

## RESEARCH ARTICLE

# Survival of Stomach Cancer Cases in Khon Kaen, Thailand 2000-2012

Sirinya Nanthanangkul<sup>1</sup>, Krittika Suwanrungruang<sup>2,4</sup>, Surapon Wiangnon<sup>3,4</sup>, Supanee Promthet<sup>1,4\*</sup>

### Abstract

**Background:** Stomach cancer is an aggressive malignancy that is difficult to detect at an early stage and therefore is characterized by poor survival rates. Over the last two decades, there has been no report of gastric cancer survival in Khon Kaen province, Thailand. The aim of this retrospective cohort study was to provide up-to-date information about the survival of gastric cancer patients in this province. **Materials and Methods:** Data from Khon Kaen population-based cancer registry, Faculty of Medicine, Khon Kaen University were newly obtained on 650 patients who were diagnosed with stomach cancer during the period 1 January, 2000 to 31 December, 2012. These were then followed up until death or the end of the study (31 December 2014). We calculated the observed survival with the actuarial life table method, and relative survival, defined as the ratio of observed survival in the group of the stomach cancer patients to the expected survival in the entire Thai population from the estimated generation life tables for Thailand of five-year birth cohorts from 1900 - 2000. **Results:** The 5 year observed and 5 year relative survival rates were 17.2 % (95% CI: 13.54-21.14) and 18.2 % (95% CI: 14.3-22.4), respectively. The highest 5 year relative survival rates were demonstrated among patients aged 45-65, with stage I or II lesions, with adenocarcinomas, with a body of stomach location, well differentiated and receiving surgery and/or chemotherapy. **Conclusions:** The observed and relative survival rates were close to each other. Our findings provide basic information beneficial to development of an effective treatment system and appropriately improved population-based cancer registration.

**Keywords:** Relative survival - stomach cancer - Khon Kaen, Thailand

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### Introduction

International Agency on Research for Cancer (IARC) determined that stomach cancer ranks the third leading cause of cancer-specific mortality, which was 8.8%. They estimated age-standardized incidence rate (ASR) were 17.4 per 100,000 for males and 7.5 per 100,000 for females. Moreover, the number of deaths will be 1,174,013 in 2030 by the prediction of IARC (Wang et al., 2012; Ferlay et al., 2015). In Thailand, the overall estimated age-standardized incidence rates (ASR) were 3.6 per 100,000 for males and 2.5 per 100,000 for females (Imsamran et al., 2015).

Stomach cancer is one of the most common forms of malignancies, include Thailand (Suwanrungruang et al., 2006). It is an aggressive malignancy that is difficult to detect at early stage and over poor outcome (Wang et al., 2007; Zhang et al., 2015). The burden and severity of a cancer were reflected by patterns of survival (Che et al., 2014). Generally, there were observed survival and relative

survival, which use to estimated survival rate. As the cancer survival was a key measure of the effectiveness of health - care system (De Angelis et al., 2014). Therefore, the study of survival of cancer patients is essential for monitoring the successful cancer control (Dickman et al., 1999). Especially in relative survival, we use this approach as a key indicator for monitoring progress against cancer in population.

Population - based cancer registries collected the information on all cancer cases in defined areas. These data should confine analysis of survival to those cases who are residents of the registry area (Jensen, 1991). For most cancer registries, cause of death information obtained from death certificate is either unavailable or unreliable due to misclassification errors. Therefore, instead of calculating the probability of surviving cancer in the usual way, considering deaths from other causes as censoring events, the concept of relative survival was developed by comparing the observed survival probability of a group of cancer patients with the survival of a similar cancer - free

<sup>1</sup>Epidemiology and Biostatistics Section, Faculty of Public Health, <sup>2</sup>Cancer Unit, <sup>3</sup>Department of Paediatrics, Faculty of Medicine, <sup>4</sup>ASEAN Cancer Epidemiology and Prevention Research Group, Khon Kaen University, Khon Kaen, Thailand \*For correspondence: [supanee@kku.ac.th](mailto:supanee@kku.ac.th)

group (Cho et al., 2011).

In Thailand, the population-based cancer registry at the Faculty of Medicine, Srinagarind hospital, Khon Kaen University, started in January 1988 which had the reports of the five years relative survival of the stomach cancer in Khon Kaen province which were 23.4% in both sexes and 14.9%, 23.3% in male and female respectively (Sriamporn et al., 1995; Vatanasapt et al., 1998). Over the last two decades, there has been no report of the gastric cancer survival in Khon Kaen province, Thailand. The aim of this retrospective cohort study was to provide up-to-date information about the survival of gastric cancer patients in this province.

## Materials and Methods

### Cases definitions

This study, we assessed all new cases of stomach cancer recorded in the population - based cancer registry of Khon Kaen province according to the International Classification of Diseases for Oncology (ICD - O 3<sup>rd</sup> edition, code C16.0 - 16.9) from January 1st, 2000 to December 31<sup>th</sup>, 2012 (n=650). Cases reported only in death certificated (n=10) and patients who diagnosed with multiple primaries were not included in our study.

### Follow - up

Through record linkage with the continuously updated Death Registry of the Nation Health Security Office (NHSO), Thailand and the medical records, we obtained for each patient the number of years of observation until the date of death or the end of the study (December 31<sup>th</sup>, 2014).

### Statistical methods

Percentages were used to describe categorical data and mean with standard deviations or medians with ranges were used to describe continuous data. We calculated the observed survival, with the actuarial life table method, and the relative survival, defined as the ratio of observed survival in the group of the stomach cancer patients to the expected survival in the entire Thai population from the estimated generation life tables for Thailand of five - year birth cohort: 1900 - 2000 (Prasartkul and Rakchanyaban, 2002), corresponding to the patient group with respect to gender, 5 - year age group, and 5 - year calendar period of observation. Consequently, an adjustment was made for deaths from causes other than stomach cancer. All analyses were conducted using Stata version 10.0 (Stata Corp LP, 2007).

### The ethics consideration

The study was approved by the Khon Kaen University Ethics Committee for Human Research. The reference number is HE 581401.

## Results

### Demographic characteristics of stomach cancer

The distribution of demographic characteristics was summarized in Table 1. The amount of stomach cancer

patients with 650, 365 (56.15 %) were male. The median (min : max) age was 61 (22: 92) years. Table 2 shows the frequencies and the distribution of pathological characteristics of cases. The most commonly specified anatomical sites of stomach cancer that identified, histological type, histological grading and stage of diseases were antrum (8.15%), Adenocarcinoma (56.92%), poorly differentiated (28.77%) and stage IV (38.77%) respectively.

### Survival rate of stomach cancer

The total follow-up person time was 562.86 person-years. The overall mortality rate and the median survival time were 80.48 per 100 person-years (95% CI: 73.40-88.25) and 5.16 months (95% CI: 4.44-6.00) respectively. The overall of the observed survival rate and the relative survival rate were demonstrated by the Figure 1. Figure 2 shows the observed survival rate and the relative survival rate with 95% confident intervals. Table 3 presented 1, 2, 3, 4, 5 year observed survival rate and relative survival rate, which had 5 year observed survival rate (17.16 (95% CI: 13.54-21.14)) and 5 year relative survival rate

**Table 1. General Characteristics of Stomach Cancer Cases**

Variables	Number (650)	%
Gender		
Male	365	56.15
Female	285	43.85
Age (years)		
<45	98	15.08
45-65	331	50.92
>65	221	34.00
Median (Min:Max)	61 (22:92)	

**Table 2. Frequencies and Distribution of Pathological Characteristics of Stomach Cancers**

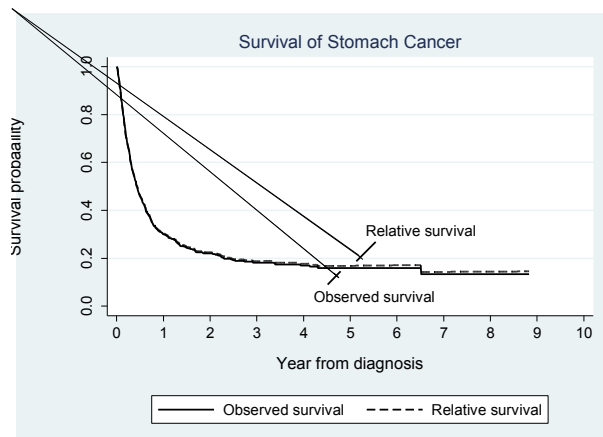
Variables	Number (650)	%
Site of diseases		
Fundus of stomach	2	0.31
Greater curvature of stomach	2	0.31
Body of stomach	3	0.46
Overlapping lesion of stomach	3	0.46
Pylorus	8	1.23
Cardia	34	5.23
Gastric antrum	53	8.15
Stomach, Not other specified	545	83.85
Histological type		
Signet ring cell carcinoma	13	2.00
Mucinous adenocarcinoma	142	21.85
Adenocarcinoma	370	56.92
Unknown	125	19.23
Histological grading		
Well differentiated	43	6.62
Moderately differentiated	76	11.69
Poorly differentiated	187	28.77
Grade cannot be assessed	344	52.92
Stage of diseases		
Stage I	5	0.77
Stage II	12	1.85
Stage III	60	9.23
Stage IV	252	38.77
Unknown stage	321	49.38

**Table 3. Overall Survival Rate of Stomach Cancer cases**

Survival time (year)	Observed survival rate (95% CI)	Relative survival rate (95% CI)
1	32.15 (28.42-35.93)	32.67 (28.88-36.51)
2	23.79 (20.15-27.60)	24.43 (20.69-28.35)
3	19.52 (15.95-23.36)	20.25 (16.54-24.23)
4	18.26 (14.69-22.15)	19.13 (15.39-23.20)
5	17.16 (13.54-21.14)	18.15 (14.32-22.37)

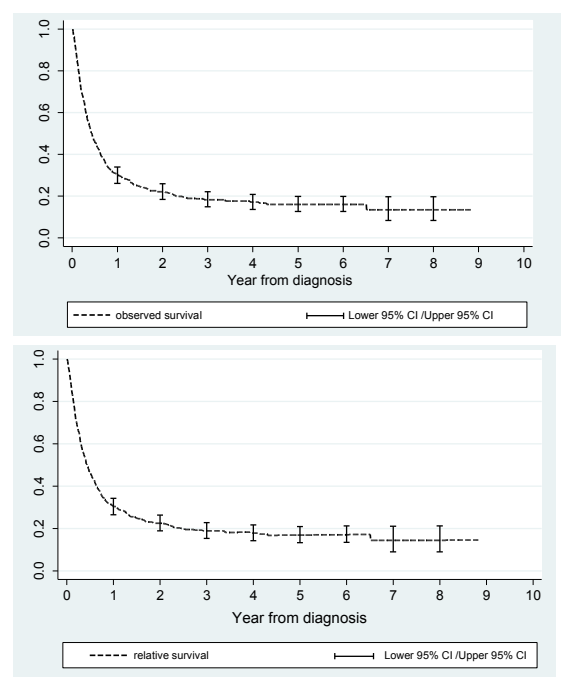
**Table 4. 5 Year Survival Rate of Stomach Cancer cases**

Variables	5 year Observed survival rate (95% CI)	5 year Relative survival rate (95% CI)
Gender		
Male	17.55 (12.85-22.86)	18.53 (13.57-24.14)
Female	17.08 (11.87-23.09)	17.89 (12.44-24.20)
Age (year)		
>45	24.02 (14.36-35.06)	24.12 (14.41-35.20)
45-65	19.55 (14.43-25.26)	20.29 (14.97-26.22)
>65	9.39 (4.63-16.19)	10.66 (5.26-18.38)
Stage of diseases		
Stage I, II	14.10 (0.95-43.89)	14.51 (0.97-45.16)
Stage III, IV	11.37 (6.88-17.10)	11.89 (7.19-17.89)
Histological type		
Adenocarcinoma	21.99 (13.59-31.67)	23.10 (14.28-33.28)
Mucinous adenocarcinoma	15.70 (10.93-21.25)	16.46 (11.46-22.28)
Signet ring cell carcinoma	15.22 (1.22-45.45)	15.55 (1.14-46.44)
Site of diseases		
Fundus	15.29 (3.04-36.46)	15.83 (3.14-37.75)
Body	33.33 (0.90-77.41)	33.39 (0.90-77.55)
Pylorus	27.37 (15.44-40.71)	28.47 (16.06-42.35)
Histological grading		
Well differentiated	26.08 (14.61-39.10)	27.53 (15.42-41.28)
Moderately differentiated	20.91 (10.77-33.31)	22.01 (11.34-35.06)
Poorly differentiated	13.42 (7.68-20.76)	13.90 (7.96-21.52)
Surgery		
Surgery	21.13 (15.47-23.80)	22.18 (16.24-28.76)
Non surgery	13.90 (9.54-19.06)	14.91 (10.23-20.44)
Treatment groups		
Only surgery	16.38 (10.22-23.80)	17.28 (10.79-25.11)
Surgery+Chemotherapy	27.02 (16.14-39.21)	27.99 (16.69-40.55)



**Figure 1. Overall Survival Curve of Stomach Cancer Cases**

(18.15 (95% CI: 14.32-22.37)). Moreover, data in Table 4 revealed the 5 year observed survival rate and 5 year relative survival rate of stomach cancer patients with dependence on gender, age groups, stage of diseases, histological type, site of diseases, histological grading, surgery and treatment groups.



**Figure 2. Overall Observed and Survival Curves of Stomach Cancer Cases**

## Discussion

The objective of this study was to provide up-to-date of survival rate of stomach cancer in Khon Kaen province. The 5 year relative survival rate from this finding was 18.15 (95% CI: 14.32-22.37), this rate was consistent with previous studies, which has been reported in Finland (5 year RS; 1980-1982; 17.9%, 1985-19987; 19.7%) (Brenner and Hakulinen, 2001) and the Netherland (5 year RS; 20.1%) (Houterman et al., 2006).

In addition to, the 5 year relative survival from this study more than in Sweden by Hansson et al. (5 year RS; 1906-1989; 13.3 (95% CI: 12.15-14.1)), in Chile by Heise (5 year RS; 1998-2002; 12.3 (95% CI: 9.1-16.1)), in Africa by Sankaranarayanan et al. (5 year RS; 1990-2001; 12%), in Uganda by Adam Gondos et al. (5 year RS; 1993-1997; 0.0%), Finland by Brenner and Hakulinen (5 year RS; 1975-1977; 12.9%) and England by Rachet et al. (5 year RS; 1996-2000, 2001-2003, 2004-2006 of male and female were 13.1, 14.4, not applicable and 14.1, 15.4, not applicable) (Hansson et al., 1999; Brenner and Hakulinen, 2001; Gondos et al., 2005; Heise et al., 2009; Rachet et al., 2009; Sankaranarayanan et al., 2010). For instance Uganda and Sub-Sahara 12 countries which had low 5 year relative survival rate thank to the different when compare to both of developing and developed country. This differentiation probably was the limitation of medical staff, standard treatment, medical advance and the system of gastric cancer control.

Furthermore, this result less than many previous studied which in U.S.A. by Hudahl et al. (5 year RS; 1985-1996; 28%), Thailand by Sriamporn et al. (5 year RS; 1985-1992; 23.4%), Estonia by Innos et al. (5 year RS; 1995-1999; 20%, 2000-2004; 22%, 2005-2009; 22%), European 22 countries by Sant et al. (5 year RS; 1985-1996; 23%), Korea by Jung et al. (5 year RS; 1993-1997; 43.8%, 1998-2002; 50.3%), Korea by Bae et al. (5 year RS; 1985; 43.9%), Japan by Tsukuma et al. (5 year RS; 1993-1996; 62.1%), Finland by Brenner and Hakulinen (5 year RS; 1990-1994; 25.9%, 1995-1999; 28.8%) and China by Xiang et al. (5 year RS; 1992-1995; 30%) (Sriamporn et al., 1995; Hundahl et al., 2000; Bae et al., 2002; Sant et al., 2003; Brenner and Hakulinen, 2005; Tsukuma et al., 2006; Jung et al., 2007; Xiang et al., 2010; Innos et al., 2014). In Japan where it had the highly 5 year relative survival rate due to Japan has implemented a stomach cancer screening program especially among high risk group since 1971. Then, they have more efficient to detect gastric cancer patients in early stages, as a result, the 5 year relative survival rate and the prognosis of gastric cancer patients becomes better. Over the last two decades, Sriamporn et al. have been reported the 5 years relative survival rate of stomach cancer higher than this study result; The rates of Sriamporn et al. was higher than this study can be possible because the limitation of followed up at that time, which increased censoring. According to an increasing of censored, the relative survival rates were overestimated.

In conclusion, the observed and relative survival rates were close to each other. The survival among Khon Kaen province population was indicated by the 5 year relative

survival rate of gastric cancer. Our findings can comprise as a basic information that beneficial to develop the basic structure of treatment system and helpful in appropriate improved population-based cancer registry, as well.

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