

An Experimental Study on A Model Primary
Health Care Program in Korean Rural
Communities Utilizing Village
Level Self-Care Substructure

Yeo Shin Hong, Soo Il Kwak
Eun Ok Lee, Seon Ja Rhee
Kwang Woong Kim

DRAFT

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BACKGROUND

Korea, as a fast developing country of over 41.0 million people with total land area of 98,807 square kilometers, and a population density of 415 persons per Km² of land, has centered its efforts on national defense and economic development. Korea has been slow in recognizing its population's health care problems, and until 1980, vast area of rural communities were left with little access to health care. Health care services, for the most part, were left in the hands of private physician practitioners who were seldomly community oriented in their outlook, and limited in number. The cost of services was also often prohibitive to the average rural individual.

Indications of poor health care among the rural residents of Korea were readily noted. Large discrepancies existed in health care practices between those of the most sophisticated urbanites and the superstition-bound people in rural communities. Largely due to poverty, ignorance and lack of basic sanitary facilities, the rural citizens of Korea were often suffered from easily preventable or curable diseases.

The national record of 1980 shows that the infant mortality rate was 36.8 per thousand live births and the maternal death rate was 4.2 per 10,000 cases (Yearbook of Public Health and Social Statistics, 1980). Considering the fact that there is no effective mechanism for accurate registry of births and deaths in the country, and from the observations of maternal and child health care practices in rural communities, it is reasonable to assume that the infant mortality rate in rural areas would actually run higher than the already too high national figure.

IMR
MDR

In 1980, the national figure estimated the crude birth and death rates to be 23.4 and 6.7 per thousand population respectively, thus the rate of national population growth was estimated to be 16.7 per thousand population. This is a marked reduction in the rate of population growth as compared with previous decades. However, existing high population density, decreasing arable land and increasing environmental pollution, as well as their counter effect to the national economic development, all relate to the grave problems of population growth which have yet to be tackled.

Population
Problems

The lack of reliable data makes it difficult to assess the magnitude of health problems in this country. However, gross examination of various survey reports of rural communities during the 1970's indicates (1) approximately 73.5 percent of babies were delivered at home with only a relative's or neighbor's assisting, while in an urban area over 78.8 percent of all deliveries reported were attended by health professionals and occurred in hospitals or other institutions; (2) the percentage of pre-school children who have obtained adequate basic immunizations was very low except for smallpox; (3) a high rate of anemic conditions among pre-school and school age children indicative of iron deficiency was found on examination; (4) the supplementary foods intake of babies at weaning age was found to be grossly inadequate (E. Hyock Kwon et al., 1969, 1975, 1977).

health
problems

The report of general morbidity rates in rural communities in two recent studies revealed that the prevalence rate during a one-month period were 28.5 percent and 22.5 percent, respectively, and high incidence rates have repeatedly been found to be largely related to sanitary conditions (Soo-Myong Kim, 1976, Chonggi Park and Dae Sung Min, 1977).

In addition, national figures indicate that in 1980, there was a 2.5% tuberculosis prevalence rate among individuals over 5 years of age. Further analysis estimated that undetected tuberculosis cases were 61 percent of the total and, among those under treatment, only 18 percent of the cases were registered with public health services. Those remaining receive treatment from private sources with varying degrees of expertise (Yearbook of Public Health and Social Statistics, 1980). There are reports that further indicate a higher tuberculosis prevalence rate among villagers with big clan group settlements. Thus, strategies for tuberculosis control need additional emphasis.

Undiagnosed conditions leading to death were estimated to run about 30 percent of total deaths reported, and it was further estimated that only about 50 percent of total deaths were reported in 1968. Among those reported, only 28 percent of the death certificates were written by physicians nationwide, while 78 percent of the cases in Seoul were diagnosed and reported by physicians (Jung Soon Kim, Chonggi Park and Dae-Sung Min, 1977).

The utilization pattern of health services was found to be one in which the majority of cases, ranging from 42 percent to 72 percent, reported using drug store medicines. 2 percent to 14 percent reported using herbal medicine and accupuncture, while utilization of hospital care or physician visits ranged from 5 to 27 percent. No treatment was received in 15 percent to 26 percent of the persons with general illness conditions, and this proportion of "no treatment" cases rose to as high as 60 percent in chronic disease conditions (Soo-Myong Kim, Jong-Kwang Hong and Nam-Mi Kang, 1975).

*traditional
medicine*

Conclusion about the Health Care Situation in rural areas

Thus it is apparent that the health care practice of rural populations in Korea consist of self-treatment with drug store medicine based on self-diagnosis without a professional advice.

Recently, the government has made remarkable strides in the development of the country through its five five-year economic development plans. Beginning with its fourth five-year economic development plan in 1977, the government has placed a higher priority on the development of the social sector. Therefore the development of health services became one such high priority area. A greater proportion of investment has been allocated for the improvement of the health and well-being of the population through the extension of health care services to the poor with government subsidies and progressive adoption of health insurance policies for the major portion of the population, and through the improvement of environmental conditions.

As part of the government's effort to improve the health care delivery system, the Korea Health Development Institute, recently reorganized as Korea Institute of Population and Health, had been established under the auspices of the Ministry of Health and Social Affairs. Its purpose is to conduct systematic empirical research on problems related to public health in order to facilitate the formulation of national policies and programs in developing an effective system of national health care.

As a result of this empirical research, the government has promulgated a special act for the health care of Korean rural people which includes the support for preservice training and deployment of professional nurses as community health practitioners to conduct primary health care services in remote rural communities.

PHC

research

C.H.Ws

National Policy

training

CHWs

Community health practitioner's training was initiated in 1981 in affiliation with the country's prominent universities and training hospitals. A plan was developed for the training and support of 2,000 nurses as community health practitioners. A six-month training program was designed to prepare licensed professional nurses to function as a primary health care practitioners who would provide an integrated and comprehensive health care services in remote rural communities.

CO The government's directives include the establishment of a community health council at each community unit to support the primary health care services provided by the community health practitioner. The special act indicates that the functions of the community health practitioners would incorporate maternal-child health, family planning, prevention of communicable diseases, minor medical treatment, health education and environmental health. By the end of 1981, 406 community health practitioners were trained and assigned to local communities.

Tasks

Until 1980, the national public health system consisted of 202 public health centers and their subcenters located throughout the country which were primarily concerned with only selected health activities such as immunization programs, acute and chronic communicable disease control, and family planning. Besides their limited functions, health centers were too few in number and were primarily located in cities, so the public health centers as a source of primary health care were not available to the general public except in cases of tuberculosis, some selective maternal and child care services and family planning. Furthermore, the reputation of such services suffered from allegation of low quality and impersonal care.

Cooperative efforts between Korean Medical Association and the administrators of the government to recruit physicians have been fruitless with lingering mistrust for temporary appointments of health personnel. Thus, the recent government's intervention with community health practitioner programs in remote rural areas is considered a major break through in bringing quality primary health care service to this currently unreached population. However, this program was only at the beginning stage of experimentation and there were no established and proven guidelines for effective program implementation. Many rural health projects have experimented with the utilization of various village workers and community groups. However, the experiences gained remain more instructional than concrete, and many gaps in knowledge with regard to the level of needed training, supervision and organizational linkages exist. Thus, it was imperative to study the effects of alternative approaches to implementation of primary health care service delivery at the local communities for the formulation of guidelines for an effective and efficient operations of the program.

impetus
for
study

STUDY PURPOSE

Objective
This project was designed to test the feasibility and effectiveness of an experimental primary health care program in the remote Korean rural communities incorporating existing nonhealth community organizations as substructures for health care service delivery in conjunction with the activities of community health practitioners who have been specially trained and deployed by the Health Ministry of the Korean government.

Problem
The project specifically addresses itself to the problem of how existing nonhealth community organizations can be effectively used as village level substructure for primary health care service to facilitate the effectiveness of Community Health Practitioner in her role function and expand the health care services to currently underserved target populations.

The particular questions to be addressed were as follows; 1) Can the use of existing nonhealth community organizations as primary health care service substructures effectively facilitate the productivity and effectiveness of the community health practitioner and expand health care service coverage for target populations? 2) How does the effect of the utilization of an official formal organization as primary health care service substructure compare with the utilization of an informal, various membership group in facilitating the productivity and effectiveness of the primary health care program conducted by community health practitioners? 3) How does the effect of the use of different substructures compare in terms of the cost-effectiveness of the services?

Methods : Phase I

METHODOLOGY

Phase 1: Problem Analysis

On examination of national health statistics, rural health research reports, quarterly Community Health Practitioner (CHP) activity reports and from observations on site visits, the project team felt that there was need for improvement of the effectiveness and productivity of CHPs in their delivery of primary health care services. The project team concluded that there were three broad categories of variables that affect CHP effectiveness and productivity: (1) personal characteristics of CHPs including their level of motivation; (2) administrative, technical and logistical support from the suprastructure; and (3) community characteristics including demographic and geographical variables, socio-economic status and their subcultures, major health needs, and the level of community participation.

baseline survey
From the above observations, we designed a baseline field survey to further delineate the problems of primary health care services provided by CHPs in our study areas. This baseline survey included a random household survey on health status and health management practices, characteristics of communities, community leaders and CHPs, and monthly activities of CHPs.

Results of baseline survey
The Problems identified from the baseline survey fell into three primary categories; (1) Problems related to health care service needs; (2) Problems related to health service system's needs; and (3) Problems related to leadership capacities and community participation.

Problems related to Health Care Service Needs

Problems related to health care service needs have been clarified

Results of HH survey

through analysis of the data from household surveys. The demographic data showed a marked decrease in proportion of age group 20-44 years and an increase in age group of 45 years and above in the study area as compared with a metropolitan area. (Fig. 1) As this figure indicates, a great proportion of the young productive generation left rural areas for employment in industrial urban cities. This emigration of the younger generation results in a rural community with unique health problem. These include: 1) a proportionately larger dependent population; 2) an increased incidences of chronic illness problems among the aged; 3) a comparatively less educated population which is relatively more ignorant of health related matters; and 4) the potential problem of isolation among the aged.

From March 1982 to February 1983, it was found that the annual birth rate in the study areas was 30.3 per thousand population, a higher birth rate as compared with the national average of 23.5 per thousand population. In actuality, this rate could be much higher considering the fact that young productive generation is proportionally smaller in these areas. Health care implications from this data include identified needs for maternal and child health care and for family planning guidance.

Among reported deliveries, an average of 45.4% occurred at home with only a family member's or neighbor's assisting. The rate of pre and post-natal care was relatively lower considering the fact that among prenatal care recipients, the frequency of care received was in the range of 1 to 3 times per pregnancy. The percentage of children immunized among the 0-3 year age group ranged from 61.5% to 69.7% in each category of vaccination, about 30% short of total coverage.

Problems related to family planning practice among eligible women

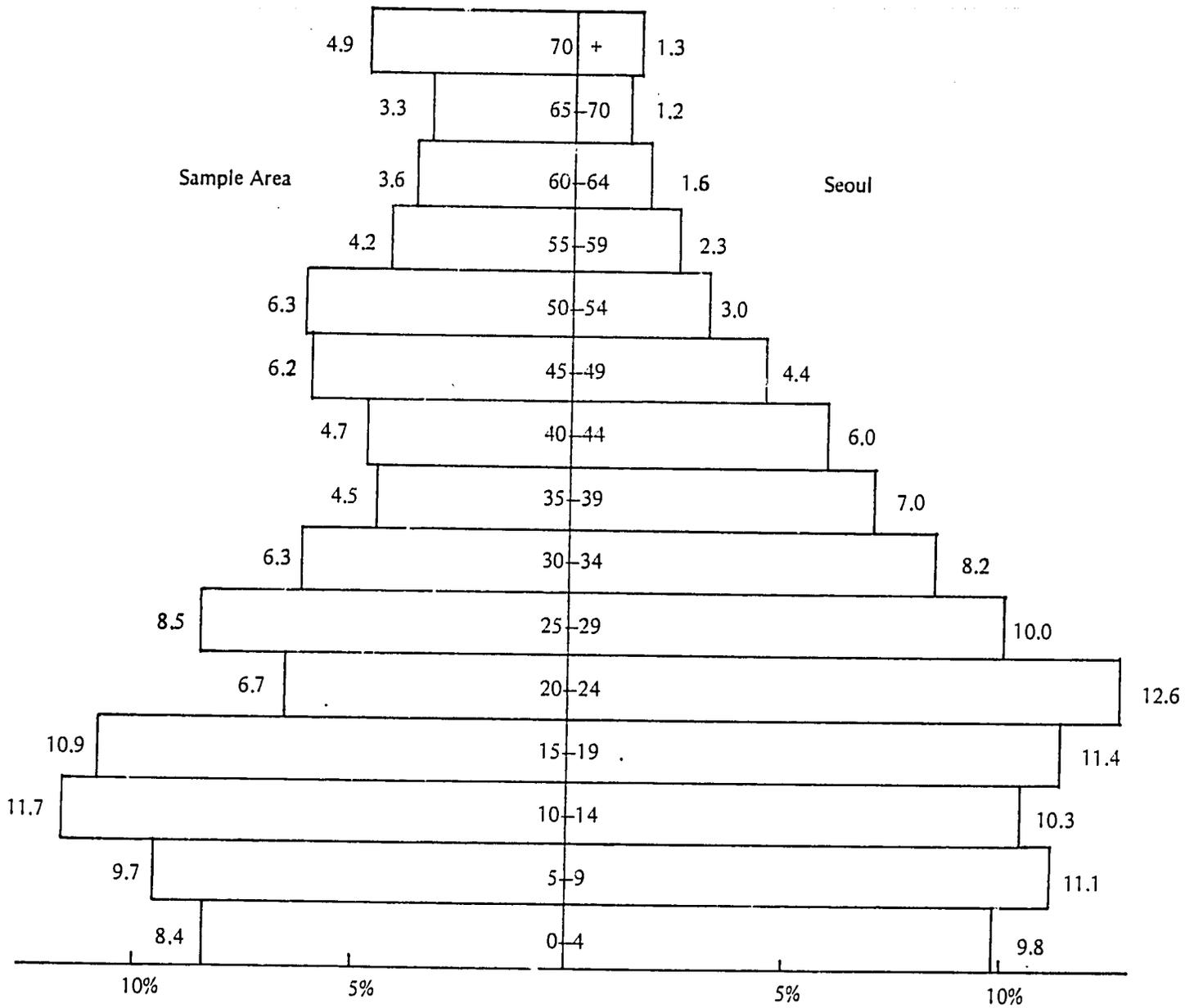


Fig. 1. Age Distribution of the population in sample area & seoul

Results of HH Survey

were also apparent. Many deterrents to further reduction of population growth were predicted. Among them were: (1) a good proportion of the reduction in birth rate has been attributed to artificial abortions and late marriage and not to the prevention of pregnancy, (2) self-motivated couples were already practicing family planning, (3) family planning practice rates were high among the middle age group and low among the younger age groups, (4) boy preference over girl was still prevalent, and (5) the concept of male dominance, filial duties and ancestral worship remains a hindrance to family planning practices.

Thus new approaches to the problem should incorporate strategies that can mobilize every possible means to reach groups of young men and women during the premarital and newly wed states and that can assist them to cope with the influence of traditions and old generations.

The morbidity rate for a 15 day period showed 111.4 episodes of illnesses Per 1,000 population with a range of 102.2 to 121.5 illnesses events. About 88.6% of the individuals with reported episodes of illness received treatment. However, further analysis of the sources of treatment showed that individuals used drug store medicines and self-diagnosis about 34.3% of the time and second in frequency to CHP post services.

Problems related to Health Care System's Needs

CHWS Problems related to health care system's needs were identified from the analysis of the baseline CHP monthly activity records. The data revealed that CHP activities were mainly concentrated on clinic-based medical care services for minor illnesses while field-based preventive and promotive activities were minimal. This problem of treatment centered

Results of CHP Activity Survey.

activities was due partly to CHP characteristics and partly to the expectations of community people.

The expectations of community people for CHP services focused on medical care in events of illnesses and ready availability of services at any times. Thus, absences from the post, even for out of clinic activities, were considered by the community people as negligence of duty.

Factors inhibiting a comprehensive health care service by CHPs were manifold: 1) CHP's limited vision and ingenuity in health care service; 2) misconceptions or lower priority for preventive or health promotive services on the part of community people; and 3) lack of assistance and effective communication channels among the CHP, the community people and the referral suprastructure.

Limited fund availability for CHP services was also an inhibiting factor. Financing of CHP services largely depended on fees collected from patients for medical care services. Almost no money was allocated specifically for preventive or health promotive care services.

CF

Another problem concerned was the inaccessibility of public transportation to and from the CHP post, villages and referral health service facilities. Buses ran on schedule and distance to CHP post on the average was not inhibiting. However, there were some isolated villages where the use of public transportation was impossible. Thus, it seems inappropriate for CHP to plan for frequent home and village visits for individual care. Mobilization of community resources should be sought as an alternative to frequent CHP's personal visits to homes and villages.

CHWs
Transport

Problems related to Leadership Capacity

Problems related to leadership capacity among community leaders centered around role development in health related matters. Leaders' ignorance in the field of health service seemed to be related to the minimum level of health related activities, even though their self evaluations of leadership skills and prospective leadership roles in primary health care service were rated high.

Methods - Phase II

* Phase II: Solution Development *

In order to alleviate the problems and to improve primary health care services by CHPs, the following approaches were identified as intervention modalities for the project operation;

- ① train CHPs regarding the importance of field centered activities which would focus on strengthening the self-care abilities of communities for the accomplishment of primary health care goal;
- ② establish effective communication channels between the CHP and the community utilizing existing community organizations and their established meetings;
- ③ enhance the understanding of community leaders concerning the CHP role and the importance of community participation in planning, implementing and evaluating the primary health care efforts; and
- ④ develop and train the community health leaders (CHL) to serve as communicators, health educators, and health care providers for minor ailments. In addition, the role of community leaders should include motivating community people for self care activities and for participation in the community's primary health care services.

CO In view of the problems and the approaches identified to alleviate the problems the project team decided that a focus on facilitation of community participation would serve as the key strategy. Thus, community organization was chosen as decision variable for the study. The strategy for enhancing community participation entailed the incorporation of existing community organizations as substructures to primary health care services. For this decision variable, three solution alternatives were tested, namely: (1) utilization of an official community organization; (2) utilization of informal community organizations; and (3) utilization of the current pattern of CHP practice as a control.

Phase III: Solution Validation

Methods: Phase III

Research Design

This action research was designed primarily as phase III solution validation study to analyze the effect of the experimental input on: (1) the effectiveness of the program on the basis of the selected indices of health and health services; (2) the productivity of the CHP Program in terms of the quantity of the services produced; and (3) the efficiency in terms of cost incurred and population reached or coverage extended. The result of the experimentation is seen through pre and post-test comparison and inter-group comparison.

CO In this study two experimental groups and one control group were used to compare the effects of the solution alternatives. Experimental group I incorporated Bansang-Hoe (villagers' meeting), a formal official organization with monthly regular meetings, as the substructure for primary health care service.

CO

Experimental group II incorporated various informal community groups such as mothers' club, 4-H club, church group, agricultural cooperatives, extension workers, clans meeting and committee for new village movement as the substructure for primary health care services (Table 1). The control group did not incorporate any special substructure.

These substructures were used as the system of communication and referrals for the dissemination and collection of health information and the delivery of health care services. Leaders of these nonhealth organizations were trained to function as health communicators, self-care facilitators and minimal care givers.

Figure 2 and table 2 show the overall research design for this study. The health service programs conducted by CHPs were uniform between control and experimental groups. The goals of increasing efficiency were measured by criterion variables in each category of service and costs incurred in goods, salaries and time for services.

Methods

Table 1. Existing Nonhealth Community Organizations

Names of Nonhealth Organization	Membership Criteria and activities
<i>formal</i> Villager's Meeting	One household member should attend the monthly meeting to discuss villagers' interests.
4-H Group	Group of Young men and Women organized in support of community activities.
Mother's Club	Housewives hold memberships. Family planning and self-help programs are their major focus.
Agricultural Co-ops	Most farmers are members of the co-op and meet frequently to discuss agriculture issues.
Church Group	Church activities center around worship and evangellism. According to their religious objectives, they organize formal and informal meetings.
Clans Meeting	The same family names are tied very strongly for protection of family's inheritance.
Committee for New village movement	Village leaders have memberships. Their activities are related to the improvement of rural life.
Extension Worker	A government employee who work with farmers to disseminate new technologies to increase production.
↑ <i>is this a community organization?</i>	

informal

Pre-test
April-May 1983

Post-test
March-April 1985

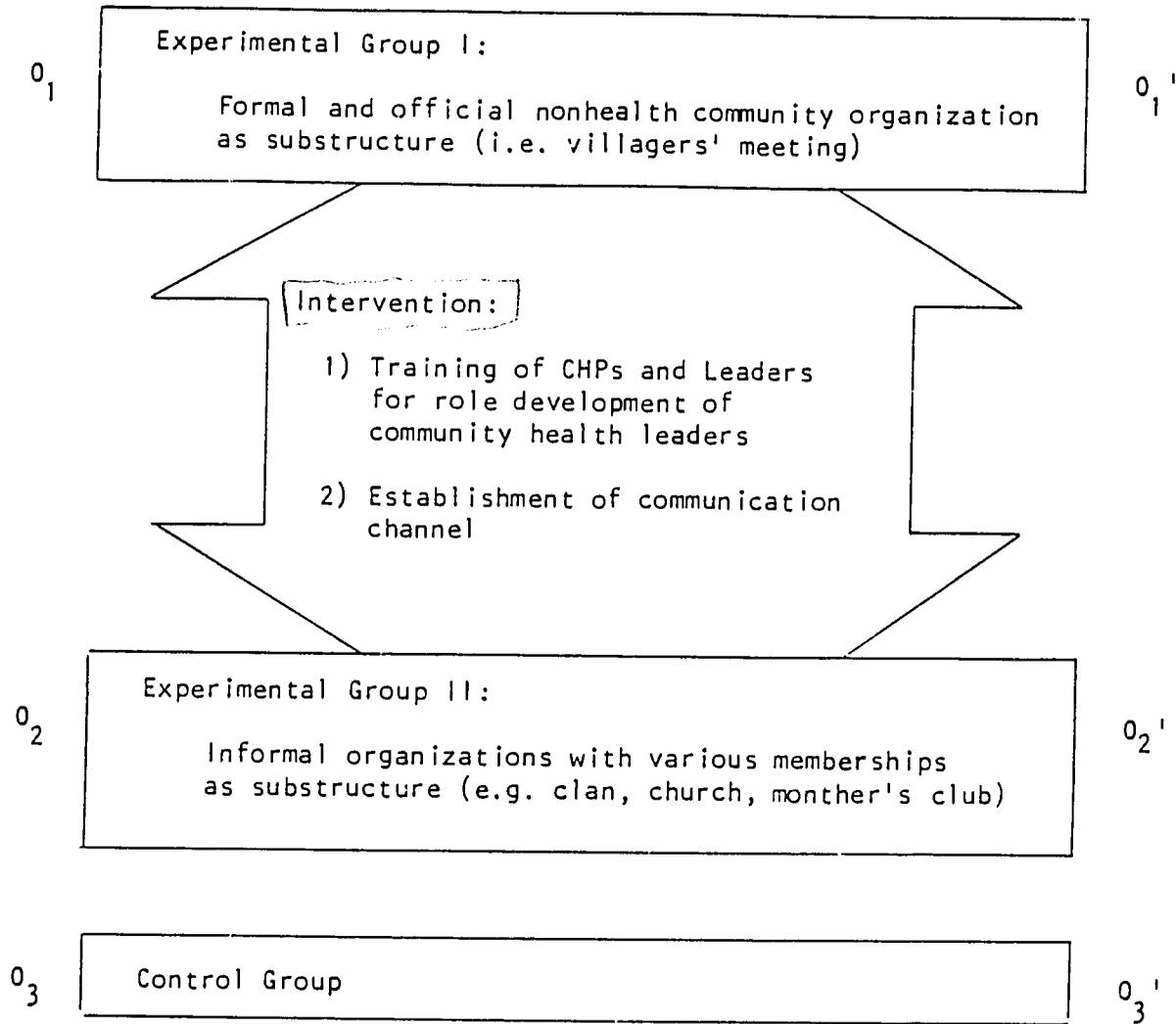


Fig. 2. Research Design

Table 2
Design for Experimentation

Study groups	Experiment I	Experiment II	Control
Type of organization utilized as substructure	Formal and official organization (villagers' meeting)	Informal org. with various memberships (irregular meetings for their own purposes)	No addition, left at CHP's disposal
Experimental inputs at the village level	<ul style="list-style-type: none"> -CHP & Leader training for role development of Community Health Leaders -Bansang Hoe as channel of communication 	<ul style="list-style-type: none"> -CHP & Leader training for role development of Community Health Leaders -Communication through various group meetings 	<ul style="list-style-type: none"> -No structured training -Arbitrary means of communication
<p>CHW Training</p> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block;"> <p>Contents of training</p> </div>	<ul style="list-style-type: none"> -Concept of PHC, and role of CHP and community leaders, -Technical knowledge and basic skills in maternal care, child care, family planning, prevention and home care management of common ill-health conditions, and first aid care in emergencies 	The same as experiment I	No structured content

Methods : Data Collection

Data Collection

Data collected for this research project include data from household surveys, data from service records of CHPs and activity records of CHLs. In addition, a set of basic data on characteristics of communities, CHPs and community leaders was collected at the beginning of the study. The data was used to assess their influences on experimental outcome.

The questionnaire for the household survey was composed of questions related to: 1) the demographic characteristics of individual families and their members; 2) incidences of acute illnesses and types of health facilities utilized; 3) diagnosed tuberculosis cases and/or cases with suspicious symptoms with the pattern of treatment; 4) family planning practices and attitudes toward family planning; 5) patterns of prenatal, perinatal and postnatal care; 6) care of infants in terms of feeding and weaning practices, health consultations and immunizations; 7) the utilization pattern of health services including CHP posts and the expressed attitude toward each service; and 8) annual health expenditure of each household. Each category of the questionnaire included several questions which were essential for understanding the health status and health practices of each family.

The total sample size numbered 1,289 for the baseline survey and 1,142 for the final survey. The same households were utilized in both surveys, and the difference in numbers was due either to family absence at the time of the final survey, migration of the people from the study area or deletion from the sample because of problems related to change in CHP.

HH
Survey

CHP Activity Survey

A set of service activity data was collected on a continual basis for a period of fifteen months. Through monthly activity checklists of CHPs and CHLs, the probable possible change desired in the service activities as an effect of experimentation.

CF? The CHP checklist was composed of; 1) clinic-centered activities; 2) field-centered activities; and 3) operation cost for the CHP post. The form was constructed in such a way that every day's service activities of CHPs and costs could be checked on a sheet up to 31 days. The checklist was composed of 25 items and cover categories of services such as medical care, maternal care, child care, tuberculosis control, family planning and other field-based activities. Program costs tallied included sources of income such as fees for services and donations and expenditures for maintenance of the CHP post, purchase of drugs, salary of personnel, and other incidental costs.

Activity checklist for CHLs included categories of activities pertaining to the roles of communicator, health educator, motivator, referrer, and first aid care provider. In addition, the project team decided that there was a need to investigate the characteristics of CHPs, CHLs, and communities which might exert great influences on the processes, and the outcomes of the primary health care services provided through CHP service activities. Thus, three sets of questionnaires were constructed, each address the personal characteristics of CHPs, CHLs, and the socioeconomic and geographical characteristics of the communities.

Data Analysis

Three techniques were used for data analysis. One technique was simple

Methods: Data Analysis

inter-group comparison with pre-post quantitative comparison. The second was simulation technique, and the third was cost-effectiveness analysis.

1. Statistical Analysis: Analysis of Data from the survey and monthly activities of CHPs and CHLs |

→ analyze data from the survey and monthly activities of CHPs and CHLs for the pre and post-test data comparison. Simple analysis methods such as frequencies, means and percentage distributions were used to

Limitations inherent in the characteristics of the data precluded the use of sophisticated statistical analysis.

The hypothesis testing for the differences between experimental and control groups was planned initially using significant tests.

Methods

Changes

It was assumed that with five townships in each county originally, non-parametric statistics such as the Wilcoxon signed-rank test could be used since rates or ^eman frequencies of these townships could be counted as individual scores. However, the number of townships that continuously participated in the study was decreased to four in Ansung and Yang Pyeong counties, thus, the hypothesis testing became meaningless.

Another attempt for hypothesis testing was tried with the McNemar test to assess the change in health behaviors such as family planning, maternal, child care practices, and etc. of the community people. However the number of families matched for the same kinds of experiences or events was found to be too small for valid use of this type of test.

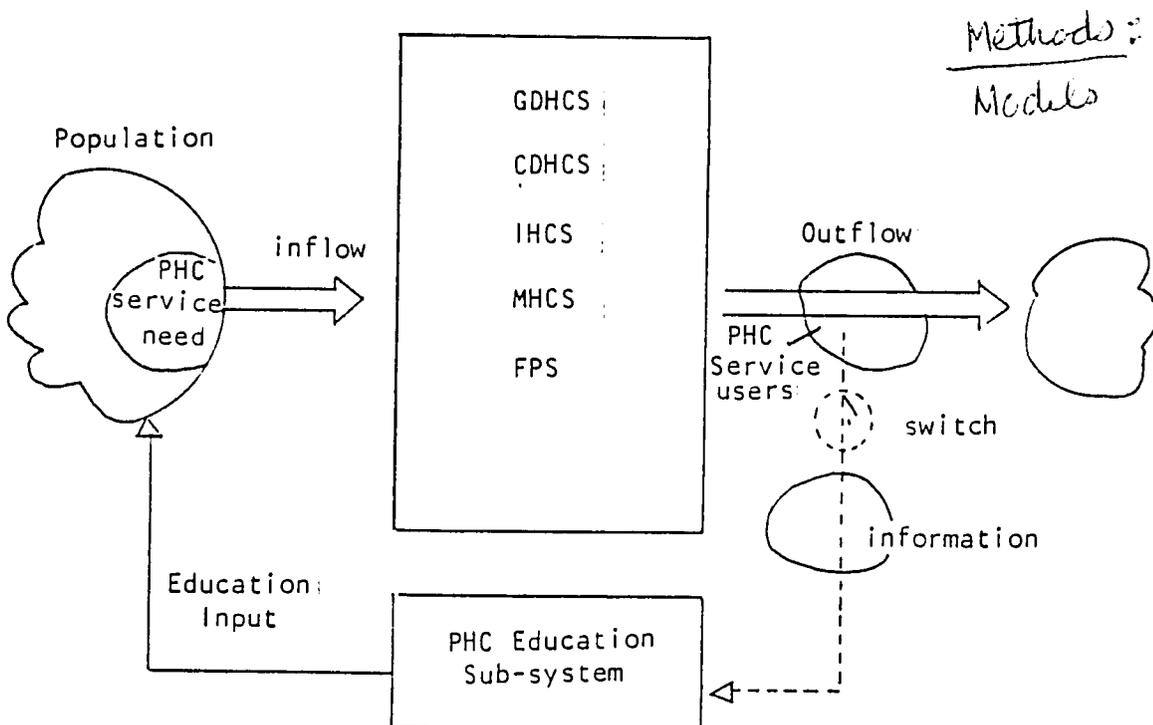
2. Simulation Technique |

Since a primary health care system is characterized by its complexity and dynamic change, it was decided that analysis based on a simplified models required too many assumptions and was restricted in its application.

System Dynamics (S.D.) as a simulation model, however, could be used effectively for the analysis of such a complex and dynamic system. Thus, for this study S.D. was adopted as a basic tool for model building and simulation running in the analysis of the utilization pattern of health services.

1) Model building of primary health care systems

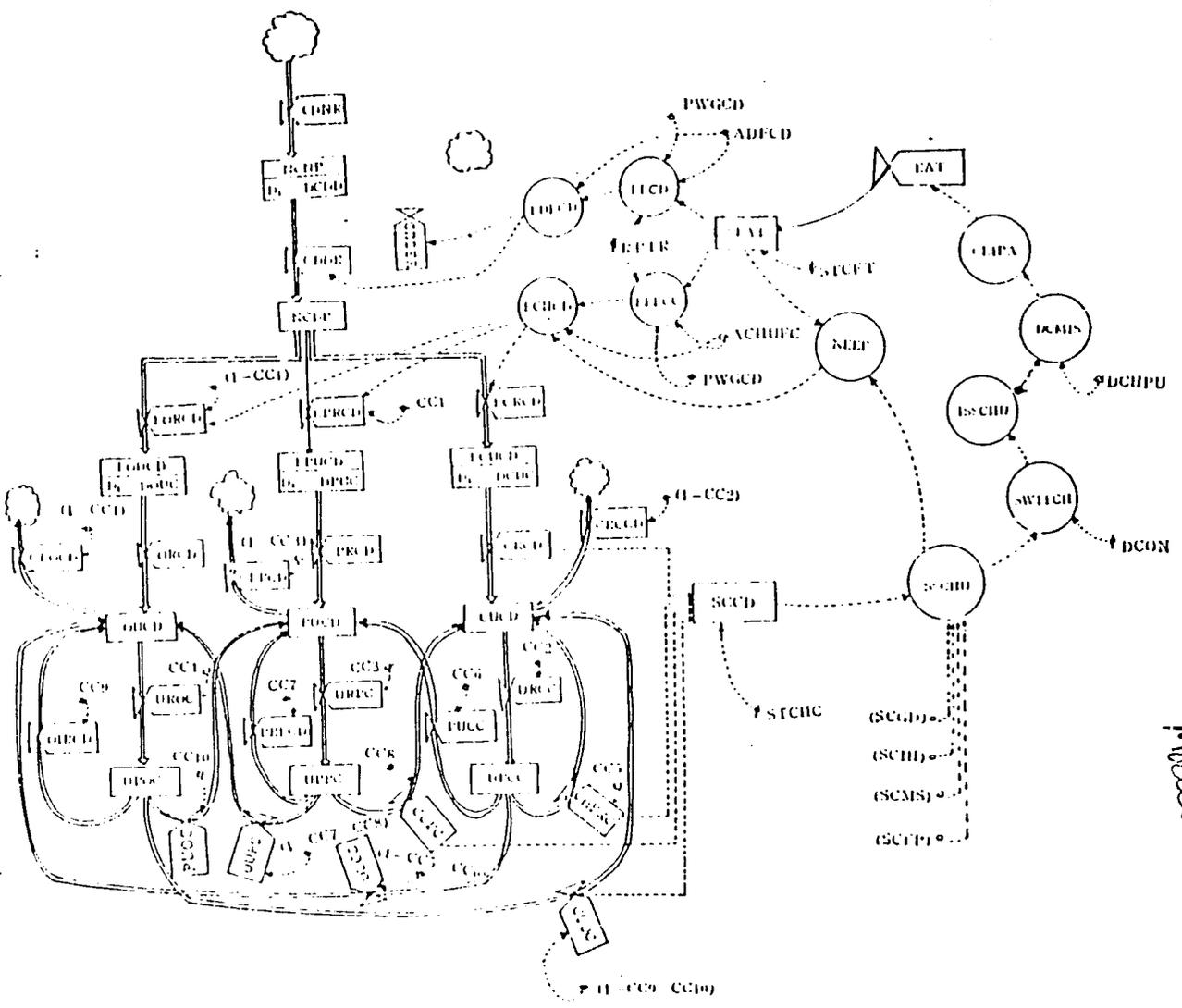
As exhibited in figure 1, the PHC service system was divided into five subsystems: (1) general acute disease care subsystem, (2) chronic disease care subsystem, (3) infant care subsystem, (4) maternal care subsystem and (5) family planning subsystem. An education subsystem was built in as an experimental input system. The complexity of the PHC service system with illustrations of the identified variables can be seen in figure 2.



(Fig. 3: Basic PHC service system model)

- 4 -
~~22~~
22

System Model



(Fig. 4: Flow Diagram of PHC service system model)

Variables of Flow Diagram

- CDNR : Chronic Disease Health Care Service (CDHCS) Needing Rate
- NCNP : Number of CDHCS Needing Persons
- DCDD : Delay of CDHCS Demand
- CDDR : CDHCS Demand Rate
- CDDER : CDHCS Demand Expiring Rate
- NCDP : Number of CDHCS Demanding Persons
- FDPCD : Fraction of Demand From CDHCS need Persons

23

System Model

EECD : Education Effect for CDHCS	OUCD : Other institution Users for CDHCS
PWGCD : Power of Group to CDHCS	PUCD : Pharmacy Users for CDHCS
ADFC : Average Demand Fraction for CDHCS without Education	CUCD : CHP Users for CDHCS
EORCD : Expected Other institution usage Rate for CDHCS	CROCD : Cured Rate of Other institution users for CDHCS
EPRCD : Expected Pharmacy usage Rate for CDHCS	CRPCD : Cured Rate of Pharmacy users for CDHCS
ECRCD : Expected CHP usage Rates for CDHCS	CRCCD : Cured Rate of CHP users for CDHCS
FCHCD : Fraction of CHP users for CDHCS from NCDP	UROC : Uncured Rate of Other institution users for CDHCS
EEFCC : Education Effect of CDHCS to CHP users	URPC : Uncured Rate of Pharmacy users for CDHCS
EOUCD : Expected Other institution Users for CDHCS	URCC : Uncured Rate of CHP users for CDHCS
EPUCD : Expected Pharmacy Users for CDHCS	UPOC : Uncured Persons of Other institution users for CDHCS
ECUCD : Expected CHP Users for CDHCS	UPPC : Uncured Persons of Pharmacy users for CDHCS
DOUC : Delay of Other institution Usage for CDHCS	UPCC : Uncured Persons of CHP users for CDHCS
DPUC : Delay of Pharmacy Usage for CDHCS	OIRCD : Other Institution Reusage rate for CDHCS
DCUC : Delay of CHP Usage for CDHCS	PUOC : Pharmacy Usage rate from Other institution Users for CDHCS
ACHUFC : Average CHP Usage Fraction for CDHCS from NCDP without education	CUOC : CHP Usage rate from Other institution Users for CDHCS
ORCD : Other institution usage Rate for CDHCS	PRECD : Pharmacy Reusage rate for CDHCS
PRCD : Pharmacy usage Rate for CDHCS	OUPC : Other institution Usage rate from Pharmacy users for CDHCS
CRCD : CHP usage Rate for CDHCS	CUPC : CHP Usage rate from Pharmacy users for CDHCS

CHPRC : CHP Reusage rate for CDHCS
OUCC : Other institution Usage rate from CHP users for CDHCS
PUCC : Pharmacy Usage rate from CHP users for CDHCS
SCCD : Smoothed CHP users for CDHCS
STCHC : Smoothing Time to cheek CHP users for CDHCS
CC1- : Outflowing fractions from each Level to next Level.

SSCHU : Sum of Smoothed CHP Users
ISSCHU: Influenced SSCHU by SWITCH function.
DCON : Decision Constant (0 or 1)
DCMIS : DCHPU Minus ISSCHU
EAT : Education Time
STCET : Smoothing Time to Cheek Education Time
NEEF : Negative Education Effect.

2) Basic simulation run

In order to understand the basic characteristics of the PHC system behavior, the "step-function" as a simple test condition for the System Dynamics study was used. In testing, it was found that, on simulation time 10, chronic disease health care service needers (ODNR) were increased suddenly by 10% from their original number. Time means Delta Time (DT) or time increment in this model. Unit DT is semi-month. In this basic simulation run "education subsystem" was not attached because a simple test condition was preferable to see how PHC service system would react to this sudden disturbance.

Result
of
Simulation
Run

The result of this basic simulation run showed that all primary health care users (A), pharmacy users (P), and smoothed CHP users (S) gradually move toward a new equilibrium. This means that our PHC systems have a simple form of negative feedback loops.

3) Cost-Effectiveness Analysis

Cost-effectiveness analysis was another technique employed to analyse the effect of experimentation. It is one technique that often is used as a decision making tool to select a future course of action. When it is used for primary health care planning, it can help policy-makers and program managers examine alternative ways of achieving a given set of objectives and enable them to select the most effective alternative by comparing the costs and effectiveness of alternatives.

Objectives

The cost-effectiveness analysis here is designed (1) to identify the productivity of the community health practitioner (CHP) in terms of the quantity of the services produced and (2) to evaluate the effectiveness of

Methods: Cost-Effectiveness Analysis

each of the primary health care programs by the CHP on the basis of the selected indices of health services.

For an accounting of Program costs and the measurements of the effectiveness the following items were considered.

Items for Costs:

Recurrent Costs

- Personnel
- Travel
- Per Diem
- Transportation
- Material and Supply Costs
- Other Direct Costs

Capital Costs

Item to measure the effectiveness outputs:

No. of services provided by CHPs such as:

- CHL training session
- Basic medical services
- Maternal health care services
- Child health care services
- Family planning services
- Tuberculosis control services
- Field based activities

No. of activities done by CHLs such as:

- Information dissemination to the community people and report to CHP

Methods: Cost-Effectiveness Analysis

Health education provided to the community people

First aid care provided

Initiation of community health activities in villages

Analysis of cost-effectiveness of each alternative

Analysis of costs included consideration of the:

Magnitude of the cost for each alternative

Absolute difference in costs by line item

Relative differences in line item costs

Analysis of effectiveness included consideration of the:

Differences in the magnitude of each alternative

Absolute differences in outcomes

Relative differences in outcomes

Cost-Effectiveness Analysis

cost-effectiveness ratio of each alternative

(computed by dividing the total cost of each alternative by its
outcome data)

Alternatives examined included:

Alternative A: Primary health care services by CHP were incorporated with a formal official organization (Bansang-Hae), the villagers' meeting. The study area was Yang Pyong.

Alternative B: Primary Health care Services by CHP were incorporated with various informal community groups such as a mother's club, 4-H club, a church group, agricultural cooperatives, clans meeting, etc. The study area was Icheon.

Alternative C: Primary Health care Services by CHP was not incorporated with any special substructures. The study area was An Sung.

Time Table for Project Activities

Methods

The stuey was undertaken according to the attached time table. The project activities were divided into three distinct stages: Stage 1, field preparation and problem analysis; stagc 2, implementation and process evaluation; and stage 3, final evaluation and solution validation.

1) Field Preparation, Problem Analysis and Solution Development

The first stage of this study encompassed selection of field sites, field preparation, collection of baseline data from households, CHPs, and CHLs, problem identification, solution development, and analysis of data.

1) Selection of field sites

Through initial visits to potential counties within keyonggi province comparison of geographic and demographic characteristics and the characteristics of CHPs in these areas, the final selection of three countries as study areas was made from January through February 1983 for their compatibility. Two experimental groups and one control group were randomly assigned among these counties.

2) Field preparation and formulation of questionnaires

Field visits to townships in experimental and control sites were carried out in February-April 1983 through in order to obtain cooperation

CO-
first
approache

CO

from community people for the purpose of the project, and to build grass-root channels of communication as cooperating substructures for community health practitioner programs.

A detailed analysis of CHP activities was also made during these visits. Informations gathered provided directions for the formulation of activity checklists and detailed plans for the conduction of the baseline household survey. After the initial contacts with central and local government officials of Country Health Centers, CHPs and community leaders, arrangements were made for an official formal channel of communication among the groups.

3) Sampling

For the purpose of the household survey, 20% of the total households were randomly selected from each area. Heads of households were identified for this sample from the registry of households kept in township offices. The resultant sample consisted of 400 households in Yang Pyong, 421 in Icheon and 405 in An Sung. A total of 1,256 households from of 71 villages covered by the 15 CHPs participated in the study.

4) Collection of baseline data

The baseline household data were collected from March to April of 1983 with willing assistance from CHPs and community leaders, even though it was busy season for the farmers. Surveys on characteristics of CHPs, communities and community leaders, and baseline survey CHP activities were completed in July 1983. For the household surveys, 15 senior nursing students were recruited and trained as interviewers. Based on problems identified in the pilot study carried out in March some modifications to

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the questionnaire were made.

5) Problem identification through analysis of baseline data

data
Analysis
Computers
Data analysis was conducted from May to August, 1983. Unfortunately some complicated problems arose in the process of data analysis. More specifically, many errors were found in editing and coding and punching the data for computer analysis. Therefore, it required more time than expected in order to find and correct the errors.

Due to the delayed data analysis, problems and alternative solutions were set up on the basis of the impressions gained from the initial marginal data analysis. Three categories of problems and their solution alternatives were identified as indicated in the methodology.

2.) Implementation and Process Evaluation

The second stage included implementation of the demonstration program, process evaluation and data collection from the CHPs and CHLs. The implementation phase included preparation of teaching materials for the CHPs and CHLs and facilitation of CHLs in fulfilling their assigned roles to the community people.

The process evaluation was conducted midway during the implementation.

1) Preparation of teaching materials and conduction of the training programs

CHV
Training
From March to December of 1983, three investigators and a research assistant prepared teaching materials in leaflet form and collected other available materials for the training of CHPs and CHLs. CHP training was conducted during August and through mid-September 1983 by the investigators with regard to the additional activities that were required for CHP

role functioning in experimental groups.

Community leader trainings were carried out from September, 1983 through December, 1984. Each CHP has trained their community leaders, as an integral part of their role functioning, they were expected to disseminate the health informations through substructures utilizing teaching materials provided by the research team.

CHW Training
The first stage of training programs for CHLs was conducted from September through October 1983. The content included basic concepts of primary health care approaches with an emphasis on the importance of community participation and the roles of community leaders in primary health care services.

CHL Tasks
Emphasis was placed on the role of liaison functioning, such as communicating, motivating, facilitating, and distributing brochures and other health information to the community people.

Training Content
The second stage of community leader training was conducted from November to December and focused on the use and recording of health related activities on the checklist. The third stage of training concentrated on MCH services including prenatal care, delivery services, post-partum care, family planning, health care in cases of abortion, weaning supplementary diet, immunization schedule, and general care of infants. The training period extended from January to March, 1984 and the content was based ^{on} information obtained from baseline surveys.

The fourth round training program for the community health leaders was conducted from April to July and concentrated on first aid care in injuries and burns and resuscitation in pulmonary and circulatory

emergencies. From September to December 1984 the training programs focused on the prevention, case finding and care of patients with hepatitis, diabetes mellitus, cancer, tuberculosis and other chronic conditions as well as the problems related to drug abuse. After the harvest in November, 1984 through February 1985, the project team encouraged CHPs and CHLs to independently conduct health education activities in the villages with the brochures and films provided by the project team.

2) Collection of monthly data | CHPs and CHLs

Monthly activity records of CHPs and CHLs which had been completed during the previous month were collected at each monthly meeting with CHPs and new blank sheets were distributed to them. Data of CHP service and community health leaders' activities were collected throughout the research period from December 1983 to February 1985.

Categories of services identified included medical care, maternal care, child care, tuberculosis control, and family planning. Data on program cost was collected from CHP's reports. The primary sources of income were CHP salary subsidies and donations from villagers. Expenditures included maintenance cost of the CHP post, purchase of drugs, salary of personnel, and other incidental costs.

CHW
incentives

3) The process evaluation

Through the sample survey for the process evaluation, three different purposes were achieved; one was to examine whether the population at need was being reached by the community health leaders through formal and informal meetings; the second was to motivate and assist the CHLs to provide health education for the groups they were leading through their

own organization activities, and the third was to inform the community people about the community health leader's responsibility and his availability to provide assistance when needed. The process evaluation was conducted in August, 1984.

The sample selection in process evaluation was done at two levels. On third of all community health leaders in both Icheon and Yang Pyong was selected as one sample. The second sample included community residents of the Icheon and Yang Pyong areas. Sixteen interviewers were selected from senior nursing students and were trained to conduct the interviews with the community health leaders and community residents. The interview was structured and a semi-standardized format composed of open-ended questions was identified.

Results of Post-Survey of CHWs (Mid-Survey?) Findings were qualitatively analyzed since open-ended questions were used to obtain the data. Most CHLs felt that the various health education programs provided were meaningful and valuable to them. And that their role as communicators between CHP and community people was realized. However, it was also found that CHLs were often discouraged due to the fact that community people neither recognized them as health care providers nor as health educators. Thus, most CHLs were timid in assuming the roles of health educator and care provider in public. They perceived these roles must be conducted by professional ones.

The majority of community residents in the sample were aware of the CHP and her role, but had little information about the community health leaders and their roles. Some had participated in formal health education programs provided in villager's meeting groups. However, the perceived value varied depending on the enthusiasm of the CHPs and

community leaders. Significant seasonal variations were also noted in terms of the extent of participation by community people in these programs. It was also found that sex roles have great influences on the role functioning of community leaders. For example, leaders of mother's clubs were very active in teaching certain subject areas to women in the community.

CHWs
Support
Inservice
Training

After the initial training of CHPs, the project team worked closely with them through scheduled meetings, site visits, incidental consultations and formal and informal contacts concerning the operation of the project. However, the project team found as a result of the process evaluation that enthusiasm on the part of CHPs for strengthening the field-based activities needed to be boosted. Thus, a two-day workshop was planned and conducted for CHPs on September 17th and 18th, 1984.

3. Final Evaluation and Solution Validation

Solution alternatives developed on the basis of the baseline data were validated through analysis of the household data and the data from CHPs' monthly activities. A dissemination seminar and final report were included in this stage.

1) Final household survey

From January to February 1983, households which have participated in the baseline survey in 1983 were identified. There have been some changes among the CHPs with whom the project teams had been working. Two of the CHPs had resigned in Icheon and Yang Pyong, a CHP could not actively participate in the monthly meetings or in the training of CHLs due to child birth. Thus, the research team decided to exclude these areas from the data analysis. Therefore, the sample size was decreased from 1,256

to 1,142. Questionnaires were reviewed on the basis of the data obtained in the baseline survey. Feedback provided by interviewers immediately after the baseline survey was also taken into consideration.

For the actual household survey, 16 newly recruited nurses, trained as interviewers conducted the survey from the end of March to the end of April 1985.

2) Final analysis of data

The data on key variables in the final data collection was compared with that gathered in the baseline survey in each experimental and control group. The data from the CHP and CHL checklists was also analyzed and compared between groups on various variables. Discussions were conducted to analyze the data. Unfortunately, no sophisticated analysis could be employed because of the type of data we have collected.

Meaningful analysis was limited because the data was largely categorical in nature and sample size varied among groups.

3) The dissemination seminar

Representatives of central and local governments, researchers and scholars in the field of health planning, heads of CHP training programs, and representatives of CHPs were invited to this dissemination seminar held in November, 1985.

FINDINGS

Findings from Baseline and Final Household Surveys.

Effectiveness of experimentation with alternative substructures of primary health care was assessed through comparing of the evaluation survey data of 1985 with data from baseline household survey done in 1983.

Episodes of Acute Illnesses and Rates and Place of Treatment in 1983 and 1985.

Table 3 shows the rate of illness episodes experienced during the last 15 day period among study population. The figure indicates a decrease of illness incidence between 1983 and 1985 by 16.8 persons in 1,000 population in Yang Pyung, and 19.0 persons per 1,000 population in An Sung. No change has been noticed in Icheon. Though there has been slight decrease in illness episodes, as table 3, shows the rate of treatment received in episodes of illnesses has increased in 1985 as compared to that of 1983. The differences were by 4.0% in Yang Pyung, 5.1% in Icheon and 2.0% in An Sung (Table 4).

As the table indicates the majority of episodes of illnesses falls into the category of upper respiratory diseases and the digestive disorder is the next most frequent problem.

Table 3. Morbidity Rate for 15 Days in March 1983 and 1985

	Icheon				Yang-pyong				Ansung			
	1983		1985		1983		1985		1983		1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Upper respiratory disease	170	67.7	120	63.8	188	66.4	134	74.8	180	64.3	105	50.2
Digestive disorder	29	11.6	24	12.8	32	11.3	14	7.8	25	8.9	29	13.9
Headache	7	2.8	4	2.1	9	3.2	2	1.1	11	3.9	6	2.9
Neuralgia	1	0.3	4	2.1	16	5.7	7	3.9	11	3.9	21	10.0
Injury or fracture	7	2.8	2	1.1	12	4.2	6	3.4	16	5.7	11	5.3
Dental carries	1	0.3	3	1.6	1	0.3	1	0.6	3	1.1	5	2.4
ENT disorders	1	0.3	3	1.6	5	1.8	1	0.6	6	2.1	4	1.9
Eye disorders	2	0.8	4	2.1	3	1.1	2	1.1	0	0.0	2	10.0
Urinary disorders	1	0.3	0	0	0	0	2	1.1	1	0.4	3	1.4
Anemia	1	0.3	0	0	2	0.7	0	0	6	2.1	0	0.0
Dermatitis	7	2.8	10	5.3	3	1.1	7	3.9	5	1.8	3	1.4
Heart disease	2	0.8	2	1.1	2	0.7	0	0	1	0.4	4	1.9
Low back pain	5	2.0	5	2.7	1	0.3	1	0.6	3	1.1	8	3.8
Hepatic disorders	2	0.8	0	0	2	0.7	0	0	1	0.4	1	0.5
Gynecological disorders	2	0.8	5	2.7	3	1.1	0	0	2	0.7	1	0.5
Others	13	5.2	2	1.1	4	1.4	2	1.1	9	3.2	6	2.9
Total	251	100.0	188	100.0	283	100.0	179	100.0	280	100.0	209	100.0
Morbidity rate (No./ 1,000 Pop.)	112.1		112.2		129.5		112.7		135.1		116.1	

Table 4 Total Clinical Contacts for Diagnosis and Treatment Received in Episodes of Illness during last 15 day-period

Area	Yang Pyong			Icheon			An Sung		
	No. of Year patients treated	Total No. of patients	Rate	No. of patients treated	Total No. of patients	Rate	No. of patients treated	Total No. of patients	Rate
1983	243	283	85.9	229	251	91.2	249	280	88.9
1985	158	179	89.9	181	188	96.3	190	209	90.9
differ- ence			4.0			5.1			2.0

Rates of CHP contact for diagnosis and treatment both in 1983 and 1985 were highest in Yang Pyong comparing those in Icheon or An Sung.

In Yang Pyong majority of cases sought CHP posts for help. In Icheon CHP posts were also visited most frequently for help and the drug store was the next. In An Sung, the drug store was mainly utilized as the first contact institute and the CHP post was the next (Table 5).

Sources
of
HC.

Rates of CHP contact for clinical diagnosis and treatment increased by 5.7% in Yang Pyong, while the rate was decreased by 2.5% in Icheon and 0.7% in An Sung. Instead, utilizers of hospitals increased by 3.6% in Icheon and 1.5% in An Sung (Table 5).

Table 5. Institutions Utilized for Treatment in Episodes of Acute Illness

	Yang Pyong				Icheon				An Sung			
	1983		1985		1983		1985		1983		1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHP post	134	55.1	96	60.8	88	38.4	65	35.9	87	34.9	65	34.2
Hospitals	30	12.3	14	8.9	54	23.5	49	27.1	42	16.9	35	18.4
Health Center	9	3.7	0	0	7	3.1	5	2.8	5	2.0	0	0
Oriental Medical Practition	6	2.5	4	2.5	5	2.2	5	2.8	7	2.8	6	3.2
Pharmacy	64	26.3	44	27.8	75	32.8	56	30.9	108	43.4	83	43.7
Other	0		0		0		1	0.5	0		1	0.5
Total	243	100.0	158	100.0	229	100.0	181	100.0	249	100.0	190	100.0

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Family Planning Practice

During the study period of two years, the rate of family planning practice was increased from 48.1% in 1983 to 64.7% in 1985 in total as indicated in table 6.

The rates of family planning practice are relatively lower than those of other study areas with similar conditions (Bang 1985). However the amount of increment in practice rates was about 15 percent both in this study and in other study areas in Korea. This increase in practice rate can be assumed to be partly related to the activities of health personnel. However, it can also be assumed that the vigorous campaign by the government and the benefits felt in life experiences of people in industrializing country has ^a lot to do with this change.

The rates of family planning practice of 1985 increased by 15.4% in Yang Pyong, 19.0% in Icheon, and 15.3% in An Sung compared with the rates of 1983.

Table 6. Rate of Family Planning Practice in 1983 and 1985

Area		1983	1985	Difference
Year				
Yang Pyong	No. of Women Practicing F.P	132	130	
	Total No. of Eligible Women for Programme	284	210	
	Rate of Practica	46.5	61.9	15.4
Icheon	No. of Women Practicing F.P	174	177	
	Total No. of Eligible Women for Programme	349	257	
	Rate of Practica	49.9	68.9	19.0
An Sung	No. of Women Practicing F.P	128	146	
	Total No. of Eligible Women For Programme	270	233	
	Rate of Practica	47.4	62.7	15.3
Total	Total No. of Eligible Women	903	700	
	Rate	48.1	64.7	16.6

As to the methods utilized for family planning, in both experimental and control areas, rates of permanent methods such as vasectomy and tubectomy were increased, while those of temporary and IUD method were decreased. Great increase in the rate of permanent method in Icheon were found to be related to the fact that one specific CHP was especially interested in the family planning activities (Table 7).

Table 7. Family Planning Methods Utilized

Types of method	Yang Pyong				Icheon				An Sung			
	1983		1985		1983		1985		1983		1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Temporary (oral condom)	26	19.7	24	18.5	41	23.6	30	17.0	26	20.3	30	20.6
Long-term m. (IUD)	17	12.9	16	12.3	27	15.5	13	7.3	18	14.1	14	9.6
Permanent m.	89	67.4	90	69.2	106	60.9	134	75.7	84	65.6	102	69.8
Total	132	100.0	130	100.0	174	100	177	100.0	128	100.0	146	100.0

Among the reasons given for discontinuing family planning practice, the most frequent reasons identified were "they want more children" or "no special reason" in 1983 data. In 1985, women who have discontinued the family planning practice with no special reason decreased in number as well as in rates from 1983 (Table 8).

Health conditions became more important reason for discontinuation in 1985 figure with no clear explanation.

Table 8. Reasons for discontinuing family planning practice among married women under the age of 49.

	Yang Pyong		Icheon		An Sung								
	1983	1985	1983	1985	1983	1985							
Want more children	51	33.8	29	36.7	67	38.3	27	34.2	47	33.8	24	27.6	80
Health condition	28	18.5	28	35.0	34	19.4	23	29.0	31	22.3	27	31.1	78
Resistance of Family	2	1.3	1	1.3	1	0.6	0	0	0	10.0	0	0.0	1
Bad rumor	1	0.7	0	0	6	7.8	0	0	2	1.4	1	1.4	1
Ignorance of method	3	2.0	4	5.0	2	1.1	1	1.3	2	1.4	4	4.6	9
Side effect	8	5.3	2	2.5	8	4.6	15	19.0	12	8.6	9	10.3	26
No special reason	58	38.4	16	20.2	63	36.0	13	16.5	45	32.4	22	25.3	53
Total	151	100.0	80	100.0	175	100.0	79	100.0	139	100.0	87	100.0	700

Antenatal Care

Comparing the rates of antenatal care recipients of two time periods, there was no increase among all three groups. The rate even shows a slight decrease in final survey. This phenomena is difficult to explain except that child birth is considered natural thing and not a medical problem for a great proportion of rural people (Table 9).

The rates of antenatal care in both time periods were higher in An Sung than in Yang Pyong or Icheon. This difference may be related to the degree of urbanization in these communities.

Hmm

Table 9. Rate of antenatal care during two periods of time

Area		Year		Difference
		1982-1983	1984-1985	
Yang Pyong	No. received antenatal care	73	63	
	Total No. of live birth	118	103	
	Rate	61.9	61.2	-0.7
Icheon	No. received antenatal care	101	81	
	Total No. of live birth	145	121	
	Rate	69.7	66.9	-2.8
An Sung	No. received antenatal care	57	57	
	Total No. of live birth	74	74	
	Rate	77.0	77.0	0

Among recipients of antenatal care of two time periods, the figure indicates that hospitals were the main place for antenatal care. However, in Yang Pyung, Use of CHP post as a place of antenatal care has increased between two periods by more than twice as frequently as in 1983, to make CHP post as the major source of antenatal care in this area (Table 10).

Whereas hospitals in Icheon and An Sung remain to be the major source of antenatal care.

Table 10: Places of Antenatal care in 1983 and 1985

	Yang Pyong				Icheon				An Sung				Total			
	1982-1983		1984-1985		1982-1983		1984-1985		1982-1983		1984-1985		1982-1983		1984-1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hospital	32	74.4	17	40.5	62	85.0	45	86.6	36	97.3	39	88.6	130	85.0	101	73.2
CHP post	11	25.6	23	54.8	5	6.8	3	5.8	1	2.7	5	11.4	17	11.1	31	22.5
Mid-wife	0	0	0	0	0	0	2	3.8	0	0	0	0	0	0	2	1.4
Health center	0	0	2	4.7	6	8.2	2	3.8	0	0	0	0	6	3.9	4	2.9
Total	43	100.0	42	100.0	73	100.0	52	100.0	37	100.0	44	100.0	153	100.0	138	100.0

Deliveries

Table 11 shows the place of deliveries. The rates of home deliveries decreased in all three areas, while the rates of hospital deliveries were increased. The decrease in home deliveries were most noticeable in An Sung by 44.9%. The differences and 13.8% respectively. Icheon were 15.1% and marked increment of hospital deliveries in An Sung relative to other two areas way be due to rapid urbanization and expanding health insurance coverage that accompany with urbanization.

Amn.

Table 11. Places of delivery in 1983 and 1985

Area	Yang Pyong					Icheon					An Sung				
	1983		1985		dif-fer-ence	1983		1985		dif-fer-ence	1983		1985		dif-fer-ence
Year	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
Hospital	49	20.1	21	34.4	14.3	75	23.0	26	34.6	11.6	52	22.1	35	68.6	46.5
Midwife clinic	2	0.8	0	0.0	-0.8	5	1.5	3	4.0	2.5	3	1.3	0	0.0	-1.3
CHP	0	0.0	1	1.6	1.6	1	0.3	0	0.0	-0.3	1	0.4	0	0.0	0
Home	192	79.0	39	63.9	-15.1	245	75.2	46	61.4	-13.8	180	76.3	16	31.4	-44.9
Total	243	100.0	61	100.0		326	100.0	75	100.0		236	100.0	51	100.0	

In cases of home deliveries, most women were assisted by lay people such as family members or neighbors in 1983. The rates of layman attendance were markedly decreased in Yang Pyong while the rates of CHP attendance were increased in 1985 comparing with those of 1983. Comparing the rates of change between groups, CHP attendance in home deliveries in Yang Pyong ng was most noticeable. The increase in rates were 22.0% in Yang Pyong, 11.9% in An Sung and 8.5% in Icheon. However, the number of cases in An Sung was too small to generalize the data (Table 12).

Table 12. Attendants in Home delivery

Area Year Attendants	Yang Pyong				Icheon				An Sung			
	1983		1985		1983		1985		1983		1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Alone	11	5.6	1	2.6	19	7.8	2	4.3	10	5.6	0	0.0
Family & neighbors	171	89.1	27	69.2	208	84.9	39	84.8	166	92.2	13	81.3
Midwife	0	0.0	1	2.6	9	3.7	0	0.0	2	1.1	1	6.3
CHP	7	3.6	10	25.6	6	2.4	5	10.9	1	0.6	2	12.5
Doctor	3	1.6	0	0.0	2	0.8	0	0.0	1	0.6	0	0.0
Other Health worker	0	0.0	0	0.0	1	0.4	0	0.0	0	0.0	0	0.0
Total	192	100.0	39	100.0	245	100.0	46	100.0	180	100.0	16	100.0

Postnatal Care Service

Comparing the rates of postnatal care recipients of two time periods, the rates increased from 9.3% to 31.5% in Yang Pyong, from 3.4% to 32.3% in Icheon and from 8.1% to 32.0% in An Sung. This finding seems to be related to increased number of hospital deliveries (Table 13).

Table 13. Postnatal care rates of women delivered during two periods of time

	Yang Pyong			Icheon			An Sung		
	No. received	Total Del	Rate	No. received	Total Del	Rate	No. received	Total Del	Rate
1982-1983	11	118	9.3	5	145	3.4	6	74	8.1
1984-1985	17	54	31.5	20	62	32.3	16	50	32.0
difference		22.1			28.9			23.9	

Immunization

Rates of polio vaccination increased in 1985 by 35.1% in Yang Pyong, 27.0% in An Sung, 23.6% in Icheon, comparing with those of 1983.

Rates of DPT vaccination increased in 1985 by 40.0% in Yang Pyong, by 31.1% in An Sung, by 23.6% in Icheon comparing with those of 1983.

Rates of vaccination against measles increased in 1985 by 7.1% in Yang Pyong, by 7.3% in An Sung, and by 3.2% in Icheon comparing with those of 1983 (Table 14).|

Table 14. Basic Immunization Completed Among 0-2 Year group

Area	Yang Pyong			Icheon			An Sung		
	No. of cases immunized	Total No. of Infant & toddler	Rate (%)	No. of cases immunized	Total No. of Infant & toddler	Rate (%)	No. of cases immunized	Total No. of Infant & toddler	Rate (%)
Polio									
1983	47	81	58.0	76	111	68.5	38	60	63.3
1985	34	35	97.1	48	51	94.1	28	31	90.3
difference			35.1			25.6			27.0
D.P.T.									
1983	44	81	54.3	76	111	68.5	35	60	59.2
1985	33	35	94.3	47	51	92.1	28	31	90.3
difference			40.0			23.6			31.1
B.C.G									
1983	47	81	58.0	82	111	45.0	27	60	45.0
1985	39	55	67.2	28	38	71.8	23	31	67.6
difference			13.8			26.8			12.6
Measles									
1983	19	28	67.9	26	37	70.3	8	11	72.7
1985	18	24	75.0	25	34	73.5	12	15	80.0
difference			7.1			3.2			7.3

Activities of Community Health Practitioners (CHP)

It was assumed that field-centered activities of CHPs at the village level would stimulate the health role behavior of the community leaders (CHL) and would initiate a change in self-care behavior of community people.

The research team conducted training sessions for the CHPs emphasizing field-centered activities and assisted them with the training activities geared to enhance the role development of CHLS community health leaders (CHL). In order to assess the changes in field-based versus clinic-based CHP activities, monthly activity report checklists were collected on a continuing basis from each CHP for a 15-month period.

CHWs
Training

In analyzing the activities of the CHPs, their activities were divided into two categories: clinic-centered activities and field-centered activities.

Clinic-Centered Activities

Clinic-centered activities were analyzed in terms of total cases per CHP per month including registration, examination, treatment, counselling, or referrals in medical care and treatment services; maternal health services; child health services; tuberculosis control services; and family planning services.

CHP's activity data were collected and tabulated in term of tasks performed. Thus, the total number of cases means the aggregate total number of activities performed by CHPs in their services for clients.

At the begining of the project in July 1983, clinic-centered activities of each CHP for one month period were tabulated.

is baseline data was collected for sequential comparison with data gathered since December 1983, during and after provision of CHP training and CHL training. In the final analysis, the pretest data could not be utilized since it did not reflect seasonal variations in illness nor CHP activities. ?? Methods

① Medical Care and Treatment Services

As shown in table 15, the total number of cases seen by each CHP per month in terms of aggregate tasks performed was 130.7 cases in Yang Pyong 90.8 cases in Icheon, and 121.5 cases in An Sung.

The number of house calls was highest in Icheon was almost 3 times higher than the number in Yang Pyong and An Sung. One possible cause of this difference is that the geographical conditions in Icheon are conducive to easy travel from place to place. ! Hmm.

In physical examination and diagnosis, An Sung scored the highest followed by Icheon. Yang Pyong reported the least number of cases, about 50% fewer as compared to An Sung. However, in terms of treatment and nursing care, Yang Pyong and An Sung were similar reporting a difference of only about 10% of the cases.

Referrals made to the suprastructures of the health care system paralleled the number of cases diagnosed.

The total number of laboratory tests performed was minimal, however, differences among groups were quite noticeable. This variation appeared to be related to the personal characteristics of the CHPs. Hmm.

Counseling, guidance and instructional activities were most frequent in Yang Pyong.

Thus, Yang Pyong was most congruent with the direction of the project

Table 15. Clinic-Centered Activities of CHPs Related to Medical Care

Activity Case Area	House call	Physical, Examinations and Diagnosis	Treatment and Nursing Care	Referral and Escorting	Laboratory Test	Counselling, Guidance, Instruction	Total	No. of Months observed	Monthly Mean
Yang Pyong (4 CHPs)	Total number 170 No./CHP 42.5	9,200	13,901	138	21	6,380	29,810	12	522.9
Icheon (5 CHPs)	Total No. 590 No./CHP 118.0	14,526	13,556	257	260	3,489	32,678	12	453
An Sung (5 CHPs)	Total No. 199 No./CHP 39.8	17,808	19,434	393	6	7,733	45,573	15	607.6
		3,561.6	3,886.8	78.6	1.2	1,546.6	9,114.6		121.5

3 more months included!

team and placed the most emphasis on the educative and supportive services.

2. Maternal Health Services

Even though care of mothers was categorized as a clinic-centered activity, it was actually a combined service based on clinic care and an out-reach service to the community.

The total number of cases seen by the CHP per month was 7.0 cases in Yang Pyong, 7.3 in Icheon and 7.9 in An Sung which indicated that Yang Pyong ranked lowest among these groups in terms of the total number of services provided (table 16). On closer examination, however, all registered pregnancies in Yang Pyong were carefully followed [the /from] prenatal period through the perinatal and postnatal periods and direct assistance, referrals and/or delivery sets were provided as needed. The rates of follow-up care for registered pregnancies in Icheon and An Sung were about 80% and 55%, respectively. CHPs assisted with about half of the deliveries in the Yang Pyong and Icheon areas, and less than one fourth of the deliveries in An ung (Table 16). |

3. Child Health Services

The total number of child care services provided by the CHPs per month was 97.9 in Yang Pyung, 44.7 in Icheon and 54.0 in An Sung, (Table 17). As shown in Table 17, the registration rates of new born infants and immunization rates for polio, DT and Measees were much higher in Yang Pyeng than in either Icheon or An Sung. These findings indicate that the CHPs' clinic-centered activities in terms of child health services were about

Table 16. Clinic-centered Activities of CHP related to Maternal Health Services

Activity Case Area	Diagnosis of Pregnancy	Registration of Pregnant Women	Prenatal Care	Distribution of Delivery Set	Assisting Delivery	Referral of High Risk Deliveries	Post Natal Care	Instruction Counselling, Guidance	Total	Monthly Mean	Remarks
Yang Pyong	Total No. 46	63	12.5	10	28	7	70	71	420	28	3 months report missed
	No./CHP 11.5	15.75	31.25	7.0	7.0	1.75	17.5	17.75	105	7.0	
Icheon	Total No. 19	48	144	4	21	14	113	184	547	36.46	3 months report missed
	No./CHP 3.8	9.6	28.8	0.8	4.2	2.8	22.6	36.8	109.4	7.29	
An Sung	Total No. 71	80	114	3	17	23	73	212	593	39.5	
	No./CHP 14.2	16.0	22.8	0.6	3.4	4.6	14.6	42.4	118.6	7.9	

Hmm.

55

55

Table 17. Clinic-Centered Activities of the CHPs related to Child Health Services

Case Area	Registration of New Born Infant	Immunization of Polio, DT Measies	Measurement of Child Development	Counselling Guidance for Nutrition of Infant	Counselling & Guidance for Child Rearing Methods	Registration of Infant and Child	Total	Monthly Mean	Remarks
Yang Pyong	Total No. 323	37.08	699	613	476	127	5,874	391.6	3 months report missed
	No./CHP 80.75	927	46.6	40.8	31.7	8.46	1,468.5	97.9	
Icheon	Total No. 75	2,185	454	166	465	10	3,355	223.7	3 months report missed
	No./CHP 15.0	437.0	90.8	33.2	93.0	6.0	671.0	44.7	
An Sung	Total No. 139	1,114	1,044	913	764	79	4,053	270.2	3 months report missed
	No./CHP 27.8	222.8	208.8	182.6	152.8	15.8	810.6	54.0	

Hmm.

twice as high in Yang Pyong as in Icheon or An Sung.

Doesn't look that way
to me!

Other activities such as the measurement of child development and counselling and guidance sessions on nutrition and child-rearing methods were conducted more often in Icheon and in An Sung than in Yang Pyong. This difference may be due in part to the geographical condition in Yang Pyong which make traveling different. *

4. Tuberculosis Control Service

Pulmonary tuberculosis is still one of the major chronic communicable diseases that affects the health status of the Korean population. Case finding, treatment, and follow-up care are considered essential. The average number of cases seen by the CHPs for the 15-month period was 145.0 cases per CHP in Yang Pyong, 51.2 cases in Icheon and 61 cases in An Sung (Table 18).

In all categories of service activities related to tuberculosis control, Yang Pyong's activities were more than double than that of the other counties.

The activities involved in finding new tuberculosis cases require considerable effort including education of the general public, observation of suspect cases, and referrals for check ups, chest X-rays, and sputum cultures. A greater case finding effort was noticed in Yang Pyong where the CHPs contacted 12.7 suspected cases and referred 20.7 cases to the health center for chest X-rays and sputum tests. Case finding and referrals to the health center in Icheon were 1.2 and 5.2 respectively and in An Sung they were 11 and 13.4 cases, respectively.

Table 18. Clinic-Centered Activities of the CHP related to Tuberculosis Control Service

Activity Case Area	Findings of Suspected case		Referral for Laboratory Test and Chest X-ray		Registration of Cases		Treatment and Follow-up		Counselling and Guidance		Total	
	Total No.	Per CHP	Total No.	Per CHP	Total No.	Per CHP	Total No.	Per CHP	Total No.	Per CHP	Total No.	Per CHP
Yang Pyong	51	12.75	83	20.75	9	2.25	188	47.0	249	62.25	580	145.0
Icheon	6	1.2	76	5.2	12	2.24	141	28.2	71	14.2	256	51.2
An Sung	55	11.0	67	13.4	1	0.2	1	0.2	181	36.2	305	61.0

5. Family Planning Services

Since the government of Korea placed the highest priority of family planning, active programs for family planning have long been carried out at health centers. Thus family planning services are not the direct responsibility of CHPs. However, the sharing of responsibility for this service with other health workers is shown in table 19.

Cases seen for oral contraceptives and surgical referrals per CHP per month was 7.6 cases in Yang Pyong, 6.32 in Icheon and 6.68 in An Sung. Tremendous efforts are required to induce new members to adopt of family planning practices in a country where an active family planning program has existed for 20 years. Family planning services per CHP per month were highest in Yang Pyong. In addition, CHPs in Yang Pyong have been highly successful in providing permanent methods for family planning.

Table 19. Clinic-Centered Activities of the CHPs related to Family Planning Services

Area	Activity Case	Referral for IUD Insertion		Distribution of Oral Contraceptives		Referral for Vasectomy and Tubal Ligation		Total		Monthly Mean	Remarks
		Total No.	No/CHP	Total No	No/CHP	Total No	No/CHP	Total No	No/CHP		
Yang Pyong	Total No.										57 CHP months
	/CHP	36	9.0	333	84.5	61	15.25	435	7.6		
Icheon	Total No.										72 CHP months
	/CHP	28	5.6	338	77.6	39	7.8	455	6.32		
An Sung	Total No.										75 CHP months
	/CHP	67	13.4	381	76.2	53	10.6	501	6.68		

60

not the same!

Field-Centered Activities

Field-centered activities consist of mass health education, leader training, school health program, mass health examination, sanitation campaign, attend community meetings and visit homes, villages and related agencies. In analyzing data, the total number of sessions conducted by the CHPs, the total number of persons attended or participated, and time spent for these activities by the CHPs in minutes were compared between groups.

1. Community Health Leader Training

Since training of community health leaders was the major experimental input in this study, the training sessions were planned, organized and conducted by the project team in cooperation with CHPs in experimental areas. Topics included in the training of community health leaders were related to the role of CHL in primary health care and the knowledge and skills essential for the performance of expected role functions. The role of CHL was conceived as (1) liaison person and communicator of health information between community people and CHPs; (2) an educator, motivator and organizer of community activities such as conducting of insect and rodent control campaigns and cleaning of public places; and (3) first-aid care provider in emergencies.

CHW
Training

Role

These training sessions were conducted by project team with the assistance of CHPs in the beginning but later sessions were conducted by CHPs with assistances by project team members. CHP activities in training of CHLs were analyzed in terms of the number of training sessions conducted, number of persons attended and CHP time spent in training.

Table 20, shows that CHPs in Yang Pyang conducted 9.75 sessions of CHL training in average per CHP with attendance of 11.4 persons and an average of 99.6 minutes of in each session. CHPs in Icheon conducted CHL training in an average of 9.25 sessions per CHP with attendance of 14 persons and an average of 100 minutes of CHP time per session.

On comparison, the frequency of CHL training and time spent by CHPs on this activity is similar between two experimental areas. This similarity is expected because of guidance by the project team.

2. Mass Health Education

Health education of public at village level was assumed to enhance the concept of health and self-care activities of the individuals, families, and communities. Thus, with the project's intervening, it was expected that mass health education activities of CHPs will rise and, as CHLs are trained and activated, more educational activities will be carried out as a whole.

Mass education activities were analyzed in terms of the number of sessions held, the number of persons attended and time spent by CHPs in minutes.

As shown in table 21, CHPs in Yang Pyung conducted 7.5 sessions of mass education in average per CHP with attendance of 40 persons and 84 minutes of CHP time spent in average per session. CHPs in Icheon conducted 2.2 sessions in average per CHP during the same period with attendance of 36.6 persons and 148.18 minutes of CHP time for an average in each session.

Table 20. Field-centered Activities of CHP's related to Community Health Leader Training during 15-month period

		Total	No./CHP	Average/CHP/ Session
Yang-Pyong (CHP=4)	No. of session	39	9.75	
	No. of person	444.6	111.15	11.4
	Time spent (min.)	3,884.4	971.10	99.6
Icheon (CHP=5)	No. of session	46.25	9.25	
	No. of person	647.5	129.5	14.0
	Time spent (min.)	4,625	925	100.0

Table 21. Field-Centered Activities of CHP related to Mass Health Education during 15-month period

		Total No.	No./CHP	Average/min / session
Yang Pyong (CHP=4)	No. of Session	30	7.5	
	No. of Person	1,221	305.3	40.67
	Time Spent (min.)	2,520	630.0	84.00
Icheon (CHP=5)	No. of Session	11	2.2	
	No. of person	403	80.6	36.64
	Time Spent (min.)	1,630	326.0	148.18
An Sung	No. of Session	36	7.2	
	No. of Person	638	127.6	17.72
	Time Spent (min.)	2,235	447.0	62.01

CHPs in Ansong conducted 7.2 health education sessions in average per CHP with 17.7 person attending and 62 minutes of CHP time spent for each session.

On comparison, Yang Pyong and An Sung conducted mass health education regularly, whereas, in Icheon mass education activities were very low. An Sung is the county of control in this study, efforts in mass education is as great or even greater than in one of the experimental sites. This difference again seems to be related to the use of official channel of communication in two counties. As regard to the number of attendants and time spent per CHP per session, Yang Pyong was most efficient for time and efforts.

— Hmm.

3. School Health Program

Since the CHPs are not the school nurses, the activities of the CHPs for school children were not their responsibility but a true services on the part of CHPs. School health program consists of physical examinations, immunization health education and environmental sanitation. In Yang Pyung, the total number of sessions for school health program per CHP was 7.5 and a total of 880 children were contacted and 802 minutes of CHP time was spent during the 15 month period. (Table 22). This data shows that each visit was made to school in every two-month period by each CHP in which visit were an average of 117 school children were contacted and 107 minutes spent per visit per CHP. The main activities were related to the immunization program. In Icheon, the total number of sessions for school health program per CHP was 3.2 times and a total of 696 children were served and a total of 768 minutes were spent by each CHP. This data implies that in every five month period each CHP visited the school and

Table 22. Field-Centered Activities of the CHPs related to School Health Program during 15-month period

		Physical exam for School Children	Immuniza- tion	Health Education	Environmental Sanitation	Total	Per CHP	Average CHP/Session
	No. of Session	(2)	(26)	(2)	(0)	30	7.5	
Yang Pyung	No. of Person	170	3,160	170	0	3,520	880	117.33
	Time Spent (min.)	460	2,650	100	0	3,210	802	107.00
	No. of Session	(2)	(11)	(3)	(0)	16	3.2	
Icheon	No. of Person	825	1,757	900	0	3,482	696	217.63
	Time Spent (min.)	710	2,830	300	0	3,840	768	240.00
	No. of Session	(7)	(0)	(0)	(10)	17	3.9	3.4
An Sung	No. of Person	904	0	0	148	1,052	210	61.88
	Time Spent (min.)	1,200	0	0	660	1,860	372	109.41

served 217 children at a time and 240 minutes were spent in each visit. The main activity was also the immunization program. Icheon has larger number of school children in each school comparing to Yang Pyung. In An Sung the total number of sessions for school health program was 3.4 times and a total of 210 children received care and 372 minutes of CHP time were spent. The main activities which CHPs of An Sung had conducted were the physical examination and environmental sanitation services.

4. Mass Health EXaminations

Mass health examinations that were organized and conducted by the CHPs were the stool test program for parasites control, indirect chest X-rays for screening pulmonary tuberculosis, pap smear test for early detection of cancer and measurement of blood perssure for hypertension case findings (Table 23). In Yang Pyung the total number of sessions for mass health examination per CHP was 5.5 times and a total of 256 persons were covered and 460 minutes were spent in average by each CHP during 15 month period. This means in every 2.7 months there was a mass health examination and an average of 46 persons participated and 83 minutes spent by the CHP in each occasion. Blood pressure checking was the main categories for these field work.

In Icheon the total number of mass health examinations per CHP was 1.4 sessions and a total of 171 persons were reached and 454 minutes were spent by each CHP. CHPs in Icheon conducted this category of field work in every ten month and 122 persons covered in each ocassion and 317 minutes spent in each time. No particular activities were emphasized by the CHPs in terms of mass health examinations. In An Sung the total num-

Table 23. Field-Centered Activities of the CHPs related to Mass Health Examinations

		Stool test	X-ray Examination for TB	Cancer detec- tion program Breast and Pap test	BP Check for hy- per-ten- sion	Total	Total/ CHP	Average/ CHP/Session
Yang Pyung	No. of Session	1	1	3	17	22	5.5	
	No. of Person	70	10	427	528	1,035	256	46.
	Time (min)	40	60	520	1,220	1,840	460	83
Icheon	No. of Session	2	0	3	2	7	1.4	
	No. of Person	467	0	76	315	858	171	122
	Time (min)	1,050	0	600	620	2,270	454	317
An Sung	No. of Session	7	0	0	10	17	3.4	
	No. of Person	842	0	0	178	1,020	204	57
	Time (min)	540	0	0	780	1,320	264	77

ber of sessions for mass health examinations per CHP was 3.4 times and a total of 204 persons attended and 264 minutes were spent by each CHP. This means that one session was held in every 4.4 months, 57 persons were served and 77 minutes were spent per CHP. The main activities were the stool test and blood pressure check-ups.

These findings indicated that CHPs in Yang Pyong had conducted various field activities within the limit time than two other areas.

5. Sanitation Campaign

Field campaign program for sanitation of the village included safe drinking water supply, parasite control, insect and rodents control, sanitary treatment of human and animal wastes, cleaning of latrine and animal house, and cleaning of public places (Table 24). In rural area of Korea, sanitary conditions of the village is still poor and the knowledge and attitude of the people need to be changed before they change their behavior. The project team emphasized this program in order to integrate primary health care service with the community development program as long-term objectives.

Each CHP in Yang Pyong conducted the sanitation campaign program for 33 times and a total of 387 households participated in and 1,541 minutes were spent in an average during 15-month period. Thus, in Yang Pyong each CHP conducted at least one program in every two week period with participation of 11.7 households and 46.7 minutes of CHP time in each session.

In An Sung, the total number of sanitation campaign was 29.4 sessions and 581 household were covered and 743 minutes were spent by each CHP in an average during the 15-month period. Those data can be interpreted as each CHP in An Sung conducted a sanitation campaign twice a month and

Table 24. Field-Centered Activities of the CHPs related to Campaigning for Sanitation during 15 months period.

		Health education on drink- ing water	Parasite control compaign	insects and rodeuts control	Management of human waste and animal excrete	Campaign for clean- ing of latr- ine and ani- mal house	Campaign for cleaning of public places	Total	Per CHP	Average/ CHP/ Session
Yang Pyung	No. of Session	5	16	15	21	26	49	132	33	
	No. of house- hold	47	38	17	147	86	1,216	1,551	387	11.7
	Time Spent (min)	355	900	900	910	1,220	1,880	6,165	1,541	46.7
iche- on	No. of Session	0	0	0	0	0	0	0	0	
	No. of house- hold	0	0	0	0	0	0	0	0	
	Time Spent (min)	0	0	0	0	0	0	0	0	
An Sung	No. of Session	4	38	21	22	12	50	147	29.4	
	No. of house- hold	7	190	617	714	551	829	2,908	581	19.81
	Time Spent (min)	80	120	415	590	470	2,040	3,715	743	25.3

19.8 households were involved and 25.3 minutes were spent for each session. The difference in time spent per session may be related to the kinds of activities carried out between groups.

In total for all the field-centered activities carried out by CHPs can be summarized as follows as in Table 25. In the experimental area 1, Yang Pyung, each CHP conducted 3.95 times of field works in a month and 31.8 households were covered at a time and 67.7 minutes were spent for each activities. In the experimental area 11, Icheon, each CHP carried out 0.72 times of field work in a month and 15.0 households had participated in each activity and 180.4 minutes were spent by a CHP for an activity. In An Sung, the total number of field activities carried out by a CHP was 2.9 times in a month with the coverage of 25.9 households at a session and expenditure of 42.1 minutes per CHP spent for each activity.

On comparison, Yang Pyung exhibited its strength most in the field-centered activities while An Sung came in the middle and Icheon was the weakest of all.

Table 25 Summary fo CHP's Field-centered Activities

		Health Educ. & Leader Traning	School Health Program	Mass Exam	Campaing for Sanitation	Total/ CHP	Total/ CHP/ Month	Average/ CHP/Month/ Session
	No. of session	13.2	7.5	5.5	33	59.2	3.95	
Yang pyong	No. of house- holds	371	880	256	378	1885	125.7	31.8/session
	Time spent (min)	1207	802	460	1,541	4010	267.3	67.7/session
	No. of sessions	6.2	3.2	1.4	0	10.8	0.72	
Icheon	No. of house- holds	136	696	171	0	1003	66.9	15.0/session
	Time spent/ (min)	726	768	254	0	1948	129.9	180.4/session
	No. of session	7.2	3.4	3.4	29.4	43.4	2.9	
AnSung	No. of house- holds	127	210	204	581	1122	74.8	25.9/session
	Time/spent (min)	447	372	264	743	1826	121.7	42.1/session

The Simulation Analysis | Pattern of Health Services
of the Utilization

Basic Characteristics of the PHC Systems

In general, a historical time series is too complex for an initial exploration of system behavior. Simple test conditions are preferable to understand the basic characteristics of a system. However, System Dynamics does provide a method to illustrate the basic characteristics of the system.

A very informative and one of the simplest test inputs for the study of System Dynamics is the "step-function" which is a sudden disturbance caused by changing an external system input to some new value that is then held constant. We used the "step-function" to understand the basic characteristics of the PHC system that our simulation is modeling. On simulation time 10, Chronic Disease Health Care Service Needers (CDNR) were increased suddenly by 10% from the original quantity. In this basic simulation run, the educational subsystem was not attached to the actual 5 PHC service subsystems, since simple test conditions were preferable. The manner in which PHC service system reacted to this sudden disturbance illustrated the basic characteristics of the system. (Fig. 5)

As can be seen in figure 5, All Primary Health Care Service Users (A), Pharmacy Users (P), and Smoothed CHP Users (S), moved toward a new equilibrium. This means that our PHC systems have a simple form of negative feed-back loops.

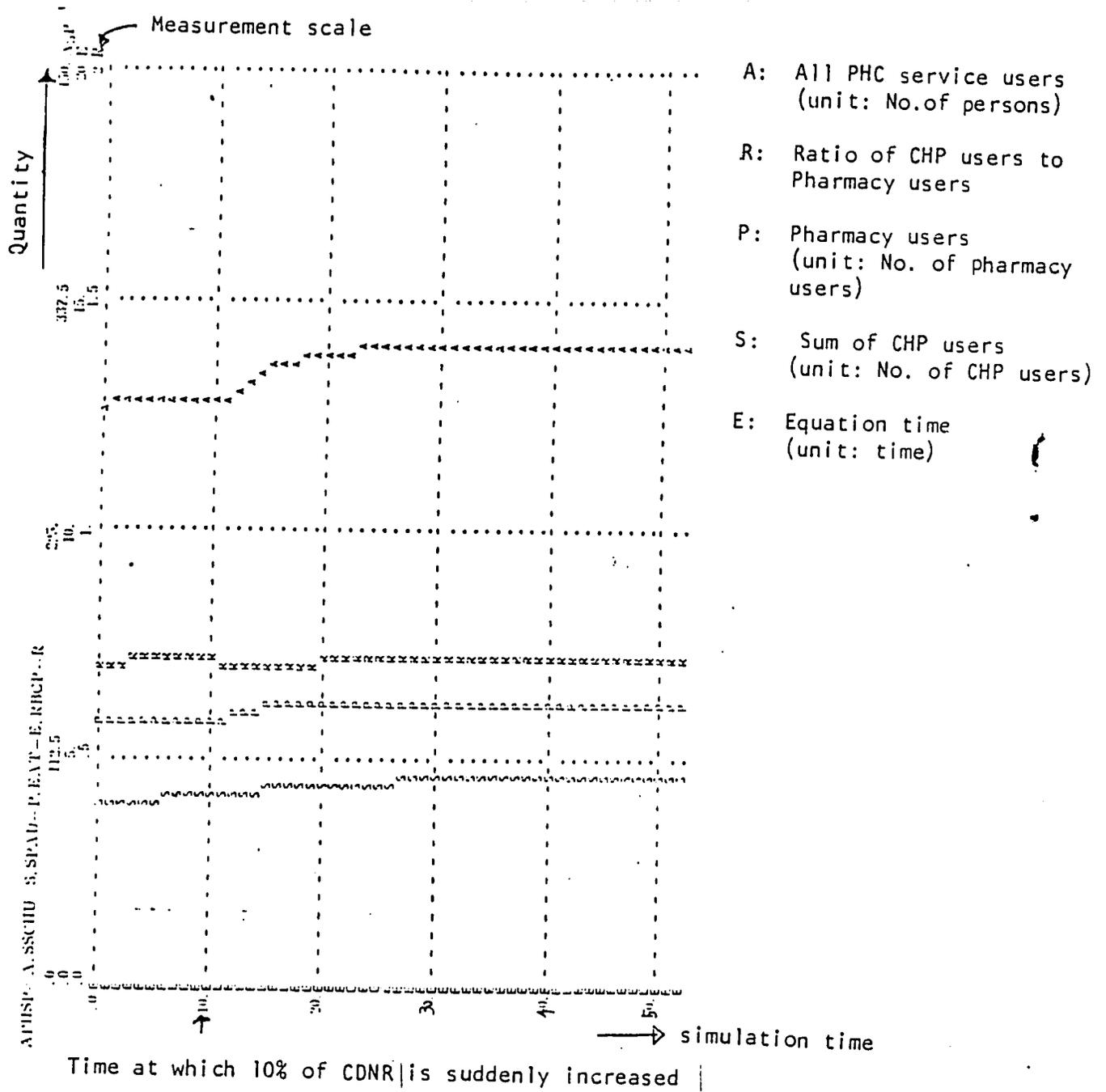


Fig. 5: Basic Simulation result

A Comparative Analysis on the Efficiency of Education Cooperator between Formal Organization and Informal Organization

CO As formerly described, various nonhealth, rural community organizations can be classified as formal and informal. Among the formal organizations, the villager's meeting is representative. Every household member is expected ^{to attend} to the monthly meeting to discuss villagers interests. Among the informal organizations, the mother's club is representative Mothers who are in charge of the care of children and the aged at home and also take an active part in family planning activities and other self-help programs.

Figure 6 shows the simulation results when the villagers meeting was adopted as the cooperator and Figure 7 shows the simulation results when the mother's club was adopted as a facilitator.

Comparing these two figures, it was found that All PHC Service Users (A), the Sum of CHP Users (S), and the Ratio of CHP Users to Pharmacy Users (R), were higher in figure 6 than in Figure 7. However, Education Time (E) and Pharmacy Users(P) were lower in Figure 6 than those in Figure 7. These simulation results imply that the villagers meeting was more efficient even with less educational input than the mother's club as a health education facilitator. In other words, the formal organization was preferable to the informal ones.

* Time means Delta Time (DT) or time increment of simulation run in this model. Unit DT is semi-month.

↑
what's that?

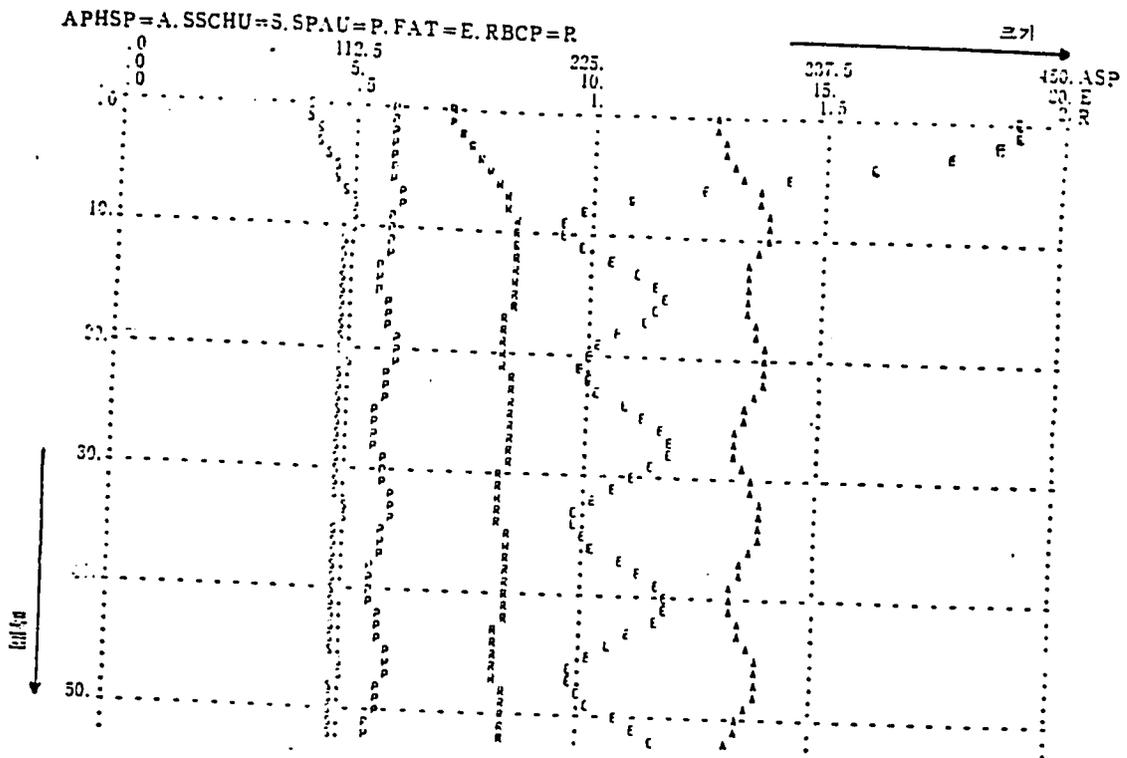


Fig. 6. Simulation result for adopting villager's meeting as a cooperator

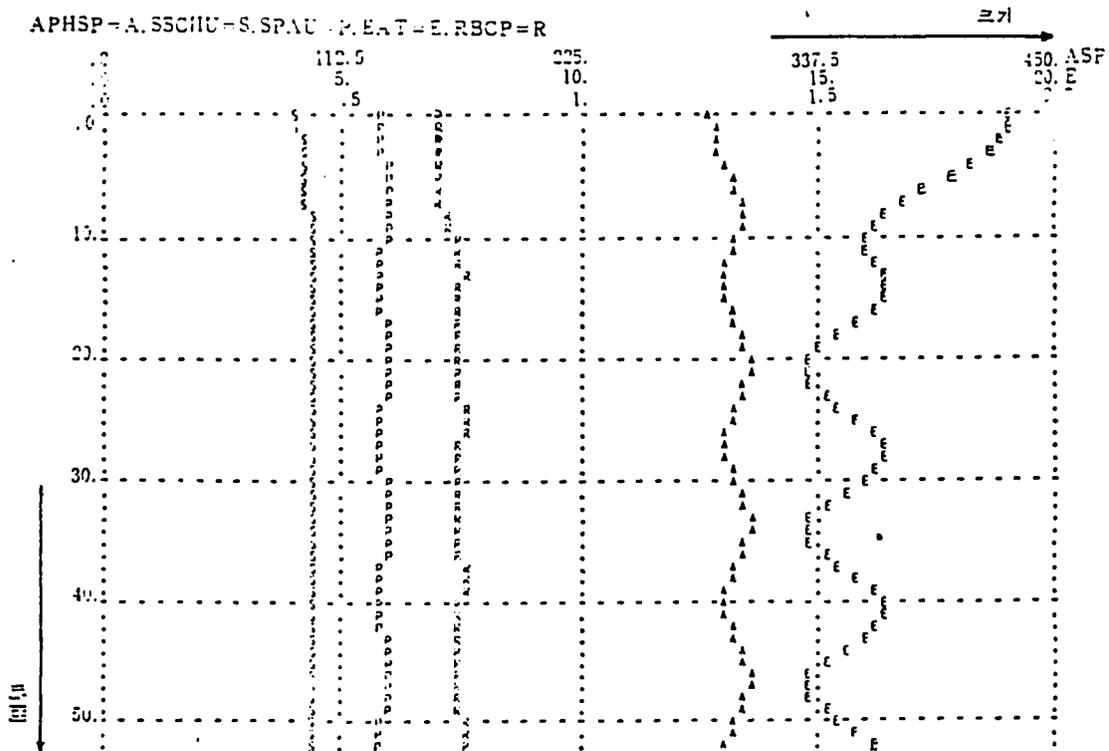


Fig. 7. Simulation result for adopting mother's club as a cooperator

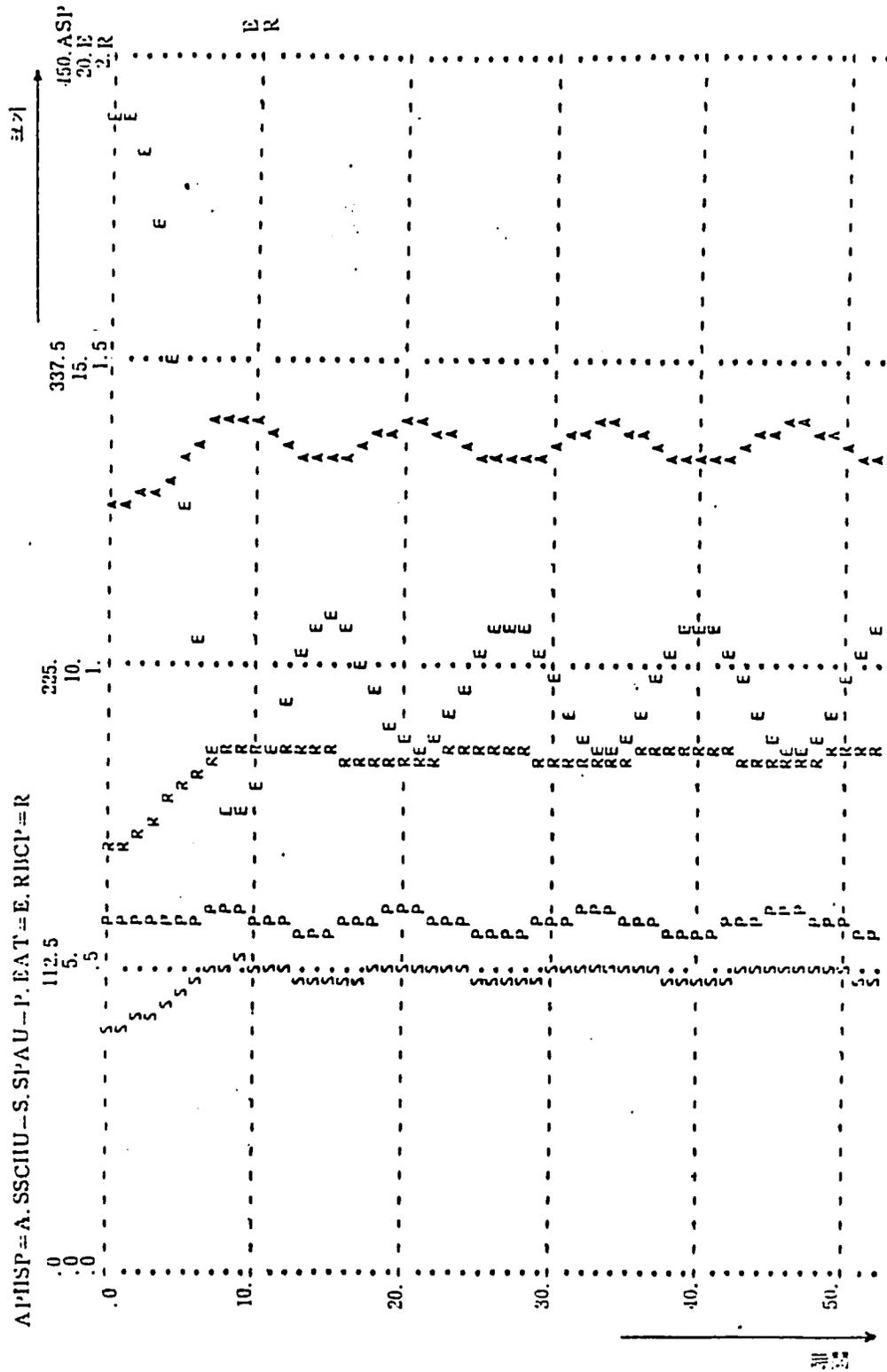


Fig. 8.) Simulation result in doubling attending rate of mother's club meeting

Two factors concerning the mothers club could explain these result. The first that even though mothers are highly interested in their family's health, the club is not as well organized as the villagers meeting. Secondly, many mother's club members are old women who actually have no great influence on their families' utilization of PHC services.

Figure 8 shows how PHC service systems behave when the attendance rate at mother's club meetings is doubled. A,S,R and E in Figure 8 barely rose to the similar level with those in Figure 6. |

CONCLUSION [Thus, until informal community organizations are considerably improved and activated, it is more effective to utilize official formal community organizations.

Sensitivity analysis for parameter parameters

For ester(forrester, 1968) insisted that it is not reasonable to exclude important variables which plainly exist in simulation model building simply because they are intangible and emphasized the importance intangible factors in System Dynamics.

We have used education effects, an intangible factor, for the analysis of PHC service system. Educational effects can be analyzed as are advertising effects in marketing. Thus, we can assume that, up to a certain level of educational time, the educational effect is too weak to change rural people's way of thinking about PHC. We can define that level as the threshold level. As the quantity of educational input increases beyond the threshold level, the educational effect increases rapidly. However, as in the law of diminishing returns, there will be a point after which regardless increase in educational inputs, the effects of education

do not show any further distinguishable increase. This point is known as the saturation level.

Since the educational effect is largely an intangible factor and system models including intangible factors need more stringent analysis, sensitivity analysis was utilized to support the validity of the model.

Methods
Sensitivity
Analysis

In System Dynamics, "table functions" are usually used to quantify intangible factors which plainly exist but are not easy to measure. Figure 9 shows three table functions of PHC education effect - Original one (O), Upgraded one (U) and Downgraded one (D).

When table functions U and D are used for the measure of educational effect, computer output Figure 9 and 10, which can be compared with the original table function that was seen already in Figure 6, can be obtained.

On comparison, it was found that A,S,P,R and E in three figures are almost the same. This means that the original table function had a certain reasonable area in which the feasibility of solution is not disturbed and parameters related to education effect are well applied to the analysis of PHC service system behavior.

Huh?

Summary

Since System Dynamics is viewed as one of the most effective means available for supplementing and correcting human institutions as complex systems, SD was adopted as a basic tool for the PHC service system analysis.

APHSP=A. SSCHU=S. SPAU=P. EAT=E. RBCP=R

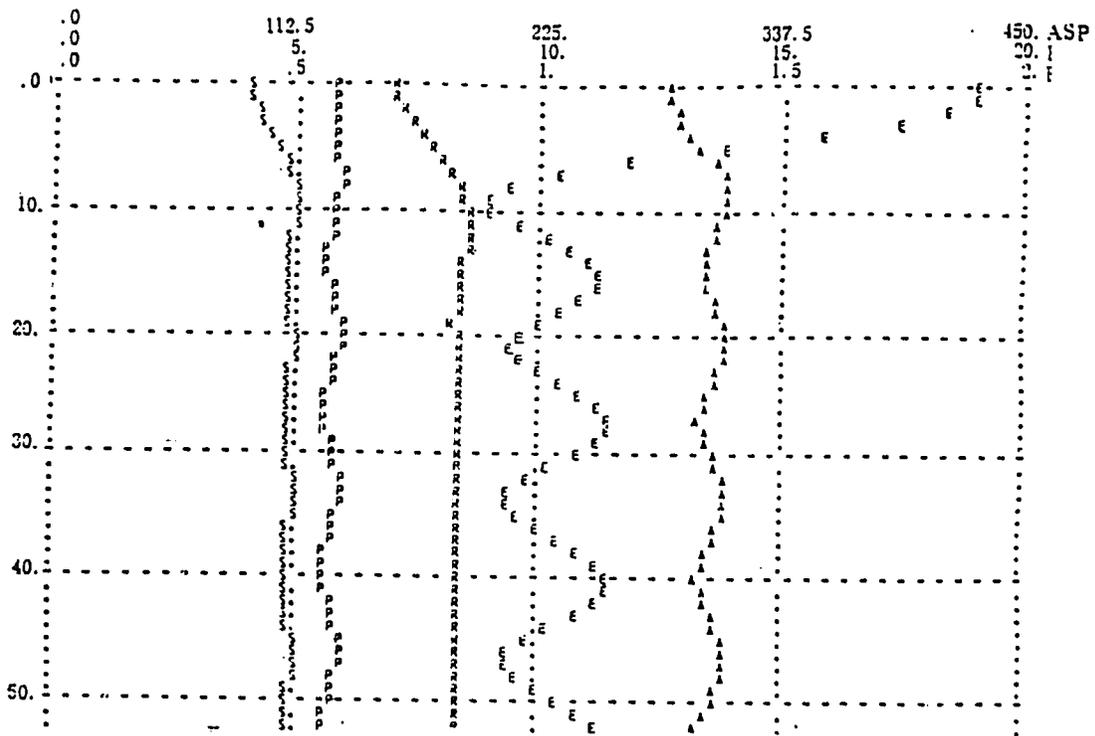


Fig. 9. PHC education effect-Downgrade one

APHSP=A. SSCHU=S. SPAU=P. EAT=E. RBCP=R

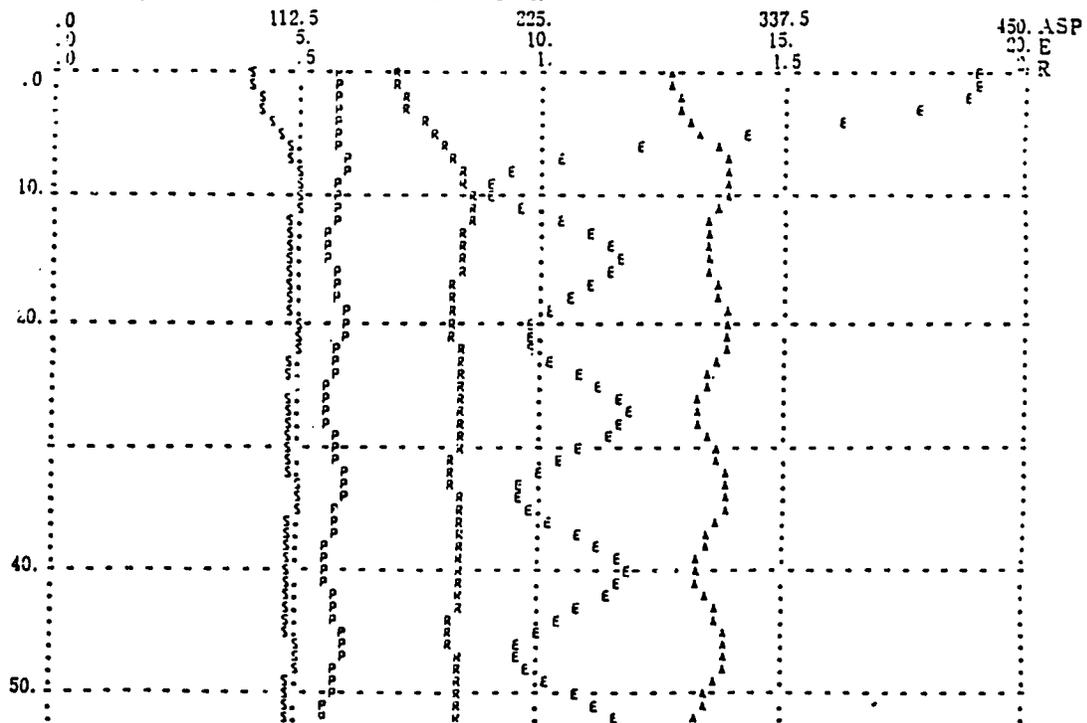


Fig. 10. PHC education effect - up grade one

It was concluded that it is more advantageous to utilize official formal community organizations than informal ones.

The analysis of the data was based on the following assumptions:

- ① Educational effects could be measured and are similar to advertising effects of marketing.
- ② Though educational effects are intangible, the weaknesses related to intangible factors could be supplemented through sensitivity analysis.
- ③ The number of current PHC service users in township areas is assumed to be at a maximum level.
- ④ Only one CHP could be assigned per cost.

Though these assumptions and the inevitable model simplification restricts actual application of this analysis, information gained concerning PHC service systems through various simulation runs can assist decision makers in problem solving.

Cost-Effectiveness Analysis

The three alternative solutions such as informal organization, formal organization and control group were compared in terms of a cost-effectiveness analysis with selected health and service indices and the total cost incurred.

Cost Analysis

The annual costs for the three alternatives are illustrated in Table 26. Alternative A was the least costly at ₩2,774,251 and Alternative C the most costly at ₩3,600,531. When line items are compared, the single most costly item of each alternative was the cost of material and supplies. Capital costs were not counted since buildings, basic equipment and motor cycle, etc. were provided by the government for each alternative at the beginning of the CHP project. The travel costs varied among the alternatives.

Table 26. Annual Costs for Three Alternatives Programs

COSTS	ALTERNATIVES (Korean won)		
	A (Yang Pyong)	B (Icheon)	C (An Sung)
RECURRENT COSTS			
Personnel	₩77,643	₩90,687	-
Travel	263,455	449,380	₩41,862
Per Diem	105,000	172,000	60,000
Transportation	4,700	15,328	62,320
Materials/Supplies	1,869,001	1,642,104	2,875,070
Other Direct Costs	454,452	734,887	561,279
Total Cost	₩2,774,251	₩3,107,386	₩3,600,531

Table 27 shows the relative distribution of each alternative's total cost. Materials and supplies accounted for 79% of alternative C's costs as compared to only 53% of alternative B's costs. Travel costs also varied and accounted for only 1% of alternative C's costs as opposed to 14% of alternative B's costs.

Table 27. Relative Annual Costs of Three CHP Program Alternatives

COSTS	ALTERNATIVES (Percentages)		
	A (Yang Pyong)	B (Icheon)	C (An Sung)
RECURRENT COSTS			
Personnel	3.0	3.0	-
Travel	9.0	14.0	1.0
Per Diem	4.0	6.0	2.0
Transportation	1.0	0.0	2.0
Materials/Supplies	67.0	53.0	79.0
Other Direct Cost	16.0	24.0	16.0
Total Cost	100.0	100.0	100.0

To answer the question of how much more one program costed than another, absolute differences are displayed as shown in table 28. The figures show that the total cost of Alternative C is ₩826,280 greater than that of the lowest cost Alternative A. There are significant differences, particularly materials and supplies, travel, and per diem between alternatives.

Table 28. Absolute Differences in Annual Costs Three CHP Program Alternatives

COSTS	ALTERNATIVES (Korean won)		
	A (Yang Ryong)	B (Icheon)	C (An Sung)
RECURRENT COSTS			
Personnel	0	13,044	-
Travel	221,593	407,518	0
Per diem	45,000	112,000	0
Transportation	0	10,628	57,620
Materials/Supplies	226,897	0	1,232,966
Other Direct Costs	0	280,435	106,827
Total Cost	0	330,135	826,280

Table 29 shows that travel costs of Alternative B are 9.7 percent greater than those of Alternative C. Alternative C's transportation Costs are 1,225.9 percent greater than Alternative A's. The overall cost of Alternative B is 11.9 percent greater than alternative A.

Table 29. Relative Differences in Annual Costs of Three CHP Program Alternatives

COSTS	ALTERNATIVES (Percentages)		
	A (Yang Pyong)	B (Icheon)	C (An Sung)
RECURRENT COSTS			
Personnel	0.0	16.8	-
Travel	5.3	9.7	0.0
Per Diem	0.8	1.9	0.0
Transportation	0.0	226.1	1,225.9
Materials/Supplies	13.8	0.0	75.1
Other Direct Costs	0.0	61.7	23.5
Total Cost	0.0	11.9	29.8

Table 31 shows that Alternative A yielded 9.75 more of CHL training sessions than C, and Alternative B resulted in 9.25 more than C. The table also shows that Alternative A yielded the largest health care services among them.

Table.31. Absolute Differences in Outcomes of Three CHP Program Alternatives

OUTCOME MEASURES	ALTERNATIVES		
	A	B	C
1) No. of services provided by CHPs:			
No. of CHL training session ocured/CHP	5.0	0.0	-
No. of basic medical services/CHP	326.6	0	232.2
No. of maternal health care services/CHP	17.1	2.4	0
No. of child health care services/CHP	698.2	208.2	0
No. of family planning services/CHP	17.8	0	9.2
No. of tuberculosis control services/CHP	93.8	0	9.8
No. of field-based activities/CHP	48.4	0	32.6

Relative differences among the outcomes that are expressed as Percentages are shown in table 32.

Twenty four percent more maternal health care services are made through Alternative A than C. Sixty percent more basic medical services are made through Alternative C than B.

Tuberculosis control services and field-based activities are made evidently enough through Alternative A.

Table 32. Relative Differences in Outcomes of Three CHP Program Alternatives

OUTCOME MEASURES	ALTERNATIVES (Percentages)		
	A	B	C
1) No. Of Services Provided by CHPS:			
CHL training session, occurred/CHP	54.1	0	-
Basic medical services/CHP	60.2	0.0	42.8
Maternal health care services/CHP	24.3	3.4	0.0
Child health care services/CHP	305.1	90.9	0.0
Family planning services/CHP	19.6	0.0	10.1
Tuberculosis control services/CHP	183.2	0	19.1
Field-based activities/CHP	448.1	0	301.9

Table 34 shows costs, effectiveness, and cost-effectiveness ratios for the three CHP program alternatives.

Alternative A looks most attractive in several aspects. It is the least costly and has the least cost-effectiveness ratio for the two measures shown above.

Table 34. Summary Data for Three CHP Program Alternatives

MEASURES	ALTERNATIVES		
	A	B	C
COST MEASURES			
Recurrent Costs	W2,774,251	W3,104,386	W3,600,531
Capital Costs	0	0	0
Total Costs	2,774,251	3,104,386	3,600,531
OUTCOME MEASURES			
No. of Services Provided by CHPS	2,206.05	1,141.45	1,281.20
No. of Activities done by CHLS	52	47.1	0
COST-EFFECTIVENESS			
Costs/Services Provided by CHPS	1,257.6	2,719.7	2,810.3
Costs/Activities done by CHLS	1,493.1	1,925.4	0

Conclusion and Recommendation

Through the brief analysis of cost-effectiveness, it is found that Alternative A is the most effective and thus recommendable. This finding is matched with the conclusion obtained by another approach presented in this paper.

Even though this analysis has its own limitations, an extension of cost-effectiveness analysis would be useful for further investigating alternative for a public health purpose.

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A N N E X

Annex A. TIME TABLE

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Activities	1983												1984												1985												1986											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Stage I. Field Preparation, Problem Analysis, and Solution Development																																																
Selection of Field Sites	1 2																																															
Field Preparation and Formulation of Questionnaire	2 4																																															
Sampling	3 5																																															
Collection of Baseline Data through Household Survey	3 5																																															
Collection of Baseline Data concerning CHP and Community Leaders	7 8																																															
Problem Identification and Solution Development through Analysis of Data Collected	5 8																																															
Stage II. Implementation and Process Evaluation																																																
Preparation of Teaching Materials for CHP and Leader Training	3 12																																															
CHP Training	8 9																																															
CHL Training	9																																															
Process Evaluation																									2																							
Collection of Monthly Data from CHPs & CHLs	12												8												2																							
Stage III. Final Evaluation and Solution Validation																																																
Final Household Survey																									1 4																							
Final Analysis of Data																									5 9																							
Dissemination Seminar																																					11 12											
Preparation of Report																									8												5											
Printing																																					6											

