RESEARCH ARTICLE

Associations between Quality of Life and Marital Status in Cancer Patients and Survivors

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Abstract

Background: The cancer survival rate in Korea has substantially increased, necessitating the management of not only patients with cancer but also longer term survivors. Although the divorce rate has drastically increased in Korea, there is not sufficient research regarding the relationship between changes in marital status and quality of life (QOL) in cancer patients and survivors. Thus, we aimed to examine the relationship between marital status and QOL in such cases. Materials and Methods: This study was performed using the Community Health Survey of 2008 administered by the Korea Centers for Disease Control and Prevention (N=169,328). We used t-tests and Chi-square tests to compare demographic variables between men and women, and analysis of variance (ANOVA) to compare QOL scores among comparison groups. We also performed a multilevel analysis on the relationship between QOL and marital status while accounting for provincial differences. Results: Decline of EuroQOL five dimensions (EQ-5D) in single patients with cancer was greater than in any other marital status group, but there was no statistically significant decline in survivors of cancer with regard to marital status. In the general population, the decline of EQ-5D was higher among single people than married people. Using the EuroQOL visual analog scale (EQ-VAS), single people had higher values than those of other marital status among both patients with cancer and survivors of cancer. In the general population, EQ-VAS values were higher for single people compared to married people. Conclusions: There may be a significant relationship between marital status and QOL in cancer patients and survivors. Policy interventions to manage patients with cancer who experience a decline in QOL as well as marital problems should be conducted.

Keywords: Cancer - EQ-VAS - EQ-5D - marital status - quality of life

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Introduction

Cancer is characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. General risk factors for cancer include age, lifestyle, family history, health condition, and environment. Although risk factors such as tobacco use, being overweight, and excessive sun exposure can be avoided, other risk factors cannot be controlled, such as aging (Ames et al., 1995).

According to the 2011 annual report of cancer statistics in Korea, the age-standardized incidence of cancer increased from 219.0 per 100,000 people in 1999 to 319.8 in 2011, a rapid increase compared to other countries. However, cancer survival rates in Korea increased substantially compared to other countries (44.0% in 1996-2000, 66.3% in 2007-2011) (Korea Central Cancer Registry, 2011). Thus, the importance of management for survivors of cancer as well as patients with cancer has gradually increased.

In many previous studies, quality of life (QOL) analyses were conducted in patients with cancer. These studies found that the QOL of patients with cancer was affected by treatment, socioeconomic status, demographic status, social support, family support, and spousal role, among others (Dorval et al., 1998; Parker et al., 2003; Chen et al., 2004; Tahmasebi et al., 2007; Pourhoseingholi et al., 2008; Sanda et al., 2008; Ashing-Giwa and Lim, 2009; Ainuddin et al., 2012; Hung et al., 2013; Ezat et al., 2014). In this study, we focused on the marital status of cancer patients.

Marital status is classified as single, marriage problems (including separation, divorce, and bereavement), and married. According to the 2008 Organization for Economic Cooperation and Development (OECD) Family Database, the divorce rate in Korea is high relative to other OECD countries (Korea: 2.6/7, OECD average: 2.1/7), and has increased rapidly from 1970 to 2008 (change

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from 1970 to 2008: 2.2/4 total points) (Organization for Economic Cooperation and Development, 2012). Moreover, according to the Population Trends Survey of the Korean National Statistical Office in 2000-2012, the divorce rate for men over 40 years of age increased from 46.5% in 2000 to 70.5% in 2012, and the divorce rate for women increased from 54.2% to 74.5%, indicating that trends in divorce rates are changing(Statistics Korea, 2000-2012). According to the Population and Housing Census Department of Statistics Korea, the percentage of single men and women aged 25-39 years rose from 30.0% and 13.2% in 1995 to 52.8% and 35.6% in 2010, respectively(Statistics Korea, 1995, 2000, 2005, 2012). Thus, given that the trends in marital status among Koreans are changing rapidly, a study on whether sudden changes in marital status influence the QOL of patients with cancer is needed.

Although previous studies were conduction regarding QOL related to marital status or cancer, they focused on topics such as the social role of the spouse in mental health, the impact of marital status in preventing certain diseases, and the QOL in patients with specific cancer (Cassileth et al., 1992; Cotten, 1999; Bottomley, 2002; Williams, 2003; Inaba, 2005; Bierman, 2009; Wang, 2011; 2013; Tabolli, 2012; Caputo, 2013). However, research regarding the impact of rapid changes in marital status and the relationship between marital status and QOL in patients with cancer is lacking. Thus, in this study, we analyzed the differences in QOL by marital status in patients with cancer and survivors of cancer.

Materials and Methods

Study population

The data used in this study were from the Community Health Survey administered by the Korea Centers for Disease Control and Prevention, which was designed to facilitate inter-provincial comparisons (Korea Centers for Disease Control and Prevention, 2008-2010). The Community Health Survey was administered by investigators who conducted one-on-one visits and interviews targeting adults 19 years of age or older in 253 health centers nationwide starting in 2008. The final analysis used data from 169,328 people from a total of 200,800, excluding 31,472 people for whom information on QOL and/or marital status by presence of current cancer was incomplete and therefore could not be analyzed. As the Community Health Survey data is secondary data that does not contain private information and is available in the public domain, our study did not need to address ethical concerns. The protocol of the Community Health Survey was reviewed and approved by the institutional review board of the Korea Centers for Disease Control and Prevention (2010-02-CON-22-P).

Variables

The outcome variables were EuroQOL visual analog scale (EQ-VAS) and EuroQOL five dimensions (EQ-5D) Index scores. EQ-VAS is a self-rated health questionnaire presented as a vertical visual analog scale, where the endpoints are labeled "best imaginable health state" and "worst imaginable health state." Participants completed the scale ranging from 0 to 100 on the study day. Responses to this scale were used as a quantitative measure of participants' self-rated health. The EQ-5D is an index of five dimensions of health-related QOL. The five dimensions are mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The original EQ-5D Index has values ranging from 0 to 1. In order to compare the two indicators (EQ-VAS and EQ-5D), the EQ-5D Index was multiplied by 100 before the data were analyzed.

The variable of major interest in its association with the outcome variables was marital status. Marital status was divided into single, marriage problems (separation, divorce, bereavement), and married. In addition, other independent variables considered in the analysis were presence of current cancer, frequent depression for more than 2 weeks, awareness of stress, age, family income, education level, perceived health status, and survey year. Awareness of stress was defined as "a lot" or "very much" as descriptive of stress in one's daily life, age was classified into 10-years intervals, family income was classified into four groups, education levels were classified as "less than high school", "high school education", and "college graduate", and subjective health status was defined as describing one's subjective health level as "good" or "bad".

Statistical analysis

In order to analyze the relationship between QOL and marital status by the presence of current cancer, the following variables were adjusted: frequent depression for more than 2 weeks, awareness of stress, age, family income, education level, and perceived health status.

We first examined the distribution of each variable to analyze the general characteristics by presence of current cancer, and we performed χ^2 tests to examine differences in each variable according to presence of current cancer. Next, to compare the average values on the QOL indices according to the independent variables, we performed analyses of variance (ANOVAs). Finally, to analyze the relationship between QOL and marital status by presence of current cancer, considering the characteristics of the Community Health Survey, we performed a multilevel analysis. All analyses were performed using SAS software (ver. 9.2). p values <0.05 were considered statistically significant.

Results

Of the 169,328 participants in the final sample, 1,526 were patients with cancer and 1,796 were survivors of cancer. The overall ANOVA revealed that the average EQ-5D was higher for the general population than those of other groups. The QOL measured by the EQ-5D Index was higher in the order single > married > marriage problems in each group. EQ-5D Index values were higher for those that did not report frequent depression for more than 2 weeks and for those who had an awareness of stress for all groups.

The average EQ-VAS was higher for the general

Table 1. Relationships of Quality of Life with Demographic Characteristics and Health Behaviors [mean (SD) and p values*]

		Patients				Survivors				General population			
		EQ-5D[a]		EQ-VAS[b]		EQ-5D		EQ-VAS		EQ-5D		EQ-VAS	
Marital status	Single	84.08	18.49	54.17	23.9	91.06	14.43	70.63	19.64	97.71	8.63	79.99	14.4
	Separation/Divorce/Bereavement	77.76	24.99	56.15	21.9	85.85	15.64	62.83	17.8	88.71	15.82	67.52	18.44
	Married	82.78	23.8	59.37	21.34	90.13	15.07	66.93	19.23	94.99	11.65	74.44	16.12
Frequent depression for more than 2 weeks													
	Yes	66.95	30.94	46.65	22.93	78.29	21.82	55	22.17	83.52	21.7	61.94	20.79
	No	86.82	18.61	62.58	19.52	90.62	13.54	67.53	18.02	95.42	10.48	75.27	15.7
Awareness of stress	Yes	72.25	29.86	49.7	22.26	83.4	19.79	58.14	20.75	91.17	16.48	68.77	18.66
	No	87.86	16.73	64.18	19.11	91.4	12.44	69.13	17.32	95.63	10.04	76.17	15.29
Sex	Male	81.02	25.32	57.64	22.27	90.58	15.42	66.96	19.67	95.73	11.55	76.14	15.83
	Female	82.56	22.52	59.47	20.8	88.27	15.16	65.46	18.55	93.25	12.82	72.4	17.08
Age (years)	20-29	87.62	18.39	54.14	21.28	94.76	11.49	74.75	15.12	98.8	5.2	81.13	13.18
	30-39	90.15	18.87	58.35	21.97	95.69	7.31	72.46	15.42	98.32	5.8	78.3	13.84
	40-49	88.21	18.12	59.85	21.79	95.67	9.39	73.6	15.68	97.32	7.72	77.21	14.4
	50-59	85.39	18.97	62.64	20.32	92.55	12	68.5	19.14	95.11	10.65	74.19	15.88
	60-69	81.5	24.08	66.72	17.51	88.6	15.17	64.72	18.28	90.13	15.29	68.79	17.62
	70-79	73.75	29.04	54	21.19	83.69	18.1	61.58	19.93	83.65	19.09	62.7	18.91
Family income (thousand won)	≤12,000	77.94	25.85	54.12	21.85	85.27	16.9	61.45	19.91	88.73	16.68	67.26	18.73
	12,000-24,000	83.39	23.18	61.59	20.74	91.82	12.8	68.12	17.45	95.78	10.43	75.45	15.6
	24,000-42,000	86.69	19.29	62.98	19.43	93.28	13.16	71.35	16.42	97.4	7.64	77.67	14.05
	>42,000	90.44	17.7	67.8	19.73	94.6	10.39	73.81	15.87	97.75	7.11	78.82	13.68
Education level	Less than high school	79.26	25.01	56.34	21.67	87.11	15.87	63.23	19.12	89.51	15.97	68.09	18.09
	High school graduate	86.58	21.35	62.03	20.82	92.6	14.18	70.18	18.38	97.3	8.16	77.51	14.59
	College graduate	86.98	20.28	64.78	20.45	95.25	10.16	75.59	14.37	98.51	5.42	79.5	13.18
Perceived health status	Good	96.07	8.56	78.11	13.27	96.81	6.43	79.97	14.63	98.73	4.63	82.39	11.67
	Bad	80.81	24.39	57.22	21.39	87.8	16	63.57	18.61	91.17	14.98	67.96	17.08
Total		81.78	23.99	58.54	21.57	89.16	15.3	66.04	19	94.41	12.31	74.14	16.61

		Survivors				General population			
		EQ-5D		EQ-VAS		EQ-5D		EQ-VAS	
Marital status	Single	0.7119		0.9246		<0.0001		<0.0001	
	Separation/Divorce/Bereavement								
	Married								
Frequent depression for more than 2 weeks									
	Yes	<0.0001		<0.0001		<0.0001		<0.0001	
	No								
Awareness of stress	Yes	<0.0001		<0.0001		<0.0001		<0.0001	
	No								
Sex	Male	0.0026		0.8276		<0.0001		<0.0001	
	Female								
Age (years)	20-29	<0.0001		0.0014		<0.0001		<0.0001	
	30-39								
	40-49								
	50-59								
	60-69								
	70-79								
Family income (thousand won)	≤12,000	0.0009		0.0003		<0.0001		<0.0001	
	12,000-24,000								
	24,000-42,000								
	>42,000								
Education level	Less than high school	0.4094		0.0035		<0.0001		<0.0001	
	High school graduate								
	College graduate								
Perceived health status	Good	<0.0001		<0.0001		<0.0001		<0.0001	
	Bad								
Total		<0.0001		<0.0001		<0.0001		<0.0001	

*p values for results by analysis of variance (ANOVA); [a]EQ-5D, EuroQOL five dimensions; [b]EQ-VAS, EuroQOL visual analog scale

population than others and was higher in the order single > married > marriage problems for survivors of cancer and the general population. However, the EQ-VAS values were higher in the order married > marriage problems > single for patients with cancer. In the categories of frequent depression for more than 2 weeks and awareness of stress, results were similar to that of EQ-5D (Table 1).

In multilevel analysis which examined the QOL by marital status, the decline of EQ-5D in single people among patients with cancer was greater than that of other marital statuses (single: -7.533, $p<0.05$, marriage problems: -0.162, $p=0.9045$). In the case of survivors of cancer, there was no statistically significant decline. In the general population, the decline of EQ-5D was higher in the order single > marriage problems > married (single: -0.993, $p<0.05$, marriage problems: -0.961, $p<0.05$).

Upon analysis of EQ-VAS, single people had higher values than other marital statuses in patients with cancer (single: -7.742, $p<0.05$, marriage problems: -0.492, $p=0.6878$), and single people among survivors of cancer had higher values than other marital statuses (single: 7.339, $p<0.05$, marriage problems: -0.225, $p=0.8162$). In the general population, EQ-VAS values were higher in the order single > married > marriage problems (single: 0.422, $p<0.05$, marriage problems: -0.928, $p<0.05$) (Table 2).

Discussion

In order to examine the relationship between QOL and marital status in patients with cancer and survivors of cancer, targeting adults 19 years of age or older, we focused on marital status as one socioeconomic issue and then analyzed its association with QOL. Some differences were evident depending on whether we used EQ-5D or EQ-VAS, but we nonetheless observed differences in the QOL of patients with cancer, survivors of cancer, and the general population by marital status.

The EQ-5D of patients with cancer was a more sensitive indicator of the decline in QOL that occurred with single status than the decline associated with other marital statuses. Also, the decline

Table 2. Multilevel Analysis Results of EQ-VAS and EQ-5D by Presence of Cancer (estimated regression coefficient, p value*)

		EQ-5D[a]						EQ-VAS[b]					
		Patients		Survivors		General population		Patients		Survivors		General population	
Marital status													
	Single	-7.533	0.0117	1.208	0.5548	-0.993	<0.0001	-7.742	0.0039	7.339	0.005	0.422	0.0003
	Separation/Divorce/Bereavement	-0.162	0.9045	0.663	0.382	-0.961	<0.0001	-0.492	0.6878	-0.225	0.8162	-0.928	<0.0001
	Married	-		-		-		-		-		-	
Frequent depression for more than 2 weeks													
	Yes	-13.354	<0.0001	-7.43	<0.0001	-6.858	<0.0001	-9.658	<0.0001	-6.101	<0.0001	-4.791	<0.0001
	No	-		-		-		-		-		-	
Awareness of stress													
	Yes	-10.032	<0.0001	-2.955	<0.0001	-2.051	<0.0001	-10.193	<0.0001	-8.046	<0.0001	-6.16	<0.0001
	No	-		-		-		-		-		-	
Sex	Male	0.554	0.6341	2.61	0.0001	0.549	<0.0001	-0.476	0.6473	-0.849	<0.0001	1.269	<0.0001
	Female	-		-		-		-		-		-	
Age	20-29	-		-		-		-		-		-	
(years)	30-39	-0.553	0.923	1.679	0.5134	-0.533	<0.0001	19.946	0.0001	1.698	0.6047	-1.125	<0.0001
	40-49	0.34	0.9508	2.577	0.2919	-0.803	<0.0001	19.172	0.0001	6.279	0.0444	-0.717	<0.0001
	50-59	-2.96	0.5953	1.455	0.5499	-1.353	<0.0001	14.756	0.0032	6.45	0.038	-1.146	<0.0001
	60-69	-6.265	0.262	-0.839	0.7316	-4.401	<0.0001	15.345	0.0023	4.523	0.1474	-3.386	<0.0001
	70-79	-18.104	0.0015	-6.833	0.0064	-9.962	<0.0001	9.708	0.0582	2.745	0.3906	-7.271	<0.0001
Family income (thousand won)													
	≤12,000	-5.213	0.0023	-4.046	<0.0001	-2.174	<0.0001	-10.692	<0.0001	-5.516	<0.0001	-3.446	<0.0001
	12,000-24,000	-3.258	0.0668	-1.035	0.2642	-0.14	0.0263	-6.187	0.0001	-1.827	0.1226	-1.065	<0.0001
	24,000-42,000	-2.418	0.1919	-0.271	0.767	0.033	0.5792	-6.302	0.0002	-1.776	0.1283	-0.601	<0.0001
	>42,000	-		-		-		-		-		-	
Education level													
	Less than high school	0.498	0.7787	-1.266	0.1945	-2.422	<0.0001	1.887	0.237	-4.515	0.0003	-2.584	<0.0001
	High school graduate	3.759	0.0282	-1.212	0.1808	-0.292	<0.0001	1.768	0.2503	-2.234	0.0533	-0.419	<0.0001
	College graduate	-		-		-		-		-		-	
Perceived health status													
	Good	6.438	0.0015	4.316	<0.0001	2.613	<0.0001	11.311	<0.0001	11.489	<0.0001	9.584	<0.0001
	Bad	-		-		-		-		-		-	

*p values for results of multilevel analysis; aEQ-5D, EuroQOL five dimensions; bEQ-VAS, EuroQOL visual analog scale

in QOL of patients with cancer associated with single status was greater than that associated with marriage problems and married status using EQ-VAS. Although we did not investigate specific reasons for this result, EQ-VAS among single people was higher than that of any other marital status, in contrast to other results. Thus, a more detailed analysis is needed.

The results of our study have both similarities and differences compared with the results of previous studies. Previous studies were focused on QOL in cancer patients by treatment (Litwin et al., 1995), whereas our study only considered QOL by marital status. Some studies did examine the relationship between marital status and cancer, concluding that married people have improved survival rates compared with those who are single, divorced, or bereaved due to their social relationship with the spouse (Goodwin et al., 1987). Additionally, other studies found that social and family supports effect positive outcomes for the mental health of patients with cancer (Given et al., 2001; Kornblith et al., 2001; Michael et al., 2002; Karnell et al., 2007). Similarly, in the present study, married people generally had higher QOL scores than did those in different marriage status groups, and married people showed less of a decline in QOL by incidence of cancer than people of other marital status.

This study has both strengths and limitations. The data used were from a large representative nationwide population, making it possible to understand the health of provincial residents, to establish health policies based on evidence, and to evaluate them. Above all, these data reflected the experiences of residents of particular provincialities, not patients.

Furthermore, to our knowledge, this is the first report describing the relationship between QOL (measured by EQ-VAS and EQ-5D) and cancer by marital status. Previous studies focused only on QOL by socioeconomic status and the relationship between cancer and marital status (Goodwin et al., 1987; Burström et al., 2001; Kravdal, 2001), and some of these studies did not measure QOL using EQ-VAS or EQ-5D (Kim et al., 1999; Kobayashi et al., 2008).

However, this study was cross-sectional in nature; hence, there are limitations in interpreting the causal relationship between QOL and marital status in patients with cancer and survivors of cancer. In order to more accurately measure this relationship, other issues must be considered. Our study also did not consider the types and stages of cancer, so the results may not be applicable to all types of cancer, necessitating further study. Finally, this study only analyzed 1 year of survey data; analysis of longitudinal data, which is difficult to obtain, would provide more accurate results.

Despite these limitations, this study suggests a relationship between marital status and QOL in patients with cancer and survivors of cancer. Sudden changes in marital status and incidence of cancer are expected to have a significant future impact on the QOL of Koreans. Realistically, these changes would be difficult to implement for managing the marital status of patients with cancer and survivors of cancer. However, it is possible to seek means to assist patients with cancer and survivors of cancer who are experiencing marriage problems. It is also possible for the QOL to decline due to factors other than marital status, so it is necessary to prevent decline in QOL in advance through government-level support for people experiencing marriage problems among patients

with cancer. Thus, this study would help health policy makers how to determine target population and support in making policy choices.

In conclusion, there may be a significant relationship between marital status and QOL in patients with cancer and survivors of cancer, though further study is needed to investigate this relationship in detail. Then, policy alternatives and efforts to prevent and manage the decline in QOL of patients with cancer associated with marital problems may become possible.

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References

Ainuddin HA, Loh SY, Low WY, et al (2012). Quality of life of multiethnic adolescents living with a parent with cancer. *Asian Pac J Cancer Prev*, **13**, 6289-94.

Ames BN, Gold LS, Willett WC (1995). The causes and prevention of cancer. *P Natl Acad Sci*, **92**, 5258-65.

Ashing-Giwa KT, Lim JW (2009). Examining the impact of socioeconomic status and socioecologic stress on physical and mental health quality of life among breast cancer survivors. In 'Oncology nursing forum'. *Oncol Nurs Forum*, **36**, 79-88.

Bierman A (2009). Marital status as contingency for the effects of neighborhood disorder on older adults mental health. *J Gerontol Soc Sci*, **64**, 425-34.

Bottomley A (2002). The cancer patient and quality of life. *The Oncol*, **7**, 120-5.

Burström K, Johannesson M, Diderichsen F (2001). Health-related quality of life by disease and socio-economic group in the general population in Sweden. *Health Policy*, **55**, 51-69.

Caputo J (2013). Physical limitation and emotional well-being: gender and marital status variations. *J Health Soc Behav*, **54**, 241-57.

Cassileth BR, Soloway M, Vogelzang N, et al (1992). Quality of life and psychosocial status in stage D prostate cancer. *Qual Life Res*, **1**, 323-30.

Chen M-L, Chu L, Chen H-C (2004). Impact of cancer patients' quality of life on that of spouse caregivers. *Support Care Cancer*, **12**, 469-75.

Cotten SR (1999). Marital status and mental health revisited: examining the importance of risk factors and resources. Family Relations, 225-33.

Dorval M, Maunsell E, Deschenes L, et al (1998). Long-term quality of life after breast cancer: comparison of 8-year survivors with population controls. *J Clin Oncol*, **16**, 487-94.

Ezat WPS, Fuad I, Hayati Y, et al (2014). Observational study on patient's satisfactions and quality of life (QoL) Among cancer patients receiving treatment with palliative care intent in a tertiary hospital in Malaysia. *Asian Pac J Cancer Prev*, **15**, 695-701.

Given BA, Given CW, Kozachik S (2001). Family support in advanced cancer. *CA: A Cancer J Clin*, **51**, 213-31.

Goodwin JS, Hunt WC, Key CR, Samet JM (1987). The effect of marital status on stage, treatment, and survival of cancer patients. *Jama*, **258**, 3125-30.

Hung H-C, Chien T-W, Tsay S-L, et al (2013). Patient and clinical variables account for changes in health-related quality of life and symptom burden as treatment outcomes in colorectal cancer: a longitudinal study. *Asian Pac J Cancer Prev*, **14**, 1905-09.

Inaba A (2005). Depression in the United States and Japan: gender, marital status and SES patterns. *Soc Sci Med*, **61**, 2280-92.

Karnell LH, Christensen AJ, Rosenthal EL, et al (2007). Influence of social support on health'related quality of life outcomes in head and neck cancer. *Head Neck*, **29**, 143-6.

Kim SP, Bennett CL, Chan C, et al (1999). QOL and Outcomes research in prostate caneer patients with low socioeconomic status. *Oncol Huntington*, **13**, 823-34.

Kobayashi K, Morita S, Shimonagayoshi M, et al (2008). Effects of socioeconomic factors and cancer survivors' worries on their quality of life (QOL) in Japan. *Psycho Oncol*, **17**, 606-11.

Korea Centers for Disease Control and Prevention. Community Health Survey. https://chs.cdc.go.kr/chs/index.do

Korea Central Cancer Registry. Annual Report Of Cancer Statistics in Korea in 2011. http://ncc.re.kr/english/infor/kccr.jsp

Kornblith AB, Herndon JE, Zuckerman E, et al (2001). Social support as a buffer to the psychological impact of stressful life events in women with breast cancer. *Cancer*, **91**, 443-54.

Kravdal Ø (2001). The impact of marital status on cancer survival. *Soc Sci Med*, **52**, 357-68.

Litwin MS, Hays RD, Fink A, et al (1995). Quality-of-life outcomes in men treated for localized prostate cancer. *Jama*, **273**, 129-35.

Michael YL, Berkman LF, Colditz GA, et al (2002). Social networks and health-related quality of life in breast cancer survivors: a prospective study. *J Psychosom Res*, **52**, 285-93.

Organization for Economic Cooperation and Development. OECD Family Database. http://www.oecd.org/els/family/SF3_1_Marriage_and_divorce_rate_Jan2014.pdf

Parker PA, Baile WF, Moor Cd, Cohen L (2003). Psychosocial and demographic predictors of quality of life in a large sample of cancer patients. *Psycho Oncol*, **12**, 183-93.

Pourhoseingholi MA, Safaee A, Moghimi-Dehkordi B, et al (2008). Quality of life in breast cancer patients-a quantile regression analysis. *Asian Pac J Cancer Prev*, **9**, 487-90.

Sanda MG, Dunn RL, Michalski J, et al (2008). Quality of life and satisfaction with outcome among prostate-cancer survivors. *New Engl J Med*, **358**, 1250-61.

Statistics Korea (1995, 2000, 2005, 2012). Population and Housing Census.

Statistics Korea (2000-2012). Population Trends Survey.

Tabolli S (2012). Limited role of marital status in the impact of dermatological diseases on quality of life. *Eur J Dermatol*, **22**, 672-7.

Tahmasebi M, Yarandi F, Eftekhar Z, et al (2007). Quality of life in gynecologic cancer patients. *Asian Pac J Cancer Prev*, **8**, 591-2.

Wang K-Y (2011). Health-related quality of life and marital quality of vitiligo patients in China. *J Eur Acad Dermatol Venereol*, **25**, 429-35.

Wang T-F (2013). Assessing the effects of oral health-related variables on quality of life in Taiwanese adults. *Qual Life Res*, **22**, 811-25.

Williams K (2003). Has the future of marriage arrived? A contemporary examination of gender, marriage, and psychological well-being. *J Health Soc Behav*, **44**, 470-87.