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HEALTH PLANNING AND RESEARCH IN KOREA

Volume I

INTERAGENCY COORDINATING COMMITTEE
KOREA/USAID HEALTH PLANNING PROJECTS

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HEALTH PLANNING AND RESEARCH IN KOREA

Volume I

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KOREA/USAID HEALTH PLANNING PROJECTS

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V

CONTENTS

Volume I

Analyses of Health Resources in Korea,
Kong-Kyun Ro and Mo-Im Kim

A Study of the Demand and Need for Medical Care in Rural Areas of Korea, *Jong Huh and Ok Ryun Moon*

Health Services Outcome Data: A Survey of Data and Research Findings on the Provision of Health Services in Korea, *Ok Ryun Moon and Jae Woong Hong*

Health Sector Plan for the Fourth Five-Year Economic Development Plan, *Hyung Jong Park*

Volume II

Development and Organization of Myun Level Health Care Services in Korea, *Il Soon Kim and Others*

Research on Training in Health Planning and Health Economics, *Jong Huh*

A Feasibility Study of a National Health Data and Information System for Korea, *Hakchung Choo and Others*

Financing Health Care Services in Korea,
Chong Kee Park

Volume III

Morbidity Survey of Rural Koreans by Means of Interview and Medical Examination, *Joung Soon Kim and Others*

Food and Nutrient Intake Studies of Rural Population in Korea, *Hong Nai Park and Harriet Kim*

Evaluation of Medical Aid Program in Korea: Utilization, Morbidity and Cost, *Il Soon Kim and Others*

Behavioral Determinants Affecting Non-Participation of the Recipients in Korean Government Medical Assistance Program for Low-Income People,
Kyung Kyoon Chung and Others

PREFACE

In 1974, USAID/Korea entered into a formal agreement to provide U.S. technical and financial assistance to the Government of the Republic of Korea in the strengthening of its health sector planning capability.

As a part of this agreement, USAID has provided funds to support a number of research activities which have been designed to carry out baseline studies, to field test innovative modalities, to study attitudes, facilities efficiency, manpower utilization, cost effectiveness, and other areas of study appropriate or necessary to assist the Government of the Republic of Korea to develop an efficient and effective health planning capability.

Included in this set of three volumes are 12 research studies funded under the AID Health Planning Grant during the period August 1974 to July 1977.

Date of Contract	Grantee Institution	Purpose of Research
8/ 2/74	Yonsei University College of Medicine	Study of Health Resources
8/ 2/74	Seoul National University School of Public Health	Study of Demand and Need for Medical Care in Rural Areas of Korea
3/21/75	Seoul National University School of Public Health	Provision of Health Services in Korea
9/18/75	Seoul National University School of Public Health	National Health Strategy - Health Sector Plan
11/28/75	Yonsei University College of Medicine	Development and Organization of Myun Level Health Care Services
3/25/76	Seoul National University School of Public Health	Training in Health Planning and Health Economics
4/26/76	Korea Development Institute	Feasibility Study of a National Health Data and Information System

Date of Contract	Grantee Institution	Purpose of Research
6/16/76	Korea Development Institute	Feasibility Study of Implementing a Health Insurance System for Korea
8/16/76	Seoul National University School of Public Health	Study of Morbidity in Rural Korea
8/17/76	Korea Statistical Association	Assessment of the Nutritional Status of Korean Villages
3/30/77	Korea Health Development Institute	Initial Evaluation of the Medical Aid Program for the Poor
7/26/77	Seoul National University School of Public Health	Research on the Behavioral Determinants Affecting the Non-participation of the Recipients in the Medical Assistance Program for Low-Income People

These research reports are published under the auspices of the Interagency Coordinating Committee of the ROKG/USAID Health Planning Project. We are confident that these studies will make a valuable contribution to health planning and policy formulation in Korea.

The views expressed in these studies are those of the authors and are not presented as the official views of either the Government of the Republic of Korea or the U.S. Agency for International Development.

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Analyses of Health Resources in Korea

A Report

Submitted to

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by

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in collaboration with

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6

Table of Contents

Chapter I	Introduction	1-1 -- 1A-4
	1. Setting of Problems	1-1 -- 1-3
	2. Theoretical Framework of Analysis	1-3 -- 1-7
	3. Data	1-7 -- 1-8
	4. Method	1-8 -- 1-9
	Appendix to Chapter I	1A-1 -- 1A-4
Chapter II	Trend Analyses of Health Resources and Projections of their Future Supply	2-1 -- 2A-1
	1. Availability of Health Resources in Each Province and their Rates of Growth over Time between 1966 and 1973	2-1 -- 2-7
	2. How Projections of Future Supply of Health Professionals Are Made	2-7 -- 2-18
	3. Projections of the Future Supply of Health Manpower	2-18 -- 2-23
	Appendix to Chapter II	2A-1
Chapter III	Health Personnel, Health Facility, Consumption of Health Services, Input-Mix for (the Production of) Health Services and Socio-Economic Indicators--An Urban and Rural Comparison	3-1 -- 3-20
	1. Health Professionals	3-1 -- 3-4
	2. Socio-Economic Factors	3-4 -- 3-7
	3. Distribution of Health Facilities	3-7 -- 3-10
	4. Level of Actual Use of Health Services in Urban and Rural Area	3-10 -- 3-16
	5. Input-Mix for (the Production of) Health Services--Urban and Rural Comparison	3-16 -- 3-20
	6. Summary	3-20
Chapter IV	Relationship Between Socio-Economic Variables and the Availability, Utilization and Mix of Health Resources--Correlation Analyses	4-1 -- 4-23
	1. Criteria for the Selection of Variables	4-1 -- 4-3
	2. Relationship between Socio-Economic Indicators and Health Manpower Supply	4-3 -- 4-6

1

	3. Relationship Between Socio-Economic Indicators and the Availability of Health Facilities	4-7 -- 4-9
	4. Relationship Between the Supply of Health Professionals and that of Health Facilities	4-9 -- 4-11
	5. Relationship Between Socio-Economic Variables and Health Services Utilization Variables	4-12 -- 4-14
	6. Relationship Between the Supply of Health Resources and the Utilization Rate of Hospital Care	4-14 -- 4-18
	7. Relationship Between Socio-Economic Variables and Health Resources Mix	4-18 -- 4-20
	8. Relationship Between Health Resources Mix and Health Resources Utilization	4-21 -- 4-23
	9. Summary	4-23
Chapter V	Multivariate Analyses of Socio-Economic Factors Affecting the Availability, Utilization and Mix of Health Resources	5-1 -- 5-27
	1. Why Multivariate Analyses	5-1 -- 5-2
	2. The Effects of Socio-Economic Variables on the Availability of Health Professionals	5-2 -- 5-9
	3. The Effects of Socio-Economic Variables on the Availability of Health Facilities per 1,000 Population	5-10 -- 5-12
	4. The Effects of Socio-Economic Variables on Health Manpower Mix (Labor-Mix)	5-13 -- 5-16
	5. The Effects of Socio-Economic Variables on Health Facilities Mix (Capital-Mix)	5-17 -- 5-18
	6. The Effects of Socio-Economic Variables on Mix of Health Manpower and Facilities (Labor-Capital Mix)	5-19 -- 5-22
	7. The Effects of Socio-Economic Variables on Utilization of Health Resources (Capacity Utilization)	5-23 -- 5-26
	8. Summary	5-26 -- 5-27

Chapter VI	Summary of Findings and their Policy Implications	6-1 -- 6-9
	1. Overview and Policy Implications	6-1 -- 6-2
	2. Summary of Findings	6-2 -- 6-5
	3. Recommendations	6-6 -- 6-9
	Appendix (to Chapter V)	5A-1 -- 5A-59

Chapter 1

Introduction

1. Setting of Problems
2. Theoretical Framework of Analysis
3. Data
4. Method

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 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 percent of GNP, government expenditures for health averaged around 0.25% and those for education 1.6% during the same period (see Table 1-1).

Table 1-1
Government Expenditures for Health and Education
as a Percent of Total Government Expenditure
and of Gross National Product
(₩ 000)

Year	GNP	Government Expenditure	% GNP		% Expenditure	
			Health	Education	Health	Education
1970	2,589,260	446,273	0.3	3.0	1.8	17.5
1971	3,151,550	524,248	0.3	3.2	1.9	18.9
1972	3,860,600	709,336	0.3	3.1	1.4	16.9
1973	4,883,560	659,375	0.2	2.4	1.4	17.9
1974	6,328,620	880,533	0.2	2.1	1.2	15.0

Source: Summary of Budget for Fiscal Years 1971 and 1974, Economic Planning Board

In this study, however, we do not attempt to explore the importance to economic development of investment in health. Our study addresses itself primarily to the question of how investment in health can be made effectively in terms of maximizing the benefits of the limited resources to be spent. The benefits of investment in health, however measured, would be enhanced if an effective system of health care were established in the Republic. It is hoped that the information and insights obtained through this study are helpful in planning such an effective system.

With this broad objective in mind, we propose to examine and document the availability of health resources in Korea longitudinally (cross section) and latitudinally (time series). 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 medical doctors, 58.6% of dentists, 52.8% of pharmacists and 39.8% of hospital beds (see Table 2-2). Secondly, there appears to be considerable departure from "optimum" distribution of health resources between physical facilities and manpower in supplying health care; this departure varies according to location. For example, the emphasis on building hospitals rather than training more health professionals appears to have resulted in a low rate of utilization of facilities, in particular in rural areas (see Table 3-6 on page 3-13).

12

Third, sub-optimal distribution of labor-mix and capital-mix may be noted in differences in the training and quality of available health resources, physical and human, according to location. Primary care in rural areas appears to evolve around 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 to migrate to the U.S. and other countries among highly trained medical doctors. According to alumni records of medical schools in Korea, there were 3,135 graduates of Korean medical schools residing in foreign countries in 1973 (see Appendix to this chapter). 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 overriding issue in establishing an effective health care system is the assignment of priorities: urban vs. rural health problems, hospital-based care vs. clinic-based care, the importance of primary 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. Theoretical Framework of Analysis

Establishing an effective health care system requires an efficient allocation of resources between health and all other "utility generating" things and also between different means of achieving health. Since the focus of our study is distributional efficiency in delivery of health care, we take the allocation of resources between health and all other purposes as given. Given the total amount of resources available for health, then, efficient allocation of resources between different means of achieving health is the ultimate objective of this study.

Given this objective, we look to the "production of health" models developed by the economists at the National Bureau of Economic Research[1] as a conceptual framework of analysis in our study. These models, which owe intellectual debt to the theories of household behavior developed by Becker and Lancaster,[2] offer a theoretically interesting and empirically plausible framework within which to conduct our research.

A justification for using these models for our study of distributional efficiency lies in the findings of the principal investigator's previous study.[3] These findings indicate that there are trade-offs between different kinds of health care and between service-intensive care and time-intensive care in the provision and consumption of health services in the U.S., e.g., the input-mix is variable in the production of health. It is the hypothesis of this study that there are similar trade-offs between the various components of health care as a whole in Korea.

The N.B.E.R. model of the production of health may be presented as follows: The individual is seen as behaving so as to maximize his utility (U) where

$$U = U(C,H) \text{ and}$$

$$C = \text{all other consumption} \qquad \text{(I)}$$

$$H = \text{health}$$

His health is determined by the Health "Production Function"[4] presented below:

$$H = f(I_i, I_j)\ \alpha(Z) \qquad \text{(II)}$$

where

I_i and I_j = input i and j for health

Z = other variables affecting health.

We assume further that f is a member of the class of Generalized Production Functions (GPF) discussed by Zellner and Revankar.[5] This class includes

production functions with variable returns to scale, but where the cost minimizing ratio of factor inputs is independent of the level of output. Thus, (II) can be rewritten as

$$H = g\left(I_j, \phi\frac{I_i}{I_j}\right)\alpha(Z) \qquad \text{(IIa)}$$

or

$$H = g\left(I_i, \phi\frac{I_j}{I_i}\right)\alpha(Z) \qquad \text{(IIb)}$$

This model assumes that each individual faces a trade-off between I_i and I_j and that the rational consumer will choose to purchase I_i and I_j in that combination which minimizes the cost per unit of health, e.g., he will set the ratio of marginal product of I_i to that of I_j equal to the ratio of their marginal cost.

According to this model, the optimum input-mix for the production of health calls for the allocation of health resources in such a way that as one increases health care of any category, its incremental cost equals its incremental contribution to health. For example, if the increase of one thousand wons worth of physicians' services in an area improves the health of residents of that area by one "unit," whereas the addition of one thousand wons worth of nurses' services increases health by, say, 1.2 "units," then optimum input-mix calls for assigning more priorities to supplying additional nurses' services vis-à-vis physicians' services. Or, to state it another way, if the addition of one physician into a rural area improves the health of residents of that area by 3 "units," whereas the addition of the same doctor into an urban area improves the health of residents of that area by one "unit," efficient allocation calls for the shift of doctors from urban to rural areas until the contribution of additional doctors to health is equal between

different areas.

With the above theoretical and conceptual underpinnings, we proceed in the following manner: In Chapter 2, we present trends analyses of the availability of health resources between 1966, 1970 and 1973 and projections of the future supply. In Chapter 3, the distribution of health resources and mix between the four biggest cities and the rest of the country in 1973 is presented. The objective of these two chapters is to describe the allocation of various components of health resources and mix over time and between areas as background information. The analytical part of this study is presented in Chapters 4 and 5. Correlation matrices are constructed to examine interrelationships between socio-economic variables and the availability, mix and utilization of various components of health resources in Chapter 4. Multivariate analyses of effects of socio-economic variables on the availability, mix and utilization of health resources are presented in Chapter 5. Finally, we summarize principal findings of this study and present their policy implications in Chapter 6.

Although the ultimate objective of this study is to provide insights and information for efficient allocation of health resources to improve health based on analyses using the production of health models, the relationship between the status of health and the availability and mix of health resources is not explored. This is because there are no data on health status or indices of residents of different areas in Korea. Out of necessity, our analyses concentrate on finding the socio-economic determinants of the availability and mix of health resources. If there is a concensus that the extent of disparity in the availability and utilization of health resources between areas as presented in Chapters 2 and 3 represents a significant departure from the norm of efficient allocation of health resources, the information as to the

causes of such disparity should be useful for improving allocative efficiency. The descriptive part of our study documents the extent of the disparity and the analytical part shows the underlying socio-economic causes for it.

3. 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 1966, 1970 and 1973 from various government and private agencies. Sources of these data are listed in the Appendix to this chapter. 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 form is reproduced in the Appendix to this chapter.

Data on health manpower include information on medical doctors, dentists, oriental (herb) doctors, registered nurses, mid-wives, pharmacists and, for 1973 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 percent of total population and (iii) the ratio of the number of emigrants to immigrants. The economic variables are (iv) farming population as percent of total population, (v) farming households as 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 school students to the population aged 15-17.

4. Method

Given the theoretical underpinnings presented in Section 2 of this chapter, the following method is used. First, for the descriptive part of this study presented in Chapters 2 and 3, cross-tabulations, means, ranges, etc., are used as statistical forms of presentation. For the analytical part in Chapter 4, correlation matrices are constructed which show the relationships between socio-economic variables and the availability, mix and utilization of health resources.

Multiple regressions of the following form are used for the multivariate analyses presented in Chapter 5:

$$H_i/P = a + \Sigma b_i D_i + \Sigma b_j Y_j + \Sigma b_k E_k + e$$

where H_i represents health professionals (from H_1, doctors, to H_6, pharmacists), D_i demographic variables, Y_j economic variables and E_k education variables. This form of multiple regression assumes that the independent variables inserted--three demographic variables, three economic variables and six education variables--influence the number of health professionals per population in a linear and additive way.

The hypothesis behind this form of estimation method is that causes of inter-kun differences in the availability of health professionals per population

are to be found in inter-kun differences in socio-economic variables inserted into the regression. The b-coefficient of each independent variable represents the estimated effect of that variable on the dependent variable, namely the availability of health professionals per capita in this case, holding constant the effects on the dependent variable of all other independent variables.

The reason why multivariate analyses are done instead of using some other method is presented in Section 1 of Chapter 5. Similar equations are used to estimate the effects of socio-economic variables on the mix and utilization of health resources. The computer program used is that available from Statistical Package for the Social Sciences, authored by Norman H. Nie and others (McGraw-Hill Book Company, New York, 1970).

Footnotes for Chapter 1

1. Previous studies in the economics of health at the N.B.E.R. all have emphasized the importance of considering medical and health services as an input for health. See Victor R. Fuchs, ed., Essays in the Economics of Medical and Health Care, (N.Y., National Bureau of Economic Research, (1972); and Michael Grossman, The Demand for Health: A Theoretical and Empirical Investigation, N.B.E.R. Occasional Paper 119, 1972. The concept of health production is also used by Mary L. Larmore, "An Inquiry into an Econometric Production Function for Health in the U.S.," unpublished Ph.D. dissertation, Northwestern University, 1967.

2. Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, Vol. 75, No. 299, September, 1965, pp. 493-517; and Kelvin J. Lancaster, "A New Approach to Consumer Theory," The Journal of Political Economy, Vol. 74, No. 2, April, 1966, pp. 132-157.

3. Kong-Kyun Ro, "Patient Characteristics, Hospital Characteristics and Hospital Use," Medical Care, Vol. 7, No. 4, July-August, 1969, pp. 295-312; reprinted in Fuchs, ed., op. cit.

4. This model is taken after the one presented in Richard Auster and Kong-Kyun Ro, "The Demand for Hospital Care by Hospitalized Individuals," a paper presented at Econometric Society Meetings, Toronto, Canada, December, 1972.

5. Arnold Zellner and Nagerh S. Revankar, "Generalized Production Functions," Review of Economic Studies, Vol. 36, (2), No. 106, April, 1969, pp. 240-50.

Appendix to Chapter 1

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, Statistical 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 Members of the Korean Pharmaceutical Association, 1967, 1971 and 1974.

10. Ministry of Health and Social Affairs, Republic of Korea, Statistical Yearbook of Health and Social Affairs, 1967, 1971 and 1974.

11. Economic Planning Board Republic of Korea, 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 to Chapter 1

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) hospitals

   ☐ 1) University hospital
   ☐ 2) Non-profit incorporated hospital
   ☐ 3) Proprietary incorporated hospital
   ☐ 4) Other

   C. ☐ Proprietary hospital (unincorporated)

4. Type of hospital:

   ☐ 1) Short-term with specialists
   ☐ 2) Short-term without specialists
   ☐ 3) Long-term with specialists
   ☐ 4) Long-term without specialists

5. Type and number of beds:

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

Type of Beds / No. of Beds	Specific			
	Tuberculosis	Mental and Psychiatric	Communicable Diseases	Total
No. Beds Approved				
No. Temporary Movable Beds				

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.	Feb.	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

Appendix to Chapter 1

Korean Doctors Residing Overseas

(1973)

Nation	Number
U.S.A.	2,834
Canada	72
Japan	65
Malaysia	18
W. Germany	17
Jamaica	22
Uganda	34
Other countries	73
Total	3,135

Source: Alumni records of eight (total) medical colleges. Compiled by Korean Medical Association.

Chapter II

Trend Analyses of Health Resources and Projections of Their Future Supply

1. The Availability of Health Resources in Each Province and their Rates of Growth over Time between 1966 and 1973.

A remarkable feature in studying the growth in the supply of health professionals in Korea is the imbalanced rate of growth between provinces and special cities. The period between 1966 and 1973 is the time of rapid industrialization and urbanization in Korea. However, the growth rate of health professionals in cities, in particular in the capital city, Seoul, is greater than that of the population. Whereas the population of Seoul increased by 75% between 1966 and 1973, the number of physicians in Seoul increased by about 131%, that of dentists by about 99% and that of nurses by 80% (see Tables 2-1 and 2-2). In 1966, Seoul had 29% of the nation's physicians and 12% of the nation's population. In 1973, Seoul had 46% of the nation's physicians and 19% of its population. More than half of the nation's dentists and pharmacists were concentrated in Seoul in 1973.

If we look at the three year period between 1970 and 1973, Seoul's population growth slowed down to 9.7% compared with 59.9% during the previous four year period. However, the number of the most skilled of health professionals, namely physicians and dentists, increased in Seoul 52% and 42.8% respectively, whereas during the previous four year period, the rate of increase for them had been slightly less--51.8% and 39.1% respectively. This appears to indicate that supply responses of physicians and dentists to the population growth and, thereby, to the demand increase in Seoul has three to four years of lag. In other words, supply adjustment to meet an increase in demand for physicians' services and dental care takes three to four years.

Although Seoul had more than half of the nation's total pharmacists in 1973, their rate of growth was 19.8% between 1970 and 1973--a small increase compared with the growth rates of doctors and dentists. One interpretation of

Table 2-1
Distribution of Health Professionals
by Province for 1966, 1970 and 1973

		Seoul	Busan	Gyeong-gi	Gang-weon	Chung Bug	Chung Nam	Jeon Bug	Jeon Nam	Gyeong Bug	Gyeong Nam	Jeju	Total
M.D.'s	1966	1874	802	672	274	167	375	261	608	895	468	49	6445
	1970	2844	874	601	274	171	427	323	694	997	346	69	7620
	1973	4324	1010	624	284	127	385	317	769	1090	354	55	9339
Dentists	1966	499	114	95	48	20	72	33	61	114	75	10	1141
	1970	694	130	97	38	24	74	42	68	141	67	17	1392
	1973	991	146	94	42	21	71	40	69	127	81	9	1691
Oriental (herb) Doctors	1966	780	178	316	108	99	263	78	81	237	179	4	2323
	1970	1029	200	289	91	97	223	80	77	246	154	7	2493
	1973	1089	227	223	69	51	169	90	70	220	145	7	2360
Nurses	1966	1984	474	NA	190	78	257	290	NA	NA	NA	NA	NA
	1970	2681	378	312	NA	150	247	359	NA	NA	NA	NA	NA
	1973	3573	1395	397	277	168	317	426	384	658	186	18	7799
Midwives	1966	252	262	128	114	42	42	131	84	169	150	18	1392
	1970	197	196	146	83	81	41	94	146	173	85	6	1248
	1973	229	275	135	106	85	41	126	256	150	53	8	1464
Pharmacists	1966	NA	NA	783	286	248	432	408	986	1160	358	50	NA
	1970	5948	1068	983	290	211	490	429	936	1172	372	70	11969
	1973	7125	1208	850	299	231	572	501	884	1335	401	100	13506
Population	1966	3470900	1419800	3109100	1832400	1550400	2913300	2523600	3900900	4478800	3177300	336700	28713200
	1970	5536400	1880700	3267200	1867100	1481400	2860800	2434600	4005800	4559600	3119100	365600	31378300
	1973	6076100	2015200	3399700	1863600	1507600	2900300	2443200	4074700	4688100	3154300	381000	32503800

Source: Publications of various government and private organizations as compiled for this study. See Appendix to Chapter 1 for complete list.

Table 2-2
Rates of Growth and Proportionate Share of Health Professionals for Special Cities and the Rest of Country: 1966-1973

		Seoul		Busan		Rest of Country		Total	
		Proportion of nation's total %	Growth rate %	Proportion of nation's total %	Growth rate %	Proportion of nation's total %	Growth rate %	Number	Growth rate
M.D.'s	1966	29.1		12.4		58.5		6445	
	1970	37.3	51.8	11.5	9.0	51.2	3.5	7620	18.2
	1973	46.3	52.0	10.8	15.6	42.0	2.6	9339	18.4
Dentists	1966	43.7		10.0		46.3		1141	
	1970	49.9	39.1	9.3	14.0	40.8	7.6	1392	22.0
	1973	58.6	42.8	8.6	12.3	32.8	-2.5	1691	21.5
Nurses	1966							NA	
	1970							NA	
	1973	45.8	NA	17.9	NA	36.3	NA	7799	
Pharmacists	1966	NA		NA		NA		NA	
	1970	49.7		8.9		41.4		11969	
	1973	52.8	19.8	8.9	13.1	38.3	4.4	13506	12.8
Midwives	1966	18.1		18.8		63.1		1392	
	1970	15.8	-21.8	15.7	-25.2	68.5	-2.6	1248	-10.3
	1973	15.6	16.2	18.8	40.3	65.6	12.3	1464	17.3
Oriental (herb) doctors	1966	33.6		7.7		58.7		2323	
	1970	41.2	31.9	8.0	12.4	50.8	-7.4	2494	7.4
	1973	46.1	5.8	9.6	13.5	44.3	-17.4	2360	-5.3
Population	1966	12.1		4.9		83.0		28713200	
	1970	17.6	59.5	6.0	32.5	76.4	0.6	31378300	9.3
	1973	18.7	9.7	6.2	7.2	75.1	1.9	32503800	3.6

Source: Publications of various government and private organizations as compiled for this study. See Appendix to Chapter 1 for complete list.

28

this phenomenon is that the rate of increase for pharmacists and oriental doctors in Seoul between 1970 and 1973 is comparable with that of population because they appear to have an adjustment period of supply responses shorter than that for doctors and dentists.

Urban-rural disparity in access to health professionals exists in all categories and the disparity is greater for more skilled workers than for less skilled ones. Note that whereas the nation's two biggest cities, Seoul and Busan, had 25% of the nation's total population, more than one half of all health professionals except midwives practiced in one of these two cities in 1973. Among provinces, Gyeong-gi, Gyeong Bug and Jeon Nam had a greater number of doctors per 1,000 population than other provinces. The principal cause for this can be found in the fact that these provinces have major cities within their boundaries. Gyeong-gi surrounds Seoul, Gyeong Bug has Taegue, the third largest city in the nation, and Jeon Nam has Kwang Ju, the fourth largest city. Urban-rural disparity in access to health resources is examined to a greater extent in Chapter 3. Since the emphasis in this chapter is on trend analyses by region, we do not pursue this subject further.

Table 2-3 shows the distribution of health facilities among provinces and special cities in 1973. Heavy concentration in all categories of health facilities except health centers is noticeable in Seoul, and to a lesser extent in Busan. Health centers are an exception because they are government sponsored facilities to provide low cost health care to the underprivileged segment of the population. The degree of urban concentration of health facilities is, however, less than that for health professionals except for midwives' and oriental doctors' clinics. Whereas more than 45% of the nation's doctors, nurses and pharmacists practiced in Seoul in 1973, the proportion of the

Table 2-3
The Availability of Health Facilities
in each Province and Special City
1973

Provinces / Health Facilities	Seoul No.	Seoul %	Busan No.	Busan %	Gyeong-gi	Gang-weon	Chung Bug	Chung Nam	Jeon Bug	Jeon Nam	Gyeong Bug	Gyeong Nam	Jeju	Total
Hospitals	77	27.6	37	13.3	32	26	8	4	14	27	35	16	3	279
Total beds	8756	39.8	3106	14.1	1540	726	245	721	896	2883	2151	802	131	21993
Clinics	2249	40.0	577	10.3	537	198	106	361	264	369	570	350	45	5626
Dental Clinics	795	56.3	133	9.4	93	30	19	69	36	44	120	63	9	1141
Oriental Clinics	1102	48.8	213	9.4	201	68	43	154	84	59	190	137	7	2258
Midwives' Clinics	231	25.8	211	23.5	106	47	25	41	44	77	55	51	8	896
Health Centers	9	4.7	6	3.2	25	19	12	17	16	24	33	26	3	190
Population	6076100	18.7	2015200	6.2	3399700	1863600	1507600	2900300	2443200	4074700	4688100	3154300	381000	32503800

Source: Mail survey conducted for this study and information provided by the Korean Hospital Association

nation's total hospitals, hospital beds and clinics located in Seoul ranged from 27.6% for hospitals to 40% for clinics. The comparative evenness of distribution of hospitals is attributable to the fact that special cities possess a greater number of large hospitals than provinces do.

The relatively small degree of concentration of health facilities in cities compared with that of health professionals must account for a smaller degree of utilization of physical resources in rural areas than in urban areas (see Section 4 of Chapter 3). This indicates that priority in rural health planning should be placed on bringing in more health workers rather than building more hospitals.

When the utilization rate of hospitals is measured by occupancy rate, rural areas appear to have a still smaller utilization rate (see Table 3-6 on page 3-13). This is partly because rural hospitals are generally smaller than those in urban areas. Note that according to the law of larger numbers, other things being equal, large hospitals have higher occupancy rates than small hospitals.

The pattern of concentration of health facilities in Seoul by the type of facility resembles that for health workers. 58.6% of all dentists practiced in Seoul in 1973 and 56.3% of the nation's total dental clinics were located there. Only 15.6% of the nation's midwives practiced in Seoul and following this pattern of distribution, 25.8% of the nation's midwives' clinics were located in Seoul in 1973. This is to be expected from the mix of capital and labor required for the production of health. Although the capital-labor mix is variable (see Section 2 of Chapter 1 and Section 5 of Chapter 3), the supply of capital obviously has a positive relation to that of labor.

Note that the urban concentration of midwives' and oriental doctors' clinics is higher than that of midwives and oriental doctors. As pointed out

before, this is an exception. (Recall that for other categories of health resources, the distribution of facilities between Seoul and the rest of the country is more even than that of workers.) This appears to be attributable to the fact that, whereas urban residents receive medical and dental care provided with higher labor-capital ratio than rural residents, for services provided by midwives and oriental medicine the opposite is true. It seems reasonable to assume that midwives practice on a house-call basis more often in rural areas than in urban areas, and that oriental doctors are less likely to have established clinics in rural areas than in urban areas. In fact, in Seoul, the number of midwives' clinics and oriental doctors' clinics exceeds that of midwives and oriental doctors respectively. This may be due to the possibility that some midwives and oriental doctors have more than one clinic. Another possibility is that our survey of health facilities is a more complete enumeration than the reporting of health manpower by other agencies.

2. <u>How Projections of Future Supply of Health Professionals are Made</u>.

Three projections of future supply of health professionals are made in the Fourth Five-Year Plan for the period of 1977 to 1981 based on the leakages-injections approach. The leakages-injections approach in macro-economics looks at injections into and leakages from the circular flow of expenditures and incomes as the determinants of the level of Net National Products, that is, the GNP minus capital consumption. The greater the injections, which in macro-economics consist of domestic and foreign investment, and the smaller the leakages, which consist of savings and investment into foreign countries, the greater the NNP.

As applied to our projections, this approach postulates that the future supply of health manpower depends on the estimated magnitude of injections of

new graduates of educational programs in health professions into the aggregate pool of health manpower and that of leakages of active health professionals from the pool. Leakages consist of (a) the emigration of active health professionals to foreign countries, (b) retirement and death, (c) involuntary unemployment or voluntarily being out of the labor force due to marriage or the lack of suitable employment opportunities at suitable locations.

Three projections are made based on three different assumptions about the future magnitude of injections and leakages. The assumptions behind Projection I are that (a) the amount of injections is the estimated number of new graduates based on the current enrollment of students in each class in educational programs in health professions, and (b) the amount of leakages remains at the current level in terms of number of health personnel leaving Korea and of active professional participation.

Projection II assumes that the level of injections is the same as that assumed for Projection I but the level of leakages is smaller. The principal reason for assuming a smaller level of leakages is that employment opportunities abroad for Korean health professionals, and for medical doctors in particular, will be substantially reduced in the future. This trend is already noticeable in the declining demand for foreign-trained interns and residents in hospitals in the U.S.

Some of the forces behind this trend may be listed as: (a) the recent increase in the number of new graduates of medical schools in the U.S., (b) the increased awareness and concern among policy makers that the migration of foreign doctors is reducing the investment in health in developing countries, (c) the highlighted sense of consumerism in the U.S. and with it, increasing complaints of voters in underprivileged areas that they are receiving second-class health care as symbolized by the presence of inordinately large numbers

of foreign doctors in the hospitals serving them, and finally (d) the increasing level of resentment against foreign competition in the U.S., including that in the health care field, at this time of poor economic performance.

The second reason for assuming a smaller level of leakages is that an increasing number of married women are seeking employment and thus are in the labor force in Korea. This is because the Korean economy is undergoing sectorial changes, the emphasis shifting from agriculture to manufacturing. It is expected that an increasing number of nurses, in particular those returning from abroad after fulfilling their contractual obligations, will remain in the labor force.

Projection III assumes that the level of leakages is of the same magnitude as that estimated for Projection II, but the level of injections is higher. The assumption behind this projection is that the Ministry of Education increases student quotas of existing educational programs in health professions and/or increases the number of institutions authorized to offer such programs.

In summary, Projection I assumes no change in factors affecting leakages or injections. Among the three projections, this forecasts the smallest increase in the supply of health manpower in Korea during the Fourth Five-Year Plan period, 1977-1981. Projection II assumes a change in factors influencing leakages making them smaller, but no change in the Korean government's policy determining injections. This projection forecasts a larger increase than does Projection I. Projection III assumes changes in factors affecting leakages and injections making the former smaller but the latter bigger. Thus, this projection forecasts the largest increase in health manpower in Korea.

a. Estimates of the Level of Leakages.

i. Leakages of Health Professionals into Foreign Countries.

Korean health professionals are leaving the country under two different.

conditions. The majority go abroad as emigrants and most of them do not return. Others, mostly nursing aides and nurses, go overseas under inter-governmental contracts for specified periods of time. Most of them return at the end of the contracted period. In our estimate of leakages, emigrating people are all counted as permanent leakages. For those leaving the country temporarily, leakages consist of those leaving minus those returning in any given year.

First, we estimate the level of leakages by emigration. For this purpose, two methods are considered. One is to take the annual number of emigrants as percent of the annual number of new graduates in recent years and apply this percentage to the estimated new graduates in the projected period. This method is based on the assumption that the number of emigrating health personnel depends mainly on the domestic supply condition of health manpower. The other method is to estimate the number of emigrating health professionals during 1977-1981 based on the number of those emigrated during the recent past through interpolation. This method is based on the assumption that foreign demand factors determine how many Korean health professionals go abroad annually and that these factors have not changed recently. We feel that the latter assumption is more plausible and, therefore, use the second method.

Based on this second method, we estimate the level of leakages of health personnel per year through migration during 1977-1981 as follows:

	Projection I	Projections II and III
Physicians	314	157
Pharmacists	218	145
Nurses	19	19
Dentists	(10)	(10)

Except for dentists, the above figures are the average annual number of those who were granted emigrant permits from the Ministry of Health and Social

Affairs during the six year period between 1969 and 1974 (see Table 2-4). For dentists, there is no data. Of necessity, we come up with the figure of ten as an appropriate estimate.

For Projections II and III, based on the assumption of declining demand abroad for Korean health personnel, we assume that the migration of doctors is reduced by half, that of pharmacists by one third; that of nurses and dentists does not change.

The level of leakages by those going abroad under inter-governmental contracts is more difficult to estimate. Table 2-4 shows the number of those who have gone overseas temporarily under this arrangement during the past six years. We do not, however, have access to data showing how many of their predecessors are returning annually. Herein lies the difficulty of estimating the level of net leakages by contractees. Due to data restrictions and convenience, we assume that the number of those leaving under inter-governmental contracts is more or less the same as that of returnees annually during the Fourth Plan years. Thus, in our estimate, contractees do not constitute any net leakages.

ii. Leakages of Health Professionals by Retirement at Old Age, by Death, Unemployment and Voluntarily Being Out of the Labor Force.

The level of leakages through retirement at old age is projected by estimating the proportion of the population aged 20-24 reaching age 65 annually during the Fourth Plan period. The estimate is based on the age distribution of population in 1977 through 1981 projected by the Korean Institute for Family Planning.

The method used is a crude one. Since it is projected by the K.I.F.P. that there will be 711,000 people aged 65-69 in 1981, it is assumed that on the average, one fifth of this number, that is, 142,200 people will reach the age of 65 annually in 1977 through 1981. 142,200 people consist of about 0.73%

Table 2-4

Number of Health Professionals Going Overseas
During the Six Year Period, 1969-74

	Emigrants*	Inter-governmental Contractees
Physicians	1,883	44+
Nurses (3-4 years training)	113	190
Pharmacists	1,309	N.A.
Nurse-aides	3,607	7,786
Dentists	N.A.	N.A.

*Those granted emigration permits by the Ministry of Health and Social Affairs.

+Excludes doctors going to the U.S.A. on an inter-governmental contract basis. Most, if not all, doctors going to the U.S.A. are emigrants or on a private contract basis.

Source: Bureau of Manpower Development, Office of Labor and Ministry of Health and Social Affairs, Republic of Korea

of the estimated population aged 20-64 in 1979 of 19,233,000. 1979 is used as the base year because it is the mid-year of the Fourth Plan period (see Appendix to this chapter for the Korean Institute for Family Planning's projection of population and its age distributions for 1977 through 1981).

The level of leakages through death is estimated by another crude method based on the K.I.F.P. projection of population. The difference between the estimated population aged 20-64 in 1976 and those aged 25-69 in 1981, which amounts to 409,000 (=17,145,000-16,736,000), is taken as the number of people who will die among those aged 20-64 during the five year period 1977-1981. This amounts to about 2.17% of the average population aged 20-64 during 1977-1981. Since the death rate for mostly urban, middle class and better educated health professionals is likely to be much less than that for the total population, we assume that their death rate is about 25% less. Thus, we use 16 per 1,000 as the death rate applicable for our estimation of leakages of health professionals through death.

It is difficult to estimate what proportion of health personnel retires from active professional participation annually because of voluntary and involuntary unemployment in the health field, for there is no data, past or present, on which to base such an estimate.

According to a forecast by the Economic Planning Board, Republic of Korea, the unemployment rate for all the labor force during the five year period 1977-1981 will range between 3.0% and 3.7% (source: Economic Planning Board, Long-Range Outlook of Our Economy, 1973, pp. 130-131). This may be an optimistic forecast because as an economy undergoes industrialization, its major impact on employment is likely to be reflected in a decline of the concealed unemployment and underemployment rather than in a decline of official unemployment figures.

Dr. Huh and his co-investigators estimate the unemployment and retirement

rate combined in 1971 through 1981 at 6.5% for physicians, nurses and pharmacists, and at 1.0% for dentists (source: Jong Huh, et.al., Health Manpower Study in Korea, 1971). No explanation is given for the basis of these estimates.

Since the unemployment rate for health professionals is likely to be far below that for the general labor force and since we feel that the E.P.B. estimate is optimistic, we decided on the following figures as our estimates of the rate of unemployment and out-of-labor force: 2% for physicians and pharmacists, 1% for dentists and 20% for nurses. For Projections II and III, we assume the same rate of unemployment and out-of-labor force for all health personnel except for nurses. For nurses, we assume 10% as the reduced rate of voluntary or involuntary unemployment.

b. Estimates of the Rate of Injections.

As mentioned before, injections into health professions consist of new graduates of educational programs. The latest data on the number of new graduates available are for 1969 through 1974 (see Table 2-5). Rather than interpolating the number of new graduates for our projection years from this data, however, we make our estimates from 1974 freshman quotas of each educational program as authorized by the Ministry of Education. Since the only way the number of new graduates can increase is through increases in incoming student quotas of existing institutions or the addition of new institutions with authorized student quotas, the 1974 freshman quotas provide a reliable basis for estimating the number of graduates in 1978 for four year programs of education and the number of graduates in 1977 for three year programs of education. Table 2-6 shows our estimates of new graduates for our projection years based on 1974 freshman quotas. In arriving at these estimates we assume that the rate of attrition for students between their time

Table 2-5

Number of Graduates of Educational Programs in Health Professions in Korea for the Academic Years 1969-1974 and their Annual Rates of Growth

Year	Medicine		Dentistry		Nursing B.S.		Nursing Diploma		Oriental Medicine	
	Number	Growth rate	Number	Growth rate	Number	Growth rate	Number	Growth rate	Number	Growth rate
1969	626		83		149		1,151		101	
		4.3%		-4.8%		20.1%		28.2%		-49.5%
1970	653		79		179		1,476		51	
		2.1%		-5.1%		2.8%		27.8%		49.0%
1971	667		75		184		1,887		76	
		-1.6%		1.3%		102.7%		21.1%		-15.8%
1972	656		76		373		2,286		64	
		9.5%		43.4%		37.0%		18.4%		-50.0%
1973	718		109		511		2,707		32	
		18.9%		36.7%		0.8%		23.5%		25.0%
1974	854		149		515		3,344		40	
Total	4,174		571		1,911		12,851		364	

Source: Statistical Year Book of Education, Ministry of Education, Republic of Korea, 1974.

of admission and their time of graduation is 7%. This figure is taken from the average attrition rate for the six-year period from 1969 to 1974. We make an exception for oriental doctors for whom we assume zero rate of attrition. This is because 1974 estimates of the number of graduates are equal to the freshman quota for oriental doctors. We do not know the reason for this.

In order to make our projection of future injections of health personnel for 1977 through 1981, we have to begin by estimating those for 1974, for our own latest data are for 1973. For our estimates of injections in 1974, we can use the number of graduates reported in Table 2-5, except for nurses. Based on student quotas, the number of graduates of nursing schools in 1974 is estimated as 2,230 junior college graduates and 515 senior college graduates. The reason we cannot use data provided in Table 2-5 for nurses is that the number of diploma receiving nurses reported in Table 2-5 (3,344), is more than that expected from the total quota of 7,360 or from the freshman quota of 2,676 students for 38 three-year junior nursing colleges in existence in 1974 (source: Statistical Year Book of the Ministry of Education, 1974). It is likely, therefore, that 3,344 nurses who received diplomas in 1974 include those who were classified as nurses (practical nurses?), although they did not graduate either from junior or from senior nursing colleges.

In 1975, we estimate about 121 additional students to graduate from junior nursing colleges, based on the difference between the freshman quota and the total student quota as shown in Table 2-6. Based on the same data, we expect 95 additional nurses to graduate from three four-year nursing colleges which had juniors as their first class in 1974. In 1976 and 1977, the increase in the number of graduates from three-year nursing colleges will be 122 per year.

As for medical colleges, the number of graduates is expected to reach

Table 2-6

Health Professions in the Republic of Korea:
Student Quotas and Estimated Annual Number of Graduates

	No. of Institutions	1974 Freshman Quota	1974 Total Quota	1974 Total Quota Based on Freshman Quota	1974 Graduates	1978 Estimated Annual No. of Graduates[b]
Medical Colleges	14	1,250	4,655	5,000	854	1,162
Dental Colleges[a]	5	290	880	1,160	149	269
Nursing Colleges (Baccalaureate)	14	770	2,670	3,080	515	716
Nursing Jr. Colleges	38	2,676	7,360	8,028	2,230	2,489
Pharmacy Colleges	14	910	3,670	3,640	N.A.	846
Oriental Medicine Colleges	2	40	160	160	40	40[c]

[a]We do not have freshman quotas for two new dental colleges starting in 1974, Gyeong Bug National University and Choseun University. We estimate them to be 50 for each university.

[b]Based on the assumption of 7% rate of attrition between the time of admission and graduation.

[c]We assume zero attrition rate for oriental medicine college students.

Source: Statistical Year Book, Ministry of Education, 1974.

1162 in 1977, which is 93% of the 1974 freshman quota. We assume that this number will be reached in an equal increment of 103 per year between 1974 and 1977.

For Projection III we add the following number of graduates to that estimated for Projections I and II:

1977: 50 graduates of nursing colleges

1978: 100 graduates of nursing colleges

1979: 150 graduates of nursing colleges

1980: 50 graduates of dental colleges
200 graduates of nursing colleges
80 graduates of medical colleges

1981: 50 graduates of dental colleges
250 graduates of nursing colleges
80 graduates of medical colleges

We assume no increase in the student quota of pharmacy colleges for Projection III. Note that the above estimates of additional graduates for Projection III are based on our conjecture about the future policy of the Ministry of Education.

3. Projections of the Future Supply of Health Manpower

Tables 2-7 through 2-10 present projections of the future supply of physicians, nurses, dentists and pharmacists. No projections are made for oriental doctors and midwives. In 1973, there were two institutions which graduated forty oriental doctors and the annual number of graduates is not expected to change in the foreseeable future. We have no data on the annual number of those who become midwives. For these reasons, we have excluded these two groups from our projections.

Although three projections for each profession were attempted, we merged them into two because our justification for three different levels of projection

does not exist except for physicians. For physicians, we merged Projection II, which assumes a lower level of leakages through emigration, with Projection III, which additionally assumes a higher level of injections of new graduates.

Regardless of our assumptions about the level of leakages and injections, our projections for all types of professions are lower than projections made by others. This may be because our estimates of 1973 figures are lower than the enumeration provided by the Ministry of Health and Social Affairs, except possibly for nurses. As shown below, our estimates are lower by 0.7% to 9.5%.

1973 Data

	Ministry of Health and Social Affairs	Ro and Kim's Estimates	Percent Difference
Physicians	10,222	9,339	9.5
Dentists	1,750	1,691	3.5
Nurses	8,440*	7,799	N.A.
Midwives		1,464	N.A.
Pharmacists	13,604	13,506	0.7

*This figure includes both nurses and midwives.

These differences may be accounted for by the fact that our sources of data are national and local professional associations. Another reason for our relatively low level of projections is that we have no access to future manpower plans for health professions of the Korean government. Of necessity, we have made conservative estimates of our own of increases in the number of new graduates from educational programs in health professions.

44

Table 2-7

Projections of Future Supply of Physicians in Korea: 1977-81

		Year							
		1974	1975	1976	1977	1978	1979	1980	1981
Projection I	New Graduates (+)	9339*	9650	10054	10338	10927	11502	12063	12612
	Emigrants (-)	854	957	1060	1162	1162	1162	1162	1162
	Deaths (-1.6%)	10193	10607	11114	11500	12089	12664	13225	13774
	Retirement (-0.73%)	314	314	314	314	314	314	314	314
	Unemployment (-2%)	9879	10293	10800	11186	11775	12350	12911	13460
	Active M.D.'s	9721	10128	10627	11007	11587	12152	12704	13244
		9650	10054	10550	10927	11502	12063	12612	13147
		9457	9853	10338	10708	11272	11822	12359	12884
Projections II and III**	New Graduates (+)	9339*	9650	10131	10778	11510	12225	12923	13683
	Emigrants (-)	854	957	1060	1162	1162	1162	1242	1242
	Deaths (-1.6%)	10293	10607	11191	11940	12672	13387	14165	14925
	Retirement (0.73%)	314	236	157	157	157	157	157	157
	Unemployment (-2%)	9879	10371	11034	11783	12515	13230	14008	14768
	Active M.D.'s	9721	10205	10857	11594	12314	13018	13784	14532
		9650	10131	10778	11510	12225	12923	13683	14426
		9457	9928	10562	11280	11980	12665	13410	14137

*1973 figure

**Projections II and III assume a higher level of injections of new graduates from 1980 and a lower level of leakages through migration from 1975, whereas Projection I assumes no increase in the number of new graduates from 1977 and no decrease in the number of emigrating doctors.

Table 2-8

Projections of Future Supply of Nurses in Korea: 1977-81

		Year							
		1974	1975	1976	1977	1978	1979	1980	1981
Projections I and II		7799*	10279	12524	15227	17986	20681	23314	25886
	New Graduates (+)	2745	2561	3083	3205	3205	3205	3205	3205
		10544	12840	15607	18432	21191	23886	26519	29091
	Emigrants (-)	19	19	19	19	19	19	19	19
		10525	12821	15588	18413	21172	23867	26500	29072
	Deaths (-1,6%)	10357	12616	15339	18118	20883	23485	26076	28607
	Retirement (-0.73%)	10279	12524	15227	17986	20681	23314	25886	28398
	Unemployment (-20%) Active R.N.'s	8224	10019	12181	14389	16545	18651	20709	22718
Projection III		7799*	10279	12524	15227	17986	20730	23459	26174
	New Graduates (+)	2745	2561	3083	3205	3255	3305	3355	3405
		10544	12840	15607	18432	21241	24035	26814	29579
	Emigrants (-)	19	19	19	19	19	19	19	19
		10525	12821	15588	18413	21222	24016	26795	29560
	Deaths (-1.6%)	10357	12616	15339	18118	20882	23632	26366	29087
	Retirement (-0.73%)	10279	12524	15227	17986	20730	23459	26174	28875
	Unemployment (-10%) Active R.N.'s	9251	11272	13704	16187	18657	21113	23556	25987

*1973 figure

*Projection III assumes a 10% rate of unemployment for all years and a higher level of injections of new graduates from 1978, whereas Projections I and II assume 20% rate of unemployment for all years and no increase in the number of new graduates after 1976.

Table 2-9

Projections of Future Supply of Dentists in Korea: 1977-81

		Year							
		1974	1975	1976	1977	1978	1979	1980	1981
Projections I and II		1691*	1788	1892	2003	2121	2325	2524	2718
	New Graduates (+)	149	159	169	179	269	269	269	269
		1840	1947	2061	2182	2390	2594	2793	2987
	Emigrants (-)	10	10	10	10	10	10	10	10
		1830	1937	2051	2172	2380	2584	2783	2977
	Deaths (-1.6%)								
		1801	1906	2018	2137	2341	2543	2738	2929
	Retirement (-0.73%)								
		1788	1892	2003	2121	2325	2524	2718	2908
	Unemployment (-1%)								
	Active Dentists	1770	1873	1983	2100	2302	2499	2691	2879
Projection III**		1691*	1788	1892	2003	2121	2325	2524	2767
	New Graduates (+)	149	159	169	179	269	269	319	319
		1840	1947	2061	2182	2390	2594	2843	3086
	Emigrants (-)	10	10	10	10	10	10	10	10
		1830	1937	2051	2172	2380	2584	2833	3076
	Deaths (-1.6%)								
		1801	1906	2018	2137	2341	2543	2788	3027
	Retirement (0.73%)								
		1788	1892	2003	2121	2325	2524	2767	3005
	Unemployment (-1%)								
	Active Dentists	1770	1873	1983	2100	2302	2499	2740	2975

*1973 figure

**Projection III assumes an increase in new graduates of 50 over and above those estimated for Projections I and II starting in 1980.

Table 2-10

Projections of Future Supply of Pharmacists in Korea: 1977-81

		Year							
		1974	1975	1976	1977	1978	1979	1980	1981
Projection I		13506*	13806	14099	14386	14666	15182	15443	15698
	New Graduates (+)	846	846	846	846	846	846	846	846
		14352	14652	14945	15232	15512	16028	16289	16544
	Emigrants (-)	218	218	218	218	218	218	218	218
		14134	14434	14727	15014	15294	15810	16071	16326
	Deaths (-1.6%)	13908	14203	14491	14774	15049	15557	15814	16065
	Retirement (0.73%)	13806	14099	14386	14666	15182	15443	15698	15948
	Unemployment (-2%) Active Pharmacists	13530	13817	14098	14373	14879	15134	15384	15629
Projections II and III**		13506*	13806	14145	14502	14851	15191	15524	15849
	New Graduates (+)	846	846	846	846	846	846	846	846
		14352	14652	14991	15348	15697	16037	16370	16695
	Emigrants (-)	218	171	145	145	145	145	145	145
		14134	14481	14846	15203	15552	15892	16225	16550
	Deaths (-1.6%)	13908	14249	14608	14960	15303	15638	15965	16285
	Retirement (0.73%)	13806	14145	14502	14851	15191	15524	15849	16166
	Unemployment (-2%) Active Pharmacists	13530	13862	14212	14554	14888	15213	15532	15843

*1973 figure
**Projections II and III assume a decline in emigrating pharmacists by one-third, whereas Projection I does not

Appendix to Chapter 2

Population Estimates 1977-81 by Age
Korean Institute for Family Planning Estimate

Age	Year 1977	1978	1979	1980	1981
20-24	3,672	3,943	4,215	4,486	4,505
25-29	2,785	2,896	3,019	3,134	3,390
30-34	2,357	2,421	2,487	2,550	2,656
35-39	2,213	2,213	2,216	2,217	2,273
40-44	1,986	2,054	2,120	2,187	2,182
45-49	1,600	1,679	1,749	1,824	1,883
50-54	1,319	1,349	1,380	1,409	1,476
55-59	1,067	1,110	1,155	1,198	1,223
60-64	836	860	882	905	942
65-69	629	651	672	694	711
Total for all ages	36,296	36,877	37,467	38,029	38,523

Unit: 1,000

Chapter III

Health Personnel, Health Facility, Consumption of Health Services, Input-Mix for (the Production of) Health Services and Socio-Economic Indicators--An Urban and Rural Comparison

I. Health Professionals

The uneven distribution of health personnel between urban and rural area is well illustrated by data presented in Table 3-1. For the four biggest cities in that nation--Seoul, Busan, Taegu, and Kwanju--there is one medical doctor for 1,724 people, whereas for the rest of country, there is one doctor for 7,692 people. Disparity is even greater for dentists and nurses. There is one dentist for 10,000 people in the four cities, a large number of people to take care of by one dentist according to any standard, but the same dentist has to take care of 100,000 people in the rest of country! The difference in the availability of nurses between urban residents and rural residents is less than that of dentists but more than that of medical doctors. There is one nurse for 1,587 urban residents and one nurse for 10,000 rural residents.

A midwife in rural area is serving about 12,500 women of child-bearing ages (about one quarter of total population according to an estimate by Korean Institute of Family Planning) whereas there is one midwife for about 2,500 women of the same ages in cities. The difference in the availability of midwives between urban and rural residents are greater than that of medical doctors. When we consider the fact that there are more babies delivered by doctors in urban area than in rural area and also the fact that rural birth rate is greater than urban birth rate, midwives may be considered to be significantly more scarce than medical doctor for rural residents than urban residents. More or less similar observation can be made about pharmacists.

Pharmacists in Korea play more or less the same role as medical doctors in the United States in providing primary care. In the context of Korean health delivery system, the first place one visits for any symptom of nonemergency

Table 3-1

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

	Means		Maximum		Minimum	
	4 Biggest Cities*	Kuns**	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Doctors	1,121	17	2,324	228	451	1
Dentists	262	3	791	35	32	0
Herb Drs.	368	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.	1/1724	1/7692	1/1250	1/2000	1/2500	0
Dentists/Pop.	1/10000	1/100000	1/10000	1/10000	1/10000	0
Herb Drs./Pop.	1/10000	1/33333	1/5000	1/5000	0	0
Nurses/Pop.	1/1587	1/10000	1/1250	1/1111	1/2500	0
Midwives/Pop.	1/10000	1/50000	1/5000	1/5000	0	0
Pharmacists/Pop.	1/1205	1/5263	1/833	1/196	1/1667	0
Public Drs.	16	1	42	7	4	0
Nurse Aids & 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
Dietitians	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).

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

nature is the neighborhood pharmacy. Pharmacists are legally authorized to prescribe any kind of medicine. For most of the people with usual ailments, this is the only person they contact. Note that there are more pharmacists than any other principal health professionals, both in urban and rural areas. As expected, there are more pharmacists available for urban residents than rural residents and the difference is slightly greater than that for medical doctors. If we consider, however, the fact that pharmacists play more important role in the entire structure of health care delivery system for rural residents than for urban residents, this disparity is significant. Thus, it appears that pharmacists as substitutes for medical doctors do little to rectify the disparity of distribution of medical doctors between urban and rural areas.

There are more herb doctors (often self-disparagingly called oriental doctors by themselves) per population in urban area than in rural area. This could not have been confidently expected because herb doctors are a part of rural culture and favorite health professionals among rural residents. Although there are 3.3 times more herb doctors per population in urban area than rural area, the difference is less than that of medical doctors. Note that this is the only health professional where the difference in the availability per population between urban and rural area is less than that for 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 what is expected because hospitals are concentrated in cities more than health workers. 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 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 Seoul--the capital city has 31.2 per cent of the nation's total medical doctors, 53.1 per cent of dentists and 42.6 per cent of nurses, whereas Seoul's population amounts to 18.7 per cent of the nation's total population.

2. Socio-Economic Factors

Underlying causes behind the concentration of health workers in urban area and, in particular, in Seoul are usually sought in the difference in social and economic indicators of the two areas: urban and rural. Table 3-2 presents some of these social and economic indicators of the four biggest cities and the rest of the country. Per capita local tax revenue of urban residents is more than three times that of rural residents. This is the only available index of income, which is the most impertant index of living standard. As expected, a small portion of population is engaged in farming in urban area (4 per cent) and in rural area, more than a half (65 per cent) of residents reported as farmers. As for migration, those who moved into cities outnumber those who left, whereas in rural area, those who moved outnumber those who moved in by about 46 per cent. Emigrants for the biggest four cities include intra-city migrants who moved from one district of city into another. This is the reason why immigrants outnumber emigrants by a small margin of about two per cent.

Schools are concentrated in cities, although there is no appreciable

Table 3-2. Socio-Economic and Demographic Variables--Urban and Rural Area: Numbers, Ratios, Means, Maximum and Minimum Values. 1975 Data.

Var. No. and Names	Means		Maximum		Minimum	
	4 Biggest Cities* (S.B.T.K.)	Kuns	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Area	345Km^2	576	613	194	178	16
Population	2,448,325	135,189	6,076,100	689,800	538,000	14,400
No. Households	477,700	23,364	1,182,700	137,300	94,100	1,000
Urban Population	2,448,350	40,735	6,076,100	689,800	538,100	0
Immigrants	529,625	8,887	1,349,300	100,400	96,600	500
Emigranta	497,500	10,964	1,267,400	100,900	116,500	800
Farming Population	46,500	84,574	56,800	220,300	36,600	2,100
Local Tax won	7,058,500m	102,547m	20,064mm	1,362mm	889mm	2mm
Pop./Area Km^2	6,089	-	9,912	-	2,502	-
Urban Pop./Pop.	1.00	0.27	1.00	1.00	1.00	0
Emigrants/Immigrants	0.98	1.46	1.21	3.40	0.79	0.10
Farming Pop. / Total Pop.	0.04	0.65	0.10	1.00	0.01	0.02
Local tax/Pop.	2,350	700	3,300	3,000	1,700	100
Elementary Teachers / Elementary Students	0.02	0.02	0.02	0.03	0.01	0.02
Middle Teachers / Middle Students	0.02	0.02	0.02	0.04	0.02	0.02
High Teachers / High Students	0.03	0.04	0.03	0.07	0.03	0

* Seoul, Busan, Taegu and Kwangju.

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

Source: Various Republic of Korea Government publications.

difference in the faculty-student ratio between urban and rural area. What is more interesting in studying the distribution of health workers is the distribution of schools training health workers. According to a survey conducted by Professor Jon Kum Kim of Seoul National University, more than a half of all students enrolled in schools which train health professionals are attending institutions located in Seoul except nursing students and "para-medical" students. (See Table 3-3) The entire students (100 per cent) of dentistry, public health and oriental medicine are enrolled in schools located in Seoul. Nursing students, which include those enrolled in nursing aide programs, and "para-medical" students show the least concentration in Seoul with more than half enrolled in schools outside the capital city.

Table 3-3. Geographic Distribution by Location of Schools in Korea of Students Enrolled in Education for the Health Professions

Academic Year 1974

Educational Field	Number Enrolled			Percentage of Total	
	In Seoul City	Outside Seoul	Total	In Seoul City	Outside Seoul
Medicine	3,492	2,187	5,679	61.5%	38.5%
Dentistry	785	-	785	100.0	-
Nursing*	5,678	8.974	14,652	38.8	61.2
Pharmacy	2,752	1,308	4,060	67.8	32.2
Public Health	107	-	107	100.0	-
Oriental Medicine	184	-	184	100.0	-
Para-Medical	1,627	2,266	3,893	41.8	58.2
Total	14,625	14,735	29,360	49.8	50.2

Source: Survey data by Prof. Jon Kum Kim, School of Public Health, Seoul National University.

* Nurse-aide programs included.

Notes: Premedicine and predentistry programs are excluded.

We do not attempt here to look for relationship between socio-economic indicators and the distribution of health workers. We would like to point out, however, that when we look at usual determinants of per capita demand for health services, such as income, relative price and "taste" which are reflected by education, occupation, urbanization, etc., data presented in Table 3-2 indicate a greater per capita demand for health services of all categories in urban area than in rural area. Presumably, the concentration of health workers in cities is to a large extent the supply response to the greater demand for health services.

3. 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 categories: dental, oriental (herb medicine), and mid-wives'clinics. Health centers are usually operated by government for low income residents of the area.

In producing health services, two broad categories of inputs are required: labor (health workers) and capital (health facilities). Like other developing countries and also most of developed countries, manufacturing industries are mainly located in urban area in Korea and farming is done in rural area. Therefore, it is reasonable to expect that more capital intensive method of production is used in urban area than in rural area. If this is true for service industry also, the distribution of health facilities between urban and rural area is likely to be more uneven than that of health professionals. Data presented

in Table 3-4 support this hypothesis for some health facilities and professionals but not for others.

First, we look at the distribution of hospital beds. Hospitals are the most important health facility and beds are a surrogate representing all spectrum of equipment and other capital investment of a hospital. If we examine "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. This indicates that the disparity in the availability of hospital beds between urban and rural area 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 is mainly because beds in tuberculosis hospitals are evenly distributed per population between urban and rural area.

The distribution of clinics between urban and rural area is more even than that of hospitals and also that of medical doctors. Nevertheless, clinic-population ratio in urban area (1/50,000) is more than three times larger than that in rural area (1/166,666). 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 area than other clinics and medical doctors.

Since health centers are usually operated by government for low income residents, there are more health centers per population in rural area than in urban area. There is, on the average, nine health centers for one million rural

Table 3-4. 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 Beds	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.	20/1mm	6/1mm	32/1mm	69/1mm	13/1mm	0
Dental Clinics/Pop.	77/1mm	16/1mm	131/1mm	107/1mm	45/1mm	0
Oriental Clinics/Pop.	97/1mm	36/1mm	181/1mm	158/1mm	0	0
Midwives'Clinics/Pop.	50/1mm	16/1mm	74/1mm	94/1mm	32/1mm	0
Health Ctrs./Pop.	3/1mm	9/1mm	4/1mm	69/1mm	1/1mm	0
General Beds/Pop.	1100/1mm	205/1mm	1457/1mm	5556/1mm	889/1mm	0
Tuberculosis Beds/Pop.	39/1mm	39/1mm	94/1mm	2367/1mm	0	0
Psychiatry Beds/Pop.	104/1mm	7/1mm	211/1mm	731/1mm	14/1mm	0
Comm. Disease Beds/Pop.	264/1mm	50/1mm	583/1mm	6353/1mm	24/1mm	0
Total Beds/Pop.	1507/1mm	301/1mm	1628/1mm	6458/1mm	1418/1mm	0
Clinics/Pop.	1/50000	1/166666	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

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.

In conclusion, do our data refute the hypothesis presented before that urban residents receive more capital intensive health care than rural residents? We believe that our data is inadequate either to refute or support this hypothesis. This is because the only measure of labor and capital is not that of actual labor and capital utilized but their existence or availability. Thus, to the extent to which the rate of utilization of labor and capital differ between urban and rural area, our measure of labor and capital input present a distorted picture. One would expect that existing labor and capital are more intensively used in urban area than in rural area and that the difference in utilization is greater for capital than for labor. If the difference in the rate of capital utilization between urban and rural area is significantly greater than that of labor utilization, then our original hypothesis that urban residents receive more capital intensive health care than rural residents appears to be supported by our data.

4. Level of Actual Use of Health Services in Urban and Rural Area

We have presented data on the distribution of health workers and facilities between urban and rural area. This reflects the supply response of labor and capital (in the production of health services) to the demand for health services. Per capita demand of urban and rural residents for health services depends on the relative price of health services, incomes and "taste" of residents, which are reflected on socio-economic characteristics of urban and rural residents. Our limited data on socio-economic characteristics of urban and rural

residents are also presented in Table 3-2. Here we present the actual level of use of health services by urban and rural residents, which reflects the quantity of health services sold and bought, that is, the quantity at which demand and supply curves intersect.

According to our questionnaire survey of hospitals, on the average one out of 42 residents in urban area are hospitalized during 1973 compared with one out of 345 residents in rural area. (See Table 3-5) In terms of patient days, on the average one out of three residents in urban area spent one day in hospital, whereas one out of 27 did in rural area. This indicates that the disparity in use of hospital services on inpatient basis between urban and rural area is greater than that in the availability of health workers and health facilities. This may partly be due to the fact that rural residents use health facilities and the service of health workers in urban area. A more important factor is likely to be the fact that urban residents have greater per capita demand for hospital services in particular and health services of all kinds in general. If this is true, it is likely that urban residents not only have better access to health facilities than rural residents, but also urban health facility is used more intensively than rural health facility. As far as it is applied to hospitals, this hypothesis is supported by a government survey.

A survey of 56 hospitals in 1973 by the Ministry of Health and Social Affairs indicates that utilization of health facilities, as measured by the occupancy rate of hospital, is lower in rural area than in urban area. The mean occupancy rate of hospitals in Seoul is 51.2 per cent for non-government owned hospitals, whereas it is 41.6 per cent in other areas. (See Table 3-6) The difference in the mean occupancy rate between hospitals in Seoul and other area

Table 3-5. Health Service Utilization Variables in Urban and Rural Area--Means, Maximum and Minimum Values. 1973 Data

	Means		Maximum		Minimum	
	4 Biggest Cities*	Kuns**	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Total No. Inpatients X 10m/Pop.	23604/1mm	2897/1mm	33578/1mm	45228/1mm	17871/1mm	0
Total No. Inpatients Days X 10m/Pop.	34310/100m	3660/100m	37541/100m	72490/100m	30399/100m	0
Total No. Visits X 10m/Pop.	20805/100m	6009/100m	65395/100m	82744/100m	-	-
Total No. New Visits X 10m/Pop.	17982/100m	3460/100m	26336/100m	52145/100m	11418/100m	0
Total No. Inpatients/General Beds	21.26	4.80	23.02	67.51	18.23	0
Total No. Inpatients Days/Gen. Beds	325.12	64.77	407.36	201.4	227.14	0
Total No. Visits/Hospitals	32964.26	4785.97	51603.34	49114.00	25241.38	0
Total No. New Visits/Hospitals	8933.35	1873.30	16330.92	23843.50	5713.03	0
Total No. Visits/Clinics	2286.14	646.04	4110.98	6405.75	1630.98	0
Total No. New Visits/Clinics	650.30	236.25	1161.36	2474.57	398.81	0
Total No. Inpatients	55,271	491	143,078	10,808	18,065	0
Total No. Inpatients Days	797,932	14,029	847,096***	1,364,099	178,075	0
Total No. of Visits	487,234	12,605	973,457***	252,632	501,540	0
Total No. of New Visits	446,538	4,922	257,481	95,374	141,686	0
Inpatients/Pop.	1/42	1/305	1/30	1/22	1/56	0
Inpatients Days/Pop.	1/3	1/27	1/3	1/1	1/2	0
Visits/Pop.	1/5	1/17	1/2	1/1	-	
New Visits/Pop.	1/6	1/29	1/4	1/2	1/9	0

* Seoul, Busan, Taegu and Kwanju
** Rest of the country including 32 smaller shis (cities)
*** Overflow (e.g., greater value but no space to record in computer)
Sources: Various Republic of Korea Government publications and our survey.

62

Table 3-6

OCCUPANCY RATE OF HOSPITAL BEDS IN KOREA, 1973

Occupancy Rate	Non-Governmental Hospital			Governmental Hospital			Grand Total
	Seoul	Other Area	Total	Seoul	Other Area	Total	
0-9	4	11	15	-	5	5	20
10-19	7	12	19	-	5	5	24
20-29	1	16	17	2	13	15	32
30-39	3	4	7	1	8	9	17
40-49	9	13	22	2	4	6	27
50-59	3	1	4	1	-	1	5
60-69	2	9	11	2	2	4	15
70-79	3	6	9	2	5	7	16
80-89	4	1	5	1	-	1	6
90-99	2	3	5	1	-	1	6
100-	4	5	9	2	2	4	13*
Total	42	81	123	14	44	58	181
Mean Occupancy Rate	51.2	41.6	44.9	65.0	36.1	43.4	44.4

Data Source: Statistical Year Book of Ministry of Health and Social Affairs, 1973.

* Some of these 13 hospitals reported 194% of occupancy rate which is rather impossible. Here the calculation was made with 110% occupancy rate for all 13 hospitals.

is greater for government owned hospitals. No doubt this difference is partly attributable to the difference in the size of hospitals in Seoul and other area. In addition, the higher occupancy rate of hospitals in Seoul may partly be accounted for by rural residents seeking hospital services in Seoul. Nevertheless, since hospital beds are more scarce in rural area than in urban area, this urban-rural difference in occupancy is another indication of the relative lack of demand for health services among rural residents.

One way to prevent the use of urban health facilities by rural residents from distorting the figures on the difference in the use of hospital and other health services between urban and rural residents is to look into expenditures for health services of rural and urban residents. For this purpose, we present in Table 3-7 data collected by a survey of 30,525 persons during one-month-period from August 1 to 31, 1973. The survey was conducted under the direction of Dr. Jong Huh and Mr. Young Soo Park of the School of Public Health, Seoul National University.

Table 3-7 shows that the difference in per capita medical expenditures between urban and rural residents is less than that of the availability of health workers and facilities. At local prices, residents of large cities spent 133 per cent more for medical care than those living in farming or fishing villages and 74 per cent more than those in tows and 11 per cent more than residents of medium-sized cities. Since medical prices are higher in urban area than in rural area, if we take into account the price differences, the difference in medical expenditures between urban and rural residents would have been less, even at a uniform price. The relatively more even distribution of medical expenditures between urban and rural residents compared with that of health facility or

Table 3-7. Urban-Rural Comparison of Medical Expenditures Per Episode of Illness, Per Treatment and Per Capita During One Month; by Sex: 1973 (Unit: Won)*

	Males			Females			Both Sexes		
	Expend. Per Episode Illness	Expend. Per Treatment	Per Capita Expend. Per Month	Expend. Per Episode Illness	Expend. Per Treatment	Per Capita Expend. Per Month	Expend. Per Episode Illness	Expend. Per Treatment	Per Capita Expend. Per Month
Big Cities	2,205	3,013	355	1,937	2,553	470	2,049	2,741	410
Med. Cities	1,358	1,600	269	1,623	1,836	462	1,508	1,735	361
Towns	1,382	2,052	270	983	1,982	206	1,158	2,018	236
Villages	1,378	1,540	163	1,311	1,639	182	1,328	1,589	176
All Places	1,469	1,906	245	1,361	1,861	307	1,404	1,879	271

Sample: 30,525 persons
Source: Jong Huh and Young Soo Park, "A Study of Medical Care Expenditures, 1973," Seoul National University.
* at 1973 exchange rate, 400 won = 1 U.S. dollar

Table 3-8. Urban-Rural Comparison of Incidence of Illness Per 1,000 Population by Sex, During One-Month-Period of August, 1973

	Incidence of Illness Per 1,000 Population			
	During One Month			On Interview Date
	Males	Females	Both Sexes	Both Sexes
Big Cities	161.1	242.5	200.2	35.6
Med. Cities	198.6	284.7	239.4	93.6
Towns	195.7	210.1	203.5	62.5
Villages	106.0	124.7	115.0	46.3
All Places	141.6	188.7	165.6	52.4

Sample: 30,525 persons
Source: Jong Huh and Young Soo Park, "A Study of Medical Care Expenditures, 1973," Seoul National University.

that of the use of health facility appears to be attributable to the use of urban health facility by rural residents. All things considered, the urban-rural difference in medical expenditures, even at a uniform price, is still significantly large.

However measured, there appears to be a significant disparity in the actual use of available health facility and workers between urban and rural residents. This disparity acquires an added significance when we take into account the difference in the "need" for health services between urban and rural residents. One would reasonably expect that health status of rural residents is lower than that of urban residents from the disparity in social and economic indicators between the two.

The only data we have been able to obtain on health indicators of urban and rural residents of Korea are those collected by the same survey by Dr. Huh and Mr. Park. Contrary to one's expectation, however, their data do not show any significant difference in incidence of illness between urban and rural residents when incidence is measured by the number of illnesses at the time of interview. (See Table 3-8) When the incidence is measured by the number of illnesses reported during the entire month of August, 1973, those residing in farming or fishing villages have fewer illnesses per 1,000 population than those living in cities or towns.

5. Input-Mix for (the Production of) Health Services--Urban and Rural Comparison

So far in this chapter, we have presented data on the distribution of health workers and facilities between urban and rural area and the use of these workers' services and facilities by urban and rural residents. In this section, we present data on input-mix for the production of health services in urban and rural

area. It is hypothesized that just as there is a significant difference in the supply response of labor and capital between urban and rural area, there is a significant difference in how these inputs are combined to produce health services demanded by urban and rural residents. In other words, there is a difference not only in the availability of health workers, facility and their use between urban and rural area, but also in the kind of health services demanded in terms of their input-mix as well as their quality.

Input-mixes for the production of health services we examine here are (a) the ratio of the number of one category of health professional to that of another, i.e., labor-mix; (b) the ratio of the quantity of one kind of health facility to that of another, i.e., capital-mix; and (c) the ratio of the number of one category of health professional to the quantity of one kind of health facility, i.e., labor-capital ratio. It is hypothesized that differences in these ratios between urban and rural area have resulted from differences in consumer preferences between urban and rural residents and from those in the relative prices of inputs between urban and rural area.

Labor-mix in health field as shown in data presented in Table 3-9 indicates that on the average urban residents demand more medical doctor-centered health services than rural residents with two exceptions. (See the mean values) The ratios of medical doctors to dentists, to herb doctors and also to mid-wives are higher in urban area than those in rural area. However, the ratios of medical doctors to nurses and to pharmacists in urban area are, on the average, lower than those in rural area. The doctor-nurse ratio in urban area appears to be lower than that in rural area because most nurses are hospital-based and hospitals are concentrated in cities more than medical doctors. The fact that there

Table 3-9. Health Service (or Input) Mix Variables Represented by Ratios of Health Personnel and Facilities in Urban and Rural Area--Means, Maximum and Minimum Values. 1973 Data

	Means		Maximum		Minimum	
	4 Biggest Cities*	Kuns**	4 Biggest Cities	Kuns	4 Biggest Cities	Kuns
Doctors/Dentists	8.26	4.50	14.09	31.99	2.94	0
Doctors/Herb Drs.	7.69	3.62	18.79	16.00	2.13	0
Doctors/Nurses	0.97	1.74	1.47	16.00	0.65	0
Doctors/Midwives	6.73	3.40	10.15	22.00	3.67	0
Doctors/Pharmacists	0.76	0.82	1.02	8.00	0.33	0
Doctors/General Beds	22.69	0.16	77.67	5.67	0	0
Doctors/Tuberculosis Beds	14.39	0.16	36.07	12.00	1.81	0
Doctors/Psychiatry Beds	10.81	0.57	34.69	15.50	0.86	0
Doctors/Comm. Disease Beds	0.38	0.13	0.51	1.71	0.27	0
Doctors/Total Beds	1.89	1.56	2.77	30.00	0.99	0
Nurses/General Beds	17.91	0.15	52.89	8.17	0	0
Nurses/Tuberculosis Beds	16.90	0.11	49.82	9.10	2.79	0
Nurses/Psychiatry Beds	11.21	0.58	33.15	20.75	1.06	0
Nurses/Comm. Disease Beds	0.41	0.10	0.49	0.92	0.29	0
Nurses/Total Beds	2.10	1.29	3.82	20.00	1.40	0
Hospital Pharmacists/Pharmacists	0.42	0.15	0.45	2.50	0.36	0
Hospital Nurses/Nurses	0.35	0.29	0.47	11.50	0.30	0
Hospitals/Clinics	0.09	0.05	0.14	0.50	0.03	0
Hospitals/Dental Clinics	0.34	0.15	0.71	2.00	0.10	0
Hospitals/Oriental Clinics	0.11	0.11	0.18	1.50	0	0
Hospitals/Midwives' Clinics	0.42	0.15	0.57	2.00	0.33	0
Hospitals/Health Centers	0.02	0.01	0.02	0.08	0.01	0
Doctors/Hospitals	29.33	4.87	33.29	43.75	26.53	0
Doctors/Clinics	2.16	1.21	3.70	4.00	1.03	0
Doctors/Oriental Clinics	3.19	3.03	5.92	27.00	0	0
Doctors/Health Centers	0.575	0.12	0.78	0.92	0.42	0
Nurses/Hospitals	33.03	4.07	46.40	45.50	22.67	0
Nurses/Clinics	2.25	1.16	3.53	15.00	1.46	0
Nurses/Dental Clinics	9.78	3.70	17.96	61.00	4.41	0
Nurses/Oriental Clinics	3.46	2.56	6.55	27.00	0	0
Nurses/Midwives' Clinics	12.92	3.15	15.47	43.00	10.78	0
Nurses/Health Centers	288.93	14.23	431.00	237.00	95.20	0

* Seoul, Busan, Taegu and Kwanju

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

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

are more pharmacists per medical doctor in urban area than in rural area is contrary to our expectation based on the data presented in Table 3-1. The difference in the distribution of pharmacists per population between urban and rural area was less than that in the distribution of medical doctors.

If we look at the maximum values, the ratios of doctors to other health workers are higher in rural area than in urban area except that of doctors to herb doctors. This seems to be attributable to the fact that doctors are more evenly distributed between urban and rural area than other health professionals. Some kuns have no health professionals except a doctor. (See Table 3-1) Thus, for example, if there is no dentist and one doctor in a kun, this kun would have the highest ratio of doctors to dentists.

Next, we examine capital mix in urban and rural area. Table 5-9 shows that, on the average, urban residents seek more hospital-based services compared with clinic and other health facility-based services than rural residents. There is, however, an exception in that there is no difference in the ratio of hospitals to oriental clinics between urban and rural area. As for the labor-capital ratio, i.e., the ratio of health professionals to health facility, it is, on the average, greater in urban area than rural area. (See mean values in Table 3-9) This does not mean that urban residents receive more labor-intensive health care than rural residents. Instead, it indicates a higher level of utilization of health facility by urban residents than by rural residents. If labor-capital ratio is measured by amounts of manhour and capital actually utilized, the true picture would have emerged.

A study of hospital use in the U.S. by Kong-Kyun Ro[1] has shown that hospitals

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[1] Kong-Kyun Ro, "Patient Characteristics, Hospital Characteristics and Hospita Use," in Victor R. Fuchs (Editor), Essays in the Economics of Health and Medical Care, National Bureau of Economic Research, N.Y.C., 1972.

with high staff-bed ratios tend to have higher occupancy rates and service-intensive care.

). Summary

There is a significant disparity in the availability and use of health professionals (services) and facility per population between urban and rural area. The disparity is greater in the availability of nurses and mid-wives than that of medical doctors and it is less in the availability of herb doctors and pharmacists than that of medical doctors. The distribution of hospital beds per population between urban and rural area is more uneven than that of medical doctors. The distribution of hospital beds per population between urban and rural area is more uneven than that of clinics of all categories. Urban health facilities have a higher staff-bed or staff-clinic ratios for all categories of health professions and facilities than rural health facilities.

Finally, in terms of kinds of medical health care sought and provided, urban residents receive more doctor-centered and hospital-based health services than rural residents.

Chapter IV

Relationship Between Socio-Economic Variables and the Availability, Utilization and Mix of Health Resources--Correlation Analyses

1. Criteria for the Selection of Variables

In Chapter 3, we have presented data on distribution of health resources between urban and rural areas. Data included those on labor-mix, labor-capital ratio, capital-mix, and utilization of health resources. In this chapter, we seek and analyze some of the underlying reasons why the health resources are distributed as shown in Chapter 3.

Locational distribution of any factors of production, in this case production of health services, reflects the supply response of these factors to the demand for the final product, i.e. health services. Therefore, we seek and analyze those factors which are, on theoretical ground, expected to influence per capita demand for health services and the supply response of health resources, i.e. factors of production, to the demand for health services.

Let the demand function of health services be expressed as

$$Hd = f(p,Y,v) \tag{1}$$

where Hd stands for the amount of health services demanded, p the relative price of health services, Y income and v a vector of additional variables. Arguments in the v vector include consumer preferences for health services vis-à-vis other consumer goods and services.

The supply function of health services may be expressed as

$$Hs = g(t,mc,z) \tag{2}$$

where Hs denotes the amount of health services supplied, t the price of alternative use of time or other input, mc marginal cost, and z a vector of additional variables. Arguments in the z vector include non-monetary factors such as amenity of urban living and psychic income.

Among the data available and those obtained through our questionnaire, we seek those variables which reflect or influence, directly or indirectly, those variables and arguments in vectors listed in equations (1) and (2), i.e. p, Y,

t, mc and arguments in v and z. Under this selection criterion, we have chosen five categories of variables as socio-economic determinants, or their surrogates, of the demand for health services and the supply response to it. They are: (1) the degree of urbanization represented by two variables—urban population as percent of total population and population density (the number of residents divided by the size of area) ; (2) average income of residents as represented by per capita local tax revenue; (3) occupation-industry represented by farming population as percent of total population and farming households as percent of total households; (4) education represented by middle school students as percent of total middle school age population and high school students as percent of total high school age population; and finally (5) migration represented by the ratio of the number of emigrants to that of immigrants.

If we give a specific rationale for the selection of these variables by example, urban population as percent of total population is included in socio-economic indicators because it is hypothesized to reflect, indirectly at least, the relative price of health services (p), income of residents (Y), consumer preferences, an argument in (v), etc. It is hypothesized that kun with a higher degree of urbanization, as shown by a greater value of urban population variable, have a higher relative price of health services (p), a higher average income (Y), and a greater preference for health services (an argument in v) than kun with lower degree of urbanization. A higher relative price of health services is expected to exert a negative influence on the demand for health services, but a higher income and a greater preference for health services are expected to exert a positive influence. On balance , income and preference effects are expected to outweigh price effect. Therefore, kuns with a greater value of urban population variable will have a greater demand for health

services and, as a result, a greater supply of health resources than kuns with a lower percent of urban population.

On the supply side, kuns with a higher degree of urbanization are expected to have a higher cost of supply (πc), a higher price of alternative use of input (t) and a greater amount of amenity (an argument in z) than kuns with a lower degree of urbanization. The higher cost of input and higher price of alternative use of input are expected to exert a negative influence on the supply of health resources, but a greater amount of amenity will exert a positive influence. On balance, the positive influence is likely to be stronger than the negative influence. For, an amenity of urban living is often cited as a crucial factor in attracting health professionals to cities away from rural areas.

In the same line of reasoning, income variable is hypothesized to have positive relationships with the amounts of health resources a kun has, education also positive ones, farming variables negative ones, and migration negative associations.

2. Relationship Between Socio-Economic Indicators and Health Manpower Supply

Table 4-1 shows the relationship between socio-economic indicators and the supply of health manpower as expressed by the ratio of the number of health workers to that of population of kun or city. The relationship is represented by correlation coefficient r. All those socio-economic indicators which are hypothesized to be reflections of factors positively influencing the supply of health professionals, i.e., offering positive inducements, have positive correlations with health manpower supply measures. Those expected to be reflections of negative influences have negative correlation coefficients. All coefficients

Table 4-1. Relationship Between Socio-Economic Indicators and The Availability of Health Manpower Per Population, 1973

Correlation Matrix Unit: Kuns and Cities

Socio-Economic Indicators / Health Manpower	Pop./Area	Urban Pop. / Pop.	Emigrants / Immigrants	Farm. Pop. / Pop.	Farm. Households / Households	Local Tax / Pop.	Middle Students Pop. Age (12-14)	High Students Pop. Age (15-19)
Doctors/Pop.	0.41	0.80	-0.46	-0.79	-0.33	0.70	0.60	0.75
Dentists/Pop.	0.36	0.71	-0.34	-0.65	-0.24	0.65	0.50	0.61
Herb Drs./Pop.	0.30	0.62	-0.43	-0.62	-0.25	0.65	0.48	0.58
Nurses/Pop.	0.39	0.69	-0.32	-0.66	-0.27	0.58	0.46	0.59
Midwives/Pop.	0.13	0.64	-0.34	-0.61	-0.19	0.47	0.49	0.60
Pharmacists/Pop.	0.23	0.48	-0.28	-0.48	-0.19	0.44	0.31	0.42

Note: n = 172 (170 kuns and cities and 2 special cities)

Significant at .95 level if $r \geq 132$ or ≤ -132

Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

except one are, furthermore, significant at .99 level.

Variables representing the degree of urbanization of km-population density and urban population as percent of total population have positive associations with the numbers of health workers per 1,000 population of all categories. The association is strongest between the variable representing urban population as percent of total population and that representing the supply of medical doctors with correlation coefficient of .80. The association is the weakest between urban population variable and that of supply of mid-wives. It appears that more highly trained health workers are more sensitive in supply responses to positive factors of urban area, i.e., more susceptible to attractions of city life and better able to exploit the greater demand for health services in cities than less trained health workers.

After urban population variable, per capita local tax revenue variable has the strongest correlation with the variable representing the supply of health workers. This has been expected because per capita tax revenue is a proxy variable for per capita income; and income of residents (Y in equation (1)) is theorized to exert a strong influence on the demand for health services. From the theory of consumer behavior and also studies of this subject in the U.S., it has also been expected that income effect of demand is stronger for higher quality health services than for lower quality services. Confirming this expectation, Table 4-1 shows that the association between tax revenue variable and health workers' supply variable is stronger for highly trained health professionals than for less trained personnel. Presumably, the former offers higher quality services than the latter.

Variables representing educational level of residents—students as percent of total population of school ages—have the next strongest associations with

health workers' supply variables. Apparently, high school education has a stronger influence on shaping consumer preference for health services than elementary and middle school education. Note that correlation coefficients for high school student variable are greater than those for middle school student variable. Also one can observe that education has created greater demand for high quality health services than lower quality services.

As expected, kuns with a greater number of farmers as proportion of total population have a smaller number of health workers per 1,000 population. Farming as an occupation appears to influence consumer preference to lower the demand for health services in general and the demand for high quality health services in particular compared with other occupations. Of course, the association between the farmers' variable and health workers supply variables as represented by correlation coefficients may simply reflect the negative association of the former with income, urbanization and education variables. We attempt to isolate the effect of one socio-economic variable on the supply of health resources by multivariate analysis in the next chapter.

Finally, Table 4-1 shows that kuns which lose more residents than gain by migration have a smaller number of health workers per 1,000 population. Presumably, kuns which have various attractions for migrants in general also attract more health workers. It appears that highly trained health workers are more mobile and/or more susceptible to "pull" factors in migration than less trained health workers. Note that correlation coefficients between migration variable and health manpower supply variables are greater in values for highly trained personnel than for less trained workers.

3. Relationship Between Socio-Economic Indicators and the Availability of Health Facility

According to data presented in Table 4-2, urban population, education and income (tax revenue) variables have positive associations with variables representing the supply of health facilities, whereas farming population, farming household and migration variables have negative associations. There are two exceptions: variables representing beds in communicable disease hospitals and health centers have associations with socio-economic variables in directions opposite to those between other health facility variables and socio-economic variables, or else associations are in the same directions but statistically insignificant.

Thus, besides the two exceptions, associations observed in Table 4-2 are similar to those observed in Table 4-1. This result has been expected because those factors which influence supply responses of labor for the production of health are likely to influence supply responses of health capital in the same direction. Magnitudes of these influences appear, however, to be different when they are exerted on health facilities compared to when exerted on health workers. As shown by correlation coefficients, relationships between socio-economic variables and health facility variables are in general weaker than those between socio-economic variables and health manpower variables.

The relative strength of various socio-economic variables' effects on health facility variables differs little from that of their effects on health manpower variables. Associations with health facility variables are the strongest for farming population, urban population and high school education variable, about in that order; and it was for urban population, farming population and tax revenue or high school education variables which had the strongest associations with

Table 4-2. Relationship Between Socio-Economic Indicators and the Availability of Health Facilities Per Population, 1973

Correlation Matrix Unit: Kuns and Cities

Socio-Economic Indicators / Health Facilities	Pop. / Area	Urban Pop. / Pop.	Emigrants / Immigrants	Farm. Pop. / Pop.	Farming Households / Households	Local Tax / Pop.	Middle School Students / Pop. Age (12-14)	High School Students / Pop. Age (15-19)
Hospitals/Pop.	0.14	0.56	-0.32	-0.63	-0.26	0.48	0.46	0.56
Clinics/Pop.	0.14	0.56	-0.32	-0.63	-0.26	0.48	0.46	0.56
Dental Clinics / Pop.	0.48	0.79	-0.48	-0.74	-0.26	0.78	0.66	0.73
Oriental Clinics / Pop.	0.36	0.34	-0.35	-0.40	-0.17	0.50	0.31	0.27
Midwives Clinics / Pop.	0.17	0.73	-0.47	-0.74	-0.17	0.61	0.54	0.70
Health Centers / Pop.	-0.14	-0.14	0.03	-0.02	0.04	-0.20	0.67	-0.01
General Beds / Pop.	0.21	0.43	-0.17	-0.46	-0.19	0.35	0.33	0.42
Tuberculosis Beds / Pop.	0.01	0.18	0.04	-0.20	-0.06	0.17	0.11	0.20
Psychiatry Beds / Pop.	0.25	0.26	-0.13	-0.26	-0.10	0.33	0.25	0.29
Comm. Disease Beds / Pop.	0.06	-0.01	0.02	-0.01	-0.01	-0.02	-0.01	0.00
Total Beds/Pop.	0.19	0.35	-0.12	-0.38	-0.16	0.29	0.26	0.36

Note: n = 172 (170 kuns and cities and 2 special cities)
Significant at .95 level if $r \geq 132$ or ≤ -132
Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

health manpower variables. (Tax revenue variable is about tied with high school education variable for the third place in their relative magnitude of association with health manpower variables.)

It has been noted that associations between communicable disease beds or health centers variables and socio-economic variables are different from those between other health facility variables and socio-economic indicators. This is attributable to the fact that communicable diseases are more prevalent among rural population than urban population and that health centers, operated by the government for low income groups, are more often located in rural areas than in urban areas.

More highly trained health professionals have been observed to be more supply responsive to demand differentials and other factors than less well trained health personnel. For health facilities, however, it is difficult to observe a clear-cut pattern in supply responses according to the category of facility. However, dental clinics and mid-wives clinics have, on the average, stronger associations with socio-economic variables than other health facilities. A greater supply response of dental clinics is to be expected from that of dentists. For mid-wives' clinics, their strong associations have not been expected from those of mid-wives. The underlying reason appears to be that mid-wives often practice without clinics on home-call basis in rural areas, whereas in urban areas, they are likely to have clinics where patients make office visits.

4. <u>The Relationship Between the Supply of Health Professionals and that of Health Facilities</u>

It has been noted that health workers are more responsive to influences of socio-economic factors than health facilities. The difference between labor supply response and capital supply response may be observed by looking at the

correlation between the two. The greater the correlation, the smaller the difference, and vice versa. Table 4-3 presents such correlations in a matrix form.

As expected, there is a greater degree of associations between health workers and facilities for matching categories, that is, between dentists and dental clinics, between mid-wives and mid-wives' clinics, and so forth, than for between non-matching categories. It is interesting to note that the variable representing dental clinics per 1,000 population has greater associations with all health manpower supply variables than other health facilities supply variables.

Associations in general, including those between matching categories, are weaker than expected. This seems to indicate that there are significant variations in labor-capital ratio or mix in the production of health services among kuns.

The principal reason for this is likely to be variations in the quality and kind of health services demanded and supplied among kuns. A secondary reason appears to be the fact that there are differences in the degree of utilization between health workers and facilities and that these differences themselves vary among kuns. It is hypothesized that kuns with higher scales of socio-economic indicators demand and receive service intensive and higher quality health care than kuns with lower scales, and that these kuns use health professionals and health facilities more intensively than kuns with lower scales. It is further hypothesized that difference between kuns in the utilization rate is greater for health capital than for health labor.

Table 4-3. Relationship Between the Availability of Health Manpower Per Population and the Availability of Health Facilities Per Population, 1973

Correlation Matrix Unit: Kuns and Cities

Health Manpower / Health Facilities	Doctors / Pop.	Dentists / Pop.	Herb Drs. / Pop.	Nurses / Pop.	Midwives / Pop.	Pharmacists / Pop.
Hospitals/Pop.	0.69	0.52	0.36	0.61	0.52	0.24
Clinics/Pop.	0.69	0.52	0.36	0.61	0.52	0.24
Dental Clinics / Pop.	0.74	0.74	0.71	0.59	0.48	0.51
Oriental Clinics / Pop.	0.31	0.31	0.65	0.15	0.11	0.36
Midwives Clinics / Pop.	0.65	0.52	0.52	0.48	0.67	0.36
Health Centers / Pop.	0.02	-0.09	-0.12	-0.07	0.04	-0.13
General Beds / Pop.	0.63	0.32	0.26	0.56	0.41	0.23
Tuberculosis Beds / Pop.	0.20	0.20	0.11	0.09	0.11	0.05
Psychiatry Beds / Pop.	0.28	0.34	0.24	0.24	0.21	0.17
Comm. Disease Beds / Pop.	0.05	0.03	-0.00	0.06	0.01	0.00
Total Beds/Pop.	0.53	0.31	0.22	0.45	0.33	0.18

Note: n = 172 (170 kuns and cities and 2 special cities)
Significant at .95 level if $r \geq 132$ or ≤ -132
Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

5. Relationship Between Socio-Economic Variables and Health Services Utilization Variables

The correlation matrix presented in Table 4-4 between socio-economic variables and hospital use variables confirm the hypothesis that kuns with higher scales of socio-economic indicators use health facilities and manpower more intensively than kuns with lower scales. All variables of hospital utilization are positively associated with urban, income, and education variables and negatively associated with migration and farming variables. This indicates that those factors influencing the supply of health workers and facilities are also influencing the rate of utilization of hospital facility as well as per capita hospital use in the same directions.

With data presented in Table 4-4, however, we cannot test another hypothesis stated previously that the difference between kuns in the utilization rate is greater for health capital than for health facilities. This is because we have variables representing the degree of utilization of health capital (beds) but not that of health labor. We attempted unsuccessfully to gather data on labor utilization such as office visits per doctor, hours worked by nurses, etc.

There are exceptions to the usual pattern of association between socio-economic variables and hospital use when hospital use is measured by the number of new visits to hospitals and to clinics and by that of visits to clinics. For these measures of hospital use, there is no discernable association with socio-economic variables.

In terms of the relative importance of their effect on hospital use, urbanization, farming population and high school education are among the most important ones. Thus, it appears that factors that exert stronger influence

Table 4-4. Relationship Between Socio-Economic Indicators and the Utilization of Health Services -- 1973

Correlation Matrix Unit: Kuns and Cities

Socio-Econ. Indicators / Health Serv. Utilization	Pop. / Area	Urban Pop. / Pop.	Emigrants / Immigrants	Farm. Pop. / Pop.	Farm. Households / Households	Local Tax / Pop.	Midd. Sch. Stud. Pop. / Age (12-14)	High Sch. Stud Pop. / Age (15-19)
Tot. # Inpat. / Pop.	0.34	0.64	-0.30	-0.63	-0.24	0.58	0.43	0.58
Tot. # Inpat. Days / Pop.	0.37	0.48	-0.18	-0.52	-0.19	0.46	0.30	0.44
Tot. # Visits / Pop.	0.34	0.65	-0.36	-0.64	-0.25	0.60	0.54	0.64
Tot. # New Visits / Pop.	0.25	0.69	-0.39	-0.66	-0.26	0.61	0.53	0.68
Tot. # Inpat. / Gen. Beds	0.23	0.55	-0.21	-0.52	-0.21	0.51	0.40	0.52
Tot. # Inpat. Days / Gen. Beds	0.17	0.31	-0.09	-0.32	-0.12	0.31	0.18	0.31
Tot. # Visits / Hospitals	0.41	0.61	-0.37	-0.58	-0.23	0.60	0.45	0.59
Tot. # New Visits / Hospitals	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
Tot. # Visits / Clinics	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
Tot. # New Visits / Clinics	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00

Note: n = 172 (170 kuns and cities and 2 special cities) Significant at .95 level if $r \geq 132$ or ≤ -132
Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

84

on the supply of health workers and facilities than other factors also exert stronger influence on hospital use.

When we compare associations between variables representing hospital use per capita and socio-economic variables with those between variables representing the utilization rate of hospital facilities (beds) and socio-economic variables, the former are in general stronger than the latter. This is to be expected because correlation coefficients between per capita hospital use and socio-economic variables reflect the effects of socio-economic variables on per capita use of hospital care in general, which is produced by both labor and capital inputs. On the other hand, correlation coefficients between per bed or per hospital measures of hospital use and socio-economic variables reflect the utilization rate of hospital facility only.

6. Relationship Between the Supply of Health Resources and the Utilization Rate of Hospital Care

It has been noted that socio-economic factors inducing a greater supply of health workers and facilities also induce a greater rate of utilization of such resources. (See Table 4-4.) We examine this phenomenon further by looking at associations between the supply of health resources and the utilization rate of hospital based services. Table 4-5 presents these associations for health workers and Table 4-6 for health facilities in correlation matrix formats.

Except for those three measures of the utilization rate of hospitals and clinics, the number of new visits to hospitals and that of new visits and all visits to clinics, our data show that there are statistically significant associations between the supply of health resources and their utilization. We do not interpret this as evidence supporting Say's law, or more recently called

Table 4-5. Relationship Between the Availability of Health Manpower Per Population and the Utilization of Health Services -- 1973

Correlation Matrix Unit: Kuns and Cities

Health Manpower / Health Services Utilization	Doctors / Pop.	Dentists / Pop.	Herb Drs. / Pop.	Nurses / Pop.	Midwives / Pop.	Pharmacists / Pop.
Tot. # Inpat. / Pop.	0.78	0.49	0.44	0.76	0.52	0.38
Tot. # Inpat. Days / Pop.	0.67	0.47	0.33	0.58	0.42	0.26
Tot. # Visits / Pop.	0.79	0.52	0.44	0.74	0.58	0.38
Tot. # New Visits / Pop.	0.76	0.47	0.49	0.70	0.58	0.39
Tot. # Inpat. / General Beds	0.56	0.43	0.46	0.45	0.31	0.35
Tot. # Inpat. Days / General Beds	0.35	0.32	0.23	0.25	0.22	0.16
Tot. # Visits / Hospitals	0.68	0.46	0.47	0.64	0.47	0.48
Tot. # New Visits / Hospitals	-0.00	-0.00	0.00	0.00	-0.00	-0.00
Tot. # Visits / Clinics	-0.00	-0.00	0.00	0.00	-0.00	-0.00
Tot. # New Visits / Clinics	-0.00	-0.00	0.00	0.00	-0.00	-0.00

Note: n = 172 (170 kuns and cities and 2 special cities)
Significant at .95 level if r $\geq$ 132 or $\leq$ -132
Significant at .99 level if r $\geq$ 187 or $\leq$ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

Table 4-6. Relationship Between the Availability of Health Facilities and the Utilization of Health Services, 1973

Correlation Matrix Unit: Kuns and Cities

Hlth. Fac. / Hlth. Service Utilization	Hosp. / Pop.	Clinics / Pop.	Dental Clinics / Pop.	Oriental Clinics / Pop.	Midwives Clinics / Pop.	Hlth. Ctrs. / Pop.	Gen. Beds / Pop.	Tuberculosis Beds / Pop.	Psychiatry Beds / Pop.	Comm. Dis.Beds / Pop.	Total Beds / Pop.
Tot. # Inpat. / Pop.	0.64	0.64	0.54	0.30	0.44	-0.01	0.70	0.16	0.20	0.03	0.55
Tot. # Inpat. Days / Pop.	0.62	0.62	0.44	0.21	0.38	0.20	0.77	0.65	0.22	0.05	0.74
Tot. # Visits / Pop.	0.66	0.66	0.58	0.29	0.51	0.08	0.68	0.12	0.19	0.02	0.51
Tot. # New Visits / Pop.	0.67	0.67	0.58	0.28	0.57	0.06	0.65	0.13	0.17	0.01	0.49
Tot. # Inpat. / Gen. Beds	0.46	0.46	0.51	0.38	0.37	-0.11	0.39	0.28	0.22	0.00	0.36
Tot. # Inpat. Days / Gen. Beds	0.24	0.24	0.30	0.17	0.26	-0.09	0.22	0.91	0.18	0.01	0.42
Tot. # Visits / Hospitals	0.50	0.50	0.57	0.30	0.48	-0.08	0.52	0.07	0.30	0.02	0.40
Tot. # New Visits / Hospitals	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00
Tot. # Visits / Clinics	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00
Tot. # New Visits / Clinics	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00

Note: n = 172 (170 kuns and cities and 2 special cities)
significant at .95 level if r $\geq$ 132 or $\leq$ -132
significant at .99 level if r $\geq$ 187 or $\leq$ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

Roemer's law, that supply creates demand; instead it is an evidence supporting our inferences drawn from data presented in Tables 4-1, 4-2 and 4-4. If we restate these inferences, the third factors, namely socio-economic factors, inducing a greater supply of health resources, also induce a greater utilization of these resources.

Data presented in Tables 4-5 and 4-6 provide some new insights by enabling us to make comparisons between supply responses to influences of socio-economic factors and the actual rate of utilization induced by these same influences. An added advantage is that such comparisons can be made between each category of health resources and that of hospital use.

Table 4-5 shows that the supply of physicians and nurses is more closely associated with the utilization of hospital care per capita and per hospital (bed) than that of other health professionals. This must be attributable to the fact that doctors and nurses work at hospitals more often than others.

As for associations between the supply of health facilities and hospital use, the supply of general beds, hospital and clinics is more closely associated with hospital use than that of other facilities. (See Table 4-6.) The reason appears to be obvious--the utilization of services represented is those based on hospitals only.

As expected from their closer associations with socio-economic variables, variables representing the utilization of hospital care per capita have greater correlation coefficients with the supply of health manpower variables than those representing the utilization of hospital care per hospital (bed). The same observation can be made for associations between the supply of health facilities variables and hospital use per capita vs. that per hospital (bed) and clinic-

It is to be noted that associations between the number of health centers per 1,000 population and hospital use are exceptions in that they are more often than not insignificant and negative.

7. Relationship Between Socio-Economic Variables and Health Resources Mix

It has been hypothesized that there is a significant difference in the kind of health services demanded and received by residents of each kun according to socio-economic indicators of that kun. Since we do not have any data on the quality and kind of health services purchased in each kun, we test this hypothesis by examining the relationship between the imput-mix used for the production of health services in each kun and socio-economic variables of that kun.

The relationship we examine is represented by correlation coefficients as presented in Table 4-7 in a matrix format. Input-mix is measured by five variables representing labor-mix, four variables representing capital-labor mix and one variable representing capital-mix. In a strict sense, these are not input-mix measures because these variables do not represent the amount of various inputs actually used but that of inputs available. To the extent to which the degree of utilization differs among inputs according to socio-economic variables, a bias is introduced.

Data presented in Table 4-7 show that those socio-economic variables which brought forth a greater supply of health resources and their utilization, are associated with a greater number of doctors per other health workers except per pharmacist. Kuns with greater values in urbanization, income and education variables have a greater number of doctors per dentist, herb doctor, nurse and mid-wive, and a smaller number of doctors per pharmacist than other kuns.

Table 4-7. Relationship Between Socio-Economic Indicators and Health Resources Mix, 1973

Correlation Matrix Unit: Kuns and Cities

Socio-Economic Indicators / Hlth. Resources Mix	Pop. / Area	Urban Pop. / Pop.	Emigrants / Immigrants	Farm. Pop. / Pop.	Farm. Households / Households	Local Tax / Pop.	Middle Students Pop. / Age (12-14)	High Students Pop. / Age (15-19)
Drs./Dentists	0.06	0.33	-0.28	-0.30	-0.20	0.25	0.28	0.35
Drs./Herb Drs.	0.07	0.20	0.01	-0.12	-0.11	0.10	0.04	0.13
Drs./Nurses	-0.05	0.01	-0.05	-0.03	0.02	0.05	0.26	0.03
Drs./Midwives	0.17	0.27	-0.13	-0.27	-0.16	0.23	0.21	0.21
Drs. / Pharmacists	-0.04	-0.06	-0.00	0.07	-0.04	-0.07	-0.00	-0.05
Drs. / General Beds	0.56	0.21	-0.14	-0.22	-0.08	0.25	0.08	0.18
Drs. / Total Beds	0.01	0.41	-0.23	-0.39	-0.17	0.29	0.49	0.60
Hospitals / Clinics	0.12	0.24	-0.19	-0.32	-0.17	0.20	0.21	0.22
Drs. / Hospitals	0.39	0.64	-0.40	-0.65	-0.26	0.62	0.43	0.59
Drs. / Clinics	0.11	0.29	-0.05	-0.21	-0.18	0.16	0.13	0.18

Note: n = 172 (170 kuns and cities and 2 special cities)

Significant at .95 level if $r \geq 132$ or ≤ -132

Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

This shows that kuns with higher scale of socio-economic indicators have labor-mix of such nature where there are more doctors vis-à-vis supportive and other health professionals. Pharmacists are exceptions in that associations between the number of doctors per pharmacist and socio-economic variables are mostly negative and all statistically insignificant. Labor-mix as revealed in Table 4-7 has been expected from the data presented in Table 4-1 which have shown that the supply responses of doctors and other highly trained health professionals to socio-economic indicators is stronger than that of less well trained health workers. The exception for pharmacists appears to be attributable to the fact that pharmacists replace doctors to a greater extent in providing primary care in areas with lower scale of socio-economic indicators than in areas with higher scale.

As for capital-labor mix, kuns with higher scale of socio-economic indicators have a smaller amount of capital--hospitals (beds) and clinics--per doctor than kuns with lower scale. So far as doctors represent labor input and hospitals (beds) and clinics represent capital input, a higher staff-facility or staff-bed ratio and relatively more labor and service intensive method of production are associated with higher scale of socio-economic indicators. Since a higher staff-bed ratio also indicates more intensive use of health facilities, this result has been expected from data presented in Table 4-4 which have shown positive associations between socio-economic indicators and the utilization of health resources.

To sum up, residents in area with higher scales of socio-economic indicators demand and receive more doctor centered health services and more service intensive hospital care than those in area with lower scales.

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8. The Relationship Between Health Resources Mix and Health Resources Utilization

It has been shown that kuns with higher scales of socio-economic indicators have higher staff-bed ratios than those with lower scales. A hypothesis is then advanced that a higher staff-bed ratio indicates a higher rate of utilization of hospital resources. This hypothesis and others are tested by data presented in Table 4-8.

Except for those three measures of utilization of hospitals and clinics, the number of all visits to clinics and that of new visits to hospitals, all four measures of labor-capital mix or staff-bed and staff-hospital ratio have positive associations with hospital use. This supports the hypothesis that a higher staff-bed ratio indicates a higher rate of hospital utilization, regardless of whether hospital use is measured per population or per facility. Associations are stronger when labor-capital ratio is measured by the number of physicians per hospital and that per clinics than when measured by the number of physicians per (total or general) bed.

This result suggests that those socio-economic variables which induce a higher rate of hospital use also induce higher labor-capital ratios. (See Tables 4-4 and 4-7.) If we look at this from another angle, a higher staff-bed ratio is usually a response to a greater demand for hospital care and a greater demand for hospital care is associated with higher scales of socio-economic indicators.

As for labor-mix, the ratios of doctors to dentists, herb doctors and to mid-wives are positively and significantly associated with hospital use, but those of doctors to nurses and pharmacists are in most cases negatively associated with hospital use and associations are all insignificant.

This result has also been expected from data presented in Tables 4-4 and 4-7. Table 4-7 has shown mostly significant associations of socio-economic variables

Table 4-8. The Relationship Between the Utilization of Health Services and Health Resources Mix -- 1973

Correlation Matrix Unit: Kuns and Cities

Hlth. Resources Mix / Hlth. Service Utilization	Drs. / Dentists	Drs. / Herb Drs.	Drs. / Nurses	Drs. / Midwives	Drs. / Pharmacists	Drs. / Gen. Beds	Drs. / Total Beds	Hospitals / Clinics	Drs. / Hospitals	Drs. / Clinics
Tot. # Inpat. / Pop.	0.38	0.23	-0.04	0.21	-0.02	0.20	0.23	0.29	0.56	0.30
Tot. # Inpat. Days / Pop.	0.24	0.14	-0.05	0.12	-0.01	0.28	0.22	0.17	0.48	0.17
Tot. # Visits / Pop.	0.36	0.24	-0.01	0.21	-0.02	0.19	0.44	0.34	0.59	0.34
Tot. # New Visits / Pop.	0.33	0.22	-0.00	0.21	-0.02	0.15	0.48	0.36	0.58	0.32
Tot. # Inpat. / Gen. Beds	0.21	0.10	0.05	0.23	-0.00	0.15	0.42	0.35	0.56	0.25
Tot. # Inpat. Days / Gen. Beds	0.15	0.08	-0.01	0.09	0.05	0.14	0.27	0.11	0.33	0.10
Total # Visits / Hospitals	0.30	0.20	0.05	0.23	-0.04	0.20	0.45	0.35	0.79	0.34
Tot. # New Visits / Hospitals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. # Visits / Clinics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tot. # New Visits / Clinics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: n = 172 (170 kuns and cities and 2 special cities)
Significant at .95 level if $r \geq 132$ or ≤ -132
Significant at .99 level if $r \geq 187$ or ≤ -187

Sources: Our questionnaire survey, Republic of Korea Government publications and other materials.

with the ratios of doctors to dentists, herb doctors and to mid-wives, but mostly insignificant associations with the ratios of doctors to nurses and pharmacists. A priori also, the ratio of physicians to nurses is expected to be negatively associated with hospital use because nurses work at hospitals more often than doctors.

Our only measure of capital-mix, the ratio of the number of hospitals to that of clinics, shows positive associations with measures representing hospital use. Obviously, the availability of a greater number of hospitals vis-à-vis that of clinics denotes a greater rate of hospital use.

9. Summary

Residents in kuns with higher scales of socio-economic indicators have a greater number of health professionals and health facilities available and use them to a greater extent than those in kuns with lower scales. The former also receive more doctor centered and labor intensive care than the latter.

Chapter V

Multivariate Analyses of Socio-Economic Factors Affecting the Availability, Utilization and Mix of Health Resources

1. Why Multivariate Analyses?

In Chapter 4, associations between socio-economic variables and the availability, utilization and mix of health resources are examined by constructing correlation matrices. Although analyses of correlation matrices brought out much enlightening information, knowledge thus gained suffers from two basic infirmities inherent in the statistical nature of simple correlation analysis. The two weaknesses are: (1) the direction of causation is not assumed to be in one or the other way, and (2) the relationship between two variables indicated by a correlation coefficient may be spurious because of their joint association with third factors.

Multivariate analyses done with multiple regressions mostly overcome these methodological defects. First, in regression analyses, we assume that there is one way causation or influence from independent variables to dependent variable. In order to justify this assumption, we first formulate theories on how exogenous variables—socio-economic indicators—influence dependent variable—health resources. Such theorizing is done in Chapter 4 within the framework of supply, demand and production functions. Our theory postulates that forces are exerted in one direction only, and if the theory is not valid, the use of regression would lead to a simultaneity bias.

Second, the estimation procedure of multiple regression is designed to avoid spurious relations by isolating the effect on the dependent variable of one independent variable from those of others. This is done by inserting into regression those other variables which are likely to influence the dependent variables, as control variables. For example, simple correlations between urbanization variables and health resource variables may reflect the effect of the higher income and/or that of better education in urban area on health

96

resources. By inserting income and education variables into regression, we are able to interpret b coefficient of urbanization variable as its influences on health resources through other features of urban life such as urbanites' consumer preference, the attraction of amenity of city living, etc. For, the effects on health resources of income and education are taken into account in computing b coefficient of urbanization variables.

2. 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 5-1 presents regression analyses 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 percent of total population has turned out to be the most important variable influencing the availability of doctors per 1,000 population, 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 explained 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.

As it has been shown that there are more doctors per population in a kun according to its degree of urbanization, Table 5-1 also shows that there are fewer numbers of doctors per population according to the proportion of farming

Table 5-1. The Effects of Socio-Economic Variables on the Availability of Doctors and Dentists per 1,000 Population

Dep. Var. / Indep. Vars.	doctors/population: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions	Dep. Var. / Indep. Vars.	dentists/population: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.345	0.012	0.003	0.645	% urban population	0.339	0.003	0.001	0.502
% farming population	-0.261	-0.012	0.003	0.061	tax / population	0.174	0.011	0.006	0.031
population density	0.279	0.000	0.000	0.027	% farming population	-0.207	-0.003	0.001	0.012
high sch. std. / 15-17 age pop.	0.286	0.167	0.049	0.021	population density	0.110	0.000	0.000	0.009
elem.sch.tch. / elem. student	0.183	1.275	0.308	0.017	emigrants / immigrants	0.095	0.001	0.000	0.006
% farming household	-0.115	-0.000	0.000	0.011	high sch. std. / 15-17 age pop.	0.094	0.014	0.015	0.003
midl.sch.std. / 12-14 age pop.	-0.068	-0.050	0.049	0.001	elem.sch.std. / 6-11 age pop.	-0.020	-0.004	0.012	0.000
emigrants / immigrants	0.012	0.000	0.001	0.000	midl.sch.tch. / students	-0.017	-0.012	0.040	0.000
	Constant = -0.008		total R^2 = 0.783			Constant = 0.001		total R^2 = 0.563	

Regression DF = 8 F = 73.25
Residual DF = 163

Analysis of Variance: significant at .95 level if $F \geq 2.02$
significant at .99 level if $F \geq 2.66$

Regression DF = 8 F = 26.22
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

population each kun has. The fact that 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 mainly done in rural areas and, therefore, farming population variable is strongly (and negatively) correlated with urban population variable. Since b coefficient of farming population is statistically significant (at .99 level), this suggests that among rural areas, there are more doctors available in places where there exists some manufacturing or other non-farming industries than in places where there is only farming.

Population density is shown to have positive influences on the supply of doctors, apart from that exerted by urban population and farming population variables. Obviously, population density is higher in kuns with greater proportion of urban population and in those with smaller proportion of farming population. The fact that population density has a statistically significant (at .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 proportion 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 higher proportion of their high school age population attending high schools tend to induce a greater number of doctors to come. It has been hypothesized that more educated people have stronger preference for health care vis-à-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 urban population is more educated than 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 primary school level, whereas the high school education variable reflects the quantity of education at secondary school level. Both measures of investment in education apparently exert (statistically) significant influence on the supply of doctors.

In spite of the fact that kuns with greater proportion of farming population have greater proportion of farming household, farming household variable is shown to have statistically significant (and negative) b coefficient. Although this reasoning may be too imaginative, this seems to imply that a household as a decision-making unit exerts a separate influence on doctors' supply apart from an individual as a decision-making unit. A literal way to interpret this result is to say that among kuns with equal proportion of farming population, those with greater proportion of farming household have fewer number of doctors.

Two remaining socio-economic variables—middle school students as 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 these variables may exert on doctors' supply, their influences 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 explain 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 number of observation is 171--relatively large--and the fact that R square as calculated here excludes overlapping influences of these independent variables. Reflecting these facts, we have F value for this regression of 73.25--a highly significant value. These denote that eight independent variables have been judiciously chosen.

B. Supply of Dentists

More or less, the same factors which were shown to influence physician supply are also influencing 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 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 effect on the demand for health services and, thereby, its effect on the supply of health personnel is 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 variables, 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 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 that on physician supply is attributable to the fact that dental care includes proportionately a greater discretionary component

than physicians' services from the standpoint of consumer choices.

Urban population, farming population and population density variables are shown to exert similar influence on dentists' supply to that exerted on physician supply. The strength of these influences on dentists' supply (in terms of the contribution made to R square) are, however, smaller than those on physicians. Reflecting this fact, the entire R square of this regression on dentists' supply with eight independent variables is 0.563, which is considerably smaller than that for the regression on doctors' supply of 0.78. Apparently, inter-kun differences in dentists' supply is less amenable to explanations by socio-economic variables we have chosen than those in doctors' supply.

Three out of the four remaining variables—migration, elementary school pupil and middle school teacher—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 significant 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 run on physician and dentists' supply, with minor variations. Urban population, population density and farming population continue to be important variables explaining inter-kun differences in nurses' supply.

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

Table 5-2. The Effects of Socio-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. std. 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 $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	clinics/population: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	-0.440	-17.378	3.574	0.396
elem.sch.tch. students	0.409	2421.848	379.270	0.074
tax population	0.192	40.920	19.744	0.026
high sch. tch. students	0.146	152.760	62.833	0.016
high sch. std. 15-17 age 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 $\geq$1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$2.59 or $\leq$ -2.95

income variable in that on dentists' supply have been shown to have significant b coefficients in addition to urban and farming variables.

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

The strong showing of urban population in regressions on nurses' and doctors' supply and the weak showing in that on dentists' supply are not expected from our previous simple correlation analyses. Table 4-1 on page 4-4 in Chapter 4 has shown that the correlation between urban population variable and nurses' supply is weaker with 0.69 than that between urban population variable and dentists' supply, which is 0.71.

Three more regressions are 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 presented in the appendix for this chapter. One interesting finding to be noted here is that our income variable has turned out to be the most important variable explaining inter-kun difference in herb doctors' supply.

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

Eleven regressions are 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 5-2 and 5-3. The results of three other regressions are presented in the Appendix for this chapter (5A-9 to 5A-15). 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 5-3). 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 availability of health professionals. Urban population, population density and tax (income) variables have positive and significant influences on the availability of health facilities, as expected. Farming population and farming household variables have negative and significant effects on the availability of health facilities. Except for the ratio of the number 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 availability of health facilities which are similar to their effects on the

Table 5-3. The Effects of Socio-Economic Variables on the Availability of Dental Clinics 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	0.080
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	5.130	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
	Constant = -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 $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	general beds/population: Beta co-efficients	b co-efficient	Standard errors b	R^2 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	86.498	0.012
% farming household	-0.138	-8.451	4.148	0.014
% urban population	0.215	331.015	191.791	0.011
	Constant = -3048.321		total R^2 = 0.413	

Regression DF = 8 F = 14.36
Residual DF = 163

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

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 direction. 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 be influenced in more or less the same manner by socio-economic factors. Regression analyses as presented in Tables 5-1, 5-2 and 5-3 and in the Appendix to this chapter confirm this hypothesis. It is pointed out, however, that the supply of labor and that of capital for the production of health services are not expected to respond to socio-economic factors in exactly the same manner. The question of the relative sensitivity of supply responses between labor and capital for the production of health services is an important one to pursue. This question is examined in Section 6 of this chapter.

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

It is hypothesized that the supply of health professionals is associated with a socio-economic 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, 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 relative sensitivity of supply responses to various socio-economic variables among different categories of health professionals.

The basic hypothesis about the effects of socio-economic variables on labor-mix is that more skilled health workers are more sensitive to inter-kun differences in socio-economic variables than less skilled workers. Since medical doctors are the most highly trained among health workers, if the ratio of number 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 regressions neither support nor reject this hypothesis conclusively.

In general, there are no clear-cut relationships between the measures of labor-mix chosen and the selected socio-economic variables. Although R^2 are all significant at .99 level according to the analysis of variance (F ratio), their values are relatively small, ranging from .099 to .144 (see Table 5-4 and Appendix 5A-17). Furthermore, all b co-efficients are statistically insignificant at .95 level. The reason for this failure to support or reject our

Table 5-4. 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: 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
emigrants immigrants	-0.141	-1.311	0.803	0.021
% farming household	-0.144	-0.071	0.040	0.009
high sch. tch. students	-0.088	-37.464	35.453	0.007
elem.sch.tch. students	0.057	136.934	196.603	0.003
midl.sch.tch. students	0.044	40.545	74.257	0.002
% urban population	0.098	1.216	1.768	0.001
tax population	-0.060	-5.219	10.940	0.001

Constant = 3.984 total R^2 = 0.144

Regression DF = 8 F = 4.05
Residual DF = 163

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	doctors/mid-wives: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.160	1.577	1.370	0.073
population density	0.071	0.026	0.031	0.010
% farming household	-0.085	-0.033	0.032	0.007
high sch. tch. students	-0.073	-25.039	29.256	0.004
elem.sch.std. 6-11 age pop.	-0.097	-22.651	19.236	0.003
midl.sch.std. 12-14 age pop.	0.195	39.954	28.524	0.005
high sch. std. 15-17 age pop.	-0.159	-25.815	27.517	0.005
elem.sch.tch. students	-0.065	-126.126	173.725	0.003

Constant = 7.424 total R^2 = 0.110

Regression DF = 8 F = 2.51
Residual DF = 163

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

hypothesis appears to lie in the fact that in areas with positive socio-economic indices, allied health professionals are more often registered 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 socio-economic variables on a particular labor-mix, namely, the mix of those workers based in hospitals and those who are not (see Table 5-5 and pages 5A-19 through 5A-22 of the Appendix). 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 indicates that a proportionately greater number of nurses work at hospitals in more "desirable" areas than in less "desirable" areas. This is to be expected because a proportionately greater number of more qualified 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.

Table 5-5. The Effects of Socio-Economic Variables on Labor-Mix and Capital-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	271.148	55.354	0.085
% farming population	-0.298	-1.230	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 population	-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 = 0.179

Regression DF = 12 F = 2.98
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	hospitals/clinics: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	-0.306	-0.098	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	0.155	2.894	1.599	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

Regression DF = 11 F = 3.26
Residual DF = 160

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

The Effects of Socio-Economic Variables on 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 5-5 and 5-6 and in Appendices 5A-24 through 5A-27 support this hypothesis.

As medical doctors are the most skilled health professionals, hospitals are the most advanced and complex of the variety of health facilities. Thus, the ratios of the number 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 variables are regressed on this measure of capital-mix, for most of the important variables--important in terms of their contribution 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 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 negatively associated with the supply of health facilities (see Tables 5-2 and 5-3), has an even smaller access to hospitals than a non-farming population.

Table 5-6. 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			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
tax population	0.405	2.627	0.876	0.187
population density	-0.138	-0.005	0.003	0.017
% farming population	-0.122	-0.147	0.162	0.009
midl.sch.std. 12-14 age pop.	-0.120	-2.300	2.757	0.006
high sch. tch. students	0.071	2.257	2.598	0.003
elem.sch.std. 6-11 age pop.	-0.047	-1.026	1.748	0.003
high sch. std. 15-17 age pop.	0.064	0.973	2.477	0.001
emigrants immigrants	-0.024	-0.017	0.063	0.000

Constant = 0.181 total R^2 = 0.226

Regression DF = 12 F = 3.89
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	hospitals/health centers			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	-0.349	-0.022	0.008	0.244
high sch. std. 15-17 age pop.	0.324	0.260	0.123	0.027
elem.sch.tch. students	0.148	1.408	0.781	0.020
high sch. tch. students	0.074	0.126	0.129	0.008
% farming household	-0.093	-0.000	0.000	0.005
midl.sch.tch. students	0.093	0.335	0.292	0.006
elem.sch.std. 6-11 age pop.	-0.069	-0.080	0.087	0.003
% urban population	-0.080	-0.004	0.007	0.002

Constant = -0.010 total R^2 = 0.315

Regression DF = 12 F = 6.09
Residual DF = 159

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

6. The Effects of Socio-Economic Variables on 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 capital-labor mix in the production of health services. One reason is that the quality of health services is often directly related to 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 and 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 rather 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 5-7 and 5-8 and in pages 5A-29 through 5A-46 of the Appendix.

Table 5-7. 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: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions	Dep. Var. / Indep. Vars.	nurses/general beds: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
population density	0.736	0.438	0.046	0.317	population density	0.768	0.324	0.031	0.401
elem.sch.tch. / students	0.256	819.480	233.829	0.052	elem.sch.tch. / students	0.206	467.662	155.298	0.035
high sch. std. / 15-17 age pop.	0.322	86.976	33.329	0.009	high sch. std. / 15-17 age pop.	0.354	67.630	22.135	0.016
midl.sch.std. / 12-14 age pop.	-0.199	-67.834	39.655	0.010	midl.sch.std. / 12-14 age pop.	-0.210	-50.564	26.337	0.011
tax / population	-0.200	-23.104	12.188	0.008	tax / population	-0.175	-14.291	8.095	0.006
% farming household	-0.062	-0.041	0.044	0.005	% farming household	-0.050	-0.023	0.029	0.004
emigrants / immigrants	-0.072	-0.884	0.901	0.003	emigrants / immigrants	-0.063	-0.549	0.598	0.003
midl.sch.tch. / students	-0.041	-50.172	88.354	0.001	midl.sch.tch. / students	-0.041	-35.527	.680	0.001
	Constant = -9.782		total R^2 = 0.405			Constant = -4.885		total R^2 = 0.477	

Regression DF = 8 F = 13.94
Residual DF = 163

Regression DF = 8 F = 18.52
Residual DF = 163

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

115

Table 5-3. The Effects of Socio-Economic Variables on Labor-Capital Mix: The Ratio of Physicians 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. / students	-0.044	-79.504	121.867	0.002
high sch. tch. / students	-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 $\geq$ 2.02
significant at .99 level if F $\geq$ 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 $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

116

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 labor-capital ratio, the reciprocal of 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 impact 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 labor-capital ratio (see Appendix 5A-45). More than 60% of inter-kun differences in the ratios of nurses to health centers are explained by twelve socio-economic variables inserted. As for more important measures of labor-capital ratios--doctors/general hospital beds, nurses/general beds, doctors/hospitals and 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.

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

Results of regression analyses presented in this chapter 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 relationship is 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 status 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.

Urban population and farming population variables are shown to have the most important effects on all of our four measures of per capita 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 5-9 and pages 5A-50 and 5A-51 of the Appendix).

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 association is measured by R squares (see Table 5-10 and pages 5A-52 through 5A-59 of the Appendix). The underlying reason must be the association shown between the availability of hospitals or clinics and socio-economic variables. The urban population variable is again the most important variable affecting

Table 5-9. The Effects of Socio-Economic Variables on per Capita Utilization 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	Standard 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. / 12-14 age pop.	-0.192	-85788.393	51448.543	0.007
tax / population	0.120	18155.556	16356.688	0.004
elem.sch.tch. / students	0.099	415074.742	293124.795	0.005

Constant = -1505.629 total R^2 = 0.499

Regression DF = 12 F = 13.38
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 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. / students	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 $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-10. The Effects of Socio-Economic Variables on the Utilization 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.sch.std. / 12-14 age pop.	-0.077	-43.222	72.879	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	

Regrcssion DF = 11 F = 8.45
Residual DF = 160

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 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	179849.402	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	18625.194	22590.263	0.004
% farming household	-0.032	-37.782	76.572	0.001
emigrants / immigrants	-0.030	-657.393	1617.947	0.001
	Constant = 4963.215		total R^2 = 0.489	

Regression DF = 11 F = 13.87
Residual DF = 160

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

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 and use the available resources to a greater extent than those in areas with lower indicators.

8. Summary

The results of multivariate analyses as presented in this chapter may give the impression that we have been belaboring the obvious. All hypotheses based on more or less accepted theoretical observations have been supported with one exception. The exception is found in testing the hypothesis about the effect of socio-economic variables on labor-mix. In this case, our regression results neither confirmed nor rejected the hypothesis. Belaboring what appears to be the obvious to some can be justified on the grounds that what had been accepted as the obvious sometimes has turned out to be a wrong assumption when it is tested with empirical data. Secondly, what is obvious for one may be new information for another.

The following is a summary of results of hypothesis testings presented in this chapter:

(a) Population variables (as represented by urban population as percent of total kun population and population density) and, to a lesser extent, the per capita income variable have turned out to have positive, and in most cases statistically significant effects on the availability of health professionals and facilities. Farming population as percent of the total population and, to a lesser extent, farming households as 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.

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

(c) Residents in areas with higher socio-economic indicators have better access to hospital-centered (in contrast to clinic or health-center based) services than those in areas with lower indicators.

(d) Urban population variables and per capita income variables (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.

(e) 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-economic variables and negatively to negative indicators.

Table 5-3. The Effects of Socio-Economic Variables on the Availability of Dental Clinics ~~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	0.080
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	5.130	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
	Constant = -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 $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	general beds/population			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 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	86.498	0.012
% farming household	-0.138	-8.451	4.148	0.014
% urban population	0.215	331.015	191.791	0.011
	Constant = -3048.321		total R^2 = 0.413	

Regression DF = 8 F = 14.36
Residual DF = 163

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-4. 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: 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
emigrants immigrants	-0.141	-1.311	0.803	0.021
% farming household	-0.144	-0.071	0.040	0.009
high.sch. tch. students	-0.088	-37.464	35.453	0.007
elem.sch.tch. students	0.057	136.934	196.603	0.003
midl.sch.tch. students	0.044	40.545	74.257	0.002
% urban popu[illegible]ion	0.098	1.216	1.768	0.001
tax population	-0.060	-5.219	10.940	0.001

Constant = 3.984 total R^2 = 0.144

Regression DF = 8 F = 4.05
Residual DF = 163

Dep. Var. / Indep. Vars.	doctors/mid-wives: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.160	1.577	1.370	0.073
population density	0.071	0.026	0.031	0.010
% farming household	-0.085	-0.033	0.032	0.007
high sch. tch. students	-0.073	-25.039	29.256	0.004
elem.sch.std. 6-11 age pop.	-0.097	-22.651	19.236	0.003
midl.sch.std. 12-14 age pop.	0.195	39.954	28.524	0.005
high sch. std. 15-17 age pop.	-0.159	-25.815	27.517	0.005
elem.sch.tch. students	-0.065	-126.126	173.725	0.003

Constant = 7.424 total R^2 = 0.110

Regression DF = 8 F = 2.51
Residual DF = 163

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 3-5. The Effects of Socio-Economic Variables on Labor-Mix and Capital-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	271.148	55.354	0.085
% farming population	-0.298	-1.230	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 population	-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 = 0.179	

Regression DF = 12 F = 2.98
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	hospitals/clinics: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	-0.306	-0.098	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	1.599	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	

Regression DF = 11 F = 3.26
Residual DF = 160

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-6. 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: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
tax population	0.405	2.627	0.876	0.187
population density	-0.138	-0.005	0.003	0.017
% farming population	-0.122	-0.147	0.162	0.009
midl.sch.std. 12-14 age pop.	-0.120	-2.300	2.757	0.006
high sch. tch. students	0.071	2.257	2.598	0.003
elem.sch.std. 6-11 age pop.	-0.047	-1.026	1.748	0.003
high sch. std. 15-17 age pop.	0.064	0.973	2.477	0.001
emigrants immigrants	-0.024	-0.017	0.063	0.000

Constant = 0.181 total R^2 = 0.226

Regression DF = 12 F = 3.89
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	hospitals/health centers: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% farming population	-0.349	-0.022	0.008	0.244
high sch. std. 15-17 age pop.	0.324	0.260	0.123	0.027
elem.sch.tch. students	0.148	1.408	0.781	0.020
high sch. tch. students	0.074	0.126	0.129	0.008
% farming household	-0.093	-0.000	0.000	0.005
midl.sch.tch. students	0.093	0.335	0.292	0.006
elem.sch.std. 6-11 age pop.	-0.069	-0.080	0.087	0.003
% urban population	-0.080	-0.004	0.007	0.002

Constant = -0.010 total R^2 = 0.315

Regression DF = 12 F = 6.09
Residual DF = 159

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-7. 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: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions	Dep. Var. / Indep. Vars.	nurses/general beds: Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
population density	0.736	0.438	0.046	0.317	population density	0.768	0.324	0.031	0.401
elem.sch.tch. / students	0.256	819.480	233.829	0.052	elem.sch.tch. / students	0.206	467.662	155.298	0.035
high sch. std. / 15-17 age pop.	0.322	86.976	33.329	0.009	high sch. std. / 15-17 age pop.	0.354	67.630	22.135	0.016
midl.sch.std. / 12-14 age pop.	-0.199	-67.834	39.655	0.010	midl.sch.std. / 12-14 age pop.	-0.210	-50.564	26.337	0.011
tax / population	-0.200	-23.104	12.188	0.008	tax / population	-0.175	-14.291	8.095	0.006
% farming household	-0.062	-0.041	0.044	0.005	% farming household	-0.050	-0.023	0.029	0.004
emigrants / immigrants	-0.072	-0.884	0.901	0.003	emigrants / immigrants	-0.063	-0.549	0.598	0.003
midl.sch.tch. / students	-0.041	-50.172	88.354	0.001	midl.sch.tch. / students	-0.041	-35.527	58.680	0.001
	Constant = -9.782		total R^2 = 0.405			Constant = -4.885		total R^2 = 0.471	

Regression DF = 8 F = 13.94
Residual DF = 163

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Regression DF = 8 F = 18.52
Residual DF = 163

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-8. The Effects of Socio-Economic Variables on Labor-Capital Mix: The Ratio of Physicians 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. students	-0.044	-79.504	121.867	0.002
high sch. tch. students	-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 $\geq$ 2.02
significant at .99 level if F $\geq$ 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 $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-9. The Effects of Socio-Economic Variables on per Capita Utilization 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	Standard 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. / 12-14 age pop.	-0.192	-85788.393	51448.543	0.007
tax / population	0.120	18155.556	16356.688	0.004
elem.sch.tch. / students	0.099	415074.742	293124.795	0.005

Constant = -1505.629 total R^2 = 0.498

Regression DF = 12 F = 13.38
Residual DF = 159

Analysis of Variance: significant at .95 level if F $\geq$ 2.02
significant at .99 level if F $\geq$ 2.66

Dep. Var. / Indep. Vars.	total visits/population			
	Beta co-efficients	b co-efficient	Standard errors b	R^2 Additions
% urban population	0.139	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. / students	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 $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

Table 5-10. The Effects of Socio-Economic Variables on the Utilization 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.sch.std. / 12-14 age pop.	-0.077	-43.222	72.879	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 $\geq$ 2.02
significant at .99 level if F $\geq$ 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	179849.402	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	18625.194	22590.263	0.004
% farming household	-0.032	-37.782	76.572	0.001
emigrants / immigrants	-0.030	-657.393	1617.947	0.001

Constant = 4963.215 total R^2 = 0.489

Regression DF = 11 F = 13.87
Residual DF = 160

b co-efficient: significant at .95 level if t ratio $\geq$ 1.96 or $\leq$ -1.96
significant at .99 level if t ratio $\geq$ 2.59 or $\leq$ -2.95

APPENDIX

KEY TO VARIABLE NUMBERS

Independent Variables: Socio-Economic Variables*

Variable Number	
67	population density
68	urban/population
69	emigrants/immigrants
70	farming population/population
71	farming households/households
72	local tax/population
73	elementary school teachers/students
74	middle school teachers/students
75	high school teachers/students
76	elementary school students/age 6-11 population
77	middle school students/age 12-14 population
78	high school students/age 15-17 population

*These 12 variables are inserted into all regressions as independent variables.

KEY TO VARIABLE NUMBERS

Dependent Variables:
The Availability of Health Professionals
(per 1,000 population)

Variable Number		Regressions with following variables as dependent variables are presented in:
79	doctors/population	Table 5-1
80	dentists/population	Table 5-1
81	herb doctors/population	Appendix for Chap.5
82	nurses/population	Table 5-2
83	mid-wives/population	Appendix for Chap.5
84	pharmacists/population	Appendix for Chap.5

(3)

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

56-3 * M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR081 herb doctors/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR067

MULTIPLE R 0.70167
R SQUARE 0.49234
STANDARD ERROR .00358

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR072	0.03063	0.32858	0.01020	9.019
VAR070	-0.00418	-0.24224	0.00189	4.910
VAR078	0.03262	0.14946	0.02882	1.281
VAR073	-0.14862	-0.05733	0.18277	0.661
VAR075	-0.01756	-0.03825	0.03023	0.338
VAR071	-0.00001	-0.01996	0.00003	0.093
VAR077	-0.00832	-0.03023	0.03208	0.067
VAR069	-0.00022	-0.02169	0.00073	0.087
VAR076	-0.00379	-0.01204	0.02034	0.035
VAR068	0.00034	0.02547	0.00171	0.039
VAR074	-0.00691	-0.00703	0.06839	0.010
VAR067	-0.00000	-0.00580	0.00004	0.006
(CONSTANT)	0.00747			

---------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	0.00198	0.00016	12.84991
RESIDUAL	159.	0.00204	0.00001	

MULTIPLE REGRESSION 07/18/75

5A-4

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR081 herb doctors/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR072	0.65004	0.42256	0.42256	0.65004
VAR070	0.69266	0.47977	0.05722	-0.62242
VAR078	0.69824	0.48754	0.00776	0.57493
VAR073	0.69992	0.48989	0.00235	-0.22892
VAR075	0.70070	0.49097	0.00109	-0.30151
VAR071	0.70101	0.49141	0.00044	-0.25326
VAR077	0.70123	0.49173	0.00032	0.47965
VAR069	0.70139	0.49195	0.00023	-0.42497
VAR076	0.70154	0.49216	0.00020	-0.13242
VAR068	0.70163	0.49228	0.00013	0.61689
VAR074	0.70165	0.49232	0.00003	-0.29200
VAR067	0.70167	0.49234	0.00002	0.30126
(CONSTANT)				

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR083 mid-wives/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR073

MULTIPLE R 0.69363
R SQUARE 0.48113
STANDARD ERROR 0.00369

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	0.00588	0.43501	0.00176	11.102
VAR070	-0.00537	-0.30496	0.00195	7.614
VAR076	0.05414	0.16876	0.02097	6.666
VAR078	0.05949	0.26740	0.02971	4.011
VAR072	-0.00817	-0.08599	0.01051	0.604
VAR075	0.03436	0.07340	0.03116	1.216
VAR077	-0.04938	-0.17601	0.03307	2.230
VAR074	-0.09693	-0.09682	0.07050	1.890
VAR071	0.00002	0.03792	0.00004	0.329
VAR067	-0.00002	-0.03743	0.00004	0.244
VAR069	0.00032	0.03188	0.00075	0.183
VAR073	0.02267	0.00858	0.18839	0.014
(CONSTANT)	0.00038			

VARIABLES

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	0.00201	0.00017	12.28612
RESIDUAL	159.	0.00217	0.00001	

Best Available Document

135

5A-6

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR083 mid-wives/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.63574	0.40416	0.40416	0.63574
VAR070	0.65827	0.43332	0.02915	-0.61097
VAR076	0.67355	0.45367	0.02035	-0.00259
VAR078	0.67868	0.46060	0.00693	0.59690
VAR072	0.68230	0.46554	0.00494	0.46710
VAR075	0.68524	0.46956	0.00402	-0.23444
VAR077	0.68761	0.47281	0.00326	0.48603
VAR074	0.69158	0.47828	0.00547	-0.26715
VAR071	0.69255	0.47962	0.00134	-0.19332
VAR067	0.69318	0.48049	0.00087	0.12942
VAR069	0.69360	0.48108	0.00059	-0.34138
VAR073	0.69363	0.48113	0.00005	-0.09423
(CONSTANT)				

(3)

31-7

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR084 pharmacists/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR073

MULTIPLE R	0.52739
R SQUARE	0.27814
STANDARD ERROR	0.03682

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	0.02307	0.20170	0.01761	1.716
VAR070	-0.03493	-0.22844	0.01942	3.071
VAR072	0.08023	0.09980	0.10488	0.585
VAR077	-0.36982	-0.15583	0.32990	1.257
VAR078	0.32128	0.17070	0.29638	1.175
VAR075	0.21139	0.05339	0.31089	0.462
VAR067	0.00025	0.05936	0.00037	0.440
VAR074	-0.17381	-0.02052	0.70338	0.061
VAR076	0.05071	0.01869	0.20920	0.059
VAR069	0.00159	0.01854	0.00753	0.045
VAR071	-0.00006	-0.01346	0.00035	0.030
VAR073	0.15791	0.00706	1.87961	0.007
(CONSTANT)	0.02899			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA I[illegible]

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	0.08308	0.00692	5.10546
RESIDUAL	159.	0.21561	0.00136	

5A-8

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR084 pharmacists/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.48360	0.23387	0.23387	0.48360
VAR070	0.50623	0.25830	0.02443	-0.48061
VAR072	0.51548	0.26572	0.00742	0.44427
VAR077	0.51810	0.26843	0.00271	0.31052
VAR078	0.52220	0.27270	0.00427	0.42172
VAR075	0.52437	0.27497	0.00227	-0.16873
VAR067	0.52661	0.27731	0.00235	0.23372
VAR074	0.52688	0.27760	0.00029	-0.18451
VAR076	0.52709	0.27782	0.00022	-0.11604
VAR069	0.52726	0.27800	0.00018	-0.27752
VAR071	0.52736	0.27811	0.00011	-0.18854
VAR073	0.52739	0.27814	0.00003	-0.14246
(CONSTANT)				

KEY TO VARIABLE NUMBERS

Dependent Variables:
The Availability of Health Facilities
(per 1,000 population)

Variable Number		Regressions with following variables as dependent variables are presented in:
85	hospitals/population	not presented
86	clinics/population	Table 5-2
87	dental clinics/population	Table 5-3
88	oriental clinics/population	Appendix for Chap.5
89	mid-wives clinics/population	Appendix for Chap.5
90	health centers/population	Appendix for Chap.5
91	general beds/population	Table 5-3
92	tuberculosis beds/population	not presented
93	psychiatric beds/population	not presented
94	communicable disease beds/population	not presented
95	total beds/population	not presented

271

MULTIPLE REGRESSION — 07/18/75

5A-10

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * *

DEPENDENT VARIABLE.. VAR088 oriental clinics/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR071

MULTIPLE R	0.57182
R SQUARE	0.32698
STANDARD ERROR	29.48340

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR072	243.86781	0.36585	83.97454	8.434
VAR073	-2394.48950	-0.12918	1504.89023	2.532
VAR069	-6.86231	-0.09652	6.03073	1.295
VAR067	0.28730	0.08339	0.29754	0.932
VAR076	153.74118	0.06833	167.49760	0.842
VAR074	-379.64607	-0.05407	563.15535	0.454
VAR078	-416.89874	-0.26714	237.29227	3.087
VAR070	-25.01863	-0.20253	15.54872	2.589
VAR077	305.60879	0.15530	264.13463	1.339
VAR075	-175.92592	-0.05358	248.90741	0.500
VAR068	-9.84205	-0.10380	14.09856	0.487
VAR071	0.08084	0.02144	0.28379	0.081
(CONSTANT)	85.08572			

VARIA...

VARIABLE	BETA

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	67150.79086	5595.89924	6.43746
RESIDUAL	159.	138214.09371	869.27103	

SA-11

141

MULTIPLE REGRESSION 07/18/75

FILE ES532 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR088 oriental clinics/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR072	0.49707	0.24708	0.24708	0.49707
VAR073	0.51549	0.26573	0.01865	-0.30371
VAR069	0.52971	0.28060	0.01487	-0.35142
VAR067	0.53793	0.28937	0.00877	0.35657
VAR076	0.54365	0.29556	0.00619	0.01482
VAR074	0.54905	0.30145	0.00590	-0.25245
VAR078	0.55391	0.30681	0.00536	0.26728
VAR070	0.56274	0.31668	0.00987	-0.39676
VAR077	0.56820	0.32285	0.00617	0.30521
VAR075	0.56974	0.32461	0.00176	-0.18806
VAR068	0.57152	0.32664	0.00203	0.33946
VAR071	0.57182	0.32698	0.00034	-0.16851
(CONSTANT)				

5A-12

MULTIPLE REGRESSION

FILE ESS32 (CREATION DATE = 07/18/75) 07/18/75

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR089 Mid-wives clinics/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR076

MULTIPLE R 0.80472
R SQUARE 0.64758
STANDARD ERROR 13.90523

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-35.44592	-0.44026	7.33323	23.364
VAR078	411.69432	0.40476	111.91389	13.533
VAR068	9.16419	0.14829	6.64929	1.899
VAR077	-269.96457	-0.21048	124.57353	4.696
VAR071	0.31091	0.12653	0.13384	5.396
VAR067	-0.28133	-0.12529	0.14033	4.019
VAR073	-1215.24790	-0.10059	709.74974	2.932
VAR072	27.34821	0.06295	39.60482	0.477
VAR074	-189.02716	-0.04130	265.60035	0.507
VAR069	-1.71379	-0.03699	2.84427	0.363
VAR075	-36.71952	-0.01716	117.39193	0.098
VAR076	7.11701	0.00485	78.99671	0.008
(CONSTANT)	71.81555			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	56491.38258	4707.61521	24.34697
RESIDUAL	159.	30743.49031	193.35528	

5A-13

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR089 mid-wives clinics/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.73780	0.54435	0.54435	-0.73780
VAR078	0.77860	0.60621	0.06186	0.70363
VAR068	0.78580	0.61748	0.01127	0.72487
VAR077	0.79092	0.62556	0.00808	0.54250
VAR071	0.79539	0.63265	0.00709	-0.16879
VAR067	0.79717	0.63548	0.00283	0.17132
VAR073	0.80180	0.64288	0.00740	-0.14862
VAR072	0.80330	0.64529	0.00240	0.60737
VAR074	0.80400	0.64641	0.00113	-0.28408
VAR069	0.80458	0.64734	0.00093	-0.46657
VAR075	0.80471	0.64756	0.00022	-0.35038
VAR076	0.80472	0.64758	0.00002	-0.14899
(CONSTANT)				

5A-14

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* MULTIPLE REGRESSION * * * * * *

DEPENDENT VARIABLE.. VAR090 health centers/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR069

MULTIPLE R	0.65798
R SQUARE	0.43294
STANDARD ERROR	5.02929

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR073	2053.43554	0.59611	256.70475	63.987
VAR075	223.81686	0.36683	42.45872	27.788
VAR077	95.42816	0.26094	45.05619	4.486
VAR067	0.14712	0.22979	0.05076	8.402
VAR072	-21.50747	-0.17363	14.32441	2.254
VAR070	-4.73103	-0.20609	2.65231	3.182
VAR068	-2.37668	-0.13488	2.40494	0.977
VAR071	-0.03275	-0.04675	0.04841	0.458
VAR074	44.54245	0.03413	96.06325	0.215
VAR076	9.56859	0.02289	28.57180	0.112
VAR078	6.57138	0.02266	40.47740	0.026
VAR069	-0.06043	-0.00457	1.02872	0.003
(CONSTANT)	-44.02753			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	3070.49417	255.87451	10.11611
RESIDUAL	159.	4021.70748	25.29376	

MULTIPLE REGRESSION 01/18/7?

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * *

DEPENDENT VARIABLE.. VAR090 health centers/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR073	0.49754	0.24754	0.24754	0.49754
VAR075	0.57184	0.32700	0.07946	0.26422
VAR077	0.61399	0.37698	0.04998	0.06708
VAR067	0.63590	0.40436	0.02738	-0.14245
VAR072	0.64369	0.41433	0.00997	-0.19549
VAR070	0.65264	0.42594	0.01161	-0.01597
VAR068	0.65579	0.43006	0.00412	-0.13455
VAR071	0.65674	0.43131	0.00125	0.04206
VAR074	0.65760	0.43243	0.00112	0.01113
VAR076	0.65790	0.43284	0.00040	0.04943
VAR078	0.65797	0.43293	0.00009	-0.00621
VAR069	0.65798	0.43294	0.00001	0.02737
(CONSTANT)				

A-15

145

KEY TO VARIABLE NUMBERS

Dependent Variables:
Health Manpower Mix
(Labor-Mix)

Variable Number		Regressions with following variables as dependent variables are presented in:
96	doctors/dentists	Table 5-4
97	doctors/herb doctors	Appendix for Chap.5
98	doctors/nurses	not presented
99	doctors/mid-wives	Table 5-4
100	doctors/pharmacists	not presented
111	hospital staff doctors/doctors	Appendix for Chap.5
112	hospital staff dentists/dentists	Appendix for Chap.5
113	hospital staff pharmacists/pharmacists	not presented
114	hospital staff nurses/nurses	Table 5-5

SA-17

MULTIPLE REGRESSION 07/18/7

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR097' doctors/herb doctors

VARIABLE(S) ENTERED ON STEP NUMBER 11.. VAR067

MULTIPLE R 0.31387
R SQUARE 0.09851
STANDARD ERROR 3.16864

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR068	2.26463	0.25640	1.37425	2.716
VAR074	91.87976	0.14047	60.50995	2.306
VAR069	0.70391	0.10629	0.60879	1.337
VAR071	-0.03746	-0.10667	0.03005	1.554
VAR076	-15.88070	-0.07577	17.95742	0.782
VAR073	-174.97682	-0.10134	160.06257	1.195
VAR075	-23.68284	-0.07744	26.70299	0.787
VAR072	-6.61704	-0.10657	9.02490	0.538
VAR078	10.62053	0.07306	25.39673	0.175
VAR077	-11.42893	-0.06235	28.28577	0.163
VAR067	-0.00135	-0.00421	0.03130	0.002
(CONSTANT)	7.32149			

---------- VARIABLES I

VARIABLE	BETA IN
VAR070	0.00106

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	11.	175.54644	15.95877	1.58948
RESIDUAL	160.	1606.44231	10.04026	

5A-18

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N

DEPENDENT VARIABLE.. VAR097 doctors/herb doctors

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.19679	0.03872	0.03872	0.19679
VAR074	0.24211	0.05862	0.01989	0.07153
VAR069	0.26348	0.06942	0.01080	0.01442
VAR071	0.28441	0.08089	0.01147	-0.10761
VAR076	0.29210	0.08532	0.00443	-0.11394
VAR073	0.29907	0.08944	0.00412	-0.11804
VAR075	0.30619	0.09376	0.00431	-0.10467
VAR072	0.31197	0.09732	0.00357	0.09548
VAR078	0.31239	0.09759	0.00027	0.12961
VAR077	0.31385	0.09850	0.00091	0.04359
VAR067	0.31387	0.09851	0.00001	0.06635
(CONSTANT)				

5A-19

551

06/02/75

MULTIPLE REGRESSION

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR111 hospital staff doctors/doctors

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR075

MULTIPLE R	0.36742
R SQUARE	0.13500
STANDARD ERROR	0.01577

---------------- VARIABLES IN THE EQUATION ----------------

VARIABLE	B	BETA	STD ERROR B	F
VAR067	0.00033	0.20161	0.00016	4.240
VAR069	-0.00347	-0.10358	0.00322	1.160
VAR074	0.30050	0.09073	0.30114	0.996
VAR070	-0.00703	-0.12073	0.00831	0.716
VAR077	-0.15016	-0.16177	0.14124	1.130
VAR078	0.10714	0.14555	0.12689	0.713
VAR072	0.02526	0.08033	0.04490	0.316
VAR071	-0.00005	-0.02775	0.00015	0.106
VAR068	-0.00262	-0.05862	0.00754	0.121
VAR073	-0.23840	-0.02727	0.80473	0.088
VAR076	0.00793	0.00748	0.08957	0.008
VAR075	0.01055	0.00681	0.13310	0.006
(CONSTANT)	0.01614			

---------------- VARIABLE

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	0.00617	0.00051	2.06788
RESIDUAL	159.	0.03952	0.00025	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR111 hospital staff doctors/doctors

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR067	0.28901	0.08353	0.08353	0.28901
VAR069	0.32941	0.10851	0.02498	-0.19950
VAR074	0.33814	0.11434	0.00583	0.00320
VAR070	0.35155	0.12359	0.00925	-0.23331
VAR077	0.35492	0.12597	0.00238	0.06858
VAR078	0.36181	0.13090	0.00494	0.15539
VAR072	0.36389	0.13242	0.00151	0.25887
VAR071	0.36553	0.13361	0.00119	-0.10507
VAR068	0.36653	0.13434	0.00073	0.19439
VAR073	0.36732	0.13492	0.00058	-0.17134
VAR076	0.36737	0.13496	0.00004	-0.05075
VAR075	0.36742	0.13500	0.00003	-0.07670
(CONSTANT)				

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR112 hospital staff dentists/dentists

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR072

MULTIPLE R	0.48398
R SQUARE	0.23424
STANDARD ERROR	0.24503

- VARIABLES IN THE EQUATION -

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-0.30002	-0.31173	0.12922	5.391
VAR078	3.60696	0.29665	1.97208	3.345
VAR077	-2.77795	-0.18118	2.19516	1.601
VAR074	3.34032	0.06106	4.68025	0.509
VAR071	-0.00173	-0.05895	0.00236	0.539
VAR075	-1.15270	-0.04506	2.06861	0.311
VAR076	0.77614	0.04428	1.39203	0.311
VAR068	0.03191	0.04319	0.11717	0.074
VAR069	0.02277	0.04110	0.05012	0.206
VAR073	-4.15827	-0.02879	12.50678	0.111
VAR067	-0.00071	-0.02653	0.00247	0.083
VAR072	0.12584	0.02423	0.69789	0.033
(CONSTANT)	0.32414			

ALL VARIABLES ARE IN THE EQUATION

VARIABLES NOT IN	
VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	2.92008	0.24334	4.05300
RESIDUAL	159.	9.54627	0.06004	

152

SA-22

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR112 : hospital staff dentists/dentists

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.44133	0.19477	0.19477	-0.44133
VAR078	0.46077	0.21231	0.01754	0.40954
VAR077	0.47333	0.22404	0.01173	0.28794
VAR074	0.47565	0.22624	0.00220	-0.10268
VAR071	0.47862	0.22908	0.00284	-0.18863
VAR075	0.48013	0.23053	0.00145	-0.20506
VAR076	0.48131	0.23166	0.00113	-0.05812
VAR068	0.48227	0.23259	0.00093	0.41523
VAR069	0.48313	0.23342	0.00083	-0.23966
VAR073	0.48354	0.23381	0.00040	-0.10127
VAR067	0.48382	0.23408	0.00027	0.13158
VAR072	0.48398	0.23424	0.00016	0.34320
(CONSTANT)				

KEY TO VARIABLE NUMBERS

Dependent Variables: Health Facilities Mix (Capital-Mix)

'ariable Number		Regressions with following variables as dependent variables are presented in'
115	hospitals/clinics	Table 5-5
116	hospitals/dental clinics	Appendix for Chap.5
117	hospitals/oriental clinics	Appendix for Chap.5
118	hospitals/mid-wives clinics	Table 5-6
119	hospitals/health centers	Table 5-6

154

5A-24

MULTIPLE REGRESSION

FILE ESS03 (CREATION DATE = 06/02/75) 06/02/75

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR116 hospitals/dental clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR072

MULTIPLE R 0.53491
R SQUARE 0.28613
STANDARD ERROR 0.30473

- VARIABLES IN THE EQUATION -

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-0.37579	-0.30313	0.16071	5.468
VAR067	-0.00245	-0.07095	0.00308	0.636
VAR078	0.92375	0.05898	2.45255	0.142
VAR076	-1.73535	-0.07686	1.73119	1.005
VAR069	-0.05088	-0.07131	0.06233	0.666
VAR073	16.23666	0.08720	15.55392	1.090
VAR071	-0.00281	-0.07421	0.00293	0.916
VAR068	0.09467	0.09949	0.14572	0.422
VAR075	1.24296	0.03772	2.57260	0.233
VAR077	1.82953	0.09264	2.72999	0.449
VAR074	3.31093	0.04699	5.82054	0.324
VAR072	-0.05915	-0.00884	0.86793	0.005
(CONSTANT)	0.07310			

------------ VARIABLES

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	5.91794	0.49316	5.31085
RESIDUAL	159.	14.76462	0.09286	

5A-25

MULTIPLE REGRESSION 06/02/75

FILE ES503 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * * * * *

DEPENDENT VARIABLE.. VAR116 hospitals/dental clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.49291	0.24296	0.24296	-0.49291
VAR067	0.50729	0.25734	0.01438	0.03683
VAR078	0.51688	0.26716	0.00982	0.43087
VAR076	0.52139	0.27185	0.00469	-0.14108
VAR069	0.52436	0.27495	0.00310	-0.33565
VAR073	0.52639	0.27709	0.00214	0.02738
VAR071	0.52984	0.28073	0.00365	-0.21029
VAR068	0.53147	0.28246	0.00173	0.44484
VAR075	0.53247	0.28352	0.00106	-0.17149
VAR077	0.53343	0.28455	0.00103	0.37759
VAR074	0.53489	0.28611	0.00156	-0.18306
VAR072	0.53491	0.28613	0.00002	0.34245
(CONSTANT)				

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR117 hospitals/oriental clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12... VAR076

MULTIPLE R	0.35221
R SQUARE	0.12405
STANDARD ERROR	0.22663

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-0.13911	-0.16714	0.11952	1.355
VAR072	1.11407	0.24806	0.64549	2.979
VAR067	-0.00413	-0.17785	0.00229	3.258
VAR075	1.59640	0.07216	1.91329	0.696
VAR074	2.07563	0.04387	4.32884	0.230
VAR078	2.18149	0.20747	1.82401	1.430
VAR077	-2.18249	-0.16460	2.03034	1.155
VAR073	-3.79280	-0.03037	11.56773	0.108
VAR071	-0.00068	-0.02668	0.00218	0.097
VAR069	0.01245	0.02598	0.04636	0.072
VAR068	-0.01799	-0.02816	0.10837	0.028
VAR076	-0.15985	-0.01054	1.28751	0.015
(CONSTANT)	0.17293			

ALL VARIABLES ARE IN THE EQUATION

VARIABL

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	1.15654	0.09638	1.87645
RESIDUAL	159.	8.16656	0.05136	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR117 hospitals/oriental clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.26772	0.07168	0.07168	-0.26772
VAR072	0.28835	0.08314	0.01147	0.26254
VAR067	0.32021	0.10253	0.01939	0.00465
VAR075	0.32860	0.10798	0.00545	-0.04270
VAR074	0.33417	0.11167	0.00369	-0.07284
VAR078	0.33742	0.11385	0.00218	0.25668
VAR077	0.34946	0.12212	0.00826	0.16220
VAR073	0.35068	0.12297	0.00085	-0.06078
VAR071	0.35136	0.12346	0.00048	-0.13706
VAR069	0.35193	0.12385	0.00040	-0.16544
VAR068	0.35209	0.12397	0.00011	0.26095
VAR076	0.35221	0.12405	0.00008	-0.08288
(CONSTANT)				

KEY TO VARIABLE NUMBERS

Dependent Variables: Mix of Health Manpower and Facilities (Labor-Capital Mix)

Variable Number		Regressions with following variables as dependent variables are presented in:
101	doctors/general beds	Table 5-7
102	doctors/tuberculosis beds	Appendix for Chap.5
103	doctors/psychiatric beds	Appendix for Chap.5
104	doctors/communicable disease beds	Appendix for Chap.5
105	doctors/total beds	not presented
106	nurses/general beds	Table 5-7
107	nurses/tuberculosis beds	Appendix for Chap.5
108	nurses/psychiatric beds	Appendix for Chap.5
109	nurses/communicable disease beds	Appendix for Chap.5
110	nurses/total beds	not presented
120	doctors/hospitals	Table 5-8
121	doctors/clinics	Appendix for Chap.5
122	doctors/oriental clinics	not presented
123	doctors/health centers	not presented
124	nurses/hospitals	Table 5-8
125	nurses/clinics	Appendix for Chap.5
126	nurses/dental clinics	not presented
127	nurses/oriental clinics	not presented
128	nurses/mid-wives clinics	not presented
129	nurses/health centers	Appendix for Chap.5

SA-29

151

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* MULTIPLE REGRESSION * * * * * *

DEPENDENT VARIABLE.. VAR102 doctors/tuberculosis beds

VARIABLE(S) ENTERED ON STEP NUMBER 11.. VAR076

MULTIPLE R	0.59987
R SQUARE	0.35984
STANDARD ERROR	2.61478

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR067	0.13054	0.41536	0.02613	24.953
VAR070	-2.00125	-0.17760	1.25069	2.560
VAR073	-262.32982	-0.15514	132.07317	3.945
VAR077	-20.30221	-0.11310	23.42304	0.751
VAR075	-14.66149	-0.04895	21.66210	0.458
VAR072	3.60179	0.05924	6.99122	0.265
VAR071	0.00814	0.02367	0.02516	0.105
VAR069	0.12617	0.01945	0.53252	0.056
VAR074	9.74304	0.01521	49.57309	0.039
VAR078	1.20072	0.00843	19.76331	0.004
VAR076	0.80824	0.00394	14.54425	0.003
(CONSTANT)	7.83185			

VARIABLE

VARIABLE	BETA IN
VAR068	0.00023

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	11.	614.90971	55.90088	8.17616
RESIDUAL	160.	1093.92937	6.83706	

5A-30

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S * * * * * *

DEPENDENT VARIABLE.. VAR102 doctors/tuberculosis beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR067	0.56366	0.31772	0.31772	0.56366
VAR070	0.57823	0.33436	0.01664	-0.29543
VAR073	0.59216	0.35065	0.01630	-0.38461
VAR077	0.59597	0.35518	0.00453	0.09209
VAR075	0.59824	0.35789	0.00271	-0.14193
VAR072	0.59897	0.35877	0.00088	0.38034
VAR071	0.59949	0.35939	0.00062	-0.10662
VAR069	0.59968	0.35962	0.00023	-0.15215
VAR074	0.59985	0.35982	0.00020	-0.06996
VAR078	0.59986	0.35983	0.00001	0.16200
VAR076	0.59987	0.35984	0.00001	-0.07712
(CONSTANT)				

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR103 doctors/psychiatric beds

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR076

MULTIPLE R 0.50662
R SQUARE 0.25667
STANDARD ERROR 3.01699

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	1.14355	0.12386	1.44268	0.628
VAR067	0.04212	0.12557	0.03045	1.914
VAR078	54.09120	0.35597	24.28171	4.962
VAR077	-58.82263	-0.30699	27.02845	4.736
VAR070	-1.69493	-0.14092	1.59107	1.135
VAR073	176.54422	0.09781	153.99285	1.314
VAR072	9.00067	0.13868	8.59297	1.097
VAR069	0.63366	0.09154	0.61711	1.054
VAR074	-30.38975	-0.04445	57.62672	0.278
VAR075	-12.21251	-0.03820	25.47027	0.230
VAR071	-0.01174	-0.03199	0.02904	0.164
VAR076	6.50775	0.02971	17.13974	0.144
(CONSTANT)	-0.69867			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION.

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	499.72722	41.64393	4.57515
RESIDUAL	159.	1447.25071	9.10221	

MULTIPLE REGRESSION 07/18/75

SA-32

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR103 doctors/psychiatric beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.43026	0.18512	0.18512	0.43026
VAR067	0.45007	0.20256	0.01744	0.24629
VAR078	0.46350	0.21483	0.01227	0.40232
VAR077	0.48449	0.23473	0.01990	0.24952
VAR070	0.49024	0.24034	0.00561	-0.40541
VAR073	0.49472	0.24474	0.00441	-0.07248
VAR072	0.49876	0.24876	0.00402	0.40766
VAR069	0.50287	0.25288	0.00412	-0.19229
VAR074	0.50439	0.25441	0.00153	-0.16288
VAR075	0.50520	0.25522	0.00081	-0.22675
VAR071	0.50596	0.25599	0.00077	-0.14746
VAR076	0.50662	0.25667	0.00067	-0.12654
(CONSTANT)				

SA-33

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR104 doctors/communicable disease beds

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR070

MULTIPLE R	0.49756
R SQUARE	0.24756
STANDARD ERROR	0.23292

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR078	4.17073	0.35769	1.87465	4.950
VAR068	0.09719	0.13719	0.11138	0.761
VAR074	6.46794	0.12328	4.44902	2.114
VAR071	-0.00279	-0.09904	0.00224	1.548
VAR076	-1.19522	-0.07110	1.32326	0.816
VAR077	1.31908	0.08971	2.08671	0.400
VAR073	9.88391	0.07136	11.88889	0.691
VAR067	0.00213	0.08256	0.00235	0.817
VAR075	1.12991	0.04606	1.96641	0.330
VAR072	-0.27349	-0.05491	0.66341	0.170
VAR069	-0.01615	-0.03041	0.04764	0.115
VAR070	0.03094	0.03352	0.12284	0.063
(CONSTANT)	-0.29210			

VARIABLE	VARIABLE BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	2.83817	0.23651	4.35943
RESIDUAL	159.	8.62632	0.05425	

5A-34

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR104 doctors/communicable disease beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR078	0.46671	0.21781	0.21781	0.46671
VAR068	0.47284	0.22358	0.00576	0.41986
VAR074	0.47917	0.22961	0.00603	-0.10189
VAR071	0.48573	0.23593	0.00632	-0.18139
VAR076	0.48913	0.23925	0.00332	-0.09921
VAR077	0.49089	0.24097	0.00172	0.37803
VAR073	0.49239	0.24245	0.00148	-0.03019
VAR067	0.49492	0.24494	0.00250	0.11665
VAR075	0.49633	0.24634	0.00140	-0.16667
VAR072	0.49691	0.24692	0.00058	0.32294
VAR069	0.49725	0.24726	0.00034	-0.23042
VAR070	0.49756	0.24756	0.00030	-0.37042
(CONSTANT)				

161

MULTIPLE REGRESSION 07/18/75

5A-35

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR107 nurses/tuberculosis beds

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR078

MULTIPLE R 0.58290
R SQUARE 0.33977
STANDARD ERROR 3.33541

------------------- VARIABLES IN THE EQUATION -------------------

VARIABLE	B	BETA	STD ERROR B	F
VAR067	0.13448	0.34175	0.03366	15.962
VAR073	-503.83752	-0.23797	170.24592	8.758
VAR070	-2.52430	-0.17891	1.75900	2.059
VAR077	-20.10513	-0.08945	29.88115	0.453
VAR075	-20.58415	-0.05489	28.15851	0.534
VAR071	0.02272	0.05277	0.03210	0.501
VAR072	6.08352	0.07990	9.49991	0.410
VAR069	0.40500	0.04987	0.68225	0.352
VAR068	-0.30769	-0.02841	1.59495	0.037
VAR074	-11.03633	-0.01376	63.70890	0.030
VAR076	-1.99452	-0.00776	18.94875	0.011
VAR078	-2.11478	-0.01186	26.84451	0.006
(CONSTANT)	13.51567			

ALL VARIABLES ARE IN THE EQUATION

------------- VARIABLES

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	910.30179	75.85848	6.81876
RESIDUAL	159.	1768.87089	11.12497	

5A-36

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * *

DEPENDENT VARIABLE.. VAR107 nurses/tuberculosis beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR067	0.52960	0.28047	0.28047	0.52960
VAR073	0.56288	0.31684	0.03637	-0.42366
VAR070	0.57324	0.32860	0.01176	-0.26471
VAR077	0.57582	0.33156	0.00296	0.08683
VAR075	0.57854	0.33471	0.00315	-0.12882
VAR071	0.58025	0.33669	0.00198	-0.09340
VAR072	0.58128	0.33788	0.00119	0.36364
VAR069	0.58246	0.33926	0.00138	-0.11989
VAR068	0.58268	0.33952	0.00026	0.24373
VAR074	0.58284	0.33970	0.00018	-0.08685
VAR076	0.58288	0.33974	0.00004	-0.07287
VAR078	0.58290	0.33977	0.00003	0.14200
(CONSTANT)				

5A-37

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E   R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR108 nurses/psychiatric beds

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR076

MULTIPLE R	0.50477
R SQUARE	0.25479
STANDARD ERROR	3.26439

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	1.51460	0.15181	1.56099	0.941
VAR067	0.05811	0.16029	0.03294	3.111
VAR078	52.18434	0.31780	26.27290	3.945
VAR077	-47.97668	-0.23170	29.24488	2.691
VAR070	-1.84534	-0.14197	1.72155	1.149
VAR069	0.66348	0.08869	0.66772	0.987
VAR073	127.74762	0.06550	166.62083	0.588
VAR072	4.71573	0.06724	9.29763	0.257
VAR074	-24.42632	-0.03306	62.35233	0.153
VAR075	-12.35409	-0.03576	27.55693	0.201
VAR071	-0.01151	-0.02902	0.03142	0.134
VAR076	3.63205	0.01534	18.54527	0.038
(CONSTANT)	0.10997			

VARIABLES

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	579.31439	48.27620	4.53032
RESIDUAL	159.	1694.34271	10.65624	

MULTIPLE REGRESSION 07/18/75

5A-38 FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR108 nurses/psychiatric beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.43883	0.19257	0.19257	0.43883
VAR067	0.46542	0.21662	0.02404	0.27078
VAR078	0.47826	0.22873	0.01211	0.40726
VAR077	0.49062	0.24071	0.01198	0.27058
VAR070	0.49540	0.24542	0.00471	-0.41257
VAR069	0.49859	0.24859	0.00317	-0.18997
VAR073	0.50068	0.25068	0.00209	-0.10203
VAR072	0.50228	0.25229	0.00161	0.40209
VAR074	0.50326	0.25327	0.00098	-0.16256
VAR075	0.50397	0.25398	0.00072	-0.22801
VAR071	0.50459	0.25461	0.00063	-0.14925
VAR076	0.50477	0.25479	0.00018	-0.12367
(CONSTANT)				

591

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* MULTIPLE REGRESSION * * * * *

DEPENDENT VARIABLE.. VAR109 nurses/communicable disease beds

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR073

MULTIPLE R 0.60031
R SQUARE 0.36038
STANDARD ERROR 0.16805

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	0.22546	0.40669	0.08036	7.872
VAR078	3.05429	0.33474	1.35252	5.100
VAR075	2.90811	0.15149	1.41873	4.202
VAR067	0.00252	0.12489	0.00170	2.201
VAR072	-0.73341	-0.18818	0.47864	2.348
VAR074	2.64787	0.06450	3.20989	0.680
VAR071	-0.00114	-0.05185	0.00162	0.499
VAR070	-0.06125	-0.08480	0.08862	0.478
VAR076	-0.42493	-0.03230	0.95471	0.198
VAR077	-0.37833	-0.03288	1.50552	0.063
VAR069	0.00371	0.00893	0.03437	0.012
VAR073	-0.73358	-0.00677	8.57761	0.007
(CONSTANT)	-0.02952			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF.	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	2.52992	0.21083	7.46529
RESIDUAL	159.	4.49030	0.02824	

MULTIPLE REGRESSION 07/18/75

FILE ESS32 (CREATION DATE = 07/18/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR109 nurses/communicable disease beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.54380	0.29572	0.29572	0.54380
VAR078	0.55952	0.31306	0.01734	0.51499
VAR075	0.57810	0.33420	0.02114	-0.12397
VAR067	0.58266	0.33950	0.00529	0.20067
VAR072	0.59282	0.35144	0.01194	0.38680
VAR074	0.59468	0.35364	0.00220	-0.13213
VAR071	0.59733	0.35680	0.00316	-0.21351
VAR070	0.59892	0.35870	0.00190	-0.48194
VAR076	0.60003	0.36004	0.00134	-0.12431
VAR077	0.60025	0.36030	0.00026	0.39015
VAR069	0.60029	0.36035	0.00005	-0.24593
VAR073	0.60031	0.36038	0.00003	-0.13670
(CONSTANT)				

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * *

DEPENDENT VARIABLE.. VAR121 doctors/clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR078

MULTIPLE R	0.41030
R SQUARE	0.16834
STANDARD ERROR	0.63358

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	0.97591	0.53241	0.30297	10.376
VAR075	7.64730	0.12049	5.34886	2.044
VAR076	-5.04170	-0.11592	3.59941	1.962
VAR072	-2.00390	-0.15551	1.80456	1.233
VAR071	-0.01255	-0.17216	0.00610	4.233
VAR067	0.01008	0.15142	0.00639	2.488
VAR073	48.71624	0.13595	32.33909	2.269
VAR074	15.25053	0.11235	12.10184	1.588
VAR070	0.20231	0.08472	0.33413	0.367
VAR069	0.07245	0.05271	0.12960	0.313
VAR077	4.39004	0.11540	5.67608	0.598
VAR078	-3.73090	-0.12367	5.09925	0.535
(CONSTANT)	-0.34148			

VARIABL

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	12.91975	1.07665	2.6820
RESIDUAL	159.	63.82611	0.40142	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR121 doctors/clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.29431	0.08662	0.08662	0.29431
VAR075	0.32110	0.10310	0.01648	-0.01460
VAR076	0.34052	0.11596	0.01285	-0.10013
VAR072	0.35498	0.12601	0.01005	0.15855
VAR071	0.36765	0.13517	0.00916	-0.17638
VAR067	0.37923	0.14382	0.00865	0.11308
VAR073	0.39012	0.15220	0.00838	-0.00884
VAR074	0.39932	0.15946	0.00726	-0.01012
VAR070	0.40396	0.16318	0.00372	-0.20859
VAR069	0.40578	0.16466	0.00148	-0.05466
VAR077	0.40687	0.16554	0.00089	0.13132
VAR078	0.41030	0.16834	0.00280	0.18248
(CONSTANT)				

5A-43

MULTIPLE REGRESSION 06/02/75

FILE ES503 (CREATION DATE = 06/02/75) * MULTIPLE REGRESSION * * * * * * * * *

DEPENDENT VARIABLE.. VAR125 nurses/clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR073

MULTIPLE R 0.37735
R SQUARE 0.14239
STANDARD ERROR 1.44668

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
VAR075	40.89807	0.28657	12.21328	11.213
VAR068	1.80459	0.43784	0.69178	6.805
VAR077	-21.20496	-0.24790	12.96045	2.677
VAR069	0.26256	0.08496	0.29591	0.787
VAR071	-0.00565	-0.03446	0.01392	0.164
VAR067	0.00873	0.05829	0.01460	0.358
VAR072	-2.46364	-0.08503	4.12043	0.357
VAR078	4.00115	0.05898	11.64336	0.118
VAR070	-0.06755	-0.01258	0.76294	0.008
VAR074	2.34787	0.00769	27.63267	0.007
VAR076	-0.49087	-0.00502	8.21870	0.004
VAR073	3.00405	0.00373	73.84132	0.002
(CONSTANT)	0.00918			

------------------ VARIABLES NOT

VARIABLE	BETA IN	P.

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	55.25010	4.60418	2.19992
RESIDUAL	159.	332.76798	2.09288	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR125 nurses/clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR075	0.20098	0.04039	0.04039	0.20098
VAR068	0.31087	0.09664	0.05625	0.12420
VAR077	0.36279	0.13161	0.03497	-0.09270
VAR069	0.37139	0.13793	0.00632	0.05258
VAR071	0.37259	0.13883	0.00089	-0.09005
VAR067	0.37359	0.13957	0.00074	0.07050
VAR072	0.37618	0.14151	0.00194	0.04064
VAR078	0.37720	0.14228	0.00077	0.01512
VAR070	0.37727	0.14233	0.00005	-0.06941
VAR074	0.37730	0.14236	0.00003	0.05121
VAR076	0.37733	0.14238	0.00002	-0.10453
VAR073	0.37735	0.14239	0.00001	-0.08425
(CONSTANT)				

SAS-45 MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * * *

DEPENDENT VARIABLE.. VAR129 nurses/health centers

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR071

MULTIPLE R 0.77910
R SQUARE 0.60699
STANDARD ERROR 34.89993

---------- VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR067	2.85394	0.53476	0.35221	65.659
VAR068	24.34912	0.16578	16.68867	2.129
VAR070	-41.97178	-0.21934	18.40525	5.200
VAR077	-664.31750	-0.21793	312.66001	4.514
VAR078	368.04511	0.15225	280.88631	1.717
VAR069	10.49492	0.09530	7.13866	2.161
VAR072	85.17361	0.08249	99.40189	0.734
VAR076	155.57727	0.04464	198.26934	0.616
VAR074	-511.55998	-0.04703	666.61518	0.589
VAR073	-919.61034	-0.03203	1781.36047	0.267
VAR075	23.24610	0.00457	294.63532	0.006
VAR071	-0.01399	-0.00240	0.33593	0.002
(CONSTANT)	59.48058			

---------- VARIABLES NOT

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	299105.12383	24925.42699	20.46414
RESIDUAL	159.	193662.84338	1218.00530	

5A-46

MULTIPLE REGRESSION 06/02/75

FILE FSSC3 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR129 nurses/health centers

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR067	0.69206	0.47894	0.47894	0.69206
VAR068	0.76108	0.57925	0.10030	0.49636
VAR070	0.76678	0.58795	0.00871	-0.50301
VAR077	0.76990	0.59275	0.00479	0.24735
VAR078	0.77260	0.59691	0.00416	0.37578
VAR069	0.77479	0.60030	0.00338	-0.22649
VAR072	0.77662	0.60314	0.00284	0.57709
VAR076	0.77752	0.60453	0.00139	-0.12483
VAR074	0.77857	0.60617	0.00164	-0.18702
VAR073	0.77908	0.60697	0.00080	-0.38268
VAR075	0.77909	0.60699	0.00002	-0.21355
VAR071	0.77910	0.60699	0.00000	-0.18927
(CONSTANT)				

KEY TO VARIABLE NUMBERS

Dependent Variables:
Utilization of Health Resources
(Capacity Utilization)

Variable Number		Regressions with following variables as dependent variables are presented in:
130	inpatients/population	Table 5-9
131	inpatients days/population	Appendix for Chap.5
132	total visits/population	Table 5-9
133	new visits/population	Appendix for Chap.5
134	inpatients/general beds	Table 5-10
135	inpatients days/general beds	Appendix for Chap.5
136	total visits/hospitals	Table 5-10
137	new visits/hospitals	Appendix for Chap.5
138	total visits/clinics	Appendix for Chap.5
139	new visits/clinics	Appendix for Chap.5

SA-48

MULTIPLE REGRESSION 06/02/75

FILE ESSC3 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR131 inpatients days/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR074

MULTIPLE R 0.65312
R SQUARE 0.42657
STANDARD ERROR 8912.09193

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-13764.34597	-0.24026	4699.58775	8.577
VAR067	355.08567	0.31472	89.93993	15.587
VAR073	1680933.71507	0.27691	454890.51082	13.655
VAR069	4663.93365	0.20033	1822.93847	6.546
VAR078	149586.98624	0.29270	71727.49128	4.349
VAR077	-173502.33445	-0.26923	79841.26361	4.722
VAR072	26173.70223	0.11991	25383.39472	1.063
VAR071	-94.29097	-0.07637	85.78312	1.208
VAR076	46338.18320	0.06289	50630.31607	0.838
VAR068	3978.80064	0.12814	4261.64031	0.872
VAR075	56760.91602	0.05279	75233.45572	0.569
VAR074	-112762.22190	-0.04904	170227.71516	0.439
(CONSTANT)	-27941.74078			

ALL VARIABLES ARE IN THE EQUATION

---------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	9394288702.14217	782857225.17851	9.85651
RESIDUAL	159.	12628635823.35406	79425382.53682	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * *

DEPENDENT VARIABLE.. VAR131 inpatients days/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.52026	0.27067	0.27067	-0.52026
VAR067	0.56463	0.31880	0.04814	0.36820
VAR073	0.59495	0.35396	0.03516	-0.01315
VAR069	0.61154	0.37398	0.02002	-0.17922
VAR078	0.62518	0.39085	0.01687	0.44302
VAR077	0.63688	0.40562	0.01476	0.29516
VAR072	0.64259	0.41292	0.00730	0.46064
VAR071	0.64767	0.41947	0.00656	-0.19391
VAR076	0.64895	0.42114	0.00166	-0.13783
VAR068	0.65046	0.42309	0.00195	0.48325
VAR075	0.65191	0.42495	0.00189	-0.18886
VAR074	0.65312	0.42657	0.00158	-0.19729
(CONSTANT)				

SA-50

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* MULTIPLE REGRESSION * * * * * * *

DEPENDENT VARIABLE.. VAR133 new visits/population

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR076

MULTIPLE R	0.75429
R SQUARE	0.56895
STANDARD ERROR	5186.03488

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR068	4911.12478	0.23566	2479.89086	3.922
VAR078	125105.31609	0.36474	41738.94014	8.984
VAR070	-5006.28274	-0.18439	2734.56959	3.351
VAR072	20623.74472	0.14077	14770.84969	1.950
VAR073	618489.64122	0.15181	264705.30980	5.459
VAR077	-37716.72029	-0.08720	46460.42491	0.659
VAR067	68.90564	0.09100	52.33694	1.733
VAR071	-55.93399	-0.06738	49.91805	1.251
VAR075	37436.00440	0.05188	43782.00524	0.731
VAR074	51850.74252	0.03360	99057.19950	0.274
VAR069	374.44659	0.02396	1060.78601	0.125
VAR076	3140.58836	0.00635	29462.28418	0.011
(CONSTANT)	-12248.71421			

ALL VARIABLES ARE IN THE EQUATION

---------- VARIABLES NO

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	5644325202.84843	470360433.57070	17.48880
RESIDUAL	159.	4276298283.45500	26894957.75758	

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR133 new visits/population

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.69122	0.47779	0.47779	0.69122
VAR078	0.72232	0.52174	0.04395	0.67983
VAR070	0.73556	0.54104	0.01930	-0.66157
VAR072	0.73906	0.54621	0.00516	0.60654
VAR073	0.74407	0.55363	0.00743	-0.06049
VAR077	0.74706	0.55810	0.00447	0.53309
VAR067	0.74953	0.56180	0.00370	0.25062
VAR071	0.75201	0.56552	0.00372	-0.25641
VAR075	0.75352	0.56779	0.00227	-0.28669
VAR074	0.75405	0.56860	0.00081	-0.25380
VAR069	0.75427	0.56892	0.00032	-0.30982
VAR076	0.75429	0.56895	0.00003	-0.14813
(CONSTANT)				

SA-52

MULTIPLE REGRESSION 06/02/75

FILE ES503 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR135 inpatients days/general beds

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR070	0.32028	0.10258	0.10258	-0.32028
VAR069	0.34191	0.11690	0.01432	-0.09128
VAR072	0.37209	0.13845	0.02155	-0.30741
VAR074	0.38188	0.14583	0.00738	-0.05330
VAR078	0.39073	0.15267	0.00684	0.30782
VAR077	0.40410	0.16329	0.01062	0.18338
VAR068	0.40515	0.16415	0.00085	0.30965
VAR075	0.40601	0.16485	0.00070	-0.15229
VAR071	0.40717	0.16579	0.00094	-0.12129
VAR067	0.40721	0.16582	0.00003	0.16456
VAR076	0.40723	0.16584	0.00002	-0.09313
(CONSTANT)				

5A-53

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR135 inpatients days/general beds

VARIABLE(S) ENTERED ON STEP NUMBER 11.. VAR076

MULTIPLE R 0.40723
R SQUARE 0.16584
STANDARD ERROR 211.94736

------------------ VARIABLES IN THE EQUATION --------

VARIABLE	B	BETA	STD ERROR B	F
VAR070	-205.53753	-0.25687	110.62036	3.452
VAR069	81.94867	0.17795	43.33165	3.577
VAR072	949.86560	0.15684	596.36981	2.031
VAR074	3295.61182	0.07246	4047.13202	0.663
VAR078	3011.55547	0.29792	1700.14715	3.138
VAR077	-2558.74658	-0.20074	1898.73230	1.816
VAR068	-43.86166	-0.07141	100.29468	0.191
VAR075	-788.22120	-0.03706	1776.82963	0.197
VAR071	-0.83177	-0.03406	1.97373	0.178
VAR067	0.14831	0.00665	1.98537	0.006
VAR076	76.60288	0.00526	1188.81365	0.004
(CONSTANT)	70.91056			

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

------------- VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN
VAR073	-0.00238

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	11.	1428936.94566	129903.35870	2.89177
RESIDUAL	160.	7187465.31054	44921.68319	

SA-54

184

MULTIPLE REGRESSION 06/02/75

FILE FSSC3 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * * *

DEPENDENT VARIABLE.. VAR137 new visits/hospitals

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.60733	0.36885	0.36885	0.60733
VAR072	0.64133	0.41130	0.04245	0.59585
VAR070	0.65397	0.42768	0.01638	-0.58720
VAR078	0.66211	0.43840	0.01072	0.57857
VAR077	0.66960	0.44836	0.00996	0.43219
VAR067	0.67260	0.45240	0.00404	0.30748
VAR069	0.67313	0.45310	0.00070	-0.38836
VAR071	0.67360	0.45374	0.00064	-0.23426
VAR073	0.67409	0.45440	0.00066	-0.16560
VAR076	0.67429	0.45466	0.00026	-0.12874
VAR074	0.67429	0.45467	0.00000	-0.23975
(CONSTANT)				

54-55 MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR137 new visits/hospitals

VARIABLE(S) ENTERED ON STEP NUMBER 11.. VAR074

MULTIPLE R 0.67429
R SQUARE 0.45467
STANDARD ERROR 3106.10069

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
VAR068	1482.50636	0.13317	1457.53276	1.035
VAR072	15913.86243	0.20335	8845.37308	3.237
VAR070	-2275.12903	-0.15687	1635.15806	1.936
VAR078	62577.15404	0.34154	24939.89900	6.296
VAR077	-42075.13257	-0.18211	27816.63329	2.288
VAR067	38.69347	0.09566	31.17094	1.541
VAR069	-247.76863	-0.02968	632.71292	0.153
VAR071	-15.54114	-0.03511	29.42611	0.279
VAR073	75577.68728	0.03473	157434.64609	0.230
VAR076	4538.37092	0.01870	17645.47105	0.078
VAR074	-2037.13176	-0.00247	59266.18497	0.001
(CONSTANT)	1448.67882			

VARIABLES NOT

VARIABLE	BETA IN	P.
VAR075	0.00169	0.

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	11.	1287007225.02908	117000656.82083	12.12711
RESIDUAL	160.	1543657835.17895	9647861.46987	

MULTIPLE REGRESSION 06/02/75

FILE ES503 (CREATION DATE = 06/02/75)

* MULTIPLE REGRESSION * * * * * *

DEPENDENT VARIABLE.. VAR138 total visits/clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR078

MULTIPLE R 0.45173
R SQUARE 0.20406
STANDARD ERROR 1213.97855

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR068	651.34769	0.18143	580.50792	1.259
VAR070	-601.21066	-0.12854	640.21830	0.882
VAR077	11677.91395	0.15673	10875.73856	1.153
VAR075	11555.29096	0.09617	10240.75781	1.361
VAR073	67974.59512	0.05685	61963.82727	1.203
VAR067	7.33791	0.05625	12.25135	0.359
VAR071	-10.26429	-0.07191	11.68512	0.772
VAR074	17002.72598	0.06395	23187.91113	0.538
VAR076	-3883.51618	-0.04559	6896.71049	0.317
VAR072	1409.58814	0.05585	3457.65024	0.166
VAR069	57.16161	0.02124	248.31524	0.053
VAR078	1556.09156	0.02634	9770.50471	0.025
(CONSTANT)	-1821.31395			

---------- VARIABLES

VARIABLE	BETA IN

ALL VARIABLES ARE IN THE EQUATION.

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	60074549.09386	5006212.42449	3.39694
RESIDUAL	159.	234325285.03729	1473743.93105	

5A-57

MULTIPLE REGRESSION 06/02/75

FILE FSS03 (CREATION DATE = 06/02/75)

* M U L T I P L E   R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR138 total visits/clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.40282	0.16227	0.16227	0.40282
VAR070	0.42107	0.17730	0.01504	-0.39580
VAR077	0.42862	0.18371	0.00641	0.34353
VAR075	0.43673	0.19074	0.00703	-0.11015
VAR073	0.43977	0.19340	0.00266	-0.03396
VAR067	0.44294	0.19620	0.00280	0.13575
VAR071	0.44630	0.19918	0.00298	-0.17980
VAR074	0.44831	0.20098	0.00180	-0.14828
VAR076	0.45046	0.20292	0.00194	-0.10300
VAR072	0.45127	0.20365	0.00073	0.34186
VAR069	0.45159	0.20393	0.00029	-0.22277
VAR078	0.45173	0.20406	0.00013	0.37953
(CONSTANT)				

187

SA-58

MULTIPLE REGRESSION 06/02/75

FILE ESS03 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR139 new visits/clinics

VARIABLE(S) ENTERED ON STEP NUMBER 12.. VAR067

MULTIPLE R 0.52656
R SQUARE 0.27727
STANDARD ERROR 399.39273

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
VAR068	309.15931	0.24942	190.50414	2.620
VAR070	-283.53493	-0.17558	210.62855	1.812
VAR073	35069.23618	0.14473	20385.78216	2.959
VAR071	-4.25106	-0.08627	3.84435	1.223
VAR075	3265.01279	0.07607	3371.78888	0.938
VAR078	2801.32487	0.13732	3214.44606	0.759
VAR074	4511.90406	0.04915	7620.70413	0.350
VAR072	526.69500	0.06045	1137.54924	0.214
VAR069	14.76416	0.01589	81.69444	0.033
VAR076	-304.84251	-0.01036	2268.98247	0.018
VAR077	-339.71580	-0.01321	3578.06234	0.009
VAR067	0.20862	0.00463	4.03063	0.003
(CONSTANT)	-646.52833			

ALL VARIABLES ARE IN THE EQUATION

---------- VARIABLES NO

VARIABLE	BETA IN

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	12.	9730184.30482	810848.69207	5.08323
RESIDUAL	159.	25362814.34690	159514.55564	

MULTIPLE REGRESSION 06/02/75

FILE FS503 (CREATION DATE = 06/02/75)

* M U L T I P L E R E G R E S S I O N * * * * * * *

DEPENDENT VARIABLE.. VAR139 new visits/clinics

SUMMARY TABLE

VARIABLE	MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R
VAR068	0.47729	0.22780	0.22780	0.47729
VAR070	0.49722	0.24722	0.01942	-0.46540
VAR073	0.50874	0.25882	0.01160	0.01179
VAR071	0.51563	0.26588	0.00706	-0.20445
VAR075	0.51920	0.26957	0.00369	-0.15694
VAR078	0.52353	0.27409	0.00452	0.44579
VAR074	0.52503	0.27565	0.00157	-0.15776
VAR072	0.52617	0.27685	0.00120	0.37909
VAR069	0.52637	0.27707	0.00021	-0.26871
VAR076	0.52651	0.27721	0.00015	-0.11995
VAR077	0.52655	0.27726	0.00004	0.35690
VAR067	0.52656	0.27727	0.00001	0.09972
(CONSTANT)				

Chapter VI

Summary of Findings and their Policy Implications

1. Overview and Policy Implications

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 develops. The resultant urban-rural difference in investment 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 strong 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 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.

2. 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 availability 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 dentists, 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 dental care.

The growth rate of health manpower has been greater than that of population 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 is 1 to 2,993 for the four largest cities and 1 to 9,656 for the rest of the country. The urban-rural disparity in the availability of clinics of all other special categories--dental, oriental and midwives'--is greater than that of medical-general clinics.

The labor-mix of health resources indicates that urban residents demand and receive more medical doctor-centered health services than rural residents except nursing services. The ratios of doctors to all other less trained health personnel are higher in urban areas than in rural areas, except for the ratio of doctors to nurses. This appears to be attributable to the fact that in rural areas a greater proportion of nursing services are provided by nurses without proper licenses than in urban areas.

The capital-labor ratio indicates that urban residents demand and receive more service-intensive care than rural residents. There were on the average 29 doctors and 33 nurses per hospital and 2.2 doctors per medical-general clinic in the four largest cities, while there were 4.9 doctors and 4.1 nurses per hospital and 1.2 doctors per medical-general clinic in the rest of the country in 1973.

Per capita utilization of hospital-based services is higher in urban areas than in rural areas. One out of 42 residents of the four largest cities was admitted to a hospital and one out of three visited out-patient clinics of a hospital during 1973, whereas one out of 345 people in the rest of the country was hospitalized and one out of 17 visited an outpatient clinic of a hospital.

The utilization rate of existing health facilities is higher in urban areas than in rural areas. The bed turn-over rate, i.e., the number of inpatients divided by the number of beds, was 21.2 in the largest four cities, whereas it was 4.8 in the rest of the country in 1973. On the average, a hospital in the four largest cities treated 32,964 patients on an outpatient basis during 1973, whereas a hospital located outside these cities treated 4,786 patients.

(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 rate of health resources.

Demographic variables (as represented by urban population as 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 percent of the total population and, to a lesser extent, farming households as 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 percent of total population and 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-economic 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 those in dentist supply and 56% of those in nurse supply.

Eight socio-economic 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 hospital beds per population.

Eight socio-economic variables (chosen in the same way) explain 41% of the inter-kun differences in the labor-capital mix as represented by doctors to general hospital beds and 48% of those in the nurses to general hospital beds ratio.

Eight socio-economic variables (chosen in the same way) explain 50% to 53% of the inter-kun differences in the per capita rate of hospital utilization and 37% to 49% of the differences in the utilization rate of hospital facilities.

3. Policy Recommendations

Reduce the financial barrier to health services by sponsoring a comprehensive health insurance plan with premiums scaled to income. Wherever feasible, private carriers should be encouraged to initiate such plans with financial guarantees by the government. As a condition for providing a financial guarantee in the initial stage at least, insurance commissions should be created at the local level to oversee the operation.

As an essential component of a rural development plan, initiate an integrated program of health education, family planning activities, consumer education and the collection of vital and health statistics. At present, there is little coordination, not to mention integration, among these activities. Integration of these activities will be an effective instrument in promoting health and economic development. These activities have objectives which are complementary to each other. Accordingly, inputs in any one activity will augment and re-enforce the effects of inputs in all other activities. This will definitely be a case of total (effect) far surpassing the sum of parts (inputs). Secondly, these activities constitute complementary goods in production. In other words, the costs of these activities will be far less when they are carried out on an integrated joint basis. For example, the marginal cost of collecting vital statistics data on a visit for health education is likely to be much less than the cost of a separate visit by another agency for such data collection.

Policy priority should be given to altering the structure of health professions rather than to increasing the aggregate supply. Most education programs at present are structured in such a way as to encourage their graduates to practice in hospitals and medical centers in urban areas and overseas. Serious consideration should be given to restructuring educational

programs of health professionals to assure low cost front-line primary care to rural residents.

In this direction, some of the more plausible suggestions made are to introduce programs for physician's associates with less than six years of schooling and for licensed nurses-aides with two years of training designed to make their graduates the core of rural primary care teams. Broadly speaking, the importance of providing quality education to allied health personnel and giving them prestige and proper credentials should be acknowledged.

Attention should be given to redressing what we preceive to be departures from the norm of optimum mix of physical resources and human resources in providing health care. Emphasis on "visible" economic progress is carried over to the health field so that we observe more hospitals being built or half-built before they can be properly staffed. As our data on the urban-rural difference in labor-capital mix show, staffing problems are more accute in rural areas than in urban areas. As a result, instances of insufficient and uneconomic rate of utilization of health facilities exist in rural areas more often than in urban areas. One way to redress this imbalance is to convert construction funds to attracting more health professionals to rural areas with financial incentives.

An intricate system of rewards and punishments should be established by the government to redress what we consider to be mal-distribution of health resources. A financial rewards system to attract health professionals to rural areas might include salary subsidies, tuition remittance of dependents, low cost housing, etc. Funds for such a financial incentive system could be sought from taxation of health professionals in urban areas which would serve as a disincentive to practice in urban areas. A financial incentive system could also be built into scholarship programs. The government could

offer scholarships to students of educational programs in health professions on the condition that they serve in rural areas for a specified period of time, the duration of which would be determined by the amount of scholarship awarded. Another financial incentive could be provided by banks. With government guarantees, banks could offer low-interest loans to those health professionals who intend to establish in rural areas for their initial capital fund.

Non-financial incentives could be provided by enabling health professionals to substitute rural practice for military service. As a disincentive against migrating abroad, prospective migrants might be required to practice in rural areas before departure, the duration of such practice being scaled to the estimated amount of public subsidy of the educational expense involved. Note that it is commonly acknowledged that tuition covers only a small proportion of total schooling expenses in most educational programs in health professions. The rural practice required of migrants should be in addition to military service or other rural practice in lieu of military service.

Rural health demonstration projects should be encouraged. They could serve as experiments in search of model programs of rural health. One or more projects should experiment with rural health insurance to examine the feasibility and strategy of adopting health insurance for other rural areas. Experiences gained could be invaluable in initiating health insurance plans in other rural areas. Some projects should train village residents, mostly women, to serve as front-line health workers. They would also be trained to provide family planning counselling or services and in some cases, to assist in collecting vital statistics. (At present, there are several successful rural health projects in operation. Some of them are already

experimenting with recommendations made above.)

One or more projects could saturate a relatively isolated area with health resources for a specified period of time and study the demand for Western-style "high-powered" health care among residents. This would give valuable information as to the magnitude of demand generated when the maximum level of health resources is available in rural areas. At least one project should carry out this kind of "saturation" experiment for an extended period of time to study what effects such an experiment would have on the health status, vital statistics and fertility rate of residents.

How well various experiments recommended above work will provide valuable inputs in shaping national policy on the nation's and its rural health system.

A STUDY OF THE DEMAND AND NEED FOR MEDICAL CARE IN RURAL AREAS IN KOREA

—韓國農村住民의 醫療必要度와 需要에 關한 研究—

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200

<國文抄錄>

韓國農村住民의 醫療必要度와 需要에 關한 研究

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본 연구는 농촌지역의 醫療要求度와 醫療受惠度를 조사해서 國家保健事業企劃에 필요한 기초자료를 얻기 위해 지난 1974년 11월 한달 동안에 시행되었다. 전국의 9개郡(제주도를 제외한 각 道에서 1個郡以上)을 추출해서 해당군의 1개 面중에서 2개 부락을 임의로 선정하여 총 1,789家口의 9,830名을 조사대상으로 삼았다. 조사방법으로는 現地 保健要員을 훈련하여, 미리 준비된 설문지로 家口主 또는 主婦와 면접케 했으며 매주 1회씩 가정방문하여 1개월간 4회 방문토록 했다.

현지 조사에 앞서 의료 요구와 의료수요 및 그 이용도에 관한 문헌조사를 실시하여 이 분야의 논쟁점에 대해서 보고서 卷頭에 記述했다. 本 研究에서는 醫療要求와 需要에 대한 概念上의 차이를 명확히 하기 위해서 다음과 같이 정의했다. 醫療要求란 絶對醫療必須要求量에서 현재의 지식과 기술로는 발견해 낼 수 없는 부분을 제외한 探知可能한 醫療必要量을 알아내어 여기에서 臨床診斷으로 接近할 수 없는 부분을 제외한 認知된 醫療必要量 만으로 局限했다. 따라서 실제로는 被面接者 스스로의 자기 건강에 대한 평가를 기준으로 醫療要求에 대한 조사를 실시했다. 한편 醫療需要란 실제로 利用한 의료에 국한했다. 결국 未充足醫療는 이 둘의 차이로 정의하고 그 크기를 측정했다.

의료 이용도에 대한 조사와 아울러 의료이용에 영향을 미치는 決定要因에 대한 多變量分析을 시도했다. 제 2 도에서 언급한 분석모형 중 여기에서 사용한 모델은 行態的 要因만을 제외한 것이 된다. 獨立變數로는 先行要因 5개와 治療必要에 대한 認知要因 2개, 臨床的要因 3개, 家族經濟能力要因 1개 및 保健組織要因 4개의 총 15개 변수를 선정했으며 從屬變數로는 通院治療회수, 入院治療회수, 藥局訪問회수, 初回訪問회수 및 總利用회수의 5개를 사용했다.

농촌주민의 月平均有病率은 人口 1,000當 149.8이었고, 여자의 경우 172.6으로 男子의 143.7보다 높았다. 연령별 유병율은 전형적인 U型 分布를 보였으며, 時點別 유병율은 99.9로 이는 농촌주민의 약 10%가 傷病 또는 傷害로 罹患됨을 의미한다. 傷病件當 有病日은 急性疾患의 경우 8.8일, 만성질환을 포함한 전체상병건당 19일 이환되고 있었다. 한편 주민 1인당 月間有病日은 3.0일 인데 男子는 월평균 2.6일, 여자는 3.4일로 여자의 경우 0.8일 더 길었다.

WHO 상병대분류에 의거하여 질병을 분류했는데, 조사시기가 늦가을이어서 호흡기계 질환의 유병율이 인구 1,000당 62로 가장 높았다. 전체 조사대상의 34%만 활동제한을 받았으며 件當 활동 制限日數는 3.38일이었고, 주민 일인당 활동제한 일수는 0.5일이었다. 활동제한 일수는 월가구 수입에 비례해서 증가했다.

전체 보건의료기관 이용자 중에서 50%가 약국을 이용했으며, 통원치료가 17%, 보건소 8%, 입원치료가 4%이었는데, 민속요법과 미신행위가 11%, 한방의료이용이 10%이었다. 이를 방문순서별로 보면 1회 방문이 전체의 78%, 2회 방문이 17%, 3회이상 방문이 5%였다. 비록 약국

201

이 농촌지역의 의료공급에 결정적인 역할을 하고 있으나, 초회 방문과 추가 방문을 비교해 보면 약국의 이용도가 병의원이나 보건소 이용보다 초회에 더욱 몰리고 있다. (초회의 경우 60% 이상이 약국을 1차로 방문했다. 이는 질병이 잘 낫지 않거나 오래 계속될때 일부가 병의원을 이용하게 되는 경향을 반영한다고 볼 수 있다.

의료이용 결정요인에 대한 다변량 분석에서 사용한 5개의 독립변수중 種別 利用指標(통원치료 입원치료 및 약국방문)가 混合利用 指標(초회 방문 및 총이용도) 보다 낫다는 것이 드러났다. 또한 기본적인 인구학적 특성과 가족 경제 상태 변수만을 사용한 step Ⅰ보다 상기 언급한 모델에서 채택된 독립변수를 사용한 step Ⅱ와 Ⅲ에서 R^2를 현저히 상승시켰다 (입원치료의 경우 16.5%, 약국방문 10.3%, 통원치료 9.5%, 초회방문 6.9% 및 총이용의 경우 6.6%). 한편 각종속변수에서 가장 유의한 독립변수는 다음과 같다. 통원치료에서는 치료 필요에 대한 인지요인, 입원치료에서는 활동제한 요인, 약국방문과 초회 방문에는 질병기간 요인이 그리고 총이용도에서는 치료가 필요하다고 느끼는 초기증상 요인으로 나타났다. 전체적으로는 임상증상요인이 의료이용에 미치는 영향이 컸는데 이는 입원치료 약국이용, 초회방문에 가장 현저했다.

未充足醫療의 크기를 추정한 바, 전체의 40%가 치료를 받지 않은 것으로 나타났으며 치료받은자 중에서 완쾌되지 않은 부분까지 포함하면, 전체의 53%가 되었다. 만약 치료를 요하지 않는 경미한 증상을 제외하면 미충족의료는 전체 의료요구의 59%에 달했다.

이상과 같은 調査成績은 農村住民들의 醫療要求가 太半 充足되지 않고 있으며, 이에 대한 農村住民의 不滿이 대단히 크다는 사실을 間接的으로 示唆하는 것으로 볼 수 있어서 向後 農村保健事業의 長期企劃 및 効率的인 遂行을 促求하는 결과로 解析할 수 있다. 本 調査에서 論述한 調査方法의 向上과 새로운 分析模型의 開發 및 導入으로 國民의 醫療機關 利用行態에 關한 體系的인 硏究가 期待되는 바이다.

202

Table of Contents

I. **Introduction** (5)

II. **Need vs. Demand Controversy in Health Services** (7)

1. The Concept of Demand (7)
2. The Concept of Need (9)
3. The Measurement of Need and Demand (11)

III. **Some Methodological Considerations** (13)

1. Determinants of Health Service Utilization and Definition of the Variables Used (13)
2. Sample Design (17)
3. Data and Response Errors (17)

IV. **Major Findings** (19)

1. Prevalence, Incidence Rate and Days of Sickness (19)
2. Leading Causes of Morbidity (21)
3. Days of Activity Restriction (24)
4. Characteristics of Health Care Utilization (26)
5. Determinants of Health Services Utilization (30)
   (1) Ambulatory Care Utilization (33)
   (2) Inpatient Care Utilization (34)
   (3) Drug Store Visits (34)
   (4) First Visits and Total Utilization (36)
   (5) Relative Importance of the Selected Independent Variables (37)
6. Estimated Unmet Need for Health Care (39)
7. Health Care Expenditure (41)

V. **Implications of Household Interview Data in Health Administration** (42)

VI. **Summary and Conclusion** (44)

Appendix (47)

Bibliography (49)

203

I. Introduction

Although it is widely publicized that the Republic of Korea has achieved remarkable economic growth during the past decade, the health sector still receives the lowest priority in the government's budget allocations. Health professionals, among others, are particularly unhappy with health services available to disadvantaged rural people in comparison to those health services available to urban dwellers.

In rural areas, the existence of a tremendous unmet need for medical care has long been noted, but few systematic attempts have been made to document the magnitude and nature of the problem. As the sharp rise in the price of medical care services, and the increase in household expenditures for medical care continues, it appears the problem will continue to worsen unless some corrective measures are put into effect.

The data from various sources support the contention of inequality in medical care provision between the rural and urban areas. The two largest metropolitan regions, Seoul and Busan, contain 62% of all physicians in the nation and 54% of all the available hospital beds. [1)2)] The city of Busan has five times more hospital and clinic beds/100,000 population than Chungchungbuk Province.[2)] The imbalance among areas is even more serious if the fact that the capital cities of each province have the largest amount of health manpower and facilities, is taken into account. In fact, more than one fourth of the myons in the country do not have a single physician[3)], and are called "doctorless myon".

Furthermore, it is noteworthy to mention that, in 1968, bed occupancy rates of rural hospitals averaged only 30.6%; equivalent to one half that of urban hospitals, despite the fact that rural areas had only 11.5% of the total hospital beds available in the nation. This is due to a remarkable difference in annual hospital admission days per capita. People in rural areas utilized hospital beds only 1/20 to 1/25 as much as urban people[4)]. Unfortunately, corresponding data concerning outpatient care, which must be considered simultaneously in the analysis of utilization, are not readily available.

Much has been said about the marked phenomenon of the under-utilization of medical care among rural people. It is obvious that their needs and demands for medical care are enormously hindered by various forces; such as, inability to pay, lack of facilities, unavailability and unaccessibility of physicians, and ignorance concerning some of these unclarified forces. Also, the influence of socio-cultural patterns cannot be ignored.

Wen indicates in his explanation of the Chinese cultural influence on the Chinese medical care utilization, that the sick are viewed as frail individuals and illness implies shame or misfortune. This attitude prevents one from thinking of, or preparing for, a disastrous

1) *Ministry of Health and Social Affairs, Data from National Physicians' License Renewal, 1974, in* Korean Medical Association Newspaper, *October, 1974.*
2) *Korean Hospital Association,* National Hospital Census, *1973.*
3) The Euy Hak Shin Bo, *March 27, 1975.*
4) *Y.S. Shin, A Study on the Trends of Hospital Beds Utilization in Korea from 1959 to 1968,* Korean J. of Public Health, *Vol.8, No.1, 87-106, 1971.*

204

period of ill-health. When an individual is actually stricken with illness, it is accepted, albeit woefully, as the mandate of heaven and beyond human control.[5] However, it is not known whether or not these Chinese notions apply to the Korean culture; or how the traditional Korean socio-psychological-cultural norms and beliefs affect the Korean's health care utilization, although Korea has admittedly been under the influence of the Chinese culture for a long period of time.

In any case, planning health services in the rural area must proceed vigorously in order to provide health care equal to that in the urban setting; and further, to resolve the gap between the need and demand for medical care services in both the rural and urban areas. This study attempts to estimate the magnitude of unmet need for medical care in rural areas in Korea.

The study used the existing myon health workers of the sampled areas as interviewers. A training session in proper interviewing techniques was conducted. Interviewers checked each item listed on the questionnaire during the home visits. Four home visits were scheduled for each household during the study period, from November 1, 1974 through November 30, 1974. They began the interview by asking, "Did you have any health problems during the last 7 days?" A morbid condition (health problems) is defined as a departure from a state of physical or mental well-being resulting from a disease or injury.[6] Because this definition is quite vague and subjective, a question like the above usually leads to an exaggeration of their symptoms in terms of frequency and intensity. The question, however, seems appropriate for the purpose of this study when we consider the total spectrum of medical care need, including the huge portions unrecognized by the people and the portion undetected by professionals. The interviewees' answers to this question, then, are considered the expressed need for medical care.

Demand for medical care, the other topic of this study, dealt mainly with the degree of actual medical care utilization. Demand could be expressed either by, 1) indices of the unit of medical care such as office visits, number of prescriptions, and patient days, or 2) the expenditures for medical care. Utilization in terms of inpatient and outpatient care appears preferrable to using the number of prescriptions or medical care expenditure for the purpose of this study. The reason is because most drugs are sold without prescription in Korea, and inflation is too high for cost to be used as a dependent variable. Thus, unmet need, the gap between need and demand, represents the difference between the amount of people's expressed need and that of actual utilization, assuming that utilization satisfies their need for medical care. This will be elaborated in the next chapter.

The study also tries to discover the amount of disability days. To the authors' knowledge, few statistics are available concerning current disability status in Korea. This study used questions concerning activity restricted days, diagnoses and symptoms, and onset and dura-

5) *Chi-Pang Wen, Health in the Midst of Economic Development in Taiwan,* **Medical Care,** *XII, No. 1, 1974.*

6) *Harold F. Dorn, Methods of Measuring Incidence and Prevalence of Disease,* **AJPH,** *Vol. 41, No.3, March, 1951.*

205

tion of disease. In addition, an attempt was made to explain some determinants of medical care utilization by applying stepwise multivariate regression analysis.

Needless to say, information from this study would be helpful for health administrators for the purpose of setting goals and objectives of health service planning activities.

Ⅱ. Need vs. Demand Controversy for Health Services

In explaining the provision and financing of health services, much disagreement occurs concerning the definition of two basic concepts, need and demand for medical care. The two concepts are not necessarily the same. The term "need" implies the consumers' biological necessity for medical care, whereas, the term "demand" implies an economic concept of the traditional supply and demand relationship of the market place. Sometimes, both terms are incorrectly used among health professionals, frequently interchanged in an indiscriminate fashion. It is generally agreed that need is distinguished from demand by the fact that the latter connotes purchasing power of consumers. This is correct, but is not sufficient to fully explain the difference between need and demand.

Health services are organized to serve the needs of people. There is no way to organize health programs without knowing something about what people need and will demand for the improvement of their health. Need is generated by the incidence of illness. The fact that the occurrence of illness fluctuates considerably among individuals, but has greater predictability for the total target population, has provided a basis for planning health services. Meanwhile, demand is generated by the interrelationship of sickness and other factors relative to both patient and provider. Both need and demand forces people to utilize health services. Therefore, this controversy is very significant when using the two concepts as a basis for planning health services.

Actually, health service organizations are structured to respond to expressed demands, and its facilities are built to meet an expected level of utilization. Need and demand interaction thus reflects the complexity of the problems faced by the community, and the magnitude of effort required on the part of an organized medical care program. There appear to be two important problems inherent in the need vs demand controversy with respect to the delivery of health services. One is the problem of conceptual definition, and the other is of measurement.

(1) *The Concept of Demand*

Demand, in essence, is an economic term, and the concept is indeed favored by economists. Demand and supply in a market setting are well known to be a function of price and quantity. The relationship is represented graphically by the demand curve which typically slopes downward to the right; that is, the quantity taken varies inversely with price.

Demand for health service is also a market phenomenon. It depends upon certain given

7) *Herbert E. Klarman*, **The Economics of Health**, *1965, Columbia University Press, pp.* 20-40.

206

factors, such as the price of medical care, the price of alternatives, financial resources, accessibility, and tastes or preferences.[7] In addition, people may often overuse medical care when not actually ill. But it is more common that people accept a disability or disorder as normal, or fail to respond to an available service out of ignorance, indifference, fear, laziness, or prejudice. Therefore, the quantity of health services requested is almost invariably less than the quantity needed.

Boulding points out that the demand for health service is primarily a demand for knowledge, or at least the results of knowledge.[8] In the case of ordinary commodities, the knowledge that is required is relatively easily available, and the actual purchasing itself is a learning process. This is not so in the case of medical care. The consumer's inability to evaluate the quality of medical care is widely known. The experiences in the medical care market cannot teach people what they haye to know in regard to the choices they must make. Furthermore, they are incapabable of buying medical care which is complex and, rarely if ever, used before purchased. Once a patient decides to seek help, it is the physician and pharmacist who make a decision as to what kind of services he needs and how often. Whether or not the patient follows his professional's advice is a different problem.

Thus, demand for health service is in most cases the demand for medical consultation or treatment. It is initiated by a patient, and this may be called patient-initiated demand. A physician then intervenes and dominates the medical care process by providing a treatment of given quality. The demand for this input may be called derived-demand, or physician-initiated demand. The former and the latter demand comprise the contents of the patient's total demand, which is usually expressed by the utilization of health service programs. Effective demand denotes the demand met by the actual utilization of services.

The concept of need is a good alternative to demand as a basis for planning health services. The fact that demand is closely related to income and to the distribution of income means it fails to reveal the real magnitude of the health problems. Although economists acknowledge the underestimation of total health need implied by the concept of demand, they seem to prefer demand because the need concept denies the autonomy and individuality of human-beings. Again, in Boulding's terms[8], demand is looked upon as implying autonomy of the individual, choice, and a tailoring of various inputs to comply with individual preferences. It has been said, "Only the slave has needs; the free man has demands."

But, an additional problem with the demand concept is that the opportunity to exercise demand is seldom equally distributed among the needy. Medical care is a "need" rather than a "want". According to the economists' arguments, one's demand for health service is what he wants to buy. But we argue that what he is able to buy for his health problems is not what he actually wants, and is hindered by such problems as inequal distribution of physicians and of facilities. A question should thus be raised, "whose opportunity is it?" Nevertheless, the proponents of the demand concept maintain that it is possible to estimate the actual volume and character of the medical care requirements of a community only through

8) *Boulding, K.E., The Concept of Need for Health Services,* MMFQ, *Vol. XIIV, No.4, October 1966, Part 2, 202-203.*

207

demand analysis, and that this is an essential tool for health service planning.

(2) *The Concept of Need*

The need concept is a multi-faceted expression. No single concept of need for health service exists. What we call need for health services can be observed from three different perspectives; the view of the individual person, of the medical profession, and of the society as a whole, including administrative authorities. It becomes clearer when we think of a case of tuberculosis. A practicing physician talks of the need of the case differently from the health center authorities. And the patient sees his needs in still a third different fashion. The needs of various population subgroups can also be defined in several ways.

Much credit must be given to the notion that the concept of medical care need is to be understood within the context of medical care process and its environment. Here, environment denotes a socio-cultural and organizational framework within which the medical care process takes place. As the impact of those environmental elements on the need for health services are very complex and difficult to analyze (and is beyond the scope of this study), it is appropriate to limit the scope of the need concept to the area of medical care process, which can be summed up as the interactions between client and provider.

The requirement for a concept of need arises from the fact that the concept of demand itself has serious weaknesses and limitations. The idea of an autonomous choice in the market implies first, that the consumer knows the real alternatives which are open to him, and second, that he makes the choice according to a value criteria or a utility function which he will not later regret. As people are neither knowledgeable consumers nor rational decision-makers, as far as health service is concerned, consumers don't know the real alternatives before them. Moreover, they cannot make the wisest choice according to their value criteria or utility function.

The medical care process begins with need and ends with some modification of need. Generally, need can be defined as "some disturbance in health and well-being." In the physician's terms, the above definition is perceived as a morbid condition derived from the manner in which medical science defines health and illness, and what services can be provided by medical knowledge and modern technology. This version, however, is far from complete. The boundary between health and illness is frequently ambiguous, and the ambiguity increases if dealing with mental illness, psychosomatic diseases, or functional disorders. As medical science and technology advances, the medical care market becomes increasingly professionalized and socialized. The medical practices are increasingly organized in one way or another to satisfy what the professional conceives of as needs. Need at this level also becomes highly professionalized.

How the client's view of need is likely to differ from that of the physician has been studied by many researchers[9~12]. Donabedian summarizes the difference as follows. First, there is a less complete commitment to the scientific view of disease; its causation, evolution and treatment. Second, although the scientific view may be accepted in principle, there is imperfect knowledge of the characteristics of particular diseases as they are scientifically

208

defined. Third, the time horizon of the client tends to be narrower, with emphasis on current manifestations rather than ultimate consequence. Finally, the client is relatively more concerned with the impact of illness in terms of physical discomfort and interference with activities of successful living as he defines them, and as they are defined for him by his place in society. Thus, physician and client are likely to define health in terms of different dimensions[13].

Jeffers, Bognanno and Bartlett introduces another term, "want", to distinguish the clients' view of need from the professionals' definition of need[14]. They define the "want" for health services what clients want to consume or think that they ought to consume. Biological and psychological health states as perceived by individuals are different from that perceived by experts. Whereas, they define the "need" for health service as normatic professional judgment of the clients' health status, the quantity of health service wanted is likely to be greater or less than that needed. The difference comes from the consumers' inertia, ignorance, perceived health status, perceived severity of a condition, and perceived benefit from medical service. In any case, want is the basis for the formulation of consumer tastes and preferences.

In spite of the disagreement of the definition of need, some consensus can be derived from the expert's norms of what the need is not. Need is not solely a medical problem. It is more likely to be a social problem. Interruption of daily earning activities, inability to work, change of occupation for medical reasons, are some typical examples of such problems on the individual level. Also, need is not the same as the term morbidity. There are needs which require attention and consume services without being diagnosticable disease entities. Moreover, need is not identical to expressed demand. There are needs which are not perceived, and even perceived needs which are not expressed as demand[15].

The concept of need must be clarified further for the purpose of collecting appropriate information. To date, the tendency in the science of health services administration has been that the estimate of professionally defined need is looked upon as more valuable than that of the client's. In this study, unfortunately, more emphasis was placed on the client's view of need. This is inevitable from the current medical care utilization pattern in rural Korea,

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9) *Koos, E.L.*, The Health of Regionville, *Columbia University Press, New York, 1954, pp. 30-52, 93-111.*

10) *Apple, D., How Laymen Define Illness*, Journal of Health and Human Behavior, *1960, 1: 219-225.*

11) *Blum, R.H., The Patient's Definition of Illness, in* The Management of the Doctor-Patient Relationship, *N.Y., McGraw-Hill, 1960, pp. 1-28.*

12) *Friedsam, H.J. and Martin, H.W., A Comparison of Self and Physicians' Health Ratings in an Older Population*, J. of Health and Human Behavior, *4:179-183, 1963, Press, 1973 pp. 58.*

13) *Donabedian, A.*, Aspects of Medical Care Administration: Specifying Requirements for Health Care, *pp.* 58-76.

14) *Jeffers, J.R., M.F. Bognanno, J.C. Bartlett, On the Demand versus Need for Medical Sciences and the Concept of 'Shortage'*, AJPH, *61:1, Jan. 1971, pp. 46-63.*

15) *Harö, A.S., Measurement of Need*, Uses of Epidemiology in Planning Health Services, *Vol.I, Jan. 1973, pp. 49-59.*

209

in which drug store visits are a major category of utilization. Therefore, the need for medical care in this study does not represent what the doctor thinks a patient ought to have. Instead, it represents service-requiring potential based on the health state of the client, as perceived by the client, which in turn, creates requirements for medical care.

(3) *The Measurement of Need and Demand*

A professionally determined need implies a wide range of possible variation in the magnitude of need according to those who evaluate it. Boulding says that the idea of professional need always rests on some definition of hemeostasis or state maintenance of the clients, his property or his environment[8]. The professional defines a certain state of his client and his related systems as a state of "health" which he has a professional interest in maintaining. The difficulty with homeostasis as the basis for a concept of need is that homeostasis is never really stable from the perspective of the unavoidable aging process. Need for health services is apparently unlimited unless appropriately constrained in operational terms. Need defined as service-requiring potential has therefore to be clarified mainly in terms of demonstrable disease requiring, and which are amenable to, some form of medical care.

According to the time-intensity relationships in disease[13], the presence of a disease becomes increasingly evident as the disease process goes on. In its earliest beginnings, disease may be undetectable even by the application of modern medical technology. This portion can be called "undetectable need". As technology advances, it may be possible to detect the unrevealed portion, and thus to broaden the spectrum of detectable need. Felt need consists mostly of physical discomfort, interference with the performance of social roles, and limitation of mobility. Absolute need includes the total spectrum of the above process.

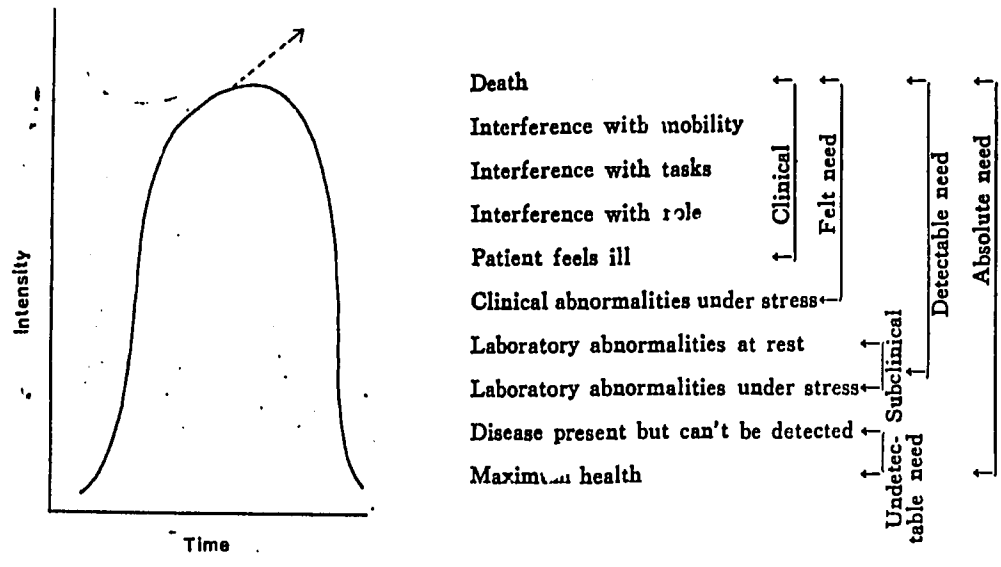

Figure 1. The Time-Intensity Gradient for a Hypothetical Disease[13]

210

Figure I is depicted for the purpose of illustrating the magnitude of need with which this study deals. Since this study is based on the client's perceived illness rather than the professionally defined illness, the scope of need spectrum is confined to the felt need. (Remember that the need measured in terms of "service requiring potential" was narrowed down to "demonstrable disease", and further limited only to the "individual perceived illness".) Therefore, it should be borne in mind that the need explored is largely underestimated compared to the total spectrum of need. The parts not appearing in this study consist of subclinical and undetectable need, and might be called "unfelt need", or "submerged iceberg".

The measurement of perceived illness refers to the client's subjective estimation of his health status. This technique is unavoidable in health interview surveys. The only way to assess the exactness of the lay interviewees' subjective estimation of their morbid conditions, is to have all the surveyed subjects examined by the professional, and compare both results. This approach takes too long and cost too much. The concept of perceived illness can not be a surrogate for a more exact concept of illness, but the authors assume that it can be used as a proxy measure for the concept of medical care need. Moreover, the approach is justifiable, since it is inevitable that health behavioral reactions reflect a person's perception of his health problems.

The spectrum of demand is further limited within the zone of felt need. Nevertheless, the trend is to accept that demand which is usually expressed by service utilization as a proxy of an index of a felt need. However, the demand itself cannot be assumed to represent a need that has been satisfied.

Demand has been measured empirically by units of service, such as hospital admissions, patient days, length of stay, and physician visits. Actual expenditure for medical care can also be used, since for a given expenditure the physician will provide a set of components for treatment[16].

It is generally agreed that units of service, rather than expenditures, as a dependent variable for demand analysis yields better results. This stems from the fact that medical care expenditure data may bias the effects of the factors believed to influence demand, if it is not first adjusted for price changes and for changes in the product itself, e.g., quality changes[17]. Estimating quality change in medical care, and developing a price index for medical care over time, are particularly difficult problems.

Patient days are commonly used as a unit to quantitatively measure the supply of hospital in-patient facilities. The difficulty of using patient days as a unit of analysis is that our study areas have virtually no hospital beds, although rural people can be admitted to a hospital located in the vicinity. It has thus been assumed that physician visits is a better quantitative unit than hospital admissions, patient bed-days and length of stay, in the analysis of demand for medical care in the rural Korean setting. Pharmacist visits as well should be

16) *Friedman, M. and Kuznets, S., Income from Independent Professional Practice, New York, National Bureau of Economic Research, 1945, pp. 157-158.*

17) *Feldstein, P.J., Research on the Demand for Health Services,* **MMFQ**, *July, 1966.*

211

considered a potential unit of measurement as the amount of drug use is substantial.

Unmet need here represents the services desired by the client but not received. In measuring the volume of unmet need, an important objective of this study, it must be defined as the magnitude of individual perceived illness less actual service utilization. Of course, the study also deals with the degree of satisfaction attained in resolving patients' medical need.

Need and demand largely depend on a wide veriety of socio-economic and cultural factors. The general consensus is that neither, by itself, is an adequate basis for decision making in the health field. These concepts are complementary rather than competitive. Thus, it is essential to use both of them to estimate medical care requirements for planning purposes.

Ⅲ. Some Methodological Considerations

1. *Determinants of Health Service Utilization and Definition of the Variables Used*

Different lines of thought prevail in explaining the process and determinants of health care utilization. The importance of socio-cultural factors has already been mentioned. It is not an easy task to pinpoint essential elements from the complicated medical care utilization complex. To help unravel the difficulty in this study we have used the perceived need of care as the point of entry. Demand for medical care is, in sequence, a successor to perceived need of care, and if circumstance permits, a certain type of medical care utilization may then occur. Use of service affects a set of predisposing factors which can influence the perceived need of care. A schematic representation is shown to depict the relationship[18](Figure 2).

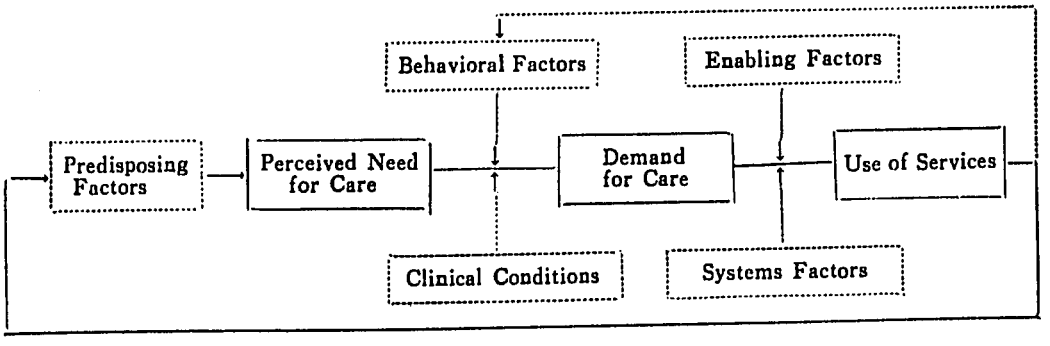

Figure 2. Conceptual Framework Showing the Use of Service

Inquiry about the perceived need of care should be accompanied by the identification of predisposing psycho-biological abnormalities and social maladjustments, which may affect how need is perceived. Perceived need itself is a complex perception of dysfunctions in normal physiology and social relationships. The forces believed to influence the linkage of perceived need and demand for care can be classified into two categories: behavioral factors and clinical condi-

18) *This framework modifies the behavioral model of health services used by Donald O. Anderson.*

tions. The former refers to the knowledge, attitude and expections of clients, which we have not dealt with in this study for the obvious reason that is just too large a topic and demands seperate research efforts. And clinical conditions relate to the actual condition of clients which is major concern in study. In adaptive ecological terms, perceived need follows an awareness of painful, stressful or inconvenient adaptive processes. The result is the demand for, and subsequent utilization of, care as another adaptive alternative within the organizational setting (system factors) through which the services are delivered.[19]

Behavioral scientists tend to separate the demand for care from the use of services. The separation seems to be justifiable in light of the fact that all demand can not be converted into actual utilization. Although one has perceived need and demand for care, some enabling factors, both personal and systemwise, are needed to connect the two components. Risk discounting behavior, for example, is liable to cause under-estimation of the magnitude of demand for care, if only service utilization is accounted for in the measurement of demand. How big is the difference? How can the demand for care be measured separately from the measurement of service utilization? These problems are not yet answered. Inevitably, this study uses services utilization as a unit of demand analysis, and behavioral aspects and organizational constraints have been dealt with only minimally.

Some efforts were concentrated on the identification of determinants of medical care utilization in the rural Korea. With the framework introduced in the conceptualization of the medical care utilization process, the authors adopted the following elements as the possible explanatory variables.

Chart I. List of Independent Variables

A. Predisposing factors
- Age
- Sex
- Level of education
- Marital status
- Occupation

B. Perceived need of care
- Initial symptom being thought of as requiring medical attention
- Perception of present health status

C. Clinical conditions
- Duration
- Days of activity restriction
- Occurrence of chronic illness

D. Personal enabling factors
- Monthly family income

E. Systems constraints
- Number of available doctors in a Myon

19) *Donald O. Anderson, Measurement of Use and Demand, in* **Uses of Epidemiology in Planning Health Services**, *pp. 325-326.*

213

Number of available doctors in a Gun
Number of available pharmacists in a Myon
Number of available pharmacists in a Gun

The following five predictors were adopted as the instruments to measure the demand for medical care, and to identify the determinants of health service utilization. A stepwise multiple regression analysis was applied to the data.

Chart Ⅱ. List of Dependent Variables

A. Number of ambulatory services
B. Number of inpatient services
C. Number of drug store visits
D. Total utilization (A+B+C)
E. First visits only

Definition of the variables used

1) **Age**: As of November 1, 1974. The midpoints of each age bracket in the questionnaire were used for the computer program input.

2) **Sex**: Self-evident variable. 0, male; 1, female.

3) **Education**: Based on response to the question, "What is the highest school you have attended?" This is recoded as the years completed in school; no schooling, 0; primary school, 6; middle school, 9; high school, 12; college education, 16. Those who began one level of education were counted as though they completed that level.

4) **Marital status**: Self-evident. This is categorized into 3 groups: unmarried, 0; married, 1; divorced or separated, 2.

5) **Occupation**: The list of standard classification of occupations is used for the collection of this information. The list is as follows: Professional and technical, managerial position, clerical workers, salesmen, agriculture and forestry, miners, transportation and communication, daily laborers, service type workers, jobless and unclassifiable job. These 11 categories are grouped into four social classes based on levels of income.

0: Social Class Ⅰ (the jobless, disabled and children)
1: Social Class Ⅱ (daily laborers, simple service workers, transportation and communication)
2: Social Class Ⅲ (farmers and their wives, salesmen)
3: Social Class Ⅳ (professional and technical, managerial, civil service workers)

6) **Average monthly family income**: Monthly total family income was counted before taxes. It is difficult to obtain exact data on this item. Income from wages, salaries, own business or farm, rent and similar sources are included. If the income was too difficult to determine, the income of the previous month (October, 1974) was substitued.

Income is classified in 7 groups:

0: less than ₩10,000
1: ₩10,000~19,999
2: ₩20,000~29,999
3: ₩30,000~49,999
4: ₩50,000~69,999
5: ₩70,000~99,999
6: more than ₩100,000

214

7) **Initial symptom perceived as requiring medical attention:** Based on the response to the question, "Did you feel the necessity of consulting a doctor at the occurrence of the initial symptom?" This variable belongs to the behavioral aspects of health care utilization. 0, no; 1, yes.

8) **Perception of present health status:** This is a basic unit of need analysis in this study. As morbidity seems to be the most potent predictor in the utilization of health services, the variable is also included.

0, those who claim to be ill

1, those who use health services purely for preventive purposes (ie: physical check-up)

9) **Duration:** Length of illness regardless of treatment. This is adopted as a substitute for the severity of an illness. Obviously, the more severe an illness, the more the patient is likely to use the health services. The actual number of illness days is used for the computations.

10) **Nature of illness:** Whether or not an illness lasts more than 1 year. This is to find out the impact of chronic conditions on medical care utilization.

0, non-chronic conditions

1, chronic conditions

11) **Activity restriction:** Sum of days reported in response to the question, "How long did a person stay in bed all or part of the day because he did not feel well?", or "How long has a person's usual activity been limited due to the sickness?" The sum of the days of restricted activity is used for computation.

12) **System factors:** Availability of health manpower. The study considers two kinds of manpower, the actual number of doctors and pharmacists practicing in a Myon or Up. Data on other system components are not dealt with, owing to the scarcity of available information.

13) **Ambulatory health services:** Number of physician visits during the period of illness. This includes seeing a doctor either at his office, the patient's home, or the hospital outpatient department. A few visits to a dental clinic or health center are included in this category, if they occurred.

14) **In-patient services:** Number of patient days in a private, municipal, or university hospital. This is the sum of the number of hospital days patients spent in a general or special short-term hospital during the study period.

15) **Drug store visits:** Number of pharmacist visits during the survey period. Drug stores are a prime source of both consultation and drug purchases. Therefore, this research utilizes to pharmacist visits as one of the idependent variables.

16) **Total utilization:** The sum of the frequencies of use via ambulatory, inpatient, and drug store visits.

17) **First visit:** Number of first visits to any source of care. Revisits are excluded here to isolate any differences between utilization variables.

18) **Step Ⅰ:** Run a stepwise multiple regression program by applying those basic six predictors as independent variables.

19) **Step Ⅱ:** Run the above program by applying all the fifteen predictors.

20) **Step Ⅲ:** Run the above program by excluding two predictors, occupation and marital status, and those less than 20 years old.

215

2. *Sample Design*

Ten guns were chosen from the eight provinces in Korea, excluding Cheju Island. One gun in each province was randomly assigned, except Chollanam and Kyungsangbuk provinces which had larger populations in the rural area than the other provinces. Two guns were randomly picked from the two provinces. Then, the authors visited these 10 guns one by one, and consulted the community resource people about the most representative myon or ub for this study. The resource people consulted were the director of the health center, senior family planning worker, and other relevant health workers in the community.

Two factors were considered in the selection of study areas. First, was a myon or ub geographically convenient for conducting this survey? Second, was a myon or ub socio-economically representative for the localities? We had to rely heavily on the opinions of the local reference people for selecting the villages to be investigated. After determining a myon or ub, two villages were selected from the each myon or ub. These villages were intentionally chosen on the basis of geographical distance and cooperative attitudes of ri people. One is close to, and the other is some distance from, the center of the myon or ub.

For each ri (village) selected, a complete list of dwelling units was made and these, in turn, were purposively sampled. About 100 households in the village were picked. Considering the average number of households in a village, almost 80 to 90% of them were included(sometimes, all the households were included if a village had less than 100 families) The sampling technique is actually a cluster sample. The primary sampling unit consisted of a cluster of households in a ri.

During the process of conducting the survey, we failed to obtain the cooperation of a gun, Kunwi gun in Kyungsangbuk province, and excluded it from the original sampling sites. Thus, 18 ris among the 9 guns were studied. The total number of households was 1,789. All the people living in the sampled dwelling units were included. The sample size was 9,826 non-institutionalized people, which was equivalent to 0.06% of the total rural population.

Two questions might be raised. First, is the sample size sufficient for the purpose of this study? Second, can the 18 selected ris actually represent all rural Korea? Obviously, it is far better to have a larger sample, but this calls for more monetary input. Frankly, the authors empirically feel that it would be desirable in this kind of research to have at least 0.1% of the universe (that is about 3,000 households) in order to provide a sound sampling basis. It is unfortunate that this study could only include 1,789 households. The second question of representativess is very difficult to verify. It really depends upon the first question. Suffice it to say that the sample probably is indicative of the total rural population, because local people requested to help us did try to suggest typical villages.

3. *Data and Response Errors*

As professional interviewers were not readily available, the existing myon level health workers were utilized. Usually, there were 3 workers per myon and about 70 households were assigned to each worker. They participated in an intensive training program at their

216

post in order to be capable of collecting the information needed to accomplish the objectives of this research. Staff nembers made two visits to each place for consultative and supervisory purposes. Interviewers were instructed to meet respondents once a week, for the four weeks in November 1974. One distinct advantage of using myon health workers (nurse-aids) as interviewers, is that they know the residents better than anyone else, and thus can better communicate with them. This is particularly helpful in curbing the tendency of rural residents to exaggerate their health problems in hopes of obtaining free medical services!

Complete, uniform, and accurate recording is a prerequisite for any successful morbidity survey. Interviewers used a structured questionnaire when a respondent claimed to have a sickness in his family during the last 7 days. Though questions have been structured, the interviewers had a fair amount of freedom to assess and interpret what the respondent and their family members said concerning their illness.

The assessments made by the interviewers may be criticized as unprofessional judgements. In other words, their assessments seem to be a little better than the lay respondents, but are still poor in the light of their limited knowledge and capability. This is the reason why this study has regarded the reported episodes of sickness by local health workers as client perceived illness. Obviously, when opinions differ markedly between interviewers and respondent, or conditions seem to be difficult for them to assess, interviewers have been advised to accept the respondents' opinions.

In spite of all the efforts to reduce interview errors and bias, they are not negligible. In fact, the weakness of the interview survey lies in the largely unknown magnitude of response error. We feel, after the experience of conducting this study, that it is essential to use professional interviewers in the future instead of existing health workers in the community. Besides the inability to assess accurately what the respondents say, the extra interviewing duties interfered with accomplishing their normal daily activities, and occasionally created conflicts between the administrators and interviewers.

Another type of error came from the respondents. The quality of the information obtained depends in part upon the person interviewed. It was difficult to meet all the family members, and since the best respondent for children is presumably one of the parents, the wife of the household was selected for the interview. If wives were not available, proxy respondents were used from the best qualified adult among those found at home. We know that the use of proxy respondents resulted in a lower rate reported for each of the illness groups. Moreover the use of proxy respondents not only reduced the total amount of illness reported, but also effected the proportions of the different types of conditions reported.[20]

Respondents were asked about their current conditions, acute or chronic, accidental injuries, and temporary or permanent impairments regardless of the time of onset of illnesses If a morbid condition occurred during the survey period the recall period was just one week (sometimes, two weeks if interviewers failed to see respondents as scheduled) so the memory bias would be minimal.

20) *Linder, Forrest E., National Health Interview Surveys, in* **Trends in the Study of Morbidity and Mortality,** *1965, pp. 88.*

217

In the case of chronic diseases, information about the onset of the disease was requested. In these instances, the recall period would vary greatly, and the respondents' loss of memory would be increased proportionally to the length of that time period. It should be kept in mind that the length of the recall period affects the accuracy of the reporting of the amount and kind of care received, the amount of medical care expenditures, as well as the time of onset of illness. This study did not attempt to follow all the courses of treatment for the reported chronic conditions, but limited its scope to the one month study period.

In general, minor but common medical care problems are well represented, while rare but still important health problems are not likely to be represented. In comparison with acute conditions, the number of chronically ill patients is not markedly influenced by the length of recall period, but the duration of chronic conditions greatly influences general prevalence rates. Memory bias is assumed not to be a significant problem in this study, because the recall period is only 7 days.

Ⅳ. Major Findings

1. *Prevalence Incidence Rate and Days of Sickness*

Overall monthly prevalence rate of sickness among the rural people is 149.8 per 1,000 people during the survey period of one month. This means 15% of the people experienced an illness or illnesses during the study period. In terms of episodes of illnesses, the rate is equivalent to 158 per 1,000 (Table 1 and Appendix Table 1-1). It was found that females

Table 1. Monthly Prevalence Rate in Episodes by Selected Characteristics (Per 1,000)

		Point Prevalence			Period Prevalence
		Beginning	End	Average	
Sex	Male	66.3	84.2	88.0	143.7
	Female	82.2	109.8	112.1	172.6
Age	0	15.2	106.1	96.2	295.5
	1~4	28.1	53.6	76.6	220.9
	5~9	22.6	29.4	44.5	110.7
	10~19	20.0	32.1	34.7	74.3
	20~29	46.6	67.7	65.9	103.4
	30~39	107.0	138.6	132.6	177.5
	40~49	145.6	182.3	181.2	244.4
	50~59	219.9	253.6	248.3	306.6
	60~	201.4	235.9	236.3	282.6
Income (Won per Month)	0~ 9,999	65.7	85.8	77.9	100.4
	10,000~29,999	70.3	95.1	94.6	144.9
	30,000~69,999	80.6	104.7	110.0	179.2
	70,000 ↑	73.0	77.0	98.8	178.4
Overall Average		74.2	96.8	99.9	158.0

218

have a higher prevalence rate than males. The difference amounts to 30 per 1,000. Age-specific prevalence rate is highest in the 50~59 year old group with 307 per 1,000. The next highest is the less than 1 year old group with 298 per 1,000. In contrast, the rate is lowest in the 10~19 year olds with the 74 per 1,000, and the 20~29 year olds with 103 per 1,000 (Table 2). These findings show a typical U-shaped curve of age-specific morbidity commonly observed in developing countries (Figure 3). As the monthly family income increases, the period prevalence rate goes up.

Table 2. Monthly Age-Specific Morbidity, November 1974 (per 1,000)*

Age	0	1~4	5~9	10~19	20~29	30~39	40~49	50~59	60~69	70	Total
No. of Episodes	39	173	147	197	142	219	240	191	124	81	1,553
Age Specific Morbidity	295.5	220.9	110.7	74.3	103.4	177.5	244.4	306.6	270.0	304.5	158.0

The average point prevalence rate denotes monthly sick days per 1,000 people. In general terms, 10% of rural person-days are troubled with some sort of illness or injury. The difference between the less than 1 year old group, and the fifty year old group, is substantial in terms of average point prevalence rate; although both of them belong to the highest period prevalence group. In terms of age-specific morbidity, the number of sick days increased markedly after 30 years of age. The number of female sick days is greater than the number of male sick days by 0.8 day per person per month. The average number of sick days per month for the rural people is 3.0 days (male 2.6, days; female, 3.4 days). The sick days per spell of illness is 8.8 days for the acute conditions, and 19.0 days for the total morbid conditions (Table 3).

Table 3. Sickness Days

Sickness Days			
Per Person Per Month		Per Spell of Illness	
Male:	2.6	Acute Conditions:	8.8
Female:	3.4	Chronic Conditions:	29.3
Both:	3.0	Both:	19.0

The point prevalence rate depends upon the point of time to be measured. Three points are measured; the beginning, end point, and the average. The prevalence rate at the end of the survey is significantly higher than that of the beginning.

Table 4. Point Prevalence as Percent of Average Prevalence Rate

(1) November, 1 1974	(2) November, 30 1974	(3) Average	As % of Average	
			$\frac{(1)}{(3)}\times 100$	$\frac{(2)}{(3)}\times 100$
74.2	96.8	99.9	74.3	96.9

* All data was collected during November 1974.

219

The prevalence rate gap of 22.6 between November 1 and November 30 may be due to the incompleteness of reporting in the interview survey approach, which apparently is unavoidable due to the inherent methodological weakness. Both the better preparedness of respondents, and the experience of interviewers, seem to be crucial for complete reporting. In brief, it may be safely stated that the point prevalence rate at the beginning of the survey is liable to be under-estimated by a bias of one fourth of the average point prevalence rate.

Incidence rate is much lower than the prevalence rate, which indicates the existence of a large volume of chronic conditions. The rate of occurence of new cases during the survey period is 77.6 per 1,000. Actually, 763 patients have contracted 837 episodes of illness. The result is comparable to 68.8 per 1,000 which was found by a previous study conducted in August, 1973.[21] Of all the families studied, 54.7% had a sick member during the one mouth.

Figure 3 shows the age-specific morbidity rate for both acute and chronic diseases. It shows the progressive increment of the prevalence of chronic diseases as age advances. If the two curves are combined, a typical U-shaped graph results.

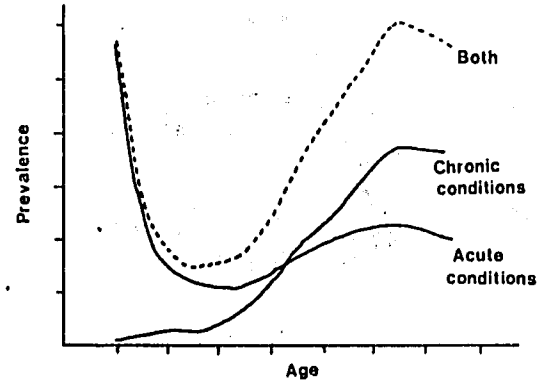

Figure 3. Age-Specific Prevalence Rate by Nature of Conditions

2. *Leading Causes of Morbidity*

Ideally, a health interview survey should be accompanied by a concurrent health examination in order to increase the accuracy of the interview survey, particularly of the diagnostic entities. In this study, a health examination was not done. If people consulted physicians, and, fortunately, they remembered what doctors said to them, their expressed needs could be regarded unreservedly as a professional diagnosis. However, as drug stores have been the predominant choice for health problem consulation for the majority of people, their perceived needs, based upon symptoms, were categorized using the International Classification of Diseases and Illnesses. Only the one major disease was acknowledged for a person with more than two diagnoses.

Table 5 shows the distribution of sex-specific morbidity rates. The leading cause of morbidity, respiratory system diseases, consisted of 39% of the total episodes or 62 per 1,000. The next most prevalent diseases of the digestive system, consisted of 16% or 26 per 1,000. If this study had been conducted during the summer, the diseases of the digestive system might have been the leading cause from a seasonal variation effect on the prevalence of diseases. Senility and ill-defined conditions ranked third with 23 per 1,000. This might

21) *Huh, J. & Park, Y.S.*, **A Study on Medical Care Expenditure,** *A Separate Volume, 1973.*

220

be a result of fact that either the prevalence of geriatric conditions was truly high, or, the interviewers were not knowledgeable enough to classify many of the ill-defined symptoms. Both reasons are believed to contribute to the high morbidity ranking of senility and ill-defined conditions. Interestingly, infectious and parasitic diseases ranked very low, though Koreans are known to be heavily infestated with intestinal worms. This implies that they do not regard the existence of parasitic diseases as a morbid condition, or, that they refuse to mention them as a condition requiring medical attention. Eight cases of neoplasm were detected. Unfortunately, the coexistence of several diseases in one person was not studied.

Tuberculosis patients were specifically investigated for comparitive purposes. Sixty-nine cases of tuberculosis were discovered during the study. It is equivalent to 0.77%. The national tuberculosis prevalence survey in 1970 revealed that the overall prevalence rate, in terms of persons with pulmonary shadows suggestive of active tuberculosis, was 4.3% for the population aged 5 years and above. Infectious tuberculosis cases accounted for 202,000 cases, and it was 0.76% in 1970.[22] Therefore, our finding of infectious tuberculosis cases

Table 5. Number of Episodes of Illness by Sex and Disease Classification

Sex / International Classification of Diseases	Male			Female			Total		
	No.	%	Per 1,000	No.	%	Per 1,000	No.	%	Per 1,000
Infectious & parasitic diseases	8	1.1	1.6	16	1.9	3.3	24	1.5	2.4
Neoplasms	3	0.4	0.6	5	0.6	1.0	8	0.5	0.8
Allergic, endocrine system, metabolic & nutritional diseases	18	2.5	3.6	14	1.7	2.9	32	2.1	3.3
Diseases of the blood and blood forming organs	3	0.4	0.6	9	1.1	1.9	12	0.8	1.2
Mental, psychoneurotic & personality disorders	9	1.3	1.8	5	0.6	1.0	14	0.9	1.4
Diseases of the nervous system & sense organs	46	6.4	9.2	46	5.5	9.5	92	5.9	9.4
Diseases of the cirulatory system	11	1.5	2.2	31	3.7	6.4	42	2.7	4.3
Diseases of the respiratory system	338	47.3	67.9	273	32.6	56.2	611	39.3	61.9
Diseases of the digestive system (including teeth diseases)	121	16.9	24.3	132	15.8	27.2	253	16.3	25.7
Diseases of the genito-urinary system	11	1.5	2.2	13	1.6	2.7	24	1.5	2.4
Deliveries and complication of pregnancy, childbirth & puerperium	NA	NA	NA	38	4.5	7.8	38	2.4	3.9
Diseases of skin and cellular tissue	24	3.4	4.8	24	2.9	4.9	48	3.1	4.9
Diseases of the bones and organs of movement	25	3.5	5.0	37	4.4	7.6	62	4.0	6.3
Congenital malformations	2	0.3	0.4	1	0.1	0.2	3	0.2	0.3
Certain diseases of early infancy	2	0.3	0.4	1	0.1	0.2	3	0.2	0.3
Symptoms, senility and ill-defined conditions	54	7.6	10.9	169	20.2	34.8	223	14.4	23.0
Accidents, poisoning and violence	40	5.6	8.0	24	2.8	4.9	64	4.1	6.5
Total	715	100.0	143.7	838	100.0	172.6	1,553	100.0	158.0

22) *Ministry of Health & Social Affairs*, **National Tuberculosis Programme**, *1973, page 9.*

221

was consistent with the national prevalence survey.

Diseases and symptoms of the circulatory system, blood, blood forming organs, senility, and ill-defined conditions was three times higher in females. Accidents, poisoning, violence, and respiratory diseases were more common in males.

Efforts have been made to list the ten leading causes of morbid conditions using a classification other than the International Classification of Diseases and Illnesses of WHO. One of the major differences between the two classification is that the cerebro-vascular diseases, such as cerebral thrombosis included in the diseases of the nervous system and sense organs in the International Classification of Diseases, were transferred to the diseases of the heart, hypertension, etc. in Table 6. We tried to define a more specific disease entity as much as possible, but the available data obtained from the interviewee's expressed symptoms severely limited our efforts to produce a complete list of the ten leading diseases. Table 6 shows the poor results.

Table 6. Ten Leading Causes of General Morbidity

Morbid Conditions	No. of Episodes	%	Per 1,000
Rhinopharyngitis & influenza	468	29.8	47.6
Arthritis & undefined senile conditions	269	17.1	27.4
Gastro-intestinal trouble	241	15.3	24.5
Diseases of the heart, hypertension, etc.	72	4.6	7.3
Accidents including fracture & burns	70	4.5	7.1
Tuberculosis and pleurisy	69	4.4	7.0
Diseases of skin	50	3.2	5.1
Pelvic inflammatory diseases & pregnancy complications	39	2.5	4.0
Infectious & parasitic diseases	24	1.5	2.4
Psychoneurotic disorders	23	1.5	2.3
Total	1,325	84.4% of total (1,571)*	134.7

* Some people have double diagnoses

In terms of the number of episodes per 1,000, rhinopharyngitis and influenza numbered 48; arthritis and undefined senile conditions, 27; gastro-intestinal trouble, 25; diseases of heart and hypertension, 7; accidents, 7; tuberculosis, 7; skin diseases, 5; pelvic inflammatory diseases and delivery complications, 7; infectious and parasitic diseases, 2; and psychoneurotic disorders, 2. These ten leading causes of morbidity accounted for 84% of the total morbidity in the rural area.

Emphasis has been placed on the chronic conditions in order to determine the leading cause of chronic morbidity. Chronic morbidity can be defined as those conditions which last more than 3 months. Chronic conditions lasting more than 1 year were also listed. Arthritis and undefined senile conditions rank first, gastro-intestinal trouble ranks second, tuberculosis and pleurisy, and the diseases of the heart and hypertension rank third, and so on (Table 7). Anemia and nutritional deficiency, and cerebro-vascular diseases are also included in the

222

list. These ten causes accounted for 84%~89% of the total illness episodes.

Table 7. Ten Leading Causes of Chronic Conditions in Rural Areas

Chronic Conditions	Last More Than 3 Months			Last More Than 1 Year		
	No. of Conditions	%	Per 1,000	No. of Conditions	%	Per 1,000
Arthritis & undefined senile conditions	170	28.5	17.3	144	31.4	14.6
Gastro-intestinal trouble	78	13.1	7.9	59	12.9	6.0
Tuberculosis & pleurisy	68	11.4	6.9	50	10.9	5.1
Diseases of the heart & hypertension	62	10.4	6.3	56	12.2	5.7
Asthma & bronchitis	35	5.9	3.6	27	5.9	2.7
Pelvic inflammatory diseases & pregnancy sequele	21	3.5	2.1	14	3.1	1.4
Psychoneurotic disorders	19	3.2	1.9	19	4.1	1.9
Diseases of skin	18	3.0	1.8	15	3.3	1.5
Anemia & nutritional deficiency	17	2.8	1.7	10	2.2	1.0
Cerebro-vascular diseases	13	2.2	1.3	14	3.1	1.4
Total	501	84.4% of total (597)	50.8	408	89.1% of total (458)	41.3

3. *Days of Activity Restriction*

Activity restriction was investigated in relation to the morbidity information. The scale for restricted activity began with a half day rest at home up to 30 days of bed confinment. A half day rest away from one's normal daily activity was used as a criterion for the measurement of sickness, as well as activity restriction when a person with need for medical care was ambiguous as to whether or not he was really ill and had activity restrictions.

Morbidity cases with activity restriction showed up in 32.8% of the cases (Appendix Table 3-2). Thus, two thirds of the reported cases (67.2%) were free from activity restriction, and could be regarded as minor illnesses. Two groups were created in terms of the length of restricted activity days for the sake of convenience; 1) a group with less than 5 days of activity restriction was called a minor activity restriction group, and 2) those with 5 or more restricted days were called the major activity restriction group. The former included 18.6% of the reported cases, and the latter included 14.2%.

Table 8 shows the days of activity restriction per month. Male patients had more days of activity restriction than females by 0.3 day; while in the general population, females had more days of activity restriction by 0.06 day per person. On the average, a morbid person

Table 8. Days of Activity Restriction per Month

Sex	Per Morbid Person	Per General Population
Male	3.54	0.48
Female	3.24	0.54
Both	3.38	0.50

223

had 3.38 days of activity restriction, which was equivalent to 0.5 day per person.

Episodes of restricted activity increase as age increases, if the less than 10-year old group is excluded (Table 9).

Table 9. Age-Specific Spells of Activity Restriction (Per 1,000)

Age	0	1~4	5~9	10~19	20~29	30~39	40~49	50~59	More than 60	Total
Population	132	783	1,328	2,650	1,373	1,234	982	623	725	9,830
Activity Restriction	128.8	61.3	27.9	23.8	40.1	66.5	70.3	109.1	96.6	51.8

The age-specific activity restriction rate and age-specific morbidity rate per 1,000 are shown on the graph. They are parallel U-shaped curves; but the gap between the two rates widens as age increases (Figure 4). This means that the older people are more likely to get sick with relatively less spells of activity restriction, though the days of activity restriction themselves increase as age increases. Activity restriction was examined in connection with medical attention and monthly family income.

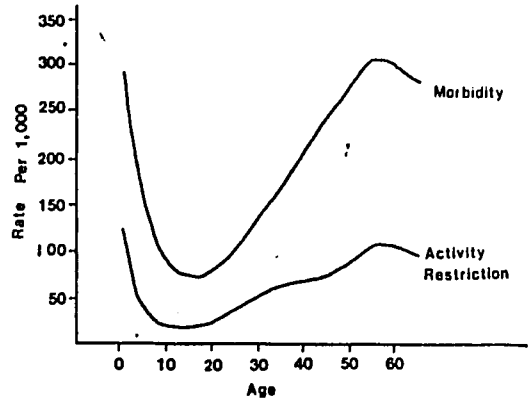

Figure 4. Age-Specific Morbidity and Activity Restriction (Per 1,000)

Among the sick with restricted activity, 16% received medical service and 27% did not. Among the sick without restricted activity, 14% visited a physician, and 43% did not (Figure 5).

Days of activity restriction increased proportionally with monthly family income.

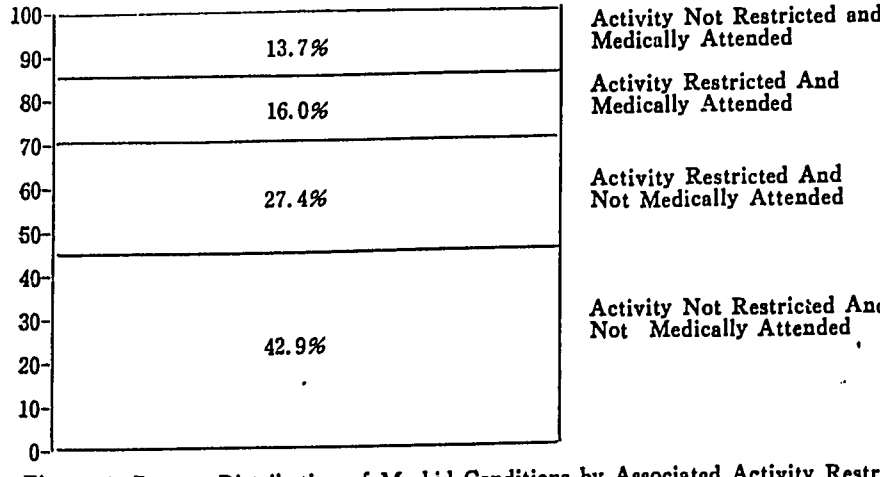

Figure 5. Percent Distribution of Morbid Conditions by Associated Activity Restriction and Physician Contact

224

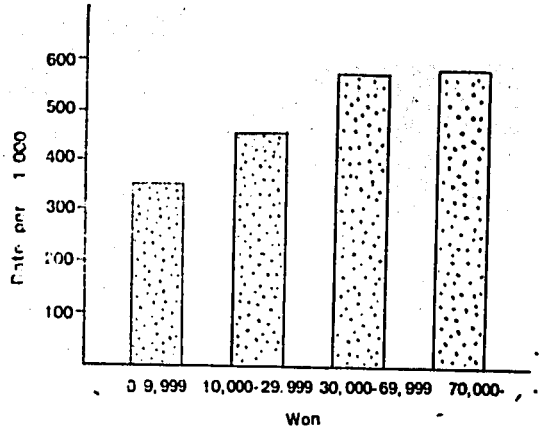

Figure 6. Days of Activity Restriction by Monthly Family Income (Per 1,000)

(Figure 6) This is difficult to interpret, because the finding suggests that the indigent are less likely to have activity limitation than the rich. The indigent may continue to work until their illness becomes severe. Another explanation may come from the observation of huge numbers of people with no activity restriction (67%). Further study is necessary to verify the relationship. Obviously, it is a difficult problem to determine who are the poor, and who are the medically indigent. Therefore, what has been explained is a comparison between those who have relatively more and less, rather than between the rich and the poor. Activity restriction will be further analyzed in relation to inpatient care in the chapter dealing with determinants of health services utilization.

4. *Characteristics of Health Care Utilization*

Fifteen percent of the sample of 9,830 people experienced 1,553 spells of morbidity during the study period of one month. Of the total spells of illness, 60% were taken care of by some type of health service (Chart Ⅲ).

Chart Ⅲ. Schematic Representation of the Occurrence of Illness

No. of People Surveyed: 9,830
- Healthy: 8,357 (85.0%)
- Unhealthy: 1,473 (15.0%)
  - 1,553 spells of illness
    - Unknown: 4 illness (0.3%)
    - Not treated: 618 illness (39.8%)
    - Treated: 931 illness (59.9%)

Of those who received care, the drug store was the predominant source of treatment (50%), physician visits ranked second (17%), folk therapy and superstition ranked third (11%), herb medicine use ranked fourth (10%), then the health center (8%), and inpatient care (4%) (Table 10). The first visit accounted for 78% of total utilization, and revisits accounted for the remaining 22% of utilization. Thus, the average number of treatments per spell of illness was 1.3, which represents marked underutilization. Dental care was negligible during the study period. The amount of herb medicine use and folk therapy, including superstition, was substantial (21%). During illness, one fifth of the rural people rely on this traditional folk medicine.

Table 11 shows the magnitude of ambulatory care and hospitalization. People used private clinics, municipal and provincial hospitals, nearby university hospitals, or health centers. Use of private hospitals was negligible. Three cases of patient's home visits were included.

225

Table 10. Number of Treatment by Source of Care

	Ambulatory Care	Inpatient Care	Dental Care	Pharmacist Visit	Health Center Use	Herb Medicine Use	Folk Therapy, Superstition, etc.	Total	%
First Visit	161	42	2	582	84	82	136	1,089	77.7
Second Visit	59	16	2	93	23	39	12	244	17.4
Third Visit	21	3	0	23	4	12	6	69	4.9
Total	241	61	4	698	111	133	154	1,402	100.0

Percentage of Treatment by Source of Care

	Ambulatory Care	Inpatient Care	Dental Care	Pharmacist Visit	Health Center Use	Herb Medicine Use	Folk Therapy, Superstition etc.	Total
First Visit	14.8	3.9	0.2	53.4	7.7	7.5	12.5	100.0
Second Visit	24.2	6.6	0.8	38.1	9.4	16.0	4.9	100.0
Third Visit	30.4	4.3	0	33.3	5.8	17.4	8.7	100.0
Total	17.2	4.4	0.3	49.8	7.9	9.5	11.0	100.0

Table 11. Number of Treatment from Physician, Ambulatory and Inpatient Care

	Ambulatory Care					Inpatient Care			
	Private Clinic	Public Hospital	University Hospital	Patient's Home Visit	Health Center	Private Clinic	Public Hospital	University Hospital	Total
First Visit	138	13	9	1	84	29	7	6	287
Second Visit	48	7	3	1	23	10	5	1	98
Third Visit	16	1	3	1	4	1	1	1	28
Total	202	21	15	3	111	40	13	8	413

Percentage of Treatment from Physician, Ambulatory and Inpatient Care

	Private Clinic	Public Hospital	University Hospital	Patient's Home Visit	Health Center	Private Clinic	Public Hospital	University Hospital	Total
First Visit	48.1	4.5	3.1	0.3	29.3	10.1	2.4	2.1	100.0
Second Visit	49.0	7.1	3.1	1.0	23.5	10.2	5.1	1.0	100.0
Third Visit	57.1	3.6	10.7	3.6	14.3	3.6	3.6	3.6	100.0
Total	49.0	5.1	3.6	0.7	26.9	9.7	3.1	1.9	100.0

in this category. Inpatient care was received at private clinics, or public and university hospitals. Three things are noteworthy here. First, the number of both ambulatory and inpatient care users did not reach the level of pharmacist visits (413 vs. 698 visits). This phenomenon is more conspicuous in the first visit cases (287 vs. 582 visits) (Table 10). In any case, the data shows that pharmacists play a significant role in medical care in rural areas. Second, if medical care provided at the health center is excluded from the calculation, then 80% of total health care was received at private clinics. If health center care is

226

included in the calculation, 59% of total health care was still received at private clinics. Particularly, two thirds of the inpatient care occurred in private clinics. It means that the role of private clinics is quite prominant in providing hospitalization service. This is one of the major characteristics of the Korean health care system. Third, though pharmacist visits is a predominant means of health service utilization, a different interpretation can be derived when the first visit cases are compared with the subsequent utilization (Table 12). Physician contacts, both ambulatory and inpatient care, shows the biggest percentage gain when going from the first to subsequent visits. The ratio of first and subsequent physician contacts almost doubles compared to that of pharmacist visits; 36.9% and 19.9% respectively. The next highest percentage increase from first to subsequent visits was health center utilization at 25.1%. This finding supports the observation that although the drug store is likely to be used as an initial entry to the rural health care system, the use of subsequent care increases more rapidly at the physician office, hospital, or health center.

Table 12. First Visit Versus Subsequent Utilization

	Pharmacist Visit	Physician Contact (Ambulatory+Inpatient)	Health Center Visit	Total
(1) First Visit	582	203	84	869
(2) Subsequent	116	75	27	218
(3) Total	698	278	111	1,087
(4) (2)/(1)×100	19.9	36.9	32.2	25.1

Table 13. Utilization of Health Services by Selected Characteristics

		Ambulatory Care		Inpatient Care		Drug Store		Health Center		Total	
		#	%	#	%	#	%	#	%	#	%
Sex	Male	136	56.4	35	57.4	331	47.4	66	59.5	568	51.1
	Female	105	43.6	26	42.6	367	52.6	45	40.5	543	48.9
	Total	241	100.0	61	100.0	698	100.0	111	100.0	1,111	100.0
Age	0~9	55	22.8	6	9.8	211	30.2	26	23.5	298	26.8
	10~19	16	6.6	9	14.8	96	13.8	12	10.8	133	12.0
	20~29	26	10.8	6	9.8	73	10.5	9	8.1	114	10.3
	30~39	39	16.2	10	16.4	73	10.5	18	16.2	140	12.6
	40~49	40	16.6	13	21.3	102	14.6	27	24.3	182	16.4
	50~59	29	12.0	10	16.4	70	10.0	16	14.4	125	11.2
	60~	36	15.0	7	11.5	73	10.4	3	2.7	119	10.7
	Total	241	100.0	61	100.0	698	100.0	111	100.0	1,111	100.0
Income (Won per Month)	0~9,999	14	5.8	0	0	12	1.7	11	9.8	37	3.3
	10,000~29,999	91	37.8	38	62.3	297	42.6	46	41.5	472	42.5
	30,000~69,999	103	42.7	17	27.9	318	45.5	46	41.5	484	43.6
	70,000	33	13.7	6	9.8	71	10.2	8	7.2	118	10.6
	Total	241	100.0	61	100.0	698	100.0	111	100.0	1,111	100.0

227

Chart IV. Utilization Rates

	Per Person with Episodes per Year	Per Person per Year
Mean Number of Physician Visits		
Male	2.44	0.33
Female	1.57	0.26
Both	1.96	0.29
Mean Number of Inpatient Care Visits		
Male	0.63	0.08
Female	0.39	0.06
Both	0.50	0.07
Mean Number of Drug Store Visits		
Male	5.94	0.08
Female	5.48	0.91
Both	5.69	0.85
Mean Number of Health Center Visits (curative purpose only)		
Male	1.18	0.16
Female	5.48	0.91
Both	0.90	0.14
Overall Mean Number of Health Services Utilization		
Male	10.19	1.37
Female	8.10	1.34
Both	9.05	1.36

Chart IV shows the utilization picture in the rural area. Males utilize health services more frequently, except drug store visits, in spite of the higher morbidity rate for females. (Table 1) The difference in utilization between the sexes is most conspicuous in health center visits. Do the males have lower pain thresholds than the females? Do behavioral or cultural influences create this difference? Or does the different social and economical role of the male create this difference? These questions are beyond the scope of this study. Age and income do not reveal consistent findings in Table 13. This will be discussed further in the next chapter. Utilization rates, as a whole, appear to be very low, both in the per person per year category and in the per person with episodes per year catagory. Most of the rates listed fall far below 1 per person per year. The utilization rate of physician services by the civilian, non-institutionalized population of the United States, for instance, based on information collected in the Health Interview Survey during 1969 was 4.3 (male; 3.7: female; 4.7)[23]. Also, the annual number of discharges from short-term hospitals in 1971, which was equivalent to the mean number of inpatient care visits per person per year, was 0.14 (male; 0.11: female; 0.16)[24].

This shows that physician services are notably underutilized in Korea, and rural people use health centers for curative purpose half as much as private physicians. The overall

23) *USDHW*, National Utilization Data from the National Center for Health Services Statistics, II, Physician Visits, *DHEW Publication No. (HSM) 72-1064, Series 10, No. 75, 1972.*

24) *USDHEW*, Current Estimates from the Health Interview Survey, *U.S.-1971, DHEW Publication No. (HSM) 73-1505, February, 1973.*

228

number of health service utilization is 1.36 visits per person per year, including pharmacist and health center visits.

Suppose the expressed perceived need of care is too inflated to use as a base for morbidity in the calculation of predicted utilization rates. (This might be supported by the fact that 25% of the interviewees regarded their morbid conditions as minor ones and not requiring medical attention). Then, it may be assumed that only three quarters of their perceived need of care actually constitutes conditions requiring medical attention. This gives a smaller denominator when we calculate the utilization rates per person with episodes per year. (Needless to say, it cannot affect the utilization rate per person per year.) For example, the figures for the category, per person with episodes per year, will be increased to 1.3 times. And the mean number of physician visits, for instance, will be 2.6 instead of 1.96.

5. *Determinants of Health Services Utilization*

The analytical framework illustrated in chapter two provides fairly satisfactory explanations. The previous studies of health services utilization have focused mostly on demographic chacteristics and household income as their descriptive variables with the application of simple cross-tabulation technique. Few studies have been conducted to identify the explanatory variables in the process of health service utilization in Korean. Therefore, an attempt is made to measure the gain of variance explained by applying the additional predictor variables listed in Chart 1. Five different utilization indicators are adopted for this analysis; ambulatory care, inpatient care, drug store visits, first visits only, and total utilization. Each utilization indicator is used three times in stepwise multiple regression analysis. First, applying the basic six predictors as independent variables (step 1); second, using all the 15

Table 14. The Proportion of Variance Explained by the Basic Six Predictors in Stepwise Multiple Regression

Independent Variables (Step 1)	Utilization Indicators in Beta Coefficients and Order of Entrance									
	Ambulatory Care		Inpatient Care		Drug Store Visits		First Visitis		Total Utilization	
	Beta	Order	Beta	Order	Beta	Order	Beta	Order	Beta	Order
Demographic Characteristics										
Age	−.0336	(6)	.0356	(3)	−.1077	**(1)	−.1484	**(1)	−.1447	**(1)
Sex	−.0656	*(1)	−.0297	(4)	.0153	(5)	−.0442	(3)	−.0573	*(3)
Educational Level	−.0321	(4)	.0324	(2)	.0158	(6)	−.0007	(6)	.0132	(6)
Marital Status	−.0553	(2)	−.0228	(1)	.0711	*(3)	.0401	(4)	.0479	(4)
Occupation	.0398	(5)	.0103	(5)	−.0290	(4)	.0287	(5)	.0405	(5)
Personal Enabling Factors										
Monthly Family Income	−.0254	(3)	.0021	(6)	.0928	**(2)	.0956	**(2)	.0943	**(2)
Multiple R.	.096		.078		.196		.188		.187	
R-SQ	0.9%		0.6%		3.8%		3.5%		3.5%	
R-SQ gained in % from step 1 to step 2	9.5%		16.5%		10.5%		6.9%		6.6%	

* *Significant at 5% level* ** *Significant at 1% level*

229

Table 15. Stepwise Multiple Regression of the Selected Variables in the Utilization of Ambulatory Care

Variables	Multiple R	R-SQ	Simple R	B	SD of Coefficient	Beta
Step 2						
Perceived Health Status	.224	.0502	−.224	−3.0290	.3342	−.2243**
Available Doctors in a Myon	.255	.0650	−.139	−.0417	.0085	−.1208**
Duration of Illness	.271	.0734	.088	.0183	.0049	.0928**
Initial Symptom Perceived As Requiring Medical Attention	.279	.0778	.059	.3117	.1125	.0677**
Sex	.286	.0818	−.065	−.2789	.1088	−.0627*
Available Pharmacists in a Myon	.292	.0853	−.164	−.0202	.0083	−.0674*
Available Pharmacists in a Gun	.306	.0936	−.085	.1509	.0403	.1598**
Monthly Family Income	.309	.0955	−.028	−.0776	.0435	−.0438
Available Doctors in a Gun	.312	.0973	−.073	−.0892	.0466	−.1419
Marital Status	.315	.0992	−.058	−.1301	.0790	−.0409
Age	.317	.1005	.007	−.0048	.0030	−.0459
Nature of Condition	.319	.1018	.096	.2520	.1601	.0551
Activity Restriction	.321	.1030	.027	−.0110	.0078	−.0357
Occupation	.322	.1037	.029	.0594	.0731	.0268
Level of Education	.322	.1037	−.006	−.0062	.0148	−.0114
a-Constant			4.3338			
Goodness of Fit			F(15, 1537)=11.8541**			
Step 3						
Perceived Health Status	.218	.0475	−.218	−2.5461	.3615	−.2179**
Nature of Condition	.247	.0610	.123	.5242	.1379	.1169**
Available Doctors in a Myon	.259	.0671	−.088	−.0263	.0105	−.0775*
Sex	.268	.0718	−.079	−.3163	.1387	−.0699*
Monthly Family Income	.274	.0751	−.055	−.1043	.0545	−.0591
Level of Education	.281	.0790	.035	.0353	.0178	.0663*
Initial Symptom Perceived As Requiring Medical Attention	.284	.0807	.039	.1854	.1410	.0405
Activity Restriction	.286	.0818	.017	−.0088	.0086	−.0320
Duration of Illness	.287	.0824	.094	.0081	.0094	.0370
Available Doctors in a Gun	.288	.0829	−.035	.0191	.0267	.0305
Age	.288	.0829	.005	−.0002	.0041	−.0015
a-Constant			3.2439			
Goodness of Fit			F(11, 985)=8.0702**			

* *Significant at 5% level* ** *Significant at 1% level*

predictors as independent variables; (step 2) third, excluding some predictors included in step 2, such as, occupation, marital status, and those aged below 20 (step 3).

As was expected in step 1, the demographic characteristics, and personal enabling factors, monthly family income in this instance, can explain the variance of health service utilization only minimally; 0.9% in ambulatory care, 0.6% in inpatient care, 3.8% in drug store

230

Table 16. Stepwise Multiple Regression of the Selected Variables in the Utilization of Inpatient Care

Variables	Multiple R	R-SQ	Simple R	B	SD of Coefficient	Beta
Step 2						
Activity Restriction	0.396	.1568	.396	.0436	.0026	.3963**
Level of Education	.399	.1592	.048	.0093	.0046	.0473*
Available Doctors in a Myon	.400	.1600	.028	.0040	.0029	.0321
Available Doctors in a Gun	.406	.1648	−.026	−.0199	.0070	−.0888**
Available Pharmacists in a Myon	.409	.1673	.030	.0060	.0029	.0555
Initial Symptom Perceived As Requiring Medicial Attention	.411	.1689	.020	−.0767	.0398	−.0466
Duration of Illness	.413	.1706	.120	.0029	.0017	.0414
Sex	.414	.1714	−.033	−.0455	.0372	−.0286
Available Pharmacists in a Gun	.414	.1714	−.005	−.0113	.0276	−.0334
Monthly Family Income	.414	.1714	.006	.0076	.0154	.0120
Nature of Condition	.414	.1714	.071	−.0192	.0544	−.0118
Occupation	.414	.1714	.049	.0046	.0203	.0058
Age	.414	.1714	.052	−.0001	.0012	−.0035
Perceived Health Status	.414	.1714	−.039	−.0127	.1173	−.026
Marital Status	.414	.1714	−.054	−.0016	.0319	−.0014
a-Constant			−.1615			
Goodness of Fit			F(15, 1537)=21.2197**			
Step 3						
Activity Restriction	.390	.1521	.390	.0411	.0031	.3898**
Level of Education	.393	.1544	.033	.0105	.0059	.0518
Age	.398	.1584	.039	.0031	.0015	.0626*
Initial Symptom Perceived As Requiring Medical Attention	.401	.1608	.007	−.0874	.0515	−.0500
Available Doctors in a Myon	.403	.1624	.025	.0048	.0038	.0371
Available Doctors in a Gun	.408	.1665	−.014	−.0220	.0095	−.0921*
Duration of Illness	.409	.1673	.089	.0026	.0025	.0313
Sex	.410	.1681	−.041	−.0222	.0519	−.0129
Nature of Condition	.410	.1681	.045	−.0183	.0690	−.0107
Monthly Family Income	.410	.1681	.013	−.0050	.0206	−.0075
Perceived Health Status	.410	.1681	−.048	.0266	.1320	.0060
a-Constant			−.2546			
Goodness of Fit			F(11, 985)=18.0622**			

* *Significant at 5% level* ** *Significant at 1% level*

visits, and 3.5% in first visits to different sources of care and total utilization respectively. Monthly family income and age appear to be significant for the explanation of drug store visits, first visits, and total utilization. Females use less health services than males except drug store visits. These are shown in terms of the beta coefficients of the six basic variables in Table 14. It also shows the percentage of explained variance gained by applying additional predictors: 9.5% in ambulatory care, 16.5% in inpatient care, 10.3% in drug

231

store visits, 6.9% in first visits only, and 6.6% in total utilization. On the average, 10% is gained. Inpatient care is the leading dependent variable in the explanation of health services utilization when the selected 15 predictors are simultaneously applied. In the meantime, the results indicate that specific utilization indicators (such as inpatient care, ambulatory care, or drug store visits), exceed the mixed utilization indicators (such as first visits only or total utilization), in its predictability of health services utilization variance when these 15 variables are used (9.5%, 16.5%, 10.3% over 6.9%, 6.6%). The result is reversed with the exception of drug store utilization, when the basic six variables are used (3.5%, 3.5% over 0.9%, 0.6%).

The older the patients are, the less likely they are to use all kinds of health services. Monthly family income is a potent variable except in the case of inpatient care. The rich, in general, use more health services in terms of utilization indicators other than ambulatory care. However, it is difficult to interpret the finding that the income is negatively associated with ambulatory care (Table 14 & 15). It needs further clarification. Step 2 of each equation from Table 14 to 18, indicates that both the level of education and occupation are negligible in the explanation of health services utilization, except for the effect of education on inpatient care. These results appear doubtful because it is generally known that the educational level is highly related to physician visits as well as to hospitalization. There are several possible explanations for this finding.

First, monthly family income may function as an intervening variable between education and health service utilization, and the interaction effect veils the relationship. This is indirectly supported by the fact that the addition of the education variable enhances the value of monthly family income significantly in step 3 in Table 15. Second, a large number of pre-school children who have neither jobs nor schooling are included in the analysis, and this may distort some possible linear relationship between education and utilization. Third, and more probably, the scale used for occupation classification is inappropriate. Thus, it is expected that the relationship becomes clear if either pre-school children are excluded from the analysis, or a more elaborate scale for job classification is applied. The result is shown in step 3 in Table 15.

Actually, an additional attempt is made to observe changes that occur when those below 20 years old, and inappropriate scales like occupation and marital status variables, are excluded from the analysis. The reason to exclude groups below 20 years old is that they are family dependents, and are incapable of paying for the cost of health care without financial assistance from the head of the households. When this group is excluded, the level of education is very positively correlated to both inpatient and ambulatory care, but is negatively related to drug store use (step 2 & 3 in Table 17). In other words, the more educated the people, the less likely they are to use a drug store. The relation, however, is not a strong one, and further study is needed.

(1) Ambulatory Care Utilization

Table 15 shows the predictive equation for utilization of ambulatory care. Ten percent of the variance in ambulatory care utilization can be accounted for by the selected 15 variables.

232

The most important variable is perceived health status which explains 5 percent of the variance in step 2, and 4.8 percent in step 3. It seems rational that a person feeling sick will see a physician more frequently. Available doctors in a myon, duration of illness, initial symptom perceived as requiring medical attention, and sex, account for an additional 3.2 percent of the variance in step 2. The significant regression equation from step 3 allows a prediction of 8.3 percent of the variance. In step 3, the nature of the condition assumes a higher entry, while the duration of illness assumes a lower entry. Particularly, the level of education becomes significant if the preschool children are excluded.

(2) Inpatient Care Utilization

Seventeen percent of the variance in hospitalization service is explained by the regression equation shown in Table 16. Activity restriction is the most powerful predictor and accounts for 16 precent of the variance. In a stepwise multiple regression, in which the independent variables enter the equation in order of the explained variance, the activity restriction variable is so dominant, it seems to disguise the effect of the other predictors. Thus, it is essential to eliminate the activity restriction variable from the analysis if multiple regression among the other predictors is to be examined in detail. Unfortunately, this procedure was not tried.

The second most important variable is the level of education in step 2 and 3, as well as in step 1. The more educated, the more inpatient utilization occurs. Health manpower variables proved to be significant in the prediction of inpatient care, as well as ambulatory care. Meanwhile, step 3 shows the importance of the age variable for the explanation of inpatient care. If those aged below 20 are not included, inpatient utilization increases as age increases. Perceived health status, in contrast to significantly explaining ambulatory care, does not play a meaningful role in the explanation of inpatient care utilization.

(3) Drug Store Visits

Table 17 shows the multiple regression equation for the drug store visits. Fourteen percent of the variance in drug store utilization can be explained by step 2, and eleven percent by step 3. Duration of illness enters first, which explains nine percent of the variance in step 2 and seven percent in step 3. The initial symptom perceived as requiring medical attention enters second, activity restriction enters third, and available pharmacists in a gun enter next. Another two or three percent can be explained by the addition of the latter three variables.

Perceived health status and educational level do not show a significant contribution to the explained variance of drug store visits. However, duration of illness, activity restriction, and nature of condition present a relatively strong negative correlation with drug store utilization. These three variables belong in the clinical conditions factor, which was illustrated in the analytical framework. In addition to belonging to the same category, the three independent variables possess a common characteristic in terms of the time dimension or length of sickdays; a person with activity restriction is more likely to have a condition of longer duration, and vice versa. Also, the nature of morbid conditions is mainly classified

Table 17. Stepwise Multiple Regression of the Selected Variables in the Utilization of Drug Store

Variables	Mutiple R	R-SQ	Simple R	B	SD of Coefficient	Beta
Step 2						
Duration of Illness	.303	.0918	−.303	−.1028	.0082	−.3027**
Initial Symptom Perceived As Requiring Medical Attention	.325	.1056	.129	.9406	.1909	.1184**
Activity Restriction	.341	.1163	−.158	−.0575	.0131	−.1082**
Available Pharmacists in a Gun	.351	.1232	.031	.1328	.0394	.0814**
Marital Status	.357	.1274	.124	.3827	.1325	.0697**
Monthly Family Income	.364	.1325	.099	.2077	.0730	.0680**
Nature of Condition	.369	.1362	−.260	−.6751	.2665	−.0855*
Available Doctors in a Myon	.371	.1376	.049	.0303	.0190	.0508
Perceived Health Status	.372	.1384	.076	.8401	.5614	.0360
Sex	.373	.1391	.014	.2025	.1836	.0264
Available Pharmacists in a Myon	.394	.1399	.095	.0171	.0182	.0331
Available Doctors in a Gun	.375	.1406	.010	.0791	.0791	.0729
Occupation	.375	.1406	−.120	−.0562	.1100	−.0147
Level of Education	.375	.1406	−.005	−.0082	.0247	−.0087
Age	.375	.1406	−.157	−.0016	.0058	−.0089
a-Constant			1.5541			
Goodness of Fit			F(15, 1537)=16.7507**			
Step 3						
Duration of Illness	.266	.0708	−.266	−.0948	.0109	−.2656**
Initial Symptom Perceived As Requiring Medical Attention	.282	.0795	.095	.6998	.2264	.0941**
Activity Restriction	.300	.0900	−.135	−.0474	.0139	−.1057**
Available Pharmacists in a Gun	.312	.0973	.047	.1294	.0459	.0862**
Nature of Condition	.317	.1005	−.218	−.4565	.3003	−.0775
Monthly Family Income	.320	.1024	.080	.1256	.0878	.0438
Perception of Health Status	.322	.1037	.058	.6202	.5837	.0327
Age	.323	.1043	−.038	−.0063	.0064	−.0296
Level of Education	.325	.1056	.054	−.0319	.0282	−.0370
Available Pharmacists in a Myon.	.325	.1056	.078	−.0168	.0223	−.0349
Sex	.326	.1063	.018	.0758	.2318	.0103
a-Constant			2.9809			
Goodness of Fit			F(11, 985)=10.6206**			

* *Significant at 5% level* ** *Significant at 1% level*

into acute and chronic by the duration of sickness. Therefore, the above finding suggests that a person with morbid conditions which last longer is less likely to use the drug store. Two explanations are possible for this finding. First, although the rural majority use drug stores as an initial entry point to the health services system, people appear to turn to

234

physician services or inpatient care if the condition lasts longer than expected, or if they believe the care provided by the pharmacists is ineffective or insufficient. Second the concept of the severity of illness might also intervene here. The long duration of an illness, in other words, indicates the severity of illness.

(4) First Visits and Total Utilization

People often combine visits to various sources of care for an episode of illness. For the first visit only, ten percent of the variance is attributed to the variables shown in Table 18. Duration of illness appears to be the leading predictor, which explains 5% of the variance. The second most important variable is the initial symptom perceived as requiring medical attention which accounts for an additional three percent. Monthly family income, perceived health status, age, and nature of the condition are also significant predictors in that order. In fact, almost the entire variance can be accounted for by these six variables.

Table 18. Stepwise Multiple Regression of the Selected Variables in the First Visits to Various Sources of Care

Variables	Multiple R	R-SQ	Simple R	B	SD of Coefficient	Beta
Step 2.						
Duration of Illness	.223	.0497	−.223	−.0787	.0087	−.2230**
Initial Symptom Perceived As Requiring Medical Attention	.284	.0807	.183	1.4501	.2011	.1757**
Monthly Family Income	.294	.0864	.102	.2418	.0776	.0762**
Perceived Health Status	.302	.0912	−.059	−1.6664	.5885	−.0688**
Age	.310	.0961	−.155	−.0146	.0049	−.0777**
Nature of Condition	.315	.0992	−.205	−.6668	.2849	−.0813*
Available Pharmacists in a Gun	.317	.1005	−.024	.0618	.0418	.0365
Activity Restriction	.318	.1011	−.050	−.0163	.0139	−.0296
Marital Status	.319	.1018	.078	.1038	.1510	.0229
Occupation	.320	.1024	−.083	.1192	.1286	.0300
Sex	.321	.1030	−.042	−.2046	.1982	−.0257
Available Pharmacists in a Myon	.321	.1030	.007	−.0136	.0193	−.0252
Level of Education	.322	.1037	.007	−.0157	.0263	−.0160
Available Doctors in a Gun	.322	.1037	−.044	−.0368	.0826	−.0326
Available Doctors in a Myon	.322	.1037	−.015	−.0042	.0207	−.0068
a- Constant			5.3812			
Goodness of Fit			(15.1537)=11.8439**			
Standard Error of Estimate			3.782			

* *Significant at 5% level* ** *Significant at 1% level*

For all the visits to different sources of care, ten percent of the variance is explained by the equation shown in Table 19. The initial symptom perceived as requiring medical attention is the most important predictor, and duration of illness the next. These two variables enter both equations for first visits and total utilization in a one-two order alternatively, and they have quite similar beta weights in both equations. The two equations resemble each other pretty much in terms of significant variables entered, and their

235

Table 19. Stepwise Multiple Regression of the Selected Variables in the Total Utilization

Variables	Multiple R	R-SQ	Simple R	B	SD of Coefficient	Beta
Step 2						
Initial Symptom Perceived As Requiring Medical Attention	.191	.0365	.191	1.5781	.2062	.1908**
Duration of Illness	.262	.0686	−.187	−.0637	.0087	−.1801**
Perceived Health Status	.277	.0767	−.080	−2.2007	.5937	−.0906**
Age	.289	.0835	−.147	−.0163	.0050	−.0862**
Monthly Family Income	.298	.0888	.103	.2433	.0778	.0765**
Available Doctors ina Gun	.306	.0936	−.001	.0800	.0281	.0708**
Nature of Condition	.311	.0967	−.175	−.6626	.2870	−.0806*
Sex	.313	.0980	−.054	−.2390	.1943	−.0299
Occupation	.314	.0986	−.071	.1346	.1215	.0338
Marital Status	.316	.0999	.074	.2562	.1648	.0448
Available Pharmacists in a Myon	.316	.0999	.017	−.0077	.0161	−.0144
Available Pharmacists in a Gun	.317	.1005	.010	.0776	.1478	.0457
Available Doctors in a Myon	.317	.1005	.008	−.0101	.0207	−.0162
Activity Restriction	.317	.1005	−.005	.0055	.0140	.0100
Level of Education	.317	.1005	.023	−.0084	.0266	−.0085
a-Constant			5.5810			
Goodness of Fit			F(15.1537)=11.4485**			
Standard Error of Estimate			3.798			

*Significant at 5% level **Significant at 1% level

respective beta weights, except for the variable of available doctors in a gun in the total utilization. As was already discussed in the general description in the determinants of health service utilization, these two mixed utilization indicators are less powerful in explaining the variance of health services utilization than are the specific indicators.

(5) Relative Importance of the Selected Independent Variables

The means of health services are so varied that it is difficult to select the most significant specific variable, or to arrange numerous relevant factors in order of importance to explain health service utilization. Efforts are made to integrate the effect of each variable into an aggregate explanatory index. This is done by summing the corresponding multiple correlation coeffecients of each variable which was obtained from each of the utilization indicators.

The results are shown in Table 20. Throughout the analysis, duration of illness ranks first, activity restriction second, initial symptom perceived as requiring medical attention third, perceived health status fourth, available doctors in a myon fifth, etc. For convenience sake, the explanatory variables are grouped into three categories; strong, moderate, and weak in terms of their magnitude of the aggregate multiple correlation coefficients. Duration of illness, activity restriction, initial symptom perceived as requiring medical attention, and perceived health status belong in the strong predictor group. Available doctors in a myon, monthly family income, available pharmacists in a gun, and age belong in the

236

Table 20. Relative Importance of the Independent Variables in the Explanation of Health Services Utilization*

	Demographic Characteristics					Enabling Factors	Systems Components				Clinical Conditions			Perception of Illness	
	Age	Sex	Level of Education	Marital Status	Occupation	Monthly Family Income	Available Doctors in a Myon	Available Doctors in a Gun	Available Pharmacists in a Myon	Available Pharmacists in a Gun	Duration of Illness	Activity Restriction	Nature of Condition	Initial Symptom As Requiring Medical Attention	Perceived Health Status
Ambulatory Care	0.002	0.007	0.000	0.003	0.001	0.003	0.031	0.003	0.006	0.014	0.016	0.002	0.002	0.008	0.224
Inpatient Care	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.006	0.003	0.000	0.002	0.396	0.000	0.002	0.000
Drug Store Visits	0.000	0.001	0.000	0.006	0.000	0.007	0.002	0.001	0.001	0.010	0.303	0.016	0.005	0.022	0.001
First Visits Only	0.008	0.001	0.001	0.001	0.001	0.010	0.000	0.000	0.000	0.002	0.223	0.001	0.005	0.061	0.008
Total Utilization	0.012	0.002	0.000	0.002	0.001	0.009	0.000	0.008	0.000	0.001	0.071	0.000	0.005	0.191	0.015
Total	0.022	0.012	0.004	0.012	0.003	0.029	0.034	0.018	0.010	0.127	0.615	0.415	0.017	0.284	0.248
Variable-Order of Importance	8	11	14	11	15	6	5	9	13	7	1	2	10	3	4
Arithmatic Sum for Each Group	0.053					0.029	0.089				1.047			0.532	
Average Per Variable	0.011					0.029	0.022				0.349			0.266	
Group-Order of Importance	5					3	4				1			2	

* *The Recorded Number are Multiple Correlation Coefficients for each Variable in Stepwise Multiple Regression Except the Order of Importance.*

237

moderate predictor group. All other variables belong in the weak predictor group.

Clinical conditions in terms of the duration of illness, activity restriction, and nature of conditions were found to be crucial in the process of overall prediction of health services utilization variance. These are particularly powerful in the explanation of inpatient care, drug store utilization and first visits. Clinical conditions seem to be less crucial in ambulatory care. The perception of illness category, in terms of initial symptoms perceived as requiring medical attention and perceived health status, were found to be the second most important factor. However, this factor shows strong predictability in the variance of ambulatory care and total utilization. Personal enabling factor in terms of monthly family income ranks third. In terms of drug store visits, first visits only, and total utilization, personal enabling factors are significant at the 1% level, but are negligible for inpatient care. System components in terms of the number of available health manpower in the region rank fourth. The number of available doctors in a myon, and doctors in a gun are significant for the explanation of ambulatory care and total utilization, respectively. Predisposing factors in terms of demographic characteristics enters last.

(6) Estimated Unmet Need for Health Care

The problem of inaccurate diagnosis is well recognized in any health interview survey. The four principal considerations in determining a diagnosis are, (1) the opinion of the individual suffering from the disease, (2) that of auxiliary and paramedical personnel concerned, (3) that of a physician conducting a clinical examination, and (4) that of a physician conducting a diagnostic laboratory test. The latter two procedures are not applied in this study. That is why the term ill health has often been used instead of a specific diagnostic entity, and why the International Classification of Diseases has widely been adopted in the Korean studies on morbidity.

With the problem of inaccurate diagnoses in mind, two different views must be taken into account to estimate the volume of unmet need for care in the rural area. First, as was already mentioned in Chapter II, the perceived need is liable to underestimate the undetectable need, subclinical conditions, and some portion of clinically detectable need. Second, and in contrast, the volume of real need for care is liable to be exaggerated by the interviewees. Some people criticize the use of perceived need of care as an instrument for the provision of data on health services planning. This criticism was taken into consideration when the utilization rates were calculated by making appropriate adjustments for possible over-reporting of morbidity. If we consider the first possibility, of underreporting of morbidity, all the expressed perceived need is then only a tip of the iceberg, called "absolute need". Health service researchers usually seem to be more concerned with this possibility. Health administrators, in contrast, need more realistic data which would be of more value in planning and implementing health services within available resource and technical limitations. Thus, the undetectable and subclinical conditions are given low priority or excluded altogether. In brief, little can be done for the first problem of underreporting, except to broaden the scope of perceived need through health education and the development

238

of new knowledge and techniques. For the second problem of overreporting, some information is available for adjustment. For example 25% of the total episodes perceived as not requiring medical attention by the interviewees themselves should be eliminated from any unmet need calculations.

The volume of unmet health need is measured in two different ways. First, the following three assumptions are considered.

(A): Those who were not treated are assumed to have unmet need.

(B): Percentage of the uncured among the treated

(C): (A) plus those who were treated but not cured are assumed to have unmet need.

(C)=(A)+(B)

Forty percent of the total reported episodes were not treated at all (Table 21). Among the treated, 78% were regarded as cured (cured+under treatment+improved) (Table 22).

Table 21. Number of Episodes Treated

Episode	Treated	Not Treated	Unknown	Total
No.	931	618	4	1,553
%	59.9	39.8	0.3	100.0

Table 22. Result of Treatment

Case	Cured	Under Treatment	Improved	Not Improved	Deceased	Unknown	Total
No.	309	197	218	106	1	100	931
%	33.2	21.2	23.4	11.4	0.1	10.7	100.0

Table 23. Result of Treatment Among Those Who Regard Their Conditions As Minor Ailment

Cured	Under Treatment	Improved	Not Improved	Deceased	Unknown	Others	Total
79	16	15	3	0	4	38	155

The following results were obtained from the above three assumptions(Chart V).

Chart V. Estimates of Unmet Need for Care

1. First Assumption

(A): $\frac{618}{1553-4}=\frac{618}{1549}=0.399$ (39.9%)

(B): $\frac{106+1}{931-100}=\frac{107}{831}=0.129$ (12.9%)

(C): $0.399+\frac{(931-100)-(309+197+218)}{931-100}=0.528$ (52.8%)

2. Second Assumption

(A): $\frac{618-155}{1549-155}=\frac{463}{1394}=0.332$ (33.2%)

(B): $\frac{106+1-3}{931-100}=\frac{104}{831}=0.125$ (12.5%)

(C): $0.332+\frac{(931-100)-\{(309-79)+(197-16)+(218-15)\}}{931-100}=0.332+\frac{217}{831}=0.593$ (59.3%)

239

Second, repeat the process of (A), (B) and (C); excluding those conditions which the interviewees regarded as not requiring medical care (Table 23).

Forty percent of those who reported illness without treatment can conservatively be assumed to have an unmet need. However, if those not cured are added, the volume of unmet health need increases to 53% of total episodes, which is considered a more meaning ful figure. The need for care is not met for more than half of the total reported episodes. Thirteen percent of the treated group shows no improvement. If those with minor ailments are excluded, then the health need for fifty-nine percent of the total episodes of illness was not fulfilled. The process of calculating the 59% figure of unmet need is shown in Chart 5, using data from Table 21, 22, and 23. If only those who had physician contacts are counted as having their health needs met, then the health needs for almost three quarters of the reported episodes were unmet.. (From Table 12)

The reasons for not receiving care are:

(1) Inability to pay for the cost of care, 43.4%;

(2) The morbid condition was not conceived of as needing care, 25.1%;

(3) Use of health services considered if symptoms worsen, 22.6%;

(4) Improvement not expected even with medical treatment, 8.1%;

(5) Unavailability of health service facilities, 0.8%.

The majority of the non-users, 43%, reported financial inability to pay as the reason for not seeking treatment. One fourth reported their illness as a minor ailment, and another 23% waited for the symptoms, some of them were presumably minor ones, to worsen. From the non-users' point of view, the system factors reported in terms of the unavailablity of health service facilities did not seem to be a serious barrier to them in entering the health system.

7. Health Service Expenditure

Appendix Table 7-1 shows age-specific health care expenditure incurred during the study period of one month. Health service expenditures are divided into two categories; direct and indirect. The former refers to primary health expenses, such as physician or pharmacist consultation fees, drug charges, hospitalization and surgical expenses, etc.. The latter refers to secondary expenses, such as transportation, nursing care, and miscellaneous items. The ratio between direct and indirect expenditures is 4 to 1. The unit price of each medical service is not considered here. The expenditures recorded in the survey are payments made, or future payments for services actually received during the survey period. It costs ₩ 2,614 per episode; ₩ 2,756 per patient; and ₩ 4,361 per treated case. (Table 24) The health expenses of males exceed that of females (₩ 3,156 per patient compared to ₩ 2,424). This expense is equivalent to ₩ 413 per person per month (₩ 424 per male, ₩ 401 per female). For a household, it amounts to ₩ 2,264 per month.

Table 24 shows the trend of health care expenditure increasing with age in terms of cost per patient, episode, treated case, and per person. For example, those in their fifties spend 42 percent more for health expenses per treated case than those in their twenties. This implicitly indicates that the older ages are more likely to suffer from major illness. For

240

Table 24. Health Care Expenditure by Selected Characteristics

		Per Patient	Per Episode	Per Treated Case	Per Person
Sex	Male	3,156	2,953	4,570	424
	Female	2,424	2,325	4,155	401
Age	0	1,661	1,576	1,920	466
	1~4	1,104	1,002	1,365	221
	5~9	1,460	1,391	2,152	154
	10~19	2,091	1,964	3,224	146
	20~29	2,723	2,723	4,158	282
	30~39	3,555	3,425	6,357	608
	40~49	3,583	3,359	5,842	821
	50~59	3,548	3,344	5,913	1,025
	60~69	3,539	3,368	6,960	910
	70	3,010	2,899	5,870	883
Cause	1	2,541	2,329	3,494	NA
	2	7,500	7,500	12,000	NA
	3	2,995	2,902	5,462	NA
	4	8,538	8,538	11,383	NA
	5	5,471	5,471	10,943	NA
	6	4,973	4,865	9,134	NA
	7	8,687	8,687	12,162	NA
	8	1,427	1,329	2,019	NA
	9	3,631	3,301	4,884	NA
	10	5,025	5,025	7,538	NA
	11	3,682	3,586	7,569	NA
	12	3,026	2,774	3,599	NA
	13	3,825	3,702	7,650	NA
	14	0	0	0	NA
	15	250	250	750	NA
	16	1,509	1,496	4,332	NA
	17	4,113	4,048	5,633	NA
Total	—	2,756	2,614	4,361	413

The International Classification of Diseases aud Injuries is used for Cause Classification

cause specific health expenditures, diseases of the circulatory system are the most expensive item at ₩ 8,687 per episode, and ₩ 12,162 per treated case. The other items costing more than ₩ 10,000 per treated case are neoplasms, diseases of blood and blood-forming organs, and diseases of the nervous system and sense organs. The two most prevalent diseases of the respiratory and digestive systems, cost ₩ 1,329 and ₩ 3,301 per episode respectively, and ₩ 2,019 and ₩ 4,884 per treated case respectively.

V. Implications of Household Interview Data in Health Administration

According to the World Health Organization's technical report published in 1952, there-

241

are many methods of using records and program statistics, in addition to illness surveys through home visits in sample households, and for the identification of health conditions of the population in a certain area.[25] Among the surveys, records, and program statistics used, are;

(1) Mass diagnostic and screening surveys;
(2) Census enumeration of sick persons;
(3) Census enumeration of certain defects;
(4) Record of notifiable communicabe diseases;
(5) Registration of certain diseases, with or without follow-up survey;
(6) Certification of certain conditions for special benefits;
(7) Record of road accidents;
(8) Record of industrial and occupational accidents and diseases;
(9) General hospital in-patient records;
(10) General hospital or clinic out-patient records;
(11) General home-visiting and nursing services;
(12) Records of special clinics, hospitals, and agencies;
(13) Continuous records of doctor's practices;
(14) Compulsory and voluntary social security schemes;
(15) Voluntary health plans and funds;
(16) Pensions and veterans' record;
(17) Life insurance and sickness insurance records;
(18) Records of health welfare centers (maternity, infant and pre-school child);
(19) Medical records in educational institutions;
(20) Records of physical examinations and sickness absenteeism in various occupational groups; and
(21) Sickness and recruitment records of the Armed Forces.

In general, illness surveys were conducted either by collecting sickness information from certain groups of people by special surveys, or through patient records from medical institutions. However, there are many cases in which it is difficult to identify the health status of the population in detail by utilizing existing records and data only.

In order to establish rational health programs aimed at improving the total medical care delivery system which are based on accurate health information, it is especially important to conduct illness and utilization surveys continuously, instead of one-shot short-term surveys. The rationale is that the incidence of disease tends to fluctate greatly by area, season, and social class. In fact, sickness surveys have been conducted in many countries of the world. Recently, the World Health Organization conducted international sickness surveys in order to identify the incidence of diseases and use of medical institutions for an international comparison.

The Korean government is heading toward a reorganization of its health service system. It seems, despite its limited applicability from the methodological problems previously mentioned, that the findings of this study can provide health administrators and researchers with baseline information on the morbidity and medical care utilization pattern. For

25) *WHO Expert Committee on Health Statistics (1952), WHO Technical Report, Ser., 53.6.*

242

instance, the hard data presented in the summary and conclusion may serve as basic information for the implementation of a health insurance program. However, there obviously is much room for methodological improvement.

It is therefore desirable to conduct a survey of sample households for at least a month during each of the four seasons. In this continuous survey, it would be possible to identify changes not only in the incidence of disease but also in health services utilization. In order to insure continuous surveys, the government should take administrative measures to guarantee such surveys in its health system. Such measures greatly assist in evaluating the effects of existing health and medical services, and in establishing a rational future health program.

VI. Summary and Conclusion

This study was conducted for the purpose of obtaining basic information necessary for planning health services in rural Korea. The information concerning need and demand for medical care must serve as the base for planning and implementing health care programs. It is very difficult to measure the volume of need and demand, particularly unmet health need; but it is indispensable for the formulation of health service strategies. Thus, the controversial issue is discussed in terms of its diversified conceptual and measurement problems. Perceived need for care is used as an instrument to measure the health status and the required amount of curative medical services. Unmet health need is defined as the gap between the amount of health services utilized and that of perceived illness. Among the 9,830 people interviewed in the nine guns, fifteen percent experienced some morbid condition during November 1974, and forty percent of the reported episodes were not treated at all. According to the most conservative estimate of this study, this forty pecent can be regarded as unmet medical need. This becomes fifty-three percent when those treated but not cured are added. But, if those who regarded their health problem as minor ones not requiring medical attention are excluded, unmet medical need increases to 59%. If we consider the fact that the large volume of met need came from pharmacist visits, then physician visits account for even less of the current level of met health need. Medical services were actually provided for 26.9% of the reported episodes. Therefore, almost three quarters of the reported health need is not medically attended.

More than sixty percent of those using health services choose the pharmacy for their primary source of care. This study however, reveals that the role of the pharmacist decreases with subsequent care. In other words. the drugstore is more likely to be used as the initial entry to the health service system. The tendency to visit the physician's office, hospital or health center for subsequent care is more prevelant than returning to the drugstore. Eighty percent of ambulatory and inpatient care takes place in private clinic settings. Furthermore, two thirds of inpatient care occurs at private clinics rather than in hospital settings.

Attempts were made to identify the determinants of health care utilization. Five factors

243

are considered in this model; predisposing demographic characteristics, personal enabling factors, available health manpower in a region, clinical conditions, and perception of illness. Inquiry about the perceived need of care was preceded by the identification of predisposing factors. Behavioral factors and clinical conditions are conceptually considered to connect the bridge between perceived need and demand for care, but behavioral aspects are not directly dealt with. Systems factors and personal enabling factors are believed to be influential in linking the demand for care and use of service. On the other hand, five predictors were adopted for the analysis of the determinants; ambulatory service and inpatient care, visits to drug store as specific utilization indicators, and first visits and total utilization as mixed utilization indicators. The former proved to be better indicators in predicting variance in health service utilization. Significant gains in variance resulted from the application of additional predictors instead of applying the basic demographic and income variables alone; 16.5% for inpatient care, 10.3% for drug store visits, 9.5% for ambulatory care, 6.9% for first visits, and 6.6% for total utilization. Ten percent is gained on the average.

The following variables were found to be the most powerful predictors in each regression equation; perceived health status in ambulatory care, activity restriction in inpatient care, duration of illness in drug store visits and first visits, and initial symptom perceived as requiring medical attention in total utilization. Relative importance of the independent variables in health service utilization is explored in terms of the magnitude of aggregate multiple correlation coefficients. Duration of illness ranks first, activity restriction second, initial symptom perceived as requiring medical attention third, perceived health status fourth, and so on. In general, clinical conditions are most significant in explaining health service utilization, particularly inpatient care, drug store utilization, and first visits. Perception of illness ranks second, and is particularly powerful in ambulatory care and total utilization. System factors rank third, and finally, predisposing factors.

The explained variance of this model in terms of R-square is not sufficient for a full understanding of health service utilization. Two additional remarks must be made in response to this problem. First, further study dealing with people's attitude and behavior is needed. This study did not include such variables. Second, further elaboration of the working model used, as well as of selected variables, is called for.

In conclusion, some baseline information is listed below:

Sickness Status

Monthly prevalence rate : 149.8/1,000 population
Monthly incidence rate : 77.6/1,000 population
Monthly sickness days percent : 10% of all the person-days
Percent of family with a sick member per month: 54.7%
Sickness days per episode : Acute-8.8 days
Chronic-29.3 days
Total-19.0 days

Sickness days per person per month	:	Male-2.6 days Female-3.4 days Both-3.0 days
Days of activity restriction per patient per month	:	3.4 days
Days of acvity restriction per person per year	:	6.0 days

Utilization of Health Services

Average number of treatment per episode	:	1.3
Mean number of physician visits per person per year	:	Male-0.33 Female-0.26 Both-0.29
~~Mean number of inpatient care per person per year~~	:	~~Male-0.08~~ ~~Female-0.26~~ ~~Both-0.29~~
Mean number of inpatient care per person per year	:	Male-0.08 Female-0.06 Both-0.07
Mean number of drug store visits per person per year	:	Male-0.80 Female-0.91 Both-0.85
Mean number of health center visits per person per year (curative service only)	:	Male-0.16 Female-0.11 Both-0.14
Overall mean number of health service utilization	:	Male-1.37 Female-1.34 Both-1.36

Health Care Expenditure

Health care expenditure per episode	Male-₩ 2,953 Female-₩ 2,325 Both-₩ 2,614
Health care expenditure per treated case	Male-₩ 4,570 Female-₩ 4,155 Both-₩ 4,361
Health care expenditure per person	Male-₩ 424/month Female-₩ 401/month Both-₩ 413/month
Health care expenditure per household	₩ 2,264/month

245

Appendix

Table G-1. Population Composition

Age \ Sex	Male #	Male %	Female #	Female %	Total #	Total %
0	72	1.4	60	1.2	132	1.3
1~4	438	8.8	345	7.1	783	8.0
5~9	694	13.9	634	13.1	1,328	13.5
10~19	1,401	28.3	1,249	25.7	2,650	27.0
20~29	671	13.5	702	14.4	1,373	14.0
30~39	594	11.9	640	13.2	1,234	12.5
40~49	487	9.8	495	10.2	982	10.0
50~59	314	6.3	309	6.4	623	6.3
60~69	204	4.1	255	5.3	459	4.7
70~	101	2.0	165	3.4	266	2.7
Total	4,976	100.0	4,854	100.0	9,830	100.0

Table G-2. Number of Households and Population Studied.

Area	# of Household	# People	Average Family Size
Chunsung	211	1,139	5.4
Dalsung	202	1,091	5.4
Yangsan	181	969	5.4
Damyang	201	870	4.3
Hwasung	200	1,060	5.3
Chungwon	199	1,094	5.5
Iksan	199	1,171	5.9
Kumsan	200	1,221	6.1
Naju	200	1,215	6.1
Total	1,793	9,830	5.5

Table G-3. Number of Available Health Manpower in the Study Area

Area	Gun		Myon or Ub		Total
	Doctor	Pharmacist	Doctor	Pharmacist	
Chunsung	7	0	2	0	9
Dalsung	11	13	2	2	28
Yangsan	3	4	1	2	10
Damyang	9	30	7	8	54
Osan	25	13	6	5	49
Chungwon	12	7	1	1	21
Kumsan	11	16	0	1	28
Iksan	9	20	1	3	33
Naju	17	24	10	7	58
Total	104	127	30	29	290

246

Table G-4(1) Marginal Information by Selected Characteristics*

Age	0	1~4	5~9	10~19	20~29	30~39	40~49	50~59	60~69	More Than 70	Total
Healthy People	1.1	7.5	14.2	29.5	14.7	12.2	9.1	5.3	4.1	2.2	100.0
Sick People	2.5	10.7	9.5	12.6	9.6	14.3	15.3	1.8	8.0	5.3	100.0
Total	1.3	8.0	13.5	27.0	14.0	12.6	10.0	6.3	4.7	2.7	100.0

* *Healthy people; 8,357*
Sick people; 1,473
Total people; 9,830

Table G-4(2).

Sex	Male	Female	Total
Healthy People	51.5	48.5	100.0
Sick People	45.4	8.2	100.0
Total	50.6	49.4	100.0

Table G-4(3).

Education	Illiterate	Primary School Attendants	Primary School Graduates	Middle School Graduates	High School Graduates	College Graduates	Total
Healthy People	26.5	18.4	30.4	15.3	7.9	1.4	100.0
Sick People	44.3	11.2	28.0	9.6	5.6	1.3	100.0
Total	29.2	17.4	30.0	14.4	7.6	1.4	100.0

Table G-4(4).

Marital Status	Married	Unmarried	Divorced	Separated	Others	Total
Healthy People	33.6	59.7	0.7	3.9	2.1	100.0
Sick People	48.3	38.6	0.5	10.1	2.4	100.0
Total	35.8	56.5	0.7	4.9	2.1	100.0

Table G-4(5).

Occupation	Professional & Technical Job	Managerial Job	Clerical Worker	Salesmen	Agriculture & Forestry	Laborers	Housewife	No Job; Students & Children	Unknown and Unclassified	Total
Healthy People	1.4	0.8	1.8	2.7	12.2	7.2	25.7	46.4	1.8	100.0
Sick People	0.9	0.4	1.5	4.8	14.6	7.8	24.6	45.5	0	100.0
Total	1.3	0.7	1.7	3	12.6	7.3	25.6	46.2	1.6	100.0

247

Table 1-1. Monthly Prevalence Rate in Person by Selected Characteristics

Characteristics \ Rate		Point Prevalence			Period Prevalence
		Beginning	End	Average	
Sex	Male	65.3	81.8	85.3	134.4
	Female	81.8	107.7	110.4	165.6
Age	0	15.2	98.5	93.9	280.3
	1~4	26.8	51.9	73.1	200.5
	5~9	22.6	28.6	43.0	105.4
	10~19	19.6	31.3	33.5	69.8
	20~29	46.6	67.7	65.9	103.4
	30~39	106.2	134.5	130.2	171.0
	40~49	143.6	175.2	179.1	229.1
	50~59	218.3	242.4	241.4	288.9
	60~	200.0	234.5	233.0	270.3
Income (Won Per Month)	0~9,999	65.7	85.8	75.5	98.5
	10,000~29,999	69.2	91.9	92.4	137.8
	30,000~69,999	80.1	101.2	108.0	170.1
	70,000~	73.0	77.0	95.0	163.5
Overall Average		73.4	94.2	97.7	149.8

Table 1-2. Prevalence Rate by Age and Sex (Per 1,000)

Age \ Sex	Male		Female		Both	
	Prevalence		Prevalence		Prevalence	
	Spell	People	Spell	People	Spell	People
0	291.7	263.9	300.0	300.0	295.5	280.3
1~4	223.7	105.5	217.4	194.2	220.5	200.5
5~9	116.7	108.1	104.1	102.5	110.7	105.4
10~19	65.7	60.7	84.1	80.1	74.3	69.8
20~29	93.9	93.9	112.5	112.5	103.4	103.4
30~39	148.0	146.5	204.7	193.8	177.5	171.0
40~49	186.9	172.5	301.0	284.8	244.4	229.1
50~59	305.7	280.3	307.4	297.7	306.6	288.9
60~	278.7	255.7	285.7	281.0	282.8	270.3
Average	143.7	134.4	172.6	165.6	158.0	149.8

248

Table 2-1. Number of Episodes of Illness by Age and International Disease Classification

I.C.D. \ Age	0	1~4	5~9	10~19	20~29	30~39	40~49	50~59	60~69	70~	Total
1	1	9	5	6	1	0	0	2	0	0	24
2	0	1	0	0	0	2	3	1	1	0	8
3	0	4	7	4	2	7	5	1	1	1	32
4	0	0	0	1	1	6	1	2	1	0	12
5	0	0	0	2	2	6	4	0	0	0	14
6	0	2	5	10	6	9	14	23	9	14	92
7	0	0	0	1	3	8	14	8	5	3	42
8	29	93	93	109	54	47	75	60	32	19	611
9	6	40	23	30	20	38	45	28	19	4	253
10	0	0	1	1	5	6	5	5	0	0	23
11	0	0	0	0	19	11	6	1	0	2	39
12	0	15	6	6	4	6	5	3	3	0	58
13	0	1	0	4	2	26	4	7	9	9	62
14	0	0	1	0	2	0	0	0	0	0	3
15	2	0	1	0	0	0	0	0	0	0	3
16	0	3	2	12	13	36	50	43	40	24	223
17	1	5	3	11	8	11	9	7	4	5	64
Total	39	173	147	197	142	219	240	191	124	81	1,553
%	2.5	11.1	9.5	12.7	9.1	14.1	15.5	12.3	8.0	5.2	100.0

Table 2-2. Age-Specific Prevalence Rate by Nature of Conditions*

Age	Population	Acute Condition	Per 1,000	Chronic Condition	Per 1,000	Both Conditions	Per 1,000
0	132	38	287.9	1	7.6	39	295.5
1~4	783	167	213.3	6	7.7	173	220.9
5~9	1,328	131	98.6	16	12.0	147	110.7
10~19	2,650	164	61.9	33	12.5	197	74.3
20~29	1,373	81	59.0	42	30.6	123	89.6
30~39	1,234	102	82.7	108	87.5	210	170.2
40~49	982	104	105.9	134	136.5	238	242.4
50~56	623	72	115.6	118	189.4	190	305.0
60~	725	74	102.1	131	180.7	205	282.8
Total	9,830	933	94.9	589	59.9	1,522*	154.8*

* *Pregnancy related conditions are excluded in this table*

Table 3-1. Number of Episodes Associated with Activity Restriction And Medical Attendance

Activity Not Restricted but Medically Attended	Activity Restricted and Medically Attended	Activity Restricted but Not Medically Attended	Activity Not Restricted and Not Medically Attended	Total
192	225	384	601	1,402
13.7	16.0	27.4	42.9	100

249

Table 3-2. Number of Episodes by Activity Restriction

No. of Restricted Days	0	1/2	1	2	3	4	5~9	10~14	15~19	20~24	25~29	30	Total
No. of Episodes	1,044	39	72	79	60	39	67	21	16	10	2	104	1,553
%	67.2	2.5	4.6	5.1	3.9	2.5	4.3	1.4	1.0	0.6	0.1	6.7	100

Table 5-1. Matrix of Simple Correlation Coefficients Among the Selected Variables

Variable	1	2	3	4	5	6	7
1	1.0000	0.0480	0.0730*	−0.4020**	0.5960**	−0.0530	0.0940**
2		1.0000	−0.1140**	0.1080**	0.1180**	0.0170	0.0040
3			1.0000	−0.2620**	0.2800**	0.1630**	0.1600**
4				1.0000	−0.5010**	−0.0270	−0.0190
5					1.0000	0.0240	0.0520
6						1.0000	−0.0740*
7							1.0000
8							
9							
10							
11							
12							
13							
14							
15							

Variables	8	9	10	11	12	13	14	15
1	0.0920**	−0.0010	0.0630*	0.3810**	0.0890**	0.3610**	−0.0530	−0.0780*
2	0.0020	−0.0070*	−0.0010	0.0510	−0.0120	0.0210	−0.0760*	0.0090
3	0.1570**	0.1000**	0.1540**	0.0100	0.0010	−0.0150	0.0010	−0.0540
4	0.0030	0.0290	0.0240	−0.1670**	−0.0740**	−0.1550**	−0.0030	0.0380
5	0.0170	0.0060	0.0030	0.2550**	0.0460	0.2140**	−0.0590	−0.0920**
6	−0.0610	−0.0310	−0.0050	−0.1180**	−0.0100	−0.0960**	0.0080	−0.0360
7	0.6610	0.4060**	0.6500**	0.1220**	−0.0270	0.0940**	0.0390	0.0840**
8	1.0000	0.5220**	0.9240**	0.1490**	−0.0100	0.1630**	−0.1640**	0.0500
9		1.0000	0.6990**	−0.0890**	−0.0120	−0.0670*	−0.0240	0.2240**
10			1.0000	0.1160**	0.0050	0.1130**	−0.1210**	0.1170**
11				1.0000	0.2360**	0.7120**	−0.0360	0.0570
12					1.0000	0.1630**	0.1070**	−0.1200**
13						1.0000	−0.0380	−0.0790*
14							1.0000	−0.0020
15								1.0000

* *Significant at the 5% level*

** *Significant at the 1% level*

250

Table 7-1. Health Care Expenditure by Age

Age	Direct Expenditure	Indirect Expenditure	Total
0	41,700	19,750	61,450
~4	154,350	19,000	173,350
5~9	163,200	41,200	204,400
10~19	313,700	73,150	386,850
20~29	291,200	95,500	386,700
30~39	597,900	152,200	750,100
40~49	647,450	158,700	806,150
50~59	513,900	124,700	638,600
60~69	335,250	82,350	417,600
70~	191,550	43,250	234,800
Total	3,250,200	809,800	4,060,000
%	80.1	19.9	100.0

Table 7-2. Health Care Expenditure by Sex

Sex	No. of Patients		No. of Treated Cases	No. of People	Per Patient and Episode		Per Treated Case	Per Person
	Patients	Episode			Patient	Episode		
Male	669	715	462	4,976	3,156	2,953	4,570	424
Female	804	838	469	4,854	2,424	2,325	4,155	401
Total	1,473	1,5[illegible]3	931	9,830	2,756	2,614	4,361	413

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251

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252

HEALTH SERVICES OUTCOME DATA:

A Survey of Data and Research Findings on the Provision of Health Services in Korea

— 人口의 死亡率, 罹患率, 醫療利用度 및 醫療費支出에 關한 分析 —

by

Ok Ryun Moon *and* **Jae Woong Hong**

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253

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Jae Woong Hong*

Health Services Outcome Data: A Survey of Data and Research Findings on the Provision of Health Services in Korea**

I. Summary

1. Mortality Data

This survey reviews 58 mortality studies published after 1945 in Korea. The indexes of mortality used in this study are the crude death rate, infant mortality rate, age and sex specific death rate, expectation of life at birth, and maternal mortality rate, etc., The mortality data were classified in these three categories; registered data, estimates, and sample survey data. The data were derived from population census, death registration, and sample surveys. The completeness of death registration and sample size are the major factors in determining the reliability of the data. Although the range of data is broad, representative figures of each item are provided as follows.

1) It is obvious that all of the death rates were slowly declining. But sizeable differences were found among the registered data, estimates, and sample survey data. Generally, the rates for all categories derived from the estimated data are highest.

2) The recent estimates of the crude death rate are approximately 10 per thousand population. However, the crude death rates surveyed in urban areas (primarily in Seoul) are around 5 per thousand population, and those in the rural areas are 7 to 8 per thousand.

3) The sample surveys show that infant mortality rates in recent years are approximately 30 to 35 per 1,000 livebirths in urban areas. In the rural areas, a wide range of

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This study is an initial attempt to collect and examine the existing data on the provision of health services in Korea. It should be emphasized that the ultimate purpose of this study can not be achieved if we stop at this point in time. Therefore, we will do our best to continue this project indefinitely, and periodically update the findings.

Certainly, we are sorry for them whose research findings fail to be appeared here. Please let us know about them, then, they will be supplemented next time.

The authors are solely responsible for any misinterpretations and errors in the study.

254

40 to 60 per 1,000 livebirths was found in the sample surveys.

4) The age specific death rates abruptly decline after the infant period, and continued at a lower level until the early forties. The increment of age specific death rate is gradual during the forties and fifties, but is quite abrupt after age sixty. The male has a higher death rate than female in all ages, especially in older ages. The difference is 1 to 2 per thousand on the average.

5) Accordingly, the life expectancy at birth was gradually increased. Recently, the life expectancy was determined as over 60 years for both sexes. The life table based on the 1966 census shows a life expectancy of 61.9 years for both sexes, with 59.7 years for the male and 64.1 years for the female.

6) All of the data on maternal mortality were based on the records of several general hospitals. Because tremendous variations exist among the studies, the findings cannot be generalized.

2. Morbidity Data

Fifty-three studies were examined in terms of the following morbidity and other factors; age, sex, age and sex, cause-specific prevalence rates and age, area specific incidence rates, annual number of sicknesses per capita, days activity restricted, and the ten leading causes of morbidity.

The results are as follows.

1) Teenagers and the productive age group, 20-40, show lower morbidity rates. The distribution of age specific prevalence rate is a U-shaped curve.

2) The mean value of prevalence rate per 1,000 people is around 160. The female has a higher prevalence rate than the male by 15 to 20.

3) The prevalence rate of urban people seems to be higher than that of rural residents, but more information is required to verify this result.

4) The average number of annual sicknesses per person is 1.9 to 2.0.

5) It can be accurately stated that the average number of days of activity restriction per person per month is 0.5, and that of activity restriction per patient is 3.4.

6) The prevalence and incidence rates surveyed on the first day of study were remarkably lower than those surveyed on the last day of the study. This may have resulted because the respondents are better prepared to answer by the end of the study.

7) The prevalence rate of chronic diseases is much higher than the incidence rate of acute diseases, which indicates the existence of a large number of chronic conditions.

8) Seasonal variations are noted in the ten leading causes of morbidity. Diseases of the digestive system are the leading cause in the summer, and diseases of the respiratory tracts in the winter.

9) The Goverment statistics indicate that the incidence rates of acute communicable diseases are rapidly decreasing, except for typhoid fever. The statistics reveal the increment of infectious tuberculosis despite the reduction of non-infectious tuberculosis.

3. Utilization Data

Eighty three references were investigated to determine the characteristics of the

255

medical care utilization pattern in Korea. The results are as follows:

1) Males use more health services than females, except for visits to pharmacists.

2) Rural residents tend to use health centers and herb doctors more frequently than urban people who use physician visits and hospitalization most frequently. The number of hospitalization increased significantly from 2.8 per 1,000 population in 1963 to 6.2 in 1974 in the rural areas.

3) Drugstores are the primary source of care for more than fifty per cent of all Koreans. Pharmacists are more frequently visited by the urban dwellers than the rural. More information is required to determine the trend of drugstore use over time.

4) Dentists are rarely consulted. The total number of dentist visits is equivalent to only one fiftieth of that of physician visits. This is evidence of the need for increased dental care in Korea.

5) The need for medical care is not met for more than half of the total reported episodes of illness.

6) The older the patients, the more likely they are to use all kinds of health services if those less than five years old are excluded.

7) The data from the national census on medical institutions suggest that the average length of inpatient stay was reduced from 16.7 days in 1966 to 12.4 days in 1973.

8) The level of education is positively correlated to hospitalization, physician and dentist visits, and is negatively correlated to herb doctors and herb druggist visits.

9) Both the educational level of mothers and geographical conditions affects the selection of place of delivery. Almost 90% of deliveries occur at home in the rural areas.

10) The following data are representative figures of the different medical care utilization patterns per 1,000 population per month.

Type of Medical Care	Rural		Urban	
	Average	Range	Average	Range
Physician Visit	22.7	5.7—47.2	30.2	20.5—47.1
Hospitalization	2.7	0.7—6.2	9.0	1.6—15.2
Health Center	10.2 11.9*	0.8—47.7 2.4*—47.7*	2.6	0.7—5.8
Pharmacist Visit	38.6 44.4*	0.9—71.0 21.6*—71.0*	50.5 61.7*	5.4—73.3 18.6*—73.3*
Dentist Visit	0.4	0.2—0.6	0.6	0.1—1.1
Herb Doctor Visit	7.4 8.8*	0.3—13.5 3.6*—13.5*	5.5	2.2—8.3
Herb Druggist Visit	6.5	3.5—9.7	8.7	4.2—16.9

* Adjusted by excluding those figures which fall beyond the one tenth of maximum figure.

4. Expenditures Data

A. Estimates of Gross National Health Expenditures.

Data are scarce in the estimates of gross national health expenditures. The following

256

data were mostly prepared by the Finance Subcommittee of the Health Sector Task Force for the Fourth 5-year Development Plan, ROK.

1) The total amount of national health expenditures was 191.2 billion won in 1974, which was three times the 64.7 billion won spent in 1970.

2) The national health expenditures as a percentage of the GNP increased from 2.5% in 1970 to 2.8% in 1974.

3) Health and medical care expenditures per capita increased from 2,000 won in 1970 to 5,700 won in 1974. The Social Security Subcommittee of the Health Sector Task Force used 5,611 won as the baseline figure for average per capita medical care expenditure in 1973.

4) In 1974, the public sector consumed 11%, or 21 billion won, of the total national health expenditures. The private sector consumed 89%, or 170.2 billion won. The sources of health expenditures are increasingly private.

5) In 1970, 48.2% of public expenditures came from the central government, and the remaining 51.8% came from the local governments. In 1974, the proportion of expenditures from the local goverments increased to 54.7%. The public sources are increasingly local government.

6) The local government's average per capita expenditures on health and medical care amounted to 386 won in 1973. Kangwon Province spent the most, 590 won per capita; and Chollanam Province spent the least 274 won per capita.

7) The proportion of out of pocket expenditures on health and medical care increased from 2.3% of total private expenditures in 1970 to 3.5% in 1974.

8) It is predicted that if the proportion of national health expenditures to GNP remain at 2.8%, the gross national health expenditures will increase from 250 billion won in 1975 to 662 billion won in 1981.

9) It is predicted that if the rate of national health expenditures to GNP increases annually by 0.1% to 3.5% in 1981, the gross national health expenditures will increase from 259 billion won in 1975 to 828 billion won in 1981.

10) It is predicted that the private consumption expenditures on health and medical care will increase from 213 billion won in 1975 to 583.3 billion won in 1981, if the income elasticity of private consumption expenditures remains at 1,036.

B. Review of the Existing Literature.

Thirty-six references were reviewed in order to identify some current features of medical care expenditures. These were itemized into by type of medical care, sex, monthly income, area, occupation, and classification of diseases and injuries. The results are summarized as follows.

1) In 1959, the per capita annual expenses for outpatient care was 77 won in rural areas. By 1972, it had increased to 912 won on a nationwide basis.

2) In-patient expenses per treated case vary according to area. In 1973, the highest expenditure was 69,102 won in urban areas, and the lowest was 10,313 won in rural areas.

257

3) In 1973, the expenses for drug store visits per treated case ranged from 765 won in rural areas to 1,261 won in urban areas. It was equivalent to one third to a half of outpatient expenses in terms of per patient and per treated case.

4) It cost an average of 1,000 won to receive medical care at the health centers in 1973. The amount was almost equal to the expenditures for drug store utilization, and two thirds of the amount for outpatient expenses.

5) Visits to herb drug stores cost twice as much as visits to the private clinics. A considerable amount of money was spent on folk therapies and superstitious remedies, although the number of users was not large.

6) On the average, the male spent slightly more than the female in terms of per patient and per treated case expenditures. However, more information is required to determine if the male or female spent more in terms of per capita expenditures.

7) The statistics for the total medical care expenses per year were only 6 to 7 times the per month expenditures. The difference may occur due to lapses of memory on the part of survey respondents. Thus, caution should be used when annual expenditure figures are quoted.

8) Monthly health and medical care expenses consist of 4% of the total monthly household income. The urban family spent more than the rural in terms of proportion of household income. Health plan subscribers spent more on medical care than non-members.

9) The medical care expenditures increased proportionally to age.

10) It is nearly impossible to identify any significant expenditure difference in terms of occupation, due to the various occupational classification systems used. Standardization is urgently needed.

11) The medical care expenditures by classification of diseases and injuries differ remarkably among studies. It should be kept in mind that this information at its best estimates is too crude to be used in planning for and administering health services.

Ⅱ. Analysis of Data

1. Mortality Data

A. Basis Data Tables

1. Registered and Estimated Crude Death Rate
2. Crude Death Rate (per 1,000 Population) Based on Sample Surveys by Area
3. Infant Mortality Rate per 1,000 Live-births Based on Sample Surveys by Area
4. Registered and Estimated Infant Mortality Rate per 1,000 Live births
5. Age and Specific Mortality Rate per 1,000 Population
6. Expectation of Life at Birth
7. Maternal Mortality Rate per 10,000 Livebirths
8. Major Cause Specific Death Rates per 100,000 Population
9. Major Causes of Infant Deaths

258

Table 1-1. Registered and Estimated Crude Death Rate(I)

Year	Sources	Population in 1000s	Crude Death Rate/1,000 Population	
			Registered	Estimated
1946	E. P. B. 1)	19,396	11.9	
1947	E. P. B.	19,886	9.0	
1946~1950	Choe, E. H. 2)			15.8
1952	Byun, S. M. et al 3)		2.3	
1953	E. P. B.	21,546	3.5	
	Byun, S. M. et al		3.6	
1954	E. P. B.	21,913	5.2	
	Byun, S. M. et al		5.3	
1955	E. P. B.	21,502	4.1	
	Byun, S. M. et al		4.2	
1951~1955	Choe, E. H.			14.3
1956	E. P. B.	22,307	4.8	
	Byun, S. M. et al		5.1	
1957	E. P. B.	22,949	4.9	
	Byun, S. M. et al		5.5	
1958	E. P. B.	23,611	5.8	
	Byun, S. M. et al		6.4	
	Kim, I. S. et al 4)			12.3
1959	E. P. B.	24,291	6.0	
	Byun, S. M. et al		7.9	
	Kim, I. S. et al			12.3
1960	E. P. B.	24,389	5.2	
	Byun, S. M. et al		9.0	
	Kim, I. S. et al			12.2
	E. P. B. 5)			8.3
	E. P. B. 57)			13.0
1955~1960	Kim, M. M. 6)			15.8
1956~1960	Choe, E. H.			12.8

259

Table 1-1. Registered and Esitmated Crude Death Rate(Ⅱ)

Year	Sources	Population in 1000s	Crude Death Rate/1,000 Population	
			Registered	Estimated
1961	E.P.B.1)	25,700	10.3	
	Byun, S M. et al		10.2	
	Kim, I.S. et al			12.1
	E.P.B.5)			9.5
	E.P.B.57)			13.0
1962	E.P.B.1)	26,432	7.5	
	Byun, S.M. et al		7.5	
	Kim, I.S. et al			12.3
1963	E.P.B.1)	27,084	4.8	
	Byun, S.M. et al		4.8	
	Kim, I.S. et al			12.0
	E.P.B.57)			12.0
1964	E.P.B.1)	27,958	4.2	
	Byun, S.M. et al		4.2	
	Kim, I.S. et al			12.0
	E.P.B.57)			11.0
1965	E.P.B.1)	28,670	4.4	
	Byun, S.M. et al		5.3	
	Kim, I.S. et al			11.9
	Koh, K.S.7)			9.0
1966	E.P.B.1)	29,086	4.2	
	Byun, S.M. et al		4.2	
	Kim, I.S. et al			11.9
	Park, Y.S.8)			8.4
	E.P.B.57)			10.0
1967	E.P.B.1)		4.7	
	Kim, I.S.et al			11.9
	E.P.B.57)			9.1
1968	E.P.B.57)			8.9
1969	E.P.B.57)			8.6
1970	E.P.B.57)			8.5
1965~1970	Kwon, O.H. et al 44)			9.0

260

Table 1-2. Crude Death Rate(Per 1,000 population) Based on Sample Surveys by Area(I)

Year	Researchers or Institution	Sample Size	Findings by Sample Area		
			Urban	Rural	Both
1952	Lee, Y.C. et al 9)	9,212		16.3	
1953	Lee, Y.C. et al	9,360		16.9	
1954~1955	Lee, Y.C. et al	Unknown		8.2	
1956	Lee, Y.C. et al	10,495		8.2	
1957	Lee, Y.C. et al	10,811		9.8	
1958	Lee, Y.C. et al	10,416		8.1	
	Won, M.S. 12)*	200,839	8.1		
1959	Lee, Y.C. et al	10,711		9.0	
	Won, M.S.*	206,747	7.6		
1960	Lee, Y.C. et al	11,026		9.1	
	Won, M.S.*	166,765	5.8		
1961	Lee, Y.C. et al	10,143		5.0	
	Kim, K.S. 10)	6,788		7.7	
	Kim, K.S. 11)	2,637		8.0	
	Lee, S.J. et al 13)	35,519		7.4	
	Won, M.S.*	172,053	5.8		
1962	Lee, Y.C. et al	10,402		6.2	
	Kim, K.S. 10)	7,006		8.6	
	Kim, K.S. 11)	2,707		8.1	
	Lee, S.J. et al	39,591		6.9	
	Won, M.S.*	191,490	4.0		
	Kwon, E.H. et al 14)	86,622	7.1		
	Kim, K.S. 15)*	268,806	4.1		
1963	Lee, Y.C. et al	10,706		5.6	
	Kim, K.S. 10)	7,240		7.3	
	Kim, K.S. 11)	2,774		6.9	
	Lee, S.J. et al	37,761		7.7	
	Cha, M.H. 16)	9,661		8.3	
	Park, H.J. et al 17)	37,750		10.6	

261

Table 1-2. Crude Death Rate (per 1,000 Population) Based on Sample Surveys by Area (Ⅱ)

Year	Researchers or Institution	Sample Size	Findings by Sample Area		
			Urban	Rural	Both
1963	Kwon, E.H. et al	8,331	9.2		
	Bang, K.M. 18)*	3,254,630	4.6		
1964	Lee, Y.C. et al	10,978		5.6	
	Kim, K.S. 10)	7,479		7.8	
	Kim, K.S. 11)	2,838		7.1	
	Lee, S.J. et al	38,810		9.4	
	Kwon, E.H. et al	91,664	7.1		
	Bang, K.M.*	3,424,385	4.3		
	E.P.B. 5)	1,000 : 1			8.5
1965	Lee, Y.C. et al	11,081		6.4	
	Kim, K.S. 10)	7,662		9.5	
	Kim, K.S. 11)	2,902		7.6	
	Lee, S.J. et al	39,714		7.6	
	Bang, K.M.*	3,470,880	5.1		
1966	Lee, Y.C. et al	11,071		7.4	
	Bang, K.M.*	3,805,261	4.3		
	Kwon, E.H. et al 19)	47,811	5.5		
	Yang, J.M. et al 20)	14,891	7.2		
1967	Lee, Y.C. et al	10,425		5.9	
	Lew, D.J. 21)	74,710		8.0	
	Kwon, E.H. et al 19)	47,811	5.7		
	Suh, H.W. 22)*	3,969,218	4.4		
	E.P.B. 43)	1,000 : 1			8.1
1968	Lee, Y.C. et al	10,581		7.4	
1969	Park, Y.W. et al 23)	6,414	4.8		
	Kang, J.K. et al 24)*	1,800,792			4.5
	Lee, K.N. 25)	14,472		8.2	
1970	Park, Y.W. et al	6,552	5.2		
	Yeh, M.H. et al 26)	14,153		6.9	

* Based on death registration

262

Table 1-3. Infant Mortality Rate per 1,000 Live-Births Based on Sample Surveys by Area (I)

Year	Researchers or Institution	No. of Births	Findings by Study Area		
			Urban	Rural	Both
1943	Yun, D. J. et al 27)	19		263.2	
1944	Yun, D. J. et al	24		166.7	
	Yun, D. J. 28)	230		160.9	
1945	Yun, D. J. et al	25		200.0	
	Yun, D. J.	201		258.7	
1946	Yun, D. J. et al	36		111.1	
	Yun, D. J.	327		143.7	
1947	Yun, D. J. et al	36		166.7	
	Yun, D. J.	280		125.0	
1943~1947	Yun, D. J. et al	140		171.4	
1948	Yun, D. J. et al	23		304.3	
	Yun, D. J.	302		168.9	
1944~1948	Yun, D. J.	1,340		165.8	
1949	Yun, D. J. et al	30		300.0	
	Yun, D. J.	338		85.8	
1950	Yun, D. J. et al	38		131.6	
	Yun, D. J.	331		87.6	
1951	Yun, D. J. et al	34		88.2	
	Yun, D. J.	285		119.3	
1952	Yun, D. J. et al	34		58.8	
	Yun, D. J.	346		92.5	
1948~1952	Yun, D. J. et al	159		163.5	
1953	Yun, D. J.	256		105.5	
1949~1950	Yun, D. J.	1,556		97.0	
1956	Yun, D. J 29)	355		59.2	
1957	Yun, D. J. 29)	470		63.8	
1952~1957	Huh, J. 30)	Unknown		125.0	
1958	Yun, D. J. 29)	337		59.3	
	Won, M. S. 12)	4,405	58.8		
1959	Yun, D. J. 29)	432		67.1	
	Won, M. S.	7,189	24.2		
	Kim, J. S. 31)	58		86.2	
	Kim, M. H. 32)	Unknown		58.0	
1954~1959	Park, H. J. 33)	14,325		82.9	
1960	Yun, D. J. 29)	394		68.5	
	Won, M. S.	6,436	12.9		
1956~1960	Yun, D. J. 28)	1,988		63.9	
1961	Won, M. S.	4,878	13.5		
	Lee, Y. C. et al 9)	314		25.5	
	Kim, K. S. 10)	275		36.4	
	Kim, K. S. 11)	89		89.9	
	Lee, S. J. et al 13)	1,289		66.7	

263

Table 1-3. Infant Mortality Rate per 1,000 Live-Births Based on Sample Surveys by Area (Ⅱ)

Year	Researchers or Institution	No. of Births	Findings by Study Area		
			Urban	Rural	Both
1957~1961	Lee, Y.C. et al			85.7	
1962	Won, M.S.	1,366	52.7		
	Lee, Y.C. et al	326		30.7	
	Kim, K.S.[10]	273		51.3	
	Kim, K.S.[11]	94		53.2	
	Lee, S.J. et al	1,372		61.2	
	Kwon, E.H. et al[14]	3,324	35.5		
	Kwon, E.H. et al[34]	5,174	108.4		
1958~1962	Won, M.S.	24,274	26.9		
1963	Lee, Y.C. et al	407		12.3	
	Kim, K.S.[10]	308		35.7	
	Kim, K.S.[11]	81		74.1	
	Lee, S.J. et al	1,508		55.7	
	Kwon, E.H. et al[14]	3,600	30.8		
	Cha, M.H.[16]	366		49.2	
	Park, H.J.[17]	1,375		67.6	
1964	Lee, Y.C. et al	259		42.5	
	Kim, K.S.[10]	281		46.3	
	Kim, K.S.[11]	87		34.5	
	Lee, S.J. et al	1,317		60.7	
	Kwon, E.H. et al[14]	2,531	42.3		
	Kim, Y.S. et al[35]	166	84.3		
1962~1964	Kwon, E.H. et al[14]	9,455	35.5		
1965	Lee, Y.C. et al	258		15.5	
	Kim, K.S.[10]	216		60.2	
	Kim, K.S.[11]	83		48.2	
	Lee, S.J. et al	1,159		53.5	
	Yum, Y.T.[36]	538		66.9	
	Shin, S.W.[37]	263		133.1	
	Oh, Y.I.[38]	261		76.6	
1961~1965	Lee, Y.C. et al	1,564		24.3	
	Kim, K.S.[10]	1,353		45.1	
	Kim, K.S.[11]	434		59.9	
	Lee, S.J. et al	6,645		59.6	
1966	Lee, Y.C. et al	226		26.5	
1967	Lee, Y.C. et al	227		39.6	
	Yang, J.M. et al[20]	306	35.9		
	Huh, I.M. et al[39]	5,952		63.3	
1966~1967	Kwon, E.H. et al[19]	2,854	32.2		
1968	Lee, Y.C. et al	223		49.3	
1966~1968	Lee, Y.C. et al	676		38.5	
1970	Lee, S.K. et al[40]	2,083		42.2	

264

Table 1-4. Registered and Estimated Infant Mortality Rate per 1,000 Livebirths

Year	Sources	Infant Mortality Rate	
		Registered	Estimated
1946	MOHSA 54)	77.5	
1947	MOHSA	48.9	
1948	MOHSA	70.9	
1949	MOHSA	85.7	
1950	MOHSA	87.6	
1951	MOHSA	121.4	
1952	MOHSA	92.5	
1953	MOHSA	106.8	
1955	Kim, Y 41)		134.0
1956	MOHSA	78.3	
1957	MOHSA	54.2	
	MOHSA 55)		82.9
1960	Kim, Y		121.0
1961	MOHSA 54)	7.6	
1962	MOHSA 54)	9.7	
1663	MOHSA 54)	12.1	
1964	MOHSA 54)	7.1	
1967	MOHSA 55)		58.2
1972	MOHSA		50.0
1973	MOHSA		45.0
1974	MOHSA		41.0
1975	MOHSA		38.0

265

Table 1-5. Age and Sex Specific Mortality Rate/1,000 Population (I)

Year	Researchers or Institution	Study Area	Sample/Pop. Size	Sex	Age Specific Mortality Rate								
					0	1—4	5—9	10—14	15—19	20—24	25—29	30—34	35—39
1955	Kim, Y.42)	Whole country	—	Both	—		—	—	—	—	—	—	—
				M.	39.4		6.3	2.3	3.2	4.8	4.9	6.0	7.1
				F.	36.3		6.4	2.4	3.5	5.0	5.0	5.7	6.3
1958	Won, M.S.12)	Seoul	200,839	Both	23.3		3.3	2.4	1.3	2.7	3.8	5.3	
1959	Won, M.S.	Seoul	206,747	Both	19.9		3.5	1.4	1.2	2.1	4.6	5.4	
1960	Won, M.S.	Seoul	166,765	Both	11.2		1.3	2.0	2.0	3.4	3.0	3.1	
	Kim, I.S. et al 4)	Whole country	—	M.	102.0	10.6	2.7	2.0	3.1	4.3	4.7	5.3	6.5
				F.	96.3	12.5	3.1	2.4	3.4	4.4	5.1	5.8	6.6
	E.P.B.5)	Whole country	—	Both	5.7	4.9	4.8	4.6	4.6	3.9	4.0	4.7	5.4
				M.	5.9	4.3	4.2	4.6	4.8	3.8	4.2	5.1	6.1
				F.	5.4	5.3	5.5	4.5	4.3	4.0	3.9	5.3	4.7
1955~1960	Kim, M.M.6)	Whole country	—	Both	107.9	10.9	2.4	2.0	2.9	4.0	4.8	6.6	8.8
				M.	118.1	11.6	2.2	2.0	2.8	3.8	5.1	6.8	9.1
				F.	97.8	10.2	2.7	2.0	3.0	4.1	4.5	6.4	8.6
1961	E.P.B.	Whole country	—	Both	6.4	6.0	5.5	5.2	5.4	4.3	4.6	5.2	6.2
				M.	6.5	5.9	4.8	5.0	5.5	4.1	4.6	5.9	7.2
				F.	6.2	6.0	6.4	5.3	5.2	4.5	4.6	4.6	5.3
	Won, M.S.	Seoul	172,053	Both	9.0		1.1	1.2	1.0	2.2	3.1	3.3	
1962	Won, M.S.	Seoul	191,490	Both	9.0		1.1	0.5	1.0	1.4	2.6	1.8	
	Kim, K.S.15)	Urban	268,806	Both	3.5		1.1	1.2	1.9	3.3	3.6	3.6	3.6
1958~1962	Won, M.S.	Seoul	937,894	Both	14.9		2.2	1.5	1.3	2.3	3.4	3.8	
1963	Cha, M.H.16)	Rural	9,661	Both	18.5		3.9	—	2.1	—	—	3.4	2.1

Table 1-5. Age and Sex Specific Mortality Rate/1,000 Population (Ⅱ)

Year	Researchers or Institution	Study Area	Sex	Age Specific Mortality Rate											Average
				40—44	45—49	50—54	55—59	60—64	65—69	70—74	75—79	80—84	85—89	90+	
1955	Kim, Y.[42]	Whole country	Both	—	—	—	—	—	—						
			M.	9.6	14.3	19.1	24.8	34.3	47.3	65.2					
			F.	6.9	8.1	9.2	13.0	19.1	29.0	47.2					
1958	Won, M.S.[12]	Seoul	Both	9.8		22.5		37.8							8.1
1959	Won, M.S.	Seoul	Both	9.4		20.5		36.5							7.6
1960	Won, M.S.	Seoul	Both	7.6		12.7		45.0							5.8
	Kim, I.S. et al[14]	Whole country	M.	8.3	11.0	15.3	21.6	31.7	36.6	70.2	107.1	182.6	296.9		
			F.	7.5	9.0	12.4	16.9	25.7	38.4	60.8	95.1	167.2	287.4		
	E.P.B.[5]	Whole country	Both	7.2	9.8	14.4	18.1	27.7	38.1	62.2	175.4	483.4			8.3
			M.	8.5	12.5	19.1	25.0	39.4	54.0	83.6	220.2	590.1			9.1
			F.	5.9	7.2	9.8	12.0	18.3	26.5	69.9	148.9	430.4			7.6
1955~1960	Kim, M.M.[6]	Whole country	Both	11.5	15.0	19.2	26.6	37.7	55.5						15.8
			M.	12.1	16.0	21.2	29.9	41.7	60.1						
			F.	11.1	14.0	17.2	23.2	33.6	50.8						
1961	E.P.B.	Whole country	Both	8.0	11.1	16.0	20.5	32.7	41.6	73.1	96.9	210.5	583.0		9.5
			M.	9.6	14.3	21.5	28.8	47.3	61.0	103.4	130.9	280.4	768.0		10.5
			F.	6.3	8.1	10.7	13.1	20.8	27.4	52.6	75.3	169.3	490.9		8.5
	Won, M.S.	Seoul	Both	9.1		15.6		48.9							5.8
1962	Won, M.S.	Seoul	Both	4.3		9.0		30.7							4.0
	Kim, K.S.[15]	Urban	Both	5.5	4.5	10.2	10.3	21.1							4.1
1958~1962	Won, M.S.	Seoul	Both	8.0		15.9		38.7							6.3
1963	Cha, M.H.[16]	Rural	Both	6.8	13.0	12.2	3.6	45.9							8.3

Table 1-5. Age and Sex Specific Mortality Rate/1,000 Population (Ⅱ)

Year	Researchers or Institution	Study Area	Sample/Pop. Size	Sex	Age Specific Motality Rate								
					0	1—4	5—9	10—14	15—19	20—24	25—29	30—34	35—39
1962~1963	Park, H.J. et al 17)	Rural	37,750	Both	67.6	7.0	2.5	1.6		3.2		3.6	
				M.				1.6		3.6		4.2	
				F.				1.6		2.7		3.1	
1964	E.P.B.5)	Whole country	1 : 1,000	Both	45.6	7.6	2.2	1.2	1.5	3.1	2.0	3.5	5.3
				M.	40.4	6.6	2.1	—	2.9	3.5	2.9	3.8	6.9
				F.	51.8	8.7	2.3	2.5	—	2.6	1.0	3.3	3.8
1966	E.P.B.43)	Whole country	29,086,000	Both	3.5		1.8	1.0	2.0	2.2	2.0	2.3	2.8
				M.	3.6		2.0	1.2	2.6	2.6	2.1	2.7	3.5
				F.	3.4		1.7	0.9	1.3	1.9	1.8	1.9	2.3
	Park, Y.S.8)	Whole country	—	Both	59.3	5.1	1.6	1.2	1.9	4.2	3.5	3.8	4.9
				M.	66.1	5.3	1.6	1.2	2.0	4.3	3.4	4.0	5.4
				F.	55.0	4.8	1.4	1.1	1.7	4.0	3.5	3.7	4.4
1967	Kwon, E.H. et al 19)	Seoul	47,811	Both	11.2		1.0	0.8	0.7	1.4	1.1	2.2	3.0
	Suh, H.W.22)	Seoul	552,644	Both			1.0	0.8	1.4				
				M.			1.1	0.9	1.7				
				F.			0.9	0.7	1.2				
1969	Lee, K.N.25)	Rural	14,472	Both	10.2		3.0	2.2		3.7		4.8	
				M.	10.3		3.3	2.1		4.5		5.2	
				F.	10.1		2.6	2.3		3.4		4.4	
1965~1970	Kwon, O.H. et al 44)	Whole country	31,435,252	Both	59.3	5.1	1.5	2.3	12.1	6.9	10.3	2.4	2.3
				M.	66.1	5.3	1.6	2.6	12.2	8.2	11.4	2.3	2.3
				F.	52.0	4.8	1.4	2.0	11.9	5.5	9.3	2.4	2.3

Table 1-5. Age and Sex Specific Mortality Rate/1,000 Population (Ⅳ)

Year	Researchers or Institution	Study Area	Sex	Age Specific Mortality Rate											Average
				40—44	45—49	50—54	55—59	60—64	65—69	70—74	75—79	80—84	85—89	90+	
1962~1963	Park, H. J. et al 17)	Rural	Both	7.3		14.2		48.2		103.6		394.2		333.3	
			M.	7.4		18.5		51.1		139.3		558.8		—	
			F.	7.3		10.1		45.4		79.7		314.3		333.3	
1964	E. P. B. 5)	Whole country	Both	3.5	9.3	15.8	21.8	29.5	33.3	56.1	89.8	234.4	285.7		8.5
			M.	2.8	9.5	20.3	34.5	44.5	56.3	88.5	160.7	250.0	111.1		9.1
			F.	3.2	9.1	11.6	10.0	16.9	19.2	35.8	54.1	229.2	368.4		8.0
1965	E. P. B. 43)	Whole coulntry	Both	3.6	5.3	7.4	10.2	13.7	20.2	26.6	46.3	70.3	318.2		4.2
			M.	4.6	7.2	10.1	14.1	19.8	28.8	38.2	60.2	89.9	377.7		4.9
			F.	2.7	3.4	4.7	6.3	8.4	13.4	18.5	37.1	58.5	284.9		3.5
	Park, Y. S. 8)	Whole country	Both	6.8	9.4	13.6	18.0	25.7	38.9	54.8	88.3	158.8	421.0		8.4
			M.	7.9	12.0	17.6	24.4	35.9	54.3	75.5	113.4	200.2	509.3		9.3
			F.	5.7	6.8	9.8	12.3	17.6	27.8	41.4	74.0	136.7	380.7		7.5
1967	Kwon, E.H. et al19)	Seoul	Both	5.8	9.1	18.3	28.2	36.9	39.4			97.9			
	Suh, H. W. 22)	Seoul	Both												
			M.												
			F.												
1969	Lee, K. N. 25)	Rural	Both	7.7		14.8			48.4						8.2
			M.	7.5		16.5			48.2						8.1
			F.	8.0		13.0			48.6						8.3
1965~1970	Kwon, O.H. et al 44)	Whole country	Both	6.2	3.5	10.3	17.7	20.6	35.6	48.8	68.3	152.8			9.0
			M.	7.4	4.3	13.0	18.9	30.0	51.1	70.8	96.2	207.8			9.9
			F.	5.2	2.8	7.6	16.5	12.8	24.6	35.2	53.4	128.5			8.1

269

Table 1-6. Expectation of Life at Birth

Year	Researchers or Institution	Study Area	Sample/Pop. Size	Sex		
				Both	Male	Female
1955~1960	E. P. B. 5)	—	—	52.6	51.1	53.7
1960	Lee, P. M. 45)	—	—	—	—	58.1
1961	E. P. B. 56)	—	—	57.5	54.9	61.0
1963	Park, H. J. et al 18)	Rural	37,750	—	57.6	60.9
1965	Koh, K. S. 7)	—	—	1/58.3 2/60.7 3/63.6	56.5 58.8 61.2	60.0 62.5 65.0
1966	E. P. B. 57)	—	—	61.9	59.7	64.1
	Park, Y. S. 8)	—	—	—	58.7	64.5
	Lim, K. H. et al 46)	—	—	—	57.2	64.1
1970	E. P. B. 58)	—	—	—	63.0	67.0
1965~1970	Kwon, O. H. et al 44)	—	—	—	57.2	64.0

1/Applied Model Life Table, West, Level 17 Mortality
2/Applied Model Life Table, West, Level 18 Mortality
3/Applied Model Life Table, West, Level 19 Mortality

Table 1-7. Maternal Mortality Rate/10,000 Live Births (I)

Year	Researchers or Institution	Study Area	No. of Live Births	Findings
1958	Lee, C. H. 47)	Hospital	3,693	151
1959	Lee, C. H.	Hospital	4,756	113
	Kim, Y. W. et al 48)	Hospital	321	62.3
1960	Lee, C. H.	Hospital	5,682	91
	Kim, Y. W. et al	Hospital	410	73.2
1961	Lee, C. H.	Hospital	7,650	78
	Kim, Y. W. et al	Hospital	501	99.8
	Chun, C. H. et al 49)	Hospital	2,050	29
1962	Lee, C. H.	Hospital	11,276	108
	Kim, Y. W. et al	Hospital	455	109.9
	Chun, C. H. et al	Hospital	1,703	24
	Kim, Y. S. 50)	Hospital	457	21.9
1958~1962	Lee, C. H.	Hospital	33,007	104*
1963	Kim, Y. W. et al	Hospital	696	86.2
	Chun, C. H. et al	Hospital	1,939	10
	Kim, Y. S.	Hospital	975	—
1964	Kim, Y. W. et al	Hospital	580	69.0
	Chun, C. H. et al	Hospital	1,725	—
	Kim. Y. S.	Hospital	1,016	51.3
1965	Kim, Y. W. et al	Hospital	691	72.3
	Chun, C. H. et al	Hospital	1,774	28.2
	Kim, Y. S.	Hospital	959	41.7
	Lee, C. S. 51)	Hospital	300	166.7
1966	Kim, Y. W. et al	Hospital	843	225.6
	Chun, C. H. et al	Hospital	1,099	9
	Kim, Y. S.	Hospital	873	57.3
	Whang, S. K. et al 52)	Hospital	1,924	41.6
	Lee, C. S.	Hospital	309	258.9
1961~1966	Chun, C. H. et al	Hospital	10,290	29.2*

270

Table 1-7. Maternal Mortality Rate/10,000 Live Births (I)

Year	Researchers or Institution	Study Area	No. of Live Births	Findings
1957	Kim, Y.W. et al	Hospital	1,141	140.2
	Kim, Y.S.	Hospital	896	30.5
	Whang, S.K. et al	Hospital	2,033	29.5
	Lee, C.S.	Hospital	377	238.7
	Hong, S.B.[53]	Hospital	10,464	9.1
1968	Kim, Y.W. et al	Hospital	235	127.7
	Kim, Y.S.	Hospital	832	24.0
	Whang. S.K. et al	Hospital	1,955	46.0
	Lee, C.S.	Hospital	450	177.8
1959~1968	Kim, Y.W. et al	Hospital	5,873	115.7*
1962~1968	Kim, Y.S.	Hospital	6,008	33.3*
1969	Whang, S.K. et al	Hospital	2,017	39.7
	Lee, C.S.	Hospital	489	327.2
1970	Whang, S.K. et al	Hospital	1,938	36.1
	Lee, C.S.	Hospital	517	174.1
1965~1970	Lee, C.S.	Hospital	2,442	225.2*
1971	Whang, S.K. et al	Hospital	1,683	77.2
1966~1971	Whang, S.K. et al	Hospital	11,550	44.2*

* Average during the period

Table 1-8. Major Cause Specific Death Rates per 100,000 Population

Cause of death	Kim, I.S. et al[4] (1958~1959 nationwide)	Won, M.S.[12] (1958~1962 Seoul)	Kim, K.S.[15] (1962 Daejon city)	Kim, I.S.[4] (1966~1967 nationwide)	Kwon, E H.[19] (1967 Seoul)
Vascular lesions affecting central nervous system	19.6 (5)	81.0 (1)	35.0 (2)	26.1 (3)	58 (1)
Tuberculosis	39.5 (2)	79.0 (2)	56.0 (1)	35.8 (2)	42 (4)
Pneumonia and bronchitis	73.8 (1)	60.6 (3)	16.0 (6)	43.8 (1)	25 (8)
Heart diseases	8.5 (6)	5[illegible].2 (4)	29.0 (3)	11.7 (7)	24 (9)
Gastroenteritis	31.0 (3)	52.9 (5)	10.0 (8)	14.2 (5)	34 (6)
Peculiar diseases to early infancy	—	46.5 (6)	—	—	—
Accident	8.2 (7)	41.5 (7)	26.0*(4)	12.8 (6)	—
Motor vehicle	—	—	—	—	27 (7)
Others than vehicle	—	—	—	—	56 (2)
Malignant neoplasm	25.8 (4)	33.6 (8)	19.6 (5)	25.8 (4)	40 (5)
Senility	—	24.1 (9)	—	—	46 (3)
Suicide	—	22.3(10)	—	—	—
Nephritis and nephrosis	—	—	—	—	20(10)
Hepatic diseases	—	—	10.8 (7)	—	—
Dyspepsia	—	—	8.5 (9)	—	—
Malnutrition	—	—	8.1(10)	—	—

Number in parenthesis are rank

* Includes suicide

271

Table 1-9. Major Causes of Infant Deaths

Rank	Yun, D. J.[28] (1942~1953, Rural)	Park, H. J.[33] (1954~1959, Rural)	Won, M. S.[12] (1959~1962, Urban)	Cha, M. H.[16] (1963, Rural)	Kwon, E H. et al[19] (1966~1967, Urban)
1	Prematurity	Convulsion	Pneumonia	Infections of the newborn	Gastroenteritis
2	Convulsion	Gastroenteritis	Gastroenteritis	Birth injuries	Other diseases peculiar to early infancy
3	Gastroenteritis	Pneumonia	Tetanus	Other diseases peculiar to early infancy	Pneumonia
4	Erysipelas	Bronchitis	Malnutrition	Pneumonia	Infections of newborn
5	Measles	Measles	Immaturity	Influenza	Birth injuries
6	Smallpox	Malnutrition	Meningitis	All other diseases (Malnutrition)	Measles
7	Pneumonia	Pertussis	Heart diseases	Gastroenteritis	Bronchitis
8	Bronchitis	Accident	Jaundice	Congenital malformation	Influenza
9	Malnutrition	Meningitis	Tuberculosis	—	Other infective and parasitic diseases
10	Pertussis	Others	Poliomyelitis	—	Accident

B. Major Findings and Discussion

Table 1—1 shows the estimates of the crude death rates compared with registered crude death rates obtained from death registration or population census data, from 1946 to 1970. The differences between registered and estimated crude death rates for the same periods are very large, which means the death registration is incomplete. The higher registered death rate in 1961 was due to a national registration compaign publisized by the revolutionary government.

The estimates of the crude death rates from 1956-1960, are 15.8 per thousand by Kim[6], and 12.8 per 1,000 by Choe's estimate[2]. The crude death rates for recent years has been estimated by several researchers. Kim and his colleague[4] estimated the highest crude death rate in 1967 at 11.9 per thousand, while the Economic Planning Board's estimates was 9.1 and 8.5 per thousand in 1967 and 1970. Two other estimates report 9.0 per thousand in 1965[7] and 9.0 for 1965-1970[44].

Table 1—2 shows the data on crude death rate obtained from sample surveys which used the interview technique. Some of these data were based on death registration[12, 15, 18, 22, 24] which have lower rates. Most of the sample surveys have small samples and lack an adequate sampling design. Thus, the variations of findings are so wide that a definite trend cannot be explored. However, these data do show a declining trend in the crude death rates and a difference between the urban and rural population. Recent studies reveal the crude death rates in urban areas (all in Seoul except one study[15]) range from 5 to 6 per thousand and those in rural areas range from 7 to 8 per thousand. These rates

272

are lower than the nationwide estimates by demographic analysis reported in Table 1—1.

According to the above two tables, it is generally assumed that the crude death rate is declining continuously, and might even be currently less than 10 per thousand. The major causes for this declining trend are thought to be the social stabilization after Korean War, and the advances in public health programs and medical care.

The infant mortality rate is regarded as a sensitive health index in developing countries. But reliable data on infant mortality rates are not available from vital registration in many areas, because of incomplete registration. Therefore, various attempts have been made to estimate the infant mortality rate.

Table 1—3 shows the infant mortality rates obtained from sample surveys carried out since 1943 in various areas of Korea. Many annual rates are based on small samples. Until the early 1950s, Yun's reports[27, 28, 29] are the only source of data on infant mortality rates. His findings are 165.8, 97.0, and 63.9 per thousand livebirths in a rural area, from 1944-1948, 1949-1953, and 1956-1960, respectively. According to the surveys made by Huh[30] and Park[33] in rural areas, the infant mortality rates were 125.0 and 82.9 per 1,000 livebirths for the period of 1952-1957 and 1954-1959, respectively. In Seoul, Won[12] reported the rate at 58.8 per 1,000 livebirths in 1958. Thereafter, infant mortality rates surveyed by several researchers are reported as decreasing annually in all areas. Kwon's[34] high rate of 108.4 in 1962 is an exception based on the urban slum area. The recent data on infant mortality rates are assumed to be approximately 35 per 1,000 livebirths in Seoul and approximately 50 per 1,000 livebirths in rural areas.

Table 1—4 shows the registered infant mortality rates which are unreliable, especially in the early 1960's. Kim's estimates[41] from census data analysis in 1955 and 1960 are 134.0 and 121.0 per thousand livebirths. Although the Ministry of Health and Social Attairs published several estimates of infant mortality rates, the basis and applied techniques of the estimates are not clear. According to their data, the infant mortality rate in 1975 was 38.0 per thousand livebirths.

Table 1—5 shows the age and sex specific death rates from 1955 to 1970. To estimate the age and sex specific death rates, registration data, sample surveys, or demographic analysis of census data were used. Use of demographic analysis has accelerated since model life tables and, particularly, model stable populations, have become avaliable.

Kim[42] made an estimate of age and sex specific death rates based on the 1955 census. Won[12] made a series of age specific death rates for the period 1958 to 1962, which were based on the analysis of death registration in Seoul. A decline in the death rates, especially among infants and children, is seen in the series of age specific death rates. The Economic Planning Board calculated age and sex specific death rates based on the vital registration in the year of 1960[5], 1961[5] and 1966[43]. The other two reports by Kim[15] and Suh[22] were also based on death registration data. These registration data show much lower figures of death rates, especially among younger ages, than the other estimates or survey data. This is due to the gross under-registration of vital events.

Kim et al[4] and Kim[6] made different estimates of age and sex specific death rates

273

for the year of 1960 and 1955-1960, respectively, by applying model demographic techniques on the 1960 census data. Park[8] also applied this technique on the 1966 census data. According to these data, the decline in the death rates is noticeable in all ages. But Kwon et al's[44] estimates of death rates for the age of 15 to 29 are extraordinarily high, because of an unreasonably estimated number of deaths. The differences between these estimates and the above mentioned registered data are tremendous among infant and children. It may be due to more incomplete vital registration for children than for adults.

The age and sex specific death rates were obtained from sample surveys made by Cha[16], Park et al[17] and Lee[25] in rural areas, and by Kwon et al[19] in Seoul. The Economic Planning Board[5] also published the age and sex specific death rates based on a sample survey taken in 1964, comparing the registration data in 1960 and 1961. The death rates surveyed in Seoul by Kwon et al[19] are lower among young ages. Because the age groupings used in the above surveys are different, direct comparisons of the findings is not possible.

It is shown that the age specific death rates abruptly decline after the infant period, and continued at a lower level until the early forties, at which point the rates gradually begin to increase. By age 60, the rate sharply increase. By sex, the male has a higher death rate than the female in all ages, but especially in the older ages.

Table 1—6 shows the life expectancy at birth, all computed from census data, except one study by Park et al[17]. The Economic Planning Board's abridged life table[5] was bawed on the 1955 and 1960 censuses. According to this, the average life expectancy at birth was 52.6 years for both sexes, with 51.1 years for the male and 53.7 years for the female. This life expectancy increased to 59.7 for the male, and 64.1 years for the female, with an average of 61.9 years for both sexes by 1966.[57] By 1970, it was 63 years for the male and 67 years for the female.[58] It took less than 15 years for the life expectancy to be increased more than 12 years, which is quite a remarkable improvement in the health status. Several other researchers[7, 8, 44, 46] estimated the life expectancy by applying various mortality levels of the model life table on the census data. Park and his colleagues[17] estimated the life expectancy of rural population by a sample survey.

Table 1—7 shows the maternal mortality rates per ten thousand livebirths surveyed from 1958 to 1971 in Korea. Because all of these data were based on the records of several general hospitals, and the percentage of hospital deliveries in Korea was quite low, the findings cannot be generalized to the total population. The tremendous variations in the findings were due to the different capabilities of hospitals and characteristics of patients.

Table 1—8 shows the cause specific death rates per 100,000 population by the leading causes of death. Three[4, 12, 15] of the four studies were based on death registration data. Kwon's study[19] was a sample survey in Seoul. As may be seen in Kim and his colleague's[4] results, the changes in trends from 1958-1959, and 1966-1967 are quite noticeable. The major decreases occurred in infectious causes, such as pneumonia, bronchitis, and gast-

274

roenteritis. At the same time, the death rates from accidents and cerebrovascular diseases increased. But yet, the infectious diseases continue to be the primary cause of death. According to Kwon's study in Seoul, accidents are the primary cause of death.

Table 1-9 shows major canses of infant deaths. Most of the causes listed are preventable.

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275

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276

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277

2. Morbidity Data

A. Basic Data Tables

1. Age Specific Prevalence Rate/1,000 Population/Month
2. Sex Specific Prevalence Rate/1,000 Population/Month
3. Age & Sex Specific Prevalence Rate/1,000 Population/Month
4. Area Specific Period and Point Prevalence Rate/1,000 Population/Month
5. Number of Sicknesses Per Capita Per Year
6. Age Specific Incidence Rate/1,000 Population/Month
7. Area Specific Incidence Rate/1,000 Population/Month
8. Days Activity Restricted Due to Sickness/Month
9. Cause Specific Morbidity/1,000 Population/Month
10. Selected Communicable Diseases; Number of Cases and Incidence Rates, Selected 1950—1974
11. Ten Leading Causes of General Morbidity

278

Table 2-1. Age Specific Prevalence Rate/1,000 Population/Month

Study Period	Researchers	Age														
		0—4	5—9	10—14	15—19	20—24	25—29	30—34	35—39	40—44	45—49	50—54	55—59	60—64	65—69	Average
Sep. 1963(1 yr)	Han, M.R. 22)	205	178	151	150	159	168	164	194	227	186	211	265	191	388	187
Sep. 1964(1 yr)	Jun. B.H. 23)	216	153	94	86	82	87	115	150	128	150	111	168	163	210	127
Oct. 1965(25 days)	Yoon. Y.S. 25)	148		59		46		61		81		91		163		91

		0—4	5—9	10—19	20—29	30—39	40—49	50—59	60—69	60+~70+	Average
Aug. 1963 (1 mo)	Lee, Y.C. 30)	211.7	103.8	74.7	97.9	199.2	240.4	247.2		255.4	152.6
Jan. 1969 (1 mo)	Shin, G.H. 3)	240.8	81.6	65.2	81.2	160.9	183.3	183.8	184.4	162.4	126.1
Jan. 1969 (1 mo)	Lee. S.K. 5)	145.8	87.6	157.5	149.8	247.8	329.3	308.9	240.7	148.9	189.9
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 18)	192.5	89.3	90.4	120.7	178.8	238.1	243.1		202.9	148.0
July 1970 (2 mos)	Kim, I.D. Moon, O.R. 9)	171.5		132.3	124.9	155.8	154	154.0	236.5		154.2

		0—5	6—10	11—19	20—34	35—49	50—59	60+	Average
Nov. 1970	Johnson, K.G. Sibley, J.R. 28)	440	250	260	320	470	470	520	360

		0—4	5—9	10—19	20—29	30—39	40—49	50—59	60+~70+	Average
Mar. 1973 (18 mos)	Kang, J.Y. 14)		216.4	58.3	231.4	300.9	192.0	156.5	73.3	170.0
Oct. 1974 (2 mos)	Meng, K.H. 10)		265	172	189	203	245	335	231	
Nov. 1974 (1 mo)	Huh, J. Moon, O.R. 29)	200.5	105.4	69.8	103.4	171.0	229.1	288.9	270.3	149.8

279

Table 2-2. Sex Specific Prevalence Rate/1,000 Population/Month

Period of Study	Researchers	Study Area	Sample Size	Both	Male	Female
May 1962 (1 mo)	Park, H. J. Huh, J. 26)	Seoul	P: 1,208	510.0		
July 1962 (1 mo)	Kwon, E H. Part, H. J. et al. 45)	Seoul	H: 1,235 P: 6,321	30.2		
Jan. 1963 (17 days)	Kwon, E H. 42)	Seoul	P: 388	430.4		
Jan. 1963 (20 days)	Kwon, E H. 42)	Seoul	P: 144	986.1	1,087.0	966.9
Sep. 1963 (1 yr)	Han, M.R. 22)	Rural	H: 2,979 P: 19,197	187.1	185.2	189.0
Sep. 1963 (1 yr)	Kim, I. D. Huh, J. 24)	Rural	P: 20,000	188.1	190.0	186.1
Jan. 1964 (1 yr)	Jang, I.U. Kim, M.H. 32)	Rural	H: 216 P: 1,245	78.9		
Sep. 1964 (1 yr)	Jun, B.H. 23)	Seoul	H: 1,680 P: 10,028	127.0	122.6	131.2
Sep. 1964 (1 yr)	In, C.Y. 1)	Seoul	H: 1,700 P: 10,100	127.0	122.6	129.9
Nov. 1965 (1 mo)	Social Security Commission 31)	Seoul	H: 1,000 P: 5,306	*242.0 **206.2	205.6 177.7	279.3 235.4
Oct. 1967 (3 wks)	Yang, J.M. Kim, M.H. 27)	Seoul	H: 3,684 P: 21,851	46.3		
Aug. 1968 (1 mo)	Chun, W.S. 2)	Seoul	H: 429 P: 1,802	176.5	166.7	186.3
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 30)	Rural	H: 2,716 P: 15,383	152.6	151.9	153.3
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 18)	Rural	H: 2,626 P: 14,472	148.0	145.7	150.4
Jan. 1969 (1 mo)	Shin, G.H.3)	Rural	H: 1,024 P: 5,679	200.2	161.1	242.5
Jan. 1969 (1 mo)	Lee, S.K. 5)	Rural	H: 410 P: 2,248	189.9	171.2	208.3
July 1969 (2 mos)	Kim, I.D. Moon, O.R. 9)	Whole Country	H: 6,303 P: 37,801	154.2	156.6	151.8
June 1971 (1 mo)	Kim, I.S. Kim, K.S. 33)	Seoul	P: 1,851	***175.6	***164.2	**187.7
Aug. 1972 (1 mo)	Huh, J. Park, Y.S 19)	Whole Country	H: 3,033 P: 15,402	260.6	225.6	295.6
Sep. 1972 (1 mo)	Kang, H.Y. 49)	Rural	P: 1,494	623.8		
Apr. 1973 (8 mos)	Lee, S. 16)	Rural	H: 20,894 P: 122,175	221		
Aug. 1973 (1 mo)	Lee, C.O. Park, Y.S. 7)	Rural	H: 2,700 P: 14,655	115,0	106.0	124.7
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S. 6)	Urban	H: 1,700 P: 7,896	200.2	161.1	242.5
Aug. 1973 (1 mo)	Huh, J. Park, Y.S. 20)	Whole Country	H: 5,985 P: 30,525	165.6	141.6	188.7
Apr. 1974	Kim, H.K. 47)	Rural	P: 736	235	185	295
June 1974(1 mo)	Oh, H.Y, Youn, B.B. Kim, K.S. 35)	Seoul	P: 3,222	164.2	127.2	247.5
Oct. 1974 (1 mo)	〃	Seoul	P: 1,290	342.6	239.8	443.3
Oct. 1974 (1 mo)	Meng, K.H.10)	Rural & Urban	P: 2,058		234.3	228.9
Nov. 1974 (1 mo)	Huh, J. Moon, O.R. 29)	Rural	H: 9,830 P: 1,793	149.8	134.4	165.6
July 1975 (1 mo)	Jang, Y.T. 37)	Rural	H: 766 P: 4,065	197.8		
	Kim, K.Y. 39)	Rural	P: 750	735.2		

*Per case **Per person ***Prevalence rates of chronic diseases
P: People H: Household

280

Table 2-3. Age & Sex Specific Prevalence Rate/1,000 Population/Month

Period of Study	Researchers	Sex	Age									
			0—4	5—9	10—19	20—29	30—39	40—49	50—59	60—69	60+~70+	Average
Sep. 1963 (1 yr)	Han, M.R. 22)	B	205.1	178.3	150.3	168.1	194.5	186.8	265.0	388.2		187.1
		M	199.4	188.0	157.1	156.1	225.8	161.8	252.6	279.4		185.2
		F	210.2	166.8	142.3	182.6	172.8	212.3	278.0	471.8		189.0
			Under 9	10—19	20—29	30—39	40—49	50—59	Over 60			
Nov. 1965 (1 mo)	Social Security Commission 31)	B	76.5	32.4	25.6	39.8	33.7	22.2	11.7			242.0
		M	78.2	33.5	13.8	22.0	29.8	19.4	8.9			205.6
		F	74.8	31.3	37.8	58.0	37.8	25.2	14.5			279.3
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 30)	B	211.7	103.8	74.7	97.9	199.2	240.4	247.2		255.4	152.6
		M	226.6	117.1	75.8	85.2	197.5	211.1	238.3		312.1	151.9
		F	195.9	89.2	74.3	111.2	200.9	266.9	255.5		212.6	153.3
Jan. 1969 (1 mo)	Shin, G.H. 3)	B	240.8	81.6	65.2	81.2	160.9	183.3	183.8	184.4	162.4	126.1
		M	258.9	99.1	61.2	83.1	169.7	167.2	140.2	140.5	148.9	124.6
		F	205.0	64.6	69.6	79.2	154.3	198.7	226.6	227.6	171.4	127.6
Jan. 1969 (1 mo)	Lee, S.K. 5)	B	145.8	87.6	157.5	149.8	247.8	322.3	308.9	240.7	148.9	189.9
		M	138.6	90.4	147.5	122.3	225.2	262.6	298.2	222.2	133.3	171.2
		F	153.8	84.4	167.2	175.6	268.9	374.1	324.7	259.2	156.3	208.3
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 18)	B	192.5	89.3	90.4	120.7	178.8	238.1	243.1		202.9	148.0
		M	211.9	96.6	90.0	111.1	189.3	213.1	220.0		208.7	145.7
		F	170.8	81.4	60.9	130.2	170.0	260.3	264.4		198.1	150.4
June 1971 (1 mo)	Kim, I.S. Kim, K.S. 33)	B	60.0	76.2		213.9	309.5	345.9	339.6		414.6	175.6
		M	60.9	82.2		253.5	238.1	314.3	317.1		611.1	164.2
		F	59.0	69.2		192.3	381.0	370.4	146.7		260.9	187.7
			Below 20	20—29		30—39	40—49	50—59	Over 60		Unknown	Average
June 1974 (1 mo)	Oh, H.Y. Youn, B.B. Kim, K.S. 35)	B	105.3	196.3		180.5	122.5	41.7	117.6		285.7	164.2
		M	143	130		146	107	72	77		200	127.2
		F		261		259	194	171	250		500	247.5
Oct. 1974 (1 mo)	Oh, H.Y. Youn, B.B. Kim, K.S. 35)	B		362.9		356.0	299.2	220.0	750.0			342.6
		M		164		288	241	176	500			240
		F		498		421	396	313	1,000			443

B: Both M: Male F: Female

Table 2-4. Area Specific Period and Point Prevalence Rate/1,000 Population/Month

Period of Study	Researchers	Study Area	Sample Size	Sex	Area			
					Seoul	Taejon	Taegu	Rural
Sep. 1967 (3 mos)	Kwon, E H. et al 36)	Seoul	P: 12,000	B	190.5	223.6	161.2	190.3
				M	175.9	248.1	192.4	175.4
				F	203.0	185.2	115.6	214.7

					Mountainous	Semi-Plain	Plain	Coastal	Island	Average
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 30)	Rural	H: 2,716 P: 15,383	B	185.5	115.3	166.9	159.4	112.6	152.6
					*102.5	*56.3	*82.5	*22.0	*18.9	*66.0
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.K. 8)	Rural	H: 2,626 P: 14,472	B	149.8	169.2	126.1	189.9	93.2	148.0
					*103.7	*62.8	*41.4	*73.0	*68.8	*62.6

					Rural	Fishery	Urban	Average
July 1969 (2 mos)	Kim, I.D. Moon, O.R. 9)	Whole Country	H: 6,303 P: 37,801	B	170.3	120.8	121.6	154.2

					Metropolitan	Medium Cities	Small Cities	Rural & Fishery	Average
Aug. 1972 (1 mo)	Huh, J. Park, Y.S. 19)	Whole Country	H: 3,033 P: 15,402	B	333.9	200.9	339.6	240.1	260.6
					*49.8	*51.3	*111.1	*61.0	*59.8
Aug. 1973 (1 mo)	Huh, J. Park, Y.S. 19)	Whole Country	H: 5,985 P: 30,525	B	200.2	239.4	203.5	115.0	165.6
				M	161.1	198.6	195.7	106.0	141.6
				F	242.5	284.7	210.1	124.7	188.7
				B	*35.6	*93.6	*62.5	*46.3	*52.4

*Point prevalence rate

282

Table 2-5. Number of Sicknesses Per Capita Per Year

Year of Study	Researcher	Study Area	Sample Size	Both	Male	Female
May 1962 (1 mo)	Park, H. J. Huh, J. 26)	Seoul	P: 1,208	6.12		
Sep. 1963 (1 yr)	Han, M. R. 22)	Rural	H: 2,979 P: 19,197	2.25	2.28	2.22
Sep. 1963 (2 yrs)	Kim, I. D. Huh, J. 24)	Rural Seoul	P: 20,000 P: 10,000	2.26 1.52	2.28 1.47	2.23 1.57
Sep. 1964 (1 yr)	In, C. Y. 1)	Seoul	H: 1,700 P: 10,100	1.52	1.47	1.56
Nov. 1965 (1 mo)	Social Security Commission 31)	Seoul	H: 1,000 P: 5,306	2.90		
Oct. 1967 (1 mo)	Yang, J. M. Kim, M. H. 27)	Rural	H: 3,684 P: 21,851	0.56		
Aug. 1968 (1 mo)	Lee, Y. C. Kim, K. S. 30)	Rural	H: 2,716 P: 15,383	1.83	1.82	1.84
Aug. 1968 (1 mo)	Chun, W. S. 2)	Seoul	H: 429 P: 1,802	2.12	2.00	2.24
Jan. 1969 (1 mo)	Lee, Y. C. Kim, K. S. 13)	Rural	H: 2,626 P: 14,472	1.78	1.75	1.80
Jan. 1969 (1 mo)	Shin, G. H. 3)	Rural	H: 1,024 P: 5,679	1.51	1.50	1.53
July 1969 (2 mos)	Kim, I. D. Moon, O. R. 9)	Urban Rural	H: 6,303 P: 37,801	1.85	1.88	1.82
Mar. 1971 (6 mos)	Kim, K. K. 4)	Seoul	P: 1,539			0.8
Aug. 1972 (1 mo)	Huh, J. Park, Y. S. 20)	Whole Country Metropolitan Medium-size Cities Small-size Cities Rural & Fishery	H: 3,033 P: 15,402	3.13 4.01 2.41 4.08 2.88	2.71 3.92 2.41 3.63 2.22	3.13 4.10 2.41 4.54 3.5
July 1973 (40 days)	Lee, S. K. Kim, D. H. 12)	Rural	H: 1,090 P: 6,151	2.35	2.46	2.24
Aug. 1973 (1 mo)	Huh, J. Park, Y. S. 19)	Whole Country Metropolitan Medium-size Cities Small-size Cities Rural & Fishery	H: 5,985 P: 30,525	1.99 2.40 2.87 2.44 1.38	1.70 1.93 2.38 2.35 1.27	2.26 2.91 3.42 2.52 1.50
Aug. 1973 (1 mo)	Lee, C. O. Park, Y. S. 7)	Rural	H: 2,700 P: 14,655	1.38	1.27	1.50
Aug. 1973 (1 mo)	Cho, D. B. Park, Y. S. 6)	Urban	H: 1,700 P: 7,896	2.40	1.93	2.91
Oct. 1974 (1 mo)	Meng, K. H. 10)	Medium-size Cities & Rural	P: 2,058		2.81	2.75
Nov. 1974 (1 mo)	Huh, J. Moon, O. R. 29)	Rural	H: 1,793 P: 9,830	1.80	1.61	1.99

283

Table 2-6. Age Specific Incidence Rate/1,000 Population/Month

Period of Study	Researchers	Study Area	Sample Size	Age										
				0	1—4	5—9	10—14	15—19	20—29	30—39	40—49	50—59	60+	Average
Nov. 1965 (1 mo)	Social Security Commission 31)	Seoul	H: 1,000 P: 5,306											*168.5 **158.9
Aug. 1968 (1 mo)	Chun, W. S. 2)	Seoul	H: 429 P: 1,802											127.0
Jan. 1969 (1 mo)	Shin, G. H. 3)	Rural	H: 1,024 P: 5,679											***84.7 ****41.4
July 1973 (40 days)	Lee, S. K. Kim, D. H. 12)	Rural	H: 1,090 P: 6,151	148	358	161	95	139	130	170	257	280	358	196

				0—9	10—19	20—29	30—39	49—49	50—59	60 or more	Unknown	Average
June 1971 (1 mo)	Kim, I. S. Kim, K. S. 33)	Seoul	P: 1,851	87.5	44.2	99.5	92.6	108.1	75.5	97.6	333.3	*****82.7

*: per 1,000 cases
**: per 1,000 persons
***: incidence rate at the end of the study
****: incidence rate at the beginning of the study
*****: incidence of acute diseases

Table 2-7. Area Specific Incidence Rate/1,000 Population/Month

Period of Study	Researchers	Study Area	Sample Size	Area					
				Mountainous	Semi-Plain	Plain	Coastal	Island	Average
Aug. 1968 (1 mo)	Lee, Y. C. Kim, K. S. 30)	Rural	H: 2,716 P: 15,383	83.0	58.9	84.4	137.4	92.6	86.5
Jan. 1969 (1 mo)	Lee, Y. C. Kim, K. S. 18)	Rural	H: 2,626 P: 14,472	46.0	106.3	84.7	117.0	24.0	85.0

		Seoul	Kwangju	Rural
Sep. 1969 (45 days)	Choi, C. K. 17)	177	214	93

				Metropolitan	Medium-size Cities	Small-size Cites	Rural & Fishery	Average
Aug. 1972 (1 mo)	Huh, J. Park, Y. S. 19)	Whole Country	H: 3,033 P: 15,402	284.1	149.6	228.5	179.1	200.8
Aug. 1973 (1 mo)	Huh, J. Park, Y. S. 20)	Whole Country	H: 5,985 P: 30,525	164.6	145.9	141.0	68.8	113.2

284

Table 2-8. Days Activity Restricted Due to Sickness/Month

Period of Study	Researchers	Study Area	Sample Size	Per Patient			Per Person		
				Both	Male	Female	Both	Male	Female
Sep, 1963 (1 yr)	Han, M. R. 22)	Rural	H: 2,979 P: 19,197	23.64	24.16	23.08	4.45	4.63	4.27
Oct. 1963 (2 mos)	Han, M. R. Kim, S. H. 21)	Rural	H: 180 P: 1,250	20.0					
Sep. 1963 (1 yr)	Kim, I. D. Huh, J. 24)	Rural	H: 3,000 P: 20,000					4.6	4.3
Sep. 1964 (1 yr)	〃	eoul	H: 1,700 P: 10,000					2.0	2.1
Sep. 1964 (1 yr)	In, C. Y. 1)	Seoul	H: 1,700 P: 10,100	5.5	5.5	5.4	2.1	2.0	2.1
Jan. 1969 (1 mo)	Lee, Y. C. Kim, K. S. 18)	Rural	H: 2,626 P: 14,472	6.7	7.5	6.1	0.32	0.32	0.32
July 1959 (2 mos)	Kim, I. D. 9) Moon, O. R.	Whole Country	H: 6,303 P: 37,801				3.5	3.5	3.5
Mar. 1971 (6 mos)	Kim, K. K. 4)	Seoul	P: 1,539	1.9		1.9	0.7		0.7
June 1971 Sep. 1971 (2 mos)	Yu, S. H. Yang, J. M. 34)	Seoul		4.2					
Nov. 1971 (7 days)	Yu, S. H. 8) Johnson, K. G.	Rural Hachung Iloon	H: 200 P: 1,539	7.2 9.6			1.9 2.9		
July 1973 (40 days)	Lee, S. K. Kim, D. H. 12)	Rural	P: 1,438	3.7	3.1	4.3	1.3	1.2	1.4
June 1974 (1 mo)	Oh, H. Y. Youn, B. B. 35)	Seoul	P: 3,222				3.6	3.9	3.2
Oct. 1974 (1 mo)	Oh, H. Y. Youn, B. B. 35)		P: 1,290				3.6	2.7	4.1
Nov. 1974 (1 mo)	Huh, J. Mooh, O. R. 29)	Rural	H: 1,793 P: 9,873	3.38	3.54	3.24	0.50	0.48	0.54

285

Table 2-9. Cause Specific Morbidity/1,000 Population/Month (I)

Period of Study	Researchers	Study Area	Sex	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Sep. 1963 (1 yr)	Han, M.R. 22)	Rural	B	33.5	0.9	4.5	3.2	1.3	16.0	3.8	45.4	33.7	3.1	1.2	14.7	8.1	0.5	0.1	5.1	7.9	188.4
			M	35.3	0.8	5.4	2.9	2.0	17.7	3.2	45.6	33.0	3.1	—	13.2	8.0	0.5	0.1	3.7	9.9	189.6
			F	31.6	1.0	4.4	3.5	0.6	14.2	4.4	46.1	33.4	3.1	2.5	16.2	8.2	0.4	0.0	6.6	5.8	188.1
Sep. 1963 (2 yrs)	Kim, I.D. Huh, J. 24)	Whole Rural	B	33.4	0.9	4.9	3.2	1.3	15.9	3.8	45.6	33.5	3.1	1.2	14.7	8.1	0.5	0.1	5.1	7.8	188.1
		Seoul	B	6.1	0.2	1.2	1.0	0.5	7.8	3.1	70.0	21.1	1.9	2.3	4.3	1.8	0.1	0.1	2.9	3.4	127.0
Oct. 1963 (2 mos)	Han, M.R. Kim, S.H. 21)	Rural	B	10.8		1.6	1.6	0.8	6.8	1.6	19.6	18.8	0.4	6	6.4	4.4				1.2	124.0
Jan. 1964 (1 yr)	Jang, I.U Kim, M.H. 32)	Rural	B	1.5		2.3		0.8	13.9	0.4	5.2	35.0	1.7		2.1					1.4	78.9
Sep. 1964 (1 yr)	In, C.Y. 1) Jun, B.H. 23)	Seoul	B	6.1	0.2	1.2	1.0	0.5	7.8	3.1	70.0	21.1	1.9	2.3	4.3	1.8	0.1	0.1	2.9	3.4	127.0
			M	7.9	0.3	1.1	0.3	0.2	7.4	2.6	68.3	20.5	0.8	—	0.0	1.9	—	0.1	2.0	4.0	122.6
			F	4.5	0.1	1.2	1.5	0.7	8.3	3.5	70.7	21.6	2.8	4.4	3.4	1.7	0.1	0.0	3.8	2.8	131.2
Nov. 1965 (1 mo)	Social Security Commission 33)	Seoul	B	7.0	1.1	2.3	2.6	0.4	19.2	15.5	94.2	40.7	5.7	1.7	8.3	2.5			29.8	11.1	242.0
			M	7.4	0.4	1.9	0.4		14.9	11.9	89.8	30.2	1.9		8.2	0.4			26.1	12.3	205.6
			F	6.5	1.9	2.7	5.0	0.8	23.7	19.1	98.8	51.5	9.5	3.4	8.4	4.6			33.6	9.9	279.3
			B	+6.6	1.1	1.9	2.5	0.4	17.7	14.3	84.6	36.8	5.7	1.7	7.9	2.5			26.6	10.6	220.7
			M	+7.4	0.4	1.5	0.4		13.8	11.2	80.1	27.2	1.9		7.8	0.4			22.0	11.5	185.5
			F	+5.7	1.9	2.3	4.6	0.8	21.7	17.6	89.3	46.5	9.5	3.4	8.0	4.6			31.3	9.5	256.8

			Influenza	Diphtheria	Measles	Mumps	Pneumonia	Typhoid fever
Jan. 1967 (1 mo)	Kwon, E.H. et al 38)	Urban	0.15	0.01	1.05	0.06	0.08	0.03

Dysentery	Food Poisoning	Polio	Whooping Cough	Encephalitis	Total
0.03	0.05	0.02	0.11		1.61

				Respiratory	Digestive	Derma. & Uro.	E.N.T.	Gyne.	T.B.	Trauma	Others
Nov. 1967 (20 days)	Yang, J.M. Kim, M.H. 27)	Seoul	B	12.7	8.4	2.5	2.1	5.0	2.4	11.2	46.3

296

Table 2-9. Cause Specific Morbidity/1,000 Population/Month (Ⅱ)

Period of Study	Researchers	Study Area	Sex	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 30)	Rural	B	21.7	0.5	1.4	3.2	3.0	15.9	1.9	21.1	63.3	2.3	3.8	5.1	3.6	0.3	0.2	0.9	4.4	152.6
			M	25.0	0.5	1.2	1.4	2.1	14.6	1.5	23.2	63.5	2.3	0.3	5.3	3.5	0.3	0.3	0.8	6.3	152.0
			F	18.5	0.5	1.7	4.9	3.9	17.3	2.2	18.9	63.2	2.2	7.3	5.0	3.7	0.3	0.1	1.0	2.5	153.3
Aug. 1968 (1 mo)	Chun, W.S. 2)	Seoul	B	13.8		2.7	3.8	1.6	23.3	3.8	27.7	59.3	3.3	6.1	13.3	6.1		0.5		10.5	176.5
			*B	10.5		1.6	1.6	1.1	14.9	1.1	22.1	42.1	1.6	4.4	12.7	2.7		0.5		9.4	127.0
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 18)	Rural	B	10.5	0.0	1.5	0.0	1.8	14.4	4.8	60.9	33.5	2.6	0.9	4.8	2.9			6.1	3.3	148.0
			M	13.8		1.0	0.1	1.4	12.3	5.5	61.9	32.1	2.0		5.5	2.2			4.1	4.8	145.7
			F	7.2	0.1	2.1		2.2	16.5	4.0	60.0	34.9	4.3	1.8	4.0	3.6			8.0	1.7	150.4
Jan. 1969 (1 mo)	Lee, S.K. 5)	Rural	B	9.8		0.9		0.4	7.6	2.7	74.7	66.7	0.9	0.4	1.3	8.9			10.2	5.3	189.9
			M	12.6		0.9			6.3	2.7	73.5	53.8	0.9		0.9	6.3			6.3	7.2	171.2
			F	7.1		0.9		0.9	8.8	2.6	75.9	79.4	0.9	0.9	1.8	11.5			14.1	3.5	208.3
Jan. 1969 (1 mo)	Shin, G.H. 3)	Rural	B	5.8	0.2	0.4	0.2	1.9	7.9	5.6	61.6	29.6	3.5	3.2	3.2	1.2			2.5	2.5	126.1
July 1969 (2 mos)	Kim, I.D. Moon, O.R. 9)	Whole Country	B	22.4	0.7	3.6	2.2	1.3	14.2	3.1	34.4	41.7	2.2	1.7	10.8	6.3	0.3	0.2	3.7	6.0	154.2
Sep. 1969 (45 days)	Choi, C.K. 17)	Seoul	B	7	0	1	2		24	14	87	44	5	1	11	1			35	16	248
			**B	4	0	1	2		14	8	17	20	4	1	5	1	0		11	4	92
		Kwangju	B	11		13	8		29	11	111	88	16	10	33	8	3		68	11	391
			**B	9		1	14		20	11	47	36	12		25	8	3		30	8	227
		Rural	B	14		1		2	28	7	36	32	7		26	4			35	16	208
			**B	13		1		1	17	6	7	24	4		11	4			16	6	110

				Resp. & E.N.T.	G.I.T. Paras.	Head-ache	Ortho-pedic	Sensory	Derma.	Cardio-vas.	Dysen. Typhoid	T.B.	F.U.O.	Gyne. & V.D.	Total
Nov. 1970 (1 mo)	Johnson, K. Sibley, J. 28)	Rural	B	100.0	60.0	54.0	43.0	40.0	32.0	19.0	19.0	6.0	3.0	3.0	405.0
			M	116.0	59.0	32.0	36.0	34.0	40.0	15.0	27.0	8.0	4.0	0.0	401.0
			F	84.0	60.0	74.0	50.0	46.0	24.0	22.0	10.0	4.0	2.0	0.6	404.0
Mar. 1971 (6 mos)	Kim, K.K. 4)	Seoul	B	4.6	0.4	6.3		5.4	0.2	22.3	12.4	0.7	3.0	5.6	2.6	63.5

287

Table 2-9. Cause Specific Morbidity/1,000 Population/Month(Ⅱ)

Period of Study	Researchers	Study Area	Sex	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
June 1971 (1 mo)	Kim, I. S. Kim, K. S. 33)	Seoul		Tuberculosis		Respiratory		Digestive			Skin	Neurological			Circulatory		Urogenital		Proctological		
				7.6		18.4		41.6			6.5	45.9			7.0		3.8		4.9		
				Dental		Nutritional		Cause Unknown				Above two diagnoses									Total
				1.1		17.8				2.7		18.4									175.6
May 1971 Aug. 1971 (2 mos)	Yu, S. H. Yang, J. M. 34)	Seoul		1	4	5	6	7	8	9	10	12	13		16	17	Above 2		Unknown		Total
			1)	17.1		2.1	8.5	2.1	76.9	25.6	2.1	12.8	2.1		27.8	19.2	6.4		29.9		232.9
			2)		2.5		12.6	2.5	125.7	80.7		20.1			55.6	12.6	12.6				316.6
			3)	2.9			14.5	8.7	66.9	40.7	2.9	8.7	2.9		17.4	11.6	8.7		75.6		261.6
			4)	3.3			19.8		69.3	66.0		13.2			6.6		19.8		33.0		231.0
Mar. 1973 (1 yr)	Kang, J. Y. 14)	Seoul	B	3.3	1.1	13.3	7.8	28.9	28.9	86.7	86.7	5.6			11.1	12.2			36.7	2.2	325.6
Aug. 1973 (40 days)	Lee, S. K. 12)	Rural	B		44.0	61.0		7.0	33.0		14.0	3.0			3.0		7.0	11.0		26.0	210.0
			M		42.0	72.9		7.0	17.0		13.9	3.1			6.0		7.0	13.0		31.9	213.3
			F		46.0	50.1		6.9	50.1	1.0	14.0	3.1			1.0		6.9	10.0		20.9	209.4
June 1974 (1 mo)	Park, W. K. 15)	Rural	B			1.0			4.8	108.6	27.2				3.9	3.9				4.8	150.3
			M			1.87			7.4	101.1	24.2				5.6					9.3	149.8
			F						2.0	116.6	32.1				2.0						150.9
June 1974 (1 mo)	Oh, H. Y. Youn, B. B. 35)	Seoul	B	0.6	0.9	0.3	0.9		1.2	3.1	32.0	11.5	1.9	2.2	0.9	3.1			16.8	1.2	81.3
			M	0.9	0.9				0.4	3.6	26.0	9.9	1.8		0.9	2.7			15.2	0.4	66.3
			F		1.0	1.0	3.0		3.0	2.0	45.5	15.2	2.0	7.1	1.0	4.0			20.2	3.0	115.2
Oct. 1974 (1 mo)	Oh, H. Y. Youn, B. B. 35)	Seoul	B	0.8		2.3	3.1	1.6	18.6	6.2	160.5	63.6	4.7	3.9	9.3	7.8			18.6	2.3	342.6
			M	1.6		1.6		1.6	11.0	4.7	106.6	58.0			7.8	6.3			17.2	3.1	239.8
			F			3.1	6.1	1.5	26.1	7.7	213.2	69.0	9.2	7.7	10.7	9.2			19.9	1.5	443.3
Oct. 1974	Meng, K. H. 10)			Digestive		Respiratory		Cardiovas.		Gyneco.		Accident	Neuro.		Derma.		E. N. T. & Opth.		Others		Total
		Small City & Rural	B	65.2		71.9		24.3		19.9		10.6	9.2		17.1		6.7		6.3		231.3
1972	EWU	Seoul	F	5.1		1.2	0.1	0.0	3.1	0.5	15.0	9.9	21		5.6	0.4	0.0		3.1	0.0	46.2
1973	Health		F	5.4		3.4	0.5	0.1	6.0	0.7	14.0	10.6	0.1	0.0	8.3	0.8			2.7		52.6
1974	Center 11)		F	1.8		0.7	0.2	0.0	2.8	0.2	9.4	6.2	1.4		3.6	0.4			1.5		28.3
Nov. 1974 (1 mo)	Huh, J. Moon, O. R. 29)	Rural	B	2.4	0.8	3.3	1.2	1.4	9.4	4.3	61.0	25.7	2.4	3.9	4.9	6.3	0.3	0.3	23.0	6.5	158.0
			M	1.6	0.6	3.6	0.6	1.8	9.2	2.2	67.9	24.3	2.2		4.8	5.0	0.4	0.4	10.9	8.0	143.7
			F	3.3	1.0	2.9	1.9	1.0	9.5	6.4	56.2	27.2	2.7	7.8	4.9	7.6	0.2	0.2	34.8	4.9	172.6

*Morbidity in person
*Sickness absenteeism
*Incidence rate/1,000 population/month
**Point prevalence rate/1,000 population/month

1) Prevalence rate of the students in May
2) Prevalence rate of the students in August
3) Prevalence rate of the faculty in May
4) Prevalence rate of the faculty in August

288

Table 2-10. Selected Communicable Disease Pattern, Number of Cases and Incidence Rates, Selected 1950—1974, ROK

Selected Disease and Indicator	Year						
	1950	1955	1960	1965	1970	1972	1974
Cholera							
Cases					206		
Incidence Rate 1)					0.7		
Dysentery							
Cases	322	319	47	355	927	215	72
Incidence Rate 1)		1.5	0.2	1.2	3.0	0.7	0.2
Typhoid							
Cases	8,810	353	2,798	3,760	4,211	2,030	656
Incidence Rate 1)		1.6	11.2	13.1	14.5	6.2	2.0
Paratyphoid Fever							
Cases	140	38	77	22	42	9	
Incidence Rate 1)		0.2	0.3	0.1	0.1	0.0	
Small Pox							
Cases	2,845	2	3				
Incidence Rate 1)		0	0				
Diphtheria							
Cases	1,255	339	828	1,079	567	556	263
Incidence Rate 1)		1.6	3.3	3.8	1.9	1.7	0.8
Meningococal Meningitis							
Cases	155	23	22	24	17		2
Incidence Rate 1)		0.1	0.1	0.1	0.1		0.0
Japanese Encephalitis							
Cases	98	2,506	1,248	752	27	73	126
Morbidity Rate 1)		9.4	5.0	2.6	0.1	0.2	0.4
Tuberculosis							
Total				71,152	171,464	149,650	176,880
Infectious					80,438	81,321	77,075
Non infectious					91,026	68,329	51,637

1) Morbidity rate in per 100,000 population.

Source: ROKG/MHSA, Yearbook of Public Health and Social Statistics, 1974.

289

Table 2-11. Ten Leading Causes of General Morbidity(I)

Morbid Conditions	Kwon, E H. 45)		Kwon, E H. 42)		Huh, J. 29)		Lee, B. M. 46)	
	Order	%	Order	%	Order	%	Order	%
Diseases of the digestive system	1	22.5	4	8.4			2	13.9
Diseases of the skin	2	16.2			7	3.2	10	3.7
Tuberculosis of respiratory tract	3	12.0	6	7.8	6	4.4	1	14.7
Neurological & sensory system	4	9.9	1	20.4				
Diseases of women	5	5.8			8	2.5		
Diseases of respiratory system	6	4.2					6	5.3
Diseases of heart & circulatory system	7	3.7			4	4.6		
Malnutrition	8	3.1						
Whooping cough	9	3.1						
Pleurisy	10	3.1						
Asthma			2	12.0			9	3.9
Mental disorders			3	8.4	10	1.5		
Diseases of ear			5	7.8				
Visual abnormality			7	7.2				
CNS paralysis			8	7.2				
Epilepsy			9	3.0				
Diseases of eyes			10	3.0				
Infectious & parasitic diseases					9	1.5		
Arthritis								
Symptoms and ill defined conditions					2	17.1	3	6.7
Infections of skin & subcutaneous tissue							4	6.5
Diseases of nervous system & sense organs							5	5.6
Diseases of musculo-skeletal system							7	4.6
Acute respiratory infections					1	29.8	8	4.4
Other diseases of digestive system					3	15.3		
Laceration & open wound					5	4.5		

290

Table 2-11. Ten Leading Causes of General Morbidity (Ⅱ)

Morbid Conditions	M. H. & S. A. 40)		Johnson 28)		Kim, J. S. 43)		M. H. & S. A. 41)		Kang, H. Y. 49)		Yoo, K. W. 48)		Kim, Y. J. 44)		Kim, H. Y. 47)	
	Order	%	Order	%	Order	%	Order	%	Other	%	Other	%	Other	%	Other	%
Neurological and sensory disorders					1	15.5										
Anemia					2	9.6										
Gastritis & duodenitis	9	2.3			3	8.9	8	2.2			9	0.5	4	3.9		
Nutritional deficiency					4	7.0										
Bronchitis, emphysema, asthma					5	6.4					4	7.9	6	3.5	4	9.2
Hypertensive heart disease			5	4.0	6	5.2			4	3.7						
Hypertension without ECG change			5	4.0	7	4.3			4	3.7						
Other d. of genito-urinary system	6	4.1			8	4.2	6	2.8	6	0.6						
Other d. of circulatory system			5	4.0	9	3.9			4	3.7						
Diseases of skin	3	5.8	6	3.2	10	3.7	3	3.5	5	3.5			5	3.		
Appendicitis	1	8.3					1	6.4					7	3.		
Peptic ulcer and complication													10	2.		
Laceration & open wound	8	2.3	4	4.3			2	4.2								
Pelvic inflammatory diseases			3	5.4												
Other diseases of digestive system	4	5.7	2	6.0			4	3.4	2	31.9	3	9.2	9	2.3	3	9.8
Cirrhosis of liver	10	2.1														
Accidents including fracture & burns							5	2.9			8	1.5			9	1.8
Tuberculosis of respiratory system	7	3.5	10	0.6			7	2.6	1	47.5			1	8.2		
Psychoneurotic disorders							9	2.2								
Adverse effects of chemical substance	5	4.9					10	2.1								
Diarrhea, Dysentey, Typhoid, etc.			8	1.9												
Influenza													8	2.5		
Headache, malaise											1	46.4			2	25.0
Toothache			1	10.0							2	16.4	2	6.0	1	34.7
Eye diseases											9	0.5			10	1.2
E. N. T. diseases			9	1.9					3	12.8	6	1.8			6	3.5
Symptoms & ill-defined conditions	2	6.1	9	1.9					3	12.8	4	7.9			4	9.2
			7	2.6												

B. *Major Findings and Discussion*

Table 2—1 shows the monthly prevalence rate by age. It does not show any significant annual changes for the last 10 years. The prevalence rate in the 0-4 age group is 200 per 1,000 population, and drops to 100 in the teen-age group. But the rate then begins to increase for those over age twenty. Most of the studies indicate that the prevalence rate increases proportionally with age except Lee's[5] and Lee's[18]. The latter two studies determine the highest prevalence rate to be at age forty and fifty. In the case of Kang's study[14], a contradictory finding stems from the small number of the aged people in the study sample. Generally, teenagers and the labor force age group 20-40, show lower morbidity rates.

Table 2—2 shows the monthly prevalence rate by sex. The prevalence rate of women is found to be higher than that of men, except in Kim's[9, 24] and Meng's[10] studies. Kwon's study can be excluded as it deals with a specific population residing in rehabilitation centers and old people's homes.[42] Oh's study found the prevalence rate of female teachers working at junior and senior high schools to be twice as high as that of male teachers.[35] The average prevalence rate, according to our best estimate, is around 160 per 1,000; and the prevalence rate of the female seems to be higher by 15 to 20 per 1,000 if the extreme figures such as Kim's 735.2[39] and Kang's 623.3[49] are excluded.

Table 2—3 shows the monthly age and sex specific prevalence rate. The male and female prevalence pattern by age is very similar. Kim's study[33] on the prevalence rate of chronic diseases shows that the female has a higher overall prevalence rate, but the prevalence rate of the male aged over sixty is more than twice that of the female in the same age group.

Table 2—4 shows the area specific point and period prevalence rate per 1,000 population per month. Areas are usually classified in three ways; 1) mountainous, semi-mountainous, plain, coastal, and island, 2) urban and rural, or 3) metropolitan, medium cities, small cities, and rural & fishery. It is very difficult to adjust the various area classification systems used. Standardization of the classification system is urgently needed. Incidentally, all studies agree that the point prevalence rate is approximately 60 in rural areas. According to Lee's studies[18, 30], period prevalence rates in coastal areas are much higher than those in islands, but sufficient explanations for this difference are not offered. Huh reported that the period prevalence rate in the rural areas decreased from 240.1 in 1972 to 115.0 in the following year, and the overall average decreased from 260.6 to 165.6 during that same time, but no explanation was offered. We assume that the sizeable difference originated mostly from errors in sampling designs and the interviewing process rather than an actual decrease. Therefore, more information is required to determine if the prevalence rate in the rural or urban areas is higher, although the data in Table 2—4 suggest that the prevalence rate is slightly higher in urban areas.

Table 2—5 shows the annual number of sichnesses per capita. The highest number is 6.12 according to Park's study in 1962, in which school children and pupils were surveyed.[26]

298

The lowest number is 0.56 according to Yang's study conducted in Yonhee-dong in 1967.[27] Excluding these two extremes, the other studies show an average number of sicknesses per person per year as 1.9 or 2.0.

Table 2—6 shows the age specific incidence rate per 1,000 population per month. It is noteworthy that the incidence rate reported at the end of a study is twice as high as that reported on the first day of the study.[3] The Social Security Commission reported that there was a difference of 10 per 1,000 population in morbidity rate between in terms of per spell of illness and of per patient.[31] Kim shows that the incidence rate of acute conditions is 82.7, while the prevalence rate of chronic conditions is 175.6.[33] (See table 2—6 and 2—2) The finding indicates the existence of a large volume of chronic conditions. The definition of acute conditions and chronic are not certainly stated in most of studies.

Table 2—7 shows the area specific incidence rate per 1,000 population per month. The results are similar to those in table 4, in that the incidence rate on the islands was very low in 1969[16], and was also very low in rural and fishery areas in 1973.[26]

Table 2—8 shows the number of days activity restricted due to sickness per month. The findings show a wide variance owing to the lack of concensus of definition of the terms used. Han's 4.5 restricted days per person and 23.6 per patient are the highest.[22] Lee's 0.3 per person is the lowest.[18] Huh defined the activity restricted day as more than a half-day of rest in bed away from ones normal activity due to sickness and reported 0.5 day per person and 3.4 days per patient.[29]

Table 2—9 shows the cause specific morbidity rate per 1,000 population per month. Most of the interview surveys used the International Classification of Diseases and Injuries by W.H.O., although several surveys used a different classification system. Of these studies, Kwon dealt with the incidence of acute communicable diseases in the urban slum population,[33] and Oh analyzed the causes of teachers absenteeism due to illness.[35]

Table 2—10 shows the government statistics on the number of cases and incidence rates for selected communicable diseases. The incidence rates for selected communicable diseases has tended to decline. Typhoid fever shows the highest incidence rate of 2.0 per 100,000 population among them. Although the number of not-infectious tuberculosis cases has decreased, the number of infectious tuberculosis cases has remained stationary.

Table 2—11 shows the ten leading causes of general morbidity. There is no uniformity in the classification system used. Generally speaking, diseases of the digestive system and respiratory system were more frequently reported in the interview surveys. The former is particularly high in the summer, the latter in the winter. Diseases of the skin, ear, nose, and throat are also quite prevalent. Symptoms and ill defined conditions are the second most often reported problems in some study.[40] This ambiquity is inevitable in an interview survey. Kim conducted a health examination study and reported somewhat different results as might be expected.[43] Neurological and sensory disorders were most frequently reported, and then anemia, gastritis and duodenitis, nutritional deficiency, and bronchitis, emphysema, asthma, were reported in descending order. Kim[47] and Yoo[48] used school children as study samples. Kim[44] analyzed the medical records of

293

the Koje Project.

Out of 53 studies, 19 were surveyed in urban areas, 24 in rural and fishery areas, and 10 in both areas. Sixty per cent of all the surveys were conducted with general community people, while the remainder were based on specific populations, such as teachers, students, employees, etc. Age grouping varied according to the researchers. For example, those less than 19 years old were grouped as 0-9, 10-19 or 0-5, 6-10, 11-19. The aged were grouped as over age 55, over 60, or over 70. The study period ranged from one day to two years. Fifty per cent, or 26 surveys, were conducted within one month. Twenty per cent, or 11 surveys, were conducted for more than one year. In the meantime, the sample size ranged from 180 to 2,000 households, or from 144 to 120,000 people. Approxmately 40% of the studies used a sample size of 1,500-3,000 households or 1,000-10,000 people. As for sampling methods, simple random sampling, cluster sampling, and multi-stage stratified sampling technique were utilized. However, few studies discussed their sampling errors.

There are three kinds of health surveys; health interview survey, health examination survey, and medical record search. Most of the studies reviewed here relied on the interview technique. Lee[12] and Kim[43] used the physical & laboratory examination approach. Four studies conducted by the Ministry of Health and Social Affairs[40, 41], Kim[44], and Lee[45] dealt with clinical records. In the case of interview rveys, the length of the recall period affects the accuracy of the data. It was found that most studies did home visiting on a weekly basis, which seems to be quite adequate. One study conducted by the Social Security Commission used the personal diary approach as an instrument in obtaining morbidity information of household members. But it does not indicate who among the household members wrote the health diary.

Yu, et al presents another term, "incapacitation", which is similar to the concept of morbid conditions[8]. Any condition which reduced an interviewee's normal activities was defined as incapacitation. Restricted activity, bed disability, absence from school, and not playing are included. Their results seem to be very high (7 2-9.6 days of incapacitation per patient, and 1.9-2.9 days of incapacitation per person) compared to Huh, et al's study on activity restriction (2.4 days of activity restriction per patient, and 0.5 day of activity restriction per person), which defines activity restriction as a half day rest in bed away from ones normal daily activities. Researchers often fail to distinguish acute conditions from chronic conditions. Criteria should be standardized and operationalized to define acute and chronic conditions. Also, data on both prevalence and incidence rates are needed.

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294

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295

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296

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297

3. Utilization Data

A. Basic Data Tables

1. Sex Specific Medical Care Utilization by Area/1,000 Population/Month
2. Sex Specific Medical Care Utilization by Area/1,000 Specific Population/Month
3. Disease Specific Medical Care Utilization/1,000 Cause Specific Population/Month
4. Age and Sex Specific Medical Care Utilization by Type of Medical Care/1,000 Population/Month
5. Average Length of Inpatient Stay
6. Percentage of Cases Treated (Treated Rate)
7. Education Specific Medical Care Utilization/1,000 Population/Month
8. Place of Delivery by Education

298

Table 3-i. Sex Specific Medical Care Utilization by Area/1,000 Population/Month (I)

Area	Year Surveyed	Researchers	Sample Size	Sex	Type of Medical Care							
					Private Clinic	Hospital-ization	Health Center	Pharmacy	Home Visit	Dentist Visit	Herb Doctor	Herb Drugstore
	Jan. 1963 (25 days)	Cha, M. H. 70)	9,961	B		2.8		0.9			0.3	
	Sep. 1963 (1 yr)	Kim, S. H. 59)	19,197	B	20.0	1.4	8.8	51.8	0.2	0.4	9.8	
	Sep. 1963 (1 yr)	Kim, I. D. Huh, J. 80)	20,000	B	19.2	1.3	49.7	34.0	0.2	0.4	9.4	
	Oct. 1963 (2 mos)	Han, M. Y. Kim, S. H. 57)	1,250	B		5.6	5.6	21.6				4.0
	July 1965 (10 days)	Jang, I. U. Kim, M. H. 19)	1,245	B	13.7			26.9				9.7
	Oct. 1965 (25 days)	Yun, Y. S. 28)	2,378	B	11.6	1.8	8.8	46.3			13.3	
Rural	Sep. 1967 (3 mos)	Kwon, E H. Kim, T. R. 38)	12,000	B	5.7	1.5		5.9			1.2	
				M	5.0	1.7		5.1			1.4	
				F	6.4	1.3		6.9			0.9	
	Aug. 1968 (1 mo)	Lee, Y. C. Kim, K. S. 14)	14,472	B	12.0	1.2	7.0	59.4		0.2	3.6	5.5
				M	13.2	1.6	9.0	62.0		0.1	6.0	6.8
				F	12.6	0.7	4.8	56.8		0.3	4.8	6.1
	Jan. 1969 (1 mo)	Yoo, I. H. Huh, J. 10)	5,679	B	26.6	0.7	6.9	46.0		0.2	5.0	3.5
				M	24.2		4.2	49.8		0.2	7.4	2.1
				F	29.0	0.7	9.5	40.0			2.5	4.9
	Apr. 1973 (8 mos)	Lee, S. 15)	7,200	B	11.1		2.4	41.7			9.3	
	July 1973 (5 mos)	Lee, S. K. Kim, D. H. 17)	1,500	B	14.1	2.6	0.8	29.8			4.5	
				M	10.5	3.3	0.3	29.0			1.7	
				F	8.0	2.8	0.3	30.5			2.1	
	Aug. 1973 (1 mo)	Lee, C. O. Park, Y. S. 12)	14,655	B	46.1	5.1	5.7	52.2		0.6	9.6	8.0
	Aug. 1973 (1 mo)	Huh, J. Park, Y. S. 79)	30,525	B	47.2	5.1	5.7	52.3	7.0	0.6	9.6	8.0
	Nov. 1974 (1 mo)	Huh, J. Moon, O. R. 56)	9,830	B	24.5	6.2	11.3	71.0		0.4	13.5	
				M	27.3	7.0	13.3	66.5				
				F	21.6	5.4	9.3	75.6				

299

Table 3-1. Sex Specific Medical Care Utilization by Area/1,000 Population/Month (I)

Area	Year Surveyed	Researchers	Sample Size	Sex	Type of Medical Care							
					Private Clinic	Hospitalization	Health Center	Pharmacy	Home Visit	Dentist Visit	Herb Doctor	Herb Drugstore
Urban	Nov. 1963 (1 yr)	Whang, C. H. 22)	143,070	B			5.8					
	Sep. 1964 (1 yr)	Jun, B. H. 58)	10,028	B	31.3	1.6	0.7	71.3	1.6	1.1	6.4	
	Sep. 1967 (3 mos)	Kwon, E H. Kim, T. R. 38)	12,000	B	22.1	10.3		30.2			4.2	
				M	20.4	11.4		22.9			4.1	
				F	24.3	10.3		39.4			4.4	
	Aug. 1968 (1 mo)	Chun, W. S. 35)	1,802	B		16.6	2.2	73.3			8.9	
				M		15.6	3.3	73.2			6.6	
				F		17.7	1.1	73.3			12.8	
	June 1971 (1 yr)	Kim, I. S. Kim, K. S. 18)	1,851	B	20.5		2.1	5.4			2.2	
	Aug. 1973 (1 mo)	Cho, D. B. Park, Y. S. 8)	7,896	B	47.1	15.2	0.8	71.8			4.9	4.9
Whole Country	Sep. 1963 (2 yrs)	Huh, I. Kim, I. D. 93)	29,225	B	11.9	0.7	3.0	29.2	0.3	0.3	4.3	
	Apr. 1972 (1 mo)	Song, S. O. 5)	2,597	B			5.3					
				M			5.5					
				F			5.0					
	Aug. 1973 (1 yr)	Song, D. O. 11)	1,009	B	9.2	3.4	2.0	18.6	0.7	0.1	4.6	4.2
	Aug. 1973 (1 mo)	Huh, J. Park, Y. S. 79)	30,525	B	68.4	17.6	1.1	136.0	24.2	0.9	8.3	16.9

300

Table 3-2. Sex Specific Medical Care Utilization by Area/1,000 Specific Population/Month (I)

Population Surveyed	Year Surveyed	Researchers	Area	Sample Size	Sex	Type of Medical Care							
						Private Clinic	Hospital-ization	Health Center	Phar-macy	Home Visit	Dentist Visit	Herb Doctor	Herb Drugstore
Blind Men	Jan. 1962 (86 days)	Kwon, E. H. Lee, M. H. 61)	Seoul Gyeong-Gi	449	B	21.0			351.2	44.3		33.4	
Students & Teachers	May 1962 (1 mo)	Park, H. J. Huh, J. 60)	Seoul	1,241	B	130.5			99.9	130.5		32.2	
The Miners	Sep. 1963 (45 days)	Nam, C. H. 20)	Gang-Weon et al	2,360	M	24.3	12.2	5.4	41.8				29.1
Indigent Laborers	June 1964 (2 mos)	Park, S. Y. 27)	Seoul	725	B	25.5	65.5	33.1	59.3			13.1	
Indigent Women	June 1964 (2 mos)	Yun, L. Z. 21)	Seoul	715	F	155.9	15.4	20.3	116.8			9.8	
Farm Laborers	Aug. 1967 (2 mos)	Lee, K. H. 23)	Rural	802	M	27.4	38.7	28.7	109.7		13.7	61.1	
Scavengers	Aug. 1964 (70 days)	Kim, H. D. 25)	Seoul	1,632	M	50.2		14.5	119.4			75.2	
Drivers	Aug. 1964 (3 mos)	Kang, R. S. 65)	Seoul	667	M	127.0	62.0		81.0				24.5
University Students	1964	Shim, U. T. 64)	Jeon Nam	2,881	B		26.6	32.9					
	1965						26.9	36.4					
	1966						11.6	13.8					
	1967						14.9	15.2					
	1968						11.2	17.3					
Old Age	Apr. 1965 (1 yr)	Seo, K. H. 40)	Seoul Gyeong-Gi	1,497	B	16.5	0.7	1.7	39.7	1.0	0.5	15.3	
Well-babies	Apr. 1965 (8 days)	Lee, Y. U. 44)	Seoul	530	B	132.1	139.6	383.0					
Old Age	Sep. 1965 (16 days)	Han, C. H. 29)	Seoul Incheon	723	B	124.7			176.3				123.9
					M	149.4			153.2				129.9
					F	109.5			190.5				120.3
Old Age	Aug. 1966 (2 mos)	Lim, [illegible]. K. 31)	Jeon Buk (rural)	600	B	66.2			75.0				215.8
					M	78.6			75.5				221.7
					F	53.7			74.5				209.2

301

Table 3-2. Sex Specific Medical Care Utilization by Area/1,000 Specific Population/Month (Ⅱ)

Population Surveyed	Year Surveyed	Researchers	Area	Sample Size	Sex	Type of Medical Care: Private Clinic	Hospitalization	Health Center	Pharmacy	Home Visit	Dentist Visit	Herb Doctor	Herb Drugstore
Middle, High & University Students	Sep. 1967 (3 mos)	Kwon, E. H. Kim, T. R. 38)	Metropolitan & Rural	12,000	B	9.3	3.9		12.0			1.8	
					M	8.5	4.4		9.3			1.8	
					F	10.2	3.4		15.4			1.8	
House Wives	Sep. 1967 (55 days)	Kim, Y. B. 33)	Gyeong Nam	404	F	37.8		28.3	234.9			129.6	
Technical Laborers	Sep. 1967 (2 mos)	Ha, M. H. 34)	Seoul	635	B	97.5	82.3		164.4			20.6	
Employees at Phar. Co.	Mar. 1971 (6 mos)	Kim, K. K. 9)	Seoul	1,539	F	63.7		2.6	188.4		2.6	14.9	

Table 3-3. Diseases Specific Medical Care Utilization/1,000 Cause Specific Population/Month

Diseases	Year Studied	Researchers	Area	Sample Size	Sex	Type of Medical Care: Private Clinic	Hospitalization	Health Center	Pharmacy	Home Visit	Dentist Visit	Herb Doctor	Herb Drugstore
Tuberculosis	July 1963 (3 mos)	Lee, S. B. 39)	Choong Nam (rural)	1,243	B	77.7		171.8		21.6			35.8
	Nov. 1963 (1 yr)	Whang, C. W. 22)	Busan (urban)	10,274	B			3.6					
	Oct. 1964 (25 days)	Hann, K. S. 26)	Seoul	1,310	B	252.0	252.0	29.1					
	Sep. 1965 (1 mo)	Kim, D. K. 30)	Seoul	463	B	110.2	101.5	667.4	43.2	60.5		8.6	
					M	115.3	112.2	648.0	43.6			6.2	
					F	98.6	77.5	711.3	42.3			14.1	
	Sep. 1966 (2 mos)	Yu, K. J. 32)	Gang-Weon (Weonju)	228	B	309.2	57.0	59.2	68.0			26.3	
Venereal Diseases	Oct. 1964 (15 days)	Lee, T. A. 24)	Choong Nam (rural)	600	B	323.3	3.3	8.3	6.7				
					M	153.3	6.7	13.3	13.3				
					F	493.3		3.3					
Typhoid Fever	July 1966 (1 mo)	Han, D. S. 16)	Choong Nam (Dae Jun)	53	B	103.8	160.4		169.8			9.4	18.9
Mental Disorders	Sep. 1972 (10 days)	Nam, K. H. 7)	Gyeong Buk (rural)	6,846	B		194.4		83.3			250.0	250.0

302

Table 3-4. Age and Sex Specific Medical Care Utilization by Type of Medical Care/1,000 Population/Month (1)

Type of Medical Care	Year Surveyed	Researchers	Area	Sample Size	Sex	Age 0—4	5—9	10—19	20—29	30—39	40—49	50—59	60—	Average
Out-patient Clinic	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.14)	Whole Rural	14,472	B	31.4	12.3	5.1	9.0	13.1	16.2	18.5	7.2	12.6
					M	33.8	14.7	3.1	6.7	10.4	13.4	14.7	4.6	
					F	23.2	9.6	7.4	18.0	15.4	18.6	22.3	9.3	
	July 1973 (5 mos)	Lee, S.K. Kim, D.H.17)	Rural	1,500	B	36.1	11.2	5.8	7.8	8.9	6.7	14.1	37.2	12.8
					M	37.6	18.3	7.7	7.8	12.0	7.4	7.8	30.5	
					F	28.2	4.5	3.7	7.8	5.9	7.8	6.1	41.4	
	Nov. 1974 (1 mo)	Huh, J. Moon, O.R.56)	Whole Rural	9,830	B	24.5		6.0	18.9	31.6	40.7	46.5	49.7	24.5
Hospitalization	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.14)	Whole Rural	14,472	B	1.4		1.1	1.1	3.0	2.1	0.9		1.2
					M	2.6		2.0	2.2	2.6	2.9			
					F				—	3.3	1.3	1.9		
	July 1973 (5 mos)	Lee, S.K. Kim, D.H.17)	Rural	1,500	B			1.2		1.5	3.4	8.0	9.9	2.1
					M			1.1		3.0	7.4	11.8	15.2	
					F			1.2				4.1	3.8	
	Nov. 1974 (1 mo)	Huh, J. Moon, O.R.56)	Whole Rural	9,830	B		2.7	3.4	4.4	8.1	13.2	16.1	9.7	6.2
Out-patient Clinic & Hospitalization	Aug. 1968 (1 mo)	Chun, W.S.35)	Seoul	1,802	B	36.0	7.1	11.5	11.1	12.3	31.6	40.0		
					M	18.7	7.7	11.0	6.2	16.8	46.5	27.8		16.6
					F	52.2	6.7	11.9	15.1	6.8	13.9	51.3		
Health Center	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.14)	Whole Rural	14,472	B	4.8	0.8	2.4	5.6	14.9	14.0	17.6	8.2	6.9
					M	6.4	0.8	2.5	5.6	22.1	20.8	23.8	11.4	
					F	2.8	0.9	2.3	5.6	8.8	8.0	11.2	5.6	
	Aug. 1968 (1 mo)	Chun, W.S. Huh, J.35)	Seoul	1,802	B					6.1	12.7			2.2
					M					5.6	23.3			
					F					6.8				
	Apr. 1972 (1 mo)	Song, S.D.5)	Dae Gu and 3 Guns	2,597	B		3.3	3.0	12.5	12.3	9.2	8.4		7.0
	July, 1973 (5 mos)	Lee, S.K. Kim, D.H.17)	Rural	1,500	B									3.5
					M							2.8		2.8
					F	1.4							2.8	4.2
	Nov. 1974 (1 mo)	Huh, J. Moon, O.R.56)	Whole Rural	9,830	B		11.6	4.5	6.6	14.6	27.5	25.7	4.1	11.3

302

Table 3-4. Age and Sex Specific Medical Care Utilization by Type of Medical Care/1,000 Population/Month (Ⅰ)

Type of Medical Care	Year Surveyed	Researcher	Area	Sample Size	Sex	Age 0—4	5—9	10—19	20—29	30—39	40—49	50—59	60—	Average
Pharmacy	Aug. 1968	Lee, Y.C. Kim, K.S.[14]	Rural	14,472	B	102.4	46.5	40.7	46.0	63.8	82.2	67.5	72.1	59.4
					M	108.5	52.3	44.2	42.6	79.6	76.0	66.0	68.8	
					F	95.5	40.3	36.9	49.4	50.4	87.6	68.9	74.8	
	Aug. 1968 (1 mo)	Chun, W.S. Huh, J.[35]	Seoul	1,802	B	121.6	64.3	57.3	52.8	76.7	88.6	106.7	31.3	73.3
					M	102.8	76.9	55.2	30.9	78.2	127.9	138.9		
					F	139.1	53.3	59.5	70.7	74.8	41.7	76.9	76.9	
	July 1973 (5 mos)	Lee, S.K. Kim, D.H.[17]	Rural	1,500	B	49.9	16.7	12.8	4.4	11.9	20.1	26.1	86.8	29.8
					M	47.0	10.4	16.5	5.9	6.0	29.6	19.6	66.0	
					F	35.4	24.0	8.6	2.6	17.6	12.2	32.9	82.7	
	Nov. 1974 (1 mo)	Huh, J. Moon, O.R.[56]	Rural	9,830	B	94.1		36.2	53.2	59.2	103.9	112.4	100.7	71.0
Dental Clinic	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.[14]	Rural	14,472	B					1.2		0.9		0.2
					M					1.2		1.8		
					F					2.2				
Herb Doctor	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.[14]	Rural	14,472	B	2.7	0.4	1.6	2.2	6.0	11.2	14.8	12.4	4.8
					M	2.5		2.0	3.3	2.6	1.4	11.0	18.3	
					F	2.8	0.9	1.1	1.1	8.8	19.9	18.6	7.5	
	Aug. 1968 (1 mo)	Chun, W.S.[35]	Seoul	1,802	B	27.0	3.6			24.5	38.0	13.3		
					M	18.7				16.8	34.9			12.8
					F	34.8	6.7			34.0	41.7	25.6		

304

Table 3-5. Average Length of Inpatient Stay

Study Year	Researchers	Area	Sample Size	Hospital Days
1959 (5 yrs)	Lee, D.J.	Seoul	B : 1,001 M : 619 F : 382	B : 4.6 M : 4.8 F : 4.6
Oct. 1965 (25 days)	Yun, Y.S.[28]	Choong Nam (Rural)	B : 2,378 M : 1,339 F : 1,139	B : 9.7
July 1966 (1 mo)	Han, D.S.[16]	Choong Nam (Dae Jun)	B : 53	B : 16.0*
Aug. 1966 (1 day)	M.H. & S.A.[78]	Whole Country		B : 16.7**
Jan. 1967 (1 yr)	Kim, B.W.[74]	Rural	B : 1,695	B : 10.4
May 1971 (2 mos)	Yu, S.H. Yang, J.M.[68]	Seoul	B : 1,513	B : 7.4
July 1973 (5 mos)	Lee, S.K. Kim, D.H.[17]	Kyung Buk (Rural)	B : 1,500	B : 12.0
Oct. 1973 (1 day)	M.H. & S.A.[77]	Whole Country		B : 12.4**
Jan. 1975 (1 Yr)	Moon, O.R.[84]	Rural (Moonkyung) (Okgu) (Choonseong) Urban (Busan) (Major Cities)	B : 3,840 B : 9,311 B : 7,344 B : 19,482 B : 4,891	B : 10.8 B : 8.0 B : 7.9 B : 7.7 B : 11.0

* Hospital days of the patients with typhoid fever
** Data from the one day National Hospital Census

Table 3-6. Percentage of Cases Treated (Treated Rate)

Study Period	Researchers	Area	Sample Size	Both	Male	Female
Oct. 1965 (25 days)	Yun, Y.S.[28]	Choong Nam (Rural)	2,378	86.9		
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S.[14]	Whole Rural	14,472	72 2** 60.2	75.1**	69.4**
Jan. 1969 (1 mo)	Yoo, I.H.[10]	Whole Rural	5,679	78.1	79.4	76.7
Nov. 1971 (7 days)	Yu, S.H. Johnson, K.[81]	Rural (Hachung) (Illoon)	1,114	 62.0 61.0		
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.[13]	Seoul Daegu Inchon	15,402	 70.5 76.9**	 74.3**	 78.9**
Sep. 1972 (10 days)	Nam, K.H.[7]	Kyung Buk (Rural)	6,846	50.0*		
July 1973 (5 mos)	Lee, S.K. Kim, D.H.[17]	Rural	1,500	73.0	76.4	69.6
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S.[8]	Seoul Busan Daegu	7,896	74.8	73.2	75.9
Aug. 1973 (1 mo)	Huh, J. Park, Y.S.[80]	Daegu	30,525	74.5 78.5**	 80.7**	 76.7**
May 1974 (2 mos)	Oh, H.Y. Yun, B.B.[76]	Seoul	3,222	78.3***	90.0***	66.5***
Nov. 1974 (1 mo)	Huh, J. Moon, O.R.[56]	Whole Rural	9,830	59.9		

* Pertains to those suffering from mental disorders
** Includes folk therapies & superstitious remedies
*** Registered tuberculosis cases in Seoul

306

Table. 3-7. Education Specific Medical Care Utilization/1,000 Population/Month

Type of Medical Care	Study Year	Researchers	Area	Sample Size	No Education	Can Read Korean	Primary School	Middle School	High School	College or University	Average
Private Clinic	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	27.1	4.7	9.0	7.7	8.3	16.7	12.6
Hospital & Clinic	July 1970 (10 day)	Lee, S.H. 4)	Seoul	1,203	15.2	15.9	12.3	13.3	12.8	12.4	13.1
Hospitalization	May 1968 (4 mos)	Kim, Y.S. 2)	Seoul	854		53.2	38.5	59.0	65.4	134.1	55.6
	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	0.6	0.7	1.6	0.8	2.1		1.2
Health Center	May 1968 (4 mos)	Kim, Y.S. 2)	Seoul	854		10.6*	40.8*	26.7*	20.4*	44.0*	304*
	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	8.8	12.4	6.5	7.7	8.3		6.9
Pharmacy	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	54.3	71.1	48.4	68.2	72.3	75.0	59.4
	July 1970 (3 yrs)	Lee, S.H. 4)	Seoul	1,203	6.1	5.8	0.6	10.6	11.4	9.3	10.4
Home Visit	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	0.6	2.0	0.1				0.3
Dental Clinic	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472			0.1		2.1	8.3	0.2
Herb Doctor	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	13.9	10.4	3.5	2.3			4.8
	July 1979 (10 days)	Lee, S.H. 4)	Seoul	1,203	3.0	2.9	1.8	2.2	1.2	2.7	1.9
Herb Drug Store	Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 14)	Rural	14,472	12.0	14.3	5.8		2.1	8.3	6.1
	July 1970 (10 days)	Lee, S.H. 4)	Seoul	1,203	0.9		0.5	0.4	0.2	0.2	0.2

Table 3-8. Place of Delivery by Education (1)

Area	Year Surveyed	Investigators	Sample Size	Hospital or Clinic				Midwives' Office				Home			
				Sub-total	Primary School & below	Middle & High School	College or University	Sub-total	Primary School & below	Middle & High School	College or University	Sub-total	Primary School & below	Middle & High School	College or University
Rural	July 1959 (15 days)	Kim, C. S. 67)	595									96.9			
	Jan. 1963 (25 days)	Cha, M. H. 70)	9,961	1.1				12.0				86.9			
	Mar. 1965 (52 days)	Kang, O. B. 66)	2,340		0.1	0.0						99.9	99.9	99.9	
	July 1966 (1 mo)	Jung, H. C. 46)	1,424	2.6	1.5	10.3	50.0					96.8	88.4	76.1	50.0
	July 1966 (2 mos)	Oh, Y. M. 50)	892	1.6	0.7	5.0	33.3	4.3	1.0	19.5		94.2	98.3	75.5	66.7
	Sep. 1966 (80 days)	Chung, Y. I. 45)	2,139	0.1								95.6			
	Dec. 1967 (1 yr)	Kim, J. I. 53)	499	1.6								98.4			
	Sep. 1968 (1 mo)	Koo, K. W. 3)	480	2.4				5.4				90.0			
	Apr. 1970 (20 mos)	Yeh, M. H. Lee, S. K. 34)	4,147	3.4				0.8				95.8			
Both	Feb. 1966 (15 mos)	Yang, J. M. Bang, S. 51)	1,897	0.5								99.5			
Urban	Nov. 1961 (20 days)	Jyoo, Y. H. 41)	300	18.3								81.7			
	Jan. 1964 (4 yrs)	Oh, M. H. 62)	3,413		33.0	48.5	94.1		0.7	1.5			66.3	50.0	5.9
	Mar. 1965 (8 mos)	Kwon, E. H. Kim, T. R. 49)	92,605	13.9				1.7				84.4			
	Jan. 1966 (1 yr)	Woo, J. O. 42)	400	33.8				6.5				51.5			
	Jan. 1966 (3 yrs)	Song, S. W. Robinson, C. 25)	2,151	23.6								76.4			

308

Table 3-8. Place of Delivery by Education (Ⅱ)

Area	Year Surveyed	Investigators	Sample Size	Hospital or Clinic				Midwives' Office				Home			
				Sub-total	Primary School & below	Middle & High School	College or University	Sub-total	Primary School & below	Middle & High School	College or University	Sub-total	Primary School & below	Middle & High School	College or University
	1967 (1 mo)	Sohn, K.C. 48)	110	10.9								89.1			
	Oct. 1967 (2 mos)	Yane, J.M. Kim, M.H. 69)	21,857	23.6								76.4			
	Jan. 1968 (1 yr)	Cho, W.S. 37)	806	48.2	48.0	49.8	2.2					51.8	60.8	38.2	1.0
	May 1968 (4 mos)	Kim. Y.S. 2)	854	41.1	21.1	52.8	80.5					58.9	67.4	47.2	19.5
	June 1968 (4 mos)	Kwon, E.H. Kim, T.R. 71)	3,171	30.5	20.2	47.8	79.4	2.9	3.2	3.5	1.5	58.3	76.5	48.8	19.1
Urban	June 1968 (52 days)	Hong, J.W. 47)	500	34.4				3.0				62.6			
	July 1968 (4 mos)	Kang, K.W. Kim, I.D. 72)	3,171	30.7	20.1	47.8	79.4	3.1	3.5	3.5	1.5	57.0	76.4	48.8	19.1
	Sep. 1969 (15 days)	Lee [illegible].K. 43)	250	86.8	77.7	88.0	88.8					13.2	22.9	12.1	11.2
	Nov. 1970 (35 days)	Yu. S.H. Chung, Y.S. 73)	305	48.0	13.3	57.9	94.5	48.0	13.3	57.9	94.5	51.2	92.9	41.3	5.5
	Apr. 1971 (2 mos)	Lee, P.K. Park, S.Y. 63)	945	26.2	50.9	70.0	92.4	1.1	0.9	4.7	1.3	10.7	48.1	25.6	6.3
	Apr. 1971 (2 mos)	Park, Y.W. Lee, P.K. 75)	6,552	68.7	38.3	71.3	93.7	2.8	2.5	3.7	1.3	28.5	59.3	24.4	5.1
	Apr. 1972 (2 mos)	Park, Y.W. Lee, P.K. 82)	893	26.9	15.2	50.0	100.0	9.0	13.0			64.2	71.7	50.0	
	May 1972 (21 days)	Kang, H.S. 36)	510	41.4	20.1	51.9	85.4	8.2	6.8	10.3	4.2	50.4	73.1	37.9	10.4
	July 1972 (2 mos)	Cho, H.S. 55)	593	64.6				3.9				31.5			
	July 1972 (50 days)	Kim, D.S. 6)	200	16.5				9.0				20.5			
	Dec. 1974 (3 mos)	Kim, J.W. Lee, S.K. 83)	500	12.9				0.5				82.7			

309

B. *Major Findings and Discussion*

Utilization of health services is a variable that can be somewhat more accurately measured compared to morbidity and expenditures, and is also the most relevant variable for those concerned with the organization of health services. Much of the data presently available that describes health service utilization behavior results primarily from interview surveys regarding the sickness status, and to a lesser extent from clinical record reviews. Therefore, it is a byproduct in the sense that both the interview surveys and clinical record reviews are primarily conducted for the purpose of determining the health status of people served. A positive aspect of the utilization data is that people are more likely to remember where and how often they have received health services, than how often they have been ill and how much they spent. However, most studies solely utilized the socio-demographical approach. Utilization of health services were only examined in terms of age, sex, education, occupation, and socio-economic status, etc.. Other approaches, deemed essential, to explore the health care utilization question were not tried; such as the socio-cultural, socio-psychological, organizational, and social systems approach. In this study, health and medical care utilization were classified in terms of physician visits, hospitalization, dentist visits, pharmacist visits, home visiting by physicians, herb doctor visits, and herb drugstore visits. Folk therapies and superstitious remedies are excluded from the analysis. Midwife visits are also included in Table 3-8.

Table 3-1 shows the monthly sex specific medical care utilization by area per 1,000 population. From previous studies, females are known to generally use less health services than males with the exception of pharmacist visits. This survey again demonstrates that result; females use more drugstores than males, while males use more inpatient care facilities, physician offices visits, and health centers. Exceptions to this finding are Kwon's[38] and Yoo's[10] study in physician visits, Lee's[14] and Yoo's[10] study in pharmacist visits, and Yoo's[10] study in health center utilization. Kwon's study did not use the general population as the sample, but dealt instead with primary, middle, high school, and university students. Yoo's study, with a sample of rural residents in plain areas, has doubtful and possibly incorrect results.

Few studies have examined the influence of the geographical variable on the utilization of health services. This survey reports a few primitive findings concerning this variable. The reason we call them primitive is that utilization differences are examined only in terms of urban and rural categories among the numerous conditions, such as distance, travel time, means of transportation, etc.. It was found that health centers and herb doctors are more predominant sources of care in the rural areas, while private clinics and hospitals are more predominant in the urban areas. This difference is most conspicuous in hospitalization; urban residents use much more hospitalization services than rural people. This is probably due to 1) the scarcity of inpatient facilities in the rural areas (most of hospitalization services are offered via private clinics in the rural Korea), and 2) the inability to pay for the cost of hospitalization by the majority of

310

rural residents. However, it is notable that the number of hospitalizations has significantly increased in the rural areas during the last twelve years, from 2.8 per 1,000 population in 1963 to 6.2 in 1974. Also, physician visits have gradually increased in the rural areas during the same period of time.

Pharmacist visits are the undisputed leading source of medical care utilization in the urban areas as well as the rural. It can be accurately stated that at least fifty per cent of the Korean people use drugstores as their main source of medical care. This survey suggests that pharmacists are more frequently consulted by the urban residents than the rural, but the frequency difference is not very large. It is difficult to predict whether or not this trend of drugstore utilization is increasing over time. More information is required to determine the answer.

Dentists are rarely consulted compared to physician visits. The maximum number of dentist visits is 1.1 per 1,000 population per month. The urban dwellers use slightly more dental services than the rural. There is no precise way of knowing why it is so low. (Actually, 91.6% of dentists are working in the urban areas) Another way of emphasing the under-utilization of dentists is to compare it to physician visits, which is equivalent to only one fiftieth of physician visits. The total number of dentists was only one fifth of that of physicians in 1975. This seems to suggest a sizeable magnitude of dental care problems in Korea. U.S. statistics show that the ratio between dentist visits in 1971 and physician visits in 1969 was 1 to 2.7.*

With the exception of Huh's 1973 study[79], patients' home visits by physicians has not played a significant role in the provision of medical care. Huh's finding is doubtful (24.2 per 1,000 population in 1973) because it indicates that a physician makes a home visit for every fourth patient, which is not true of most private practitioners in Korea. However, this survey indicates that the roles of herb doctors and herb druggists are quite important in the provision of health services. According to the survey, the rural residents use more herb doctors than the urban people, while the urban residents use more herb drugstores than the rural.

If unmet need for health care is defined as health services desired by the client but not received, the magnitude of the unmet need can be measured by subtracting the actual services utilization from the total amount of individual perceived illness. It is possible to calculate the magnitude by using Part 2 (morbidity data) and Part 3 (utilization data). However, the range of the magnitude is so broad, from 12% to 83%, it is impossible to determine a representative figure. It becomes more complicated if those of the uncured among the treated are also included. Thus, it is better to quote the finding of one of the most recent studies conducted by Huh and Moon[56] as an example. They estimated that 40% of the people were not treated at all in the rural areas. It became 53% if those uncured were included, and 51% if those who regarded themselves as not requiring medical care were excluded. In brief, it can be stated that the need for medical care is not met for more than half of the total reported episodes of illness in the rural areas.

* USDHEW, PHS, Data from the National Health Survey, Physician Visits (Series 10, Number 75) and Current Estimates from the Health Interview Survey (Series 10, Number 79), DHEW Publication No. (NSM) 72-1064 & 73 1550.

311

Table 3-2 shows the monthly sex specific medical care utilization by area per 1,000 specific population, such as the blind, students, indigent laborers, street cleaners, taxi drivers, etc.. The number of utilization studies dealing with various specific populations has recently declined. In other words, more attention seems to be currently placed on medical care utilization of the general population, which is more meaningful. The range of the data in Table 3-2 is much broader than that in Table 3-1. Shim found the lowest utilization rates among university students, 28.5 per 1,000 students in 1968.[64] Han found the highest utilization rate in the elderly urban residents, 424.2 per 1,000 elderly population in 1965.[29] The aged use herb drugstores as their main source of care, and is most conspicuous in the rural areas.[31] Many studies failed to distinguish physician visits from hospitalization.

Table 3-3 shows the monthly disease specific medical care utilization per 1,000 cause specific population. The highest utilizers were tuberculosis cases. They use health centers as a primary source of care, but many use private clinics and hospitals. Han indicated that both private clinics and hospitals were the main source of tuberculosis care among gevernment employees in Seoul.[26] Yu also indicated that the majority of the moderately advanced and far advanced tuberculosis cases were treated at private clinics.[32] Most of the patients with venereal diseases were shown to receive medical care at private clinics.[24] In the case of mental disorders, herb doctors and herb druggists were found to be the major source of care.[7]

Table 3-4 shows the monthly age and sex medical care utilization by type of medical care per 1,000 population. Those less than five years old and the aged were found to be the highest utilizers in all kinds of medical care utilization. This survey indicates that the older the patients are, the more likely they are to use all kinds of health services, if those less than five years old are excluded.

Table 3-5 shows the data on the average length of inpatient stay. The Ministry of Health and Social Affairs conducted two studies on this topic, one in 1966 and the other in 1973. Almost seventy per cent of medical institutions nationwide were involved in the studies. The data from the national census suggests that the average length of inpatient stay was reduced from 16 7 days in 1966 to 12 4 days in 1973. Kim reviewed university hospital records at the departments of internal medicine and surgery, and determined the average length of stay to be 10.4 days in 1967.[74] Yu studied medical care problems of the Yonsei University faculty and students, and found the average length of stay to be 7.4 days in 1971.[68] Lee's study on health care needs in the rural areas indicated it was 12 days in 1973.[17] Moon presented recent figures on average length of stay from the experience of health insurance projects. It ranges from 7.7 days to 11.0 days[84]. The average length of stay is closely related to the total cost of inpatient care, the most expensive item. More information is needed to determine the trends in the average length of stay.

Table 3-6 shows the percentage of cases treated. More than 60% of the total cases receive some kind of health care. It increases to approximately 70% if folk therapies and superstitious remedies are included. Only fifty per cent of patients with mental disorders receive some kind of health care, which is the lowest treated rate. Generally,

312

the treated rate of males is higher than that of females.

Table 3-7 shows the monthly education specific medical care utilization per 1,000 population. It is generally known that the level of education is highly correlated with health service utilization, particularly to physican and dentist visits and hospitalization. The results of this survey concurrs with that of Kim's[2] and Lee's[14] which indicate the level of education is positively correlated to hospitalization, physician visits, and dentist visits. Lee's[14] and Lee's[4] studies indicate the level of education is negatively correlated to herb doctor and herb druggist visits. In other words, the more educated the people, the less likely they are to use herb doctors and herb druggists.

Table 3-8 shows the percentage of place of delivery by education. The place of delivery is classified in three categories; 1) hospital or clinic, 2) midwives' office, and 3) home. It was found that the effect of the educational level of mothers on the place of delivery was substantial. The more educated the mothers, the more likely they were to use hospitals, clinics, or midwives. The geographical conditions do affect the choice of place of delivery. For examples, in the rural areas, the highest figure for hospital or clinic delivery was 3.4% in 1970,[54] and the lowest figure for home delivery was 86.9% in 1963.[70] In the urban areas, the highest figure for hospital or clinic delivery was 86.8% in Seoul in 1969,[43] and that for midwifery was 48.0% in Yonhi apartment dwellers in 1970.[73] Home delivery ranged from 13.2% to 82.7% in the urban areas.

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313

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314

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315

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316

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317

4. Expenditure Data

A. Basic Data Tables

1. Estimates of Private Health Expenditures, 1960-1974
2. Estimates of Annual Urban and Rural Household Expenditures for Health and Medical Care, 1963-1973
3. Medical Care Expenditure by Type of Medical Care
4. Medical Care Expenditure by Sex/Month
5. Medical Expenses per Case by Monthly Income Status
6. Medical Care Expenditure by Occupation
7. Medical Care Expenditure by Area/Person/Month
8. Medical Care Expenditure by Age/Month
9. Medical Care Expenditure by International Classification of Diseases & Injuries
10. Household Medical Care Expenditures/Month: Direct vs Indirect Expenses
11. The Composition of Indirect Medical Care Expenditures in Percentage
12. Estimates of Gross National Health Expenditure, 1970-1974
13. Estimates of Local Government Health Expenditures (Ⅰ), 1973
14. Estimates of Local Government Health Expenditures (Ⅱ), 1967-1970.
15. Predicting Gross National Health Expenditures, 1975-1981

318

Table4-1. Estimates of Private Health Expenditures, (1960~1974)

(Unit: Million Won)

Year	Private Consumption Expenditures for Health & Medical care (A)	Total Amount of Private Consumption Expenditures (B)	(A)/(B) %
1960	4,754	207,260	2.3
1961	5,661	245,440	2.3
1962	7,582	293,790	2.6
1963	12,664	403,310	3.1
1964	14,085	586,310	2.4
1965	18,280	668,800	2.7
1966	24,379	805,180	3.0
1967	31,560	985,970	3.2
1968	42,447	1,204,440	3.5
1969	47,549	1,493,650	3.2
1970	53,275	1,884,250	2.8
1971	64,907	2,337,320	2.8
1972	89,571	2,844,450	3.1
1973	111,142	3,365,740	3.3
1974	168,140	4,734,330	3.6

Source: Bank of Korea. National Income Statistics Yearbook, 1975.

Table 4-2. Estimates of Annual Urban and Rural Household Expenditures for Health and Medical Care, (1963-1973)

(Unit: Won)

Year	Urban Household Expenditures*			Rural Household Expenditures**		
	Total	Health and Medical Care	%	Total	Health and Medical Care	%
1963	84,960	2,280	2.7	110,989	1,893	1.7
1964	103,440	2,160	2.1	140,066	2,645	1.9
1965	117,360	1,320	1.1	141,561	2,962	2.1
1966	162,720	2,040	1.3	153,916	3,666	2.4
1967	247,440	4,080	1.7	175,991	4,499	2.6
1968	278,280	8,040	2.9	197,826	5,153	2.6
1969	312,840	9,480	8.0	233,990	5,697	2.4
1970	359,400	11,040	3.1	279,094	6,966	2.5
1971	419,640	10,920	2.6	326,223	7,721	2.4
1972	426,720	12,240	2.6	411,098	8,830	2.1
1973	497,880	13,080	2.6	460,328	11,581	2.5

Source: * Economic Planning Board. Annual Report on the Income and Expenditure Survey. 1973-4
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319

Table 4-3. Medical Care Expenditure by Type of Medical Care

(Unit: Won)

Year of Study	Researchers	*	Study Area	Sample Size	Out-Patient	Hospitalization	Dental Clinic	Home Visit	Pharmacy	Health Center	Herb Med.	Herb Drug Store	Folk Med.	Superstition	Others	Average
Nov. 1959 (3 mos)	Huh, J.	A	Rural	P:13,643	77				73		70					
Sep. 1963 (1 yr)	Kim, S.H. 16)	B	Rural	H: 2,979 P:19,197	414	3,731	305	1,818	131	7	269		31			141
Sep. 1963 (2 yrs)	Kim, I.D. Huh, J. 18)	B	Whole Country	P:30,000	603	8,487	1,486	1,044	204	9	587		39			274
Jan. 1964 (11 yrs)	Lee, B.M. Yu, S.H. 27)	B	Rural	P: 2,542												
1964					986											
1966					1,197											
1968					1,114											
1970					1,760											
1972					2,049											
1974					2,555											
July 1970 (10 days)	Lee, S.H. 7)	B	Seoul	H: 1,281	1,530				990		1,410	750				4,680
Mar. 1971 (6 mos)	Kim, K.K. 1)	B	Seoul	P: 1,539	6,205		2,113		789	100	4,400				1,950	2,092
		A			790		98		298		130				202	1,248
Aug. 1972 (1 mo)	Huh, J. Park, Y.S. 14)	A	Whole Country	H: 3,033	912	936	84	84	816	72	192	156			312	3,552
		C		P:15,402	1,519	39,810	1,942	1,242	469	668	2,808	1,420			1,526	1,202
Jan. 1973 (1 yr)	Kim, Y.J. 28)	B	Rural	P: 3,621	780											
Mar. 1973 (1 yr)	Kang, J.Y. 9)	A	Seoul	P: 9,000	6,528	6,444			516		1,908				744	16,140
		C			4,352	69, 02			1,261		10,175				9,520	7,116
July 1973 (40 days)	Lee, S.K. Kim, D.H 8)	C	Rural	P: 1,500	3,398	10,313			720		2,226					2,438
Aug. 1973 (1 mo)	Lee, C.O. Park, Y.S. 5)	C	Rural	H: 2,700 P:14,655	1,443	3,178	472	1,685	765	1,097	1,083	2,345	483	1,250	2,333	1,589
Aug. 1973 (1 mo)	Huh, J. Park, Y.S. 15)	B	Whole County	H: 5,985 P:30,525	1,690	5,210	1,328	2,038	1,073	1,012	1,803	3,498	1,327	4,191	4,166	1,879

* A: Medical care expenditure/person/year
B: Medical care expenditure/patient
C: Medical care expenditure/treated case

320

(Unit : Won)

Year of Study	Researchers	Study Area	Sample Size	Both			Male			Female		
				Per Case	Treated Case	Capita (or Household)	Per Case	Treated Case	Capita	Per Case	Treated Case	Capita
Sep. 1963 (1 yr)	Kim, S.H.[16]	Rural	H : 2,979 P : 19,197	141 1,692*		26						
Sep. 1964 (1 yr)	Jun, B.H.[17]	Seoul	H : 1,680 P : 10,028	685		87						
Nov. 1965 (1 mo)	Social Security Commission[23]	Seoul	H : 1,000 P : 5,306	571	584	108	241	534	90	330	634	126
1966 (1 mo)	Social Security Commission[29]	Whole Seoul Urban Rural	P : 6,864		711 732 494 788							
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S.[22]	Rural						516	56		741	79
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S.[13]	Rural			802	86		725	79		883	92
Jan. 1969 (1 mo)	Yoo, I.H.[2]	Rural	H : 1,024 P : 5,679		884	89		850	84		937	92
1971	M.H.S.A.[30]	Whole			2,747	432 2,160*						
1971 (1 mo)	Yu, S.H. Yang, J.M.[24]	Seoul			6,426	1,380						
Mar. 1972 (1 yr)	Kang, J.Y.[9]	Seoul	P : 900		7,116	1,345 6,185*						
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.[14]	Metropolitan M. cities S. cities Rural & Fishery	H : 3,033 P : 15,402	1,645 1,354 908 803	1,892 1,764 1,320 1,112	549 272 308 193	1,665 1,325 1,086 904	1,900 1,840 1,498 1,381	530 264 338 167	1,627 1,381 759 739	1,884 1,702 1,155 967	569 264 279 219
Jan, 1973 (1 yr)	Kim, Y.J.[28]	Rural	P : 3,621		780			814			746	
Apr. 1973 (8 mos)	Lee, S.[11]	Rural	H : 20,894 P : 122,175		3,356	526 3,235*						

121

Table 4-4. Medical Care Expenditure by Sex/Month(I)

(Unit: Won)

Year of Study	Researchers	Study Area	Sample Size	Both			Male			Female		
				Per Case	Treated Case	Capita	Per Case	Treated Case	Capita	Per Case	Treated Case	Capita
July 1973 (40 days)	Lee, S.K. Kim, D.H.8)	Rural	P : 1,438	809 1,256*	1,109 2,436*	171 1,256*	1,084	1,420 2,600*	230 1,410*	533	767 2,255*	112 1,100*
Aug. 1973 (1 mo)	Lee, C.O. Park, Y.S.5)	Whole Rural	H : 2,700 P : 14,655	1,315	1,546	151	1,331	1,487	141	1,299	1,504	162
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S.4)	Urban	H : 1,700 P : 7,896	1,983	2,637	397	2,155	3,935	347	1,860	2,443	451
Aug. 1973 (1 mo)	Huh, J. Park, Y.S.15)	Whole	H : 5,985 P : 30,525	1,404	1,379	271	1,469	1,905	245	1,851	1,361	307
June 1974 (1 mo)	Park, W. K.10)	Rural	P : 1,031	235	298	36	209	352	45	149	200	23
Nov. 1974 (1 mo)	Huh, J. Moon, O.R.21)	Rural	H : 1,793 P : 9,830	2,756	4,361	413	3,156	4,570	424	2,424	4,155	401

* Annual Medical Care Expenditures

Table 4-5. Medical Expenses Per Case by Monthly Income Status

(Unit: Won)

Year of Study	Researchers	Study Area	Sample Size	Income							
				0	1—5,000	5,000—10,000	10,000—20,000	20,000—50,000	50,000—100,000	100,000+	Average
Sep. 1964 (1 yr)	Jun, B.H.	Seoul	H : 1,680 P : 10,028	902	344	459	949	916	1,660	1,629	685

					Metro-politan	Medium-cities	Small-cities	Rural & Fishery	Average
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.14)	Whole Country	H : 3,033 P : 15,402	(1) Average Family Income/Month	52,770	43,130	33,830	28,830	37,610
				(2) Monthly Medical Expenditure/Household	2,582	1,415	1,387	1,027	1,502
				(3) Per cent of (2) to (1)	4.9	3.3	4.1	3.5	4.0

Table 4-7. Medical Care Expenditure by Area/Person/Month

(Unit: Won)

Year of Study	Researchers	Study Area	Sample Size	Metropolitan	Medium Cities	Small Cities	Rural & Fishery	Whole area
Sep. 1963 (1 yr)	Kim, S.H.16)	Rural	H : 3,000			(1,044)	(316)	
Nov. 1965 (1 mo)	Social Security Commission23)	Seoul	H : 1,000 P : 5,306	108				
1966	Social Security Commission29)	Whole Country	P : 6,864	148 (789)		110 (681)	84 (488)	136 (752)
1971 (1 mo)	Yu, S.H. Yang, J.M.24)	Seoul		1,380				
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.14)	Whole Country	H : 3,033 P : 15,402	2,582*	1,415*	1,387*	1,022*	1,502*
Mar. 1973 (1 yr)	Kang, J.Y.9)	Seoul	P : 900	1,345 6,185*				
Apr. 1973 (8 mos)	Lee, S.11)	Rural	H : 20,894 P : 12,175				3,235* 526	
July 1973 (5 mos)	Lee, S.K. Kim, D.H.8)	Rural	P : 1,438				171	
Aug. 1973 (1 mo)	Huh, J. Park, Y.S.15)	Whole Country	H : 5,985 P : 30,525	1,905* 410	1,683* 361	1,333* 236	955* 176	1,383* 271

* Medical care expenditure/household/month
( ) Medical care expenditure/person/year

Table 4-6. Medical Care Expenditure by Occupation(I)

(Unit: Won)

Year of Study	Researchers	Study Area	*	Jobless	Professional & Technical	Administrative Worker	Clerical Worker	Sales, Retail, (Peddler)	Farmers, (Fishermen)	Miners, Quarryman, etc.	Transport & Communication	Craftsman, Production Worker	Service Worker	Not Classified	Student & (Unknown)	Average
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 22)	Rural	A	81			211	133 (218)	135 (88)			56		51	25 (402)	86
			C	654			1,458	958 (1,480)	975 (896)			847		537		802
Jan. 1969 (1 mo)	Yoo, I.H.2)	Rural	A	80			44	76	135 (138)			146		34	(24)	89
			C	516			563	879	1,133 (550)			1,950		400	(461)	884

323

Table 4-6. Medical Care Expenditure by Occupation (Ⅱ)

(Unit: Won)

Year of Study	Researchers	Study Area	*	Jobless	Professional & Technical	Administrative Worker	Clerical Worker	Sales, Retail, (Peddler)	Farmers, (Fishermen)	Miners, Quarryman, etc.	Transport & Communication	Craftsman, Production Worker	Service Worker	Not Classified	Student & (Unknown)	Average
Jan. 1969 (1 mo)	Lee, S.K.[31]	Rural	C	513	267			1,298	1,794 (362)					156	(126)	465
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.[14]	Metropolitan	A	572	1,124	966	757	575	1,950		169	525	523	4,133		640
			B	1,396	2,960	2,231	1,003	1,971	5,200		843	1,485	1,457	12,400		1,649
			C	1,747	3,619	2,454	2,175	2,415	5,200		1,180	1,740	1,684	12,400		2,004
		Medium Cities	A	222	737	500	584	427	541		544	283	458			330
			B	1,128	1,719	1,500	1,595	1,413	1,282		1,450	891	1,186			1,310
			C	1,359	2,579	1,962	1,844	1,871	1,873		2,175	1,089	1,535			1,610
		Small Cities	A	327	743	971	594	471	321			519	538			391
			B	636	1,300	3,400	1,960	1,238	1,151			1,246	4,266			995
			C	1,502	2,600	6,800	2,800	1,485	1,276			1,780	1,433			1,629
		Rural & Fishery	A	170	630	2,267	406	539	188	600		187	1,025		300	210
			B	604	2,467	5,440	1,339	1,580	909	1,000		772	2,460		1,275	815
			C	812	2,691	6,800	1,861	1,746	1,044	1,500		1,006	2,460		2,550	1,038
Aug. 1973	Huh, J. Park, Y.S.[15]	Metropolitan	A	437	232	836	523	308	1,198	2,156	597	468	490	906	1,042	410
			C	2,643	2,848	2,785	3,403	2,848	6,388	2,516	2,324	4,216	3,145	6,638	3,125	2,741
			B	1,993	2,170	1,950	2,299	2,170	3,833	2,097	1,901	3,513	2,200	2,982	2,500	2,049
		Medium Cities	A	472	176	824	238	741	750		772	253	263			361
			B	1,623	1,000	1,614	854	2,361	2,000		2,833	774	1,083			1,508
			C	1,875	1,335	1,614	1,319	2,656	2,000		2,833	1,083	1,083			1,735
		Small Cities	A	181	625	392	820	331	244	4,041	187	125	226			236
			B	937	2,000	1,841	1,444	1,813	1,012	667	750	833	1,766			1,158
			C	1,696	3,333	2,630	2,527	2,803	2,361	4,041	750	2,500	1,766			2,018
		Rural & Fishery	A	131	316	378	105	281	247	89	48	200	134	455	300	176
			B	1,263	2,383	1,766	1,077	2,205	1,638	667	278	1,672	1,002	2,277	1,500	1,328
			C	1,566	2,383	1,892	1,257	2,388	1,993	1,333	417	1,801	1,173	3,383	1,500	1,589
Aug. 1973 (1 mo)	Lee, C.O. Park, Y.[5]	Rural	C	1,527	2,006	1,894	1,258	2,390	1,978	1,333	417	1,693		3,420	1,500	2,637
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S.[4]	Urban	C	2,568	2,762	2,787	3,292	2,407	6,373	2,518	2,326	4,218		6,643	2,472	2,637

* A: Medidal care expenditures/person
B: Medical care expenditures/case
C: Medical care expenditures/treated case

326

Table 4-8. Medical Care Expenditure by Age/Month(I)

(Unit : Won)

Year of Study	Researchers	Sample Size	Study Area	*	0	1—4	5—9	10—19	20—29	30—39	40—49	50—59	60—69	60+ or 70+	Average
Sep. 1964 (1 yr)	Kim, S.H.16)	H : 2,979 P : 19,197	Rural	A		113	88	181	211	203	245	116	101	46	
Sep. 1964 (1 yr)	Jun, B.H.17)	H : 1,680 P : 10,028	Seoul	A		385	328	277	780	1,234	1,207	1,318	571	222	
Oct. 1965 (25 days)	Yoon, Y.S.20)	P : 400	Rural	A		591		292	1,795	1,729	2,311	2,133		2,752	1,021
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S.13)	H : 2,626 P : 14,472	Rural	C		624	500	453	674	1,051	1,053	1,027			803
				D		94	33	28	58	129	174	174	163		85
Jan. 1969 (1 mo)	Yoo, I.H.2)	H : 1,024 P : 5,679	Rural	C		436	398	526	761	1,211	1,489	1,262		1,489	884
				D		83	29	25	40	153	204	184		214	89
Jan. 1969 (1 mo)	Lee, S.K.31)	H : 410 P : 2,248	Rural	C		152	178	203	231	464	851	909	461	675	465
July 1973 (5 mos)	Lee, S.K. Kim, D.H.8)	P : 1,500	Rural	C		659		1,313	520	692	1,500	1,433		1,492	1,109
				A		561		857	371	509	1,055	1,075		971	809
				D		132		97	48	90	271	302		347	171
Aug. 1973 (1 mo)	Lee, C.O. Park, Y.S.5)	H : 2,700 P : 14,655	Rural	C	2,250	978	2,145	1,546	1,510	1,778	1,131	1,067	590		1,545
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S.4)	H : 1,700 P : 7,896	Urban	C	1,500	4,118	2,389	1,495	2,308	2,184	2,588	2,269	3,404		2,637
Nov. 1974 (1 mo)	Huh, J Moon, O.K.21)	H : 1,793 P : 9,830	Rural	A	1,661	1,104	1,460	2,091	2,723	3,555	3,583	3,548	3,539	3,010	2,756
				B	1,576	1,002	1,391	1,964	2,723	3,425	3,359	3,344	3,368	2,899	2,614
				C	1,920	1,365	2,152	3,224	4,158	6,357	5,842	5,913	6,960	5,870	4,361
				D	466	221	154	146	282	608	821	1,025	910	883	413

325

Table 4-8. Medical Care Expenditure by Age/Month (I)

(Unit: Won)

Year of Study	Researchers	Sample Size	Study Area	*	0	1—4	5—9	10—19	20—29	30—39	40—49	50—59	60—69	60+ or 70+	Average
Aug. 1972 (1 mo)	Huh, J. Park, Y.S.14)	H : 3,033 P : 15,420	Metropolitan	A			1,979	1,267	1,650	1,613	1,640	1,103		1,690	1,645
			Medium-city	A			1,491	1,075	1,351	1,344	1,536	1,304		1,300	1,354
			Small-city	A			802	805	852	1,182	652	1,499		1,041	908
			Rural, Fishery	A			986	626	703	555	945	818		1,254	803
			Metropolitan	C			2,125	1,454	1,989	1,887	1,760	1,363		3,300	1,892
			Medium-city	C			1,624	1,349	1,819	2,128	2,081	1,825		2,189	1,774
			Small-city	C			1,046	1,117	1,215	1,733	1,082	2,690		1,784	1,320
			Rural, Fishery	C			1,213	971	984	776	1,184	1,168		1,917	1,112
			Metropolitan	E			465	305	364	287	343	261		568	361
			Medium-city	E			220	212	193	190	213	169		167	200
			Small-city	E			113	148	128	152	95	157		96	128
			Rural, Fishery	E			179	106	146	127	159	97		126	133
			Metropolitan	D			601	231	543	607	880	701		900	549
			Medium-city	D			257	156	260	303	345	537		562	272
			Small-city	D			306	149	298	369	332	690		446	308
			Rural, Fishery	D			163	112	202	168	280	285		499	193
Aug. 1973 (1 mo)	Huh, J. Park, Y.S.15)	H : 5,985 P : 30,525	Metropolitan	D	43	140	173	197	467	547	569	960	1,100	420	410
			Medium-city	D	812	205	107	119	636	634	284	280	1,333	5,000	361
			Small-city	D		120	71	113	201	383	445	455	447	340	236
			Rural, Fishery	D	113	114	59	88	100	237	340	218	344	254	176

* A: Medical care expenditure/patient
B: Medical care expenditure/episode of illness
C: Medical care expenditure/treated case
D: Medical care expenditure/person
E: Medical care expenditure/treated day

326

Table 4-9. Medical Care Expenditure by International Classification of Diseases & Injuries

(Unit: Won)

Study Year	Researchers	Study Area	*	1	2	3	4	5	6	7	8	9
Sep. 1963 (1 yr)	Kim, S.H. 16)	Rural	B	142	1,470	105	230	117	130	292	98	158
Sep. 1963 (2 yrs)	Kim, I.D. Huh. J. 18)	Whole Country	B	321	1,811	314	520	758	213	647	164	617
Sep. 1964 (1 yr)	Jun, B.H. 17)	Seoul	B	2,019	4,004	2,287	3,021	3,949	553	1,721	237	886
Nov. 1965 (1 mo)	Social Security Commission23)	Seoul	B	490	2,042	1,210	225		884	578	336	771
			E	432	2,042	1,210	193		779	499	307	668
Aug. 1968 (1 mo)	Lee, Y.C. Kim, K.S. 22)	Rural	C	479	2,450	568	686	1,285	613	759	639	478
			A									
			D	47	5	2	5	18	32	5	58	114
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 13)	Rural	C	885	7,500	1,418	7,500	1,403	1,020	1,995	638	621
			A									
Jan. 1969 (1 mo)	Yoo, I.H. 2)	Rural	C B	1,795	7,500	2,500	7,500	921	1,260	1,196	479	825
			M	1,882			7,500	917	132	1,142	422	847
			F	1,486	7,500	2,500		925	1,233	1,240	534	803
			A M F									
Jan. 1969 (1 mo)	Lee, S.K. 31)	Rural	C B	378		2,500		750	900	7,117	162	316
			M	417					550	10,050	175	302
			F	263		2,500		750	1,250	1,250	144	326
Aug. 1972 (1 mo)	Huh, J. Park, Y.S. 14)	Metropolitan	B	744	2,333	1,250	3,272	500	2,686	3,684	1,228	1,124
		Medium-city	B	1,162		9,000	7,600	1,500	1,372	1,852	1,410	1,089
		Small-city	B	550		2,700	650		1,456	2,559	430	362
		Rural	B	319	2,000	3,250	275	15,000	409	3,603	543	864
		Metropolitan	C	787	3,500	1,250	4,530	500	2,793	4,700	1,570	1,210
		Medium-city	C	1,483		9,000	9,120	3,000	1,627	2,105	1,903	1,452
		Small-city	C	707		2,700	813		2,046	3,346	686	530
		Rural	C	370	2,000	3,250	330	1,500	796	4,451	737	810
		Whole Area	A									
Aug. 1973 (1 mo)	Cho, D.B. Park, Y.S. 4)	Urban	C	4,662	5,949	3,304	8,333	2,537	2,718	3,970	1,616	1,989
Aug. 1973 (1 mo)	Huh, J. Park, Y.S. 15)	Whole Area	B	2,574	4,733	2,133	4,166	1,469	1,127	2,672	907	1,398
		Metropolitan	B	4,662	4,250	2,796	8,333	1,575	1,458	3,473	1,311	1,488
		Medium-city	B	2,455	8,333	2,916		639	1,377	2,333	612	871
		Small-city	B	1,767	8,332	1,508		466	762	1,644	886	1,336
		Rural	B	1,679	916	1,419	4,166	2,416	1,003	2,431	816	1,449
		Whole Area	C	2,829	5,916	2,673	5,209	2,635	1,862	3,521	1,067	1,782
		Metroplitan	C	4,662	5,949	3,304	8,833	2,537	2,718	3,970	1,616	1,989
		Medium-city	C	2,455	8,333	2,916		958	1,463	2,333	739	1,038
		Small-city	C	3,437	8,333	2,513		1,555	1,715	3,403	1,300	2,004
		Rural	C	1,767	917	1,723	4,166	4,027	1,367	2,972	910	1,755
Nov. 1974 (1 mo)	Huh, J. Moon, O.R. 21)	Rural	B	2,541	7,500	2,995	8,538	5,471	4,973	8,687	1,427	3,631
			E	2,329	7,500	2,902	8,538	5,471	4,865	8,687	1,329	3,301
			C	3,494	12,000	5,462	11,383	10,943	9,134	12,162	2,019	4,884
			A									

* A: Medical expenses/person/month
B: Medical expenses/patient/month
C: Medical expenses/treated/case
D: Medical expenses/household
E: Medical expenses/episode of illness

327

Table 4-9

(Unit: Won)

Study Year	Researchers	Study Area	*	10	11	12	13	14	15	16	17	Average
Sep. 1963 (1 yr)	Kim, S.H. 16)	Rural	B	326	310	60	199	100	183	33	270	141
Sep. 1963 (2 yrs)	Kim, I.D. Huh, J. 18)	Whole Country	B	1,830	658	127	235	92	183	77	726	284
Sep. 1964 (1 yr)	Jun. B.H. 17)	Seoul	B	4,005	1,100	61.9	545			333	2,076	685
Nov. 1965 (1 mo)	Social Security Commission23)	Seoul	B	2,295	999	534	1,668			1,285	585	653
			E	2,295	999	500	1,668			1,082	552	584
Aug. 1968 (1 mo)	Lee. Y.C. Kim, K.S. 22)	Rural	C	2,124	2,039	253	947	1,150	350	2,660	611	625
			A									67
			D	20	25	6	15	0	0	0	14	383
Jan. 1969 (1 mo)	Lee, Y.C. Kim, K.S. 13)	Rural	C	3,657	1,567	387	2,225			630	690	802
			A									85
Jan. 1969 (1 mo)	Yoo, I.H. 2)	Rural	C B	2,735	2,567	516	6,667			281	1,389	
			M	1,500		383	5,000			350	1,550	850
			F	3,205	2,567	613	7,500			258	100	937
			A M									84
			F									92
Jan. 1969 (1 mo)	Lee S.K. 31)	Rural	C B	10,375		57	967			266	500	465
			M	20,000		350	350			163	380	570
			F	750		225	1,172			311	800	361
Aug. 1972 (1 mo)	Huh, J. Park, Y.S. 14)	Metropolitan	B	4,786	5,044	517	2,260			411	1,650	1,645
		Medium-city	B	1,500	360	1,065	1,875			762	1,975	1,345
		Small-city	B	700		2,385	8,600			317	240	908
		Rural	B	2,355	2,908	196	1,698			483	3,787	803
		Metropolitan	C	5,850	6,053	886	4,520			1,300	1,650	1,892
		Medium-city	C	2,250	900	1,750	3,850			3,000	2,370	1,764
		Smal-city	C	1,167		3,875	14,333			475	400	1,320
		Rural	C	3,315	4,725	346	3,476			1,516	5,742	1,112
		Whole Area	A									285
Aug. 1973 (1 mo)	Cho, D.B. Rark, Y.S. 4)	Urban	C		4,369	1,023	2,492		3,722	2,018	3,750	2,637
Aug. 1973 (1 mo)	Huh, J. Park, Y.S. 15)	Whole Area	B	2,934	2,568	954	2,231		2,083	698	1,740	1,589
		Metropolitan	B	2,260	3,329	862	2,492	3,190	3,190	757	2,678	2,049
		Medium-city	B	4,882	2,547	2,097					5,416	1,508
		Small-city	B	2,092		722	2,111		292	896	454	1,158
		Rural	B	3,258	1,904	960	2,038		1,250	578	1,500	1,328
		Whole Area	C	3,029	2,996	1,120	2,619		2,651	1,667	2,013	1,879
		Metropolitan	C	2,260	4,369	1,023	2,492		3,722	2,018	3,750	2,741
		Medium-city	C	4,883	2,547	2,516					5,416	1,735
		Small-city	C	2,354		903	3,166		583	2,694	500	2,018
		Rural	C	3,258	2,004	1,070	2,650		1,562	667	1,500	1,589
Nov. 1974 (1 mo)	Huh, J. Moon, O.R. 21)	Rural	B	5,025	3,682	3,026	3,825		250	1,509	4,013	2,756
			E	5,025	3,586	2,774	3,702		250	1,496	4,048	2,614
			C	7,538	7,569	3,599	7,650		750	4,332	5,633	4,361
			A									413

* A: Medical expenses/person/month
B: Medical expenses/patient/month
C: Medical expenses/treated case
D: Medical expenses/household
E: Medical expenses/episode of illness

328

Table 4-10. Household Medical Care Expenditures/Month: Direct vs Indirect Expenses.

(Unit: Won)

Area	1972, 14)			1973, 15)			1974, 21)		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Metropolitan	2,291	291	2,582	1,400	505	1,905	—	—	—
M. Cities	1,300	115	1,415	1,425	258	1,683	—	—	—
S. Cities	1,294	93	1,387	1,032	301	1,333	—	—	—
Rural	930	92	1,022	707	248	955	1,817	453	2,270
Average(%)	1,357 (90.3)	145 (9.7)	1,502 (100.0)	1,055 (76.3)	328 (23.7)	1,383 (100.0)	1,817 (80.0)	453 (20.07)	2,270 (100.0)

Table 4-11. The Composition of Indirect Medical Care Expenditures in Percentage

Area	1972			1973		
	A	B	C	A	B	C
Metropolitan	34.5	58.7	6.8	38.4	37.7	23.9
M. Cities	28.8	57.5	13.7	34.7	41.1	24.2
S. Cities	32.7	39.4	27.9	22.7	45.2	32.1
Rural	35.7	16.5	47.8	38.7	26.9	34.4
Average	34.0	44.1	21.9	36.5	35.2	28.3

A: Expenses for purchasing materials and supplies
B: Nursing expenses
C: Transportation fees

Table 4-12. Estimates of Gross National Health Expenditures, (1970—1974)

(Unit: Million Won)

Items	1970(%)	1971(%)	1972(%)	1973(%)	1974(%)
Public Expenditures ①	10.77 (16.6)	12.78 (16.2)	15.96 (15.0)	17.69 (13.6)	20.98 (11.0)
Ministry of Health & Social Affairs	2.35 (3.6)	2.90 (3.7)	3.35 (3.2)	3.55 (2.7)	4.30 (2.3)
Other Ministries & Public Hospitals	2.67 (4.1)	3.10 (3.9)	4.18 (3.9)	4.49 (3.4)	5.20 (2.7)
Local Government ②	5.75 (8.9)	6.78 (8.6)	8.43 (7.9)	9.65 (7.4)	11.48 (6.0)
Private Expenditures	53.97 (83.4)	65.93 (83.8)	90.75 (85.0)	112.67 (86.4)	170.18 (89.0)
Private Consumption Expenditures	53.28 (82.3)	64.91 (82.5)	89.57 (83.9)	111.14 (85.2)	168.14 (87.9)
Voluntary Health Agencies ③	0.69 (1.1)	1.02 (1.3)	1.18 (1.1)	1.53 (1.2)	2.04 (1.1)
Total Expenditures	64.74 (100.0)	78.71 (100.0)	106.71 (100.0)	130.36 (100.0)	191.16 (100.0)
Total Expenditures/GNP(%)	2.50	2.50	2.76	2.64	2.82
Per Capita Health Expenditures (Won)	2,060	2,473	3,298	3,962	5,713

① Net total
② Excludes subsidies from geneal accounts which are allocated for operating the public hospitals.
③ Includes the Korean National Tuberculosis Association, Korean Family Planning Association, Korean Institute of Family Planing, and Korean Parasitic Diseases Eradication Campaign.

Source: 1) Economic Planning Board, Annual Balance Sheets, 1971-5.
2) Ministry of Interior, Financial Abstract of Local Government, 1970-4.
3) Economic Planning Board, Monthly Statistics of Korea, 1971-5.
4) Personal communication with the staff of the voluntary health agencies.

329

Table 4-13. Estimates of Local Government Health Expenditures(1), 1973.

Province	Health Expenditures	%	Population	%	Per Capita Expenditures
Seoul	1,954,000,000	15.3	6,290,000	18.9	308
Busan	1,048,000,000	8.2	2,072,000	6.2	506
Gyunggi	1,255,000,000	9.8	3,670,000	11.0	342
Gangweon	1,094,000,000	8.5	1,852,000	5.6	590
Choongbug	812,000,000	6.3	1,519,000	4.6	535
Choongnam	1,087,000,000	8.5	2,923,000	8.8	372
Jeonbug	1,061,000,000	8.3	2,453,000	7.4	433
Jeonnam	1,121,000,000	8.7	4,099,000	12.3	274
Gyungbuk	1,782,000,000	13.9	4,781,000	14.4	373
Gyungnam	1,391,000,000	10.9	3,202,000	9.6	434
Jeju	202,000,000	1.6	390,000	1.2	517
Total	12,807,000,000	100.0	33,251,000	100.0	386

Source: ① Ministry of Interior, Financial Abstract of Local Government, 1974.
② Annual Statistical Reports of Provinces, 1974.

Table 4-14. Estimates of Local Government Health Expenditures(Ⅱ), 1967—1970.

(Unit: 1,000Won)

	Total Budget in General Accounts(A)				Health Expenditures(B)				(B)/(A) %			
	1967	1968	1969	1970	1967	1968	1969	1970	1967	1968	1969	1970
Total	59,926,612	48,044,196	902,031,511	22,963,038	2,751,098	3,654,284	4,528,704	6,557,775	4.5	6.9	5.0	5.1
Seoul	9,743,612	12,996,055	18,865,221	23,632,658	528,878	699,572	1,002,254	1,434,411	5.4	5.4	5.3	6.1
Busan	2,776,161	3,483,929	4,750,956	7,181,684	193,225	214,253	340,394	337,934	7.0	6.1	7.2	4.7
Province	23,170,055	10,405,148	22,222,429	32,660,349	792,805	895,652	1,101,952	1,917,194	3.4	8.6	5.0	5.9
Cities	7,212,321	6,149,270	14,973,711	18,126,844	318,348	321,710	497,432	568,271	4.4	5.2	3.3	3.2
Guns	17,024,453	15,009,794	29,390,834	41,361,503	917,842	162,097	1,586,672	2,299,965	5.4	7.8	5.4	5.6

Sourdes: Ministry of Interior, Financial Abstract of Local Goverment, 1968-1971.
This table is cited from Park, H. J. et al's A Comprehensive Study for Improvement of Rural Health in Korea, 1971, page 210.

330

Table 4-15. Predicting Gross National Health Expenditures, 1975~1981

(Unit: 100Millon Won)

	1974	1975	1976	1977	1978	1979	1980	1981
Hypothesis A								
E/GNP ratio	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
E	1,912	2,496	3,100	3,717	4,295	4,963	5,733	6,623
Hypothesis B								
E/GNP ratio	2.8	2.9	3.1	3.1	3.2	3.3	3.4	3.5
E	1,912	2,585	3,322	4,115	4,908	5,850	6,962	8,278
E P	1,681	2,129	2,664	3,213	3,730	4,331	5,026	5,833
Ep/PCE ratio	3.5	3.5	3.6	3.8	3.9	4.0	4.1	4.2

E: Gross National Health Expenditures
EP: Private Consumption Expenditures for Health and Medical Care
PCE: Gross Private Consumption Expenditures
Source: Data presented at the Finance Subcommittee of Health Sector Task Force for the Fourth 5-Year Economic Development Plan.

B. Major Findings and Discussion

Table 4—1 shows private consumption expenditures on health and medical care by year. According to the Bank of Korea, out of pocket expenditures on health and medical care increased by 0.1% annually, from 2.3% in 1960 to 3.3% in 1973. It reached 3.6% in 1974. Huh's study[14] in 1972 reported 4.0% as the rate of medical care expenditures to monthly household income (see table 4—5). This seems to be a more realistic finding as this study concentrated on only medical care expenditures for its study objective, while other studies conducted by the Economic Planning Board and the Bank of Korea included other factors.

Table 4—2 shows the estimates of annual urban and rural household expenditures for health and medical care. Medical care expenditures for the urban family exceed those of the rural family. In 1973, urban households spent 2.6% of their income on health care, while rural households spent 2.5%. These are markedly under-estimated if it is compared to the finding of table 4—1(3.3%). This results partially from a mistake in the household expenditures survey of the Economic Planning Board, in which a certain income group, defined as those with a monthly income of 200,000 won or more were excluded in the urban areas.

It is interesting to see the difference among the estimates done by the Economic Planning Board, Ministry of Agriculture, and the Bank of Korea (see table 4—1 & 4—2). Table 4—1 shows the Bank of Korea data, 111.1 billion won in 1973. Table 4—2 shows medical care expenditures by area, 13,080 won per urban household and 11,581 won per rural household. If these are multiplied by the respective number of households, then the total private health expenditures result in 76.9 billion won, which is under-estimated by 30% compared with the Bank of Korea's study data. Caution should be used in the interpretation of household medical expense data.

Table 4—3 shows medical care expenditures by type of care. The outpatient expenses per person increased from 77 won in rural areas in 1959, to 912 won[14] nationwide in 1972.

331

Kang's study[9] reports an average of 544 won per month, and 6,528 won per year. This study is not appropriate for comparison because it dealt only with the faculty of Yonsei University who could be regarded as middle and upper class in Korea. A noteable difference is reported between the study of Koje Island[28] and that of Gangwha Christ King Clinic[27]. In 1973, the former reports 780 won per outpatient, and the latter 2,555 won. Other studies show the following results in 1973: Huh's 1,690 won[15], Kang's 4,352 won[9], Lee's 3,398 won[8], and Lee's 1,443 won[5].

Inpatient expenses per treated case vary greatly according to study area. Kang presents 69,102 won[9] in urban areas, Lee[8] and Lee[5] present 10,313 won and 3,178 won in rural areas respectively. Kim[1] fails to distinguish between inpatient and outpatient expenses.

In 1973, the cost for drug store visits per treated case ranged from 720 won[8] and 765 won[5] in rural areas, to 1,261 won in urban areas. It was equivalent to one third to a half of outpatient expenses in terms of per patient and per treated case. It cost 1,000 won to receive medical care at the health centers.[5, 15] This was almost equal to the expenses for drug store utilization, and two thirds of outpatient expenses. Visits to herb drug-store cost twice more than those to private clinics.[15] A substantial amount of money was spent for folk therapies and superstitious remedies, although the number of users was not large. This suggests the necessity to develop some adequate measures to induce the users of folk therapy to utilize modern medical care.

Table 4—4 shows medical care expenditures by sex. The male spent a little more than the female in terms of per patient expenditures except in the study by the Social Security Commission[23] and by Huh[15]. The male also spent a little more than the female in terms of per treated case expenditures except in the study by Social Security Commission[23], by Yu[2], and by Lee[5]. However, more information is required before it is possible to conclude that the female spent more than the male in terms of per capita expenditures, because studies are equally divided concerning this information. The female obviously spent more than the male if the expenses connected with normal pregnancy and delivery are included.

Medical care expenditures per patient per year are only one and half times as much as those per patient per month.[8] This implies that annual medical care expenditures per patient are under-estimated if it is assumed that a patient gets sick twice a year. Furthermore, medical care expenditures per person per year are only six to seven times as much as those reported per person per month[8, 29] instead of twelve times as much. Lee ascribes the differences to the loss of memory concerning medical care utilization and expenditures.[8] Some researchers fail to recognize that data on expenditures for medical care generally involve a time element, -what was paid out for medical care in a week, a month, a year, or in the course of an illness, during a hospital stay, or throughout a period of rehabilitation.* Thus, careful consideration must be used when annual expenditure figures are quoted.

Table 4—5 shows medical care expenditures by monthly income. According to Jun's study

* USDHEW, PHS, United States Statistics on Medical Economics, 1954, p. 42.

37

in 1964, medical care expenditures increased proportionally to the income.[17] According to Huh's study in 1972, four percent of the total monthly household income was spent for health and medical care, and the urban family spent a higher proportion of their income for medical care than the rural.

Table 4—6 shows medical care expenditures by occupation. Because researchers used different job classification systems, minor adjustments were necessary for regrouping. It is nearly impossible to identify any significant expenditure differences in terms of occupation.

Table 4—7 shows medical care expenditures by area. Metropolitan people generally spent more than any others. In metropolitan areas, it cost 2,582 won per household per month[14], and 1,905 won per person per month[15]. Health plan members in a rural area (Okgu) spent more on medical care than non-members. According to Lee[11], it cost 3,235 won per enrolled household per month, and 526 won per enrolled member per month, which were higher than the expenditures in other rural areas. City-dwellers utually spent more than rural-dwellers in all age group, and people in medium size cities spent more than those in small cities.

Table 4—8 shows medical care expenditures by age. It increases proportionally with age in terms of cost per patient, per episode of illness, per treated case, per person, and per treated day. For example, those in their fifties spent 42% more for health and medical care per treated case than those in their twenties[21]. This implicitly indicates that the older ages are more likely to suffer from major serious illnesses. Lee offers the same explanation for the finding that the aged are hospitalized more frequently than the young.[8] The age group under 10 spent the least for medical care except for Cho's[16] and Huh's[14] study in 1972 which reported different findings.

Table 4—9 shows medical care expenditures by the International Classification of Diseases and Injuries. The findings are so varied that interpretation is quite difficult. For instance, diseases of the circulatory system were the leading cause of medical care expenditures in Huh's study in 1974.[21] His other studies reported accidents as the leading expenditure cause in 1972[14], and diseases of blood and blood-forming organs were the leading expenditure cause in 1973[15]. Lee indicated diseases of the genito-urinary system as a leading item[8]. Such results might be excused despite its variability if it is understood that the diagnoses were obtained from interviews with respondents. It should be mentioned that the value of such information is doubtful in planning for health services.

Table 4—10 shows the composition of household medical care expenditures. Generally, medical care expenditures consist of direct payment and indirect expenses. The former refers to physician fees, fees for laboratory examinations, inpatient expenses, and the cost of drugs. The latter refers to the expenditures for material and supply purchasing, nursing services, and transportation. Three studies reveal that the rate between direct payment and indirect expenses is 80 per cent to 20 per cent.

Table 4—11 shows the composition of indirect medical care expenditures in percentages. Nursing care is 40 per cent of the total indirect expenses, purchasing material and supplies 35 per cent, and the remaing one fourth for transportation.

337

Table 4—12 shows the estimates of gross national health expenditures. The total amount of national health expenditures was 191.2 billion won in 1974, which was three times the expenditures of 1970. The national health expenitures consisted of 21 billion won by the public sector (11%), and of 170 billion won by the private sector (89%). The proportion of the Ministry of Health and Social Affairs' expenditures to the gross national health expenditures decreased from 3.6% in 1970 to 2.3% in 1974. These figures show that the Korean health care system is heavily dependent upon the private sector in the financial structure. In 1970, 48.2% of the public expenditures came from the central government, and the remaining 51.8%, came from the local government. In 1974, the proportion of the provision from local governments increased to 54.7%. In other words, the public sources are increasingly local. The percentage of national health expenditures to the GNP climbed from 2.5% in 1970 to 2.8% in 1974. Health and medical care expenditures per capita increased from 2,060 won in 1970 to 5,713 won in 1974. The percentage of private consumption expenditures for medical care compared to gross national health expenditures increased from 82.3% in 1970 to 87.9% in 1974.

Table 4—13 shows health expenditures by province. It shows a wide range of local health expenditures per capita among the provinces. Kangwon Province spent the most, 590 won per capita: and Chollanam Province spent the least, 274 won per capita. The local government's average per capita health expenditures amounted to 386 won in 1973.

Table 4—14 shows the estimates of local government's health expenditures. It is a little more than 5.0% of the total general accounts of the local governments. Seoul, Busan and the guns spend a much higher proportion of their resources on health and medical care than any other cities.

Table 4—15 shows the prediction of gross national health expenditures, 1975-1981. These figures were provided by the Finance Subcommittee of the Health Sector Task Force for the Fourth 5-Year Economic Development Plan, ROK. They assumed that national health expenditure was solely a function of the GNP.

1) It is predicted that if the proportion of national health expenditures to GNP remain at 2.8%, the gross national health expenditures will increase from 250 billion won in 1975 to 662 billion won in 1981, the final year of the Fourth 5-Year Development Period.
2) It is predicted that if the rate of national health expenditures to GNP increases annually by 0.1% to 3.5% in 1981, the gross national health expenditures will increase from 259 billion won in 1975 to 828 billion won in 1981.
3) It is predicted that the private consumption expenditures on health and medical care will increase from 213 billion won in 1975 to 583 billion won in 1981, if the income elasticity of private consumption expenditures remains at 1.036.
4) It is predicted that if the local government's per capita health expenditures of four provinces (Kyunggi, Choongnam, Chunnam, Kyungnam) and Seoul which fall below the national average of 386 won increase to 386 won, then, as much as 1.2 billion won in additional funds will be required.

It is unfortunate that data are not available for personal health care expenses by

334

type of expenditures, such as hospitalization, physician services, dental care, prescribed drugs, X-ray and laboratory examination, and surgical services.

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335

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Ⅲ. Implications And Recommendations For Health Planning Activities

Planning health services requires much information on the existing health status of the people to be served. In Korea, such data are available only on a limited basis and are not collated with the goal of utilization by planners and administrators. Health professionals well acknowledge the fact that it is very difficult to measure the level of health status, but it is an indispensable component in planning health services.

Several end-results are frequently used to define the level of people's health status. They are expressed in terms of mortality, morbidity, disability, degree of satisfaction, etc.. More immediate, but not less important, is the data relative to the health service process directly influencing the end results. These are, for example, health service utilization and health care expenditure data. The intent of this study is to collect this information and address some of the practical problems related to health services data.

336

The quality of data was found to be a big problem in practical use. Thus, the original attempt to provide representative values for each item was not satisfactorily achieved owing to the sizeable differences in the range of data. This is particularly remarkable in morbidity data. The following reasons may explain the differences.

1) The definition of morbid conditions was not operationalized. Few studies specified the operational definition of morbid conditions. Therefore, most data were obtained from the response to a general question, such as "Were any of your family sick recently?"

2) Sample errors might be substantial. Most studies did not seem to pay much attention to sampling design, which is very evident from the fact that few studies discussed the actual sampling errors. There is also no way of knowing if sampling specialists were consulted.

3) The roles and functions of interviewers, mostly selected from among myon health workers, seemed to vary greatly in each study. Interviewers ought to be selected, trained, and supervised in an appropriate way. Otherwise, the study biases would be enormous. It is most desireable to have professional interviewers in order to help eliminate and standardize interviewer errors.

4) Questionnaire errors might be substantial. Few studies, to out surprise, attached the original questionnaires. Thus, it is hardly possible to analyze the survey instrument itself.

5) There is no way of knowing the magnitude of response errors. As it is difficult to meet all the family members, the wife of a household was usually selected for the interview. It is well-known that the use of proxy respondents not only reduced the total amount of illness, utilization and expenditures, but also affected the proportions of the different types of conditions reported.

6) Diagnostic inaccuracy should be considered. This is unavoidable in health interview surveys, as the measurement of perceived illness refers to the interviewee's subjective estimation of his or her health status. Therefore, it is essential to conduct a health examination study and medical record examination in order to compare the results.

7) Minor, but significant, errors occur during calculation and tabulation. For example, there is no uniformity in counting the multi-diagnosis cases. Researchers often fail to distinguish the rates between per person and per spell of illness.

8) The government statistics are markedly under-reported. This problem is openly acknowledged by health professionals. These are but a few of the problems encountered during the study.

It is very difficult to set normal figures if we considered a few of the above constraints. It seems to be very worthwhile, however, to set normal ranges of values for the purpose of planning health services, although much has been written about the fact that such normal ranges are open to debate. After the experience of investigating the existing literature, the authors strongly urge 1) the establishment of national norms on the measurement of diseases, medical care utilization, and expenditures, and 2) the standardization of survey research instruments for morbidity, utilization, and expenditures

study. These things must be done before conducting a national health survey. We believe that several small group conferences or workshops are sufficient for that purpose.

This survey shows that the mortality rates are declining in terms of the crude death rate and infant mortality rate. Life expectancy increased from 52.6 in 1955 to 61.9 in 1966. However, mortality data and life expectancy cannot, in and of themselves, be regarded as health status indicators. In other words, the health status of people may not be proportional to the increasing average life expectancy and the decreasing mortality rate, although the two indicators do indicate a marked improvement of the health status.

Meanwhile, morbidity data fails to show any definite annual trend, except that official statistics indicate most acute communicable diseases are decreasing. Some people argue that the general morbidity rate will increase, owing to the fact that the number of people in the old age group and disadvantaged infants who have survived due to modern medical technology, are greatly increasing. Furthermore, people are more likely to be exposed to hazardous environments. Though the official statistics indicate the incidence rates of acute communicable diseases are rapidly diminishing except for typhoid fever, we believe still that a higher priority in budgetary allocations should be given to the complete eradication of those preventable diseases in order to promote the health status of the country. The validity of giving a higher budgetary priority to eradicating infectious diseases, becomes more apparent when remembering the under-reporting of government statistics. The policy maker must also consider the fact that the prevalence rate of chronic conditions is much higher than the incidence rate of acute diseases. This represents the trend of an increasing aged population. Thus, appropriate preventive and curative measures should be explored to decrease senile degenerative conditions and to minimize their ill effects.

Four aspects of health services utilization must be, at least, considered with respect to health planning activities.

1) Medical care is inaccessible to many people. Some studies suggests that 75 per cent of the rural population are beyond the reach of modern medical services. This is currently an important inequity issue in the health policy area. It is obvious that no health policy will be successful without the development of an effective health care delivery system that can ease the tremendous amount of unmet need for medical care.

2) All studies agree that the drug store is the predominant source of medical care, ranging from 50% to 80%. It is a well-known aspect of health service utilization in Korea, which does not seem easily amenable to any sort of public control for the time being. However, a serious government decision is called for: to either continue to allow pharmacists to fulfill this role but provide better training for the pharmacists, or to distinguish their role from doctors by enforcing strict regulations. Unless appropriate financing mechanisms for physicians' medical care are made available to consumers in an acceptable fashion, it is hardly possible to change this utilization behavior.

3) One study conducted in rural areas reveals that two thirds of inpatient care occur in private clinics. In other words, this denotes that private clinics are operating as small-scale independent units. The advantages of economy of scale and inter-clinic

330

communication cannot be obtained with the cottage style of providing services. It is particularly difficult to control the quality of care provided at the independent private clinics, and it appears the government has no intention of controlling them immediately.

4) As sources of care, a considerable number of people resort to folk therapies and superstitious remedies. Some measures need be developed to convince them of the benefit of using modern medical care, and to thus minimize such undersirable expenditures.

Very little has been written about the national health expenditures. Total national health expenditures increased from 64.7 billion won in 1970 to 191.2 billion won in 1974, or from 2.5% to 2.8% of the GNP. By the most important reason for the increase in expenditures for personal health care seems to be price increases, and not the greater utilization of services or the introduction of new medical techniques.

The proportion of direct payment among total private consumption expenditures for health and medical care increased from 2.3% in 1970 to 3.5% in 1974. One study showed that monthly medical care expenditures consisted of 4% of the monthly household income in 1972. Visits to the herb drug stores cost twice as much as visits to private clinics. Health and medical care expenditures per capita soared from 2,000 won in 1970 to 5,700 won in 1974. Some people argued that these numbers were markedly under-estimated, owing to the fact that the source of data failed to include the income group, defined as those with a monthly income of 200,000 won or more. However, it is not known how much the figures were affected by excluding this group. Quite incidentally, the Social Security Subcommittee of Health Sector Task Force used 5,611 won in 1975 as the baseline to forecast social insurance expenditures.

One of the most important findings was that 89% of the gross national health expenditures in 1974 came from out of pocket expenditures by the private sector. The public sector spent only 11%. This represents the overwhelming financial dependence on the private sector. The proportion of expenditures from the local government increased to 54.7% in 1974. The role of the central government in providing financial support declined slightly. It is our conviction that the central government must increase its share in national health expenditures in order to assume the key role in restructuring the Korean health services system.

The study also shows the prediction of national health expenditures during the Fouth 5-Year Development Period, with the assumption that national health expenditures are solely the function of the GNP. The maximum estimate is 827.8 billion won in 1981 which is 3.2 times the total expenditures in 1975. National spending policy must be meticulously planned so that the huge amounts of precious resources are rationally allocated.

Planning health services should be based on sound data which are obtained from well-designed scientific research. It is our feeling that the demand for such data is rapidly increasing as the Korean Government tries to reorganize its health service delivery system. Therefore, more attention should be placed on the production, conservation, and retrieval of such data. The followings are a list of information either completely lacking or requiring further elaborations for planning health services in Korea.

339

1. Mortality Data

1) Infant Mortality Rate: Social Class, Availability of Care, Geographical Area.
2) Neonatal and Post-neonatal Mortality Rate: Social Class, Availablity of Care, Geographical Area.
3) Maternal Mortality Rate: Parity, Availability of Care, Age, Area.
4) Curde Death Rate: Age, Sex, Area, Occupation.
5) Cause Specific Mortality Rate: Age, Sex, Area, Occupation.

2. Morbidity Data

1) Prevalence Rate: Age, Sex, Area, Income, Month, Education, Occupation.
2) Incidence Rate: Age, Sex, Area, Income, Month, Education, Occupation.
3) Disability Rate: Age, Sex, Area, Income, Month, Education, Occupation.
4) Days Activity Restricted: Age, Sex, Area, Income, Acute Conditions, Chronic Conditions.
5) Cause Specific Morbidity Rate: Age, Sex, Area, Income, Occupation.
6) Comparison between Acute and Chronic Conditions.
7) Degree of Notification in Communicable Diseases.

3. Utilization Data

1) Age, Sex, Income, Area, Educaton, and Insured Status Specific Utilization Rate: Physician Visits, Hospitalization, Dental Care, Drugstores, Health Centers, Herb Medicine, and Folk Therapy and superstition.
2) Nature of Utilization: Preventive vs Curative.
3) Prenatal Care: Education of Mothers, Income, Insured Status, Area.
4) Referral Patterns.
5) Average Length of Stay in Hospitalization.

4. Expenditure Data

1) Total Health Expenditures: Public vs Private, Trends, Source of Fund, GNP, Method of Payment.
2) Type of Expenditures: Hospitalization, Physician Visits, Dental Care, Drugs, Research, Construction, Hospital Daily Service.
3) Medical Care Price Index: Trends, Consumer Price Index.
4) Hospital Cost: Trends, Charges, Size of Hospital.
5) Per Capita Expenditures: Type of Care, Age, Sex, Area.
6) Drug Industry: Trends, Profit, Drug Price.

340

<抄 錄>

人口의 死亡率, 罹患率, 醫療利用度 및 醫療費支出에 關한 分析

—國家保健企劃을 위한 基礎資料의 考察—

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科學的인 方法에 의해서 얻어진 信憑性있는 資料의 획득은 保健事業의 企劃 및 執行過程의 必須要件이 된다. 그러나 정작 쓸만한 價値가 있는 資料는 그렇게 흔히지 않다. 이는 國民保健狀態에 대한 國家水準에서의 調査制度가 體系的으로 導入되어 있지 않은 우리 現實에서 避치 못할 일이다.

따라서 有益한 資料가 稀貴할 뿐아니라, 설사 調査된 자료가 있다 하더라도 일부는 妥當性을 缺如한 것도 있으며, 거의 대부분이 整理되지 않은채 散在해 있어서 接近이 容易하지 않거나, 일부에서는 똑같은 일을 불필요하게 反復해야 하는 경우가 許多하다.

本 調査는 解放後 現在까지의 既存資料를 蒐集하여 保健事業의 企劃 및 執行過程에 基礎資料로 이용할 수 있도록 하기 위하여 既存論文 約 300編을 分析한 후 本文에서와 같은 43個項目으로 分類製表했다.

1. 死亡率 資料

死亡率을 算出하는데 있어 資料의 入手源은 크게 3가지로 나뉜다. 즉 人口動態와 센서스 資料를 利用한 경우와 死亡申告書나 死亡診斷書의 分析과 直接面接에 의한 調査 등이다.

1) 우리나라의 人口 1,000名當 粗死亡率은 年次的 低下趨勢를 보이나, 資料源에 따라 差異가 있다. 人口 센서스 資料에서 算出된 値가 가장 낮으며, 다음은 死亡申告書에 의한 조사이고, 直接面接에 의한 調査結果가 가장 높은 値를 보인다. 그러나 人口 센서스 資料에 生命表의 死亡水準을 적용하여 推定한 粗死亡率은 훨씬 더 높다.

2) 粗死亡率의 地域間 差異는 서울地域이 農村地域보다 대부분 낮으며, 그 差는 대략 人口 1,000名當 2~3 程度로서, 最近에 調査된 資料는 서울에서 人口 1,000名當 5前後였으며 農村地域에서는 7~8 程度였다.

3) 最近의 標本調査에 의한 嬰兒死亡率은 都市 특히 서울地域에서는 出生 1,000名當 30~35 農漁村地域에서는 50 前後였다.

4) 年齡 및 性別 死亡率은 嬰兒期를 지나면 급격히 低下되어 낮은 死亡率을 유지하다가 40代부터 계속적으로 높아진다. 性別로는 어느 年齡層에서나 女子보다 男子의 死亡率이 높으나, 특히 老齡일수록 그 差가 크다. 전체적으로는 人口 1,000名當 1~2의 差가 있다.

5) 平均壽命도 점차 延長되어 최근의 결과는 男子 60歲, 女子 64歲 前後이다.

6) 母性死亡率에 대한 資料는 모두 病院에서 調査된 것으로 一般化가 不可能하며 큰 差異를 보였다.

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341

7) 死亡原因別 死亡率의 資料는 過去에 비해 感染症에 의한 死亡率은 줄어들었으나 아직도 높은 상태며 事故死 및 뇌혈관질환에 의한 사망률은 증가경향을 보인다.

2. 罹患率 資料

資料間의 幅이 너무 넓어서 意圖했던 代表値를 얻어내기가 무척 어려웠다. 이에는 다음과 같은 要因이 作用하는 것 같다.

즉 疾病에 대한 客觀的 作業用槪念이 定義되어 있지 않으며, 標本誤差가 상당하고, 地域選定에 대한 기준이 명확치 않아서 調査地域에 따른 差異가 많이 생기고 있다. 또한 現地調査員들의 訓練監督 및 그들의 調査敎量에 대한 基準이 設定되어 있지 않아서 面接人誤差가 생길 여지가 많으며, 診斷 그 자체의 正確性 缺如 및 應答誤差 그리고 設問紙자체의 誤差등을 예로 들 수 있다.

1) 年齡別 有病率은 生産層人口인 10代와 40代 사이에서 낮은 U型 分布를 보인다.

2) 性別 月間 有病率은 女子가 男子보다 약간 더 높다. 대체적으로 인구 1,000名當 160 정도였고 男女間 差異는 15~20 정도였다.

3) 地域別 有病率은 本資料만으로 結論내리기 어려우나, 대체적으로 農村地域의 有病率이 都市보다 약간 낮은 것으로 나타났다.

4) 年間 人口 1人當 罹病回數는 1.9回 내지 2回 정도였고, 月間 活動制限日數는 住民 1人當 0.5일, 患者 1人當 3.4일 정도였다.

5) 調査末日의 有病率이나 發病率은 調査初日의 그것보다 월등히 높았으며, 慢性疾患의 有病率은 急性疾患의 發病率보다 훨씬 높았다.

6) 原因別 有病率은 冬季에는 呼吸器系 疾患이 제일 많았고, 夏季에는 消化器系 疾患이 제일 많았다. 장티브스를 제외한 모든 急性傳染病의 發生率은 급격히 감소하고 있다.

3. 醫療利用度 資料

醫療利用度 關係資料는 罹患率 관계자료나 醫療費支出 關係資料보다 客觀性이 높고, 被面接人이 더욱 잘 기억할 수 있는 項目이어서 保健企劃活動에 많이 사용되고 있다. 그러나 대부분의 硏究資料가 人口學的인 面만 다루고 있어서 醫療利用에 관한 硏究는 극히 初步段階에 머물고 있다.

1) 醫療機關 利用度를 性別로 보면 藥局訪問을 제외한 모든 경우에 男子의 利用頻度가 女子보다 높았다.

2) 保健所와 漢方醫療는 農村住民이, 醫院利用과 入院은 都市住民에서 높다. 그러나 가장 地域差가 현저했던 入院의 경우에도 農村地域에서 人口 1,000名當 1963年에 2.8회였으나, 1974年에 6.2회로 增加하고 있어서, 國民의 醫療利用度가 크게 伸張되었음을 알 수 있다.

3) 모든 조사가 藥局이 韓國人의 50% 이상에서 主된 醫療利用源이 되고 있음을 指摘하고 있다. 이는 都市居住者에서 더욱 현저하다.

4) 齒科醫師 利用度는 醫師利用度의 1/50에 해당하는 低利用率을 보이며, 대개의 調査에서 전체 報告된 自覺症勢 基準의 醫療要求量의 50% 이상이 未充足醫療임을 指摘하고 있다.

5) 年齡이 증가할수록 醫療利用度가 증가했으며, 入院, 醫院 및 齒醫院 利用度와 敎育程度와는 서로 正相關關係에 있고, 漢方醫療 利用度와 敎育程度와는 逆相關關係를 보이고 있다.

6) 患者在院期間은 1966年의 16.7日에서 1973年의 12.4日로 감소하고 있다. 示範醫療保險事

342

業의 資料에 의하면, 加入者의 平均在院期間은 10日이하로 나타나 있다.

7) 產母의 敎育程度와 地理的條件이 分娩場所選定에 미치는 영향은 지대했으며, 農村地域의 경우 90%의 分娩이 아직도 家庭에서 행해지고 있다.

4. 保健醫療費支出 資料

1) 현재 파악이 가능한 우리나라 國民總保健費 推計値는 1974年에 1,912億원으로 1970年의 647億원에 비하여 약 3배가 增加했다. 國民總保健費의 國民總生產에 대한 比率은 1970年의 2.5%에서 1974年의 2.8%로 약간 上昇하고 있다.

2) 住民 1人當 保健醫療費는 1970年에 2,000원이던 것이 1974年에 와서는 5,700원으로 上昇했다.

3) 國民總保健費 중에서 公共費支出은 1974年에 210億원으로 전체의 11%에 불과했으며, 民間部門支出은 1,702億원으로 89%를 占하고 있어서 保健醫療費支出을 構造的으로 볼때 民間部門依存度가 아주 높음을 알 수 있다. 한편 公共保健費의 構成은 1970年에 中央政府가 48.2%, 地方政府가 51.8%이던 것이 1974年에 와서는 中央政府가 45.3%, 地方政府가 54.7%로 變하고 있다.

4) 個人 醫療費의 民間總消費支出에 관한 比率은 1970年의 2.3%에서 1974年의 3.5%로 增加했다.

5) 1974年의 國民總保健費/GNP 比率인 2.8%를 계속 維持한다고 가정하면 總保健費는 1975年의 2,500億원에서 1981年에는 6,620億원으로 할 것이다.

6) 年間 1人當 外來醫療費는 1959年의 農村値인 77원에 비해서 1972年의 全國値는 912원으로 11.8배 增加했다. (이는 不變價格이 아님)

7) 1973年의 治療件當 入院費는 都市地域이 最高 69,102원, 農村地域은 最高 10,313원으로 地域間의 차이가 심하다. 1973年의 藥局利用의 경우, 治療件當 藥값은 農村地域이 765원, 都市地域은 1,261원인데, 患者當 및 治療件當 藥局利用費는 外來患者治療費의 1/2 내지 2/3에 해당한다.

8) 漢藥局 利用에 대한 費用이 外來治療費의 2배 이상되었고, 비록 利用者數는 적지만 民俗療法과 迷信行爲에 의한 것도 상당한 比重을 차지하고 있다.

9) 家計 月平均收入의 약 4%가 保健醫療費였는데 都市家計의 保健醫療費支出 比率이 農村家計보다 더 높았다.

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343

HEALTH SECTOR PLAN

- For the Fourth Five Year Economic Development Plan -

Republic of Korea

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344

HEALTH SECTOR PROGRAM (I)

under

4th Five-Year Economic Development Plan

1 9 7 6

Working Planning Team on Health-Social Security

345

Education Charter

On the 4th Health-Social Security Planning

December 1976

Minister of the Health and Social Affairs

Foreword

December 1976

Park Sang-Yol,
Chief,
Health-Social Security Sector
Working Planning Team

Chief,
Planning-Control Office,
Health-Social Affairs Ministry

346

Contents

Chapter 1. Background and Present Status of Health Sector 1

Section 1. Historical Background of Health Sector 1

Section 2. Present Status of Public Health 3

Chapter 2. Direction and Tasks of Major Policies 11

Chapter 3. Sector-by-Sector Planning 16

Section 1. Systematization and Expansion of Health-Medical Care Network 16

Section 2. Improvement of Health-Care Manpower Supply 30

Section 3. Promotion of Production Foundation for Quality Medicines 47

Section 4. Adjustment and Improvement of Health Statistics 50

Section 5. Improvement of Mother-Child Health 55

Section 6. Stepped-up Disease Control and Preventive Activities 65

Section 7. Efficient Demonstration of Health Pilot Projects 87

Section 8. Improvement of Environmental Sanitation 87

Section 9. Extensive Conservation of Environment 93

Chapter 4. Principal Forecast for 1981 99

Appendix Tables 99

347

Contents of Charts

1. International Comparison of Maternity and Infant Mortality Rates 3

2. International Comparison of Medical Doctors and Hospital Beds as Against Populations 6

3. Major Policy System 11

4. Implementation System for Policy 15

5. Functional System of Medical Organizations 23

6. Process of Formulation of Health-Care Manpower Supply and Demand Plan 33

7. Organization of Information System on Health-Related Matters 54

348

Contants of Tables

1. Goals and Strategies of Development Plans 2
2. Mother-child Health and Public Nutrition Conditions 4
3. Loss of Manpower from Acute and Chronic Contagious Diseases 4
4. Composition of Medical Personnel 7
5. International Comparison of Medical Personnel 7
6. Present Status of Health-Medical Care Costs 9
7. Basic Environmental Facilities and Status of Environmental Pollution 10
8. Major Targets 13
9. Number of Medical Organizations by Year 17
10. Distribution of Hospital Beds by Region 18
11. Status of Medical Doctors in Health Care Centers and Branches 19
12. Hospital Bed Use Rates in National, Public Hospitals 20
13. Total Health-Medical Care Expenditures (1970-1974) 21
14. Replenishment and Existing Number of Health Care Center Personnel 24
15. Authorized and Actual Number of Health Care Center Branch Personnel 25
16. Building Construction and Addition Plans 25
17. Equipment Expansion Plan 26

349

18. Plan for Improvement of Equipment and Facilities in City and Province Government-run Hospitals 27

19. Hospital Bed Increase Plan for Psychotics and Tuberculosis Patients 28

20. Hospital Bed Increase in Private Hospitals and Clinics 30

21. Health-Medical Care Supply and Demand Forecast 335

22. Demand and Supply Increase Rates During Forecast Period 36

23. Supply and Demand Plan by Job Type 37

24. Number of Pharmaceutical Manufacturers and Items 47

25. Pharmaceuticals in Each Field of Efficacy 48

26. Evaluation of Pharmaceuticals by Year 48

27. Pharmaceutical Re-Evaluation Plan by Year 50

28. Improvement Plan for Surveys and Statistics 52

29. Computerization Plan for Control of Health-related Information 53

30. Population of Those Eligible for Mother-Child Health Projects (1975) 55

31. Comparison of Infant and Maternity Mortality Rates 56

32. Status of Childbirth Assistance 57

33. Status of Health Workers in Active Service 58

34. Annual Projects and Investments 59

35. Annual Target of Maternity and Infant Motarlity Rates 62

36. Annual Plan to Recruit Field Workers 63

37. Target of Safety Carriage Assistance During Period of Plan ... 64

38. Yearly Outbreak of Contagious Diseases 67

350

39. B.C.G. Vaccination Rate 73

40. Yearly Parasite Infestation Rate 77

41. Major Goals of Disease Control 80

42. Intensification of Preventive Vaccination and Examination of Germ-carriers 82

43. Strengthening of Testing Functions of Health Research Institutes and Quarantine Stations 83

44. Tuberculosis Control Target 84

45. Leprosy Control Project 85

46. Parasite Control Project 86

47. Present Status of Water Supply 88

48. Excrement Disposal Facilities in Cities (1976) 89

49. Status of Environmental Pollution 94

50. Plan for Environmental Pollution Measurement Network and Conservation of Environment 97

51. Development of Anti-pollution Know-how 98

52. Crematory and Charnel House Construction Plan 98

351

Chapter 1. Background and Present Status of Health Sector

Section 1. Historical Background of Health Sector

The level of the health of the people is determined not only by the natural environment but also by the counteraction of various conditions in a given society. Thus the primary target of the health program is that the people should be kept healthy by influencing such a relationship.

The national policy of our country has been centered on economic development, as is underscored by the goals and development strategies (Ref. Table 1-1) the nation pursued in the course of implementing three five-year economic development plans starting in 1962.

However, as its goals, the fourth five-year economic development plan emphasizes "stable growth and social development," while the fifth five-year economic development plan is expected to underline "the building of the economic structure after that in advanced countries, and a full-dress push for the social development."

In this light, the time has come for the nation to act to lay solid ground for the lasting development of the health sector.

358

Table 1.

Goals and Strategies of Development Plans

	First Plan (1962 - 66)	2nd Plan (1967 - 71)	3rd Development Plan (1972 - 76)	4th Development Plan (1977 - 81)	5th Development Plan (1982 - 86)
Goals	Beginning of development era; Institutional ground-laying work	Pursuit of high economic growth; Industrialization	Development of industrial structure; balanced stable growth	Substantial growth; social development	Modeling of economic structure after that in advanced countries; full-dress social development
Development Strategies	Solution to major bottlenecks -- Investment in social overhead capital -- Promotion of basic industries -- Import-replacement of consumer goods	Foreign-oriented industrialization (Economic open-door system) — Export boost for consumer goods — Import-replacement of consumer goods and semi-finished goods — Expansion of social overhead capital	Growth, stability, balance — Development of rural economy — Construction of heavy and chemical industries — Exports of semi-finished goods and facility goods	Harmony between growth and efficiency — Strengthening of self-supporting structure of economy — Development of technology and labor-intensive industries — Strengthening of international competitive power through efficiency and technological reform — Promotion of social development and equilibrium — Stepped-up exports of facility goods	Maturity of economic structure and promotion of welfare — Pursuit of industrialization after advanced model (development of knowledge-and information-intensive industries) — Full-dress work on social development — Expansion of sanitation and distribution policy — Full-dress exports of plants

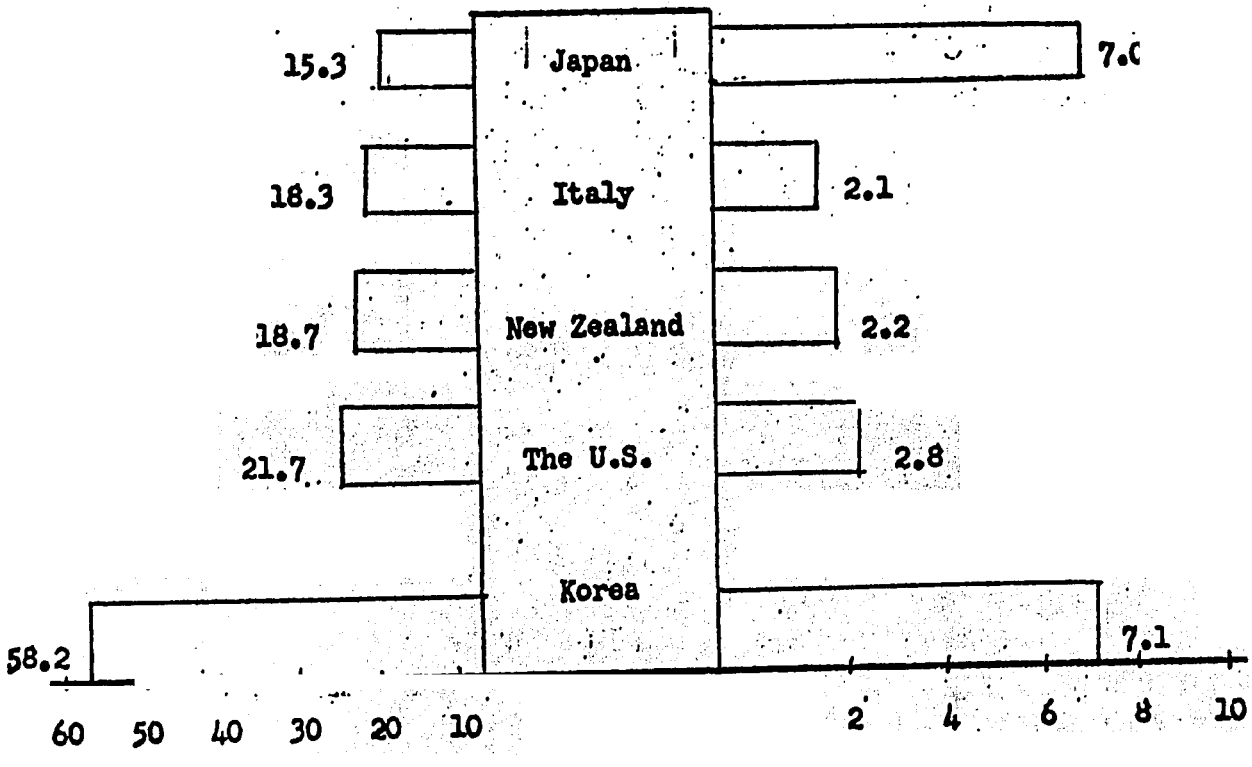
Section 2. Present Status of Public Health

2-1. Present Status of Health and Medical Care Service

Mother-child health and nutrition conditions are generally improving, but a far cry from those in advanced countries.

Infant and maternity mortality rates are still high, compared with foreign countries, while the intake of animal protein falls far short of the one-third desirable level of protein intake.

Chart 1. International Comparison of Maternity and Infant Mortality Rates



354

Table 2. Mother-child Health and Public Nutrition Conditions

	Unit	1970	1975
1) Infant mortality rate	Per 1,000 infants born	50 172	38
2) Maternity mortality rate	Per 1,000 persons	7.8 172	5.6
3) Protein intake (day/person)	g	73	76
4) Intake of animal protein (day/person)	g	11	14

As for diseases, the loss of manpower arising from tuberculosis and parasites is significant.

The rate of contracting tuberculosis has been on the decline, but the number of those showing positive reactions has been rather on the rise.

The rate of roundworm contraction has been declining, but the rate still exceeds 40 percent.

Table 3. Loss of Manpower from Acute and Chronic Contagious Diseases

	Unit	1970	1975
1) Tuberculosis			
A. Contraction rate	%	4.2	3.3
B. Population of infected persons	1,000 persons	1,112	949
C. Number of persons showing positive reactions	"	198	207
2) Parasites (Roundworms)			
A. Affection rate	%	55.6	44
B. Population of affected persons	1,000 persons	6,042	4,834

75

As for medical care services, the rate of the use of hospitals and clinics stood at only 31 percent in 1975, but the rate of use of hospital beds is generally low -- 58 percent in 1970 and 58.17 percent in 1975. The rate is especially low in hospitals run by city and provincial governments.

We believe, however, that the potential demand for medical care is high.

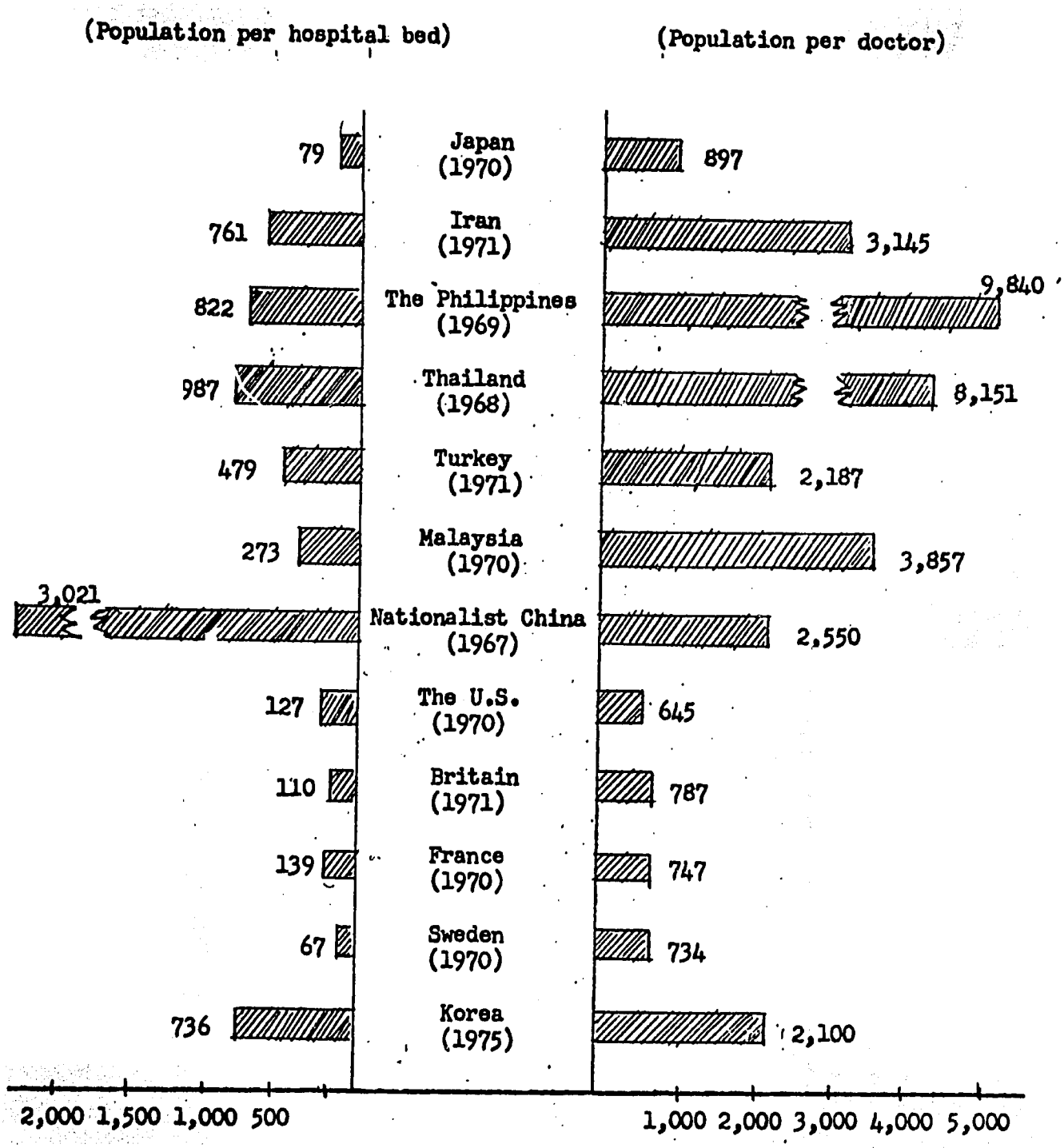
2-2. Medical Care Resources and Health and Medical Outlays

About 86 percent of medical doctors and 85 percent of medical facilities are concentrated in cities which account for only 48 percent of the total population.

Medical resources are scanty in rural communities, except for up (counties).

The number of medical doctors is not small, compared with those in countries which are economically on a par with our country. However, the number of hospital beds is small, showing an imbalance in the structure of the medical system in our country.

Chart 2. International Comparison of Medical Doctors and Hospital Beds as Against Populations



357

Regarding the composition of medical manpower by job type, the ratio of pharmacists to medical doctors is higher than that in foreign countries, while the ratio of midwives is very low.

Table 4. Composition of Medical Personnel

(Per 100 doctors)

	Unit	1970	1975
Dentists	Persond	14	17.4
Pharmacists	"	98	132
Nurse personnel	"	108	179.3
Nurses	"	97	87.3
Nurse aides	"	11	92.0
Midwives	"	41	13.2

(Based on usable manpower including those in the military)

Table 5. International Comparison of Medical Personnel

(Personnel for 100 doctors)

	Dentists	Pharmacists	Nurses
Korea	16	132	100.5*
Japan	32	55	236
Iran	21	35	109
The Philippines	12	9	131
Thailand	9	27	120
Turkey	21	21	114

358

	Dentists	Pharmacists	Nurses
Malaysia	11	8	352
Britain	22	22	267
The U.S.	32	39	326
France	31	47	272

* Includes nurses and midwives

The number of nurses in active service is smaller than that of doctors, a situation which is attributed to the fact that employment opportunities for nurses have been restricted due to the peculiar structure of the medical system.

But such a situation also suggests that there are disparities between the supply and demand for nurses, since it is impossible under our present medical system to produce enough qualified nurses.

The ratio of medical costs to the GNP rose from 2.5 percent in 1970 to 2.8 percent in 1975, while the ratio of health and medical outlays in the government budget rather declined.

Per capita spending for medical costs stood at 285 in 1974, with the year 1970 as 100. Considering the fact that the consumer price index reached 160 in 1974 (1970 = 100), that means that demand for medical care has risen and that the medical costs rose faster than those of commodity goods. (Table 1-6)

It is assumed, therefore, that the share of medical costs in home budgets will increase,

Table 6. Present Status of Health-Medical Care Costs

	Unit	1970	1975
1) Ratio of health-medical care spending to GNP	%	2.5	2.8
2) Ratio of health outlays to government budget	%	0.97	0.84
3) Medical cost index (per capita medical cost)	1970 = 100	100	285 74
4) Consumer price index (Seoul)	1970 = 100	100	160 74
5) Ratio of medical costs in family spending			
Cities	%	1.12 65	2.59
Countryside	%	2.95 65	3.34

2-3. Basic Environmental Facilities and Status of Environmental Pollution

As for basic environmental health facilities and environmental pollution, the water supply and sanitary disposal of excrement have been improved, but the general status is not satisfactory.

Air and water pollution has been deteriorating, although the level is below the danger level.

360

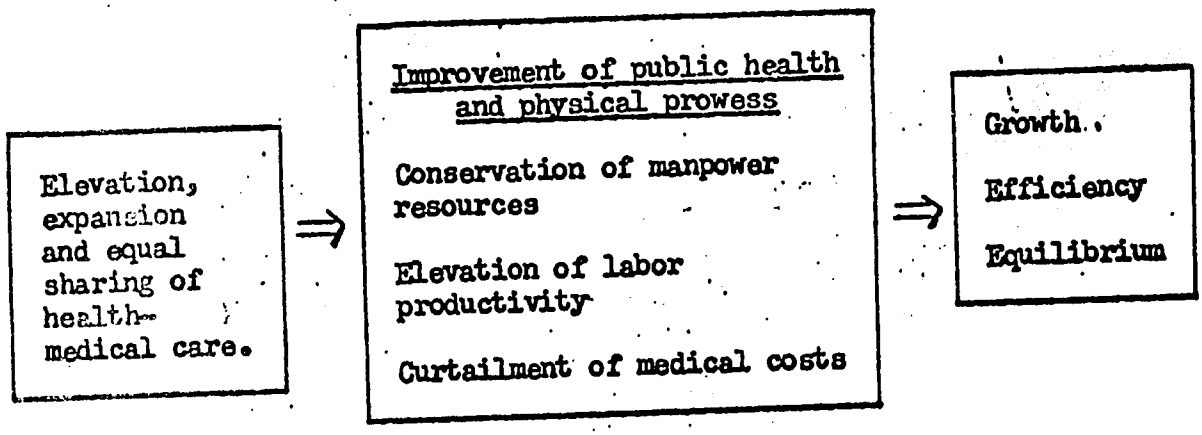
Table 7. Basic Environmental Facilities and Status of Environmental Pollution

	Unit	1970	1975
Sanitary water supply ratio	%	14	41
Ratio of sanitary excrement disposal	%		29.5
Cremation ratio (Seoul city)	%		20
Air pollution (SO_2)	ppm	0.038	0.049 "
Water pollution (BOD)	ppm		4.4 12

Chapter 2. Direction and Tasks of Major Policies

1. Direction of basic policy

Chart 3. Major policy system



2. Order of Priority of Investments

By target population

- Infants
- Rural dwellers
- Needy urban dwellers

By project

- Improvement of basic environmental sanitation
- Expansion of public medical care sector
- Stepped-up control of diseases amenable to prevention and treatment
- Protection of environment

362

3. Major policy goals:

- To establish an efficient medical delivery system for needy urban dwellers and rural inhabitants;
- To strengthen preventive health measures including control of recuperation and improvement of mother-child health;
- To expand the basic environmental facilities in the countryside and minimize industrial pollution;
- To expand and promote equal sharing of medical care services, and improve the environment.

4. Major policy tasks

4-1. Expansion of health and medical care infrastructure

- Systematization and expansion of health and medical care network;
- Improvement of supply of health care manpower
- Promotion of production foundation for quality medicines
- Adjustment and improvement of health statistics

4-2. Stepped-up control of public health

- Improvement of mother-child health
- Strengthening of disease control

4-3. Conservation and Improvement of Environment

- Improvement of environmental and sanitary facilities
- Conservation of environment

5. Major targets

Table 8. Major targets

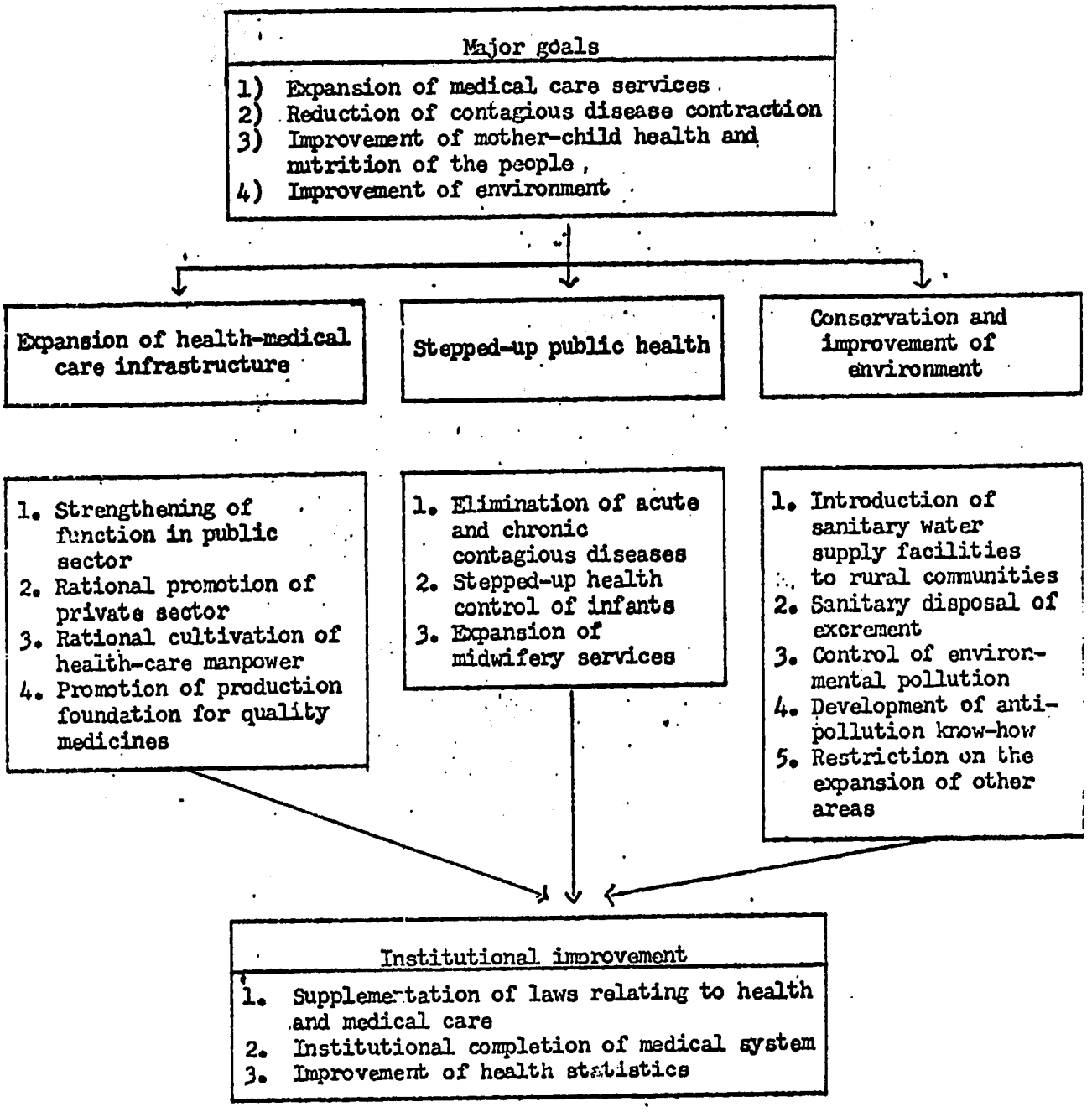
	Unit	1975	1981
1. Expansion of medical care services			
1) Hospital and clinic use ratio	%	31.3	50
2) City- and province government-run hospital bed use ratio	%	45	80
3) Urban concentration ratio of doctors	%	86	75
4) Urban concentration ratio of medical facilities	%	87	75
2. Reduction of contagious disease contraction			
1) Ratio of outbreak of acute contagious diseases	No. of cases per 100,000 persons	44.7	20
2) Parasite infestation ratio (as against total population)	%	44	15
3) Ratio of tuberculosis patients (as against total population)	%	3.3	1.5

364

	Unit	1975	1981
3. Improvement of mother-child health and nutrition of people			
1) Infant mortality rate	Per 1,000 persons	38	20
2) Maternity morality rate	Per 10,000 births	5.6	3.0
3) Calorie intake	Per adult/day (K cal)	2,567	2,630
4) Protein intake	Per adult/day (g)	76	87
5) Animal protein	Per adult/day (g)	14	31
4. Improvement of environment			
1) Sanitary water supply rate in countryside	%	41	100
2) Excrement disposal rate (35 cities)	%	29.5	96
3) Water pollution (BOD)	PPM	4.4	6.0
4) Air pollution (SO_2)	PPM	0.049	0.05

365

Chart 4. Implementation System for Policy



366

Chapter 3. Sector-by-Sector Planning

Section 1. Systematization and Expansion of Health-Medical Care Network

1. Present status

1-1. Hospital, clinic facilities

— The number of hospitals, clinics and dental clinics has been steadily on the rise, while no measurable change has been seen regarding other medical organizations.

Since 1973, the number of privately run hospitals has been on the decline, but this drop is not significant, because a lot of small-sized hospitals have turned into clinics due to the amendment of the Medical Care Law under which only medical juridical persons are allowed to open hospitals. The amendment, however, entailed more disadvantages than advantages for medical juridical persons, while no clear line has been drawn as to the standards of facilities of hospitals and clinics.

— Cities accommodate about 85 percent of the nation's medical organizations and hospital beds and about 77 percent of the clinic beds.

The number of hospital beds is roughly the same as that of beds in clinics, a situation which explains the fact that small-sized clinics from the mainstay of the nation's medical system.

Table 9. Number of Medical Organizations by Year

		1970	1971	1972	1973	1974	1975	'70-'75 annual average growth rate
Total		10,183	10,625	10,760	11,061	10,887	11,429	1.61
Hospitals	National, public	59	62	57	54	62	60	
	Private	109	217	223	154	115	113	
Clinics		5,402	5,700	5,796	5,993	6,028	6,111	2.5
Midwives		756	767	799	786	749	790	0.9
Dental division	Hospitals	1	2	3	3	3	3	
	Clinics	1,343	1,424	1,463	1,543	1,563	1,537	2.7
Herb doctors' clinics		2,443	2,443	2,419	2,528	2,367	2,415	

* Note: Some hospitals have been made into clinics in accordance with the modification of the standards of medical facilities under the revision of the pertinent law.

Table 10. Distribution of Hospital Beds by Region

	Pop. (1,000)	Gross total	Hospitals			Clinics	Midwives
			Total	National-public	Private		
Total	35,281	47,582	21,289	9,855	11,434	25,889	394
Cities	17,076	40,352	20,106	8,937	11,159	19,943	303
Ratio (%)	(48.4)	(84.8)	(94.4)	(90.8)	(97.6)	(77.0)	(76.9)
Rural communities	18,205	7,230	1,183	908	275	5,956	91
Ratio (%)	(51.6)	(15.2)	(5.6)	(9.2)	(2.4)	(23.0)	(23.1)

1-2. Health Care Centers and Branches

— Health care centers and branches have been unable to secure required personnel, and this situation has been becoming chronic.

The major function of the health care centers and branches is the diagnosis of patients and wide-ranging preventive activities. However, cooperation between the health care centers and branches and city and province government-run hospitals is not smooth, since the former are operated as part of projects involving cities and countries.

Especially, the branches of health care centers have a lot of difficulties in organization and manpower in health-care activities in regional community.

— Hospital bed use rates are generally low in hospitals run by city and province governments.

The overhall hospital bed use rate stood at 58 percent in 1974. But over two-thirds of national and public hospitals minus special wards such as mental and tuberculosis hospitals show less than 40 percent use rates.

In this light, measures should be taken to ensure efficient operation of the hospitals run by city and province governments.

Table 11. Status of Medical Doctors in Health Care Centers and Branches

(1975)

	Health-care center chiefs	Branch chiefs
Required personnel	198	1,336
Replenishment	129	640
Replenishment ratio (%)	65.2	47.9

370

.le 12. Hospital Bed Use Rates in National, Public Hospitals

(Excluding university hospitals)

Bed use ratio	No. of hospitals	Composition ratio (%)
Less than 20%	14	32
20% - 30%	14	32
30% - 50%	6	14
50% - 70%	6	14
More than 70%	4	8
Total	44	100

1-3. Health-Medical Care Cost?

— The share of health and medical care costs in the GNP is low. Especially, spending in the public sector is minimal. Although the absolute amount has risen in the public sector, the weight in the total health and medical care expenses has been on the decline.

371

Table 13. Total Health-Medical Care Expenditures (1970-1974)

(Unit: ₩100 million)

	1970	1971	1972	1973	1974
1. Expenditures in public sector [1]	106	147	165	181	214
(Composition ratio)	(16.4)	(18.2)	(15.4)	(13.8)	(11.2)
Central gov't agencies, national and public hospitals	47	73	76	82	95
Local self-governing agencies	59	74	89	99	119
2. Expenditures in private sector	540	659	908	1,127	1,712
(Composition ratio)	(83.6)	(81.8)	(84.6)	(86.2)	(89.8)
Individual spending	533	649	896	1,112	1,681
Medical organizations [2]	7	10	12	15	21
3. Total expenditures	646	806	1,073	1,308	1,916
(Composition ratio)	(100)	(100)	(100)	(100)	(100)
4. GNP	25,893	31,516	38,600	49,287	67,791
5. Population (1,000 persons)	31,435	31,828	32,360	32,905	33,459
6. Total expenditures/GNP (%)	2.5	2.6	2.8	2.7	2.8
7. Per capita health-medical care spending (in won)	2,053	2,532	3,316	3,975	5,726

372

Note: 1) Net spending in public sector
2) Including Tuberculosis Association, family planning associations, Parasite Extermination Association, and Korean institute for Family Planning.

Sources: 1. "Report on settlement account of expenditures and revenues," the Republic of Korea, 1970-1974

2. "Yearbook of Provincial Finance," Home Ministry, 1971-1975

3. "Industry and Labor," Office of Labor Affairs, No. 4, Vol. 8, 1974.

2. Problems

— Imbalance in the distribution of medical resources between cities and rural communities

— Irrationality in the standards of facilities of medical organizations at every level, and functional categorization

— Insufficient functions of health care centers and branches

— Inadequate operation of hospitals run by city and province governments

— Lack of policy to relocate privately run medical organization in provincial areas

3. Major goals

— Gradual adjustment and completion of medical delivery system

— Expansion of public medical organizations for rural communities and low-income people

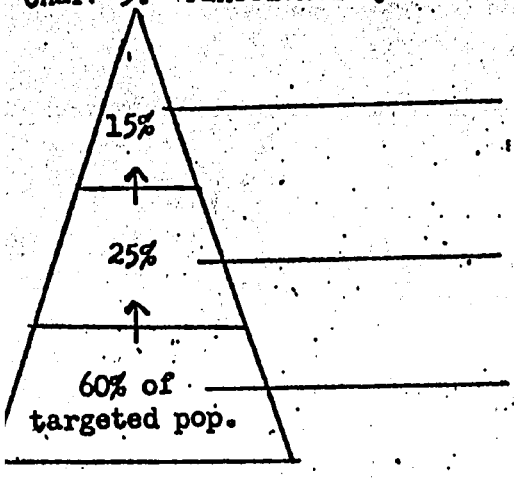
— Rational promotion of private medical sector

Objects

.. Qualitative and functional improvement of medical organizations, and the elevation of efficiency

377

Chart 5. Functional System of Medical Organizations



General hospitals, special hospitals (specialized medical care, and hospitalized treatment for patients afflicted with special diseases)

Public hospitals, privately run hospitals, individual clinics, health care centers (secondary care)

Health care centers, branches, individual clinics (primary care and preventive activities)

4-2. Expansion of Health Care Centers and Branches

4-2-1. Improvement of function of health care centers and branches

- Qualitative improvement of preventive health activities
- Cultivation of basic health care ability by strengthening the function of diagnosis
- Support of preventive health and diagnosis activities by strengthening testing function
- Expedition of scientific implementation of health projects by improving health statistical affairs
- Elevation of the efficiency of patient transportation by strengthening the ability of health care centers to move patients

4-2-2. Improvement of Management of Medical Personnel

- Rationalization of manpower management by placing those in charge of health affairs on regular government payroll
- Establishment of work-handling system by gradually upgrading temporary workers to the status of regular officials

374

— Establishment of optimum standards of authorized number of medical personnel at health care centers, and adequate recruitment of required personnel

— Launching of health-care activities in regional communities by strengthening the network of branches of health care centers

Table 14. Replenishment and Existing Number of Health Care Center Personnel

(Unit: persons)

	A-class (in Ku, cities; pop. of above 200,000) (24 places)	B-class (in Ku, cities; pop. of less than 200,000) (36 places)	C-class (in counties) (138 places)	Total
Authorized numbers	1,920	1,800	3,726	7,446
Existing number	1,426	1,602	3,152	6,163
Shortage	494	198	601	1,293

375

Table 15. Authorized and Actual Number of Health Care Center Branch Personnel

	Secured	Planned	Shortage
Total	4,305	6,680	2,375
Doctors (including part-time doctors)	640	1,336	696
Mother-child health workers	993	1,336	343
Family planning workers	1,336	1,336	
Tuberculosis control workers	1,336	1,336	
Health administration workers		1,336	1,336

4-2-3. Expansion of Facilities and Supplementation of Facilities

— Facility expansion plans

Table 16. Building Construction and Addition Plans

	1977	1978	1979	1980	1981	1977-81 Total	Scope (Pyong)
Health Care Centers							
New construction	1	1				2	220
Branches of Health Care Centers							
New construction	26	70	70	70	72	308	32
Additions of child-care rooms		125	125	125	125	500	10

* Among the health care center buildings, 120 places require additions, since they do not meet the standard area -- 200 pyong for a health care center at a clinic; 150 pyong in cities; 100 pyong in countries.

376

— Equipment expansion plan

Table 17. Equipment Expansion Plan

	1977	1978	1979	1980	1981	1977-81 Total
Health care centers	99	99				198
	1,107	1,107	1,053	1,053	1,053	5,373
Branches of health care centers	604					604
	21,740					21,740

— Mobilization of required resources

A) Building costs:

Cities — State treasury will cover two-third, and local government funds will cover one-third.

Counties — All the required costs will be born by the state treasury

B) Costs of lots and auxiliary facilities:

All required costs will be borne by local government funding

C) Equipment:

All costs to be borne by state treasury

377

4-3. Improvement of Hospitals run by City and Province Governments

4-3-1. Improvement of operation

- Able medical personnel will be secured by rationalizing personnel administration and increasing pay
- Efficient support will be provided for repair of medical equipment.
- A medical treatment system will be established for patients requiring evacuation.
- An active campaign will be launched to attract subscription to various medical insurance and industrial accident insurance
- The shortage of medical doctors will be eased by utilizing student doctors and giving priority to province government-run hospitals in the assignment of student doctors.

4-3-2. Improvement of Equipment and Facilities

Table 18. Plan for Improvement of Equipment and Facilities in City and Province Government-run Hospitals

	Unit	1977	1978	1979	1980	1981	1977-81 Total
New construction				2	2	2	6
	(Hospital beds)			(400)	(600)	(400)	(1,400)
Repair and rebuilding		7	6	7	7	6	33
	(Hospital beds)	(560)	(480)	(560)	(560)	(480)	(2,640)

378

	Unit	1977	1978	1979	1980	1981	1977-81 Total
Expansion of equipment (Excluding hospitals built with loans)		10	5	9	4	16	44

Investment standards:

New construction -- ₦5,973,000 per hospital bed

Improvement:-- ₦5,973,000 + auxilitary cost (3% of cost) per hospital bed

Equipment -- ₦331,000,000

4-4. Increase in Accommodation Capacity of Hospitals for Patients Afflicted with Contagious Diseases and Mental Ailments

-- Strengthening of management capacity for mentally ill persons and tuberculosis patients

Estimated number of psychotics:

About 122,500 persons (Accommodation capacity; 11 percent)

Table 19. Hospital Bed Increase Plan for Psychotics and Tuberculosis Patients

	1977	1978	1979	1980	1981	1977-81 Total
Hospital beds for psychotics			200	200		400
Hospital beds for tuberculosis patients				190	190	380

379

— Utilization of hospital beds in hospitals run by city and province governments

About 10 percent of the total hospital beds will be utilized for mental asylums and hospitals for patients suffering from contagious diseases.

4-5. Rational Promotion of Private Medical Sector

4-5-1. Reduction of imbalance between cities and rural communities in the distribution of medical organizations

— Research and surveys on the medical resources required in each region

— Surveys of excess of medical resources in each region

— Restrictions on new medical development in regions where medical resources are heavily concentrated

— Promotion of medical development in regions where medical resources are scanty

4-5-2. Assistance to private hospitals and clinics in increasing hospital beds

— Low-interest loans:

₩5 million each for the planned 500 clinics to operate in doctorless regions

— Tax favors:

Tax holidays for medical organizations which are eligible for the loans

— Assistance to private hospitals and clinics regarding their expansion plans

Table 20. Hospital Bed Increase in Private Hospitals and Clinics

	1977	1978	1979	1980	1981	1977-81 Total
Hospital beds	350	350	400	450	450	2,000

Section 2. Improvement of Health-Care Manpower Supply

Present Status

1-1. Organizations responsible for cultivation of health-care manpower and authorized quotas

There are 109 organizations (excluding training centers for nurse aides) responsible for the cultivation of health-care manpower in 12 job types. The authorized number of trainees totals 12,763, and enrollment is 32,345.

1-2. Health-care manpower utilization ratio in each job type

The ratio of field workers to license-holders is 86.8 percent for dentists, 86.6 percent for pharmacists, 86.5 percent for Chinese herb doctors, and 76.8 percent for general medical doctors.

The ratio is only 50.3 percent for nurses, while it is a meager 45.0 percent for midwives.

1-3. Health-care manpower cultivation system

Regarding general medical doctors, there is no official training course required after graduation, whereas those aspiring to be medical practioners are required to undergo four years of training after graduation to obtain qualification.

381

This inevitably entails many disparities regarding the quality of medical know-how.

— Those aspiring to be midwives are required to undergo one-year training at designated medical organizations after obtaining nurse licenses.

However, the number of designated medical organizations is insufficient, while no special favor is provided for them, thus impeding the cultivation of midwives. (Ref. Appendix 5)

2. Problems

2-1. Disparties in the composition of health-care manpower

When only usable manpower is considered, the number of pharmacists is proportionately high, while the number of dentists and nurses is small.

For every 100 doctors there are 87 nurses, 92 nurse aides, 13 midwives, 132 pharmacists, and 17 dentists.

2-2. Unreasonable points involved in medical-care manpower cultivation system

3. Major Goals

— Efficient operation of manpower resources by rationalizing the cultivation of health-care manpower and improving the composition of medical personnel

— Formulation of long- and short-term measures for supply of health-care manpower

4. Policy Means and Assistance

4-1. Short-term Expansion of supply of health-care manpower

— Intensification of retraining for general doctors

— Increased supply of midwives

382

4-2. Long-term balance of supply and demand for health-care manpower, and rationalization of cultivation system

— Attraction of doctors to rural communities by offering scholarships

— Optimum adjustment of the authorized quota of medical practioners

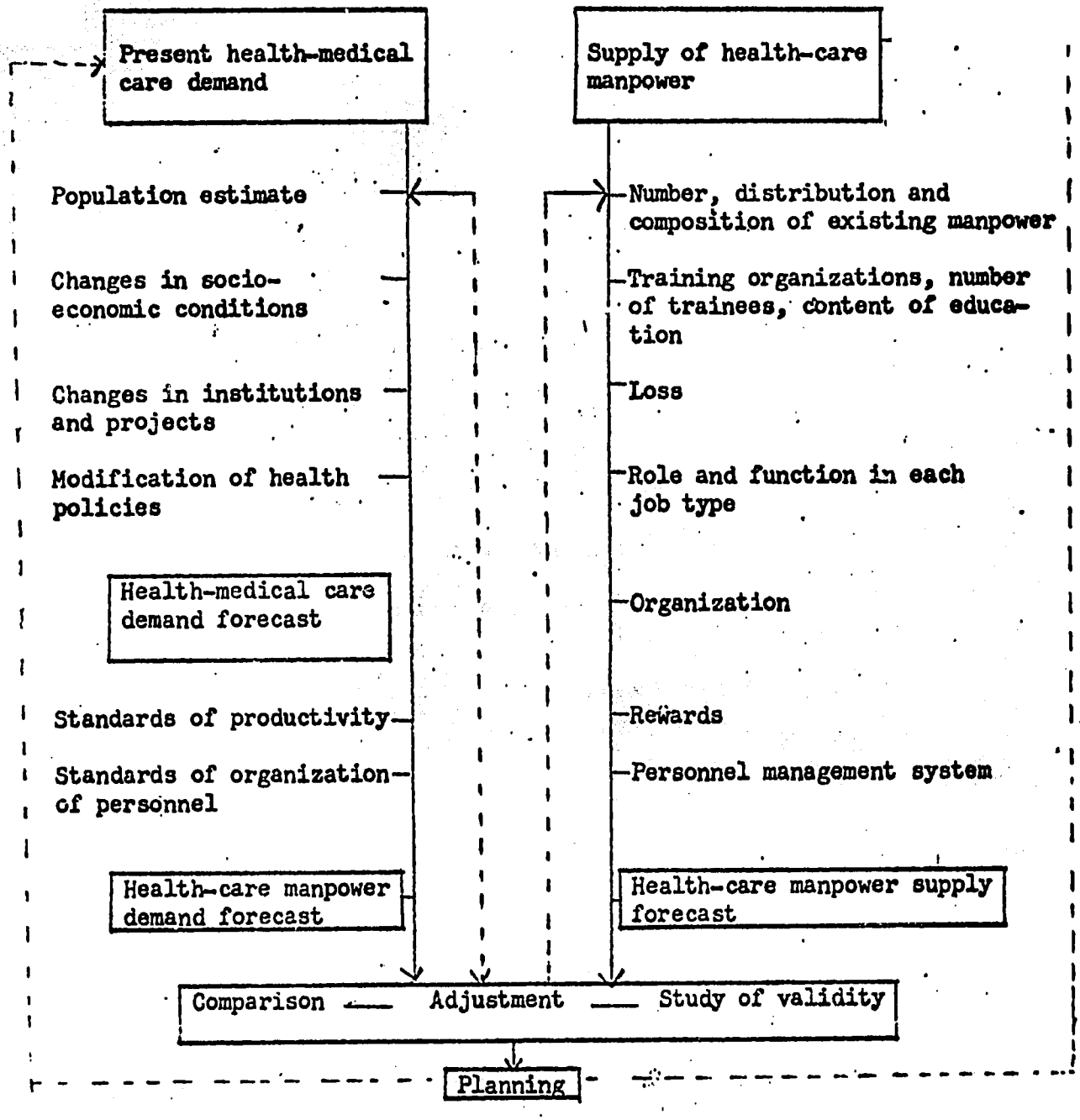
— Reduction of authorized enrollment of medical colleges

— Improvement of other health-care cultivation systems

5. Health-care Manpower Supply and Demand

5-1. The process of the formulation of health-care manpower supply and demand plan

Chart 6. Process of Formulation of Health-Care Manpower Supply and Demand Plan



384

5-2. What should be considered in drawing up demand forecast

— Regarding health-medical care demand forecast, complex social characteristics should be considered. Major determinants are: characteristics of maladies, size of population, the distribution of population by sex and age group, pace of urbanization, level of education, level of incomes, general awareness of medical care, and medical care insurance system.

— Organization and system of health-medical care

— The productivity of health-care manpower is determined by duty hours, composition of medical workers, facilities and equipment

5-3. What should be considered in drawing up supply forecast

— Items requiring general review include the size of present health-care manpower, authorized quota of trainees at training organizations, number of applicants, size of enrollment, ratio of advance, ratio of passes in license qualification tests, mortality rate, job turnover rate, and overseas resettlement rate.

— Optimum distribution by region and function

— Rationality of organization system and adequacy of the distribution of function

5-4. Supply and demand plan

385

Table 21. Health-Medical Care Supply and Demand Forecast (1975-90)

	1975			1981			1990		
	Demand	Supply	Balance	Demand	Supply	Balance	Demand	Supply	Balance
1. Doctors	13,000	12,902	-78	20,190	19,505	-685	33,610	30,124	-3,486
2. Nurse personnel	25,600	23,130	-2,470	58,000	52,345	-5,655	97,474	88,317	-9,157
3. 2-1. Nurses	11,300	11,260	-40	26,900	24,784	-2,116	50,420	43,192	-7,228
2-2. Nurse aides	14,300	11,870	-2,430	31,100	27,561	-3,539	47,054	45,125	-1,929
3. X-ray technicians	860	770	-90	2,020	1,788	-232	4,030	4,152	-122
4. Clinical pathologists	1,400	1,490	90	3,030	2,798	-232	5,380	5,353	-27
5. Midwives	1,600	1,700	100	4,150	2,268	-1,882	6,720	3,621	-3,099
6. Herb doctors	2,400	2,410	10	2,910	2,762	-148	3,900	3,728	-172
7. Pharmacists	16,500	17,096	590	18,100	21,631	3,531	20,800	28,102	7,302
8. Dentists	2,200	2,252	52	3,810	3,491	-379	6,720	5,978	-742
9. Dental technicians	680	670	-10	970	1,445	475	1,654	2,648	994

386

Table 22. Demand and Supply Increase Rates During Forecast Period

	Demand				Supply			
	75 (po)	90 (pm)	Logr	Annual Average Growth Rate	75 (po)	90 (pm)	Logr	Annual Average Growth Rate
1. Doctors	4.11394	4.52647	0.027502	6.53	4.11066	4.47891	0.02455	5.8
2.1 Nurses	4.05308	4.7026	0.0433	10.5	4.05154	4.63540	0.038924	9.4
2.2 Nurse aides	4.15534	4.6726	0.03648	8.3	4.07445	4.65442	0.038664	9.3
3. X-ray technicians	2.9345	3.6053	0.0447	10.8	2.88549	3.61826	0.04878	11.9
4. Clinical pathologists	3.14613	3.7307	0.0389	9.4	3.17319	3.7286	0.03702	8.9
5. Midwives	3.20412	3.82737	0.04155	10.0	3.23045	3.55883	0.021892	5.2
6. Herb doctors	3.38021	3.59106	0.01405	3.3	3.38202	3.57148	0.021630	5.1
7. Pharmacists	4.21748	4.31806	0.006705	1.6	4.23289	4.44874	0.01439	3.4
8. Dentists	3.34242	3.82737	0.03233	7.7	3.35257	3.77656	0.028266	6.7
9. Dental technicians	2.83251	3.21853	0.02573	6.1	2.820607	3.42292	0.03979	9.6

Table 23. Supply and Demand Plan by Job Type

A. Doctors

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	13,000	13,950	15,120	15,970	17,300	18,730	20,190	33,610	r = 0.0653
2. Supply	12,902	13,772	14,790	15,948	17,186	18,327	19,505	30,124	
Licenses	16,798	17,718	18,803	20,024	21,336	22,546	23,796	35,068	Including 538 doctors assigned to remote areas
Deaths	67	71	75	80	85	90	95	140	0.4% of license-holders
Overseas	3,661	3,698	3,744	3,796	3,852	3,904	3,958	4,453	$\beta + \varepsilon$(new licenses x 0.04)
Unemployed	168	177	188	200	213	225	238	351	1% of new license-holders
Demand in the military	1,573	1,600	1,600	1,600	1,600	1,600	1,600	1,600	
Graduates	1,056	1,089	1,200	1,331	1,420	1,290	1,359	1,380	Student enrollment
3. New licenses	870	920	1,156	1,296	1,392	1,295	1,340	1,368	Pass rate -- 85% (including 95% of those who failed in previous years)
4. Balance	-98	-178	-324	-22	-114	-403	-685	-3,486	

388

B. Nurses

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	11,300	13,100	15,100	17,500	20,200	23,300	26,900	50,420	Increase: 75-91; 15.6% 81-90; 7.23%
2. Supply	11,260	13,825	15,763	17,887	20,124	22,411	24,784	43,192	
Licenses	23,632	26,490	29,504	32,833	36,315	39,935	43,692	76,957	
Deaths	97	109	121	135	149	163	179	315	0.41% of license-holders
Overseas	6,784	7,258	7,766	8,309	8,890	9,512	10,177	18,703	Up 7% over previous year
Unemployed	5,491	5,298	5,854	6.502	7,152	7,849	8,552	14,747	20% of license-holders
Demand in the military	655	655	655	655	655	655	655	655	
Graduates	2,5[illegible]	3,026	3,142	3,486	3,036	3,780	3,936	3,936	Authorized student enrollment
3. New licenses	2,316	2,955	3,123	2,450	3,617	3,769	3,920	3,936	90% pass rate (including those who failed in previous year)
4. Balance	-40	725	663	387	-76	-889	-2,116	-7,228	

389

C. Nurse Aides

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	14,300	16,300	18,500	21,100	24,000	27,300	31,100	47,054	Annual average growth rate: 75-81 -- 13.8% 81-90 -- 4.71%
2. Supply	11,870	16,469	18,619	20,804	23,023	25,275	27,561	45,125	
Licenses	22,344	27,537	29,454	31,366	33,272	35,173	37,068	50,867	
Deaths	67	83	88	94	99	105	111	162	0.3% of license-holders
Overseas	3,704	3,000	2,500	2,000	1,500	1,000	500	500	Overseas demand is expected to be reduced.
Unemployed (%)	6,703 (30)	7,985 (29)	8,247 (28)	8,468 (27)	8,650 (26)	8,793 (25)	8,896 (24)	8,080 (15)	Annual reduction by 15 to 30% of license-holders
3. New licenses	2,000	5,260	2,000	2,000	2,000	2,000	2,000	2,000	
4. Balance	-2,430	169	119	-269	-977	-2,025	-3,539	-1,929	

390

D. X-ray Technicians

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	860	990	1,140	1,320	1,520	1,750	2,020	4,030	Annual average growth rate: 75-81; 15.28% 81-90; 7.98%
2. Supply	770	825	966	1,146	1,349	1,565	1,788	4,152	
Licenses	1,093	1,173	1,368	1,617	1,897	2,195	2,503	5,336	
Deaths	5	5	6	7	8	9	10	22	0.41% of license-holders
Overseas	60	62	68	76	85	94	104	255	$\beta + \mathcal{E}$(new licenses x 0.03); 0.05 will be applied starting 1982
Unemployed	258	281	328	388	455	527	601	907	24% until 1981; Down 1% every year starting 1982, and down 17% after 1988
Demand in the military	55	55	55	55	55	55	55	55	
Graduates	86	254	360	360	360	360	360	360	Authorized student enrollment (256) + ½ (104) of authorized number of trainees
3. New licenses	33	80	200	255	287	306	317	332	Pass rate: 38% (including 95% of those who failed in previous year)
4. Balance	-90	-165	-174	-174	-171	-185	-232	122	

34

E. Clinical Pathologists

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	1,400	1,590	1,810	2,060	2,340	2,670	3,030	5,380	Annual average growth rate: 75-81; 13.73% 81-90 6.58%
2. Supply	1,490	1,745	1,938	2,144	2,358	2,577	2,798	5,353	
Licenses	2,001	2,200	2,449	2,715	2,992	3,275	3,562	6,148	
Deaths	8	9	10	11	12	13	15	25	0.41% of license-holders
Overseas	62	72	85	99	113	128	143	278	β - ε (new licences x 0.05)
Unemployed	341	374	416	461	509	557	606	492	17% of license-holders during 1975-81 period; down 1% every year after 1982, and 8% in 1990
Demand in the military	19	19	19	19	19	19	19	19	
Graduates	249	687	342	342	342	342	342	342	Authorized student enrollment quota (256) + authorized number of trainees (89)
3. New licenses	140	109	258	276	288	292	300	308	Pass rate: 32% (including 95% of those who failed in previous year)
4. Balance	90	155	128	-84	-18	-93	-232	27	

F. Midwives

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	1,600	1,880	2,200	2,580	3,030	3,540	4,150	6,720	Annual average growth rate: 75-81; 17.2% 81-90; 5.5%
2. Supply	1,700	2,006	2,005	2,071	2,137	2,203	2,268	3,621	
Licenses	3,773	3,908	4,042	4,176	4,309	4,441	4,573	6,178	
Deaths	15	16	16	17	18	18	19	25	0.41% of license-holders
Overseas	-	-	-	-	-	-	-	-	
Unemployed	2,058	1,886	2,021	2,088	2,154	2,220	2,286	2,532	41 to 50% of license-holders
3. New licenses	150	150	150	150	150	150	150	200	
4. Balance	100	120	-195	-509	-883	-1,337	1,882	-3,099	

G. Herb Doctors

(Unit: persons)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	2,400	2,480	2,560	2,640	2,730	2,820	2,910	3,900	r = 0.0328
2. Supply	2,410	2,458	2,479	2,497	2,540	2,642	2,762	3,728	Licenses - (Deaths + Overseas + Unemployed)
Licenses	2,786	2,852	2,878	2,905	2,983	3,121	3,268	4,493	Including 235 herb doctors in remote areas
Deaths	-	12	12	12	12	13	14	19	0.41% of license-holders
Overseas	18	20	25	30	50	70	70	750	Increased overseas demand considered
Unemployed	351	354	362	366	381	396	422	596	12.5% of license-holders
Demand in the military	7	8	8	10	5	25	30	30	Those serving military duty in line with the graduates from two colleges
Graduates	66	67	39	40	91	158	168	160	Authorized student enrollment in two colleges (80 x 2)
3. New licenses	65	66	38	39	90	150	160	152	('75-79 = 98%, '80-90 + 95%) pass rate applied
4. Balance	+10	-22	-81	-143	-190	-178	-148	-172	

394

H. Pharmacists

(Unit: person)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	16,500	16,800	17,000	17,300	17,600	17,900	18,100	20,800	r = 0,016
2. Supply	17,096	17,831	18,632	19,440	20,162	20,898	21,631	28,102	
Licenses	19,750	20,600	21,527	22,463	23,301	24,153	25,004	32,507	
Deaths	81	85	88	92	96	99	103	133	0.41% of license-holders
Overseas	598	624	654	685	713	741	770	1,022	$\beta + \varepsilon$ (new licenses x 0.03)
Unemployed	1,973	2,060	2,153	2,246	2,330	2,415	2,500	3,250	10% of new license-holders
Demand in the military	187	190	190	190	190	190	190	190	
Graduates	569	991	1,030	1,026	920	950	950	950	Authorized student enrollment quota
3. New licenses	512	850	1,012	1,024	930	948	950	950	Pass rate: 90% (including those who failed in previous year)
4. Balance	596	1,031	1,632	2,140	2,562	2,998	3,531	7,302	

395

I. Dentists

(Unit: person)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	2,200	2,400	2,660	2,920	3,200	3,530	3,870	6,720	Annual average growth rate: '75-81; 9.9% '81-90; 6.32%
2. Supply	2,252	2,378	2,527	2,700	2,916	3,199	3,491	5,978	
Licenses	2,595	2,740	2,911	3,109	3,357	3,684	4,020	6,889	Including 83 dentists in remote areas
Deaths	10	11	12	12	13	15	16	28	0.4% of license-holders
Overseas	112	118	125	133	143	157	171	297	$\beta + \varepsilon$(new license x 0.04)
Unemployed	221	233	247	264	285	313	342	586	8.5% of new license-holders
Demand in the military	321	321	321	321	321	321	321	321	
Graduates	165	155	182	210	260	340	351	340	Authorized student enrollment
3. New licenses	165	155	182	210	260	340	351	340	Pass rate: 100%
4. Balance	52	22	-133	-220	-284	-331	-379	-742	

396

J. Dental Technicians

(Unit: person)

Classification	1975	1976	1977	1978	1979	1980	1981	1990	Remarks
1. Demand	680	721	765	812	861	914	970	1,654	Annual average growth rate: 6.1%
2. Supply	670	735	815	955	1,123	1,281	1,445	2,648	
Licenses	939	995	1,079	1,246	1,412	1,577	1,742	3,194	
Deaths	4	4	4	5	6	6	9	13	0.4% of license-holders
Overseas	30	37	37	44	49	57	64	118	3.7% of license-holders
Unemployed	235	219	223	242	234	233	226	415	13% of license-holders
Demand in the military	56	56	56	56	56	56	56	56	
Graduates	75	211	231	460	460	460	460	460	The same as incumbent students during '78-'79 period
3. New licenses	27	60	88	171	171	171	171	171	Pass rate: 23% (including those who failed in previous year)
4. Balance	-10	14	50	143	262	367	475	994	

Section 3. Promotion of Production Foundation for Quality Medicines

1. Present Status

1-1. Pharmacentical Manufacturers and Status of Items

— A look at the yearly trend shows that the number of pharmaceutical manufacturers and authorized items has been on the rise.

The increase in the number of authorized items has been noticeable since 1974.

Table 24. Number of Pharmaceutical Manufacturers and Items

	1970	1971	1972	1973	1974	1975
No. of pharmaceutical manufacturers	286	284	291	286	293	300
No. of authorized pharmaceutical items	6.068	6,020	6,249	6,279	7,161	8,841

— Pharmaceutical items for the central nervous system and digestive system are dominant in number, while antibiotics show the fastest annual growth rate in number of items approved.

398

Table 25. Pharmaceuticals in Each Field of Efficacy

	1971	1972	1973	1974
Central nervous system	437	463	511	511
Peripheral nervous system	61	63	73	76
Digestive system	490	484	528	533
Antibiotics	182	215	250	284
Chemical therapeutics	136	150	165	183
Biological medicines	16	22	37	34
Vitamins	205	213	229	287
Others	1,343	1,538	1,626	765
Total	2,870	3,148	3,419	2,673

1-2. Evaluation of Pharmaceuticals

— Evaluation of efficacy and safety of pharmaceuticals has been conducted since 1971, while re-evaluation began in 1975, but the result has been meager, compared with the catalogue of items produced.

Table 26. Evaluation of Pharmaceuticals by Year

	Unit	1970	1971	1972	1973	1974	1975
Evaluation of efficacy and safety	No. of Kinds	-	9	6	5	6	11
Re-evaluation	"	-	-	-	-	-	17
Investments	W1 million	-	13.5	19	21	22	29.3

39

2. Problems

— The re-evaluation of pharmaceuticals has been very meager, compared with the growth of items and newly approved items. In order to enhance the efficacy and safety of pharmaceuticals, the re-evaluation should be scaled up under an annual program.

— GMP has been recommended on an international scale, but Korea has yet to adopt it. For early adoption of GMP, various conditions should be fulfilled.

— Development of domestically available quality medicinal raw materials should be expedited and promoted to reduce imports of the medicinal raw materials.

3. Major Goals

— To ensure an institutional guarantee of efficacy and safety of pharmaceuticals by expanding the re-evaluation of the efficacy of pharmaceuticals.

— To guarantee the quality of pharmaceuticals and obtain international recognition by instituting standards for the manufacture of pharmaceuticals.

4. Projects

4-1. Re-evaluation of pharmaceuticals

— Re-evaluation of efficacy will be conducted for 250 kinds of compound medicines and 250 kinds of unitary medicines. For this project, required facilities and equipment will be secured, and trained workers will be recruited.

400

Table 27. Pharmaceutical Re-evaluation Plan by Year

	Unit	1977	1978	1979	1980	1981	1977-81 Total
Re-evaluation of medicinal efficacy	Kinds	60	110	110	110	110	500
Required equipment	Kinds	50					50
Required facilities	Pyong	590					590
Overseas training of workers	Persons	10					10

4-2. Establishment of GMP

— Standards for the manufacture of pharmaceuticals will be established on the basis of international standards in order to ensure quality and obtain international approval.

— This requires the training of related workers, and repair and improvement of manufacturing firms. During the period of the plan, about 1,000 trained workers will be secured.

Section 4. Adjustment and Improvement of Health Statistics

1. Present Status

1-1. Survey statistics

Regularly conducted survey statistics are for three fields — nutrition of the people, measurement of growth of infants, and the evaluation of standards of living among those requiring relief measures.

401

However, these statistical surveys involve a lot of problems in survey method and content which require improvement to make them serviceable as information necessary for administrative management.

1-2. Statistics on administration

As of the end of 1975, regular reports were available in 54 titles, and there were a lot of other reports which were not officially approved.

But there is no coordinated control among the data while the forms of reports are irrational. In particular, reports from each city and province are loose and rarely utilized.

Also, it is pressing to establish a statistical data system concerning medical facilities and services in various hospitals and clinics.

1-3. Statistics equipment

As for equipment for statistical surveys and treatment, there is a Univac 1005 computer, but this device is outdated and the memory capacity is small, and printing quality is insufficient. Six punchers and one classifier have been used on lease. Facilities and equipment regarding statistical matters should be supplemented to better adjust statistical treatment.

2. Problems

-- Lack of authenticity and reliability of various statistical data

-- Lack of system for gathering, treatment, safe-keeping and utilization of statistical and survey data

-- Insufficiency in statistical workers and treatment equipment

3. Major Goals

-- Improvement and development of basic survey and statistical affairs

402

— Establishment of a comprehensive health control information system

— Stepped-up utilization of surveys and statistical data

4. Projects

4-1. Improvement and development of survey and statistical affairs

The existing statistical methods, content, analysis and the utilization of the findings will be extensively reviewed for possible sweeping readjustment.

Table 28. Improvement Plan for Surveys and Statistics

Present Status	Improvement Measures			
	Classification	Frequency of Survey	Survey Method	Survey Target
Survey of nutrition of people	People's health survey	Once in 2 years	Sample	5,000 families
	Statistical survey of diseases and damage	Once a year	Universal	13,000 installations
Survey and measurement of infant growth	Survey of medical care spending	Once in 2 years	Sample	5,000 families
	Survey of nutrition of the people	Once a year	Sample	5,000 families
Survey of livelihood of those requiring relief	Statistical survey of mortality and causes of deaths	Once in 2 years	Sample	25,000 families
	Fact-finding survey of handicapped	Once in 5 years	Universal	7,000 families

403

4-2. Establishment of Comprehensive Health-control Information System

Health-related statistical data will be nationally organization and systematized, while an electronic computing system will be installed in a move to establish an efficient information control system regarding health-related data.

What is most important regarding the establishment of such a system is acquisition of required manpower.

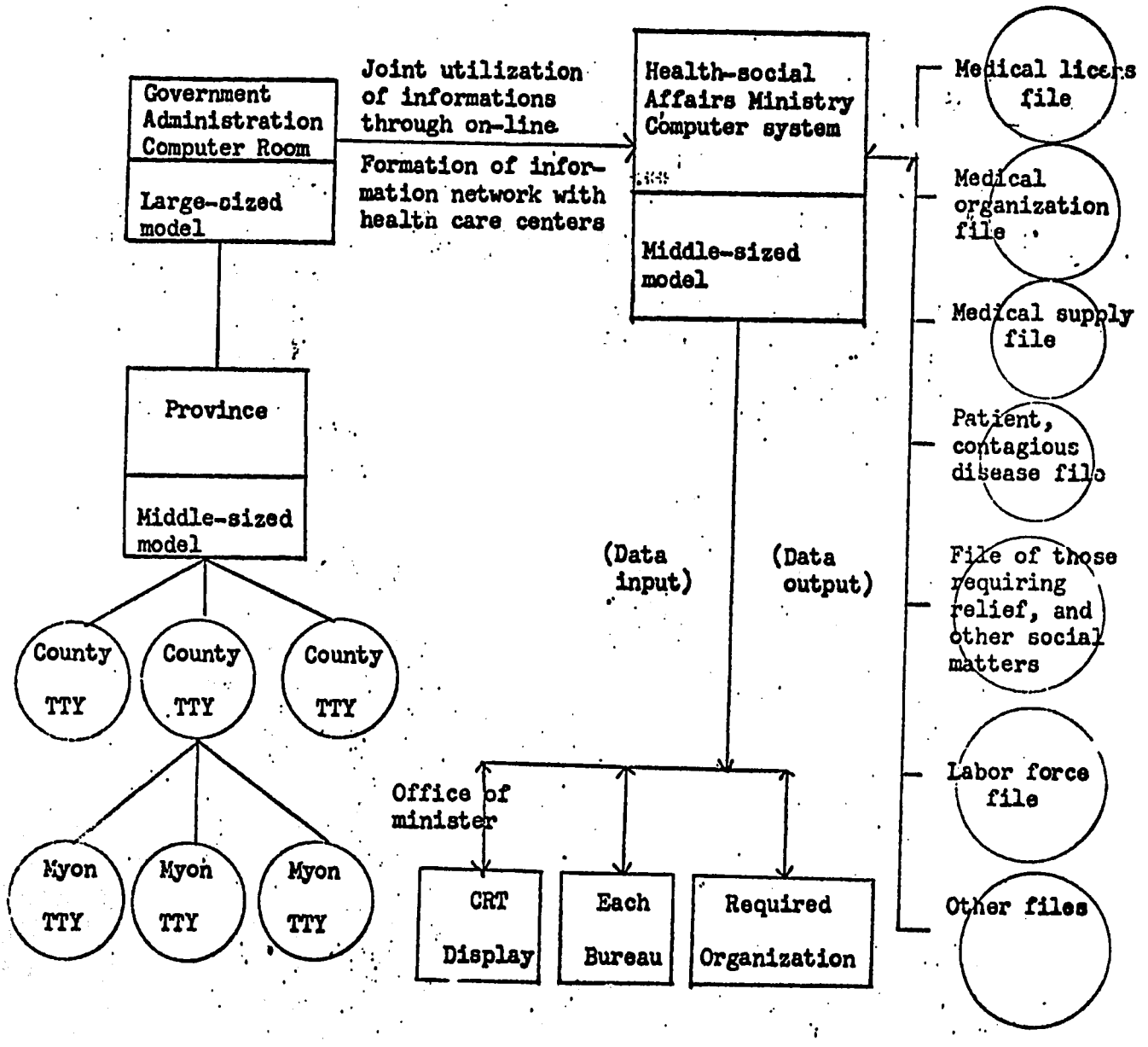
Intensive training will be conducted for about 500 persons to be exclusively in charge of statistical affairs, while about 35 electronic computer operators will be secured under an annual program.

Table 29. Computerization Plan for Control of Health-related Information

Year	Process of Computerization	Required Equipment	Recruitment of Computer Workers
1977	Formulation of basic plan for computerization of health-social affairs administration		15
1978	Development of programs for major computerizing matters		20
1979	Completion of data base on various matters requiring computerization		25
1980	Computer-fed treatment of various affairs	One computer	30
1981	Establishment of system for information exchange and utilization	Establishment of on-line system linked with gov't computer system	35

404

Chart 7. Organization of Information System on Health-related Matters



405

Section 5. Improvement of Mother-Child Health

1. Present Status

General status

— Mother-child health accounts for an important part of the health of the people.

Those requiring mother-child health care represent two-thirds of the total population.

According to the 1970 population census, those above 15 years of age account for 42 percent of the total population, while women in the 15-44 age group, who are the target of material health case, account for 40 percent of the total population of women.

Table 30. Population of Those Eligible for Mother-Child Health Projects (1975)

	Range of Target	Target Population	Ratio to Total Population
Maternity	Women in 15-44 age group	6,278,000	18.1%
Infants	0-4 age group	5,030,000	14.5%
Total	-	11,308,000	32.6%

* Those subject to children health care include children under 15 years of age, but in the above table, only those in 0-4 age group are listed.

— In 1975, the infant and maternity mortality rates were 38.0 and 5.6, respectively, a rate which is considerably high, in light of the level of economic development and standards of living. In the countryside the ratio is estimated to be higher than that.

406

International comparison shows that the infanty and maternity mortality rates are about three times as high as those in the United States, Japan, and Taiwan.

Table 31. Comparison of Infant and Maternity Mortality Rates

	1971		1972		1973	
	Maternity Mortality	Infant Mortality	Maternity Mortality	Infant Mortality	Maternity Mortality	Infant Mortality
Korea	-	-	7.8	50.0	7.0	45.0
Taiwan	40.3	16.85	3.47	14.02	4.03	14.1
Japan	5.21	13.1	4.1	11.7	3.8	11.3
The U.S.	2.24	19.8	-	-	-	-

Note: Maternity mortality: Rate per 10,000 motners after carriage

Infant mortality: Rate per 1,000 births

However, about 50 to 70 percent of such high infant mortality may be sufficiently prevented with our existing medical expertise. But the high mortality rate is attributed to the fact that a majority of those eligible for mother-child health care do not enjoy the benefits of medical expertise.

According to a sample survey conducted in 1974, 50 to 60 percent of pregant women in Seoul received helping hands from doctors, nurses and midwives at the time of delivery. The comparable ratio in provincial cities was only 20 to 30 percent. It was especially low, about 10 percent, in the countryside.

407

1-2. Mother-Child Health Care Projects by Government

— From 1970 to 1975, only about 20 percent of the targeted pregnant women received government-provided help at the time of delivery. Due to the low rate of assistance, infant mortality stemming from tentanus, conjunctivitis and wounds at the time of birth was apparently high.

Table 32. Status of Childbirth Assistance

(Unit: 1,000 persons)

	1970	1971	1972	1973	1974	1975
Targeted pregnant women (No. of births)	953	901	898	883	865	833
Government-provided assistance	132.3	175.4	208.1	248.2	257.5	187.9
Ratio (%)	14	19	23	28	30	22

Note: Figures for 1973 and 1974 stand for projects entirely funded by local government agencies.

— Currently, government-funded mother-child health care projects are mainly aimed at the inhabitants of rural communities poor in private medical facilities and medical personnel, and needy urban people.

In the case of rural communities, one mother-child health care worker is obliged to get 25 pregnant women and 30 infants registered with county or myon offices every month to offer them health assistance. Among the registered women and infants, those requiring the special nutrition are given UNICEF-provided nutrients.

One health-care worker is supposed to provide childbirth assistance to at least ten pregnant women a month.

However, the workers, in case they are not midwives,

408

cannot go beyond simply providing safe birth equipment to the pregnant women.

- The mother-child health-care program calls for the assignment of at least one health worker holding a midwife license to each up (county) and myon.

  But this requirement is not fully fulfilled due to shortage of funds and qualified midwives.

  Often, nurses aides play the role.

- As of January 1975, the authorized number of health workers totaled 1,244, including 993 eligible for state treasury funding, and 251 eligible for local government funding. However, the number of workers in active service totals only 1,184, a situation which is attributed mainly to difficulty in securing funds by local government agencies.

  The ratio of active health workers to the target was 82.6 percent in 1970, and 96.2 percent in 1975.

Table 33. Status of Health Workers in Active Service

	1970	1970	1971	1972	1973	1974	1975
Target		700	800	1,000	1,200	1,400	1,244
Recruited		644	766	947	1,018	1,157	1,184
(Ratio of qualified persons)							(15)
Ratio (%)		92.0	95.7	97.2	84.8	82.6	96.2

409

— As for mother-child health-care facilities, there are mother-infant health rooms at 198 health care centers. And there are seven mother-child health centers in urban areas populated by low-income people, while there are branches in each up (county) and myon.

Due to lack of general awareness on the part of inhabitants, these existing facilities are not fully utilized.

— From 1970 to 1975, government investment in the mother-child health-care projects amounted to ₩100 million to ₩300 million every year, a sum which is meager, compared with the targed population.

The sum is also far smaller than the government investments in other health fields.

In 1973 and 1974, state treasury subsidies were not earmarked, and the required outlay was filed by local government funding. This indicates that mother-child health-care project was given low priority among government health projects.

Table 34. Annual Projects and Investments

	1970	1971	1972	1973	1974	1975
Assignment of field workers (persons)	644	766	947	1,018	1,157	1,184
Assistance in childbirth (cases)	132,320	175,379	208,063	248,160	257,542	187,919
Registration of pregnant women (persons)	136,584	198,717	243,943	280,044	323,329	336,876
Registration of infants (persons)	132,844	241,741	330,691	376,356	480,404	527,526
Government investments (₩1 million)	157	205	241	14	22	301

410

Health care at schools, especially health control at primary schools, pertains to the mother-child health care, but is almost ignored.

Recently, the problem of health control involving unmarried woman workers and unmarried women has been emerging as a social issue. Thus it is urgent to take proper measures.

2. Problems

— Low rate of assistance for safe childbirth

— Insufficient facilities required for mother-child health control and low use rate

— Absolute shortage of mother-child health-care workers and drop in quality

The 1970 population census indicates that even if all required health-care workers are secured, only one worker is available for an annual average 2,600 pregnant women; 3,500 infants in the 0-5 age group, 470 births a year, and an annual 2,000 cases of preventive vaccination.

Hence, the authorized number of health-care workers shows an absolute shortage to take care of mother-child health.

Moreover, about only 20 percent of the existing field workers are qualified nurses or midwives, while the remaining 80 percent, mostly graduates of middle schools, are nurse aides who have undergone training nine months or less.

Insufficient treatment has led to the growing job turnover rate among qualified field workers.

— Low order of priority given to the mother-child health care

— Insufficient health-care programs at schools

— Urgent need to provide health control for unmarried woman workers and unmarried women

411

3. Major goals

3-1. Expansion of Mother-Child Health-Care Projects

— Mother-child health-care projects will be directed at needy urban dwellers and inhabitants of rural communities where privately run medical facilities are poor and medical personnel runs short.

The function of the health care centers and their branches will be reinforced to carry out mother-child health-care projects in rural communities.

3-2. Acquisition and Training of Mother-Child Health-Care Workers

— In order to increase the rate of sanitary safety child carriage currently standing only at 20 percent, qualified mother-child health-care field workers, especially midwives, will be trained and secured to the maximum possible extent.

3-3. Strengthening of Preventive Treatment of Newly Born Babies and Mothers

The rates of maternity and infant mortality arising from such curable diseases as tetanus and other contagious diseases will be lowered to zero or reduced sharply during the period of the plan.

3-4. Stepped-Up Education on Mother-Child Health and Research and Surveys

As part of the plan to buttress education on public health, health education at primary schools will be augumented. Also, measures will be worked out to promote the health of unmarried woman workers and unmarried women as a whole, while research and survey activities will be launched adtively to stimulate planning and evaluation activities concerning mother-child health control.

4. Project Plan

The maternity mortality rate will be reduced from 5.6 in 1975 to 3.0 in 1981, and the infant mortality rate from 20 persons to 38 persons.

412

Table 35. Annual Target of Maternity and Infant Mortality Rates

		1975	1976	1977	1978	1979	1980	1981
Maternity	Pregnant women (per 1,000 persons)	833	837	884	886	888	906	925.1
	No. of deaths	466	419	407	372	338	308	278
	Ratio (per 10,000 persons)	5.6	5.1	4.6	4.2	3.8	3.4	3.0
	No. of target (per 1,000 persons)	833	837	884	886	888	906	925.1
Infants	No. of deaths	31,654	29,295	28,288	25,694	23,088	20,830	18,502
	Ratio (per 1,000 persons)	38	35	32	29	26	23	20

413

4-1. Acquisition of Qualified Mother-Child Health Field Workers

Among the existing mother-child health-care field workers, qualified ones account for only 15 percent. As part of the multilateral measures to help secure qualified field workers, the existing field workers who are in temporary status equivalent to rank 5-B will be accorded regular status equivalent to rank 4-B, so as to implement the health-care project in efficient fashion. By 1981, the number of qualified field workers will total 1,200, or about 20 percent of the targeted 1,750.

Table 36. Annual Plan to Recruit Field Workers

	1975	1976	1977	1978	1979	1980	1981
Target	1,184	993	1,400	1,500	1,600	1,700	1,750
Qualified workers	175	180	400	600	800	1,000	1,200
Ratio (%)	15	18	28.6	40	50	58.8	68.5

4-2. Expansion of Safety Carriage Assistance Project

The most important reason for the high mortality rates among infants and mothers is the fact that carriage is aided mostly by laymen lacking professional medical knowledge.

The rate of safety carriage assistance stood at only 14.2 percent as of 1976. Policy support will be bolstered to increase the rate to 22.7 percent in 1981.

414

Table 37. Target of Safety Carriage Assistance During Period of Plan

(Unit: 1,000 cases)

	1975	1976	1977	1978	1979	1980	1981	1977-81 Total
Total births	833	837	857	870	887	907	927	4,450
Gov't-funded carriage assistance	188	119	168	180	192	204	210	954
Ratio of carriage assistance (%)	22.0	14.2	19.6	20.7	21.6	22.4	22.6	21.4

4-3. Other projects

The investment projects the government intends to undertake n the field of mother-child health care during the period of he plan are as follows:

- Facilities and equipment, now in short supply, will be expanded and secured, while the existing facilities and equipment will be utilized to the fullest.

- Health education will be conducted for inhabitants of rural communities. Also, health education will be provided to unmarried woman workers, and unmarried mothers.

- Health control of school-age children will be stepped up in conjunction with the health control of infants. Health evaluation and selective health check-ups will be conducted at least once a year, while nutrition education will be conducted in relation to the school food program.

- Research and survey activities will be bolstered in cooperation with related specialists, private organizations and relevant government agencies. This project will be reflected in the next plan.

Section 6. Stepped-up Disease Control and Preventive Activities

1. Present Status

- The pattern of the outbreak of diseases changed sharply in line with the rapid social change and economic development in the last ten years.

  The combination of generally dirty environment, unsanitary disposal of human excrement, loose sanitary control among individuals and malnutrition led to an explosive state of various water-borne diseases including typhoid fever, amoebic dysentery, whooping cough, diphtheria, cholera, and other diseases such as measles, polio, malaria, and Japan-type encephalitis.

  As a result, a lot of people died or suffered pains before 1960.

- Also, almost 90 percent of the people were infested with parasites, and the mortality rate from tuberculosis was high, causing considerable loss in economic and social terms to the nation.

  Besides, various contagious diseases spread, but the infection rate was relatively low. The nation, however, must not overlook the spread of contagious diseases.

- Acute and chronic contagious diseases have been sharply curtailed thanks to the remarkable economic development in the last ten years, the improvement of the standards of living, and improved dietary conditions, careful control of diseases and improvement of the environment.

  In particular, the collective outbreak of contagious diseases has been noticeably curbed, but there is a growing need for the input of new technology and investments for the steady and efficient control of diseases.

- Outbreaks of diseases showed a new pattern. Diseases which carried relatively little weight in the past, including infectious hepatitis, seasonal hemorrhagic fever, Salmonella and other maladies traceable to domesticated animals have sharply risen.

416

Also, the extension of life expectancy and the reduction of diseases, however, has led to a noticeable growth of such uncommunicable diseases as malignant tumors, hypertension and diabetes.

In addition, diversification of society and complex social life have sharply increased cases of neuro-psychosis, calling for new measures.

— In this light, efficient preventive activities including preventive vaccination, improvement of environment sanitation and health education should be intensified.

Also, national control should be stepped up in dealing with acute and chronic communicable diseases, uncommunicable maladies, neuro-psychosis, and dental health.

1-1. Acute Communicable Diseases

— Most acute contagious diseases have rapidly diminished. The recession is especially noticeable in seasonal collective outbreaks.

Not a single case of smallpox or eruptive typhus has been reported in the past fifteen years. In addition, a lot of bacterial diseases have disappeared.

— Contagious diseases belonging to the first and second categories are subject to mandatory reporting. However, the rate of reporting contagious diseases is estimated to be lower than actually reported, because it takes time to confirm the diseases, and patients require treatment without awaiting diagnosis.

In general, however, the rate of outbreak is estimated to be low.

417

Table 38. Yearly Outbreak of Contagious Diseases

A. First-category Diseases

(Unit: person)

	1960	1961	1962	1963	1964	1965	1966	1967
Typhoid fever	2,798	4,982	2,682	4,919	4,380	3,760	3,454	4,230
Paratyphus	77	92	43	25	35	22	34	33
Dysentery	47	145	101	818	434	355	133	139
Diphtheria	828	914	758	713	841	1,079	1,281	1,070
Cerebro-spinal meningitis	22	9	20	20	18	24	17	9
Scarlet fever	26	2	6	-	2	1	-	-
Smallpox	3	-	-	-	-	-	-	-
Eruptive typhus	84	41	30	32	14	23	1	1
Cholera	-	-	414	20	-	-	-	-
Relapsing fever	1	5	-	-	-	-	-	-

418

Table 38. (Cont'd)

	1968	1969	1970	1971	1972	1973	1974
Typhoid fever	3,931	5,404	4,221	3,146	2,030	787	656
Paratyphus	59	20	33	5	9	2	-
Dysentery	251	282	927	306	215	110	72
Diphtheria	537	220	567	349	556	416	263
Cerebro-spinal meningitis	15	3	17	7	-	-	2
Scarlet fever	-	-	-	-	2	1	1
Smallpox	-	-	-	-	-	-	-
Eruptive typhus	-	-	-	-	-	-	-
Cholera	-	1,538	200	-	-	-	-
Relapsing fever	-	-	-	-	-	-	-

419

B. Second-category Diseases

	1960	1961	1962	1963	1964	1965	1966	1967
Acute poliomyelitis	1,178	2,003	1,183	1,644	359	174	153	198
Whopping cough	8,711	16,887	16,311	10,700	4,038	2,676	8,373	1,327
Rabies	-	-	28	103	45	5	101	2
Measles	16,028	16,251	30,792	9,328	12,698	6,748	11,925	982
Parotitis	4,826	7,269	5,104	3,123	2,437	2,259	2,982	1,297
Malaria	-	1,083	4,600	1,425	1,028	628	404	1,443
Encephalitis	1,248	1,058	1,038	19	2,952	752	3,563	2,673

B. Second-category Diseases (Cont'd)

	1968	1969	1970	1971	1972	1973	1974
Acute poliomyelitis	367	194	176	61	33	198	22
Whooping cough	1,205	4,774	3,818	1,436	989	1,846	3,077
Rabies	11	1	24	2	4	1	1
Measles	6,286	5,397	3,625	4,192	6,738	3,408	4,867
Parotitis	1,687	1,961	813	1,431	1,655	590	2,039
Malaria	3,270	299	15,926	9,914	4,275	1,354	1,827
Encephalitis	1,208	76	27	43	73	286	126

— Among the acute water-borne contagious diseases, reports of cholera outbreaks have been non-existent since 1975, while typhoid fever, paratyphus, bacterial and amoebic diseases have also sharply diminished.

The seasonal collective outbreaks have given way to sporadic individual infections.

— Effective anti-epidemic control through wide-ranging preventive vaccination has measurably reduced the occurence of respiratory and other diseases including diphtheria, whooping cough, acute poliomyelitis and measles.

However, cases of whooping cough have sharply risen as the adverse effects of preventive vaccination made parents reluctant to accept vaccinations.

Through extensive preventive vaccination, however, respiratory-related contagious diseases can be reduced to the level in advanced countries during the period of the plan.

— Cases of malaria and Japan-type encephalitis have also noticeably diminished. It is expected that malaria can be eliminated in five years through extensive and efficient control of diseases.

Encephalitis has been sharply reduced, but the reason has not been clarified, thus leaving room for a potential rise. Since the immunized population is small, the rise in encephalities, if any, will be potentially explosive.

— While acute contagious diseases generally diminished, infectious hepatitis, salmonella and seasonal hemorrhagic fever have comparatively risen. Rabies and brusella (phonetic) are also expected to rise.

— Government assistance in the control of acute contagious diseases has been directed largely at typhoid fever, cholera, diphtheria, whooping cough, acute poliomyelitis, malaria and Japan-type encephalitis.

422

Government investment in anti-epidemic projects amounted to only ¥100 million in 1974, while testing capability and equipment are insufficient. Under these circumstances, it is deemed difficult to effectively eradicate acute contagious diseases.

— Regarding the control of communicable diseases, the testing function and information system for the control of diseases are poor.

Moreover, the existing anti-epidemic methods are unrealistic, while the control of sporadic cases of communicable diseases is inefficient.

1-2. Tuberculosis

— Since 1965 fact-finding surveys on tuberculosis have been conducted on national scale every five year.

According to the findings of the surveys conducted for the 1965-1970 period and 1975, the rate of infection and the ratio of tuberculosis patients has been declining.

The tuberculosis infection rate among children in the 5-9 age group has declined about 50 percent in ten years from 33.7 percent in 1965 to 26.1 percent in 1970, and 15.9 percent in 1975.

Also, the ratio of tuberculosis patients has dropped from 5.1 percent in 1965 to 4.2 percent in 1970, and 3.3 percent in 1975.

However, the ratio of tuberculosis patients in Japan and the Republic of China is far lower than that in our country. The ratio stood at less than 1.0 percent in 1973 in Japan, and 2.3 percent in 1972 in the Republic of China.

No significant curtailment has been seen in the number of tuberculosis patients with positive germs. The tuberculosis patients with positive germs accounted for 0.94 percent of the population of those above five years in age in 1965. The ratio stood at 0.74 percent in 1970, and 0.75 percent in 1975.

423

— Tuberculosis control projects call for B.C.G. vaccination, discovery of cases, and registered treatment.

B.C.G. vaccination has been conducted very efficiently. The vaccination ratio to the total population has risen from 16.4 percent 1965 to 30.0 percent in 1970, and 41.3 percent in 1975.

Continued vaccination is expected to considerably reduce the tuberculosis infection rate.

Table 39. B.C.G. Vaccination Rate (%)

	1965	1970	1975
All ages	16.4	30.0	41.3
0 - 4	6.1	38.8	48.2
5 - 9	28.1	54.3	72.8
10 - 14	49.3	52.6	77.1
15 - 19	32.6	47.4	62.9
20 - 24	22.6	28.3	49.2
25 - 29	5.5	20.5	29.5
30 - 34	0.8	7.6	22.5
Above 35	0.1	0.4	2.2

424

— As of 1974, tuberculosis patients were estimated at 900,000 to one million, but the registered patients numbered only 176,880, or about 20 percent of the total. Considering patients who receive treatment at private hospitals and clinics without registration, a considerable number of unreported patients are believed to impede tuberculosis prevention and control.

— X-ray inspection of about one million cases usually leads to the discovery of five to seven active tuberculosis patients, and sputum inspection of one million cases leads to the discovery of about 25,000 patients with postive germs.

All of the registered patients are given treatment based on standard remedies, but about 30 percent of them normally drop out.

Among the patients, there are many who have tuberculosis germ-resistent reactions due to incomplete treatment, and inadequate treatment in line with free sale of tuberculosis chemical remedies. Thus there is a growing need to administer secondary doses to them.

— Meanwhile, tuberculosis control field workers number only about 2,500, of whom specialist doctors account for only 50. This means that one doctor has to take care of about 20,000 patients.

Moreover, the budget for tuberculosis control, including the amount funded by private organizations, amounted to about ₩3 billion in 1976. This means that the amount available to each citizen was only ₩300, showing an absolute shortage.

1-3. Leprosy

— No authentic data have been provided regarding the rate of infection of leprosy and the ratio of lepers, but the rate is believed to have been reduced considerably in the past 10 to 20 years, in view of this fact: Before 1960, leprosy was the biggest problem in our health sector; and about 50.2 percent of the health budget in 1958 went to the control of leprosy.

425

— The import of DDS in 1954 provided an epochal achievement in treating lepers.

Also, the efficient government control of leprosy, the active cooperation of private organizations, and social and economic development are believed to have reduced cases of leprosy.

Still, considering the chronic nature of leprosy, it is hard to expect an epochal and sweeping reduction of leprosy cases.

Moreover, people generally consider leprosy incurable, while patients themselves tend to conceal the disease.

Thus it is pressing to conduct a thorough enlightenment campaign and provide opportunities for renewed lives after treatment.

— There are no authentic statistical data concerning lepers. But across the country, the number of lepers is estimated at 80,000 or less. Thus the ratio of patients is estimated at less than 2.5 per 1,000 persons.

Yet authentic figures on patients should be provided first. The number of registered lepers in 1975 stood at 32,399, only 40 percent of the estimated total.

Among the registered patients, those with positive germs in 1975 accounted for about 8.4 percent, lower than had been estimated in the past.

Complete cure has remained a task.

Among the registered patients, 27,037 are home-based and live collectively, while 5,362 are accommodated at national facilities.

Regarding the patients with negative germs, there is no consensus as to the desirability of their registration. This problem should be handled in social, academic and administrative contexts.

426

- As for leprosy control facilities, there are 13 outpatient clinics (four places equipped with short-term hospitalization facilities), 14 mobile diagnosis teams (11 teams under the Leprosy Association, and one financed by foreign aid.)

  One hundred and ten leprosy control field workers have been assigned to those areas where the cases of leprosy are numerous. But the leprosy control project entails many difficulties due to the frequent job turnover among the field workers.

  In addition, there are a national leprosy hospital, the Korea Leprosy Research Institute and the Lepers Association, both private agencies, which have been much helpful in controlling leprosy and conducting research.

1-4. Survey of Adult Diseases and Stepped-up Enlightenment

1-5. Parasites

- Infestation by parasites has been sharply reduced, and is expected to go down further, thanks to the improvement of standards of living in line with rapid economic growth in the last 10 years, improvement of environmental sanitation (sanitary disposal of excrement, and the supply of piped water), extensive health education, and wide-ranging examination of feces and a drive to eliminate intestinal worms.

- The ratio of roundworm infestation among primary and secondary school students dropped from 61.9 percent in 1967 to 43 percent in 1974. A similar trend is seen in infestation by other parasites.

427

Table 40. Yearly Parasite Infestation Rate

(Survey of Primary and Secondary School Students)

	1967	1968	1969	1970	1971	1972	1973	1974
Roundworms	61.9	65.2	70.6	55.6	51.6	45.8	42.0	43.0
Hookworms	2.2	2.7	1.6	1.2	0.7	0.4	0.4	0.4
Distoma	2.2	1.2	0.9	0.7	0.5	0.4	0.7	0.6
Ciliary eelworms	2.0	2.0	1.8	0.7	0.3	0.2	0.2	0.2

— The decline in the parasite infestation rate in the future will be determined by the improvement of individual anitation, sanitary disposal of human excrement, and increase in water supply facilities.

Endemic diseases such as worms affecting lungs and liver, and ciliary worms can be reduced to the minimum through extensive control in specific regions and research projects.

— Ongoing projects such as regular examinations of feces and insecticide drives should be expanded along with an increased campaign to improve environmental sanitation.

In particular, health education should be strengthened, while active assistance should be provided to the activities of the Parasite Extermination Association, a private organization.

2. Problems

2-1. Acute contagious diseases

— Persistent communicable diseases which can be prevented, and loss of manpower

428

— Relative increase in new communicable diseases

— Need for Increased input of money and energy for prevention of diseases

— Shortage of disease-control field workers

— Absolute shortage of testing workers and equipment and facilities.

2-2. Tuberculosis

— A high level of tuberculosis infection

— Quality-wise and quantity-wise shortage of tuberculosis-control field workers

— Increase in number of patients building up resistance to medicine

— Low ratio of registered patients

— Need for stepped-up treatment with primary administering of medicine, and timely acquisition of medicine at in adequate amounts

2-3. Leprosy

— Persisting existence of undiscovered patients

— Lack of measures for normal social activities by patients with negative germs

— Shortage of leprosy-control field workers and control facilities

2-4. Parasites

— High ratio of infestation

— Unsanitary control of water closets and unsanitary disposal of human excrement

— Lack of measures to attack endemic diseasses such as lung and liver distoma and ciliary worms

2-5. Adult diseases

2. Major Goals

- Stepped-up prevention of acute contagious diseases and disease-control activities

In order to reduce the over-all rate of acute contagious diseases to less than 20 per 100,000 persons, testing facilities will be expanded for authentic diagnosis. Also, surveys of the reporting of diseases and epidemic patterns will be conducted to reduce the irregular collective outbreaks of contagious diseases to the greatest possible extent.

Also, sporadic outbreaks of contagious diseases will be reduced to the minimum through extensive health education, preventive vaccination and anti-epidemic projects.

In particular, an effective campaign will be launched to discover germ-carriers in order to reduce the typhoid fever infection ratio.

- Discovery of tuberculosis patients and sharp reduction of infection rate

In order to reduce the tuberculosis infection rate from 3.3 percent in 1975 to 1.5 percent in 1981, discovery of patients will be extensively launched, the number of patients registered for treatment will be increased and primary medication treatment will be augumented.

In addition, secondary medication will be provided for those patients who have built up resistance to medicine.

For the prevention of tuberculosis among children, B.C.G. vaccinations will be steadily conducted while close cooperation with private organizations will be maintained.

- Discovery of lepers and strengthening of treatment

In order to reduce the leprosy infection rate from 8.9 percent to 5.0 percent, steady efforts will be made to discover

430

unreported lepers and bolster treatment through health education, and operation of mobile medical teams.

A survey of the leprosy infection rate will be conducted on a national scale while a leprosy control project will be launched in close cooperation with private organizations.

— Survey of adult diseases and intensification of enlightenment

— Intensification of health education to prevent parasites and survey of parasite infestation

In order to reduce the parasite (roundworm) infestation rate from 44 percent to 15 percent, health education, examination feces and removal of intestinal worms will be steadily launched.

Fact-finding surveys on lung and liver distoma will be conducted.

— Expansion of the testing function and facilities of health research institutes

The testing function and facilities of health research institutes are generally weak. Thus the function and facilities will be expanded to improve testing and quarantine activities which are basic to the control of diseases.

Table 41. Major Goals of Disease Control

	Unit	1975	1976	1977	1978	1979	1980	1981
Ratio of communicable diseases	Per 100,000 persons	44.7	40.6	36.5	32.4	28.3	24.2	20
Tuberculosis patient ratio	%	3.3	3.0	2.7	2.4	2.1	1.8	1.5
Positive leprosy ratio	%	8.9	8.9	7.6	7.0	6.4	5.8	5.0
Roundworm infestation rate	%	44	40	35	30	25	20	15

431

4. Projects

4-1. Restriction of outbreak of acute contagious diseases

— Intensification of preventive vaccination

Basic preventive vaccination for children, including cow-pox, D.P.T., and polio will be conducted for all children as planned, while preventive vaccination for typhoid fever and cholera will be conducted for inhabitants of areas which are vulnerable to these diseases.

— Intensification of discovery and examination of germ-carriers

In order to discover typhoid fever germ-carriers, workers employed in entertainment businesses and those who are suspected of carrying germs will be subjected to periodical examination of feces, while far-reaching health education will be conducted.

In addition, efforts will be made to revise the existing epidemic prevention law.

4-2. Survey of patients afflicted with uncommunicable diseases

Small-scale research and surveys of uncommunicable diseases will be conducted every year to prepare for the control of brain hemorrhages, malignant tumors, diabetes and hypertension, a project which is expected to be implemented under the fifth five-year economic development plan starting in 1982.

432

Table 42. Intensification of Preventive Vaccination and Examination of Germ-carriers

	Unit	1977	1978	1979	1980	1981	1977-81 Total
Preventive vaccinations (man-day)	1,000 persons	21,300	19,050	19,050	19,050	19,050	97,500
Examination of germ-carriers (man-day)	1,000 persons	590	590	590	590	590	2,950

4-3. Strengthening of Testing Functions of Health Research Institutes and Quarantine Stations

Among the health research institutes established in Seoul, Pusan, and each province, five institute buildings will be repaired or expanded, while six new buildings will be constructed, and equipment in each health research institute will be expanded.

In addition, in order to reinforce the function of each quarantine station, nine quarantine station buildings will be newly constructed, while 10 quarantine ships will be built and quarantine equipment will be augumented.

433

Table 43. Strengthening of Testing Functions of Health Research Institutes and Quarantine Stations

	1977	1978	1979	1980	1981	1977-81 Total
New building construction						
Quarantine stations	2	2	3	2	-	9
Health research institutes	-	2	2	1	-	5
Equipment supplementation						
Quarantine stations	67	49	27	-	-	143
Health research institutes	1,000	326	185	632	684	2,827
Quarantine ships	2	2	2	2	2	10

4-3. Lowering of tuberculosis infection ratio

-- Intensification of B.C.G. vaccination

B.C.G. vaccination will be implemented at least once for infants who are less than four weeks old, children below school age, and first-graders at primary schools.

For sixth-graders in primary schools, tuberculosis skin reaction tests will be conducted, and in case the result shows a positive reaction, one round of B.C.G. vaccination will be conducted.

-- Prim

434

— Doses of primary anti-tuberculosis medicine

Doses of primary anti-tuberculosis medicine will be given on the basis of standard prescriptions for all registered patients. (Ref. Table 3-15)

— Doses of secondary anti-tuberculosis medicine

Among the registered patients, secondary doses will be given on a small scale for patients who show resistent reactions to the primary doses.

— Every year an estimated 100,000 new patients will be identified through chest X-rays and examination of sputum, for treatment.

— Registration and treatment of patients

About 1.8 million patients including new and registered patients will be subject to treatment.

Table 44. Tuberculosis Control Target

	Unit	1977	1978	1979	1980	1971	1977-81 Total
B.C.G. vaccination	1,000 persons	2,400	2,400	2,300	2,300	2,200	11,600
Primary anti-tuberculosis medicine	"	134	134	134	134	134	670
Secondary anti-tuberculosis medicine	"		16	16	16	16	80
Discovery of patients	"		100	100	100	100	500
Registration and treatment of patients	"		180	180	180	180	900

435

4-4. Curtailment of positive germ ratio among registered lepers, and leper control projects

Treatment of patients at national leprosy hospitals

About 2,400 to 3,000 lepers with positive germs will be subjected to treatment free of charge every year at national leprosy hospitals. (Ref. Table 3-16)

-- Assistance for settlement of patients with negative reactions

Assistance will be provided for the settlement of those whose normal social activities are considered very difficult due to the problem of their outward appearance, although leprosy germs have turned negative.

-- Discovery of new patients

Every year about 1,500 to 1,900 new patients will be brought to light.

-- Survey of the leprosy infection rate

A nationwide survey of the leprosy infection rate will be conducted in 1977, while extensive health education will be conducted.

Table 45. Leprosy Control Project

	Unit	1977	1978	1979	1980	1981	1977-81 Total
Assistance for settlement of patients with negative reactions	Persons	2,600	2,650	2,750	2,800	2,900	13,700
Discovery of new patients	"	1,500	1,600	1,700	1,800	1,900	8,500

436

4-5. Lowering of parasite infestation rate

— Extensive examination of feces

The examination of feces will be conducted at least twice for all students at primary and secondary schools. (Ref. Table 3-17)

— Doses of vermicide

Vermicide will be administered to those who are infested with parasites as a result of the examination of feces.

— Fact-finding survey

Fact-finding surveys of the infestation of ciliary worms, lung distoma, liver distoma and other parasites will be conducted every year.

Table 46. Parasite Control Project

	Unit	1977	1978	1979	1980	1981	1977-81 Total
Roundworms among students	1,000 persons	8,150	8,200	8,250	8,300	8,350	41,250
Examination of feces							
Doses of vermicide	"	2,852	2,460	2,062	1,660	1,252	10,286

431

4-6. Implementation of health education

Extensive health education will be conducted for the general public every year.

4-7. Strengthening of testing function at health research institutes and quarantine stations

Among the health research institutes established in Seoul, Pusan, and each province, five institute buildings will be repaired or expanded, while six new buildings will be constructed, and equipment in each health research institute will be expanded.

In addition, in order to reinforce the function of each quarantine station, nine quarantine ships will be built and quarantine equipment will be augumented.

4-8. Promotion of private organizations

In order to encourage the campaign to eliminate parasites, private organizations including the Parasite Extermination Association will be given assistance and subsidies.

Section 7. Efficient Demonstration of Health Pilot Projects

Section 8. Improvement of Environmental Sanitation

The rapid growth of population and industrialization have caused various environmental problems.

Air pollution, water contamination, noise, vibration, soil pollution, disposal of waste materials and the task of conserving the natural environment have emerged as social and political issues.

There is a growing need to work out efficient measures regarding this problem in order to ensure the health of the people and preserve a comfortable living environment.

438

1. Present Status

1-1. Present status of waterworks

— The ratio of piped-water supply in the United States, Britain, Japan and other advanced countries exceeds 90 percent.

In our country, however, the ratio of piped-water supply is only 54.6 percent (as of the end of 1975). The ratio in rural communities is only 41 percent.

Due to the shortage of the supply of sanitary water; the rate of typhoid fever and other water-borne contagious diseases is high. And the medical cost required to combat these diseases is substantial.

— Due to lack of water supply systems in the countryside, inhabitants are compelled to expend considerable labor and time to secure potable water.

In other words, one family in the countryside spends an average 1.6 hours a day drawing and carrying water.

Table 47. Present Status of Water Supply

Unit: 1,000 persons (1975)

	Target Pop.	Benefited Pop.	Water Supply Rate (%)
Nationwide	34,681	18,941	54.6
Urban areas	16,770	14,331	85.5
Rural communities (up, myon)	17,911	4,610	25.7
Myon	14,353	4,610	32.1
Vulnerable regions with more than 20 homes in myon	11,150	4,610	41.3

Source: Population statistics, Oct. 1, 1975 (foreigners excluded)

439

1-2. Status of disposal of excrement in cities

— Sewage and excrement volume has been steadily on the rise in line with the rapid growth of urban population, but disposal facilities have not caught up with the rise.

Lack of sewage and excrement disposal facilities in cities inflicts damage on urban beautification and pollutes the source of piped water, thus causing infestation by parasites.

— The pollution of water serving as the source of supply in cities increases the cost of water purification.

In all major cities across the country, the volume of excrement subjected to sanitary disposal accounts for only 30 percent, while the amount not collected accounts for about 30.5 percent.

able 48. Excrement Disposal Facilities in Cities (1976)

Classification	Volume (Kl/H)	Ratio (%)
Collection target	7,000	100
Disposal situation		
Sanitary disposal	2,100	30.0
Unsanitary disposal	2,768	39.5
Not collected	2,132	30.5

— As for the status of excrement disposal facilities in cities, Seoul and Pusan have one facility each which is capable of disposing of 600 kiloliters a day.

440

There are about 56 excrement tanks at 35 places across the country, but 90 percent of them are inoperative.

- The existing system governing the instalation of excrement disposal facilities, loan arrangements for instalation, designing, construction process and licensing of technicians is insufficient.

2. Problems

- Low rate of sanitary water supply
- Inadequacy of sanitary water supply facilities in countryside
- Inadequacy of excrement disposal facilities in cities, and poor function of existing facilities
- Lack of ordinance concerning the disposal of excrement

3. Major Goals

- Expansion of water supply facilities

In order to improve the unsanitary water supply method which is the cause of water-borne contagious diseases, and to introduce one way of cultural life, sanitary water supply facilities will be introduced on a national scale, especially in the countryside.

The sanitary water supply ratio will reach 100 percent by 1981.

- Expansion of excrement disposal facilities in cities

Human excrement in cities, which is the source of contagious diseases and inflicts damage on urban beauty, will be collected and disposed of in sanitary fashion, while excrement disposal facilities in 35 cities will be extensively expanded to increase the ratio of sanitary disposal to 90 percent.

4. Projects

4-1. Elevation of sanitary water supply rate

- According to a survey conducted in June 1974, the number of villages with more than 20 homes which had no sanitary water supply facilities stood at 41,854, of which 25,112 had the potential of installing the facilities.

  During the period of the fourth five-year economic development plan, sanitary water supply facilities will be installed in 20,427 villages where installations are deemed possible, in order to raise the water supply ratio in the countryside from 41.3 percent to 100 percent by 1981.

- When the ratio reaches 100 percent, the population of those to enjoy the benefit of sanitary water supply will reach 10,728,000, and the number of sanitary water supply facilities will stand at 32,877.

Table 48. Sanitary Water Supply Project

	1975	1976	1977	1978	1979	1980	1981	1977-81 Total
Population in target areas (1,000 persons)	11,150	11,078	11,007	10,937	10,867	10,997	10,728	
Cumulative number of facilities	10,317	12,450	14,450	18,450	22,450	27,450	32,877	
Number of facilities to be installed	1,013	2,133	3,000	3,000	4,000	5,000	5,427	20,427
Average No. of persons to enjoy sanitary water per facility	444	400	360	320	280	240	200	
Total population of those to enjoy the benefits (1,000 persons)	4,610	5,463	6,543	7,503	8,623	9,823	10,908	
Propagation rate (%)	41.3	49.3	59.4	68.6	79.4	89.3	100.0	

442

2. Expansion of excrement-disposal facilities

The daily target volume of excrement disposal in major cities across the country is 7,000 kiloliters.

Seoul and Pusan have one excrement disposal facilities each, capable of disposing of 600 kiloliters a day.

Disposal facilities capable handling 100 kiloliters a day are under construction in Taejon, Chonju, Kwangju, Taegu and Chunchon. For the same facilities, ground will be broken in 1976 in Taegu, Masan, Inchon and Ulsan.

The construction of the disposal facilities will be expanded, and by 1981 the combined disposal capacity a day in 35 cities will reach 6,720 kiloliters.

This will raise the ratio of the sanitary disposal of human excrement from 29.5 percent in 1975 to 100 percent in 1981. This, coupled with the projected increase in the installation of flush toilets, is expected to greatly contribute to the improvement of environmental sanitary facilities.

Table 4-4. Expansion Plan for Excrement Disposal Facilities

	1976	1977	1978	1979	1980	1971	1977-81 Total
Target volume of disposal (A) (Kl/day)	7,000	7,000	7,000	7,000	7,000	7,000	
No. of facilities	4	6	10	10	12	12	50
Disposal capacity (B) (Kl/day)	2,100	2,652	3,572	4,492	5,596	6,720	4,620
Ratio (B/A x 100) (%)	30.0	37.98	51.0	64.2	80.0	96.0	96.0

443

Section 9. Extensive Conservation of Environment

1. Present Status

1-1. Status of environmental pollution

— Urban concentration and the development of industrial estates in line with population growth and industrialization have led to environmental pollution that is unprecedented.

As a consequence, the environment has been damaged and various natural resources have been diminishing.

— As of July 1975, the number of pollution-causing firms across country totaled 12,922, while 779 firms have been ordered to improve facilities in accordance with the anti-pollution law.

The firms which faced suspension of business operation and cancellation of licenses numbered 163.

— The major cause of air pollution is noxious gases including sulphur dioxide arising from the use of low-quality bunker C oil. Also, factories situated in downtown areas and loose maintenance of vehicles have emerged as major causes of urban pollution.

— Insufficient facilities for the disposal of sewage and drainage in cities, coupled with insufficient devices to treat waste water from plants, have been aggravating pollution.

— A survey of environmental pollution in some regions in 1975 indicated that pollution would get worse in line with the progress of industrialization.

In advanced countries, pollution has caused various diseases, notably, the Minamata disease reported in Japan, and the Idaiidai disease caused by cadmium pollution in soil and water.

In 1952, lingering smog in London led to the deaths of some 4,000 persons.

444

Despite steady efforts made by every country to combat pollution, various pollution accidents have been reported.

In this view, our country should take multilateral and active measures to combat pollution.

Table 49. Status of Environmental Pollution

(At the end of 1975)

Classification	Index	Region	Level of Pollution	Remarks
Air Pollution	SO_2 (PPM)	Seoul	0.048	Sept. average
		Pusan	0.045	Nov. average
		Inchon	0.033	Apr. average
		Standard level in foreign countries	0.04-0.25	
Water Pollution	BOD (PPM)	Han River	4.4	4 water intake places
		Nakdong River	4.1	2 water intake places
		Yongsan River	3.8	2 water intake places
		WHO-recommended level	6.0	

1-2. Status of Cemetery Control

— The cemetery area is 850 square kilometers, or 0.8 percent of the land area. The number of tombs is estimated to total 17 million, and the figure is expected to rise further.

By type, public cemeteries number 11,645, privately owned cemeteries number 42, and the number of individual cemeteries 519,318.

445

About one-third (five million tombs) of the total tombs are unaccounted for. Thus it is necessary to take steps to remove these unaccounted tombs, but the traditional posthumous respect for persons makes it hard to take action.

-- Moreover, people tend to shun cremation. Thus excess occupation of land by tombs causes economic loss such as the reduction of arable land.

Currently, there are 47 crematories, of which 15 are under normal operation. But most of them are outdated in facilities. There are four charnel houses, indicating a serious shortage.

2. Problems

2-1. Environmental conservation

-- Lack of law governing the conservation of the environment

-- Lack of standards on environment

-- Insufficient assistance system for projects relating to environment

-- Poor facilities and monitoring system for pollution measurement

-- Poor research and survey of the conservation of the environment

-- Shortage of know-how and specialists on the conservation of the environment

2-2. Tomb control

-- Lack of ordinance governing the control of cemeteries

-- Lack of general recognition of cremation system

446

3. Major Goals

3-1. Conservation of environment

— Arrangement of legal system for the conservation of the environment

— Intensification of regulations, supervision and guidance on the conservation of the environment

— Establishment and enforcement of environmental standards

— Stepped-up import of anti-pollution equipment and establishment of comprehensive pollution monitoring network

— Development of know-how to prevent pollution, and implementation of research and survey projects

— Relocation of pollution-causing firms in cities to industrial estates

— Extensive assistance to anti-pollution projects and installation of anti-pollution facilities.

3-2. Control of cemeteries

— Establishment of ordinance system governing the control of cemeteries

— Adjustment of crematory facilities and encouragement of use of crematories

— Collectivization and standardization of tombs

— Removal of unaccounted tombs

4. Projects

4-1. Conservation of environment

In order to work out comprehensive measures for the conservation of the environment, related ordinances will be adjusted.

447

An official organization dealing with the conservation of the environment will be established to strengthen the comprehensive coordinating function concerning the establishment and enforcement of the basic plans for the environment.

— As part of measures to prevent and arrest environmental pollution, new measuring instruments will be imported, while a comprehensive measurement network will be established on a national scale for an authentic look at the pollution situation.

— Anti-pollution technical field workers will be trained and cultivated, while various anti-pollution technical development plans will be established and implemented.

Table 50. Plan for Environmental Pollution Measurement Network and Conservation of Environment

	Unit	1976	1977	1978	1979	1980	1981	Total
Pollution measurement network	Set		40	50	58	62	81	291
Acquisition of equipment								
Acquisition of field workers	"		50	38	48	51	62	249
			(50)	(88)	(136)	(187)	(249)	(249)

— Regarding the development of anti-pollution know-how, specialized research organizations will be commissioned to conduct research on pending tasks and prospective problems.

The development of anti-pollution know-how will be undertaken under an annual program, starting with those items which require urgent action.

448

The plan calls for about 34 research programs during the five-year span.

— Research on environmental standards will be conducted and norms will be set forth during the period of the fourth five-year economic development plan.

Various measures for assistance to the installation of anti-pollution equipment at industrial facilities will be discussed and implemented.

Table 57. Development of Anti-pollution Know-how

	Unit	1977	1978	1979	1980	1981	Total
Anti-pollution know-how Development projects	No. of Cases	5	5	7	7	10	24

4-2. Control of cemeteries

— In order to restrict the expansion of cemetery areas and ensure efficient conservation and management of national land, related ordinances will be established.

— Also the crematory system will be encouraged. By 1981 80 crematories will be built, while the number of charnel houses will be increased to 80.

Table 52. Crematory and Charnel House Construction Plan

	1976	1977	1978	1979	1980	1981	Total
Crematories	2	6	8	12	24	30	80
Charnel houses	2	6	8	12	24	30	80

449

Appendix Tables

1. Investment Plan 99

2. Authorized Number of Medical Personnel by Job Type in Health Care Centers 147

3. Authorized Number of Personnel at Health Care Training Organizations 148

4. Authorized Number of Health Care Personnel by Year of School Grade 150

5. Medical Personnel Utilization Ratio 152

6. Health Personnel Training System 153

7. Method of Demand Forecast (Doctors) 155

8. Demand for Doctors and Facilities 157

9. Estimate of Other Health Care Manpower 158

10. Major Indices 160

11. Existing Statistical Surveys of Health Affairs 164

12. Status of Statistical Reports 166

13. Equipment for Health Statistical Compilation 167

Roster of Working Planning Team in Health Sector 168

450

Chapter 4. Principal Forecast for 1981

Appendix Table 1. Investment Plan

Overall-all Health Field

At 1975 prices:
(Domestic capital; ¥1 million
Foreign capital; $10-million)

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		176,878	4,552	179,081	77,181	33,601	36,500	31,799
Expansion of health medical care network		70,133		70,133	16,012	121	36,500	17,500
Public health and preventive control		32,609		32,609	25,548	7,061		
Environmental sanitation		72,832		72,832	32,114	26,419		14,299
Statistical survey of health	35 cases	567		567	567			
Health care demonstration projects		737	4,552	2,940	2,940			

458

Over-all Health Field (Cont'd)

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		27,970	976	28,442	12,653	4,707	6,232	4,850
Expansion of health medical care network		11,691		11,691	2,648	61	6,232	2,750
Public health and preventive control		6,070		6,070	4,883	1,187		
Environmental sanitation		9,940		9,940	4,381	3,459		2,100
Statistical survey of health	6 cases	111		111	111			
Health care demonstration projects		158	976	630	630			

453

Over-all Health Field (Cont'd)

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		28,278	1,291	28,903	14,132	5,733	4,188	4,850
Expansion of health medical care network		9,842		9,842	2,844	60	4,188	2,750
Public health and preventive control		6,427		6,427	5,066	1,361		
Environmental sanitation		11,683		11,683	5,271	4,312		2,100
Statistical survey of health	9 cases	117		117	117			
Health care demonstration projects		209	1,291	854	834			

454

Over-all Health Field (Cont'd)

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		35,589	1,339	36,237	15,227	6,561	8,149	6,300
Expansion of health medical care network		14,572		14,572	2,923		8,149	3,500
Public health and preventive control		6,582		6,582	5,139	1,443		
Environmental sanitation		14,107		14,107	6,189	5,118		2,800
Statistical survey of health	7 cases	111		111	111			
Health care demonstration projects		217	1,339	865	865			

455

Over-all Health Field (Cont'd)

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		41,007	946	41,465	17,890	8,046	8,154	7,375
Expansion of health medical care network		16,230		16,230	4,201		8,154	3,875
Public health and preventive control		6,739		6,739	5,229	1,510		
Environmental sanitation		17,782		17,782	7,746	6,536		3,500
Statistical survey of health	7 cases	103		103	103			
Health care demonstration projects		153	946	611	611			

456

Over-all Health Field (Cont'd)

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health sector		44,034		44,034	17,279	8,554	9,777	8,424
Expansion of health medical care network		17,798		17,798	3,396		9,777	4,625
Public health and preventive control		6,791		6,791	5,231	1,560		
Environmental sanitation		19,320		19,320	8,527	6,994		3,799
Statistical survey of health	6 cases	125		125	125			
Health care demonstration projects								

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health field		176,878	4,552	179,081	77,181	33,601	36,500	31,799
1. Expansion of health-medical infrastructures		70,133		70,133	16,102	121	36,500	17,500
- Expansion of health care centers		3,091		3,091	2,970	121		
New construction	2 places	121		121		121		
Equipment	198 places	2,970		2,970	2,970			
- Expansion of branches of health care centers		4,284		4,284	4,284			
New construction	308 places	2,464		2,464	2,464			
Additions to labor rooms	500 places	1,500		1,500	1,500			
Equipment	604 places	320		320	320			

458

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		39,173		39,173	2,673		36,500	
New construction	6 places (1,400 hospital bed)	8,362		8,362			8,362	
Improvement	33 places (2,640 hospital bed)	16,241		16,241	472 (30%)		15,769 (70%)	
Equipment	44 places	14,570		14,570	2,201 (1.5%)		12,369 (85%)	
- Mental hospitals		2,784		2,784	2,784			
Increase in hospital beds	400 hospital bed	2,357		2,357	2,357			
Equipment		427		427	427			

459

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Tuberculosis hospitals		2,977		2,977	2,977			
Increase in hospital beds	380 hospital bed	2,240		2,240	2,240			
Equipment		737		737	737			
- Construction of private hospitals and beds	2,000 hospital bed	15,000		15,000				15,000
- Arrangement of loans to construction of medical facilities in doctorless areas	500 places	2,500		2,500				2,500
- Evaluation of medicinal efficacy	500 cases	324		324	324			
!. Public health and disease control		32,609		32,609	25,548	7,061		
- Control of acute contagions diseases		3,213		3,213	3,213			

460

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Expansion of testing facilities and equipment	2,970	1,278		1,278	1,278			
Construction of buildings								
Quarantine stations	9 places	276.0		276.0	276.0			
Health research institutes	5 places	218.8		218.8	218.8			
Equipment								
Quarantine stations	143 places	62.0		62.0	62.0			
Health research institutes	2,827 places	421.2		421.2	421.2			
Building of quarantine vessels	10 vessels	300.0		300.0	300.0			
Preventive vaccination	97,500,000	1,180		1,180	1,180			

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Facilities for control of patients	5 places	542	542	542	542			
Discovery of germ-carriers	2,950,000	213		213	213			
- Tuberculosis control		18,461		18,461	15,558	2,903		
Preventive vaccination	11,600,000	45		45	45			
Discovery of patients	500,000	300		300	300			
Registration and treatment	900,000	12,310		12,310	12,310			
Management of field workers	27,845 person	5,806		5,806	2,903	2,903		
- Leprosy control		2,742		2,742	1,828	914		
Discovery and treatment of lepers	8,500 person	888		888	592	256		

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Settlement of lepers with negative reactions	13,700 persons	1,854		1,854	1,236	618		
- Mother-child health		7,728		7,728	4,484	3,244		
Childbirth	954,000	1,240		1,240	1,240			
Management of field workers	1,750	6,488		6,488	3,244	3,244		
- Research and survey of adult diseases	3 cases	55		55	55			
- Removal of parasites	10,286,000	410		410	410			
3. Improvement of living environment		72,832		72,832	32,114	26,419		14,299
- Instalation of sanitary water supply facilities	20,427 places	42,897		42,897	14,299	14,299		14,299
- Instalation of excrement disposal facilities	50 places	20,000		20,000	10,000	10,000		

463

	Total (1977 - 1981)							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Instalation of crematories	80 places	3,280		3,280	1,640	1,640		
- Chranel houses	80 places	960		960	480	480		
- Prevention of pollution		5,695		5,695	5,695			
Pollution measurement equipment	291 sets	4,255		4,255	4,255			
Anti-pollution field workers	249 sets	1,180		1,180	1,180			
Development of anti-pollution know-how	134 cases	260		260	260			
3. Statistical survey of health affairs	35 cases	567		567	567			
4. Health demonstration projects		737	4,552	2,940	2,940			

(Cont'd)

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health field		27,970	976	28,442	12,653	4,707	6,232	4,850
1. Expansion of health-medical infrastructures		11,691		11,691	2,648	61	6,232	2,750
- Expansion of health care centers		1,546		1,546	1,485	61		
New construction	1 place	61		61		61		
Equipment	99 places	1,485		1,485	1,485			
- Expansion of branches of health care centers		510		510	510			
New construction	26 places	208		208	208			
Additions to labor rooms								
Equipment	570 places	302		302	302			

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		6,845		6,845	613		6,232	
New construction								
Improvement	7 places (560 hospital bed)	3,445		3,445	100		3,345	
Equipment	10 places	3,400		3,400	513		2,887	
- Mental hospitals								
Increase in hospital beds								
Equipment								
- Tuberculosis hospitals								
Increase in hospital beds								
Equipment								

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Construction of private hospitals and beds	350 hospital beds	2,250		2,250				2,250
- Arrangement of loans to construction of medical facilities in doctorless areas	100 places	500		500				500
- Evaluation of medicinal efficacy	60 pases	40		40	40			
Public health and disease control		6,070		6,070	4,883	1,187		
- Control of acute contagious diseases		712		712	712			
Expansion of testing facilities and equipment	878	326		326	326			
Construction of buildings								

467

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Quarantine stations	20 places	90.0		90.0	90.0			
Health research institutes								
Equipment								
Quarantine stations	67 places	27.0		27.0	27.0			
Health research institutes	1,000 places	149.0		149.0	149.0			
Building of quarantine vessels	2 vessels	60.0		60.0	60.0			
Preventive vaccination	21,300,000	236		236	236			
Facilities for control of patients	1 places	108		108	108			
Discovery of germ-carriers	590,000	42		42	42			
- Tuberculosis control		3,465		3,465	2,998	467		

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Preventive vaccination	2,400,000	9		9	9			
Discovery of patients	100,000	60		60	60			
Registration and treatment	180,000	2,462		2,462	2,462			
Management of field workers	5,034	934		934	467	467		
- Leprosy control		447		447	298	149		
Discovery and treatment of lepers	1,500 persons	117		117	78	39		
Settlement of lepers with negative reactions	2,600 persons	330		330	220	110		
- Mother-child health		1,360		1,360	789	571		
Childbirth	168,000	218		218	218			
Management of field workers	1,400 persons	1,142		1,142	571	571		

469

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Research and survey of adult diseases								
- Removal of parasites	2,852,000	86		86	86			
Improvement of living environment		9,940		9,940	4,381	3,459		2,100
- Instalation of sanitary water supply facilities	3,000 places	6,300		6,300	2,100	2,100		2,100
- Instalation of excrement disposal facilities	6 places	2,400		2,400	1,200	1,200		
- Instalation of crematories	6 places	246		246	123	123		
- Charnel houses	6 places	72		72	36	36		
- Prevention of pollution		922		922	922			
Pollution measurement equipment	40 sets	859		859	859			

670

	1977							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Anti-pollution field workers	50 persons	38		38	38			
Development of anti-pollution know-how	5 cases	25		25	25			
3. Statistical survey of health affairs	6 cases	111		111	111			
4. Health demonstration projects		158	976	630	630			

(Cont'd)

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health field		28,278	1,291	28,903	14,132	5,733	4,188	4,850
Expansion of health-medical infrastructures		9,842		9,842	2,844	60	4,188	2,750
- Expansion of health care centers		1,545		1,545	1,485	60		
New construction	1 place	60		60		60		
Equipment	99 places	1,485		1,485	1,485			
- Expansion of branches of health care centers		953		953	953			
New construction	70 places	560		560	560			
Additions to labor rooms	125 places	375		375	375			
Equipment	34 places	18		18	18			

472

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		4,509		4,509	321		4,188	
New construction								
Improvement	6 places (480 hospital beds)	2,953		2,953	86		2,867	
Equipment	5 places	1,556		1,556	235		1,321	
- Mental hospitals								
Increase in hospital beds								
Equipment								
- Tuberculosis hospitals								
Increase in hospital beds								
Equipment								

473

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Construction of private hospitals and beds	350 hospital beds	2,250		2,250				2,250
- Arrangement of loans construction of medical facilities in doctorless areas	100 places	500		500				500
- Evaluation of medicinal efficacy	110 cases	85		85	85			
2. Public health and disease control		6,427		6,427	5,066	1,361		
- Control of acute contagious diseases		696		696	696			
Expansion of testing facilities and equipment	802	310		310	310			
Construction of buildings								

474

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Quarantine stations	20 places	90.0		90.0	90.0			
Health research institutes	2 places	87.5		87.5	87.5			
Equipment								
Quarantine stations	49 places	24.0		24.0	24.0			
Health research institutes	326 places	48.5		48.5	48.5			
Building of quarantine vessels	2 vessels	60.0		60.0	60.0			
Preventive vaccination	19,050,000	236		236	236			
Facilities for control of patients	1 place	108		108	108			
Discovery of germ-carriers	590,000	42		42	42			

975

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
– Tuberculosis control		3,706		3,706	3,118	588		
Preventive vaccination	2,400,000	9		9	9			
Discovery of pati petients	100,000	60		60	60			
Registration and treatment	180,000	2,462		2,462	2,462			
Management of field workers	5,674	1,175		1,175	587	588		
– Leprosy control		483		483	322	161		
Discovery and treatment of lepers	1,600 persons	139		139	93	46		
Settlement of lepers with negative reactions	2,650 persons	344		344	229	115		
– Mother-child health		1,458		1,458	846	612		
Childbirth	180,000	234		234	234			

476

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Management of field workers	1,500 persons	1,224		1,224	612	612		
- Research and survey of adult diseases								
- Removal of parasites	2,460,000	84		84	84			
3. Improvement of living environment		11,683		11,683	5,271	4,312		2,100
- Instalation of sanitary water supply facilities	3,000 places	6,300		6,300	2,102	2,100		2,100
- Instalation of excrement disposal facilities	10 places	4,000		4,000	2,000	2,000		
- Instalation of crematories	8 places	328		328	164	164		
- Charnel houses	8 places	96		96	48	48		

477

	1978							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Prevention of pollution		959		959	959			
Pollution measurement equipment	50 sets	834		834	834			
Anti-pollution field workers	88 sets	95		95	95			
Development of anti-pollution know-how	15 sets	230		230	230			
3. Statistical survey of health affairs	9 sets	117		117	117			
4. Health demonstration projects		209	1,291	834	834			

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health field		35,589	1,339	36,237	15,227	6,561	8,149	6,300
1. Expansion of health-medical infrastructures		14,572	14,632	14,572			8,149	3,500
- Expansion of health care centers								
New construction								
Equipment								
- Expansion of branches of health care centers		935		935	935			
New construction	70 places	560		560	560			
Additions to labor rooms	125 places	375		375	375			
Equipment								

479

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		8,679		8,679	530		8,149	
New construction	2 places (400 hospital beds)	2,389		2,389			2,389	
Improvement	7 places (560 hospital beds)	3,445		3,445	100		3,345	
Equipment	9 places	2,845		2,845	430		2,415	
- Mental hospitals		1,392		1,392	1,392			
Increase in hospital beds	200 hospital beds	1,178		1,178	1,178			
Equipment		214		214	214			
- Tuberculosis hospitals								
Increase in hospital beds								
Equipment								

480

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Construction of private hospitals and beds	400 hospital beds	3,000		3,000				3,000
- Arrangement of loans to construction of medical facilities in doctorless areas	100 places	500		500				500
- Evaluation of medicinal efficacy	110 cases	66		66	66			
4. Public health and disease control		6,582		6,582	5,139	1,443		
- Control of acute contagious diseases		627		627	627			
Expansion of testing facilities and equipment	521	240		240	240			
Construction of buildings								

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Capital Gov't	Local Gov't	People's Investment Fund	Others
Quarantine stations	3 places	54.0		54.0	54.0			
Health research institutes	2 places	87.5		87.5	87.5			
Equipment								
Quarantine stations	27 places	11.0		11.0	11.0			
Health research institutes	185 places	27.5		27.5	27.5			
Building of quarantine vessels	2 vessels	60.0		60.0	60.0			
Preventive vaccination	19,050,000	236		236	236			
Facilities for control of patients	1 places	108		108	108			
Discovery of germ-carriers	590,000	43		43	43			

482

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Tuberculosis control		3,744		3,744	3,138	606		
Preventive vaccination	2,300,000	9		9	9			
Discovery of patients	100,000	60		60	60			
Registration and treatment	180,000	2,462		2,462	2,462			
Management of field workers	5,702	1,213		1,213	607	606		
- Leprosy control		551		551	367	184		
Discovery and treatment of lepers	1,700	172		172	114	58		
Settlement of lepers with negative reactions	2,750	379		379	253	126		
- Mother-child health		1,556		1,556	903	653		
Childbirth	792,000	250		250	250			

487

	1979							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Management of field workers	1,600 persons	1,306		1,306	653	653		
- Research and survey of adult diseases	1 case	22		22	22			
- Removal of parasites	2,062,000	82		82	82			
3. Improvement of living environment		14,107		14,107	6,189	5,118		2,800
- Instalation of sanitary water supply facilities	4,000 places	8,400		8,400	2,600	2,600		2,600
- Instalation of excrement disposal facilities	10 places	4,000		4,000	2,000	2,000		
- Instalation of crematories	12 places	492		492	246	246		
- Charnel houses	12 places	144		144	72	72		

	1979							
	P Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Prevention of pollution		1,071		1,071	1,071			
Pollution measurement equipment	58 sets	826		826	826			
Anti-pollution field workers	136 persons	196		196	196			
Development of anti-pollution know-how	7 cases	49		49	49			
3. Statistical survey of health affairs	7 cases	111		111	111			
4. Health demonstration projects		217	1,339	865	865			

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
otal in health field		41,007	946	41,465	17,890	8,046	8,154	7,375
• Expansion of health-medical infrastructures		16,230		16,230	4,201		8,154	3,875
- Expansion of health care centers								
New construction								
Equipment								
- Expansion of branches of health care centers		935		935	935			
New construction	70 places	560		560	560			
Additions to labor rooms	125 places	375		375	375			
Equipment								

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		8,473		8,473	319		8,154	
New construction	2 places (600 hospital beds)	3,584		3,584			3,584	
Improvement	7 places (560 hospital beds)	3,445		3,445	100		3,345	
Equipment	4 places	1,444		1,444	219		1,225	
- Mental hospitals		1,392		1,392	1,392			
Increase in hospital beds	200 hospital beds	1,179		1,179	1,179			
Equipment		213		213	213			
- Tuberculosis hospitals		1,489		1,489	1,489			
Increase in hospital beds	190 hospital beds	1,120		1,120	1,120			
Equipment		369		369	369			

187

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Construction of private hospitals and beds	450 hospital beds	3,375		3,375				3,375
- Arrangement of loans to construction of medical facilities in doctorless areas	100 places	66		500				500
- Evaluation of medicinal efficacy	110 cases	66		66	66			
2. Public health and disease control		6,739		6,739	5,229	1,500		
- Control of acute contagious diseases		628		628	628			
Expansion of testing facilities and equipment	513	240		240	240			
Construction of buildings								

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Quarantine stations	2 places	42.0		42.0	42.0			
Health research institutes	1 place	43.8		43.8	43.8			
Equipment								
Quarantine stations								
Health research institutes	632 places	94.2		94.2	94.2			
Building of quarantine vessels	2 vessels	60.0		60.0	60.0			
Preventive vaccination	19,050,000	236		236	236			
Facilities for control of patients	1 place	109		109	109			
Discovery of germ-carriers	590,000	43		43	43			

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Tuberculosis control		3,773		3,772	3,152	621		
Preventive vaccination	2,300,000	9		9	9			
Discovery of patients	100,000	60		60	60			
Registration and treatment	180,000	2,462		2,462	2,462			
Management of field workers	5,722	1,242		1,242	621	621		
- Leprosy control		583		583	388	196		
Discovery and treatment of lepers	1,800 persons	215		215	143	72		
Settlement of lepers with negative reactions	2,800 persons	368		368	245	123		
- Mother-child health		1,653		1,653	959	694		
Childbirth	204,000	265		265	265			

140

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Management of field workers	1,700 persons	1,388		1,388	694	694		
- Research and survey of adult diseases	1 case	22		22	22			
- Removal of parasites	1,600,000	80		80	80			
3. Improvement of living environment		17,782		17,782	17,746	6,536		3,500
- Instalation of sanitary water supply facilities	5,000 places	10,500		10,500	3,500	3,500		3,500
- Instalation of excrement disposal facilities	12 places	4,800		4,800	2,400	2,400		
- Instalation of crematories	24 places	984		984	492	492		
- Charnel houses	24 places	288		288	144	144		

	1980							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Prevention of pollution		1,210		1,210	1,210			
Pollution measurement equipment	52 sets	830		830	830			
Anti-pollution field workers	187 sets	324		324	324			
Development of anti-pollution know-how	7 cases	56		56	56			
3. Statistical survey of health affairs	7 cases	103		103	103			
4. Health demonstration projects		153	946	611	611			

492

(Cont'd)

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Total in health field		44,034		44,034	17,279	8,544	9,777	8,424
1. Expansion of health-medical infrastructures		17,798		17,798	3,396		9,777	4,625
- Expansion of health care centers								
New construction								
Equipment								
- Expansion of branches of health care centers		951		951	951			
New construction	72 places	576		576	576			
Additions to labor rooms	125 places	375		375	375			
Equipment								

43

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Municipal hospitals		10,667		10,667	890		9,777	
New construction	2 places (400 hospital beds)	2,389		2,389			2,389	
Improvement	6 places (480 hospital beds)	2,953		2,953	86		2,867	
Equipment	16 places	5,325		5,325	804		4,521	
- Mental hospitals								
Increase in hospital beds								
Equipment								
- Tuberculosis hospitals		1,488		1,488	1,488			
Increase in hospital beds	190 hospital beds	1,120		1,120	1,120			
Equipment		368		368	368			

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Construction of private hopsitals and beds	450 hopsital beds	4,125		4,125				4,125
- Arrangement of loans to construction of medical facilities in doctorless areas	100 places	500		500				500
- Evaluation of medicinal efficacy	100 cases	67		67	67			
2. Public health and diseases control		6,791		6,791	5,231	1,560		
- Control of acute contagious diseases		550		550	550			
Expansion of testing facilities and equipment	256	162		162	162			
Construction of buildings								

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Quarantine stations								
Health research institutes								
Equipment								
Quarantine stations								
Health research institutes	68 places	102.0		102.0	102.0			
Building of quarantine vessels	2 vessels	60.0		60.0	60.0			
Preventive vaccination	19,050,000	236		236	236			
Facilities for control of patients	1 place	109		109	109			
Discovery of germ-carriers	590,000	43		43	43			
Tuberculosis control		3,773		3,773	3,152	621		

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Preventive vaccination	2,200,000	9		9	9			
Discovery of patients	100,000	60		60	60			
Registration and treatment	180,000	2,462		2,462	2,462			
Management of field workers	5,722	1,242		1,242	621	621		
Leprosy control		678		678	435	225		
Discovery and t treatment of lepers	1,900 persons	245		245	164	81		
Settlement of lepers with negative reactions	2,900 persons	433		433	289	144		
Mother-child health		1,701		1,701	987	714		
Childbirth	210,000	273		273	273			

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
Management of field workers	1,750 persons	1,428		1,428	714	714		
- Research and survey of adult diseases	1 case	11		11	11			
- Removal of parasites	1,252,000	78		78	78			
Improvement of living environment		19,320		19,320	8,527	6,994		3,797
- Instalation of sanitary water supply facilities	5,427 places	11,397		11,397	3,799	3,799		3,799
- Instalation of excrement disposal facilities	12 places	4,800		4,800	2,400	2,400		
- Instalation of crematories.	30 places	1,230		1,230	615	615		
- Charnel houses	30 places	360		360	180	180		

	1981							
	Project Volume	Domestic Capital	Foreign Capital ($)	Total	Central Gov't	Local Gov't	People's Investment Fund	Others
- Prevention of pollution		1,533		1,533	1,533			
Pollution measurement equipment	81 sets	906		906	906			
Anti-pollution field workers	249 sets	527		527	527			
Development of anti-pollution know-how	10 cases	100		100	100			
3. Statistical su. of health affa:	6 cases	125		125	125			
4. Health demonstr...ion projects								

499

Appendix Table 2.

Authorized Number of Medical Personnel by Job type in Health Care Centers

(Unit: persons)

	A Type	B Type	C Type	Total
Doctors	5	3	2	504
Denstists	1	1	1	198
Pharmacists	1	1	1	198
Health care nurses	3	2	1	282
Midwives	2	1	1	222
Nurses	27	14	4	1,704
X-ray technicians	2	1	1	222
Clinical pathologists	2	2	1	258
Dental technicians	1			24
Dental sanitarists	1	1	1	198
Those in health posts	12	8	6	1,404
Those in administrative posts	6	3	3	666
Nurses aides	10	10	3	1,014
Laborers	7	3	2	552
Sub-total	80	50	27	7,446

580

Appendix Table 3.

Authorized Number of Personnel at Health Care Training Organizations

Job Type	No. of Organizations	Authorized Number	Total Authorized Number
Doctors			
(Medical colleges)	14	1,270	7,620
Pharmacists			
(Colleges of pharmacy)	14	950	3,800
Dentists			
(Dental colleges)	5	240	1,440
Herb doctors			
(Oriental medical colleges)	2	80	480
Nurses			
(Colleges)	14	760	3,040
(Specialized schools)	35	2,520	7,560
(High schools)	3	146	438
Nurses aides			
(Training centers)		4,887	4,887
Clinical pathologists			
(Specialized schools)	1	520	1,560
(Junior college)	1	70	140

501

Job Type	No. of Organizations	Authorized Number	Total Authorized Number
Sanitarists			
(Specialized schools)	6	400	1,200
(Junior college)	1	40	80
X-ray technicians			
(Specialized schools)	3	200	600
(Junior colleges)	1	70	140
Dental technicians			
(Specialized schools)	3	240	720
(Junior colleges)	1	40	80
Physical therapists			
(Specialized schools)	1	80	240
(Junior colleges)	1	40	80
Health administrators			
(Specialized schools)	2	160	480
(Junior colleges)	1	50	100

502

Appendix Table 4.

Authorized Number of Health Care Personnel by Year of School Grade

	No. of Organizations	Preliminary Dept.		Main Dept.				Total
		1	2	1	2	3	4	
Medical colleges	14	1,359	1,457	1,420	1,331	1,200	1,079	7,846
Colleges of pharmacy	14	-	-	782	1,026	1,035	771	3,834
Dental colleges	5	351	362	260	210	182	155	1,520
Oriental medical colleges	2	168	158	91	40	39	67	563
Nurse educational organizations								
Nursing colleges	14		-	791	771	662	613	2,837
Nursing junior colleges	35		-	2,569	2,301	2,159		7,029
Nursing high schools	3			146	179	254		579
Nurse aides				4,887				4,887
Clinical pathologists								
(Specialized schools)	6		-	510	418			928
(Junior colleges)	1			83	73			156
Sanitarists								
(Specialized schools)	6			378	227			605

503

	No. of Organizations	Preliminary Dept.		Main Dept.				Total
		1	2	1	2	3	4	
(Junior colleges)	1			59	41			100
X-ray technicians								
(Specialized schools)	5			186	148			334
(Junior colleges)	1			108	56			164
Dental technicians								
(Specialized schools)	3			170	175			345
(Junior colleges)	1			61	36			97
Physical therapists								
(Specialized schools)	1			80	53			133
(Junior colleges)	1			50	44			94
Health administrators								
(Specialized schools)	2			98	76			174
(Junior colleges)	1			69	51			120

504

Appendix Table 5.

Medical Personnel Utilization Ratio

(Based on 1975)

	Based on License		Usable Personnel		
	Personnel (A)	Ratio to Doctors	Personnel (B)	Ratio to Doctors	B/Ax100
Doctors	16,798	100.0	12,902	100.0	76.8
Dentists	2,595	15.4	2,252	17.4	86.8
Pharmacists	19,750	117.6	1,796	132.0	86.6
Nurses	23,632	140.0	11,260	87.3	47.6
Nurse aides	22,344	133.0	11,870	92.0	53.1
Herb doctors	2,786	16.5	2,410	18.7	86.5
Midwives	3,773	22.5	1,700	13.2	45.0
X-ray technicians	1,093	6.5	770	5.9	70.4
Clinical pathologists	2,001	11.9	1,490	11.5	74.5
Dental technicians	939	5.6	670	5.2	71.3

Note: In usable personnel, those who are abroad or unemployed are excluded, but those in the military are included.

505

Appendix Table 6.

Health Personnel Training System

Type, Indispensable Conditions	Specific Conditions	Justification
1. Midwives		
Nurses	1. Nurse license-holders who have undergone training for one year at designated organizations; after training license is given without qualification examination	Article 6 of Medical Law
	(Authorized number of trainees is within one third of the average monthly births)	Health-Social Ministry decree
2. Nurses aides		
Graduates of middle schools or above; above 18 years of age	1. Completion of training at the training organizations designated by the Health-Social Affairs Ministry; Qualification recognized by province governors	Article 57 of Medical Law; Health-Social Ministry decree
	2. Training period covers 9 months to 1 year; lectures covers 740 hours; practice covers more than 780 hours	Health-Social Ministry decree

506

Type, Indispensable Conditions	Specific Conditions	Justification
3. Medical technicians Clinical pathologist X-ray technicians Physical therapists Occupational therapists Dental technicians Dental sanitarists	1. Graduates of junior colleges or above who have majored in health medical subjects commensurate with the desired licenses.	Article 4 of Medical Technicians Law
Graduates of high schools, junior colleges	2. Graduates of junior colleges and specialized schools who have learned skills for more than one year at health and medical organizations.	
	3. Graduates of high schools or above who have spent more than three years as apprentices at the above organizations.	
4. General doctors		
Graduates of medical colleges	1. Graduates of medical colleges who have passed state qualification examinations	Medical Law
5. Medical practitioners		
General doctors	1. Those who passed the state qualification examination, and also passed required qualification examinations after spending one year as interns, and three years as residents.	

507

Appendix Table 7.

Method of Demand Forecast (Doctors)

	Unit	1975	1976	1977	1978	1979	1980	1981	1990	Annual Average Growth Rate 1975-81	Annual Average Growth Rate 1981-90	Remarks
Total population	1,000 persons	35,281	35,860	36,436	37,019	37,605	38,197	38,807	44,549	1.6	1.5	
Demand for doctors												
1. Per capita in injuries a year	cases	2.2	2.23	2.26	2.29	2.33	2.36	2.40	3.50			
2. Hospital, clinic use rate (%)	%	31.3	33.8	36.5	39.5	42.8	46.09	50.0	70.0	8.1	3.8	
3. Total No. of cases of treatment	cases	24,294	27,040	30,067	33,495	37,514	41,572	46,600	109,145	11.5	9.9	(Total pop.) x (No. of per capita injuries a year) x (hospital, clinic use ratio)
Hospitalization	"	728	811	902	1,004	1,125	1,747	1,398	3,274			3% of total cases of treatment
Outpatients	"	23,566	26,229	29,165	32,491	36,389	40,325	45,202	105,871			97% of total cases of treatment
4. Total days of bed occupation	1,000 days	7,280	8,110	9,020	10,040	11,250	12,470	13,980	32,740			Average hospitalization days: 10 days
5. Total days of hospital visits	"	47,132	52,458	58,330	64,982	72,778	80,650	90,404	211,742			Average hospital visit days: 2 days

508

	Unit	1975	1976	1977	1978	1979	1980	1981	1990	Annual Average Growth Rate 1975-81	Annual Average Growth Rate 1981-90	Remarks
6. Total days of treatment	1,000 days	31,919	35,529	45,341	50,507	56,571	62,690	70,272	206,937	14.1	12.8	
Hospitalization	"	3,640	4,055	4,510	5,020	5,627	6,235	6,990	16,370			(No. of cases of hospitalization examination) x 5 times
Outpatients	"	28,279	31,474	40,831	45,487	50,944	56,455	63,282	190,567			(No. of outpatient treatment) x 1.2 to 1.8 days
7. No. of annual treatments by one doctor	persons	3,071	3,170	3,686	3,855	3,983	4,070	4,233	7,200	5.4	6.1	
Average daily No. of patients	"	9.8	10.2	11	12	13	14	15	260			
Annual duty days	days	313	312	310	300	291	285	280	276			
8. No. of patients requiring home treatment	1,000 persons	942	1,049	1,020	974	1,091	1,209	1,356	2,117	5.48	6,54	(2 to 4% of total outpatient treatment; 912 times per doctor a year; 2.5 persons a day) x 365 days

609

Appendix Table 8.

Demand for Doctors and Facilities

	Unit	1975	1976	1977	1978	1979	1980	1981	1990	Annual Average Growth Rate 1975-81	Annual Average Growth Rate 1981-90	Remarks
Demand for doctors												
1. Treatment	persons	10,400	11,200	12,300	13,100	14,200	15,400	16,600	28,740	8.10	6.3	Total No. of days of treatment / No. of treatments per doctor a year
2. Home-visit treatment	"	1,030	1,150	1,120	1,070	1,200	1,330	1,490	2,320	5.62	5.52	
3. Prevention, others	"	1,570	1,600	1,700	1,800	1,900	2,000	2,100	2,550	4.9	2.2	
4. Total	"	13,000	13,950	15,120	15,970	17,300	18,730	20,190	33,610	7.6	5.82	
Demand for facilities												
1. Required hospital beds	place	24,931	27,773	30,890	34,383	58,527	42,705	47,876	112,123	11.41	9.55	Total days of occupation of hospital beds / 365 x 125
2. Secured beds	"	37,000	38,600	40,300	42,000	43,900	45,800	47,800	112,100	4.36	9.38	
3. Required beds/ secured beds x 100	%	148	139	131	122	114	106	100	100			
Bed use rate	"	54	57	61	65	70	75	80	80			Required beds x 0.8 / Secured beds

Appendix Table 9.

Estimate of Other Health Care Manpower

	1975			1981			1990			Remarks
	A	B	C	A	B	C	A	B	C	
1. Doctors	13,000	100	2,713	20,190	100	1,923	33,610	100	1,325	
2. Demand for nurses	25,600	198	1,378	58,000	287	669	97,474	290	457	Based on 290 per 100 doctors
3. 2.1 Nurses	11,300	87	3,122	26,900	133	1,443	50,420	150	883	Improvement required regarding composition ratio between nurses and nurse aides
2.2 Nurse aides	14,300	11	2,467	31,100	154	1,248	47,054	140	946	
3. X-ray technicians	860	6	41,024	2,020	10	19,225	4,030	12	11,054	
4. Clinical pathologists	1,400	10.7	25,200	3,030	15	12,816	5,380	16	8,280	
5. Midwives	1,600	12.3	22,050	4,150	20	9,357	6,720	20	6,627	Estimated birth rate in 1990 : 23.88 No. of births: 1,064,000 Monthly 13 cases per person x 12 = 158 $\frac{1,064,000 \text{ cases}}{158 \text{ cases}}$ = 6,734 persons ≧ 6,720 persons
6. Herb doctors	2,400	18.4	14,700	2,910	14.4	13,345	3,900	11.6	11,422	
7. Pharmacists	16,500	126.9	2,138	18,000	89	2,145	20,800	62	2,141	
8. Dentists	2,200	16.9	16,036	3,870	19 (100)	10,035	6,720	20 (100)	6,629	
9. Dental technicians	680	5.2	51,883	970	48 (25)	40,036	1,654	49 (25)	26,934	4 persons per dentist; 1981 level to be maintained.

A: No. of persons, B: Composition ratio, C: Population per specialist

Method of Demand Forecast

Supply = licenses - (deaths + Overseas emigration + unemployed)

* Licenses:

  Licenses in previous year - deaths in previous year + new licenses in given year

* New licenses:

  Graduates (Authorized number of students) x pass ratio (including those failed in previous year)

* Deaths:

  Given mortality rate is applied to the number of license-holders

* Overseas emigration:

  Number of those who had been employed in previous year + (new licenses x overseas employment)

512

Appendix Table 10. Major Indices

	Unit	1975	1976	1977	1978	1979	1980	1981
* Population	1,000 persons	35,281	35,860	36,426	37,019	37,605	38,197	38,807
* Medical personnel								
Doctors	persons	16,798	17,718	18,803	20,024	21,336	22,546	23,796
(Per capita population)		(2,100)	(2,023)	(1,937)	(1,848)	(1,762)	(1,694)	(1,630)
Dentists	persons	2,595	2,740	2,911	3,109	3,357	3,684	4,020
(Per capita population)		(13,595)	(13,087)	(12,516)	(11,907)	(11,201)	(10,368)	(9,653)
Pharmacists	persons	19,750	20,600	21,527	22,463	23,301	24,153	25,004
(Per capita population)		(1,786)	(1,740)	(1,692)	(1,647)	(1,613)	(1,581)	(1,552)
Nurses	persons	23,632	26,490	29,504	32,833	36,315	39,935	43,692
Nurse aides	"	22,344	27,537	29,454	31,366	33,272	35,173	37,068
Total nurses	"	45,976	54,027	58,958	64,199	69,587	75,108	80,760
(Per capita population)		(767)	(663)	(618)	(576)	(540)	(508)	(480)

513

	Unit	1975	1976	1977	1978	1979	1980	1981
* General medical personnel								
Number of personnel	persons	7,005	7,012	8,716	10,070	11,628	13,430	15,522
(Per capita population)		(5,036)	(5,116)	(4,183)	(3,676)	(3,234)	(2,844)	(2,500)
* Population per bed								
– Above the level of hospital	persons	1,764	1,733	1,695	1,667	1,635	1,605	1,575
* Ratio of disease infection								
– Acute contagious diseases	Per 100,000 persons	44.7	40.6	36.5	32.4	28.3	24.2	20
– Tuberculosis	Against population of those above 5 years of age	3.3	3.0	2.7	2.4	2.1	1.8	1.5
– Leprosy	Positive ratio	8.9	8.9	7.6	7.0	6.4	5.8	5.0

514

	Unit	1975	1976	1977	1978	1979	1980	1981
- Roundworm infestation ratio	Against total population	44	40	35	30	25	20	15
* Level of living environment								
- Sanitary water supply rate in rural communities	%	41	49	59.5	68.7	79.5	90.9	100.0
- Sanitary excrement disposal ratio (35 cities)	%	-	30	37.9	51.0	64.2	80.0	96.0
- Ratio of pollution measurement equipment secured	%	-	32.1	39.4	53.7	67.3	81.6	100.0
* Population-related ratios								
- Natural growth rate	%	1.70	1.58	1.61	1.59	1.59	1.60	1.60

	Unit	1975	1976	1977	1978	1979	1980	1981
- Family planning participation rate	%	40	42	45	49	53	57	60
- Infant mortality rate	Per 1,000 persons	38	35	32	29	26	23	20
- Maternity mortality rate	Per 10,000 cases	5.6	5.0	4.6	4.2	3.8	3.4	3.0
- Childbirth assistance rate	Against births age	18.5	14.2	19.6	20.7	21.6	22.4	22.6
- Average longevity	age	68.1	68.7	69.4	70.1	70.8	71.5	72.2

Appendix Table 11. Existing Statistical Surveys of Health Affairs

At the end of 1975

Title, Survey Purpose	Survey Target	Survey Method	Survey Items
1. National natrition survey			
To measure the status of health and physical prowess of the people for data required to improve diet of the people	1,200 families across the country	Sampling method	Food intake; food economy; health status
2. Survey and measurement of growth of children			
To obtain data for improvement of physical prowess and health of the people	Those in 0-20 age group across the country	Mother-child health care field workers	Height, weight chest circumference, skull circumference
3. Survey of livelihood among those requiring relief measures			
To obtain data required for the improvement of criteria for relief measures, and social security system	Those eligible for relief under Livelihood Protection Law	Universal survey	Composition of families; number of family members; income, spending, hospitalization, etc.

517

Appendix table 11. Statistical Reports

At the end of 1975

	Total	Weeklies	Monthlies	Quarterlies	Semi-annual reports	Annual reports
Total	54	1	27	18	2	6
Bureau of medical affairs	9	-	2	6	-	1
Bureau of health affairs	9	1	7	1	-	-
Office of mother-child health control	2	-	2	-	-	-
Bureau of pharmaceuticals	9	-	6	2	-	1
Bureau of environmental sanitation	7	-	4	1	-	2
Bureau of social affairs	5	-	3	2	-	-
Bureau of women and children	13	-	3	6	2	2

518

Appendix Table 12. Status of Statistical Reports

	Total		Monthly		Quarterly		Semi-Annual Report		Annual Report		Remarks
	A	B	A	B	A	B	A	B	A	B	
Total	706	397	471	151	204	165	7	42	24	39	Total number of cases received: 5,038
Seoul	25	18	15	5	8	7	1	4	1	2	
Pusan	120	33	79	7	34	18	1	4	6	4	
Kyonggi Province	84	31	23	12	11	14	-	3	-	2	
Kangwon Province	41	27	20	7	20	15	-	2	1	3	
N. Chungchong Province	45	35	30	17	15	14	-	1	-	3	
S. Chungchong Province	57	37	41	18	15	16	1	1	-	2	
N. Cholla Province	63	42	45	19	18	14	-	5	-	4	
S. Cholla Province	101	48	62	21	32	15	-	7	7	5	
N. Kyongsang Province	52	45	39	16	12	18	-	5	1	6	
S. Kyongsang Province	75	42	52	14	17	16	3	7	3	5	
Cheju Province	67	39	39	15	22	18	1	3	5	3	
Quarantine stations	26	-	26	-	-	-	-	-	-	-	

A: Demand, B: Returned

519

Appendix table 13. Equipment for Health Statistical Compilation

Type of machine	No of units	Quality	loans	Remarks
Central processing machine (UNIVAC-1005)	1	Memory volume: 2ke Reading speed: 400 sheets/min Printing speed: 400 sheets/min (132 words/lines)		Operation is done through writing instead of internal programming
Punchers	6			
VP (puncher)	5		Lease	
VIP (printing punchers)	1		Lease	
Classifier	1	Classifying speed: 400 sheets/min	Lease	

520

Roster of Working Planning Team in Health Sector

Team leader: Pak Sang-Yol, Chief, Office of Planning-Coordination, Health-Social Affairs Ministry

Team member: Chang Kyong-sik, Director, Medical Bureau, Health-Social Affairs Ministry

" : Song Yu-Un, Director, Health Bureau, Health-Social Affairs Ministry

" : Han Kyu-Ho, Director, Mother-Child Health Control, Health-Social Affairs Ministry

" : Sim Ung-Ki, Director, Bureau of Pharmaceuticals, Health-Social Affairs Ministry

" : So Chong-Hyon, Director, Bureau of Environmental Sanitation, Health-Social Affairs Ministry

" : Pak Hyong-Chong, Dean, Graduate School of Public Health, Seoul Nat'l Univ.

" : Han Tal-Son, Cradjate School of Public Health, Seoul Nat'l Univ.

" : Chong Mun-Sik, " "

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521