Patterns of Elderly Life Expectancy in Three Chinese Cities

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Introduction:

The cardiovascular revolution occurred since the late 1960s, resulting in the epidemiology transition from the third stage "The age of degenerative and man-made diseases" to the fourth stage "The age of delayed degenerative diseases" (Olshansky & Ault 1986). To date, in most advanced countries, mortality under age 65 have fallen so low that further improvement in life expectancy has rely almost on mortality decline at old age(Mesle and Vallin 2006). In the past three decades, the epidemiologic transition in some developing countries has occurred more rapidly than those developed countries with long-term economic development historically (Yusuf et al. 2001; Chung et al. 2010). Analysis of the changes in major causes of death among the elderly in those populations going through a rapid epidemiologic transition will help to understand the impact of such a swift economic growth on mortality.

Hong Kong, Shanghai and Taipei, well developed cities, experienced great economic growth since 1970s. Life expectancy at aged 65 increased steadily. Despite similar level of mortality and unprecedented declines in mortality, the composition of major causes of death and the pattern of changes in causes of death among the elderly are different in these three cities.

More importantly, they had the unique experiences for last 100 years under the different impacts of United Kingdom for Hong Kong, Japan for Taiwan, Europe, United States and Soviet Union for China. Their unique historical experiences lead them to different political circumstances with considerable effect on the health care systems eventually. Hong Kong has a relatively equitable health care system mainly followed the British health care system (The Harvard Team 1999). Every resident in Hong Kong could equally access to essential health care (The Harvard Team 1999). As early as 1974, Hong Kong government began to emphasize the provision of medical services under a normal charge for those who heavily rely on subsidized medical care (HKMMSS 2006). However, the health service in Hong Kong is still criticized for its diverse quality and long waiting time (The Harvard Team 1999).

Japanese colony had an impact on health service system in Taiwan in addition to the influence of the medical technology brought from United States after World War II. Since 1970s, Taiwan's health policy was devoted to health care resource, which lead to

the number of hospital beds almost doubled from 1970 to 1994 (Chiang 1997). On the other hand, the proportion of population with health insurance was only 20% or lower before 1985. The coverage rate of health insurance increased to 57% in 1994 due to a newly developed Farmers' Health Insurance in 1985 and the revision of "Labor Insurance Act" and "Public Service Insurance Act". The health insurance coverage improved to more than 90% due to the implementation of National health insurance (NHI) in 1995, especially improved considerably for the elderly (Wen et al. 2008). Noticeably, the referral system to visit specialists before go to medical center is not so successful, but the waiting time to visits is much shorter than Hong Kong (The Harvard Team 1999; Lu & Hisao 2003).

Shanghai health care system inherited the Soviet Model after 1950s, achieving great progress in control of infectious diseases but lost the advantage in control of chronic diseases. China's economic reform and open up policy since 1978 brought in the Western medical knowledge and such reform accelerated after Deng Xiaoping's Southern Inspection Tour Speech in January 1992. As for health insurance system, the medical expenditure among the elderly fully depended on enterprises they were employed before 1996. Once such state or collective enterprises bankrupted or reorganized due to the market reform, the elderly most likely lost their medical expenses support. In May 1996, the hospitals admissions expenses and 50% of outpatient expenditure among retired population were paid by overall social planning health insurance system rather than state enterprises. In 2001, social health insurance system further improved to fully cover the outpatient expenditure for retired population (Wang 2008). There is no compulsory referral system and patients can see the specialist directly.

Hong Kong, Shanghai, and Taipei under different health service systems experienced rapid economic growth since 1970s. This paper aims to develop a more accurate understanding of mortality changes from major causes of death and their impacts on the improvement of life expectancy among the elderly during the period of 1970s - 2007.

Methods:

Mortality data are obtained from official mortality surveillance systems. Data based on multiple causes of death in Shanghai and Taipei is used to examine the relationship between mortality from cardiovascular disease (CVD) and from other chronic disease. The decomposition method is applied to assess the contribution of major causes of death to the improvement of life expectancy.

Preliminary Results:

GDP per capita growth was highly correlated with the increase in LE65 independently in the three cities during the past three decades. But to date, Shanghai achieved the similar level of LE65 as Hong Kong with lower GDP per capita.

Mortality from CVD made remarkable contribution to the progress of life expectancy at age 65 (Table 1). In contrast, mortality from neoplasma at age 80 and above reduced the speed to further advance life expectancy.

Moreover, the changes in major causes of death in Shanghai was a delayed pattern (around15 years postponement) comparing with that in Hong Kong and Taipei. In fact, mortality from CVD in Shanghai did not improve for the period of mid-1980s - mid-1990s when Shanghai had a deterioration of health care system with the state-enterprise reform. Then mortality caused by CVD declined dramatically afterwards. Furthermore, the decline in CVD mortality was the most pronounced including those aged 80 and older in Taipei. This is coincidence with the same period when the health equity improved considerably as a result of the implementation of National Health Insurance, especially among the elderly who enjoyed the benefits the most. CVD has now happened to be a treatment and preventative disease. Therefore, the most significant decline of the CVD mortality in Taipei probably attributed to the progress of equity of health care system.

Despite the great progress of CVD mortality, neoplasms mortality also deteriorated most obviously in Taipei. In order to examine the relationship between the reduction of CVD mortality and changes in neoplasms mortality, we use multiple causes of death data to analyze mortality from neoplasms among cases with mention of CVD (U-neoplasms-M-CVD) in Shanghai and Taipei, considering the availability of data. We also investigate mortality from diabetes among cases with mention of CVD (U-diabetes-M-CVD). Mortality from U-neoplasms-M-CVD, especially among the oldest-old, made the negative contribution to the improvements of life expectancy. The deterioration of mortality from U-diabetes-M-CVD was also observed in these two cities. The empirical results seem to support the competing risk theory that with the reduction of CVD mortality as underlying cause of death, the probability of dying from other diseases (mainly diabetes and neoplasms) at older age may increase.

Concluding Remarks:

There are several reasons behind the different patterns of mortality changes and life expectancy improvements in these three cities, including rules of classification of causes of death, economic development, health service systems, and competing risks between CVD and other chronic diseases.

The three cities conformed to the experiences of the epidemiological transition and life expectancy at age 65 has been improved rapidly and dramatically comparing with many other parts of the world during 1970s to 2000s. Economic development played a vital role in the changes of major causes of death among the elderly. But the effect of equity of health service delivery has become a major key and essential.

Table 1 Contribution of Major Causes of Death to Improvements of Life Expectancy (per year)

	Males						Females					
	Hong Kong		Taipei		Shanghai		Hong Kong		Taipei		Shanghai	
	Age 65-	Age 80+	Age 65-	Age 80+	Age 65-	Age 80+	Age 65-	Age 80+	Age 65-	Age 80+	Age 65-	Age 80+
mid-1970s-1996												
All Causes	0.159	0.034	0.120	0.066	0.098	0.015	0.108	0.051	0.111	0.063	0.087	0.031
Neoplasms	0.004	-0.010	-0.012	-0.007	0.008	-0.002	-0.002	-0.013	-0.012	-0.008	0.008	0.000
Stomach Cancer	0.005	0.000	0.003	0.001	0.008	0.000	0.002	-0.001	0.003	0.000	0.005	0.001
Lung Cancer	-0.005	-0.004	-0.005	-0.003	-0.004	-0.001	0.001	-0.003	-0.004	-0.003	-0.001	-0.001
Colon Cancer	-0.002	-0.002	-0.003	-0.002	0.000	0.000	-0.003	-0.002	-0.003	-0.001	0.000	0.000
CVD	0.080	0.023	0.067	0.021	0.017	-0.002	0.059	0.017	0.083	0.026	0.020	-0.003
IHD	0.010	0.002	-0.002	-0.009	-0.009	-0.006	0.004	-0.006	-0.002	-0.005	-0.010	-0.011
CBV	0.030	0.008	0.050	0.014	0.015	0.001	0.026	0.006	0.059	0.015	0.016	0.002
Respitoary Disease	0.020	-0.011	0.010	0.013	0.038	0.008	0.016	-0.007	0.015	0.011	0.035	0.015
Pneumonia	0.017	-0.001	0.011	0.011	0.006	0.002	0.009	-0.003	0.009	0.011	0.005	0.004
COPD	0.002	-0.009	0.001	0.003	--	--	0.006	-0.003	0.005	0.002	--	--
Ill-Defined	0.029	0.035	0.031	0.037	0.002	0.003	0.029	0.075	0.028	0.048	0.004	0.004
Injury	0.006	0.000	0.004	0.002	0.002	0.001	0.004	-0.001	0.000	0.004	0.003	0.002
Other Causes	0.019	-0.003	0.019	0.002	0.030	0.007	0.002	-0.021	-0.004	-0.018	0.017	0.013
1996-2007												
All Causes	0.105	-0.002	0.082	0.083	0.215	0.085	0.126	0.109	0.118	0.072	0.184	0.114
Neoplasms	0.024	-0.007	-0.006	-0.012	0.031	-0.008	0.028	0.016	0.010	-0.016	0.013	-0.014
Stomach Cancer	0.002	0.002	0.009	0.001	0.014	0.001	0.002	0.003	0.004	0.001	0.007	0.001
Lung Cancer	0.014	-0.003	-0.005	-0.003	0.008	-0.004	0.009	0.005	0.001	-0.006	0.000	-0.004
Colon Cancer	-0.002	-0.002	0.002	-0.002	-0.002	-0.001	0.002	0.002	0.001	-0.002	-0.001	-0.003
CVD	0.038	0.000	0.060	0.061	0.088	0.026	0.046	0.014	0.064	0.066	0.091	0.021
IHD	0.016	0.000	0.015	0.033	0.016	0.001	0.015	0.004	0.017	0.037	0.015	-0.008
CBV	0.016	0.002	0.027	0.019	0.072	0.022	0.023	0.017	0.035	0.018	0.073	0.027
Respitoary Disease	0.038	0.017	0.013	-0.004	0.073	0.044	0.032	0.074	0.009	0.004	0.048	0.065
Pneumonia	0.015	0.005	-0.002	-0.004	0.002	0.001	0.018	0.052	0.000	-0.006	0.001	0.003
COPD	0.023	0.012	0.009	-0.007	0.070	0.040	0.012	0.019	0.006	0.007	0.045	0.059
Ill-Defined	0.000	-0.001	0.001	0.020	0.002	0.014	0.001	-0.001	0.005	0.051	0.005	0.028
Injury	-0.002	-0.001	0.005	0.002	0.004	0.004	0.004	0.006	0.004	0.002	0.007	0.008
Other Causes	0.006	-0.009	0.009	0.016	0.017	0.005	0.014	0.001	0.027	-0.035	0.021	0.007

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