

## Chapter 5

### Discussion and Conclusion

This study presents the assessment of the VR causes based on the 9,644 deaths from the VA study in 2005 using logistic regression. The Poisson model was used to estimate liver cancer death rates by gender-age group, year and province based on the corrected number of liver cancer deaths from 2000 to 2009.

#### 5.1 Summary of findings

This study adjusted number of reported deaths from vital registration data focusing on liver cancer deaths. The number of liver cancer deaths reported from 2000-2009 were corrected and the adjusted death rates from Poisson registration model based on the corrected number of liver cancer deaths were presented over the decade 2000-2009. The estimated number of liver cancer deaths were 134,243.6 (males) and 61,964.5 (females). These are 56% and 74% higher than the reported totals of 85,873 and 35,643, respectively.

The preliminary results in Chapter 3 and the logistic regression model in Chapter 4 show that liver cancer deaths in 2005, the year that we have verbal autopsy data, varied with province, gender-age group and VR reported cause location group. The liver cancer deaths were high in Ubol Ratchathani in the Northeast and Phayao in the North. The liver cancer deaths were also high in male aged 40-49, followed by male aged 60-69, male aged 50-59 and female aged 60-69. As expected, liver cancer deaths

are more likely to be reported as liver cancer in hospital, liver cancer outside hospital and other cancer outside hospital.

The Poisson model results in Chapter 4 show that liver cancer in Thailand varied substantially by province, gender-age group and to a lesser extent by year. Provinces with average mortality rate were Mae Hong Son and Prachin Buri. Provinces with above average mortality rate were in the Northeast region except Nakhon Ratchasima and 10 provinces (Chiang Mai, Chiang Rai, Phayao, Nan, Phrae, Uttaradit, Sukhothai, Phetchabun, Lamphun and Lampang) of the Northern region. Mortality rate in Sa kaeo province was also above average. The rest were below average. The liver cancer death rates were more pronounced among men. The overall death rate for male (42.16) was more than double of that for female (18.01). The adjusted rates increased with age for both male and female. The rates for male aged 60-69, 70-79 and 80+ were 198.20, 254.24 and 336.12 per 100,000 population, respectively. The rates at these ages for female were less than half of those for male. The year effect was relatively low. The rates range from 27.73 in 2009 to 31.57 in 2003. It reflected stable trend during study period.

## **5.2 Discussion**

Deaths from liver cancer diseases were estimated based on 9,644 deaths in 2005 VA study. Logistic regression models with the logit of probability of death due to liver cancer diseases were fitted separately to the data classified by province, gender-age group. The methodologies used in this thesis can be applied to correct number of deaths based on a similar verbal autopsy study in developing countries that the quality of vital registration data is low. The verbal autopsy procedures to verify register cause

of death have been successfully applied in China and the Islamic Republic of Iran (Rao et al. 2007, Khosravi et al. 2008).

Thematic maps of the province coefficients suggested that liver cancer deaths have different regional patterns. Our results are consistent with previous studies in this issue. Since, geographical inequalities in liver cancer mortality have been reported (Faramnuayphol et al. 2008, Pearce 2006, Vecchia et al. 2000).

Our results on year effect on liver cancer mortality do not agree with the previous study (Vecchia et al. 2000). The trend in our study is stable during 2000-2009 but they found increasing trend among male in the US and other European countries during 1979-1998.

### **5.3 Limitations, strength and further study**

There are some limitations in this study. First, there is some uncertainty about generalizing our findings because we assume that the model is valid for years before and after 2005. A further limitation is the completeness of mortality registration in Thailand remains uncertain.

The strength of this study lies in the thorough methodologies used. This study used appropriate statistical models to estimate liver cancer mortality rates. The benefit of using statistical model is that it provides adjusted rates for the factor accounting for other factors.

Further research should be focus on analysis of other major causes of deaths. More over the appropriate methods used for forecasting liver cancer death rates and other cause groups are also essential for further studies.