RESEARCH ARTICLE

Need to Pay More Attention to Attendance at Follow-Up Consultation after Cancer Screening in Smokers and Drinkers

Jaeyong Shin[1,2,3], Eun-Cheol Park[1,2,3], Hong-Chul Bae[1,2,3], Seri Hong[1], Suk-Yong Jang[1,2,3], Jae-Hyun Kim[1], Jee Suk Chang[4], Sang Gyu Lee[5]*

Abstract

Background: Follow-up clinical consultations could improve overall health status as well provide knowledge and education for cancer prevention. Materials and Methods: This is the cross-sectional study using the Korean Community Health Survey (KCHS) 6th edition for 2012, with 115,083 respondents who underwent cancer checkups selected as subjects. Associations between the presence of consultation and the socioeconomic status were determined using statistical methods with the SAS 9·3 statistical package (Cary, NC, USA). Findings: Among the recipients, 32,179 (28.0%) received clinical consultations after cancer screenings. Those in rural areas (odds ratio, OR=0.71, 95% confidence interval (CI), 0.69-0.73) visited follow-up clinics less frequently than did those in urban areas. Starting at the elementary school level, as the education level increased to middle school (OR=1.26, 95% CI: 1.19-1.34), high school (OR=1.29, 95% CI: 1.23-1.36) or college (OR=1.76, 95% CI: 1.65-1·89), the participation rates also increased. When compared with the lowest quartile group, the quartile income level showed a statistical trend and difference as follows: second lowest quartile (OR=1.11, 95% CI: 1.07-1.16), third lowest (OR=1·12, 95% CI: 1.07-1.17) and highest quartile income (OR=1.29, 95% CI: 1.23-1.35). In addition, the people with economic activities (OR=0.87, 95% CI: 0.84-0.90) visited follow-up clinics less frequently than did the others. Current smokers (OR=0·93, 95% CI: 0.89-0.98) and inveterate drinkers (OR=0.88, 95% CI: 0.85-0.94) had a tendency to visit less often than did non-smokers and other drinkers with all cancers combined. Interpretation: We suggest primary prevention through lifestyle modifications including smoking and drinking, and environmental interventions may offer the most cost-effective approach to reduce the cancer burden.

Keywords: Cancer - screening - prevention - follow-up - consultation - Korea

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Introduction

Cancer has been the leading cause of death in Korea since 1983 and is associated with the largest disease burden (Jung et al., 2010; Statistical Korea, 2014). The cancer burden in Korea was estimated as 1,525 person-years per 100,000 in early 2000s (Yoon et al., 2007). According to the Korean Statistical Information Service, over 200,000 patients were newly diagnosed with cancer in Korea and one in four deaths was due to cancer. In addition, the incidence rate of cancer (case/100,000 people) has been increasing sharply, nearly doubling from 214.2 in 1999 to 435.1 in 2011. Furthermore, the crude incidence rate per 100,000 for all cancer sites combined is estimated to reach 524.7 and the age-standardized incidence rate to reach 338.5 in 2014 (Jung et al., 2014).

Consequently, as the population ages the nation's cancer burden will continue to increase. The five most common cancers in Korea are thyroid, stomach, colorectal, lung and liver. Relatively safe and easy techniques are available to aid in early detection. For this reason, the Korean Ministry of Health and Welfare began a National Cancer Screening Program (NCSP) in 1999 for stomach, liver, colon, breast and cervical cancers. Based on several studies regarding the cost-effectiveness of the NCSP, stomach and cervical cancer screening programs were acceptable in terms of GDP per capita (Statistical Korea, 2014).

To accomplish both a cost reduction in national healthcare and improvement in the quality of life of the general population, the government has attempted to increase the rate of opportunistic and organized cancer screenings. Through the efforts of many studies, the overall rate of cancer screenings has increased from 25.9% in 2004 to 64.7% in 2013 (Kim et al., 2011; Noh et al., 2012; Park et al., 2012a; 2012b; Suh et al., 2013;

*[1]Department of Public Health, Graduate School, [2]Institute of Health Services Research, [3]Department of Preventive Medicine, [4]Department of Radiation Oncology, College of Medicine, [5]Department of Hospital Management, Graduate School of Public Health, Yonsei University, Seoul, Korea *For correspondence: leevan@yuhs.ac*

Statistical Korea, 2014).

Although the main purpose for the checkups is early cancer detection, they can also provide many additional health benefits and suggestions for lifestyle modifications. For example, the cancer screening program includes regular blood tests and physical examinations. Accordingly, the follow-up consultations could improve overall health status and provide knowledge and education for cancer prevention and treatment (Cho et al., 2013). Thus, we analyzed the factors associated with clinical consultations following cancer screenings and introduced solutions to increase the follow-up rate.

Materials and Methods

Data from the Korean Community Health Survey (KCHS: Korea Centers for Disease Control and Prevention, KCDC) in 2012 was obtained for this study. In 2008, the KCDC initiated the KCHS, the first nationwide survey to gather data that could be used to plan, implement, monitor and evaluate community health promotion and disease prevention programs. The standardized KCHS questionnaire encompasses a wide variety of health topics which can be used to assess the prevalence of personal health behaviors related to disease causes.

Because we focused on cancer screening in the present study, we only included data from 2012, which had additional information pertaining to cancer. A total of 228,921 people were enrolled in the 2012 survey. Among them, we selected those respondents who had received cancer checkups (115,083 subjects).

Demographic characteristics included gender, age group, basic living status, geographic area, unmet needs, number of chronic diseases, quality of life and other socioeconomic factors. We included stomach, colorectal and liver cancers for both genders and breast and cervical cancers for females. In the latter group, gender was not included in the statistical analysis.

The associations between consultations after cancer screenings and the demographic and socioeconomic status were determined using a chi-square test. To examine the multiple associations between consultations and many factors, we conducted a logistical analysis using the SAS 9.3 statistical package (Cary, NC, USA).

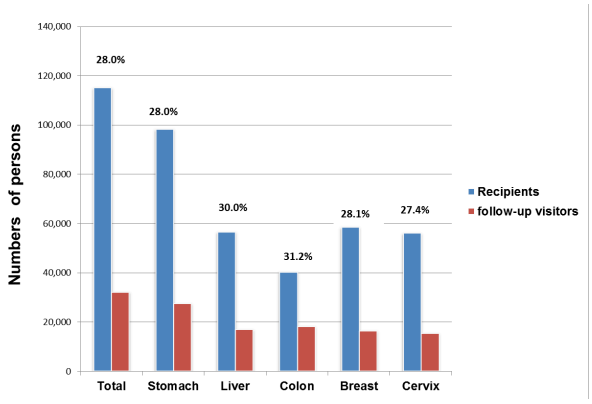

Figure 1. The Participation Rates of Follow-Up Consultation after Cancer Screening Examinations by Total and Each Cancer Group. Participation rate for each cancer was almost same to the total one, regardless of different numbers of participants

Results

The general characteristics of the recipients enrolled in this study (115,083) are shown in Table 1. Among them, 32,179 recipients (28.0%) underwent a clinical

Table 1. Demographic, Socioeconomic and Health-Related Characteristics between Groups in the all Cancers Combined Screening Group

	No consultation		Follow-up consultation			
	N	%	N	%	TOTAL	p-value
SEX						0.006
male	33,358	71.6	13,232	28.4	46,590	
female	49,546	72.3	18,947	27.7	68,493	
Age group						<0.001
19-44	18,329	71.3	7,386	28.7	25,715	
45-64	38,655	70.8	15,905	29.2	54,560	
65-74	16,174	73.1	5,940	26.9	22,114	
≥75	9,746	76.8	2,948	23.2	12,694	
Presence of spouse						<.0001
No	16,913	74.5	5,802	25.5	22,715	
Yes	65,991	71.4	26,377	28.6	92,368	
Area						<0.001
urban area	41,973	67.6	20,081	32.4	62,054	
rural area	40,931	77.2	12,098	22.8	53,029	
Education level						<0.001
Elementary school	26,378	77.5	7,678	22.5	34,056	
Middle school	11,749	72.0	4,568	28.0	16,317	
High school	24,275	71.1	9,870	28.9	34,145	
College	20,502	67.1	10,063	32.9	30,565	
basic living status						0.032
control	79,652	72.0	31,018	28.0	110,670	
recipient, current	2,494	73.4	904	26.6	3,398	
recipient, previous	758	74.7	257	25.3	1,015	
Income						<0.001
Q1	22,476	76.1	7,042	23.9	29,518	
Q2	21,244	72.8	7,939	27.2	29,183	
Q3	19,803	71.6	7,864	28.4	27,667	
Q4	19,381	67.5	9,334	32.5	28,715	
Economic activity						<0.001
No	27,738	69.9	11,967	30.1	39,705	
Yes	55,166	73.2	20,212	26.8	75,378	
Percieved health status						<0.001
very poor	3,467	67.2	1,692	32.8	5,159	
poor	15,277	70.9	6,270	29.1	21,547	
good	34,260	71.4	13,708	28.6	47,968	
nice	26,371	73.9	9,332	26.1	35,703	
excellent	3,529	75.0	1,177	25.0	4,706	
Major depressive disorder(MDD)						<0.001
none	80,716	72.2	31,037	27.8	111,753	
diagnosed group	2,188	65.7	1,142	34.3	3,330	
Number of chronic diseases						<0.001
none	46,842	73.2	17,138	26.8	63,980	
one	21,658	71.5	8,654	28.5	30,312	
two or more	14,404	69.3	6,387	30.7	20,791	
Unmet need						0.134
absence	73,706	72.0	28,708	28.0	102,414	
presence	9,198	72.6	3,471	27.4	12,669	
Quality of Life (EQ-VAS)						0.010
Q1	22,124	72.0	8,588	28.0	30,712	
Q2	19,251	72.4	7,324	27.6	26,575	
Q3	20,356	72.4	7,759	27.6	28,115	
Q4	21,173	71.3	8,508	28.7	29,681	
	82,904	72.0	32,179	28.0	115,083	

*life style behaviors such as smoking, drinking, sleep hours, and stress were adjusted

consultation after cancer screening while 82,904 (72.0%) did not. According to the specific cancer, 27,511 (28.0%) of 98,275 stomach, 16,937 (30.0%) of 56,546 liver, 18,261 (31.2%) of 40,308 colorectal, 16,437 (28.1%) of 58,472 breast and 15,377 (27.4%) of 56,061 cervical cancer screening patients received a consultation following screening examinations (Figure 1).

First, we performed the chi-square test to evaluate the results of the bivariate analyses (Tables 1, 2, 3). Among all cancer screening groups, demographic and socioeconomic variables including gender (p=0.006), age group (p<0.001), presence of spouse (p<0.001), living area (p<0.001), educational level (p<0.001), basic living status (p<0.001), income level (p<0.001), economic activities (p<0.001) and health-related variables, such as perceived health status (p<0.001), major depressive disorders (MDDs, p<0.001), number of chronic diseases including hypertension, diabetes, arthritis and dyslipidemia (p<0.001) and quality of life (EQ-VAS), were statistically different, while unmet needs was not. Stomach (p=0.058), and liver (p=0.100) cancer screening groups were not associated with basic living status (Tables 2, 3). Gender

Table 3. Demographic, Socioeconomic and Health-Related Characteristics of Participants in the Female-Specific Cancer Screening Groups

	Cervix						Breast					
	No consultation		Follow-up		TOTAL	p-value	No consultation		Follow-up		TOTAL	p-value
	N	%	N	%			N	%	N	%		
Demographic characteristics												
Age group						<0.001						<0.001
19-44	11,167	70.7	4,632	29.3	15,799		7,256	69.4	3,205	30.6	10,461	
45-64	19,751	70.7	8,194	29.3	27,945		20,385	71.1	8,297	28.9	28,682	
65-74	7,078	74.2	2,458	25.8	9,536		8,283	75.8	2,651	24.2	10,934	
≥75	4,039	77.8	1,153	22.2	5,192		4,760	79.5	1,224	20.5	5,984	
Presence of spouse						<0.001						<0.001
No	10,045	74.1	3,514	25.9	13,559		10,814	75.5	3,510	24.5	14,324	
Yes	31,990	71.2	12,923	28.8	44,913		29,870	71.6	11,867	28.4	41,737	
Area						<0.001						<0.001
urban area	22,827	68.2	10,663	31.8	33,490		20,226	67.5	9,745	32.5	29,971	
rural area	19,208	76.9	5,774	23.1	24,982		20,458	78.4	5,632	21.6	26,090	
Socioeconomic characteristics												
Education level						<0.001						<0.001
Elementary school	14,405	77.2	4,261	22.8	18,666		16,673	78.5	4,567	21.5	21,240	
Middle school	5,661	71.0	2,311	29.0	7,972		5,861	71.3	2,362	28.7	8,223	
High school	12,564	71.0	5,120	29.0	17,684		11,101	70.6	4,621	29.4	15,722	
College	9,405	66.5	4,745	33.5	14,150		7,049	64.8	3,827	35.2	10,876	
Recipient of basic living						0.015					-	0.001
control	40,335	71.8	15,857	28.2	56,192		38,829	72.4	14,784	27.6	53,613	
recipient, current	1,288	74.7	437	25.3	1,725		1,420	75.7	456	24.3	1,876	
recipient, previous	412	74.2	143	25.8	555		435	76.0	137	24.0	572	
Income						<0.001						<0.001
Q1	10,913	76.6	3,328	23.4	14,241		12,439	77.9	3,520	22.1	15,959	
Q2	10,985	72.9	4,087	27.1	15,072		10,291	73.4	3,726	26.6	14,017	
Q3	10,293	71.2	4,171	28.8	14,464		9,022	70.9	3,698	29.1	12,720	
Q4	9,844	67.0	4,851	33.0	14,695		8,932	66.8	4,433	33.2	13,365	
Economic activity						<0.001						<0.001
No	18,163	70.1	7,762	29.9	25,925		17,546	70.7	7,271	29.3	24,817	
Yes	23,872	73.3	8,675	26.7	32,547		23,138	74.1	8,106	25.9	31,244	
Health-related characteristics												
Percieved health status						<0.001						<0.001
very poor	1,683	68.4	779	31.6	2,462		1,978	70.4	832	29.6	2,810	
poor	8,051	71.0	3,286	29.0	11,337		8,907	72.6	3,367	27.4	12,274	
good	18,001	71.2	7,264	28.8	25,265		17,030	71.7	6,712	28.3	23,742	
nice	12,781	73.4	4,626	26.6	17,407		11,488	73.9	4,057	26.1	15,545	
excellent	1,519	75.9	482	24.1	2,001		1,281	75.8	409	24.2	1,690	
MDD						<0.001						<0.001
none	40,559	72.1	15,678	27.9	56,237		39,134	72.8	14,640	27.2	53,774	
diagnosed group	1,476	66.0	759	34.0	2,235		1,550	67.8	737	32.2	2,287	
Number of chronic diseases						<0.001						<0.001
none	24,463	72.3	9,372	27.7	33,835		21,298	72.6	8,047	27.4	29,345	
one	10,054	72.1	3,894	27.9	13,948		10,820	73.2	3,967	26.8	14,787	
two or more	7,518	70.3	3,171	29.7	10,689		8,566	71.8	3,363	28.2	11,929	
Unmet need						0.029						<0.001
absence	36,759	71.9	14,382	28.1	51,141		35,546	72.5	13,505	27.5	49,051	
presence	5,276	72.0	2,055	28.0	7,331		5,138	73.3	1,872	26.7	7,010	
Quality of Life (EQ-VAS)						0.155						0.001
Q1	11,860	72.2	4,565	27.8	16,425		12,413	73.5	4,486	26.5	16,899	
Q2	9,605	71.9	3,763	28.1	13,368		9,188	72.6	3,470	27.4	12,658	
Q3	10,242	72.3	3,931	27.7	14,173		9,608	72.6	3,620	27.4	13,228	
Q4	10,328	71.2	4,178	28.8	14,506		9,475	71.4	3,801	28.6	13,276	
Total	42,035	71.9	16,437	28.1	58,472		40,684	72.6	15,377	27.4	56,061	

Table 2. Demographic, Socioeconomic and Health-Related Characteristics in Cancer Screenings for Both Gender Groups

	Stomach						Liver(heaptocellular carcinoma)						Colo-rectum					
	No consulation		Follow-up		TOTAL	p-value	No consulation		Follow-up		TOTAL	p-value	No consulation		Follow-up		TOTAL	p-value
	N	%	N	%			N	%	N	%			N	%	N	%		
Demographic characteristics																		
Gender						0.013						0.024						0.306
Male	31,546	71.6	12,507	28.4	44,053		21,596	70.4	9,060	29.6	30,656		20,874	68.6	9,540	31.4	20,874	
Female	39,218	72.3	15,004	27.7	54,222		18,013	69.6	7,877	30.4	25,890		19,434	69.0	8,721	31.0	19,434	
Age group						<0.001						<0.001						<0.001
19-44	11,782	70.9	4,833	29.1	16,615		6,183	70.0	2,651	30.0	8,834		4,553	66.4	2,301	33.6	4,553	
45-64	35,101	70.7	14,524	29.3	49,625		19,910	68.4	9,216	31.6	29,126		21,097	67.5	10,171	32.5	21,097	
65-74	15,043	73.2	5,521	26.8	20,564		8,650	71.3	3,486	28.7	12,136		9,715	70.5	4,066	29.5	9,715	
≥75	8,838	77.0	2,633	23.0	11,471		4,866	75.4	1,584	24.6	6,450		4,943	74.2	1,723	25.8	4,943	
Presence of spouse						<0.001						<0.001						<0.001
No	14,488	74.6	4,936	25.4	19,424		7,524	72.6	2,843	27.4	10,367		7,898	71.8	3,101	28.2	7,898	
Yes	56,276	71.4	22,575	28.6	78,851		32,085	69.5	14,094	30.5	46,179		32,410	68.1	15,160	31.9	32,410	
Area						<0.001						<0.001						<0.001
Urban area	34,478	67.2	16,816	32.8	51,294		17,658	64.7	9,643	35.3	27,301		18,601	63.4	10,746	36.6	18,601	
Rural area	36,286	77.2	10,695	22.8	46,981		21,951	75.1	7,294	24.9	29,245		21,707	74.3	7,515	25.7	21,707	
Socioeconomic characteristics																		
Education level						<0.001						<0.001					-	<0.001
Elementary school	24,250	77.5	7,057	22.5	31,307		13,362	75.5	4,343	24.5	17,705		14,576	74.9	4,873	25.1	14,576	
Middle school	10,706	71.9	4,177	28.1	14,883		6,166	70.3	2,607	29.7	8,773		6,760	69.5	2,968	30.5	6,760	
High school	20,032	70.7	8,290	29.3	28,322		10,949	68.9	4,940	31.1	15,889		10,680	66.8	5,312	33.2	10,680	
College	15,776	66.4	7,987	33.6	23,763		9,132	64.4	5,047	35.6	14,179		8,292	61.9	5,108	38.1	8,292	
Recipient of basic living						0.058					-	0.100						0.004
Control	67,957	71.9	26,508	28.1	94,465		38,081	70.0	16,347	30.0	54,428		38,662	68.7	17,611	31.3	38,662	
Recipient, current	2,157	73.5	778	26.5	2,935		1,180	72.1	456	27.9	1,636		1,253	71.0	512	29.0	1,253	
Recipient, previous	650	74.3	225	25.7	875		348	72.2	134	27.8	482		393	74.0	138	26.0	393	
Income						<0.001						<0.001						<0.001
Q1	20,345	76.3	6,314	23.7	26,659		11,389	74.4	3,916	25.6	15,305		12,265	73.9	4,331	26.1	12,265	
Q2	17,975	72.7	6,766	27.3	24,741		9,803	70.8	4,035	29.2	13,838		10,126	69.4	4,471	30.6	10,126	
Q3	16,181	71.4	6,470	28.6	22,651		8,845	69.8	3,833	30.2	12,678		8,653	67.8	4,110	32.2	8,653	
Q4	16,263	67.1	7,961	32.9	24,224		9,572	65.0	5,153	35.0	14,725		9,264	63.4	5,349	36.6	9,264	
Economic activity						<0.001						<0.001						<0.001
No	22,686	69.7	9,842	30.3	32,528		11,591	67.2	5,664	32.8	17,255		12,996	66.6	6,503	33.4	12,996	
Yes	48,078	73.1	17,669	26.9	65,747		28,018	71.3	11,273	28.7	39,291		27,312	69.9	11,758	30.1	27,312	
Health-related characteristics																		
Percieved health status						<0.001						<0.001						<0.001
Very poor	3,130	67.7	1,492	32.3	4,622		1,733	64.5	952	35.5	2,685		1,845	63.1	1,079	36.9	1,845	
Poor	13,678	71.1	5,573	28.9	19,251		7,489	68.4	3,467	31.6	10,956		8,129	68.0	3,822	32.0	8,129	
Good	28,934	71.2	11,683	28.8	40,617		15,767	69.2	7,017	30.8	22,784		16,223	68.4	7,485	31.6	16,223	
Nice	22,099	74.0	7,760	26.0	29,859		12,800	72.6	4,829	27.4	17,629		12,415	70.6	5,175	29.4	12,415	
Excellent	2,923	74.5	1,003	25.5	3,926		1,820	73.0	672	27.0	2,492		1,696	70.8	700	29.2	1,696	
MDD						<0.001						<0.001						<0.001
None	68,902	72.2	26,534	27.8	95,436		38,647	70.3	16,361	29.7	55,008		39,197	69.0	17,627	31.0	39,197	
Diagnosed group	1,862	65.6	977	34.4	2,839		962	62.5	576	37.5	1,538		1,111	63.7	634	36.3	1,111	

Table 2. Demographic, Socioeconomic and Health-Related Characteristics in Cancer Screenings for Both Gender Groups (Continue)

Number of chronic diseases						<0.001						<0.001						<0.001
None	37,899	73.3	13,808	26.7	51,707		21,084	71.8	8,277	28.2	29,361		19,918	70.0	8,534	30.0	19,918	
One	19,683	71.5	7,827	28.5	27,510		11,352	69.5	4,982	30.5	16,334		12,162	68.9	5,497	31.1	12,162	
Two or more	13,182	69.2	5,876	30.8	19,058		7,173	66.1	3,678	33.9	10,851		8,228	66.0	4,230	34.0	8,228	
Unmet need						0.029						0.170						0.009
Absence	63,237	71.9	24,716	28.1	87,953		35,829	70.0	15,383	30.0	51,212		36,368	68.7	16,601	31.3	36,368	
Presence	7,527	72.9	2,795	27.1	10,322		3,780	70.9	1,554	29.1	5,334		3,940	70.4	1,660	29.6	3,940	
Quality of Life (EQ-VAS)						0.001						0.005						0.006
Q1	19,214	72.2	7,415	27.8	26,629		10,360	69.7	4,512	30.3	14,872		10,896	68.9	4,918	31.1	10,896	
Q2	16,341	72.5	6,202	27.5	22,543		9,037	70.6	3,769	29.4	12,806		9,238	69.3	4,087	30.7	9,238	
Q3	17,311	72.4	6,603	27.6	23,914		9,802	70.9	4,021	29.1	13,823		9,865	69.4	4,345	30.6	9,865	
Q4	17,898	71.1	7,291	28.9	25,189		10,410	69.2	4,635	30.8	15,045		10,309	67.7	4,911	32.3	10,309	
Total	70,764	72.0	27,511	28.0	98,275		39,609	70.0	16,937	30.0	56,546		40,308	68.8	18,261	31.2	40,308	

was not statistically associated with cancer type (p=0.306). Interestingly, despite the absence of a statistically significant difference in unmet needs among the cancers screened, all organ subgroups evaluated except for liver showed statistical differences (Tables 2, 3). In the cervical cancer screening group, the follow-up consultation was not associated with quality of life (p=0.155).

We also performed the multivariate analysis using logistical models for all cancer screening groups and then for each specific cancer group. Lifestyle and behaviors such as smoking, alcohol consumption and amount of sleep were adjusted (Tables 4, 5).

When considering all cancer screening groups, the age groups of 45-64 years (odds ratio (OR)=1.12, 95% confidence interval (CI): 1.08-1.17) and 65-74 years (OR=1.12, 95% CI: 1.07-1.19) visited follow-up clinics more often after the cancer screening. The oldest age group over 75 years (OR=0.91, 95% CI: 0.86-0.97) visited less compared with the standard age group of 19-44 years. The recipients with a spouse (OR=1.07, 95% CI: 1.04-1.11) tended to have more consultations compared with those without a spouse, and the recipients living in rural areas (OR=0.71, 95% CI: 0.69-0.73) tended to follow-up less frequently. The follow-up consultation was influenced by education level. Starting with elementary school, as the education level increased to middle school (OR=1.26, 95% CI: 1.19-1.34), high school (OR=1.41, 95% CI: 1.33-1.50) and college (OR=1.76, 95% CI: 1.65-1.89), the participation rates also increased. Although the basic living status was not associated with the follow-up visit, the quartile income level showed a statistical trend and difference when compared with the lowest quartile group: the second lowest quartile (OR=1.11, 95% CI: 1.07-1.16), the third lowest (OR=1.12, 95% CI: 1.07-1.17) and the highest quartile income group (OR=1.29, 95% CI: 1.23 -1.35). The subjects with economic activities (OR=0.87, 95% CI: 0.84-0.90) visited less often than did the others.

We also analyzed the effects of health-related factors at the follow-up visits. Perceived health status was correlated negatively with the follow-up visits, in that the recipients who answered their health status as 'excellent' (OR=0.53, 95% CI: 0.48-0.59) tended to follow-up the least. The group with MDDs (OR=1.22, 95% CI: 1.13-1.31) diagnosed by doctors, chose to visit more frequently. The number of chronic diseases was related positively to the number of visits. For example, the recipients with one (OR=1.19, 95% CI: 1.15-1.23) or two or more (OR=1.34, 95% CI: 1.29-1.40) chronic diseases visited more than those without chronic disease. The recipients with unmet needs (OR=0.96, 95% CI: 0.92-1.00) did not visit as often as those without, and this was statistically different. Lastly, the recipients with the best quality of life (OR=1.06, 95% CI: 1.02-1.11) visited the follow-up clinics more often than did those with a poorer quality of life.

The results were nearly the same among cancers affecting both genders, such as stomach, hepatocellular carcinoma (HCC) and colorectal cancers, in terms of statistically meaningful independent covariates. However, regarding colorectal cancer, the age group from 65-74 years (OR=1.07, 95% CI: 0.99-1.16) did not show a statistical difference regardless of statistical trend. In the female-specific cancers such as cervical and breast, the presence of unmet needs was not associated with the follow-up visits, but in all other aspects, the results were similar to those of the all cancers combined group.

To determine their association with follow-up visits, the logistical outcomes were analyzed in greater detail (Figure 2). Current smokers (OR=0.93, 95% CI: 0.89 -0.98) had a tendency to visit less often than did non-smokers in the all cancers combined and male groups. Regarding alcohol consumption, there was a dose-dependent relationship among the all cancers combined and female groups; the male group was not associated with social drinking (defined as the amount equivalent to two or three times per month or less), and the female group was not associated with smoking.

Table 4. Adjusted Odds Ratios (OR) and 95% Confidence Intervals (95% CI) for Cancer Screenings in Both Gender Groups

	All			Stomach			Liver			Colo-rectum		
	OR	95% C.I.		OR	95% C.I.		OR	95% C.I.		OR	95% C.I.	
SEX												
male	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
female	0.96	0.92	1.00	0.98	0.93	1.03	1.06	1.00	1.13	1.03	0.98	1.10
Age group												
19-44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
45-64	1.12*	1.08	1.17	1.11*	1.07	1.16	1.19*	1.12	1.26	1.09*	1.02	1.16
65-74	1.12*	1.07	1.19	1.11*	1.05	1.18	1.15*	1.07	1.24	1.07	0.99	1.16
≥75	0.91*	0.86	0.97	0.89*	0.83	0.95	0.92*	0.84	1.00	0.89*	0.82	0.97
Presence of spouse												
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.07*	1.04	1.11	1.08*	1.04	1.13	1.09*	1.04	1.15	1.09*	1.04	1.15
Area												
urban area	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
rural area	0.71*	0.69	0.73	0.70*	0.68	0.72	0.71*	0.68	0.74	0.71*	0.68	0.74
Education level												
Elementary school	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Middle school	1.26*	1.19	1.34	1.29*	1.23	1.36	1.26*	1.19	1.34	1.26*	1.19	1.33
High school	1.41*	1.33	1.50	1.43*	1.36	1.49	1.41*	1.33	1.50	1.44*	1.36	1.52
College	1.76*	1.65	1.89	1.74*	1.65	1.83	1.76*	1.65	1.89	1.78*	1.67	1.90
Basic living status												
control	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
recipient, current	0.97	0.89	1.05	0.97	0.89	1.06	0.92	0.82	1.03	0.95	0.85	1.06
recipient, previous	1.02	0.88	1.18	1.06	0.91	1.24	1.05	0.86	1.29	0.95	0.78	1.16
Income												
Q1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q2	1.11*	1.07	1.16	1.13*	1.08	1.18	1.12*	1.06	1.19	1.15*	1.09	1.22
Q3	1.12*	1.07	1.17	1.13*	1.07	1.18	1.12*	1.05	1.19	1.16*	1.09	1.23
Q4	1.29*	1.23	1.35	1.30*	1.24	1.37	1.29*	1.21	1.38	1.31*	1.23	1.39
Economic activity												
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.87*	0.84	0.90	0.87*	0.84	0.90	0.87*	0.83	0.91	0.87*	0.83	0.91
Percieved health status												
very poor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
poor	0.81*	0.76	0.87	0.83*	0.77	0.89	0.82*	0.75	0.90	0.77*	0.70	0.84
good	0.69*	0.64	0.74	0.72*	0.66	0.77	0.71*	0.64	0.77	0.65*	0.60	0.71
nice	0.59*	0.55	0.63	0.60*	0.55	0.64	0.58*	0.53	0.64	0.56*	0.51	0.62
excellent	0.53*	0.48	0.59	0.55*	0.50	0.62	0.54*	0.47	0.62	0.52*	0.46	0.60
MDD												
none	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
diagnosed group	1.22*	1.13	1.31	1.21*	1.11	1.31	1.12*	1.07	1.33	1.13*	1.02	1.25
Number of chronic diseases												
none	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
one	1.19*	1.15	1.23	1.18*	1.14	1.23	1.18*	1.13	1.24	1.14*	1.09	1.19
two or more	1.34*	1.29	1.40	1.35*	1.29	1.41	1.37*	1.30	1.44	1.30*	1.24	1.37
Unmet need												
absence	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
presence	0.96*	0.92	1.00	0.94*	0.90	0.99	0.93*	0.87	0.99	0.93*	0.87	0.99
Quality of Life (EQ-VAS)												
Q1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q2	0.97	0.94	1.01	0.97	0.93	1.01	0.96	0.91	1.01	0.96	0.91	1.01
Q3	1.00	0.96	1.04	0.99	0.95	1.04	0.97	0.91	1.02	0.97	0.91	1.02
Q4	1.06*	1.02	1.11	1.08*	1.03	1.13	1.07*	1.01	1.13	1.07*	1.01	1.13

* p-value <0.05; **lifestyle behaviors such as smoking, alcohol consumption, amount of sleep and stress were adjusted

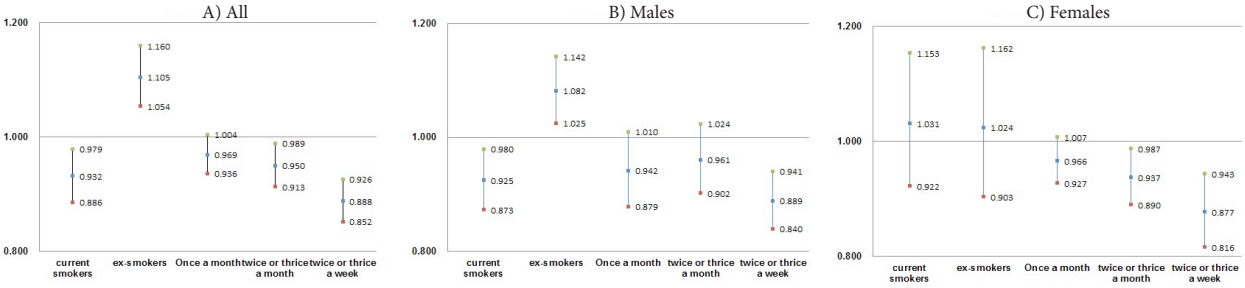

Figure 2. Adjusted Odds Ratio (OR) for the all Cancers Combined and Specific Gender Groups. According to the results of this study, the follow-up visits in males were related to smoking status. In contrast, smoking did not have any influence in females, and among males, ex-smokers visited more often than did non-smokers. However, the number of follow-up visits among females was related to alcohol consumption in a dose-dependent manner. Overall, smoking and alcohol use were negatively associated with the frequency of follow-up consultations

Table 5. Adjusted OR and 95% Confidence Intervals (95% CI) for the Female-Specific Cancer Screening Groups

	cervix			breast		
	OR	95% C.I.		OR	95% C.I.	
Age group						
19-44	1.00	1.00	1.00	1.00	1.00	1.00
45-64	1.14*	1.08	1.20	1.07*	1.01	1.13
65-74	1.10*	1.02	1.19	1.00	0.93	1.09
≥75	0.87*	0.80	0.95	0.78*	0.72	0.86
Presence of spouse						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.03	0.98	1.08	1.06*	1.01	1.11
Area						
urban area	1.00	1.00	1.00	1.00	1.00	1.00
rural area	0.75*	0.72	0.78	0.69*	0.66	0.72
Education level						
Elementary school	1.00	1.00	1.00	1.00	1.00	1.00
Middle school	1.34*	1.26	1.44	1.36*	1.28	1.45
High school	1.47*	1.38	1.56	1.46*	1.38	1.56
College	1.84*	1.72	1.98	1.90*	1.76	2.04
Basic living status						
control	1.00	1.00	1.00	1.00	1.00	1.00
current	0.93	0.83	1.04	0.94	0.84	1.06
previous	1.05	0.86	1.28	1.03	0.85	1.26
Income						
Q1	1.00	1.00	1.00	1.00	1.00	1.00
Q2	1.13*	1.06	1.20	1.13*	1.06	1.20
Q3	1.17*	1.10	1.24	1.18*	1.10	1.25
Q4	1.35*	1.26	1.44	1.32*	1.24	1.42
Economic activity						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.89*	0.86	0.93	0.89*	0.85	0.92
Percieved health status						
very poor	1.00	1.00	1.00	1.00	1.00	1.00
poor	0.82*	0.75	0.91	0.83*	0.75	0.91
good	0.69*	0.63	0.77	0.70*	0.64	0.78
nice	0.60*	0.54	0.67	0.60*	0.54	0.66
excellent	0.51*	0.44	0.59	0.51*	0.44	0.59
MDD						
none	1.00	1.00	1.00	1.00	1.00	1.00
diagnosed group	1.22*	1.11	1.34	1.17*	1.07	1.29
Number of chronic diseases						
none	1.00	1.00	1.00	1.00	1.00	1.00
one	1.18*	1.12	1.24	1.18*	1.12	1.24
two or more	1.35*	1.27	1.43	1.34*	1.26	1.42
Unmet need						
absence	1.00	1.00	1.00	1.00	1.00	1.00
presence	0.98	0.93	1.04	0.97	0.91	1.02
Quality of Life (EQ-VAS)						
Q1	1.00	1.00	1.00	1.00	1.00	1.00
Q2	1.00	0.94	1.05	0.99	0.94	1.05
Q3	1.00	0.94	1.05	1.00	0.94	1.06
Q4	1.06*	1.00	1.12	1.06*	1.00	1.13

*p-value <0.05; **lifestyle behaviors such as smoking, alcohol consumption, amount of sleep and stress were adjusted

Discussion

Based on the results from this study, the recipients with low socioeconomic status, such as low education and income levels, those with unmet needs, and those living in a rural area tended to visit follow-up clinics less frequently. Moreover, regarding health-related factors, a greater number of chronic diseases, presence of MDDs and a high quality of life were associated with more frequent follow-up visits to the clinic.

Several studies have been conducted on the factors associated with cancer screening. Kang et al. used data from the Korea National Health and Nutrition Examination Survey (KNHANES), a cross-sectional nationwide study (Shin and Lee, 2012; Kang et al., 2014). In terms of education level, disparities in attendance were observed for the opportunistic screening program. In another study, Lee et al. conducted a study regarding factors associated with the use of breast cancer screening services by females in Korea (Lee et al., 2010). They concluded more attention should be given to under-represented groups, particularly the elderly, those with a low education level, smokers and those with a negative attitude towards screening tests. In our study, similarly, the independent variables associated with low socioeconomic status, such as low income level and low education level, were negatively correlated with the dependent variables. Because no previous study has evaluated the factors associated with follow-up consultation after cancer screening in Korea, confirming our hypothesis and comparing our results with other studies are difficult.

However, we believe that education regarding lifestyle modifications, including smoking and alcohol use, is more important for cancer prevention. In fact, population-based efforts to lower tobacco use, mainly cigarettes, have reduced the lung cancer rates (Bamoya and Glantz, 2004; Thun and Jemal, 2006; Jemal et al., 2008; Glantz and Gonzalez, 2012). A 2008 U.S. annual report to the nation showed a decline in the incidence and death rates of all cancers and reasoned that reductions in tobacco use was the largest single factor preventing nearly one-third of cancer deaths by utilizing the existing knowledge. Another U.S. study concluded that reductions in tobacco use in the last half of the 20th century accounted for approximately 40% of the decrease in overall male cancer death rates and prevented at least 146,000 lung cancer deaths in males between 1991 and 2003 (Jemal et al., 2008). The gold standard for cessation treatment is the five A's (Ask, Advise, Assess, Assist, And Arrange) (Schroeder, 2005). Knowledge that most smokers require multiple attempts before they succeed, that rigorous studies show long-term quit rates of 14-20%, with one report as high as 35%, that cessation rates for users of telephone quit lines and integrated health care systems are comparable with those using individual clinicians, and that no other clinical intervention can offer such a large potential health benefit may help counter clinicians' pessimism regarding cessation. In our study, the current smokers visited follow-up clinics less often than did non-smokers, although ex-smokers visited more often than did non-smokers. However, to accomplish the objective of cancer screening programs, current smokers should be encouraged to attend the follow-up visits, obtain information on smoking cessation, and enroll in a quit smoking program.

Regarding alcohol use, the association between drinking alcohol and cancer has been demonstrated. A total of 21,201 Japanese males completed a self-administered questionnaire on various health habits, including alcohol consumption. The risk for any cancer was significantly higher in ex-drinkers than never-drinkers. A dose-response relationship between the amount of alcohol consumed and the risk of cancer among current drinkers showed 17.9% (95% CI 3.1-30.5) of cancer risk was attributable to drinking habits.

Additionally, a well-established relationship between cancer incidence and socioeconomic deprivation has been demonstrated; poor socioeconomic groups have high rates of cancer (Limb, 2014). Ramsay et al. studied socioeconomic inequalities among cancer mortality cases in Britain between 1978 and 2013 (Ramsay et al., 2014). The hazard ratio for cancer mortality between manual and non-manual social classes remained unchanged: 1.62 (95% CI 1.17-2.24) from 1980-1990 and 1.65 (95% CI 1.14-2.40) from 1990-2000 among males aged 50-59 years. The absolute difference (non-manual minus manual) in probability of surviving cancer at 70 years remained at 3% over the follow-up period. The consistency of risks over time was similar between smoking-related and non-smoking-related cancer mortalities. Another study was conducted in France on educational inequalities between males and females and cancer mortality in the 2000s (Menvielle et al., 2013). In this study, significant relative inequalities were found among males for all cancers and for smoking and/or alcohol-related cancer mortality. Furthermore, this disparity could induce different treatment outcomes. Mahdi et al. investigated racial disparities among the 30-day morbidity and mortality rates after surgery for endometrial cancer (Mahdi et al., 2014). According to this study, African American patients with endometrial cancer had more preoperative morbidities and postoperative complications and were less likely to undergo minimally invasive surgery. Although European American females are more likely to be diagnosed with breast cancer than are African American females (Office of Public Health Statistics and Information Services DoHaEC, 2006), the latter are more likely to die from breast cancer than the former (Ries et al., 2005). In addition, the average cancer stage at diagnosis was significantly higher in African American than European American females.

Therefore, controlling cancer-related lifestyles, such as smoking and drinking, especially in patients with low socioeconomic status are important. However, this group of recipients was not willing to attend the follow-up consultations, which contribute to lifestyle modifications and public health education related to cancer prevention.

Health education could significantly improve health-related behaviors in cancer patients, resulting in more favorable outcomes (Goss et al., 2014). Marek et al. (2012) evaluated the effect of an educational intervention on Hungarian adolescents' awareness, beliefs and attitudes on the prevention of cervical cancer. A self-administered anonymous questionnaire was completed by 394 male and female adolescents in September 2010 in Hungary. Half of the students (48.5%) received a one-on-one educational intervention regarding cervical cancer, consisting of a 45-min lesson, while the remaining participants (the control group) did not receive the educational intervention. Three months following the intervention, both groups were retested using the same questionnaire. A significant increase in cervical cancer awareness was detected. Health-related beliefs were enhanced, such as 'HPV may cause cervical cancer' (64.9%→81.0%, $p<0.05$) or 'cervical cancer may be prevented by vaccination' (66.5%→85.3%, $p<0.05$). Health education may also increase the cancer screening rates of participants. Huang et al. performed a community-based 2-year health educational intervention, after which 24.5% of the 1,041 respondents underwent a fecal occult blood test and 12% a colonoscopy examination during the study period, both substantially higher than the background screening rate in Shanghai (Huang and Shi, 2011).

Furthermore, easier accessibility to health clinics is needed in rural areas. In the last 20 years, public health has improved significantly in Korea. As a result, the disparity in accessibility to medical care between urban and rural areas has decreased dramatically. However, some inequity remained in this study due to geographic inconvenience. Thus, we suggest another venue is necessary to provide more information on current health status and education for cancer prevention. Fortunately, the emergence of high-tech communication devices, such as smartphones and smart TVs may, be the most cost-effective distribution method in rural areas (Wentzensen and Schiffman, 2014)

In Korea, if the patients are unable to follow-up, physicians traditionally report the results of cancer-screening programs by telephone or mail with only a "yes" or "no" regarding the presence of cancer. Therefore, the reporting system for results, including health education, needs to be upgraded from that of minimal information reporting.

There were several limitations in this study. First, due to its cross-sectional design, causal relationships could not be determined. To address this issue, we intend to analyze this topic further using a panel survey. Second, the cancer screening results could not be determined, and if a patient's results are negative for cancer, they potentially may not consider the clinic follow-up visit necessary. Consequently, we could not measure the unmet needs, which may require further cancer evaluation for suspicious positive results, but do not involve additional follow-ups. Investigating the actual unmet needs among different socioeconomic classes and lifestyles may prove more meaningful.

In conclusion, To the best of our knowledge, this is the first study to determine the associated factors to follow-up consultations after establishing a cancer screening program in Korea. Patients with low socioeconomic status and living in rural areas visited follow-up clinics less often. Furthermore, we believe that primary prevention through lifestyle modifications and environmental interventions addressing various health determinants may offer the most cost-effective approaches to reducing the cancer burden. Because the several risk factors discussed here are common to other diseases, controlling such risk factors may have a positive impact on a population's health.

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