

# Female breast cancer statistics of 2010 in China: estimates based on data from 145 population-based cancer registries

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**Background:** The aim of the study is to provide incidence and mortality data of female breast cancer at national level of China in 2010.

**Methods:** A total of 145 population-based cancer registries submitted qualified cancer incidence and mortality data to National Cancer Registration Center of China. Based on the qualified cancer registries' data, we estimated the overall breast cancer incidence and mortality data of China in 2010 and reported breast cancer statistics by age and geographical area.

**Results:** The estimated number of female breast cancer cases was about 208 thousand. The crude incidence rate, age-standardized rate by China and World population were 32.43 per 100,000, 25.89 per 100,000 and 24.20 per 100,000, respectively. The incidence rates were higher in urban area than in rural area. And the incidence rates in Eastern area and Middle area were similar and higher than those in Western areas. The estimated number of female breast cancer death in 2010 of China was about 55.5 thousand. The crude, age-standardized mortalities by China population and World population were 8.65 per 100,000, 6.56 per 100,000 and 6.36 per 100,000, respectively. The mortality rates by geographical area had similar pattern to the incidence rates.

**Conclusions:** Breast cancer is still a major health burden for Chinese women especially in urban area. Prevention strategies such as weight control, high-quality screening and diagnosis may help control the disease.

**Keywords:** Breast cancer; cancer registry; incidence; mortality; China; 2010

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## Introduction

Breast cancer is the most common cancer among women in China for several years. It is also the principal cause of cancer death for females (1). As a result of “westernized lifestyles” and exogenous estrogen exposure, there is an increasing trend of breast cancer incidence in China in the latest decades (2).

Cancer registry is an information system designed for the collection, storage, management, and analysis of data on persons with cancer, usually covering a specific area. Cancer registration may provide accurate, up-to-date population-based cancer data of incidence, mortality and survival, which

are vital for decision making regarding cancer prevention and control. The data may also provide basic information for cancer research and cancer surveillance. In China, population-based cancer registries collect cancer statistics from clinics and hospitals, health insurance database, death surveillance database, and cooperative health insurance database over many years. National Cancer Registration Center of China published annual cancer report based on the local cancer registries' data since 2008 (3).

The precise number of breast cancer cases diagnosed each year in the nation is unknown because the cancer registration is incomplete in China. Therefore, we estimated the status of the female breast cancer of 2010,

**Table 1** The Quality control indicators of female breast cancer in Chinese cancer registries, 2010

Areas	New cases	New deaths	M/I	MV%	DCO%
All	30,819	7,615	0.25	89.88	0.70
Urban area	21,867	5,156	0.24	91.16	0.51
Rural area	8,952	2,459	0.27	86.75	1.15
Eastern area	22,846	5,359	0.23	91.01	0.49
Middle area	6,040	1,587	0.26	88.00	1.11
Western area	1,933	669	0.35	82.36	1.81

M/I, mortality to incidence ratio; MV%, percent of proportion of morphological verification; DCO%, percent of proportion of death certification only.

based on existing population-based cancer registries' data. To characterize the geographical distribution of breast cancer incidence and mortality, we examined the rates by different areas of China. Comparisons of disease rates by area and age can provide important clues to the underlying causes of diseases and the scope for preventive strategies.

## Material and methods

We obtained the incidence and mortality information of invasive breast cancer for women from the National database of cancer registration of China. In 2013, 219 population-based cancer registries submitted cancer incidence and mortality data to National Cancer Registration Center. The cancer data quality was evaluated for quality control. The detailed criteria of the data inclusion were based on "Technical Protocols of Cancer Registration and Follow up" by Ministry of Health 2009, "Guideline of Chinese Cancer Registration" and "Cancer Incidence in Five Continents Volume IX" by The International Agency for Research on Cancer (IARC)/The International Agency for Cancer Registry (IACR) (4,5). And 145 cancer registries' data were accepted for further analysis.

The female population covered by the qualified cancer registration areas in 2010 was 78,048,060, accounting for 12.96% of overall female population of China. By geographical area, the female population covered by cancer registration in Eastern areas, Middle areas, and Western areas of China were 52,618,341, 17,735,155 and 7,694,564, respectively.

Among the 145 cancer registries, the mortality to incidence ratio (M/I), percent of proportion of morphological verification (MV%) and percent of proportion of death certification only (DCO%) were 0.25%, 89.88% and 0.70 respectively. In urban cancer registries, the MV%, DCO%,

and M/I were 0.24, 91.16 and 0.51 respectively. In rural cancer registries, the MV%, DCO% and M/I were 0.27, 86.75 and 1.15 respectively (*Table 1*).

Based on the standard of National Bureau of Statistics in China, we classified qualified cancer registries into Eastern urban area, Eastern rural area, Middle urban area, Middle rural area, Western urban area and Western rural area (6). We firstly calculated the age-specific and sex-specific cancer registration incidence and mortality by these areas. According to the age-specific cancer incidence (mortality) by each strata, we further multiply the corresponding 2010 national census population data of each strata by the age-specific cancer incidence (mortality) data. And the overall estimated new cancer cases (deaths) were summed up. Overall female breast cancer incidence and mortality of China by age and area were further estimated.

## Results

### Breast cancer incidence

As shown in *Table 2*, the estimated number of female breast cancer cases was about 208 thousand. And the overall crude incidence rate was 32.43 per 100,000, accounting for 16.20% of all cancer cases in women, ranking first among all cancer incidences. After age standardization by China population and World population, the standardized rates were 25.89 per 100,000 and 24.20 per 100,000, respectively.

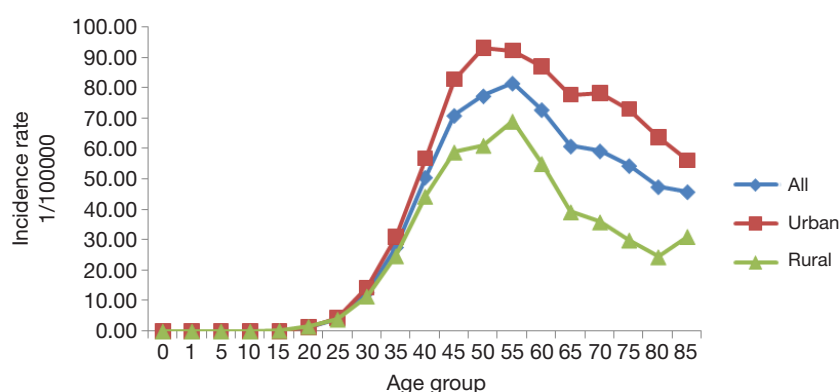
Stratified by area, the incidence rate of urban area were higher in urban area than in rural area, both for crude rate and age-standardized rate. The incidence rates in Eastern area and Middle area were similar, but in Western areas, the incidence rate of the disease was 23.47 per 100,000, lowest among all areas.

Age-specific incidence rates were presented in *Figure 1*. The age-specific incidence rate of female breast cancer was

**Table 2** Estimated breast cancer incidence of China in 2010

Areas	Number of cases	Crude rate (1/10 <sup>5</sup> )	Ratio (%)	ASRcn (1/10 <sup>5</sup> )	ASRwld (1/10 <sup>5</sup> )	Cumulative rate 0-74 (%)	TASR 35-64 (1/10 <sup>5</sup> )	Rank
All	208,192	32.43	16.20	25.89	24.20	2.59	61.16	1
Urban area	127,707	39.47	17.64	30.50	28.56	3.09	71.02	1
Rural area	80,485	25.28	14.34	20.78	19.28	2.02	50.55	1
Eastern area	95,484	35.57	17.19	28.05	26.21	2.82	65.73	1
Middle area	73,624	35.58	17.31	28.05	26.36	2.86	66.88	1
Western area	39,084	23.47	12.85	19.48	18.03	1.88	45.74	2

ASRcn, Age-standardized rate (using China standard population, 2000); ASRwld, Age-standardized rate (using World standard population, 1985); TASR, Truncated age-standardized rate (using World standard population, 1985).

**Figure 1** Age-specific incidence rates of female breast cancer of 2010 in China.

relatively low before 25 years old, but dramatically increased after then. The incidence rate reached peak at the age group of 55-59 years, and then gradually decreased. The trend of age-specific incidence in urban and in rural were similar as the overall incidence. And the age-specific incidence rates in urban was significantly higher than those in rural in all age groups after 24 years.

### Breast cancer mortality

The estimated number of female breast cancer death in 2010 of China was about 55.5 thousand. And the overall crude mortality rate was 8.65 per 100,000, accounting for 7.90% of all cancer deaths in women, ranking fifth among all cancer deaths. After age standardization by China population and World population, the standardized rates were 6.56 per 100,000 and 6.36 per 100,000, respectively (Table 3).

Stratified by area, the mortality rate of female breast cancer in urban area were higher than that in rural area, both for crude rate and age-standardized rates. And the mortality rate

in Middle area was highest among all three areas of China, with 9.18 per 100,000 for crude rate (Table 3).

The age-specific mortality rates of female breast cancer were shown in Figure 2. The mortality rate increased with age until 55-59 years old, and then slightly dropped after then. Since 65-69 years old, the mortality rate increased very quickly, reaching highest in age group of 85+ years. Stratified by urban area and rural area, both rates were very low in young age groups. And the age-specific mortality rates were higher in urban than in rural since 20 years old.

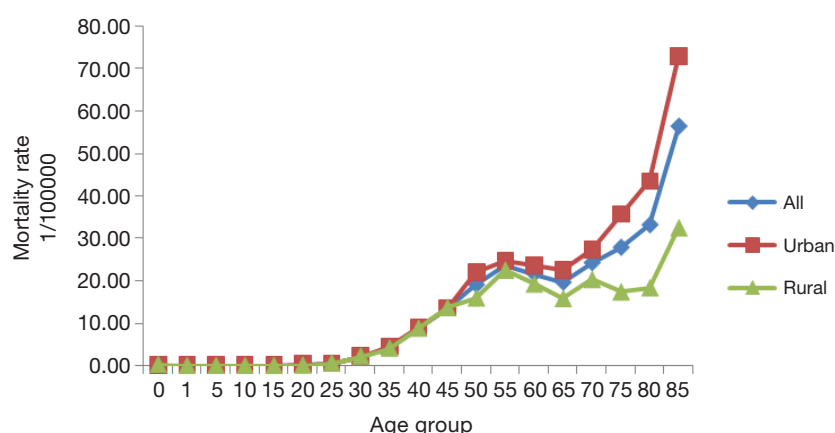
### Discussion

In this paper, we described the epidemiology of female breast cancer in 2010, focusing on geographical variations in incidence and mortality of China. For female breast cancer the age standardized rate by World population as a whole was 24.20 per 100,000 for incidence and 6.36 per 100,000 for mortality. For incidence, the lowest rates were found in rural areas and Western areas. For mortality, similar spatial pattern

**Table 3** Estimated breast cancer mortality of China in 2010

Areas	Number of cases	Crude rate (1/10 <sup>5</sup> )	Ratio (%)	ASRcn (1/10 <sup>5</sup> )	ASRwld (1/10 <sup>5</sup> )	Cumulative rate 0-74 (%)	TASR 35-64 (1/10 <sup>5</sup> )	Rank
All	55,500	8.65	7.90	6.56	6.36	0.69	14.10	5
Urban area	32,765	10.13	8.59	7.19	7.00	0.75	14.99	5
Rural area	22,735	7.14	7.09	5.78	5.57	0.62	13.11	5
Eastern area	22,309	8.31	7.37	6.07	5.93	0.65	12.32	6
Middle area	18,992	9.18	8.61	7.04	6.82	0.76	15.13	5
Western area	14,199	8.53	7.92	6.79	6.51	0.68	15.79	5

ASRcn, Age-standardized rate (using China standard population, 2000); ASRwld, Age-standardized rate (using World standard population, 1985); TASR, Truncated age-standardized rate (using World standard population, 1985).

**Figure 2** Age-specific mortality rates of female breast cancer of 2010 in China.

was shown as for incidence.

The interpretation of the breast cancer incidence and mortality patterns are complex due to the multiple risk factors such as reproductive, hormonal and nutritional factors, the implementation of breast cancer screening, and the improvement in cancer therapy (7,8). In general, the high rates of breast cancer are the consequence of a higher prevalence of known risk factors for the disease. The changing patterns of childbearing and breastfeed, exogenous hormonal intake, obesity and physical inactivity contributed to trends in incidence and mortality (9). For example, the prevalence of obesity was significantly higher in urban than in rural for several years in China (10-12).

Age-specific incidence curve of breast cancer was distinctive. The rates increased very fast before menopause and decreased after that, probably due to diminishing levels of circulating estrogens. And the age-specific incidence pattern was similar to that of Japan (13). The variation in mortality rates reflect in part variations in incidence, but mortality is

also affected by case fatality. We found the range in mortality rates between regions is less than that for incidence because of the more favorable survival of breast cancer in developed regions of urban area and Eastern area. Advances in recent years for breast cancer therapy have made the subsequent stabilization of breast cancer death rates in some big cities of China such as Beijing and Shanghai (14).

The main strength of the study is we provided the updated data of overall female breast cancer statistics of China. Although population-based cancer registries in China have provided with cancer incidence and mortality data for many years, there are still many regions with low or no accurate registry data. We estimated the overall breast cancer incidence and mortality of China and by area with techniques. And the projected numbers of new cancer cases and deaths should be interpreted with caution because these estimates are model-based. Expansion of the existing registry network so that it may cover a more representative sample of the national population would increase the accuracy of the estimation.

## Conclusions

Despite much research in understanding and controlling breast cancer, it is still a major health burden for Chinese women especially in urban area. Primary prevention strategies aimed at weight control and breastfeeding promotion may be beneficial though the prolonged endogenous hormonal exposure is not easily modifiable. Increased efforts to provide high-quality screening, diagnosis and treatment may also reduce the breast cancer mortality.

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## References

1. Ferlay J, Soerjomataram I, Ervik M, et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013.[ cited 2013 Nov 1.] Available online: [http://globocan.iarc.fr/Pages/fact\\_sheets\\_cancer.aspx](http://globocan.iarc.fr/Pages/fact_sheets_cancer.aspx)
2. Li N, Zheng RS, Zhang SW, et al. Analysis and prediction of breast cancer incidence trend in China. *Zhonghua Yu Fang Yi Xue Za Zhi* 2012;46:703-7.
3. Wei KR, Chen WQ, Zhang SW, et al. Cancer registration in the Peoples Republic of China. *Asian Pac J Cancer Prev* 2012;13:4209-14.
4. Curado MP, Edwards B, Shin HR, et al. eds. Cancer Incidence in Five Continents Vol. IX. Lyon: IARC Scientific Publications, 2007.
5. Ferlay J, Burkhard C, Whelan S, et al. eds. Check and conversion programs for cancer registries. Lyon: IARC Technical Report No. 42; 2005.
6. National Bureau of Statistics of the People's Republic of China. [Internet]. [cited 2013 Nov 1]. Available online: <http://www.stats.gov.cn/tjsj/tjbz/>
7. Colditz GA, Rosner B. Cumulative risk of breast cancer to age 70 years according to risk factor status: data from the Nurses' Health Study. *Am J Epidemiol* 2000;152:950-64.
8. Berg WA, Blume JD, Cormack JB, et al. Combined screening with ultrasound and mammography vs mammography alone in women at elevated risk of breast cancer. *JAMA* 2008;299:2151-63.
9. Linos E, Spanos D, Rosner BA, et al. Effects of reproductive and demographic changes on breast cancer incidence in China: a modeling analysis. *J Natl Cancer Inst* 2008;100:1352-60.
10. Ma GS, Li YP, Wu YF, et al. The prevalence of body overweight and obesity and its changes among Chinese people during 1992 to 2002. *Zhonghua Yu Fang Yi Xue Za Zhi* 2005;39:311-5.
11. Tian H, Xie H, Song G, et al. Prevalence of overweight and obesity among 2.6 million rural Chinese adults. *Prev Med* 2009;48:59-63.
12. Xi B, Liang Y, He T, et al. Secular trends in the prevalence of general and abdominal obesity among Chinese adults, 1993-2009. *Obes Rev* 2012;13:287-96.
13. Bray F, McCarron P, Parkin DM. The changing global patterns of female breast cancer incidence and mortality. *Breast Cancer Res* 2004;6:229-39.
14. Huang ZZ, Chen WQ, Wu CX, et al. The trends of female breast cancer incidence and mortality in Beijing, Shanghai, Linzhou and Qidong in China. *Tumor* 2012;32:605-8.

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