Original Article

Report of Incidence and Mortality in China Cancer Registries, 2008

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10.1007/s11670-012-0171-2

ABSTRACT

Objective: Annual cancer incidence and mortality in 2008 were provided by National Central Cancer Registry in China, which data were collected from population-based cancer registries in 2011.

Methods: There were 56 registries submitted their data in 2008. After checking and evaluating the data quality, total 41 registries' data were accepted and pooled for analysis. Incidence and mortality rates by area (urban or rural areas) were assessed, as well as the age- and sex-specific rates, age-standardized rates, proportions and cumulative rate.

Results: The coverage population of the 41 registries was 66,138,784 with 52,158,495 in urban areas and 13,980,289 in rural areas. There were 197,833 new cancer cases and 122,136 deaths in cancer with mortality to incidence ratio of 0.62. The morphological verified rate was 69.33%, and 2.23% of cases were identified by death certificate only. The crude cancer incidence rate in all areas was 299.12/100,000 (330.16/100,000 in male and 267.56/100,000 in female) and the age-standardized incidence rates by Chinese standard population (ASIRC) and world standard population (ASIRW) were 148.75/100,000 and 194.99/100,000, respectively. The cumulative incidence rate (0–74 years old) was of 22.27%. The crude incidence rate in urban areas was higher than that in rural areas. However, after adjusted by age, the incidence rate in urban was lower than that in rural. The crude cancer mortality was 184.67/100,000 (228.14/100,000 in male and 140.48/100,000 in female), and the age-standardized mortality rates by Chinese standard population (ASMRC) and by world population were 84.36/100,000 and 114.32/100,000, respectively. The cumulative mortality rate (0–74 years old) was of 12.89%. Age-adjusted mortality rates in urban areas were lower than that in rural areas. The most common cancer sites were lung, stomach, colon-rectum, liver, esophagus, pancreas, brain, lymphoma, breast and cervix which accounted for 75% of all cancer incidence. Lung cancer was the leading cause of cancer death, followed by gastric cancer, liver cancer, esophageal cancer, colorectal cancer and pancreas cancer, which accounted for 80% of all cancer deaths. The cancer spectrum varied by areas and sex in rural areas, cancers from digestive system were more common, such as esophageal cancer, gastric cancer and liver cancer, while incidence rates of lung cancer and colorectal cancer were much higher in urban areas. In addition, breast cancer was the most common cancer in urban women followed by liver cancer, gastric cancer and colorectal cancer.

Conclusion: Lung cancer, gastric cancer, colorectal cancer, liver cancer, esophageal cancer and female breast cancer contributed to the increased incidence of cancer, which should be paid more attention to in further national cancer prevention and control program. Different cancer control strategies should be carried out due to the varied cancer spectrum in different groups.

Key words: Cancer registry; Incidence; Mortality; Epidemiology, China

INTRODUCTION

Population-based cancer registries collect the data on cancer new cases and deaths from covered population to describe and surveille the cancer incidence, mortality and survival. The data from cancer registration can not only be utilized for plan, implement and evaluation on cancer prevention and control but also for scientific research. Since 2006 when Disease Prevention and Control Bureau, Ministry of Health of China started to publish cancer data annually, National Central Cancer Registry (NCCR) of China has been responsible for collecting data from all local registries, calculating the statistical items accurately, analyzing the data of cancer incident cases and deaths from registration areas, and then released the updated cancer statistics in annual cancer report. All the information

Received 2011–05–02; **Accepted** 2012–06–22
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has been very useful in scientific researches, clinical trials and decision of cancer prevention and control strategies.

MATERIALS AND METHODS

Data Source

There were 56 cancer registries from 19 provinces submitted cancer registration data in 2008, 8 registries more than last year. For total 56 registries, 38 registries were from local Centers for Disease Control and Prevention and 18 were from cancer institutes; 26 registries were located in urban areas and 30 were located in rural areas.

The coverage population of all 56 registries was 82,433,497 (41,621,780 men and 40,811,717 women), which accounted for 6.21% of whole national population by the end of 2008. The total cancer incident cases were 227,555 (127,765 for male and 99,790 for female) and deaths were 139,240 (87,349 for male and 51,891 for female), respectively.

Quality Control

Proportion of morphological verification (MV%), percentage of cancer cases identified with death certification only (DCO%), mortality to incidence ratio (M/I), percentage of uncertified cancer (UB%) and percentage of cancer with undefined or unknown primary site (secondary) (O&U%) were used to evaluate the completeness, validity and reliability of cancer statistics. According to NCCR acceptable criterion, the MV% should be higher than 66%, DCO% less than 15% and MI between 0.6 and 0.8.

The one of advantages of cancer registration data was timely report of cancer. However, for the completeness, validity and reliability of cancer statistics, the time gap between data updating and analyzing might exist[1]. NCCR ruled that every registry should upload the cancer registry data of 2008 before July 15th 2011, which was 30 months after cancer diagnosis.

Statistical Analysis

The quality of data was assessed based on "Guideline of Chinese Cancer Registration"[2] and referred to the criteria for "Cancer Incidence in Five Continents Volume IX"[3] by The International Agency for Research on Cancer (IARC)/The International Agency for Cancer Registry (IACR)[4-6]. Once the cancer registration data met the criteria of quality on completeness, comparability and validity, it would be accepted for final analysis.

Crude incidence and mortality rates in both rural and urban areas were calculated stratified by cancer type, sex, areas (urban or rural) and age-group (0, 1−4, 5−9, ⋯, 80−84, 85 years old and above), age-standardized to the 1982 Chinese population and world Segi's population. IARC-crgTools issued by IARC/IACR[4-6] were used for data check and evaluation[7].

RESULTS

Data Pooling and Quality Evaluation

In 2008, 41 cancer registries' data, including 19 from urban areas and 22 from rural areas, met the criteria for data quality and then were pooled for national annual report. The population covered by the 41 cancer registries was 66,138,784 (33,340,597 in male and 32,798,187 in female), with 52,158,495 in urban (78.86%) and 13,980,289 in rural (21.14%). The total new cancer cases and deaths were 197,833 and 122,136, respectively. Detailed information in each cancer registry is shown in Table 1.

The MV%, DCO%, and M/I ratio for the national pooled data was 69.33%, 2.23% and 0.62, respectively. The MV%, DCO%, and M/I ratio in cancer registries of urban areas were 70.53%, 2.49% and 0.59, respectively, whereas in rural areas, that were 64.22%, 1.12% and 0.73. The quality for each cancer registry in both urban and rural areas is presented in Table 2.

Main Results Of Cancer (ICD10: C00−C97) In China Registries, 2008

Incidence Rate Of All Cancers In Registration Areas

The crude incidence rate of all cancers in registration areas was 299.12/100,000 in 2008 (330.16/100,000 in males and 267.56/100,000 in females). The age-standardized incidence rate was 148.75/100,000 and 194.99/100,000 by China (ASIRC) and World population (ASIRW), respectively. Among the patients aged 0–74 years, the cumulative incidence rate was 22.27%. The crude cancer incidence rate for both males and females in urban areas was higher than that in rural areas. While, the age-standardized rates and cumulative incidence rate in urban areas were lower than that in rural areas for all and males. But for females, the age-standardized rates and cumulative incidence rate were higher in urban than in rural areas (Table 3).

Age-Specific Incidence Rate in Cancer Registration Areas

Table 4 shows the age-specific incidence rates for all cancer sites by sex and region. Cancer incidence was relatively lower before 39 years old, then increased dramatically after 40 years old and finally peaked after 85 years old (Table 4, Figure 1). The pattern was similar between urban and rural areas. However, the incidence peaked in the age group of 80 years and then decreased after 85 years in rural area, while kept increased and peaked after 85 years old in urban areas.

Comparing the age-specific incidence rate between urban and rural areas, we found that, in males, the

cancer incidence before 39 years and after 80 years was higher in urban areas than that in rural areas, but lower in the age-group of 40- 79 years. However, in females, the incidence before 49 years and after 70 years was higher in urban than that in rural areas, while that was opposite in the age group of 50–69 years (Table 4, Figure 1).

Mortality in Cancer Registration Areas

The crude mortality in cancer registration areas was 184.67/100,000 (228.14/100,000 in male and 140.48/100,000 in female). The age-standardized rates by Chinese population and World population were 84.36/100,000 and 114.32/100,000, respectively. The cumulative mortality (0–74 years) rate was 12.89%. Rural areas had higher cancer mortality of 196.34/100,000 than that of urban areas (181.54/100,000), 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 5).

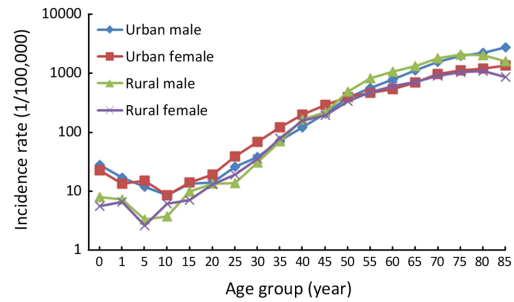

Figure 1. Age-specific cancer incidence rates in urban and rural areas, 2008

Table 1. Distribution for total population, new case and death number in each registry in 2008

ID	Cancer registry	Category 1: urban 2: rural	Population			New cancer cases			Cancer deaths		
			Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
1	Beijing	1	7,513,532	3,796,097	3,717,435	22,536	11,504	11,032	13,097	7,617	5,480
2	Shexian	2	393,068	204,175	188,893	1,269	801	468	936	616	320
3	Cixian	2	629,362	320,489	308,873	1,839	1,091	748	1,300	807	493
4	Yangcheng	2	382,667	193,237	189,430	1,227	673	554	810	471	339
5	Shenyang	1	3,486,819	1,724,993	1,761,826	10,779	5,582	5,197	6,791	4,033	2,758
6	Dalian	1	2,286,743	1,145,030	1,141,713	8,964	4,642	4,322	4,684	2,906	1,778
7	Anshan	1	1,474,115	734,861	739,254	4,670	2,434	2,236	2,666	1,601	1,065
8	Benxi	1	958,034	477,602	480,432	2,422	1,295	1,127	1,516	937	579
9	Dandong	1	754,604	373,054	381,550	2,313	1,253	1,060	1,488	889	599
10	Harbin-Daoli	1	703,798	343,577	360,221	1,623	873	750	870	503	367
11	Harbin-Nangang	1	1,037,786	519,913	517,873	2,113	1,104	1,009	1,689	994	695
12	Shanghai	1	6,167,941	3,087,207	3,080,734	24,320	12,726	11,594	15,880	9,344	6,536
13	Suzhou	1	6,287,735	3,105,480	3,182,255	20,737	12,222	8,515	12,030	7,748	4,282
14	Qidong	2	1,116,272	550,234	566,038	3,754	2,317	1,437	2,802	1,827	975
15	Haimen	2	1,019,352	465,991	553,361	3,486	2,036	1,450	2,584	1,689	895
16	Lianyungang	1	808,784	412,365	396,419	1,791	1,007	784	1,143	688	455
17	Huai'an-Chuzhou	1	1,187,430	612,067	575,363	2,524	1,522	1,002	1,744	1,119	625
18	Jinhu	2	363,983	183,173	180,810	878	532	346	600	377	223
19	Sheyang	2	964,852	493,646	471,206	2,659	1,569	1,090	2,071	1,303	768
20	Jianhu	2	805,234	410,247	394,987	2,164	1,367	797	1,683	1,075	608
21	Dafeng	2	724,502	363,491	361,011	1,967	1,148	819	1,685	1,029	656
22	Yangzhong	2	273,434	135,115	138,319	1,061	556	505	850	506	344
23	Taixing	2	1,197,000	650,429	546,571	2,470	1,661	809	2,092	1,393	699
24	Hangzhou	1	6,737,379	3,408,365	3,329,014	19,657	10,987	8,670	11,484	7,401	4,083
25	Jiaxing	1	505,149	252,057	253,092	1,641	889	752	875	542	333
26	Jiashan	2	381,688	189,660	192,028	1,378	794	584	917	591	326
27	Haining	2	652,028	322,373	329,655	1,325	737	588	966	600	366
28	Ma'anshan	1	627,561	321,347	306,214	1,647	1,024	623	1,105	751	354
29	Tongling	1	411,795	211,367	200,428	926	555	371	694	473	221
30	Changle	2	670,256	352,984	317,272	1,494	898	596	825	562	263
31	Linqu	2	802,520	409,307	393,213	1,715	1,034	681	1,244	806	438
32	Feicheng	2	734,828	358,310	376,518	2,337	1,427	910	1,455	989	466
33	Linzhou	2	1,022,559	522,617	499,942	2,422	1,463	959	1,564	921	643
34	Wuhan	1	4,833,008	2,493,854	2,339,154	12,464	6,858	5,606	6,753	4,301	2,452
35	Guangzhou	1	3,926,921	1,997,570	1,929,351	13,298	7,191	6,107	6,319	3,982	2,337
36	Sihui	2	410,893	210,919	199,974	773	493	280	435	301	134
37	Zhongshan	1	1,457,901	728,359	729,542	3,050	1,805	1,245	2,048	1,372	676
38	Fusui	2	438,342	232,800	205,542	641	451	190	526	397	129
39	Yanting	2	607,497	314,950	292,547	2,280	1,462	818	1,805	1,150	655
40	Gejiu	2	389,952	196,206	193,746	548	330	218	299	216	83
41	Wuwei-Liangzhou	1	991,460	515,079	476,381	2,671	1,764	907	1,811	1,235	576
	Total		66,138,784	33,340,597	32,798,187	197,833	110,077	87,756	122,136	76,062	46,074

Table 2. Quality evaluation for China cancer registers in 2008

	All areas			Urban			Rural		
	MV%	DCO%	M/I	MV%	DCO%	M/I	MV%	DCO%	M/I
Oral and pharyngeal	84.54	1.33	0.45	83.74	1.52	0.44	90.38	0.00	0.58
Nasopharynx	75.09	1.62	0.56	74.83	1.93	0.56	76.44	0.00	0.60
Esophagus	78.63	1.95	0.78	73.50	2.26	0.78	83.91	1.63	0.77
Stomach	80.67	2.03	0.70	78.79	2.61	0.68	84.85	0.75	0.74
Colon-rectum	81.83	1.44	0.47	81.25	1.59	0.46	86.70	0.18	0.55
Liver	31.35	4.05	0.92	36.49	5.06	0.92	17.91	1.42	0.91
Gallbladder	50.97	3.20	0.76	52.08	3.37	0.75	41.67	1.72	0.79
Pancreas	41.53	4.78	0.88	43.24	5.34	0.88	31.71	1.54	0.93
Throat	81.61	2.17	0.55	82.79	2.31	0.54	73.46	1.23	0.65
Lung	50.84	3.45	0.84	54.37	3.87	0.84	32.96	1.34	0.84
Other organs in chest	60.97	2.72	0.54	63.61	2.84	0.52	35.48	1.61	0.69
Bone	56.70	4.33	0.76	58.63	5.04	0.68	50.00	1.87	1.03
Skin melanoma	93.02	0.84	0.59	92.83	0.65	0.64	94.12	1.96	0.33
Breast	91.92	0.44	0.22	92.03	0.46	0.21	90.86	0.27	0.31
Cervix	91.53	0.65	0.24	91.38	0.73	0.22	92.08	0.35	0.31
uterus	88.22	1.12	0.29	88.30	1.24	0.27	87.66	0.26	0.46
Ovary	82.64	0.82	0.42	82.57	0.92	0.42	83.27	0.00	0.43
Prostate	74.64	0.95	0.37	74.85	1.02	0.36	71.71	0.00	0.49
Didymus	87.27	0.91	0.17	86.41	0.97	0.16	100.00	0.00	0.43
Kidney	78.81	1.06	0.31	79.73	1.09	0.30	61.11	0.46	0.42
Bladder	80.24	1.01	0.35	80.65	1.10	0.33	76.61	0.20	0.50
Brain	52.66	3.08	0.57	57.22	3.22	0.53	29.70	2.33	0.78
Thyroid gland	89.33	0.32	0.07	89.32	0.32	0.07	89.50	0.25	0.12
Lymphoma	92.87	0.54	0.55	93.39	0.60	0.53	89.19	0.17	0.69
Leukemia	94.57	1.50	0.69	94.88	1.69	0.67	92.96	0.49	0.79
Other cancers	68.50	2.64	0.53	68.26	2.54	0.53	70.58	3.55	0.57
Total	69.33	2.23	0.62	70.53	2.49	0.59	64.22	1.12	0.73

Table 3. The incidence of cancer (ICD10: C00–C97) register in China in 2008

Areas	Genders	Cancer cases	Crude incidence ($1/10^5$)	ASIRC* ($1/10^5$)	ASIRW** ($1/10^5$)	Cumulative rate 0.74 (%)
All areas	Both	197,833	299.12	148.75	194.99	22.27
	Male	110,077	330.16	167.11	223.68	25.81
	Female	87,756	267.56	132.69	170.43	18.98
Urban	Both	160,146	307.04	148.64	194.52	21.92
	Male	87,237	332.20	162.71	218.04	24.80
	Female	72,909	281.52	136.89	175.18	19.30
Rural	Both	37,687	269.57	151.02	198.33	23.83
	Male	22,840	322.58	186.77	247.55	30.08
	Female	14,847	215.18	117.19	152.34	17.74

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

Age-Specific Mortality Rate in Cancer Registration Areas

Table 6 shows the age-specific mortality rates for all cancers by sex and area. The cancer mortality was relatively lower before 49 years. The rate was dramatically increasing after 50 years, and reached peak after 85 years. The mortality rate was highest in the age-group of 80–84 years in rural areas. The acceleration trend of age-specific mortality was shown in both urban and rural, with dramatical increase after 45 years in male and after 50 years in female, respectively.

In general, the age-specific mortality in urban areas was lowerer than that in rural in most of age-groups. The age-specific mortality in urban was about 20% lower than that in rural in the age-group of 20–79 years. Exception can be observed in the age-group of 10–14 years and after 80 years in which the mortality in urban was higher than that in rural. The mortality fluctuated violently before 20 year-old (Table 6, Figure 2).

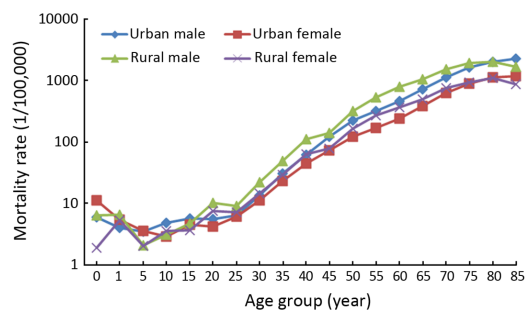

Figure 2. Age-specific cancer mortality rates in urban and rural areas, 2008

Table 4. Age-specific incidence rate for all cancers (ICD10: C00–C97) in cancer registration areas in 2008 ($1/10^5$)

Age	All areas			Urban			Rural		
groups	Both	Male	Female	Both	Male	Female	Both	Male	Female
Total	299.12	330.16	267.56	307.04	332.20	281.52	269.57	322.58	215.18
0–	20.91	23.01	18.54	25.90	28.50	23.03	6.97	8.08	5.67
1–	13.19	14.47	11.75	15.32	17.02	13.46	7.04	7.32	6.70
5–	10.61	9.65	11.68	13.59	12.14	15.20	3.04	3.39	2.64
10–	7.55	7.23	7.90	8.71	8.76	8.66	4.94	3.81	6.18
15–	12.73	12.77	12.69	13.98	13.63	14.35	8.68	10.04	7.20
20–	16.21	14.16	18.40	16.79	14.26	19.52	13.42	13.69	13.15
25–	29.26	23.82	34.90	32.39	26.22	38.81	16.55	14.03	19.14
30–	48.35	36.43	60.43	53.26	38.26	68.46	33.06	30.73	35.41
35–	92.13	72.02	112.35	97.17	72.45	122.02	74.58	70.51	78.69
40–	159.76	130.96	189.34	159.64	122.03	198.25	160.23	164.30	156.04
45–	241.29	212.68	270.96	249.05	210.68	288.97	208.78	221.11	196.15
50–	394.95	404.10	385.57	391.50	386.71	396.41	410.89	483.87	335.09
55–	539.31	607.46	470.76	514.03	558.99	469.07	653.36	822.34	478.50
60–	695.32	844.42	548.53	658.98	786.43	534.82	840.17	1,069.62	604.61
65–	925.51	1,158.75	705.19	904.85	1,119.22	705.03	1,004.85	1,305.66	705.82
70–	1,266.38	1,611.62	953.37	1,253.15	1,571.79	964.18	1,327.36	1,795.38	903.59
75–	1,518.47	1,987.50	1,109.88	1,519.78	1,969.10	1,123.74	1,512.03	2,081.18	1,044.00
80–	1,603.61	2,164.98	1,173.61	1,634.46	2,197.32	1,193.49	1,456.77	1,998.95	1,084.09
85–	1,755.15	2,566.22	1,269.67	1,893.11	2,761.18	1,360.73	1,116.07	1,579.73	868.57

Table 5. Cancer mortality in cancer registration areas in 2008

Areas	Sex	Deaths	Mortality rate ($1/10^5$)	ASIRC ($1/10^5$)	ASIRW ($1/10^5$)	Cumulative rate 0.74 (%)
All areas	Both	122,136	184.67	84.36	114.32	12.89
	Male	76,062	228.14	109.78	149.91	16.88
	Female	46,074	140.48	60.67	81.92	9.08
Urban	Both	94,687	181.54	79.21	107.76	11.92
	Male	58,436	222.53	102.17	140.13	15.47
	Female	36,251	139.97	57.92	78.50	8.56
Rural	Both	27,449	196.34	106.05	141.69	16.98
	Male	17,626	248.94	141.40	190.00	22.74
	Female	9,823	142.36	72.50	96.58	11.35

Table 6. Age-specific mortality in cancer registration areas in 2008 ($1/10^5$)

Age	All areas			Urban			Rural		
groups	Both	Male	Female	Both	Male	Female	Both	Male	Female
Total	184.67	228.14	140.48	181.54	222.53	139.97	196.34	248.94	142.36
0–	7.35	6.08	8.78	8.43	5.94	11.19	4.36	6.47	1.89
1–	5.02	4.66	5.42	4.68	3.98	5.44	6.00	6.55	5.36
5–	3.12	3.12	3.13	3.53	3.53	3.54	2.07	2.09	2.06
10–	3.70	4.26	3.10	3.87	4.79	2.89	3.32	3.08	3.59
15–	4.90	5.44	4.34	5.11	5.66	4.53	4.24	4.74	3.70
20–	5.59	6.32	4.81	4.91	5.54	4.23	8.88	10.21	7.52
25–	6.69	6.99	6.37	6.33	6.48	6.18	8.14	9.11	7.13
30–	13.80	15.57	12.01	12.32	13.47	11.15	18.41	22.12	14.66
35–	29.65	34.64	24.63	26.95	30.52	23.36	39.04	48.97	29.04
40–	60.51	71.97	48.73	53.33	61.63	44.81	87.32	110.58	63.40
45–	99.85	124.84	73.93	97.44	121.03	72.90	109.95	140.92	78.24
50–	185.53	239.74	129.92	173.23	223.03	122.29	242.38	316.42	165.48
55–	270.24	353.26	186.72	241.38	314.49	168.28	400.39	525.14	271.30
60–	394.50	527.86	263.22	348.27	461.23	238.23	578.78	786.54	365.47
65–	592.62	789.46	406.67	547.58	722.75	384.29	765.56	1,037.38	495.35
70–	902.47	1,188.46	643.19	854.84	1,115.64	618.32	1,122.06	1,524.42	757.74
75–	1,256.99	1,668.56	898.45	1,233.20	1,620.73	891.63	1,373.64	1,912.06	930.89
80–	1,508.86	2,022.38	1,115.51	1,519.41	2,028.15	1,120.83	1,458.67	1,992.74	1,091.56
85–	1,511.03	2,152.95	1,126.80	1,588.72	2,245.73	1,185.79	1,151.14	1,683.46	866.99

Table 7. Top 10 cancer incidence rates in cancer registration areas in 2008

Rank	Site	Incidence rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Lung	54.75	18.30	24.98
2	Stomach	37.88	12.66	17.89
3	Colon-rectum	31.39	10.49	14.62
4	Liver	28.17	9.42	13.99
5	Breast	23.82	7.96	12.74
6	Esophagus	20.85	6.97	9.88
7	Pancreas	8.55	2.86	3.83
8	Bladder	7.49	2.50	3.29
9	Lymphoma	7.21	2.41	4.04
10	Brain	7.03	2.35	4.47
	Top 10	227.15	75.94	109.73
Male				
1	Lung	73.12	22.15	35.02
2	Stomach	51.63	15.64	25.41
3	Liver	40.99	12.41	21.30
4	Colon-rectum	33.93	10.28	16.59
5	Esophagus	28.66	8.68	14.26
6	Bladder	11.41	3.46	5.30
7	Prostate	11.00	3.33	4.57
8	Pancreas	9.26	2.81	4.42
9	Lymphoma	8.28	2.51	4.74
10	Kidney	8.01	2.42	4.13
	Top 10	276.29	83.68	135.74
Female				
1	Breast	47.64	17.81	25.26
2	Lung	36.08	13.49	15.66
3	Colon-rectum	28.80	10.76	12.78
4	Stomach	23.91	8.94	10.82
5	Liver	15.14	5.66	6.81
6	Esophagus	12.92	4.83	5.69
7	Cervix	12.24	4.58	6.87
8	Thyroid gland	10.49	3.92	6.55
9	Uterus	9.52	3.56	5.00
10	Ovary	8.50	3.18	4.76
	Top 10	205.26	76.71	100.21

*Age-standardized incidence rate (China population).

Table 8. The 10 most common cancer mortality rates in cancer registration areas in 2008

Rank	Site	Mortality rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Lung	46.07	24.95	20.09
2	Stomach	26.58	14.39	11.83
3	Liver	25.84	13.99	12.61
4	Esophagus	16.24	8.79	7.34
5	Colon-rectum	14.82	8.02	6.18
6	Pancreas	7.56	4.09	3.32
7	Breast	5.23	2.83	2.52
8	Leukemia	3.99	2.16	2.71
9	Brain	3.99	2.16	2.34
10	lymphoma	3.96	2.14	1.96
	Top 10	154.27	83.54	70.88
Male				
1	Lung	62.47	27.38	28.96
2	Liver	37.40	16.39	19.23
3	Stomach	35.76	15.67	16.90
4	Esophagus	22.44	9.84	10.84
5	Colon-rectum	15.64	6.85	6.99
6	Pancreas	8.10	3.55	3.83
7	lymphoma	4.64	2.04	2.36
8	Brain	4.43	1.94	2.66
9	Leukemia	4.39	1.92	2.98
10	Prostate	4.07	1.78	1.50
	Top 10	199.33	87.37	96.24
Female				
1	Lung	29.39	20.93	11.91
2	Stomach	17.25	12.28	7.13
3	Liver	14.08	10.03	6.13
4	Colon-rectum	13.98	9.95	5.44
5	Breast	10.41	7.41	4.90
6	Esophagus	9.94	7.07	4.02
7	Pancreas	7.01	4.99	2.83
8	Gallbladder	4.12	2.93	1.58
9	Leukemia	3.60	2.56	2.44
10	Brain	3.55	2.52	2.03
	Top 10	113.33	80.67	48.41

*Age-standardized mortality rate (China population).

Major Cancer in Cancer Registration Areas 2008

Cancer Incidence Rates For the 10 Most Common Cancers in Cancer Registration Areas, 2008

Lung cancer was the most common cancer in cancer registration areas, followed by stomach cancer, colorectal cancer, liver cancer and breast cancer. The 10 most common cancers accounted for 75.94% of all new cases with 83.68% in male and 76.71% in female, respectively. Lung cancer was the most frequently diagnosed cancers in male followed by stomach cancer, liver cancer, colon-rectum cancer and esophageal cancer in male. And breast cancer was the most frequently diagnosed cancers followed by lung cancer, colon-rectum cancer, stomach cancer and liver cancer in female (Table 7).

Cancer Mortality Rates for the 10 Most Common Cancers in Cancer Registration Areas, 2008

Lung cancer was the leading cause of death in cancer registration areas followed by stomach cancer, liver cancer, esophageal cancer and colon-rectum cancer. The 10 most common cancer of death causes accounted for 83.54% of all cancer death. In male, lung cancer was the leading cause followed by liver cancer, stomach cancer, esophageal cancer and colon-rectum cancer; while in female, lung cancer was still the leading cause followed by stomach cancer, liver cancer, colon-rectum cancer and breast cancer (Table 8).

Incidence of the 10 Most Common Cancer in Urban Areas, 2008

In urban areas, lung cancer was the most frequently diagnosed cancers, followed by colon-rectum cancer, stomach cancer, breast cancer and liver cancer. The 10 most common cancer accounted for 73.91% (82.12% in male and 76.02% in female) of all cancers. The most common sites of cancer were lung, stomach, colon-rectum, liver and esophagus in male, while were breast,

Table 9. The 10 most common cancer incidence rates in urban areas in 2008

Rank	Site	Incidence rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Lung	57.96	18.88	25.44
2	Colon-rectum	35.53	11.57	15.99
3	Stomach	33.12	10.79	14.97
4	Breast	27.37	8.91	14.31
5	Liver	25.84	8.42	12.32
6	Esophagus	13.41	4.37	6.01
7	Pancreas	9.22	3.00	3.98
8	Prostate	8.55	2.78	3.63
9	Lymphoma	8.03	2.62	4.45
10	Kidney	7.91	2.58	3.90
	Top 10	226.94	73.91	105.01
Male				
1	Lung	76.66	23.08	35.28
2	Stomach	44.81	13.49	21.04
3	Colon-rectum	38.57	11.61	18.22
4	Liver	37.81	11.38	18.92
5	Esophagus	19.88	5.98	9.40
6	Bladder	13.07	3.93	5.87
7	Prostate	13.01	3.92	5.19
8	Pancreas	10.10	3.04	4.66
9	Kidney	9.68	2.92	4.87
10	Lymphoma	9.23	2.78	5.23
	Top 10	272.82	82.12	128.67
Female				
1	Breast	54.69	19.43	28.35
2	Lung	38.99	13.85	16.33
3	Colon-rectum	32.45	11.53	13.92
4	Stomach	21.26	7.55	9.31
5	Liver	13.71	4.87	5.87
6	Uterus	12.19	4.33	6.79
7	Thyroid gland	12.11	4.30	7.52
8	Cervix	10.56	3.75	5.40
9	Ovary	9.70	3.45	5.35
10	Pancreas	8.33	2.96	3.34
	Top 10	214.01	76.02	102.19

*Age-standardized incidence rate (China population).

Table 10. The 10 most common cancer mortality rates in urban areas in 2008

Rank	Site	Mortality rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Lung	48.76	26.86	20.33
2	Liver	23.81	13.12	11.08
3	Stomach	22.64	12.47	9.53
4	Colon-rectum	16.44	9.06	6.57
5	Esophagus	10.51	5.79	4.49
6	Pancreas	8.09	4.45	3.43
7	Breast	5.77	3.18	2.67
8	lymphoma	4.24	2.34	2.04
9	Gallbladder	4.23	2.33	1.66
10	Leukemia	4.14	2.28	2.72
	Top 10	148.63	81.87	64.52
Male				
1	Lung	65.62	29.49	29.09
2	Liver	34.41	15.46	16.93
3	Stomach	30.46	13.69	13.62
4	Colon-rectum	17.47	7.85	7.47
5	Esophagus	15.61	7.01	7.15
6	Pancreas	8.68	3.90	3.96
7	lymphoma	4.98	2.24	2.47
8	Bladder	4.69	2.11	1.63
9	Leukemia	4.59	2.06	2.99
10	Brain	4.31	1.94	2.54
	Top 10	190.81	85.75	87.86
Female				
1	Lung	31.66	22.62	12.27
2	Colon-rectum	15.39	11.00	5.76
3	Stomach	14.71	10.51	5.76
4	Liver	13.07	9.34	5.37
5	Breast	11.48	8.20	5.20
6	Pancreas	7.49	5.35	2.92
7	Esophagus	5.35	3.82	1.97
8	Gallbladder	4.65	3.32	1.71
9	Ovary	4.03	2.88	1.89
10	Leukemia	3.68	2.63	2.46
	Top 10	111.51	79.66	45.30

*Age-standardized mortality rate (China population).

lung, colon-rectum, stomach and liver in female (Table 9).

Mortality of the 10 Most Common Cancer in Urban Areas, 2008

Lung cancer was the leading cause of cancer death in urban registration areas for both men and women. The top 10 cancers accounted for 81.87% (85.75% for male and 79.66% for female) of all mortality induced by malignant tumors. Other cancer types with high mortality in men were liver cancer, stomach cancer, colorectal cancer and esophageal cancer. In women, colorectal cancer was the second cause of cancer death, followed by stomach cancer, liver cancer and breast cancer (Table 10).

Incidence of the 10 Most Common Cancer in Rural Areas, 2008

Table 11 shows the 10 most common cancer incidence rate in rural areas. Stomach cancer was the most frequently diagnosed cancers, followed by esophagus cancer, lung cancer, liver cancer and colorectal cancer. The 10 most common cancers accounted for 86.24% (92.27% in male and 83.89% in female) of all registered new cases. The most common sites of cancer were stomach, esophagus, lung, liver and colon-rectum in male, while were esophagus, stomach, lung, breast and liver cancer in female.

Mortality of the 10 Most Common Cancer in Rural Areas, 2008

Stomach cancer was the leading cause of cancer death in rural registration areas for both men and women. The 10 most common cancers of death accounted for 89.92% (93.11% in male and 87.03% in female) of all cancer mortality. The other cancer types with high mortality were lung cancer, liver cancer, esophageal cancer and colorectal cancer in male, and

Table 11. The 10 most common cancer incidence rates in rural areas 2008

Rank	Site	Incidence rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Stomach	55.66	20.65	30.46
2	Esophagus	48.60	18.03	26.51
3	Lung	42.80	15.88	22.96
4	Liver	36.87	13.68	20.98
5	Colon-rectum	15.92	5.91	8.70
6	Pancreas	10.56	3.92	6.27
7	Brain	6.14	2.28	3.67
8	Leukemia	6.02	2.23	3.15
9	Breast	5.51	2.05	3.61
10	Lymphoma	4.37	1.62	3.45
	Top 10	232.47	86.24	129.77
Male				
1	Stomach	76.95	23.85	43.97
2	Lung	61.23	18.98	34.99
3	Liver	59.97	18.59	33.77
4	Esophagus	52.78	16.36	31.13
5	Colon-rectum	16.74	5.19	9.59
6	Pancreas	6.17	1.91	3.40
7	Brain	5.92	1.83	4.02
8	Leukemia	5.28	1.64	2.86
9	Lymphoma	4.73	1.47	2.94
10	Bladder	4.65	1.44	3.55
	Top 10	294.41	91.27	170.23
Female				
1	Esophagus	35.65	16.57	35.65
2	Stomach	33.83	15.72	33.83
3	Lung	25.17	11.70	25.17
4	Liver	21.17	9.84	21.17
5	Colon-rectum	20.54	9.54	20.54
6	Breast	15.09	7.01	15.09
7	Pancreas	12.45	5.79	12.45
8	Cervix	5.87	2.73	5.87
9	Brain	5.64	2.62	5.64
10	Leukemia	5.10	2.37	5.10
	Top 10	180.51	83.89	180.51

*Age-standardized incidence rate (China population).

Table 12. The 10 most common cancer mortality rates in rural areas 2008

Rank	Site	Mortality rate ($1/10^5$)	%	ASIRC* ($1/10^5$)
Both				
1	Stomach	41.29	21.03	21.71
2	Esophagus	37.60	19.15	19.64
3	Lung	36.03	18.35	18.85
4	Liver	33.38	17.00	18.93
5	Colon-rectum	8.76	4.46	4.42
6	Pancreas	5.59	2.85	2.86
7	Brain	4.31	2.20	2.81
8	Leukemia	3.46	1.76	2.68
9	Breast	3.23	1.64	1.84
10	Lymphoma	2.89	1.47	1.64
	Top 10	176.54	89.92	95.38
Male				
1	Stomach	55.42	22.26	30.89
2	Lung	50.79	20.40	28.10
3	Liver	48.49	19.48	28.55
4	Esophagus	47.78	19.19	26.67
5	Colon-rectum	8.84	3.55	4.83
6	Pancreas	5.97	2.40	3.27
7	Brain	4.89	1.96	3.20
8	Leukemia	3.63	1.46	2.92
9	Lymphoma	3.38	1.36	1.94
10	Bladder	2.61	1.05	1.30
	Top 10	231.80	93.11	131.67
Female				
1	Esophagus	27.16	19.08	12.95
2	Stomach	26.78	18.81	13.08
3	Lung	20.88	14.67	10.26
4	Liver	17.88	12.56	9.32
5	Colon-rectum	8.67	6.09	4.05
6	Breast	6.41	4.50	3.59
7	Pancreas	5.20	3.65	2.45
8	Cervix	3.90	2.74	2.20
9	Brain	3.72	2.62	2.42
10	Leukemia	3.29	2.31	2.44
	Top 10	123.90	87.03	62.78

*Age-standardized mortality rate (China population).

lung cancer, liver cancer, colorectal cancer, and breast cancer in female (Table 12).

DISCUSSION

Cancer Burden in Cancer Registration Areas

In 2008, the crude incidence rate for all cancers in registration areas was 299.12/100,000 with the ASIRC of 148.75/100,000. The incidence was higher in urban areas (307.04/100,000 and 148.64/100,000 for crude rate and ASIRC) than in rural areas (269.57/100,000 and 151.02/100,000 for crude rate and ASIRC). The incidence in urban areas was higher than that in rural areas. But the ASIRC, ASIRW and the accumulated rate were higher in rural areas than in urban areas for all and males, but opposite for females.

The crude mortality in cancer registration areas was 184.67/100,000 and the mortality rate was higher in rural areas (196.34/100,000) than in urban areas (181.54/100,000). But after standardization by Chinese population, the morality was 79.21/100,000 in urban areas, which was lower than that in rural areas (106.06/100,000).

Lung cancer, stomach cancer, colorectal cancer, liver cancer, breast cancer, esophagus cancer, pancreas cancer, brain cancer and lymphoma were the most common cancer in cancer registration areas, which accounted for more than 75% new cases, and were the major causes (more than 80%) of cancer death in China in 2008.

The incidence and mortality varied greatly by sex and region. The 5 most common sites of cancer in male in urban areas were lung, stomach, colon-rectum, liver cancer and esophagus, with lung cancer and liver cancer being the most leading causes of cancer death; while, in rural areas the most common sites of cancer were stomach and esophagus, followed by lung, liver and colon-rectum, with the stomach and esophagus

cancer being the leading causes for cancer death. In female, the 5 most common sites of cancer were lung, colon-rectum, stomach and liver. The incidence of female breast cancer ranked firstly for female cancers in urban areas. The other 10 most common cancers in female were cervix cancer, uterus cancer and ovary cancer and thyroid gland cancer. The most common cancers in rural in female were esophagus cancer and stomach cancer, followed by liver cancer, breast cancer, cervix cancer and uterus cancer. Esophagus cancer and stomach cancer were the most common cancers in female in rural areas.

Comparison with Results of Third National Survey for Cause of Death

The results of Third National Survey for Cause of Death showed that the mortality rate and its ASMRC in all the cancer registries was 135.88/100,000 and 91.24/100,000, respectively, with the mortality rate and its ASMRC were 150.18/100,000 and 91.41/100,000 in urban, while 128.65/100,000 and 91.19/100,000 in rural, respectively. Lung cancer was the leading cause of death in all the cancer registries, with the mortality of 30.83/100,000. The mortality for other cancer was 26.26/100,000 for liver cancer, 24.71/100,000 for stomach cancer, 15.71/100,000 for esophagus cancer and 7.25/100,000 for colorectal cancer[8].

Our results showed a higher crude mortality rate comparing with the results of Third National Survey for Cause of Death, as well as the mortality rate and its ASMRC in rural areas. But the ASMRC mortality was lower in our survey. The 5 most common fetal cancers were as same as the results of Third National Survey for Cause of Death, with a little bit change of the rank of cancer.

Representative and Quality of Data in NCCR

Total 56 cancer registries reported cancer registration data to NCCR in 2011 with 8 registries more than last year. Cancer registration data from 41 cancer registries were pooled into the National Data for Annual Report finally. However, the quality of data are still needed to improved, such as establishing a complete of life statistics and registration system, minimizing the number of omission and reiteration of new cases, reducing the missing report of death cases and improving the MV% and the fluctuation of both incidence and mortality.

Compared to the cancer incidence in 2006 and 2007, the prevalence of cancer in China was increasing dramatically[9-10]. Several issues might contribute to this phenomenon. The aged tendency of population probably was associated with the nature increase of cancer incidence. On the other hand, the reduced miss report of cancer might affected it, which resulting from more emphasizes of Ministry of Health on cancer register in 2008, more and more manpower, physical resource and financial resource invested by all levels of governments, and professional training on cancer register and so on.

It is admitted that the study population were mainly from 56 register areas of China. So the representative of our report still needs to be evaluated. The 78.86% of study population were from urban areas, which mainly represented a typical character of cancer burden in urban areas. The incidence and mortality in rural areas only represented the characters of cancer in high-risk cancer areas and could not reflect the characters of some certain cancers, such as esophagus cancer, stomach cancer, liver cancer and naso-pharyngeal cancer. The national incidence and mortality of these cancers in rural areas are significantly higher than they should be, which is in accordance with the result of Third National Survey for Cause of Death.

Long-Term Process of Development of New Tumor Registries

The work of cancer registries is an important part of the surveillance of chronic disease, and meets the need of prevention and control of cancer. It is imperative to make the cancer register more and more flawless. According to the Plan for Chinese Cancer Prevention and Control (2004−2010) from Ministry of Health, 52 cancer registries were newly established. Since 2008, there have been 95 cancer registries in every 31 provinces in China, and the population increased to more than 120,000,000, which was 8.0% of the whole Chinese population, and been 195 cancer registries by the end of 2011. The coverage population increased to more than 190,000,000 (120,000,000 in urban areas and 70,000,000 in rural) which accounted for 14% of the whole population in 2011. The population in rural registries and improvement of the representative of data from rural areas should be further increased.

Cancer register is professional, which involves in experts from health administration, oncology, pathology, medical statistics and epidemiology etc. It will take at least 5 years to build a new register to make a skillful and steady work on data collection and procession. So cancer register provide basic measures for cancer prevention and control.

Suggestions for Cancer Prevention and Control in China

Our results showed that the profile of cancer incidence and mortality in urban areas was different from rural areas. Such disparities would reflect regional differences in the prevalence and distribution of major risk factors, detection practices and availability of treatment services. Therefore, different strategies should be put out according to different areas and sex.

In urban areas, the prevalence of lung cancer, colorectal cancer and female breast cancer has increased

quickly since these years. The westernization of lifestyle and air pollution may explain part of the change of cancer spectrum. Programs of enhancing the screening of cancer in high risk population and improvement of diagnose and treatment of early cancer should be placed at the important aspect in urban.

While in rural areas, the cancers related to digestive system such as stomach cancer, cervical cancer and liver cancer remained the leading causes of cancer deaths in rural areas of China. More emphasis should be put to standardize the cancer treatment to improve the survival rate and mortality rate in rural poor.

We also found that the incidence and mortality varied greatly by sex. Lung cancer was the most common cancer and the leading cause of cancer death in male in urban. In female, the incidence of breast cancer was the highest, while the mortality for breast cancer ranked 5th due to the effective therapy for breast cancer. More emphasis should be placed for female cancer, such as cervix cancer, ovary cancer and thyroid gland cancer for female.

Acknowledgment

We gratefully acknowledged the cooperation of all the population-based cancer registries in providing cancer statistics, data collection, sorting, verification and database creation. The authors assume full responsibility for analyses and interpretation of these data.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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