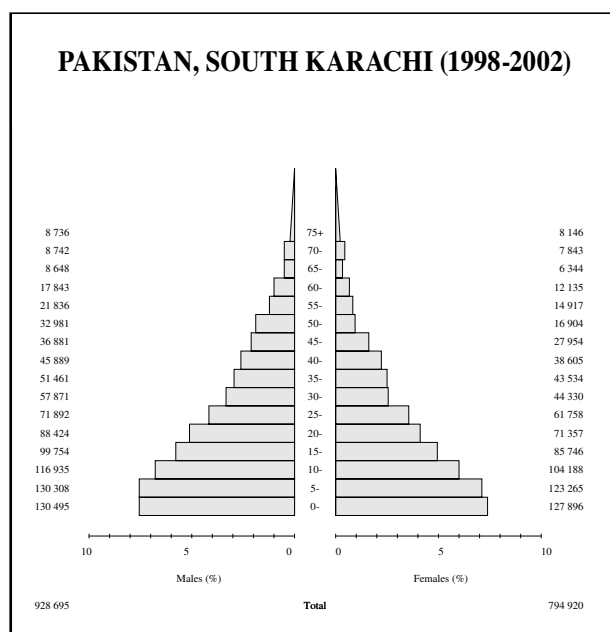
There are no screening programs for any region in Pakistan; however, there are facilities for PSA testing, PAP smears and mammography.

It is not possible to precisely estimate how many cancer cases remain undiagnosed, as there are no autopsies and the death registration system is very inadequate and incomplete. The registry however annually conducts a formal evaluation of the completeness or accuracy by utilizing the well-maintained and documented cancer data at Zainab Punjwani Medical Centre and the Baqai Institute of Oncology.

The district has a preponderance of self-inflicted (tobacco, arecanut, paan misuse) malignancies in men and breast cancer in women. These outweigh any occupational exposures if present, there being oil refineries and tanneries in this district. Karachi South is a belt fringing the Arabian Sea. Potential environmental hazards could be oil spillage and un-detoxified chemical products discharged into the sea by tanneries and other factories.

## Use of the data

The incidence data are reported regularly to the Federal Government and various agencies in Pakistan requiring the same



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for health sector planning and monitoring. The data are used for case-control studies, for research theses and dissertations of post-graduate students and fellows. The NCCP Pakistan planning, implementation and monitoring is based on this data.

**Source of population**

Census 1998. 1999–2002 estimated using 1.94% growth rate from Census 1998.

**Multiple primary rules used**

IACR rules (2004) on historical data

**Notes on the data**

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).

# Philippines, Manila

## Registration area

The registry covers the four major cities (Manila, Quezon, Pasay, Caloocan) of the National Capital Region (NCR), the major urban centre of the country. It encompasses a land area of 274.2 km<sup>2</sup> located in the southwest portion of Luzon between latitudes 14°48'23" and 14°31'15" N and longitudes 14°39'53" and 121°05'20" W. Manila is the capital and main port of the Philippines, the hub of commerce and trade and the seat of cultural and intellectual activities.

The population covered by the registry, based on the 2000 census of Population and Housing, is 5 287 425, a 4.1% increase over 1995. As a whole, the population is young, with 31.87% under 15 years of age and only 2.10% over 65. It comprises 140 different ethnic groups, the largest of which are Tagalog (69.85%), Bicol (4.27%), Ilocano (4.16%), Bisaya (3.87%) and Waray (2.81%). Among the foreign ethnic groups the largest are Chinese (0.59%), Other Foreign (0.04%) and American/English (0.02%). Most (88.8%) are Roman Catholic, 3.2% Iglesia ni Kristo and 0.6 % Muslim.

## Cancer care facilities

Health services in the National Capital Region and the adjacent province of Rizal include four cancer institutes, 168 secondary and tertiary care hospitals, 43 primary care hospitals and 32 Department of Health clinics for out-patient consultations. Ten hospitals have radiotherapy facilities.

## Registry structure and methods

The Philippine Cancer Society (PCS) began cancer registration in 1959 in an attempt to organise a national cancer registry. Although this was not successful, it served as a pilot study. In 1968, the Central Tumor Registry of the Philippines (CTRP) was launched, covering 25 hospitals in Manila and one in Cebu, completely relying on notifications from these hospitals. In 1983, it was converted to a population-based cancer registry and renamed the Philippine Cancer Society-Manila Cancer Registry. Cancer registry clerks were trained to abstract pertinent information from hospital records and death certificates and they actively collected data on cancer cases in its catchment area for the period 1980–82 onwards.

The registry is located in the PCS building, and is fully funded by the PCS. The registry staff comprises six part-time consultants, one full-time supervisor, and six cancer registry research assistants. In 1984, the registry started a cooperative effort with the Department of Health-Rizal Cancer Registry in covering 134 hospitals within the National Capital Region and Rizal Province. Both registries use the same active data collection methods.

Hospital data sources include medical records, radiotherapy records, pathology/haematology records and

logs, radiology, ultrasound, nuclear medicine, CT/MRI reports and logs, and hospital tumour registries. Death certificates from the office of the Local Civil Registries are also reviewed. The registry staff also visits selected private surgeons, oncologists and hematologists.

Data received are checked manually and electronically for completeness and consistency as well as for duplication. Coding consistency and validity is checked with the IARC/IACR CanReg-4 software. Follow-up was done previously through death certificate review. In 1997, however, PCS-MCR conducted its first population-based survival study on the 1987 incident cancer cases, using both active and passive follow-up. Although regular formal evaluation of data completeness or accuracy is ideal, limitation in funding still restricts this activity.

## Interpreting the results

Some challenges faced by the registry include inadequate manpower for data collection and other registry procedures; poor record-keeping in some hospitals; non-inclusion of private pathologists' reports in some hospital records; use of different names (particularly among Chinese); and delayed data collection due to confidentiality concerns in some hospitals.

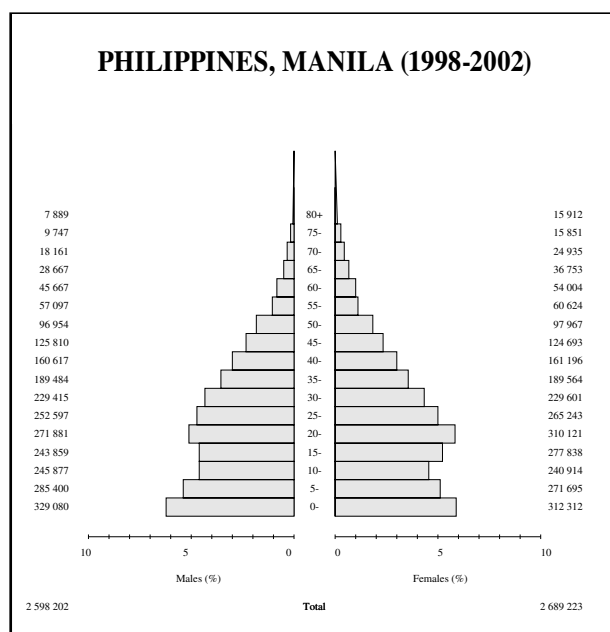
The increase in availability of diagnostic and treatment facilities has not necessarily increased their utilisation because of economic and educational factors; PSA testing is not common, and

there are no organised screening programmes for any cancer site. There were no unusual environmental or occupational exposures which could have influenced cancer incidence in the population.

Those changes in case definition and coding initiated by IARC are the only ones used by the registry. High percentages of DCO registrations in 1993–1997 led to more thorough trace-back of DCN cases in the hospitals and patient residences, particularly for liver cases (50% at the time). In spite of these problems, the staff continues its efforts at improving completeness as well as data accuracy.

## Use of the data

The registry prepares reports on cancer incidence as well as trends. Data generated from the Manila and Rizal registries have served as a basis for planning of most of the cancer control activities of the Philippine Cancer Control Program of the Department of Health. They have been used for epidemiological research, as well as for public information activities of the media and NGO's. There is an ongoing collaboration with the German Cancer Research Center regarding recent trends, up-to-date estimates and determinants of cancer survival on 10 leading sites among 1993–2002 incident cases.



**Source of population**

Census 2000. Gathering of population and housing data was performed by census enumerators through house–house visits and interview of a responsible member of each household. The household was the enumeration unit.

**Multiple primary rules used**

IACR rules (2004) on historical data

**Notes on the data**

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).

# Singapore

## Registration area

The registry covers the whole of the Republic of Singapore, situated in Southeast Asia, and comprises the main island of Singapore and several offshore islands which jointly cover an area of 682.7 km<sup>2</sup>. The main island measures 42 km from east to west and 23 km from north to south, and is situated on latitude 1°17'N and longitude 103°15'E, at the southern tip of the Malayan Peninsula. The island is rather flat, the highest point being a central granite hill 166 metres high. The maximum temperature is around 31°C and the minimum 24°C. The mean relative humidity is around 84%. The island generally has rainfall throughout the year (total annual rainfall approximately 2344mm), but is particularly wet during the monsoon season from November to January.

The resident population (3 263 209 in 2000) comprises several ethnic groups, the largest of which are Chinese (76.8%), Malays (13.9%) and Indians (7.9%). Overall, the population density (2000 Census) is 4780 persons per km<sup>2</sup>.

## Cancer care facilities

In 2000, there were 5395 registered medical practitioners (one medical practitioner to 745 people), of whom 2779 were in private practice and 2616 in the public sector. A total of 11 798 hospital beds (2.9 hospital beds per 1000 population) were available: 9556 in 13 public hospitals and 2242 in 13 private hospitals. There were also 16 public outpatient Polyclinics, which together with private clinics offer primary health care. Diagnostic and treatment services including radiotherapy are available in the public and private hospitals.

## Registry structure and methods

Comprehensive population-based cancer registration began in January 1968. The Registry was founded primarily to obtain information on cancer patterns and trends in Singapore. Until March 2001, the Registry was staffed by one pathologist and three epidemiologists (part-time), and three secretaries and one record searcher (full-time). In April 2001, the Registry came under the auspices of the National Disease Registries Office and is currently situated at the Health Promotion Board with two additional full-time staff. There is a Steering Committee comprising representatives of the Ministry of Health and various hospitals.

Sources of data are: (a) cancer notifications from all sections of the medical profession, (b) pathology records, (c) hospital records and (d) death certificates. Cancer notification is voluntary. All doctors in Singapore are provided with notification forms with prepaid postage. The Registry ensures

that notifications are as complete as possible by checking all pathology reports from public and private laboratories, and death certificates issued in Singapore as well as records of all public hospitals. Cancer cases identified from these sources are checked against registered cases, and reminders are sent to doctors in charge of cases that have not been notified to the Registry. Cancer cases not notified by doctors (approximately 10%) are registered by the Registry staff on the basis of information derived from the sources mentioned above. Cancer registration is generally comprehensive since all cases diagnosed histologically and all cases with mention of cancer in hospital discharge forms and death certificates are included.

There is no personal contact with cases or patient follow-up by the Registry. Information on diagnosis and survival is obtained through hospital, pathology and death records.

The cancer notification forms and a register of cases are maintained on a current chronological basis. All relevant information is coded, and the Registry maintains a computerised file of all cases. Duplication of cases is avoided by checking all new cases against the master index.

Certification of death is virtually complete in Singapore. In 2000, 97.6% of all deaths were certified by qualified medical practitioners or the Coroner and 2.4% by Inspecting Officers. The latter would certify a case as cancer

only on the basis of a previous hospital diagnosis.

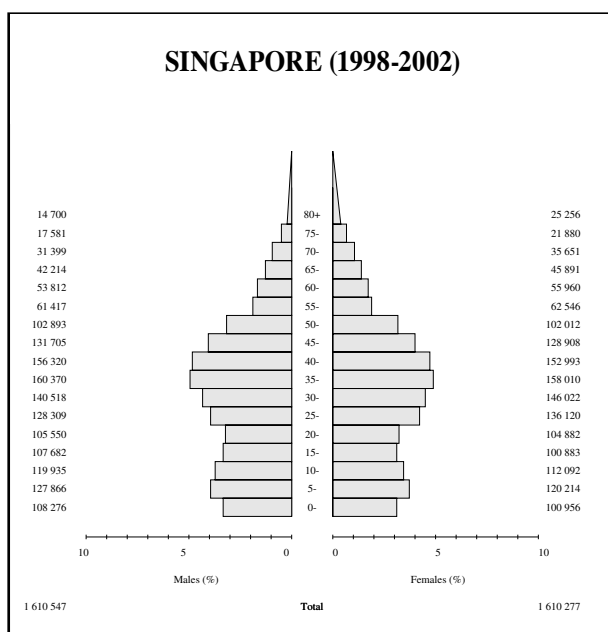
Evaluation of completeness or accuracy of information recorded will be carried out at the end of a 5-year period before publishing the Singapore Cancer Registry 5-year monograph.

## Interpreting the results

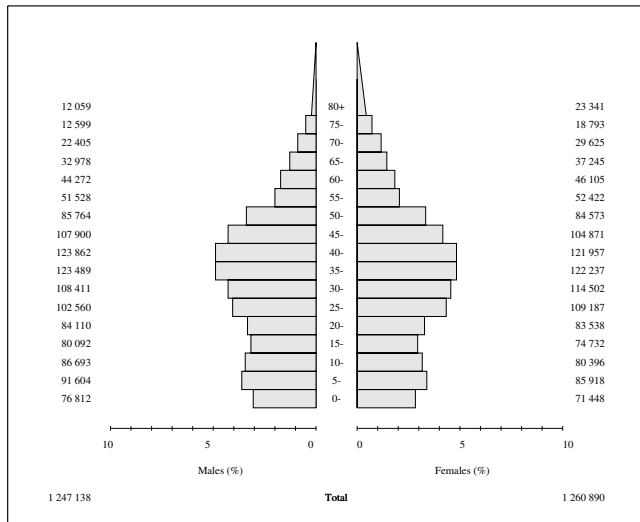
Although the population covered by the registry has increased (the growth rate for resident population was 1.8% in 2000), it is unlikely that cancer cases will be missed as the public and private hospitals in Singapore have the full range of diagnostic and treatment facilities and the population-to-doctor ratio continued to improve. Opportunistic cancer screening services were offered by hospitals and clinics in the public and private sectors.

## Use of the data

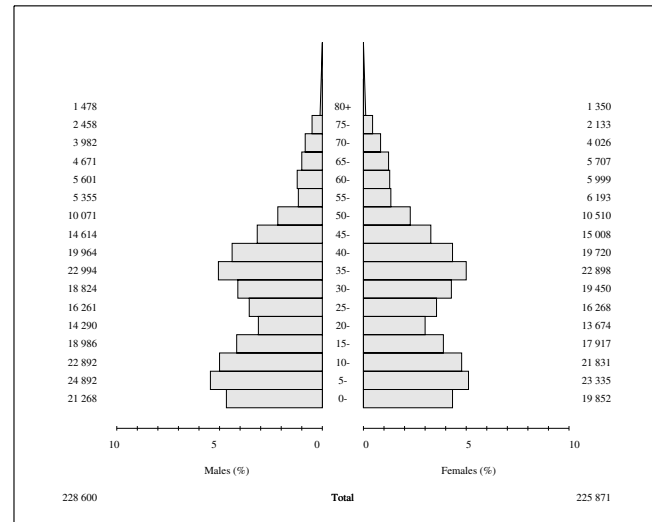
The data have been used mainly to determine incidence levels and relative risks of cancers in Singapore by sex, ethnic groups and migrant status. Such information has formed the basis of epidemiological and clinical studies on specific cancers. The Ministry of Health Singapore and hospitals administrators use the data for planning and evaluation.



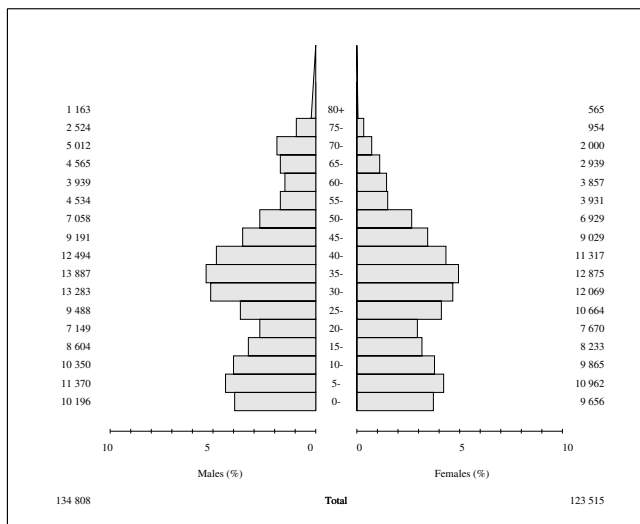
**SINGAPORE: CHINESE (1998-2002)**



**SINGAPORE: MALAY (1998-2002)**



**SINGAPORE: INDIAN (1998-2002)**



**Source of population**

Estimates based on the 1990 and 2000 census data.

**Multiple primary rules used**

IACR rules (1990)

# Thailand, Chiang Mai

## Registration area

Chiang Mai Cancer Registry covers the population of Chiang Mai province. The population of the province at the 2000 census was 1 500 127 persons. There were approximately 430 154 families, and the population density averaged 79.1 people per km<sup>2</sup>. In the municipal area, this figure increased to 4789.9 per km<sup>2</sup>. Only 26.5% of the total population was living in the municipal area.

Eighty-two percent of the population was local by birth, and the remainder was made up of Thai nationals, Chinese, Laos, and hill tribe people. Buddhism was the professed religion of 91.7% of the people in the province. For the remainder, most were either Christians or Muslims.

## Cancer care facilities

The Chiang Mai Provincial Public Health Office, through the provincial hospitals and district hospitals, predominantly provides general health care in Chiang Mai province. Cancer diagnostic services (clinical consultations, radiological and pathological investigations) are available at most public and private hospitals in the province. However, diagnostic and cancer-related therapeutic facilities are available within the same institution only at the University Hospital (Maharaj Nakorn Chiang Mai Hospital). Cancer surgery services are provided at several locations; the university hospital, five government hospitals, two community hospitals and eight private hospitals. Cancer chemotherapy services are provided at the university hospital, two government and six private hospitals. Radiotherapy equipment is available at the university hospital. Most patients at primary and secondary care facilities suspected of having cancer are referred to Maharaj Nakorn Chiang Mai Hospital.

## Registry structure and methods

The registry is located within The Maharaj Nakorn Chiang Mai Hospital, and is fully supported by the Faculty of Medicine of Chiang Mai University. The registry is staffed by 3 part-time physicians, 4 full-time registrar nurses, and 3 practical nurses, and is supervised by members of the Hospital Cancer Committee.

Data on patients diagnosed with cancer are collected actively from the university hospital (Maharaj Nakorn Chiang Mai Hospital, 1800 beds), 11 government hospitals (2200 beds), 17 community hospitals (620 beds), 13 private hospitals (1500 beds) and medical clinics, under the care of 900 physicians, with the total of about 6185 beds in Chiang Mai province.

The principal sources of information on cancer cases are hospital and pathology laboratory records.

Death certificates were taken from the Unit of Data Processing, 5th Region of Ministry of Interior. All death certificates that mention cancer as the cause of death are matched

against the registered cases. Every cancer death not traceable to an existing entry is labelled as "death certificate only".

The registry staff visits all sources and registers of individual departments concerned with diagnosis and treatment of cancers, to identify and abstract information on cases of cancer into the tumour registration forms. Although cancer is not a notifiable disease, the hospitals in the registration area cooperate with the registry.

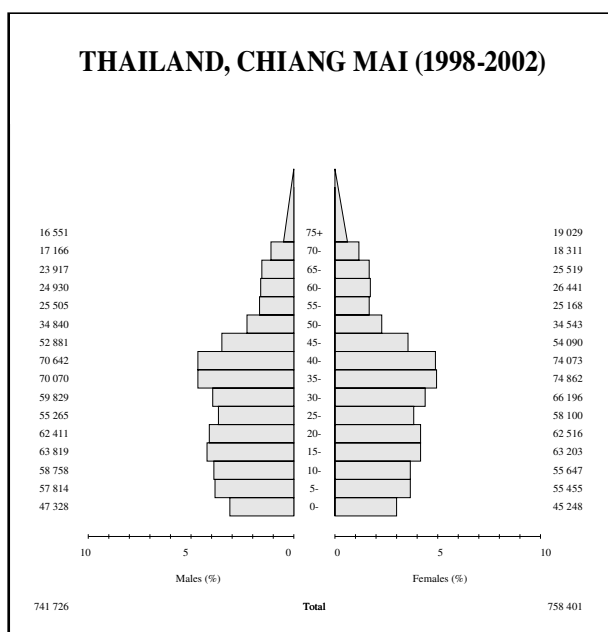
## Interpreting the results

It is not possible to estimate how many cancer cases remain undiagnosed, but this probably occurs for subjects in rural areas. Maharaj Nakorn Chiang Mai Hospital is the only university

hospital in the area and has a full range of diagnostic facilities, so that it is unlikely that cases referred will be missed. The diagnostic facilities are increased by image studies (CT scan and MRI) and especially by cytology (fine needle aspiration biopsy) and histology.

There is only one screening program for cancer of cervix, and there are sporadic health education campaigns about common cancers in the region. PSA testing is commonly used in the Maharaj Nakorn Chiang Mai Hospital.

Coding was changed from ICD-0-2 to ICD-0-3 as of the cases registered in 2000. Plans are underway to use the IT system of the hospitals in Chiang Mai to evaluate the completeness and accuracy of data.



## Use of the data

The registry has reported annually on cancer occurrence since the first volume in 1978, when it was a hospital-based registry. Population-based registration was started in 1986 to report the incidence and mortality of cancer in Chiang Mai province since 1983.

The registry has also joined with the other registries in Thailand to report on national cancer incidence every 3–5 years.

The registry is involved in epidemiological research of common cancer in Chiang Mai.

Chiang Mai Cancer Registry data are used together with other Cancer Registries to inform the Ministry of Public Health.

## Source of population

Census 2000, the 2000 Population and Housing Census, Chiang Mai province, National Statistical Office, Office of the Prime Minister.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# Thailand, Lampang

## Registration data

Lampang is one of the 17 provinces located in the northern part in Thailand, between 17°-19°N and 98°-100°E, 269 m above sea level, 602 km by car from Bangkok (625 km by train) with a land area of 12 534 km<sup>2</sup>. It has common boundary with Chiang Mai in the north and the west. This registry covers the population of 13 districts.

The total population in 2000 (housing census by National Statistical Office, office of the Prime Minister) was 782 152, with 390 256 males and 391 896 females at a population density of 62 people per km<sup>2</sup>. About 30% of the population live in urban areas; 97% are Buddhists, the remainder mainly Christians.

The climate is generally cooler than the rest of the country in winter from November to February, and hot and dry during March to May in summer. The average total rainfall is 974.5 mm per year.

Most people are farmers, working in rice and tobacco. There are many porcelain production and very large open cast-mines (with national coal-fired electricity-generating plants close by).

## Cancer care facilities

General health care in the region is provided in all 13 districts. In the urban area (Muang district), there is one cancer centre (Lampang Cancer Center), two private hospitals and one military hospital. Cancer diagnostic services including CT scan (clinical consultations and radiological/pathological investigations), cancer surgery services and chemotherapy are available in Lampang Cancer Center and Lampang provincial hospital. Radiation therapy equipment (one simulator, two cobalt-60 machines, one linear accelerator and two remotes after-loading for brachytherapy) is provided at Lampang Cancer Center. All hospitals in the province provide palliative care.

Patients suspected to have cancer in the primary and secondary health care centres in the registry area are mostly referred to Lampang Cancer Center and Lampang provincial hospital.

## Registry structure and methods

The registry is located within Lampang Cancer Center, which also provides equipment, and is funded by cancer research foundation for National Cancer Institute. A part-time expert consultant, a part-time doctor, a part-time nurse and two full-time health workers staff the registry.

The Lampang registry was established in 1995 with the backup data of a population-based cancer registry in Lampang dating from 1983 which was collected by Dr. Nimit Martin, our expert consultant. The registration uses passive methods by notification from 21 sources of data consisting of cancer centres, general hospitals, community hospitals, private hospitals, university hospital, the provincial public health service of Lampang and pathological laboratories.

New cancer cases from all hospitals are collected from out- and inpatient departments, wards, radiotherapy units, surgery units and pathology services. Data collection consists of: registry number, name, residential address, date of birth, age, sex, date of diagnosis, site of cancer, histology of cancer, staging, extension of disease, method of diagnosis, treatment, date of last contact and status of cancer patients (alive or dead).

We carried out follow-up of registered cases by matching of cases with all death certificates. Death certificates mentioning cancer death without other information about the individual traceable from other sources are registered as Death Certificate Only (DCO).

We have used histologically verified percentage (%HV), Mortality Incidence ratio (MI Ratio) and percent of DCO (%DCO) for evaluation of our completeness since our first report on 2002.

## Interpreting the results

Cancer cases are collected from all hospitals in Lampang. However, there were some patients referred to Chiang Mai University Hospital and the National Cancer Institute in Bangkok. We therefore collected these cases in our registry as well. We also have back up data since 1983. Due to these reasons, we believe that cases might not be missed or repeated. Data are entered using the IARC/IACR CanReg software.

A cervical cancer screening programme (Pap smear every 5 years) has been supported by Ministry of Public Health since

1999. The target population is women aged 35–64 years old. Pap smear is available in all hospitals in Lampang and easily accessible.

PSA testing is available only at provincial hospitals, university hospitals, cancer centres and some private hospitals, and is not routinely included in yearly checkup programmes, except in cancer centres.

## Use of the data

The registry provides periodic reports on cancer incidence, mortality and survival in Lampang. The data are also sent to the National Cancer Institute to help compile the report *Cancer in Thailand*. The data are also used by the local health authority for the evaluation of public health measures in the prevention, screening and treatment of cancer.

## Source of population

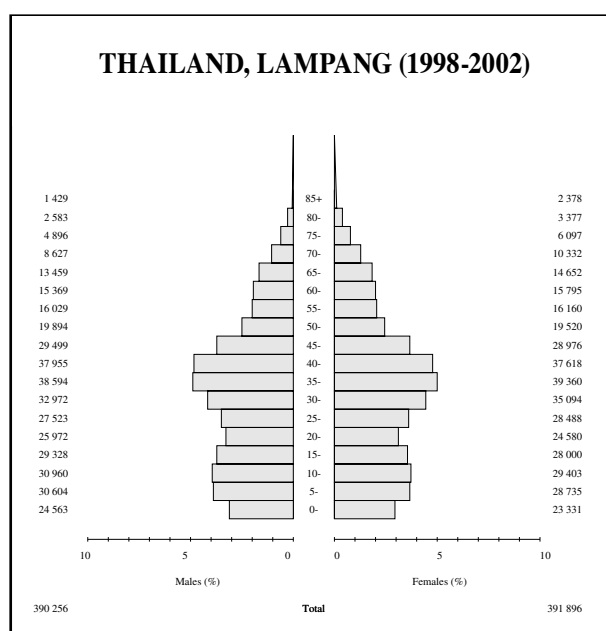
Census 2000, Lampang Provincial Statistical Office.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# Thailand, Songkhla

## Registration area

The Songkhla Registry covers the population of 16 districts in the south of Thailand. The population at the 2000 census was 1 255 662. About 80% of the population is Buddhist, and nearly 20% are Moslems. Christians and others account for less than 1% of the population. People with Chinese ancestry live in Songkhla town and Hat Yai city, which is the economic centre of the south of Thailand.

## Cancer care facilities

The government of Thailand predominantly provides general health care in the region. There are three hospitals with over 500 beds, 13 community hospitals and an extensive network of healthcare facilities at the household level. Private practitioners, a few private hospitals, and a few small special hospitals, all in the urban area, supplement this. The university hospital of Prince of Songkla University is the larger of the two places in the south of Thailand providing radiotherapy services. A few other large hospitals also have facilities for cancer surgery and chemotherapy. Patients suspected to have cancer in the health care system and community hospitals are referred to Songkhla, Hat Yai or Songklanagarind hospitals.

## Registry structure and methods

The registry is located within the Faculty of Medicine, Prince of Songkla University. Three part-time medical doctors, a full-time nurse as a registrar and four full-time workers staff the registry.

The Songkhla registry undertakes active casefinding from 23 sources of data, consisting of Songklanagarind hospital, Hat Yai hospital, Songkhla hospital, community hospitals, private hospitals, special hospitals, provincial health office, and the population registration office of the province.

The completeness of death registration is acceptable but the cause of death is not so accurate, being mostly cardiopulmonary arrest and senility. After the national health care reform started in 2000, the validity of the death certificates has been improving.

The registry staff also runs the hospital-based registry of the Songklanagarind hospital, and the data are shared with the registry of Songkhla. Hat Yai hospital has its own system of cancer case reporting but not a full-scale hospital-based cancer registry, and provides the cases residing in Songkhla to the

registry. The registry staff visits Hat Yai, Songkhla, and private hospitals to consult medical records and pathology records.

Assigned staff in community hospitals send the record forms of cancer cases to the registry once a year. Registry staff regularly visit them to reviews procedures. Some cases are sent to the registry by the network of cancer registries in Thailand, especially the registry of Bangkok.

## Interpreting the results

The number of undiagnosed and unregistered cancer cases is difficult to estimate. Some Moslems in a remote area in the south of Songkhla visit large hospitals in the two nearby provinces, and some residents, especially the elderly, use traditional herbal medicines and never enter the country's healthcare system. Because of the linkage between the referral system and the new national health assurance system, it is expected that only a small number of cancer patients in that remote area seek medical facilities outside the province. A few other cases look for special medical care in Bangkok, the capital of Thailand.

There were no screening programmes over the period in question, and PSA testing is not common.

A very recent study of ours demonstrates a relationship between radium-contaminated shallow well water and oral pharynx and oesophageal cancer.

## Use of the data

The registry is preparing a fifteen-year report providing information on cancer incidence and trends in Songkhla. It provides data for causation studies, especially in the field of oral and esophageal cancer, which is the main burden in this area. Extent of disease and survival are reported in *Cancer in Thailand vol. IV*.

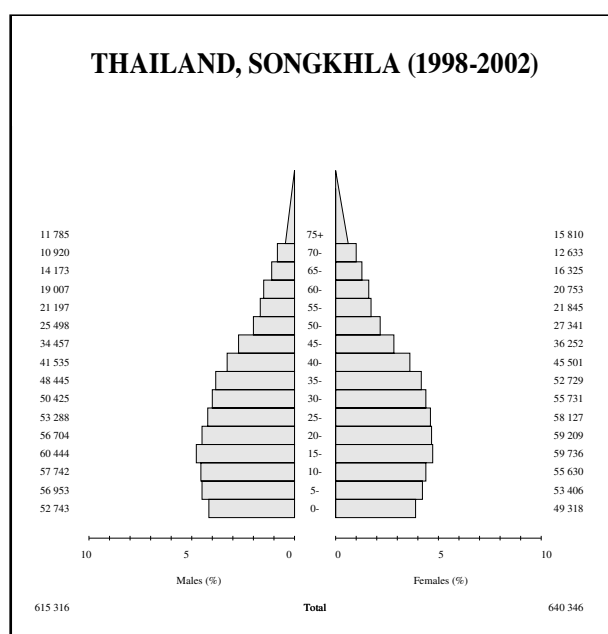
The Thai Network of Cancer Registries (TNCR) was recently founded. The Thai NCI and TNCR work together to supply policymakers, academic bodies and public organisations recent accurate cancer statistics, projections, and ideas for cancer control for Thailand. We plan to undertake this collaboration as a non-governmental academic body to have more power and a louder voice.

## Source of population

Census 2000, National Statistical Office.

## Multiple primary rules used

IACR rules (1990).



# Turkey, Antalya

## Registration area

Antalya is a city located in the southern part of Turkey's Mediterranean region. The province of Antalya is located between the 36°07"N latitude and 29°20"E longitude. The population of Antalya according to health statistics is 1 392 172 (2000); 74% of the population lives in urban areas. The region of the most of people is Islam. Antalya has had the fastest population growth in Turkey in recent years because of internal immigration. Regional income comes from trade, agriculture (especially commercial growing of hothouse flowers, vegetables, or fruits), tourism and construction.

## Cancer care facilities

General health care is predominantly provided by primary health centres and government hospitals, but in the last few years the number of private health centres has increased. Patients suspected to have cancer in the primary and secondary care facilities in the registry area are mostly referred to Mediterranean University hospital and government hospitals in the centre of Antalya.

## Registry structure and methods

The registry centre is staffed by a full-time public health specialist (MD), and full-time health workers. Additionally there are 17 cancer registry staff in the hospital; the six staff members who work in the government and university hospital in the centre of Antalya are full-time, other registry staff are part-time.

The Antalya Cancer Registry collects data on all new cases of cancer from all hospitals and some clinics that provide all diagnostic and treatment services for cancer in the province. In 1998–2002, Antalya registry used active case finding from 14 government hospitals, 2 university hospitals, 2 private radiotherapy clinics and 7 private pathology laboratories. The death registration system is incomplete, particularly in the rural

areas, and the cause of death is often not mentioned or given as cardio-respiratory arrest. The registry staffs work government and university hospitals, where they scrutinise the records kept in medical records departments, and the registers of individual departments concerned with diagnosis of cancers, to identify and abstract information on cases of cancer, diagnosed by all methods. Additionally, private hospitals and other sources are visited monthly by registry personnel who take note of medical records of cancer patients.

## Interpreting the results

It is not possible to estimate how many cancer cases remain undiagnosed, but underdiagnosis probably occurs for elderly subjects in rural areas. An opportunistic screening service for cervical cancer has been operated by the cancer society since 2006.

## Use of the data

The registry prepares an annual report of cancer incidence, highlighting trends and changes. In 2006, the pathology laboratories of three hospitals in Antalya with access to county government hospital records were scrutinised and our data were examined for completeness and accuracy for 1998–2002. The statistical analysis of the information recorded is not yet complete.

## Source of population

Annual registrations by primary health center of the Provincial Health Directorate

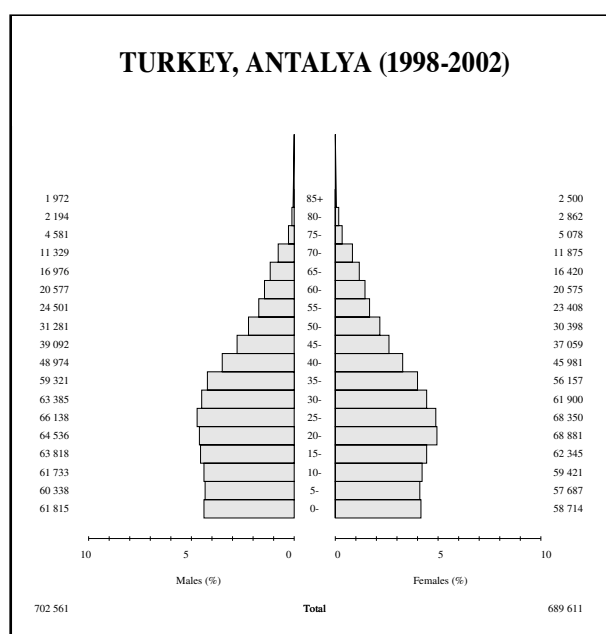
of Antalya in 2000.

## Multiple primary rules used

IACR rules (1990)

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).



# Turkey, Izmir

## Registration area

The Izmir Cancer Registry covers the population of the province of Izmir, which is divided into 28 administrative districts. Izmir province is in the extreme west of the country, on the Aegean Sea coast. The population is 3.37 million (mid 2000), making it the third-largest province in Turkey; 81% of the population lives in urban areas, with the remaining 19% in rural areas. Most of the people are Islamic. Izmir is one of the most developed and westernised parts of the country.

## Cancer care facilities

The registry is a subdivision of the Provincial Health Directorate of Izmir and is mainly funded by the state. ICR is also financially supported by the MECC (Middle East Cancer Consortium).

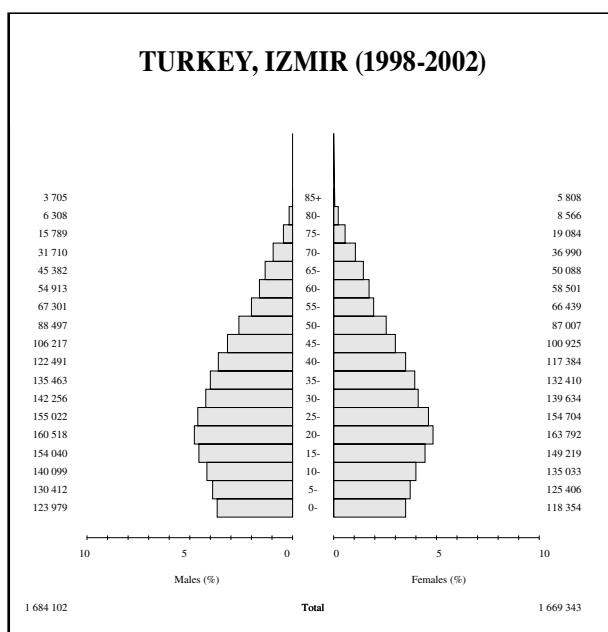
General healthcare in the region is provided predominantly by the Turkish state health services department, through the two university hospitals, state hospitals and a network of primary health centres. This is supplemented by private physicians and private hospitals. While major hospitals provide radiotherapy and chemotherapy services, cancer diagnosis and cancer surgery procedures are available in most health facilities. Also, there are five private oncology centres that provide radiotherapy and chemotherapy facilities. With its developed health services, Izmir is a referral centre for patients from other provinces, especially the provinces of the Aegean Region. It is possible that some Izmir residents with cancer choose to be treated elsewhere, such as Istanbul or Europe. However, this is unlikely to be more than 1% of the cancer patients, bearing in mind the social composition of the population.

## Registry structure and methods

The Izmir Cancer Registry (ICR) collects data on all new cases of cancer from all of the facilities in the province, including university hospitals, state hospitals, teaching hospitals, municipality hospitals, other governmental hospitals, private hospitals, private cancer centres (n=25) and pathology laboratories (n=23). Nine hospitals have hospital-based cancer registries, from which the ICR receives the data directly. The staffs of these hospital registries apply the same rules with ICR while collecting, abstracting and coding the data and are supervised by ICR. For all other sources, data collection is active at the time of visits by full-time, medically qualified registrars. Internal consistency checks

are continuously done for all cases and for whole database, in addition to this, re-coding of selected cases (10% by random selection) for each series are performed systematically.

Similar to Turkey in general, mortality data in Izmir are incomplete, and notified only for urban areas, with a problem of accuracy in regard to underlying cause of death. Although ICR collects data of death certificates referred to cancer obtained from Provincial Health Directorate records, these certificates are poor in quality and lack information even for socio-demographic data and addresses. Matching these data with ICR database is quite difficult. Despite all these realities, ICR began in 2005 to routinely match the death certificates with the records of incident cases and process them.



## Interpreting the results

It is not possible to estimate how many cancer cases remain undiagnosed, but underdiagnosis probably occurs for older adults in rural areas. While awareness of the public has been increasing in the last 5–10 years, cancer diagnosis at health facilities in the region has improved consistently. Opportunistic screenings for breast, prostate, cervical and colorectal cancers are quite widely performed. Systematic screening for breast cancer has been applied for a small population, which covers approximately 2000 women aged 50–69. ICR collects data from all of these screenings.

## Use of the data

The registry has published the results occasionally in scientific meetings and journals and at the website: <http://www.ism.gov.tr/kidem>.

Some special studies such as survival of registered cancer cases and some case–control (colorectal cancer) studies have been carried out.

## Source of population

Annual registrations by primary health center of the Provincial Health Directorate of Izmir.

## Multiple primary rules used

IACR rules (1990).

## Notes on the data

The Editors recommend that some care be taken in the interpretation of these data; see Chapter 5 (Categorisation).