RESEARCH COMMUNICATION

Cancer Incidence in Thailand, 1995-1997

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Abstract

There are five population-based cancer registries in Thailand in different regions of the country. Four of them (Chiang Mai, Khon Kaen, Bangkok, and Songkhla) have been operating since 1988 and the other (Lampang) since the early 1990's. These registries have published regular 3-year cancer incidence reports since the first in 1993 for the period 1989-1991. The objective of this article is to summarize the figures of cancer incidence in Thailand during 1995-1997. The population of Thailand in 1996, at the middle of the period, was 27 million males and 27.5 million females. Information of cancer cases residing in the five provinces was collected and abstracted from different sources. Age-standardized incidence rate (ASR) of cancer in males and females was calculated for each registry and that for the whole country was estimated using the five registries as representatives for the four geographical regions of Thailand. The estimated number of new cancer cases in 1996 for the whole country was 35,539 men and 38,476 women and the ASRs were 149.2 and 125.0 per 10^5 population in men and women respectively. Cancer incidences greatly differed from region to region. Lung cancer was the commonest in Chiang Mai and Lampang in the Northern region in both sexes. The incidence of liver cancer in Khon Kaen in the Northeastern region outnumbered all the others in both sexes; cholangiocarcinoma was the major type of liver cancer. In Bangkok, lung cancer was the most important cancer in males and breast cancer was in females. Though it was lung and cervix uteri cancer that ranked the first in men and women in Songkhla, the rate of oral and pharyngeal cancer was exceptionally higher than in other registries. The geographical variability in cancer patterns in Thailand reflects exposure of the population to different risk factors unique to the different regions. In the study as a whole, there are some methodological weak points in estimating the ASRs and number of cancer cases for the whole country, but the results are the most reliable cancer statistics from Thailand at the moment. In conclusion, both a country-wide and region-specific cancer control programmes are needed for Thailand. The national one would be for the cancers common to all regions, and the provincial-level emphasis should be on cancers which are the major problems in the area.

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Introduction

In Thailand, the first population-based cancer registry was begun in Chiang Mai in 1986. At present, there are five registries actively working in different parts of the country. Provinces representative for the four regions of the country are Chiang Mai and Lampang in the North, Khon Kaen in the Northeast, Bangkok in the Central, and Songkhla in the South. The first national report covering the period of 1988-1991 was sponsored by the International Agency for Research on Cancer (IARC) and published in 1993 as the IARC Technical Report No. 16 (Vatanasapt et al., 1993). It was briefly summarized and published in the literature (Vatanasapt et al., 1995). Later in 1999, the incidence figures from the period of 1992-1994 were published in Cancer in Thailand vol. II (IARC Technical Report No. 34) (Deerasamee et al., 1999) and a summary was presented in the APJCP (Deerasamee et al., 2001).

Changes in the environment and lifestyle of Thailand and its people have been occurring for decades, as they follow modern, westernized trends. It is not unexpected to see a change in cancer incidence rates during this time, such as was briefly illustrated in the third volume of Cancer in Thailand published in 2003 (Sriplung et al., 2003). This article summarizes figures of cancer incidence in Thailand during 1995-1997, also published in that volume. Childhood cancer rates in Thailand during the same period were published earlier in 2003 (Wiangnon et al., 2003). The trends in incidence of cancers will be published later in a separate article.

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Materials and Methods

Thailand and Its Population

Thailand is divided into 76 provinces within four geographical regions. The location of the five registries is shown in Figure 1. The population of Thailand at the 1990 census was 54.5 million (27 million males and 27.5 million females) (National Statistical Office, 1992) and at the 2000 census was 61.4 million (29.9 million males and 31.5 million females) (National Statistical Office, 2002). The population covered by the five provincial cancer registries in 1996 is shown in Table 1.

Registry Methods

Data on cancer cases are collected from hospitals, laboratories and death certificates. The data for each cancer patient includes identification items, age, sex, date of diagnosis, method of diagnosis, primary site of cancer, histology, and other. Registries follow the procedures suggested by the IARC (Jensen et al., 1991). Some minor procedures can be slightly different from registry to registry to fit its situation and environment. The primary site and histology are coded according to ICD-O, 2nd edition (Percy et al., 1990). Second and subsequent primary cancers are registered with different registration numbers but are linked to the same person.

Statistical Methods

Only cases with behaviour code of 3 (malignant) diagnosed during 1995-1997 were selected for calculation of cancer incidence. In situ and borderline cases were excluded. Age-standardized incidence rates of cancer for each registry were calculated by the direct method (Jensen et al., 1991). The data from Chiang Mai and Lampang registries were first pooled by adding together the cases and person-years at risk from the two registries to get the estimate of cancer incidence in the Northern region. Then the age (five-year age group) and sex specific rates for Chiang Mai plus Lampang (North), Khon Kaen (Northeast), Bangkok (Central), and Songkhla (South) were applied to the populations of the representative regions in 1996 as estimated from the two censuses.

The sum of these provided the estimated total by sex, site and age group for the country as a whole and the corresponding incidence rates were calculated using the 1996 population of Thailand.

Figure 1 Cancer Registries in Thailand

Results

The National Estimate

The estimated number of new cancer cases in 1996 was 35,539 in men and 38,467 in women and the age-standardized incidence rates (ASR) were 149.2 and 125.0 per 10^5 population in men and women respectively (Table 2). Liver, lung, and colorectum were the three commonest primary sites of cancer in males with the rates of 37.6, 25.9, and 10.8 per 10^5 of population respectively (Figure 2). In females, cancers of the cervix uteri, breast, and liver were the three most common cancers with the rates of 19.5, 17.2, and 16.0 per 10^5 population respectively. Estimated numbers of new cancer cases and incidence rates for cancer sites or groups are presented in Table 2.

Table 1. Estimated Population in 1996*

	Male	Female	Land Area (km^2)	Population Density (person/km^2)
Chiang Mai	716,202	716,186	20,107	79.1
Lampang	378,468	374,773	12,534	60.1
Khon Kaen	836,531	842,914	10,886	159.0
Bangkok	2,921,143	3,181,195	1,565	4,061.0
Songkhla	538,258	601,170	7,394	154.1
Thailand	28,533,487	30,040,238	513,155	114.1

* Estimated from 1990 and 2000 censuses (National Statistical Office, 1992; National Statistical Office, 2002)

Table 2. Age-specific Incidence Rates for Cancers per 100,000 Population (Estimated) 1996

Male Site	All Ages	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75+	Crude Rate	ASR (W)	ICD (10th)
Oral cavity	982	-	-	0.1	0.2	0.6	0.3	0.7	1.4	2.0	4.6	7.8	14.4	15.9	25.1	24.2	36.8	3.4	4.2	C00-C08
Pharynx	594	-	-	0.2	-	0.1	0.1	0.1	0.9	2.1	2.1	3.8	6.8	9.8	14.7	23.7	23.8	2.2	2.6	C09-10;C12-14
Nasopharynx	872	-	-	0.2	0.4	0.1	1.1	1.7	3.5	4.6	5.6	8.3	12.0	10.5	16.7	14.4	10.4	3.1	3.4	C11
Oesophagus	720	-	-	-	-	-	-	0.2	0.5	1.0	3.3	3.8	12.4	15.8	18.0	19.5	31.7	2.5	3.2	C15
Stomach	945	-	-	-	-	0.1	0.4	1.0	1.0	2.5	3.7	5.4	11.1	17.3	28.0	29.6	36.4	3.3	4.1	C16
Colon & rectum	2,533	-	-	0.2	0.2	0.8	1.2	2.8	3.7	8.0	8.5	17.7	29.6	45.1	63.1	76.2	99.5	8.8	10.8	C18-C21
Liver	9,031	0.3	-	0.1	0.2	1.1	3.3	9.0	14.6	30.1	62.9	89.4	143	181	220	161	151	31.7	37.6	C22
Larynx	684	-	-	-	-	-	-	0.4	0.6	0.9	1.5	3.9	8.7	15.9	20.2	29.1	24.6	2.4	3.1	C32
Bronchus, lung	5,916	-	-	0.1	0.4	1.2	2.5	4.8	5.1	11.5	17.9	44.2	86.1	137	178	172	162	20.7	25.9	C33-C34
Skin & melanoma	999	-	-	0.3	0.2	0.1	0.1	0.6	0.7	2.0	4.8	4.5	11.4	11.8	24.7	27.5	44.7	3.5	4.3	C43-C44
Prostate	1,019	-	-	-	-	-	-	-	-	0.2	0.4	2.6	4.5	23.4	23.9	49.1	90.7	3.6	4.8	C61
Testis	146	0.1	0.1	0.1	0.2	0.4	0.6	1.7	0.7	0.5	0.2	0.9	0.5	1.1	0.7	1.9	0.3	0.5	0.5	C62
Penis	390	-	-	-	-	-	0.3	0.3	0.9	1.6	2.1	1.8	5.3	8.0	7.2	11.6	12.6	1.4	1.6	C60
Bladder	1,024	0.2	-	-	0.1	-	0.1	0.5	1.2	1.6	3.8	3.3	11.2	19.0	29.9	36.4	56.2	3.6	4.6	C67
Thyroid	289	-	0.1	-	-	0.5	0.8	0.2	0.9	1.5	2.9	2.0	3.4	2.6	4.1	5.2	5.5	1.0	1.1	C73
Hodgkin's disease	106	0.1	0.2	0.1	-	0.2	0.5	0.5	0.3	0.5	0.9	0.4	0.9	1.5	0.5	1.3	0.9	0.4	0.4	C81
NHL	1,120	0.7	0.7	0.9	1.0	1.8	2.7	2.8	4.3	4.1	4.6	7.8	9.4	11.3	20.3	20.6	24.6	3.9	4.3	C82-C85;C96
Leukaemia	1,012	5.9	3.0	1.6	2.2	2.3	3.4	3.2	1.6	2.4	3.4	3.8	6.0	8.8	9.6	8.9	9.8	3.5	3.9	C91-C95
Other and unspec.	4,394	1.0	0.3	0.4	1.3	3.4	10.4	9.5	11.0	13.4	18.7	36.6	60.2	69.8	84.4	78.7	97.5	15.4	17.6	O&U
All sites	35,539	13.2	5.9	7.5	9.6	15.3	31.7	45.2	60.8	101	164	267	462	648	845	837	983	124.6	149.2	ALL

Female Site	All Ages	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75+	Crude Rate	ASR (W)	ICD (10th)
Oral cavity	1,256	-	-	-	0.3	0.1	-	1.1	0.9	2.6	1.8	4.2	8.9	20.1	29.3	32.0	44.2	4.3	4.3	C00-08
Pharynx	131	-	-	-	-	-	-	0.2	0.2	0.5	0.6	0.5	0.9	1.1	2.9	3.0	4.3	0.5	0.5	C09-10;C12-14
Nasopharynx	405	-	-	-	-	0.4	0.7	0.6	1.7	2.1	2.3	4.1	3.5	4.7	4.8	2.9	2.1	1.3	1.3	C11
Oesophagus	248	-	-	-	-	-	0.2	-	0.1	0.1	0.8	0.3	2.0	3.4	6.5	10.1	7.2	0.8	0.9	C15
Stomach	793	-	-	-	-	0.1	0.7	1.5	1.8	2.9	3.1	4.3	5.3	10.5	14.4	15.1	18.5	2.6	2.6	C16
Colon & rectum	2,215	-	0.1	-	-	0.6	1.2	2.1	3.0	7.6	10.2	11.3	18.8	35.0	37.8	47.2	50.8	7.4	7.3	C18-C21
Liver	4,696	0.6	0.1	-	0.5	0.6	0.6	1.2	3.6	9.3	19.2	41.9	58.6	80.8	98.6	87.2	70.5	15.6	16.0	C22
Larynx	79	-	-	-	-	-	-	0.1	0.1	0.1	-	0.4	0.8	0.9	2.7	2.5	2.0	0.3	0.3	C32
Bronchus, lung	2,964	-	0.1	0.1	0.1	0.7	0.8	2.3	3.1	5.6	11.0	20.9	33.7	50.3	62.9	61.9	51.6	9.9	10.0	C33-C34
Skin & melanoma	1,064	0.1	-	-	0.2	0.2	0.3	0.9	1.1	2.0	3.7	3.8	8.0	15.8	14.2	28.5	42.2	3.5	3.5	C43-C44
Breast	5,592	-	-	-	0.1	0.5	3.1	10.5	23.1	39.9	54.2	48.8	49.8	48.4	44.9	41.2	36.5	18.6	17.2	C50
Cervix uteri	6,268	-	-	0.1	0.4	1.0	3.6	11.4	24.4	40.5	51.0	56.6	63.0	64.8	56.1	53.8	39.1	20.9	19.5	C53
Corpus uteri	886	-	-	-	-	0.1	0.2	0.7	1.5	3.8	7.2	11.7	11.6	11.4	10.5	10.7	2.4	2.9	2.9	C54
Ovary etc.	1,655	0.1	0.2	0.1	1.3	2.0	2.5	4.6	5.5	7.6	12.6	14.6	17.6	15.7	13.2	13.8	6.0	5.5	5.2	C56
Bladder	324	-	-	-	-	-	0.1	0.4	0.2	0.3	0.4	1.6	1.6	5.0	7.6	8.7	12.8	1.1	1.1	C67
Thyroid	1,202	-	0.2	0.3	1.0	2.3	3.8	4.6	6.3	6.7	7.3	7.8	6.8	8.7	6.6	9.9	4.6	4.0	3.6	C73
Hodgkin's disease	82	-	-	-	0.2	0.2	0.3	0.3	0.2	0.5	0.8	0.1	0.2	0.3	1.2	0.4	0.4	0.3	0.3	C81
NHL	964	0.7	0.4	0.5	0.8	1.1	1.9	2.0	2.9	2.1	3.7	4.7	7.3	9.6	16.6	13.8	17.1	3.2	3.1	C82-C85;C96
Leukemia	988	5.6	2.8	2.0	1.3	1.6	1.7	0.9	2.4	3.2	5.0	4.9	5.7	6.8	6.3	6.8	10.3	3.3	3.4	C91-C95
Other and unspec.	3,437	1.1	0.4	0.3	0.3	1.2	3.1	5.4	7.0	9.7	13.5	21.7	34.7	53.5	59.0	57.2	56.8	11.4	11.4	O&U
All sites	38,467	13.4	6.3	5.9	9.5	14.7	30.1	55.5	96.6	159	221	282	363	486	541	551	530	128.1	125.0	ALL

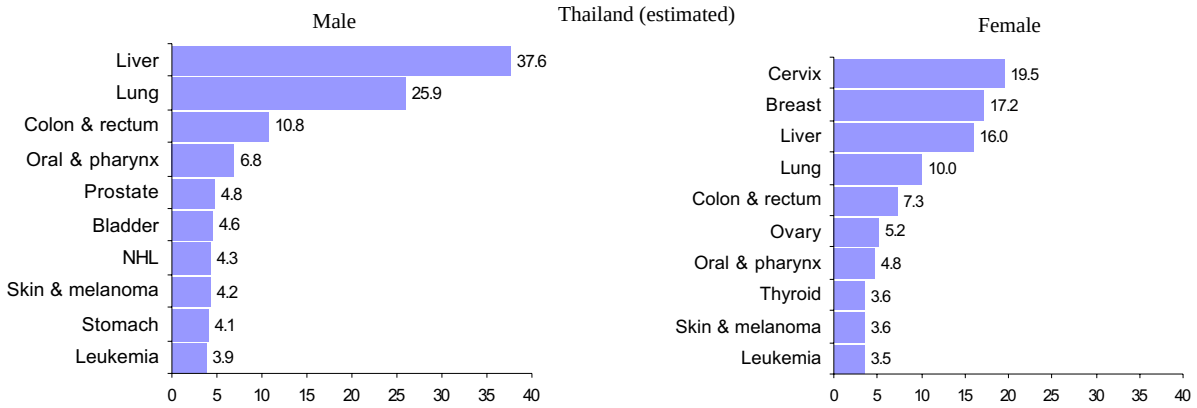

Figure 2. Leading Cancers in Thailand, 1996. (Age-standardized incidence rates per 100,000 population)

Regional Variation

The ASRs of cancer at all sites ranged from 91.4 per 10^5 population in men and 81.3 in women in Songkhla to 182.5 in men in Khon Kaen and 148.6 in women in Chiang Mai. There were marked differences in cancer incidence in different regions of Thailand, as demonstrated in Figure 3.

In Chiang Mai and Lampang, lung cancer was the commonest in males. The incidence of lung cancer was about twice that of liver cancer which was the second in rank in both registries. In females, the incidence of lung cancer was about the same as that of cervix cancer. Breast, liver, and colorectal cancers were strikingly less common.

In Khon Kaen, liver cancer was the commonest cancer in both sexes. The incidence of liver cancer in Khon Kaen was extremely high and placed the first in both sexes. Cancers of the cervix and breast were the second and third

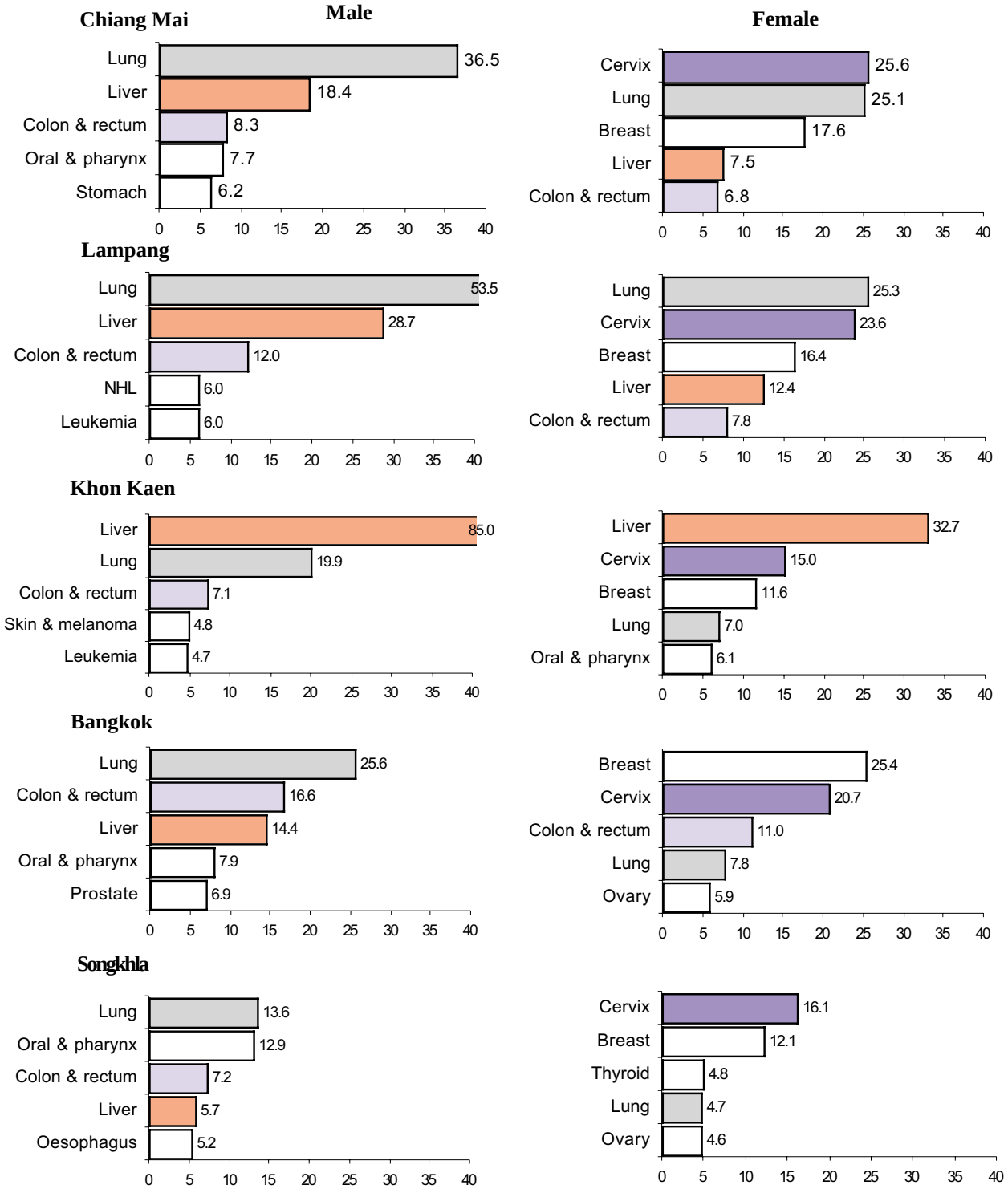

Figure 3 Leading Cancers by Registry. (Age-standardized incidence rate per 100,000 population)

in females.

In Bangkok, lung cancer was the most important cancer in men, followed by cancer of the colorectum. Breast cancer was more common than cervix cancer in women. This feature was not evident in other registries. Female colorectal cancer ranked the third in Bangkok while it was far less common than lung and liver cancers in other registries.

Songkhla, in the south, showed different cancer incidence rates. Lung cancer was the commonest tumour in males. Oral/pharyngeal cancer placed second in rank here, but was far less common in other registries. In females, cervix and breast cancers were the two commonest cancers, also common elsewhere, however thyroid cancer was unusually common in women in the south and ranked the third in women with an incidence rate very similar to that of lung and ovarian cancers.

Burden of Some Common Cancers

Liver cancer accounted for an estimated 13,727 new cancer cases in both sexes, with an ASR of 37.6 per 10^5 population in males and 16.0 in females. It was extraordinary prevalent in the northeastern region with an ASR of 85.0 in males and 32.7 in females, nearly 3 times higher than the average of the country and approximately 25 times higher than the rate in the southern region. Most of the cases were clinically diagnosed by ultrasonography or biochemistry studies. Histological verification was done in only 4-5% of cases in Khon Kaen, but for nearly 50% in Bangkok and Songkhla. Cholangiocarcinoma (CCA) was the main histologic type (87%) of liver cancer in Khon Kaen, but this was rather rare in Songkhla (approximately 5% in males). The proportion of CCA was around 40-60% in Chiang Mai and Lampang and approximately 20% in Bangkok.

Lung cancer accounted for an estimate of 8,880 new cancer cases in both sexes, with an ASR of 25.9 per 10^5 population in males and 10.0 in females. Lung cancer was markedly prevalent in the northern region in both sexes. It was also the commonest cancer in the central and southern regions, though the incidence was not as high as in the northern part of the country. The percentage of histologic verification varied from 70% in Songkhla to 31% in Khon Kaen. In general, squamous cell carcinoma, 23%-38% among males and 12%-31% among females, was not as common as adenocarcinoma. The proportion of adenocarcinoma was high in Khon Kaen, 57% in males and 73% in females. The proportion was 35%-40% among males and 40-60% among females in other regions.

Cancer of the cervix uteri accounted for an estimated 6,268 new cases in females, with an overall ASR of 19.5 per 10^5 female population. The incidence was as high as 26 per 10^5 population in the northern region while in Khon Kaen and Songkhla it did not exceed 20 per 10^5 population. In general, the percentage of histological verification was high, with the lowest in Khon Kaen, at 68% of cases.

Breast cancer accounted for an estimated 5,592 new cases in females, with an ASR of 17.2 per 10^5 female population. Bangkok had the highest incidence rate of breast cancer, 25.4 per 10^5 population. The incidence in Chiang Mai and Lampang was around 17 and that in the rest of the country was 12 to 13 per 10^5 population. In general, the percentage of histological verification was high, not less than 87% in all registries.

Colorectal cancer accounted for an estimated 4,748 new cases in both sexes, with ASRs of 10.8 per 10^5 population in males and 7.3 in females. The incidence rate in Bangkok, 16.6 per 10^5 population in males and 11.0 in females, was the highest among the five registries. The incidence rate in the northern registries was slightly higher than those in Khon Kaen and Songkhla, which was around 7 and 4 per 10^5 population in males and females respectively.

Discussion

The estimated incidence rates of all cancers in Thailand were 149.2 and 125.0 per 10^5 population in men and women respectively. The three commonest cancers in males were those of the liver, lung, and colorectum with rates of 37.6, 25.9, and 10.8 per 10^5 male population respectively, while cancers of the cervix uteri, breast, and liver were the three commonest in females, with rates of 19.5, 17.2, and 16.0 per 10^5 female population respectively.

It is interesting that the pattern of cancer occurrence differs from region to region. Lung cancer occupies the first rank in the northern registries in both sexes, while liver cancer dominates all the others in the Northeastern region, represented by Khon Kaen. Lung cancer ranks first among men in Bangkok and Songkhla while breast cancer is the commonest among women in Bangkok and cervix cancer is the topmost one in Songkhla.

Regional differences in cancer incidence in Thailand may be partly explained by exposure to region-specific risk factors. The liver fluke, Opisthorchis viverrini, a known risk factor for cholangiocarcinoma (IARC, 1994; Srivatanakul et al., 2004), is endemic to the Northeastern region. The factor or factors attributable to the strikingly high incidence rate of lung cancer in the Northern region is not fully explained. It is noted that the prevalence of cigarette smoking, especially local cigarettes, among people in the Northern region is higher than that in other parts of the country, however, the lower incidence rate of oral-pharyngeal cancer, which is also a cigarette-related cancer, than that in Songkhla suggests a role of other local factors on carcinogenesis of the cancers of the upper aero-digestive tract and lungs. Khon Kaen and Songkhla have lower incidences of cervix, breast, and colorectal cancers than Bangkok and the two provinces in the North. It is not clear whether lifestyle or genetic factor play a major role in carcinogenesis of the diseases.

There are some methodological factors that may lead to uncertainty of the results. The registries were founded at or near the economic center of the region, but these provinces may not be highly representative of cancer problems in the entire region. This may lead to an over-estimation of incidence rates due to various factors, i.e. migration from

peripheral provinces to the center of a patient to reside with his or her relatives working in the area where there is also more sophisticated medical care.

The five registries cover a population of 11 million people, which was approximately 19.0% of the population of Thailand in mid-1996. If Bangkok is excluded, the other four registries cover only about 9.5% of the population in Thailand. Also, since it is the capital city of Thailand, Bangkok is not a good proxy for the central region, as a large proportion of people in the rest of the area have a rural lifestyle and environment. Unfortunately, there is no other registry in the Central region.

Though registries followed the registration procedure of the IARC, variation in data abstraction, coding, and other processes may lead to biased differences in incidence rates. It is likely that in a prevalent area of cancer of a deep organ such as lung and liver, the incidence rate of the tumour tends to be higher than the true rate because of suspicion in the clinical diagnosis, and the reverse may be true in a registry where that particular cancer is not so common. Physicians may hesitate to make a diagnosis of the cancer when they have limited clinical information.

The method of estimating expected cases in each region by assuming that cancer incidence rates in the representative registries are the average of the whole region is not confirmed by any evidence. Applying a weight to the incidence rates by the rank in mortality rate reported by the Ministry of Public Health is one quite reliable adjustment method; however, this procedure was not done because of a significant lack of precision of the mortality statistics during the period.

Despite these problems, these estimates of cancer incidence rates and number of cases are the best we have at the moment. We hope that the estimates do not deviate significantly from the true figures. Attempts are being made to increase the amount of population covered, and the National Cancer Institute aims at 15-20% coverage of the population of the country, excluding Bangkok.

In conclusion, regions in Thailand have their own story to tell in terms of cancer occurrence and risk factors, and looking at the national figures alone may not give a clear insight into cancer problems in the country. A general policy of cancer prevention and control for the whole country may be suitable for some cancers common in all regions such as cancers of the cervix uteri, breast, and colorectum, but region-specific plans may also be needed to accommodate significant differences in certain cancer incidences in different regions of the country.

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