OVERVIEW

Cancer in Asia - Incidence Rates Based on Data in Cancer Incidence in Five Continents IX (1998-2002)

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Abstract

Data from 44 cancer registries in 15 countries in Asia were published in Cancer Incidence in Five Continents Volume IX (CI5 IX). These and findings from 3 other registries were here analysed to provide an overview on the incidence and characteristics of specific cancers by country/region in Asia. Using the collected database, the annual number of cancer cases and the corresponding population numbers divided into six age groups (0-29, 30-39, 40-49, 50-59, 60-69, 70 and more) were extracted and used for incidence estimation. The incidence rates of cancer across Asia vary greatly, with approximately three fold differences in both males and females.

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Introduction

Asia represented more than 60% of the world population in 2008 (World Population Prospects, The 2008 Revision) (United Nations, 2009) and according to the GLOBOCAN estimates in 2002, 45% (4.9 million) of all new cancer cases in the world diagnosed and 50% (3.4 million) of cancer deaths occurred in Asian countries (Ferlay et al, 2004).

Cancer is becoming a more important health problem in Asian countries with aging of populations and changes in lifestyles associated with economic development. This underlines the necessity of high qualified cancer registration.

Data Sources and Methods

Data from 44 population-based cancer registries in Asia published in Cancer Incidence in Five Continents Volume IX (CI5 IX) (Curado et al., 2007) and four submissions with permission (Jordan cancer registry, Taiwan cancer registry and two registries from Hanoi and Ho Chi Min in Viet Nam) were included in the analysis. The countries included, population data and registry details are summarized in Table 1. The populations were categorized into four groups according to the geographical location - Eastern Asia (Chinese registries, Japanese registries, Korea, and Taiwan), South-Eastern Asia (Hong Kong, Malaysian registries, Filipino registries, Singapore, Thai registries, and Viet Nam registries), Western Asia (Bahrain, Cyprus, Israel, Jordan, Kuwait, Kuwaitis, Oman,Omani and Turkish registries), and South-Central Asia (Indian registries, Pakistan registry).

Using the collected database, the annual number of cancer cases and the corresponding population numbers divided into six age groups (0-29, 30-39, 40-49, 50-59, 60-69, 70 and more) were extracted and used for incidence estimation.

To calculate the pooled estimates of incidence rates , data from Chinese registries of mainland China (Guangzhou, Jiashan, Nangang District, Harbin City, Shanghai, and Zhongshan), Japanese registries (Aichi, Fukui , Hiroshima, Miyagi, Nagasaki, Osaka, and Yamagata), Malaysian registries (Penang, Sarawak), Thai registries (Chiang Mai, Lampang, Songkhla), Viet Namese registries (Hanoi, Ho Chi Min), Turkish registries (Antalya, Izmir), Indian registries (Chennai (Madras), New Delhi, Karunagappally, Mumbai (Bombay), Nagpur, Poona, Trivandrum),were combined for each population. Then their annual numbers of cases and population by 5-year age-group were summed up.

For the incidence rates in Cyprus, Hong Kong, Israel, Jordan, the Republic of Korea, the Philippines (Manila), Pakistan (Karachi), Singapore, Taiwan, national/regional registry data were used and in Bahrain, Kuwait, Oman, data for Bahraini, Kuwaitis, Omani were respectively used. The age-standardized rates per 100,000 person-years for male and female were computed on the basis of the world standard population (Segi, 1960).

Results

Table 1 shows the list of countries/regions with the numbers of population in 2000 and coverage (%) by cancer registries. The overall coverage percentage of each region was 6.7% for Eastern Asia, 8.7% for South-eastern Asia, 22.7% for Western Asia, and 3.2% for South-Central Asia (data not shown). The population coverage was less than

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Table 1. List of Countries/Regions with Populations and Coverage by Cancer Registries

Population	No. of population in 2000 (in 1,000s)			Registries submitted		Registries accepted		Data
	Male	Female	Total	n	% coverage	n	% coverage	Included
Eastern Asia								
Chinese (Mainland)	655,211	618,768	1,273,979	24	3.4	5	1.0	5
Japanese	62,178	64,856	127,034	7	13.0	7	13.0	7
Korea*	23,121	23,308	46,429	8	100	8	100	KCCR*
Taiwan	11,375	10,870	22,245	1	100			1
South-Eastern Asia								
Hong Kong	3,206	3,431	6,637	1	100	1	100	1
Malaysian	11,680	11,317	22,997	2	13.4	2	13.4	2
Philippines	38,151	37,615	75,766	3	17.0	1	7.0	1
Singapore	1,610	1,610	3,220	1	100	1	100	1
Thai	30,301	31,137	61,438	6	21.3	3	5.8	3
Viet Namese	39,275	39,396	78,671	2	9.9			2
Western Asia								
Bahrain, Bahraini	387	285	672	1	59.3	1	59.3	1
Cyprus	387	399	786	1	88.8	1	88.8	1
Israel	3,004	3,080	6,084	1	100	1	100	1
Jordan	2,590	2,382	4,972	1	100	1	100	1
Kuwait, Kuwaitis	1,355	874	2,230	1	38.4	1	38.4	1
Oman, Omani	1,423	1,019	2,442	1	71.8	1	71.8	1
Turkish	34,437	33,798	68,234	2	7.0	2	7.0	2
South-Central Asia								
Indian	525,068	496,016	1,021,084	9	3.6	7	3.5	7
Pakistan (Karachi)	73,423	69,226	142,648	1	1.2	1	1.2	1

* Korea Central Cancer Registry data (1999-2001) were used

5% in China, Pakistan, and India and less than 10% in the Philippines, Thailand, and Turkey.

Tables 2, 3 and 4 provide details on quality, populations and incidence rates by sex and age group, and cumulative rates (risks, %) at age 74, respectively. In terms of the quality indices of each registry, most registries met the inclusion criteria for CI5 IX, except two registries from Viet Nam.

The incidence rates of cancer across Asia vary greatly. There were approximately three fold differences in cancer incidence rates in males and females. Men in Israel (ASR 288.0 per 100,000 males) and in the Republic of Korea (ASR 281.9) showed the highest cancer risk, but men in Oman (Omani) (ASR 100.9) and in India (103.9) showed the lowest cancer risk. Women in Israel (ASR 270.7 per 100,000 females) and in the Philippines (ASR 205.0) had

Table 2. Quality Indices for Registries Included in CIV IX for Each Country/Region

Population	No of CR	Males				Females			
		MV%	DCO%	M/I%	UB%	MV%	DCO%	M/I%	UB%
Eastern Asia									
Chinese (Mainland)	5	58.4-78.0	0.0-2.2	56.7-80.3	0.0-1.0	71.1-86.4	0.0-1.9	43.5-56.0	0.0-0.8
Japanese	7	77.6-84.5	3.1-17.0	47.6-67.9	0.0-5.1	75.8-86.0	4.1-16.2	42.1-61.6	0.0-5.7
Korea	9	72.2	6.1	62.2	-	78.8	5.8	46.1	-
Taiwan	1	82.4	-	64.5	-	78.8	-	48.8	-
South-Eastern Asia									
Hong Kong	1	84.4	1.5	60.7	-	87.7	1.4	47.1	
Malaysian	2	84.3-84.6	6.2-7.7	29.3-50.0	0.0-0.3	87.8-88.8	4.1-5.8	22.6-39.9	0.0-0.2
Philippines (Manila)	1	63.9	12.7	-	0.0	77.6	8.1	-	0.0
Singapore	1	87.5	0.0	65.0	-	92.3	0.0	47.8	-
Thai	3	59.9-82.8	4.4-12.7	10.5-79.8	0.0-0.1	71.3-88.9	2.7-8.8	8.8-65.8	0.0-0.2
Viet Namese	2	53.4-64.3				57.0-78.0			
Western Asia									
Bahrain, Bahraini	1	84.4	6.5	67.8	0.5	91.4	4.9	47.8	0.4
Cyprus	1	95.3	-	24.9	1.2	96.8	-	18.9	0.7
Israel	1	85.4	3.3	46.0	4.0	88.7	3.0	42.0	2.3
Jordan	1	99.7	-	-	-	99.6	-	-	-
Kuwait, Kuwaitis	1	84.3	12.2	52.4	0.4	88.6	9.4	44.3	0.2
Oman, Omani	1	89.3	1.1	-	0.7	92.3	0.5	-	0.2
Turkish	2	86.7-88.2	0.0-1.8	36.5-54.8	1.7-2.0	88.7-92.0	0.0-1.2	22.7-38.1	1.1-2.1
South-Central Asia									
Indian	7	73.3-88.0	2.4-6.9	37.8-54.9	0.0-9.3	78.7-92.3	2.0-6.5	0.0-5.2	32.1-46.0
Pakistan (Karachi)	1	89.5	1.1	-	-	93.2	0.5	-	-

MV: morphologically verified, DCO: Death certificate only, M/I: mortality incidence ratio, UB: unknown basis of diagnosis

Table 3. Number of Person-years and Crude and Age-standardized Cancer Incidence Rates by Sex, 1998-2002

Population	Males				Females			
	PY	Cases	CR	**ASR**	PY	Cases	CR	**ASR**
Eastern Asia								
Chinese (Mainland)	27,923	80,757	289.2	**223.6**	27,077	64,498	238.2	**161.7**
Japanese	41,349	202,021	488.6	**270.7**	43,362	43,883	331.8	**166.3**
Korea	95,726	241,155	251.9	**281.9**	94,974	83,620	193.3	**162.7**
Taiwan	56,875	165,445	290.9	**254.3**	54,349	119,916	220.6	**192.1**
South-Eastern Asia								
Hong Kong	16,353	56,776	347.2	**259.6**	16,921	45,492	268.9	**190.7**
Malaysian	7,769	8,047	103.6	**143.0**	7,624	8,683	113.9	**138.5**
Philippines (Manila)	12,991	14,119	108.7	**209.8**	13,446	18,638	138.6	**205.0**
Singapore	8,053	17,810	221.2	**221.5**	8,051	18,185	225.9	**189.7**
Thai	8,736	12,002	137.4	**136.2**	8,953	13,116	146.5	**134.8**
Viet Namese	16,789	13,534	80.6	**154.2**	17,005	12,349	72.6	**111.6**
Western Asia								
Bahrain, Bahraini	1,005	929	92.4	**156.0**	987	944	95.6	**141.4**
Cyprus	1,716	4,311	251.3	**188.0**	1,776	4,081	229.8	**171.4**
Israel	5,153	48,406	319.5	**288.0**	15,489	52,172	336.8	**270.7**
Jordan	13,182	9,833	74.6	**132.5**	12,024	9,215	76.6	**126.4**
Kuwait, Kuwaitis	2,110	1,294	61.3	**119.9**	2,167	1,648	76.1	**127.2**
Oman, Omani	3,568	1,859	52.1	**100.9**	3,450	1,627	47.2	**86.5**
Turkish	11,933	20,669	173.2	**190.6**	1,795	13,317	112.9	**113.6**
South-Central Asia								
Indian	96,513	69,268	71.8	**103.9**	82,524	69,607	84.3	**108.9**
Pakistan (Karachi)	4,643	4,454	95.9	**162.3**	3,975	4,085	102.8	**187.9**

PY, Person-years (in thousands); CR, crude rate; ASR, age-standardized rate

the highest incidence rates of cancer, but women in Oman (Omani) (ASR 86.5) and in India (ASR 108.9) had the lowest. Incidence data for the major cancers in males and females are summarized in Table 5a and 5b.

Discussion

Among submissions from 77 cancer registries (18 countries), data from 44 cancer registries (15 countries) were published in CI5 IX. The overall population coverage is 155 millions (approximately 4% of the total population in Asia) (Curado et al., 2007). There was a small increase in the number of registries from Asia compared to those in CI5 VIII (43 cancer registries from 12 countries) (Parkin et al., 2002).

The purpose of Cancer Incidence in Five Continents is to present comparable incidence rates of cancer from different populations world-wide. As described in Chapter

Table 4a. Age-specific Incidence, Crude, and Standardized (World Standard) Rates/100,000 : Males

Population	No of cases	Age unknown	0-29	30-39	40-49	50-59	60-69	≥70	**ASR**	**Cumulative* rate**	**Cumulative* risk (%)**
Eastern Asia											
Chinese (Mainland)	80,757	0	14.8	59.7	184.0	398.7	989.7	2,069.0	**223.6**	**25.6**	**22.6**
Japanese	202,021	13	12.8	40.4	162.5	490.8	1,286.9	2,694.8	**270.7**	**31.7**	**27.2**
Korea	241,155	3	14.8	58.1	199.2	621.0	1,365.3	2,270.8	**281.9**	**34.3**	**29.0**
Taiwan	165,445	0	17.9	88.8	242.4	544.7	1,144.4	1,897.0	**254.3**	**29.3**	**25.4**
South-Eastern Asia											
Hong Kong	56,776	20	18.8	68.2	199.3	480.4	1,164.5	2,313.1	**259.6**	**29.7**	**25.7**
Malaysian	8,047	4	14.4	47.4	118.6	296.2	663.8	1,016.5	**143.0**	**17.0**	**15.6**
Philippines (Manila)	14,119	173	15.6	50.1	127.9	398.4	959.2	1,763.8	**209.8**	**24.5**	**21.7**
Singapore	17,810	1	16.3	48.4	125.6	377.1	1,027.9	2,094.8	**221.5**	**25.0**	**22.1**
Thai	12,002	4	13.4	47.5	116.8	297.0	624.1	966.2	**136.2**	**15.9**	**14.7**
Viet Namese	13,534	46	12.1	46.9	153.5	344.8	699.7	1,052.4	**154.2**	**18.1**	**16.6**
Western Asia											
Bahrain, Bahraini	929	0	13.2	29.9	85.6	249.3	666.7	1,618.2	**156.0**	**18.0**	**16.5**
Cyprus	4,311	92	22.9	57.8	111.0	319.5	848.3	1,608.4	**188.0**	**21.8**	**19.6**
Israel	48,406	0	23.0	70.9	173.2	501.2	1,421.9	2,592.9	**288.0**	**34.4**	**29.1**
Jordan	9,833	1	18.2	53.0	125.8	281.8	571.8	867.0	**132.5**	**15.4**	**14.3**
Kuwait, Kuwaitis	1,294	6	15.5	40.6	81.4	221.7	530.0	969.1	**119.9**	**13.2**	**12.4**
Oman, Omani	1,859	0	11.1	36.5	105.3	209.0	449.9	642.3	**100.9**	**12.0**	**11.3**
Turkish	20,669	18	16.4	45.6	154.7	434.0	945.2	1,330.1	**190.6**	**23.6**	**21.0**
South-Central Asia											
Indian	69,268	345	12.9	31.4	92.6	242.9	471.4	645.3	**103.9**	**12.2**	**11.5**
Pakistan (Karachi)	4,454	0	19.1	83.2	177.6	355.0	757.2	778.1	**162.3**	**19.5**	**17.7**

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Table 4b. Age-specific Incidence, Crude, and Standardized (World Standard) Rates/100,000 : Females

Population	No of cases	Age unknown	0-29	30-39	40-49	50-59	60-69	≥70	ASR	Cumulative* rate	Cumulative* risk (%)
Eastern Asia											
Chinese (Mainland)	64,498	0	15.7	77.5	222.6	364.7	624.4	1,071.8	**161.7**	**18.1**	**16.6**
Japanese	143,883	37	12.9	79.4	236.5	370.5	623.9	1,216.7	**166.3**	**18.1**	**16.6**
Korea	183,620	2	20.2	109.2	240.0	386.7	580.0	887.2	**162.7**	**18.0**	**16.5**
Taiwan	119,916	0	19.3	113.6	264.4	439.3	723.6	1,176.6	**192.1**	**21.3**	**19.2**
South-Eastern Asia											
Hong Kong	45,492	22	20.3	103.7	267.5	423.4	676.2	1,328.2	**190.7**	**20.5**	**18.5**
Malaysian	8,683	7	15.1	84.3	208.5	365.3	510.1	637.0	**138.5**	**15.3**	**14.2**
Philippines (Manila)	18,638	235	17.6	108.4	278.3	500.5	777.5	1,121.4	**205.0**	**23.1**	**26.0**
Singapore	18,185	9	16.2	94.7	267.9	460.5	659.6	1,272.2	**189.7**	**20.3**	**18.4**
Thai	13,116	1	16.9	91.6	208.5	342.9	506.8	575.9	**134.8**	**15.1**	**14.0**
Viet Namese	12,349	32	13.0	57.8	167.4	320.4	419.1	462.1	**111.6**	**12.7**	**11.9**
Western Asia											
Bahrain, Bahraini	944	1	12.7	87.6	205.8	326.7	522.3	815.4	**141.4**	**15.8**	**14.6**
Cyprus	4,081	54	25.5	100.1	238.9	444.4	587.3	822.4	**171.4**	**18.8**	**17.1**
Israel	52,172	0	24.0	125.8	335.5	666.8	1,084.0	1,699.7	**270.7**	**30.5**	**26.3**
Jordan	9,215	0	16.4	89.0	197.3	335.3	478.0	446.0	**126.4**	**14.1**	**13.1**
Kuwait, Kuwaitis	1,648	3	14.7	67.0	200.5	304.6	475.3	617.7	**127.2**	**14.0**	**13.0**
Oman, Omani	1,627	2	12.7	54.3	129.0	204.5	300.6	374.9	**86.5**	**9.9**	**9.4**
Turkish	13,317	21	14.0	63.2	172.3	284.4	417.9	565.1	**113.6**	**12.8**	**12.0**
South-Central Asia											
Indian	69,607	346	11.4	59.1	171.6	306.9	418.2	432.8	**108.9**	**12.3**	**11.6**
Pakistan (Karachi)	4,085	0	17.5	148.4	294.5	576.4	755.5	421.5	**187.9**	**21.0**	**19.0**

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5: Comparability and quality of data in Cancer Incidence in Five Continents Volume 9, many indices were considered as inclusion criteria (Curado et al., 2007).

Of the data quality indicators, percentage of microscopic verification (MV) index was specifically low in data from Asian cancer registries due to the high proportions of liver cancer (Curado et al., 2008). For example, the MV% of liver cancer gradually decreased in the data from some Asian registries. In the practice guidelines, the diagnostic criteria of hepatocellular carcinoma included the non-invasive methods defined by the European Association for the Study of the Liver (Bruix et al., 2001) and by the American Association for the Study of Liver Disease (Bruix and Sherman, 2005). In the regions with a high proportion of liver cancer among the total number of incidence cases, the overall MV% was highly affected by the MV% of liver cancer. Therefore, MV% without liver cancer was considered as one of the criteria for acceptance.

Table 5a. Age-standardized (World Standard) Incidence Rates per 100,000 by Major Site and Country - Males

Population	C00-14	C15	C16	C18-21	C22	C33-34	C61
Eastern Asia							
Chinese	12.4	10.5	28.7	25.2	29.1	53.2	6.0
Japanese	6.4	11.2	58.8	44.4	28.7	41.8	14.8
Korea	6.4	8.3	65.9	29.5	44.9	51.1	8.5
Taiwan	32.3	8.4	17.5	32.3	52.6	37.1	14.1
South-Eastern Asia							
Hong Kong	24.3	9.5	14.7	39.2	29.5	57.9	15.0
Malaysia	17.8	2.2	12.3	17.4	9.6	27.1	7.6
Philippines	12.4	3.1	7.9	24.3	21.7	51.7	25.3
Singapore	17.0	5.0	18.3	40.1	18.8	45.3	17.3
Thai	12.1	3.8	4.8	10.3	18.8	32.1	5.0
Viet Nam	14.3	5.6	24.7	12.9	20.6	32.0	3.0
Western Asia							
Bahrain	6.6	4.2	8.5	13.2	5.3	34.2	14.3
Cyprus	3.6	1.1	7.0	21.6	3.2	24.8	40.8
Israel	6.0	2.1	11.6	41.7	3.3	32.2	50.2
Jordan	4.9	1.7	6.8	14.8	2.6	17.6	12.1
Kuwaitis	4.4	2.2	3.4	13.7	8.4	15.6	10.5
Omani	4.3	2.6	13.4	5.3	7.4	9.8	10.5
Turkish	5.9	2.1	10.9	13.9	3.4	64.6	15.2
South-Central Asia							
Indian	18.4	6.6	5.3	5.6	3.3	10.6	6.5
Pakistan	30.7	6.7	6.0	7.1	5.4	25.2	10.1

C00-14, Head and Neck; C15, Oesophagus; C16, Stomach; C18-21,Colorectal Anus; C22, Liver; C33-34, Lung; C61, Prostate

There were clear geographical differences in risk by cancer site within Asian populations. For males, incidence rates of cancers of head and neck, esophagus, stomach, and liver were higher in Eastern Asia than those in Western Asia. In Western Asia, incidence rates of cancers of colorectal anus and prostate were higher than in Eastern Asia. For females, geographical variations by cancer sites were much more variable than in males. These geographical variations might be explained in part due to differences of prevalence of known risk factors (Park et al., 2008).

Among 49 countries/regions in Asia, data from 15 countries/regions were available for the present study. Even though some registries published their data recently, data of more than 30 countries/regions are not available to be included in this study. The registries which did not cover the entire population are mostly from urban areas, such as Manila in the Philippines and the two cities in Viet Nam. Thus there are potential limitiations for their applicability to subsequent study populations.

Originally, cancer registries were primarily concerned with the description of cancer patterns, trends in cancer occurrence and etiology of cancer. More recently, in the

Table 5b. Age-standardized (World Standard) Cancer Incidence Rates per 100,000 by Major Site and Country - Females

Population	C00-14	C15	C16	C18-21	C22	C33-34	C50	C53	C73
Eastern Asia									
Chinese (Mainland)	5.6	2.7	13.8	20.6	8.8	21.1	31.2	3.2	4.1
Japanese	2.1	1.7	22.8	25.8	9.2	13.1	35.1	6.7	5.6
Korea	1.8	0.6	25.9	17.7	12.0	12.5	23.3	15.4	12.2
Taiwan	5.8	0.8	9.1	25.3	20.4	18.0	35.3	21.3	7.3
South-Eastern Asia									
Hong Kong	9.3	1.7	7.3	28.4	7.3	23.4	41.3	9.8	7.2
Malaysia	8.9	1.7	6.9	14.0	3.4	10.7	29.4	16.8	3.5
Philippines (Manila)	6.9	0.8	5.4	18.5	7.0	14.8	55.2	19.8	11.1
Singapore	5.9	1.1	9.9	29.3	4.8	16.4	54.1	10.6	6.6
Thai	5.3	1.0	3.2	8.6	7.2	18.6	20.6	23.8	4.9
Viet Namese	6.5	0.9	11.6	8.9	4.9	9.0	21.5	15.3	3.3
Western Asia									
Bahrain, Bahraini	2.6	1.8	5.4	7.3	3.1	11.8	46.8	6.0	7.7
Cyprus	2.2	0.3	4.3	16.9	1.1	5.0	62.2	4.3	9.3
Israel	2.8	0.9	6.3	33.8	1.5	12.1	92.2	5.4	11.7
Jordan	2.5	0.9	3.7	13.3	1.5	3.6	42.5	3.3	5.2
Kuwait, Kuwaitis	3.1	1.6	2.6	12.5	3.6	4.6	41.3	4.5	7.3
Oman, Omani	2.0	2.7	6.2	3.7	3.2	2.3	14.6	6.5	5.9
Turkish	2.6	1.0	5.2	9.7	1.3	5.6	33.3	5.1	3.9
South-Central Asia									
Indian	7.8	4.3	2.6	4.2	1.5	2.9	27.3	18.2	2.0
Pakistan (Karachi)	23.8	8.6	3.6	5.2	3.7	3.6	69.0	7.5	2.9

C00-14, Head and Neck; C15, Oesophagus; C16, Stomach; C18-21,Colorectal Anus; C22, Liver; C33-34, Lung; C50, Breast; C53, Cervix; C73, Thyroid

last 20 years, cancer registries provided not only information on the incidence and characteristics of specific cancers, but also represented the basis of cancer control planning and evaluation and the care of individual cancer patients and their survival (Parkin, 2006). The results with high quality could be used for cancer treatment and cancer control. The extent of collaboration in cancer research between developing and developed countries was suggested to enhance either hospital-based or population-based cancer registries and to be available cancer data in developing countries (Valsecchi and Steliarova-Foucher, 2008). Through the collaboration and twining of cancer registries within the Asian countries, the results with high quality at the international level might be obtainable. Then development of cancer control strategy should be taken account together with prevalence of risk factors and the amount of level of incidence obtained from population-based cancer registry with high completeness.

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