ORIGINAL ARTICLE

Received: February 2020
Accepted: April 2020

The Impact of Socioeconomic Factors on Cancer Survival Rate

Rajabali Daroudi[1], Nasrin Sargazi[1], Arya Sakhidel Hovasin[1], Mohammadreza Sheikhy-Chaman[2]*

ABSTRACT

Background: Socioeconomic status, as a major determinant of health, has a considerable impact on the cancer survival rate. The present study aimed to investigate the impact of socioeconomic factors on the 5-year survival rate for the most common cancer types in 56 countries.

Methods: In this ecological study, 5-year survival data for gastric cancer, colon cancer, lung cancer, breast cancer, cervical cancer, ovarian cancer, prostate cancer, and leukemia during the period of 2005-2009 and socioeconomic factors including gross domestic product (GDP), life expectancy, literacy rate, urbanization and healthcare expenditure were extracted from the CONCORD-2 study and the World Bank database, respectively. multivariate regression analysis was used to estimate the model with the ordinary least-squares (OLS) method using Stata 14 software.

Results: The GDP coefficient for breast cancer, cervical cancer, and leukemia was positive and significant. No correlation was identified between gastric, colon, lung, ovarian, and prostate cancer and GDP. Gastric, colon, breast, and prostate cancers had a positive and significant correlation with life expectancy. In contrast, no significant correlation was found between lung cancer, cervical cancer, ovarian cancer, leukemia and life expectancy. There was no correlation between cancer survival rate and literacy rate, or urbanization. There was only a positive correlation between prostate cancer and healthcare expenditure. Furthermore, there was no statistically significant relationship between gastric and ovarian cancers and socioeconomic variables. Finally, GDP and life expectancy had the most significant impact on cancer survival rates.

Conclusion: Different countries can play a key role in increasing cancer survival rates by implementing policies to improve economic and social factors.

Keywords: Socioeconomic Factors, Cancer, Survival Rate

1. Department of Management Science and Health Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.
2. Department of Health Economics, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran.

***Corresponding Author:**
Mohammadreza Sheikhy-Chaman, PhD Student, Department of Health Economics, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran.
Phone: (+98)9384463246
Email: Sheikhy.Mr@iums.ac.ir

BCCR
2020; 12(1):1-9
bccr.tums.ac.ir

Copyright © 2020 Tehran University of Medical Sciences. Published by Tehran University of Medical Sciences.
This work is licensed under a creative commons Attribution-nonCommercial 4.0 international license (https://creativecommons.org/licenses/by-nc/4.0/).
None-commercial uses of the work are permitted, provided the original work is properly cited.

INTRODUCTION:

Cancer, as a chronic disease, is one of the leading causes of mortality and disability worldwide (1, 2). Based on the officially published statistics, 42 million people are diagnosed with cancer worldwide, while this number is expected to increase by 15 million until 2020 (3). The global burden of cancer has also been rising due to aging, population growth, and high-risk behaviors. It is considered one of the main challenges for the health systems in different countries (4). Due to advances in therapeutic methods and technological breakthroughs in medical equipment, patients survive for a long time after the initial diagnosis of their disease (5). The survival rate is one of the most critical indicators that help health policymakers and physicians provide accurate diagnoses and treatment methods by estimating disease prognosis (6). According to numerous studies and scientific evidence, socioeconomic factors, as determinants of health status, significantly impact cancer survival rate. So, people with lower socioeconomic status have a lower survival rate (7, 8). A comparative study has been conducted in the United States, Wales, England, Denmark, Netherlands, Finland, France, Germany, Italy, Spain, and Sweden. They showed that the United States and France, with the highest cancer survival rate, allocated the largest share of their gross domestic product (GDP) to health. Thus, there is a possible correlation between financial inputs to the health system and its proportional outcomes (9). In a cohort study conducted in Portugal on patients aged 15 to 84, men with colorectal cancer had a 5 to 10 years lower cancer survival rate than women (8). Another study in Denmark that focused on the direct impact of education, the amount of income, and the type of homeownership on the cancer survival rate, concluded that individuals with higher education levels, higher income, and personal homeownership had higher survival rate (10). Based on another study in Finland, patients of a higher social class status had a higher survival rate for the 10 most prevalent cancers in that country (11). A study conducted among European countries also suggested a positive role of health system funds in increasing cancer survival rates (5). Findings from another study on breast cancer patients living in England and Wales showed that deprived women who had a lower life expectancy lost a considerable amount of their lives after the initial cancer diagnosis. They also had a lower survival rate than women living in less deprived areas. Hence, the deprivation factor was identified as an important component of life expectancy (7), and life expectancy is a socioeconomic factor that influences the cancer survival rate.

In the ecological studies, although it is not possible to find out the specific condition for each patient separately due to the nature of the study, which is based on the past documentation, we can probably show the possible relationship between socioeconomic factors and cancer survival rate (8). It should be noted that ecological studies are the first step in initiating epidemiological research and measuring socioeconomic factors through different methods and based on various variables. The current ecological study aimed to investigate the impact of socioeconomic factors, including GDP, life expectancy, literacy rate, urbanization, and healthcare expenditure on the 5-year survival rate for eight most common cancers, including gastric cancer, colon cancer, lung cancer, breast cancer, cervical cancer, ovarian cancer, prostate cancer, and leukemia.

METHODS:

This ecological study aimed to investigate the impact of socioeconomic factors on the 5-year survival rate for common cancers. In this study, the impact of socioeconomic factors including GDP, life expectancy, literacy rate, urbanization, and healthcare expenditure on the 5-year survival rate for eight most common cancers, including gastric cancer, colon cancer, lung cancer, breast cancer, cervical cancer, ovarian cancer, prostate cancer, and leukemia have been investigated according to the

following model:

SUR=F (GDP, LE, LR, UR, HE)

Where "SUR" represents the cancer 5-year survival rate (the dependent variable), "GDP" represents the gross domestic product, "LE" represents the life expectancy, "LR" represents the literacy rate, "UR" represents urbanization, and finally "HE" represents the healthcare expenditure (the independent variables).

Data sources

In this study, the 5-year survival rate for the included cancers was collected and extracted from the Global surveillance of cancer survival study (CONCORD-2) conducted by Claudia Allemani et al. (12) and available data from cancer registry systems in the studied countries between the years 1995 and 2009. Due to the lack of complete data on the 5-year cancer survival rate for some countries, 56 countries were selected and entered the study. Eventually, data concerning GDP, life expectancy, literacy rate, urbanization, and healthcare expenditure as socioeconomic factors were extracted from the World Bank database (13).

Data analyzing method

Univariate and multivariate regression analyses were used to investigate the correlation between cancer survival rate and socioeconomic factors. Eight regression models were created with the OLS to estimate the models. Each model was related to a separate type of cancer. Significance levels of 5% and 10% were used in all analyses. Data analysis was performed using Stata software version 14.

RESULTS:

Table 1 shows the statistical description of study variables and cancers. As illustrated, GDP and healthcare expenditure had the highest and the lowest average between socioeconomic variables, respectively. The average survival rates for gastric cancer, colon cancer, lung cancer, breast cancer, cervical cancer, ovarian cancer, prostate cancer, and leukemia were 25.33, 55.18, 14.04, 78.72, 61.41, 38.30, 78.17, and 41.43, respectively (Additional information can be deduced from **Table 1**). The Breusch-Pagan heteroskedasticity test was performed using the "hettest" command. Results showed that the null hypothesis based on homoscedasticity was rejected. Afterward, the "robust" command was used to resolve the heteroskedasticity issue.

The results of the univariate and multivariate regression analyses are shown in **Tables 2** and **Table 3**, respectively. According to the univariate regression analysis results, gastric cancer, colon cancer, breast cancer, prostate cancer, and leukemia were significantly associated with independent variables. Gastric cancer, considered as a single variable, had a significant correlation only with the level of literacy and life expectancy. In contrast, cervical cancer was associated with variables such as GDP, life expectancy, and literacy rate. Finally, no relationship was observed between ovarian cancer and the study variables as single variables (Additional information can be deduced from **Table 2**).

According to the multivariate regression analysis results, the GDP coefficients for breast cancer, cervical cancer, and leukemia were positive and significant.This means that a one-unit increase in the GDP will increase the mentioned cancers' survival rates by 0.00019290, 0.00038330, and 0.00057780, respectively. The survival rate of gastric, colon, lung, ovarian, and prostate cancers had no relationship with GDP.

The survival rate of gastric, colon, breast, and prostate cancers had a positive and significant correlation with life expectancy at a level of 5%. In other words, by increasing one unit in life expectancy, the mentioned cancer survival rates will increase by 1.25, 1.54, 1.10, and 1.86, respectively. No significant correlation was found between lung cancer, cervical cancer, ovarian cancer, and leukemia and life expectancy. The relationship between cancer survival rates with literacy rate and urbanization was not statistically meaningful. A significantly positive relationship was found between prostate

Table 1. The statistical description of study variables (N=56)

Effect	Variables	Observations	Average	Standard Deviation	Minimum	Maximum
Socioeconomic Factors	GDP Per Capita	56	21469.88	17903.24	707.00	66775.39
	LE	56	75.66	4.53	64.56	81.92
	LR	56	54.93	46.04	1	99.8
	UR	56	70.61	16.98	15.18	97.44
	HE	56	7.10	2.39	2.36	15.13
	Cancers	**Observations**	**Average**	**Standard Deviation**	**Minimum**	**Maximum**
5-Year Survival Rate	Gastric	56	25.33	9.56	3	57.9
	Colon	56	55.18	9.81	28.1	69.4
	Lung	56	14.04	5.89	2.2	37.2
	Breast	56	78.72	8.92	43.1	90.6
	Cervical	56	61.41	10.91	10.3	86.7
	Ovarian	56	38.30	9.26	8	82.7
	Prostate	56	78.17	16.30	27.4	100
	Leukemia	56	41.43	18.51	6	90

GDP: Gross Domestic Product; LE: Life Expectancy; LR: Literacy Rate; UR: Urbanization; HE: Health Expenditures

cancer and healthcare expenditure. Thus, by each unit increase in healthcare expenditure, the survival rate of prostate cancer would increase by 1.83. There was no significant correlation between healthcare expenditure and the rest of the studied cancers. There was no significant statistical relationship between gastric and ovarian cancer survival rates with the independent variables. Overall, among socioeconomic factors considered in the current study, GDP and life expectancy had the most significant impact on cancer survival rates. (Additional information can be deduced from **Table 3**).

DISCUSSION:

Cancer is one of the most important health issues globally and accounts for a significant share of countries' limited resources and health facilities (14, 15). The present ecological study aimed to investigate the impact of socioeconomic factors including GDP, life expectancy, literacy rate, urbanization, and healthcare expenditure on the 5-year survival rate for the most common cancers, including gastric cancer, colon cancer, lung cancer, breast cancer, cervical cancer, ovarian cancer, prostate cancer, and leukemia. Univariate and mul-

Table 2. Results of univariate regression analysis (N=56)

Variable	Gastric	Colon	Lung	Breast	Cervical	Ovarian	Prostate	Leukemia
	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
GDP Per Capita	$1*10^{-3}$	$3*10^{-3}$	$6*10^{-5}$	$3*10^{-3}$	$2*10^{-3}$	$4*10^{-5}$	$4*10^{-3}$	$5*10^{-3}$
LE	0.82*	1.56*	0.34	1.25*	0.87*	0.15	2.1*	1.79*
LR	-0.05*	-0.11*	-0.03	-0.07*	-0.05*	-0.01	-0.13*	-0.12*
UR	0.05*	0.19*	0	0.14*	0.05	-0.08	0.27*	0.29*
HE	0.92*	1.96*	0.29	1.48*	0.3	-0.02	3.58*	3.22*
Variable	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation
GDP Per Capita	$7*10^{-4}$	$5*10^{-4}$	$4*10^{-5}$	$5*10^{-4}$	$7*10^{-4}$	$7*10^{-5}$	$1*10^{-1}$	$1*10^{-3}$
LE	0.26	0.2	0.17	0.2	0.3	0.02	0.39	0.49
LR	0.02	0.02	0.016	0.02	0.03	0.02	0.04	0.05
UR	0.07	0.07	0.04	0.06	0.08	0.07	0.12	0.14
HE	0.52	0.48	0.33	0.46	0.61	0.52	0.78	0.95

GDP: Gross Domestic Product; LE: Life Expectancy; LR: Literacy Rate; UR: Urbanization; HE: Health Expenditures

tivariate regression analyses were used to assess the relationship between cancer survival rate and socioeconomic factors. Thus, the models were established by using eight regression models and applying the OLS. The results of this study indicated the positive impact of GDP on increasing cancer survival rates. The GDP coefficients for breast cancer, cervical cancer, and leukemia were positive and significant, in a way that one unit increase in GDP will increase the cancer survival rate by 0.00019290, 0.00038330, and 0.00057780, respectively. Quaglia et al. identified GDP as the main determinant of cancer survival rate in elderly patients living in 16 European countries (16). In another study in high-income countries, there was also a strong and significant relationship between GDP and decreasing cancer mortality rates (17). It seems that countries with a higher GDP and, subsequently, better public welfare and health system indices have higher cancer survival rates. These countries have advanced cancer early detection techniques and a better treatment process by allocating funds for health services. These techniques are not affordable for the government or people in coun-

Table 3: Results of multivariate regression analysis (N=56)

Variable	Gastric	Colon	Lung	Breast	Cervical	Ovarian	Prostate	Leukemia
	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
GDP Per Capita	$1*10^{-3}$	$3*10^{-3}$	$6*10^{-5}$	$3*10^{-3}$	$2*10^{-3}$	$4*10^{-5}$	$4*10^{-3}$	$5*10^{-3}$
LE	0.82*	1.56*	0.34	1.25*	0.87*	0.15	2.1*	1.79*
LR	-0.05*	-0.11*	-0.03	-0.07*	-0.05*	-0.01	-0.13*	-0.12*
UR	0.05*	0.19*	0	0.14*	0.05	-0.08	0.27*	0.29*
HE	0.92*	1.96*	0.29	1.48*	0.3	-0.02	3.58*	3.22*
Constant	31.38	23.67	20	23.65	32.37	32.13	46.4	55.6
Variable	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation	Standard Deviation
GDP Per Capita	$7*10^{-4}$	$5*10^{-4}$	$4*10^{-5}$	$5*10^{-4}$	$7*10^{-4}$	$7*10^{-5}$	$1*10^{-1}$	$1*10^{-3}$
LE	0.26	0.2	0.17	0.2	0.3	0.02	0.39	0.49
LR	0.02	0.02	0.016	0.02	0.03	0.02	0.04	0.05
UR	0.07	0.07	0.04	0.06	0.08	0.07	0.12	0.14
HE	0.52	0.48	0.33	0.46	0.61	0.52	0.78	0.95
Constant	57.94**	-52.07*	-20.17	0.13	16.86	10.72	-65	12.93
Adjusted R2	0.11	0.52	0.05	0.42	0.27	0.01	0.33	0.25
F Statistics	2.43	13.01	1.62	9.05	5.22	1.13	6.54	4.84
Root MSE	8.99	6.78	5.73	6.78	9.27	9.21	13.29	15.93

GDP: Gross Domestic Product; LE: Life Expectancy; LR: Literacy Rate; UR: Urbanization; HE: Health Expenditures
**P<0.05; **P<0.1*

tries with low GDP. Therefore, people become aware of their disease when there is a far lower possibility of treatment and low survival probability for the affected patients.

According to our results, gastric, colon, breast, and prostate cancers had positive and significant correlations with life expectancy. In a study entitled "Life expectancy and cancer survival rate in the EUROCARE-3 cancer registry areas", Micheli et al. found that there is a significantly strong relationship between the 5-year survival rate for all of the cancer types and life expectancy (18). A study conducted among women with breast cancer also showed that patients with lower life expectancy had lost much of their lives after the primary diagnosis

of cancer and subsequently had lower survival rates (7). The results of another study showed that people with higher life expectancy also have a higher survival rate (19). These studies are consistent with the present study. The positive relationship between cancer survival rate and life expectancy suggests that people with low life expectancy generally live in more deprived areas and have a lower socioeconomic status. Hence, the total sum of these factors causes a higher cancer mortality rate among these groups.

Baeradeh et al. indicated no relationship between the literacy rate and the survival rate of patients with gastric cancer (20), which was in line with a study conducted in Chile (21). Even though several studies have demonstrated a relationship between literacy rate and cancer survival rate (6, 8, 10, 11, 22-24), we detected no significant relationship between these factors. Overall, considering the different results reported by previous studies, there is a need to do more research to clarify the impact of literacy rate on cancer survival rate.

An analytical research paper titled "Survival rate of patients with gastric cancer and its effective factors" found that there is no meaningful relationship between residence (urbanization or living in rural areas) and the 5-year survival rate of patients with gastric cancer (20). Another study performed in the United States clearly showed the difference between people living in urban and rural areas regarding the cancer survival rate. They showed that people in urban areas were more likely to survive while living in rural areas had a reduced survival rate by 10%. In this study, cancer incidence in rural areas was also reported lower than in urban areas (25). A study conducted in Wales concluded that the survival probability of people living in the countryside was 35% lower than those who had better access to healthcare facilities in urban areas (26). Another study conducted in the United States and Wales is not consistent with the present study either. Therefore, we could not reach a meaningful relationship between cancer survival rate and urbanization in this study. It is possible that due to less diagnostic and screening capacities in rural areas and difficult access to healthcare and health facilities, cancer will be detected in more advanced stages, and the patient will receive less care. All the factors mentioned above reduce the survival rate of cancer patients in countryside areas. It should be noted that some patients living in rural areas undergo treatment process by moving to cities to have better access to health services and have a better chance of survival. This may explain why different studies report less survival rate for the people living in suburban areas.

A study conducted among European countries highlighted the role of healthcare expenditure in increasing the cancer survival rate (5). In a similar study, among the healthcare expenditure indicators, the number of CT scan devices had a significant relationship with the cancer survival rate (16). The results of another study also showed a strong and significant relationship between healthcare expenditure and cancer survival rate (17). In line with these findings, this study suggests a positive and significant relationship between the survival rate for prostate cancer and healthcare expenditure. Accordingly, it can be concluded that increasing the number of financial resources entering the health system will probably improve the health outcomes in various fields. Typically, in ecological studies, results should not be generalized at the individual level because the study units are communities. Besides, variation in each country's social and cultural conditions can play a key role in this regard. There may also be other factors that affect the cancer survival rate. Hence, it is better to generalize the results of the current study more carefully. Despite these limitations, in this study, the impact of different socioeconomic factors on most common cancers' survival rates was investigated. Single studies were com-

pared together in a comprehensive view to see all variables near each other and reach a logical conclusion. For future research, doing more specialized studies on each cancer in each country and finding the hidden reasons for the current study results are suggested. Policymakers can apply the findings derived from different studies in large-scale policies to make better decisions based on scientific evidence (evidence-based policymaking).

CONCLUSION:

Overall, according to this study's results and other studies in this field, countries with higher GDP, life expectancy, literacy rate, urbanization rate, and higher allocated budget to the health system have a higher cancer survival rate. Therefore, policies to improve socioeconomic factors can affect this index positively.

CONFLICT OF INTEREST:

The authors have no conflict of interest to declare.

ACKNOWLEDGMENT:

The authors would like to sincerely thank all of the professors who helped improve the study's quality through constructive criticism and professional viewpoints. We are especially grateful to Dr. Kazem Zendehdel (Medical Epidemiologist) and Dr. Azin Nahvijou (MD and Health Care Management Researcher) from Cancer Institute of Imam Khomeini hospital, Tehran University of Medical Sciences.

FUNDING

No funding was acquired for this study.

REFERENCES

1. Daroudi R, Zendehdel K, Sheikhy-Chaman M. Designing and Validity and Reliability Assessment of Change in Employment Status and Income and Supportive Mechanisms in Cancer Survivors. IJCA. 2020;1(4):1-9.
2. Rebecca L, Siegel RL, Miller KD, Jemal A. Cancer Statistics, 2018. CA Cancer J Clin. 2018;68(1):7-30.
3. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA Cancer J Clin. 2019;69(1):7–34.
4. Fitzmaurice C, Abate D, Abbasi N, Abbastabar H, Abd-Allah F, Abdel-Rahman O, et al. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 1990 to 2017: A Systematic Analysis for the Global Burden of Disease Study. JAMA Oncol. 2019;5(12):1749-68.
5. Lu T, Yang X, Huang Y, Zhao M, Li M, Ma K, et al. Trends in the incidence, treatment, and survival of patients with lung cancer in the last four decades. Cancer Manag Res. 2019;11:943–953.
6. Haghighat S, Olfatbaksh a, Akram S¬¬¬, Mehrdad N, Ansari M, Ebrahimi M, et al. Survival rate and its correlated factors in breast cancer patients referred to Breast Cancer Research Center. Iranian Quarterly Journal of Breast Diseases. 2013;6(3):28-36.
7. Rutherford MJ, Andersson T-L, Møller H, Lambert P. Understanding the impact of socioeconomic differences in breast cancer survival in England and Wales: avoidable deaths and potential gain in expectation of life. Cancer epidemiology. 2015;39(1):118-25.
8. Antunes L, Mendonça D, Bento MJ, Rachet B. No inequalities in survival from colorectal cancer by education and socioeconomic deprivation-a population-based study in the North Region of Portugal, 2000-2002. BMC cancer. 2016;16(1):608.
9. Evans B, Pritchard C. Cancer survivals and GDP expenditure on health: a comparison of England and Wales and the USA, Denmark, Netherlands, Finland, France, Germany, Italy, Spain and Switzerland in the 1990s. Public Health. 2000;114(5):336-9.
10. Frederiksen BL, Osler M, Harling H, Ladelund S, Jørgensen T. Do patient characteristics, disease, or treatment explain social inequality in survival from colorectal cancer? Social science & medicine. 2009;69(7):1107-15.
11. Dickman PW, Auvinen A, Voutilainen ET, Hakulinen T. Measuring social class differences in cancer patient survival: is it necessary to control for social class differences in general population mortality? A Finnish population-based study. Journal of Epidemiology & Community Health. 1998;52(11):727-34.
12. Allemani C, Weir HK, Carreira H, Harewood R, Spika D, Wang X-S, et al. Global surveillance of cancer survival 1995–2009: analysis of individual data for 25676887 patients from 279 population-based registries in 67 countries (CONCORD-2). The Lancet. 2015;385(9972):977-1010.
13. World Bank database: https://www.data.worldbank.org/. Last Access: Apr 16, 2020.
14. Svynarenko R, Zhang Q, Kim H. The financial burden of cancer: financial ratio analysis. J Fam Econ. 2019;40(2):165-79.
15. Hofmarcher T, Lindgren P, Wilking N, Jönsson B. The cost of cancer in Europe 2018. European Journal of Cancer. 2020;129:41-9.
16. Quaglia A, Vercelli M, Lillini R, Mugno E, Coebergh JW,

Quinn M, et al. Socio-economic factors and health care system characteristics related to cancer survival in the elderly: A population-based analysis in 16 European countries (ELD-CARE project). Critical Reviews in Oncology/Hematology. 2005;54(2):117-28.

17. Batouli A, Jahanshahi P, Gross CP, Makarov DV, James BY. The global cancer divide: Relationships between national healthcare resources and cancer outcomes in high-income vs. middle-and low-income countries. Journal of epidemiology and global health. 2014;4(2):115-24.
18. Micheli A, Baili P, Quinn M, Mugno E, Capocaccia R, Grosclaude P. Life expectancy and cancer survival in the EUROCARE-3 cancer registry areas. Annals of Oncology. 2003;14(5):28-40.
19. Rajaeifard A, Talei A, Baneshi M. Survival analysis models for breast cancer patients in Shiraz, 1993-2002. JMR. 2005;3(4):41-50.
20. Baeradeh N, Lotfi M, Fallahzadeh H, Kargar S, Salman Roghani H. Survival rate of patients with gastric cancer and its effective factors in Yazd Province. The Journal of Community Health Research. 2015;3:278-87.
21. Heise K, Bertran E, Andia ME, Ferreccio C. Incidence and survival of gastric cancer in a high-risk population of Chile. World journal of gastroenterology: WJG. 2009;15(15):1854.
22. Seedhom AE, Kamal NN. Factors affecting survival of women diagnosed with breast cancer in El-Minia Governorate, Egypt. International journal of preventive medicine. 2011;2(3):131.
23. Li CI. Breast Cancer Epidemiology. 2010, New York: Springer.
24. Cella DF, Orav EJ, Kornblith AB, Holland JC, Silberfarb PM, Lee KW, et al. Socioeconomic status and cancer survival. Journal of Clinical Oncology. 1991;9(8):1500-9.
25. Hashibe M, Kirchhoff AC, Kepka D, Kim J, Millar M, Sweeney C, et al. Disparities in cancer survival and incidence by metropolitan versus rural residence in Utah. Cancer medicine. 2018;7(4):1490-7.
26. Jong KE, Smith DP, Xue QY, O'Connell DL, Goldstein D, Armstrong BK. Remoteness of residence and survival from cancer in New South Wales. Medical Journal of Australia. 2004;180(12):618.