

Incidence and Survival of Cancer in Kangwha County (1983-1987)

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To measure incidence and survival rates of cancer in Kangwha County, 663 cancer patients registered in the Kangwha County Cancer Registry Program for the past 5 years (1983-1987) were analyzed. The average annual cancer incidence rate per 100,000 population was 183.0 in males and 99.5 in females. The common cancers were stomach (37.3%), lung (14.8%), and liver cancer (11.1%) in males and stomach (25.6%), cervix uteri (20.9%), and liver cancer (9.7%) in females. The median survival times of all cancer patients after diagnosis and onset of the first symptom were 8.4 ± 0.8 months and 15.0 ± 1.1 months respectively. Female cancer patients survived significantly longer than male cancer patients. The median survival times of the stomach, lung, and liver cancer in males were 7.7 ± 0.9 , 4.9 ± 0.9 , and 2.3 ± 0.4 months respectively. In females, the median survival times of the stomach and liver cancer patients were 9.2 ± 1.5 and 2.5 ± 0.5 months. The 5 year survival rate of cervical cancer was 67.1%. Those cancer patients who received anticancer therapy survived significantly longer than cancer patients without treatment.

Key Words: Cancer incidence rate, cancer survival rate, cancer registry

Since the early 1970s, mortality patterns of the Korean population have changed from infectious diseases to noninfectious diseases (Kim 1979). Among the noninfectious diseases, stroke and malignant neoplasms have been reported to be the leading causes of death (National Bureau of Statistics 1988).

Incidence rates are the fundamental tool for etiologic studies of both acute and chronic diseases because they are direct indicators of risk of diseases (Mausner and Kramer 1985). Survival of cancer patients provides very valuable information on the natural history of cancer and on the effectiveness of treatment method. Unfortunately, information on incidence and survival rates of cancers in Korea is rare and, if there is any, very inaccurate.

Incidence rates of malignant neoplasms are usually very difficult to obtain. Mortality statistics, therefore, are used for epidemiologic studies and inter-

national comparison due to their availability through the analysis of existing data collected routinely or administratively. Mortality statistics, however, are largely inaccurate and incomplete in Korea due to the poor registration system and undercoverage of medical care in the past. Information on cancer mortality is available based on vital registration and on hospital records. Among deaths officially registered in vital statistics, only 33.6% were diagnosed by medical doctors and the completeness of registration was about 80% on average (Kong *et al.* 1983).

Mortality statistics, therefore, can not delineate accurate pictures of mortality patterns of cancers in Koreans. Hospital data on cancer has many limitations due to undercoverage of medical care and suffers from problems of representativeness. Also, hospital statistics do not provide incidence rates.

In order to collect basic information on incidence and survival of cancer in the general population, a population-based cancer registry program was developed in Kangwha County in 1982 for the first time in Korea. The county-wide compulsory regional medical insurance program initiated by the government enabled us to implement the cancer registry program. Health insurance has largely removed the economic barrier of the people in medical care utilization and also under this program, medical utilization records

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are being completed in the offices of health insurance cooperatives in the form of the bill requested by the clinics and hospitals after they treat patients (Kim 1984).

The population-based cancer registry program in Kangwha County has already accumulated data for more than 5 years. The purpose of this study is to analyze the data accumulated and hopefully provide information on cancer incidence and survival in the Korean population. The specific objectives of this study are :1) To measure cancer incidence rates among the population in Kangwha County and 2) To measure survival rates of cancer patients diagnosed and registered in the Kangwha County Cancer Registry Program for five years (1983-1987).

METHODS

Target population

The entire population of 92,852 as of 1983 in Kangwha County was used for the study. Age structure of the target population is shown in Fig. 1. which dis-

closes a typical population structure of a rural area in Korea.

Identification of cancer

All cancers which belong from 140 to 208 in the 9th revision of the International Classification of Diseases (WHO 1977) and benign neoplasms of the brain are included in the Cancer Registry Program.

To identify cancer cases, 4 different data sources were examined. The main source of data examined was files kept in health insurance cooperatives for the insurance holders and in county government offices for the medical aid beneficiaries. We detected 1,179 suspected cases through these sources for the 5 years (Table 1). Secondly, we examined records kept by a hospital based central cancer registry at the National Medical Center. Even though the data at the central registry program was not complete, we double-checked any cancer patients from Kangwha County who were not detected through the above two sources of information. Through this channel we were able to find 47 more cancer cases for the 5 years. Thirdly, we examined hospital records in Kangwha

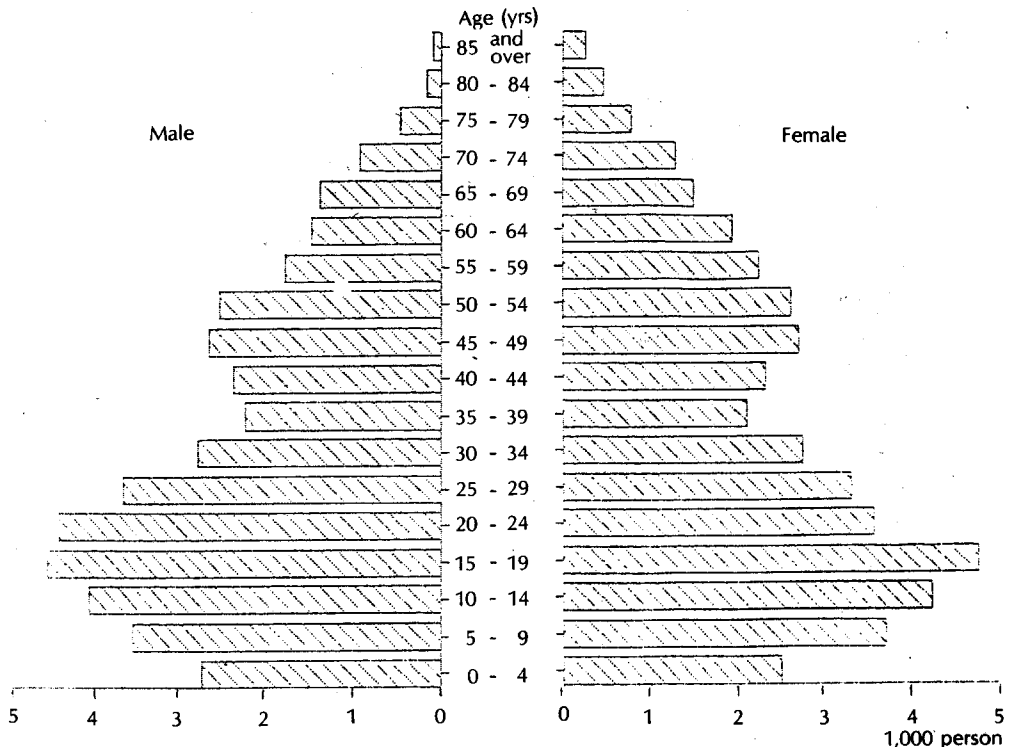


Fig. 1. Age structure of population in Kangwha County (1987).

Table 1. Proportion of confirmed cases among patients initially detected as having cancer by sources of data (1983-87)

Source of data	Confirmed	Not confirmed		Total
		Other diagnosis	No record	
Health insurance bill	584 (49.5)	575 (48.8)	29 (1.7)	1,179 (100.0)
Death registry	26 (33.8)	21 (27.3)	30 (39.0)	77 (100.0)
Kangwha hospital record	22 (100.0)	—	—	22 (100.0)
Hospital based central cancer registry	47 (100.0)	—	—	47 (100.0)
Total	679 (51.2)	596 (45.0)	50 (3.8)	1,325 (100.0)

Table 2. Cancer incidence rates by year, Kangwha County (1983-1987) unit: per 100,000

	Total	1983	1984	1985	1986	1987
No. of cancer patients registered	663	113	139	132	130	149
Population	88,307	92,852	90,197	88,367	86,926	83,685
Incidence rate	150.0	121.7	154.1	149.4	149.6	178.0
Adjusted incidence rate*	134.8	112.0	141.0	129.4	134.7	158.8

*Age-adjusted incidence rate using UICC's world population as the standard

Community Hospital, which is the only hospital in Kangwha County, to find any patients who were diagnosed as having cancer but not reported as cancer to the health insurance cooperatives. We were able to find 22 more cases through this channel. Finally, we examined all the death registries filed in 13 township offices in the County to detect any cancer deaths which were not previously detected by any method mentioned above. We found 77 suspected cancer deaths through this examination.

The diagnosis of cancer was confirmed by a team of a physician and a nurse with the medical records kept in the clinics and hospitals based on the diagnostic criteria recommended by WHO (WHO 1976). For this purpose, a trained nurse visited all the clinics and hospitals where diagnoses of cancer were made and reviewed medical records of patients who were reported as cancer cases.

Out of 1,179 suspected cancer cases obtained through the bills in the health insurance and medical aid program, only 584 cases (49.5%) were confirmed as cancer (Table 2). The forty-seven cases obtained from the hospital based central cancer registry and 22 cases identified in hospital records in Kangwha Community Hospital were all confirmed as cancer. To confirm the 77 cancer deaths detected in death registries, home visits were made to obtain information on the clinic or hospital where the diagnosis of cancer

was made. Through reviewing their medical records in the clinics and hospitals, 26 cases (33.8%) were finally confirmed as cancer.

The total number of cancer cases confirmed for the 5 years was 679. Sixteen cases were dropped because they were diagnosed before the cancer registry started, therefore, we finally confirmed 663 cancer cases for this study.

All the cancer cases registered were followed up by home visiting every 6 months by a nurse to collect data on survival, death and status of medical care.

Methods of analysis

Incidence rate: Cancer incidence rates were measured based on a population of 100,000 at each year. The numerator was cancer patients who were diagnosed and confirmed in each year and the denominator was the entire population in that year. All the incidence rates were adjusted using UICC's world population as the standard by the direct method (Waterhouse *et al.* 1976).

Survival rate: Survival rates were computed in two ways: after the diagnosis of cancer and after the onset of the first symptom related to the cancer. Survivals of registered cancer patients were followed up until May 1988. Survival analysis was done either by the Product-Limit method or Life table method using

the BMDP package program and testing for the equality of survival distributions for different groups was

done by the Mantel-Cox and Breslow tests.

Table 3. Cancer incidence rates by sex by year, Kangwha County (1983-1987) unit: per 100,000

Year	Male			Female		
	No. of patients	Incidence rate	Adjusted* incidence rate	No. of patients	Incidence rate	Adjusted* incidence rate
1983	68	143.9	141.9	45	98.7	89.7
1984	89	201.9	191.8	50	108.4	100.4
1985	86	199.3	192.6	46	101.7	82.1
1986	81	189.0	188.5	49	111.2	94.5
1987	81	197.0	190.7	68	159.7	138.8
Total	405	185.4	183.0	258	115.4	99.5

*Age-adjusted incidence rate using UICC's world population as the standard

Table 4. Cancer incidence rates by primary sites in males, Kangwha County (1983-1987)

Primary sites	Number	Percent	Incidence rate/100,000
Stomach	151	37.3	69.1
Lung	60	14.8	27.5
Liver	45	11.1	20.6
Esophagus	19	4.7	8.7
Rectum and anus	17	4.2	7.8
Colon	15	3.7	6.9
Leukemia	12	3.0	5.5
Brain*	10	2.5	4.1
Urinary bladder	9	2.2	4.1
Pancreas	7	1.7	2.7
Larynx	6	1.5	2.7
Lymphoid tissue	6	1.5	2.7
Gall bladder	5	1.2	2.3
Thyroid gland	3	0.7	1.4
Tongue	3	0.7	1.4
Prostate	3	0.7	1.4
Penis	3	0.7	1.4
Major salivary gland	2	0.5	1.0
Gingiva	2	0.5	1.0
Retroperitoneum	2	0.5	1.0
Kidney and urethra	2	0.5	1.0
Nasopharynx	2	0.5	1.0
Skin	2	0.5	1.0
Other sites*	8	2.0	(3.7)
Unknown primary sites	11	2.7	(3.5)
Total	405	100.0	185.4

* Floor of mouth 1, Unspecified part of mouth 1, Nasal cavity 1, Abdominal cavity 1, Small intestine 1, Pleura 1, Testis 1, Multiple myeloma 1.

+ Includes benign neoplasms

RESULTS

Incidence rates

The total number of registered cancer patients from January 1, 1983 to December 31, 1987 was 663 and the average age-adjusted annual cancer incidence rate per 100,000 population was 134.8 (Table 2). Sex specific cancer incidence rates by year are shown in table 3. The average age-adjusted annual cancer incidence rate per 100,000 population was 183.0 in males and 99.5 in females. Table 4 shows cancer incidence rates by primary sites in males. The common cancers in male were stomach cancer (37.3%), lung cancer (14.8%) and liver cancer (11.1%). In females, stomach cancer was also the most common cancer (25.6%). Cancer of the cervix uteri (20.9%) and liver cancer (9.7%) were the next most common cancers (Table 5).

Age specific cancer incidence rates increased with increasing age and the highest rate was shown in the age between 60 and 64 years in both sexes (Table 6). Table 7 shows age specific cancer incidence rates for stomach, lung and liver cancer in males. The age

specific cancer incidence rates for the 3 common cancers showed the highest peak at the age between 60 and 64 years. In females, the stomach cancer incidence rate was highest between 70 and 74 years of age and cervical cancer was highest at the age between 35 and 39 years (Table 8).

Age-adjusted incidence rates of stomach, lung and liver cancer per 100,000 population were 67.7, 26.8 and 19.7 in males and 22.8, 4.3 and 9.1 in females respectively. The rate of cervical cancer was 22.5 (Table 7,8).

Survival analysis

Among 663 cases registered for the 5 years, we were able to follow up 658 cases (99.2%) and 5 cases were lost due to migration to other areas. As of May 1988, 459 cases had already expired and 199 cases were still alive. We used 658 cases for the survival analysis.

The survival curve of all cancer cases after the diagnosis is shown in Fig. 2 with the median survival time 8.4 ± 0.8 (standard error) months. Median survival time of all cancer cases after onset of the first symptom was estimated to be 15.0 ± 1.1 months (Fig. 3).

Table 5. Cancer incidence rates by primary sites in females, Kangwha County (1983-1987)

Primary Sites	Number	Percent	Incidence rate/100,000
Stomach	66	25.6	29.5
Cervix uteri	54	20.9	24.2
Liver	25	9.7	11.2
Thyroid gland	15	5.8	6.7
Breast	13	5.0	5.8
Lung	11	4.3	4.9
Colon	10	3.9	4.5
Rectum and anus	8	3.1	3.6
Pancreas	8	3.1	3.6
Ovary	6	2.3	2.7
Leukemia	6	2.3	2.7
Brain*	6	2.3	2.7
Gall bladder	5	1.9	2.3
Urinary bladder	4	1.6	1.8
Lymphoid tissue	3	1.2	1.4
Esophagus	2	0.8	0.9
Nasal cavities and accessory sinuses	2	0.8	0.9
Other sites*	8	3.1	(3.6)
Unknown primary sites	6	2.3	(2.7)
Total	258	100.0	115.4

* Tongue 1, Hypopharynx 1, Major salivary glands 1, Small intestine 1. Pleura 1, Vagina 1, Kidney 1, Multiple myeloma 1.

+ Includes benign neoplasms

Table 6. Sex and age specific cancer incidence rates, Kangwha County (1983-1987)

unit: per 100,000

Age (years)	Male		Female	
	Number	Rate*	Number	Rate*
0 - 4	2	1.7	0	0.0
5 - 9	1	0.6	2	1.0
10-14	1	0.4	2	0.8
15-19	3	1.1	1	0.4
20-24	2	0.7	7	3.0
25-29	2	0.8	14	6.4
30-34	5	2.1	7	2.9
35-39	6	3.2	20	10.8
40-44	14	7.0	16	7.9
45-49	38	16.8	26	11.0
50-54	63	24.3	30	10.9
55-59	66	29.1	30	10.2
60-64	77	40.8	30	11.8
65-69	65	27.4	26	9.9
70-74	34	14.3	25	7.4
75-79	19	8.0	19	4.7
80-84	6	3.5	3	0.6
85 and over	1	1.2	0	0.0
Total	405	183.0	258	90.1

* Age-adjusted incidence rate using UICC's world population as the standard

Survival of female cancer patients was significantly longer than that of males (Fig. 4). Median survival time of female cancer patients was 13.8 ± 3.2 months and that of male cancer patients was 6.4 ± 0.8 months. Survival distributions of stomach, lung and liver cancers between the two sexes showed no difference (Table 9).

Survival of treated cases was significantly longer than that of untreated cases (Fig. 5). The median survival time of the treated group was 13.9 ± 2.2 months and that of the untreated group was 4.4 ± 0.6 months. The survival of lung, liver and cervical cancer cases did not show significant differences between treated and untreated groups (Table 10). But the survival of stomach cancer showed significant difference according to the history of treatment. Median survival time was 10.9 ± 1.3 months for the treated group and 5.4 ± 0.8 months for the untreated group. Survivals of common cancers were compared in males. As shown in Fig. 6, the median survival times of stomach, lung and liver cancer cases were 7.7 ± 0.9 , 4.9 ± 0.9 and 2.3 ± 0.4 months respectively. In females, the median survival times of stomach and liver cancers were 9.2 ± 1.5 and 2.5 ± 0.5 months (Fig. 7). But the survival time of cervical cancer cases was relatively long and the 5 year survival rate of cervical cancer patients was 67.1%.

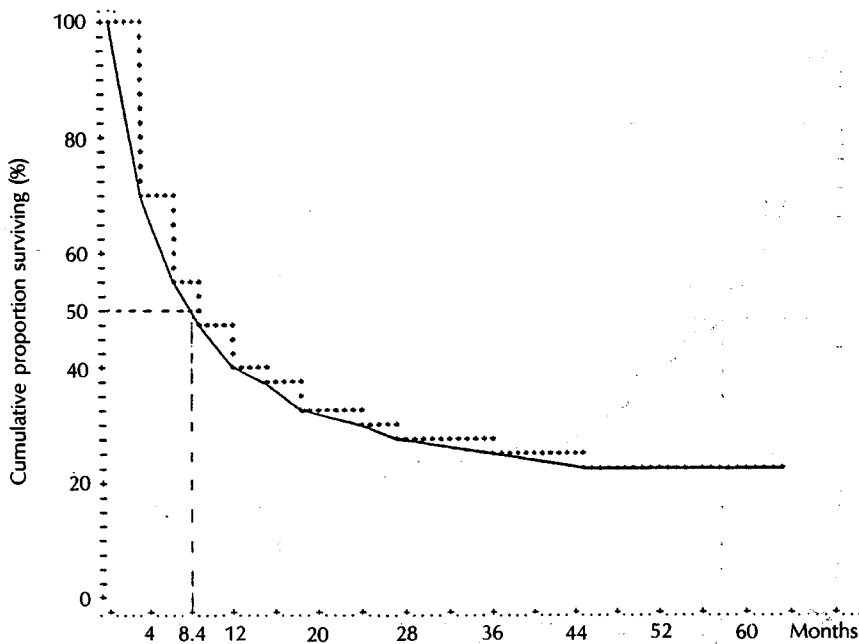
**Fig. 2. Survival time of cancer patients after diagnosis, Kangwha County**

Table 7. Age specific cancer incidence rates for 5 years in selected sites in males, Kangwha County

unit: per 100,000

Age (years)	Population	Stomach Ca		Lung Ca		Liver Ca	
		No.	Rate*	No.	Rate*	No.	Rate*
0 - 4	2805	—	—	—	—	—	—
5 - 9	3667	—	—	—	—	—	—
10-14	4228	—	—	—	—	—	—
15-19	4746	—	—	—	—	—	—
20-24	4616	—	—	—	—	—	—
25-29	3797	1	2.1	—	—	—	—
30-34	2847	1	2.1	—	—	—	—
35-39	2286	2	5.3	—	—	1	2.6
40-44	2416	5	12.4	1	2.5	2	5.0
45-49	2718	14	30.9	3	6.6	5	11.0
50-54	2589	22	42.5	11	21.2	7	13.5
55-59	1813	30	66.2	11	24.3	9	19.9
60-64	1510	27	71.5	13	34.4	10	26.5
65-69	1423	22	46.4	11	23.2	8	16.9
70-74	949	13	27.4	5	10.5	3	3.2
75-79	475	11	23.2	4	8.4	—	—
80-84	173	3	8.7	1	2.9	—	—
85 and over	86	—	—	—	—	—	—
Total	43,144	151	338.6 (67.7)**	60	134.1 (26.8)**	45	98.5 (19.7)**

*: Age-adjusted incidence rate for 5 years

**: Age-adjusted incidence rate

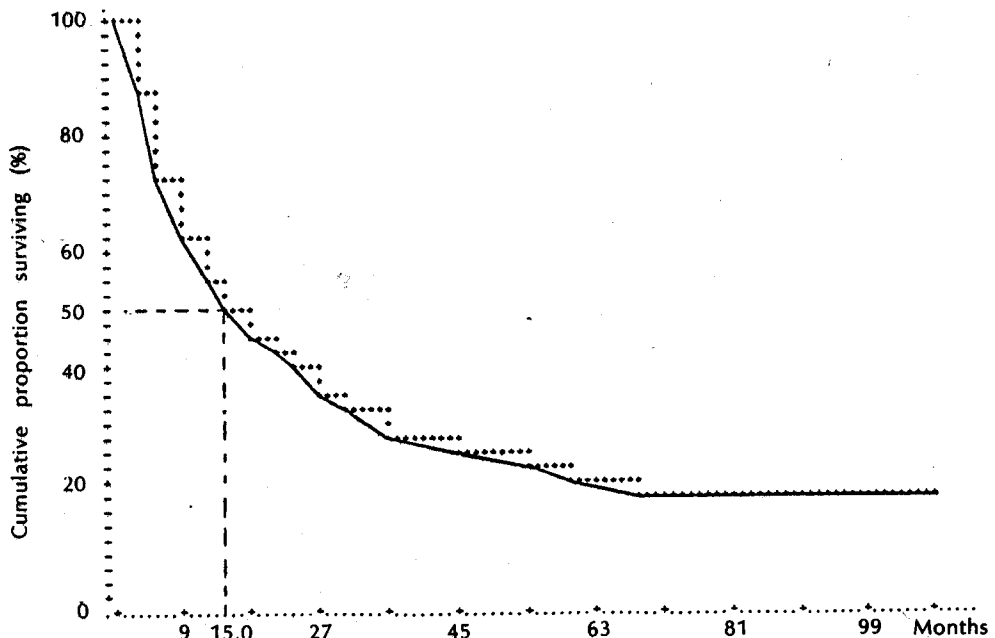


Fig. 3. Survival time of cancer patients after onset of symptoms, Kangwha County

Table 8. Age specific cancer incidence rates for 5 years in selected sites in females, Kangwha County

unit: per 100,000

Age (year)	Population	Stomach Ca		Lung Ca		Liver Ca		Cervix Ca	
		No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
0 - 4	2623	—	—	—	—	—	—	—	—
5 - 9	3889	—	—	—	—	—	—	—	—
10-14	4432	—	—	—	—	—	—	—	—
15-19	4975	—	—	—	—	—	—	—	—
20-24	3753	2	4.3	—	—	—	—	—	—
25-29	3482	3	6.9	—	—	—	—	4	9.2
30-34	2894	3	6.2	—	—	1	2.1	1	2.1
35-39	2216	2	5.4	1	2.7	1	2.7	8	21.7
40-44	2442	3	4.4	2	4.9	—	—	5	12.3
45-49	2849	4	8.4	—	—	3	6.3	7	14.7
50-54	2759	4	7.3	—	—	3	5.4	9	16.3
55-59	2352	8	13.6	—	—	4	6.8	9	15.3
60-64	2035	6	11.8	5	9.8	7	13.8	7	13.8
65-69	1583	7	13.3	—	—	—	—	3	5.7
70-74	1357	13	19.2	1	1.5	4	5.9	1	1.5
75-79	814	9	11.1	1	1.2	2	2.5	—	—
80-84	497	2	2.0	1	1.0	—	—	—	—
85 and over	271	—	—	—	—	—	—	—	—
Total	45,223	66	113.8 (22.8)**	11	21.2 (4.3)**	25	45.5 (9.1)**	54	112.5 (22.5)**

*: Age-adjusted incidence rate for 5 years

**: Age-adjusted incidence rate

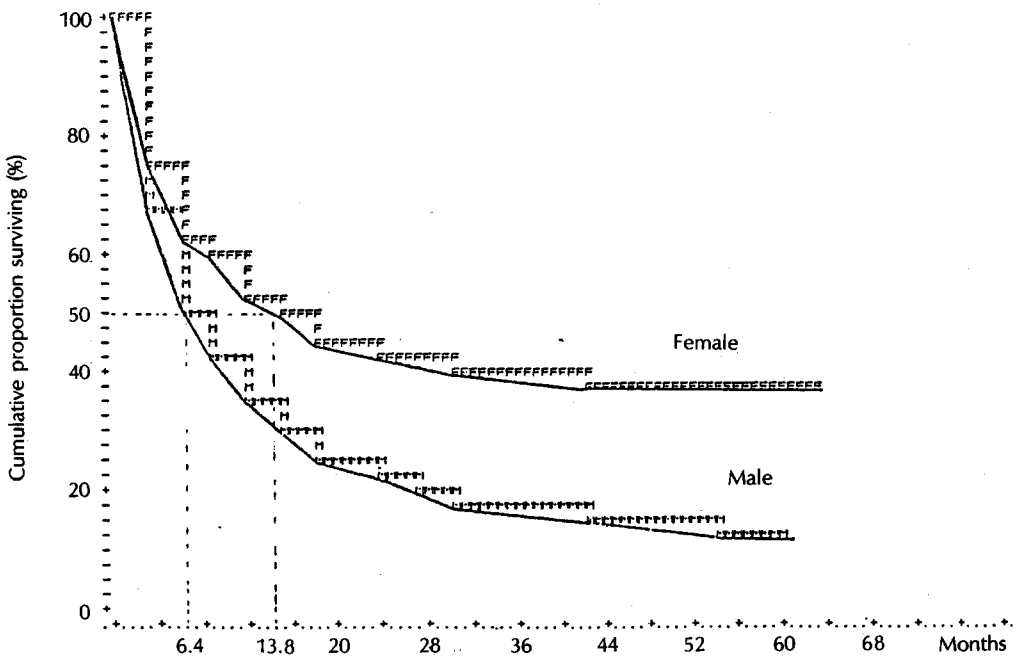
**Fig. 4. Survival time of cancer patients after diagnosis by sex, Kangwha County**

Table 9. Comparison of survival of cancer patients after diagnosis by sex

Cancer	Quantile*	Male	Female	Generalized Wilcoxon test (p value)
		Survival months \pm S.E.	Survival months \pm S.E.	
Stomach		(N=151)	(N=66)	0.82
	75th	2.8 \pm 0.4	3.3 \pm 0.7	
	50th	7.7 \pm 0.9	9.2 \pm 1.5	
Lung	25th	21.5 \pm 3.7	22.9 \pm 3.3	0.54
		(N=60)	(N=11)	
	75th	2.1 \pm 0.5	1.2 \pm 0.6	
Liver	50th	4.9 \pm 0.9	2.4 \pm 0.7	0.51
	25th	10.5 \pm 1.6	11.8 \pm 3.2	
		(N=45)	(N=25)	
	75th	1.2 \pm 0.3	1.3 \pm 0.4	0.51
	50th	2.3 \pm 0.4	2.5 \pm 0.5	
	25th	4.7 \pm 1.1	5.8 \pm 1.6	

* Times of which 75%, 50% or 25% of the patients are alive.

S.E.: Standard error

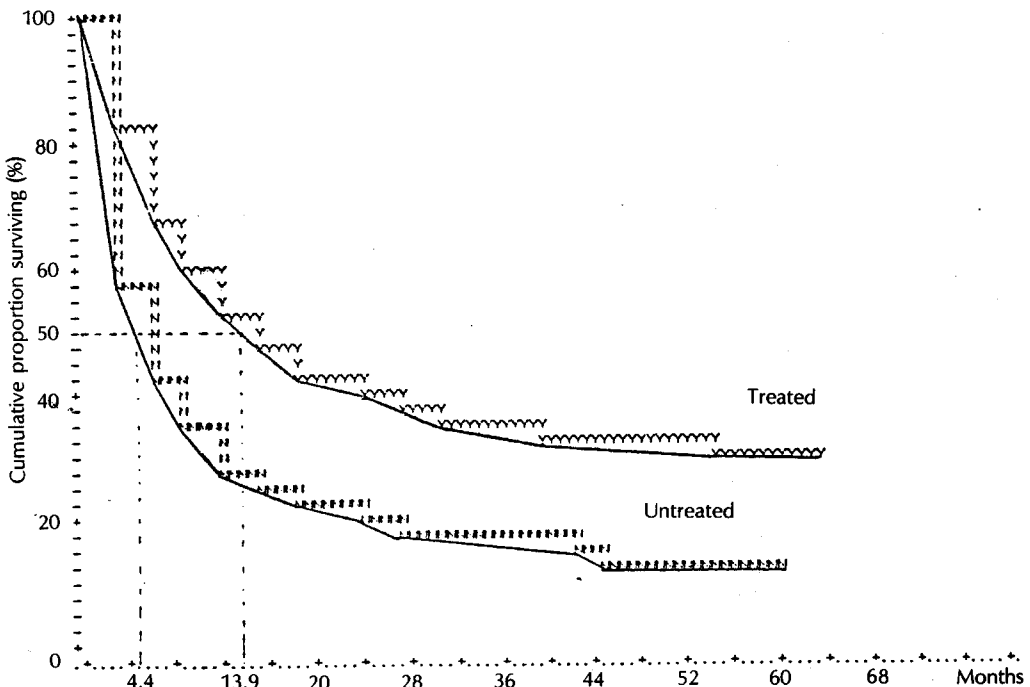


Fig. 5. Survival time of cancer patients after diagnosis according to the history of treatment, Kangwha County

Treatment of cancer patients

Among 663 cancer patients, 356 patients (53.7%) received some form of anticancer therapy in clinics or hospitals. Surgical operations were performed in

232 patients (35.0%). Chemotherapy was administered to 162 patients (24.4%) and 75 patients (11.3%) received radiotherapy. But 307 patients (46.3%) did not receive any form of treatment (Table 11).

Table 10. Comparison of survival of cancer patients after diagnosis according to the history of treatment

Cancer	Quantile*	Treated	Untreated	Generalized Wilcoxon test (p value)
		Survival months \pm S.E.	Survival months \pm S.E.	
Stomach		(N=102)	(N=115)	0.01
	75th	4.9 \pm 0.7	2.0 \pm 0.3	
	50th	10.7 \pm 1.3	5.4 \pm 0.8	
Lung		(N=35)	(N=36)	0.82
	75th	1.9 \pm 0.6	1.8 \pm 0.5	
	50th	4.5 \pm 1.3	4.5 \pm 1.5	
Liver		(N=19)	(N=51)	0.78
	75th	1.2 \pm 0.5	1.2 \pm 0.3	
	50th	2.4 \pm 0.5	2.4 \pm 0.3	
Cervix		(N=36)	(N=18)	0.36
	75th	4.1 \pm 0.9	6.1 \pm 2.2	
	75th	25.3 \pm 4.6	7.5 \pm 5.5	

* Times at which 75%, 50% or 25% of the patients are alive.

S.E.: Standard error

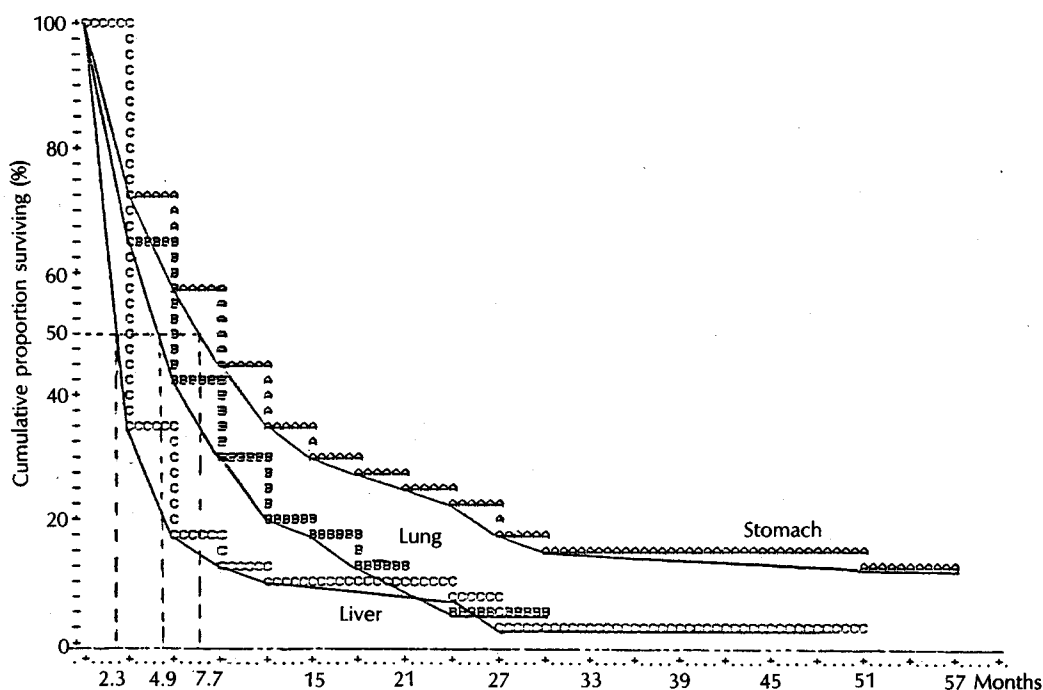


Fig. 6. Survival time of stomach, lung and liver cancer patients after diagnosis in males, Kangwha County

DISCUSSION

By reviewing medical records of initially detected

cancer cases, the rate of confirmation was only 49.5%. This means that the diagnosis reported to the health insurance cooperatives for the purpose of billing is rather the initial diagnosis and not necessarily the fi-

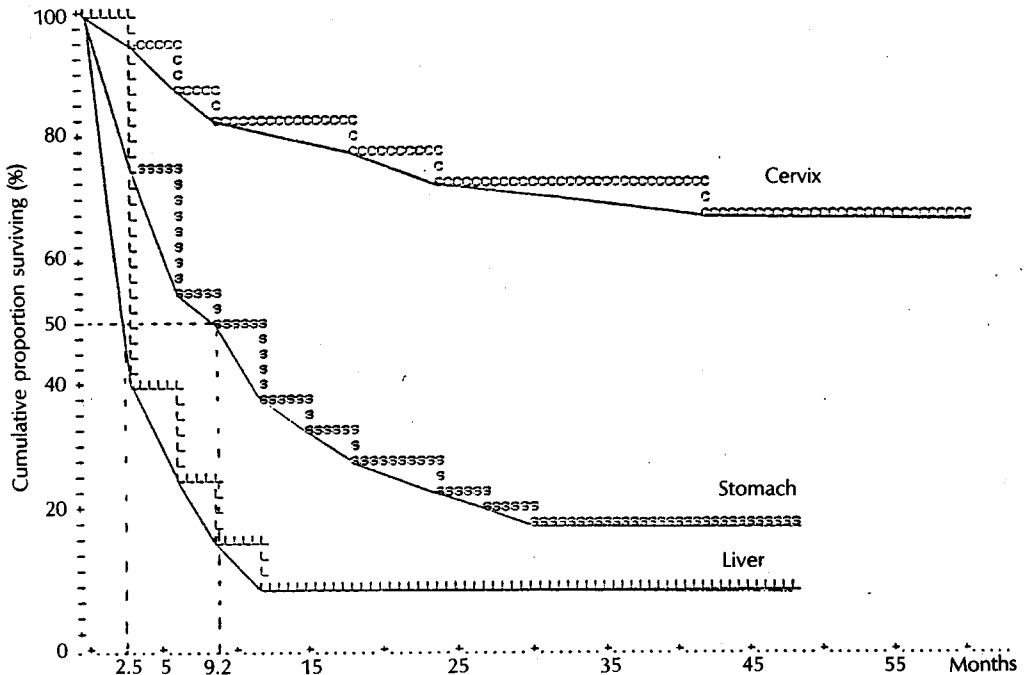


Fig. 7. Survival time of cervix, stomach and liver cancer patients after diagnosis in females, Kangwha County

Table 11. Methods of treatment in cancer patients

Treatment	No.	(%)
Treated	356	(53.7)
Surgical operation only (A)	155	(23.4)
Anticancer drug only (B)	78	(11.8)
Radiotherapy only (C)	25	(3.8)
A+B	48	(7.2)
A+C	14	(2.1)
A+B+C	21	(3.2)
B+C	15	(2.3)
Not treated	307	(46.3)
Total	663	(100.0)

nal diagnosis in medical records.

Even though the cancer incidence rate in males appears to be stable and in females the rate seems to be increased during the 5 years, a longer period of observation may be needed for a valid statement because five years is not long enough to see trends in cancer incidence.

In other studies on cancer incidence in Korea using hospital cases (Lee 1988; Yoo 1988; Central Cancer Registry, The National Medical Center 1986; Kim

1982), the most common cancer in females was reported as cervical cancer. But in our study, the incidence rate of stomach cancer was higher than that of cervical cancer. In the study analyzing cancer mortality among Koreans (Kim 1988), the most common cause of death due to cancer was stomach cancer in both sexes. The primary reason for this discrepancy in findings may be due to the relatively long survival rate of cervical cancer. These cases, therefore, have more chance to visit doctors and to be diagnosed.

Compared with the cancer incidence rates of all sites in other countries, the rate in Kangwha County was very low, belonging to the 10 countries with the lowest cancer incidence rates. In females, the cancer incidence rate was also among the lowest in the world (Table 12, 13). Even though the cancer incidence rate of all sites was very low, the stomach, liver and cervical cancer incidence rates were very high, belonging to the 10 countries with the highest cancer incidence rates in the world. But the incidence rate of lung cancer was among the lowest countries (Muir *et al.* 1987).

Age-specific cancer incidence rates increase up to the age of 65 years and decline thereafter. This may be due to underutilization of medical care by people over the age of 65 years since older people in Korea still tend to regard their sickness as a process of se-

Table 12. Ten countries with the lowest cancer incidence rates for males

Cancer incidence rate per 100,000	Country
92-145	India
143	Philippines
183	Korea (Kangwha)
117-249	Israel
176-196	Romania
121-283	Singapore
207	Netherlands
180-247	China
221	Martinique
230	Iceland

Source: IARC: Cancer Incidence in Five Continents, Volume 5, 1987

Table 13. Ten countries with the lowest cancer incidence rates for females

Cancer incidence rate per 100,000	Country
100	Korea (Kangwha)
75-148	Kuwait
109-146	India
138	Philippines
132-153	Romania
114-183	Singapore
145-156	China
135-170	Japan
155	Netherlands
142-172	Spain

Source: IARC: Cancer Incidence in Five Continents, Volume 5, 1987

Table 14. Cancer incidence rates among Koreans in Kangwha and Koreans in L.A.

Primary site	Male		Female	
	Kangwha	Koreans* in L.A.	Kangwha	Koreans* in L.A.
All site	183.0	196.5	99.5	129.9
Stomach	67.7	44.8	22.8	18.6
Liver	19.7	15.8	9.1	5.7
Lung	26.8	34.7	4.3	10.5
Cervix	—	—	22.5	17.5

* IARC: Cancer Incidence in Five Continents, Volume 5, 1987

nility and usually do not seek medical care.

The incidence rates of cancer in Kangwha County were compared with the Koreans in Los Angeles (Table 13). The cancer incidence rate of all sites in Koreans in Los Angeles was somewhat higher than those in Kangwha County of both sexes. The stomach, liver and cervical cancer incidence rates, however, were higher in Kangwha County than those in Koreans in Los Angeles. But the lung cancer incidence rate was much higher in Koreans in Los Angeles than those in Kangwha County. In this comparison, the high lung cancer incidence rate in Koreans in Los Angeles may reflect a higher smoking rate in Koreans in Los Angeles than that in the people in Kangwha County in the past. And the low stomach and liver cancer rates among Koreans in Los Angeles may be due to changes in environmental factors, such as dietary patterns.

The median survival time of all cases was 8.4 months after diagnosis and was 15.0 months after onset of symptoms. This implies that it takes 6.6 months on average for cancer to be diagnosed after onset of

symptoms. The significant difference of survival between sexes is mainly due to the long survival of cervical cancer patients in females because the survival rates of the stomach, lung and liver cancers did not show any difference in both sexes.

The survival rate of the treated group was higher than that of the untreated group. However, it is difficult to say that the results are the effect of treatment since all the cancers were not detected at the same stage.

One weak point of the Kangwha County Cancer Registry Program is that the size of target population is not large enough to show stable rates, but can be compensated with a long observation period. Almost complete detection of cancer cases and fairly complete follow-up by home visiting can be strong points of this program.

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