Chapter 5

Discussion and Conclusion

This chapter concludes with a discussion of results presented in previous chapters. The limitations and recommendations for further studies are also included.

5.1 Summary of findings

Drowning accounted for more than 41,620 of all deaths in Thailand from 2000 to 2009. The average proportion of drowning deaths for all causes of injury deaths in Thailand was 9.8%. Of these, the proportions of drowning deaths were 7.4% for males and 2.4% for females. Age group 5-14 years had the highest proportion of drowning deaths which was 21.3%. The majority of drowning deaths were males (75.4%). The overall average death rate was 6.3 per 100,000 population. The death rates among males aged 0-4 years had the highest drowning rate with a rate of 14.9 per 100,000 population while females aged 15-29 years had lowest drowning rate with the rate of 1.3 per 100,000 population. Drowning death rate had a peak in year 2006. Bangkok had the lowest death rate with 3.3 per 100,000 population. Drowning death rate was associated with gender-age group, PHA and year. Drowning death rates by gender-age group in males were consistently higher than those in females across all age groups except in aged 15-29 years. Drowning death rates in year 2005 and 2006 were statistically significant higher than the average.

Death rates in PHA2, PHA3, PHA4, PHA5, PHA8, and PHA9 were higher than the average death rate whereas death rates in PHA6, PHA11, PHA12, and PHA13 were lower than the average.

5.2 Discussion

Previous studies on drowning death in Thailand mainly focused on specific areas (Plitponkarnpim et al, 1999b; Laosee et al, 2007d). We found only one published study that analyzed drowning death data for the whole country of Thailand (Gerdmongkolgan et al, 2009d). However this study did not analyze drowning death data by PHA as our study.

Among all causes of injury deaths in this study, drowning was accounted for 9.8%. The overall drowning death rate in Thailand was 6.3 per 100,000 population. This rate is similar to the estimated global drowning death rate in 2004 which was 6.2 (WHO, 2010c) and the death rate in developing countries such as Bangladesh (Hyder et al, 2003), India (Suresh Kumar Shetty and Shetty, 2007b), Mexico (Celis et al, 2008c), Kyrgyzstan, Public of Moldova, and Lithuania (Lu et al, 2010b) with the rate per 100,000 population of 10.5, 7.4, 6.6, 5.4, 6.9, and 9.8, respectively.

In developed countries, drowning death rate has declined (Steensberg, 1998b; Langley et al, 2001b; Lunetta et al, 2004e; Nakahara et al, 2004b; Pan et al, 2006d; Hong et al, 2011; Nasrullah and Muazzam, 2010c) whereas the rate has still increased in developing countries (Ahmed et al, 1999c; Laosee et al, 2007e). An increasing trend in drowning deaths in Thailand was evident in 1987-1996 (Plitponkarnpim et al, 1999c). However in this study, the increasing trend was observed only in males.

This can be explained that outdoor activities are often dictated by cultural for gender roles. Males are more likely to engage in recreational activities outside the home or surrounding areas, while females are more likely to engage in recreational activities in or near their homes. This is consistent with Rahman et al (2006), Fang et al (2007e), and Kiakalayeh et al (2008d).

Drowning death rates were higher for males than females. Our finding agrees with the previous studies. Langley et al (2001c) exposed that the majority of unintentional drowning in New Zealand were males (76%). In Louisiana, most of drowning deaths occurred among males (84%) (Kohn et al, 2001). A review of Peden and McGee (2003) revealed that males had previously been found to have higher drowning death rates than females in all age groups. Lindholm and Steensberg (2000b) reported that 72.5% of drowning deaths in Denmark were males. In Iran, 87% of drowning deaths were males and a male-female ratio of death rate was 6.5:1 (Sheikhazadi and Ghadyani, 2009c). In China, the finding of Ma et al (2010c) revealed that boys were at higher risk of drowning compared with girls. In United States, the proportion of deaths was significantly greater among males than females (Nasrullah and Muazzam, 2010d). In Thailand, Ekchaloemkkiet and Gerdmongkolgan (2008) and Gerdmongkolgan et al (2009e) reported that the proportion of deaths in aged less than 15 years was greater among males than females up to three times.

Drowning rate was highest in ages less than five years, which is consistent with drowning data from most areas of the world (Ahmed et al, 1999d; Nakahara et al, 2004c; Salomez and Vincent, 2004b; Yang et al, 2005d; Rahman et al, 2009b; Antonio and Consunji, 2010). In contrast, Mitchell et al (2010b) estimated of drowning mortality adjusted for exposure to risk in Australia found that males aged

65 years and over had higher rates than females. Nevertheless, in Thailand, drowning is the fourth of the leading causes of death at aged less than 15 years accounted for 10% of all causes of deaths (Porapakkham et al, 2010b). Most drowning cases among children may be lack of swimming skills or parents are always busy with their daily activities and might unknown that their children prefer to swim in the pools or natural river nearby the house.

Drowning death was associated with PHA. In this study, the majority of drowning deaths occurred in the Central (PHA1-PHA4) and the North regions (PHA8-PHA10) with above the overall mean of drowning death rates whereas Bangkok (PHA13), the capital of Thailand, had the lowest of drowning death rate. This finding is consistent with previous studies of most drowning occurred in rural area (Adekoya, 2003; Celis et al, 2008d, Claesson et al, 2008; Hu et al, 2010b). Another possible reason can be explained that drowning deaths in rural area were higher than urban area (Quan and Cumming, 2003b; Ma et al, 2008b; Liu et al, 2012). Several studies (Stiglets, 2001; Bener et al, 2007b; Strayer et al, 2010) reported that the place of drowning death was the important factor determining the risk of drowning death. Many past studies reported that most of drowning deaths in all age groups accrued in natural bodies of water such as ponds, ditches, river, sea and lakes which most were in rural areas (Ahmed et al, 1999e; Browne et al, 2003b; Lunetta et al, 2004f; Fang et al, 2007f, Hyder et al, 2008b). Unfortunately, our study lacks of this information due to the data from death certificates recorded place of drowning less than 1% of the deaths. Thus this factor was not included in the analysis.

Death rates in years 2005 and 2006 were higher than average. The higher number of drowning deaths may be related to flood. In 2005, a big flood covered 8 provinces in the South and Chiang Mai province in the North. In 2006, a great flood happened in the North covered 8 provinces and caused landslide. A largely water in water resources may be affected due to flooding disaster. The reasons for explaining this result are also needed to be investigated in further studies.

A prevention policy for drowning mortality should be targeted at children aged 0-4 years and males. As the results in this study, increasing awareness among mothers and relatives about the risk of drowning, require more precaution practice and knowledge transfer to the parents. Drowning prevention programs in the form of active prevention such as water safety guidance for parents, water safety education and swimming lessons for children, and placing warning signs in unsafe zones, should be used to reduce drowning death rates in Thailand. All of these prevention programs need to be emphasized especially in the Central, the Northeast and North regions of Thailand.

5.3 Limitations and future study

Present study analyzed drowning deaths in Thailand based on only available data gender-age group, PHA and year. There are some limitations in this study. First, death rate was calculated based on death certificate data which may under reported. The second limitation is lack information on other factors which may associated with drowning deaths such as the place of drowning, time of drowning, month of drowning, distance of place of drowning from home, and swimming ability that may help us for getting more additional information.

Further studies need to indentify the association of all these factors with drowning death. Multivariate multiple regression and Lee Carter model (Lee and Carter, 1992) are further models worth to be used for investigating and forecasting the trend of drowning death rates.