

Chapter
IV

PROJECTION OF CANCER PROBLEMS

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Projection of cancer problems in Thailand was first published in the third volume of Cancer in Thailand (CIT). Though the data in this volume are not much different from the present one, the estimation method of cancer incidence is different and conceivably be more precise than that was used in the previous volume. Thus, it is worth presenting the re-estimation of cancer problems in Thailand again.

PROJECTION METHOD

Data Sources

The data of all registries published in this volume were used as the sources for the period 1998-2000. The rates in the first two periods from 1989 to 1994 are those from five registries of Chiang Mai, Lampang, Khon Kaen, Bangkok, and Songkhla. The rates were recalculated using population denominators estimated from the 1990 and 2000 censuses with the procedure mentioned in Chapter I. The results are slightly different from those published in the first two volumes of CIT affected by two factors. Cancer registry databases are regularly updated and the population denominators used to calculate the rates are changed. The population data available at the time of CIT I was that projected from 1990 census by the National Statistical Office (1992), and in CIT II, the population denominators were from the Population Projections for Thailand 1990-2020 (Human Resources Planning Division, 1995).

Only common cancer sites - liver, lung, colon and rectum, cervix uteri, and female breast were presented for the purpose of public health impact. The overall trends

of all cancer sites are also shown.

Statistical Method

In each region, expected cancer cases per year were calculated by pooling together expected cases in the year at the middle of the period from registries in the region, for example, cases in Khon Kaen, Udon Thani, and Nakhon Phanom for the northeastern region. When i = representative registry, and j = sex and 5-year age group stratum, age-specific incidence rate per 100 000 population for a sex and 5-year age group in a region was calculated by the formula

$$R_j = K_j (\sum N_{ij} / \sum P_{ij}) \times 10^5$$

where

$\sum N_{ij}$ = pooled cancer cases in representative registries,

$\sum P_{ij}$ = pooled population in representative registries,

$K_j = D_j / \sum D_{ij}$,

D_j = cancer death rate in the region,

$\sum D_{ij}$ = pooled cancer death rate in representative registries.

And the number of cancer cases for a sex and 5-year age group was calculated by

$$N_j = R_j \times P_j / 10^5,$$

where

P_j = population in the region.

Since the incidence rates in the representative registries are not at the average of the region, an adjustment factor K_j was applied to the expected number of cancer cases in each sex and 5-year age group stratum. The adjustment factor K_j was derived from the reported number of cancer death from the Ministry of Public Health in the year 2004. There are some

evidences that cancer deaths reported to the Ministry of Public Health in the year 2004 and later are not much underestimated and can be used in adjustment procedure. The adjustment process was applied to all three-year periods in a region, even there was only one registry representing the region. For example, the ratio obtained from Khon Kaen was used for the periods 1989-1991, 1992-1994, and 1995-1997, while that from Khon Kaen, Udon Thani, and Nakhon Phanom was used in the period 1998-2000. The process was applied for all four regions of Thailand. The estimated age-specific incidence rates by sex and 5-year age group for the region were calculated.

The estimated age-specific incidence rates for the future periods of 2001-2003, 2004-2006, and 2007-2009 for different regions were projected by fitting linear models with the rates for the same sex and 5-year age group in the known four 3-year periods, if they were increasing, and log-linear model, if they were decreasing. The expected cancer cases per year could be calculated by multiplying the projected rates with the expected population. ASRs for topographic sites then were obtained by the procedure described in Chapter I.

Reliability of the Projection

Since the projection was based on nine registries during the years 1998-2000 rather than 5 registries in the previous periods, estimated rates and number of cases in the recent period were more reliable than that published in the third volume of Cancer in Thailand. Adjustment for the estimates of the

rates and number of cases in each region by the ratio of cancer deaths described above could make the estimates closer to the average of the region. However, reliability of the estimates cannot be easily determined. Deviation of the estimates can occur by the following facts. The ratio of cancer death may not be the same as the ratio of cancer occurrence, especially for cancers with good treatment outcomes such as breast and cervix cancers. The trends in incidence in one province may not be the same in the others. Having one registry in the first three periods and more registries in the last period of 1998-2000 may deviate the slope of the regression line. However, having more than one registry as the representative of a region is better than having only one. The better quality in case ascertainment of Bangkok registry in recent years than in that of in the past makes a steep inclining slope of the regression line in the central region. With some known biases, the results of the projection are thought to be more accurate.

RESULTS

The projected incidence rates and number of cases were slightly less than those previously reported in CIT III (Sriplung, 2003; Sriplung *et al.*, 2006). Table 4.1 shows number of cancer cases in the middle of three-year periods from 1989-2009 and five cancer sites in males and females. Trends in number of cancer cases from 1990 to 2008 for the five cancer cases and all sites in both sexes are shown in Figure 4.1. The number of cancer cases is increasing in all cancer sites, even those with stable incidence rate, since the population of Thailand is

increasing throughout the two decades from 1990 to 2009. By the end of the 21st century, around 103 000 new cancer cases of all sites are projected. In both sexes, liver cancer will be the leading cancer and lung cancer ranks second through the next decade. Within this decade, breast, not cervix cancer, is increasing and rapidly becoming the leading cancer among female in Thailand. The rate of increase in number of cases of colorectal and breast cancer is clearly higher than that of the others, although the rate of lung cancer among Thai men by the end of the first decade of the 21st century. As demonstrated in Table 4.1, the number of cases of colorectal cancer in both sexes is rapidly increasing and will probably exceed that of lung cancer in the next decade. Cancer of the colon-rectum is increasing rapidly in both sexes. Over 8 000 new cases are expected in 2008.

The incidence rates of liver cancer in the northeastern region and the rates of lung cancer in the northern region seem to be decreasing (Figure 4.2), while they are stable or increasing in other regions. Colon and rectum cancer is increasing in the whole countries but at different rates in different region. Breast cancer also shows an increasing trend in all regions. Since lung and liver cancers are decreasing, the incidence rates of cancer of all sites are declining in the northern and northeastern regions. The central and southern regions have no striking reduction in any cancer in the population, the increasing trends of colon-rectum and breast cancers underlie an increasing trend of cancer of all sites in the two regions.

Table 4.1 Number of cancer cases in Thailand, based on the actual data of 1989-2000

	1990	1993	1996	1999	2002	2005	2008
Male							
Colon-rectum	1,335	1,566	2,024	2,439	2,845	3,365	3,966
Liver	6,568	7,292	8,004	8,402	8,583	9,195	9,921
Lung	3,605	4,115	4,717	4,945	5,468	6,044	6,705
All sites	22,998	26,657	29,404	32,524	35,321	39,158	43,594
Female							
Colon-rectum	1,172	1,574	1,845	2,444	2,995	3,649	4,415
Liver	2,702	3,320	3,279	3,251	3,891	4,267	4,740
Lung	1,871	2,125	2,368	2,551	2,910	3,268	3,688
Cervix uteri	4,353	4,404	5,247	6,746	7,419	8,483	9,747
Female breast	2,800	3,443	5,085	6,798	8,439	10,425	12,775
All sites	22,875	27,024	31,496	37,547	43,826	50,858	59,171

The expected number of new cancer cases is slightly lower than the projection published in CIT III. Approximately 103 000 new cancer cases are expected by the end of the first decade of the 21st century while it was 120 000 in the previous projection. The drop in expected number of cancer cases is largely due to the correction of the incidence rates of cancer in regions, which, on average, are lower than that of the representative provinces for a particular region.

Figure 4.1 Projection of all cancer cases in Thailand, both sexes, based on the actual data of 1989-2000

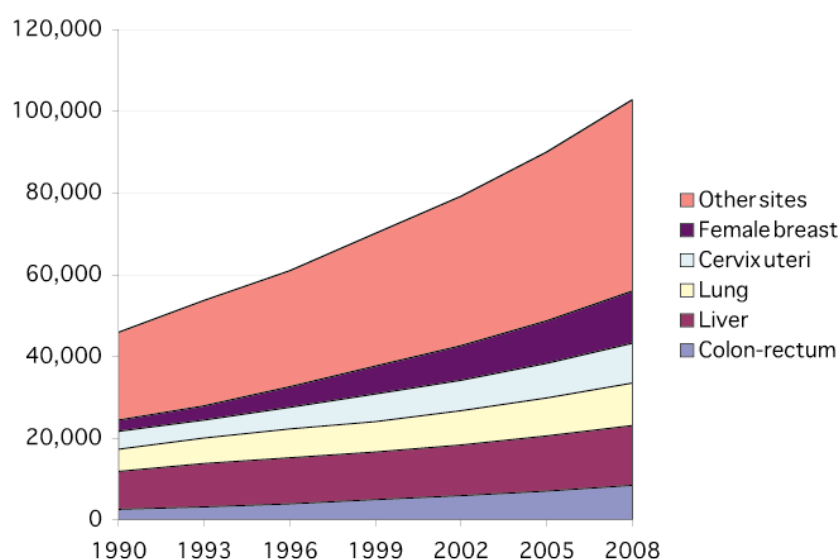


Figure 4.2 Trends and projection of incidence rates of cancer in Thailand, 1990-2008, based on the actual data of 1989-2000

