

# Setting a Health Policy Research Agenda for Controlling Cancer Burden in Korea

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Received September 1, 2013  
Accepted February 21, 2014  
Published online September 11, 2014

## Purpose

The aim of study was to provide suggestions for prioritizing research in effort to reduce cancer burden in Korea based on a comprehensive analysis of cancer burden and Delphi consensus among cancer experts.

## Materials and Methods

Twenty research plans covering 10 topics were selected based on an assessment of the literature, and e-mail surveys were analyzed using a two-round modified Delphi method. Thirty-four out of 79 experts were selected from four organizations to participate in round one, and 21 experts among them had completed round two. Each item had two questions; one regarding the agreement of the topic as a priority item to reduce cancer burden, and the other about the importance of the item on a nine-point scale. A consensus was defined to be an average lower coefficient of variation with less than 30% in importance.

## Results

Seven plans that satisfied the three criteria were selected as priority research plans for reducing cancer burden. These plans are “research into advanced clinical guidelines for thyroid cancer given the current issue with over-diagnosis,” “research into smoking management plans through price and non-price cigarette policy initiatives,” “research into ways to measure the quality of cancer care,” “research on policy development to expand hospice care,” “research into the spread and management of *Helicobacter pylori*,” “research on palliative care in a clinical setting,” and “research into alternative mammography methods to increase the accuracy of breast cancer screenings.”

## Conclusion

The seven plans identified in this study should be prioritized to reduce the burden of cancer in Korea. We suggest that policy makers and administrators study and invest significant effort in these plans.

## Key words

Cancer burden, Delphi technique, Agenda, Research plan, Priority, Thyroid neoplasms, Hospices, *Helicobacter pylori*, Early detection of cancer

## Introduction

Cancer is a major cause of mortality worldwide, contributing to 7.6 million deaths and resulting in an estimated 169.3 million years of healthy life lost in 2008 [1]. In Korea, cancer has been the leading cause of death since 1983, and is associated with the largest disease burden [2].

Deaths from cancer in Korea in 2010 accounted for 28.2% of all deaths (age-standardized deaths per 100,000 persons:

96.3) and the burden of cancer was ranked first in males (1,956 per 100,000) and second in females (1,405 per 100,000) by disability-adjusted life years (DALYs) [2,3]. The economic burden due to cancer is vast—estimated as 14.1 trillion Korean won (KRW, about 13 billion US dollar [USD]) in South Korea for the year 2005, and morbidity costs accounted for 3.2 trillion won (about 3 billion USD) [4].

Although health spending in Korea is low, at 7.1% of the gross domestic product (GDP) and lower than the average of countries belonging to the Organization for Economic

Cooperation and Development (OECD, 9.7% in 2010; OECD health data 2013), health care expenditure is expected to rise sharply due to the retirement of baby-boomers, and cancer burden is also expected to increase (247,732 new cancer cases and 74,179 cancer deaths are expected for 2013) [5].

To maximize efficient disease management, research priorities should be determined in accordance to the disease burden [6]. Efficient resource allocation and planning of the use of limited human and financial resources require prioritization of research by the government [6].

In Korea, the government has implemented several cancer control projects, including the 'Action Plan for the 10-Year Cancer Plan' from 1996 to 2005, 'Action Plan for the 2nd Phase of the 10-Year Cancer Plan' from 2006, and 'Cancer Control 2015: Second Term Comprehensive 10-Year Plan' in 2011. 'Action Plan for the 10-Year Cancer Plan' was successful at building organizations and systems for cancer control, at providing statistics of national cancer cases, and building a cancer screening system. In the 2nd phase action plan that began in 2006, the government invested in the management of cancer attribute risk factors, early cancer screening for the whole nation, and expansion of cancer care coverage. In 2009, based on the interim evaluation report of the 'Action Plan for the 2nd Phase of 10-Year Cancer Plan,' a modified plan was developed—the 'Cancer Control 2015: Second Term Comprehensive 10-Year Plan'—because the cancer burden and national cancer control situation had changed so rapidly.

Investment and studies based on evidence are needed in order to reduce cancer burden efficiently. For this, object selection and priority setting based on objective data and a comprehensive understanding of the current cancer burden are required.

In this study, we selected research plans to reduce cancer burden and conducted a Delphi survey to prioritize cancer burden-reducing research plans. We suggest research priorities for reducing cancer burden in Korea based on a comprehensive analysis of the current cancer burden grounded on a consensus among cancer experts using the Delphi method.

## Materials and Methods

The Delphi approach refers to the structured, iterative process of collecting and summarizing opinions from experts with the goal of forecasting the future events and group consensus building on a specific issue based on expert opinion [7]. We used a two-round modified Delphi method. We surveyed a panel of experts, who provided both qualitative and quantitative feedback for the two rounds [7]. Delphi

method has the advantage of anonymity; thus, decreasing the chance that some participants may have modified their responses based on the opinions of highly influential experts [7].

At first, 10 topics represented by 20 plans were selected. Topic selection was performed using a two-dimensional approach: cancer type and attribution factor of burden. An expert survey was conducted. A consensus was defined as an average lower coefficient of variation (CV) with less than 30% in importance. Less than the range of CV 0.5 is generally accepted as stable and was applied conservatively.

Topic subjects were selected by ranking DALYs. According to the study of Park et al. [8], the five cancer types that are associated with the greatest cancer burden in Korea are stomach cancer, liver cancer, lung cancer, colon cancer, and breast cancer (DALYs, 292, 254, 239, 214 and 111 per 100,000, respectively). These five types, along with other cancer types were predicted to have a burden of over 100 DALYs by 2020, namely thyroid cancer, prostate cancer, and pancreatic cancer (165, 185, 112 per 100,000 in 2020, respectively), were selected as topic subjects (DALYs of prostate cancer in 2020 can be confirmed to the author) [8].

Smoking and infection, which have the highest population attributable fractions (PAFs) to cancer death, were also included as topic subjects. The PAF of infection is 23.6% and the PAF of smoking is 22.8% for cancer mortality. Another risk factor is occupation, but its PAF is relatively low in comparison (PAF is 8.5) [9]. The PAF of smoking is 73% of lung cancer deaths, 32% of stomach cancer deaths, and 15% of liver cancer deaths in Korean males [10]. Furthermore, approximately 21.2% of all cancers and 24.7% of all cancer deaths are attributed to infection [11].

A low screening rate is a concern in colon cancer (44.7%), while the low accuracy of breast cancer screening tests is of concern [12]. Relevance is well known between the increased risk of gastric cancer and *Helicobacter pylori* infection [13]. So, *H. pylori* infection control is necessary. Hepatitis B and hepatitis C are commonly accepted as predisposing factors that lead to liver cancer. Hepatitis B and hepatitis C infection studies are needed to reduce the burden of liver cancer. Thyroid cancer was selected because of its high incidence, which may reflect over-diagnosis, and cancer types that are expected to increase in incidence in the future, namely prostate cancer and pancreatic cancer, were selected to gain an understanding of current conditions [8]. We also included topics considered to be important for cancer burden management, namely monitoring of the quality of cancer care and development of hospice-palliative care.

All 20 plans were selected for consideration of reducing the burden of cancer by the expert advisory meeting.

Items included in the 10 topics are listed in Table 1, and we requested "other suggestions" to obtain the opinions of

**Table 1.** Topics evaluated in the cancer burden-reducing management plans

Section	Topic	Sub-section	Cancer burden-reducing management plan
1	Colorectal cancer screening rate	1-1	Substitution of fecal occult blood test (FOBT) for colonoscopy should be investigated to increase the low colorectal cancer screening rate.
		1-2	Current FOBT methods should be improved to increase the low colorectal cancer screening rate.
2	Causal relationship between gastric cancer and <i>Helicobacter pylori</i> and ways to decrease infection rate	2-1	Epidemiological studies should be conducted to determine if there is a causal relationship between gastric cancer and <i>Helicobacter pylori</i> .
		2-2	Studies on the association between occurrence of gastric cancer and <i>H. pylori</i> antibiotic use should be conducted to verify a causal relationship.
		2-3	Studies on the spread and management of <i>H. pylori</i> should be conducted.
3	Hepatitis management to prevent liver cancer	3-1	Research into the association between hepatitis B and liver cancer should be performed.
		3-2	Research into the association between hepatitis C and liver cancer should be performed.
4	Improvement of the accuracy of breast cancer screenings	4-1	Mammography management plans that increase the accuracy of breast cancer screening should be investigated.
		4-2	Alternative mammography methods to increase the accuracy of breast cancer screenings should be researched.
5	Development of clinical guidelines for thyroid cancer and their application	5-1	Advanced clinical guidelines for thyroid cancer given the current issue of over-diagnosis need to be developed.
6	Selection and management plan for men at high-risk for prostate cancer	6-1	Selection methods to identify individuals at high-risk of prostate cancer need to be developed.
		6-2	Plans to manage individuals at high-risk for prostate cancer need to be determined.
7	Registration and management plan for pancreatic cancer	7-1	National status of pancreatic cancer in Korea should be determined through analysis of medical records, including disease state.
8	Population smoking management plan	8-1	Research into smoking management plans, particularly price and non-price cigarette policy initiatives, should be conducted.
9	Monitoring of the quality of cancer care	9-1	Research into ways to measure the quality of cancer care should be conducted.
		9-2	The 5-year survival rate of pediatric cancer should be determined.
10	Development of a hospice-palliative care model and its application	10-1	Research on application of palliative care in a clinical cancer setting should be conducted.
		10-2	Policies to expand hospice care should be developed.
		10-3	Clinical guidelines for former cancer patients should be drawn up.
11	Other suggestions	11-1	Please describe any other research that you feel should be conducted to reduce cancer burden.

**Table 2.** Affiliations of Delphi surveyees

Classification	Organization	No. of subjects	Respondent	
			First survey	Second survey
Cancer center	National Cancer Center	20	13	9
	Regional Cancer Center	23	6	3
Researcher	Korean Foundation for Cancer Research	7	2	1
	The Korean Society for Preventive Medicine	29	13	8
Total		79	34	21

**Table 3.** Criteria for selecting priority plans

Criterion	Substance
Agreement	Agreement percent $\geq 90\%$
Importance	Average importance scale $\geq 6.5$
Conformity	Agreement percent difference between cancer center group and researcher group $< 10\%$

individual experts. Each item was associated with two questions; one regarding the agreement on the selection of the item as a priority item for reducing cancer burden, and another about its importance on a 9-point scale. The first question was “Do you agree with the selection of this research plan as a priority for reducing cancer burden?” while the second question was “How important do you think this research plan is for reducing cancer burden? Please rank on a scale from nine (most important) to one (least important).” The survey was conducted via e-mail.

All contact between the researchers and participants was done by e-mail; we did not organize face-to-face or telephone meetings with experts, either before or after the study. All correspondence was sent individually to maintain privacy. Potential participants received an email introducing the purpose of the study and the nature of their participation, including the goal of building consensus and explanation of how topics were selected. Each potential participant received an online link to the first round survey, and one additional email was sent to encourage participation. Information about the results of the prior round was provided to participants in the second round.

Emails were sent to 79 experts, of which 34 (43%) completed the first survey. Experts were selected from four different organizations: National Cancer Center (n=20), Regional Cancer Center (n=23), Korean Foundation for Cancer Research (n=7), and Korean Society for Preventive Medicine (n=29).

A second survey was sent to 34 experts with their answer and answer-statistics of the first survey (percentage of agreement answers, mean and quartiles of importance answers). Twenty-one experts responded to the second survey (21/34, 62%) and the affiliated organization of participants are shown in Table 2. The average CV of the importance criterion of the second survey was 29.4%; therefore, no more survey cycles were conducted.

The priority items were decided based on predetermined thresholds for the three criteria of agreement, importance, and conformity (Table 3). Items satisfying the thresholds for these criteria were selected as priority research plans for reducing cancer burden. Ranking was determined in accordance to importance. The items that satisfied two criteria were selected as secondary priority research plans.

## Results

Results from the second Delphi survey are shown in Table 4, and priority research plans and other suggestions for reducing cancer burden in Korea are shown in Table 5. Other suggestions were classified into four categories.

Seven plans were selected as priority plans for reducing cancer burden—“Advanced clinical guidelines for thyroid cancer given the current issue of over-diagnosis need to be

Table 4. Second round results of the Delphi survey

Sub-section	Cancer burden reducing management plans	Importance scale	Agreement (%)	Agreement difference (%)
1-1	Substitution of FOBT for colonoscopy should be investigated to increase the low colorectal cancer screening rate.	6.6 <sup>a)</sup>	90.5 <sup>a)</sup>	22.2
1-2	Current FOBT methods should be improved to increase the low colorectal cancer screening rate.	6.3	95.2 <sup>a)</sup>	11.1
2-1	Epidemiological studies should be conducted to determine if there is a causal relationship between gastric cancer and <i>Helicobacter pylori</i> .	5.2	61.9	40.0
2-2	Studies on the association between occurrence of gastric cancer and <i>H. pylori</i> antibiotic use should be conducted to verify a causal relationship.	6.1	85.7	33.3
2-3	Studies on the spread and management of <i>H. pylori</i> should be conducted.	6.8 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
3-1	Research into the association between hepatitis B and liver cancer should be performed.	4.4	61.9	50.0
3-2	Research into the association between hepatitis C and liver cancer should be performed.	4.7	66.7	58.3
4-1	Mammography management plans that increase the accuracy of breast cancer screening should be investigated.	6.7 <sup>a)</sup>	95.2 <sup>a)</sup>	11.1
4-2	Alternative mammography methods to increase the accuracy of breast cancer screenings should be researched.	6.6 <sup>a)</sup>	95.2 <sup>a)</sup>	-8.3 <sup>a)</sup>
5-1	Advanced clinical guidelines for thyroid cancer given the current issue of over-diagnosis need to be developed.	7.4 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
6-1	Selection methods to identify individuals at high-risk of prostate cancer need to be developed.	5.8	85.7	33.4
6-2	Plans to manage individuals at high-risk for prostate cancer need to be determined.	5.9	90.5 <sup>a)</sup>	-16.7
7-1	National status of pancreatic cancer in Korea should be determined through analysis of medical records, including disease state.	5.7	90.5 <sup>a)</sup>	22.2
8-1	Research into smoking management plans, particularly price and non-price cigarette policy initiatives, should be conducted.	7.1 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
9-1	Research into ways to measure the quality of cancer care should be conducted.	7.0 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
9-2	The 5-year survival rate of pediatric cancer should be determined.	6.3	95.2 <sup>a)</sup>	11.1
10-1	Research on application of palliative care in a clinical cancer setting should be conducted.	6.8 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
10-2	Policies to expand hospice care should be developed.	7.0 <sup>a)</sup>	100 <sup>a)</sup>	0 <sup>a)</sup>
10-3	Clinical guidelines for former cancer patients should be drawn up.	6.4	100 <sup>a)</sup>	0 <sup>a)</sup>

FOBT, fecal occult blood test. <sup>a)</sup>Satisfy the criterion.

**Table 5.** Priority research plans and other suggestions for reducing cancer burden in Korea

Ranking <sup>a)</sup>	Cancer burden reducing management plans		Other suggestions	
	Category	Other suggestions for reducing cancer burden	Category	Other suggestions for reducing cancer burden
<b>Priority plans</b>				
1	Cancer care assessment and management	Advanced clinical guidelines for thyroid cancer given the current issue of over-diagnosis need to be developed.	Cancer care assessment and management	Management plans for unnecessary cancer care treatments should be developed.
2		Research into smoking management plans, particularly price and non-price cigarette policy initiatives, should be conducted.		Assessment and management plans to determine the effectiveness of cancer screening, its economic efficiency, and accuracy should be developed.
3		Research into ways to measure the quality of cancer care should be conducted.	Cancer prevention	Research should be conducted into methods to prevent stomach cancer and liver cancer.
4		Policies to expand hospice care should be developed.		The effectiveness of lung cancer screening programs should be examined.
5		Studies on the spread and management of <i>Helicobacter pylori</i> should be conducted.	Cost of cancer care	Studies on standards for national insurance coverage, cancer care and costs, and the economic burden of introducing a new anti-cancer drug should be performed.
6		Research on application of palliative care in a clinical cancer setting should be conducted.		Studies on economic burdens experienced by families, out-of-pocket money treatments, and alternative medicines for cancer patients should be conducted.
7		Alternative mammography methods to increase the accuracy of breast cancer screenings should be researched.	Cancer care	Research into ways to reduce disparities in cancer care according to socio-economic and regional strata should be performed.
<b>Secondary priority plans</b>		Mammography management plans that increase the accuracy of breast cancer screening should be investigated.		Cancer screening and care management plans for elderly individuals should be developed.
		Substitution of FOBT for colonoscopy should be investigated to increase the low colorectal cancer screening rate.		Cancer management plans for patients with chronic diseases should be developed.
		Clinical guidelines for former cancer patients should be drawn up.		

FOBT, fecal occult blood test. <sup>a)</sup>Ranking by importance scale.

developed," "Research into smoking management plans, particularly price and non-price cigarette policy initiatives, should be conducted," "Research into ways to measure the quality of cancer care should be conducted," "Policies to expand hospice care should be developed," "Studies on the spread and management of *H. pylori* should be conducted," "Research on application of palliative care in a clinical cancer setting should be conducted," and "Alternative mammography methods to increase the accuracy of breast cancer screenings should be researched" (sub-titles 5-1, 8-1 9-1, 10-2, 2-3, 10-1, and 4-2, in order of importance). "Mammography management plans that increase the accuracy of breast cancer screening should be investigated," "Substitution of fecal occult blood test (FOBT) for colonoscopy should be investigated to increase the low colorectal cancer screening rate," and "Clinical guidelines for former cancer patients should be drawn up" (sub-titles 4-1, 1-1, and 10-3) were selected as secondary priority plans. "Advanced clinical guidelines for thyroid cancer given the current issue of over-diagnosis need to be developed," "Research into smoking management plans, particularly price and non-price cigarette policy initiatives, should be conducted," and "Research into ways to measure the quality of cancer care should be conducted" (sub-titles 5-1, 8-1, and 9-1) were ranked first, second, and third, respectively, based on the results from both rounds of the survey. "Policies to expand hospice care should be developed" and "Research on application of palliative care in a clinical cancer setting should be conducted" (sub-titles 10-2 and 10-1) were also selected in both the first and second surveys. "Studies on the spread and management of *H. pylori* should be conducted" and "Alternative mammography methods to increase the accuracy of breast cancer screenings should be researched" (sub-titles 2-3 and 4-2) were not selected in the first survey, but were newly selected during the second survey.

The average CV of importance was 32.1% for the first survey and 29.4% for the second survey.

## Discussion

We used the Delphi method to select priority research plans to reduce future cancer burden in Korea. The incidence of thyroid cancer has increased in recent decades in Korean woman (10.6/100,000 in 1996 to 111.3/100,000 in 2010), but mortality was only 0.4 in 2010 [14]. This is similar to what has been observed in the United States, Scotland, and Australia [15]. Davies and Welch [15] suggested that the increasing incidence reflects increased detection of subclinical disease. It is thought that advanced clinical guidelines are

therefore needed.

Some early studies suggested that tax increase led to declines in smoking rates [16]. One of the most noteworthy measures implemented was a cigarette tax increase in December 2004, leading to an increase in the average retail price of cigarettes by 29%, in South Korea [16]. This large tax increase represented an explicit policy goal to reduce smoking rates, which was the first time in Korean history [16,17]. Since 2004, no other political measures have been attempted. Cigarette sales are decreasing in Korea, but at a slow rate. There have been many disputes over how to modify smoking in Korea by altering the price of cigarettes. However, few studies have examined how smoking can be controlled by pricing measures. Research into plans to manage smoking by price control is therefore very important.

According to Korean meta-analysis, there are just a few studies that studied cancer pain and psychosocial intervention. Furthermore, there are minimal number of studies concerning other qualities of cancer patients [18]. Studies on the quality of cancer patients are a necessity in South Korea, since the number of cancer patients have reached up to 960,654, and 202,053 patients were newly diagnosed cancer in 2010 [2].

Hospice care and palliative care are also of great importance—there are an estimated 1 million cancer survivors in South Korea, and 1.9% of the population has received cancer treatment or survived after cancer treatment [19]. Nevertheless, there were only 722 beds for palliative care of cancer patients in 2011. Development of plans for hospice and palliative care will have a major impact on reducing cancer burden.

The International Agency for Research on Cancer and the World Health Organization (IARC/WHO) concluded in 1994 that there was a positive causal linkage between *H. pylori* and gastric carcinogenesis, and numerous epidemiological studies have shown an association between *H. pylori* infection and increased risk of gastric cancer. Although the prevalence of *H. pylori* has decreased from 64.7% in 1998 to 40.0% in 2005, it still remains high, especially in younger individuals (44.1% in 19-39-year-olds, 42.6% in 40-59-year-olds, and 28.3% in individuals over 60 years) [20]. Therefore, further studies are required to investigate the spread of *H. pylori* and develop management plans.

However, some recent studies have questioned the association between *H. pylori* infection and gastric cancer. Yoon et al. demonstrated that 5.4% cases of gastric cancer in South Korea are *H. pylori* negative [21]. Khanna [22] reported a higher prevalence of *H. pylori* (80%) in the control group than the gastric cancer case group (78%). Further studies are therefore required to determine if there is in fact a causal relationship between the occurrence of gastric cancer and *H.*

*pylori* (sub-sections 2-1 and 2-2), even though this was not selected as a priority research plan.

Lastly, worldwide randomized controlled trial study conducted on the basis of screening by mammography in breast cancer mortality showed only about 20% mortality reduction [23]. Another study reports that the screening effect of mammography, excluding time effect, is about 10% [24]. For this reason, the US Food and Drug Administration (FDA) suggested delaying the age of breast cancer screening and lowering the number of screening. It is necessary to increase the accuracy of mammography to overcome these results. Due to concerns about the accuracy of breast cancer screening with mammography, researchers have been using an ultrasound or magnetic resonance imaging for screening in addition to mammography [25]. A cost-effectiveness evaluation of alternative methods is also needed.

This study has some limitations. First, we proposed survey items rather than letting the surveyees propose research topics. However, the subject fields of cancer and cancer burden are very large, and we wanted to present surveyees with a comprehensive range of topics. Therefore, we suggested 20 plans according to expert advisory with 10 topics. We determined the agreement among researchers for each item in the survey and selected items that had high agreement ( $\geq 90\%$ ). For this item, to reduce plan selection problem, we have set the standard that is 10% less than the difference between the agreement of clinical experts and researchers. We also included "other suggestions" section in the survey. In future studies, these "other suggestions" should be considered.

Second, the makeup of surveyees was biased towards non-clinical researchers. However, experts in cancer centers are field workers; so, we divided the experts into two groups: a cancer center group and a researcher group, and evaluated the differences between these two groups (our criterion of conformity).

Third, the cut-off value of agreement, one of the criteria is not objective. However, we made a proposal based on the order of agreement. Thus, a cut-off value might not have an effect on the priority ordering of plans.

Last, this study does not suggest any detail models or political direction of plans, and just suggests priority health policy research plans for reducing future cancer. We believe

that a study regarding these research plans for suggesting national political direction and success model is needed.

However, despite our limitations, we believe that our findings are important and should be used to prioritize funding for research projects with the ultimate goal of reducing cancer burden.

## Conclusion

We propose seven prioritized research plans that should be implemented to reduce cancer burden in South Korea.

In particular, the study about over-diagnosis of thyroid cancer will be a useful research worldwide, and price policy of cigarette will have much effectiveness in the domestic realm. Furthermore, in the context of the rapid aging of the population, we do not have enough time to prepare to study for the "quality of cancer treatment," "hospice care," and "palliative care". In addition, research for screening and treatment, which is currently being conducted, should not be neglected.

We urge policy makers and administrators to invest in these plans.

## Conflicts of Interest

Conflict of interest relevant to this article was not reported.

## Acknowledgments

This work was supported by a grant from the Korean Foundation for Cancer Research (CB-2011-01-01). The authors are indebted to the Korean Foundation for Cancer Research and all surveyees.

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