

RESEARCH COMMUNICATION

Audience Segmentation to Promote Lifestyle for Cancer Prevention in the Korean Community

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Abstract

Objectives: This study was designed to segment the audience group of '10 lifestyle for cancer prevention' based on demographic characteristics and the level of knowledge about each guideline for cancer prevention among the community in South Korea. **Methods:** Participants were chosen through stratified random sampling according to the age and gender distribution of Gangwon province in South Korea. A telephone survey was conducted from 6 to 15 calls among 2,025 persons on October 2008. A total of 1,687 persons completed the survey (response rate: 83.3%). Survey items were composed of socio-demographic characteristics such as age, gender, income, education, and residence area and the knowledge level of '10 guidelines for cancer prevention', developed by 'Korean Ministry of Health and Welfare' and covering smoking cessation, appropriate drinking, condom use, and regular physical activity and so on. We selected the priority needed to promote awareness and segmented the audience group based on the demographic characteristics, homogeneous with respect to the knowledge level using Answer Tree 3.0 with CHAID as a data mining algorithm. **Results:** The results of analysis showed that each guideline of '10 lifestyle for cancer prevention' had its own segmented subgroup characterized by each demographic. Especially, residence area, - city or county, and ages were the first split on the perceived level of knowledge and these findings suggested that segmentation of audiences for targeting is needed to deliver more effective education of patients and community people. In developing the strategy for effective education, the method of social marketing using the decision tree analysis could be a useful and appropriate tool. **Conclusion:** The study findings demonstrate the potential value of using more sophisticated strategies of designing and providing health information based on audience segmentation.

Keywords: Cancer prevention - lifestyle - audience segmentation - Korean communities

Asian Pacific J Cancer Prev, 12, 869-874

Introduction

Cancer is the most common leading cause of death in Korea, each year approximately 10 million people become to be diagnosed as a cancer. Also, the cancer mortality has got increased; 130.1, 132.6, 134.0 and 139.5 per 100,000 people in 2002, 2004, 2006 and 2008 accordingly (Ministry of Health & Welfare, 2009). According to the report of Korean National Cancer Center (KNCC), the number of incidences and deaths caused by cancer are expected to increase by 46% and 30% in the next 10 years.

Most risk factors of cancer are known to be related with lifestyles (Ahn, 1992). In particular, a bad lifestyle such as alcohol-drinking and smoking is closely associated with cancer (Wynder, et al., 1970; Whittemore and Altshuller, 1976; Shin, et al., 2000). WHO reported that preventable factors including dietary habits and smoking accounted for 60% of total causes of cancer and suggested that improvement of dietary habits and others could reduce the risk of cancer to a third of the current level (WHO, 2002). Most cancer can be attributed to environmental, lifestyle,

and genetic factors and the interaction of these factors. Especially, lifestyle is the most important and modifiable factor among risk factors accounting for about 60% of all causes.

The Korean government has established 'Cancer Control 10 years Plan' since 1996, and has implemented 'National Cancer Screening Program' as a part of many efforts since 1999 (National Cancer Information Center, 2010). However, the development of measures for systemic and specific advertisement to enhance awareness of lifestyle for cancer prevention among the public is still insufficient. For more effective and efficient advertisement, systemic and scientific strategies using social marketing methods rather than ones for many and unspecific persons are required.

First of all, it is necessary to decide one code which has the priority for education and advertisement among '10 codes of conduct for cancer prevention'. Next, to develop the advertisement strategies, it is important to understand the audience. It is essential to examine the knowledge levels of lifestyle for cancer prevention from

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respondents because it should be found which group needs the education first.

To understand the perception of preventive behavior of cancer is essential in identifying groups that may benefit from more targeted strategies in cancer prevention and detection. In addition, it is necessary to find out a preferred medium for a main audience and use it for a systemic promotion rather than choosing an advertisement medium unilaterally. This study showed a methodology to identify a group needing the promotion first by applying market segmentation to advertize the lifestyle for cancer prevention to the respondents of Gangwon Cancer Center located in the surveyed region and presented the measures for a preferred promotion on the identified group.

Materials and Methods

Subjects

This study aimed to investigate the recognition level of codes of conduct for cancer prevention among respondents, primarily to develop advertisement documents for cancer prevention in Gangwon province through a questionnaire survey, which was composed of cancer-related knowledge and awareness of cancer-related promotion performed with the respondents in the region on October, 2008. The survey was conducted by telephone from October to November, 2008 and the subjects were randomly selected from one 'city' and five 'county'. By excluding 338 ones with many incomplete answers out of 2025 ones, the data of 1687 were analyzed.

Measurement tools

Dependent variables. The awareness of each of '10 codes of conduct for cancer prevention' invented by Korean ministry of health and welfare was asked and the subjects answered it with "yes", "no" or "I don't know". The respondents answering it with "yes" were considered to be those recognizing the code and the subjects answering it with "no" and "I don't know" were considered not to recognize it. But, for the tenth code, 'Undergo routine check-ups following cancer screening program', whether a respondent took the check-up actually was asked because the cancer screening program was already advertised significantly after Cancer Control 10 years Plan had been made in 1996 and National Cancer Screening Program had started. The plan currently focuses on strategies to increase the participation rate of cancer screening and the awareness of the necessity of cancer screening is already high. So, investigating the participation rate of the screening rather than the awareness rate is more useful as basic data to be applied to advertisements for participation. The '10 codes of conduct for cancer prevention' are:

- Don't smoke and avoid smoke-filled environment
- Consume sufficient amounts of fruits and vegetables and balance your diet with a wide range of healthy foods
- Limit your salt intake from all sources and avoid burnt or charred foods
- Limit your consumption of alcoholic beverages to one or two drinks per day
- Engage in at least 30 minutes of regular, moderate-

- intensity physical activity on most days of the week
- Maintain your body weight within a health range
- Ensure vaccination against hepatitis B virus following the HBV vaccination schedule
- Engage in safe sexual behavior to avoid sexually transmitted disease
- Follow all health and safety instructions at work places aimed at preventing exposure to known cancer-causing agents.
- Undergo routine check-ups following the cancer screening program

Independent variables. Data related to socio-demographic characteristics such as age, gender, residence area, education, annual income and job were collected. Socio-demographic characteristics of respondents are shown in Table 1. The socio-demographic characteristics included gender, residence area, age, education, annual income and job which were considered to influence the awareness of the codes. The residence area was divided into city and county according to the actual address of the respondents and age was classified into less than 50 years, 50~59 years and 60 and above by the answered age. Education was divided into graduation of middle school or lower academic institution, graduation of high school, graduation of junior college and graduation of college or higher academic institution. Annual income was done into less than 10 million won, 10 to 20 million won, 20 to 30 million won, 30 to 40 million won and above 40 million won. Job was classified with office worker

Table 1. Socio-demographic characteristics of respondents

		N	%
Gender	Male	798	47.3
	Female	889	52.7
Residence area	city	820	48.6
	county	867	51.4
Age	Younger than 50 years	720	42.7
	As old as or older than 50 years but younger than 60 years	437	25.9
	As old as or older than 60 years	530	31.4
Education	Meddle school or under	652	38.6
	High school	637	37.8
	College	87	5.2
	University or beyond	311	18.4
Annual income	Less than 10 million won	251	14.9
	10~20 million won	381	22.6
	20~30 million won	351	20.8
	30~40 million won	324	19.2
	Over 40 million won	380	22.5
Job	Office worker (company worker, public official) / professional, manager	262	15.5
	Service, sales/self-employed	276	16.4
	Technical worker, production/ agriculture, forestry, fishery/ laborer	431	25.5
	Housewife	562	33.3
	Unemployed	156	9.2
	Total	1687	100

Table 2. Recognition of 10 Codes of Conduct for Cancer Prevention

Lifestyle related knowledge	Unaware		Aware	
	N	(%)	N	(%)
Smoking and indirect smoking can provoke cancer	319	18.9	1,368	81.1
The intake of vegetables and fruits is helpful in preventing cancer.	204	12.1	1,483	87.9
The intake of burnt or charred can cause cancer	190	11.3	1,497	88.7
Drinking three or more cups of alcohol per day is related to cancer	782	46.4	905	53.6
Engaging in at least 30 minutes of walking on five or more days per week helps prevent cancer	197	11.7	1,490	88.3
Maintaining a normal body weight is helpful in preventing cancer	163	9.7	1,524	90.3
Vaccination against hepatitis B helps to prevent cancer	481	28.5	1,206	71.5
Condom use is helpful in preventing cancer	1,354	80.3	333	19.7
Exposure to benzopyrene, asbestos and formaldehyde can cause cancer	348	20.6	1339	79.4
Participated in cancer screening after January 1, 2003 No/Yes	537	68.2	1150	31.8

(including public official, professionals and managers), service (including sales)-self-employed, technical worker (including production)-agriculture (including forestry, fishery)-laborer, housewife and unemployed.

Frame of this study. Main analysis was conducted through the two phases. The detected a code of conduct with a low recognition - out of the 10 codes of conduct for cancer prevention those with less than 50% of recognition was chosen for a preferential advertisement. Identifying a subgroup who needs definitely the promotion of the prevention codes. For the detected code segmentation analysis was performed to examine socio-demographic characteristics of a subgroup with a low recognition. Then, media preferred by the identified group were examined and analyzed.

Data analysis

Data processing. This study excluded copies of the questionnaire with no answer for many questions or wrong answers before analysis. To evaluate pruning in the decision tree and the model, the data were divided into two parts - training data set and validation data set. Among the total data 67% were randomly selected as training data set of decision tree while the other 33% were done as validation data set of the tree and to assess the model.

Segmentation analysis. In segmentation analysis the correlation between the awareness of each code for cancer prevention and an independent variable, was examined by choosing a variable by stages according to its influence on dependent variables out of various input variables in Chi-square Automatic Interaction Detection (CHAID) algorithm out of decision tree analysis. Segmentation analyses were conducted with the Chisquared Automatic Interaction Detection (CHAID) option of AnswerTree

3.0(SPSS, 2001).

The CHAID algorithm developed in 1975 (Hartigan, 1975) conducts multiway split by using chi-square test (a discrete target) or F test (a continuous target) and it was oriented from Automatic Interaction Detection (AID) system reported by Morgan and Sonquist (1963). As implied in AID, CHAID originally aims to determine a statistical correlation among variables. As the statistical correlation can be presented again with decision tree, this method can be utilized as a classification technique (Thearling, 1995).

Results

Distribution of respondents

A total of 1,687 respondents, 798(47.3%) males and 889 (52.5%) females, were included in the analysis. Distribution of respondents according to age group was as follows: younger than 50 years old, 42.7; 50–59, 25.9%; 60 and older 31.4%. For education level, the majority were middle school graduates (38.6%). The largest proportion of respondents had an annual income of 10 to 20 million won (22.6%). Residence breakdown was 48.6% city dwellers, and 51.4% county dwellers. For job, 15.5% were office workers (company workers and public officials), professionals or managers, 16.4% were involved in service or sales or were self-employed, 25.5% were technical workers, production workers or laborers or were involved in agriculture-forestry-fishery and 33.3% and 9.22% were housewife and unemployed, respectively.

Awareness of 10 codes of conduct for cancer prevention

Table 2 presents the results of analysis on awareness of '10 codes of conduct for cancer prevention' among the subjects. The respondents knowing each code and not doing it were classified as "aware group" and "unaware group", respectively.

Order of awareness rate

The awareness rates of 'To maintain a normal body weight is helpful in preventing cancer', 'the intake of burnt or charred foods can cause cancer', 'To engage in at least 30 minutes of walking on five or more days per week is helpful in preventing cancer', 'the intake of vegetables and fruits is helpful in preventing cancer', 'smoking and indirect smoking can provoke cancer', and 'exposure to Benzopyrene, asbestos and formaldehyde can cause cancer' were relatively high by recording 90.3% 88.7%, 88.3%, 87.9%, 81.1%, and 79.4%, respectively. The rate of 'vaccination against hepatitis B helps to prevent cancer' was 71.5% and the subjects having participated in the cancer screening for the last two years was found to be 68.2%. The rate of 'drinking three or more cups of alcohol per day is related with cancer' was 53.6%, but that of 'condom use is helpful in preventing cancer' was only 19.7%.

Distribution of the information messenger and information media had multiple responses. For a question about an information messenger, 'who do you think is the most appropriate in providing information on cancer prevention and early detection of cancer?', the subjects

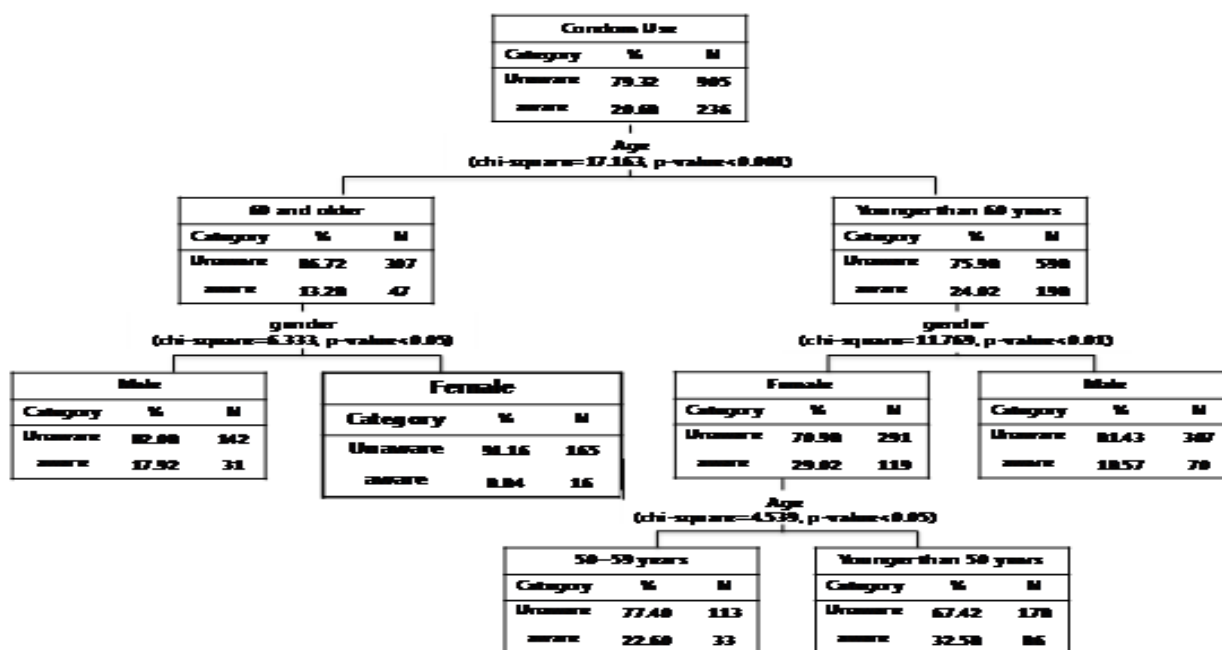


Figure 1. Diagram of the Audience Segmentation According to the Condom Used

answered it with one of experts, the public and artists, and for a question about information media, ‘what do you think is the most effective in promoting the contents about codes of conduct for cancer prevention?’ they answered it with one of TV, radio’s AD, promotion of paper (handbills, brochures, leaflets, newspapers and articles in newspapers), column of experts in health-related magazines and others (mementos and Internet) by considering the first and the second order.

The information messenger and information media were multiply responded. Appropriate messenger were; experts (75.6%), the public (16.7%), and artists (7.7%) among people who information on the codes of conduct for cancer prevention. The subjects recognized experts like physicians as the best messenger. As the most effective information medium, TV and radio’s AD, promotion of paper, column of expert and others were responded by 47.9%, 39.7%, 5.4% and 7.0%, respectively. The subjects recognized that the most easily approachable media or the mass media and printed matters were the most effective.

Audience segmentation for promotion of major codes

Based on the results of the analysis on the awareness of codes of conduct for cancer prevention, decision tree audience segmentation analysis on the awareness of condom use with a low awareness rate was conducted. For awareness of ‘condom use to avoid sexually transmitted infection’, the respondents were divided into three subgroups by age first (chi-square=17.163, p-value<0.001) and the awareness rate of the subjects with 60’s was very low by recording 13.28%. Second, they were classified by gender (chi-square=6.332, p-value<0.05) and the females with 60 years old and above showed the lowest, 8.84% (Figure 1).

“Age” appears to be the first determinant factor for awareness of ‘condom use to avoid sexually transmitted infection’: 60’s (86.7%) higher than less than 60 years old (76.0%). On the 60 years old and above, male and female are 82.1% and 91.2% (Figure 1).

Strategies for promotion

By dividing the total subjects into the ‘females with 60 years old and above’, who had the lowest awareness rate of condom use for a healthy sex life, and would be a main target to prevent cancer and the others, the most approachable promotion measure and the most reliable information messenger were examined.

According to the results of segmentation, most respondents considered experts as the most appropriate information messenger in both of the two groups and their rates were 81.25% and 74.5% in the group of ‘females with 60 years old and above’ and the other, respectively. The public was answered by 13.0% of the elderly female group and 17.5% of the other group and artists were done by 5.5% and 8.1%, respectively.

The group of ‘females with 60 years old and above’ responded (81.5%) that it was more important of the opinion of experts than the other groups (74.5%).

The results about effective information media analyzed through segmentation are shown in Table 5. Both of the two groups thought that TV and radio’s AD and promotion of paper were the most effective. TV and radio’s AD was responded by 51.2% of ‘females with 60 years old and above’ and 47.3% of the other group and promotion of paper was done by 39.2% and 39.7%, respectively. Column of expert was answered by 4.2% and 5.4%.

The group of ‘females aged 60 and olders’ considered the mass media such TV and radio media more informative than the others and it did not show any difference for promotion of paper and column of expert compared to the other group.

Discussion

This study was examined to detect “codes of conduct for cancer prevention” with low awareness rates by segmenting the audience with the lowest awareness rate by using socio-demographic variables, and to determine appropriate promotion methods for the subgroup.

This study revealed that awareness of a healthy gender life out of the codes of conduct was very low. While the other codes have been relatively advertised through broadcasting to the public, the promotion of the effect of condom use of preventing cancer has been poorly conducted, and that was reflected in this study.

A previous study performed with Korean adults reported that only 23.8% of the subject knew the correlation between Human Papilloma Virus Infection (HPV) infection and uterine cervical cancer and other study on awareness of HPV in female public health personnel also said that the percentage of a collect answer of 'condom use can prevent HPV' was less than 50% and even female public health personnel with relatively higher education did not recognize HPV sufficiently(Cho, et al., 2010). The awareness of the cancer preventive effect of condom use was reported to be low in foreign countries.

In Hongkong, around 90% of Chinese adult females aged over 18 years had not heard about HPV, and in Canada only 15% were found to have heard about HPV in a study conducted with adult males and females(Lee, et al., 2007). These findings showed that the general awareness of HPV was low like that of this study. A study of Muhammad insisted that only 32% knew that HPV virus was a risk factor of cervical cancer among 205 college students in South Africa(Muhammad, 2010). However, a report in Australia said that 88.9% of persons visiting a cervical dysplasia clinic had heard about HPV (Giles and Graland, 2006). These results meant that the awareness of HPV largely varied according to education and promotion levels by countries and more active advertisement could increase the awareness.

Kotler(1999) classified information into individual information (family members, close relatives, neighbors and friends), public sources (books, related books, articles in newspapers and magazines, contents of TV and radio, telephone dictionary, AD in TV/radio, newspapers and magazines, pamphlets, leaflets, promotional materials, etc), empirical sources (experiences of using medical service) and expert sources (advice of doctors and nurses). This study investigated preference of securing information through the public sources because it aimed to develop promotion strategies using the public sources.

Previous studies(Go, 1990; Pae, 1992; Hong and Yoo, 199) insisted that local medical consumers tended to depend mainly on informal sources. This finding suggested that the urgency of medical service was high compared to other materials or service and available sources of the consumers were very limited because of a high professional of the medical service. That showed that more public sources about health information should be developed and provided. Previous studies in Korea found that subjects had heard about HPV infection from physicians in the largest number of cases while Waller et al(2003) reported that subjects knew it through TV and newspapers. Even though uterine cervical cancer occurred much more in South Korea than in Western countries, the promotion of education about HPV infection and prevention was poorly performed and in most cases obstetricians and gynecologists played an important role in awareness of HPV through regular check-ups of obstetrics

and gynecology.It should be deeply discussed to use effectively public sources. Rather than simple campaigns or chanting slogans without specific strategies, there are necessary to identify required information and to advertise it properly.

This study used segmentation analysis to identify a group demanding the promotion first. Although market segmentation has been actively performed in marketing-related studies, it has been limitedly utilized in the public health area. However, as the interest in a social marketing approach has currently increased, a methodology to establish effective strategies by segmenting the audience is required. As a similar study, there was a study subdividing the audience based on focus group data to make promotion strategies to increase the screening rate of colorectal cancer (Holt, et al., 2009). But, the study classified the subjects randomly through a qualitative research.

Other previous study segmented health campaign messages for Koreans(Jo, et al., 2008). The study investigated the response to messages about cancer screening, lifestyle and socio-demographic characteristics with 490 adults and divided the subjects into four subgroups by lifestyle. It developed and suggested messages for education on the screening fitting the properties of the subgroups. Although the study tried newly to segment the audience according to lifestyle and suggested effective messages for each of them, its direction was different from that of this study because the previous study divided the audience first and then developed the messages.

As 10 codes of conduct for cancer prevention was invented by the Korean government and the message was already made, this study detected a code with a low awareness rate out of the ten ones, identified a subgroup demanding promotion first based on socio-demographic characteristics and considered that finding out the preferred media of the subgroup was necessary to establish promotion strategies. In particular, the 10 codes of conduct have been advertised through public institutions such as local health centers or local cancer centers. The segmentation standard to determine feasibility to administer the project is useful. Therefore, this study used gender, age and administrative districts as the frame of analysis by not including other psychological criteria. This method was considered to be applicable in making promotion strategies to increase cancer prevention and cancer screening rate in other countries.

As this study investigated the respondents of one province, it had a limitation to generalize the results of study in Korea. In addition, it did not deal with many variables related with health behaviors including psychological ones comprehensively and examined only socio-demographic variables to explain the differences.

Despite these limitations, this study also has some strength: it recruited representative subjects through sampling; it investigated awareness of codes of conduct for cancer prevention among respondents; and it shared a methodology by applying statistical methods to detect a subgroup demanding the promotion first and to identify persons for a social marketing. The results of this study could be used effectively for the advertisement of health

messages.

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