Factors Affecting the Availability and Mix of Health Resources in Korea

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1. Setting of Problems

The Republic of Korea is considered to be one of the few developing countries which entered into the take-off stage of economic development during the 1960's. No one factor can be singled out as the major cause of this economic success. The most plausible theory advanced is that the Republic of Korea possessed the requisite human resources which have been effectively utilized with the infusion of foreign physical capital and technology during

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the sixties. According to this theory, the investment in human capital and the socio-political climate, which induced foreign investment, should receive the main credit for the rapid growth of the GNP.

It is ironic, then, to observe the relatively low priority given to one of the twin components of human capital, namely health, the other component being education. Whereas around 18% of government expenditures were spent for education, about 1.5% were spent for health from 1970 through 1974. As a percent of GNP, government expenditures for health averaged around 0.25% and those for education 1.6% during the same period.

In this study, however, we do not attempt to explore the importance to economic development of investment in health. The emphasis of the study is not on the examination of aggregate availability of health resources for the nation over time, but rather on the investigation of the distribution and mix of health resources among different locations and how such distributions are related to the socio-economic conditions of each area.

Allocation or distribution problems of health resources in Korea exist on several levels. First, there is the classical case of urban and rural disparity in the availability of health manpower and facilities. According to the data we collected, while Seoul has about 18.7% of the population, it has 46.3% of the medical doctors, 58.6% of the dentists, 52.8% of the pharmacists and 39.8% of the hospital beds (see Table 1). Secondly, there appears to be co-siderable departure from "optimum" distribution of health resources beween Physical facilities and manpower in supplying health care; this departue varies accrding to location. For examphle, the emphasis on building hospitals rather than training more health professionals appears to have resulted in a low rate of utilization of facilities, partcularly in rural areas,

Third, sub-optimal distribution of the labor-mix and the capital-mix may be noted in differences in the training and quality of available health resour-ces, physical and human, according to location. Primary care in rural areas appears to be provided by marginally trained health personnel. Direct care from highly trained medical doctors and that involving hospitalization appears to be beyond the financial reach of most rural residents. Lastly, there is the high propensity among highly trained medical doctors to migrate to the U.S. and other countries. According to alumni records of medical schools in Korea, there were 3,135 graduates of Korean medical schools residing in foreign countries in 1973. This amount is about one third of the entire number of active physicians in Korea!

From the point of view of improving distributional efficiency, the overri-

ding issue in establishing an effective health care system is the assignment is priorities: urban vs. rural health problems, hospital-based care vs. clinicbased care, the importance oprimary vs. secondary and tertiary care in urban and rural settings, curative care vs. public health measures, etc. This study attempts to provide useful information in setting these priorities.

2. Data

Data are collected for each of 170 kuns and shis and two special cities in South Korea. Kuns correspond to counties in the U.S.A. and shis are cities. Seoul and Busan are administratively autonomous special cities comparable to dos (provinces). Data on health manpower and socio-economic variables are collected for 1666, 1970 and 1973 from various government and private agencies. Sources of these data are listed in the Appendix. Data on health facilities and hospital staff are collected for 1973 only from our own survey and that conducted by the Korean Hospital Association. The questionnaire from is reproduced in the Appendix also.

Data on health manpower include information on medical doctors, dentists, oriental (herb) doctors, registered nurses, mid-wives, pharmacists and, for 19 73 only , hospital-based technicians and other auxiliary personnel. Data on health facilities include those on hospitals and clinics of all categories, health centers and hospital beds, which are classified by the category of the hospital. Data on health services utilization include those on inpatients, inpatient days, visits and new visits.

Data collected for socio-economic factors consist of twelve variables. These may be divided into three broad categories…, demographic, economic and education variables. Three variables are included as demographic variables. They are (i) population density, (ii) urban population as a percent of total population and (iii) the ratio of the number of emigrants to immigrants. The economic variables are (iv) farming population as a percent of total population, (v) farming households as a percent of total households and (vi) per capita tax revenue. The education variables are (vii) the ratio of elementary school teachers to elementary school pupils, (viii) the ratio of middle school teachers to middle school pupils, (ix) the ratio of high school teachers to high school pupils, (x) the ratio of elementary school pupils to the population aged 6-11, (xi) the ratio of middle school pupils to the population aged 12-14, and (xii) the ratio of high schoolstudents to the population aged 15-17.

3. Health Professionals

The uneven distribution of health personnel between urban and rural areas is well illustrated by the data presented in Table 1. For the four biggest cities in Korea-Seoul, Busan, Taegu and Kwangju···there is one medical doctor for 1,510 people, whereas for the rest of the country, there is one doctor for 7,692 people. Tho diparity is even greater for dentists and nurses. There is one dentist for 7,847 people in the four cities, but the same dentist has to take care of 45,063 people in the rest of the country. The difference in the availability of nurses to urban residents and rural residnts is slightly less than that of dentists but more than that for medical doctors. There is one nurse for 1,587 urban residents and one nurse for 9,013 rural residents.

A midwife in a rural area serves about 8,450 women of child-bearing age (about one-quarter of the total population accordiing to an estimate of the Korea Institute of Family Planning) whereas there is one midwife for about 3,500 women of child-bearing age in the cities. The difference in the availability of midwives to urban and rural residents is less than that of medical doctors.

The concentration of health professionals is greater for hospital-based technicians and nursing aides. Except for nursing aides, there is on the average one or less technician in each kun. "Others" include several categories of occupations and therefore cannot be compared with another single occupation. This is to be expected because hospital beds are concentrated in cities more than most health workers and also because hospital-based allied health personnel are, in general, better trained than others. If we look at the minimum values, we realize that those who live in remote rural areas have no access to any health personnel (except for one medical doctor) unless they travel to another kun.

If we divide the nation into two sectors, the capital city as the unique urban center, and the rest of the country, the uneven distribution of health workers between the two sectors is more striking. If we look at the maximum values for all health workers for the four biggest cities-they are invariably values for Seoule--the capital city has 46.3% of the nation's total medical doctors, 58.6% of the dentists and 42.6% of the nurses, whereas Seoul's population amounts to 18.7% of the nation's total population.

4. Urban and Rural Distribution of Health Facilities

Health facilities in Korea may be grouped into three categories: hospitals,

clinics, and health centers. Hospitals are further divided into four categories: general, tuberculosis, mental and communicable diseases hospitals. Clinics are a doctor's or doctors' offices usually with less than 15 beds and are divided into three categrories: dental, oriental, oriental(herb medicine), and mid-wives' clinics. Health centers are usually operated by the government for low income residents of the area.

If we examine the "general" bed-population ratio, which is more comparable than beds of all categories, there is one general bed for 909 urban (the four biggest cities) residents and one general bed for 4,878 rural (the rest of the country) residents (see Table 2). This indicates that the disparity in the availability of hospital beds between urban and rural areas is greater than that of medical doctors, who are the most important component of labor in the production of health. The disparity in the availability of beds of all categories between the two is less than that of general beds. This mainly because beds in tuberculosis hospitals are evenly distributed per population between urban and rural areas.

The distribution of clinics between urban and rural areas is more even than that of hospitals and that of medical doctors. Nevertheless, the clinicpopulation ratio in urban areas (1/2,993) is more than three times larger than that in rural areas (1/9,656). As expected from the distribution of dentists, the disparity in the availability of dental clinics between urban and rural residents is greater than that of all clinics and also that of medical doctors. The distribution of oriental and mid-wives clinics follows that of herb doctors and mid-wives: it is more evenly distributed between urban and rural areas than other clinics and medical doctors.

Since health centers are usually operated by the government for low income residents, there are more health centers per population in rural areas than in urban areas. There are, on the average, nine health centers for one million rural residents, compared with three for one million urban residents. Although the number is small, there are more health centers per population than clinics for rural residents.

5. The Effects of Socio-Economic Variables on the Availability of Health Professionals

A. Physician Supply

In this section, we analyze the effect of socio-economic variables on the availability of six categories of health professionals: physicians, dentists, herb doctors, nurses, mid-wives and pharmacists, Table 3 presents regression anal-

yses of factors affecting the availability of physicians and dentists per 1,000 population. Of twelve variables representing socio-economic factors, eight are selected by the computer as those which have stronger influences on the supply of doctors and dentists than others.

Urban population as a percent of total population has turned out to be the most important variable influencing the availability of doctors per 1,000 popu lation, with an impressive R square of 0.64. In other words, about 64 percent of inter-kun differences in the number of doctors per population can be expla ined by inter-kun differences in the proportion of urban population each kun has. The degree of urbanization as measured by this variable is, then, the single most important factor in determining the distribution of doctors among kuns.

Table 1 shows that there are fewer doctors per population according to the proportion of farming population each kun has. The fact that the farming population variable has turned out to be the second most important variable explaining inter-kun differences in the supply of doctors is significant, It is because farming is mainty done in rural areas and, therefore, the farming population variable is strongly (and negatively) correlated with the urban population variable. Since the b coefficient of the farming population is statistically significant (at the. 99 level), this suggests that among rural areas there are more doctors available in places where exists some manufacturing or other non-farming industries then in places where there is only farming,

Poputation density is shown to have positive influences on the supply of doctors, distinct from those exerted by urban population and farming population variables. Obviosly, population density is higher in kuns with a greater proportion of urban population and in those with a smaller proportion of farming population. The fact that population density has a statistically significant (at the. 99 level) b coefficient indicates that it has an independent influence of its own on the supply of doctors. This means that among kuns with equal proportions of urban population and/or farming population, kuns with higher population densities tend to have more doctors. The concentration of people itself apparently induces a greater per capita demand for physicians' services or a greater supply response of doctors or both.

Kuns with a higher proportion of their high school age population attending high schools tend to induce a greater number of doctors to practies there. It has been hypothesized that more educated peoplo have stronger preference for health care vis-a-vis other consumer goods than less educated people. This hypothesis has been supported by the significant b coefficient of our high

school education variable. Since this is a multivariate analysis, it is to be kept in mind that although the urban population is more educated than the rural population, education apparently influences the supply of doctors as an independent factor.

A similar observation can be made for the influence on the supply of physicians of another education variable--the number of elementary school teachers per (elementary school) pupil. It is interesting to note that this variable reflects the quality of education at the primary school level, whereas the high school education variable reflects the quantity of education at the secondary school level. Both measures of investment in education apparently exert a (statistically) significant influence on the supply of doctors.

Two remaining socio-economic variables--middle school students as a proportion of middle school age population and the ratio of emigrants to immigrants -have b coefficients with plus-minus signs in opposite directions from those expected from our hypotheses and a priori reasoning. These coefficients, however, cannot be taken seriously because they are both statistically insignificant. Whatever influences variables may exert on doctors' supply, they are so closely related to those of other variables inserted into the same regression that they cease to operate as independent forces.

Eight socio-economic variables altogether explained about 78 percent of inter-kun differences in doctors' supply per population. This value of R square is impressive if we keep in mind the fact that the numberof observations is 171--relatively large--and the fact that R square as calculated here excludes over-lapping influences of these independent variables. Reflecting these facts, we have an F value for this regression of 73.25--a highly significant value. These denote that the eight independent variables have been judiciously chosen

B. Supply of Dentists

This same factors which were shown to influence physicians' supply also influence dentists' supply in a similar manner, but there is an important exception. The exception is the emergence of our proxy variable for income--tax revenue per capita--as the second most important variable influencing dentists' supply, with a simple R of 0.65. Note that in the previous regression on doctors' supply, our income variable was one of the four variables the computer failed to pick up because of their lack of influence on the dependent variable.

It has been hypothesized that income's effect on the demand for health services and, thereby, its effect on the supply of health personnel one of the

strongest among all variables. In relation to doctors' supply, however, our income variable was unable to show any significant independent influence as it was submerged under other variables such as urban population, farming population and population density, which are likely to be inter-correlated with our income variable. The result seems to support findings of various studies in the U.S. that the income effect is stronger on the demand for dental care than on that for physicians' services. It can be theorized that the stronger income effect on dentists' supply than on physicians' supply is attributable to the fact that dental care includes a proportionately greater discretionary component than physicians' services from the standpoint of consumer choices.

Urban population, farming population and population density variables are shown to exert an influence on dentists' supply similar to that exerted on physicians' supply. The strength of these influences on dentists' supply (in terms of the contribution made to R square) is. however smaller than that on physicians'. Reflecting this fact, the entire R square of this regression on dentists' supply, with eight independent variables, is 0. 563. This is considerably smaller than that for the regression on doctors' supply, which is 0. 78. Apparently, inter-kun differences in dentists' supply are less amenable to explanations by the socio-economic variables we have chosen than those in doctors' supply.

Three out of the four remaining variable--migration, elementary school pupils and middle school teachers--are found to have b coefficients with plus-minus signs in directions opposite to those expected. They are, however, all statistically insignificant and, therefore, cannot be taken seriously. this is likely to be attributable to inter-correlations of these three variables with other sig-nificant variables.

C. Supply of Nurses

Regression of our socio-economic variables on the availability of nurses per population has brought out a similar result to those from runs on physicians' supply and dentists' supply. Urban population, population density and farming population continue to be important variables explaining inter-kun differences in nurses' supply (see Table 4).

There are only three independent variables which have been shown to have statisitically significant effects on nurses' supply, and all of them are measures reflecting various aspects of urban vs. rural characteristics. Note that previously, the high school students variable in the regression on doctors' supply and the income variable in that on dentists' supply have been shown

to have significant b coefficients in addition to urban and farming variables.

Whereas the urban population variable has been shown to have no significant effects no dentists' supply and failed to be one of eight important explanatory variables picked by the computer, this same variable is shown to be the most important variable explaining inter-kun differences in nurses' supply as it has been for doctors' supply. Note that the R square contribution of the urban population variable in the regression on nurses' supply is 0.48 out of 0.56 for the entire regression.

Three more regressions were run with the same twelve socio-economic variables on the availability of three other health professionals--herb doctors, mid-wives and pharmacists. Since the results appear to offer no new insights they are not presented here. One interesting finding to be noted here is that our income variable has turned out to be the most important variable explaining inter-kun differences in herb doctors' supply.

6. Effects of Socio-Economic Variables on the Availability of Health Facilities

Eleven regressions were run with twelve socio-economic variables on various (eleven) measures of health facilities. Of these, the results of three regressions on the availability of clinics, dental clinics and general (hospital) beds are presented in Tables 4 and 5. The remaining five are not presented because they appear to add little to our analyses.

The availability of dental clinics per 1,000 population appears to be more sensitive to inter-kun differences in socio-economic variables selected than that of other health facilities(see Table 5). Eight socio-economic variables succeeded in explaining about 77% of inter-kun differences in the availability of dental clinics. The availability of mid-wives' clinics is the next most sensitive one to inter-kun differences in socio-economic variables. The availability of all categories of health facilities appears to be influenced by the chosen economic variables in more or less the same manner as the availibility of health professionals. Urban population, population density and tax (income) variables have positive and significant influences on the availability of health facilites' as expected. Farming population and farming household variables have negative and significant effects on the availability of health facilites. Except for the ratio of the numer of elementary pupils to the number of children in the 6–11 age group, all education variables have positive and more often than not significant effects on the availability of health facilities.

To sum up, the socio-economic variables chosen exert influences on the

availabiiity of health facilities which are similar to their effects on the availability of health professionals. This is to be expected because those forces which are associated positively or negatively with the supply of health professionals are likely to be associated with that of health facilities in the same diretion. Since labor is a complementary input of capital in the production of health services, the supply of labor (health professionals) and that of capital (health facilities) have been hypothesized to beinfluenced in more or less the same manner by socio-economic factors. Regression analyses as presented in Tables 1, 2 and 3 confirm this hypothesis. It is pointed out, hoowever, that the supply of labor and that of capital for the production of health services are not expected to respond to socio-economic variables in exactly the same manner. The question of the relative sensitvity of supply responses between labor and capital for the production of health services is an important one to pursue. This question is examined later in this article.

7. The Effects of Socio-Economic Variables on the Health Manpower Mix (Labor Mix)

it is hypothesized that the supply of health professionals associated with a socio-econmic variable positively or negatively depending on whether that variable reflects positive or negative aspects of living conditions in a kun. It is expected that health professionals prefer to practice in areas with "better" living conditions, and furthermore, that there is likely to be a greater per capita demand for health services in areas with relatively positive indices of socio-economic variables. Thus, the demand factor reinforces the influence of socio-economic attributes of living conditions of an area in attracting a greater number of health professionals per population. In this section, we examine the relaive sensitivity of supply responses to various socio-economic variables among different categories of health professionals.

The basic about the effects of socio-economicvariables on labor-mix is that more skilled health workers are more sensitive tointer-kun differences in socio-economic variables than less skilled workers. Since medical doctors are the most highly trained among health workers, if ratio of the numer of doctors to that of any other workers is found to be positively associated with positive indices of socio-economic variables, this could be interpreted as supporting our hypothesis Results of regressionsn neither support nor reject this hypothesis conclusively.

In general, there are no clear-cut raltionships beween the meaures of labor-mix chosen and the selected socio-economic variables. Although the R^2 are all

significant at the 99 level accoring to the analysis of variance (F ratio), their values are relatively small, ranging from .099 to .144 (see Table 6). Furthermore, all b coefficients are statistically insignificant at the .95 level. The reason for this failure to support or reject our hypothesis appears to lie in the fact that in areas with positive socio-economic indices, allied health professionals are more often registerd or certified than those in areas with negative indices. Since we included only those allied health workers who were registered or certified, our calculation tends to underestimate the number of those in less "desirable" areas.

Next in this section, we examine the effects of soco-economic variables on a particular labor-mix, namely, the mix of those workers based in hospitals and those who are not (see Table 7). Results again fail to establish clear-cut relationships except for nurses. The ratio of hospital staff nurses to all nurses is positively related to positive indices of socio-economic variables and negatively to negative indices for b co-efficients whose t ratios are greater than one. This indicate s that a proportionately greater number of nurses work at hospitals in more "desirable" areas. This is to be expected because a proportionately greater number of more gualified nurses find jobs at hospitals than less qualified nurses.

In summary, there is no significant association between labor-mix of health workers and the socio-economic variables chosen. This can be attributed to the fact that allied health professionals in more "desirable" areas are more likely to be certified or registered and thus included in our calculation than those in less "desirable" areas. Note that all medical doctors are licensed regardless of their places of practice.

8. The Effects of Socio-Economic Variables on the Health Facilities Mix (Capital Mix)

It is hypothesized that residents in areas with positive indices of socio-economic indicators are more likely to demand and get health services produced with more refined and complex equipment, facilities and buildings than those living in areas with negative indices. Supply responses of capital to such differences in demand would then be reflected in inter-kun differences in the mix of various categories of health facilities available. Results of regression analyses presented in Tables 7 and 8 support this hypothesis.

As medical doctors are the most skiled health professionals, hospitals are the most advanced and complex of the variety of healthfacilities. Thus. the ratios of the numer of hospitals to the number of each of the various other

health facilities are chosen as variables representing the degree of refinement and complexity of health facilities available in each kun. When socio-economic indicators are regressed on this measure of capital-mix, for of most of the important variables--important in terms of their contridution to R squares --there are positive and significant associations between the two. Except for the ratio of hospitals to mid-wives' clinics, the variable representing farming population as a percent of total population has turned out to be the most important variable explaining inter-kun differences in capital-mix. For the ratio of hospitals to health centers, the farming population variable alone explains more than 24% of inter-kun differences in capital mix. Thus a farming population, which has been shown to be negativey associated with the supply of health facilities (see Tables 4 and 5) has an even smaller access to hospitals than to other health facilities.

9. The Effects of Socio-Economic Variables on the Mix of Health Manpower and Facilities (Labor-Capital Mix)

One of the most important factors affecting labor productivity is the capital-labor ratio. A higher capital-labor ratio usually denotes higher labor productivity. we cannot, however, apply this line of reasoning to our study of the capital-labor mix in the production of health services. One reason is that the quality of health services is often directly related to the service-intensiveness of care for a given facility. In a service industry such as health care, service-intensive care means labor-intensive care. Thus, a higher capital-labor ratio may denote lower quality of care, rather than higher productivity of labor as such!

Secondly, for most industries, demand fluctuations are more often reflected in differences in the utilization rate than in differences in the amount of supply. This is usually more true for capital than for labor. Since the health care industry is a service industry, and since it provides emergency services when called for, the variations of demand for health care are reflected in the utilization rate of capital, raher than in the labor supply, to a greater extent than in other industries. This means that since variations in the utilization rate are not observable in our data, a higher capital-labor ratio may simply indicate a greater degree of idleness in capital utilization.

Based on these assumptions, we hypothesize that residents of kuns with higher socio-economic indicators demand and receive higher quality and more service-intensive care. Thus, it is expected that socio-economic indicators are negatively associated with the existing capital-labor ratio of health resources

in each kun. This hypothesis is supported by the results of regression analyses as presented in Tables 9 and 10.

In our regressions, labor is represented by doctors and nurses and capital by hospitals, hospital beds of most categories, clinics and health centers. In all regressions, positive indices of socio-economic indicators are positively associated with labor-capital ratio measures. Note that for convenience we used the labor-capital ratio, the reciprocal of the capital-labor ratio, as the dependent variable in all of our regressions.

Population density, urban population and farming population variables, roughly in that order, have a more important imact on the labor-capital ratio than other independent variables. The number of nurses available at each health center is more sensitive to inter-kun differences in socio-economic indicators than any other measure of the labor-capital ratio. More than 60% of inter-kun differences in the ratios of nurses to health centers are explained by the twelve socio-economic variables inserted. As for more important measures of labor-capital ratios--doctors/general hospital beds, nurses/general beds doctors/hospitals, nurses/hospitals--eight socio-economic variables chosen explain 40% or more of inter-kun differences in labor-capital ratios.

To sum up, residents in kuns with higher socio-economic indicators have better access to health services produced with a higher labor-capital ratio than those in kuns with lower indicators. Thus, to the extent to which a higher labor-capital ratio in the production of health services denotes higher quality and service-intensive care, it can be said that people of higher socio-economic status have better access to, and probably receive, higher quality and more service-intensive health care than those of lower status.

10. The Effects of Socio-Economic Variables on Utilization of Health Resources

The results of regression analyses presented in this article so far have shown that there exists a systematic relationship between inter-kun differences in the availability and mix of health resources and differences in socio-economic variables. On theoretical grounds it has been assumed that the principal underlying cause for this relationshipis supply responses of health resources, human and physical, to inter-kun differences in demand for health services, which in turn are induced by differences in the socio-economic stantus of residents. In order to test this theoretical assumption, we have run regressions of socio-economic variables on the utilization of hospital services per population and per facility. If positive socio-economic indicators are shown to have

positive effects on the utilization rate of health resources chosen, our hypothesis is supported. The results of regression analyses support our hypothesis,

Urban population and farming population variables are shown to have the most important effects on all of our four measures of per cpita rate of utilization of hospital care. When the utilization rate is represented by the number of inpatients, total visits or new visits per a given population, these two variables explain more than 40% of inter-kun differences in the utilization rate (see Table 11).

When the utilization rate is represented by the number of services provided per hospital, clinic or hospital bed, the association between socio-economic variables and the utilization rate is in general slightly weaker than when the latter is represented by per capita measures. The relative strength of associa tion is measured by R squares (see Table 12). The underlying reason must be the association shown between the availability of hospitals or clinics and socio-economic variables. The urban popiulation variable is again the most important variable affecting the utilization rate of physical resources.

To sum up, residents in areas with higher socio-economic indicators have better access to all categories of health resources of health resources and use the available resources to a greater extent than those in areas with lower indicators.

11. Summary of Findings

However one may define what constitutes the "optimum", there appears to be a considerable departure from the norm of optimum in the allocation of health resources in Korea.

A. Reflecting the common features of a dual economy, urban-rural disparity in the availity of health resources exists for all categories.

In 1973, while Seoul had 18.7% of the nation's population, it had 46.3% of its medical doctors, 58.6% of its dentisits and 52.8% of its pharmacists.

The four largest cities--Seoul, Busan, Teague and Kwangju--had one doctor per 1,150 population, one dentist per 7,847 population and one nurse per 1,587 population. In the rest of the nation, there was one doctor per 7.692 population, one dentist per 45,063 population and one nurse per 9,013 population in 1973. Note that the service most inaccessible to rural residents is den tal care.

The growth rate of health manpower has been greater than that of popula tion for the entire country. However, the health manpower growth rate exceeds the population growth rate in big cities to a greater extent than in the

rest of the country.

There was one general hospital bed per 909 residents of the largest four cities, whereas there was one per 4,878 population in the rest of the country. The ratio of medical-general clinics to population was 1 to 2,993 for the four largest cities and 1 to 9,656 for the rest of the country. The urban-rural dis parity in the availability of clinics of clinics of all other special categories--dental, oriental and midwives'--is greater than that of medical-general clinics.

B. The underlying socio-economic causes of the existing distribution of health resources and of inter-Kun differences in the labor-mix, capital-labor mix and utilization of health resources.

Demographic variables (as represented by urban popualtion as a percent of total population and population density) and, to a lesser extent, the per capita income variable, have positive, and in most cases statistically significant, effects on the availability of health professionals and facilities. Farming population as a percent of the total population and, to lesser extent, farming households as a percent of total households, have negative, and in most cases statistically significant, effects on the availability of health resources, both physical and human. Education variables have turned out to have mostly insignificant effects on the availability of health resources.

The above effects, as revealed in our regression analyses, appear to be the result of supply responses of health resources to differences in demand, which in turn, can be traced to differences in the socio-economic status of residents. In addition, associations between socio-economic variables and the availability of health professionals reflect labor supply responses to the inter-kun differences in living conditions shown by the socio-economic variables chosen.

The socio-economic variables chosen have no significant effects on the labor-mix, or skill mix if you please, of health professionals.

Socio-economic indicators have positive associations with hospital-centered (in contrast to clinic or health-center based) services.

Urban population as a percent of total population and the per capita income variable (as represented by per capita tax revenue) have positive effects on the labor-capital ratio of health resources, whereas the farming population variable has a negative effect. A higher labor-capital ratio in the health services industry usually indicates higher quality and more service-intensive care.

Whether it is measured by care delivered per population or per facilities, the utilization of health services is positively related to positive indicators of socio-ecenomic variables and negatively to negative indicators.

Eight socio-economic variables (chosen by computer out of twelve inserted)

explain 78% of the inter-kun differences in physician supply per population, 56% of these in dentist supply and 56% of those in nurse supply.

Eight socioieconomic variables (chosen again by computer out of twelve inserted) explain 55% of inter-kun differences in the availability of clinics per 1,000 population and 41% of those in general hospitals beds per population.

12. Concluding Remarks

As we see it, the allocative problem of health resources in Korea stems from the nature of the country's dual economy. Two distinct sectors exist within a nation, characterized variously as urban vs. rural, manufacturing vs. agricultural, high standard of living vs. low standard of living, etc. Given this dichotomy, the distribution of health resources reflects their supply responses to differences in the socio-economic conditions of the two sectors.

What is needed is a bold action to break what we consider to be a vicious circle. Rural socio-economic conditions result in lower demand for health services than in urban areas. Given this relatively weak demand for health services in rural areas and the less desirable environment for highly trained persons to work and live, a significant disparity between the two sectors in the availability of health resources, as well as other resources, The resultant urbanrural difference in health and other human and physical capital leaves the socio-economic development of rural areas further behind. This, in turn, discourages the infusion of new health resources into rural areas, thus completing a circular chain of cause and effect.

We believe that this vicious circle can be broken by a policy-induced, incentive-oriented infusion of a sufficient and sustained dose of health resources into rural areas. This would, in turn, lead to better working conditions, a more favorable environment and stronger demand, giving further incentive for still more expansion of health resources into rural areas to augment the initial infusion. A corollary development accompanying the increasing investment in rural health would be a reduction in the rural birth rate and thereby, a lessening of the urban-rural fertility difference. This would augment the favorable socio-economic development resulting directly from the infusion of health resources into rural areas.

Furthermore, a policy designed to induce an infusion of health resources into rural areas should be coordinated with policies designed to disperse manufacturing facilities, diversify industry and increase productivity in agriculture. Such coordination would enhance the mutually re-enforcing effect of these policies in accelerating the socio-economic development of rural areas.

Planning for efficient allocation of health resources should be an integral and indispensable part of the development strategy of the national economy.

Table 1 Distribution of Health Professionals Between Urban (Four Biggest Cities) and Rural Area (The Rest of Country): Numbers (Including Ratios), Means, Maximum and Minimum Numbers. 1973 Data.

	Means		Maximum		Minimum	
	4 Biggest Cities*	Kuns**	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Doctors	1,921	17	4,234	228	451	1
Dentists	312	3	991	35	32	0
Herb Doctors	398	5	1,089	69	24	0
Nurses	1,469	15	3,573	237	431	0
Midwives	175	4	275	44	75	0
Pharmacists	2,405	35	7,125	2,290	441	0
M.D.'s/Pop.	1/1510	1/7692	1/1405	1/3025	1/2500	0***
Dentists/Pop.	1/7847	1/45063	1/6131	1·19709	1/16812	0
Herb Drs./Pop.	1/6653	1/27038	1/5579	1/9997	1/22416	0
Nurses/Pop.	1/1587	1/9013	1/1250	1/2911	1/2500	0
Midwives/Pop.	1/13890	1/33797	1/7325	1/15677	1/17173	0
Pharmacists/Pop.	1/1205	1/5263	1/833	1/1301	1/1667	0
Public Doctors	16	1	42	7	4	0
Nurse Aides Others	477	4	1,124	103	144	0
Lab. Technicians	112	1	320	16	22	0
X-ray Technicians	61	1	180	10	12	0
Dieticians	21	0	60	5	3	0
Others	1'549	10	4,384	245	321	0

* Seoul, Busan, Taegu and Kwanju

** Rest of the country including 32 smaller shis (cities)

*** Approaches 0. less than the computer tolerance.

Sources: Various Republic of Korea Government publicatons and our survey.

Table 2 Distribution of Health Services Facilities--Clinics, Hospitals, Beds, Etc., in Urban and Rural Area. 1973 Data

Var. No. and Names	Means		Maximum		Minimum	
	4 Biggest Cities	Kuns**	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Hospitals	38	1	77	12	17	0
Clinics***	818	14	2,249	134	122	0
Dental Clinics	257	2	795	32	24	0
Oriental Clinics	358	5	1,102	63	0	0
Midwives' Clinics	105	2	231	31	37	0
Health Centers	5	1	9	4	1	0
General Beds	2,561	27	6,527	427	784	0
Tuberculosis Beds	173	7	570	500	0	0
Psychiatry Beads	360	1	1,281	85	28	0
Comm. Disease Beds	504	10	1,175	1,472	13	0
Total Beds	3,599	45	8,756	1,472	876	0
Hospitals/Pop.	-	-	-	-	-	-
Clinics/Pop.	20/1㎜	6/1㎜	32/1㎜	69/1㎜	13/1㎜	0
Dental Cinics/Pop.	77/1㎜	16/1㎜	131/1㎜	107/1㎜	45/1㎜	0
Oriental Clinics/Pop.	97/1㎜	36/1㎜	181/1㎜	158/1㎜	0	0
Midwives' Dlinics/Pop.	50/1㎜	16/1㎜	74/1㎜	94/1㎜	32/1㎜	0
Health Ctrs./Po.	3/1㎜	9/1㎜	4/1㎜	69/1㎜	1/1㎜	0
General Beds/Pop.	1100/1㎜	205/1㎜	1457/1㎜	5556/1㎜	889/1㎜	0
Tuberculosis Beds/Pop.	39/1㎜	39/1㎜	94/1㎜	2367/1㎜	0	0
Psychiatry Beds/Pos.	104/1㎜	7/1㎜	211/1㎜	731/1㎜	14/1㎜	0
Comm. Disease Beds/Pop.	264/1㎜	50/1㎜	583/1㎜	6353/1㎜	24/1㎜	0
Total Beds/Pop.	1507/1㎜	301/1㎜	1628/1㎜	6458/1㎜	1418/1㎜	0
Clinics/Pop.	1/2993	1/9656	1/31250	1/14493	1/76923	0
General Beds/Pop.	1/909	1/4878	1/686	1/180	1/1125	0

* Seoul, Busan, Taegu and Kwanju

** Rest of the country including 32 smaller shis (cities)

*** Clinics are smaller than hospital, usually with less than 15 beds

Sources: Various Republic of Korea Government publications and our survey

Table 3 The Effects of Socio-Economic Variables on the Availability of Dotors and Dentists per 1,000 Population

Dep. Var. / Indep. Vars.	doctors/populatic Beta co-efficiects	b co-efficient	Standard errors b	R^2 Additions
% urben population	0.345	0.012	0.003	0.645
% farming population	−0.261	−0.012	0.003	0.061
population density	0.279	0.000	0.000	0.027
high sch std. 15-17 age pop.	0.286	0.167	0.049	0.021
elem.scih.tch eləm. student	0.183	1.275	0.308	0.017
% farming household	−0.115	−0.000	0.000	0.011
midl. sch. std. 12-14 age pop.	−0.068	−0.050	0.049	0.001
emigrants immigrants	0.012	0.000	0.001	0.000

Constant=−0.008 total R^2=0.783

Regression DF=8 F=73.25

Residual DF=163

Analysis of Variance: significant at. 95 level if F≥2.02; significant at. 99 level if F≥2.66

Dep. Var. / Indep. Vars.	dentists/population Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.339	0.003	0.001	0.502
tax population	0.174	0.011	0.006	0.031
% farming population	−0.207	−0.003	0.001	0.012
population density	0.110	0.000	0.000	0.009
emigrants immigrants	0.095	0.001	0.000	0.006
high sch. std. 15-17 age pop.	0.094	0.014	0.015	0.003
elem.sch.std. 6-11 age pop.	−0.020	−0.004	0.012	0.000
midl. sch. tch. students	−0.017	−0.012	0.040	0.000

Constant=0.001 total R^2=0.563

Regression DF=8 F=26.22

Residual DF=163

b coefficient: significant at. 95 level if t ratio ≥1.96 or ≤−1.96; significant at. 99 level if t ratio ≥2.59 or ≤−2.95

Table 4 The Effects of Scoio-Economic Variables on the Availability of Nurses and Clinics per 1,000 Population

Dep. Var. / Indep. Vars.	nurses/population Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.414	0.020	0.005	0.480
population density	0.196	0.000	0.000	0.042
% farming population	−0.271	−0.168	0.006	0.022
high sch. tch. students	0.091	0.150	0.098	0.008
emigrants immigrants	0.092	0.003	0.002	0.005
high sch. sd. 15-17 age pop.	0.168	0.131	0.093	0.003
midl. sch. std. 12-14 age pop.	−0.085	−0.084	0,092	0.002
% farming household	−0.046	−0.000	0.000	0.002

Constant=0.008 total R^2=0.564

Regression DF=8 F=26.46

Residual DF=163

Analysis of Variance: significant at. 95 level if F≥2.02; significant at. 99 level if F≥2.66

Dep. Var. / Indep. Vars.	clinics/population Beta co-efficieuts	b co-efficient	Standard errors b	R^2 additions
% farming population	−0.0440	−17.378	3.574	0.396
elem. sch. tch. students	0.490	2421.848	379.270	0.074
tax populatiion	0.192	40.920	19.744	0.026
high sch. tch. students	0.146	152.760	62.833	0.016
high sch. std. 15-17age pop.	0.217	108.104	42.652	0.017
% farming household	−0.123	−0.148	0.071	0.009
emigrants immigrants	0.105	2.379	1.531	0.009
population density	0.100	0.110	0.076	0.006

Constant=−45.898 total R^2=0.553

Regression DF=8 F=25.11

Residual DF=163

b co-efficient: significant at. 95 level if t ratio ≥1.96 or ≤−1.96; significat at. 99 level if t ratio ≥2.59 or ≤−2.95

Table 5 The Effcets of Socio-Economic Varables on the Availability of Dental Coinics and General (Hospital) Beds per 1,000 Population

Dep. Var. / Indep. Vars.	dental clinics/population Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.231	13.588	4.949	0.616
tax population	0.224	92.857	28.854	0.084
midl. sch. std. 12-14 age. pop.	0.210	257.100	95.070	0.024
population density	0.219	0.469	0.098	0.035
% farming population	−0.151	−11.633	5.140	0.008
high sch. std. 15-17 age pop.	0.086	83.068	85.180	0.002
midl.sch. tch. students	0.031	134.263	198.722	0.001
elem. sch. std. 6-11 age pop.	−0.022	−30.986	59.447	0.000
	Constand=−3.541			total R^2=0.766
Regression DF=8		F=66.76		
Residual DF=163				
Analysis of Variance:	significant at. 95 level if F ≥2.02 significant at. 99 level if F ≥2.66			

Dep. Var. / Indep. Vars.	general beds/population Beta co-efficients	b co-efficient	Standard orrors b	R_r Additions
% farming population	−0.244	−490.628	231.817	0.215
elem. sch. tch. students	0.471	142149.858	22033.070	0.072
population density	0.304	17.061	4.079	0.048
high sch. std. 15-17 age pop.	0.160	4069.773	2674.798	0.020
high sch. tch. students	0.152	8116.762	3726·506	0.021
emigrants immigrants	0.145	168.134	89.498	0.012
% farming household	−0.183	−8.451	4.148	0.014
% urban population	0.215	331.015	191.761	0.011
	Constant=−3048.321			total R^2=0.413
Regression DF=8		F=14.36		
Residual DF=163				
b co-efficient:	significient at. 95 level if t ratio ≥1.96 or ≤−1.96 significant at. 99 level if t ratio ≥2.59 or ≤−2.95			

Table 6 The Effects of Socio-Economic Variables on Labor-Mix: The Ratio of Doctors to Dentists and that of Doctors to Mid-Wives

Dep. Var. / Indep. Vars.	doctors/dentists Beat co-efficients	b co-efficient	Standard errors b	R^2 Additions	Dep. Var. / Indep. Vars.	doctors/mid-wives Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
high sch.std. 15-17 age pop.	0.194	39.408	25.570	0.120	% urban population	0.160	1.577	1.370	0.073
emigrants immigrants	−0.141	−1.311	0.803	0.021	population density	0.071	0.026	0.031	0.010
% farming household	−0.144	−0.071	0.040	0.009	% farming household	−0.085	−0.033	0.032	0.007
high sch. tch. students	−0.088	−37.464	35.458	0.007	high sch. tch. students	−0.073	−25.039	29.256	0.005
elem. sch. tch. students	0.057	136.934	196.603	0.003	elem.sch. std. 6-11 age pop.	−0.097	−22.651	19.346	0.003
midl. sch. tch. students	0.044	40.545	74.257	0.002	midl. sch. sud. 12-14 age pop.	0.195	39.954	28.524	0.005
% urban population	0.098	1.216	1.768	0.001	high sch. std. 15-17 age pop.	−0.179	−25.815	27.517	0.007
tax population	−0.060	−5.219	10.940	0.001	elem. sch. tch. stuents	−0.065	−126.126	173.725	0.003
	Constant=3.984		total R^2=0.144			Constant=7.424		total R^2=0.110	
Regression DF=8		F=4.05			Regression DF=8		F=2.51		
Residual DF=163					Residual DF=163				
Analysis of Variance:	significant at. 95 level if F≥2.02 significant at. 99 level if F≥2.66				b co-efficient:	significant at. 95 level if t ratio ≥1.96 or ≤−1.96 significant at. 99 level if t ratio ≥2.59 or ≤−2.95			

Table 7 The Effects of Socio-Economic Varables on Lbbor-Mix and Capital-Mix:Mix: The Ratio of Hospital Staff Nurses to All Nurses and that of Hospitals to Clinics

Dep. Var. / Indep. Vars.	Hospital staff nurses/nurses: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
elem. sch. tch. students	0.438	271.146	55.354	0.085
% farming population	−0.296	−0.230	0.572	0.043
population density	0.146	0.017	0.011	0.014
% farming household	−0.117	−0.015	0.010	0.017
high sch. tch. students	0.090	9.885	9.155	0.011
emigrants immigrants	0.101	0.241	0.222	0.004
% urban populatinn	−0.080	−0.252	0.519	0.003
midl. sch. tch. students	−0.059	−13.872	20.714	0.002

Constant = −4.989 total R^2 = 0s179
Regresson DF = 12 F = 2.98
Residual DF = 159
Analysis of Variance: significant at. 95 level if F ≥ 2.02
significant at. 99 level if F ≥ 2.66

Dep. Var. / Indep. Vars.	hospitals/clinics: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	−0.306	−0.008	0.041	0.104
elem. sch. tch. students	0.211	10.116	4.270	0.025
high sch. tch. students	0.165	1.397	0.704	0.025
% farming household	−0.116	−0.001	0.001	0.006
midl.sch. tch. students	0.159	2.894	1.559	0.008
midl. sch. std. 12-14 age pop.	0.195	0.993	0.750	0.005
elem. sch. std. 6-11 age pop.	−0.074	−0.432	0.473	0.005
tax population	0.103	0.177	0.229	0.002

Constant = −0.226 total R^2 = 0.180
Regresson DF = 11 F = 3.26
Residual DF = 160
b co-efficieuts: significant at. 95 level if tratio ≥ 1s96 or ≤ −1.96
significant at. 99 level if t ratio ≥ 2.59 or ≤ −2.95

Table 8 The Effects of Socio-Economic Variables on Capital-Mix: The Ratio of Hospitals to Mid-wives Clinics and that of Hospitals to Health Centers

Dep. Var. / Indep. Vars.	hospitals/mid-wives clinics Beat co-efficients	b co-efficient	Standard errors b	R^2 Additions	Dip. Var. / Indep. Vars.	hospitals/health conters Beat co-efficients	b co-efficient	Standard errors b	R^2 Additions
tax					% farming				
population	0.405	2.627	0.876	0.187	population	−0.349	−0.022	0.008	0.244
population					high sch. std.				
density	−0.138	−0.005	0.003	0.017	15-17 age pop.	0.324	0.260	0.123	0.027
% farming					elem. sch. tch.				
poputation	−0.122	−0.147	0.162	0.009	students	0.148	1.408	0.781	0.020
midl. sch. std.					high sch. tch.				
12-14 age pop.	−0.120	−2.300	2.757	0.006	students	0.074	0.126	0.129	0.008
high sch. tch.					% farming				
students	0.071	3.257	2.598	0.003	household	−0.093	−0.000	0.000	0.005
elem. sch. std.					midl. sch. tch.				
6-11 age pop.	−0.047	−1.026	1.748	0.003	students	0.093	0.005	0.292	0.006
high sch. std.					elem. sch. std.				
15-17 age pop.	0.064	0.973	2.477	0.001	6-11 age pop.	−0.069	−0.080	0.087	0.003
emigrants					% urban				
immigrants	−0.024	−0.017	0.063	0.000	population	−0.080	−0.004	0.007	0.002
	Constant=0.181		total R^2=0.226			Contant=−0.010		total R^2=0.315	
Regression DF=12	F=3.89				Regression DF=12	F=6.09			
Residual DF=159					Residual DF=159				
Analysis of Variance:	significant at. 95 level if F≥2.02 significant at. 99 level if F≥2.66				b co-efficient:	significant at. 95 tevel if t ratio ≥1.96 or ≤−1.96 significant at. 99 level if t ratio ≥2.59 or ≤−2.95			

Table 9 The Effects of Socio-Economic Variables on Labor-Capital Mix: The Ratio of physicians to General (Hospital) Beds and that of Nurses to General Beds

Dep. Var. / Indep. Vars.	doctors/general beds: Beat co-efficients	b co-efficient	Standard errors b	R^2 Additions
population density	0.736	0.438	0.046	0.317
elem. sch. tch. students	0.256	819.480	233.829	0.052
high sch. std. 15-17 age pop.	0.322	86.976	33.329	0.009
midl. sch. std. 12-14 age pop.	−0.199	−67.834	39.655	0.010
tax population	−0.200	−23.104	12.188	0.008
% farming household	−0.062	−0.041	0.044	0.005
emigrants immigrants	−0.072	−0.884	0.901	0.003
midl.sch.tch. students	−0.041	−50.172	88.354	0.001
	Constant=−9.782		total R^2=0.405	
Regression DF=8			F=13.94	
Residual DF=163				
Analysis of Variance:	significant at. 95 level if F≥2.02			
	significant at. 99 level if F≥2.66			

Dep. Var. / Indep. Vars.	nurses/general beds: Beta co-efficients	b co-efficient	Standard errors b	R^2 Abbitions
population density	0.768	0.324	0.031	0.401
elem. sch. tcs. students	0.206	467.662	155.298	0.035
high sch. std. 15-17 age pop.	0.354	67.630	22.135	0.016
midl. soh. std. 12-14 age pop.	−0.210	−50.564	26.337	0.011
tax population	−0.175	−14.291	8.095	0.006
% farming household	−0.050	−0.023	0.029	0.004
emigrants immigrants	−0.063	−0.549	0.598	0.003
midl. sch. tch. students	−0.041	−35.527	58.680	0.001
	Constant=−4.885		total R^2=0.477	
Regression DF=9			F=18.52	
Residual DF=163				
b co-efficient:	significant at. 95 level if t ratio ≥1.96 or ≤−1.96			
	significant at. 99 level if t ratio ≥2.59 or ≤−2.95			

Table 10 The Effects of Socio-Economic Variables on Labor-Capital Mix: The Ratio of physicions to Hospitals and that of Nurses to Hospitals

Dep. var. / Indep. Vars.	doctors/hospitals Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	−0.263	−8.432	3.365	0.418
tax population	0.105	18.205	18.172	0.055
high sch. std. 15-17 age pop.	0.357	144.917	51.350	0.012
population density	0.177	0.159	0.064	0.021
midl. sch. std. 12-14 age. pop.	−0.250	−127.681	57.159	0.017
% urban population	0.121	2.989	3.051	0.003
midl. sch. tch. student	−0.044	−79.504	121.867	0.002
high sch. tch. student	−0.059	−49.926	53.864	0.002

Constant=16.044 total R^2=0.530
Regression DF=12 F=15.13
Residual DF=159
Analysis of Variance: significant at. 95 level if F≥2.02
significant at. 99 level if F≥2.66

Dep. Var. / Indep. Vars.	nurses/hospitals Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0,336	8.656	3.111	0.434
population density	0.278	0.260	0.066	0.089
% farming population	−0.216	−7.246	3.431	0.015
high sch. std. 15-17 age pop.	0.262	111.025	52.368	0.005
midl. sch. std. 12-14 age pop.	−0.156	−83.447	58.291	0.007
elem. sch. tch. students	−0.051	−258.862	332.112	0.003
high sch. tch. students	0.043	38.648	54.931	0.002
emigrants immigrants	0.046	0.891	1.331	0.001

Constant=11.940 total R^2=0.556
Regression DF=12 F=16.62
Residual DF=159
b co-efficient: significant at. 95 level if t ratio ≥1.06 or ≤−1.96
significant at. 99 level if t ratio ≥2.95 or ≤−2.95

Table 11 The Effects of Socio-Economic Variables on per Capita Untiliztion of Hospital Care: The Number of Inpatients and Total Visits per 1,000 population

Dep. Var. / Indep. Vars.	inpatients/population Beta co-efficients	b co-efficient	Standerd errors b	R^2 Additions
% urban population	0.216	4631.682	2746.139	0.404
% farming population	−0.311	−8699.165	3028.603	0.042
population density	0.158	123.671	57.956	0.019
high sch. std. 15-17 age pop.	0.276	97670.529	46220.147	0.009
emigrants immigrants	0.132	2124.096	1174.675	0.008
midl. sch. std. 12-13 age pop.	−0.192	−85788.393	51448.543	0.007
tax population	0.120	18155.556	16356.688	0.004
elem. sch. tch. students	0.069	617074.742	293124.795	0.005

Consiant=−1505.629 total R^2=0.498
Regression DF=12 F13.38
Residual DF=159
Analysis of Variance: significant at. 95 level if F≥2.02
signifciant at. 99 level if F≥2.66

Dep. Var. / Indep. Vars.	total visits/population Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.159	8928.665	6926.536	0.424
high sch. std. 15-17 age pop.	0.289	266392.251	116580.235	0.042
population density	0.199	405.975	146.181	0.034
% farming population	−0.196	−14305.505	7638.991	0.017
elem. sch. tch. studeuts	0.128	1401490.167	739343.337	0.007
high sch. tch. students	0.059	115167.485	122286.681	0.004
% farming household	−0.063	−140.067	139.425	0.003
tax population	0.104	40987.086	41256.178	0.002

Constant−28762.650 total R^2=0.533
Regression DF=12 F=15.24
Residual DF=159
b co-efficient: significant at. 95 level if t ratio ≥1.96 or ≤−1.96
signifcant at. 99 level if t ratio ≥2.59 or ≤−2.95

Table 12 The Effects of Socio-Economic Variables on the Untilization of Hospital Facility: The Number of Inpatients per General (Hospital) Beds and Total Visits per Hospital

Dep. Var. / Indep. Vars.	inpatients/general beds			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.119	3.221	3.850	0.301
% farming population	−0.248	−8.755	4.246	0.020
emigrants immigrants	0.186	3.766	1.663	0.014
tax population	0.209	39.747	22.891	0.020
high sch. std. 15-17 age pop.	0.238	106.089	65.257	0.010
midl. sid. std. 12-14 age pop.	−0.077	−43.222	72.892	0.002
% farming household	−0.042	−0.045	0.076	0.001
high sch. tch. students	−0.016	−14.862	68.200	0.000

Constant=3.037 total R^2=0.368
Regression DF=11 F=8·45
Residual DF=160
Analysis of Variance: significant at. 95 level if F≥2.02
significant at. 99 level if F≥2.66

Dep. Var. / Indep. Vars.	total visits/hospitals			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.168	4951.402	3724.560	0.377
population density	0.242	258.597	80.282	0.061
high sch· std. 15-17 age pop.	0.371	17984.402	63977.441	0.036
% farming population	−0.090	−3447.424	4185.135	0.005
midl. sch. std. 12-14 age pop.	−0.123	−75148.184	66904.381	0.004
tax population	0.090	18635.194	22590.263	0.004
% farming household	−0.032	−37.782	76.573	0.001
emigrants immigrants	−0.030	−657.393	1617.947	0.001

Constant=4963.215 total R^2=0.489
Regression DF=11 F=13.88
Residual DF=160
b co-efficient: significant at. 99 level if t ratio ≥1.95 or ≤−1.96
significant at. 95 level if t ratio ≥2.95 or ≤−2.95

Appendix

Sources of Data

1. Seoul, Busan, Gyeongi-do, Gangweon-do, Choongchung buk-do, Choongchung nam-do, Jeonlla buk--do, Jeonlla nam-do, Gyeongsang buk-do, Gyeongsang nam-do, Jeju-do Statistical Yearbook, 1967, 1971 and 1974.
2. Seoul, Busan Statistical Yearbook No. 7, 1967; No. 11, 1971; and 1974
3. Statistical Yearbook of Guns in Gyeongsang buk-do, Gangweon-do, 1973
4. Bureau of Statistics, Economic Planning Board, Yearbook of Migration Statistics, No. 1, 1970; No. 3, 1972.
5. Local Administration Bureau, Ministry of Home Affairs, Statistica Book of Local Tax, 1967, 1971 and 1974.
6. The Korean Medical Association, A List of the Members of the Korean Medical Association, 1967, 1971 and 1974.
7. Choongchung buk-do, Choongchung nam-do, Jeonlla nam-do, Gyeongsang buk-do Statistical Yearbook of Education, 1971 and 1974.
8. Ministry of Education, Republic of Korea, Statistical Yearbook of Education, 1967, 1971 and 1974.
9. The Korean Pharmaceutical Association, A List of the Menbers of the Korean Pharmaceutical Association, 1967, 1971 and 1974.
10. Ministry of Health and Social Affairs, Republic of Korea, Statistica Yearbook of Health and Social Affairs, 1967, 1971.
11. Economic Planning Board Republic of Korea Statistical Yearbook, No. 14, 1967; and No. 18, 1971; 1974.
12. Economic Planning Board, Population Census Report of Korea, No. 12-1 to 12-12, 1971.

Appendix

Questionnaire Form
Yonsei University

Hospitals and Clinics: 1973

1. Name of hospital or clinic:
2. Location:
3. Control and ownership: (check one)
   A. National hospitals
      □1) National hospital
      □2) National university (teaching) hospital
      □3) Public hospital
   B. Incorporated (private) hospital
      □1) University hospitall
      □2) Non-profit incorporated hospitals
      □3) Proprietary incorporated hospital
      □4) Other
   C. □Proprietary hospital (unincorporated)
4. Type of hospital:
   □1) Short-term with sepcialists
   □2) Short-term without specialists
   □3) Long-tem with specialists
   □4) Long-term without specialists
5. Type and numbr of beds:

Type of Beds / No. of Beds	General				
	Intenal Medicine	External & Med. Surg.	Ob/Gyn.	Pediatric	Total
No. Beds Approved					
No. Temprorary Movable Beds					

Type of Beds / No. of Beds	Specific			
	Tuberculosis	Mental and Psychiatric	Communicable Diseases	Total
No. Beds Approved				
No. Temprorary Movabled No.				

6. Hospital employees:

Occupation / Sex	M.D.	Dentists	Pharmacists	Regist. Nurses	Nurses' Aides	X-ray Tech.	Lab Tech.	Dietic.	Clerks, Others
Male									
Female									

7. Inpatient census and number of visits to outpatient clinics:

		Month of Year											
		Jan.	Fed.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Inpatients	Inpatient Number												
	Inpatient Days												
Outpatients	New Visits												
	Visits												

8. Emergency rooms:

   Number of visits January 1-December 31, 1973:

9. Hospital facilities, equipment and programs: (check if available)

   ☐ 1) Outpatient clinic
   ☐ 2) OB clinic
   ☐ 3) Operating room
   ☐ 4) Emergency room
   ☐ 5) Pathology lab
   ☐ 6) Disinfecting unit
   ☐ 7) Dining facilities
   ☐ 8) Laundry facilities
   ☐ 9) Dental unit
   ☐10) Delivery room
   ☐11) Radiology unit
   ☐12) Anesthesiology
   ☐13) Convalescing room