

Brief Report

The incidences and mortalities of major cancers in China, 2010

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Abstract

To estimate the cancer incidences and mortalities in China in 2010, the National Central Cancer Registry (NCCR) of China evaluated data for the year of 2010 from 145 qualified cancer registries covering 158,403,248 people (92,433,739 in urban areas and 65,969,509 in rural areas). The estimates of new cancer cases and cancer deaths were 3,093,039 and 1,956,622 in 2010, respectively. The percentage of morphologically verified cases were 67.11%; 2.99% of incident cases were identified through death certification only, with the mortality to incidence ratio of 0.61. The crude incidence was 235.23/100,000 (268.65/100,000 in males and 200.21/100,000 in females). The age-standardized rates by Chinese standard population (ASR China) and by world standard population (ASR world) were 184.58/100,000 and 181.49/100,000, respectively, with a cumulative incidence (0–74 years old) of 21.11%. The crude cancer mortality was 148.81/100,000 (186.37/100,000 in males and 109.42/100,000 in females). The ASR China and ASR world were 113.92/100,000 and 112.86/100,000, respectively, with a cumulative mortality of 12.78%. Lung, breast, gastric, liver, esophageal, colorectal, and cervical cancers were the most common cancers. Lung, liver, gastric, esophageal, colorectal, breast, and pancreatic cancers were the leading causes of cancer deaths. 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. Given the increasing cancer burden in the past decades, China should strengthen its cancer prevention and control.

Key words Cancer registry, malignant tumor, incidence, mortality, China

According to the cancer registry report released by the National Central Cancer Registry (NCCR) of China, the incidence and mortality of cancer have been rising gradually. New cancer cases and cancer deaths in China in 2009 were estimated at approximately 3 million 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) of China, 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 general objective of cancer registration in China is 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 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.

Materials and Methods

Data collection

Cancer registries should collect cancer statistics, including cancer incidence, cancer deaths, cancer survival, and population data from clinics and hospitals, health insurance databases, death surveillance databases, and cooperative health insurance databases

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in rural areas. The cancer registries are responsible for completing cancer case report forms. The cancer death records should also be matched with incidence case in the database. Missing cases should be supplemented, and duplicated cases should be deleted. Cancer cases were contacted through home visits, telephone calls, mails, and emails to collect survival information.

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 to C97. Population coverage data should also be collected. The personal information, detailed cancer data, and follow-up information for registered cancer patients should be recorded. Information about mortality often comes from population-based death databases. The population data were originated from statistics or public security census data departments.

Data quality control

The comparability, completeness, validity, and timeliness were used to address 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 and the "Guideline for Chinese Cancer Registration" and "Cancer Incidence for 5 Continents Volume IX" published by the International Agency for Research on Cancer/International Association of Cancer Registry (IARC/IACR). The mortality to incidence ratio (M/I), the percentage of morphologically verified cases (MV%), and the percentage of death certificate-only cases (DCO%) were used to evaluate the completeness, validity, and reliability of cancer statistics.

Statistical analysis

New cancer cases and deaths reported in registered areas between January 1 and December 31, 2010 were pooled with demographic information. Average annual population, sex- and age-specific populations, crude incidence and mortality, sex- and age-specific incidences and mortalities, age-standardized rates (ASR),

proportional distributions, cumulative rates, and truncated rates were analyzed. The Segi's world population and the China 2000 population census data were used as the population standards.

Results

Data sources

A total of 219 cancer registries submitted 2010 cancer registration data to NCCR. Among them, 145 registries with qualified data were included in the final database for further analysis. The MV%, DCO%, and M/I were 67.11%, 2.99%, and 0.61, respectively. In urban cancer registries, the MV%, DCO%, and M/I were 71.51%, 2.49%, and 0.59, respectively. In rural cancer registries, the MV%, DCO%, and M/I were 60.65%, 3.72%, and 0.64, respectively. The population covered by the 145 cancer registries 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%).

Incidence for all cancers

The estimate of new cancer cases was 3,093,039 in 2010. The crude incidence was 235.23/100,000 (268.65/100,000 in males and 200.21/100,000 in females). The ASR by Chinese standard population (ASR China) and by world standard population (ASR world) were 184.58/100,000 and 181.49/100,000, respectively, with a cumulative incidence (0–74 years old) of 21.11% (**Table 1**). The cancer incidence dramatically increased after age 35, and peaked at age 80.

Mortality for all cancers

The estimate of cancer deaths was 1,956,622 in 2010. The crude cancer mortality in China was 148.81/100,000 (186.37/100,000 in males and 109.42/100,000 in females). The ASR China and ASR

Table 1. Incidence of all cancers in China (ICD-10: C00-C96)

Area	Sex	Cases	Crude rate (1/100,000)	ASR China (1/100,000)	ASR world (1/100,000)	Cumulative rate (%)
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

ASR China, age-standardized rate by Chinese standard population; ASR world, age-standardized rate by world standard population.

world were 113.92/100,000 and 112.86/100,000, respectively, with a cumulative mortality of 12.78% (Table 2). The cancer mortality incidence dramatically increased after age 35, and peaked at age 85+ and 80- in urban and rural areas, respectively.

The 10 most common cancers in China

Lung cancer was the most common cancer in both urban areas and rural areas, followed by breast, gastric, liver, and esophageal cancers. In males, the 5 most common cancers were lung, gastric, liver, esophageal, and colorectal cancers. In females, the 5 most common cancers were breast, lung, colorectal, gastric, and liver cancers.

Lung cancer was the leading cause of cancer death in both urban areas and rural areas, followed by liver, gastric, esophageal, and colorectal cancers. In males, the 5 leading causes of cancer deaths were lung, liver, gastric, esophageal, and colorectal cancers. In females, the 5 leading causes of cancer deaths were lung, gastric, liver, esophageal, and breast cancers.

Discussion

Since the launch of the Cancer Registration Program 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 estimates for 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 decreased across China in 2010 when compared with the data in 2009^[8], mostly because of a great increase of covering population.

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 cancer incidence is significantly higher in urban areas than in rural areas, whereas the mortality is dramatically higher in rural areas. In addition, the proportions of different tumors are also different. In 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, breast, and colorectal cancers have increased annually. The cancer spectrum in urban areas is similar to those in developed countries, and the incidences of lung, breast, and colorectal cancers 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 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 use of registration data, so as to contribute more in the fighting against tumors.

Table 2. Mortality of all cancers in China (ICD-10: C00-C96)						
Area	Sex	Cases	Crude rate (1/100,000)	ASR China (1/100,000)	ASR world (1/100,000)	Cumulative rate (%)
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

Abbreviations as in Table 1.

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