The Incidence of Breast Cancer in Iran: A Systematic Review and Meta-Analysis

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Abstract: *Background*: Breast cancer is the most common invasive cancer among women globally. Its incidence greatly varies around the world the globe. There are several estimates of breast cancer incidence from different geographical areas in Iran. In addition, no systematic reviews are available pertaining to the incidence rate of breast cancer in Iran. Therefore, the present systematic review aimed to address this epidemiological gap.

Method: This systematic review was carried out based on the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) in January 2016. In doing so, the researchers searched Medline/PubMed, Scopus, Sciencedirect, and Google scholar for international papers and four Iranian databases (Scientific Information Database, MagIran, Iran Medex, and Iran Doc) for Persian articles.

Result: A total of 427 titles were retrieved in the initial search of the databases. Further refinement and screening of the retrieved studies produced a total of 18 researches. Based on the random effect model, the Age-Standardized Rate (ASR) of breast cancer was 26.4, 95% CI (20.1 to 31.7). However, the results of Cochran's test showed the heterogeneity of the studies (Q=1788.2, df=17, I^2=99%, p<0.001).

Conclusion: The incidence of breast cancer was lower in Iran compared to other parts of the world. However, establishing cancer registries covering a broader perspective of the population and carrying out further studies are needed to map out the exact incidence rate and trend of breast cancer in Iran.

Keywords: Incidence, Breast cancer, Iran.

INTRODUCTION

Cancer is now the leading cause of death globally [1]. In 2012, about 14.1 million new cases of cancer occurred worldwide [2], which led to an estimated 8.2 million deaths consisting of 14.6% of all human deaths [2]. Breast cancer is the most common invasive cancer among women worldwide [3, 4], affecting about 12% of women worldwide [1]. In 2012, breast cancer comprised 25.2% of the cancers diagnosed in women, making it the most common female cancer [2]. According to U.S. statistics of 2015, 2.8 million women were affected by breast cancer [5, 6].

The incidence of breast cancer greatly varies around the globe, with the highest and lowest rates being related to developed and less-developed countries, respectively [7]. The annual age-standardized incidence rates per 100,000 women in the twelve regions of the world have been reported as follows:18 in Eastern Asia, 22 in South-Central Asia, 22 in sub-Saharan Africa, 26 in South-Eastern Asia, 28 in North Africa and Western Asia, 42 in South and Central America, 56 in Southern Europe, 49 in Eastern Europe, 73 in Northern Europe, 78 in Western Europe, 90 in North America, and 74 in Oceania [5]. The incidence of breast cancer is on the increase in low- and middle-income countries like Iran, due to aging population, change in lifestyle, and industrialization [8]. Literally, breast cancer affects Iranian women at least one decade earlier compared to developed countries [9, 10].

The first formal cancer-related data from Iran were published by Habibi in 1962 [11]. In 1984, the National Cancer Registry (NCR) was established. After the foundation of the NCR, various reports of the incidence and prevalence of malignancies were published from single centers or different provinces of the country. Thus far, few studies and reports have been carried out on this issue in Iran. In line with the previous report by the Ministry of Health, Treatment, and Medical Education in 2009, breast cancer was the most

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common cancer among Iranian women (). Nevertheless, no systematic reviews have been carried out on the incidence rate of breast cancer in Iran. Hence, the present systematic review aims to address this epidemiological gap.

METHODS

This systematic review was designed and carried out in 2016. This review was undertaken in line with the Preferred Reporting Items for Systematic reviews and Meta-Analyses [PRISMA] [12].

Search Strategy of Systematic Reviews

In January 2016, the researchers searched Medline/PubMed, Scopus, Sciencedirect, and Google Scholar for international papers and four Iranian databases, namely Scientific Information Database [SID] (http://www.sid.ir), MagIran (www.magiran.com), IranMedex (www.iranmedex.com), and Irandoc (www.irandoc.ac.ir), for Persian articles. The keywords included: “breast cancer”, “breast neoplasms”, “breast tumor”, “human mammary neoplasms”, “ cancer of breast”, “neoplasms of breast”, “incidence”, and “Iran”. The results were imported into an EndNote X7 library and the duplicates were automatically removed. It should be noted that the two reviewers (So.H and Am.M) selected the articles independently.

Inclusion and Exclusion Criteria

The studies that clearly described the Age-Standardized Rate (ASR) of breast cancer and

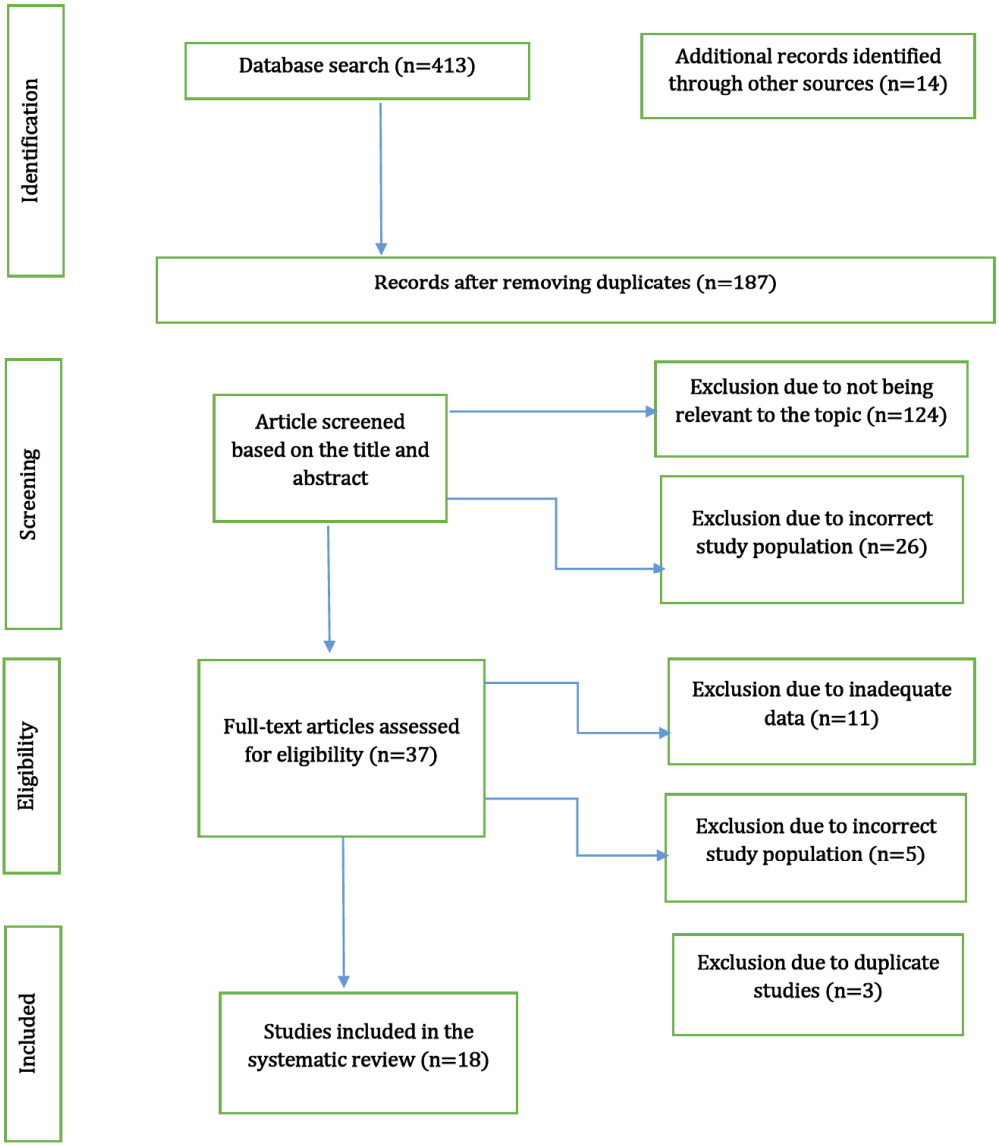

Figure 1: Flow chart of the eligible studies included in the review.

contained reports from Iranian populations were included in the review. On the contrary, the studies that reported the prevalence rate and were exclusively based on pathological data, and had inadequate sample size as well as conference or poster papers, were excluded from the analysis.

Statistical Analysis

Heterogeneity was assessed by Cochran's Q statistic (with a significance level of $p \leq 0.1$) combined with I^2 statistic (with a significance level of >50%). In the presence of significant heterogeneity ($p \leq 0.1$ and $I^2 \geq 50\%$), random effect model (with inverse variance method) was utilized. On the other hand, in case where there was no evidence of heterogeneity ($p > 0.1$ and $I^2 < 50\%$), fixed effect model was employed. All analyses were carried out using Stata software, version 12 (Stata Corp LP, College Station, Texas).

RESULTS

Description of Literature Search

The database, grey literature searches, and hand searching, yielded 427 potentially relevant studies. Overall, 187 unique studies were reviewed and 37 studies were entered into the second stage of evaluation. In total, our review included 18 unique studies. Study retrieval and selection is illustrated in Figure **1**. A number of studies were excluded from the review as a result of not being relevant to the topic (n=124), incorrect study population (n=31), duplicate study (n=3), and inadequate data (n=11). The flow chart of the included studies in this review is illutrated in Figure **1**.

Description of the Included Studies

The characteristics of the included studies are summarized in Table **1**. Considering geographical region, four studies were carried out in Iran [13-16], three in Fars province [17-19], two in Tehran province [20, 21], two in Golestan province [22, 23], one in Ardabil province [24], one in Semnan province [25], one in East Azerbaijan province [26], one in Khuzestan province [27], one in Kermanshah province [28], and one in Sistan and Baluchistan province [29]. In addition, one survey was conducted in five provinces [Ardabil, Gilan, Mazandaran, Golestan, and Kerman] [30]. It should be mentioned that all the studies reported ASRs.

Table 1: Basic Characteristics of the Studies Included in the Review

Order	Author/Year	Time period	Location	Sample size	ASR
1	Sadjadi 2003	1996-1999	Ardabil	3455	7.6
2	Babaei 2005	1998-2002	Semnan	1732	21.3
3	Mousavi 2006	1998-2001	Tehran	7098	17.9
4	Marjani 2009	2004	Golestan	348	11.8
5	Mohagheghi 2009	1998-2001	Tehran	15773	31.4
6	Mousavi 2009	2003-2006	Iran	61031	24
7	Sadjadi 2009	1996-2000	5 Provinces	2421	16.2
8	Radmard 2010	2000-2009	Iran	-	17.1
9	Masoompour 2011	1998-2002	Fars	8359	13
10	Hashemzadeh 2012	2003-2008	East Azerbaijan	12083	52.3
11	Mehrabani 2012	2001-2006	Fars	1988	19.1
12	Roshandel 2012	2004-2008	Golestan	9007	26.9
13	Faramarzi 2013	2001-2009	Fars	28654	112.9
14	Talaiezadeh 2013	2002-2009	Khuzestan	16801	26.4
15	Khademi 2014	2009-2010	Kermanshah	2263	22.5
16	Ghoncheh 2015	2012	Iran	9795	28.1
17	Jazayeri 2015	2000-2010	Iran	52068	27.4
18	Rafiemanesh 2015	2004-2009	Sistan and Baluchistan	3535	4.8

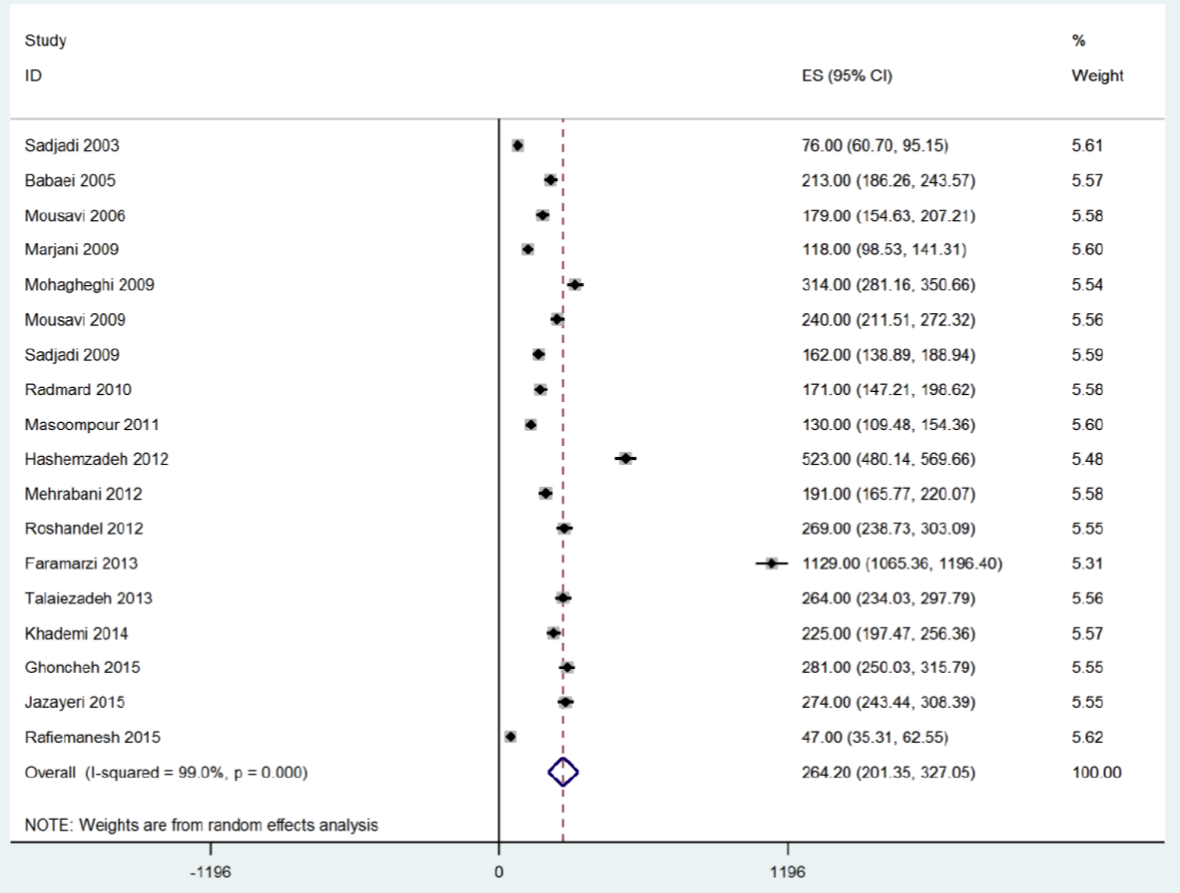

Figure 2: Forest plot of the random-effect meta-analysis for age standardized incidence rates of breast cancer in Iran.

The Results of Individual Studies

The highest ASR was reported from Fars province between 2001 and 2009 [112.9] [19], and the lowest ASR was reported from Sistan and Baluchistan province between 2004 and 2009 [4.8] [29].

The Results of Meta-Analysis

According to the random effect model, the ASR of breast cancer was 26.4, 95% CI (20.1 to 31.7). In addition, the results of Cochran's test showed the heterogeneity of the studies (Q=1788.2, df=17, I^2=99%, p<0.001). The forest plot of the random-effect meta-analysis for age standardized incidence rates of breast cancer in Iran is presented in Figure **2**. Owing to the small values of ASRs, all the measurements in the forest plot were multiplied by 10^6.

DISCUSSION

Iran is the 18th largest country in the world and second in the Middle East. It is a large and diverse country, with several different religious and ethnic groups. This country is divided into five main regions with 31 provinces. Recently, Iran was ranked as an upper middle-income country by the World Bank [31].

Cancer is the third leading cause of mortality in Iran [32]. Nevertheless, GLOBOCAN 2012 reported that breast cancer was the most common cancer among women in Iran [33]. The difference between the incidence rates reported from Iran and the GLOBOCAN studies might be attributed to the fact that the earlier mentioned studies made their estimations based on the hypothetical incidence of all cancer types calculated from various data sources in Iran.

Up to now, a limited number of studies have been carried out on cancer epidemiology in developing countries, such as Iran, which might be due to scarcity of tools for disease surveillance and control [34]. The first report on cancer occurrence in Iran dates back to the 1970s; a study on cancer in the Caspian littoral region between 1968 and 1972 [35, 36]. The 2009 NCR report revealed that breast cancer was the most common cancer among Iranian women [37, 38].

The findings of the current study showed that the ASR of breast cancer was low (26.4/100 000), as in

most Asian countries: 21.8, 20.6, and 33.3 in south central, eastern, and western Asia, respectively [1, 2, 39]. This is contrary to the report in Europe and North America with the highest rates of breast cancer (99.4 per 100 000 person-years for north America and 62.4, 82.5, 42.6, and 84.6 per 100 0000 person-years for southern, northern, western, and eastern and central Europe, respectively) [2, 3]. The difference can be due to variations in environmental exposure, level of income, lifestyle, and partially due to the presence of screening programs that detect early aggressive cancers in richer regions [39-41].

The mean age at the time of diagnosis of breast cancer is around 50 years in most developing countries, which is at least 1 decade younger in comparison to developed countries [42]. Thus, like in other Asian developing countries, the percentage of young and pre-menopausal women with breast cancer in our study was higher compared to reports from developed countries [4]. This might be attributed to the lower age structure of the Iranian population. Nevertheless, the ASR of breast cancer was 83.8 per 100 000 person-years in post-menopausal women (over the age of 50 years) in 5 provinces. On the other hand, the corresponding rates for the U.K., U.S., India, and China were 298, 354.5, 105, and 105.5 per 100 000 person-years[34], respectively.

According to the present study results, the lowest ASR of breast cancer in Iran was related to Ardabil and Sistan and Baluchistan provinces. According to various studies, reproductive patterns in Ardabil and Sistan and Baluchistan provinces, like earlier age at first pregnancy, older age at menarche, longer duration of breast-feeding, and greater number of pregnancies, have probably caused lower risk of breast cancer among women [43]. Lower rates of breast cancer in Ardabil and Sistan and Baluchistan provinces can also be explained according to the studies indicating a clear positive gradient in the risk of breast cancer by education level (illiteracy rate was 45.5% among women in Ardabil and 37.4% among those in Sistan and Baluchistan) and socioeconomic status [44, 45].

On the other hand, the highest ASR of breast cancer in Iran was related to Fars and Tehran provinces. Illiteracy rate among women, reproductive status, number of pregnancies, breastfeeding status, physical activity, environmental status, air pollution, and other lifestyle factors in Fars and Tehran provinces are different from those in Ardabil and Sistan and Baluchistan provinces [46-48].

Finally, it should be mentioned that the prevalence of the risk factors of cancer is high and is following an increasing trend in Iran [49]. Infact, due to increase in the number of old individuals and increase in life expectancy, the number of cancer cases is expected to rise rapidly in Iran in future [50].

CONCLUSION

The incidence of breast cancer in Iran was lower in comparison to other parts of the world. Thus, establishing cancer registries covering a broader perspective of the population and performing further studies are needed to map out the exact incidence rate and trend of breast cancer in Iran.

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CONFLICT OF INTEREST

None declared.

REFERENCES

[1] Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. CA Cancer J Clin 2016; 66(1): 7-30. http://dx.doi.org/10.3322/caac.21332

[2] Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, *et al*. GLOBOCAN 2012 v1. 0. Cancer incidence and mortality worldwide: IARC Cancer Base 2013; (11).

[3] Ma J, Jemal A. Breast cancer statistics. Breast Cancer Metastasis and Drug Resistance: Springer 2013; pp. 1-18. http://dx.doi.org/10.1007/978-1-4614-5647-6_1

[4] Stewart B, Wild CP. World cancer report 2014. World 2015.

[5] Siegel RL, Miller KD, Jemal A. Cancer statistics, 2015. CA Cancer J Clin 2015; 65(1): 5-29. http://dx.doi.org/10.3322/caac.21254

[6] Ostrom QT, Gittleman H, Liao P, Rouse C, Chen Y, Dowling J, *et al*. CBTRUS statistical report: primary brain and central nervous system tumors diagnosed in the United States in 2007–2011. Neuro Oncol 2014; 16(suppl 4): iv1-iv63. http://dx.doi.org/10.1093/neuonc/nou223

[7] Panieri E. Breast cancer screening in developing countries. Best practice & research. Clinical Obstetrics & Gynaecology 2012; 26(2): 283-90. http://dx.doi.org/10.1016/j.bpobgyn.2011.11.007

[8] DeSantis CE, Bray F, Ferlay J, Lortet-Tieulent J, Anderson BO, Jemal A. International variation in female breast cancer incidence and mortality rates. Cancer Epidemiology Biomarkers & Prevention 2015; 24(10): 1495-506. http://dx.doi.org/10.1158/1055-9965.EPI-15-0535

[9] Taghavi A, Fazeli Z, Vahedi M, Baghestani AR, Pourhoseingholi A, Barzegar F, *et al*. Increased trend of breast cancer mortality in Iran. Asian Pac J Cancer Prev 2012; 13(1): 367-70. http://dx.doi.org/10.7314/APJCP.2012.13.1.367

[10] Afsharfard A, Mozaffar M, Orang E, Tahmasbpour E. Trends in epidemiology, clinical and histopathological characteristics of breast cancer in Iran: results of a 17 year study. Asian Pac J Cancer Prev 2013; 14(11): 6905-11. http://dx.doi.org/10.7314/APJCP.2013.14.11.6905

[11] Habibi A. Cancer in Iran. Statistical data for the most frequent forms. Rev Med Moyen Orient 1962; 19: 302.

[12] Deshpande S, van Asselt A, Tomini F, Armstrong N, Allen A, Noake C, *et al*. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist 2013.

[13] Mousavi SM, Gouya MM, Ramazani R, Davanlou M, Hajsadeghi N, Seddighi Z. Cancer incidence and mortality in Iran. Ann Oncol 2009; 20(3): 556-63. http://dx.doi.org/10.1093/annonc/mdn642

[14] Radmard AR. Five common cancers in Iran. Arch Iran Med 2010; 13(2): 143-6.

[15] Ghoncheh M, Mohammadian-Hafshejani A, Salehiniya H. Incidence and Mortality of Breast Cancer and their Relationship to Development in Asia. Asian Pacific journal of cancer prevention: APJCP 2015; 16(14): 6081. http://dx.doi.org/10.7314/APJCP.2015.16.14.6081

[16] Jazayeri SB, Saadat S, Ramezani R, Kaviani A. Incidence of primary breast cancer in Iran: Ten-year national cancer registry data report. Cancer Epidemiol 2015; 39(4): 519-27. http://dx.doi.org/10.1016/j.canep.2015.04.016

[17] Masoompour SM, Yarmohammadi H, Rezaianzadeh A, Lankarani KB. Cancer incidence in southern Iran, 1998–2002: Results of population-based cancer registry. Cancer Epidemiol 2011; 35(5): e42-e7. http://dx.doi.org/10.1016/j.canep.2011.05.018

[18] Mehrabani D, Almasi A, Farahmand M, Ahrari Z, Rezaianzadeh A, Mehrabani G, *et al*. Incidence of breast cancer in Fars province, southern Iran: A hospital-based study. World journal of plastic surgery 2012; 1(1): 16.

[19] Faramarzi H, Bagheri P, Farahmandfar M, Lari MA. Cancer occurrence in the south of Iran based upon pathology reports (2001–2009). Journal Africain du Cancer/African Journal of Cancer 2013; 5(3): 137-43. http://dx.doi.org/10.1007/s12558-013-0263-z

[20] Mousavi SM, Mohaghegghi MA, Mousavi-Jerrahi A, Nahvijou A, Seddighi Z. Burden of breast cancer in Iran: a study of the Tehran population based cancer registry. Asian Pac J Cancer Prev 2006; 7(4): 571.

[21] Mohagheghi M-A, Mosavi-Jarrahi A, Malekzadeh R, Parkin M. Cancer incidence in tehran metropolis: the first report from the tehran population-based cancer registry. Arch Iran Med 2009; 12(1): 15-23.

[22] Marjani A, Kabir M. Breast cancer incidence among females in the Golestan province, Iran. Indian J Cancer 2009; 46(4): 351-2. http://dx.doi.org/10.4103/0019-509X.55564

[23] Roshandel G, Sadjadi A, Aarabi M, Keshtkar A, Sedaghat SM, Nouraie SM, *et al*. Cancer incidence in Golestan Province: report of an ongoing population-based cancer registry in Iran between 2004 and 2008. Arch Iran Med 2012; 15(4): 196-200.

[24] Sadjadi A, Malekzadeh R, Derakhshan MH, Sepehr A, Nouraie M, Sotoudeh M, *et al*. Cancer occurrence in Ardabil: Results of a population-based Cancer Registry from Iran. Int J Cancer 2003; 107(1): 113-8. http://dx.doi.org/10.1002/ijc.11359

[25] Babaei M, Mousavi S, Malek M, Tosi G, Masoumeh Z, Danaei N, *et al*. Cancer occurrence in Semnan Province, Iran: results of a population-based cancer registry. Asian Pac J Cancer Prev 2005; 6(2): 159-64.

[26] Hashemzadeh S, Aligholipour Maleki R, Golzari SE. The Incidence of Breast Cancer in Northwest Iran (2003 -2008). Journal of Cardiovascular and Thoracic Research 2012; 4(1): 5-9.

[27] Talaiezadeh A, Tabesh H, Sattari A, Ebrahimi S. Cancer incidence in southwest of iran: first report from khuzestan population-based cancer registry, 2002-2009. Asian Pac J Cancer Prev 2013; 14(12): 7517-22. http://dx.doi.org/10.7314/APJCP.2013.14.12.7517

[28] Khademi N, Khasi K. Epidemiology of Females Cancer in Kermanshah in (2009-2010). Laboratory and diagnostics 2014; 24(2): 32-9.

[29] Rafiemanesh H, Mehtarpoor M, Mohammadian-Hafshejani A, Salehiniya H, Enayatrad M, Khazaei S. Cancer epidemiology and trends in Sistan and Baluchestan province, Iran. Med J Islam Repub Iran 2015; 29(1): 752-9.

[30] Sadjadi A, Nouraie M, Ghorbani A, Alimohammadian M, Malekzadeh R. Epidemiology of breast cancer in the Islamic Republic of Iran: first results from a population-based cancer registry 2009.

[31] Group WB. World Development Indicators 2012: World Bank Publications 2012.

[32] Forouzanfar MH, Sepanlou SG, Shahraz S, BESc PN, Pourmalek F, Lozano R, *et al*. Evaluating causes of death and morbidity in Iran, global burden of diseases, injuries, and risk factors study 2010. Arch Iran Med 2014; 17(5): 304.

[33] Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, *et al*. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer 2015; 136(5): E359-E86. http://dx.doi.org/10.1002/ijc.29210

[34] Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. CA Cancer J Clin 2015; 65(2): 87-108. http://dx.doi.org/10.3322/caac.21262

[35] Kmet J, Mahboubi E. Esophageal cancer in the Caspian littoral of Iran: initial studies. Science 1972; 175(4024): 846-53. http://dx.doi.org/10.1126/science.175.4024.846

[36] Mahboubi E, Kmet J, Cook P, Day N, Ghadirian P, Salmasizadeh S. Oesophageal cancer studies in the Caspian Littoral of Iran: the Caspian cancer registry. Br J Cancer 1973; 28(3): 197. http://dx.doi.org/10.1038/bjc.1973.138

[37] Vostakolaei FA, Broeders MJ, Mousavi SM, Kiemeney LA, Verbeek AL. The effect of demographic and lifestyle changes on the burden of breast cancer in Iranian women: A projection to 2030. The Breast 2013; 22(3): 277-81. http://dx.doi.org/10.1016/j.breast.2012.07.002

[38] National Cancer Registry report. Iran: Cancer Administration, Noncommunicable Diseases Sector, Iranian Center for Diseases Control and Prevention 2009.

[39] Parkin DM, Fernández LM. Use of statistics to assess the global burden of breast cancer. The breast journal 2006; 12(s1): S70-S80. http://dx.doi.org/10.1111/j.1075-122X.2006.00205.x

[40] Jemal A, Center MM, DeSantis C, Ward EM. Global patterns of cancer incidence and mortality rates and trends. Cancer Epidemiology Biomarkers & Prevention 2010; 19(8): 1893-907. http://dx.doi.org/10.1158/1055-9965.EPI-10-0437

[41] Hassanipour-Azgomi S, Mohammadian-Hafshejani A, Ghoncheh M, Towhidi F, Jamehshorani S, Salehiniya H. Incidence and mortality of prostate cancer and their relationship with the Human Development Index worldwide. Prostate International 2016; 4(3): 118-24. http://dx.doi.org/10.1016/j.prnil.2016.07.001

[42] Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, *et al*. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet 2013; 380(9859): 2095-128. http://dx.doi.org/10.1016/S0140-6736(12)61728-0

[43] Alireza S, Mehdi N, Ali M, Alireza M, Reza M, Parkin D. Cancer occurrence in Iran in 2002, an international perspective. Asian Pac J Cancer Prev 2005; 6(3): 359.

[44] Dumitrescu R, Cotarla I. Understanding breast cancer risk-where do we stand in 2005? J Cell Mol Med 2005; 9(1): 208-21. http://dx.doi.org/10.1111/j.1582-4934.2005.tb00350.x

[45] Rarani MA, Rafiye H, Morasae EK. Social health status in iran: an empirical study. Iranian Journal of Public Health 2013; 42(2): 206.

[46] Maharlouei N, Zakeri Z, Mazloomi E, Lankarani KB. Maternal mortality rate in Fars Province: trends and associated factors in a community-based survey. Arch Iran Med 2012; 15(1): 14.

[47] Hosseinpoor AR, Van Doorslaer E, Speybroeck N, Naghavi M, Mohammad K, Majdzadeh R, *et al*. Decomposing socioeconomic inequality in infant mortality in Iran. Int J Epidemiol 2006; 35(5): 1211-9. http://dx.doi.org/10.1093/ije/dyl164

[48] Keramatinia A, Hassanipour S, Nazarzadeh M, Wurtz M, Monfared A, Khayyamzadeh M, *et al*. Correlation Between Nitrogen Dioxide as an Air Pollution Indicator and Breast Cancer: a Systematic Review and Meta-Analysis. Asian Pacific journal of cancer prevention: APJCP 2015; 17(1): 419-24. http://dx.doi.org/10.7314/APJCP.2016.17.1.419

[49] Mousavi SM, Gouya MM, Ramazani R, Davanlou M, Hajsadeghi N, Seddighi Z. Cancer incidence and mortality in Iran. Ann Oncol 2008; mdn642. http://dx.doi.org/10.1093/annonc/mdn642

[50] Torre LA, Siegel RL, Ward EM, Jemal A. Global cancer incidence and mortality rates and trends—an update. Cancer Epidemiology Biomarkers & Prevention 2016; 25(1): 16-27. http://dx.doi.org/10.1158/1055-9965.EPI-15-0578

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