(國文要約)

人口移動과 所得分配 : 相對的 剝奪感 模型의 再檢討

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本 論文에서는 人口移動과 所得分配의 관계를 分析하기 위하여 相對的 剝奪感 槪念을 적용한 人口移動模型을 바탕으로 個人과 社會의 分配要素가 人口移動과 어떤 相互聯關性을 갖는가를 理論的으로 檢討하였다.

人口移動으로 인한 個人의 相對的 剝奪感의 변화는 移動者와 非移動者의 移動 以前과 以後의 상대적 位置와 그들의 準據集團이 누구를 포함하는가에 따라 增加할 수도 있다.

또한 各 個人의 相對的 剝奪感의 변화에 따라 社會的 所得分配는 人口移動으로 인하여 더욱 惡化될 수도 있다는 것을 論議하였다.

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An Analysis on Korean Mortality Structure

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Ⅰ. Introduction

1. Why Study Cause of Death

Mortality levels are inevitably a product of social and individual choice made under budget constraints and in the presence of competing alternatives (Preston, 1976). It is generally agreed that mortality levels are strongly associated with development (UN, 1984). Development may improve levels of health and longevity through its contribution to the advancement in the welfare and well - being of populations. However, development is not seen as bringing only benefits to health and mortality of a society ; changes in life - styles, environmental deterioration and hazardous industrial working conditions, often concomitant with development, have negative consequences.

Thus, changes in socio - economic, cultural and public factors resulting mostly from development are the major determinants of the mortality level. In other words, mortality differences reflect primarily the influence of the stage of social and economic development (naturally including medical progress) (Bahm and Vallin, 1982). However, these and other factors often have different impact on mortality levels among human groups, particularly among age and sex groups.

It is often difficult to measure the contribution of these factors to the slope and curvature of mortality curves in a direct way, mainly due to lack of data connected both with mortality and development. How can the im-

pact of changes in socio - economec, cultural and other factors on mortality be examined without the relevant data ?

It is well known that the contribution of these factors to mortality patterns and the variation among them depends upon the composition of death by cause, which in turn bears directly on the age pattern of mortality. Causes of death represent biological variables through which all social and environmental influences must necessarily operate (Preston, 1976). Thus, cause - specific mortality is an intervening variable between socio - economic, cultural and public health conditions and a particular pattern of mortality (Goldman, 1980).

Therefore, a study of the role of the causes of death may offer us a way of examining the contribution of changes in socio - economic, cultural and public factors during development process to mortality levels and patterns, and thereby a better understanding of determinants and consequences of mortality structure in a population.

Table 1. Life Expectancy at Birth ; Korea, 1906–1985

Year	Male	Female	Sex Difference
1906[a]	22.6	24.4	1.8
1926–1930[a]	32.4	35.0	2.6
1931–1935[b]	36.3	38.5	2.2
1936–1940[c]	40.6	44.7	4.1
1942[d]	42.8	47.1	4.3
1955–1960[e]	51.1	53.7	2.6
1960–1965[d]	52.7	57.7	5.0
1966[f]	59.7	64.1	4.4
1970[f]	59.8	66.7	6.9
1978–1979[f]	62.7	69.1	6.4
1985[g]	63.5	72.2	8.7

Sources : a) Mizushima, 37
b) Choe, 108
c) Ishi, 128 and 187
d) Lee, 52–55
e) Koh and Kim, Table 3
f) National Bureau of Statistics
g) Computed from Vital Registration by present author (Appendix Table 2)

2. Purpose and Scope of the Study

Table 1 presents the historical decline in mortality in Republic of Korea since 1906. The life expectancy at birth has increased from 22.6 years for male and 24.4 years for female for the year 1906 to 63.5 years for male and 72.2 years for female for 1985, or by 40.9 years for male and 47.8 years for female during the period of 80 years between 1906 and 1985.

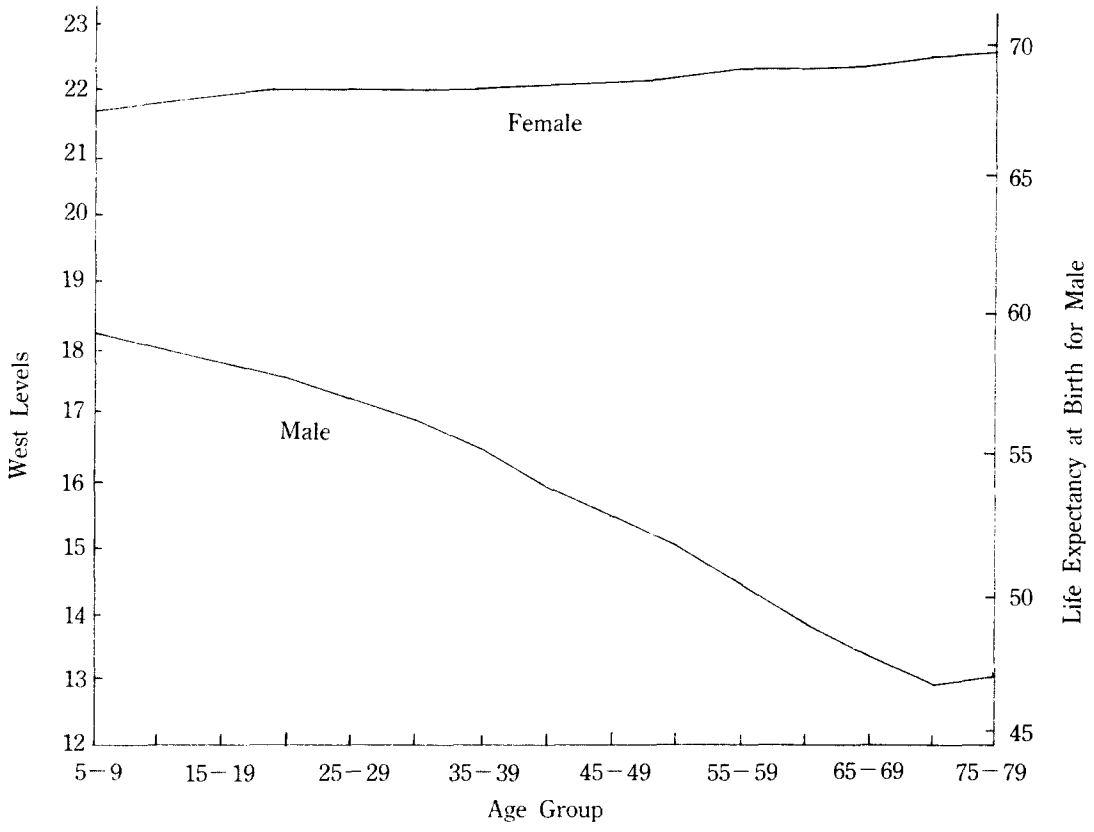
However, the difference between life expectancies of men and women has grown considerably since 1960, because the life expectancy of women has increased greatly compared to that of men during development process. A girl, born during the period 1955–60, could, on average, expect to outlive her male counterpart by about 2.6 years. By 1985, however, this gap has widened to 8.7 years, an increase of about 330 percent. In particular, mortality above age 40 accounted for most of the female - male difference in life expectancy (about 91 percent in 1970 and 88 percent in 1985).

In addition to the widening disparity in survival between the sexes, mortality among male age groups revealed the rapid increase between age groups under - and over - 40, sho-

wing a departure from model mortality schedules based on any of four regional patterns : West, North, South and East which were developed by Coale and Demeny (1966) who found that most of life tables could be described by these four general age patterns of mortality (see, Appendix Table 1). The levels of West model life tables implied by men's and women's death rates for 1985 can be seen from Figure 1. Death rates of women, generally conformed to a West model mortality pattern. Men's death rates for age below 40 implied more or less a constant level of West model pattern, but after this age, men's death rates showed a considerable departure form the model with advancing age.

Thus, moprtality pattern in Republic of Korea has been characterized by excess death rates among older males relative to those among young males and among females since 1960 the rapid economic growth and socio-cultural modernization started. In this present study, we shall attempt to analyze the pattern of mortality in Repulic of Korea, in terms of causes of death which would presumably be responsible for excess death rates of older

Figure 1. Levels of West Model Life Table Implied by Death Rates by Sex for 1985, Republic of Korea



Source : Appendix Table 1.

males during development process, using death data for 1985.

3. Methods and Materials

As for materials, death data for 1985, based upon vital registration and classified by causes of 307 basic tabulation list according to the ninth revision of the International Classification of Diseases (ICD - 9) of World Health Organization (WHO) are available by age and sex and mid - year population which was estimated, based upon 1985 census, by National Bureau of Statistics, Economic Planning Board (NBOS, EPB) are also available by age and sex.

However, death data for 1985 are subject to underregistration. The underregistration in this case seems to be in the nature of late registration rather than an absence of registration. Late registrations are known from the vital statistics publications of later years. In order to incorporate the late registrations, 1985 was inappropriate since the present publications go only up to 1987. The exercise of incorporating these deaths was performed on 1983 deaths. Late registrations of 1983 deaths by age and sex were obtained and age - specific rates of late registrations for males and females were obtained for the 1983 deaths. The 1983 deaths registered in 1983 formed about 91.2 percent of the total 1983 deaths which closely agrees with the percent completeness of 1983 registered deaths estimated independently (Shin, 1988) at 90.9 percent.

In the adjustment of the registered deaths for 1985, we assumed the 1983 age - sex specific rates of completeness to hold for 1985. For the infant deaths, however, the infant mortality rate estimated for 1985 by NBOS EPB was accepted (See Kim and Choi, 1988).

In terms of cause of death statistics, not all causes are, in general, described in specific terms. As a consequence, categories have been created in the International Classification of Diseases to accomodate poor description of the cause of death. One such category is 'signs, symptoms and ill - defined conditions' (ICD - 9 : 46). Therefore, cause of death statistics can be evaluated by computing the proportion of deaths from this category to deaths from 'all causes combined' in each age group. In Table 2, the deaths from this category for 1985 never account for more than about 7 percent in the age groups between 1 and 65. As a whole, they can be considered as reliable. As for the non - classifiable deaths which account for 13.7 percent of total deaths and con-

Table 2. Proportion of Deaths from Signs, Symptoms and Ill-defined Condition to Deaths from All Causes Combined : Korea, 1985

Age group	Both Sexes	Male	Female
0	19.8	18.6	21.1
1−4	4.6	4.3	4.9
5−14	5.4	5.1	5.9
15−24	2.5	2.2	3.0
25−34	1.8	1.7	2.0
35−44	2.0	1.8	2.5
45−54	2.5	2.4	2.6
55−64	6.2	5.7	7.2
65−74	24.0	22.9	25.5
75+	46.1	43.3	47.9

Source : Computed from Annual Report on the Cause of Death Statistics, 1985

sist mainly of 'not - stated', they are distributed into causes in the known proportion.

We used the data adjusted for underregistration and 'non - classification' to compute age - sex specific death rates from which the computation of life table for 1985 (see Appendix Table 2) is made and to investigate the role of cause - specific mortality in determining the pattern of mortality in Republic of Korea for 1985.

From the methodological point of view, Chiang's method is utilized to calculate each item of the life table (see Chiang, 1970). In order to obtain each life table function after eliminating a certain cause of death (α), the probability of dying ($nqx, (-\alpha)$) is computed, using the following formula :

$$nqx, (-\alpha) = ndx(-\alpha)/\{lx - 1/2 \ .ndx, \alpha\}$$

where

lx = number of survivors at age x in all - cause life table

ndx = number of deaths in age group x, x + n in all cause life tabel

ndx, α = (ndx) x [observed proportion of all deaths ascribed to cause α in age group x, x+n]

ndx, $(-\alpha)$ = ndx − ndx, α (see Nomboodiri, et. al., 1987 : p. 105), and then Chiang's method is applied to these calculated probabilities of dying.

4. Selection of Causes of Death

In order to account for the unique pattern of mortality in Republic of Korea for 1985, the present investigation considered ten leading causes in Korea. These ten leading causes of death accounted jointly for about 59 percent of deaths from 'all causes combined' among males aged 40 and over, and are

Table 3. Proportion of Male Deaths Aged 40 and over According to the Ten Leading Causes of Death in Republic of Korea, 1985

Cause of death	Constituent categories*	Proportion (%)
Tuberculosis of Respiratory System	020 - 021	3.36
Malignant Neoplasm of Stomach	091	6.97
Malignant Neoplasm of Liver Specified as Primary	095	4.73
Malignant Neoplasm of Treachea, Bronchus and Lung	101	2.11
Diabetes Mellitus	181	1.37
Hypertensive Diseases	26	9.94
Diseases of Pulmonary Circulation and Other forms of Heart Diseases	28	6.90
Cerebrovascular diseases	29	14.26
Bronchitis, Chronic and Unspecified Emphysema and Asthma	323	2.06
Chronic Liver Disease and Cirrhosis	347	7.38
Total		59.08

Source : Same as in Table 2

*(ICD-9)

presented in Table 3. Most of the remaining causes individually account for less than one percent of the total deaths.

5. Organization of the Study

In the introduction, we indicated the unigue pattern of mortality in Republic of Korea. Four substantive sections follow. Section II examines selected causes of death by decomposing death rates into them. Section III discusses some factors associated with the pattern of mortality in Republic of Korea in terms of causes of deaths which are examined in Section II. In Section IV, we consider the impact of elimination of each cause on longevity and the pattern of mortality under several assumptions. In final, section V summarizes the implication of the findings.

II. Structure and Pattern in Cause of Death

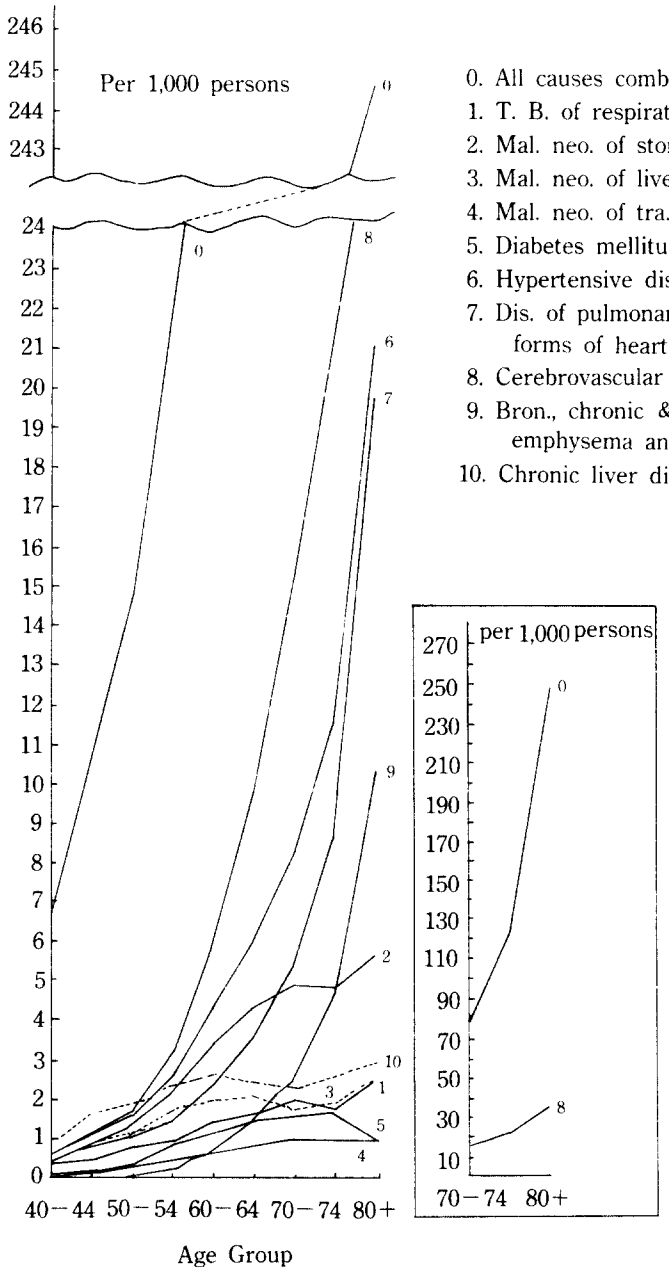
In the introduction, we considered briefly an unique pattern of mortality in Republic of Korea, characterized by excess death rates among older males compared to those among young males and among females. In determining this pattern of mortality the cause - specific mortality plays an important role since the incidence of mortality by cause varies substantially with age and sex. In this section our hypothesis that those selected causes of death are responsible for excess mortality of older males will be examined mainly by considering the relationship between causes of death and the patterns of mortality by age and between causes of death and the sex - difference in mortality, focusing especially on the population aged 40 and over.

1. Cause of Death and the Age pattern

Age specific death rates which are computed for selected causes of death in 1985 for the population aged 40 and over (see Appendix, Table 3) are shown in Figure 2. Without exception, the death rates vary directly with age. In particular, for three diseases of circulatory system – 'Hypertensive disease', 'Diseases of pulmonary circulation and other forms of heart diseases' and 'Cerebrovascular disease', the rise in mortality with age is very sharp for the sexes, which show the approximately same slope and curvature of overall mortality pattern. The progression for 'Malignant neoplasm of stomach' is also sharp but less than the three circulatory diseases. The mortality rates from 'Bronchitis, chronic and unspecified emphysema and asthma' are neglible before age 50 for male and age 60 for female, but after these ages, they rise very sharply. The remaining causes of death show much flatter progressions in their age - pattern of mortality. In all age groups, death rates from each cause are, without exception, higher for male than for female.

The distribution of age - specific death rates into causes of death is given in Table 4. Three circulatory diseases are, on average, the most principal contributors to overall death rates for both sexes (accounting jointly for 31 percent of male death rates and 36 percent of female's death rates). In particular, 'Cerebrovascular disease', on average, account for 14.3 percent of male's death rates and 17.8 percent of female's death rates for the ages 40 and over.

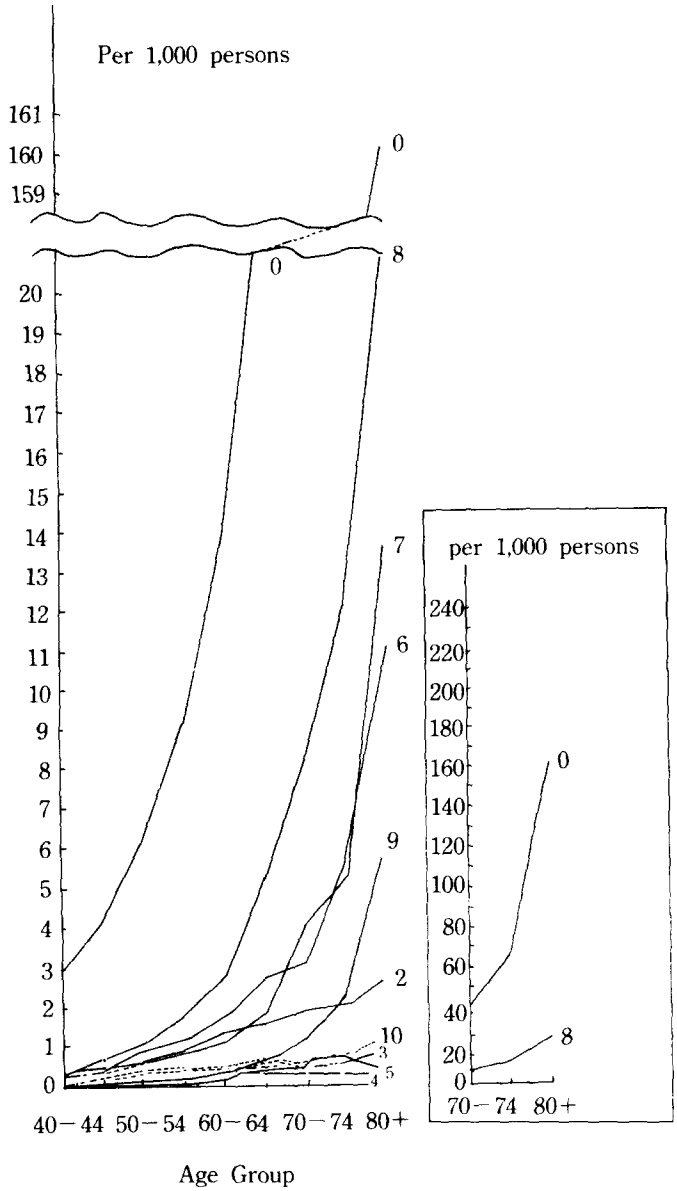
Figure 2-A. Age Specific Death Rates from Selected Causes of Death for Male Aged 40 and over : Korea, 1985



0. All causes combined
1. T. B. of respiratory system
2. Mal. neo. of stomach
3. Mal. neo. of liver
4. Mal. neo. of tra. bron. & lung
5. Diabetes mellitus
6. Hypertensive disease
7. Dis. of pulmonary cir. & other forms of heart diseases
8. Cerebrovascular disease
9. Bron., chronic & unspecified emphysema and asthma
10. Chronic liver disease & cirrhosis

Source : Same as in Table 2

Figure 2-B. Age Specific Death Rates from Selected Causes of Death for Female Aged 40 and over : Korea, 1985



Source : Same as in Table 2

Table 4. Population Aged 40 and over : Percentage Distribution of Deaths by Cause ; Republic of Korea, 1985

Cause of death	40+	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Male										
All Causes Combined	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(Death Rates per 10,000 Pop.)	(265.4)	(65.6)	(108.1)	(149.2)	(223.7)	(348.1)	(525.8)	(799.4)	(1236.4)	(1472.8)
Tuberculosis of Respiratory System	3.4	5.8	4.5	5.2	4.0	4.2	3.2	2.5	1.4	1.0
Malignant Neoplasm of Stomach	7.0	6.3	7.7	8.9	10.0	9.9	8.2	6.1	3.9	2.3
Malignant Neoplams of Liver	4.7	7.0	7.7	8.0	7.6	5.6	3.9	2.2	1.5	1.0
Malignant Neoplasm of Trachea, Bronchus and Lung	2.1	1.3	1.8	2.5	3.7	3.2	2.8	1.9	1.3	0.4
Diabetes Mellitus	1.4	1.2	1.6	2.0	1.9	1.8	1.6	1.2	0.8	0.4
Hypertensive Disease	9.9	8.1	9.3	10.3	11.4	12.3	11.4	10.3	9.3	8.5
Diseases of Pulmonary Circulation & other forms of Heart Diseases	6.9	8.0	7.5	7.6	6.4	6.8	6.7	6.6	7.0	8.0
Cerebrovascular Disease	14.3	8.3	10.0	11.2	14.1	16.7	18.6	18.9	17.1	14.2
Bronchitis, Cronic & Unspecified Emphysema and Asthma	2.1	0.3	0.5	0.8	1.1	2.1	2.8	3.2	3.7	4.2
Chronic Liber Diseases and Cirrhosis	7.4	14.1	15.4	13.0	10.5	7.4	4.6	2.9	2.1	1.2
Residuals	40.8	39.6	34.0	30.5	29.3	30.0	36.2	44.2	51.9	58.8
Female										
All Causes Combined	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(Death Rates per 10,000 Pop.)	(176.0)	(29.1)	(42.0)	(61.3)	(90.5)	(138.4)	(238.4)	(401.3)	(660.5)	(1602.4)
Tuberculosis of Respiratory System	1.5	4.5	3.4	2.8	2.2	1.7	1.7	1.2	0.9	0.6
Malignant Neoplasm of Stomach	5.6	10.0	10.3	10.1	9.5	9.5	6.9	4.9	3.1	1.7
Malignant Neoplams of Liver	2.1	4.4	4.4	5.0	3.8	3.0	2.4	1.2	1.0	0.5
Malignant Neoplasm of Trachea, Bronchus and Lung	1.0	1.3	1.6	1.7	1.7	1.8	1.5	1.0	0.5	0.2
Diabetes Mellitus	1.3	1.6	1.4	1.5	2.1	2.4	2.1	1.7	1.0	0.3
Hypertensive Disease	9.8	10.0	11.5	13.1	12.6	12.7	11.5	10.0	8.4	6.9
Diseases of Pulmonary Circulation & other forms of Heart Diseases	8.4	9.1	9.4	8.7	9.0	8.5	8.2	7.7	7.8	8.5
Cerebrovascular Disease	17.8	10.7	14.5	17.7	19.6	21.3	21.8	20.6	18.2	14.5
Bronchitis, Cronic & Unspecified Emphysema and Asthma	2.6	0.4	0.5	0.6	1.0	1.9	2.2	3.1	3.6	3.8
Chronic Liber Diseases and Cirrhosis	2.4	4.9	5.3	5.2	5.1	3.4	2.5	1.6	1.1	0.8
Residuals	47.5	43.1	37.7	33.6	33.4	33.8	39.2	47.0	54.4	62.2

Source : Same as in Table 2

Among three malignant neoplasms –'Malignant neoplasm of stomach', 'Malignant neoplasm of liver' and 'Malignant neoplasm of trachea, bronchus and lung'– which, on average, contribute 13.8 percent for male and 8.7 percent for female to death rates from 'all causes combined', 'Malignant neoplasm of stomach', on average, account for 7.0 percent for male and 5.6 percent for female.

Among the remaining causes of death, 'Chronic liver diseases and cirrhosis' is very important cause of death for male : it, on average, ranks the third in cause of death, accounting for 7.4 percent of all deaths of male (particularly, it ranks the first between age groups 40–44 and 50–54 for male). However, the contribution of this disease to female death rates is relatively low. Meanwhile, 'Tuberculosis of Respiratory system' which is the only one disease from "Infectious and parasitic disease' group (ICD - 9 : 01 - 07) among selected causes, show relatively low contribution to death rates for older age groups, (on average, accounting for 3.4 percent of males death rate and 1.5 percent of female death rates). The other two causes, 'Diabetes mellitus' and 'Bronchitis, chronic and unspecified emphysema and asthma' account for a little less than 5 percent of total deaths in all age groups of male and female.

All the selected causes of death, with exception of 'Diseases of pulmonary circulation and other forms of heart disease', 'Cerebrovascular disease' and 'Bronchitis, chronic and unspecified emphysema and asthma', are more perdominant contributors to death rates for older males than for older female. The other three causes are relatively more prevailing among females than among males.

In terms of age pattern of contribution of cause of death to overall death rate, each cause shows either increasing, decreasing, or increasing and then decreasing trend in its contribution with advancing age, 'Bronchitis, chronic and unspecified emphysema and asthma' for both sexes exhibits the increasing trend in its contribution with age, whereas 'Tuberculosis of respiratory system' and 'Chronic liver disease and cirrhosis' for both sexs and 'Malignant neoplasm of stomach' for male show the decreasing trend in their contribution to death rates with age. For the other causes of death, their contribution to death rates increase until a certain age group, but after this age group, it declines, 'Hypertensive disease' for male, for example, show the increasing trens, but after reaching the peak in the age group 60–64, it shows the decreasing trend with age.

It is noteworthy that three circulatory diseases, 'Chronic liver diseases and cirrhosis', and two malignant neoplasms –'Maliganant neoplasm of stomach' and 'Malignant neoplasm of liver'– played an important role in determining death rates for older males : deaths from these causes of death, on average, account for about 50 percent of death rates for males aged 40 and over.

2. Cause of Death and Sex Differential Mortality

The relative impact of selected causes of death on the sex mortality differential for the population aged 40 and over in 1985 can be seen from Table 5. A most striking feature of the tables is the obsevation that around

one-fifth of the differential between the sexes can, on average, be directly attributed to differential mortality form 'Chronic liver disease and cirrhosis' : its contribution to the sex difference in mortality accounted for Over 20 percent in the age groups 40−44 and 45−49, and after these age groups, it declined rapidly with increasing age.

The additional one-fourth of the differential between the sexes can, on average, be accounted for by differential mortality from three malignant neoplasms : the contribution from 'Malignant neoplasm of stomach' and 'Malignant neoplasm of liver', each, on average, accounted for around one-tenth but male excess mortality from 'Malignant neoplasm of trachea, bronchus and lung' accounted for 4.3 percent of the sex differential in mortality. In the age pattern of their contribution to sex differential in mortality, they reached

Table 5. Absolute Difference between Cause Specific Death Rates of Male and Female Ages 40 and over and its Relative Impact on Difference in Mortality : Republic of Korea, 1985

Cause of death	40+	40−44	45−49	50−54	55−59	60−64	65−69	70−74	75−79	80+
All Causes Combined	893.7 (100.0)	365.0 (100.0)	661.1 (100.0)	870.2 (100.0)	1331.8 (100.0)	2097.4 (100.0)	2877.1 (100.0)	3981.0 (100.0)	5679.3 (100.0)	8704.0 (100.0)
Tuberculosis of Respiratory System	63.8 (7.1)	24.9 (6.8)	34.3 (5.2)	59.9 (6.9)	69.6 (5.2)	122.7 (5.9)	127.8 (4.4)	151.7 (3.8)	112.9 (2.0)	151.2 (1.7)
Malignant Neoplasm of Stomach	87.2 (9.8)	12.2 (3.3)	39.9 (6.0)	70.1 (8.1)	137.7 (10.3)	213.1 (10.2)	266.9 (9.3)	291.0 (7.3)	275.0 (4.8)	296.3 (3.4)
Malignant Neoplams of Liver	87.7 (9.8)	33.1 (9.1)	64.7 (9.8)	87.9 (10.1)	105.6 (10.2)	153.4 (7.3)	148.0 (5.1)	127.7 (3.2)	118.6 (2.1)	167.2 (1.9)
Malignant Neoplasm of Trachea, Bronchus and Lung	38.1 (4.3)	4.7 (1.3)	12.8 (1.9)	26.7 (3.1)	67.4 (5.1)	86.9 (4.1)	111.5 (3.9)	111.8 (2.8)	127.3 (2.2)	66.9 (0.8)
Diabetes Mellitus	14.3 (1.6)	3.2 (0.9)	11.4 (1.7)	20.8 (2.4)	23.5 (1.8)	29.5 (1.4)	34.1 (1.2)	27.7 (0.7)	32.0 (0.6)	50.8 (0.6)
Hypertensive Disease	90.2 (10.1)	24.0 (6.6)	52.2 (7.9)	72.4 (8.3)	141.0 (10.6)	152.4 (12.0)	325.6 (11.3)	514.4 (12.9)	588.4 (10.4)	996.2 (11.4)
Diseases of Pulmonary Circulation & other forms of Heart Diseases	35.3 (3.9)	26.0 (7.1)	41.6 (6.3)	59.4 (6.8)	61.7 (4.6)	119.1 (5.7)	157.1 (5.5)	126.3 (3.2)	344.1 (6.1)	616.2 (7.1)
Cerebrovascular Disease	66.2 (7.4)	23.3 (6.4)	47.2 (7.1)	57.6 (6.6)	138.0 (10.4)	286.5 (13.7)	458.9 (16.0)	684.2 (17.2)	897.5 (15.8)	1187.9 (13.6)
Bronchitis, Chronic & Unspecified Emphysema and Asthma	9.9 (1.1)	1.3 (0.4)	3.3 (0.5)	8.2 (0.9)	15.5 (1.2)	46.8 (2.2)	94.8 (3.3)	131.4 (3.3)	216.8 (3.8)	429.7 (4.9)
Chronic Liver Diseases and Cirrhosis	154.2 (17.3)	78.2 (21.4)	144.2 (21.8)	160.9 (18.5)	188.7 (14.2)	210.5 (10.0)	182.4 (6.3)	167.6 (4.2)	186.4 (3.3)	168.5 (1.9)
Residuals	246.8 (27.6)	134.4 (36.8)	209.2 (31.6)	246.3 (28.3)	353.1 (26.5)	576.5 (27.5)	970.0 (33.7)	1647.2 (41.4)	2780.3 (49.0)	4573.1 (52.5)

Source : Same as in Table 2

Note : 1) Death rates are per 100,000 persons

2) Figures in parentheses are precent

their peak point in the age group 55－59.

Sex mortality differential from three circulatory diseases, on average, accounted for additional one - fifth of the differential in death rates ; the contribution from 'Hypertensive disease', on average, accounted for one - tenth of sex mortality differential and from 'Cerebrovascular disease' and 'Diseases of pulmonary circulation and other forms of heart diseases', they accounted for 7.4 and 4.0 percent of the difference, respectively. For the latter two diseases, their impact on the difference increased with age, while the impact of the former one on the sex difference in mortality is similar among age groups.

Among the remaining causes of death, sex differential mortality form 'Tuberculosis of respiratory system' contributed, on average, 7.1 percent to the differential in death rates, with its impact on the sex difference in mortality increasing with age. The contribution from male - female differences in the other two causes, 'Diabetes mellitus' and 'Bronchitis, chronic and unspecified emphysema and asthma' is practically negligible. Sex mortality differential from all selected causes, on average, account jointly for 72.4 percent of the differential in death rates for older population.

In this section, we have considered the age pattern of mortality and sex mortality differential in terms of selected causes of death. It has been found that mortality from selected causes of death played a very important role in determining age - specific death rates for older age groups of male ; among causes, 'Cerebrovascular disease', 'Hypertensive disease', 'Chronic liver disease and cirrhosis', 'Malignant neoplasm of stomach and 'Disease of pulmonry circulation and other forms of heart disease' are, in that order, the most principal contributors. At the same time, sex mortality differential from these selected causes contributed considerably to the differential in death rates at older ages ; among causes, 'Chronic liver disease and cirrhosis', 'Hypertensive disease', 'Malignant neoplasm of liver', 'Malignant neoplasm of stomach' and 'Cerebrovascular disease', in that order, are the most important causes in determining the sex difference in mortality at older age groups.

The results support our hypothesis that these selected causes of death are responsible for the pattern of mortality in Republic of Korea in 1985, characterized by excess mortality of older males, although some causes at certain age groups, appeared to be less significant than others. Based upon these results, some factors associated with the pattern of mortality in Republic of Korea in 1985 will be considered in the following section.

III. Some Factors Associated with the Mortality Pattern

1. Development Variables and the Mortality Pattern

Since 1962, economic development by means of industrialization was given the priority among the national goals. The assumption behind the policy is the basic precondition of raising the standard of livine, including the health status of population. The rapid decline in mortality in particular during development process has been largely the result of improved nutrition and raising standards of living

resulting from economic development. In particular, the improved nutrition levels have played a very important role in reducing child mortality since child mortality is very sensitive to nutrition levels, both directly and through its influence on the perniciousness of infectious diseases. The role of nutrition in maternal mortality is also certainly of considerable importance.

In addition, the family planning programme which was adopted as a national policy in late 1961, served as the platform from which to develop maternal and child health. The improvement of health technology during the development has also worked relatively to the benefits of females in the two aspects : the first is the decline in maternal mortality, which has naturally worked to the exclusive benefit of females. The other major development is the improved detection and treatment of cancer of the female reproductive organs.

Accute communicable diseases and tuberculosis control projects have also contributed to the decline of child mortality through reduction in mortality from these diseases. It is described in the 24th World Health Assembly that no case of small box has been seen since 1959, and no case of typhoid fever since 1960 in Republic of Korea (Yang, 1982).

In order to account for the relationship between infant and maternal mortality and some socio - economic variables described above which are presented in Table 6, the simple correlation coefficients are calculated. The calculated correlation coefficients show that both infant and maternal mortality are highly correlated negatively development. All variables introduced here are significant at 99 percent level.

Thus, changes in economic development, socio - cultural modernization and public factors have all worked to the benefits of children and females. However the process of development has brought not only benefits but also unwelcome effects to the older males, in terms of mortality.

It is konwn that process of development itself affects the sexes differentially. For example, the attainment of a high level of economic modernization may have placed women in their optimal exercise range but deposited men below theirs (Preston, 1976). It is sometimes argued that cerebral occupations are more 'stressful' than physical ones, although the importance of the links for mortality in an entire population has been questioned (Preston, 1970). The lack of exercise and stress are thought to operate primarily by raising male mortality from heart diseases, relative to female mortality from this cause (Retherford, 1975). Since a higher proportion of men than women participate in the labour force, such mechanism would presumably be responsible for excess mortality of older males in Republic of Korea.

Other specific factors that raise mortality risk for adult males and result from industrialization include association between 'Malignant neoplasm of trachea, bronchus and lung' and inhalation of asbestos dust, pollution and some noxious chemistrical gas used in manufacturing industries. (According to Social Statistics Survey (1983) by NBOS EPB, around 23 percent of respondents felt pollution from smoke and dust).

Table 6. Economic Development, Family Planning and Infant and Maternal Mortality : Republic of Korea

Year	IMR[1]	MMR[2]	per capita GNP[2] (US Dollar)	FPPR[3]	CBR[3]	per capita Daily Calorie (KCal)[1]
1970	55.0	–	288	24.0	29.3	2370
1975	41.4	–	590	40.0	24.0	2390
1976	40.4	–	797	43.0	23.6	2414
1977	39.5	–	1008	45.0	23.4	2427
1978	38.5	4.3	1392	49.0	23.5	2533
1979	37.6	4.2	1640	55.0	23.4	2599
1980	36.8	4.2	1589	55.0	23.0	2485
1981	35.8	4.1	1719	–	22.5	2531
1982	35.0	4.0	1773	58.0	21.7	2588
1983	34.2	3.8	1914	60.0	20.6	2622
1984	33.3	3.6	2044	70.0	19.7	2636
1985	32.6	3.4	2047	70.4	19.4	2687

Source : 1) Yearbook of Public Health Social Statistics, Ministry of Social Affairs
2) National Income Accounts, The Bank of Korea
3) Korea Institute for Population Health

Note : IMR=Infant Mortality Rate (per 1000 Live Births)
MMR=Maternal Mortality Rate (per 1000 Live Births)
FPPR=Family Planning Practice Rate (Married couples practicing family planning)/(Married couples in ages 15–44)×100
CBR=Crude Birth Rate (No. of Live Births per 1000 persons)

Correlation Coefficients

	FPPR	CBR	per capita GNP	per capita Daily Calorie
IMR	–.9754	.9282	–.9644	–.9181
MMR	–.9663	.9826	–.9476	–.8623

2. Behavioural Changes and the Mortality Pattern

The mechanism related to economic development are highly correlated with changes in behaviours such as alcohol consumption, cigarette smoking, etc. in that they may be associated as ways of solution of the physical ans mental strain resulting from modern mechanical and tough life.

Alcohol consumption which is concentrated

among older males, may explain high mortality risks of males, since Republic of Korea is one of high alcohol consumption countries. According to WHO (1987), Republic of Korea has reached a considerable level of alcohol consumption within a time period of only 20 years between 1961 and 1980 with its very low starting point : alcohol consuption during the same period was 10 to 15 litres per adult per year, which ranked the second highest level of alcohol consumption in the world which includes USA and Eastern Europe (see WHO 1987, Fig. 8). This can also be seen from Table 7, where drinking population account for around 70 percent of males in 1986.

Alcohol consumption is known to aggravate liver disorders (Preston, 1970) and may be partly responsible for the high masculinity of death from 'Chronic liver diseases and Cirrhosis', Malignant neoplasm of liver', 'Hypertensive disease', 'Diseases of pulmonary circulation and other forms of heart diseases', 'Cerebrovascular disease' and 'Tuberculosis of respiratory system' (Preston, 1970 ; Room and Day, 1974). Indeed, those described diseases accounted for the significant proportion of mortality of older males in 1985 (see section II).

Cigarette smoking which is also concentrated among older males, is an obvious candidate to account for part of excess mortality of older males in Republic of Korea. Cigarette is related to the rising incidence of mortality form 'Malignant neoplasm of trachea, bronchus and lung' and 'Cerebrovascular disease' (Compton, 1985), which played an important role in determining excess mortality of older males.

While factors related to changes in economic development, socio - cultural modernization and public policy have worked to the benefits of children and females through their contribution to the rapid decline in mortality for children and female population, those factors described above and resulted mainly from development have worked relatively to the disadvantage of older males in Republic of Korea, resulting in slowing down the mortality decline of older males relative to those of young population and female population and thereby, widening the gap between life expectancy of male and female and leading to the rapid rise in mortality between childhood and adulthood of male.

Table 7. Drinking Population : Republic of Korea, 1986

Sex	Total	Drinking Population	Frequence of Drinking				Never Drinking
			Once or Less per month	2−4 per month	2−4 per week	Almost every day	
Both	100.0	41.6	12.2	15.7	8.9	4.8	58.4
Male	100.0	67.8	13.3	28.0	17.3	9.2	32.2
Female	100.0	17.8	11.2	4.6	1.2	0.8	82.2

Source : Social Statistic Survey, 1986 (NBOS, EPB)

The resultant pattern of mortality directly affects the sex ratio of the population at older ages, the expected length of widowhood and a host of other social and demographic variables.

Perhaps the most important social cost of the widening mortality gap between the sexes at older ages stems from sex ratios increasingly in favour of women at the older ages and the relatively high incidence of widowhood. In Table 8 where sex ratios, proportion of widowed and wage levels by age group are presented for 1985, population sex ratios are seen to be over 100 per 100 females at ages below 40 but it declined rapidly with advancing age. When compared to those for the 1966 population, they showed the decreasing trend for ages 45 and over with exception of age group 65－69. Proportion widowed among female population for 1985 is less than 10 per 100 females at age groups between 15 and 44 but it increased rapidly with age and reached over 80 in the oldest age groups. Other social costs are incurred such as an increased risk of paternal orphanhood.

From an economic viewpoint, the excess mortality of older males who are at ages of maximum earning power(see Table 8 col. 4) and whose careers are by this stage well established, implied a substantial cost in terms of lost productivity. Additionally, since the majority of deaths at the older ages usually resulted from the action of one or more chronic debilitating agents, it might be expected that many of those who ultimately succumbed to these diseases did so only after an extended period of illness, during which time their economic activity was minimized of often terminated altogether and burdens of sickness and ill health were considerable.

Table 8. Sex Ratios, Proportion Widowed and Wage Level : Republic of Korea, 1985

Age group	Sex Ratio[1]		Proportion Widowed[1] (1985)	Wage Level[2]
	1966	1985		
0－4	107.2	108.0	–	–
5－9	107.6	107.1	–	–
10－14	107.2	106.7	–	–
15－19	106.9	106.6	0.02	42.1
20－24	109.9	106.1	0.05	59.1
25－29	98.9	99.2	0.34	93.4
30－34	99.2	104.2	1.32	123.6
35－39	89.7	105.4	3.42	137.4
40－44	95.9	102.8	7.18	140.1
45－49	100.6	99.7	12.31	142.3
50－54	96.6	91.4	21.78	148.4
55－59	91.3	79.3	35.05	
60－64	81.9	77.7	49.10	157.9
65－69	71.8	73.7	60.67	
70－74	64.6	61.3	82.13	
75－79	56.9	49.6	81.25	
80＋	50.1	31.7	89.27	

Source : 1) 1966 and 1985 Population and Housing Census, NBOS EPB

2) Occupational Wage Survey (1985), Ministry of Labor

Note : 1 Sex Ratio : Male/Female×100

2 Proportion Widowed : per 100 Female

3 Wage Level : Average＝100

Ⅳ. Impact of Elimination of Causes of Death on Longevity and the Age-Sex Differential Mortality

So far, we have discussed the patterns of mortality by age and sex and some factors

related to the mortality pattern in terms of causes of death responsible for excess mortality of older males in Republic of Korea for 1985. The room for further improvement in longevity for older males which may result in reducing the age - sex differential mortality, may be gauged by considering the increase in life expectancy that result from the elimination of causes of death responsible for excess mortality of older males in Republic of Korea for 1985. Based upon this concept, we shall, in this section, discuss gains in longevity by eliminating these cause and their contribution to the reduction in age - sex differential mortality.

1. Gain in Longevity by Eliminating Causes of Death

The gain in life expectancy by eliminating selected causes of death can be seen from Table 9. The computation was made based upon the following assumptions :

1 the death rates and life table will continue into the future without change,
2 when the cause in question is assumed to be completely eliminated, deaths from the cause are not present and the lives so saved are subjected to death from the remaining causes, and
3 the gains for causes are not additive.

For many causes of death, complete elimination would add only a fraction of a year to expectation of life at birth for the sexes. For example, complete elimination of 'Tuberculosis of respiratory system' would add only 0.48 year for male and 0.29 year for female to their average length of life ; for 'Diabetes mellitus', it is 0.15 year for male and female.

Most significant for lengthening average life span would be complete elimination of the three circulatory deseases : for 'Cerebrovascular disease', complete elimination would add 1.58 years for male and 1.72 years for female to average life span and the gain in life expec-

Table 9. Gain in Longevity at Birth and at Age 40 by Eliminating Causes of Death : Republic of Korea, 1985

Cause of Death	Male		Female	
	Birth	40	Birth	40
Tuberculosis of Respiratory System	0.48	0.37	0.29	0.16
Malignant Neoplasm of Stomach	0.78	0.80	0.64	0.60
Malignant Neoplasm of Liver	0.55	0.54	0.24	0.22
Malignant Neoplasm of Trachea, Bronchus and Lung	0.24	0.24	0.12	0.10
Diabetes Mellitus	0.15	0.15	0.15	0.14
Hypertensive Disease	1.05	1.09	0.92	0.94
Diseases of Pulmonary Circulation & Other Forms of Heart Diseases	1.08	0.71	1.11	0.72
Cerebrovascular Disease	1.58	1.60	1.72	1.72
Bronchitis, Chronic and Unspecified Emphysema and Asthma	0.19	0.18	0.19	0.18
Chronic Liver Disease and Cirrhosis	0.89	0.84	0.26	0.25

Source : Same as in Table 2

tancy from the elimination of 'Hypertensive disease' and 'Diseases of pulmonary circulation and other forms of heart diseases' would be 1.05 and 1.08 years for males and 0.92 and 1.11 years for female, respectively.

'Chronic liver disease and cirrhosis' and 'Malignant neoplasm of stomach' show relatively high potential for improvement in male mortality, accounting for a calculated gain of 0.89 and 0.78 year, respectively.

For most of selected causes of death, the gains in life expectancy at age 40 by their elimination would be greater than or the approximately same as those at birth for male and female, with the gains being greater for male than for female both at birth and at age 40. However, the increase in life expectancy from elimination of 'Diseases of pulmonary circulation and other forms of heart disease' would be greater at birth than at age 40 by relatively big defference. In addition, the gains from complete elimination of 'Disease of pulmonary circulation and other forms of heart diseases' and 'Cerebrovascular disease' would be slightly greater for female than for male both at birth and at age 40.

In order to make our assumptions more realistic, we modified ② and ③ of the previous assumptions as follows :

② since each of selected causes of death can not be expected to be eliminated completely, even with a further medical progress, we made different assumptions for each cause according to the possibility of its elimination.

- 'Tuberculosis of respiratory system' can be reduced by 70 percent from the present level.
- 'Chronic liver disease and cirrhosis' and 'Bronchitis, chronic and unspecified emphysema and asthma' which appeared to be more related to environmental factors, life styles, etc. can be reduced by 50 percent from the present level.
- 'The other causes can be reduced by 30 percent, mainly be early detection and prevention of causes of death,

③ Elimination of causes occurs concurrently and they are additive.

The gains in life expectancy by eliminating selected causes of death under the modified assumptions are presented in Table 10. For all selected causes, elimination would add less than half a year to expectation of life at birth for the sexes. Among causes of death, the increase in life expectancy from elimination of 'Cerebrovasular diseases' for two sexes and from elimination of 'Chronic liver disease and Cirrhosis' for male would be the greatest. The gain from elimination of male's deaths from 'Tuberculosis of respiratory system' would be relatively big. The differences in the gains between at birth and at age 40 and between males and female for most of selected causes of death would show the similar patterns to those under the initial assumptions, although at lower levels.

2. Impact of Elimination of Causes of Death on Age - Differential Mortality

The West levels of mortality implied by male's death rates after eliminating deaths from causes based on assumptions (described in section Ⅳ. 1) and data for 1985 can be seen form Figure 3.

The complete elimination of male's deaths

Table 10. Gain in Longevity at Birth and at Age 40 by Eliminating Cause of Death under the Modified Assumptions : Republic of Korea, 1985

Cause of Death	Male		Female	
	Birth	40	Birth	40
Tuberculosis of Respiratory System	0.34	0.27	0.20	0.11
Malignant Neoplasm of Stomach	0.23	0.24	0.20	0.18
Malignant Neoplasm of Liver	0.17	0.17	0.07	0.07
Malignant Neoplasm of Trachea, Bronchus and Lung	0.07	−0.07	0.03	0.03
Diabetes Mallitus	0.04	0.05	0.05	0.04
Hypertensive Disease	0.03	0.32	0.28	0.28
Diseases of Pulmonary Circulation & Other Forms of Heart Diseases	0.31	0.21	0.33	0.21
Cerebrovascular Disease	0.44	0.45	0.50	0.50
Bronchitis, Chronic and Unspecified Emphysema and Asthma	0.09	0.09	0.09	0.09
Chronic Liver Disease and Cirrhosis	0.45	0.43	0.14	0.13
Combined	2.71	2.51	1.80	1.67

Source : Same as in Table 2

from 'Cerebrovascular disease' which is the most principal contributor to older male's death rates, would eliminate considerably the deviations of men's death rates for older age groups from West model patterns, with the implied West levels of mortality being between 18 and 20. For 'Hypertensive disease', 'Diseases of pulmonary circulation and other forms of heart diseases' and 'Malignant neoplasm of stomach', complete elimination would show significant reduction in the diviations of older male's death rates from West model pattern.

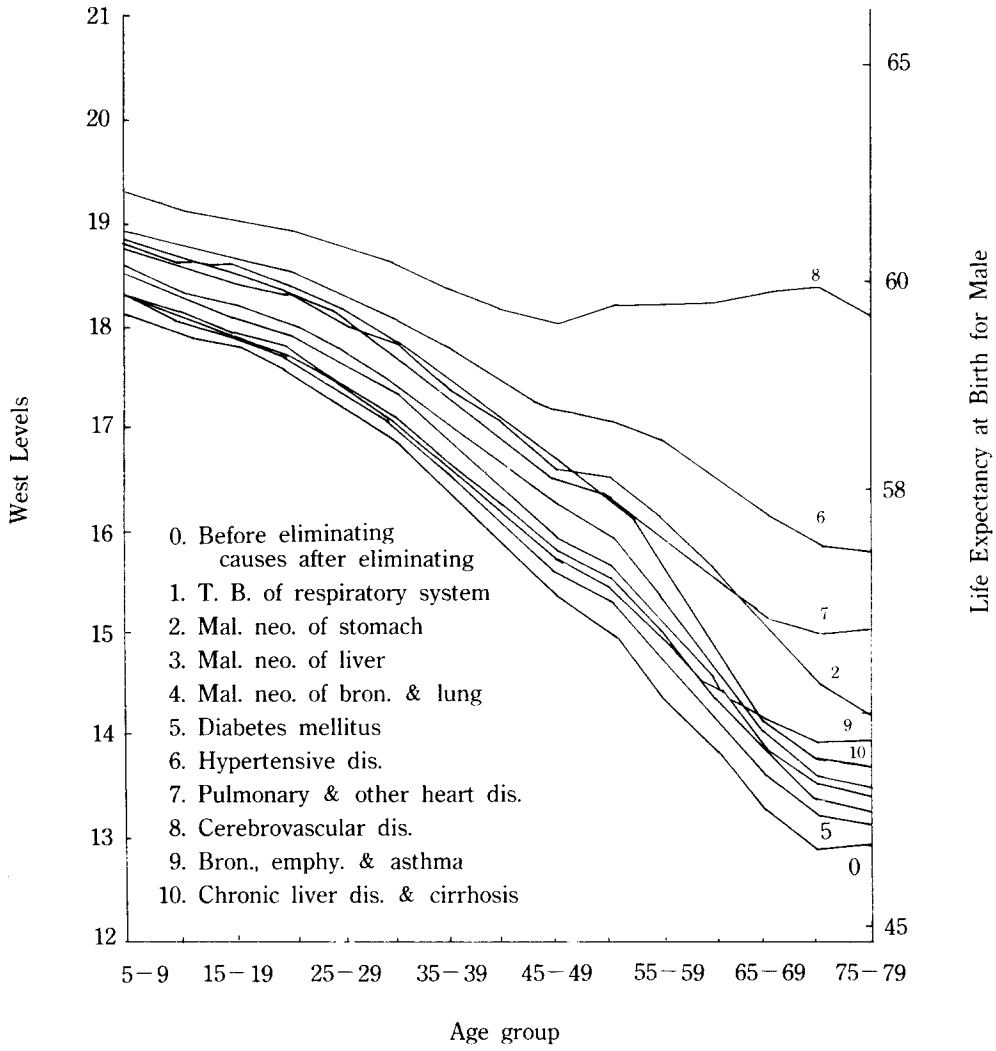
Elimination of death from 'Chronic liver disease and cirrhosis' would reduce the excess mortality of male in the age groups between ages 40 and 45 significantly rather than in other age groups. However, elimination of male's deaths from the remaining causes would not significantly reduce the departures from West model patterns.

Expectation of life by elimination of causes under the modified assumptions is computed and is shown in Figure 4. In figure 4, the elimination of excess Cerebrovascular mortality of males (by 30 percent) would not sufficiently eliminate men's excess mortality at older age. However, as the elimination of mortality from additional causes of death proceed, the mortality pattern would become close to a pattern of West levels ; the elimination of excess deaths of men from all selected causes combined under the modified assumptions woule considerably eliminate the deviant mortality pattern.

3. Impact of Elimination of Causes of Death on Sex - Differential Mortality

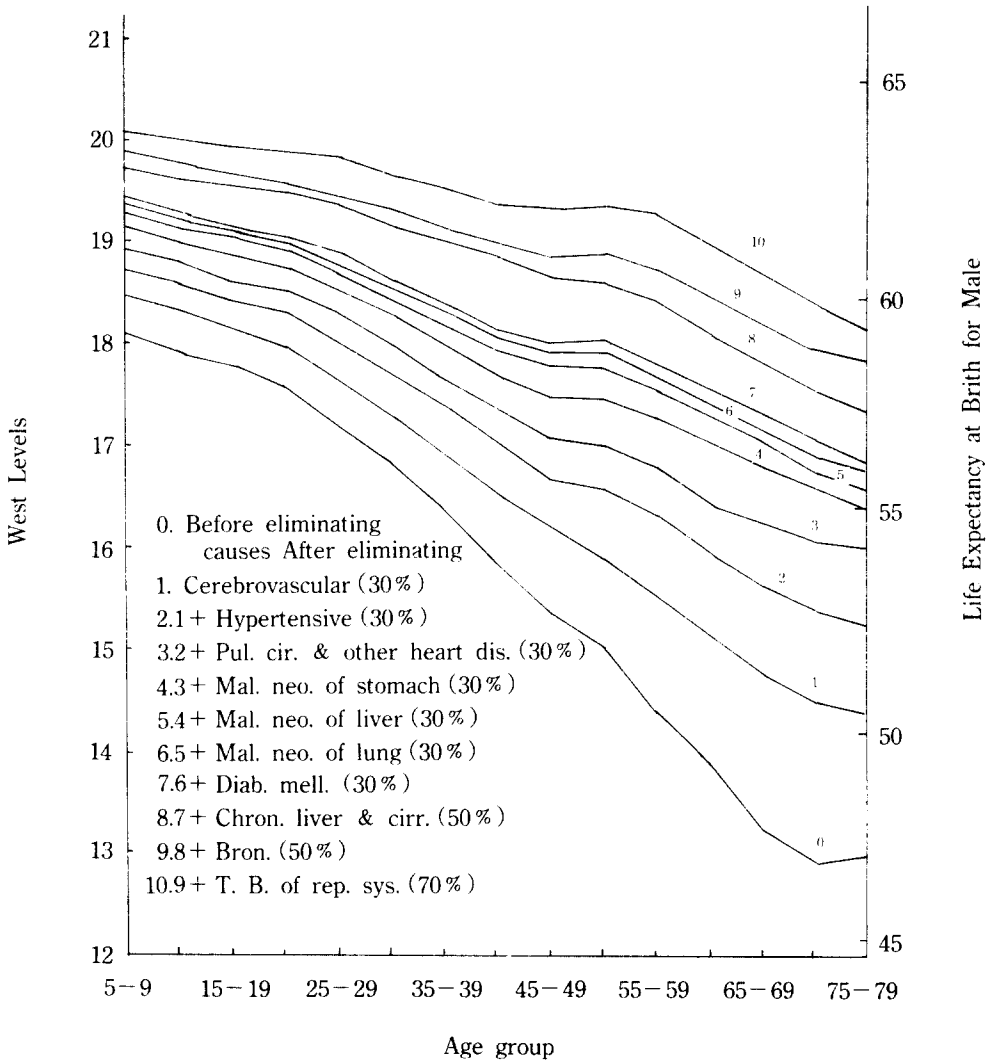
In the previous subsection, we have considered only males. If we, however, eliminate

Figure 3. Levels of West Model Life Table Implied by Male Death Rates after Eliminating Causes of Death under Initial Assumptions, Republic of Korea, 1985



Source : Same as in Table 2

Figure 4. Levels of West Model Life Table Implied by Male Death Rates after Eliminating Causes according to Modified Assumptions : Republic of Korea, 1985



Source : Same as in Table 2.

deaths from selected causes of death under the same assumptions, the life expectancy for female would also increase, with the sex-difference in mortality increasing or declining. Therefore, we shall make a brief examination of sex differential mortality ⓐ after eliminating only male's death rates from selected causes, keeping female's mortality fixed as in 1985 and ⓑ after eliminating deaths from the same causes for both sexes.

The difference between average life expectancies of men and women based upon the above assumptions are presented in Table 11. In all cases, mortality above age 40 account for over 80 percent of the female - male difference in life expectancy. In case of ⓐ, complete elimination of deaths from 'Cerebrovascular disease' would be the most principal contributor to reduction in sex difference by 21.1 percent for age 40 and over. The complete elimination of 'Hypertensive disease' and 'Diseases of pulmonary circulation and other forms of heart diseases', each would eliminate the difference at age 40 by 14.5 and 9.5 percent, respectively.

Two malignant neoplasms, 'Malignant neoplasm of stomach' and 'Malignant neoplasm of liver' would also play important roles in reduction of the difference by their elimination : the elimination of deaths from 'Malignant neoplasm of stomach' and 'Malignant neoplasm of liver' would eliminate the difference at age 40 by 10.7 and 7.3 percent, respectively. The complete elimination of 'Chronic liver disease and cirrhosis' would reduce the difference at age 40 by 4.5 percent. However, the roles of others in reduction of sex difference in life expectancy at age 40 would not be significant as presented in Table 10.

Under the modified assumptions, the role of each cause of death in reducing sex differential mortality for older age groups would be less signigicant than that under the initial assumptions : for example, the elimination of deaths from 'Cerebrovascular disease' by 30 percent and from 'Chronic liver disease and cirrhosis' by 50 percent, each would eliminate the difference at age 40 by 5.9 and 5.7 percent, respectively but the elimination of other causes according to the assumptions would reduce the difference at age 40 by a little less than 5 percent. However, the elimination of all selected causes at the same time under the modified assumptions would eliminate the difference at age 40 by 33.1 percent.

In case of ⓑ where we assumed that each of selected causes would be eliminated for the two sexes under the same assumptions, the effect of elimination of each cause on sex differential in life expectancy at age 40 would be quite less significant than that in case of ⓐ ; the complete elimination of the 'Cerebrovascular disease' and 'Diseases of pulmonary circulation and other forms of heart diseases' would even increase the sex difference in life expectancy at age 40 by . 21 and . 26 percent, respectively, indicating that these diseases are more prevailing among older females than among older males. The elimination of 'Bronchitis, chronic and unspecified emphysema and asthma' would not affect sex mortality differential at older ages.

'Chronic liver disease and cirrhosis' and 'Malignant neoplasm of liver' which are highly associated with alcoholism, would play the most important roles in reducing the sex

Table 11. Impact of the Elimination of Cause on Sex differential Mortality : Republic of Korea, 1985

Cause of death	Elimination of Male's Deaths				Elimination of Both Sexes Death			
	Difference[1]		Propo-rtion[2]	Impact on SDM[3]	Difference[1]		Propo-rtion[2]	Impact on SDM[3]
	at birth	at age 40	(%)	(%)	at birth	at age 40	(%)	(%)
Under Intial Assumptions :								
Tuberculosis of rep. sys.	8.17	7.20	88.1	5.14	8.46	7.36	87.0	3.03
Mal. neo. of stomach	7.86	6.78	86.3	10.67	8.52	7.40	86.9	2.50
Mal. neo. of liver	8.09	7.04	87.0	7.25	8.34	7.27	87.2	5.14
Mal. neo. of tra., bron.& lung	8.41	7.34	87.3	3.29	8.53	7.45	87.3	1.84
Diabetes mellitus	8.51	7.43	87.3	2.11	8.67	7.57	87.3	0.26
Hypertensive dis.	7.60	6.49	85.4	14.49	8.55	7.46	87.3	1.71
Dis. of pulmonary cir. and Other farms of heart dis.	7.58	6.87	90.6	9.49	8.70	7.61	87.5	−0.26
Cerebrovascular dis.	7.08	5.99	84.6	21.08	8.85	7.75	87.6	−0.21
Bron., chronic and unspe. emphysema and asthma	8.47	7.40	87.4	2.50	8.66	7.58	87.5	0.13
Chron. liver dis and cirr.	7.75	6.72	86.7	11.46	8.02	6.98	87.0	8.04
Under Modified Assumptions :								
Tuberculosis of rep. sys.	8.32	7.32	88.0	3.55	8.52	7.43	87.2	2.11
Mal. neo. of stomach	8.43	7.35	87.2	3.16	8.63	7.53	87.3	0.79
Mal. neo. of liver	8.49	7.42	87.4	2.24	8.56	7.49	87.5	1.32
Mal. neo. of tra., bron.& lung	8.59	7.52	87.5	0.92	8.62	7.55	87.6	0.53
Diabetes mellitus	8.62	7.54	87.5	0.66	8.67	7.57	87.3	0.26
Hypertensive dis.	8.36	7.27	87.0	4.22	8.64	7.55	87.4	0.53
Dis. of pulmonary cir. and Other farms of heart dis.	8.35	7.38	88.4	2.77	8.68	7.59	87.4	0.00
Cerebrovascular dis.	8.22	7.14	86.9	5.93	8.72	7.64	87.6	−0.66
Bron., chronic and unspe. emphysema and asthma	8.57	7.50	87.5	1.19	8.66	7.59	87.6	0.00
Chron. liver dis and cirr.	8.21	7.16	87.2	5.67	8.35	7.29	87.3	3.95
All selected causes combined	5.95	5.08	85.4	33.07	7.95	5.08	86.0	9.88

Source : Same as in Table 2

Note : 1) Sex difference in life expectancy (SDM)

2) (SDM at age 40 / SDM at birth)×100

3) (SDM at age 40 after eliminating cause−SDM at age 40 for 1985 (7.59 years) / SDM at age 40 for 1985×100

differential mortality for older age groups : they would reduce the difference at age 40 by 8.0 and 5.1 percent respectively, by their elimination.

V. Summary and Conclusion

Mortality in Republic of Korea has declined considerably during development process. However, the female - male difference in life expectancy, in particular for older age groups, has also grown considerably : in addition to the significant sex mortality differentials, the levels of mortality for older males have been quite higher than those for young males (as measured by deviations of male's age specific mortality from four general patterns of mortality of Coale and Demeny).

Cause of death analyses point to the diverging death rates of older males and older females, and older males and young males form such causes as 'Cerebrovascular disease', 'Hyperthonsive disease', 'Diseases of pulmonary circulation and other forms of heart disease', 'Malignant neoplasm of stomach', 'Malignant neoplasm of liver', 'Chronic liver disease and cirrhosis', 'Tuberculosis of respiratory system', 'Malignant neoplasm of trachea, bronchus and lung', 'Bronchitis, chronic and unspecified emphysema and asthma' and 'Diabetes mellitus' as the major determinants of the pattern of mortality in Republic of Korea for 1985. All these causes, with possible exception of 'Tuberculosis of respiratory system', are closely related to such environmental of external factors including life style as cigarette smoking, alcohol consumption, working conditions, social stress, lack of exercise, etc., which in turn reflect primarily the influence of the stage of social and economic development. Indeed, these causes, particularly among older males, have emerged as the most important causes of death in developed countries and are now appearing as the most important causes of death in the more developing countries as they progress along the path of economic and social modernization that is, as the relatively indiscriminate infectious ans parasitic diseases have receded, older males have shown a much greater susceptibility than older females and young males to succumb to the Chronic diseases characteristic of the industrialized societies (Lopez, 1983).

Elimination of these causes, particularly 'Cerebrovascular disease', 'Hypertensive disease', Diseases of pulmonary circulation and other forms of heart disease', 'Malignant neoplasm of stomach', 'Malignant neoplasm of liver' and 'Chronic liver disease and cirrhosis', showed the considerable roles in reducing excess mortality of older males. Since these causes are highly linked to environmental factors including life style resulting mainly from the rapid economic development, attention should be paid to improvements in environments such as improvement in working condition, removal of pollution, changes in life style (which include reducing alcohol consumption, preventing smoking, providing substitues of solving stress, etc), etc., so that older males may be exposed to less risk of death.

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Appendix Table 1. Levels of Four General Patterns of Mortality Implied by Male's and Femal's Death Rates for 1970, 1978−79 and 1985 : Republic of Korea

Age group	Male												Female		
	1970				1978−1979				1985				1970	1978−79	1985
	W	N	E	S	W	N	E	S	W	N	E	S	W	W	W
0	18.4	18.4	18.6	18.5	19.6	19.6	19.6	19.6	20.0	19.9	20.2	19.9	19.7	20.6	21.9
1−4	17.8	18.0	17.3	17.1	18.7	18.8	18.2	17.9	19.1	19.2	18.7	18.3	19.7	20.9	22.0
5−9	17.2	17.2	16.4	15.3	18.0	17.8	17.3	16.2	18.2	18.0	17.6	16.4	19.7	21.3	21.8
10−14	17.0	16.5	16.1	14.9	17.8	17.3	17.1	15.7	18.0	17.4	17.3	16.0	19.6	21.3	21.9
15−19	16.9	16.2	15.9	14.7	17.7	16.9	16.9	15.5	17.8	17.1	17.1	15.7	19.6	21.3	21.9
20−24	16.6	15.8	15.7	14.4	17.4	16.5	16.6	15.2	17.6	16.7	16.9	15.5	19.7	21.3	22.0
25−29	16.3	15.1	15.2	13.8	17.1	15.9	16.2	14.7	17.2	16.1	16.4	14.9	19.6	21.3	22.0
30−34	15.8	14.3	14.7	13.2	16.8	15.1	15.8	14.1	16.9	15.4	16.1	14.4	19.6	21.3	22.0
35−39	15.2	13.3	14.1	12.4	16.1	14.3	15.2	13.4	16.4	14.6	15.6	13.7	19.6	21.2	22.0
40−44	14.3	12.3	13.2	11.4	15.0	13.0	14.4	12.5	15.9	13.7	15.1	13.1	19.6	21.1	22.1
45−49	13.6	11.5	12.5	10.6	14.8	12.2	13.8	11.7	15.4	12.8	14.7	12.5	19.6	21.2	22.1
50−54	12.6	10.5	11.4	9.8	13.6	11.3	12.7	10.8	15.0	12.3	14.6	12.4	19.6	21.1	22.2
55−59	11.4	9.6	10.1	8.9	12.5	10.3	11.3	9.9	14.4	11.7	14.1	12.1	19.5	21.1	22.3
60−64	10.1	8.6	8.8	8.1	11.2	9.3	9.9	9.0	13.8	11.4	13.8	12.1	19.5	20.9	22.3
65−69	8.9	8.1	8.1	7.8	10.1	8.8	9.2	8.8	13.3	11.2	13.8	12.4	19.5	20.7	22.3
70−74	8.7	8.5	8.5	8.7	10.2	9.2	9.7	9.8	12.9	11.3	14.1	13.2	19.4	20.4	22.5
75−79	8.7	8.5	8.8	9.5	10.3	9.3	10.1	10.7	13.0	11.3	14.6	14.2	18.9	21.0	22.5
80+	11.0	10.0	10.8	12.1	14.6	10.7	13.2	14.1	14.0	11.8	15.6	15.0	18.5	20.9	22.1

Source : 1) Life Table of Korea, 1978−79 and 1970 (NBOS EPB, 1982)

2) Computed from vital registration for 1985

Note : W, N, E and S are West, North East and South Model Life Table of Cole and Demeny, respectively.

Appendix Table 2. Abridged Life Table for Males and Females : Korea, 1985

Age	Mx	Qx	Ix	Dx	Lx	Tx	Ex
Male							
0	.030780	.029977	100000.	2998.	97392.	6350776.	63.51
1−4	.001480	.001475	97002.	143.	387660.	6253384.	64.47
5−9	.001050	.005236	96859.	507.	483028.	5865724.	60.56
10−14	.000710	.003544	96352.	341.	480907.	5382696.	55.86
15−19	.001620	.008067	96011.	775.	478117.	4901789.	51.05
20−24	.002010	.010000	95236.	952.	473799.	4423673.	46.45
25−29	.002440	.012126	94284.	1143.	468560.	3949873.	41.89
30−34	.002840	.014100	93140.	1313.	462419.	3481313.	37.38
35−39	.004150	.020537	91827.	1886.	454421.	3018894.	32.88
40−44	.006560	.032271	89941.	2902.	442450.	2564472.	28.51
45−49	.010810	.052628	87039.	4581.	423743.	2122022.	24.38
50−54	.014830	.071499	82458.	5896.	397552.	1698280.	20.60
55−59	.022370	.105926	76562.	8110.	362538.	1300728.	16.99
60−64	.034810	.160116	68453.	10960.	314862.	938190.	13.71
65−69	.052580	.232357	57492.	13359.	254064.	623329.	10.84
70−74	.079940	.333125	44133.	14702.	183913.	369264.	8.37
75−79	.123640	.472233	29432.	13889.	112411.	185352.	6.30
80+	.247280	1.000000	15533.	15533.	72940.	72941.	4.70
Female							
0	.026820	.026236	100000.	2624.	97822.	7217232.	72.17
1−4	.001480	.001474	97376.	144.	389141.	7119409.	73.11
5−9	.000890	.004440	97233.	432.	485085.	6730268.	69.22
10−14	.000530	.002646	96801.	256.	483365.	6245183.	64.52
15−19	.000920	.004589	96545.	443.	481617.	5761818.	59.68
20−24	.000970	.004838	96102.	465.	479347.	5280201.	54.94
25−29	.001130	.005634	95637.	539.	476837.	4800854.	50.20
30−34	.001310	.006529	95098.	621.	473938.	4324017.	45.47
35−39	.001800	.008960	94477.	846.	470270.	3850079.	40.75
40−44	.002910	.014451	93631.	1352.	464772.	3379809.	36.10
45−49	.004200	.020782	92278.	1918.	456597.	2915037.	31.59
50−54	.006130	.030187	90361.	2728.	444983.	2458440.	27.21
55−59	.009050	.044249	87633.	3878.	428470.	2013457.	22.98
60−64	.013840	.066886	83755.	5602.	404771.	1584988.	18.92
65−69	.023810	.112362	78153.	8781.	368812.	1180217.	15.10
70−74	.040130	.182355	69372.	12650.	315233.	811405.	11.70
75−79	.066850	.286387	56721.	16244.	242996.	496172.	8.75
80+	.160240	1.000000	40477.	40477.	253177.	253176.	6.25

Source : Computed from Annual Report on the Census of Death Statistics, 1985

Appendix Table 3. Age-Specific Death Rates by Cause for Population Aged 40 and over ; Korea, 1985

(per 100,000 persons)

Cause of death	40+	40-4	45-9	50-4	55-9	60-4	65-9	70-4	75-9	80+
Male										
All Causes Combined	2654.0	656.0	1081.0	1483.0	2237.0	3481.0	5258.0	7994.0	12364.0	24728.0
Tuber. of res. sys.	90.2	38.0	48.6	77.1	89.5	146.2	168.3	199.9	173.1	247.3
Mal. neo. of stomach	185.8	41.3	83.2	132.0	223.7	844.6	431.2	487.6	482.2	568.7
Mal. neo. of liver	124.7	45.9	83.2	118.6	170.0	194.9	205.1	175.9	185.5	247.3
Mal. neo. of tra. bron. and lung	55.7	8.5	19.5	37.1	82.8	111.4	147.2	151.9	160.7	98.9
Diabetes mellitus	37.2	7.9	17.3	30.0	42.5	62.7	84.1	95.9	98.9	98.9
Hypertensive dis.	262.7	53.1	100.5	152.7	255.0	428.2	599.4	823.4	1149.9	2101.9
Dis. of pul. cir. & other forms of heart dis.	183.1	52.5	81.1	112.7	143.2	236.7	352.3	527.6	865.5	1978.2
Cerebrovascular dis.	379.5	54.4	108.1	166.1	315.4	581.3	978.0	1510.9	2114.2	3511.4
Bron., chron. & unspe. emphysoma & asthma	55.7	2.0	5.4	11.9	24.6	73.1	147.2	255.8	457.5	1038.6
Chron. liver dis. & cirr.	196.4	92.5	166.5	192.8	234.9	257.0	241.9	231.8	259.6	296.7
Residuals	1082.8	259.8	367.5	452.3	655.4	1044.3	1903.4	3533.3	6416.9	14540.1
Female										
All Causes Combined	1760.0	219.0	420.0	613.0	905.0	1384.0	2381.0	4013.0	6685.0	16024.0
Tuber. of res. sys.	26.4	13.1	14.3	17.2	19.9	23.5	40.5	48.2	60.2	96.1
Mal. neo. of stomach	98.6	29.1	43.3	61.9	86.0	131.5	164.3	196.6	207.2	272.4
Mal. neo. of liver	37.0	12.8	18.5	30.7	34.4	41.5	57.1	48.2	66.9	80.1
Mal. neo. of tra. bron. and lung	17.6	3.8	6.7	10.4	15.4	24.9	35.7	40.1	33.4	32.0
Diabetes mellitus	22.9	4.7	5.9	9.2	19.0	33.2	50.0	68.2	66.9	48.1
Hypertensive dis.	172.5	29.1	48.3	80.3	114.0	175.8	273.8	309.0	561.5	1105.7
Dis. of pul. cir. & other forms of heart sis.	147.8	26.5	39.5	53.3	81.5	117.6	195.2	401.3	521.4	1362.0
Cerebrovascular dis.	313.3	31.1	60.9	108.5	177.4	294.8	519.1	826.7	1216.7	2323.5
Bron., chron. and unspe. emphysema & asthma	45.8	1.2	2.1	3.7	9.1	26.3	52.4	124.4	240.7	608.9
Chron. liver dis. & cirr.	42.2	14.3	22.3	31.9	46.2	47.1	59.5	64.2	73.5	128.2
Residuals	836.0	125.4	158.3	206.0	302.3	467.8	934.4	1886.1	3636.6	9966.9

Source : Computed from Annual Report on the Cause of Death Statistics, 1985