

**Change to the epidemiological transition in Thailand
due to HIV/AIDS:
Implications for population and health policies**

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Significance:

The emergence and re-emergence of infectious diseases in Thailand, particularly HIV/AIDS, tuberculosis and pneumonia, challenges the epidemiological transition theory and forces us to rethink related population and health policies.

Objectives:

This study estimates the impact of the re-emergence of tuberculosis and pneumonia on Thai mortality and explores how it challenges the epidemiological transition theory.

Method:

1970 to 2000 national, annual age-sex death rates by cause of death were calculated using Ministry of Public Health death registration data.

Results:

Death rates from infectious diseases in Thailand declined until 1986 (4.5 per 100,000 population), only to start rising in 1987. There was a sharp increase after 1994, when reported deaths from tuberculosis and pneumonia was almost double that of 1990. The increased mortality occurred predominately among those aged 20-44 and affected males more than females. Even though only a small number of deaths were reported to be HIV/AIDS, mostly being attributed to tuberculosis and pneumonia, HIV/AIDS has been the underlining cause of death.

Discussion:

Epidemiological transition theory has overstated the decline in infectious diseases as cause of death. The emergence of HIV/AIDS and re-emergence of tuberculosis are forcing us to re-think both population and public health policies. Questions on how to effectively control infectious diseases like HIV/AIDS and tuberculosis should be re-focused.

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Introduction:

During the 19th to the mid 20th century, many parts of the world experienced dramatic mortality declines. This phenomenon was attributed to a decline of infectious diseases. Better sanitary living conditions and improved medical technology, rapidly replaced living conditions that were previously conducive to the spread of infectious and parasitic diseases. The risk of dying from infectious diseases was reduced among young people and those saved from dying from such diseases survived into middle and old ages, where they faced the elevated risk of dying from degenerative or man-made diseases. The shifting of health and disease patterns, linked with demographic change was described in the epidemiological transition theory (Omran, 1971).

Since this general theory of mortality change was published in 1971, many parts of the world have experienced declines in mortality following the pattern as described in this theory. Health experts and social scientists began to focus their attention more on chronic degenerative conditions that plagued older people. Advances in medical technology in treating degenerative disease and their complications became increasingly successful in postponing deaths and thus reducing case-fatality rates. This resulted in improved survival and a shift in the age structure towards older ages.

However, at the end of 20th century, morbidity and mortality differentials between subgroups demonstrated a marked change in the mortality pattern. The emergence and re-emergence of infectious and parasitic diseases, particularly tuberculosis (TB) and the acquired immunodeficiency syndrome (AIDS), was a substantial epidemiological phenomena of the late of twentieth century (UNAIDS, 2000:8). This transition was concentrated primarily among those aged 25-44. This was different from previous mortality patterns, which occurred among children and women. This change forced a focus of attention on the linkage between the epidemiological transition, mortality differentials and the AIDS epidemic.

The emergence of HIV has shown that infectious diseases can have a major impact even in a period of advanced medical treatment, good hygiene and health conditions. UNAIDS estimated that globally at the end of 1999, 34.3 millions adults and children were living with HIV/AIDS. While, 18.8 million

people around the world had died of AIDS, including 3.8 million children (UNAIDS, 2000:8).

African countries have been hardest-hit by the HIV/AIDS epidemic. There are now 16 African countries where more than one-tenth of the adult population aged 15-49 is infected with HIV. In seven countries at the southern part of the continent, at least one-fifth of the population is living with the virus. In Botswana 35.8 percent of adults are now infected with HIV, while in South Africa 19.9 percent are infected. The African HIV gender pattern is dominated by women, as they are affected at earlier ages than are men. There are an estimated 12 African women living with HIV for every 10 men. In Asia, HIV prevalence in the population is lower when compared with Africa. The prevalence among 15-49 year olds exceeds one percent in three countries: Cambodia, Myanmar and Thailand (UNAIDS, 2000:9-10).

Since the early 1990s, it has been clear that HIV/AIDS has affected the mortality pattern. Before this time in developed countries the leading causes of death were chronic diseases, as described in the last stage of the epidemiological transition. But by 1992, AIDS had become the 10th leading cause of death for 35-44 year-old men in Australia, Canada, France, Italy and the Netherlands in 1988 (Mann, Tarantola et al. 1992:125). The same pattern occurred in the United States where the age-adjusted-death rate for HIV more than doubled from 5.5 to 11.3 deaths per 100,000 population. HIV moved up from 15th to 8th in the ranking of leading causes of death in 1992. In 1993 and 1994, provisional mortality data indicated that HIV/AIDS ranked first among all causes of death for 25-44 year olds (CDC, 1995).

It is hard to clearly demonstrate the impact of AIDS on mortality in developing countries, as death-reporting information is usually incomplete (Mann, Tarantola et al. 1992:127). In Africa, small community-based studies with information on the causes of death show that whereas just under 10 percent of the adult population was HIV positive, almost 80 percent of all deaths among adults aged 25-45 are associated with HIV (UNAIDS, 2000:25).

A global review by WHO indicates that a large increase in TB victims has occurred among young adults during the HIV/AIDS era. The death rate from infectious diseases in the United States, which had been low since 1950, has recently increased. During the years 1985-87 a sharp increase in TB cases occurred among certain people and places. For example, nationwide the case rate increased 6.1 percent among African Americans and 12.7 percent among

non-Hispanics. The increases were largest among young African Americans. Americans and Hispanics in the age group 25-44 TB cases increased 17 and 27 percent respectively (Farmer, 1999). More alarmingly, in sub-Saharan African countries, there was a reported doubling in the average number of reported TB cases between 1986 to 1990, with increases of 140 percent in Burundi, 154 percent in Zambia, and 180 percent in Malawi (Mann, Tarantola et al., 1992:125).

In 1984, the first AIDS case was reported in Thailand. After 1989 HIV/AIDS spread rapidly from injecting drug users to sex workers and then to the general population (Weniger, Limpakarnjanarat et al., 1991). In 1999, about 2 percent of women attending antenatal clinics were infected with HIV/AIDS (AIDS Division 2000). The most recent estimation by the Asian Epidemic Model (AEM) estimated that by 2000, 984,000 people (951,000 adult and 33,000 children) had been infected with HIV in Thailand since start of the epidemic and 289,000 of these people had subsequently died of AIDS (The Thai Working Group on HIV/AIDS Projection, 2001).

The emergence of HIV/AIDS in Thailand also challenges the epidemiological transition theory. Thus, this paper attempts to examine the change of mortality levels and patterns before and since the start of the AIDS epidemic. Understanding the epidemiological change in the HIV/AIDS epidemic era is essential for program planners and policy makers to re-focus their lens onto the emergence and re-emergence of infectious disease and its implication.

Specific objectives:

1. To estimate Thai mortality levels and patterns during 1970 to 2000.
2. To estimate Thai mortality levels and patterns of selected infectious diseases during 1988 to 2000.

Methods:

Death registration statistics from 1970 to 2000 are used for this analysis. Cause of death were identified by their code in the International Classification of Disease (ICP), ninth and tenth revisions. The mid-year population was obtained from the Ministry of Interior. The age-sex distribution of the population for each year of 1988 to 2000 was obtained from the 1991 and 1995 Population Projection. Annual death rates per 1,000 population were calculated at the national levels. Annual rates and age specific death rates were used to analysis the level and pattern of mortality by cause of deaths (National Economic and Social development Board, 1991; National Economic

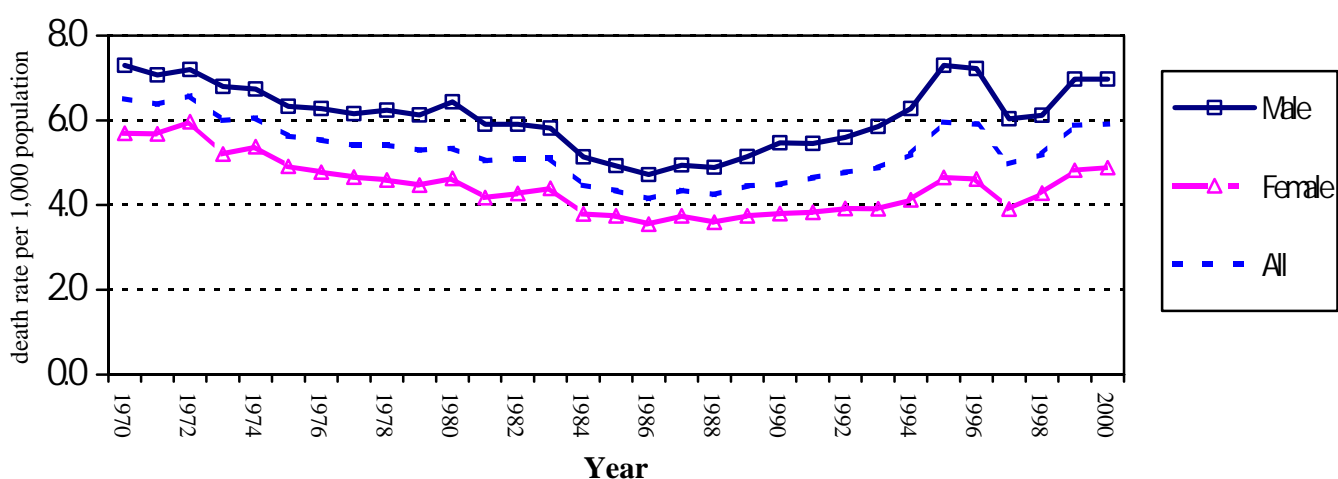
and Social development Board, 1995).

Results:

1. Increased national mortality levels in Thailand in the mid 1980s.

Annual crude death rates in Thailand dramatically declined in the period of 1970 to 1986 when death rates dropped from 6.5 to 4.5 per 1,000 people. This was the case for both males and females. However, death rates started rising in 1987. Within the ten-year period 1987 to 1996 the death rate gradually increased from 4.5 to 6.0 per 1,000 people. There was a sharp increase after 1994. This trend was probably maintained at this level until 2000 (Figure 1)¹.

Figure 1. Registered death rates per 1,000 population by sex :
1970-2000



After 1986, the male and female mortality trends were different. Male mortality started rising quicker than that of females. The male death rate was lowest in 1986, at a level of 4.7 per 1,000 people but increased to 4.9 in 1987 and to 7.3 in 1996. By 2000 the male mortality rate was about 7. The female death rate had remained at 4 per 1,000 people from 1986 till 1994. Then there was an upward trend rising to 4.9 by 2000.

¹ The decline of death rates in 1997–1998 resulted from the change of the data management system of vital registration, which did not reflect the actual mortality trend (Im-em, 1999 :15-16).

2. Re-emergence of reported tuberculosis and pneumonia in the mid 1990s

The Thai mortality transition changed from being dominated by infectious diseases in the mid 1970s to degenerative diseases in the early 1980s. In 1968, infectious diseases were the main cause of mortality among Thais. These diseases included diarrhea, TB and pneumonia. The impact of diarrhea declined by about five times from 1968 to 1983 (32 in 1968 to 6 per 100,000 people in 1983 (Porapakham, 1986).

TB and pneumonia were great killers before 1970, however, their impact continued to decline up until 1990. The death rates from TB dramatically declined almost 7 times from 1970 to 1995. The death rates of pneumonia in 1990 dropped by two times from the 1970 level (7 compared to 15 per 100,000 population) (Table 1).

Diseases of the circulatory system started rising after 1975 and showed a remarkable increase in 1980. Malignant neoplasm death rates also increased from 1970 and continued increasing thereafter. Deaths from accidents were relatively high, but appeared to decline during 1985-1990 but with an upward trend again from 1995.

Table 1. Death rates per 100,000 population on selected causes of death in Thailand 1970 –2000

Selected cause of death	1970	1975	1980	1985	1990	1995	2000
Infectious disease							
- Tuberculosis	47.5	15.8	14.5	10.3	7.0	7.0	10.1
- Pneumonia	15.1	17.6	10.0	10.1	6.8	11.0	13.5
Non-infectious disease							
- The circulatory system		21.1	24.8	31.3	49.4	71.3	95.0
	52.3						
- Cancer	12.4	17.5	23.6	26.6	39.3	50.9	63.9
Accidents	49.0	67.3	68.5	46.8	57.3	74.7	66.7

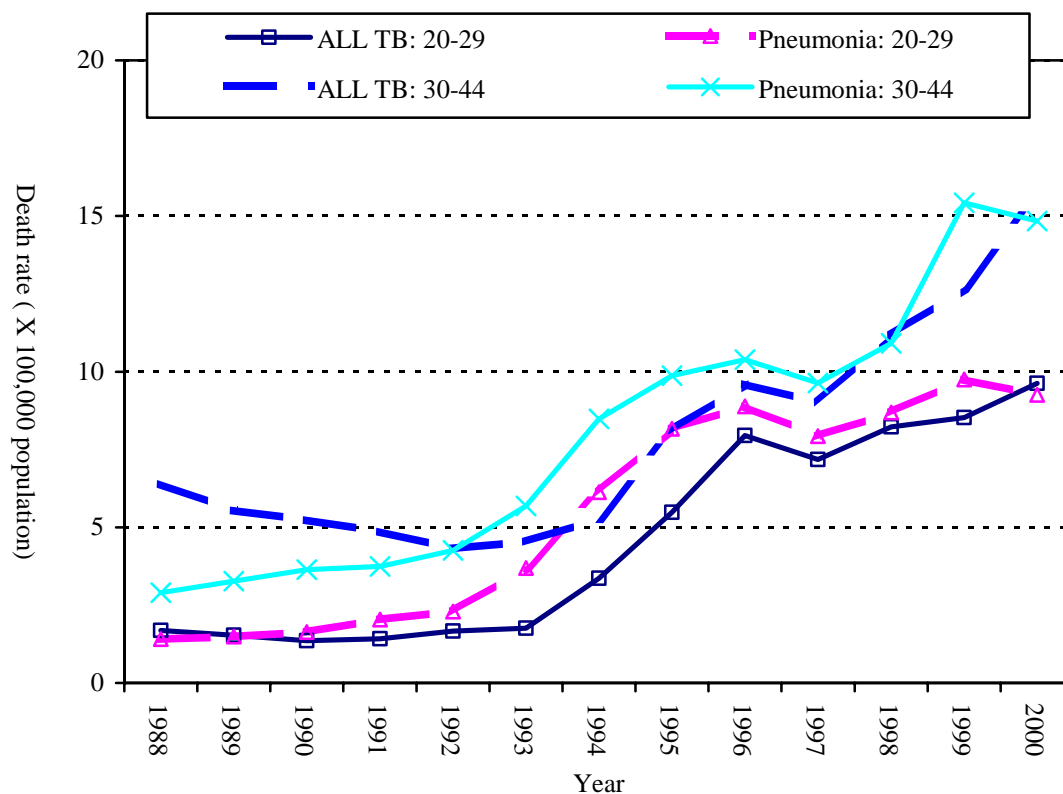
The epidemiological transition theory was able to explain the Thai mortality pattern up to 1990. However, this theory has limitations in explaining the growth of TB and pneumonia since 1990. Deaths from pneumonia in 1995-

2000 doubled from the 1990 level. While TB deaths increased by almost 50 percent during 1995-2000. It should be noted that diarrhea deaths have continued to decline and by 2000 accounted for only 1.7 deaths per 100,000.

3. Re-emerging of tuberculosis and pneumonia occurred predominately among those aged 20 – 44

The re-emergence of TB and pneumonia in the HIV/AIDS era is associated with different age groups from earlier times. Previously, the majority of those dying from infectious diseases were infants and children. The death rates from TB and pneumonia have remained low among this subgroup. The TB death rate for those aged 0-4 was less than 1 per 100,000 during 1988–2000. Pneumonia death rates of infant and children decreased from 14 in 1988 to 6 per 100,000 population in 2000.

Figure 2. Death rates of aged 15-29, 30-44 per 100,000 population of tuberculosis and pneumonia in 1988-2000



Adults aged 20-44 previously had low TB and pneumonia death rates. However, since 1988, increasing death rates from these diseases have occurred predominately among those aged 20–44. The TB death rate among adults aged 20-29 increased six times from 1992 to 2000 (1.7 compared to 9.6 per 100,000 people). While the death rate from TB among those aged 30-44 increased from 4.4 in 1992 to 15.7 in 2000 per 100,000 people (Figure 2).

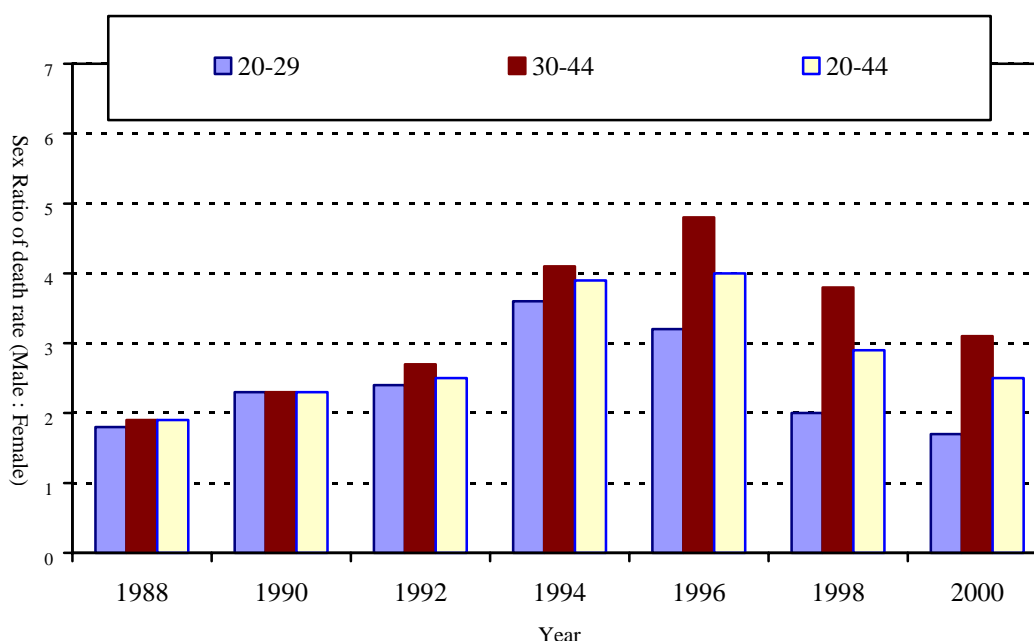
The shift in the mortality trend caused by pneumonia occurred in the same age group as affected by TB but it took place earlier. The pneumonia death rate for those aged 20-29 started to rise in 1990, with the rate increasing from 1.6 per 100,000 in 1990 to 9.3 per 100,000 in 2000. The pneumonia death rate at 2000 was five times greater than the 1988 level among Thais aged 30-44 (2.9 compared to 14.8 per 100,000 people).

4. More males died than females from the re-emergence of tuberculosis and pneumonia

The sex ratio of the rate was calculated by male death rate divided by female death rate. The sex specific death rates due to TB and pneumonia from 1970 to 1983 indicate more male than female deaths, with a sex ratio was 1.4 to 1.9 male deaths per a female (Porapakkham, Pramarnpol et al., 1996). A similar pattern existed until 1988-1989 among those aged 20-44. However, after 1990 male deaths increased dramatically. The death sex ratio from TB and pneumonia for those aged 20-44 nearly doubled in the six years 1990-1996 (2.3 versus 4.0 respectively). Even though the sex difference started to decline after 1996, the sex ratio was still higher than the 1988 level within the range of 3.3-2.5 (Figure 3).

The proportion of male to female deaths for those aged 20-29 peaked in 1994; double the 1988 level, but declined to 1.7 in 2000. The death sex difference for those aged 30-44 was more than twice the level in 1996 as in 1988. The sex ratio declined slightly for those aged 30-44 after 1996, but still remains higher than before HIV/AIDS epidemic (Figure 3).

Figure 3 The sex ratio of death rates (male:female death) of aged 20-44 of tuberculosis and pneumonia in 1988-2000



Discussion:

The results of this analysis clearly demonstrate that the re-emergence of TB and pneumonia occurred after 1990, once the HIV/AIDS epidemic had taken place in Thailand. There have been relative few HIV/AIDS deaths that have been reported. This is because the death registration and HIV/AIDS surveillance systems are incomplete and underreported. However, it is believed that the explosion of TB and pneumonia has been caused by HIV/AIDS.

The majority of TB and pneumonia deaths have been caused by HIV/AIDS as the underlying cause of death since TB and pneumonia are major opportunistic infections that occur among people living with HIV/AIDS in Thailand (Chariyalertsak, Sirisanthana et al., 2001) (Rangsin, Silarung et al., 1994; Chuprapawan, Porapakham et al., 2000).

Based on these increased death rates, Thailand is a country where the epidemiological transition theory has overstated the disappearance of infectious diseases. The emergence of HIV/AIDS and the re-emergence of TB and pneumonia have occurred in the same period of high mortality rates of

degenerative diseases and man-made diseases. The epidemiological transition theory must be broadened, by accounting for behavioral changes. In the HIV/AIDS era, it is not only diseases that need to be considered, but also behavior risk factors that are driving the epidemic. A specific medical intervention is not sufficient to control the disease but must be combined with behavior and social interventions.

The implication of the re-emergence of infectious diseases during the HIV/AIDS epidemic has challenged the epidemiological transition theory in two major ways in Thailand. First, a change of the population age structure has occurred. In the earlier phase of the epidemiological transition declining infectious diseases and improving infant and child mortality shifted the population to an older age distribution. But the emergence and re-emergence of infectious diseases affected predominately those aged 20-44 year old.

Secondly, a change in the population sex ratio also occurred. The time before 1990, women and children gained more benefits from the improved health status than men, resulting in a shift in the sex ratio. However, in the AIDS era in Thailand, the sex ratio was further altered when deaths from infectious diseases mostly killed men. But, since 1998 it has been increasing affecting women. These mortality patterns reflect the Thai HIV/AIDS pattern where a large proportion of males who were infected at the early phase of the epidemic died in the early 1990s. However, women have been infected later and continue to get infected at higher rates in the later phase of the epidemic, female deaths after 1996 increased and will continue to do so in the near future.

Changes in the Thai population because of HIV/AIDS and the re-emergence of TB and pneumonia have forced us to re-think many aspects of population and public health policies. There is evidence of a need for renewed efforts in TB prevention and control in the HIV/AIDS era. Effort to improve access by people living with HIV/AIDS to prevention and treatment tuberculosis and pneumocystis carinii pneumonia (PCP) warrants immediate attention. The majority of deaths from infectious diseases in the HIV/AIDS era have been among the 20-44-age range, the most productive segment of the labor force. This implies serious consequences for the Thai labor force at both the household and country level. Finally, improving quality of death statistics, especially information on cause of death, is needed. With better information policy makers will be in a better position to guide the country.

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