Chapter 1

Introduction

1.1 Introduction

Cancer is an important public health problem that causes social and economic loss worldwide. It is a class of diseases in which a group of cells display uncontrolled growth beyond the normal limits, invasion and destruction of adjacent tissues and organs, and sometimes metastasis which is the spread to other locations in the body (Kumar et al, 2007). In 2008, cancer was reported as a leading cause of death worldwide. The disease accounted for 7.9 million deaths or around 13% of all deaths. The main types of cancer leading to overall cancer mortality each year are lung, stomach, colorectal, and liver cancers (World Health Organization, 2008)

In Thailand, liver cancer is the top leading cause of death. The mortality rate in 2007 was approximately 83.1 per 100,000 population, and men are affected than women (Ministry of Science and Technology, 2006). There are two common types of liver cancer which are Hepatocellular Carcinoma (HCC) and Cholangiocarcinoma (CCA). HCC is originated from liver cells and the most common cause is exposure to hepatitis B virus. Other causes can be hepatitis C virus infection, aflatoxin exposure, alcohol, and other hepatotoxic agents. CCA is the cancer of bile ducts. An important cause of CCA is exposure to a species of liver fluke (Srivatanakul et al, 2004). The incidence rate of liver cancer was reported to be 29.9 per 100,000 population in 2002 and increases to 58.8 per 100,000 populations in 2007 (Ministry of Science and Technology, 2006). The incidence starts to rise from age 30 years and reaches a peak

at age group of 60-69 years old (Srivatanakul and Attasara, 2007). The incidence rates in different regions of Thailand estimated by Sriplung et al, (2006) are shown in Table 1.1

Provincial	Incidence per 100,000 population			
	2002	2003	2006	2007
North	33.74	30.91	37.64	42.03
Northeastern	51.55	47.46	50.07	51.68
Central	22.85	26.11	20.43	30.67
South	**11.08**	**11.39**	**14.67**	**15.05**

Table 1.1: The incidence rate of liver cancer in different regions, estimated for the years 2002-2007

The liver cancer differs according to regions. The highest liver cancer incidence was found in the northeast. The highest age-standardized incidence rate (ASR) of liver cancer was found in Udon Thani province (Sriplung et al, 2003). In year 1998-2000 Cancer registry in Thailand reported that the incidence rates in males were found between 7.3 in Prachuap Khiri Khan to 113.4 in Udon Thani while those in females were found between 2.1 in Songkla to 49.8 in Udon Thani (Khuhaprema et al, 2007). The incidence rate of liver cancer in Southern is the lowest. It was increasing every year. In Songkhla province, the incidence rate in males was higher than in females; 7.7 and 2.1 per 100,000 population, respectively (Srivatanakul and Attasara, 2007). In 1992 in Songkhla province, hepatitis B vaccine for children aged between 2 months and 15 years was available (Chub-uppakarn et al, 1998). In this study the trend of liver cancer in Songkhla province is investigated. The result from this study might be used as basic information for Province-level health policy to prevent the outbreak of liver cancer in the area.

1.2 Objectives

1. To investigate the temporal trends for liver cancer in Songkhla during 1989-2007

2. To create statistic modeling to estimate incidence rate for liver cancer in Songkhla during 1989-2007

1.3 Literature Reviews

Incidence of HCC

Hepatocellular Carcinoma (HCC) is the fifth leading cause of liver cancer death worldwide accounting for approximately 500,000 deaths each year (Ferlay et al, 2004).The incidence rate per 100,000 population of liver cancer globally for time periods (1975,1980,1985 and 1990) were 182.5, 171.7, 214.2 and 316.3 in male while female were 76.7, 79.4, 100.7 and 121.1, respectively (Notani, 2001). In Osaka, Japan from 1981 to 2003, the age-standardized incidence rates in study period were 29.2 and 24.0 in male and 7.3 and 6.6 in female, respectively (Tanaka et al, 2008). In China, from 1991-1993, the highest liver cancer incidence was HCC which accounted for 100 per 100,000 population per year (Tian and Chen, 2006). The result also shows that the majority where in the 65 age group for both gender (Le, 2006). In Thailand, in 1990 the age-adjusted HCC incidence rates were 40.5 per 100,000 population among males and 16.3 per 100,000 population among females (Vatanasapt et al, 1998). The incidence rate increased to 47.4 per 100,000 population males and 19.5 per 100,000 population among females in 1993 (Deerasamee et al, 1999). The highest incidence rate for liver cancer in Thailand during 1995-1997 occurred in the 60-65 age group of both gender (Matin and Patel, 2004). In 1998-2000 the highest incidence rate in Thailand for both genders was in the 65-70 age groups (Srivatanakul and Attasara,

2007). HCC is a very critical liver cancer it accounts for 80 to 90% of all liver cancers in Thailand where the overall incidence rate ranged between 6.4 to 87.5 per 100,000 population in males and 1.4 to 37.2 in females (Parkin et al, 1999).

Incidence of CCA

Other types of liver cancer is Cholangiocarcinoma (CCA) accounting for 15% of all primary liver cancers worldwide (Nakanuma et al, 1999). In United States of America CCA was found 7.7% of primary liver cases. This kind of cancer varies according to the difference in geographical characteristics (Parkin et al, 1993). CCA was relatively high in Hong Kong and Italy with the ratio between male and female of 1.1:1-2.2:1 (Parkin et al, 1997). In Thailand the age-specific incidence rates of liver cancer increase at older ages and reach the peak around the age of 65. The ratio of male to female in CCA ranges from 1.1:1 to 2.2:1 (Deerasamee et al, 1999). The lowest of age-standardized incidence rate in Songkhla of male and female are 0.3 and 0.4 per 100,000 population while highest incidence in Khon Kaen of male and female are 67.5 and 33.5 (Srivatanakul et al, 2004).

Modeling

Dyba and Hakulinen (2008) using simple extrapolation models and poisson regression models compared the length of the 95% prediction intervals of cancer incidence rate from 1967-2003 in Finland. The results show the length of the 95% prediction intervals of liver cancer among male and female as 65 and 78, respectively. It is shorter than simple extrapolation model, which showed 81 in male and 97 in female. Hao et al. (2003) using poisson model to assess the incidence rate trends of liver cancer in a geographically defined Chinese population showed the liver cancer case (N= 13,685) were diagnosed between 1981 and 2000. The result show that age-

adjusted incidence rate per 100,000 population in the study period were 27.4 and 16.4 in male and 11.5 and 6.4 in female, respectively.

1.4 Plan of Thesis

This thesis contains five chapters, the first is the introduction in this chapter.

Chapter 2 includes study population and sample, study design and data source, variables and conceptual framework, data management and statistical methods.

Chapter 3 includes the preliminary data analysis for the liver cancer incidence data. This involves using graphical and statistic methods.

Chapter 4 comprises the result using poisson regression model.

Chapter 5 includes a general summary of the previous four chapters and the conclusions.