Incidence and Mortality of Female Breast Cancer in Jiangsu, China

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Abstract

Objectives: The aim of this study was to describe and analyze the incidence and mortality of female breast cancer in Jiangsu Province of China. Methods: Incidence and mortality data for female breast cancer and corresponding population statistics from eligible cancer registries in Jiangsu from 2006 to 2010 were collected and analyzed. Crude rates, age-specific rates and age-standardized rates of incidence and mortality were calculated, and annual present changes (APCs) were estimated to describe the time trends. Results: From 2006 to 2010, 11,013 new cases and 3,068 deaths of female breast cancer were identified in selected cancer registry areas of Jiangsu. The annual average crude incidence and age-standardized incidence by world population (ASW) were 25.2/100,000 and 17.9/100,000, respectively. The annual average crude and ASW for mortality rates were 7.03/100,000 and 4.81/100,000. The incidence was higher in urban areas than that in rural areas, and this was consistent in all age groups. No significant difference was observed in mortality between urban and rural areas. Two peaks were observed when looking at age-specific rates, one at 50-59 years and another at over 85 years. During the 5 years, incidence and mortality increased with APCs of 4.47% and 6.89%, respectively. Compared to the national level, Jiangsu is an area with relatively low risk of female breast cancer. Conclusion: Breast cancer has become a main public health problem among Chinese females. More prevention and control activities should be conducted to reduce the burden of this disease, even in relatively low risk areas like Jiangsu.

Keywords: Breast cancer - incidence - mortality - trend analysis - cancer registry - Jiangsu, China

Introduction

Breast cancer is the most common malignancy among women in the world (Jemal et al., 2011). It was estimated that 1.38 million new cases and 458,000 deaths occurred worldwide in 2008 (Curado et al., 2011). Although the risk of breast cancer is relatively lower in China than in developed countries, the incidence and mortality of this disease have been sustainably increased in the past decades (Yang et al., 2006). According to the latest Chinese Cancer Registry Annual Report (Hao and Chen, 2012), breast cancer has become the most common cancer occurred among Chinese women and ranked the fifth leading cause of female cancer deaths in 2009. The age-standardized rate of incidence and mortality by world standard population (ASW) was 29.0 and 6.56 per 100,000 in Chinese females, respectively.

As the national cancer registry system has not been well established yet, the distribution of cancer including breast cancer in China still need to be further depicted. Jiangsu Province is one of the developed coastal areas in China. It is located in the South-eastern part of the country with a population of more than 80 million, 49.96% of which are women. Jiangsu is also a high-risk area for cancer incidence, according to the results of the 1990-1992 National Mortality Retrospective Sampling Survey, cancer mortality was 159.8 per 100,000 in Jiangsu and was about 50% higher than the national average at the same period (108.3 per 100,000) (Li et al., 1996). To date, the incidence and mortality of female breast cancer in this province have not been sufficiently reported. In this paper, we used the data from 2006 to 2010 from established cancer registries in Jiangsu to describe and analyze the incidence and mortality of female breast cancer in this province, aiming to provide further information for policy making and benefit the disease control at provincial and national level as well.

Materials and Methods

Population data and the information of female breast cancer cases from 2006 to 2010 were extracted from the
Provincial Cancer Registry of Jiangsu.

Based on the “Guideline for Chinese Cancer Registration” (The National Central Cancer Registry, 2004) and the recruitment criteria of “Cancer Incidence in Five Continents Volume IX” (Ferlay et al., 2008), data quality of each cancer registry was checked from the aspects of completeness, validity and reliability, including the proportion of morphologic verification (MV%), the percentage of cancer cases identified by death certification only (DCO%), the mortality-to-incidence ratio (M/I) and the percentage of cancer with undefined or unknown primary site (secondary) (O&U%). Cases were identified by International Classification of Disease, 10th prevision (ICD-10). Provincial capital, prefecture-level cities, and municipalities were considered as urban areas, while counties and county-level cities were considered as rural areas, following the definition used by “Chinese Cancer Registry Annual Report” (National Central Cancer Registry, 2004).

Similar to the situation in China, most cancer registries in Jiangsu were established in late 2000s, but it has been rapidly developed this province. In 2006, only 9 counties past the annual quality evaluation, but till 2010, 27 cancer registries passed the quality examination and were involved in the present analysis.

From 2006 to 2010, the total population size observed in selected registry areas was 43,646,290 person-years (19,168,709 in urban areas and 24,477,581 in rural areas), accounted for about 11% of the total population in Jiangsu. Crude rates, age-specific rates and age-standardized rates of incidence and mortality of female breast cancer were calculated for the present analyses. Crude rates were calculated using the number of cases/deaths divided by the number of the total population of the registry areas during the same period. Age-specific rates were calculated for 19 age groups. Age-standardized were calculated by using 1982 Chinese standard population (ASR) and Segi’s world population (ASW) as the standard population distributions. The differences of rates between urban and rural areas were tested by two sample U test. To describe the time trends in incidence and mortality, annual percent changes (APCs) were estimated by a linear regression on the logarithm scale during the five years. In the model \( y = \alpha + \beta x + \epsilon \) and APC = \( 100 \times (e^\beta - 1) \) (Xiang et al., 2004), where \( \alpha \) means constant term, \( \beta \) represents regression coefficient and \( \epsilon \) stands for random error. Database management software including MS-FoxPro, MS-Excel, SAS and IARCcrgTools issued by IARC/IACR (Ferlay 2008) were used for data checking, evaluation and analysis, p<0.05 means statistically significant.

### Results

From 2006 to 2010, a total number of 11,013 newly diagnosed breast cancer cases were identified in selected cancer registry areas, which ranked the fourth and accounted for 11.7% of total new cancer cases among females. The annual average crude incidence was 25.2/100,000, while the ASR and ASW were 14.3 and 17.9/100,000, respectively. The annual average crude incidence rate in urban areas was 30.6/100,000, which was 46% higher than that in rural areas (21.0/100,000),

| Index         | Population     | Cancer cases | Crude rate (1/10^5) | ASR China (1/10^5) | ASW World (1/10^5) | Cumulative rate 0-74 (%) | Ratio (%) | Rank |
|---------------|----------------|--------------|---------------------|--------------------|-------------------|--------------------------|-----------|------|
| Incidence     | All areas      | 43,646,290   | 11,013              | 25.2               | 14.3              | 17.9                     | 1.88      | 11.7 | 4    |
|               | Urban          | 19,168,709   | 5,872               | 30.6               | 17.5              | 21.9                     | 2.29      | 13.6 | 1    |
|               | Rural          | 24,477,581   | 5,141               | 21.0               | 11.9              | 14.8                     | 1.57      | 10.2 | 4    |
| Mortality     | All areas      | 43,646,290   | 3,068               | 7.03               | 3.81              | 4.81                     | 0.53      | 5.15  | 6    |
|               | Urban          | 19,168,709   | 1,412               | 7.37               | 4.05              | 5.11                     | 0.57      | 5.72  | 6    |
|               | Rural          | 24,477,581   | 1,656               | 6.77               | 3.64              | 4.59                     | 0.50      | 4.74  | 6    |

**Table 1. The Incidence and Mortality for Breast Cancer in Cancer Registration in Jiangsu, 2006-2010**

| Age group | Incidence | Mortality |
|-----------|-----------|-----------|
| All areas | Urban     | Rural     | All areas | Urban | Rural     |
| 0~        | 0.00      | 0.00      | 0.00      | 0.00  | 0.00      |
| 1~        | 0.00      | 0.00      | 0.00      | 0.00  | 0.00      |
| 5~        | 0.00      | 0.00      | 0.00      | 0.00  | 0.00      |
| 10~       | 0.00      | 0.00      | 0.00      | 0.00  | 0.00      |
| 15~       | 0.27      | 0.15      | 0.37      | 0.00  | 0.00      |
| 20~       | 1.28      | 1.02      | 1.50      | 0.19  | 0.07      |
| 25~       | 3.03      | 3.72      | 2.40      | 0.53  | 0.37      |
| 30~       | 8.31      | 11.5      | 5.77      | 1.11  | 1.08      |
| 35~       | 18.8      | 22.6      | 16.1      | 3.14  | 3.34      |
| 40~       | 39.5      | 46.9      | 33.7      | 6.99  | 6.89      |
| 45~       | 50.8      | 61.6      | 43.0      | 9.28  | 9.62      |
| 50~       | 62.6      | 75.1      | 52.7      | 16.0  | 18.3      |
| 55~       | 60.5      | 74.7      | 49.4      | 19.4  | 20.8      |
| 60~       | 50.7      | 59.5      | 43.7      | 15.7  | 15.8      |
| 65~       | 41.0      | 51.2      | 33.5      | 16.3  | 16.7      |
| 70~       | 39.3      | 51.0      | 30.9      | 17.9  | 21.1      |
| 75~       | 36.2      | 44.9      | 29.7      | 18.9  | 22.0      |
| 80~       | 36.5      | 45.2      | 30.2      | 24.4  | 26.1      |
| 85+       | 64.5      | 125.8     | 22.0      | 31.9  | 33.0      |
| all       | 25.2      | 30.6      | 21.0      | 7.03  | 7.37      |

**Table 2. Age-specific Incidence and Mortality of Breast Cancer in Cancer Registration in Jiangsu, 2006-2010 (1/10^5)**

**Figure 1. Age-specific Incidence of Breast Cancer in Cancer Registration in Jiangsu, 2006-2010**
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Two peaks were found when looked into age-specific incidences. The first peak appeared at the age group of 50-54 years, and then the rate gradually decreased after 55 but dramatically increased again in the group of over 85 years. The trend in urban areas was similar as the overall situation, while in rural areas only one peak was found at the age group of 50-54 years (Table 2 and Figure 1).

Similar to the incidence curve, the age-specific mortality also had two peaks. The first peak appeared at the group of 55-59 years and the second was observed in those aged over 85 years. The patterns of age-specific mortality in urban and rural areas were consistent, while urban populations showed higher age-specific mortality than rural areas among all age groups over 45 years. (Table 2 and Figure 2)

Changes of breast cancer in five years were analyzed and results are shown in Table 3, Figure 3 and Figure 4. Although there is no statistically significant difference, crude incidence increased from 22.3/100,000 in 2006 to 26.5/100,000 in 2010 with an APC of 4.47% ($p=0.22$), and crude mortality rates also elevated from 5.98 in 2006 to 7.36/100,000 in 2010 with an APC of 6.89% ($p=0.05$).

In rural areas, incidence and mortality were observed significantly increased during 2006 to 2010 with an APC of 7.26% ($p=0.01$) and 7.38% ($p=0.03$). Similar trend was observed in urban areas, the APC was 3.68% ($p=0.44$) for incidence and was 7.70% ($p=0.15$) for mortality. After adjusting for Chinese standard population, we found that the increasing trends of ASR still exist but not statistically significant.

Table 3. Incidence and Mortality Trends for Breast Cancer in Cancer Registration in Jiangsu, 2006-2010 (1/105)

| Index         | Area  | 2006  | 2007  | 2008  | 2009  | 2010  | APC  | $p$       |
|---------------|-------|-------|-------|-------|-------|-------|------|----------|
| Incidence     |       |       |       |       |       |       |      |          |
| Crude rate (1/105) | All areas | 22.3  | 22.3  | 28.1  | 24.5  | 26.5  | 4.47 | 0.22     |
|               | Urban | 26.6  | 27.4  | 36.7  | 30.8  | 30.0  | 3.68 | 0.44     |
|               | Rural | 17.0  | 19.9  | 20.4  | 21.3  | 23.4  | 7.26 | 0.01     |
| ASR China (1/105) | All areas | 12.8  | 13.9  | 15.0  | 13.8  | 14.9  | 2.90 | 0.19     |
|               | Urban | 15.2  | 17.1  | 18.3  | 18.3  | 17.7  | 3.85 | 0.13     |
|               | Rural | 9.84  | 12.4  | 11.9  | 11.7  | 12.6  | 4.46 | 0.19     |
| Mortality     |       |       |       |       |       |       |      |          |
| Crude rate (1/105) | All areas | 5.98  | 6.13  | 7.17  | 7.86  | 7.36  | 6.89 | 0.05     |
|               | Urban | 6.39  | 5.79  | 7.80  | 8.55  | 7.63  | 7.70 | 0.15     |
|               | Rural | 5.46  | 6.28  | 6.60  | 7.52  | 7.13  | 7.38 | 0.03     |
| ASR China (1/105) | All areas | 3.28  | 3.50  | 3.70  | 4.12  | 3.79  | 4.63 | 0.08     |
|               | Urban | 3.43  | 3.30  | 3.81  | 4.62  | 4.22  | 7.78 | 0.07     |
|               | Rural | 3.10  | 3.59  | 3.60  | 3.88  | 3.47  | 3.07 | 0.30     |

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Discussion

In this present analysis, we found breast cancer has become one of the most common cancers among women in Jiangsu during the period of 2006 to 2010. The incidence was higher in urban areas than that in rural areas and was consistent in all age groups. But no significant difference was observed for the mortality between urban and rural areas. Moreover, the incidence and mortality of this disease remained slightly increasing during the five years.

Although breast cancer incidence and mortality in developed countries have been decreasing or remaining stable in recent years (Peter and Bernard, 2008; Canfell et al., 2009; Marliace et al., 2011; Adetunji and Graham, 2013), both rates have been increasing rapidly in many developing countries (Jemal et al., 2010), such as India (Dhillon et al., 2011), Thailand (Hutcha et al., 2006), Iraq (Ramadhan et al., 2011; Muzahem and Wang, 2014), Iran (Taghavi et al., 2012) and Mongolia (Rebecca et al., 2012). In China, as previously published study reported (Huang et al., 2012), the ASR of incidence has increased from 21.2/100,000 in 2003 to 24.7/100,000 in 2007. According to the results of three National Mortality Retrospective Surveys (Zheng et al., 2011), the ASR of mortality has increased from 2.88/100,000 in 1973-1975 to 3.97/100,000 in 2005. Similar increasing trend was also observed in Jiangsu Province, for instance, the ASR of breast cancer mortality in Jiangsu had increased from 21.2/100,000 in 2006 to 24.7/100,000 in 2010. The incidence and mortality have been much higher in urban areas than that in rural areas and was consistent in all age groups. But no significant difference was observed for the mortality between urban and rural areas. Moreover, the incidence and mortality of this disease remained slightly increasing during the five years.

In this study, we observed 1.46 folds higher incidence of breast cancer in urban areas than in rural areas, and the urban-rural differences were consistent in all age groups. This difference found in Jiangsu was also found at national level and in other developing countries, such as India, Thailand, Korea, Argentina, and Egypt (Dey et al., 2010; Huang et al., 2012). For example, the ASR of breast cancer in urban area of Shanghai was 38.7/100,000 while was 27.9/100,000 in nearby rural areas of Jiashan (Hao and Chen 2012). Similarly in Egypt, incidence of breast cancer was 3.4 folds higher in urban areas (Dey et al., 2010). The urban-rural differences indicate that the risk of breast cancer is positively associated with socioeconomic conditions (Schootman et al., 2010; Marzieh et al., 2012), and also suggest a relationship to the introduction and increased use of xenoestrogens in environment (Wael et al., 2012), and this could also partly explain the difference level between developed and developing countries (Bray et al., 2004; Youlden et al., 2012).

Our results showed that the age-specific incidence curve of female breast cancer had two peaks. The first incidence peak appeared around the age of 50-54 years and the second appeared over 85 years old. This “two-peaks” also has been found in Chinese women by other studies. Zhang et al reported that the incidence was higher in the age group of 50-54 years and 65-69 years (Zhang et al., 2012). Interestingly, most literatures reported (Althuis et al., 2005; Toi et al., 2010; Curado 2011, Manas and Chaowanee, 2013) that the age-specific incidence for female breast cancer in China as well as in other Asian countries is high before menopause and then declined, however in Western countries, the incidence shows continuous increasing even after menopause. The reasons for the difference between oriental and occidental remain obscure, but estrogen may play important roles in causing the population heterogeneity. Estrogen is the main cause of breast cancer (Vogel, 2008; Cummings et al., 2009; Nelson et al., 2012), due to ovarian atrophy in postmenopausal women, the level of endogenous estrogen may decrease and thus may decrease the risk of breast cancer. As compared to female Caucasians, Asians including Chinese women are less exposed to estrogen related risk factors, such as using oral contraceptives and hormone replacement therapy (HRT). Several researches indicated that HRT can increase the risk of breast cancer (Bouchard et al., 2010; Li et al., 2011).

Several limitations need to be discussed here. Firstly, the data we used in this study were collected from the established population-based cancer registries in Jiangsu. However, most cancer registries in this province were established in 2000s, therefore we are not able to describe the long time trends of breast cancer. Secondly, only 9 registries were involved in our analysis in 2006, this might not sufficiently represent the whole province. But till 2010, 27 cancer registries passed the quality examination, accounted for about 32% of the total population.

Despite these limitations, we confirmed breast cancer has become one of the major health problems in Jiangsu and China, and the disease may continue increasing in the population. More control and prevention activities including health education and health promotion, cancer screening should be strengthened in the population to reduce the burden of this disease.

Acknowledgements

This study was supported by World Cancer Research Fund (WCRF 2011/RFA/473). We appreciate support from all staff in cancer registries in Jiangsu.
References

Althuis MD, Dozier JM, Anderson WF, et al (2005). Global trends in breast cancer incidence and mortality 1973-1997. *Int J Epidemiol, 34*, 405-12.

Ahn J, Schatzkin A, Jr JVL, et al (2007). Adiposity, Adult weight change, and postmenopausal breast cancer risk. *Arch Intern Med, 167*, 2991-100.

Adetunji TT, Graham AC (2013). Trends in breast cancer incidence and mortality in the United States: implications for prevention. *Breast Cancer Res Treat, 138*, 665-73.

Bray F, McCarron P, Parkin DM, et al. (2004). The changing global patterns of female breast cancer incidence and mortality. *Breast Cancer Res, 6*, 229-39.

Bouchardy C, Usel M, Verkooijen HM, et al (2010). Changing pattern of age-specific breast cancer incidence in the Swiss canton of Geneva. *Breast Cancer Res Treat, 120*, 519-23.

Canfell K, Banks E, Clements M, et al (2009). Sustained lower rates of HRT prescribing and breast cancer incidence in Australia since 2003. *Breast Cancer Res Treat, 117*, 671-7.

Cummings S R, Tice J A, Bauer S, et al (2009). Prevention of breast cancer in postmenopausal women: approaches to estimating and reducing risk. *J Natl Cancer Inst, 101*, 384-98.

Curado MP (2011). Breast cancer in the world: incidence and mortality. *Salud Publica Mex, 53*, 372-84.

Dey S, Soliman AS, Hablas A, et al (2010). Urban-rural differences in breast cancer incidence in Egypt (1999-2006). *Breast, 19*, 417-23.

Dhillon PK, Yeole BB, Dikshit R, et al (2011). Trends in breast cancer, ovarian and cervical cancer incidence in Mumbai, India over a 30-year period, 1976-2005: an age-period-cohort analysis. *Br J Cancer, 105*, 723-30.

Ellassen AH, Colditz GA, Rosner B, et al (2006). Adult weight change and risk of postmenopausal breast cancer. *JAMA, 296*, 193-201.

Ferlay J, Heanue M, Boyle P. Cancer Incidence in Five Continents. *Vol IX IARC Scientific Publication, No. 160.*

Hutchs S, Surapon W, Sineenat S, et al (2006). Cancer incidence trend in Thailand, 1989-2000. *Asian Pac J Cancer Prev, 7*, 239-44.

Han RQ, Huang JP, Zhou JY, et al (2011). The mortality of malignant neoplasm in Jiangsu province: analysis on the data of the third death retrospective survey. *Jiangsu J Prev Med, 22*, 1-4.

Hao Jie, Chen WQ (2012). Chinese Cancer Registry Annual Report (2012). *Beijing: Peking Union Medical College Press, No. 80-3.*

Huang ZZ, Chen WQ, Wu CX, et al (2012). Incidence and mortality of female breast cancer in China: a report from 32 Chinese Cancer registries, 2003-2007. *Tumor, 32*, 435-9.

Inumara LE, da Silveira EA, Naves MMV (2011). Risk and protective factors for breast cancer: a systematic review. *Cad Saude Publica, 27*, 1259-70.

Iwasaki M, Tsgane S (2011). Risk factors for breast cancer: epidemiological evidence from Japanese studies. *Cancer Sci, 102*, 1607-14.

Ilie M, Vlajnic H, Marinkovic J (2013). Cigarette smoking and breast cancer: a case-control study in Serbia. *Asian Pacific J Cancer Prev, 14*, 6643-7.

Jemal A, Center MM, DeSantis C, Ward EM (2010). Global patterns of cancer incidence and mortality rates and trends. *Cancer Epidemiol Biomarkers Prev, 19*, 1893-907.

Jemal A, Bray F, Center MM, Ferlay J, et al (2011). Global cancer statistics. *CA Cancer J Clin, 61*, 69-90.

Kotepui M, Chuepeerach C (2013). Age distribution of breast cancer from a Thailand population-based cancer registry.

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Asian Pac J Cancer Prev, 14, 3815-7.

Kruk J, Marchlewicz M (2013). Dietary fat and physical activity in relation to breast cancer among Polish women. *Asian Pacific J Cancer Prev, 14*, 2495-502.

Li LD, Lu FZ, Zhang SW et al (1996). Analysis the prevalence of mortality of breast cancer in China, 1990-1992. *Chin J Oncol, 18*, 403-7.

Lee SM, Park JH, Park HJ (2008). Breast cancer risk factors in Korean women: a literature review. *Int Nurs Rev, 55*, 355-9.

Lv SR, Pan XQ, Xiang QY, et al (2010). Epidemiological analysis of overweight and obesity in Jiangsu Province. *Chin J Prev Contr Chor Dis, 18*, 20-2.

Li J, Zhang BN, Fan JH, et al (2011). A nation-wide multicenter 10-year (1999-2008) retrospective clinical epidemiological study of female breast cancer in China. *BMC Cancer, 11*, 364.

Nelson, H. D., B. Zakher, et al (2012). Risk factors for breast cancer for women aged 40 to 49 years: a systematic review and meta-analysis. *Ann Intern Med, 156*, 635-48.

Malcolm AM, Yasantha A, Farhana B, et al (2009). Cancer epidemiology in South Asia - Past, Present and future. *Asian Pacific J Cancer Prev, 10*, Asian Epidemiology Supplement, 49-67.

Marliace LD, Delafosse P, Boiturs JB, et al (2011). Breast cancer incidence and time trend in France from 1990 to 2007: a population-based study from two French cancer registries. *Ann Oncol, 22*, 329-34.

Marzieh RR, Maziar ML, Rashid R, et al (2012). Measuring socioeconomic disparities in cancer incidence in Tehran, 2008. *Asian Pac J Cancer Prev, 13*, 2955-60.

Alegre MM, Knowles MH, Robison RA, O’Neill KL (2013). Mechanics behind breast cancer prevention-focus on obesity, exercise and dietary fat. *Asian Pac J Cancer Prev, 14*, 2207-12.

Muzahem Mohammed Yahya Al-Hashimi, Wang XJ (2014). Breast cancer in Iraq, incidence trends from 2000-2009. *Asian Pacific J Cancer Prev, 15*, 281-6.

Peter Boyle, Bernard Levin (2008). World Cancer Report 2008. WHO press, No. 412-7.

Pou SA, Osella AR, Eynard AR, et al (2010). Cancer mortality in Cordoba, Argentina, 1986-2006: an age-period-cohort analysis. *Tumori, 96*, 202-12.

Qian Y, Shen HB, Zhang JP, et al (2009). Related risk factors of breast cancer in female of Wuxi city: a case-control study. *Chin J Public Health, 25*, 1177-87.

Ramadhan TO, Rezvan A, Abdullah S, et al (2011). Cancer incidence rates in the Kurdistan Region/Iraq from 2007-2009. *Asian Pac J Cancer Prev, 12*, 1261-4.

Rebecca T, Dalkhjja A, Gammada D, et al (2012). Breast cancer incidence in Mongolia. *Cancer Cause Control, 23*, 1047-53.

Schootman M, Lian M, Deshpande AD, et al (2010). Temporal trends in area socioeconomic disparities in breast-cancer incidence and mortality, 1988-2005. *Breast Cancer Res Treat, 122*, 533-43.

Suleeporn S, Arkom C, Pattama P, et al (2013). Obesity, diet and physical inactivity and risk of breast cancer in Thai women. *Asian Pac J Cancer Prev, 14*, 7023-7.

The National Central Cancer Registry (2004). Guideline for Chinese cancer registration. *Beijing: Peking Union Medical College Press, No. 48-50.*

Toi M, Ohashi Y, Seow A, et al (2010). The Breast Cancer Working Group presentation was divided into three sections: the epidemiology, pathology and treatment of breast cancer. *Jpn J Clin Oncol, 40* Suppl 1, i13-8.

Taghavi A, Fazeli Z, Vaheidi M, et al (2012). Incidence trend of breast cancer mortality in Iran. *Asian Pac J Cancer Prev, 13*, 367-70.
| Situation                      | Newly diagnosed without treatment | Newly diagnosed with treatment | Persistence or recurrence | Remission |
|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
| None                          | 12.8                              | 38.0                          | 46.8                     | 31.3      |
| Chemotherapy                  | 20.3                              | 54.2                          | 46.8                     | 31.3      |
| Radiotherapy                  | 25.0                              | 30.0                          | 30.0                     | 30.0      |
| Concurrent chemoradiation     | 10.3                              | 10.3                          | 10.3                     | 10.3      |
| Vogel VG (2008). Epidemiology, genetics, and risk evaluation of postmenopausal women at risk of breast cancer. *Menopause*, 15, 782-9. |
| Wang LD (2005). A General Report on Chinese National Nutrition And Health Survey in 2002. Beijing: People’s Health Press. |
| Wael MA-R, Yasser MM, Bassamat OA, et al (2012). Endocrine disruptors and breast cancer risk - time to consider the environment. *Asian Pac J Cancer Prev*, 13, 5937-46. |
| Xiang YB, Zhang W, Gao LF, et al (2004). Methods for time trend analysis of cancer incidence rates. *Chin J Epidemiol*, 25, 173-7. |
| Yang L, Li LD, Chen YD, et al (2006). Time trends, estimates and projects for breast cancer incidence and mortality in China. *Chin J Oncol*, 28, 438-40. |
| Youlden DR, Cramb SM, Nathan AM Dunn, et al (2012). The descriptive epidemiology of female breast cancer: An international comparison of screening, incidence, survival and mortality. *Cancer Epidemiology*, 36, 237-48. |
| Zhang ML, Huang ZH, Zheng Y, et al (2012). Estimates and prediction on incidence, mortality and prevalence of breast cancer in China, 2008. *Chin J Epidemiol*, 33, 1049-51. |
| Zheng Y, Wu CX, Wu F, et al (2011). Status and trends of breast cancer mortality in Chinese females. *Chinese Journal of Preventive Medicine*, 45, 150-4. |