Chapter 3

Preliminary Data Analysis

This chapter presents a basic descriptive analysis of mortality from diabetes in 1996-2006 in Southern Thailand. Graphical displays were used to investigate age-specific patterns of diabetes mortality rates. Section 3.1 shows the description of determinant variables. Section 3.2 presents numbers of diabetes mellitus deaths and mortality incidence rates. The analysis was separated for each gender. These preliminary results provide ideas for further statistical analysis.

3.1 Description of determinants

Number of deaths from diabetes mellitus is an outcome, and diabetes mellitus mortality rate is treated as a continuous outcome with determinants being gender, age groups, province, and year. They are all categorical determinants. The categories are show in Table 3.1.

Determinant	Categories
Gender	1= Male, 2= Female
Age group	0, 1-4, 5-9, 10-14, 15-19, 20-24, 25-29,30-34, 35-39, 40-44, 45-49, 50-54,55-59, 60-64, 56-69, 70-74, 75+
Province	80:Nakhon Si Thammarat, 81:Krabi, 82:PhangNga, 83:Phuket, 84:SuratThani, 85:Ranong, 86:Chumporn, 90:Songkla, 91:Satun, 92:Trang, 93:Phattalung, 94:Pattani, 95:Yala, 96:Narathiwat
Year	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006

Table 3: Determinant categories

3.2 Numbers of deaths and mortality incidence rates

During the period from 1996 and 2006, there were 6,773 deaths from diabetes

mellitus (ICD-10 codes E10-E14.9) in Southern Thailand.

Figure 3.1 shows number of deaths by year for males and females using a mosaic plot.

The numbers of deaths from diabetes slightly increases every year, with proportion of

deaths in females being higher than in males. After the year 2001, numbers of deaths

are slightly greater than 400 cases a year for females and about 300 cases for males.
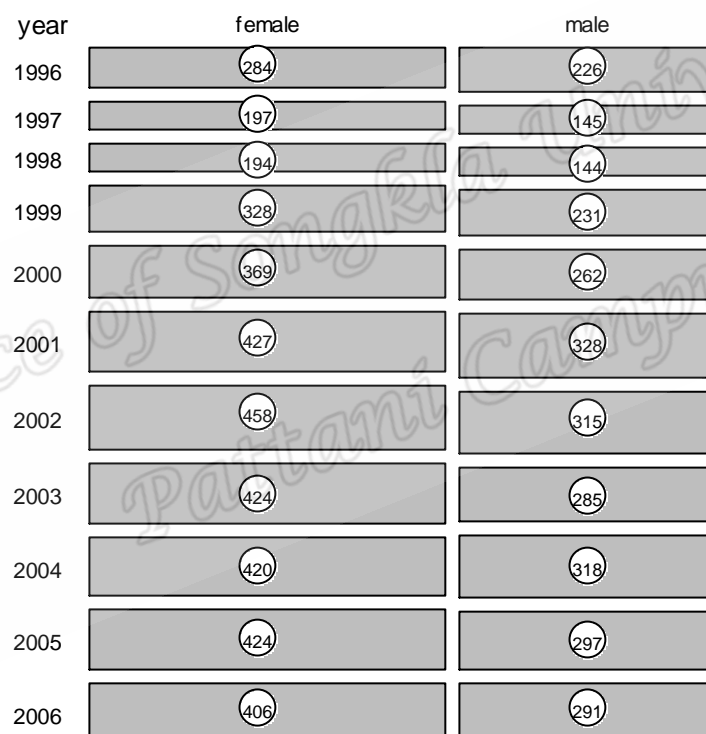

Figure 3.1: Mosaic plot of annual number of deaths by gender

Figure 3.2 shows numbers of deaths by age group for males and females. In this plot

the ages were combined into ten-year age groups except for the oldest age group 70-

84. More than 90% of the deaths occurred in people aged 30 and older for both males

and females, especially females aged 60-69 and females aged 70-84, with 1332 cases and 1229 cases respectively.
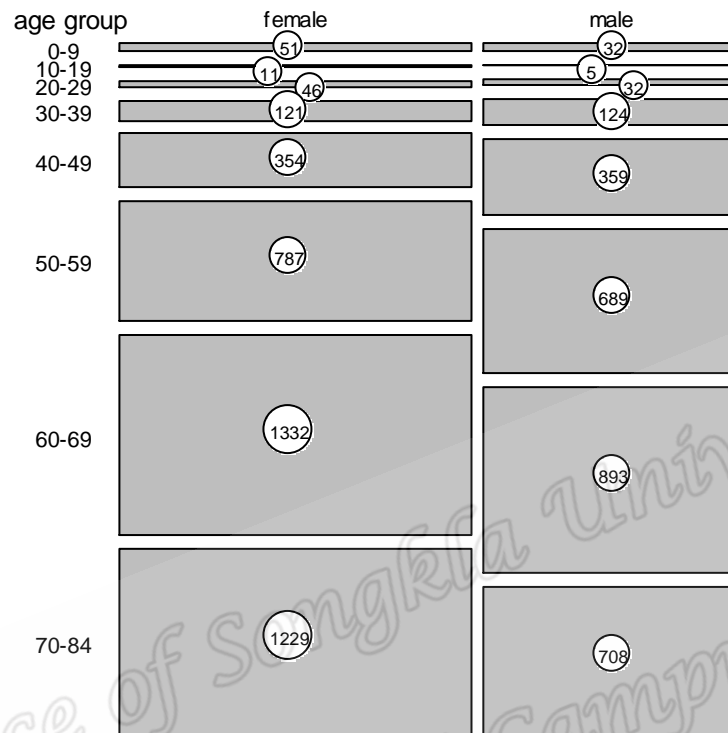

Figure 3.2: Mosaic plot of numbers of deaths by age group and gender
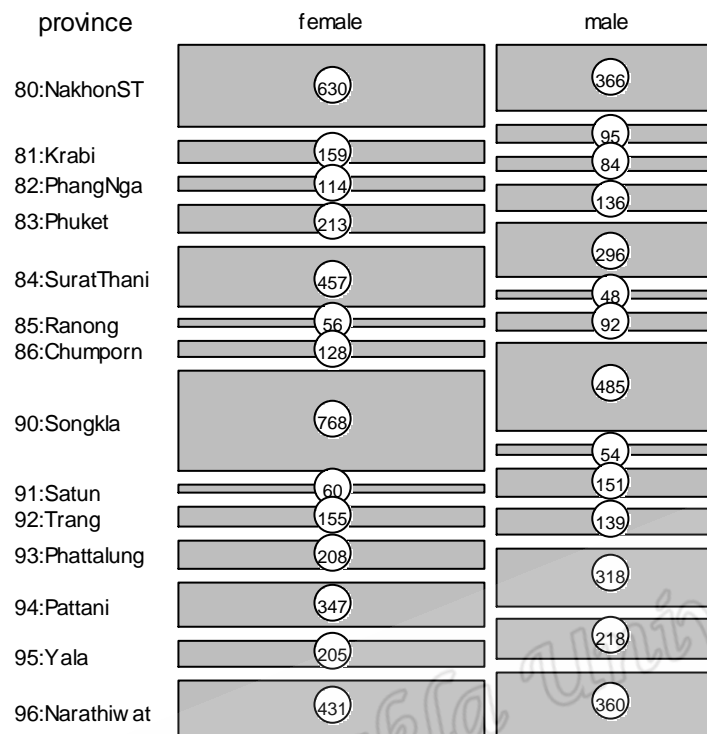
Figure 3.3: Mosaic plot of numbers of deaths by province and gender

Figure 3.3 shows numbers of deaths by province for males and females. One third of the deaths occurred in Nakhon Si Thammarat and SongKla. Compared to other provinces, Songkla has the maximum numbers of deaths (18% of all deaths in the study period.)

Figure 3.4 shows the age patterns of mortally from diabetes mellitus, and all causes for each year using a square root scale. The top left and top right panels are mortality rates from diabetes for males and females respectively. The bottom left and top right panels are mortality rates from all causes of deaths for males and females respectively. The black lines without dots are incidence mortality rates for Japan in 2006.

Diabetes mortality incidence rates are calculated as numbers of deaths divided by corresponding population as described in Chapter 2. To facilitate the comparison at

different ages, square root scales was used for plotting mortality rates. The mortality rates from all causes of deaths were also plotted, together with the mortality rates from a very low country mortality rate namely Japan (see Figure 3.4).

Death rates from both deaths rates from 'diabetes' and 'all causes' increase with age, but the patterns are slightly different: the diabetes mortality rates fluctuate, but 'all causes' of death is smooth. As expected, Southern Thailand's mortality rates are higher for 'diabetes' in age group 30-69 and for 'all causes' in all male age groups. Surprisingly, all causes of death rates for females aged 55 to 74 for Southern Thailand is lower than those of Japan in 2006. It can be seen from the graphs that the mortality rates in 1997 and 1998 are quite low compared to other years.
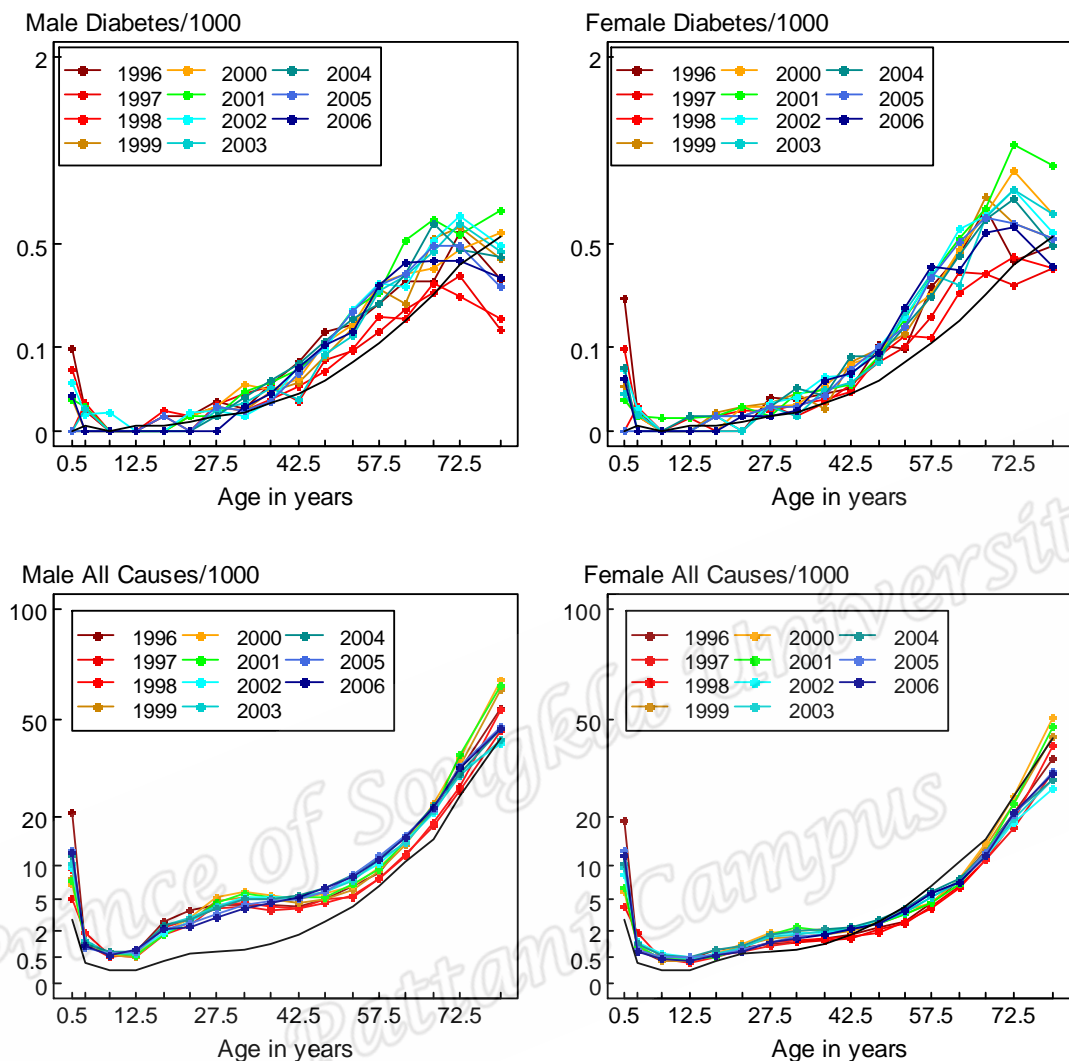
Figure 3.4: Southern Thailand mortality incidence rates per 1000 population in square root scale

Figure 3.5 shows the excess deaths in Southern Thailand compared with Japan in year 2006 increased with age. The excess diabetes deaths varied from "-30 (in the 75+ age group) to +40 (in the 55-69 age group)" for males and "0 (in the 1-29 age group) to 70 (in the 60-64 age group)" for females. The excess all causes of deaths varied from 0 to 1800 for males and from 100 to almost 2100 for females. These excess deaths are almost 1800 for middle age male.
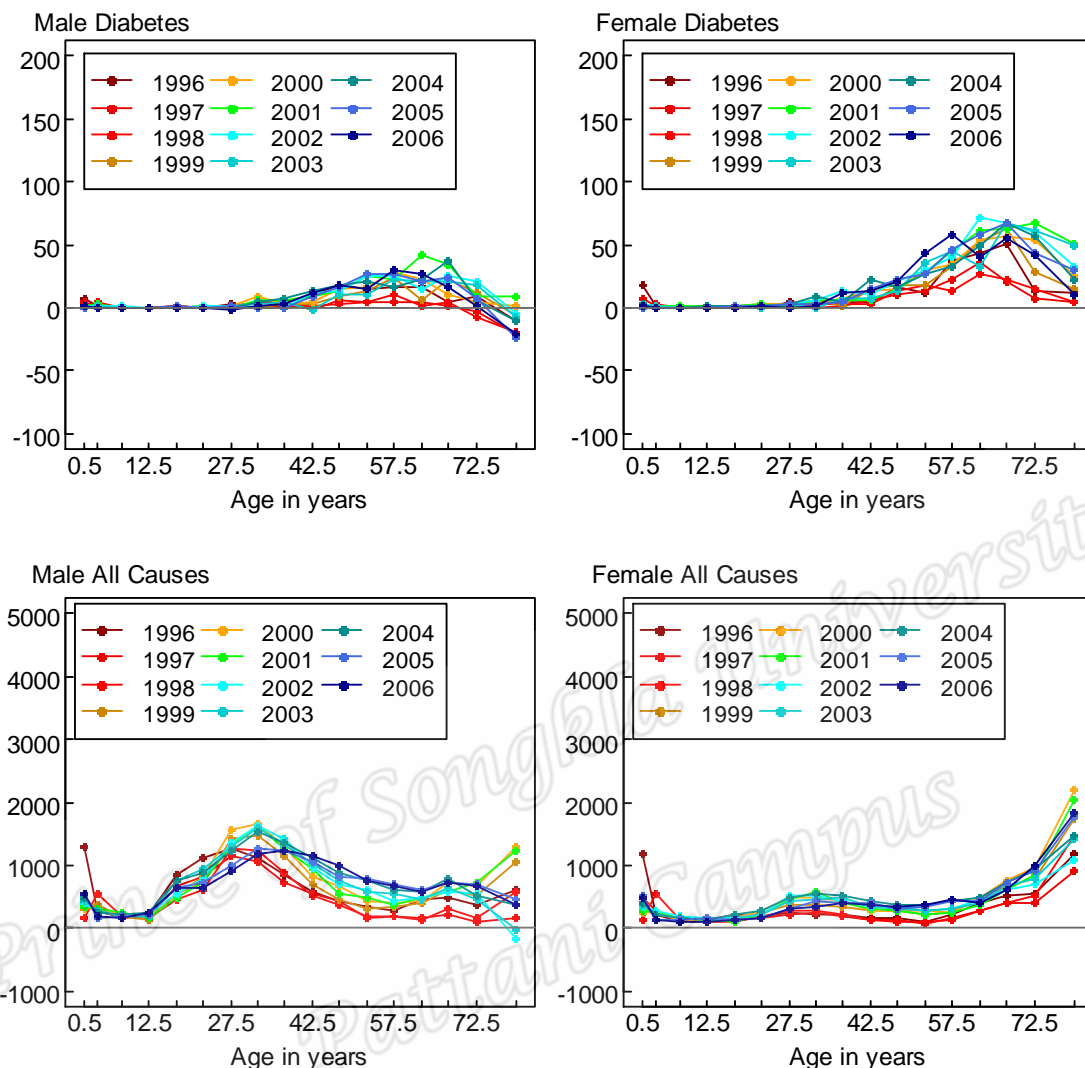
Figure 3.5: Excess deaths in southern Thailand over Japan in 2006

Figure 3.6 shows excess mortality incidence rates in Southern Thailand compared to Japan in 2006. The excess rates for diabetes varied from -0.3 (aged 75+) to 0.3 (aged 65-69) per 1000 population for males and varied from 0 (aged 1-39) to 1.1 (aged 70-74) for females. In both gender the risk was lower among aged less than 30 years. The excess rates for all causes of deaths varied from 0 (aged 75+) to 22 (aged 75) for males and varied from 0 (aged 1-54) to 30 (aged 75+) for females.
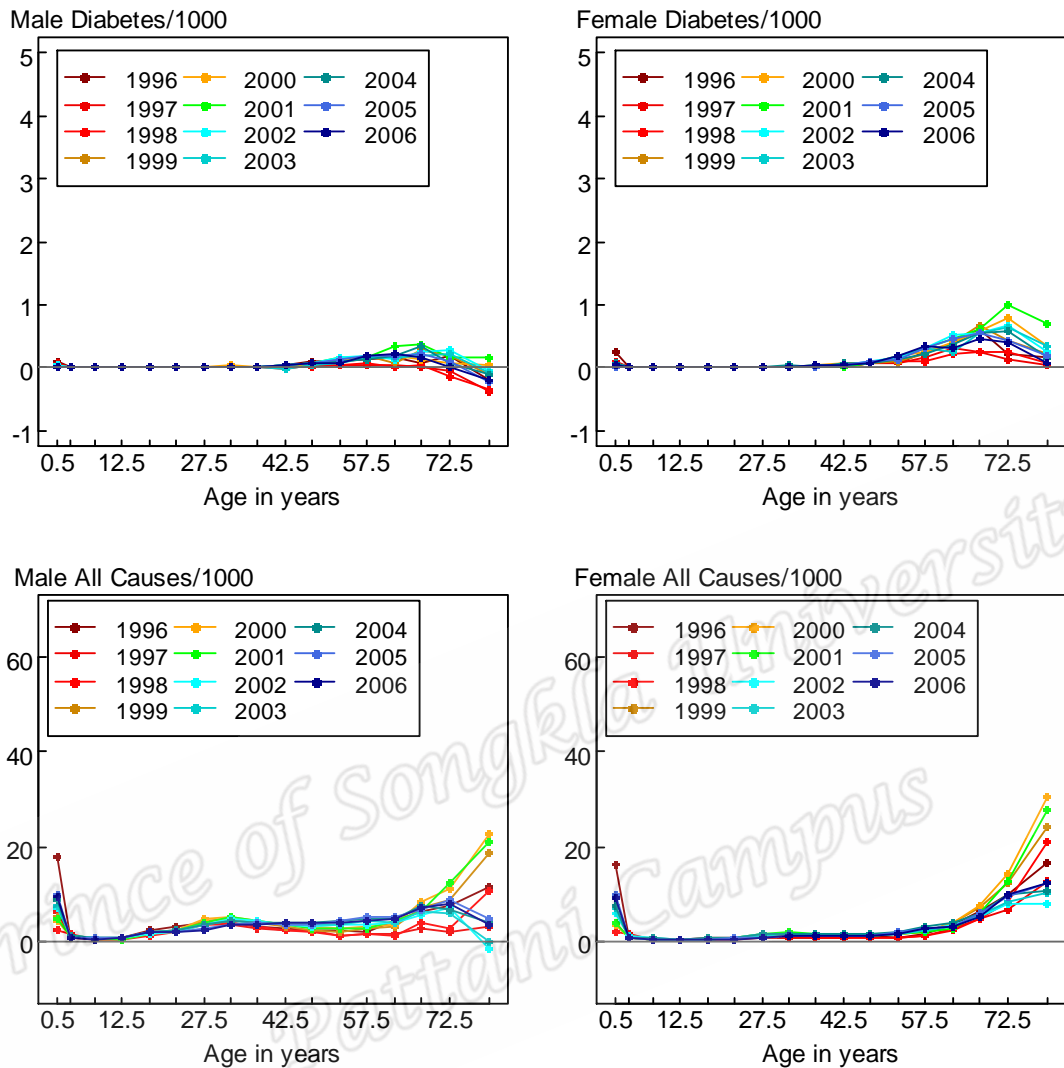
Figure 3.6: Excess mortality incidence rates in Southern Thailand over Japan in 2006

Figure 3.7 shows diabetes mortality incidence rates per 100,000 population for Southern and other regions of Thailand using square root scale. The patterns of lower diabetes mortality rates in Southern Thailand are quite similar to other regions for both males and females. The rates vary from 0 to 100 per 100,000 population for both males and females.
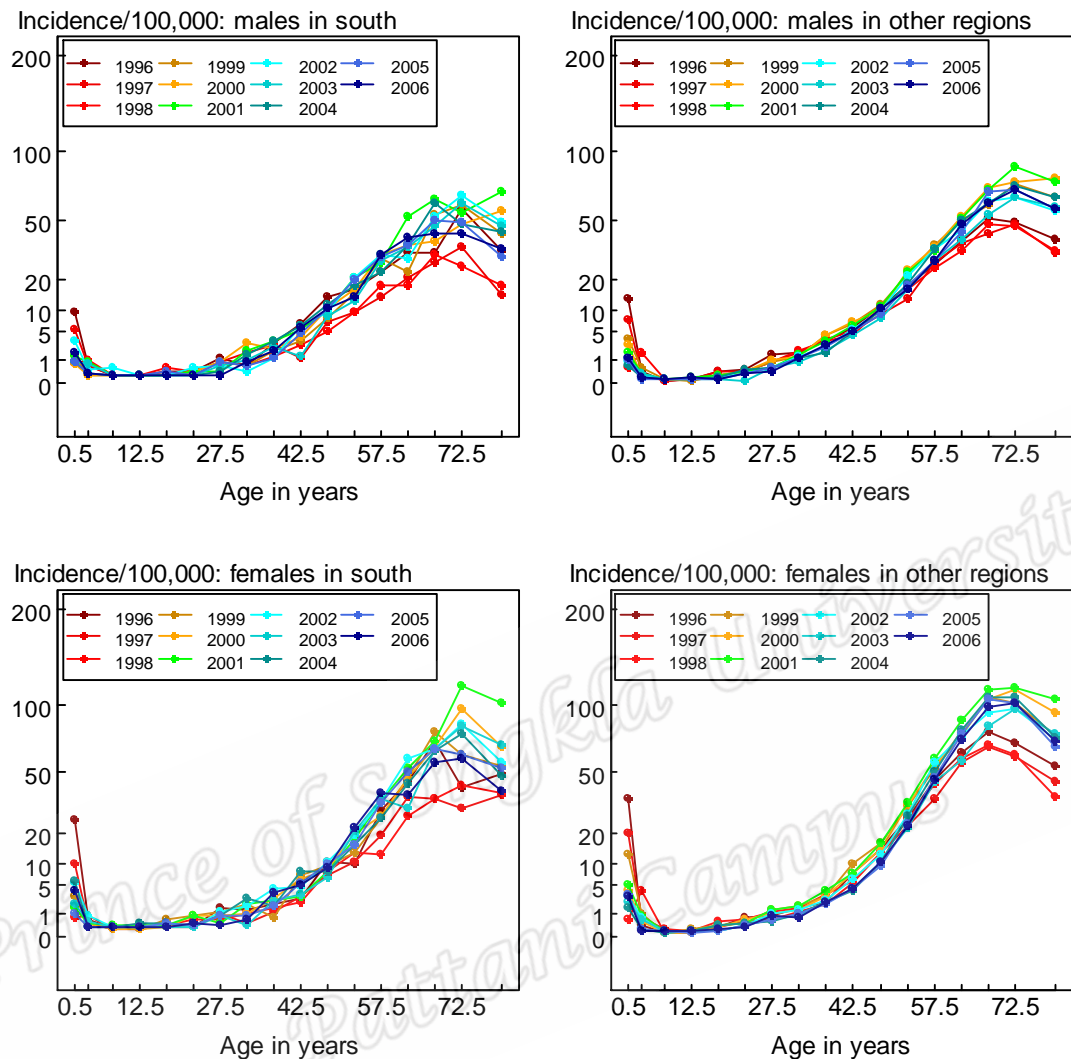
Figure 3.7: Southern and other regions of Thailand diabetes mortality incidence rates per 100,000 population

Figure 3.8 shows excess deaths for diabetes mellitus in Southern Thailand over the rest of Thailand for males and females in three dimensions with X-axis being age, Y-axis being excess number of diabetes deaths, and Z-axis being year. The surfaces reveal that for older age groups Southern Thailand has lower death from diabetes than other regions.

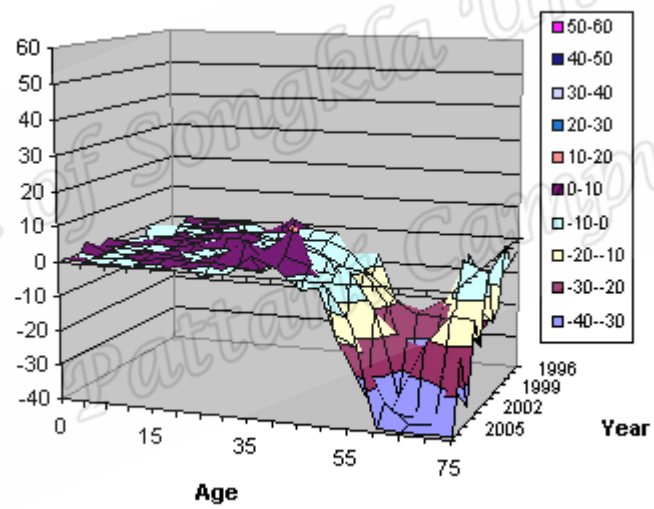**Male Excess Deaths**
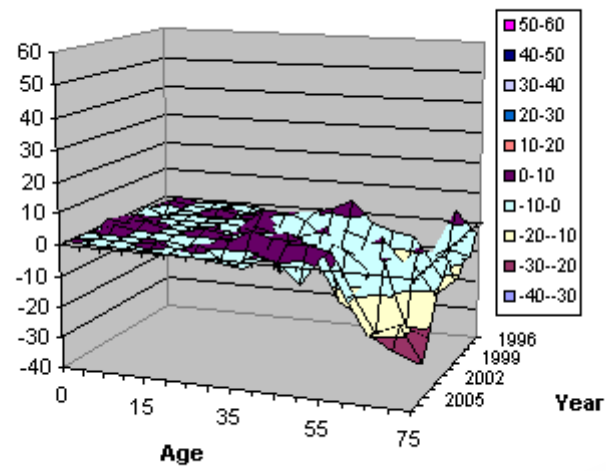
Female Excess Deaths

Figure 3.8: Excess deaths in Southern Thailand over the rest of Thailand