Original Article

Cancer Incidence and Mortality in China, 2007

Wan-qing Chen*, Hong-mei Zeng, Rong-shou Zheng, Si-wei Zhang, Jie He

National Office for Cancer Prevention and Control/National Central Cancer Registry, Cancer Institute, Chinese Academy of Medical Sciences, Beijing 100021, China

DOI: 10.1007/s11670-012-0001-6

ABSTRACT

Objective: Cancer incidence and mortality data collected from population-based cancer registries were analyzed to present the overall cancer statistics in Chinese registration areas by age, sex and geographic area in 2007.

Methods: In 2010, 48 cancer registries reported cancer incidence and mortality data of 2007 to National Central Cancer Registry of China. Of them, 38 registries' data met the national criteria. Incidence and mortality were calculated by cancer sites, age, gender, and area. Age-standardized rates were described by China and World population.

Results: The crude incidence rate for all cancers was 276.16/100,000 (305.22/100,000 for male and 246.46/100,000 for female; 284.71/100,000 in urban and 251.07/100,000 in rural). Age-standardized incidence rates by China and World population were 145.39/100,000 and 189.46/100,000 respectively. The crude mortality rate for all cancers was 177.09/100,000 (219.15/100,000 for male and 134.10/100,000 for female; 173.55/100,000 in urban and 187.49/100,000 in rural). Age-standardized mortality rates by China and World population were 86.06/100,000 and 116.46/100,000, respectively. The top 10 most frequently common cancer sites were the lung, stomach, colon and rectum, liver, breast, esophagus, pancreas, bladder, brain and lymphoma, accounting for 76.12% of the total cancer cases. The top 10 causes of cancer death were cancers of the lung, liver, stomach, esophagus, colon and rectum, pancreas, breast, leukemia, brain and lymphoma, accounting for 84.37% of the total cancer deaths.

Conclusion: Cancer remains a major disease threatening people's health in China. Prevention and control should be enhanced, especially for the main cancers.

Key words: Cancer registry; Incidence; Mortality; China

INTRODUCTION

Cancer has become a major public health issue in China. According to the third National Death Survey, cancer mortality had increased these years, ranking as the second leading cause of death[1]. With increasing cancer burden, Chinese government led to a series of national initiative to address specific cancer issues including cancer surveillance. Systematic cancer surveillance could not only provide the statistics of cancer burden, but also form the basis of cancer prevention and control.

Population-based cancer registries play an important role in collecting and providing accurate cancer statistics, building up the major component of cancer surveillance. The first population-based cancer registry in China was established more than 50 years ago. But the covering population of cancer registries around China was very limited in the 20th century[2, 3]. National Office for Cancer Prevention and Control was built up as a federal bureau fighting against cancer. And it published the first manual of national cancer registration in 1982. In 2002, National Central Cancer Registry (NCCR) was established by the Health Ministry of China to enhance systematic management of cancer surveillance. Since then, NCCR has enhanced the management of cancer registries all over the country. NCCR currently provides national cancer statistics, enabling a thorough definition of the cancer burden, which is a necessary process before addressing it. In 2010, the number of cancer registries which reported cancer statistics of 2007 to NCCR had increased to 48, and the quality of the cancer statistics

Received 2011–10–19; **Accepted** 2011–12–10

*Corresponding author.
E-mail: chenwq@cicams.ac.cn

had improved.

Based on the increasing demand of cancer information for effective cancer prevention and control, NCCR published the annual cancer report of China to provide the latest statistics from registration areas[4]. In the present study, we pooled the qualified cancer data from population-based cancer registries and calculated the cancer incidence and mortality rates in 2007. Although the representativeness of the data in a national level might be considered, it remained the only source of information available on the profile of cancer in China. Our data also covered the largest population reflecting the most recent estimate of cancer burden in China.

MATERIALS AND METHODS

Data Source

NCCR of China was responsible for the collection, evaluation and publication of the cancer statistics from population-based cancer registries. In 2010, 48 cancer registries from 19 provinces reported cancer registration data of 2007 to NCCR. Of them, 20 registries were located in urban areas and 28 were located in rural areas. All data of incidence and mortality were reported to population-based cancer registries from hospitals, community health centers or other departments, including centers of township medical insurance and the New-type Rural Cooperative Medical System. The death record database was compared with cancer registration database to identify cancer deaths and supplement missing cases. Demographic information was provided by local statistics bureaus.

Quality Control

For data quality, the proportion of morphological verification (MV%), percentage of cancer cases identified with death certification only (DCO%) and mortality to incidence ratio (M/I) were used to evaluate the completeness, validity and reliability of the cancer statistics. Based on "Guideline of Chinese Cancer Registration" and the standard of data inclusion in "Cancer Incidence in Five Continents Volume IX"[5], we used software including MS-Excel and IARC-crgTools issued by the International Agency for Research on Cancer/the International Association of Cancer Registries (IARC/IACR) for data check and evaluation[6, 7].

Of 48 cancer registries' data, 38 met the data quality criteria and were pooled into the national data for annual report. The population covered by the 38 cancer registries was 59,809,313, with 44,609,139 in urban and 15,200,174 in rural, 30,228,938 for males and 29,580,375 for females. The MV%, DCO%, and M/I ratio for the national pooled data were 65.83%, 1.95% and 0.64, respectively. The three indicators in cancer registries of urban areas were 67.71%, 2.28%, and 0.61, whereas in cancer registries of rural areas, they were 59.57%, 0.83% and 0.75, respectively.

Statistical Analysis

International Classification of Diseases (ICD)-10 and ICD-O-3 were used for the coding of the cancers. Crude incidence and mortality rates were prepared for different types of cancer, by sex, area and for 19 age groups (0–, 1–4, 5–9, ⋯ 80–84, 85+ years). Age-standardized rates were calculated using the Chinese population (1982) and World Segi's population. The cumulative risk of developing or dying from cancer before 75 years old is calculated and presented as a percentage.

RESULTS

The number of overall new cancer cases reported from qualified cancer registries of China was 165,171, including 92,266 for males and 72,905 for females. The number of overall cancer deaths was 105,916, including 66,248 for males and 39,668 for females. The detailed information for the number of new cases and cancer deaths in each cancer registry is shown in Table 1.

The crude incidence rate for all cancers in registration areas was 276.16/100,000 in 2007 (305.22/100,000 for males and 246.46/100,000 for females). The age-standardized rates by China and World population were 145.39/100,000 and 189.46/100,000, respectively. Among the patients aged 0–74 years, the cumulative incidence rate was 21.68%. The crude cancer incidence rate in urban areas was 284.71/100,000 and it was higher than that in rural areas (251.07/100,000). After age standardization, the incidence rate in urban was lower than that in rural (Table 2).

Lung cancer was the most common cancer with crude rate of 51.25/100,000, followed by stomach cancer, colorectal cancer, liver cancer and breast cancer. The top ten most common cancers accounted for 76.12% of all registered new cases. Lung cancer in males and breast cancer in females were the most frequently diagnosed cancers (Table 3). Cancer atlas also showed difference between urban and rural areas. The incidence rates of lung cancer and colorectal cancer were higher in urban than those in rural. However, the incidence rates of stomach cancer, liver cancer and esophageal cancer were higher in rural than those in urban (Table 4).

Table 1. Population, number of new cancer cases and deaths in cancer registries in 2007

Registry	Urban=1 Rural=2	Population			New cancer cases			Cancer deaths		
		Both	Male	Female	Both	Male	Female	Both	Male	Female
Beijing	1	7,385,826	3,734,516	3,651,310	20,736	10,806	9,930	11,778	6,909	4,869
Shexian	2	391,398	203,473	187,925	1,090	644	446	850	559	291
Cixian	2	624,084	317,671	306,413	1,886	1,120	766	1,369	891	478
Yangcheng	2	385,450	193,981	191,469	1,245	732	513	851	475	376
Shenyang	1	3,473,371	1,722,554	1,750,817	9,774	5,083	4,691	6,524	3,889	2,635
Dalian	1	2,195,949	1,103,964	1,091,985	7,843	4,235	3,608	4,412	2,790	1,622
Anshan	1	1,462,456	729,979	732,477	4,235	2,232	2,003	2,446	1,483	963
Benxi	1	959,458	478,918	480,540	2,361	1,324	1,037	1,463	949	514
Haerbin-daoli	1	698,335	341,526	356,809	1,912	1,035	877	1,334	816	518
Haerbin-nangang	1	1,047,989	526,483	521,506	2,428	1,292	1,136	1,908	1,187	721
Shanghai	1	6,152,360	3,088,243	3,064,117	23,031	12,052	10,979	14,239	8,327	5,912
Suzhou	1	2,099,527	1,051,450	1,048,077	6,203	3,675	2,528	3,731	2,368	1,363
Qidong	2	1,121,411	553,060	568,351	3,674	2,254	1,420	2,628	1,733	895
Haimen	2	1,022,168	467,280	554,888	3,493	2,122	1,371	2,548	1,656	892
Lianyungang	1	715,569	364,010	351,559	1,576	879	697	961	597	364
Guanyun	2	1,090,978	566,033	524,945	2,175	1,313	862	1,393	889	504
Huai'an-Chuzhou	1	1,207,776	622,836	584,940	2,627	1,613	1,014	1,856	1,174	682
Jinhu	2	358,484	182,398	176,086	985	601	384	623	368	255
Jianhu	2	804,287	415,466	388,821	2,077	1,335	742	1,713	1,128	585
Dafeng	2	727,386	364,338	363,048	1,932	1,149	783	1,602	997	605
Yangzhong	2	273,860	135,369	138,491	1,046	554	492	869	551	318
Taixing	2	1,277,353	639,990	637,363	2,692	1,761	931	2,365	1,570	795
Hangzhou	1	6,679,363	3,386,559	3,292,804	15,036	8,339	6,697	11,155	7,261	3,894
Jiaxing	1	500,978	250,332	250,646	1,468	810	658	825	539	286
Jiashan	2	381,010	189,650	191,360	1,231	718	513	847	551	296
Haining	2	647,418	320,492	326,926	1,320	768	552	1,023	639	384
Ma'anshan	1	621,077	318,515	302,562	1,175	739	436	923	641	282
Changle	2	664,983	350,444	314,539	1,170	751	419	894	628	266
Linqu	2	795,780	405,525	390,255	1,463	929	534	1,215	811	404
Feicheng	2	733,988	379,076	354,912	2,020	1,232	788	1,461	937	524
Linzhou	2	1,018,942	520,744	498,198	2,154	1,203	951	1,541	927	614
Wuhan	1	4,737,505	2,450,144	2,287,361	12,051	6,667	5,384	6,544	4,228	2,316
Guangzhou	1	3,886,593	1,981,494	1,905,099	12,981	7,185	5,796	6,175	3,897	2,278
Sihui	2	409,413	211,778	197,635	680	444	236	457	318	139
Zhongshan	2	1,437,026	717,977	719,049	3,041	1,823	1,218	2,038	1,349	689
Fusui	2	430,726	228,613	202,113	598	449	149	502	386	116
Chongqing-Jiulongpo	1	785,007	399,829	385,178	1,571	987	584	1,143	759	384
Yanting	2	604,029	314,228	289,801	2,191	1,411	780	1,710	1,071	639
Total		59,809,313	30,228,938	29,580,375	165,171	92,266	72,905	10,5916	66,248	39,668

Table 2. Cancer incidence by sex and area in registration areas in 2007

Area	Sex	New cases	Incidence rate ($1/10^5$)	CASR* ($1/10^5$)	WASR† ($1/10^5$)	Cumulative rate (0–74, %)
All areas	Both	165,171	276.16	145.39	189.46	21.68
	Male	92,266	305.22	164.39	218.21	25.14
	Female	72,905	246.46	128.67	164.65	18.46
Urban	Both	127,008	284.71	143.18	185.89	20.94
	Male	68,953	305.76	155.95	206.90	23.45
	Female	58,055	263.20	132.55	168.60	18.65
Rural	Both	38,163	251.07	155.57	204.10	24.47
	Male	23,313	303.65	195.89	259.47	31.25
	Female	14,850	197.41	118.20	153.60	17.94

*Age: standardized incidence rate (China population); †Age: standardized incidence rate (World population).

Table 5 shows the age-specific incidence rates for all cancers by sex and area. The cancer incidence was relatively low in subjects before 30 years old. And the rate was dramatically increasing for patients after 30

years old, reaching the peak in those of 80–84 years old (Table 5, Figure 1). Stratified by sex and area, subjects in the age group of 80–84 had highest age-specific rates, both for males and for females, in urban and in rural.

The crude mortality in cancer registration areas was 177.09/100,000. And the age-standardized rates by Chinese population and World population were 86.06/100,000 and 116.46/100,000, respectively. Rural areas had higher cancer mortality of 187.49/100,000 than urban areas (173.55/100,000), though the incidence in rural was lower than that in urban. After age standardization, the mortality rate in rural was still higher than that in urban (Table 6).

Lung cancer was the leading cause of cancer death in cancer registration areas both for men and for women with crude rates of 60.83/100,000 and 29.83/100,000, respectively. Other cancer types with high mortality in men were liver cancer, stomach cancer, esophageal cancer and colorectal cancer. In women, stomach cancer was the second cause of cancer death, followed by liver cancer, colorectal cancer and esophageal cancer (Table 7). Stratified by demographic area, lung cancer was the leading cause of cancer death in urban areas with crude mortality of 65.71/100,000 in men and 33.05/100,000 in women. However, in rural areas, the mortality rates of gastric cancer were highest both for males (50.47/100,000) and for females (24.86/100,000) (Table 8).

For overall age-specific cancer mortality, the cancer mortality rate in age group of 0–4 was higher than that in patients of 5–24 years old. And the age-specific mortality showed a significant increasing trend after 25 years old. A peak appeared in the age group of 80–84 years with a rate of 1,568.80/100,000 (Table 9, Figure 2). Stratified by sex and area, the trends generally showed similarity both in males and in females, in urban areas and in rural areas.

Table 3. Top 10 cancer incidence rates in cancer registration areas in 2007

Rank	Cancer sites	Incidence rate ($1/10^5$)	%	CASR ($1/10^5$)
Both sexes				
1	Lung (C33–34)	51.25	18.56	24.82
2	Stomach (C16)	33.68	12.19	17.06
3	Colon an rectum (C18–21)	29.62	10.73	14.76
4	Liver (C22)	27.11	9.82	14.36
5	Breast (C50)	21.59	7.82	12.05
6	Esophagus (C15)	19.86	7.19	10.14
7	Pancreas (C25)	7.28	2.64	3.49
8	Bladder (C67)	6.98	2.53	3.27
9	Brain (C70–72)	6.79	2.46	4.30
10	Lymphoma (C81–85, 88, 90, 96)	6.06	2.19	3.57
	Top 10	210.22	76.12	107.82
Male				
1	Lung (C33–34)	67.93	22.26	34.62
2	Stomach (C16)	45.36	14.86	24.04
3	Liver (C22)	40.01	13.11	22.10
4	Colon and rectum (C18–21)	32.50	10.65	16.90
5	Esophagus (C15)	26.85	8.80	14.39
6	Bladder (C67)	10.53	3.45	5.21
7	Prostate (C61)	9.80	3.21	4.39
8	Pancreas (C25)	7.95	2.60	4.05
9	Kidney (C64–66, 68)	7.35	2.41	4.09
10	Lymphoma	6.95	2.28	4.17
	Top 10	255.23	83.62	133.96
Female				
1	Breast (C50)	43.19	17.53	23.87
2	Lung (C33–34)	34.20	13.88	15.73
3	Colon and rectum (C18–21)	26.68	10.82	12.80
4	Stomach (C16)	21.74	8.82	10.46
5	Liver (C22)	13.92	5.65	6.73
6	Esophagus (C15)	12.72	5.16	6.05
7	Cervix (C53)	11.64	4.72	6.85
8	Uterus (C54–55)	8.70	3.53	4.84
9	Ovary (C56)	8.57	3.48	5.00
10	Thyroid gland (C73)	8.38	3.40	5.42
	Top 10	189.74	76.98	97.76

Table 4. Cancer incidence rate for major cancers in urban and rural areas in 2007

Rank	Male			Rank	Female		
	Sites	Incidence rate ($1/10^5$)	CASR ($1/10^5$)		Sites	Incidence rate ($1/10^5$)	CASR ($1/10^5$)
Urban							
1	Lung	72.82	34.86	1	Breast	51.24	27.14
2	Stomach	37.92	18.80	2	Lung	37.78	16.43
3	Colon and rectum	37.84	18.59	3	Colon and rectum	31.34	14.27
4	Liver	35.03	18.37	4	Stomach	18.42	8.42
5	Esophagus	17.33	8.63	5	Liver	12.26	5.64
6	Bladder	12.29	5.72	6	Cervix	11.75	6.78
7	Prostate	12.10	5.06	7	Thyroid	10.16	6.45
8	Kidney	9.20	4.90	8	Ovary	10.13	5.70
9	Pancreas	8.57	4.12	9	Uterus	9.60	5.09
10	Lymphoma	7.75	4.52	10	Brain	7.80	4.67
Rural							
1	Stomach	67.20	42.98	1	Stomach	31.57	18.20
2	Esophagus	54.80	35.17	2	Esophagus	31.49	17.97
3	Liver	54.65	35.31	3	Lung	23.70	13.26
4	Lung	53.56	33.60	4	Breast	19.61	12.60
5	Colon, rectum	16.80	10.73	5	Liver	18.78	10.74
6	Pancreas	6.12	3.80	6	Colon and rectum	13.00	7.47
7	Nasopharynx	6.08	4.09	7	Cervix	11.31	7.35
8	Bladder	5.35	3.30	8	Uterus	6.05	3.92
9	Brain	5.21	3.67	9	Brain	5.14	3.55
10	Lymphoma	4.98	4.19	10	Pancreas	4.35	2.31

Table 5. Age-specific incidence rate in cancer registration areas in 2007 ($1/10^5$)

Age group (year)	All areas			Urban			Rural		
	Both	Male	Female	Both	Male	Female	Both	Male	Female
All	276.16	305.22	246.46	284.71	305.76	263.20	251.07	303.65	197.41
0–	15.26	16.78	13.56	20.66	22.32	18.83	6.01	7.49	4.31
1–	13.12	15.20	10.79	16.45	19.38	13.23	7.21	7.94	6.36
5–	8.17	7.27	9.17	10.98	9.88	12.21	3.33	2.84	3.88
10–	7.51	7.78	7.23	9.22	8.91	9.54	4.67	5.90	3.32
15–	11.96	12.65	11.24	12.83	13.20	12.45	9.72	11.27	8.05
20–	14.75	12.75	16.91	15.62	13.13	18.36	11.51	11.28	11.75
25–	27.56	22.62	32.70	30.69	23.84	37.92	18.69	19.07	18.30
30–	47.09	36.04	58.27	52.74	37.01	68.73	33.75	33.75	33.76
35–	86.61	67.64	105.80	87.34	61.92	113.15	84.42	85.08	83.76
40–	163.37	136.34	191.51	159.35	122.49	198.03	177.34	185.38	169.18
45–	239.03	219.23	259.58	246.84	214.79	280.38	211.81	235.02	188.38
50–	400.27	414.07	386.17	388.05	382.06	394.14	447.55	536.64	354.97
55–	534.21	602.42	465.11	495.83	540.72	450.60	672.67	822.10	518.14
60–	683.65	833.05	537.59	629.66	748.78	515.74	858.41	1,093.45	611.68
65–	861.78	1,069.85	665.90	832.68	1,003.07	674.77	958.47	1,284.01	635.44
70–	1,237.35	1,570.61	932.69	1,199.57	1,490.65	930.31	1,395.42	1,916.22	942.36
75–	1,533.70	2,031.99	1,100.74	1,541.73	1,998.94	1,131.25	1,501.15	2,178.80	985.98
80–	1,623.46	2,232.65	1,163.89	1,652.19	2,250.86	1,182.39	1,512.54	2,153.90	1,098.00
85–	1,385.23	2,057.86	991.46	1,436.73	2,113.29	1,024.33	1,184.28	1,811.44	872.11

DISCUSSION

In the present study, we provided the overall cancer incidence and mortality rates of 2007 in Chinese registration areas, based on 38 population-based cancer registries' data. The crude incidence and mortality rates for all cancers in registration areas were 276.16/100,000 and 77.09/100,000, respectively. The incidence was higher in urban than that in rural, in males than in females, whereas the mortality was higher in rural than in urban, in males than in females.

Lung cancer, stomach cancer, colorectal cancer, liver cancer, breast cancer and esophageal cancer remained the most frequently diagnosed cancers of

Table 6. Cancer mortality in cancer registration areas in 2007

Area	Sex	Deaths	Mortality rate ($1/10^5$)	CASR ($1/10^5$)	WASR ($1/10^5$)	Cumulative rate (0–74, %)
All areas	Both	105,916	177.09	86.06	116.46	13.06
	Male	66,248	219.15	112.74	153.52	17.05
	Female	39,668	134.10	61.16	82.73	9.23
Urban	Both	77,417	173.55	78.78	107.05	11.73
	Male	47,814	212.02	101.66	139.14	15.06
	Female	29,603	134.21	57.46	77.96	8.55
Rural	Both	28,499	187.49	112.06	149.96	17.85
	Male	18,434	240.10	152.39	204.65	24.18
	Female	10,065	133.80	74.58	100.01	11.72

Table 7. Cancer mortality for major cancers in cancer registration areas in 2007

Cancer sites	Mortality ($1/10^5$)	%	CASR ($1/10^5$)
Both sexes			
Lung	45.50	18.56	24.82
Liver	25.91	34.20	13.88
Stomach	24.59	26.68	10.82
Esophagus	15.80	21.74	8.82
Colon and rectum	14.15	13.92	5.65
Pancreas	7.15	12.72	5.16
Breast	4.67	11.64	4.72
Leukemia	4.04	8.70	3.53
Brain	3.95	8.57	3.48
Lymphoma	3.64	8.38	3.40
Top 10	149.40	189.74	76.98
Male			
Lung	60.83	27.76	30.05
Liver	37.94	17.31	20.62
Stomach	32.51	14.84	16.41
Esophagus	21.58	9.84	11.10
Colon and rectum	15.58	7.11	7.55
Pancreas	7.64	3.49	3.83
Leukemia	4.57	2.08	3.30
Brain	4.39	2.00	2.69
Lymphoma	4.36	1.99	2.38
Bladder	3.76	1.72	1.62
Top 10	193.16	88.14	99.55
Female			
Lung	29.83	22.24	12.87
Stomach	16.49	12.29	7.30
Liver	13.62	10.16	6.28
Colon and rectum	12.69	9.46	5.32
Esophagus	9.90	7.38	4.25
Breast	9.31	6.95	4.61
Pancreas	6.64	4.95	2.87
Gallbladder	3.95	2.95	1.63
Brain	3.50	2.61	2.00
Lymphoma	3.50	2.61	2.29
Top 10	109.43	81.6	49.43

China. Our study presented the most recent cancer statistics of China, providing the basic information for cancer prevention and control.

Compared to the cancer incidence and mortality in 2006, we found that the prevalence of cancer in China was relatively stable[8]. The crude incidence and mortality rates were a little higher than those in 2006. But after age standardization, the incidence and mortality rates showed small decrease, suggesting aging population was a major cause of increasing cancer burden. As reflected from the age-specific incidence and mortality rates, age was observed to be associated with increased risk of developing cancer. It is expected that the cancer burden would be heavier in the next few years for the country with aging population[9].

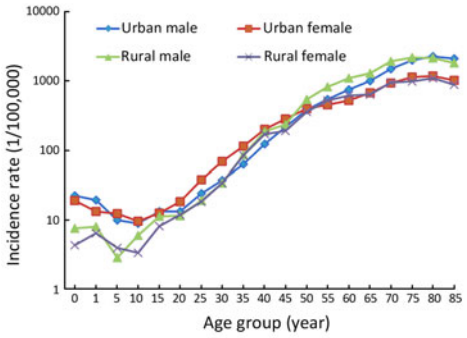

Figure 1. Age-specific cancer incidence rates in urban and rural areas, 2007.

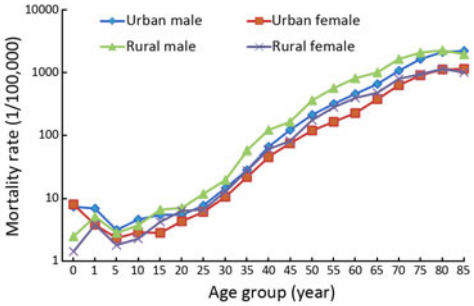

Figure 2. Age-specific cancer mortality rates in urban and rural areas, 2007.

Table 8. Cancer mortality for major cancers in urban and rural areas in 2007

Rank	Male			Rank	Female		
	Sites	Mortality ($1/10^5$)	CASR ($1/10^5$)		Sites	Mortality ($1/10^5$)	CASR ($1/10^5$)
Urban							
1	Lung	65.71	30.31	1	Lung	33.05	13.35
2	Liver	33.92	17.33	2	Colon and rectum	14.29	5.64
3	Stomach	26.40	12.20	3	Stomach	13.63	5.64
4	Colon and rectum	17.63	7.98	4	Liver	12.55	5.38
5	Esophagus	13.99	6.62	5	Breast	10.35	4.85
6	Pancreas	8.45	3.99	6	Pancreas	7.55	3.09
7	Lymphoma	4.85	2.50	7	Esophagus	5.09	1.92
8	Leukemia	4.58	3.16	8	Gallbladder	4.52	1.74
9	Prostate	4.35	1.67	9	Ovary	3.93	1.88
10	Brain	4.31	2.61	10	Leukemia	3.69	2.30
Rural							
1	Stomach	50.47	31.75	1	Stomach	50.47	31.75
2	liver	49.74	32.13	2	liver	49.74	32.13
3	Lung	46.51	28.86	3	Lung	46.51	28.86
4	Esophagus	43.87	27.55	4	Esophagus	43.87	27.55
5	Colon and rectum	9.57	5.89	5	Colon and rectum	9.57	5.89
6	Pancreas	5.29	3.25	6	Pancreas	5.29	3.25
7	brain	4.64	3.14	7	brain	4.64	3.14
8	Leukemia	4.55	3.71	8	Leukemia	4.55	3.71
9	Nasopharynx	3.66	2.43	9	Nasopharynx	3.66	2.43
10	Lymphoma	2.92	1.94	10	Lymphoma	2.92	1.94

Table 9. Age-specific mortality in cancer registration areas in 2007 ($1/10^5$)

Age group	All areas			Urban			Rural		
(year)	Both	Male	Female	Both	Male	Female	Both	Male	Female
All	177.09	219.15	134.10	173.55	212.02	134.21	187.49	240.1	133.80
0–	5.66	5.59	5.74	7.79	7.44	8.19	2.00	2.50	1.44
1–	5.20	6.37	3.89	5.55	7.05	3.89	4.59	5.19	3.89
5–-	2.64	3.07	2.17	2.81	3.21	2.36	2.36	2.84	1.83
10–	3.55	4.32	2.72	3.83	4.64	2.95	3.08	3.78	2.32
15–	4.60	5.85	3.27	4.24	5.53	2.88	5.52	6.67	4.28
20–	5.42	5.91	4.88	5.04	5.59	4.42	6.84	7.16	6.51
25–	7.66	8.91	6.35	7.08	7.88	6.23	9.30	11.92	6.68
30–	14.04	16.5	11.55	12.93	14.96	10.87	16.66	20.16	13.16
35–	30.03	36.05	23.94	25.57	28.64	22.46	43.50	58.64	28.37
40–	63.85	77.78	49.34	55.95	65.46	45.97	91.34	121.38	60.88
45–	104.78	131.94	76.59	99.19	122.27	75.03	124.28	166.24	81.91
50–	188.82	244.54	131.94	167.71	214.08	120.57	270.56	361.15	176.43
55–	284.79	377.93	190.44	244.67	323.23	165.54	429.48	572.66	281.43
60–	404.44	544.59	267.43	339.66	455.90	228.5	614.15	818.67	399.47
65–	567.06	745.37	399.20	514.51	663.03	376.87	741.63	1,009.44	475.88
70–	924.12	1,200.65	671.33	856.69	1,091.81	639.19	1,206.27	1,671.03	801.97
75–	1,306.11	1,745.32	924.48	1,272.03	1,668.75	915.85	1,444.33	2,085.46	956.92
80–	1,568.80	2,147.47	1,132.25	1,564.79	2,119.77	1,129.27	1,584.29	2,267.27	1,142.84
85–	1,521.07	2,191.42	1,128.64	1,572.24	2,245.41	1,161.89	1,321.42	1,951.32	1,007.89

We found that the profile of cancer incidence and mortality in urban areas was different from that in rural areas. Such disparities would reflect regional differences in the prevalence and distribution of major risk factors, detection practices and availability of treatment services. In urban areas, the prevalence of lung cancer, colorectal cancer and female breast cancer has increased quickly these years. The westernization of lifestyle and air pollution may explain part of the change of cancer spectrum. The cancers related to infections such as stomach cancer, cervical cancer and liver cancer remained leading causes of cancer deaths

in rural areas of China. Programs of early diagnosis and treatment on these cancers are ongoing in many cancer epidemic areas of China, aiming to control the prevalence of the diseases. The mortality rate of cancer in rural was higher than that in urban area. In rural areas, cancers tend to be diagnosed at later stages and patients have reduced access to appropriate therapeutics.

Cigarette smoking is a major cause of lung cancer, esophageal cancer, bladder cancer, and oral cancer, accounting for 45% of cancer deaths in men and 21.5% of cancer deaths in women[10]. Smoking is also a cause of many other serious conditions including diseases of the lung and heart. China has the world's largest smoking population with an estimated number of 350,000,000 smokers[11]. Reducing smoking is a declared government priority. In the United States, the mortality of overall cancers has decreased due to effective tobacco control and programs of cancer early diagnosis and treatment[12]. Chinese government should take more effective actions for nationwide tobacco control.

A limitation of the study is the lower proportion of MV%, as compared to many developed countries' registration data. However, cancer data in Chinese settings are shown to be reasonably reliable and relatively stable these years. And the population coverage for the cancer registries is much larger than 20 years ago. In 2008, Ministry of Health in China started a nationwide program of Chinese cancer registry and follow-up. A total of 193 local registries were funded by the government in 2010, covering about 13% of the whole population. It is expected that the cancer statistics of China would be more accurate and representative in the future.

Overall, in China, the cancer incidence and mortality of 2007 were still very high. The cancer burden would continue to increase due to aging population. Effective intervention is imperative for cancer prevention and control.

Acknowledgment

The cooperation of 48 population-based cancer registries in providing cancer statistics is gratefully acknowledged. The authors assume full responsibility for analyses and interpretation of these data.

REFERENCES

1. Ministry of Health. National death survey report 2004–2005. Beijing: Peking Union Medical College Publication House; 2008.
2. Lu FZ, Zhang SW, Chen YH, et al. Investigation analysis of cancer registration in China. Zhong Guo Zhong Liu (in Chinese) 2004; 13:134–41.
3. Chen WQ, Zhao P, Rao KQ. A primary cancer registration system in China, 2010. Zhong Hua Yu Fang Yi Xue Za Zhi (in Chinese) 2010; 44:374–5.
4. National Office for Cancer Prevention and Control. China cancer annual report 2010. Beijing: Military Medical Sciences Press; 2011.
5. Curado MP, Edwards B, Shin HR, et al. Cancer Incidence in Five Continents, Vol. IX. In: IARC Scientific Publications No. 160. Lyon: IARC Press; 2007.
6. Parkin DM, Chen VW, Ferlay J, et al. Comparability and quality control in cancer registration. IARC Technical Report No.19, Lyon: IARC Press; 1994.
7. Felay J, Burkhard C, Whelan S, et al. Check and conversion programs for cancer registries. IARC Technical Report No.42. Lyon: IARC Press; 2005.
8. Chen WQ, Zhang SW, Zou XN, et al. Cancer incidence and mortality in China, 2006. Chin J Cancer Res 2011; 23:3–9.
9. Chen WQ, Zheng RS, Zeng HM. Bayesian age-period-cohort prediction of lung cancer incidence in China. Thoracic Cancer 2011; 2:149–55.
10. Shopland DR, Eyre HJ, Pechacek TF. Smoking-attributable cancer mortality in 1991: is lung cancer now the leading cause of death among smokers in the United States? J Natl Cancer Inst 1991; 83:1142–8.
11. Ma GS, Kong LZ. The national nutrition and health survey in China, 2002: Behavior and Lifestyle. Beijing: People's Medical Publishing House; 2006.
12. Cole P, Rodu B. Declining cancer mortality in the United States. Cancer 1996; 78:2045–8.