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RECENT TRENDS AND PATTERNS OF MORTALITY IN KOREA

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Korea continues to experience rapid demographic transition and population aging. This study examines mortality trends and patterns between 1985-1995. Various death rates and ratios are calculated using death registration data. Mortality trends are analyzed by regression analysis, and life tables are constructed. Major findings are as follows: (1) The primary causes of mortality reduction were declines in infectious disease, circulatory disease, and respiratory disease; (2) The relative reduction of mortality was greater for females than males under 70 years of age, but the reverse is observed for people of 70 years and over; (3) Among all age groups, mortality reductions were greatest among children aged 5-9 years; (4) The leading cause of death for those under 40 was traffic accidents. Liver disease was the leading cause of death for those in their 40's, and cerebrovascular diseases were most important for those 50 years of age and over; (5) The major causes of increased death rates for both sexes were cancers (especially lung and large intestine cancer), diabetes, ischaemic heart disease, mental and behavioral disorders, traffic accidents, suicide, and homicide; and (6) Major causes increasing sex differentials in mortality were tuberculosis, cancers (esophagus, large intestine, and liver), liver diseases, drowning, and mental and behavioral disorders due to psychoactive substance use.

INTRODUCTION

Mortality has been declining in Korea since 1925, with exceptions during the years of World War II and the Korean War, 1940-1955. While economic development preceded mortality decline in developed countries, Korea experienced substantial drops in mortality prior to social and economic improvement. The main causes of mortality reduction have been continuous improvements in public health measures and the control of epidemic diseases. Life expectancy rose from 40.9 years during the period between 1936-1940 to 50.3 years during 1955-1960 period. The reduction of mortality after the Korean War was mainly due to a large supply of antibiotics (Kwon 1977).

Between 1960 and 1985, Korea experienced profound social and demographic changes as a result of rapid economic growth. No less remarkable than Korea's economic success were the changes in the status of women and the value of children as the country's per capita income, educational attainment, and female labor force participation rose. As living standards

improved and better medical care became widely available, life expectancy rose from 69.0 years in 1985 to 73.5 years in 1995 (NSO 1997), and the Total Fertility Rate fell from 6.0 in 1960 to 1.7 in 1995, and has remained within the range of 1.5 to 1.7 since then (NSO 1998). With such a rapid demographic transition in such a short period of time, Korea is on the verge of becoming an aging society. It will take 22 years for Korea to move from an aging society to an aged society.[1] The percent of the population under 15 years of age declined from 42.3% in 1960 to 23.4% in 1995, while the proportion of those age 65 and over increased from 2.9% in 1960 to 5.9% in 1995 (NSO 1996).

With changes in the age and sex structure of the population, the structure of causes of death statistics has also changed. Until the 1950s the leading causes of death, in order, were communicable diseases, digestive diseases, and respiratory diseases. After the transitional period of the 1960s and mid-1970s, the leading causes of death changed from communicable to non-communicable diseases, and in particular to chronic degenerative diseases involving the circulatory system diseases and neoplasms (Kim 1993; Yoon et al. 1993). Thus, it seems that Korea has followed Omran's (1971) three stages of epidemiologic transition: (1) age of infection and famine; (2) age of receding pandemic; and (3) age of degenerative and man-made diseases. Although most countries follow Omran's epidemiologic transition stages, the transitions through these stages occur differently in different cultural settings. As the pace of demographic transition in developed countries cannot be applied to developing countries, the western experience in epidemiologic transition cannot be automatically applied to other cultures. Following this line of thought, this study examines mortality reduction and the cause of death structure in Korea.

REVIEW OF LITERATURE

(1) Mortality Reduction by Age and Sex

In the 1920s mortality rates began to decline with the introduction of public health and disease control programs. Betwee 1925 and 1940, female mor-

[1] Myers (1995) characterized four stages in the demographic transition from a relatively "young" to an "aged" population. According to the definition of a "mature" population, as compared to "young" and "aged," in which at least 4% but less than 7% of the population is elderly, Korea is one of the "mature" population group, with 5.9% of its total population being elderly (65 years and over) in 1995. The proportion of those aged 65 and over in Korea is expected to reach 7% by 2000. The time required to change the proportion of people aged 65 and over from 5% to 12% was 40 years for Japan, 65 years for USA, and 175 years for France.

tality was higher than male mortality during the reproductive years (20 to 34 years) and during childhood (between the ages of 1 to 14). This pattern was due in large part to the prevalence of male dominance and a strong preference for sons in Korean society (Kwon 1986). Such a pattern has gradually diminished with continuous reductions in mortality.

Following World War II, mortality declined faster in developing countries than in the West. However, there were notions that mortality decline in the developing countries would slow down, showing the diverse mortality patterns among the developing countries (Gwatkin 1980). In Korea, rapid mortality reductions continued, except for a brief interruption during the Korean War (1950-53). From 1970 until 1985, a slowdown in mortality reductions occurred for both sexes. A relatively more significant decline in mortality was observed for females than for males in all age groups. As a consequence, the difference in life expectancy at birth between males and females widened from 6.93 years in 1970 to 8.41 years in 1995. For the same period, mortality reductions in late childhood to young adult ages (5-34 years of age) was greater than for any other age groups (Kim 1990; Kwon and Kim 1990).

(2) The Causes of Child Deaths by Sex

A comparison of Korea and US life expectancy between 1920 and 1980 suggests that mortality slowdowns occured at a much earlier stage of the mortality transition in Korea than in the US (Lee 1985). Furthermore, it was observed that declines in child mortality in Korea were more pronounced than in any other age groups between 1920-1980. During this period, mortality rates among Korean infants and children were relatively high, and Korean children lagged behind their elders in epidemiologic transition (Lee 1985). That is, Korean children were suffering from infectious and parasitic diseases and other viral diseases at greater levels than suggested by the epidemiologic transition.

Additionally, patterns of mortality decline differ by age and sex. For children after age one, death rates due to infectious diseases and respiratory diseases were higher for females than for males until the early 1990s. Kim (1990) observed sex differentials in the cause of death structure in child mortality during 1980-1981. Like other societies where son-preference is strong, the biological disadvantages of males in the first year of life diminished because of the greater care given to them. After age one, infectious and respiratory diseases, in which a lack of health care is a risk factor, are more important causes of death among girls than boys because of the strong son-

preference. Park (1995) also observed that the death rates of children due to infectious and respiratory diseases were higher for females than males between 1983 and 1993. Considering male children's biological weakness in communicable diseases and female children's higher death rates due to infectious diseases, female Korean children still seem to suffer from ill treatment because of son-preference. Thus, as Preston and Nelson (1974) suggest, the simple application of western medical technology is not sufficient to alter the disease patterns of developing countries.

(3) The Reduction of Avoidable Causes

Health care services and health insurance policies in the 1980s seem to have played an important role in reducing mortality for elderly males. The patterns of mortality reduction between 1982 and 1991 were examined in order to evaluate the effects of health services on mortality reduction (Song and Kim 1993). Mortality from potentially "avoidable causes"[2] of death in Korea for the period of 1982-1991 was compared with mortality from "unavoidable causes." Decreases in "avoidable" causes of death were greater than "unavoidable" causes of deaths.[3] Mortality from avoidable causes decreased more remarkably for males than females, and more for the elderly (65 years and over) than the young (less than 65). The reductions in death rates were largely due to reductions in acute respiratory diseases, nutritional deficiency, pneumonia and influenza, meningitis, and hypertension, showing 60% to 80% decreases. Nevertheless, because the rate of decline in avoidable deaths was rather low in Korea compared to the past experience of developed countries, health services need to be reexamined in order to reduce avoidable deaths to the level of the developed countries.

METHODS AND MATERIALS

Although the quality of Korean death statistics has continuously improved, registration of the causes of death is hardly complete. There are still such problems as delayed registration of all deaths, and under-registration of infant deaths.[4] In addition, the quality of the cause of death statistics is affected by the number and variety of persons involved in diagnosing,

[2] The list of avoidable causes is a revised version of Rustein et al.(1976).

[3] The decline in deaths due to avoidable causes was large — 37.4%, while mortality declines from all other couses was smaller, at 24.6% (1982-1991).

[4] It is estimated that about 68% of infant deaths were not reported in 1995, and that about 2% of all deaths were not registered within one year of the occurrence of the deaths.

registering, and classifying the causes of death. The proportion of deaths assigned to "Symptoms, Signs and Ill-defined Conditions" is relatively high, especially among the elderly.[5] Although the 9th ICD (International Classification of Diseases and Causes of Death) was continuously applied to the classification of causes of death between 1985 and 1994, and the 10th ICD to 1995 data, the comparability of the causes of death over this period is not affected by the classification system. Rather, the degree of diagnostic precision and the consistency of diagnostic and certification practices have affected the quality of statistics.

These unfavorable circumstances place limits on the analysis and interpretation of mortality trends and patterns in Korea. Despite such data problems, this study analyzes the Korean mortality structure, because mortality is the most objective and comprehensive measurement of the physical, mental, and social health of a population. The data utilized in this paper are drawn from the Annual Report on Vital Statistics and the Annual Report on the Cause of Death Statistics for the period of 1985-1995. For statistical analysis, life tables are constructed, and age-adjusted death rates are calculated by the direct method using the 1990 Korean national population as the standard (Shryock et al. 1976). The percent change of death rates is calculated, and the ordinary regression method is used to examine the trends of cause-specific mortality rates.

RESULTS AND DISCUSSION

(1) Mortality Decline by Age

Between 1985 and 1995 male mortality reductions from all causes were greater than female mortality reductions for the total population of all age groups (Table 1). There was, however, age variation in mortality reductions. Relative reductions in female mortality was greater than in male mortality for people under 70 years of age, while the reverse was observed for the elderly (70 years and over). In other words, the rate of female mortality reduction is faster than the rate of male mortality reduction for those under 70 years of age, but female mortality reduction stagnates for those 70 years and over. The results suggest that mortality reduction does not occur uniformly among the age and sex subgroups, and that it stagnates when mortality is reduced to a certain level. For both sexes, child (5-9 years) mortality

[5] The proportion of ill-defined deaths decreased rapidly over the period (Park 1995). Even so, the proportion of ill-defined deaths among all causes of deaths is 18.6% for the elderly (aged 65 and over), and 0.7% for non-elderly (under 65 years of age).

TABLE 1. AGE-SPECIFIC DEATH RATES AND PERCENT CHANGES OF RATES FROM ALL CAUSES, 1985-1995

Age	Male			Female			Male/Female Ratio		
	1985	1995	% Change	1985	1995	% Change	1985	1995	Difference
Total	6.9	6.1	–11.6	5.0	4.8	–4.0	137.5	127.8	–9.7
0-4	3.4	2.4	–29.4	3.3	2.1	–36.4	105.2	115.1	9.9
5-9	0.9	0.5	–44.4	0.8	0.3	–62.5	118.3	137.8	19.5
10-14	0.6	0.4	–33.3	0.5	0.3	–40.0	129.3	157.9	28.6
15-19	1.5	1.1	–26.7	0.8	0.5	–37.5	180.7	216.0	35.3
20-24	1.7	1.2	–29.4	0.9	0.6	–33.3	191.7	202.8	11.1
25-29	2.3	1.6	–30.4	1.1	0.7	–36.4	214.8	240.1	25.3
30-34	2.7	1.9	–29.6	1.3	0.8	–38.5	214.5	257.8	43.3
35-39	4.1	2.9	–29.3	1.8	1.0	–44.4	227.9	280.9	53.0
40-44	6.5	4.6	–29.2	2.7	1.6	–40.7	243.3	288.7	45.4
45-49	10.0	6.8	–32.0	3.7	2.3	–37.8	266.9	288.2	21.3
50-54	13.7	10.3	–24.8	5.5	3.6	–34.5	249.2	282.0	32.8
55-59	19.7	15.1	–23.4	8.1	5.6	–30.9	241.9	272.2	30.3
60-64	30.5	22.7	–25.6	12.3	9.0	–26.8	247.8	252.2	4.4
65-69	47.8	35.6	–25.5	21.6	15.8	–26.9	220.8	225.5	4.7
70-74	72.0	56.1	–22.1	36.4	29.5	–19.0	197.6	190.4	–7.2
75-79	116.3	87.1	–25.1	62.0	52.9	–14.7	187.6	164.6	–23.0
80+	231.2	155.3	–32.8	148.5	121.6	–18.1	155.7	127.7	–28.0

Note: Death rates are estimated considering delayed registration of all deaths and underregistration of infant deaths.

Source: NSO. 1997. *1995 Annual Report on Vital Statistics.*

reduction was the most remarkable among all age groups. Because of fertility decline, more care must have been given to each child.

Between 1986 and 1995, the mortality rates for males were higher than for females across all age categories; moreover, sex differentials (male to female mortality ratio) widened over the periods, especially for those 70 years old and younger (Table 1). Unlike the highest sex differentials at the ages 20-30 in the United States (Lee, 1994), Korea showed the highest sex mortality differentials among people in their 40s, indicating a significantly higher male mortality risk in Korea at middle ages. Thus, Korean female mortality was classified following the "General Model," while male mortality was initially classified as following the "Far Eastern Model," characterized by high male death rates at older ages relative to the death rates at younger ages, and very high sex mortality differentials at older ages (Coale et al. 1980; Goldman 1980; UN 1982a). However, further studies based on newly derived sets of Korean male mortality rates and life tables from the early

1990s have shown the "Western Model" to be more applicable than the "Far Eastern Model". This phenomenon suggests that the mortality of certain birth cohorts of Korean males has been influenced by social upheavals such as the Independence movement against Japan and the Korean War.

(2) Cause-Specific Mortality Trends

Linear regression methodology was used for a trend analysis of cause-specific age-adjusted mortality rates. Data for individual years contain a certain amount of stochastic variability, and the stochastic variability can reduce the reliability of using a linear regression model to describe time series data. In order to reduce the effects of the stochastic variability in the mortality rates, a three-year moving average process was used to create eight smoothed data points for the years 1985 to 1994. A linear regression coefficient was then calculated just to determine the direction of mortality change. If the estimated slope of the regression is statistically positive, the trend is increasing.

As presented in Table 2, death rates of all causes, infectious diseases, circulatory diseases, respiratory diseases, and digestive diseases declined significantly for both sexes. Relative reductions in death rates due to infectious diseases were the most remarkable among the various causes for both sexes between 1985 and 1994 (Table 2). Furthermore, Kim (1993) expects that the occurrence of communicable diseases might become minimal in the 21th century, although viral hepatitis, venereal diseases, AIDS, and well-adapted herpes virus infections would maintain their endemic level, and tuberculosis might increase should AIDS continue to spread. Relative mortality reductions including "circulatory diseases" was greater for males than females, while mortality reductions from digestive diseases, respiratory diseases, and infectious diseases were greater for females than males (Table 2).

Increasing mortality trends for both sexes are observed for diabetes, large intestine cancer, lung cancer, ischaemic heart diseases, traffic accidents, and assaults. Death rates from all these diseases and incidents are higher for males than females. In particular, death rates from lung cancer, liver cancer, and traffic accidents are three to four times higher than those of females. The decreasing trends for both sexes are observed for infectious and parasitic diseases, circulatory diseases, and respiratory diseases. Meanwhile, a decreasing trend from respiratory disease is observed for females, but not for males. As a result, infectious diseases, neoplasms (cancers of liver and lung), respiratory diseases, and digestive diseases widened sex differentials in mortality (male to female mortality ratio) significantly over the period,

TABLE 2. PERCENT CHANGES AND REGRESSION COEFFICIENTS FOR TREND ANALYSIS OF AGE-ADJUSTED DEATH RATES FROM MAJOR CAUSES, 1985-1994, KOREA

Causes	Male AADR		Female AADR		Male / Female Ratio	
	1985	1994	1985	1994	1985	1994
All causes	877.8	672.8	449.4	352.7	195.3	190.8
Infectious and parasitic diseases	36.0	19.3	15.0	6.9	240.0	279.7
Neoplasms	135.4	154.6	62.8	66.1	215.6	233.9
Large intestine cancer	3.6	6.3	2.3	4.5	156.5	140.0
Liver cancer	34.0	35.6	8.9	8.9	382.0	400.0
Lung cancer	15.9	30.6	4.3	7.5	369.8	408.0
Diabetes	10.3	19.4	5.7	12.4	180.7	156.5
Circulatorry system diseases	277.1	179.6	155.2	121.6	178.5	147.7
Ischemic heart diseases	6.6	16.7	2.7	7.4	244.4	225.7
Respiratory system diseases	39.2	35.4	22.3	16.5	175.8	214.5
Digestive system diseases	89.4	60.8	26.7	17.1	334.8	355.6
External causes	97.7	110.1	33.6	36.2	290.8	304.1
Traffic accidents	27.9	53.0	8.5	17.0	328.2	311.8
Assault	1.4	2.2	0.8	1.1	175.0	200.0

Causes	Male		Female		Male / Female Ratio	
	%Change	b	%Change	b	Difference	b
All causes	–23.4	–27.23***	–21.5	–12.49***	–4.6	–0.83***
Infectious and parasitic diseases	–46.4	–1.99***	–54.0	–.93***	39.7	4.85**
Neoplasms	14.2	1.57*	5.3	.19	18.3	1.85**
Large intestine cancer	75.0	0.36***	95.7	.25**	–16.5	–1.69
Liver cancer	4.7	–0.02	0.0	–.08	18.0	2.36**
Lung cancer	92.5	1.73***	74.4	.38**	38.2	2.98*
Diabetes	88.3	1.25***	117.5	.83**	–24.3	–3.21***
Circulatory system diseases	–35.2	–11.81***	–21.6	–3.58***	–30.8	–4.58***
Ischaemic heart diseases	153.0	1.40***	174.1	.74**	–18.8	–1.43
Respiratory system diseases	–9.7	–0.37	–26.0	–.50**	38.8	3.30***
Digestive system diseases	–32.0	–3.42***	–36.0	–1.15***	20.7	3.05*
External causes	12.7	1.51	7.7	.44*	13.4	.50
Traffic accidents	90.0	3.01**	100.0	1.05**	–16.5	–3.69**
Assault	57.1	0.18**	37.5	0.06*	25.0	–7.77*

Notes: (1) * p<.05, ** p<.01, *** p<.0001

(2) Percent Change = ((1994 death rate-1985 death rate) / 1985 death rate) × 100.

(3) Difference = (1994 sex mortality ratio - 1985 sex mortality ratio).

(4) Causes are selected from the 9th ICD.

(5) Age-adjustment is made by 1990 Korea as a standard population.

Source: NSO. 1986-1995. *1985-1994 Annual Report on the Cause of Death Statistics.*

while diabetes, circulatory diseases, traffic accidents, and assaults narrowed sex differentials in mortality (Table 2).

(3) Mortality in 1995

Circulatory diseases, malignant neoplasms, and accidental deaths have been the three major causes of Korean mortality since the mid-1970s, and their overall importance in the mortality structure is increasing. The proportion of these three diseases to all deaths was 58.5% in 1985, but increased to 61.9% in 1995. Especially, the relative importance of cancer (16.9% → 21.3%) and accidental deaths (12.0% → 14.3%) increased, while that of circulatory diseases decreased (31.7% →26.3%). Although regression analysis is not applied for trend analysis, clear increasing trends are observed for both sexes from a variety of cancers (except stomach cancer), diabetes, mental and behavioural disorders, ischaemic heart diseases, traffic accidents, suicide, and assault. Decreasing causes of death for both sexes are tuberculosis, stomach cancer, hypertensive diseases, pneumonia, liver diseases, falls, and drownings (Table 3).

The age-cause-specific death rates are presented in Table 4, and the primary causes of death by age in 1995 were traffic accidents for those under 40 years of age (except infants), liver diseases among people in their 40s, and cerebrovascular diseases at the ages of 50 and over. Except traffic accidents, accidental drowning is the leading cause for those under 10, and suicide is the leading cause for 10s and 20s and the second leading cause for 30s. The high level of accidental mortality for youths can be explained by youths' vigorous activities and lack of safety. The highest level of mortality due to liver disease in the 40s can be understood by males' smoking and alcohol consumption coupled with widespread viral hepatitis. After the 50s, cerebrovascular disease is the leading cause of death, as population ages and chronic degenerative diseases increase.

With regard to sex-specific mortality, the five leading causes of death for males were cerebrovascular disease, traffic accidents, liver diseases, heart diseases, and liver cancer; and cerebrovascular diseases, heart diseases, hypertensive diseases, traffic accidents, and stomach cancer were most common for females. The leading causes contributing to sex differentials in mortality are esophagean cancer, larynx cancer, liver diseases, drowning, and mental and behavioral disorders due to psychoactive substance use. Male death rates from these diseases are 4~7 times higher than those of females (Table 3). Since these diseases are highly correlated with smoking (Meng 1988), alcohol consumption, cholesterol level (Suh et al. 1993), spicy food

TABLE 3. MAJOR SEX-CAUSE-SPECIFIC DEATH RATES, PERCENT CHANGES, AND MALE TO FEMALE MORTALITY RATIOS, 1985-1995, KOREA

(Rates per 100,000)

Causes of Death	Male			Female			Male / Female Ratio		
	1985	1995	% Change	1985	1995	% Change	1985	1995	Difference
All causes	646.9	592.4	–8.4	467.5	459.6	–1.7	138.4	128.9	–9.5
Infectious & parasitic diseases	28.2	16.3	–42.2	14.4	6.9	–52.1	195.8	236.2	40.4
Tuberculosis	23.5	12.9	–45.1	10.4	4.4	–57.7	226.0	293.2	67.2
Neoplasms	116.8	142.7	22.2	72.1	81.2	12.6	162.0	175.7	13.7
Lip, oral cavity, pharynx	1.1	1.7	54.5	0.2	0.5	150.0	550.0	340.0	–210.0
Oesophagus	3.7	5.6	51.4	0.8	0.8	0.0	462.5	700.0	237.5
Stomach	40.0	33.2	–17.0	25.2	19.8	–21.4	158.7	167.7	8.9
Colon, rectum, & anus	3.0	6.1	103.3	2.6	5.6	115.4	115.4	108.9	–6.5
Liver	30.5	33.6	10.2	10.3	10.4	1.0	296.1	323.1	27.0
Pancreas	2.5	4.9	96.0	1.6	3.7	131.3	156.3	132.4	–23.8
Larynx	2.2	3.3	50.0	0.6	0.6	0.0	366.7	550.0	183.3
Bronchus and lung	13.7	28.1	105.1	5.1	9.6	88.2	268.6	292.7	24.1
Endocrine & metabolic dis.	10.6	18.7	76.4	8.0	18.7	133.8	132.5	100.0	–32.5
Diabetes mellitus	8.8	17.4	97.7	6.3	17.0	169.8	139.7	102.4	–37.3
Mental, behavioural disorders	2.3	10.4	352.2	0.7	12.4	1671.4	328.6	83.9	–244.7
Psychoactive substance Use	2.9	4.9	69.0	0.2	0.4	100.0	1450.0	1225.0	–220.0
Circulatory system diseases	191.7	134.5	–29.8	162.6	142.8	–12.2	117.9	94.2	–23.7
Hypertensive diseases	53.1	16.4	–69.1	40.4	20.2	–50.0	131.4	81.2	–50.2
Ischaemic heart dieases	5.3	15.7	196.2	3.3	10.4	215.2	160.6	151.0	–9.6
Cerebrovascular diseases	79.4	75.6	–4.9	73.5	83.9	14.1	108.0	90.1	–17.9
Respiratory system diseases	25.8	27.6	7.0	22.1	21.0	–5.0	116.7	131.4	14.7
Pneumonia	8.2	4.6	–43.9	7.3	3.8	–47.9	112.3	121.1	8.7
Digestive system diseases	73.2	58.3	–20.4	27.6	19.9	–27.9	265.2	293.0	27.7
Diseases of the liver	54.7	47.8	–12.6	14.5	10.9	–24.8	377.2	438.5	61.3
External causes	97.0	108.9	12.3	35.8	41.7	16.5	270.9	261.2	–9.8
Traffic accidents	29.5	57.1	93.6	9.1	20.0	119.8	324.2	285.5	–38.7
Falls	11.2	7.5	–33.0	3.3	3.0	–9.1	339.4	250.0	–89.4
Drowning	9.6	6.3	–34.4	2.6	1.5	–42.3	369.2	420.0	50.8
Suicide	14.5	16.2	11.7	5.4	7.4	37.0	268.5	218.9	–49.6
Assualt	1.6	2.3	43.8	0.8	1.3	62.5	200.0	176.9	–23.1

Note: Causes are seleceted from The 103 General Mortality Condensed List by the 10th ICD, if death rate is above 10 or sex mortality ratio is above 200.

Source: NSO. 1997. *1995 Anual Report on the Cause of Death Statistics*; NSO. 1986. *1985 Annual Report on the Cause of Death Statistics.*

(Choi 1988), and stress, Korean males' excessive rate can be further reduced by improvements in individual behaviour patterns and / or job-related social

TABLE 4. MAJOR AGE-CAUSE-SPECIFIC DEATH RATES, 1995, KOREA

(Rates per 100,000)

Causes of Death	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
All causes	280.9	51.3	55.1	99.7	164.7	371.8	826.6	1830.1	6843.9
Infectious & parasitic diseases	11.2	1.1	0.7	2.2	5.8	12.3	23.0	43.1	110.4
Tuberculosis	0.6	0.1	0.3	1.5	4.1	9.2	16.9	32.3	80.2
Neoplasms	5.4	5.1	5.7	9.4	28.0	96.3	283.4	606.6	980.8
Lip, oral cavity, pharynx	0.0	0.0	0.0	0.1	0.2	1.1	3.6	6.2	8.2
Oesophagus	0.0	0.0	0.0	0.0	0.1	1.3	9.6	21.8	29.2
Stomach	0.0	0.0	0.1	1.8	6.9	19.1	58.9	147.8	270.7
Colon, rectum, & anus	0.0	0.0	0.2	0.5	1.7	4.5	13.1	27.9	63.2
Liver	0.4	0.2	0.3	0.6	5.5	30.9	76.9	108.9	128.9
Pancreas	0.1	0.0	0.0	0.0	0.4	2.8	10.1	27.8	12.2
Larynx	0.0	0.0	0.0	0.1	0.1	0.8	5.1	12.7	19.4
Bronchus and lung	0.3	0.0	0.2	0.4	2.0	9.7	42.3	123.9	197.0
Endocrine & metabolic dis.	2.2	0.2	0.3	0.7	3.1	10.2	33.6	95.8	244.3
Diabetes mellitus	0.3	0.0	0.1	0.4	2.6	9.3	31.9	91.1	223.3
Mental, behavioural disorders	0.0	0.1	0.3	1.0	4.4	8.4	11.4	22.3	201.7
Psychoactive substance Use	0.0	0.0	0.0	0.3	2.5	6.5	8.1	7.4	6.3
Circulatory system diseases	13.3	1.6	3.1	6.7	19.6	64.4	190.0	575.4	2208.1
Hypertensive diseases	0.0	0.0	0.0	0.3	1.3	5.6	21.3	75.8	325.2
Ischaemic heart dieases	0.3	0.0	0.3	0.9	3.2	10.6	23.9	58.2	164.3
Cerebrovascular diseases	3.5	0.4	0.7	2.0	7.3	31.3	106.9	344.4	1314.6
Respiratory system diseases	17.8	2.3	0.8	0.9	2.3	6.7	24.7	80.9	447.3
Pneumonia	8.1	1.2	0.4	0.3	0.7	1.6	4.4	12.9	68.3
Digestive system diseases	6.7	0.7	0.7	1.9	18.7	61.0	110.5	144.2	293.4
Diseases of the liver	1.0	0.4	0.4	1.3	16.5	56.1	98.8	111.0	132.3
External causes	46.7	28.1	37.3	70.0	72.5	94.7	118.6	139.9	225.0
Traffic accidents	10.1	16.2	20.1	37.3	35.5	46.8	61.5	75.1	109.1
Falls	1.7	2.1	1.1	2.6	4.1	6.2	10.2	12.8	34.5
Drowning	1.0	5.2	4.1	3.6	2.9	3.7	4.1	3.8	6.8
Suicide	0.0	0.0	4.5	12.3	12.6	14.6	16.8	18.1	26.5
Assualt	1.3	0.6	0.9	2.2	2.8	2.5	2.0	1.8	1.3

Notes: (1) Causes are seleceted from The 103 General Mortality Condensed List by the 10th ICD, if death rate for all ages is above 10 or sex mortality ratio is above 200.

(2) Death rates for infants (0 year) are unreliable due to under-registration.

Source: NSO. 1997. *1995 Anual Report on the Cause of Death Statistics.*

environment.

Assuming that a certain cause of death is eliminated, a person would eventually die of another cause. As a result, one's life span would be extended. This extension, the absence of which is called the potential years of life lost, can be regarded as the year's of life lost due to a certain cause of

TABLE 5. POTENTIAL YEARS OF LIFE LOST (GAIN IN EXPECTATION OF LIFE DUE TO ELIMINATING SPECIFIED CAUSE OF DEATH) AND PROBABILITY OF EVENTUALLY DYING FROM SPECIFIED CAUSES AT BIRTH, 1995, KOREA

Causes of Death	PYLL (years)		Probability (%)	
	Male	Female	Male	Female
Life expectancy at birth	69.49	77.36	100	100
Infectious & parasitic diseases	0.57	0.23	2.54	1.20
Tuberculosis	0.43	0.14	2.05	0.73
Endocrine diseases & immunity disorders	0.64	0.56	3.23	3.68
Diabetes	0.59	0.51	3.00	3.31
Malignant neoplasms	5.01	2.60	22.20	12.70
Stomach cancer	1.16	0.61	5.49	3.39
Liver cancer	1.17	0.34	4.46	1.59
Lung cancer	0.99	0.30	4.86	1.69
Diseases of the circulatory system	4.45	3.79	26.32	31.75
Cerebrovascular diseases	2.50	2.26	15.32	4.77
Hypertensive diseases	0.52	0.50	3.58	7.73
Heart diseases	1.29	0.92	6.71	3.22
Diseases of the respiratoty system	0.90	0.52	6.14	5.28
Pneumonia	0.17	0.11	0.94	0.93
Diseases of the digestive system	1.99	0.57	7.78	3.90
Diseases of liver	1.64	0.35	5.73	1.72
External causes	3.82	1.56	9.78	4.83
Transport accidents	1.97	0.75	4.99	2.34
Suicide	0.48	0.23	1.29	0.63

Sources: NSO. 1997. *1995 Annual Report on Vital Statistics*; NSO. 1997. *1995 Annual Report on the Cause of Death Statistics*; NSO. 1997. *1995 Life Tables*

death. As presented in Table 5, malignant neoplasms show the largest potential years of life lost for males at birth (5.01), followed by circulatory diseases (4.45 years) and external causes (3.82 years). Meanwhile, circulatory diseases show the largest potential loss for females (3.79 years) followed by malignant neoplasms (2.60 years) and external causes (1.56 years). Potential years of life lost by the three main causes of death (neoplasms, circulatory diseases, and external causes) are 13.28 years for males, and 7.95 years for females at birth.

The probability of dying from infectious and parasitic diseases is high in childhood, while the probability of lying from malignant neoplasms is high in middle age. While the probability of dying from external causes decreases with age, the probabilities of dying from circulatory diseases and respiratory diseases increase with age. At birth, the probability of dying from circulatory diseases is highest (26.32% for males; 31.75% for females) followed by

malignant neoplasms (22.20% for males; 12.70% for females) and external causes (9.78%; 4.83%). The probabilities of dying from diabetes and hypertensive diseases are higher for females than males, but the probabilities of dying from other causes are greater for males than females (Table 5).

CONCLUSION

Since 1960, Korea has experienced a rapid decline in mortality as Korea has undergone economic growth, medical and public health improvement, intoduction of widespread medical insurance systems, and fertility decline. During 1985-1995, the male mortality decline was greater than the female mortality decline for the elderly of 70 years and over, but the reverse is observed for non-elderly under 70 years. This suggests that relative reduction of mortality was faster for females, and that mortality reduction stagnates when it reaches a certain level. Among all age groups the childhood (5-9 years) mortality decline is most remarkable for both sexes. The leading causes of death are traffic accidents for those under 40 years, liver diseases for those in their 40s, and cerebrovascular diseases for those 50 years and over. Considering that two-thirds of child deaths occurred from accidents in 1995, further reduction of child mortality can be made possible by better safety practices and better emergency care. As the mortality transition in developing countries was predominantly medically determined and much faster than in the West, medically enhanced mortality reduction will be a challenge. Recent stagnation of mortality reduction in Korea can be further improved by socioeconomic development and cultural changes rather than medical technology.

For the mortality transition during 1985-1994, declines in infectious diseases, circulatory diseases, respiratory diseases, and digestive diseases have contributed to the reduction in mortality. The causes with increased death rates for both sexes are large intestinal cancer, lung cancer, ischaemic heart diseases, mental and behavioral disorders, diabetes, traffic accidents, suicide, and homicide. The causes contributing to increased sex differentials in mortality (male to female mortality ratios) are esophogeal cancer, lung cancer, liver cancer, traffic accidents, drowning, and mental and behavioral disorders due to psychoactive substance use. It appears that the medically induced Korean mortality transition today requires greater social and economic efforts to ensure further progress, because modifications in social and behavioral factors should play increasingly important roles in controlling chronic diseases. According to social and behavioral studies, many important risk factors for degenerative and man-made diseases are related to

smoking, alcohol consumption, Type-A personality characteristics, etc. Overemphasis on expensive individual medical care instead of preventive measures must be reconsidered with regard to mortality reduction.

The rapid growth rate of the elderly population will have an impact on the health care system. Chronic diseases and disabilities, such as dementia, hypertension, osteoporosis, and diabetes, should be addressed more intensively, and appropriate medical and social care facilities should be established. Musculoskeletal diseases, which contribute to the disability of aged people, will likely be one of the growing major health problems due to the increase of the aged population. Mental disease, particularly caused by alcohol and drug abuse, and senile dementia may also become prominent health problems. Moreover, respiratory diseases such as emphysema and asthma are likely to increase because of aggravating air pollution. Circulatory diseases are also likely to increase due to the rapid increase of the aging population.

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