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1991 Cancer Incidence in Seoul, Korea : Results of the Implementation Study of the Seoul Cancer Registry

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This article presents the results of the Implementation Study of the Seoul Cancer Registry, which started in July, 1991 as a population based cancer registry in Seoul, Korea. The completeness and validity of the registered data were evaluated using Mortality / Incidence ratio (M / I ratio), Histologically Verified Cases (HV%), Primary Site Uncertain (PSU%), and Age Unknown (Age UNK%). Owing to the additional active surveillance, the completeness of the data turned out to be fairly acceptable, except for the aged over 75(Mortality / Incidence ratio was over 100%). Eventhough the Seoul cancer registry(SCR) has further way to go in the completeness especially among elderly persons, the validity of SCR data was also acceptable in terms of HV%, PSU%, and Age UNK%. However, PSU% and Age UNK% might need to be further reduced to be comparable with other well established cancer registries. The age standardized incidence rates(ASR) of all cancers between July 1, 1991 and June 30, 1992 were 232.4 / 100,000 in males and 147.9 / 100,000 in females. The top five major sites of cancers in Seoul were the stomach, liver, lung, colo-rectum, and bladder in order in males, and the uterine cervix, stomach, breast, colo-rectum, and liver in females. Those 5 cancer sites comprised 68.9% and 64.7% of the total cancer incidence in males and females, respectively.

Key Words : *Cancer Registry, Seoul, Incidence, ASR, Completeness, Validity*

INTRODUCTION

The Korean government has operated the Central Cancer Registry Program(CCRP) at the National Medical Center since July 1980. The cancer incidence data, however, have not yet been available for the whole country of Korea nor for Seoul(Ministry of Health and Social Affairs, 1992). The main reason for the unavailability of incidence data is that the CCRP is not a population based cancer registry. As of 1991, the number of hospitals participating in the CCRP are 104, and 35 of them are in Seoul(Ministry of Health and Social Affairs, 1991). These are all large teaching hospitals. Most of the non-teaching hospitals or small -sized clinics are not reporting their cancer patients to the CCRP, even though they are capable of cancer diagnosis. Naturally, the number of cancer cases registered in the program is underrepresented(Ministry of Health and Social Affairs, 1992). The need for a population based cancer registry has been raised in order to have reliable and fully represented incidence data. Since a registry is more efficient and feasible when it is targetted on a more restricted area rather than the whole country, the authors decided to chose Seoul as a target place for the registry.

Seoul is not only the capital city of Korea, but also the largest city of it. The total population was enumerated as 10,603,247 in 1990 (Fig. 1, National Bureau of Statistics, 1993). Being a center of politics and the economy, most of the major teaching hospitals are concentrated in Seoul. Therefore, Seoulites do not need to go to other places to seek better treatment. These two characteristics, namely the large population and concentrated medical facilities make Seoul the most eligible area for a population based cancer registry in Korea.

The Implementation Study of the Seoul Cancer Registry (SCR) has launched under the support of the Korean Foundation for Cancer Research, 1) to test the feability of operating a population based cancer registry in the Seoul area, with dual sources of case registration, i.e., one is from CCRP cases and the other is from additionaly surveilled cases diagnosed in small-sized hospitals, 2) to provide the cancer incidence for all sites in the Seoul area with completeness and validity assessment.

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MATERIALS AND METHODS

The SCR started on July 1, 1991. The primary source of data were the registry files of the CCRP. From these files, the records of patients residing in Seoul were extracted. Patients who were diagnosed in CCRP non-joining hospitals were surveilled by an SCR data collection team, who visited each hospital at regular intervals and identified cancer patients through looking up the medical records or diagnosis files. The medical records for cancer patients were abtracted using a formated sheet. All data were then computerized and sorted by personal unique identification number. If duplicate records came out, only the record from the earlier date of diagnosis was kept, if it was not a multiple primary case.

Information obtained from all cases included hospital number, patient number, sex, personal unique identification number, name, occupation, current address, date of diagnosis, primary site(ICD-O), pathologic type (ICD-M), expiration date, diagnosis method(most valid bases), and treatment modalities.

The source population of SCR was the 1990 census data of the Seoul population as indicated in Fig. 1.

Cancer death statistics in Seoul in 1991 were obtained from the National Bureau of Statistics to calculate the cross sectional age-sex specific Mortality/Incidence ratios, one of the methods for measuring the completeness of the registry (Goldberger et al., 1980). The reliability of the cancer death statistics, 1991 in Seoul was verified by a special survey for cause of death(National Statistical Office, Korea, 1992). If mortality exceeds incidence in a certain point of time, it is highly probable that incidence cases are not registered fully.

The validity of the information in the registry data was assessed against such indices as proportion of histologically verified cases(HV%), proportion of primary site uncertain(PSU%), and proportion of age unknown(Age UNK%)(Parkin and Muir, 1992). HV% indicates the thoroughness of diagnostic investigation, PSU% and Age UNK% indicate the completeness of diagnostic work-up and of medical abstraction.

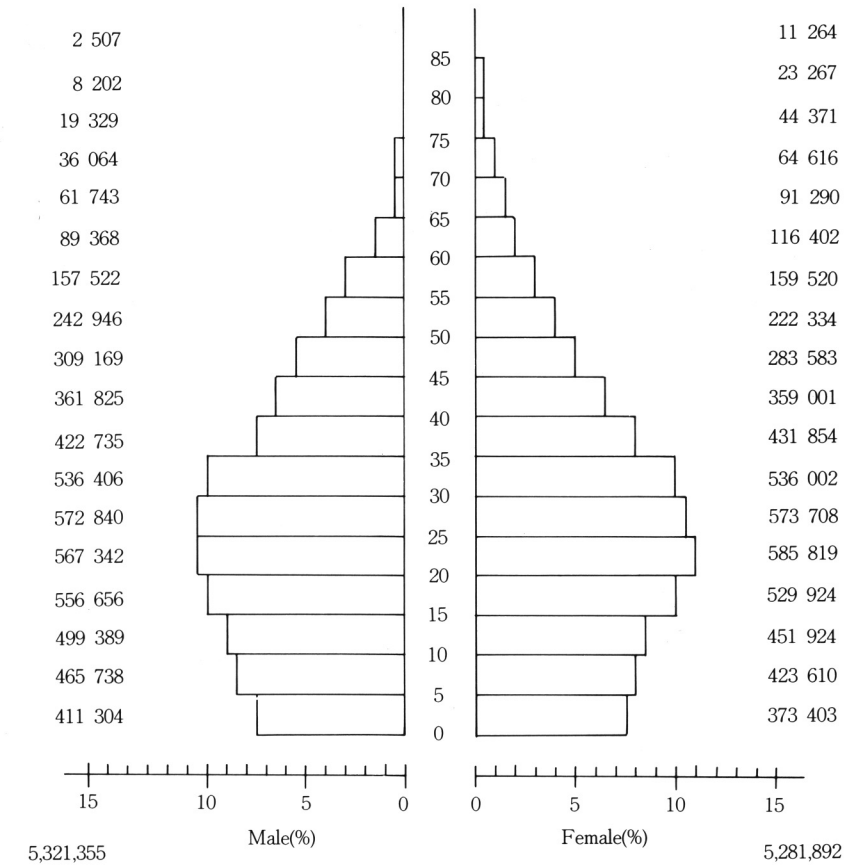

Fig. 1. The Source Population of SCR : The 1990 Census Data of Seoul
Census : National Bureau of Statistics, 1990 population and housing census report. Seoul, Korea, 1993

RESULTS

Number hospitals where the data from cancer cases were collected

Of the total of 104 hospitals participating in the CCRP, 35 hospitals which were located in Seoul and 34 which were out of Seoul, had reported 14,608 and 126 cancer patients who were residing in Seoul, respectively, during one year from July 1, 1991 to June 30, 1992. In the meantime, the SCR data collection team had abstracted the medical records of 1,689 cancer cases from Aug., 1991 to May, 1993 at 71 hospitals out of 113 CCRP non-joining hospitals in Seoul(small clinics or doctor's offices were not considered as cancer diagnosing hospitals). Fifteen hospitals out of 113 did not treat cancer patients at all because of their speciality and the other 27 hospitals(23.9%) refused to render the information.

In total, the data on Seoul cancer cases were collected from 106 hospitals in Seoul and 34 out of Seoul. The total number of new cancer patients residing in Seoul, diagnosed between July 1, 1991 and June 30, 1992, was 13,466(6,965 in males, 6,501 in females).

Mortality / Incidence ratio : All sites and 5 leading sites for each sex

The cross-sectional ratios of deaths/cases(the M/I ratio) of all sites of cancer for each sex and age group are shown in Table 1. The ratios of cancer deaths to incidence were around 50%-70% except

Table 1. M/I ratios(%)[a] of all sites of cancer for each sex in Seoul, 1991. 6-1992. 7, SCR[b]

	Male			Female		
Age group	deaths[C]	cases	M/I ratio	deaths[C]	cases	M/I ratio
1-4	13	48	27.1%	10	28	35.7%
5-9	18	25	72.0	11	19	57.9
10-14	21	24	87.5	12	20	60.0
15-19	27	53	50.9	20	61	32.8
20-24	41	63	65.1	34	110	30.9
25-29	40	121	33.1	54	209	25.8
30-34	87	199	43.7	94	444	21.2
35-39	154	257	59.9	156	588	26.5
40-44	276	424	65.1	177	709	25.0
45-49	463	740	62.6	256	707	36.2
50-54	664	961	69.1	294	738	39.8
55-59	661	1,034	63.9	322	669	48.1
60-64	668	931	71.8	346	645	53.6
65-69	627	874	71.7	398	603	66.0
70-74	507	598	84.8	405	464	87.3
75+	543	543	100.0	556	435	127.8
unknown		70			52	
Total	4,813	6,965	69.1	3,148	6,501	48.4

a. Mortality/Incidence ratio
b. Implementation Study of the Seoul Cancer Registry
c. The data came from Seoul death statistics, 1991

Table 2. M/I ratios(%)[a] of the 5 leading sites of cancer in males, 1991. 6-1992. 7, SCR[b]

Age group	stomach	liver	lung	colorectum	bladder
1-4	-	-	-	-	-
5-9	-	-	-	-	-
10-14	-	-	-	-	-
15-19	-	100.0	-	-	-
20-24	71.4	66.7	-	100.0	-
25-29	39.1	18.2	40.0	30.8	-
30-34	54.6	72.0	109.1	16.0	-
35-39	63.5	98.0	70.0	30.0	14.3
40-44	60.7	110.1	81.7	28.6	11.1
45-49	48.8	101.1	90.1	30.3	23.5
50-54	57.5	119.4	81.7	22.5	28.6
55-59	49.8	113.3	66.7	33.1	12.2
60-64	66.3	105.0	81.5	30.9	18.9
65-69	67.5	110.8	93.0	37.5	31.7
70-74	87.3	142.6	107.7	48.1	17.2
75+	110.2	160.0	119.4	73.6	100.0
Total	62.3	110.9	88.7	35.1	27.4

a. Mortality/Incidence ratio
b. Implementation Study of the Seoul Cancer Registry

for that of those aged over 75, suggesting that the case registration in this age group was incomplete. In general, the ratios in females were lower than those in males for all age groups except those over 70.

The M/I ratios for the 5 leading sites for each sex were variable by site, as shown in Table 2 and Table 3. For liver cancer, some of the ratios exceeded 100%, in those aged over 40 in males and thirties

Table 3. M/I ratios(%)[a] of the 5 leading sites of cancer in females, 1991. 6-1992. 7, SCR[b]

Age group	Uterus Cx	stomach	breast	colorectum	liver
1-4	-	-	-	-	-
5-9	-	-	-	-	-
10-14	-	-	-	-	-
15-19	-	-	-	-	100.0
20-24	-	57.1	-	33.3	100.0
25-29	7.7	82.1	18.2	50.0	-
30-34	3.8	46.0	7.0	22.2	142.9
35-39	2.7	37.8	20.0	58.8	162.5
40-44	2.8	48.6	16.5	41.0	84.2
45-49	9.4	43.0	26.9	55.8	60.6
50-54	11.2	57.3	33.0	40.6	77.6
55-59	8.6	63.6	31.2	35.7	84.7
60-64	11.4	58.3	37.3	29.5	77.2
65-69	18.1	65.4	37.9	47.7	110.4
70-74	35.6	89.3	33.3	66.7	119.5
75+	23.8	161.9	48.0	76.1	196.8
Total	8.5	64.9	24.6	47.8	100.3

a. Mortality/Incidence ratio
b. Implementation Study of the Seoul Cancer Registry

and sixties in females.

Distribution of the Most Valid Basis of Diagnosis

The proportions of histologically verified(HV%) cases were 79.2%(76.8% in males, and 85.0% in females). However, most of the non-microscopically diagnosed cases(i.e. 20.8% of total) were diagnosed by sophisticated radiologic tests such as CT, sonography, and interventional radiologic images, or exploratory surgery, or specific biochemical tests (See Table 4). Site specific HV% are shown in Table 5. Liver cancer had the lowest HV% among all sites.

Table 4. Distribution of the most valid basis of diagnosis of the cancer cases and Proportion of Histologically Verified Cases(HV%)[a] in Seoul, 1991. 7-1992. 6

	Male		Female		Total	
Method	No	%	No	%	No	%
Non-Microscopic methods						
Clinical only	35	.5	49	.8	84	.6
Investigations[b]	1,253	18.0	780	12.0	2,033	15.1
Exploratory surgery	35	.5	42	.7	77	.6
Specific biochemical tests	266	3.8	86	1.3	352	2.6
Microscopic methods						
Cytology/Hematology	406	5.8	250	3.9	656	4.9
Histology of metastasis	294	4.2	211	3.3	505	3.8
Histology of primary	4,501	64.6	4,888	75.2	9,389	69.7
Other histologic exam	46	0.7	64	1.0	110	.8
HV%[a]		76.8		85.0		79.2
Missing data	129	1.9	131	2.0	260	1.9
Total	6,965	100.0	6,501	100.0	13,466	100.0

a. The percentage of cases diagnosed by all the microscopic methods.
b. Clinical investigations such as CT, Sonography, MRI etc.

Table 5. The numbers and percentages of histologically verified cases(HV%) in various cancer sites

Site	Male		Female	
	No	HV%	No	HV%
Stomach	1,621	88.1	904	88.3
Liver	286	26.0	95	26.5
Lung	800	85.0	274	77.2
Colorectum	540	88.4	424	84.1
Bladder	220	95.6	50	90.9
Breast	-	-	772	93.3
Ut. Cervix	-	-	1,340	95.4

Percentage of primary site uncertain(PSU%) and age unkown(Age UNK% ; all sites)

The number of cases of primary site uncertain was 359(5.2%) in males and 234(3.6%) in females. The number of cases of age unknown was 70(1.0%) and 52(0.8%) in males and females, respectively.

Age-specific annual incidence rate of cancer, all sites

Table 6 shows the annual incidence rate(per 100,000) of all sites of cancer by age group and sex.

Table 6. Annual incidence rate (per 100,000) of all cancer sites by age sex in Seoul, 1991-1992

Age group	Male	Female
1-4	11.7	7.5
5-9	5.4	4.5
10-14	4.8	4.4
15-19	9.5	11.5
20-24	11.1	18.8
25-29	21.1	36.4
30-34	37.1	82.8
35-39	60.8	136.2
40-44	117.2	197.5
45-49	239.4	249.3
50-54	395.6	331.9
55-59	656.4	419.4
60-64	1,038.6(13.0%)[a]	554.1(10.3%)[a]
65-69	1,415.5	660.5
70-74	1,658.2(28.4%)[b]	718.1(17.2%)[b]
75+	1,807.7	551.3
Total, crude	130.9	123.1
age-adjusted[C]	232.4	147.9

a. cumulative incidence rate for the age span 0-64
b. cumulative incidence rate for the age span 0-74
c. age-standardized(adjusted) rate for the World population

The crude rate for males was 130.9, and 123.1 for females in the year of 1991-1992 in Seoul, Korea. The cumulative rates for age spans 0-64(CR64) and 0-74(CR74) were 13.0% and 28.4% in males, respectively. In females they were 10.3% and 17.2%. The age standardized rates(ASR) for the world population were 232.4 in males and 147.9 in females.

When comparing the age-specific incidence rates between males and females in the 20-49 years of age group, the female incidences were higher than that of males. This female preponderance was reversed just after the age of 50, where the male incidence markedly increased in proportion to the age.

Incidence rates of the 5 leading cancer sites by sex

All the incidence statistics of cancer by site and sex in Seoul, 1991-1992 are shown in the Annex Table 1 and 2. The crude and age-adjusted incidence rates of the 5 leading cancer sites are summarized as in Table 7. As seen in the table, the 5 leading cancer sites in Seoul were the stomach, liver, lung, colorectum, and bladder in order in males, and the cervix uteri, stomach, breast, colorectum and liver in females. These 5 cancer sites comprised 68.9%, 64.7% of the total cancer incidence in males and females, respectively.

DISCUSSION

A population based cancer registry provides an invaluable data base for cancer incidence estimation in a certain area. For the sake of reliable and comparable incidence estimation, the collection process of the registry should be complete and the information collected should be valid as well. The authors evaluated the completeness and validity of

Table 7. Summary of the incidences(crude rate,[a] CR64,[b] CR74[c])of the 5 leading cancer sites by sex, Seoul, 1991-1992

	Male					Female			
Rank	Site	Crude[a]	CR64[b]	CR74[c]	ASR[d]	Site	Crude[a]	CR64[b]	CR74[c]	ASR[d]
1	Stomach	35.0	3.5	7.6	60.6	Cervix	27.1	2.5	3.3	29.9
2	Liver	21.1	2.3	4.0	33.1	Stomach	19.7	1.6	3.1	24.6
3	Lung	17.9	1.9	4.8	37.2	Breast	15.9	1.4	1.7	17.0
4	Colorectum	11.8	1.1	2.4	20.4	Colorectum	9.9	0.8	1.6	13.1
5	Bladder	4.4	0.4	1.2	8.9	Liver	7.0	0.7	1.3	9.8
	All sites	130.9	13.0	28.4	232.4		123.1	10.3	17.2	147.9

a. Crude means the crude rate per 100,000
b. cumulative incidence rates for the age span 0-64
c. cumulative incidence rates for the age span 0-74
d. age-adjusted(or standardized) rate for the World population

the SCR data using the indices such as M/I ratio(%), HV%, PSU%, and Age UNK%. Overall M/I ratio showed fair-good registration throughout the age-sex specific strata, except for those over 75 years old. In these old age groups, the M/I ratios were over 100 in both sexes, suggesting incomplete registration, especially in females. Site-specific M/I ratio showed various degrees of M/I ratios, leaving liver cancer as the cancer of the highest M/I ratio (110.9 for male, 100.3 for female). This site-specific M/I ratio, however, could also be in proportion to the fatality of the cancer, not only to the incompleteness of the registry. It is interesting to note that this high M/I ratio for liver cancer appears consistently in other cancer registries, such as US Connecticut(85 for white males, 106 for white females), US SEER(98 for white males, 117 for white females), and Shanghai, China(96 for males, 102 for females)(IARC and IACR, 1992). Therefore, we concluded that the SCR data were fairly acceptable in terms of completeness except for the elderly age groups. The site-specific M/I ratios increased with age in most of the cancer sites, so under-registration of cases might occur in elderly people whatever the cancer site may be.

Case loss in old age groups can be reduced further by additional surveillance of the SCR non-cooperative hospitals. Old people tended to be diagnosed and treated in small hospitals rather than large sophisticated hospitals. From the duplicate record data, which had one record from the CCRP joining hospital and another from the CCRP non-joining hospital, the authors noticed that the transfer rates from small clinics(CCRP non-joining hospitals) to large teaching hospitals(CCRP joining hospitals) were relatively lower in the old age groups than the other age groups. The transfer rate was even lower in elderly females than elderly males. The visit-and-abstract surveillance of the CCRP non-joining hospitals improved the registration rate of new cases especially in the old ages. Therefore, if we try to increase the participation rate of small hospitals in the SCR(74% now) further, the completeness of the SCR data will be improved.

Since the SCR did not obtain batches of death certificates periodically, cases with death certificate only(DCO) could not be registered as new cancer cases. If cancer case finding is processed from death certificates simultaneously, case loss will be diminished further(Parkin and Muir, 1992).

HV%, PSU%, and Age Unk% are the indicators for validity of the information from the registered cases. The average HV% were 77% for men and 85% for women in the SCR data, which were slightly lower than other reliable cancer registries(94% for whites in US Connecticut, 95% for whites in US SEER, 70 and 73% for males and females in Osaka, Japan). These numbers of HV% of SCR included cytologies as well as needle biopsies. The low levels of average HV% might be due to the high relative frequency of liver cancer in Korea(Table 7). In fact, liver cancer had the lowest level of HV%(26 for both males and females), while most of the other cancers had HV%s over 85%(Table 5). Regarding the preponderance of non-biopsical radiologic tests(Computerized Tomography, Ultrasonography, Magnetic Resonance Images, etc.) in liver cancer diagnosis, slightly low levels of average HV% in the SCR data do not necessarily imply a low level of validity of the data.

The PSU% were between 3-5%, Age UNK% were under 1%, both of which were within acceptable

range. Compared to other well established registries, however, both of them, especially Age UNK% should be further reduced. By education and close supervision of the personnel who are involved with cancer registry in CCRP joining hospitals, the personnel will become more competent and dedicated, and the incidence data will be of better quality in turn.

The overall incidence for Seoul was 232.4 for males and 147.9 for females in terms of ASR. Ahn et al. estimated the national incidence of cancer using the data from Korean Medical Insurance Coperation(Ahn et al.,1989 ; Ahn et al.,1991 ; Ahn et al.,1994 ; Ahn, 1994). The estimated national incidence was 225 for males and 140 for females. The numbers are quite comparable, although the incidences in Seoul were slightly higher than those of the whole nation. Comparing the site specific incidences between SCR and Ahn et al.'s national data, the incidences of stomach cancer are similar each other(CR74 ; male 7.6% and female 3.1% in SCR, male 7.3%, female 3.0% in national data), those of lung cancer are higher in national data(CR74 ; male 4.8% and female 1.2% in SCR, male 5.7% and female 1.3% in national data), and those of liver (CR74 : male 4.0% and female 1.3% in SCR, male 3.6% and female 0.9% in national data), colorectum(CR74 : male 2.4% and female 1.6% in SCR, male 2.1% and female 1.3% in national data), female breast(CR74 : 1.7% in SCR, 1.0% in national data), and uterine cervix(CR74 : 3.3% in SCR, 2.2% in national data) are higher in SCR. The cancer incidences in most sites increase with age, but not in female breast and uterine cervix. There is a middle age(40 - 60's) peak of incidence in those two cancer sites, which is a unique feature observed in the countries of Asia and Latin America(Kelsey and Gammon, 1990).

The ASRs of the SCR are comparable to those of Osaka, Japan(266.5 for males, 156.1 for females) and Shanghi, China(228.8 for males, 147.5 for females)(IARC and IACR, 1992). Americans and western Europeans have a higher incidence of cancer than Koreans. US SEER data show ASR of 330.4 and 277.0 for male and female whites, 351.3 and 227.1 for male and female blacks. US Los Angeles data show ASR(excluding ICD9-173) of 464.3 and 491.2 for male and female whites, 195.6 and 190.5 for male and female Chinese, 288.1 and 306.8 for male and female Japanese, and 110.5 and 102.3 for Koreans(International Agency for Research on Cancer, 1992). Even though we consider that the exclusion of rubrics 173(skin cancer) might decrease 2 - 10 of ASR, cancer incidence in Korean and Chinese immigrants is lower than in their original countries.

The SCR data will be used in epidemiologic research and control programs for cancers. Also, this study makes a good model for a future population based cancer registry in some potential areas in Korea.

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ANNEX1. Average Annual Incidence per 100,000 by Age Group (years)-Male

KOREA, SEOUL 1991.7.1-1992.6.30

AVERAGE ANNAL INCIDENCE PER 100,000 BY AGE GROUP(YEARS)-MALE

SITE	ALL AGES	AGE UNK	1-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	CRUDE RATE	CR 64	CR 74	ASR WORLD	%ASR TOTAL	ICD-9
Lip	3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	2.8	3.3	0.1	0.0	0.0	0.1	0.1	140
Tongue	37		0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.5	0.3	1.9	2.1	5.1	2.2	9.7	16.6	0.0	0.7	0.1	0.2	1.2	0.5	141
Salivary gland	22		0.0	0.0	0.0	0.2	0.4	0.2	0.2	0.2	0.6	1.3	1.2	0.0	2.2	3.2	5.5	0.0	0.4	0.0	0.1	0.6	0.2	142
Mouth	43		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	1.3	2.5	4.4	3.3	9.7	19.4	16.6	0.8	0.1	0.2	1.6	0.7	143-5
Oropharynx	35		0.0	0.0	0.0	0.2	0.0	0.2	0.4	0.7	0.0	1.6	4.1	0.0	3.3	8.1	5.5	10.0	0.7	0.1	0.1	1.1	0.5	146
Nasopharynx	33		0.0	0.0	0.0	0.0	0.4	0.2	0.4	1.9	1.4	1.6	1.2	2.5	2.2	0.0	2.8	0.0	0.6	0.1	0.1	0.7	0.3	147
Hypopharynx	23		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.6	1.2	3.2	6.7	6.5	0.0	6.7	0.4	0.1	0.1	0.8	0.4	148
Pharynx unspec.	2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.1	0.0	149
Oesophagus	141	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	5.5	7.0	14.0	30.1	30.8	52.7	46.6	2.6	0.3	0.7	5.4	2.4	150
Stomach	1865	50	0.0	0.0	0.0	0.7	1.2	4.0	10.3	14.9	33.7	65.0	115.3	191.1	271.1	374.1	435.3	426.1	35.0	3.5	7.6	60.6	26.4	151
Small intestine	30	1	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.5	1.1	0.3	2.5	2.5	1.1	6.5	8.3	3.3	0.6	0.0	0.1	0.9	0.4	152
Colo-rectum	626	5	0.2	0.0	0.0	0.0	0.7	2.3	4.7	7.1	11.6	21.3	36.6	67.3	75.9	116.6	144.2	176.4	11.8	1.1	2.4	20.4	8.9	153-4
Liver	1125	4	0.5	0.0	0.2	0.2	1.1	1.9	4.7	12.1	27.4	59.8	89.3	109.8	156.2	179.8	149.7	149.8	21.1	2.3	4.0	33.1	14.4	155
Gallbladder etc.	215	2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.7	1.4	7.8	11.5	15.2	33.5	58.3	97.0	89.9	4.0	0.4	1.1	8.6	3.8	156
Pancreas	169		0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.4	1.7	4.5	9.5	19.0	29.0	47.0	52.7	39.9	3.2	0.3	0.8	6.2	2.7	157
Peritoneum etc.	14		0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.8	0.3	0.4	1.9	1.1	1.6	2.8	0.0	0.3	0.0	0.0	0.4	0.2	158
Nose, sinuses etc.	52		0.0	0.0	0.2	0.0	0.2	0.3	0.9	0.5	2.8	2.3	2.9	1.9	4.5	9.7	2.8	10.0	1.0	0.1	0.1	1.4	0.6	160
Larynx	127		0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	1.1	2.9	4.9	14.6	26.8	47.0	38.8	33.3	2.4	0.3	0.7	5.0	2.2	161
Bronchus, lung	952	2	0.0	0.0	0.0	0.0	0.0	0.9	1.9	2.6	11.1	23.0	45.7	93.3	205.3	252.7	324.4	326.3	17.9	1.9	4.8	37.2	16.2	162
Pleura	11		0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	2.5	2.2	3.2	2.8	0.0	0.2	0.0	0.1	0.4	0.2	163
Other thoracic organs	15		0.0	0.2	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.6	0.8	1.3	3.3	0.0	5.5	3.3	0.3	0.0	0.1	0.5	0.2	164
Bone	40		0.0	0.6	0.6	1.4	0.4	0.5	0.6	0.5	0.6	0.6	1.2	2.5	1.1	3.2	0.0	6.7	0.8	0.1	0.1	0.9	0.4	170
Connective tissue	59		0.7	0.2	0.4	0.5	0.7	0.9	0.6	1.4	1.7	1.9	1.2	3.2	4.5	4.9	2.8	13.3	1.1	0.1	0.1	1.5	0.6	171
Melanoma of skin	6		0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.6	0.4	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	172
Other skin	79	2	0.5	0.0	0.4	0.4	0.0	0.9	0.0	1.9	0.6	1.3	3.7	5.7	7.8	16.2	19.4	33.3	1.5	0.1	0.3	2.7	1.2	173
Breast	10		0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.3	0.0	0.4	0.0	2.2	3.2	0.0	3.3	0.2	0.0	0.0	0.3	0.1	175
Prostate	121		0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.3	2.5	9.5	14.5	35.6	55.5	139.8	2.3	0.1	0.6	6.1	2.7	185
Testis	18		1.0	0.0	0.0	0.4	0.5	0.3	0.6	0.2	0.0	0.3	0.0	0.0	0.0	3.2	0.0	0.0	0.3	0.0	0.0	0.4	0.2	186
*Penis	13		0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.3	0.0	0.8	0.0	3.3	4.9	2.8	3.3	0.2	0.0	0.1	0.5	0.2	187.1-4
Other male genital																								187.5-9
Bladder	234		0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.7	2.5	5.5	8.6	26.0	41.3	66.4	80.4	73.2	4.4	0.4	1.2	8.9	3.0	188
Other urinary	128	1	0.5	0.2	0.0	0.0	0.0	0.2	0.4	1.7	1.4	4.2	9.9	11.4	24.5	19.4	33.3	26.6	2.4	0.3	0.5	4.3	1.9	189
Eye	11	1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.4	0.6	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.1	190
Brain, nerv. system	105		0.5	0.6	0.8	0.5	0.2	2.4	1.5	2.8	2.2	3.9	5.4	2.5	7.8	13.0	8.3	10.0	2.0	0.2	0.3	2.5	1.1	191-2
Thyroid	55		0.0	0.2	0.2	0.0	0.2	1.0	0.7	1.9	0.3	3.2	3.3	1.9	3.3	3.2	11.1	10.0	1.0	0.1	0.2	1.4	0.6	193
Other endocrine	15		1.2	0.6	0.2	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.4	0.0	0.0	1.6	0.0	0.0	0.3	0.0	0.0	0.3	0.2	194
**Lymphosarcoma etc.	172		4.9	1.9	1.0	3.2	2.1	1.6	3.2	1.2	2.5	2.6	3.7	8.9	17.8	11.3	13.9	30.0	3.2	0.3	0.4	4.5	2.0	200
Hodgkin's disease																								201
Other reticuloses																								202
Multiple myeloma																								203
Lymphoid leukaemia																								204
Myeloid leukaemia																								205
Monocytic leukaemia																								206
Other leukaemia																								207
Leukaemia, cell unspec.																								208
***Primary Site Uncertain	359	1	0.5	0.4	0.6	1.6	2.6	1.6	2.8	2.8	6.6	12.9	14.0	33.0	50.2	64.8	61.0	113.2	6.7	0.6	1.3	11.6	5.1	PSU
#All sites	6965	70	11.7	5.4	4.8	9.5	11.1	21.1	37.1	60.8	117.2	239.4	395.6	656.4	1038.6	1415.5	1658.2	1807.7	130.9	13.0	28.4	232.4	101.2	ALL
#All sites but 173	6886	68	11.2	5.4	4.4	9.2	11.1	20.2	37.1	58.9	116.6	238.1	391.9	650.7	1030.8	1399.3	1638.8	1774.4	129.4	12.9	28.1	229.7	100.0	
##Rate from 1 case			0.243	0.215	0.200	0.180	0.176	0.175	0.186	0.237	0.276	0.323	0.412	0.635	1.116	1.620	2.773	3.329						

ANNEX2. Average Annual Incidence per 100,000 by Age Group (years)-Female

KOREA, SEOUL 1991.7.1-1992.6.30

AVERAGE ANNAL INCIDENCE PER 100,000 BY AGE GROUP(YEARS)-FEMALE

SITE	ALL AGES	AGE UNK	1-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	CRUDE RATE	CR 64	CR 74	ASR WORLD	%ASR TOTAL	ICD-9
Lip	1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	140
Longue	7		0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.6	1.7	1.1	1.5	0.0	0.1	0.0	0.0	0.2	0.1	141
Salivary gland	13		0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.7	0.9	2.5	0.9	0.0	1.5	1.3	0.2	0.0	0.0	0.3	0.2	142
Mouth	22		0.0	0.0	0.2	0.0	0.0	0.3	0.4	0.5	0.6	0.4	0.9	1.9	1.7	1.1	6.2	0.0	0.4	0.0	0.1	0.5	0.3	143-5
Oropharynx	6	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.6	0.9	0.0	1.5	0.0	0.1	0.0	0.0	0.1	0.1	146
Nasopharynx	12		0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.5	0.6	0.0	0.9	0.6	0.9	0.0	0.0	1.3	0.2	0.0	0.0	0.2	0.2	147
Hypopharynx	4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.4	0.0	1.7	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	148
Pharynx unspec.	0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	149
Oesophagus	21	1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.0	1.8	0.0	3.4	3.3	7.7	2.5	0.4	0.0	0.1	0.6	0.4	150
Stomach	1041	35	0.3	0.0	0.0	0.4	1.2	4.9	11.8	19.0	20.1	37.7	43.2	62.1	113.4	142.4	159.4	106.5	19.7	1.6	3.1	24.6	16.9	151
Small intestine	17		0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	1.1	0.4	0.6	1.7	3.3	3.1	2.5	0.3	0.0	0.1	0.5	0.3	152
Colo-rectum	521	0	0.0	0.0	0.0	0.4	0.5	1.0	5.0	3.9	10.9	15.2	28.8	43.9	52.4	71.2	88.2	84.9	9.9	0.8	1.6	13.1	9.0	153-4
Liver	369	0	0.0	0.0	0.0	0.2	0.2	0.0	1.3	1.9	5.3	11.6	26.1	40.7	49.0	52.6	63.5	39.3	7.0	0.7	1.3	9.8	6.7	155
Gallbladder etc.	178	1	0.3	0.0	0.0	0.0	0.0	0.0	0.4	0.2	1.4	4.6	8.1	11.9	24.1	29.6	46.4	41.8	3.4	0.3	0.6	4.9	3.4	156
Pancreas	112		0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.5	1.4	2.8	4.9	9.4	14.6	21.9	21.7	20.3	2.1	0.2	0.4	3.0	2.1	157
Peritoneum etc.	12		0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.2	0.3	0.0	1.8	1.3	0.0	1.1	0.0	0.0	0.2	0.0	0.0	0.2	0.2	158
Nose, sinuses etc.	18		0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.5	0.0	0.0	0.4	0.6	2.6	4.4	4.6	2.5	0.3	0.0	0.1	0.5	0.3	160
Larynx	16		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6	1.7	4.4	3.1	5.1	0.3	0.0	0.1	0.5	0.3	161
Bronchus, lung	362	1	0.0	0.0	0.0	0.2	0.7	0.3	0.9	3.2	5.0	8.8	14.4	27.0	40.4	72.3	69.6	74.8	6.9	0.5	1.2	9.7	6.6	162
Pleura	6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.0	0.0	0.0	1.1	1.5	1.3	0.1	0.0	0.0	0.1	0.1	163
Other thoracic organs	13		0.0	0.2	0.0	0.4	0.0	0.0	0.2	0.2	0.0	0.0	0.9	1.3	0.0	3.3	1.5	0.0	0.2	0.0	0.0	0.3	0.2	164
Bone	28		0.0	0.0	0.7	0.2	0.2	0.5	0.2	0.7	0.8	1.4	0.0	1.9	0.9	2.2	3.1	1.3	0.5	0.0	0.1	0.6	0.4	170
Connective tissue	42		0.3	0.0	0.2	0.6	0.2	0.3	0.7	1.6	1.1	0.7	0.4	2.5	2.6	6.6	3.1	1.3	0.8	0.1	0.1	0.9	0.6	171
Melanoma of skin	5		0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.9	0.0	0.0	1.3	0.1	0.0	0.0	0.1	0.1	172
Other skin	74		0.0	0.2	0.4	0.2	0.2	0.5	0.4	0.9	1.1	2.5	2.2	3.1	4.3	6.6	9.3	27.9	1.4	0.1	0.2	1.8	1.2	173
Breast	841	4	0.0	0.0	0.0	0.2	0.3	3.8	16.0	24.3	42.3	56.4	47.7	48.3	43.8	31.8	32.5	31.7	15.9	1.4	1.7	17.0	11.6	174
Uterus unspec.	29		0.0	0.0	0.0	0.0	0.0	0.5	0.2	1.2	0.8	1.4	2.2	0.6	5.2	0.0	0.0	1.3	0.5	0.1	0.1	0.6	0.4	179
Cervix uteri	1429	4	0.0	0.2	0.0	0.0	1.0	6.8	24.4	50.7	69.1	59.9	84.6	87.8	105.7	103.0	69.6	26.6	27.1	2.5	3.3	29.9	20.5	180
Placenta	34		0.0	0.0	0.0	0.0	1.5	1.4	1.7	0.7	0.3	0.7	0.9	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.5	0.3	181
Corpus uteri	88		0.0	0.0	0.0	0.0	0.3	0.5	0.7	1.4	3.6	4.6	7.6	7.5	5.2	7.7	6.2	1.3	1.7	0.2	0.2	2.0	1.3	182
Ovary etc.	220	1	0.0	0.7	0.2	1.7	1.7	4.4	2.4	3.9	8.6	8.8	9.9	13.8	14.6	12.0	15.5	3.8	4.2	0.4	0.5	4.5	3.1	183
Other female genital	15		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.7	0.0	1.9	3.4	1.1	1.5	1.3	0.3	0.0	0.0	0.4	0.3	184
Bladder	55		0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.9	0.8	0.7	0.9	3.1	5.2	6.6	18.6	17.7	1.0	0.1	0.2	1.5	1.0	188
Other urinary	52	1	0.5	0.0	0.0	0.2	0.2	0.2	0.4	0.5	1.1	1.1	4.5	3.8	6.9	7.7	3.1	2.5	1.0	0.1	0.1	1.3	0.9	189
. Eye	4		0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	190
Brain, nerv, system	81	1	1.9	1.2	0.4	0.6	0.3	0.5	2.2	1.6	1.7	2.5	2.7	1.3	3.4	7.7	3.1	6.3	1.5	0.1	0.2	1.7	1.2	191-2
Thyroid	342		0.0	0.0	0.2	1.7	4.6	6.1	7.3	7.9	10.6	13.8	21.1	15.0	16.3	12.0	17.0	10.1	6.5	0.5	0.7	6.6	4.5	193
Other endocrine	14		0.3	0.0	0.2	0.2	0.0	0.2	0.2	0.2	0.6	0.4	0.4	1.3	0.0	1.1	1.5	0.0	0.3	0.0	0.0	0.3	0.2	194
** Lymphosarcoma etc.	163		2.7	1.9	1.3	3.0	2.9	1.2	1.7	3.2	2.8	3.2	5.8	6.3	8.6	8.8	13.9	8.9	3.1	0.2	0.3	3.5	2.4	200
Hodgkin's disease																								201
Other reticuloses																								202
Multiple myeloma																								203
Lymphoid leukaemia																								204
Myeloid leukaemia																								205
Monocytic leukaemia																								206
Other leukaemia																								207
Leukaemia, cell unspec.																								208
*** Primary Site Uncertain	234	2	0.5	0.0	0.2	1.3	1.9	2.1	3.2	4.2	4.7	7.1	6.7	13.2	16.3	31.8	38.7	22.8	4.4	0.3	0.7	5.4	3.7	PSU
@ All sites	6501	52	7.5	4.5	4.4	11.5	18.8	36.4	82.8	136.2	197.5	249.3	331.9	419.4	554.1	660.5	718.1	551.3	123.1	10.3	17.2	147.9	101.2	ALL
# All sites but 173	6427	52	7.5	4.2	4.0	11.3	18.6	35.9	82.5	135.2	196.4	246.8	329.7	416.2	549.8	654.0	708.8	523.4	121.7	10.2	17.0	146.1	100.0	
## Rate from 1 case			0.268	0.236	0.221	0.819	0.171	0.174	0.187	0.232	0.279	0.353	0.450	0.627	0.859	1.095	1.548	1.267						

Notes to tables in ANNEX1 and ANNEX2
Patient number of rubrics 187. 1-187. 4(site : penis) also includes rubrics 187. 5-187. 9.
Patient number of rubrics 200 includes all patients from rubrics 200-208
PSU includes rubrics 159, 165, 195-199.
CR64 stands for cumulative incidence rate for the age span 0-64.
CR74 stands for cumulative incidence rate for the age span 0-74.
Rate from 1 case is the annual incidence per case per 100,000.

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