Original Article

Report of cancer incidence and mortality in China, 2010

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Purpose: To estimate the cancer incidences and mortalities in China in 2010.

Methods: On basis of the evaluation procedures and data quality criteria described in the National Central Cancer Registry (NCCR), data from 219 cancer registries were evaluated. Data from 145 registries were identified as qualified and then accepted for the 2010 cancer registry report. The incidences and mortalities of major cancers and the overall incidence and mortality were stratified by residency (urban or rural), areas (eastern, middle, and western), gender, and age. The cancer cases and deaths were estimated based on age-specific rate and national population in 2010. The China 2010 Population Census data and Segi's world population data were used for calculating the age-standardized cancer incidence/mortality rates.

Results: Data were obtained from a total of 145 cancer registries (63 in urban areas and 82 in rural areas) covering 158,403,248 people (92,433,739 in urban areas and 65,969,509 in rural areas). The percentage of morphologically verified cases (MV%) were 67.11%; 2.99% of incident cases were identified through proportion of death certification only (DCO%), with the mortality to incidence ratio of (M/I) 0.61. The estimates of new cancer cases and cancer deaths were 3,093,039 and 1,956,622 in 2010, respectively. The crude incidence was 235.23/10^5 (268.65/10^5 in males and 200.21/10^5 in females), the age-standardized rates by Chinese standard population (ASR China) and by world standard population (ASR world) were 184.58/10^5 and 181.49/10^5, and the cumulative incidence rate (0-74 age years old) was 21.11%. The cancer incidence and ASR China were 256.41/10^5 and 187.53/10^5 in urban areas and 213.71/10^5 and 181.10/10^5 in rural areas. The crude cancer mortality in China was 148.81/10^5 (186.37/10^5 in males and 109.42/10^5 in females), the age-standardized mortalities by Chinese standard population and by world standard population were 113.92/10^5 and 112.86/10^5, and the cumulative mortality rate (0-74 age years old) was 12.78%. The cancer mortality and ASR China were 156.14/10^5 and 109.21/10^5 in urban areas 141.35/10^5 and 119.00/10^5 in rural areas, respectively. Lung cancer, female breast cancer, gastric cancer, liver cancer, esophageal cancer, colorectal cancer, and cervical cancer were the most common cancers. Lung cancer, liver cancer, gastric cancer, esophageal cancer, colorectal cancer, breast cancer, and pancreatic cancer were the leading causes of cancer deaths.

Conclusions: The coverage of cancer registration has rapidly increased in China in recent years and may reflect more accurate cancer burdens among populations living in different areas. As the basis of cancer control program, cancer registration plays an irreplaceable role in cancer surveillance, intervention evaluation, and policy-making. Given the increasing cancer burden in the past decades, China should strengthen its cancer prevention and control.

Keywords: Cancer registry; malignant tumor; incidence; mortality; China

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1 Introduction

1.1 Introduction of the cancer registration system

By definition, a cancer registry is an information system designed for the collection, storage, management, and analysis of data related to people with cancer. A registry usually covers a specific area. Cancer registries may provide accurate, up-to-date, population-based cancer data for incidence mortality and survival that are vital for decision making about cancer prevention and control. The data may also provide basic information for cancer research and cancer surveillance.

According to the cancer registry report released by National Central Cancer Registry (NCCR), the incidence and mortality of cancer have been rising gradually. New cancer cases and cancer deaths in 2009 were estimated at approximately 3 and 2 million, respectively (1). Since the national cancer registration program was established by the National Health and Family Planning Commission (NHFPC, previously the Ministry of Health), population-based cancer registration that collects information about cancer cases, cancer deaths and follow-up has spread to 31 provinces and municipalities throughout the country. Currently, the number of cancer registries is increasing, and the data quality is improving. The report has provided basic data that contribute to cancer control strategies, cancer research and clinical trials. At present, there are more than 250 cancer registries covering more than 200 million people. The cancer registration program is headed by the Bureau of Disease Prevention and Control, NHFPC and enforced by NCCR under the support of public health authorities in every province.

1.2 Development of cancer registries in China

1.2.1 National cancer registration program

The National Cancer Registry Program was established by the NHFPC in 2008 to support registry investigation, technical training, data collection and data management through central financing. In 2008, based on existing cancer registries, 52 counties or cities were selected to house new cancer registries that followed registry selection principles. These new registries covered all 31 provinces and municipalities with populations over 110 million. In fiscal year 2009, 54 cancer registries were established on the basis the previous year's work, covering 10% of the national population. In fiscal years 2010 and 2011, another 46 registries came into operation; the total number of cancer registries increased to 195 and covered more than 13% of the national population. In 2012, the number of cancer registries expanded to 222, covering more than 200 million people.

1.2.2 Objective of cancer registration in China

General objective: to establish and perfect the cancer registration reporting system at a country level suitable to China's socioeconomic status and actual situation. The cancer registry should reflect cancer epidemic trends and the different cancer incidences, mortalities and survivals in different areas and different regions, and it should provide sufficient information to meet the requirements of cancer prevention and control.

Stage of this objective:

(I) Systematic construction phase: By 2010, the number of cancer registries should reach 100. Every province should have at least two cancer registries: one in an urban area and the other in a rural area. These registries should cover all provinces and 10% of the national population after a comprehensive evaluation by the NCCR and the current state of the cancer registration system and the integration of existing resources via continuously enhancing the construction of the registry. This objective has been achieved.

(II) Standardized management phase: By 2015, the work flow of all cancer registries should be standardized and institutionalized. The data quality should meet the regulatory requirements established at the national level.

(III) Sustainable development phase: By 2020, through the increased number of cancer registries and improved data quality, the cancer registration data should be representative of the country and its regions.

1.2.3 Cancer incidence for 5 continents (CI5)

The International Agency for Research on Cancer/International Association of Cancer Registry (IARC/IACR) collects cancer incidence data from every country in the world and publishes the "Cancer Incidence for 5 Continents" report every 5 years. In 2010, the IACR called for the submission of incidence data for the years 2003 to 2007. The NCCR of China organized this submission, including data collection, data evaluation and quality control, to make sure the submitted data qualified. We submitted pooled data from 26 cancer registries for this report. After being evaluated by IACR, data from 12 registries on the

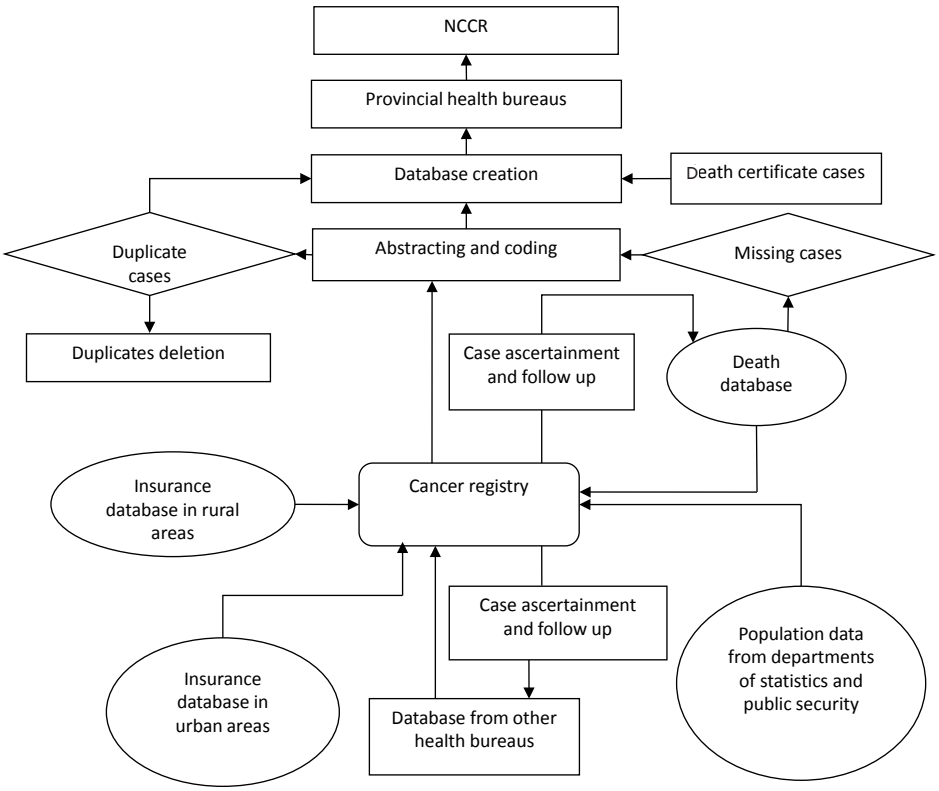

Figure 1 Flow diagram of the cancer registration system.

Chinese mainland were accepted, which was the highest number ever accepted. The accepted registries were from Beijing, Shanghai, the Nangang District of Harbin City, Cixian of Hebei, Yangcheng of Shanxi, Haining, Jiaxing and Jiashan of Zhejiang, Qidong of Jiangsu, Yanting of Sichuan, Zhongshan of Guangdong and Wuhan of Hubei. This achievement indicates the gradual progress of cancer registration in China, which has been widely recognized by international colleagues and has entered a new stage.

1.2.4 Follow-up and survival analysis

Population-based cancer survival analysis can provide useful information that reflects the regional cancer burden and medical resources and evaluates cancer care. In the "National Program of Cancer Registry", the importance of follow-up for cancer cases was emphasized.

To enhance population-based cancer follow-up and survival analysis, NCCR began collecting survival information in some of the registries that implemented follow-up. We also joined the international survival study (CONCORD II) and prepared to submit survival data. To date, a total of 14 registries have submitted follow-up data for cancer incidence cases from 2003 to 2005. The survival analysis is ongoing.

2 Data collection method and indices

2.1 Data collection

2.1.1 Data collection methods

Traditionally, reporting methods have been classified as active or passive. Active reporting involves registry personnel actually vesting the sources of data and abstracting the required information onto special forms or obtaining copies of necessary documents. Passive reporting relies on other health care workers to complete notification forms and forward them to the registry or to send copies of abstracts from which the necessary data can be obtained (*Figure 1*).

(I) Data collecting channels. Cancer registries should collect cancer statistics, including cancer incidence, cancer deaths, cancer survival, and population data from all kinds of channels. The cancer registries may collect cancer statistics from clinics and hospitals, health insurance databases, death surveillance databases, and cooperative health insurance databases in rural areas.

(II) Cancer case certification. The cancer registries are responsible for completing cancer case report

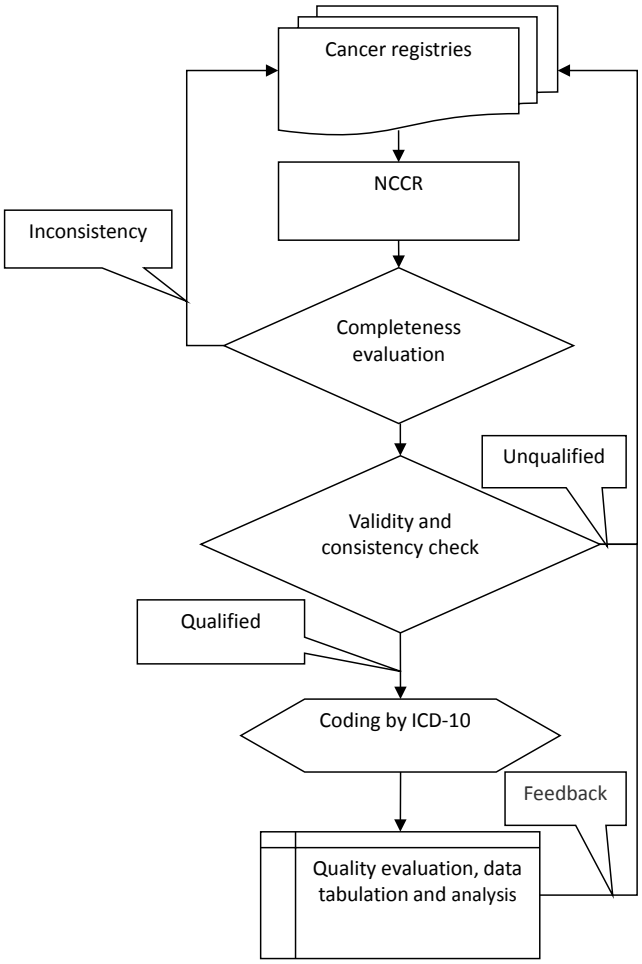

Figure 2 Flow diagram of data quality.

forms using identification card numbers as personal identification codes. The cancer death records should also be matched with incidence case in the database. Missing incidence cases should be supplemented, and duplicated cases should be deleted.

(III) Follow-up practice. Through home visits, telephone calls, mail, and email, workers should contact the cancer cases and collect survival information.

2.1.2 Data collection indices

A core cancer registration service requires the collection of cancer incidence, mortality, and survival data, including data for cancers with ICD-10 codes of C00.0 to C97 (neoplasms of the central nervous systems and uncertain behaviors). Population coverage data should also be collected.

(I) Incidence: the personal information for incident cases, such as age, sex, date of birth, age at diagnosis, identification number, address, place of birth, race, marital status, and career, should be collected. Registries much archive the following detailed cancer data for each case: date of diagnosis; anatomical site and subsite; pathological, histological, and cytological results; diagnosis basis; and stage. The date of the reporting clinics of the diagnosis reporting bureau and reporting doctors should be collected. The follow-up information for registered cancer patients should also be recorded.

(II) Mortality: information about mortality often comes from population-based death databases that also report cancer cases that died from causes other than cancer. In addition to personal cancer incidence information, the mortality data should contain each case's date of death, age at death, cause of death, place of death, and the diagnostic basis for the cause of death.

(III) Population data: the population data originate from statistics or public security census data departments. The detailed population data should cover the overall population, with age-specific data by 5-year age groups and sex-specific data.

2.2 Data quality control

2.2.1 Flow diagram of data quality control

After receiving cancer registration data, NCCR will first check the data's completeness. After that, IARC/IACR check software will be used to determine whether all the variables are complete and valid (2,3). The internal consistency of the dataset will also be checked. NCCR will further publish a specific data evaluation report to each registry. The local registries will follow the evaluation report to check and revise the cancer datasets once again. Qualified cancer datasets will be pooled and analyzed for the annual national cancer report (*Figure 2*).

2.2.2 Quality control indices

The value of the cancer registry relies heavily on the underlying data quality and quality control procedures. The practical aspects for addressing data quality aim to provide qualified cancer registration data that is comparable, complete, valid, and timely (4,5).

(I) Comparability: comparability is the extent to which coding and classification at a registry, together with the requirements for recording and reporting specific data items, adhere to agreed international guidelines. When evaluating the comparability

Table 1 Data quality classification

A	B	D
Covering the whole population	Covering the whole population or a specific population	The population coverage is not clear
Complete and solid death surveillance system	The death surveillance system is not complete with poor data quality	No death surveillance system available
The proportion of unknown basis of diagnosis <10%	The proportion of unknown basis of diagnosis <20%	The proportion of unknown basis of diagnosis ≥20%
0< DCO% <10%	DCO% <20%	DCO% ≥20%
The proportion of cases with unknown site <10%	The proportion of cases with unknown site <20%	The proportion of cases with unknown site ≥20%
0.60< M/I <0.80	0.55< M/I <0.85	M/I ≤0.55 or ≥0.85
The M/I was reasonable for major cancers	The M/I was reasonable for major cancers	The M/I was not reasonable for major cancers
66%< MV% <85%	55%< MV% <95%	MV% ≤55% or ≥95%
Trend of cancer statistics are stable and reasonable	Trend of cancer statistics are relatively stable and reasonable	Trend of cancer statistics is not stable
Mortality rate ≥120/105	Mortality rate ≥100/105	

DCO%, the proportion of death certification only; M/I, the mortality to incidence ratio; MV%, the percentage of morphologically verified cases.

of registry data, the following topics demand particular attention: the classification and coding of neoplasms, the incidence distinction between primary cancer and the recurrence or metastasis of an existing cancer, and death certification criteria.

(II) Completeness: the completeness of cancer registry data refers to the extent to which all of the incident cancers occurring in the population are included in the registry database and is an extremely important attribute of a cancer registry. The methods that provide an indication of completeness include the following mortality and incidence ratios: the proportion of death certification only (DCO%), histological verification of the diagnosis, the number of sources/notifications per case, the stability of incidence rates over time, a comparison of incidence rates in different populations, the shape of age-specific curves, and the incidence rates of childhood cancers. Capture-recapture methods are also available to obtain a quantitative evaluation of the registry's degree of completeness.

(III) Validity: validity is defined as the proportion of cases in a dataset with a given characteristic that truly have that attribute. Re-abstracting and recording permit comparisons with specified subsets of cases. The validity of the cancer registration information can be verified using diagnostic criteria (histological verification and DCO%), missing information analysis, and internal consistency methods.

(IV) Timeliness: timeliness relates to the rapidity with which a registry can collect, process, and report reliable and complete cancer data. It indicates the time to availability as the interval between the date of diagnosis and the date that the case became available in the registry for further use. The cancer registries should collect and report cancer statistics in a timely manner. While there are no international guidelines for the timeliness of cancer registry data, NCCR requires the cancer registries of China to report cancer statistics within 30 months.

2.2.3 Classification of data quality

The detailed data inclusion criteria were based on the 2009 "Technical Protocols of Cancer Registration and Follow up" published by the Ministry of Health, the "Guideline for Chinese Cancer Registration" (6), and "Cancer Incidence for 5 Continents Volume IX" published by the IARC/IACR (7). The percentage of morphologically verified cases (MV%), DCO%, and the mortality to incidence ratio (M/I) were used to evaluate the completeness, validity, and reliability of cancer statistics. The quality of the cancer data was classified into three categories (*Table 1*). The data

Table 2 Cancer categories by ICD-10

Site	ICD-10 code
Oral Cavity & Pharynx excluding Nasopharynx	C00-C10; C12-C14
Nasopharynx	C11
Esophagus	C15
Stomach	C16
Colon, Rectum & Anus	C18-C21
Liver	C22
Gallbladder etc.	C23-C24
Pancreas	C25
Larynx	C32
Trachea, Bronchus & Lung	C33-C34
Other Thoracic Organs	C37-C38
Bone	C40-C41
Melanoma of Skin	C43
Breast	C50
Cervix Uteri	C53
Uterus & Unspecified	C54-C55
Ovary	C56
Prostate	C61
Testis	C62
Kidney & Unspecified Urinary Organs	C64-C66, 68
Bladder	C67
Brain & Central Nervous System	C70-C72; D32-D33; D42-D43
Thyroid Gland	C73
Lymphoma	C81-C85, C88, C90, C96
Leukemia	C91-C95
Others	Other
All Sites	ALL

that were classified as Category A or B were qualified and deemed acceptable, whereas data classified into category D was rejected.

2.3 Classification and coding

2.3.1 Cancer classification

Based on the WHO ICD-10 cancer classification publications, cancers are classified into 25 categories with different anatomic sites. Neoplasms of the brain and central nervous system are also included in the ICD-10 cancer dictionary (*Table 2*).

2.3.2 Area classification

According to the GB2260-2009 standard, prefecture-level cities were classified as urban areas, whereas counties and county-level cities were classified as rural areas.

The classification of the east area, middle area, and west area is based on the National Statistics Bureau standard (*Figure 3*).

The east area consists of Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan.

The middle area consists of Heilongjiang, Jilin, Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan.

The west area consists of Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

2.4 Statistical indicators

2.4.1 Average annual population

The average annual population is the denominator of the incidence (mortality) rates. The exact method used to calculate this value is the average number of people at risk of incidence (death) each day of a specific year. Because this formula is highly complex, we often use the estimated calculation to quantify the population effectively. The formula is:

$$\text{Average annual population} = \frac{\text{population at the beginning of the year} + \text{population at the end of the year}}{2}$$

The midyear population is the population on July 1 00:00. If the population is relatively stable, the midyear population can be used to represent average annual population.

2.4.2 Sex- and age-specific population

The sex- and age-specific populations are the populations categorized according to sex and different age groups. These populations can be calculated by interpolation. Age-specific populations may be grouped into classes of up to five years, e.g., 0, 1-4, 5-9, 10-14…80-84, and 85+ years.

2.4.3 Incidence (mortality) rates

The incidence (mortality) rate measure the frequency with which an event, such as a new case of cancer (cancer death) occurs in a population over a period of time.

$$\text{The incidence (mortality) rate per 100,000} = \frac{\text{new cases (cancer deaths) occurring during a given time period}}{\text{population at risk during the same time period}} \times 100{,}000$$

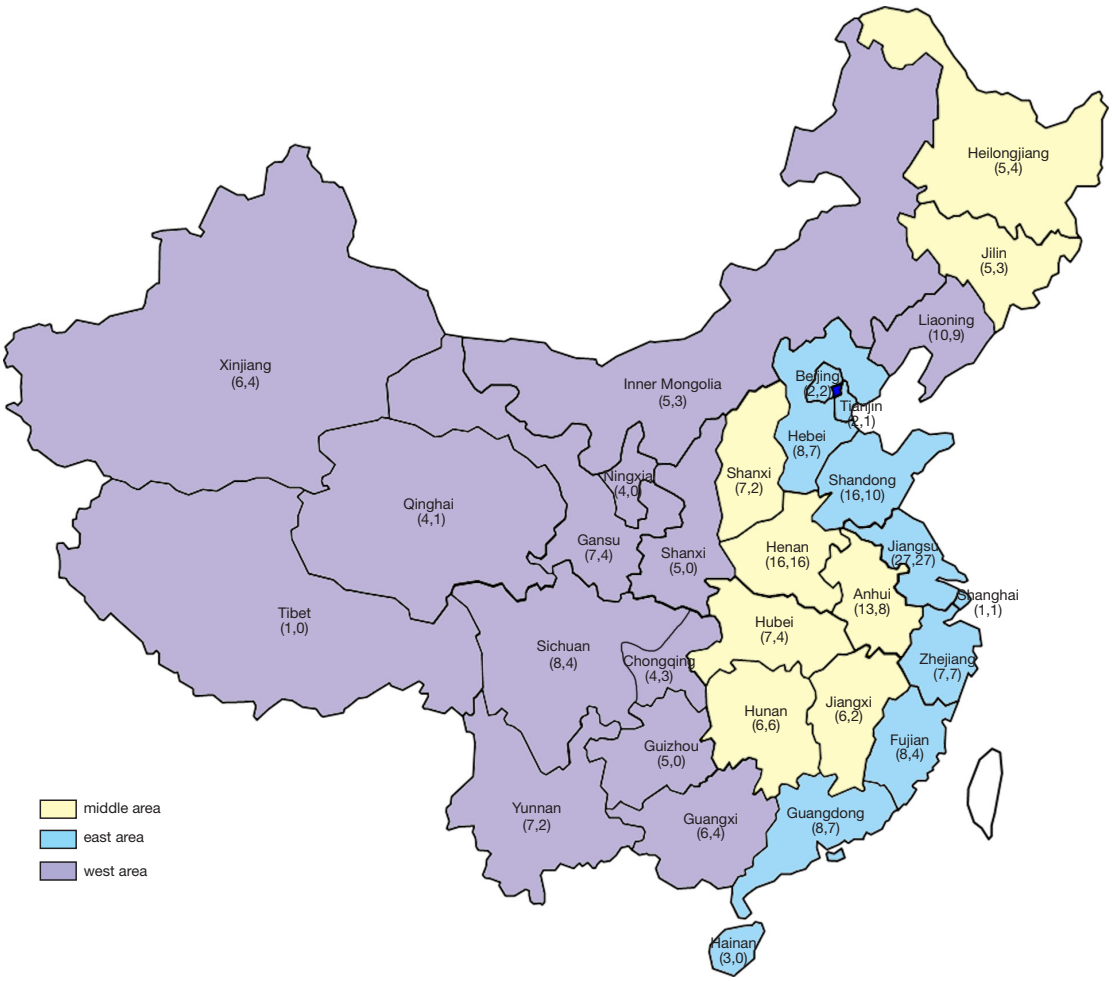

Figure 3 Classification of areas in China and distribution of cancer registries. Distribution of cancer registries was indicated by (Number of cancer registries submitted data, Number of cancer registries submitted qualified data).

2.4.4 Sex and age-specific incidence (mortality) rates

Sex and age are important factors influencing cancer incidence and mortality. Sex-specific and age-specific rates are important statistical indicators.

$$\text{Age-specific incidence (mortality) rate per 100,000} = \frac{\text{cases in a specific age group}}{\text{population in the age group}} \times 100{,}000$$

2.4.5 Age-standardized rate or age-adjusted rate (ASR)

Standardization is necessary when comparing several populations with different age structures because age has such a powerful influence on cancer incidence and mortality. ASR is a summary measure of the rate that a population would have if it had a standard age structure.

In this report, the population standards we used are Segi's population and the fifth Chinese national census of 2000 (*Table 3*).

Direct method for calculating incidence (mortality) rate:

(I) Calculating the rates for subjects from a study population in a specific age category.

(II) Calculating the weighted age-specific rates. The weights applied represent the relative age distribution of the standard population.

(III) Adding each weighted age-specific rate. The summary rates reflect the adjusted rates.

$$\text{Age-standardized rate} = \frac{\sum \text{standard population in the corresponding age group} \times \text{age–specific rate}}{\sum \text{standard population}}$$

2.4.6 Proportions

Proportional distribution indicate the site-specific percentage level of incident cases and deaths compared with the total cases recorded. The formula is as follows:

$$\text{Proportion of a certain type of cancer} = \frac{\text{cases of a particular cancer}}{\text{cases of all cancers}} \times 100{,}000$$

Table 3 Population standards

Age group (years)	China standard population (2000)	Segi's population
0	13,793,799	2,400
1-4	55,184,575	9,600
5-9	90,152,587	10,000
10-14	125,396,633	9,000
15-19	103,031,165	9,000
20-24	94,573,174	8,000
25-29	117,602,265	8,000
30-34	127,314,298	6,000
35-39	109,147,295	6,000
40-44	81,242,945	6,000
45-49	85,521,045	6,000
50-54	63,304,200	5,000
55-59	46,370,375	4,000
60-64	41,703,848	4,000
65-69	34,780,460	3,000
70-74	25,574,149	2,000
75-79	15,928,330	1,000
80-84	7,989,158	500
85+	4,001,925	500
(Total)	1,242,612,226	100,000

2.4.7 Cumulative rate

A cumulative rate expresses the probability of cancer onset between birth and a specific age. The rate can be compared without age standardization because it is not affected by age structures. This rate is often expressed as the risk between 0 and 74 years old.

$$\text{Cumulative rate} = [\sum (\text{age-specific rate} \times \text{width of the age group})] \times 100\%$$

2.4.8 Truncated incidence (mortality) rate

The truncated rate is the calculation of rates over the truncated age of 35-64 years old using the WHO world standard population. The data are presented as truncated rates mainly because the accuracy of age-specific rates in the elderly may be much less certain and because cases in the younger age groups may be rare.

$$\text{Truncated incidence (mortality) rate} = \frac{\sum \text{truncated in a specific age group} \times \text{standard proportion of the age group}}{\sum \text{standard proportion}} \times 100\%$$

2.5 Data analysis

For the analyses, new cancer cases and deaths reported in registered areas in 2010 were pooled with demographic information. Data quality indicators, such as M/I, MV% and DCO% were analyzed. The cancer registry's variables included the crude incidence rate, mortality, ASR China (based on the national population structure in 2000), ASR world (based on the world population structure in 2000), cumulative rate, and age-specific rate. The incidence and mortality were stratified by two levels: urban/rural, eastern/middle/western.

New cancer cases and cancer deaths were estimated based on the real national population in 2010, an application with widespread benefit. Based on the National Statistics Bureau China standard, we classified the population into the eastern area, the middle area, and the western area. We first calculated the cancer registration data for these three areas. Using the age-specific cancer incidence for the three different areas, the 2010 National Census Population data was multiplied by the age-specific cancer incidence (mortality) data, and the overall estimated new cancer cases (deaths) were summed up.

3 Results

3.1 Data in this cancer registry report

3.1.1 Data sources

A total of 219 cancer registries submitted 2010 cancer registration data to NCCR. Among them, 187 cancer registries were funded by the National Cancer Registration Follow-up Program, and 16 registries were funded by the Huai River Cancer Screening Program. Another 16 registries were funded by other programs. A total of 32 provinces (autonomous regions, municipalities, and Xinjiang production and construction corps) were covered by the registries, with a total of 92 prefecture-level cities and 127 counties (county-level cities). Jiangsu Province had the most cancer registries [27]. Shandong and Henan provided data from 16 registries. Beijing, Tianjin, and Guangzhou provided cancer data from metropolitan and rural areas separately; these data were classified as urban and rural areas correspondingly.

3.1.2 Coverage area

The 219 cancer registries were distributed across 31 provinces (autonomous regions and municipalities) consisting of 91 cities and 125 counties (*Figure 3*). In general, urban registries cover all central districts, and rural registries cover administrative areas. However, several urban registries only covered one district, such as the Nangang District and the Daoli District of Harbin City.

3.1.3 Population coverage

The total covered population of the 219 cancer registries in 2010 was 207,229,403, including 105,355,619 males and 101,873,784 females; this population accounted for 15.42% of the entire national population in 2010. The population coverage was 112,818,343 in urban areas (54.44%) and 94,411,060 in rural areas (45.56%), accounting for 15.02% of the overall national population in 2010.

3.1.4 Time scope

The data are all from individuals who were diagnosed with or died from cancer between January 1 and December 31, 2010 in registration areas that had reported population data in mid-2010.

3.2 Analysis of cancer registration data in 2010

3.2.1 Population coverage and the number of new cancer cases and cancer deaths

A total of 495,069 new cancer cases were reported in 2010. Among those cases, 59.35% were from urban areas, and 40.65% were from rural areas. There were 301,140 new cancer deaths in 2010. The urban cancer deaths accounted for 57.21% of overall cancer deaths, and rural cancer deaths accounted for 42.79%.

3.2.2 Trend analysis for the cancer incidence in China from 2003 to 2010

Overall, cancer incidence trends were relatively stable for most cancer registries that were established before 2008. However, for some new cancer registries established after 2008, including those from Linfen, Kailu, Dandong, Zidong, Yuzhou, and Wanzhou, the cancer incidence trends fluctuated sharply during these years.

3.3 Cancer registry selection and data quality evaluation

3.3.1 Cancer registry selection

Among the 219 cancer registries that provided cancer data to NCCR, a total of 145 cancer registries with qualified data were included in the final database for further analysis. Specifically, 52 submitted qualified cancer data (quality classification A). A total of 73 cancer registries submitted qualified cancer data (quality classification B). The data from 74 cancer registries that were classified as quality classification D were rejected. In particular, 20 cancer registries had only one or two indicators that did not reach the standard for quality classification B; those registries were included in the report. These 145 registries distributed throughout 28 provinces and municipalities, including 63 cities and 82 counties (*Figure 3*).

3.3.2 Data quality evaluation in the 2010 national cancer registries

Among the 145 cancer registries, the MV%, DCO%, and M/I were 67.11%, 2.99% and 0.61, respectively. In the urban cancer registries, the MV%, DCO% and M/I were 71.51%, 2.49% and 0.59, respectively. In the rural cancer registries, the MV%, DCO% and M/I were 60.65%, 3.72% and 0.64, respectively (*Table 4*).

3.3.3 Population coverage in selected cancer registries, 2010

The population covered by national cancer registration areas in 2010 was 158,403,248 (80,355,188 males and 78,048,060 females), which accounted for 11.82% of the national population in 2010, including 92,433,739 in urban areas (58.35%) and 65,969,509 in rural areas (41.65%). The population covered by cancer registration in the eastern areas was 106,326,379 (53,708,038 males and 52,618,341 females), which accounted for 67.12% of all cancer registration areas. The population covered in the middle and western areas in 2010 was 36,353,656 (18,618,501 males and 17,735,155 females) and 15,723,213 (8,028,649 males and 7,694,564 females), respectively, which accounted for 22.95% and 9.93% of all cancer registration areas, respectively.

3.4 Incidence and mortality for all cancer sites

3.4.1 Incidence for all cancer sites

The incidence rate, ASR for China, ASR worldwide and cumulative rate for both sexes and for males in eastern areas were lower than those in the middle and western areas, but for females, the rates were higher in the eastern areas than in the middle and western areas. The ASR for China, ASR worldwide and cumulative rate for females in the middle areas were the highest, and the rates in the western areas were the lowest (*Table 5*).

3.4.2 Age-specific incidence rate for all cancer sites

The cancer incidence was relatively low for the 0-24-year age group. It dramatically increased after 35 years, reached its peak in the 80-year-old group and then decreased slightly after 85 years. The model of age-specific incidence in urban areas was similar to that in rural areas. Incidence rates were higher in urban areas than in rural areas for

Table 4 Quality indicators of the qualified national cancer registries in China, 2010

Site	ICD-10	Total			Urban areas			Rural areas		
		MV%	DCO%	M/I	MV%	DCO%	M/I	MV%	DCO%	M/I
Oral Cavity & Pharynx excluding Nasopharynx	C00-C10; C12-C14	81.05	2.27	0.41	85.29	1.92	0.41	73.32	2.90	0.40
Nasopharynx	C11	72.67	1.73	0.45	77.00	1.79	0.47	66.70	1.65	0.43
Esophagus	C15	74.56	2.53	0.71	74.32	2.03	0.72	74.72	2.85	0.71
Stomach	C16	75.33	3.11	0.68	78.43	2.27	0.68	72.09	3.99	0.69
Colon, Rectum & Anus	C18-C21	79.51	1.95	0.46	81.38	1.63	0.46	75.34	2.67	0.47
Liver	C22	36.71	5.07	0.86	41.54	4.72	0.85	31.62	5.45	0.87
Gallbladder etc.	C23-C24	51.35	3.27	0.71	50.93	3.64	0.74	52.28	2.44	0.65
Pancreas	C25	44.40	4.39	0.86	45.22	4.01	0.88	42.72	5.17	0.80
Larynx	C32	74.97	3.06	0.53	80.75	1.90	0.49	64.89	5.07	0.60
Trachea, Bronchus & Lung	C33-C34	51.87	4.25	0.80	58.80	3.77	0.81	41.92	4.94	0.77
Other Thoracic Organs	C37-C38	61.59	2.32	0.46	65.85	2.45	0.47	51.01	2.02	0.41
Bone	C40-C41	51.27	4.68	0.72	58.01	3.81	0.68	43.91	5.63	0.77
Melanoma of Skin	C43	90.35	0.72	0.42	91.98	0.85	0.41	86.56	0.40	0.45
Breast	C50	88.40	0.72	0.24	90.54	0.53	0.23	83.79	1.13	0.26
Cervix Uteri	C53	86.78	0.78	0.25	88.74	0.71	0.22	83.74	0.89	0.28
Uterus & Unspecified	C54-C55	82.71	1.56	0.32	88.16	1.11	0.27	74.61	2.23	0.39
Ovary	C56	80.03	1.57	0.41	81.67	1.43	0.44	76.73	1.86	0.35
Prostate	C61	72.03	1.50	0.43	74.65	1.43	0.41	62.19	1.79	0.49
Testis	C62	82.89	1.14	0.19	88.06	1.39	0.17	71.69	0.60	0.24
Kidney & Unspecified Urinary Organs	C64-C66,68	76.40	1.50	0.35	79.67	1.31	0.34	65.01	2.15	0.37
Bladder	C67	79.63	1.81	0.38	83.63	1.31	0.38	70.88	2.91	0.39
Brain & Central Nervous System	C70-C72	50.52	3.76	0.57	59.43	2.96	0.56	38.44	4.85	0.60
Thyroid Gland	C73	90.25	0.32	0.07	92.67	0.29	0.07	83.18	0.42	0.09
Lymphoma	C81-C85, 88, 90, 96	91.26	1.46	0.58	91.63	1.18	0.57	90.42	2.08	0.61
Leukemia	C91-C95	92.23	1.77	0.69	92.08	1.18	0.66	92.46	2.72	0.74
All others	Other	66.92	4.25	0.52	69.89	3.87	0.53	60.79	5.02	0.51
Total sites	Total	67.11	2.99	0.61	71.51	2.49	0.59	60.65	3.72	0.64

DCO%, the proportion of death certification only; M/I, the mortality to incidence ratio; MV%, the percentage of morphologically verified cases.

males younger than 40 years and older than 60 years. Conversely, the rates were lower than in rural areas for males between 40 and 60 years. Incidence rates were higher in urban areas than in rural areas for females in all age groups (*Table 6*, *Figure 4*).

3.4.3 Mortality for all cancer sites

The mortality, age-standardized mortality and cumulative rate for all cancer sites in the western areas were higher than those in the eastern and middle areas for both males and females. The mortality, age-standardized mortality and cumulative rate for all cancer sites in the middle and eastern areas were basically same (*Table 7*).

3.4.4 Age-specific mortality for all cancer sites

The age-specific mortality increased with age and was relatively low in the population younger than 30 years old. There was a dramatic increase in mortality in the 35-year age group, and it peaked at the ages of 85+ and 80– years old in urban and rural areas, respectively. The change model

Table 5 Incidence of all cancer sites in China, 2010

Area	Sex	No. cases	Crude rate (1/10^5)	ASR China (1/10^5)	ASR world (1/10^5)	Cum. rate 0~74(%)
All	Both sexes	3,093,039	235.23	184.58	181.49	21.11
	Male	1,807,921	268.65	216.53	215.12	25.33
	Female	1,285,118	200.21	154.44	149.66	16.84
Urban areas	Both sexes	1,699,483	256.41	187.53	183.91	21.19
	Male	975,653	287.56	214.50	212.82	24.76
	Female	723,830	223.74	162.52	156.91	17.50
Rural areas	Both sexes	1,393,556	213.71	181.10	178.54	21.02
	Male	832,268	249.42	218.53	217.54	26.00
	Female	561,288	176.29	145.47	141.38	16.12
Eastern areas	Both sexes	1,284,993	233.66	181.34	177.85	20.67
	Male	729,523	259.17	208.05	206.31	24.37
	Female	555,470	206.91	156.88	151.53	16.99
Middle areas	Both sexes	1,007,587	238.47	187.50	184.63	21.76
	Male	582,165	270.04	217.11	216.12	25.82
	Female	425,422	205.58	159.39	154.67	17.63
Western areas	Both sexes	800,459	233.77	186.18	183.61	20.98
	Male	496,233	282.09	229.68	228.36	26.25
	Female	304,226	182.71	143.79	140.02	15.61

ASR, age-standardized rate; Cum. rate, cumulative rate.

Table 6 Age-specific incidence rates of all cancer sites in China, 2010 (1/10^5)

Age group (years)	All areas			Urban areas			Rural areas		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Total	235.23	268.65	200.21	256.41	287.56	223.74	213.71	249.42	176.29
0	11.34	11.50	11.17	12.25	12.50	11.94	9.89	9.86	9.93
1-4	10.35	11.58	8.87	10.69	12.24	8.83	9.84	10.62	8.92
5-9	7.23	8.09	6.22	7.98	8.50	7.36	6.21	7.52	4.67
10-14	8.28	9.09	7.32	8.62	9.36	7.76	7.82	8.74	6.75
15-19	10.86	11.81	9.84	11.10	12.79	9.23	10.65	10.92	10.37
20-24	15.67	13.50	17.86	14.91	12.70	17.09	16.29	14.15	18.49
25-29	24.06	20.11	28.06	25.63	20.04	31.33	22.84	20.16	25.55
30-34	43.30	33.65	53.33	46.81	34.52	59.75	40.65	32.99	48.54
35-39	80.93	68.01	94.46	84.10	64.57	104.44	78.27	70.88	86.04
40-44	145.60	125.82	166.15	144.90	114.68	175.67	146.29	136.57	156.60
45-49	231.78	219.38	244.63	233.57	207.75	259.54	230.00	230.61	229.34
50-54	348.70	377.81	318.13	353.44	368.83	337.33	343.81	387.06	298.18
55-59	524.61	618.77	428.52	505.60	577.10	431.57	547.40	669.52	424.92
60-64	718.76	895.84	535.56	696.36	845.22	539.01	747.50	962.40	531.23
65-69	901.02	1,155.14	642.10	904.94	1,140.83	657.36	895.80	1,174.85	622.49
70-74	1,150.04	1,496.72	807.14	1,189.59	1,522.22	852.26	1,100.13	1,463.60	751.78
75-79	1,358.08	1,812.59	950.90	1,433.09	1,905.18	1,018.25	1,261.32	1,695.89	862.17
80-84	1,448.13	2,023.44	992.48	1,572.81	2,208.76	1,098.22	1,280.86	1,793.25	841.59
85+	1,296.64	1,846.27	967.60	1,464.85	2,097.65	1,108.91	1,069.95	1,536.74	766.46

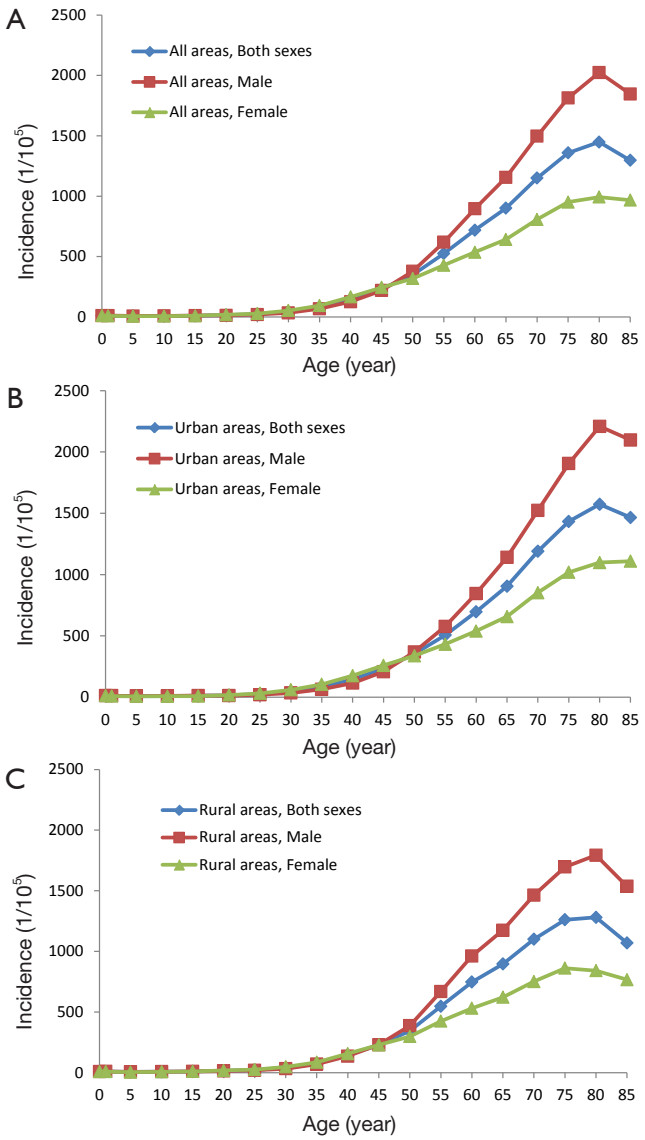

Figure 4 Age-specific incidence rates of all cancer sites in China, 2010. (A) all areas; (B) urban areas; (C) rural areas.

for age-specific mortality in the urban and rural areas was basically same. In all age groups between 15 and 70 years old, the mortalities in rural areas were higher than those in urban areas; in other age groups, the mortality rates were lower (*Table 8*, *Figure 5*).

3.5 The 10 most common cancers in China

3.5.1 Incidence of the 10 most common cancers

Lung cancer was the most common cancer, followed by cancers of the breast, stomach, liver and esophagus. In males, lung cancer was the most common cancer, followed by cancers of the stomach, liver, esophagus and colorectum. In females, breast cancer was the most common cancer, followed by cancers of the lung, colorectum, stomach and liver (*Table 9*, *Figure 6*).

3.5.2 The 10 leading causes of cancer death

Lung cancer was the leading cause of cancer death, followed by cancers of the liver, stomach, esophagus and colorectum. In males, lung cancer was the leading cause of cancer death, followed by cancers of the liver, stomach, esophagus and colorectum. In females, the five leading causes of cancer deaths were lung cancer, stomach cancer, liver cancer, esophageal cancer and breast cancer (*Table 10*, *Figure 7*).

3.5.3 Incidence of the 10 most common cancers in urban areas

In urban areas, lung cancer was the most common cancer, followed by cancers of the breast, stomach, colorectum and liver. In males, lung cancer was the most common cancer, followed by stomach cancer, liver cancer, colorectal cancer and esophageal cancer. In females, breast cancer was the most common cancer, followed by cancers of the lung, colorectum, stomach and liver (*Table 11*, *Figure 8*).

3.5.4 The 10 leading causes of cancer death in urban areas

In urban areas, lung cancer was the leading cause of cancer death, followed by cancers of the liver, stomach, colorectum and esophagus. In males, lung cancer was the leading cause of cancer death, followed by liver cancer, stomach cancer, esophageal cancer and colorectal cancer. In females, lung cancer was the leading cause of cancer death, followed by stomach cancer, liver cancer, colorectal cancer and breast cancer (*Table 12*, *Figure 9*).

3.5.5 Incidence of the 10 most common cancers in rural areas

In rural areas, lung cancer was the most common cancer, followed by cancers of the stomach, liver, esophagus and breast. In males, lung cancer was the most common cancer, followed by stomach cancer, liver cancer, esophageal cancer and colorectal cancer. In females, breast cancer was the most common cancer, followed by lung cancer, stomach cancer, esophageal cancer and liver cancer (*Table 13*, *Figure 10*).

3.5.6 The 10 leading causes of cancer death in rural areas

In rural areas, lung cancer was the leading cause of cancer

Table 7 Mortality of all cancer sites in China, 2010

Area	Sex	No. cases	Crude rate (1/10^5)	ASR China (1/10^5)	ASR world (1/10^5)	Cum. rate 0~74(%)
All	Both sexes	1,956,622	148.81	113.92	112.86	12.78
	Male	1,254,232	186.37	149.37	148.43	16.80
	Female	702,390	109.42	79.88	78.82	8.70
Urban areas	Both sexes	1,034,936	156.14	109.21	108.15	12.08
	Male	653,285	192.55	141.70	140.86	15.68
	Female	381,651	117.97	78.22	77.05	8.35
Rural areas	Both sexes	921,686	141.35	119.00	118.02	13.61
	Male	600,947	180.09	158.06	157.18	18.16
	Female	320,739	100.74	81.36	80.45	9.10
Eastern areas	Both sexes	817,610	148.67	111.44	110.19	12.44
	Male	515,047	182.98	145.28	143.97	16.26
	Female	302,563	112.70	79.37	78.29	8.59
Middle areas	Both sexes	614,496	145.44	112.30	111.23	12.68
	Male	394,008	182.76	146.84	145.97	16.62
	Female	220,488	106.55	79.09	77.95	8.66
Western areas	Both sexes	524,516	153.18	119.90	119.21	13.46
	Male	345,177	196.22	158.99	158.60	17.89
	Female	179,339	107.71	81.54	80.74	8.94

ASR, age-standardized rate; Cum. rate, cumulative rate.

Table 8 Age-specific mortalities of all cancer sites in China, 2010 (1/10^5)

Age group (years)	All areas			Urban areas			Rural areas		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Total	148.81	186.37	109.42	156.14	192.55	117.97	141.35	180.09	100.74
0	4.76	5.01	4.48	5.04	5.54	4.43	4.33	4.14	4.55
1-4	4.49	4.91	3.99	4.25	4.64	3.79	4.84	5.31	4.28
5-9	3.15	3.49	2.74	3.02	3.19	2.83	3.31	3.89	2.63
10-14	3.17	3.41	2.90	3.22	3.37	3.05	3.11	3.45	2.71
15-19	5.06	6.17	3.85	5.01	6.47	3.39	5.10	5.89	4.25
20-24	6.26	6.71	5.81	4.46	5.14	3.80	7.73	7.96	7.48
25-29	7.76	8.86	6.65	6.44	6.75	6.12	8.78	10.49	7.05
30-34	15.50	17.38	13.54	14.97	15.92	13.96	15.90	18.50	13.22
35-39	31.40	37.27	25.25	28.52	32.68	24.19	33.81	41.11	26.14
40-44	60.10	71.51	48.25	50.87	57.75	43.86	69.18	84.78	52.65
45-49	103.84	126.45	80.40	93.95	112.85	74.95	113.67	139.58	85.99
50-54	175.78	224.37	124.73	160.65	202.75	116.59	191.43	246.63	133.20
55-59	285.41	376.66	192.29	259.25	339.08	176.59	316.76	422.41	210.81
60-64	424.34	569.82	273.83	384.13	511.41	249.59	475.94	646.61	304.19
65-69	590.32	790.97	385.89	573.23	759.42	377.82	613.06	834.42	396.27
70-74	839.02	1,112.23	568.79	823.48	1,074.75	568.65	858.63	1,160.90	568.95
75-79	1,142.97	1,528.57	797.52	1,151.83	1,522.71	825.94	1,131.54	1,535.96	760.09
80-84	1,405.63	1,921.42	997.11	1,484.32	2,020.92	1,083.87	1,300.06	1,797.84	873.32
85+	1,471.68	2,055.97	1,121.89	1,606.50	2,242.07	1,249.02	1,289.97	1,826.81	940.94

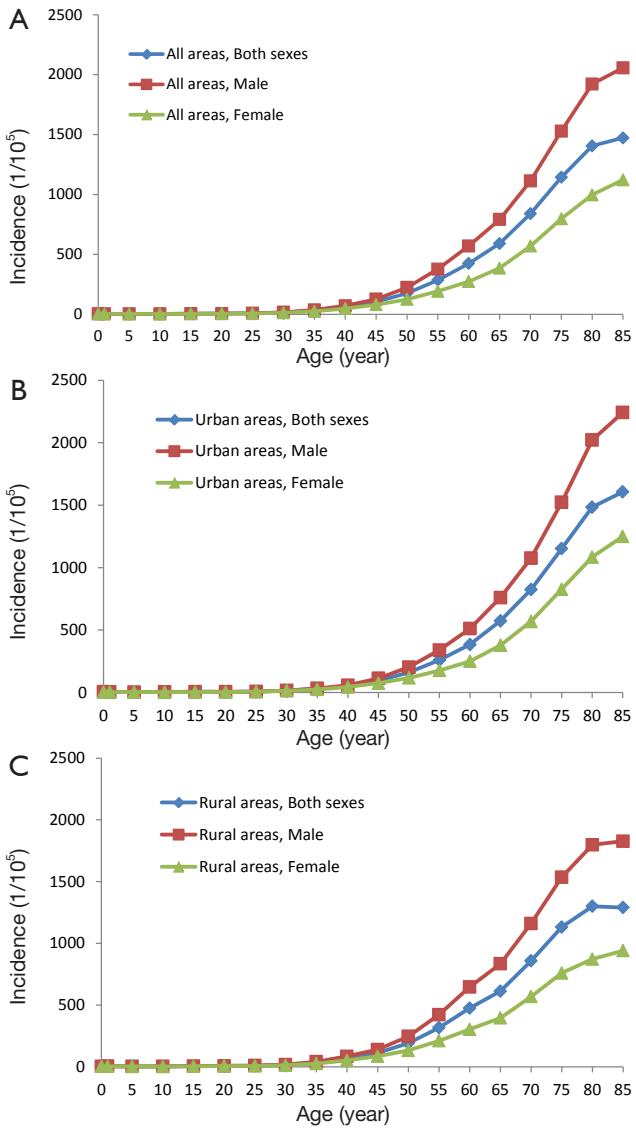

Figure 5 Age-specific mortalities of all cancer sites in China, 2010. (A) all areas; (B) urban areas; (C) rural areas.

death, followed by liver cancer, stomach cancer, esophageal cancer and colorectal cancer for the whole population and for males. In females, lung cancer was the leading cause of cancer death, followed by stomach cancer, liver cancer, esophageal cancer and breast cancer (*Table 14*, *Figure 11*).

4 Discussion

Since the launch of cancer registration project in 2008, the populations covered by cancer registration have dramatically increased in China on an annual basis, with the nationwide coverage reaching 15% in 2010 (1). The implementation of the NCCR project throughout the country has increased the number of tumor registries and the quality of data. In 2010, the data for the annual report were collected in an even more rigorous manner. The NCCR carefully reviewed all the data received and finally included the data from 145 registries in the 2013 annual report to analyze the morbidities and mortalities of cancers in China in 2010. Data were stratified according to areas (the eastern, middle, and western areas) to increase the applicability of the annual report. Also, the estimates for the new cases and deaths were added to reflect the tumor burdens nationwide and in different areas in a more direct way. As shown in the report, the incidences and mortalities of malignant tumors remained unchanged across China in 2010 when compared with the data in 2009 (8). Although the coverage of tumor registration still remarkably differs among different areas, the data met the features of tumor development and its associated deaths, indicating that the tumor registration data has become reliable. Also, the coverage of certain populations can reflect the overall tumor burden in China, and therefore is nationally representative. However, its representativeness in different populations, areas, and regions after stratification requires further evaluation. The tumor burdens dramatically differ in urban and rural areas. The incidences of tumors are significantly higher in urban areas than in rural areas, while the case-fatality rate is dramatically higher in rural areas. In addition, the proportions of different tumors are also different. In the rural areas, the inadequate medical resources, low diagnosis/treatment capabilities, and low health awareness result in delayed identification of tumors and poor prognosis. Upper gastrointestinal tumors remain common among rural residents and are the leading causes of cancer deaths; meanwhile, the incidences of lung cancer, breast cancer, and colorectal cancer have increased annually. The cancer spectrum in urban areas is similar to those in developed countries, and the incidences of lung cancer, breast cancer, and colorectal cancer also have been rising. Notably, there is an obvious upward trend in thyroid cancer among women. Thus, the prevention and control of tumors in China should be tailored in different areas. Currently, the increasing burdens of chronic diseases, in particular tumors and other environment-related health problems, have become a nationwide concern. The NHFPC of China has developed the Chronic Diseases Prevention and Control Program for the Twelfth Five-Year Plan, focusing on information monitoring, health education, and early detection/treatment, with an attempt

Table 9 The top 10 cancer incidence in China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	605,946	46.08	19.59	35.23	Lung (C33~34)	416,333	61.86	23.03	49.27	Breast (C50)	208,192	32.43	16.20	25.89
2	Breast (C50)	208,192	32.43	6.83	25.89	Stomach (C16)	287,844	42.77	15.92	34.05	Lung (C33~34)	189,613	29.54	14.75	21.66
3	Stomach (C16)	404,565	30.77	13.08	23.71	Liver (C22)	268,757	39.94	14.87	32.21	Colorectum (C18~21)	117,486	18.30	9.14	13.63
4	Liver (C22)	358,840	27.29	11.60	21.35	Oesophagus (C15)	204,449	30.38	11.31	24.05	Stomach (C16)	116,721	18.18	9.08	13.55
5	Oesophagus (C15)	287,632	21.88	9.30	16.71	Colorectum (C18~21)	157,355	23.38	8.70	18.75	Liver (C22)	90,083	14.03	7.01	10.41
6	Colorectum (C18~21)	274,841	20.90	8.89	16.14	Bladder (C67)	46,102	6.85	2.55	5.49	Oesophagus (C5)	83,183	12.96	6.47	9.46
7	Cervix (C53)	76,884	11.98	2.49	9.84	Pancreas (C25)	40,394	6.00	2.23	4.78	Cervix (C53)	76,884	11.98	5.98	9.84
8	Uterus (C54~55)	47,751	7.44	1.54	5.84	Brain, CNS (C70~72)	39,782	5.91	2.20	5.10	Uterus (C54~55)	47,751	7.44	3.72	5.84
9	Ovary (C56)	41,516	6.47	1.34	5.22	Prostate (C61)	38,373	5.70	2.12	4.56	Ovary (C56)	41,516	6.47	3.23	5.22
10	Brain, CNS (C70~72)	78,933	6.00	2.55	5.03	Leukaemia (C91~95)	37,523	5.58	2.08	5.10	Thyroid (C73)	41,213	6.42	3.21	5.62

ASR, age-standardized rate.

Table 10 The top 10 cancer mortality in China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	486,555	37.00	24.87	27.93	Lung (C33~34)	336,786	50.04	26.85	39.79	Lung (C33~34)	149,769	23.33	21.32	16.62
2	Liver (C22)	312,432	23.76	15.97	18.43	Liver (C22)	231,950	34.47	18.49	27.69	Stomach (C16)	87,833	13.68	12.50	9.83
3	Stomach (C16)	287,851	21.89	14.71	16.64	Stomach (C16)	200,018	29.72	15.95	23.70	Liver (C22)	80,482	12.54	11.46	9.15
4	Oesophagus (C15)	208,473	15.85	10.65	11.95	Oesophagus (C15)	148,865	22.12	11.87	17.54	Oesophagus (C15)	59,608	9.29	8.49	6.52
5	Colorectum (C18~21)	132,110	10.05	6.75	7.55	Colorectum (C18~21)	76,646	11.39	6.11	9.10	Breast (C50)	55,500	8.65	7.90	6.56
6	Breast (C50)	55,500	8.65	2.91	6.56	Pancreas (C25)	34,509	5.13	2.75	4.08	Colorectum (C18~21)	55,464	8.64	7.90	6.12
7	Pancreas (C25)	57,735	4.39	2.95	3.32	Leukaemia (C91~95)	26,212	3.89	2.09	3.45	Pancreas (C25)	23,226	3.62	3.31	2.58
8	Brain, CNS (C70~72)	46,740	3.55	2.39	2.91	Brain, CNS (C70~72)	26,029	3.87	2.08	3.27	Cervix (C53)	21,626	3.37	3.08	2.60
9	Leukaemia (C91~95)	45,653	3.47	2.33	3.00	Lymphoma (C81~85, 88, 90, 96)	22,178	3.30	1.77	2.70	Brain, CNS (C70~72)	20,711	3.23	2.95	2.55
10	Cervix (C53)	21,626	3.37	1.11	2.60	Bladder (C67)	17,386	2.58	1.39	2.05	Leukaemia (C91~95)	19,441	3.03	2.77	2.56

ASR, age-standardized rate.

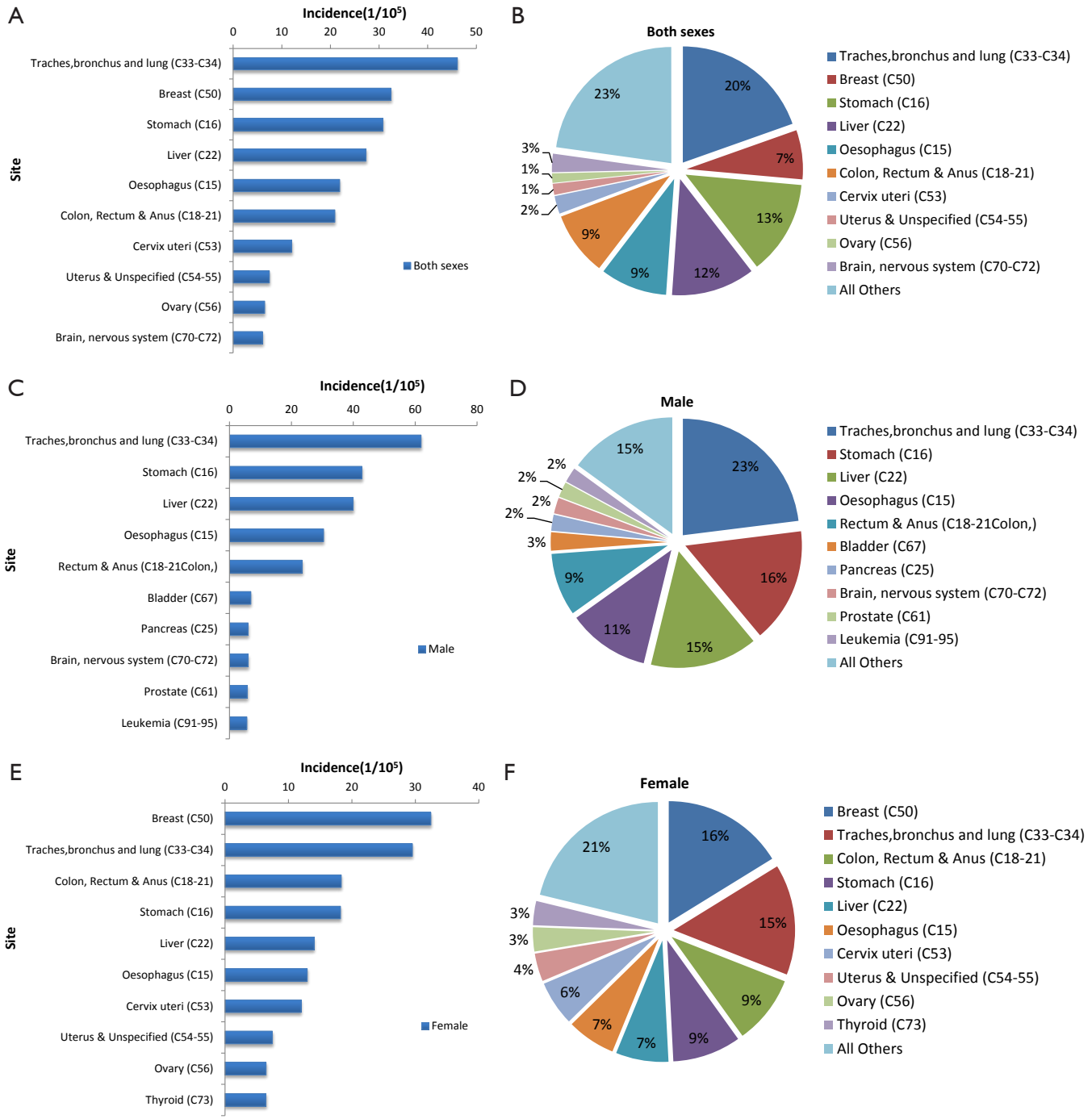

Figure 6 Top 10 most common cancers in China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) incidence rates of the 10 most common cancers; (B,D,F) the proportion of the 10 most common cancers.

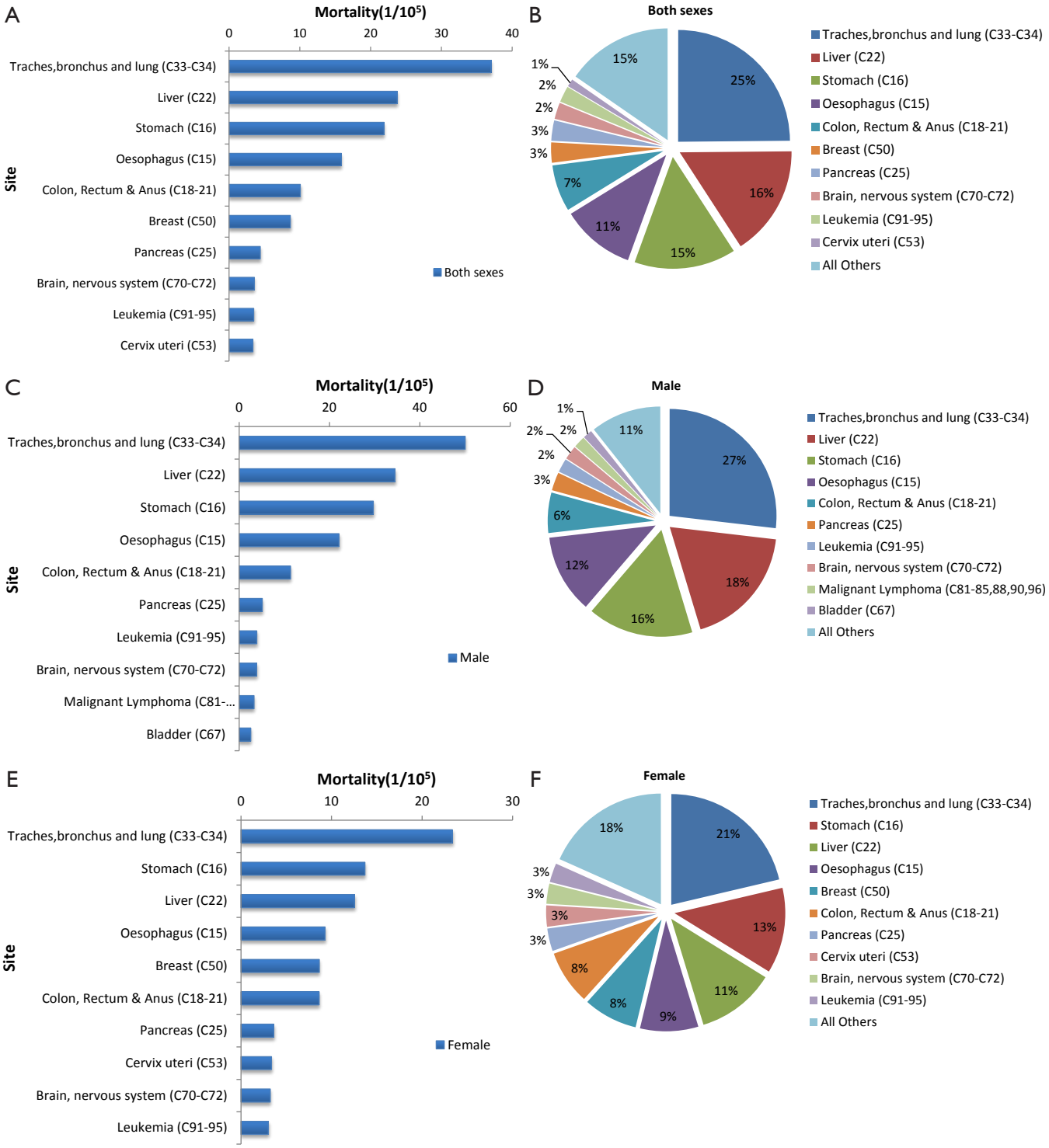

Figure 7 Top 10 leading causes of cancer death in China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) mortalities of the top 10 leading causes of cancer death; (B,D,F) the proportion of the top 10 leading causes of cancer death.

Table 11 The top 10 cancer incidence in urban areas of China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	348,107	52.52	20.48	36.62	Lung (C33~34)	238,816	70.39	24.48	51.22	Breast (C50)	127,707	39.47	17.64	30.50
2	Breast (C50)	127,707	39.47	7.61	30.50	Stomach (C16)	137,509	40.53	14.09	29.60	Lung (C33~34)	109,291	33.78	15.10	22.52
3	Stomach (C16)	193,832	29.24	11.41	20.72	Liver (C22)	123,924	36.52	12.70	27.69	Colorectum (C18~21)	75,583	23.36	10.44	15.94
4	Colorectum (C18~21)	176,942	26.70	10.41	18.91	Colorectum (C18~21)	101,359	29.87	10.39	22.05	Stomach (C16)	56,323	17.41	7.78	11.99
5	Liver (C22)	166,166	25.07	9.78	18.27	Oesophagus (C15)	81,167	23.92	8.32	17.31	Liver (C22)	42,242	13.06	5.84	8.80
6	Oesophagus (C15)	109,683	16.55	6.45	11.50	Bladder (C67)	29,703	8.75	3.04	6.43	Cervix (C53)	42,173	13.04	5.83	10.70
7	Cervix (C53)	42,173	13.04	2.48	10.70	Prostate (C61)	28,670	8.45	2.94	6.08	Oesophagus (C15)	28,516	8.81	3.94	5.76
8	Prostate (C61)	28,670	8.45	1.69	6.08	Pancreas (C25)	24,396	7.19	2.50	5.23	Thyroid (C73)	26,791	8.28	3.70	7.30
9	Ovary (C56)	25,000	7.73	1.47	6.01	Lymphoma (C81~85, 88, 90, 96)	24,279	7.16	2.49	5.60	Ovary (C56)	25,000	7.73	3.45	6.01
10	Uterus (C54~55)	24,763	7.65	1.46	5.73	Kidney (C64~66, 68)	23290	6.86	2.39	5.15	Uterus (C54~55)	24,763	7.65	3.42	5.73

ASR, age-standardized rate.

Table 12 The top 10 cancer mortality in urban areas in China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	279,919	42.23	27.05	28.88	Lung (C33~34)	192,438	56.72	29.46	41.04	Lung (C33~34)	87,481	27.04	22.92	17.31
2	Liver (C22)	142,388	21.48	13.76	15.46	Liver (C22)	104,689	30.86	16.03	23.26	Stomach (C16)	41,921	12.96	10.98	8.47
3	Stomach (C16)	134,956	20.36	13.04	14.09	Stomach (C16)	93,035	27.42	14.24	19.94	Liver (C22)	37,699	11.65	9.88	7.67
4	Colorectum (C18~21)	83,312	12.57	8.05	8.58	Oesophagus (C15)	60,544	17.84	9.27	12.90	Colorectum (C18~21)	35,359	10.93	9.26	6.98
5	Oesophagus (C15)	80,798	12.19	7.81	8.35	Colorectum (C18~21)	47,953	14.13	7.34	10.33	Breast (C50)	32,765	10.13	8.59	7.19
6	Breast (C50)	32,765	10.13	3.23	7.19	Pancreas (C25)	21,355	6.29	3.27	4.57	Oesophagus (C15)	20,254	6.26	5.31	3.90
7	Pancreas (C25)	36,465	5.50	3.52	3.77	Leukaemia (C91~95)	14,479	4.27	2.22	3.53	Pancreas (C25)	15,110	4.67	3.96	2.99
8	Leukaemia (C91~95)	24,315	3.67	2.35	2.94	Lymphoma (C81~85, 88, 90, 96)	14,038	4.14	2.15	3.14	Ovary (C56)	11,375	3.52	2.98	2.51
9	Prostate (C61)	12,367	3.64	1.19	2.58	Brain,CNS (C70~72)	12,443	3.67	1.90	2.91	Brain, CNS (C70~72)	11,255	3.48	2.95	2.56
10	Brain, CNS (C70~72)	23,698	3.58	2.29	2.73	Prostate (C61)	12,367	3.64	1.89	2.58	Cervix (C53)	10,950	3.38	2.87	2.48

ASR, age-standardized rate.

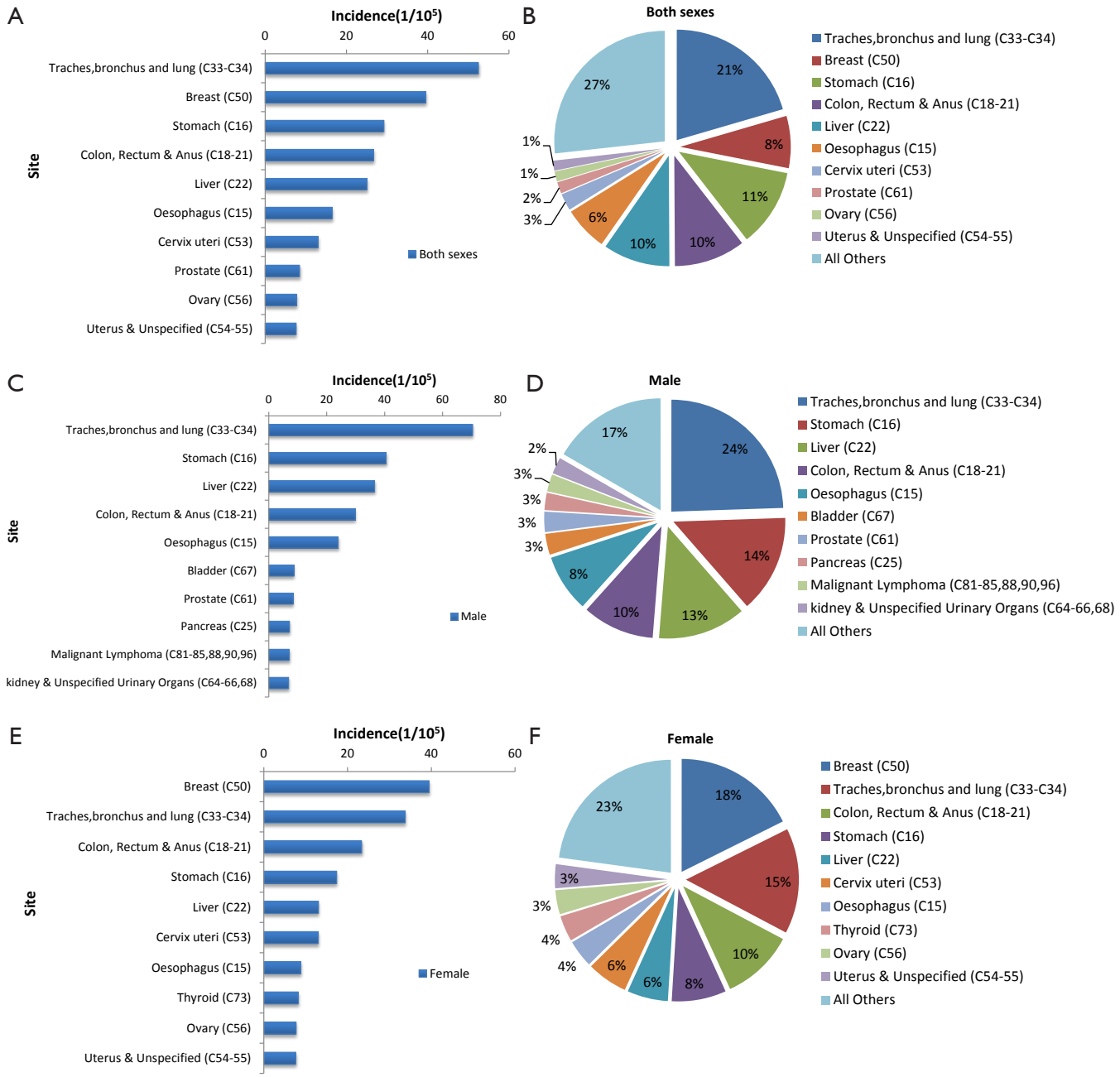

Figure 8 Top 10 most common cancers in urban areas of China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) incidence rates of the 10 most common cancers; (B,D,F) the proportion of the 10 most common cancers.

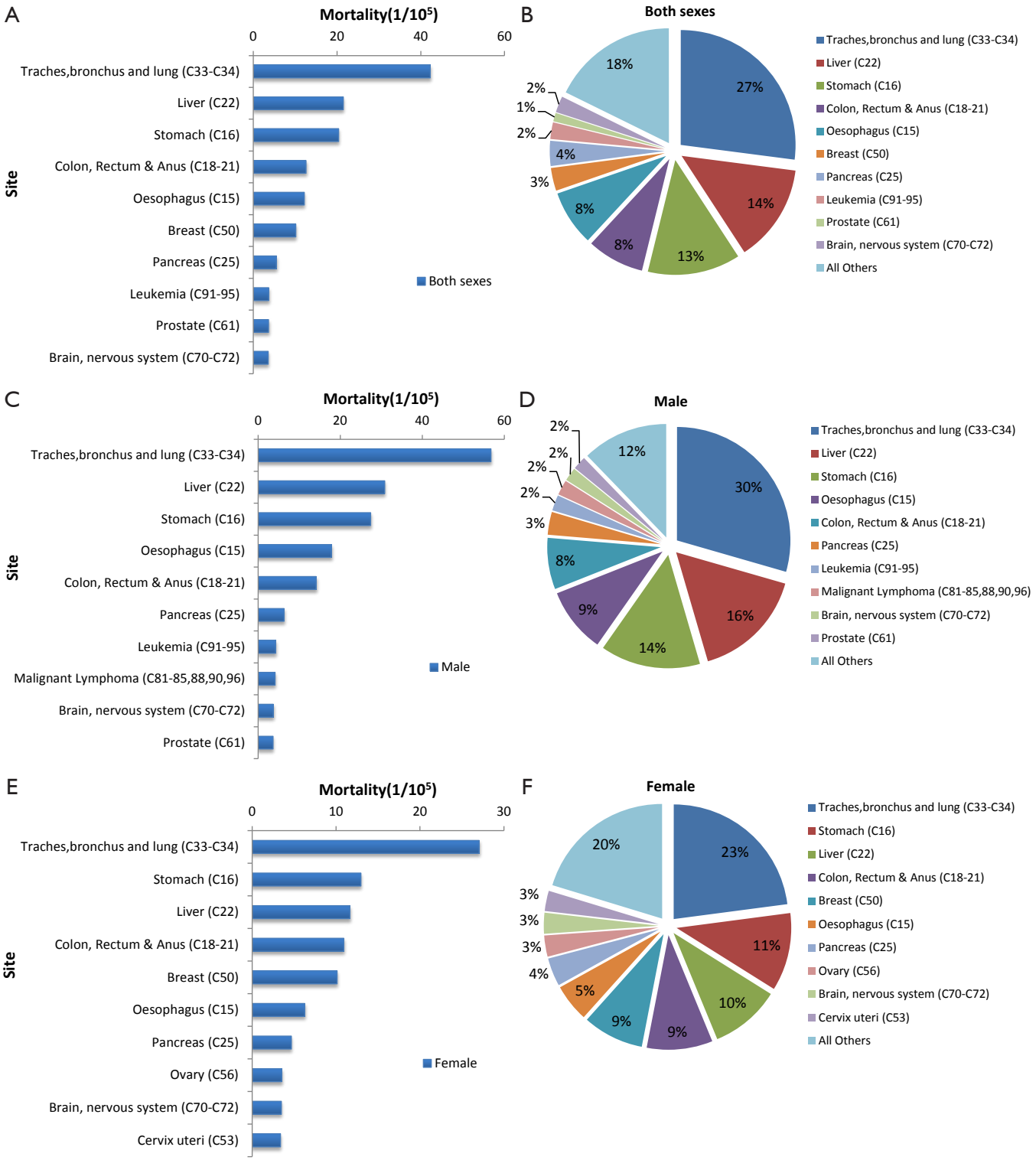

Figure 9 Top 10 leading causes of cancer death in urban areas of China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) mortalities of the top 10 leading causes of cancer death; (B,D,F) the proportion of the top 10 leading causes of cancer death.

Table 13 The top 10 cancer incidence in rural areas of China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Incidence ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	257,839	39.54	18.50	33.39	Lung (C33~34)	177,517	53.20	21.33	46.75	Breast (C50)	80,485	25.28	14.34	20.78
2	Stomach (C16)	210,733	32.32	15.12	27.37	Stomach (C16)	150,335	45.05	18.06	39.51	Lung (C33~34)	80,322	25.23	14.31	20.49
3	Liver (C22)	192,674	29.55	13.83	24.74	Liver (C22)	144,833	43.40	17.40	37.21	Stomach (C16)	60,398	18.97	10.76	15.51
4	Oesophagus (C15)	177,949	27.29	12.77	23.10	Oesophagus (C15)	123,282	36.95	14.81	32.40	Oesophagus (C15)	54,667	17.17	9.74	13.97
5	Breast (C50)	80,485	25.28	5.88	20.78	Colorectum (C18~21)	55,996	16.78	6.73	14.65	Liver (C22)	47,841	15.03	8.52	12.20
6	Colorectum (C18~21)	97,899	15.01	7.03	12.67	Brain, CNS (C70~72)	19,805	5.94	2.38	5.32	Colorectum (C18~21)	41,903	13.16	7.47	10.77
7	Cervix (C53)	34,711	10.90	2.49	9.08	Bladder (C67)	16,399	4.91	1.97	4.33	Cervix (C53)	34,711	10.90	6.18	9.08
8	Uterus (C54~55)	22,988	7.22	1.65	5.92	Pancreas (C25)	15,998	4.79	1.92	4.20	Uterus (C54~55)	22,988	7.22	4.10	5.92
9	Brain, CNS (C70~72)	38,455	5.90	2.76	5.15	Leukaemia (C91~95)	15,944	4.78	1.92	4.62	Brain, CNS (C70~72)	18,650	5.86	3.32	4.98
10	Ovary (C56)	16,516	5.19	1.19	4.32	Nasopharynx (C11)	13,760	4.12	1.65	3.53	Ovary (C56)	16,516	5.19	2.94	4.32

ASR, age-standardized rate.

Table 14 The top 10 cancer mortality in rural areas of China, 2010

Rank	Both					Male					Female				
	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)	Site (ICD-10 code)	Cases	Mortality ($1/10^5$)	%	ASR China ($1/10^5$)
1	Lung (C33~34)	206,636	31.69	22.42	26.61	Lung (C33~34)	144,348	43.26	24.02	38.09	Lung (C33~C34)	62,288	19.56	19.42	15.64
2	Liver (C22)	170,044	26.08	18.45	21.75	Liver (C22)	127,261	38.14	21.18	32.69	Stomach (C16)	45,912	14.42	14.31	11.55
3	Stomach (C16)	152,895	23.45	16.59	19.82	Stomach (C16)	106,983	32.06	17.80	28.40	Liver (C22)	42,783	13.44	13.34	10.81
4	Oesophagus (C15)	127,675	19.58	13.85	16.43	Oesophagus (C15)	88,321	26.47	14.70	23.30	Oesophagus (C15)	39,354	12.36	12.27	9.79
5	Colorectum (C18~21)	48,798	7.48	5.29	6.26	Colorectum (C18~21)	28,693	8.60	4.77	7.54	Breast (C50)	22,735	7.14	7.09	5.78
6	Breast (C50)	22,735	7.14	2.55	5.78	Brain, CNS (C70~72)	13,586	4.07	2.26	3.64	Colorectum (C18~21)	20,105	6.31	6.27	5.03
7	Brain, CNS (C70~72)	23,042	3.53	2.50	3.06	Pancreas (C25)	13,154	3.94	2.19	3.46	Cervix (C53)	10,676	3.35	3.33	2.73
8	Cervix (C53)	10,676	3.35	1.16	2.73	Leukaemia (C91~95)	11,733	3.52	1.95	3.31	Leukaemia (C91~95)	9,605	3.02	2.99	2.72
9	Leukaemia (C91~95)	21,338	3.27	2.32	3.01	Lymphoma (C81~85, 88, 90, 96)	8,140	2.44	1.35	2.17	Brain, CNS (C70~72)	9,456	2.97	2.95	2.49
10	Pancreas (C25)	21,270	3.26	2.31	2.75	Nasopharynx (C11)	6,574	1.97	1.09	1.69	Uterus (C54~55)	9,063	2.85	2.83	2.33

ASR, age-standardized rate.

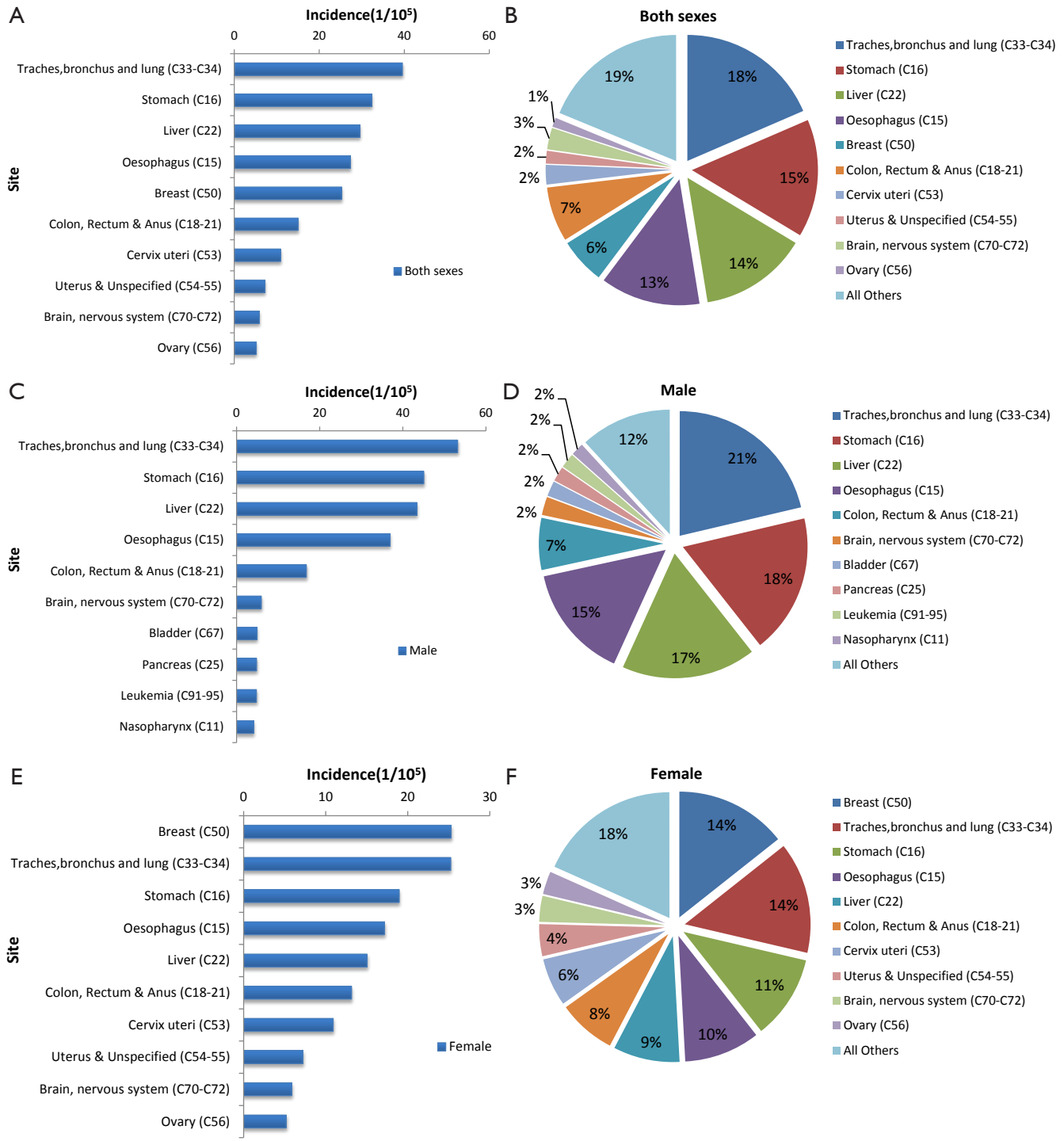

Figure 10 Top 10 most common cancers in rural areas of China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) incidence rates of the 10 most common cancers; (B,D,F) the proportion of the 10 most common cancers.

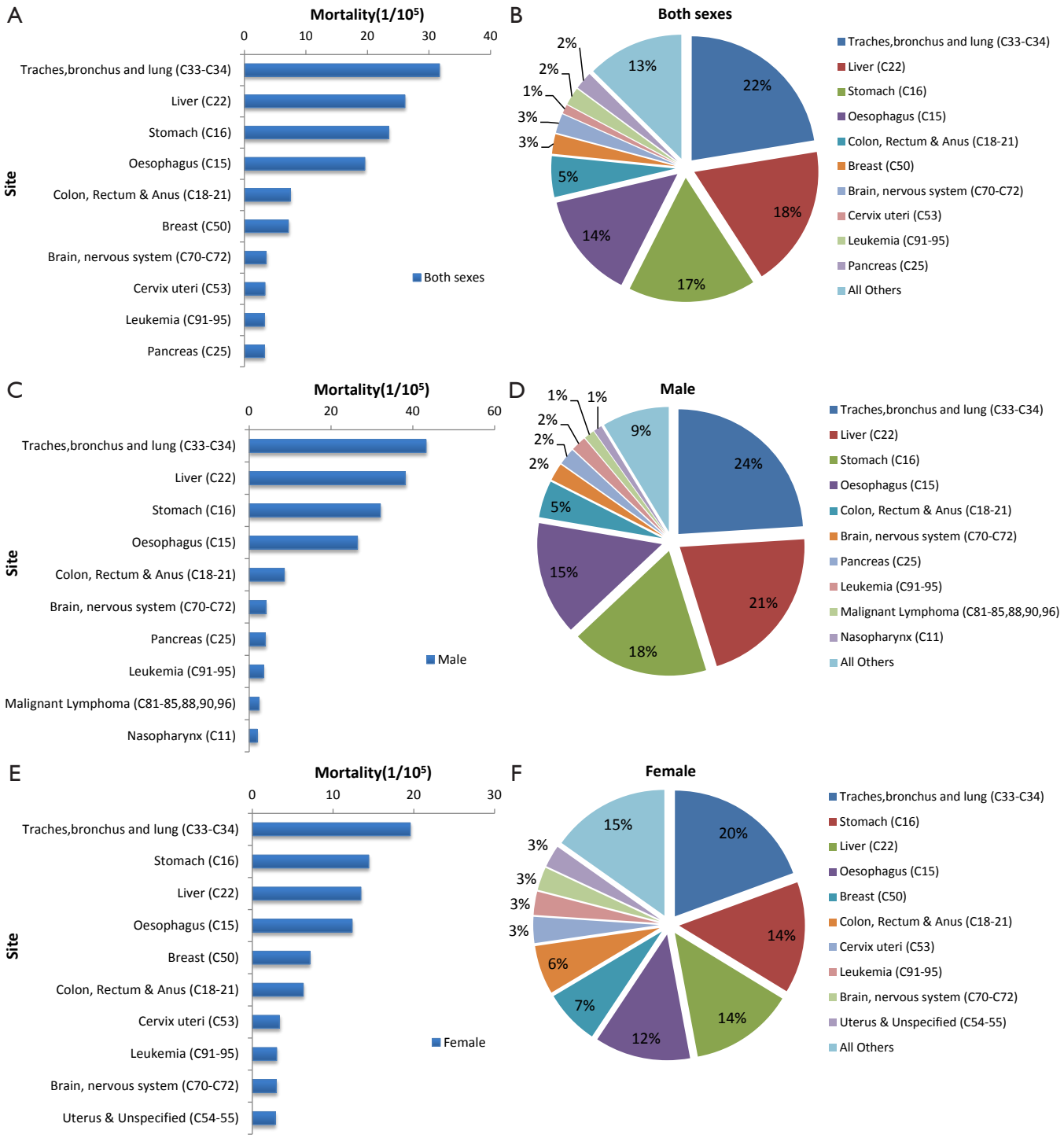

Figure 11 Top 10 leading causes of cancer death in rural areas of China, 2010. (A,B) all population; (C,D) male population; (E,F) female population. (A,C,E) mortalities of the top 10 leading causes of cancer death; (B,D,F) the proportion of the top 10 leading causes of cancer death.

to hold back the rising burdens of chronic diseases. As a basis for tumor prevention and control, the dynamic monitoring of tumor incidences and mortalities will be beneficial for the implementation, adjustment, and evaluation of the program. The NCCR will seize this opportunity and gradually enlarge the populations covered by the tumor registries, improve the data quality, and strengthen the analysis and utilization of registration data, so as to contribute more in the fighting against tumors.

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