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Sex Differential Mortality : Geographic Variations in Korea

Ⅰ. Introduction

Death rates have been a widely used measure of health by demographers in evaluating the effect of social/economic factors on health. Although death rates do not perfectly reflect the broad conception of health, that is, physical, psychological, and social well-being, they possess several advantages. Mortality rates are readily available, and they can be made reasonably and objectively comparable for intertemporal and interspatial comparisons.

Although no attention has been paid in Korea yet, the geographic variations in mortality have aroused considerable interest in other countries.[1] The aims have been to determine if the geographical distribution of mortality had any association with spatial features of area. This approach attempts to reduce mortality in environmental conditions rather than the individual's risk factors such as, diet, cigarette smoking, high blood pressure, etc. Some of such studies include those concerned with spatial variations in physical environment such as, drinking water, weather, air

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1) A. G. Shaper, "Geographic Variations in Cardiovascular Mortality in Great Britain", *British Medical Bulletin,* 40(4), 1984, pp. 366~373 ; R. C. Ziegenfus and W. Gesler, "Geographical Patterns of Heart Disease in the Northeastern United States", *Social Science and Medicine,* 18(1), 1984, pp. 63~72.

2) G. W. Comstock, M. Cauthen, and K. J. Helsing, "Water Hardness at Home and Deaths from Arteriosclerotic Heart Disease in Washington County, Maryland", *American Journal of Epidemiology,* 112, 1980, pp. 209~216 ; R. Fabsitz and M. Feinleib, "Geographic Patterns in County Mortality Rates from Cardiovascular Disease", *American Journal of Epidemiology,* 111(3), 1980, pp. 315~328.

pollution, latitude, and altitude,[2] and those focused on socio-environmental characteristics such as, occupational status, distribution of industries, medical services, and socio-economic conditions.[3]

The main emphasis of all these studies has been on improving understanding of factors causing mortality by noting ecological correlations.

The study of geographic patterns in mortality has potential value to those concerned with the delivery of health care. Provinces with high mortality rates may need any preventive health services than other areas. In areas of high death rate the patients in need of delivery of health services will tend to be younger than those in low death rate areas. Thus, geographic death rates would appear to be part of information needed by comprehensive health planning groups.

Recently, substantial progress has been made in reducing mortality. However, males and females have not followed the same rates of reduction in mortality.[4] That is, the relative inequality between male and female death rates has increased despite decreases in the absolute levels of mortality for both sexes. Males have higher rates of mortality than females, and as overall mortality declines, sex mortality differentials are increasing.[5]

Furthermore, sex differentials in mortality are the most controversial among various mortality differentials, since they are the consequences of environmental (behavioral, socio-cultural, and physical environment) as well as biological-genetic causes of each sex. However, geographic variations of sex differential mortality appears to reflect in large part the variability of external

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3) A. J. Fox, D. R. Jones, and P. O. Goldblatt, "Approaches to Studying the Effect of Socio-Economic Circumstances on Geographic Differences in Mortality in England and Wales", *British Medical Bulletin,* 40(4), 1984, pp. 366~373 ; M. K. Miller, D. E. Voth, and D. Danforth, "The Medical Care System and Community Malady : Rural, Urban, and Suburban Variations", *Rural Sociology,* 47(4), 1982, pp. 634~654 ; E. M. Kitagawa and P. M. Hauser, *Differential Mortality in the United States : A Study in Socio-Economic Epidemiology,* Harvard University Press, Cambridge, Mass., 1973.

4) H. Ueshima et al., "Age-Specific Mortality Trends in the U. S. A. from 1960 to 1980 : Divergent Age-Sex-Color Patterns", *Journal of Chronic Disease,* 37(6), 1984, pp. 425~439.

5) U. Levitan and J. Cohen, "Gender Differences in Life Expectancy among Kibbutz Members", *Social Science and Medicine,* 21(5), 1985, pp. 545~551 ; A. D. Lopez, "The Sex Mortality Differential in Developed Countries", in A. D. Lopez and L. T. Ruzicka (eds.), *Sex Differentials in Mortality : Trends, Determinants, and Consequences,* Australian National University, Canberra, 1983, pp. 53~120.

6) I. Waldron, "Sex Differences in Human Mortality : The Role of Genetic Factors", *Social Science and Medicine,* 17(6), 1983, pp. 321~333.

living conditions, if we control the age and sex structure of subpopulation. In addition, it is suggested that variations in mortality by sex are not strongly tied to biological differences of sex.[6]

Thus, the purpose of this study is to provide information on the extent and nature of geographic variations of sex mortality differentials from all causes. Additional attempts have been made on improving understanding of factors causing mortality by environmental conditions.

Ⅱ. Data and Methods

The mortality data base is derived from the 1982 Vital Statistics (Based on Vital Registration). The population data base is derived from the 1980 Population and Housing Census Report (Complete Enumeration). For socio-environmental indicators, data are derived from various censuses conducted in Korea circa 1980 as reported in the 1980 Population and Housing Census Report, the 1983 Social Indicators in Korea, and the 1981 Year Book of Labour Statistics.

In this study, deaths from all causes in Korea circa 1980 are included, and provinces are used as the unit of analysis. Death rates are age adjusted by the direct method using the age distribution of the 1980 Korea Complete Enumeration Population as the standard. As a measure of sex mortality differentials, the ratio of male to female age adjusted death rates is used.

Using Selvin et al.'s method (1980),[7] standard errors of mortality rates are calculated to determine how confident one can be that the rate of a particular province differs from the rate of Korea as a whole.

The size of sex mortality ratio depends on two components of variation, the male and female death rates. For example, large ratios can result from abnormally low female mortality coupled with a relatively high death rates for males or, may reflect higher male mortality compared with other populations having a similar level of female mortality. In order to differentiate these contributions, a component analysis is applied.[8]

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7) The approximate standard error for the direct and indirect age-adjusted rates is,

$S_{DARx} = S_{IARx} = \sqrt{Dx}/Px = \sqrt{Rx}/Px$

where R_X is the crude death rate in community x.

Finally, in the search for explanations of geographic variations of sex differential mortality, Pearson product moment correlation is utilized to generate possible hypotheses.

Ⅲ. Results

1. Standardization of Sex Mortality Differentials

The age-adjusted mortality rates by sex are calculated at the province level. (Table 1) The range of male death rate is from 6.62 to 13.33 per 1000 population, and that of female is from 3.46 to 6.95. The range of male to female mortality ratio is from 1.57 to 2.32. For the country as a whole, male death rate is 9.34 and that of female is 5.11, with the ratio of 1.83. That is, male death rate is an average of 1.8 times higher than female rate in Korea.

Standardization of sex mortality differentials by province provides a measure for describing both similarities and differences in geographic patterns of death rates by sex. Standardized sex mortality differentials are calculated using the sex-specific age-adjusted rates and sex mortality ratio of Korea as the base. All the differentials between the nation and the province are statistically significant at 1 percent of significance level.

As presented in Table 1, Seoul has the lowest mortality for both males and females, and Jeonnam has the highest mortality for both sexes. Although Jeonnam's mortality rates in 1980 are

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8) Using Lopez's method (1983), the difference between the mortality ratio for a given population and that based on the average male and female mortality can be decomposed as follows :

$M/F-\bar{M}/\bar{F}=(1/2)\ (M-\bar{M})\ (1/F+1/\bar{F})+(1/2)\ (M+\bar{M})\ ((\bar{F}-F)/\bar{F}*F)$

where :

M is the male mortality of the given province,

F is the female mortality of the given province,

$\bar{M}$ is the male mortality of Korea, and

$\bar{F}$ is the female mortality of Korea.

Where the first component on the right hand side of the equation measures the contribution arising from differences in male mortality between the given population and Korea, and the second, the contribution due to differences in female mortality.

Table 1. Sex-Specific Age-Adjusted Mortality Rates, Male to Female Mortality Ratio, and the Standardization of Sex Mortality Differentials by Province, 1980

Province	Male	Female	M / F Ratio
Nation	9.34 (1.00)	5.11 (1.00)	1.83 (1.00)
Seoul	6.62 (.71)	3.46 (.68)	1.91 (1.04)
Busan	8.10 (.87)	3.85 (.75)	2.10 (1.15)
Kyeonggi	8.06 (.86)	4.81 (.94)	1.68 (.92)
Gangweon	10.18 (1.09)	6.17 (1.21)	1.65 (.90)
Chungbug	10.37 (1.11)	6.37 (1.25)	1.63 (.89)
Chungnam	8.66 (.92)	5.51 (1.08)	1.57 (.86)
Jeonbug	11.17 (1.20)	6.31 (1.23)	1.77 (.97)
Jeonnam	13.33 (1.43)	6.95 (1.36)	1.92 (1.05)
Kyeongbug	9.93 (1.06)	5.75 (1.13)	1.73 (.95)
Kyeongnam	9.91 (1.06)	5.29 (1.04)	1.87 (1.02)
Jeju	9.38 (1.00)	4.05 (.79)	2.32 (1.27)

Note : a. Rates are per 1,000 population.
b. Figures in parenthesis are standardized mortality. That is, a ratio of age-adjusted death rate or male to female death rate for a given province to the corresponding death rate or ratio of the nation.
c. All comparisons are significant between a given province and national rate at 99 percent confidence level.

greatly influenced by the political turmoil, they are more than twice than Seoul's for both sexes. Of course, death rates for females tend to parallel those for males, but not perfectly. In Chungnam, male rate is higher than the average, while female rate is significantly lower than that of Korea, resulting in the lowest male to female mortality ratio. For Jeju, female rate is significantly lower than the average, but male rate is about the same with the average, resulting in the highest male to female mortality ratio. In other works, areas with high level of male mortality do not necessarily have high level of female mortality. But, the strength of association between male and female mortality is strong (r = .86).

2. Decomposition of Sex Mortality Differentials

In order to investigate the relationship between sex-specific mortality and sex mortality ratio, the differences between male to female mortality ratio for a given province and that based on the national population are decomposed as males' and females' contribution in Table 2. A positively signed difference indicates that a given province has higher sex mortality ratio than the national average. A positively signed male or female component indicates that sex-specific mortality operates to increase the differential between men and women, while a negative sign signifies the opposite effect.

The differences in sex mortality ratios are resulted from various combinations of male and female mortality. Four types of sex differential mortality are identified as follows : (1) In Chungnam, both male and female mortality rates reduce sex mortality ratio, which means lower male mortality and higher female mortality than the national averages. (2) In Jeju, although the difference between Jeju and the nation is absolutely negligible for males, both male and female mortality rates

Table 2. Decomposition of Sex Mortality Differentials by Province, Korea, 1980.

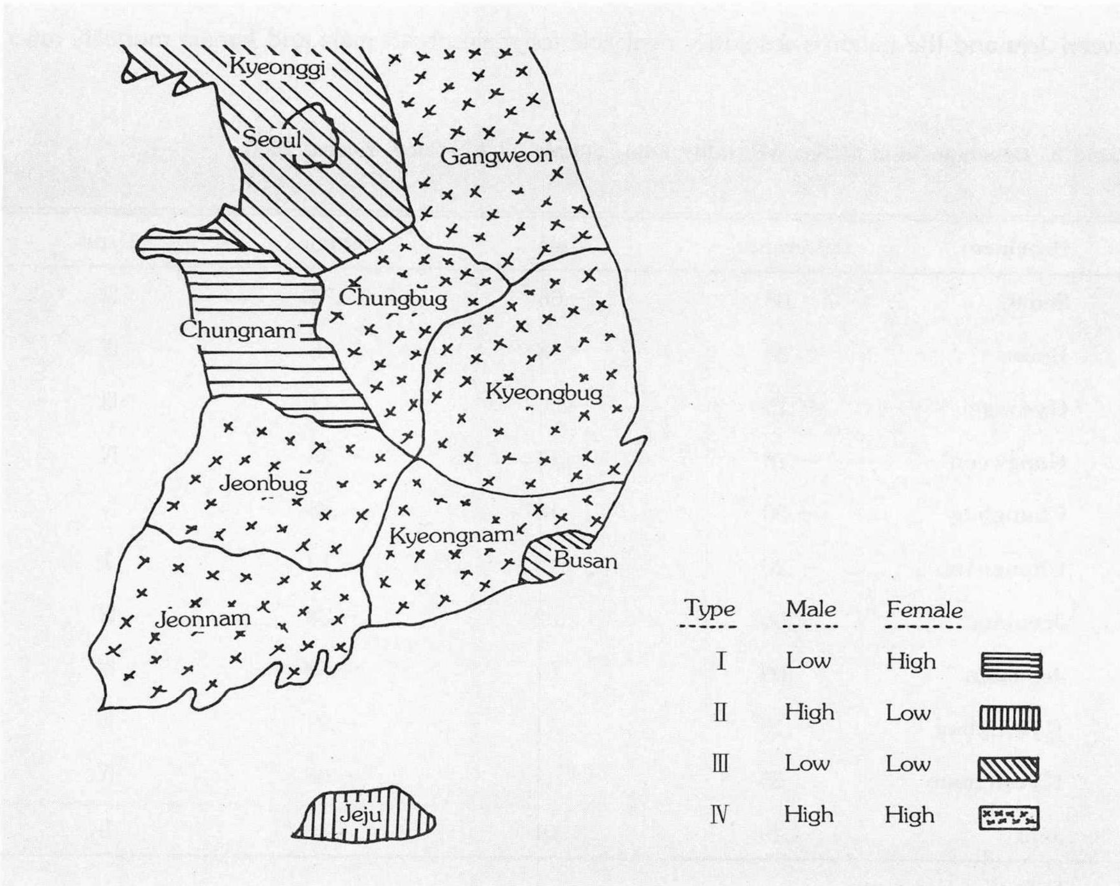
Province	Difference	Male	Female	Type
Seoul	.08	−.66	.74	III
Busan	.28	−.28	.56	III
Gyeonggi	−.15	−.26	.11	III
Gangweon	−.18	.15	−.33	IV
Chungbug	−.20	.18	−.38	IV
Chungnam	−.26	−.13	−.13	I
Jeonbug	−.06	.32	−.38	IV
Jeonnam	.09	.67	−.58	IV
Kyeongbug	−.10	.11	−.21	IV
Kyeongnam	.05	.11	−.06	IV
Jeju	.49	.01	.48	II

Legend : See text.

tend to increase sex mortality ratio, i.e., almost similar level of male rate to the average and lower female rate than that of the nation. (3) For Seoul, Busan, and Kyeonggi, male mortality reduces sex mortality ratio, while female rate increases it, i.e., lower mortality than the nation for both sexes. (4) In other areas (Chungbug, Gangweon, Jeonbug, Jeonnam, Kyeongbug, and Kyeongnam), male rate increases sex mortality ratio and female rate decreases it, i.e., higher mortality than the nation for both sexes.

These four types of sex-specific mortality experience are presented in Figure 1. The map is designed to help visualize geographic variations of mortality at the province level. The map should serve to identify patterns of mortality by sex which in turn may provide hypotheses concerning ecological variations.

Figure 1. Types of Sex Mortality Differentials by Province, Korea, 1980.



3. Age-Specific Sex Mortality Differentials

The risk of dying increases markedly as one becomes older, and the increase is dramatic for males. For almost all age groups, male's death rate exceeds that of female. However, excess male mortality is not observed in all age groups of all provinces. In the case of under 9 years of age group in Gangweon, Chungbug, Chungnam, Jeonbug, and Kyeongbug, females have higher mortality than males.(Table 3 and 4)

With the exception of the case mentioned above, age-specific male rates are consistently higher than those for females of the same age. However, after middle ages, because of the substantial

Figure 2. Age-Specific Sex Mortality Ratio by Type of Sex Mortality Differentials, Korea, 1980.

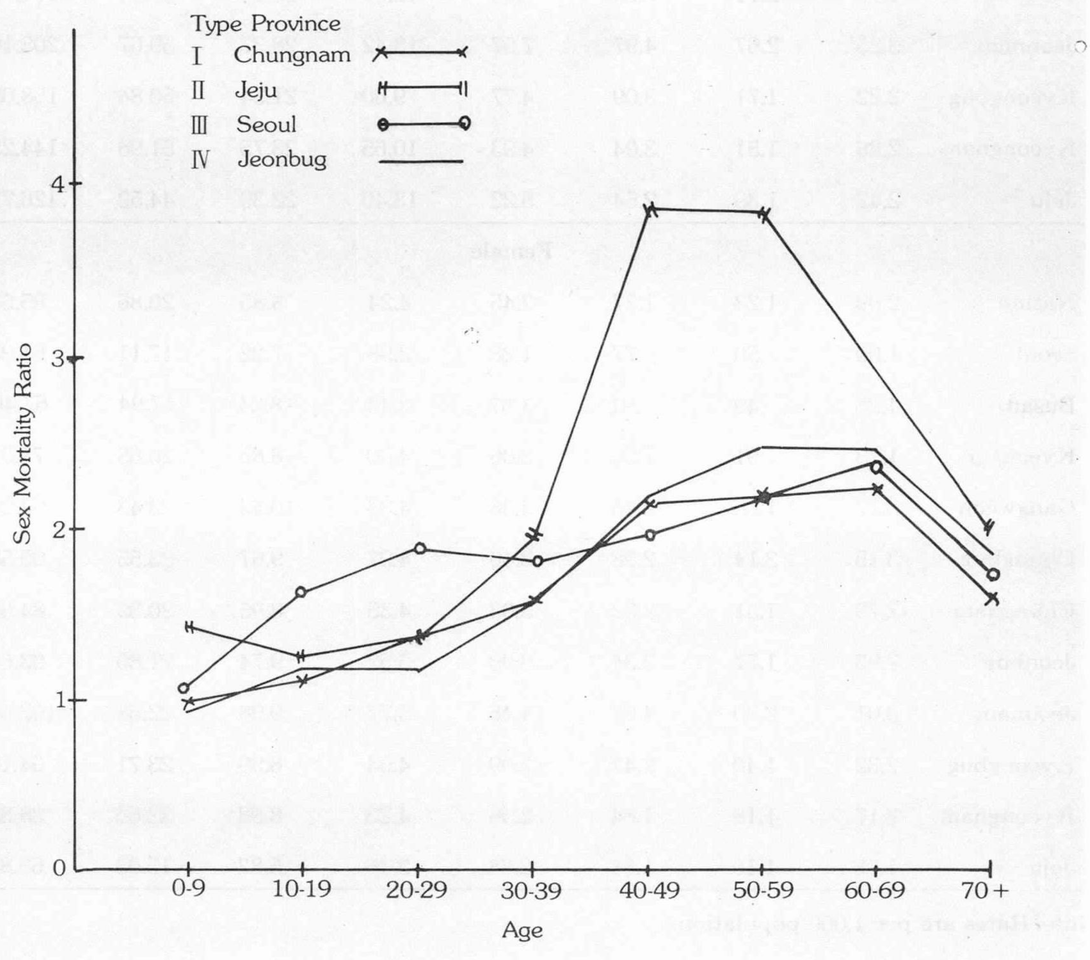


Table 3. Age-Sex-Specife Mortality Rates by Province, Korea, 1980

	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
				Male				
Nation	2.15	1.55	2.67	4.18	8.74	21.34	48.99	147.87
Seoul	1.20	.82	1.45	2.33	5.92	15.82	40.74	107.19
Busan	1.35	.74	1.84	3.07	7.88	20.78	50.32	125.42
Kyeonggi	1.90	1.25	2.26	3.50	8.75	19.81	44.31	115.77
Gangweon	3.17	2.06	3.28	6.13	10.17	22.40	48.80	144.45
Chungbug	2.98	2.28	3.58	5.81	10.76	21.87	48.20	151.72
Chungnam	2.73	1.71	3.45	4.78	9.29	19.56	45.91	134.55
Jeonbug	2.76	2.11	3.95	6.00	12.01	24.29	53.94	174.12
Jeonnam	3.25	2.67	4.97	7.57	13.42	28.37	59.67	205.10
Kyeongbug	2.22	1.71	3.09	4.77	9.60	21.34	50.84	158.05
Kyeongnam	2.26	1.51	3.04	4.93	10.65	23.75	51.98	144.25
Jeju	2.42	1.39	2.54	5.22	13.40	22.39	44.52	126.77
				Female				
Nation	2.09	1.23	1.77	2.45	4.24	8.85	20.86	85.57
Seoul	1.09	.50	.77	1.28	2.98	7.22	17.11	61.35
Busan	1.25	.49	.91	1.57	3.43	8.24	17.94	67.40
Kyeonggi	1.73	.91	1.26	2.06	4.00	8.85	20.65	77.61
Gangweon	3.27	1.86	2.45	3.06	4.83	10.43	23.43	94.08
Chungbug	3.15	2.14	2.98	3.46	4.97	9.67	23.55	95.58
Chungnam	2.79	1.51	2.52	3.03	4.35	8.95	20.39	84.05
Jeonbug	2.93	1.77	3.34	3.90	5.52	9.74	21.80	93.66
Jeonnam	3.01	2.30	4.01	4.46	5.77	9.98	22.68	103.96
Kyeongbug	2.32	1.40	2.47	3.09	4.54	8.99	23.71	94.11
Kyeongnam	2.17	1.18	1.84	2.56	4.23	8.98	22.62	88.88
Jeju	1.68	1.10	1.84	2.68	3.46	5.82	15.03	63.83

Note: Rates are per 1,000 population.

Table 4. Age-Specific Male to Female Mortality Rates by Province, Korea, 1980

	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+	Range
Nation	1.03	1.25	1.52	1.71	2.06	2.41	2.35	1.73	1.38
Seoul	1.10	1.64	1.89	1.82	1.98	2.19	2.38	1.75	1.28
Busan	1.08	1.49	2.03	1.96	2.30	2.52	2.80	1.97	1.72
Kyeonggi	1.10	1.37	1.80	1.70	2.18	2.24	2.15	1.49	1.14
Gangweon	.97	1.10	1.34	2.00	2.11	2.15	2.08	1.54	1.14
Chungbug	.94	1.06	1.20	1.68	2.16	2.26	2.05	1.59	1.66
Chungnam	.99	1.13	1.37	1.58	2.14	2.18	2.25	1.60	1.26
Jeonbug	.94	1.19	1.18	1.54	2.18	2.49	2.47	1.86	1.55
Jeonnam	1.08	1.16	1.24	1.70	2.33	2.84	2.63	1.97	1.76
Kyeongbug	.96	1.22	1.25	1.54	2.11	2.37	2.14	1.68	1.41
Kyeongnam	1.04	1.28	1.65	1.93	2.52	2.65	2.30	1.62	1.61
Jeju	1.44	1.26	1.38	1.95	3.87	3.85	2.96	1.99	2.61
Range	.50	.58	.85	.46	1.89	1.70	.91	.48	

Note: The range in column is the difference across age-groups for a given province, and the range in row is the difference across province for a specific age group.

increasing risk with age, female rates are higher than the rates for males ten years younger. (Table 3) Hence, sex mortality ratio by types of sex-specific mortality in Figure 2 gradually increases with age and then decreases with a peak for middle age group. Ratios for age-specific groups are compared to see if geographic patterns are similar. At middle age groups, the differences in sex mortality ratios are the greatest in all provinces. In general, the low ratio provinces tend to be consistently low and the high areas consistently high, as compared with the ratio of Korea as a whole. However, no single province consistently has the highest ratio for every age group. Although the differences of sex mortality ratio among provinces across age groups are negligible, the difference is the greatest in Jeju. (Table 4)

4. Ecological Correlations

In this section, we will describe the extent of association between sex mortality differentials and various social, economic, and medical conditions at the province level. The pattern of association is highly suggestive of the factors that underlie the observed pattern of differentials.

Since smaller sample sizes (n = 11) tend to produce larger correlations, the magnitude of association is unreliable. However, the direction of association presented in Table 5 shows a consistent pattern regarding sex differentials in mortality. Factors which are related to the reduction of mortality for both males and females are associated with the increase of male to female mortality ratio, and vice versa. That is, spatial features operate in opposite direction for sex-specific mortality rates and sex mortality ratio.

Factors which are related to the increase of mortality for both sexes and the decrease of male to female mortality ratio are as follows: the percentage of population infected with parasites, the percentage of population 6 years old and over who have never attended school, the percentage

Table 5. Ecological Correlations between Mortality and Various Social Indicators at the Province Level, Korea, 1980

Variables	Male	Female	M / F Ratio
Urban Population	−.67	−.77	.39
Density	−.65	−.71	.30
Parasites	.63	.67	−.33
Net Migration	−.77	−.85	.38
Population Growth	−.78	−.90	.48
Foreign Population	−.79	−.88	.46
Piped Water	−.69	−.79	.41
No Education	.76	.80	−.31
Farm Population	−.75	.73	−.18
Medical Insurance	−.70	−.65	.10
Agricultural Work	.79	.77	−.20

Legend : See text.

of farm population, and the percentage of agricultural workers. Factors which are related to the decrease of mortality for both sexes and the increase of sex mortality ratio are as follows : the percentage of urban population, density, net migration rate, the percentage of foreign population, the percentage of piped water household, and the percentage of population covered by medical insurance.

Ⅳ. Discussion

Geographically the mortality rates are not randomly distributed. Male and female death rates usually coincide spatially. However, in Jeju and Chungnam, mortality patterns are significantly different by sex. This suggests that explanatory variables for sex differentials in mortality are strongly tied to socio-environmental conditions of the area rather than biological conditions of each sex.

In most provinces, male children have higher risk of death than female children, which confirms that sex differentials in childhood mortality reflect innate biological sex differences.[9] However, in some predominantly rural provinces, females have higher risk of deaths than male children suggesting that socio-environmental effects far exceeds biological influences.

The factor most commonly mentioned as an influence on sex mortality differentials is the relative socio-economic status of women and girls. In less developing countries, the environmental disadvantages of women have quite severe repercussion on their health. Higher female mortality than male mortality in these societies is attributable to the subordinate position of women and the relative discriminatory parental care against female children.[10] Like other developing societies, medical, nutritional, social, and educational discrimination against females in favor of males may be postulated to operate in rural Korea. It is reasonable to expect that the comparative value of males to the household is greater in an agricultural than in an urban area, because of larger contribution of sons to household production and to support of aged parents. Consequently,

9) Waldron, *ibid.*

10) S. D'Souza and L. C. Chen, "Sex Differentials in Mortality in Rural Bangladesh", *Population and Development Review*, 6(2), 1980, pp. 257～270.

more sex discriminatory practices may be expected in rural areas.

Urbanization has long been linked to mortality. Despite the inconsistent findings regarding the relationship between urbanization and mortality,[11] the natural environment of rural areas is well known to be better for health than that of urban areas. In addition, agricultural workers have lower mortality than other occupational groups controlling for socio-economic conditions.[12]

However, in Korea, mortality differentials over geographic aggregation by the province level suggest that urban areas have lower mortality for both sexes than rural areas. Urbanization is a process of population concentration within a given geographical area. It implies significant differences in lifestyles, quality of physical environment, occupational characteristics, industry distribution, and accessibility to medical services, etc. These urbanization-related factors appear to make a different contribution to geographic variations of mortality. In other words, urbanization process seems to have severe repercussion on disadvantaged rural populations resulting in the social inequality of death in Korea. Improvements in the conditions of rural populations might result in substantial mortality reductions for both sexes.

Ecological correlations between mortality and social indicators also reveal that geographic variations of mortality largely reflect the inequality of social, economic, and political development. Whether we view mortality as a "correlate" of inequality or a "consequence" of inequality, geographic variation of mortality is fundamentally a function of geographic inequalities in various life chances.

Empirically, mortality is higher in the underdeveloped poor countries compared to the industrialized rich countries, and mortality declines have characterized the evolutionary changes accompanying industrialization or modernization.[13] As international comparisons and historical

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11) W. B. Clifford and Y. Brannon, "Rural-Urban Differentials in Mortality", *Rural Sociology*, 50(2), 1985, pp. 210~224 ; K. G. Keppel, "Mortality Differentials by Size of Place and Sex in Pennsylvania for 1960 and 1970", *Social Biology*, 28(1/2), 1981, pp. 41~48 ; Kitagawa and Hauser, *ibid* ; Miller et al., *ibid.*

12) L. Guralnick, "Mortality by Occupation and Industry among Men 20 to 64 Years of Age, United States, 1950", *United Statistics-Special Reports*, 53(3), U. S. Dept. of HEW, GPO, 1963 ; K. A. Park, Sex Differentials in Cardiovascular Mortality : An Ecological Analysis, Ph. D. Dissertation, North Carolina State University, 1986 ; Kitagawa and Hauser, *ibid.*

13) C. Mosk and C. R. Johansson, "Income and Mortality : Evidence from Modern Japan", *Population and Development Review*, 12(3), 1986, pp. 415~440 ; Lopez, *ibid.*

trends of mortality show, modernization certainly reduces mortality for both sexes. However, as Preston[14] suggests, economic modernization appears to reduce systematically the level of female mortality relative to male mortality. Ecological correlations of this study also indicate that modernization-related factors reduce mortality for both sexes but operate for the increase of male to female mortality ratio.

Most of all, the process of modernization itself appears to affect the sexes differentially through sustenance organization. Such changes as industrialization, urbanization, and mechanization have a bearing on the division of labor which in turn consequentially assigns different social roles and statuses to each sex. New sex roles and statuses certainly have more positive influence on the longevity of females relative to males. Since a higher proportion of men than women participate in the labor force out of necessity, occupational risks would presumably affect male mortality more than female mortality. Empirically, for nonmanual and unskilled sustenance activities, the direction of occupational effect for males is not necessarily the same for females.[15]

The reduction of mortality would owe a good deal to specific medical measures but be also influenced considerably by general improvements in standards of living, particularly in respect of infant care, improved nutrition, better hygiene, and immunization. Variations in lifestyle, associated with occupational or socio-economic status, influence the risk of premature death. Social organization and the distribution of social power induce certain behavioral patterns. The physical environment has always posed health risks via climate, certain constituents of atmosphere and water. The resources available to deal with such environmental demands also include the wealth and prestige that accompany high social status. Hence, mortality variation among subpopulations within society is the consequence of social, economic, and political inequality. This supports the idea that reductions in mortality may be achieved through programs designed to improve the socio-economic and political conditions of the disadvantaged population. Medical services are not adequately delivered to the poor. But, this is one of main factors in the deleterious lifestyles of the lower socio-economic status populations that lead to their higher mortality.

Geographic correlation studies provide a weak basis for making inferences about the relationship

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14) S. H. Preston, *Mortality Patterns in National Populations*, Academic Press, New York, 1976.

15) Park, *ibid.*

between the health of individuals and their lifestyles, socio-economic circumstances, and their personal exposure to environmental hazards. Difficulties arise because in more affluent areas there are poor people and in less affluent areas there are people who are well-off. This brings the potential for an "ecological fallacy". The extent of the ecological fallacy would be influenced by the degree of homogeneity of the area. For the concern of ecological influence further analysis needs to focus on a smaller unit than the province, which has an advantage over larger areas in the greater homogeneity of the population with respect to demographic characteristics and environmental exposures.

What other factors could cause these geographic differences in mortality? While these findings are consistent with the idea that modernization affects mortality, additional factors require consideration. Population change resulting from migration is related to the health of the community by disrupting the demographic composition of the population.[16] Most of all, the age structure of an area is affected by the age selectivity of migrants. Since migration tends to be selective of young populations, areas receiving large numbers of migrants, like urban areas in Korea, are likely to increase this pool of young persons. The corollary is that areas experiencing out-migration, like rural areas in Korea, tend to have older populations. These areas may have higher death rates. Of course, some of this variation is accounted for by standardizing the mortality rates by national age structure. However, high migration could substantially bias the base population's distribution, even if age composition of the population is standardized at one point in time. In fact, the results of this study also show that net migration rates have negative relationships with mortality rates for both sexes. In order to distinguish the "age composition" effect of migration from socio-environmental effect of migration, intensive research is required.

Mortality differentials for particular causes of death may also differ from the all-cause mortality pattern. Various factors in some areas may contribute to certain causes of death more than others. When the nature of mortality differentials has been specified in this aspect, it will be possible to examine the relative power of socio-environmental and physical-environmental factors in explaining geographic variations of mortality.

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16) L. Polissar, "The Effect of Migration on Comparison of Disease Rates in Geographic Studies in the United States", *American Journal of Epidemiology,* 111(2), 1980, pp. 175~182 ; J. Pick, "Correlates of Fertility and Mortality in Low Migration SMSA's", *Social Biology,* 24(1), 1977, pp. 69~83.

The tasks completed in this first phase of a project are descriptions on the extent and nature of sex differentials in mortality, and attempts to generate possible hypotheses in explaining the observed geographic variations of mortality. If the factors responsible for the experience of the areas with low and high death rate would be identified, and if they could be applied for other areas, then fewer deaths and lower level of male to female mortality ratio could occur. For this job is to be accomplished, data should be collected first at various social, economic, and demographic level.

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성별 사망력 차이 : 한국의 지역적 격차

박 경 애*

성별 사망률과 성별 사망력 비율의 지역적 격차에 관해 1980년 한국의 모든 사망 자료를 이용하여 도를 단위로 분석하고 있다. 남녀 모두 서울이 가장 낮은 사망률을 보여 주며 호남지역이 가장 높은 수준의 사망률을 나타낸다. 남성 대 여성의 상대적인 사망 수준에서는 충남이 가장 낮은 비율을 그리고 제주가 가장 높은 비율을 나타낼 뿐만 아니라 전국적으로 네 가지 유형의 성별 사망력 차이가 나타난다. 연령별 사망력 분석 결과가 지역에 상관없이 중년이 성별 사망력 차이에 가장 큰 책임이 있음을 보여준다. 끝으로, 사망력의 지역적 격차를 설명하기 위해 성별 사망력과 다양한 사회, 경제, 및 보건 지표 사이의 생태학적 상관관계를 검토한다. 사망력의 지역적 차이가 사회, 경제, 및 정치적 불평등의 결과이고, 근대화가 남녀 모두의 사망력을 감소시키지만, 남성 대 여성의 상대적인 사망 비율을 증가시킨다고 주장하면서 이 결과의 중요성을 논하고 있다.

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