

## RESEARCH ARTICLE

# Incidence and Mortality and Epidemiology of Breast Cancer in the World

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### Abstract

Breast cancer is the most common malignancy in women around the world. Information on the incidence and mortality of breast cancer is essential for planning health measures. This study aimed to investigate the incidence and mortality of breast cancer in the world using age-specific incidence and mortality rates for the year 2012 acquired from the global cancer project (GLOBOCAN 2012) as well as data about incidence and mortality of the cancer based on national reports. It was estimated that 1,671,149 new cases of breast cancer were identified and 521,907 cases of deaths due to breast cancer occurred in the world in 2012. According to GLOBOCAN, it is the most common cancer in women, accounting for 25.1% of all cancers. Breast cancer incidence in developed countries is higher, while relative mortality is greatest in less developed countries. Education of women is suggested in all countries for early detection and treatment. Plans for the control and prevention of this cancer must be a high priority for health policy makers; also, it is necessary to increase awareness of risk factors and early detection in less developed countries.

**Keywords:** Incidence – mortality – epidemiology - breast cancer – world

*Asian Pac J Cancer Prev, 17, Cancer Control in Western Asia Special Issue, 43-46*

### Introduction

Today, the burden of non-communicable diseases is growing in the world (Razi et al., 2015b; Zahedi et al., 2015) and its main reasons are: increased life time, prolong exposure to risk factors, and life style changes. Studies show that cancer is one of the most important diseases in the world and is complicated due to being multifactorial in an epidemiologic view. There were about 14.9 million new cases in the world in 2012. It is predicted that it will reach up to 22 million new cases in two decades (Ferlay et al., 2015). One of the most common cancers is breast cancer and it has a high incidence rate in all countries (Clegg et al., 2009). It includes 1.7 million new cases per year and 25% of all types of cancers, and is the second common cancer (Ferlay et al., 2015). The incidence rate of breast cancer ranges from 19.4 per 100,000 people in East Africa to 89.7 per 100,000 in West Europe (WHO, 2015).

Increased incidence and improved treatments have resulted in rising the prevalence of patients with breast cancer in the world. The importance of breast cancer as a disease with high incidence and death rate is really bold in developing countries. In most countries, breast cancer is among the main causes of death in women (Fitzmaurice et al., 2015). Breast cancer can be due to

unhealthy lifestyles (Chlebowski, 2013). In about half of patient cases and specifically 38% of deaths occur in developed countries. One of the risk factors of breast cancer is long time fertility that happens with menarche in early ages and menopause in old ages. The use of preventive pregnancy hormones and having no children are also among risk factors. Obesity after menopause, use of hormone replacement therapy, physical inactivity and alcohol consumption has also been reported as risk factors. In contrast, having children and breast-feeding can be among preventive factors (Torre et al., 2015).

Breast cancer is growing strongly in South America, Africa and Asia. Studies show that early detection of breast cancer has an important role in reducing the mortality rate and improving the prognosis of the disease (Rahimzadeh et al., 2014). In developed countries, more than 50 percent of eligible women are being screened but in these countries, immigrant women and the ones who have low economic status are being deprived of screening (Vahabi et al., 2015).

Living in less privileged areas is associated with decreased survival of patients. In these areas patients do not receive suitable care. Timely diagnosis is associated with socio-economic status (Downing et al., 2007). Awareness of disease incidence and its geographic distribution is necessary for better health planning

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(Almasi et al., 2015; Razi et al., 2015a) and lack of information about breast cancer incidence and geographical distribution is a big obstacle in planning health status and etiological studies. Hence, regarding lack of studies on this topic, this study was performed to assess the epidemiology, incidence and mortality rates of breast cancer in the world in 2012.

## Materials and Methods

In this study, data about the age-specific incidence and mortality rate (ASIR) for every Asian countries for the year 2012 were obtained from global cancer project available on <http://globocan.iarc.fr/Default.aspx> (Ferlay J, 2013).

### *Age-Specific Incidence Rate (ASIR)*

The methods of estimation are country specific and the quality of the estimation depends upon the quality and on the amount of the information available for each country. In theory, there are as many methods as countries, and because of the variety and the complexity of these methods, an overall quality score for the incidence and mortality estimates combined is almost impossible to establish. However, an alphanumeric scoring system which independently describes the availability of incidence and mortality data has been established at the country level. The combined score is presented together with the estimates for each country with an aim of providing a broad indication of the robustness of the estimation.

The methods to estimate the sex- and age-specific incidence rates of cancer for a specific country fall into one of the following broad categories, in priority order: 1- Rates projected to 2012 (38 countries), 2- Most recent rates applied to 2012 population (20 countries), 3-Estimated from national mortality by modelling, using incidence mortality ratios derived from recorded data in country-specific cancer registries (13 countries), 4- Estimated national mortality estimates by modelling, using incidence mortality ratios derived from recorded data in local cancer registries in neighboring countries (9 European countries), 5-Estimated from national mortality estimates using modelled survival (32 countries), 6- Estimated as the weighted average of the local rates (16 countries), 7- One cancer registry covering part of a country is used as representative of the country profile (11 countries)-8-Age/sex specific rates for “all cancers” were partitioned using data on relative frequency of different cancers (by age and sex) (12 countries), and

9-The rates are those of neighboring countries or registries in the same area (33 countries) (Ferlay J, 2013)

### *Age-Specific Mortality Rate (ASMR)*

Depending on the degree of detail and accuracy of the national mortality data, six methods have been utilized in the following order of priority: 1-Rates projected to 2012 (69 countries), 2- Most recent rates applied to 2012 population (26 countries), 3- Estimated as the weighted average of regional rates (1 country), 4- Estimated from national incidence estimates by modelling, using country-specific survival (2 countries), 5-Estimated from national incidence estimates using modelled survival (83 countries), and 6-The rates are those of neighboring countries or registries in the same area (3 countries).

## Results

### *The Incidence Rate*

It was estimated that there were 1,671,149 new cases of breast cancer in the world in 2012. Among the cases, 882.9(per 100,000) were attributed to less developed countries, while 793.7(per 100,000) of them were attributed to developed countries. According to Globocan, it is the most common cancer in women, with the standardized incidence rate of 43.1 per 100,000. It also includes 25.1% of all cancers.

Among the six regions of WHO, the highest breast cancer incidence rate (67.6) was observed in Paho, and the lowest incidence rate was 27.8 for SEARO (Table 1).

The highest incidence rate (111.9) was seen in Belgium, and the lowest rate (9) was related to Mongolia and Lesotho. Five countries with the highest standardized incidence rate (per 100,000) were Belgium (111.9), Denmark (105), Bahamas (98), and Netherlands (96), respectively. According to the division of the continents, the highest incidence rates were 91.6 and 91.1 for Northern America and Western Europe, respectively. However, the lowest incidence rates were 26.8 And 27 for Middle Africa and Eastern Asia, respectively (Figure 1).

### *The Mortality Rate*

It was estimated that 521,907 cases of deaths were due to breast cancer in the world in 2012. Breast cancer is the second cause of cancer death, with the standardized mortality rate (ASMR) of 12.9 (per 100,000), after lung cancer in the world. Breast cancer with the mortality rate of 12.9 is the first cause of cancer death in women.

Among the six regions of WHO, the highest standardized mortality rate (18.6) was observed in the EMRO, and the lowest rate was 7 for the WPRO. According to the division of the continents, the highest rate was 17, and the lowest rate was 6.9 for Africa and Eastern Asia, respectively (Map1). Five countries with the highest standardized mortality rate (per 100,000) were Fiji (28.4), Bahamas (26.3), Nigeria (25.9), FYR Macedonia (25.6), and Pakistan (25.2), respectively (Figure 2).

## Discussion

Based on the results of this study, breast cancer has

Table1. MIR in the Six Regions of W.H.O

MIR	AMSR	ASR	Regions
0.5	17.2	34.5	AFRO
0.2	14.0	67.6	PAHO
0.4	18.6	41.9	EMRO
0.2	16.0	66.5	EUROP
0.5	12.9	27.8	SEARO
0.3	7.0	28.6	WPRO

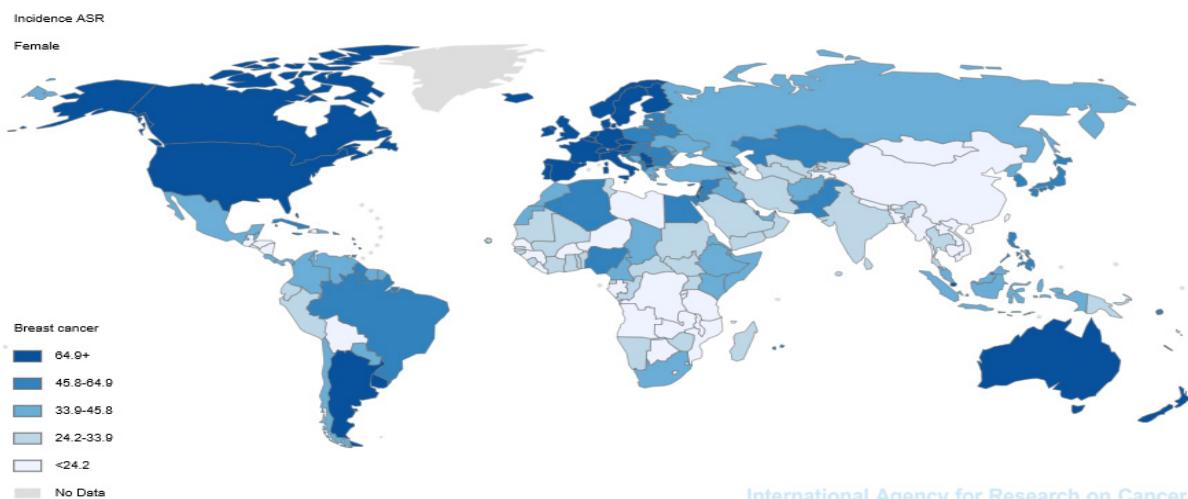


Figure 1. Distribution of the Standardized Incidence Rate of Breast Cancer in World in 2012 (Extracted from Globocan 2012)

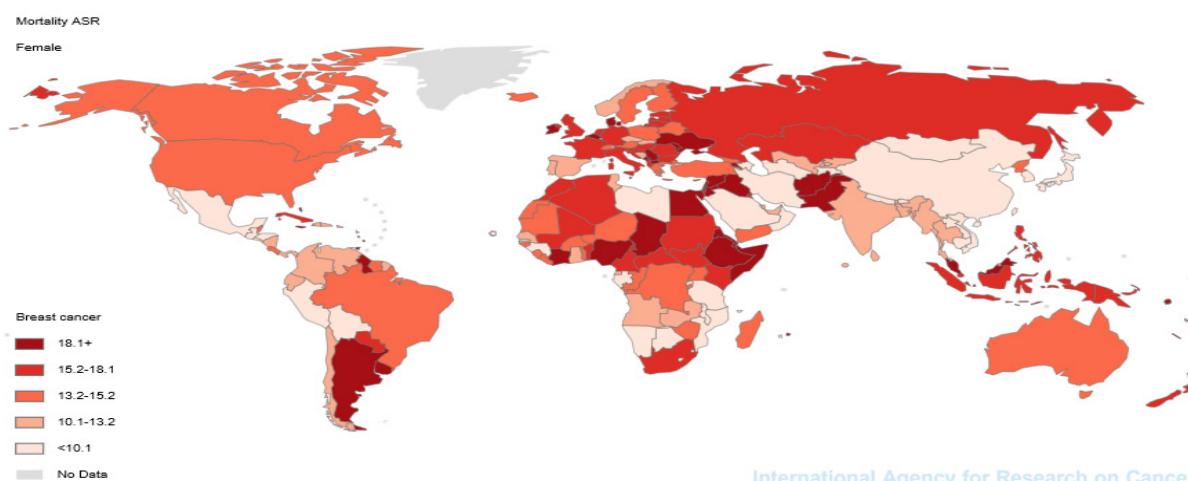


Figure 2. Distribution of Standardized Breast Cancer Mortality Rates in World in 2012 (Extracted from Globocan 2012)

a high incidence and mortality rate and is among the most common cancers in the world. According to World Health Organization, it is necessary to have a health system with high capacity which requires the development of knowledge, skills, commitment and effective performance management for the prevention and control of non-communicable diseases. Among Belgium, Denmark, Bahamas and Netherlands which have the highest incidence rate of breast cancer, all except Bahamas have national cancer registration system based on population, but among the countries with the highest death rate due to breast cancer, none of them have national population-based cancer registry (WHO, 2014). National Population-Based registration system is recommended as a way to control the disease (Roshandel et al., 2014).

A significant breast cancer increase has been observed in several Asian countries. Japan has experienced 6 percent increase per year from 1999 to 2008. Each year, 2% of deaths from breast cancer has decreased in Australia. In contrast, the death rate has increased in several countries. The highest increase was recorded in Malaysia and Thailand. The death rate to incidence ratio of breast cancer in Asia-Pacific countries and the world is 0.27 to

0.30 respectively. This ratio is 0.2 in the Pacific and 0.41 in Southeast Asian countries (Youlden et al., 2014).

In South Korea that Breast cancer incidence was rare, now incidence and death from this disease have increased (Choi et al., 2006). In Hong Kong, the incidence has declined (Hoerger et al., 2011). Brazil as a country that had successful role in public health, is faced with some problems due to women prognosis about breast cancer screening (Cecilio et al., 2015). In general, the differences in breast cancer incidence in different regions is due to difference in risk factors, level of education, average life expectancy in different countries, screening programs (Ghoncheh et al., 2015), and breast cancer registration (Razi et al., 2015a). And with increased life expectancy and increased life time and screening programs, the number of diagnosed cases of this cancer increases (Ghoncheh et al., 2015).

Breast cancer care management requires a multidisciplinary team: breast surgery, radiation and chemotherapy that need more resources and also related expertise to identify genes associated with breast cancer which requires accurate procedures and has high costs. For this reason, to have early detection and access to

care for all patients, it is necessary to reduce the gap in social levels (Yip et al., 2015). In this study, the cancer mortality in countries with lower income is higher. Women in low-income countries, especially in Africa, seek treatment in advanced stages of disease, when it has spread to other organs and care has a relief aspect in these people. In England and Australia, very few women are diagnosed in third and fourth stages of disease. In Kenya and Uganda, almost all women are diagnosed late and are associated with higher mortality (Munzone, 2014).

The changes in different areas mortality rates are due to several screening and treatment programs in these areas. More than half of women in the Middle East are diagnosed with lymph node involvement. Despite less common prevalence than Ashkenazi and Jewish women, the survival rate is lower in these women. In Mexico and South America, women are diagnosed at stages two or three of the disease. But 60 percent of East European women are diagnosed at stages one and two (Bhikoo et al., 2011). If the disease is diagnosed at a localized stage, the risk of cancer death will be less than death due to other reasons. And if the disease is diagnosed in regional stage, survival is in relation with age and other comorbid conditions. But with diagnosis in advanced stage, 69% of patients die up to five years after treatment. Studies show that survival in patients depends on diagnosis time and access to treatment facilities rather than characteristics of the tumor (Downing et al., 2007). Death due to breast cancer decreased in America (Harford et al., 2009). Because of access to better treatment and diagnostic facilities.

Breast cancer, is one of the most common cancers in the world and although its incidence is more in some developed countries, death is higher in countries with low level of development. Therefore, better plans for screening and early detection programs in these countries are suggested.

## References

- Almasi Z, Rafiemanesh H, Salehiniya H (2015). Epidemiology characteristics and trends of incidence and morphology of stomach cancer in Iran. *Asian Pac J Cancer Prev*, **16**, 2757-61.
- Bhikoo R, Srinivasa S, Yu TC, et al (2011). Systematic review of breast cancer biology in developing countries (part 2): asian subcontinent and South East Asia. *Cancers (Basel)*, **3**, 2382-401.
- Cecilio AP, Takakura ET, Jumes JJ, et al (2015). Breast cancer in Brazil: epidemiology and treatment challenges. *Breast Cancer (Dove Med Press)*, **7**, 43-9.
- Chlebowski RT (2013). Nutrition and physical activity influence on breast cancer incidence and outcome. *Breast*, **22**, S30-7.
- Choi Y, Kim Y, Park SK, et al (2006). Age-period-cohort analysis of female breast cancer mortality in Korea. *Breast Cancer*, **13**, 266-71.
- Clegg LX, Reichman ME, Miller BA, et al (2009). Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end results: National Longitudinal Mortality Study. *Cancer Causes Control*, **20**, 417-35.
- Downing A, Prakash K, Gilthorpe M, et al (2007). Socioeconomic background in relation to stage at diagnosis, treatment and survival in women with breast cancer. *Br J Cancer BJC*, **96**, 836-40.
- Ferlay JSI, Ervik M, Dikshit R, et al. (2013). Globocan 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer [Online]. Available: Available from: <http://globocan.iarc.fr>, accessed on 7/JUNE/2015.
- Ferlay J, Soerjomataram I, Dikshit R, et al (2015). Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*, **136**, E359-E86.
- Fitzmaurice C, Dicker D, Pain A, et al (2015). The Global Burden of Cancer 2013. *JAMA Oncol*, **1**, 505-27.
- Ghoncheh M, Mohammadian-Hafshejani A, Salehiniya H (2015). Incidence and Mortality of Breast Cancer and their Relationship to Development inAsia. *Asian Pac J Cancer Prev*, **16**, 6081-7.
- Harford JB, Edwards BK, Nandakumar A, et al (2009). Cancer control-planning and monitoring population-based systems. *Tumori*, **95**, 568-78.
- Hoerger TJ, Ekwueme DU, Miller JW, et al (2011). estimated effects of the national breast and cervical cancer early detection program on breast cancer mortality. *Am J Prev Med*, **40**, 397-404.
- Munzone E (2014). Highlights from the ninth European breast cancer conference, glasgow, 19-21 march 2014. *Ecancermedicalscience*, **8**, 426-32.
- Rahimzadeh M, Baghestani AR, Gohari MR, et al (2014). Estimation of the cure rate in Iranian breast cancer patients. *Asian Pac J Cancer Prev*, **15**, 4839-42.
- Razi S, Enayatrad M, Mohammadian-Hafshejani A, et al (2015a). The Epidemiology of Skin Cancer and its Trend in Iran. *Int J Prev Med*, **6**, 64-9.
- Razi S, Rafiemanesh H, Ghoncheh M, et al (2015b). Changing Trends of Types of Skin Cancer in Iran. *Asian Pac J Cancer Prev*, **16**, 4955-8.
- Roshandel G, Boreiri M, Sadjadi A, et al (2014). A diversity of cancer incidence and mortality in West Asian populations. *Ann Glob Health*, **80**, 346-57.
- Torre LA, Bray F, Siegel RL, et al (2015). Global cancer statistics, 2012. *CA Cancer J Clin*, **65**, 87-108.
- Vahabi M, Lofters A, Kumar M, et al (2015). Breast cancer screening disparities among urban immigrants: a population-based study in Ontario, Canada. *BMC Public Health*, **15**, 679.
- WHO, (2014). World Health Organization - Noncommunicable Diseases (NCD) Country Profiles, 2014. [Online]. WHO. Available: [http://www.who.int/nmh/countries/fji\\_en.pdf?ua=1](http://www.who.int/nmh/countries/fji_en.pdf?ua=1) 2015.
- WHO, (2015). Breast cancer: prevention and control [Online]. Available: <http://www.who.int/cancer/detection/breastcancer/en/index1.html#4/1/2015>.
- Yip CH, Buccimazza I, Hartman M, et al (2015). Improving outcomes in breast cancer for low and middle income countries. *World J Surg*, **39**, 686-92.
- Youlden DR, Cramb SM, Yip CH, et al (2014). Incidence and mortality of female breast cancer in the Asia-Pacific region. *Cancer Biol Med*, **11**, 101-15.
- Zahedi A, Rafiemanesh H, Enayatrad M, et al (2015). Incidence, trends and epidemiology of cancers in North West of Iran. *Asian Pac J Cancer Prev*, **16**, 7189-93.