Chapter 3

Preliminary Data Analysis

In this chapter, we report results from preliminary analysis of under-five death in Thailand from 2000 to 2009. Section 3.1 covers numbers of deaths by gender, cause, Public Health Area, and year. Section 3.2 covers estimating number of deaths. Section 3.3 covers death rates. Finally, section 3.4 covers the distribution of death rates.

3.1 Number of deaths

During the decade from 2000 to 2009, there were 84,227 deaths among children under-five were recorded and they contributed to 2.2% of all deaths. Causes of deaths were mainly due to perinatal (24.9%), ill-defined (19.9%) and congenital (11.2%) as shown in Table 3.1.

Table 3.1: Cause of deaths for children under-five years

Causes of death (ICD-10)	Cases (n=84,227)	Percentage
1:TB (A15-A19)	163	0.2
2:Septicemia (A40-A41)	4,653	5.5
3:HIV (B20-B24)	931	1.1
4:Other Infectious (A, B)$^{-}$	2,588	3.1
5:Cancer (C, D)	2,004	2.4
6:Endocrine+ (E,F,G,H)	3,061	3.6
7:Ischemic+ (I)	2,759	3.3
8:Pneumonia (J12-J18)	5,470	6.5
9:Other respiratory (J)$^{-}$	2,879	3.4
10:Digestive	1,143	1.4

Table 3.1: Cont.

Causes of death (ICD-10)	Cases (n=84,227)	Percentage
11:GenitoUrinary (N00-N99)	400	0.5
12:Perinatal (P)	20,979	24.9
13:Congenital (Q)	9,454	11.2
14:Ill-defined (R)	16,769	19.9
15:Transport accidents (V)	1,619	1.9
16:Drowning (W65-W74)	5,181	6.2
17:Other injuries (W^{-}, X,Y)	4,174	5.0

Endocrine: $^{+}$mental and behavioral disorder/the nervous system/the eye and adnexa/ the ear and mastoid process, Ischemic: $^{+}$cardiovascular, $^{-}$exclude above

Table 3.2 shows frequency distributions of deaths. The majority of deaths were boys (56.2%). The number of deaths in the Norteast accounted for 31.0% of all deaths followed by the Central for 25.4%, the South for 18.3%, the North for 16.6% and Bangkok for 8.6%. The highest number of deaths occurred in PHA6: Northeast (12.1%) followed by PHA12: South (11.4%) and PHA7: Northeast (9.7%). The annual number of death accounted for 7,476 in 2000 and 9,001 in 2009. The percentage of under-five death dropped 16.8% from 10.7% in 2000 to 8.9% in 2009.

Table 3.2: Frequency distribution of deaths for children under-five years

Factors	Category	Cases (n=84,227)	Population	Percentage
Public Health Area (PHA)	PHA1: Central	3,233	1,797,557	3.8
	PHA2: Central	2,988	1,452,736	3.5
	PHA3: Central	8,120	4,057,504	9.6
	PHA4: Central	7,171	3,270,109	8.5
	PHA5: Northeast	7,764	5,427,889	9.2
	PHA6: Northeast	10,158	6,577,575	12.1
	PHA7: Northeast	8,193	5,074,034	9.7
	PHA8: North	3,356	1,821,404	4.0
	PHA9: North	4,396	2,374,261	5.2
	PHA10: North	6,202	3,343,281	7.4
	PHA11: South	5,822	3,493,908	6.9
	PHA12: South	9,600	4,061,022	11.4
	PHA13: Bangkok	7,224	4,568,821	8.6
Gender	Boy	47,366	24,177,682	56.2
	Girl	36,861	23,142,419	43.8
Year	2000	9,001	4,832,753	10.7
	2001	9,632	4,821,361	11.4
	2002	8,790	4,809,974	10.4
	2003	8,322	4,798,577	9.9
	2004	8,297	4,787,194	9.9
	2005	8,665	4,794,518	10.3
	2006	8,276	4,771,821	9.8
	2007	7,980	4,706,303	9.5
	2008	7,788	4,581,576	9.3
	2009	7,476	4,416,024	8.9

Figure 3.1 shows numbers of death by PHA, gender and year. The number of death was decreased with year for both sexes for most of PHAs except PHA11 and PHA12 in the South.

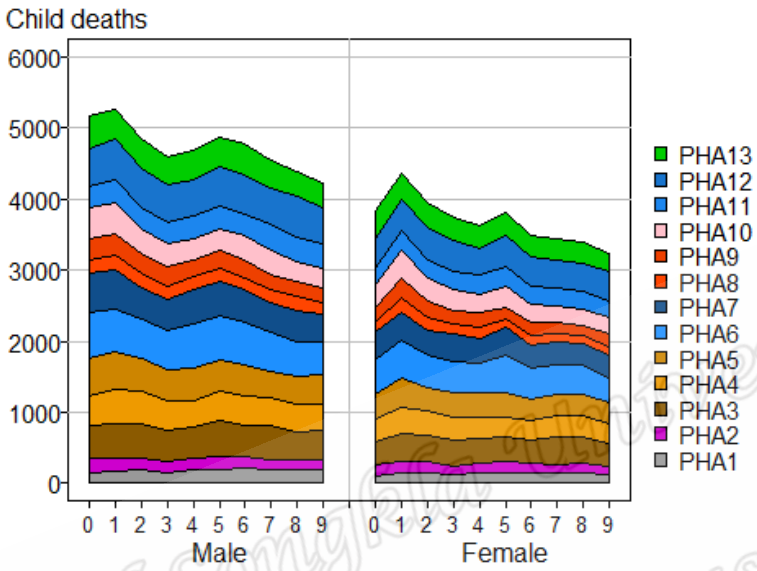

Figure 3.1 Numbers of children under-five years death by gender, PHA, and year

Figure 3.2 shows numbers of death by cause, gender and year. More than half of deaths were due to perinatal originating conditions, congenital malformations, and ill-defined cause. Ill-defined cause was then decreased after 2005. It reflects data quality in terms of cause of deaths.

For further analysis on death by cause, the causes of death were grouped into three cause groups as perinatal originating conditions, congenital malformations, and others. Since our data have a high number of ill-defined cause, it reflects misclassification causes of death. Therefore, we estimate the number of death by cause based on analysis of the 2005 VA data.

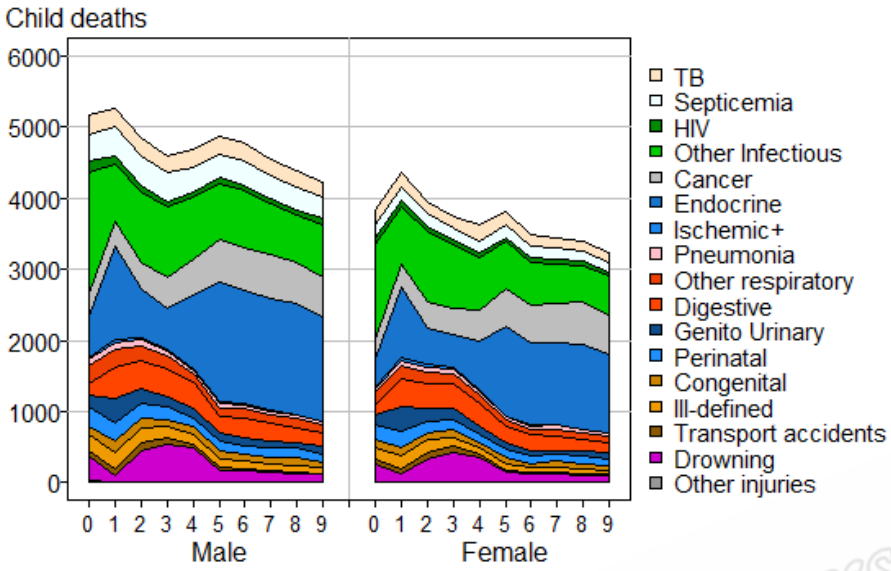

Figure 3.2 Numbers of children under-five years death by gender, cause, and year

3.2 Estimating number of deaths

From 149 VA child deaths, most likely DR cause groups are perinatal originating conditions (40 deaths), congenital malformations (21 deaths), and other cause (46 deaths). They are shown as buble plots in Figure 3.3.

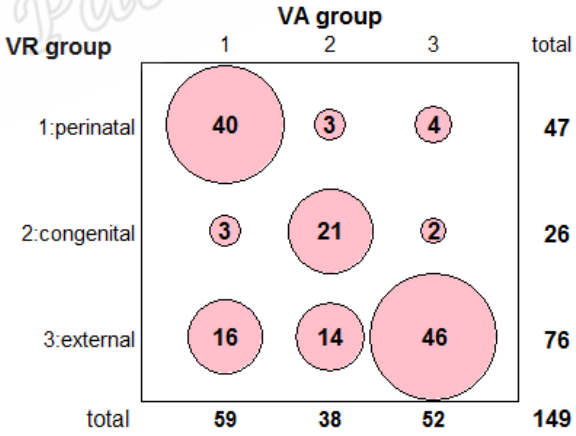

Figure 3.3: Association between VA and DR groups

The number of deaths for three causes were estimated using different logistic regression models of the selected causes. The models also give confidence intervals

for percentages of deaths in cause groups for levels of each risk factor adjusted for other risk factors.

Figure 3.4 shows bar charts and confidence interval of percentages. The bar chart and confidence interval of percentages of perinatal originating conditions deaths (left panel), congenital malformations death (midlle panel), and other cause deaths (right panel). The DR cause was statistically significant (p-value <0.00001) in the three models, whereas province and gender were not significant in all models.

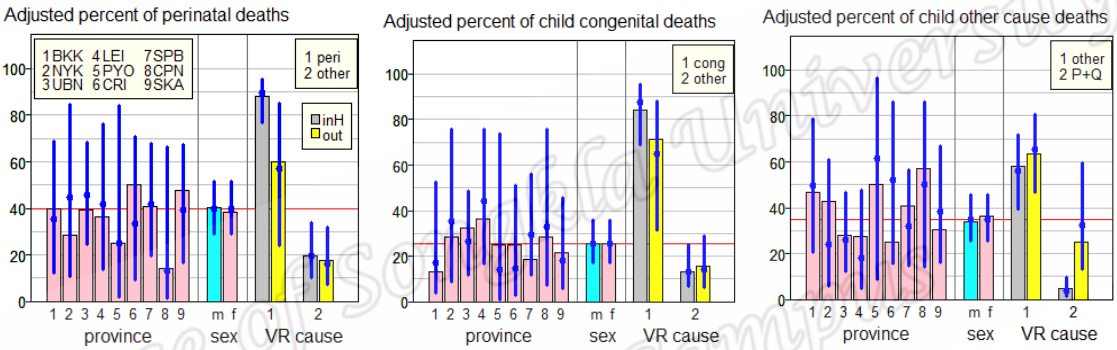

Figure 3.4: Association between outcome and determinants

Figure 3.5 compares children under-five years deaths between VA estimated and DR reported deaths using an area plot. Between 2000 to 2009, the estimated number of children under-five deaths was 83,103.7 deaths. It is lower than the report of 84,227 from 3,794,821 deaths. The estimated number of children under-five deaths were 46,716 for boys and 36,387.7 for girls. These are lower than the report of 47,366 and 36,861, respectively. The estimated number of deaths was 27,634.2 deaths for perinatal originating conditions, 36,968.5 deaths for conginatal malformations, and 37,549.38 deaths for other. These are higher than the report of 20,979 for perinatal originating conditions, and 9,454 for conginatal malformations, but the estimated number of death for other was lower thanit was reported (53,794 deaths). The estimated number of death of perinatal origainating conditions were 17,271.8 for boys

and 10,362.4 for girls. Theses are higher than 12,052 and 8,927 for reported boy and girl deaths, respectively. The death rates decrease in 2002 and 2003 for both sexes.

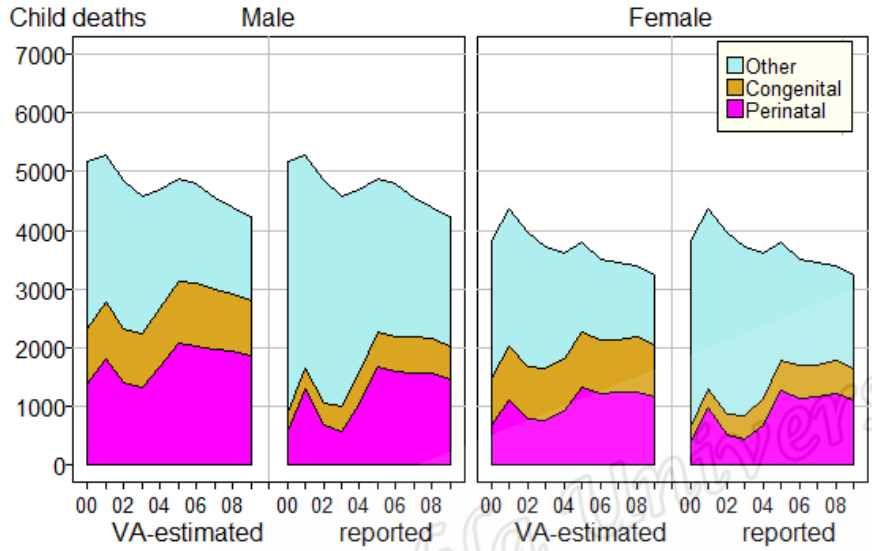

Figure 3.5: Cumulative graphs from chidren under-five years deaths in 2000-2009

3.3 Children under-five death rates

During the study period, the overall of death rates was 177.9 per 100,000 population of all cause, perinatal originating conditions (58.4), congenital malformations (39.1), and other cause (78.2). Figure 3.6 shows death rates by cause and year for boys (left panel) and girls (right panel). Deaths rates of other causes were decreased for both sexes. The death rates of perinatal originating conditions tend to increase with the exception for years 2002 and 2003 both sexes. Deaths rates due to perinatal originating conditions shows quite a distinct trend for boys and girls. Although both are increasing from 2004, the trend for boys is much higher than that for girls.

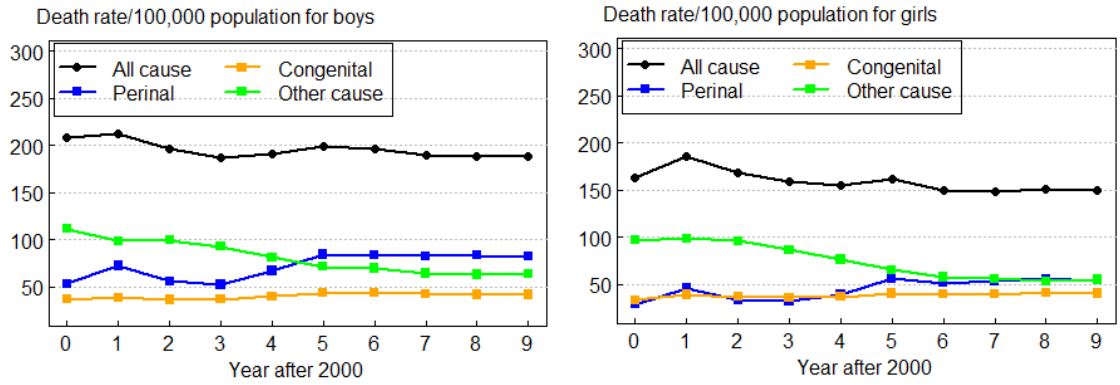

Figure 3.6: Death rates by gender

Figure 3.7 shows death rates for boys by PHA. Death rates clearly decrease in PHA13 which represent Bangkok from 250 per 100,000 in 2000 to 150 in 2009.

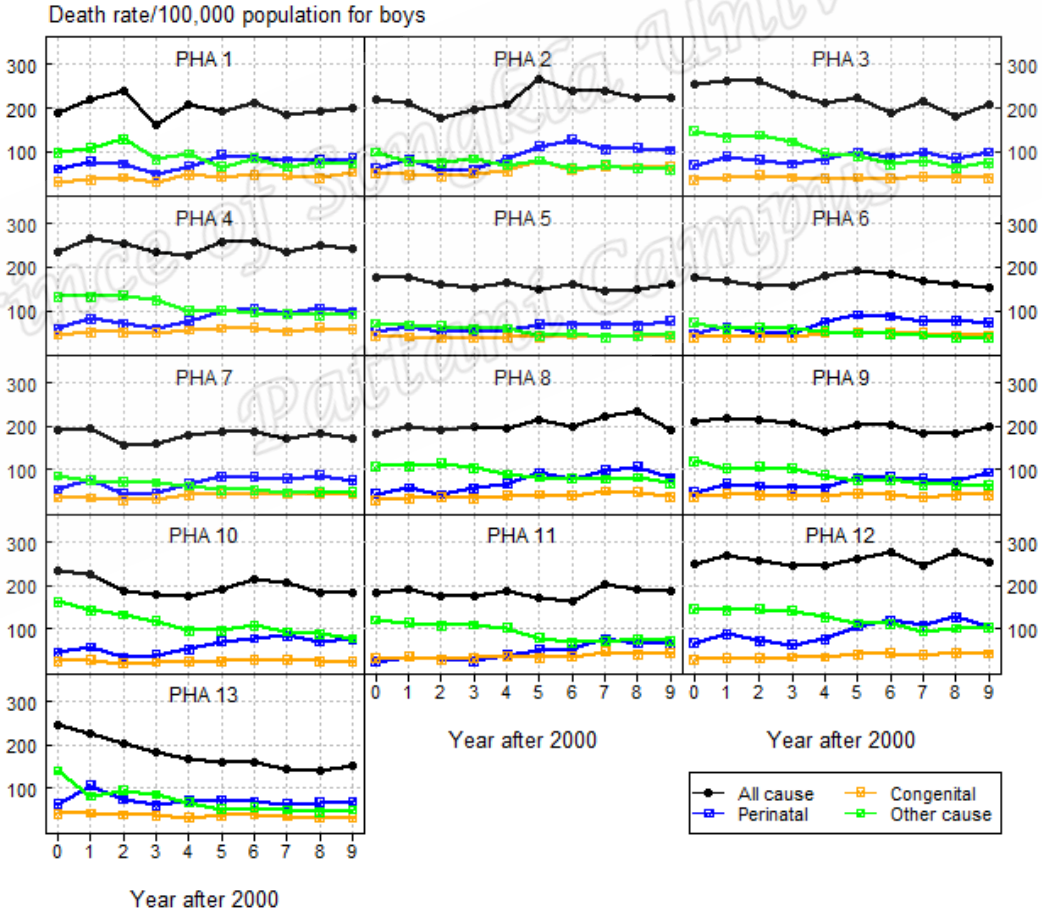

Figure 3.7: Trends of death rates for boys by PHA

Figure 3.8 shows death rates for girls by PHA. Death rates clearly decrease in PHA13 which represent Bangkok from 200 per 100,000 in 2000 to 100 in 2009. The decrase in death rates for girl occurred in PHA10 and PHA11.

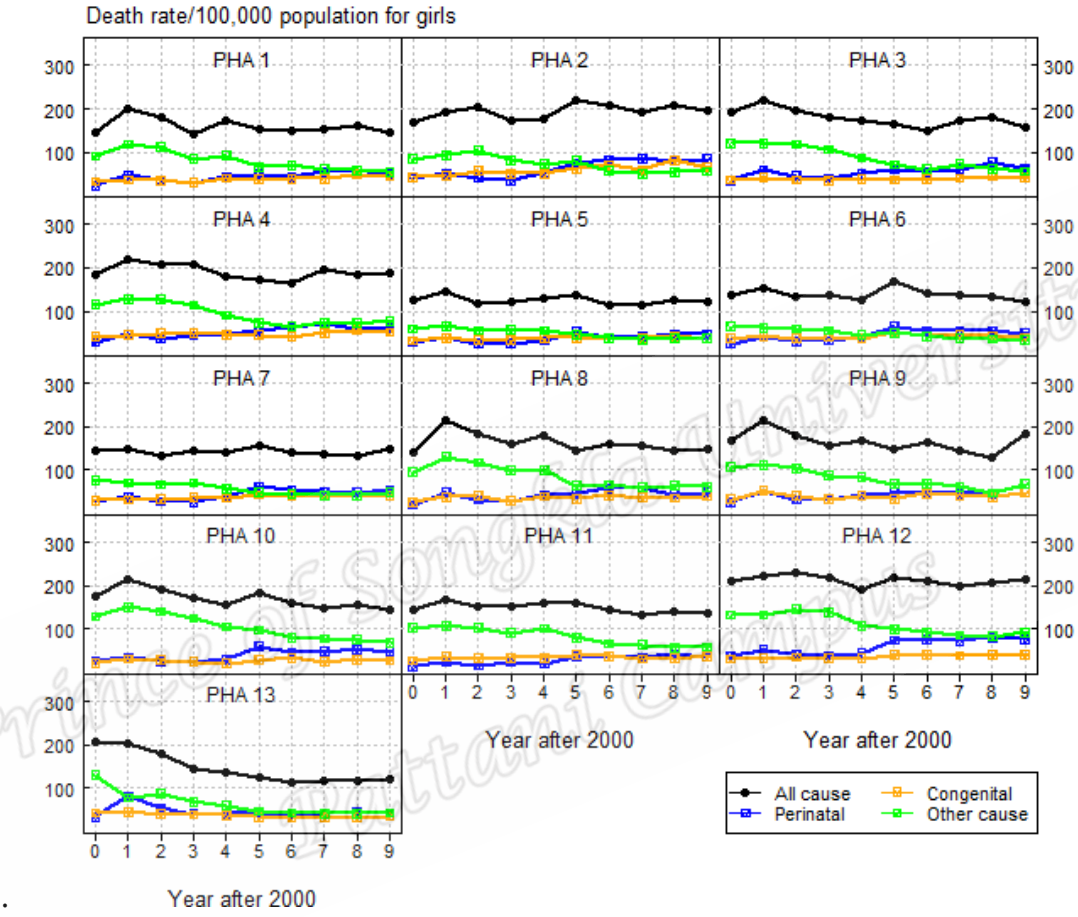

Figure 3.8: Trends of death rates for girls by PHA

The patterns between for boys and girls are diffent especially in PHA10, PHA11 and PHA12. The fluctuate in death rates for boys occurred in PHA12.

3.4 Distribution of death rates

In this study the death rates were an outcome. The distribution of death rates has positively skewed. The death rates were violated the assumptions for linear regression model. So it is conventional to transform them by applying logarithms. Zero counts

were replaced by 1 to avoid calculating the logarithm of zero. Figure 3.9 shows the histrogram of death rates before transformation (left panel) and the histrogram of death rates after transformation (right panel).

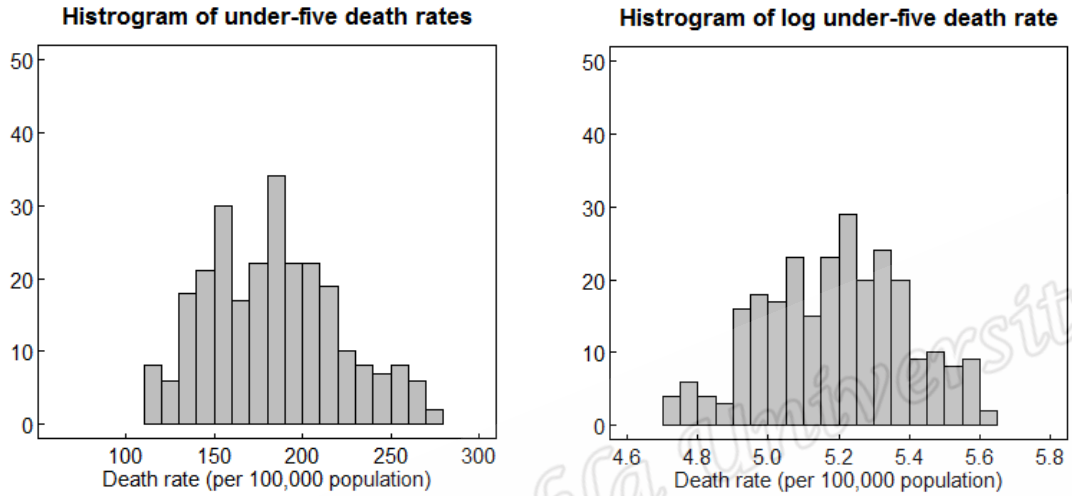

Figure 3.9: The distribution of death rates

The death rates by PHA, gender, and year were investigated using an appropriate statistical model. The results were shown in the Chapter 4.