Cancer Incidence and Mortality: A Cohort Study in China, 2008-2013

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Abbreviations:

NCCR: The National Central Cancer Registry of China; CKB: the China Kadoorie Biobank; MIR: mortality-to-incidence ratio; HI: health insurance; DSPs: disease surveillance points system death registries; PY: person years.

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What's new?

This study provides additional cancer statistics of China based on a large national prospective cohort-the China Kadoorie Biobank (CKB). The results indicate that the cancer burden of China for populations aged 35-74 years was probably underestimated. Moreover, we also found significant differences for incidence, mortality and profile of cancer in urban and rural areas of China, suggesting the value of different cancer control strategies for urban and rural areas in the future.

Abstract

The National Central Cancer Registry of China (NCCR) was the only available source of cancer monitoring in China, even though only about 70% of cancer registration sites were qualified by now. In this study, based on a national large prospective cohort-the China Kadoorie Biobank (CKB), we aimed to provide additional cancer statistics and compare the difference of cancer burden between urban and rural areas of China. A total of 497,693 cancer-free participants aged 35-74 years were recruited and successfully followed up from 2004 to 2013 in 5 urban and 5 rural areas across China. Except for traditional registration systems, the national health insurance system and active follow-up were used to determine new cancer incidents and related deaths. The mortality-to-incidence ratio (MIR) was used to compare the differences of cancer burden between urban and rural areas of China. We found that cancer mortality coincided well between our cohort and NCCR, while the incidence was much higher in our cohort. Based on CKB, we found the MIR of all cancers was 0.54 in rural areas, which was approximately one-third higher than that in urban areas with 0.39. Cancer profiles in urban areas were transiting to Western distributions, which were characterized with high incidences of breast cancer and colorectal cancer; while cancers of the esophagus, liver, and cervix uteri were still common in rural areas of China. Our results provide additional cancer statistics of China and demonstrate the differences of cancer burden between urban and rural areas of China.

Introduction

Over the past few decades, China has experienced a remarkable economic growth accompanied by an epidemiological and demographic transition.[1, 2] Cancer has become the leading cause of death in urban China and the second most common cause of death in rural China.[3] Even though substantial progress has been made regarding prevention and treatment options for certain cancers in recent years, the cancer burden has been increasing due to the ageing population, increased environmental pollution, uncontrolled chronic infection and increased exposure to risk factors, such as smoking, obesity, dietary patterns, and physical inactivity.[4, 5] With urbanization and industrialization, the wealth gap has grown and lifestyles have become more diverse, which has conferred different risk exposures and disease profiles for urban and rural areas of China.

Accurate and valid information on cancer incidence and mortality is indispensable for cancer prevention and control. Population-based cancer registries have provided cancer statistics since the 1960s in developed European countries[6] and since the 1970s in the United States[7]. However, the development of a standard cancer registration practice has been slow in China until the National Central Cancer Registry (NCCR) was established in 2002. Since then, the coverage and quality of cancer registration have experienced a noticeable improvement, and the annual report on cancer in China has been available since 2008.[8-12] Although the number of registration sites has increased rapidly from 56 in 2008 (covering 82 million people) to 261 in 2012 (covering 239 million people), only approximately 70% (66.2%-75.6%)

of the registration sites were qualified and included in the final analysis by the NCCR, despite a series of quality reviews were performed.[8-12]

The nationwide prospective cohort-China Kadoorie Biobank (CKB), which covered 0.5 million people aged 30-79, was launched from 2004 to 2008 in ten geographically diverse areas (5 urban areas and 5 rural areas) across China.[13, 14] Through linkage with local health insurance (HI) system, the local disease surveillance points system death registries (DSPs), chronic disease registries, residential records, and active visits to local communities or direct contact with participants, disease and survival status were followed up to Dec 31, 2013 successfully for almost all of the participants. In this study, we will evaluate the incidence and mortality of cancers in the CKB cohort, and compare the differences of cancer burden between urban and rural areas comprehensively. Results from this study will be an important supplement to the cancer statistics of China.

Methods

Study design and participants

Detailed information about the CKB design and procedures has been described elsewhere.[13] In brief, the socioeconomic levels, risk factor patterns, and disease patterns from ten geographically defined regions (Qingdao, Harbin, Haikou, Suzhou, and Liuzhou in urban areas; and Pengzhou, Tianshui, Huixian, Tongxiang, and Liuyang in rural areas) were chosen from the DSPs[15] and included in the CKB cohort between June 2004 and July 2008.[13-14] The distinguishing of rural and urban was mainly based on local residential records (registered residence). Further information about the cohort can be found in our website (http://www.ckbiobank.org/site/). Within each region, 100-150 administrative units (either rural villages or urban residential committees) were identified through official residential records, and potentially eligible participants were informed through invitation letters (with study information leaflets) that were delivered door-to-door by local community leaders or health workers.

Demographic and socio-economic statuses, self-reported medical history, reproductive history (for women) and lifestyle characteristics (e.g., smoking, alcohol drinking, diet, and physical activities) were collected by trained staff who administered the laptop-based questionnaires. A physical examination, including height, weight, bio-impedance, waist and hip circumferences, blood pressure, heart rate, and lung function, was carried out by trained health workers with validated instruments. As described in our previous study[13], several methods were performed to control the quality of our study, such as involving ~5% of randomly chosen participants for the re-survey after the completion of baseline survey in 10 study regions. As a result, a total of 500,223 individuals aged 35-74 years and another 12,668 just outside this age range participated, gave written informed consent, and consented to follow-up. This study was approved by the ethical review committee of the Chinese Center for Disease Control and Prevention (Beijing, China) and the Oxford Tropical Research Ethics Committee, University of Oxford (UK).

Procedures

Participants were followed up to determine cancer incidence mainly through the linkage with the national health insurance (HI) system, which recorded details of all hospitalized events, examinations, and treatment procedures. Almost all of the participants had been successfully linked to the HI databases in 2013. And the proportions of successful linkage to HI databases were similar for participants from urban and rural areas. Linkage to local health insurance database was renewed annually. Additional data collected from the established chronic disease registries in the study areas were also used in our cohort. Cause-specific mortality was monitored through the DSP death registries and annually supplemented with local residential records[13]. The HI system was also used for death monitoring (yielding few additional cases). For the few deaths (<5%) without any recent medical attention, standardized procedures were used to determine probable causes from symptoms or signs described by informants (usually family members). There was about 3.8% (654/17088) of primary unknown tumors in our cohort and these cases were classified as ‘other tumors’ in this study.

Illness and death were coded using the International Classification of Diseases, Tenth Revision (ICD-10) codes by trained staffs that were blinded to the baseline information. Losses to follow-up in this study refer to participants whose permanent registered residence moved out of the study area, those who could not be contacted after at least three reasonable efforts within one year, or those who could be contacted but their new residence was out of the jurisdiction of the regional coordinating center.[16] In the present study, only participants aged 35-74 and who were free from tumors at baseline were included in our analysis. Among the 500,223 participants aged 35-74 years, we excluded 2,529 individuals with cancer at baseline and only 1 person for whom an implausible censoring date was recorded and loss to follow-up. Finally, a total of 497,693 participants, including 204,230 males (88,537 from urban areas and 115,693 from rural areas) and 293 463 females (130,749 from urban areas and 162,714 from rural areas), were retained for further analysis.

Statistical analysis

Cancer incidence and mortality rates were presented as per 100,000 person years (PY) in this study. We measured person years from baseline (2004-2008) to the date of cancer diagnosis (for cancer incidence) or death, loss to follow-up or December 31, 2013 (for cancer mortality), depending on whichever occurred first. The crude incidence and mortality rates were standardized by age, sex, and region (urban/rural) using the population composition of those aged 35-74 years from the 2010 Chinese census population. Cancer incidence rates, mortality rates and constituent ratios of the top five cancers from our cohort were also compared with those derived from the 2008-2012 Annual Report by the NCCR [8-12]. The mortality-to-incidence ratio (MIR), which has been proven to be an effective indicator of disparities in cancer screening, treatment, and survival, was also calculated to compare the difference of cancer burden between urban and rural areas.[17-19] The median-cubic-spline, which calculates cross medians and then fits a cubic spline, was used to fit the incidence trend among different age groups for female-specific cancers.[20] All of the statistical analyses were performed with Stata (version 12.0) and R (version 3.2.1).

Results

Incidence and mortality of overall cancers in CKB

Incidence

A total of 17,088 new cancer cases were diagnosed before 31 December 2013. The crude incidence rate of all cancers was 483.7 per 100,000 PY (594.4 in males and 408.2 in females) (**Table 1**). After standardization by age, sex, and region, the incidence rate was 452.7 per 100,000 PY for populations aged 35-74 years. When stratified by region, the incidence rates were almost similar for urban areas and rural areas (467.8 vs. 446.5 per 100,000 PY) (**Table 1**).

Cancer incidence increased in concert with age. The incidence rates of cancer were higher among females than males for populations aged 35-44 years, after which a more rapid increase was observed among males; among populations older than 50 years old, the cancer incidence rates were always higher in males; this switch occurred between 45 and 50 years old (**Figure 1A**). The pattern was similar in both urban and rural areas, although the age of switch was slightly younger in rural areas than that in urban areas.

Mortality

There were 8,052 participants died of cancer in our cohort. The crude mortality rate was 225.9 per 100,000 PY (336.4 in males and 150.5 in females). After standardization by age, sex, and region, the mortality rate was 225.1 per 100,000 PY. Compared with urban areas, the standardized mortality rates were much higher in rural areas (241.2 *vs* 183.5 per 100,000 PY), and this was consistent both among males (317.1 *vs* 242.8 per 100,000 PY) and females (162.7 *vs* 122.1 per 100,000 PY)

(**Table 2**).

Cancer mortality rates increased slowly from 35 to 50 years old, after which the rates increased in a more rapid manner. The age-specific mortality analysis also showed that the mortality rates of all age groups were always higher in rural areas than those in urban areas, and this was consistent among both males and females (**Figure 1B**).

Incidence and mortality rates for major cancers in CKB

Cancer incidence for the major cancers

Lung cancer (including trachea cancer) was the most frequently diagnosed cancer among males, followed by stomach, esophageal, liver, and colorectal cancers, which accounted for 70.4% of all male cancer cases (**Figure 2A)**. Among females, breast cancer was the most common cancer and accounted for 15.7% of all incident cancers alone. The following incident cancers were cancers of the lung (including trachea), colon-rectum, cervix uteri, and stomach, which accounted for another 37.0% of all cancer cases among women (**Figure 2B**).

In urban areas, the cancers of the female breast, lung (including the trachea), colon-rectum, stomach, liver, cervix uteri, esophagus, ovary, lip-oral cavity and pharynx, and endometrium were the ten most commonly diagnosed cancers (in descending order); while in rural areas, the corresponding order was lung cancer (including the trachea), esophageal cancer, stomach cancer, liver cancer, female breast cancer, colorectal cancer, cervix uteri cancer, pancreatic cancer, leukemia, and lip-oral cavity and pharynx cancers (**Supplementary Table 1**).The most commonly diagnosed cancer in urban areas, i.e., female breast cancer, was only the fifth most common in rural areas, with an incidence rate 1.5 times higher in urban areas (94.7 per 100,000 PY) than that in rural areas (38.3 per 100,000 PY) (**Figure 2B**). Similarly, the incidence rate of colorectal cancer was 50% higher in urban areas (54.6 per 100,000 PY) compared with that in rural areas (35.6 per 100,000 PY), and this was consistent among both sexes (**Figure 2A-B**). In contrast, esophageal cancer, which was the second most frequently diagnosed cancer in rural areas, ranked only seventh in urban areas. The incidence rate of esophageal cancer was more than three times higher in rural areas (61.3 per 100,000 PY) compared with that in urban areas (15.0 per 100,000 PY) (**Supplementary Table 1**). This pattern was also observed for liver cancer and cervix uteri cancer, which also showed higher incidence rates in rural areas (**Figure 2A-B**).

Cancer mortality for the major cancers

The leading causes of cancer death among both males and females were cancers of the lung (including the trachea), liver, stomach, esophagus, and colon-rectum (**Figure 3**). In urban areas, the top ten deadly causes were lung cancer (including the trachea), liver cancer, stomach cancer, colorectal cancer, esophageal cancer, female breast cancer, pancreatic cancer, ovarian cancer, leukemia, and prostate cancer (in descending order); while in rural areas, the corresponding order was lung cancer (including the trachea), liver cancer, esophageal cancer, stomach cancer, colorectal cancer, pancreatic cancer, cervix uteri cancer, female breast cancer, leukemia, and lymphoma (**Supplementary Table 2**). Although the incidence rates of female breast cancer and colorectal cancer were higher in urban areas, the mortality rates were almost similar (**Figure 3B**). In contrast, the mortality rates of liver cancer, esophageal cancer, and cervix uteri cancer, consistent with the trend in incidence rates, were still remarkably higher in rural areas than those in urban areas (**Figure 3A-B**).

Comparison between CKB and NCCR

To evaluate the reliability of our study, we compared our results with the average incidence and mortality rates derived from the 2008-2012 Annual Report by the NCCR. We found the standardized cancer mortality rates were almost equal between our data and NCCR (225.1 *vs* 229.3 per 100,000 PY) for populations aged 35-74, while the cancer incidences were much higher in our data (452.7 *vs* 387.6 per 100,000 PY) (**Supplementary Table 3-4**). Moreover, in the age-specific analysis, we found the mortality curves generated from our data almost perfectly coincided with those from the NCCR**,** while cancer incidence curves from the two resources were almost parallel and with an obvious upward offset in our data (**Supplementary Figure 1-2**). For different age groups, the difference of incidence ranged from 45.6 to 88.7 per 100,000 PY. The pattern was consistent among both sexes.

We also compared the constituent ratios of top five cancers in our study and those derived from the 2008-2012 Annual Report of NCCR. As shown in **Supplementary Table 5**, the top five most frequently diagnosed cancers accounted for about 56.9% of new cancer cases in CKB cohort and the ratio was 59.8% in NCCR, and the site-specific constituent ratios from the two resources were also similar. The top five leading causes of cancer death accounted for 71.1% of cancer death in CKB, and the ratio was 71.5% in NCCR. Site-specific constituent ratios of cancer death from the two resources were also comparable (**Supplementary Table 6**). Sex-specific analysis showed the similar pattern.

Difference of MIRs in urban and rural areas in CKB

The MIR of all cancers in rural areas was 0.54, which was about one-third higher than that in urban areas with 0.39. Compared with those in urban areas, the MIRs of the top ten common cancers, except for esophageal cancer, were consistently higher in rural areas (**Table 3**). This was especially obvious for female breast cancer, stomach cancer, colorectal cancer, and cervical cancer, which all showed at least a 20% increase in rural areas (**Table 3**).

Bimodal age distribution of female-specific cancers

The median-cubic-spline was used to fit the incidence trend among different age groups for female-specific cancers. As expected, we observed a bimodal age distribution for breast cancer, cervix uteri cancer, and ovarian cancer (**Supplementary Figure 3**).[21-23] A stratified analysis showed that the peaks of breast cancer incidence in urban areas were more than twice the height as those in rural areas (**Supplementary Figure 4**). We also observed a distinct pattern for cervix uteri cancer in urban and rural areas; the incidence rate of the early onset peak was similar between urban and rural areas, while in rural areas, the late-onset peak was about twice the height as that in urban areas (**Supplementary Figure 4**).

Discussion

In this study, we performed a comprehensive analysis of the cancer statistics in a nationwide prospective cohort of China. The data shown was collected from June 2004 to December 2013; therefore, the incidence and mortality of cancers in this study only represented the epidemiological fact sheets for populations aged 35-74 during the past decade. Unlike NCCR, which relied on passive report from different sources, we actively searched new cancer incidents and deaths in the populations of our cohort. Through linkage to the HI system, different registry systems and active follow-up, almost all of the participants in our cohort were tracked successfully at December 2013. For the cause-specific mortality monitoring, few additional cases were detected from the HI system. As a result, we found the age-specific mortality curves generated from our cohort almost perfectly coincided with those from the NCCR, while the cancer incidence curves from our cohort showed an obvious parallel upward offset. This indicates that even though with less sites and inferior representativeness compared to NCCR, results from our cohort were still reliable owing to its large sample size. Moreover, results from our study also suggested that the cancer incidence rates in China were probably underestimated for populations aged 30-74 years by the population-based cancer registry systems.

We observed that the standardized incidence rates of all cancers were almost comparable between urban and rural areas, while the standardized mortality rates were relatively higher in rural areas. MIR is a ratio of the death and incidence figures registered in the same period of time for a specific cancer. It is a proxy measurement for survival rates of specific cancer sites, which also reflect cancer-specific screening and prevention, treatment, and survival dynamics. Studies also showed MIR was significantly associated with the human development index and world health system ranking[18, 24]. In this study, the MIR is 0.39 in urban and 0.54 in rural, which are much less than those from NCCR (0.60-0.70) [8-12]. We think the most important reasons is that the cancer mortality is almost equal between our data and those from NCCR, while the cancer incidence is much higher in our results due to active follow-up and low false negative rate. Moreover, we should notice that the participants in this study are aged 35-74, which might diverge from the entire population. At last, the sample size of this study is relative small compared to population-based cancer registry, and some age group is not sufficient especially for rare cancer incidence and mortality. We can observe that the MIR of all cancers in rural areas was more than one-third higher than that in urban areas, and this was almost consistent for the top ten common cancers. The exact reason underlying the discordance was still unclear, which probably due to the difference of lifestyle, social economy condition, environmental factors as well as the opportunity of medical services for screening and treatment of cancer [25, 26]. The majority of the tertiary hospitals, which had the ability to provide clinical care for cancer patients, were located in urban areas, limiting the opportunity for people living in rural areas to obtain appropriate cancer care. Moreover, the high cost also reduced the likelihood of most rural patients to seek medical advice from such hospitals.[27]

The cancer profiles in urban areas of China were transiting to Western distributions, which were characterized by higher incidence rates of breast cancer and colorectal cancer. Westernized lifestyle behaviors, including tobacco and harmful alcohol use, unhealthy diet, overweight and obesity, and physical inactivity, are likely to be the most important risk factors for these tumors[28, 29]. Unlike western cancer profiles, it is needed to point out that tumors in digestive system (e.g. stomach cancer, liver cancer, and esophageal cancer), which has been prevalent in China for several decades, remain at high incidence rate in urban China. The similar pattern was also observed in the recent annual report of NCCR [8-12]. Cancers in digestive system and cervix uteri are more commonly diagnosed in rural areas of China according to our database. The major risk factors that contributing to the difference are still poorly understood by now. However, less availability of running water, poor nutritional status, a low socioeconomic status, insufficient intake of fruits and vegetables, a habit of drinking beverages at high temperatures, a chronic hepatitis B virus infection, a high-risk human papillomavirus infection, and a lower likelihood of having a Papanicolaou (Pap) test are thought to be involved in the development of these cancers.[30] Besides, we also need to be aware of that the cancer profiles in rural China might be changed along with rural urbanization and lifestyle changes in the coming years. Even though the patterns of malignancies were different in urban and rural areas of China, the overall incidence of tumor were similar in urban and rural areas for male and female (**Figure 1**), and a semblable pattern was observed in the recent annual reports of NCCR [9,11,12](**Supplementary Figure 5**).

We also observed a bimodal age distribution of incidence for female-specific cancers in both urban and rural areas. Unexpectedly, we found the late-onset peak for cervix uteri cancer in rural areas was about twice the height of that in urban areas. This was perplexing but probably reflected the effect of the cervical screening project that had been gradually spread in urban areas because the project detected precancerous lesions. The majority of receivers was aged 30-49 and had urban health insurance, while women in rural areas, especially those at an older age, were less likely to have the cervical screening.[31]

Compared to previous cancer statistics of China, the most strengths of our study is that we active search new cancer indicates and related deaths through different systems. We successfully tracked almost all of the participants in our cohort at the end of 2013, thus we were less likely to leave out new cancer incidents compared to previous cancer monitoring, which based on passive report by the staffs in different systems. Based on 72 local population-based cancer registries, the NCCR estimated the cancer statistics of 2015 in China[32]. However, we should notice that both the sites of our cohort and the 72 cancer registration sites in NCCR were distributed unevenly in China. Taking into account of the huge difference between western and eastern, southern and northern of China, the representativeness of our study needed to be further discussed in the future.

Even though a part of the registration sites were unqualified in NCCR, the absolute number and the percentage of coverage of national population increased steadily in accordance with the number of population-based cancer registry sites from 2008 to 2012.[8-12] Based on the increasing data, the NCCR can provided more detail information about cancer statistics of China, especially for rare cancers and long term trends in China. Whereas, our cohort can only provide summary statistics for a period spanning several years due to the small number of new cancer cases in each year. We hope our findings can be regarded as a supplement to the data from NCCR, and help understand the cancer burden of China in a different way.

In summary, based on the national prospective cohort CKB, we found the burden of cancer was still huge in China, and the cancer incidence rates were probably underestimated by the population-based cancer registry system. Cancers which are prevalent in developing countries (e.g., esophageal, liver, gastric and cervical cancer) remain common in China, whereas those related to westernized lifestyles (e.g., breast, and colorectal cancer) are rapidly increasing in urban China. In our cohort, urban areas had a similar cancer incidence compared with rural areas, but showed remarkably lower mortality for populations aged 35-74 years. These results indicate that the profiles and burden of cancer were quite different in urban and rural areas of China, and different cancer control strategies should be taken into account in the future.

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Conflict of interest statement

The authors have no conflicts of interest to declare.

Legends to figures

Figure 1. Age-specific incidence (A) and mortality (B) trends in urban and rural areas in CKB.

Figure 2. The age-standardized incidence rates of the top ten tumor sites in males (A) and females (B) in CKB.

Figure 3. The age-standardized mortality rates of the top ten tumor sites in males (A) and females (B) in CKB.

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Tables

Table 1 The incidence rates of cancer in CKB

Area	Gender	No. of subjects	No. of cases	No. of person years	Incidence (1/10^5)	Stand-incidence (1/10^5)*
All	Both	497,693	17,088	3532,858.7	483.7	452.7
	Male	204,230	8,513	1432,127.7	594.4	517.2
	Female	293,463	8,575	2100,731.1	408.2	387.3
Urban	Both	219,286	7,931	1531,684.0	517.8	467.8
	Male	88,537	3,714	612,336.4	606.5	510.5
	Female	130,749	4,217	919,347.7	458.7	423.6
Rural	Both	278,407	9,157	2001,174.7	457.6	446.5
	Male	115,693	4,799	819,791.3	585.4	517.0
	Female	162,714	4,358	1181,383.4	368.9	373.4

* Stand-incidence: Standardized incidence; the incidence rates were standardized by age, sex and region based on the 2010 Chinese census population.

Table 2 The mortality rates of cancer in CKB

Area	Gender	No. of subjects	No. of death	No. of person years	Mortality rate (1/10^5)	Stand-mortality (1/10^5)*
All	Both	497,693	8,052	3,564,464.7	225.9	225.1
	Male	204,230	4,863	1,445,440.6	336.4	298.0
	Female	293,463	3,189	2,119,024.2	150.5	150.4
Urban	Both	219,286	3,156	1,547,529.1	203.9	183.5
	Male	88,537	1,845	618,700.0	298.2	242.8
	Female	130,749	1,311	928,829.1	141.2	122.1
Rural	Both	278,407	4,896	2,016,935.6	242.7	241.2
	Male	115,693	3,018	826,740.6	365.1	317.1
	Female	162,714	1,878	1,190,195.1	157.8	162.7

* Stand-mortality: Standardized mortality; the mortality rates were standardized by age, sex and region based on the 2010 Chinese census population.

Table 3 The MIR of the top ten cancers in CKB

Rank	Site	Both			Urban			Rural		
		Incidence (1/10^5)*	Mortality (1/10^5)†	MIR	Incidence (1/10^5)*	Mortality (1/10^5)†	MIR	Incidence (1/10^5)*	Mortality (1/10^5)†	MIR
1	Lung (including trachea)	79.1	50.7	0.64	82.6	49.5	0.60	77.9	51.2	0.66
2	Female breast	55.0	7.1	0.13	94.7	8.1	0.09	38.3	6.7	0.18
3	Stomach	52.3	31.3	0.60	51.7	24.1	0.47	52.6	33.9	0.64
4	Esophagus	48.6	30.0	0.62	15.0	9.3	0.62	61.3	37.7	0.62
5	Liver	46.4	35.0	0.75	37.4	24.6	0.66	50.1	39.2	0.78
6	Colon-rectum	40.8	14.1	0.35	54.6	14.7	0.27	35.6	13.9	0.39
7	Cervix uteri	29.7	6.2	0.21	22.5	3.0	0.13	32.3	7.4	0.23
8	Pancreas	10.9	8.4	0.78	10.6	7.8	0.74	11.0	8.7	0.79
9	Lip-oral cavity and pharynx	10.1	3.5	0.34	12.4	2.7	0.21	9.1	3.8	0.41
10	Leukemia	9.9	4.7	0.47	8.9	3.8	0.42	10.3	5.0	0.49
	Overall	452.7	225.1	0.50	467.8	183.5	0.39	446.5	241.2	0.54

* The incidence rates were standardized by age, sex and region based on the 2010 Chinese census population;

† The mortality rates were standardized by age, sex and region based on the 2010 Chinese census population;