

Cancer Control Programs in East Asia: Evidence From the International Literature

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Cancer is a major cause of mortality and morbidity throughout the world, including the countries of North-East and South-East Asia. Assessment of burden through cancer registration, determination of risk and protective factors, early detection and screening, clinical practice, interventions for example in vaccination, tobacco cessation efforts and palliative care all should be included in comprehensive cancer control programs. The degree to which this is possible naturally depends on the resources available at local, national and international levels. The present review concerns elements of cancer control programs established in China, Taiwan, Korea, and Japan in North-East Asia, Viet Nam, Thailand, Malaysia, and Indonesia as representative larger countries of South-East Asia for comparison, using the published literature as a guide. While major advances have been made, there are still areas which need more attention, especially in South-East Asia, and international cooperation is essential if standard guidelines are to be generated to allow effective cancer control efforts throughout the Far East.

Key words: Cancer control programs, Registration, Screening, Tobacco control, Vaccination, East Asia

INTRODUCTION

Cancer control programs must be based on specific plans backed up by legislation, and although there are ostensibly such plans drafted by almost all of the countries of Eastern Asia, only from Japan [1,2] and Korea [3] have they been published in detail in the PubMed accessible literature. Components of a National Cancer Control Program are 1) assessment of burden, 2) risk factor determination, 3) primary prevention,

4) secondary prevention, 5) therapeutic intervention, and 6) palliative care. The present review concerns the present status of such programs in the different countries of East Asia, with an especial focus on findings reported in PubMed accessible scientific journals. A very general idea of the trends in research in the different areas is given by the graphs of Figure 1, depicting change in numbers of citations for China, Taiwan, Korea, Japan, Thailand, and Australia, for comparison, found with key words of A) cancer registry, B) cancer risk factors, C) tobacco control, D) cancer screening, E) cancer treatment, and F) cancer palliative; limited to the Title/Abstract for five year periods (1995-2000, 2001-2005, 2006-2010, 2011-now). Although increase over time has been general, different countries appear to be placing different emphases in their research efforts, like Japan and China for registration, Korea for screening, China for smoking, and Japan for palliative care.

In the literature accessible, only Japan and Korea have published comprehensive details of their programs although other countries are in the process of doing so. Cancer has been

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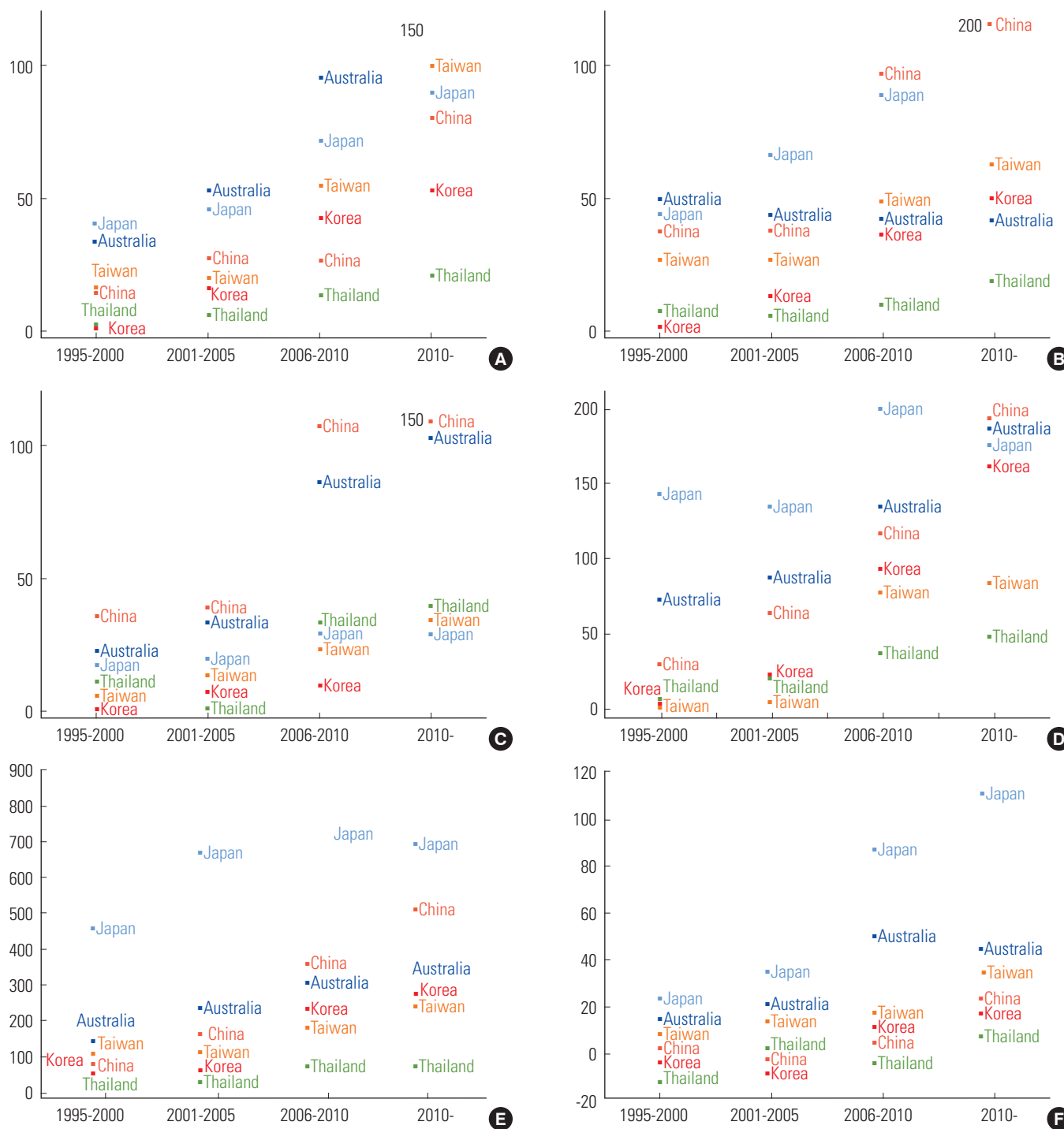


Figure 1. Results of literature searches of PubMed for selected countries. (A) Cancer registration, (B) cancer risk factors, (C) cancer tobacco control, (D) cancer screening, (E) cancer treatment, and (F) cancer palliation.

the leading cause of death in Japan since 1981 and a Cancer Control Act was approved in June 2006, and the Basic Plan to Promote Cancer Control program was approved to cover 2007 to 2011. A Phase Two Basic Plan was approved by the Japanese

Cabinet in June 2012. Although the first plan was limited to medicine or medical care, the second plan was broadened to include social undertakings such as patient support in terms of job acquisition or student education for an in-depth under-

standing of cancer [1,4].

Cancer has been the leading cause of death in Korea since 1983 and the government formulated its first 10-year plan for cancer control in 1996. In 2000, the National Cancer Center was created and the Cancer Control Division was set up within the Ministry of Health and Welfare. The Cancer Control Act was legislated in 2003 [3], covering anti-smoking campaigns, hepatitis B virus (HBV) vaccination, cancer registration and networking, promotion of R&D activities for cancer control, education and training for cancer control and prevention, operation of the national cancer information center, operation of the mass screening program for five common cancers, management of cancer patients at home, financial support for cancer patients, and designation of regional cancer centers [3]. The government has also been very active in providing the necessary legal environment for cancer registration while safe-guarding the privacy of individual patients.

It is to be hoped that more emphasis will be placed in the future on open publication of national cancer control plans and programs for comparison and mutual assistance in efforts to control cancer. In addition, more stress could be placed on region-wide cooperation. For example with a stated-preference approach, clinical experts from Australia, China, Japan, Korea, Taiwan, and the United States valued dimensions of hepatocellular carcinoma control and stressed needs for greater political and public awareness and improved management of lifestyle risk factors across the region [5].

CANCER BURDEN AND CANCER REGISTRIES

High quality population-based cancer registration data are the basis of any cancer control program and over the last 30 years a large number of registries have been set up which are considered adequate for inclusion in Cancer Incidence in Five Continents series [6-12]. Although the absolute number of such registries from East Asia has been increasing (Table 1) that of countries has not, reducing from eight in 1997 and 2002 to seven in 2007 and 2013, with no data included from Mongolia, Viet Nam, Laos, Cambodia, Myanmar, Indonesia or East Timor.

To a certain extent the Globocan effort of International Agency for Research on Cancer (IARC) provides a more comprehensive, if less accurate, picture [13-15] and other coordinated efforts have provided data for South-East Asia for example [16]. In addition, single papers have appeared in the literature for Laos [17], Indonesia [18], and Mongolia [19]. Results from Glob-

ocan for the five most prevalent cancers in males and females are compared with those from individual registries from Cancer Incidence in Five Continents (CIV) or individuals registries in Figure 2 for North-East Asia and Figures 3 and 4 for South-East Asia. As can be seen there is considerable variation among leading cancers, lung in males generally sharing first place with liver cancer in the mainland countries and more with colon and prostate in Peninsular and Island North-East Asia. Nasopharyngeal cancer is only within the first five cancers in Viet Nam, Brunei, Indonesia, and Malaysia. Of interest is the very low level of gastric cancer in Indonesia. In females almost everywhere in the South-East region, breast and cervical cancer occupy the first two spots, with the exception of Khon Kaen with high liver, Lampang with high lung and Hanoi with many stomach cancers in females. Especially within Thailand, there is major variation between regions, pointing to the necessity for local population-based cancer registration.

In North-East Asia (Figure 2), Korea and Japan continue to demonstrate high stomach cancer rates, not found in many Chinese registries, while liver is a major problem in China and Korea but not so prevalent in Japan, except in Osaka. Interestingly, in Chinese and Japanese males in Hawaii, as with Philipinos, prostate cancer is number one, as in the Western population.

In addition to the IARC related data, papers are regularly published for cancer incidence and mortality in China [20], Korea [21], and Japan, with emphasis on cohort effects [22,23]. For example, one recent publication covered the year 2009 for the Chinese National Central Cancer Registry 104 registries covering 85 470 522 people (57 489 009 in urban areas and 27 981 513 in rural areas) [20]. A recent focus has been on establishing more rural registries since estimated cancer mortality for all sites from national cancer registration was found to be representative for China, especially in urban areas, but mortality was over-estimated for rural areas, with large differences in some cancer site-specific mortalities [24]. Mortality data also available for Viet Nam [25] and Laos [26].

In Korea the coverage is nearly 100% and a comparison of the cancer incidence rates between the national cancer registry and insurance claims data generated very similar findings [27], while Japan is emphasizing hospital-based registries to provide a broad base picture of cancer statistics [28]. In Thailand there are now 6 population-based registries reporting to CIV [12] and the regional cancer centers are now coming on line so that the total population-based registries is now 16, with a plan for coverage of every region of the country. Unfor-

Table 1. Numbers of East Asian registries in the Cancer Incidence in Five Continents series of International Agency for Research on Cancer

Volume	IV	V	VI	VII	VIII	IX	X
China							
Beijing/Changle/Cixian/Wuhan					1		1
Guangzhou/Harbin						1	
Hainin/Jiaxing/Macao/Yangchen/Yanting/Zhongshan							1
Hong Kong/Shanghai	1	1	1	1	1	1	1
Jiashan					1	1	1
Qidong			1	1	1		1
Tianjin	1	1	1	1			
Japan							
Aichi/Fukui						1	1
Hiroshima		1	1	1	1	1	1
Miyagi/Osaka	1	1	1	1	1	1	1
Nagasaki	1	1	1	1	1		1
Saga			1	1	1		1
Yamagata			1	1	1		
Korea							
Busan/Daegu/Seoul					1	1	1
Daejeon/Gwangju/Inchon/Ulsan/Jeju						1	1
Kanghwa				1	1		
Malaysia							
Penang						1	1
Sarawak						1	
Philippines							
Manila			1	1	1	1	1
Rizal			1	1		1	1
Singapore ¹	1	1	1	1	1	1	1
Thailand							
Chiang Mai			1	1	1	1	1
Chonburi							1
Lampang					1	1	1
Khon Kaen			1	1	1		1
Bangkok					1		1
Songkhla					1	1	1
Viet Nam							
Ho Chi Minh City					1		
Hanoi				1	1		
Total	4	8	16	17	28	26	32

¹National Cancer Registry: Chinese, Malay, and Indian.

tunately the situation remains less clear for the other countries of South-East Asia, where coverage by high quality registries remains relatively low. Very recently, Korean registry specialists have focused on generating a single measure of cancer burden by summing incidence and mortality scores [29].

Regional data for trends over time have been published for

North-East Asia [30]; and South-East Asia [31,32] and in individual countries like Thailand for cancers overall [33]. Many papers have appeared documenting increase in cancers of the colorectum, urinary bladder and kidney, prostate, breast, endometrium and thyroid, and decrease in the oesophagus, stomach, liver and cervix [30-32,34-36]. With thyroid cancer the increase

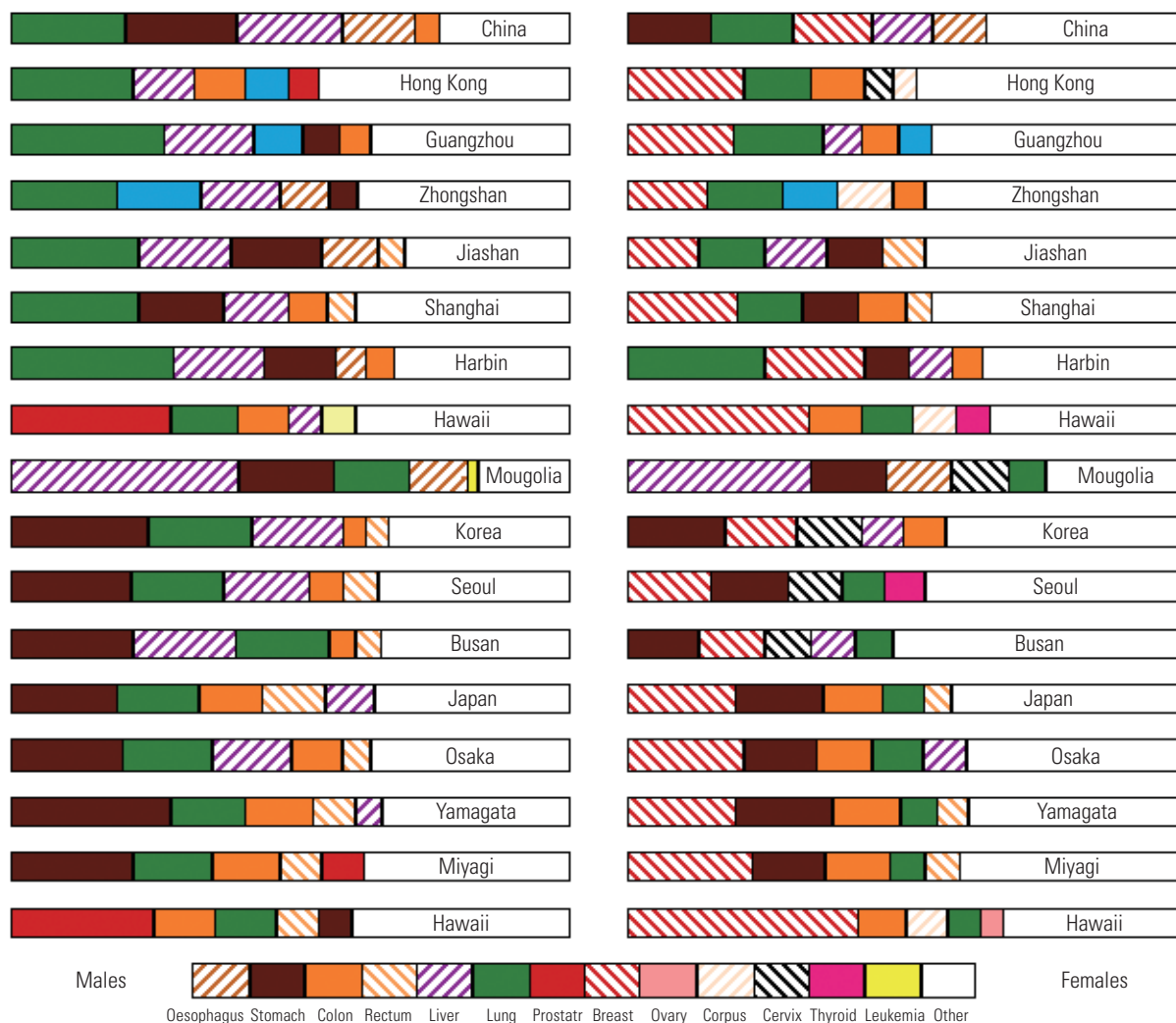


Figure 2. Percentage data for the five most prevalent cancers in populations of mainland North-East Asia. Country data are from Globocan 2002 and individual registry data from Curado et al., 2007 [11] (after Moore et al., 2009 [1]).

has been so marked that it is now the most common cancer in women in Korea [37]. In the oesophagus and lung cancer cases the situation is complicated by opposing tendencies for squamous cell carcinomas, generally decreasing, and adenocarcinomas, on the increase [30-32].

In recent years, more attention has been placed on survival, for example by a collaborative group in selected registries in East Asia [38]. Data on population based survival have been published from Japan [23,39] and Korea where cancer patients showed relatively favorable stage and 5-year survival, suggesting a potential contribution of the national cancer screening program (NCSP) [40]. No changes were detected in the mortality for colorectal, female breast or cervical cancers after the establishment of national screening programs for these cancers

[36]. Secular trends in breast cancer mortality were compared for five East Asian populations: Hong Kong, Japan, Korea, Singapore, and Taiwan [41].

Other relatively new developments regarding cancer registries include focusing on clustering, for example of breast cancer in Japan [42] and colorectal cancer in Malaysia [43]. Demonstration of quality of care measurement using the Japanese liver cancer registry has been reported [44] and improving trends in 'cure' fraction from colorectal cancer by age and tumour stage between 1975 and 2000 was established using population-based data for Osaka [45]. In one cooperative effort, cancer registries from eight economies in the Asia-Pacific region—Australia, China, Hong Kong, Malaysia, Singapore, South Korea, Taiwan, and Thailand—joined together to find

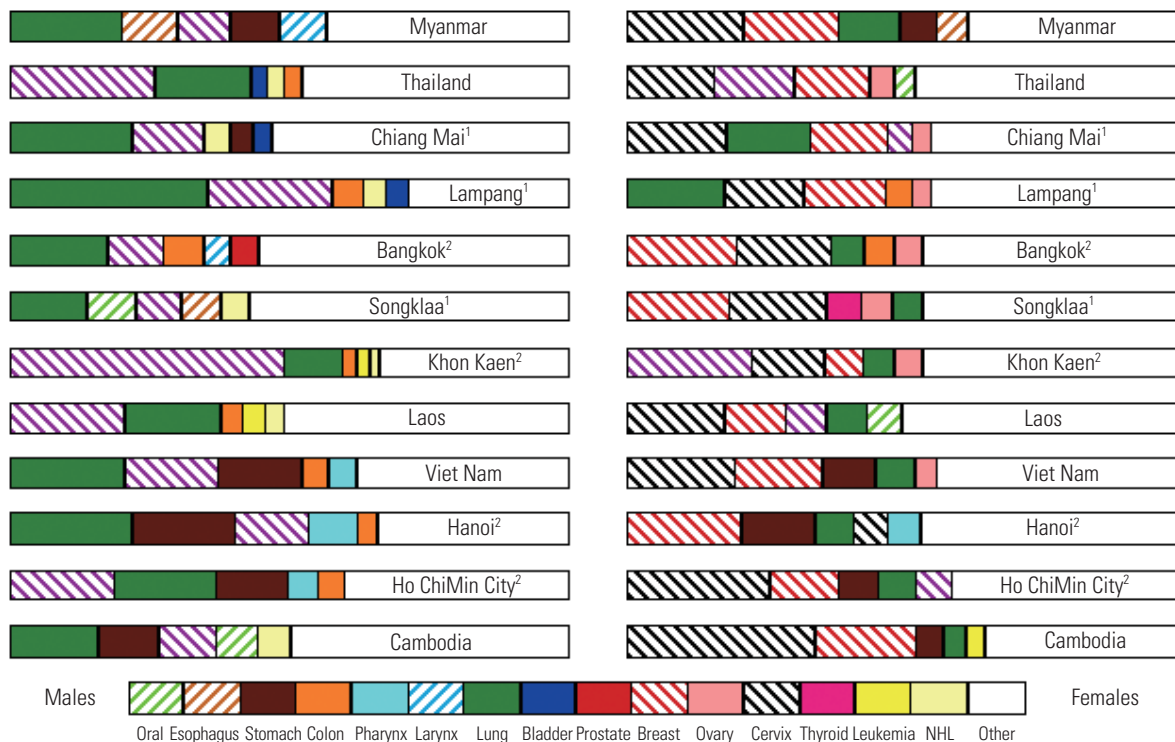


Figure 3. Percentage data for the five most prevalent cancers in countries of mainland South-East Asia. Country data are from Globocan 2002 (Ferlay et al., 2004 [13], ¹Curado et al., 2007 [11], and ²Parkin et al., 2002 [10]) after Moore et al., 2009 [1].

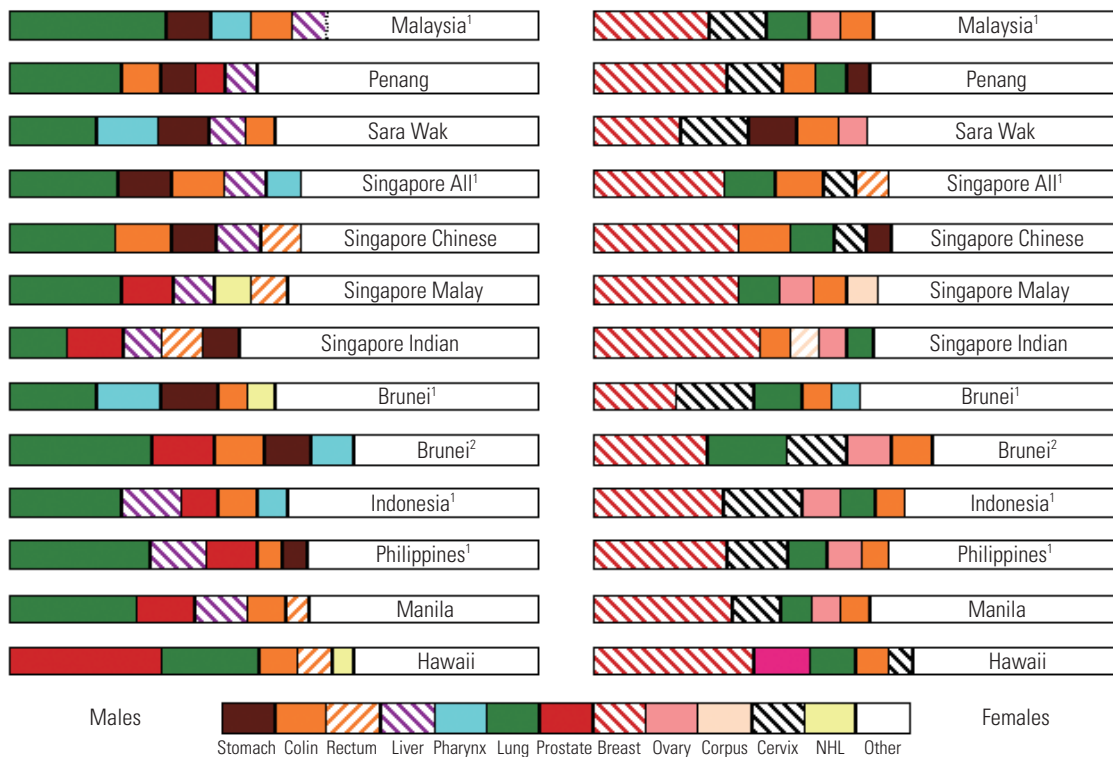


Figure 4. Percentage data for the five most prevalent cancers in countries of peninsular and island South-East Asia. Country data are from ¹Globocan 2002 (Ferlay et al., 2004 [13]), others Curado et al., 2007 [11]; ²Nyunt et al., personal communication (after Moore et al., 2009 [1]).

ways that they can contribute to oncology drug access [46]. On a national level, linking registry data with clinical, drug safety, financial, or drug utilization databases allows analyses of associations between utilization and outcomes [47].

Clearly cancer registration is continuing to attract a great deal of research attention in all major countries of East Asia, with increasing rates of PubMed accessible papers over the last 17 years (Figure 1A).

CANCER RISK FACTORS

General

In general, evidence for risk and beneficial factors covered in reviews of North-east and South-East Asia [30-32] are in line with the data summarized in the World Cancer Research Fund/American Institute for Cancer Research (2007) report [48,49] (Table 2 for findings for the alimentary tract, lung and prostate cancer, and Table 3 for female cancers). Cancer risk factors also continue to be a major focus of research attention in all major countries of East Asia, with increasing rates of PubMed accessible papers over the last 17 years (Figure 1B).

In 2005, 55% of cancer among men was attributable to preventable risk factors in Japan. The corresponding figure was lower among women, but preventable risk factors still accounted for nearly 30% of cancer. In men, tobacco smoking had the highest population attributable fraction (30% for incidence and 35% for mortality, respectively) followed by infectious agents (23% and 23%). In women, in contrast, infectious agents had the highest PAF (18% and 19% for incidence and mortality, respectively) followed by tobacco smoking (6% and 8%) [50]. In Korea, fractions of all cancers attributable to infection were 25.1% and 16.8% for cancer incidence in men and women, and 25.8% and 22.7% of cancer mortality in men and women, respectively [51]. Among infection-related cancers, *Helicobacter pylori* was responsible for 56.5% of cases and 45.1% of deaths, followed by HBV (23.9% of cases and 37.5% of deaths) and human papillomavirus (HPV, 11.3% of cases and 6% of deaths) and then by hepatitis C virus (HCV, 6% of cases and 9% of deaths). The health burden of cancers due to smoking was 2038.9 disability adjusted life years (DALYs) per 100 000 individuals in men and 732.2 DALYs per 100 000 individuals in women, cancers of the trachea, lungs and bronchus are the leading causes of health and economic burden [52]. In Chinese males, 4.40% of all cancers due to alcohol, mostly in liver [53], and 30% to tobacco [54].

Organ Specific Factors

Oral cavity

Betel chewing and tobacco are the major risk factors. Given the role for tobacco, for a priori reasons vegetables should be protective, as concluded by the World Cancer Research Fund/American Institute for Cancer Research [48] but there is only limited information available in Asia. Alcohol is not a major influence. There is limited evidence of protection by coffee drinking, while hot drinks may confer some risk. A possible viral etiology has long been discussed and HPV-related sites like oropharynx increased significantly over the period 1999 to 2009, particularly in young men (30 to 59 years), whereas HPV-unrelated sites such as larynx and hypopharynx decreased markedly in both sexes [55].

Nasopharyngeal

The generally accepted risk factors are genetic and exposure to carcinogens through consumption of fish/However a recent paper did not support the idea that changes in salted fish consumption could explain secular trends of nasopharyngeal cancer rates in Hong Kong and worldwide, while emphasizing potentially protective effects of vegetable consumption [56].

Esophagus

Again betel chewing and tobacco, with vegetable and fruit intake as protective. Very hot drinks may confer some risk, as do other sources of trauma, including salt and grit, and deficiency in zinc or other metals in the diet. These factors all impact on squamous cell carcinoma development. In the adenocarcinoma case, obesity is the main risk determinant.

Gastric

Atrophic gastritis due to heavy infection with *Helicobacter pylori* and high salt intake are established risk factors, with tobacco, while consumption of vegetables and fruits can be recommended. The very low incidence of gastric cancer in Indonesia has been attributed primarily to very low rates of infection with helicobacter [57]. Alcohol does not appear to be a major influence.

Colon and rectum

The obvious factors which need to be avoided as preventive measures are obesity and excessive alcohol consumption. Furthermore a diet high in meat and fat is detrimental, while consumption of vegetables and fish as well as physical exercise

Table 2. East Asian evidence for modifying factors for the alimentary tract, lung, and prostate

	Oral			Oesophageal			Gastric			Colorectal			Lung			Prostate			
	SE	NE	World ¹	SE	NE	World ¹	SE	NE	World ¹	SE	NE	World ¹	SE	NE	World ¹	SE	NE	World ¹	
Lifestyle																			
Carcinogens	++ ²	+	NA	ND	+ ²	NA	++ ³	++ ³	NA	+	+	NA	++ ⁴	++ ⁴	NA	ND	ND	NA	
Tobacco	++	++	NA	+	++	NA	+	++	NA	+	+	NA	+++	+++	NA	ND	ND	NA	
Alcohol	ND	++	+++	ND	++	+/-	ND	+	+/-	ND	+	+	ND	+/-	+/-	ND	ND	+/-	
Obesity	ND	+	+/-	ND	+	+/-	ND	+	+/-	ND	+	+++	ND	ND	+/-	ND	+	+/-	
Exercise	ND	ND	+/-	ND	--	+/-	ND	-	+/-	ND	--	---	ND	ND	-	ND	-	+/-	
Diet																			
Vegetables	ND	ND	--	ND	--	--	--	--	--	--	--	-	-	--	-	ND	--	--	
Fruits	ND	ND	--	ND	-	--	-	-	--	-	-	-	-	-	--	ND	-	-	
Fat	ND	ND	+/-	ND	--	+/-	ND	++	+/-	ND	++	+	ND	ND	+	ND	+	+/-	
Meat	ND	ND	+/-	ND	ND	+	ND	ND	+	+	+	+++	ND	ND	+	ND	ND	+/-	
Fish	ND	ND	+/-	ND	ND	+	ND	--	+	ND	--	-	ND	-	+/-	ND	-	+/-	
Tea/coffee	ND	-	+/-	ND	-	+/-	ND	+/-	+/-	ND	-	NA	ND	-	+/-	ND	-	+/-	

SE, South-East; NE, North-East; NA, not applicable; ND, no data; +/-, slight/weak protection; +/+, no effect; +/+/+, slight, weak, strong risk.

¹World Cancer Research Fund, American Institute for Cancer Research 2007.

²Betel/human papillomavirus.

³*Helicobacter pylori*.

⁴Asbestos/particles.

Table 3. Asian evidence for modifying factors for breast and cervix

	Breast cancer			Cervical cancer		
	SE	NE	World ¹	SE	NE	World ¹
Lifestyle						
Carcinogens	ND	+	NA	+++ ²	+++ ²	+++ ²
Tobacco	ND	+	NA	++	++	++
Alcohol	+	ND	+++	ND	ND	+/-
Obesity	ND	++	++	ND	ND	+/-
Exercise	ND	--	-	ND	ND	+/-
Reproductive factors						
Menarche	+	++	NA	ND	ND	NA
Menopause	+	++	NA	ND	ND	NA
Hormones	+	+	NA	ND	ND	NA
Pregnancy	-	--	NA	+	+	NA
Lactation	--	--	--	ND	ND	+/-
Diet						
Vegetables	-	-	+/-	-	ND	-
Fat	ND	+	+	ND	ND	+/-
Fish	ND	--	+/-	ND	--	+/-
Soy food	--	--	NA	ND	ND	+/-

SE, South-East; NE, North-East; ND, no data; NA, not applicable; +/-, slight/weak protection; +/+, no effect; +/+/+, slight, weak, strong risk.

¹World Cancer Research Fund, American Institute for Cancer Research 2007.

²Human papillomavirus.

are protective. Tobacco and dietary carcinogens may be secondary risk factors.

Liver

Roles are established for carcinogen exposure and viral and parasite infection, with lesser roles for alcohol and tobacco. Vegetables and other dietary influences are generally protective. Due to the link with steatohepatitis, avoidance of overweight may also be recommended.

Lung

The obvious factors which need to be avoided as a preventive measure are tobacco and particulate matter that can be breathed in like cooking oils, coal dusts and asbestos, for example. Vegetables and fruits are protective.

Prostate

There is no obvious factor which needs to be avoided, with the possible exception of dairy foods. Regarding prevention, consumption of soy products and vegetables, as well as fruit, would appear to warrant attention.

Breast

Post-menopausal obesity, early menarche and late menopause, and hormone therapy are risk factors. Tobacco and alco-

hol could play minor roles. The strongest protective factors would appear to be exercise, pregnancy, lactation, and consumption of soy products, followed by intake of fish and vegetables. Recently evidence has been present of pollution as a factor [58].

Cervix

The obvious factors which need to be avoided as preventive measures are infection with high risk human papilloma viruses and smoking, and to a lesser extent sexually transmitted disease. Dietary factors appear to have marginal significance.

INTERVENTIONS: PRIMARY PREVENTION

General

Awareness about cancer risk factors and symptoms varies greatly between and within societies in East Asia, and especially in countries like Malaysia and Indonesia where belief in faith healers remains strong. The situation in North-East Asia, Thailand, Singapore, and Viet Nam appears more promising however.

Vaccination

All of the countries of North-East and South-East Asia are implementing vaccination against HBV for control of liver cancer and practical evidence of efficacy has already been published for Taiwan [59] and Thailand [60], although in places like Mongolia where infection rates are high for HCV, for which there is no vaccine, the benefit may be limited [61].

With regard to high risk HPV vaccination the situation is fluid and most countries have yet to introduce a national program, at least as evidenced by the literature, an exception being Japan in 2011 [62]. It also appears, however, to be part of the program in Malaysia, where a number of papers have appeared regarding willingness for parents to have their daughter vaccinated and positive attitudes of students themselves and medical personnel [63-65].

Tobacco Control

Some countries in Asia have a long history of tobacco control activities beginning in the 1970s, and World Health Organization (WHO)'s Western Pacific Region is still the only region where all countries have ratified WHO's Framework Convention on Tobacco Control [66]. This is an epoch making event for the world tobacco control. However, in Japan, almost nothing has

been changed due to the intrusion of the tobacco industry and Ministry of Finance. Similarly in Korea, smoking still is possible in public places like restaurants. The Japan Society for Tobacco Control has made a passive smoking prevention bill and presented a petition to the Minister of Health, Labor and Welfare with related 4 bills. Cooperation, money and champion are the three most important issues that must be pursued [67]. Kanagawa Prefecture became the first subnational government in Japan to implement an ordinance for the prevention of exposure to secondhand-smoke in public facilities, aiming to protect people from the negative health impacts of secondhand smoke; however, it has wide exemptions especially for hospital-ity and leisure business establishments [68]. China's attitudes and actions in the negotiations: the aspiration to be a responsible power; concerns about sovereignty; and domestic political economy the Framework Convention on Tobacco Control [69]. China faces intractable political, structural, economic, and social barriers in tobacco control, which make the whole-hearted implementation of Framework Convention on Tobacco Control measures a painstaking process [70]. In Thailand, despite active anti-smoking policy measures [71], smoking prevalence among adolescents apparently increased from 2005 to 2008 [72].

Where anti-smoking initiatives have taken hold however, incidence rates of lung cancer are declining as in Viet Nam [73]. Reducing the smoking prevalence from 35% in 2007 to 0% in 2017 in Japan was estimated to avoid 333 900 all-cancer deaths and 171 100 lung cancer deaths in 20 years [74]. In a recent review for China, Korea, and Japan [75] findings indicated an urgent need for the following set of policies: raise cigarette prices to increase the quit attempt rate, particularly among adult men; develop a multi-component quitting assistance system to provide adequate assistance for smoking cessation; implement effective smoke-free policies in workplaces and public places to reduce exposure to passive smoking; and rebuild the administrative structure to denormalise tobacco industry activities. Reducing tobacco use through raising tobacco taxes/prices in China needs to take into account cost/price-reducing behaviour [76].

CANCER SCREENING

General

Clearly, the level of importance of a particular cancer in any given country will depend on the prevalence, as well as emotional and treatment costs. In Korea, mean financial 5-year net

costs per patient were found to vary widely, from 5647 US dollars for thyroid cancer to 20 217 US dollars for lung cancer, advanced stage at diagnosis being associated with a 1.8-2.5-fold higher total cost [77], so that early detection and down-staging of cancers is of obvious importance. One way to improve early detection and presentation is by increasing awareness of the general public about warning signs and symptoms and the efficacy of timely treatment, so that delay in presentation does not occur. This may be especially important in countries like Malaysia where belief in spiritual healers is very strong and can cause delay in seeking help from hospital-based clinicians [78,79]. The other is by population-based screening.

Whether screening will be beneficial and cost-effective is often unclear but the country with the most highly developed and attended screening program in East Asia, Korea, has generated compelling evidence that cost for life year saved is below the per capita gross domestic product for most major cancers [80-82].

Population-based programs have now been described in the literature for Japan, Korea, Taiwan, Singapore, and Thailand, and are beginning in other countries like China (Figure 2). The literature is rapidly increasing (Figure 1D), especially in Korea, where lifetime screening rates for gastric, liver, colorectal, breast, and cervical cancers were 77.9%, 69.9%, 65.8%, 82.9%, and 77.1%, respectively [83]. Lower rates generally prevail in Japan, but one problem with all Asian countries is that there is almost no focus on any negative consequences of screening, in terms of overdiagnosis and distress, and more emphasis needs to be placed on actual practical benefit and relative costs of screening and awareness programs to increase early detection of tumours [84].

Lack of trust in the NCSP and cancer screening units; fear of being diagnosed with cancer; discomfort or pain from the screening procedure; lack of time, lack of knowledge about cancer screening or lack of awareness of the existence of the NCSP; physical disability or underlying disease; and logistic barriers are the most common reasons for failure to follow advice and guidelines for screening along with no symptoms [85]. Client reminders for breast and cervical cancer screening increased attendance rates in smaller municipalities in Japan [86] and removing out-of-pocket costs improves female cancer screening uptake in Japan but may not be cost-saving [87]. Interventions such as individualized counseling, letters and reminders, or other individual-targeted strategies, especially for those with lower socioeconomic status are required to increase

participation and reduce disparities in cancer screening [88,89]. A very brief coverage of recent findings at the organ-tissue level is given below.

Nasopharyngeal

Valuation of plasma Epstein-Barr virus DNA load to distinguish nasopharyngeal carcinoma patients from healthy high-risk populations in Southern China was found to have limited value in screening patients who have early stage nasopharyngeal cancer and predicting nasopharyngeal cancer development [90].

Esophagus

While there are no country-wide population-based screening for esophageal cancer, estimating the costs of early diagnosis and treatment with screening in three high risk areas in China did reveal great cost savings [91].

Gastric

Endoscopic screening for gastric cancer is reported to give a higher sensitivity than radiographic screening [92]. In South Korea, endoscopy was the most cost-effective strategy [80] sensitivity being better with equal specificity to upper-gastrointestinal series [93]. The fluoro-D-glucose positron emission tomography (FDG-PET) screening program in Japan detected some cases of early-stage gastric cancer, but this was not achieved using FDG-PET alone but in combination with gastric endoscopy [94]. In a health economic assessment for screening of gastric cancer in a high risk population in northeastern China was demonstrated to be cost-effective [95].

Colo-rectal

Based on the American Cancer Society recommendations, a fecal occult blood test every year should be performed. However, among East-Asian country, this test was most popular in only Japan (76.9%) and Indonesia, sigmoidoscopy every 5 years and total colonoscopy every 10 years being the most popular methods [96]. In a multi-center study of adults 50 years and older, 27% had undergone previous colorectal cancer testing; the Philippines (69%), and Japan (38%) had the highest participation rates, whereas Malaysia (3%), Indonesia (3%), and Brunei (13.7%) had the lowest rates [97]. Organised colorectal cancer screening in Lampang Province, Thailand has generated preliminary results which should lead to introduction of a national program [98].

Recently, attention has concentrated on FDG-PET screening but this modality alone cannot detect all colon lesions [99]. One problem with all methods is compliance with follow-up tests after a positive result. In Korea, after positive fecal occult blood test, colonoscopy rates increased from 17.9% in 2004 to 27.6% in 2008, while double contrast barium enema decreased from 43.4% in 2004 to 11.0% in 2008, showing that endoscopy is preferred [100].

Liver

In Korea, the screening of liver cancer is recommended to those aged 40 or old who are HBs-antigen or anti-HCV positive or have liver cirrhosis [101]. An ultrasonographic examination and alpha-feto protein test is done every 6 months for these high risk groups. In Chinese high risk groups, extensive use of des-γ-carboxyprothrombin screening of HBV-related chronic liver disease promoted the early detection of hepatocellular carcinoma [102].

Lung

Although presently limited to Japan, results suggest that wide implementation of low-dose chest computed tomography screening may decrease lung cancer mortality [103].

Prostate

While most results indicate prostate cancer screening to be not cost-effective, those patients diagnosed by Prostate-Specific Antigen testing have better prognosis than those with symptoms [104].

Breast

Although breast self examination is generally recommended to increase awareness, there are doubts as to whether it is efficacious in reducing mortality [105]. Furthermore, limited effectiveness of screening mammography in addition to clinical breast examination by trained nurse midwives was found in rural Jakarta, Indonesia [106] because of barriers to appropriate treatment of women who are identified as having breast cancer, as reported earlier in the Philippines [107]. While breast cancer screening participation rates are high in Koreans, they are lower elsewhere and in Chinese women they vary greatly by age, region, and insurance status [108]. In order to improve the mammographic screening rate in Japan, quality-controlled mammography as a stand-alone examination should be promoted, and performed biennially for women aged 50 to 74 years [109].

Regarding alternative methodology, ultrasonography may be more sensitive than mammography in detecting breast cancer in women, especially in those with high-density and relatively small breasts [110]. However, this was not confirmed in Thailand [111]. Cost-effectiveness needs to be improved by increasing the sensitivity of breast cancer screening and by setting appropriate age limits [82].

Cervix

The Pap smear is generally applied in Eastern Asian countries for cervical cancer screening and in Thailand it has recently achieved excellent coverage [112]. However, women who have been screened multiple times are at substantially lower risk than those only screened a few times suggesting that the quality of the screening could be improved [113]. An alternative for low-middle income countries is visual inspection with acetic acid and in a large project involving 45 000 women in Indonesia, 83.1% of visual inspection acetic acid-positive women sought cryotherapy [114]. Recent interest has focused on two HPV DNA tests-care HPV and Hybrid Capture 2 [115] and detection of 14 high-risk HPVs with HPV 16 and HPV 18 genotyping by polymerase chain reaction [116].

Three strategies to expand screening coverage and ensure prompt treatment for cervical cancer have been proposed: strengthening community mobilization and advocacy activities, modifying the service delivery model to encourage a single visit approach to screening and treatment, and working to gain men's support [117].

CLINICAL TREATMENT

In many countries of East Asia the clinical emphasis within cancer control programs is for better access to treatment and diagnostic services outside of the major cities so that specialist cancer hospitals are being designated, as in Japan, or regional cancer centers established, as in China, Korea, Thailand, and Viet Nam. There is a great deal of research continuing to be performed (Figure 1E) and there is now a need to measure a wide range of outcomes, including quality of care and quality of life measures. One recent multinational focus has been on cost-effectiveness in cancer treatment [118].

PALLIATIVE CARE

Generally palliative care has lagged behind other areas of

cancer control programs, although the literature from Japan in particular has been rapidly increasing over the last 12 years (Figure 1F). Two areas deserve particular attention, access to pain control and availability of specialised trained staff. While a lack of both health care personnel fully trained in palliative care and specialist palliative care services has been reported in Thailand [119] with difficulties in opioid access [120], Japan has been successful in increasing full-time palliative care physicians and nurses and the median number of annual referrals [121]. Although late referral to palliative care services has been described as one problem in Korea [122], long-term cancer survivors can benefit from the Health Partner Program to become health coaches [123]. There are reported to be physician-related and population-related barriers which impede palliative care development in China [124].

There is a need to measure a wide range of outcomes, including quality of care and quality of life measures specifically designed for palliative care populations, whether patients died where they actually preferred, the changes in physicians and nurses at a regional level; adopts qualitative studies along with quantitative evaluations; and the intervention is without a fundamental change in health care systems [125].

CONCLUSION

Cancer control programs require a great deal of resources, both financial and human, and the evidence-base for particular measures must be efficiently generated and evaluated in order

for governments to give the necessary emphasis within their Health Ministries. This author has repeatedly argued for the population-based regional cancer registry as a hub for research to all aspects of cancer control, from incidence through to clinical epidemiology and palliative care [126,127]. The essential expertise in epidemiological methods and statistical analysis are at hand and generally also the human contacts within different hospital departments without which it is impossible to collect reliable registry data. The local cancer registry research centre can offer a location for training with input from International organizations like WHO and Union for International Cancer Control, providing research capacity and the essential data collection potential, not only for incidence, mortality and survival but also for assessment of risk factors, efficacy, barriers and facilitators of screening, prognostic factors in clinical cases, and satisfaction with palliative and other services. It is to be hoped that special publications for cancer registration or other areas of cancer control can be organized as a follow-up to the 'Cancer registration in Asia in the year 2000: past, present and future' earlier produced with input from the IARC [128]. Provision of up-to-date information to the local community in laymen's language should also assist in transferring messages concerning national cancer control programs, at whatever stage in the processes contributing to neoplasia (Figure 5). In addition, data linkage units may be used to link cancer registry data with administrative data on vaccinations, cancer screening, co-morbidity and treatment, which significantly increases the linked data available for routine cancer surveillance [47].

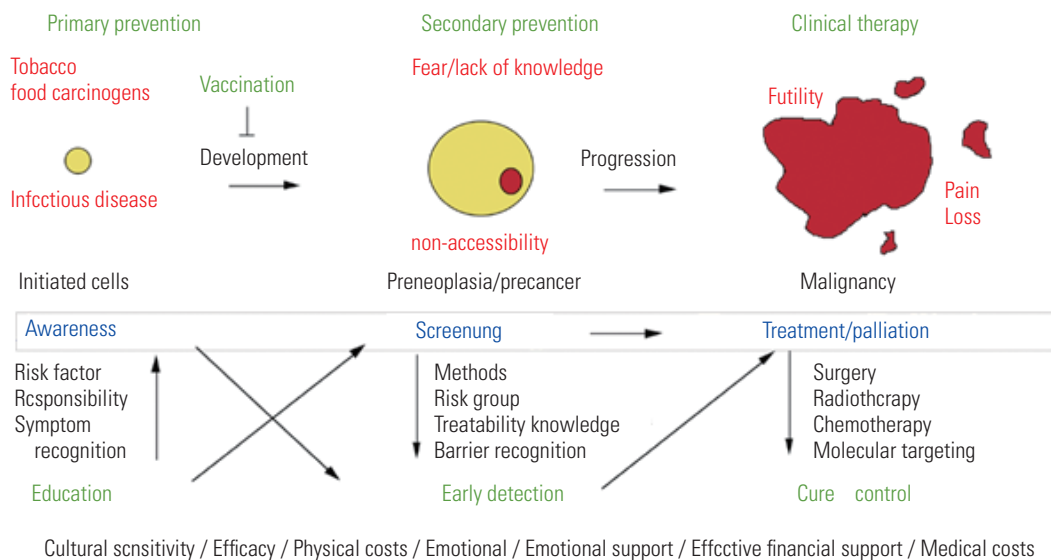


Figure 5. Stages in processes contributing to neoplasia and cancer control programs.

Clinical registries, where they exist, provide fundamental data that can be used to validate administrative data for evaluation of treatment and population-based surveillance.

How the cancer control programs in East Asia develop in future will be greatly influenced by the research work conducted to answer specific questions. Reviews like the present brief introduction will hopefully contribute to this important aim.

CONFLICT OF INTEREST

The author has no conflicts of interest with the material presented in this paper.

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