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The Geographical Distribution of Breast Cancer Incidence Using Geographic Information System in Khorasan Razavi Province, North East Iran: A Registry-based Study

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ABSTRACT

Background & aim: Breast cancer is top-ranking cancer among women regarding its incidence and mortality rates. This study aimed to estimate the possible geographical distribution of breast cancer in the Khorasan Razavi province, North East Iran.

Methods: This registry-based study utilized data from the cancer registry, focusing on patients registered from 2013 to 2017 in Khorasan Razavi Province, North East Iran. Information from clinical, pathological, and cytological evaluations, as well as death certificates, was collected. Sample size was determined through full enumeration, including all diagnosed patients with breast cancer. Statistical analyses were performed using Stata V. 14 and SPSS V. 20, incorporating mean ± SD and frequency reporting. Incidence rates, age-standardized rates, and geographic clustering were assessed using ArcMap V. 10.6.1 software.

Results: Over five years, 5553 patients with breast cancer were diagnosed. The average diagnosis age of the patients was 51.41 ± 12.94 years. The age-standardized incidence rate (ASR) between 2013 and 2017 was 54.3, 40.9, 44.8, 42.8, and 40, respectively, which revealed an almost decreasing trend. Bakharz and Taibad cities have the highest and lowest incidence rates compared to neighborhood cities in Khorasan Razavi province, respectively. Anselin Local Moran's I test revealed that there is no identified significant cluster in the counties of Khorasan Razavi (P>0.05).

Conclusion: The study suggests a decreasing trend in breast cancer incidence, with the highest rates in the 40-49 age group. Recommendations include implementing screening and prevention measures, particularly targeting high-risk populations to address this health concern.

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Introduction

The non-communicable diseases are the most common cause of death in the world, and cancer is expected to be the main cause of death in the world in the 21st century (1). Based on the World Health Organization (WHO) estimates in 2015, in 91 countries of the world, cancer is the

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first or second cause of death among people aged under 70 years; it is also the third or fourth cause of death in 22 countries (2). Meanwhile, the most common type of cancer and one of the main causes of death among women is breast cancer (3). Although cancer is a global disease, its incidence is significantly different in various countries; it can be caused by such factors as lifestyle, genetic factors, population structure, and environmental factors (4-6). The incidence of breast cancer has increased due to the increasing changes in risk factors (7). According to the report of the American Cancer Society in 2019, 268,000 women were among the new breast cancer cases, of which 41,760 died due to this disease (8). There are substantial geographical variations in breast cancer incidence. According to the GLOBOCAN estimates in 2018, Australia/New Zealand, Western Europe, Northern Europe, and Northern America had the highest incidence rates of breast cancer among women (90 per 100,000 individuals), and Central Africa and South Central Asia had the lowest incidence rates (27 per 100,000 individuals) (2). The incidence of breast cancer is higher in developed countries due to the higher prevalence of the cancer risk factors such as use of oral contraceptives, higher age at first pregnancy, low parity, high-calorie diet, sedentary career, use of HRT (Hormone Replacement Therapy), and alcohol ingestion (2, 9, 10). The incidence and prevalence of breast cancer in Asian countries compared to Europe and the United States are lower. However, the mortality rate is much higher in low-income countries than Europe and the United States. This difference may be related to low breast cancer awareness, delay in diagnosis of disease, lack of access to healthcare facilities, and lack of successful implementation of a national screening program in Asian countries (11-13). In addition, Asia has about 60% of the global population (2). According to the estimates of the International Agency for Research on Cancer, there will be a rapid increase in global cancer cases, and the highest incidence rate will be in developing continents including Africa, Asia, and Central and South America (14). Different studies identified breast cancer as a major problem in Asian countries, including Qatar, Saudi Arabia, Iraq, and Bahrain (15-18), and the average age-standardized incidence rate (ASR) in these countries is 20.4 cases per 100,000 (19). Another study showed that Pakistan has the highest mortality rate of breast cancer among Asian countries (20).

Cancer is the third cause of death in Iran (21). According to the studies conducted in Iran, breast cancer incidence is raising and includes 25% of all cancers (22). In research conducted on the breast cancer incidence in Iran in 2017, the highest ASR (per 100,000 women) was found in the provinces of Tehran (57.40), Isfahan (51.90), Yazd (48.70), Gilan (48.00), Khorasan Razavi (45.50) and Alborz (47.60) (23, 24). The average age at diagnosis of breast cancer in Iran is about 10 to 15 years lower than in developing countries (25). In addition to the potential risk of death, cancer can have adverse effects on the physical, social, psychological, and economic dimensions, as well as the overall quality of life of patients and their family members. In recent years, Khorasan Razavi Province has experienced the steepest increasing trend in breast cancer incidence (23). Therefore, it is of high importance to pay attention to the epidemiological aspects of this disease for better management and also to make more appropriate plans to prevent it in this province (11, 26). However, few studies have been performed in Khorasan Razavi province in this regard. Different reports can document the potential high-risk areas (areas with a high incidence of breast cancer). In that case, policymakers should take actions for timely diagnosis, prevention, and control of disease in these places. To address this issue, the crucial aim of this study was to estimate and examine the spatial distribution of breast cancer incidence in Khorasan Razavi province between 2013 and 2017.

Materials and Methods

This registry-based study was performed based on the data recorded in the cancer registry of Khorasan Razavi, North East Iran between 2013 and 2017. This study is a type of clinical research study in which data is collected from the electronic cancer registry database (27). Cancer registration in this province is based on data collection from clinical, pathological, and cytological evaluations as well

as death certificates. The data was obtained from the Health Vice-Chancellor of Mashhad University of Medical Sciences after observing the necessary formalities. The method of determining the sample size was full enumeration and all patients who were diagnosed between 2013 and 2017 and whose information was registered in the cancer registration system were included in the study. After refining and coding the data in Excel, the patients' information were sorted alphabetically for multiple registrations. Then, 1) Patients whose information was recorded only once were included in the study. 2) Patients whose diagnosis date, sex, or age were unknown were excluded from the study. 3) Patients who were registered duplicated were not included in the study.

In order to collect information, a researcher-made checklist was used and its validity was confirmed by five clinical and epidemiologists. Then, the required data were extracted from the information recorded in the electronic cancer registry database using the aforementioned checklist. Notably, a small subsample (10% of the total sample) was used as a pilot study to check agreement with the previously coded data and to determine the pattern and extent of inaccuracies.

Mean ± SD and frequency (percent) were used to summarize the quantitative and qualitative variables, respectively. All these statistical analyzes were performed by Stata V. 14 and SPSS V. 20 software at the significance level of 0.05.

The ASR was calculated by the direct standardization method using the world standard population. Furthermore, the incidence rates (per 100,000 individuals) were calculated both as a whole and separately for each city of Khorasan Razavi province for each year. Then, the ArcMap V. 10.6.1 software was applied for mapping the incidence rates per 100,000 individuals in the cities of Khorasan Razavi province. as Additionally, the Anselin Local Moran's I test was used to cluster and outlier analysis or assess the presence or absence of significant geographic differences in the cities of Khorasan Razavi province in terms of the crude rates of breast cancer incidence with ArcMap V. 10.6.1 software. It is notable that Khorasan Razavi province includes 33 cities, and in this study, we had information on 24 cities.

Results

During the five years of investigation, the total number of identified breast cancer cases in Khorasan- Razavi Province were 5553 cases. As shown in Table 1, the average diagnosis age of the patients was 51.41 ± 12.94 years. The distribution of diagnosed cases based on age groups is illustrated in Table 1 and Figure 1.

Table 1. Frequency distribution (percent) of new cases of diagnosed breast cancer in terms of age groups and year in Khorasan Razavi province between 2013 and 2017#

Age	Total	Year				
		2013	2014	2015	2016	2017
Mean±SD	51.41±12.94	51.22±13.70	51.64±12.47	51.12±12.39	51.95±13.30	51.18±12.56
10-19 years	3 (0.1)	1 (0.1)	1 (0.1)	0 (0)	1 (0.1)	0 (0)
20-29 years	123(2.2)	34 (2.5)	25 (2.4)	20 (1.8)	22 (2.1)	22 (2.2)
30-39 years	872 (15.7)	228 (16.8)	141 (13.8)	185 (16.5)	161 (15.4)	157 (15.7)
40-49 years	1710 (30.8)	420 (30.9)	313 (30.6)	342 (30.5)	326 (31.2)	309 (30.9)
50-59 years	1486 (26.8)	351 (25.8)	289 (28.2)	312 (27.8)	258 (24.7)	276 (27.6)
60-69 years	833 (15)	187 (13.8)	158 (15.4)	175 (15.6)	156 (14.9)	157 (15.7)
70< years	526 (9.5)	139 (10.2)	97 (9.5)	88 (7.8)	122 (11.7)	80 (8.0)
Total Number	5553	1360	1024	1122	1046	1001

#The values are reported as Mean ± SD and frequency (percent)

Most cases of the diagnosed cases are in the age group of 40-49 years. The same pattern was observed regarding years of under study as well. While the age group of 50-59 years has the highest crude incidence rate per 100,000 individuals. In this study, the crude incidence decreased from 52.50 in 2013 to 38.70 cases per 100,000 individuals in 2017. Also, the ASR

between 2013 and 2017 was 54.30, 40.90, 44.80, 42.80, and 40.00 per 100,000 individuals, respectively. In general, the trend of the disease is decreasing during the years under study except in 2015 which observed an increase in the trend of disease (Table 2).

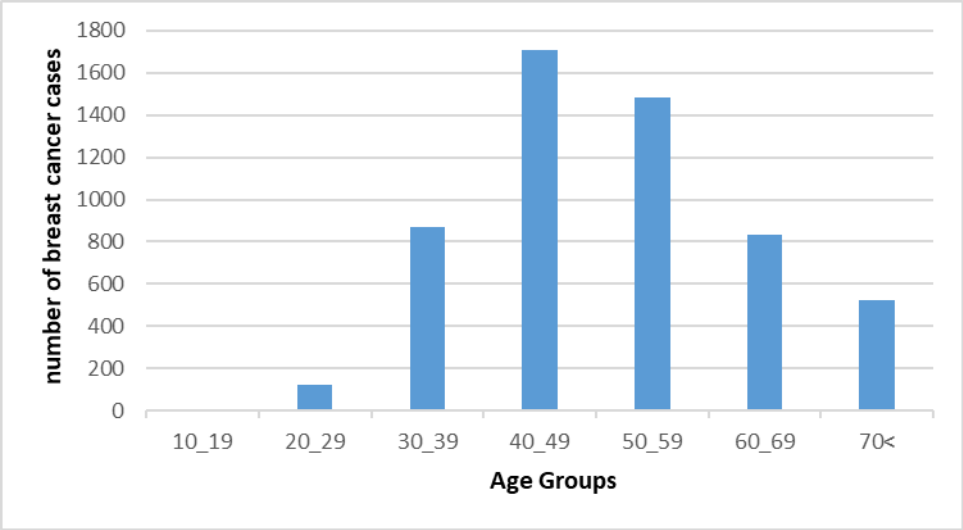

Figure 1. The number of new cases of diagnosed breast cancer by age groups in Khorasan Razavi province between 2013 and 2017

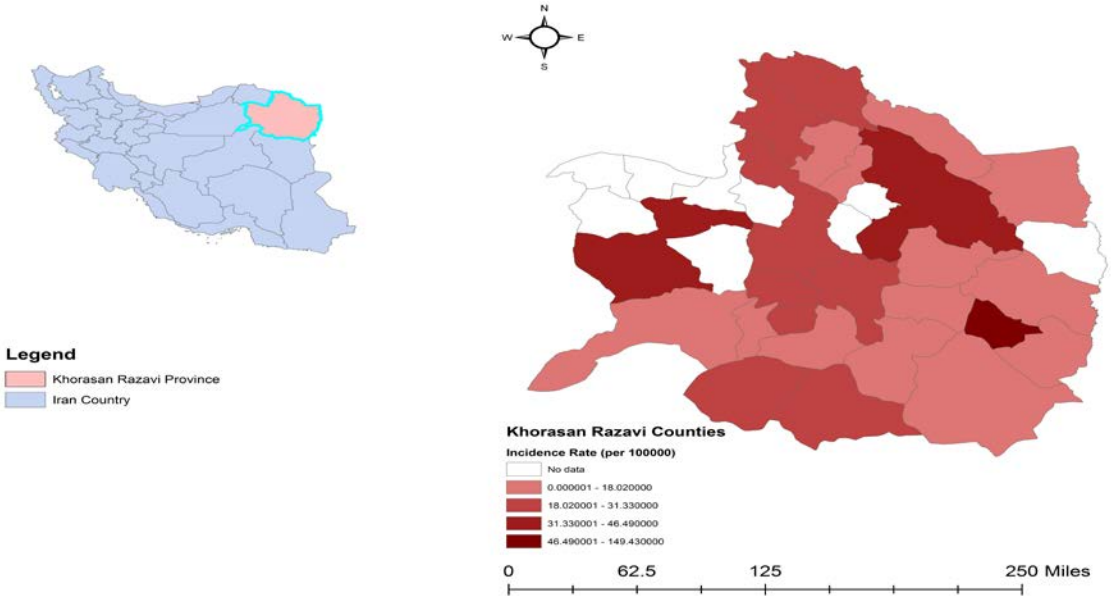

Figure 2. Overall crude incidence rate of breast cancer (per 100,000 individuals) in the counties of Khorasan Razavi province

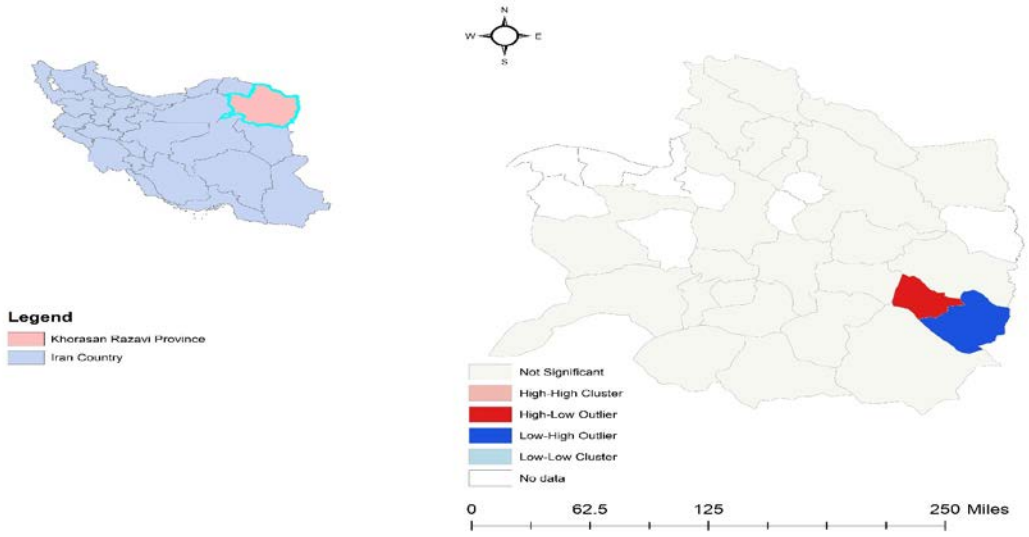

Figure 3. Geographical cluster analysis of the overall crude incidence rate of breast cancer (per 100,000 individuals) in the counties of Khorasan Razavi province

The zoning of the total calculated incidence rate (per 100,000 individuals) at the level of the counties of Khorasan Razavi province between 2013 and 2017 is depicted in Figure 2. The highest rate of crude occurrence (per 100.000 individuals) was in Bakharz County (149.43) followed by Sarakhas (18.02), Khalilabad (15.71), Torbet Jam (13.91), Chenaran (13.50), Golbahar (13.50), Bardaskan (13.40), Mehvelat (11.81), Fariman (11.15), Roshtkhar (10.71), Kalat (10.09), Khaf (9.61), Zaveh (8.35). Taybad (6.94 per 100.000 individuals) had the lowest incident rate.

Table 2. Crude incidence and age-standardized incidence rate (per 100,000 individuals) in Khorasan Razavi province between 2013 and 2017 by age groups

Rate	Year				
	2013	**2014**	**2015**	**2016**	**2017**
Crude incidence	52.5	39.5	43.3	41.4	38.7
Age-standardized	54.3	40.9	44.8	42.8	40
95 % ASR CI	(51.4-57.2)	(38.4-43.4)	(42.2-47.5)	(40.3-45.4)	(37.5-42.5)
Age Group					
10-19	0.21	0.21	0	0.21	0
20-29	5.91	4.35	3.48	3.83	3.83
30-39	37.75	23.35	30.63	26.66	26.00
40-49	108.89	81.14	88.66	84.51	80.11
50-59	128.05	105.43	113.82	103.97	100.69
60-69	118.69	100.28	111.08	99.01	99.65
70<	114.51	100.28	111.08	99.01	99.65

Next, Anselin Local Moran's I test was applied to assess significant geographical differences, that is to identify significant clusters and outlying areas, at the level of the counties of Khorasan Razavi province in terms of the total crude incidence rate between 2013 and 2017 (Figure 3). Considering the results of this test, no significant cluster was identified in terms of

the total crude occurrence rate in the counties of Khorasan Razavi province (P > 0.05). Only the crude incidence rate of breast cancer in Bakharz County was significantly higher than the neighboring counties, which requires more investigation and attention. Also, the crude incidence rate of breast cancer in Taybad County was significantly lower than other counties.

Discussion

This study aimed to estimate the possible geographical distribution of breast cancer in the Khorasan Razavi province. In this study, according to the data related to 5,553 breast cancer patients, the highest incidence rate was related to the age group of 40-49 years and the trend of ASR in this age group was decreasing. The possible reason could be related to advances in diagnostic tools, close supervision, special attention, and extensive healthcare system efforts in recent years. Generally, developed countries have higher incidence rates of breast cancer compared to many low- and middle-income countries (LMICs) (2, 10). The various geographical patterns of breast cancer incidence could be associated with different risk factors and the availability of screening mammography (27). In addition, according to the 2012 report by GLOBOCAN, the ASR of cancer in developed countries was 74.10 per 100,000 individuals and in developing countries, it was 31.3 per 100,000. Also, the highest rate was in Eastern Europe with 96 per 100,000 and the lowest one was in Central Africa with 26.8 per 100,000 individuals (8). In 2020, this rate was reported as 95.5 per 100,000 in developed countries and 26.2 per 100,000 in developing countries, which showed an increase in ASR in developed countries (28). The results of our study are in line with these results. Although in this study, the ASR in 2017 was estimated to be 40 per 100,000 which was higher than the average in developing countries, it was significantly lower compared to developed countries. A 10-year study in Bahrain showed a decrease in ASR during 2000-2010 (18), which is consistent with the results of this study. In the study by Ahmadi et al. (2018), the ASR in Iran was 29.88 per 100,000 (29), and in this study, it was higher than the mentioned value, which can be due to the better quality of information registration in the Khorasan Razavi cancer registration system, more comprehensive implementation of screening programs, or a real increase in the incidence. Also, we witnessed that breast cancer was most common in the age range of 40-60 years, which was in line with the findings of Ahmadi et al. (2018) (29). According to the study by Varghese et al. (2018) in the United States, breast cancer incidence increased with age and its peak was in the age group of 55-64 years (30). In the study by Manzouri et al. (2021), the average age for the diagnosis of breast cancer was 41.45 years in Yasouj, Iran (31). A study conducted in China also showed that the age group of 40-45 had the highest number (32).

The main strength of this study is that it is a population-based study, which deals with investigating the epidemiology and geographical variation of breast cancer incidence in the Khorasan Razavi province. This study is of high value and can show the changes in the epidemiological picture of the disease in society. This type of study is precious, especially in developing countries where recording and maintaining data face many problems.

However, the current study had some limitations. 1) Due to the incomplete registration of diseases, some patients were eliminated. 2) The low number of breast cancer cases in this study could be related to failure to identify all cancer cases, missing reports, and the referral of some cancer patients in this province to neighboring provinces. 3) Another critical point was that these studies represented the diagnosed cancer cases each year rather than the actual incidence rate in the same year. 4) Due to the lack of registration of clinical and pathological variables of the disease in the cancer registration system, the present study did not provide any information about the reasons for the observed changes in the incidence of this cancer. All the possible reasons raised in this study are hypotheses that need further investigation in future studies.

Conclusion

The results of our study demonstrated that the incidence rate of breast cancer in Khorasan Razavi Province decreased except in 2015. In addition, Bakharz and Taibad cities have the highest and lowest incidence rates compared to

neighborhood cities in Khorasan Razavi province, respectively. Therefore, it is recommended that the responsible authorities take the following measures: promoting the cancer registration system of the province, conducting synthetic prevention, careful evaluation of breast cancer risk factors, performing basic and in-depth clinical studies, reinforcing early detection and screening programs, combining prevention programs, and controlling preventable risk factors, especially in high-risk populations.

Declarations

Acknowledgements

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Conflicts of interest

Authors declared no conflicts of interest.

Ethical considerations

Patients' data were obtained after getting the ethical code from the ethical review committee of the Mashhad University of Medical Sciences. Also, all patient information was considered confidential. In addition, the supporting data of the study would be available from the corresponding author upon reasonable request.

Ethical approval

The ethics committee of Mashhad University of Medical Sciences has approved this research with the code (ethical code: IR.MUMS.REC. 1401.020).

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Authors' contribution

A T and M A supervised the study. A K participated in data collection, data analysis, M S and H D assisted with data interpretation. N S assisted with data analysis. All authors have read and approved the manuscript.

References

1. Omran AR. The epidemiologic transition. A theory of the Epidemiology of population change. 1971. Bull World Health Organ. 2001; 79(2): 161-170.
2. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. A Cancer Journal for Clinicians. 2018; 68(6): 394-424.
3. 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. International Journal of Cancer. 2015; 136(5): E359-E86.
4. Luginaah IN, Gorey KM, Oiamo TH, Tang KX, Holowaty EJ, Hamm C, et al. A geographical analysis of breast cancer clustering in southern Ontario: generating hypotheses on environmental influences. International Journal of Environmental Health Research. 2012; 22(3): 232-348.
5. Kiadaliri AA. Social disparity in breast and ovarian cancer incidence in iran, 2003-2009: a time trend province-level study. Journal Breast Cancer. 2013; 16(4): 372-377.
6. 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. International Journal of Cancer. 2003; 107(1): 113-118.
7. Hortobagyi GN, de la Garza Salazar J, Pritchard K, Amadori D, Haidinger R, Hudis CA, et al. The global breast cancer burden: variations in epidemiology and survival. Clinical Breast Cancer. 2005; 6(5): 391-401.
8. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. A Cancer Journal for Clinicians. 2015; 65(2): 87-108.
9. Dolatkhah R, Somi MH, Jafarabadi MA, Hosseinalifam M, Sepahi S, Belalzadeh M, et al. Breast cancer survival and incidence: 10 years cancer registry data in the Northwest, Iran. International Journal of Breast Cancer. 2020; 2020.
10. Farhood B, Geraily G, Alizadeh A. Incidence and mortality of various cancers in Iran and compare to other countries: a review article. Iranian Journal of Public Health. 2018; 47(3): 309.
11. Jazayeri SB, Saadat S ,Ramezani R, Kaviani A. Incidence of primary breast cancer in Iran: Ten-year national cancer registry data report. Cancer Epidemiology. 2015; 39(4): 519-527.
12. Medhin LB, Tekle LA, Fikadu DT, Sibhatu DB, Gebreyohans SF, Gebremichael KH, et al. Incidence of Breast Cancer in Eritrea: A

Retrospective Study from 2011 to 2017. International Journal of Breast Cancer. 2019; 2019(1): 8536548.
13. Stapleton JM, Mullan PB, Dey S, Hablas A, Gaafar R, Seifeldin IA, et al. Patient-mediated factors predicting early-and late-stage presentation of breast cancer in Egypt. Psycho-Oncology. 2011; 20(5): 532-537.
14. Adeloye D, Sowunmi OY, Jacobs W, David RA, Adeosun AA, Amuta AO, et al. Estimating the incidence of breast cancer in Africa: a systematic review and meta-analysis. Journal of Global Health. 2018; 8(1): 1-21.
15. Donnelly TT, Khater AH, Al-Bader SB, Al Kuwari MG, Al-Meer N, Malik M, et al. Arab women's breast cancer screening practices: a literature review. Asian Pacific Journal of Cancer Prevention. 2013; 14(8): 4519-4528.
16. Katayama K, Yokoyama K, Yako-Suketomo H, Okamoto N, Tango T, Inaba Y. Breast cancer clustering in Kanagawa, Japan: a geographic analysis. Asian Pacific Journal of Cancer Prevention. 2014; 15(1): 455-460.
17. Al-Hashimi MM, Wang XJ. Breast cancer in Iraq, incidence trends from 2000-2009. Asian Pacific Journal of Cancer Prevention. 2014; 15(1): 281-286.
18. Hamadeh RR, Abulfatih NM, Fekri MA, Al-Mehza HE. Epidemiology of Breast Cancer among Bahraini Women: Data from the Bahrain Cancer Registry. Sultan Qaboos University Medical Journal. 2014; 14(2): e176-e182.
19. Al-Othman S, Haoudi A, Alhomoud S, Alkhenizan A, Khoja T, Al-Zahrani A. Tackling cancer control in the Gulf Cooperation Council Countries. Lancet Oncol. 2015; 16(5): e246-e257.
20. Ghoncheh M, Mahdavifar N, Darvishi E, Salehiniya H. Epidemiology, incidence and mortality of breast cancer in Asia. Asian Pacific Journal of Cancer Prevention. 2016; 17(sup3): 47-52.
21. Mahmoodi SA, Mirzaie K, Mahmoodi SM. Determining the Effective Factors in the Incidence of Gastric Cancer by Using Data Mining Approach. Payavard Salamat. 2017; 11(3): 332-341.
22. Alizadeh M, Ghojazadeh M, Piri R, Mirza-Aghazadeh-Attari M, Mohammadi S, Naghavi-Behzad M. Age at diagnosis of breast cancer in Iran: a systematic review and meta-analysis. Iranian Journal of Public Health. 2021; 50(8): 1564.
23. Rahimzadeh S, Burczynska B, Ahmadvand A, Sheidaei A, Khademioureh S, Pazhuheian F, et al. Geographical and socioeconomic inequalities in female breast cancer incidence and mortality in Iran: A Bayesian spatial analysis of registry data. Plos One. 2021; 16(3): e0248723.
24. Haghighat S, Motlagh A, Omidi Z. Trend of Breast Cancer Incidence in Iran During A Fifteen-Year Interval According To National Cancer Registry Reports. Iranian Journal of Breast Disease. 2022; 15(2): 4-17.
25. Parvizpour S, Razmara J, Omidi Y. Breast cancer vaccination comes to age :impacts of bioinformatics. BioImpacts. 2018; 8(3): 223.
26. Asgarian F, Mirzaei M, Asgarian S, Jazayeri M. Epidemiology of breast cancer and the age distribution of patients over a period of ten years. 2016; 9(1): 31-36.
27. Roudsari RL. Methodological Issues in Conducting Retrospective Record Reviews. Journal of Midwifery and Reproductive Health. 2020; 8(4): 2383-2384.
28. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. A Cancer Journal for Clinicians. 2021; 71(3): 209-249.
29. Ahmadi A, Ramazani R, Rezagholi T, Yavari P. Incidence pattern and spatial analysis of breast cancer in Iranian women: Geographical Information System applications. East Mediterr Health Journal. 2018; 24(4): 360-367.
30. Varghese F, Wong J. Breast Cancer in the Elderly. Surgical Clinics of North America. 2018; 98(4): 819-833.
31. Manzouri L, Parhizkar S, Amiri S. Prevalence of Risk Factors and Protective Factors of Breast Cancer in Yasuj City, Iran. Journal of Clinical Care and Skills. 2021; 2: 35-39.
32. Su H, Li X, Lv Y, Qiu X. Breast Cancer Epidemiology and Survival Analysis of Shenyang in Northeast China: A Population-Based Study from 2008 to 2017. Breast Journal. 2022; 2022: 6168832.