

Tumor Registry 2008-2009
Hospital Based Report, Khon Kaen Hospital

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Preface

This report from the tumor registry for 2008-2009 includes all patients with newly diagnosed cancers between 1 January 2008 and 1 January 2010 (two years period) and follows up data for this patient group up to 1st May 2010. We have used the experience gained from preparing the previous report to improve (Tumor Registry 2007) to improve the analysis and presentation of data in this one. More patients are included and a more rigorous process of verifying the data and checking them for completeness has been applied. We have also added more detail about each treatment modality used, and death rates.

We would like to thank Dr. Wattanachai Susaengrat, director of the Cancer Board Committee, and Dr. Werapan Supanchaimat, director of the Khon Kaen hospital, for the great support and encouragement they have given us to maintain the registry and prepare this report. We would also like to thank Professor Robert Mills for editing the English language translation of this report.

We hope the report will prove to be a useful tool to develop the tumor information system of the hospital and facilitate research involving cancer patients. Finally, we hope that the lessons learned from this report all will lead to improvements in all aspects of cancer services, including treatment, rehabilitation and disease prevention to the benefit of all Thai people.

The Editor
July 10th, 2010

Introduction

Khon kaen hospital is one of regional hospitals of the Ministry of Public Health with 867 beds services. It is a referral hospital for all district hospitals in Khon Kaen Province and those nearby (Mahasarakam, Roi et, Kalasin and Chaiyapum) Approximately 845,178 patients attended the out patients departments, and 69,710 patients for in patients departments in 2009. Cancer is one of the top five most common diseases treated at the hospital.

Method

1. Data from newly diagnosed cancer patients were collected between 1 January 2008 and 1 January 2010 (two years). Data were gathered from patients' records, pathology reports and some departments' records. Quality assurance was achieved by rechecking the data for accuracy and completeness. The patients' records were examined to obtain information about follow up and the result of their treatment using both paper based records and electronic hospital data bases. New data was entered regularly and when a significant new event occurred. All the information obtained was analysed.
2. Information about patient deaths was sought from both hospital records and using the linked-identification number of the Ministry of the Interior from first diagnosis to the first of May 2010.

Data analysis

The patients' demographic data, tumor characteristics, geographical data, tumor type classified according to ICD-O (International Classification of Diseases for Oncology), details of treatment and outcomes, including follow up status and deaths were analysed.

Results

Number and distribution of patients according to geographical location

The majority of patients came from Khon Kaen Province (66%). Table One shows the numbers of patients coming from Khon Kaen province and the surrounding provinces in rank order. Khon-kaen Hospital is the local referral centre for Chaiyaphum, Maha Salakam, Kalasin and Roi-et Provinces. A proportion of patients with cancer from the other provinces on the list will have been treated at Udon Thani. There was a small increase (172) in the number of cases treated in 2009, as compared to 2008 and this was due to an increase in the number of patients coming from outside Khon Kaen Province. In fact there was a small drop in the number of patients from Khon Kaen itself (60 patients). However, overall there has been little change between 2008 and 2009.

Table 1: Number and distribution of patients by their home province

Province	Number of cases in 2008 N (%)	Number of cases in 2009 N(%)
Khon Kaen	1588 (66.1)	1528 (59.4)
Chaiyaphum	186 (7.7)	240 (9.3)
Maha Salakam	187 (7.8)	211 (8.2)
Kalasin	140 (5.8)	192 (7.5)
Roi et	121 (5.0)	162 (6.3)
Loei	64 (2.7)	36 (1.4)
Sakhon Nakhon	33 (1.4)	39 (1.5)
Nong Kai	16 (0.7)	20 (0.8)
Phetchabun	12 (0.5)	19 (0.7)
Udon Thani	10 (0.4)	14 (0.5)
Other provinces	45 (1.9)	113 (4.4)
All	2402 (100)	2574 (100)

Figure One shows a map of Khon Kaen Province with the numbers of patients coming from each district. There has been hardly any variation in the numbers from each district between the two years. These data are also presented in the form of a pie chart in Figure Two. The largest number of patients came from the Southern and Western Districts (32 and 30 % respectively) while the smallest proportion came from the North (17 %).

Figure 1: Number and distribution of patients by their home district

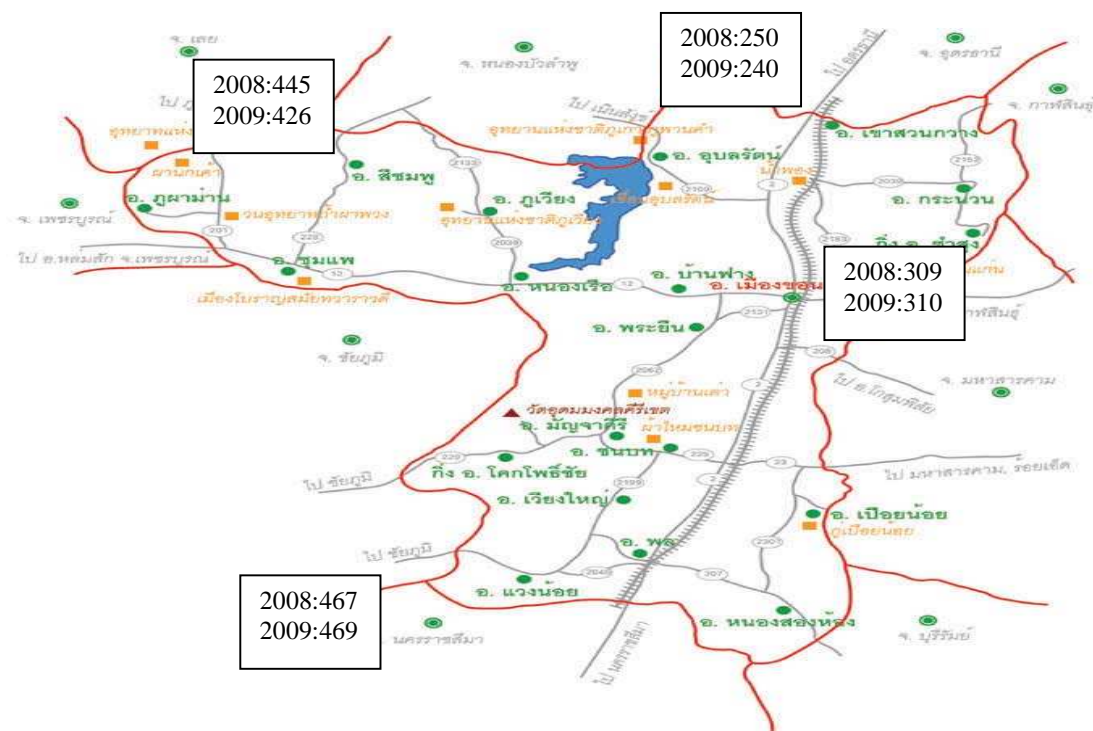
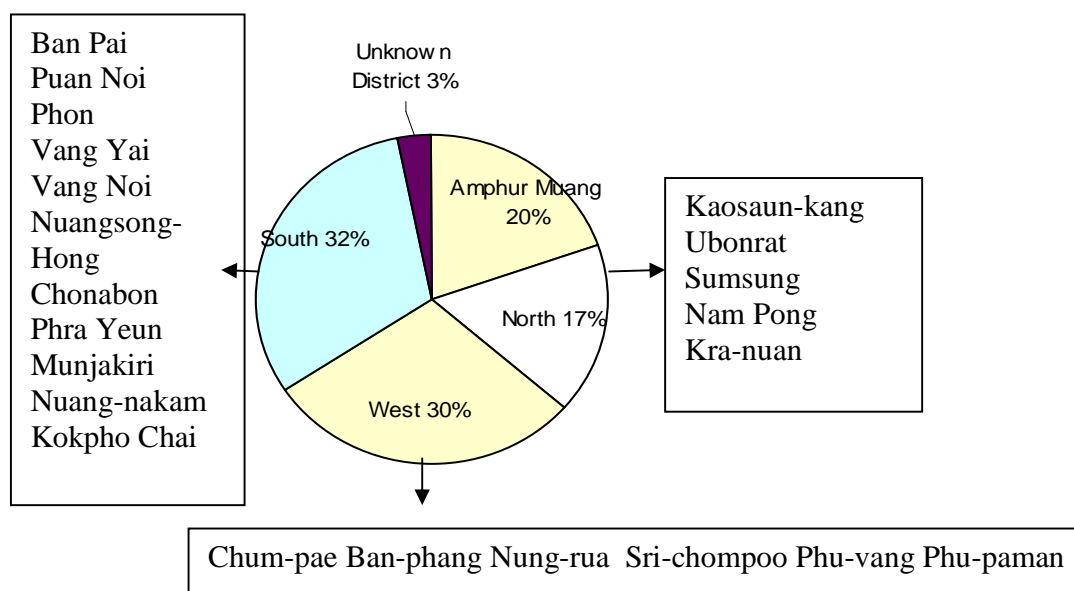


Figure 2: Proportion of patients from each district within Khon Kaen Province



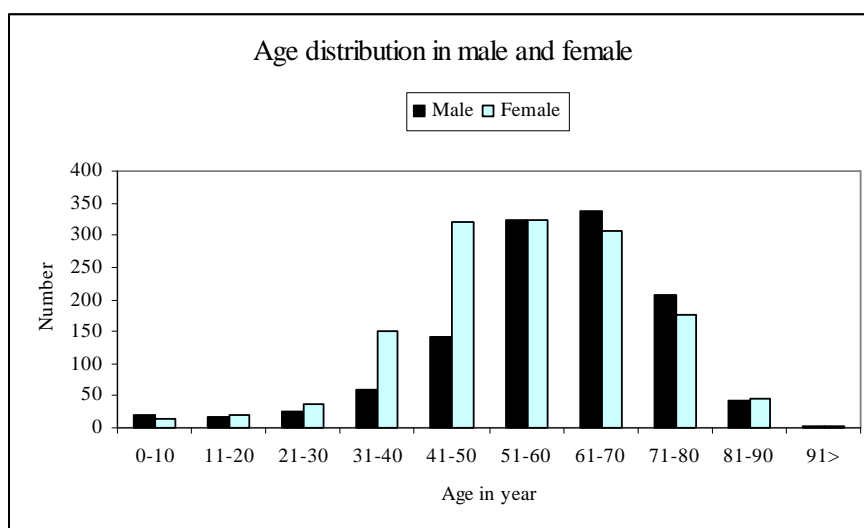
Tumor Registry 2009

1. Number and distribution of patients according to age and sex

In 2009, the total number of patients was 2574. There were 6 patients who were counted twice because they had two non-related tumors at different sites and different times for which they received different treatment (for example: nasopharynx and breast, rectum and limb)

The male to female ratio was 1:1.2 or 1180 (45.8%): 1394 (54.2%) The average age of the patients was 56.7 (standard deviation was 15.5) years (range 2 months -102 years). The majority of patients were in the age range 50 to 70 years. There was no difference between the proportions of males and females in most age group, but in the third and fourth decades of life females predominated.

Figure 3: Age distribution in males and females



	Topography/Age range	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	All
340-349	Lung-bronchus	0	1	3	7	27	67	86	53	5	1	250
379-379	Thymus	0	0	0	0	0	1	0	0	0	0	1
380-388	Heart-mediastinum	0	2	1	1	2	0	1	0	0	0	7
390-399	Other parts in respiratory	0	0	0	0	0	0	0	0	0	0	0
400-409	Limbs bone	0	2	0	0	1	0	0	0	0	0	3
410-419	Other bone-joint	0	0	0	1	1	1	0	1	0	0	4
420-424	Bone marrow*	22	21	12	23	28	40	37	16	2	0	201
440-449	Skin	1	0	1	3	6	18	32	20	4	1	86
470-479	Peripheral nerve, ANS	0	0	0	0	0	0	0	0	0	0	0
480-488	Retroperitoneum	0	0	0	1	0	0	0	0	0	0	1
490-499	Connective,subcutaneous	0	1	1	4	1	2	0	2	1	0	12
500-509	Breast	0	1	5	24	81	57	41	12	4	0	225
510-529	Vulva-vagina	0	0	0	0	2	1	2	1	0	0	6
530-539	Cervix	0	1	11	66	102	64	26	16	4	0	290
540-559	Uterus	0	0	0	3	9	12	15	5	0	0	44
569-569	Ovary	2	2	1	7	18	16	14	4	1	0	65
570-579	Other parts in female genital organs	0	0	0	0	0	0	0	0	0	0	0
589-589	Placenta	0	0	1	0	0	1	0	0	0	0	2
600-609	Penis	0	0	1	0	3	4	4	7	0	0	19
619-619	Prostate	0	0	0	0	1	2	12	7	7	0	29
620-629	Testis	0	0	0	2	0	1	0	0	0	0	3
630-639	Other parts in male genital organs	0	0	0	0	0	1	0	0	0	0	1
649-659	Kidney	3	0	2	0	2	6	4	1	1	0	19
669-669	Ureter	0	0	0	0	0	0	0	0	0	0	0
670-679	Bladder	0	0	0	0	3	11	16	12	0	1	43
680-689	Other parts in urinary Tract organs	0	0	0	0	0	0	0	0	0	0	0
690-699	Eye-adnexa	0	0	0	1	0	1	1	0	0	0	3
710-719	Brain-meniges	2	2	0	2	3	2	2	2	0	0	15
720-729	Spinal cord	0	0	0	0	0	0	0	0	0	0	0
739-739	Thyroid	0	1	4	3	10	8	3	0	0	0	29
740-749	Adrenal gland	1	0	0	1	2	0	0	0	0	0	4

	Topography/Age range	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	All
750-759	Other endocrine glands	0	0	0	0	0	0	0	0	0	0	0
760-768	Ill-defined sites	0	0	0	0	0	0	0	0	0	0	0
770-779	Lymph node**	4	3	8	11	10	35	25	18	3	0	117
809-809	Unknown Primary	0	0	2	3	8	29	21	18	3	0	84
	All	35	38	63	208	461	646	644	384	89	6	2574

* Bone marrow (leukemia) is majority of cancer in hematopoietic and reticuloendothelial

** Lymphoma was classified in Lymph node group(according to ICD-O classification)

3. The most common cancers

Table Three shows the fifteen most common cancers in both sexes. Overall the most common cancer was cholangiocarcinoma, but in females carcinomas of the breast and cervix were more common.

Table 3: The fifteen most common cancers in both sexes

Order	Male	Female	Both sexes
1	Cholangiocarcinoma	Cervix	Cholangiocarcinoma
2	Lung-Bronchus	Breast	Cervix
3	Colon-Rectum	Cholangiocarcinoma	Lung-Bronchus
4	Bone marrow	Colon-Rectum	Breast
5	Liver	Bone marrow	Colon-Rectum
6	Lymph node	Lung-Bronchus	Bone marrow
7	Unknown Primary	Ovary	Liver
8	Skin	Oral cavity	Lymph node
9	Bladder	Lymph node	Oral cavity
10	Oral cavity*	Uterus	Skin
11	Stomach	Skin	Unknown Primary
12	Prostate	Liver	Ovary
13	Nasopharynx	Unknown Primary	Stomach
14	Penis	Stomach	Uterus
15	Esophagus	Thyroid	Bladder

*(ICD-O code from Lip, Tongue, Gum and Floor of mouth were included in Oral cavity)

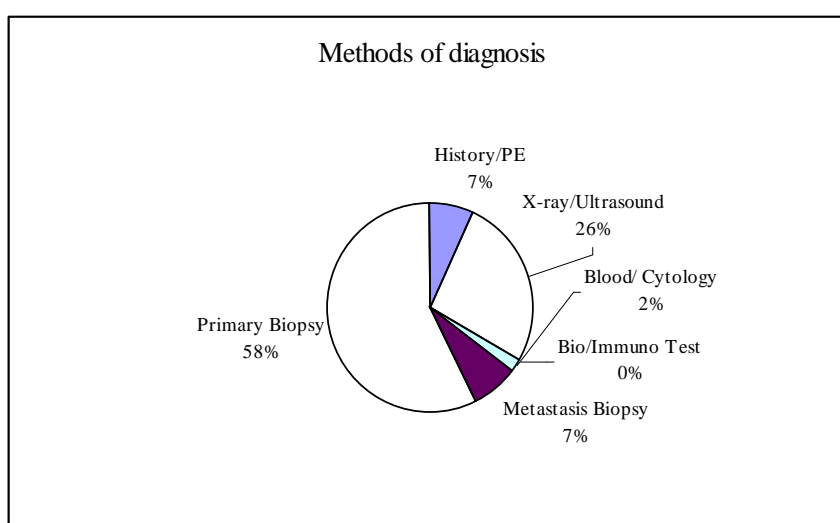
4. Method of Diagnosis

Table Four and Figure Four show the methods by which tumors were diagnosed. Tumor diagnosis was made by biopsy only 65% of cases. This is because the most common tumor (cholangiocarcinoma) is not readily accessible for biopsy. Ultra-sound diagnosis is an acceptable method for advanced and aggressive tumors.

Table 4: Methods of diagnosis* (N =2574)

Method	History Physical Exam.	Radiographic Ultrasound	Biochem/ Immuno. Test	Blood/ Cytology	Metastasis Biopsy	Primary Biopsy
Number (%)	179 (7.0)	679 (26.4)	0	51 (2.0)	187 (7.3)	1478 (57.4)

*There were no autopsy/death certificates for diagnosis of cancer in the study

Figure 4: Methods of diagnosis

5. Characteristics of Tumors

The majority of tumors were invasive at the time of diagnosis, with only 4.5% being in situ (Table Five and Figure Five).

Table 5: Behavior of cancers (N=2574)

Behavior	Uncertain	In situ	Malignant
Number (%)	1(0.0)	117(4.5)	2456(95.4)

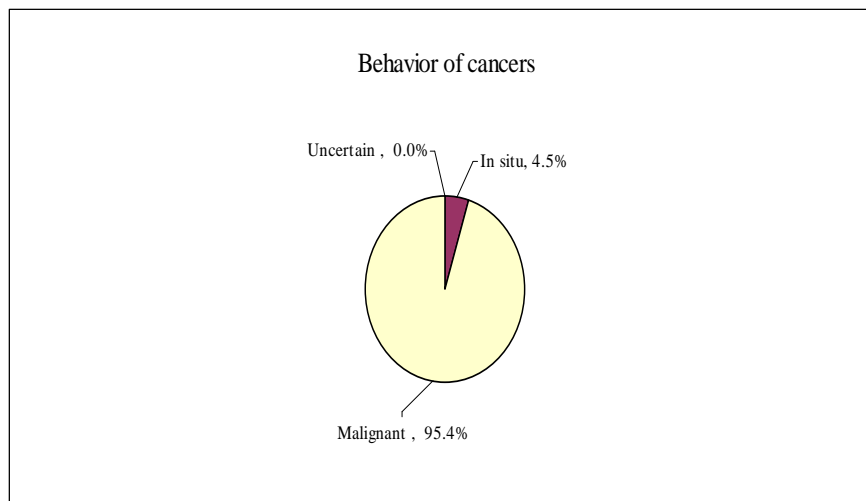
Figure 5: Behavior of Cancers

Table Six and Figure Six show the numbers of tumors for each grade of differentiation. Only 17% of tumors were poorly differentiated or undifferentiated.

Table 6: Degree of differentiation of tumors

Grade	Well diff.*	Moderate diff.	Poor diff.	Undiff.	Positive T-cell	Positive B-cell	NK cell	All
Number (%)	224 (30.1)	234 (31.5)	128 (17.2)	7(0.9)	10(1.3)	139 (18.7)	2(0)	744 (100)

*diff = differentiation

Not known or N/A (not applicable) = 1830, indicates a tumor for which differentiation cannot be determined such as bone marrow cancer

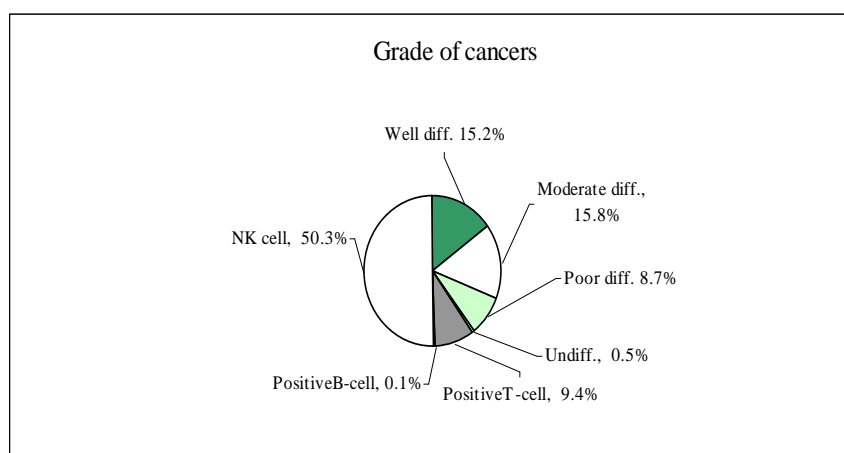
Figure 6: Degree of Differentiation of Tumors

Table seven and Figure seven show the numbers of tumors for each stage of disease progression, using the TNM Staging System. **Among all the records of staging, stage 4,D, is most common (29.2%), in other words most patients present to hospital with advanced disease.**

Table 7: Staging of tumors

Stage	0	I,A	II,B	III,C	IV,D	IIa, B1	IIb, B2	IIIa, C1	IIIb, C2	All
Number (%)	110 (14.0)	97 (12.4)	70 (8.9)	116 (14.8)	385 (49.2)	2 (0)	1 (0)	0	1 (0)	782 (100)

Not known or N/A (not applicable) = 1792, indicates a tumor for which differentiation cannot be determined such as bone marrow cancer

Figure 7: Staging of Tumors

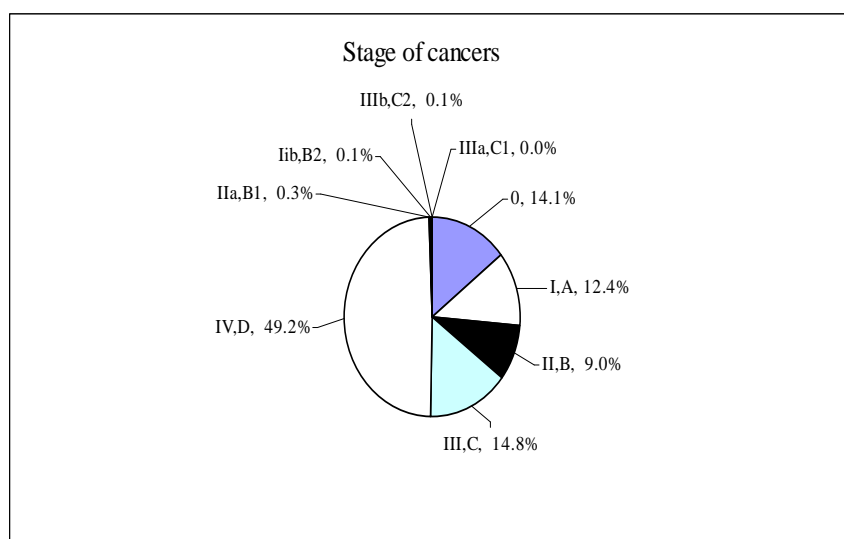


Table Eight and Figure Eight show the data for the spread of the tumors. **As for staging, among all records of tumor spread, distant metastases are the most common (61.7%), because most patients presented to the hospital with advanced disease.**

Table 8: Extension of Tumors:

Extend	In situ	Local	Direct extension	Regional nodes	Distant metastasis	All
Number (%)	117 (19.7)	5 (1.3)	18 (3.0)	87 (14.7)	365 (61.7)	592

Not known or N/A = 1982

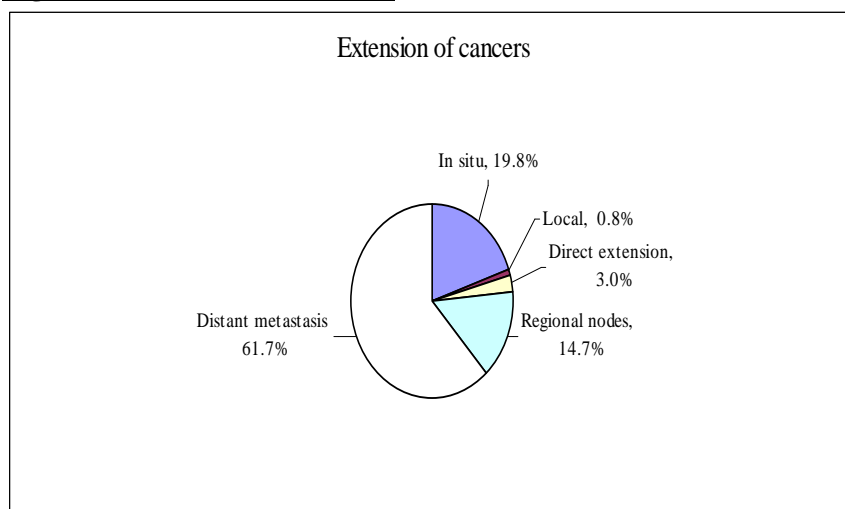
Figure 8: Extension of Tumors

Table Nine and Figure Nine show the sites for distant metastases from tumors. Lymph node spread was most common with bone second.

Table 9: Sites of tumor metastases

Metastasis	Bone	Brain	Liver	Lung	Lymph node	Peritoneum	Other	All
Number (%)	78 (18.3)	47 (11.0)	37 (8.7)	25 (5.8)	182 (42.8)	33 (7.7)	24 (5.6)	426

Not known=2148

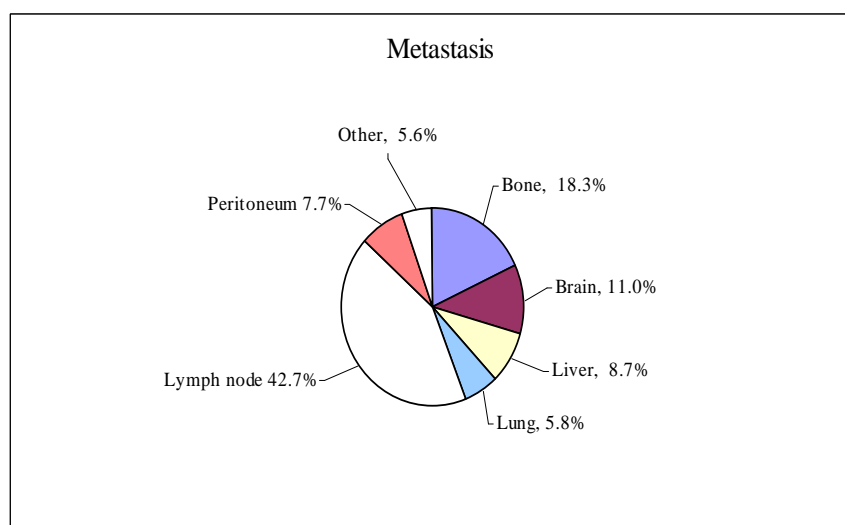
Figure 9: Sites of tumor metastases

Table Ten and Figure Ten show the numbers of tumors on the right and left sides of the body and those which were bilateral.

Table 10: Laterality of tumors

Laterality	Right	Left	Bilateral	Unilateral	All
N (%)	212(17.3)	205(16.7)	11(0.9)	795(65.0)	1223

Unknown= 1302

Figure 10: Laterality of Tumors

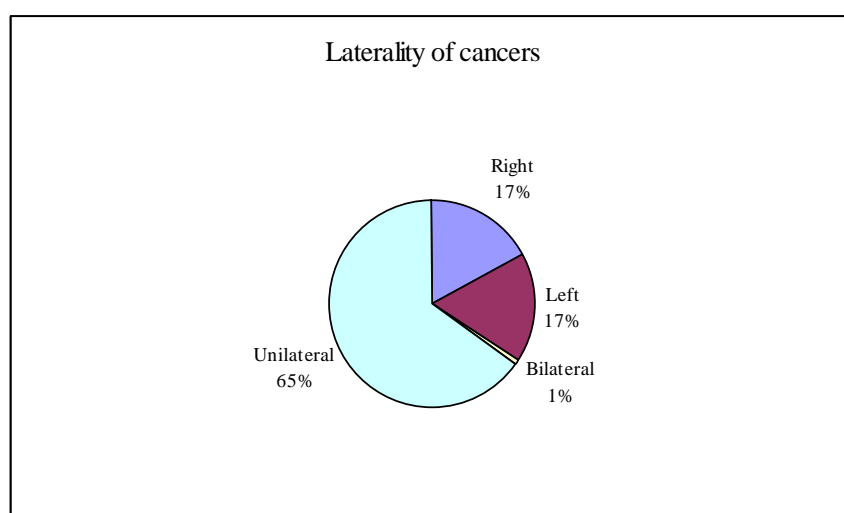


Table Eleven shows the top ten histological types of tumor. Adenocarcinoma was the commonest type with invasive squamous carcinoma a close second.

Table 11: Top ten histological tumor types

Morphology	Number
1. Adenocarcinoma	351
2. Invasive Squamous cell carcinoma	284
3. Invasive ductal carcinoma	179
4. Squamous cell carcinoma in situ	115
5. Leukemia	94
6. Lymphoma	85
7. Basal cell carcinoma	41
8. Papillary carcinoma	31
9. Mucinous adenocarcinoma	24
10. Urothelial carcinoma	21

6. Treatment

Figure Eleven shows the numbers of patients undergoing each method of treatment and those who received more than one treatment modality.

Figure 11: Proportions of patient receiving each treatment method

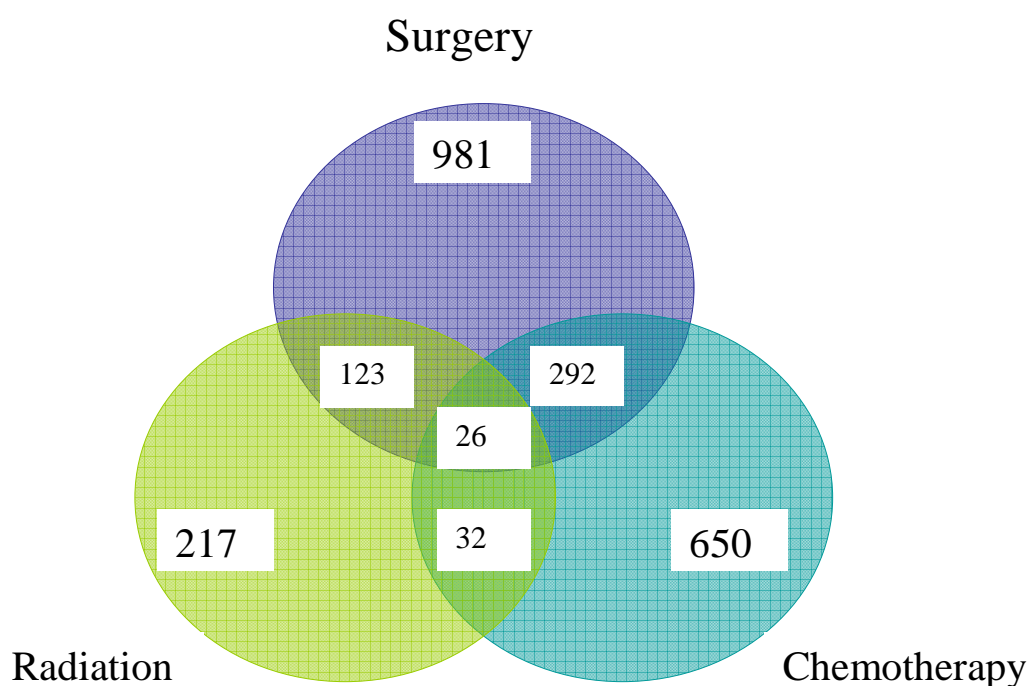


Table Twelve shows the death rate from cancer for each of the treatment modalities used: surgery, radiation therapy and chemotherapy. The death rate was lowest following surgery plus chemotherapy. Combined therapy with all surgery, radiation and chemotherapy had the second lowest death rate. Surgery alone had the third lowest death rate. The treatments with the highest death rates were: a combination of radiation and chemotherapy.

However, the decision to select those treatments was probably based on the inability of the patients to tolerate the consequences of their initial treatment or the fact that their disease was advanced and aggressive.

Table 12: Treatment modalities and death rates for each method (N = 2574)

Treatment modalities	Number (%)	Death rate (%)
Surgery	592(41.5)	15.5
Radiation	88(6.2)	46.6
Chemotherapy	350(24.6)	37.1
Surgery+Radiation	97(6.8)	27.8
Surgery+Chemotherapy	266(18.6)	8.6
Radiation+Chemotherapy	6(0)	66.7
Surgery+Radiation+Chemotherapy	26(1.8)	11.5
Supportive	1129(69.6)	66.2

The total number of patients who got active treatment was 1425. Fourteen patients received hormone treatment alone and eight had hormone therapy plus surgery, making 22 in all. Two received immunotherapy alone and one immunotherapy plus surgery. Four had non-surgical interventional treatment, such as embolisation of the tumor alone and another four had this treatment plus surgery.

The diseases which were most commonly treated with radiation alone were CA Nasopharynx (20 patients) and CA Cervix (17 patients) and in both cases the death rate at one year was 40%. The diseases most commonly treated with chemotherapy alone were CA Bone marrow (162 patients), Lymphoma (99 patients) and CA breast (13patients). The death rates within one year were 40%, 34 % and 15% respectively.

The number of patients who had supportive treatment only was 1129 (69.6% of all patients) and 748 of these patients(66%) died less than one year after diagnosis

Less than ten cases of each CA Liver, Lung-Bronchus, Unknown primary and Brain patients were treated with surgery per year. The death rate for these tumors was over 75% while for CA cervix, uterus and lip the death rate less than 10%.

The data for death rates in the ten commonest tumors treated by surgery are summarized in Table Thirteen.

Table 13: Death rates for the ten commonest tumors treated by surgery

Order	Cancer	Number	Death	Death rate
1	Cervix	238	21	8.8
2	Breast	186	14	7.5
3	Cholangiocarcinoma	145	24	16.5
4	Skin	82	7	8.5
5	Lip	25	4	16.0
6	Stomach	31	18	58.0
7	Ovary	39	5	12.8
8	Uterus	34	4	11.7
9	Bladder	22	3	13.6
10	Thyroid	20	1	5

7. Death

Table Fourteen shows the death rates in relation to age and sex. Figure Twelve shows the distribution of male patients by age and the death rates in each age group, while Figure Thirteen shows the same data for females. Figure Fourteen presents a comparison of death rates for males and females in relation to age. Data for site of tumor, gender and death rate are presented in Table Fifteen. Table Sixteen shows the estimated death rates at one year for the most common cancers.

Table 14: Number of cancers and death rate (%) by age and sex (N =2574)
(No data for 5 patients)

Age group (year)	Male		Female	
	Number of cases	Number of death (%)	Number of cases	Number of death(%)
0-10	20	7(35.0)	15	3(20.0)
11-20	17	4(23.5)	21	4(19.0)
21-30	26	9(34.6)	37	7(18.9)
31-40	59	25(42.4)	149	23(15.4)
41-50	141	82(58.2)	320	72(22.5)
51-60	323	189(58.5)	323	108(33.4)
61-70	339	198(58.4)	305	133(43.6)
71-80	208	116(55.8)	176	83(47.2)
81-90	43	30(69.8)	46	22(47.8)
91>	4	3(75.0)	2	2(100)
All	1180	663(56.2)	1394	457(32.8)

Figure 12: Age distribution of male patients and death rate for each age group

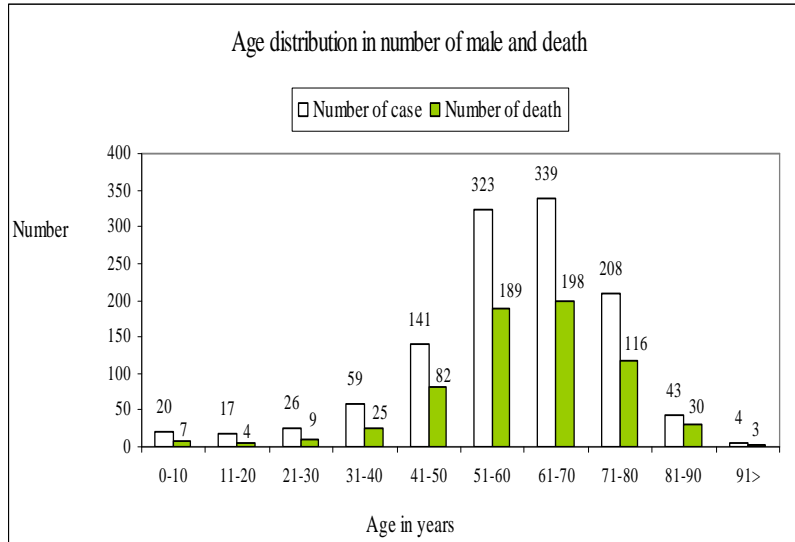


Figure 13: Age distribution of female patients and death rates for each age groups

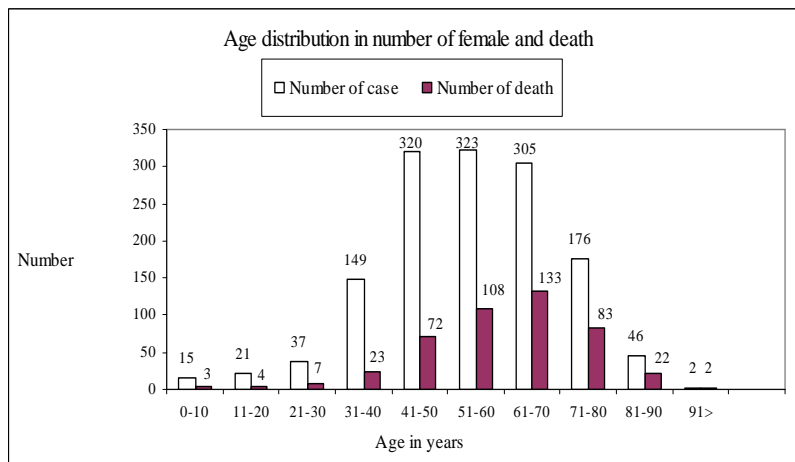
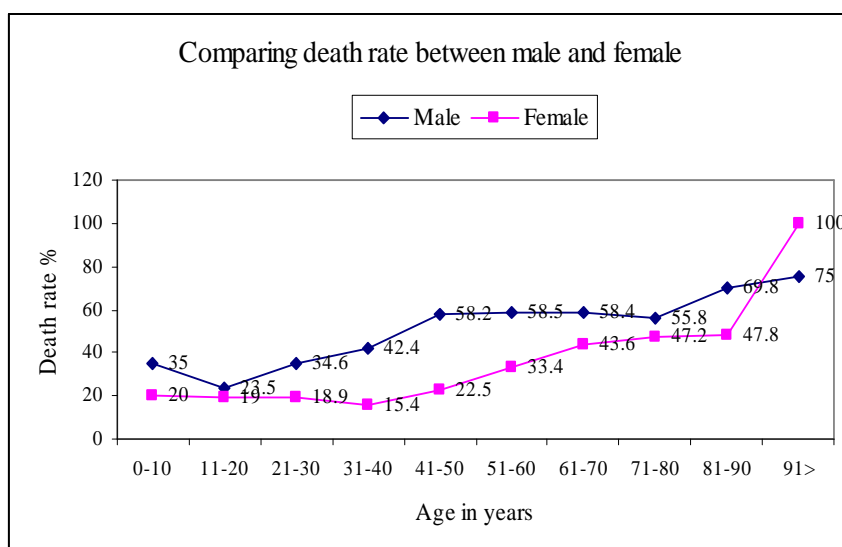


Figure 14: Comparison of death rates for males and females in relation to age

There were more females than males in most age groups but the death rate in males was higher, except in patients over ninety years of age. The overall death rates among males and females were 56.2 % and 32.8 % respectively

Table 15: Site of tumor, gender and death rates

ICD O	Site	Male	Female	New cases Both sexes	Male	Female	Deaths Both sexes	Death rate(%)
000-009	Lip	2	28	30	0	5	5	16.7
019-029	Tongue	15	13	28	6	4	10	35.7
030-039	Gum	5	5	10	1	1	2	20.0
040-049	Floor of mouth	5	0	5	3	0	3	60.0
050-059	Palate	1	3	4	0	2	2	50.0
060-069	Other parts in mouth	7	11	18	5	4	9	50.0
079-079	Parotid	3	3	6	1	1	2	33.3
080-089	Other salivary glands	1	1	2	1	0	1	50.0
090-099	Tonsil	2	6	8	1	3	4	50.0
100-109	Oropharynx	0	0	0	0	0	0	0

ICD O	Site	Male	Female	New cases Both sexes	Male	Female	Deaths Both sexes	Death rate(%)
110-119	Nasopharynx	25	12	37	8	3	11	29.7
129-129	Pyriiform	2	0	2	2	0	2	100.0
130-139	Hypopharynx	0	0	0	0	0	0	0
140-149	Other parts in oral cavity	0	0	0	0	0	0	0
150-159	Esophagus	19	6	25	14	3	17	68.0
160-169	Stomach	34	29	63	24	19	43	68.3
170-179	Small intestine	5	1	6	2	1	3	50.0
180-189	Colon-Rectum	114	108	222	38	32	70	31.5
220-220	Liver	86	34	120	73	26	99	82.5
221-221	Cholangiole	243	129	372	181	92	273	73.4
239-239	Gallbladder	7	4	11	5	2	7	63.6
240-249	Unspecify bile duct	6	7	13	1	2	3	23.1
250-259	Pancreas	4	7	11	2	3	5	45.5
260-296	Other parts in GI	0	0	0	0	0	0	0.0
300-319	Sinus-nasal cavity	3	2	5	0	1	1	20.0
320-329	Larynx	10	3	13	1	2	3	23.1
339-339	Trachea	0	0	0	0	0	0	0.0
340-349	Lung-bronchus	182	68	250	131	46	177	70.8
379-379	Thymus	1	0	1	0	0	0	0.0
380-388	Heart-mediastinum	4	3	7	2	0	2	28.6
390-399	Other parts in respiratory	0	0	0	0	0	0	0.0
400-409	Limbs bone	1	2	3	0	2	2	66.7
410-419	Other bone-joint	2	2	4	2	2	4	100.0
420-424	Bone marrow*	107	94	201	50	41	91	45.3
440-449	Skin	44	42	86	7	1	8	9.3
470-479	Peripheral nerve, ANS	0	0	0	0	0	0	0.0

ICD O	Site	Male	Female	New cases Both sexes	Male	Female	Deaths Both sexes	Death rate(%)
480-488	Retroperitoneum	1	0	1	0	0	0	0.0
490-499	Connective,subcutaneous	4	8	12	1	1	2	16.7
500-509	Breast	1	224	225	0	26	26	11.6
510-529	Vulva-vagina	0	6	6	0	3	3	50.0
530-539	Cervix	0	290	290	0	40	40	13.8
540-559	Uterus	0	44	44	0	7	7	15.9
569-569	Ovary	0	65	65	0	20	20	30.8
570-579	Other parts in female genital organs	0	0	0	0	0	0	0
589-589	Placenta	0	2	2	0	0	0	0
600-609	Penis	19	0	19	7	0	7	36.8
619-619	Prostate	29	0	29	6	0	6	20.7
620-629	Testis	3	0	3	1	0	1	33.3
630-639	Other parts in male genital organs	1	0	1	0	0	0	0
649-659	Kidney	12	7	19	5	4	9	47.4
669-669	Ureter	0	0	0	0	0	0	0.0
670-679	Bladder	36	7	43	9	2	11	25.6
680-689	Other parts in urinary Tract organs	0	0	0	0	0	0	0
690-699	Eye-adnexa	3	0	3	0	0	0	0
710-719	Brain-meniges	9	6	15	7	5	12	80.0
720-729	Spinal cord	0	0	0	0	0	0	0
739-739	Thyroid	7	22	29	0	2	2	6.9
740-749	Adrenal gland	1	3	4	0	2	2	50.0
750-759	Other endocrine glands	0	0	0	0	0	0	0

ICD O	Site	Male	Female	New cases Both sexes	Male	Female	Deaths Both sexes	Death rate(%)
760-768	Ill-defined sites	0	0	0	0	0	0	0
770-779	Lymphnode**	59	58	117	21	23	44	37.6
809-809	Unknown Primary	55	29	84	45	24	69	82.1
	All	1180	1394	2574	663	457	1120	43.5

Table 16: Estimated death rate at one year after diagnosis for common cancers

< 15%	<50%	50-70%	> 70%
Breast Cervix Skin Thyroid Uterus	Bladder Colon-rectum Prostate Lymphnode Oral cavity Bone marrow Nasopharynx Ovary	Gallbladder Unspecify bile duct Larynx	Liver Unknown Primary Lung-bronchus Cholangiole Stomach

Overall Death rate within the study group at the time of writing was 43.5%.
The death rate is almost 50% within a follow up period less than one year

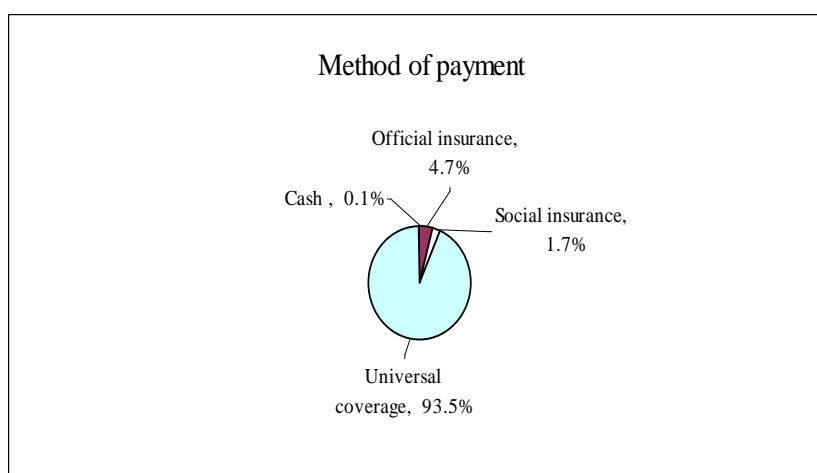
8. Methods of payment for treatment

Table Seventeen and Figure Fifteen show the number of patients who paid for their own treatment and those whose treatment costs were reimbursed by some form of insurance or universal state cover.

Universal Coverage is most common method of payment (91.8%)

Table 17: Methods of payment

Method of payment	Cash	Official insurance	Social insurance	Universal coverage	Not known	All
N (%)	3(0.1)	118(4.6)	44(1.7)	2355(91.8)	44(1.7)	2564

Figure 15: Methods of Payment

Conclusions

The total number of patients in 2009 was 2,574, only sixty percent of them were from Khon Kaen province, the remainders being referred from nearby provinces. Tumor diagnosis was made by biopsy only 65% of cases, compared with Chiangmai and Khon Kaen University^{1,2}. This is because the most common tumor (cholangiocarcinoma) is not readily accessible for biopsy in Khon Kaen Hospital. Ultra-sound diagnosis is an acceptable method for advanced and aggressive tumors.

Most patients presented to the hospital with advanced disease, therefore, stage 4, D, and lymph node involvement were most common metastases. The commonest type of cancer is cholangiocarcinoma (by contrast, colon-rectum and lung-bronchus were the most common cancers report from National Cancer Institute³), but carcinomas of the cervix and breast are more common in females. The overall death rates from all cancers, within a follow up period less than one year, among males and females were 56.2 % and 32.8 % respectively. It is clear that a disappointingly high proportion of patients present with advanced disease. But the death rate following surgery is less than 10% such as breast, cervix, lip and thyroid.

The death rate was lowest following surgery plus chemotherapy. Combined therapy with all surgery, radiation and chemotherapy had the second lowest death rate of the study. The treatments with the highest death rates were: a combination of radiation and chemotherapy.

The best way to improve treatment outcomes would therefore be to encourage earlier presentation of patients to the hospital and increased awareness of the possibility of malignant disease among care takers. Reasons for this include unawareness of significance of symptoms, reliance on traditional healers and negative images of the side effects of orthodox medial treatment in the public's mind. This could be achieved by

health education programmes, particularly in rural areas, and increased awareness of the possibility of malignant disease in district hospitals. The higher death rate in males is probably due to the reluctance of men to present with potentially serious symptoms and the different pattern of tumour occurrence as compared to women.

Cancer Trend (from 2007 to 2009)

When the results reported here are compared with those from the 2007 report, it is evident that the total number of patients is higher for both 2008 and 2009. This could indicate a rise in the referral rate to Khon Kaen Hospital, but the difference could also be explained by the acquisition of a more complete data set for the present report. Overall there seems to have been little change in the cancer work load.

The rank order of the ten commonest cancers in male and female has not changed between 2007 through 2009. The most common form of cancer presenting to Khon Kaen Hospital is still cholangiocarcinoma. The early symptoms of this disease are non-specific, leading to late presentation and a high death rate all three years.

There have been small variation in proportion of cancer diagnosed by biopsy but there is no consistent trend (53%, 74% and 65% in 2007, 2008 and 2009 respectively). There was a small changed of percentage of cancer patients in behavior, differentiation, staging, extension, site of metastases and morphology among last three years.

A higher proportion of patients received active treatment in 2009 (1425 patients) compared with 2008 (794 patients). However, only half as many patients received a combination of surgery, chemotherapy and radiation in 2009 as compared with 2008. The fact that the proportion of patients undergoing surgery has risen from 25% in 2007 to 42% in 2008 and 50% in 2009 suggests that more patients with operable disease are presenting to the hospital, which is an encouraging trend. It could, however, indicate a lower threshold for offering surgery among operating surgeons.

The over all death rate of both sexes were 52.7%, 43.5% in 2008 and 2009 respectively. However, the shorter follow up period for patients treated in 2009 as compared to 2008 means that comparison of death rate for the two years are likely to be misleading.

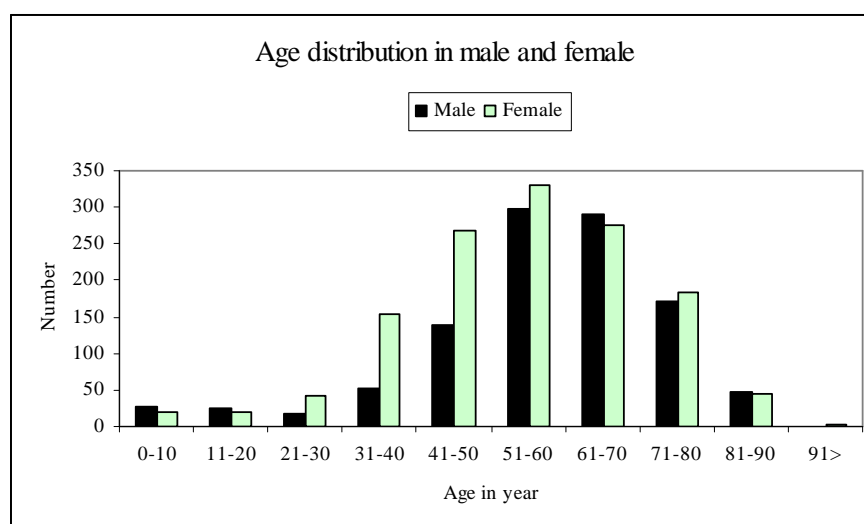
The treatment costs of the majority of patients (91.8%) are now met by Universal State Health Cover. In 2008 and 2007, the proportion of patient's funded in this way was lower (81.5% and 65% respectively). This means one barrier to seeking effective treatment has been removed. Cancer management is an area where socialized medicine is the most appropriate health care model. This is because the cost of treatment is high and patients must travel to a major center to be treated. The psychological impact of the disease affects the patient's family as well as the patient him or herself.

Tumor Registry 2008

1. Number and distribution of patients according to age and sex

In 2008, the total number of patients was 2402.
 The male to female ratio was 1:1.2 or 1067 (44.4%): 1335 (55.6%)
 The average age of the patients was 56.3 (standard deviation was 16.3) years (range 20 days-98 years). The majority of patients were in the age range 50 to 70 years. There was no difference between the proportions of males and females in most age group, but in the third and fourth decades of life females predominated.

Figure 16: Age distribution in males and females



2. Number and distribution of patients according to age and topography

Table 18 shows the numbers of patients with tumors at each site according to age (unknown age for two patients).

Table 18: Tumour sites in different age groups

	Topography/Age range	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	All
000-009	Lip	0	0	0	0	1	8	4	16	3	0	32
019-029	Tongue	0	0	0	2	2	5	7	5	2	0	23
030-039	Gum	0	0	0	0	1	1	4	4	3	0	13
040-049	Floor of mouth	0	1	0	0	1	2	1	3	0	0	8
050-059	Palate	0	1	0	1	1	0	0	1	0	0	4
060-069	Other parts in mouth	1	0	1	1	0	1	5	8	0	0	17
079-079	Parotid	0	0	0	0	1	2	1	0	0	0	4
080-089	Other salivary glands	0	0	0	0	0	1	0	0	2	0	3
090-099	Tonsil	0	0	0	3	1	2	1	2	1	0	10
100-109	Oropharynx	0	0	0	0	0	0	0	0	0	0	0
110-119	Nasopharynx	1	0	3	4	11	16	9	3	0	0	47
129-129	Pyriiform	0	0	0	1	1	1	0	0	1	0	4
130-139	Hypopharynx	0	1	0	0	0	0	2	1	0	0	4
140-149	Other parts in oral cavity	0	0	0	0	0	0	0	0	0	0	0
150-159	Esophagus	0	0	0	0	4	5	5	5	1	0	20
160-169	Stomach	0	0	1	3	9	19	16	11	0	1	60
170-179	Small intestine	1	0	0	1	3	1	1	0	0	0	7
180-189	Colon	1	0	1	7	25	50	56	36	8	0	186
199-218	Rectum-sigmoid	0	0	0	0	0	0	0	0	0	0	0
220-220	Liver	2	0	0	3	24	23	23	13	2	1	91
221-221	Cholangiole	4	0	0	6	31	86	99	48	12	0	286
239-239	Gallbladder	0	0	1	0	1	1	4	2	3	0	12
240-249	Unspecify bile duct	0	0	0	0	1	1	5	1	0	0	8
250-259	Pancreas	0	0	3	3	1	5	6	0	0	0	18
260-296	Other parts in GI	0	0	0	0	0	0	0	1	0	0	1
300-319	Sinus-nasal cavity	0	0	1	0	1	2	2	2	1	0	9
320-329	Larynx	0	0	0	0	2	5	8	2	1	0	18

	Topography/Age range	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	All
339-339	Trachea	0	0	0	0	0	0	0	0	0	0	0
340-349	Lung-bronchus	0	0	1	10	19	74	62	43	10	0	221
379-379	Thymus	0	0	1	1	0	0	0	0	0	0	2
380-388	Heart-mediastinum	0	1	0	2	1	0	1	0	0	0	7
390-399	Other parts in respiratory	0	0	0	0	0	0	0	0	0	0	0
400-409	Limbs bone	0	0	0	0	1	0	1	1	0	0	3
410-419	Other bone-joint	0	0	0	0	2	0	1	1	0	0	4
420-424	Bone marrow*	23	23	10	20	20	38	34	26	7	0	201
440-449	Skin	0	0	1	2	7	21	24	38	10	1	104
470-479	Peripheral nerve, ANS	0	0	0	0	1	0	0	0	0	0	1
480-488	Retroperitoneum	0	0	0	1	0	1	0	0	0	0	2
490-499	Connective,subcutaneous	0	1	0	4	2	4	5	1	1	0	18
500-509	Breast	0	0	7	29	60	56	38	17	3	0	210
510-529	Vulva-vagina	0	0	0	0	02	4	17	3	0	0	6
530-539	Cervix	0	2	10	61	98	80	29	7	1	0	288
540-559	Uterus	0	0	0	1	7	24	9	1	0	0	42
569-569	Ovary	0	3	4	9	15	12	9	5	0	0	57
570-579	Other parts in female genital organs	0	0	0	0	1	0	0	1	0	0	2
589-589	Placenta	0	0	0	0	0	0	0	0	0	0	0
600-609	Penis	0	0	0	2	2	9	8	3	1	0	25
619-619	Prostate	0	0	0	0	1	3	8	9	4	0	25
620-629	Testis	0	0	0	1	1	1	0	0	0	0	3
630-639	Other parts in male genital organs	0	0	0	0	0	0	0	0	0	0	0
649-659	Kidney	2	0	2	0	3	3	4	0	1	0	15
669-669	Ureter	0	0	0	0	0	0	0	1	0	0	1
670-679	Bladder	0	0	0	0	3	8	18	9	4	0	42
680-689	Other parts in urinary Tract organs	0	0	0	0	0	0	0	0	0	0	0
690-699	Eye-adnexa	0	0	0	0	0	1	0	0	1	0	2
710-719	Brain-meniges	2	3	1	5	0	4	2	0	0	0	17
720-729	Spinal cord	0	0	0	0	0	2	0	0	0	0	2
739-739	Thyroid	0	2	2	8	7	10	5	7	2	0	43

	Topography/Age range	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	>90	All
740-749	Adrenal gland	1	1	0	0	0	0	0	0	0	0	2
750-759	Other endocrine glands	0	0	0	0	0	0	0	0	0	0	0
760-768	Ill-defined sites	0	0	0	0	0	0	0	0	0	0	0
770-779	Lymphnode**	5	3	7	11	12	19	18	10	4	0	89
809-809	Unknown Primary	0	1	1	5	18	15	27	11	3	0	81
	All	45	43	58	207	405	626	566	355	92	3	2400

* Bone marrow (leukemia) is majority of cancer in hematopoietic and reticuloendothelial

** Lymphoma was classified in Lymph node group(according to ICD-O classification)

3. The most common cancers

Table 19 shows the fifteen most common cancers in both sexes. Overall the most common cancer was cervix, but in males carcinomas of the Cholangiocarcinoma and Lung-Bronchus were more common.

Table 19: The fifteen most common cancers in both sexes

Order	Male	Female	Both sexes
1	Cholangiocarcinoma	Cervix	Cervix
2	Lung-Bronchus	Breast	Cholangiocarcinoma
3	Bone marrow	Colon-Rectum	Lung-Bronchus
4	Colon-Rectum	Cholangiocarcinoma	Breast
5	Liver	Bone marrow	Bone marrow
6	Unknown Primary	Lung-Bronchus	Colon-Rectum
7	Lymph node	Oral cavity	Skin
8	Skin	Skin	Oral cavity
9	Oral cavity*	Ovary	Liver
10	Bladder	Uterus	Lymph node
11	Stomach	Lymph node	Unknown Primary
12	Nasopharynx	Thyroid	Stomach
13	Prostate	Liver	Ovary
14	Penis	Unknown Primary	Nasopharynx
15	Esophagus	Stomach	Thyroid

*(ICD-O code from Lip, Tongue, Gum and Floor of mouth were included in Oral cavity)

4. Method of Diagnosis

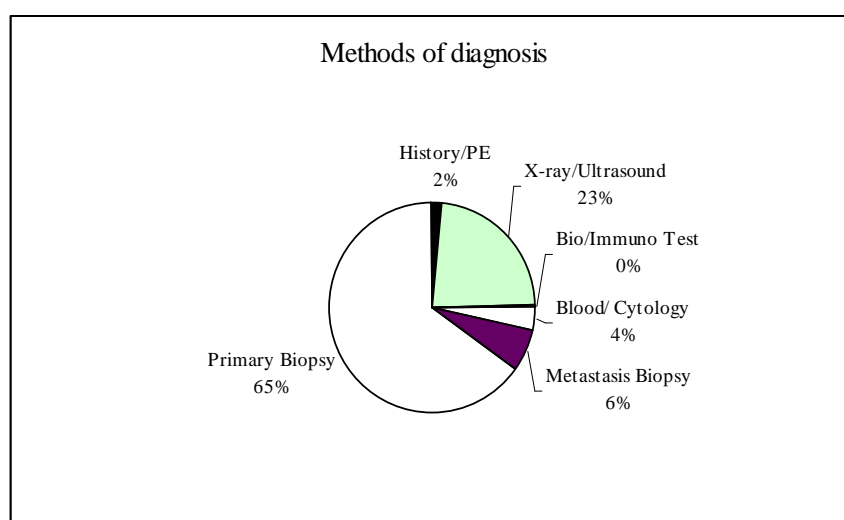
Table 20 and Figure 17 show the methods by which tumors were diagnosed. Tumor diagnosis was made by biopsy in 76% of cases. This is because the most common tumor (cholangiocarcinoma) is not readily accessible for biopsy. Ultra-sound diagnosis is an acceptable method for advanced and aggressive tumors.

Table 20: Methods of diagnosis* (N =2402)

Method*	History Physical Exam.	Radiographic Ultrasound	Biochem/ Immuno. Test	Blood/ Cytology	Metastasis Biopsy	Primary Biopsy
Number (%)	43 (1.8)	549 (22.9)	11 (0.5)	86 (3.6)	155 (6.5)	1558 (64.9)

*There were no autopsies/death certificates for diagnosis of cancer in the study

Figure 17: Methods of diagnosis



5. Characteristics of Tumors

The majority of tumors were invasive at the time of diagnosis, with only 4.7% being in situ (Table 21 and Figure 18).

Table 21: Behavior of cancers (N=2402)

Behavior	Uncertain	In situ	Malignant
Number (%)	1(0.0)	114(4.7)	2287(95.1)

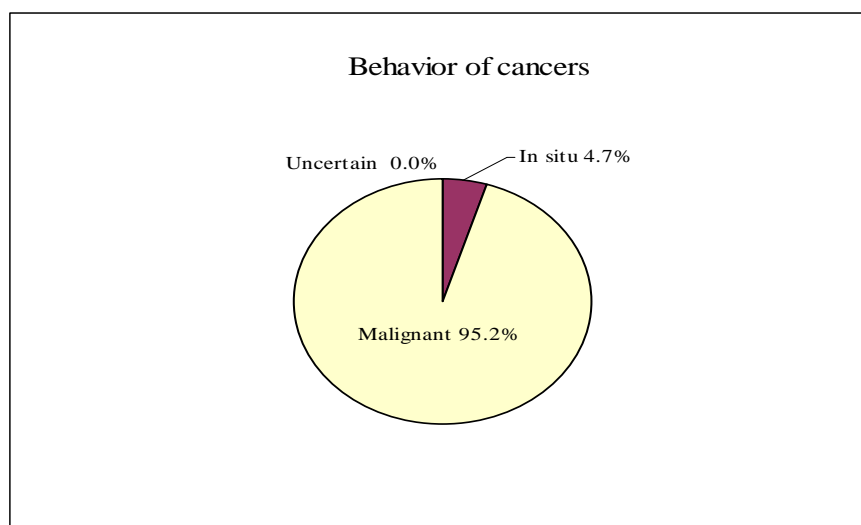
Figure 18: Behavior of Cancers

Table 22 and Figure 19 show the numbers of tumors for each grade of differentiation. Only 19% of tumors were poorly differentiated or undifferentiated.

Table 22: Degree of differentiation of tumors

Grade	Well diff.*	Moderate diff.	Poor diff.	Undiff.	Positive T-cell	Positive B-cell	NK cell	All
Number (%)	243 (33.9)	231 (32.2)	112 (15.6)	22 (3.0)	9 (1.2)	97 (13.5)	2 (0.3)	716 (100)

*diff = differentiation

Not known or N/A (not applicable) = 1686, indicates a tumor for which differentiation cannot be determined such as bone marrow cancer

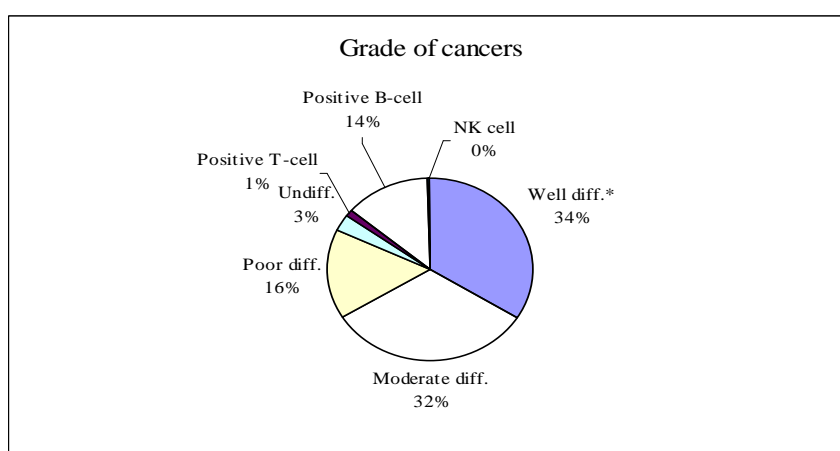
Figure 19: Degree of Differentiation of Tumors

Table 23 and Figure 20 show the numbers of tumors for each stage of disease progression, using the Staging System. **Among all the records of staging, stage 4,D, is most common (48.5%), in other words most patients present to hospital with advanced disease.**

Table 23: Staging of tumors

Stage	0	I,A	II,B	III,C	IV,D	IIa, B1	IIb, B2	IIIa, C1	IIIb, C2	All
Number (%)	97 (14.8)	131 (19.3)	56 (8.2)	56 (8.2)	329 (48.5)	3 (0)	0 (0)	1 (0)	5 (0)	678 (100)

Not known or N/A (not applicable) = 1724, indicates a tumor for which differentiation cannot be determined such as bone marrow cancer

Figure 20: Staging of Tumors

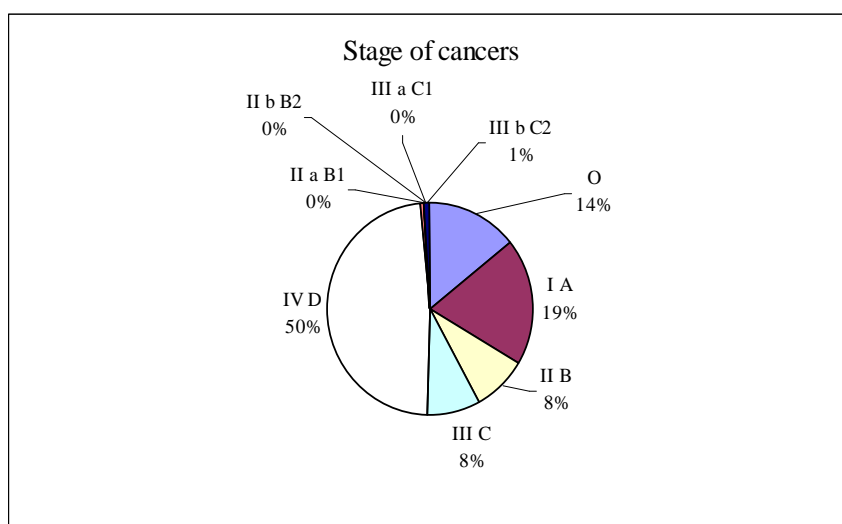


Table 24 and Figure 21 show the data for the spread of the tumors.

As for staging, among all records of tumor spread, distant metastases are the most common (73.7%), because most patients presented to the hospital with advanced disease.

Table 24: Extension of Tumors:

Extend	In situ	Local	Direct extension	Regional nodes	Distant metastasis	All
Number (%)	49 (12.2)	22 (5.5)	5 (1.2)	30 (7.4)	297 (73.7)	403

Not known and N/A =1996

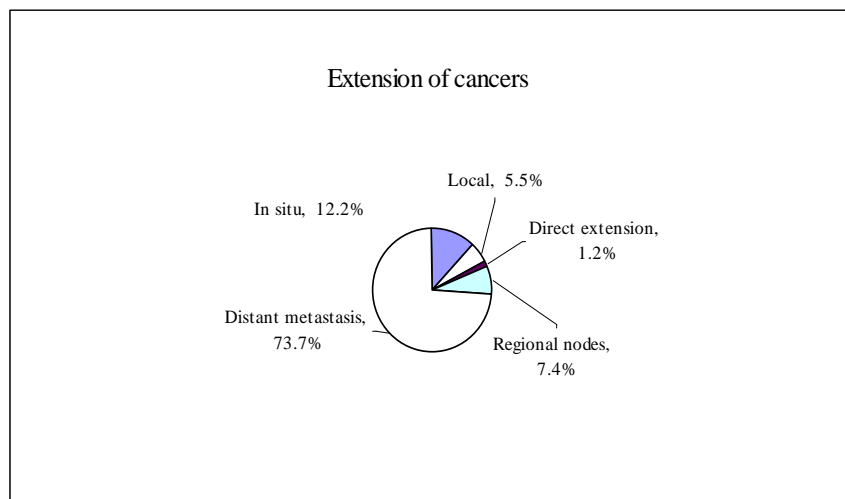
Figure 21: Extension of Tumors

Table 25 and Figure 22 show the sites for distant metastases from tumors. Lymph node spread was most common with bone second.

Table 25: Sites of tumor metastases

Metastasis	Bone	Brain	Liver	Lung	Lymph node	Peritoneum	Other	All
Number	47	33	28	31	119	27	57	342
(%)	(13.7)	(9.6)	(8.2)	(9.0)	(34.8)	(7.8)	(16.6)	

Not known=2060

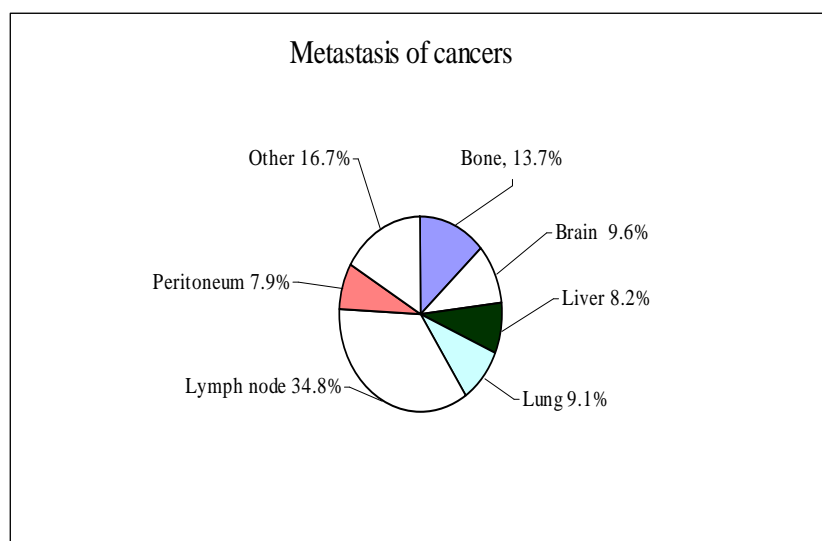
Figure 22: Sites of tumor metastases

Table 26 shows the top ten histological types of tumor. Adenocarcinoma was the commonest type with invasive squamous carcinoma a close second.

Table 26: Top ten histological tumor types

Morphology	Number
1. Adenocarcinoma	302
2. Invasive Squamous cell carcinoma	221
3. Invasive ductal carcinoma	170
4. Squamous cell carcinoma in situ	97
5. Leukemia	96
6. Lymphoma	80
7. Basal cell carcinoma	37
8. Papillary carcinoma	29
9. Mucinous adenocarcinoma	20
10. Urothelial carcinoma	17

6. Cancer in Children

Total number of patients who younger than 15 years old is 58 (3.6% of all number of patients) The most youngest (two days old) was diagnosed of Down's syndrome and leukemia. Most common cancer in children were Leukemia 73% (AML40%, ALL33%), Lymphoma 15.5% and Neuroblastoma 3.5%. For number of cancers of Liver, Lung, Kidney and Nasopharynx together were less than 8%

7. Treatment

Figure 23 shows the numbers of patients undergoing each method of treatment and those who received more than one treatment modality.

Figure 23: Proportions of patient receiving each treatment method

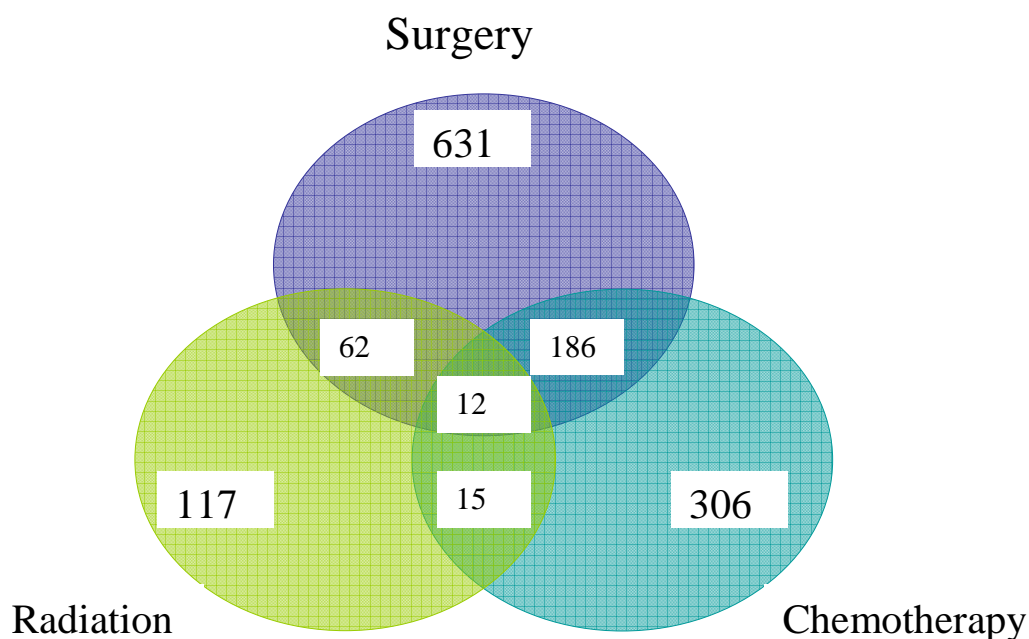


Table 27 shows the death rate from cancer for each of the treatment modalities used: surgery, radiation therapy and chemotherapy. The death rate was lowest following surgery. Combined therapy with surgery and chemotherapy had the second lowest death rate. The treatments with the highest death rates were: a combination of all three modalities, radiation alone and chemotherapy alone. However, the decision to select those treatments was probably based on the inability of the patients to tolerate the consequences of their initial treatment or the fact that their disease was advanced and aggressive.

Table 27: Treatment modalities and death rates for each method (N = 2402)

Treatment modalities	Number (%)	Death rate %
Surgery	395(49.7)	17.0
Radiation	52(6.5)	51.9
Chemotherapy	108(13.6)	47.2
Surgery+Radiation	50(6.4)	34.0
Surgery+Chemotherapy	174(21.9)	23.0
Radiation+Chemotherapy	3(0.3)	33.3
Surgery+Radiation+Chemotherapy	12(1.5)	58.3
Supportive	1602(66.7)	66.2

The total number of patients who got active treatment was 794. Seven patients received hormone therapy plus surgery and six patients received hormone therapy plus chemotherapy, making 13 in all. One had non-surgical interventional treatment, such as embolisation of the tumor. None received immunotherapy. The diseases which were most commonly treated with radiation alone were CA Nasopharynx (14 patients) and CA Cervix (11 patients) and in both cases the death rate at one year was 57% and 78% respectively.

The diseases most commonly treated with chemotherapy alone were CA Bone marrow and Lymphoma. The death rates within one year were 52% and 41 % respectively. The number of patients who had supportive treatment only was 1602 (67% of all patients) and 1039 of these patients (65%) died less than one year after diagnosis.

Less than ten cases of each CA Liver, Lung-Bronchus, Stomach and Unknown primary patients were treated with surgery per year. The death rate for these tumors was over 85%. The data for death rates in the ten commonest tumors treated by surgery are summarized in Table 28.

Table 28: Death rates for the ten commonest tumors treated by surgery

Order	Cancer	Number	Death	Death rate
1	Cervix	148	10	6.7
2	Breast	121	21	21
3	Cholangiocarcinoma	81	22	27.2
4	Skin	45	8	17
5	Lip	19	1	5.5
6	Ovary	29	6	20.6
7	Uterus	22	2	9.0
8	Penis	18	5	27.7
9	Bladder	23	8	37.4
10	Thyroid	17	2	11.7

8. Death

Table 29 shows the death rates in relation to age and sex. Figure 24 shows the distribution of male patients by age and the death rates in each age group, while Figure 25 shows the same data for females. Figure 26 presents a comparison of death rates for males and females in relation to age. Data for site of tumor, gender and death rate are presented in Table 30. Table 31 shows the estimated death rates at one year for the most common cancers.

Table 29: Number of cancers and death rate (%) by age and sex (N =2402)
(No data for 33 patients)

Age group (year)	Male		Female	
	Number of cases	Number of death (%)	Number of cases	Number of death(%)
0-10	27	10(37.0)	19	10(52.6)
11-20	24	12(50.0)	19	6(31.6)
21-30	17	10(58.8)	41	13(31.7)
31-40	52	24(46.2)	155	39(25.2)
41-50	138	85(61.6)	268	75(28.0)
51-60	297	190(64.0)	329	134(40.7)
61-70	291	205(70.4)	275	147(53.5)
71-80	172	131(76.2)	183	98(53.6)
81-90	48	36(75.0)	44	27(61.4)
91>	1	1(100.0)	2	1(50.0)
All	1067	704(66.0)	1335	550(41.2)

Figure 24: Age distribution of male patients and death rate for each age group

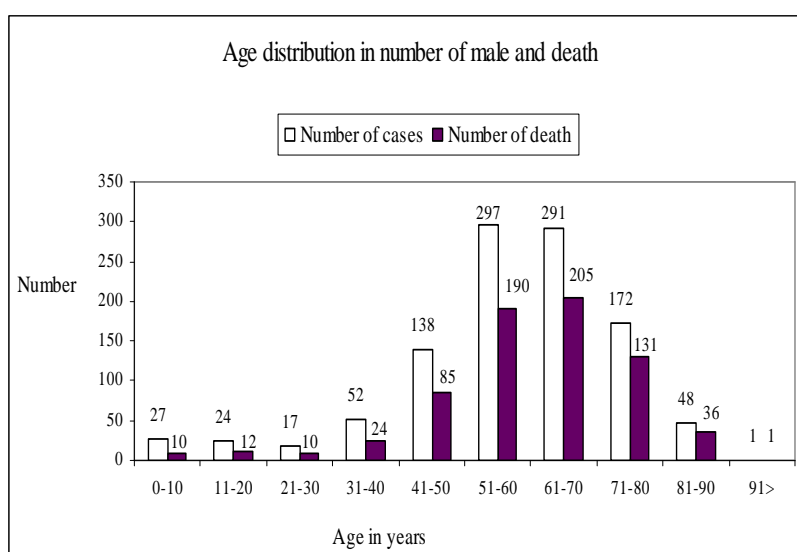


Figure 25: Age distribution of female patients and death rates for each age groups

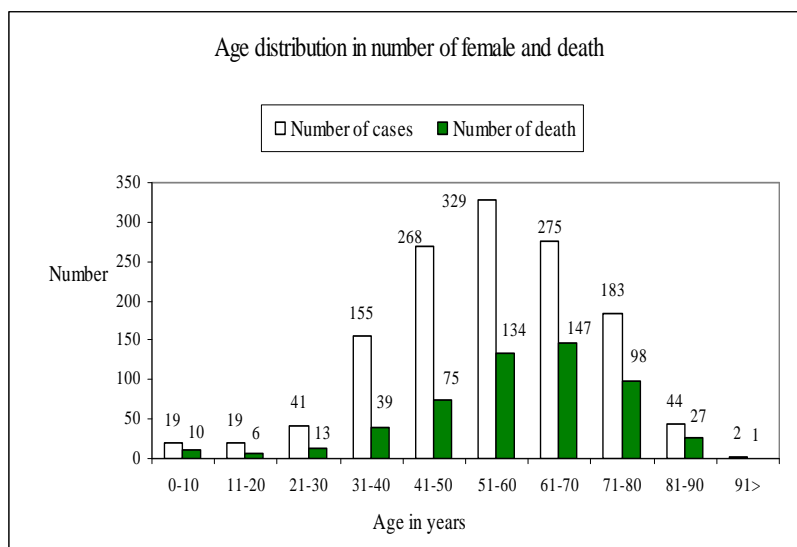
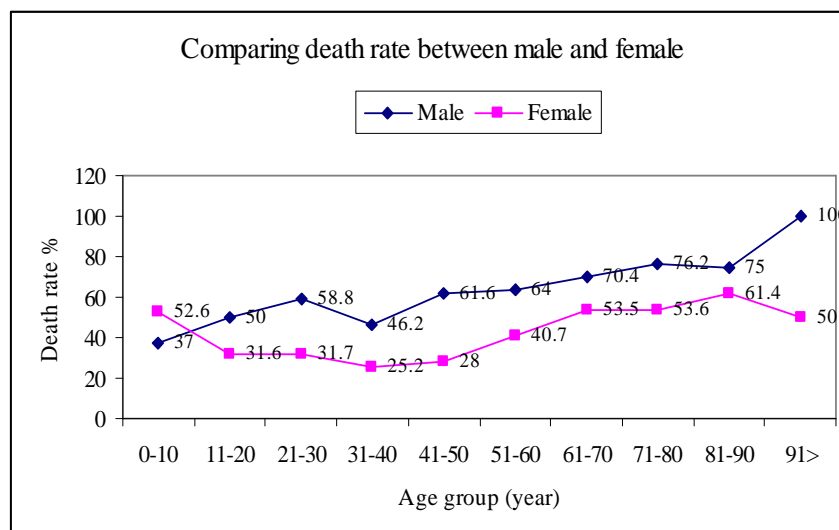


Figure 26: Comparison of death rates for males and females in relation to age



There were more females than males in most age groups but the death rate in males was higher, except in patients over ninety tears of age. The overall death rates among males and females were 66 % and 41.2 % respectively

Table 30: Site of tumor, gender and death rates

ICD O	Topography	Male	Female	New cases Both sexes	Male	Female	Deaths Both sexes	Death rate(%)
000-009	Lip	4	28	32	1	4	5	15.6
019-029	Tongue	14	9	23	11	4	15	65.2
030-039	Gum	6	7	13	4	3	7	53.8
040-049	Floor of mouth	2	6	8	2	4	6	75.0
050-059	Palate	2	2	4	1	0	1	25.0
060-069	Other parts in mouth	6	11	17	1	5	6	35.3
079-079	Parotid	3	1	4	1	0	1	25.0
080-089	Other salivary glands	1	2	3	0	1	1	33.3
090-099	Tonsil	5	5	10	1	2	3	30.0
100-109	Oropharynx	0	0	0	0	0	0	0
110-119	Nasopharynx	28	19	47	12	6	18	38.3
129-129	Pyriiform	3	1	4	3	0	3	75.0
130-139	Hypopharynx	2	2	4	2	1	3	75.0
140-149	Other parts in oral cavity	0	0	0	0	0	0	0
150-159	Esophagus	17	3	20	16	3	19	95.0
160-169	Stomach	33	27	60	23	22	45	75.0
170-179	Small intestine	5	2	7	2	2	4	57.1
180-218	Colon-Rectum	89	97	186	39	45	84	45.2
220-220	Liver	64	28	92	57	25	82	89.1
221-221	Cholangiole	194	92	286	160	83	243	85.0
239-239	Gallbladder	4	8	12	3	4	7	58.3
240-249	Unspecify bile duct	3	5	8	2	3	5	62.5
250-259	Pancreas	10	8	18	8	6	14	77.8
260-296	Other parts in GI	0	1	1	0	1	1	100.0
300-319	Sinus-nasal cavity	3	6	9	1	4	5	55.6

ICD O	Topography	Male	Female	New cases	Male	Female	Deaths	Death rate(%)
320-329	Larynx	16	2	18	6	2	8	44.4
339-339	Trachea	0	0	0	0	0	0	0
340-349	Lung-bronchus	157	64	221	141	51	192	86.9
379-379	Thymus	0	2	2	0	1	1	50.0
380-388	Heart-mediastinum	5	2	7	2	2	4	57.1
390-399	Other parts in respiratory	0	0	0	0	0	0	0
400-409	Limbs bone	2	1	3	0	0	0	0
410-419	Other bone-joint	0	4	4	0	2	2	50.0
420-424	Bone marrow*	113	89	202	72	58	130	64.4
440-449	Skin	43	61	104	8	11	19	18.3
470-479	Peripheral nerve, ANS	0	1	1	0	0	0	0
480-488	Retroperitoneum	1	1	2	1	0	1	50.0
490-499	Connective,subcutaneous	9	9	18	5	4	9	50.0
500-509	Breast	1	209	210	0	46	46	21.9
510-529	Vulva-vagina	0	6	6	0	3	3	50.0
530-539	Cervix	0	288	288	0	52	52	18.1
540-559	Uterus	0	42	42	0	6	6	14.3
569-569	Ovary	0	57	57	0	21	21	36.8
570-579	Other parts in female genital organs	0	2	2	0	0	0	0
589-589	Placenta	0	0	0	0	0	0	0
600-609	Penis	25	0	25	9	0	9	36.0
619-619	Prostate	25	0	25	10	0	10	40.0
620-629	Testis	3	0	3	0	0	0	0
630-639	Other parts in male genital organs	0	0	0	0	0	0	0
649-659	Kidney	6	9	15	3	2	5	33.3

ICD O	Topography	Male	Female	New cases	Male	Female	Deaths	Death rate(%)
669-669	Ureter	1	0	1	0	0	0	0.0
670-679	Bladder	34	8	42	13	4	17	40.5
680-689	Other parts in urinary Tract organs	0	0	0	0	0	0	0
690-699	Eye-adnexa	1	1	2	1	1	2	100.0
710-719	Brain-meninges	9	8	17	5	7	12	70.6
720-729	Spinal cord	1	1	2	1	0	1	50.0
739-739	Thyroid	11	32	43	3	8	11	25.6
740-749	Adrenal gland	2	0	2	0	0	0	0
750-759	Other endocrine glands	0	0	0	0	0	0	0
760-768	Ill-defined sites	0	0	0	0	0	0	0
770-779	Lymphnode**	51	38	89	28	18	46	51.7
809-809	Unknown Primary	53	28	81	46	23	69	85.2
	All	1090	1312	2402	704	550	1249	52.7

Table 31: Estimated death rate at one year after diagnosis for common cancers

< 20%	<50%	<75%	> 80%
Breast Cervix Skin Thyroid	Bladder Colon-rectum Prostate Lymphnode Oral cavity Nasopharynx Ovary Thyroid	Gallbladder Unspecify bile duct Larynx Bone marrow Stomach	Liver Unknown Primary Lung-bronchus Cholangiole

Overall Death rate within the study group at the time of writing was 52.2%.

The death rate is over 50% within a follow up period one year

8. Methods of payment for treatment

Table 32 and Figure 27 show the number of patients who paid for their own treatment and those whose treatment costs were reimbursed by some form of insurance or universal state cover.

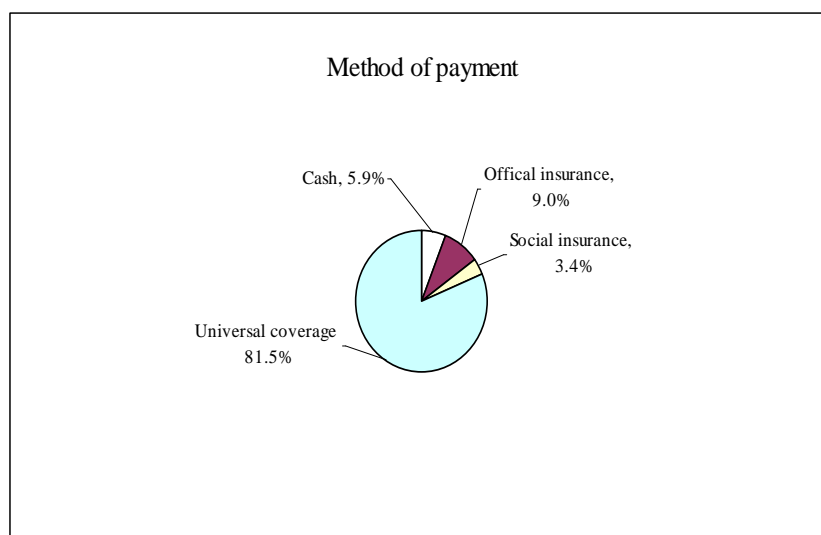
Universal Coverage is most common method of payment (81.5%)

Table 32: Methods of payment

Classification patients according to their method of payment

Method of payment	Cash	Official insurance	Social insurance	Universal coverage	Not known	All
N (%)	136(5.7)	207(8.6)	81(3.4)	1866(81.5)	107(4.5)	2397(100)

Figure 27: Methods of Payment



Conclusions

The total number of patients was 2,402. There were slightly more females than males. Most patients presented to the hospital with advanced disease, therefore, stage 4, distant metastases and lymph node involvement was most common. The commonest type of cancer is cholangiocarcinoma, but carcinomas of the cervix and breast are more common in females. The overall death rates from all cancers, within a follow-up period of one year, among males and females were 66% and 41.2% respectively. But the death rate following surgery is much lower among tumors treated by surgery. The most effective treatment is surgery. Combined surgery plus chemotherapy had the second lowest death rate of the study. The treatments with the highest death rates were: a combination of surgery, radiation and chemotherapy. The main reason for the high death rate in patients is late presentation with advanced disease. The best way to improve treatment outcomes would therefore be to encourage earlier presentation of patients to the hospital and increased awareness of the possibility of malignant disease among caretakers.

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